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 paper tray unit 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. If the hot roller temperature is low when the main switch is turned on, the copier starts process control self check automatically. Keep hands away from the mechanical and the electrical components to avoid any injury.
6. 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.

HEALTH SAFETY CONDITIONS

1. Never operate the copier without the ozone filters installed.
2. Always replace the ozone filters and the ozone neutralizers with the ones specified 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. The RAM board on the main control board has a lithium battery which can explode if replaced incorrectly. Replace the battery only with an identical one. The manufacturer recommends replacing the entire RAM board. Do not recharge or burn this battery. Used batteries must be handled in accordance with local regulations.

SAFETY AND ECOLOGICAL NOTES FOR DISPOSAL

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

LASER SAFETY

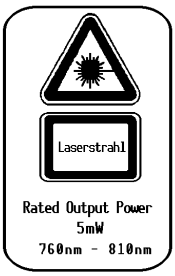
The Center for Devices and Radiological Health (CDRH) prohibits the repair of laser-based optical units in the field. The optical housing unit can only be repaired in a factory or at a location with the requisite equipment. The laser subsystem is replaceable in the field by a qualified Customer Engineer. The laser chassis is not repairable in the field. Customer engineers are therefore directed to return all chassis and laser subsystems to the factory or service depot when replacement of the optical subsystem is required.

WARNING:
Use of controls, or adjustment, or performance of procedures other than those specified in this manual may result in hazardous radiation exposure.

WARNING FOR LASER UNIT

WARNING: Turn off the main switch before attempting any of the procedures in the Laser Unit section. Laser beams can seriously damage your eyes.

CAUTION MARKING:

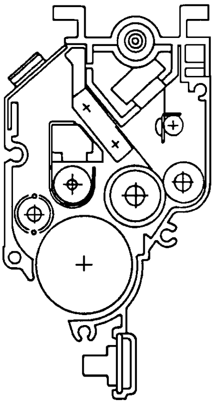
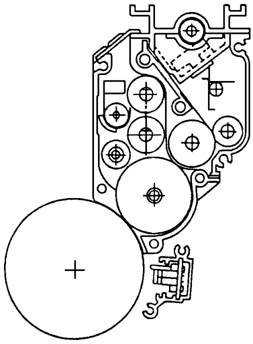
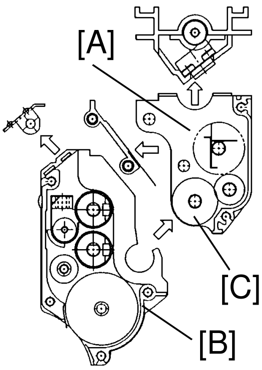
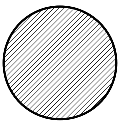
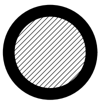
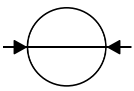
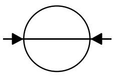


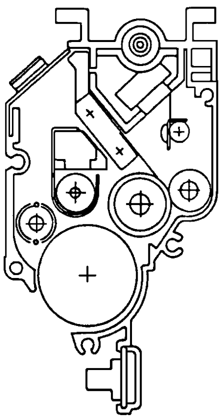
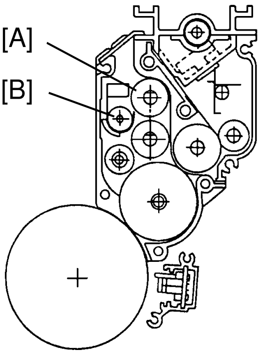
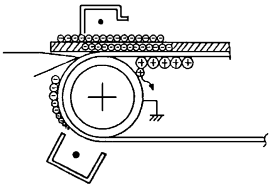
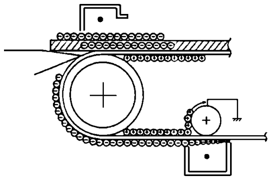
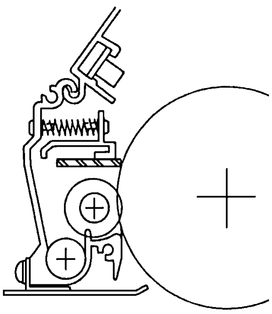
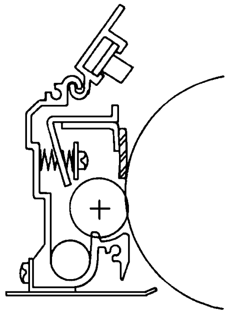
SECTION 1

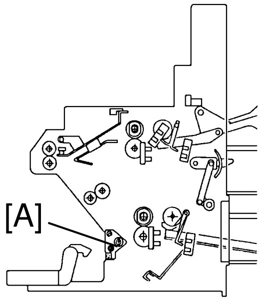
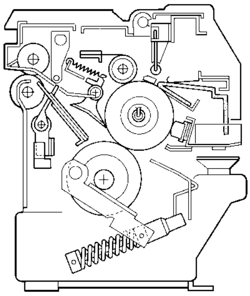
OVERALL MACHINE INFORMATION

1. DIFFERENCES

<table>
<tr><th>DESCRIPTION</th><th>MODEL A092</th><th>MODEL A105</th><th>Reason for modification</th></tr>
<tr><td colspan="4">SCANNER</td></tr>
<tr><td>Resolution</td><td>16 lines/mm (406.4 dpi)</td><td>400 dpi</td><td>To meet printer standard.</td></tr>
<tr><td>CCD Drive Board Set</td><td>CCD Drive Board CCD Pre-amp Board and Video Processing Board
These boards have to be replaced as a set.</td><td>CCD Pre-amp Board has been eliminated.
CCD Drive Board and Video Processing Board these two boards can be replaced separately.</td><td>To ease servicing.</td></tr>
<tr><td colspan="4">IMAGE PROCESSING</td></tr>
<tr><td>Gradation</td><td>64 gradation 6 bit</td><td>256 gradation 8 bit</td><td rowspan="4">To improve copy quality.</td></tr>
<tr><td rowspan="3">Dithering Pattern Matrix</td><td>Letter: 2 x 2</td><td>Letter: 1 x 1</td></tr>
<tr><td>Photo/Letter: 3 x 3</td><td>Photo/Letter: 2 x 1</td></tr>
<tr><td>Photo: 4 x 4</td><td>Photo: 2 x 2</td></tr>
<tr><td>RGBγ Parameter</td><td><table><tr><th></th><th>L</th><th>H</th></tr><tr><td>R</td><td>6</td><td>5</td></tr><tr><td>G</td><td>5</td><td>5</td></tr><tr><td>B</td><td>7</td><td>5</td></tr></table></td><td><table><tr><th></th><th>L</th><th>H</th></tr><tr><td>R</td><td>8</td><td>7</td></tr><tr><td>G</td><td>8</td><td>6</td></tr><tr><td>B</td><td>9</td><td>6</td></tr></table></td><td>To meet the new type toner.</td></tr>
<tr><td>Memory</td><td>18 MBytes (1M x 144)</td><td>64 MBytes (4M x 128)</td><td>An image defined at 8 bits per pixel requires much more memory than one defined at 3 bits per pixel.</td></tr>
<tr><td>4 Color Developing (Y, M, C, Bk)</td><td>Image repeat
Edit image
These cannot use black developing.</td><td>The functions at left can now use black developing.</td><td>To improve the copy quality.</td></tr>
<tr><td colspan="4">LASER</td></tr>
<tr><td>Gradation</td><td>64 steps by using dither matrix
(8 steps/pixel)</td><td>256 gradation
(256 steps/pixel)</td><td>To improve the copy quality.</td></tr>
<tr><td>Polygon Motor Rotation Speed</td><td>9000 rpm</td><td>8858.3 rpm</td><td>As the resolution has been changed from 406.4 dpi to 400 dpi.</td></tr>
<tr><td>Horizontal Magnification
&
Printing Start Adjustment Method</td><td>Adjusted by DGSs on the drum exposure control board.</td><td>Adjusted keys on the operation panel. (SP mode)</td><td>To ease servicing.</td></tr>
</table>

DESCRIPTION	MODEL A092	MODEL A105	Reason for modification
ID SENSOR			
ID Sensor	ID sensor is set on the casing of the development unit. 	ID sensor is set on the casing of the copier. 	When replacing the development unit, it is not necessary for model A105 to perform Vmin check. Because, the ID sensor is set separately from the casing of the development unit.
DEVELOPMENT UNIT			
Unit Separation	Cannot be separated sub-tank from main-tank.	Can be separated the sub-tank [A] from the main-tank [B] 	To replace the toner supply roller [C].
Developer for all colors	Uncoated ferrite carrier.  250 g/bag	Silicon coated ferrite carrier.  200 g/bag	To prolong the life of the developer. 15K → 20K To increase the charge ability of the developer.
Toner Diameter for all colors	12 µm 	6.4 µm 	To improve the resolution of copy image.
Toner Supply Roller	Rubber roller	Silicon rubber roller	To improve toner supply capacity.

DESCRIPTION	MODEL A092	MODEL A105	Reason for modification
Cross-mixing Mechanism		Add upper auger [A] and upper transfer roller [B]. [A] [B] 	To stabilize the image density. To eliminate the un-even density band (12 mm/0.47 inch pitch). To power up the mixing function.
Bias	–DC (–278V ~ –678V)	–DC+AC DC (–278V ~ –678V) AC (1 kV peak to peak)	To get uniform density on copies.
Development Sleeve Speed	Drum speed : Sleeve speed = 1 : 2.3	Drum speed : Sleeve speed = 1 : 1.6	
TRANSFER UNIT			
Transfer Drive Roller	Low impedance	High impedance	To insure cyan toner is transferred to the copy paper.
Transfer Belt Discharge			
CLEANING UNIT			
Cleaning Method	Trailing blade 	Counter blade 	The new toner consists of smaller particles. To remove the smaller particles of the new toner and to improve the durability of the cleaning blade.

DESCRIPTION	MODEL A092	MODEL A105	Reason for modification
PAPER FEED UNIT			
Paper Feed Unit Parallel Adjustment Mechanism [A]	This mechanism has been applied by the engineering change.	This mechanism has been applied from the 1st production run. 	To adjust the skew and the color layer alignment at the trailing edge.
FUSING			
Hot Roller Cleaning Mechanism	Not Used	A cleaning roller and cleaning scraper have been added. 	To increase durability of fusing unit.

NOTE: This is not a complete list of the differences between the model A092 and A105, but does illustrate the major differences.

2. SPECIFICATIONS

Configuration:	Console type
Copy Process:	Laser electrostatic transfer/tetradrive system
Originals:	Book/sheet, fixed platen
Original Alignment:	Front-right corner
Maximum Original Size:	A3, 11" x 17"
Copy Paper Size:	Maximum: A3, 11" x 17 Minimum: A6 (lengthwise only), $5\frac{1}{2}$" x $8\frac{1}{2}$"
Copy Paper Weight:	64 to 157 g, 17 to 42 lb (Paper with more than 128 g/34 lb and OHP film should be used with Thick Paper/OHP mode.)
Copy Speed:	<Model A092> 14.5 cpm/$8\frac{1}{2}$" x 11" sideways, or smaller 15 cpm/A4, sideways, or smaller 7.5 cpm/A3, 11" x 17" **<Model A105>** **15 cpm/$8\frac{1}{2}$" x 11" sideways, or smaller** **15 cpm/A4, sideways, or smaller** **7.5 cpm/A3, 11" x 17"** (In thick paper/OHP mode, copy speed is reduced to one half.)
First Copy:	18 seconds/A4, $8\frac{1}{2}$" x 11" sideways (In thick paper/OHP mode, it is 35 seconds.)
Warm-up Time:	Within 8 minutes (at room temperature 20°C/68°F)
Copy Counter:	1 to 99 (Maximum set number is adjustable with SP38.)
Automatic Reset:	After 60 seconds (Adjustable from 1 to 180 minutes, or no reset with SP37.)
Photo Conductor:	Organic photoconductor (OPC) drum, 60 mm in diameter, 4 drum system driven by a dc servo motor through a single drive shaft (tetradrive).
Drum Charge:	Single wire with grid plate (negative charge), variable grid voltage type.

Fixed Reproduction Ratios: 5 enlargement ratios and 7 reduction ratios

Letter Version		A4 version		
1 : 4.00	400% copy	1 : 4.00	400% copy	
1 : 2.00	5 1/2" x 8 1/2" ⇒ 11" x 17"	1 : 2.00	A5 ⇒ A3	A6 ⇒ A4
1 : 1.55	5 1/2" x 8 1/2" ⇒ 8 1/2" x 17"	1 : 1.41	A4 ⇒ A3	A5 ⇒ A4
1 : 1.29	8 1/2" x 11" ⇒ 11" x 17"	1 : 1.22	F ⇒ A3	A4 ⇒ B4
1 : 1.21	8 1/2" x 14" ⇒ 11" x 17"	1 : 1.15	B4 ⇒ A3	
1 : 1	100% copy	1 : 1	100% copy	
1 : 0.93	To create margin	1 : 0.93	To create margin	
1 : 0.85	8 1/2" x 13" ⇒ 8 1/2" x 11"	1 : 0.82	F ⇒ A4	B4 ⇒ A4
1 : 0.77	8 1/2" x 14" ⇒ 8 1/2" x 11"	1 : 0.75	B4 ⇒ F4	B4 ⇒ F
1 : 0.74	11" x 15" ⇒ 8 1/2" x 11"	1 : 0.71	A3 ⇒ A4	A4 ⇒ A5
1 : 0.65	11" x 17" ⇒ 8 1/2" x 11"	1 : 0.65	A3 ⇒ F	
1 : 0.50	11" x 17" ⇒ 5 1/2" x 8 1/2"	1 : 0.50	A3 ⇒ A5	A4 ⇒ A6
1 : 0.25	25% copy	1 : 0.25	25% copy	

Reproduction error:
±0.5% for full size mode, ±1.0% for other ratios.

Zoom: From 25% to 400%, 1% steps
(In thick paper/OHP mode, from 25% to 200%)

Scanning System: One way scanning with optical fiber array and full size color CCD's, single scan with simultaneous B, G, R, color separation.
<Model A092> 16 dots/mm, 256 gradation
<Model A105> 400 dpi, 256 gradation

Scanner Light Source: Two fluorescent lamps

Drum Exposure System: 4 semiconductor laser beams (1 laser beam per OPC drum), one dimensional simultaneous scanning onto 4 drums with one polygon motor/two polygon mirrors.
<Model A092> 16 dots/mm, 64 gradations
<Model A105> 400 dots/inch, 256 gradations

Development: Dual component dry toner/single development roller system. (Negative toner charge/Negative drum charge process.)

Developer: <Model A092>
- Bk, Y, C: 250 g/bag
- M: 200 g/bag (same as that of model A105)

<Model A105>
- Bk, M, Y, C: 200 g/bag

Toner:	<Model A092> - Bottle Type: 400 g/bottle - Consumption: 9000 copies/A4, $8\frac{1}{2}$" x 11" (5% image area for each color) **<Model A105>** **- Bottle Type: 340 g/bottle** **- Consumption: 7000 copies/A4, $8\frac{1}{2}$" x 11"** **(5% image area for each color)**
Development Bias:	<Model A092> Negative dc variable bias **<Model A105>Negative dc and ac variable bias**
Image Transfer:	Single wire dc positive charge from the reverse side of the transfer belt.
Paper Transport:	One flat transfer belt system
Paper Separation:	Primary: Paper curvature separation Secondary: Pick-off pawls, and single wire separation ac corona for paper discharge.
Transfer Belt Discharge:	<Model A092> Single wire ac corona **<Model A105> Single wire ac corona and discharge roller**
Transfer Belt Cleaning:	Blade and brush cleaning
OPC Drum Cleaning:	<Model A092> Trailing blade and brush cleaning **<Model A105> Counter blade and brush cleaning**
Quenching:	Photo quenching by LEDs
Paper Feeding:	Dual cassettes (500 sheet capacity each), and a bypass feed table (20 sheets)
Paper Feed System:	Feed and reverse roller (FRR) system
Image Fusing:	Heat and pressure type with silicone oil. Silicone hot-roller, and silicone pressure roller.
Fusing Lamp:	Halogen lamp (220 – 240 V/550 W, 115 V/550 W)
Silicone Oil Consumption:	350 cc per 35,000 copies (A4/$8\frac{1}{2}$" x 11")
Copy Tray Capacity:	100 sheets

Self-diagnostic Codes:	72 codes
Process Control:	Drum potential control Development bias control Toner supply roller bias control
Copy Counters:	Two counters (Double count mode for A3/DLT can be set with SP45.) • Single color copy counter (including black) • Full color copy counter
User Code Mode:	20 4 digits numbers from 0001 to 9999
Power Source:	220 – 240 V/50 Hz: 8 A 115 V/60 Hz: 12 A
Power Consumption:	Maximum: 1.4 kW Warm-up: 0.9 kW (average) Ready: 0.5 kW (average) Copy cycle: 1.0 kW (average)
Dimensions (W x D x H):	Main frame only: 930 mm x 725 mm x 930 mm (36.6" x 28.5" x 36.6") With platen cover, copy tray, and A3/DLT cassette in the lower feed section: 1695 mm x 725 mm x 954 mm (66.7" x 28.5" x 37.6")
Weight:	Main frame only without consumables: <Model A092> 285 kg (628.3 lbs) or less **<Model A105> 285 kg (628.3 lbs) or less** Main frame with consumables: <Model A092> 296 kg (652.6 lbs) or less **<Model A105> 300 kg (661.4 lbs) or less**
Optional Equipment:	- Editor **(This is standard for Model A105.)** - SPU SPU(Model A984-27) can only be connected to Model A092-25 and A092-27. **SPU (Model A711-27) can be connected to Model A105-25 and A105-27.** **SPU(Model A984-17) can be connected to Model A092-17 and A105-17.** - Key counter (locally procured)

<Additional Features>

User Program Mode: 5 modes (The image repeat mode and the poster mode can not be stored as a program mode.)

Original Recognition Mode: The default is the Off mode. Using SP-31, the On mode can be selected. In APS/ARE, Centering, Mirroring, Slanted Image modes, the On mode is automatically selected.

Color Selection: The default is Full Color. Using SP-44, the Black mode can be selected as the default mode.

Single color: 9 kinds
black, yellow, orange, red, magenta, blue, cyan, green, light green.

Optional single color:
3 user programmable colors can be registered.

Original Modes: 4 modes
- Automatic Letter/Photo separation (Auto) mode: Default
- Letter mode
- Letter/Photo mode
- Photo mode

The default mode can be changed by SP40, and 41.
In the Auto mode, photo areas are processed using the Photo mode as a default.
(It can be changed from Photo mode to Letter/Photo mode with SP43.)

APS: Pre-scanning type

Paper Weight: Thick Paper/OHP mode:
Process speed is changed from 75 mm/sec. to 37.5 mm/sec. This mode is for paper that is 128 g/34 lb or heavier and for OHP film.

Thin Paper:
The fusing temperature during the copy run is controlled at 143°C (131°C for model A105) rather than 148°C (135°C for model A105). (By SP42, the default mode can be set at the Thin Paper mode.)

Special Reduce/Enlarge:	- ARE (Auto Reduce/Enlarge) - Directional size magnification - Directional magnification - Size magnification - Zoom
Edit Image:	- Centering - Save area - Delete area
Image Creation:	- Outline mode - Positive/Negative mode - Shadow mode - Image Repeat mode - Mirror Image mode - Slanted Image mode **- Poster mode (Model A105 only)**
Color Creation:	- Color Background mode - Color Conversion mode - Pastel Image mode - Posterization mode - Solarization mode - Mosaic mode

<Image Adjustments>

Image Density Selection:	9 steps
Color Balance:	For black, cyan, magenta, and yellow, adjustable in 9 steps. Adjusted balance can be stored as a default setting by pressing the Balance Memory key.
Color Adjustment:	Color tone of green, cyan, blue, magenta, red, or yellow can be independently adjusted to one of the neighboring colors. This can be done with up to three colors.
Sharp/Soft:	Adjusts the sharpness of the copy image.
Contrast:	Adjusts the contrast between light and dark parts of the copy image.
Background Density Control:	Adjusts background image density of the copy.

User Tool/Service Tool:

<Model A092>

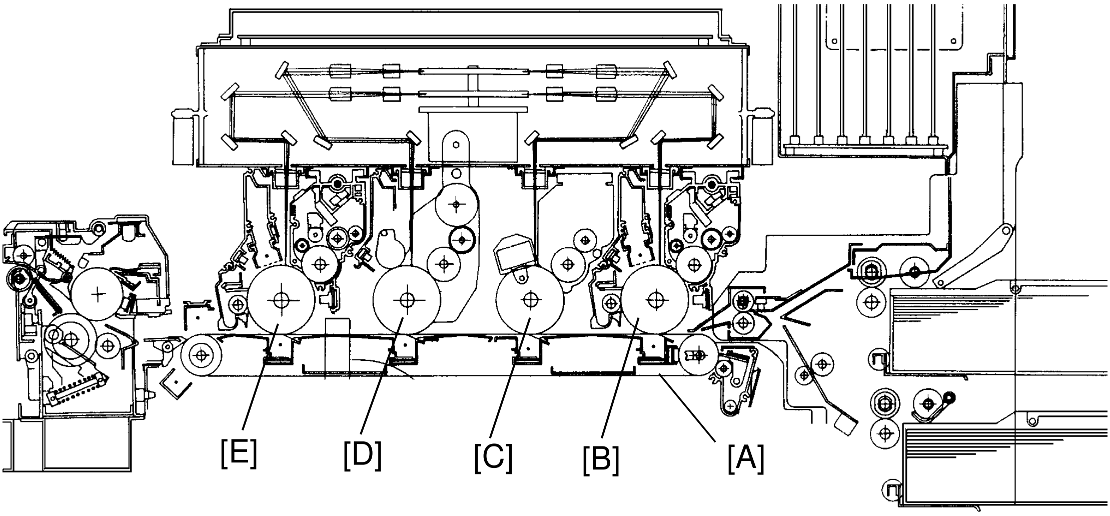
- For users
  - 10 user tools (UT-1 to UT-10) for 115 V version
  - 11 user tools (UT-1 to UT-11) for 230 V version
- For service
  - SP mode (SP-1 to SP-92)
  - SPT/SPD mode
    - SP Test mode (SPT-0 to SPT-119)
    - SP Data mode (SPD-1 to SPD-898)

<Model A105>

- For users
  - **11 user tools (UT-1 ~ 10 and 12) for 115 V version**
    12 user tools (UT-1 ~ 12) for 230 V version
- For service
  - SP mode (SP-1 to SP-95)
    5 SP modes have been added from model A092.
  - SPT/SPD mode
    - SP Test mode (SPT-0 to SPT-119)
    - SP Data mode (SPD-1 to SPD-898)

3. COPY PROCESS

3.1 OVERVIEW



The main marketing strengths of this copier are:

1) High productivity with the world's fastest digital full color copy speed (15 cpm/A4, 14.5 cpm/LT: Model A092, **15 cpm/A4, LT: Model A105**).

2) A wide variety of copy paper can be used, such as heavy paper (up to 157 g/42 lb), and small paper (up to A6 lengthwise or 5 1/2" x 8 1/2").

To achieve this productivity, this machine adapts four OPC drums, four laser beams, and one time scanning with a simultaneous B, G, R, (Blue Green Red) color separation system (tetradrive system). Paper is transported on a flat transfer belt [A] where the toner image on each drum is transferred to the paper in order. These four layers of color toner image are fused on the paper.

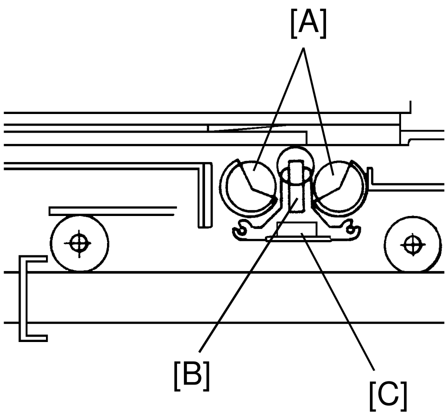
For compactness, each drum is 60 mm in diameter, and they are located at 110 mm intervals. From the right side, the drums are: black [B], magenta [C], yellow [D], and cyan [E]. Each drum has the following components around it:

- Charge corona unit
- Development unit
- ID sensor
- Transfer corona unit (below the transfer belt)
- Drum cleaning unit
- Quenching lamp (LEDs)

3.2 SCANNING

3.2.1 Original Scanning

The color original is illuminated by two exposure lamps [A]. Reflected light from the original passes through the optical fiber array [B] to the full size color CCD [C].
(CCD = Charge coupled device)

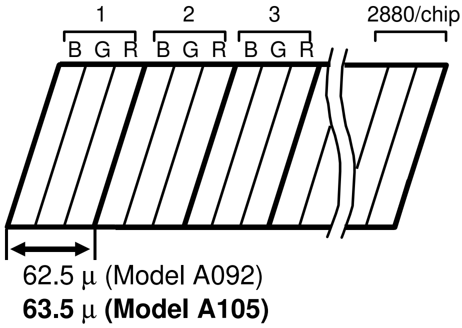


The CCD converts the light intensity to an electrical value.

The scanner which is composed of the exposure lamps, optical fiber array, and CCD, is always in contact with the exposure glass while scanning.

3.2.2 Photo-electric Conversion

The full size color CCD has blue, green, or red filters on each picture element (pixel) in a line. Three elements, with the filters for each color, are used as one unit for color separation of the original image.
<Model A092>
16 pixels per 1 mm = 406.4 pixels per inch (DPI)
<Model A105>
400 pixels per inch (DPI)



The CCD converts the light intensity into an electrical analog signal.

3.2.3 Analog-digital Conversion

The analog signal output from the CCD is digitized. Eight bits are used for each picture element (pixel), which gives 256 gradation steps.

3.2.4 RGB Separation

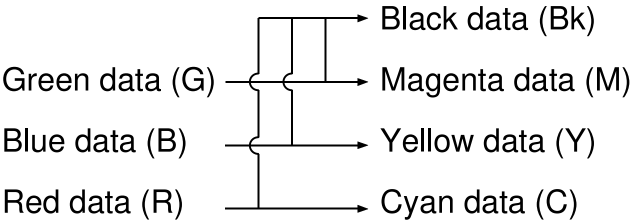
Signals from the 14,600 picture elements are separated into three groups of red, green, and blue picture elements.

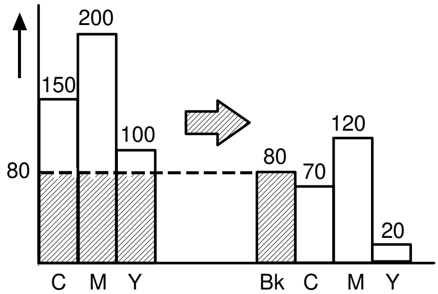
3.2.5 Image Processing

Image processing for various copy modes is done in the image processing PCB's.

Filter	B	G	R
Toner	Y	M	C

The 8-bit gradation digital data for one set of red, green and blue elements is changed to the data for four toner colors:





(UCR Ratio: 80%)

The black output is determined by the CMY data (which is a result of the RGB data). A common value is subtracted from the C, M, and Y values and this value becomes the black value. This is called UCR (Under Color Removal).

<Model A092>
There are 8 laser exposure gradation steps (7 levels + laser off), so only 3 data bits are needed. The four color data are converted from 8-bits to 3-bits. 64 kinds of 4 x 4 bit dither matrices (Photo mode) are used to make 64 gradations of the copy image.

<Model A105>
There are 256 laser exposure gradation steps (255 levels + laser off), so 8 data bits are needed. One pixel can make 256 gradations of the copy image.

3.3 LASER EXPOSURE

1. There are four laser beams (one beam per drum) and two polygon mirrors in the laser unit. The two polygon mirrors are turned using one motor.

   The laser beam is reflected by the turning polygon mirror, and passes through a complex lens (called the fθ lens) to the drum.
   Using one surface of the polygon mirror, one main scan line is made. The main scan direction is:

   1st (black) and 2nd (magenta) drums: front to rear.
   3rd (yellow) and 4th (cyan) drums: rear to front.

2. The laser beam switches on and off at very high frequency to make an image with 16 dots/lines per 1 mm (400 dpi for Model A105).

   <Model A092>
   Furthermore, the on-time (PWM) per dot for the laser beam is controlled in 8 steps based upon the 3-bit data sent from the image processing unit.

   <Model A105>
   Furthermore, the on-time per dot for the laser beam is controlled 256 steps based upon the 8-bit data sent from the image processing unit.

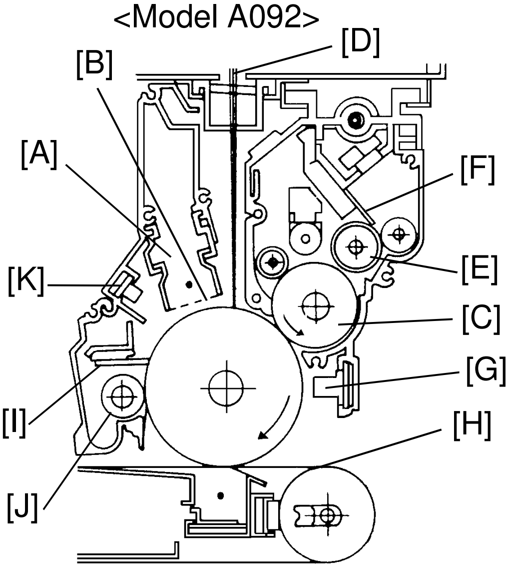
   As a result, the negatively charged drum potential drops to the appropriate level, forming an electrical latent image on the drum.

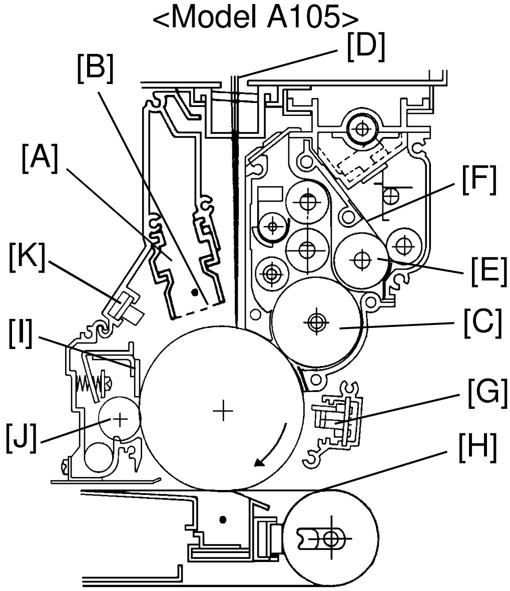
   Unlike other PPCs, the exposed areas correspond to the dark image areas on the original (image area exposure).

3. The data for black is sent just after image processing to the laser unit for laser exposure on the black drum.

   However the data for the other three colors is stored in the memory board, and is sent to the laser unit at the appropriate time. This is to align the horizontal direction of the image developed on each of the four drums.

3.4 DRUM PROCESSES





3.4.1 Charge

<Model A092 & A105>

In the dark the charge corona unit [A] applies a negative charge to the drum. The grid plate [B] ensures that the charge is applied uniformly and that the amount of the charge applied is correct. The charge remains on the surface of the drum because the photoconductive drum has a high electrical resistance in the dark.

3.4.2 Development

<Model A092 & A105>

The magnetic developer brush on the development roller [C] comes in contact with the latent image on the drum surface. Negatively charged toner particles are electrostatically attracted to the areas of the drum surface where the laser [D] has reduced the negative charge on the drum.

Unlike most PPCs, this machine uses a Negative/Negative development system. (Negative/Negative: Negative toner developed on a negatively charged drum.)

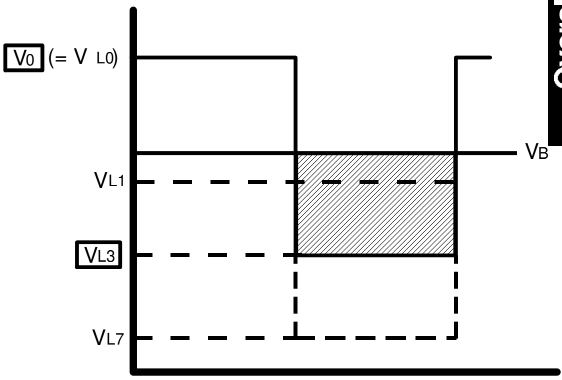
Another unique point is how the toner is supplied to the developer. Toner is supplied in an even and thin layer on the supply roller [E] using a metering blade [F].
While toner is passing the metering blade, the toner becomes negatively charged, and is caught by the positively charged carrier in the development unit.

3.4.3 ID Sensor

The ID sensor [G] is used to detect the different kinds of patterns developed on the drum. It has two basic functions.

It's used to control the density of toner in the developer.

It's used to select the best process conditions such as, charge grid voltage [V_0], development bias [V_B] and laser power (remaining or residual drum voltage after level 3 exposure [V_{L3}]: A092/ level 4 exposure [V_{L4}]: A105).



Development Potential : $V_B – V_{L3}$

3.4.4 Image Transfer

Copy paper is fed to the transfer belt [H] by the registration rollers. A positive charge is applied to the backside of the paper through the transfer belt. This charge pulls the toner particles on the OPC drum surface onto the copy paper.

After the first toner transfer (black), the entire copy paper is electrically held on the belt's surface.

Transfer charge for magenta, yellow, and cyan is stepped up to pull a new color toner layer onto the paper.

3.4.5 Paper Separation

The paper's stiffness causes it to separate from the transfer belt when the belt turns sharply at the separation point. This is called "curvature separation". To ensure separation of paper that has low stiffness, this machine also uses a separation corona, for paper potential discharge, and pick-off pawls. Three pick-off pawls touch the belt just before the leading edge of the paper reaches the pick-off position.

3.4.6 Drum Cleaning and Quenching

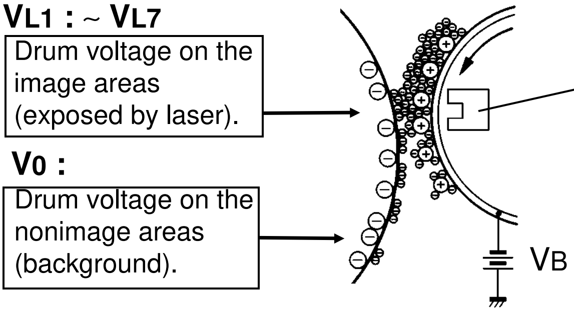
The cleaning blade [I] and cleaning brush [J] remove any toner remaining on the drum surface and the toner is carried to the toner collection bottle.

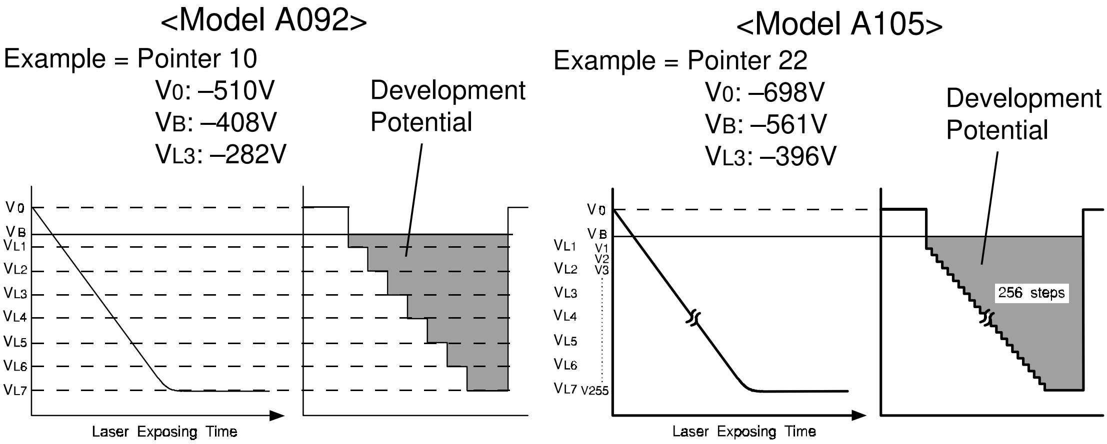
The quenching lamp (LEDs) [K] electrically neutralize the surface of the drum.

3.4.7 Transfer Belt Discharge and Cleaning

After paper separation, the residual electrical potential is discharged by the belt discharge corona. Then, any toner remaining on the belt surface is removed by the belt cleaning brush and blade.

3.5 NEGATIVE/NEGATIVE DEVELOPMENT PROCESS





Most copiers use either a positively charged photoconductor and negatively charged toner or a negatively charged photoconductor and positively charged toner. This is known as positive/negative development. However, this machine uses a negative/negative process where both the drum surface charge and the toner charge are negative.

Several forces interact in the development process to produce a visible image on the OPC drum. These forces are the charge pattern of the latent image, the development bias, the magnetic field of the development roller, the positive triboelectric charge of the carrier, and the negative triboelectric charge of the toner.

One of the most important of these forces is the charge pattern of the latent image on the drum. To make the latent image, the laser exposes an area of the drum surface. The laser on-time for one pulse is controlled using a pulse width modulation circuit (PWM).

<Model A092>
The on-time is determined according the 3-bit data sent from the IPU (10 ~ 120 nsec).

<Model A105>
The on-time is determined according to the 8-bit data sent from the IPU (2 ~ 86 nsec).

V_D: Drum charge potential
V_0: Non exposed area (Non image area on original) = V_D

<Model A092>
V_0: Remaining drum voltage at laser data 0 (No laser exposure)
V_{L1}: Remaining drum voltage at laser data 1 (Shortest phase)
|
V_{L7}: Remaining drum voltage at laser data 7 (Full phase)

<Model A105>
V_0: Remaining drum voltage at laser data 0 (No laser exposure)
V_{L1}: Remaining drum voltage at laser data 34
V_{L2}: Remaining drum voltage at laser data 46
V_{L3}: Remaining drum voltage at laser data 63
V_{L4}: Remaining drum voltage at laser data 80
V_{L5}: Remaining drum voltage at laser data 127
V_{L6}: Remaining drum voltage at laser data 191
V_{L7}: Remaining drum voltage at laser data 255 (Longest phase)

256 step laser exposure is used for copying. 7 step (V_{L1} ~ V_{L7}) laser exposure is for process control.

<Model A092 & A105>
The power pack for each drum applies a dc negative bias [V_B] (75 ~ 160 V lower than V_0) to the development roller sleeve. The main magnet [A] is located inside the sleeve, facing the drum.

The toner is negatively charged and the carrier is positively charged due to the agitation of the toner and developer inside the development unit (tribo electric charge).

In a negative/negative process, toner particles are attracted to the drum areas exposed by the laser hence, to the lower drum potential areas. Development potential is the gap from V_B (bias) to V_{LX} (Laser exposed area, X=1 to 7).

In the development area, the following forces act on the toner particles:

F_C: The attractive force between toner (–) and carrier (+)

F_D: The repelling force between toner (–) and the drum charge (–)

F_B: The repelling force between the toner (–) and the development roller bias (–)

The forces on the exposed areas of the drum are such that:

$F_B > F_C + F_D$ (Fig. 1)

This means toner is repelled from the carrier to the drum. (F_D is very small in the image areas.)

The non-exposed areas of the drum are such that.

$F_B < F_C + F_D$ (Fig. 2)

Here F_D is very large and repels toner from the non image areas.

You might expect that the positively charged carrier would be attracted to the negatively charged nonimage areas of the drum. However, this does not happen. In the development area, the following forces act on the carrier particles:

F_{MC}: The attractive force of the magnet on the carrier

F_{BC}: The attractive force between the carrier and development bias

F_{DC}: The attractive force between the carrier (+) and the non-exposed areas of the drum (–)

Since $F_{DC} < F_{MC} + F_{BC}$ (Fig. 3), the carrier remains on the development roller's sleeve.

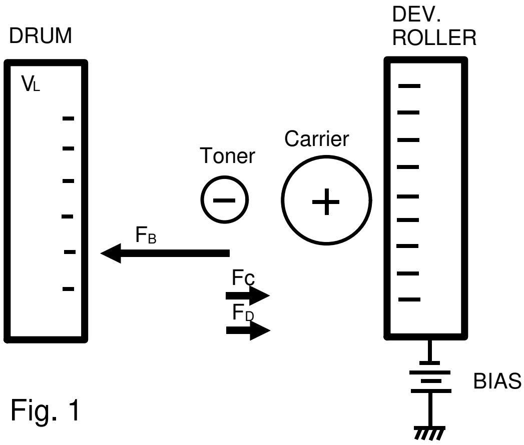


Fig. 1

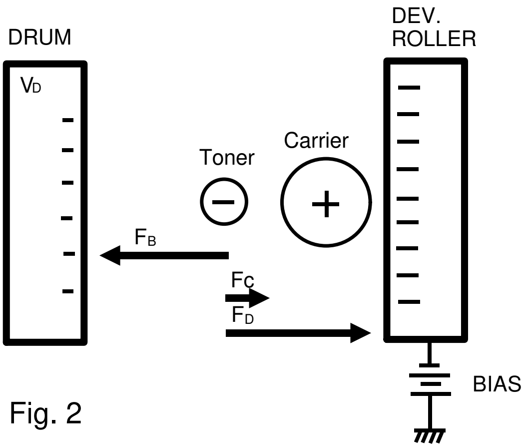


Fig. 2

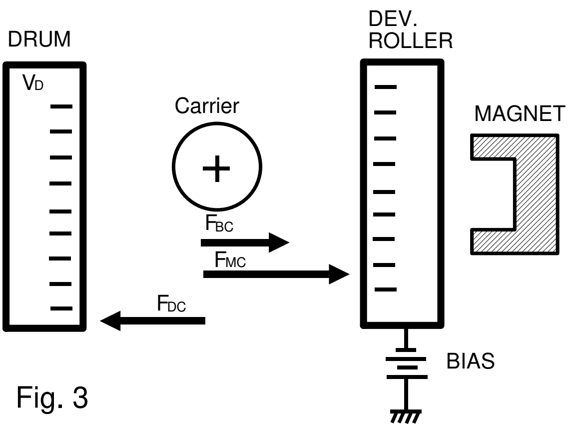
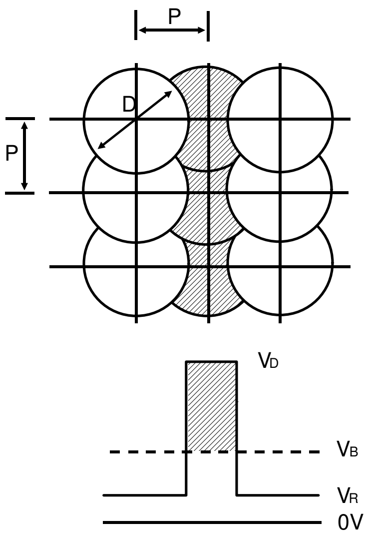
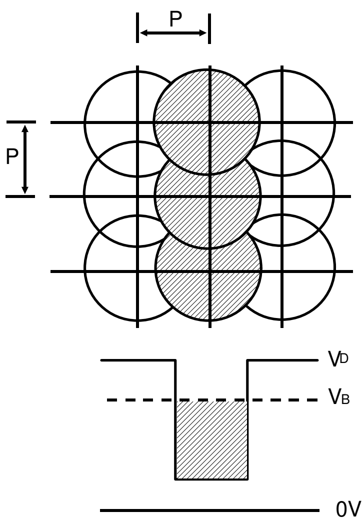


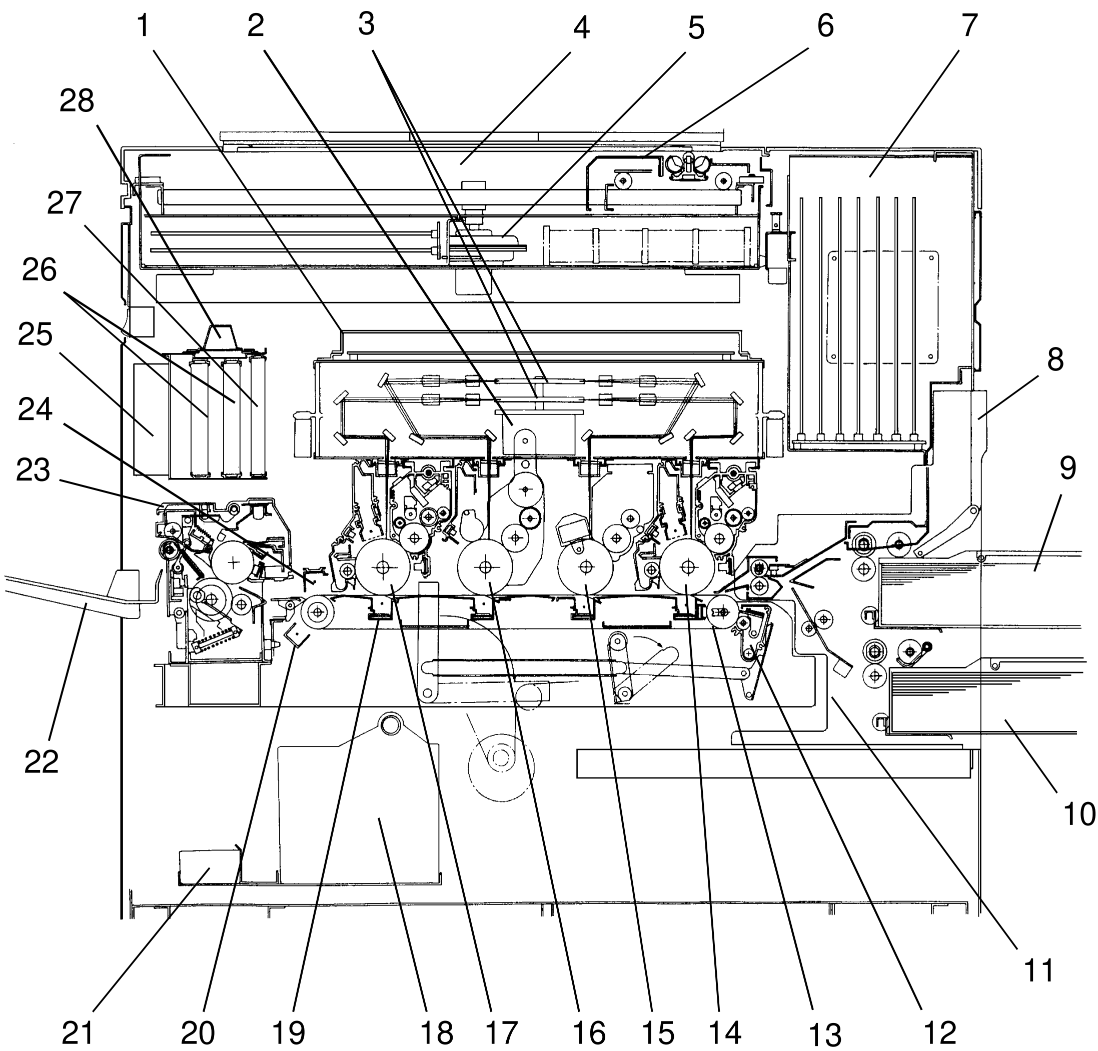
Fig. 3

Positive/Negative Development VS. Negative/Negative Development (2-component dry development process)

In a negative/negative process, some copy problems are exactly opposite to what many copier service people have intuitively come to expect. The table below gives some of the differences between the positive/negative process and the negative/negative process.

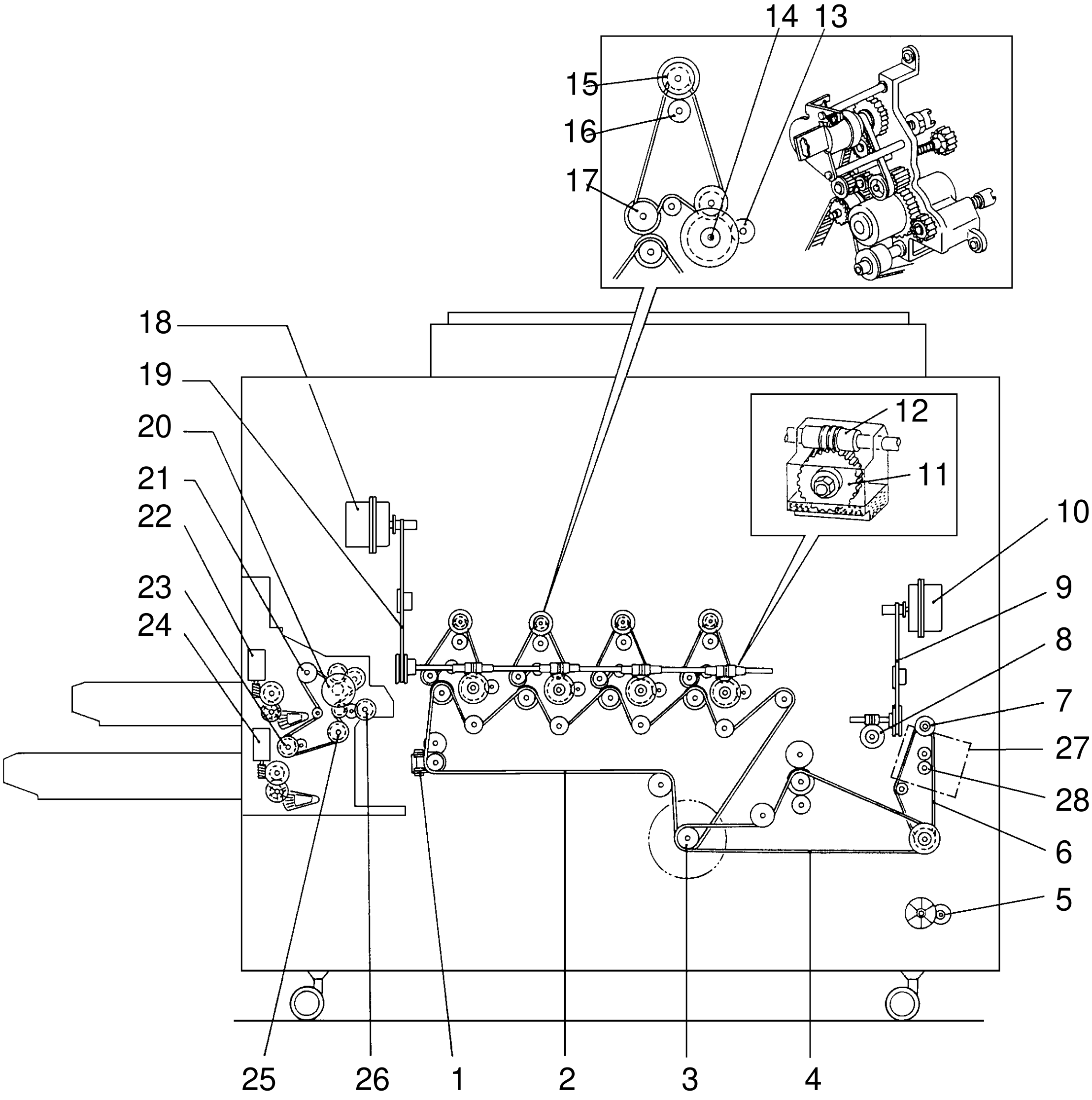
	Positive/Negative		Negative/Negative
Type of Laser	He-neon (gas, 630 nm)	He-neon or semiconductor	Semiconductor (765 ~ 795 nm)
Photoconductor	Se Drum	OPC	OPC
Charge Corona	Positive	Negative	Negative
Carrier Charge	Positive	Negative	Positive
Toner Charge	Negative	Positive	Negative
Photoconductor Exposure P: Pitch (1/16mm + 62.5μ for model A092, 63.5μ for model A105) D: Laser beam diameter V_D: Drum voltage V_B: Bias voltage V_R: Residual voltage	Background exposure 		Image exposure 
Copy Problems			
1. No photoconductor charge	White copy		Black solid copy
2. Low photoconductor charge	Low image density		Dirty background
3. High development bias	Low image density		Dirty background
4. Low development bias	Dirty background		Low image density
5. Stained toner shield glass	Black stripes		White stripes

4. MECHANICAL COMPONENT LAYOUT



1. Laser Unit
2. Polygon Motor
3. Polygon Mirrors (2 pcs)
4. Scanner Unit
5. Scanner Motor
6. Scanner
7. IPU Section (7 PCB's)
8. By-pass Table
9. Upper Cassette
10. Lower Cassette
11. Paper Feed Unit
12. Transfer Belt Cleaning Unit
13. Transfer Belt Unit
14. Black OPC Drum
15. Magenta OPC Drum
16. Yellow OPC Drum
17. Cyan OPC Drum
18. Toner Collection Bottle
19. Transfer Corona (4 pcs)
20. Belt Discharge Corona
21. Developer Catch Pan
22. Copy Tray
23. Fusing Unit
24. Separation Corona
25. Fusing Exhaust Fan (2 pcs)
26. Exit Ozone Filters (2 pcs)
27. Dust Filter
28. Ozone Neutralizer

5. DRIVE LAYOUT



1. Toner Collection Coil Drive Belt
2. 1st Timing Belt
3. Main Motor
4. 2nd Timing Belt
5. Developer Removal Motor
6. 3rd Timing Belt
7. Fusing Unit Drive Gear
8. Transfer Belt Drive Worm Wheel
9. Transfer Belt Drive Timing Belt
10. Transfer Belt Drive Motor
11. Drum Drive Worm Wheel (4 pcs)
12. Drum Drive Worm Gear (4 pcs)
13. Cleaning Unit Drive Gear (4 pcs)
14. OPC Drum Shaft (4 pcs)
15. Toner Supply Clutch (4 pcs)
16. Toner Supply Drive Gear (4 pcs)
17. Development Unit Drive Gear (4 pcs)
18. Drum Drive Motor
19. Drum Drive Timing Belt
20. Paper Feed Motor
21. Upper Paper Feed Clutch
22. Upper Lift Motor
23. Lower Paper Feed Clutch
24. Lower Lift Motor
25. Relay Clutch
26. Registration Clutch
27. **Fusing Unit Idling Motor (Model A105 only)**
28. **Fusing Idling Gear (Model A105 only)**

6. ELECTRICAL COMPONENT DESCRIPTIONS

Refer to the electrical component layout on the reverse side of the point to point (water proof sheet).

SYMBOL	NAME	FUNCTION	LOCATION
MOTORS			
M1	Scanner Motor	Drives the scanner (dc servomotor).	53
M2	Polygon Motor	Turns two polygon mirrors (dc servomotor).	71
M3	Main Motor	Drives the development units, cleaning units, toner collection coil, belt cleaning unit, and fusing unit.	12
M4	Drum Motor	Turns the four OPC drums (dc servo motor).	10
M5	Transfer Belt Motor	Turns the transfer belt (dc servomotor).	6
M6	Paper Feed Motor	Drives the paper feed rollers, relay rollers, registration rollers.	113
M7	Upper Lift Motor	Lifts the upper cassette’s bottom plate.	93
M8	Lower Lift Motor	Lifts the lower cassette’s bottom plate.	99
M9	Toner Supply Motor – Black	Supplies black toner from the toner supply unit to the toner container in the development unit.	123
M10	Toner Supply Motor – Magenta	Supplies magenta toner from the toner supply unit to the toner container in the development unit.	125
M11	Toner Supply Motor – Yellow	Supplies yellow toner from the toner supply unit to the toner container in the development unit.	127
M12	Toner Supply Motor – Cyan	Supplies cyan toner from the toner supply unit to the toner container in the development unit.	129
M13	Developer Removal Motor	Is used when developer is removed from the development units.	2
M14	Front Scanner Fan	Cools the scanner cavity.	65
M15	Rear Scanner Fan	Cools the scanner cavity.	58
M16	Front IPU Inlet Fan	Cools the IPU cavity by taking air from outside the copier.	23
M17	Rear IPU Exhaust Fan	Cools the IPU cavity by blowing hot air out of the copier through an ozone filter.	11
M18	Rear Exhaust Fan	Always turns during power on to cool the air around the fusing unit.	4
M19/20	Fusing Exhaust Fans (2 pcs)	Cool the air around the fusing unit and OPC drums through ozone filters during copy run.	44
M21	Charge Fan – Black	Provides a flow of air to the charge corona unit, ID sensor, and the toner shield glass.	8
M22	Charge Fan – Magenta	Same function as M21.	8

SYMBOL	NAME	FUNCTION	LOCATION
M23	Charge Fan – Yellow	Same function as M21.	8
M24	Charge Fan – Cyan	Same function as M21.	8
M25	Toner Collection Pipe Fan	Provides a flow of air to the toner collection pipe for cooling.	1
—	PSU Fans (2 pcs)	Located in the PSU to cool the PSU cavity.	–
M26	**Fusing Unit Idling Motor**	**Turn the fusing roller at low speed while in stand-by condition. (Model A105 only)**	**27**
SOLENOIDS			
SOL1	Upper Pick-up Solenoid	Controls the up-down movement of the upper pick-up roller.	95
SOL2	Lower Pick-up Solenoid	Controls the up-down movement of the lower pick-up roller.	100
SOL3	By-pass Feed Solenoid	Controls the up-down movement of the upper pick-up roller in by- pass feed mode.	96
SOL4	Pick-off Solenoid	Controls the ON/OFF movement of the pick-off pawls against the transfer belt.	81
SOL5	Ozone Neutralizer Solenoid	Controls the shutter plate for the ozone neutralizer.	45
MAGNETIC CLUTCHES			
MC1	Upper Paper Feed Clutch	Feeds paper from the upper cassette.	91
MC2	Lower Paper Feed Clutch	Feeds paper from the lower cassette.	101
MC3	Relay Roller Clutch	Turns the relay rollers when paper is fed from the lower cassette.	103
MC4	Registration Clutch	Turns the registration rollers at the appropriate timing.	112
MC5	Toner Supply Clutch – Black	Turns the toner supply roller to add toner to the developer.	9
MC6	Toner Supply Clutch – Magenta	Same as MC5.	9
MC7	Toner Supply Clutch – Yellow	Same as MC5.	9
MC8	Toner Supply Clutch – Cyan	Same as MC5.	9

SYMBOL	NAME	FUNCTION	LOCATION
SWITCHES			
SW1	Front Door Safety Switch – DC (3 contacts)	Cuts the following dc lines: 1. DC 24 V for door open signal 2. DC 5 V for the LD control board (Vcc 7) 3. DC 24 V for the power packs (Charge/Transfer : VPP)	36
SW2	Front Door Safety Switch – DC (2 contracts)	Cuts the following dc lines: 1. DC 5 V for the LD control board (Vcc 7) 2. DC 24 V for the power packs (Belt discharge/Separation)	37
SW3	Front Door Safety Switch – DC (2 contacts)	Cuts the following dc lines: 1. DC 36 V for the main motor (VMM 3) 2. DC 24 V for the drum, belt, polygon motors, etc. (VMM 2)	38
SW4	Front Door Safety Switch – AC (2 contacts)	Cuts ac power to the fusing lamp through SSR when the door is open.	39
SW5	Main Switch	Provides power to the copier.	42
SW6	By-pass Paper Width Switch	Provides the paper width signal on the by-pass feed table.	111
SENSORS			
S1	Scanner Home Position Sensor	Notices when the scanner is at the home position.	56
S2	Original Lead Edge Sensor	Provides the basic start signals of laser exposure on the drum and of paper feeding from the registration rollers.	55
S3	ID Sensor – Black	Detects various sensor patterns on the drum for the best process conditions.	121
S4	ID Sensor – Magenta	Same as S3.	121
S5	ID Sensor – Yellow	Same as S3.	121
S6	ID Sensor – Cyan	Same as S3.	121
S7	Toner Supply Sensor – Black	Detects the low toner condition in the toner container of the development unit and turns on the toner supply motor.	122
S8	Toner Supply Sensor – Magenta	Same as S7.	122
S9	Toner Supply Sensor – Yellow	Same as S7.	122
S10	Toner Supply Sensor – Cyan	Same as S7.	122
S11	Toner End Sensor – Black	Detects toner end condition in the toner tank.	124

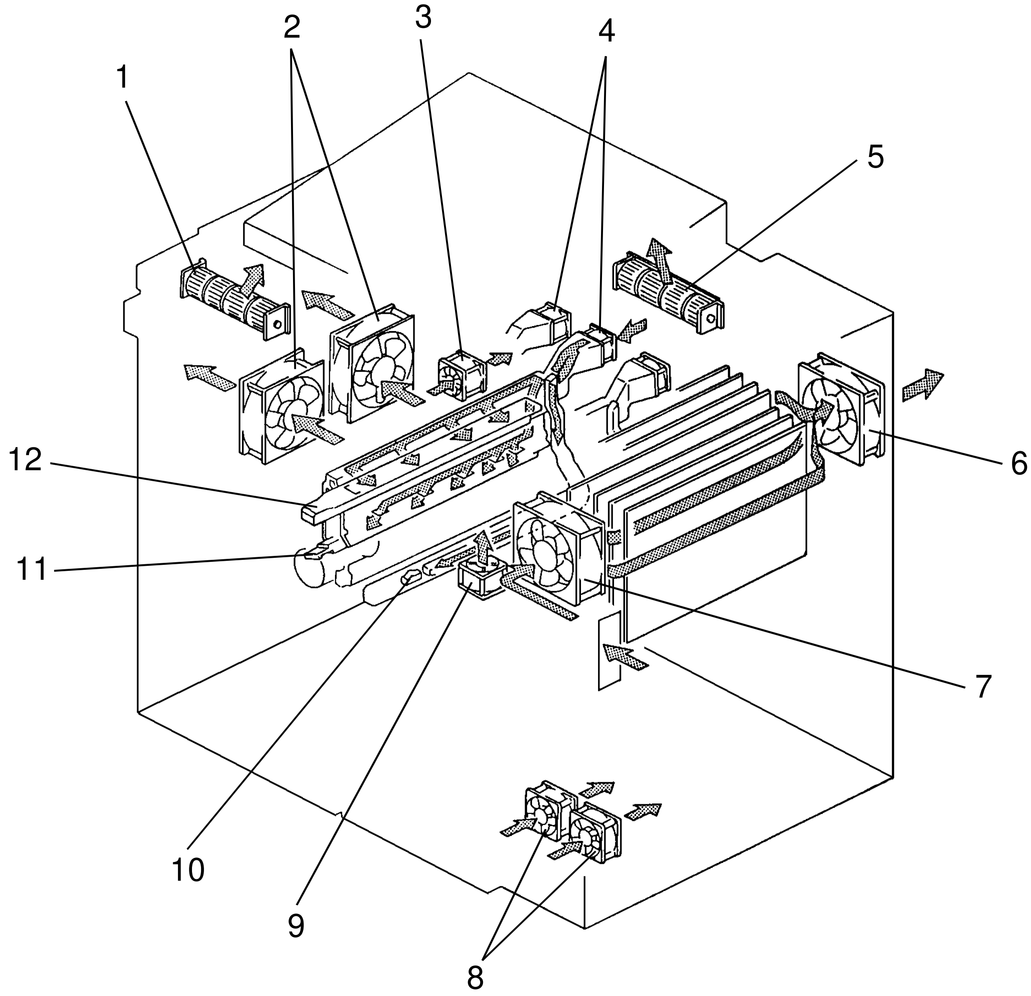
SYMBOL	NAME	FUNCTION	LOCATION
S12	Toner End Sensor – Magenta	Same as S11.	126
S13	Toner End Sensor – Yellow	Same as S11.	128
S14	Toner End Sensor – Cyan	Same as S11.	130
S15	Upper Paper Size Sensor	Detects what size paper is in the upper cassette.	104
S16	Lower Paper Size Sensor	Detects what size paper is in the lower cassette.	105
S17	Upper Paper End Sensor	Detects when the upper cassette runs out of paper.	106
S18	Lower Paper End Sensor	Detects when the lower cassette runs out of paper.	107
S19	Upper Paper Lift Sensor	Detects the correct feed height of the upper cassette.	94
S20	Lower Paper Lift Sensor	Detects the correct feed height of the lower cassette.	98
S21	By-pass Feed Sensor	Detects whether or not the by-pass table is in down position.	109
S22	By-pass Paper End Sensor	Detects whether or not the copy paper is set, and/or is running out on the by-pass table.	108
S23	Cassette Arm Sensor	Detects when the cassette arm for the upper cassette is in the down position.	97
S24	Registration Sensor	Detects paper jam condition, and controls the paper feed and relay clutch OFF timing.	110
S25	Exit Sensor	Detects paper jam condition.	86
S26	Oil End Sensor	Detects when the oil bottle is empty.	89
S27	Toner Overflow Sensor	Detects when the toner collection bottle is full.	40
S28	Toner Coil Sensor	Detects whether or not the toner collection coil is turning.	3
PCBs			
	<Scanner Unit>		
	CCD Drive Board	Controls the electrical signal from the CCD.	62
	CCD Pre-amp Board	**Amplify the signal from the CCD. (Model A092 only)**	**63**
	Video Processing Board	Converts the analog signal to an 8-bit digital signal after shading and variable amplification.	51
	Scanner Control Board	Aligns the signals from 5 CCD chips, performs RGB separation, and outputs an 8-bit signal to the IPU.	52

SYMBOL	NAME	FUNCTION	LOCATION
	Scanner Motor Board	Controls the scanner motor.	54
	Scanner Mother Board	Works as the interface for electrical components in the scanner unit.	64
	<IPU>		
	IPU Board 1	Controls image processes such as the main scan magnification and image create function.	21
	IPU Board 1.5	In Auto mode, photo and letter areas are separated by this board.	20
	IPU Board 2	Image data processes for the RGB gamma adjustment, RGB signal conversion, UCR/UCA, YMCBk gamma adjustment etc.	19
	IPU Memory Board	Stores image data so that laser exposure for each drum starts at the appropriate timing for image alignment.	18
	System Control Board	Controls start/stop timing of components, communicating with the operation panel, scanner unit, laser unit, and PCBs in the IPU. All programmed data are stored in RAM on this board.	22
	Drum Exposure Control Board – Bk/Y	Controls the start timing of main scan for black and yellow.	16
	Drum Exposure Control Board – M/C	Controls the start timing of main scan for magenta and cyan.	17
	IPU Mother Board	Works as the interface of 7 PCBs.	24
	<Laser Unit>		
	LD Control Board	Controls laser power and pulse width for the 8 laser exposure steps (7 levels, and laser off).	75
	LD Unit	Generates the laser beam.	76 ~ 79
	Polygon Motor Board	Drives the polygon motor.	73
	<Rear Side>		
	Sequence Control Board	Performs ON/OFF control of fan motors solenoids, counters, and quenching.	13
	Process Control Board	Controls power packs, ID sensors, and toner supply clutches.	14
	Motor Control Board	Controls the main motor, drum motor, and belt motor.	15
	<Others>		

SYMBOL	NAME	FUNCTION	LOCATION
	DC Power Supply Unit	Provides dc power.	31
	Operation Panel	Is used for copy mode input.	43
	SP Panel	Is used for SP test and data modes.	35
	Toner Supply Motor Board	Controls the toner supply motors.	131
	Paper Feed Control Board	Controls electrical components in the paper feed unit except paper feed motor.	102
	Paper Feed Motor Board	Controls the paper feed motor.	92
LAMPS			
L1	Exposure Lamp (2 pcs)	Provides light to reflect the original image to the CCD.	60
L2	Quenching Lamp (LED) (4 pcs)	Neutralizes any charge on the drum surface remaining after drum cleaning.	41
L3	Fusing Lamp	Provides heat to the hot roller.	88
POWER PACKS (P.P.)			
P1	Charge/Bias P.P. – Black	Provides high voltage power for the charge wire, grid plate, and toner supply roller.	7
P2	Charge/Bias P.P. – Magenta	Same as P1.	7
P3	Charge/Bias P.P. – Yellow	Same as P1.	7
P4	Charge/Bias P.P. – Cyan	Same as P1.	7
P5	Transfer P.P. – Black/Magenta	Provides high voltage for the transfer corona wire.	84
P6	Transfer P.P. – Yellow/Cyan	Same as P5.	83
P7	Belt Discharge P.P.	Provides high voltage for the belt discharge corona wire.	82
P8	Separation P.P.	Provides high voltage for the separation corona wire.	5
P9	Development Roller Bias P.P. - Black	Provides high voltage power for the development rollers.	46
P10	Development Roller Bias P.P. - Magenta	Same as P9.	46
P11	Development Roller Bias P.P. - Yellow	Same as P9.	46

SYMBOL	NAME	FUNCTION	LOCATION
P12	Development Roller Bias P.P. - Cyan	Same as P9.	46
HEATERS			
H1	Exposure Lamp Heaters (2 pcs)	Warms the exposure Lamps.	61
H2	Laser Unit Anti-condensation Heaters (2 pcs)	Warms the laser unit cavity while the power cord is plugged in.	74
H3	Scanner Unit Anti-condensation Heater (1 pc)	Warms the scanner unit cavity while the main switch is off.	59
H4	Transfer Belt Unit Anti-condensation Heaters (2 pcs)	Warms the transfer belt and OPC.	34
THERMISTOR			
TH1	Laser Unit Thermistor	Detects the temperature in the laser unit cavity. This is used only to monitor the temperature by SP mode.	72
TH2	Fusing Thermistor	Controls the hot roller temperature.	85
COUNTERS			
CO1	Single Color Copy Counter	Keeps track of the total number of black and single color copies made.	32
CO2	Full color copy counter	Keeps track of the total number of full color copies made.	33
OTHER			
LS	Lamp Stabilizer	Powers the exposure lamps.	57
TF	Fusing Thermofuse	Protects against fusing overheat.	87
NF	Noise Filter	Filters electrical noise on the ac power input line.	26
RA	Main Relay	Provides ac power to the fusing lamp, and opens if any SC code condition is detected.	25
SSR	Solid State Relay	Turns the fusing lamp on and off.	28
CB	Circuit Breaker	Protects against voltage surges on the ac line.	27
AR	Arrester	Discharges a surge from the ac wall outlet.	30
PF	Powerfuse	Protect unit from over current condition.	29

7. AIR FLOW



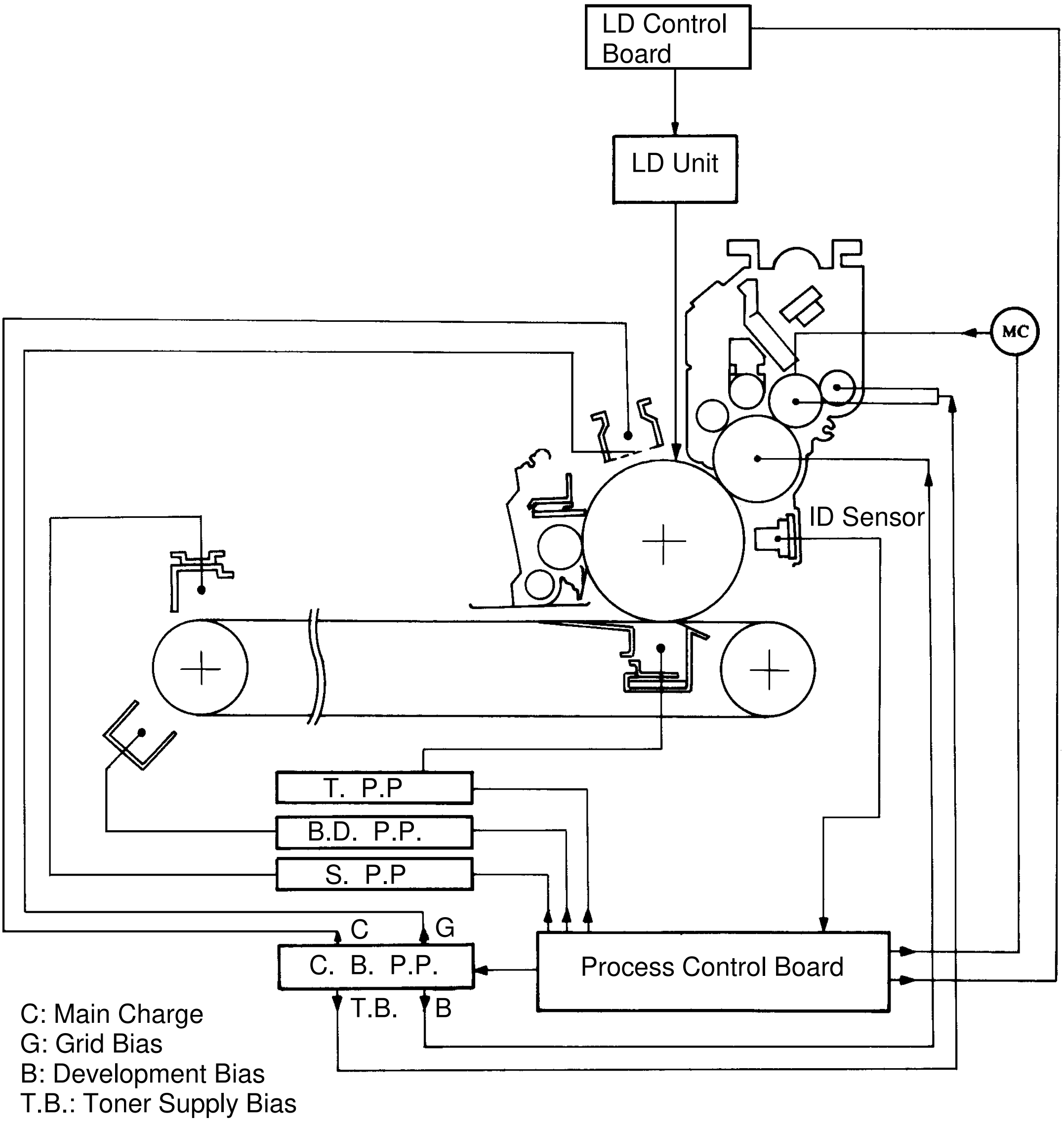
1. Front Scanner Fan
2. Fusing Exhaust Fans (2 pcs)
3. Rear Exhaust Fan
4. Charge Fans (4 pcs)
5. Rear Scanner Fan
6. Rear IPU Exhaust Fan
7. Front IPU Inlet Fan
8. DC Power Supply Inlet Fans (2 pcs)
9. Toner Collection Pipe Fan
10. ID Sensors (4 pcs)
11. Charger Units (4 pcs)
12. Toner Shield Glasses (4 pcs)

SECTION 2

DETAILED SECTION DESCRIPTIONS

1. PROCESS CONTROL

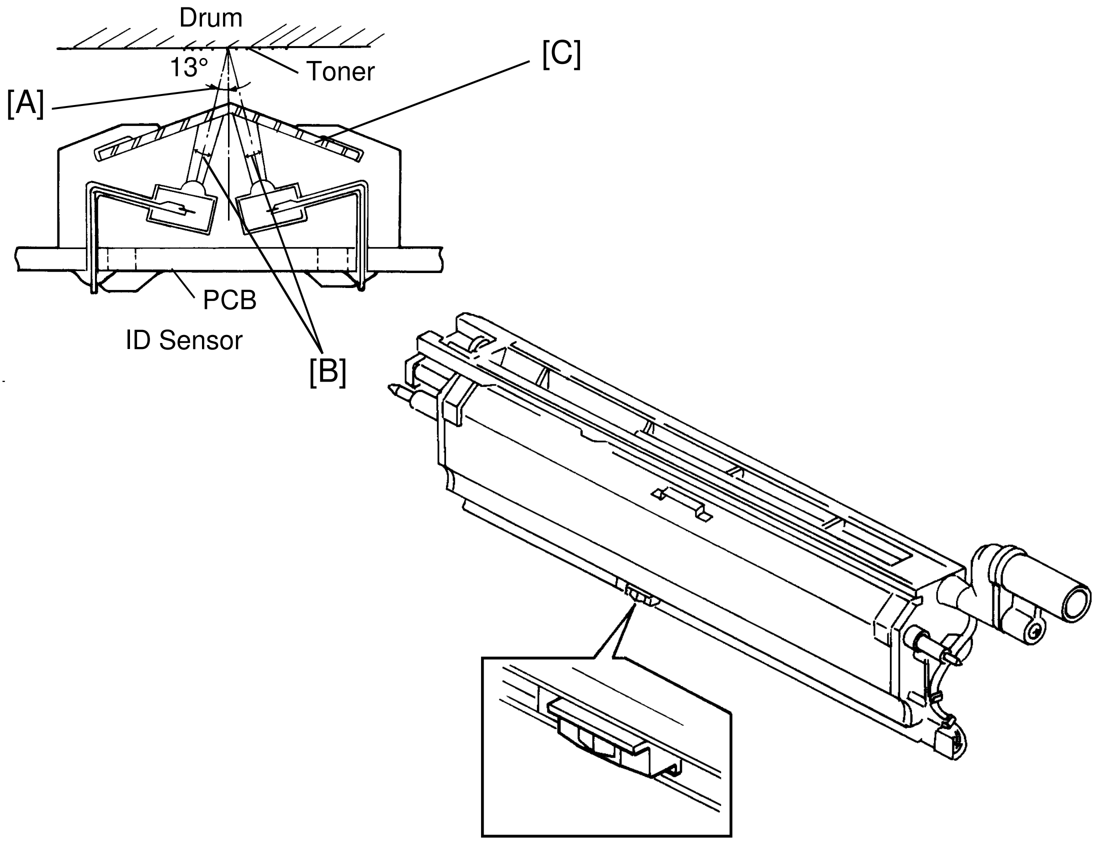
1.1 OVERVIEW



The process control board serves the following two functions to maintain proper copy quality:

1. Using the ID sensor, changes related to image development, such as, toner density, drum residual or remaining potential and so on. --- INPUT DATA
2. In accordance with these detected conditions, it controls all power packs and the toner supply clutch to maintain the copy image. --- OUTPUT

1.2 ID SENSOR



The color toner cannot uniformly reflect the ID sensor light (infrared light), the randomly reflected light from the pattern becomes more as the toner density becomes higher. If the standard type of ID sensor was used in this model, it might mis-detect the image density level on the drum due to the randomly reflected light.

To minimize the influence of this random reflection, this model uses a new type of ID sensor. This ID sensor incorporates:

(1) a low angle of incidence/reflection [A]

(2) an LED light band which is critically limited [B]

(3) an angle filter is used [C]

When the sensor surface becomes dirty, the sensor output is lowered. If it is lower than a certain level, the LED light intensity is automatically increased, which can be monitored using SPD#611 ~ #614. Normal data is 30 to 100. Sensor cleaning is required at 15 K PM **(20K PM for Model A105)**, or when the data in SPD#611 ~ #614 is more than 101 **(151 for Model A105)**. After cleaning the sensor, TD check should be performed. The ID sensor is used to detect the following kinds of voltage:
SVsg, Vsg, Vsp, Vk, V_{LL},V_{LH}, Vmin. (V_{L1}, V_{L2} ~ V_{L7})

1.3 POINTER CONTROL

Unlike other copiers, the drum potential after drum charge [V_0], the development bias [V_B] and the residual voltage after laser exposure with 3rd laser power [V_{L3}] will combine to form 32 sets or combination. These combinations of V_0, V_B and V_{L3} (from 0 to 31) are called "Pointers".

Based upon the following data, an appropriate pointer is automatically selected to maintain proper copy quality:

1) DIF (V_{LL} – V_{LH}) detection (image density difference from the middle to the high density areas on the original)
2) Vsg detection (dirty background caused by a too high toner concentration)

This pointer control is required due to the following characteristic;

- Toner potential in this developer is changed by humidity conditions, and toner concentration will be greatly changed from very low to very high. This may give low image density problem, or overtoning problem.

This problem can be solved by changing the pointer.

When a lower pointer is selected;

1) V_0, V_B, V_{L3} are all decreased.
2) The development potential (V_B – V_{L3}) is reduced, and the toner concentration in the developer is increased.

When a higher pointer is selected;

1) V_0, V_B, V_{L3} are all increased.
2) The development potential (V_B – V_{L3}) becomes more, and the toner concentration is decreased.
3) The potential difference between V_B and V_0 will increase, providing a higher tolerance against dirty background due to the actual bias increase.

[Pointer table]

<Model A092/A105>

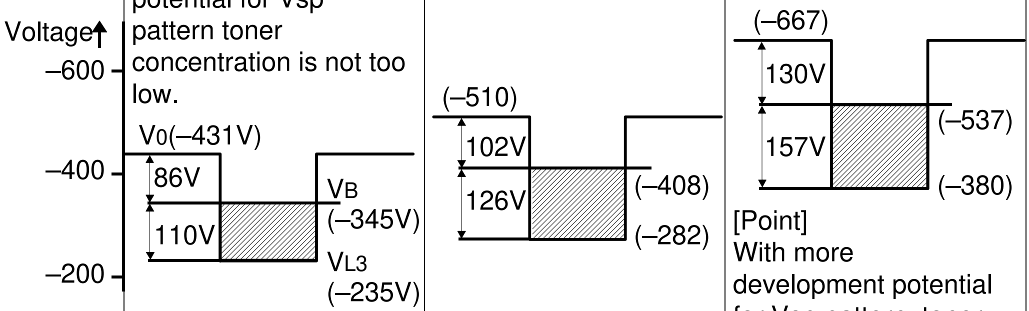
Pointer	V_O	V_B	V_{L3}
0	353	278	188
1	369	290	196
2	384	306	208
3	400	318	216
4	416	329	224
5	431	345	235
6	447	357	243
7	463	369	255
8	478	380	263
9	494	396	275
10	510	408	282
11	525	420	294
12	541	431	302
13	557	447	314
14	573	459	322
15	588	471	329
16	604	486	341
17	620	498	349
18	635	510	361
19	651	522	369
20	667	537	380
21	682	549	388
22	698	561	396
23	714	576	408
24	729	588	416
25	745	600	427
26	761	612	435
27	776	627	447
28	792	639	455
29	808	651	463
30	824	667	475
31	839	678	482

↑ Higher toner concentration

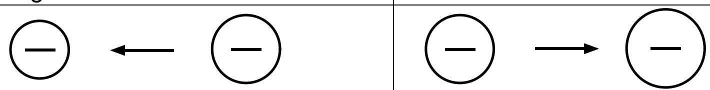
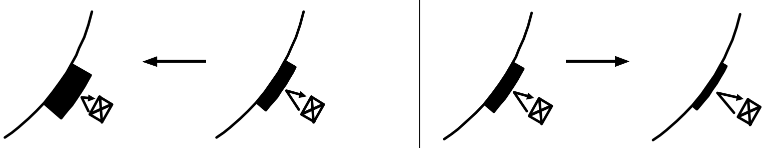
Lower toner concentration ↓

Pointer / Humidity / Toner Concentration

<Model A092>

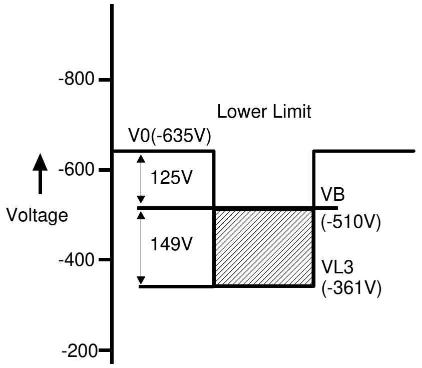
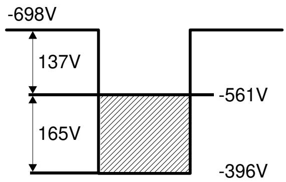
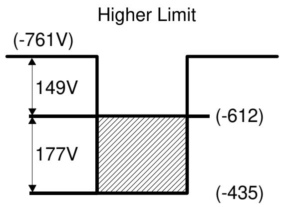


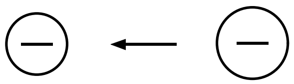
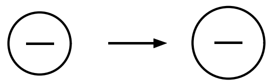
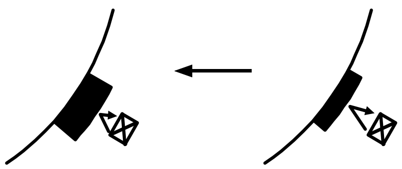
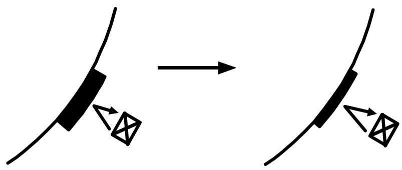
	[Point] With less development potential for Vsp pattern toner concentration is not too low.		[Point] With more development potential for Vsp pattern, toner concentration is not too high.
Pointer	[Pointer: 5]	[Pointer: 10]	[Pointer: 20]
SPD#106 Humidity Setting	SPD#106-0 for high humidity (75% RH ~)	SPD#106-1 for normal humidity (35 ~ 75% RH)	SPD#106-2 for low humidity (~ 35% RH)
SPD#110~#113 Pointer	Pointer: 5	Pointer: 10	Pointer 20
SPD#115~#118 Pointer Limitter	Display: 0 Range: 0 ~ 20	Display: 5 Range: 5 ~ 25	Display: 10 Range: 10 ~ 30

Humidity	High ← Normal	Normal → Low
Toner Potential		
Toner Amount for development (Vsp pattern)	 More toner, Less light, Low Vsp	Less toner, More light, High Vsp
Toner concentration in the developer	Low toner concentration	High toner concentration
Possible problem	Low image density for high tone areas on original.	Overtone, Toner scattering from the unit.
Solution	To select smaller pointer for less development potential of Vsp pattern.	To select greater pointer for more development potential of Vsp pattern.

Detailed Descriptions

<Model A105>

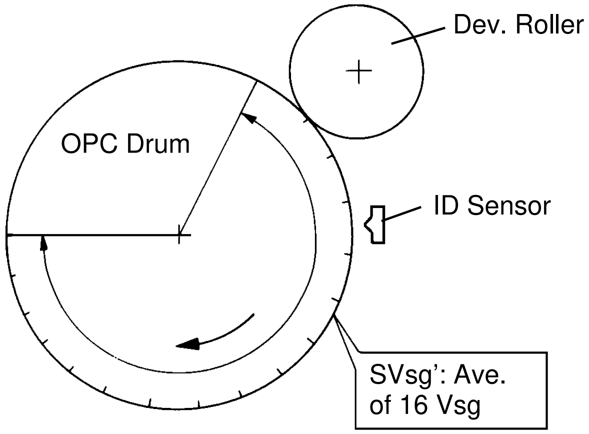
 [Point] With less development potential for Vsp pattern toner concentration is not too low.	 Default Pointer for Bk, M, Y, C	 [Point] With more development potential for Vsp pattern, toner concentration is not too high.

Pointer	[Pointer: 22]	
SPD#106 Humidity Setting	SPD#106-1 for all humidity range. **Note:** SPD#106-0 and 2 can be accessed but as SPD#106-1 covers the entire humidity range, 0 and 2 are not needed in the field.	
SPD#110~#113 Pointer Default	Pointer: 22 (Bk, M, Y, C)	
SPD#115~#118 Pointer Limitter	Display: 18 (all colors) Range: 18 ~ 26	
Humidity	High ← Normal	Normal → Low
Toner Potential		
Toner Amount for development (Vsp pattern)	 More toner, Less light, Low Vsp	 Less toner, More light, High Vsp
Toner concentration in the developer	Low toner concentration	High toner concentration
Possible problem	Low image density for high tone areas on original.	Overtone, Toner scattering from the unit.
Solution	Select smaller pointer for less development potential of Vsp pattern automatically.	Select greater pointer for more development potential of Vsp pattern automatically.

[SPD modes for pointer]

<table>
<tr><th>SPD#</th><th>Name</th><th>Function</th></tr>
<tr><td>101</td><td>Pointer control - Auto/Fixed</td><td>L: Pointer automatic control mode (Standard)
H: Fixed pointer mode (used at TD check)</td></tr>
<tr><td>104</td><td>Pointer control by DIF ($V_{LL} – V_{LH}$)</td><td>L: Pointer automatic control by DIF (Standard)
H: No pointer change by DIF</td></tr>
<tr><td>105</td><td>Pointer control by Vsg</td><td>L: Pointer automatic control by Vsg (Standard)
H: No pointer change by Vsg</td></tr>
<tr><td>106</td><td>Pointer humidity default setting</td><td>0: High humidity
1: 35 ~ 75% RH
2: Low humidity
For model A105, 0 and 2 can be accessed, but 1 should be selected for any humidity range.</td></tr>
<tr><td>107</td><td>Pointer reset - TD check</td><td>At the TD check, pointer is reset by selecting SPD#107-H to the following value depending upon SPD#106 data:
<table>
<tr><td></td><td>Model A092</td><td>Model A105</td></tr>
<tr><td>SPD #106</td><td colspan="2">SPD#110 ~ #113</td></tr>
<tr><td>0 (75%~)</td><td>5 (10 for SPD#111)</td><td>18</td></tr>
<tr><td>1 (35~75%)</td><td>10 (20 for SPD#111)</td><td>22</td></tr>
<tr><td>2 (~35%)</td><td>20 (25 for SPD#111)</td><td>26</td></tr>
</table></td></tr>
<tr><td>108</td><td>Pointer reset - Vmin check</td><td>At the Vmin check, pointer is reset by selecting SPD#108-H to the following value depending upon SPD#106 data:
<table>
<tr><td></td><td>Model A092</td><td>Model A105</td></tr>
<tr><td>SPD #106</td><td colspan="2">SPD #110 ~ #113</td></tr>
<tr><td>0 (75%~)</td><td>10 (5 for SPD#111)</td><td>18</td></tr>
<tr><td>1 (35~75%)</td><td>15 (5 for SPD#111)</td><td>22</td></tr>
<tr><td>2 (~35%)</td><td>25 (5 for SPD#111)</td><td>26</td></tr>
</table></td></tr>
<tr><td>110 ~ 113</td><td>Pointer data monitor/change</td><td>Data: 0 ~ 31</td></tr>
<tr><td rowspan="2">115 ~ 118</td><td>Pointer limit</td><td>Depending upon SPD#106 data, pointer limit data is changed when pointer is reset by SPD#107-H.</td></tr>
<tr><td colspan="2">
<table>
<tr><td></td><td colspan="2">Model A092</td><td colspan="2">Model A105</td></tr>
<tr><td>SPD#106</td><td>#115 ~ #118</td><td>Pointer Range</td><td>#115 ~ #118</td><td>Pointer Range</td></tr>
<tr><td>0</td><td>000</td><td>0 ~ 20</td><td>014</td><td>14 ~ 22</td></tr>
<tr><td>1</td><td>005 (010 for SPD#116)</td><td>5 ~ 25 (10 ~ 30 for SPD#111)</td><td>018</td><td>18 ~ 26</td></tr>
</table>
(Lower pointer limit) (Higher pointer limit is "20 + Lower pointer limit".)</td></tr>
</table>

1.4 SVsg (Standard Vsg)



[Detection Method]

16 different areas of the bare drums surface (without having toner applied) are checked by the ID sensor. This is accomplished by turning the drum without the development roller rotating. The average value for the 16 areas (SVsg') is stored. Then, the latest SVsg value is given as the average of the last 5 SVsg' data. SVsg is monitored by SPD#560 ~ #563. (Normal range is 200 to 420, meaning 2.0 to 4.2 V.)

[Detection Timing/Interval]

SVsg' is detected one time after every copy job is completed and five times during the self check operation.

[Purpose]

1. To standardize the sensor output for all the various patterns.
   Using the following formula, the actual sensor output is standardized to the data used for process control by SVsg:

$$\boxed{\text{Standardized data} = \text{Sensor output} \times \frac{400}{\text{SVsg}}}$$

Example: SVsg = 3.8 V $\left(\frac{\text{Data in SPD\#560 \sim \#563}}{100}\right)$

Vsp' = 1.9 V (Actual sensor output)

$$\text{Vsp} = 1.9 \times \frac{400}{3.8} = 200 \text{ (Standardized Vsp data)}$$

In the same manner, the data for Vsg, Vk, V_{LL}, V_{LH} and Vmin is standardized and is used for process control.

2. To monitor the sensor's surface condition through SVsg data and perform automatic compensation when SVsg becomes lower than 2.0 V. (Normal: 200 ~ 420: 2.0 ~ 4.2 V)

   NOTE: For this compensation, SPD#610 data should be "L".

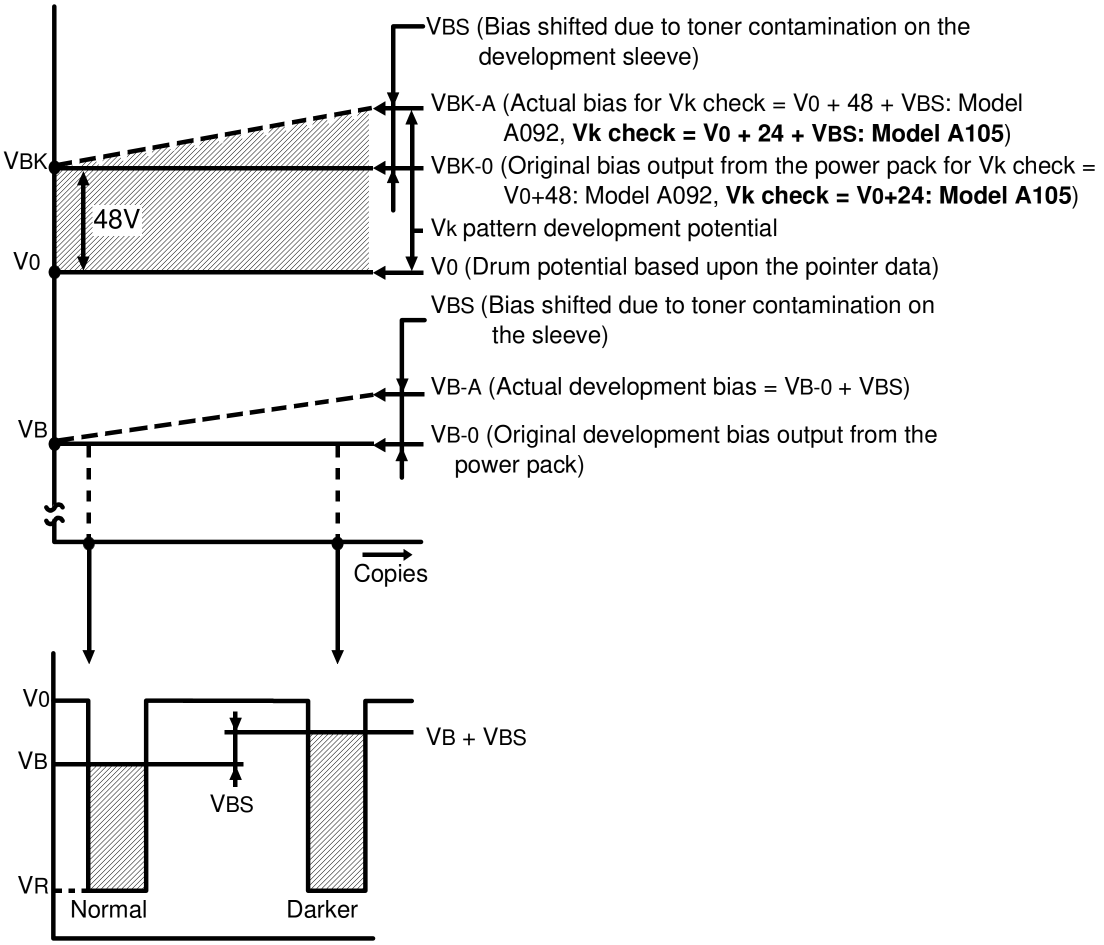
As the sensor's surface gradually gets dirty, SVsg gradually lowers. When it becomes less than 2.0 V, the LED in the ID sensor becomes brighter in order to increase SVsg. The sensor LED data can be monitored by SPD#611 ~ #614, the normal range is 30 to 100 (30 to 150 for Model A105). (A small data value means a clean sensor and dark LED condition.)

< Key points for ID sensor maintenance>

1. The ID sensor should be cleaned at every 15K PM (20K PM for Model A105) before a Vmin check or a TD check, or when SPD#611 ~ #614 (ID sensor LED data) is more than 101 (more than 151 for Model A105).
2. After cleaning, discharge the static electricity on the sensor surface with your finger.
3. After cleaning, it is **necessary** to perform TD check (manual).
4. Never change the ID sensor from one to the other. So, mark the color (Bk, C, M, or Y) on the sensor board if these are removed at the same time.
5. Confirm that the ID sensor is fully inserted in position.

1.5 Vk (Development Bias) Compensation

[Purpose]



The development roller sleeve is subjected to toner contamination (or residual toner remaining on the development sleeve) which will gradually increase as the number of copies made is increases. Corresponding to this increase of toner contamination, actual development bias [$V_{B\text{-}A}$] is increased, and is higher than the bias output from the power pack [$V_{B\text{-}0}$]. This shifted voltage from $V_{B\text{-}0}$ to $V_{B\text{-}A}$ is named V_{BS}.

Because of V_{BS}, image density is increasing due to the higher development potential and dirty background may be visible due to the decreased potential (difference gap) from V_0 to the actual bias level ($V_B + V_{BS}$). This means that the sensor pattern for Vsp is developed darker, resulting in a low toner concentration in the developer. If it is too low, areas on the original with high image density can not be developed with enough toner. This would result in a decrease in image density on the copy.

To prevent these problems, it is necessary to determine the value of this bias shift and then to adjust the bias output. This is called Vk compensation.

[Detection Method]

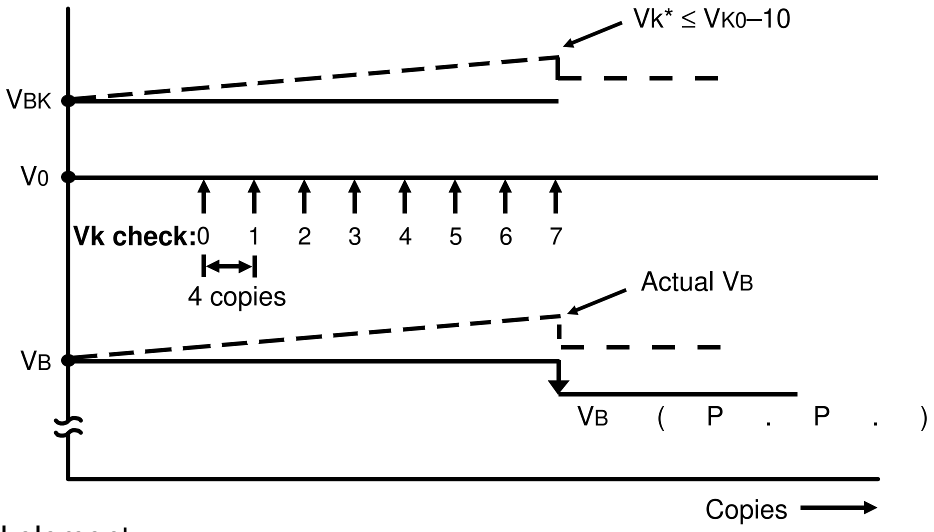
The ID sensor checks the Vk pattern which is made as follows:

1. Drum charge is applied. (V_0: Drum potential)
2. No laser exposure for the pattern.
3. Development is made with a specific development bias [V_{BK}], which is +48 V higher than V_0 **(24 V higher than V_0: Model A105)**. Then, the pattern is developed due to the potential from V_{BK} to V_0. When the sleeve is in clean condition, the Vk pattern is developed with less toner (Low pattern density). So, the sensor output [Vk] is high. However, when the sleeve becomes toner contaminated, the Vk pattern becomes darker due to V_{BS}. Then, Vk becomes a lower voltage value.

[Detection Timing/Interval]

- At the end of every four copies, the Vk check is performed.
- At the Vmin check and/or the TD check, it is necessary to perform a Vk check using SPD225 (Forced Vk check). This is to store the new Vk data when using either a new drum, new sensor, or new developer and clean sleeve surface.

[Vk compensation]



Control element:

The bias output from the power pack is adjusted to control the actual bias level, so that Vk* becomes closer to Vk0. (SPD#220-L, Development bias Vk control)

Control method:

Vk0: Vk target data preset at the factory, monitored by SPD#235 ~ #238.

Vk*: (Vk star) The weighted average of the latest 8 Vk detected data. This data is used to compare with Vk0, monitored by SPD#245 ~ #248.

Vk* ≤ Vk0–10	Vk pattern is much darker than standard. And bias is decreased. (VBS is increased.)
Vk0–10 ≤ Vk* ≤ Vk0+10	No bias shifted.
Vk* ≥ Vk0+10	Vk pattern is much lighter than standard. And bias is increased. (VBS is decreasing.)

VBS: The bias voltage to be shifted is called VBS, and is monitored by SPD#226 ~ #229. (VBS: –50 V ~ +150 V) (If VB given by the pointer table is –400 V, variable range of bias output is –250 to –450 V.)
SPD#221 must always be set to "L" (on) even though VBS does not effect pointer control.
If VBS is higher than 100, dirty backgrounds might appear. (model A092)
If VBS is higher than 50, dirty backgrounds might appear. (model A105)

<Key points>

1. Whenever the developer is removed for replacement, be certain to clean the dv roller sleeve with a **dry cloth** to remove all toner contamination of the dv roller sleeve. Do not use alcohol. Toner melts easily and sticks to sleeve. This should be done at every developer replacement interval (15K for model A092, 20K for model A105).

2. Under the following conditions, clean the roller sleeve (after removing the developer) and perform the TD check procedure.

   1) Copy image using SPD#82-H (Color patch with 7th LD power)
   The 100% color patch as well as the other high density areas in that color on the original will be light on the copy. However, low to middle density areas on copy appear normal.

   2) Copy image with SPD#83-H (Color patch with 1st LD power)
   The image density of that color is harder (more dense) than usual.

   3) V_{BS} (SPD#226 ~ #229) shows a high value such as 100, or more (50, or more for model A105)

   4) Vk* (SPD#245 ~ #248) is much smaller than Vk_0 (SPD#235 ~ #238) by 11 or more.
   The cause of this problem is that the roller sleeve was not cleaned at the last PM. As a result, Vk compensation is not enough for heavy toner contamination on the sleeve.

1.6 Vsg

[Purpose]

Vsg is used to detect a dirty background condition on the drums surface due to a too high toner concentration in the developer.

[Detection Method]

At the beginning of every copy cycle, Vsg as well as Vsp is checked by the ID sensor as follows;

1. Drum charge is applied
2. No laser exposure
3. Development is performed with development roller sleeve rotation, and with normal bias ($V_B + V_{BS}$).

   [Example] If pointer is set at "10" (SPD#110 ~ #113), V_B is –408 V (SPD#230 ~ #233). V_{BS} (SPD#226 ~ #229) is 30. In this case, output from the power pack is –378 V (–408 + 30).

4. Vsg' is detected by the ID sensor and is standardized by SVsg.

$$\underbrace{Vsg = Vsg'}_{\text{detected voltage}} \times \frac{400}{SVsg}$$

Then, one Vsg data reading is stored in memory. This is done at every copy cycle.

1) Using 8 readings of Vsg data, the Vsg dropping tendency (over toning condition) is detected. (Every 8 copies)
2) Using 64 readings of Vsg data, the very slow Vsg dropping tendency is also detected. (Every 64 copies)

[Controlling Element]

When a dirty background condition is detected, the pointer data and/or ND data is increased.

1) Light background: When the data of SPD#880 ~ 883 (V_{SG} Decreasing 1up counter for pointer) is incremented by "1", Pointer → +1
2) Heavy background: When the data of SPD#885 ~ 888 (V_{SG} Decreasing 2up counter for pointer) is incremented by "1", Pointer → +2, and ND → +1

By selecting a higher pointer, the Vsp pattern becomes darker due to the higher potential from V_B to V_{L3}. This will lower the toner concentration.

ND will be explained later in detail. However, by selecting a higher ND data value, the toner control target [V_{TC} = Vsp target] is increased. (It has the same effect to increase ND data as it is to increase TD data.) This will also lower toner concentration.

[SPD Modes for Vsg]

1. SPD#105:	Pointer control – Vsg Data "L" is the default for pointer control mode through the detection of Vsg.
2. SPD#565 ~ #568:	Vsg* (Vsg star) This is the average detected data for the latest 8 detections of Vsg and is compared with the present Vsg monitored by SPD#570 ~ #573.
3. SPD#570 ~ #573:	The latest Vsg detected data.
4. SPD#575 ~ #578:	The Vsg decreasing tendency detected data. This value is the result of comparison made at every 8 copies.
5. SPD#580 ~ #583:	The Vsg slow decreasing tendency, made at every 64th copy.

1.7 DIF (V_{LL} – V_{LH})

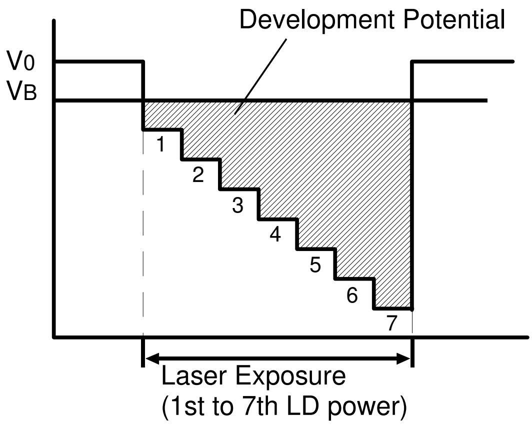


Fig. 1

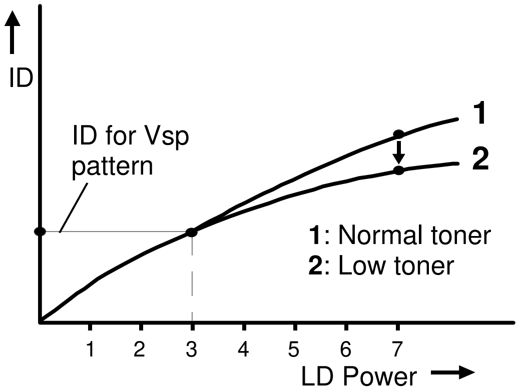


Fig. 2

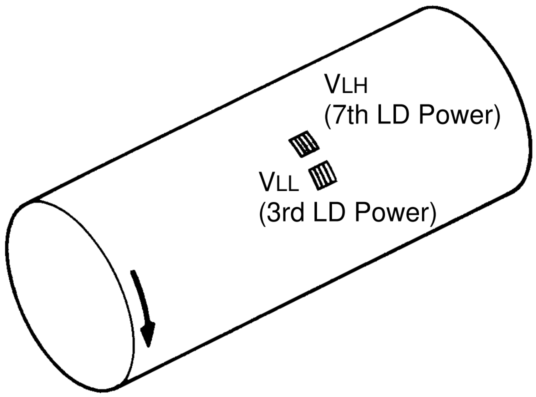
[Purpose]

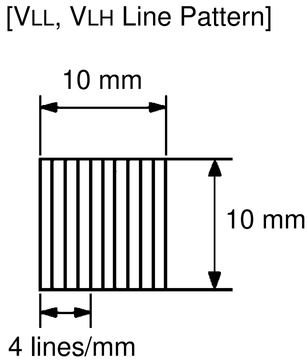
When the drum is exposed by each LD power from 1st to 7th, development potential is increasing as shown. So, image density on the drum for each LD power is increasing if toner concentration in the developer is normal. (See **Fig. 1**.)

In accordance with high humidity, toner concentration in the developer is lowered as explained in "Pointer Control". Since the Vsp pattern for toner control is made by the 3rd LD power, image density at the 3rd LD power can be maintained. However, for the areas which are exposed by the 6th to 7th LD power, it is too low in toner to keep the standard image density. (See **Fig. 2**.)

To prevent this low image density on high tone areas of the original, the pointer should be lowered to increase the toner amount in the developer. For this detection, V_{LL}, V_{LH}, and DIF are used.

[VLL, VLH Pattern]

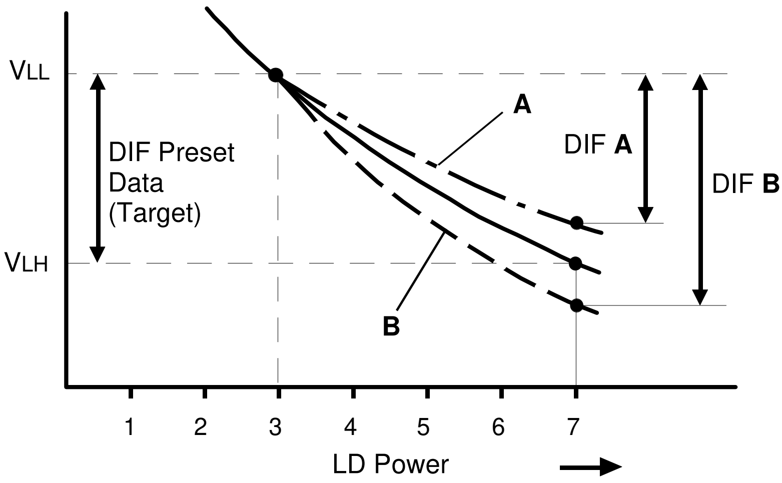




The two individual line patterns are developed on the drum just before and after each copy job. The first pattern is exposed by using the 3rd LD power, the ID sensor output from this pattern is called VLL. The second pattern is exposed by using the 7th LD power, its output is called VLH. The process control board monitors their difference, which is called DIF.

For VLL and VLH detection, using a line pattern is better than using a solid pattern due to the greater difference of sensor output compared to the image density of the pattern.

[DIF Pointer Control]



At the factory the targeted DIF data has been preset and is monitored by SPD#120 ~ #123. Before and after each copy job the VLL and VLH patterns are made and are checked by the ID sensor. This difference from VLL to VLH is called the detected DIF data, which is monitored by SPD#125 ~ #128. Then, the detected DIF data is compared with the targeted DIF data:

For Example:

Case A: Targeted DIF data > Detected DIF data (DIF A in above illustration)
(SPD#120 ~ #123) (SPD#125 ~ #128)
This means that VLH has been getting higher and that the image density for the VLH pattern has been lowered due to too low a toner concentration in the developer. This may happen when the humidity is increasing. If this condition is continued too many times, the pointer is lowered by one step in order to increase the toner concentration.

Case B: Targeted DIF data < Detected DIF data (DIF B in above illustration)
This means the VLH pattern is too dark because of a high toner concentration in the developer. If this condition is continued too many times, pointer is shifted up by one step in order to decrease the toner concentration.

1.8 Vsp

[Purpose]

Vsp is used to judge whether toner concentration in the developer is sufficient or insufficient.

[Detection Timing/Interval]

At the beginning of every copy cycle, the Vsp pattern is made by the exposure of the 3rd LD power (4th LD power for model A105) and is checked by the ID sensor.

Detailed Descriptions

[Toner Supply]

Detected Vsp at every copy cycle (SPD#460 ~ #463) is compared with VTC (toner control) which is the target Vsp (SPD#455 ~ #458).

Detected Vsp > VTC (Target Vsp) → Toner is supplied.

Detected Vsp ≤ VTC (Target Vsp) → No toner is supplied.

Vsp* (Vsp star) monitored by SPD#470 ~ #473 is the average of the latest 8 checks of Vsp. If Vsp* (SPD#470 ~ #473) is approximately the same as (or close to) VTC (SPD#455 ~ #458), toner control by Vsp is working normally.

[VTC (Target Vsp)]

The following formula is used to determine the target Vsp (VTC, SPD#455 ~ #458)

<Model A092>

$$\mathbf{V_{TC}} = \text{Vmin} + \frac{2TD + 2ND + CD - 24}{200}(4.0 - \text{Vmin})$$

<Model A105>

$$\mathbf{V_{TC}} = \text{Vmin} + \frac{8 \times (TD + ND) + CD - 80}{800}(4.0 - \text{Vmin})$$

VTC will be changed by either the self check operation or it heavy (dirty) background detected by Vsg. If VTC is increased, the toner concentration in the developer is decreased. From the above formula, a higher TD, ND or CD value will lower toner concentration.

The weight of the CD data in the VTC formula for model A105 is decreased from that of model A092. The CD data is changed during self check in the morning and at lunch time. however, this is too frequent for low copy volume customers. Because, the developer mixing time is quite short due to low copy volume, the electrical charge of the developer is also low. In this condition, if self check is performed, appropriate CD data might not be selected. To prevent this problem, the weight of the CD data is decreased.

[TD]

TD data preset at the factory is monitored by SPD#490 ~ #493. These SPD numbers are also used to change TD data by manual at TD check. The range is 0 to 30. The data once set is not changed automatically.

[ND]

ND data is monitored by SPD#495 ~ #498. (0 to 24, default by process control reset using SPD#28 is 8.) ND data is automatically changed by either Vsg or TGRD:

1) Vsg: If Vsg drops drastically in a short period, the toner concentration is now so high that toner is present on the image background. Then, the ND data is automatically increased by one data to lower the toner concentration.

2) TGRD: During a self check cycle, TGRD detected data reading is stored in memory (SPD#520 ~ #523). If TGRD detected data is different from TGRD target data (SPD#515 ~ #518) by 5 or more, the CD data will be changed. (See [CD] for details.) Then, the ND data is changed depending on the CD data. See the table below.

CD Data	ND Correction
0 ~ 1	–3
2 ~ 3	–2
4 ~ 5	–1
6 ~ 26	0
27 ~ 28	+1
29 ~ 30	+2
31 ~ 32	+3

[CD]

CD data is monitored by SPD#500 ~ #503. (0 ~ 32, default by process control reset using SPD#28 is 16.) Since the ND data change interval is slow, CD data is used to change V_{TC} until the next self check is performed.

See the V_{TC} formula on the previous page.

Parameters cd (0) ~ cd (7) are detected during self checks. One parameter is detected during one self check. The number in brackets identify the following:

Cd (0): Detected during the last self check
Cd (1): Detected during the self check before last
⋮ ⋮
Cd (7): Detected during 7 self checks before the last one

Cd (i) is detected as follows (i = 0 ~ 7):

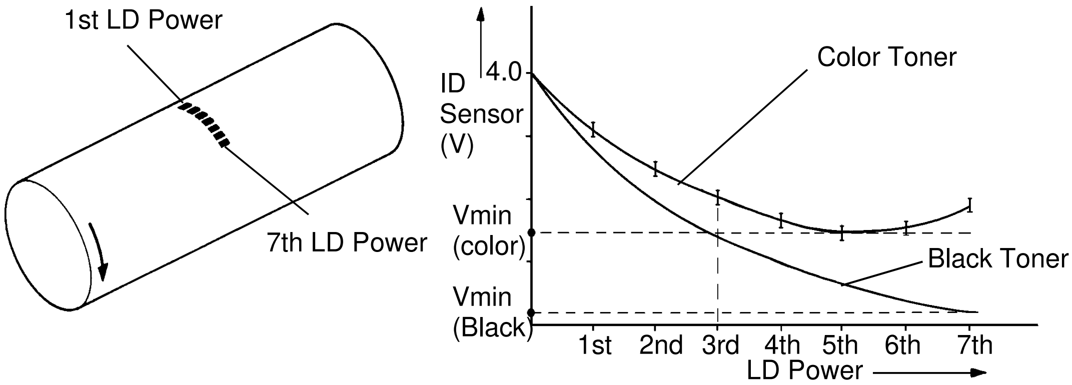
T_{GRD} Detected Data – T_{GRD} Target Data > 5 → Cd (i) = 2
T_{GRD} Detected Data – T_{GRD} Target Data ≤ ±5 → Cd (i) = 1
T_{GRD} Detected Data – T_{GRD} Target Data < –5 → Cd (i) = 0

By using the formula below, CD (SPD#500 ~ #503) is decided.

CD = 4 [cd (0) + cd (1)] + 2 [cd (2) + cd (3)] + cd (4) + cd (5) + cd (6) + cd (7)

The cd (i) default is 1. Therefore, the CD default is 16.

1.9 Vmin



[Purpose]

For color toner, unlike black toner, the ID sensor output from the patterns exposed by the higher LD power ranges (4th to 7th) does not always drop as the pattern ID gets darker. From a certain point (the turning point) of the ID level, the sensor output increases as shown in the above illustration. Also, the sensor output will not drop lower even if a darker pattern is made. This minimum output at a certain ID level is called Vmin, and it is used to decide the toner control target called, VTC (Vsp target).

<Model A092>

$$V_{TC} = \textbf{Vmin} + \frac{2TD + 2ND + CD - 24}{200}(4.0 - \textbf{Vmin})$$

<Model A105>

$$V_{TC} = \textbf{Vmin} + \frac{8 \times (TD+ND)+CD-80}{800}(4.0 - \textbf{Vmin})$$

[Vmin check]

To decide Vmin, the Vmin check must be performed before the TD check when the following is performed:

1. The drum is replaced.
2. The sensor is replaced.
3. The development unit is replaced. (Model A092 only)*

* As the ID sensor in Model A105 is not set on the development unit, Vmin check is not needed for model A105.

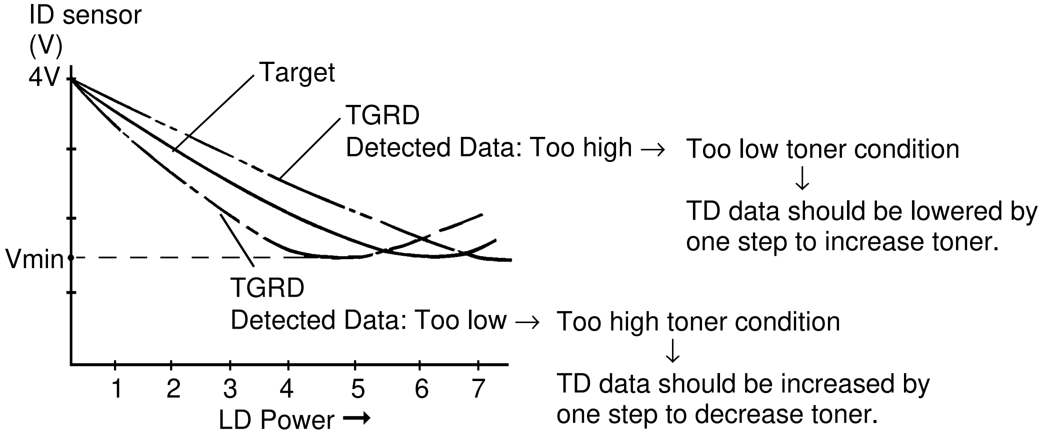
During Vmin check, the seven sensor patterns are exposed using each LD power, from 1st to 7th, in order and the sensor output from each pattern is stored. This is continued for 5 times. From these outputs, Vmin is decided. However, if the toner in the developer is too low, or too high, or if V_{BS} is abnormal, Vmin data becomes abnormal at the first the Vmin check. In this case, the Vmin check should be performed again after correcting the abnormal conditions.

The Vmin detected data can be monitored by SPD#485 ~ #488. The normal range is:

<Model A092>
SPD#485 (Black Vmin): 0 ~ 30 (0 ~ 0.3 V)
SPD#486 ~ 488 (M, Y, and C Vmin): 110 ~ 200 (1.1 ~ 1.9 V)

<Model A105>
SPD#485 (Black Vmin): 0 ~ 20 (0 ~ 0.2 V)
SPD#486 ~ 488 (M, Y, and C Vmin): 130 ~ 170 (1.3 ~ 1.7 V)

1.10 TD CHECK / TGRD



TD check is necessary after new developer installation. After the reset of the process data such as the pointer, ND, CD, and other data, a free run and a self check is performed at least four times.

During the free run, the new developer will have the proper characteristics. During the self check, TGRD (Toner gradation) is checked by making the patterns in the same manner as for the Vmin check. At the fourth detection cycle, the developer has reached the proper characteristics and the process control system will now utilize accurate data. So, with the fourth detection, TGRD detected data can be evaluated against the TGRD target data. If it is too low, toner concentration is too high. Then, the TD data is decreased by one step, (one to three steps for model A105) and a free run is performed so that the toner concentration is increased to ensure proper TGRD data.

< Key points>

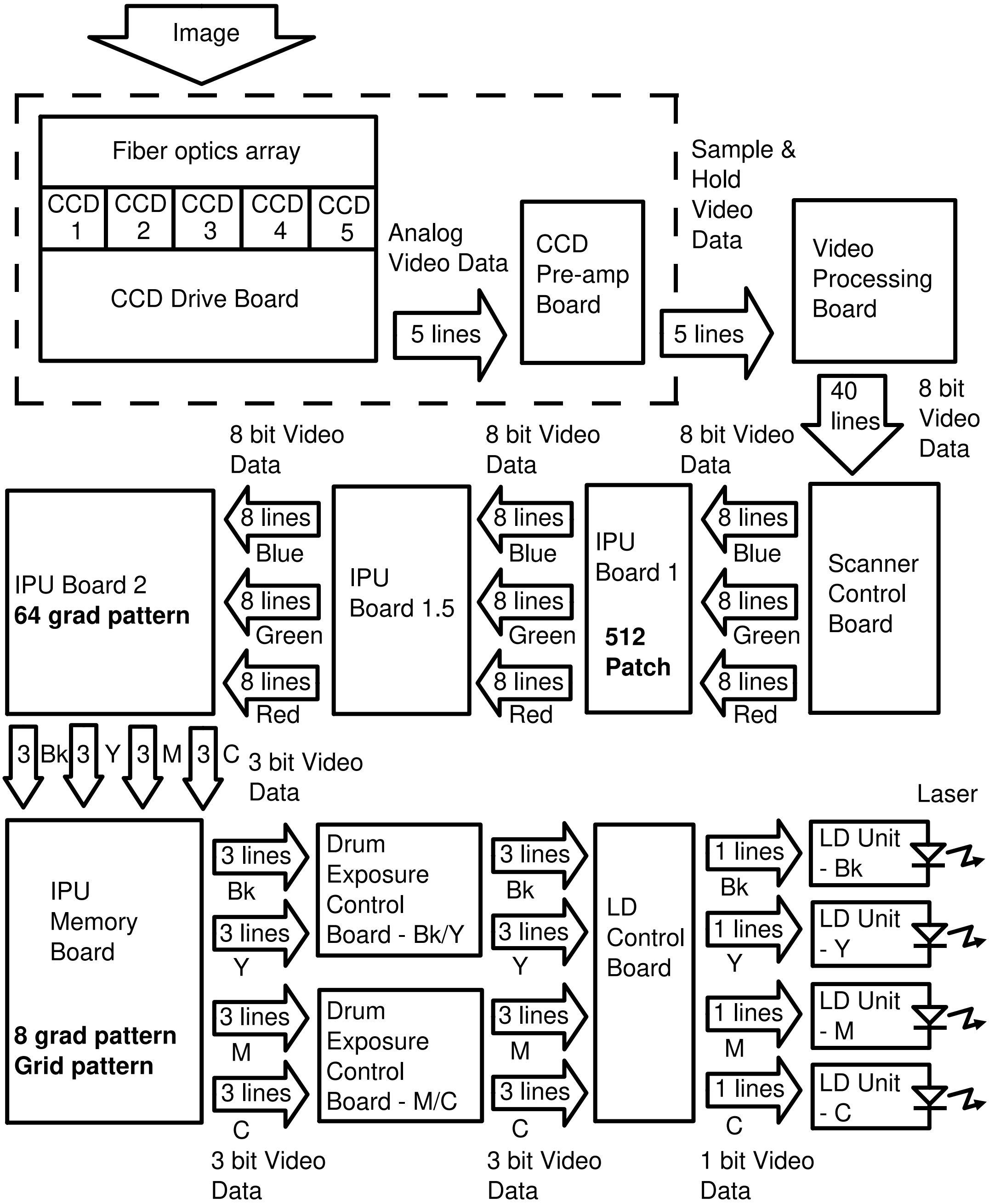
1. The drum for each color should not be used for another color.
2. The drum should be installed with the serial number on the front side. (Never change the direction of front and rear.)

If the drum or its orientation in the copier is changed, the Vmin and TD check procedure must be performed.

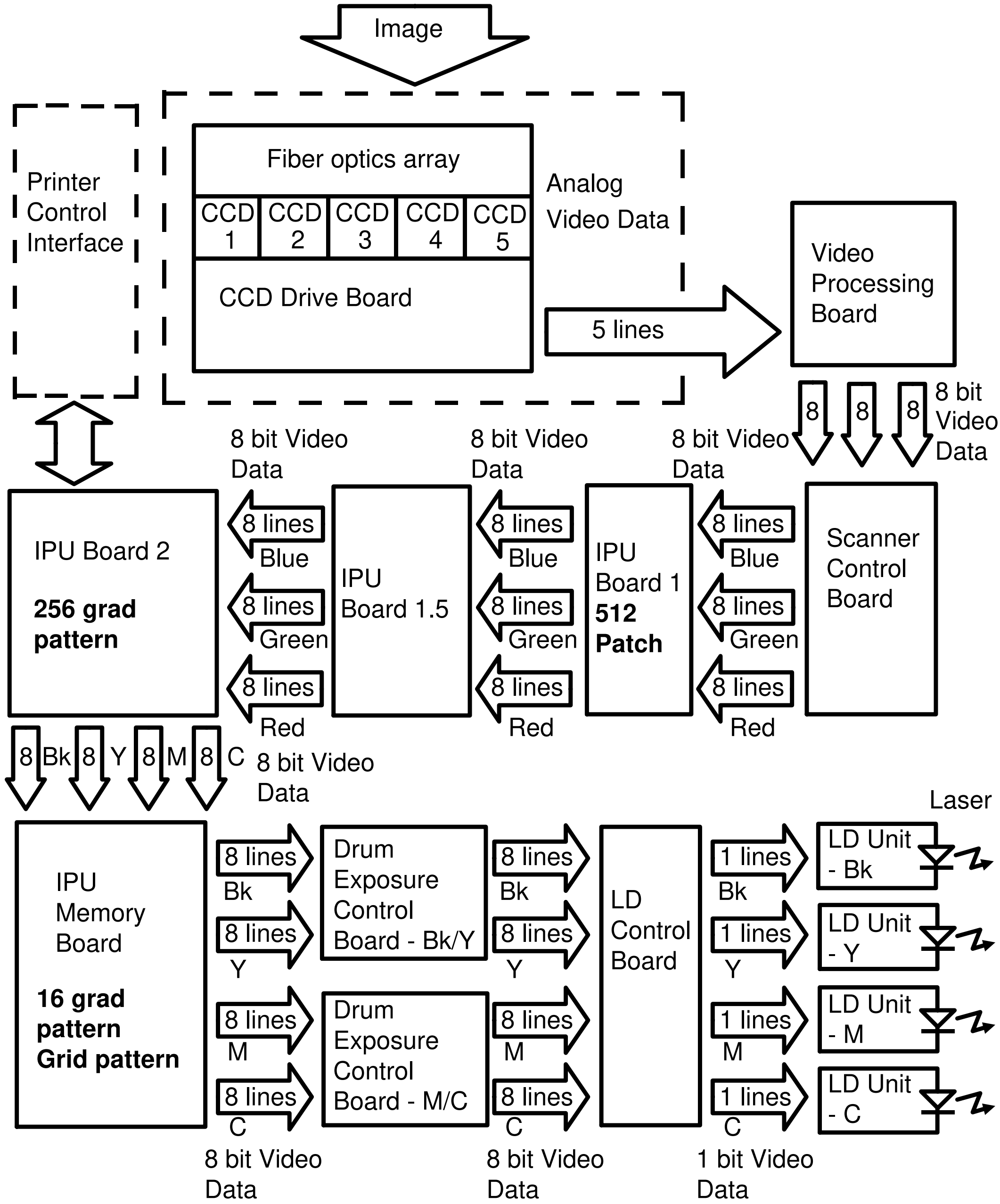
2. IMAGE PROCESSING

2.1 OVERVIEW

<Model A092>



<Model A105>



CCD Drive Board

The CCD drive board has 5 separate CCD chips, which generate the analog video signals. The analog video signal is transferred to the CCD pre-amp board through coaxial cables.

CCD Pre-amp Board

<Model A092>
The CCD pre-amp board amplifies the analog video signal and removes the dc component from the video signal. The analog video signal is transferred to the video processing board.

<Model A105>
This board has been eliminated from Model A105. The function of this board has been combined the video processing board.

Video Processing Board

<Model A092>
The video processing board performs the auto shading correction and converts the analog video signal to an 8-bit digital video signal (256 gradations), which is transferred to the scanner control board.

<Model A105>
The function of CCD Pre-amp Board has been added on the function described above. Shading correction is removed from this board and added to the scanner control board.

Scanner Control Board

<Model A092>
The scanner control board connects the digital video signals from the 5 CCD chips and separates them into blue video data, green video data, and red video data. The separated data is transferred to IPU board 1, IPU board 1.5, and IPU board 2 in sequence.

<Model A105>
The shading correction is added to the above function.

IPU board 1, IPU board 1.5, and IPU board 2 perform these functions:

IPU board 1

- Main scanning magnification
- Slanted image
- Mirror image
- Shadow
- Mosaic
- 512 color patch pattern
- OHP mode timing signal

IPU board 1.5

- Auto letter/photo
- MTF correction

IPU board 2

- Color conversion
- Background density control
- Single color
- Edit image
- Positive/Negative reverse
- Test copy (256 gradation pattern)
- Dithering
- Outline
- Auto original size detection
- Pastel image
- Posterization
- Solarization
- UCR
- UCA
- RGB gamma
- YMCBk gamma
- Color balance
- MTF correction

After processing the video data, the IPU board 2 transfers the black, yellow, magenta, and cyan video data (3 bits for each color) to the IPU memory board.

IPU Memory Board

The IPU memory board stores the full-color video data of the image. The board performs these functions:

- Grid pattern
- 16-gradation pattern
- Laser exposure timing control
- Image editing

The IPU memory board sends the 3 bit video data for each color to the drum exposure control board.

Drum Exposure Control Board

Two drum exposure control boards are used in this machine. One is for Black and Yellow, and the other one is for Magenta and Cyan.
These boards perform the following:

- ID pattern generation
- Main scanning magnification adjustment
- Main scanning laser exposing start timing
- Laser synchronizing detector

The 3 bit data (8 bit data: Model A105) for each color are sent to the LD control board.

LD Control Board

This board controls the laser exposure power level for each color. This board performs the following:

- Auto power control

The serial data is sent to the LD unit for each color.

<Model A092>

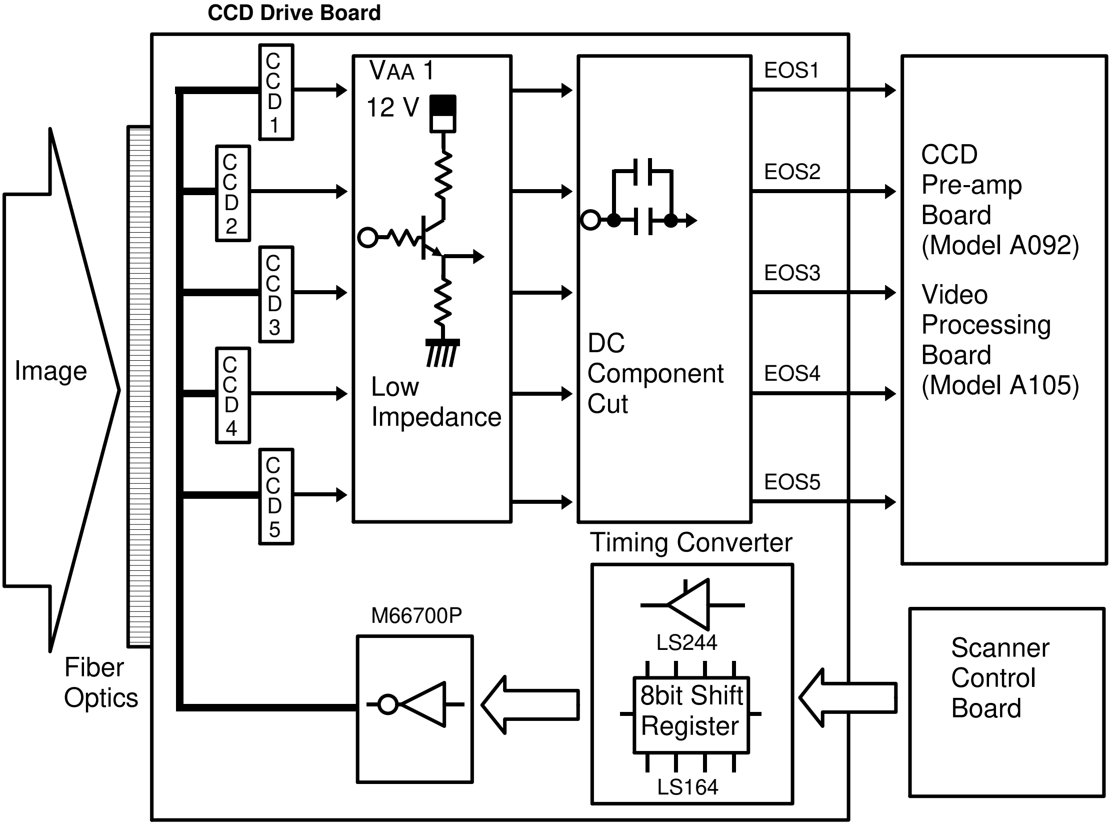
- 8 step laser exposure power level control

<Model A105>

- 256 step laser exposure power level control.

2.2 CCD DRIVE BOARD

<Model A092 & A105>



The timing signals for the CCDs come from the scanner control board. The timing converter transfers them to the 5 CCDs.

The blue, green, and red video signals that are scanned by the 5 CCDs are sent in sequence to the transistors to reduce the impedance of the signal line.

Then, the video signals go through the capacitor to remove the dc portion, and the video signals (EOS1 ~ 5) are sent to the CCD pre-amp board (Model A105 = video processing board).

2.3 CCD PRE-AMP BOARD

<Model A092>

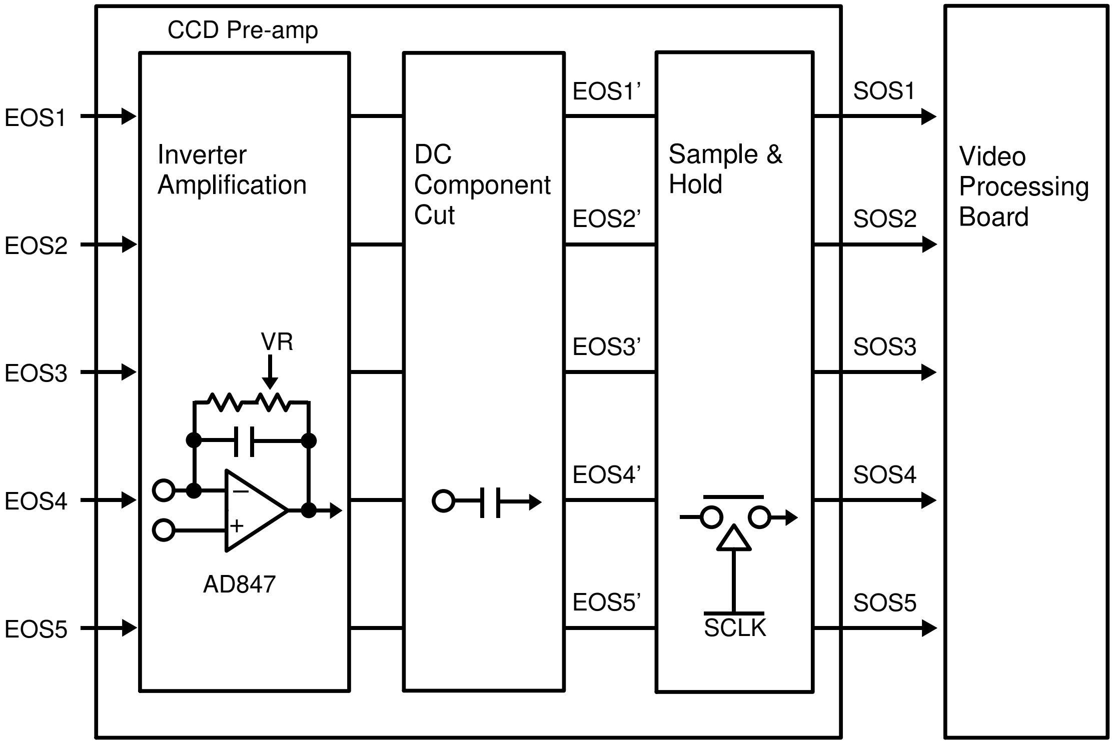


Fig. 1

The video signals (EOS1 ~ 5) are amplified and inverted by AD847s. The amplification factor has been adjusted at the factory by controls VR301, VR321, VR341, VR361, and VR381. **Never touch these controls**.

If the setting's of these VR's is changed, uneven density vertical bands will appear on the copy.

The dc portion of the video data for each color is removed by the capacitor.

The sample and hold circuit processes the analog video signals as shown in fig 2. Then SOS1 ~ 5 are sent to the video processing board.

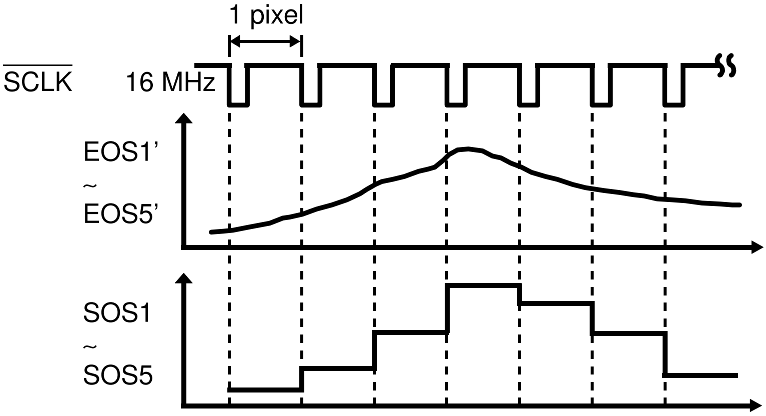
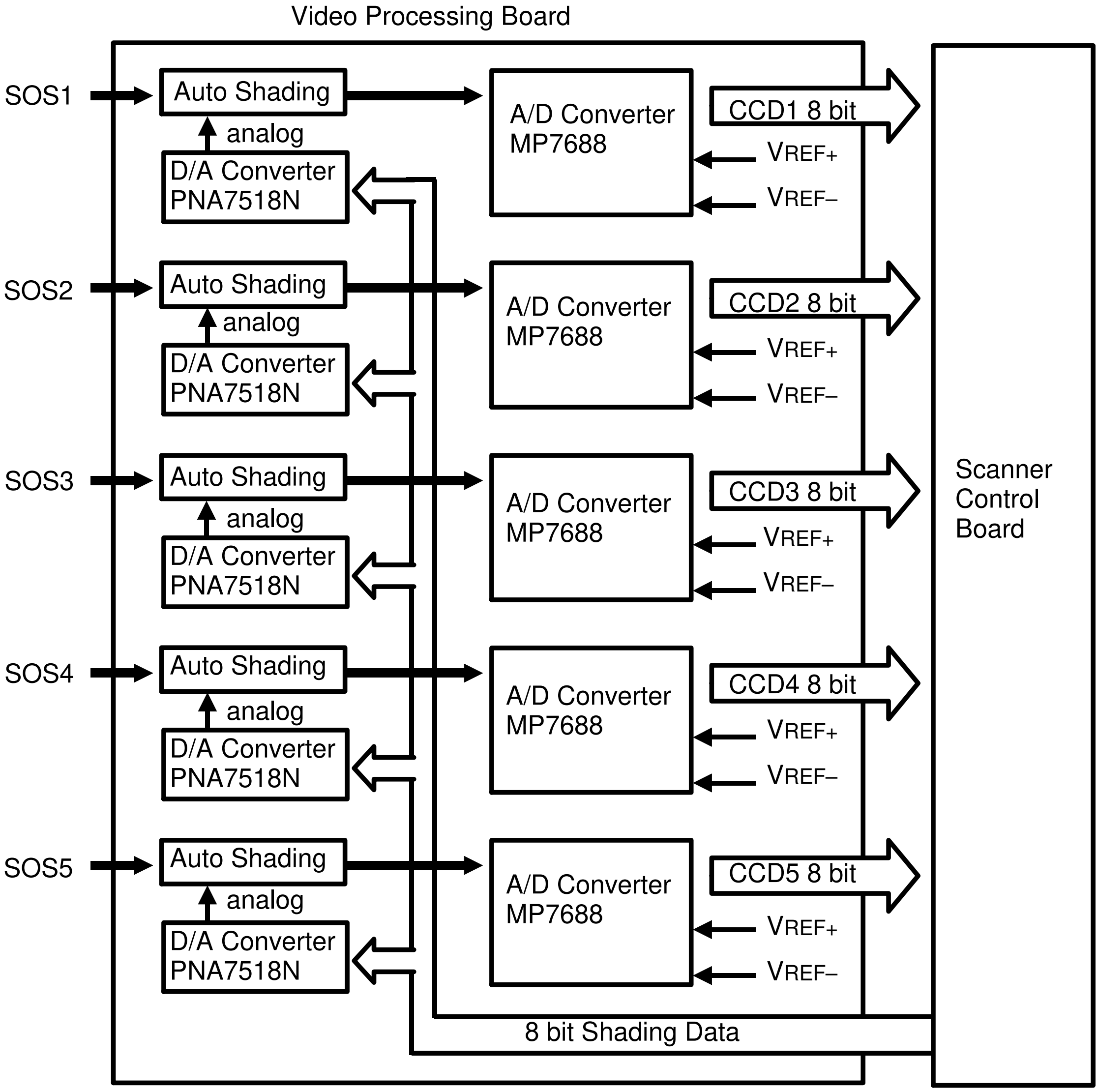


Fig. 2

2.4 VIDEO PROCESSING BOARD

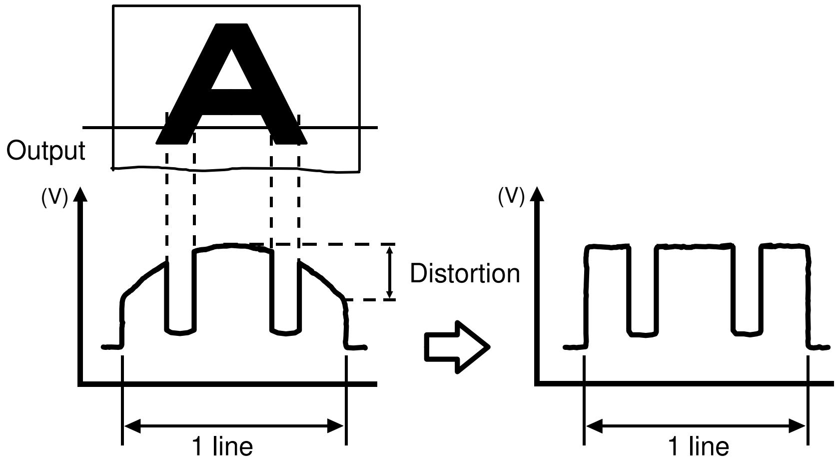
< Model A092>



Auto shading

Auto shading corrects the following variations of the video data (SOS1 ~ 5):

- Variations in sensitivity between individual elements (pixels) of the CCD. (This arises from production processes.)
- Variations in characteristics of the optical fiber array unit. (This machine uses an optical fiber array unit instead of a lens.)
- Loss of brightness towards the ends of the fluorescent lamp.



Video signal before correction

Video signal after correction

Auto shading is necessary for the following reasons:

Before scanning the original, the machine reads a reference wave form from the white reference plate (below the right side scale). The white reference plate video level for each pixel is placed in memory on the scanner control board. The video signal information obtained during image scanning is then input and it is corrected in accordance with the white waveform data which is read out from the scanner control board. In this way, distortion is eliminated and a signal containing only image data is achieved.

A/D Conversion

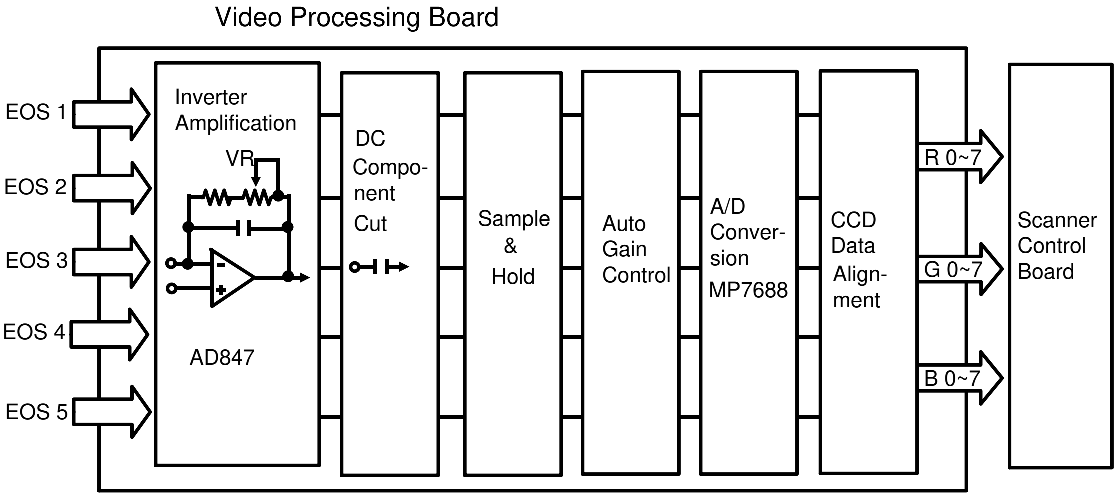
The analog video data is digitized by the A/D converter; 8 bits are used for each pixel, giving 256 graduation steps. VREF+ (maximum analog video data) takes its value from CCD1 which scans the white standard plate before scanning the original image, VREF+ is affected by VR501, VR502, and VR505.

Only VR502 is adjustable. If the background is dirty, turn this VR anti-clockwise. If low ID areas are not reproduced well, turn this VR clockwise.

VREF– (minimum analog video data) is factory set by VR504, VR506, VR507.

CAUTION: Do not bend the white standard plate located over the optics fiber array. If it is bent, the CCD cannot detect the standard white, or may detect it as gray. As a result, the copy image may become lighter.

<Model A105>



– Inverter Amplification –

The video signals (EOS1~5) are amplified and inverted by AD847's. The amplification factor was adjusted at the factory by VR502, VR506, VR509, VR512 and VR515. Never touch these variable resistors. If the setting of these VRs is changed, uneven density vertical bands will appear on the copy.

– DC Component Cut –

The dc portion of the video data for each color is removed by the capacitor.

– Auto Gain Control –

The light intensity of the exposure lamps change on each scan due to changing wall power, changing room temperature, and the length of time the exposure lamps have been on. To correct this change. The white plate under the right scale is scanned to detect the white peak level, which is stored in memory. This white peak level is compared with the standard peak level which is pre-stored in the ROM and the scanned original video data is corrected by the difference between the white peak level and the standard level.

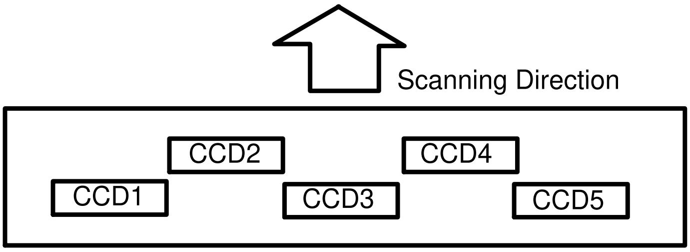
– A/D Conversion –

The analog video data is digitized by the A/D converter; 8 bits are used for each pixel, giving 256 gradation steps. VREF+ (maximum analog video data) takes its value from CCD1 which scans the white standard plate before scanning the original image, VREF+ is affected by DG501, DG502 and VR504.

