# SERVICE MANUAL

### GENERAL PRECAUTIONS REGARDING THE INSTALLATION AND SERVICE FOR THE COPIER

The installation and service should be done by a qualified service technician.

#### 1. Transportation/Installation

• When transporting/installing the copier, employ two persons and be sure to use the positions as shown on the right.

The copier is quite heavy and weighs approximately 191 kg (421 lb), therefore pay full attention when handling it.

Fixing the adjusters (stoppers)

There are two adjusters (stoppers) located in the front bottom part of the copier. After moving/installing the copier, be sure to turn the adjusters clockwise to fix them firmly on the floor.

• To unlock the adjusters when moving the copier, turn them anticlockwise.

If the copier is not steady, it may fall over and result in personal injury.

- Be sure to use a dedicated outlet with AC 115V or 120V/20A (127V/20A, 220V, 230V, 240V/10A) for its power source.
- The copier must be grounded for safety. Never ground it to a gas pipe or a water pipe.
- Select a suitable place for installation. Avoid excessive heat, high humidity, dust, vibration and direct sunlight.
- Also provide proper ventilation as the copier emits a slight amount of ozone.
- To insure adequate working space for the copying operation, keep a minimum clearance of 80 cm (32") on the left, 80 cm (32") on the right and 10 cm (4") in the rear.
- The socket-outlet shall be installed near the copier and shall be easily accessible.

#### 2. Service of Machines

- Basically, be sure to turn the main switch off and unplug the power cord during service.
- Be sure not to touch high-temperature sections such as the exposure lamp, the fuser unit, the damp heater and their periphery.
- Be sure not to touch high-voltage sections such as the chargers, high-voltage transformer, exposure lamp control inverter, inverter for the LCD backlight and power supply unit. Especially, the board of these components should not be touched since the electirc charge may remain in the condensers, etc. on them even after the power is turned OFF.
- Be sure not to touch rotating/operating sections such as gears, belts, pulleys, fan, etc.
- Be careful when removing the covers since there might be the parts with very sharp edges underneath.
- When servicing the machines with the main switch turned on, be sure not to touch live sections and rotating/operating sections. Avoid exposure to laser radiation.
- Use suitable measuring instruments and tools.
- Avoid exposure to laser radiation during servicing.
  - Avoid direct exposure to the beam.
  - Do not insert tools, parts, etc. that are reflective into the path of the laser beam.
  - Remove all watches, rings, bracelets, etc. that are reflective.
- Unplug the power cable and clean the area around the prongs of the plug once a year or more. A fire may occur when dust lies on this area.





#### 3. Main Service Parts for Safety

 The breaker, door switch, fuse, thermostat, thermofuse, thermistor, etc. are particularly important for safety. Be sure to handle/install them properly. If these parts are shorted circuit and/or made their functions out, they may burn down, for instance, and may result in fatal accidents. Do not allow a short circuit to occur. Do not use the parts not recommended by Toshiba TEC Corporation.

#### 4. Cautionary Labels

• During servicing, be sure to check the rating plate and the cautionary labels such as "Unplug the power cord during service", "Hot area", "Laser warning label" etc. to see if there is any dirt on their surface and whether they are properly stuck to the copier.

#### 5. Disposition of Consumable Parts/Packing Materials

- Regarding the recovery and disposal of the copier, supplies, consumable parts and packing materials, it is recommended to follow the relevant local regulations or rules.
- 6. When parts are disassembled, reassembly is basically the reverse of disassembly unless otherwise noted in this manual or other related documents. Be careful not to reassemble small parts such as screws, washers, pins, E-rings, star washers in the wrong places.
- 7. Basically, the machine should not be operated with any parts removed or disassembled.

#### 8. Precautions Against Static Electricity

• The PC board must be stored in an anti-electrostatic bag and handled carefully using a wristband, because the ICs on it may become damaged due to static electricity.

# Caution: Before using the wristband, pull out the power cord plug of the copier and make sure that there are no uninsulated charged objects in the vicinity.

Caution :	Dispose of used batteries and RAM-ICs including lithium batteries according to the manufacturer's instructions.
Attention :	Se débarrasser de batteries et RAM-ICs usés y compris les batteries en lithium selon les instructions du fabricant.
Vorsicht :	Entsorgung des gebrauchten Batterien und RAM-ICs (inklusive der Lithium-Batterie) nach Angaben des Herstellers.

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In this manual, colors are sometimes shown in abbreviations as below:

Yellow : Y; Magenta : M; Cyan : C; Black : K

#### 1. SPECIFICATIONS · ACCESSORIES · OPTIONS · SUPPLIES

#### **1.1 Specifications**

- Copy process
  Indirect electrophotographic process (dry)
- Type Console type
- Original table Fixed table (the left rear corner used for Standard original placement)
- Acceptable originals Type: Sheets, books and 3-dimensional objects. However, the automatic document feeder only accepts sheets of paper (64~105 g/m<sup>2</sup>, or 17~28 lb.), excluding carbon paper, pasted sheets and stapled sheets. Size : A3/LD max.

• Co	• Copy speed (Copies/min.)					
Paper supply Bypass feeding						
		Cassette	Size specification	Size specification	LCT	
	Paper size		YES	NO		
ber	A4, LT	31(31)	21(21)	10.3(10.3)	21(31)	Ξ
Pap	B5	31(31)	23(23)	13(13)	-	
nal	A5-R, ST-R	31(31)	24(24)	24(24)	-	
2 Q	A4-R, B5-R, LT-R	23(23)	17(17)	17(17)	-	
9r / 1	B4, LG	19(19)	13(13)	13(13)	-	
ape	A3, LD	16(16)	10.3(10.3)	10.3(10.3)	-	
Ц.	Full bleed (12" x 18")	_	9.0(9.0)	9.0(9.0)	-	
르	A6-R	-	24(24)	24(24)	-	
	A4, LT	10.3(10.3)	9.5(9.5)	9.5(9.5)	10.3(10.3)	
-	B5, A5-R, ST-R	10.3(10.3)	10.3(10.3)	10.3(10.3)	-	
be	A4-R, B5-R, LT-R	9.3(9.3)	8.7(8.7)	8.7(8.7)	-	
Pa	B4, LG	8.5(8.5)	7.4(7.4)	7.4(7.4)	-	
<u>S</u>	A3, LD	7.9(7.9)	6.5(6.5)	6.5(6.5)	-	
님	Full bleed (12" x 18")	-	6.3(6.3)	6.3(6.3)	-	
	A6-R	-	10.3(10.3)	10.3(10.3)	-	
	Thick Paper 2(All size)	-	2~6 (2~6)	2~6 (2~6)	-	
5	Thick Paper 3(All size)	_	2~6 (2~6)	2~6 (2~6)	-	
the	OHP films (A4, LT)	3.3(3.3)	2~6(2~6)	-	-	
0	Thick Paper 4	-	2~6 (2~6)	2~6 (2~6)	-	
	Special Paper	_	2~6 (2~6)	2~6 (2~6)	_	

\*Thin paper: 64~79 g/m<sup>2</sup>, or 17~20 lb.

\*Normal paper:80~105 g/m<sup>2</sup>, or 21~28 lb.

\*Thick paper 1: 106~163 g/m<sup>2</sup>, or 29lbs.~60 lb. cover/90lb. index

\*Thick paper 2: 164g/m<sup>2</sup> ~209 g/m<sup>2</sup>, or 91~110 lb. index

\*Thick paper 3: 210~256 g/m<sup>2</sup>, or 111~140 lb. index

\*Thick paper 4: 257~280 g/m<sup>2</sup>, or ~~ ~104 lb. cover

\*Special paper: "Special paper" means the gloss paper for POP (Point of Purchase)

- \* Values in parentheses ( ) are the copy speed in the black mode copying.
- \* "-" means "not available".
- \* The copy speeds listed are available when originals are manually placed for single-side, multiple copying.
- \* When the document feeder is used, the copy speed is only available under the following conditions:
  - Original/Mode: Single-side originals of A4/LT size, not selecting auto color, APS,
    - automatic density and advance image enhancement mode
  - Number of sheets set: 31 or over
  - Paper feeding: 2nd cassette
  - Reproduction ratio: Actual ratio
- \* Reverse side copying speed of the automatic duplexing unit (When specific paper size is selected)

A4, B5, A5-R, LT, ST-R:31 sheets/minA4-R, B5-R, LT-R:23 sheets/minB4, LG:19 sheets/minA3, LD:16 sheets/min

#### \* System copy speed

Copy mode		Copies/min.
Single-sided originals	1 set	16 [18]
х	3 sets	19 [25]
Single-sided copies	5 sets	19 [27]
Single-sided originals	1 set	8 [9]
х	3 sets	14 [17]
Two-sided copies	5 sets	16 [21]
Two-sided originals	1 set	7 [7]
х	3 sets	12 [15]
Two-sided copies	5 sets	14 [18]
Two-sided originals	1 set	11 [11]
х	3 sets	16 [19]
Single-sided copies	5 sets	18 [23]

- \* Values in square brackets [ ] are for FC-311.
- \* The copy speeds are applicable when 10 A4sized originals are set in the automatic document feeder and are copied with any of the modes listed on the left. The first copy time is included.
- \* These values are attained in full color mode copying.

#### · Copy paper

	Cassette	Duplex copy	LCF	Bypass copy	Remarks
Size	A3~.	A5R	A4, LT	A3~A5-R	In the bypass mode,
	LD~S	ST-R		LD~ST-R	either irregular sizes or
					arbitrary sizes can be set.
Weight	64~163g/m <sup>2</sup>	64~105g/m <sup>2</sup>	64~163g/m <sup>2</sup>	64~280g/m <sup>2</sup>	
	17lb~60lb.cover	17~28lb.	17lb~60lb.cover	17lb~104lb.cover	
	~90lb.index		~90lb.index		
Special paper	_	_	-	Recommended	
				OHP films, gloss	
				paper for POP	
				(Point for Purchase)	
				and sticker labels	

- First copy time ...... Approx. 9.5 seconds (A4/LT, the first cassette, 100%)
- Warming-up time ...... Approx. 4 minutes
- Multiple copying ...... Up to 999 copies;entry by digital keys
- Reproduction ratio ...... Actual ratio: 100±0.5%

	Zooming:	25~400% in increments of 1%
Resolution/Gradation	Read:	600 dpi (10 bit)
	Write:	Corresponding to 600 dpi x 600 dpi
		(primary scanning only : 256 division smoothing)
• Excluded image width	Leading edge:	5.0±2.0 mm, Trailing edge: 2.5±2.0 mm
	Side edge:	2.0±2.0 mm
Paper feeding	Automatic feedi	ng: Cassettes – 2 pieces standard (expandable up to 4
		pieces by installing optional cassettes)
		LCF – Optional (Stack height 165 mm : equivalent to 1500

- sheets of 80 g/m<sup>2</sup>, 20 lb.)
- Bypass feeding: (Stack height 21 mm : equivalent to 130 sheets of 80 g/m<sup>2</sup>, 20 lb.)

Capacity for originals

A4, A4-R, B5, B5-R, A5-R, LT, LT-R, ST-R: 50 sheets (64~90g/m<sup>2</sup>) (17~24 lb.)

(Optional automatic document feeder)

40 sheets (91~105g/m<sup>2</sup>) (25~28 lb.) B4, Folio, LG, Comp: 35 sheets (64~90g/m<sup>2</sup>) (17~24 lb.)

25 sheets (91~105g/m²) (25~28 lb.)

A3, LD: 25 sheets (64~90g/m<sup>2</sup>) (17~24 lb.)

20 sheets (91~105g/m<sup>2</sup>)(25~28

lb.)

• Stacking capacity of sheets Paper weight 64~105 g/m<sup>2</sup>, 17~28 lb.: 30 sheets (Optional automatic duplexing unit)

- Toner supplying ...... Automatic toner-density detection and supply Toner cartridge replacing method
- Density control ...... Automatic density mode and manual density mode selectable in 11 steps
- Weight ..... Approx. 187 kg/413lb.
- Power requirements ...... AC 115V/16A, AC 220 240V/9A
- Power consumption ...... 2.0 kW or less (127V/16A, 115V series, 200V series)
  - \* The automatic document feeder, automatic duplexing unit and LCF are supplied with electric power through the copier.
- · Power consumption and warm-up time at energy saving mode

	Mode		Power Consumption	Warm-up time	Efficiency
		Level 1	Approx.100W	Approx. 2 min 30 sec.	Approx. 56%
	Energy saving mode		(Approx.135W)		(Approx. 48%)
115V sorios		Level 2	Approx.160W	Approx. 1 min 15 sec.	Approx. 29%
1134 261162			(Approx.195W)		(Approx. 25%)
	Normal standby		Approx. 225W	0	0%
			(Approx.260W)		(0%)
	Energy saving mode	Level 1	Approx.100W	Approx. 2 min 15 sec.	Approx. 57%
200V series			(Approx.135W)		(Approx. 49%)
			Approx.160W	Approx. 1 min 15 sec.	Approx. 30%
			(Approx.195W)		(Approx. 26%)
	Normal standby		Approx. 230W	0	0%
			(Approx.265W)		(0%)

\* Values in parentheses ( ) are when the copier is with full options: The automatic document feeder, automatic duplexing unit, large-capacity feeder, finisher, hole punch unit, cassette modules, AI board and scrambler board.

\* Level 1: Energy saver mode with priority aim of energy saving

Level 2: Energy saver mode with priority aim of returning to standby

• Dimensions ...... See the figure below (W868 x D750 x H997mm)



#### **1.2 Accessories**

Setup instructions	1 pc.
Operator's manual	1 pc. (not available for MJD)
Color copy guide	1 pc. (not available for MJD)
PM sticker	1 pc. (for MJD)
Setup report	1 set. (for NAD and MJD)
CS card	1 pc. (for MJD)
Drum	4 pcs.
Operator's manual pocket	1 pc.
Detachable code	1 pc. (for ASD, AUD, MJD and CND)
Copy receiving tray	1 pc.
Preventive maintenance check list	1 pc. (for MJD)
Toner bag symbol sticker	1 pc. (for MJD)
Warranty sheet	1 pc. (for NAD)
DF level up kit	1 pc.

\* Machine version

NAD: North America

MJD: Europe

AUD: Australia

ASD: Asia

CND: China

### 1.3 Options

Platen cover	Platen Cover Type3131
Automatic document feeder	DF81
Automatic duplexing unit	AD470
Cassette module	PS570
Slot cover	Slot Cover Type3131
Large capacity tray	RT47
Finisher	SR930/940
Punch unit	Hole Punch Unit Type3131
Built-in printer controller (Fiery New X3e V2.0)	E750
Video I/F kit for external controller connection	Controller Interface Type3131
Control panel kit for built-in controller	LCD PAanel Type3131



#### 2. OUTLINE OF THE MACHINE

#### 2.1 Sectional View

[A] Front view (The drive system is illustrated in [B] and [C])



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1	Carriage 1
2	Exposure lamp
3	Reflector
4	Mirror 1
5	Inverter
6	Carriage 2
7	Mirror 2
8	Mirror 3
9	Lens
10	CCD PC board
11	Scanner control board
12	Original glass
13	Carriage fan
14	SCM fan
15	Board unit cooling fan
16	Drum Y
17	Drum M
18	Drum C
19	Drum K
20	Developer sleeve (Magnetic roller) Y
21	Developer sleeve (Magnetic roller) M
22	Developer sleeve (Magnetic roller) C
23	Developer sleeve (Magnetic roller) K
24	Upper mixer Y
25	Upper mixer M
26	Upper mixer C
27	Upper mixer K
28	Lower mixer Y
29	Lower mixer M
30	Lower mixer C
31	Lower mixer K
32	Doctor blade Y
33	Doctor blade M
34	Doctor blade C
35	Doctor blade K
36	Scattered toner recovery roller Y
37	Scattered toner recovery roller M
38	Scattered toner recovery roller C
39	Scattered toner recovery roller K

40	Cleaning blade Y
41	Cleaning blade M
42	Cleaning blade C
43	Cleaning blade K
44	Recovery blade Y
45	Recovery blade M
46	Recovery blade C
47	Recovery blade K
48	Toner recovery auger Y
49	Toner recovery auger M
50	Toner recovery auger C
51	Toner recovery auger K
52	Discharge LED Y
53	Discharge LED M
54	Discharge LED C
55	Discharge LED K
56	Main charger Y
57	Main charger M
58	Main charger C
59	Main charger K
60	Charger wire cleaner Y
61	Charger wire cleaner M
62	Charger wire cleaner C
63	Charger wire cleaner K
64	Image quality sensor
65	Color registration sensor
66	Transfer belt
67	Transfer belt drive roller
68	Transfer belt cleaning blade
69	Transfer belt recovery blade
70	Transfer belt toner recovery auger
71	Suction charger
72	Transfer belt contact/release motor
73	Transfer belt driven roller
74	Transfer roller Y
75	Transfer roller M
76	Transfer roller C
77	Transfer roller K
78	Transfer belt push-up mechanism