Only VR504 is adjustable. Adjust it when replacing the video control board or the CCD drive board. See SECTION 5 "CCD DRIVE AND CCD PRE-AMP BOARD REPLACEMENT". VREF– (minimum analog video data) is 0V.

CAUTION: Do not bend the white standard plate located over the optics fiber array. If it is bent, the CCD cannot detect the standard white, or may detect it as gray. As a result, the copy image may become lighter.

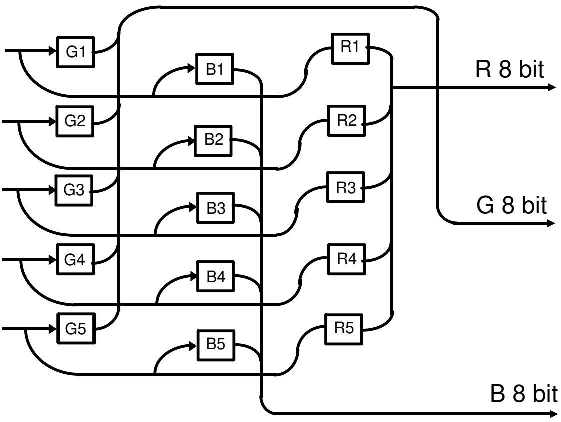
– CCD Data Alignment –



CCD2 and CCD4 scan the image earlier than CCD1, CCD3, and CCD5, because of the CCD layout. The data transfer timing of CCD2 and CCD4 is delayed by buffers (LS244) to match them with the timing of CCD1, CCD3, and CCD5.

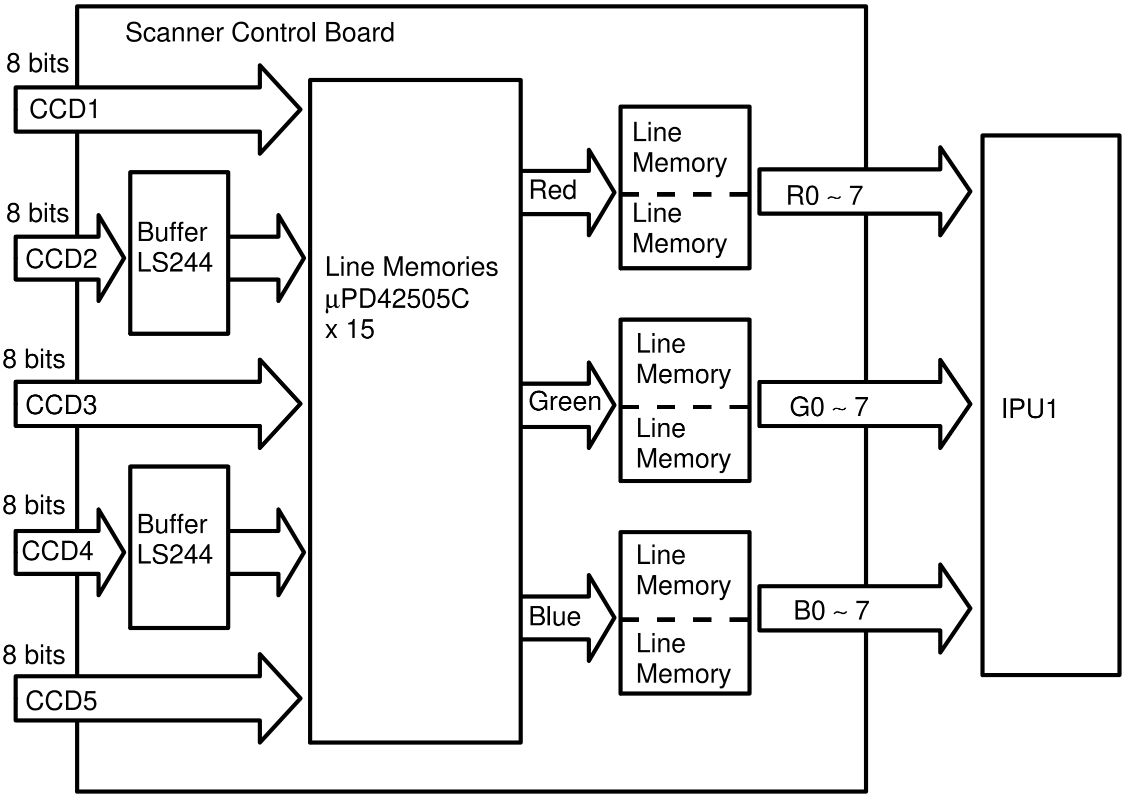
– Color Grouping –

The line memories (M66251 x 15) change the order of the video data. The video data are divided into red, green, and blue video data (8 bits).



2.5 SCANNER CONTROL BOARD

<Model A092>



< Model A092>

– CCD Data Alignment –

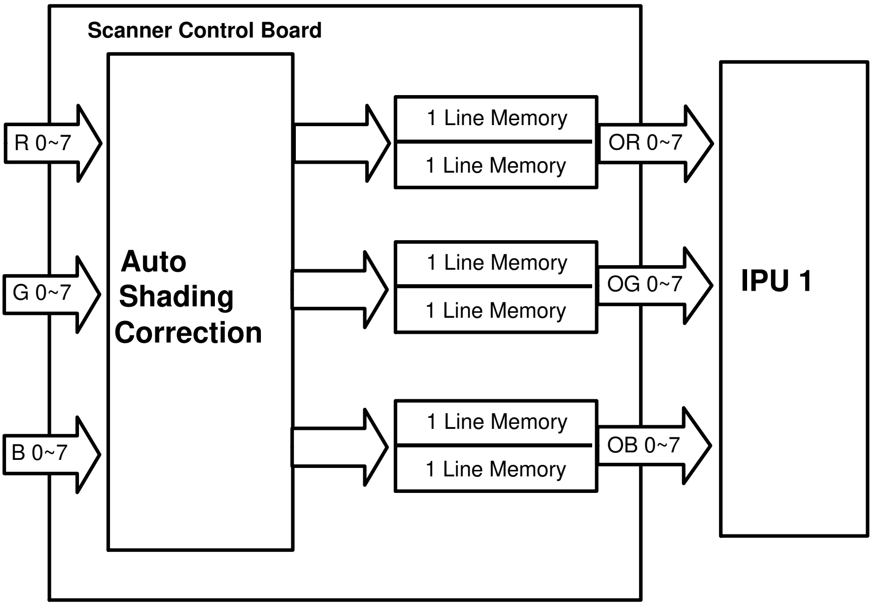
CCD 2 and CCD4 scan the image earlier than CCD1, CCD3, and CCD5, because of the CCD layout. The data transfer timing of CCD2 and CCD4 is delayed by buffers (LS244) to match them with the timing of CCD1, CCD3, and CCD5.

– Color Grouping –

The line memories (µPD4250C x 15) change the order of the video data. The video data is divided into red, green, and blue video data.

The video data for each color is stored in one of the line memories. Two line memories for each color are used alternately and hold one scan line.

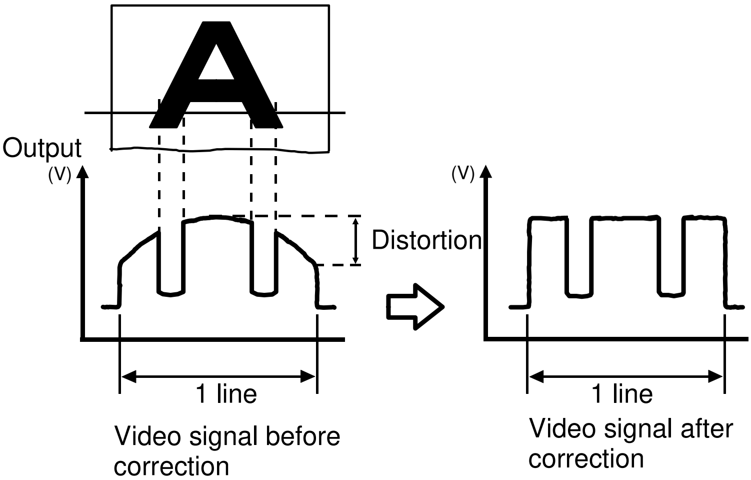
<Model A105>



– Auto shading –

Auto shading corrects the following variations of the video data (R0 ~ 7, G0 ~ 7, B0 ~7):

- Variations in sensitivity between bits of the CCD. (This arises from production processes.)
- Variations in characteristics of the optical fiber array unit. (This machine uses an optical fiber array unit instead of a lens.)
- Loss of brightness toward the ends of the fluorescent lamp.

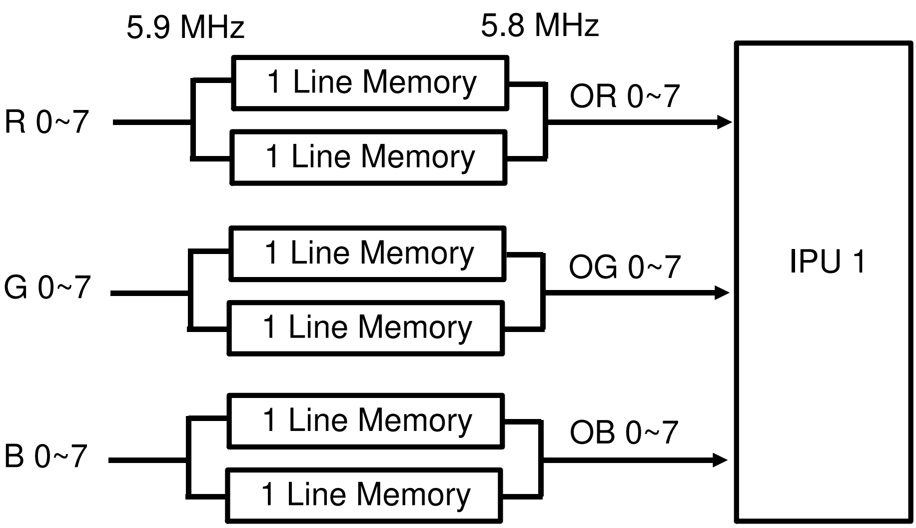


Detailed Descriptions

Auto shading is necessary for the following reasons:

Before scanning the original, the machine reads a reference wave form from the white reference plate (below the right scale). The white reference plate video level for each pixel is written to the scanner control board. The video signal information obtained during image scanning is then input and, it is corrected in accordance with the white waveform data which is read out from the scanner control board. In this way, distortion is eliminated and a signal containing only image data is achieved.

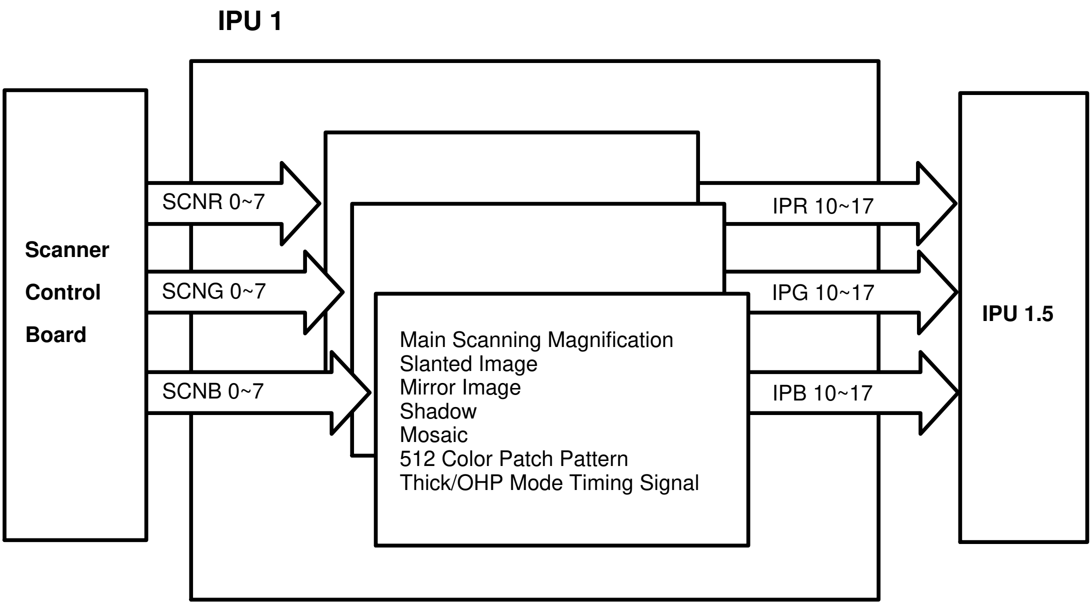
– 1 Line Memory –



The clock frequency of the scanner control board is 5.9 MHz. The clock frequency of the IPU1 is 5.8 MHz. To meet the data transfer timing, 1 line memories are adequated. There are two 1 line memories for each color. When scanning the original, one line video data is stored in the 1 line memory. This data is transferred to IPU 1 when next line data is stored in the other 1 line memory. Therefore, 1 line memory is a kind of buffer and it can adjust the output rate.

2.6 IMAGE PROCESSING UNIT BOARD 1 (IPU 1)

2.6.1 Overview



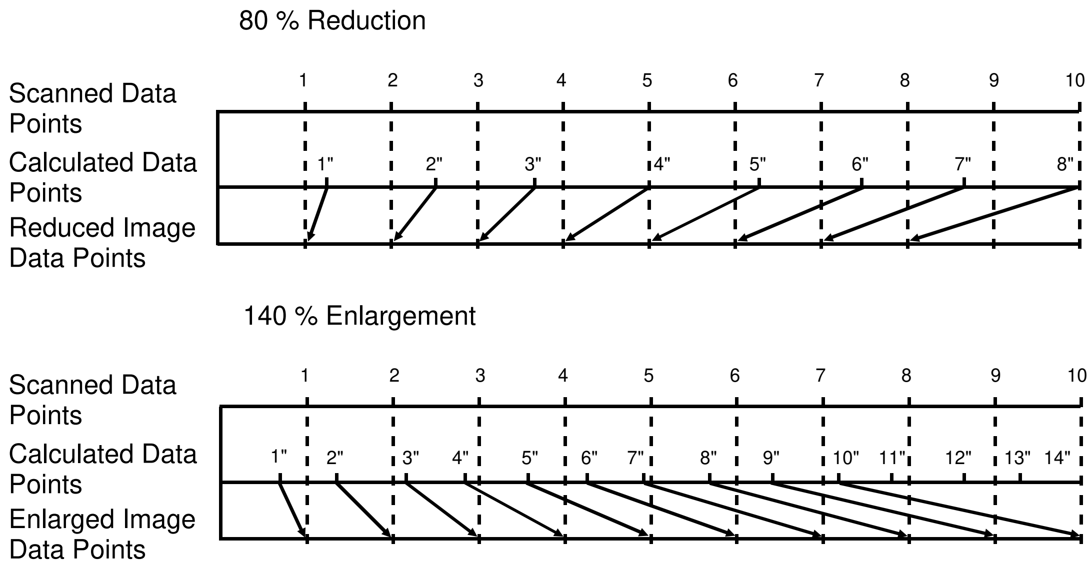
Detailed Descriptions

<Model A092 & A105>

IPU 1 uses 9 custom made LSIs to process the video data. These LSIs perform the following functions:

- Main scan magnification
- Slanted image
- Mirror image
- Shadow
- Mosaic
- 512 color patch pattern
- Thick/OHP mode timing signal

2.6.2 Main Scanning Magnification

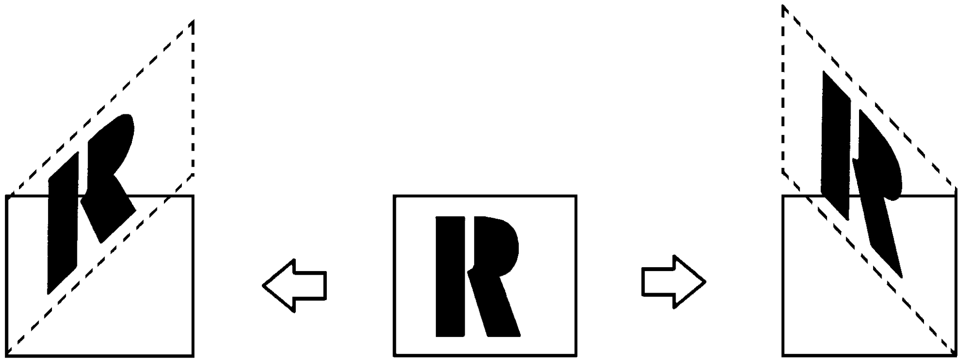


Reduction and enlargement in the sub scan direction is done by changing the scanner speed. However, reduction and enlargement in the main scan direction is handled by IPU board 1.

Scanning and laser writing are done at a fixed pitch (the CCD elements cannot be squeezed or expanded). So, to reduce or enlarge an image, IPU Board 1 calculates imaginary points that would correspond to a physical enlargement or reduction of the image. It then calculates the correct image density for each of the imaginary points based on the image data of the nearest four true points. The calculated image data then becomes the new (reduced or enlarged) image data.

NOTE: The actual calculations for main scan magnification are performed following the polynomial convolution method. This mathematical process is beyond the scope of a service manual and will not be covered here.

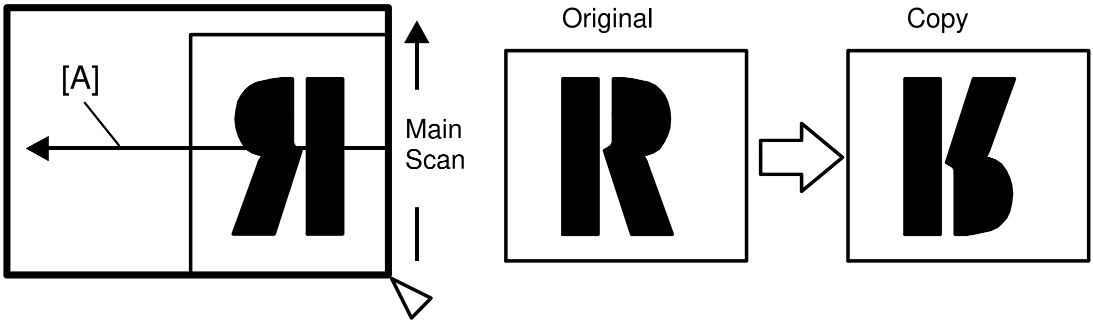
2.6.3 Slant Image



–45° (MAX) ⇐ 0 ⇒ +45° (MAX)
5° step 5° step

The copy image is slanted as shown in illustration above. If a greater slant is selected, portions of the image will not be printed.

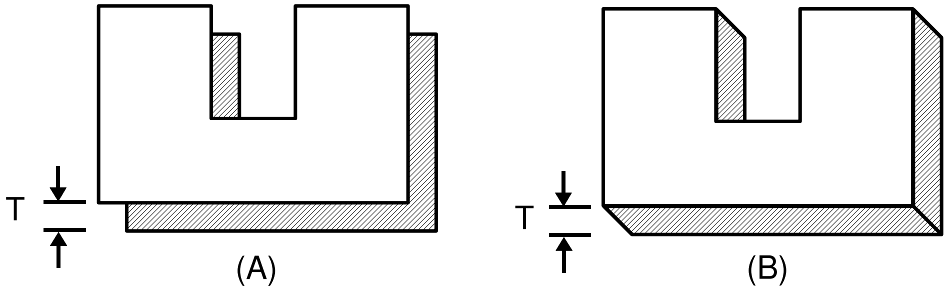
2.6.4 Mirror Image



The image is inverted relative to the subscan axis [A].

The main scanning data is transferred to the laser unit starting with the data at the end of the main scan line.

2.6.5 Shadowing

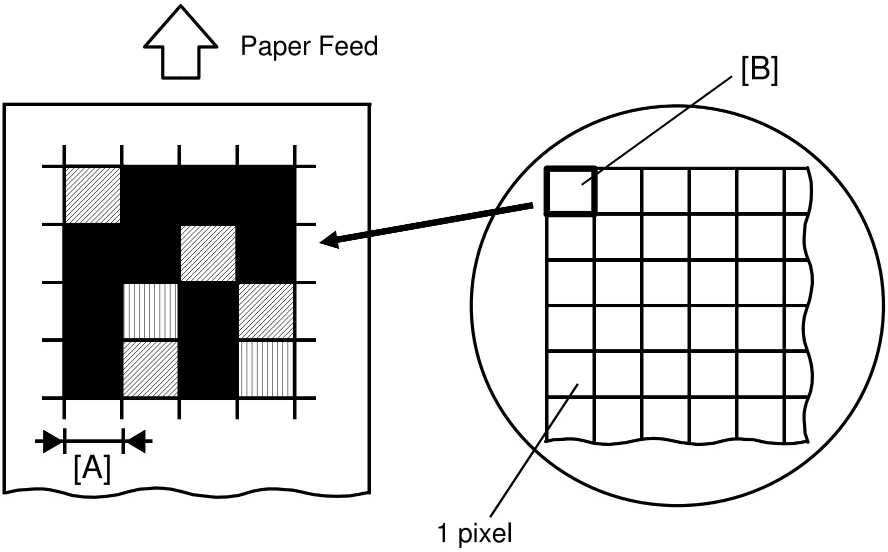


There are two shadowing functions: off-set shadowing (A) and block shadowing (B).

The shadow falls below and to the right of the image. The shadow can be any of 9 colors: yellow, magenta, cyan, blue, green red, light green, orange, and black.

The width (T) of shadow can be adjusted to 1, 3, or 5 mm.

2.6.6 Mosaic



The resolution of mosaic can be adjusted on the operation panel to 1 mm, 2 mm, 4 mm, or 8 mm [A].

A mosaic block is made of many pixels. In standard copy mode, each pixel will have its color determined independently but in mosaic mode, the color of the pixels forming a block will be the color of the pixel in the upper left corner of the block [B].

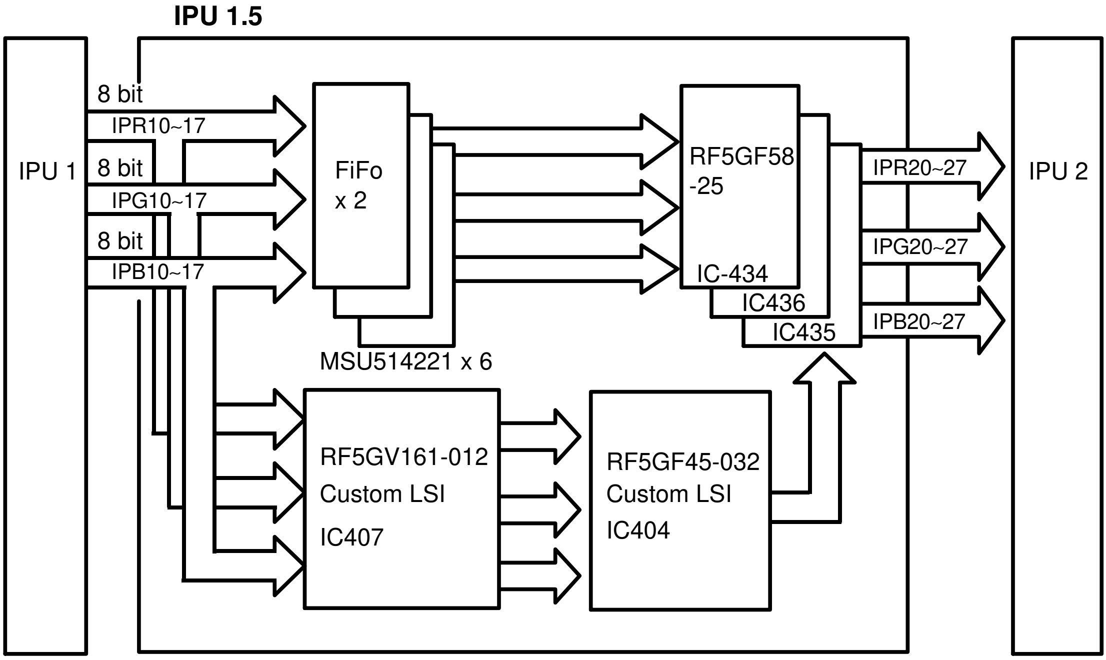
2.6.7 512 Color Patch Pattern

Prints out the 512 color gradations. When an abnormal copy comes out, this test copy mode is used for finding the cause of the trouble.

2.7 IMAGE PROCESSING UNIT BOARD 1.5 (IPU 1.5)

2.7.1 Overview

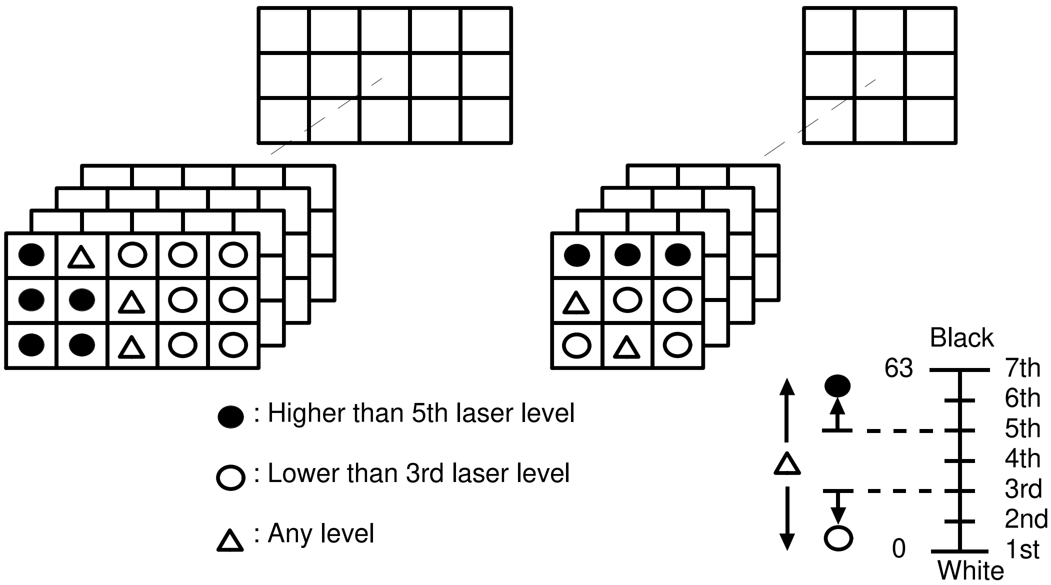
<Model A092 & A105>



The IPU board 1.5 uses 5 custom LSIs to process the video data. These LSIs perform the following functions:

- Auto Letter/Photo separation
- MTF correction

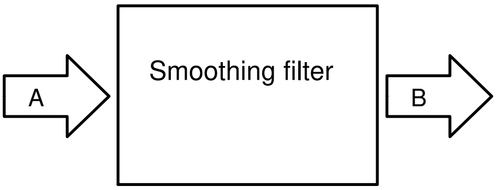
2.7.2 Auto Letter/Photo Separation

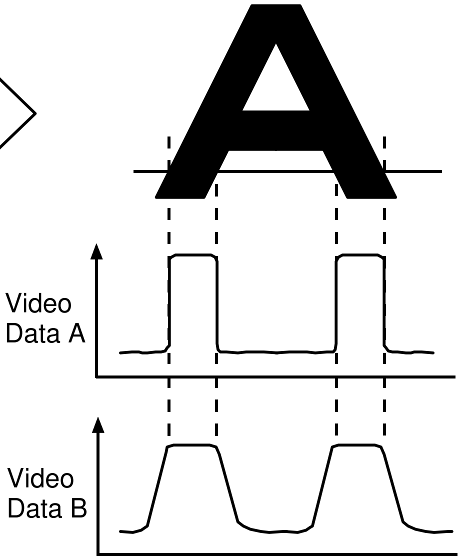


The custom LSI (RF5GV161-012) utilizes several kinds of video data matrices (3 x 5 matrix, 3 x 3 matrix). When the scanned video data is sent to this board, the scanned data is compared with the matrix data in the custom LSI one matrix at a time. If the scanned data matches the custom LSI data, the data is processed in letter mode. If the data doesn't match, the video data is processed in photo mode.

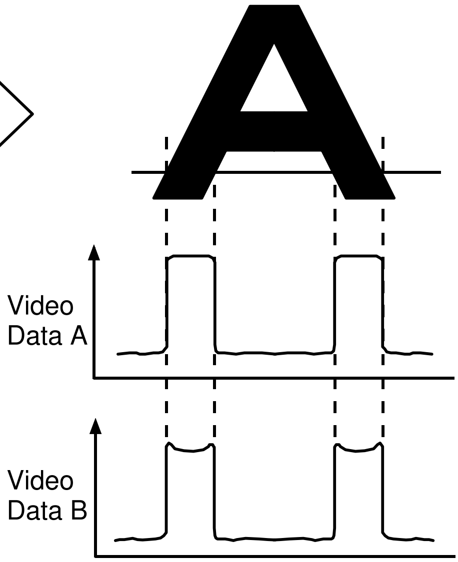
This processing is effective for small letters. If there are big letters or solid patterns in the original, only the edges of those images are processed in letter mode. The inside of those images will be processed in the photo mode.

2.7.3 MTF Correction (Modulation Transfer Function)





- Photo mode
- Letter/photo mode
- Photo area of auto letter/photo mode



- Letter mode
- Letter area of auto letter/photo mode

There are two MTF correction functions. One function is a smoothing filter used in photo and the letter/photo modes. The smoothing filter is also used on the photo area when in the auto letter/photo mode. The other function is a high contrast filter used in letter mode and used on the letter area when in auto letter/photo mode.

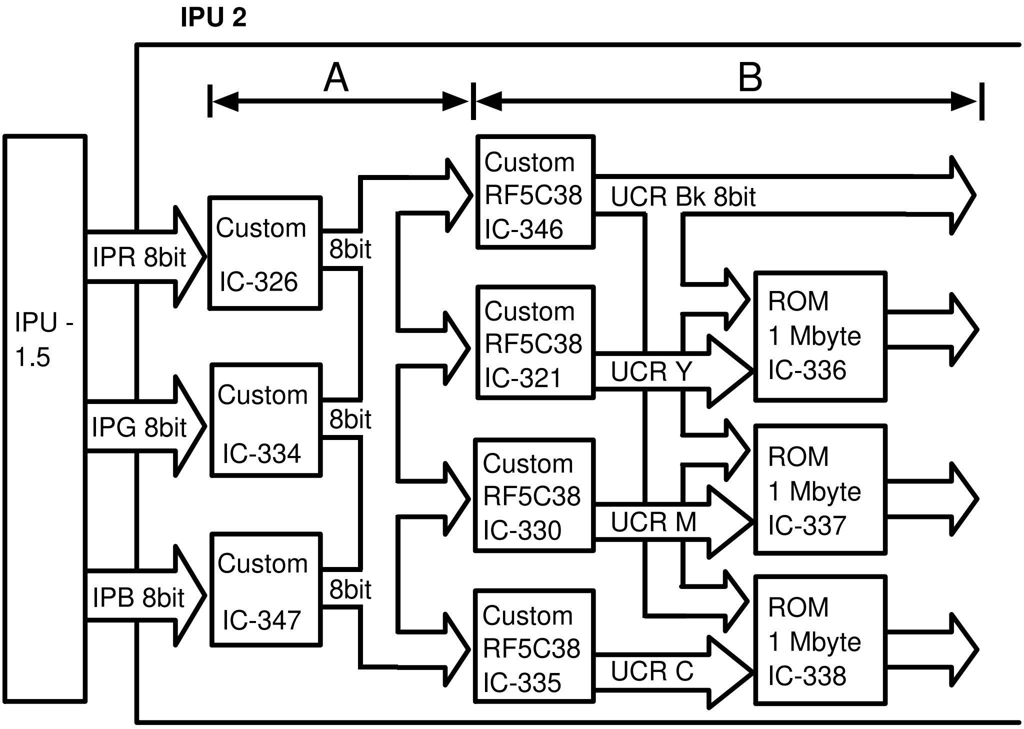
The smoothing filter improves the image by smoothing the gradient of the half tone areas.

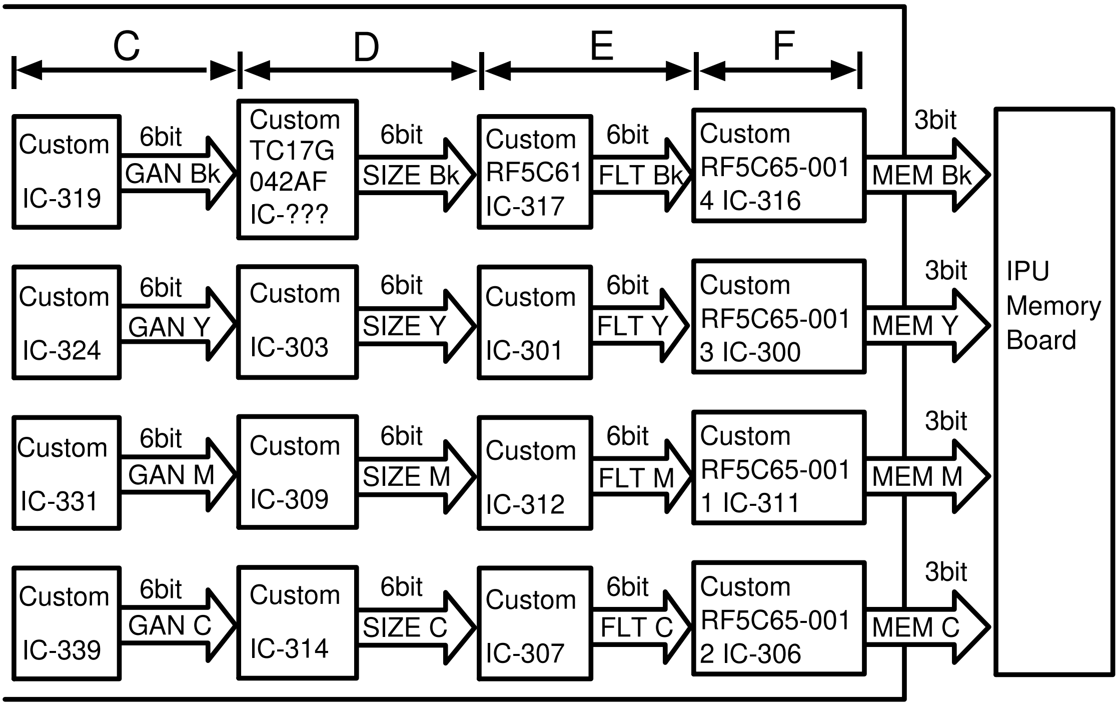
The high contrast filter improves letters by contrasting or sharply defining the edge of the image.

2.8 IMAGE PROCESSING UNIT BOARD 2 (IPU 2)

2.8.1 Overview

<Model A092>





The custom LSIs on this board perform these functions:

A: 1) RGB gamma adjustment
   2) Positive/Negative

B: 1) Color conversion BGR → YMCBk
   2) UCR (Under Color Removal)
   3) UCA (Under Color Addition)

C: Image adjustment:
   1) YMCBk gamma adjustment
   2) Density
   3) Contrast
   4) Color balance adjustment
   5) Background density control

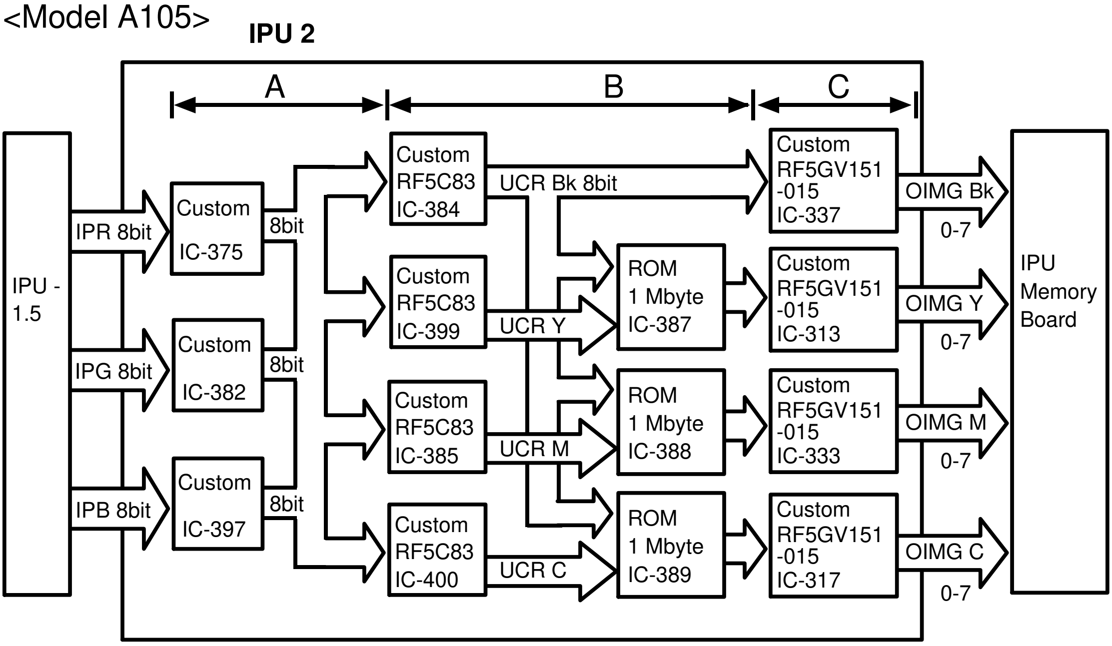
   Color creation:
   6) Pastel
   7) Solarization
   8) Posterization

D: 1) Original size detection
   2) Test copy (64-graduation pattern)
   3) Binary conversion

E: 1) MTF (Modulation Transfer Function) correction
   2) Outline image

F: 1) Dither processing
   2) Erase function

<Model A105>



The custom LSIs on this board perform these functions:

A: 1) RGB gamma adjustment
2) Positive/Negative

B: 1) Color conversion BGR → YMCBk
2) UCR (Under Color Removal)
3) UCA (Under Color Addition)

C: Image adjustment:
1) YMCBk gamma adjustment
2) Density
3) Contrast
4) Color balance adjustment
5) Background density control

Color creation:
6) Pastel
7) Solarization
8) Posterization
9) Original size detection
10) Test copy (64-graduation pattern)
11) Binary conversion
12) MTF (Modulation Transfer Function) correction
13) Outline image
14) Dither processing
15) Erase function

2.8.2 RGB Gamma Adjustment

<Model A092 & A105>

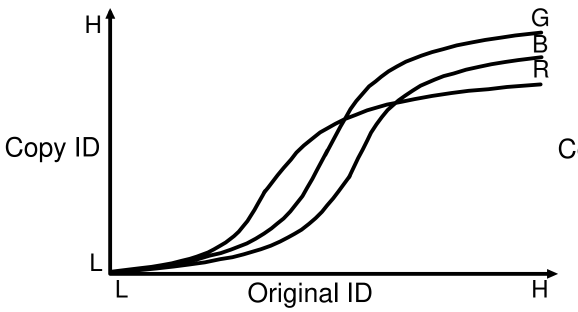


Fig. 1

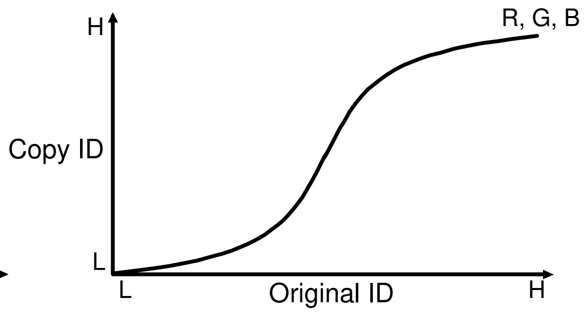
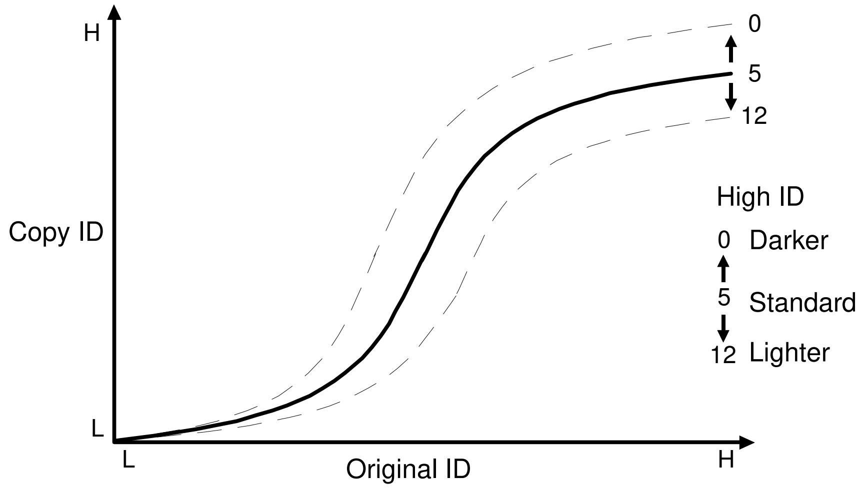


Fig. 2

The relationship between the original ID and the copy ID for each color (red, green, blue) is not linear. The relationship is described by the gamma curve (fig 1). Ideally, the gamma curves for red, green, and blue should be identical as shown in fig 2, but they are not because similar electronic components of the same type and specifications, like transistors, are never really identical, hence performance varies (fig 1). Because of this the gamma curve for each color can be adjusted by the service representative via a service program mode (SP11).

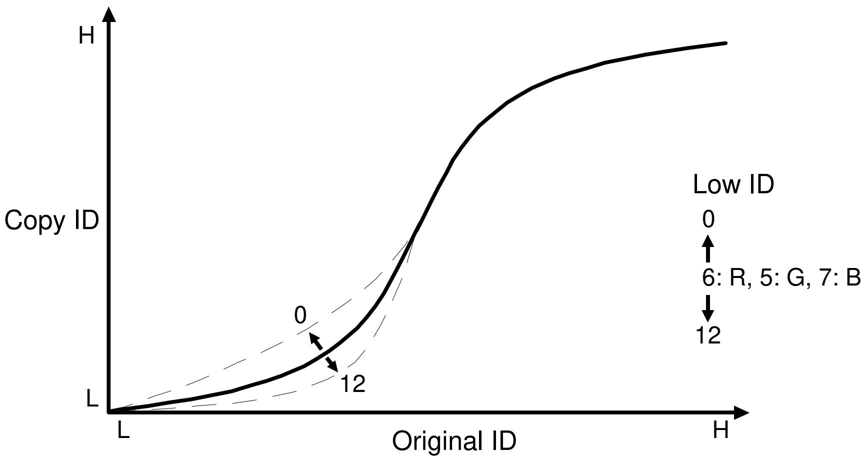
The gamma curve is adjusted from 2 angles. One is the High ID adjustment mode, the other is the Low ID adjustment mode.

High ID adjustment



The High ID mode is used to adjust the total image density. The factory setting for each color is 5. In the field, this value should not be changed.

Low ID adjustment

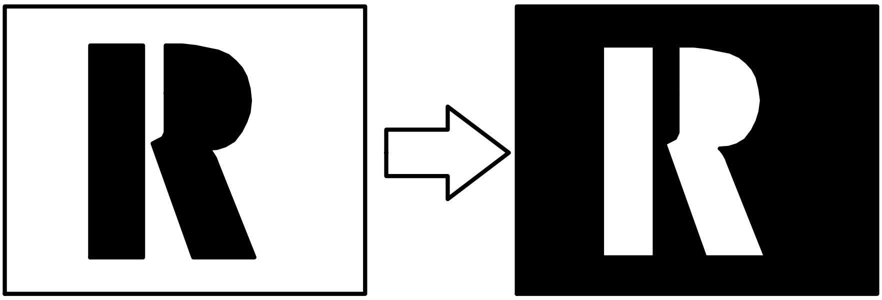


The Low ID mode is used to adjust low image density.

A change of 1 in the Low ID value corresponds roughly to a change of 10% in low image density.

2.8.3 Positive/Negative

<Model A092 & A105>



Colors are changed to their complement, as show in this table:

Red	→	Cyan
Green	→	Magenta
Blue	→	Yellow
Yellow	→	Blue
Magenta	→	Green
Cyan	→	Red
Black	→	White
White	→	Black

2.8.4 UCR (Under Color Removal)

<Model A092 & A105>

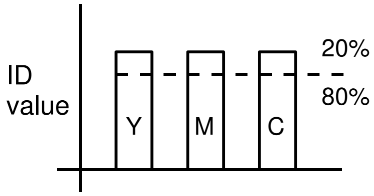


Fig. 1

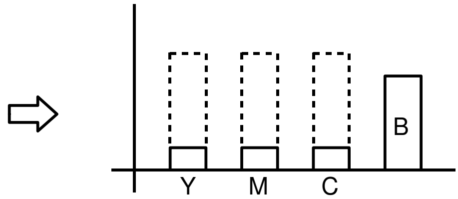


Fig. 2

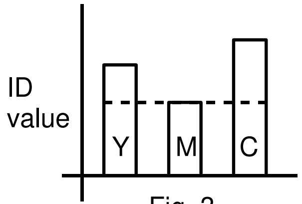


Fig. 3

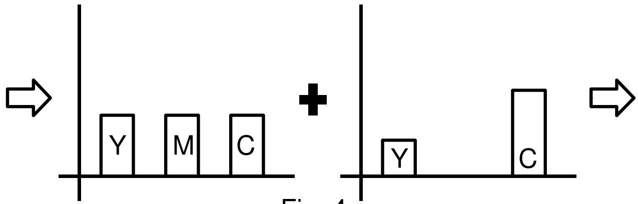


Fig. 4

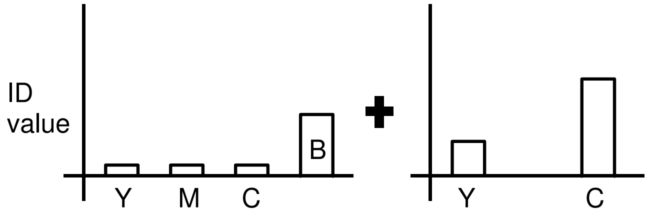


Fig. 5

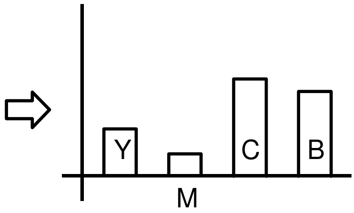


Fig. 6

If for each color (yellow, magenta, cyan) the same quantity of toner is put on the paper, ideally the image should become black, but in reality it becomes dark blue.

To compensate for this, an equal portion of the ID value for each color is subtracted. This reduces the amount of color toner on the paper, and a proportional amount of black toner is added. This turns what would have appeared more dark blue into a true black.

When a black image is copied, the ID values for all colors are equal (figure 1). For each color, the ID value is reduced by 80 % and a black ID value is added to compensate for the color ID reduction (figure 2).

When a color image is copied, the color ID values are different from one another (figure 3), but the ID values for this image can be separated into two parts: 1) a set of values equal to the lowest color ID value and 2) the remainder of the two higher values (figure 4).

The part with equal values can be treated as a black image (figures 1 and 2), then added to the remainder part (figure 5). The final result gives us the copy ID value for each color and for black (figure 6).

The 80 % and 20 % used in the figures are not fixed. They can be adjusted by changing the two parameters.

The first parameter is "STOP" and it adjusts the proportion of black toner used. Its adjustment range is 0 (0 %) to 24 (120 %).

STOP	Black ID Value (%)
0	0
↓	↓
10	50
↓	↓
20	100
↓	↓
24	120

The second parameter is "START", and it represents the minimum total ID value for which the under coloring processing is applied. Its adjustment range is 0 to 28. If "START" is 0, then UCR is always applied, and if it is 28, then UCR is applied only when the total ID value exceeds 0.49.

START	Minimum total ID
0	0
↓	↓
10	0.175
↓	↓
20	0.35
↓	↓
28	0.49

The factory setting is described in the table below.

<Model A092>

Mode	UCR (%)	Start (0~28)	Stop (0~24)
Letter	80	2	16
Letter/Photo	80	16	16
Photo	60	20	12

<Model A105>

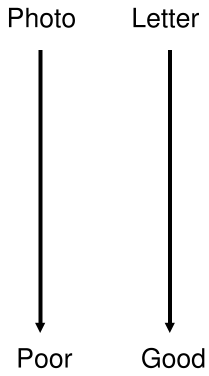
Mode	UCR (%)	Start (0~28)	Stop (0~24)
Letter	100	0	20
Letter/Photo	80	28	16
Photo	100	22	20

- The letter area settings in the auto Letter/Photo mode are the same as those for the Letter mode.
- The photo area settings in the auto Letter/Photo mode are the same as those for the Photo mode.

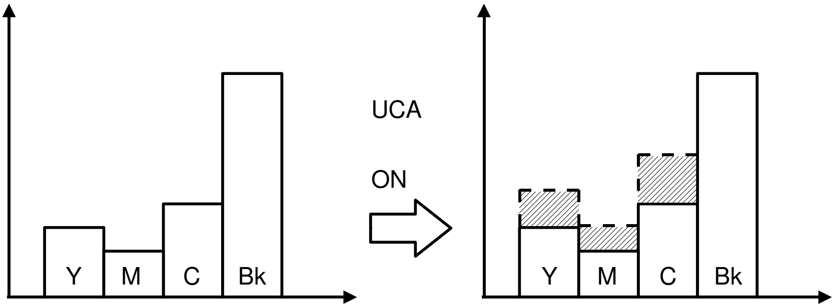
User tool

The user can choose one of 9 settings in the Photo/Letter mode.

	Model A092		Model A105	
UCR	START	STOP	START	STOP
0	16	16	28	12
1	14	16	24	13
2	12	17	20	14
3	10	17	16	15
4	8	18	12	16
5	6	18	8	17
6	4	19	4	18
7	2	19	0	19
8	0	20	0	20



2.8.5 UCA (Under Color Addition)



Using only UCR processing, the copy image lacks depth. So, a specified ratio of toner is added for each color (yellow, magenta, cyan). The amount of additional toner added for each color is in proportion to the overall color's density.

UCA is turned ON or OFF by SP14. Factory setting is ON for all modes.

2.8.6 YMCBk Gamma

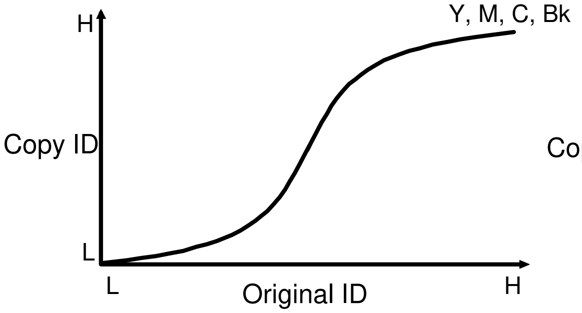


Fig. 1

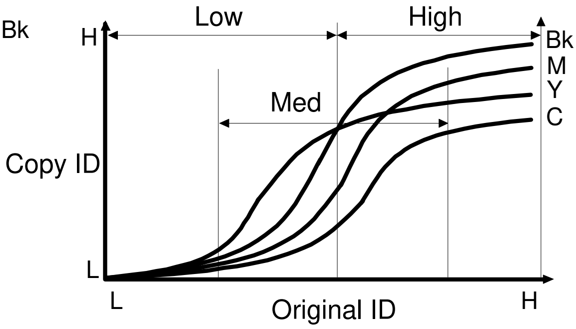


Fig. 2

Ideally, the gamma curves for yellow, magenta, cyan, and black should be identical as shown in figure 1. But they are not because the electrical components used for processing each color are never really identical to one another. This results in gamma curves as shown in figure 2. So, the gamma curve for each color can be adjusted using a service program. (SP12)

The gamma curve can be adjusted through 4 different modes: ID max, High ID, Low ID, Middle ID. (See figure 2)

ID max

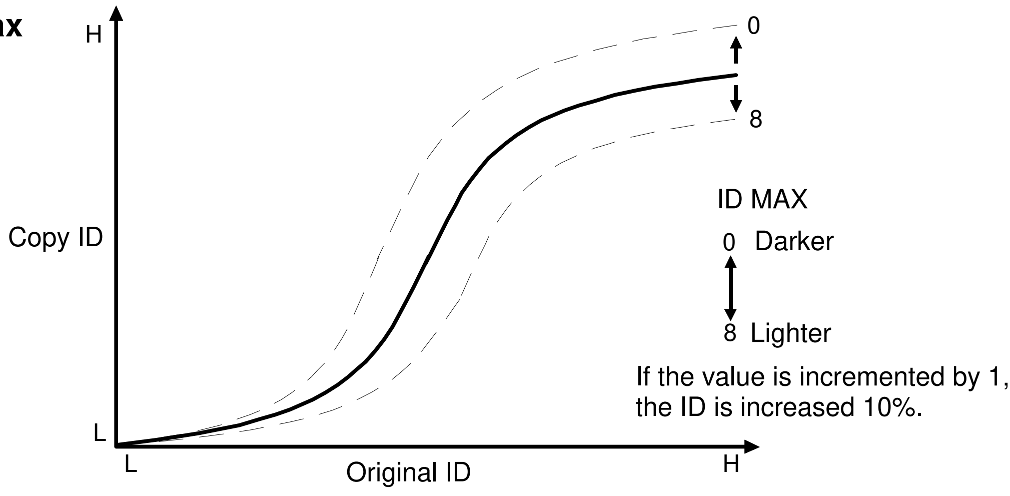


Fig. 3

This mode is used to adjust the total image density level as shown in figure 3. This adjustment is done when replacing the OPC drum, and the specified ID cannot be obtained even after the Vmin and TD check have been performed. When adjusting the color balance, the ID max value will be changed.

CAUTION: If ID max is adjusted, also adjust the High ID, Low ID, and Middle ID.

High ID

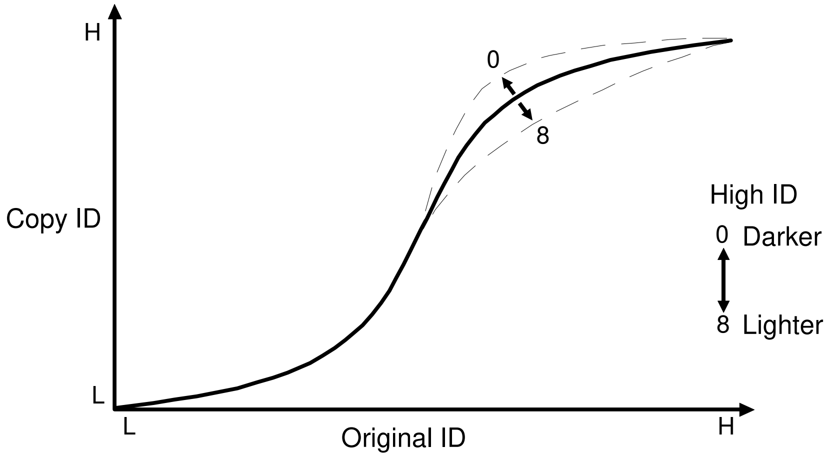


Fig. 4

The ID mode is used to adjust the image density between Level 5 and Level 10 of the color gradation scale on the C-4 test chart (figure 4).

Low ID

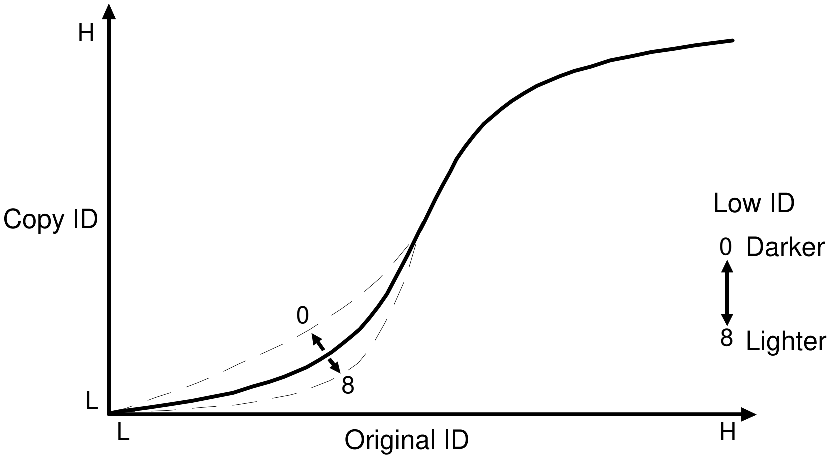


Fig. 5

The Low ID mode is used to adjust the image density between Level 1 to Level 5 of the color gradation scale of the C-4 test chart (figure 5).

Middle ID

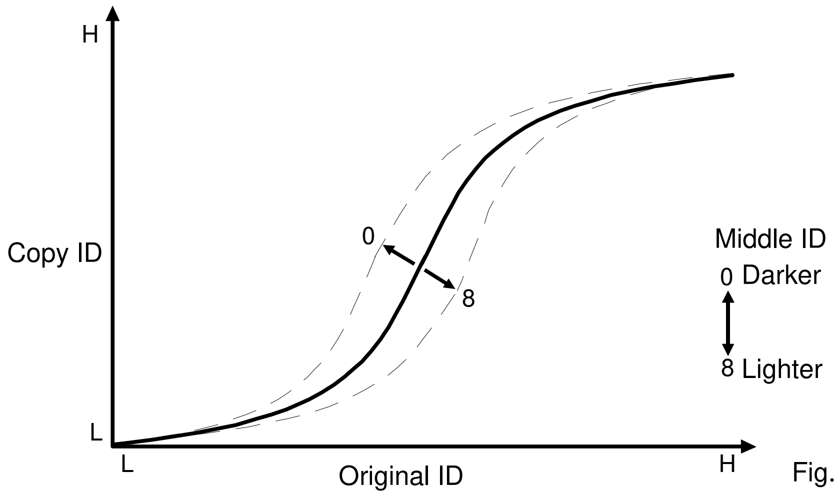


Fig. 6

Middle ID is used to adjust the image density for all ID levels (figure 6).

2.8.7 Image Density

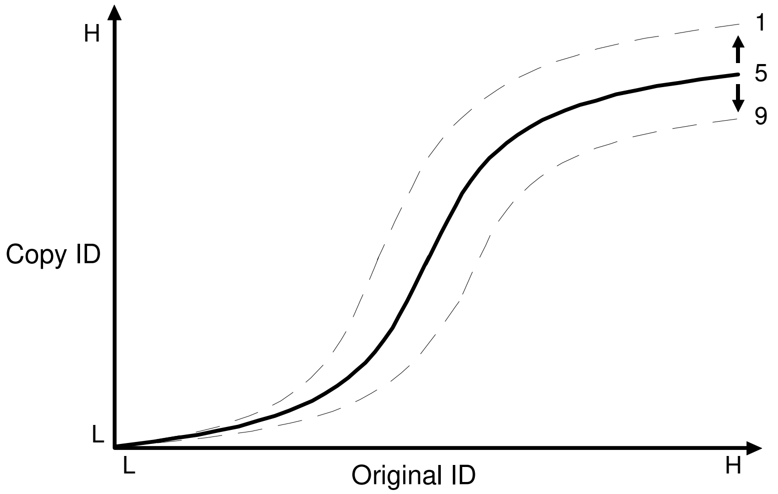
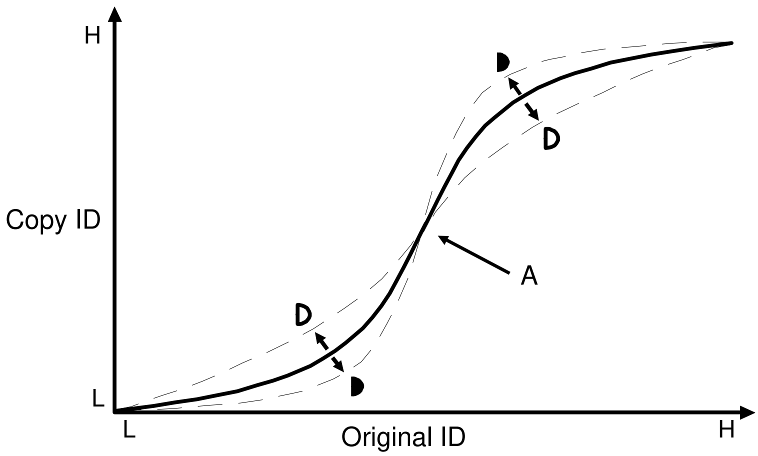


Fig. 7

Image density can be adjusted by the Image Density control key on the operation panel. There are 9 density levels (figure 7).

2.8.8 Contrast



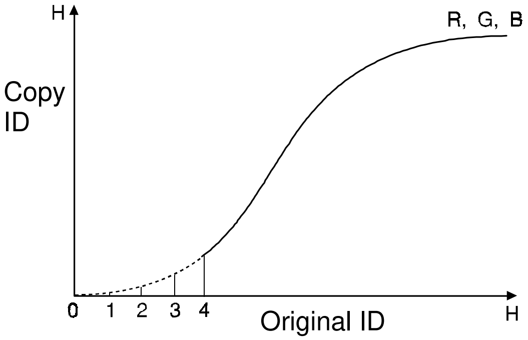
Contrast can be adjusted by the contrast keys on the left side of the operation panel. The contrast of each color (Y, M, C, Bk) can be adjusted independently over 9 levels. The slope of the line in the graph changes, but stays centered around point A. (A: 32 of 64 graduation steps)

2.8.9 Color Balance

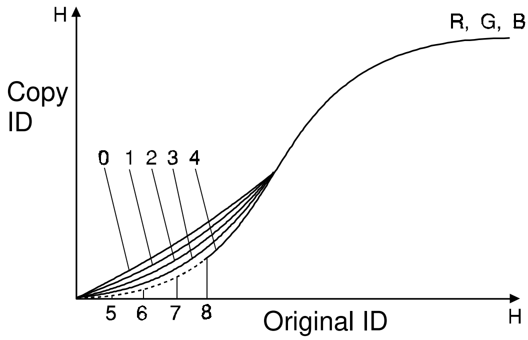
Image density control changes every color density setting at the same time, but the color balance changes each color density setting independently. Colors are adjusted by the color balance keys.

2.8.10 Background Density Control

<Model A092>



<Model A105>



Low ID image background is removed by this function.

<Model A092>

There are 5 selections (0 ~ 4).

0:	(Default for Low ID background)	
1:	0~5 of 64 gradation steps are removed	
2:	0~10	"
3:	0~15	"
4:	0~20	"

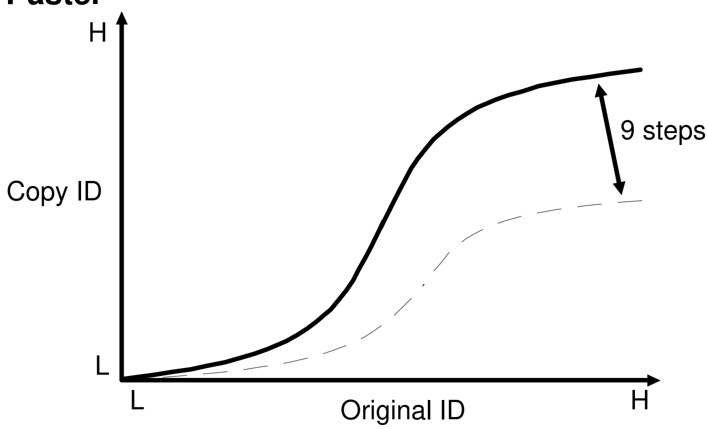
<Model A105>

There are 9 selections (0 ~ 8).

0:	Low ID parameter of RGB gamma is decrease by 4.	
1:	"	by 3.
2:	"	by 2.
3:	"	by 1.
4:	Default	
5:	0~12 of 256 gradation steps are removed.	
6:	0~24	"
7:	0~36	"
8:	0~48	"

This is adjusted by the background density key on the operation panel.

2.8.11 Pastel



This function can be used to decrease the copy density more than by using image density control. The image will become pastel.

2.8.12 Solarization

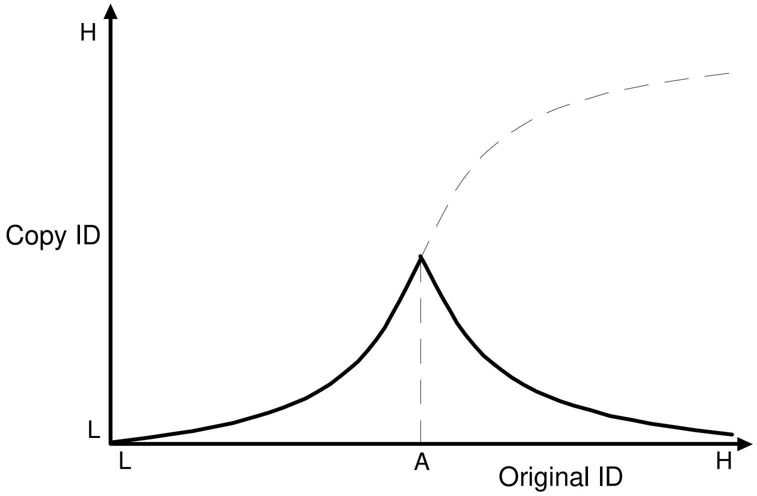
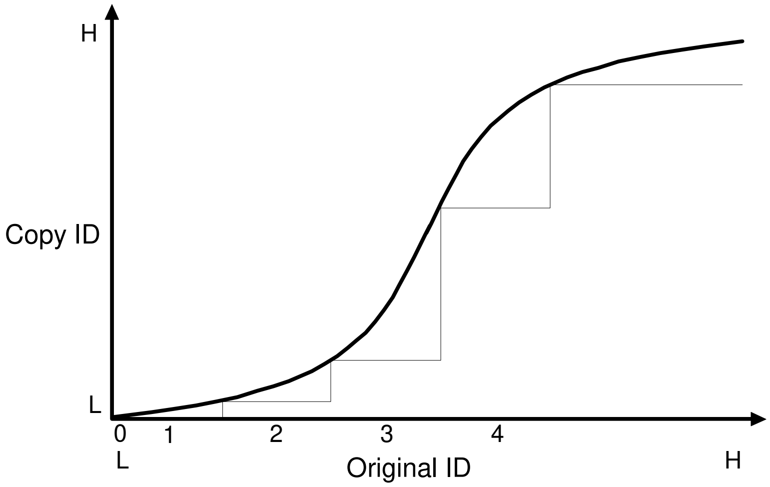


Image densities with ID values greater than A are reversed.
Model A092: (A: 30 of 64 gradation steps)
Model A105: (A: 120 of 256 gradation steps)

2.8.13 Posterization



Instead of being distributed over a 64-level range (256 level range for model A105), image density is distributed over a 4-level range. This gives the copy image a poster effect.

2.8.14 Dither Processing

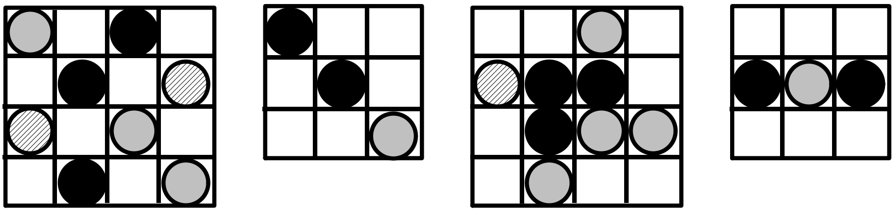
<Model A092>

	Pattern 1 (4 x 4)	Pattern 2 (3 x 3)	Pattern 3 (4 x 4)	Pattern 4 (3 x 3)
Photo mode Photo area in Auto Letter/Photo mode			Y, M, C, Bk	
Letter/Photo mode		Bk	Y	M, C
Letter mode Letter area in Auto Letter/Photo mode	M, C, Bk	Y		

Table 1

One laser pixel can range over only 8 gradations (or shades) for black, magenta, and cyan. The range is only 4 gradations for yellow. Dither processing simulates 64-gradation images from this limited range.

This process uses four patterns. When the operator selects one of the copy modes (Letter mode, Photo mode, Letter/Photo mode, or Auto Letter/Photo mode), one of the patterns is automatically selected for each color (see table 1).



Pattern 1 (Matrix 31) Pattern 2 (Matrix 31) Pattern 3 (Matrix 31) Pattern 4 (Matrix 31)

Fig. 1

There are 64 matrices, numbered 0 to 63, matching each pattern. Laser output values are stored in each matrix. For example, matrix 0, a white image, has "0" entries for laser output. Matrix 63, a solid image, has "7" entries for laser output. Figure 1 shows matrix 31 of patterns 1 to 4. These are the half-tone patterns.

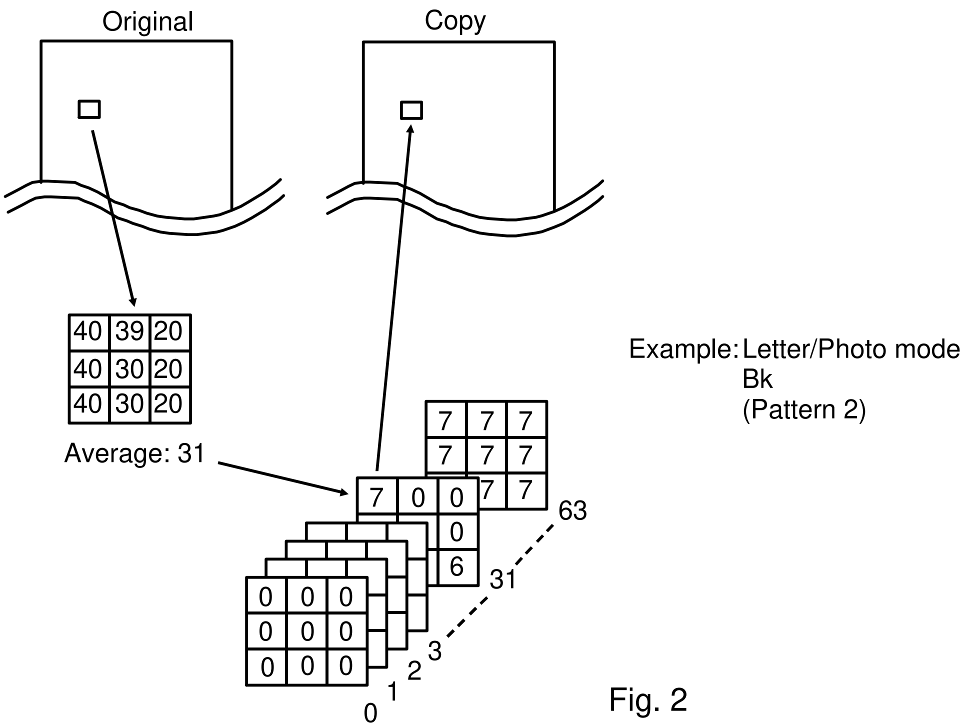
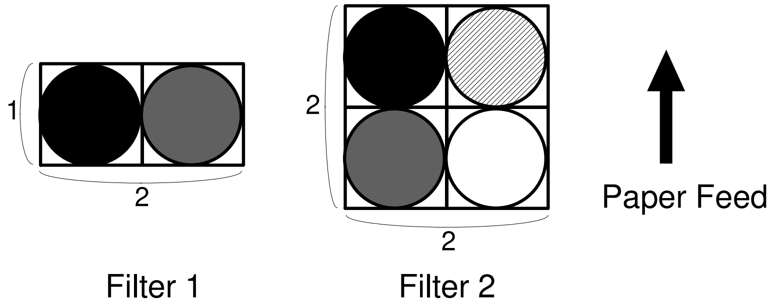


Fig. 2

Original image data is processed matrix by matrix (3 x 3 or 4 x 4). When one matrix image is scanned, the image data in the matrix is averaged and one of the 64 matrices will be selected according to the average. The laser will expose the drum following the values in the appropriate matrix. See figure 2.

<Model A105>



Dither processing is not adopted on this model. This is because one pixel can range over 256 gradations (or shades) for black, magenta, yellow, and cyan. This means that a 256 gradation full color image can be out put without dither processing. However, to make a smoother looking image 2 digital filters are adopted on this model.

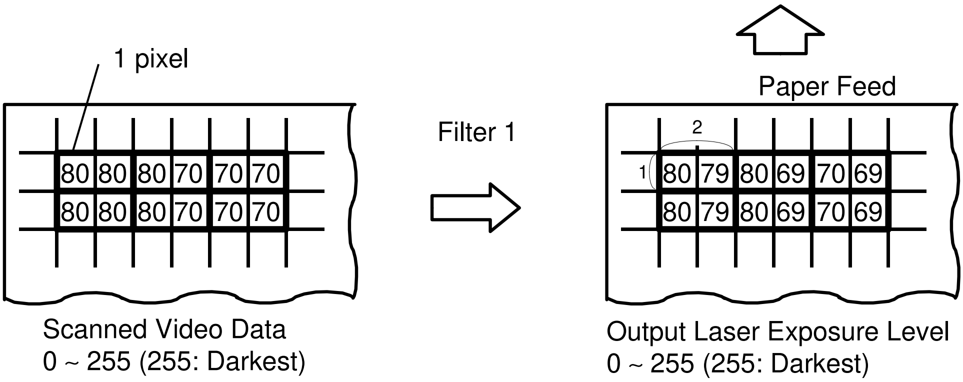
These digital filters are called "Filter 1", "Filter 2". "Filter 1" is used for the letter/photo mode, and "Filter 2" is used for the photo mode. The letter mode does not have a filter, and scanning video data is passed without any changes.

Filter 1
Filter 1 is a 2 by 1 matrix, which is used for the letter/photo mode. This can make the better gradation image than the raw scanned image (letter mode). However, letters or the lines become softer than in the letter mode.

When the video data goes through this filter, the video data is processed as follows:

- When the video data goes through the left pixel of the 2 by 1 matrix, the video data is not changed.
- When the video data goes through the right pixel of the 2 by 1 matrix, the video data is subtracted by 1.

See the illustration on the next page.



After going through this filter, the copier image becomes lighter than that of letter mode.

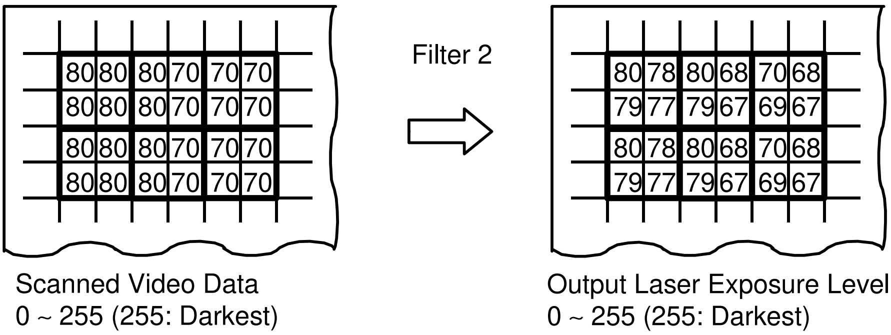
Filter 2

Filter 2 is a 2 by 2 matrix, which is used for the photo mode. This can make the best gradation image of the 3 modes (Letter mode, Photo mode, Letter/Photo mode). But the letter and the line image becomes blurred one.

When the video data goes through this matrix filter, the video data is processed as follows:

- When the video data goes through the left upper pixel of the 2 by 2 matrix, the video data is not changed.
- When the video data goes through the left lower pixel of the 2 by 2 matrix, the video data is subtracted by 1.
- When the video data goes through the right upper pixel of the 2 by 2 matrix, the video data is subtracted by 2.
- When the video data goes through the right lower pixel of the 2 by 2 matrix, the video data is subtracted by 3.

See the illustration below.

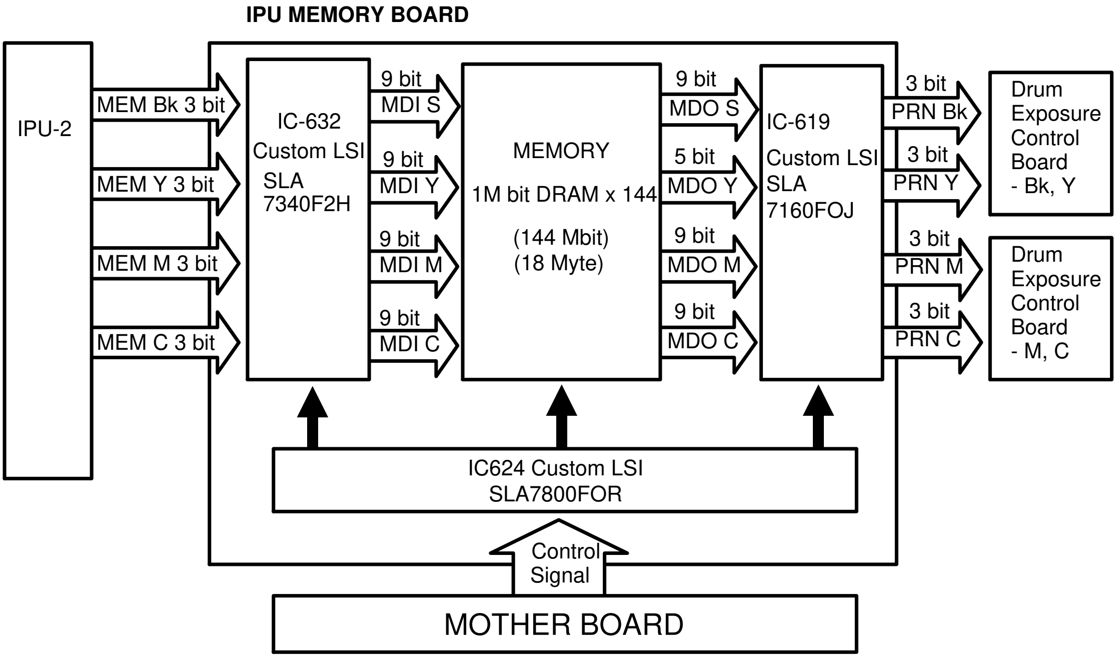


After going through this filter, the copier image becomes lighter than that of the Letter/Photo mode.

2.9 IPU MEMORY BOARD

2.9.1 Overview

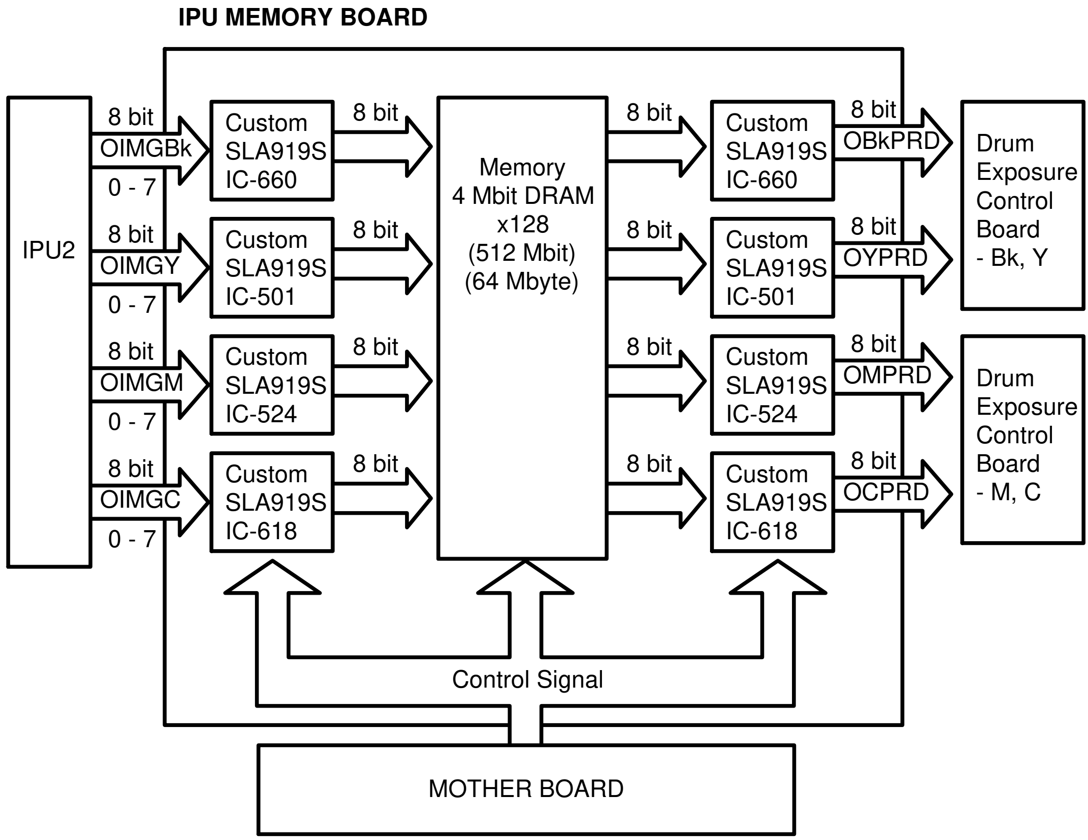
<Model A092>



The IPU memory board consists of three custom LSIs and 144 Mbits DRAM (1 Mbit DRAM 144 pcs). This board has the following functions:

1. It holds two test patterns (8-gradation pattern, grid pattern).
2. It holds the laser exposure video data.

<Model A105>

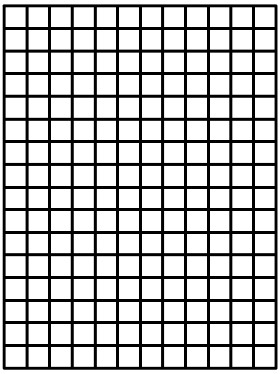


This board consists of 4 custom LSIs and 512 Mbits DRAM (4 Mbit DRAM 128 pcs). This board has the following functions:

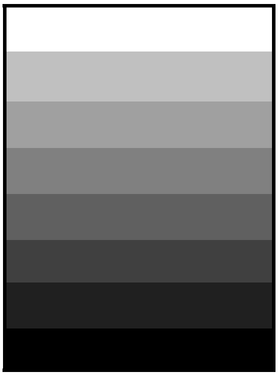
1. It holds two test patterns (64 gradation pattern grid pattern).
2. It keeps the laser exposure video data.

2.9.2 Test Pattern

<Model A092 & A105>



[A]



[B]

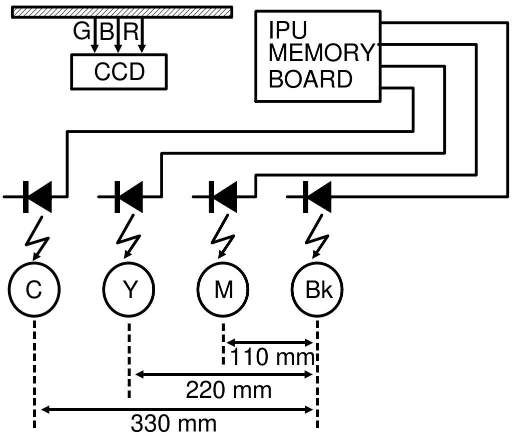
Two test patterns are generated.

1. Grid Pattern [A]
2. Gradation Pattern [B]
   8 gradation for model A092
   64 gradation for model A105

The grid pattern is used to adjust each color's line alignment. The 8 graduation pattern is used to track down worm images due to fusing problems. These patterns can be printed by using SP21.

2.9.3 Laser Exposure Video Memory

<Model A092 & A105>

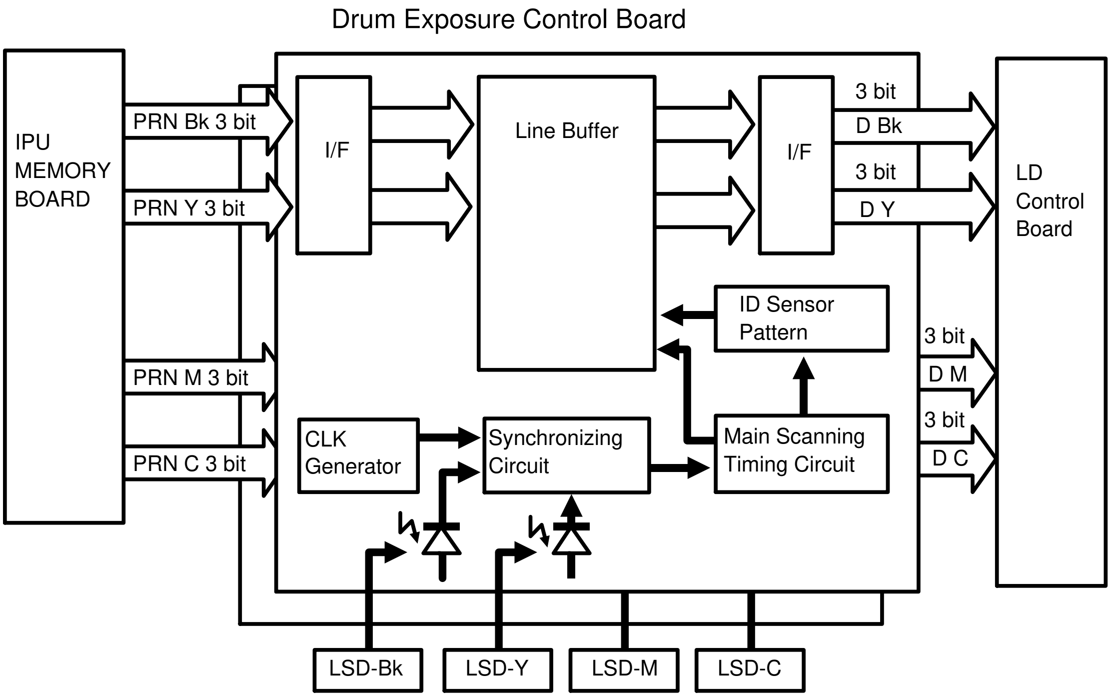


Laser exposure timing for each color is different, because of the tetradrive layout. Laser exposure for each color is done at intervals (see figure). Black is exposed immediately but the video data for magenta, yellow and cyan must be stored in memory.

2.10 DRUM EXPOSURE CONTROL

2.10.1 Overview

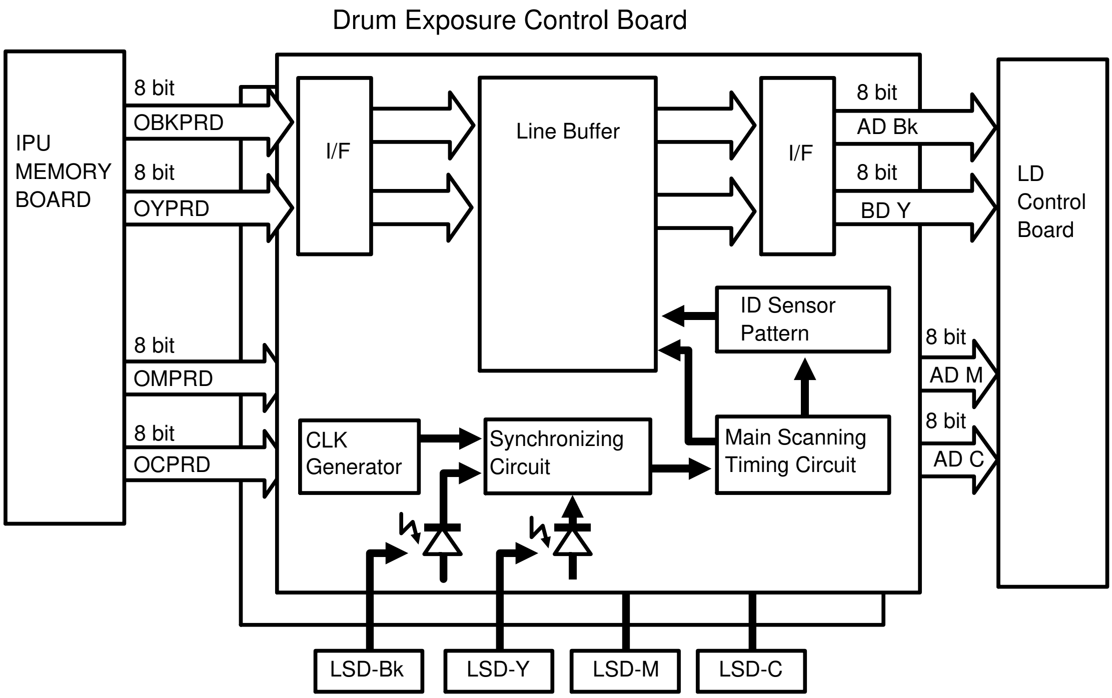
<Model A092>



Two drum exposure control boards are used in this machine. One is for black and yellow laser exposure and the other one is for magenta and cyan laser exposure. These boards have the following functions:

Laser synchronizing detection
Laser main scanning start timing
Laser main scanning magnification adjustment
ID sensor patterns generation

<Model A105>



Two drum exposure control boards are used in this machine. One is for black and yellow laser exposure and the other one is for magenta and cyan laser exposure. These boards have the following functions:

Laser synchronizing detection
Laser main scanning start timing
Laser main scanning magnification adjustment
ID sensor patterns generation

2.10.2 Laser Synchronizing Detector

<Model A092 & A105>

The laser beam (pulse) received by the laser synchronizing cylinder is transferred through the glass fiber to this board. The synchronizing circuit transforms the laser beam to an electrical pulse signal, which is used for the timing signal.

2.10.3 Printing Start Position Adjustment

<Model A092 & A105>

The main scan timing circuit generates the start timing signal for all laser units. The start timing for each color can be adjusted by digital graduated switches (DGS).

For model A105, SP29 (Vertical Line Alignment) can be used for this adjustment.

2.10.4 Laser Main Scanning Magnification Adjustment

<Model A092 & A105>

Horizontal magnification for each color can be adjusted by digital graduated switches (DGS).

For model A105, SP30 (Horizontal Magnification) can be used for this adjustment.

2.10.5 Laser Unit Temperature

<Model A092 & A105>

Laser unit temperature can be monitored by SPD750. If this temperature is under the specified value, it will be necessary to wait before adjusting the line alignment until the temperature reaches the specified one.

If the temperature of the laser unit is higher than 33°C (SPD750: data 130) or 9°C higher than room temperature, you may perform the line alignment procedure.

SPD 750 Laser unit temperature monitor

Displayed Data	Temp.	Displayed Data	Temp.
84	11	125	31
86	12	128	32
88	13	130	33
90	14	132	34
92	15	134	35
94	16	136	36
96	17	138	37
98	18	140	38
100	19	142	39
102	20	144	40
105	21	148	41
107	22	150	42
109	23	152	43
111	24	154	44
113	25	156	45
115	26	157	46
117	27	159	47
119	28	161	48
121	29	163	49
123	30		

You can adjust the alignment anytime.

NOTE: Room Temp. Displayed data

15°C → 109, or more
20°C → 119, or more
25°C → 129, or more

More than 130 → You can adjust the alignment anytime.

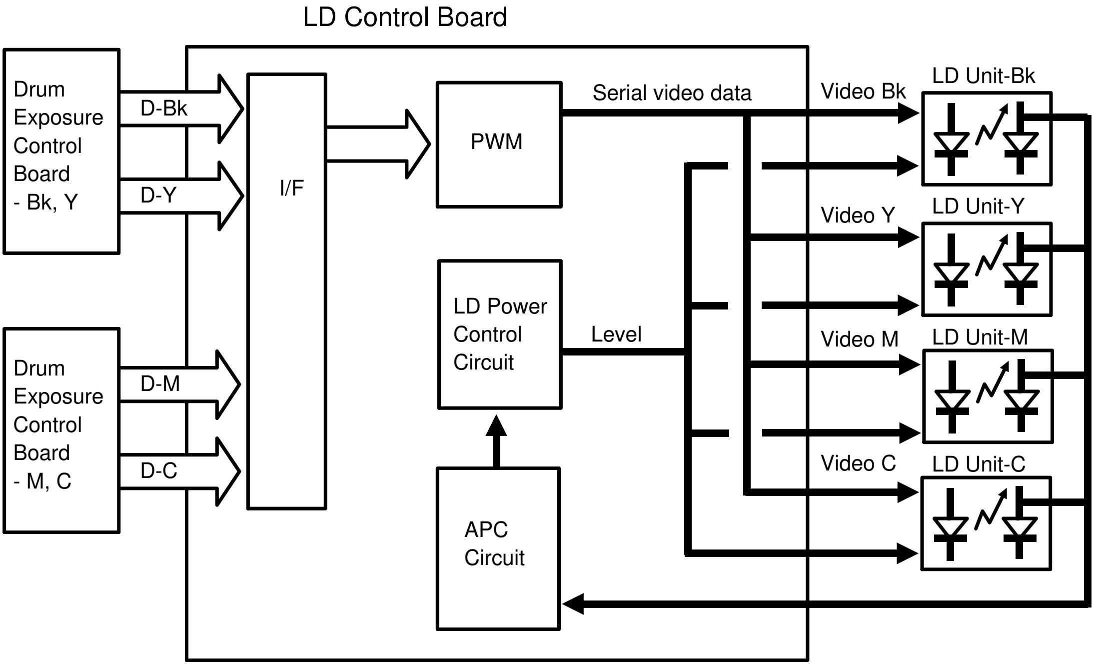
2.10.6 ID Sensor Patterns Generation

The ID sensor pattern circuit ROM generates the ID patterns for each color. The pattern's length can be selected by SPD52, and the kind of pattern can be selected by SPD51.

2.11 LD CONTROL BOARD

2.11.1 Overview

<Model A092 & A105>

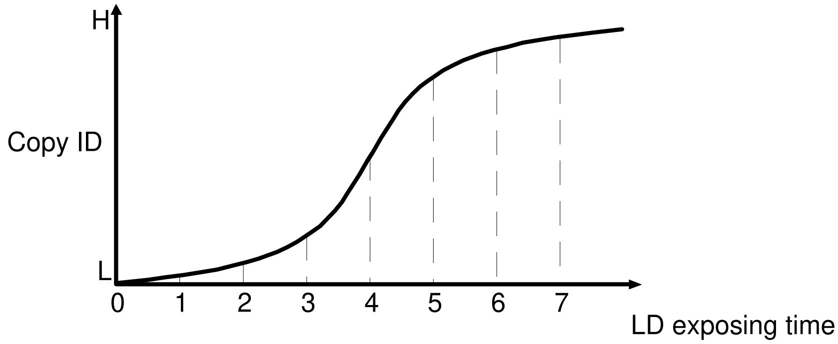


LD control board has a PWM circuit and an LD power control circuit for each color (yellow, magenta, cyan, black). There are several digital rotary switches and dip switches which are used to control the laser power and which are adjusted at the factory.

When the LD control board is replaced, adjust the VRs on this board. See "Vref. ADJUSTMENT" for this adjustment.

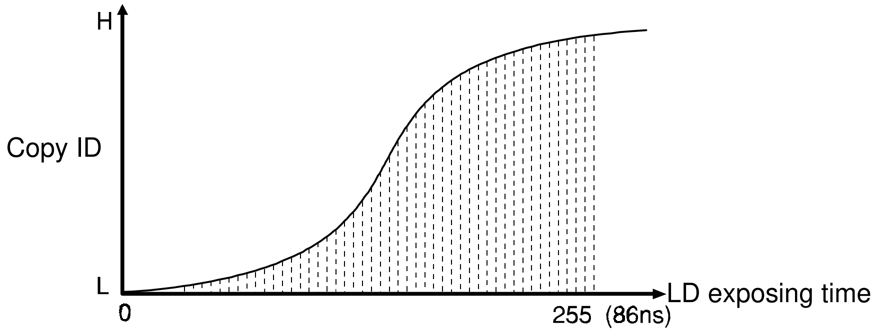
2.11.2 Laser Exposure Power Level Control

<Model A092>



Laser power can be changed over 8 levels by controlling the laser exposure time of each pixel. The relationship between the laser exposure time and the copy ID level is shown in the table. The laser beams for black, magenta, and cyan have 8 levels. However the laser beam for yellow has 4 levels because it is difficult to produce 8 graduations of yellow.

<Model A105>



Laser power can be changed over 256 levels by controlling the laser exposure time of each pixel. The exposing time for data 0 is 0s, for data 1 is 2ns, and for data 255 is 86ns. The exposing time between data 1 and 255 is the same interval for each data. The laser beams for all colors have 256 levels.

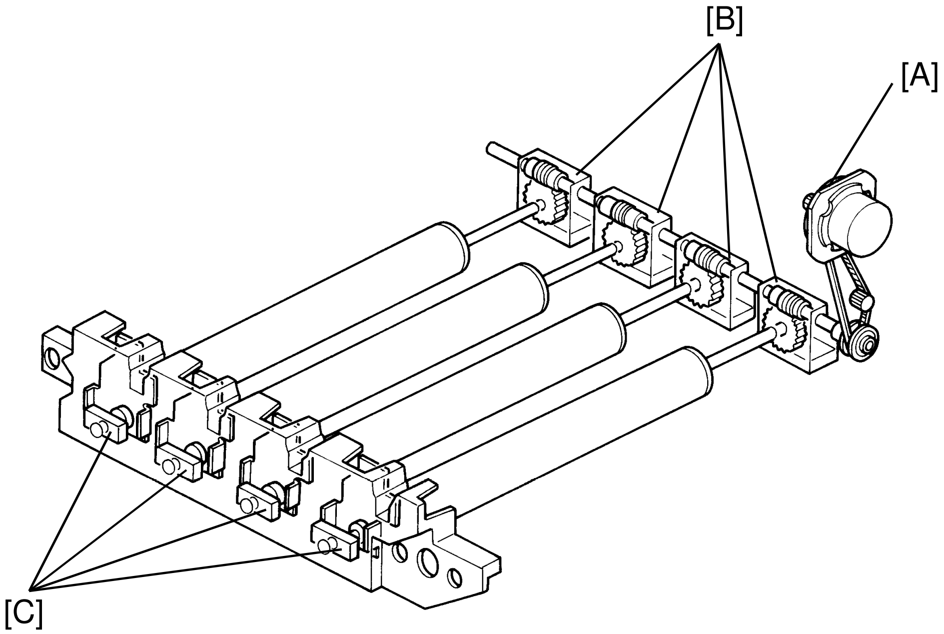
2.11.3 Auto Power Control (APC)

Even if a constant electric current is applied to the laser diode, the intensity of the output light changes with the temperature. The intensity of the output decreases as the temperature increases. In order to keep the output level constant, the output light intensity is monitored through a photodiode, and as a result, the current to the laser diode is increased or decreased. The LD control board and the process control board check the output of the laser diode at the beginning of each copy cycle for APC. See the block diagram on page 2-60.

3. DRUM

3.1 OVERVIEW

<Model A092 & A105>



Models A092 and A105 use the some drums and the drive mechanism.

The drum section consists of the following parts:

The OPC drum motor [A], which is a dc servo motor used to drive the 4 OPC drums.

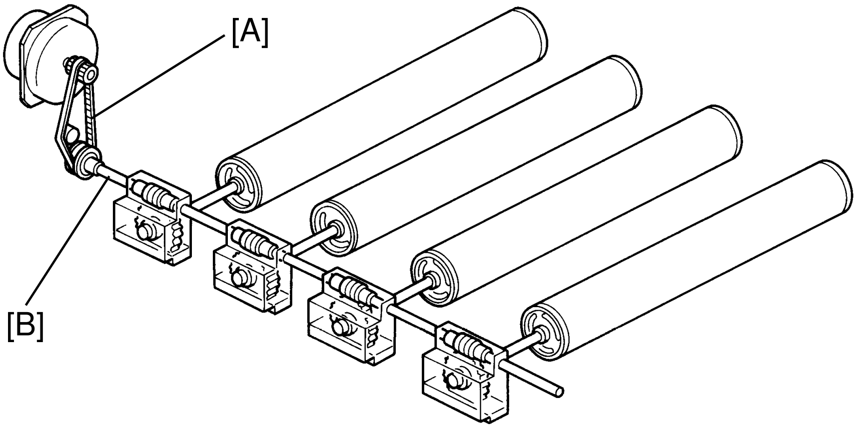
The motor control board, which controls the OPC drum motor speed.

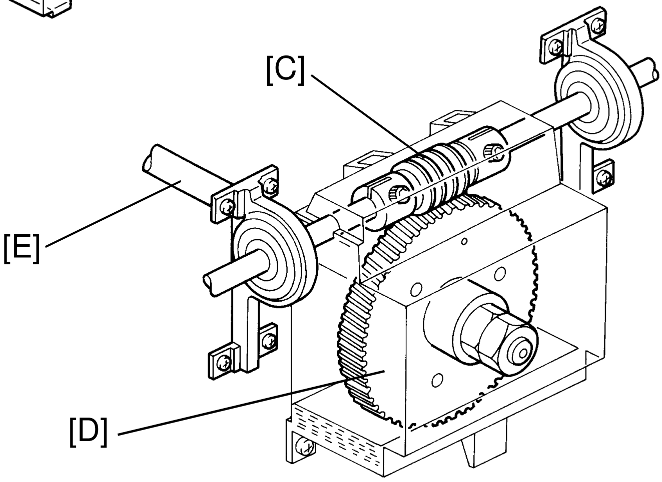
The worm gears [B], which are very accurately cast and machined parts that need to be continuously lubricated by motor oil.

The drum positioning adjusters [C], which adjust the drum shafts to make them all parallel.

3.2 DRUM DRIVE

<Model A092 & A105>





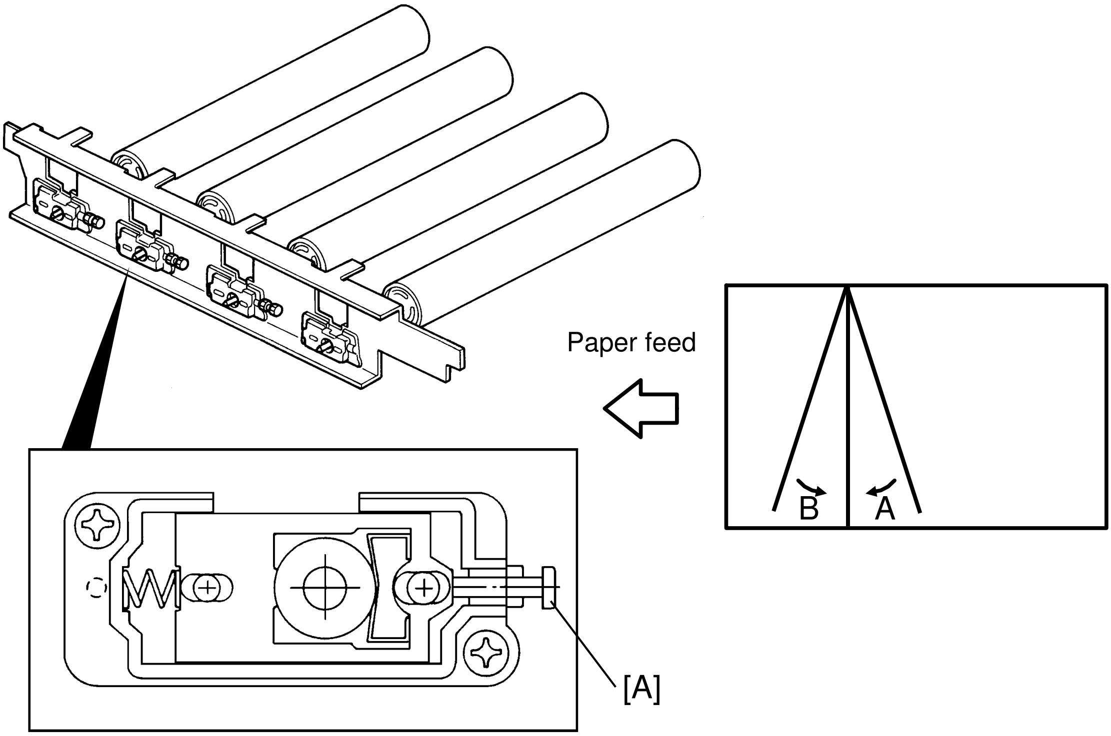
The OPC drum motor drives the 4 OPC drums through the timing belt [A], the worm drive shaft [B], the worm shaft [C], the worm gear [D], and the drum shaft [E]. The OPC drum motor speed is controlled by the motor control board. The speed is 75 mm/sec in standard mode and 37.5 mm/sec in OHP/thick mode.

The worm gears are continuously lubricated by motor oil (20W-40) held in the oil pan. The gears are very accurate and if they become scratched or worn, the copy image will become poor.

The combination of each worm shaft, worm gear and drum shaft assembly is very important. The best combination is selected at the factory and the image alignment is adjusted based on this combination. When you remove the worm gears in the field, never interchange them, and never change the position of the worm gear with respect to the drum shaft.

3.3 DRUM POSITIONING ADJUSTMENT

<Model A092 & A105>



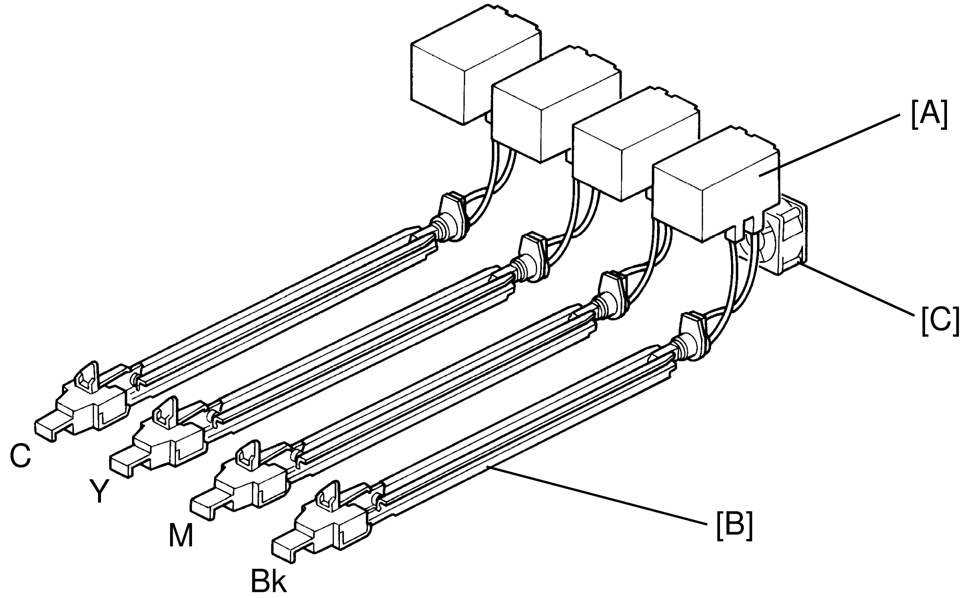
To obtain proper copy quality, the image for each color should be perfectly aligned and synchronized. If the drums aren't parallel to each other, the individual color images do not fit together and the copy image becomes poor. Each drum has been adjusted to be parallel at the factory. When poor copies appear, adjust the position of the drum shafts. The drum shaft position for black is fixed, so you must adjust the position of the yellow, magenta, and cyan shafts.

The drum shaft position can be adjusted from side to side by turning the adjusting screw [A]. If you turn it clockwise, the front side of the drum shaft moves to the left and the image moves in direction A. On the other hand, if you turn the adjusting screw counterclockwise, the front side of the drum shaft moves to the right and the image moves in direction B.

4. CHARGE

4.1 OVERVIEW

<Model A092 & A105>



The main charge section consists of the following parts:

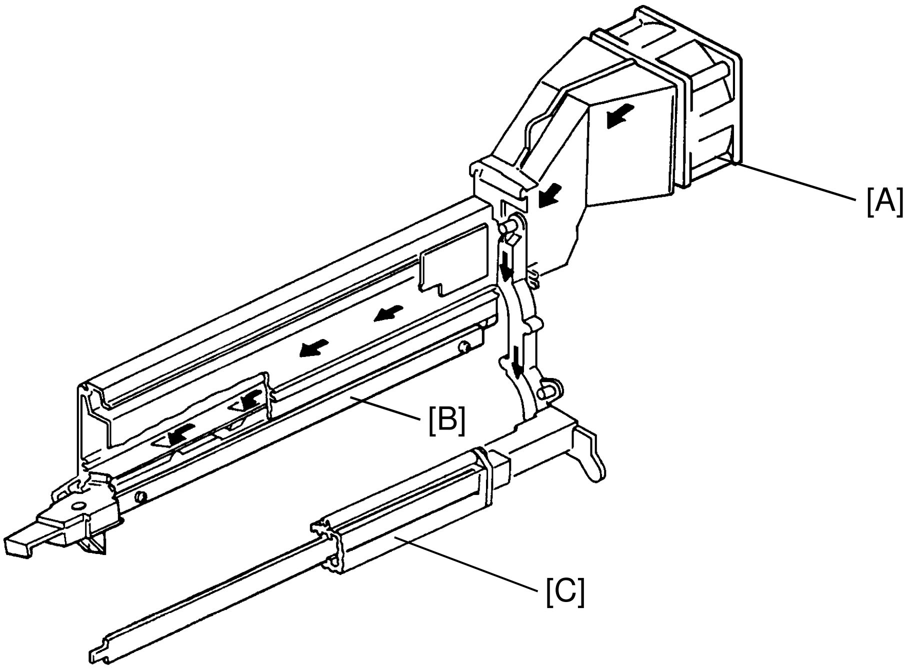
The charge power pack [A], which outputs high voltage to the main charge corona wire and supplies voltage to the development roller (for model A105, voltage for this roller is supplied from the development bias power pack), and the toner supply roller. It also supplies the grid wire voltage for the main charge. The development bias voltage, Vb, and the grid wire voltage, Vo, will change depending on the pointer value.

The main charge assembly [B], consists of a charge corona housing, an uncoated tungsten corona wire, the hexagon pattern grid wire and the manual corona wire cleaner system.

The charge fan [C], draws air in to prevent the corona wire from becoming contaminated with toner and to remove ozone.

4.2 CHARGE VENTILATION

<Model A092 & A105>



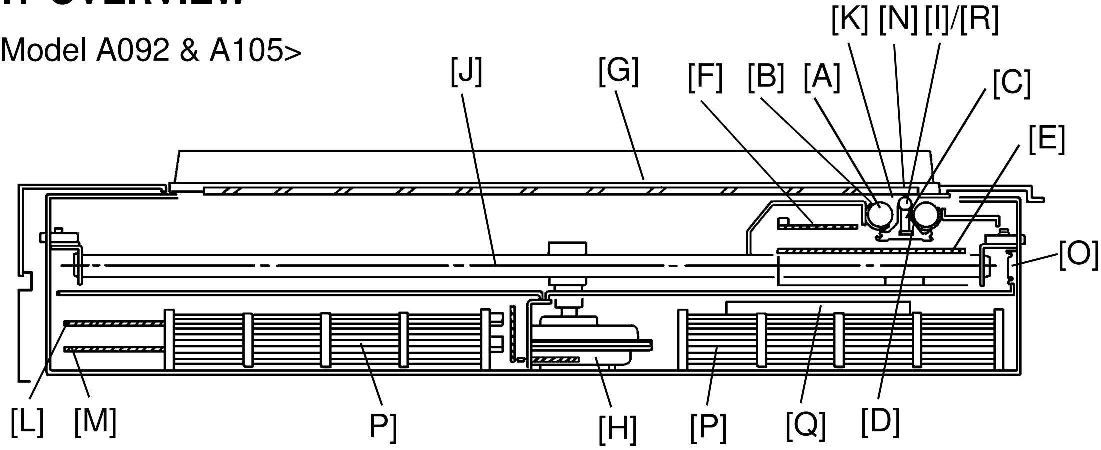
Ozone from the charge corona unit can oxidize the surface of the drum. This oxidization can result in a dirty background on the copy. To prevent this, the charge fan [A] circulates air through the charge corona unit [B]. The charge fan also send air to the ID sensor [C] to blow toner off it.

The charge fan turns on when the main motor starts, and turns off one minute after the main motor stops.

5. SCANNING

5.1 OVERVIEW

<Model A092 & A105>

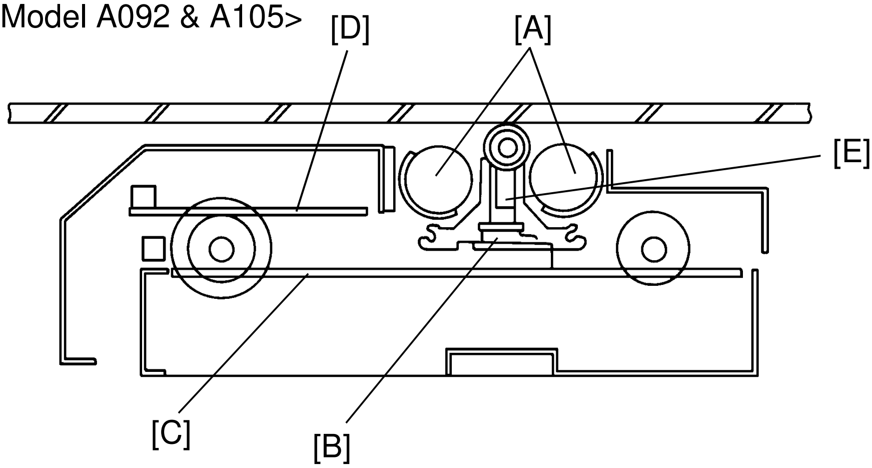


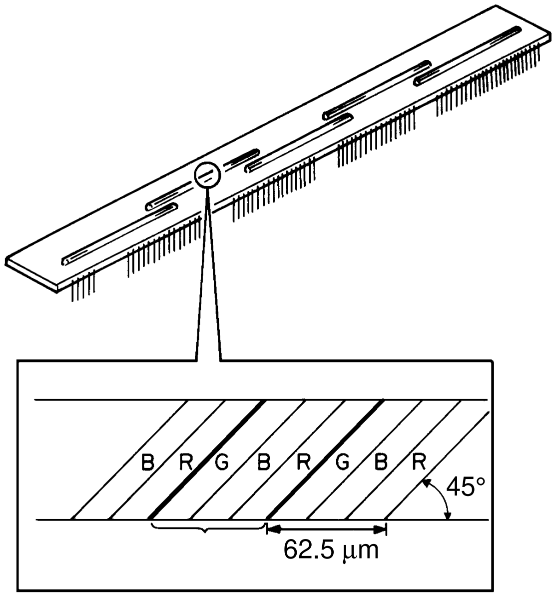
The scanner unit has the following parts and functions.

Scanner Unit		
Carriage	Fluorescent lamp [A]:	2 lamps
	Fluorescent lamp heater [B]:	• 24 V 20 W
		• Heater is turned on under 40°C
	Optics fiber array [C]:	Length 32 mm
	Full size CCD [D]:	• 16 lines/mm (Model A092)
		• 400 dpi (Model A105)
		• 5 CCD chips
	CCD drive board [E]:	Controls the CCDs
	CCD pre-amp board [F]:	Amplifies the CCD signals. This board is in model A092 only.
Original Size Detection	Pressure pad [G]:	Mirror face. While pre-scanning, original size is detected. The pre-scanning speed is 4 times as fast as the normal scanning speed.
Scanner Drive	Scanner motor [H]:	Forward: 75 mm/s Return: 800 mm/s
	Positioning roller [I]:	Always contacts the exposure glass.
	Scanner wire [J]:	2 wires. Front side and rear side are driven.
	Scanner control:	Phase width modulation control
	H.P. sensor [K]:	Photo-interrupter
Image Processing	Video processing board [L]	
	Scanner control board [M]	
Others	Shading plate [N]	
	Anti-condensation heater - 100 V 18 W	
	Scanner cooling fan [P] - 24 V x 2 pcs	
	Scanner slide mechanism - Can slide 580 mm	
	Lamp Stabilizer [Q]	
	White reference plate [R]	

5.2 SCANNER UNIT

<Model A092 & A105>



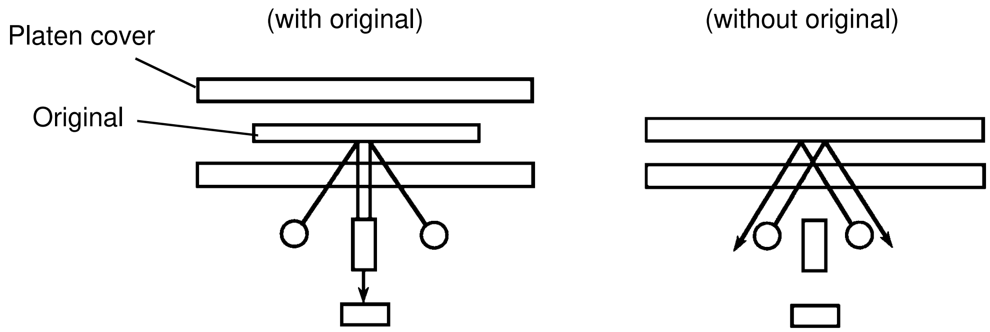


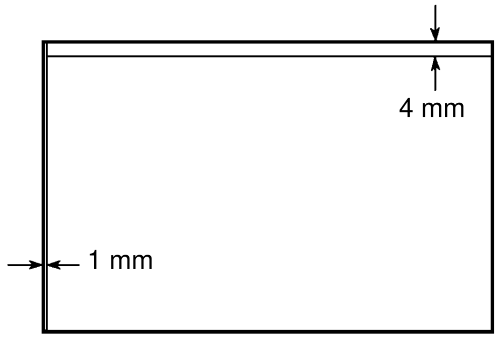
The scanner unit consists of two exposure lamps [A] (fluorescent lamps), the full-size CCD [B], the CCD drive board [C], the CCD pre-amp board [D] and the optical fiber array [E]. The light from the exposure lamps expose the original and reflects on to the full-size CCD through the optical fiber array.

There are 5 CCD chips on the CCD board, each CCD chip has 2,928 elements (2,880 elements for model A105). Each element has a green (G), blue (B), or red (R) filter on top. This G.B.R. order is repeated for all elements. One set of these G.B.R. elements is equal to picture element. The CCD elements are angled 45 degrees, so that each CCD element receives the reflected light evenly.

5.3 ORIGINAL SIZE DETECTION

<Model A092 & A105>





When the original is scanned, the light from the exposure lamps is reflected and the image is sent to the CCD board by diffuse reflection. Since the platen cover sheet of this copier acts like a mirror, at the non-original area, the light cannot reach the CCD board because of the spicular (mirror-like) reflection. By using the difference in reflected light intensity, the original size is determined.

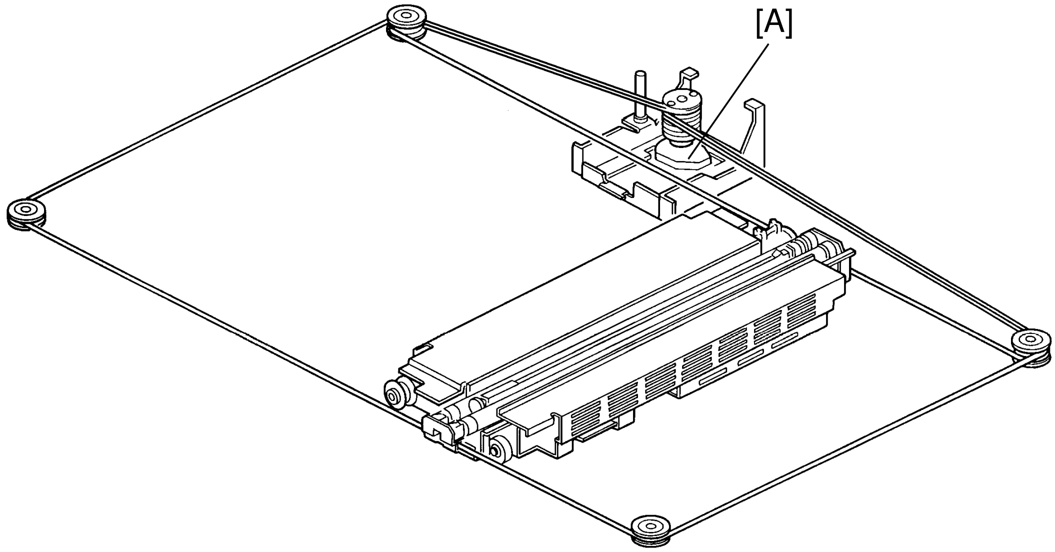
The original size to be detected is as follows:
Max: 297 x 432 mm / 11.7" x 17.0 "
Min: 82 x 117 mm / 3.2" x 4.6"

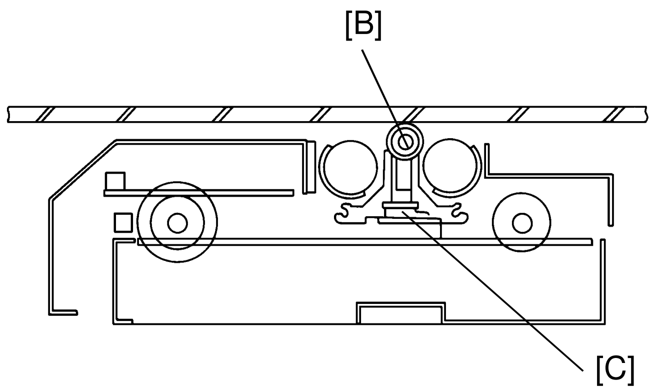
Original size detection may not work in the following cases:

1. Book type of original
   (This is because the distance between the platen sheet and the CCD board is too great. To correct this condition copy with the platen cover open.)
2. No white area at any side
   (More than a 4 mm wide white area in the main scan direction and 1 mm at the sub scanning direction is required.)
3. Original mis-setting

5.4 SCANNER DRIVE MECHANISM

<Model A092 & A105>



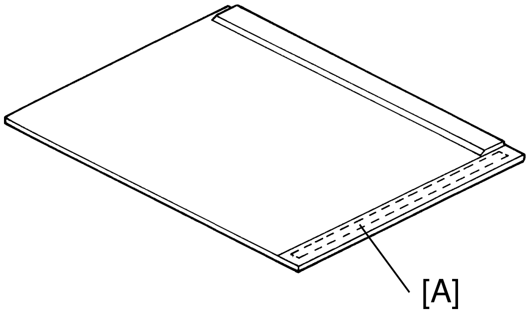


This model uses a dc servo motor [A] to drive the scanner. Both ends of the scanner are driven by two scanner wires to prevent the scanner from skewing. Also, in order to prevent vibration of the unit, positioning rollers [B] are installed at both ends of the scanner. The scanner unit is always pushing up against the exposure glass via these positioning rollers, and hence minimize vibration. This keeps the distance between the CCD board [C] and the exposure glass (the original) constant to prevent the original from being out of focus.

5.5 WHITE PLATE SCANNING

<Model A092 & A105>

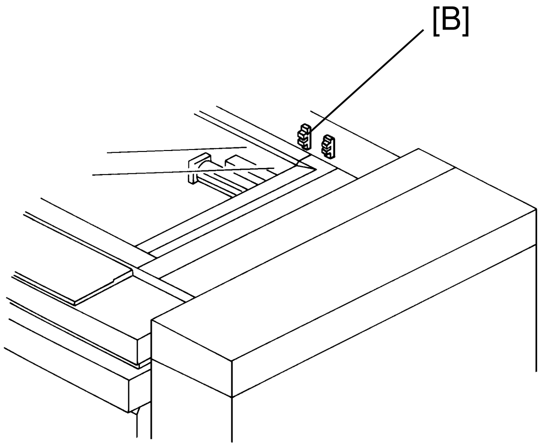
For auto shading, a white plate is stuck on the exposure glass, underneath the right scale. If a part of this white plate becomes dirty, a vertical light band may appear in that area of the copy.



5.6 ORIGINAL LEAD EDGE DETECTION

<Model A092 & A105>

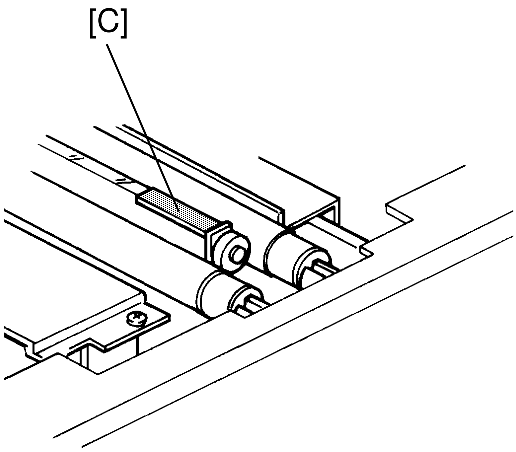
There is a photo sensor, next to the scanner home position sensor, aligned with the lead edge of the original position. This is the original lead sensor which informs the CPU of the start timing for the image and the reference timing for the registration clutch.



5.7 WHITE STANDARD PLATE

<Model A092 & A105>

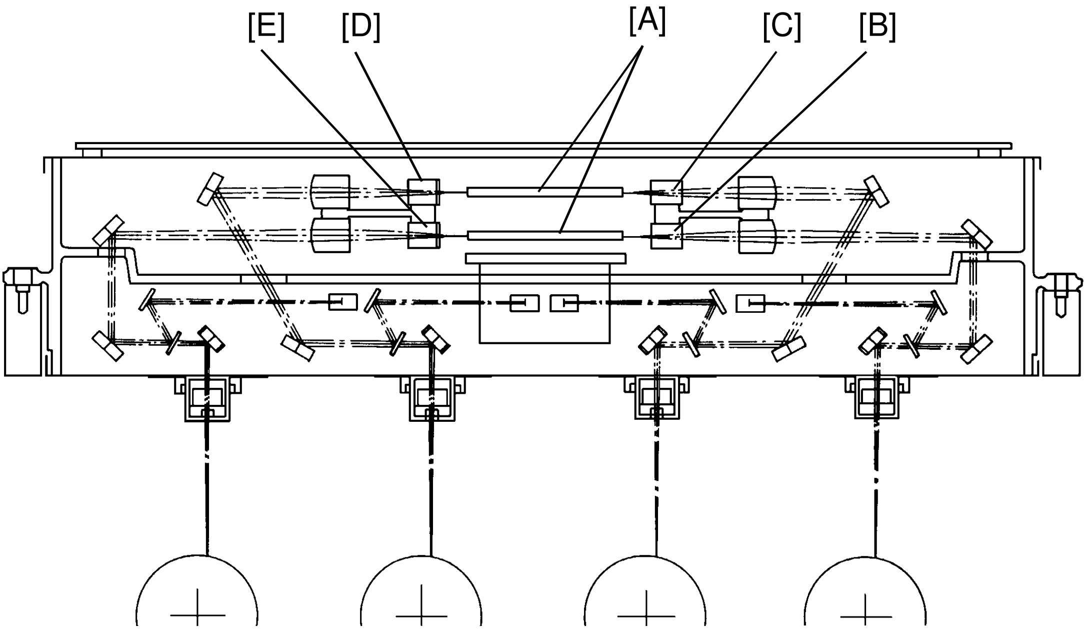
The white standard plate [C] is located over the optical fiber array at the front side.
Before scanning the original image, the CCD 1 scans the white standard plate and resultant analog video data is used as the white (peak) standard data.



6. LASER EXPOSURE

6.1 OVERVIEW

<Model A092 & A105>



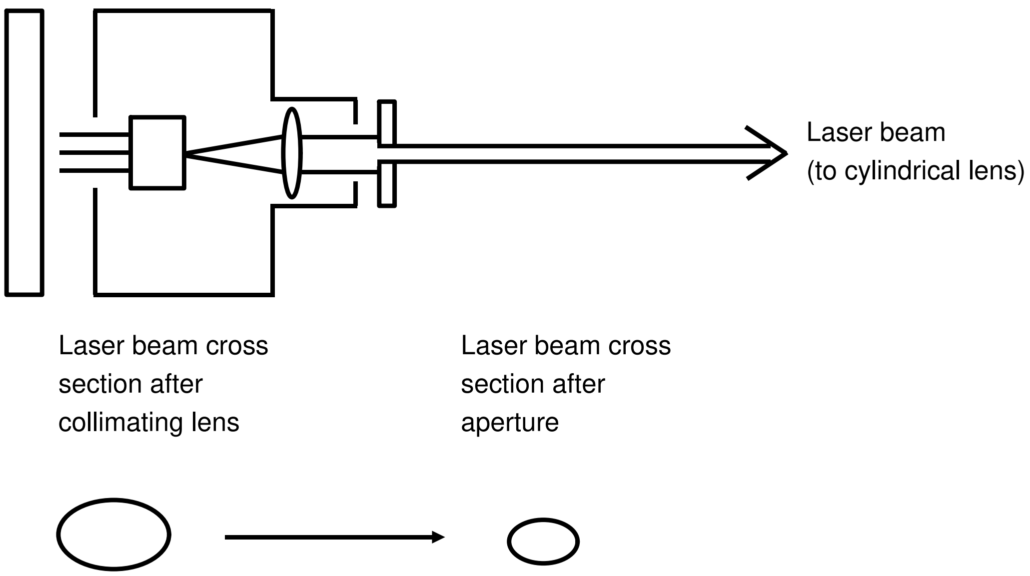
This model uses four laser diodes to produce an electrostatic image on four OPC (organic photoconductor) drums. The LD control board converts image data from the drum exposure control board into laser pulses and the optical components direct these pulses to the OPC drum.

The four laser diodes and two polygon mirrors [A] are necessary since a single scan process is used. The laser light path for each color (Bk [B], M [C], Y [D], and C [E]) is illustrated in the figure above.

Exposure of the drum by the laser beam creates the latent image. The laser beam creates the main scan while drum rotation controls the sub scan.

6.2 LD UNIT

<Model A092 & A105>



Each LD unit (Bk, M, Y, and C) consists of the LD (laser diode), aperture, collimating lens, and LD driver board.

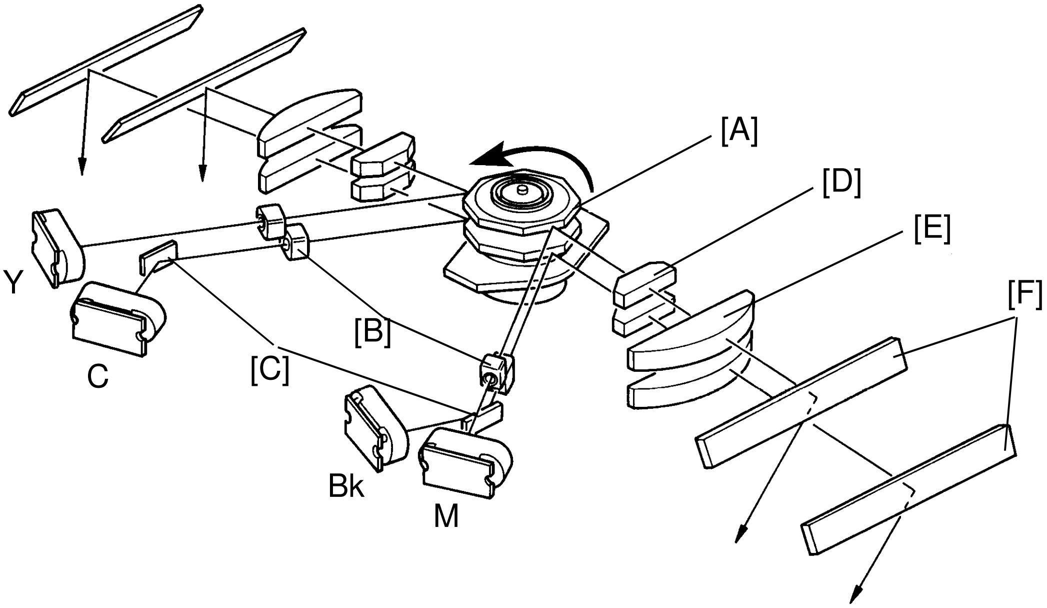
The collimating lens forms the output light into a parallel beam. After the light passes through the collimating lens, the beam is oval in shape.

After the collimating lens, the aperture alters the beam, giving it a smaller cross-section as shown.

The laser light's wave length is about 780 nm, (this is outside the range of visible light.)

6.3 OPTICAL PATH

<Model A092 & A105>



The laser beam path from the laser diode to the OPC drum is shown above.

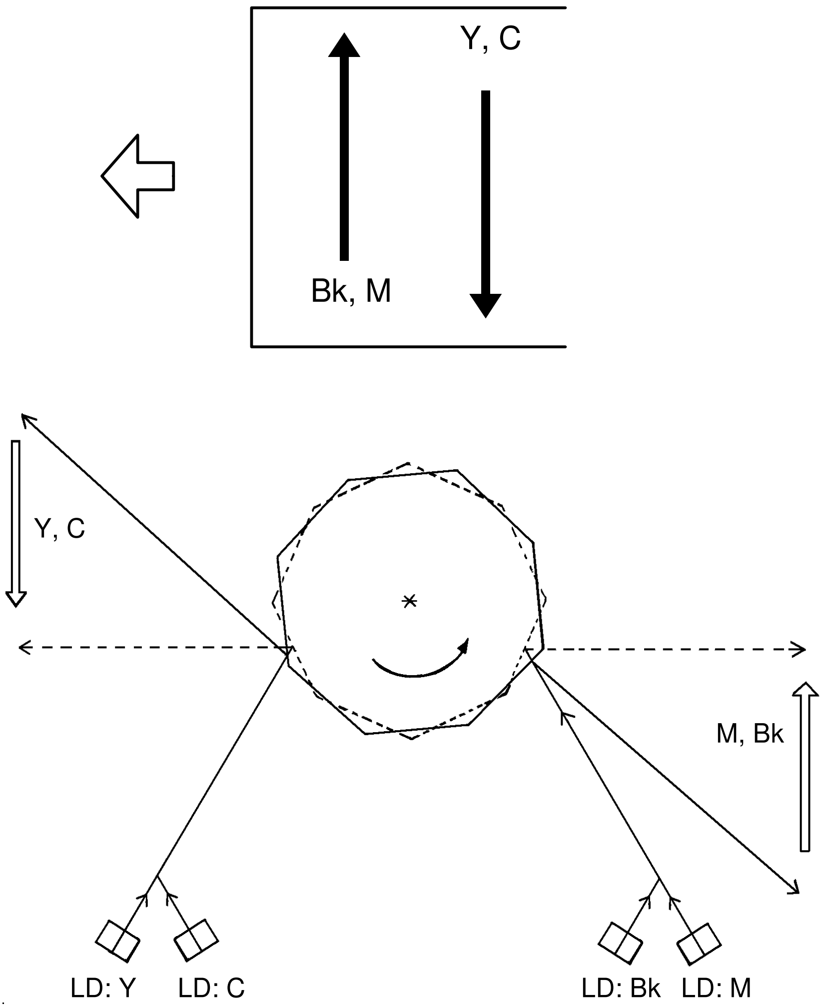
The LD unit outputs the laser beam to the polygon mirror [A] through the cylindrical lens [B]. (The laser beams for black and cyan are reflected by the LD mirrors [C] and pass through the cylindrical lens.)

The laser beams for magenta and yellow are directed to the upper polygon mirror, and those for black and cyan are directed to the lower polygon mirror.

The speed of the polygon motor is 9,000 rpm (8858.3 rpm for model A105). The polygon mirror reflects a full main scan line with a single surface of the mirror. The laser beam goes through the 1st fθ lens [D], 2nd fθ lens [E] and reaches the 1st drum mirror [F]. The laser beam reaches the drum through the 2nd drum mirror, the 3rd drum mirror, and the toner shield glass.

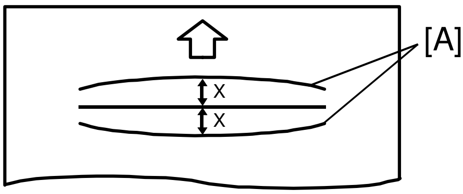
In thick/OHP copy mode, every second surface of the polygon mirror is used for a full main scan line. This is necessary due to the (half speed) reduction in copying speed in this mode. This is done so as to prevent changing the polygon motor speed.

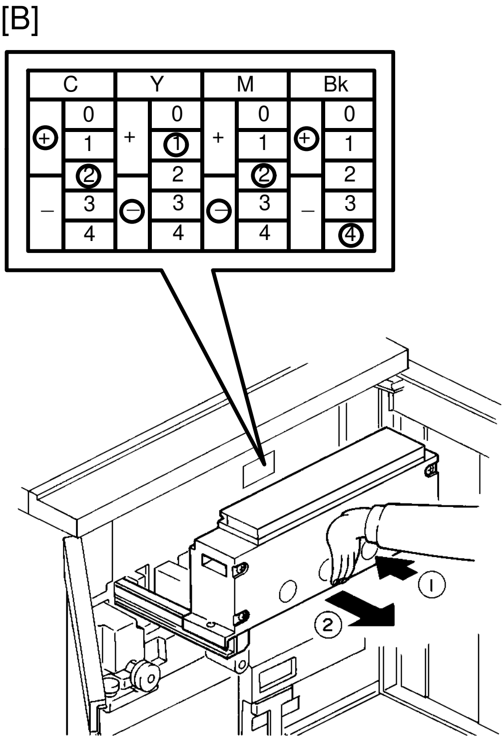
The laser exposure for black and magenta starts from the front side of the drum, but that for yellow and cyan start from the rear side of the drum. This is because of the opposite position of the LD units.

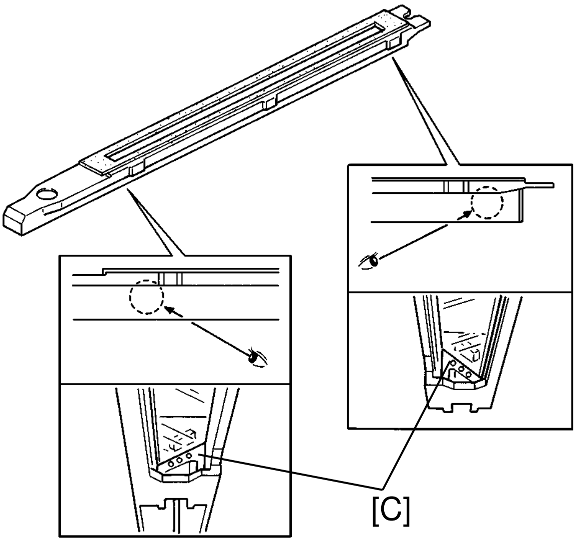


6.4 TONER SHIELD GLASS

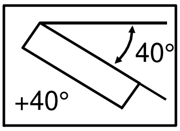
<Model A092 & A105>



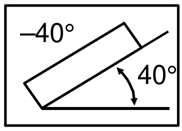




Label	Angle	x correction	Number of dots
0	+2°	0 mm	0
+1	+10°	0.031 mm	1
+2	+20°	0.062 mm	2
+3	+30°	0.091 mm	3
+4	+40°	0.117 mm	4
–1	–10°	–0.031 mm	1
–2	–20°	–0.061 mm	2
–3	–30°	–0.091 mm	3
–4	–40°	–0.117 mm	4



(Front View)

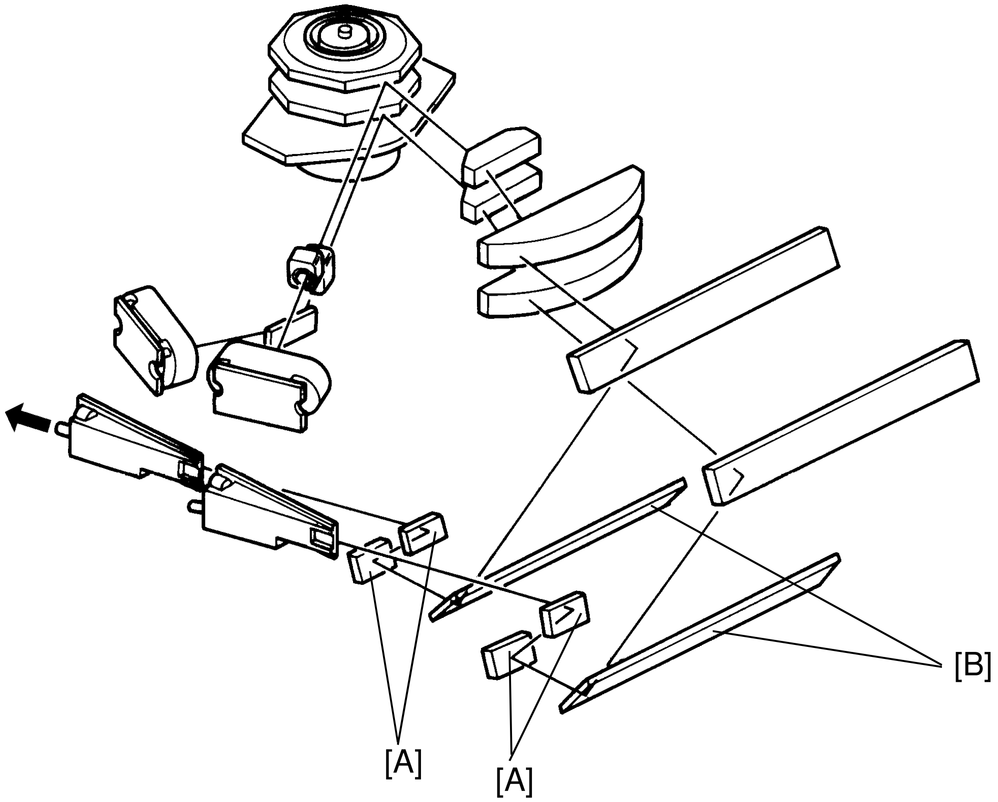


For this model, the image is produced by overlaying four color lines. These four lines should be aligned as one line. However, each line in the main scan direction may be curved [A] due to the variety of optical parts. (It especially depends upon the tolerance of the concave surface of the fθ lens.) To correct such curved lines, the toner shield glass is angled at an incline. A total of nine different angled-glasses are possible.

CAUTION: When the toner shield glass is replaced, do not interchange them. Make sure it is of the correct angle. The angle is indicated in the label attached the front machine frame [B]. Also, each toner shield glass has the corresponding number of dots on the bracket as shown in the illustration [C].

6.5 LASER SYNCHRONIZING DETECTOR

<Model A092 & A105>

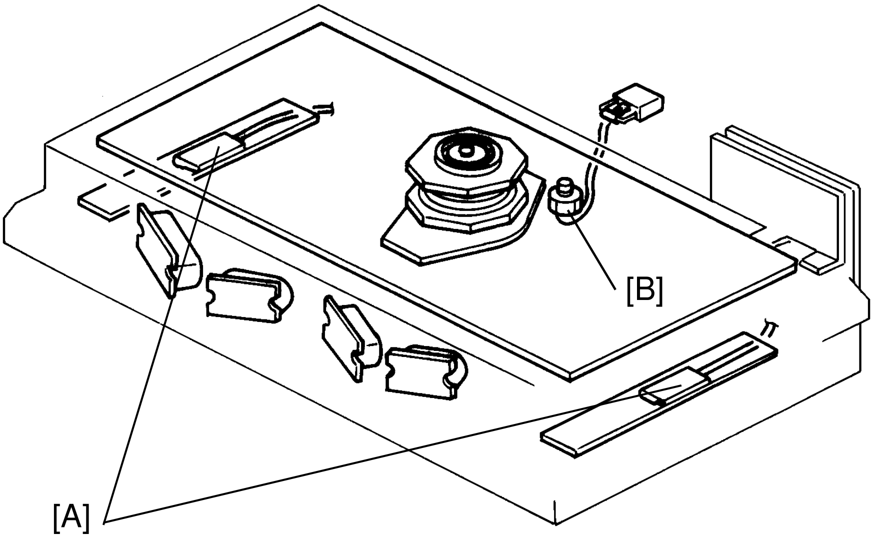


At the start of each scan line, the synchronizing mirrors [A] and the 2nd drum mirrors [B] reflect the laser beam to the laser synchronizing detector, as shown above.

Activation of this detector signals the start of the main scan "writing" by the laser beam.

6.6 ANTI-CONDENSATION HEATER AND THE LASER UNIT THERMISTOR

<Model A092 & A105>



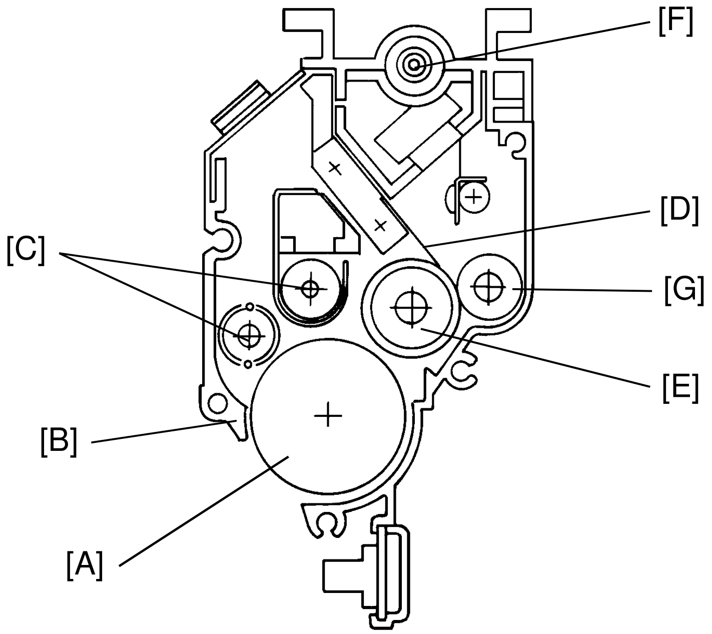
The laser unit has two anti-condensation heaters [A] to prevent condensation from forming on the optical parts (lens and mirrors) and to help prevent any expansion/contraction of the unit due to temperature changes.

They are located at the right and left sides of the unit. The thermistor [B] is installed near the polygon motor to monitor the temperature around the polygon motor.