79Transfer transformer80Registration roller81Registration switch82Bypass pick-up roller83Bypass feed roller84Bypass separation roller85Bypass tray861st cassette pick-up roller871st cassette feed roller881st cassette separation roller891st cassette ray901st cassette feed roller912nd cassette pick-up roller922nd cassette feed roller932nd cassette separation roller942nd cassette tray952nd cassette feed jam sensor101Transport roller102Cassette feed jam sensor103Upper heat roller104Lower heat roller105Upper heater lamp106Lower heater lamp107Fuser roller108Fuser belt109Separation finger111Upper thermostat112Lower thermostat113Upper thermistor114Lower thermistor115Cleaning roller116Oil roller117Fuser unit exit roller118Exit roller119Exit sensor120Duplex Unit/exit switching gate121Duplex Unit transport roller 1122Duplex Unit transport roller 1			
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106Lower heater lamp107Fuser roller108Fuser belt109Separation guide110Separation finger111Upper thermostat112Lower thermostat113Upper thermistor114Lower thermistor115Cleaning roller116Oil roller117Fuser unit exit roller118Exit roller119Exit sensor120Duplex Unit/exit switching gate121Duplex Unit transport roller 1122Duplex Unit transport roller 2	105	Upper heater lamp	
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108Fuser belt109Separation guide110Separation finger111Upper thermostat112Lower thermostat113Upper thermistor114Lower thermistor115Cleaning roller116Oil roller117Fuser unit exit roller118Exit roller119Exit sensor120Duplex Unit/exit switching gate121Duplex Unit transport roller 1122Duplex Unit transport roller 2	107	Fuser roller	
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117Fuser unit exit roller118Exit roller119Exit sensor120Duplex Unit/exit switching gate121Duplex Unit transport roller 1122Duplex Unit transport roller 2	116	Oil roller	
118Exit roller119Exit sensor120Duplex Unit/exit switching gate121Duplex Unit transport roller 1122Duplex Unit transport roller 2	117	Fuser unit exit roller	
119Exit sensor120Duplex Unit/exit switching gate121Duplex Unit transport roller 1122Duplex Unit transport roller 2	118	Exit roller	
120Duplex Unit/exit switching gate121Duplex Unit transport roller 1122Duplex Unit transport roller 2	119	Exit sensor	
121Duplex Unit transport roller 1122Duplex Unit transport roller 2	120	Duplex Unit/exit switching gate	
122 Duplex Unit transport roller 2	121	Duplex Unit transport roller 1	$\neg$
	122	Duplex Unit transport roller 2	

123	Duplex Unit transport roller 3
124	Toner bag
125	Used toner transport unit (main unit
	side)
126	OHP sensor

#### [B] Front drive system



### [C] Rear drive system



1	Scan motor
2	Drive belt
3	Drive pulley
4	Driven pulley
5	Carriage drive wire
6	Color drum motor (drum Y, M,C)
7	Black drum motor (drum K)
8	Transfer belt
9	Color developer drive belt
10	Developer motor
11	Black developer drive belt
12	Developer sleeve (magnetic roller) Y
13	Developer sleeve (magnetic roller) M
14	Developer sleeve (magnetic roller) C
15	Developer sleeve (magnetic roller) K
16	Used toner transport unit (PCU side)
	drive belt
17	Transfer belt motor
18	Transfer belt drive roller
19	Pre-feed clutch (F)
20	Pre-feed clutch (R)
21	Registration roller
22	Registration motor
23	Paper feed motor
24	Feed path clutch
25	Bypass feed roller
26	Bypass feed clutch
27	1st cassette feed roller
28	1st cassette feed clutch
29	1st cassette tray-up motor unit
30	2nd cassette feed roller
31	2nd cassette feed clutch
32	2nd cassette tray-up motor unit
36	Transport roller
37	Fuser motor
38	Fuser roller
39	Cleaning roller
40	Fuser exit roller
41	Exit roller

42	Paper exit gate solenoid
43	Duplex Unit transport roller 1
44	Duplex Unit transport roller 2
45	Duplex Unit transport roller 3
46	Duplex Unit transport drive belt
47	Used toner transport motor
48	Used toner transport unit (main unit
	side) drive belt
49	Document motor

#### **2.2 Location of Electrical Parts**

[A] Arrangement of Various Units



#### [B] Scanner unit



#### (B-2) Sensors and switches







Rear side



(B-4) Others




(C-2)PC boards





#### (D-2) Sensors, switches, thermistors and lamps



## [E] Transfer/transport unit

## (E-1) Motors, thermostats and heaters



## (E-2) Switches, PC boards and fuses





[G]Main unit (G-1) Motors



#### (G-2) Switches, clutches and solenoids







OUTLINE OF THE MACHINE

## (G-4) PC boards



(G-5) Others



## 2.3 Symbols and Functions of Various Devices

The "< P - I >" under the Name column shows the page item of the Parts List.

(1) Motors

Symbol	Name	Function	Remarks
M1	Scan motor	Scans the carriages.	(B-1)
M2	Document motor	Drives the original-width indicator.	(B-1)
М3	Carriage fan motors	Cool the surroundings of the carriages. (2 pcs.)	(B-1)
M4	SCM fan motor	Cools SCM PC boards.	(B-1)
M5	Board unit cooling fan motor	Cools the PC boards (suction).	(G-1)
M6	Board unit cooling fan motor	Cools the PC boards (exhaust).	(G-1)
M7	Ozone exhaust fan motor	Exhausts the ozone of copier.	(G-1)
M8	Fuser-unit exhaust fan motor	Cools the fuser unit.	(G-1)
M9	Power-unit fan motor	Cools the power unit.	(G-1)
M10	Used toner transport motor	Transports used toner to the toner bag.	(G-1)
M11	Polygonal motor	Drives the polygonal mirror.	(C-1)
M12	Tilt motor Y	Drives the parallel adjustment controls of the laser optical system (Y).	(C-1)
M13	Tilt motor M	Drives the parallel adjustment controls of the laser optical system (M).	(C-1)
M14	Tilt motor C	Drives the parallel adjustment controls of the laser optical system (C).	(C-1)
M15	Toner motor Y	Supplies toner (Y).	(G-1)
M16	Toner motor M	Supplies toner (M).	(G-1)
M17	Toner motor C	Supplies toner (C).	(G-1)

Symbol	Name	Function	Remarks
M18	Toner motor K	Supplies toner (K).	(G-1)
M19	Wire cleaning motor Y	Drives the main charger-wire cleaner (Y).	(D-1)
		Drives the main charger wire cleaner (M).	
M20	Wire cleaning motor M	Drives the main charger wire cleaner (C).	(D-1)
		Drives the main charger wire cleaner (K).	
M21	Wire cleaning motor C		(D-1)
M22	Wire cleaning motor K	Drives to contact/release the transfer	(D-1)
		belt to/from the drums Y, M and C.	
M23	Registration motor	Drives the registration roller and	(G-1)
		bypass feed roller	
M24	Transfer belt contact/release drive motor	Drives the developer unit.	(E-1)
M25	Paper feed motor		(G-1)
M26	Developer motor		(G-1)
M27	Color drum motor	Drives the drums (Y,M,C)	(G-1)
M28	Black drum motor	Drives the drum (K)	(G-1)
		Drives the transfer belt.	
M29	Transfer belt motor		(G-1)
M30	Fuser motor	Drives the fuser unit.	(G-1)
M31	1st cassette tray-up motor	Drives the 1st cassette tray upward.	(G-1)
M32	2nd cassette tray-up motor	Drives the 2nd cassette tray upward.	(G-1)

## (2) Solenoids

Symbol	Name	Function	Remarks
SOL1	Paper-exit gate solenoid	Drives the ADU/exit switching gate.	(G-2)
SOL2	Image quality sensor shutter solenoid	Drives the shutter for protecting the	(G-2)
		image quality sensor.	

## (3) Electromagnetic spring clutches

Symbol	Name	Function	Remarks
CL1	Feed path clutch	Drives the paper feed unit.	(G-2)
CL2-1	Feed clutch (for 1st cassette)	Drives the cassette pick-up roller.	(G-2)
CL2-2	Feed clutch (for 1st cassette)		
CL2-3	Feed clutch (for 2nd cassette)		
CL3	Bypass feed clutch	Drives the bypass pick-up roller.	(G-2)
CL4	Pre-feed clutch (front)	Drives the paper feed unit.	(G-2)
CL5	Pre-feed clutch (rear)	Drives the paper feed unit.	(G-2)

## (4) Switches and thermostats

Symbol	Name	Function	Remarks
SW2-1	Cassette detection switch	Detects if the cassette is set or not.	
	(for 1st cassette)		(G-2)
SW2-2	(for 2nd cassette)		
SW3	Side door open/close switch	Detects if the side door is open or not.	(G-2)
SW4	Bypass unit open/close switch	Detects if the bypass unit is open or not.	(G-2)
		Detects the home position of the main	
SW5-Y	Wire cleaner home position switch	charger wire cleaning pad.	
	(Y)		(D-2)
SW5-M	(M)		
SW5-C	(C)		
SW5-K	(K)		

Symbol	Name	Function	Remarks
SW6-Y	Wire cleaner limit switch (Y)	Detects the limit position of the main	(D-2)
SW6-M	(M)	charger wire cleaning pad.	
SW6-C	(C)		
SW6-K	(K)		
SW7-Y	Developer cartridge detection switch (Y)	Detects if the developer cartridge is set	(G-2)
SW7-M	(M)	or not.	
SW7-C	*C)		
SW7-K	(K)		
SW9	Transfer belt home position switch	Detects the home position of the trans-	(E-2)
		fer belt.	
SW10	Transfer belt limit switch	Detects the limit when the transfer belt is	(E-2)
		released from drums Y, M and C.	
SW12	Paper-exit unit open/close switch	Detects if the paper-exit unit is open or	(G-2)
		closed.	
SW13	Front cover switch (front door switch)	Interlock switch to shut off the AC power	(G-2)
		when the front cover is open.	
SW14	Paper-exit unit switch (left door switch)	Interlock switch to shut off the AC power	(G-2)
		when the paper-exit unit cover is open.	
SW15	Main switch	Shuts off the AC power to the copier.	(G-2)
THMO1	Thermostat	Turns the drum damp heater ON/OFF.	(E-1)
THMO2	Fuser unit upper thermostat	Prevents the fuser belt (upper heat roller)	[F]
		from over-heating.	
THMO3	Fuser unit lower thermostat	Prevents the lower heat roller from over-	[F]
		heating.	

(5) Sensors and thermistors

Symbol	Name	Function	Remarks
APS-1,2,3	APS-1, 2, 3 (3-beam)	Detects the size of original documents.	(B-2)
APS-C	APS-C	(A4 series)	
APS-R	APS-R		
	Automatic original detection sensor		
APS-1	APS-1	Detects the size of original documents.	(B-2)
APS-3	APS-3	(LT series)	
APS-C	APS-C		
APS-R	APS-R		
	Automatic original detection sensor		
CCD	CCD sensor	Reads out information on originals.	(B-3)
SEN1	Carriage home position sensor	Detects the carriage home position.	(B-2)
SEN2	Platen sensor	Detects if the platen cover is open or	(B-2)
OLINE		closed	
SEN3-1	Cassette paper-empty sensor	Detects if there is paper in the cassette	
	(for 1st cassette)	or not	(G-3)
SEN3-2	(for 2nd cassette)		(0.0)
SEN4	Bypass paper sensor	Detects if there is paper in the bypass	(G-3)
		tray or not.	
SEN5-1	Cassette tray-up limit sensor	Detects paper inside the cassette as	
	(for 1st cassette)	well as detecting if the cassette tray is	(G-3)
SEN5-2	(for 2nd cassette)	at its upper limit.	
SEN6-1	Cassette-feed jam sensor	Detects paper misfeeding.	
	(for 1st cassette)		(G-3)
SEN6-2	(for 2nd cassette)		
SEN6-3	(for 3rd cassette)		
SEN6-4	(for 4th cassette)		
SEN7	OHP sensor	Detects if paper or OHP is set.	(G-3)
SEN8	Registration sensor	Detects if paper has reached the regis- tration roller or not.	(G-3)

Symbol	Name	Function	Remarks
SEN9-Y	Auto-toner sensor (Y)	Detects the toner density.	(D-2)
SEN9-M	(M)		
SEN9-C	(C)		
SEN9-K	(K)		
THM1-Y	Drum thermistor (Y)	Detects the surface temperature of the	(D-2)
THM1-K	(K)	drum.	
THM2	Upper thermistor (center)	Detects the surface temperature in the	[F]
		center of the fuser belt.	
ТНМЗ	Upper thermistor (rear)	Detects the surface temperature at the	[F]
		rear of the fuser belt.	
THM4	Lower thermistor (center)	Detects the surface temperature in the	[F]
		center of the lower heat roller.	
THM5	Lower thermistor (rear)	Detects the surface temperature at the	[F]
		rear of the lower heat roller.	
SEN12	Exit sensor	Detects paper in the paper exit area.	(G-3)
SEN13	Auto duplex path sensor	Detects paper in the exit area of the ADU	(G-3)
		paper transport path.	
SEN14	Toner bag limit sensor	Detects if the used toner bag is full as well	(G-3)
		as detecting if it is set or not.	
SEN15	Image quality sensor	Detects the amount of toner on the patch	(G-3)
		on the transport belt.	
SEN16-F	Color registration sensor (front)	Detects deviation in printed images.	(G-3)
SEN16-R	(rear)		
SEN17	Temperature/humidity sensor	Detects the temperature and humidity	(G-3)
		inside the copier.	
SEN18	Developer removal shutter	Detects the home position of the devel-	(G-1)
	home position sensor	oper removal shutters.	

(6) Heaters and lamps

Symbol	Name	Function	Remarks
EXP	Exposure lamp	Exposes the original.	(B-4)
DH1-1	Damp heater (for lenses)	Prevents condensation in the scanner	(B-4)
DH1-2	(for mirrors)	section.	
DH3-1	Damp heater (paper feed side)	Prevents condensation on the drum sur-	(E-1)
DH3-2	(paper exit side)	face.	
LAMP1	Upper heater lamp	Heats the upper heat roller.	[F]
LAMP2	Lower heater lamp	Heats the lower heat roller.	[F]
ERS-Y	Discharge LED array (Y)	Removes residual charge on the drum	(D-2)
ERS-M	(M)	surface.	
ERS-C	(C)		
ERS-K	(K)		

(7) PC boards

Symbol	Name	Function	Remarks
SYS	System board (SYS board)	Controls the image compression/expansion,	(G-4)
		the control panel and the entire system.	
IMG	Image processing board (IMG board)	Controls the image processing.	(G-4)
LDR-Y	Laser drive board (Y)	Drives the lasers.	(C-2)
LDR-M	(M)		
LDR-C	(C)		
LDR-K	(К)		
OPT	H-Sync signal detection PC board	Detects the position of laser beams.	(C-2)
MTH1	Mother board1	Relays among IMG board, SYS board and IMC board.	(G-4)
MTH2	Mother board2	Relays between IMG board and the con- trol.	(G-4)
LGC	Logic board	General control of the copier.	(G-4)
IMC	Printer control board	Controls image processing and color registration.	(G-4)
RLY	Laser relay board	Relays between IMC board and laser drive board.	(C-2)
SCM	Scanner control board	Controls the scanner section.	(B-3)
CCD	CCD board	Controls the pre-processing of CCD image data.	(B-3)
SDV	Scan motor drive board	Controls the scan motor.	(B-3)
DSP	Display Board	DSP board	(G-4)
PNL	Panel Bosrd	PNL board	
KEY	Key Board	KEY board	
AI	AI board	Processes image discrimination.	(G-4)
DES	Scrambler board	Encryption/Decription the data of the in- ternal HDD	(G-4)

## (8) Transformers

Symbol	Name	Function	Remarks
HVT-M-Y	Main high-voltage transformer (Y)	Produces high voltages for charging,	(G-4)
HVT-M-M	(M)	development and discharging.	
HVT-M-C	(C)		
HVT-M-K	(K)		
HVT-TB	Transfer transformer	Produces high voltages for transfer and	(E-2)
		suction.	

(9) Others

Symbol	Name	Function	Remarks
SSR-U	Solid-state relay (U)	Switches the upper and lower heater	(G-5)
SSR-L	Solid-state relay (L)	lamps ON and OFF.	
FUS-SCN	Fuse PC board(SCN)	Prevents over-current to damp	(B-4)
FUS-TBU	Fuse PC board (TBU)	heaters (scanner section, transfer/	(E-2)
		transport unit).	
PS	Switching power supply	Provides electrical power.	(G-5)
NFL	Noise filter		(G-5)
		Cuts off noise.	
BR	Breaker		(G-5)
		Safety switch	
INL	Inlet		(G-5)
		Inlet	
PWC	Power cable		(G-5)
		Power cable	
HDD	Hard disk drive	Stores the image data.	(G-5)
INV	Lamp inverter		(B-4)

## 2.4 General Description of System

2.4.1 System block diagram



April 2004



#### 2.4.2 General description

#### (1) SYS board

The SYS board controls and supervises the whole system.