7. DEVELOPMENT

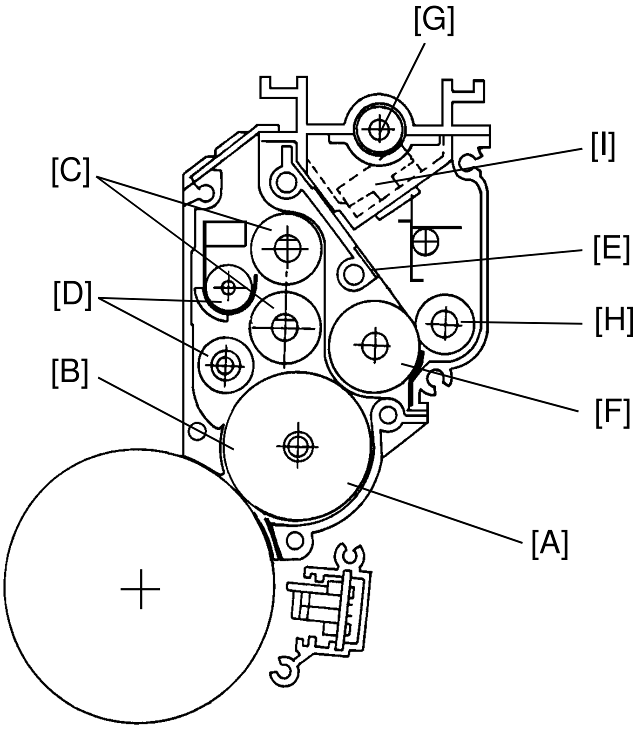
7.1 OVERVIEW

<Model A092>



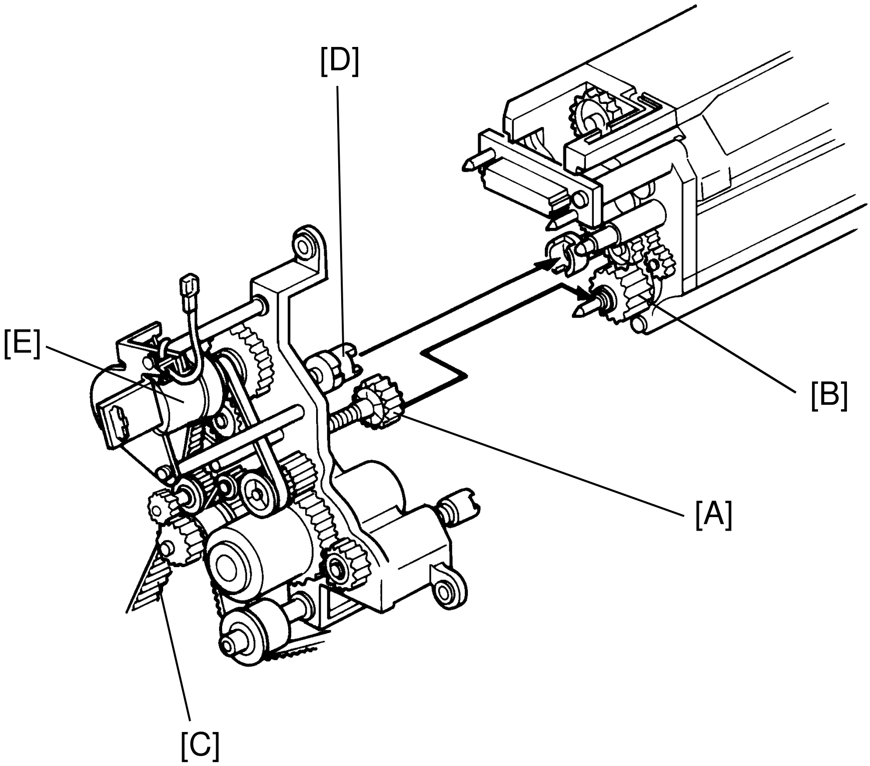
Development Unit		
Development	Development sleeve [A]:	30.4 ∅, 5 magnetic fields
	Doctor gap [B]:	0.6 mm
	Developer:	Non coated ferrite carrier 250 g/bag
	Toner:	Diameter 12 µm
Mixing Mechanism	Upper/Lower auger [C]:	Mix the developer
	Magnet:	Help the mixing
Bias System	Development sleeve bias:	–408 V for pointer 10
	Toner supply roller bias:	–460 to –510 V
Toner Supply Mechanism	Toner supply blade [D]:	Makes a thin toner layer around the toner supply roller.
	Toner supply roller [E]:	Bias is applied to this roller.
	Toner supply clutch:	Controlled by the Process Control Board.
	Toner transport screw [F]:	Transfer toner to the sub tank.
	Sponge roller [G]:	Applies electric charge to the toner by rubbing.
Drive Mechanism	Main motor	
Sensor	Toner supply sensor	

<Model A105>



Development Unit		
Development	Development sleeve [A]:	30.8 ∅, 5 magnetic fields
	Doctor gap [B]:	0.45 mm (cannot be adjusted in the field)
	Developer:	Silicon coated ferrite carrier 200 g/bag
	Toner:	6.4 µm ∅
Mixing Mechanism	Upper/Lower developer transport roller [C]:	Remove excess developer from the development sleeve and transfer the developer to the mixing area.
	Upper/Lower auger [D]:	Mix the developer by moving it to side.
Bias System	Development sleeve bias:	AC: 1 kV (peak to peak) fixed DC: –200 V ~ –1 kV, depends on pointer
	Toner supply roller bias:	DC: –200 V ~ –1 kV, depends on pointer
Toner Supply Mechanism	Toner supply blade [E]: (Metering blade)	Makes a thin toner layer on the toner supply roller.
	Toner supply roller [F]:	• Bias is applied on this roller. • A thin toner layer is made around this roller.
	Toner supply clutch:	Controlled by the Process Control Board.
	Toner transport screw [G]:	Transfer toner to the sub tank.
	Sponge roller [H]:	Apply electric charge to the toner by rubbing.
Drive Mechanism	Main motor	
Sensor	Toner supply sensor [I]	

7.2 DRIVE MECHANISM



<Model A092>

The development drive gear [A] turns the development roller gear [B] when the main motor is turning. The rotation of the main motor is transmitted to every development unit drive gear at the same time via the timing belt [C]. The auger gear starts turning at the same moment via the development roller gear.

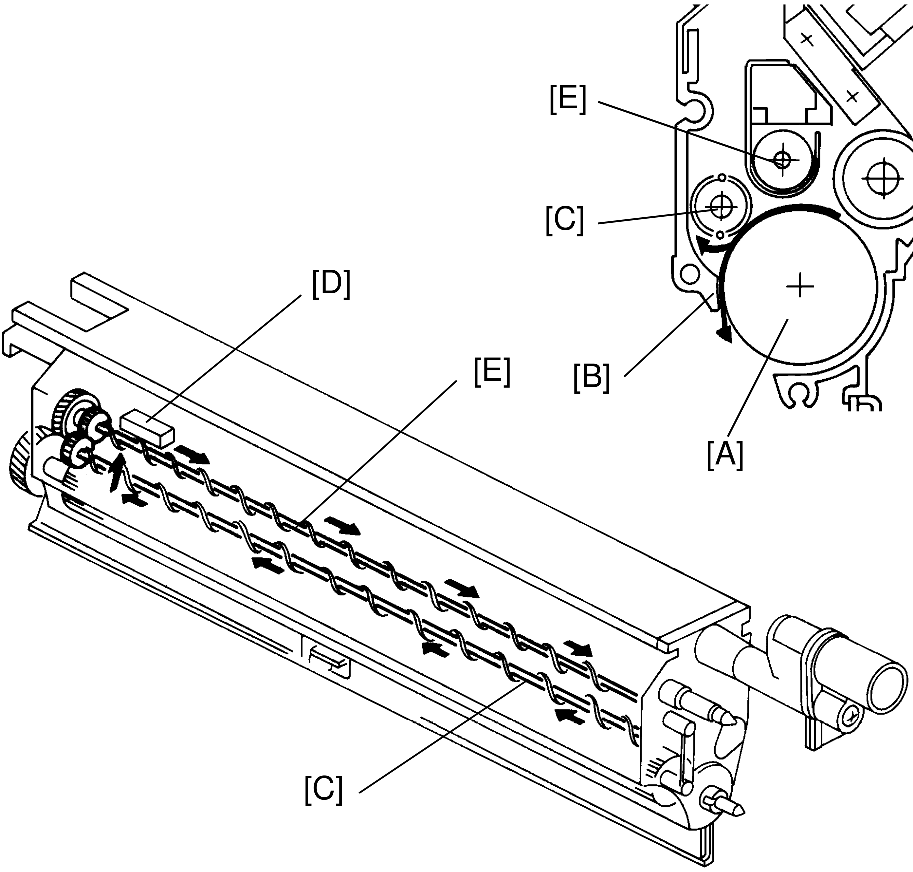
The toner supply roller gear [D] rotates when the toner supply clutch [E] turns on.

<For Model A105>

To improve the copy image, fine toner (Diameter: 6.4 µm) and high C/A (Change Ability) developer are adopted and the development sleeve speed is reduced to half of the speed of model A092 by using gears [F] and [G]. Basically, good copy quality is achieved due to the combination of high charge ability and low development sleeve turning speed.

7.3 CROSS-MIXING

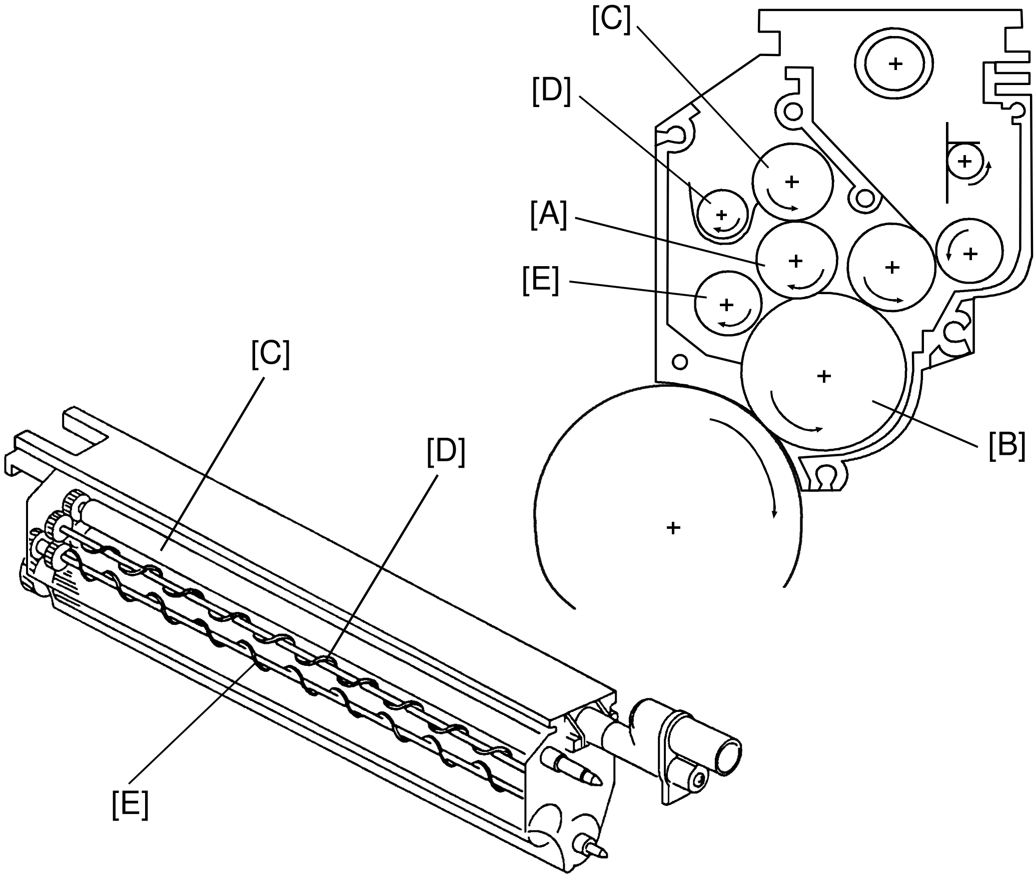
<Model A092>



In model A092, only two augers and one permanent magnet serve for both cross-mixing and for agitating the developer.

The developer on the rotating development roller [A] is split in to two parts by the doctor blade [B]. The part that stays on the development roller forms the magnetic brush and develops the latent image on the drum. The part that is trimmed off by the doctor blade is carried to the rear side of the unit by the lower auger [C]. The permanent magnet [D] at the rear side of the unit picks the developer up to the upper auger [E]. The upper auger, then brings the developer to the front side of the unit.

<Model A105>



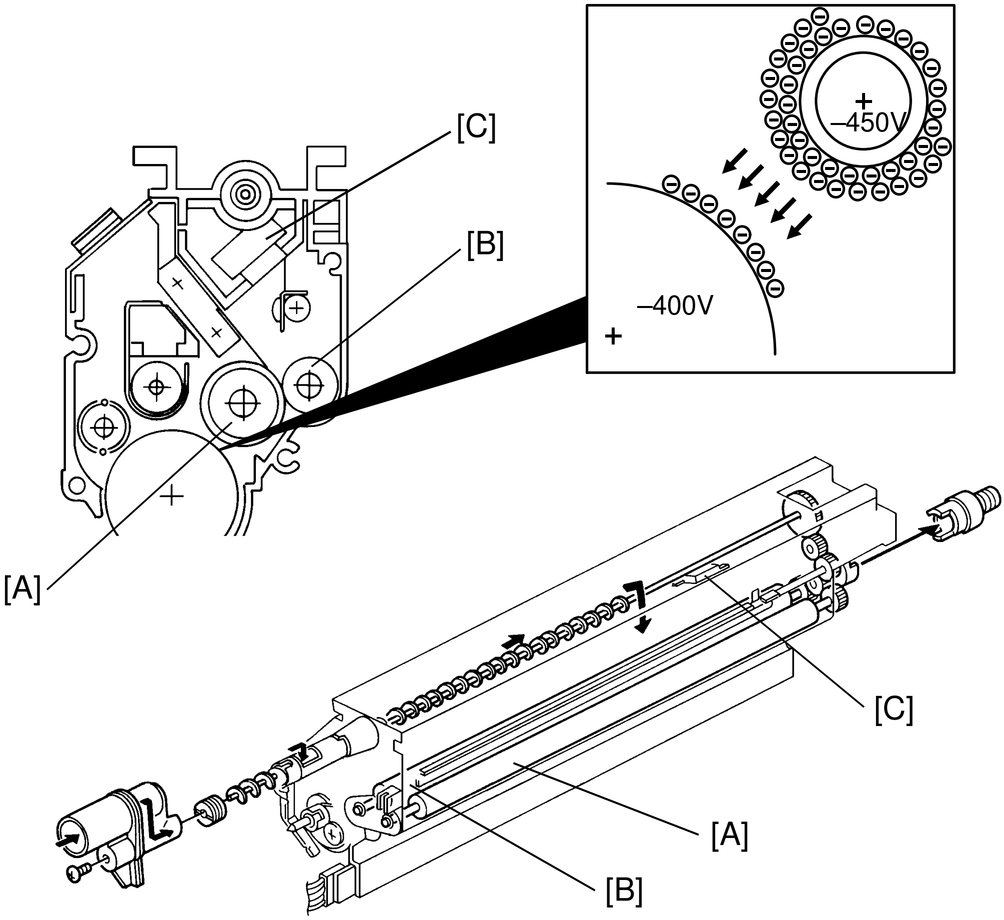
To achieve good copy quality, the development sleeve speed is reduced to half, as explained in the previous section. The rotation speeds of the other rollers in the development unit are also reduced, and this causes insufficient developer mixing. To power up the mixing function, two additional rollers (the upper and lower transfer roller) are adopted.

The transfer rollers have interval magnets to attract the developer. The lower transport roller [A] picks up developer from the development roller [B] and carries it to the upper transport roller [C]. The upper transport roller releases the toner onto the upper auger [D].

The upper auger [D] carries developer from rear to front. Also, excess developer spills over from the auger. The carried developer and the spilled developer fall on the lower auger [E]. The lower auger carries the developer from front to rear in is opposite direction of the upper auger. The excess developer spills over from it. The developer, having been fully charged by friction while riding on the transport rollers and augers, falls on the development sleeve.

7.4 TONER SUPPLY

<Model A092 & A105>



When the ID sensor detects an insufficient toner condition (Vsp > Vtc), the toner supply clutch turns on.

The toner supply roller [A] and the toner supply foam roller [B] then start to supply toner to the development roller. The toner metering blade trims the toner on the toner supply roller to the proper level.

Negative bias is applied not only to the development roller but also to the toner supply roller and the toner supply foam roller (which is conducted).
In order to feed the toner to the development roller from the toner supply roller, the process control board controls the bias so that the bias to the development roller is less than that to the toner supply roller, as shown in the illustration.
The toner supply amount increases with the difference between both bias voltages.

When the toner supply sensor [C] is activated while the toner supply clutch is on, it means there is no toner in the toner container in the development unit. The toner is transported from the toner tank unit to the development unit via the toner supply motor and transport coil. When the toner supply sensor is de-actuated, toner transportation stops.

<Model A105>

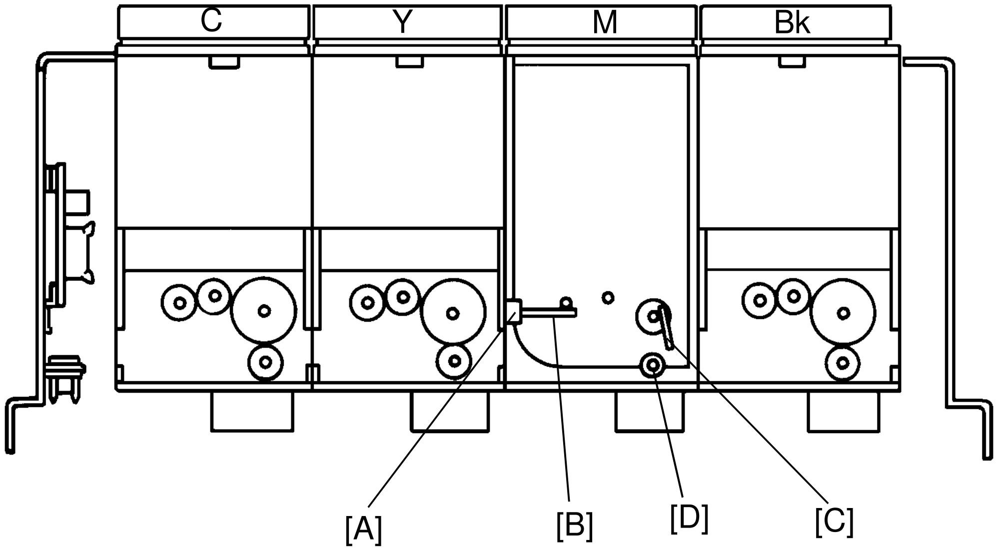
Only the following points have been changed from model A092 to match the new type developer.

- Material of the toner supply roller.

8. TONER TANK

8.1 OVERVIEW

<Model A092 & A105>



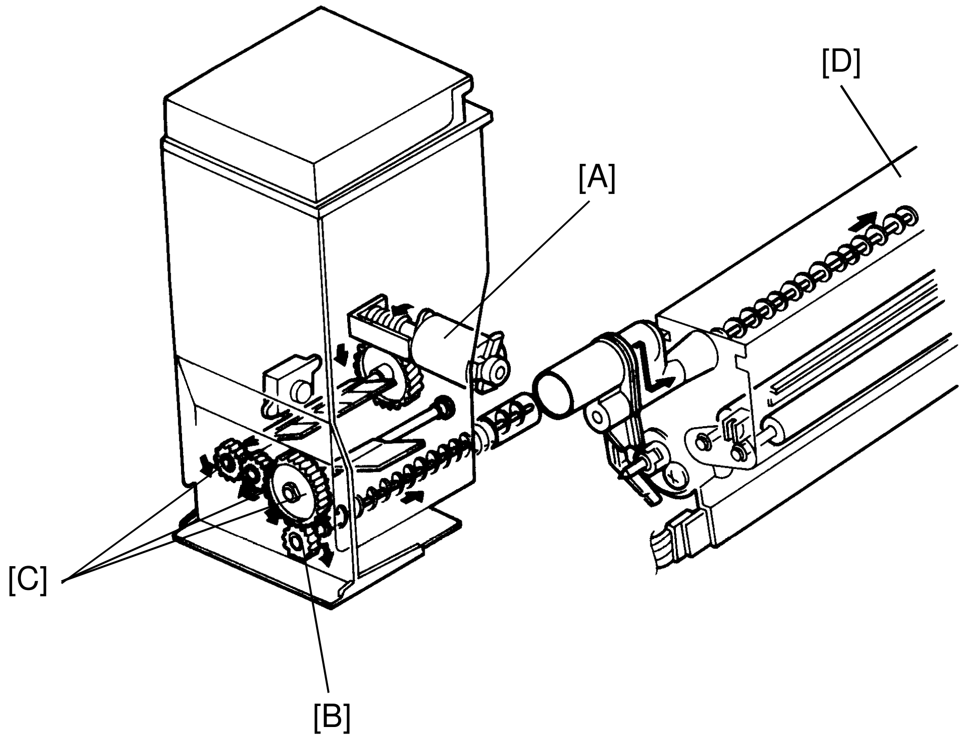
Same mechanisms are used for both models A092 and A105 except for the toner bottle guide, which avoids mis-replenishing between model A092 and A105. Each color (Bk, M, Y, and C) has its own toner tank. The capacity of each tank is a maximum of 600 g. When the toner supply sensor in the development unit is actuated while the toner supply clutch is on, the toner supply motor of the toner tank unit turns on. The toner is agitated by the agitators [B] and [C]. The toner is then transported to the development unit via the transport coil [D].

When the toner supply sensor is de-activated, it means there is sufficient toner in the development unit. The toner supply motor turns off.

If there is not enough toner in the toner tank, the toner end sensor [A] inside the toner tank detects the toner near end or toner end conditions.

8.2 TONER TRANSPORT AND AGITATION

<Model A092 & A105>



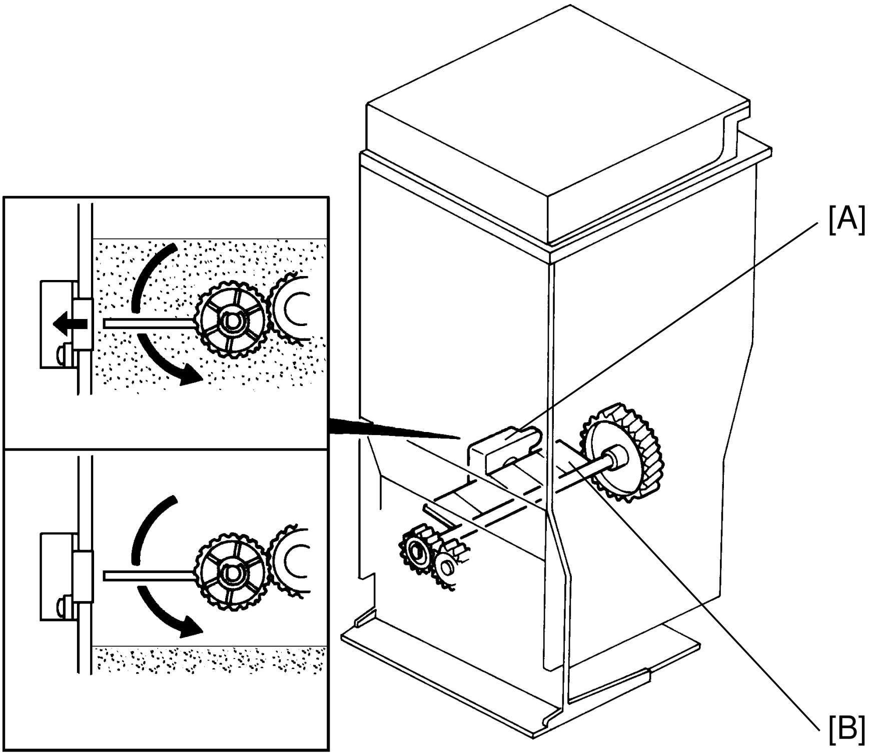
When the toner supply motor [A] turns on, two agitators begin rotating clockwise to agitate the toner inside. The rotation of the toner supply motor is also transmitted to the transport coil gear [B] through the agitator gears [C] and the toner is then transported to the development unit [D].

The toner supply motor turns on when the main switch is turned on and the toner supply sensor is also turned on.

In order to prevent the toner agitators from becoming deformed, the toner supply motor rotates in both directions when the main switch is turned on. And, while the toner supply sensor is on, it rotates in reverse after one copy job is completed. This also prevents the mis-detection of the toner end condition. However, during the copy cycle, the toner supply motor only rotates forward.

8.3 TONER END DETECTION

<Model A092 & A105>



This model uses a pressure sensitive type sensor as the toner end sensor [A].

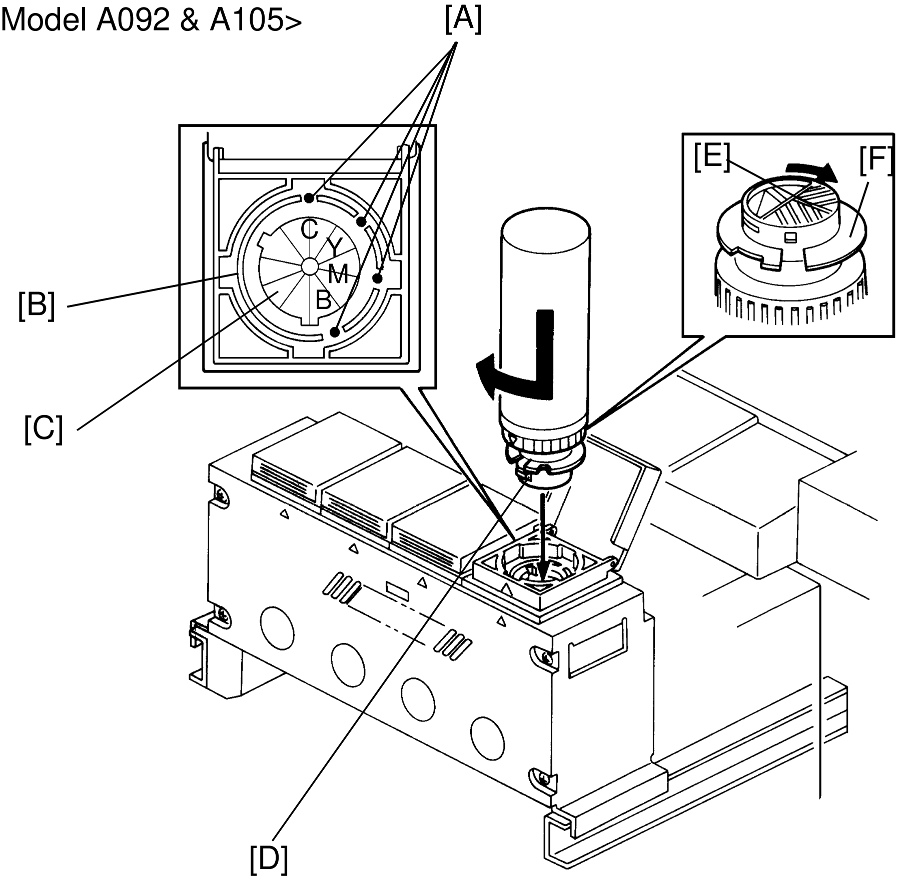
When there is enough toner in the tank, the toner is pressed against the toner end sensor surface by the agitator [B] while the agitator is turning.

When there isn't enough toner in the tank, the toner end sensor does not feel any pressure even if the agitator is rotating.

When the toner end sensor detects an insufficient toner condition, the add toner indicator starts blinking. This is the toner near end condition. The copier allows the operator to make 50 copies more after this condition is detected. After 50 copies are made, the copier stops and the add toner indicator stays on. This is the toner end condition.

8.4 TONER BOTTLE

<Model A092 & A105>



At the top of the toner tank, there is a toner bottle guide which has a positioning pin [A], a notch cut-in [B] and an entrance seal [C].

The size and position of the positioning pin and the notch are difference between model A092 and A105. The position of both the positioning pin and the notch cut-in determines each color, this prevents the wrong color bottle from being installed on the toner tank. When the correct color toner bottle is set to the toner bottle guide aligning the tab [D] with the notch, the positioning pin fits into the notch cut-in of the toner bottle. By rotating the (thoroughly shaken) toner bottle 180° clockwise, the inner shutter [E] of the toner bottle is opened as the positioning pin holds the outer shutter [F]. Then the toner inside the bottle is supplied to the tank.

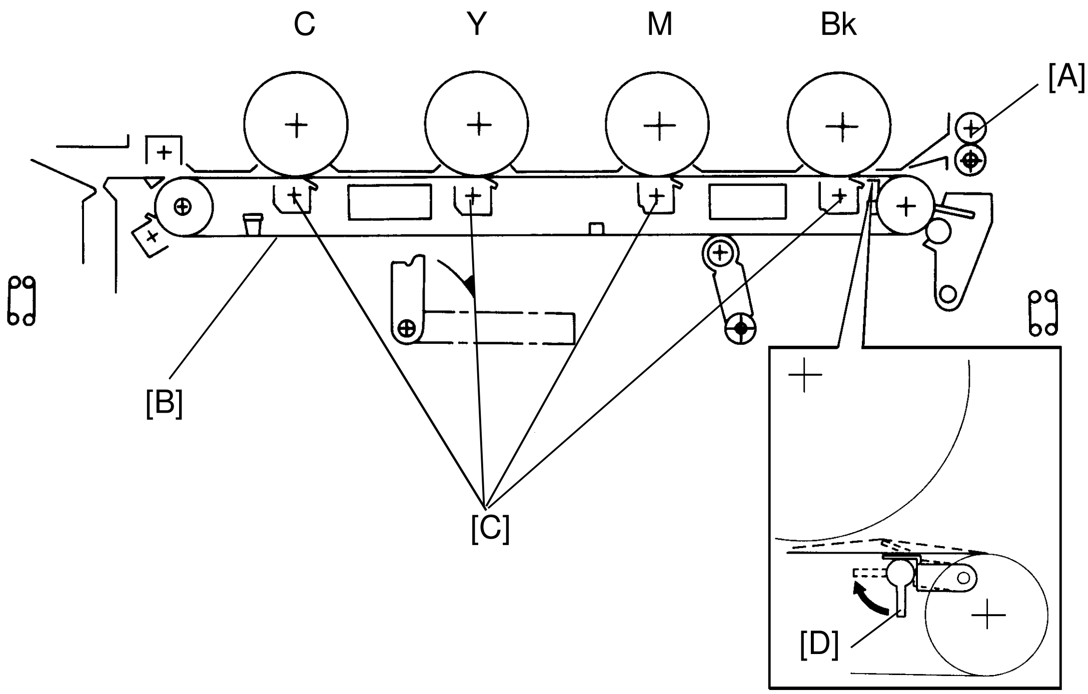
The entrance seal prevents toner from scattering when the toner bottle is being removed. This is necessary because the toner is very fine.

CAUTION:	**Even though the toner tank capacity (600 g) exceeds the amount in one bottle, never add more than one bottle, and always wait until the Add toner indicator lights.**

9. IMAGE TRANSFER AND SEPARATION

9.1 IMAGE TRANSFER

<Model A092 & A105>



The registration rollers [A] feed the copy paper to the transfer section. Then, the copy paper is transported by the transfer belt towards the fusing entrance section while the Bk, M, Y, and C color images are independently transferred to the paper, in order.

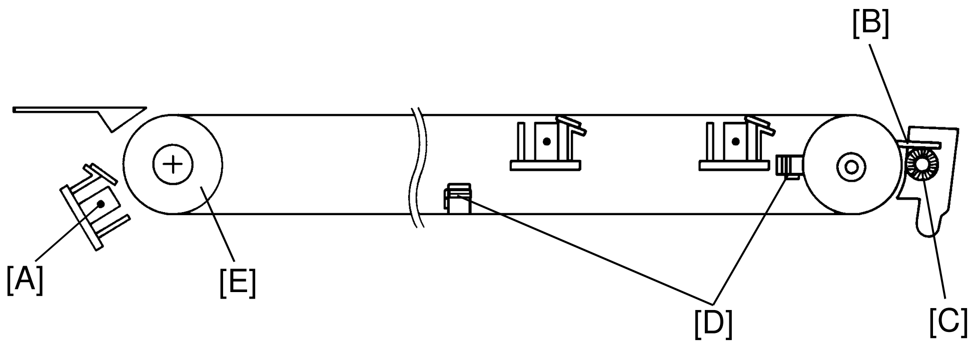
A positive charge is applied to the paper behind the transfer belt [B] (polyester film) for image transfer.

Though the material of the transfer wire [C] for each color is the same, the charge wires for yellow and cyan are installed closer to the drum than that of black and magenta. This compensates for a transfer power loss due to yellow and cyan toner being overlaid on the other toner colors.

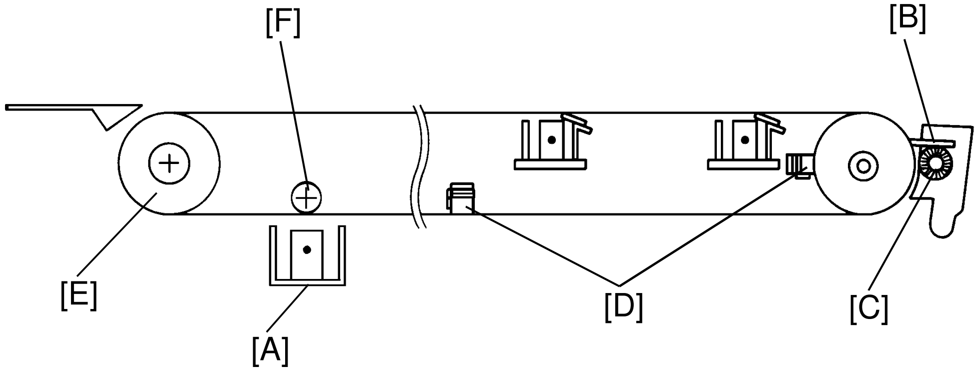
The transfer belt position lever [D] raises the transfer belt to the drum to prevent void image problems under high humidity conditions.

9.2 BELT CLEANING AND DISCHARGE MECHANISM

<Model A092>



<Model A105>



After cyan toner is transferred to the paper, the transfer belt must be cleaned both electrically and physically.

The belt discharge corona [A] applies an ac charge (with positive dc bias) to the transfer belt to eliminate the residual transfer charge remaining on the belt.

In the case of model A092, the transfer belt drive roller [E] removes the remaining electrical charge from the transfer belt. However, under high humidity conditions, the transfer belt drive roller removes the electrical charge on the transfer belt too efficiently and bleeds off some of the charge in the area of the cyan transfer charger. In this case, the cyan image may not be transferred well.

To improve cyan image transferring, the following two items are adopted on model A105.

1) The drive roller material has been changed from low resistance metal to high resistance metal so that the electrical charge on the transfer belt cannot flow through the transfer belt roller to ground.

2) A transfer belt grounding roller [F] has been newly installed. This roller removes the remaining electrical charge from the transfer belt. It is located for from the cyan transfer area; so, the cyan image will not have any insufficient transferring problem.

The remaining toner and any paper dust on the transfer belt are cleaned by the cleaning blade [B] and brush [C]. Cleaning pads [D] clean the surface of the belt drive roller and the back side of the transfer belt.

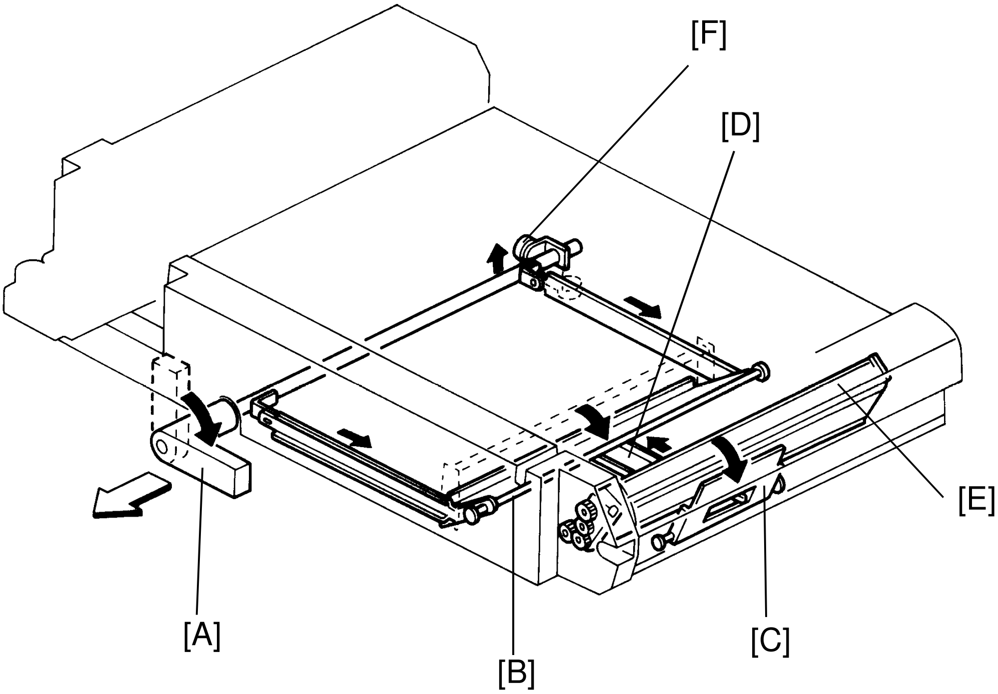
To shorten the waiting period for the next copy job, the transfer belt stops before all ID pattern images are cleaned (ie: some ID pattern images are left on the transfer belt).
The remaining pattern image will be cleaned at the beginning of the next copy cycle.

NOTE: If the machine is left for long a period with the pattern images remaining on the belt, these images may be difficult to thoroughly clean off the transfer belt.

To avoid this, set SPD#11 to H in order to have the machine clean all pattern images off before the end of the copy cycle. In this condition, it takes 2 seconds longer for the machine to be ready for use. This setting is especially recommended for customers with low copy volume.

9.3 TRANSFER BELT AND BELT CLEANING UNIT RELEASE MECHANISM

<Model A092 & A105>

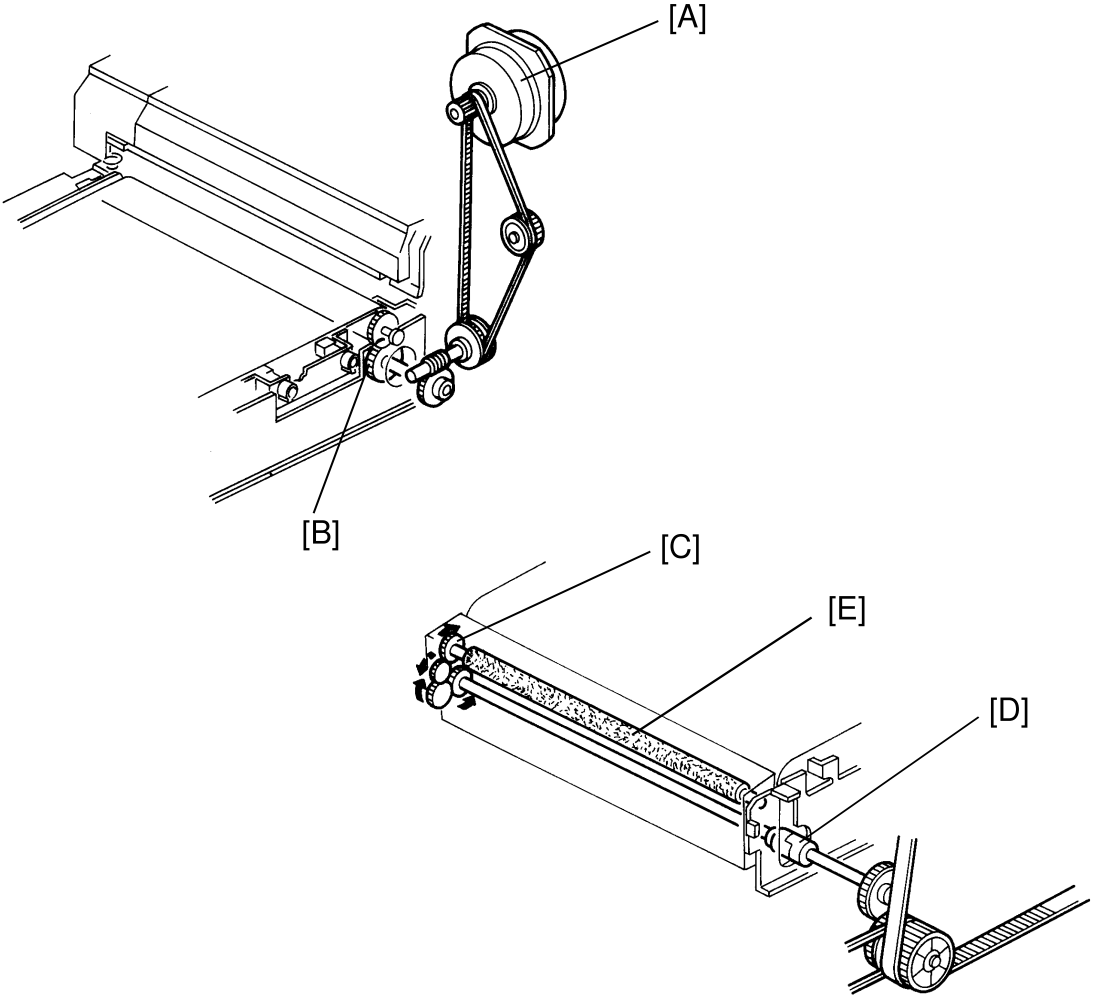


When the transfer unit handle [A] is turned clockwise, the transfer belt arm [B] is pulled down via the unit's linkage. The transfer belt is then released from the drums. Since the belt cleaning unit arm [C] is connected with the belt arm another linkage [D], the belt cleaning unit [E] is also released from the transfer belt.

A roller [F] is installed at the rear end of the transfer unit handle shaft. When the transfer unit handle is in the standard or operational position, the roller falls through a groove in the base frame and performs as the stopper to keep the transfer unit from being pulled out too far. When the transfer unit handle is turned clockwise, the roller is also turned and is removed from the groove. The roller then allows the transfer unit to be pulled out smoothly.

9.4 TRANSFER BELT AND BELT CLEANING DRIVE MECHANISM

< Model A092 & A105>



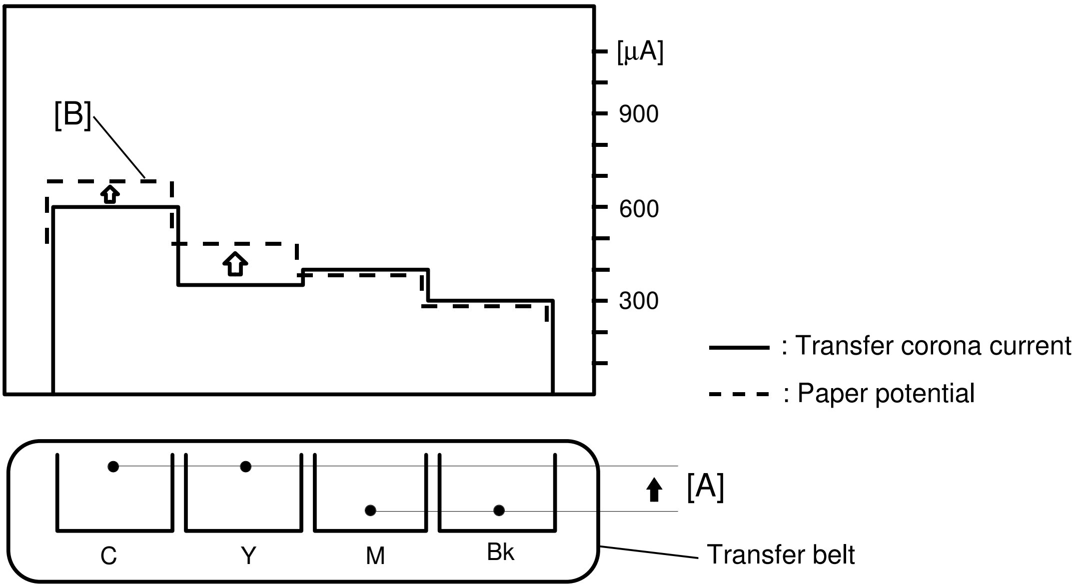
This model uses an independent dc servo motor for transfer belt drive. This is necessary because precise speed control of the transfer belt is required. The rotation of the transfer belt drive motor [A] is transmitted to the transfer drive roller [B] through a timing belt and gears.

Machine oil (20W-40) is required to prevent the worm gear from wearing out.

The belt cleaning brush [E] is driven by the main motor. The rotation of the main motor is transmitted to the belt cleaning brush drive shaft [C] through the timing belt, gears, and drive joint [D]. When the belt cleaning brush is rotating, the collection coil is also rotating. The collection coil transports the collected toner from the transfer belt to the toner collection section.

9.5 TRANSFER CORONA CURRENT

<Model A092 & A105>



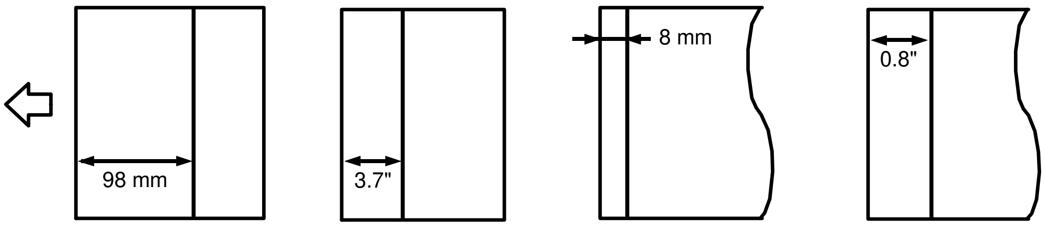
The transfer corona current for each color is as follows:

Black:	300 μA
Magenta:	400 μA
Yellow:	350 μA
Cyan:	600 μA

The transfer corona units for all four colors are the same, except for the corona wire height. The corona wires for yellow and cyan are installed closer to the drum than that for black and magenta [A].

The potential at the paper surface is increased in steps as each color is developed [B].
This is necessary because the top layers of toner require a stronger transfer force than the bottom layers.

9.6 TRANSFER CORONA TRAILING EDGE ADJUSTMENT



A4 size   11" x 81/2" size   A3 size   11" x 17" size

Transfer Corona Shift (µA)

		Bk	M	Y	C
UT #7 Trail Edge Adjust	1	300	400	350	600
	2	200	300	250	450
	3	**100**	**200**	**150**	**300**
	4	50	0	0	0
	5	0	0	0	0

Under high humidity conditions, the copy paper will become damp. When damp paper is separated from the drum, the positive charge kept on the paper is discharged through to the drum easily. As the drum potential at this area becomes more positive, the toner is then attracted to this more positive area.

On the copy paper, a horizontal dark line appears at about 98 mm (3.7") from the leading edge for A4 sideways (for LT sideways) from the second copy onward.

NOTE: The points where a horizontal dark line appears for each paper size are as follows:

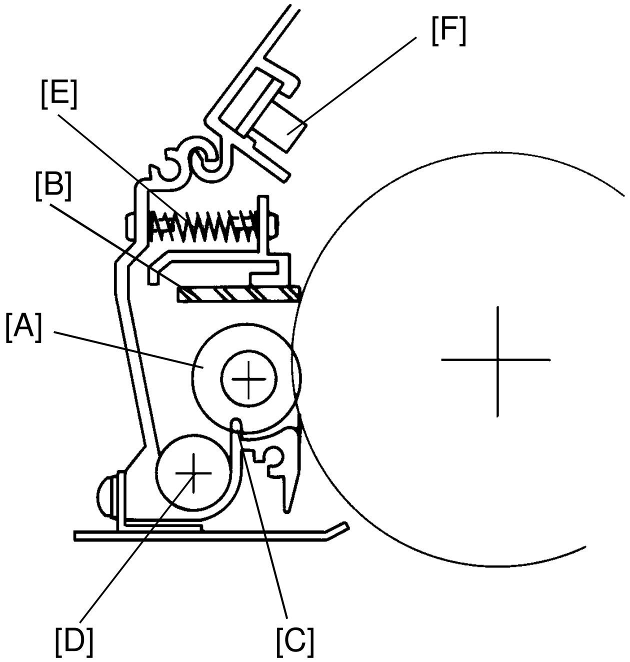
A4 sideways	: 98 mm	11" x 81/2"	: 3.7"
A3	: 8 mm	11" x 17"	: 0.8"

To eliminate this line, **the transfer corona charge can be lowered only at the trailing edge (10 mm from the trailing edge of the copy paper)** by a user tool (UT #7) as shown in the table above. The weaker the trailing transfer charge, the better to reduce or eliminate this dark line on the copy. However, incomplete image transfer may occur with this weaker charge under normal or low humidity condition, if UT #7 is not returned to the correct setting.

10. DRUM CLEANING

10.1 OPERATION

<Model A092>



Drum cleaning is accomplished by the cleaning brush [A] and the cleaning blade [B]. This mechanism is very much like other PPCs.

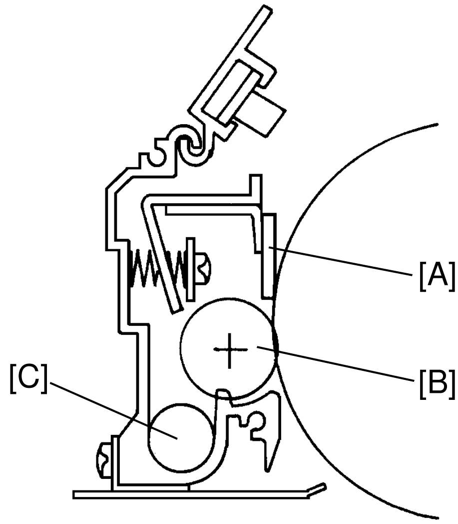
The cleaning brush and drum move in opposite directions at their point of contact. The cleaning brush removes paper dust and toner from the drum surface to reduce the cleaning load placed on the blade.

Next, the cleaning blade removes the remaining toner. The toner is caught by the fibers of the cleaning brush and is carried inside the cleaning unit. As the brush turns inside the cleaning unit, it rubs against a beater ridge [C], which dislodges the toner particles. The toner particles fall onto the toner collection coil [D].

As only springs [E] are used for the cleaning pressure mechanism, the cleaning blade presses against the drum whenever the cleaning unit is set in the copier.

In preparation for the next copy cycle, light from the quenching lamp (LED array lamp) [F] neutralizes any charge remaining on the drum.

<Model A105>

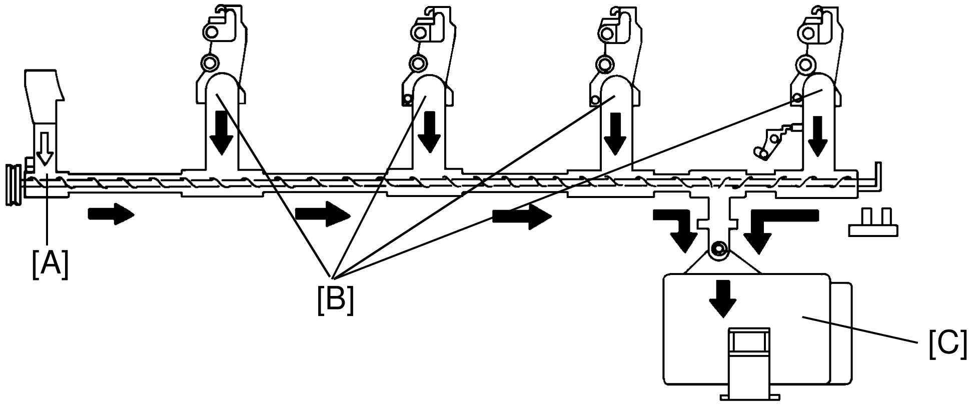


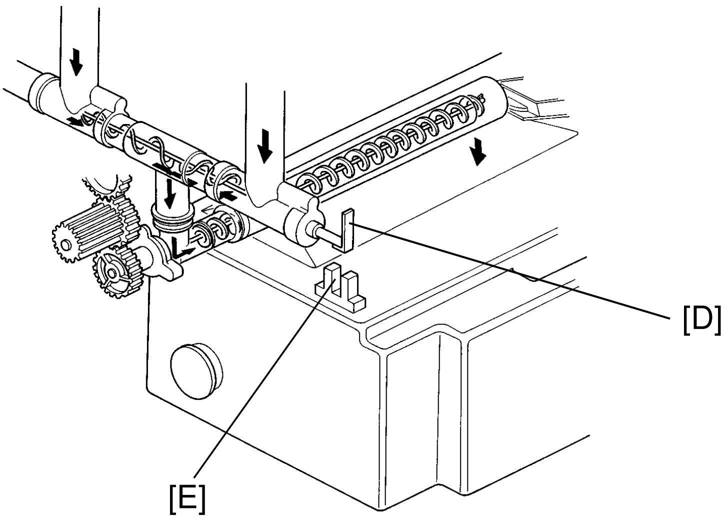
Cleaning mechanism has been changed from that of model A092. For model A092, the trailing blade cleaning mechanism is used. For model A105, the counter blade cleaning mechanism is adopted to remove the new type toner (6.4µm diameter). The only difference is in the way the cleaning blade [A] contacts the drum. The counter-blade mechanism achieves a high reliability (20K PM).

The other parts of the mechanism, the cleaning brush [B] and cleaning collection coil [C] are the same as those of model A092.

10.2 TONER COLLECTION

<Model A092 & A105>





The toner collected during transfer belt cleaning [A] and the toner collected during drum cleaning for each color [B] is transported to the toner collection bottle [C].

To monitor whether or not toner becomes clogged in the toner collection pipe, the toner coil sensor actuator [D] is installed at the end of the collection coil.

When the toner is transported without any restrictions, the toner coil sensor actuator rotates smoothly. The sequence board can receive the signal periodically from the toner coil sensor [E]. If the sequence board does not detect any signal change of the toner coil sensor for 5 seconds, it determines that the toner is clogging in the collection pipe. The copier then stops and SC #310 is lit.

10.3 TONER CLOGGING PREVENTION

<Model A092 & A905>

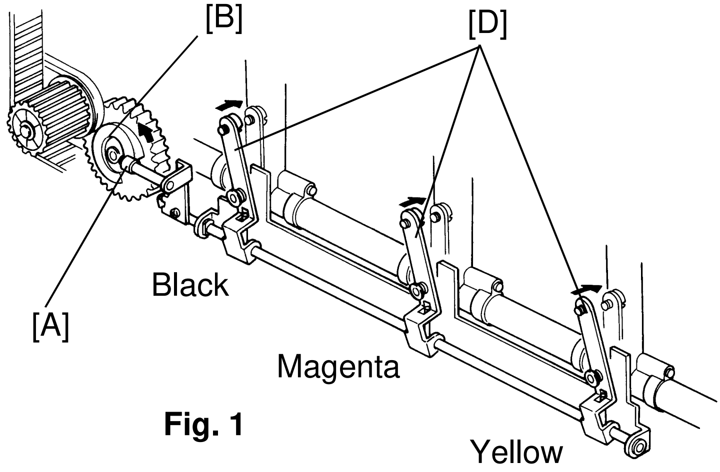


Fig. 1

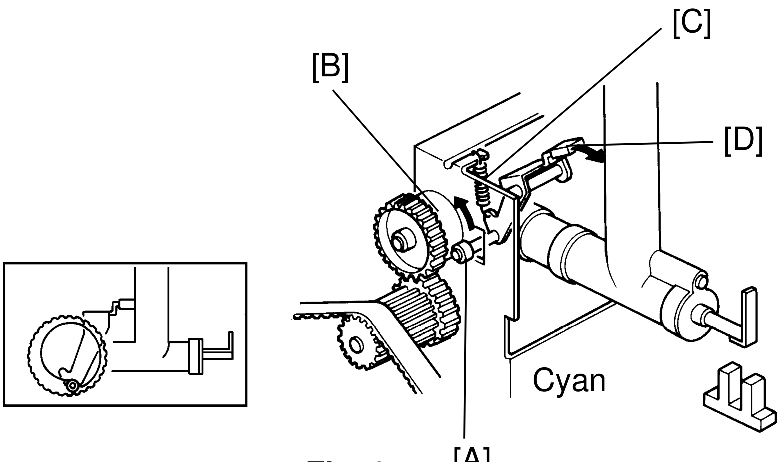


Fig. 2

There are two toner collection pipe knock mechanisms used prevent toner from adhering to the sides of the pipe, being melted and creating a clog in the toner collection pipe.

In Fig. 1, the roller [A] of the pipe knock bracket runs along the cam surface [B], while the main motor is rotating. At the highest part of the cam surface, the pipe knock spring [C] is compressed. As the roller falls into the cut-out of the cam surface, the pipe knock lever [D] knocks the pipe.

In Fig. 2, the roller [A] of the pipe knock bracket runs along the cam surface [B] while the main motor is rotating. At the highest part of the cam surface, the pipe knock spring [C] is stretched. As the roller falls into the cut-out of the cam surface the pipe knock lever [D] knocks the pipe.

The toner collection pipe fan is located under the cyan color collection pipe to keep the pipe cool.

10.4 DRIVE MECHANISM

<Model A092 & A105>

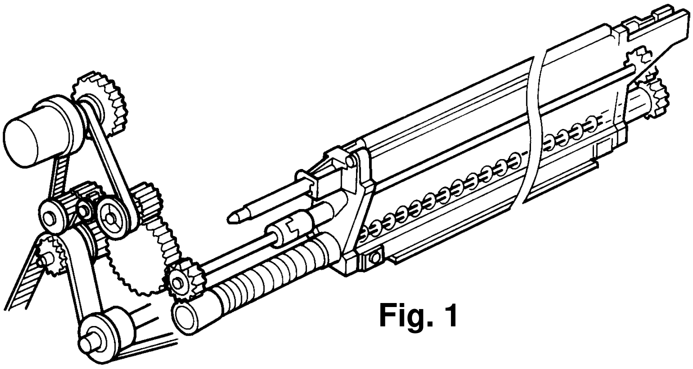


Fig. 1

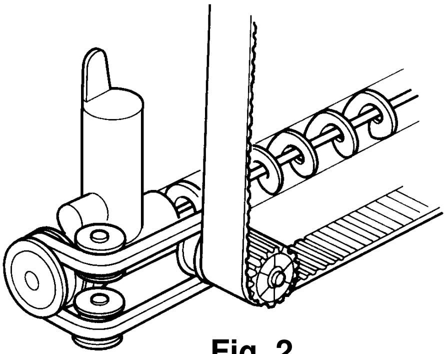


Fig. 2

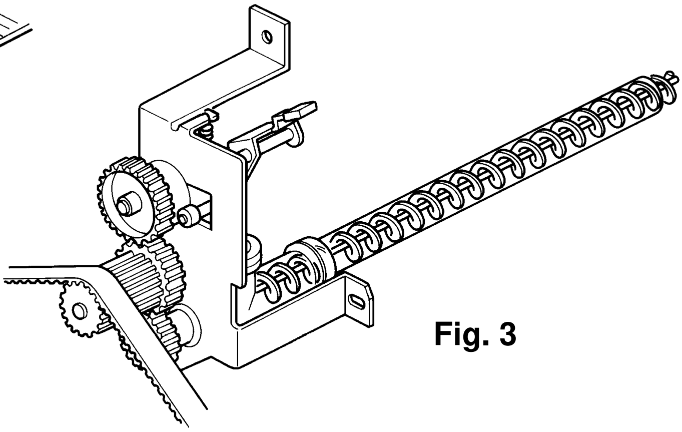


Fig. 3

The main motor drives the cleaning and the toner collection mechanisms.

The main motor rotation is transmitted to the cleaning unit for each color through the timing belt, gears, and the joints. The cleaning brush and the collection coil then rotate (Fig. 1).

The rubber belt transmits the rotation of the main motor to the horizontal direction and drives the collected toner transport coil (Fig. 2).

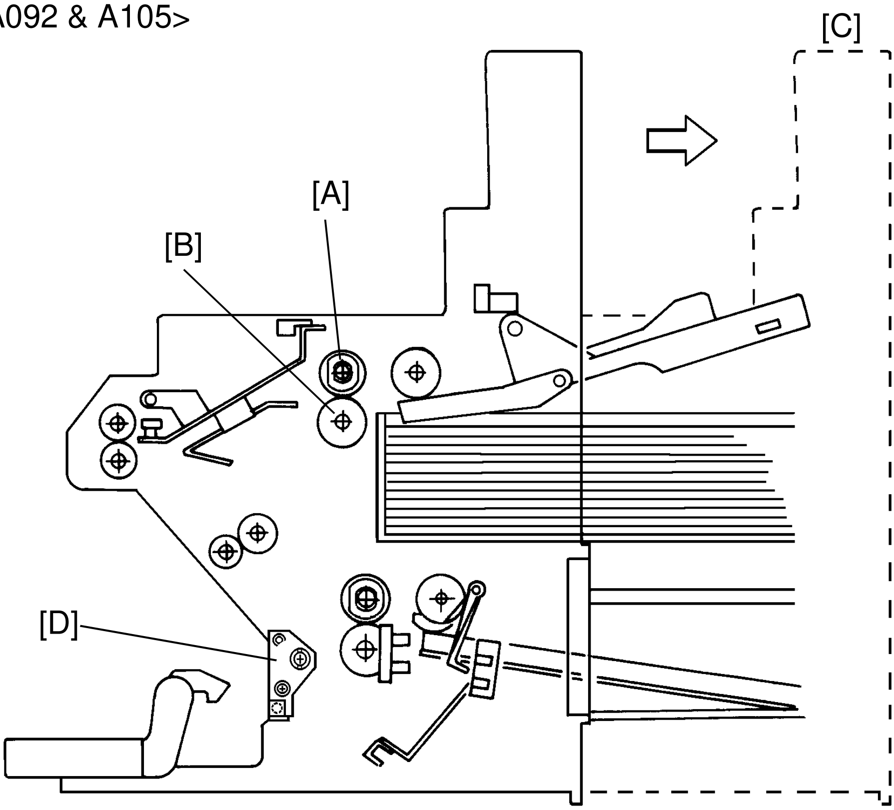
And then, the collection coil for the collection bottle is also driven through the drive gear, and the timing belt (Fig. 3).

Detailed Descriptions

11. PAPER FEED

11.1 OVERVIEW

<Model A092 & A105>



Paper is fed from either of two cassettes or from the by-pass feed table. The capacity of each cassette is 500 sheets and the by-pass feed table is 20 sheets.

This model uses an F.R.R. mechanism (feed [A] and reverse rollers [B]) to separate the top sheet of paper from the stack and to feed it into the copier. Attached to the cassette bottom plate is a dampness proof mylar which helps prevent the stack of paper from becoming damp.

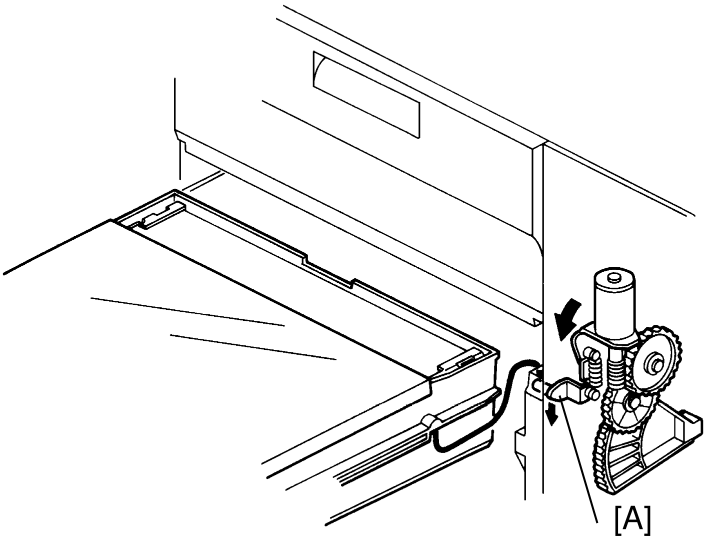
The entire paper feed unit can be slid out of the copier about 300 mm, so that the user can clear any misfed paper easily [C].

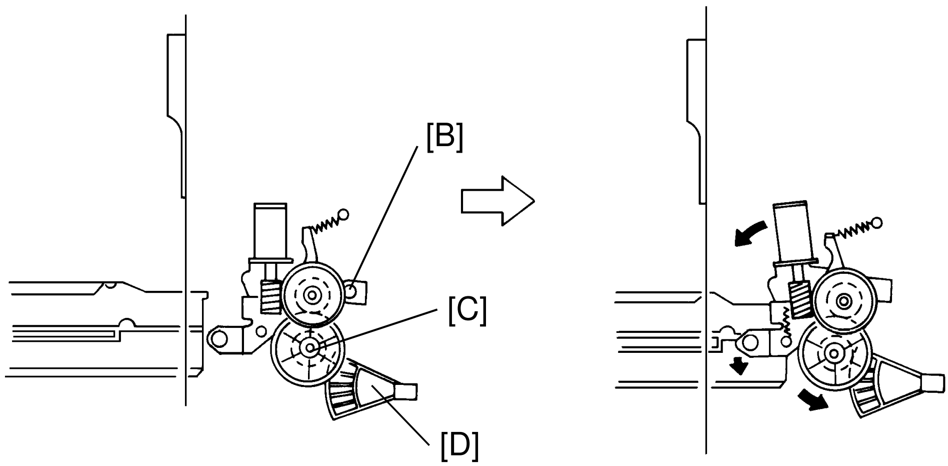
The parallel adjustment bracket [D] can adjust the position of the paper feed unit so that it is parallel against the copier main unit.

If the tone of the copy image within 80 mm from the trailing edge is slightly changed or the Y, M, C, and Bk grid pattern in this area does not fit on the same lines, perform the paper feed unit parallel adjustment. See section 5. This is needed only for model A105. This is because this model has 256 gradation steps and a slight tone change can be visible.

11.2 PAPER LIFT MECHANISM

<Model A092 & A105>



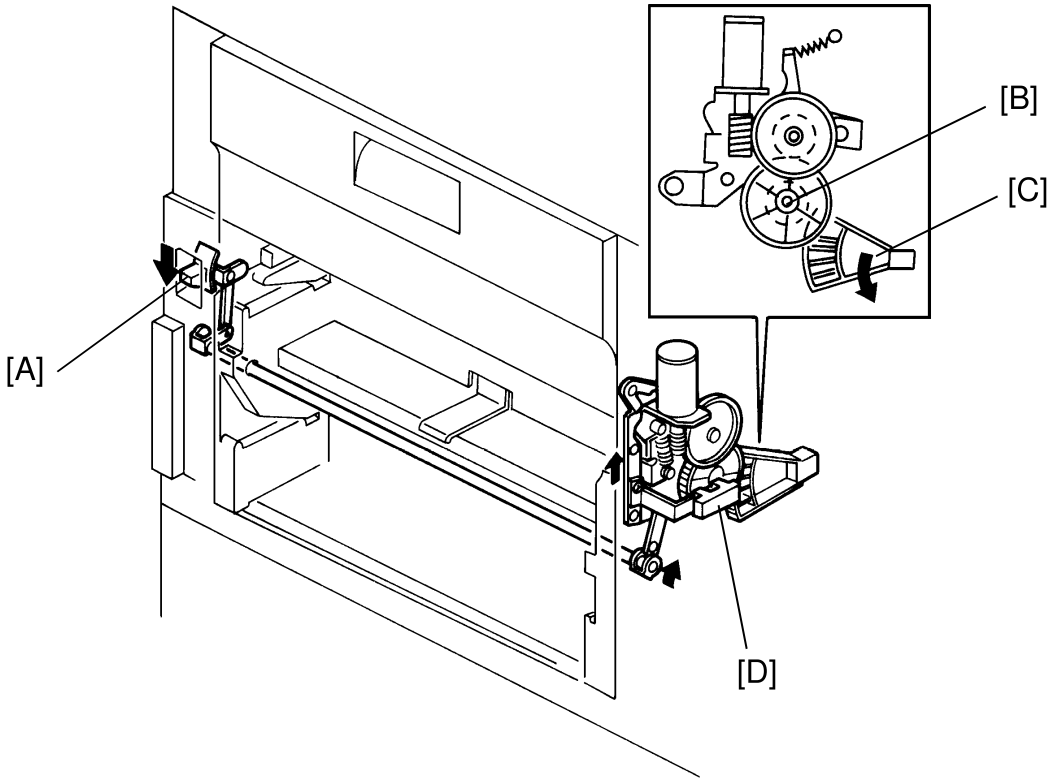


When the cassette is inserted into the copier, the cassette actuator pin [A] is pushed down by the cassette. The lift motor unit then mechanically pivots counterclockwise (looking from the rear of the copier) at point [B] so that the lift gear [C] engages with the sector gear [D].

Simultaneously, the paper size actuator plate actuates the paper size sensor. The CPU then detects that a cassette has been inserted and turns on the lift motor. The lift motor raises the bottom plate until the top sheet pushes up the pick-up roller.

When the paper pushes up the pick-up roller, the lift sensor is de-actuated and the CPU turns off the lift motor.

(Paper Load Lever)

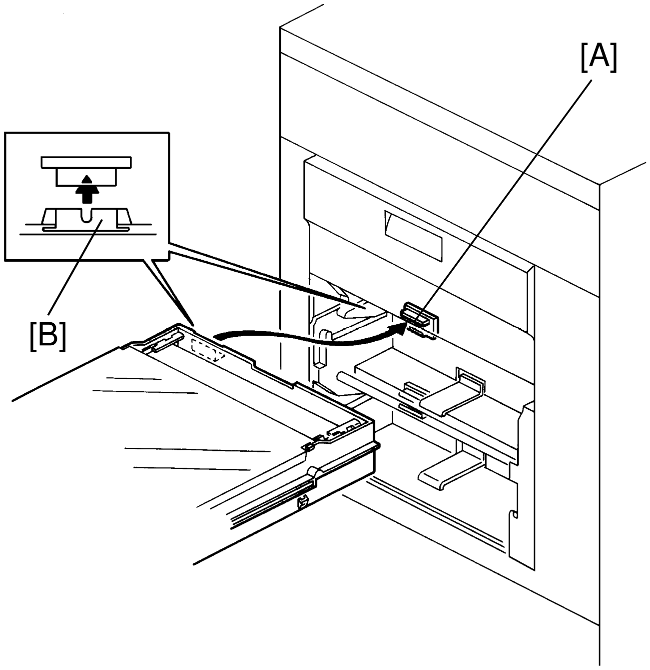


When the paper load lever [A] is pushed down, the lift gear [B] is dis-engaged from the sector gear [C] through the shaft and linkage. The cassette arm is lowered. At this time, the cassette arm release sensor [D] is de-actuated (the sensor actuator is removed from the sensor) and the lift motor is inhibited in order to keep the cassette arm from raising.

This cassette arm release mechanism allows the users to replenish paper without taking the cassette out.

11.3 PAPER SIZE DETECTION

<Model A092 & A105>

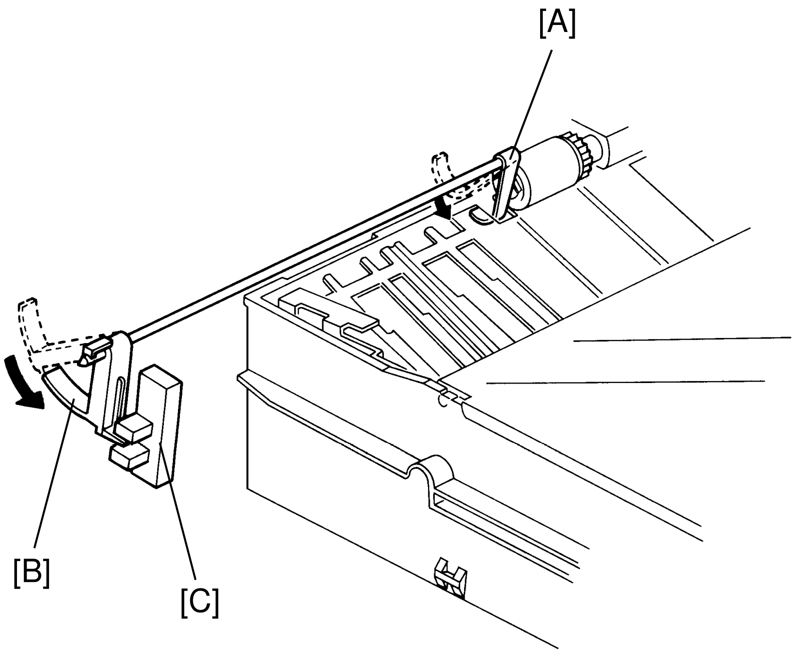


An array of five photointerruptors [A] in the cassette entrance detects the paper size. The paper size sensors are actuated by a plate [B] on the front of the cassette. Each paper size has its own unique combination of notches in the actuator plate. The CPU reads which photointerruptors have been blocked de-actuated by the actuator plate to determine which paper size has been inserted.

NOTE: When all five photointerruptors are de-actuated, the CPU recognizes that the cassette is not inserted. And, the CPU inhibits the paper lift motor.

11.4 PAPER END DETECTION

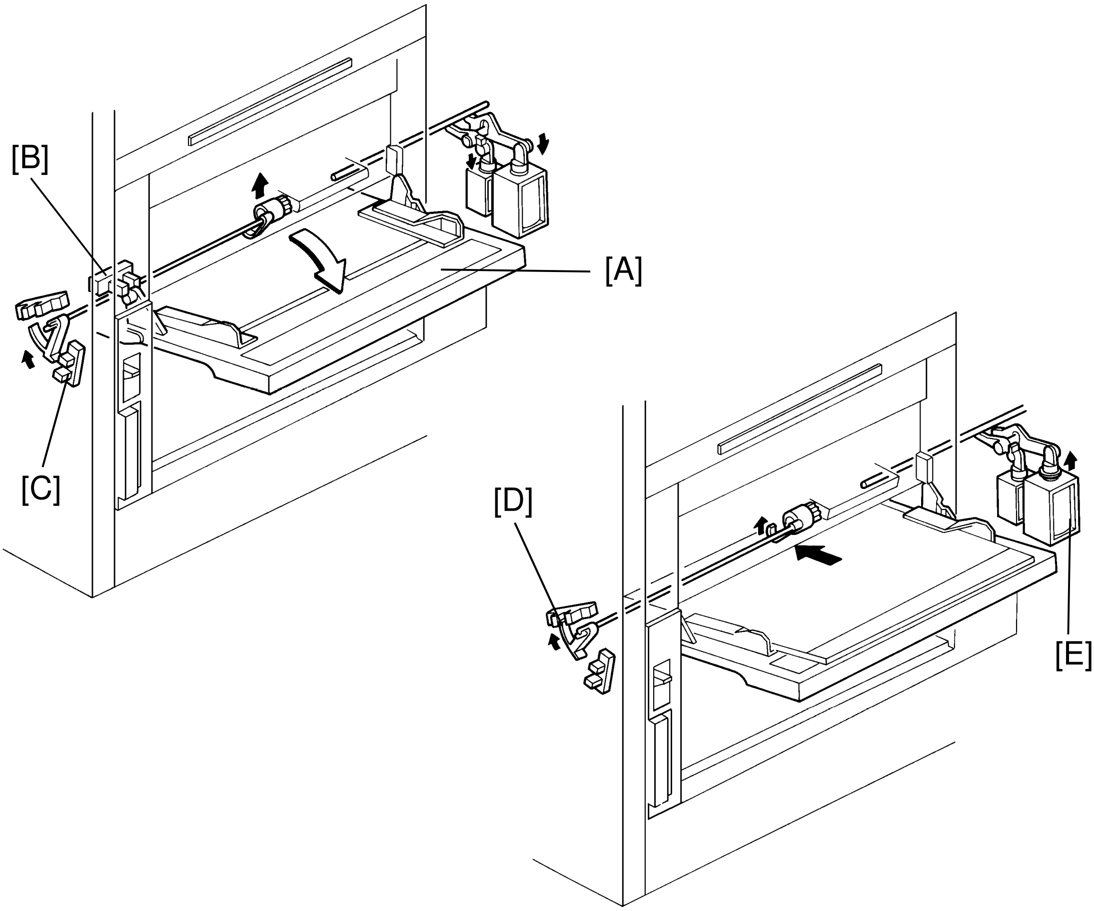
<Model A092 & A105>



When paper is in the cassette, the paper stack lifts the paper end feeler [A]. When paper runs out, the paper end feeler falls through a groove in the bottom plate and the sensor actuator [B] installed on the end of the actuator shaft blocks the paper end sensor [C]. The paper feed control board detects the paper end condition and lights the "Add Paper" indicator.

11.5 BY-PASS FEED TABLE

<Model A092 & A105>



(By-pass feed mode detection)

In the by-pass feed mode, up to 20 sheets (normal weight) can be loaded on the by-pass feed table and fed into the copier without using cassette. The by-pass feed mode uses the same paper feed and separation rollers as the upper feed station.

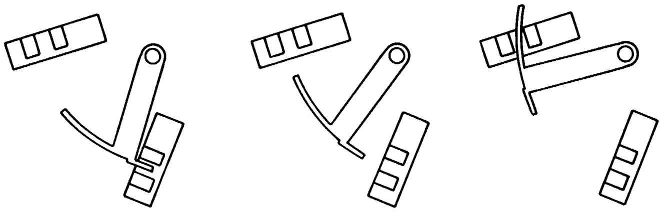
When the by-pass feed table [A] is opened, the by-pass feed sensor [B] sends a low signal to the CPU. Then the CPU shifts to the by-pass feed mode. The actuator of the upper paper end sensor [C] stays in the same position but the CPU detects a paper end condition in the by-pass feed table and lights the "Add Paper" indicator.

When paper is inserted into the by-pass feed table, the by-pass feed paper end sensor [D] is actuated. The CPU then turns off the "Add Paper" indicator.

In by-pass feed mode, the by-pass feed solenoid [E] lifts the pick-up roller. This solenoid has a longer stroke since the pick-up roller must be lifted higher when the by-pass feed table is used.

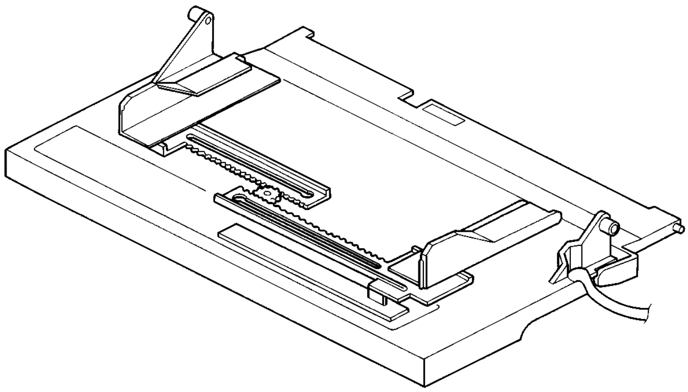
(Paper end detection)

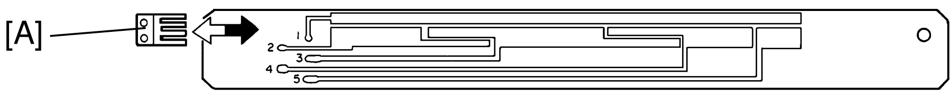
For the first feed station there are two sensors (an upper paper end sensor and a by-pass paper end sensor) to detect the paper end condition in either the cassette feed mode or the by-pass feed mode. The CPU detects a paper end condition by monitoring the activation of these two sensors as shown below:



Cassette Feed Paper End	Cassette Feed with Paper or Manual Feed Paper End	Manual Feed with Paper

(Paper width detection)



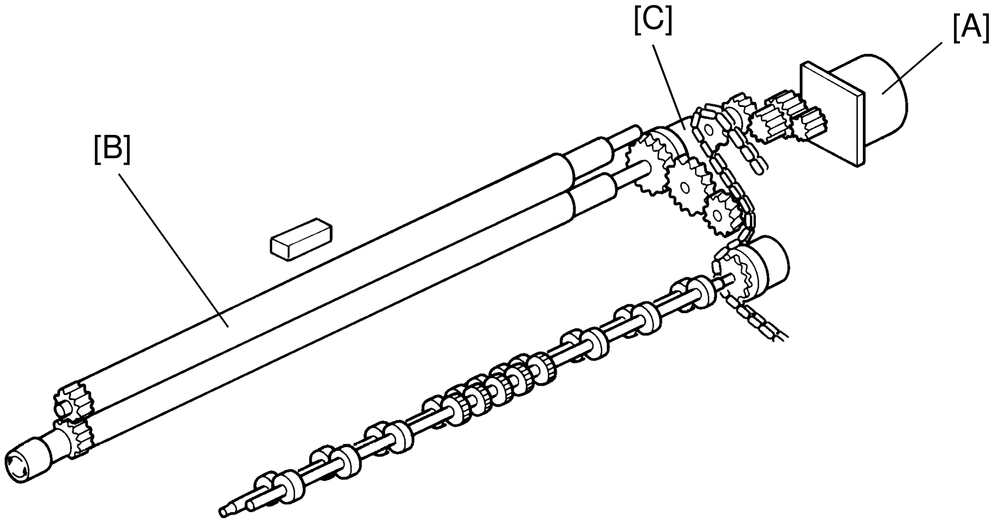


In the by-pass feed mode, the CPU needs paper width data in order to decide the drum exposure area in the main scan direction.

The paper width switch [A] is a slide switch, that is located inside the by-pass feed table. This switch has four contacts which are connected to the ground by a side. The slide moves when the user positions the by-pass feed guides against the paper, and the CPU determines the paper width based on which of the contact is grounded.

11.6 REGISTRATION

<Model A092 & A105>



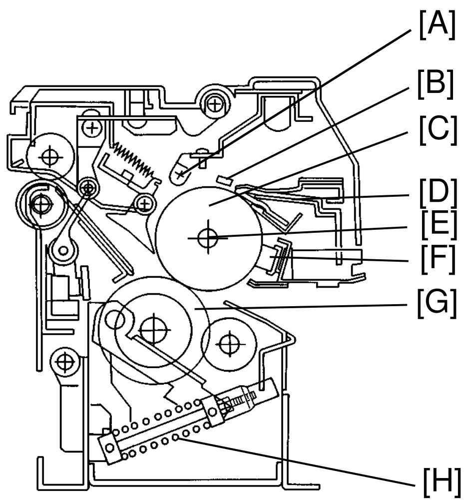
The paper feed motor [A] drives the registration rollers via the drive chain, gears, and the registration clutch.

Shortly after the leading edge of the paper reaches the registration rollers [B], the CPU receives a registration start signal from the sequence control board. The CPU then energizes the registration clutch [C]. The registration rollers start rotating. This very short delay of the start timing causes the paper to buckle so as to correct any paper skew. Then, the paper is fed into the transfer section by the registration rollers.

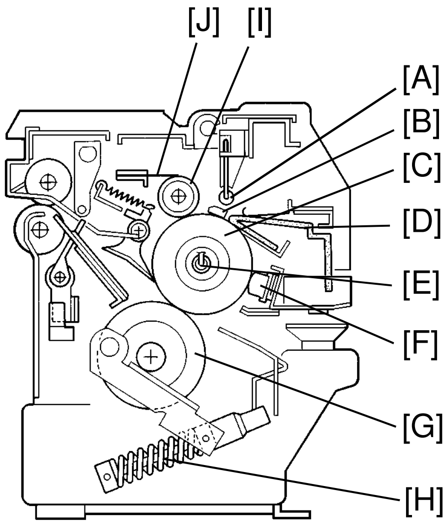
12. IMAGE FUSING

12.1 OVERVIEW

<Model A092>



<Model A105>



The fusing unit consists of the following sections:

1) Pressure and heating.

Description	Model A092	Model A105
Fusing roller [C]	φ45 silicon roller	φ45 silicon roller (The hardness is lower than that of model A092 to match the D type toner.)
Pressure roller [G]	φ45 teflon tubed roller	φ45 teflon tubed roller (The hardness is lower than that of model A092 to match the D type toner.)
Fusing lamp [E]	550 W halogen lamp	550 W halogen lamp
Pressure spring [H]	63 Kg each	45 Kg each (As the softer rollers are adapted, the pressure is lowered.)

2) Cleaning

Description	Model A092	Model A105
Cleaning blade [B]	Rubber	Rubber
Cleaning roller [I]	Not adopted	φ20 resin roller
Cleaning scraper [J]	Not adopted	Thickness: 0.2 mm, Stainless steel

3) Oil supply

Description	Model A092	Model A105
Oil supply pad [D]	Contact width with the fusing roller: 12 mm or more	Contact width with the fusing roller: 12 mm or more
Oil tank	350 cc	350 cc
Pumping mechanism	Same as on other copiers	

4) Drive

Description	Model A092	Model A105
Main motor	DC servo motor	DC servo motor
Fusing idling motor	Not adopted	DC servo motor

5) Temperature control

Description	Model A092	Model A105
Thermistor [F]	In contact with the fusing roller	
Thermofuse [A]	Open at 169°C	Open at 169°C
SSR	Turning the fusing lamp on and off	
Sequence control board	Control the SSR, fusing exhaust fan and rear exhaust fun.	

6) Jam detection

Description	Model A092	Model A105
Paper exit sensor	Feeler and photo interrupter sensor	
Sequence control board	Monitoring the signal from the paper exit sensor.	

7) Fan

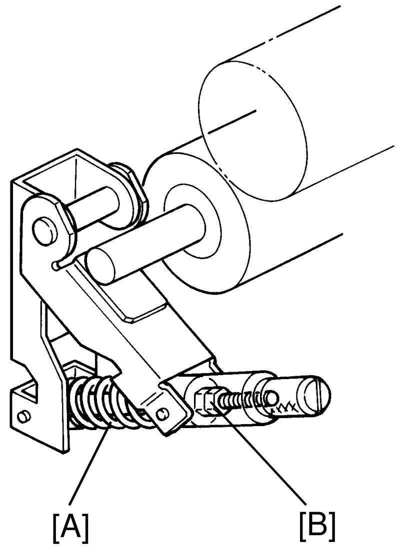
Description	Model A092	Model A105
Fusing exhaust fan	dc 24V, 2 pcs	
Rear fan	dc 24 V, 1pc	

8) Service Calls

SC520 - Fusing lamp open
SC530 - Fusing thermistor open
SC540 - Fusing temperature cannot reach the specified temperature
SC550 - Overheat

12.2 FUSING PRESSURE MECHANISM

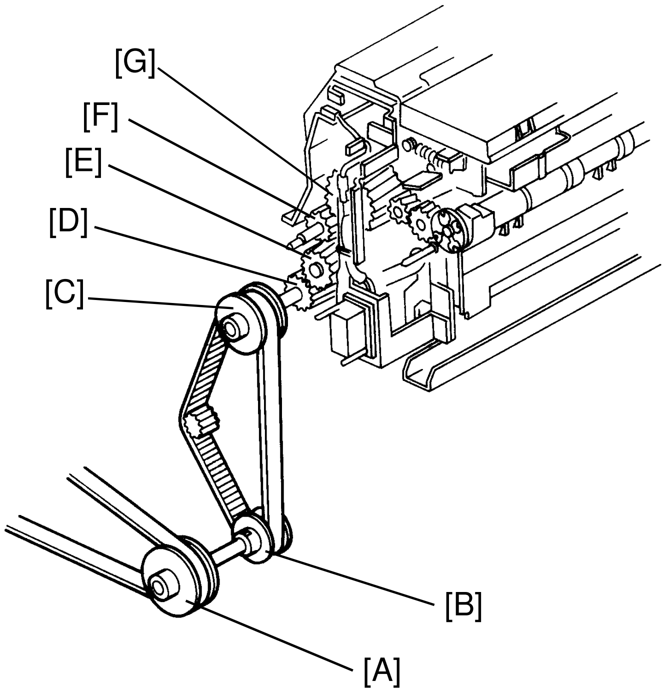
<Model A092 & A105>



The pressure roller is pressed upwards by the pressure spring [A]. The pressure is adjusted by the position of the nuts [B]. If the nuts are lowered, the pressure is decreased; on the other hand, if the nuts are raised, the pressure is increased. The pressure is checked by measuring the nip band on an OHP sheet (Folex 100).

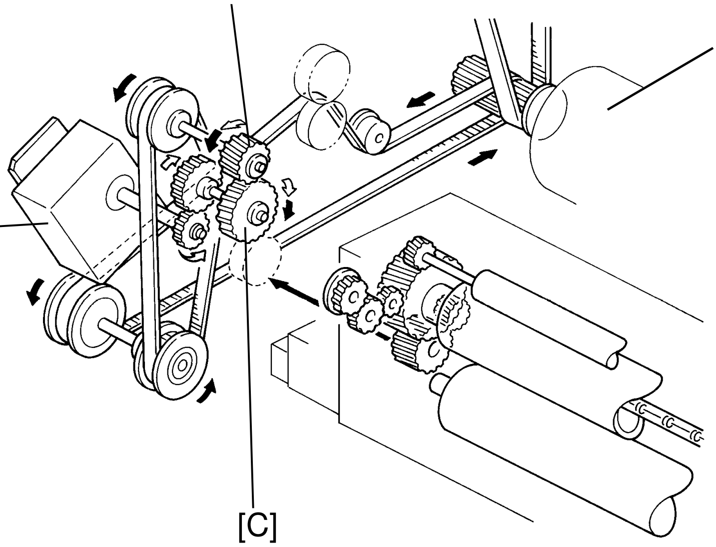
12.3 DRIVE MECHANISM

<Model A092>



The rollers in the fusing unit are driven by the main motor. The torque of the main motor is transferred to the fusing unit through the following gears and belts: timing belt, pulley 47T [A], pulley 25T [B], timing belt, pulley 35T [C], 1st drive gear 21Z [D], 2nd drive gear 27Z [E], idle gear 20Z [F], fusing roller 45Z gear [G].

<Model A015>



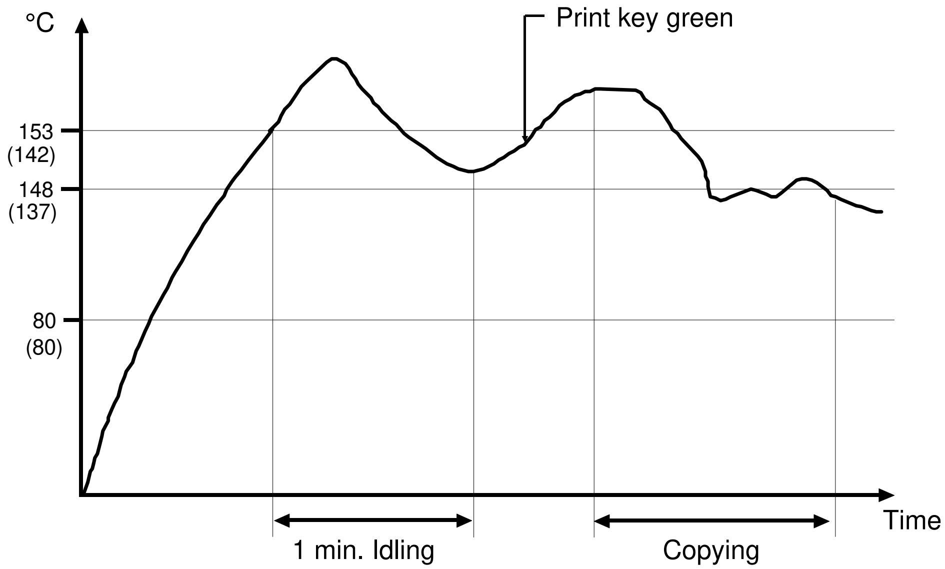
In copying, the rollers in the fusing unit are driven by the main motor [A]. The power of the main motor is transferred to the fusing unit as shown in the illustration by the black (⬆) arrows. As the gears [C] have one way clutch mechanism, the main motor power does not transfer to the fusing idling motor [B].

A fusing idling motor motor turns only in the stand-by condition. It continually alternates one second on and 3 seconds off.

Tuning the rollers in stand-by mode keeps the entire surface of the pressure roller at the same temperature. The power of the fusing idling motor is transferred as shown in the illustration by the white (⇧) arrows.

This is to prevent un-even shiny image. If while in the stand by condition the rollers stop, the part of pressure roller surface which contracts the hot roller becomes hotter than the other part. When making copies, the part with the higher temperature makes a shiny image and the other part makes a normal image.

12.4 TEMPERATURE CONTROL



To control the temperature of the hot roller, the fusing lamp is turned off and on by the SSR (Solid State Relay).

When the main switch is turned on, one of two things will happen, depending on the initial temperature of the fusing roller.

1. The temperature of the fusing roller is lower than 80°C:
   In this case, after reaching 153°C (142°C for model A105), the fusing roller and pressure roller start turning for 1 minute to make the temperature on the rollers uniform. The print key then turns green.
2. The temperature of the fusing roller is higher than 80°C:
   In this case, the process described above is not performed.

While copying, the fusing temperature is controlled at 148°C (137°C for model A105) which is lower than the ready temperature.

The specified temperature can be adjusted by SPD (see table 1 in next page). When changing the temperature, see table 2. The data for the temperature is not the actual temperature.

In thin paper mode, the temperature is controlled at 148°C (135°C for model A105) during standby, and at 143°C (131°C for model A105) during a copy run.

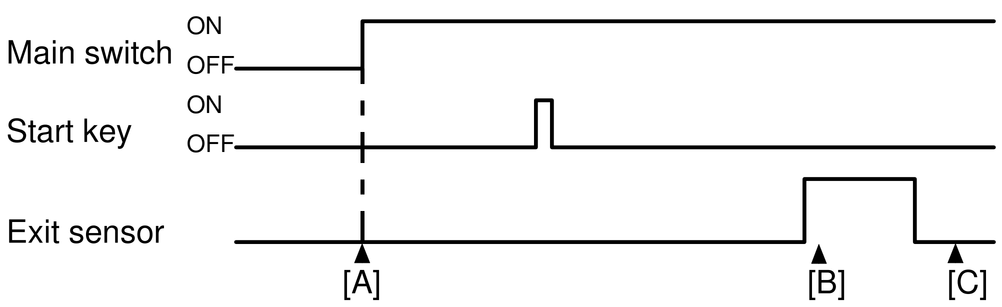
Table 1

SPD	Item	Data
703	Fusing temperature for thin paper mode during standby	152 (148°C) (A092) 135 (135°C) (A105)
704	Fusing temperature for thin paper mode while copying	146 (143°C) (A092) 129 (131°C) (A105)
705	Fusing temperature at idling start	47 (80°C) (A092) 47 (80°C) (A105)
707	Fusing temperature for standard mode during standby	160 (153°C) (A092) 144 (142°C) (A105)
708	Fusing temperature for standard mode while copying	152 (148°C) (A092) 138 (137°C) (A105)
709	Fusing temperature for OHP mode while copying	152 (148°C) (A092) 137 (136°C) (A105)
710	Idling time	60 (60 sec.) (A092) 60 (60 sec.) (A105)

Table 2

Temp.	Data	Temp.	Data
75	39	120	112
80	47	125	119
85	55	130	127
90	64	135	135
95	72	140	141
100	81	145	149
105	89	150	157
110	97	155	165
115	105	160	172

12.5 JAM DETECTION



Paper jam is checked under the following conditions:

1. Initial jam check [A] - When the main switch is turned on, the exit sensor detects paper.

2. On check [B] - After a specified time (depending on paper size), the exit sensor should detect paper.
3. Off check [C] - After a specified time (depending on paper size), the exit sensor should not detect paper.

12.6 SC RESET

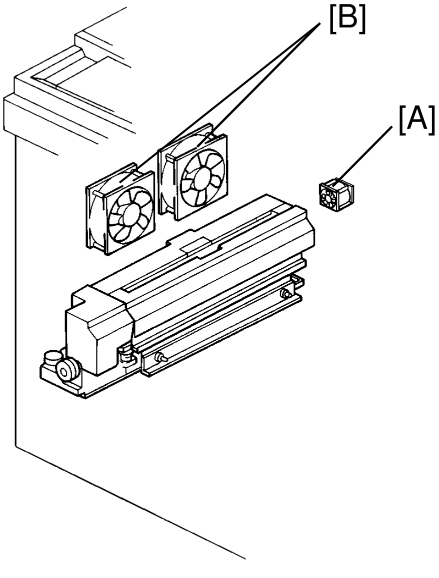
For safety reasons, it is not possible to reset the service calls for the fusing section by turning the main switch off and on. To reset these service call indicators, first repair the problem, then change the data in SPD#701 from L to H and finally turn the main switch off and on.

Service code

On the Operation panel	On the SP panel	Item
SC520	E520	Fusing lamp open
SC530	E530	Fusing thermistor open
SC540	E540	Fusing temp. cannot reach specified temp.
SC550	E550	Overheat

12.7 OTHERS

Two kinds of fans are used for removing the heat from the fusing unit and ozone from the charge assemblies. During the ready condition, only the rear exhaust fan [A] turns this is to reduce noise. While copying, two fusing exhaust fans [B] and the rear exhaust fan turn.



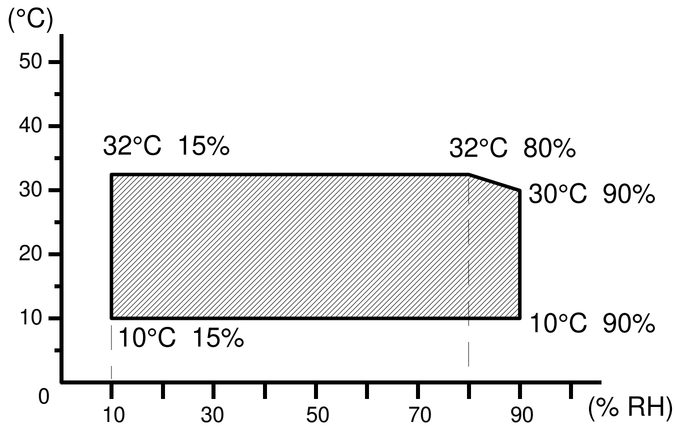
SECTION 3

INSTALLATION

1. INSTALLATION REQUIREMENTS

1.1 ENVIRONMENT

1. Temperature Range: 10°C to 32°C (50°F to 90°F)
2. Humidity Range: 15% to 90% RH



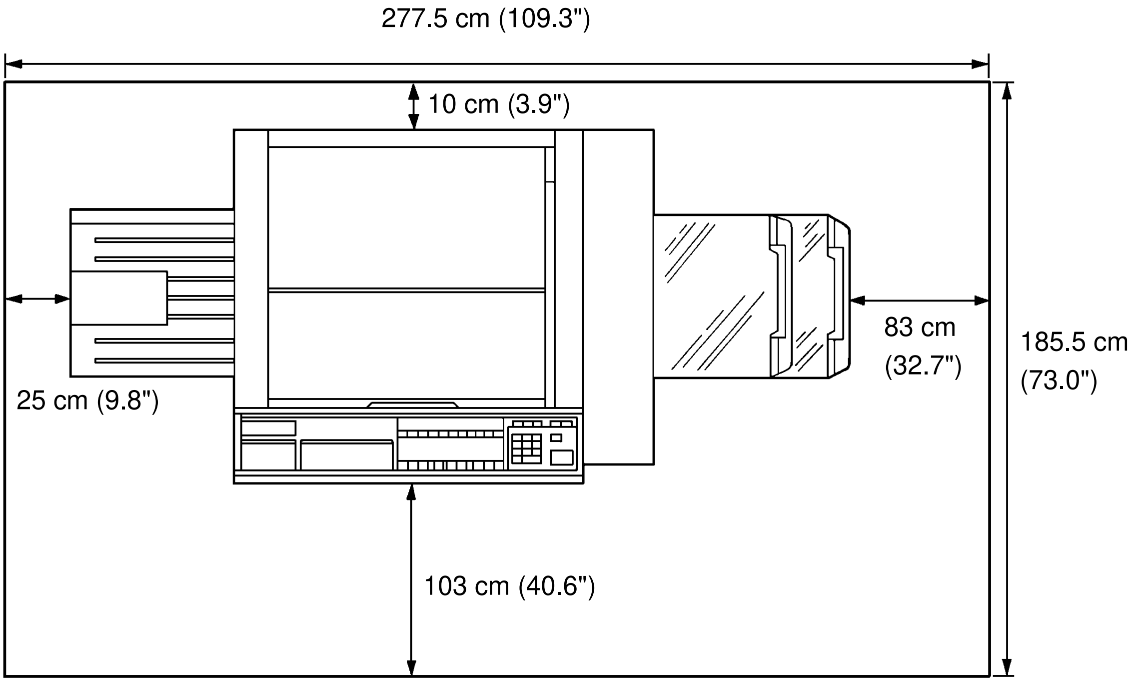
3. Ambient Illumination: Less than 2,000 lux (Do not expose to direct sunlight.)
4. Ventilation: Minimum space 20 m^3. Room air should turn over at least 30 m^3/hr/person.
5. Ambient Dust: Less than 0.15 mg/m^3 (4 x 10 -3oz/yd3)
6. If the installation site is air-conditioned or heated, place the machine as follows:
   a) Where it will not be subjected to sudden temperature changes.
   b) Where it will not be directly exposed to cool air from an air-conditioner in the summer.
   c) Where it will not be directly exposed to reflected heat from a space heater in winter.
7. Avoid placing the machine in an area filled with corrosive gas.
8. Avoid any area higher than 2,000 meters (6,500 feet) 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 vibration.

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

   Screw the leveling feet up or down in order to level the machine. Use a carpenter's level if necessary.

1.3 MINIMUM SPACE REQUIREMENTS



1. Front: 103 cm (40.6")
2. Back: 10 cm (3.9")
3. Right: 83 cm (32.7")
4. Left: 25 cm (9.8")

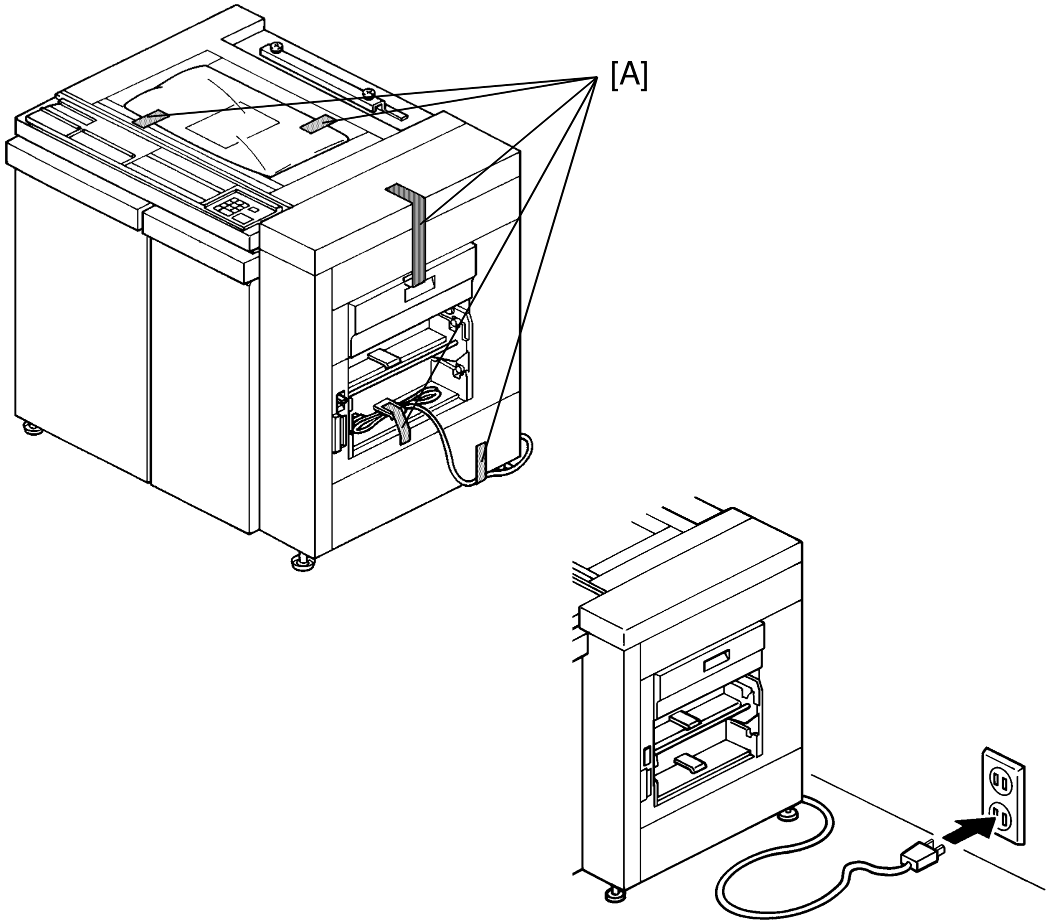
1.4 POWER REQUIREMENTS

1. Input voltage level: 115 V/60 Hz: More than 15 A (for N.A.)
   220 V/50 Hz: More than 8 A (for EU.)
   230 V/50 Hz: More than 8 A (for EU.)
   240 V/50 Hz: More than 8 A (for EU.)
2. Permissible voltage fluctuation: ±10%
3. Do not set anything on the power cord.
4. Make sure that the wall-outlet is near the copier and easily accessible.

   NOTE: 1) Be sure to ground the machine.
   2) Make sure the plug is firmly inserted in the outlet.
   3) Avoid multi-wiring.

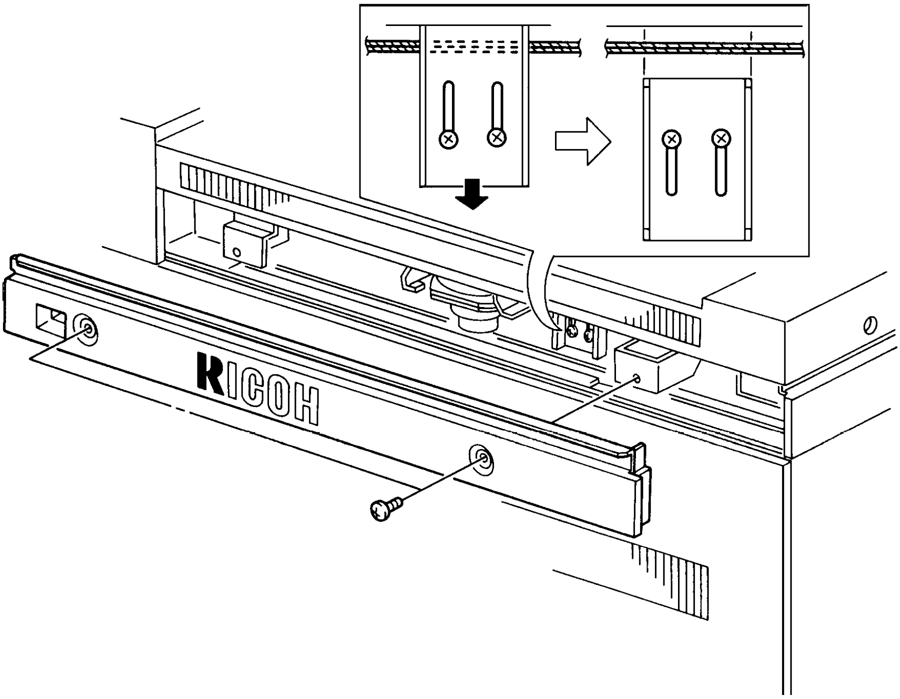
2. INSTALLATION PROCEDURE

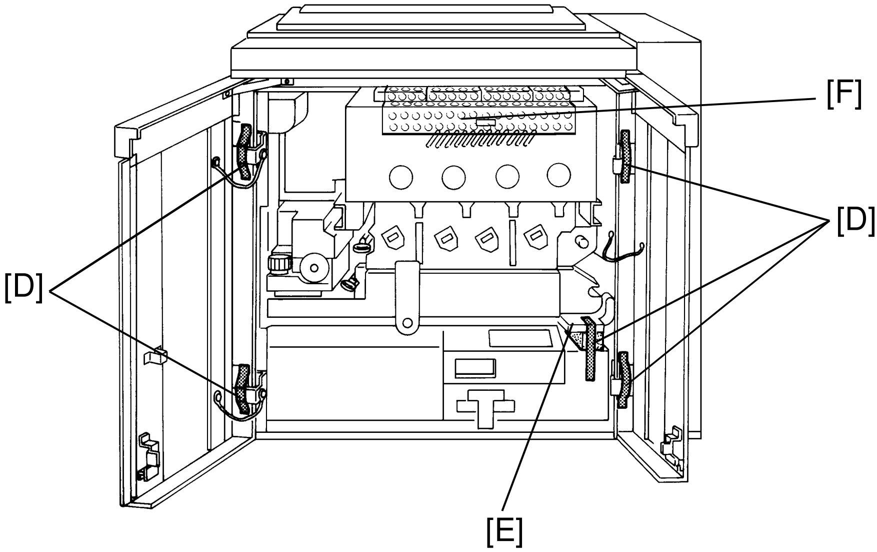
2.1 MACHINE INSTALLATION



1. Remove the strips of tape [A] from the copier at the locations shown.
2. Plug in the copier power cord.

CAUTION: Do not turn the main switch on at this time. Tape a piece of cardboard or thick paper over the top of the main switch. This will help prevent the main switch from being accidentally turned on.
If turned on at this time damage to the unit can occur.



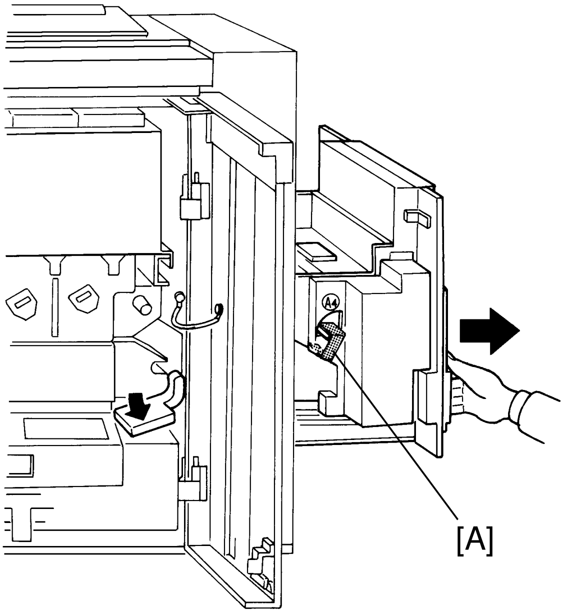


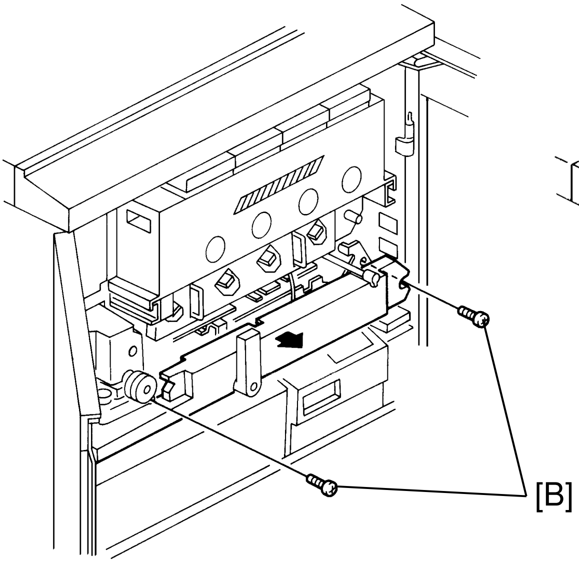
3. Remove the rear upper cover [A] (2 screws).

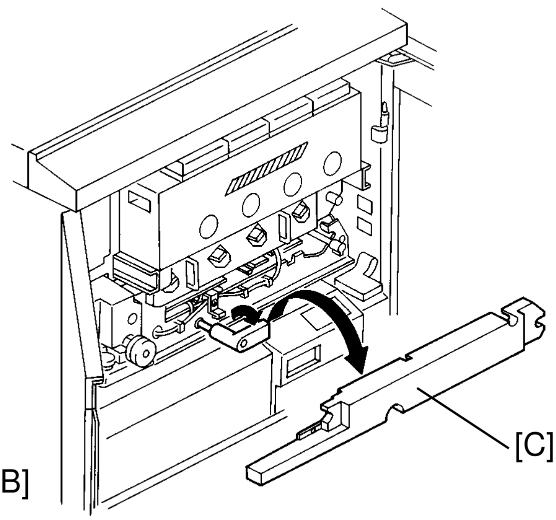
4. Loosen the screws [B] securing the scanner wire clamp and then, lower the scanner wire clamp [C]. Tighten the screws and reinstall the rear cover. Remove the red tag.

5. Open the front doors and remove the strips of tape [D] and the bubble wrap [F] at the locations shown.

6. Remove a strip of tape and a cushion block from the A1 lever [E].





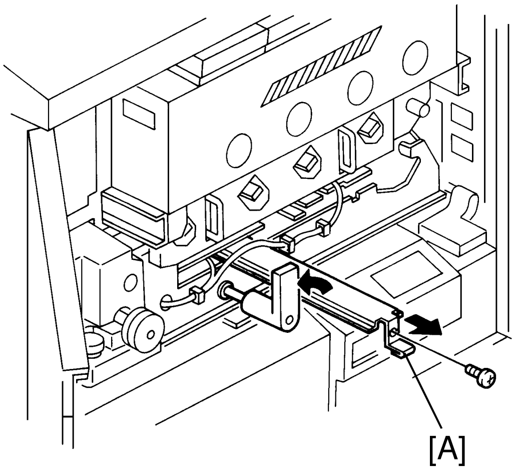


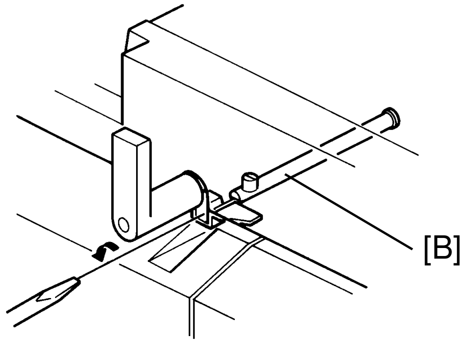
7. Push down the A1 lever and pull the paper feed unit out and remove a strip of tape from the A4 lever [A].

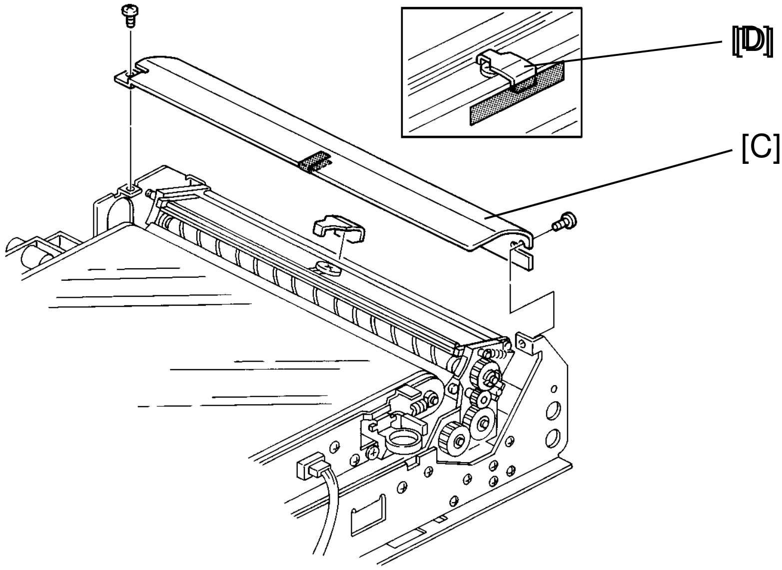
8. Remove the screws [B] securing the transfer unit inner cover (2 screws).

9. Turn handle B1 clockwise and remove the transfer unit inner cover [C].

CAUTION: At this time, leave the transfer unit as it is. If removed, the drums may be scratched by the shipping stay.







10. Turn handle B1 back to its original position and remove the shipping stay [A] (1 screw).

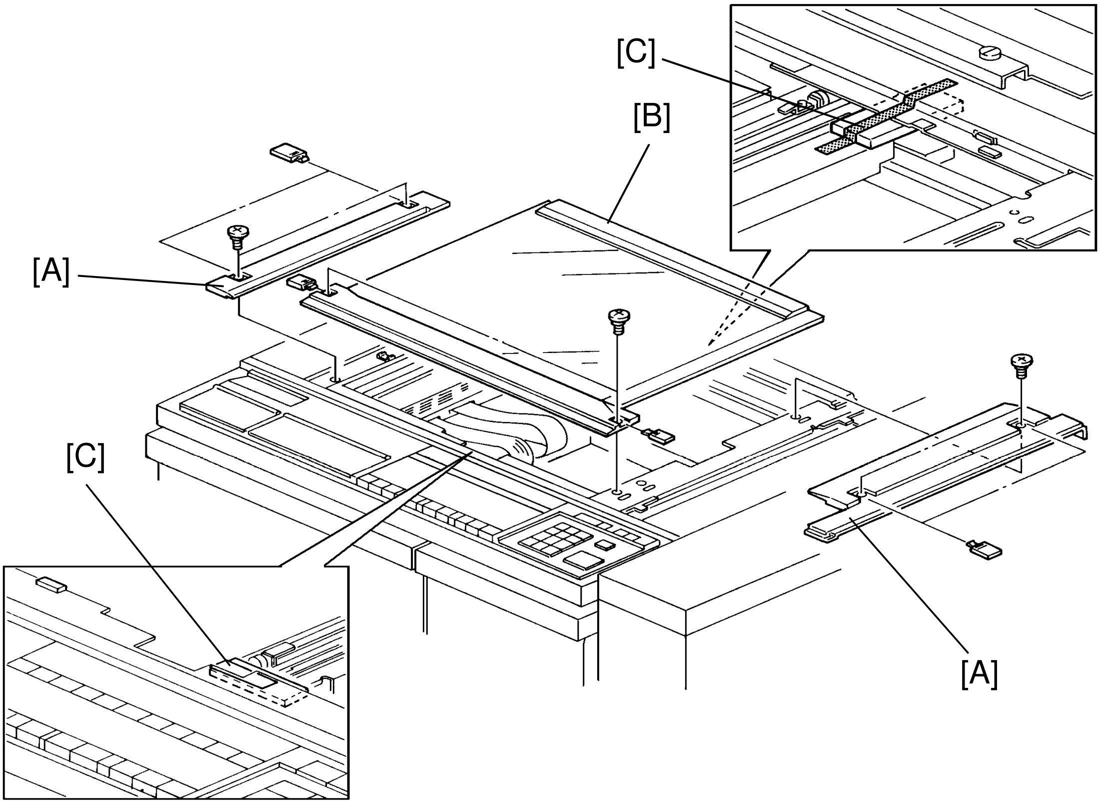
11. Using a slotted screwdriver turn the transfer unit stopper lever [B] counterclockwise and pull the transfer unit all the way out.

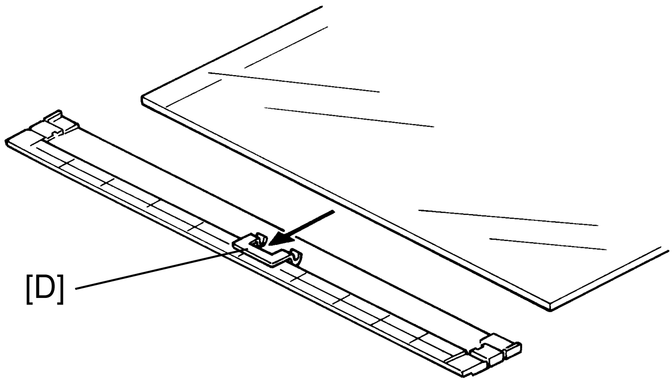
12. Remove the belt cleaning unit cover [C] (2 screws).

13. Hold the cleaning blade and remove the cleaning blade clamp [D] with the tape. Then remove the tape from the cover.

14. Reinstall the belt cleaning unit cover and the transfer unit inner cover. Push the transfer unit back in.

CAUTION: Be sure to relock the transfer unit stopper lever, so that the unit will not be pulled out too far by the customer.

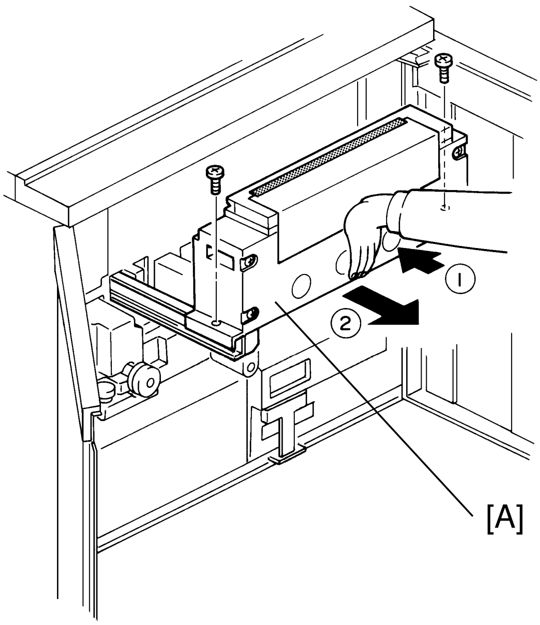


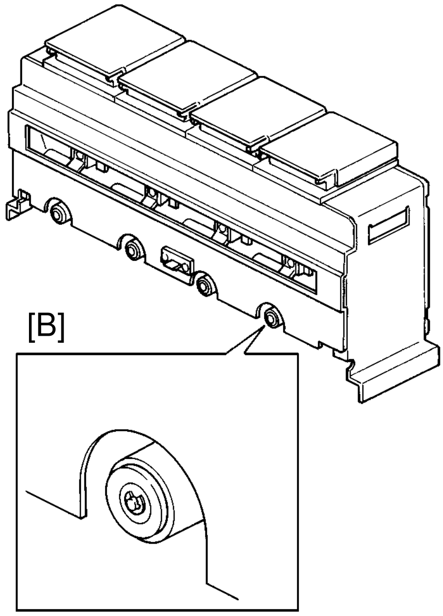


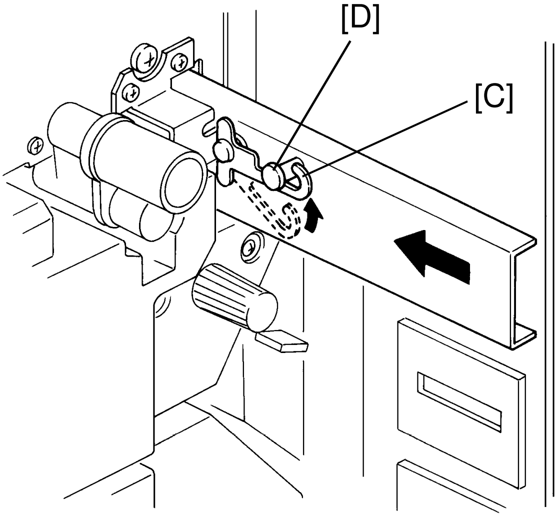
15. Remove the right and left scales[A] (2 screws each), remove the front scale (2 screws) with the exposure glass [B]. Be careful not to lose the plastic screw covers.

16. Remove the 3 strips of tape and cushion blocks [C] on front, rear, and left sides of the scanner unit. Reinstall the exposure glass and all the scales.

    NOTE: Install the exposure glass with the front scale [D].





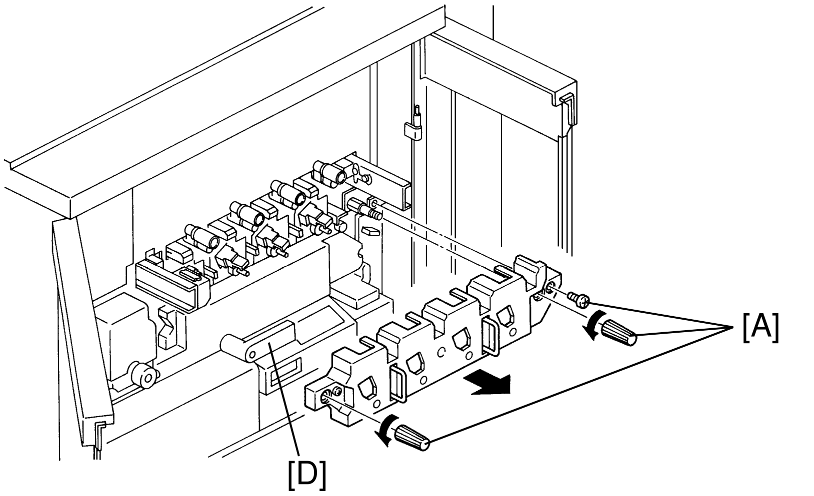


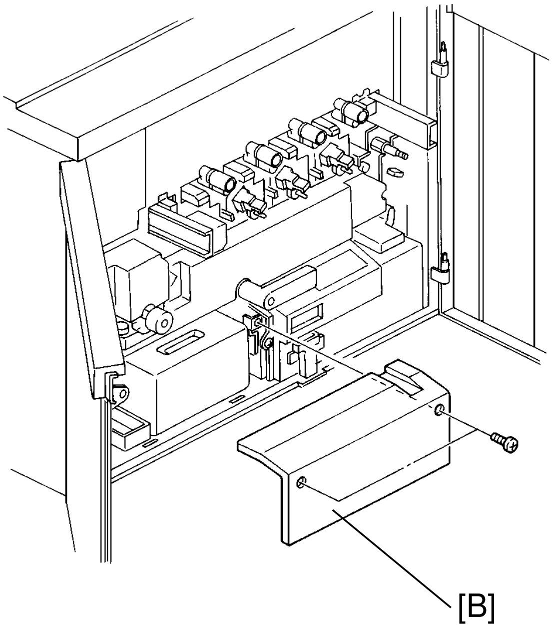
17. Push the center of the toner tank unit [A] to slide the unit out and remove the unit (2 screws and padding).

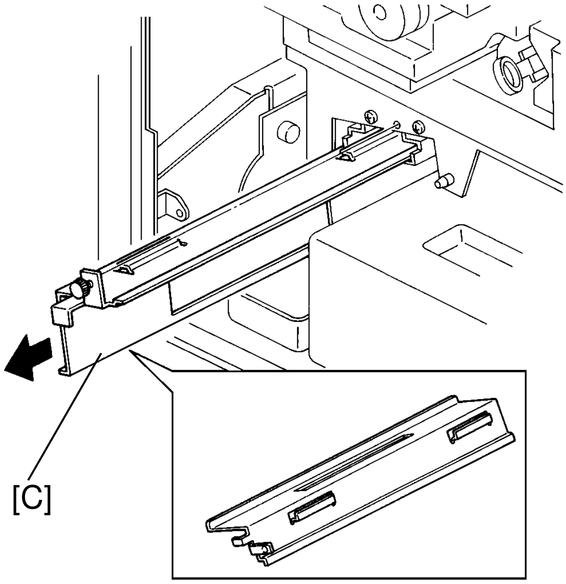
18. Make sure that each toner supply pipe is well sealed with the rubber ring [B].

    NOTE: During the install process, toner may spill out if the pipes are not well sealed.

19. Push the accuride rails into the copier and hook the stoppers [C] to the stopper pins [D] on the toner tank unit. This will hold the Accuride rail inside the machine.





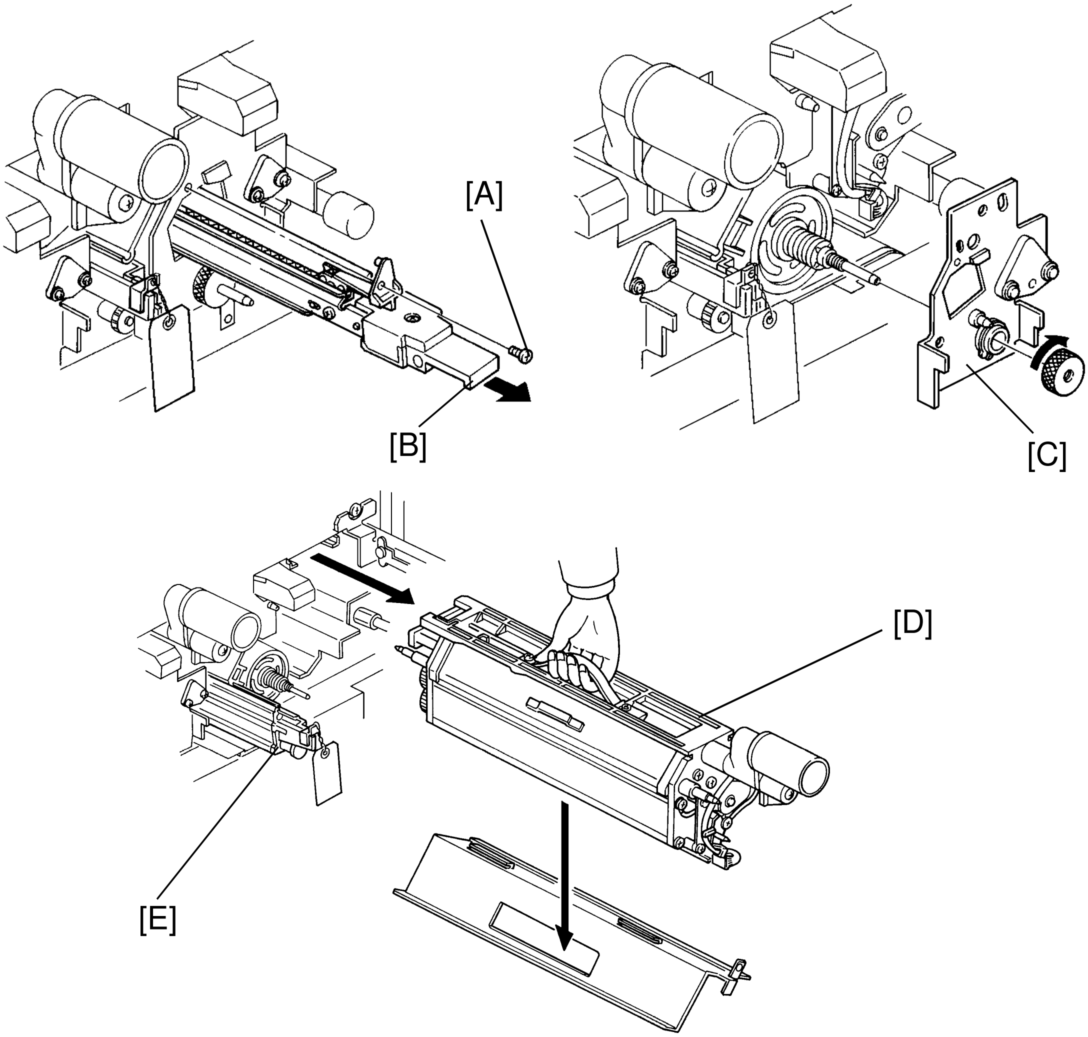


20. Turn the B1 lever [D] clockwise and remove the screws [A] (2 knob screws, one ordinary screw) and slowly pull the drum unit cover.

CAUTION: If the drum unit cover is removed too roughly the drum axis will have to be realigned.

21. Remove the toner collection bottle cover [B] (2 screws).

22. Pull out the development unit stand [C] (1 thumb screws).



Perform steps 23 to 31 on the black development section, and repeat these steps for the three other development sections.

23. Remove the wire cleaner screw [A] and pull the charge corona unit out [B].

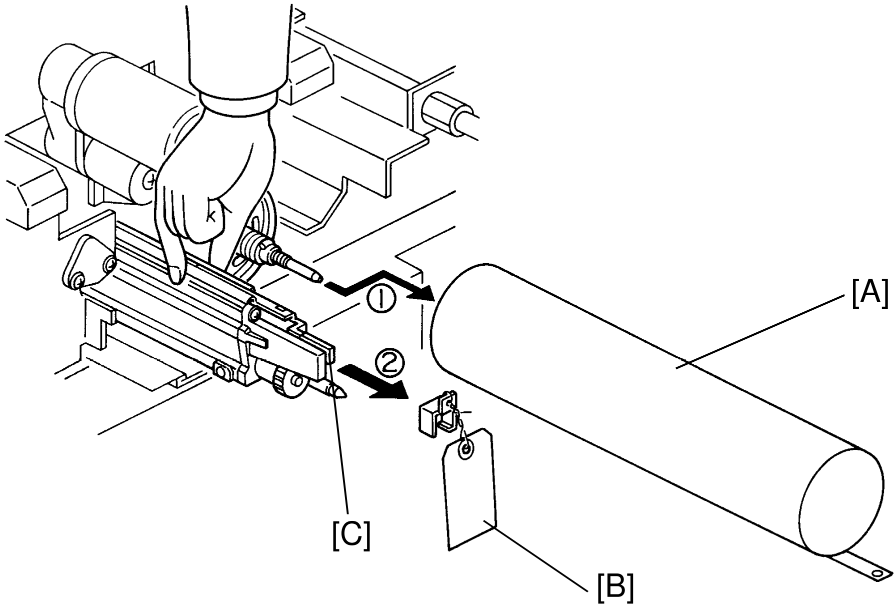
    NOTE: When re-installing the unit, be sure that the unit is pushed fully in to position. If it stops on the way, twist it counterclockwise and push it. If the charge corona unit is not set properly, SC840 ~ 843 will be indicated.

24. Remove the drum stay [C] (reverse-thread knob).

    NOTE: Do not remove the clamp from the cleaning unit at this moment.

25. Pull the development unit [D] out and put the unit on the stand.

26. Pull the cleaning unit [E] until the cleaning blade clamp appears.

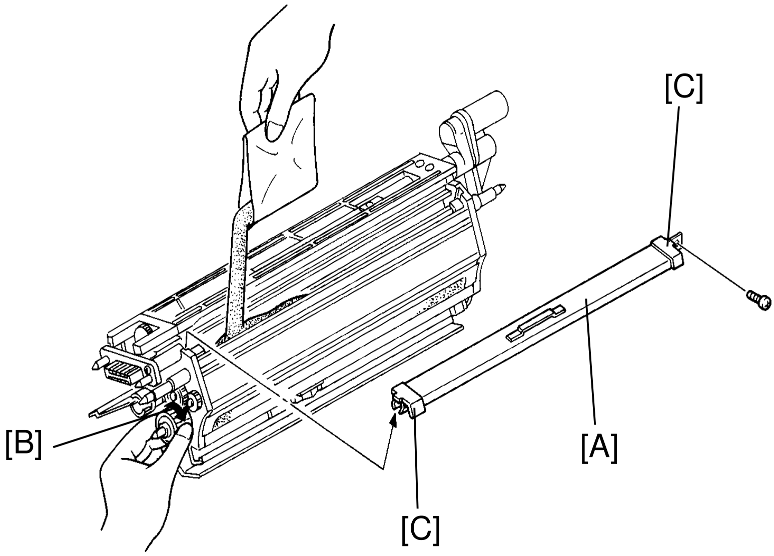


27. Pull the drum protective sheet [A] off the drum.

    NOTE: If the drum is removed, return it in the correct direction and proper development station. (The side with serial number should be at the front side.)

28. Hold the cleaning blade bracket and take the clamp [B] off. While squeezing the pressure release lever [C] push the unit back in the machine.

    NOTE: Once used individual color drums should be replaced to same location and the serial number facing to the front.



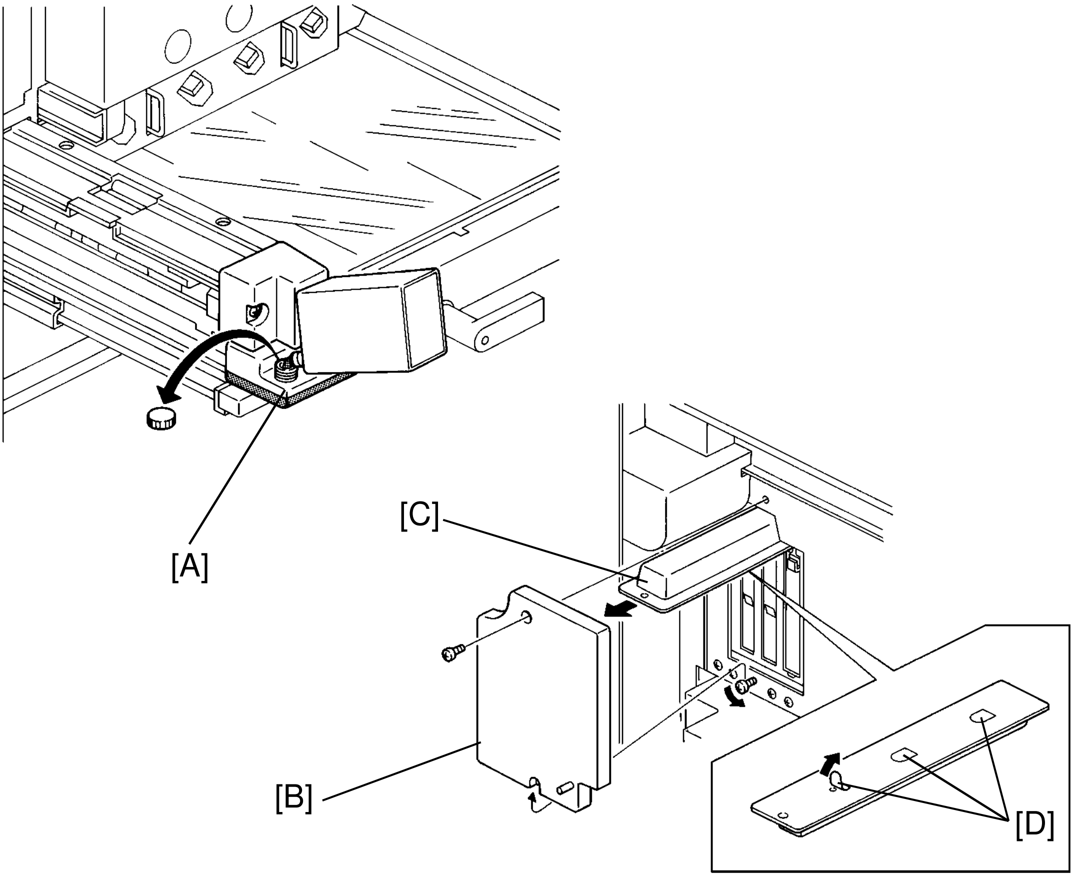
29. Remove the development unit upper cover [A]. (1 screw: for model A105 only)

30. Shake one bag of developer well. Pour the contents into the developer unit while turning the drive gear [B] clockwise to distribute the developer evenly.

    NOTE: 1. Do not turn the drive gear [B] counterclockwise.
    2. Do not turn the other development drive gears.
    3. Make sure that the developer is distributed evenly onto the development sleeve.
    4. Make sure that the upper cover is closed correctly after the developer is poured in.
    5. Make sure that the developer has not spilled out the development seals.
    6. Make sure that the ID sensor is not dirty. If it is dirty, wipe it off with a dry cloth and discharge it with your bare finger.
    7. Keep the unit straight up. Do not turn it up side down, or do not lay it down.
    8. Clean and remove any spilled developer on the right side of the casing which is caught by magnetic field from the development roller. This is to prevent bias leakage.

31. Reinstall the development unit upper cover and reinstall the development unit, the charge corona unit, the wire cleaner, and the drum stay.

    NOTE: When reinstalling the development unit upper cover be certain that the seals [C] are in good condition and are positioned correctly against the development unit's side frame.



After going through steps 23 to 31 for each color, continue with:

32. Carefully reinstall the drum unit cover. Put the development unit stand back, and reinstall the toner collection bottle cover.

33. Unhook the stoppers from the stopper pins and pull out the Accuride. Reinstall the toner tank unit (2 screws) and push it back in.

    NOTE: Always tighten the screws before pushing the unit back in. If not the catch receiving the hook from the toner tank unit may be damaged.

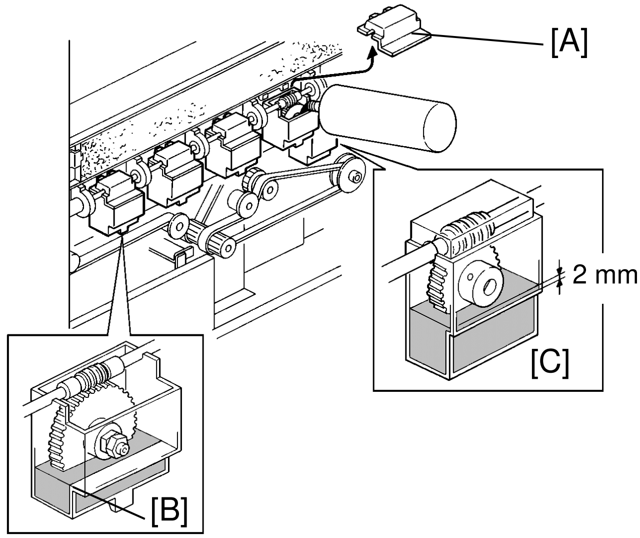
34. Turn handle B1 and pull out the transport unit. Fill the oil tank [A] with silicone oil until the oil level reaches the maximum line.

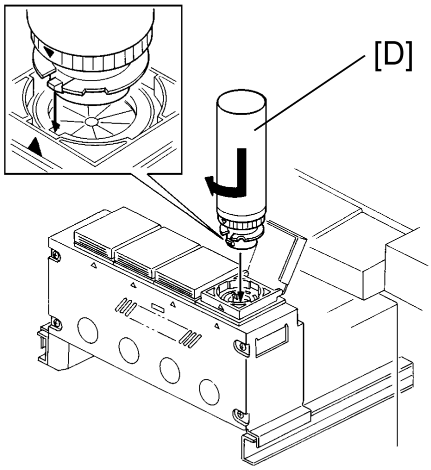
35. Push the transport unit back in.

36. Remove the ozone filter cover [B] (remove the upper screw, loosen the lower screw) and pull the ozone neutralizer unit [C].

37. Peel the three seals [D] off of the ozone neutralizer unit.

38. Reinstall the ozone neutralizer unit.





39. Remove the lower rear cover (5 screws).

40. Remove the cover [A] from each of the five oil pans.

41. Fill the pans with oil (type 20W-40) as shown until the oil level reaches just over the lip [B]. (See and judge from the side.)

    NOTE: For the transfer belt drive gear oil pan [C], the oil level should be 2 mm higher than for the other ones.

42. Reinstall the oil pan covers and the lower rear cover.

    NOTE: To avoid vibration noise or oil spilling, make sure the covers are properly closed.

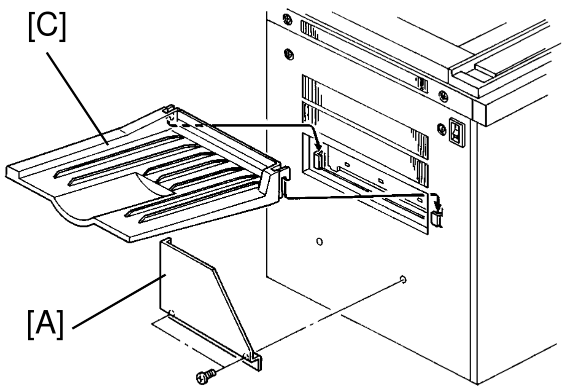
43. Push to release, then slide out the toner tank unit.

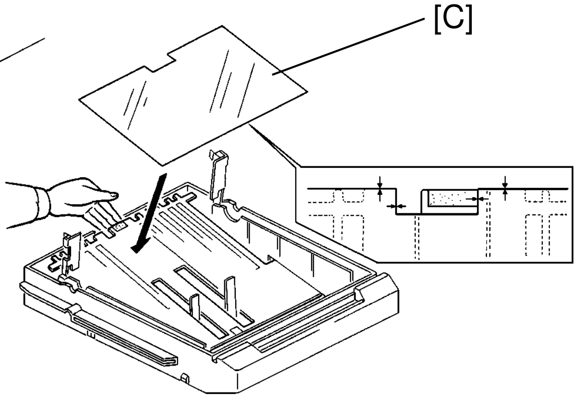
44. **Shake the toner bottle well.** Set the toner bottle [D] on the toner tank and rotate it clockwise. Do this for each color.

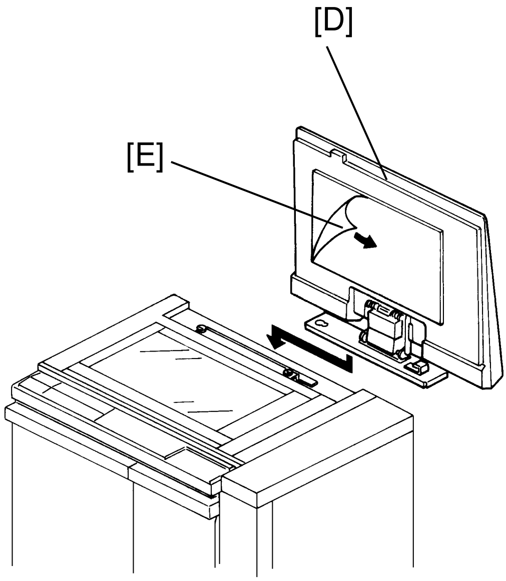
    NOTE: Do not tap or hit the toner bottle after setting it on the toner tank.

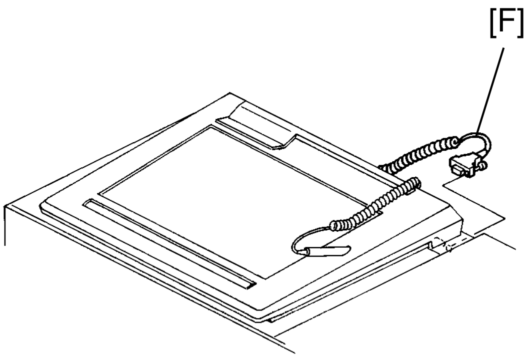
45. Wait 1 minute remove the toner bottles and push the tank unit back in.

    NOTE: This waiting is required only when toner is loaded in a new toner tank unit.









46. Install the following parts:
    1) the operating instructions holder [A] (2 screws)
    2) the copy tray [B]

47. Stick the dampness proof mylar [C] on the cassette bottom plate. Align the mylar as shown.

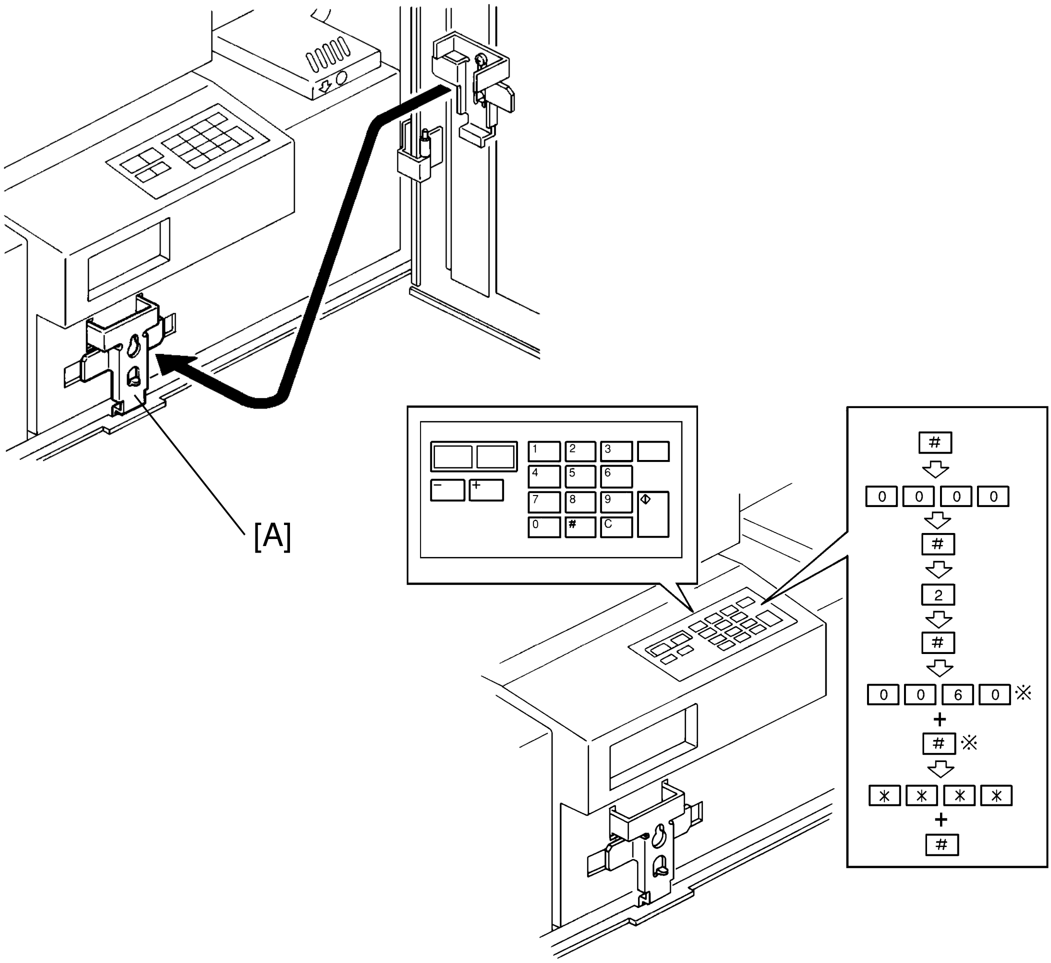
Step 48, 49 and 50 are performed only for model A105.