#### (2) CPU functions

The CPU on the SYS board performs the following controls.

- 1. ASIC control on the IMG board
- 2. ASIC control for the system control
  - $\cdot$  Communication with the LGC board
  - · Communication with the SCM board
  - $\cdot$  Control of the keys on the control panel
- 3. Page memory control
- 4. HDD control

#### (3) Page memory countrol

(3-1) General

The image data digitized by the IMG board can be memorized in page units and then be edited such as by rotating pages, changing the page order, etc. and be printed. The basic processings of the memory copying are as follows.

1. Scanner input processing	: Writes the digitized data read from the scanner section of the
	main unit to the page memory.
2. Printer output processing	: Outputs the image data on the page memory to the printer
	output section of the main unit.
3. Compression/Expansion processing	: Performs the compression processing against the image data
	when writing the data to the page memory in the scanner
	input processing and performs the expansion processing
	against the image data when outputting the page memory in
	the printer output processing.

By the time-shared system, the above processings can be operated simultaneously. With the combination of these processings, functions such as electronic sorting can also be realized.



(3-2) Construction overview

#### (3-3) Interfaces

#### 1. Scanner interface

By the external interface of the image processing section in the main unit, the digital signal data read from the scanner section is fetched and then kept in the page memory.

#### 2. Printer interface

By the external interface of the image processing section in the main unit, the image data on the page memory is output to the laser related control section of the printer section.

#### (3-4) Page memory

#### 1. Memory

A 128M-byte memory which consists of eight 128M-bite SD-RAM is mounted on the page memory.

#### 2. Page memory control ASIC

a) Address control

Under the conditions below, an address is generated on the page memory.

- $\cdot$  when the digital image data is written to the page memory
- $\cdot$  when the digital image data on the page memory is read

b) Data control

- $\cdot$  Controls the data bus of the page memory.
- Controls the image data transmission between the compression/expansion blocks inside the ASIC and the page memory.
- Processes the editing jobs such as composing the image data from the page memory and that read from the scanner section of the main unit and writing the data into the page memory.
- c) Rotating/Composing control
- Through the scanner interface and the printer interface, receives and keeps the image data transmitted between the main unit and the page memory.
- $\cdot$  When processing the page rotating, changes the order of the data on the page memory.
- d) Compression/Expansion control
- $\cdot$  Compresses the image data on the page memory and produces the signal data.
- $\cdot$  Expands the compressed signal data on the page memory and restores the image data.
- e) LCD control
- · Displays the screen data saved on the page memory on the control panel.

# 2.5 Removal and Reinstallation of Covers, PC Boards and Roms

2.5.1 Removal and reinstallation of covers

#### [A] Right front cover

- (1) Open the right front cover.
- (2) Lift up 2 L-shaped pins out from the hinges.

#### [B] Left front cover

- (1) Open the left front cover.
- (2) Lift up 2 L-shaped pins out from the hinges.

#### [C] Middle inner cover

- (1) Draw out the processing unit.
- (2) Remove the middle inner cover (5 screws).

#### [D] Right inner cover

- (1) Remove the right inner cover (3 screws).
- (2) Disconnect the connector of the temperature/ humidity sensor.

#### [E] Left inner cover

(1) Remove the left inner cover (4 screws).

#### [F] Rear cover

- (1) Unscrew 9 screws.
- (2) Unlock the lower 3 hooks and remove the rear cover.





#### [G] Feed-side upper cover

- (1) Open the bypass unit.
- (2) Remove the feed-side upper cover (4 screws).

#### [H] Feed-side front and rear covers.

- (1) Remove the feed-side front cover (2 screws).
- (2) Remove the feed-side rear cover (3 screws).



#### [I] Exit-side upper cover

- (1) Shift the slide cover toward the rear to remove it.
- (2) Unscrew 3 screws and remove the exit-side upper cover.

## [J] Exit-side lower cover, front cover and rear cover, and paper-exit unit cover

- (1) Remove the exit-side lower cover (4 screws).
- (2) Remove the exit-side front cover (2 screws).
- (3) Remove the exit-side rear cover (2 screws).
- (4) Remove the paper-exit unit cover (6 screws).



#### [K] Right top cover

(1) Remove the right top cover (3 screws).

#### [L] Rear top cover

(1) Remove the rear top cover (6 screws).

#### [M] Left top cover

(1) Remove the left top cover (3 screws).





## 2.5.2 Removal of PC boards and ROMs [A] LGC board

- (1) Remove the rear cover.
- (2) Disconnect 24 connectors.
- (3) Detach the M-ROM on the LGC board.
- (4) Unscrew 2 screws, remove 4 lock supports and take out the LGC board.



- [B] SYS board/IMG board/IMC- board, Hard disk, AI board (option), Scrambler board (option)
- (1) Remove the feed-side upper cover and feedside upper inner cover (4 screws).



- (2) Disengage the harness from the clamp.
- (3) Disconnect the connector from the fan.
- (4) Remove the metal shield cover (4 screws).



- (5) Disconnect 2 connectors of the SYS board, unscrew 2 screws and take out the SYS board.
- (6) Disconnect 5 connectors of the IMG board, unscrew 2 screws and take out the IMG board.
- (7) Disconnect 5 connectors of the IMC board, unscrew 2 screws and take out the IMC board.



(8) Disconnect 2 connectors of the hard disk, unscrew 1 screw and take out the hard disk.

**Note:** When replacing the HDD, make sure the position of jumper connector as shown on the right.



- (1) Remove the glass retainer (2 screws).
- (2) Remove the original glass.
- (3) Remove the right top cover (3 screws).
- (4) Remove the right top bracket (3 screws).
- (5) Remove the lens cover (9 screws and 2 connectors).
- (6) Detach the SCM board by disconnecting 6 connectors and unscrewing 4 screws.
- \* See Chapter 9 for the details of above steps (1) to (5).

## [D] Main high-voltage transformer

- (1) Remove the rear cover.
- (2) Disconnect 5 connectors.
- (3) Unscrew 2 screws and remove the main high-voltage transformer together with its bracket.
- (4) Remove 2 screws and 2 lock supports and take out the main high-voltage transformer.
- \* All 4 transformers should be removed using the same procedure.









## [E] Switching power supply

- (1) Remove the rear cover.
- (2) Disconnect 11 connectors.
- (3) Unscrew 3 screws.
- (4) Take out the switching power supply.



# **3. COPY PROCESS**

## 3.1 Expression of Colors and 4-Step Copy Process

A variety of colors can be expressed by mixing the three primary colors : Yellow, magenta and cyan. Red can be created by mixing yellow and magenta; blue can be created by mixing magenta and cyan; green is created by mixing cyan and yellow; and mixing all the three primary colors allows you to obtain black.

With color copiers, a variety of colors are accomplished by mixing toners of the above three colors at proper ratios.



However, there are no coloring agents available which

exhibit ideal characteristics, so if you mix all the three colors made of available coloring agents, you cannot obtain a suitable black color. To improve the reproduction of black color, black toner is added to the mixture of the three colors.

On this model, a 4-step copy process is employed to realize the color expression described above. In the 4-step copy process, four sets of the drum, developer unit, main charger, etc., corresponding to the four colors of yellow, magenta, cyan and black, are horizontally arranged along the paper path. Paper is passed through these units to allow the four colors to be overlaid for the appropriate expressions of colors.



## **3.2 General Description of Copying Process**



1. Charging: Places a negative charge on the surface of the photoconductive drum.

Х

2. Original exposure: Converts images on the original into optical signals.

#### Х

3. Data reading: The optical image signals are read into CCD and converted into electrical signals.

х

4. Data writing: The electrical image signals are changed to light signals (by laser emission) which expose the surface of the photoconductive drum.

х

5. Development: Negatively-charged toner is made to adhere to the photoconductive drum, producing a visible image.

6. Transfer/separation: Transfers the visible toner image onto paper, and separates the paper with the toner image from the photoconductive drum.

K

7. Fusing: Fuses the toner image to the paper by applying heat and pressure.

х

8. Conductive blade cleaning : While scraping off the residual toner from the drum, this blade also eliminates the (+) residual charge on the drum left after image transfer.

Х

9. Discharging: Eliminates the residual (–) charge from the surface of the photoconductive drum.

## 3.3 Details of Copying Process

#### (1) Photoconductive drum

The photoconductive drum consists of two layers. The outer layer is a photoconductive layer made of an organic photoconductive carrier (OPC), and the inner layer is an aluminum conductive base in a cylindrical form.

The photoconductive carrier has a special property: when it is exposed to light, the electrical resistance it possesses increases or decreases with the strength of the light.

Example:

· Strong incident lightn

Decreases resistance (works as a conductor.)

Weak incident lightn

Increases resistance (works as an insulator.)

#### [Formation of electrostatic latent images]

In the processes of charging, data reading, data writing, discharging described below, the areas on the drum corresponding to colored areas on the original are deprived of negative charge, while the areas on the drum corresponding to white areas retain the negative charge, thus forming a negative charge image on the drum surface.

As this negative charge image on the drum is not visible to the human eye, it is called an "electrostatic latent image."

#### (2) Charging

Charging is a process to apply some charge uniformly to the drum surface.

The charger wire produces negative corona discharge, which is controlled by the grid so that the drum surface is uniformly charged with negative potential.

The surface potential on the drum is determined by the grid potential and is controlled to a fixed value by the grid control circuit.



Structure of the photoconductive drum (Example of OPC)



Electric potential of the photoconductive drum



(3) Data reading (scanning)

Data reading is the process of illuminating the original with light and converting the reflected light into electrical signals.

The light reflected from the original is directed to the charge coupled device (CCD) and this optical image information is converted to electrical signals (image signals), which are then sent to the image processing section via the scanner control PC board. The CCD for color processing has RGB filters provided over its surface, which allow the CCD to read the light amount in the respective ranges of wavelength. The image data corresponding to the respective RGB colors is then sent to the image processing section.



(Example)



#### (4) Data writing

Data writing is the process of converting the image signals sent from the image processing section into light signals and exposing the drum surface with the light signal.

Namely, the image signals sent from the image processing section are converted into optical signals (laser emission) by the semiconductor laser element, which are then used to expose the drum surface, thus forming an electrostatic latent image there.



(5) Development

Development is the process of making the electrostatic latent images visible to the eye (visible image).

Developer material is supplied to the photoconductive drum surface by means of a magnetic roller, allowing the toner in the developer material to adhere to the areas on the drum surface where the potential is lower than the developer bias which is applied to the magnetic roller (reverse development).





About developer material

The developer material is comprised of a mixture of toner and carrier. The toner is charged to a negative polarity and the carrier to a positive polarity, due to the friction with each other caused by mixing.

Toner : Mainly consists of resin and coloring.

Carrier: Consists of ferrite, and over its surface resin coating to provide consistent frictional electrification.





#### Note:

If the developer material is used for long periods of time (beyond its normal life span), toner will become caked onto the carrier.

Х

The carrier's (charging) performance is lowered.

Result: 1. Image density is lowered.

2. Toner scattering occurs.

3. Background fogging occurs.

Solution: Replace the developer material.



Magnetic roller

- Magnetic brush development technique-Inside magnetic rollers, the south and north poles are arranged as shown in the right figure. The developer material forms a brush-like fluff which contacts the photoconductive drum surface.

#### Х

This is caused by the lines of magnetic force between the south and north poles.



#### (6) Transfer/separation

- Transfer is the process of transcribing the toner image (visible image) formed on the photoconductive drum to the copy paper.
- 1. Transfer process

A positive bias is applied to the transfer roller, causing the transfer belt to be positively charged. This in turn helps to form an electric field E between the transfer belt (positive) and the aluminum base of the photoconductive drum (grounded), thereby making the paper electrostatically polarized, as shown in the figure.

An electrostatic attracting force occurs between the polarized charge (positive) on the upper surface of the paper and the toner (negative) on the photoconductive drum, thus making the toner image transferred to the paper.

In the 4-step copy process of this model, images are transferred, in the order of YnMnCnK, onto the paper which is transported on the transfer belt.

#### 2. Separation process

An electrostatic force occurs between the polarized charge (negative) on the underside of the paper and the transfer belt (positive), allowing the paper to be attracted to the belt and separated from the photoconductive drum.



(7) Fusing process

Fusing is a process of melting the toner on the paper and fixing it firmly onto the paper.

Method : The melting point of the toner (main component : resin) is 100~110°C.

х

- (Heat) Toner is melted by the heat emitted from the surfaces of the heat roller and the fuser belt.
  - +
- (Pressure) The lower heat roller is pressed against the fuser belt by the springs to increase adherence of the melted toner to the paper.

Х

The paper is subjected to the heat and pressure when passing through the lower heat roller and the fuser belt.

(Fusing) The toner on the paper is fused to it.



(8) Conductive blade cleaning

While eliminating the (+) charge on the photoconductive drum applied during the transfer stage, the conductive blade recovers the toner left on the drum at the same time.

• Elimination of transfer charge

With this OPC photoconductive drum, (+) charge on their surface cannot be eliminated optically. Therefore, (–) voltage is applied to the conductive blade, which is pressed against the drum, to eliminate the (+) charge applied at the transfer stage.



#### Cleaning

The edge of the conductive blade is pressed against the photoconductive drum surface to scrape off residual toner from it. The toner thus removed is then caught by the recovery blade.



(9) Discharging process

Discharging is the process of eliminating the (–) charge remaining on the photoconductive drum before the next charging process.

If the charge remaining on the photoconductive drum is not eliminated, the following phenomena would occur:

(-) charge remaining on the photoconductive drum surface causes uneven application of the charge for the next copying.

х

The next copy will have a double image. (The preceding image will also be copied.)

To prevent this :

The entire surface of the photoconductive drum is flooded with light by the discharge LED array.

Х

The photoconductive drum becomes electrically conductive.

Х

All of the (–) charge remaining on the photoconductive drum is conducted away to ground (However, (+) charge is eliminated by the conductive blade as mentioned in (8)).

Х

Preparation for the next copying process is completed.



# 3.4 List of Copying Process Conditions

Process	
1. Photoconductive drum	(OPC drum)
(1) Sensitivity	(1) Highly sensitized drum
(2) Surface potential	(2) -550 V (grid voltage -600 V)
	Scolotron method
2. Charging	-250~-1000V (grid voltage)
	(adjusting by image quality control)
3. Data writing	
(1) Light source	(1) Semiconductor laser (adjustment not
	required)
(2) Light amount	(2) 6.0 nJ/mm <sup>2</sup>
4. Image control	Image quality control by sensoring toner
	adhesion amount
5. Development	
(1) Magnetic roller	(1) One magnetic roller
(2) Auto-toner detection	(2) Magnetic bridge-circuit method
(3) Toner supply	(3) Toner cartridge replacing method
	(4) Density detection method
(4) Toner-empty detection	(6) DC-100 ~ -700V (adjusting by image
(7) Developer bias	quality control) AC 1.2 kV/
	4 kHz
	Transfer belt method
6. Transfer	Separation by electrostatic attraction of the
7. Separation	transfer belt
8. Cleaning	(1) Blade cleaning
(1) Method	(2) Non-reusable
(2) Recovered toner	(3) Simultaneous cleaning and discharging by the
	conductive blade

Processs	
9. Discharge	LED array (red)
10. Fusing (1) Method	<ul> <li>(1) Belt fusing system</li> <li>Upper heat roller: metal tube roller (ø30) (Lamp rating: 550W (115V, 127V), 628W (200V series))</li> <li>Fuser roller: Silicone sponge roller (ø38)</li> <li>Lower heat roller: PFA tube roller (ø40) (Lamp rating : 450W (115V, 127V), 515W (200V series))</li> </ul>
(2) Cleaning	<ul> <li>Fuser belt :PFA tube belt (ø70)</li> <li>(2) Oil roller method</li> <li>Oil roller (ø22)</li> </ul>
(3) Heat roller temperature control	<ul> <li>Cleaning roller (ø21)</li> <li>(3) ON/OFF control by thermistor (upper/lower roller independent temperature control)</li> </ul>
11. System Control	Microcomputer control
12. Drive system	Units are controlled independently by separate DC motors.
# 4. GENERAL OPERATION

## 4.1 Overview of Operation

Copier operation — Operation during warming-up, pre-running and standby

Automatic paper feed copying with the START key

Copy operation — Bypass paper feed copying

— Interrupt copying

## 4. 2 Description of Operation

## 4.2.1 Warming-up

(1) Initializing operation

- Power ON
- Fuser lamp ON
- "WAIT WARMING UP" displayed.
- Fan motors ON
- Initializing of the scanner system:
  - ~ The carriage moves to and stops at its home position.
  - ~ The carriage moves to the peak detection position.
  - ~ The exposure lamp ON~Peak detection (white color detection based on the shading correction plate)
  - ~The exposure lamp OFF.
  - ~ The original size indicator initializes, then displays the original size.
- Initialization of the paper feeding system:
  - ~ The tray of each cassette rises.
  - ~ The guides of the automatic duplexing unit detect their home positions, then move to their maximum-size position.
- Initialization of the laser optical system:
  - ~ The polygonal motor rotates.
- PCU initialization:
  - ~ The main charger wire cleaners operate.
- Drum rotation:
  - ~ When the execution of toner supply control, image quality control or color registration control is requested n drum motors ON, transfer belt motor ON and developer motor ON.
- Toner supply control:
  - ~ If the toner density in any developer unit is lower than specified, the toner supply mode starts.
- Image quality control:
  - ~ The heat roller performs image quality control operation at a specified temperature. Based on the reflection factors of the test patterns formed on the transfer belt, the optimal conditions are set.

- Color registration control:
  - ~ The heat roller performs color registration control operation at a specified temperature. Test patterns are formed on the transfer belt and their signals are read to detect if toner is present or not. This information is used to correct registrational deviation of each color.
- (2) Pre-running operation

When the heat roller reaches a certain temperature, pre-running operation is performed. (If the heat roller is already warm enough, this operation does not take place.)

• The heat roller rotates.

(3) When the heat roller reaches a temperature capable of fusing:

- Heater lamp OFF
- "READY" displayed.

#### 4. 2. 2 Standby state (ready for copying)

- All keys on the control panel are operable.
- If no key is pressed for a certain period of time:
  - ~Copy counter "1", reproduction ratio "100%" and other defaults are set.
- After the warming-up has ended and a given time has passed:
   Color registration control

#### 4.2.3 Cassette feed copying

(1) START key ON

• Display: "READY"n "COPYING"

(2) Carriage operation

- Exposure lamp ONn Shading correction
- Scan motor ONn Carriages 1 and 2 start moving forward.
- If any mode is selected, the driving operation of (3) is performed after the reading process has been finished.

(3) Driving operation

- In black copying, the transfer belt performs its release operation and the suction charger bias is turned ON.
- The main chargers, developer bias, discharge LEDs and cleaning blade bias are turned ON. The fan motor rotates and the polygonal motor rotates at high speed.
- The drum motors, developer motors, transfer belt motor and fuser motor rotate.

- (4) Cassette paper feeding
  - The feed motor, feed path clutch, pre-feed clutch (F) and feed clutch for the selected cassette are turned ON:
    - ~ The pick-up roller, feed roller, separation roller, and transport roller rotate.
  - The jam sensor for the selected cassette is turned ON, which then turns the feed clutch OFF.
  - The pre-feeding of the following pages operates.
    - A sheet of paper reaches the 1st jam sensor.
      - ~ Pre-feed clutch (F) OFF
    - After a given time
      - ~ Pre-feed clutch (F) ON
  - The paper reaches the registration roller:
    - ~ Aligning operation takes place.
  - When the aligning operation ends, the feed path clutch and the pre-feed clutch (F) are turned OFF.

(5) After the carriage has operated for a fixed time,

- Registration motor, feed path clutch and pre-feed clutch (R) are turned ONn Transports the paper to the transfer section.
- The copy counter operates.

(6) Carriage scanning completion

- Scan motor OFF
- Exposure lamp OFF

(7) Based on the registration motor ON

- After a fixed period, the toner supply is operated in the order of Y, M, C, K and the transfer roller bias is turned on.
- After a fixed period, the arrival of the paper is detected by the exit sensor.

(8) After the trailing edge of the paper has passed the registration roller,

- Registration motor, feed path clutch and pre-feed clutch (R) are turned OFF.
- After a fixed period, the transfer roller bias is turned OFF in the order of Y, M, C, K.
- (9) Paper exit operation
  - The trailing edge of the paper is detected by the exit sensor.
  - The main chargers, developer bias, discharge LEDs and cleaning blade bias are turned OFF.
  - The drum motors, transfer belt motor, developer motors, feed motor stop their operations. The fan motors and polygonal motor return to their standby rotations.
  - The fuser motor stops running when the heat rollers reach a given temperature.
  - "READY" is displayed and the copier goes into standby status.



Timing chart for copying two A4 sized sheets fed from the 2nd cassette

GENERAL OPERATION

Feed path clutch Drum motor (Color /Black) Transfer belt motor Developer motor 4 - 4 Developer bias (Y,M,C,K) Y transfer bias M transfer bias C transfer bias K transfer bias Discharge LED Cleaning blade bias Registration sensor Registration clutch

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### 4. 2. 4 Bypass feed copying

(1) Insertion of the paper in the bypass tray

- Bypass paper sensor ON:
  - ~ "Ready for bypass feeding" is displayed.
- The carriage moves to its home position.
- (2) Pressing of the START key
  - "Ready for bypass feeding"n "COPYING" display
- (3) Carriage operation
  - Exposure lamp ON n Shading correction
  - Scan motor ON n Carriages 1 and 2 start moving onward.
- (4) Driving operation
  - In black copying, the transfer belt performs its release operation and the suction charger bias is turned ON.
  - The main chargers, developer bias, discharge LEDs and cleaning blade bias are turned ON. The fan motors rotate and the polygonal motor rotates at high speed.
  - The drum motors, developer motors, transfer belt motor and fuser motor rotate.

#### (5) Bypass paper feed operation

- The feed motor, feed path clutch and bypass feed clutch are turned ON:
  - ~ The bypass pick-up roller lowers.
  - ~ The bypass pick-up roller and bypass feed roller rotate.
- When the paper arrives at the registration sensor, the bypass feed clutch is turned OFF.
- The paper arrives at the registration roller.
  - ~ Aligning operation takes place.

(6) Hereafter, the same operation as described in (5) to (9) of "4.2.3 Cassette feed copying" is performed.

#### 4.2.5 Interruption copying

(1) Pressing of the INTERRUPT key

- The INTERRUPT lamp is turned ON.
- The copying operation now in progress is stopped temporarily. Carriages 1 and 2 return to their preset positions.
- "Job interrupted job 1 saved" is displayed.
- The center step of manual density and the 100% reproduction ratio are set. The copy quantity does not change.
- (2) Selection of the desired copy modes
- (3) After interruption copying is finished,
  - "Press INTERRUPT to resume job 1" is displayed.
  - Pressing the INTERRUPT key turns the INTERRUPT lamp OFF, returning the copier to the condition before the interruption.
  - "Ready to resume job 1" is displayed.

#### (4) Pressing the START key

The copying operation before interruption is resumed.

## 4. 3 Detection of Abnormal Conditions

When an abnormal condition occurs, the symbol corresponding to the abnormality is displayed to alert the operator.

#### 4. 3. 1 Types of abnormality

- A) Type that can be cleared without turning the door switch OFF:
  - (1) Add paper
  - (2) Paper misfeed in bypass
  - (3) Set key copy counter
- B) Type that cannot be cleared without turning the door switch OFF:
  - (1) Misfeed in copier
  - (2) Install new toner cartridge
  - (3) Replace toner bag
- C) Type that cannot be cleared without turning the main switch (SW15) OFF:
  - (1) Call for service

#### 4.3.2 Description of abnormalities

A-1) Add paper

[For the copier's cassette]

When the cassette detection sensor detects that the cassette is not inserted, "Add paper" symbol flashes.

When the sensor detects that the cassette is inserted, based on the combination of the cassette tray-up motor operation and the conditions of the cassette tray-up limit sensor and cassette paper empty sensor, the CPU detects the presence or absence of paper.

• When the power is turned ON or when the LCF door is opened/closed, the LCF performs initialization.

Х

Detection of whether there is paper or not :

Tray-up motor ON~The tray rises.

- At this time, both tray-up and LCT paper empty sensors are OFF.
- n If the tray-up sensor is not turned ON in a fixed time:
  - The tray is abnormal. x x

Cleared by turning the power ON/OFF.

n If the tray-up sensor is turned ON in a fixed time:

~The tray-up motor stops rotating.

At this time, if the empty sensor is ON: It is judged that there is paper.

OFF: It is judged that there is no paper

nThe tray lowers.

х

"Add paper" symbol flashes.

• During copying, after paper has been fed, and the paper source becomes low: nThe tray-up sensor is turned OFF.

nThe tray-up motor is turned ON~The tray moves up.

The tray-up sensor is turned ONnThe tray-up motor stops.

• During copying, despite of the tray-up sensor being ON, if the paper empty sensor is turned OFF:

It is judged that there is no paper.

Х

"Add paper" symbol flashes.

Х

The copying operation is stopped.

A-2) Paper misfeed in bypass (8/)

• During bypass copying:

Bypass feed clutch is turned ON.

Х

\*If the registration sensor is not turned ON in a fixed time (E12),

Х

Bypass misfeeding

Х

Bypass misfeed symbol (9/y) is displayed.

Х

The copying operation is disabled.

Х

To clear: Remove the paper from the bypass tray. The bypass paper sensor is turned OFF.

#### A-3) Set key copy counter

In the case of a copier equipped with a key copy counter (option), if this is pulled out:
 "Set key copy counter" is displayed.

Х

The copying operation is disabled.

• During copying, if the key copy counter is pulled out,

copying is stopped after the paper being copied is finished and ejected. -

B-1) Misfeed in copier ( $8\sqrt{}$ )

• Leading-edge jam detection with the exit sensorn(E01)



#### • Trailing-edge jam detection with the exit sensorn(E02)



• Immediately after the power is turned ON:

Х

Any of the sensors in the paper transport path detects paper (ON).

Х

Paper jam (E03)

• During copying, the front cover is opened:

х

Paper jam (E41)

• During paper feeding from duplex unit, a fixed time after the feed clutch has been turned ON, the cassette-feed jam sensor (1st cassette) is not turned ON,

```
x
Paper jam (E11)
```

• During duplex copying, the duplex unit path sensor and the duplex unit jam sensor do not detect paper:

Х

```
Paper jam (E50~E52, E54)
```

• During paper feeding from the cassette or LCF, a fixed time after the feed clutch has turned ON, the paper jam sensor is not turned ON,

Х

Paper jam (E13~E16, E19: depending on the paper sources)

B-2) Install new toner cartridge (

The toner density has become low:

Х

Toner empty detection: Auto-toner mechanism

х

Control circuit n "Install new toner cartridge" is displayed: Copying is disabled

To clear: Open the front cover and replace the toner cartridge.

Toner supply operation: Copying is enabled

#### B-3) Replace toner bag (

The toner bag is filled with used toner to the limit.

Х

The toner bag limit sensor is turned ON.

Х

"Replace toner bag" is displayed.

• During copying, if the toner bag limit sensor is turned ON,

х

After ejecting the copy paper now in process, the copying operation is stopped. To clear: Open the front cover, replace with a new toner bag and then close the front cover.

#### B-4) Call for service

When the "Call for service" symbol is flashing, pressing the CLEAR key and "8" key simultaneously causes an error code to be shown on the copy quantity display. Refer to the error code table in the Service Handbook.

## 4.4 Flowchart

#### 4.4.1 Immediately after the power is turned ON





#### 4. 4. 2 Automatic paper feed copying







# **5. IMAGE PROCESSING**

## 5.1 Image Processing Circuit

### 5.1.1 General description

This model has an original on the original table scanned optically to read its content, which is then optically converted into an electrical signal by the CCD (opto-electronic conversion device). This signal then undergoes analog-to-digital conversion and is changed into digital signal. After undergoing shading correction (correction of variance in CCD elements and the light source), this digital signal is then output as an image signal from the scanner unit.

Using this image signal from the scanner unit as an input, the image processing unit performs various image processing treatments on the signal and provides the output result to the ASIC of the laser-related control section.

ASIC stands for application specific IC, meaning an IC designed specifically for a particular application. On this model, image processing is performed using a image processing PC board, a system PC board and, if necessary, an optional AI board, for image discrimination, which is connected to the image processing PC board.

(1) Image processing circuit on the image processing PC board

Five image processing ASICs are mounted on the image processing PC board, realizing the following functions.

### <Functions>

ACS, color conversion, monochrome conversion, high image-quality processing, image memory editing, rectangular-area signal generation, edit processing, gamma correction, gradation processing, and fixed length compression/expansion.

### (2) Image processing circuit on AI board (optional)

An ASIC and a CPU are mounted on this PC board and the following functions are accomplished.

#### <Functions>

The type of originals (text originals or photographic originals) is automatically discriminated and if the original has text and photographic images mixed, the respective image areas are automatically discriminated too.

### (3) Image processing circuit of the controller

The image processing circuit of the controller has 2 types of ASIC for processing controller image mounted on its board to perform image processing against the image data input from the controller, realizing the following functions.

#### <Functions>

High image-quality processing, gamma correction and gradation processing

#### 5.1.2 Construction of Image Processing Section

The following diagram shows the image processing section of this model:



Construction of image processing section

## 5.2 Image Processing Circuit on Image Processing PC Board

## 5.2.1 Features

- (1) The image processing ASIC is controlled by the System CPU on the image processing PC board.
- (2) The image processing capabilities of the System board help to realize the following functions:
  - · ACS
  - $\cdot$  Color conversion
  - · Monochrome conversion
  - · High image-quality processing
  - · Image memory editing
  - · Rectangular-area signal generation
  - · Edit processing
  - · Gamma correction
  - · Gradation processing
  - · Fixed length compression/expansion

## 5.2.2 Description of functions

### (1) ACS (Auto Color Selection) function

This function works to determine whether the original to be copied is colored or monochrome, based on the analysis of the R, G and B signals output from the CCD.

### (2) Color conversion

The RGB image data is converted to CMY image data.

The image data taken in by the scanner represents the intensities of reflection of the three primary colors of light (Red, Green and Blue). These RGB values are then color-converted to the respective amounts of toners corresponding to the three colors (Yellow, Magenta and Cyan) for the purpose of printing (= CMY image data).

Also, K (Black) signal is generated from the CMY image data. Based on this K signal, the CMY image data is corrected to suppress color hue in reproducing grays or to make the black look more real.

### (3) Monochrome conversion

In black copying, monochrome signal is generated based on the R, G and B signals output from the CCD.

#### (4) High image-quality processing

(a) Background processing function

By pre-scanning, the background information of the image is read to help remove undesirable background so that the original can be reproduced appropriately. By using the background adjustment function while manually adjusting the image density, undesirable background of the original can be removed if any, and some necessary but disappeared background can be recovered. By using this function, it is possible to cut the background density down to zero when copying originals which have a certain level of background density, such as newspapers.

<Example>



(b) Image area discrimination

By determining the magnitude of density variation in a block (n x n dot), the target pixels are judged if they are text or photograph. If they are determined to be text, they are further judged if they are black or color text, using the differences in the levels of CMY signals.

(c) Filtering function

This function consists of a low-pass and high-pass filter circuits.

· Low-pass filter circuit function

This function works to remove image noise and electrical noise. Based on a matrix (m x n) of image signals existing around a target pixel, averaging operation is performed on the signals, making the result become an image signal of the target pixel after low-pass filter processing.

<Example> x is converted to x'. x' signifies the value obtained after low-pass filtering.



· High-pass filter circuit function

This function is used as a supplementation to the scanner characteristics, such as sharpening character outline. Based on a matrix (m x n) of image signals existing around a target pixel, enhancement processing is performed on the signals, and the result is output as the high-pass filtered image signals of the target pixel.

<Example> When the matrix is (3 x 1):



### (5) Image memory editing

This function performs editing, such as enlargement/reduction, mirror imaging, image repeating, etc, using the line memory where pixel data for one line in the primary scanning direction is stored. This memory is renewed at each line.

### (a) Enlargement/reduction

The function of enlargement/reduction is accomplished by using the line memory control in the process of the image processing operation.

<Example> Enlargement





Reduction





### (b) Mirror imaging

50%

This feature is accomplished by reading and outputting the line memory data backwards, starting from its end.

### (c) Image repeat function

The image in the selected position on the coordinates is repeated by the selected number of times in the primary scanning direction.

#### (6) Rectangular area signal generation

When a rectangular coordinate position is selected, the corresponding rectangular area signals are generated. Using these signals, various edit processings related to the area specification can be performed.

#### (7) Edit processing function

This function performs trimming, masking and negative/positive reversal.

#### (a) Trimming

Using rectangular area signals, the image signals inside the rectangular area are left and the other image signals outside the area are erased.

#### (b) Masking

Using rectangular area signals, the image data inside the rectangular area are erased.

### (c) Positive/negative reversal

This function reverses the entire area from positive to negative, or vice versa.

#### (8) Gamma correction function

This function corrects the input/output characteristics of the printer and then adjusts the image signals so that their input/output characteristics would match better with the copy mode.

<Example> Linear input/output density



### (9) Gradation processing function

Depending on the copy mode, this function switches the type of gradation processing: A type which selects the printer characteristics that give the priority to the resolution such as for text data, and another which selects the printer characteristics that give the priority to the reproducibility such as for photographic images.

### (10) Fixed length compression/expansion

To lessen the data amount of the color image signals, this function effects the compression/expansion on the fixed length data.