48. Set the editor [D] onto the platen cover bracket.

49. Peel off the protective sheet [E] on the silver platen plate.

50. Connect the editor cable [F] onto the interface connector (2 screws).

2.2 SERVICE ACCESS CODE SETTING



NOTE: For a new machine, the access code to SP TEST/DATA Modes is set to "0000" at the factory.
At the machine installation, enter your own number using SP Data Mode No. 60. The number set must be recorded for the next access.
It is impossible to monitor the access code set once it has been set.
It is recommended that the service center use a single standard code.

- Set the switch actuator [A]. (It can be found inside the right front door.)
- Press the following keys on the SP panel.
  1. # 0 0 0 0 #
  2. 2 #
  3. 0 0 6 0 # (SPD mode #60: service access code setting)
- Choose a four digit access code. While pressing the start key on the SP panel, enter the four digit access code and press the # key.

NOTE: For field servicing, this service access code should be the same for all the machines in a territory.

2.3 COPY IMAGE ADJUSTMENTS

1. Perform TD check (see TD Check Procedure - All colors).
2. YMCBk color balance adjustment (see YMCBk Color Balance Adjustment).
3. YMCBk fine image adjustment (see YMCBk Color Balance Adjustment).

   NOTE: The line alignment should be performed after the printer unit is warm enough. Warming up may take up to six hours.
4. Check SPD#750 to see if the printer unit is warm enough or not.
   - When the Temp. Data becomes equal to or greater than the following value when compared to the present room temperature, image alignment can be adjusted:

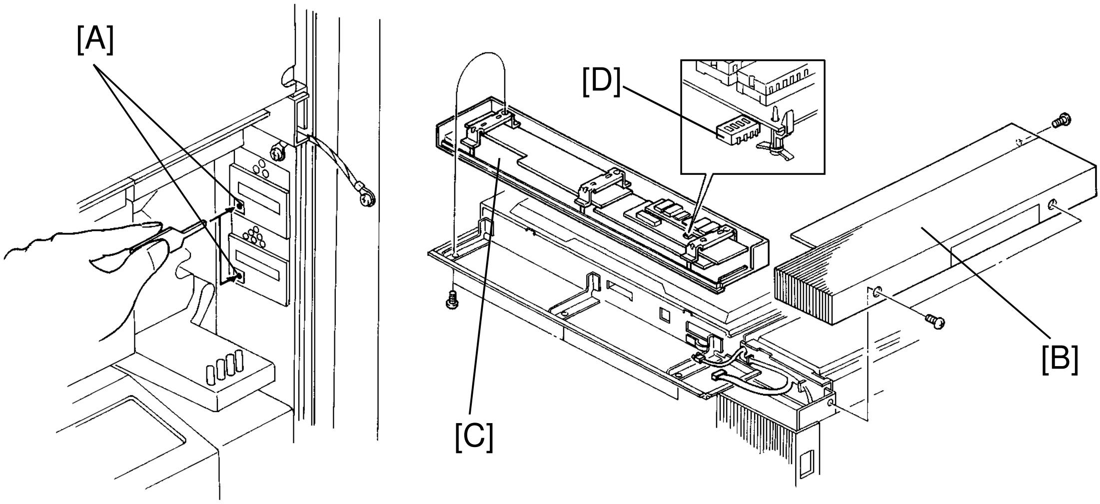
Room Temp.		Temp. Data
15°C/59°F	→	109, or greater
20°C/68°F	→	119, or greater
25°C/77°F	→	129, or greater

5. Horizontal line alignment (see Horizontal Line Adjustment).
   - Line parallel adjustment
   - Line alignment
6. Vertical line alignment (see Vertical Line Adjustment).
   - Horizontal magnification adjustment
   - Printing start position alignment

2.4 OTHER SETTINGS

1. Set the self check automatic start time.
   - Self check will start (90 + x) minutes after the main switch is turned on.
     (Default: x = 120)
   - While pressing the start key, enter the proper number of minutes in SPD#21, so that the self check can be done during the customer's lunch time.

   NOTE: For customers running a high copy volume, set SPD#30 to H to start the self check whenever the main switch is turned on or set SPD#22 (Forced self check) to 1 ~ 5. If more than 1,000 copies are made continuously, the image may become lighter. Instruct the customers to turn the main switch off and on in this case.



Language Table

A4 version		LT version	
Language	DSW 1 2 3 4	Language	DSW 1 2 3 4
Japanese	0 0 0 0	—	–
English	1 0 0 0	English	1 0 0 1
French	0 1 0 0	French	0 1 0 1
German	1 1 0 0	—	–
Italian	0 0 1 0	—	–
Spanish	1 0 1 0	Spanish	1 0 1 1
Swedish	0 1 1 0	—	–
Norwegian	1 1 1 0	—	–
Danish	0 0 0 1	—	–

2. Initialize the copy counters.

    - Firmly insert the reset pin all the way into the total counters at the white spot [A].

      Note: The copy (mechanical) counter can be initialized only once. However, if the counter has already counted past "0000000" then it cannot be initialized.

    - Set SP#84 (All counter clear).

3. Set the language for the guidance display.

    - Open the front doors and remove the toner tank unit (2 screws).
    - Remove the right upper cover [B] (3 screws) and the operation panel [C] (2 connectors and 3 screws).
    - Set the DSW [D] on the operation panel board to the proper combination according to the table.

4. Check copy quality, perform the following if necessary:
   - SP23 (See scanner Leading Edge Registration Adjustment)
   - SP24 Vertical Magnification
   - SP25 Original Rear Edge Detection
   - SP26 Original Trailing Edge Detection
   - SP27 Trailing Edge Detection Count
5. Set the following based on requests from the user or upon the service contact:
   - SP31 Original Detection
   - SP32 Beeper
   - SP33 Auto Cassette Shift
   - SP35 Copy Counter Up/Down
   - SP37 Auto Reset
   - SP38 Set Counter Limit
   - SP39 Cassette Priority
   - SP40 Letter/Photo Priority
   - SP41 Auto Letter/Photo Priority
   - SP42 Thin Paper Mode Priority
   - SP43 Photo Area Processing
   - SP44 Color Priority
   - SP85 SC Telephone Number Set
6. Again check copy quality and all modes set.

2.5 SHORT HAUL TRANSPORTATION PROCEDURE

Install the following parts, in reverse order from installation procedure:

1	Drum Protective Sleeves (4)	p3-12
2	Cleaning Blade Clamps (4)	p3-12
3	Cushion Blocks I& Tape on Scanner	p3-8
4	Transport Cleaning Blade Clamp & Tape	p3-7
5	Shipping Stay & Screw	p3-7
6	Secure "A4" Lever with Tape	p3-6
7	Raise Scanner Wire Clamp and Tighten Screws (Install Red Tag)	p3-5
8	Install Cushion Block under "A1" Lever	p3-5
9	Attach Tape at locations [D]	p3-5
10	Attach Tape at locations [A]	p3-4

2.6 LONG HAUL TRANSPORTATION PROCEDURE

The following must be done in addition to the short haul procedure.

1 Remove Toner Collection Bottle and clean out any toner

2 Remove Developer from all four units

3 Remove Fuser Oil from bottle

Installation

SECTION 4

SERVICE TABLES

1. PM TABLE

<Model A092>

NOTE: The amounts mentioned in the PM interval are copy numbers.

Symbol key: **C**: Clean **R**: Replace **L**: Lubricate **A**: Add

<Model A092>	15K	30K	60K	120K	EM	NOTE
SCANNER						
Platen Cover Sheet	C	C	C	C	C	Replace the platen cover sheet if the original recognition does not work due to scratches on its surface.
Exposure Glass	C	C	C	C	C	Water/Alcohol
Fluorescent Lamp		C	C	R		Water/Alcohol
Optical Fiber Array	C	C	C	C	C	Optical cloth (see NOTE 1)
Guide Rods		C	C	C		Dry cloth
Cooling Fan Filter				R		
LASER						
Toner Shield Glass	C	C	C	C	C	Optical cloth
PAPER FEED						
Pick-up Rollers		C	R	R		Water/Alcohol
Paper Feed Rollers		C	R	R		Water/Alcohol
Reverse Rollers		C	R	R		Water/Alcohol
Slip Clutch and Gears			L			Mobil Temp. 78
Registration Rollers			C	C		Water/Alcohol
Guide Plates	C	C	C	C		Water/Alcohol
AROUND THE DRUM						
OPC Drum		R	R	R		
Charge Wires	C	R	R	R	C	Dry cloth
Grid Plate	C	R	R	R	C	Water/Alcohol (See NOTE 2)
Wire Cleaner		R	R	R		
End Blocks and Casings	C	C	C	C	C	Dry cloth
Quenching Lamp	C	C	C	C		Dry cloth

Service Tables

<Model A092>	15K	30K	60K	120K	EM	NOTE
ID Sensor	C	C	C	C		Dry cloth (After cleaning, touch the window of the ID sensor with your finger to discharge it.) ID sensor cleaning is required after replacing the developer. Clean it before performing the TD check.
CLEANING						
Cleaning Blade	R	R	R	R		Put a small amount of toner on the edge.
Cleaning Entrance Mylar	C	C	C	C		If damaged, replace it.
Cleaning Brush	C	R	R	R		
Toner Catch Plate	C	C	C	C		Dry cloth
TRANSFER BELT CLEANING & TONER COLLECTION						
Belt Cleaning Blade	C	R	R	R		Put a small amount of toner on the edge.
Blade Entrance Mylar	C	C	C	C		If damaged, replace it.
Belt Cleaning Brush	C	R	R	R		
Belt Cleaning Brush Bushings	C	R	R	R		2 are necessary
Toner Collection Bottle	C	C	C	C	C	Just empty the bottle.
DEVELOPMENT						
Developer (replacement for Y, M, C, and Bk at the same time)	R	R	R	R		Clean the development roller sleeve with dry cloth.
Development Entrance Mylar	C	C	C	C		If damaged, replace it.
Development Side Mylar	C	C	C	C		If damaged, replace it.
Drive Gear	C	C	C	C		
Toner Transport	C	C	C	C	C	
Toner Container				C		Only the case of Magenta D type developer used. Magenta Dev. unit only
TRANSFER BELT UNIT						
Transfer Belt		R	R	R		Alcohol
Transfer Belt Rollers		C	C	C		Alcohol
Corona Wires	C	R	R	R	C	Dry/Water/Alcohol
End Blocks and Casings	C	C	C	C		Dry cloth

<Model A092>	15K	30K	60K	120K	EM	NOTE
Belt Cleaning Pads		R	R	R		
Belt Roller Cleaning Pads		R	R	R		
Transfer Belt Entrance Mylar		C	C	C		If damaged, replace it.
Stripper Pawls	C	C	C	C		
Paper Guide Plates	C	C	C	C		Water/Alcohol
Drive Gears			L			Mobil Temp. 78
FUSING						
Hot Roller	R	R	R	R		
Pressure Roller				R		
Pressure Roller Bearing				R		NOK grease A0289300
Oil Blade	C	C	R	R		Prime with oil when replacing.
Oil Supply Pad	R	R	R	R		Prime with oil when replacing.
Hot Roller Stripper	C	C	C	R		
Thermistor		C	C	C		
Guide Plates		C	C	C		
Silicon Oil	A	A	A	A	A	
Oil Sump				C		
Drive Gears		L	L	L		Mobil Temp. 78
FILTER						
Ozone Filter - Exit		R	R	R		
Dust Filter - Exit		R	R	R	I	
Ozone Neutralizer			R	R		60 K or 1 year
Ozone Filter - Rear				R		
Charge Fan Filter			C	C		
Air Inlet - IPU/PSU	C	C	C	C		Inside the right cover.
OTHERS						
Drum Drive Gears				A		Motor Oil 20W-40
Transfer Belt Drive Gear				A		Motor Oil 20W-40
Plastic Gears			L	L		Grease G501
Drive Gears (others)			L	L		Mobil Temp. 78

NOTE 1: After cleaning the optical fiber array. Be certain to discharge any static by wiping across the array with your finger.
CLEANING THE OPTICAL FIBER ARRAY AT EACH EM IS VERY IMPORTANT.

NOTE 2: Cleaning grid plate with running water, do not wipe. After cleaning with water you can rinse with alcohol if desired. Let air dry. CLEANING THE GRID AT EACH EMS VERY IMPORTANT. If a cloth was used be certain after cleaning, there is no fiber dust remaining on the grid.

<Model A105>

NOTE: The amounts mentioned in the PM interval are copy numbers.

Symbol key: **C**: Clean **R**: Replace **L**: Lubricate **A**: Add

<Model A105>	20K	40K	60K	120K	EM	NOTE
SCANNER						
Platen Cover Sheet	C	C	C	C	C	Replace the platen cover sheet if the original recognition does not work due to scratches on its surface.
Exposure Glass	C	C	C	C	C	Water/Alcohol
Fluorescent Lamp		C	C	R		Water/Alcohol
Optical Fiber Array	C	C	C	C	C	Optical cloth
Guide Rods		C	C	C		Dry cloth (see NOTE 1)
Cooling Fan Filter				R		
LASER						
Toner Shield Glass	C	C	C	C	C	Optical cloth
PAPER FEED						
Pick-up Rollers		C	R	R		Water/Alcohol
Paper Feed Rollers		C	R	R		Water/Alcohol
Reverse Rollers		C	R	R		Water/Alcohol
Slip Clutch and Gears			L			Mobil Temp. 78
Registration Rollers	C	C	C	C		Water/Alcohol
Guide Plates	C	C	C	C		Water/Alcohol
AROUND THE DRUM						
OPC Drum		R		R		
Charge Wires	C	R	C	R	C	Dry cloth
Grid Plate	C	R	C	R	C	Water/Alcohol (see NOTE 2)
Wire Cleaner		R		R		
End Blocks and Casings	C	C	C	C	C	
Quenching Lamp	C	C	C	C		Dry cloth

Service Tables

<Model A105>	20K	40K	60K	120K	EM	NOTE
ID Sensor	C	C	C	C		Dry cloth (After cleaning, touch the window of the ID sensor with your finger to discharge it.) ID sensor cleaning is required after replacing the developer. Clean it before performing the TD check.
CLEANING						
Cleaning Blade	R	R	R	R		Put a small amount of toner on the edge.
Cleaning Entrance Mylar	C	C	C	C		If damaged, replace it.
Cleaning Brush	C	R	C	R		
Toner Catch Plate	C	C	C	C		Dry cloth
TRANSFER BELT CLEANING & TONER COLLECTION						
Belt Cleaning Blade	C	R	C	R		Put a small amount of toner on the edge.
Blade Entrance Mylar	C	C	C	C		If damaged, replace it.
Belt Cleaning Brush	C	R	C	R		
Belt Cleaning Brush Bushings	C	R	C	R		2 are necessary
Toner Collection Bottle	C	C	C	C	C	Just empty the bottle.
DEVELOPMENT						
Developer (replacement for Y, M, C, and Bk at the same time)	R	R	R	R		Clean the development roller sleeve with dry cloth.
Development Entrance Mylar	C	C	C	C		If damaged, replace it.
Development Side Mylar	C	C	C	C		If damaged, replace it.
Drive Gear	C	C	C	C		
Toner Transport	C	C	C	C	C	
Toner Supply Roller			R	R		
TRANSFER BELT UNIT						
Transfer Belt		R	C	R		Alcohol
Transfer Belt Rollers		C	C	C		Alcohol
Corona Wires	C	R	C	R	C	Dry/Water/Alcohol
End Blocks and Casings	C	C	C	C		Dry cloth
Belt Cleaning Pads		R		R		
Belt Roller Cleaning Pads		R		R		
Transfer Belt Entrance Mylar		C	C	C		If damaged, replace it.

<Model A105>	20K	40K	60K	120K	EM	NOTE
Stripper Pawls	C	C	C	C		
Paper Guide Plates	C	C	C	C		Water/Alcohol
Drive Gears			L			Mobil Temp. 78
Discharge Roller		C		C		Alcohol
FUSING						
Hot Roller	R	R	R	R		
Pressure Roller				R		
Pressure Roller Bearing				R		NOK grease A0289300
Oil Blade	C	C	R	R		Prime with oil when replacing.
Oil Supply Pad	R	R	R	R		Prime with oil when replacing.
Hot Roller Stripper	C	C	C	R	C	
Thermistor		C		C		
Guide Plates		C		C		
Silicon Oil	A	A	A	A	A	
Oil Sump	C	C	C	C	C	
Drive Gears		L	L	L		Mobil Temp. 78
Cleaning Roller	C	C	C	C	C	Remove the melted toner. Belt cleaner can be used.
Scraper	C	C	C	C	C	Remove the melted toner. Belt cleaner can be used.
FILTER						
Ozone Filter - Exit		R		R		
Dust Filter - Exit		R		R	I	
Ozone Neutralizer			R	R		60 K or 1 year
Ozone Filter - Rear				R		
Charge Fan Filter			C	C		
Air Inlet - IPU/PSU	C	C	C	C		Inside the right cover.
OTHERS						
Toner Supply Drive Gears			L	L		Tri-Flow (Grease) 52159539 See "6. LUBRICATION POINT" in section 4.
Drum Drive Gears				A		Motor Oil 20W-40
Transfer Belt Drive Gear				A		Motor Oil 20W-40
Plastic Gears			L	L		Grease G501
Drive Gears (others)			L	L		Mobil Temp. 78

NOTE 1: After cleaning the optical fiber array. Be certain to discharge any static by wiping across the array with your finger.
CLEANING THE OPTICAL FIBER ARRAY AT EACH EM IS VERY IMPORTANT.

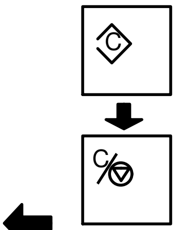
NOTE 2: Cleaning grid plate with running water, do not wipe. After cleaning with water you can rinse with alcohol if desired. Let air dry. CLEANING THE GRID AT EACH EMS VERY IMPORTANT. If a cloth was used be certain after cleaning, there is no fiber dust remaining on the grid.

2. USER/SERVICE TOOL

2.1 USER TOOL MODE

Explain the User Tool function and usage to the key operator.

The procedure to access the <u>User Tool</u> mode is as follows:



1) Press the Clear Modes key.

2) Press the Clear/Stop key <u>for more than 3 seconds</u> until the message display shows "USER TOOLS No._ _".

USER TOOLS No._ _(1 ~ 11) *
Select with No. keys. Press [#] key.

(For more than 3 seconds.)

*(1 ~ 12) for model A105

3) Input one of the following 11 mode numbers (12 mode numbers for A105 220/240 V version) with the number keys, and press the Enter key ( ).

4) After the job is completed, exit the <u>user tool</u> mode by pressing the Clear Modes key ( ).

No.1 User Code Mode – ON/OFF

0: OFF, 1: ON (Default: OFF)

The user code ON mode can be used to monitor the number of copies made by user groups for administration purposes and to control access to the copier. In this mode, the operators need to input a four-digit code before copy operation.

No. 2 User Code Number Registration

This mode is used to register a new 4 digit user code. In total, 20 user codes can be stored.
To register a code input the appropriate number (from 0001 to 9999) with the number keys and press the Enter key.

No. 3 User Code Number Change

This mode is used to change from an old code number to a new one while keeping copy volume data for the old code number.
Enter the old code number to be changed and press the Enter key.
Then, enter the new code number and press the Enter key.

Service Tables

No. 4 User Code Number Cancel

This mode is used to cancel a code number and erase its copy volume data.
To cancel, enter a code number and press the Enter key.

No. 5 Copy Accounting Card Print

This mode is used to print copy volume data (by copy sizes and color modes) for all user code numbers.
To print, place the copy accounting card on the exposure glass and press the Start key. (The edge with bar code should face the right scale.)

NOTE: This function can also be used to check how many user code numbers have been registered and what numbers have been registered.
User code "0000" means that the copies are made in UT-1 (User Code Mode) OFF.

No. 6 User Code Counter Clear (No: 0, YES: 1)

This mode is used to clear copy volume data for all user code numbers.
To clear the counters, enter "1" (Yes), then press the Enter key.

NOTE: If you want to clear the copy volume data for only one user code counter, do the following:

1) Check the copy volume data for the code number to be cleared with user tool mode No. 5.
2) Cancel that code number with No. 4.
3) Enter the same code number (or a new code number) with No. 2.

No. 7 Trailing Edge (Transfer Corona) Adjustment

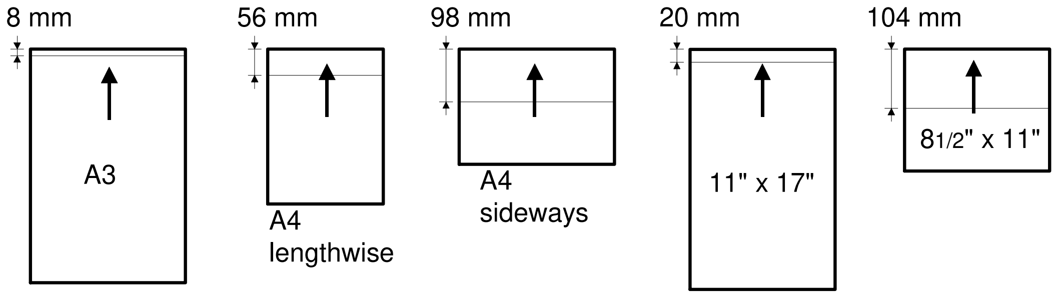
Default: 3, adjustable range: 1 to 5

When one of the following two types of abnormal copy image is observed, the user can increase or decrease this data to adjust the copy image.

Case 1 A faint horizontal line from 2nd copy onwards.

<Symptom>

During multi-copy run, a faint horizontal line appears from the second copy onwards. (When one copy is made from one original, no line is observed.) Its location on the copy image changes depending on copy paper size as follows.



This may happen especially under high humidity conditions.

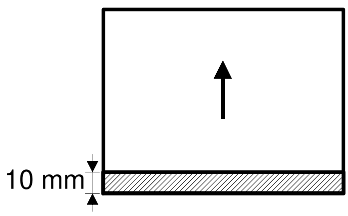
<Action>

1. Enter a value greater than the present data and press the Enter key.
2. Exit the User Tool mode by pressing the Clear Modes key.
3. Make three full color copies and check the 2nd and 3rd copies.
4. If the line is no longer observed, check whether the trailing part (up to 10 mm from the trailing edge of the copy image, is normal or too light.
5. If it is normal, the adjustment is finished. If it is too light, decrease the data of user tool No. 7.

Case 2 Trailing part (up to 10 mm from the trailing edge) of the image is too light.

<Symptom>

In multi-copy run, image density of the trailing part of the image (up to 10 mm from the trailing edge) is too light. This may happen on OHP film.

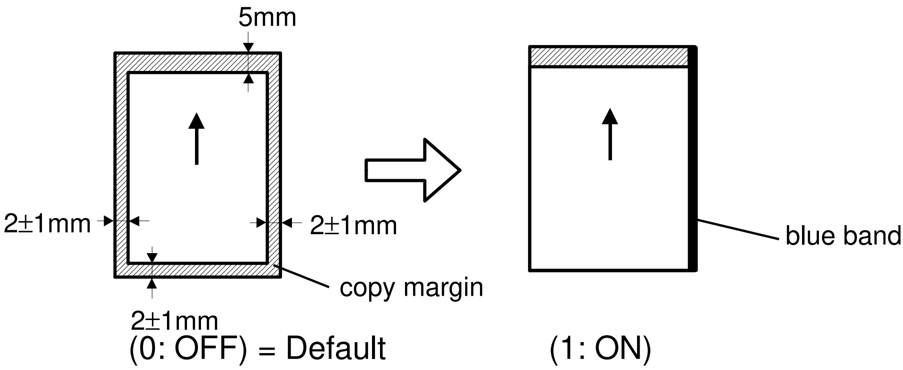


<Action>

1. Enter a value smaller than the present data, and press the Enter key.
2. Exit the user tool mode, and make three full color copies.
3. Check the trailing part of the image. If it is still to light, decrease the data of User Tool mode No. 7, and make three full color copies.
4. Check whether there is a line as explained in "Case 1". If not, the adjustment is finished. If yes, increase the data of User Tool mode No. 7.

   NOTE: If you cannot find an appropriate setting, instruct the user to make one to one copy in OHP film.

No. 8 Full Image on Three Sides – OFF/ON



Normally, all four sides of copy image have narrow margins in which no image appears.

The margins are about 5mm on the leading edge and about 2mm on the other three sides.

The user can eliminate the copy margins on the sides and trailing edge of the copy by setting the data of user tool No. 8 to 1. With this setting, a blue band which is caused by the silver platen sheet, may appear on one or two sides of the copy image.

The procedure is as follows:

1. Enter "1" with the number keys and press the Enter key.
2. Press the Clear Modes key, and input the necessary copy number.
3. Press to start key.
4. Full Image ON mode will be reset to normal (OFF) mode by pressing the Clear Modes key, or by auto-reset in one minute, or by turning the main switch off and on.

No. 9 UCR Adjustment in Letter/Photo Mode

Normal : 0, Adjustable image : 0 ~ 8

In the Letter/Photo mode, if the user needs to have very clear and crisp black characters/lines or gray tone reproduction, the user can input greater data with the number keys rather than the normal data (0).

When the greater data is input, black toner amount is increased and color toner amount is decreased. Then, black characters/lines or gray tone areas are improved. However, photo areas will be reproduced slightly darker.

Therefore, it is necessary to input an appropriate value, considering both character/lines areas and photo areas of the original.

The procedure is as follows:

1. Enter an appropriate data value (1 to 8) with the number keys and press the Enter key.
2. Press the Clear Modes key, and input the necessary copy number.
3. Select Letter/Photo mode, and press the Start key.
4. UCR data entered will be reset to the normal data (0) when the Clear Modes key is pressed or at automatic reset, or if the main switch is turned off and on.

No. 10 Photo Area Image Processing in Auto Letter/Photo Mode

0 : Photo, 1 : Letter/Photo

In the Auto Letter/Photo mode, photo areas on an original are processed by the photo mode. (This can be changed to the Letter/Photo mode as the default mode by SP43.) This user tool allows the user to select the Letter/Photo mode for one copy job. (If the Letter/Photo mode processing for photo areas in the Auto Letter/Photo mode has been selected by SP43, the user can change it to the photo mode by this user tool.)

The mode selected by this user tool will be reset to the default mode (set with SP43) when the Clear Modes key is pressed or at auto-reset in one minute, or if the main switch is turned off and on.

No. 11 A4/F4/F Selection in By-pass Feed Mode
(A4/A3 version machine only)

0: A4, 1: F4, 2: F

Paper width for A4 lengthwise, F4 and F are very close to one another. The paper width switch inside the by pass table cannot distinguish these three paper widths. If paper width data does not match the actual paper width, the copy image will be printed in the wrong location on the paper, resulting in missing image on one side and a white band on the other side.

This user tool allows the user to change the paper width data from A4 lengthwise to F4 or F when the side fences are positioned near the A4 lengthwise/A5 position.

New width data (F4 or F) is then stored in memory, and is not reset to A4 lengthwise even if the Clear Mode key is pressed or the main switch is turned off and on. In this setting, if A4 lengthwise paper is required, it is necessary to reset the user tool No.11 data to "0" (A4 lengthwise), or to use the A4 lengthwise cassette.

NOTE: F4 = 81/2" x 13" (L)
F = 8" x 13" (L)
A4 = 210 mm x 297 mm (L)

No. 12 Non-standard size paper in By-pass Feed Mode
(A105 model only)

0: Standard Size
1: Non-standard Size

To fit the original image on the non-standard size paper, the size of the paper is manually input in this user tool.

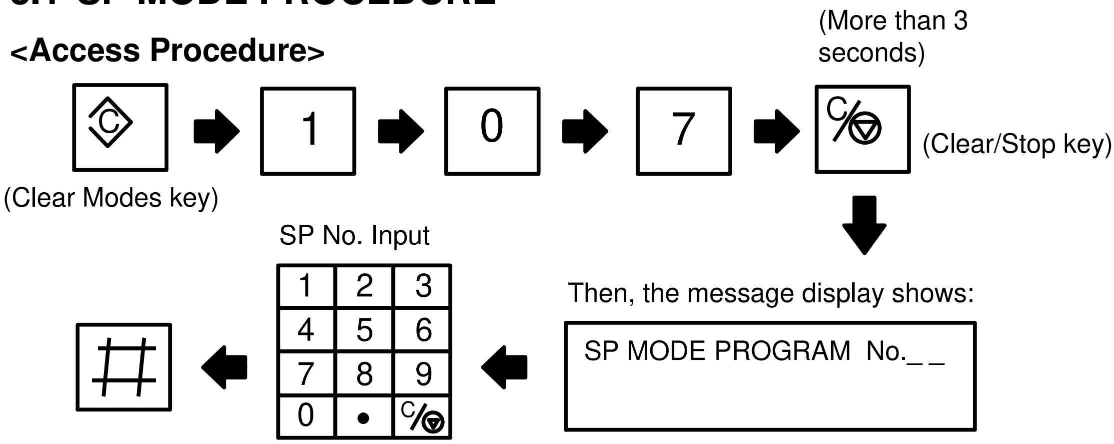
According to the guidance on the LCD, input the vertical size and the horizontal size.

Input range	vertical	100 ~ 297 mm (4.0 ~ 11.7")
	Horizontal	148 ~ 420 mm (5.5 ~ 17.0")

3. SP MODE

3.1 SP MODE PROCEDURE

<Access Procedure>



1. Press the Clear Modes key.
2. Press the number keys, "1", "0", and "7" in order.
3. Press and hold the Clear/Stop key for more than 3 seconds until the message display shows "SP MODE PROGRAM No._ _".
4. Enter the SP number with the number keys.
5. Press the Enter key.

<Data Change>

1. Enter the data number with the number keys.
2. Press the Enter key (#) to store a new data, or to start the operation.

   NOTE: For SP11,12 (2nd screen), 13, 22, 90, and 91, 2 or more kinds of data can be set using one screen. In this case, the data for the selected mode blinks where the data change is accepted. By pressing the Enter key (#), the next mode is selected.

S	P	1	1			R	G	B		G	A	M	M	A			(	0		~		1	2	)															
[	R	]	L	:	6			H	:	6			[	G	]	L	:	6			H	:	6			[	B	]	L	:	6			H	:	6			

Blinking (Low area of red gamma is selected.)

3. After pressing the Enter key (#), press the Clear Modes key (◇) to return to the SP mode initial screen (SP MODE PROGRAM No._ _).
4. To exit the SP mode, press the Clear Modes key (◇) again.

Service Tables

3.2 SERVICE PROGRAM MODE TABLE

NOTE: 1. In the *Function* column, comments (extra information) are in italics.
2. In the *Data* column, the default value is printed in bold letters.

<table>
<tr><th colspan="2">Mode No.</th><th>Function</th><th>Data</th></tr>
<tr><td>1</td><td>Free Run</td><td>To operate the machine without feeding paper.
Enter 1, and press the Start key to start running. Press the Clear/Stop key to stop running.</td><td>0: OFF
1: ON</td></tr>
<tr><td>2</td><td>All Indicators ON</td><td>To turn on all indicators on the operation panel.
Press the Enter key to turn on. Press the Clear Modes key to turn off.</td><td></td></tr>
<tr><td>11</td><td>RGB Gamma
<Model A092><table><tr><th></th><th>L</th><th>H</th></tr><tr><td>R</td><td>6</td><td>5</td></tr><tr><td>G</td><td>5</td><td>5</td></tr><tr><td>B</td><td>7</td><td>5</td></tr></table><Model A105><table><tr><th></th><th>L</th><th>H</th></tr><tr><td>R</td><td>8</td><td>7</td></tr><tr><td>G</td><td>8</td><td>6</td></tr><tr><td>B</td><td>9</td><td>6</td></tr></table></td><td>To allow RGB Gamma adjustment for red, green, and blue. Each color has low ID (L), and high ID (H) adjustments. In field, adjust the low data only (±1).
• Increase the RGB Gamma value to decrease the signal (image).
• Decrease the RGB Gamma value to increase the signal (image).
• High ID(H) data should not be changed.</td><td>0 ~ 12</td></tr>
<tr><td>12</td><td>YMCBk Gamma</td><td>To adjust color balance. With 1st screen, select one color.
0: Cyan, 1: Yellow, 2: Magenta, 3: Black
With 2nd screen, adjust the data of low ID area, middle ID area, and high ID area for selected color. This adjustment is for Letter, Letter/Photo, and Photo mode. Selected mode is shown on the message display. To change the data for the other original mode, press the Original Mode key.
• To change low, middle, and high, press the Enter key.
• Standard data shown in the right table should not be adjusted.
• When this SP mode is selected in Auto Letter/Photo mode, the Letter/Photo mode is automatically selected.
• Smaller data for darker setting.
• Greater data for lighter setting.
<Model A092>
• Yellow data in Photo and Letter/Photo modes may be set at the following data:
L: 1 or 2, M: 1 or 2, H: 7 or 8</td><td>0 ~ 8</td></tr>
</table>

Mode No.		Function	Data
	(continued)		

<Model A092>

<Letter>

	L	M	H	ID
Bk	-	-	-	1
M	-	-	-	4
Y	7 or 8	-	-	7 or 8
C	-	-	-	3

<Letter/Photo>

	L	M	H	ID
Bk	-	-	-	4
M	-	-	-	4
Y	-	-	-	7or8
C	-	-	-	4

<Photo>

	L	M	H	ID
Bk	4	2	4	4
M	-	-	-	4
Y	-	-	-	6or7
C	-	-	-	4

<Model A105>

<Letter>

	L	M	H	ID
Bk	-	-	-	7
M	-	-	-	4
Y	-	-	-	8
C	-	-	-	4

<Letter/Photo>

	L	M	H	ID
Bk	-	-	-	6
M	-	-	-	4
Y	-	-	-	8
C	-	-	-	4

<Photo>

	L	M	H	ID
Bk	1	3	5	5
M	-	-	-	5
Y	-	-	-	7
C	-	-	-	5

Mode No.		Function	Data
13	UCR	To adjust UCR start, and UCR stop (UCR ratio). UCR data is different in three original modes. Check the selected mode in the message display. • *Start:* *0 → UCR starts from very light gray tone* *Greater data →UCR starts from a certain high gray tone.* • *Stop: UCR ratio* *0 → 0%, 10 → 50%, 20 → 100%, 24 → 120%*	Start: 0 ~ 28 Stop: 0 ~ 24

<Model A092>

	start	stop
L	2	16
L/P	16	16
P	20	12

<Model A105>

	start	stop
L	0	20
L/P	24	16
P	22	20

Mode No.		Function	Data
14	UCA	To select UCA ON or OFF. *<Model A092>* *For all three modes, ON mode is a default.* *<Model A105>* *For Photo and Letter/Photo modes, ON is a default.* *For Letter mode, OFF is a default.*	**0: ON** 1: OFF
21	Test Pattern	Prints test patterns. • *Grid pattern and 8-gradation steps are generated by the IPU memory board.* • *64-gradation steps are generated by the IPU2 board.* • *Patch pattern is generated by the IPU1 board.*	<Model A092> **0: No pattern** 1: Grid Pattern 2: 8 gradation steps 3: 64 gradation steps 4: Patch pattern

Service Tables

Mode No.		Function	Data
			<Model A105> **0: No pattern** 1: Grid Pattern 2: 16 gradation steps 3: 256 gradation steps 4: Patch pattern
22	Horizontal Line Alignment	To align three horizontal lines of cyan, magenta, and yellow to the black horizontal line. Check it with grid pattern copy at the leading edge, 40 ± 4 mm inside from both sides. • *To lower the position of a line, increase the data for that color.* • *To raise the position of a line, lower the data.* • *0.0625 mm/step, (1.00 mm/16 steps)* • *Adjustable range: ±2 mm (65 steps)*	0 to 64 (Center: 32)
23	Leading Edge Registration	To adjust leading edge registration. • *To lower the position of the copy image, increase the data.* • *To raise the position of the copy image, lower the data.* • *0.0625 mm/step, (1.00 mm/16 steps)*	0 to 64 (Center: 32)
24	Vertical Magnification	To adjust vertical magnification. • *To increase magnification, increase data.* • *To decrease magnification, decrease data.*	0.2 to 0.3%/step
25	Original Rear Edge Detection	To adjust the detection level for the rear edge of original. *1. Select smaller data for the detection of darker original on the rear side.* *2. Select greater data if original detection error happens due to a dirty or scratched platen cover.*	8, 10, 12, **15**, 18, 20, 25 15: Default
26	Original Trailing Edge Detection	To adjust the detection level for the trailing edge of the original. *1. Select greater data for the detection of a darker original on the rear side.* ***(But, never select 30.)*** *2. Select smaller data if original detection error happens due to dirty or scratched platen cover.*	8, 10, 12, **15**, 18, 20, (30) - 15: Default - Never select 30
27	Trailing Edge Detection Count	To adjust minimum original width (main scan direction). *Data: 35: 78 mm 40: 47 mm* *36: 72 mm 42: 34 mm* *37: 65 mm 44: 22 mm* *39 (Default): 53 mm*	35, 36, 37, **39**, 40, 42, 44 39: Default

Mode No.		Function	Data
28	Scanning Speed for Original Detection	To adjust the scanner speed for original detection if the following happens with original recognition mode; *1. Select greater data if image on the trailing edge is missing.* *2. Select smaller data if the trailing edge of the original is copied as a horizontal line.*	0 to 10 5: Default
29	Vertical Line Alignment (Model A105 only)	To adjust the printing start position of black. To align three vertical lines of cyan, magenta, and yellow to black. To move the position of line to right side, increase the data for color. To move the position of line to left side, decrease the data for color. • *0.032 mm/step*	0 to 31
30	Horizontal Magnification (Model A105 only)	To adjust horizontal magnification. • *To increase magnification, enter greater data.* • *To decrease magnification, enter smaller data.*	0 to 31 (Center: 16)
SP31 to SP45 are special features which can be set based upon requests from the user, or based upon service contract (SP45 A3/11" x 17" Double Count).			
31	Original Detection	Selects original size detection mode. • *To reduce first copy time, the default is OFF mode. In this case, when an original is copied onto larger paper, a blue background appears on non original area of copy. To avoid this, the user can press the Original Detection key. If requested, ON mode can be selected.* • *Even in the OFF mode, original detection is automatically done in the following modes:* *- Auto Paper Selection mode* *- Auto Reduce/Enlarge mode* *- Centering mode* *- Mirroring mode* *- Slant Image mode*	**0: OFF** 1: ON
32	Beeper	Sets beeper operation.	**0: ON** 1: OFF
33	Auto Cassette Shift	Sets auto cassette shift. • *If this is ON, and same size paper cassettes are in both upper and lower feed stations, copy run is continued by selecting the next cassette automatically when one cassette runs out of paper.*	**0: OFF** 1: ON
34	Not used		
35	Copy Counter Up/Down	Selects the copy counter mode. *"UP" mode shows the number of copies mode. "Down" mode shows the number of copies remaining.*	**0: Up** 1: Down
36	Not used		

Service Tables

Mode No.		Function	Data
37	Auto Reset Time	Sets the automatic reset time. *To select Auto reset time, or deselect auto reset function.*	0: No reset **1: 1 minute** 2: 2 minutes ~ 180: 180 minutes (Max.)
38	Set Counter Limit	Sets the maximum number of copies that can be entered.	1 ~ 99 copies **99:**
39	Cassette Priority	Sets cassette feed priority. *If APS is a default, the first copy time becomes longer due to pre-scan for original size detection.*	**0: Upper** 1: Lower 2: APS
40	Letter/Photo Priority	Sets default image processing method. *This is effective if Auto Letter/Photo separation priority mode is off.*	**0: Letter** 1: Letter/Photo 2: Photo
41	Auto Letter/Photo Separation Priority	In ON mode: When the Original mode key is pressed, $\boxed{\text{Auto}}$ → Photo → Letter/Photo → Letter In OFF mode: The mode selected by SP40 is a default. If it is Letter/Photo mode, $\boxed{\text{Letter/Photo}}$ → Letter → Auto → Photo	**0: ON** 1: OFF
42	Thin Paper Mode Priority	Selects thin paper mode as a default. *If thin paper (Less than 70g or 18 lb) is mainly used, toner may be repelled from copy paper to the hot roller, resulting in copy image problems and short life of the oil supply pad.* *In this case, thin paper mode can be selected as a default.* *In thin paper mode, fusing temperature is controlled at 5°C lower than usual.*	**0: OFF** 1: ON
43	Photo Area Processing	Selects the type of image processing for photo areas in Auto Letter/Photo Separation mode.	**0: Photo** 1: Letter/Photo
44	Color priority	Selects either color or black as the standard copy mode.	**0: Full color** 1: Black
45	A3/11" x 17" Double Count	Based upon the service contract with the user, the machine can be set to count-up two times when a A3 or 11" x 17" copy is made. *Without having a contract to charge double for A3, 11" x 17" sizes, never select ON mode.*	**0: OFF** 1: ON (NOTE: 1)

NOTE1: It is recommended to set SP mode 45, A3/11" x 17" Double Count to 1 (ON). This of course depends on customer contract and may be different for individual dealerships.

Mode No.		Function	Data
60	Logging Data Print-out	To print out logging data, using the service cards: 1. The number of copies by modes and paper sizes. 2. The number of service calls, jams, PM counter, drum counter developer counter, etc.	
		1. Place the service card on the exposure glass. *(The side with bar code is facing to the right scale.)* *2. After accessing SP60, press the Enter key.* *3. Press the Start key to print.* *(It takes about 2 minutes to print out.)*	
61	Size/Color Modes Counter Clear	To clear the copy counter by paper size and color modes.	
		1. After accessing SP number, press the Enter key. *2. Enter "1".* *3. Press the Enter key to clear it.*	
62	Copy Modes Counter Clear	To clear the copy counter by copy modes.	
63	SC Counter Clear	To clear the SC counter for all SC codes.	
64	Jam Counter Clear	To clear the jam counter.	
65	Power ON Time Clear	To clear the counter for total number of hours while the main power switch is on.	
66	Upper Cassette Counter Clear	To clear the count of the number of sheets fed from the upper cassette and the by-pass feed table.	
67	Lower Cassette Counter Clear	To clear the count of the number of sheets fed from the lower cassette.	
68	15K/20K PM Counter Clear	To clear the 15K/20K PM counter.	
69	30K/40K PM Counter Clear	To clear the 30K/40K PM counter.	
70	60K PM Counter Clear	To clear the 60K PM counter.	
71	120K PM Counter Clear	To clear the 120 K PM counter.	
72	Yellow Drum Counter Clear	To clear the "Yellow" drum counter.	
73	Magenta Drum Counter Clear	To clear the "Magenta" drum counter.	
74	Cyan Drum Counter Clear	To clear the "Cyan" drum counter.	
75	Black Drum Counter Clear	To clear the "Black" drum counter.	
76	Yellow Developer Counter Clear	To clear the "Yellow" developer counter.	

Mode No.		Function	Data
77	Magenta Developer Counter Clear	To clear the "Magenta" developer counter.	
78	Cyan Developer Counter Clear	To clear the "Cyan" developer counter.	
79	Black Developer Counter Clear	To clear the "Black" developer counter.	
80	Yellow Toner End Counter Clear	To clear the "Yellow" toner end counter.	
81	Magenta Toner End Counter Clear	To clear the "Magenta" toner end counter.	
82	Cyan Toner End Counter Clear	To clear the "Cyan" toner end counter.	
83	Black Toner End Counter Clear	To clear the "Black" toner end counter.	
84	All Counters Clear	To clear the counters for SP61 to SP83.	
85	SC Telephone Number Set	To enter the telephone number for service calls. The decimal point key can be used as "–" in between numbers.	
90	RGB Gamma Adjustment for SPU Positive mode	To adjust RGB gamma for SPU positive mode.	L: 3 ~ 9 H: 0 ~ 12
91	RGB Gamma Adjustment for SPU Negative mode	To adjust RGB gamma for SPU negative mode.	L: 3 ~ 9 H: 0 ~ 12
92	SPU Focus Adjustment	To adjust the focus for SPU.	
93	YMCBk Gamma for Printer mode (Model A105 only)	See SP12 for function.	0 ~ 8
94	Vertical Line Alignment for Printer (Model A105 only)	See SP29 for function.	0 to 10 5: Default
95	Leading Edge Registration for Printer mode (Model A105 only)	See SP23 for function.	0 to 64 (Center: 32)

4. SP TEST MODE/SP DATA MODE

4.1 OVERVIEW

In addition to the SP mode using the operation panel, this machine has two other service modes, which are called the SP Test Mode and SP Data Mode. For the operation of these two modes, there is an SP panel inside the front door.

SP Test Mode is used to check the ON/OFF operation of electrical components such as sensors, motors, clutches, solenoids, high voltages supplied to corona wires or rollers.

SP Data Mode is used to:
1) Set special modes for servicing this machine.
2) Monitor or adjust the process conditions.

4.2 SP TEST MODE / SP DATA MODE ACCESS PROCEDURE

1. Open the right-front door, and remove the door switch actuator (1 screw).
2. Set the actuator to turn on the door switches.
3. Press the Enter key on the SP panel.
4. Enter the 4 digit access code.
5. Press the Enter key.
6. - Press the "1" key for the SP Test Mode.
   - Press the "2" key for the SP Data Mode.
7. Press the Enter key. Then, the display blinks:
   "J000" for the SP TEST Mode.
   "F000" for the SP DATA Mode.

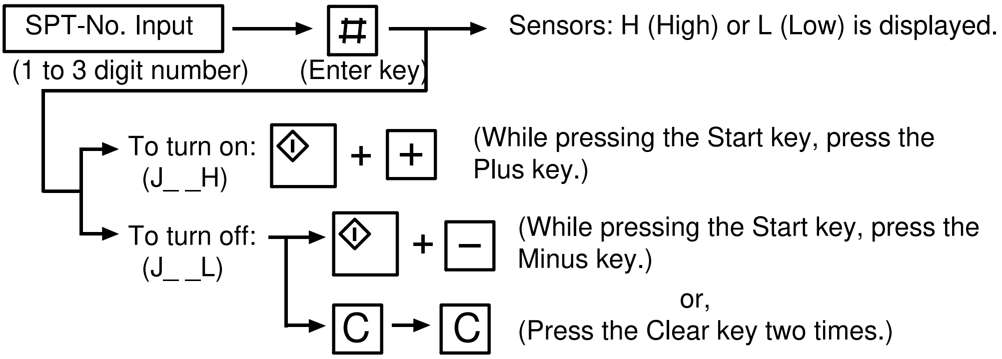
Key	Display
#	L L L L
* * * *	H L H L
#	P 0
SP TEST Mode: 1, or	P 1
SP DATA Mode: 2	P 2
SP TEST Mode: #	J 0 0 0 (Blinking)
SP DATA Mode: #	F 0 0 0 (Blinking)

NOTE: For a new machine, the access code to SP TEST/DATA Modes is set to "0000" at the factory.
At the machine installation, enter your own number using SP Data Mode No. 60. The number set must be recorded for the next access. It is impossible to monitor the access code set. It is recommended that the service center use a single standard code.

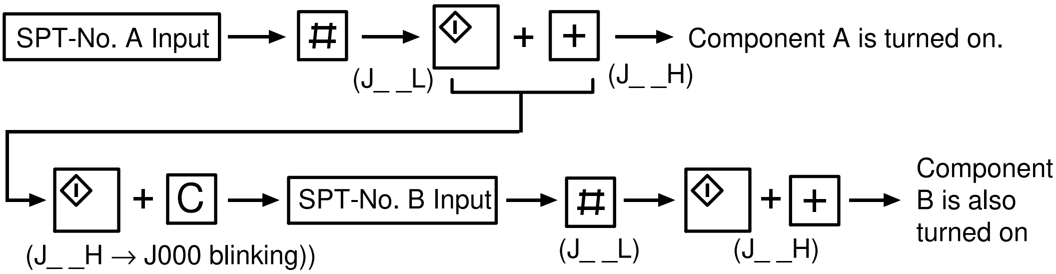
Service Tables

4.3 SP TEST MODE OPERATION PROCEDURE

1. One component operation

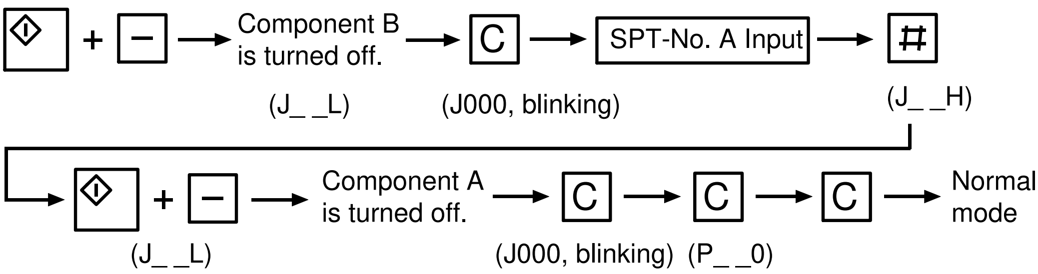


2. Multi-components operation
   It is possible to operate two or more components in the SP Test mode.
   <Turn ON>



<Turn OFF>

Press the Clear key (C) two times to turn off all components, or, do the following to turn off one by one;



3. Press the Clear key (C) three times to return to the normal copy mode.

4. Press the Recall key (R) to check which SP Test number has been accessed.

4.4 SP TEST MODE TABLE (SPT)

No.	Function	Remarks
0	Registration Sensor	L: No paper, H: Paper present
1	Upper Lift Sensor	L: Down, H: Up
2	Lower Lift Sensor	
3	Door Safety Switch (DC)	L: Close, H: Open
12	Polygon Motor Speed	L: Stop, or low speed H: Full speed
13	Toner Supply Sensor: Bk	L: Enough toner H: Toner is supplied
14	Toner Supply Sensor: M	
15	Toner Supply Sensor: Y	
16	Toner Supply Sensor: C	
17	Toner End Sensor: Bk	L: Enough toner H: Toner end
18	Toner End Sensor: M	
19	Toner End Sensor: Y	
20	Toner End Sensor: C	
21	Exit Sensor	L: No paper, H: Paper present
22	Oil End Sensor	L: Enough oil, H: Oil end
23	Toner Overflow Sensor	L: Normal, H: Full used toner
24	Upper Paper End Sensor	L: Paper present, H: Paper end
25	Cassette Arm Sensor	L: Up, H: Down
26	Lower Paper End Sensor	L: Paper present, H: Paper end
27	By-pass Paper End Sensor	L: Paper Present, H: Paper end
28	By-pass Table Sensor	L: Table closed, H: Table opened
29	ID Sensor: Bk	Set "H" to turn on the ID sensor
30	ID Sensor: M	
31	ID Sensor: Y	
32	ID Sensor: C	
33	Motor Control Board Reset	Set "H" to reset.
50	Toner Supply Motor: Reverse Rotation Mode	This can be used together with SPT-53 to 56 to operate the toner supply motor without supplying toner to the toner container in the development unit.
		1. Set "H" to select reverse mode.

Service Tables

No.	Function	Remarks
		2. While pressing the start key, press the Clear key.
		3. Enter SPT-53 ~ 56, and press the enter key.
		4. Set "H" to turn the motor in the reverse direction.
		5. Press the Clear key two times.
51	LD Control Board Reset	Set "H" to reset.
53	Toner Supply Motor: Bk	Set "H" to turn on the motor to supply toner, but stop it immediately by setting "L". It is recommended to use this with SPT-50. (See SPT-50.)
54	Toner Supply Motor: M	
55	Toner Supply Motor: Y	
56	Toner Supply Motor: C	
57	Quenching Lamp: Bk	Set "H" to turn the lamp on.
58	Quenching Lamp: M	
59	Quenching Lamp: Y	
60	Quenching Lamp: C	
61	Upper Paper Feed Clutch	Set "H" to turn the component on.
62	Lower Paper Feed Clutch	
63	Upper Pick-up Solenoid	
64	Lower Pick-up Solenoid	
65	Bypass Feed Solenoid	
66	Relay Clutch	
67	Registration Clutch	
68	Charge Fan Motor	
69	Upper Lift Motor	Use only when the lift motor does not turn even if the cassette is set in position. Set "H" to turn it on.
70	Lower Lift Motor	
71	Fusing Lamp	L: OFF, H: ON
72	Main Relay	L: OFF, : ON
73	Developer Removal Motor	Set "H" to turn the component ON.
74	Paper Feed Motor	
75	Shutter Solenoid (Ozone Neutraizer)	

No.	Function	Remarks
76	Pick-off Solenoid	Set "H" to turn the component on.
77	Process Control Board Reset	Set "H" to reset.
78	Charge Corona/Grid: Bk	Set "H" to output high voltage to the charge corona wire and grid plate.
79	Charge Corona/Grid: M	
80	Charge Corona/Grid: Y	
81	Charge Corona/Grid: C	
82	Development Bias: Bk	Set "H" to output bias voltage to the development roller for copy image.
83	Development Bias: M	
84	Development Bias: Y	
85	Development Bias: C	
86	Development Bias for ID Sensor Pattern: Bk	Set "H" to output bias voltage to the development roller for ID sensor pattern.
87	Development Bias for ID Sensor Pattern: M	
88	Development Bias for ID Sensor Pattern: Y	
89	Development Bias for ID Sensor Pattern: C	
90	Toner Supply Roller Bias: Bk	Set "H" to output high voltage to the toner supply roller.
91	Toner Supply Roller Bias: M	
92	Toner Supply Roller Bias: Y	
93	Toner Supply Roller Bias: C	
98	Transfer Corona: Bk	Set "H" to output high voltage to the transfer corona wire.
99	Transfer Corona: M	
100	Transfer Corona: Y	
101	Transfer Corona: C	
102	Transfer Belt Discharge Corona	Set "H" to output.
103	Separation Corona	
104	Toner Supply Clutch: Bk	Set "H" to turn the clutch on.
105	Toner Supply Clutch: M	
106	Toner Supply Clutch: Y	
107	Toner Supply Clutch: C	
108	Main Motor	Set "H" to turn the motor on. After confirming its rotation immediately set "L" to turn it off.
109	Drum Motor	
110	Transfer Belt Motor	

No.	Function	Remarks
111	Forced Toner Supply: Bk	Set "H" to supply toner to the developer.
112	Forced Toner Supply: M	
113	Forced Toner Supply: Y	
114	Forced Toner Supply: C	
115	Bypass Paper Width Switch	1: A3/A4(S), 3: B4/B5(S), 5: A4(L)/A5(S) 7: B5(L)/B6(S), 9: A5(L)/A6(S), 11: B6(L), 13: A6(L), 16: 11" (11" x 17" ~ 11" x 81/2"), 19: 10" x 14" (L), 20: 81/2" x 14" (L), 25: 8" x 13" (L), 28: 51/2" x 81/2" (L) S: sideways, L: lengthwise
116	Toner Supply Motor – Forward/Reverse: Bk	Set "H" to turn the toner supply motor in both forward and reverse directions.
117	Toner Supply Motor – Forward/Reverse: M	
118	Toner Supply Motor – Forward/Reverse: Y	
119	Toner Supply Motor – Forward/Reverse: C	

4.5 SP DATA MODE OPERATION PROCEDURE

CAUTION: Enter the SPD number only when "F000" is blinking.
If the display is continuously on, press the Recall key to find out the SPD number set.

SPD-No. Input → # → Present data is displayed. (Data stays on.)

To select new data:

+ + To change "L" to "H", or to select the next greater data value.

or

+ – To select the next smaller data value.
NOTE: This is effective only when some value is displayed.

or

+ Number keys To select an appropriate value.

+ # To store new data, press the Enter key while pressing the Start key.
NOTE: If the Enter key is pressed without pressing the Start key, the new data will not be stored.

To turn off selected data mode:

+ – To turn off the selected data mode, change "H" to "L" by pressing the Minus key while pressing the Start key.

+ # Then, press the Enter key while pressing the Start key. Now, the normal (Low) mode is stored.

To exit SP Data mode:

C → C → C

(F000) (P_ _0)

To exit SP Mode, press the clear key three times.

Service Tables

4.6 SP DATA MODE TABLE (SPD)

NOTE: 1. Only SPD numbers in bold letters are used in the field.
2. Do not use SPD numbers with normal letters, unless indicated in an adjustment procedure.
3. "L" (Low) is always default.

<table>
<tr><th>No.</th><th>Item</th><th>Remarks</th></tr>
<tr><td>1</td><td>Scanner ON/OFF Line</td><td>H: ON Line</td></tr>
<tr><td>2</td><td>Copy Number set in scanner OFF line mode</td><td></td></tr>
<tr><td>3</td><td>Paper feed station selection in scanner off line mode</td><td>1: Upper Cassette
2: Lower Cassette</td></tr>
<tr><td>4</td><td>Multi-copy run in the scanner off line mode</td><td>H: Multi-copy</td></tr>
<tr><td>5</td><td>Free run in the scanner off line mode</td><td>H: Free run</td></tr>
<tr><td>6</td><td>OHP/thick paper mode</td><td>H: ON
L: OFF</td></tr>
<tr><td>7</td><td>Jam detection</td><td>H: OFF mode
L: ON mode</td></tr>
<tr><td>8</td><td>Polygon motor rotation</td><td>H: OFF mode
L: ON mode</td></tr>
<tr><td>9</td><td>Paper feeding in free run mode</td><td>H: Paper feeding</td></tr>
<tr><td>10</td><td>Free run automatic stop in 80 scans</td><td>H: Set
L: Reset</td></tr>
<tr><td>11</td><td>Belt Cleaning Time at the end of one copy job.</td><td>L: Normal
H: Normal +
2 seconds
(NOTE 1)</td></tr>
<tr><td>12</td><td>Key counter management
To select copy modes for key counter management.
<table>
<tr><th>Data</th><th>Full Color</th><th>Single Color</th><th>Black</th></tr>
<tr><td>0 0 0</td><td>x</td><td>x</td><td>x</td></tr>
<tr><td>0 0 1</td><td>o</td><td>x</td><td>x</td></tr>
<tr><td>0 0 2</td><td>x</td><td>o</td><td>x</td></tr>
<tr><td>0 0 3</td><td>o</td><td>o</td><td>x</td></tr>
<tr><td>0 0 4</td><td>x</td><td>x</td><td>o</td></tr>
<tr><td>0 0 5</td><td>o</td><td>x</td><td>o</td></tr>
<tr><td>0 0 6</td><td>x</td><td>o</td><td>o</td></tr>
<tr><td>0 0 7</td><td>o</td><td>o</td><td>o</td></tr>
</table>
o: Counter is incremented
x: Counter is not incremented
Default: 0 0 7</td><td>To use the key counter, set SW100 on the sequence control board OFF. Its normally set ON.</td></tr>
<tr><td>20</td><td>Self check automatic start during the noon hour.</td><td>H: OFF
L: ON</td></tr>
<tr><td>21</td><td>Self check automatic start time, (90 + x) minutes after the power on.</td><td>x = 120: Default</td></tr>
</table>

No.	Item	Remarks
22	Forced self check at specified copy interval.	**0: No** 1: check every 200 copies 2: check every 400 copies 3: check every 600 copies 4: check every 800 copies 5: check every 1000 copies
25	Process control SC detection	H: OFF **L**: ON
26	ID sensor SC detection	H: OFF **L**: ON
27	Self check	H: OFF **L**: ON
28	Process control data reset	H: Reset (NOTE 2)
29	Process control RAM reset	H: Reset
30	Self check ON whenever the power is turned on.	H: ON **L**: OFF (NOTE 3)
32	RAM data transmission	H: Set
35	Process control all OFF - batch processing The SPD's are set to as follows: SPD#020 to H SPD#104 to H SPD#450 to H SPD#022 to 000 SPD#105 to H SPD#453 to H SPD#027 to H SPD#220 to H SPD#454 to H SPD#030 to L SPD#221 to H SPD#610 to H SPD#100 to H SPD#340 to H SPD#101 to H	H: Set
36	Process control all ON - batch processing The SPD's are set to as follows: SPD#020 to L SPD#105 to L SPD#453 to L SPD#027 to L SPD#220 to L SPD#454 to L SPD#030 to L SPD#221 to L SPD#526 to L SPD#100 to L SPD#340 to L SPD#610 to L SPD#101 to L SPD#450 to L SPD#104 to L	H: Set
45	Process control data transmission to PC.	H: Set
50	Color mode selection 0: No 8: C 1: Bk 9: Bk + C 2: M 10: M + C (B) 3: Bk + M 11: Bk + M + C 4: Y 12: Y + C (G) 5: Bk + Y 13: Bk + Y + C 6: M + Y (R) 14: M + Y + C (3C) 7: Bk + M + Y **15**: Bk + M + Y + C (4C)	

Service Tables

No.	Item	Remarks
51	Color pattern selection 0: Color patch : 7th LD power 1: Solid : 3rd LD power* 2: 50% dot screen : 3rd LD power* 3: 1 horizontal line for every two main scans : 5th LD power 4: 1 horizontal line for every four sub scans : 7th LD power 5: 1 vertical line for every four sub scans : 3rd LD power* (4 lines/mm : ID sensor pattern) 6: Solid : 3rd LD power* (ID sensor pattern) 7: Color patch : 3rd LD power* 8: Color patch : 1st LD power	*: 4th LD power for A105
52	Color pattern length 0: No pattern (0 mm) (To be used not to print color pattern.) 1: 15 mm on the trailing edge 2: One half length of paper 3: Full length of paper 4: 7 gradation patterns on the leading edge	
60	Access code monitor/input Warning: After inputting your own code, keep that number recorded somewhere for the next access. A common service center code is recommended.	Factory set: 0000

<table>
<tr><th>No.</th><th>Item</th><th>Remarks</th></tr>
<tr><td>65</td><td>
Machine serial number registration
Model A092:
As only 5 digits can be registered in the memory, the serial number in the memory is different from the serial number on the rating plate. The 5-digit number has been decided and input at the factory according to the following rule:

Serial number in memory: # # # # #
Serial number on the rating plate: A 3 0 1 #######
<Same Number>

<table>
<tr><th>Year Month</th><th># #</th><th>Year Month</th><th># #</th><th>Year Month</th><th># #</th></tr>
<tr><td>92 02</td><td>02</td><td>92 10</td><td>10</td><td>93 06</td><td>18</td></tr>
<tr><td>92 03</td><td>03</td><td>92 11</td><td>11</td><td>93 07</td><td>19</td></tr>
<tr><td>92 04</td><td>04</td><td>92 12</td><td>12</td><td>93 08</td><td>20</td></tr>
<tr><td>92 05</td><td>05</td><td>93 01</td><td>13</td><td>93 09</td><td>21</td></tr>
<tr><td>92 06</td><td>06</td><td>93 02</td><td>14</td><td>93 10</td><td>22</td></tr>
<tr><td>92 07</td><td>07</td><td>93 03</td><td>15</td><td>93 11</td><td>23</td></tr>
<tr><td>92 08</td><td>08</td><td>93 04</td><td>16</td><td>93 12</td><td>24</td></tr>
<tr><td>92 09</td><td>09</td><td>93 05</td><td>17</td><td>94 01</td><td>25</td></tr>
</table>

<table>
<tr><th>Area Code</th><th>#</th></tr>
<tr><td>17 (115V version)</td><td>0</td></tr>
<tr><td>22 (OEM version)</td><td>1</td></tr>
<tr><td>27 (220-240V version)</td><td>3</td></tr>
</table>

Model A105:
Maximum 12 digits can be registered in the memory. The serial number in the memory has been decided and input at the factory according the the following rule. If a different number is stored, SC191 or SC192 is displayed.

Serial number in memory: 0 1 3 5 8 #######
Serial number on the rating plate: A 3 5 8 #######
<Same Number>
Fixed for this mode
</td><td></td></tr>
<tr><td>66</td><td>
Machine serial number monitor
Model A092 and A105:
The 5-digits (12 digits for model A105) serial number in memory can be monitored. Only 3 digits are displayed on the LED panel at a time. To see the full number, shift the position by using the + or − keys while pressing the ◇ key.
</td><td></td></tr>
</table>

No.	Item	Remarks
70	Copy image initial setting - batch processing The SPD's are set to as follows: SPD#029 to H SPD#030 to H SPD#221 to H SPD#020 to 000 SPD#100 to H SPD#340 to H SPD#022 to H SPD#101 to H SPD#450 to H SPD#025 to H SPD#104 to H SPD#453 to H SPD#027 to H SPD#105 to H SPD#610 to H SPD#028 to H SPD#220 to H SPD#701 to H	H: Set
71	LD power check mode set - batch processing The SPD's are set to as follows: SPD#001 to L SPD#030 to L SPD#220 to H SPD#005 to H SPD#051 to 001 SPD#221 to H SPD#020 to H SPD#052 to 003 SPD#310 to H SPD#022 to 000 SPD#100 to H SPD#340 to H SPD#025 to H SPD#101 to H SPD#450 to H SPD#027 to H SPD#104 to H SPD#453 to H SPD#028 to H SPD#105 to H SPD#610 to H	H: Set
72	LD power check mode reset - batch processing SPD#001 to H SPD#051 to 007 SPD#005 to L SPD#052 to 001	H: Set
73	V_0–V_{L3} target data monitor - batch processing The following SPD's are displayed sequentially: SPD#170 SPD#285 SPD#171 SPD#286 SPD#172 SPD#287 SPD#173 SPD#288	H: Set
74	LD power level check - batch processing The SPD's are set to as follows: SPD#020 to H SPD#100 to H SPD#340 to H SPD#022 to 000 SPD#101 to H SPD#450 to H SPD#025 to H SPD#104 to H SPD#453 to H SPD#027 to H SPD#105 to H SPD#610 to H SPD#028 to H SPD#220 to H SPD#030 to L SPD#221 to H	Must be "L"
75	V_0–V_{L3} detected data monitor - batch processing The following SPD's are displayed sequentially: SPD#315 SPD#316 SPD#317 SPD#318	H: Set
76	V_B, V_{HB} target data monitor - batch processing V_B: Development bias, V_{HB}: Toner Supply Roller Bias The following SPD's are displayed sequentially: SPD#230 SPD#355 SPD#231 SPD#356 SPD#232 SPD#357 SPD#233 SPD#358	H: Set

No.	Item	Remarks
77	Vmin adjustment mode set - batch processing The SPD's are set to as follows: SPD#020 to H SPD#121 to 035 (020) SPD#022 to 000 SPD#122 to 040 (020) SPD#025 to L SPD#123 to 036 (020) SPD#026 to L SPD#028 to H SPD#027 to L SPD#611 to 015 (032) SPD#030 to L SPD#612 to 015 (032) SPD#100 to L SPD#613 to 015 (032) SPD#101 to L SPD#614 to 015 (032) SPD#104 to L SPD#490 to 005 (018) SPD#105 to L SPD#491 to 006 (018) SPD#190 to H SPD#492 to 018 (018) SPD#220 to L SPD#493 to 011 (018) SPD#221 to L SPD#235 to 154 (165) SPD#340 to L SPD#236 to 177 (178) SPD#450 to L SPD#237 to 177 (178) SPD#453 to H SPD#238 to 177 (178) SPD#610 to L SPD#108 to H SPD#120 to 063 (040) SPD#480 to 015 The values in the bracket are for the model A105.	H: Set (Never set H)
78	Vmin detected data monitor - batch processing (Data in SPD#481 to #488 is displayed.)	H: Set
79	Vmin adjustment mode reset - batch processing The SPD's are set to as follows: SPD#050 to 015 SPD#346 to L SPD#052 to 000 SPD#347 to L SPD#345 to L SPD#348 to L	H: Set
80	Pointer/Vk adjustment mode set - batch processing The SPD's are set to as follows: SPD#020 to H SPD#280 to L SPD#491 to 008 (018) SPD#022 to 000 SPD#340 to L SPD#492 to 018 SPD#027 to L SPD#450 to L SPD#493 to 010 (018) SPD#030 to L SPD#453 to H SPD#515 to 110 (055) SPD#100 to L SPD#610 to L SPD#516 to 110 (065) SPD#101 to L SPD#028 to H SPD#517 to 100 (055) SPD#104 to L SPD#107 to H SPD#518 to 100 (065) SPD#105 to L SPD#100 to H SPD#225 to 015 SPD#220 to L SPD#101 to H SPD#221 to L SPD#490 to 015 (018) The values in the bracket are for the model A105.	H: Set **(Never set H for model A092)**
81	T GRD. detected data monitor - batch processing (Data in SPD#520 to #523 is displayed)	H: Set
82	Color patch - 15 mm - 7th LD power mode set - batch processing (SPD#051-0 and SPD#052-1 are selected)	H: Set
83	Color patch - 15 mm - 1st LD power mode set - batch processing (SPD#051-8 and SPD#052-1 are selected)	H: Set

Service Tables

No.	Item	Remarks
84	DIF check - batch processing The SPD's are set to as follows: SPD#120 to 000 SPD#104 to L SPD#610 to L SPD#121 to 000 SPD#105 to L SPD#107 to H SPD#122 to 000 SPD#220 to L SPD#101 to H SPD#123 to 000 SPD#221 to L SPD#100 to H SPD#020 to H SPD#280 to L SPD#052 to 001 SPD#022 to L SPD#340 to L SPD#051 to 000 SPD#027 to L SPD#450 to L SPD#030 to L SPD#453 to L	Must be "L"
85	Process control data monitor - batch processing (To be used to fill in the data sheet for model A092.)	H: Set **For model A092**
86	Process control initial setting mode reset - batch processing The SPD's are set to as follows: SPD#020 to L SPD#100 to L SPD#340 to L SPD#025 to L SPD#101 to L SPD#450 to L SPD#026 to L SPD#104 to L SPD#453 to L SPD#027 to L SPD#105 to L SPD#610 to L SPD#030 to L SPD#220 to L SPD#031 to H SPD#052 to 000 SPD#221 to L SPD#454 to L SPD#022 to 000 SPD#190 to L SPD#526 to L	H: Reset
90	Process control data monitor - batch processing (To be used to fill in the data sheet for model A105.)	H: Set **For model A105**
91	V_{BS} compensation detected data monitor - batch processing The following data is displayed sequentially: SPD#226, 227, 228, and 229	H: Set **For model A105**
92	V_{SG} decreasing counter - batch processing The following SPD's values are displayed sequentially: SPD#865, 866, 867, 868, 885, 886, 887, and 888	H: Set **For model A105**
100	Drum potential control - Auto/Fixed	H: Fixed **L**: Auto (Normal)
101	Pointer control - Auto/Fixed	H: Fixed **L**: Auto (Normal)
102	Humidity default setting If process control becomes totally out of order, but the copier must operational until the next visit, select SPD#35-H (Process Control all OFF) and select humidity data of SPD#102. Now the copier is controlled with the most suitable preset conditions.	1: Low 2: Normal 3: High
104	Pointer control by DIF (V_{LL}–V_{LH})	**L**: ON
105	Pointer control by V_{SG}	**L**: ON
106	Pointer humidity default setting 0: High humidity 1: 35% ~ 75% RH 2: Low humidity For model A105, 0 and 2 can be accessed, but 1 should be selected for any humidity range.	

No.	Item	Remarks
107	Pointer reset - TD check At the TD check, pointer is reset by selecting SPD#107-H to the following value depending upon SPD#106 data: <table><tr><td></td><td>Model A092</td><td>Model A105</td></tr><tr><td>SPD#106</td><td colspan="2">SPD#110 ~ #113</td></tr><tr><td>0 (75%~)</td><td>5 (10 for SPD#111)</td><td>18</td></tr><tr><td>1 (35~75%)</td><td>10 (20 for SPD#111)</td><td>22</td></tr><tr><td>2 (~35%)</td><td>20 (25 for SPD#111)</td><td>26</td></tr></table>	
108	Pointer reset - Vmin check At the Vmin check, pointer is reset by selecting SPD#108-H to the following value depending upon SPD#106 data: <table><tr><td></td><td>Model A092</td><td>Model A105</td></tr><tr><td>SPD#106</td><td colspan="2">SPD#110 ~ #113</td></tr><tr><td>0 (75%~)</td><td>10 (5 for SPD#111)</td><td>18</td></tr><tr><td>1 (35~75%)</td><td>15 (5 for SPD#111)</td><td>22</td></tr><tr><td>2 (~35%)</td><td>25 (5 for SPD#111)</td><td>26</td></tr></table>	
110 ~ 113	Pointer data monitor/change Data: 0 ~ 31	
115 ~ 118	Pointer limit Depending upon SPD#106 data, pointer limit data is changed when pointer is reset by SPD#107-H. <table><tr><td></td><td colspan="2">Model A092</td><td colspan="2">Model A105</td></tr><tr><td>SPD#106</td><td>#115 ~ #118</td><td>Pointer Range</td><td>#115 ~ #118</td><td>Pointer Range</td></tr><tr><td>0</td><td>000</td><td>0~20</td><td>014</td><td>14~22</td></tr><tr><td>1</td><td>005 (010 for SPD#116)</td><td>5~25 (10~30 for SPD#111)</td><td>018</td><td>18~26</td></tr><tr><td>2</td><td>010</td><td>10~30</td><td>022</td><td>22~30</td></tr></table>(Lower pointer linit) (Higher pointer limit is "20 + Lower pointer limit".) (Higher pointer limit is "8 + Lower pointer limit")	
120	Bk, VLL–VLH (DIF) preset data	Do not change Factory setting **for model A092**
121	M, "	
122	Y, "	
123	C, "	
125	Bk, VLL–VLH (DIF) detected data	
126	M, "	
127	Y, "	
128	C, "	

Service Tables

No.	Item	Remarks
130	V_{LL}–V_{LH} (DIF) preset data set	H: Set (Press ◇ once and # twice.)
170	Bk, V0 target data setting (when SPD#100 is set at "H")	
171	M, " "	
172	Y, " "	
173	C, " "	
180	Bk, V_G coefficient data for grid	106
181	M, "	
182	Y, "	
183	C, "	
190	SC840 ~ 843 detection	**L**: ON H: OFF
220	Development bias Vk control	**L**: ON H: OFF
221	Pointer control by V_{BS}	**L**: ON H: OFF
222	AC bias applying to the development bias **for model A105**	H: Not applying
225	Forced Vk compensation ON and color mode set (Press the Enter key while pressing the Start key to start compensation.)	15: 4 colors 8: C 4: Y 2: M 1: Bk
226	Bk, V_{BS} compensation detected data	
227	M, "	
228	Y, "	
229	C, "	
230	Bk, V_B target data (when SPD#100 is set at "H")	
231	M, " "	
232	Y, " "	
233	C, " "	
235	Bk, Vk target data	
236	M, "	
237	Y, "	
238	C, "	
240	Bk, Vk detected data	
241	M, "	
242	Y, "	
243	C, "	
245	Bk, Vk* average detected data	
246	M, "	
247	Y, "	
248	C, "	
285	Bk, V_{L3} target data (when SPD#100 is set at "H")	Not used

No.	Item	Remarks
286	M, V_{L3} target data (when SPD#100 is set at "H")	Not used
287	Y, " "	Not used
288	C, " "	Not used
310	Factory use only	Must be "L"
311	Factory use only	Must be "L"
315	Bk, LD power control data (V_{L3})	(V_{L4} for A105)
316	M, "	(V_{L4} for A105)
317	Y, "	(V_{L4} for A105)
318	C, "	(V_{L4} for A105)
340	Toner supply roller bias control	**L**: ON
341	Forced toner supply for all colors	**L**: OFF H: ON
345	Bk, toner supply stop	**L**: No H: Yes
346	M, "	
347	Y, "	
348	C, "	
350	Bk, V_{HB}–V_B data	V_{HB}: Supply roller bias V_B: Development bias
351	M, "	
352	Y, "	
353	C, "	
355	Bk, V_{HB} target data	V_{HB}: Supply roller bias
356	M, "	
357	Y, "	
358	C, "	
400	Bk transfer current data	Normal: 300 µA
401	M "	Normal: 400 µA
402	Y "	Normal: 350 µA
403	C "	Normal: 600 µA
405	Trailing edge transfer corona shift	Normal: 3 (1~5)
430	Transfer belt discharge voltage	Normal: 800 V
431	Separation corona voltage	Normal: 300 V
435	Leading edge separation corona shift (Final and temporary countermeasure against "Mimizu" together with SPD#725.)	**L**: OFF H: ON
450	V_{SP} target data control	**L**: Automatic H: Manual
452	TD data change	**L**: Not accepted H: Accepted
453	CD fixed during self check	H: fixed
454	ND fixed	H: fixed
455	Bk, Vsp target data (V_{TC})	
456	M, "	
457	Y, "	
458	C, "	

Service Tables

No.	Item	Remarks
460	Bk, Vsp detected data	
461	M, "	
462	Y, "	
463	C, "	
465	Bk, Vsp manual setting data (when SPD#450 is set at "H")	
466	M, " "	
467	Y, " "	
468	C, " "	
470	Bk, Vsp* average detected data	
471	M, "	
472	Y, "	
473	C, "	
480	Vmin check ON, and color selection 15: All colors 8: C 4: Y 2: M 1: Bk Press # key while pressing the Start key.	
481	Bk, Vmin check result code	
482	M, "	
483	Y, "	
484	C, "	
485	Bk, Vmin detected data	A092: 0~30 (0V~0.3V) A105: 0~20 (0V~0.2V)
486	M, "	A092: 110~190 (1.1V~1.9V) A105: 130~170 (1.3V~1.7V)
487	Y, "	
488	C, "	
490	Bk, TD data monitor	0~30
491	M, "	
492	Y, "	
493	C, "	
495	Bk, ND present data monitor	0~24, Reset by SPD#28 to "8" (default).
496	M, "	
497	Y, "	
498	C, "	
500	Bk, CD data monitor	0~32, Reset by SPD#28 to "16" (default)
501	M, "	
502	Y, "	
503	C, "	

No.	Item	Remarks
505	Bk, NGRD detected data	
506	M, "	
507	Y, "	
508	C, "	
510	Bk, V_{L1} detected data	
511	M, "	
512	Y, "	
513	C, "	
515	Bk, TGRD target data	
516	M, "	
517	Y, "	
518	C, "	
520	Bk, TGRD detected data	
521	M, "	
522	Y, "	
523	C, "	
525	Forced self check	Data 015 and #
560	Bk, SV_{SG} detected data	
561	M, "	
562	Y, "	
563	C, "	
565	Bk, V_{SG}* average detected data	
566	M, "	
567	Y, "	
568	C, "	
570	Bk, V_{SG} latest detected data	
571	M, "	
572	Y, "	
573	C, "	
575	Bk, V_{SG} decreasing tendency detected data, total value for last 64 data	
576	M, "	
577	Y, "	
578	C, "	
580	Bk, V_{SG} decreasing tendency detected data, total value for last 8 data	
581	M, "	
582	Y, "	
583	C, "	
610	ID sensor LED light intensity automatic adjustment.	

No.	Item		Remarks
611	Bk, ID sensor LED data	If the data is more than 101, (151 for model A105) clean the sensor surface and perform TD check.	<Model A092> OK Range: 30~100 <Model A105> OK Range: 30~150
612	M, ID sensor LED data		
613	Y, ID sensor LED data		
614	C, ID sensor LED data		
700	Fusing unit in/out		L: IN H: OUT
701	Fusing SC reset (for SC520, 530, 540, and 550).		H: Reset
703	Fusing temperature for thin paper mode during standby.		152 (148°C) (A092) 135 (135°C) (A105)
704	Fusing temperature for thin paper mode during copy run.		146 (143°C) (A092) 129 (131°C) (A105)
705	Fusing temperature threshold for fusing idling.		47 (80°C) (A092) 47 (80°C) (A105)
707	Fusing temperature for standard mode during standby.		160 (153°C) (A092) 144 (142°C) (A105)
708	Fusing temperature for standard mode during copy run.		152 (148°C) (A092) 138 (137°C) (A105)
709	Fusing temperature for OHP/thick paper mode during copy run.		152 (148°C) (A092) 137 (136°C) (A105)
710	Fusing idling time.		60 seconds
711	Fusing temperature data at the sequence board.		
712	Fusing temperature data at the process control board.		
720	Main motor speed fine adjustment for all paper sizes.		Default 6 (0 to 12)
721	Drum motor speed fine adjustment.		Default 6 (0 to 12)
722	Belt motor speed fine adjustment.		Default 6 (0 to 12)
723	Paper feed motor fine adjustment.		Default 6 (0 to 12)
724	A3 (11" x 17") Paper Feed Motor speed fine adjustment		Default 6 (0~12)
725	A3 (11" x 17") main motor speed adjustment. This can be used when SPD#435 is set "H". (With SPD#435-L, the speed can not be changed.)		Default 8 (0~12)
750	Laser unit temperature monitor. When the temperature data becomes equal to or greater than the following value when compared to the present room temperature, image alignment can be adjusted: Room Temp. Temp. Data 15°C/59°F → 109, or more 20°C/68°F → 119, or more 25°C/77°F → 129, or more		
850	Bk toner end copy run		0
851	M "		
852	Y "		
853	C "		
860	Bk V_{SG} decreasing stepped counter		
861	M "		
862	Y V_{SG} decreasing stepped counter		

No.	Item	Remarks
863	C "	
865	Bk VSG abnormal decreasing counter	
866	M "	
867	Y "	
868	C "	
870	Bk VSG middle interval decreasing counter	
871	M "	
872	Y "	
873	C "	
875	Bk VSG long interval decreasing counter	
876	M "	
877	Y "	
878	C "	
880	Bk VSG decreasing pointer-1up counter	
881	M "	
882	Y "	
883	C "	
885	Bk VSG decreasing pointer-2up counter	
886	M "	
887	Y "	
888	C "	
890	Bk VSG middle interval decreasing loop counter	
891	M "	
892	Y "	
893	C "	
895	Bk VSG stepped decreasing loop counter	
896	M "	
897	Y "	
898	C "	

For SPD#703 to #709, the data displayed and actual temperature have the following relation:

Temperature (°C)	Data	Temperature (°C)	Data
75	39	120	112
80	47	125	119
85	55	130	127
90	64	135	135
95	72	140	141
100	81	145	149
105	89	150	157
110	97	155	165
115	105	160	172

NOTE 1: For machines with low copy volumes, or used under high temperature conditions or it the VLL/VLH pattern is visible or reverse side of copy paper, set SP11 to "H". In this condition, it takes 2 seconds longer for the machine to return to the "Ready Condition" but the VLL/VLH line pattern will always be cleaned from the belt's surface.

NOTE 2: Refer to Vmin Check and TD Check Procedures for proper usage.

NOTE 3: Recommendation is that setting be set to H.

5. SERVICE TABLES

5.1 OVERVIEW

A: Adjustable
X: Never Touch
–: Not relevant
U: Useful

VR: Variable Resistor
DGS: Digital Switch
DPS: Dip Switch
JPS: Jumper Switch
TP: Test Point

COMMON: Common Board for A092 and A105
UNIQUE: Unique Board for A092 or A105

<Model A092>

COMPATIBILITY		VR	DGS	DPS	JPS	FUSE	TP
UNIQUE	CCD Drive Board	–	–	–	–	–	–
"	CCD Pre-amp Board	X	–	–	–	–	U
"	Video Processing Board	A, X	–	X	X	–	U
"	Scanner Control Board	–	A	X	X	–	U
"	IPU 1	–	–	–	–	–	U
"	IPU 1.5	–	–	–	–	–	U
"	IPU 2	–	–	–	–	–	U
"	IPU Memory	–	–	–	–	–	U
"	Drum Exposure Control Board	–	A	–	–	–	U
"	LD Control Board	A	–	X	X	–	U
COMMON	LD Unit	X	–	–	–	–	U
UNIQUE	System Control Board	–	–	X	–	–	U
"	Sequence Control Board	–	–	A	–	–	U
"	Process Control Board	–	–	–	–	–	U
"	Operation Panel Board	A	–	A	–	–	–
"	Power Supply Unit	X	–	–	–	U	–
COMMON	Motor Control Board	–	X	X	–	U	U
UNIQUE	Polygon Motor Board	–	–	–	–	–	–
COMMON	Charge Bias Power Pack	X	–	–	–	–	–
"	Belt Discharge Power Pack	–	–	–	–	–	–
"	Transfer Power Pack	–	–	–	–	–	–

Service Tables

<Model A105>

COMPATIBILITY		VR	DGS	DPS	JPS	FUSE	TP
UNIQUE	CCD Drive Board	X	–	–	–	–	U
"	Video Processing Board	A, X	–	X	X	–	U
"	Scanner Control Board	–	A	–	–	–	U
"	IPU 1	–	–	–	–	–	U
"	IPU 1.5	–	–	–	–	–	U
"	IPU 2	–	–	–	–	–	U
"	IPU Memory	–	X	–	–	–	U
"	Drum Exposure Control Board	–	A	–	A	–	U
"	LD Control Board	A	X	X	–	–	U
COMMON	LD Unit	X	–	–	–	–	U
UNIQUE	System Control Board	–	X	U	X	–	U
"	Sequence Control Board	–	–	A	–	–	U
"	Process Control Board	–	–	–	–	–	U
"	Operation Panel Board	A	–	A	–	–	–
"	Power Supply Unit	X	–	–	–	U	–
COMMON	Motor Control Board	–	X	X	–	U	U
UNIQUE	Polygon Motor Board	–	–	–	–	–	–
COMMON	Charge Bias Power Pack	X	–	–	–	–	–
"	Belt Discharge Power Pack	–	–	–	–	–	–
"	Transfer Power Pack	–	–	–	–	–	–
UNIQUE	Development Roller Bias Power Pack	X	–	–	–	–	–

5.2 VARIABLE RESISTOR (VR)

5.2.1 CCD Pre-amp Board

<Model A092>

Symbol	Function
VR301	Do Not Touch It, Factory Use (to adjust the CCD 1 output level)
VR321	Do Not Touch It, Factory Use (to adjust the CCD 2 output level)
VR341	Do Not Touch It, Factory Use (to adjust the CCD 3 output level)
VR361	Do Not Touch It, Factory Use (to adjust the CCD 4 output level)
VR381	Do Not Touch It, Factory Use (to adjust the CCD 5 output level)

<Model A105>

Symbol	Function
VR101	Do Not Touch It, Factory Use (to adjust the CCD 1 output level)
VR102	Do Not Touch It, Factory Use (to adjust the CCD 2 output level)
VR103	Do Not Touch It, Factory Use (to adjust the CCD 3 output level)
VR104	Do Not Touch It, Factory Use (to adjust the CCD 4 output level)
VR105	Do Not Touch It, Factory Use (to adjust the CCD 5 output level)

5.2.2 Video Processing Board

<Model A092>

Symbol	Function
VR502	To adjust the Vref+ (See the video processing board section)
VR501 VR503 ~ 507 VR10A, VR10B VR11A, VR11B VR20A, VR20B VR30A, VR30B VR31A, VR31B VR40A, VR40B VR41A, VR41B VR50A, VR50B VR51A, VR51B	Do Not Touch It, Factory Use

<Model A105>

Symbol	Function
VR504	When replacing the video processing board, set the voltage between TP506 and TP533 to 3.2 ± 0.1 V. See the CCD drive and CCD pre-amp board replacement.
VR501 ~ 503 VR505 ~ 516	Do Not Touch It, Factory Use

5.2.3 LD Control Board

<Model A092>

Symbol	Function
VR600	To adjust the voltage between TP600 (Vref Y) and TP602 (GND) to the voltage written on the LD control board cover
VR601	To adjust the voltage between TP604 (Vref C) and TP606 (GND) to the voltage written on the LD control board cover
VR602	To adjust the voltage between TP608 (Vref Bk) and TP610 (GND) to the voltage written on the LD control board cover
VR603	To adjust the voltage between TP612 (Vref M) and TP614 (GND) to the voltage written on the LD control board cover

When the LD control board is replaced, adjust these VRs.

<Model A105>

Symbol	Function
VR1 ~ 8	Factory use. Never touch these volumes.
VR9	To adjust the voltage between TP32 (Vref Y) and TP43 (GND) to the voltage written on the LD control cover
VR10	To adjust the voltage between TP38 (Vref Bk) and TP45 (GND) to the voltage written on the LD control cover
VR11	To adjust the voltage between TP41 (Vref M) and TP46 (GND) to the voltage written on the LD control cover
VR12	To adjust the voltage between TP35 (Vref C) and TP44 (GND) to the voltage written on the LD control cover

5.2.4 LD Unit

<Model A092 & A105>

Symbol	Function
VR101 VR102	Do Not Touch It, Factory Use

5.2.5 Operation Panel Board

<Model A092 & A105>

Symbol	Function
VR1	To adjust the LCD brightness

5.2.6 Power Supply Unit

<Model A092 & A105>

Symbol	Function
VR1 VR2 VR3	Do Not Touch It, Factory Use

5.2.7 Charge Bias Power Pack

<Model A092 & A105>

Symbol	Function
VRM	Do Not Touch It, Factory Use

5.2.8 Development Roller Bias Power Pack

<Model A105>

Symbol	Function
VR201 VRV VRF	Do Not Touch It, Factory Use

5.3 DIGITAL SWITCH

5.3.1 Scanner Control Board

<Model A092 & A105>

Symbol	Function
DGS701	To adjust the side to side registration of scanning (1mm/step)
DGS702	To adjust the side to side registration of scanning (0.0625mm/step)
DGS703	Factory Use (Model A092 only)

5.3.2 Video Processing Board

<Model A105>

Symbol	Function
DG501 DG502	Do Not Touch It, Factory Use (white level adjustment)

5.3.3 System Control Board

<Model A105>

Symbol	Function
DPS103	0 ~ F Default: 0

5.3.4 Drum Exposure Control Board

<Model A092>

Symbol	Function
DGS600: BR16 *	To adjust the printing start position (1mm/step, Bk/M)
DGS601: BR1	To adjust the printing start position (0.0625mm/step, Bk/M)
DGS602: BR/8 *	To adjust the printing start position (0.0078mm/step, Bk/M)
DGS603: AR16 *	To adjust the printing start position (1mm/step, Y/C)
DGS604: AR1	To adjust the printing start position (0.625mm/step, Y/C)
DGS605: AR/8 *	To adjust the printing start position (0.0078mm/step, Y/C)
DGS606: B100	Not used
DGS607: B10	To adjust the horizontal magnification (0.1%/step, Bk/M)
DGS608: B1	To adjust the horizontal magnification (0.01%/step, Bk/M)
DGS609: A100	Not used
DGS610: A10	To adjust the horizontal magnification (0.1%/step, Y/C)
DGS611: A1	To adjust the horizontal magnification (0.01%/step, Y/C)

* For these, 0 to 7 position can be used.

<Model A105>

Symbol	Function
SW1: BR8	To adjust the printing start position (0.5mm/step, Bk/M)
SW2: BR/2	To adjust the printing start position (0.032mm/step, Bk/M)
SW3: AR8	To adjust the printing start position (0.5mm/step, Y/C)
SW4: AR/2	To adjust the printing start position (0.032mm/step, Y/C)
SW5: B100	To adjust the horizontal magnification (1%/step, Bk/M)
SW6: B10	To adjust the horizontal magnification (0.1%/step, Bk/M)
SW7: B1	To adjust the horizontal magnification (0.01%/step, Bk/M)
SW8: A100	To adjust the horizontal magnification (1%/step, Y/C)
SW9: A10	To adjust the horizontal magnification (0.1%/step, Y/C)
SW10: A1	To adjust the horizontal magnification (0.01%/step, Y/C)

5.3.5 LD Control Board

<Model A105>

Symbol	Function
SW1 SW2 SW3 SW4 SW5 SW6 SW7 SW8 SW9 SW10 SW11 SW12 SW13 SW14 SW15 SW16	Do Not Touch It, Factory Use for All SWs

5.3.6 Motor Control Board

Symbol	Function
DGS501 DGS502	Do Not Touch It, Factory Use

5.4 DIP SWITCH

5.4.1 Video Processing Board

<Model A092>

Symbol	Function
SW501-1 SW501-2	Must be ON, Factory Use

5.4.2 Scanner Control Board

<Model A092>

Symbol	Function
DPS701-1 DPS702-2	Must be OFF, Factory Use

<Model A105>

Symbol	Default	Function
DPS701-1 DPS701-2 DPS701-3 DPS701-4	ON	Must be ON, Factory Use
DPS701-5 DPS701-6 DPS701-7 DPS701-8	OFF	Must be OFF, Factory Use
DPS702-1 DPS702-2	OFF	ON: Scanner Free Run ON: Scanner Lamp ON
DPS702-3 DPS702-4 DPS702-5 DPS702-6	OFF	Must be OFF, Factory Use
DPS703-1	OFF	ON: Separate the scanner unit from the control line of the system control
DPS703-2 DPS703-3 DPS703-4	OFF	Must be OFF, Factory Use

Service Tables

5.4.3 System Control Board

<Model A092>

Symbol	Function
DPS101-1 DPS101-2	Must be ON, Factory Use
DPS101-3 DPS101-4	Must be OFF, Factory Use

<Model A105>

<table>
<tr><th>Symbol</th><th>Default</th><th>Function</th></tr>
<tr><td>DPS101-1
DPS101-2
DPS101-3
DPS101-4
DPS101-5
DPS101-6
DPS101-7
DPS101-8</td><td>OFF</td><td>Must be OFF, Factory Use</td></tr>
<tr><td>DPS102-1
DPS102-2
DPS102-3
DPS102-4</td><td>ON</td><td rowspan="2">When resetting the RAM on the system control board, set 1 and 2 to OFF. See the system control board replacement.</td></tr>
<tr><td>DPS102-5
DPS102-6</td><td>OFF</td></tr>
</table>

5.4.4 IPU Memory Board

<Model A105>

Symbol	Function
SW500-1 SW500-2 SW500-3 SW500-4	Must be OFF, Factory Use

5.4.5 LD Control Board

<Model A092>

Symbol	Function
DPS600 DPS601 DPS602 DPS603	Must be OFF, Factory Use

<Model A105>

Symbol	Function
SW17-1 SW17-2 SW17-3 SW17-4 SW17-5 SW17-6	Must be OFF, Factory Use

5.4.6 Sequence Control Board

<Model A092 & A105>

Symbol	Function
SW100	ON: No key counter installed OFF: Key counter installed

5.4.7 Operation Panel Board

<Model A092 & A105>

A4 version		LT version	
Language	DSW 1 2 3 4	Language	DSW 1 2 3 4
Japanese	0 0 0 0	—	–
English	1 0 0 0	English	1 0 0 1
French	0 1 0 0	French	0 1 0 1
German	1 1 0 0	—	–
Italian	0 0 1 0	—	–
Spanish	1 0 1 0	Spanish	1 0 1 1
Swedish	0 1 1 0		
Norwegian	1 1 1 0		
Danish	0 0 0 1		

5.4.8 Motor Control Board

<Model A092 & A105>

Symbol	Function
DPS501-1 DPS501-2 DPS501-3 DPS501-4	Must be ON, Factory Use
DPS501-5	Must be OFF, Factory Use
DPS501-6	Must be ON, Factory Use
DPS502-1 DPS502-2 DPS502-3 DPS502-4 DPS502-5 DPS502-6 DPS502-7 DPS502-8	Must be OFF, Factory Use

5.5 JUMPER SWITCH

5.5.1 Video Processing Board

<Model A092>

Symbol	Function
JP501	5 and 6 are shorted. Factory Use

5.5.2 Scanner Control Board

<Model A092>

Symbol	Function
JP701	Pin is set on 3. Factory Use

<Model A105>

Symbol	Function
JP701	Pin must be set.
JP702	1 and 12 must be shorted.
JP703	1 and 12 must be shorted.
JP704	4 and 9 must be shorted.
JP705	6 and 7 must be shorted.

5.5.3 System Control Board

<Model A105>

Symbol	Function
JP101	No pin is connected

5.5.4 Drum Exposure Control Board

<Model A105>

Symbol	Function
JP1	M,C: For Magenta and Cyan K,Y: For Black and Yellow

5.5.5 LD Control Board

<Model A092 & A105>

Symbol	Function
SW604~659	Do Not Touch It, Factory Use

5.6 FUSE

5.6.1 Power Supply Unit

<Model A092>

Symbol	Function
FUSE	125VAC/15A for 115V machine 250VAC/6.3A for 230V machine

<Model A105>

Symbol	Function
F1	125VAC/15A for 115V machine 250VAC/6.3A for 230V machine
F2,4,6	125VAC/6.3A
F3,8,9,11	125VAC/8A
F5,7	125VAC/5A
F10,14	125VAC/10A
F12	125VAC/8A
F13	125VAC/5A

5.6.2 Motor Control Board

<Model A092 & A105>

Symbol	Function
FUSE 501	2.0A, 125V
FUSE 502	2.0A, 125V
FUSE 503	6.3A, 125V

5.7 TEST POINT

5.7.1 CCD Drive Board

<Model A150>

Symbol	Function
TP101	GND
TP102	+12V
TP104	GND
TP105	+5V
TP106	+12V
TP107	EOS1
TP108	EOS2
TP109	EOS3
TP110	EOS4
TP111	EOS5

5.7.2 CCD Pre-amp Board

<Model A092>

Symbol	Function
TP301 TP321 TP341 TP361 TP381	Factory Use

5.7.3 Video Processing Board

<Model A092>

Symbol	Function
TP10, 11, 20, 21, 30, 31, 40, 41, 50, 51, TP503, 506, 510, 513, 516, 519, 522, 523, 524	Factory Use
TP501	–12V
TP507	+12V
TP514	+5V
TP502, 504, 505, 509, 511, 512, 515, 517, 518, 520, 521, 525	GND

<Model A105>

Symbol	Function
TP502	–12V
TP508	+12V
TP528	+5V
TP507, 511, 513, 518, 520, 523, 525, 531, 533	AGND
TP527	GND
TP501, 503, 504, 505, 509, 510, 512, 514, 515, 516, 517, 519, 521, 522, 524, 526, 529, 530, 532	Factory Use
TP506	White Standard Level Adjust VR506 on this board to 3.2 ± 0.1 V.

5.7.4 Scanner Control Board

<Model A092>

Symbol	Function
TP702, 703, 706, 707, 708, 709, 710, 711	Factory Use
TP704	+5V
TP701, 705	GND

<Model A105>

Symbol	Function
TP702, 707, 723	GND
TP711	+5V
TP701, 703, 704, 705, 706, 708, 709, 710, 712~722	Factory Use

5.7.5 IPU 1

<Model A092 & A105>

Symbol	Function
TP204, 205, 206, 207, 208, 209, 210	Factory Use
TP202	+5V
TP200, 201, 203, 211, 212	GND

5.7.6 IPU–1.5

<Model A092 & A105>

Symbol	Function
TP401 TP402 TP403	5V: VCC1 5V: VCC1 GND

5.7.7 IPU 2

<Model A092>

Symbol	Function
TP300, 301, 306, 307, 308	GND
TP302	+5V

<Model A105>

Symbol	Function
TP301, 302, 304, 305, 306	GND
TP303	+5V

5.7.8 IPU Memory

<Model A092 & A105>

Symbol	Function
TP504, 505, 506, 507, 508, 509, 510, 511, 512, 513, 514, 515, 516, 517	Factory Use
TP502, 518	+5V
TP500, 501, 503, 519, 520	GND

5.7.9 Drum Exposure Control Board

<Model A092>

Symbol	Function
TP600, 601	Factory Use
TP602	GND

<Model A105>

Symbol	Function
TP1, 3, 5, 7	Factory Use
TP2, 4, 6	GND

5.7.10 LD Control Board

<Model A092>

Symbol	Function
TP600	Vref Y, adjust this voltage by using VR600
TP604	Vref C, adjust this voltage by using VR601
TP608	Vref Bk, adjust this voltage by using VR602
TP612	Vref M, adjust this voltage by using VR603
TP601, 603, 605, 607, 609, 611, 613, 615	Factory Use
TP602, 606, 610, 614	GND

<Model A105>

Symbol	Function
TP32	Vref Y, this voltage can be adjusted by VR9
TP35	Vref C, this voltage can be adjusted by VR12
TP38	Vref Bk, this voltage can be adjusted by VR10
TP41	Vref M, this voltage can be adjusted by VR11
TP1~31 TP33, 34 TP36, 37 TP39, 40	Factory Use

5.7.11 LD Unit

<Model A092 & A105>

Symbol	Function
TP102, 103	Factory Use
TP101	GND

5.7.12 System Control Board

<Model A092>

Symbol	Function
TP106, 107, 108, 109, 110, 111	Factory Use
TP104, 105	+5V
TP101, 102, 103, 112, 113, 114	GND

<Model A105>

Symbol	Function
TP101	+5V
TP110, 111, 112, 114	GND
TP102~109, 115~119	Factory Use

5.7.13 Sequence Control Board

<Model A092 & A105>

Symbol	Function
TP100, 101, 103, 106, 107, 108, 109, 110, 111, 114, 115, 116, 117, 118	Factory Use
TP102, 104	+5V
TP112	+24V
TP105, 113, 119	GND

5.7.14 Process Control Board

<Model A092 & A105>

Symbol	Function
TP201, 202, 203, 204, 205, 207, 208, 209, 210, 211, 215, 216	Factory Use
TP212	–12V
TP213	+12V
TP214	+24V
TP219, 220, 221	GND

5.7.15 Motor Control Board

<Model A092 & A105>

Symbol	Function
TP502, 503, 504, 505, 507, 508	Factory Use
TP501, 506	GND

6. LUBRICATION POINT

The locations of the parts to be lubricated at PM are shown in the following figures:

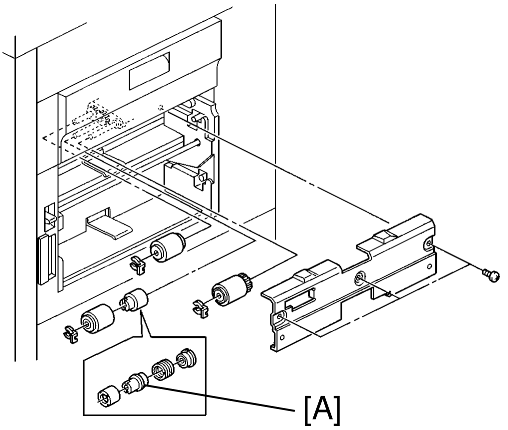
NOTE: Clean each part before lubrication.

6.1 PAPER FEED

Reverse Rollers

Use Mobil Temp. 78.

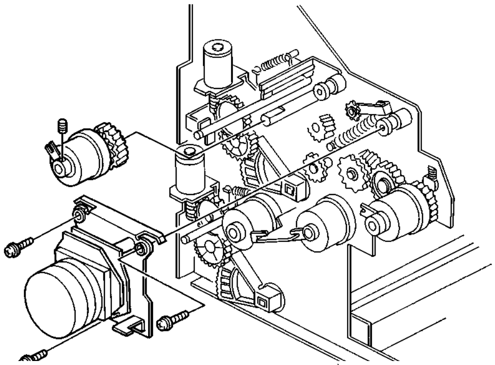
Lubricate the part [A] and the inside of the spring every 60K copies.



Drive Section

Use Mobil Temp.78 and Grease G501.

Lubricate the metal gears with Mobil Temp.78 and the plastic gears with Grease G501 every 60K copies.

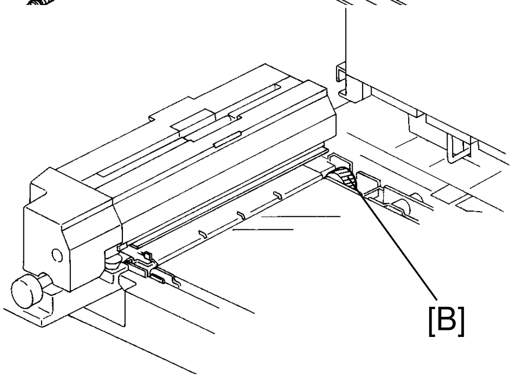


6.2 TRANSFER BELT UNIT

Drive Gear

Use Mobil Temp.78.

Lubricate the drive gear [B] every 60K copies.

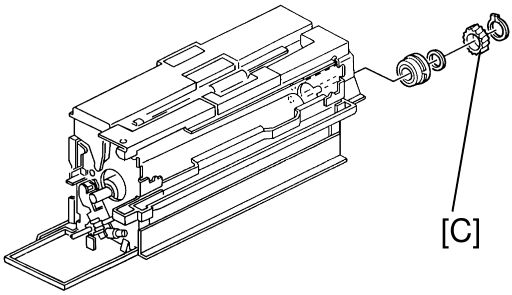


6.3 FUSING UNIT

Drive Gears

Use Mobil Temp.78.

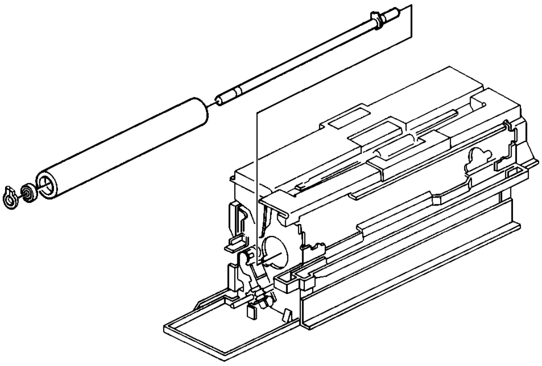
Lubricate the drive gear [C] every 30K copies (40K copies for model A105).



Pressure Roller Bearing

Use NOK Grease (P/N A0289300).

Lubricate the inner side of the pressure roller bearings whenever the new bearings are installed.

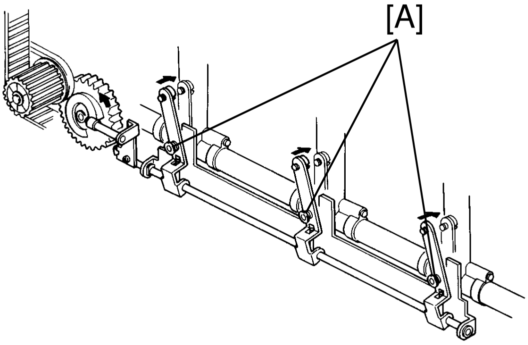


6.4 OTHERS

Pipe Knock Mechanism

Use Mobil Temp.78.

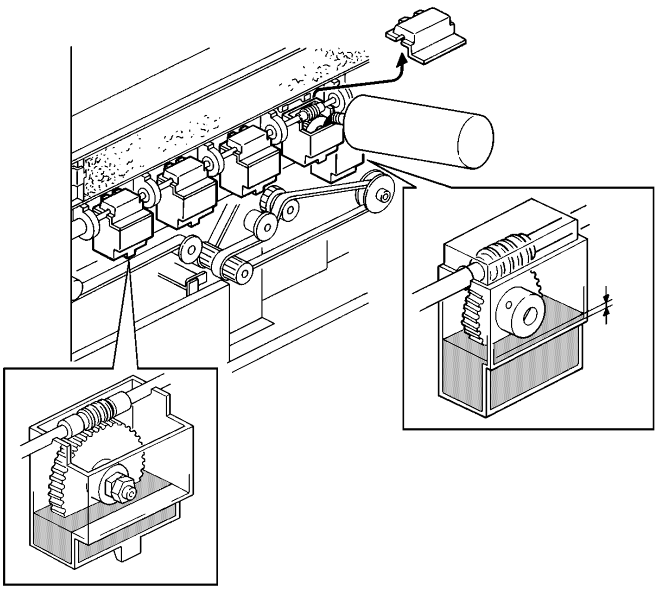
Lubricate the part [A] every 30K copies (40K copies for model A105).



Drum Drive Gears and Transfer Belt Drive Gears

Use Motor oil 20W-40.

Add the oil to the pans every 120K copies.

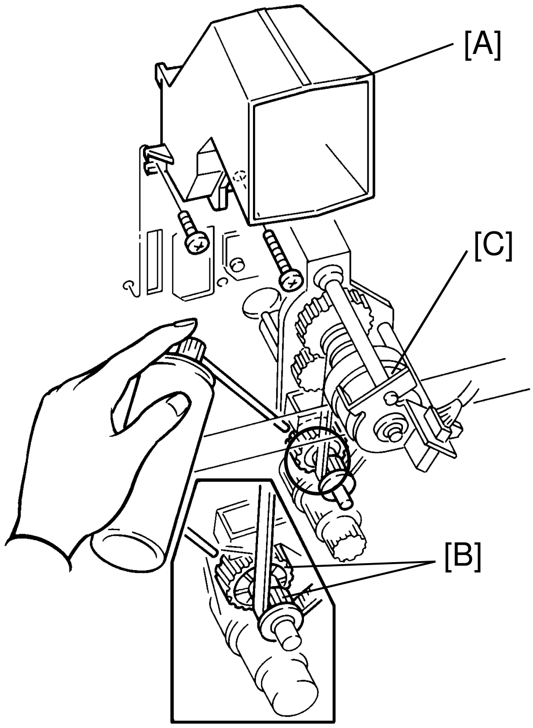


Toner Supply Drive Gears

Use Tri-Flow (#52159539).

Remove the charge fan duct [A] (2 screws).
Lubricate the gears [B] every 60K copies.

NOTE:
- Do not spray grease on the toner supply clutch [C] and be careful that grease does not drip on to the PCB.
- It is important to perform this lubrication, if not image "banding" can occur.



7. SERVICE REMARKS

7.1 GENERAL CAUTION

Do not turn off the main switch intentionally while any of the electrical component is active.
Doing so might cause damage to the units such as transfer belt, transfer roller, development, etc. when they are pulled in or out from the copier.

7.2 DRUM

The organic photoconductor (OPC) drum is comparatively more sensitive to light and ammonia gas than a selenium drum. Follow the cautions below when handling an OPC 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 keeping the drum unit, or the drum itself, out of the copier. Doing so avoids exposing it to bright light or direct sunlight. This will protect the drum from light fatigue.
9. Dispose of used drums according to local regulations.
10. When installing a **new** drums the following must be performed.
    a) Remove the protective sheet after securing the new drum to the machine.
    b) Apply setting powder to the entire surface.
    c) Perform Vmin check and TD check.
11. When reassembling the drum(s) to the machine, set the drum to the same position as it was previously.

7.3 TRANSFER BELT UNIT

1. Take care not to scratch the transfer belt as the surface is easily damaged.
2. Before installing the new transfer belt, clean all the rollers and shafts with alcohol to prevent belt slipping.
3. When reinstalling, manually turn the rollers and making sure that the transfer belt's rubber linings are not caught up in the rollers.

7.4 SCANNER UNIT

1. Replace the CCD drive/CCD pre-amp/video processing board at the same time only for model A092.
2. Clean the exposure glass with alcohol or glass cleaner to reduce the amount of static electricity on the glass surface.
3. Use a cotton pad with water or a blower brush to clean the optical fiber array.
4. Do not bend the white reference plate.
5. Do not turn any of the CCD positioning screws. Doing so will throw out the position of the CCD and the RGB signal's grey balance.

7.5 LASER UNIT

1. Do not loosen the screws securing the LD drive board to the laser diode casing. Doing so would throw the LD unit out of adjustment.
2. The polygon mirror and Fθ lenses are very sensitive to dust. Do not open the optical housing unit except when required.
3. Do not touch the polygon mirror's reflecting surface with bare hands.

7.6 CHARGE CORONA

1. Clean the charge corona wire with a dry cloth. Do not use sandpaper or a solvent.
2. Clean the charge corona casing with wet cotton and dry cloth.
3. Clean the end blocks with a blower brush first to remove toner and paper dust. Then clean it with dry cloth if any toner still remains on it.
4. Do not touch the corona wires with oily bare hands. oil stains may cause uneven image density on copies.

5. Make sure that there is no foreign material (iron filings, etc.) on the casing.
6. When installing new corona wires, do not bend or scratch the wire surface to avoid any uneven charge. Also be sure that the corona wires are correctly positioned in the grooves of the end blocks.
7. Clean the charge grid plate with a blower brush, water, then with a dry cloth. When doing so, be careful not to damage the grids by letting them catch fibers.
8. Do not touch the charge grid plate with oily bare hands. Also, do not bend the charge grid plate or make any dent on it. Doing so may cause uneven charge.

7.7 DEVELOPMENT

1. Be careful not to nick or scratch the development rollers.
2. Place the development units on a sheet of paper after removing it from the copier.
3. Never disassemble the development roller assembly. The position of the doctor plate is set with a special tool and instrument at factory to ensure the proper gap between the doctor blade and the development roller.
4. Clean the drive gears after removing used developer.
5. Dispose of used developer according to local regulations.
6. Never load different types of developer and toner into the development unit. Doing so will cause poor copy image and toner scattering.
7. After collecting the developer, make sure to shift back the magnet release lever to ensure proper developer flow in the unit.
8. To maintain good color copy quality, the developer replacement should be performed for all colors at the same time so that all the developers have similar characteristics.
9. When installing new developer, perform the process control adjustment carefully.

7.8 DRUM CLEANING

1. When installing a new cleaning blade, apply setting powder or toner to the entire surface of the drum.
2. Do not touch the cleaning brush with oily bare hands.

7.9 TRANSFER BELT CLEANING

1. Do not touch the lubricant brush with oily bare hands.
2. When installing a new cleaning blade, apply setting powder or toner along the edge of the blade.

7.10 FUSING UNIT

1. The fusing drive gears should be lubricated with Mobil Temp. 78 every 2 PM.
2. After installing the fusing thermistor, make sure that it's in contact with the hot roller and movable.
3. Be careful not to damage the edges of the hot roller strippers or their tension springs.
4. Do not touch the fusing lamps and rollers with bare hands.
5. Make sure that the fusing lamps are positioned correctly and that they do not touch the inner surface of the rollers.
6. After replacing the oil blade and oil supply pad, prime the entire length of the blade with silicon oil.
7. When Mimizu pattern appears on a copy at installation or a service call, perform the fusing unit mechanical adjustment according to the procedure in section 5.

7.11 PAPER FEED

1. Do not touch the surface of the pick-up, feed, and separation rollers.

7.12 FILTER

1. All the dust filters and ozone filters should be replaced according to the PM table.

7.13 USED TONER

1. The used toner tank should be emptied at every PM cycle, but we recommend confirming the amount of used toner in the tank at every EM.
2. When reinstalling the used toner tank, make sure that the toner overflow sensor connector is inserted firmly.

3. Dispose of used toner according to local regulations. Never throw into an open flame, for toner dust may ignite when exposed to open flame.

SECTION 5

REPLACEMENT
AND ADJUSTMENT

1. PROCESS CONTROL ADJUSTMENT SUMMARY

There are 2 types of process control adjustment.

According to the type of the machine model, the adjustment steps are different. Confirm the machine model and follow the appropriate procedure (see the table below).

Model	ROM ver. Process Control ROM Sequence Control ROM	Developer Type				Type of Process Control Adjustment
		Bk	M	Y	C	
A092	A0925509D Ver.5.24 or later A0925507E Ver.1.17 or later	B	D	B	B	2. PROCESS CONTROL ADJUSTMENT (A092)
A105	— —	D	D	D	D	3. PROCESS CONTROL ADJUSTMENT (A105)

Replacement Adjustment

2. PROCESS CONTROL ADJUSTMENT (A092)

2.1 PROCESS CONTROL ADJUSTMENT CHART FOR MODEL A092

For this version of the process control adjustment procedure, type D of the magenta developer and EPROMs **A0925507/ver 1.17 or A0925507F (or later) (Sequence control) and A0925509/ver 5.24 or A0925509E, or later (Process control)** should be installed on the machine.

The following table indicates the tasks required, and their order, when you replace or clean the OPC drums, developers, development units, ID sensors, or when you install a new machine.

NOTE:
1. This procedure should be performed only once, when D type magenta developer is installed for the first time. See the table on the next page.
2. If the drum for magenta has been used for 10K copies or more, replace it and perform the required maintenance (OPC drum replacement). This is necessary only once, when replacing EPROMs. See the table on the next page.
3. Whenever OPC drums are replaced, replace the relevant color developers with the drums as a set.
4. Perform the necessary tasks from top to bottom, in order.
5. When two or more maintenance tasks are done at one time, combine the necessary jobs for those tasks. Write the color symbols of each relevant color in the brackets (   ).
6. Vmin check for all colors includes that for 1 to 3 colors. If both of these cases are marked, do only the Vmin check for all colors.
7. TD check for all colors includes that for 1 to 3 colors or manual TD check. If both of these cases are marked, do only the TD check for all colors.

●: For all four colors (4C) ▲: only for the relevant colors (1 to 3C) —: Don't do it

Maintenance items / Necessary tasks, in order	OPC drum replacement			Developer replacement			Development unit replacement		ID sensor			New machine installation
	4 drums	1 to 3 drum(s)		4 colors	1 to 3 color(s)		Including Magenta	Excluding Magenta	Replaced		Cleaned	
		Including Magenta	Excluding Magenta		Including Magenta	Excluding Magenta			Including Magenta	Excluding Magenta		
1 EPROMS replacement	NOTE1	NOTE1	—	NOTE1 NOTE2	NOTE1 NOTE2	—	NOTE1 NOTE2	—	NOTE1 NOTE2	—	—	NOTE1
2 Developer replacement (including dev. roller cleaning)	●	▲( )	▲( )	●	▲( )	▲( )	▲( )	▲( )	▲( )	▲( )	—	●
3 ID sensor cleaning	●	▲( )	▲( )	●	▲( )	▲( )	▲( )	▲( )	▲( )	▲( )	▲( )	●
4 Drum replacement	●	▲( )	▲( )	—	—	—	—	—	—	—	—	—
5 Vmin check - All colors	●	—	—	—	—	—	—	—	—	—	—	●
Vmin check - 1 to 3 colors Including magenta	—	▲( )	—	—	—	—	▲( )	—	▲( )	—	—	—
Vmin check - 1 to 3 colors Excluding magenta	—	—	▲( )	—	—	—	—	▲( )	—	▲( )	—	—
6 TD check - All colors	●	—	—	●	—	—	—	—	—	—	—	●
TD check - 1 to 3 colors Including magenta	—	▲( )	—	—	▲( )	—	▲( )	—	▲( )	—	—	—
TD check - 1 to 3 colors Excluding magenta	—	—	▲( )	—	—	▲( )	—	▲( )	—	▲( )	—	—
TD check - Manual	—	—	—	—	—	—	—	—	—	—	▲( )	—

2.2 EPROMs REPLACEMENT PROCEDURE FOR MODEL A092

1. Turn on the main switch and make the machine in door open condition.
2. Read the following data.

		Black	Magenta	Yellow	Cyan
1. Pointer	SPD110 ~ 113				
2. DIF Preset	SPD120 ~ 123				
3. LD Power	SPD315 ~ 318				
4. V_{K0} preset	SPD235 ~ 238				
5. Vmin Detected	SPD485 ~ 488				
6. TD	SPD490 ~ 493				
7. ND	SPD495 ~ 498				
8. CD	SPD500 ~ 503				
9. TGRD Target	SPD515 ~ 518				

3. Turn off the main switch and replace the ROMs (Sequence Control ROM, Process Control ROM).

   New ROMs
   Sequence Control ROM (512K): A0925507 ver. 1.17 or A0925507F or later
   Process Control ROM (256K): A0925509 ver. 5.24 or A0925509E or later

4. Turn on the main switch and confirm that the process control data is as in the table above.

   If the data does not match, perform the following procedure:
   1) Reset the RAM of the process control board. (SPD 29 to H)
   2) Set the data to match the table above.

5. Lower the magenta TGRD target data (SPD516) by 20 and change the data of SPD516 in the last process control data check sheet to the new one.

2.3 Vmin CHECK (All Colors) FOR MODEL A092

NOTE: The Vmin check procedure should be performed, when the all drums are replaced.

1. Replace all developers, clean all development rollers and ID sensors. Make sure that the magenta developer is type D.

2. Set SPD as follows:
   - SPD#036 to H (process control all on)
   - SPD#028 to H (process control reset)
   - SPD#190 to H (SC#840 ~ #843 detection off mode)
   - SPD#611 ~ #614 to 20 (ID Sensor LED Data)
   - SPD#315, #317, #318 from 9 to 7 (LD power control data) and #316 to 10
   - Turn off and on the main switch.
   - Make 5 copies one by one. (C4 chart A3/11" x 17" size)

   NOTE: If it is a solid color copy, check and set the charge corona unit for that color in position.

3. Key the proper data in SPD#106. (season select)
   - High humidity (more than 75% RH): 0
   - Normal humidity (35% to 75% RH): 1
   - Low humidity (less than 35% RH): 2

4. Set SPD#108 to H. (pointer reset - Vmin), and confirm if the pointer data for each color is reset properly.

   NOTE: This data is determined by the data input in SPD#106 (season select).

SPD#106 (Season select)	0	1	2
SPD#110 (Pointer Data - Bk)	10	15	25
SPD#111 (Pointer Data - M)	5	5	5
SPD#112 (Pointer Data - Y)	10	15	25
SPD#113 (Pointer Data - C)	10	15	25

   NOTE: If the reset data is not 5, 10, 15, or 25 based upon SPD#106 data, Pointer Reset by SPD#108 has not been properly done. Repeat steps 4.

5. Confirm if the TD data for each color is being kept as the TD preset data (the data are at the last adjustment).

   NOTE: The TD preset data are written on the process control data check sheet kept in the developer catch pan.

   - SPD#490 (TD preset data Bk)
   - SPD#491 (TD preset data M)
   - SPD#492 (TD preset data Y)
   - SPD#493 (TD preset data C)

6. Perform the Vmin check (SPD#480).
   - Key 15 in the SPD#480.
   - Press the Enter key while pressing the Start key to start Vmin check operation.

   * The setting 15 means the Vmin check is performed for all four colors at the same time.
   (15 = 1 (Bk) + 2 (M) + 4 (Y) + 8 (C))

7. After the copier stops, press the Clear key on the SP panel once.

8. Read the Vmin evaluation result and its detected data for each color and write them.
   - Set SPD#078 to H

   NOTE: When the SPD#078 is set to H, the Vmin evaluation result and its data is displayed on the panel in order as shown below:

   (Vmin Evaluation Result)
   SPD#481 (Bk), #482 (M), #483 (Y), #484 (C)

   (Vmin Detected Data)
   SPD#485 (Bk), #486 (M), #487 (Y), #488 (C)

   How to read the data.

   Ex. SPD#481 (Bk)
   "F004" - "F048" - "F481" - "Fxxx"
   (This XXX is the data.)

Vmin Evaluation Result				Vmin Detected Data			
#481 (Bk)	#482 (M)	#483 (Y)	#484 (C)	#485 (Bk)	#486 (M)	#487 (Y)	#488 (C)

Normal Vmin Detected Data: Bk; 0 ~ 30
Color; 110 ~ 200

9. For each color, perform the proper action below depending upon the data for the Vmin evaluation result.

Evaluation Result	Action Required
13, 19, 22	Check the detected data is in normal range. Bk: 0 ~ 30 M, Y, and C: 110 ~ 200 If the data for all four colors is normal, go to step 10. If some of them is more than 40 for black or 210 for C, M, or Y, do the same action as those for Result "7 or 16". (Adding toner and Vmin check again.)
25	Vmin check again only for relevant color(s). See Note 1.
3, 6, 11, 12, 14, 15, 21, 23, 24, 26	1. Vk compensation only for relevant color(s). 1) Set relevant color data in SPD#225. See Note 2. 2) Press the Enter key while pressing the Start key to start. 2. Vmin check again only for relevant color(s). See Note 1.
7, 16	1. Adding relevant color toner into the developer 1) Select an appropriate SPT (Test Mode) number of "Forced toner supply". SPT#111: Bk, #112: M, #113: Y, #114: C 2) While pressing the Start key, press the Plus key to start. 3) If the development unit is new, operate the relevant toner supply motor just after step 2) to feed toner from the main tank to the development toner tank. • SPT#53: Bk, #54: M, #55: Y, #56: C • See "Multi-components operation" of SP Test Mode. (Page 4-24) 4) After 30 seconds, press the Clear key twice to stop. 2. Vmin check again only for relevant color(s). See Note 1.

Evaluation Result	Action Required
1, 10	1. Consuming excess toner. 1) Set relevant SPD modes to H to stop toner supply. SPD#345: Bk, #346: M, #347: Y, #348: C 2) Set the 8 gradation step pattern mode. (SP#21-2) 3) Set relevant color data in SPD50. See Note 2. 4) Make 4 copies (A3/11" x 17" size). 5) Turn off and on the main switch to clear modes selected in step 1) to 3). 2. Vmin check again only for relevant color(s). See Note 1.
4, 5, 8, 17	1. Adding relevant color toner into the developer. 1) Select an appropriate SPT (Test Mode) number of "Forced toner supply". SPT#111: Bk, #112: M, #113: Y, #114: C 2) While pressing the Start key, press the Plus key to start. 3) If the development unit is new, operate the relevant toner supply motor just after step 2) to feed toner from the main tank to the development toner tank. • SPT#53: Bk, #54: M, #55: Y, #56: C • See "Multi-components operation" of SP Test Mode. (Page 4-24) 4) After 30 seconds, press the Clear key twice to stop. 2. Vk compensation only for relevant colors. 1) Set relevant color data in SPD#225. See Note 2. 2) Press the Enter key while pressing the Start key to start. 3. Vmin check again only for relevant color(s). See Note 1.

Evaluation Result	Action Required
0, 2, 9, 18, 20	1. Consuming excess toner. 1) Set relevant SPD modes to H to stop toner supply. SPD#345: Bk, #346: M, #347: Y, #348: C 2) Set the 8 gradation step pattern mode. (SP#21-2) 3) Set relevant color data in SPD 50. See Note 2. 4) Make 4 copies (A3/11" x 17" size). 5) Turn off and on the main switch to clear modes selected in step 1) to 3). 2. Vk compensation only for relevant colors. 1) Set relevant color data in SPD#225. See Note 2. 2) Press the Enter key while pressing the Start key to start. 3. Vmin check again only for relevant color(s). See Note 1.

Note 1: If this evaluation result is applied to 1, 2, or 3 colors, Vmin check should be only for those colors.

1) Enter relevant color data in SPD#480. See Note 2.
2) Press the Enter key while pressing the Start key to operate.
3) Go back to Step 7.
4) Repeat the above procedure until the Vmin evaluation result becomes 13, 19, or 22. If these numbers do not appear even repeating 4 times, check if the ID sensor, the drum, and the developer have something wrong.

Note 2: Relevant color data for SPD#50, SPD#225, and SPD#480

1: Bk	4: Y	7: Bk+M+Y	10: M+C	13: Bk+Y+C
2: M	5: Bk+Y	8: C	11: Bk+M+C	14: M+Y+C
3: Bk+M	6: M+Y	9: Bk+C	12: Y+C	15: Bk+M+Y+C

10. Finish the Vmin check.
    Set SPD#079 to H. (Vmin adjustment mode reset – batch processing)

11. Set SPD#190 to L. (SC#840 ~ #843 detection)

12. Exit from the SPD mode.

13. Perform TD Check (All Colors).

2.4 Vmin CHECK (1 to 3 Colors) (Excluding Magenta) FOR MODEL A092

CAUTION: Only change the data and perform the maintenance of the relevant colors.

NOTE: The Vmin check (1 to 3 colors) procedure should be performed,

1. when the drum(s) (1 to 3 colors) are replaced.
2. when the ID sensor(s) (1 to 3 colors) are replaced.
3. when the development unit(s) (1 to 3 colors) are replaced.

Following steps, only perform the maintenance for the relevant colors.

1. When the relevant drums, the development units or the ID sensors are replaced, clean the relevant development rollers and ID sensors, and replace the relevant developer.

2. Set SPD as follows:
   - SPD#315, #317, #318 from 9 to 7 (LD power control data), **if the drum(s)** are replaced.
     (SPD#315: Bk, #317: Y, #318: C).
     Only change the data for relevant colors.
   - When the development unit or the ID sensor is replaced, install a new developer. If this developer is used for the later half of drum life (15k to 30k copies for the drum in use), set SPD#315, #317, #318 from 7 to 9 only for relevant color.
   - SPD#190 to H (SC#840, #842, #843 off mode)
   - SPD#611 ~ #614 to 20 (ID Sensor LED Data)
     Only change the data for the relevant colors.
     (SPD#611: Bk, #613: Y, #614: C).
   - SPD#115, #117, #118 (Pointer lower limit data monitor/change) and SPD#110, #112, #113 (Pointer data monitor/change) manual reset to the data in the table below only for relevant colors, referring to SPD#106 data (Season selection).

SPD#106 (Season select)	0	1	2
SPD#115 (Pointer Limit: Bk) SPD#117 (Pointer Limit: Y) SPD#118 (Pointer Limit: C)	5	10	15
SPD#110 (Pointer: Bk) SPD#112 (Pointer: Y) SPD#113 (Pointer: C)	10	15	25

   - Turn off and on the main switch.

3. Make 5 copies one by one of the C-4 chart (A3/11" x 17" size).

   NOTE: If it is a solid copy, set the relevant charge corona unit in position.

4. Confirm if the TD data for each color is being kept as the TD preset data (the data are at the last adjustment).

   NOTE: The TD preset data are written on the process control data check sheet kept in the developer catch pan.

   - SPD#490 (TD preset data Bk)
   - SPD#492 (TD preset data Y)
   - SPD#493 (TD preset data C)

5. Perform the relevant Vmin check (SPD#480). Make sure of which data should be entered. See note below.
   - Key an appropriate data in the SPD#480, referring to the following notes:
   - Press the Enter key while pressing the Start key to start.

   NOTE: • Select relevant colors for Vmin check by changing SP480 data from "15" to the other data (1 to 14).

1: Bk	4: Y	5: Bk+Y	8: C
9: Bk+C	12: Y+C	13: Bk+Y+C	

   (example)
   When the yellow drum and the black drum are replaced at the same time, key 5 (= 4(Y) + 1(Bk)) in SPD#480.

   • If you set 15 for SPD#480 and have started it by mistake, perform TD check (Manual) for all colors.

6. After the copier stops, press the Clear key on the SP panel once.

7. Read the only the relevant Vmin evaluation result and its detected data for each color and write them.
   - Set SPD#078 to H

   NOTE: When the SPD#078 is set to H, the Vmin evaluation result and its data is displayed on the panel in order as shown below:

   (Vmin Evaluation Result)
   SPD#481 (Bk), #482 (M), #483 (Y), #484 (C)

(Vmin Detected Data)
SPD#485 (Bk), #486 (M), #487 (Y), #488 (C)

Ex. SPD#481 (Bk)
"F004" - "F048" - "F481" - "Fxxx"
(This XXX is the data.)

Vmin Evaluation Result				Vmin Detected Data			
#481 (Bk)	#482 (M)	#483 (Y)	#484 (C)	#485 (Bk)	#486 (M)	#487 (Y)	#488 (C)

NOTE: Even if the Evaluation Result is NG for other colors, you do not need to follow the table in page 5-7, 5-8, and 5-9.

8. Only for relevant colors, perform the proper action depending upon the data for the Vmin evaluation result. See the table on page 5-7, 5-8, and 5-9.
9. Finish the Vmin check.
   Set SPD#079 to H. (Vmin adjustment mode reset – batch processing)
10. Set SPD#190 to L. (SC#840 ~ #843 detection)
11. Exit from the SPD mode.
12. Perform the TD check (1 to 3 colors).

2.5 Vmin CHECK (Including Magenta, Developer Type D) FOR MODEL A092

CAUTION: Only change the data and perform the maintenance of the relevant colors.

NOTE: The Vmin check (1 to 3 colors) procedure should be performed,

1. when the drum(s) (1 to 3 colors) are replaced.
2. when the ID sensor(s) (1 to 3 colors) are replaced.
3. when the development unit(s) (1 to 3 colors) are replaced.

Following steps, only perform the maintenance for the relevant colors.

1. When the relevant drums, the development units or the ID sensors are replaced, clean the relevant development rollers and ID sensors, and replace the relevant developer.

2. Set SPD as follows:
   - SPD#315, #317, #318 from 9 to 7 (LD power control data), **if the drum(s)** are replaced.
     (SPD#315: Bk, #316: M, #317: Y, #318: C).
     SPD#316 to 10.
     Only change the data for relevant colors.
   - When the development unit or the ID sensor is replaced, install a new developer. If this developer is used for the later half of drum life (15k to 30k copies for the drum in use), set SPD#315, #317, #318 from 7 to 9 only for relevant color, and SPD#316 to 12.
   - SPD#190 to H (SC#840 ~ #843 off mode)
   - SPD#611 ~ #614 to 20 (ID Sensor LED Data)
     Only change the data for the relevant colors.
     (SPD#611: Bk, #612: M, #613: Y, #614: C).
   - SPD#115 ~ #118 (Pointer lower limit data monitor/change) and SPD#110 ~ #113 (Pointer data monitor/change) manual reset to the data in the table below only for relevant colors, referring to SPD#106 data (Season selection).

SPD#106 (Season select)	0	1	2
SPD#115 (Pointer Limit: Bk)	5	10	15
SPD#116 (Pointer Limit: M)	5	5	5
SPD#117 (Pointer Limit: Y)	5	10	15
SPD#118 (Pointer Limit: C)	5	10	15
SPD#110 (Pointer: Bk)	10	15	25
SPD#111 (Pointer: M)	5	5	5
SPD#112 (Pointer: Y)	10	15	25
SPD#113 (Pointer: C)	10	15	25

   - Turn off and on the main switch.

3. Make 5 copies one by one of the C-4 chart (A3/11" x 17" size).

   NOTE: If it is a solid copy, set the relevant charge corona unit in position.

4. Confirm if the TD data for each color is being kept as the TD preset data (the data are at the last adjustment).

   NOTE: The TD preset data are written on the process control data check sheet kept in the developer catch pan.

   - SPD#490 (TD preset data Bk)
   - SPD#491 (TD preset data M)
   - SPD#492 (TD preset data Y)
   - SPD#493 (TD preset data C)

5. Perform the relevant Vmin check (SPD#480). Make sure of which data should be entered. See note below.
   - Key an appropriate data in the SPD#480, referring to the following notes:
   - Press the Enter key while pressing the Start key to start.

   NOTE: • Select relevant colors for Vmin check by changing SP480 data from "15" to the other data (1 to 14).

2: M	3: Bk+M	6: M+Y	7: Bk+M+Y
10: M+C	11: Bk+M+C	14: M+Y+C	

   (example)
   When the yellow drum and the magenta drum are replaced at the same time, key 6 (= 4(Y) + 2(M)) in SPD#480.

   • If you set 15 for SPD#480 and have started it by mistake, perform TD check (Manual) for all colors.

6. After the copier stops, press the Clear key on the SP panel once.

7. Read the only the relevant Vmin evaluation result and its detected data for each color and write them.
   - Set SPD#078 to H

   NOTE: When the SPD#078 is set to H, the Vmin evaluation result and its data is displayed on the panel in order as shown below:

   (Vmin Evaluation Result)
   SPD#481 (Bk), #482 (M), #483 (Y), #484 (C)

(Vmin Detected Data)
SPD#485 (Bk), #486 (M), #487 (Y), #488 (C)

Ex. SPD#481 (Bk)
"F004" - "F048" - "F481" - "Fxxx"
(This XXX is the data.)

Vmin Evaluation Result				Vmin Detected Data			
#481 (Bk)	#482 (M)	#483 (Y)	#484 (C)	#485 (Bk)	#486 (M)	#487 (Y)	#488 (C)

NOTE: Even if the Evaluation Result is NG for other colors, you do not need to follow the table in page 5-39, 5-40, and 5-41.

8. Only for relevant colors, perform the proper action depending upon the data for the Vmin evaluation result. See the table on page 5-39, 5-40, and 5-41.
9. Finish the Vmin check.
   Set SPD#079 to H. (Vmin adjustment mode reset – batch processing)
10. Set SPD#190 to L. (SC#840 ~ #843 detection)
11. Exit from the SPD mode.
12. Perform the TD check (1 to 3 colors).

2.6 TD (Toner Density) CHECK (All Colors) FOR MODEL A092

NOTE: The TD check (All colors) procedure should be performed,

1. when the all 4 developers are replaced.
2. when Vmin (All colors) is performed.
3. when a new machine is installed.

1. Confirm that all four color developers have been replaced and that the ID sensors have been cleaned.

2. Set the SPD as follows:
   - SPD#036 to H (process control all on)
   - SPD#028 to H (process control reset)

3. For PMs when the drum is **not** replaced (15k, 45k, 75k .....), perform the following procedure:
   - Set SPD#315, #317, #318 from 7 to 9 (LD power control), and #316 to 12.
   - Turn the main switch off and on to save the new LD power control settings.

CAUTION: At PMs when the drum is replaced, SPD#315, #317, #318 are changed from 9 to 7 at the Vmin check procedure. Therefore, do not return it to 9. SPD#316 is changed to 10 at the Vmin Check procedure. Therefore do not return it to 12.

4. Key the proper data in the SPD#106. (season select)
   - High humidity (more than 75%RH): 0
   - Normal humidity (35% to 75%RH): 1
   - Low humidity (less than 35%RH): 2

5. Set the SPD#107 to H (pointer reset - TD) and confirm if the pointer data for each color is set properly.

   NOTE: This data is determined by the data input in SPD#106 (season select).

SPD#106 (Season select)	0	1	2
SPD#110 (Pointer Data - Bk)	5	10	20
SPD#111 (Pointer Data - M)	10	20	25
SPD#112 (Pointer Data - Y)	5	10	20
SPD#113 (Pointer Data - C)	5	10	20

6. Confirm if the pointer limit data for each color is set properly.

   NOTE: This data is determined by the data input in SPD#106 (season select).

SPD#106 (Season select)	0	1	2
SPD#115 (Pointer Limit - Bk)	0	5	10
SPD#116 (Pointer Limit - M)	0	10	10
SPD#117 (Pointer Limit - Y)	0	5	10
SPD#118 (Pointer Limit - C)	0	5	10

7. Set SPD#101 to H (pointer control disable).

8. Set SPD#100 to H (drum potential control).

9. Take the latest process control data check sheet provided in the developer catch pan. Confirm the following:
   (TD: preset data)
   Confirm if the TD preset data for each color on the process control check sheet (line 13) is identical to the data displayed on the SP panel.

   SPD#490 (TD preset data Bk)
   SPD#491 (TD preset data M)
   SPD#492 (TD preset data Y)
   SPD#493 (TD preset data C)

   NOTE: If there are any discrepancies between both data, correct the setting to the data on the latest process control data check sheet.

Only at machine installation:

<TD (preset data) & ND (K_0)>

- Confirm that all ND (K_0) settings (line 14) are 10 or less from the process control data check sheet. Do not confirm them from the SP panel, the data on the SP panel have been reset by SPD#28 (Process Control All Reset) and the data for SPD#495 ~ #498 are "8".
- If the ND (K_0) setting is over 10, increase the appropriate TD setting (SPD#490 to #493) by ΔTD. Refer to the table below for the required ΔTD.

ND (K_0)	11	12, 13	14, 15	16, 17	18, 19	20, 21	22, 23
ΔTD	1	2	3	4	5	6	7

CAUTION: The TD setting can be between 0 and 30. If the corrected setting is outside this range, do not change the TD setting. Add the ΔTD value to the ND default value (8). (SPD#495 ~ #498)

10.
- Set SPD#190 to H (SC#840 ~ #843 detection off mode)
- Set SPD#611 ~ #614 to 20 (ID Sensor LED Data)
- Confirm that the SPD#351 is "50". (M, V_{HB}–V_B data). If not, set it to "50".
- Set SPD#453 to H (CD fixed)
- Make 5 copies one by one from C4 chart in A3/11" x 17" size.

11. Set SPD#225 to 015. (Vk compensation all color)
- Press the Enter key while pressing the Start key to start.

The machine starts idling for Vk compensation for a while and then stops automatically.

11-1 Perform the free run.

- Set A4/8 1/2" x 11" sideways paper in the upper cassette.
- Select the upper cassette.
- Put the C-4 test chart face down on the exposure glass.
- Set SP1 for the free run mode.
- Press the clear modes key only once.

NOTE: Never press the clear modes key twice or more because the free run mode would be canceled.

- Set SPD#10 to H.
- Select magenta for the Color Background mode.
- Press the start key.

NOTE: If SC871 (Vsp Detection Error - M) is displayed during the free run, turn the main switch off and on, and continue from step 11-1.

11-2 Press the clear modes key 3 times to clear the free run mode.

11-3 Set A3/11" x 17" paper in the lower cassette and make a 15 mm color patch copy (LD 7th power).

- Set SPD#082 to H.
- Make one A3/11" x 17" copy of the C-4 test chart.

11-4 Change the TD parameter for Bk, Y, and C.

- If the Color patch density of Bk, Y, or C is too dark, add 2 to the TD value.
- If the color patch density of Bk, Y, or C is too light, substract 2 from the TD value.
- The magenta color patch density, does not matter at all.

11-5 Repeat step 11-1 through 11-4 three more times. (total 4 times)

11-6 Set SPD#453 to L (CD fixed mode reset).

11-7 Change the ND parameter for magenta.

- If the present data of SPD#496 (ND, Magenta) is 11 or more, substract 2 from that data.
- If the present data of SPD#496 is 9 or 10, set SPD496 to 8.
- If the present data of SPD#496 is lower than 8, do not change the data of SPD#496.

12. Prepare the TD & TGRD data sheet.
    - Copy the TGRD target data for each color from line 16 (SPD#515 ~ #518) on the process control data check sheet to the TD & TGRD data sheet. (✻) (The process control data check sheet is provided in the developer catch pan.)
    - For each color, calculate the TGRD column, as in the example.

    (Example)

TD & TGRD DATA SHEET

[BLACK]

✻ TGRD target

ΔTD	TGRD Range	±Range	1	2	3	4	5	6	7	8	9	10
+1		+26 ~ +35										
OK		+21 ~ +25										
OK		+16 ~ +20										
OK		+11 ~ +15										
OK		+1 ~ +10										
~~OK~~	•	±0										
OK		-5 ~ -1										
OK		-10 ~ -6										
OK		-15 ~ -11										
OK		-20 ~ -16										
-1		-40 ~ -21										
TD Data (490) / ND Data (495)												
TGRD Detected Data (520)												

13. Perform the free run.
    - Set A4/81/2" x 11" sideways paper in the upper cassette.
    - Select the upper cassette.
    - Put the C-4 test chart face down on the exposure glass.
    - Set SP#01 for the free run mode.
    - Set SPD#10 to H.
    - Press start key.

    NOTE: It takes 5 min. 30 sec. for the free run. There are 80 scans.

14. Press the clear modes key 3 times to clear the free run.

15. Set A3/11" x 17" paper in the lower cassette and make a 15 mm color patch copy (LD 7th power).
    - Set SPD#082 to H
    - Make one A3/11" x 17" copy of the C-4 test chart.

    NOTE: Since the toner density has not been stable yet, it is normal that image density of color patch is changed among copies made in this step. In any case, toner especially in magenta, may drop on copy, resulting in magenta spots.

16. Perform the self check.
    - Set SPD#030 to H. (self check)
    - Turn the main switch off and wait for 3 seconds.
    - Turn the main switch on.

17. Read the TGRD value for each color and copy it on the TD and TGRD data sheet.
    - Set SPD#081 to H

    NOTE: When the SPD#081 is set to H, the TGRD value for Bk (520), M (521), Y (522), and C (523) are displayed on the SP panel in this order automatically.

    (How to read the TGRD display)
    Ex. Bk (520)
    "F005" → "F052" → "F520" → "Fxxx"
    (This XXX is the TGRD data for Bk color.)

18. For each color, if the final data is not within the OK area, obtain the ΔTD value from the sheet and change the TD setting accordingly. (SPD#490, 491, 492, or 493 depending on the color.)

19. Repeat steps #13 through #17 **until the TGRD data get into the OK area**.

    NOTE: The TD setting can be between 0 and 30. If the corrected setting is outside this range, do not change the TD setting. Add or subtract 1 from the ND setting for each color (SPD#495 ~ #498).

20. Confirm the image density for each color using the last 15 mm color patch copy (LD 7th power) with standard color patch sample.

    NOTE: If the density is not normal (too low, or too high), perform "TD Check Additional Procedure".

21. Reset the following SPDs to the default value:
    - Set SPD#101 to L (pointer control disable)
    - Set SPD#100 to L (drum potential control)
    - Set SPD#052 to 000 (no color patch printed)
    - Set SPD#030 to L (self check)
    - Set SPD#190 to L (SC#840 ~ #843 detection off mode)

    21-1 There steps should be performed only once after replacing the ROMs of the process control board and the sequence control board.

    - Make A4 size one to one copies 5 times.
    - Read the DIF detected data (SPD#126) and set the data to SPD#121 (DIF Target).

22. Use SPD#085 to call all process control data. Copy the data to the process control data check sheet.

23. Clean the Magenta development unit Lower Casing.
    - Remove the toner tank unit (2 screws), the drum unit cover (1 screw, 2 knob screws) and the drum stay for the magenta section.
    - Remove the ID sensor for Magenta (1 connector).

NOTE: Be sure not to touch the ID sensor surface. If you touch the surface you have to perform the TD-check (manual) again!

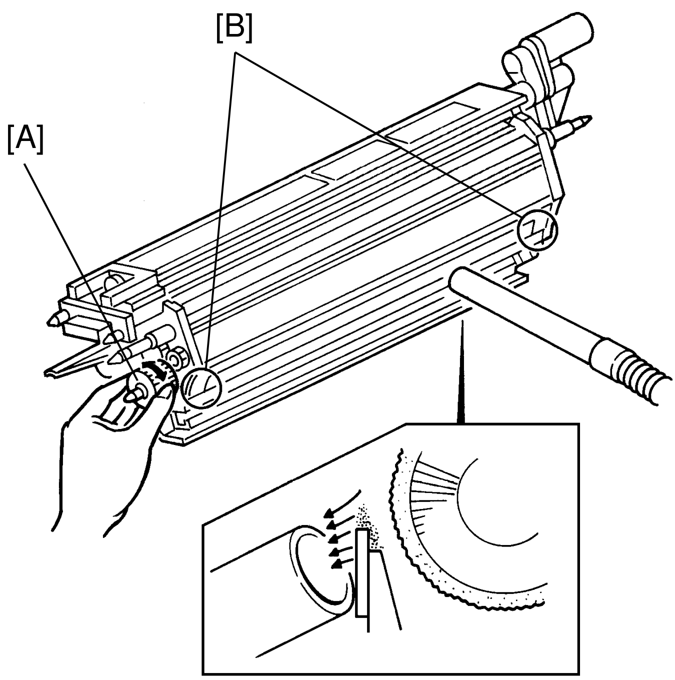
- Remove the development unit for magenta.
- Turn the drive gear [A] counter-clockwise a little to put the toner behind the casing on the development sleeve.

CAUTION: Do not turn the drive gear counter-clockwise 30° or more.

- Remove the toner around the lower casing by vacuum cleaner.
- Turn the drive gear clockwise for 2 or 3 times and remove the toner again.

NOTE: Make sure the side mylars [B] are back inside the lower casing.

- Reinstall all parts and make copies.



2.7 TD (Toner Density) CHECK (1 to 3 Colors) (Excluding Magenta) FOR MODEL A092

NOTE: The TD check (1 to 3 Colors) procedure should be performed,

1. when the developers (1 to 3 colors) are replaced.
2. when the Vmin (1 to 3 colors) is performed.
3. when the development units (1 to 3 colors) are replaced.
4. when the ID sensors (1 to 3 colors) are replaced.

1. • If Vmin check (1 to 3 colors) has been performed just before, go to step 2.
   • If you're just replacing the developer, clean the development rollers and ID sensors, and replace the relevant developers.

2. Set the SPD as follows:
   • SPD#036 to H (process control all on)
   • SPD#495, #497, #498 to 8 (ND Present Data) Only change the data for relevant colors.
   • SPD#115, #117, #118 (Pointer lower limit data monitor/change) and SPD#110, #112, #113 (Pointer data monitor/change) manual reset to the data in the table below only for relevant colors, referring to SPD106 data (Season selection).

SPD#106 (Season select)	0	1	2
SPD#115 (Pointer Limit: Bk) SPD#117 (Pointer Limit: Y) SPD#118 (Pointer Limit: C)	0	5	10
SPD#110 (Pointer: Bk) SPD#112 (Pointer: Y) SPD#113 (Pointer: C)	5	10	20

   • Turn off and on the main switch.

3. For PMs when the drum is **not** replaced (15k, 45k, 75k .....), perform the following procedure:
   • Set SPD#315, #317, #318 from 7 to 9 (LD power control).
   • Turn the main switch off and on.

   NOTE: This is necessary to save the new LD power control settings.

CAUTION: At PMs when the drum is replaced, SPD#315, #317, #318 are changed from 9 to 7 at the Vmin check procedure. Therefore, do not return it to 9.

4. Set SPD#101 to H (pointer control disable).

5. Set SPD#100 to H (drum potential control).

6. Take the latest process control data check sheet provided in the developer catch pan. Confirm the following:
   (TD: preset data)
   Confirm if the TD preset data for each color on the process control check sheet (line 13) is identical to the data displayed on the SP panel.

   SPD#490 (TD preset data Bk)
   SPD#492 (TD preset data Y)
   SPD#493 (TD preset data C)

   NOTE: If there are any discrepancies between both data, correct the setting to the data on the process control data check sheet.

7. Set SPD#190 to H (SC840 ~ 843 detection off mode).

8. Set SPD#611, #613, #614 to 20 (ID Sensor LED Data). Only change the data of the relevant colors.

9. Make 5 copies one by one from C4 chart in A3/11" x 17" size (5 jobs).

10. Set SPD#225 to (XXX). (Vk compensation)
    - Enter the data of the relevant colors.
      (Bk: 1, Y: 4, C: 8, If there are two or three relevant colors, add each color number.)
      Example: B + C = 1 + 8 = 9
      Bk + Y + C = 1 + 4 + 8 = 13
    - Press the Enter key while pressing the Start key to start.

    The machine starts idling for Vk compensation for a while and then stops automatically.

11. Make one copy (A3/11" x 17" size) to check if all four colors are developed or not.

    NOTE: At this time, do not care about the color balance. If it is a solid copy, check and set the relevant charge corona unit in position.

12. Prepare the TD & TGRD data sheet.
    - Copy the TGRD target data for each color from line 16 (SPD#515 ~ #518) on the process control data check sheet to the TD & TGRD data sheet. (✻) (The process control data check sheet is provided in the developer catch pan.)
    - For each color, calculate the TGRD column, as in the example.

   (Example)

   TD & TGRD DATA SHEET

[BLACK]

✻ TGRD target

△TD	TGRD Range	±Range	1	2	3	4	5	6	7	8	9	10
+1		+26 ~ +35										
OK		+21 ~ +25										
OK		+16 ~ +20										
OK		+11 ~ +15										
OK		+1 ~ +10										
OK	•	±0										
OK		-5 ~ -1										
OK		-10 ~ -6										
OK		-15 ~ -11										
OK		-20 ~ -16										
-1		-40 ~ -21										
TD Data (490) / ND Data (495)												
TGRD Detected Data (520)												

13. Perform the free run.
    - Set A4/81/2" x 11" sideways paper in the upper cassette.
    - Select the upper cassette.
    - Put the C-4 test chart face down on the exposure glass.
    - Set SP#01 for the free run mode.
    - Set SPD#10 to H.
    - Press the start key.

    NOTE: It takes 5 min. 30 sec. for the free run (80 scans).

14. Press the clear modes key 3 times to clear the free run mode.

15. Set A3/11" x 17" paper in the lower cassette and make a 15 mm color patch copy (LD 7th power).
    - Set SPD#082 to H
    - Make one A3/11" x 17" copy from C-4 test chart.

    NOTE: Since the toner density has not been stable yet, it is normal that image density of color patch is changed among copies made in this step. In any case, toner especially in magenta, may drop on copy, resulting in magenta spots.

16. Perform the self check.
    - Set SPD#030 to H. (self check)
    - Turn the main switch off and wait for 3 seconds.
    - Turn the main switch on.

17. Read the TGRD value for each color and copy it on the TD and TGRD data sheet.
    - Set SPD#081 to H

    NOTE: When the SPD#081 is set to H, the TGRD value for Bk (520), M (521), Y (522), and C (523) are displayed on the SP panel in this order automatically.

    (How to read the TGRD display)
    Ex. Bk (520)
    "F005" → "F052" → "F520" → "Fxxx"
    (This XXX is the TGRD data for Bk color.)

18. Repeat steps #13 through #17 four times and plot these four data on the TD and TGRD data sheet.

19. For each color, if the final data is not within the OK area, obtain the ΔTD value from the sheet and change the TD setting accordingly. (SPD#490, 491, 492, or 493 depending on the color.)
    If the data is within the OK area, skip the next step.

    NOTE: The TD setting can be between 0 and 30. If the corrected setting is outside this range, do not change the TD setting. Add or subtract 1 from the ND setting for each color (SPD#495 ~ #498).

20. Repeat steps #13 to #17 until the TGRD data gets into the OK area.

21. Confirm the image density for each color using the last 15 mm color patch copy (LD 7th power) with the standard color patch sample.

    NOTE: If the density is not normal (too low or too high), perform "TD Check Additional Procedure".

22. Reset the following SPDs to the default value:
    - Set SPD#101 to L (pointer control disable)
    - Set SPD#100 to L (drum potential control)
    - Set SPD#052 to 000
    - Set SPD#030 to L (self check)
    - Set SPD#190 to L (SC#840 ~ #843 detection off mode)

23. Use SPD#085 to call all process control data. Copy the data to the process control data check sheet.

24. Clean the Magenta development unit Lower Casing. See page 5-8-13.

2.8 TD (Toner Density) CHECK (Including Magenta, Developer Type D) FOR MODEL A092

NOTE: The TD check (1 to 3 Colors) procedure should be performed,

1. when the developers (1 to 3 colors) are replaced.
2. when the Vmin (1 to 3 colors) is performed.
3. when the development units (1 to 3 colors) are replaced.
4. when the ID sensors (1 to 3 colors) are replaced.

1. • If Vmin check (1 to 3 colors) has been performed just before, go to step 2.
   • If you're just replacing the developer, clean the development rollers and ID sensors, and replace the relevant developers.

2. Set the SPD as follows:
   • SPD#036 to H (process control all on)
   • SPD#495 ~ #498 to 8 (ND Present Data) Only change the data for relevant colors.
   • SPD#115 ~ #118 (Pointer lower limit data monitor/change) and SPD#110 ~ #113 (Pointer data monitor/change) manual reset to the data in the table below only for relevant colors, referring to SPD106 data (Season selection).

SPD#106 (Season select)	0	1	2
SPD#115 (Pointer Limit: Bk)	0	5	10
SPD#116 (Pointer Limit: M)	0	10	10
SPD#117 (Pointer Limit: Y)	0	5	10
SPD#118 (Pointer Limit: C)	0	5	10
SPD#110 (Pointer: Bk)	5	10	20
SPD#111 (Pointer: M)	10	20	25
SPD#112 (Pointer: Y)	5	10	20
SPD#113 (Pointer: C)	5	10	20

   • Turn off and on the main switch.

3. For PMs when the drum is **not** replaced (15k, 45k, 75k .....), perform the following procedure:
   • Set SPD#315, #317, #318 from 7 to 9 (LD power control).
   • Set SPD#316 TO 12.
   • Turn the main switch off and on.

   NOTE: This is necessary to save the new LD power control settings.

Replacement Adjustment

CAUTION: At PMs when the drum is replaced, SPD#315, #317, #318 are changed from 9 to 7 and SPD#316 to 10 at the Vmin check procedure. Therefore, do not return it to 9 or 12.

4. Set SPD#101 to H (pointer control disable).
5. Set SPD#100 to H (drum potential control).
6. Take the latest process control data check sheet provided in the developer catch pan. Confirm the following:
   (TD: preset data)
   Confirm if the TD preset data for each color on the process control check sheet (line 13) is identical to the data displayed on the SP panel.

   SPD#490 (TD preset data Bk)
   SPD#491 (TD preset data M)
   SPD#492 (TD preset data Y)
   SPD#493 (TD preset data C)

   NOTE: If there are any discrepancies between both data, correct the setting to the data on the process control data check sheet.
7. Set SPD#190 to H (SC840 ~ 843 detection off mode).
8.
   - Set SPD#611 ~ #614 to 20 (ID Sensor LED Data). Only change the data of the relevant colors.
   - Confirm that the SPD#351 is "50" (Magenta, V_{HB}–V_B data). If not, set SPD#351 to "50".
   - Set SPD#453 to H (CD fixed).
9. Make 5 copies one by one from C4 chart in A3/11" x 17" size (5 jobs).
10. Set SPD#225 to (XXX). (Vk compensation)
    - Enter the data of the relevant colors.
      (Bk: 1, Y: 4, C: 8, If there are two or three relevant colors, add each color number.)
      Example: M + C = 2 + 8 = 10
      M + Y + C = 2 + 4 + 8 = 14
    - Press the Enter key while pressing the Start key to start.

    The machine starts idling for Vk compensation for a while and then stops automatically.

11. Make one copy (A3/11" x 17" size) to check if all four colors are developed or not.

NOTE: At this time, do not care about the color balance. If it is a solid copy, check and set the relevant charge corona unit in position.

11-1 Perform the free run.

- Set A4/81/2" x 11" sideways paper in the upper cassette.
- Select the upper cassette.
- Put the C-4 test chart face down on the exposure glass.
- Set SP1 for the free run mode.
- Press the clear modes key only once.

NOTE: Never press the clear modes key twice or more because the free run mode would be canceled.

- Set SPD#10 to H.
- Select magenta for the Color Background mode.
- Press the start key.

NOTE: If SC871 (Vsp Detection Error - M) is displayed during the free run, turn the main switch off and on, and continue from step 11-1.

11-2 Press the clear modes key 3 times to clear the free run mode.

11-3 Set A3/11" x 17" paper in the lower cassette and make a 15 mm color patch copy (LD 7th power).

- Set SPD#082 to H.
- Make one A3/11" x 17" copy of the C-4 test chart.

11-4 Change the TD parameter for Dk, Y, and C.

- If the Color patch density of Bk, Y, or C is too dark, add 2 to the TD value.
- If the color patch density of Bk, Y, or C is too light, substract 2 from the TD value.
- The magenta color patch density, does not matter at all.

11-5 Repeat step 11-1 through 11-4 three more times. (total 4 times)

11-6 Set SPD#453 to L (CD fixed mode reset).

11-7 Change the ND parameter for magenta.

- If the present data of SPD#496 (ND, Magenta) is 11 or more, substract 2 from that data.
- If the present data of SPD#496 is 9 or 10, set SPD496 to 8.
- If the present data of SPD#496 is lower than 8, do not change the data of SPD#496.

12. Prepare the TD & TGRD data sheet.
    - Copy the TGRD target data for each color from line 16 (SPD#515 ~ #518) on the process control data check sheet to the TD & TGRD data sheet. (✱) (The process control data check sheet is provided in the developer catch pan.)
    - For each color, calculate the TGRD column, as in the example.

(Example)

TD & TGRD DATA SHEET

[BLACK]

✱ TGRD target

ΔTD	TGRD Range	±Range	1	2	3	4	5	6	7	8	9	10
+1		+26 ~ +35										
OK		+21 ~ +25										
OK		+16 ~ +20										
OK		+11 ~ +15										
OK		+1 ~ +10										
OK	•	±0										
OK		-5 ~ -1										
OK		-10 ~ -6										
OK		-15 ~ -11										
OK		-20 ~ -16										
-1		-40 ~ -21										
TD Data (490) / ND Data (495)												
TGRD Detected Data (520)												

13. Perform the free run.
    - Set A4/81/2" x 11" sideways paper in the upper cassette.
    - Select the upper cassette.
    - Put the C-4 test chart face down on the exposure glass.
    - Set SP#01 for the free run mode.
    - Set SPD#10 to H.
    - Press the start key.

NOTE: It takes 5 min. 30 sec. for the free run (80 scans).

14. Press the clear modes key 3 times to clear the free run mode.

15. Set A3/11" x 17" paper in the lower cassette and make a 15 mm color patch copy (LD 7th power).
    - Set SPD#082 to H
    - Make one A3/11" x 17" copy from C-4 test chart.

NOTE: Since the toner density has not been stable yet, it is normal that image density of color patch is changed among copies made in this step. In any case, toner especially in magenta, may drop on copy, resulting in magenta spots.

16. Perform the self check.
    - Set SPD#030 to H. (self check)
    - Turn the main switch off and wait for 3 seconds.
    - Turn the main switch on.

17. Read the TGRD value for each color and copy it on the TD and TGRD data sheet.
    - Set SPD#081 to H

NOTE: When the SPD#081 is set to H, the TGRD value for Bk (520), M (521), Y (522), and C (523) are displayed on the SP panel in this order automatically.

(How to read the TGRD display)
Ex. Bk (520)
"F005" → "F052" → "F520" → "Fxxx"
(This XXX is the TGRD data for Bk color.)

18. For each color, if the final data is not within the OK area, obtain the ΔTD value from the sheet and change the TD setting accordingly. (SPD#490, 491, 492, or 493 depending on the color.)

19. Repeat steps #13 through #17 **until the TGRD data get into the OK area**.

NOTE: The TD setting can be between 0 and 30. If the corrected setting is outside this range, do not change the TD setting. Add or subtract 1 from the ND setting for each color (SPD#495 ~ #498).

20. Confirm the image density for each color using the last 15 mm color patch copy (LD 7th power) with the standard color patch sample.

NOTE: If the density is not normal (too low or too high), perform "TD Check Additional Procedure".

21. Reset the following SPDs to the default value:
    - Set SPD#101 to L (pointer control disable)
    - Set SPD#100 to L (drum potential control)
    - Set SPD#052 to 000
    - Set SPD#030 to L (self check)
    - Set SPD#190 to L (SC#840 ~ #843 detection off mode)

21-1 There steps should be performed only once after replacing the ROMs of the process control board and the sequence control board.

- Make A4 size one to one copies 5 times.
- Read the DIF detected data (SPD#126) and set the data to SPD#121 (DIF Target).

22. Use SPD#085 to call all process control data. Copy the data to the process control data check sheet.

23. Clean the Magenta development unit Lower Casing. See page 5-8-13.

2.9 TD (Toner Density) CHECK (Manual) FOR MODEL A092

NOTE: The TD check (Manual) procedure should be performed,

1. when the ID sensor is cleaned.

1. Set the SPD as follows:
   - SPD#036 to H (process control all on)
   - SPD#190 to H (SC#840 ~ #843 detection off mode)
   - SPD#611 ~ #614 to 20 (ID Sensor LED Data)
     Change only the data for relevant color
     (SPD#611: Bk, #612: M, #613: Y, #614: C)
     For example, if you clean the ID sensor for Magenta, change SPD#612 to 20.

2. Make 5 copies one by one of the C-4 test chart in A3/11" x 17" size.

   NOTE: If it is a solid copy, check and set the relevant charge corona unit in position.

3. For PMs when the drum is **not** replaced (15k, 45k, 75k .....), perform the following procedure:
   - Set SPD#315, #317, #318 from 7 to 9 (LD power control).
   - Set SPD#316 to 12.
   - Turn the main switch off and on.

   NOTE: This is necessary to save the new LD power control settings.

CAUTION: At PMs when the drum is replaced, SPD#315, #317, #318 are changed from 9 to 7 or SPD#316 to 10 at the Vmin check procedure. Therefore, do not return it to 9.

4. Take the process control data check sheet provided in the developer catch pan. Confirm the following:
   (TD: preset data)
   Confirm if the TD preset data for each color on the process control check sheet (line 13) is identical to the data displayed on the SP panel.

   SPD#490 (TD preset data Bk)
   SPD#491 (TD preset data M)
   SPD#492 (TD preset data Y)
   SPD#493 (TD preset data C)

   NOTE: If there are any discrepancies between both data, correct the setting to the data on the process control data check sheet.

5. Set SPD#225 to (XXX). (Vk compensation)
   - Enter the data of the relevant colors.
     (Bk: 1, M: 2, Y: 4, C: 8. Add these numbers if there are two or three relevant colors.)
     For example, M + C = 4 + 8 = 12.
   - Press the Enter key while pressing the Start key to start.

   The machine starts idling for Vk compensation for a while and then stops automatically.
   - Press the Clear key three times to exit the SPD mode.

6. Prepare the TD & TGRD data sheet.
   - Copy the TGRD target data for each color from line 16 (SPD#515 ~ #518) on the process control data check sheet to the TD & TGRD data sheet. (✻) (The process control data check sheet is provided in the developer catch pan.)
   - For each color, calculate the TGRD column, as in the example.

   (Example)

TD & TGRD DATA SHEET

[BLACK]

✻ TGRD target

ΔTD	TGRD Range	±Range	1	2	3	4	5	6	7	8	9	10
+1		+26 ~ +35										
OK		+21 ~ +25										
OK		+16 ~ +20										
OK		+11 ~ +15										
OK		+1 ~ +10										
OK	•	±0										
OK		-5 ~ -1										
OK		-10 ~ -6										
OK		-15 ~ -11										
OK		-20 ~ -16										
-1		-40 ~ -21										
TD Data (490) / ND Data (495)												
TGRD Detected Data (520)												

7. Perform the free run.
   - Set A4/81/2" x 11" sideways paper in the upper cassette.
   - Select the upper cassette.
   - Put the C-4 test chart face down on the exposure glass.
   - Set SP#01 for the free run mode.
   - Set SPD#10 to H.
   - Press the start key.

   NOTE: It takes 5 min. 30 sec. for the free run (80 scans).

8. Press the clear modes key 3 times to clear the free run.

9. Set A3/11" x 17" paper in the lower cassette and make a 15 mm color patch copy (LD 7th power).
   - Set SPD#082 to H
   - Press the Start key.

   NOTE: Since the toner density has not been stable yet, it is normal that image density of color patch is changed among copies made in this step. In any case, toner, especially in magenta, may drop on copy, resulting in magenta spots.

10. Perform the self check.
    - Set SPD#030 to H. (self check)
    - Turn the main switch off and wait for 3 seconds.
    - Turn the main switch on.

11. Read the TGRD value for each color and copy it on the TD and TGRD data sheet.
    - Set SPD#081 to H

    NOTE: When the SPD#081 is set to H, the TGRD value for Bk (520), M (521), Y (522), and C (523) are displayed on the SP panel in this order automatically.

    (How to read the TGRD display)
    Ex. Bk (520)
    "F005" → "F052" → "F520" → "Fxxx"
    (This XXX is the TGRD data for Bk color.)

12. Repeat steps #7 through #11 four times and plot these four data on the TD and TGRD data sheet.

13. For each color, if the final data is not within the OK area, obtain the ΔTD value from the sheet and change the ND setting accordingly. (SPD#495, 496, 497, or 498 depending on the color.)
    If the data is within the OK area, skip the next step.

    NOTE: Manual TD check is done without replacing the developer. In this case, ND data (SPD#495 ~ #498) should be changed.
    The ND setting can be between 0 and 24. If the corrected setting is outside this range, do not change the ND setting. Add or subtract 1 from the TD setting for each color (SPD#490 ~ #493).

14. Repeat steps #7 to #11 and #13 until the TGRD data gets into the OK area.

15. Confirm the image density for each color using the last 15 mm color patch copy (LD 7th power) with the standard color patch sample.

    NOTE: If the density is not normal (too low or too high), perform "TD Check Additional Procedure".

16. Reset the following SPDs to the default value:
    - Set SPD#052 to 000
    - Set SPD#030 to L (self check)
    - Set SPD#190 to L (SC#840 ~ #843 detection off mode)

17. Use SPD#085 to call all process control data. Copy the data to the process control data check sheet.

18. Clean the Magenta development unit Lower Casing. See page 5-22.

2.10 TD CHECK ADDITIONAL PROCEDURE FOR MODEL A092

1. After getting TGRD detected data into "OK" area (SPD#520 ~ #523) during all three type of TD check, set SPD82 to "H" to print 15 mm color patches using 7th LD power.

2. Make a test copy and check the following two points:
   1) Image density of color patches in Bk, M, Y, and C. (See the one on the left side which is 100% dots filling.)
   2) Toner scattering around those patches.

   STANDARD: Compared with the standard color patch sample of the 7th LD power enclosed in the manual, image density of each color on copy should be equal to or slightly lower than the standard sample, but there shouldn't be any toner scattering around those patches.

3. If a patch is lighter than standard, or if it is too dark (with toner scattering), the next steps should be done only for the abnormal color(s) depending upon the difference of $\pm\alpha$.

   $\pm\alpha$ = [Last TGRD detected data (SPD#520 ~ #523)–TGRD target data (SPD#515 ~ #518)]

[First Correction Table]

$\pm\alpha$ = Last TGRD detected data – TGRD target data
(SPD#520 ~ #523) – (SPD#515 ~ #518)

$\pm\alpha$	Color patch is too dark. (ID is too high.)	Color patch is too light. (ID is too low.)
+16	1. ΔTD: +1 (Increase TD data by "1", using SPD#490 ~ #493.) 2. Repeat steps #13 through #17 two times, and plot TGRD detected data on a new check sheet.	1. Raise TGRD target data by +15 for Bk and M or +20 for Y and C. (SPD#515 ~ #518) 2. Repeat steps #13 through #17 four times, and plot TGRD detected data on a new check sheet.
+15 –10	1. ΔTD: +1 (SPD#490 ~ #493.) 2. Lower TGRD target data by -15 for Bk and M or -20 for Y and C. (SPD#515 ~ #518) 3. Repeat steps #13 through #17 four times, and plot TGRD detected data on a new check sheet.	1. ΔTD: –1 (SPD#490 ~ #493.) 2. Raise TGRD target data by +15 for Bk and M +20 for Y and C. (SPD#515 ~ #518) 3. Repeat steps #13 through #17 four times, and plot TGRD detected data on a new check sheet.
–11	1. Lower TGRD target data by -15 for Bk and M or -20 for Y and C. (SPD#515 ~ #518) 2. Repeat Step #13 through #17 four times, and plot TGRD detected data on a new check sheet.	1. ΔTD: –1 (SPD#490 ~ #493.) 2. Repeat steps #13 through #17 two times, and plot TGRD detected data on a check new sheet.

NOTE: 1. The TD setting can be between 0 and 30. If there are no more steps to shift, change the ND setting by same value. (SPD#495 ~ #498)

2. When TGRD target data is changed, the free run/self-check must be done four times. (A new check sheet is required.)

4. After repeating Step #13 through #17 two times (only when TD data is changed), or four times (when TGRD target data is changed.), check the color patches (7th LD power) again.

   If it is too light or too dark, the next steps should be done only for the abnormal color(s) depending upon this differences:
   [Last TGRD detected data (SPD#520 ~ #523) – TGRD new target data (SPD#515 ~ #518)]

[Second Correction Table]

±α = Last TGRD detected data – TGRD target data
(SPD#520 ~ #523) – (SPD#515 ~ #518)

±α	Color patch is too dark. (ID is too high.)	Color patch is too light. (ID is too low.)
+16	1. ΔTD: +1 (Increase TD data by "1", using SPD#490 ~ #493.) 2. Repeat steps #13 through #17 two times, and plot TGRD detected data on a check sheet.	1. Raise TGRD target data by +10. (SPD#515 ~ #518) 2. Repeat steps #13 through #17 four times, and plot TGRD detected data on a check sheet.
+15 –10	1. ΔTD: +1 (SPD#490 ~ #493) 2. Lower TGRD target data by –10. (SPD#515 ~ #518) 3. Repeat steps #13 through #17 four times, and plot TGRD detected data on a check sheet.	1. ΔTD: –1 (SPD#490 ~ #493) 2. Raise TGRD target data by +5 for Bk and M +20 for Y and C. (SPD#515 ~ #518) 3. Repeat steps #13 through #17 four times,and plot TGRD detected data on a new check sheet.
–11	1. Lower TGRD target data by –10 from the present data. (SPD#515 ~ #518) 2. Repeat steps #13 through #17 four times,and plot TGRD detected data on a new check sheet.	1. ΔTD: –1 (SPD#490 ~ #493.) 2. Repeat steps #13 through #17 two times, and plot TGRD detected data on a check sheet.

NOTE: 1. The TD setting can be between 0 and 30. If there are no more steps to shift, change the ND setting by same value. (SPD#495 ~ #498)
2. When TGRD target data is changed, the free run/self-check must be done four times. (A new check sheet is required.)

TD & TGRD DATA SHEET FOR MODEL A092

S/N:________________ Date:_________

[BLACK]

SPD515 data (TGRD Target)

ΔTD	TGRD Range	±Range	1	2	3	4	5	6	7	8	9	10
+1		+26 ~ +35										
OK		+21 ~ +25										
OK		+16 ~ +20										
OK		+11 ~ +15										
OK		+1 ~ +10										
OK		±0										
OK		-5 ~ -1										
OK		-10 ~ -6										
OK		-15 ~ -11										
OK		-20 ~ -16										
-1		-40 ~ -21										
TD Data (490) / ND Data (495)												
TGRD Detected Data (520)												

[MAGENTA]

SPD516 data (TGRD Target)

ΔTD	TGRD Range	±Range	1	2	3	4	5	6	7	8	9	10
+1		+29 ~ +40										
OK		+24 ~ +28										
OK		+16 ~ +23										
OK		+1 ~ +15										
OK		±0										
OK		-3 ~ -1										
OK		-8 ~ -4										
OK		-13 ~ -9										
OK		-18 ~ -14										
-1		-40 ~ -19										
TD Data (491) / ND Data (496)												
TGRD Detected Data (521)												

[YELLOW]

SPD517 data (TGRD Target)

ΔTD	TGRD Range	±Range	1	2	3	4	5	6	7	8	9	10
+1		+31 ~ +40										
OK		+24 ~ +30										
OK		+16 ~ +23										
OK		+1 ~ +15										
OK		±0										
OK		-15 ~ -1										
OK		-18 ~ -16										
OK		-25 ~ -19										
-1		-35 ~ -26										
TD Data (492) / ND Data (497)												
TGRD Detected Data (522)												

[CYAN]

SPD518 data (TGRD Target)

ΔTD	TGRD Range	±Range	1	2	3	4	5	6	7	8	9	10
+1		+21 ~ +30										
OK		+16 ~ +20										
OK		+13 ~ +15										
OK		+1 ~ +12										
OK		±0										
OK		-5 ~ -1										
OK		-10 ~ -6										
OK		-15 ~ -11										
OK		-20 ~ -16										
-1		-40 ~ -21										
TD Data (493) / ND Data (498)												
TGRD Detected Data (523)												

2.11 PROCESS CONTROL ADJUSTMENT FOR ABNORMAL COPY FOR MODEL A092

NOTE: If toner scattering, dirty back ground, or high/low image density occurs on the copy image, follow the steps below.

1. Set SPD#82 to H (Color Patch – 15 mm 7th LD Power).
2. Make 5 copies of the C-4 chart in A3/11" x 17" size to check the problem. (Copy Sample #1)
3. Perform a self check.
   - Set SPD#30 to H (Self check ON whenever power is switched on.)
   - Turn the main switch off and on.
   - Set SPD#30 to L
4. Take the process control data. (Data Sheet #1)
   - Set SPD#085 to H (Process Control Data - Monitor)
   - Copy the data to the process control data check sheet.
5. Check V_{BS} and Vsp* are normal or not from Data Sheet #1:
   1) If V_{BS} (SPD#226 ~ #229) is higher than 100,
      - Replace the relevant developer and clean the relevant development rollers and the ID sensors.
      - Perform TD check (1 to 3 colors).

   2) If the difference between V_{SP} Target (SPD#455 ~ #458) and V_{SP}* (SPD#470 ~ #473) is bigger than 20,
      - Vsp* (SPD#470 ~ #473) > Vsp Target (V_{TC}, SPD#455 ~ #458) + 20
        This means that the present toner concentration is too low. Check the toner supply.
      - Vsp* < Vsp Target –20
        This means that the present toner concentration is too high, go to next steps 6.
6. Set SPD#101 to H (Pointer Control).
7. Set SPD#100 to H (Drum Potential Control).
8. Make one copy from C-4 chart.

9. Prepare the TD & TGRD data sheet.
   - Copy the TGRD target data for each color from line 16 (SPD#515 ~ #518) on the process control data check sheet to the TD & TGRD data sheet. (✻) (The process control data check sheet is provided in the developer catch pan.)
   - For each color, calculate the TGRD column, as in the example.

(Example)

TD & TGRD DATA SHEET

[BLACK]

✻ TGRD target

△TD	TGRD Range	±Range	1	2	3	4	5	6	7	8	9	10
+1		+26 ~ +35										
OK		+21 ~ +25										
OK		+16 ~ +20										
OK		+11 ~ +15										
OK		+1 ~ +10										
OK	•	±0										
OK		-5 ~ -1										
OK		-10 ~ -6										
OK		-15 ~ -11										
OK		-20 ~ -16										
-1		-40 ~ -21										
TD Data (490) / ND Data (495)												
TGRD Detected Data (520)												

10. Perform the free run.
    - Set A4/81/2" x 11" sideways paper in the upper cassette.
    - Select the upper cassette.
    - Put the C-4 test chart face down on the exposure glass.
    - Set SP#01 for the free run mode.
    - Set SPD#10 to H.
    - Press the start key.

    NOTE: It takes 5 min. 30 sec. for the free run (80 scans).

11. Press the clear modes key 3 times to clear the free run mode.

12. Set A3/11" x 17" paper in the lower cassette and make a 15 mm color patch copy (LD 7th power).
    - Set SPD#082 to H
    - Press the Start key.

NOTE: Since the toner density has not been stable yet, it is normal that image density of color patch is changed among copies made in this step. In any case, toner, especially in magenta, may drop on copy, resulting in magenta spots.

13. Perform the self check.
    - Set SPD#030 to H (self check)
    - Turn the main switch off and wait for 3 seconds.
    - Turn the main switch on.
    - Set SPD#030 to L (self check) after finishing self check.

14. Read the TGRD value for each color and copy it on the TD and TGRD data sheet.
    - Set SPD#081 to H

    NOTE: When the SPD#081 is set to H, the TGRD value for Bk (520), M (521), Y (522), and C (523) are displayed on the SP panel in this order automatically.

    (How to read the TGRD display)

    Ex. Bk (520)
    "F005" → "F052" → "F520" → "Fxxx"
    (This XXX is the TGRD data for Bk color.)

15. Take the process control data. (Data Sheet #2)
    - Set SPD#85 to H (Process Control Data - Monitor)
    - Copy the data to the process control data check sheet.

16. Check V1 data and adjust LD power data as follows:
    1) Check V1 data (SPD#510 ~ #513) on Data Sheet #2.
    2) If V1 is higher than 200, increase the relevant LD power data (SPD#315 ~ #318) by +2.

    NOTE: For the initial 5k copies since the last new drum installation, do not change this data.

    3) Turn off and on the main switch.

17. Repeat steps #10 through #14 four times and plot these four data on the TD and TGRD data sheet.

    NOTE: Step 17 is required regardless LD power data (SPD#315 ~ #318) has been changed or not.

18. Repeat steps #15 and #16.
    1) Take the process control data by SPD#85-H. (Data Sheet #3)
    2) Check V1 data. (SPD#510 ~ #513)
    - Normal range: 130 < SPD#510 (Bk) < 200
      150 < SPD#511 ~ 513 (M, Y, and C) < 200
    - If SPD#510 (Bk) is lower than 130 or SPD#511 ~ #513 is lower than 150, decrease the relevant LD power data (SPD#315 ~ #318) by –2 to reset to the previous data. And repeat steps #10 through #14 four times again, and also repeat step 18.

19. For each color, if the final data is not within the OK area, obtain the ΔTD value from the sheet.
    - For colors which developers have been just replaced, change TD data. (SPD#490 ~ #493)
    - For colors which developers have <u>not</u> been replaced yet, change ND data. (SPD#495 ~ #498)

    If the data is within the OK area, skip the next step.

    NOTE: 1) The TD setting can be between 0 and 30. If the corrected setting is outside this range, do not change the TD setting. Add or subtract 1 from the ND setting for each color. (SPD#495 ~ #498)
    2) The ND setting can be between 0 and 24. If the corrected setting is outside this range, do not change the ND setting. Add or subtract 1 from the TD setting for each color. (SPD#490 ~ #493)

20. Repeat steps #10 to #14 until the TGRD data gets into the OK area. If TGRD is not in OK area, change the TD or ND (see note above) at each time.

21. Compare the image density for 15 mm color patches (7th LD power) with the standard color patch sample.

    NOTE: If the density is not normal (too low or too high), perform "TD Check Additional Procedure".
    If the density is still abnormal after TD check additional procedure, replace the developer.

22. Reset the following SPDs to the default value:
    - Set SPD#101 to L (pointer control disable)
    - Set SPD#100 to L (drum potential control)
    - Set SPD#052 to 000
    - Set SPD#030 to L (self check)

23. Use SPD#085 to call all process control data. Copy the data to the process control data check sheet.

24. Clean the Magenta development unit lower casing. See page 5-22.

3. PROCESS CONTROL ADJUSTMENT (A105)

3.1 PROCESS CONTROL ADJUSTMENT CHART FOR MODEL A105

The following table indicates the tasks required, and their order, when you replace or clean the OPC drums, developers, development unit(s), ID sensor(s), and/or to install a new machine.

●: For all four colors (4C) ▲: only for the relevant colors (1 to 3C) —: Don't do it

	Maintenance items / Necessary tasks, in order	OPC drum replacement		Developer replacement	
		4 drums	1 to 3 drum(s)	4 colors	1 to 3 color(s)
1	Developer replacement (including dev. roller cleaning)	●	▲ ( )	●	▲ ( )
2	ID sensor cleaning	●	▲ ( )	●	▲ ( )
3	Drum replacement	●	▲ ( )	—	—
4	Vmin check - All Colors	●	—	—	—
	Vmin check - 1 to 3 Color(s)	—	▲ ( )	—	—
5	TD check - All Colors	●	—	●	—
	TD check - 1 to 3 color(s)	—	▲ ( )	—	▲ ( )
	TD check - Manual	—	—	—	—

	Maintenance items / Necessary tasks, in order	Development unit replacement	ID sensor		New machine installation
			Replaced	Cleaned	
1	Developer replacement (including dev. roller cleaning)	▲ ( )	▲ ( )	—	●
2	ID sensor cleaning	▲ ( )	▲ ( )	▲ ( )	●
3	Drum replacement	—	▲ ( )	—	—
4	Vmin check - All Colors	—	—	—	—
	Vmin check - 1 to 3 Color(s)	—	▲ ( )	—	—
5	TD check - All Colors	—	—	—	●
	TD check - 1 to 3 color(s)	▲ ( )	▲ ( )	—	—
	TD check - Manual	—	—	▲ ( )	—

NOTE:
- Whenever OPC drums are replaced, replace the relevant color developers for the drums as set.
- Do the necessary tasks from top to bottom, in order.
- When two or more maintenance items are done at one time, combine the necessary jobs for those maintenance items. Write the color symbols of each relevant color in (   ).
- Vmin check for all colors includes that for 1 to 3 colors. If both of these cases are marked, do only the Vmin check for all colors.
- TD check for all colors includes that for 1 to 3 colors or manual TD check. If both of these cases are marked, do only the TD check for all colors.

3.2 Vmin CHECK (All Colors) FOR MODEL A105

NOTE: The Vmin check procedure should be performed, when the all drums are replaced.

1. Replace all developers, clean all development rollers and ID sensors.

2. Set SPD as follows:
   - SPD#036 to H (process control all on)
   - SPD#028 to H (process control reset), press the $\boxed{+}$ key twice while pressing $\boxed{\diamond}$ key.
   - SPD#190 to H (SC#840 ~ #843 detection off mode)
   - SPD#611 ~ #614 to 32 (ID Sensor LED Data)
   - SPD#315 ~ #318 to 7 (LD power control data)
   - SPD#106 to 1 (season select)
   - SPD#108 to H (pointer reset - Vmin)
   - Turn off and on the main switch.
   - Make 1 copy. (C4 chart A3/11" x 17" size or A4/8 1/2" x 11" size)

   NOTE: If it is a solid color copy, check and set the charge corona unit for that color in position.
   If the SPD#110 ~ #113 are not 22 based upon SPD#106 data, Pointer Reset by SPD#108 has not been properly done.

3. Perform the Vmin check (SPD#480).
   - SPD#480 to *15 (Vmin check for all colors).
   - Press the Enter key while pressing the Start key to start Vmin check operation.

   * The setting 15 means the Vmin check is performed for all four colors at the same time.
   (15 = 1 (Bk) + 2 (M) + 4 (Y) + 8 (C))

4. After the copier stops, press the Clear key on the SP panel once.

5. Read the Vmin evaluation result and its detected data for each color and write them.
   - Set SPD#078 to H
     (Vmin detected data monitor - batch processing)

   The values of SPD#481 to #488 are displayed sequentially.

	Vmin Evaluation Result				Vmin Detected Data			
	#481 (Bk)	#482 (M)	#483 (Y)	#484 (C)	#485 (Bk)	#486 (M)	#487 (Y)	#488 (C)
1st								
2nd								
3rd								

Normal Vmin Detected Data: Bk: 0 ~ 20
M,Y, and C: 130 ~ 170

6. For each color, perform the proper action below depending upon the data for the Vmin evaluation result.

Evaluation Result	Action Required
13, 19, 22	Check the detected data is in normal range. Bk: 0 ~ 20 M, Y, and C: 130 ~ 170 If the data for all four colors is normal, go to step 10. If some of them is 30 or higher for black or 180 or higher for C, M, or Y, do the same action as those for Result "4, 5, 7, 8, 16 or 17". (Adding toner and Vmin check again.)
3, 6, 11, 12, 14, 15, 21, 23, 24, 25, 26	Vmin check again only for relevant color(s). See Note 1.

Replacement Adjustment

Evaluation Result	Action Required
4, 5, 7, 8, 16, 17	1. Adding relevant color toner into the developer 1) Select an appropriate SPT (Test Mode) number of "Forced toner supply". SPT#111: Bk, #112: M, #113: Y, #114: C 2) While pressing the Start key, press the Plus key to start. 3) If the development unit is new, operate the relevant toner supply motor just after step 2) to feed toner from the main tank to the development toner tank. • SPT#53: Bk, #54: M, #55: Y, #56: C • See "Multi-components operation" of SP Test Mode. 4) After 30 seconds, press the Clear key twice to stop. 2. Vmin check again only for relevant color(s). See Note 1.
0, 1, 2, 9, 10, 18, 20	1. Using up excess toner. 1) Set relevant SPD modes to H to stop toner supply. SPD#345: Bk, #346: M, #347: Y, #348: C 2) Set the 16 gradation step pattern mode. (SP#21-2) 3) Set relevant color data in SPD#50. See Note 2. 4) Make 4 copies (A3/11" x 17" size). 5) Turn off and on the main switch to clear modes selected in step 1) to 3). 2. Vmin check again only for relevant color(s). See Note 1.

Note 1: If this evaluation result is applied to 1, 2, or 3 colors, Vmin check should be only for those colors.

1) Enter relevant color data in SPD#480. See Note 2.
2) Press the Enter key while pressing the Start key to operate.
3) Go back to Step 4.
4) Repeat the above procedure until the Vmin evaluation result becomes 13, 19, or 22. If these numbers do not appear even repeating 4 times, check if the ID sensor, the drum, and the developer have something wrong.

Note 2: Relevant color data for SPD#50, SPD#225, and SPD#480

1: Bk	4: Y	7: Bk+M+Y	10: M+C	13: Bk+Y+C
2: M	5: Bk+Y	8: C	11: Bk+M+C	14: M+Y+C
3: Bk+M	6: M+Y	9: Bk+C	12: Y+C	15: Bk+M+Y+C

10. Finish the Vmin check.
    Set SPD#079 to H. (Vmin adjustment mode reset – batch processing)
    Press the + key twice while pressing ◇ key.
11. Set SPD#190 to L. (SC#840 ~ #843 detection)
12. Exit from the SPD mode.
13. Perform TD check (all colors).

Replacement Adjustment

3.3 Vmin CHECK (1 to 3 Colors) FOR MODEL A105

CAUTION: Only change the data and perform the maintenance of the relevant colors.

NOTE: The Vmin check (1 to 3 colors) procedure should be performed,

1. when the drum(s) (1 to 3 colors) are replaced.
2. when the ID sensor(s) (1 to 3 colors) are replaced.

Following steps, only perform the maintenance for the relevant colors.

1. When the relevant drums or "the ID sensors and the drums" are replaced, clean the relevant development rollers and ID sensors, and replace the relevant developer.

2. Only set the SPD for the relevant color as follows:
   - SPD#315 ~ #318 to 7 (LD power control data)
     (SPD#315: Bk, #316: M, #317: Y, #318: C)
   - SPD#190 to H (SC#840 ~ #843 off mode)
   - SPD#611 ~ #614 to 32 (ID Sensor LED Data)
     (SPD#611: Bk, #612: M, #613: Y, #614: C)
   - SPD#110 ~ #113 (Pointer data monitor/change) to 22
     (SPD#110: Bk, #111: M, #112: Y, #113: C)
   - SPD#115 ~ #118 (Pointer lower limit data monitor/change) to 18
     (SPD#115: Bk, #116: M, #117: Y, #118: C)

3. Turn off and on the main switch.

4. Make 5 copies of the C-4 chart on A3/11" x 17" size or A4/81/2" x11". (Do not make these copies in a continuous copy run. Make 5 single-way runs.)

   NOTE: If it is a solid copy, set the relevant charge corona unit in position.

5. Perform the relevant Vmin check (SPD#480).
   - Key an appropriate data in the SPD#480, referring to the following notes:
   - Press the Enter key while pressing the Start key to start.

   NOTE: Select relevant colors for Vmin check by changing SP480 data from "15" to the other data (1 to 14).

1: Bk	4: Y	7: Bk+M+Y	10: M+C	13: Bk+Y+C
2: M	5: Bk+Y	8: C	11: Bk+M+C	14: M+Y+C
3: Bk+M	6: M+Y	9: Bk+C	12: Y+C	15: Bk+M+Y+C (all colors)

(Example)
When the yellow drum and the magenta drum are replaced at the same time, key **6** (= 4(Y) + 2(M)) in SPD#480.

NOTE: If you set 15 for SPD#480 and have started it by mistake, replace the drums of the other color and perform Vmin check all colors.

6. After the copier stops, press the Clear key on the SP panel once.
7. Read the only the relevant Vmin evaluation result and its detected data for each color and write them.
   - Set SPD#078 to H

NOTE: When the SPD#078 is set to H, the Vmin evaluation result and its data is displayed on the panel in order as shown below:

(Vmin Evaluation Result)
SPD#481 (Bk), #482 (M), #483 (Y), #484 (C)

Ex. SPD#481 (Bk)
"F004" - "F048" - "F481" - "Fxxx"
(This XXX is the data.)

	Vmin Evaluation Result				Vmin Detected Data			
	#481 (Bk)	#482 (M)	#483 (Y)	#484 (C)	#485 (Bk)	#486 (M)	#487 (Y)	#488 (C)
1st								
2nd								
3rd								

NOTE: Even if the Evaluation Result is NG for other colors, you do not need to follow the table in page 5-47, 5-48, and 5-49.

8. Only for relevant colors, perform the proper action depending upon the data for the Vmin evaluation result. See the table in Vmin check (all colors for model A105).
9. Finish the Vmin check.
   Set SPD#079 to H. (Vmin adjustment mode reset – batch processing)
10. Set SPD#190 to L. (SC#840 ~ #843 detection)
11. Exit from the SPD mode.
12. Perform the TD check.

3.4 TD (Toner Density) CHECK (All Colors) FOR MODEL A105

NOTE: The TD check (all colors) procedure should be performed:

1. When all the developers are replaced.
2. When the Vmin (all colors) adjustment is performed.
3. When a new machine is installed.

A. Preparation for a TD Check

A-1. Prepare the "TD check (all colors) sheet, No 1, No 2, No 3, No 4, and Process control data check sheet".

A-2. Confirm that all four color developers have been replaced and that the ID sensors and all the development sleeves have been cleaned.

A-3. Set the SPD modes as follows:

- SPD#106 to 001 (Season select)
- SPD#80 to H (Pointer/Vk adjustment mode set)

  NOTE: For this mode press the + key twice while pressing the key to enter.
- SPD#490 to 020 (TD data monitor - Bk)
- SPD#491 to 020 (TD data monitor - M)
- SPD#492 to 020 (TD data monitor - Y)
- SPD#493 to 020 (TD data monitor - C)
- SPD#707 to 132 (Fusing Temperature for standard mode during standby.)
- SPD#708 to 126 (Fusing temperature for standard mode during a copy run.)
- SPD#315, #316, #317, and #318 to the appropriate value *1 (LD power control).

*1

	SPD#315	SPD#316	SPD#317	SPD#318
New Drum	4	4	4	4
Drum used for 20K copies or more	Present data + 2	Present data + 2	Present data + 2	Present data + 2

A-4. Turn the main switch off and on.

A-5. Set SPD#82 to H (color patch - 15 mm)

A-6. Make one copy of a C-4 test chart on A3/11" x 17" or A4/8.5" x 11" paper.

NOTE: If it is a solid color copy, set the charge corona unit for that color in position.

B. Rough TD Adjustment

B-1. Perform the "Self Check Mode".

- Set SPD#525 to 015 (forced self check).
- Press the # key while pressing the ◇ key to start.

B-2. Press clear key to exit SPD#525 then make 10 copies that include the color patch patterns on A4/8.5" x 11" paper in a continuous copy run, and keep the 10th copy which will be used in step B-9.

B-3. Confirm that the TD value for each color is set to 020.
If not, set it to 020.

- SPD#490 (TD data - Bk) : 020
- SPD#491 (TD data - M) : 020
- SPD#492 (TD data - Y) : 020
- SPD#493 (TD data - C) : 020

B-4. Confirm that the ND value for each color is set to 008.
If not, set it to 008.

- SPD#495 (ND data - Bk) : 008
- SPD#496 (ND data - M) : 008
- SPD#497 (ND data - Y) : 008
- SPD#498 (ND data - C) : 008

B-5. Read the Vsp target and Vsp* detected values and write them in the "Table 1-3 (Vsp Target Data)" and "Table 1-4 (Vsp Detected Data)" of the "TD Check Sheet No. 1".

- SPD#455 (Vsp target - Bk)
- SPD#456 (Vsp target - M)
- SPD#457 (Vsp target - Y)
- SPD#458 (Vsp target - C)
- SPD#470 (Vsp* detected - Bk)
- SPD#471 (Vsp* detected - M)
- SPD#472 (Vsp* detected - Y)
- SPD#473 (Vsp* detected - C)

B-6. Compare the Vsp target value to the Vsp* detected value for each color.
If the value is different, adjust the TD or ND to fit the Vsp target value to the Vsp* detected value key.

The Vsp target value consists of TD, ND, CD, and Vmin. The Vsp target value will be changed immediately when the TD or ND value is changed.

Example
SPD#455 (Vsp target - Bk) is 80.
SPD#470 (Vsp* detected - Bk) is 70.
In this case, decrease the value of SPD#490 (TD data - Bk) by 1. But, the value of SPD#455 is still 80. Then, decrease the value of SPD#490 by 1 again. We get a value of "70" for SPD#455 which is the same as that for SPD#470.

For your reference.

- Vsp target = $\text{Vmin} + \frac{8(\mathbf{ND} + \mathbf{TD}) + \text{CD} - 80}{800}(4.0 - \text{Vmin})$

- SPD#490 (TD data - Bk)
- SPD#491 (TD data - M)
- SPD#492 (TD data - Y)
- SPD#493 (TD data - C)
- SPD#495 (ND data - Bk)
- SPD#496 (ND data - M)
- SPD#497 (ND data - Y)
- SPD#498 (ND data - C)

NOTE: Adjust the TD value first. Only if the TD value is not adjustable (the TD value is 0 or 30), adjust the ND value. Confirm data is entered correctly by confirming that the target data now matches the detected value.

B-7. Read the TD value and the ND value for each color and write them in the "Table 1-1 (TD Data)" and "Table 1-2 (ND Data)" of the TD Check Sheet No. 1.

- SPD#490 (TD data - Bk)
- SPD#491 (TD data - M)
- SPD#492 (TD data - Y)
- SPD#493 (TD data - C)
- SPD#495 (ND data - Bk)
- SPD#496 (ND data - M)
- SPD#497 (ND data - Y)
- SPD#498 (ND data - C)

B-8. Read the VBS detected value for each color and write them in the "Table 1-5 (VBS Data)" of the "TD Check Sheet No. 1".

- Set SPD#91 to H (VBS compensation detected value monitor - batch processing)
  The values of SPD#226, #227, #228, and #229 are displayed sequentially.
- If the value (SPD#226, #227, #228, or #229) is 50 or more, perform the VBS Correction Procedure in Step E.

B-9. Prepare the 10th copy which was made in step B-2 and the standard color patch copy sample which was made at the service training by yourself. Compare the color patch density of the 10th copy with the standard color patch copy sample color by color. Then adjust the TD or the ND as follows:

- The color patch density of the copy is *1——— compared with the standard color patch copy sample.

*1: Too light :	decrease the TD (ND) value by 3 or 4.
Light :	decrease the TD (ND) value by 1 or 2.
Almost the same:	No adjustment is necessary.
Dark:	increase the TD (ND) value by 1 or 2.
Too dark:	increase the TD (ND) value by 3 or 4.

For your reference
Bk: SPD#490 (TD - Bk) or SPD#495 (ND - Bk)
M: SPD#491 (TD - M) or SPD#496 (ND - M)
Y: SPD#492 (TD - Y) or SPD#497 (ND - Y)
C: SPD#493 (TD - C) or SPD#498 (ND - C)

NOTE: Adjust the TD value first. Only if the TD value is not adjustable (the TD value is 0 or 30), adjust the ND value.

B-10. Read the TD value and the ND value for each color and write them in the "Table 1-1 (TD Data)" and "Table 1-2 (ND Data)".

- SPD#490 (TD data - Bk)
- SPD#491 (TD data - M)
- SPD#492 (TD data - Y)
- SPD#493 (TD data - C)
- SPD#495 (ND data - Bk)
- SPD#496 (ND data - M)
- SPD#497 (ND data - Y)
- SPD#498 (ND data - C)

B-11. Perform a free run of 80 scans.

- Set A4/81/2" x 11" sideways paper in the upper cassette.
- Put the C-4 test chart face down on the exposure glass. (The four-color gradation of the C-4 test chart are must be at the right hand side of the exposure glass.)

- Set SP#01 for the free run mode.
- Set SPD#10 to H. (Free run will automatically stop after 80 scans.)
- Press the start key.
- After finishing the free run, press the clear modes key 3 times to clear the free run mode.

B-12. Perform Vk compensation and make one copy.

- Set SPD#225 to 015. (Vk compensation for all colors.)
  Press the $\boxed{\#}$ key while pressing the $\boxed{\Diamond}$ key.
- Set SPD#082 to H (Color Patch) after finishing the Vk compensation.
- Make one copy in A3/11" x 17" or A4/81/2" x 11" size of a C-4 chart.
- Write step number "B-12" on the copy. This copy will be used in step B-14.

B-13. Read the VBS detected value for each color and write them in the "Table 1-5 (VBS Data)".

- Set SPD#91 to H. (VBS compensation detected value monitor - batch processing)
  The values of SPD#226, #227, #228, and #229 are displayed sequentially.
- If the value (SPD#226, #227, #228, or #229) is 50 or more, perform the VBS Correction Procedure in Step E .

B-14. Prepare the copy which was made in step B-12 and the standard color patch copy sample. Compare the color patch density of the copy with the standard color patch copy sample color by color. Then adjust the TD or the ND as follows:

- The color patch density of the copy is *1———— compared with the standard color patch copy sample.

*1:	Too light :	decrease the TD (ND) value by 3 or 4.
	Light :	decrease the TD (ND) value by 1 or 2.
	Almost the same:	No adjustment is necessary.
	Dark:	increase the TD (ND) value by 1 or 2.
	Too dark:	increase the TD (ND) value by 3 or 4.

For your reference
Bk: SPD#490 (TD - Bk) or SPD#495 (ND - Bk)
M: SPD#491 (TD - M) or SPD#496 (ND - M)
Y: SPD#492 (TD - Y) or SPD#497 (ND - Y)
C: SPD#493 (TD - C) or SPD#498 (ND - C)

NOTE: Adjust the TD value first. Only if the TD value is not adjustable (the TD value is 0 or 30), adjust the ND value.

B-15. Read the TD value and the ND value for each color and write them in the "Table 1-1 (TD Data)" and "Table 1-2 (ND Data)".

- SPD#490 (TD data - Bk)
- SPD#491 (TD data - M)
- SPD#492 (TD data - Y)
- SPD#493 (TD data - C)
- SPD#495 (ND data - Bk)
- SPD#496 (ND data - M)
- SPD#497 (ND data - Y)
- SPD#498 (ND data - C)

B-16. Perform a free run of 80 scans.

- Set A4/8 1/2" x 11" sideways paper in the upper cassette.
- Put the C-4 test chart face down on the exposure glass. (The four-color gradation are must be at the right hand side of the exposure glass.)
- Set SP#01 for the free run model.
- Set SPD#10 to H. (Free run will automatically stop after 80 scans.)
- Press the start key.
- After finishing the free run, press the clear modes key 3 times to clear the free run mode.

B-17. Perform Vk compensation and make one copy.

- Set SPD#225 to 015. (Vk compensation for all colors.)
  Press the $\boxed{\#}$ key while pressing the $\boxed{\diamond}$ key.
- Set SPD#082 to H (Color Patch) after finishing the Vk compensation.
- Make one copy in A3/11" x 17" or A4/8 1/2" x 11" size of a C-4 chart.
- Write step number "B-17" on the copy. This copy will be used in step B-19.

B-18. Read the VBS detected value for each color and write them in the "Table 1-5 (VBS Data)".

- Set SPD#91 to H. (VBS compensation detected value monitor - batch processing)
  The values of SPD#226, #227, #228, and #229 are displayed sequentially.
- If the value (SPD#226, #227, #228, or #229) is 50 or more, perform the VBS Correction Procedure in Step E.

B-19. Prepare the the copy which was mode in step B-17 and the standard color patch copy sample. Compare the color patch density of the copy with the standard color patch copy sample color by color. Then adjust the TD or the ND as follows:

- The color patch density of the copy is *1________ compared with the standard color patch copy sample.

*1:	Too light :	decrease the TD (ND) value by 3 or 4.
	Light :	decrease the TD (ND) value by 1 or 2.
	Almost the same:	No adjustment is necessary.
	Dark:	increase the TD (ND) value by 1 or 2.
	Too dark:	increase the TD (ND) value by 3 or 4.

For your reference
Bk: SPD#490 (TD - Bk) or SPD#495 (ND - Bk)
M: SPD#491 (TD - M) or SPD#496 (ND - M)
Y: SPD#492 (TD - Y) or SPD#497 (ND - Y)
C: SPD#493 (TD - C) or SPD#498 (ND - C)

NOTE: Adjust the TD value first. Only if the TD value is not adjustable the TD value is 0 or 30), adjust the ND value.

B-20. Read the TD value and the ND value for each color and write them in the "Table 1-1 (TD Data)" and "Table 1-2 (ND Data)".

- SPD#490 (TD data - Bk)
- SPD#491 (TD data - M)
- SPD#492 (TD data - Y)
- SPD#493 (TD data - C)
- SPD#495 (ND data - Bk)
- SPD#496 (ND data - M)
- SPD#497 (ND data - Y)
- SPD#498 (ND data - C)

B-21. Perform a free run of 80 scans.

- Set A4/8 1/2" x 11" sideways paper in the upper cassette.
- Put the C-4 test chart face down on the exposure glass. (The four-color gradation are must be at the right hand side of the exposure glass.)
- Set SP#01 for the free run model.
- Set SPD#10 to H. (Free run will automatically stop after 80 scans.)
- Press the start key.
- After finishing the free run, press the clear modes key 3 times to clear the free run mode.

B-22. Perform Vk compensation and make one copy.

- Set SPD#225 to 015. (Vk compensation for all colors.)
- Press the $\boxed{\#}$ key while pressing the $\boxed{\Diamond}$ key.
- Set SPD#082 to H (Color Patch) after finishing the Vk compensation.
- Make one copy in A3/11" x 17" or A4/8 1/2" x 11" size of a C-4 chart.

- Write step number "B-22" on the copy. This copy will be used in step B-24.

B-23. Read the VBS detected value for each color and write them in the "Table 1-5 (VBS Data)".

- Set SPD#91 to H (VBS compensation detected value monitor - batch processing)
  The values of SPD#226, #227, #228, and #229 are displayed sequentially.
- If the value (SPD#226, #227, #228, or #229) is 50 or more, perform the VBS Correction Procedure in Step E.

B-24. Prepare the the copy which was made in step B-22 and the standard color patch copy sample. Compare the color patch density of the copy with the standard color patch copy sample color by color. Then adjust the TD or the ND as follows:

- The color patch density of the copy is *1——— compared with the standard color patch copy sample.

*1:	Too light :	decrease the TD (ND) value by 3 or 4.
	Light :	decrease the TD (ND) value by 1 or 2.
	Almost the same:	No adjustment is necessary.
	Dark:	increase the TD (ND) value by 1 or 2.
	Too dark:	increase the TD (ND) value by 3 or 4.

For your reference
Bk: SPD#490 (TD - Bk) or SPD#495 (ND - Bk)
M: SPD#491 (TD - M) or SPD#496 (ND - M)
Y: SPD#492 (TD - Y) or SPD#497 (ND - Y)
C: SPD#493 (TD - C) or SPD#498 (ND - C)

NOTE: Adjust the TD value first. Only if the TD value is not adjustable (the TD value is 0 or 30), adjust the ND value.

B-25. Read the TD value and the ND value for each color and write them in the "Table 1-1 (TD Data)" and "Table 1-2 (ND Data)".

- SPD#490 (TD data - Bk)
- SPD#491 (TD data - M)
- SPD#492 (TD data - Y)
- SPD#493 (TD data - C)
- SPD#495 (ND data - Bk)
- SPD#496 (ND data - M)
- SPD#497 (ND data - Y)
- SPD#498 (ND data - C)

B-26. If the density of all the color patch patterns are within the standard, this means you did not change the TD or ND value in step 24, then go to step C-1 (LD power adjustment). Otherwise, go to step B-27

Replacement Adjustment

B-27. Perform a free run of 80 scans.

- Set A4/81/2" x 11" sideways paper in the upper cassette.
- Put the C-4 test chart face down on the exposure glass. (The four-color gradation are must be at the right hand side of the exposure glass.)
- Set SP#01 for the free run model.
- Set SPD#10 to H. (Free run will automatically stop after 80 scans.)
- Press the start key.
- After finishing the free run, press the clear modes key 3 times to clear the free run mode.

B-28. Perform Vk compensation and make one copy.

- Set SPD#225 to 015. (Vk compensation for all colors.)
- Press the # key while pressing the ◇ key.
- Set SPD#082 to H (Color Patch) after finishing the Vk compensation.
- Make one copy in A3/11" x 17" or A4/81/2" x 11" size of a C-4 chart.
- Write step number "B-28" on the copy. This copy will be used in step B-30.

B-29. Read the VBS detected value for each color and write them in the "Table 1-5 (VBS Data)".

- Set SPD#91 to H (VBS compensation detected value monitor - batch processing)
  The values of SPD#226, #227, #228, and #229 are displayed sequentially.
- If the value (SPD#226, #227, #228, or #229) is 50 or more, perform the VBS Correction Procedure in Step E.

B-30. Prepare the the copy which was made in step B-28 and the standard color patch copy sample. Compare the color patch density of the copy with the standard color patch copy sample color by color. Then adjust the TD or the ND as follows:

- The color patch density of the copy is [*1]——— compared with the standard color patch copy sample.

*1: Too light :	decrease the TD (ND) value by 3 or 4.
Light :	decrease the TD (ND) value by 1 or 2.
Almost the same:	No adjustment is necessary.
Dark:	increase the TD (ND) value by 1 or 2.
Too dark:	increase the TD (ND) value by 3 or 4.

For your reference
Bk: SPD#490 (TD - Bk) or SPD#495 (ND - Bk)
M: SPD#491 (TD - M) or SPD#496 (ND - M)
Y: SPD#492 (TD - Y) or SPD#497 (ND - Y)
C: SPD#493 (TD - C) or SPD#498 (ND - C)

NOTE: Adjust the TD value first. Only if the TD value is not adjustable (the TD value is 0 or 30), adjust the ND value.

B-31. Read the TD value and the ND value for each color and write them in the "Table 1-1 (TD Data)" and "Table 1-2 (ND Data)".

- SPD#490 (TD data - Bk)
- SPD#491 (TD data - M)
- SPD#492 (TD data - Y)
- SPD#493 (TD data - C)
- SPD#495 (ND data - Bk)
- SPD#496 (ND data - M)
- SPD#497 (ND data - Y)
- SPD#498 (ND data - C)

B-32. If the density of all the color patch patterns are within the standard, this means you did not change the TD or ND value in step 30, then go to step C-1 (LD power adjustment). Otherwise, go to step B-33.

B-33. Perform a free run of 80 scans.

- Set A4/81/2" x 11" sideways paper in the upper cassette.
- Put the C-4 test chart face down on the exposure glass. (The four-color gradation are must be at the right hand side of the exposure glass.)
- Set SP#01 for the free run model.
- Set SPD#10 to H. (Free run will automatically stop after 80 scans.)
- Press the start key.
- After finishing the free run, press the clear modes key 3 times to clear the free run mode.

B-34. Perform Vk compensation and make one copy.

- Set SPD#225 to 015. (Vk compensation for all colors.)
- Press the # key while pressing the ◇ key.
- Set SPD#082 to H (Color Patch) after finishing the Vk compensation.

Replacement Adjustment

- Make one copy in A3/11" x 17" or A4/81/2" x 11" size of a C-4 chart.
- Write step number "B-34" on the copy. This copy will be used in step B-36.

B-35. Read the VBS detected value for each color and write them in the "Table 1-5 (VBS Data)".

- Set SPD#91 to H (VBS compensation detected value monitor - batch processing)
  The values of SPD#226, #227, #228, and #229 are displayed sequentially.
- If the value (SPD#226, #227, #228, or #229) is 50 or more, perform the VBS Correction Procedure in Step E.

B-36. Prepare the the copy which was made in step B-36 and the standard color patch copy sample. Compare the color patch density of the copy with the standard color patch copy sample color by color. Then adjust the TD or the ND as follows:

- The color patch density of the copy is *1——— compared with the standard color patch copy sample.

*1:	Too light :	decrease the TD (ND) value by 3 or 4.
	Light :	decrease the TD (ND) value by 1 or 2.
	Almost the same:	No adjustment is necessary.
	Dark:	increase the TD (ND) value by 1 or 2.
	Too dark:	increase the TD (ND) value by 3 or 4.

For your reference
Bk: SPD#490 (TD - Bk) or SPD#495 (ND - Bk)
M: SPD#491 (TD - M) or SPD#496 (ND - M)
Y: SPD#492 (TD - Y) or SPD#497 (ND - Y)
C: SPD#493 (TD - C) or SPD#498 (ND - C)

NOTE: Adjust the TD value first. Only if the TD value is not adjustable (the TD value is 0 or 30), adjust the ND value.

B-37. Read the TD value and the ND value for each color and write them in the "Table 1-1 (TD Data)" and "Table 1-2 (ND Data)".

- SPD#490 (TD data - Bk)
- SPD#491 (TD data - M)
- SPD#492 (TD data - Y)
- SPD#493 (TD data - C)
- SPD#495 (ND data - Bk)
- SPD#496 (ND data - M)
- SPD#497 (ND data - Y)
- SPD#498 (ND data - C)

B-38. If the density of all the color patch patterns are within the standard, this means you did not change the TD or ND value in step 36, then go to step C-1 (LD power adjustment). Otherwise, go to step B-39

B-39. Perform a free run of 80 scans.

- Set A4/8 1/2" x 11" sideways paper in the upper cassette.
- Put the C-4 test chart face down on the exposure glass. (The four-color gradation are must be at the right hand side of the exposure glass.)
- Set SP#01 for the free run model.
- Set SPD#10 to H. (Free run will automatically stop after 80 scans.)
- Press the start key.
- After finishing the free run, press the clear modes key 3 times to clear the free run mode.

B-40. Perform Vk compensation and make one copy.

- Set SPD#225 to 015. (Vk compensation for all colors.)
- Press the [#] key while pressing the [◇] key.
- Set SPD#082 to H (Color Patch) after finishing the Vk compensation.
- Make one copy in A3/11" x 17" or A4/8 1/2" x 11" size of a C-4 chart.
- Write step number "B-40" on the copy. This copy will be used in step B-42.

B-41. Read the VBS detected value for each color and write them in the "Table 1-5 (VBS Data)".

- Set SPD#91 to H (VBS compensation detected value monitor - batch processing)
  The values of SPD#226, #227, #228, and #229 are displayed sequentially.
- If the value (SPD#226, #227, #228, or #229) is 50 or more, perform the VBS Correction Procedure in Step E.

B-42. Prepare the the copy which was made in step B-40 and the standard color patch copy sample. Compare the color patch density of the copy with the standard color patch copy sample color by color. Then adjust the TD or the ND as follows:

- The color patch density of the copy is [*1]———— compared with the standard color patch copy sample.

Replacement Adjustment

*1: Too light :	decrease the TD (ND) value by 3 or 4.
Light :	decrease the TD (ND) value by 1 or 2.
Almost the same:	No adjustment is necessary.
Dark:	increase the TD (ND) value by 1 or 2.
Too dark:	increase the TD (ND) value by 3 or 4.

For your reference
Bk: SPD#490 (TD - Bk) or SPD#495 (ND - Bk)
M: SPD#491 (TD - M) or SPD#496 (ND - M)
Y: SPD#492 (TD - Y) or SPD#497 (ND - Y)
C: SPD#493 (TD - C) or SPD#498 (ND - C)

NOTE: Adjust the TD value first. Only if the TD value is not adjustable (the TD value is 0 or 30), adjust the ND value.

B-43. Read the TD value and the ND value for each color and write them in the "Table 1-1 (TD Data)" and "Table 1-2 (ND Data)".

- SPD#490 (TD data - Bk)
- SPD#491 (TD data - M)
- SPD#492 (TD data - Y)
- SPD#493 (TD data - C)
- SPD#495 (ND data - Bk)
- SPD#496 (ND data - M)
- SPD#497 (ND data - Y)
- SPD#498 (ND data - C)

B-44. If the density of all the color patch patterns are within the standard, this means you did not change the TD or ND value in step 42, then go to step C-1 (LD power adjustment). Otherwise, go to step B-45.

B-45. Go back to step B-21.

C. LD Power Control Data Adjustment

C-1. Change the LD power control data according to the following procedure.

- Read the LD power control data for each color and write them in the "Table 2-1 (LD Power Control Data Adjustment ③)", "Before changing" SPD#315, SPD#316, SPD#317, SPD#318.
- Read the TD value and the ND value for each color and write them down in the "Table 2-1 ① (LD Power Control Data Adjustment)".

- SPD#490 (TD data - Bk)
- SPD#491 (TD data - M)
- SPD#492 (TD data - Y)
- SPD#493 (TD data - C)
- SPD#495 (ND data - Bk)
- SPD#496 (ND data - M)
- SPD#497 (ND data - Y)
- SPD#498 (ND data - C)

- Add the TD value to the ND value for each color and write the result down in the "Table 2-1 ② (LD Power Control Data Adjustment)".

NOTE: Do not change the values in SPD#490 ~ 493, #495 ~ 498.

- If the result of TD value + ND value is:

0 ~ 13, decrease the relevant LD Power Control value *by 2.
14 ~ 21, decrease the relevant LD Power Control value *by 1.
22 ~ 34, No adjustment is necessary.
35 ~ 42, increase the relevant LD Power Control value *by 1.
43 ~ 50, increase the relevant LD Power Control value *by 2.
51 ~ 54, increase the relevant LD Power Control value *by 3.

* the relevant LD Power Control value.
Bk: SPD#315 (LD Power Control Data - Bk)
M: SPD#316 (LD Power Control Data - M)
Y: SPD#317 (LD Power Control Data - Y)
C: SPD#318 (LD Power Control Data - C)

- Read the relevant LD power control value and write the new value in the "Table 2-1 (LD Power Control Data Adjustment 3)".

C-2. If you did not change the LD power control value (SPD#315, #316, #317 or #318) in step C-1, go to step C-7. Otherwise, go to step C-3.

C-3. Turn the main switch off and on.

C-4. Make a copy of the C-4 test chart on A4/8.5" x 11" sideways paper.

C-5. Only read the Vsp target and Vsp detected for the same color as the LD power control value which was changed in step C-1, and write them in the "Table 2-2 (Vsp Target Data)" and the "Table 2-3 (Vsp Detected Data)".

- SPD#455 (Vsp target - Bk)
- SPD#456 (Vsp target- M)
- SPD#457 (Vsp target - Y)
- SPD#458 (Vsp target- C)
- SPD#460 (Vsp detected - Bk)
- SPD#461 (Vsp detected- M)
- SPD#462 (Vsp detected - Y)
- SPD#463 (Vsp detected - C)

C-6. Compare the relevant Vsp target value to the Vsp detected value for each color. If the value is different, adjust the TD or ND to fit the Vsp target value to the Vsp detected value.
The Vsp target value consists of TD, ND, CD, and Vmin. The Vsp target value will be changed immediately when the TD or ND value is changed.

Example
SPD#455 (Vsp target - Bk) is 80.
SPD#460 (Vsp detected - Bk) is 70.
In this case, decrease the value of SPD#490 (TD data - Bk) by 1. But, the value of SPD#455 is still 80. Then, decrease the value of SPD#490 by 1 again. We get a value of "70" for SPD#455 which is the same as that for SPD#460.

For your reference.

- $\text{Vsp target} = \text{Vmin} + \dfrac{8(\mathbf{ND} + \mathbf{TD}) + \text{CD} - 80}{800}(4.0 - \text{Vmin})$

- SPD#490 (TD data - Bk)
- SPD#491 (TD data - M)
- SPD#492 (TD data - Y)
- SPD#493 (TD data - C)
- SPD#495 (ND data - Bk)
- SPD#496 (ND data - M)
- SPD#497 (ND data - Y)
- SPD#498 (ND data - C)

NOTE: Adjust the TD value first. Only if the TD value is not adjustable (the TD value is 0 or 30), adjust the ND value. Confirm data is entered correctly by confirming that the target data now matches the detected value.

C-7. Perform the "Self Check Mode".

- Set SPD#525 to #015 (forced self check).
- Press the # key while pressing the  key to start.

C-8. Read the VL1 values for each color and write them in the "Table 2-4 (VL1 Data)".

C-9.
- Compare the V_{L1} values in the "Table 2-4 (V_{L1} Data)" with the OK range of the V_{L1} values which are shown at the right hand side of the "Table 2-4 (V_{L1} Data)".
- If all the V_{L1} values are in the OK range of the V_{L1} values, go to step D-1.
- If all or some of the V_{L1} values are out of the OK range of the V_{L1} values, go to step C-10.

C-10. Change the LD control values only for the colors which were not in the OK range of the V_{L1} values.
See the "Table 2-4 (V_{L1} Data)".

- If the V_{L1} value is above the OK range of the V_{L1} value, increase the LD control value by 1.
- If the V_{L1} value is below the OK range of the V_{L1} value, decrease the LD control value by 1.
  SPD#510 (V_{L1} - Bk) ➔ SPD#315 (LD power control - Bk)
  SPD#511 (V_{L1} - M) ➔ SPD#316 (LD power control - M)
  SPD#512 (V_{L1} - Y) ➔ SPD#317 (LD power control - Y)
  SPD#513 (V_{L1} - C) ➔ SPD#318 (LD power control - C)
- Only write the values which were changed in the "Table 3-1 (LD Power Control Data)".

C-11. Turn the main switch off and on.
Wait until the toner supply motor stops, then go to step C-12.

C-12. Perform the "Self Check Mode".

- Set SPD#525 to #015 (forced self check).
- Press the # key while pressing the ◇ key to start.

C-13. Only read the V_{L1} values which were out of the OK range in step C-8, and write them in the "Table 2-4 (V_{L1} Data)".
SPD#510 (V_{L1} - Bk)
SPD#511 (V_{L1} - M)
SPD#512 (V_{L1} - Y)
SPD#513 (V_{L1} - C)

C-14. For the same color, if both the V_{L1} values in step C-8 and C-13 are out of the OK range, go to step C-15. Otherwise, go to C-30. See the "Table 2-4 (V_{L1} Data)".

NOTE: If V_{L1} value gets into the OK range once at least, you don't need to perform any more adjustment on that color in step C.

C-15. • If the V_{L1} value is below the OK range, decrease the LD power control value by 1, then write it in the "Table 3-1 (LD Power Control Data)".
SPD#315 (LD Power Control Data - Bk)
SPD#316 (LD Power Control Data - M)
SPD#317 (LD Power Control Data - Y)
SPD#318 (LD Power Control Data - C)

• If the V_{L1} value is above OK range, use up the excess toner for the relevant color, using the following procedure.
Consuming excess toner.

1) Set relevant SPD modes to H to stop toner supply.
SPD#345: Bk, #346: M, #347: Y, #348: C
2) Set the 16 gradation step pattern mode. (SP#21-2)
3) Set relevant color data in SPD#50. See Note 2.
4) make 4 copies (A3/11" x 17" size).
5) Turn off and on the main switch to clear modes selected in step 1) to 3).

C-16. Turn the main switch off and on.
Wait until the toner supply motor stops, then go to step C-17.

C-17. Perform the "Self Check Mode".

• Set SPD#525 to #015 (forced self check).
• Press the # key while pressing the ◇ key to start.

C-18. Only read the V_{L1} values which were out of the OK range in step C-13, and write them in the "V_{L1} Data Table".
SPD#510 (V_{L1} - Bk)
SPD#511 (V_{L1} - M)
SPD#512 (V_{L1} - Y)
SPD#513 (V_{L1} - C)

C-19. For the same color, if all the V_{L1} values in step C-8, C-13, and C-18 are out of the OK range, go to step C-20. Otherwise, go to C-30. See the "V_{L1} Data Table".

NOTE: If V_{L1} value gets into the OK range once at least, you don’t need to perform any more adjustment on that color in step C.

C-20.
- If the V_{L1} value is below the OK range, decrease the LD power control value by 1, then write it in the "Table 3-1 (LD Power Control Data)".
  SPD#315 (LD Power Control Data - Bk)
  SPD#316 (LD Power Control Data - M)
  SPD#317 (LD Power Control Data - Y)
  SPD#318 (LD Power Control Data - C)
- If the V_{L1} value is above OK range, use up the excess toner for the relevant color, using the following procedure.
  Consuming excess toner.
  1) Set relevant SPD modes to H to stop toner supply.
     SPD#345: Bk, #346: M, #347: Y, #348: C
  2) Set the 16 gradation step pattern mode. (SP#21-2)
  3) Set relevant color data in SPD#50. See Note 2.
  4) make 4 copies (A3/11" x 17" size).
  5) Turn off and on the main switch to clear modes selected in step 1) to 3).

C-21. Turn the main switch off and on.
Wait until the toner supply motor stops, then go to step C-22.

C-22. Perform the "Self Check Mode".
- Set SPD#525 to #015 (forced self check).
- Press the $\boxed{\#}$ key while pressing the $\boxed{\Diamond}$ key to start.

C-23. Only read the V_{L1} values which were out of the OK range in step C-18, and write them in the "V_{L1} Data Table".
SPD#510 (V_{L1} - Bk)
SPD#511 (V_{L1} - M)
SPD#512 (V_{L1} - Y)
SPD#513 (V_{L1} - C)

C-24. For the same color, if all the V_{L1} values in step C8, C-13, C-18, and C-23 are out of the OK range, go to step C-25. Otherwise, go to C-30. See the "V_{L1} Data Table".

NOTE: If V_{L1} value gets into the OK range once at least, you don't need to perform any more adjustment on that color in step C.

C-25.
- If the V_{L1} value is below the OK range, decrease the LD power control value by 1, then write it in the "Table 3-1 (LD Power Control Data)" of the "TD Check Sheet No. 3".
  SPD#315 (LD Power Control Data - Bk)
  SPD#316 (LD Power Control Data - M)
  SPD#317 (LD Power Control Data - Y)
  SPD#318 (LD Power Control Data - C)
- If the V_{L1} value is above the OK range, increase the LD power control value by 1, then write it in the "LD Power Control Data Adjustment Table".

C-26. Turn the main switch off and on.
Wait until the toner supply motor stops, then go to step C-27.

C-27. Perform the "Self Check Mode".
- Set SPD#525 to #015 (forced self check).
- Press the $\boxed{\#}$ key while pressing the $\boxed{\Diamond}$ key to start.

C-28. Only read the V_{L1} values which were out of the OK range in step C-23, and write them in the "Table 2-4 (V_{L1} Data)".
SPD#510 (V_{L1} - Bk)
SPD#511 (V_{L1} - M)
SPD#512 (V_{L1} - Y)
SPD#513 (V_{L1} - C)

C-29. For the same color, if all the V_{L1} values in step C-8, C-13, C-18, C-23, and C-28 are out of the OK range, go to step C-15. Otherwise, go to C-30. See the "Table 2-4 (V_{L1} Data)".

NOTE: If V_{L1} value gets into the OK range once at least, you don't need to perform any more adjustment on that color in step C.

C-30. See the "Table 2-1 (LD Power Control Data Adjustment ③)" and the "Table 3-1 (LD Power Control Data)". Confirm which color's LD power control values were changed from the values in the "After changing column of the "Table 2-1 (LD Power Control Data Adjustment ③)". From step C-31 to C-33, only these colors should be adjusted.

C-31. Make a copy of C-4 chart in A4/8 1/2" x 11" sideways paper.

C-32. Read the relevant Vsp target and the relevant Vsp detected values and write them in the "Table 3-2 (Vsp Target Data)" and "Table 3-3 (Vsp Detected Data)".

- SPD#455 (Vsp target - Bk)
- SPD#456 (Vsp target - M)
- SPD#457 (Vsp target - Y)
- SPD#458 (Vsp target - C)
- SPD#460 (Vsp detected - Bk)
- SPD#461 (Vsp detected - M)
- SPD#462 (Vsp detected - Y)
- SPD#463 (Vsp detected - C)

C-33. Compare the Vsp target value to the Vsp detected value for each color. If the value is different, adjust the TD or ND to fit the Vsp target value to the Vsp detected value.
The Vsp target value consists of TD, ND, CD, and Vmin. The Vsp target value will be changed immediately when the TD or ND value is changed.

Example
SPD#455 (Vsp target - Bk) is 80.
SPD#460 (Vsp detected - Bk) is 70.
In this case, decrease the value of SPD#490 (TD data - Bk) by 1. But, the value of SPD#455 is still 80. Then, decrease the value of SPD#490 by 1 again. We get a value of "70" for SPD#455 which is the same as that for SPD#460.

For your reference.

- Vsp target = $\mathrm{Vmin} + \dfrac{8(\mathbf{ND} + \mathbf{TD}) + \mathrm{CD} - 80}{800}(4.0 - \mathrm{Vmin})$

- SPD#490 (TD data - Bk)
- SPD#491 (TD data - M)
- SPD#492 (TD data - Y)
- SPD#493 (TD data - C)
- SPD#495 (ND data - Bk)
- SPD#496 (ND data - M)
- SPD#497 (ND data - Y)
- SPD#498 (ND data - C)

NOTE: Adjust the TD value first. Only if the TD value is not adjustable the TD value is 0 or 30), adjust the ND value.

Replacement Adjustment

D. Fine TD Adjustment

D-1. Read the following values and write them in the "Table 4-1 (Fine TD Adjustment)".

- SPD#490 (TD data - Bk)
- SPD#491 (TD data - M)
- SPD#492 (TD data - Y)
- SPD#493 (TD data - C)
- SPD#495 (ND data - Bk)
- SPD#496 (ND data - M)
- SPD#497 (ND data - Y)
- SPD#498 (ND data - C)

- SPD#520 (T_{GRD} detected - Bk)
- SPD#521 (T_{GRD} detected - M)
- SPD#522 (T_{GRD} detected - Y)
- SPD#523 (T_{GRD} detected - C)

- Set SPD#91 to H (V_{BS} Compensation Detected Value - Batch Processing)
  SPD#226, SPD#227, SPD#228 and SPD#229 will be displayed sequentially.
- Set SPD#92 to H (V_{SG} Decreasing Counter - Batch Processing)
  SPD#865, SPD#866, SPD#867, SPD#868, SPD#885, SPD#886, SPD#887, and SPD#888 will be displayed sequentially.

D-2. Put the color patch pattern on the trailing edge of the sample copy.

- Set SPD#82 to H (color patch - 15 mm).

D-3. Perform a free run of 80 scans.

- Set A4/8 1/2" x 11" sideways paper in the upper cassette.
- Put the C-4 test chart face down on the exposure glass. (The four-color gradation of the C-4 test chart are must be at the right hand side of the exposure glass.)
- Set SP#01 for the free run model.
- Set SPD#10 to H. (Free run will automatically stop after 80 scans.)
- Press the start key.
- After finishing the free run, press the clear modes key 3 times to clear the free run mode.

D-4. Make one copy in A3/11" x 17" or A4/8 1/2" x 11" size of a C-4 chart.

D-5. Write Step number "D-4" on the copy.

D-6. Perform the "Self Check Mode".

- Set SPD#525 to #015.
- Press the # key while pressing the ◇ key to start.

D-7. Read the following values and write them in the "Table 4-1 (Fine TD Adjustment)".

- SPD#520 (TGRD detected - Bk)
- SPD#521 (TGRD detected - M)
- SPD#522 (TGRD detected - Y)
- SPD#523 (TGRD detected - C)

- Set SPD#91 to H (VBS Compensation Detected Value - Batch Processing)
SPD#226, SPD#227, SPD#228 and SPD#229 will be displayed sequentially.
- Set SPD#92 to H (VSG Decreasing Counter - Batch Processing)
SPD#865, SPD#866, SPD#867, SPD#868, SPD#885, SPD#886, SPD#887, and SPD#888 will be displayed sequentially.

D-8. Read the VBS detected value for each color in the step D-7 column of "Table 4-1 (Fine TD Adjustment)".

- If the value (SPD#226, #227, #228, or #229) is 50 or more, perform the VBS Correction Procedure in Step E.
- For those colors where the TD or the ND values have been changed, write the appropriate data in column D-7, of TD Check Sheet No. 4.

NOTE: If some colors have been adjusted using the VBS Correction Procedure in step D-8, do not perform any adjustment for these colors in step D-9 and step D-10.
However, you must perform steps D-9 and D-10 to the remaining colors (those colors that were not adjusted using the VBS Correction Procedure in step D-8).

D-9. Prepare the the copy which was made in step D-4 and the standard color patch copy sample. Compare the color patch density of the copy with the standard color patch copy sample color by color. Then adjust the TD or the ND as follows:

- The color patch density of the copy is *1——— compared with the standard color patch copy sample.

*1:	Too light :	decrease the TD (ND) value by 3 or 4.
	Light :	decrease the TD (ND) value by 1 or 2.
	Almost the same:	No adjustment is necessary.
	Dark:	increase the TD (ND) value by 1 or 2.
	Too dark:	increase the TD (ND) value by 3 or 4.

Replacement Adjustment

For your reference
Bk: SPD#490 (TD - Bk) or SPD#495 (ND - Bk)
M: SPD#491 (TD - M) or SPD#496 (ND - M)
Y: SPD#492 (TD - Y) or SPD#497 (ND - Y)
C: SPD#493 (TD - C) or SPD#498 (ND - C)

- For those colors where the TD or the ND values have been changed, write the appropriate data in column D-7, of TD Check Sheet No. 4.

NOTE: Adjust the TD value first. Only if the TD value is not adjustable (the TD value is 0 or 30), adjust the ND value.

If the "VBS Correction Procedure" in step D-8 or the "TD/ND Adjustment" in step D-9 was performed for some colors, do not perform any adjustment in step D-10 for these colors. However, you must perform step D-10 to the remaining colors.

D-10.
- Check the difference between the "VSG Abnormal Decreasing Counter" value in step D-7 and D-1 for each color.
  SPD#865 (VSG Abnormal Decreasing Counter - Bk)
  SPD#866 (VSG Abnormal Decreasing Counter - M)
  SPD#867 (VSG Abnormal Decreasing Counter - Y)
  SPD#868 (VSG Abnormal Decreasing Counter - C)
- Check the difference between the "VSG Decreasing 2up Counter" value in step D-7 and D-1 for each color.
  SPD#885 (VSG Abnormal 2up Counter - Bk)
  SPD#886 (VSG Abnormal 2up Counter - M)
  SPD#887 (VSG Abnormal 2up Counter - Y)
  SPD#888 (VSG Abnormal 2up Counter - C)
- If some of the above values are different, change the TD value according to the following table.

		Difference between the "VSG Abnormal Decreasing Counter" value in step D-1 and D-7.		
		0 ~ 1	2 ~ 7	8 ~
Difference between the "VSG 2up Counter" value in step D-1 and D-7.	0	No adjustment necessary	Increase TD value by 1	Increase TD value by 2
	1 ~ 3	Increase TD value by 1	Increase TD value by 2	Increase TD value by 3
	4 ~	Increase TD value by 2	Increase TD value by 3	Increase TD value by 4

- For those colors where the TD or the ND values have been changed, write the appropriate data in column D-7, of TD Check Sheet No. 4.

D-11. Perform a free run of 80 scans.

- Set A4/81/2" x 11" sideways paper in the upper cassette.
- Put the C-4 test chart face down on the exposure glass. (The four-color gradation of the C-4 test chart are must be at the right hand side of the exposure glass.)
- Set SP#01 for the free run model.
- Set SPD#10 to H. (Free run will automatically stop after 80 scans.)
- Press the start key.
- After finishing the free run, press the clear modes key 3 times to clear the free run mode.

D-12. Make one copy in A3/11" x 17" or A4/81/2" x 11" size of a C-4 chart and write step number "D-12" on the copy.

D-13. Perform the "Self Check Mode".

- Set SPD#525 to #015.
- Press the # key while pressing the ◇ key to start.

D-14. Read the following values and write them in the "Table 4-1 (Fine TD Adjustment)".

- SPD#520 (TGRD detected - Bk)
- SPD#521 (TGRD detected - M)
- SPD#522 (TGRD detected - Y)
- SPD#523 (TGRD detected - C)

- Set SPD#91 to H (VBS Compensation Detected Value - Batch Processing)
  SPD#226, SPD#227, SPD#228 and SPD#229 will be displayed sequentially.
- Set SPD#92 to H (VSG Decreasing Counter - Batch Processing)
  SPD#865, SPD#866, SPD#867, SPD#868, SPD#885, SPD#886, SPD#887, and SPD#888 will be displayed sequentially.

D-15. Read the VBS detected value for each color in the step D-14 column of the "Table 4-1 (Fine TD Adjustment)".

- If the value (SPD#226, #227, #228, or #229) is 50 or more, perform the VBS Correction Procedure in Step E.
- For those colors where the TD or the ND values have been changed, write the appropriate data in column D-14, of TD Check Sheet No. 4.

Replacement Adjustment

NOTE: If some colors have been adjusted using the VBS Correction Procedure in step D-15, do not perform any adjustment for these colors in step D-16 and step D-17. However, you must perform steps D-16 and D-17 to the remaining colors.

D-16. Prepare the the copy which was made in step D-12 and the standard color patch copy sample. Compare the color patch density of the copy with the standard color patch copy sample color by color. Then adjust the TD or the ND as follows:

- The color patch density of the copy is *1——— compared with the standard color patch copy sample.

*1:

Too light :	decrease the TD (ND) value by 3 or 4.
Light :	decrease the TD (ND) value by 1 or 2.
Almost the same:	No adjustment is necessary.
Dark:	increase the TD (ND) value by 1 or 2.
Too dark:	increase the TD (ND) value by 3 or 4.

For your reference
Bk: SPD#490 (TD - Bk) or SPD#495 (ND - Bk)
M: SPD#491 (TD - M) or SPD#496 (ND - M)
Y: SPD#492 (TD - Y) or SPD#497 (ND - Y)
C: SPD#493 (TD - C) or SPD#498 (ND - C)

- For those colors where the TD or the ND values have been changed, write the appropriate data in column D-14, of TD Check Sheet No. 4.

NOTE: Adjust the TD value first. Only if the TD value is not adjustable (the TD value is 0 or 30), adjust the ND value.

If the "VBS Correction Procedure" in step D-15 or the "TD/ND Adjustment" in step D-16 was performed for some colors, do not perform any adjustment in step D-17 for these colors.
You must perform D-17 to the remaining color.

D-17.
- Check the difference between the "VSG Abnormal Decreasing Counter" value in step D-14 and D-7 for each color.
  SPD#865 (VSG Abnormal Decreasing Counter - Bk)
  SPD#866 (VSG Abnormal Decreasing Counter - M)
  SPD#867 (VSG Abnormal Decreasing Counter - Y)
  SPD#868 (VSG Abnormal Decreasing Counter - C)
- Check the difference between the "VSG Decreasing 2up Counter" value in step D-14 and D-7 for each color.
  SPD#885 (VSG Abnormal 2up Counter - Bk)
  SPD#886 (VSG Abnormal 2up Counter - M)

SPD#887 (V_{SG} Abnormal 2up Counter - Y)
SPD#888 (V_{SG} Abnormal 2up Counter - C)

- If some of the above values are different, change the TD value according to the following table.

		Difference between the "V_{SG} Abnormal Decreasing Counter" value in step D-7 and D-14.		
		0 ~ 1	2 ~ 7	8 ~
Difference between the "V_{SG} 2up Counter" value in step D-7 and D-14	0	No adjustment necessary	Increase TD value by 1	Increase TD value by 2
	1 ~ 3	Increase TD value by 1	Increase TD value by 2	Increase TD value by 3
	4 ~	Increase TD value by 2	Increase TD value by 3	Increase TD value by 4

- For those colors where the TD or the ND values have been changed, write the appropriate data in column D-14, of TD Check Sheet No. 4.

D-18. Perform a free run of 80 scans.

- Set A4/8$\frac{1}{2}$" x 11" sideways paper in the upper cassette.
- Put the C-4 test chart face down on the exposure glass. (The four-color gradation of the C-4 test chart are must be at the right hand side of the exposure glass.)
- Set SP#01 for the free run model.
- Set SPD#10 to H. (Free run will automatically stop after 80 scans.)
- Press the start key.
- After finishing the free run, press the clear modes key 3 times to clear the free run mode.

D-19. Make one copy in A3/11" x 17" or A4/8$\frac{1}{2}$" x 11" size of a C-4 chart and write step number "D-19" on the copy.

D-20. Perform the "Self Check Mode".

- Set SPD#525 to #015.
- Press the # key while pressing the ◇ key to start.

D-21. Read the following values and write them in the "Table 4-1 (Fine TD Adjustment)".

- SPD#520 (T_{GRD} detected - Bk)
- SPD#521 (T_{GRD} detected - M)
- SPD#522 (T_{GRD} detected - Y)

- SPD#523 (TGRD detected - C)
- Set SPD#91 to H (VBS Compensation Detected Value - Batch Processing)
  SPD#226, SPD#227, SPD#228 and SPD#229 will be displayed sequentially.
- Set SPD#92 to H (VSG Decreasing Counter - Batch Processing)
  SPD#865, SPD#866, SPD#867, SPD#868, SPD#885, SPD#886, SPD#887, and SPD#888 will be displayed sequentially.

D-22. Read the VBS detected value for each color in the step D-21 column of the "Table 4-1 (Fine TD Adjustment)".

- If the value (SPD#226, #227, #228, or #229) is 50 or more, perform the VBS Correction Procedure in Step E.
- For those colors where the TD or the ND values have been changed, write the appropriate data in column D-21, of the TD Check Sheet No. 4.

NOTE: If some colors have been adjusted using the VBS Correction Procedure in step D-22, do not perform any adjustment for these colors in step D-23 and step D-24.

D-23. Prepare the the copy which was made in step D-19 and the standard color patch copy sample. Compare the color patch density of the copy with the standard color patch copy sample color by color. Then adjust the TD or the ND as follows:

- The color patch density of the copy is *1——— compared with the standard color patch copy sample.

*1: Too light :	decrease the TD (ND) value by 3 or 4.
Light :	decrease the TD (ND) value by 1 or 2.
Almost the same:	No adjustment is necessary.
Dark:	increase the TD (ND) value by 1 or 2.
Too dark:	increase the TD (ND) value by 3 or 4.

For your reference
Bk: SPD#490 (TD - Bk) or SPD#495 (ND - Bk)
M: SPD#491 (TD - M) or SPD#496 (ND - M)
Y: SPD#492 (TD - Y) or SPD#497 (ND - Y)
C: SPD#493 (TD - C) or SPD#498 (ND - C)

- For those colors where the TD or ND values have been changed, write the appropriate data in column D-21, of the TD Check Sheet No. 4.

NOTE: Adjust the TD value first. Only if the TD value is not adjustable (the TD value is 0 or 30), adjust the ND value.

If the "VBS Correction Procedure" in step D-22 or the "TD/ND Adjustment" in step D-23 was performed for some colors, do not perform any adjustment in step D-24 for these colors.

D-24.
- Check the difference between the "VSG Abnormal Decreasing Counter" value in step D-21 and D-14 for each color.
  SPD#865 (VSG Abnormal Decreasing Counter - Bk)
  SPD#866 (VSG Abnormal Decreasing Counter - M)
  SPD#867 (VSG Abnormal Decreasing Counter - Y)
  SPD#868 (VSG Abnormal Decreasing Counter - C)
- Check the difference between the "VSG Decreasing 2up Counter" value in step D-21 and D-14 for each color.
  SPD#885 (VSG Abnormal 2up Counter - Bk)
  SPD#886 (VSG Abnormal 2up Counter - M)
  SPD#887 (VSG Abnormal 2up Counter - Y)
  SPD#888 (VSG Abnormal 2up Counter - C)
- If some of the above values are different, change the TD value according to the following table.

		Difference between the "VSG Abnormal Decreasing Counter" value in step D-14 and D-21.		
		0 ~ 1	2 ~ 7	8 ~
Difference between the "VSG 2up Counter" value in step D-14 and D-21.	0	No adjustment necessary	Increase TD value by 1	Increase TD value by 2
	1 ~ 3	Increase TD value by 1	Increase TD value by 2	Increase TD value by 3
	4 ~	Increase TD value by 2	Increase TD value by 3	Increase TD value by 4

- For those colors where the TD or the ND values have been changed, write the appropriate data in column D-21, of TD Check Sheet No. 4.

D-25. If none of the TD data or ND data in the D-7, D-14, and D-21 columns has been changed, go to step D-75.

D-26. Perform a free run of 80 scans.
- Set A4/81/2" x 11" sideways paper in the upper cassette.
- Put the C-4 test chart face down on the exposure glass. (The four-color gradation of the C-4 test chart are must be at the right hand side of the exposure glass.)
- Set SP#01 for the free run model.
- Set SPD#10 to H. (Free run will automatically stop after 80 scans.)

- Press the start key.
- After finishing the free run, press the clear modes key 3 times to clear the free run mode.

D-27. Make one copy in A3/11" x 17" or A4/81/2" x 11" size of a C-4 chart and write step number "D-27" on the copy.

D-28. Perform the "Self Check Mode".

- Set SPD#525 to #015.
- Press the $\boxed{\#}$ key while pressing the $\boxed{\Diamond}$ key to start.

D-29. Read the following values and write them in the "Table 4-1 (Fine TD Adjustment)".

- SPD#520 (TGRD detected - Bk)
- SPD#521 (TGRD detected - M)
- SPD#522 (TGRD detected - Y)
- SPD#523 (TGRD detected - C)

- Set SPD#91 to H (VBS Compensation Detected Value - Batch Processing)
  SPD#226, SPD#227, SPD#228 and SPD#229 will be displayed sequentially.
- Set SPD#92 to H (VSG Decreasing Counter - Batch Processing)
  SPD#865, SPD#866, SPD#867, SPD#868, SPD#885, SPD#886, SPD#887, and SPD#888 will be displayed sequentially.

D-30. Read the VBS detected value for each color in the step D-29 column of the "Table 4-1 (Fine TD Adjustment)".

- If the value (SPD#226, #227, #228, or #229) is 50 or more, perform the VBS Correction Procedure in Step E.
- For those colors where the TD or the ND values have been changed, write the appropriate data in column D-29, of TD Check Sheet No. 4.

NOTE: If some colors have been adjusted using the VBS Correction Procedure in step D-30, do not perform any adjustment for these colors in step D-31 and step D-32. However, you must perform steps D-31 and D-32 to the remaining colors.

D-31. Prepare the the copy which was made in step D-27 and the standard color patch copy sample. Compare the color patch density of the copy with the standard color patch copy sample color by color. Then adjust the TD or the ND as follows:

- The color patch density of the copy is *1——— compared with the standard color patch copy sample.

*1:	Too light :	decrease the TD (ND) value by 3 or 4.
	Light :	decrease the TD (ND) value by 1 or 2.
	Almost the same:	No adjustment is necessary.
	Dark:	increase the TD (ND) value by 1 or 2.
	Too dark:	increase the TD (ND) value by 3 or 4.

For your reference
Bk: SPD#490 (TD - Bk) or SPD#495 (ND - Bk)
M: SPD#491 (TD - M) or SPD#496 (ND - M)
Y: SPD#492 (TD - Y) or SPD#497 (ND - Y)
C: SPD#493 (TD - C) or SPD#498 (ND - C)

- For those colors where the TD or the ND values have been changed, write the appropriate data in column D-29, of TD Check Sheet No. 4.

NOTE: Adjust the TD value first. Only if the TD value is not adjustable (the TD value is 0 or 30), adjust the ND value.

If the "VBS Correction Procedure" in step D-30 or the "TD/ND Adjustment" in step D-31 was performed for some colors, do not perform any adjustment in step D-32 for these colors. However, you must perform D-32 to the remaining colors.

Replacement Adjustment

D-32.
- Check the difference between the "VSG Abnormal Decreasing Counter" value in step D-29 and D-21 for each color.
  SPD#865 (VSG Abnormal Decreasing Counter - Bk)
  SPD#866 (VSG Abnormal Decreasing Counter - M)
  SPD#867 (VSG Abnormal Decreasing Counter - Y)
  SPD#868 (VSG Abnormal Decreasing Counter - C)
- Check the difference between the "VSG Decreasing 2up Counter" value in step D-29 and D-21 for each color.
  SPD#885 (VSG Abnormal 2up Counter - Bk)
  SPD#886 (VSG Abnormal 2up Counter - M)
  SPD#887 (VSG Abnormal 2up Counter - Y)
  SPD#888 (VSG Abnormal 2up Counter - C)
- If some of the above values are different, change the TD value according to the following table.

- For those colors where the TD or the ND values have been changed, write the appropriate data in column D-29, of TD Check Sheet No. 4.

D-33. If none of the TD data or ND data in the D-14, D-21, and D-29 columns has been changed, go to step D-75.

D-34. Perform a free run of 80 scans.

- Set A4/8½" x 11" sideways paper in the upper cassette.
- Put the C-4 test chart face down on the exposure glass. (The four-color gradation of the C-4 test chart are must be at the right hand side of the exposure glass.)
- Set SP#01 for the free run model.
- Set SPD#10 to H. (Free run will automatically stop after 80 scans.)
- Press the start key.
- After finishing the free run, press the clear modes key 3 times to clear the free run mode.

D-35. Make one copy in A3/11" x 17" or A4/8½" x 11" size of a C-4 chart and write step number "D-35" on the copy.

D-36. Perform the "Self Check Mode".

- Set SPD#525 to #015.
- Press the $\boxed{\#}$ key while pressing the $\boxed{\Diamond}$ key to start.

D-37. Read the following values and write them in the "Table 4-1(Fine TD Adjustment)".

- SPD#520 (T_{GRD} detected - Bk)
- SPD#521 (T_{GRD} detected - M)
- SPD#522 (T_{GRD} detected - Y)
- SPD#523 (T_{GRD} detected - C)

- Set SPD#91 to H (V_{BS} Compensation Detected Value - Batch Processing)
  SPD#226, SPD#227, SPD#228 and SPD#229 will be displayed sequentially.
- Set SPD#92 to H (V_{SG} Decreasing Counter - Batch Processing)
  SPD#865, SPD#866, SPD#867, SPD#868, SPD#885, SPD#886, SPD#887, and SPD#888 will be displayed sequentially.

D-38. Read the VBS detected value for each color in the step D-37 column of the "Table 4-1 (Fine TD Adjustment)".

- If the value (SPD#226, #227, #228, or #229) is 50 or more, perform the VBS Correction Procedure in Step E.
- For those colors where the TD or the ND values have been changed, write the appropriate data in column D-37, of TD Check Sheet No. 4.

NOTE: If some colors have been adjusted using the VBS Correction Procedure in step D-38, do not perform any adjustment for these colors in step D-39 and step D-40. However, you must perform steps D-39 and D-40 to the remaining colors.

D-39. Prepare the the copy which was made in step D-35 and the standard color patch copy sample. Compare the color patch density of the copy with the standard color patch copy sample color by color. Then adjust the TD or the ND as follows:

- The color patch density of the copy is *1——— compared with the standard color patch copy sample.

*1:	Too light :	decrease the TD (ND) value by 3 or 4.
	Light :	decrease the TD (ND) value by 1 or 2.
	Almost the same:	No adjustment is necessary.
	Dark:	increase the TD (ND) value by 1 or 2.
	Too dark:	increase the TD (ND) value by 3 or 4.

For your reference
Bk: SPD#490 (TD - Bk) or SPD#495 (ND - Bk)
M: SPD#491 (TD - M) or SPD#496 (ND - M)
Y: SPD#492 (TD - Y) or SPD#497 (ND - Y)
C: SPD#493 (TD - C) or SPD#498 (ND - C)

- For those colors where the TD or the ND values have been changed, write the appropriate data in column D-37, of TD Check Sheet No. 4.

NOTE: Adjust the TD value first. Only if the TD value is not adjustable (the TD value is 0 or 30), adjust the ND value.

If the "VBS Correction Procedure" in step D-38 or the "TD/ND Adjustment" in step D-39 was performed for some colors, do not perform any adjustment in step D-40 for these colors. However, you must perform step D-40 to the remaining colors.

D-40. • Check the difference between the "VSG Abnormal Decreasing Counter" value in step D-37 and D-29 for each color.
SPD#865 (VSG Abnormal Decreasing Counter - Bk)
SPD#866 (VSG Abnormal Decreasing Counter - M)

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SPD#867 (VSG Abnormal Decreasing Counter - Y)
SPD#868 (VSG Abnormal Decreasing Counter - C)

- Check the difference between the "VSG Decreasing 2up Counter" value in step D-37 and D-29 for each color.
  SPD#885 (VSG Abnormal 2up Counter - Bk)
  SPD#886 (VSG Abnormal 2up Counter - M)
  SPD#887 (VSG Abnormal 2up Counter - Y)
  SPD#888 (VSG Abnormal 2up Counter - C)
- If some of the above values are different, change the TD value according to the following table.

		Difference between the "VSG Abnormal Decreasing Counter" value in step D-29 and D-37.		
		0 ~ 1	2 ~ 7	8 ~
Difference between the "VSG 2up Counter" value in step D-29 and D-37.	0	No adjustment necessary	Increase TD value by 1	Increase TD value by 2
	1 ~ 3	Increase TD value by 1	Increase TD value by 2	Increase TD value by 3
	4 ~	Increase TD value by 2	Increase TD value by 3	Increase TD value by 4

- For those colors where the TD or the ND values have been changed, write the appropriate data in column D-37, of TD Check Sheet No. 4.

D-41. If none of the TD data or ND data in the D-21, D-29, and D-37 columns has been changed, go to step D-75.

D-42. Perform a free run of 80 scans.

- Set A4/81/2" x 11" sideways paper in the upper cassette.
- Put the C-4 test chart face down on the exposure glass. (The four-color gradation of the C-4 test chart are must be at the right hand side of the exposure glass.)
- Set SP#01 for the free run model.
- Set SPD#10 to H. (Free run will automatically stop after 80 scans.)
- Press the start key.
- After finishing the free run, press the clear modes key 3 times to clear the free run mode.

D-43. Make one copy in A3/11" x 17" or A4/81/2" x 11" size of a C-4 chart and write step number "D-43" on the copy.

D-44. Perform the "Self Check Mode".

- Set SPD#525 to #015.
- Press the # key while pressing the ◇ key to start.

D-45. Read the following values and write them in the "Table 4-1 (Fine TD Adjustment)".

- SPD#520 (TGRD detected - Bk)
- SPD#521 (TGRD detected - M)
- SPD#522 (TGRD detected - Y)
- SPD#523 (TGRD detected - C)
- Set SPD#91 to H (VBS Compensation Detected Value - Batch Processing)
  SPD#226, SPD#227, SPD#228 and SPD#229 will be displayed sequentially.
- Set SPD#92 to H (VSG Decreasing Counter - Batch Processing)
  SPD#865, SPD#866, SPD#867, SPD#868, SPD#885, SPD#886, SPD#887, and SPD#888 will be displayed sequentially.

D-46. Read the VBS detected value for each color in the step D-45 column of the "Table 4-1 (Fine TD Adjustment)".

- If the value (SPD#226, #227, #228, or #229) is 50 or more, perform the VBS Correction Procedure in Step E.
- For those colors where the TD or the ND values have been changed, write the appropriate data in column D-45, of TD Check Sheet No. 4.

NOTE: If some colors have been adjusted using the VBS Correction Procedure in step D-46, do not perform any adjustment for these colors in step D-47 and step D-48. However, you must perform steps D-47 and D-48 to the remaining colors.

D-47. Prepare the the copy which was made in step D-43 and the standard color patch copy sample. Compare the color patch density of the copy with the standard color patch copy sample color by color. Then adjust the TD or the ND as follows:

- The color patch density of the copy is *1——— compared with the standard color patch copy sample.

*1: Too light :	decrease the TD (ND) value by 3 or 4.
Light :	decrease the TD (ND) value by 1 or 2.
Almost the same:	No adjustment is necessary.
Dark:	increase the TD (ND) value by 1 or 2.
Too dark:	increase the TD (ND) value by 3 or 4.

For your reference
Bk: SPD#490 (TD - Bk) or SPD#495 (ND - Bk)
M: SPD#491 (TD - M) or SPD#496 (ND - M)
Y: SPD#492 (TD - Y) or SPD#497 (ND - Y)
C: SPD#493 (TD - C) or SPD#498 (ND - C)

Replacement Adjustment

- For those colors where the TD or the ND values have been changed, write the appropriate data in column D-45, of TD Check Sheet No. 4.

NOTE: Adjust the TD value first. Only if the TD value is not adjustable (the TD value is 0 or 30), adjust the ND value.

If the "VBS Correction Procedure" in step D-46 or the "TD/ND Adjustment" in step D-47 was performed for some colors, do not perform any adjustment in step D-48 for these colors. However, you must perform step D-48 to the remaining colors.

D-48.
- Check the difference between the "VSG Abnormal Decreasing Counter" value in step D-45 and D-37 for each color.
  SPD#865 (VSG Abnormal Decreasing Counter - Bk)
  SPD#866 (VSG Abnormal Decreasing Counter - M)
  SPD#867 (VSG Abnormal Decreasing Counter - Y)
  SPD#868 (VSG Abnormal Decreasing Counter - C)
- Check the difference between the "VSG Decreasing 2up Counter" value in step D-45 and D-37 for each color.
  SPD#885 (VSG Abnormal 2up Counter - Bk)
  SPD#886 (VSG Abnormal 2up Counter - M)
  SPD#887 (VSG Abnormal 2up Counter - Y)
  SPD#888 (VSG Abnormal 2up Counter - C)
- If some of the above values are different, change the TD value according to the following table.

		Difference between the "VSG Abnormal Decreasing Counter" value in step D-37 and D-45.		
		0 ~ 1	2 ~ 7	8 ~
Difference between the "VSG 2up Counter" value in step D-37 and D-45.	0	No adjustment necessary	Increase TD value by 1	Increase TD value by 2
	1 ~ 3	Increase TD value by 1	Increase TD value by 2	Increase TD value by 3
	4 ~	Increase TD value by 2	Increase TD value by 3	Increase TD value by 4

- For those colors where the TD or the ND values have been changed, write the appropriate data in column D-45, of TD Check Sheet No. 4.

D-49. If none of the TD data or ND data in the D-29, D-37, and D-45 columns has been changed, go to step D-75.

D-50. Perform a free run of 80 scans.

- Set A4/8$\frac{1}{2}$" x 11" sideways paper in the upper cassette.

- Put the C-4 test chart face down on the exposure glass. (The four-color gradation of the C-4 test chart are must be at the right hand side of the exposure glass.)
- Set SP#01 for the free run model.
- Set SPD#10 to H. (Free run will automatically stop after 80 scans.)
- Press the start key.
- After finishing the free run, press the clear modes key 3 times to clear the free run mode.

D-51. Make one copy in A3/11" x 17" or A4/81/2" x 11" size of a C-4 chart and write step number "D-51" on the copy.

D-52. Perform the "Self Check Mode".

- Set SPD#525 to #015.
- Press the # key while pressing the ◇ key to start.

D-53. Read the following values and write them in the "Table 4-1 (Fine TD Adjustment)".

- SPD#520 (TGRD detected - Bk)
- SPD#521 (TGRD detected - M)
- SPD#522 (TGRD detected - Y)
- SPD#523 (TGRD detected - C)
- Set SPD#91 to H (VBS Compensation Detected Value - Batch Processing)
  SPD#226, SPD#227, SPD#228 and SPD#229 will be displayed sequentially.
- Set SPD#92 to H (VSG Decreasing Counter - Batch Processing)
  SPD#865, SPD#866, SPD#867, SPD#868, SPD#885, SPD#886, SPD#887, and SPD#888 will be displayed sequentially.

D-54. Read the VBS detected value for each color in the step D-53 column of the "Table 4-1 (Fine TD Adjustment)".

- If the value (SPD#226, #227, #228, or #229) is 50 or more, perform the VBS Correction Procedure in Step E.
- For those colors where the TD or the ND values have been changed, write the appropriate data in column D-53, of TD Check Sheet No. 4.

NOTE: If some colors have been adjusted using the VBS Correction Procedure in step D-54, do not perform any adjustment for these colors in step D-55 and step D-56. However, you must perform steps D-55 and D-56 to the remaining colors.

D-55. Prepare the the copy which was made in step D-51 and the standard color patch copy sample. Compare the color patch density of the copy with the standard color patch copy sample color by color. Then adjust the TD or the ND as follows:

- The color patch density of the copy is *1——— compared with the standard color patch copy sample.

*1:	Too light :	decrease the TD (ND) value by 3 or 4.
	Light :	decrease the TD (ND) value by 1 or 2.
	Almost the same:	No adjustment is necessary.
	Dark:	increase the TD (ND) value by 1 or 2.
	Too dark:	increase the TD (ND) value by 3 or 4.

For your reference
Bk: SPD#490 (TD - Bk) or SPD#495 (ND - Bk)
M: SPD#491 (TD - M) or SPD#496 (ND - M)
Y: SPD#492 (TD - Y) or SPD#497 (ND - Y)
C: SPD#493 (TD - C) or SPD#498 (ND - C)

- For those colors where the TD or the ND values have been changed, write the appropriate data in column D-53, of TD Check Sheet No. 4.

NOTE: Adjust the TD value first. Only if the TD value is not adjustable (the TD value is 0 or 30), adjust the ND value.

If the "VBS Correction Procedure" in step D-54 or the "TD/ND Adjustment" in step D-55 was performed for some colors, do not perform any adjustment in step D-56 for these colors. However, you must perform step D-56 to the remaining colors.

D-56.
- Check the difference between the "VSG Abnormal Decreasing Counter" value in step D-53 and D-45 for each color.
  SPD#865 (VSG Abnormal Decreasing Counter - Bk)
  SPD#866 (VSG Abnormal Decreasing Counter - M)
  SPD#867 (VSG Abnormal Decreasing Counter - Y)
  SPD#868 (VSG Abnormal Decreasing Counter - C)
- Check the difference between the "VSG Decreasing 2up Counter" value in step D-53 and D-45 for each color.
  SPD#885 (VSG Abnormal 2up Counter - Bk)
  SPD#886 (VSG Abnormal 2up Counter - M)
  SPD#887 (VSG Abnormal 2up Counter - Y)
  SPD#888 (VSG Abnormal 2up Counter - C)
- If some of the above values are different, change the TD value according to the following table.

		Difference between the "VSG Abnormal Decreasing Counter" value in step D-45 and D-53.		
		0 ~ 1	2 ~ 7	8 ~
Difference between the "VSG 2up Counter" value in step D-45 and D-53.	0	No adjustment necessary	Increase TD value by 1	Increase TD value by 2
	1 ~ 3	Increase TD value by 1	Increase TD value by 2	Increase TD value by 3
	4 ~	Increase TD value by 2	Increase TD value by 3	Increase TD value by 4

- For those colors where the TD or the ND values have been changed, write the appropriate data in column D-53, of TD Check Sheet No. 4.

D-57. If none of the TD data or ND data in the D-37, D-45, and D-53 columns has been changed, go to step D-75.

D-58. Perform a free run of 80 scans.

- Set A4/81/2" x 11" sideways paper in the upper cassette.
- Put the C-4 test chart face down on the exposure glass. (The four-color gradation of the C-4 test chart are must be at the right hand side of the exposure glass.)
- Set SP#01 for the free run model.
- Set SPD#10 to H. (Free run will automatically stop after 80 scans.)
- Press the start key.
- After finishing the free run, press the clear modes key 3 times to clear the free run mode.

Replacement Adjustment

D-59. Make one copy in A3/11" x 17" or A4/81/2" x 11" size of a C-4 chart and write step number "D-59" on the copy.

D-60. Perform the "Self Check Mode".

- Set SPD#525 to #015.
- Press the # key while pressing the ◇ key to start.

D-61. Read the following values and write them in the "Table 4-1 (Fine TD Adjustment)".

- SPD#520 (TGRD detected - Bk)
- SPD#521 (TGRD detected - M)
- SPD#522 (TGRD detected - Y)
- SPD#523 (TGRD detected - C)

- Set SPD#91 to H (VBS Compensation Detected Value - Batch Processing)
  SPD#226, SPD#227, SPD#228 and SPD#229 will be displayed sequentially.
- Set SPD#92 to H (VSG Decreasing Counter - Batch Processing)
  SPD#865, SPD#866, SPD#867, SPD#868, SPD#885, SPD#886, SPD#887, and SPD#888 will be displayed sequentially.

D-62. Read the VBS detected value for each color in the step D-61 column of the "Table 4-1 (Fine TD Adjustment)".

- If the value (SPD#226, #227, #228, or #229) is 50 or more, perform the VBS Correction Procedure in Step E.
- For those colors where the TD or the ND values have been changed, write the appropriate data in column D-61, of TD Check Sheet No. 4.

NOTE: If some colors have been adjusted using the VBS Correction Procedure in step D-62, do not perform any adjustment for these colors in step D-63 and step D-64. However, you must perform steps D-63 and D-64 to the remaining colors.

D-63. Prepare the the copy which was made in step D-59 and the standard color patch copy sample. Compare the color patch density of the copy with the standard color patch copy sample color by color. Then adjust the TD or the ND as follows:

- The color patch density of the copy is *1——— compared with the standard color patch copy sample.

*1:	Too light :	decrease the TD (ND) value by 3 or 4.
	Light :	decrease the TD (ND) value by 1 or 2.
	Almost the same:	No adjustment is necessary.
	Dark:	increase the TD (ND) value by 1 or 2.
	Too dark:	increase the TD (ND) value by 3 or 4.

For your reference
Bk: SPD#490 (TD - Bk) or SPD#495 (ND - Bk)
M: SPD#491 (TD - M) or SPD#496 (ND - M)
Y: SPD#492 (TD - Y) or SPD#497 (ND - Y)
C: SPD#493 (TD - C) or SPD#498 (ND - C)

- For those colors where the TD or the ND values have been changed, write the appropriate data in column D-61, of TD Check Sheet No. 4.

NOTE: Adjust the TD value first. Only if the TD value is not adjustable (the TD value is 0 or 30), adjust the ND value.

If the "VBS Correction Procedure" in step D-62 or the "TD/ND Adjustment" in step D-63 was performed for some colors, do not perform any adjustment in step D-64 for these colors. However, you must perform step D-64 to the remaining colors.

D-64.
- Check the difference between the "VSG Abnormal Decreasing Counter" value in step D-61 and D-53 for each color.
  SPD#865 (VSG Abnormal Decreasing Counter - Bk)
  SPD#866 (VSG Abnormal Decreasing Counter - M)
  SPD#867 (VSG Abnormal Decreasing Counter - Y)
  SPD#868 (VSG Abnormal Decreasing Counter - C)

- Check the difference between the "VSG Decreasing 2up Counter" value in step D-61 and D-53 for each color.
  SPD#885 (VSG Abnormal 2up Counter - Bk)
  SPD#886 (VSG Abnormal 2up Counter - M)
  SPD#887 (VSG Abnormal 2up Counter - Y)
  SPD#888 (VSG Abnormal 2up Counter - C)
- If some of the above values are different, change the TD value according to the following table.

		Difference between the "VSG Abnormal Decreasing Counter" value in step D-53 and D-61.		
		0 ~ 1	2 ~ 7	8 ~
Difference between the "VSG 2up Counter" value in step D-53 and D-61.	0	No adjustment necessary	Increase TD value by 1	Increase TD value by 2
	1 ~ 3	Increase TD value by 1	Increase TD value by 2	Increase TD value by 3
	4 ~	Increase TD value by 2	Increase TD value by 3	Increase TD value by 4

- For those colors where the TD or the ND values have been changed, write the appropriate data in column D-61, of TD Check Sheet No. 4.

D-65. If none of the TD data or ND data in the D-45, D-53, and D-61 columns has been changed, go to step D-75.

D-66. Perform a free run of 80 scans.
- Set A4/8 1/2" x 11" sideways paper in the upper cassette.
- Put the C-4 test chart face down on the exposure glass. (The four-color gradation of the C-4 test chart are must be at the right hand side of the exposure glass.)
- Set SP#01 for the free run model.

- Set SPD#10 to H. (Free run will automatically stop after 80 scans.)
- Press the start key.
- After finishing the free run, press the clear modes key 3 times to clear the free run mode.

D-67. Make one copy in A3/11" x 17" or A4/81/2" x 11" size of a C-4 chart and write step number "D-67" on the copy.

D-68. Perform the "Self Check Mode".

- Set SPD#525 to #015.
- Press the # key while pressing the ◇ key to start.

D-69. Read the following values and write them in the "Table 4-1 (Fine TD Adjustment)".

- SPD#520 (T_{GRD} detected - Bk)
- SPD#521 (T_{GRD} detected - M)
- SPD#522 (T_{GRD} detected - Y)
- SPD#523 (T_{GRD} detected - C)

- Set SPD#91 to H (V_{BS} Compensation Detected Value - Batch Processing)
  SPD#226, SPD#227, SPD#228 and SPD#229 will be displayed sequentially.
- Set SPD#92 to H (V_{SG} Decreasing Counter - Batch Processing)
  SPD#865, SPD#866, SPD#867, SPD#868, SPD#885, SPD#886, SPD#887, and SPD#888 will be displayed sequentially.

D-70. Read the V_{BS} detected value for each color in the step D-69 column of the "Table 4-1 (Fine TD Adjustment)"

- If the value (SPD#226, #227, #228, or #229) is 50 or more, perform the V_{BS} Correction Procedure in Step E.
- For those colors where the TD or the ND values have been changed, write the appropriate data in column D-69, of TD Check Sheet No. 4.

NOTE: If some colors have been adjusted using the V_{BS} Correction Procedure in step D-70, do not perform any adjustment for these colors in step D-71 and step D-72. However, you must perform steps D-71 and D-72 to the remaining colors.

D-71. Prepare the the copy which was made in step D-69 and the standard color patch copy sample. Compare the color patch density of the copy with the standard color patch copy sample color by color. Then adjust the TD or the ND as follows:

- The color patch density of the copy is *1——— compared with the standard color patch copy sample.

*1:	Too light :	decrease the TD (ND) value by 3 or 4.
	Light :	decrease the TD (ND) value by 1 or 2.
	Almost the same:	No adjustment is necessary.
	Dark:	increase the TD (ND) value by 1 or 2.
	Too dark:	increase the TD (ND) value by 3 or 4.

For your reference
Bk: SPD#490 (TD - Bk) or SPD#495 (ND - Bk)
M: SPD#491 (TD - M) or SPD#496 (ND - M)
Y: SPD#492 (TD - Y) or SPD#497 (ND - Y)
C: SPD#493 (TD - C) or SPD#498 (ND - C)

- For those colors where the TD or the ND values have been changed, write the appropriate data in column D-69, of TD Check Sheet No. 4.

NOTE: Adjust the TD value first. Only if the TD value is not adjustable (the TD value is 0 or 30), adjust the ND value.

If the "VBS Correction Procedure" in step D-70 or the "TD/ND Adjustment" in step D-71 was performed for some colors, do not perform any adjustment in step D-72 for these colors. However, you must perform step D-72 to the remaining colors.

D-72.
- Check the difference between the "VSG Abnormal Decreasing Counter" value in step D-69 and D-61 for each color.
  SPD#865 (VSG Abnormal Decreasing Counter - Bk)
  SPD#866 (VSG Abnormal Decreasing Counter - M)
  SPD#867 (VSG Abnormal Decreasing Counter - Y)
  SPD#868 (VSG Abnormal Decreasing Counter - C)
- Check the difference between the "VSG Decreasing 2up Counter" value in step D-69 and D-61 for each color.
  SPD#885 (VSG Abnormal 2up Counter - Bk)
  SPD#886 (VSG Abnormal 2up Counter - M)
  SPD#887 (VSG Abnormal 2up Counter - Y)
  SPD#888 (VSG Abnormal 2up Counter - C)
- If some of the above values are different, change the TD value according to the following table.

		Difference between the "VSG Abnormal Decreasing Counter" value in step D-61 and D-69.		
		0 ~ 1	2 ~ 7	8 ~
Difference between the "VSG 2up Counter" value in step D-61 and D-69.	0	No adjustment necessary	Increase TD value by 1	Increase TD value by 2
	1 ~ 3	Increase TD value by 1	Increase TD value by 2	Increase TD value by 3
	4 ~	Increase TD value by 2	Increase TD value by 3	Increase TD value by 4

- For those colors where the TD or the ND values have been changed, write the appropriate data in column D-69, of TD Check Sheet No. 4.

D-73. If none of the TD data or ND data in the D-53, D-61, and D-69 columns has been changed, go to step D-75. Otherwise, go to step D-74.

D-74.
- Make a copy of the "TD Check Sheet No. 4"
- Copy the values in the step 61 and step 69 columns to the step 7 and step 14 columns of the new "TD Check Sheet No. 4".
- Go back to step D-18.

D-75. Set the TGRD target values using the following procedure:

- Calculate the weighted average from the last three TGRD detected values for each color. See the "Table 4-1 (Fine TD Adjustment)".

	Example:
SPD#520 (TGRD detected - Bk)	65 70 65 → 66 ( )
SPD#521 (TGRD detected - M)	87 87 87 → 87 ( )
SPD#522 (TGRD detected - Y)	79 68 84 → 77 ( )
SPD#523 (TGRD detected - C)	$\underbrace{\text{88 93 94}}_{\text{Last 3 values}}$ → 91 ( ) Weighted average

NOTE: Round off the result of the calculation to a whole number.

- Replace the TGRD target values with these weighted average values.
  SPD#515 (TGRD Target - Bk)
  SPD#516 (TGRD Target - M)
  SPD#517 (TGRD Target - Y)
  SPD#518 (TGRD Target - C)

D-76. Set the DIF Preset values in accordance with the following procedure:

- Make 16 copies of a C-4 chart on A4/8 1/2" x 11" paper. (Do not make these copies in a continuous copy run. Make 16 single-copy runs.)
- Read the DIF detected values for each color and multiply by "1.1" to get the DIF detected value.
  SPD#125 (DIF detected - Bk) ________ x 1.1 = ________
  SPD#126 (DIF detected - M) ________ x 1.1 = ________
  SPD#127 (DIF detected - Y) ________ x 1.1 = ________
  SPD#128 (DIF detected - C) ________ x 1.1 = ________

NOTE: Round off the result of the calculation to a whole number.

- Compare the above results with the DIF Preset value for each color, and input the higher value as the DIF Preset value.
  If the DIF Preset value is higher than the above result, you do not need to change the DIF Preset value for that color.
  SPD#120 (DIF Preset - Bk)
  SPD#121 (DIF Preset - M)
  SPD#122 (DIF Preset - Y)
  SPD#123 (DIF Preset - C)

D-77. End the TD check in accordance with the following procedure.

- Set SPD#707 to 144 (Fusing temperature for standard mode during standby.)
- Set SPD#708 to 138 (Fusing temperature for standard mode during a copy run.)
- Make one copy of a C-4 chart on A3/11 x 17" paper and check the copy quality.
- Set SPD#86 to H (Process control initial setting mode reset.)
- Set SPD#090 to H (Process Control Data Monitor) then copy the values to the process control data check sheet.

E. V_{BS} Correction Procedure (In the case of $V_{BS} \geq 50$)

NOTE: Perform the following procedure only for the relevant color. For example, if SPD#226 (Bk-V_{BS} Compensation detected data) is 50 or more, perform the procedure for Black only.

E-1. If the relevant V_{BS} (SPD#226 ~ #229) is between 50 and 70, add 4 to the relevant color's TD value (SPD#490 ~ #493).
If the relevant V_{BS} (SPD#226 ~ #229) is between 80 and 150, add 6 to the relevant color's TD value (SPD#490 ~ #493).

NOTE: Adjust the TD value first. Only if the TD value is not adjustable (the TD value is 0 or 30), adjust the ND value.

E-2. Set the relevant color's Toner Supply Stop (SPD#345 ~ #348) to H.

E-3. Set SP21 (Test Pattern) to 2 (16 Gradation) from the upper operation panel.

E-4. Select the relevant color using SPD#50 (color mode selection).

0: No	4: Y	8: C	12: Y+C
1: Bk	5: Bk+Y	9: Bk+C	13: Bk+Y+C
2: M	6: M+Y	10: M+C	14: M+Y+C
3: Bk+M	7: Bk+M+Y	11: Bk+M+C	15: Bk+M+Y+C

E-5. Make 4 copies (A3/11" x 17" size).

E-6. Repeat step E-5 until the relevant Vsp detected data (SPD#470 ~ #473) overshoots the Vsp target data (SPD#455 ~ #458) by 10.

E-7. Set SPD#79 (batch processing) to H.

E-8. Perform the Vk compensation (SPD#225) only for the relevant color. Select the value from step E-4.

3.5 TD (Toner Density) CHECK (1 to 3 Colors) FOR MODEL A105

NOTE: The TD check (1 to 3 colors) procedure should be performed:

1. When the developers (1 to 3 colors) are replaced.
2. When the Vmin (1 to 3 colors) adjustment is performed.

A. Preparation for a TD Check

A-1. Prepare the "TD check sheet, No 1, No 2, No 3, No 4, and Process control data check sheet".

A-2. Confirm that the relevant color developers have been replaced and that the relevant ID sensors and the relevant development sleeves have been cleaned.

A-3. Set the SPD modes as follows:

- SPD#36 to H (Process Control All ON)
- SPD#707 to 132 (Fusing Temperature for standard mode during standby.)
- SPD#708 to 126 (Fusing temperature for standard mode during a copy run.)
- Only change the value for the relevant colors as follws:

Bk → SPD#490 to 020 (TD data monitor - Bk)
M → SPD#491 to 020 (TD data monitor - M)
Y → SPD#492 to 020 (TD data monitor - Y)
C → SPD#493 to 020 (TD data monitor - C)

Bk → SPD#495 to 008 (NDpreset data - Bk)
M → SPD#496 to 008 (NDpreset data - M)
Y → SPD#497 to 008 (NDpreset data - Y)
C → SPD#498 to 008 (NDpreset data - C)

Bk → SPD#110 to 022 (Pointer data monitor/change - Bk)
M → SPD#111 to 022 (Pointer data monitor/change - M)
Y → SPD#112 to 022 (Pointer data monitor/change - Y)
C → SPD#113 to 022 (Pointer data monitor/change - C)

Bk → SPD#315 to the appropriate value*1 (LD power control - Bk)
M → SPD#316 to the appropriate value*1 (LD power control - M)
Y → SPD#317 to the appropriate value*1 (LD power control - Y)
C → SPD#318 to the appropriate value*1 (LD power control - C)

Replacement Adjustment

Bk → SPD#611 to 032 (ID sensor LED data - Bk)
M → SPD#612 to 032 (ID sensor LED data - M)
Y → SPD#613 to 032 (ID sensor LED data - Y)
C → SPD#614 to 032 (ID sensor LED data - C)

*1

	SPD#315	SPD#316	SPD#317	SPD#318
New Drum	4	4	4	4
Drum used for 20K copies or more	Present data + 2	Present data + 2	Present data + 2	Present data + 2

- SPD#101 to H (Painter control -Fixed)
- SPD#100 to H (Drum potential control -Fixed)
- SPD#190 to H (SC840~843 detection off mode)
- SPD#453 to H (CD data fixed during self check)
- SPD#454 to H (ND fixed)

A-4. Turn the main switch off and on.

A-5. Set SPD#82 to H (color patch - 15 mm)

A-6. Make one copy of a C-4 test chart on A3/11" x 17" or A4/8.5" x 11" paper.

NOTE: If it is a solid color copy, set the charge corona unit for that color in position.

B. Rough TD Adjustment

B-1. Perform the "Self Check Mode".

- Set SPD#525 to 015 (forced self check).
- Press the # key while pressing the ◇ key to start.

B-2. Press clear key to exit SPD525 then make 10 copies that include the color patch patterns on A4/8.5" x 11" paper in a continuous copy run, and keep the 10th copy which will be used in step B-9.

B-3. Confirm that the TD value for the relevant color is set to 020. If not, set it to 020.

Bk → SPD#490 (TD data - Bk) : 020
M → SPD#491 (TD data - M) : 020
Y → SPD#492 (TD data - Y) : 020
C → SPD#493 (TD data - C) : 020

B-4. Confirm that the ND value for the relevant color is set to 008. If not, set it to 008.

Bk → SPD#495 (ND data - Bk) : 008
M → SPD#496 (ND data - M) : 008
Y → SPD#497 (ND data - Y) : 008
C → SPD#498 (ND data - C) : 008

B-5. Read the Vsp target and Vsp* detected values for the relevant colors and write them in the "Table 1-3 (Vsp Target Data)" and "Table 1-4 (Vsp Detected Data)" of the "TD Check Sheet No. 1".

Bk → SPD#455 (Vsp target - Bk)
M → SPD#456 (Vsp target - M)
Y → SPD#457 (Vsp target - Y)
C → SPD#458 (Vsp target - C)

Bk → SPD#470 (Vsp* detected - Bk)
M → SPD#471 (Vsp* detected - M)
Y → SPD#472 (Vsp* detected - Y)
C → SPD#473 (Vsp* detected - C)

B-6. Compare the Vsp target value to the Vsp* detected value for the relevant color.

If the value is different, adjust the TD or ND to fit the Vsp target value to the Vsp* detected value.

The Vsp target value consists of TD, ND, CD, and Vmin. The Vsp target value will be changed immediately when the TD or ND value is changed.

Example: The relevant color is Black.
SPD#455 (Vsp target - Bk) is 80.
SPD#470 (Vsp* detected - Bk) is 70.
In this case, decrease the value of SPD#490 (TD data - Bk) by 1. But, the value of SPD#455 is still 80. Then, decrease the value of SPD#490 by 1 again. We get a value of "70" for SPD#455 which is the same as that for SPD#470.

For your reference.

- Vsp target = $\text{Vmin} + \dfrac{8(\mathbf{ND} + \mathbf{TD}) + \text{CD} - 80}{800}(4.0 - \text{Vmin})$

- SPD#490 (TD data - Bk)
- SPD#491 (TD data - M)
- SPD#492 (TD data - Y)
- SPD#493 (TD data - C)
- SPD#495 (ND data - Bk)
- SPD#496 (ND data - M)
- SPD#497 (ND data - Y)
- SPD#498 (ND data - C)

NOTE: Adjust the TD value first. Only if the TD value is not adjustable (the TD value is 0 or 30), adjust the ND value.

B-7. Read the TD value and the ND value for the relevant color and write them in the "Table 1-1 (TD Data)" and "Table 1-2 (ND Data)" of the "TD Check Sheet No. 1".

- SPD#490 (TD data - Bk)
- SPD#491 (TD data - M)
- SPD#492 (TD data - Y)
- SPD#493 (TD data - C)
- SPD#495 (ND data - Bk)
- SPD#496 (ND data - M)
- SPD#497 (ND data - Y)
- SPD#498 (ND data - C)

B-8. Read the VBS detected value for the relevant color and write them in the "Table 1-5 (VBS Data)" of the "TD Check Sheet No. 1".

- Set SPD#91 to H (VBS compensation detected value monitor - batch processing)
  The values of SPD#226, #227, #228, and #229 are displayed sequentially.

NOTE: From step B-9, do not only adjust the relevant color but also the all colors.

B-9. Prepare the 10th copy which was made in step B-2 and the standard color patch copy sample which was made at the service training by yourself. Compare the color patch density of the 10th copy with the standard color patch copy sample color by color. Then adjust the TD or the ND as follows:

- The color patch density of the copy is *1———— compared with the standard color patch copy sample.

*1: Too light : decrease the TD (ND) value by 3 or 4.
Light : decrease the TD (ND) value by 1 or 2.
Almost the same: No adjustment is necessary.
Dark: increase the TD (ND) value by 1 or 2.
Too dark: increase the TD (ND) value by 3 or 4.

For your reference
Bk: SPD#490 (TD - Bk) or SPD#495 (ND - Bk)
M: SPD#491 (TD - M) or SPD#496 (ND - M)
Y: SPD#492 (TD - Y) or SPD#497 (ND - Y)
C: SPD#493 (TD - C) or SPD#498 (ND - C)

NOTE: Adjust the TD value first. Only if the TD value is not adjustable (the TD value is 0 or 30), adjust the ND value.

B-10. Read the TD value and the ND value for the relevant color and write them in the "Table 1-1 (TD Data)" and "Table 1-2 (ND Data)".

- SPD#490 (TD data - Bk)
- SPD#491 (TD data - M)
- SPD#492 (TD data - Y)
- SPD#493 (TD data - C)
- SPD#495 (ND data - Bk)
- SPD#496 (ND data - M)
- SPD#497 (ND data - Y)
- SPD#498 (ND data - C)

B-11. Perform a free run of 80 scans.

- Set A4/8 1/2" x 11" sideways paper in the upper cassette.
- Put the C-4 test chart face down on the exposure glass. (The four-color gradation of the C-4 test chart are must be at the right hand side of the exposure glass.)
- Set SP#01 for the free run mode.
- Set SPD#10 to H. (Free run will automatically stop after 80 scans.)
- Press the start key.
- After finishing the free run, press the clear modes key 3 times to clear the free run mode.

B-12. Perform Vk compensation and make one copy.

- Set SPD#225 to 015. (Vk compensation for all colors.)
- Press the # key while pressing the ◇ key.
- Set SPD#082 to H (Color Patch) after finishing the Vk compensation.
- Make one copy in A3/11" x 17" or A4/8 1/2" x 11" size of a C-4 chart.
- Write step number "B-12" on the copy. This copy will be used in step B-14.

B-13. Read the V_{BS} detected value for each color and write them in the "Table 1-5 (V_{BS} Data)".

- Set SPD#91 to H (V_{BS} compensation detected value monitor - batch processing)
  The values of SPD#226, #227, #228, and #229 are displayed sequentially.
- If the value (SPD#226, #227, #228, or #229) is 50 or more, perform the V_{BS} Correction Procedure in Step E.

B-14. Prepare the copy which was made in step B-12 and the standard color patch copy sample. Compare the color patch density of the copy with the standard color patch copy sample color by color. Then adjust the TD or the ND as follows:

- The color patch density of the copy is *1———— compared with the standard color patch copy sample.

*1: Too light :	decrease the TD (ND) value by 3 or 4.
Light :	decrease the TD (ND) value by 1 or 2.
Almost the same:	No adjustment is necessary.
Dark:	increase the TD (ND) value by 1 or 2.
Too dark:	increase the TD (ND) value by 3 or 4.

For your reference
Bk: SPD#490 (TD - Bk) or SPD#495 (ND - Bk)
M: SPD#491 (TD - M) or SPD#496 (ND - M)
Y: SPD#492 (TD - Y) or SPD#497 (ND - Y)
C: SPD#493 (TD - C) or SPD#498 (ND - C)

NOTE: Adjust the TD value first. Only if the TD value is not adjustable (the TD value is 0 or 30), adjust the ND value.

B-15. Read the TD value and the ND value for each color and write them in the "Table 1-1 (TD Data)" and "Table 1-2 (ND Data)".

- SPD#490 (TD data - Bk)
- SPD#491 (TD data - M)
- SPD#492 (TD data - Y)
- SPD#493 (TD data - C)
- SPD#495 (ND data - Bk)
- SPD#496 (ND data - M)
- SPD#497 (ND data - Y)
- SPD#498 (ND data - C)

B-16. Perform a free run of 80 scans.

- Set A4/8 1/2" x 11" sideways paper in the upper cassette.
- Put the C-4 test chart face down on the exposure glass. (The four-color gradation are must be at the right hand side of the exposure glass.)
- Set SP#01 for the free run model.
- Set SPD#10 to H. (Free run will automatically stop after 80 scans.)
- Press the start key.
- After finishing the free run, press the clear modes key 3 times to clear the free run mode.

B-17. Perform Vk compensation and make one copy.

- Set SPD#225 to 015. (Vk compensation for all colors.)
- Press the # key while pressing the ◇ key.
- Set SPD#082 to H (Color Patch) after finishing the Vk compensation.
- Make one copy in A3/11" x 17" or A4/8 1/2" x 11" size of a C-4 chart.
- Write step number "B-17" on the copy. This copy will be used in step B-19.

B-18. Read the VBS detected value for each color and write them in the "Table 1-5 (VBS Data)".

- Set SPD#91 to H (VBS compensation detected value monitor - batch processing)
  The values of SPD#226, #227, #228, and #229 are displayed sequentially.
- If the value (SPD#226, #227, #228, or #229) is 50 or more, perform the VBS Correction Procedure in Step E.

B-19. Prepare the the copy which was mode in step B-17 and the standard color patch copy sample. Compare the color patch density of the copy with the standard color patch copy sample color by color. Then adjust the TD or the ND as follows:

- The color patch density of the copy is *1 ________ compared with the standard color patch copy sample.

*1:

Too light :	decrease the TD (ND) value by 3 or 4.
Light :	decrease the TD (ND) value by 1 or 2.
Almost the same:	No adjustment is necessary.
Dark:	increase the TD (ND) value by 1 or 2.
Too dark:	increase the TD (ND) value by 3 or 4.

For your reference
Bk: SPD#490 (TD - Bk) or SPD#495 (ND - Bk)
M: SPD#491 (TD - M) or SPD#496 (ND - M)
Y: SPD#492 (TD - Y) or SPD#497 (ND - Y)
C: SPD#493 (TD - C) or SPD#498 (ND - C)

NOTE: Adjust the TD value first. Only if the TD value is not adjustable the TD value is 0 or 30), adjust the ND value.

B-20. Read the TD value and the ND value for each color and write them in the "Table 1-1 (TD Data)" and "Table 1-2 (ND Data)".

- SPD#490 (TD data - Bk)
- SPD#491 (TD data - M)
- SPD#492 (TD data - Y)
- SPD#493 (TD data - C)
- SPD#495 (ND data - Bk)
- SPD#496 (ND data - M)
- SPD#497 (ND data - Y)
- SPD#498 (ND data - C)

B-21. Perform a free run of 80 scans.

- Set A4/8 1/2" x 11" sideways paper in the upper cassette.
- Put the C-4 test chart face down on the exposure glass. (The four-color gradation are must be at the right hand side of the exposure glass.)
- Set SP#01 for the free run model.
- Set SPD#10 to H. (Free run will automatically stop after 80 scans.)
- Press the start key.
- After finishing the free run, press the clear modes key 3 times to clear the free run mode.

B-22. Perform Vk compensation and make one copy.

- Set SPD#225 to 015. (Vk compensation for all colors.)
- Press the # key while pressing the ◇ key.
- Set SPD#082 to H (Color Patch) after finishing the Vk compensation.
- Make one copy in A3/11" x 17" or A4/8 1/2" x 11" size of a C-4 chart.
- Write step number "B-22" on the copy. This copy will be used in step B-24.

B-23. Read the V_{BS} detected value for each color and write them in the "Table 1-5 (V_{BS} Data)".

- Set SPD#91 to H (V_{BS} compensation detected value monitor - batch processing)
  The values of SPD#226, #227, #228, and #229 are displayed sequentially.
- If the value (SPD#226, #227, #228, or #229) is 50 or more, perform the V_{BS} Correction Procedure in Step E.

B-24. Prepare the the copy which was made in step B-22 and the standard color patch copy sample. Compare the color patch density of the copy with the standard color patch copy sample color by color. Then adjust the TD or the ND as follows:

- The color patch density of the copy is *1——— compared with the standard color patch copy sample.

*1: Too light :	decrease the TD (ND) value by 3 or 4.
Light :	decrease the TD (ND) value by 1 or 2.
Almost the same:	No adjustment is necessary.
Dark:	increase the TD (ND) value by 1 or 2.
Too dark:	increase the TD (ND) value by 3 or 4.

For your reference
Bk: SPD#490 (TD - Bk) or SPD#495 (ND - Bk)
M: SPD#491 (TD - M) or SPD#496 (ND - M)
Y: SPD#492 (TD - Y) or SPD#497 (ND - Y)
C: SPD#493 (TD - C) or SPD#498 (ND - C)

NOTE: Adjust the TD value first. Only if the TD value is not adjustable (the TD value is 0 or 30), adjust the ND value.

B-25. Read the TD value and the ND value for each color and write them in the "Table 1-1 (TD Data)" and "Table 1-2 (ND Data)".

- SPD#490 (TD data - Bk)
- SPD#491 (TD data - M)
- SPD#492 (TD data - Y)
- SPD#493 (TD data - C)
- SPD#495 (ND data - Bk)
- SPD#496 (ND data - M)
- SPD#497 (ND data - Y)
- SPD#498 (ND data - C)

B-26. If the density of all the color patch patterns are within the standard, this means you did not change the TD or ND value in step 24, then go to step C-1 (LD power adjustment). Otherwise, go to step B-27.

B-27. Perform a free run of 80 scans.

- Set A4/81/2" x 11" sideways paper in the upper cassette.
- Put the C-4 test chart face down on the exposure glass. (The four-color gradation are must be at the right hand side of the exposure glass.)
- Set SP#01 for the free run model.
- Set SPD#10 to H. (Free run will automatically stop after 80 scans.)
- Press the start key.
- After finishing the free run, press the clear modes key 3 times to clear the free run mode.

B-28. Perform Vk compensation and make one copy.

- Set SPD#225 to 015. (Vk compensation for all colors.)
- Press the # key while pressing the ◇ key.
- Set SPD#082 to H (Color Patch) after finishing the Vk compensation.
- Make one copy in A3/11" x 17" or A4/81/2" x 11" size of a C-4 chart.
- Write step number "B-28" on the copy. This copy will be used in step B-30.

B-29. Read the VBS detected value for each color and write them in the "Table 1-5 (VBS Data)".

- Set SPD#91 to H (VBS compensation detected value monitor - batch processing)
  The values of SPD#226, #227, #228, and #229 are displayed sequentially.
- If the value (SPD#226, #227, #228, or #229) is 50 or more, perform the VBS Correction Procedure in Step E.

B-30. Prepare the the copy which was made in step B-28 and the standard color patch copy sample. Compare the color patch density of the copy with the standard color patch copy sample color by color. Then adjust the TD or the ND as follows:

- The color patch density of the copy is *1———— compared with the standard color patch copy sample.

*1: Too light : decrease the TD (ND) value by 3 or 4.
Light : decrease the TD (ND) value by 1 or 2.
Almost the same: No adjustment is necessary.
Dark: increase the TD (ND) value by 1 or 2.
Too dark: increase the TD (ND) value by 3 or 4.

For your reference
Bk: SPD#490 (TD - Bk) or SPD#495 (ND - Bk)
M: SPD#491 (TD - M) or SPD#496 (ND - M)
Y: SPD#492 (TD - Y) or SPD#497 (ND - Y)
C: SPD#493 (TD - C) or SPD#498 (ND - C)

NOTE: Adjust the TD value first. Only if the TD value is not adjustable (the TD value is 0 or 30), adjust the ND value.

B-31. Read the TD value and the ND value for each color and write them in the "Table 1-1 (TD Data)" and "Table 1-2 (ND Data)".

- SPD#490 (TD data - Bk)
- SPD#491 (TD data - M)
- SPD#492 (TD data - Y)
- SPD#493 (TD data - C)
- SPD#495 (ND data - Bk)
- SPD#496 (ND data - M)
- SPD#497 (ND data - Y)
- SPD#498 (ND data - C)

B-32. If the density of all the color patch patterns are within the standard, this means you did not change the TD or ND value in step 30, then go to step C-1 (LD power adjustment). Otherwise, go to step B-33.

B-33. Perform a free run of 80 scans.

- Set A4/8 1/2" x 11" sideways paper in the upper cassette.
- Put the C-4 test chart face down on the exposure glass. (The four-color gradation are must be at the right hand side of the exposure glass.)
- Set SP#01 for the free run model.
- Set SPD#10 to H. (Free run will automatically stop after 80 scans.)
- Press the start key.
- After finishing the free run, press the clear modes key 3 times to clear the free run mode.

B-34. Perform Vk compensation and make one copy.

- Set SPD#225 to 015. (Vk compensation for all colors.)
- Press the $\boxed{\#}$ key while pressing the $\boxed{\Diamond}$ key.
- Set SPD#082 to H (Color Patch) after finishing the Vk compensation.
- Make one copy in A3/11" x 17" or A4/8 1/2" x 11" size of a C-4 chart.
- Write step number "B-34" on the copy. This copy will be used in step B-36.