## 5.3 Al Board Image Processing Circuit

## 5.3.1 Features

Al board means the advance image enhancement board and Al Mode is added to the copy modes by installing it.

Al mode has two modes available for image discrimination:

- original discrimination mode to determine the type of the input signals of original (text or photograph)
- area discrimination mode, for original with texts and photographs mixed, to determine the type of each area of the original whether the area is text or photograph.

On Al board, the image layout on the original is analyzed during pre-scanning, and depending on the type of the image, one of the above modes is automatically selected and necessary discrimination is performed.

Maximum 3 seconds (A4/LT) is required for the discrimination by CPU, in addition to the time for prescanning.

This AI mode makes it unnecessary to select the copy mode for each original type and produces higher reproducibility of both original text and photograph than the default TEXT/PHOTO mode.

## 5.4 Controller Image Processing Circuit

## 5.4.1 General description

Using the image signal from the optional printer controller as an input, the image processing unit performs various image processing treatments on the input signal and output the result to the ASIC laser-related control section. Also, using the image signal scanned by the scanner as an input, it performs various image processing treatments on the input signal and outputs the result to the controller.

When the printer controller is being connected, the image processing ASIC is controlled by the System CPU on the System board .

### 5.4.2 Construction of Image Processing Section

The following diagram shows the image processing section of the copier and the printer controller:



#### Scanner control PC board

Construction of image processing section

#### 5.4.3 Features

When the controller is being connected, the image processing ASIC is controlled by the System CPU on the system board. Two controller image processing ASICs are mounted on the controller image processing PC board, where is the only area for image processing of the image data input and output from the controller. The functions below are realized.

<Functions>

- · High image-quality processing of the printer
- · Gamma correction
- · Gradation processing
- · High image-quality processing of the scanner

#### 5.4.4 Functions description

(1) High image-quality processing of the printer

This function reproduces the image signals output from the printer controller sharper.

(2) Gamma correction function

This function corrects the input/output characteristics of the printer and then adjusts the image signals so that their input/output characteristics would match better with the output of the printer controller.

#### (3) Gradation processing function

Depending on the print image, this function switches the type of gradation processing at each printing. A type which selects the printer characteristics that give the priority to the resolution such as for text data, and another which selects the printer characteristics that give the priority to the reproducibility such as for photographic images.

#### (4) High image-quality processing of the scannner

This function corrects the image signals scanned by the scanner and reproduces them in a higher imagequality.

# 6. IMAGE QUALITY CONTROL

## **6.1 General Description**

With this copier, image quality is controlled by the image quality sensor. In this control, image forming conditions are automatically adjusted so as to minimize the change in the image density or line width caused by the fluctuation of working environment or life of supply items. The image quality sensor works to detect the density of a test pattern developed on the transfer belt, and based on the results of the detection, image forming conditions are modified accordingly.

## 6.2 How the Sensor Works

Image quality sensor projects light onto the transfer belt and the toner image (test pattern) developed on the transfer belt to produce a voltage corresponding to the amount of the reflected light.

Based on the amount of reflected light obtained by the image quality sensor, a relative reflection factor is calculated, which is referred to as toner adhesion amount.



## 6.3 Overview of Control Procedure

Start of control procedure (During pre-running after power ON, control is performed.) х [1] Reference image forming conditions are set. х [2] The sensor light source is adjusted. х [3] The test pattern is produced. х [4] The image quality sensor reads in data. х Return to [3]. [5] Judgment (Whether the toner adhesion amount of the test pattern is within the acceptable range or not) NO  $\rightarrow$  [6] Image forming conditions are modified. YES

[7] Control procedure is completed.

(The determined image forming conditions will be reflected on subsequent copies.)

## 6.4 Construction

<ul> <li>Image quality sensor:</li> </ul>	Projects the amount of light corresponding to the light amount control	
	voltage, and produces the voltage corresponding to the amount of	
	light reflected from the transfer belt and the toner image on the trans-	
	fer belt.	
· D/A converter:	Produces light source amount control voltage.	
· Laser optical system:	Performs test pattern exposure (for toner image formation).	
· A/D converter:	Converts the output voltage from the sensor into digital values and	
	reads them into the CPU.	
<ul> <li>Image forming process:</li> </ul>	Consists of charging, laser exposing and developing processes.	
· CPU:	Performs steps [1] to [7] described previously.	



## 6.5 Disassembly and Replacement

## [A] Image quality sensor

- (1) Open the front covers, turn the lever to the right and then draw out the transfer/transport unit.
- (2) Remove the bracket (1 screw).



- (3) Open the paper-exit unit.
- (4) Disconnect the connector.
- (5) Remove the bracket from the frame (1 screw).
- (6) Remove the image quality sensor from the bracket (1 screw).



# 7. COLOR REGISTRATION CONTROL

## 7.1 General Description

In a color copier, four primary colors (yellow, magenta, cyan and black) are overlaid to represent particular colors. If they are not overlaid properly (or deviated from the position), the text and image obtained may look blurred.

In this model, color registration control method is used to automatically correct any registrational deviation in any of the four colors.

Color registration control in this model is performed automatically in the following order.

- 1) A built-in test pattern is printed on the transfer belt several times repeatedly.
- 2) Each time, this printed test pattern is read by the rear and front registration sensors to measure the amount of deviation between four colors.
- 3) The amount of deviation thus measured is arithmetically operated on by the microcomputer.
- 4) The deviation is judged and the laser write position is corrected according to the deviation amount.

This color registration control is performed during warming-up, and at a fixed schedule (10 min., 40 min. and 160 min. later) after then.

The aim of controlling at fixed intervals is to correct deviation in the relative positions of the laser optical system components caused by the rise of the temperature inside the machine after warming-up. However, there are cases such as when the machine is turned on again immediately after it is turned off, it may not be necessary to correct deviation in the relative positions of the laser optical system components caused by the rise of the temperature inside the machine after warming-up. In this case, the temperature of the fuser roller in the fuser unit will be checked when the power is turned on, and if it is above the allowable temperature range, color registration control will be omitted at the warming up.

## 7.2 Control Procedure

[1] Control start			
X			
[2] Test patterns printing (18 times for each color)			
X			
[3] Measurement of the amount of deviation by the rear			
and front registration sensors			
x			
[4] Arithmetic and logic operation on the amount of deviation among	Return to [2].		
four colors			
x			
[5] Determination of the deviation amount			
x			
[6] Correction for laser write position (correction of primary			
and secondary scanning deviation) and angle adjustment			
of laser beam reflected mirrors (tilt correction)			
the value is out-of-spec:			
the value is within-spec:			

[7] Complete

\* After the test patterns printing, if the specified number of data is unable to be read successfully, the error (CF1) is generated.

## 7.3 Control Method



The test patterns for the four colors illustrated above are regarded as one set. Several sets are printed directly onto the transfer belt, and the pitch of the test patterns is measured by the front and rear color registration sensors.

Four types of deviation are measured: horizontal deviation in the secondary-scanning direction; deviation of write start position in the primary-scanning direction; deviation of reproduction ratio in the primary-scanning direction and tilt deviation.

The measurement/calculation pitch and the objects of correction for each deviation are shown as the table below.

Deviation	Measurement/Calculation Pitch (x = y, m, c)	Object of Correction
Horizontal deviation in the sec-	[Pk-c],[Pc-m],[Pm-y]	Laser write start position
ondary-scanning direction		(secondary-scanning)
Deviation of write start position in	[Wx-f]-[Wk-f]	Laser write start position
the primary-scanning direction		(primary-scanning)
Deviation of reproduction ratio in	([Wx-r]-[Wx-f])–([Wk-r]-[Wk-f])	Image written frequency
the primary-scanning direction		
Tilt deviation	[Sx]	Tilt angle of mirror in the laser unit

## 7.4 Deviation Unable To Be Corrected by Color Registration Control

Since the color registration control optimizes the laser write start position (including the relative position of the drum), it can correct the deviation that appears uniformly on the paper. But it cannot correct such deviation that fluctuates (including deviation generated by particular timing or deviation generated by the pitch).

The deviations unable to be corrected are as follows.

#### (1) Deviation caused by drum rotation errors

Eccentricity of the driving parts from the drum motor to the drum (including the drum itself) can result in deviation in the secondary-scanning direction of approximately 94 mm pitch.

#### (2) Deviation caused by fluctuations in transfer belt speed

Fluctuations in transfer belt speed can be caused by eccentricity of the driving parts from the transfer belt motor to the transfer belt drive roller, as well as by slippage between the transfer belt and the transfer belt drive roller. It results in a fluctuating deviation in the secondary-scanning direction.

#### (3) Deviation caused by meandering of the transfer belt

The transfer belt can meander because of some damages to the transfer belt edge, resulting in fluctuating deviation in the primary-scanning direction.

(4) Deviation caused by differences in the speed of units related to paper transporting

This is generated when differences occur in the transporting speed among the registration roller, the transfer belt and the fuser unit.

- a) When the fuser unit paper transport speed is larger than the transfer belt speed Deviation in the secondary-scanning direction occurs in the order of Y, M, C and K from the leading edge of the paper.
- b) Transfer belt speed is larger than the registration roller speed
   Deviation in the secondary-scanning direction occurs in the order of K, C, M and Y from the leading edge of the paper.
- c) Transfer belt speed is smaller than the registration roller speed
   Deviation in the secondary-scanning direction occurs in M and Y at approximately 75 mm pitch in the trailing half of paper of A3, LD, etc.

## 7.5 Disassembly and Replacement

### [A] Color registration sensor

- (1) Pull out the transfer/transport unit.
- (2) Remove the bracket (1 screw).





- (3) Open the paper-exit unit.
- (4) Disconnect the connectors of color registration sensors.
- (5) Remove 2 color registration sensors (2 screws for each).

# 8. DISPLAY UNIT

## 8.1 Detailed Drawing of the Control Panel and the Display Panel

The display unit consists of key switches and touch-panel switches for copier operation/selection of each mode, LEDs and an LCD displaying the copier state or messages.

When the operator's attention is needed, a graphic symbol lights or flashes and a message indicating that particular condition is displayed on the LCD panel.



Layout of the control panel

## 8.2 Items Shown on the Display Panel

8.2.1 Display during normal copying



Fia.	8.2-1
i iy.	0.2-1

No.	Message	Conditions of machine	Notes
1	Wait Warming Up	<ul> <li>Being warmed up</li> <li>Displayed after the main switch is turned ON up until the machine becomes ready for copying.</li> </ul>	<ul> <li>When the main switch comes ON, the quantity and reproduction ratio of copies are indicated, for example, as "1", "100%".</li> </ul>
2	READY	<ul> <li>Standby for copying.</li> <li>The machine is ready for copying and operator's instructions on copying conditions can be input.</li> <li>Returns to the default condition if no key is pressed for 45 seconds.</li> </ul>	<ul> <li>Copy quantity indicator shows "1". When a digital key is pressed, that number indicates the set quantity.</li> <li>The set quantity can be cleared to "1" by pressing the CLEAR key.</li> <li>Bypass copying is possible.</li> </ul>
3	COPYING	<ul> <li>Now copying.</li> <li>Displayed by pressing the START key.</li> <li>Copy quantity indicator becomes "1" and copying is completed.</li> </ul>	<ul> <li>After completion of copying, the copy quantity indicator returns to the initially set number.</li> </ul>
4	Saving energy - press START	Energy saver mode.	Reset by pressing the ENERGY     SAVER key or the START key.
5	Place next original Press PRINT (START) to copy	ADU back-side copying standby state.	When using ADF one-sided, and when not using ADF.
6		<ul> <li>Timer OFF</li> <li>No message is displayed on the display panel.</li> <li>Timer LED is turned ON.</li> </ul>	Press the START key to clear.
## 8.2.2 Display in the event of faulty conditions



Fig. 8.2-2

No	Message	Abnormal state & indication	Solution
7	Add Paper	Indication of lack of paper	Supply paper to the selected cassette
		• Elashes when there is no naper in	Select another cassette
		the cassette (A in Fig. 8.2-2)	
		• Bypass copying is possible	
0	Install now X tanar	Indication of look of topor	- Poppt after the taper is supplied and
0		- Din Fig. 9.0.2 is displayed when the	the frent equer is closed
		• B in Fig. 8.2-2 is displayed when the	the front cover is closed.
	(X: Y, M, C, K)	toner in the toner cartridge becomes	
		empty.	
		• When this message is displayed, it	
		is not possible to copy.	
9	Set key copy counter	Key copy counter withdrawn.	Reset and return to normal conditions
		• Displayed when the key copy coun-	by inserting the key copy counter.
		ter is withdrawn when the machine	
		is READY or during copying. C in Fig.	
		8.2-1.	
		• When it is removed after the press-	
		ing of the START key, the machine	
		stops after the current copy is com-	
		pleted, but the counter counts it.	
10	Dispose of used toner	Indication of need to replace the toner	Open the front covers, replace the
		bag.	toner bag, and then close the front
		Displayed when the toner bag is	covers to reset.
		full. D in Fig. 8.2-2.	
		The copier stops.	
		I I	

	No.	Message	Abnormal state & indication	Solution		
	11	Paper misfeed in	Bypass paper jamming	The machine returns to normal condi-		
		bypass	<ul> <li>Paper jams at the bypass guide. E</li> </ul>	tions automatically when the paper out		
			in Fig. 8.2-2.	is pulled from the bypass guide.		
	12	Misfeed in copier	Paper jammed in the machine.	Press the HELP key and remove the		
			F in Fig. 8.2-2.	paper jammed in the copier by follow-		
	10			Ing the messages.		
	13	Misteed in copier	Cassette paper misteed.	Press the HELP key and remove the		
			Paper supplied from the casselle	paper jammed in the copier by lollow-		
			in a set time	ing the messages.		
			G in Fig. 8.2-2.			
	14	Misfeed in doc. feeder	Original jammed	Open the ADF jam-access cover and		
			• An original is jammed in the ADF.	the ADF unit, and remove the jammed		
			H in Fig. 8.2-2.	original.		
	15	Misfeed in finisher	Paper jammed in the finisher.	Remove the paper jammed in the		
			l in Fig. 8.2-2.	finisher and open and close the front		
				cover for once.		
	16	Misfeed in duplexer	Paper jammed in the ADU.	Press the HELP key and remove the		
			J in Fig. 8.2-2.	paper jammed in the copier by follow-		
				ing the messages.		
	17	Call for service	Some parts of the mechanism,	Turn OFF the machine, remove the		
			motors, switches or sensors are	cause of the fault and turn the machine		
			abnormal. K in Fig. 8.2-2.	back ON.		
	18	Time for periodic	Indication of PM cycle.	Maintenance and inspection by a		
		maintenance (XXXX)	<ul> <li>Displayed when it is time for</li> </ul>	qualified service technician.		
		(XXXX: colo(u)r, black)	preventive maintenance and			
			inspection.			
			Capable of copying.			
Ξ	19	*** toner decreased.	The message appears as the copier	Displayed until the toner becomes empty.		
		Prepare new toner	counts up with the replaced new toner	ON/OFF setting can be changed in the		
		cartridge.	cartridge and the remaining toner	setting mode (08-652).		
			becomes about 30% to urge the user to	Default: ON		
			prepare a new toner cartridge.	The display can be turned OFF temporarily		
				from the User Selection screen.		
	20	Set correct cassette	Displayed when "XX-R" paper is not	Set the cassette in which correct size		
			set for the photo zoom.	paper is set.		
	21	Dept. copy limit exceeded	Displayed when the number of	This should be coped with by the		
			copies exceeds the limitation set in	administrator. Ask him or her to resolve		
			the department management.	it. (Clear the total copy counter of the		
				department or key in a bigger number		
				as the limitation for the total copy.)		
	22	Dept. color copy limit	Displayed when the number of color	This should be coped with by the		
		exceeded	copies exceeds the limitation set in the department management	administrator. Ask him or her to resolve		
			and coparations management.	department or key in a bigger number		
				as the limitation for the color copy.)		

8.3 Relation betwee	n Copier	<b>Conditions and</b>	<b>Operator's</b>	Actions
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Operation Status	START key	CLEAR key	STOP key	Digital keys	INTERRUPT key	ENERGY SAVER key	Bypass feeding	Touch panel	COLOR MODE key	ACCESS key
Warming up	0	0		0	_	0	0	0	0	0
Ready for copying	0	0		0	0	0	0	0	$\bigcirc$	$\bigcirc$
Reproduction ratios being switched	—	0	_	0	0	0	0	0	0	0
Copying operation	_	_	0		0	0	*1	_	_	
Paper being added	-	0	_	0	0	0	0	0	0	0
Toner being added	- *2	0	_	0	0	0	0	0	0	0
Key copy couter not inserted	-	0	_	0	0	0	0	0	0	0
Paper misfeed in bypass copying	_	_	_	_	—	_	—		_	_
Toner bag being replaced	_	_	_	_		_	_	_	_	_
Paper jammed inside the machine	_	_	_	_		_		_	_	_
Service call indicated	_		_		_					
Ready for interrupt copying*3	0	_	_	_	0	_	0	0		_
Energy saver mode activated*4	0				_	0				

○: Operation available. –: Operation unworkable

- \*1 Avoid bypass insertion during copying operation since this may result in paper jamming.
- \*2 Black mode is available while color toner is all used up.
- \*3 Interruption condition is automatically released if the machine is not used for 45 sec.
- \*4 Energy saver mode is released by pressing the ENERGY SAVER key or the START key.