B-35. Read the V_{BS} detected value for each color and write them in the "Table 1-5 (V_{BS} Data)".

- Set SPD#91 to H (V_{BS} compensation detected value monitor - batch processing)
  The values of SPD#226, #227, #228, and #229 are displayed sequentially.
- If the value (SPD#226, #227, #228, or #229) is 50 or more, perform the V_{BS} Correction Procedure in Step E.

B-36. Prepare the the copy which was made in step B-34 and the standard color patch copy sample. Compare the color patch density of the copy with the standard color patch copy sample color by color. Then adjust the TD or the ND as follows:

- The color patch density of the copy is *1——— compared with the standard color patch copy sample.

*1:	Too light :	decrease the TD (ND) value by 3 or 4.
	Light :	decrease the TD (ND) value by 1 or 2.
	Almost the same:	No adjustment is necessary.
	Dark:	increase the TD (ND) value by 1 or 2.
	Too dark:	increase the TD (ND) value by 3 or 4.

For your reference
Bk: SPD#490 (TD - Bk) or SPD#495 (ND - Bk)
M: SPD#491 (TD - M) or SPD#496 (ND - M)
Y: SPD#492 (TD - Y) or SPD#497 (ND - Y)
C: SPD#493 (TD - C) or SPD#498 (ND - C)

NOTE: Adjust the TD value first. Only if the TD value is not adjustable (the TD value is 0 or 30), adjust the ND value.

B-37. Read the TD value and the ND value for each color and write them in the "Table 1-1 (TD Data)" and "Table 1-2 (ND Data)".

- SPD#490 (TD data - Bk)
- SPD#491 (TD data - M)
- SPD#492 (TD data - Y)
- SPD#493 (TD data - C)
- SPD#495 (ND data - Bk)
- SPD#496 (ND data - M)
- SPD#497 (ND data - Y)
- SPD#498 (ND data - C)

B-38. If the density of all the color patch patterns are within the standard, this means you did not change the TD or ND value in step 36, then go to step C-1 (LD power adjustment). Otherwise, go to step B-39.

B-39. Perform a free run of 80 scans.

- Set A4/8 1/2" x 11" sideways paper in the upper cassette.
- Put the C-4 test chart face down on the exposure glass. (The four-color gradation are must be at the right hand side of the exposure glass.)
- Set SP#01 for the free run model.
- Set SPD#10 to H. (Free run will automatically stop after 80 scans.)
- Press the start key.
- After finishing the free run, press the clear modes key 3 times to clear the free run mode.

B-40. Perform Vk compensation and make one copy.

- Set SPD#225 to 015. (Vk compensation for all colors.)
- Press the $\boxed{\#}$ key while pressing the $\boxed{\Diamond}$ key.
- Set SPD#082 to H (Color Patch) after finishing the Vk compensation.
- Make one copy in A3/11" x 17" or A4/8 1/2" x 11" size of a C-4 chart.
- Write step number "B-40" on the copy. This copy will be used in step B-42.

B-41. Read the V_{BS} detected value for each color and write them in the "Table 1-5 (V_{BS} Data)".

- Set SPD#91 to H (V_{BS} compensation detected value monitor - batch processing)
  The values of SPD#226, #227, #228, and #229 are displayed sequentially.
- If the value (SPD#226, #227, #228, or #229) is 50 or more, perform the V_{BS} Correction Procedure in Step E.

B-42. Prepare the the copy which was made in step B-40 and the standard color patch copy sample. Compare the color patch density of the copy with the standard color patch copy sample color by color. Then adjust the TD or the ND as follows:

- The color patch density of the copy is *1________ compared with the standard color patch copy sample.

*1:	Too light :	decrease the TD (ND) value by 3 or 4.
	Light :	decrease the TD (ND) value by 1 or 2.
	Almost the same:	No adjustment is necessary.
	Dark:	increase the TD (ND) value by 1 or 2.
	Too dark:	increase the TD (ND) value by 3 or 4.

For your reference
Bk: SPD#490 (TD - Bk) or SPD#495 (ND - Bk)
M: SPD#491 (TD - M) or SPD#496 (ND - M)
Y: SPD#492 (TD - Y) or SPD#497 (ND - Y)
C: SPD#493 (TD - C) or SPD#498 (ND - C)

NOTE: Adjust the TD value first. Only if the TD value is not adjustable (the TD value is 0 or 30), adjust the ND value.

B-43. Read the TD value and the ND value for each color and write them in the "Table 1-1 (TD Data)" and "Table 1-2 (ND Data)".

- SPD#490 (TD data - Bk)
- SPD#491 (TD data - M)
- SPD#492 (TD data - Y)
- SPD#493 (TD data - C)
- SPD#495 (ND data - Bk)
- SPD#496 (ND data - M)
- SPD#497 (ND data - Y)
- SPD#498 (ND data - C)

B-44. If the density of all the color patch patterns are within the standard, this means you did not change the TD or ND value in step 42, then go to step C-1 (LD power adjustment). Otherwise, go to step B-45.

B-45. Go back to step B-21.

C. LD Power Control Data Adjustment

C-1. Change the LD power control data according to the following procedure.

- Read the LD power control data for each color and write them in the "Table 2-1 (LD Power Control Data Adjustment ③)", "Before changing" SPD#315, SPD#316, SPD#317, SPD#318.
- Read the TD value and the ND value for each color and write them down in the "Table 2-1 ① (LD Power Control Data Adjustment)".
- Add the TD value to the ND value for each color and write the result down in the "Table 2-1 ② (LD Power Control Data Adjustment)".

NOTE: Do not change the values in SPD#490 ~ 493, #495 ~ 498.

- If the result of TD value + ND value is:

0 ~ 13,	decrease the relevant LD Power Control value *by 2.
14 ~ 21,	decrease the relevant LD Power Control value *by 1.
22 ~ 34,	No adjustment is necessary.
35 ~ 42,	increase the relevant LD Power Control value *by 1.
43 ~ 50,	increase the relevant LD Power Control value *by 2.
51 ~ 54,	increase the relevant LD Power Control value *by 3.

* the relevant LD Power Control value.
Bk: SPD#315 (LD Power Control Data - Bk)
M: SPD#316 (LD Power Control Data - M)
Y: SPD#317 (LD Power Control Data - Y)
C: SPD#318 (LD Power Control Data - C)

- Read the relevant LD power control value and write the new value in the "Table 2-1 (LD Power Control Data Adjustment 3)".

C-2. If you did not change the LD power control value (SPD#315, #316, #317 or #318) in step C-1, go to step C-7. Otherwise, go to step C-3.

C-3. Turn the main switch off and on.

C-4. Make a copy of the C-4 test chart on A4/8.5" x 11" sideways paper.

C-5. Only read the Vsp target and Vsp detected for the same color as the LD power control value which was changed in step C-1, and write them in the "Table 2-2 (Vsp Target Data)" and the "Table 2-3 (Vsp Detected Data)".

- SPD#455 (Vsp target - Bk)
- SPD#456 (Vsp target- M)
- SPD#457 (Vsp target - Y)
- SPD#458 (Vsp target- C)
- SPD#460 (Vsp detected - Bk)
- SPD#461 (Vsp detected- M)
- SPD#462 (Vsp detected - Y)
- SPD#463 (Vsp detected - C)

C-6. Compare the relevant Vsp target value to the Vsp detected value for each color. If the value is different, adjust the TD or ND to fit the Vsp target value to the Vsp detected value.
The Vsp target value consists of TD, ND, CD, and Vmin. The Vsp target value will be changed immediately when the TD or ND value is changed.

Example
SPD#455 (Vsp target - Bk) is 80.
SPD#460 (Vsp detected - Bk) is 70.
In this case, decrease the value of SPD#490 (TD data - Bk) by 1. But, the value of SPD#455 is still 80. Then, decrease the value of SPD#490 by 1 again. We get a value of "70" for SPD#455 which is the same as that for SPD#460.

For your reference.

- $\text{Vsp target} = \text{Vmin} + \dfrac{8(\mathbf{ND} + \mathbf{TD}) + \text{CD} - 80}{800}(4.0 - \text{Vmin})$

- SPD#490 (TD data - Bk)
- SPD#491 (TD data - M)
- SPD#492 (TD data - Y)
- SPD#493 (TD data - C)
- SPD#495 (ND data - Bk)
- SPD#496 (ND data - M)
- SPD#497 (ND data - Y)
- SPD#498 (ND data - C)

NOTE: Adjust the TD value first. Only if the TD value is not adjustable (the TD value is 0 or 30), adjust the ND value. Confirm data is entered correctly by confirming that the target data now matches the detected value.

C-7. Perform the "Self Check Mode".

- Set SPD#525 to #015 (forced self check).
- Press the # key while pressing the ◇ key to start.

C-8. Read the VL1 values for each color and write them in the "Table 2-4 (VL1 Data)".

C-9.
- Compare the VL1 values in the "Table 2-4 (VL1 Data)" with the OK range of the VL1 values which are shown at the right hand side of the "Table 2-4 (VL1 Data)".
- If all the VL1 values are in the OK range of the VL1 values, go to step D-1.
- If all or some of the VL1 values are out of the OK range of the VL1 values, go to step C-10.

C-10. Change the LD control values only for the colors which were not in the OK range of the VL1 values.
See the "Table 2-4 (VL1 Data)".

- If the VL1 value is above the OK range of the VL1 value, increase the LD control value by 1.
- If the VL1 value is below the OK range of the VL1 value, decrease the LD control value by 1.
  SPD#510 (VL1 - Bk) ➔ SPD#315 (LD power control - Bk)
  SPD#511 (VL1 - M) ➔ SPD#316 (LD power control - M)
  SPD#512 (VL1 - Y) ➔ SPD#317 (LD power control - Y)
  SPD#513 (VL1 - C) ➔ SPD#318 (LD power control - C)
- Only write the values which were changed in the "Table 3-1 (LD Power Control Data)".

C-11. Turn the main switch off and on.
Wait until the toner supply motor stops, then go to step C-12.

C-12. Perform the "Self Check Mode".

- Set SPD#525 to #015 (forced self check).
- Press the # key while pressing the ◇ key to start.

C-13. Only read the VL1 values which were out of the OK range in step C-8, and write them in the "Table 2-4 (VL1 Data)".
SPD#510 (VL1 - Bk)
SPD#511 (VL1 - M)
SPD#512 (VL1 - Y)
SPD#513 (VL1 - C)

C-14. For the same color, if both the VL1 values in step C-8 and C-13 are out of the OK range, go to step C-15. Otherwise, go to C-30. See the "Table 2-4 (VL1 Data)".

NOTE: If VL1 value gets into the OK range once at least, you don’t need to perform any more adjustment on that color in step C.

Replacement Adjustment

C-15.
- If the VL1 value is below the OK range, decrease the LD power control value by 1, then write it in the "Table 3-1 (LD Power Control Data)".
- SPD#315 (LD Power Control Data - Bk)
  SPD#316 (LD Power Control Data - M)
  SPD#317 (LD Power Control Data - Y)
  SPD#318 (LD Power Control Data - C)
- If the VL1 value is above OK range, use up the excess toner for the relevant color, using the following procedure.

  Consuming excess toner.

  1) Set relevant SPD modes to H to stop toner supply.
     SPD#345: Bk, #346: M, #347: , #348: C
  2) Set the 16 gradation step pattern mode. (SP#21-2)
  3) Set relevant color data in SPD#50. See Note 2.
  4) make 4 copies (A3/11" x 17" size).
  5) Turn off and on the main switch to clear modes selected in step 1) to 3).

C-16. Turn the main switch off and on.
Wait until the toner supply motor stops, then go to step C-17.

C-17. Perform the "Self Check Mode".
- Set SPD#525 to #015 (forced self check).
- Press the $\boxed{\#}$ key while pressing the ◇ key to start.

C-18. Only read the VL1 values which were out of the OK range in step C-13, and write them in the "VL1 Data Table".

SPD#510 (VL1 - Bk)	SPD#511 (VL1 - M)
SPD#512 (VL1 - Y)	SPD#513 (VL1 - C)

C-19. For the same color, if all the VL1 values in step C-8, C-13, and C-18 are out of the OK range, go to step C-20. Otherwise, go to C-30. See the "VL1 Data Table".

NOTE: If VL1 value gets into the OK range once at least, you don't need to perform any more adjustment on that color in step C.

C-20.
- If the VL1 value is below the OK range, decrease the LD power control value by 1, then write it in the "Table 3-1 (LD Power Control Data)".
  SPD#315 (LD Power Control Data - Bk)
  SPD#316 (LD Power Control Data - M)
  SPD#317 (LD Power Control Data - Y)
  SPD#318 (LD Power Control Data - C)

- If the V_{L1} value is above OK range, use up the excess toner for the relevant color, using the following procedure.

  Consuming excess toner.

  1) Set relevant SPD modes to H to stop toner supply.
     SPD#345: Bk, #346: M, #347: , #348: C
  2) Set the 16 gradation step pattern mode. (SP#21-2)
  3) Set relevant color data in SPD#50. See Note 2.
  4) make 4 copies (A3/11" x 17" size).
  5) Turn off and on the main switch to clear modes selected in step 1) to 3).

C-21. Turn the main switch off and on.
Wait until the toner supply motor stops, then go to step C-22.

C-22. Perform the "Self Check Mode".

- Set SPD#525 to #015 (forced self check).
- Press the # key while pressing the ◇ key to start.

C-23. Only read the V_{L1} values which were out of the OK range in step C-18, and write them in the "V_{L1} Data Table".
SPD#510 (V_{L1} - Bk)
SPD#511 (V_{L1} - M)
SPD#512 (V_{L1} - Y)
SPD#513 (V_{L1} - C)

C-24. For the same color, if all the V_{L1} values in step C8, C-13, C-18, and C-23 are out of the OK range, go to step C-25. Otherwise, go to C-30. See the "V_{L1} Data Table".

NOTE: If V_{L1} value gets into the OK range once at least, you don’t need to perform any more adjustment on that color in step C.

C-25.
- If the V_{L1} value is below the OK range, decrease the LD power control value by 1, then write it in the "Table 3-1 (LD Power Control Data)" of the "TD Check Sheet No. 3".
  SPD#315 (LD Power Control Data - Bk)
  SPD#316 (LD Power Control Data - M)
  SPD#317 (LD Power Control Data - Y)
  SPD#318 (LD Power Control Data - C)
- If the V_{L1} value is above the OK range, increase the LD power control value by 1, then write it in the "LD Power Control Data Adjustment Table".

C-26. Turn the main switch off and on.
Wait until the toner supply motor stops, then go to step C-27.

C-27. Perform the "Self Check Mode".

- Set SPD#525 to #015 (forced self check).
- Press the # key while pressing the ◇ key to start.

C-28. Only read the V_{L1} values which were out of the OK range in step C-23, and write them in the "Table 2-4 (V_{L1} Data)".
SPD#510 (V_{L1} - Bk)
SPD#511 (V_{L1} - M)
SPD#512 (V_{L1} - Y)
SPD#513 (V_{L1} - C)

C-29. For the same color, if all the V_{L1} values in step C-8, C-13, C-18, C-23, and C-28 are out of the OK range, go to step C-15. Otherwise, go to C-30. See the "Table 2-4 (V_{L1} Data)".

NOTE: If V_{L1} value gets into the OK range once at least, you don't need to perform any more adjustment on that color in step C.

C-30. See the "Table 2-1 (LD Power Control Data Adjustment ③)" and the "Table 3-1 (LD Power Control Data)". Confirm which color's LD power control values were changed from the values in the "After changing column of the "Table 2-1 (LD Power Control Data Adjustment ③)". From step C-31 to C-33, only these colors should be adjusted.

C-31. Make a copy of C-4 chart in A4/8 1/2" x 11" sideways paper.

C-32. Read the relevant Vsp target and the relevant Vsp detected values and write them in the "Table 3-2 (Vsp Target Data)" and "Table 3-3 (Vsp Detected Data)".

- SPD#455 (Vsp target - Bk)
- SPD#456 (Vsp target - M)
- SPD#457 (Vsp target - Y)
- SPD#458 (Vsp target - C)
- SPD#460 (Vsp detected - Bk)
- SPD#461 (Vsp detected - M)
- SPD#462 (Vsp detected - Y)
- SPD#463 (Vsp detected - C)

C-33. Compare the Vsp target value to the Vsp detected value for each color. If the value is different, adjust the TD or ND to fit the Vsp target value to the Vsp detected value.
The Vsp target value consists of TD, ND, CD, and Vmin. The Vsp target value will be changed immediately when the TD or ND value is changed.

Example

SPD#455 (Vsp target - Bk) is 80.
SPD#460 (Vsp detected - Bk) is 70.
In this case, decrease the value of SPD#490 (TD data - Bk) by 1. But, the value of SPD#455 is still 80. Then, decrease the value of SPD#490 by 1 again. We get a value of "70" for SPD#455 which is the same as that for SPD#460.

For your reference.

- Vsp target = $\text{Vmin} + \dfrac{8(\mathbf{ND} + \mathbf{TD}) + \text{CD} - 80}{800}(4.0 - \text{Vmin})$

- SPD#490 (TD data - Bk)
- SPD#491 (TD data - M)
- SPD#492 (TD data - Y)
- SPD#493 (TD data - C)
- SPD#495 (ND data - Bk)
- SPD#496 (ND data - M)
- SPD#497 (ND data - Y)
- SPD#498 (ND data - C)

NOTE: Adjust the TD value first. Only if the TD value is not adjustable the TD value is 0 or 30), adjust the ND value.

D. Fine TD Adjustment

D-1. Read the following values and write them in the "Table 4-1 (Fine TD Adjustment)".

- SPD#490 (TD data - Bk)
- SPD#491 (TD data - M)
- SPD#492 (TD data - Y)
- SPD#493 (TD data - C)
- SPD#495 (ND data - Bk)
- SPD#496 (ND data - M)
- SPD#497 (ND data - Y)
- SPD#498 (ND data - C)
- SPD#520 (T_{GRD} detected - Bk)
- SPD#521 (T_{GRD} detected - M)
- SPD#522 (T_{GRD} detected - Y)
- SPD#523 (T_{GRD} detected - C)
- Set SPD#91 to H (V_{BS} Compensation Detected Value - Batch Processing)
  SPD#226, SPD#227, SPD#228 and SPD#229 will be displayed sequentially.
- Set SPD#92 to H (V_{SG} Decreasing Counter - Batch Processing)
  SPD#865, SPD#866, SPD#867, SPD#868, SPD#885, SPD#886, SPD#887, and SPD#888 will be displayed sequentially.

D-2. Put the color patch pattern on the trailing edge of the sample copy.

- Set SPD#82 to H (color patch - 15 mm).

D-3. Perform a free run of 80 scans.

- Set A4/8 1/2" x 11" sideways paper in the upper cassette.
- Put the C-4 test chart face down on the exposure glass. (The four-color gradation of the C-4 test chart are must be at the right hand side of the exposure glass.)
- Set SP#01 for the free run model.
- Set SPD#10 to H. (Free run will automatically stop after 80 scans.)
- Press the start key.
- After finishing the free run, press the clear modes key 3 times to clear the free run mode.

D-4. Make one copy in A3/11" x 17" or A4/8 1/2" x 11" size of a C-4 chart.

D-5. Write Step number "D-4" on the copy.

D-6. Perform the "Self Check Mode".

- Set SPD#525 to #015.
- Press the # key while pressing the ◇ key to start.

D-7. Read the following values and write them in the "Table 4-1 (Fine TD Adjustment)".

- SPD#520 (TGRD detected - Bk)
- SPD#521 (TGRD detected - M)
- SPD#522 (TGRD detected - Y)
- SPD#523 (TGRD detected - C)
- Set SPD#91 to H (VBS Compensation Detected Value - Batch Processing)
  SPD#226, SPD#227, SPD#228 and SPD#229 will be displayed sequentially.
- Set SPD#92 to H (VSG Decreasing Counter - Batch Processing)
  SPD#865, SPD#866, SPD#867, SPD#868, SPD#885, SPD#886, SPD#887, and SPD#888 will be displayed sequentially.

D-8. Read the VBS detected value for each color in the step D-7 column of "Table 4-1 (Fine TD Adjustment)".

- If the value (SPD#226, #227, #228, or #229) is 50 or more, perform the VBS Correction Procedure in Step E.
- For those colors where the TD or the ND values have been changed, write the appropriate data in column D-7, of TD Check Sheet No. 4.

NOTE: If some colors have been adjusted using the VBS Correction Procedure in step D-8, do not perform any adjustment for these colors in step D-9 and step D-10.
However, you must perform steps D-9 and D-10 to the remaining colors (those colors that were not adjusted using the VBS Correction Procedure in step D-8).

D-9. Prepare the the copy which was made in step D-4 and the standard color patch copy sample. Compare the color patch density of the copy with the standard color patch copy sample color by color. Then adjust the TD or the ND as follows:

- The color patch density of the copy is *1———— compared with the standard color patch copy sample.

*1: Too light :	decrease the TD (ND) value by 3 or 4.
Light :	decrease the TD (ND) value by 1 or 2.
Almost the same:	No adjustment is necessary.
Dark:	increase the TD (ND) value by 1 or 2.
Too dark:	increase the TD (ND) value by 3 or 4.

For your reference
Bk: SPD#490 (TD - Bk) or SPD#495 (ND - Bk)
M: SPD#491 (TD - M) or SPD#496 (ND - M)
Y: SPD#492 (TD - Y) or SPD#497 (ND - Y)
C: SPD#493 (TD - C) or SPD#498 (ND - C)

- For those colors where the TD or the ND values have been changed, write the appropriate data in column D-7, of TD Check Sheet No. 4.

NOTE: Adjust the TD value first. Only if the TD value is not adjustable (the TD value is 0 or 30), adjust the ND value.

If the "VBS Correction Procedure" in step D-8 or the "TD/ND Adjustment" in step D-9 was performed for some colors, do not perform any adjustment in step D-10 for these colors. However, you must perform step D-10 to the remaining colors.

D-10.
- Check the difference between the "VSG Abnormal Decreasing Counter" value in step D-7 and D-1 for each color.
  SPD#865 (VSG Abnormal Decreasing Counter - Bk)
  SPD#866 (VSG Abnormal Decreasing Counter - M)
  SPD#867 (VSG Abnormal Decreasing Counter - Y)
  SPD#868 (VSG Abnormal Decreasing Counter - C)
- Check the difference between the "VSG Decreasing 2up Counter" value in step D-7 and D-1 for each color.
  SPD#885 (VSG Abnormal 2up Counter - Bk)
  SPD#886 (VSG Abnormal 2up Counter - M)
  SPD#887 (VSG Abnormal 2up Counter - Y)
  SPD#888 (VSG Abnormal 2up Counter - C)
- If some of the above values are different, change the TD value according to the following table.

		Difference between the "VSG Abnormal Decreasing Counter" value in step D-1 and D-7.		
		0 ~ 1	2 ~ 7	8 ~
Difference between the "VSG 2up Counter" value in step D-1 and D-7.	0	No adjustment necessary	Increase TD value by 1	Increase TD value by 2
	1 ~ 3	Increase TD value by 1	Increase TD value by 2	Increase TD value by 3
	4 ~	Increase TD value by 2	Increase TD value by 3	Increase TD value by 4

- For those colors where the TD or the ND values have been changed, write the appropriate data in column D-7, of TD Check Sheet No. 4.

D-11. Perform a free run of 80 scans.

- Set A4/81/2" x 11" sideways paper in the upper cassette.
- Put the C-4 test chart face down on the exposure glass. (The four-color gradation of the C-4 test chart are must be at the right hand side of the exposure glass.)
- Set SP#01 for the free run model.
- Set SPD#10 to H. (Free run will automatically stop after 80 scans.)
- Press the start key.
- After finishing the free run, press the clear modes key 3 times to clear the free run mode.

D-12. Make one copy in A3/11" x 17" or A4/81/2" x 11" size of a C-4 chart and write step number "D-12" on the copy.

D-13. Perform the "Self Check Mode".

- Set SPD#525 to #015.
- Press the # key while pressing the ◇ key to start.

D-14. Read the following values and write them in the "Table 4-1 (Fine TD Adjustment)".

- SPD#520 (TGRD detected - Bk)
- SPD#521 (TGRD detected - M)
- SPD#522 (TGRD detected - Y)
- SPD#523 (TGRD detected - C)
- Set SPD#91 to H (VBS Compensation Detected Value - Batch Processing)
  SPD#226, SPD#227, SPD#228 and SPD#229 will be displayed sequentially.
- Set SPD#92 to H (VSG Decreasing Counter - Batch Processing)
  SPD#865, SPD#866, SPD#867, SPD#868, SPD#885, SPD#886, SPD#887, and SPD#888 will be displayed sequentially.

D-15. Read the VBS detected value for each color in the step D-14 column of the "Table 4-1 (Fine TD Adjustment)".

- If the value (SPD#226, #227, #228, or #229) is 50 or more, perform the VBS Correction Procedure in Step E.
- For those colors where the TD or the ND values have been changed, write the appropriate data in column D-14, of TD Check Sheet No. 4.

NOTE: If some colors have been adjusted using the VBS Correction Procedure in step D-15, do not perform any adjustment for these colors in step D-16 and step D-17. However, you must perform steps D-16 and D-17 to the remaining colors.

D-16. Prepare the the copy which was made in step D-12 and the standard color patch copy sample. Compare the color patch density of the copy with the standard color patch copy sample color by color. Then adjust the TD or the ND as follows:

- The color patch density of the copy is *1———— compared with the standard color patch copy sample.

*1:

Too light :	decrease the TD (ND) value by 3 or 4.
Light :	decrease the TD (ND) value by 1 or 2.
Almost the same:	No adjustment is necessary.
Dark:	increase the TD (ND) value by 1 or 2.
Too dark:	increase the TD (ND) value by 3 or 4.

For your reference
Bk: SPD#490 (TD - Bk) or SPD#495 (ND - Bk)
M: SPD#491 (TD - M) or SPD#496 (ND - M)
Y: SPD#492 (TD - Y) or SPD#497 (ND - Y)
C: SPD#493 (TD - C) or SPD#498 (ND - C)

- For those colors where the TD or the ND values have been changed, write the appropriate data in column D-14, of TD Check Sheet No. 4.

NOTE: Adjust the TD value first. Only if the TD value is not adjustable (the TD value is 0 or 30), adjust the ND value.

If the "VBS Correction Procedure" in step D-15 or the "TD/ND Adjustment" in step D-16 was performed for some colors, do not perform any adjustment in step D-17 for these colors.
You must perform D-17 to the remaining color.

D-17.
- Check the difference between the "VSG Abnormal Decreasing Counter" value in step D-14 and D-7 for each color.
  SPD#865 (VSG Abnormal Decreasing Counter - Bk)
  SPD#866 (VSG Abnormal Decreasing Counter - M)
  SPD#867 (VSG Abnormal Decreasing Counter - Y)
  SPD#868 (VSG Abnormal Decreasing Counter - C)
- Check the difference between the "VSG Decreasing 2up Counter" value in step D-14 and D-7 for each color.
  SPD#885 (VSG Abnormal 2up Counter - Bk)
  SPD#886 (VSG Abnormal 2up Counter - M)
  SPD#887 (VSG Abnormal 2up Counter - Y)
  SPD#888 (VSG Abnormal 2up Counter - C)
- If some of the above values are different, change the TD value according to the following table.

		Difference between the "V_{SG} Abnormal Decreasing Counter" value in step D-7 and D-14.		
		0 ~ 1	2 ~ 7	8 ~
Difference between the "V_{SG} 2up Counter" value in step D-7 and D-14.	0	No adjustment necessary	Increase TD value by 1	Increase TD value by 2
	1 ~ 3	Increase TD value by 1	Increase TD value by 2	Increase TD value by 3
	4 ~	Increase TD value by 2	Increase TD value by 3	Increase TD value by 4

- For those colors where the TD or the ND values have been changed, write the appropriate data in column D-14, of TD Check Sheet No. 4.

D-18. Perform a free run of 80 scans.

- Set A4/8 1/2" x 11" sideways paper in the upper cassette.
- Put the C-4 test chart face down on the exposure glass. (The four-color gradation of the C-4 test chart are must be at the right hand side of the exposure glass.)
- Set SP#01 for the free run model.
- Set SPD#10 to H. (Free run will automatically stop after 80 scans.)
- Press the start key.
- After finishing the free run, press the clear modes key 3 times to clear the free run mode.

D-19. Make one copy in A3/11" x 17" or A4/8 1/2" x 11" size of a C-4 chart and write step number "D-19" on the copy.

D-20. Perform the "Self Check Mode".

- Set SPD#525 to #015.
- Press the # key while pressing the ◇ key to start.

D-21. Read the following values and write them in the "Table 4-1 (Fine TD Adjustment)".

- SPD#520 (T_{GRD} detected - Bk)
- SPD#521 (T_{GRD} detected - M)
- SPD#522 (T_{GRD} detected - Y)
- SPD#523 (T_{GRD} detected - C)
- Set SPD#91 to H (V_{BS} Compensation Detected Value - Batch Processing)
  SPD#226, SPD#227, SPD#228 and SPD#229 will be displayed sequentially.

- Set SPD#92 to H (VSG Decreasing Counter - Batch Processing) SPD#865, SPD#866, SPD#867, SPD#868, SPD#885, SPD#886, SPD#887, and SPD#888 will be displayed sequentially.

D-22. Read the VBS detected value for each color in the step D-21 column of the "Table 4-1 (Fine TD Adjustment)".

- If the value (SPD#226, #227, #228, or #229) is 50 or more, perform the VBS Correction Procedure in Step E.
- For those colors where the TD or the ND values have been changed, write the appropriate data in column D-21, of TD Check Sheet No. 4.

NOTE: If some colors have been adjusted using the VBS Correction Procedure in step D-22, do not perform any adjustment for these colors in step D-23 and step D-24.

D-23. Prepare the the copy which was made in step D-19 and the standard color patch copy sample. Compare the color patch density of the copy with the standard color patch copy sample color by color. Then adjust the TD or the ND as follows:

- The color patch density of the copy is *1———— compared with the standard color patch copy sample.

*1: Too light :	decrease the TD (ND) value by 3 or 4.
Light :	decrease the TD (ND) value by 1 or 2.
Almost the same:	No adjustment is necessary.
Dark:	increase the TD (ND) value by 1 or 2.
Too dark:	increase the TD (ND) value by 3 or 4.

For your reference
Bk: SPD#490 (TD - Bk) or SPD#495 (ND - Bk)
M: SPD#491 (TD - M) or SPD#496 (ND - M)
Y: SPD#492 (TD - Y) or SPD#497 (ND - Y)
C: SPD#493 (TD - C) or SPD#498 (ND - C)

- For those colors where the TD or ND values have been changed, write the appropriate data in column D-21, of the TD Check Sheet No. 4.

NOTE: Adjust the TD value first. Only if the TD value is not adjustable (the TD value is 0 or 30), adjust the ND value.

If the "VBS Correction Procedure" in step D-22 or the "TD/ND Adjustment" in step D-23 was performed for some colors, do not perform any adjustment in step D-24 for these colors.

D-24.
- Check the difference between the "VSG Abnormal Decreasing Counter" value in step D-21 and D-14 for each color.
  SPD#865 (VSG Abnormal Decreasing Counter - Bk)
  SPD#866 (VSG Abnormal Decreasing Counter - M)
  SPD#867 (VSG Abnormal Decreasing Counter - Y)
  SPD#868 (VSG Abnormal Decreasing Counter - C)
- Check the difference between the "VSG Decreasing 2up Counter" value in step D-21 and D-14 for each color.
  SPD#885 (VSG Abnormal 2up Counter - Bk)
  SPD#886 (VSG Abnormal 2up Counter - M)
  SPD#887 (VSG Abnormal 2up Counter - Y)
  SPD#888 (VSG Abnormal 2up Counter - C)
- If some of the above values are different, change the TD value according to the following table.

		Difference between the "VSG Abnormal Decreasing Counter" value in step D-14 and D-21.		
		0 ~ 1	2 ~ 7	8 ~
Difference between the "VSG 2up Counter" value in step D-14 and D-21.	0	No adjustment necessary	Increase TD value by 1	Increase TD value by 2
	1 ~ 3	Increase TD value by 1	Increase TD value by 2	Increase TD value by 3
	4 ~	Increase TD value by 2	Increase TD value by 3	Increase TD value by 4

- For those colors where the TD or the ND values have been changed, write the appropriate data in column D-21, of TD Check Sheet No. 4.

D-25. If none of the TD data or ND data in the D-7, D-14, and D-21 columns has been changed, go to step D-75.

D-26. Perform a free run of 80 scans.
- Set A4/8½" x 11" sideways paper in the upper cassette.
- Put the C-4 test chart face down on the exposure glass. (The four-color gradation of the C-4 test chart are must be at the right hand side of the exposure glass.)
- Set SP#01 for the free run model.
- Set SPD#10 to H. (Free run will automatically stop after 80 scans.)
- Press the start key.
- After finishing the free run, press the clear modes key 3 times to clear the free run mode.

D-27. Make one copy in A3/11" x 17" or A4/8½" x 11" size of a C-4 chart and write step number "D-27" on the copy.

D-28. Perform the "Self Check Mode".

- Set SPD#525 to #015.
- Press the [#] key while pressing the [◇] key to start.

D-29. Read the following values and write them in the "Table 4-1 (Fine TD Adjustment)".

- SPD#520 (TGRD detected - Bk)
- SPD#521 (TGRD detected - M)
- SPD#522 (TGRD detected - Y)
- SPD#523 (TGRD detected - C)
- Set SPD#91 to H (VBS Compensation Detected Value - Batch Processing)
  SPD#226, SPD#227, SPD#228 and SPD#229 will be displayed sequentially.
- Set SPD#92 to H (VSG Decreasing Counter - Batch Processing)
  SPD#865, SPD#866, SPD#867, SPD#868, SPD#885, SPD#886, SPD#887, and SPD#888 will be displayed sequentially.

D-30. Read the VBS detected value for each color in the step D-29 column of the "Table 4-1 (Fine TD Adjustment)".

- If the value (SPD#226, #227, #228, or #229) is 50 or more, perform the VBS Correction Procedure in Step E.
- For those colors where the TD or the ND values have been changed, write the appropriate data in column D-29, of TD Check Sheet No. 4.

NOTE: If some colors have been adjusted using the VBS Correction Procedure in step D-30, do not perform any adjustment for these colors in step D-31 and step D-32. However, you must perform steps D-31 and D-32 to the remaining colors.

D-31. Prepare the the copy which was made in step D-27 and the standard color patch copy sample. Compare the color patch density of the copy with the standard color patch copy sample color by color. Then adjust the TD or the ND as follows:

- The color patch density of the copy is *1——— compared with the standard color patch copy sample.

*1: Too light :	decrease the TD (ND) value by 3 or 4.
Light :	decrease the TD (ND) value by 1 or 2.
Almost the same:	No adjustment is necessary.
Dark:	increase the TD (ND) value by 1 or 2.
Too dark:	increase the TD (ND) value by 3 or 4.

For your reference
Bk: SPD#490 (TD - Bk) or SPD#495 (ND - Bk)
M: SPD#491 (TD - M) or SPD#496 (ND - M)
Y: SPD#492 (TD - Y) or SPD#497 (ND - Y)
C: SPD#493 (TD - C) or SPD#498 (ND - C)

- For those colors where the TD or the ND vaues have been changed, write the appropriate data in column D-29, of TD Check Sheet No. 4.

NOTE: Adjust the TD value first. Only if the TD value is not adjustable (the TD value is 0 or 30), adjust the ND value.

If the "VBS Correction Procedure" in step D-30 or the "TD/ND Adjustment" in step D-31 was performed for some colors, do not perform any adjustment in step D-32 for these colors. However, you must perform step D-32 to the remaining colors.

D-32.
- Check the difference between the "VSG Abnormal Decreasing Counter" value in step D-29 and D-21 for each color.
  SPD#865 (VSG Abnormal Decreasing Counter - Bk)
  SPD#866 (VSG Abnormal Decreasing Counter - M)
  SPD#867 (VSG Abnormal Decreasing Counter - Y)
  SPD#868 (VSG Abnormal Decreasing Counter - C)
- Check the difference between the "VSG Decreasing 2up Counter" value in step D-29 and D-21 for each color.
  SPD#885 (VSG Abnormal 2up Counter - Bk)
  SPD#886 (VSG Abnormal 2up Counter - M)
  SPD#887 (VSG Abnormal 2up Counter - Y)
  SPD#888 (VSG Abnormal 2up Counter - C)
- If some of the above values are different, change the TD value according to the following table.
- For those colors where the TD or the ND values have been changed, write the appropriate data in column D-29, of TD Check Sheet No. 4.

D-33. If none of the TD data or ND data in the D-14, D-21, and D-29 columns has been changed, go to step D-75.

D-34. Perform a free run of 80 scans.

- Set A4/81/2" x 11" sideways paper in the upper cassette.
- Put the C-4 test chart face down on the exposure glass. (The four-color gradation of the C-4 test chart are must be at the right hand side of the exposure glass.)

Replacement
Adjustment

- Set SP#01 for the free run model.
- Set SPD#10 to H. (Free run will automatically stop after 80 scans.)
- Press the start key.
- After finishing the free run, press the clear modes key 3 times to clear the free run mode.

D-35. Make one copy in A3/11" x 17" or A4/8 1/2" x 11" size of a C-4 chart and write step number "D-35" on the copy.

D-36. Perform the "Self Check Mode".

- Set SPD#525 to #015.
- Press the $\boxed{\#}$ key while pressing the $\boxed{\Diamond}$ key to start.

D-37. Read the following values and write them in the "Table 4-1(Fine TD Adjustment)".

- SPD#520 (T_{GRD} detected - Bk)
- SPD#521 (T_{GRD} detected - M)
- SPD#522 (T_{GRD} detected - Y)
- SPD#523 (T_{GRD} detected - C)
- Set SPD#91 to H (V_{BS} Compensation Detected Value - Batch Processing)
  SPD#226, SPD#227, SPD#228 and SPD#229 will be displayed sequentially.
- Set SPD#92 to H (V_{SG} Decreasing Counter - Batch Processing)
  SPD#865, SPD#866, SPD#867, SPD#868, SPD#885, SPD#886, SPD#887, and SPD#888 will be displayed sequentially.

D-38. Read the V_{BS} detected value for each color in the step D-37 column of the "Table 4-1 (Fine TD Adjustment)".

- If the value (SPD#226, #227, #228, or #229) is 50 or more, perform the V_{BS} Correction Procedure in Step E.
- For those colors where the TD or the ND values have been changed, write the appropriate data in column D-37, of TD Check Sheet No. 4.

NOTE: If some colors have been adjusted using the V_{BS} Correction Procedure in step D-38, do not perform any adjustment for these colors in step D-39 and step D-40. However, you must perform steps D-39 and D-40 to the remaining colors.

D-39. Prepare the the copy which was made in step D-35 and the standard color patch copy sample. Compare the color patch density of the copy with the standard color patch copy sample color by color. Then adjust the TD or the ND as follows:

- The color patch density of the copy is *1——— compared with the standard color patch copy sample.

*1:	Too light :	decrease the TD (ND) value by 3 or 4.
	Light :	decrease the TD (ND) value by 1 or 2.
	Almost the same:	No adjustment is necessary.
	Dark:	increase the TD (ND) value by 1 or 2.
	Too dark:	increase the TD (ND) value by 3 or 4.

For your reference
Bk: SPD#490 (TD - Bk) or SPD#495 (ND - Bk)
M: SPD#491 (TD - M) or SPD#496 (ND - M)
Y: SPD#492 (TD - Y) or SPD#497 (ND - Y)
C: SPD#493 (TD - C) or SPD#498 (ND - C)

- For those colors where the TD or the ND vaues have been changed, write the appropriate data in column D-37, of TD Check Sheet No. 4.

NOTE: Adjust the TD value first. Only if the TD value is not adjustable (the TD value is 0 or 30), adjust the ND value.

If the "VBS Correction Procedure" in step D-38 or the "TD/ND Adjustment" in step D-39 was performed for some colors, do not perform any adjustment in step D-40 for these colors. However, you must perform step D-40 to the remaining colors.

Replacement Adjustment

D-40.
- Check the difference between the "VSG Abnormal Decreasing Counter" value in step D-37 and D-29 for each color.
  SPD#865 (VSG Abnormal Decreasing Counter - Bk)
  SPD#866 (VSG Abnormal Decreasing Counter - M)
  SPD#867 (VSG Abnormal Decreasing Counter - Y)
  SPD#868 (VSG Abnormal Decreasing Counter - C)
- Check the difference between the "VSG Decreasing 2up Counter" value in step D-37 and D-29 for each color.
  SPD#885 (VSG Abnormal 2up Counter - Bk)
  SPD#886 (VSG Abnormal 2up Counter - M)
  SPD#887 (VSG Abnormal 2up Counter - Y)
  SPD#888 (VSG Abnormal 2up Counter - C)
- If some of the above values are different, change the TD value according to the following table.

		Difference between the "V_{SG} Abnormal Decreasing Counter" value in step D-29 and D-37.		
		0 ~ 1	2 ~ 7	8 ~
Difference between the "V_{SG} 2up Counter" value in step D-29 and D-37.	0	No adjustment necessary	Increase TD value by 1	Increase TD value by 2
	1 ~ 3	Increase TD value by 1	Increase TD value by 2	Increase TD value by 3
	4 ~	Increase TD value by 2	Increase TD value by 3	Increase TD value by 4

- For those colors where the TD or the ND values have been changed, write the appropriate data in column D-37, of TD Check Sheet No. 4.

D-41. If none of the TD data or ND data in the D-21, D-29, and D-37 columns has been changed, go to step D-75.

D-42. Perform a free run of 80 scans.

- Set A4/8½" x 11" sideways paper in the upper cassette.
- Put the C-4 test chart face down on the exposure glass. (The four-color gradation of the C-4 test chart are must be at the right hand side of the exposure glass.)
- Set SP#01 for the free run model.
- Set SPD#10 to H. (Free run will automatically stop after 80 scans.)
- Press the start key.
- After finishing the free run, press the clear modes key 3 times to clear the free run mode.

D-43. Make one copy in A3/11" x 17" or A4/8½" x 11" size of a C-4 chart and write step number "D-43" on the copy.

D-44. Perform the "Self Check Mode".

- Set SPD#525 to #015.
- Press the $\boxed{\#}$ key while pressing the $\boxed{\Diamond}$ key to start.

D-45. Read the following values and write them in the "Table 4-1 (Fine TD Adjustment)".

- SPD#520 (TGRD detected - Bk)
- SPD#521 (TGRD detected - M)
- SPD#522 (TGRD detected - Y)
- SPD#523 (TGRD detected - C)
- Set SPD#91 to H (VBS Compensation Detected Value - Batch Processing)
  SPD#226, SPD#227, SPD#228 and SPD#229 will be displayed sequentially.
- Set SPD#92 to H (VSG Decreasing Counter - Batch Processing)
  SPD#865, SPD#866, SPD#867, SPD#868, SPD#885, SPD#886, SPD#887, and SPD#888 will be displayed sequentially.

D-46. Read the VBS detected value for each color in the step D-45 column of the "Table 4-1 (Fine TD Adjustment)".

- If the value (SPD#226, #227, #228, or #229) is 50 or more, perform the VBS Correction Procedure in Step E.
- For those colors where the TD or the ND values have been changed, write the appropriate data in column D-45, of TD Check Sheet No. 4.

NOTE: If some colors have been adjusted using the VBS Correction Procedure in step D-46, do not perform any adjustment for these colors in step D-47 and step D-48. However, you must perform steps D-47 and D-48 to the remaining colors.

D-47. Prepare the the copy which was made in step D-43 and the standard color patch copy sample. Compare the color patch density of the copy with the standard color patch copy sample color by color. Then adjust the TD or the ND as follows:

- The color patch density of the copy is *1——— compared with the standard color patch copy sample.

*1:

Too light :	decrease the TD (ND) value by 3 or 4.
Light :	decrease the TD (ND) value by 1 or 2.
Almost the same:	No adjustment is necessary.
Dark:	increase the TD (ND) value by 1 or 2.
Too dark:	increase the TD (ND) value by 3 or 4.

For your reference
Bk: SPD#490 (TD - Bk) or SPD#495 (ND - Bk)
M: SPD#491 (TD - M) or SPD#496 (ND - M)
Y: SPD#492 (TD - Y) or SPD#497 (ND - Y)
C: SPD#493 (TD - C) or SPD#498 (ND - C)

Replacement Adjustment

- For those colors where the TD or the ND values have been changed, write the appropriate data in column D-45, of TD Check Sheet No. 4.

NOTE: Adjust the TD value first. Only if the TD value is not adjustable (the TD value is 0 or 30), adjust the ND value.

If the "VBS Correction Procedure" in step D-46 or the "TD/ND Adjustment" in step D-47 was performed for some colors, do not perform any adjustment in step D-48 for these colors. However, you must perform step D-48 to the remaining colors.

D-48.
- Check the difference between the "VSG Abnormal Decreasing Counter" value in step D-45 and D-37 for each color.
  SPD#865 (VSG Abnormal Decreasing Counter - Bk)
  SPD#866 (VSG Abnormal Decreasing Counter - M)
  SPD#867 (VSG Abnormal Decreasing Counter - Y)
  SPD#868 (VSG Abnormal Decreasing Counter - C)
- Check the difference between the "VSG Decreasing 2up Counter" value in step D-45 and D-37 for each color.
  SPD#885 (VSG Abnormal 2up Counter - Bk)
  SPD#886 (VSG Abnormal 2up Counter - M)
  SPD#887 (VSG Abnormal 2up Counter - Y)
  SPD#888 (VSG Abnormal 2up Counter - C)
- If some of the above values are different, change the TD value according to the following table.

		Difference between the "VSG Abnormal Decreasing Counter" value in step D-37 and D-45.		
		0 ~ 1	2 ~ 7	8 ~
Difference between the "VSG 2up Counter" value in step D-37 and D-45.	0	No adjustment necessary	Increase TD value by 1	Increase TD value by 2
	1 ~ 3	Increase TD value by 1	Increase TD value by 2	Increase TD value by 3
	4 ~	Increase TD value by 2	Increase TD value by 3	Increase TD value by 4

- For those colors where the TD or the ND values have been changed, write the appropriate data in column D-45, of TD Check Sheet No. 4.

D-49. If none of the TD data or ND data in the D-29, D-37, and D-45 columns has been changed, go to step D-75.

D-50. Perform a free run of 80 scans.

- Set A4/81/2" x 11" sideways paper in the upper cassette.
- Put the C-4 test chart face down on the exposure glass. (The four-color gradation of the C-4 test chart are must be at the right hand side of the exposure glass.)
- Set SP#01 for the free run model.
- Set SPD#10 to H. (Free run will automatically stop after 80 scans.)
- Press the start key.
- After finishing the free run, press the clear modes key 3 times to clear the free run mode.

D-51. Make one copy in A3/11" x 17" or A4/81/2" x 11" size of a C-4 chart and write step number "D-51" on the copy.

D-52. Perform the "Self Check Mode".

- Set SPD#525 to #015.
- Press the # key while pressing the ◇ key to start.

D-53. Read the following values and write them in the "Table 4-1 (Fine TD Adjustment)".

- SPD#520 (TGRD detected - Bk)
- SPD#521 (TGRD detected - M)
- SPD#522 (TGRD detected - Y)
- SPD#523 (TGRD detected - C)
- Set SPD#91 to H (VBS Compensation Detected Value - Batch Processing)
  SPD#226, SPD#227, SPD#228 and SPD#229 will be displayed sequentially.
- Set SPD#92 to H (VSG Decreasing Counter - Batch Processing)
  SPD#865, SPD#866, SPD#867, SPD#868, SPD#885, SPD#886, SPD#887, and SPD#888 will be displayed sequentially.

D-54. Read the VBS detected value for each color in the step D-53 column of the "Table 4-1 (Fine TD Adjustment)".

- If the value (SPD#226, #227, #228, or #229) is 50 or more, perform the VBS Correction Procedure in Step E.
- For those colors where the TD or the ND values have been changed, write the appropriate data in column D-53, of TD Check Sheet No. 4.

NOTE: If some colors have been adjusted using the VBS Correction Procedure in step D-54, do not perform any adjustment for these colors in step D-55 and step D-56. However, you must perform steps D-55 and D-56 to the remaining colors.

D-55. Prepare the the copy which was made in step D-51 and the standard color patch copy sample. Compare the color patch density of the copy with the standard color patch copy sample color by color. Then adjust the TD or the ND as follows:

- The color patch density of the copy is *1———— compared with the standard color patch copy sample.

*1:
Too light :	decrease the TD (ND) value by 3 or 4.
Light :	decrease the TD (ND) value by 1 or 2.
Almost the same:	No adjustment is necessary.
Dark:	increase the TD (ND) value by 1 or 2.
Too dark:	increase the TD (ND) value by 3 or 4.

For your reference
Bk: SPD#490 (TD - Bk) or SPD#495 (ND - Bk)
M: SPD#491 (TD - M) or SPD#496 (ND - M)
Y: SPD#492 (TD - Y) or SPD#497 (ND - Y)
C: SPD#493 (TD - C) or SPD#498 (ND - C)

- For those colors where the TD or the ND values have been changed, write the appropriate data in column D-53, of TD Check Sheet No. 4.

NOTE: Adjust the TD value first. Only if the TD value is not adjustable (the TD value is 0 or 30), adjust the ND value.

If the "VBS Correction Procedure" in step D-54 or the "TD/ND Adjustment" in step D-55 was performed for some colors, do not perform any adjustment in step D-56 for these colors. However, you must perform step D-56 to the remaining colors.

D-56. • Check the difference between the "VSG Abnormal Decreasing Counter" value in step D-53 and D-45 for each color.
SPD#865 (VSG Abnormal Decreasing Counter - Bk)
SPD#866 (VSG Abnormal Decreasing Counter - M)
SPD#867 (VSG Abnormal Decreasing Counter - Y)
SPD#868 (VSG Abnormal Decreasing Counter - C)

- Check the difference between the "V_{SG} Decreasing 2up Counter" value in step D-53 and D-45 for each color.
  SPD#885 (V_{SG} Abnormal 2up Counter - Bk)
  SPD#886 (V_{SG} Abnormal 2up Counter - M)
  SPD#887 (V_{SG} Abnormal 2up Counter - Y)
  SPD#888 (V_{SG} Abnormal 2up Counter - C)
- If some of the above values are different, change the TD value according to the following table.

		Difference between the "V_{SG} Abnormal Decreasing Counter" value in step D-45 and D-53.		
		0 ~ 1	2 ~ 7	8 ~
Difference between the "V_{SG} 2up Counter" value in step D-45 and D-53.	0	No adjustment necessary	Increase TD value by 1	Increase TD value by 2
	1 ~ 3	Increase TD value by 1	Increase TD value by 2	Increase TD value by 3
	4 ~	Increase TD value by 2	Increase TD value by 3	Increase TD value by 4

- For those colors where the TD or the ND values have been changed, write the appropriate data in column D-53, of TD Check Sheet No. 4.

D-57. If none of the TD data or ND data in the D-37, D-45, and D-53 columns has been changed, go to step D-75.

D-58. Perform a free run of 80 scans.

- Set A4/8½" x 11" sideways paper in the upper cassette.
- Put the C-4 test chart face down on the exposure glass. (The four-color gradation of the C-4 test chart are must be at the right hand side of the exposure glass.)
- Set SP#01 for the free run model.
- Set SPD#10 to H. (Free run will automatically stop after 80 scans.)
- Press the start key.
- After finishing the free run, press the clear modes key 3 times to clear the free run mode.

D-59. Make one copy in A3/11" x 17" or A4/8½" x 11" size of a C-4 chart and write step number "D-59" on the copy.

D-60. Perform the "Self Check Mode".

- Set SPD#525 to #015.
- Press the # key while pressing the ◇ key to start.

D-61. Read the following values and write them in the "Table 4-1 (Fine TD Adjustment)".

- SPD#520 (TGRD detected - Bk)
- SPD#521 (TGRD detected - M)
- SPD#522 (TGRD detected - Y)
- SPD#523 (TGRD detected - C)
- Set SPD#91 to H (VBS Compensation Detected Value - Batch Processing)
  SPD#226, SPD#227, SPD#228 and SPD#229 will be displayed sequentially.
- Set SPD#92 to H (VSG Decreasing Counter - Batch Processing)
  SPD#865, SPD#866, SPD#867, SPD#868, SPD#885, SPD#886, SPD#887, and SPD#888 will be displayed sequentially.

D-62. Read the VBS detected value for each color in the step D-61 column of the "Table 4-1 (Fine TD Adjustment)".

- If the value (SPD#226, #227, #228, or #229) is 50 or more, perform the VBS Correction Procedure in Step E.
- For those colors where the TD or the ND values have been changed, write the appropriate data in column D-61, of TD Check Sheet No. 4.

NOTE: If some colors have been adjusted using the VBS Correction Procedure in step D-62, do not perform any adjustment for these colors in step D-63 and step D-64. However, you must perform steps D-63 and D-64 to the remaining colors.

D-63. Prepare the the copy which was made in step D-59 and the standard color patch copy sample. Compare the color patch density of the copy with the standard color patch copy sample color by color. Then adjust the TD or the ND as follows:

- The color patch density of the copy is *1——— compared with the standard color patch copy sample.

*1: Too light :	decrease the TD (ND) value by 3 or 4.
Light :	decrease the TD (ND) value by 1 or 2.
Almost the same:	No adjustment is necessary.
Dark:	increase the TD (ND) value by 1 or 2.
Too dark:	increase the TD (ND) value by 3 or 4.

For your reference
Bk: SPD#490 (TD - Bk) or SPD#495 (ND - Bk)
M: SPD#491 (TD - M) or SPD#496 (ND - M)
Y: SPD#492 (TD - Y) or SPD#497 (ND - Y)
C: SPD#493 (TD - C) or SPD#498 (ND - C)

- For those colors where the TD or the ND values have been changed, write the appropriate data in column D-61, of TD Check Sheet No. 4.

NOTE: Adjust the TD value first. Only if the TD value is not adjustable (the TD value is 0 or 30), adjust the ND value.

If the "VBS Correction Procedure" in step D-62 or the "TD/ND Adjustment" in step D-63 was performed for some colors, do not perform any adjustment in step D-64 for these colors. However, you must perform step D-64 to the remaining colors.

D-64.
- Check the difference between the "VSG Abnormal Decreasing Counter" value in step D-61 and D-53 for each color.
  SPD#865 (VSG Abnormal Decreasing Counter - Bk)
  SPD#866 (VSG Abnormal Decreasing Counter - M)
  SPD#867 (VSG Abnormal Decreasing Counter - Y)
  SPD#868 (VSG Abnormal Decreasing Counter - C)
- Check the difference between the "VSG Decreasing 2up Counter" value in step D-61 and D-53 for each color.
  SPD#885 (VSG Abnormal 2up Counter - Bk)
  SPD#886 (VSG Abnormal 2up Counter - M)
  SPD#887 (VSG Abnormal 2up Counter - Y)
  SPD#888 (VSG Abnormal 2up Counter - C)
- If some of the above values are different, change the TD value according to the following table.

		Difference between the "VSG Abnormal Decreasing Counter" value in step D-53 and D-61.		
		0 ~ 1	2 ~ 7	8 ~
Difference between the "VSG 2up Counter" value in step D-53 and D-61.	0	No adjustment necessary	Increase TD value by 1	Increase TD value by 2
	1 ~ 3	Increase TD value by 1	Increase TD value by 2	Increase TD value by 3
	4 ~	Increase TD value by 2	Increase TD value by 3	Increase TD value by 4

- For those colors where the TD or the ND values have been changed, write the appropriate data in column D-61, of TD Check Sheet No. 4.

D-65. If none of the TD data or ND data in the D-45, D-53, and D-61 columns has been changed, go to step D-75.

D-66. Perform a free run of 80 scans.

- Set A4/8½" x 11" sideways paper in the upper cassette.
- Put the C-4 test chart face down on the exposure glass. (The four-color gradation of the C-4 test chart are must be at the right hand side of the exposure glass.)
- Set SP#01 for the free run model.
- Set SPD#10 to H. (Free run will automatically stop after 80 scans.)
- Press the start key.
- After finishing the free run, press the clear modes key 3 times to clear the free run mode.

D-67. Make one copy in A3/11" x 17" or A4/8½" x 11" size of a C-4 chart and write step number "D-67" on the copy.

D-68. Perform the "Self Check Mode".

- Set SPD#525 to #015.
- Press the $\boxed{\#}$ key while pressing the $\boxed{\Diamond}$ key to start.

D-69. Read the following values and write them in the "Table 4-1 (Fine TD Adjustment)".

- SPD#520 (TGRD detected - Bk)
- SPD#521 (TGRD detected - M)
- SPD#522 (TGRD detected - Y)
- SPD#523 (TGRD detected - C)
- Set SPD#91 to H (VBS Compensation Detected Value - Batch Processing)
  SPD#226, SPD#227, SPD#228 and SPD#229 will be displayed sequentially.
- Set SPD#92 to H (VSG Decreasing Counter - Batch Processing)
  SPD#865, SPD#866, SPD#867, SPD#868, SPD#885, SPD#886, SPD#887, and SPD#888 will be displayed sequentially.

D-70. Read the VBS detected value for each color in the step D-69 column of the "Table 4-1 (Fine TD Adjustment)"

- If the value (SPD#226, #227, #228, or #229) is 50 or more, perform the VBS Correction Procedure in Step E.
- For those colors where the TD or the ND values have been changed, write the appropriate data in column D-69, of TD Check Sheet No. 4.

NOTE: If some colors have been adjusted using the VBS Correction Procedure in step D-70, do not perform any adjustment for these colors in step D-71 and step D-72. However, you must perform steps D-71 and D-72 to the remaining colors.

D-71. Prepare the the copy which was made in step D-69 and the standard color patch copy sample. Compare the color patch density of the copy with the standard color patch copy sample color by color. Then adjust the TD or the ND as follows:

- The color patch density of the copy is *1——— compared with the standard color patch copy sample.

*1:	Too light :	decrease the TD (ND) value by 3 or 4.
	Light :	decrease the TD (ND) value by 1 or 2.
	Almost the same:	No adjustment is necessary.
	Dark:	increase the TD (ND) value by 1 or 2.
	Too dark:	increase the TD (ND) value by 3 or 4.

For your reference
Bk: SPD#490 (TD - Bk) or SPD#495 (ND - Bk)
M: SPD#491 (TD - M) or SPD#496 (ND - M)
Y: SPD#492 (TD - Y) or SPD#497 (ND - Y)
C: SPD#493 (TD - C) or SPD#498 (ND - C)

- For those colors where the TD or the ND values have been changed, write the appropriate data in column D-69, of TD Check Sheet No. 4.

NOTE: Adjust the TD value first. Only if the TD value is not adjustable (the TD value is 0 or 30), adjust the ND value.

If the "VBS Correction Procedure" in step D-70 or the "TD/ND Adjustment" in step D-71 was performed for some colors, do not perform any adjustment in step D-72 for these colors. However, you must perform step D-72 to the remaining colors.

Replacement Adjustment

D-72.
- Check the difference between the "VSG Abnormal Decreasing Counter" value in step D-69 and D-61 for each color.
  SPD#865 (VSG Abnormal Decreasing Counter - Bk)
  SPD#866 (VSG Abnormal Decreasing Counter - M)
  SPD#867 (VSG Abnormal Decreasing Counter - Y)
  SPD#868 (VSG Abnormal Decreasing Counter - C)
- Check the difference between the "VSG Decreasing 2up Counter" value in step D-69 and D-61 for each color.
  SPD#885 (VSG Abnormal 2up Counter - Bk)
  SPD#886 (VSG Abnormal 2up Counter - M)
  SPD#887 (VSG Abnormal 2up Counter - Y)
  SPD#888 (VSG Abnormal 2up Counter - C)
- If some of the above values are different, change the TD value according to the following table.

		Difference between the "VSG Abnormal Decreasing Counter" value in step D-61 and D-69.		
		0 ~ 1	2 ~ 7	8 ~
Difference between the "VSG 2up Counter" value in step D-61 and D-69.	0	No adjustment necessary	Increase TD value by 1	Increase TD value by 2
	1 ~ 3	Increase TD value by 1	Increase TD value by 2	Increase TD value by 3
	4 ~	Increase TD value by 2	Increase TD value by 3	Increase TD value by 4

- For those colors where the TD or the ND values have been changed, write the appropriate data in column D-69, of TD Check Sheet No. 4.

D-73. If none of the TD data or ND data in the D-53, D-61, and D-69 columns has been changed, go to step D-75. Otherwise, go to step D-74.

D-74.
- Make a copy of the "TD Check Sheet No. 4"
- Copy the values in the step 61 and step 69 columns to the step 7 and step 14 columns of the new "TD Check Sheet No. 4".
- Go back to step D-18.

D-75. Set the TGRD target values using the following procedure:

- Calculate the weighted average from the last three TGRD detected values for each color. See the "Table 4-1 (Fine TD Adjustment)".

	Example:
SPD#520 (TGRD detected - Bk)	65 70 65 → 66
SPD#521 (TGRD detected - M)	87 87 87 → 87
SPD#522 (TGRD detected - Y)	79 68 84 → 77
SPD#523 (TGRD detected - C)	88 93 94 → 91
	Last 3 values / Weighted average

NOTE: Round off the result of the calculation to whole number.

- Replace the TGRD target values with these weighted average values.
  SPD#515 (TGRD Target - Bk)
  SPD#516 (TGRD Target - M)
  SPD#517 (TGRD Target - Y)
  SPD#518 (TGRD Target - C)

D-76. Set the DIF Preset values in accordance with the following procedure:

- Make 16 copies of a C-4 chart on A4/8 1/2" x 11" paper. (Do not make these copies in a continuous copy run. Make 16 single-copy runs.)
- Read the DIF detected values for each color and multiply by "1.1" to get the DIF detected value.
  SPD#125 (DIF detected - Bk) ________ x 1.1 = ________
  SPD#126 (DIF detected - M) ________ x 1.1 = ________
  SPD#127 (DIF detected - Y) ________ x 1.1 = ________
  SPD#128 (DIF detected - C) ________ x 1.1 = ________

NOTE: Round off the result of the calculation to a whole number.

- Compare the above results with the DIF Preset value for each color, and input the higher value as the DIF Preset value.
  If the DIF Preset value is higher than the above result, you do not need to change the DIF Preset value for that color.
  SPD#120 (DIF Preset - Bk)
  SPD#121 (DIF Preset - M)
  SPD#122 (DIF Preset - Y)
  SPD#123 (DIF Preset - C)

D-77. End the TD check in accordance with the following procedure.

- Set SPD#707 to 144 (Fusing temperature for standard mode during standby.)
- Set SPD#708 to 138 (Fusing temperature for standard mode during a copy run.)
- Make one copy of a C-4 chart on A3/11 x 17" paper and check the copy quality.
- Set SPD#86 to H (Process control initial setting mode reset.)
- Set SPD#090 to H (Process Control Data Monitor) then copy the values to the process control data check sheet.

E. VBS Correction Procedure (In the case of VBS ≥ 50)

NOTE: Perform the following procedure only for the relevant color. For example, if SPD#226 (Bk-VBS Compensation detected data) is 50 or more, perform the procedure for Black only.

E-1. If the relevant VBS (SPD#226 ~ #229) is between 50 and 70, add 4 to the relevant color's TD value (SPD#490 ~ #493).
If the relevant VBS (SPD#226 ~ #229) is between 80 and 150, add 6 to the relevant color's TD value (SPD#490 ~ #493).

NOTE: Adjust the TD value first. Only if the TD value is not adjustable (the TD value is 0 or 30), adjust the ND value.

E-2. Set the relevant color's Toner Supply Stop (SPD#345 ~ #348) to H.

E-3. Set SP21 (Test Pattern) to 2 (16 Gradation) from the upper operation panel.

E-4. Select the relevant color using SPD#50 (color mode selection).

0: No	4: Y	8: C	12: Y+C
1: Bk	5: Bk+Y	9: Bk+C	13: Bk+Y+C
2: M	6: M+Y	10: M+C	14: M+Y+C
3: Bk+M	7: Bk+M+Y	11: Bk+M+C	15: Bk+M+Y+C

E-5. Make 4 copies (A3/11" x 17" size).

E-6. Repeat step E-5 until the relevant Vsp detected data (SPD#470 ~ #473) overshoots the Vsp target data (SPD#455 ~ #458) by 10.

E-7. Set SPD#79 (batch processing) to H.

E-8. Perform the Vk compensation (SPD#225) only for the relevant color. Select the value from step E-4.

3.6 TD (Toner Density) CHECK (Manual) FOR MODEL A105

NOTE: The TD check (Manual) procedure should be performed:

1. When the ID sensor is cleaned.

A. Preparation for a TD Check

A-1. Prepare the "TD check sheet No 4" and "Process control data check sheet".

A-2. Confirm that the relevant ID sensors have been cleaned.

A-3. Set the SPD modes as follows:

- SPD#36 to H (Process Control All ON)
- SPD#453 to H (CD data fixed during self check)
- SPD#454 to H (ND fixed)
- SPD#707 to 132 (Fusing Temperature for standard mode during standby.)
- SPD#708 to 126 (Fusing temperature for standard mode during a copy run.)
- Only change the value for the relevant colors as follows:

  Bk → SPD#611 to 032 (ID sensor LED data - Bk)
  M → SPD#612 to 032 (ID sensor LED data - M)
  Y → SPD#613 to 032 (ID sensor LED data - Y)
  C → SPD#614 to 032 (ID sensor LED data - C)

A-4. Turn the main switch off and on.

A-5. Set SPD#82 to H (color patch - 15 mm)

A-6. Make one copy of a C-4 test chart on A3/11" x 17" or A4/8.5" x 11" paper.

NOTE: If it is a solid color copy, set the charge corona unit for that color in position.

B. Rough TD Adjustment

NOTE: Rough TD adjustment is not necessory for the TD check (Manual).

C. LD Power Control Data Adjustment

NOTE: LD power control data adjustment is not necessory for the TD check (Manual).

D. Fine TD Adjustment

D-1. Read the following values and write them in the "Table 4-1 (Fine TD Adjustment)".

- SPD#490 (TD data - Bk)
- SPD#491 (TD data - M)
- SPD#492 (TD data - Y)
- SPD#493 (TD data - C)
- SPD#495 (ND data - Bk)
- SPD#496 (ND data - M)
- SPD#497 (ND data - Y)
- SPD#498 (ND data - C)

- SPD#520 (T_{GRD} detected - Bk)
- SPD#521 (T_{GRD} detected - M)
- SPD#522 (T_{GRD} detected - Y)
- SPD#523 (T_{GRD} detected - C)

- Set SPD#91 to H (V_{BS} Compensation Detected Value - Batch Processing)
  SPD#226, SPD#227, SPD#228 and SPD#229 will be displayed sequentially.
- Set SPD#92 to H (V_{SG} Decreasing Counter - Batch Processing)
  SPD#865, SPD#866, SPD#867, SPD#868, SPD#885, SPD#886, SPD#887, and SPD#888 will be displayed sequentially.

D-2. Put the color patch pattern on the trailing edge of the sample copy.

- Set SPD#82 to H (color patch - 15 mm).

D-3. Perform a free run of 80 scans.

- Set A4/8½" x 11" sideways paper in the upper cassette.
- Put the C-4 test chart face down on the exposure glass. (The four-color gradation of the C-4 test chart are must be at the right hand side of the exposure glass.)
- Set SP#01 for the free run model.
- Set SPD#10 to H. (Free run will automatically stop after 80 scans.)
- Press the start key.
- After finishing the free run, press the clear modes key 3 times to clear the free run mode.

D-4. Make one copy in A3/11" x 17" or A4/8½" x 11" size of a C-4 chart.

D-5. Write Step number "D-4" on the copy.

D-6. Perform the "Self Check Mode".

- Set SPD#525 to #015.
- Press the $\boxed{\#}$ key while pressing the $\boxed{\diamond}$ key to start.

D-7. Read the following values and write them in the "Table 4-1 (Fine TD Adjustment)".

- SPD#520 (TGRD detected - Bk)
- SPD#521 (TGRD detected - M)
- SPD#522 (TGRD detected - Y)
- SPD#523 (TGRD detected - C)
- Set SPD#91 to H (VBS Compensation Detected Value - Batch Processing)
  SPD#226, SPD#227, SPD#228 and SPD#229 will be displayed sequentially.
- Set SPD#92 to H (VSG Decreasing Counter - Batch Processing)
  SPD#865, SPD#866, SPD#867, SPD#868, SPD#885, SPD#886, SPD#887, and SPD#888 will be displayed sequentially.

D-8. Read the VBS detected value for each color in the step D-7 column of "Table 4-1 (Fine TD Adjustment)".

- If the value (SPD#226, #227, #228, or #229) is 50 or more, perform the VBS Correction Procedure in Step E.
- For those colors where the TD or the ND values have been changed, write the appropriate data in column D-7, of TD Check Sheet No. 4.

NOTE: If some colors have been adjusted using the VBS Correction Procedure in step D-8, do not perform any adjustment for these colors in step D-9 and step D-10.
However, you must perform steps D-9 and D-10 to the remaining colors (those colors that were not adjusted using the VBS Correction Procedure in step D-8).

D-9. Prepare the the copy which was made in step D-4 and the standard color patch copy sample. Compare the color patch density of the copy with the standard color patch copy sample color by color. Then adjust the TD or the ND as follows:

- The color patch density of the copy is *1——— compared with the standard color patch copy sample.

*1: Too light :	decrease the TD (ND) value by 3 or 4.
Light :	decrease the TD (ND) value by 1 or 2.
Almost the same:	No adjustment is necessary.
Dark:	increase the TD (ND) value by 1 or 2.
Too dark:	increase the TD (ND) value by 3 or 4.

For your reference
Bk: SPD#490 (TD - Bk) or SPD#495 (ND - Bk)
M: SPD#491 (TD - M) or SPD#496 (ND - M)
Y: SPD#492 (TD - Y) or SPD#497 (ND - Y)
C: SPD#493 (TD - C) or SPD#498 (ND - C)

Replacement Adjustment

- For those colors where the TD or the ND values have been changed, write the appropriate data in column D-7, of TD Check Sheet No. 4.

NOTE: Adjust the TD value first. Only if the TD value is not adjustable (the TD value is 0 or 30), adjust the ND value.

If the "VBS Correction Procedure" in step D-8 or the "TD/ND Adjustment" in step D-9 was performed for some colors, do not perform any adjustment in step D-10 for these colors. However, you must perform step D-10 to the remaining colors.

D-10.
- Check the difference between the "VSG Abnormal Decreasing Counter" value in step D-7 and D-1 for each color.
  SPD#865 (VSG Abnormal Decreasing Counter - Bk)
  SPD#866 (VSG Abnormal Decreasing Counter - M)
  SPD#867 (VSG Abnormal Decreasing Counter - Y)
  SPD#868 (VSG Abnormal Decreasing Counter - C)
- Check the difference between the "VSG Decreasing 2up Counter" value in step D-7 and D-1 for each color.
  SPD#885 (VSG Abnormal 2up Counter - Bk)
  SPD#886 (VSG Abnormal 2up Counter - M)
  SPD#887 (VSG Abnormal 2up Counter - Y)
  SPD#888 (VSG Abnormal 2up Counter - C)
- If some of the above values are different, change the TD value according to the following table.

<table>
<tr><td colspan="2" rowspan="2"></td><td colspan="3">Difference between the "VSG Abnormal Decreasing Counter" value in step D-1 and D-7.</td></tr>
<tr><td>0 ~ 1</td><td>2 ~ 7</td><td>8 ~</td></tr>
<tr><td rowspan="3">Difference between the "VSG 2up Counter" value in step D-1 and D-7.</td><td>0</td><td>No adjustment necessary</td><td>Increase TD value by 1</td><td>Increase TD value by 2</td></tr>
<tr><td>1 ~ 3</td><td>Increase TD value by 1</td><td>Increase TD value by 2</td><td>Increase TD value by 3</td></tr>
<tr><td>4 ~</td><td>Increase TD value by 2</td><td>Increase TD value by 3</td><td>Increase TD value by 4</td></tr>
</table>

- For those colors where the TD or the ND values have been changed, write the appropriate data in column D-7, of TD Check Sheet No. 4.

D-11. Perform a free run of 80 scans.

- Set A4/8 1/2" x 11" sideways paper in the upper cassette.
- Put the C-4 test chart face down on the exposure glass. (The four-color gradation of the C-4 test chart are must be at the right hand side of the exposure glass.)

- Set SP#01 for the free run model.
- Set SPD#10 to H. (Free run will automatically stop after 80 scans.)
- Press the start key.
- After finishing the free run, press the clear modes key 3 times to clear the free run mode.

D-12. Make one copy in A3/11" x 17" or A4/81/2" x 11" size of a C-4 chart and write step number "D-12" on the copy.

D-13. Perform the "Self Check Mode".

- Set SPD#525 to #015.
- Press the $\boxed{\#}$ key while pressing the $\boxed{\diamond}$ key to start.

D-14. Read the following values and write them in the "Table 4-1 (Fine TD Adjustment)".

- SPD#520 (TGRD detected - Bk)
- SPD#521 (TGRD detected - M)
- SPD#522 (TGRD detected - Y)
- SPD#523 (TGRD detected - C)

- Set SPD#91 to H (VBS Compensation Detected Value - Batch Processing)
  SPD#226, SPD#227, SPD#228 and SPD#229 will be displayed sequentially.
- Set SPD#92 to H (VSG Decreasing Counter - Batch Processing)
  SPD#865, SPD#866, SPD#867, SPD#868, SPD#885, SPD#886, SPD#887, and SPD#888 will be displayed sequentially.

D-15. Read the VBS detected value for each color in the step D-14 column of the "Table 4-1 (Fine TD Adjustment)".

- If the value (SPD#226, #227, #228, or #229) is 50 or more, perform the VBS Correction Procedure in Step E.
- For those colors where the TD or the ND values have been changed, write the appropriate data in column D-14, of TD Check Sheet No. 4.

NOTE: If some colors have been adjusted using the VBS Correction Procedure in step D-15, do not perform any adjustment for these colors in step D-16 and step D-17. However, you must perform steps D-16 and D-17 to the remaining colors.

D-16. Prepare the the copy which was made in step D-12 and the standard color patch copy sample. Compare the color patch density of the copy with the standard color patch copy sample color by color. Then adjust the TD or the ND as follows:

- The color patch density of the copy is *1——— compared with the standard color patch copy sample.

*1:	Too light :	decrease the TD (ND) value by 3 or 4.
	Light :	decrease the TD (ND) value by 1 or 2.
	Almost the same:	No adjustment is necessary.
	Dark:	increase the TD (ND) value by 1 or 2.
	Too dark:	increase the TD (ND) value by 3 or 4.

For your reference
Bk: SPD#490 (TD - Bk) or SPD#495 (ND - Bk)
M: SPD#491 (TD - M) or SPD#496 (ND - M)
Y: SPD#492 (TD - Y) or SPD#497 (ND - Y)
C: SPD#493 (TD - C) or SPD#498 (ND - C)

- For those colors where the TD or the ND values have been changed, write the appropriate data in column D-14, of TD Check Sheet No. 4.

NOTE: Adjust the TD value first. Only if the TD value is not adjustable (the TD value is 0 or 30), adjust the ND value.

If the "VBS Correction Procedure" in step D-15 or the "TD/ND Adjustment" in step D-16 was performed for some colors, do not perform any adjustment in step D-17 for these colors. You must perform D-17 to the remaining color.

D-17.
- Check the difference between the "VSG Abnormal Decreasing Counter" value in step D-14 and D-7 for each color.
  SPD#865 (VSG Abnormal Decreasing Counter - Bk)
  SPD#866 (VSG Abnormal Decreasing Counter - M)
  SPD#867 (VSG Abnormal Decreasing Counter - Y)
  SPD#868 (VSG Abnormal Decreasing Counter - C)
- Check the difference between the "VSG Decreasing 2up Counter" value in step D-14 and D-7 for each color.
  SPD#885 (VSG Abnormal 2up Counter - Bk)
  SPD#886 (VSG Abnormal 2up Counter - M)
  SPD#887 (VSG Abnormal 2up Counter - Y)
  SPD#888 (VSG Abnormal 2up Counter - C)
- If some of the above values are different, change the TD value according to the following table.

		Difference between the "V_{SG} Abnormal Decreasing Counter" value in step D-7 and D-14.		
		0 ~ 1	2 ~ 7	8 ~
Difference between the "V_{SG} 2up Counter" value in step D-7 and D-14.	0	No adjustment necessary	Increase TD value by 1	Increase TD value by 2
	1 ~ 3	Increase TD value by 1	Increase TD value by 2	Increase TD value by 3
	4 ~	Increase TD value by 2	Increase TD value by 3	Increase TD value by 4

- For those colors where the TD or the ND values have been changed, write the appropriate data in column D-14, of TD Check Sheet No. 4.

D-18. Perform a free run of 80 scans.

- Set A4/8 1/2" x 11" sideways paper in the upper cassette.
- Put the C-4 test chart face down on the exposure glass. (The four-color gradation of the C-4 test chart are must be at the right hand side of the exposure glass.)
- Set SP#01 for the free run model.
- Set SPD#10 to H. (Free run will automatically stop after 80 scans.)
- Press the start key.
- After finishing the free run, press the clear modes key 3 times to clear the free run mode.

D-19. Make one copy in A3/11" x 17" or A4/8 1/2" x 11" size of a C-4 chart and write step number "D-19" on the copy.

D-20. Perform the "Self Check Mode".

- Set SPD#525 to #015.
- Press the # key while pressing the ◇ key to start.

D-21. Read the following values and write them in the "Table 4-1 (Fine TD Adjustment)".

- SPD#520 (T_{GRD} detected - Bk)
- SPD#521 (T_{GRD} detected - M)
- SPD#522 (T_{GRD} detected - Y)
- SPD#523 (T_{GRD} detected - C)

- Set SPD#91 to H (V_{BS} Compensation Detected Value - Batch Processing)

SPD#226, SPD#227, SPD#228 and SPD#229 will be displayed sequentially.

- Set SPD#92 to H (VSG Decreasing Counter - Batch Processing) SPD#865, SPD#866, SPD#867, SPD#868, SPD#885, SPD#886, SPD#887, and SPD#888 will be displayed sequentially.

D-22. Read the VBS detected value for each color in the step D-21 column of the "Table 4-1 (Fine TD Adjustment)".

- If the value (SPD#226, #227, #228, or #229) is 50 or more, perform the VBS Correction Procedure in Step E.
- For those colors where the TD or the ND values have been changed, write the appropriate data in column D-21, of TD Check Sheet No. 4.

NOTE: If some colors have been adjusted using the VBS Correction Procedure in step D-22, do not perform any adjustment for these colors in step D-23 and step D-24.

D-23. Prepare the the copy which was made in step D-19 and the standard color patch copy sample. Compare the color patch density of the copy with the standard color patch copy sample color by color. Then adjust the TD or the ND as follows:

- The color patch density of the copy is *1———— compared with the standard color patch copy sample.

*1: Too light :	decrease the TD (ND) value by 3 or 4.
Light :	decrease the TD (ND) value by 1 or 2.
Almost the same:	No adjustment is necessary.
Dark:	increase the TD (ND) value by 1 or 2.
Too dark:	increase the TD (ND) value by 3 or 4.

For your reference
Bk: SPD#490 (TD - Bk) or SPD#495 (ND - Bk)
M: SPD#491 (TD - M) or SPD#496 (ND - M)
Y: SPD#492 (TD - Y) or SPD#497 (ND - Y)
C: SPD#493 (TD - C) or SPD#498 (ND - C)

- For those colors where the TD or ND values have been changed, write the appropriate data in column D-21, of the TD Check Sheet No. 4.

NOTE: Adjust the TD value first. Only if the TD value is not adjustable (the TD value is 0 or 30), adjust the ND value.

If the "VBS Correction Procedure" in step D-22 or the "TD/ND Adjustment" in step D-23 was performed for some colors, do not perform any adjustment in step D-24 for these colors.

D-24.
- Check the difference between the "V_{SG} Abnormal Decreasing Counter" value in step D-21 and D-14 for each color.
  SPD#865 (V_{SG} Abnormal Decreasing Counter - Bk)
  SPD#866 (V_{SG} Abnormal Decreasing Counter - M)
  SPD#867 (V_{SG} Abnormal Decreasing Counter - Y)
  SPD#868 (V_{SG} Abnormal Decreasing Counter - C)
- Check the difference between the "V_{SG} Decreasing 2up Counter" value in step D-21 and D-14 for each color.
  SPD#885 (V_{SG} Abnormal 2up Counter - Bk)
  SPD#886 (V_{SG} Abnormal 2up Counter - M)
  SPD#887 (V_{SG} Abnormal 2up Counter - Y)
  SPD#888 (V_{SG} Abnormal 2up Counter - C)
- If some of the above values are different, change the TD value according to the following table.

		Difference between the "V_{SG} Abnormal Decreasing Counter" value in step D-14 and D-21.		
		0 ~ 1	2 ~ 7	8 ~
Difference between the "V_{SG} 2up Counter" value in step D-14 and D-21.	0	No adjustment necessary	Increase TD value by 1	Increase TD value by 2
	1 ~ 3	Increase TD value by 1	Increase TD value by 2	Increase TD value by 3
	4 ~	Increase TD value by 2	Increase TD value by 3	Increase TD value by 4

- For those colors where the TD or the ND values have been changed, write the appropriate data in column D-21, of TD Check Sheet No. 4.

D-25. If none of the TD data or ND data in the D-7, D-14, and D-21 columns has been changed, go to step D-75.

D-26. Perform a free run of 80 scans.
- Set A4/81/2" x 11" sideways paper in the upper cassette.
- Put the C-4 test chart face down on the exposure glass. (The four-color gradation of the C-4 test chart are must be at the right hand side of the exposure glass.)
- Set SP#01 for the free run model.
- Set SPD#10 to H. (Free run will automatically stop after 80 scans.)
- Press the start key.
- After finishing the free run, press the clear modes key 3 times to clear the free run mode.

D-27. Make one copy in A3/11" x 17" or A4/81/2" x 11" size of a C-4 chart and write step number "D-27" on the copy.

D-28. Perform the "Self Check Mode".

- Set SPD#525 to #015.
- Press the [#] key while pressing the [◇] key to start.

D-29. Read the following values and write them in the "Table 4-1 (Fine TD Adjustment)".

- SPD#520 (TGRD detected - Bk)
- SPD#521 (TGRD detected - M)
- SPD#522 (TGRD detected - Y)
- SPD#523 (TGRD detected - C)

- Set SPD#91 to H (VBS Compensation Detected Value - Batch Processing)
  SPD#226, SPD#227, SPD#228 and SPD#229 will be displayed sequentially.
- Set SPD#92 to H (VSG Decreasing Counter - Batch Processing)
  SPD#865, SPD#866, SPD#867, SPD#868, SPD#885, SPD#886, SPD#887, and SPD#888 will be displayed sequentially.

D-30. Read the VBS detected value for each color in the step D-29 column of the "Table 4-1 (Fine TD Adjustment)".

- If the value (SPD#226, #227, #228, or #229) is 50 or more, perform the VBS Correction Procedure in Step E.
- For those colors where the TD or the ND values have been changed, write the appropriate data in column D-29, of TD Check Sheet No. 4.

NOTE: If some colors have been adjusted using the VBS Correction Procedure in step D-30, do not perform any adjustment for these colors in step D-31 and step D-32. However, you must perform steps D-31 and D-32 to the remaining colors.

D-31. Prepare the the copy which was made in step D-27 and the standard color patch copy sample. Compare the color patch density of the copy with the standard color patch copy sample color by color. Then adjust the TD or the ND as follows:

- The color patch density of the copy is [*1]——— compared with the standard color patch copy sample.

*1:	Too light :	decrease the TD (ND) value by 3 or 4.
	Light :	decrease the TD (ND) value by 1 or 2.
	Almost the same:	No adjustment is necessary.
	Dark:	increase the TD (ND) value by 1 or 2.
	Too dark:	increase the TD (ND) value by 3 or 4.

For your reference
Bk: SPD#490 (TD - Bk) or SPD#495 (ND - Bk)
M: SPD#491 (TD - M) or SPD#496 (ND - M)
Y: SPD#492 (TD - Y) or SPD#497 (ND - Y)
C: SPD#493 (TD - C) or SPD#498 (ND - C)

- For those colors where the TD or the ND vaues have been changed, write the appropriate data in column D-29, of TD Check Sheet No. 4.

NOTE: Adjust the TD value first. Only if the TD value is not adjustable (the TD value is 0 or 30), adjust the ND value.

If the "VBS Correction Procedure" in step D-30 or the "TD/ND Adjustment" in step D-31 was performed for some colors, do not perform any adjustment in step D-32 for these colors. However, you must perform step D-32 to the remaining colors.

D-32.
- Check the difference between the "VSG Abnormal Decreasing Counter" value in step D-29 and D-21 for each color.
  SPD#865 (VSG Abnormal Decreasing Counter - Bk)
  SPD#866 (VSG Abnormal Decreasing Counter - M)
  SPD#867 (VSG Abnormal Decreasing Counter - Y)
  SPD#868 (VSG Abnormal Decreasing Counter - C)
- Check the difference between the "VSG Decreasing 2up Counter" value in step D-29 and D-21 for each color.
  SPD#885 (VSG Abnormal 2up Counter - Bk)
  SPD#886 (VSG Abnormal 2up Counter - M)
  SPD#887 (VSG Abnormal 2up Counter - Y)
  SPD#888 (VSG Abnormal 2up Counter - C)
- If some of the above values are different, change the TD value according to the following table.
- For those colors where the TD or the ND values have been changed, write the appropriate data in column D-29, of TD Check Sheet No. 4.

D-33. If none of the TD data or ND data in the D-17, D-21, and D-29 columns has been changed, go to step D-75.

D-34. Perform a free run of 80 scans.

- Set A4/81/2" x 11" sideways paper in the upper cassette.
- Put the C-4 test chart face down on the exposure glass. (The four-color gradation of the C-4 test chart are must be at the right hand side of the exposure glass.)
- Set SP#01 for the free run model.
- Set SPD#10 to H. (Free run will automatically stop after 80 scans.)
- Press the start key.
- After finishing the free run, press the clear modes key 3 times to clear the free run mode.

D-35. Make one copy in A3/11" x 17" or A4/81/2" x 11" size of a C-4 chart and write step number "D-35" on the copy.

D-36. Perform the "Self Check Mode".

- Set SPD#525 to #015.
- Press the # key while pressing the ◇ key to start.

D-37. Read the following values and write them in the "Table 4-1(Fine TD Adjustment)".

- SPD#520 (TGRD detected - Bk)
- SPD#521 (TGRD detected - M)
- SPD#522 (TGRD detected - Y)
- SPD#523 (TGRD detected - C)
- Set SPD#91 to H (VBS Compensation Detected Value - Batch Processing)
  SPD#226, SPD#227, SPD#228 and SPD#229 will be displayed sequentially.
- Set SPD#92 to H (VSG Decreasing Counter - Batch Processing)
  SPD#865, SPD#866, SPD#867, SPD#868, SPD#885, SPD#886, SPD#887, and SPD#888 will be displayed sequentially.

D-38. Read the VBS detected value for each color in the step D-37 column of the "Table 4-1 (Fine TD Adjustment)".

- If the value (SPD#226, #227, #228, or #229) is 50 or more, perform the VBS Correction Procedure in Step E.
- For those colors where the TD or the ND values have been changed, write the appropriate data in column D-37, of TD Check Sheet No. 4.

NOTE: If some colors have been adjusted using the VBS Correction Procedure in step D-38, do not perform any adjustment for these colors in step D-39 and step D-40. However, you must perform steps D-39 and D-40 to the remaining colors.

D-39. Prepare the the copy which was made in step D-35 and the standard color patch copy sample. Compare the color patch density of the copy with the standard color patch copy sample color by color. Then adjust the TD or the ND as follows:

- The color patch density of the copy is [*1]——— compared with the standard color patch copy sample.

*1: Too light : decrease the TD (ND) value by 3 or 4.
Light : decrease the TD (ND) value by 1 or 2.
Almost the same: No adjustment is necessary.
Dark: increase the TD (ND) value by 1 or 2.
Too dark: increase the TD (ND) value by 3 or 4.

For your reference
Bk: SPD#490 (TD - Bk) or SPD#495 (ND - Bk)
M: SPD#491 (TD - M) or SPD#496 (ND - M)
Y: SPD#492 (TD - Y) or SPD#497 (ND - Y)
C: SPD#493 (TD - C) or SPD#498 (ND - C)

- For those colors where the TD or the ND vaues have been changed, write the appropriate data in column D-37, of TD Check Sheet No. 4.

NOTE: Adjust the TD value first. Only if the TD value is not adjustable (the TD value is 0 or 30), adjust the ND value.

If the "VBS Correction Procedure" in step D-38 or the "TD/ND Adjustment" in step D-39 was performed for some colors, do not perform any adjustment in step D-40 for these colors. However, you must perform step D-40 to the remaining colors.

D-40. • Check the difference between the "VSG Abnormal Decreasing Counter" value in step D-37 and D-29 for each color.
SPD#865 (VSG Abnormal Decreasing Counter - Bk)
SPD#866 (VSG Abnormal Decreasing Counter - M)
SPD#867 (VSG Abnormal Decreasing Counter - Y)
SPD#868 (VSG Abnormal Decreasing Counter - C)

- Check the difference between the "VSG Decreasing 2up Counter" value in step D-37 and D-29 for each color.
  SPD#885 (VSG Abnormal 2up Counter - Bk)
  SPD#886 (VSG Abnormal 2up Counter - M)
  SPD#887 (VSG Abnormal 2up Counter - Y)
  SPD#888 (VSG Abnormal 2up Counter - C)
- If some of the above values are different, change the TD value according to the following table.

		Difference between the "VSG Abnormal Decreasing Counter" value in step D-29 and D-37.		
		0 ~ 1	2 ~ 7	8 ~
Difference between the "VSG 2up Counter" value in step D-29 and D-37.	0	No adjustment necessary	Increase TD value by 1	Increase TD value by 2
	1 ~ 3	Increase TD value by 1	Increase TD value by 2	Increase TD value by 3
	4 ~	Increase TD value by 2	Increase TD value by 3	Increase TD value by 4

- For those colors where the TD or the ND values have been changed, write the appropriate data in column D-37, of TD Check Sheet No. 4.

D-41. If none of the TD data or ND data in the D-21, D-29, and D-37 columns has been changed, go to step D-75.

D-42. Perform a free run of 80 scans.

- Set A4/8½" x 11" sideways paper in the upper cassette.
- Put the C-4 test chart face down on the exposure glass. (The four-color gradation of the C-4 test chart are must be at the right hand side of the exposure glass.)
- Set SP#01 for the free run model.
- Set SPD#10 to H. (Free run will automatically stop after 80 scans.)
- Press the start key.
- After finishing the free run, press the clear modes key 3 times to clear the free run mode.

D-43. Make one copy in A3/11" x 17" or A4/8½" x 11" size of a C-4 chart and write step number "D-43" on the copy.

D-44. Perform the "Self Check Mode".

- Set SPD#525 to #015.
- Press the # key while pressing the ◇ key to start.

D-45. Read the following values and write them in the "Table 4-1 (Fine TD Adjustment)".

- SPD#520 (TGRD detected - Bk)
- SPD#521 (TGRD detected - M)
- SPD#522 (TGRD detected - Y)
- SPD#523 (TGRD detected - C)
- Set SPD#91 to H (VBS Compensation Detected Value - Batch Processing)
  SPD#226, SPD#227, SPD#228 and SPD#229 will be displayed sequentially.
- Set SPD#92 to H (VSG Decreasing Counter - Batch Processing)
  SPD#865, SPD#866, SPD#867, SPD#868, SPD#885, SPD#886, SPD#887, and SPD#888 will be displayed sequentially.

D-46. Read the VBS detected value for each color in the step D-45 column of the "Table 4-1 (Fine TD Adjustment)".

- If the value (SPD#226, #227, #228, or #229) is 50 or more, perform the VBS Correction Procedure in Step E.
- For those colors where the TD or the ND values have been changed, write the appropriate data in column D-45, of TD Check Sheet No. 4.

NOTE: If some colors have been adjusted using the VBS Correction Procedure in step D-46, do not perform any adjustment for these colors in step D-47 and step D-48. However, you must perform steps D-47 and D-48 to the remaining colors.

D-47. Prepare the the copy which was made in step D-43 and the standard color patch copy sample. Compare the color patch density of the copy with the standard color patch copy sample color by color. Then adjust the TD or the ND as follows:

- The color patch density of the copy is *1——— compared with the standard color patch copy sample.

*1: Too light :	decrease the TD (ND) value by 3 or 4.
Light :	decrease the TD (ND) value by 1 or 2.
Almost the same:	No adjustment is necessary.
Dark:	increase the TD (ND) value by 1 or 2.
Too dark:	increase the TD (ND) value by 3 or 4.

For your reference
Bk: SPD#490 (TD - Bk) or SPD#495 (ND - Bk)
M: SPD#491 (TD - M) or SPD#496 (ND - M)
Y: SPD#492 (TD - Y) or SPD#497 (ND - Y)
C: SPD#493 (TD - C) or SPD#498 (ND - C)

- For those colors where the TD or the ND values have been changed, write the appropriate data in column D-45, of TD Check Sheet No. 4.

NOTE: Adjust the TD value first. Only if the TD value is not adjustable (the TD value is 0 or 30), adjust the ND value.

If the "VBS Correction Procedure" in step D-46 or the "TD/ND Adjustment" in step D-47 was performed for some colors, do not perform any adjustment in step D-48 for these colors. However, you must perform step D-48 to the remaining colors.

D-48.
- Check the difference between the "VSG Abnormal Decreasing Counter" value in step D-45 and D-37 for each color.
  SPD#865 (VSG Abnormal Decreasing Counter - Bk)
  SPD#866 (VSG Abnormal Decreasing Counter - M)
  SPD#867 (VSG Abnormal Decreasing Counter - Y)
  SPD#868 (VSG Abnormal Decreasing Counter - C)
- Check the difference between the "VSG Decreasing 2up Counter" value in step D-45 and D-37 for each color.
  SPD#885 (VSG Abnormal 2up Counter - Bk)
  SPD#886 (VSG Abnormal 2up Counter - M)
  SPD#887 (VSG Abnormal 2up Counter - Y)
  SPD#888 (VSG Abnormal 2up Counter - C)
- If some of the above values are different, change the TD value according to the following table.

		Difference between the "VSG Abnormal Decreasing Counter" value in step D-37 and D-45.		
		0 ~ 1	2 ~ 7	8 ~
Difference between the "VSG 2up Counter" value in step D-37 and D-45.	0	No adjustment necessary	Increase TD value by 1	Increase TD value by 2
	1 ~ 3	Increase TD value by 1	Increase TD value by 2	Increase TD value by 3
	4 ~	Increase TD value by 2	Increase TD value by 3	Increase TD value by 4

- For those colors where the TD or the ND values have been changed, write the appropriate data in column D-45, of TD Check Sheet No. 4.

D-49. If none of the TD data or ND data in the D-29, D-37, and D-45 columns has been changed, go to step D-75.

D-50. Perform a free run of 80 scans.

- Set A4/8½" x 11" sideways paper in the upper cassette.
- Put the C-4 test chart face down on the exposure glass. (The four-color gradation of the C-4 test chart are must be at the right hand side of the exposure glass.)
- Set SP#01 for the free run model.
- Set SPD#10 to H. (Free run will automatically stop after 80 scans.)
- Press the start key.
- After finishing the free run, press the clear modes key 3 times to clear the free run mode.

D-51. Make one copy in A3/11" x 17" or A4/8½" x 11" size of a C-4 chart and write step number "D-51" on the copy.

D-52. Perform the "Self Check Mode".

- Set SPD#525 to #015.
- Press the $\boxed{\#}$ key while pressing the key to start.

D-53. Read the following values and write them in the "Table 4-1 (Fine TD Adjustment)".

- SPD#520 (T_{GRD} detected - Bk)
- SPD#521 (T_{GRD} detected - M)
- SPD#522 (T_{GRD} detected - Y)
- SPD#523 (T_{GRD} detected - C)

- Set SPD#91 to H (V_{BS} Compensation Detected Value - Batch Processing)
  SPD#226, SPD#227, SPD#228 and SPD#229 will be displayed sequentially.
- Set SPD#92 to H (V_{SG} Decreasing Counter - Batch Processing)
  SPD#865, SPD#866, SPD#867, SPD#868, SPD#885, SPD#886, SPD#887, and SPD#888 will be displayed sequentially.

D-54. Read the V_{BS} detected value for each color in the step D-53 column of the "Table 4-1 (Fine TD Adjustment)".

- If the value (SPD#226, #227, #228, or #229) is 50 or more, perform the V_{BS} Correction Procedure in Step E.
- For those colors where the TD or the ND values have been changed, write the appropriate data in column D-53, of TD Check Sheet No. 4.

NOTE: If some colors have been adjusted using the VBS Correction Procedure in step D-54, do not perform any adjustment for these colors in step D-55 and step D-56. However, you must perform steps D-55 and D-56 to the remaining colors.

D-55. Prepare the the copy which was made in step D-51 and the standard color patch copy sample. Compare the color patch density of the copy with the standard color patch copy sample color by color. Then adjust the TD or the ND as follows:

- The color patch density of the copy is *1——— compared with the standard color patch copy sample.

*1:

Too light :	decrease the TD (ND) value by 3 or 4.
Light :	decrease the TD (ND) value by 1 or 2.
Almost the same:	No adjustment is necessary.
Dark:	increase the TD (ND) value by 1 or 2.
Too dark:	increase the TD (ND) value by 3 or 4.

For your reference
Bk: SPD#490 (TD - Bk) or SPD#495 (ND - Bk)
M: SPD#491 (TD - M) or SPD#496 (ND - M)
Y: SPD#492 (TD - Y) or SPD#497 (ND - Y)
C: SPD#493 (TD - C) or SPD#498 (ND - C)

- For those colors where the TD or the ND values have been changed, write the appropriate data in column D-53, of TD Check Sheet No. 4.

NOTE: Adjust the TD value first. Only if the TD value is not adjustable (the TD value is 0 or 30), adjust the ND value.

If the "VBS Correction Procedure" in step D-54 or the "TD/ND Adjustment" in step D-55 was performed for some colors, do not perform any adjustment in step D-56 for these colors. However, you must perform step D-56 to the remaining colors.

D-56.
- Check the difference between the "VSG Abnormal Decreasing Counter" value in step D-53 and D-45 for each color.
  SPD#865 (VSG Abnormal Decreasing Counter - Bk)
  SPD#866 (VSG Abnormal Decreasing Counter - M)
  SPD#867 (VSG Abnormal Decreasing Counter - Y)
  SPD#868 (VSG Abnormal Decreasing Counter - C)
- Check the difference between the "VSG Decreasing 2up Counter" value in step D-53 and D-45 for each color.
  SPD#885 (VSG Abnormal 2up Counter - Bk)
  SPD#886 (VSG Abnormal 2up Counter - M)

SPD#887 (VSG Abnormal 2up Counter - Y)
SPD#888 (VSG Abnormal 2up Counter - C)

- If some of the above values are different, change the TD value according to the following table.

		Difference between the "VSG Abnormal Decreasing Counter" value in step D-45 and D-53.		
		0 ~ 1	2 ~ 7	8 ~
Difference between the "VSG 2up Counter" value in step D-45 and D-53.	0	No adjustment necessary	Increase TD value by 1	Increase TD value by 2
	1 ~ 3	Increase TD value by 1	Increase TD value by 2	Increase TD value by 3
	4 ~	Increase TD value by 2	Increase TD value by 3	Increase TD value by 4

- For those colors where the TD or the ND values have been changed, write the appropriate data in column D-53, of TD Check Sheet No. 4.

D-57. If none of the TD data or ND data in the D-37, D-45, and D-53 columns has been changed, go to step D-75.

D-58. Perform a free run of 80 scans.

- Set A4/81/2" x 11" sideways paper in the upper cassette.
- Put the C-4 test chart face down on the exposure glass. (The four-color gradation of the C-4 test chart are must be at the right hand side of the exposure glass.)
- Set SP#01 for the free run model.
- Set SPD#10 to H. (Free run will automatically stop after 80 scans.)
- Press the start key.
- After finishing the free run, press the clear modes key 3 times to clear the free run mode.

D-59. Make one copy in A3/11" x 17" or A4/81/2" x 11" size of a C-4 chart and write step number "D-59" on the copy.

D-60. Perform the "Self Check Mode".

- Set SPD#525 to #015.
- Press the # key while pressing the ◇ key to start.

D-61. Read the following values and write them in the "Table 4-1 (Fine TD Adjustment)".

- SPD#520 (TGRD detected - Bk)
- SPD#521 (TGRD detected - M)
- SPD#522 (TGRD detected - Y)

- SPD#523 (TGRD detected - C)
- Set SPD#91 to H (VBS Compensation Detected Value - Batch Processing)
  SPD#226, SPD#227, SPD#228 and SPD#229 will be displayed sequentially.
- Set SPD#92 to H (VSG Decreasing Counter - Batch Processing)
  SPD#865, SPD#866, SPD#867, SPD#868, SPD#885, SPD#886, SPD#887, and SPD#888 will be displayed sequentially.

D-62. Read the VBS detected value for each color in the step D-61 column of the "Table 4-1 (Fine TD Adjustment)".

- If the value (SPD#226, #227, #228, or #229) is 50 or more, perform the VBS Correction Procedure in Step E.
- For those colors where the TD or the ND values have been changed, write the appropriate data in column D-61, of TD Check Sheet No. 4.

NOTE: If some colors have been adjusted using the VBS Correction Procedure in step D-62, do not perform any adjustment for these colors in step D-63 and step D-64. However, you must perform steps D-63 and D-64 to the remaining colors.

D-63. Prepare the the copy which was made in step D-59 and the standard color patch copy sample. Compare the color patch density of the copy with the standard color patch copy sample color by color. Then adjust the TD or the ND as follows:

- The color patch density of the copy is *1———— compared with the standard color patch copy sample.

*1: Too light : decrease the TD (ND) value by 3 or 4.
Light : decrease the TD (ND) value by 1 or 2.
Almost the same: No adjustment is necessary.
Dark: increase the TD (ND) value by 1 or 2.
Too dark: increase the TD (ND) value by 3 or 4.

For your reference
Bk: SPD#490 (TD - Bk) or SPD#495 (ND - Bk)
M: SPD#491 (TD - M) or SPD#496 (ND - M)
Y: SPD#492 (TD - Y) or SPD#497 (ND - Y)
C: SPD#493 (TD - C) or SPD#498 (ND - C)

- For those colors where the TD or the ND values have been changed, write the appropriate data in column D-61, of TD Check Sheet No. 4.

NOTE: Adjust the TD value first. Only if the TD value is not adjustable (the TD value is 0 or 30), adjust the ND value.

If the "VBS Correction Procedure" in step D-62 or the "TD/ND Adjustment" in step D-63 was performed for some colors, do not perform any adjustment in step D-64 for these colors. However, you must perform step D-64 to the remaining colors.

D-64.
- Check the difference between the "VSG Abnormal Decreasing Counter" value in step D-61 and D-53 for each color.
  SPD#865 (VSG Abnormal Decreasing Counter - Bk)
  SPD#866 (VSG Abnormal Decreasing Counter - M)
  SPD#867 (VSG Abnormal Decreasing Counter - Y)
  SPD#868 (VSG Abnormal Decreasing Counter - C)
- Check the difference between the "VSG Decreasing 2up Counter" value in step D-61 and D-53 for each color.
  SPD#885 (VSG Abnormal 2up Counter - Bk)
  SPD#886 (VSG Abnormal 2up Counter - M)
  SPD#887 (VSG Abnormal 2up Counter - Y)
  SPD#888 (VSG Abnormal 2up Counter - C)
- If some of the above values are different, change the TD value according to the following table.

		Difference between the "VSG Abnormal Decreasing Counter" value in step D-53 and D-61.		
		0 ~ 1	2 ~ 7	8 ~
Difference between the "VSG 2up Counter" value in step D-53 and D-61.	0	No adjustment necessary	Increase TD value by 1	Increase TD value by 2
	1 ~ 3	Increase TD value by 1	Increase TD value by 2	Increase TD value by 3
	4 ~	Increase TD value by 2	Increase TD value by 3	Increase TD value by 4

- For those colors where the TD or the ND values have been changed, write the appropriate data in column D-61, of TD Check Sheet No. 4.

Replacement Adjustment

D-65. If none of the TD data or ND data in the D-45, D-53, and D-61 columns has been changed, go to step D-75.

D-66. Perform a free run of 80 scans.
- Set A4/81/2" x 11" sideways paper in the upper cassette.
- Put the C-4 test chart face down on the exposure glass. (The four-color gradation of the C-4 test chart are must be at the right hand side of the exposure glass.)
- Set SP#01 for the free run model.
- Set SPD#10 to H. (Free run will automatically stop after 80 scans.)
- Press the start key.

- After finishing the free run, press the clear modes key 3 times to clear the free run mode.

D-67. Make one copy in A3/11" x 17" or A4/81/2" x 11" size of a C-4 chart and write step number "D-67" on the copy.

D-68. Perform the "Self Check Mode".

- Set SPD#525 to #015.
- Press the # key while pressing the ◇ key to start.

D-69. Read the following values and write them in the "Table 4-1 (Fine TD Adjustment)".

- SPD#520 (TGRD detected - Bk)
- SPD#521 (TGRD detected - M)
- SPD#522 (TGRD detected - Y)
- SPD#523 (TGRD detected - C)

- Set SPD#91 to H (VBS Compensation Detected Value - Batch Processing)
  SPD#226, SPD#227, SPD#228 and SPD#229 will be displayed sequentially.
- Set SPD#92 to H (VSG Decreasing Counter - Batch Processing)
  SPD#865, SPD#866, SPD#867, SPD#868, SPD#885, SPD#886, SPD#887, and SPD#888 will be displayed sequentially.

D-70. Read the VBS detected value for each color in the step D-69 column of the "Table 4-1 (Fine TD Adjustment)"

- If the value (SPD#226, #227, #228, or #229) is 50 or more, perform the VBS Correction Procedure in Step E.
- For those colors where the TD or the ND values have been changed, write the appropriate data in column D-69, of TD Check Sheet No. 4.

NOTE: If some colors have been adjusted using the VBS Correction Procedure in step D-70, do not perform any adjustment for these colors in step D-71 and step D-72. However, you must perform steps D-71 and D-72 to the remaining colors.

D-71. Prepare the the copy which was made in step D-69 and the standard color patch copy sample. Compare the color patch density of the copy with the standard color patch copy sample color by color. Then adjust the TD or the ND as follows:

- The color patch density of the copy is *1———— compared with the standard color patch copy sample.

*1:	Too light :	decrease the TD (ND) value by 3 or 4.
	Light :	decrease the TD (ND) value by 1 or 2.
	Almost the same:	No adjustment is necessary.
	Dark:	increase the TD (ND) value by 1 or 2.
	Too dark:	increase the TD (ND) value by 3 or 4.

For your reference
Bk: SPD#490 (TD - Bk) or SPD#495 (ND - Bk)
M: SPD#491 (TD - M) or SPD#496 (ND - M)
Y: SPD#492 (TD - Y) or SPD#497 (ND - Y)
C: SPD#493 (TD - C) or SPD#498 (ND - C)

- For those colors where the TD or the ND values have been changed, write the appropriate data in column D-69, of TD Check Sheet No. 4.

NOTE: Adjust the TD value first. Only if the TD value is not adjustable (the TD value is 0 or 30), adjust the ND value.

If the "VBS Correction Procedure" in step D-70 or the "TD/ND Adjustment" in step D-71 was performed for some colors, do not perform any adjustment in step D-72 for these colors. However, you must perform step D-72 to the remaining colors.

D-72.
- Check the difference between the "VSG Abnormal Decreasing Counter" value in step D-69 and D-61 for each color.
  SPD#865 (VSG Abnormal Decreasing Counter - Bk)
  SPD#866 (VSG Abnormal Decreasing Counter - M)
  SPD#867 (VSG Abnormal Decreasing Counter - Y)
  SPD#868 (VSG Abnormal Decreasing Counter - C)
- Check the difference between the "VSG Decreasing 2up Counter" value in step D-69 and D-61 for each color.
  SPD#885 (VSG Abnormal 2up Counter - Bk)
  SPD#886 (VSG Abnormal 2up Counter - M)
  SPD#887 (VSG Abnormal 2up Counter - Y)
  SPD#888 (VSG Abnormal 2up Counter - C)
- If some of the above values are different, change the TD value according to the following table.

		Difference between the "VSG Abnormal Decreasing Counter" value in step D-61 and D-69.		
		0 ~ 1	2 ~ 7	8 ~
Difference between the "VSG 2up Counter" value in step D-61 and D-69.	0	No adjustment necessary	Increase TD value by 1	Increase TD value by 2
	1 ~ 3	Increase TD value by 1	Increase TD value by 2	Increase TD value by 3
	4 ~	Increase TD value by 2	Increase TD value by 3	Increase TD value by 4

- For those colors where the TD or the ND values have been changed, write the appropriate data in column D-69, of TD Check Sheet No. 4.

D-73. If none of the TD data or ND data in the D-53, D-61, and D-69 columns has been changed, go to step D-75. Otherwise, go to step D-74.

D-74.
- Make a copy of the "TD Check Sheet No. 4"
- Copy the values in the step 61 and step 69 columns to the step 7 and step 14 columns of the new "TD Check Sheet No. 4".
- Go back to step D-18.

D-75. Set the TGRD target values using the following procedure:

- Calculate the weighted average from the last three TGRD detected values for each color. See the "Table 4-1 (Fine TD Adjustment)".

	Example:
SPD#520 (TGRD detected - Bk)	65 70 65 → 66 ( )
SPD#521 (TGRD detected - M)	87 87 87 → 87 ( )
SPD#522 (TGRD detected - Y)	79 68 84 → 77 ( )
SPD#523 (TGRD detected - C)	88 93 94 → 91 ( )
	Last 3 values / Weighted average

NOTE: Round off the result of the calculation to whole number.

- Replace the TGRD target values with these weighted average values.
  SPD#515 (TGRD Target - Bk)
  SPD#516 (TGRD Target - M)
  SPD#517 (TGRD Target - Y)
  SPD#518 (TGRD Target - C)

D-76. Set the DIF Preset values in accordance with the following procedure:

- Make 16 copies of a C-4 chart on A4/81/2" x 11" paper. (Do not make these copies in a continuous copy run. Make 16 single-copy runs.)
- Read the DIF detected values for each color and multiply by "1.1" to get the DIF detected value.
  SPD#125 (DIF detected - Bk) ________ x 1.1 = ________
  SPD#126 (DIF detected - M) ________ x 1.1 = ________
  SPD#127 (DIF detected - Y) ________ x 1.1 = ________
  SPD#128 (DIF detected - C) ________ x 1.1 = ________

NOTE: Round off the result of the calculation to a whole number.

- Compare the above results with the DIF Preset value for each color, and input the higher value as the DIF Preset value.
  If the DIF Preset value is higher than the above result, you do not need to change the DIF Preset value for that color.
  SPD#120 (DIF Preset - Bk)
  SPD#121 (DIF Preset - M)
  SPD#122 (DIF Preset - Y)
  SPD#123 (DIF Preset - C)

D-77. End the TD check in accordance with the following procedure.

- Set SPD#707 to 144 (Fusing temperature for standard mode during standby.)
- Set SPD#708 to 138 (Fusing temperature for standard mode during a copy run.)
- Make one copy of a C-4 chart on A3/11 x 17" paper and check the copy quality.
- Set SPD#86 to H (Process control initial setting mode reset.)
- Set SPD#090 to H (Process Control Data Monitor) then copy the values to the process control data check sheet.

E. VBS Correction Procedure (In the case of VBS ≥ 50)

NOTE: Perform the following procedure only for the relevant color. For example, if SPD#226 (Bk-VBS Compensation detected data) is 50 or more, perform the procedure for Black only.

E-1. If the relevant VBS (SPD#226 ~ #229) is between 50 and 70, add 4 to the relevant color's TD value (SPD#490 ~ #493).
If the relevant VBS (SPD#226 ~ #229) is between 80 and 150, add 6 to the relevant color's TD value (SPD#490 ~ #493).

NOTE: Adjust the TD value first. Only if the TD value is not adjustable (the TD value is 0 or 30), adjust the ND value.

E-2. Set the relevant color's Toner Supply Stop (SPD#345 ~ #348) to H.

E-3. Set SP21 (Test Pattern) to 2 (16 Gradation) from the upper operation panel.

E-4. Select the relevant color using SPD#50 (color mode selection).

0: No	4: Y	8: C	12: Y+C
1: Bk	5: Bk+Y	9: Bk+C	13: Bk+Y+C
2: M	6: M+Y	10: M+C	14: M+Y+C
3: Bk+M	7: Bk+M+Y	11: Bk+M+C	15: Bk+M+Y+C

E-5. Make 4 copies (A3/11" x 17" size).

E-6. Repeat step E-5 until the relevant Vsp detected data (SPD#470 ~ #473) overshoots the Vsp target data (SPD#455 ~ #458) by 10.

E-7. Set SPD#79 (batch processing) to H.

E-8. Perform the Vk compensation (SPD#225) only for the relevant color. Select the value from step E-4.

4. COPY IMAGE ADJUSTMENT - Printing

<Model A092 & A105>

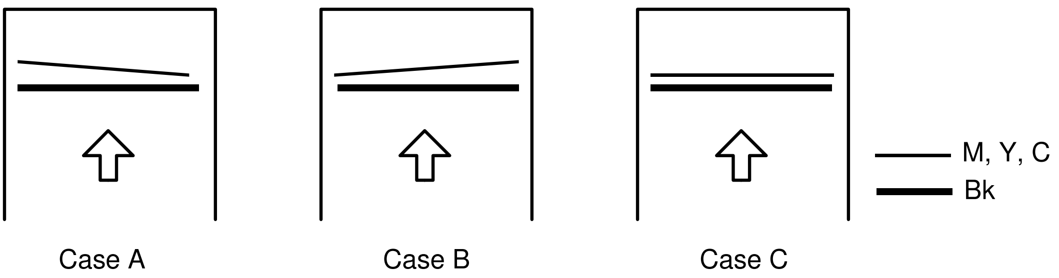
CAUTION: Both horizontal and vertical line adjustment should be done if SPD#750 data has been normal:

Room Temperature	SPD#750 data
15°C	109 or more
20°C	119 or more
25°C	129 or more

4.1 HORIZONTAL LINE ADJUSTMENT

<Model A092 & A105>

1. Open the test pattern screen (SP#21) and select 1: Grid pattern.
2. Set A3/11" x 17" paper and press the Start key. The grid image appears on the paper.
3. Using a microscope, check whether or not each color line is parallel to the black line.



Case A & B: First, perform the horizontal line parallel adjustment. Then, perform the horizontal line alignment adjustment.

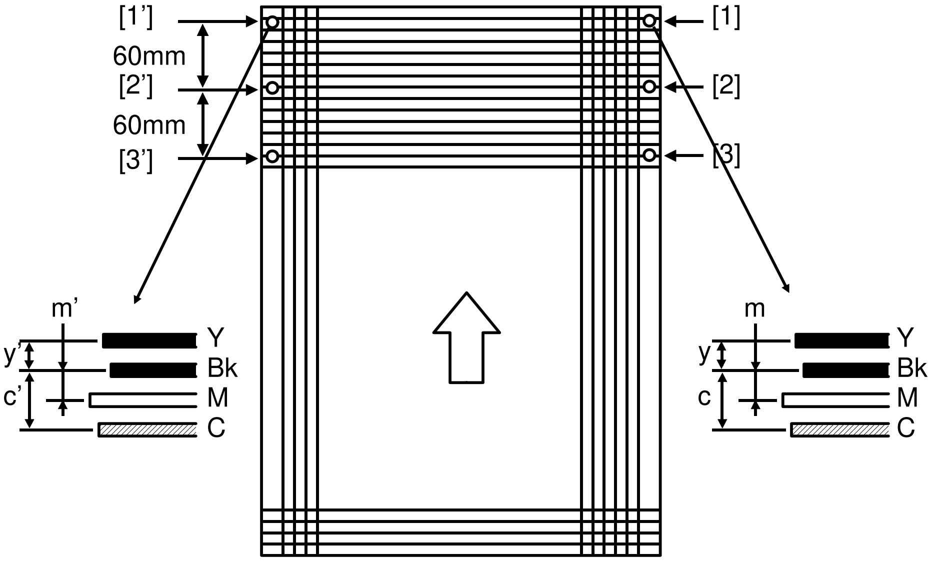
Case C: Perform the horizontal line alignment adjustment.

4.1.1 Horizontal Line Parallel Adjustment

<Model A092 & A105>

Adjustment Standard: ±40µn

NOTE: This should be checked at machine installation and when the parts related to the drum drive are removed or replaced.



1. At point [1], measure the distance between each color line and the black line (y, m, and c) as shown in the illustration.
2. At point [1'], measure the distance between each color line and the black line (y', m', and c') as shown in the illustration.
3. Calculate how each line is not parallel to the black line as follows:

   $[Y_1] = y - y'$, $[M_1] = m - m'$, $[C_1] = c - c'$

4. At points [2]–[2'] and [3]–[3'], calculate how each line is not parallel to the black line in the same manner as $[Y_1]$, $[M_1]$ and $[C_1]$.

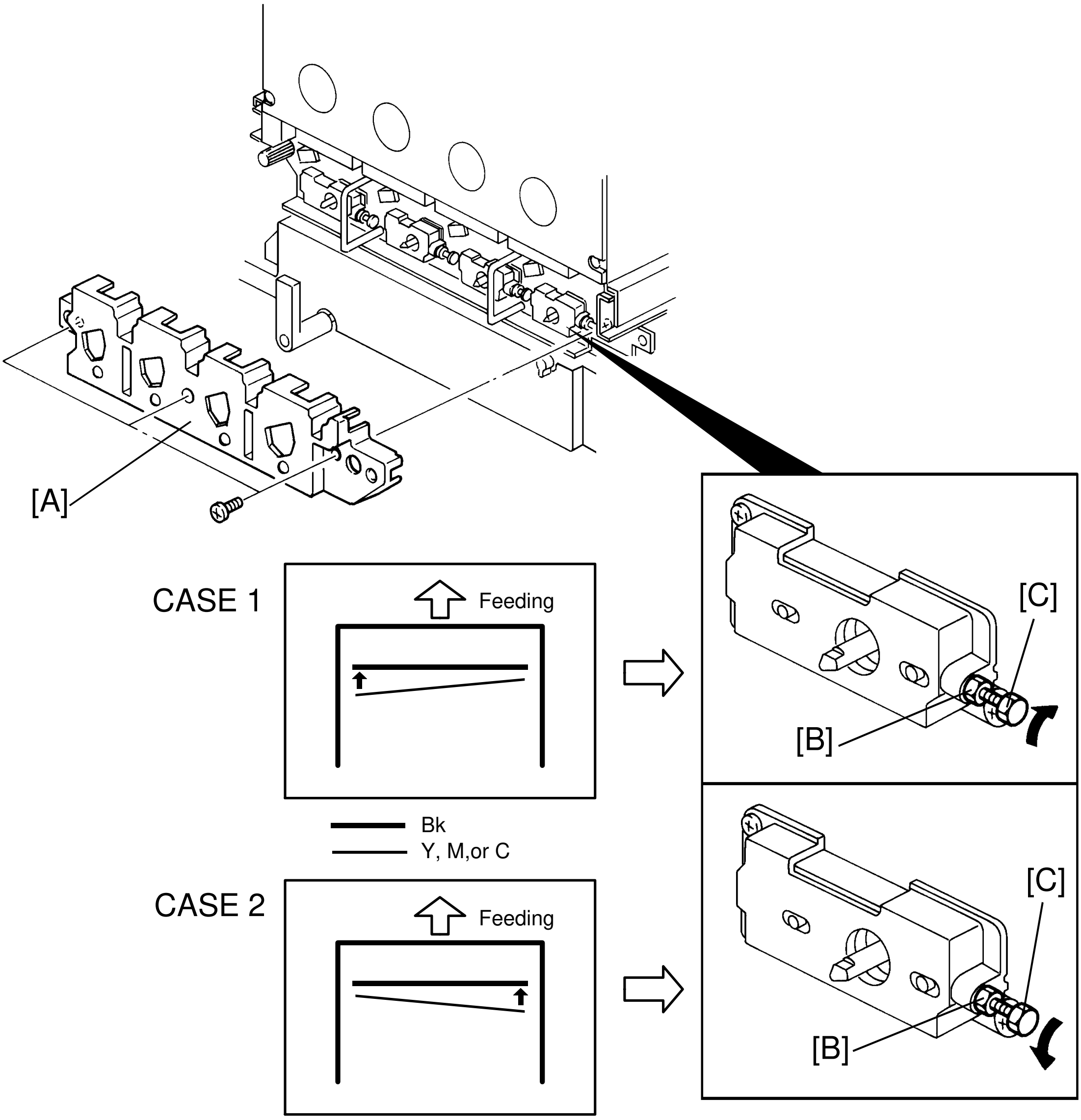
   Point [2]–[2']: $[Y_2]$ $[M_2]$ $[C_2]$
   Point [3]–[3']: $[Y_3]$ $[M_3]$ $[C_3]$

5. Take the average among the above three measurements for each color as shown below:

$$[Y] = \frac{[Y_1] + [Y_2] + [Y_3]}{3}$$

$$[M] = \frac{[M_1] + [M_2] + [M_3]}{3}$$

$$[C] = \frac{[C_1] + [C_2] + [C_3]}{3}$$



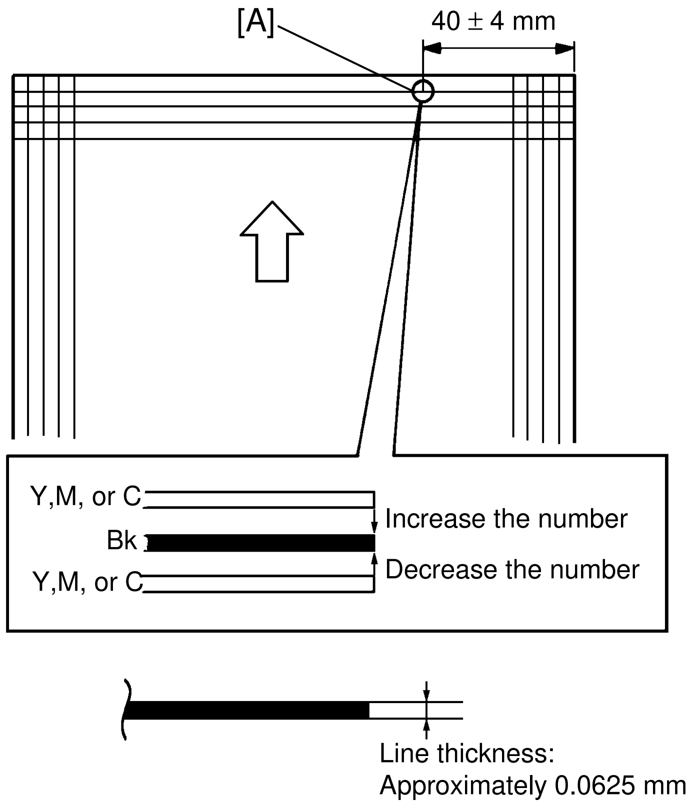
6. Remove the plastic part of the drum unit cover [A].
7. Loosen the lock nut [B].
8. Adjust the drum shaft alignment by turning the adjusting screw [C], so that the line for each color becomes parallel to the black line. (0.12 mm / 1/6 rotation of adjusting screw)

   NOTE: 1. In the case 1, tighten the screw.
   2. In the case 2, loosen the screw.
9. Tighten the lock nut.
10. Press the Start key again to make the grid test pattern image. Confirm if the line of each color is acceptably parallel to the black line over the whole area.

4.1.2 Horizontal Line Alignment Adjustment

<Model A092 & A105>

Adjustment Standard: All four lines should be within 0.15 mm of each other.



SP#22: Horizontal Line Alignment
Setting range 0 ~ 64 steps
(0.0625 mm/step)

1. At point [A] of the copy, measure the distance between each color line and the black line.
2. Open the horizontal line alignment screen **(SP#22)** and adjust the setting, so that every color line is overlaid on the black line.

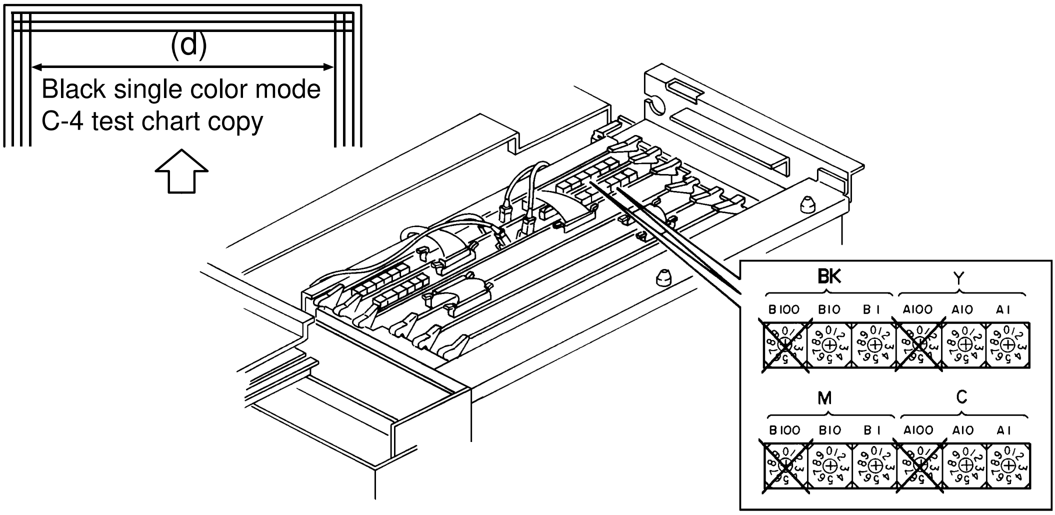
   NOTE: When the color line is ahead of the black line, increase the setting.
   When the color line is behind the black line, decrease the setting.
3. Return to the original screen.

4.2 VERTICAL LINE ADJUSTMENT (Model A092 & A105)

4.2.1 Black Line Adjustment (Preparation) (Model A092 & A105)

– Horizontal magnification adjustment –

Adjustment Standard: less than 0.5%



X: Not effective
A10/B10: 0.1%
A1/B1: 0.01%
To lengthen: Decrease the number
To shorten: Increase the number

1. Make a copy of the C-4 test chart in the black single color mode.
2. Comparing the copy with the original, check whether or not the span (d) of copied vertical lines at both ends is the same as that of the test chart.

<Model A092>

3. If it is not the same, adjust the horizontal magnification by DGS B10 and B1 on the drum exposure control board Bk/Y.

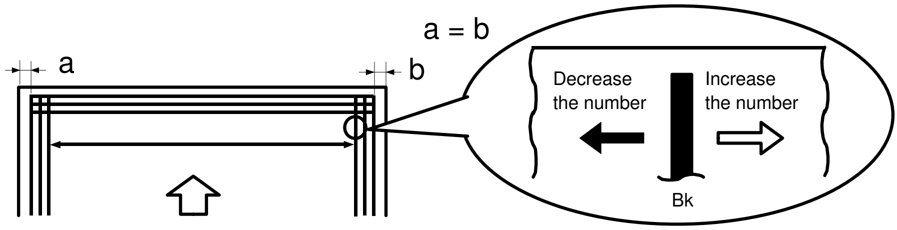
   NOTE: DGS B100 (not effective)
   DGS B10 (0.1%)
   DGS B1 (0.01%)

<Model A105>

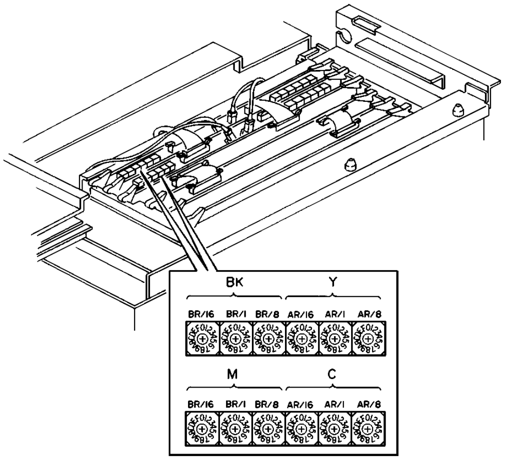
3. If it is not the same, adjust the horizontal magnification by **SP30** (Horizontal Magnification).
   Adjustment range (0 ~ 31, 0.1%/step)
   If it is not possible to adjust the horizontal magnification by SP30, use DGS B10 and B1 on the drum exposure control board.
4. Make a copy of the C-4 test chart again and confirm that the horizontal magnification is adjusted correctly.

– Printing start position adjustment –

5. Comparing the copy with the original, check whether or not the printing start position (blank margin at both sides) is adjusted correctly.



<Model A092>

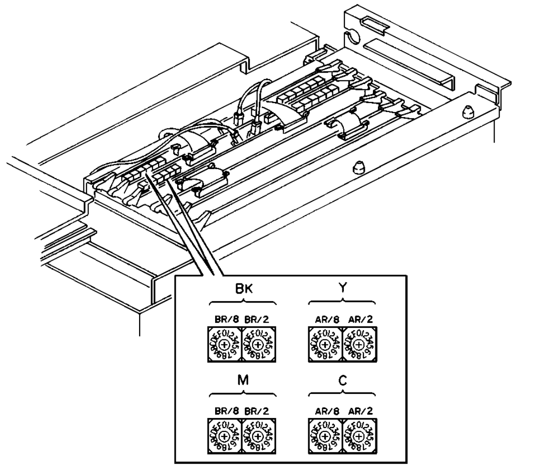


AR16/BR16: 1.0 mm/step
(only 0 ~ 7 can be selected)
AR1/BR1: 0.0625 mm/step
AR8/BR8: 0.0078 mm/step
(only 0 ~ 7 can be selected)

<Model A105>

SP29 (Vertical Line Alignment) → OK → END

NG ↓



AR8/BR8: 0.625 mm/step
AR2/BR2: 0.031 mm/step

<Model A092>

6. If it is not correct, adjust the printing start position by BR16, BR1, and BR/8 on the drum exposure control board Bk/Y.

<Model A105>

6. If it is not correct, adjust the printing start position by SP29.
   SP29 (Vertical Line Alignment)
   0 ~ 31 (0.032 mm/step)
   If it is not possible to adjust the printing start position by SP29, use BR8 or BR/2 on the drum exposure control board.

7. Make a copy of the C-4 test chart again and confirm that the printing start position is adjusted correctly.

– Check the procedure for magenta, yellow and cyan –

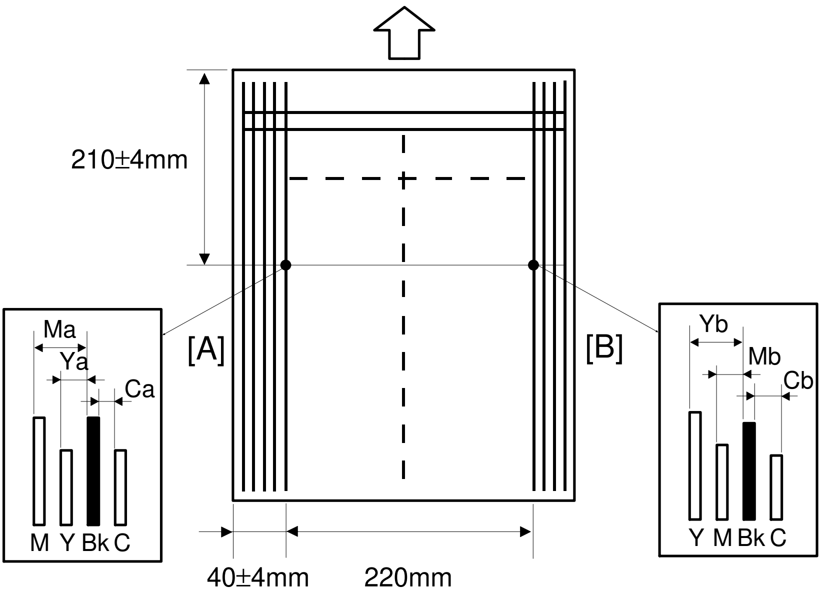
8. Open the test pattern screen **(SP#21)** and select **1: Grid pattern**.

9. Set A3/11" x 17" paper and press the Start key. The grid image appears on the paper.

10. At points [A] and [B], measure the distance between each color line and the black line as in the following example:

CHECK POINTS:

1. At point [A], check whether or not the magenta line is overlaid on the black line.
2. At point [B], check whether or not the yellow and the cyan lines are overlaid on the black line.
3. Check whether or not the horizontal magnification for each color line is adjusted correctly.
   [M] = Ma – Mb, [Y] = Ya – Yb, [C] = Ca – Cb



11. If the vertical line for each color (at point [A] for magenta and at point [B] for yellow and cyan) is not overlaid on the black line, perform the **printing start position adjustment**.

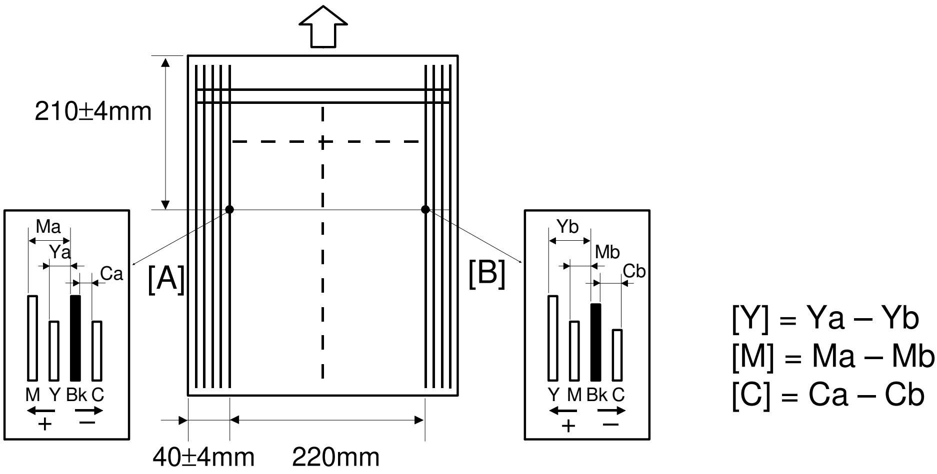
12. If [M] (= Ma – Mb), [Y] (= Ya – Yb), or [C] (= Ca – Cb) is not zero, perform **the horizontal magnification adjustment**.

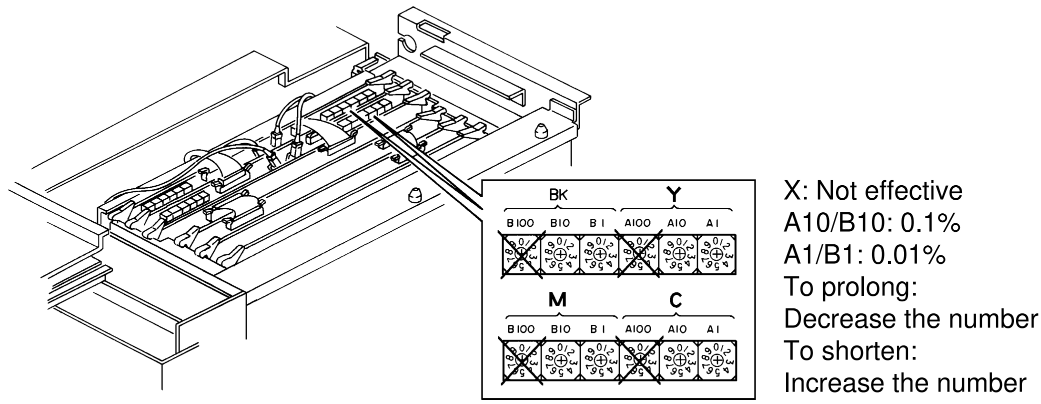
Replacement Adjustment

4.2.2 Horizontal Magnification Adjustment

NOTE: The horizontal magnification adjustment for the black line should be adjusted first. It becomes the reference for other color adjustments.

Adjustment Standard: less than 0.5%





1. At points [A] and [B] of the copy, measure the distance between each color line and the black line ([Y], [M] and [C]).

<Model A092>

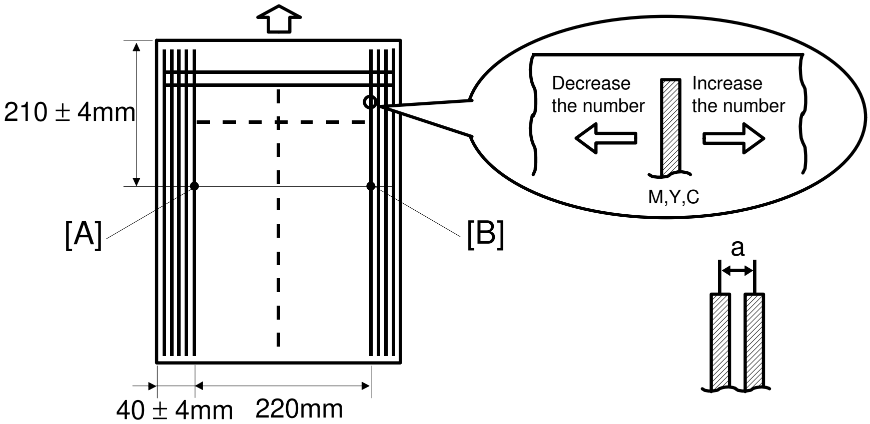
2. If the [Y], [M], or [C] lines are not within specifications, adjust the horizontal magnification by the following DGSs:

<Model A105>

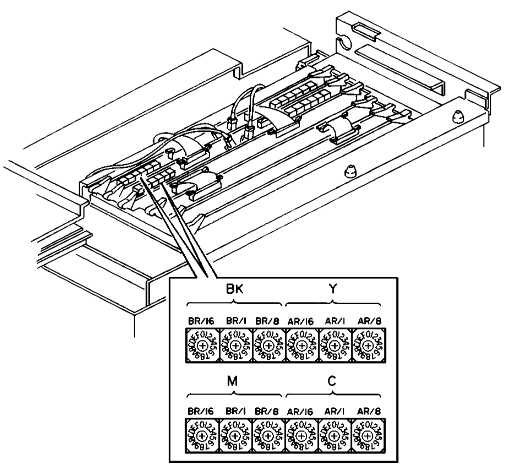
2. If the [Y], [M], or [C] lines are not within specification, adjust the horizontal magnification by SP30.
   SP30: (Horizontal Magnification)
   Adjustment range: 0 ~ 31, 0.1%/step
   If the horizontal magnification can not be adjusted by SP30, adjust it by the DGSs in the same way as for model A092.

4.2.3 Printing Start Position Adjustment

Adjustment Standard: All four lines should be within 0.15 mm [a] of each other.

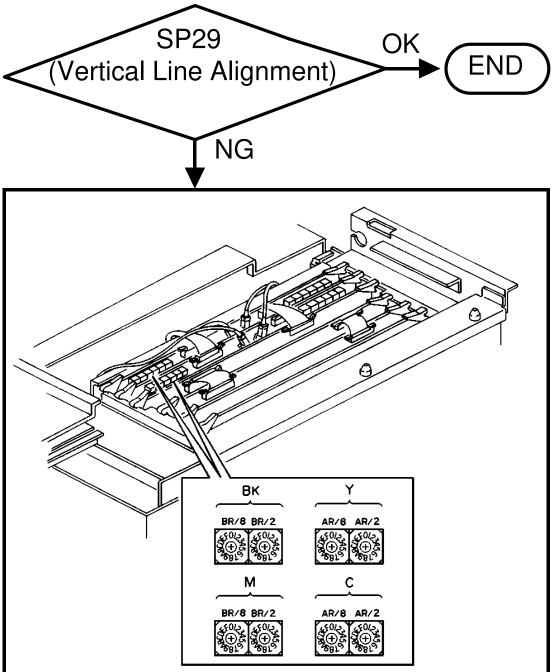


<Model A092>



AR16/BR16: 1.0 mm/step
(only 0 ~ 7 can be selected)
AR1/BR1: 0.0625 mm/step
AR8/BR8: 0.0078 mm/step
(only 0 ~ 7 can be selected)

<Model A105>



AR8/BR8: 0.625 mm/step
AR2/BR2: 0.031 mm/step

<Model A092>

1. Align each color vertical line (M, Y, and C) with the black line by the DGSs. See the illustration above.

<Model A105>

1. Align each colored vertical line (M, Y, and C) with the black line by SP29.
   SP29 (Vertical Line Alignment)
   Adjustment Range: 0 ~ 31 (0.032 mm/step)
   If the alignment cannot be fixed, use the DGSs. See the illustration above.

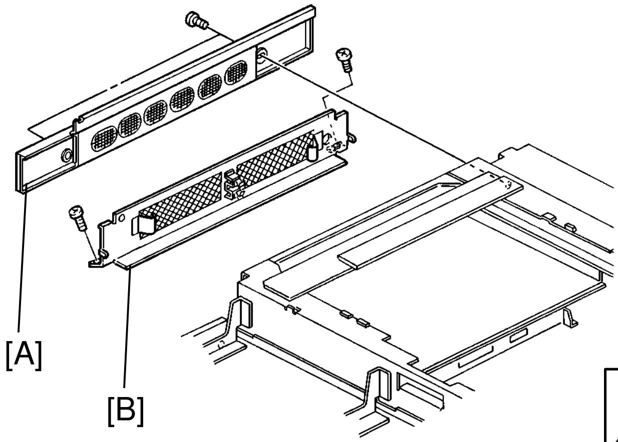
2. Make a test copy and confirm if every color horizontal line is aligned with the black line.

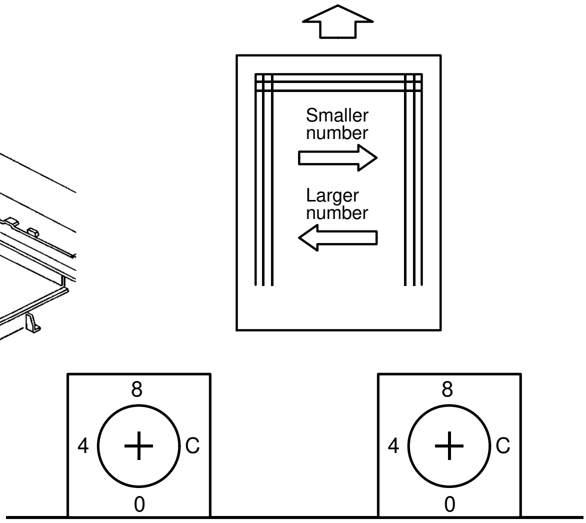
3. If some of them are not aligned within specifications, repeat the above procedure.

5. COPY IMAGE ADJUSTMENT - Scanner

5.1 SCANNER SIDE-TO-SIDE REGISTRATION ADJUSTMENT

Adjustment Standard: 0 ± 2.0 mm





DGS701 (SW701) DGS702 (SW702)

1 mm/step 0.0625 mm/step

(For model A105 in the bracket)

NOTE: Before performing this adjustment, make sure that the printing start position is within specifications (see Printing Start Position Adjustment).

1. Make a copy of the test chart.
2. Fold the copy once with the fold running down the middle of the copy, then verify that the vertical line at the top center of the test chart is on the fold or within 2.0 mm of the fold.
3. If the side to side registration is not within specifications, follow the procedure below.
4. Remove the upper left cover [A] (2 screws).
5. Remove the PCB cover grid [B] (6 screws). (7 screws for model A105)
6. Adjust side-to-side registration by DGS 701 and DGS 702 on the scanner control board.

   NOTE: DGS 701: 1 mm/step
   DGS 702: 0.0625 mm/step

5.2 SCANNER LEADING EDGE REGISTRATION ADJUSTMENT

Adjustment Standard: 0 ± 2.0 mm

1. Place a 150 mm scale perpendicular to the right scale on the exposure glass.
2. Adjust the leading edge registration by **SP#23**.

   NOTE: 0.0625 mm/step, 65 steps

6. COPY IMAGE QUALITY ADJUSTMENT

<For Model A092 & A105>

For color copy images, there are four adjustments as shown below.
These adjustments should always be performed in order. Only when installing brand-new machines, start from step 3 (Y, M, C, Bk color balance adjustment).

Step	Adjustment
1	RGB, YMCBk GAMMA STANDARD SETTING
2	RGB GRAY BALANCE ADJUSTMENT
3	YMCBk COLOR BALANCE ADJUSTMENT
4	YMCBk COLOR BALANCE FINE ADJUSTMENT

Start here only at the machine installation.

6.1 RGB AND YMCBk GAMMA STANDARD SETTING

CAUTION: Only when the CCD drive board/CCD pre-amp board/video processing board are replaced, make sure that all data for RGB and YMCBk Gamma are set at their standard setting.

1. Open the RGB Gamma screen (SP#11) and key the data in as follows:

<Model A092>

	Low ID	High ID
R	6	5
G	5	5
B	7	5

<Model A105>

	Low ID	High ID
R	8	7
G	8	6
B	9	6

2. Open the YMCBk Gamma screen (SP#12) and key the data in as follows:

<Model A092>

- Letter Mode -

	Low ID	Middle ID	High ID	ID max
Bk	4	4	4	1
M	5	5	4	4
Y	7 or 8	2	6	7 or 8
C	4	4	2	3

- Letter/Photo Mode -

	Low ID	Middle ID	High ID	ID max
Bk	4	4	4	4
M	5	5	4	4
Y	1 or 2	1 or 2	7 or 8	7 or 8
C	4	4	2	4

- Photo Mode -

	Low ID	Middle ID	High ID	ID max
Bk	4	2	4	4
M	5	6	4	4
Y	1 or 2	1 or 2	7 or 8	6 or 7
C	3	4	3	4

<Model A105>

- Letter Mode -

	Low ID	Middle ID	High ID	ID max
Bk	1	2	4	7
M	3	6	6	4
Y	3	4	3	8
C	3	4	6	4

- Letter/Photo Mode -

	Low ID	Middle ID	High ID	ID max
Bk	1	1	7	6
M	6	6	6	4
Y	1	4	3	8
C	1	4	6	4

- Photo Mode -

	Low ID	Middle ID	High ID	ID max
Bk	1	3	5	5
M	2	6	3	5
Y	3	2	4	7
C	2	2	3	5

3. Open the UCR screen (SP#13) and key in the data for each mode as follows:

<Model A092>

Mode	UCR Start	UCR Stop
Letter	2	16
Letter/photo	16	16
Photo	20	12

<Model A105>

Mode	UCR Start	UCR Stop
Letter	0	20
Letter/photo	24	16
Photo	22	20

4. Open the UCA screen (SP#14) and set at 0: ON for every mode.

5. Return to the original screen.

6.2 RGB GRAY BALANCE ADJUSTMENT

1. Select the letter/photo mode.
2. Set SPD#050 at 014. (color copy without black toner)
3. Set SP#13 (UCR) at Start: 0, Stop: 20.
4. Set SP#14 (UCA) at 1: OFF.
5. Make test copies.
6. Confirm that no residual image appears in the 6th through 10th level of the gray scale of the test copy.

If any image appears on the gray scale area, perform the following steps:

NOTE: It is impossible to eliminate the residual image completely. If the density of the residual image is less than the 3rd level of the gray scale, it is acceptable for this adjustment.

7. Open the RGB Gamma screen (SP#11).
8. Adjust the low ID area setting for red, green, and blue to minimize the residual image.

Ref:

Condition of residual image	Low ID setting to be adjusted	Direction
Reddish	Red	Increase the setting
Greenish	Green	Increase the setting
Bluish	Blue	Increase the setting
Yellowish	Blue	Decrease the setting
Magentaish	Green	Decrease the setting
Cyanish	Red	Decrease the setting

NOTE: Do not adjust the high ID area setting.
The low ID setting can be changed only ±1.

9. Reset SPD#050 at 015. (full color copy)
10. Leave the UCR data and the UCA data as they are, because the same setting is required at the YMCBk color balance adjustment.

6.3 YMCBk COLOR BALANCE ADJUSTMENT

NOTE: Only when new developer is installed, set the manual ID level at the 4th position from darkest position instead of the middle position. Reset the color balance memory by selecting the center position. For all four colors before adjustment.

6.3.1 Letter/Photo Mode Adjustment

<Model A092 & A105>

1. Set the manual ID level at the middle position.
2. Select the Letter/Photo mode.
3. Set SP#13 (UCR) at Start: 0, Stop: 20.
4. Set SP#14 (UCA) at 1: OFF.
5. Set SPD#082 to H (15 mm color patch).

   NOTE: The patches exposed at the 7th LD power for each color appear at the 1st, 3rd, 5th and 7th positions from the left.
6. Put the test chart on the exposure glass.
7. Open the YMCBk Gamma screen (SP#12).

– Bk adjustment –

1. Select the black adjustment screen (3: Bk).
2. Make a copy of test chart.
3. Checking the copy image, adjust the low ID, middle ID, and high ID area.

   NOTE: Do not adjust the ID Max setting.
   * Smaller setting for a darker result.
   * Greater setting for a lighter result.

ID area	Gray scale to be checked	Adjustment standard
Low	3rd level	The ID of the 3rd level is the same as that of the standard image.
Middle	5th level	The copy ID of the 5th level is between the 4th level ID and 6th level ID of the original (C4 chart).
High	8th to 10th level	The graduation of the 8th and the 9th level are visible, and the ID of the 10th level is the same (80% ~ 100%) as that of the 7th LD power color patch.

– YMC Adjustment –

<Model A092>

1. Reset SP#13 (UCR) at Start: 16, Stop: 16.

<Model A105>

1. Reset SP#13 (UCR) at Start: 24, Stop: 16.

<Model A092 & A105>

2. Reset SP#14 (UCA) at 0: ON.
3. Open the YMCBk Gamma screen (SP#12).
4. Adjust each color balance setting in order, following the Bk adjustment procedure.

   Adjustment screen: 0: Cyan, 1: Yellow, 2: Magenta

6.3.2 Photo Mode Adjustment

<Model A092>

1. Set the manual ID level at the middle position.
2. Select the photo mode.
3. Set SP#13 (UCR) at Start: 20, Stop: 12.
4. Set SP#14 (UCA) at 0: ON.
5. Put the test chart on the exposure glass.
6. Open the YMCBk Gamma screen (SP#12).

NOTE: The Bk color balance adjustment is not required.

– YMC Adjustment –

1. Adjust each color balance setting in order, following the Bk adjustment procedure for the letter/photo mode.

NOTE: Do not adjust the ID Max setting.

Adjustment screen: 0: Cyan, 1: Yellow, 2: Magenta

<Model A105>

1. Set the manual ID level at the middle position.
2. Select the photo mode.
3. Set SP#13 (UCR) at Start: 0, Stop: 20.
4. Set SP#14 (UCA) at 1: OFF.
5. Put the test chart on the exposure glass.
6. Open the YMCBk Gamma screen (SP#12).

– Bk Adjustment –

1. Adjust the Bk color balance setting in order following. The Bk adjustment procedure for the letter/photo mode.

– YMC Adjustment –

1. Reset SP#13 (UCR) at Start 22, Stop: 20.
2. Set SP#14 (UCA) at 0: ON.
3. Open the YMCBk Gamma screen (SP#12).
4. Adjust each color balance setting in order, following the Bk adjustment procedure.

NOTE: Do not adjust the ID Max setting.
Adjustment screen: 0: Cyan, 1: Yellow, 2: Magenta

6.3.3 Letter Mode Adjustment

1. Select the letter mode.
2. Open the YMCBk Gamma screen (SP#12).

<Model A092>

3. Input the same settings as for the letter/photo mode, except for the low ID area for yellow and all ID Max data.

NOTE: Key 7 or 8 in the low ID area for yellow. Do not adjust the ID Max setting.

<Model A105>

3. Input Low: 1, Middle: 2, High: 4, ID MAX: 7 for Bk.
4. Input the same setting as for the letter/photo mode for M, Y, and C.
5. Make a copy of the C4 chart in Auto letter photo mode.
6. Check the ID of black letters or solid area on the copy of the C4 chart. If the ID is low, change the ID max for Bk from 7 to 6 or 5.

6.4 YMCBk COLOR BALANCE ADJUSTMENT (FINE ADJUSTMENT)

1. Make test copies at every mode (the letter, letter/photo, photo, and auto letter/photo separation).
2. Open the YMCBk Gamma screen (SP#12).
3. Adjust the data, so that the picture image of test chart becomes similar to that of the original.

   NOTE: 1. Only one of four colors can be adjusted.

   <Model A092>

   2. Only the middle ID area data can be adjusted for that color.

   3. The setting should only be changed by ±1.

   <Model A105>

   2. Only the low ID area data of the photo mode or the Letter photo mode can be adjusted for that color.

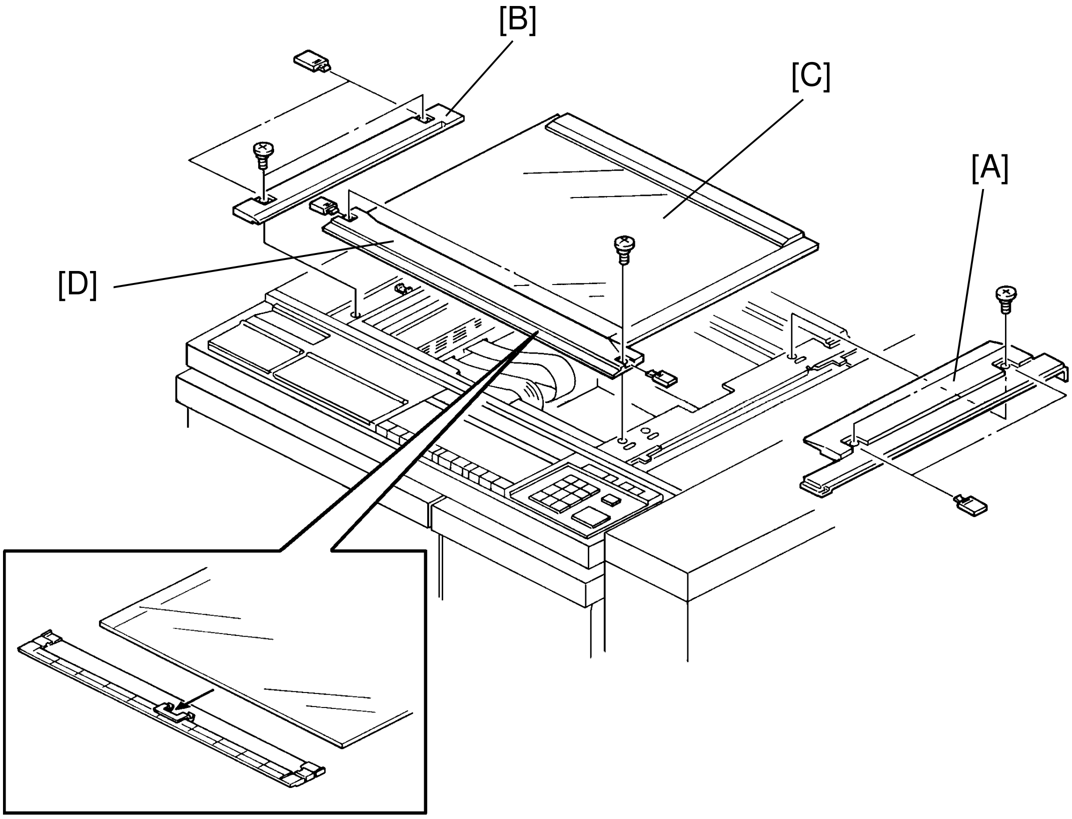
   3. The setting of low ID should only be changed by ±2.

4. Copy all color balance settings on the copy of the test chart and keep it for future reference.
5. Return to the original screen.

7. SCANNER UNIT

7.1 EXPOSURE GLASS REMOVAL

<Model A092 & A105>

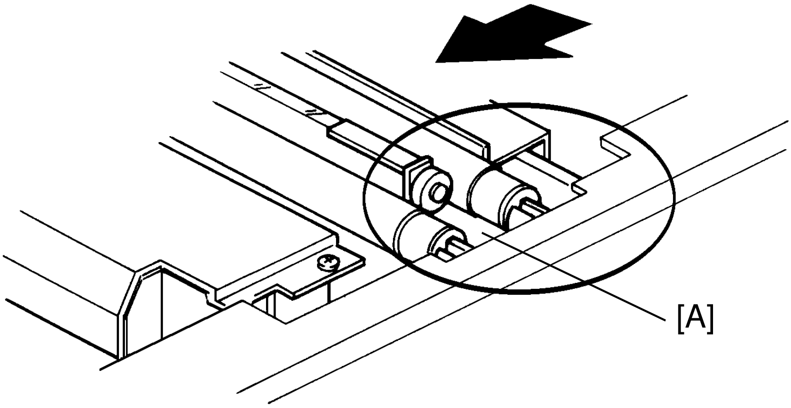


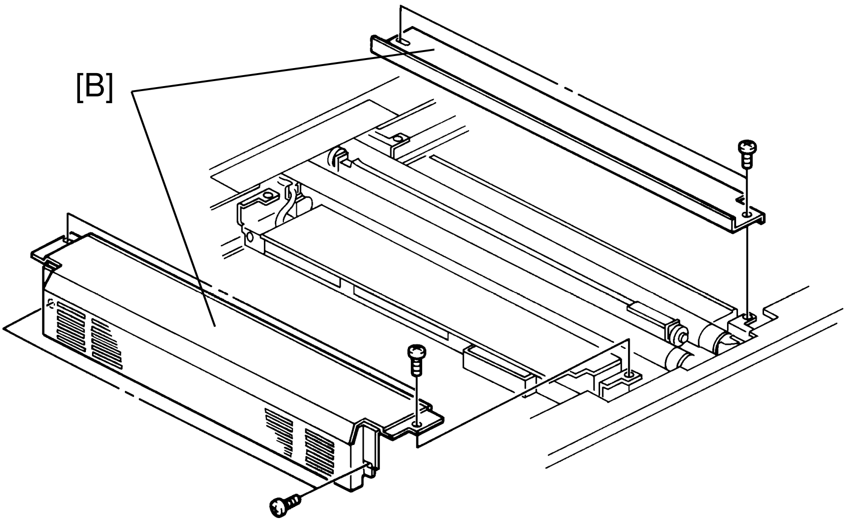
1. Remove every screw cover (6 pcs) from the right, left and front scales.
2. Remove the right [A] and the left scale [B] (2 screws each).
3. Remove the exposure glass [C] together with the front scale [D] (2 screws).

   NOTE: The front scale is clamped to the exposure glass, so when reinstalling the exposure glass make sure that the front scale clamp is properly set on the glass.

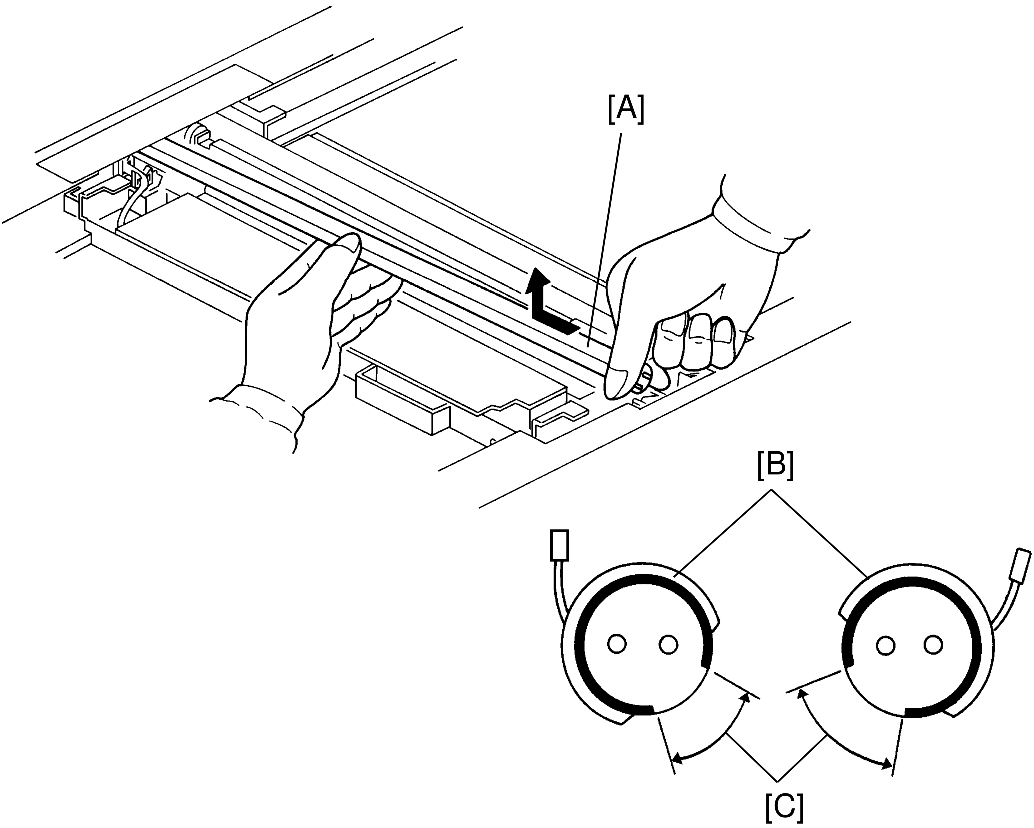
7.2 EXPOSURE LAMP AND HEATER REPLACEMENT

<Model A092 & A105>





1. Remove the exposure glass.
2. Gently slide the scanner to the front frame cut-out [A]. Use both hands and slide the scanner by the ends and not by the middle.
3. Remove the right and left scanner covers [B] (right cover: 2 screws, left cover: 4 screws).



4. Remove the 2 exposure lamp and heater assemblies [A] (1 connector each).

5. Peel off the heaters from the lamps.

To reassemble:

1. Wrap the heaters [B] around the lamps so that the clear part [C] of the lamps are left uncovered by the heaters. The clear part of the lamps should be exactly centered in the heater slits (see diagram).

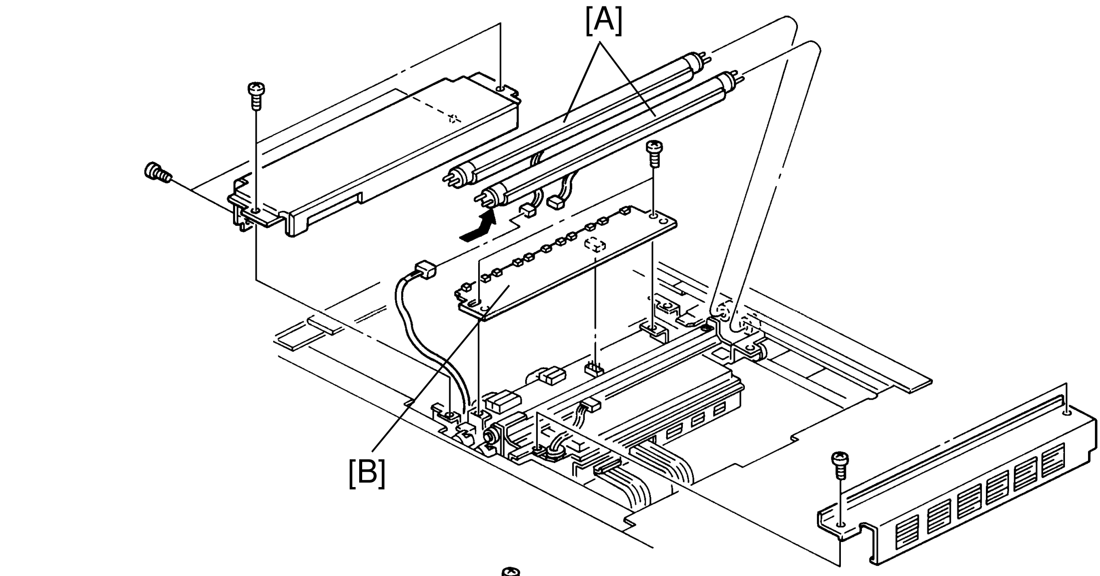
2. Set both lamp-heater assemblies in the scanner so that:
   - Open parts face the center.
   - Two pins on the rear lamp terminal are fully inserted into the rear lamp receptacle.
     (There should be no gap between the rear receptacle and the rear end of lamp.)

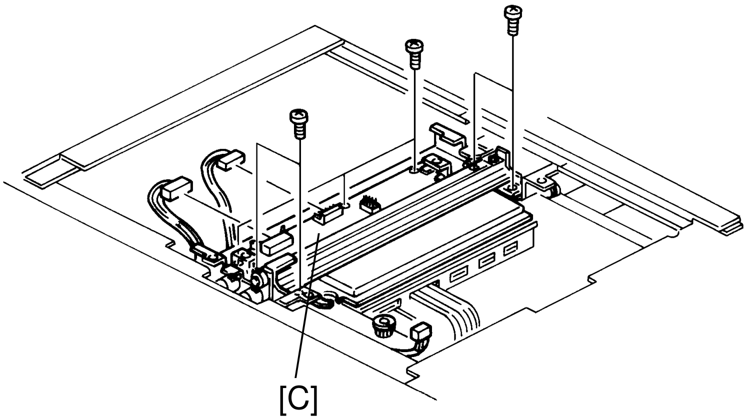
3. Slowly slide the scanner towards the home position to make sure that the heaters do not rub against the frame. If they do, adjust the heaters' position on the lamp.

4. Reinstall all covers, the exposure glass, and the scales.

7.3 CCD DRIVE AND CCD PRE-AMP BOARD REPLACEMENT

<Model A092>

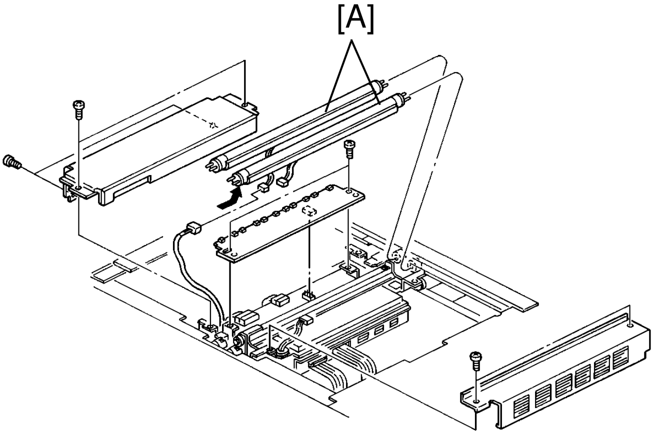


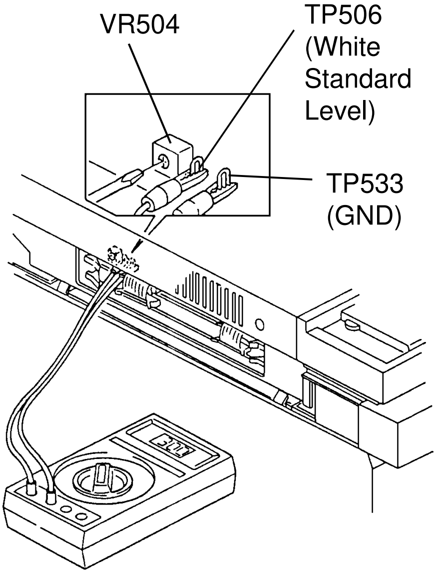


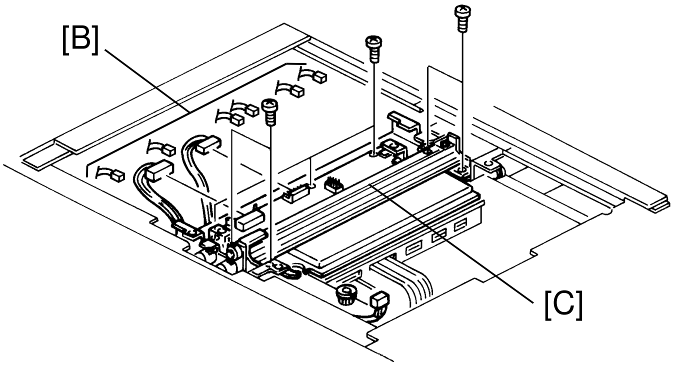
CAUTION: For model A092 replace the CCD drive/CCD pre-amp/video processing boards at the same time. These PCBs are a matched set.

1. Remove the exposure lamps [A] (see Exposure Lamp Replacement).
2. Remove the two screws securing the CCD pre-amp board and lift the board [B].
3. Disconnect the 11 connectors.
4. Disconnect CN220 and CN221 from the CCD drive board.
5. Remove the CCD drive board [C] with the optical fiber array unit (7 screws).
6. Remove the harness bushing form the CCD drive board.

<Model A105>







CAUTION: • This model does not have a CCD-pre amp board, and it is not necessary to replace the CCD drive board and the video processing board at the same time.
• When replacing the CCD drive board or the video processing board, adjust the output level of the white standard plate.

1. Remove the exposure lamps [A]. (See Exposure Lamp Replacement.)
2. Disconnect all connectors [B] on the CCD drive board.
3. Replace the CCD drive board [C] (7 screws, 1 harness bushing).

– White Standard Plate Output Level Adjustment –

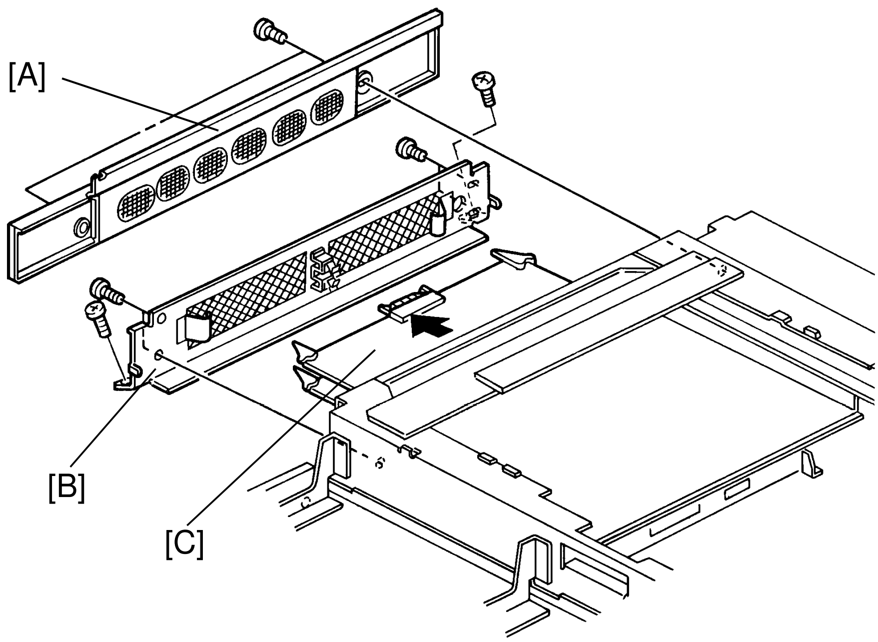
1. Slide out the scanner control board. See "Video Processing / Scanner Control Board Replacement".
2. Turn DPS703-1, DPS702-2 and 3 on the scanner control board ON and put the boards back.

3. Make sure that the scanner is positioned under the right scale and lower the editor board.
4. Turn the main switch on (Exposure lamps light), and wait 10 minutes.
5. Connect the lines of the multi-meter to TP506 (White Standard Level) and TP533 (GND).
6. Adjust the voltage between TP506 and TP533 to **3.2** ± **0.1 V** using VR504 on the video processing board.
7. Turn DPS703-1, DPS702-2 and 3 OFF.

7.4 VIDEO PROCESSING BOARD AND SCANNER CONTROL BOARD REPLACEMENT

CAUTION: For model A092, replace the CCD drive the CCD pre-amp the video processing board, at the same time. These PCBs are a matched set.
For model A105, when replacing the video processing board, adjust the white standard level. See the CCD drive and CCD pre-amp board replacement.

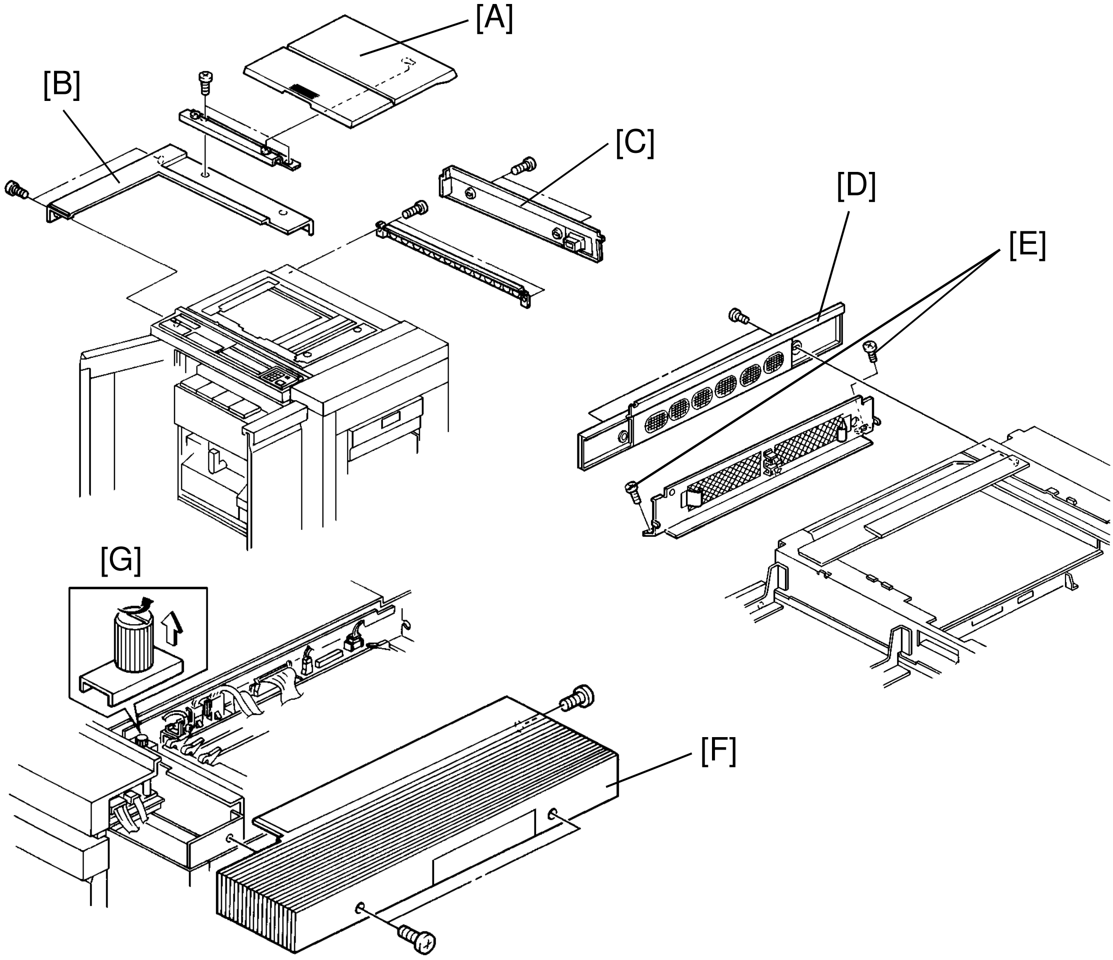
<Model A092 & A105>



1. Remove the upper left cover [A] (2 screws).
2. Remove the PCB cover grid [B] (7 screws).
3. Disconnect CN251 and CN252 from the video process board (the upper board).
4. Flip the white hooks on the side of the board and remove the video process PCB [C].
5. Repeat step 4. for the scanner control board (the lower board).

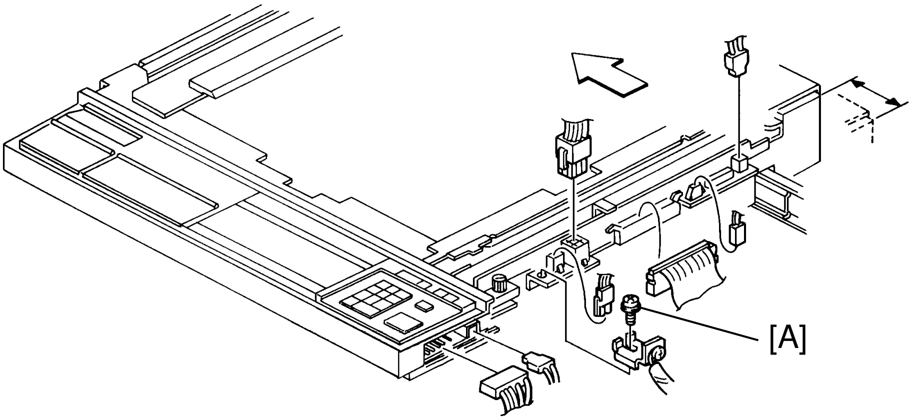
7.5 SCANNER MOTOR REPLACEMENT

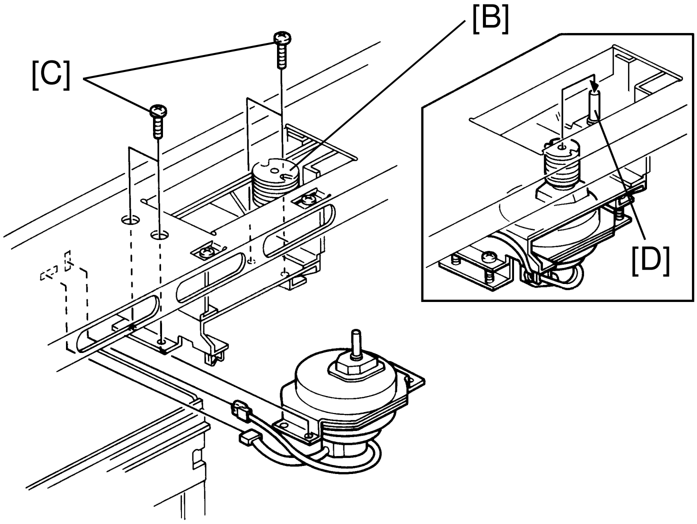
<Model A092 & A105>



1. Remove the platen cover or editor board [A].
2. Remove the top left cover [B] (2 usual screws and 2 platen cover support screws).
3. Remove the upper rear cover [C] (2 screws).
4. Remove the left upper cover [D] (2 screws).
5. Remove the 2 bottom screws [E] from the PCB cover grid.
6. Remove the right upper cover [F] (3 screws).
7. Loosen the scanner unit frame securing screw [G]. Make sure the lock releases.

7’. Remove 4 screws securing the PCB cover and the scanner unit.

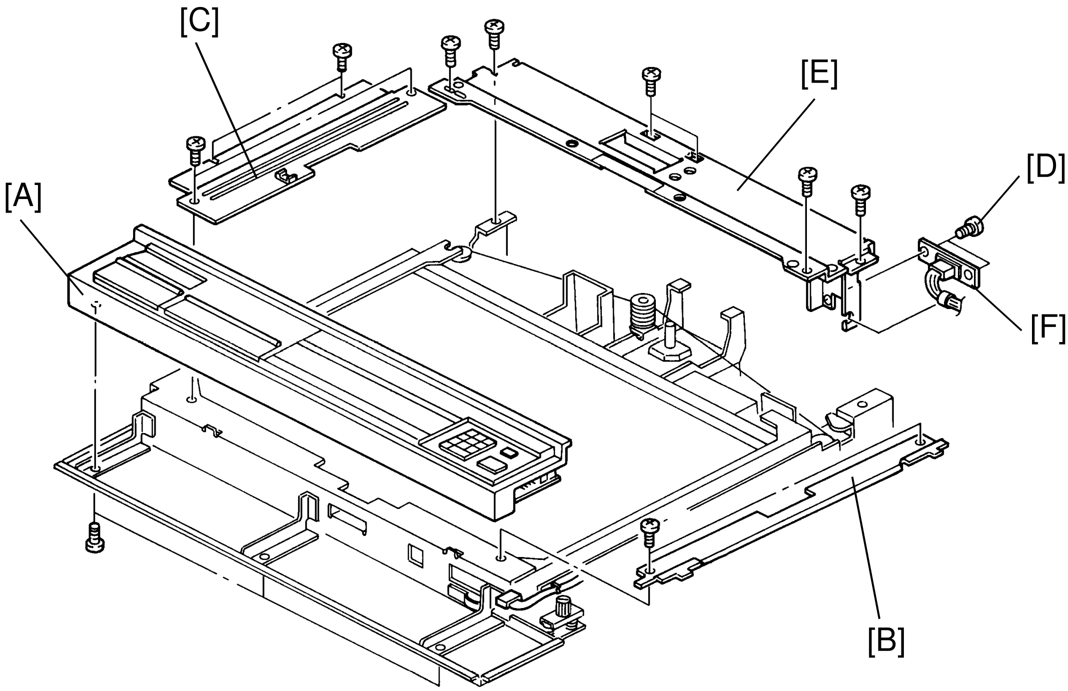




8. Slide the scanner unit 3 centimeters, disconnect all 5 connectors from the scanner unit, and 2 connectors from the operation panel.
9. Loosen the screw [A] securing the security chain and remove the chain.
10. Slide the scanner unit all the way out.
11. Wrap tape around the scanner wire pulley [B].
12. Loosen the 4 screws [C] holding the scanner motor. Unscrew them as much as possible without removing the screws.
13. Loosen the 2 Allen screws at the base of the scanner wire pulley.
14. Pull the scanner wire pulley off the motor and put it on the pulley support [D] next to the motor.
15. Completely unscrew the 4 screws and remove the motor. Do not let it go.
16. Disconnect the motor connectors.

7.6 SCANNER WIRE REPLACEMENT

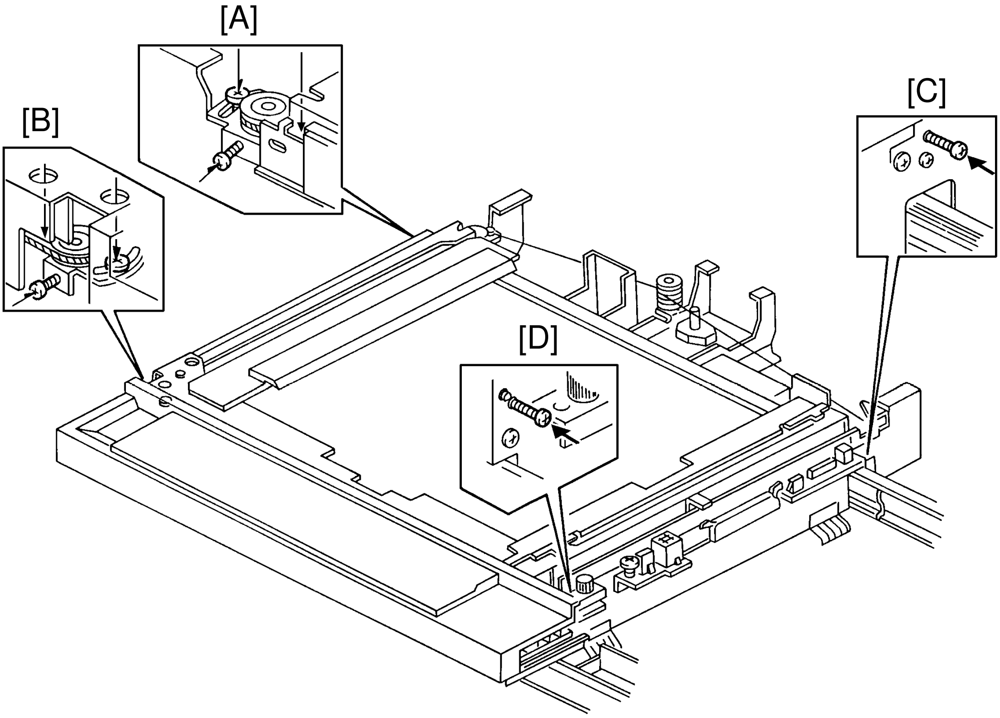
<Model A092 & A105>



NOTE: Left, right, front, and rear are positioned relative to the key operator side.

Follow steps 1 to 10 from the Scanner Motor Replacement procedure.

11. Remove the operation panel [A] (3 screws and 1 more connector).
12. Remove the right scale bracket [B] (2 screws).
13. Remove the left scale bracket [C] (4 screws).
14. Remove 2 screws [D] from the editor connector support plate.
15. Remove the rear scanner unit frame [E] (7 screws). While holding this part, remove the editor connector bushing [F].



Performing steps 16 to 20 will release the scanner wire tension.

16. Loosen 3 screws [A] on the rear left scanner pulley bracket.

17. Loosen 3 screws [B] on the front left scanner pulley bracket.

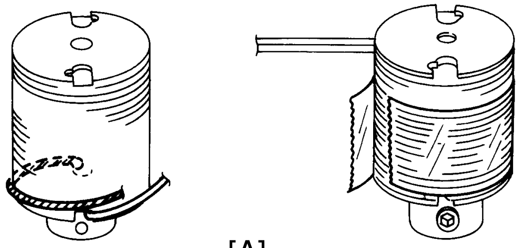
18. Remove 2 screws from the cooling fan located on the bottom plate. Use in steps 19 and 20.

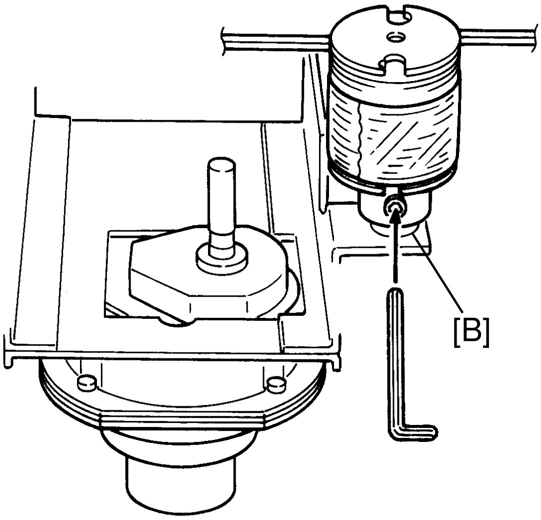
19. Put one cooling fan screw on the rear right scanner pulley bracket [C].

20. Put the other cooling fan screw on the front right scanner pulley bracket [D].

21. Loosen the 2 screws on each of the front and rear wire clamps located on the scanner.

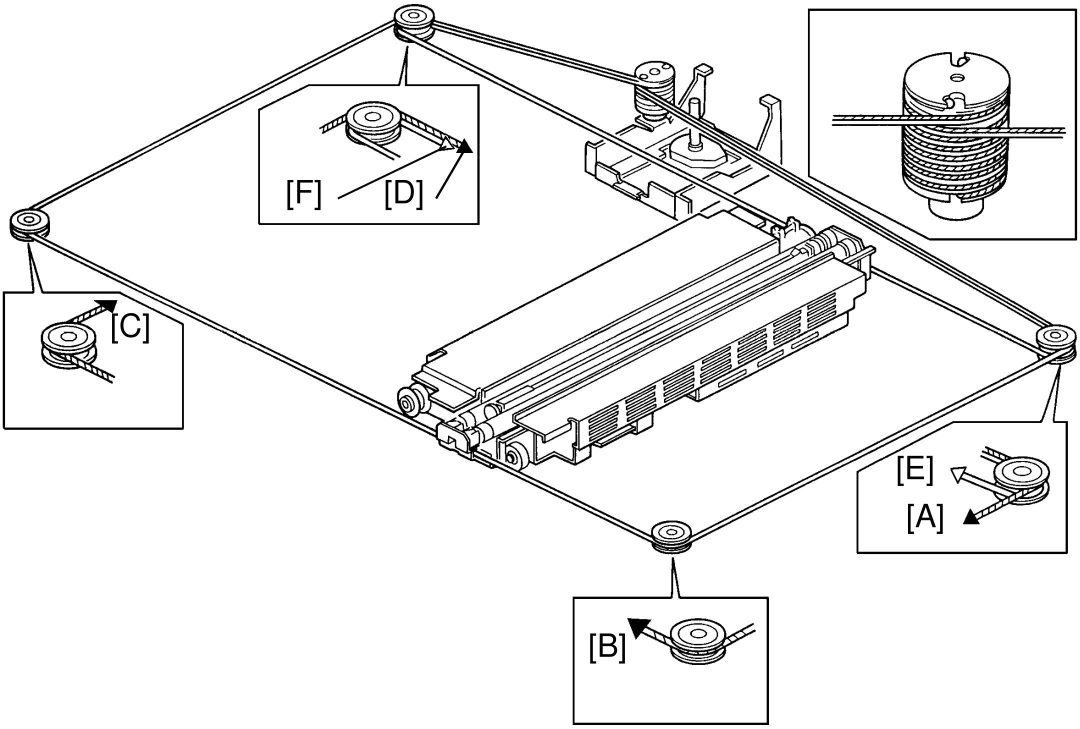
22. Remove the scanner wires.



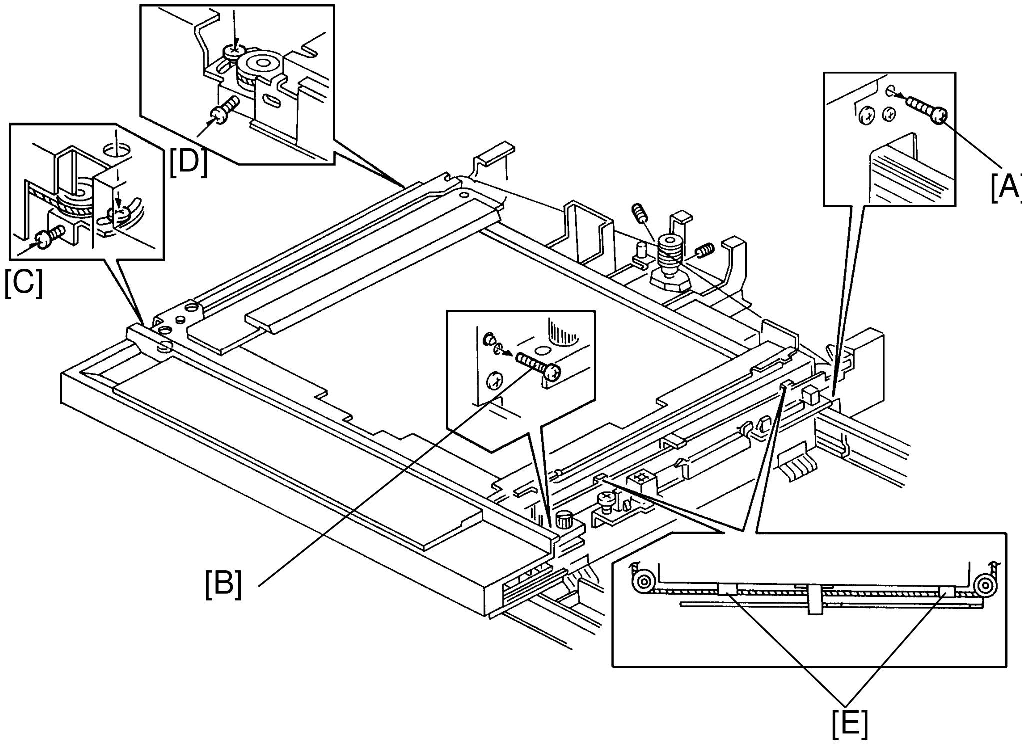


To reinstall:

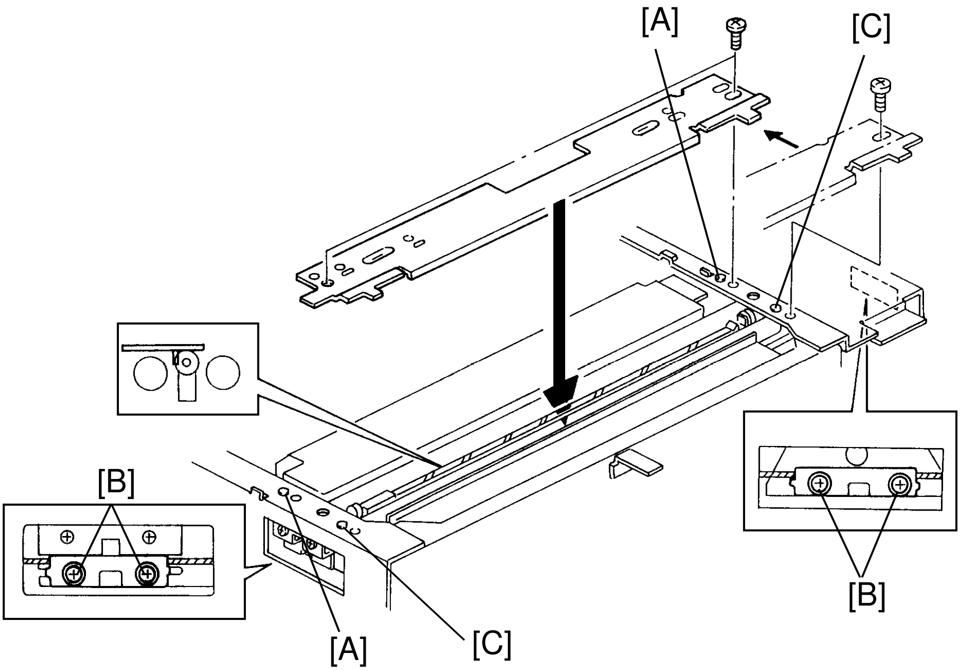
1. Hook the 2 wires in the bottom slots of the pulley, as in the diagram. The Allen screw should face towards you. Put the bead of the dark wire in the bottom slot on the side opposite the Allen screw, and the bead for the light wire in the bottom slot on the side of the Allen screw [A].
2. Wind the dark wire one half-turn around the pulley, until it is under the slot opposite the Allen screw.
3. Wind both wires together 6 1/2 times. In total, the dark wire should be wound 7 times and the light wire should be wound 6 1/2 times.
4. Tape the wires to the pulley (see diagram).
5. Set the pulley on the temporary pulley support [B] with the Allen screw facing out.
6. Tighten the Allen screw.



7. Take the dark wire and wind it around the right rear pulley [A], the right front pulley [B], the left front pulley [C], and the left rear pulley [D]. In all cases, make sure the dark wire is in the upper slot of the pulley (see diagram).
8. Take the dark wire and wind it around the scanner motor pulley 1/2 turn. Begin winding on the side opposite the Allen screw. Hook the wire bead in the top slot on the side of the Allen screw. Make sure that there is one free groove at the top of the pulley.
9. Take the light wire and wind it around the rear right pulley [E] and the rear left pulley [F]. Make sure that the light wire goes in the bottom groove of each pulley (see diagram).
10. Wind the light wire 1 time around the scanner motor pulley. Hook the bead in the slot opposite the Allen screw.



11. Loosen the Allen screw. Take the scanner motor pulley from the temporary support, and place it on the scanner motor shaft.
12. Adjust the position of the pulley on the shaft so that the tip of the shaft is even with the top surface of the pulley. Tighten the Allen screw.
13. Unscrew the tension screws on the front and rear right pulleys [A], [B].
14. Slightly tighten the tension screws [C], [D] on the front and rear left pulleys.
15. Verify that the dark wire is aligned with the front and rear adjustment sights [E]. If they are not repeat step 15 until the wire and the sights are aligned as in diagram.



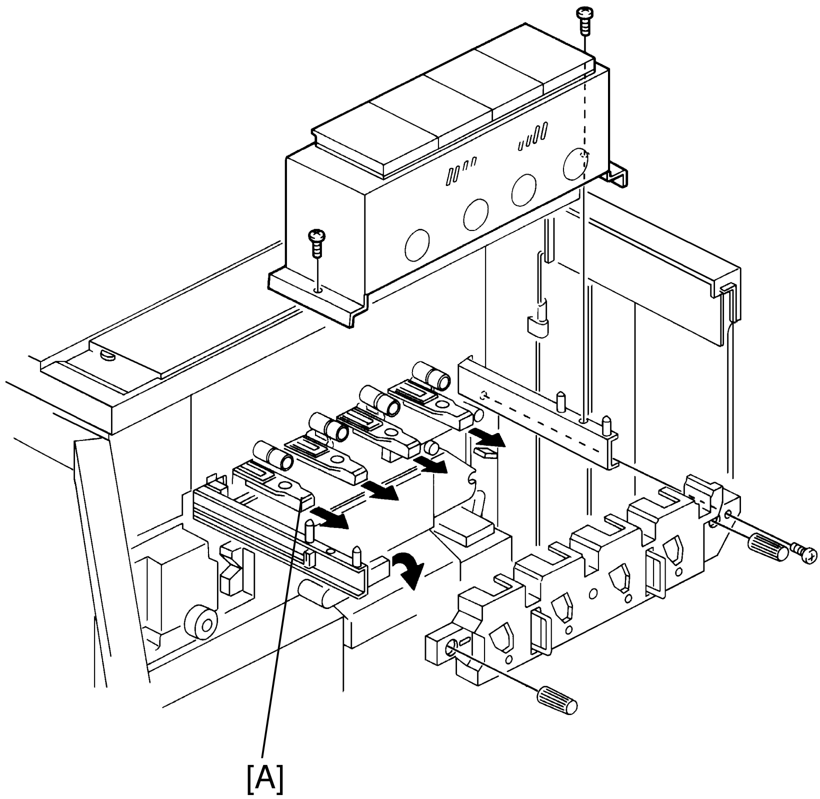
Steps 16 to 23 are to align the scanner.

16. Reinstall the rear scanner frame.
17. Remove one screw from the rear filter.
18. Push the scanner towards the home position as far as possible. Make sure the wires are in between the scanner wire clamps.
19. Install the right scale bracket on the positioning pegs [A]. Make sure the bracket is in the pegs and that the scanner is in between the bracket and the right scanner frame.
20. Tighten the screws [B] on the front and rear scanner wire clamps.
21. Remove the right scale bracket from the positioning pegs and reinstall on its proper positioning pegs [C], 5 centimeters to the right of the positioning pegs.
22. Reinstall the left scale bracket.
23. Move the scanner back and forth to verify that the scanner wire is properly installed.
24. Reassemble the machine.
25. Perform the copy image adjustment procedures.

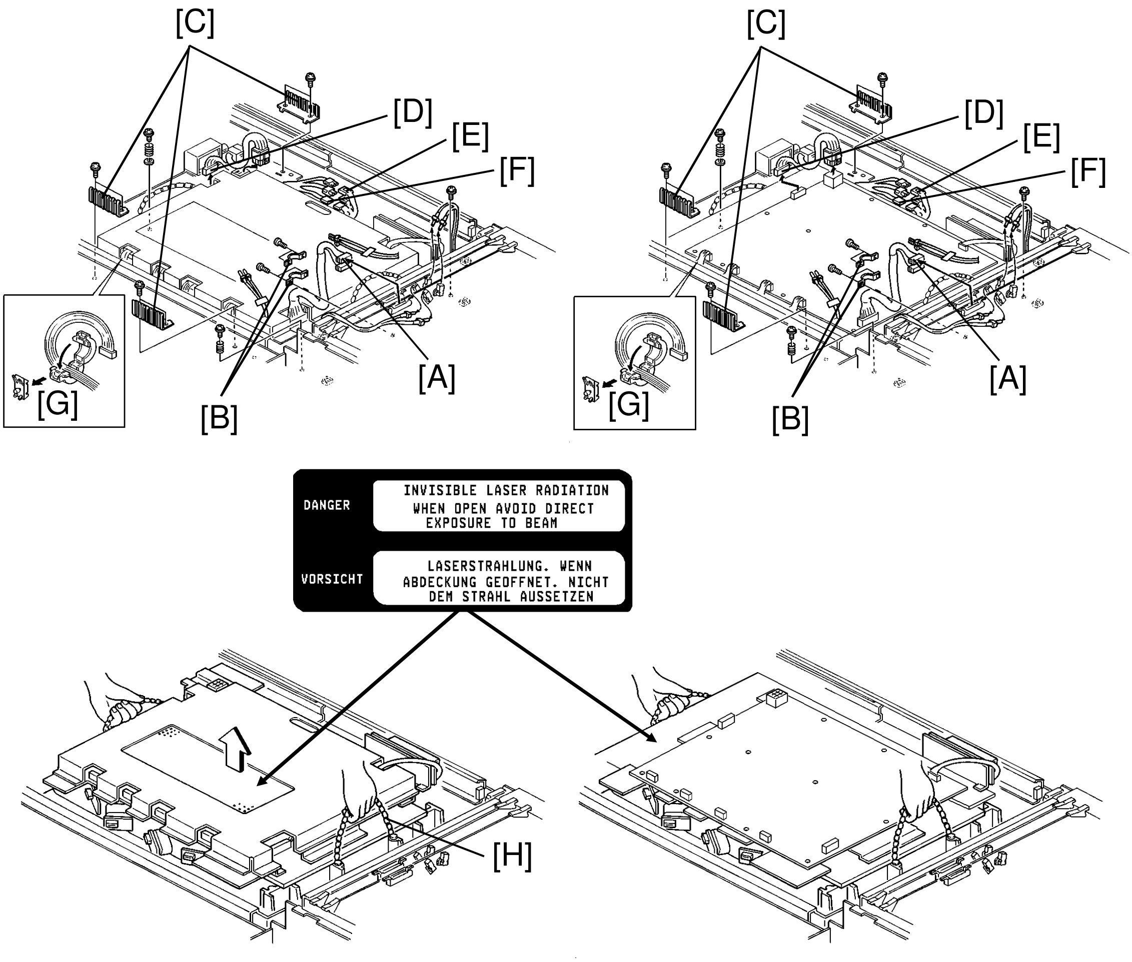
8. LASER UNIT

8.1 LASER UNIT REPLACEMENT

<Model A092 & A105>



1. Open the front cover and remove the toner tank unit (2 screws).
2. Remove the drum unit cover (2 knob screws and 1 ordinary screw).
3. Remove all 4 toner shield glasses [A].
4. Slide the scanner unit all the way out. Refer to the scanner motor replacement section.

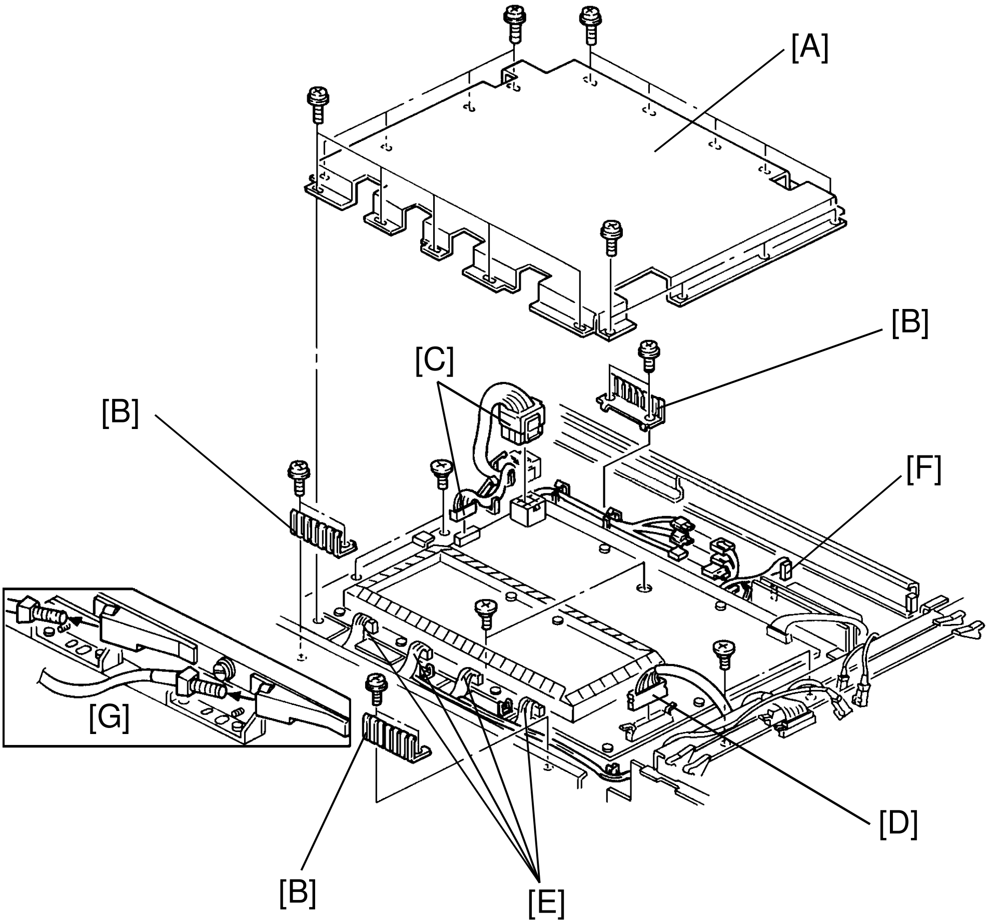


[For Model A092] **[For Model A105]**

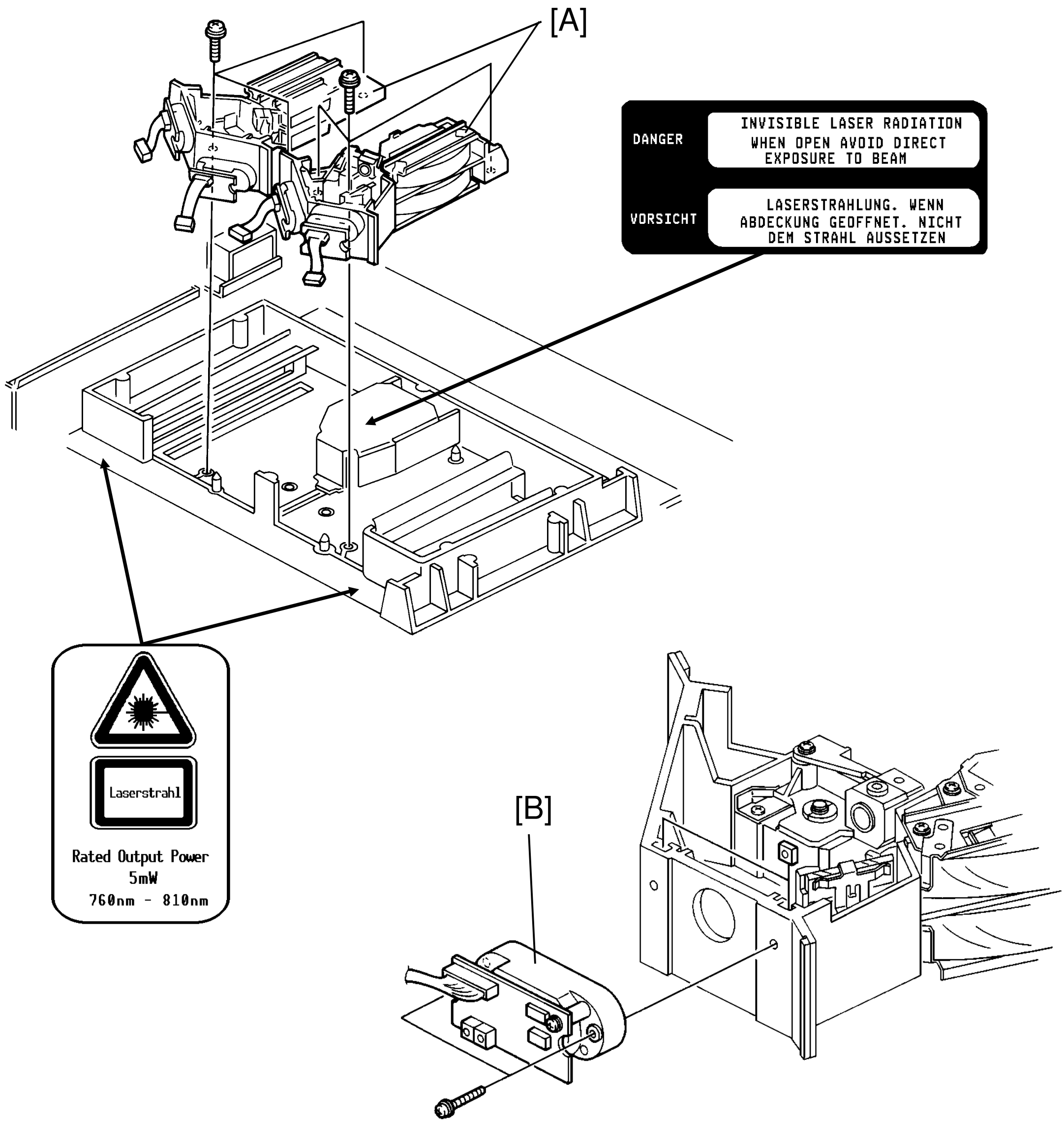
5. Remove the PCB cover (7 screws).
6. Disconnect the CN154 connectors [A] and remove the two harness clamps [B].
7. Remove the 3 grounding plates [C] (2 screws each).
8. Remove the 4 fiber cables from the PCBs and the clamps.
9. Remove CN601 and CN602 [D] from the PCBs and the clamps.
10. Disconnect the 2 red anticondensation heater connectors [E] and the white thermistor connector [F]. Remove from the harness clamps.
11. Remove the ferrite cores [G] from the front frame. Release the core holders from the front of the machine.
12. Remove the laser unit (2 screws with springs and washers and 1 more screw). Pull the unit out by the handling chains [H]. Be careful not to damage the surrounding harnesses. When reinstalling the unit, insert it into the holding pegs.

8.2 LD UNIT REPLACEMENT

<Model A092 & A105>



1. Slide the scanner unit all the way out.
2. Remove laser unit top cover [A] (18 screws). **(Model A092 only)**
3. Remove the 3 grounding plates [B] (2 screws each).
4. Disconnect CN601, 602 [C], and 604 [D] and remove them from their clamps.
5. Disconnect CN605, CN606, CN607, and CN608 [E] from the laser drive control board.
6. Disconnect CN552 [F] from the polygon motor drive board.
7. Remove the anti-condensation heater connector and the laser unit thermistor harness from their clamps.
8. Remove the 4 fiber optic cables [G] from their clamps.



9. Remove the LD control board (6 screws).

   NOTE: Remove only the indicated screws. Do NOT remove or loosen any other screws. This might upset the optical settings.

10. Remove the optical assembly [A] (3 screws each).

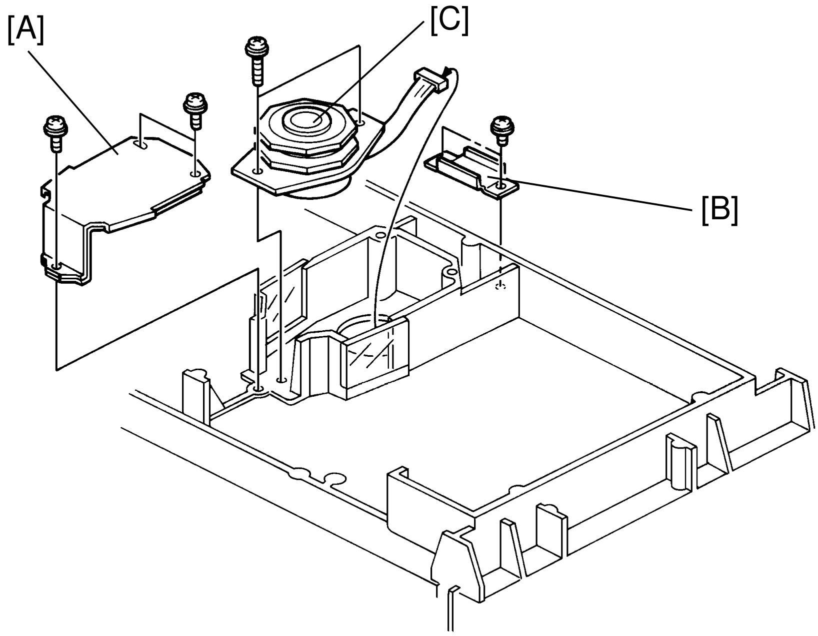
11. Remove the LD unit [B] (2 screws).

    NOTE: Do NOT remove the board from the unit.

12. Replace it with new unit.

8.3 POLYGON MOTOR REPLACEMENT

<Model A092 & A105>



1. Follow the laser drive unit replacement procedure until step 9.
2. Remove the polygon motor cover [A] (3 screws).
3. Remove the harness cover [B] (2 screws).
4. Remove the polygon motor [C] with the harness.

Do NOT touch the mirror surface with your bare hands. Keep the mirrors perfectly clean.

8.4 Vref. ADJUSTMENT

NOTE: After replacing the LD control board, it is necessary to perform the Vref. adjustment.

1. Connect only CN601. (After replacing the LD control board.)

2. Connect the multi-meter as follows and turn on the main switch.

<Model A092>

Vref. Bk:	TP608 — TP610 (AGND)	$\rightarrow$	VR602
M:	TP612 — TP614 (AGND)	$\rightarrow$	VR603
Y:	TP600 — TP602 (AGND)	$\rightarrow$	VR600
C:	TP604 — TP606 (AGND)	$\rightarrow$	VR601

<Model A105>

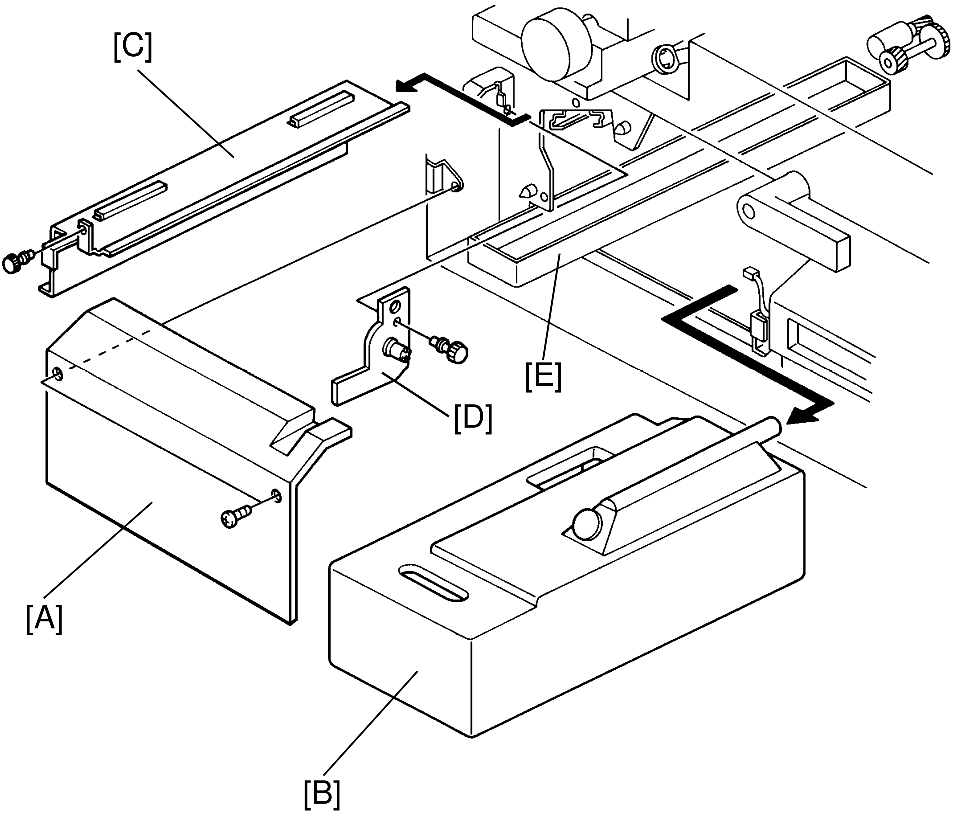
Vref. Bk:	TP38 — TP45 (AGND)	$\rightarrow$	VR10
M:	TP41 — TP46 (AGND)	$\rightarrow$	VR11
Y:	TP32 — TP43 (AGND)	$\rightarrow$	VR9
C:	TP35 — TP44 (AGND)	$\rightarrow$	VR12

3. Adjust the voltage to that given on the instruction label on the cover by an appropriate VR.

9. DEVELOPMENT

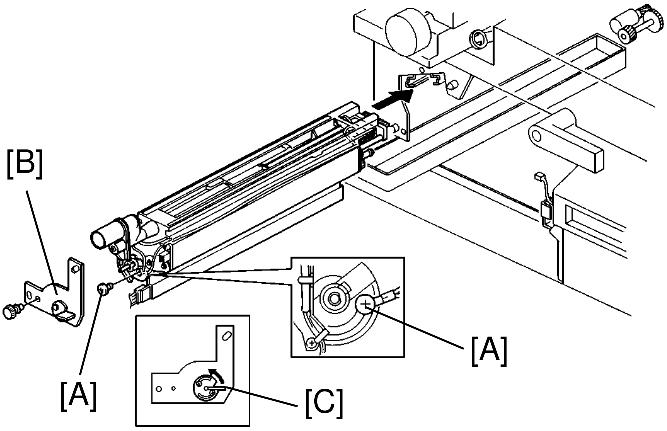
9.1 DEVELOPER REPLACEMENT

<Model A092 & A105>



This procedure applies for all four colors.

1. Open the front door and remove the toner collection bottle cover [A] (2 screws).
2. Remove the toner collection bottle [B] (1 connector) and the development unit stand [C] (1 thumb screw).
3. Remove the magnet angle adjuster [D] (1 thumb screw).
4. Make sure the developer catch pan [E] is properly set.
5. Remove the development unit (see Installation Procedure).
6. Set the development unit on the guide rail for the development unit stand.



7. Loosen the magnet angle lock screw [A] and set the magnet angle adjuster [B] over the side of the development unit (1 screw).

8. Pull out the paper feed unit and install the door switch actuator.

   NOTE:
   - To prevent the copier from performing self check, completely slide out the paper feed unit.
   - Paper jam and SC540 will be displayed. This is normal, so don’t care about it.

9. Set SPT#73 to start the developer removal motor.

10. Very slowly turn the lever [C] on the developer magnet angle adjuster until it stops. Turning it too quickly might lock the motor.

11. Wait 30 seconds for all the developer to be emptied.

12. Exit SPT#73 to stop the motor. (Press ⊖ key.)

13. Return the adjuster lever to its original position (the lever is in the horizontal position) and remove the magnet angle adjuster [B].

14. Tighten the magnet lock screw [A], while pushing down the magnet angle adjuster of the development unit. Be sure that the bias terminal is properly fitted.

15. Remove the developer catch pan and dispose of the developer according to local regulations.

16. Pull out the development unit and put it on the unit stand.

17. Clean the roller sleeve with vacuum and a dry cloth. Repeat procedure after turning the roller, little by a little until the entire roller is cleaned. And clean the ID sensor with your finger.

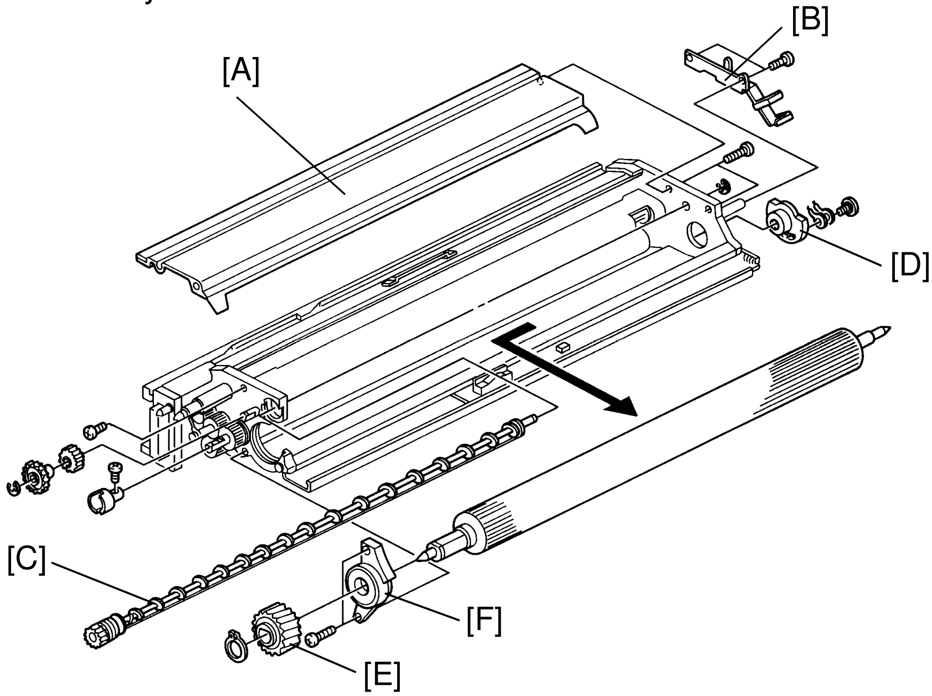
18. Put in new developer (see Installation Procedure, steps 29 to 31).

19. Perform either TD check (4 colors) or TD check (1 to 3 colors).

9.2 DEVELOPMENT ROLLER REPLACEMENT

CAUTION: For model A105, "Development Roller Replacement" is prohibited according to the current model. This is because, it is very difficult to guarantee the copy quality.

<Model A092 only>



1. Remove the development unit (see Installation Procedure, step 23 to 25).
2. Remove the developer (see Developer Replacement).
3. Remove the upper cover.
4. Remove the doctor plate [A] (4 screws). THROW THE OLD SIDE SEALS AWAY.
5. Remove the ID sensor harness guide bracket [B] (4 screws).
6. Remove the lower mixing auger [C] (1 E-ring and 1 screw).
7. Remove the magnet angle plate [D] (1 screw).
8. Remove the development roller gear [E] (1 C-ring) and the bearing holder [F] (2 screws).
9. Replace the development roller.

   NOTE: When reinstalling the side seals, use new side seals. Do not reuse the old ones.

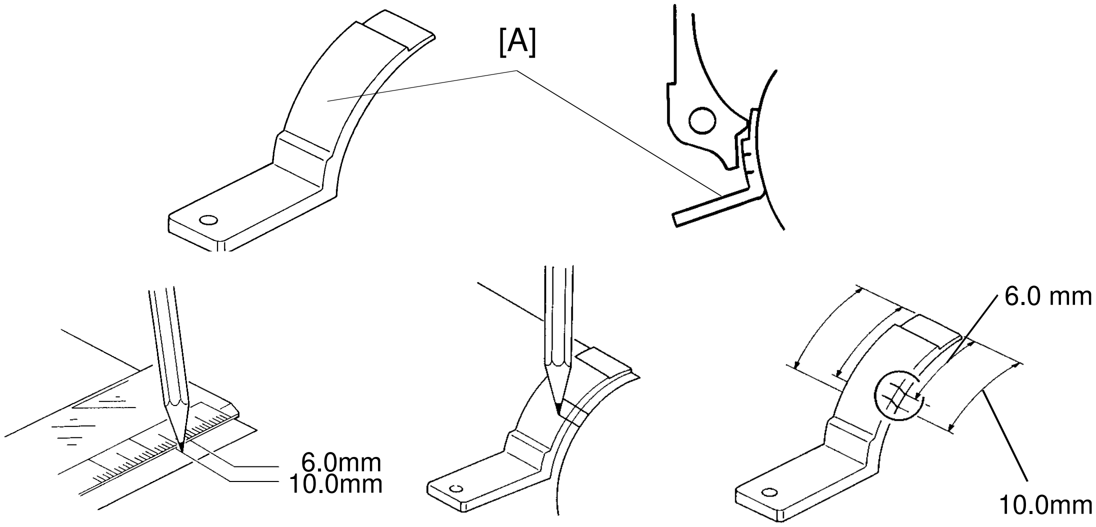
9.3 DOCTOR GAP ADJUSTMENT

<Model A092 only>

Adjustment Standard: $0.50 \leq DG \leq 0.70$

CAUTION: The doctor gap was adjusted at the factory using a special tool. Therefore, normally this adjustment is not required in the field. Only when the development unit is disassembled or the development roller is replaced, this adjustment is required.

For model A105, "Development Roller Replacement" is prohibited according to the current model. This is because, it is very difficult to guarantee the copy quality.



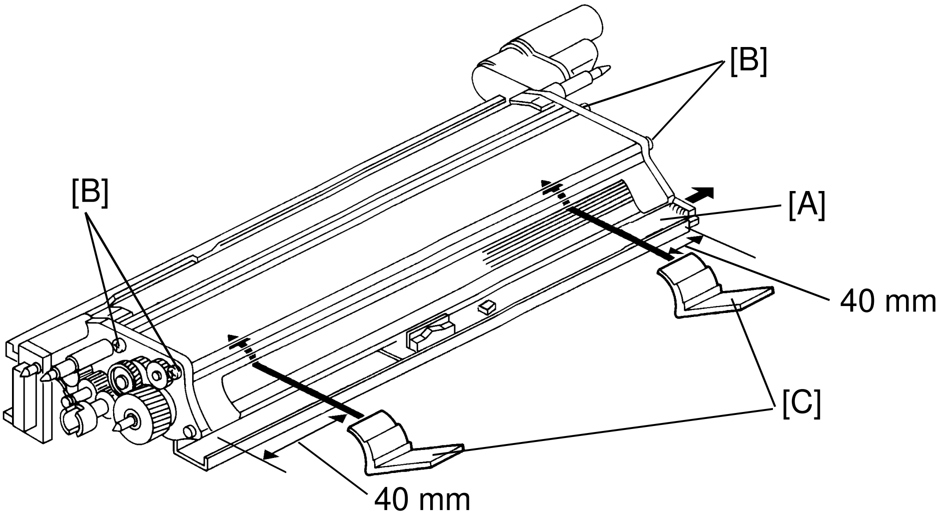
– Doctor Gap Gauge (P/N A0929504) [A] Preparation (2 pcs/set) –

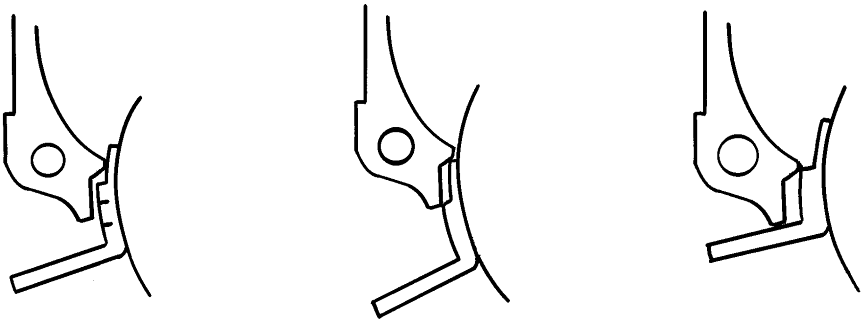
1. Make two marks as shown on the D/G gauge, 6.0 mm and 10.0 mm from the leading edge as shown in the illustration.

– Confirmation Procedure –

1. Take out the development unit.
2. Remove the developer.
3. Remove the ID sensor board (1 connector).
4. Clean all developer from the development roller with a vacuum cleaner. Turn the roller to make sure that it is free of developer.

CAUTION: This prevents surface damage to the roller and ensures an accurate adjustment.





(1) Good (2) Too narrow (3) Too wide

5. Position the gauge [D] 40 mm (1.6 inch) from the front end of the development roller, and insert the gauge into the doctor gap until it stops.

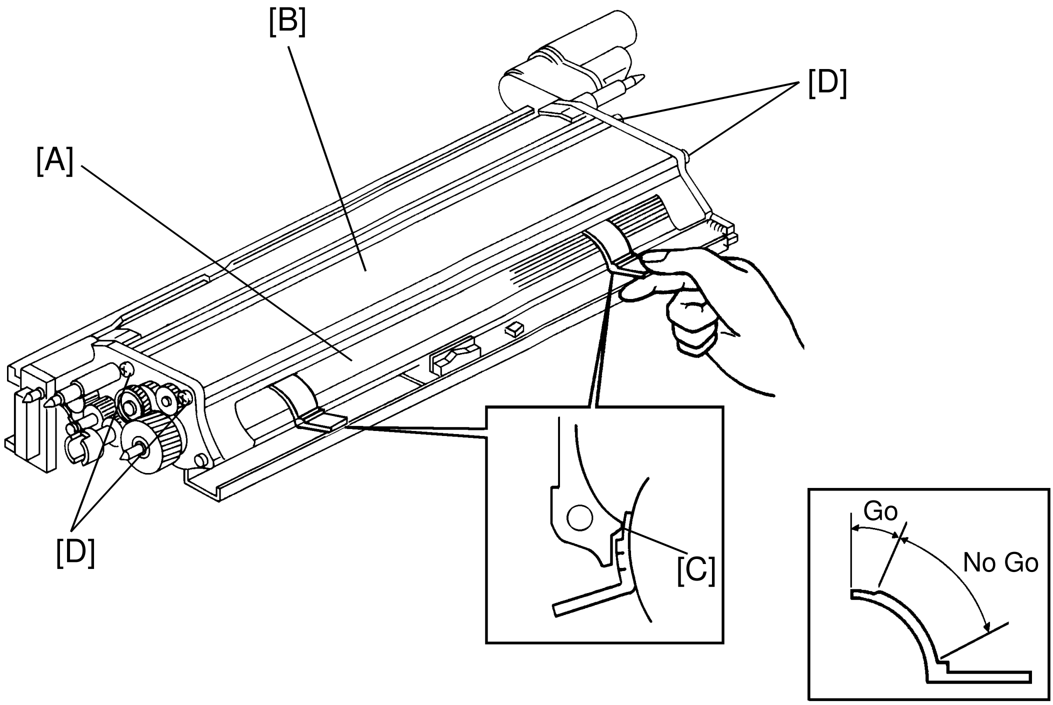
CAUTION: Do not force the DG gauge into the gap and do not press the gauge too hard on the roller. The roller should not rotate when you insert the gauge into the gap.

6. Check the doctor gap at four points turning the development roller 90° each time.
   1) If the "GO" part of the gauge goes through the doctor gap, and the "NO GO" part does not go through, the gap at this point is: $0.50 \text{ mm} \leq DG \leq 0.70 \text{ mm}$
   2) If the "GO" part of the gauge does not go through the doctor gap, the gap at this point is: $DG < 0.50$ mm
   3) If both the "GO" part and "NO GO" part go through the doctor gap, the gap at this point is: $DG < 0.70$ mm
8. Repeat steps 6 and 7 for the rear side of the development roller.
9. If either 3 out of 4 checked points or all 4 points are "$0.50 \text{ mm} \leq DG \leq 0.70 \text{ mm}$", the gap is in good condition.

– Adjustment Procedure <Model A092 only> –

Adjustment Standard: $0.50 \leq DG \leq 0.70$

CAUTION: Before adjusting the doctor gap, the confirmation procedure must be performed.

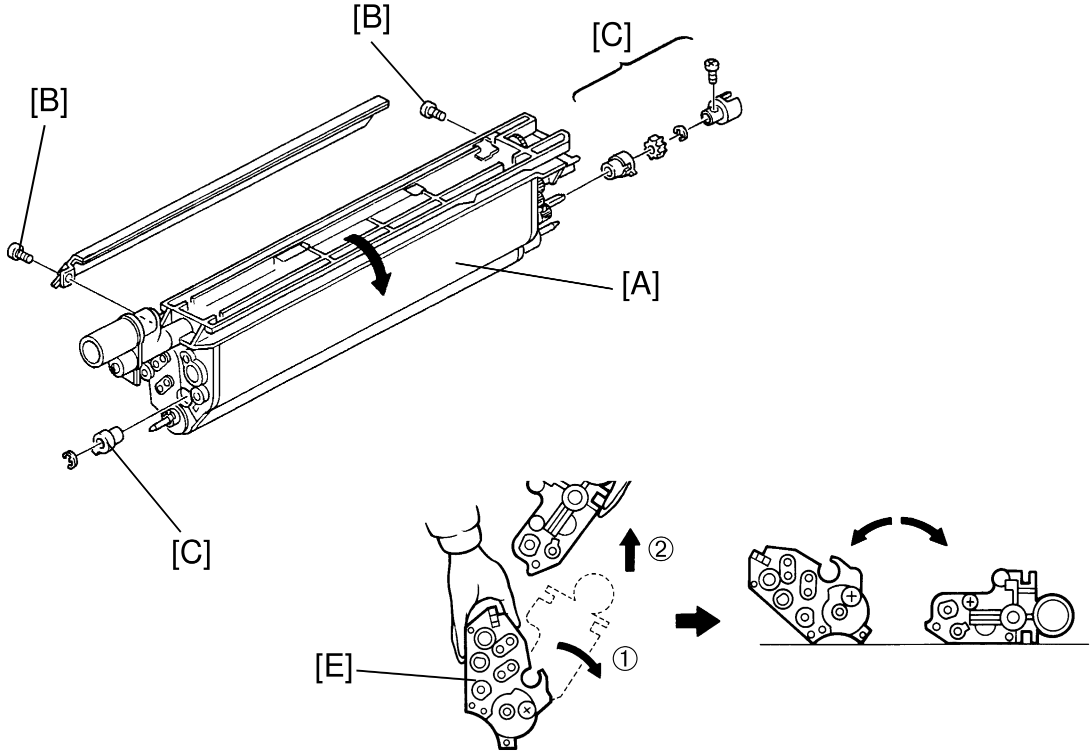


1. Clean the development roller [A] with a vacuum cleaner until no developer is on the roller. Turn the roller to make sure that it is free of developer.
2. Loosen the doctor plate [B] (4 screws).
3. Insert the "GO" part of the gauge [C] in the doctor gap 40 mm from the front and the rear side of the development roller as shown.
4. Press down the doctor plate directly above the gauge, and tighten the front doctor plate screws [D].

   NOTE: Do not press the doctor plate too hard, the doctor gap will become too narrow.
5. Confirm that the doctor gap is adequate by following the confirmation procedure.

9.4 TONER SUPPLY ROLLER REPLACEMENT

<Model A105 only>



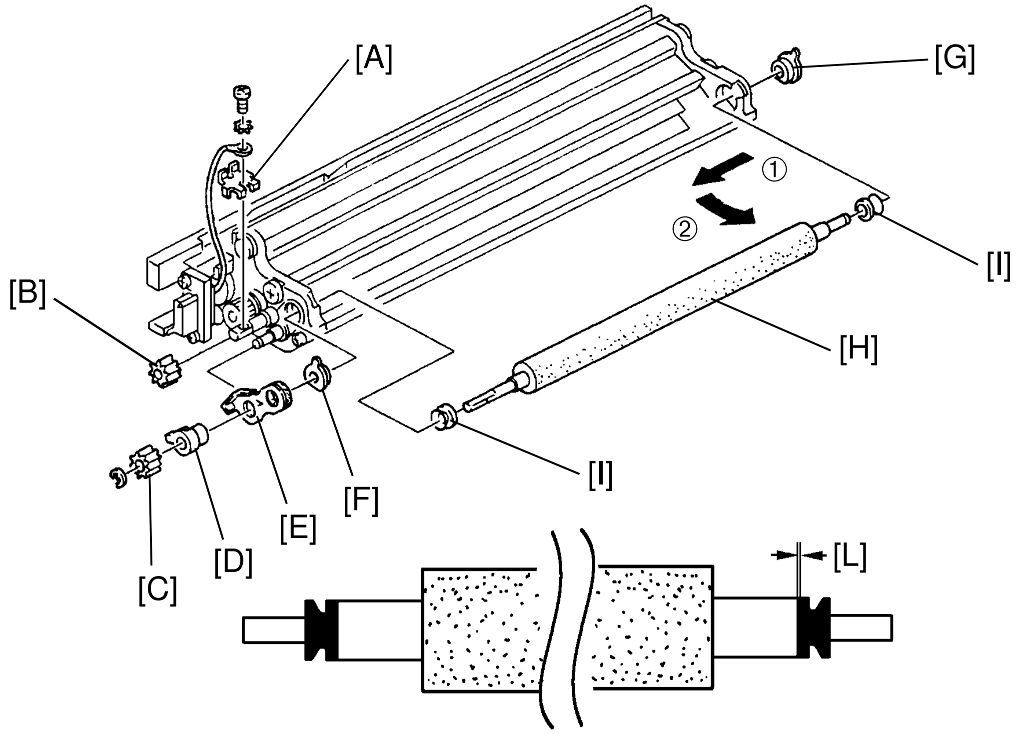
1. Put the development unit [A] on its stand.

2. Remove 2 screws [B] fixing the sub tank and the main tank.

3. Remove a coupling (1 screw), a gear, and two bushings (2 E-rings) [C] which are also fixing the sub tank and the main tank. (To remove the bushings, use a small screw driver.)

4. Now you can separate the main tank and the sub tank. To prevent spilling developer or toner from the assemblies, separate them as follows:
   - Hold the development unit not to be separated into the main tank and the sub tank and take off the development unit from its stand.
   - Turn the sub tank [D] in direction ① to open the development unit and slide up the sub tank, then you can separate the development unit into the main tank [E] and the sub tank.
   - Put the both tanks on clean paper as shown in the illustration.

CAUTION: Do not flip the open side down. Developer or toner will spill out.



5. Remove the grounding bracket [A] (1 screw, 1 star washer). Remove the gear [B] (1 E-ring), the gear [C], the bushing [D], the bracket [E] and the bushings [F] [G] in order.

   NOTE: Be careful not to bent the bracket [E].

6. Remove the toner supply roller [H] sliding indirection ① and ② in order.

   NOTE: As there is a mylar behind the toner supply roller, remove the toner supply roller gently not to bent the mylar.

7. Remove the V-rings [I] carefully not to be damaged.

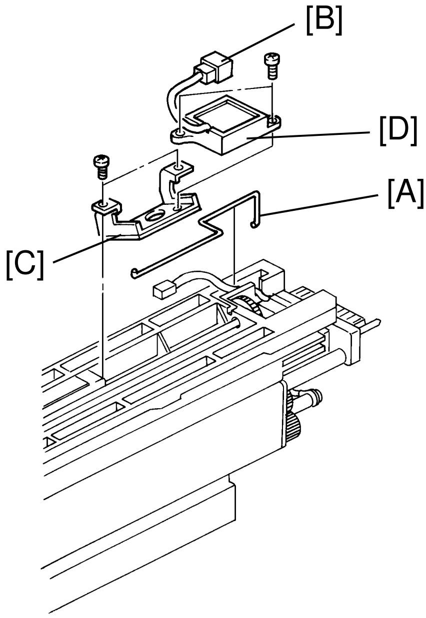
   NOTE: When inserting the V-ring, make sure not to have any space between the V-ring and the shaft cut face [L] and make sure that the V-rings are set as the correct direction.

9.5 TONER SUPPLY SENSOR REPLACEMENT

<Model A092 & A105>

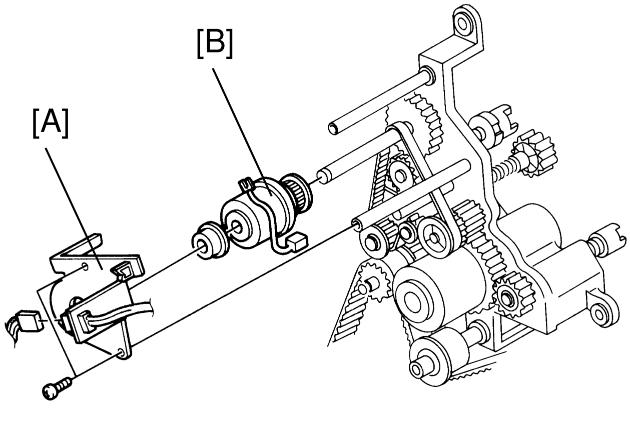
1. Take out the development unit (see Installation Procedure, step 23 to 25).
2. Remove the harness holding wire [A].
3. Disconnect the sensor connector [B].
4. Remove the sensor bracket [C] (2 screws).
5. Replace the toner supply sensor [D].

   NOTE: Be careful not to damage the sensor surface



9.6 TONER SUPPLY CLUTCH REPLACEMENT

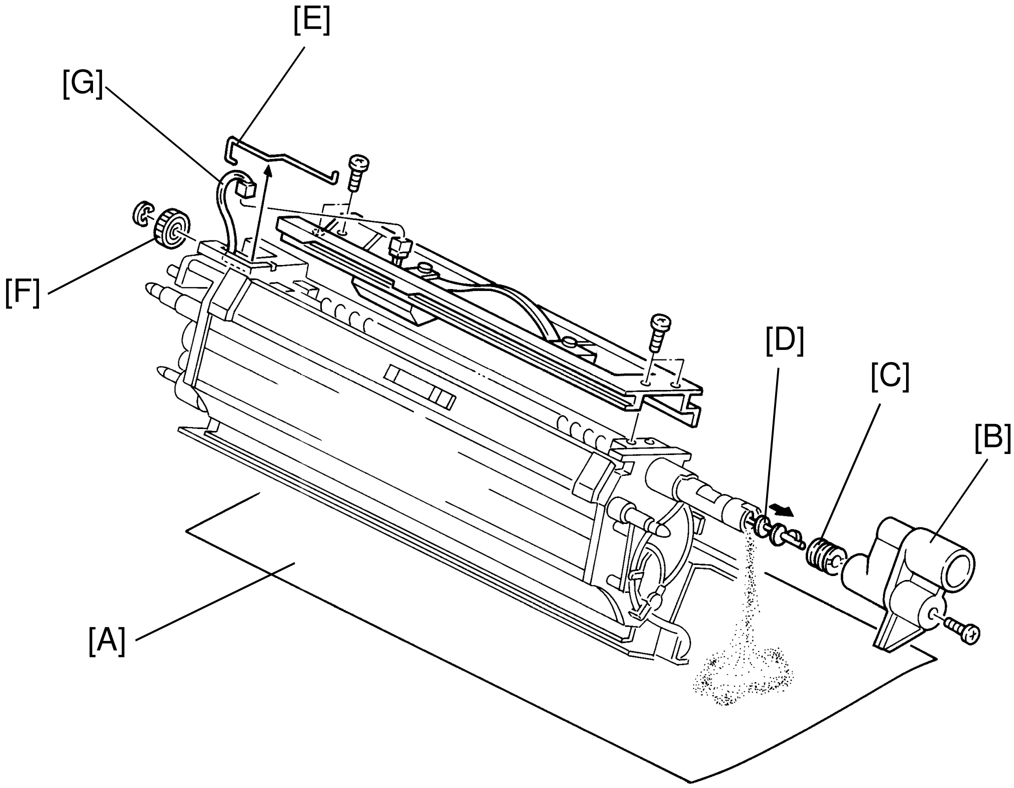
<Model A092 & A105>



1. Remove the lower rear cover (5 screws).
2. Remove the charge fan bracket (4 screws and 1 connector).
3. Remove the toner supply clutch bracket [A] (2 screws and 2 connectors).
4. Remove the toner supply clutch from the timing belt [B].
5. Replace the toner supply clutch.

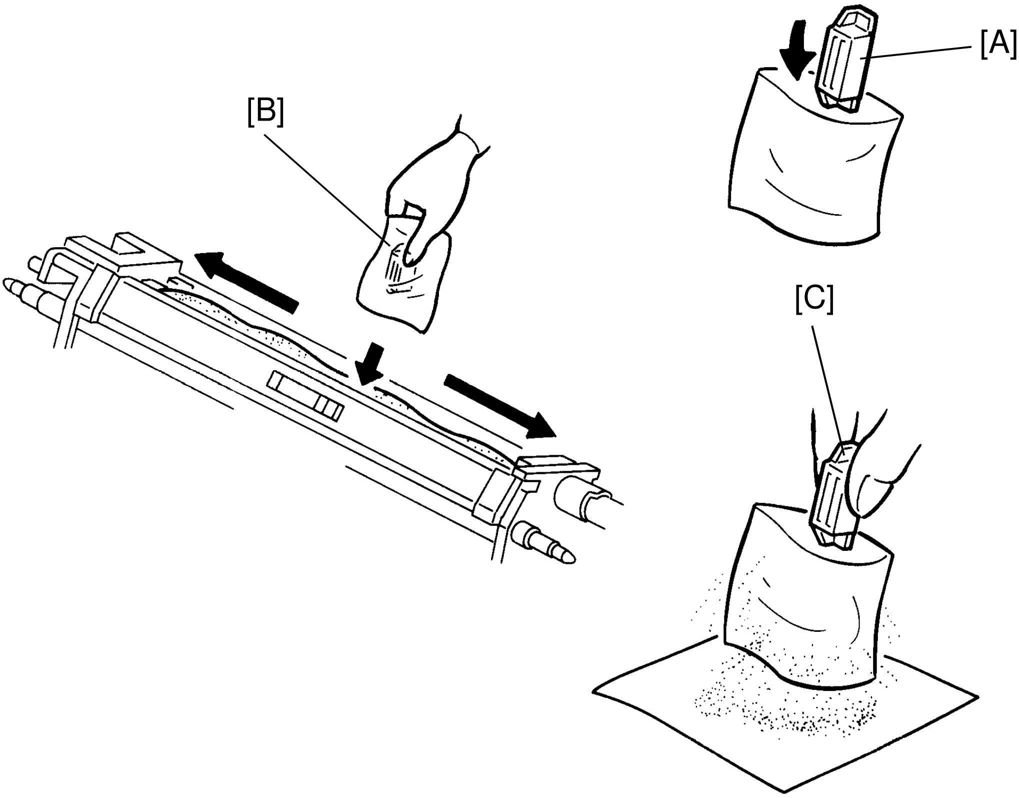
   NOTE: When reinstalling a new clutch, make sure that the stopper bracket locks the toner supply clutch as shown.

9.7 TONER CONTAINER CLEANING PROCEDURE (Model A092 Only)



1. Remove the ID sensor before removing the development unit from the machine and put it on the development unit stand.
2. Put a paper [A] as shown in the figure.
3. Remove the toner entrance sprocket [B], the coil cap [C] and the toner supply auger [D].

   NOTE: Toner falls on the paper. Keep it and put the toner back to the toner container in step 8.
4. Remove the harness clamp [E] and the white gear [F] (2.5 mm retailing ring).
5. Disconnect the connector [G].
6. Remove the upper cover [H] (4 screws).



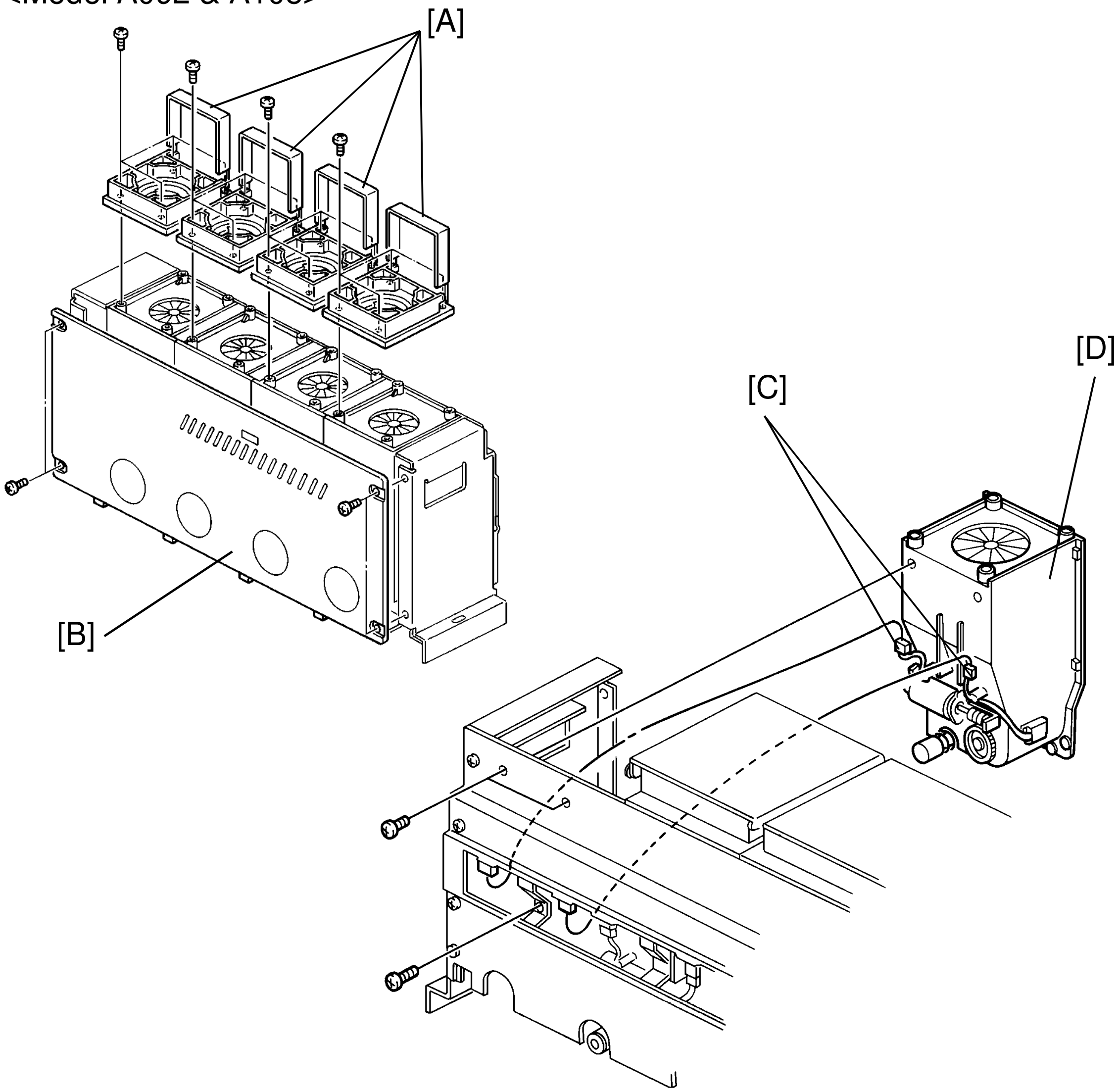
7. Remove the door catch magnet [A] from the machine and wrap it in a vinyl bag.
8. Put the door catch magnet with the vinyl bag [B] into the toner container and move it as shown in the figure to collect the carrier.
9. Take the door catch magnet [C] out of the vinyl bag to let the carrier fall to the paper.
10. Repeat steps 8 and 9 four or five times.

NOTE:
- It is not necessary to remove all the carrier from the toner container.
- If the magnet sticks hard to the metering blade, remove the magnet carefully so as not to damage the metering blade.
- While performing this procedure, do not turn the coupling (which turns the toner supply roller and toner supply auger).

10. TONER TANK SECTION

10.1 TONER TANK REMOVAL

<Model A092 & A105>



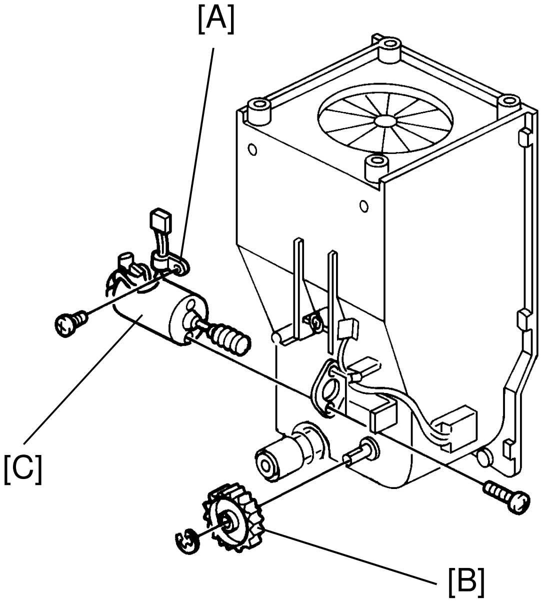
This procedure applies to all four color tanks.

1. Remove the toner tank unit (see Installation Procedure).
2. Remove all 4 toner tank unit upper covers [A] (4 screws each).
3. Remove the toner tank unit front cover [B] (4 screws).
4. Remove the 2 connectors on the back of the tank [C].
5. Remove the toner tank [D] (3 screws).

10.2 TONER TRANSPORT MOTOR REPLACEMENT

<Model A092 & A105>

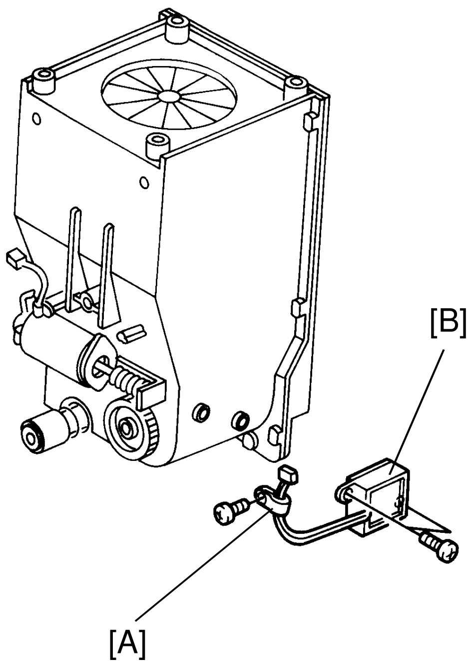
1. Remove the toner tank (see Toner Tank Removal).
2. Remove the harness clamp [A] (1 screw).
3. Remove the agitator gear [B] (1 E-ring).
4. Replace the motor [C] (2 screws).



10.3 TONER END SENSOR REPLACEMENT

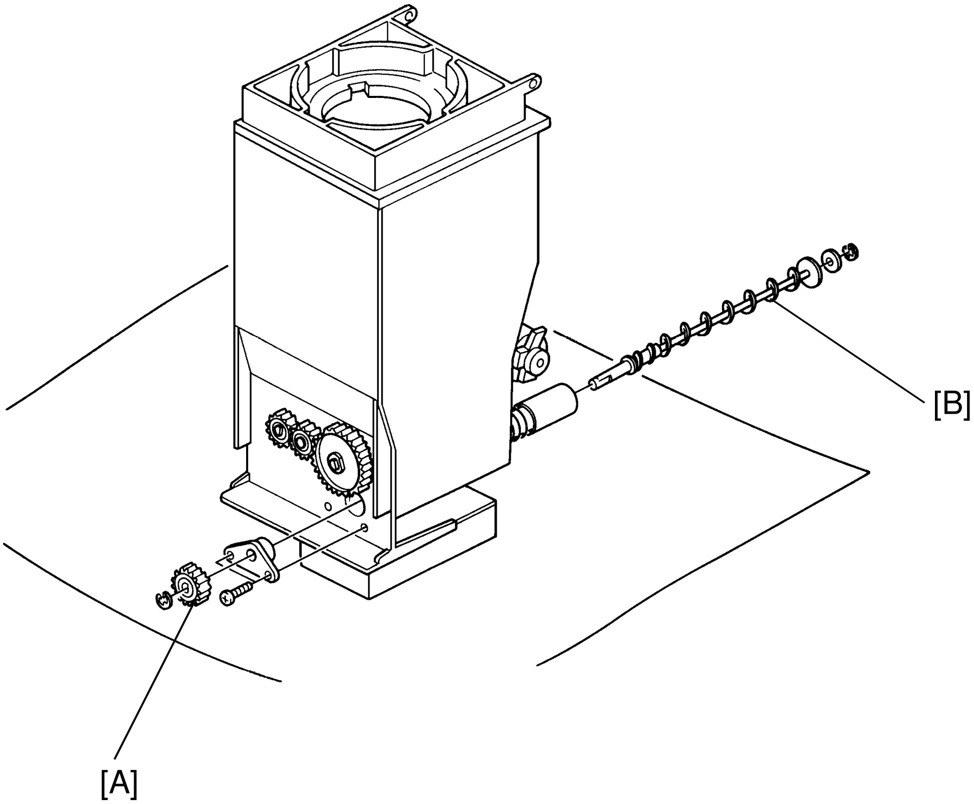
<Model A092 & A105>

1. Remove the toner tank (see Toner Tank Removal).
2. Remove the harness clamp [A] (1 screw).
3. Tilt the tank 45 degrees, so that both the sensor and the toner bottle entrance seal face up.
4. Remove the toner end sensor [B] (2 screws) very slowly. Be careful not to spill any toner.
5. Replace and reinstall the sensor.



10.4 TONER TRANSPORT COIL REPLACEMENT

<Model A092 & A105>



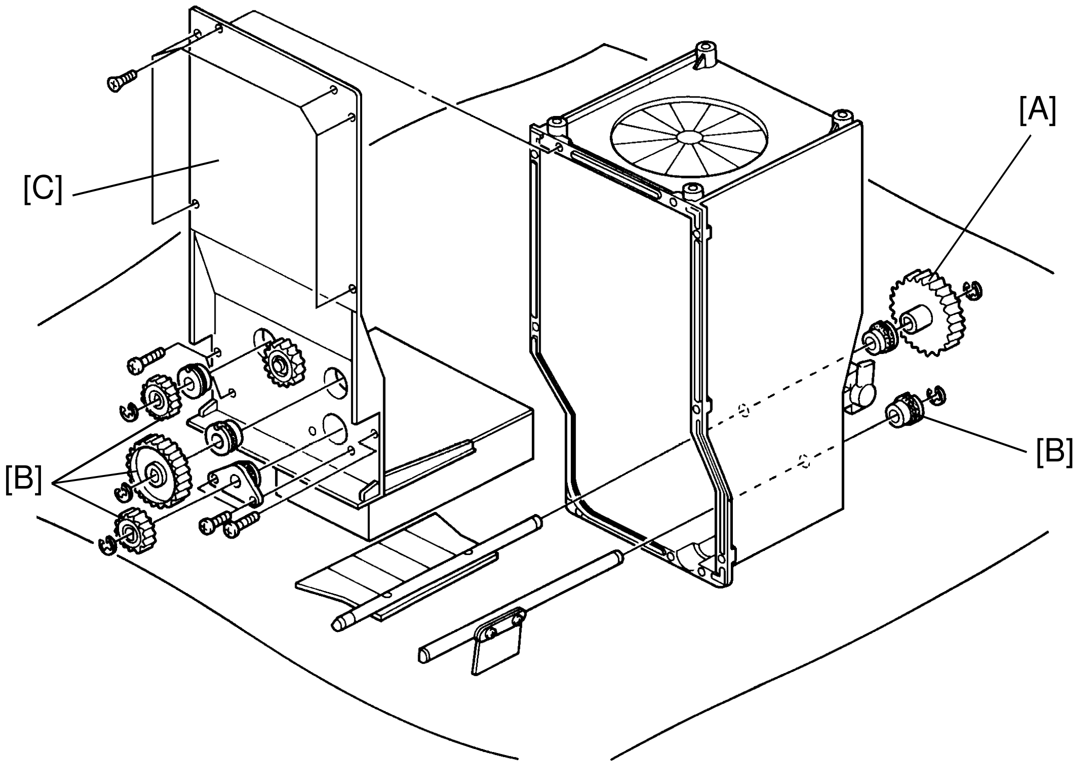
This procedure is very messy. Always work on newspapers or anything else large enough to catch all the toner that will spill out. Take care to keep the customer site clean.

Be careful not to lose the E-rings (clips).

1. Remove the toner tank (see Toner Tank Removal).
2. Remove the drive gear [A] (1 E-ring).
3. Remove the coil with the seal [B].
4. Remove the seal and washer from the old coil and install on the new coil.

10.5 AGITATOR REPLACEMENT

<Model A092 & A105>



This procedure is very messy. Always work on newspapers or anything else large enough to catch all the toner that will spill out. Take care to keep the customer site clean.

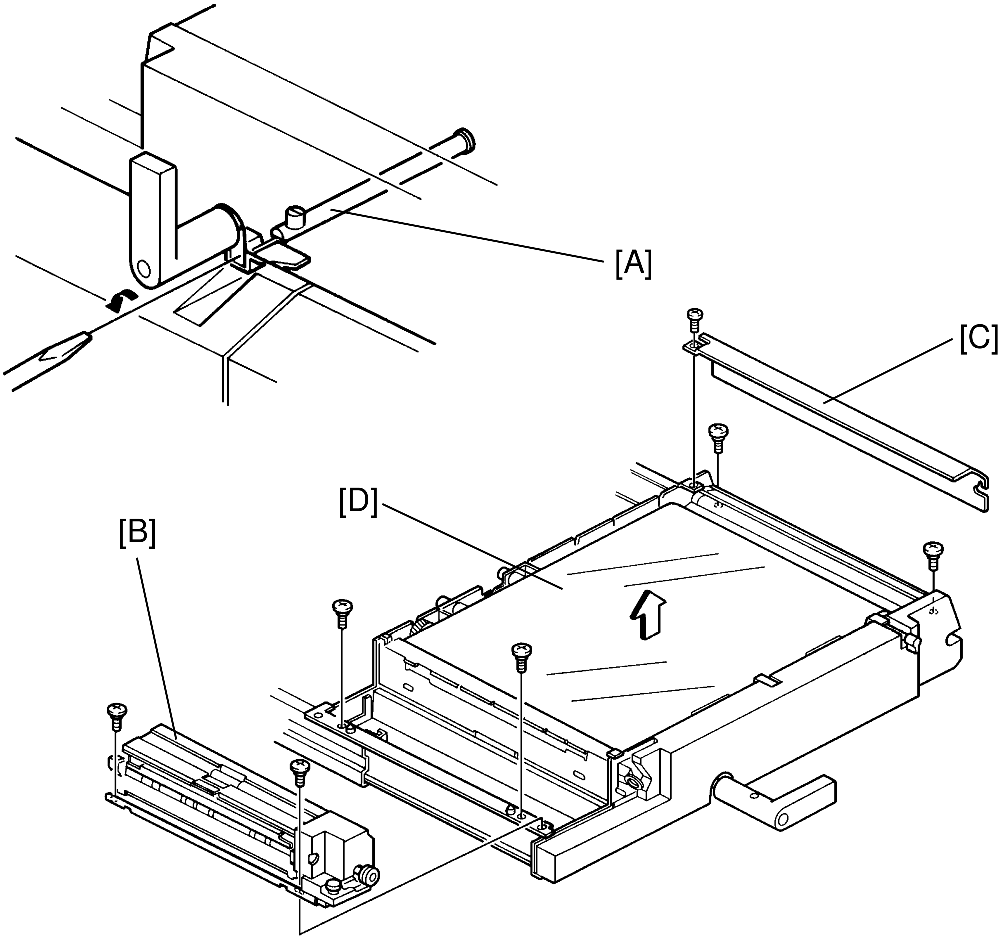
Be careful not to lose the E-rings (clips).

1. Remove the toner tank (see Toner Tank Removal).
2. Remove the agitator gear [A] (1 E-ring).
3. Remove 1 E-ring from each agitator shaft.
4. Remove all 4 gears [B] (1 E-ring each).
5. Remove the toner tank front cover [C] (11 screws).
6. Replace the agitators.

11. IMAGE TRANSFER

11.1 TRANSFER UNIT REMOVAL

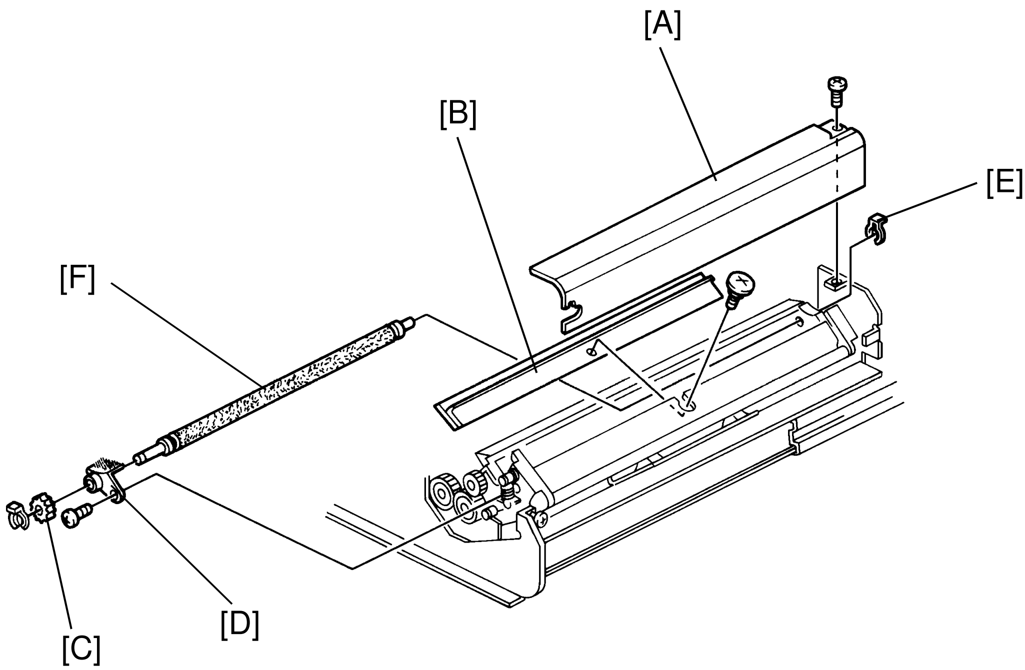
<Model A092 & A105>



1. Turn the transfer unit stopper lever [A] counter-clockwise using a minus screwdriver and pull the unit all the way out.
2. Remove the fusing unit [B] (2 screws) taking care no oil spills from the sump.
3. Remove 1 screw and loosen 1 screw to remove the belt cleaning unit cover [C].
4. Remove the transfer unit [D] (4 screws) and place on newspapers.

11.2 BELT CLEANING BLADE AND BRUSH REPLACEMENT

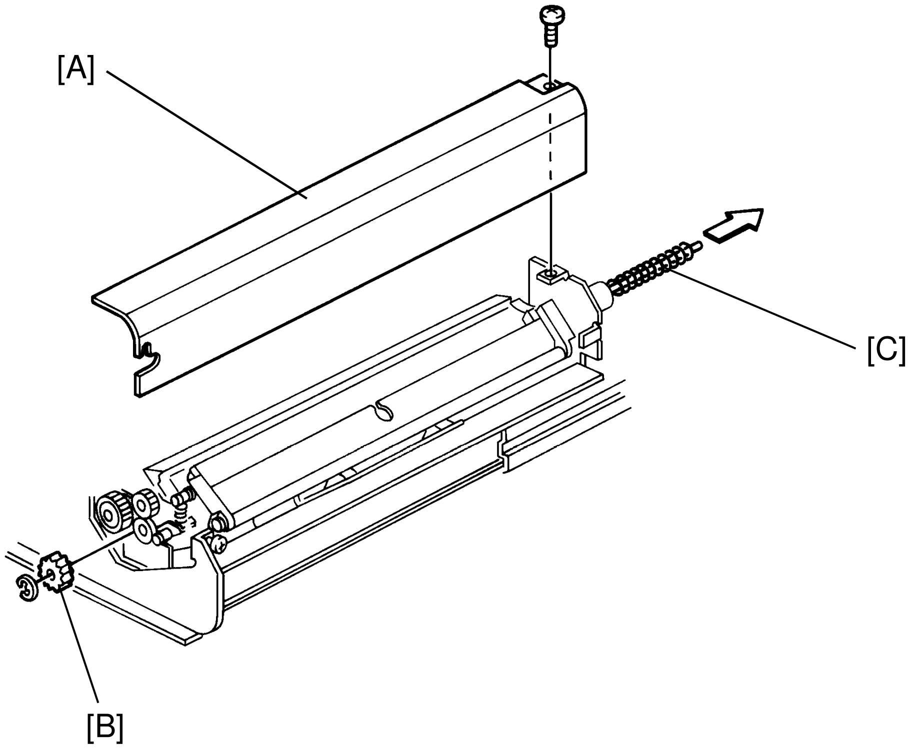
<Model A092 & A105>



1. Turn the transfer unit stopper lever counter-clockwise using a minus screwdriver pull the unit all the way out.
2. Remove 1 screw and loosen 1 screw to remove the belt cleaning unit cover [A].
3. Remove the cleaning blade [B] (1 screw).
4. Remove the transfer unit cover (2 screws).
5. Remove the front snap ring and gear [C].
6. Remove the brush bracket [D] (1 screw).
7. Remove the rear snap ring [E].
8. Slide the brush [F] slightly forward and pull out. Take care to keep the spacing rings from sliding off the brush. Place the brush on paper to avoid dirtying the customer site.
9. When installing the brush, check that the spacing rings roll freely.

11.3 TONER COLLECTION COIL REPLACEMENT

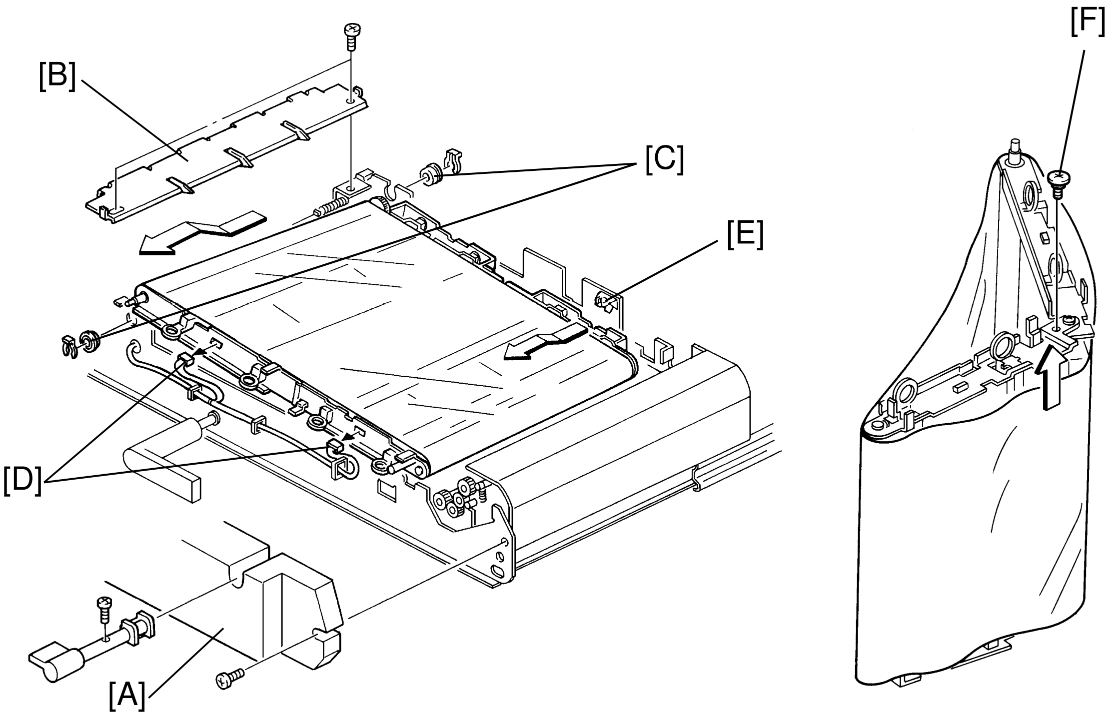
<Model A092 & A105>



1. Remove the transfer unit (see Transfer Unit Removal).
2. Remove the transfer unit cover [A] (2 screws).
3. Remove the E-ring and the gear [B] from the toner collection coil [C].
4. Push the coil shaft from the front side until the other end comes out the back and slowly pull the coil out. Make sure the toner falls on the newspaper and not the floor. Do not dispose of the toner in the sink.

11.4 TRANSFER BELT REPLACEMENT

<Model A092 & A105>



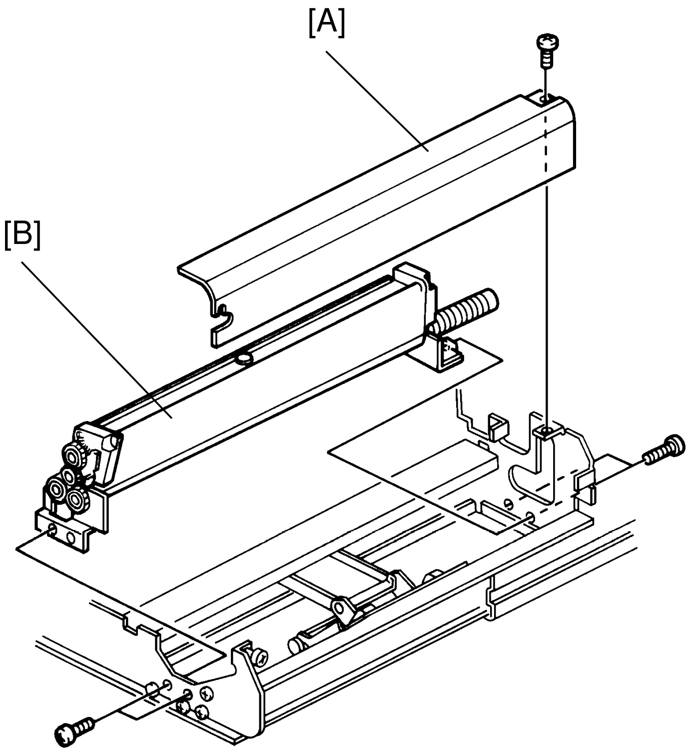
1. Turn the transfer unit stopper lever counter-clockwise using a minus screwdriver to pull the unit all the way out.
2. Remove the transfer unit front cover [A] (2 screws).
3. Remove the pick-off pawl bracket [B] (2 screws).
4. Remove the snap rings and the bearings [C] at each end of the drive roller.
5. Disconnect the two 6 pin connectors [D].
6. Pull the transfer belt assembly up and out. Be careful not to hit the grounding bracket [E].
7. Let the transfer belt assembly rest on its rear edge and remove the lock screw [F].
8. Fold the transfer belt assembly as shown above.
9. Pull the belt off the assembly.
10. When reinstalling the belt locate the arrow on it, and install the belt so that the arrow is on top of the unit and points to the belt moving direction.

CAUTION: Make sure that the transfer belt's rubber linings are not caught in the rollers.

Replacement Adjustment

11.5 BELT CLEANING UNIT REMOVAL

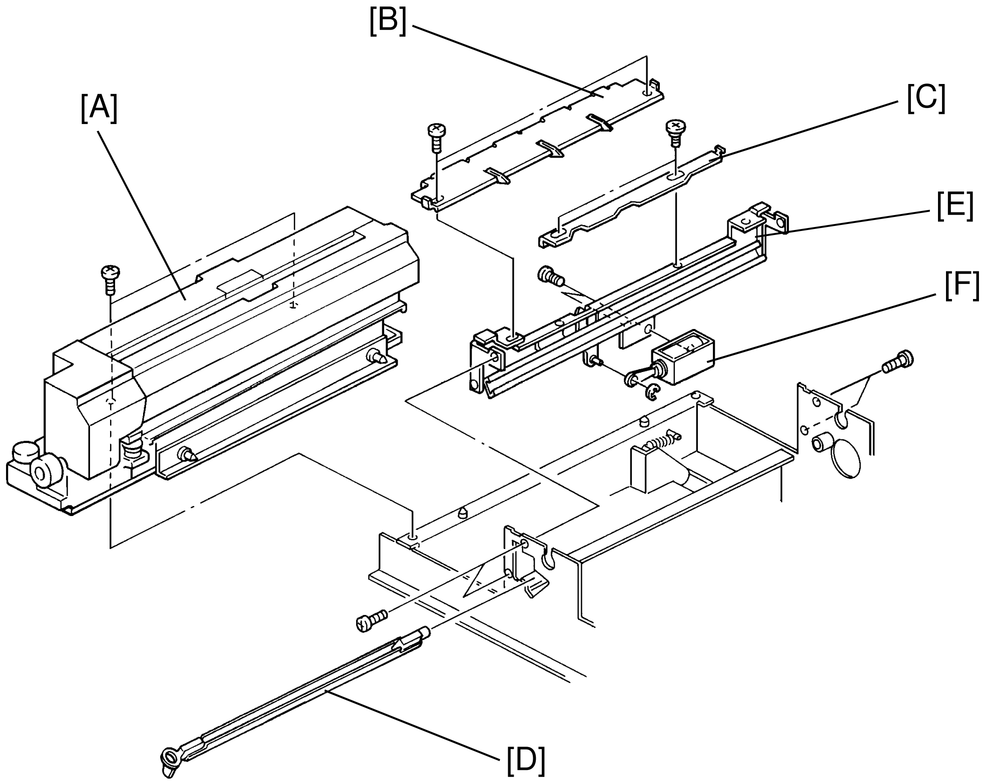
<Model A092 & A105>



1. Remove the transfer unit (see Transfer Unit Removal).
2. Remove the belt cleaning unit cover [A] (2 screws).
3. Remove the cleaning unit [B] (4 screws).

11.6 PICK-OFF PAWL SOLENOID REPLACEMENT

<Model A092 & A105>

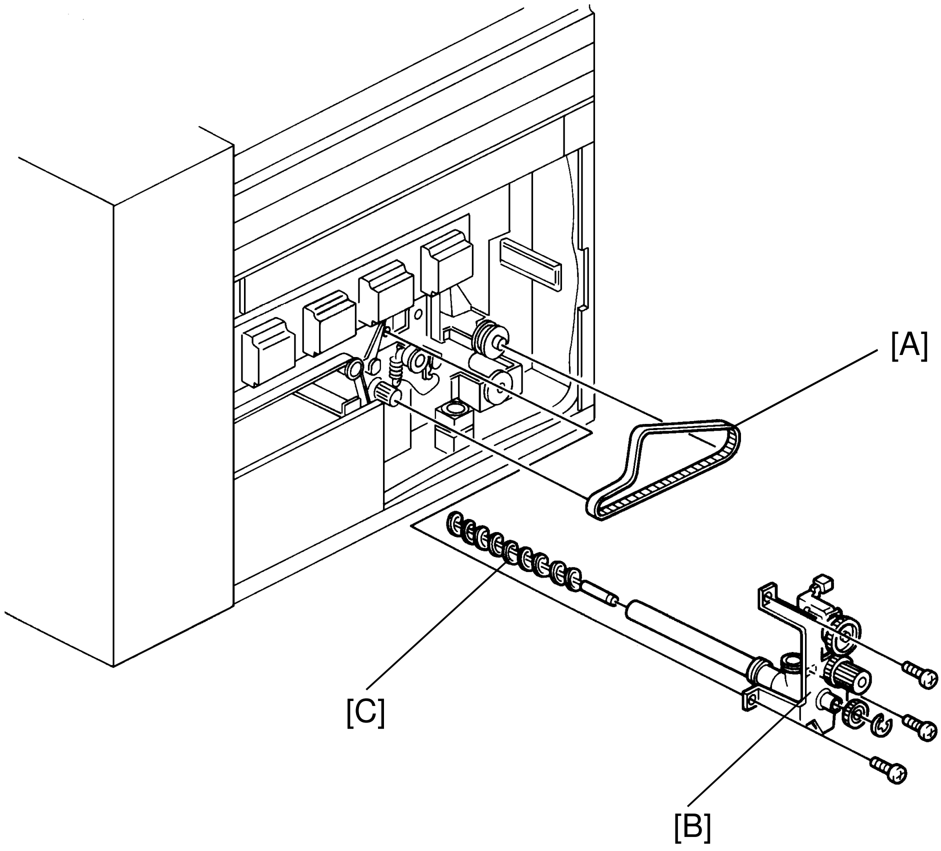


1. Turn the transfer unit stopper lever counterclockwise using a minus screwdriver to pull the unit all the way out.
2. Remove the transfer unit cover (2 screws).
3. Remove the fusing unit [A] from the transfer unit (2 screws).
4. Remove the pick-off pawl bracket [B] (2 screws).
5. Remove the pick-off pawl stopper [C] (2 screws and 1 spring).
6. Pull out the belt quenching corona unit [D] (1 snap ring).
7. Remove the transfer unit side frame [E] (4 screws and 1 connector).
8. Remove the pick-off pawl unit solenoid [F] from the transfer unit side frame (2 screws).

12. CLEANING/TONER COLLECTION SECTION

12.1 TONER COLLECTION COIL REPLACEMENT

<Model A092 & A105>

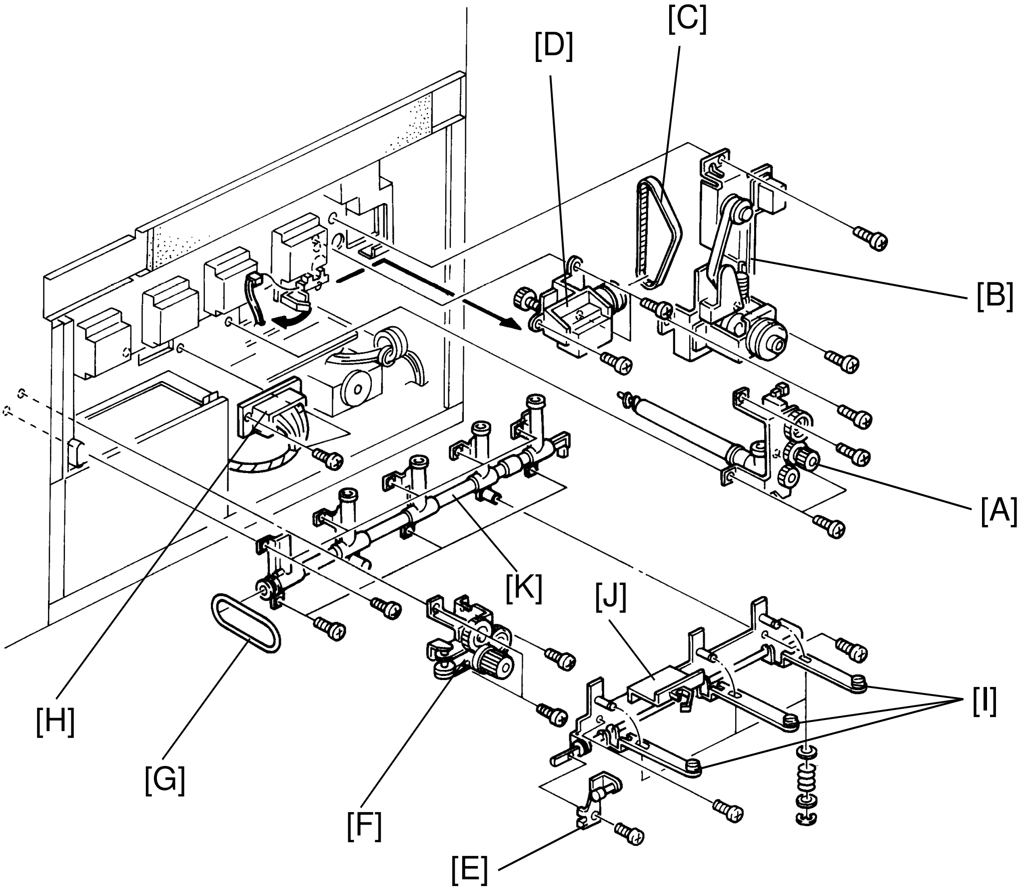


This procedure is very messy. Always work on newspapers or anything else large enough to catch all the toner that will spill out. Take care to keep the customer site clean.
Be careful not to lose the E-rings (clips).

1. Remove the left rear cover (4 screws).
2. Unhook the timing belt tension spring and remove the timing belt [A].
3. Remove the toner collection bracket [B] (3 screws). Place a rag under the unit to prevent toner from spilling on the machine.
4. Remove the toner collection coil [C] (1 E-ring).

12.2 TONER TRANSPORT COIL

<Model A092 & A105>



1. Open the front doors and pull the transfer unit out about 20 centimeters.
2. Remove the left rear cover (4 screws).
3. Remove the toner collection coil ass'y [A] (see Toner Collection Coil Replacement).
4. Unhook the main timing belt spring and release the belt from the gears.
5. Remove the harness from the clamp and remove the drive bracket [B] (4 screws).
6. Remove the belt drive timing belt [C].
7. Remove the transfer belt drive gear [D] by sliding it to the right (3 screws).
8. Remove the cam lever bracket [E] (1 screw).
9. Remove the toner transport coil drive bracket [F] (3 screws) along with the coil rubber belt [G].

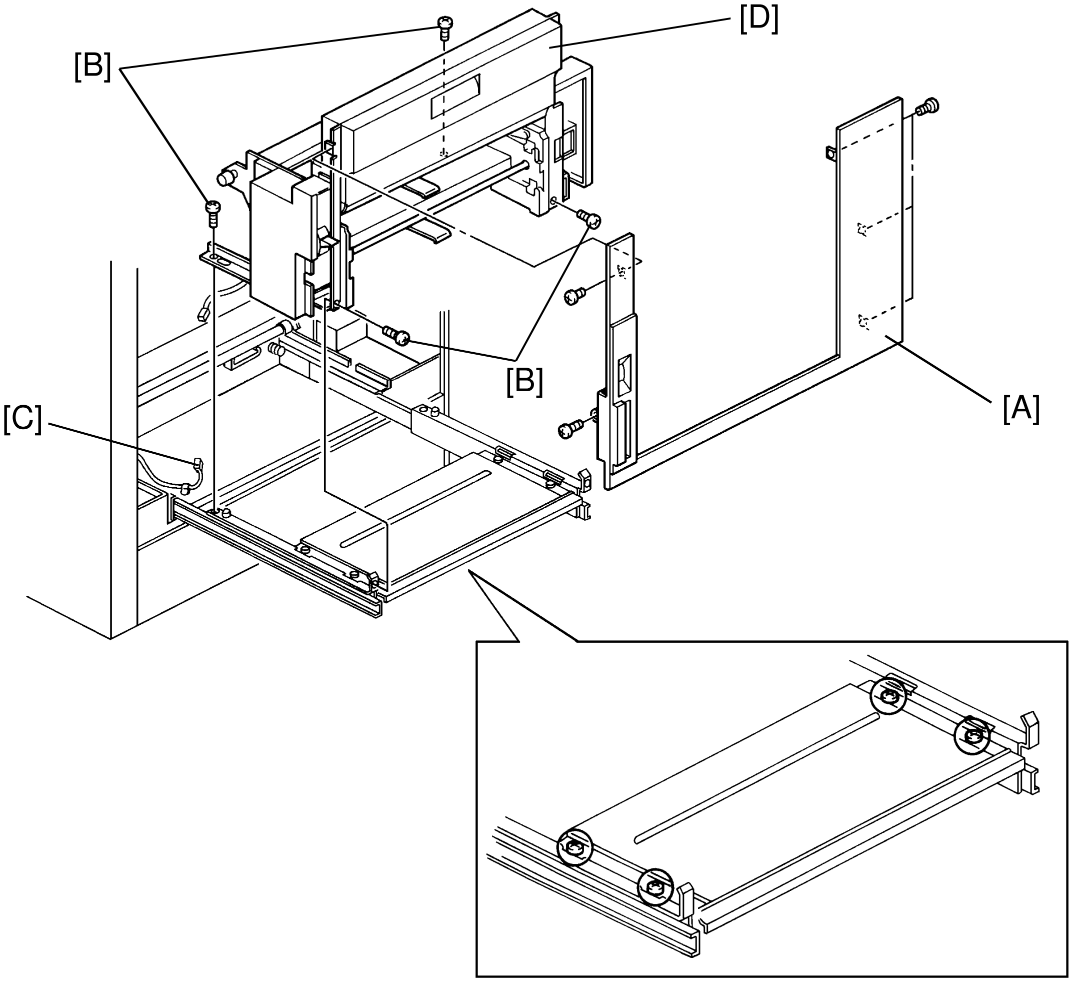
10. Remove the transfer unit connector [H] (2 spring screws).
11. Lay three pipe knock levers down [I] (1 E-ring, 1 spring and 2 washers each).
12. Remove the pipe knock ass’y [J] (2 screws).
13. Make sure the rag is in place under the toner transport unit opening and remove 8 screws from the unit.
14. Gently remove the toner transport unit [K].

    NOTE: Be careful not damage the toner overflow sensor.
15. Remove toner transport coil pulley (1 E-ring).
16. Remove the two end-caps and pull the coil out.

13. PAPER FEED SECTION

13.1 PAPER FEED UNIT REPLACEMENT

<Model A092 & A105>

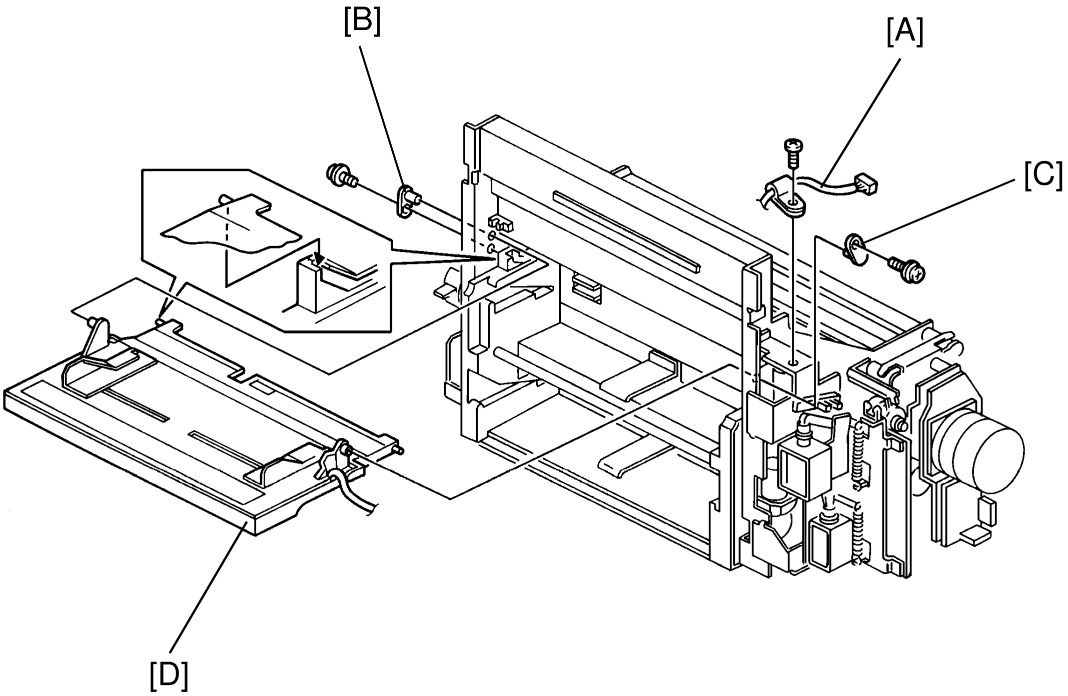


1. Pull the paper feed unit out and remove the lower side cover [A] (5 screws).
2. Remove 4 screws [B] linking the unit to the guide rails.
3. Disconnect the ground connector [C], and remove its harness from the clamp. Remove the paper feed unit [D].

CAUTION: Do not remove any of the 4 screws of the paper feed unit support table as shown in the outlined figure above.

13.2 BY-PASS FEED TABLE REPLACEMENT

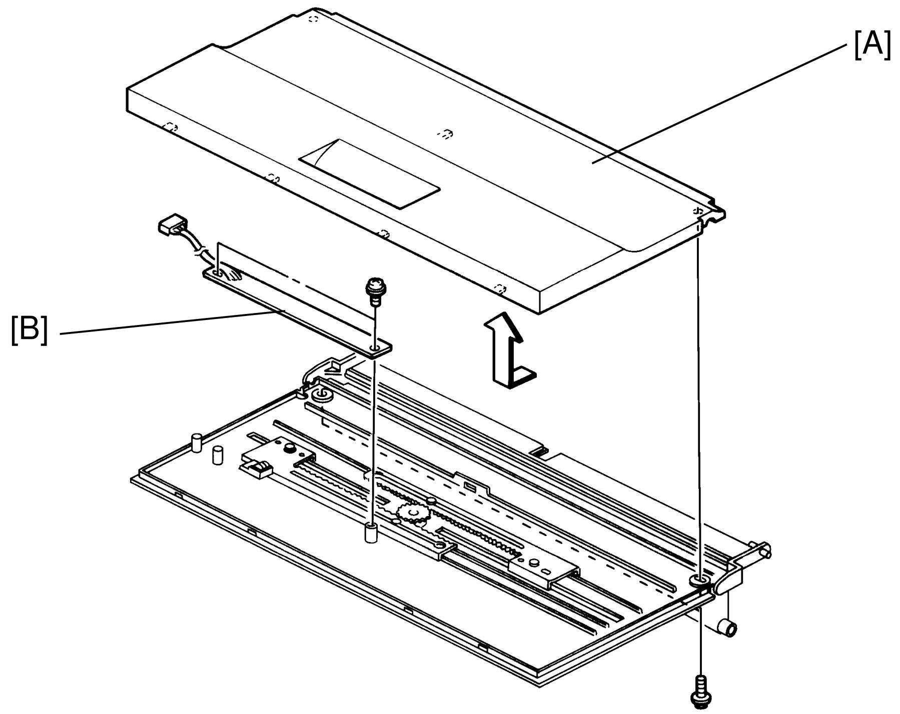
<Model A092 & A105>



1. Pull the paper feed unit out and remove the lower side cover (5 screws).
2. Remove the paper feed unit side covers (front side, 4 screws; rear side, 3 screws).
3. Remove the size detection harness [A] from its two clamps (1 screw) and disconnect the size detection connector.
4. Remove the front and rear stopper pin screws, and remove the front stopper pin [B] by pushing it out from the inside. The rear stopper pin [C] can not be removed.
5. Remove the by-pass feed table [D] by bending in slightly the rear table support.
6. When reinstalling the table, first slide the paper guide plate into the slots then make the rear table support fit over the rear stopper pin, then insert the front stopper pin into the front table support, and put back the stopper pin screws.