## 8.4 Description of Operation

## 8.4.1 Dot matrix LCD circuit

(1) Structure



The LCD display is an STN black & white mode transmissive type LCD with a 320 x 240-dot display capacity. It includes a driver LSI, frame, printed circuit board, and lateral type CFL backlighting. \*STN: Super Twisted Nematic

#### (2) Block diagram



#### (3) LCD drive operation

The following describes the drive operation to display the message "READY".

- ① The System CPU requests the data for displaying "READY" from the PROM.
- 2 The PROM outputs the data for displaying the message to the System CPU.
- 3 The System CPU writes to RAM IC1~8 the data to be displayed on the LCD.
- ④ The ASIC IC10 reads the display data from RAM IC1~8, and outputs the data to the LCD.



(4) Data Transmission Method



#### 8.4.2 LED display circuit

(1) LED display method

As an example, how LED1 (ACS) for indicating "Auto color" is driven to light is as follows.



When the signal LDON0 changes to the level "L", the transistor (Q3) is turned ON. In addition, when pin 17 (D7) of IC8 changes to the level "L", the current flows from 5VL via the transistor to LED1 (ACS), i.e. LED1 (ACS) is turned ON.

Conditions for the LED to light

- ① The transistor (Q3) connected to the LED anode is ON.
- 2 The output connected to the cathode of the LED is the level "L".
  - The LED comes ON when both 1 and 2 above are satisfied.

## 8.5 Disassembly and Replacement

## [A] Control panel

- (1) Open the front covers and remove the toner cartridges.
- (2) Remove the processing unit (EPU). (Refer to Chapter 13.)
- (3) Remove the middle inner cover.
- (4) Unscrew 3 screws, disconnect 2 connectors, and then raise the control panel upward to remove it.
- (5) Disconnect 7 connectors, remove 1 screw and 7 lock supports, and then take out the DSP PC board.







KEY PC board LCD panel PNL PC board

(7) Remove the PNL PC board (9 screws).(8) Remove the KEY PC board (9 screws).(9) Remove the LCD panel (4 screws).

(6) Unscrew 6 screws and then remove the bracket.

April 2004

# 9. SCANNER

## 9.1 Color CCD Sensor and Color Separation

In the scanner section of digital full-color copiers, RGB filters are used to separate the light reflected from the original into primary colors, which are then changed into data of corresponding amounts of light by a CCD sensor for later processing operations. In the image processing section, this data is used to create respective output data for Y, M, C and K for the printer. Based on this output data, the emission time of laser light are determined for writing to the drum.





With this copier, a reduction-type CCD for color processing is used.

What this CCD differs from black-and-white CCDs is that its sensor is arranged in three lines as shown on the right, and these lines of sensor are covered with R (red), G (green) and B (blue) filters respectively. These filters work to make color separation possible.

The diagram on the right shows variations in output voltage from a CCD as it receives light. This analog output voltage is then amplified and converted to a 10-bit digital output (1024 steps) through an analog-to-digital conversion means (A/D conversion). In addition, based on the value read from the white shading correction plate (reference plate) and that read when the lamp is OFF, shading correction (normalization on white and black) is performed.



[CCD sensor]

.....



R

1

2

7499 7500

The following shows an example of reading a monochromatic red original on a blank background:

The sensor line covered with blue filter detects only blue light amount.

Since the text area on the red original does not reflect blue light, it is taken as "dark", making the light receiving level (voltage) of the CCD sensor low. The background area is taken as "light", making the light receiving level (voltage) high.

The sensor line covered with green filter detects only green light amount.

Since the text area on the red original does not reflect green light, it becomes "dark" as in the case of the blue filter, making the light receiving level (voltage) of the CCD sensor low. The background area is taken as "light", making the light receiving level (voltage) high.

The sensor line covered with red filter detects only red light amount.

Since a red original only reflects red light, unlike in the case of blue or green filter, both the text and background areas on the original become "light", making the light receiving level (voltage) of the CCD sensor high over the entire area.

However, the red, green and blue lines are arranged 4 lines apart from each other in the secondary scanning direction, so if all color- separated data is read simultaneously, an image 4 line apart in colors will result. To avoid this, the green and red data, after having been read, is temporarily stored in line memory. RGB colors are then synchronized by having the green data delayed by 4 lines and the red data by 8 lines, respectively.

## 9.2 Function

In the scanner section of this machine, the surface of an original is irradiated with a direct light and the reflected light is led through the mirrors and lens to CCD where optical-to-electrical conversion takes place, converting the optical image data into an electrical signal. This analog signal is changed to a digital signal, which then undertakes various corrective processes necessary for image formation. After that, arithmetic operation is performed on the digital signal, which is then sent to the data write section.

R	eflector	Exposure lamp		
Carriag	e 2	Carriage 1	Original glass	Carriage rail (Shared by carriage 1 and 2)
e				Drive pulley
ļ		Lens	CCD PC board	Scanner control board (SCM PC board)
		CCD sensor_/		

## 9.3 Construction

The following shows the construction and purpose of the scanner system:

#### (1) Original glass

This is where originals to be copied are placed. The light from the exposure lamp is irradiated to the original through this glass.

#### (2) Carriage 1

Carriage 1, consisting of the exposure lamp, lamp inverter PC boad, reflector, mirror 1, etc., is driven by a scan motor to scan an original on the glass.



a. Exposure lamp

This lamp is the light source to irradiate the original on the glass. (A 22W xenon arc lamp)

b. Lamp inverter

Controls the ON/OFF switching of the xenon lamp.

c. Reflector

This provides a reflecting plate to efficiently direct the light from the exposure lamp to the surface of the original on the glass.



#### d. Mirror 1

This mirror directs the light reflected from the original to the mirror 2 described later.

#### (3) Carriage 2

Carriage 2, mainly comprised of the mirror 2 and mirror 3, works to direct the reflected light from the mirror 1 through the mirrors 2 and 3 up to the lens.

This carriage is driven by the same scan motor as the carriage 1 at half the scanning speed of the carriage 1 (the scanning distance is also half that of the carriage 1).



#### (4) Lensn CCD

The light reflected from mirror 3 is led to CCD placed at the focal point of the lens which is fixed in position. (5) CCD PC board, scanner control PC board

Pre-processing operations for image processing, such as signal amplification, signal integration, A/D conversion and shading correction, are performed on the electrical signal which was converted by CCD.



#### (6) Automatic original detection unit

The size of the original placed on the glass is instantly detected using the automatic original detection sensors (APS sensors) fixed on the lens cover and the base frame without having to move carriage 1.

#### (7) Original-width indicator unit

This unit works to indicate the width of original now selected by the machine. The size of original is indicated, using an indicator in the unit and a yellow line on the carriage 1.



## 9.4 Description of Operation

## 9.4.1 Scan motor



This motor drives the carriages 1 and 2 through the timing belt and carriage drive wires as follows. First it drives the carriages 1 and 2 to their respective home positions. The home positions are detected when the carriage 1 passes the home position sensor. When the START key is pressed, both carriages start to move from their home positions and scan the original on the glass.

#### 9.4.2 Document motor

Through the timing belts, this motor drives the original-width indicator on the front side to its home position, i.e., the maximum original width. When an original size is selected or magnification is changed, the motor moves the indicator to the selected size, indicating the original setting position on the glass.

#### 9.4.3 Carriage fan motor

This fan motor rotates during copying and for a fixed time after copying to cool the scanner section including the original glass.

## 9.5 Drive of the 5-Phase Stepping Motor

#### 9.5.1 Features

This motor has the following advantages over conventional 2-phase hybrid stepping motors with 1.8° step angle which have been considered to have the highest performance so far.

- (1) Provides small step angles of 0.72 in full step and 0.36 in half step. This means that this motor has a high resolution capability 2.5 times that of conventional stepping motors. To move over the same distance, this motor can use 2.5 times as many steps, enabling high-speed positioning via optimal slow-up and slow-down control.
- (2) Variation in torque during operation is extremely small, thus causing minimal vibration and providing smooth rotation. This motor is ideal for use in applications where variation in torque and/or noise must be avoided.
- (3) Since vibration is small even at resonance points and special dampers are not required, the motor can be used over its entire drive range.
- (4) Provides approx. 2.5 times as high self-starting frequencies as 2-phase stepping motors, and does not have any resonance area. The motor helps to realize speed control of high speed-change ratios even without taking advantage of slow-up and slow-down control.
- (5) Excels in high-speed response compared with 2-phase stepping motors, and helps to realize high-speed units and machines.
- (6) Provides superb damping characteristics by being driven in 4-phase or 5-phase excitation method.
- (7) Provides various stepping angles such as 0.72, 0.36, 0.18, etc. by having the excitation method changed.

#### 9.5.2 Stepping motor theory

Fundamental differences from 2-phase stepping motors are the number of main poles of the stator and the structure of its windings. While 2-phase stepping motors have the windings arranged in a 2-phase, 4-pole configuration, 5-phase stepping motors have their windings in a 5-phase, 2-pole configuration. Fig. 9.5-1 shows the relationship between the stator teeth and rotor teeth of a 5-phase stepping motor, and its structure of windings.



Fig. 9.5-1 Structure of a 5-phase stepping motor

The stator consists of 10 main poles, and facing two main poles each comprises one phase. Coils are so wound that the facing two main poles acquire the same polarity (S or N). The stator teeth are so arranged that, assuming the rotor tooth pitch as  $\tau_{R}$ , the stator tooth on a main pole is shifted 0.6  $\tau_{R}$  from its adjacent rotor tooth. This means that the stator tooth is shifted (0.6 - 0.5)  $\tau_{R} = \tau_{R}/10$  from the tooth on the rotor cup on the opposite side, which is arranged  $0.5\tau_{R}$  shifted from that on this side of the rotor. Fig. 9.5-2 shows this relationship in an easy-to-understand fashion.



Fig. 9.5-2 Relationship between stator teeth and rotor teeth

Thus, as the stator pole is moved as shown in Fig.9.5-3, the rotor rotates clockwise at the rate of 1/10 the tooth pitch of the rotor.





Fig. 9.5-3 Movement of poles at 1-phase excitation

#### 9.5.3 5-Phase motor drive circuit (fixed-current type)

The drive circuit is comprised of the following main components: micro-step drive controller (IC6), predriver (IC3), fixed-current control IC (IC8), drivers (IC1 and IC2), and current detecting resistor (R1).



- Process to excite phase A -
- 1 Signal H. OFF is turned ON (Low).
- 2 At the same time, signal CW/CCW and divided data (DATA 0~3) are input.
- 3 Approx. 10 ms later, SCCLK is input.
- 4 IC6 then outputs, from AP~EP (Pch side) and AN~EN (Nch side), excitation ON signals based on the divided data. At this time, IC3, having received these excitation signals, drives IC1 and provides current to the motor.
  - **Note:** As this motor is a new pentagon-driven type, twice as much current as the set current flows through the motor leads while it is driven in 4-5 phase or 5 phase excitation.

5 The current flowing into the motor, as a total current, runs through current detecting resistor R1. The current flowing through R1 is then compared in IC8 with the current value set by CPU. Based on the result, Q1 is turned ON or OFF, allowing the motor drive power supply to be controlled.

SCCLK H. OFF CW/		DATA			Operation				
-0	-1	CCW	3	2	1	0			
Н	Н						Hold OFF state (Open winding circ	uit)	
Н	L	*	*	*	*	*	Excitation ON state		
		L	*	*	*	*	Normal operation (CW)		
		Н	*	*	*	*	Normal operation (CCW)		
			L	L	L	L	(250 di	vision)	0.00288°
			L	L	L	Н	(200 di	vision)	0.00360°
			L	L	Н	L	(125 di	vision)	0.00576°
*	L	*	L	L	Н	Н	(100 di	vision)	0.00720°
			L	Н	L	L	(80 di	vision)	0.0090°
			L	Н	L	Н	(50 di	vision)	0.0144°
			L	Н	Н	L	(40 di	vision)	0.0180°
			L	Н	Н	Н	(25 di	vision)	0.0288°
			Н	L	L	L	(20 di	vision)	0.036°
			Н	L	L	Н	(10 di	vision)	0.072°
			Н	L	Н	L	2W4–5 phase (8 di	vision)	0.090°
			Н	L	Н	Н	(5 di	vision)	0.144°
			Н	Н	L	L	W4–5 phase (4 di	vision)	0.180°
			Н	Н	L	Н	(2.5 di	vision)	0.288°
			Н	Н	Н	L	4–5 phase (2 di	vision)	0.36°
			Н	Н	Н	Н	H 4 phase (1 division)		0.72°
*: unfixed	_							_	
Timing chart FWD star		art	FWD end		BWD start				

## Operation spec.



The following shows the relationship among the pulse signals input to IC6, signals output from the APch and ANch, and the current flowing into the motor (micro-step 4 division).



## 9.6 Exposure Lamp Control Circuit

## 9.6.1 General description

#### [A] This control circuit is comprised of the following 3 blocks:

(1) Xenon lamp lighting device (Inverter)

Controls the ON/OFF switching of the exposure lamp.

(2) CCD sensor circuit

Converts the reflected light amount from the original's surface or the shading correction plate to electrical signals. The reflected light amount from the shading correction plate is read to control the exposure amount.

(3) Scanner control board

The output signals from CCD are digitized to be used in a series of image processing such as gamma correction, shading correction, etc.



#### Construction of exposure control circuit

#### 9.6.2 Exposure lamp

External electrode type Xenon fluorescent lamp is used as an exposure lamp in this copier.

#### (1) Structure

Fluorescer is applied on the inside surface of the lamp pipe (except a part to be an opening) which is filled with the Xenon gas.

A pair of the external electrodes covered by the film with the adhesive agent is attached over the pipe.



(2) Behavior inside the Lamp The electron inside the pipe is led to the electric field by applying voltage to the pair of the external electrodes, and discharge is started. Electrons then flow and clash with the Xenon atom inside the pipe to excite them, and generate the ultraviolet ray. This ultraviolet ray converts the fluorescer into the visible light.



(1)Electrode (2)Electron (3)Xenon atom (4)Ultraviolet ray (5)Fluorescer (6)Visible light (irradiated from the opening to the outside of the pipe) (7)Opening (8)Harness

## 9.6.3 Control circuit for the exposure lamp



#### Working conditions

WDTOUT-0	5VSWON-0	LMPON-0 (Lamp drive signal)	+5VSW	Xenon lamp	State of copier
Н	L	Н	ON	OFF	Normal operation
Н	L	L	ON	ON	Normal operation
L	х	x	OFF	OFF	Scanner CPU overdriving
Н	Н	X	OFF	OFF	Call for Service

## 9.7 General Description of CCD Control

## 9.7.1 Opto-electronic conversion

In order to produce electrical signal corresponding to the reflected light amount from the original, a CCD (charge-coupled device) is employed in this model. Generally, CCD is a one-chip opto-electronic conversion device, comprised of several thousand light-receiving elements arranged in a line, each one of which is a few micron square.

Since this model is a color copier, it is equipped with a special CCD which has three lines of light-receiving elements, each line having 7,500 elements and covered with a colored filter (red, blue or green).

Each element of the light-receiving section is comprised of a pair of layers P and N of semiconductor. When light strikes the element, light energy produces a (-) charge in the P layer; the amount of the charge produced is proportional to the energy and time of lighting. The charges produced in the light-receiving section are then sent to the transfer section, where they are shifted by transfer clocks from right to left as shown in the diagram below and are finally output from the CCD. At this time, to increase the image transfer speed in the CCD, image signals in the even-number and odd-number elements are separated and made to output in parallel via two channels.



Fig. 9.7-1 Principle of opto-electronic conversion by CCD

## 9.7.2 Shading correction

Signal voltages read by the CCD must be corrected for variations as described below:

- ① Light source has a variation in its light distribution.
- ② Since the light beam reflected from the original is converged using a lens, the light path is the shortest at the center of the CCD, and the closer to either end of the CCD, the longer the light path becomes. This will cause a difference in the amount of light reaching the CCD (i.e. the light amount is maximum at the CCD center, gradually decreasing toward either end).
- ③ Each of the 7,500 elements varies in opto-electronic conversion efficiency.

These factors of variation need to be corrected. This correction is referred to as shading correction. Shading correction is performed like this. Based on the black and white data obtained in advance, raw image data is put to a normalization process represented by the following formula to correct lighting variance and element variation in the image data.

$$I = k \times \frac{(S - K)}{(W - K)}$$

where k : Coefficient

- S: Pre-correction data (or raw image data)
- K : Black data (stored in "black" memory)
- W: White data (stored in "white" memory)

## 9.8 Automatic Original Size Detection Circuit

This circuit detects the size of original (standard sizes only) placed on the glass, using reflection type photo sensors arranged on the base frame of the scanner unit.

#### 9.8.1 Principle of original size detection

Reflection type photosensors are placed in proper positions on the base frame of the scanner unit, as shown in Fig. 9.8-1. Each sensor consists of an infrared light emitting diode (LED) on the light emitting side, and a phototransistor on the light receiving side.

When there is an original on the glass, light beams from the LEDs are selectively reflected from the original and led to the matching phototransistors. This means that the size of original is detected by checking which phototransistors are turned ON or not.



#### 9.8.2 Process of detecting original size

- (1) When the copier is in the original size detection mode, carriage 1 is set at its home position.
- (2) When the platen cover is opened and an original is placed on the glass, the sensors receive or do not receive the light reflected from the original; if one of the matrix conditions shown in step (4) for original sizes holds true, the size of the original is instantly detected.
- (3) The output signal from each sensor is input to CPU on the SCM board to determine the size of original.



Fig. 9.8-2 Original-size detection circuit

#### [A4 Series]



[LT Series]





(4) Original size is determined by the combination of presence/absence signal of original output at each detection point stated in step (3). Combination charts for size determination of A4 series and LT series are as follows.

Nia			3-	3-beam sensor		Size	Handling on control
INO.	APS-C	APS-R	APS-1	APS-2	APS-3	judgement	
1	1	1	1	1	1	No original	No original decision
2	1	1	1	1	0	_	Hold
3	1	1	1	0	1	-	Hold
4	1	1	1	0	0	-	Hold
5	1	1	0	1	1	_	Hold
6	1	1	0	1	0	_	Hold
7	1	1	0	0	1	_	Hold
8	1	1	0	0	0	_	Hold
9	1	0	1	1	1	_	Hold
10	1	0	1	1	0	_	Hold
11	1	0	1	0	1	_	Hold
12	1	0	1	0	0	_	Hold
13	1	0	0	1	1	_	Hold
14	1	0	0	1	0	_	Hold
15	1	0	0	0	1	_	Hold
16	1	0	0	0	0	-	Hold
17	0	1	1	1	1	A5-R	Size decision
18	0	1	1	1	0	A5	Size decision
19	0	1	1	0	1	_	Hold
20	0	1	1	0	0	B5	Size decision
21	0	1	0	1	1	_	Hold
22	0	1	0	1	0	_	Hold
23	0	1	0	0	1	_	Hold
24	0	1	0	0	0	A4	Size decision
25	0	0	1	1	1	B5-R	Size decision
26	0	0	1	1	0	A4-R	Size decision
27	0	0	1	0	1	_	Hold
28	0	0	1	0	0	B4	Size decision
29	0	0	0	1	1	_	Hold
30	0	0	0	1	0	-	Hold
31	0	0	0	0	1	-	Hold
32	0	0	0	0	0	A3	Size decision

[A4 Series]

#### [LT Series]

No.	APS-C	APS-R	APS-1	APS-3	Size judgement	Handling on control
1	1	1	1	1	No original	No original decision
2	1	1	1	0	ST	Size decision
3	1	1	1	1	_	Hold
4	1	1	1	0	_	Hold
5	1	1	0	1	_	Hold
6	1	1	0	0	-	Hold
7	1	1	0	1	_	Hold
8	1	1	0	0	_	Hold
9	1	0	1	1	ST-R	Size decision
10	1	0	1	0	LT-R	Size decision
11	1	0	1	1	_	Hold
12	1	0	1	0	_	Hold
13	1	0	0	1	_	Hold
14	1	0	0	0	_	Hold
15	1	0	0	1	_	Hold
16	1	0	0	0	LT	Size decision
17	0	1	1	1	-	Hold
18	0	1	1	0	_	Hold
19	0	1	1	1	_	Hold
20	0	1	1	0	_	Hold
21	0	1	0	1	_	Hold
22	0	1	0	0	_	Hold
23	0	1	0	1	_	Hold
24	0	1	0	0	_	Hold
25	0	0	1	1	_	Hold
26	0	0	1	0	LG	Size decision
27	0	0	1	1	_	Hold
28	0	0	1	0	-	Hold
29	0	0	0	1	_	Hold
30	0	0	0	0	—	Hold
31	0	0	0	1	_	Hold
32	0	0	0	0	LD	Size decision

Code	Output signal	Original
1	Н	Absent
0	L	Present

\* When platen sensor is OFF

• Output signals from APS sensors determine the following.

Size decision : Size is displayed on the control panel and a specific paper or reproduction ratio is selected. Hold : Retain the latest original size recognized (or no original state) until new paper size is properly recognized.

No original : Reproduction ratio and paper are not selected

• Size change is always observed and detected if any.

• The carriage-1 stays at the standby position even when original size is changed and thus the reproduction ratio changes.

\* When platen sensor is ON

Retains the latest original size (or no original state) recognized just before the platen sensor is turned ON regardless the APS sensor output signals. - Supplementary explanation

(1) Reflection type photosensor

The reflection type photosensor is comprised of an infrared light emitting diode and a phototransistor. It uses pulse modulation to detect an original.



## 9.9 Disassembly and Replacement

## [A] Original glass

(1) Remove 2 screws and then the glass retainer.



(2) Raising the feed-side end of the glass ①, take it out in the direction of arrow ②.







# (1) Remove 3 sensors on the base frame (4 screws

(1) Remove 3 sensors on the base frame (3 screws

[B] Automatic original detection unit

# and 3 connectors).

(B-1) A4 Series

(B-2) LT series

and 3 connectors).

(2) Remove the right top cover and take out the right top bracket (3 screws).

(3) Remove the lens cover (9 screws and 2 con-

(4) Remove the sensor bracket mounted to the lens

nectors).





(5) Remove the sensor (1 screw).

cover (2 screws).



#### [C] Original-width indicator unit

 Remove the left top cover (3 screws) and then the arrowed one of the screws securing the rear top cover.

- (2) Remove the indicator unit (4 screws, haraness from a harness clamp and 1 connector).
- **Note:** Lift with your fingers the rear top cover located above the document motor to take out the indicator unit.

- (3) Remove 2 screws and then the document motor.
- (4) When removing the shading correction plate, first remove the original scale (1 screw, 1 stepped screw and 1 spring) and then take out the shading correction plate.
- (5) When removing the belt, first remove the indicator guide (2 screws) and then remove the belt.









#### [D] Exposure lamp

- (1) Remove the original glass.
- (2) Remove the left top cover.
- (3) Remove the indicator unit.
- (4) Remove 1 connector, the harness from 2 clamps and 2 screws and then take out the exposure lamp.
- **Notes:** 1. When installing the exposure lamp, it should be placed as shown on the illustration on the right.
  - 2. Do not touch the surface of the exposure lamp with bare hands.





#### [F] Scan motor

- (1) Remove the left top cover, the right top cover and the rear top cover.
- (2) Remove the rear-side frame (12 screws).



- (3) Disconnect the connector.
- (4) Remove 2 screws and then take out the scan motor bracket.



(5) Unscrew 2 screws and remove the scan motor.



#### [H] Carriage 1

- (1) Remove the original glass.
- (2) Remove the right top cover, the right top bracket and the lens cover.
- (3) Unscrew the screw which secures the ground wire.
- (4) Remove the rear-side frame and the indicator unit.
- (5) Move the carriage to the paper exit side.
- (6) Remove 2 screws securing the carriage 1 at the front and rear.
- (7) Move the carriage to the center, and tilting it at an angle, pull it out upward.

#### [I] Mirror 1

When replacing the mirror 1, replace the carriage 1 together with the mirror inside.

Note: Mirror 1 should not be removed in the field. When replacing the carriage 1, do not touch the 2 screws indicated with arrows. However, the screw A can be adjusted during image distortion adjustment.







#### [J] Carriage 2 and carriage drive wire

- Remove the original glass, feed-side cover, exitside cover, top cover, rear cover, inner cover, control panel unit, rear frame, and front stay.
- (2) Remove the scanner unit (screws: 5 at front side, 1 at feed side and 1 at exit side).



- (3) Remove the scan motor.
- (4) Remove the ADF bracket (4 screws).

- (5) Remove the carriage 1.
- (6) Remove the rear top frame (10 screws) and front top frame (15 screws).



- (7) Remove the wire tension spring.
- (8) Take out the carriage 2.



- (9) Remove the drive pulley (2 setscrews).
- (10) Remove 2 wire pulleys (2 setscrews for each).
- (11) Remove the wires from the wire pulleys.



- **Note:** For reassembly, the wire should be mounted as shown below.
  - Refer to the Service Handbook for information about how to wind the wire around the wire pulleys.
  - When reinstalling the wire and carriages 1 and 2, refer to the Service Handbook.
  - When reinstalling the drive pulley and wire pulleys, the 2 setscrews must be fixed in the same direction.



#### [K] Mirrors 2 and 3

When replacing the mirrors 2 and 3, replace the carriage 2 together with the mirrors inside.

**Note:** Mirrors 2 and 3 should not be removed in the field. When replacing the carriage 2, do not touch the 2 screws indicated with arrows.

However, the screw A can be adjusted during image distortion adjustment.

#### [L] Lens unit

- (1) Remove the lens cover.
- (2) Remove the shield bracket (2 screws).
- (3) Remove 2 screws and 1 connector.
- (4) Remove the lens unit, pulling it upwards.

- Note: 1. When replacing the lens unit, do not touch the screws indicated with arrows (6 screws paint-locked).
  - 2. When handling the lens unit, do not touch the adjusted section and the lens.
  - When reinstalling the lens unit, be sure to use the positioning pins. (Refer to the Service Handbook.)










### [M] Damp heater

- (1) Remove the lens cover.
- (2) Remove the screw and the connector. Then, take out the lens damp heater unit.
- (3) Unscrew the screw, release the harness from the clamp, and then remove the lens damp heater.
- (4) Unscrew 2 screws which are securing the mirror damp heater bracket, disconnect the connector and release the clamp holding the cable.
- (5) Disconnect 2 connectors and remove the cable. Then take out the mirror damp heater unit.
- (6) Unscrew the screw, release the harness from the clamp, and then remove the mirror damp heater.

### [N] SCM fan

- (1) Remove the original glass and lens cover.
- (2) Remove 3 screws and the connector from the lens cover. Then, detach the fan unit.







(3) Unscrew 2 screws which hold the fan in place and take out the fan.



# [O] Carriage home position sensor

 Disconnect the connector, release 2 latches and take out the carriage home position sensor.



# **10. LASER OPTICAL UNIT**

# **10.1 General Function**

For the formation of electrostatic latent images, the laser optical unit works to project color-separated digital image signals (basic elements of color images) sent from the scanner section or printer controller onto the drums of yellow, magenta, cyan and black, respectively. The image signal is first changed into a light signal emitted from a laser diode via the laser drive PC board. This light signal then passes through optical elements such as a pre-deflection lens, polygonal mirror, f $\theta$  lens and other mirrors, and illuminates the surface of the drum. Since this set of optical components are very vulnerable to dirt and dust, they are assembled and precision-adjusted in a clean room at the factory. Therefore, the laser optical unit must not be disassembled in the field for any reason.



Fig. 10.1-1 General illustration of the laser optical unit



Fig. 10.1-2 Outside view of the laser optical unit

# **10.2 Construction**

### (1) Laser emitting unit

This unit is comprised of laser diodes, laser drive PC board, finite lenses, apertures, etc. There are four laser emitting units inside the laser optical unit, which are producing modulated signals corresponding to the respective colors.

### (a) Laser diode

Based on a laser modulation control signal (ON/OFF) from the laser drive PC board, the laser diode emits a laser beam.

### (b) Laser drive PC board

This control PC board has the following functions:

- 1 APC (Auto power control) function : regulates variation in the output of laser emission, which occurs due to change in temperature.
- 2 Laser emission control (ON/OFF) function

### (c) Finite lens

Laser beams passing the finite lens form converging light rays, focusing on the drum surface.

(d) Aperture

This is a slit for regulating the form of the laser beam.

### (e) Laser safety

The beam of the semiconductor laser is extremely weak (about 120 mW) itself, but focusing the parallel rays results in an increase in energy to which extended exposure is hazardous.

The laser optical system of the digital plain paper copier is encased in metal which in turn is housed in the external cover. There is thus no risk of leaks during use, nor during normal servicing. Note, however, extreme care must be exercised when servicing involves focusing the laser. Such operations are hazardous and must not be attempted unless you are specifically trained to work in this area. The warning label shown below is attached on the left side of the upper inner cover.



# [CAUTION]

- Do not insert tools that are highly reflective into the path of the laser beam.
- · Remove all watches, rings, bracelets, etc.

### (2) Pre-deflection lens

Along with the  $f\theta$  lenses, the pre-deflection lens, a combination of anamorphic plastic lens and glass lenses, serves the purpose of compensating for change in the characteristics of plastic lenses resulting from temperature change.

### (3) Pre-deflection reflecting mirrors

These mirrors are so arranged that individual laser beams are led to the polygonal mirror.

### (4) Polygonal cover

The polygonal cover is so constructed that it covers the polygonal mirror completely and shields the "aircutting" sound of high-speed rotating polygonal mirror from coming out of the unit. In addition, yellow, magenta and cyan laser beams enter the unit in a direction different from the black laser beam, and each incoming-beam window has an optical filter installed which works to attenuate the light transmission factors of the laser beams. AR(anti-reflection)-coated glass is attached to each outgoing-beam window.

### (a) Incoming window ND filter

The ND filter, equipped to increase the stabilization of the laser emitting characteristics, has a light transmission factor that can make the light amount on the drum surface just as specified.

### (b) AR-coated glass of the outgoing window

To prevent the laser beam reflected by the polygonal mirror from being reflected back by glass in the outgoing window, AR-coating has been applied to the glass.

#### (5) Polygonal mirror motor unit

This unit is comprised of a polygonal mirror motor and a polygonal mirror.

### (a) Polygonal mirror motor

This motor works to rotate the polygonal mirror at the specified rotation speed (22,500 rpm). Since the motor rotates at high speed and with high accuracy, extreme care should be used not to give any impact or vibration; otherwise, an abnormal noise of motor may occur, or the life of the motor may be shortened.

# (b) Polygonal mirror

As the laser beam emitted is reflected by the rotating polygonal mirror, the beam is caused to scan over the drum surface.

Four beams corresponding the respective colors come onto the polygonal mirror and follow their respective routes to scan the drums of the corresponding colors. In one rotation of the polygonal mirror, eight scanning lines are written on each drum.



#### (6) $f\theta$ lenses 1 and 2

These two lenses are set to make the following corrections to the laser beams reflected from the polygonal mirror.

### (a) Uniform-velocity scanning

Since the polygonal mirror is rotating at a uniform velocity, the laser beam reflected from the mirror scans over the drum surface at a uniform angular velocity; namely, the pitch between the dots on the drum is wider at both ends than at the center of the scanning range. The  $f\theta$  lenses help to correct this difference, making all the dotto-dot pitches equal on the drum surface.



(b) Face tilt correction

Even if assembled with precision, the reflecting faces of the polygonal mirror are tilted slightly to one side relative to the perfect vertical. The  $f\theta$  lenses help to correct the displacement of the laser beam on the drum, which occurs due to the tilt of the reflecting faces.



(c) Laser beam shape

The lenses help to correct the beam-spot shape of the laser beam projected onto the drum surface.

### (7) Reflecting mirrors

These reflecting mirrors lead the laser beams reflected by the polygonal mirror and corrected by the  $f\theta$  lenses to the drum. The laser beams of respective colors are directed to the drum by respectively different routes using ten mirrors in total, three each for yellow, magenta and cyan beams and one for black beam.



### (8) Tilt correction device

At the front end of each of the third mirrors for yellow, magenta and cyan beams, a tilt correction mechanism is provided. This mechanism works to make the four beams corresponding to the respective colors parallel in the following manner:

- 1 A position-error detection pattern is marked on the transfer belt. This is read by a sensor to recognize the current error in position.
- 2 With the black scanning line as a standard, a tilt motor installed at the end of each of the yellow, magenta and cyan beam mirrors is operated to automatically adjust the degree of beam parallelization by inclining the mirror in the lengthwise direction.

### (9) Slit glass

The laser optical unit has slit glasses installed in a position from which the laser beams are output to shield the unit from dirt and dust.

# (10) H-Sync (Horizontal Synchronization) signal detection PC board

A sensor is employed to detect the signal for determining the starting position for writing scanning lines. The signal is detected for each scanning line, and a fixed period of time after the detection, image writing is started.

The H-Sync signal is only detected for black beams (reference beam), and then other color beams start being written in positions relative to that of the reference beam; namely, the color registration test pattern on the transfer belt mentioned previously is first read, and the time to start writing images is determined so that other beams are aligned with the reference beam.