13.3 PAPER SIZE SENSOR BOARD REPLACEMENT (By-pass Feed Table)

<Model A092 & A105>

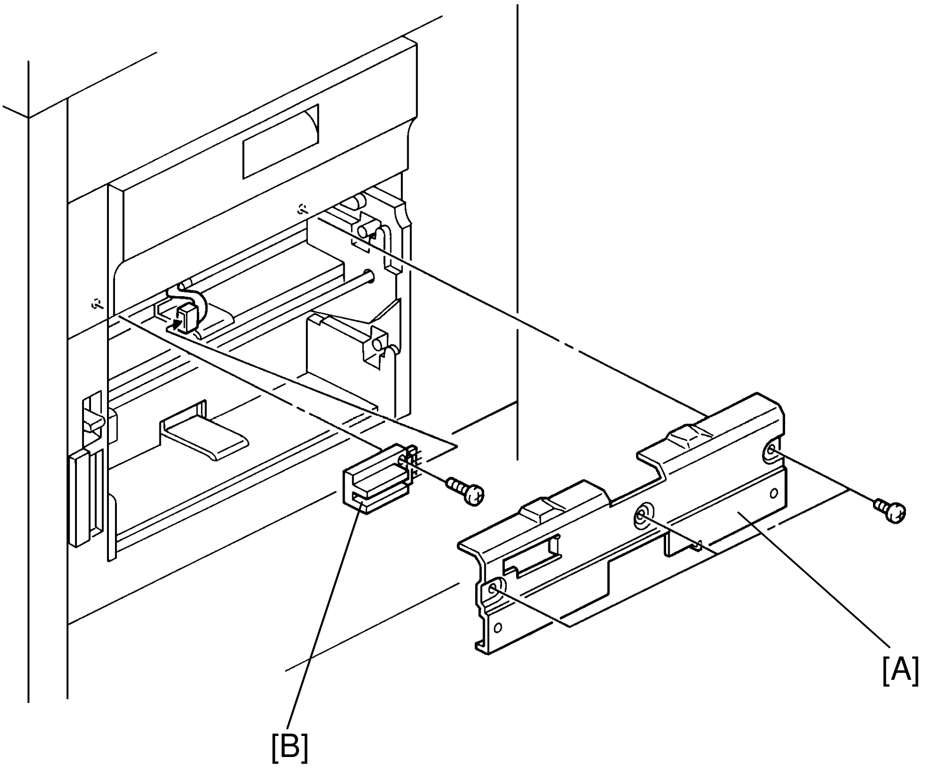


Replacement Adjustment

1. Remove the by-pass feed table (see By-pass Feed Table Replacement).
2. Remove the two screws from the by-pass feed table cover [A].
3. Turn the feed table over and pull the cover off (see illustration).
4. Remove the sensor board [B] (2 screws, 1 harness clamp).
5. When reassembling the table, make sure that the metal part of the paper guide plate faces down when installed on the copier.

13.4 PAPER SIZE SENSOR REPLACEMENT (Cassette)

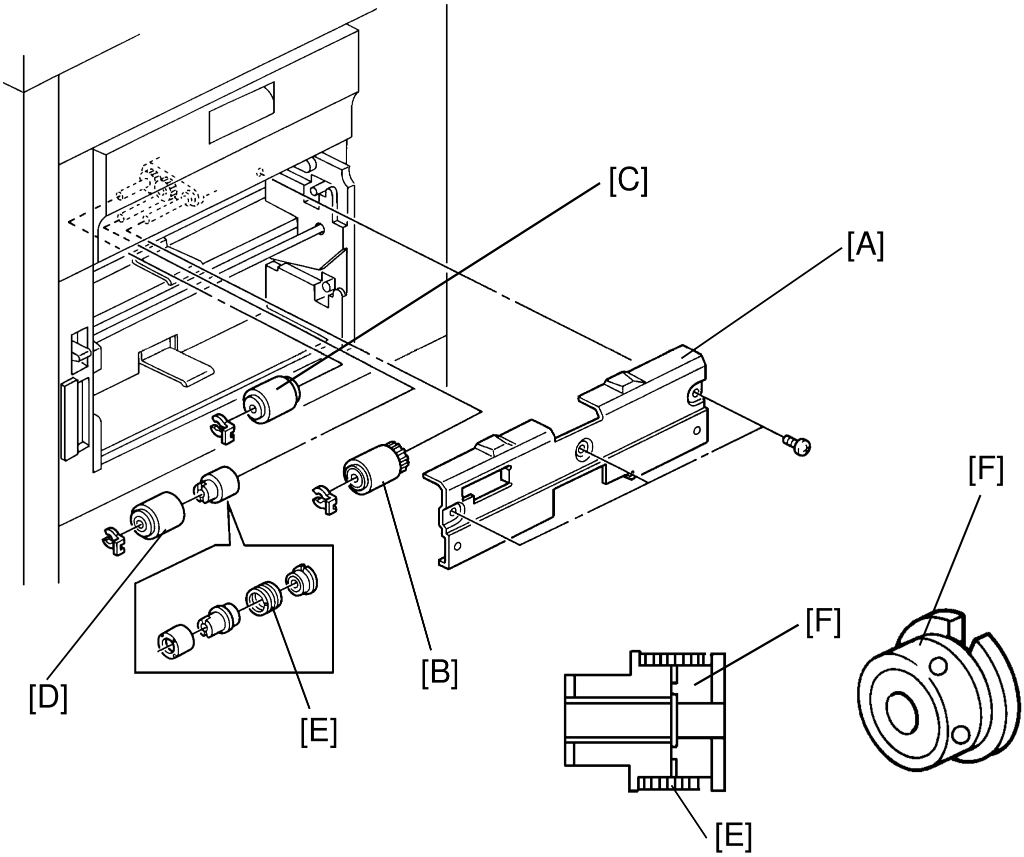
<Model A092 & A105>



1. Remove the cassette and the feed-in roller cover [A] (3 screws).
2. Remove the size sensor [B] (1 screw and 1 connector).

13.5 PICK-UP, PAPER FEED, AND REVERSE ROLLER REPLACEMENTS

<Model A092 & A105>



1. Remove the cassette and the feed-in roller cover [A] (3 screws).
2. Remove the pick-up roller [B] from its shaft (1 snap ring), be careful not to damage the paper end actuator.
3. Remove the paper feed roller [C] from its shaft (1 snap ring).
4. Remove the reverse roller [D] from its shaft (1 snap ring).

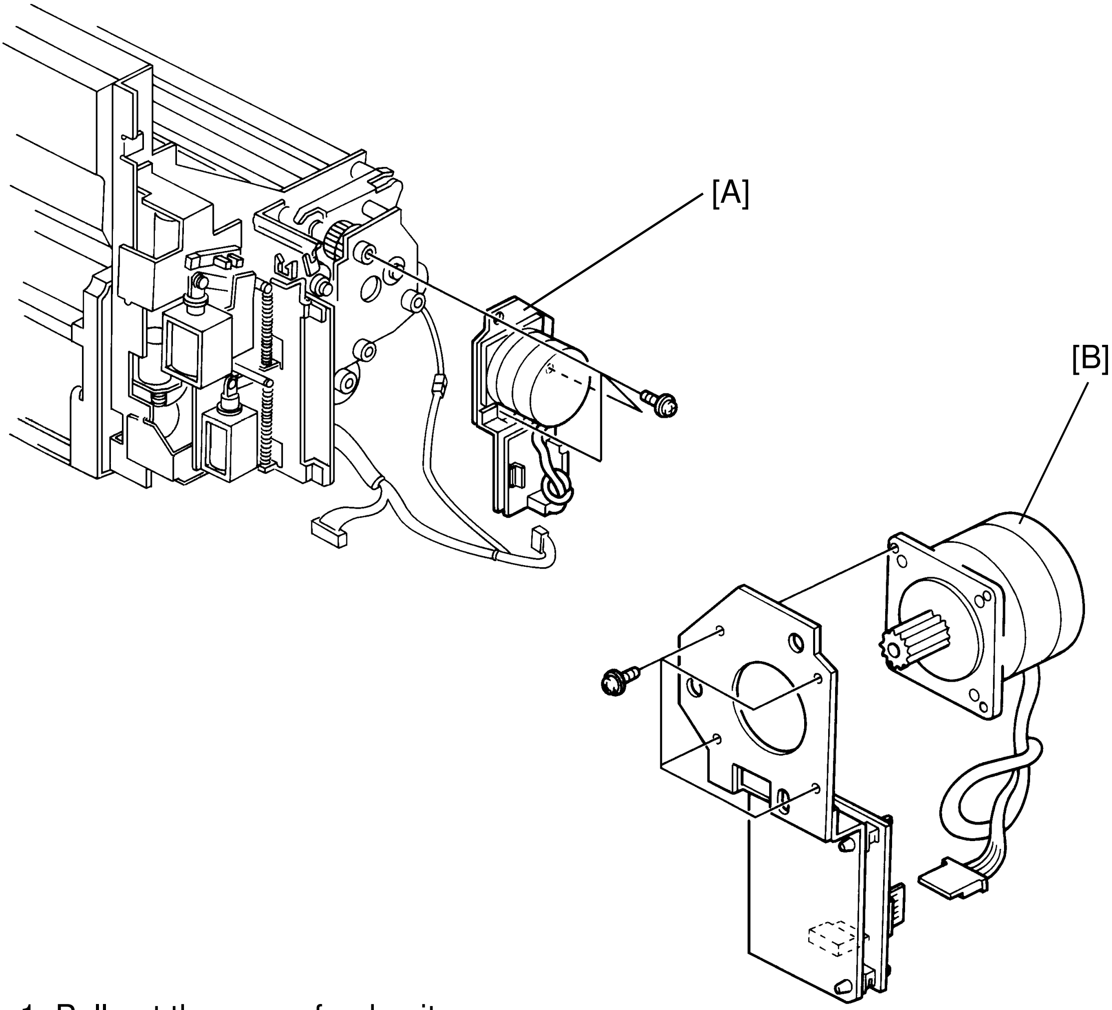
To install:

When handling rollers, try to keep your fingers off the rubber to prevent loss of friction.

1. Clean the rollers with a damp cloth.
2. Clean the clutch spring [E] of the reverse roller.
3. Lubricate the surface of the hub [F] with Mobil Temp. 78.

13.6 PAPER FEED MOTOR REPLACEMENT

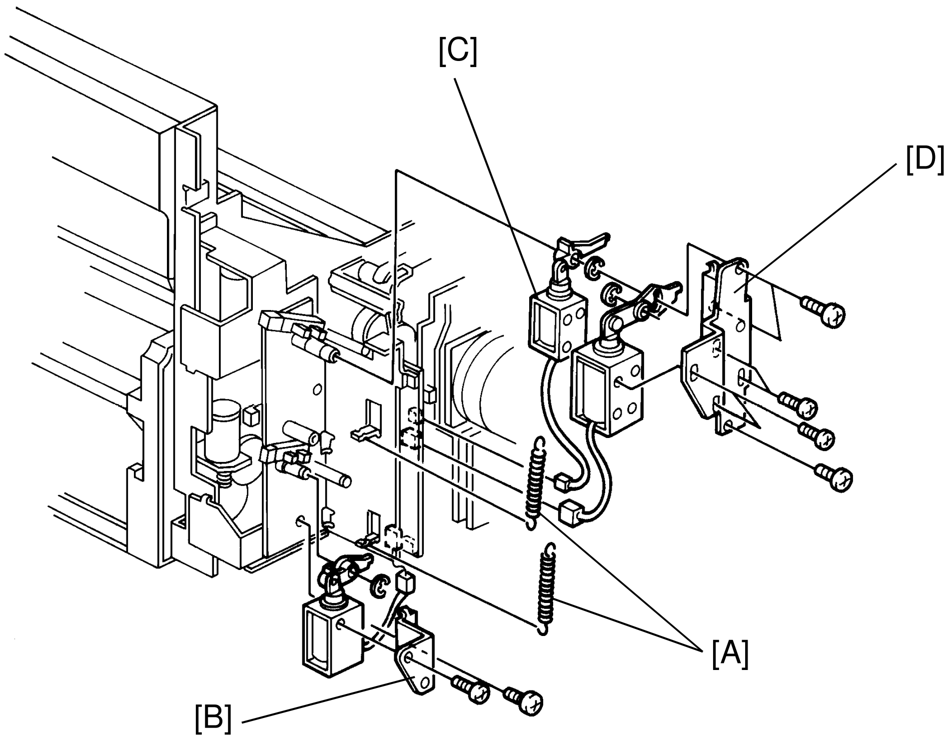
<Model A092 & A105>



1. Pull out the paper feed unit.
2. Remove the lower side cover (5 screws).
3. Remove the rear paper feed unit cover (3 screws).
4. Remove the paper feed motor bracket [A] (3 screws).
5. Remove the motor [B] from the bracket (4 screws).

13.7 PICK-UP SOLENOID AND BY-PASS FEED SOLENOID REPLACEMENT

<Model A092 & A105>



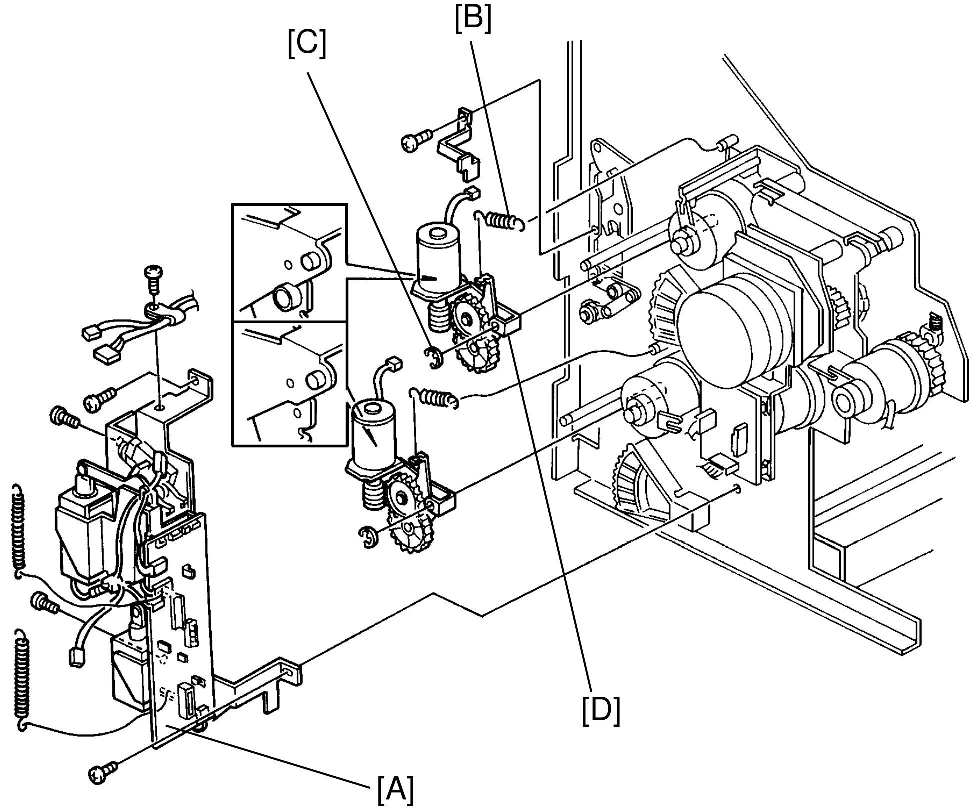
There are two pick-up solenoids and one by-pass solenoid.

By-pass feed solenoid connector:	CN434
Upper pick-up solenoid connector:	CN424
Lower pick-up solenoid connector:	CN421

1. Pull out the paper feed unit.
2. Remove the lower side cover (5 screws).
3. Remove the rear paper feed unit cover (3 screws).
4. Unhook the two solenoid springs [A]. Do not mix up the springs.
5. Remove the lower pick-up solenoid bracket [B] (1 screw and one connector).
6. Remove the by-pass feed solenoid [C] and upper pick-up solenoid bracket [D] (3 screws, 2 connectors, and 1 E-ring).
7. To remove each solenoid from its bracket, remove two screws from the bracket.

13.8 UPPER AND LOWER PAPER LIFT MOTOR REPLACEMENT

<Model A092 & A105>

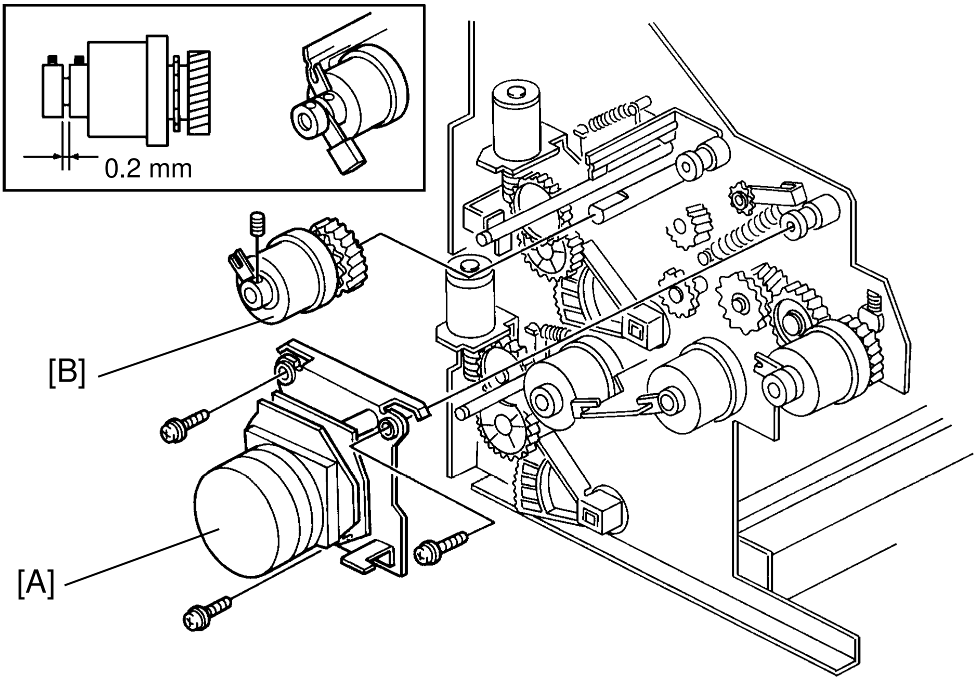


Be careful to distinguish the upper paper lift motor and gear assembly from the lower one. The assembly brackets do not match and are not interchangeable.

1. Pull out the paper feed unit.
2. Remove the lower side cover (5 screws).
3. Remove the rear paper feed unit cover (3 screws).
4. Remove the solenoid and paper feed control board assembly bracket [A] (5 screws, 11 connectors).
5. Remove the spring [B] on the paper lift motor bracket.
6. Remove the E-ring [C] from the paper lift motor bracket.
7. Remove the paper lift sensor actuator (1 screw).
8. Pull out the motor and gear assembly bracket [D].
9. Remove the motor from the bracket (2 screws).

13.9 PAPER FEED CLUTCH REPLACEMENT

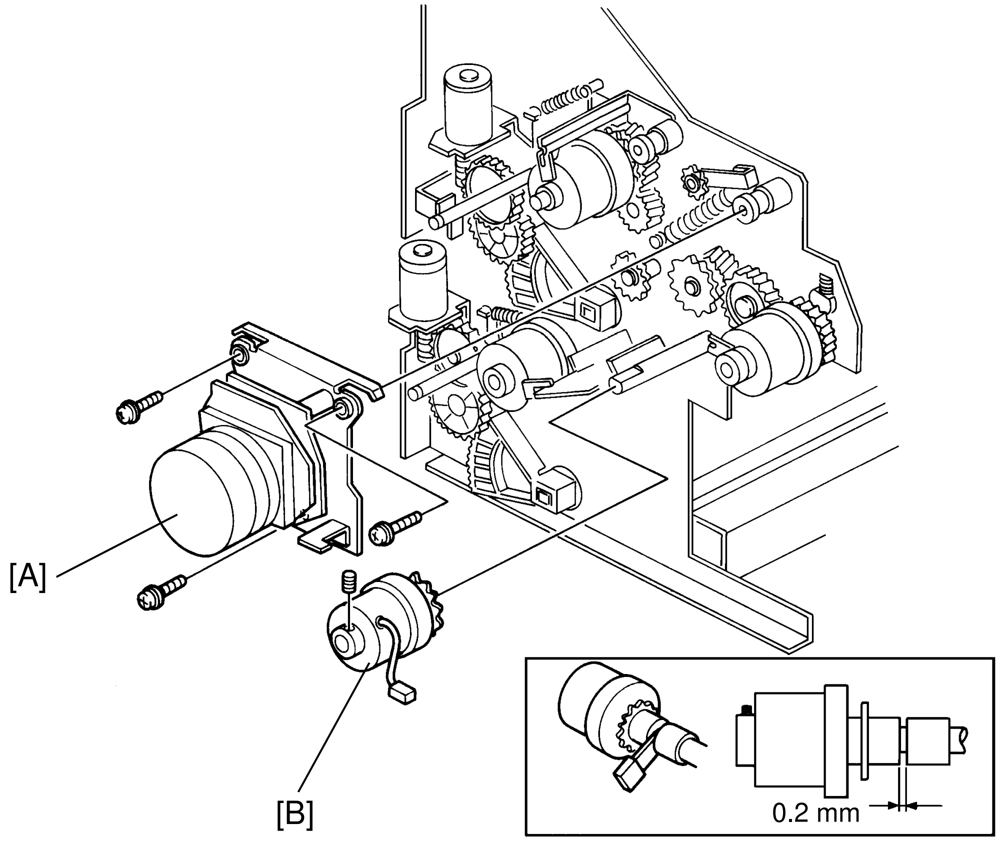
<Model A092 & A105>



1. Pull out the paper feed unit.
2. Remove the lower side cover (5 screws).
3. Remove the rear paper feed unit cover (3 screws).
4. Disconnect the paper feed motor connector and another connector whose harness passes over the motor.
5. Remove the paper feed motor assembly [A] (3 screws).
6. Remove the clutch [B]. The clutch might get stuck, so try sliding it along its shaft.
7. When reinstalling the paper feed clutch, remember to adjust the gap. Insert the 0.2 millimeter spacer into the gap, as shown in the illustration.
8. With the spacer in place, push the clutch in, and screw on the Allen screw.

13.10 RELAY ROLLER CLUTCH REPLACEMENT

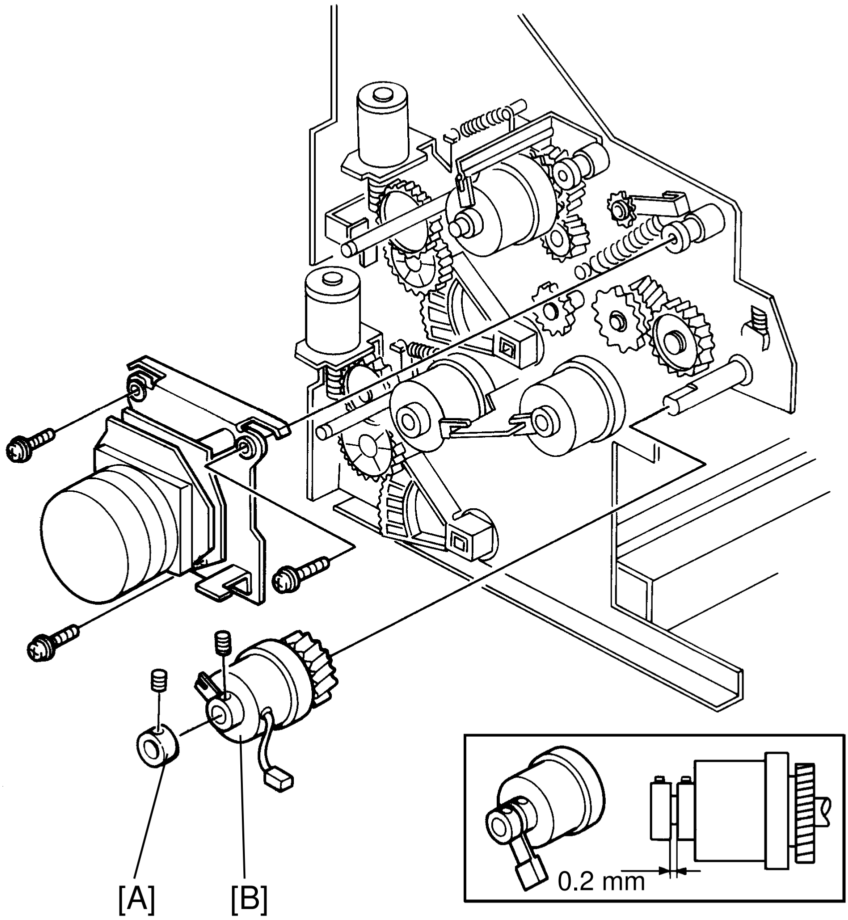
<Model A092 & A105>



1. Pull out the paper feed unit.
2. Remove the lower side cover (5 screws).
3. Remove the rear paper feed unit cover (3 screws).
4. Disconnect the paper feed motor connector and another connector whose harness passes over the motor.
5. Remove the paper feed motor assembly [A] (3 screws).
6. Remove the relay roller clutch [B] (1 Allen screw, 1 connector).
7. When reinstalling the relay roller clutch, remember to adjust the gap. Insert the 0.2 millimeter spacer into the gap, as shown in the illustration.
8. With the spacer in place, push the clutch in, and screw on the Allen screw.

13.11 REGISTRATION CLUTCH REPLACEMENT

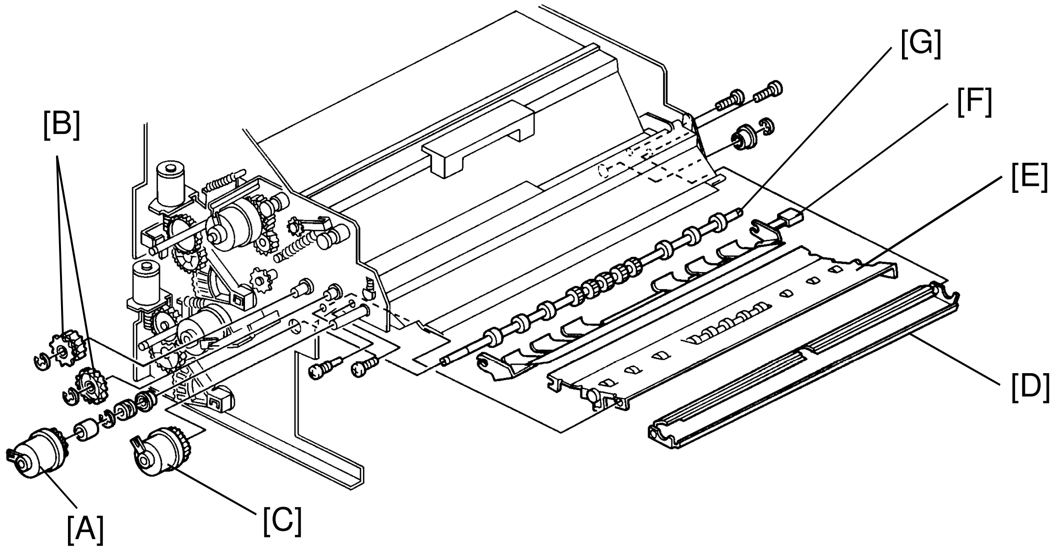
<Model A092 & A105>



1. Follow the relay roller clutch replacement procedure, steps 1 to 5 (see Relay Roller Clutch Replacement).
2. Remove the registration clutch collar [A] (1 Allen screw).
3. Remove the registration clutch [B] (1 Allen screw).
4. When reinstalling the clutch and the collar, adjust the gap between them using a 0.2 millimeter spacer. Insert the spacer in the gap, and tighten the Allen screw as you push on the ring as in the figure above.

13.12 RELAY ROLLER REPLACEMENT

<Model A092 & A105>

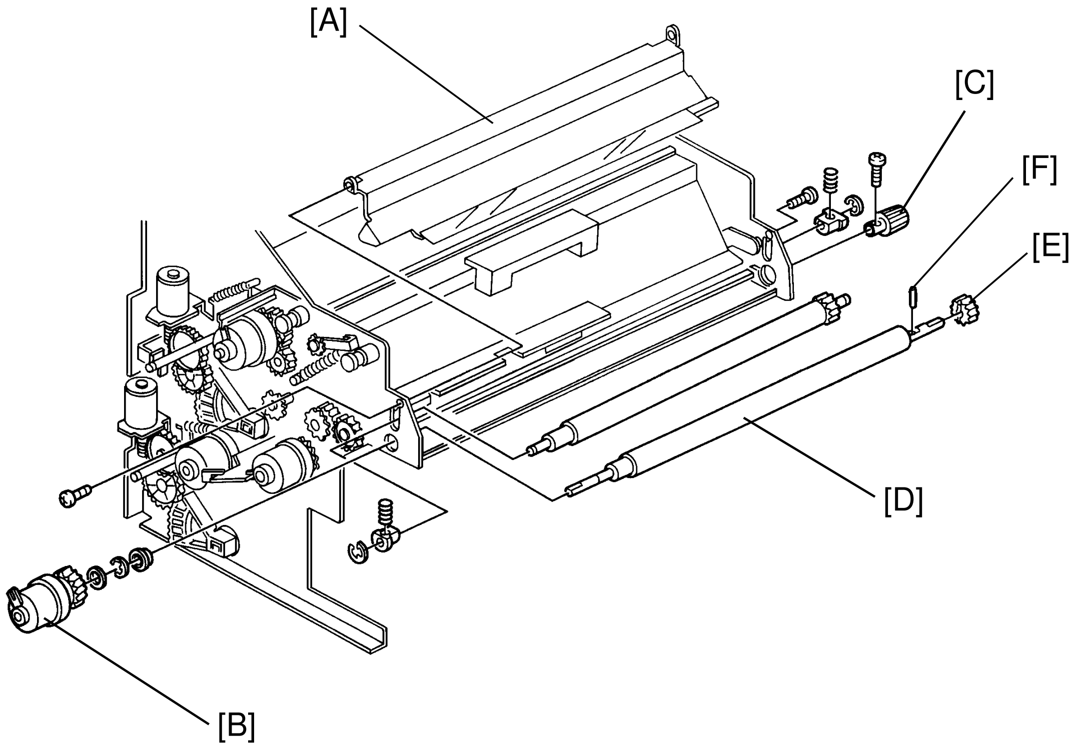


1. Follow the relay roller clutch replacement procedure, step 1 to 5.
2. Remove the front paper feed unit cover (5 screws).
3. Disconnect the registration sensor connector.
4. Remove the gear bracket spring.

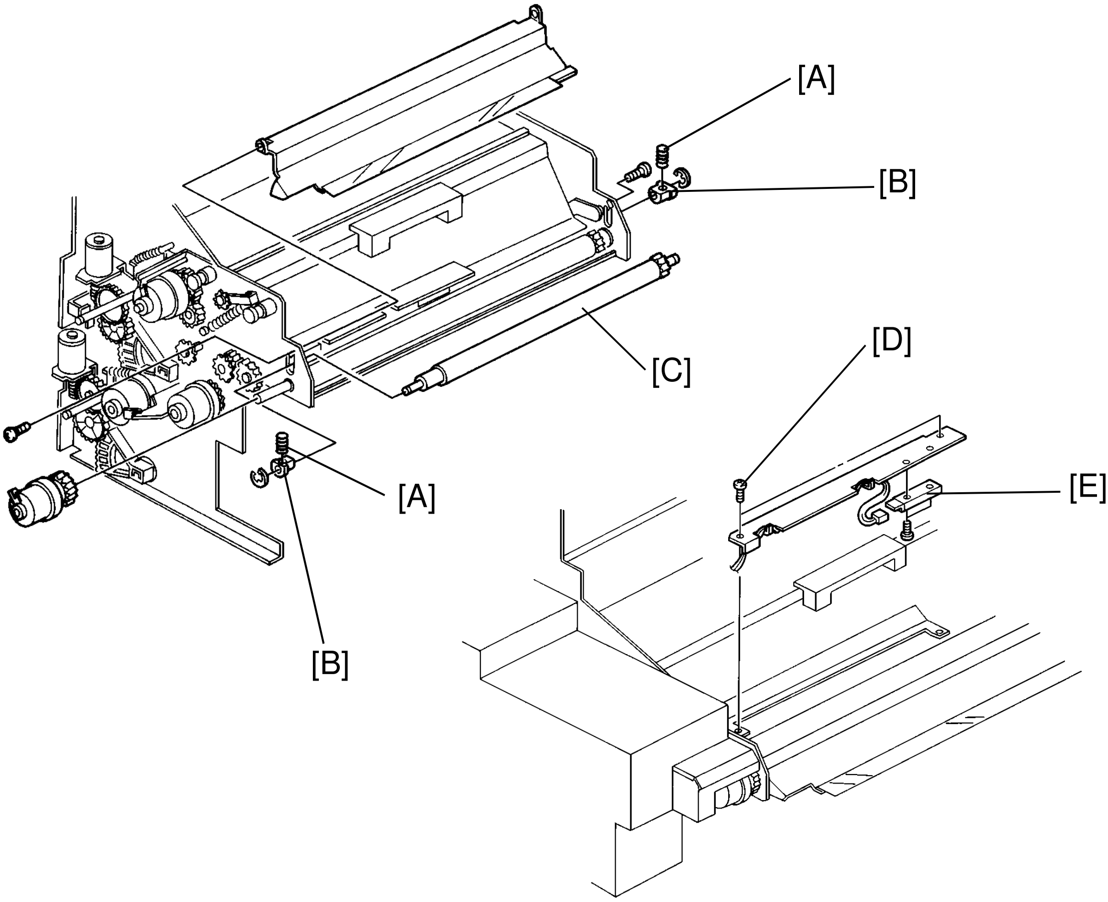
   NOTE: Before removing any gear from the chain, memorize the chain path so that you will be able to reinstall it quickly.
5. Remove the paper feed motor bracket (3 screws, 1 connectors). Turn the bracket out of the chain as you pull it toward you.
6. Remove the relay roller clutch [A], gear, and ring (1 Allen screw, 1 connector).
7. Remove the registration gear and the idle gear [B] (1 E-ring each).
8. Remove the registration clutch [C] and ring (1 Allen screw each, 1 connector). Pull off the gear behind the clutch (no screws).
9. Remove the registration bottom plate [D] (2 screws).
10. Remove the relay transfer guide plate [E] (1 ordinary screw at the front, and one rubber coated screw at the rear).
11. Remove the relay roller E-rings and bearings at the front and rear. Do not lose the black rings that go in between the E-rings and the bearings.
12. Remove the upper transfer guide plate [F] and the relay roller [G]. Be careful not to damage the mylar on the transfer guide plate.

13.13 LOWER REGISTRATION ROLLER AND REPLACEMENT

<Model A092 & A105>



1. Follow the relay roller clutch replacement procedure, step 1 to 5.
2. Remove the front paper feed unit cover (5 screws).
3. Remove the registration guide upper plate [A] (4 screws).
4. Remove the registration clutch [B] and ring (1 Allen screw each, 1 connector). Pull off the gear behind the clutch (no screws).
5. Remove the registration knob [C] (1 screw).
6. Remove the E-rings and bearings on each side of the roller.
7. Remove the lower registration roller [D].
8. Remove the lower registration roller gear [E] (1 E-ring) from the roller. Be careful not to lose the gear lock pin [F], and not to damage the mylars.



13.14 UPPER REGISTRATION ROLLER REPLACEMENT

<Model A092 & A105>

1. Follow the Lower Registration Roller Replacement Procedure, step 1 to 4.
2. Remove the pressure springs [A] from each end of the upper registration roller bushings.
3. Remove the E-rings and the bushings [B] from each end of the roller.
4. Remove the upper registration roller [C].

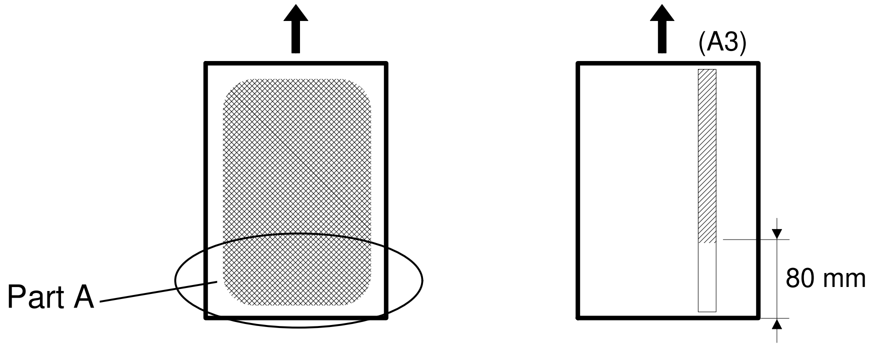
13.15 REGISTRATION SENSOR REPLACEMENT

<Model A092 & A105>

1. Pull out the paper feed unit.
2. Remove the two screws [D] from the registration sensor bracket. Pull the bracket off the registration plate. Don’t pull on the harness.
3. Remove the sensor [E] (2 screws, 1 connector).

13.16 PAPER FEED UNIT POSITIONING ADJUSTMENT

<Model A092 & A105>



Perform "PAPER FEED UNIT POSITIONING ADJUSTMENT" when the following phenomenon occurs on the copy image.

- The tone of the color image in part A is different from the other area.

  Example: When making solid gray copy, the color of the parts is like a bluish gray. The other area is stand gray.

1. Set SPD's as follows:
   - SPD51 to 5 (1 vertical line for every four sub scan: 3rd LD power)
   - SPD52 to 3 (color pattern full length)
2. Make three A3 size copies.
3. Check whether the color in part A is different from the other area.
   If the color is different, go to step 4.
   If the color is same, go to step 9.
4. Remove the inner cover [A] (4 screws).
5. Loosen screws [B] and [C].
6. Turn the cam [D] about 10° clockwise and fix the screws [B] and [C].
7. Make two A3 size copies, and confirm the image.
   If the color is different, go back to step 4.
   If the color is same, go to step 8.
8. Put inner cover back.
9. Set SPD's as follows:

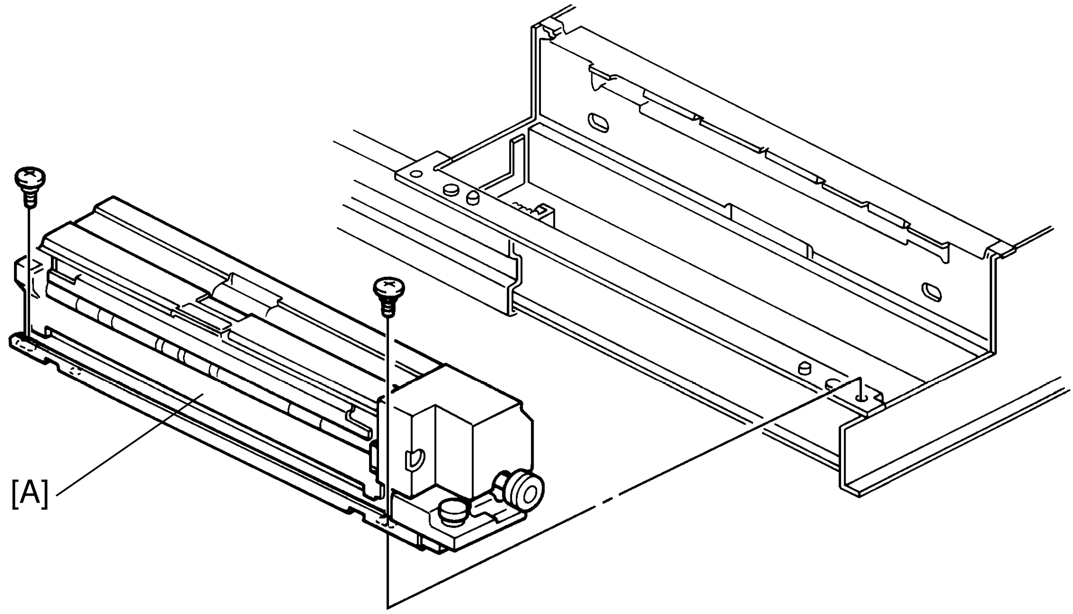
   SPD51 to 0 (color patch: 7th LD power)
   SPD52 to 0 (no pattern)

Replacement Adjustment

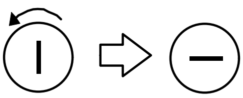
14. FUSING

14.1 FUSING UNIT REMOVAL

<Model A092 & A105>

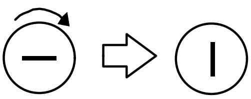


1. Turn the stopper screw counterclockwise, and pull out the transfer belt unit.



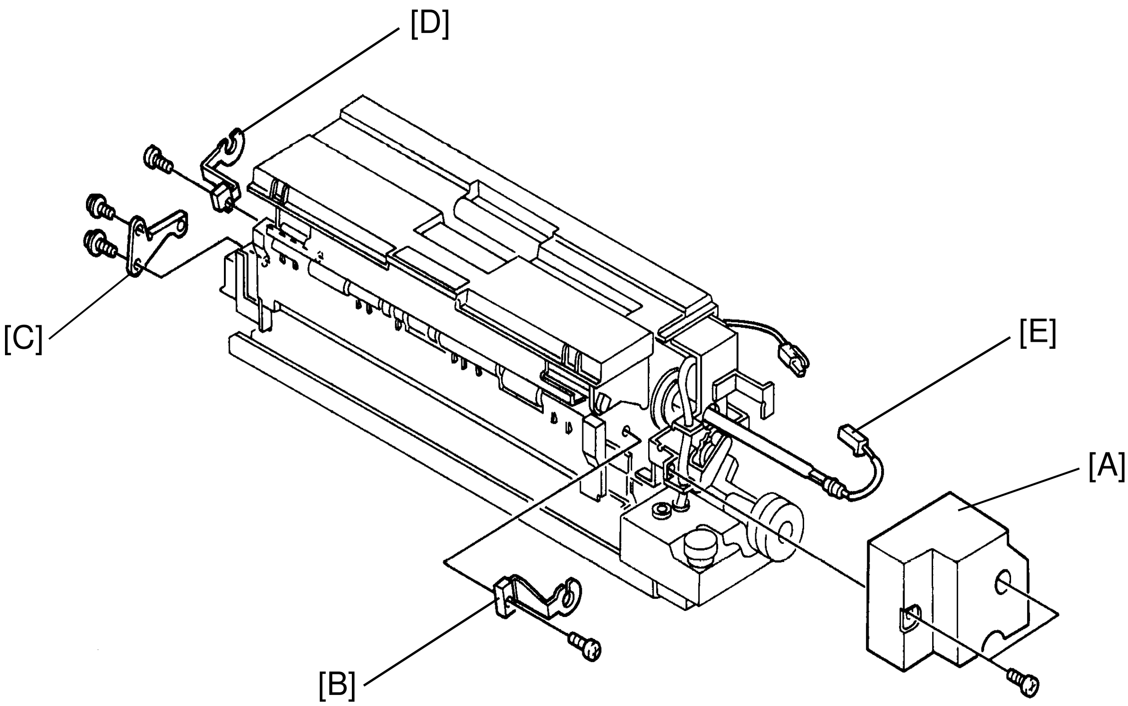
2. Remove the fusing unit [A] (two M4 x 6 screws).

CAUTION: After servicing, turn the stopper screw clockwise.



14.2 FUSING HEATER REPLACEMENT

<Model A092 & A105>

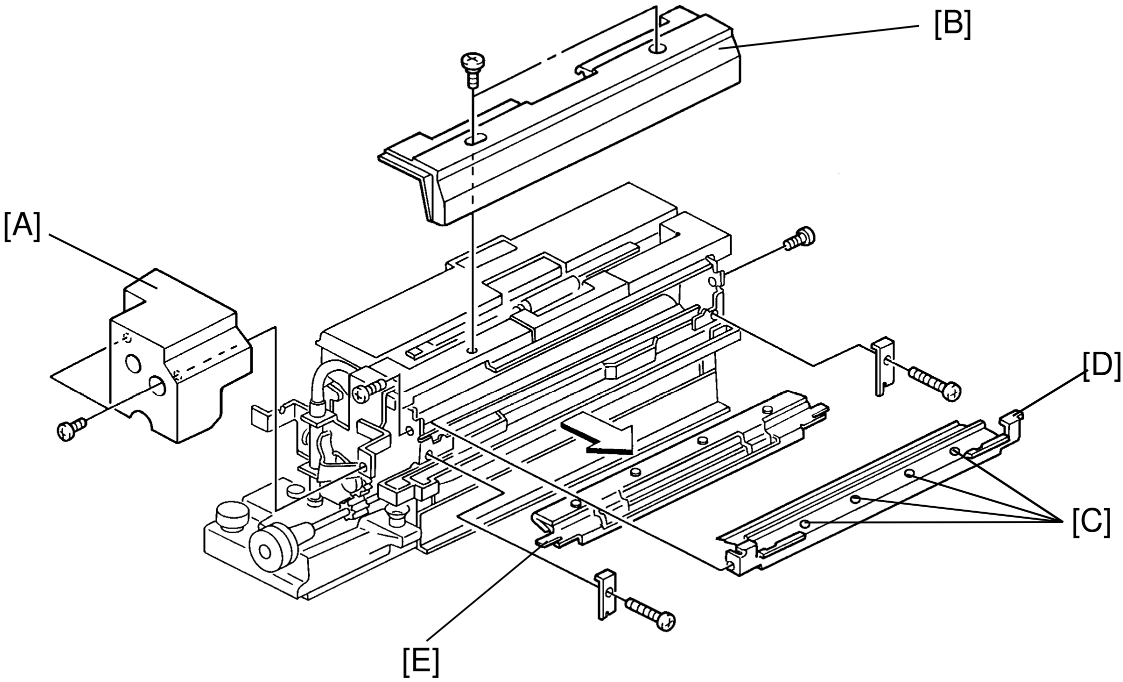


1. Remove the cover [A] (two M4 x 8 screws).
2. Remove the holder [B] (one M4 x 8 screw).
3. Remove the bracket [C] .
   (one M4 x 6 screw and one M6 x 12 screw for model A092)
   (one M4 x 8 screw and one M6 x 16 screw for model A105)
4. Remove the holder [D] (one M4 x 8 screw).
5. Disconnect both sides of the fusing lamp [E], and remove it.

CAUTION: Do not touch the fusing lamp with oily fingers because oil marks may damage the lamp.

14.3 OIL SUPPLY PAD REPLACEMENT

<Model A092 & A105>

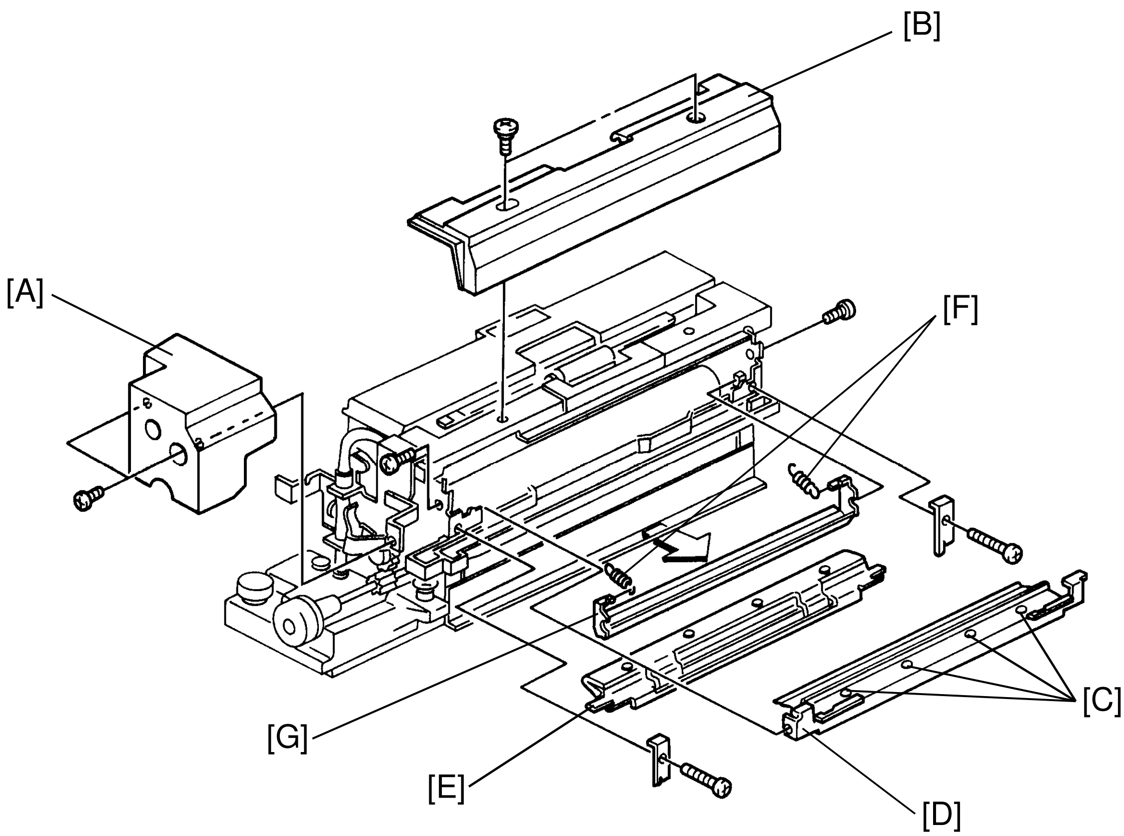


1. Remove the cover [A] (two M4 x 8 screws).
2. Remove the cover [B] (2 stepped screws).
3. Loosen the 4 screws [C] fixing the pressure plate.
4. Remove the bracket with the pressure plate [D] (two M4 x 6 screws).
5. Remove the oil supply pad [E] (two M4 x 12 screws).

CAUTION: After re-assembling the bracket with the pressure plate [D], retighten the 4 screws loosened in step 3.

14.4 FUSING CLEANING BLADE REPLACEMENT

<Model A092 & A105>

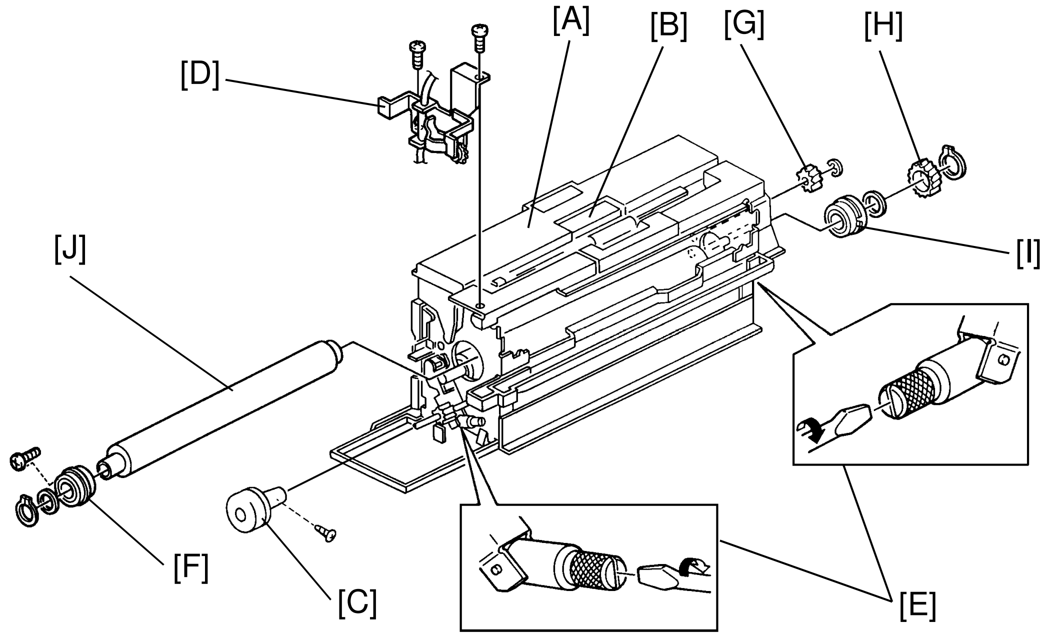


1. Remove the cover [A] (two M4 x 8 screws).
2. Remove the cover [B] (2 stepped screws).
3. Loosen the 4 screws [C] fixing the pressure plate for the oil supply pad.
4. Remove the bracket with the pressure plate [D] (two M4 x 6 screws).
5. Remove the oil supply pad [E] (two M4 x 12 screws).
6. Remove 2 springs [F].
7. Remove the fusing cleaning blade [G].

CAUTION: Do NOT scratch the fusing cleaning blade edge, otherwise oil lines may appear on the copy. If toner sticks to the rollers, remove it using a soft cloth.

14.5 HOT ROLLER REPLACEMENT

<Model A092 & A105>

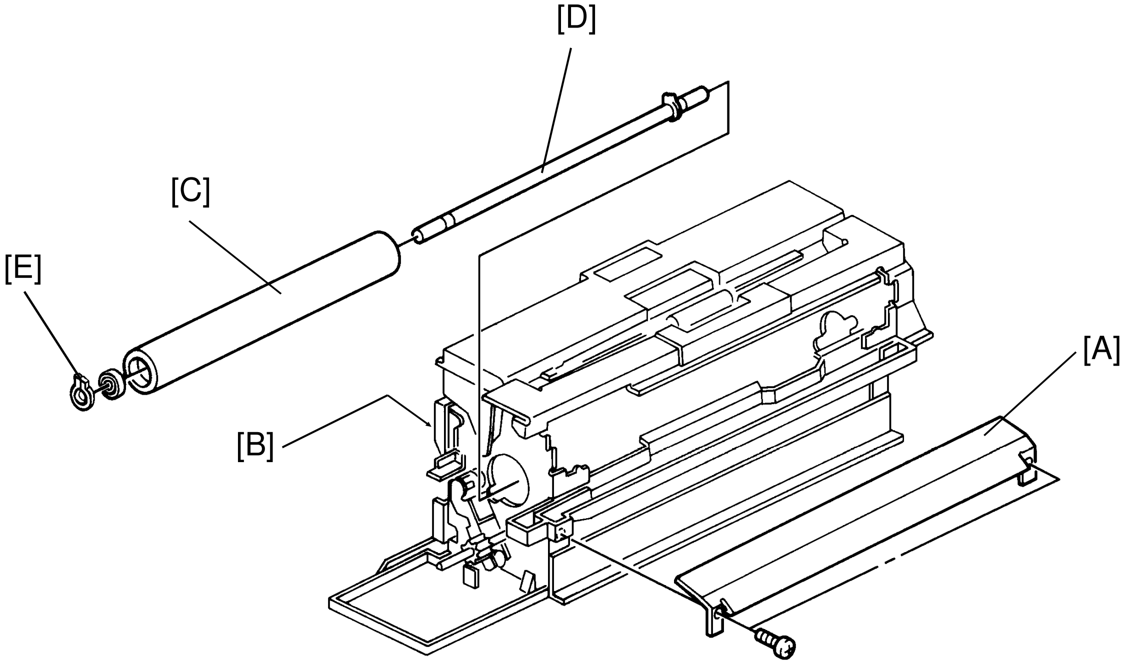


1. Remove the fusing heater (see fusing heater replacement).
2. Remove the fusing cleaning blade (see fusing cleaning blade replacement).
3. Remove the top cover [A] (two stepped screws).
4. Remove the fusing upper unit [B].
   (two E-rings for model A092)
   (one E-ring which is inner side for model A105)
5. Remove the knob [C] (one M4 x 6 screw).
6. Remove the bracket [D] (two M4 x 6 screws).
7. Turn the ⊖ screws [E] clockwise until they stop. The rollers pressure will be released.
8. Remove the front side bearing and the washer [F] (one M4 x 6 screw, one C-ring).
9. Remove the idle gear [G] (1 E-ring) and a second gear [H] (1 C-ring).
10. Remove the rear side bearing, washer, and collar [I].
11. Remove the hot roller [J] from the front side.

CAUTION: After replacing the hot roller, turn the ⊖ screws [E] counterclockwise until they are just loose.

14.6 PRESSURE ROLLER REPLACEMENT

<Model A092 & A105>

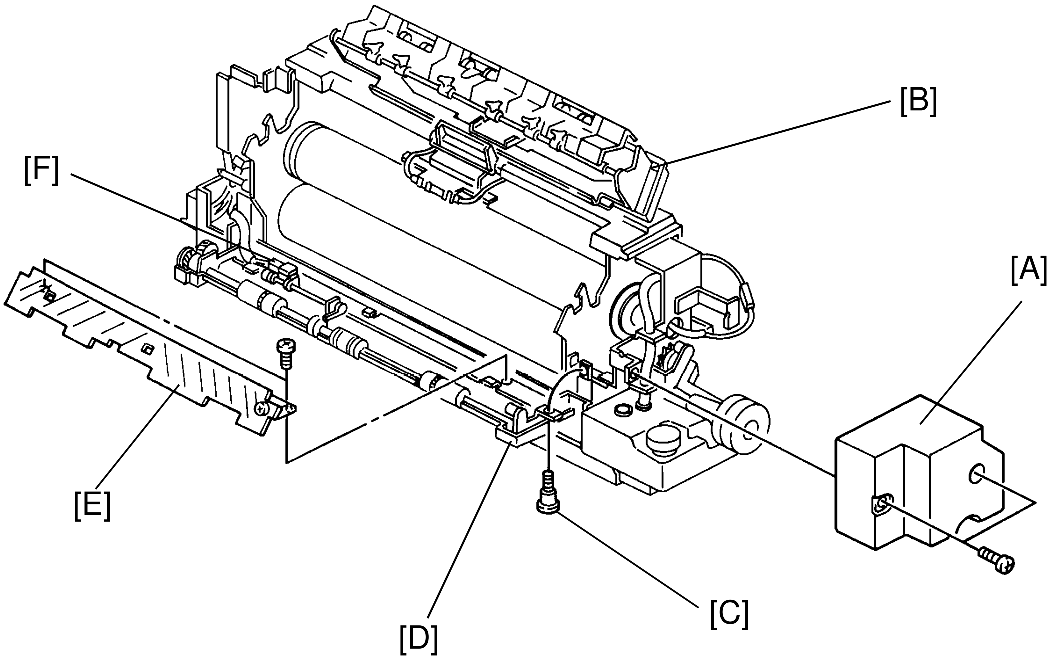


1. Remove the hot roller (see hot roller replacement).
2. Remove the guide plate [A] (2 stepped screws).
3. Open the lower paper exit unit [B] (1 screw). (See 12.7 EXIT SENSOR REPLACEMENT step 3.)
4. Remove the pressure roller [C] with its shaft [D].
5. Remove the C-ring [E] and remove the shaft from the pressure roller.

CAUTION: After replacing the pressure roller, perform the Fusing Pressure Adjustment procedure (Nip Band width).

14.7 EXIT SENSOR REPLACEMENT

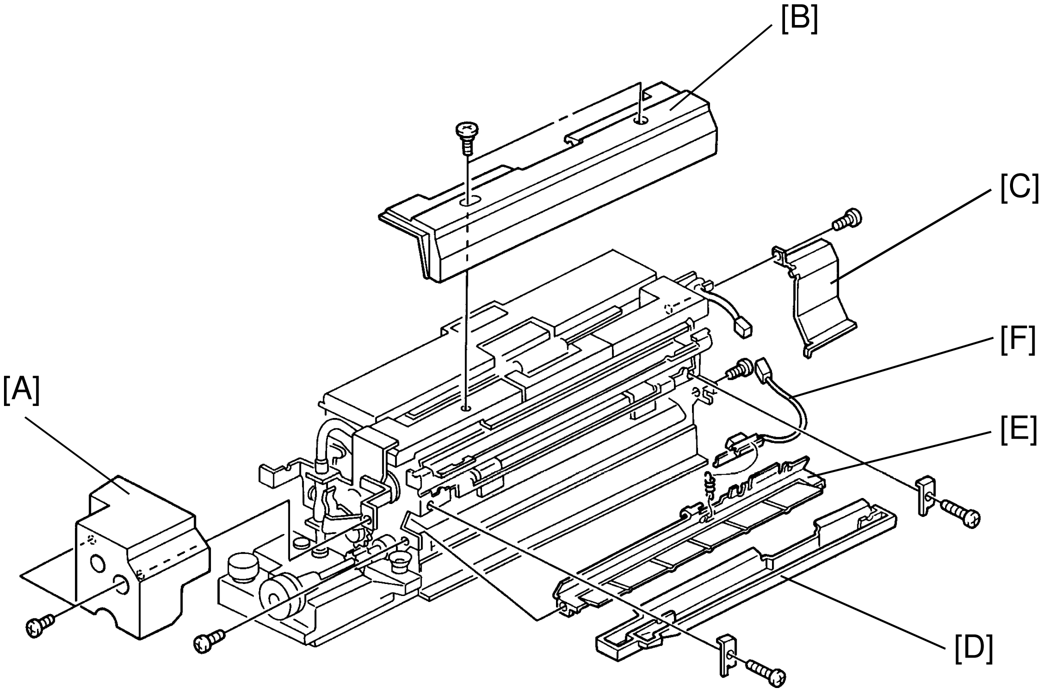
<Model A092 & A105>



1. Remove the cover [A] (two M4 x 8 screws).
2. Open the fusing upper unit [B].
3. Remove the stepped screw [C] and open the lower paper exit unit [D].
4. Remove the bracket [E] (two M4 x 6 screws).
5. Remove the exit sensor [F] (one M4 x 10 screw).

14.8 FUSING THERMISTOR REPLACEMENT

<Model A092 & A105>

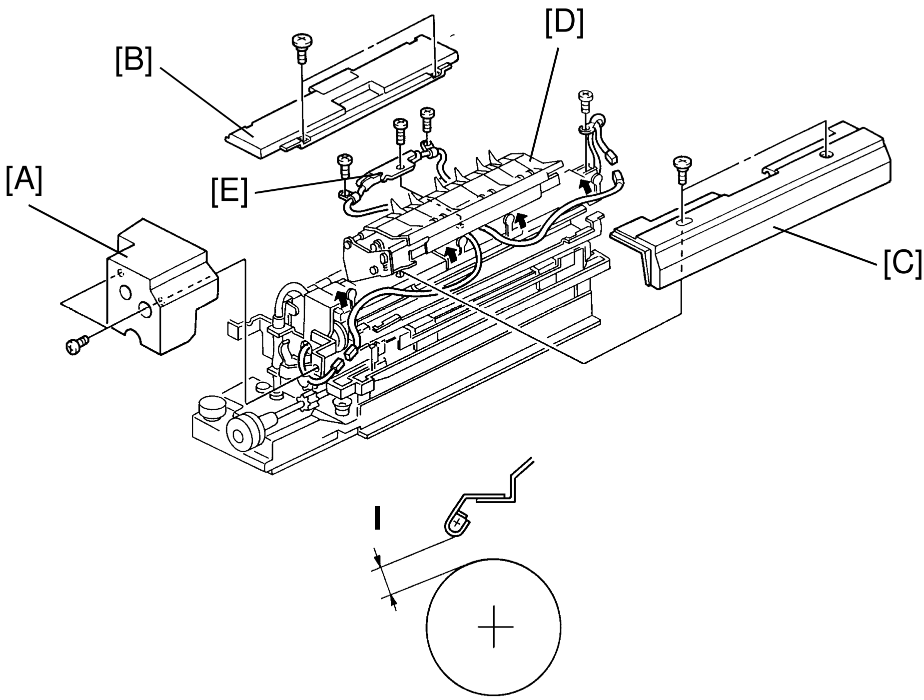


1. Remove the cover [A] (two M4 x 8 screws).
2. Remove the cover [B] (2 stepped screws).
3. Remove the bracket [C] (one M4 x 8 screw).
4. Remove the oil sump [D] (two brackets and two M4 x 12 screws).
5. Remove the bracket [E] with the fusing thermistor [F] (two M4 x 6 screws).
6. Remove the fusing thermistor (one connector).

CAUTION: When installing the new thermistor, put a little oil on its surface with your finger.

14.9 THERMOFUSE REPLACEMENT

<Model A092>

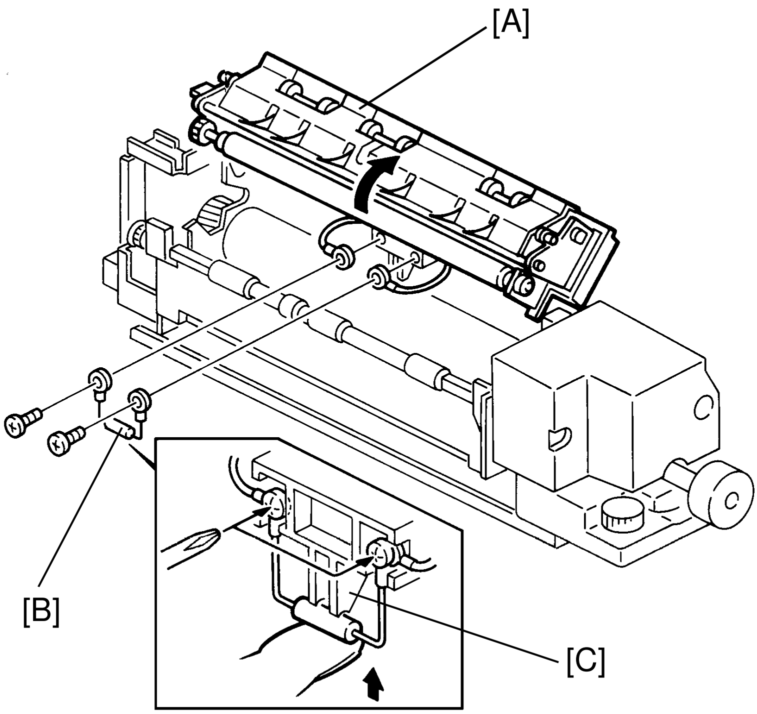


1. Remove the cover [A] (two M4 x 8 screws).
2. Remove the cover [B] (2 stepped screws).
3. Remove the cover [C] (2 stepped screws).
4. Open the upper unit [D].
5. Remove the thermofuse [E] (one M3 x 6 screw, two M4 x 6, two connectors).

CAUTION: The clearance "I" should be 1.5 ± 0.8 mm.

– THERMOFUSE REPLACEMENT –

<Model A105>



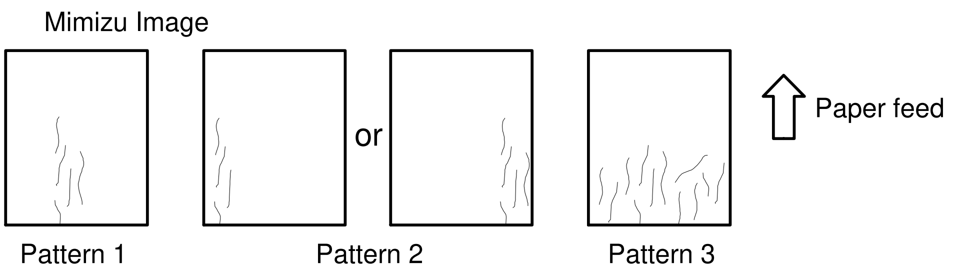
1. Open the fusing upper unit [A].
2. Remove the thermofuse [B] (two M3 x 8 screws).

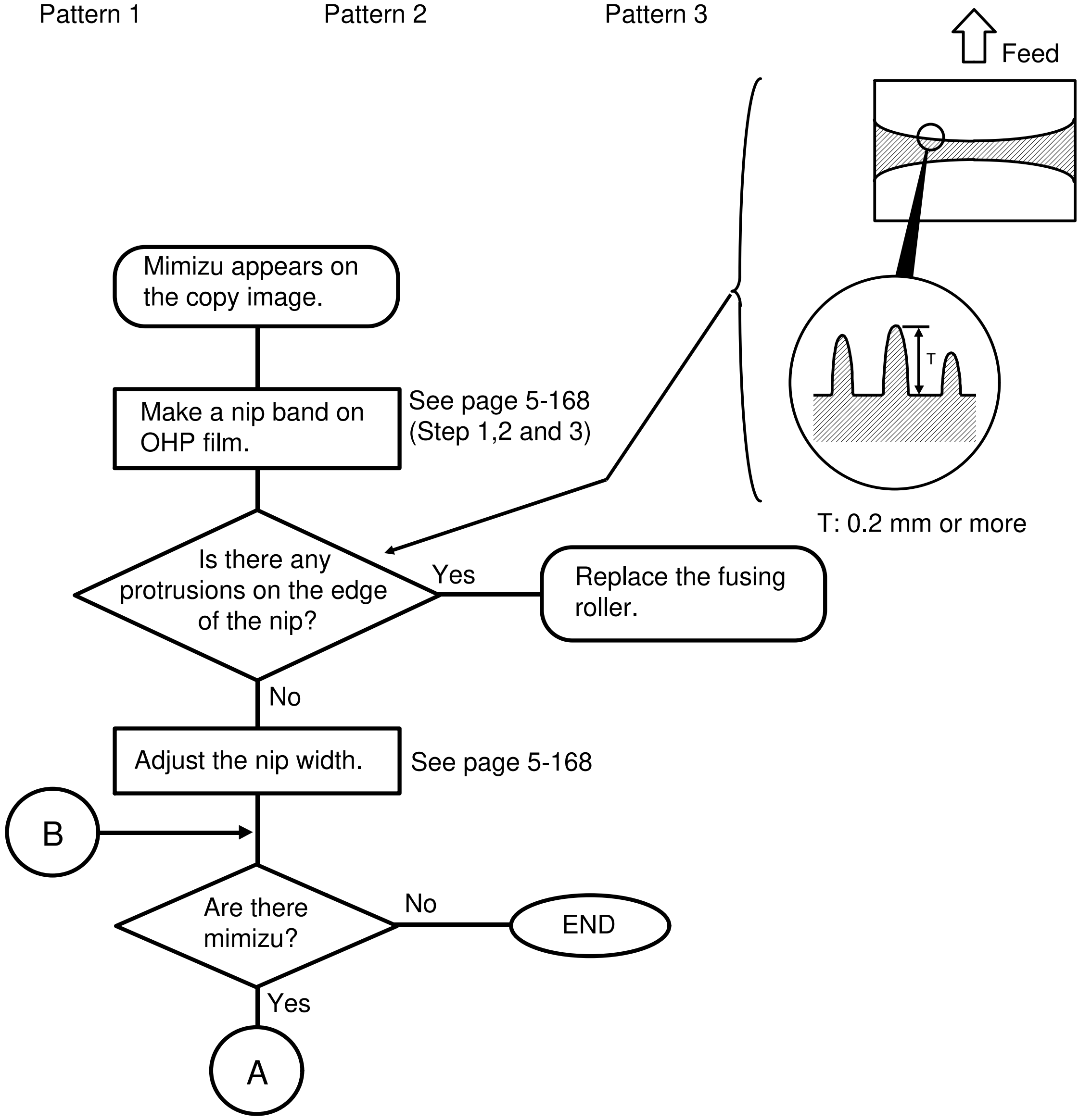
CAUTION: When installing the thermofuse, press it upper until it contacts the bracket [C] and fix the screws.

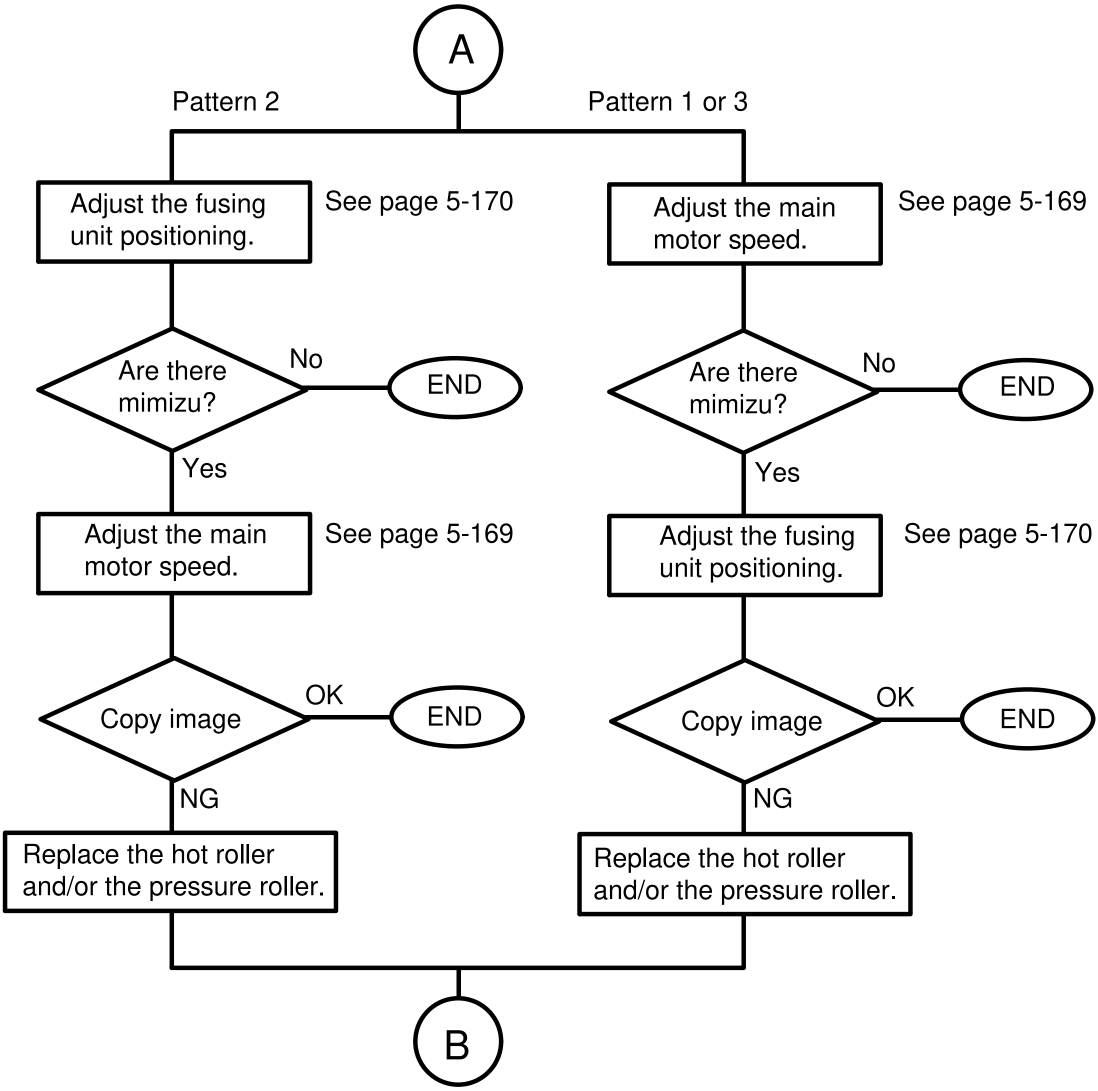
14.10 FUSING UNIT ADJUSTMENT FOR MODEL A092

14.10.1 Fusing Unit Adjustment Flow Chart

"Mimizu" is Japanese for "earthworm". Some problems with fusing unit adjustment result in images resembling earthworms. Though the problem is hated by Japanese service engineers its appellation is quite popular.







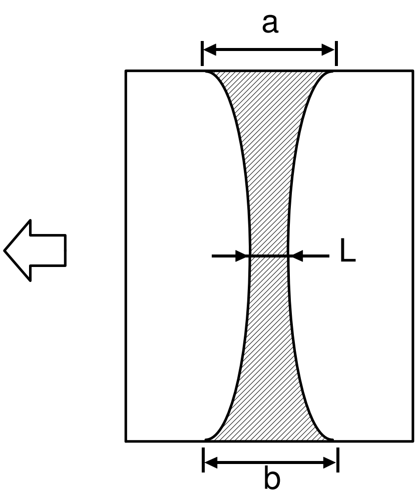
If you do not have new fusing rollers, adjust the machine as follows until you get the rollers. This is only a temporary adjustment, and only for A3/DLT.

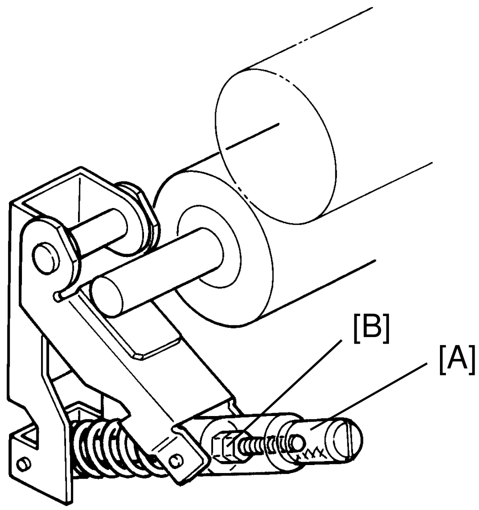
1. Set SPD#435 L to H. (This delays discharge to paper.)
2. Adjust the main motor speed for feeding A3/DLT size paper by SPD#725. Only when SPD#435 is set to H, SPD#725 can be used.
3. Make a copy (no document, platen copy) and check the image.

CAUTION: This mode will cause toner scattering around the belt separation corona charger. After you change the fusing roller(s), be certain to set SPD#435 H to L.

14.10.2 Fusing Pressure Adjustment

Adjustment Standard: 7.6 ± 0.4 mm (center of nip band width; L)
Less than 0.2 mm (difference between a and b)
Use Folex OHP sheet Type 100.





1. Perform a free run (SP 1) for 3 min.
2. As soon as the print key becomes green, pull out the transfer belt unit and open the fusing exit cover.
3. Insert an OHP sheet into the center of the fusing unit by turning the fusing knob manually and wait 30 seconds to make the nip band on the OHP sheet.
4. Turn the fusing roller 90 degrees and then wait for 30 seconds. Repeat this step three more times and exit the OHP sheet. You should now have four nip bands on the OHP sheet.
5. Measure the width L, a, and b. Average each parameter and confirm that they are within specification. If they are not, go to step 6. If OK, make and check a copy image.
6. Remove the slotted-screws [A] (at both side) and adjust the fusing pressure by turning nuts [B].
   Turning the nut clockwise to reduce the fusing pressure
   Turning the nut counterclockwise to increase the fusing pressure
7. Go back to step 1.

14.10.3 Main Motor Speed Adjustment

Necessary tool: flash light

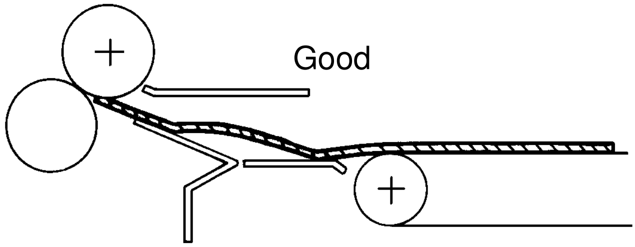


Fig. 1

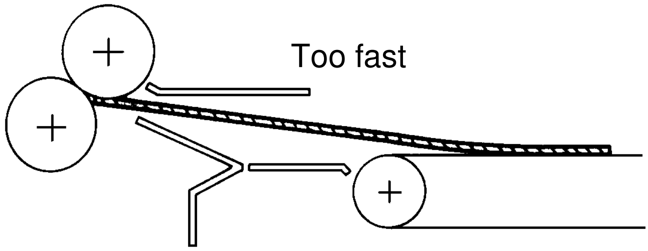


Fig. 2

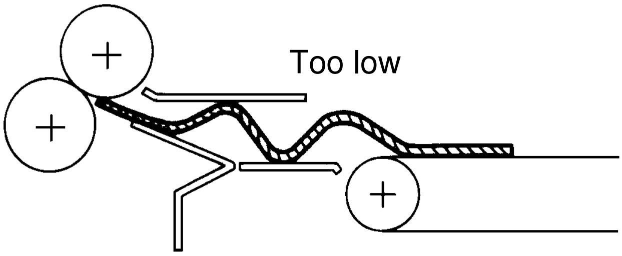


Fig. 3

CAUTION: Adjust the main motor speed only when the copy image is scraped by something, flat images or mimizu appear.

1. Load A3/DLT size paper into the cassette.
2. Put a white A3/DLT paper on the exposure glass.
3. Observe the paper condition when the paper is pulled by the fusing rollers. If the paper is pulled strongly by the fusing rollers (figure 2), lower the speed of the fusing rollers by choosing a lower setting for SPD#720. If the paper buckles (figure 3), increase the speed of the fusing rollers by choosing a higher setting for SPD#720.
   One setting between 3 and 8 has been selected at the factory.

14.10.4 Fusing Unit Positioning Adjustment

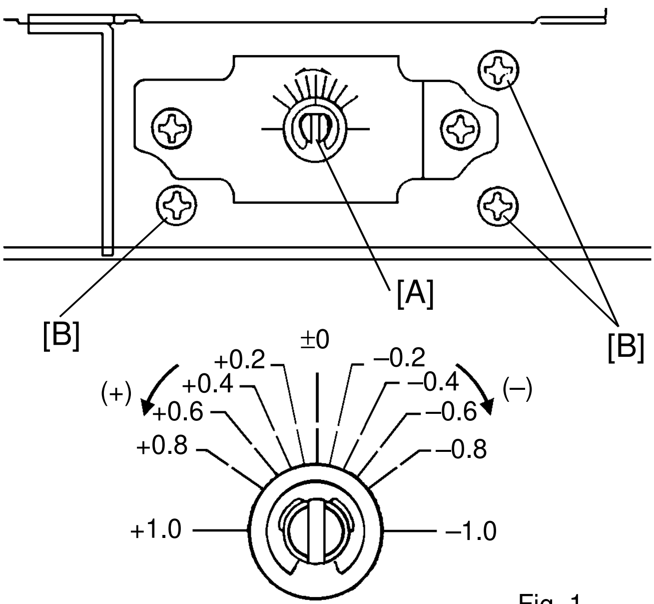


Fig. 1

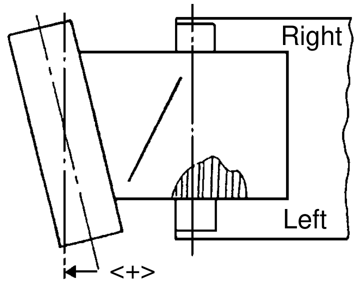


Fig. 2

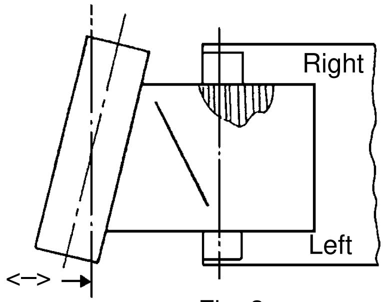


Fig. 3

1. Increase the preset data of SPD#720 (Main Motor Speed Adjustment) by 2 or 3. This can make mimizu, scratched images, or flat images bigger.

2. Make an A3/DLT platen copy, and check where mimizu, scratched images, or flat images appear.

3. Mark the home position of the adjusting cam [A] and loosen the screws [B].

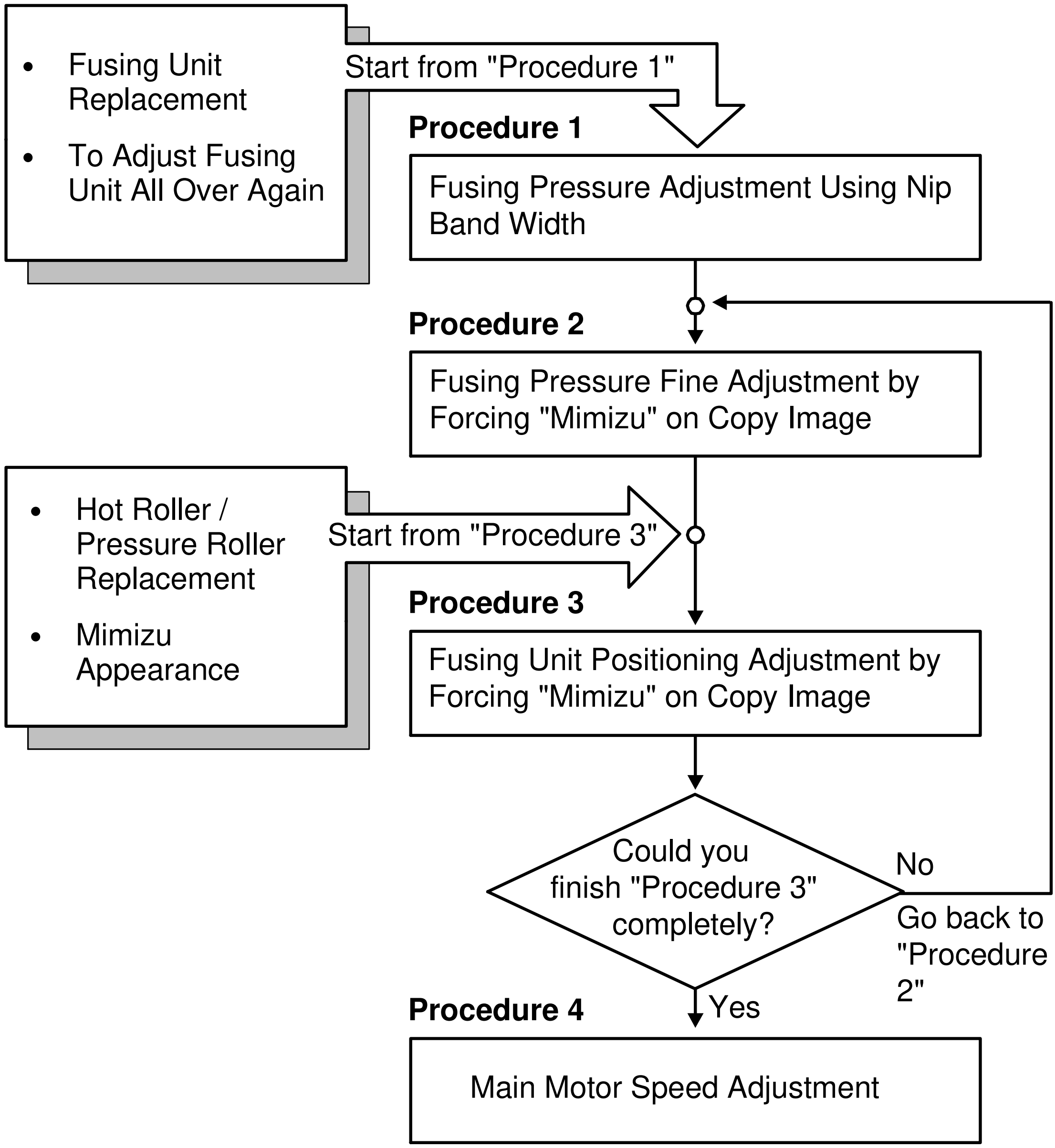
4. Turn the adjusting cam [A] as follows;
   - If abnormal images appear left of the paper direction (towards the front of the fusing unit) turn the adjusting cam counterclockwise until the same scale of the abnormal image appears on the right of the paper direction.
   - If abnormal images appear right of the paper direction (towards the rear of the fusing unit) turn the adjusting cam clockwise until the same scale of the abnormal image appears on the left of the paper direction.

5. Return SPD#720 to the preset data.

14.11 FUSING UNIT ADJUSTMENT FOR MODEL A105

14.11.1 Fusing Unit Adjustment Flow Chart

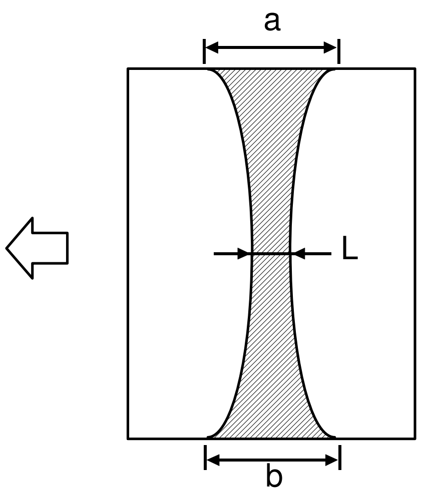
When replacing the fusing roller, pressure roller, or fusing unit or if "Mimizu" pattern appears on the copy image, adjust the fusing unit according to the following procedures:

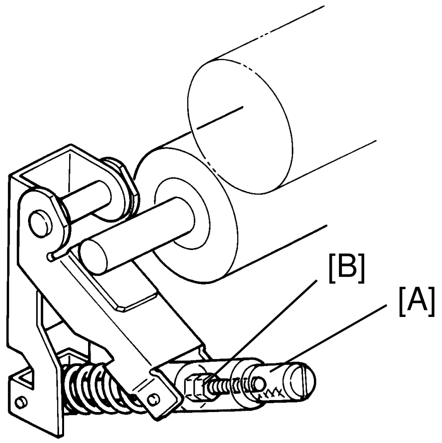


14.11.2 Procedure 1

Fusing Pressure Adjustment Using Nip Band Width

Adjustment Standard:
- 7.6 ± 0.4 mm (center of nip band width; L)
- Less than 0.2 mm (difference between a and b)





1. Prepare Folex OHP sheet Type 100.
2. Place a white paper (A3/11" x 17") on the exposure grass and perform free run (SP1) for 3 minutes.
3. As soon as the print key becomes green, pull out the transfer belt unit and open the fusing exit cover.
4. Insert an OHP sheet into the center of the fusing unit by turning the fusing knob manually and wait 15 seconds to make the nip band on the OHP sheet.
5. Turn the fusing roller 90 degrees and then wait for 15 seconds. Repeat this step two more times and exit the OHP sheet. You should now have four nip bands on the OHP sheet.
6. Measure the width L, a, and b. Average each parameter and confirm that they are within specification. If they are not, go to step 7. If OK, this adjustment is finished.
7. Remove the slotted-screws [A] (at both side) and adjust the fusing pressure by turning nuts [B].

   - Turning the nut clockwise to reduce the fusing pressure
   - Turning the nut counterclockwise to increase the fusing pressure

14.11.3 Procedure 2

Fusing Pressure Fine Adjustment by Forcing "Mimizu" on Copy Image

1. Loosen the screws [A]
2. Turn the adjustment cam [B] which points to the scale (±0) on the bracket [C] as shown in figure 1.

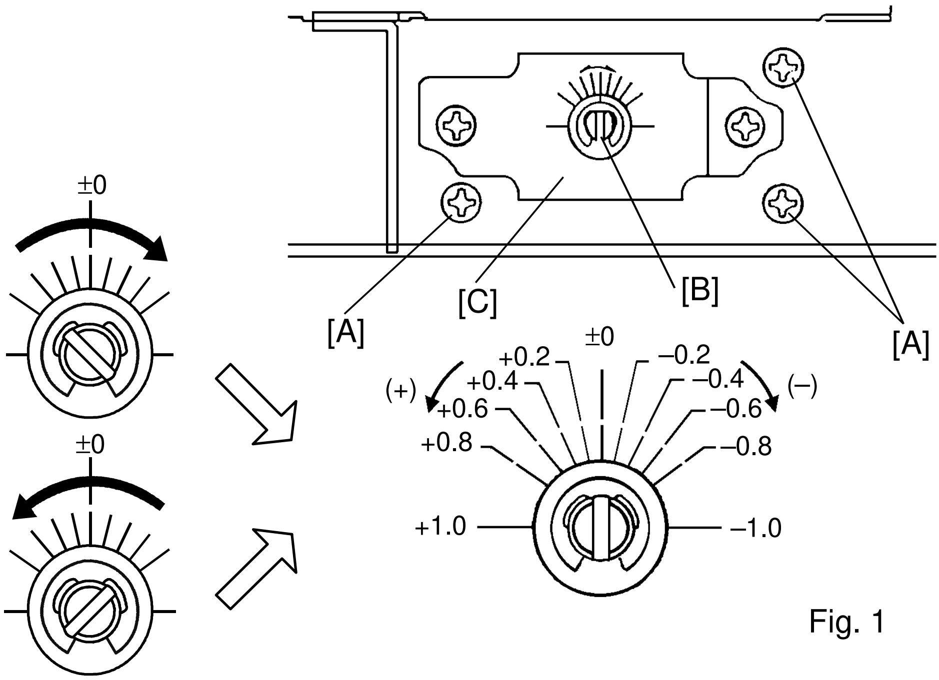


Fig. 1

3. Force "Mimizu" on the copy image as follows:
   - Set **SPD#51** to **003** (1 horizontal line for every main scans)
   - Set **SPD#52** to **003** (Full length pattern of paper)
   - Set SPD#720 to 007 (Main motor speed fine adjustment)
   - Set 11" x 17"/A3 size paper in the cassette and make 5 copies continuously.

NOTE: If "Mimizu" pattern does not appear on the copy image, increase the main motor speed by setting SPD#720 to 008 or higher.
When making copies, use the same paper as the customer uses.

Replacement Adjustment

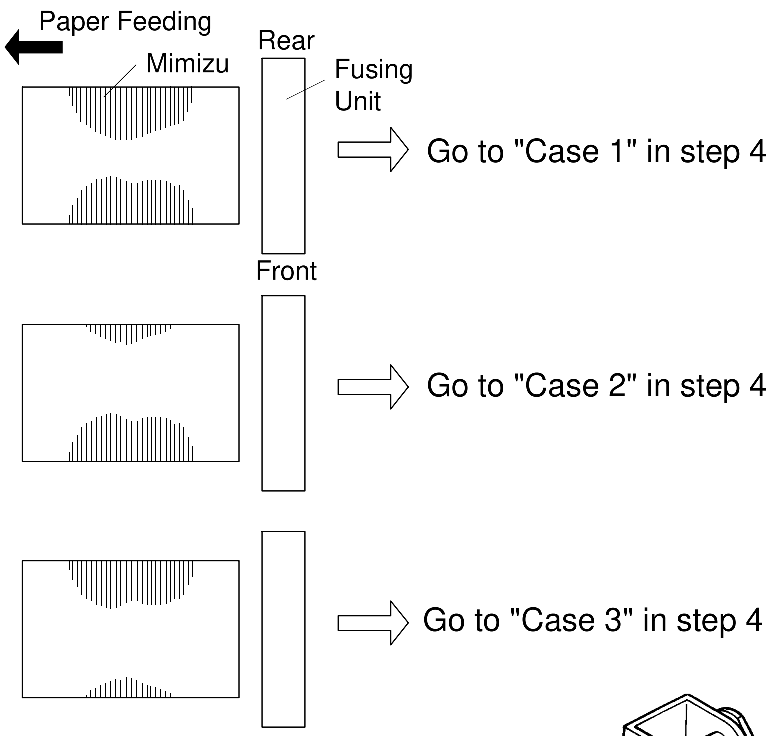


Figure 2

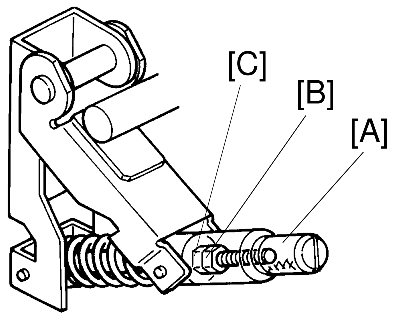


Figure 3

4. Confirm the location and size of the "Mimizu" patterns on the copy image. Then do the appropriate procedure (Case 1, Case 2, or Case 3). See Figure 2.

Case 1 The "Mimizu" pattern toward the front of the fusing unit is almost same size as that toward the rear of the fusing unit.

- Go to **"Procedure 3"**

Case 2 The "Mimizu" pattern toward the front of the fusing unit is bigger than that toward the rear.

1) Remove the slotted - screw [A] and the nut [B] at the **front of the fusing unit**.
2) Turn the nut [C] at the front of the fusing unit 90 degrees clockwise.
3) Make 5 copies continuously.

4) Confirm the location and size of the "Mimizu" patterns. Is the "Mimizu" pattern toward the front the same size as that toward the rear?

- Yes: Go to **procedure 3**.
- If not, do the appropriate procedure as follows until the "Mimizu" pattern toward the front is the same size as that toward the rear:
  - No, the "Mimizu" pattern towards the front of the fusing unit is bigger than that toward the rear:
    Turn "the nut [C] at the front of the fusing unit" 45 degrees ~ 90 degrees clockwise.
  - No, the "Mimizu" pattern towards the front of the fusing unit is smaller than that toward the rear:
    Turn "the nut [C] at the front of the fusing unit" 45 degrees ~ 90 degrees counterclockwise.
- Go to **procedure 3**.

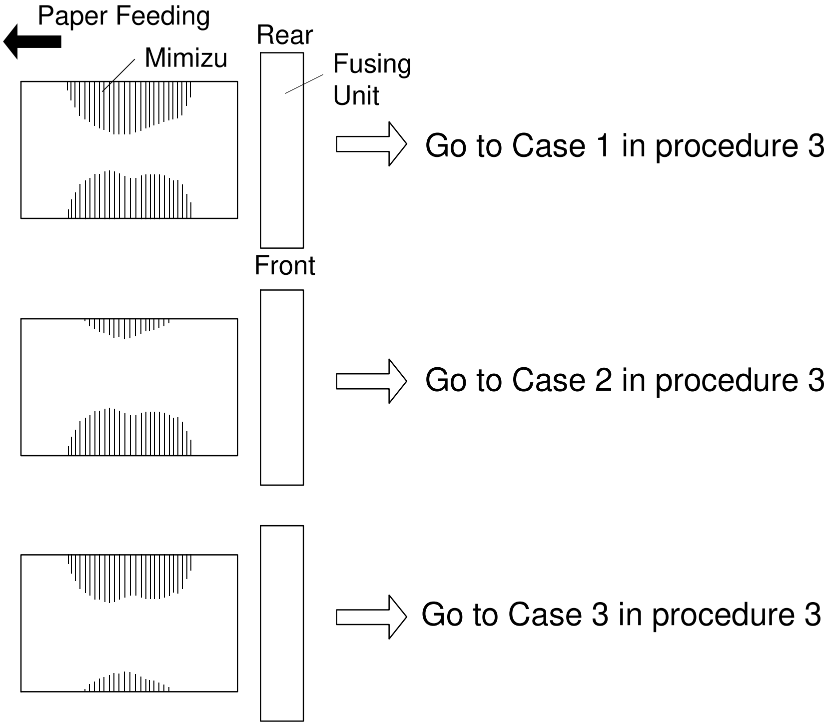
Case 3 The "Mimizu" pattern towards the rear of the fusing unit is bigger than that of the front.

1) Remove the slotted screw [A] and the nut [B] at the **rear of the fusing unit**. See Figure 3 in the previous page.
2) Turn the nut [C] at the rear of the fusing unit 90 degrees clockwise.
3) Make 5 copies continuously.
4) Confirm the location and size of the "Mimizu" patterns on the copy image.
   Is the "Mimizu" pattern toward the rear the same size as that toward the front?

- Yes: Go to **procedure 3**.
- If not, do the appropriate procedure as follows **until** the "Mimizu" pattern toward the front is the same size as that toward rear:
  - No, the "Mimizu" pattern toward the rear is bigger than that toward the front:
    Turn the nut [C] at the rear 45 degrees ~ 90 degrees clockwise.
  - No, the "Mimizu" pattern toward the rear is smaller than that toward the front:
    Turn the nut [C] at the rear 45 degrees ~ 90 degrees counterclockwise.
- Go to **procedure 3**.

14.11.4 Procedure 3

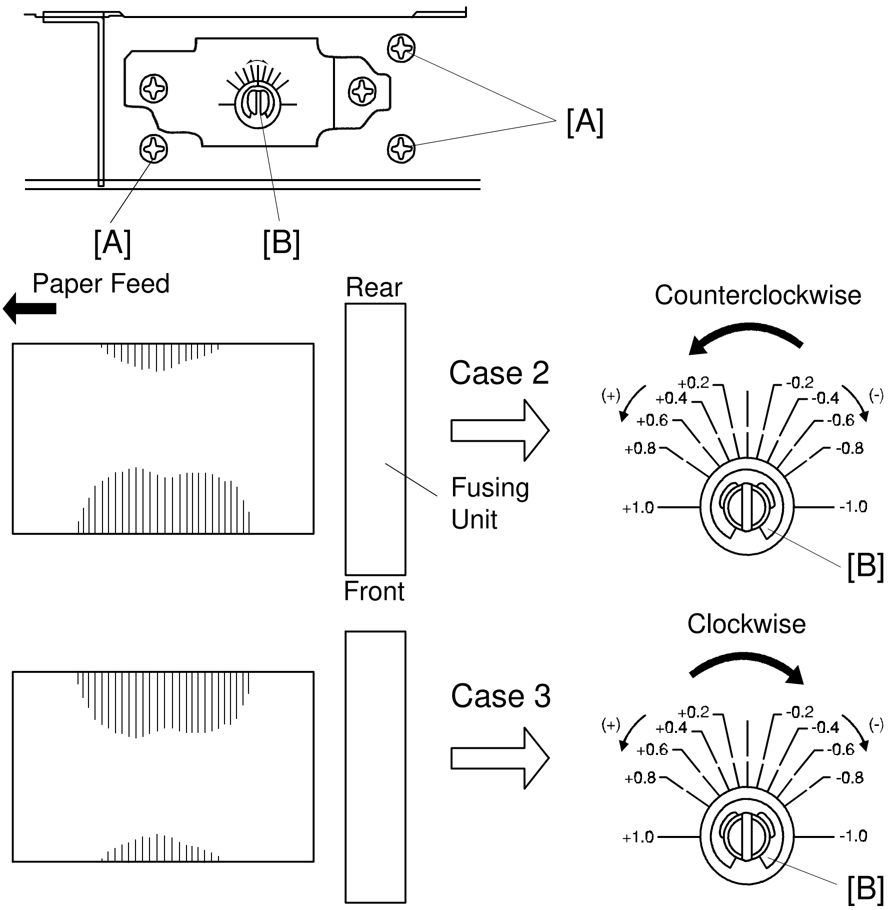
Fusing Unit Positioning Adjustment by Forcing "Mimizu" on the Copy Image



1. Force the "Mimizu" pattern on the copy image as follows:
   - Set SPD#51 to 003 (1 horizontal line for every main scans)
   - Set SPD#52 to 003 (Full length pattern of paper)
   - Set SPD#720 to 007 (Main motor speed fine adjustment)
   - Set 11" x 17"/A3 size paper in the cassette and make 5 copies continuously.

NOTE: If the "Mimizu" pattern does not appear on the copy image, increase the main motor speed by setting SPD#720 to 008 or higher. When making copies, use the same paper as the customer uses.

2. Confirm location and size of the "Mimizu" patterns on the copy image. Refer to figure 1, and choose the necessary procedure from the following:



Case 1 The "Mimizu" pattern toward the front of the fusing unit is almost same size as that toward the rear.

1) Decrease the data of SPD#720 (Main motor speed) by 1.
2) Make 5 copies continuously.
3) Repeat step 2 until the "Mimizu" pattern on the copy image **just disappears**.

Case 2 The "Mimizu" pattern toward the front of the fusing unit is bigger than the "Mimizu" pattern toward the rear.

1) Loosen the screws [A].
2) Turn the adjustment cam [B] counterclockwise to equalize the "Mimizu" patterns toward the front and the rear.
3) Decrease the data of SPD#720 (Main Motor Speed) by 1.
4) Make 5 copies continuously.
5) Repeat step 2 until the "Mimizu" pattern on the copy image **just disappears**.

Case 3 The "Mimizu" pattern toward the rear of the fusing unit is bigger than the "Mimizu" pattern toward the front.

1) Loosen the screws [A].
2) Turn the adjustment cam [B] clockwise to equalize the "Mimizu" patterns toward the front and the rear.
3) Decrease the data of SPD#720 (Main Motor Speed) by 1.
4) Make 5 copies continuously.
5) Repeat step 2 until the "Mimizu" patterns on the copy image **just disappears**.

14.11.5 Procedure 4

Main Motor Speed Adjustment

Necessary tool: flash light

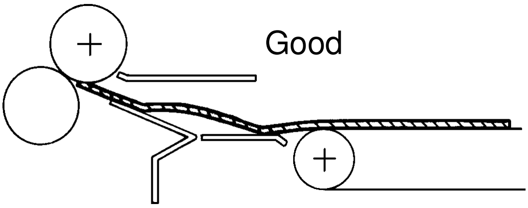


Fig. 1

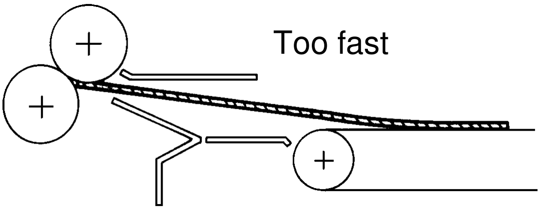


Fig. 2

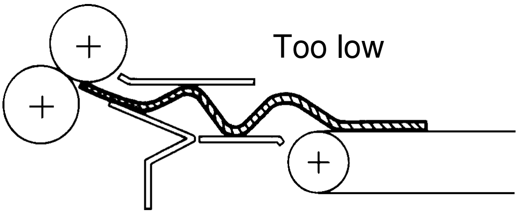


Fig. 3

1. Read the data of SPD#720 (Main motor speed)
2. Set SPD#720 (Main motor speed) to the mew data according to the following table:

SPD#720 (Main motor speed)

Current data	New data
006	004
005	003
004	003 or 002
003	002
002	Go back to procedure 2 or replace the fusing roller or the pressure roller.

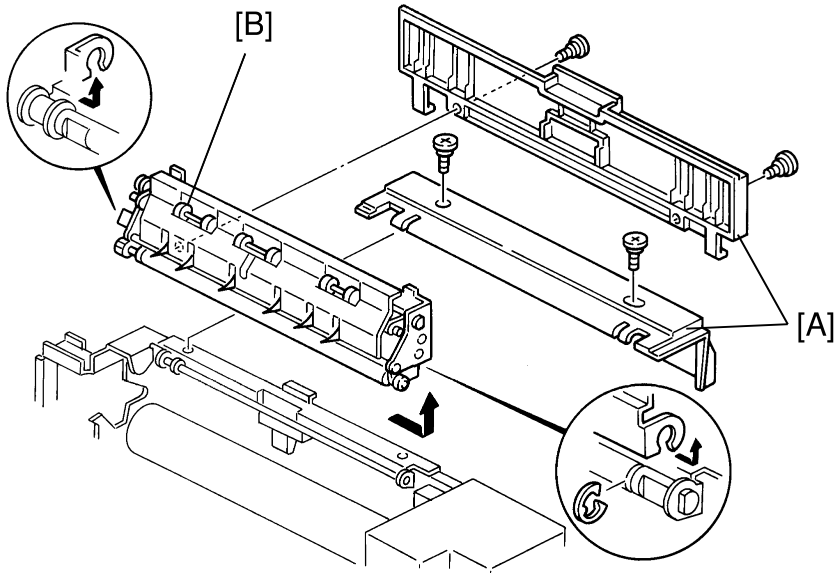
3. Observe the paper condition when the paper is pulled by the fusing rollers. If the paper is pulled strongly by the fusing rollers (figure 2), lower the speed of the fusing rollers by choosing a lower setting for SPD#720. If the paper buckles (figure 3), increase the speed of the fusing rollers by choosing a higher setting for SPD#720.
   One setting between 3 and 8 has been selected at the factory.

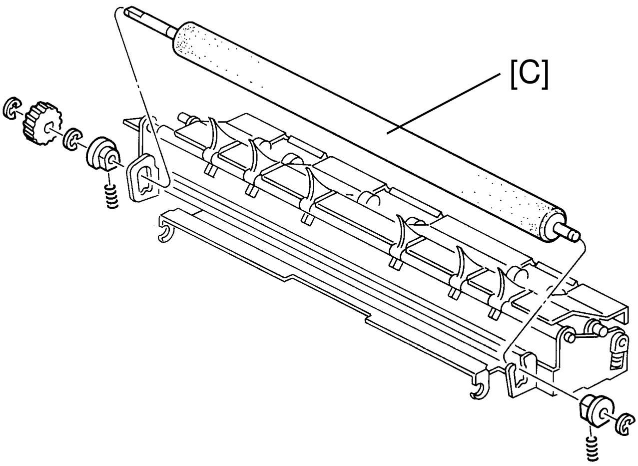
NOTE: In the case of figure 3, the copy image is scraped by the upper paper guide.

4. Set SPD#51 and #52 as follows:
   SPD#51 to 007
   SPD#52 to 000.

14.12 CLEANING ROLLER REPLACEMENT

<Model A105 only>



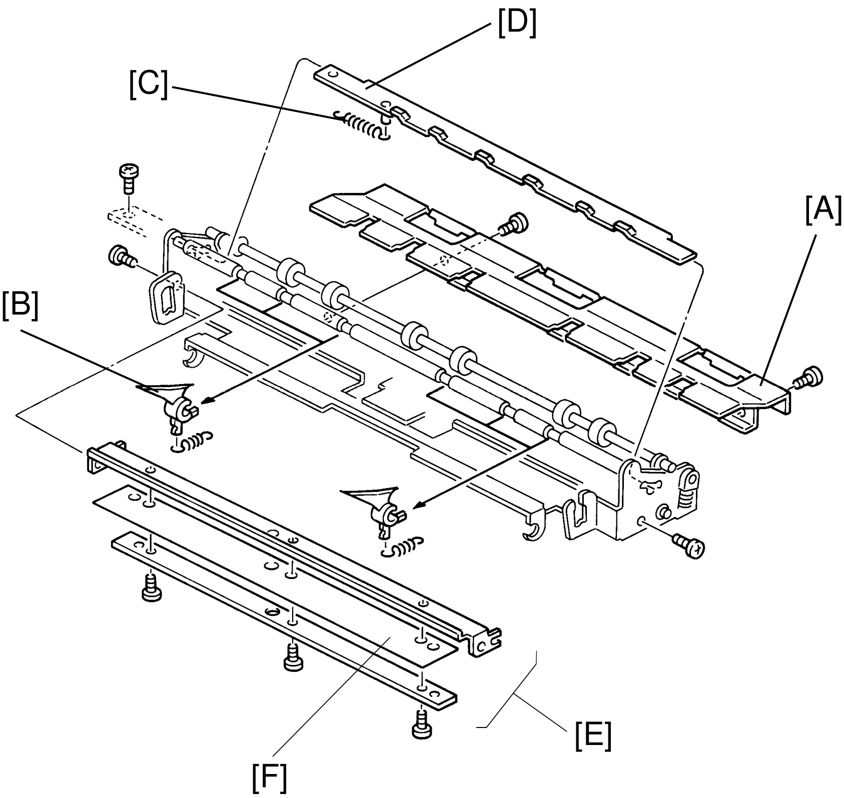


1. Remove the upper covers [A] (2 stepped screws each).
2. Remove the upper unit [B] (1 E-ring).
3. Remove the cleaning roller [C] (1 gear, 3 E-rings, 2 bushings).

   NOTE: When replacing the cleaning roller, put the silicon oil on the new cleaning roller.

14.13 CLEANING SCRAPER REPLACEMENT

<Model A105 only>

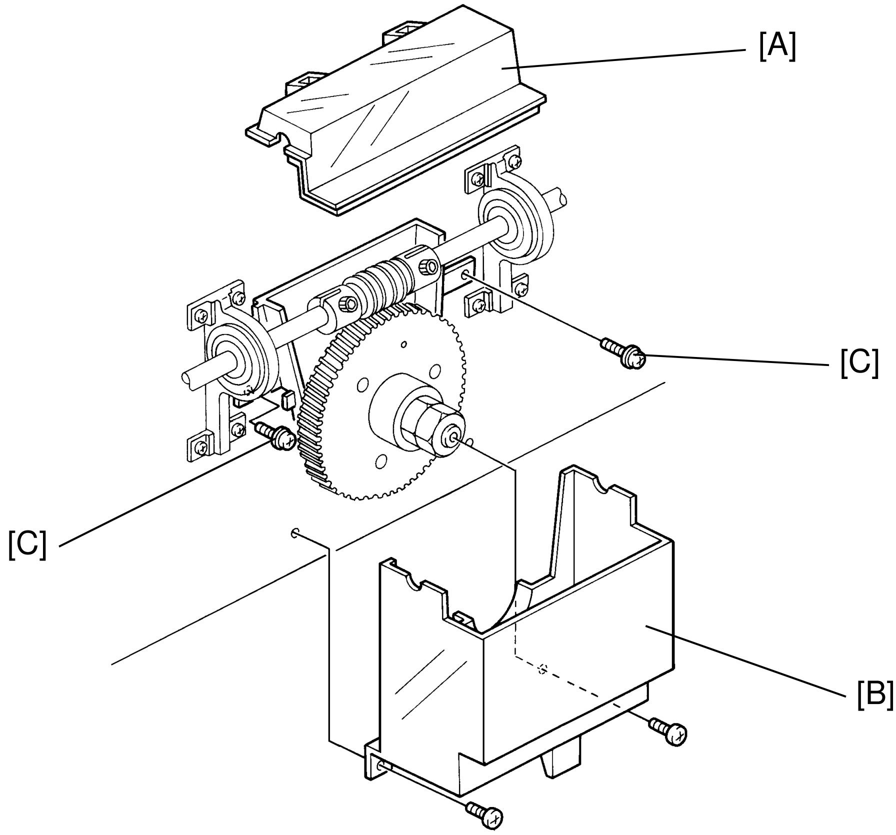


1. Remove the cleaning roller (see 12.11 CLEANING ROLLER REPLACEMENT).
2. If you just want to clean the cleaning scraper, you can clean it now.
3. Remove the guide plate [A] (two M4 x 6 screws).
4. Remove 6 pick-off pawls [B] (6 springs).
5. Remove the spring [C].
6. Remove the bracket [D] (1 screw).
7. Remove the cleaning scraper unit [E] (two M4 x 6 screws).
8. Remove the cleaning scraper [F] (three M4 x 6 screws).

15. CORONA UNIT AND DRUM UNIT

15.1 DRUM DRIVE SECTION REMOVAL AND RE-ASSEMBLE

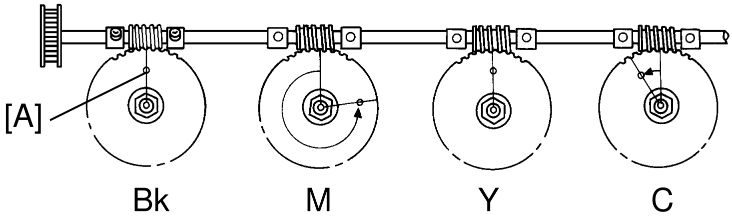
<Model A092 & A105>



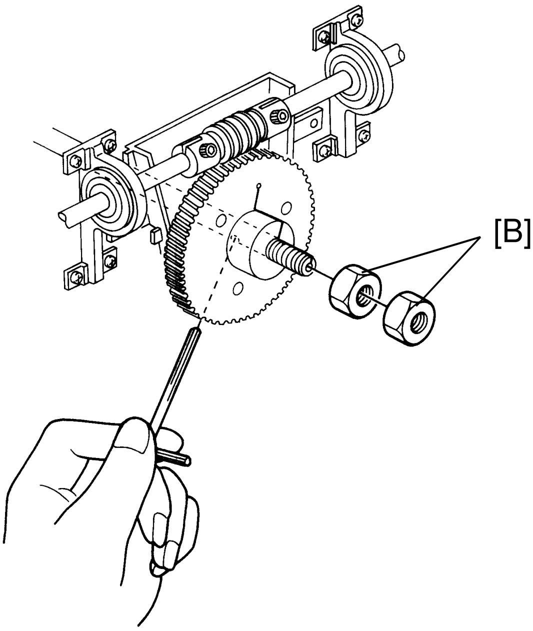
REMOVAL

CAUTION: 1. Do not interchange the worm gears. At the factory, all adjustment have been performed based on the gears' present combination.
2. Put protective rags below the oil pans to prevent oil from dripping on other parts.

1. Remove 4 oil caps [A].
2. Remove 2 screws from each pan and slide down and remove the 4 oil pans [B].
3. Remove 2 screws from each pan [C].



Back view [Example]



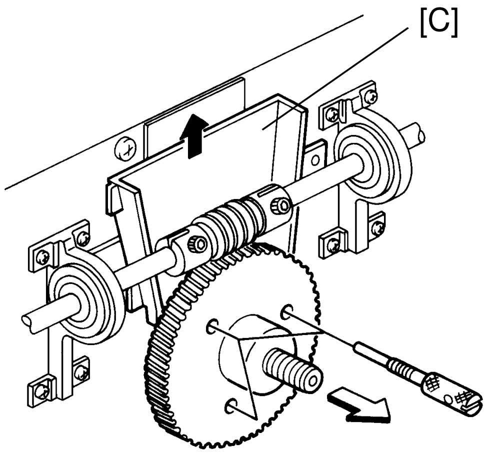
CAUTION: When turning the worm gears, turn them counterclockwise only. Turning them clockwise will damage the cleaning blades.

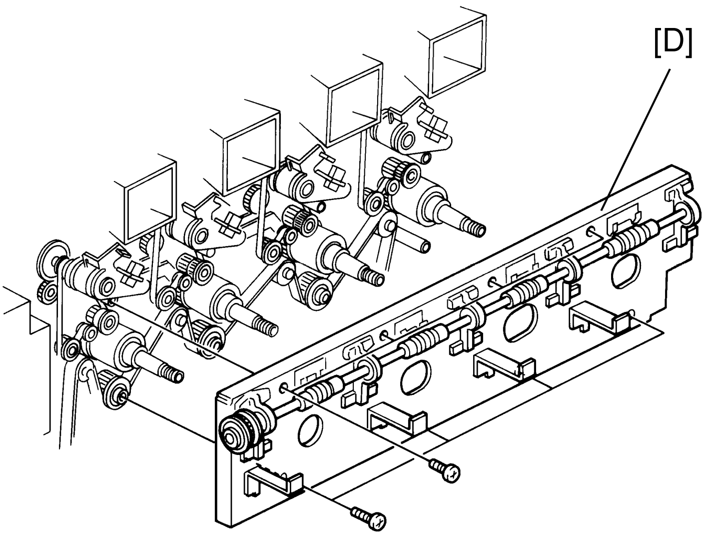
4. Turn the worm gears by moving the drum drive belt. Position the hole [A] on the worm gear (black) at the top.

5. Make a mark on each drum shaft to make sure in maintained the proper combination of worm gear and drum shaft.

6. Count the number of teeth from the top to the hole [A], for other gears (M, Y, and C) and write them down on a note pad.

7. Insert the Allen key into the drum shaft, so as not to turn it, and remove the double nuts [B].



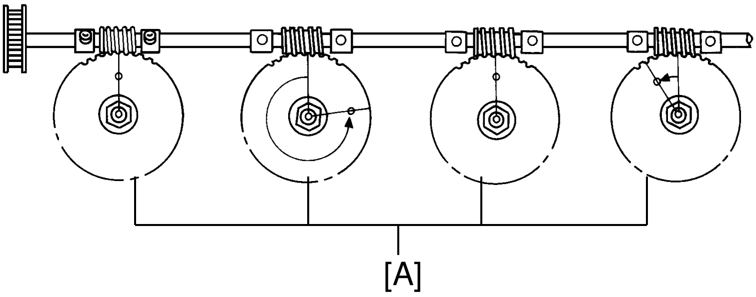


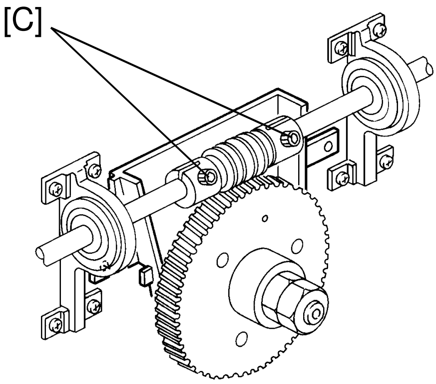
CAUTION: Put the worm gears removed in step 8 on a sheet of clean paper or a cloth to prevent them from getting dust or scratches.
Turn the special screws gently to prevent the worm gears and the drum shaft from being overloaded.

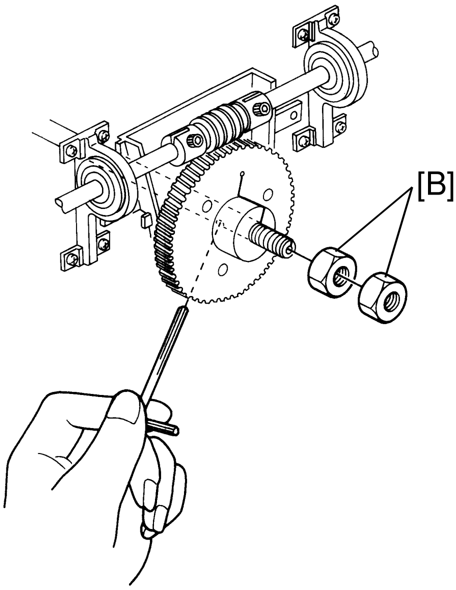
8. Insert 3 special screws (M4 x 40) into 3 hole on the worm gear. First, turn the screws until they stop. Slide up the oil pan holder [C], and turn the screws until the worm gear is loosened.

9. Remove the bracket [D] (8 screws).

<Model A092 only>



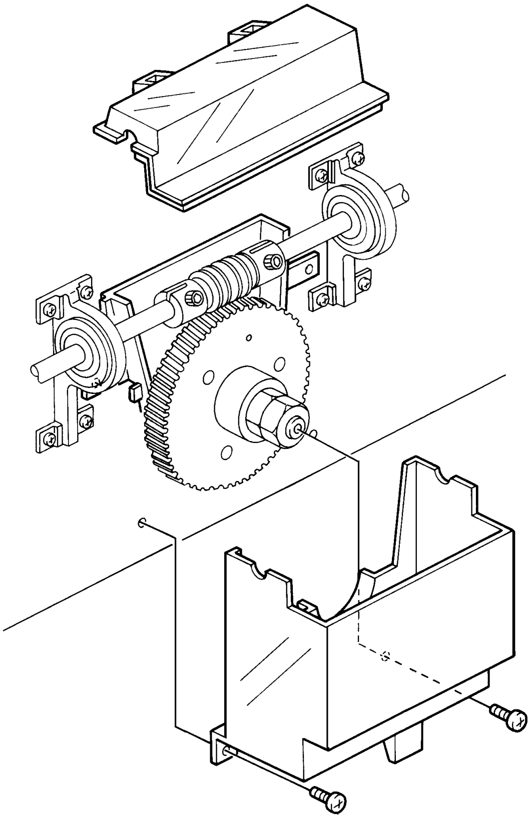




REPLACEMENT

CAUTION: Return the worm gear to the same drum shaft from which it was taken.

1. Insert the worm gears [A] to meet the mark on the drum shaft and the hole on the worm gear.
2. Replace the nuts [B], but do not secure them yet.
3. Insert the Allen key as in step 7 of the removal procedure, and secure the two nuts.
4. Turn the worm shaft to rotate the worm gears counterclockwise and confirm if the shaft is turning smoothly. If not, start again.
5. Loosen the worm fixing screws [C] except for the screws which fix the worm gear for the black drum.
6. Rotate the worm gears (M, Y, C) to place the hole of the gears to the original starting position, and fix the worm fixing screws so as not to push the screws strongly.
7. Rotate the worm gears counterclockwise, and confirm their movement.



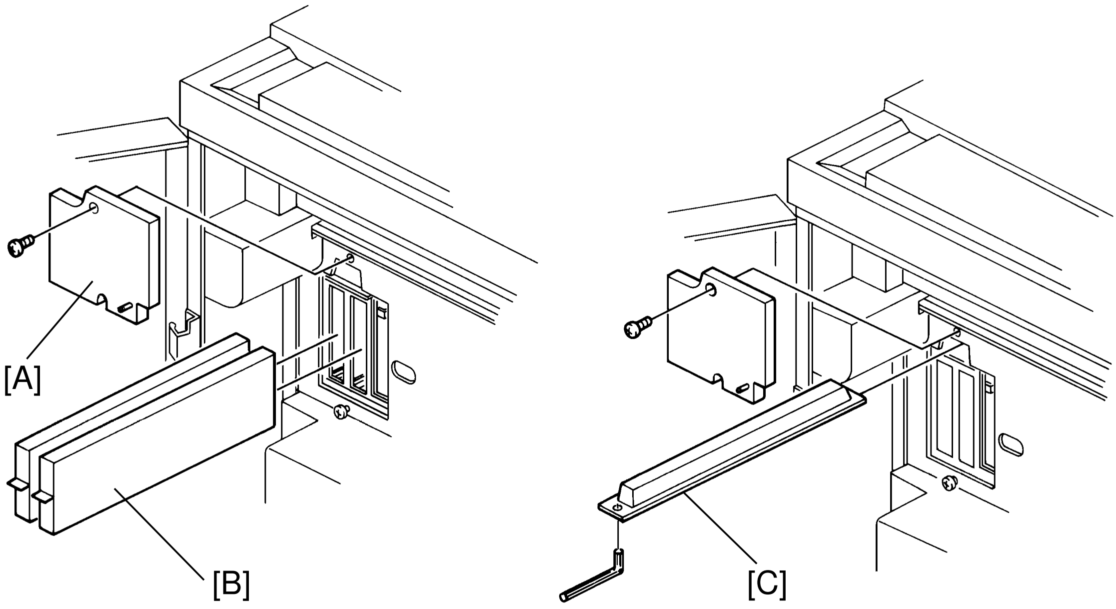
8. Reassemble other parts.

Copy image check

1. Place the C-4 test chart or A3 paper on the exposure grass.
2. Input the following data by using the lower operation panel.
   SPD#50 - Data 15
   SPD#51 - Data 7
   SPD#52 - Data 2
3. Make a copy, and check if image density is uneven. If uneven, reassemble the worm gears again.

Replacement Adjustment

16. OZONE FILTER UNIT



16.1 EXIT OZONE FILTER REPLACEMENT

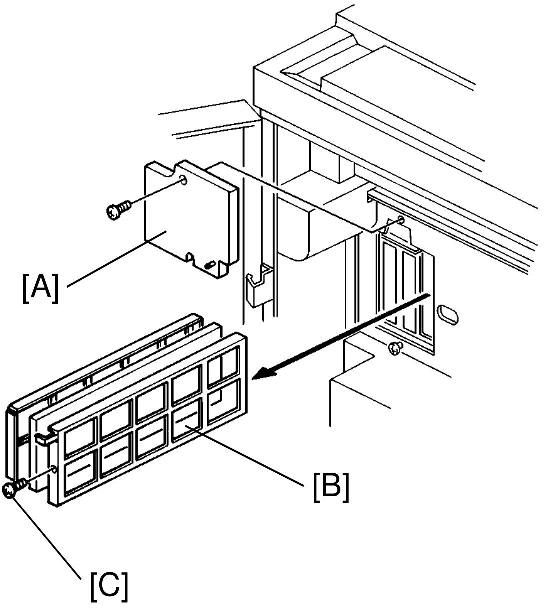
<Model A092 & A105>

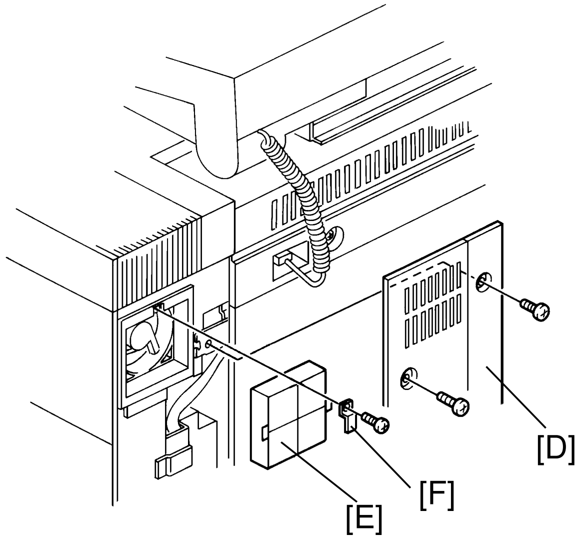
1. Open the front doors.
2. Remove the top screw and loosen the bottom screw of the ozone filter unit cover [A] and remove the cover.
3. Pull the ozone filters [B] out by the tab.
4. When inserting an ozone filter, set the filter with the tab at the front.

16.2 OZONE NEUTRALIZER REPLACEMENT

<Model A092 & A105>

1. Open the front doors.
2. Remove the top screw and loosen the bottom screw of the ozone filter unit cover and remove the cover.
3. Pull the old ozone neutralizer [C] out. If it won’t come out pull it out by the hole. You can use a small screw driver, spring hook, etc.
4. When inserting an ozone neutralizer, remove the seal and set it with the hole at the front.





16.3 DUST FILTER REPLACEMENT

<Model A092 & A105>

1. Open the front doors.
2. Remove the top screw and loosen the bottom screw of the ozone filter unit cover [A] and remove the cover.
3. Pull the dust filter out with the frame [B].
4. Remove the filter frame screw [C] and pull the frame apart.
5. Remove the older filter and place the new one in the smaller frame section with the woolly side of the filter facing up.
6. Reassemble the frame and insert it back into the machine. The woolly side of the filter material should face the toner section, the smoother side should face the exit section, the screw should face the operator, and the tab should be at the top.

16.4 IPU OZONE FILTER REPLACEMENT

<Model A092 & A105>

1. Remove the right rear cover [D] (4 screws).
2. Remove the IPU ozone filter [E] (1 screw).
3. When installing the ozone filter, set it with the tabs [F].

SECTION 6

TROUBLESHOOTING

1. SERVICE CALL CONDITIONS

1.1 SCANNER

CODE SC130: EXPOSURE LAMP HEATER CIRCUIT OPEN

SC 130 lights if the temperature of exposure lamp unit does not reach operating temperature within the specified time.

Points to check:
Exposure lamp heater (2 pcs), scanner control board, scanner mother board (CN205-B6, CN270-A11), scanner motor board, scanner harness

CODE SC140: EXPOSURE LAMP HEATER OVERHEAT

SC140 lights if the temperature of exposure lamp unit goes over 90°C.

Points to check:
Scanner motor board (CN291-1, 2), scanner control board

CODE SC150: EXPOSURE LAMP THERMISTOR SHORT

SC150 lights if the resistance of the exposure lamp thermistor becomes zero.

Points to check:
Exposure lamp heater, scanner mother board, scanner harness scanner control board

CODE SC191: BAR CODE SCANNING ERROR

SC191 lights if the bar code for the machine identification number cannot be detected when the main switch is turned on.

Points to check:
- The bar code label is dirty
- Scanner mirrors are not in position

CODE SC192: BAR CODE NUMBER IS DIFFERENT

SC192 lights if the bar code number is not identical to the machine identification number stored in memory.

Points to check:
- Wrong machine identification number in memory
- Machine identification number is not entered in the new (replaced) RAM board
- RAM board defective
- Main control board defective

CODE SC210: SCANNER HOME POSITION NOT OFF

SC210 lights if the scanner does not leave the home position sensor within the specified time.

Points to check:
HP sensor, scanner mother board, scanner control board

CODE SC220: SCANNER HOME POSITION NOT ON

SC220 lights if the scanner does not return to the home position sensor within the specified time.

Points to check:
HP sensor, scanner mother board (CN205-A5, CN270-B10), scanner control board, scanner harness

CODE SC230: ORIGINAL LEAD EDGE SIGNAL NOT OFF

SC230 lights if the original lead edge is detected when the scanner is in the home position.

Points to check:
Original lead edge sensor, scanner control board, scanner mother board (CN205-A10), scanner harness

CODE SC240: ORIGINAL LEAD EDGE SIGNAL NOT ON

SC240 lights if the original lead edge is not detected after the scanner starts.

Points to check:
Original lead edge sensor, scanner control board, scanner mother board (CN205-A10), scanner harness

CODE SC250: SCANNER MOTOR MALFUNCTION

SC250 lights if the scanner motor does not rotate. (No encoder pulses are generated.)

Points to check:
Scanner mother board, scanner control board, scanner motor

CODE SC260: INCORRECT SCANNER MOTOR ROTATION

SC260 lights if the scanner motor starts turning in the wrong direction.

Points to check:
Motor control board, scanner motor

1.2 TONER COLLECTION

CODE SC310: TONER COLLECTION PIPE CLOGGED

SC310 lights if the toner collection coil does not rotate.

Points to check:
Sequence board (CN402-A6), toner pipe sensor, toner collection mechanism

1.3 FUSING

NOTE: For the purpose of safety, the following SC codes that are marked with an asterisk (*) cannot be cleared by turning the main switch off and on.
To clear these SC codes, set the SPD #701 to "H" first. Then, turn the main switch off and on.

CODE *SC520: FUSING HEATER CIRCUIT OPEN

SC520 lights if the thermistor resistance becomes greater than the standard data (approx. 80°C) after the copier reaches the ready condition.

Points to check:
Fusing lamp, fusing thermistor, process control board, sequence control board, SSR, main relay

CODE *SC530: FUSING THERMISTOR BLOWN

SC530 lights if the thermistor resistance is infinite.

Points to check:
Fusing thermistor, sequence control board, process control board

CODE *SC540: READY SIGNAL NOT ON

SC540 lights if the thermistor resistance does not reach the target (operating temperature) within 10 minutes after the main switch is turned on.

Points to check:
Fusing lamp, fusing thermistor, process control board, sequence control board, SSR, main relay, thermofuse

CODE *SC550: FUSING OVERHEAT

SC550 lights if the thermistor resistance is lower than the preset lower limit data (approx. 200°C).

Points to check:
Sequence control board, SSR, main relay (CN503-A8, 9, 10, CN504-1, 2)

1.4 MECHANICAL DRIVE

CODE SC610: MAIN MOTOR ROTATION ERROR

SC610 lights if the main motor speed does not reach the desired speed within 1 second after the main motor ON signal is sent or if the speed fluctuates more than ±5% during operation.

Points to check:
Sequence control board, dc power supply board, motor control board

CODE SC612: MAIN MOTOR STOP ERROR

SC612 lights if the main motor does not stop within 4 seconds after the stop signal is sent.

Points to check:
Motor control board, main motor

CODE SC620: DRUM MOTOR ROTATION ERROR

SC620 lights if the drum motor speed does not reach the desired speed within 1 second after the main motor ON signal is sent or if the speed fluctuates more than ±5% during operation.

Points to check:
Sequence control board, dc power supply board, motor control board (FU502)

CODE SC622: DRUM MOTOR STOP ERROR

SC622 lights if the transfer motor does not stop within 4 seconds after the stop signal is sent.

Points to check:
Motor control board, drum motor

CODE SC630: TRANSFER BELT MOTOR ROTATION ERROR

SC630 lights if the transfer motor speed does not reach the desired speed within 1 second after the main motor ON signal is sent or if the speed fluctuates more than ±5% during the operation.

Points to check:
Sequence control board, dc power supply board, motor control board (FU501)

CODE SC632: TRANSFER BELT MOTOR STOP ERROR

SC632 lights if the transfer motor does not stop within 4 seconds after the stop signal is sent.

Points to check:
Motor control board, transfer motor

CODE SC640: POLYGON MOTOR ROTATION ERROR

SC640 lights if the polygon motor does not reach the desired speed within 60 seconds after the main switch is turned on.

Points to check:
Polygon motor drive board, LD control board (CN603-6, 8) polygon motor

CODE SC650: TONER SUPPLY MALFUNCTION – Bk
CODE SC651: TONER SUPPLY MALFUNCTION – M
CODE SC652: TONER SUPPLY MALFUNCTION – Y
CODE SC653: TONER SUPPLY MALFUNCTION – C

If the toner supply sensor keeps detecting the Insufficient toner condition for 20 minutes after the toner supply motor turns on, this code lights.

Points to check:
Toner supply motor control board (CN762), sequence control board

1.5 PRINTING

CODE SC710: SYNCHRONIZING DETECTION ERROR – Bk
CODE SC711: SYNCHRONIZING DETECTION ERROR – M
CODE SC712: SYNCHRONIZING DETECTION ERROR – Y
CODE SC713: SYNCHRONIZING DETECTION ERROR – C

If the interval of the synchronizing signals becomes longer than the standard interval, this code lights.

Points to check:
LD unit, LD drive board, polygon motor control board, drum exposure control board, synchronizing mirrors, sequence control board

CODE SC720: LD ERROR – Bk
CODE SC721: LD ERROR – M
CODE SC722: LD ERROR – Y
CODE SC723: LD ERROR – C

If the current through the LD exceeds the maximum limit, this code lights.

Points to check:
LD unit, LD drive board, sequence control board, LD control board, LD

CODE SC730: LSYNC ERROR

SC730 lights if the number of the laser beam pulses detected in one minute by the synchronizing detector is less than the standard minimum number (600 pulses/sec).

Points to check:
sequence control board, drum exposure control board

1.6 IMAGE DEVELOPMENT

CODE SC810: GRID BIAS ERROR – Bk
CODE SC811: GRID BIAS ERROR – M
CODE SC812: GRID BIAS ERROR – Y
CODE SC813: GRID BIAS ERROR – C

If the feed back voltage of the grid bias does not reach the desired voltage, this code lights.

Points to check:
Power packs, process control board

CODE SC820: DEVELOPMENT BIAS ERROR – Bk
CODE SC821: DEVELOPMENT BIAS ERROR – M
CODE SC822: DEVELOPMENT BIAS ERROR – Y
CODE SC823: DEVELOPMENT BIAS ERROR – C

If the feed back voltage of the development bias does not reach the desired voltage, this code lights.

Points to check:
Power packs, process control board

CODE SC830: TONER SUPPLY BIAS ERROR – Bk
CODE SC831: TONER SUPPLY BIAS ERROR – M
CODE SC832: TONER SUPPLY BIAS ERROR – Y
CODE SC833: TONER SUPPLY BIAS ERROR – C

If the feed back voltage of the toner supply bias does not reach the desired voltage, this code lights.

Points to check:
Power packs, process control board

CODE SC840: CHARGE VOLTAGE ERROR – Bk
CODE SC841: CHARGE VOLTAGE ERROR – M
CODE SC842: CHARGE VOLTAGE ERROR – Y
CODE SC843: CHARGE VOLTAGE ERROR – C

If charge is not applied to the drum, this code lights.

Points to check:
Set of the charge unit, charge power pack, process control board.

CODE SC850: TRANSFER CORONA LEAK – Bk
CODE SC851: TRANSFER CORONA LEAK – M
CODE SC852: TRANSFER CORONA LEAK – Y
CODE SC853: TRANSFER CORONA LEAK – C

If excess current flows into the transfer P.P. leak detection circuit, this code lights.

Points to check:
Power packs, process control board, transfer corona wire (end blocks)

CODE SC860: ID SENSOR CURRENT SET ERROR – Bk
CODE SC861: ID SENSOR CURRENT SET ERROR – M
CODE SC862: ID SENSOR CURRENT SET ERROR – Y
CODE SC863: ID SENSOR CURRENT SET ERROR – C

If SVSG is not between 450 V and 350 V even after the current to the ID sensor LED is adjusted, this code lights. The data of SPD #611 ~ #615 becomes more than 100 in this condition.

Points to check:
ID sensor control board, process control board

CODE SC870: Vsp DETECTION ERROR – Bk
CODE SC871: Vsp DETECTION ERROR – M
CODE SC872: Vsp DETECTION ERROR – Y
CODE SC873: Vsp DETECTION ERROR – C

If the condition Vsp – Vtc > 1.0 V occurs 15 times in a row, this code lights.

Points to check:
ID sensor, process control board

1.7 SYSTEM CONTROL

CODE SC910: SINGLE COLOR COUNTER MALFUNCTION

SC910 lights if the CN403-A10 of the sequence control board goes low when the counter should be off (during copy cycle), or if the CN403-A10 of the sequence control board stays high when the counter should be on.

Points to check:
Sequence control board (CN403-A10), total counter, dc power supply unit

CODE SC911: FULL COLOR COUNTER MALFUNCTION

SC911 lights if the CN403-A9 of the sequence control board goes low when the counter should be off (during copy cycle), or if the CN403-A9 of the sequence control board stays high when the counter should be on.

Points to check:
Sequence control board (CN403-A9), total counter, dc power supply unit

CODE SC920: MOTOR CONTROL BOARD COMMUNICATION ERROR

SC920 lights if the sequence control board does not communicate with the motor control board.

Points to check:
Motor control board, sequence control board, dc power supply board (CN501-1)

CODE SC930: SCANNER CONTROL BOARD COMMUNICATION ERROR

SC930 lights if the system control board does not communicate with the scanner control board.

Points to check:
System control board, scanner fiber cable

CODE SC940: OPERATION PANEL BOARD COMMUNICATION ERROR

SC940 lights if the system control board does not communicate with the operation panel board.

Points to check:
System control board

CODE SC950: SEQUENCE CONTROL BOARD COMMUNICATION ERROR

SC950 lights if the system control board does not communicate with the sequence control board.

Points to check:
Sequence control board, process control board

CODE SC951: SEQUENCE CONTROL BOARD MALFUNCTION

SC951 lights if the pulse from the sequence control board is not sent for more than 100 msec.

Points to check:
Sequence control board, process control board

CODE SC960: PROCESS CONTROL BOARD COMMUNICATION ERROR

SC960 lights if the sequence control board does not communicate with the process control board.

Points to check:
Process control board, sequence control board, dc power supply board

CODE SC965: PROCESS CONTROL BOARD MALFUNCTION

SC965 lights if the pulse from the process control board is not sent for more than 1.0 second.

Points to check:
Sequence control board, process control board

CODE SC991: PROCESS CONTROL BOARD RAM MALFUNCTION

SC991 lights if the data for the fusing operating temperature stored in RAM is not in the specification when the main switch is turned on.

Points to check:
Memory board, fusing operating temperature setting

2. SP PANEL INDICATIONS

2.1 U-CODES

U110 Upper Cassette No Lift-up

U110 lights if the upper paper lift sensor is not actuated within 20 seconds after the upper lift motor turns on.

U210 Lower Cassette No Lift-up

U210 lights if the lower paper lift sensor is not actuated within 20 seconds after the lower lift motor turns on.

U740 LD Power Error – Bk
U741 LD Power Error – M
U742 LD Power Error – Y
U743 LD Power Error – C

This code lights if the LD power goes out of control range.

U790 Laser Unit Thermistor Open

U790 lights if the laser unit thermistor is open.

2.2 E-CODES

EJ11 Registration Paper Jam

EJ11 lights if the registration sensor is not turned off within the proper period (see Timing table: line 1) after the Start signal is sent.

EJ12 Paper Misfeed

EJ12 lights if the registration sensor is not turned on within the proper period (see Timing table: line 2) after the Start signal is sent.

EJ13 Transport Paper Jam

EJ13 lights if the exit sensor is not turned on within the proper period (see Timing table: line 3) after the Start signal is sent.

EJ14 Fusing Paper Jam

EJ14 lights if the exit sensor is not turned off within the proper period (see Timing table: line 4) after the Start signal is sent.

EJ15 Registration Clutch On Signal Error (Too early)

RJ15 lights if the system control board sends the registration clutch on signal too early.

EJ16 Registration Clutch On signal Error (Too late)

RJ16 lights if the system control board sends the registration clutch on signal too late.

<Timing Table> (seconds)

	Code# \ Paper size	A3	B4	F/F4	A4 (L)	B5 (L)	A4 (S) A5 (L)	B5 (S) B6 (L)	A5 (S) A6 (L)	B6 (S)
1	EJ11 (Registration)	5.14	5.14	5.14	5.14	5.14	5.14	5.14	5.14	5.14
2	EJ12 (Misfeed)	10.91	10.16	9.71	9.27	8.73	8.11	7.73	7.28	7.01
3	EJ13 (Transport)	14.23	14.23	14.23	14.23	14.23	14.23	14.23	14.23	14.23
4	EJ14 (Fusing)	19.83	19.08	18.63	18.19	17.65	17.03	16.65	16.20	15.93

(seconds)

	Code# \ Paper size	11" x 17"	81/2" x 14"	81/2" x 11"	11" x 81/2" 51/2" x 81/2"	81/2" x 51/2"
1	EJ11 (Registration)	5.14	5.14	5.14	5.14	5.14
2	EJ12 (Misfeed)	11.06	10.05	9.03	8.18	7.17
3	EJ13 (Transport)	14.23	14.23	14.23	14.23	14.23
4	EJ14 (Fusing)	19.98	18.97	17.95	17.10	16.09

NOTE: In the OHP/thick mode, the above numbers are double.

3. COPY IMAGE PROBLEMS

3.1 SOLID AREA TAILING IMAGE

Description:

When you make copies under low humidity conditions, the trailing edges of solid areas may have slight streaking or dusting of toner (toner "tailing").

Cause:

When humidity is very low (around 15%) and the paper is too dry, the paper is easily electrified. When the paper is separated from the drum, toner tends to be dispersed at the edge of the image due to discharge between the paper and the drum. This effect is noticeable near the trailing edges of solid areas.

Action:

- Install a humidifier.
- Keep paper in the bag.

3.2 HONEYCOMB IMAGE

Description:

When you make copies at low humidity and low temperature, the copy might be dotted with small blank areas.

Cause:

1. If the dots are 2 mm or larger in diameter.
   During copying, the shielding plate of the Drum Cleaning Unit stores electrical charge. This easily discharges from the shielding plate to the paper under low humidity conditions.
2. If the dots are smaller than 2 mm in diameter.
   This is caused by dust on the edge of the Transfer Belt Guide Mylar which is on the transfer corona unit.
   Low resistance materials on the reverse of the transfer belt accumulate on the Guide Mylar. These easily discharge under low humidity conditions.

Action:

- Clean the guide mylar of the transfer belt.
- Clean the shield plate at the bottom of the Drum Cleaning Unit.
- Replace the paper with undamaged paper.

3.3 DIRTY BACKGROUND

Description:

Dirty background occurs, especially at the side edge of the paper and with black toner.

Cause:

When the developer deteriorates, the charge on toner becomes low and some toner might not be controlled correctly by the bias. Therefore toner might appear in no image areas.
This is also caused by the high concentration of the toner in the development unit.

Action:

- When the copy image density is too high, check Bk toner density with the color patch and perform the TD check procedure (Manual).
  When the copy image density is normal or not high enough, replace the developer and perform the TD check procedure.

3.4 PARTIAL BLANKING IN LINES OR SOLID IMAGE AREAS

Description:

Under high temperature and high humidity conditions, partial blanking might appear on some brands of paper, especially in lines (such as with text) and at the edge of solid image areas.

Cause:

When line image or solid image areas have a large amount of toner, the toner might be transferred incompletely.

Action:

- When the copy image density is too high, perform the manual TD check procedure to reduce toner density in the development unit.
- When the copy image density is normal or not high enough, replace the developer.

NOTE: This problem might not be solved completely, depending on the brand of paper.

3.5 UNEVEN SHINY IMAGE ON OHP SHEETS

Description:

When using OHP sheets, an uneven shiny image might appear, especially when copying A4/LT sideways.
The quality of the projected image might be slightly affected.

Cause:

The contact between OHP sheets and the hot roller of the fusing unit is uneven.

Action:

- Advise the customers to copy OHP sheets lengthwise.

3.6 MIMIZU PATTERN ON SOLID AND HALFTONE AREAS

Description:

When using some brands of paper under high humidity conditions, a mimizu pattern might appear on solid and halftone areas.

Cause:

The contact between the paper and the hot roller of the fusing unit is uneven.

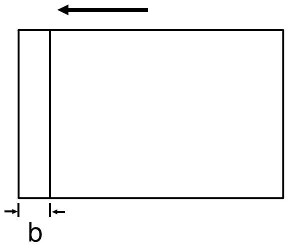
Action:

- Replace the paper with unhumidified paper.
- Perform the Fusing Unit Positioning Adjustment (see section 5 - 14.11.4 Procedure 3).

3.7 HORIZONTAL LINE

Description:

Under high humidity, horizontal lines appear on the background of copies from the 2nd copy onward in multiple copy runs.



a = 98 mm (A4)
a = 107 mm (8 1/2" x 11")

b = 8 mm (A3)
b = 20 mm (11" x 17")

Cause:

Depending on humidity, paper type, and paper conditions, charge transfer occurs from the trailing edge of the paper to the drum. It makes a charged line on the drum. When this line goes through the entrance seal, the cleaning blade, and the cleaning brush, the toner are attracted to this line, and the line appears on the next sheet of copy paper (a, b). This is most obvious when the cleaning blade and the cleaning brush are deteriorated.

Action:

Replace the cleaning blade and the cleaning brush. Then set UT-7 to the default (3).

NOTE: Customers can improve this problem by changing UT-7 from 3 (default) to 4 or 5. However, these settings may cause the image to be too light at the trailing part, (10 ~ 15 m, 0.4" ~ 0.6") on OHP or thick paper as a side effect.