# (11) Laser relay PC board

Signals on the laser drive PC board for yellow, magenta, cyan and black beams, and those on the H-Sync signal detection PC board are collected on this relay PC board, and then those signals are sent to the IMC PC board.

The relay PC board has a variable resistor attached to adjust the laser power output, but this resistor is to be handled only at the factory. Don't touch it in the field.

# **10.3 Disassembly and Replacement**

# [A] Laser optical unit

- (1) Open the front covers.
- (2) Remove the processing unit (EPU). (► Chapter 13)
- (3) Unscrew 2 screws which hold the laser optical unit in place.
- (4) Remove the feed-side upper cover.
- (5) Remove the feed-side upper inner cover (4 screws).

- (6) Remove the bypass feed unit. (► Chapter 12)
- (7) Remove the metal shield cover (4 screws).









- (8) Disconnect 3 connectors.
- (9) Shift the laser optical unit slightly toward the rear, before drawing it out completely.
- Disengage the 2 front-side bosses from the front frame, and then while releasing the hooks from the shaft which runs through the front and rear frames, take out the unit.

- Notes: 1. To avoid an undesirable load being applied to the removed laser optical unit, place it with the laser relay PC board facing upward. At this time, since the 4 slit glasses, through which light beams come out, face downward, put a clean sheet of paper under the unit to protect them from dust.
  - 2. Be careful to prevent the slit glasses from being stained, such as with fingerprints.
  - Since the laser optical unit is a precision mechanism, handle the unit with extreme care so as not to impart any impact or vibration to it.
  - 4. Since the laser optical unit is precisionadjusted and therefore should be protected against dust and stain, <u>never dis-</u> <u>assemble the unit in the field</u>.



# **11. DRIVE SYSTEM**

# 11.1 Construction of the Drive System

The drive system is so constructed as to provide drive to the following units: the drums, developer units, cleaners, transfer belt, fuser and exit rollers.

# **11.2 Description of Functions**

- Drum drive
  Drives the drums by transmitting the rotation of the drum motors through gears and couplings to the drums.
  Developer-unit drive
  Drives the developer units by transmitting the rotation of developer motors through gears and timing belts to the developer-unit gears.
  Cleaner drive
  Drives the cleaners by transmitting the rotation of the developer motors through gears and timing belts to both cleaner drive and developer-unit gears.
  Transfer belt drive
  Drives the transfer belt drive rollers by transmitting the rotation of the transfer belt motor through gears and timing belts to transfer belt drive rollers.
- Fuser-unit drive Drives the fuser unit by transmitting the rotation of the fuser motor through gears to the heat rollers, fuser rollers and exit rollers.



# 11.3 Motor Driving

# 11.3.1 Brushless DC motors







right angles to the shaft



Condition of the poles when phases are excitied

### 11.3.3 Driving of drum motors and transfer belt motor

Drum motors consist of a Y, M, C driven color motor and a K drum driven black motor. Both drum motors and transfer belt motor are 2-phase HB type stepping motors. Their construction is as illustrated below:



The durm motors and the transfer belt are controlled by the LGC board. The general of the control system is as follows:

(1) LGC outputs signals to control the rotation movement and rotation direction of the motors.

- STCDIR, STKDIR, STTDIR : Motor rotation direction setting
- (2) The motor rotation frequency, after having been made synchronized with the clock signal, is control-

led.

STCLK : Control clock signal

NM12 : Observation of the control clock signal

(3) The excitation mode is set.

STPTN1, STPTN2, STWEDGE : Excitation mode signal

(4) LGC observes each door switch and performs the stop control of the motors if one of the doors is open.

### 11.3.4 Developer motor driving

Developer motor is an IC motor and the LGC board controls its speed and ON/OFF switch.



The control and driving system of developer motor is summarized as follows:

(1) LGC provides a signal to control the rotation of the developer motor so that the color developer mode can be switched.

DVMDIR = "L" : Color development mode

DVMDIR = "H" : Black developement mode

- (2) The excitation phase switching section works to excite each phase of the developer motor.  $\rightarrow$  The developer motor starts rotating.
- (3) Hall elements A, B and C detect the rotation position of the motor (rotor).
- (4) The excitation phase switching section switches the excitation of each phase of the motor.(The steps (2) to (4) being repeated, the motor continues to rotate.)
- (5) Rotation of the developer motor causes FG pulses to be generated.
- (6) The FG pulse and the reference frequency are compared in terms of phase and speed, and the difference is added. Deflection in the power supply voltage is also added to the resultant signal (signal generation).

The reference frequency of the color developer motor is supplied from LGC, while that of the black developer motor is generated inside the motor.

(7) Based on the signal obtained in step (6), the switch timing of excitation phase switching section is changed:

= Control is performed to make the FG pulse and the reference frequency equal  $\rightarrow$  The developer motor rotates at a fixed speed (locked range).

(8) When DVMON signal from LGC comes to the level "H", the developer motor comes to a stop.

<Control signal>

## (1) DVMCLK signal

This is a reference clock signal to make the developer motor rotate at a fixed speed. The frequency of the reference clock is 420 Hz.

When the period of the FG pulse is within  $\pm 6.25\%$  that of the reference frequency, it is specified that the motor is in a locked range (normal rotation), and this signal comes to the level "L". LED 'LP1' also lights.

Signal levels of developer motor circuit:

Signal name	Level "H"	Level "L"	
DVMCLK	Reference clock (420 Hz)		
DVMON	Motor OFF	Motor ON	
DVMDIR	Black development mode	Color development mode	

### 11.3.5 Fuser motor driving

Fuser motor is an brushless DC motor and the LGC board controls its speed and ON/OFF switch.



The control and driving system of fuser motor is summarized as follows:

- (1) LGC provides a signal to control the rotation of the fuser motor:
  - (FSMOON : Motor rotation command)
- (2) The excitation phase switching section works to excite each phase of the fuser motor.→The fuser motor starts rotating.
- (3) Hall elements A, B and C detect the rotation position of the motor (rotor).
- (4) The excitation phase switching section switches the excitation of each phase of the motor.(The steps (2) to (4) being repeated, the motor continues to rotate.)
- (5) Rotation of the fuser motor causes FG pulses to be generated.
- (6) The FG pulse and the reference frequency from LGC are compared in terms of phase and speed, and the difference of both is added. Deflection in the power supply voltage is also added to the resultant signal (signal generation).
- (7) Based on the signal obtained in the step (6), the switch timing of excitation phase switching section is changed:

= Control is performed to make the FG pulse and the reference frequency equal $\rightarrow$ The fuser motor rotates at a fixed speed (locked range).

- (8) When FSMOON signal comes to the level "H", the fuser motor comes to a stop.
- (9) During the OHP mode, FSMOSL signal comes to the level "L", and making the motor rotate at 1/4 the normal speed.

<Control signal>

(1) FSMCLK signal (LGC→MOT : Input)

This is a reference clock signal to make the fuser motor rotate at a fixed speed. The frequency of the reference clock is 1087 Hz.

(2) FSMOSL signal (LGC→MOT : Input)

This signal is used to turn the fuser motor ON and OFF at slow speed. When this signal comes to the level "L", the fuser motor rotates at a low speed.

(3) FSMOON signal (LGC→MOT : Input)

This signal is used to turn the fuser motor ON and OFF. When this signal comes to the level "L", the fuser motor is turned ON.

Signal levels of fuser motor circuit:

Signal name	Level "H"	Level "L"
FSMCLK	Reference clock	
FSMOSL	Motor OFF	Motor ON at low speed
FSMOON	Motor OFF	Motor ON

# **11.4 Disassembly and Replacement**

# [A] Drum drive unit

- (1) Remove the rear cover.
- (2) Remove the ozone filter and take out the fan (3 connectors and 2 screws).

- (3) Detach 2 flywheels (3 screws for each).
- **Note:** With the EPU being installed, be careful not to allow the flywheels to rotate when detaching them.

(4) Detach 2 flywheel holders (1 screw for each).







### (A-1) Black drum motor

- (1) Disconnect 1 connector of the black drum motor , and then remove the motor (2 screws).
- Note: When removing the black drum motor, do not loose the damper screws.







- Disconnect 1 connector of the color drum motor , and then remove the motor (2 screws).
- **Note:** When removing the color drum motor, do not loose the damper screws.



 Disconnect 1 connector of the developer motor and remove the motor (2 screws).



# (A-4) Drive gears and pulleys

(1) Remove the drive unit cover (5 screws).

tach two flywheels (3 screws for each).

(3) Remove two flywheel holders (1 screw for each).

6









(5) Remove the developer drive unit cover (9 screws).



(6) Referring to the following diagram, remove the developer drive gears and pulleys.



- (7) Unscrew 7 setscrews on the cover, and unscrew6 setscrews on the shaft. Then remove the cover.
- Note: Be careful once the setscrews on the shaft have been unscrewed, the gears will also drop out of the cover.



(8) Referring to the following diagram, remove the developer drive gears and pulleys.



**Note:** Markings used for positioning when the drum-unit drive gears "Y (yellow)","M (Magenta)" and "C (Cyan) " are assembled.



Fit "Y", "M" and "C" markings on the gears in "Y", "M" and "C" markings on the bracket frame, respectively.

The extension of the arrow on the gear should be within 2 lines of the bracket frame (A: Tolerance range) when assembling.

# [Supplementary explanation]

The position of "M" on the gear should be in the same direction as the pin for stopping rotation that is on the rear side.

The phase difference between "Y" and "M" at assembling is 73.5 degrees. The phase difference between "M"and "C" at assembling is 73.5 degrees.



## [B] Transfer belt/fuser drive unit

# (B-1) Transfer belt motor

 Disconnect 1 connector on the transfer belt motor and remove the transfer belt motor (2 screws).

## (B-2) Fuser motor

 Disconnect 1 connector on the fuser motor and remove the fuser motor (2 screws).

### (B-3) Transfer belt/fuser drive unit

- (1) Open the front cover and draw out the transfer/ transport unit.
- (2) Remove the transfer belt/fuser drive unit (4 screws).









# (B-4) Transfer belt coupling

- Rotate the stopper 90° to remove it. (Be careful not to break it.)
- (2) Separate the transfer belt coupling from its bearing, draw out the transfer belt coupling along with the belt, and finally take out the transfer belt coupling.
- Note: The belt will remain in the assembly.

### (B-5) Transfer belt/fuser drive gear

- (1) Remove 1 clip and then take out the fuser drive gear.
- (2) Detach the cover of the transfer belt/fuser drive unit (4 screws).

(3) Detach the clip and then take out the transfer belt drive pulley gear and the arm unit.



(4) Unscrew 1 screw and remove the e-ring. Then take out the arm unit drive transmission gear, timing belt, etc.

(5) Referring to the following diagram, remove the transfer-belt/fuser drive gears and pulleys.



# **12. PAPER FEEDING SYSTEM**

# **12.1 Function**

This system works to pick up paper, sheet by sheet, from the cassette or the bypass tray and send it to the transfer/transport unit.

The paper feeding system is mainly comprised of the pick-up roller, paper feed roller, separation roller, registration rollers, bypass paper sensor, cassette paper-empty sensor, cassette-feed jam sensor, registration sensor, and their drive mechanism.

### (1) Pick-up roller

These rollers work to draw out a sheet of paper from the cassette or bypass tray and send it to their respective feed roller. For this purpose, they are raised up and down.

### (2) Paper feed roller

Mounted against the separation roller, this roller transports the paper from the pick-up roller to the registration rollers.

### (3) Separation roller

Mounted against the paper feed roller, this roller works to prevent double feeding. If two sheets or more are sent from the pick-up roller, the frictional force between the sheets is smaller than the separating force of the separation roller. Thus, the sheet in contact with the separation roller cannot advance any further. When only one sheet is sent from the pick-up roller, the separation roller is forced to follow the paper feed roller.

### (4) Transport rollers

These rollers transport the paper sent from the paper feed roller to the registration rollers.

### (5) Registration rollers

The paper sent from the paper feed roller is pushed against the registration rollers, which align the leading edge of the paper. Then, the upper and lower registration rollers start rotating to carry the paper to the transfer/transport unit.

To prevent paper dust from adhering to the registration rollers, a brush is provided in contact with the lower registration roller.

Next explanation is about the various sensors for detecting paper size, presence or absence of paper, and the position of the paper transported to enable the rollers to be controlled ON and OFF.

(6) Bypass paper sensor

This sensor works to detect whether paper is set in the bypass tray. If paper is set there, bypass feeding is selected in preference to cassette feeding.

### (7) Cassette paper-empty sensor

This is a transmission type sensor, using an actuator to detect whether or not paper is set in the cassette. If there is no paper in the cassette, the actuator works to block the optical path of the sensor, allowing it to determine that there is no paper.

(8) Cassette-feed jam sensor

This switch detects when the leading or trailing edge of paper passes the paper feed roller. It is also used for detecting jams such as paper misfeeding.

(9) Registration sensor

This switch detects that the leading edge of the paper has arrived at the registration rollers. It also detects the passage of the trailing edge of the paper. When the leading edge has been detected, it is determined that the aligning of the paper by the registration rollers has been finished.

(10) OHP sensor

The fusing temperature and speed for OHP film copying are different from those for normal paper. A modulating reflector photo interrupter, resistant to external light interference, is equipped in this machine to discriminate OHP films from normal paper when films are fed.



### [OHP film detection circuit]

The OHP film detection circuits are as shown above. The sensor output is pulled up by the LGC board and its Vout varies according to the type of paper fed, as shown in the table on the right.

OHP sensor output is transmitted to CPU, providing information on the type of paper fed.

Paper type	Vout
OHP film (transparent area)	
Normal paper	L



Sectional view (Front side)

No.	Name	No.	Name
1	Bypass separation roller	9	Transport roller 2
2	Bypass feed roller	10	Registration sensor
3	Bypass pick-up roller	11	Registration roller 1
4	Cassette separation roller	12	Registration roller 2
5	Cassette feed roller	13	Cassette-feed jam sensor (1st cassette)
6	Cassette pick-up roller	14	Cassette-feed jam sensor (2nd cassette)
1	Transport roller 1	15	OHP sensor
8	Bypass paper sensor		



Paper feeding drive system (Rear side)

No.	Name	Note
17	Paper feed motor	
18	Registration motor	
19	Pre-feed clutch (Rear)	
20	Pre-feed clutch (Front)	
21	Feed path clutch	Shaft dia: Ø8, gear teeth: 28
22	Bypass feed clutch	Shaft dia: Ø8, gear teeth: 28

# **12.2 Description of Operation**

# 12.2.1 Operation of the bypass pick-up roller



When a driving force is applied to the paper feed roller shaft, the rotational force is transmitted via the spring clutch to the pick-up lever, allowing the pick-up arm to fall by its own weight. The pick-up lever is stopped when the spring clutch comes to the stopper.

When the driving force is removed from the paper feed roller shaft, the lever spring forces up the pick-up lever, and thus the pick-up arm is also lifted up.

# 12.2.2 Operation of the cassette pick-up roller



When the cassette is inserted, the lever (a) is moved up in the direction of A by the lever (d) attached to the cassette. This causes the link mechanism comprised of levers (b) and (c) to allow the pick-up roller to move down by its own weight.

#### 12.2.3 Operation of paper separation

This model is equipped with a paper separation roller in the paper feed section to prevent multiple paper feeding. As shown on the right, the separation roller mechanism is mainly comprised of a paper feed roller, separation roller, and spring joint. The paper feed roller is so arranged that it rotates in the direction of via a feed clutch at the same timing as the pick-up roller rotation.

The diagram on the bottom right shows how the double feeding is prevented: since the friction between two sheets is small, the lower sheet is not transported any further by the separation roller, and only the upper sheet is moved by the paper feed roller in the direction of **4** 



#### Example:

When a single sheet ① enters between the rollers: since the transporting force of the paper feed roller is greater than the braking force of the separation roller, the separation roller is forced to follow the paper feed roller, making the sheet go forward to the registration rollers.



#### 12.2.4 Description of general operation

### [A] From power ON up until the copier becomes ready:

- (1) When the copier is turned ON, each cassette tray-up motor is energized, causing each cassette tray to start moving up. When the cassette tray-up limit sensor is turned ON (LnH), the cassette tray-up motor is de-energized, causing the cassette tray to stop. At this time, if the cassette paper-empty sensor is turned ON (H), it is determined that there is paper in the cassette. Otherwise, it is determined that there is no paper. Whether or not there is paper in the cassette, the tray moves up and stops at the upper position.
- (2) If a cassette is withdrawn when the copier is turned ON, the corresponding cassette tray-up motor remains OFF. Only after the cassette is reinserted, the cassette tray moves up to check whether there is paper in the cassette.
- (3) When the copier is turned ON, if any of cassette-feed jam sensor is ON (i.e. paper remaining on the paper path), it is determined that a jam has occurred, and no operation is performed until the jam is removed.

#### [B] During standby

- (1) After each cassette tray has moved up and checked whether there is paper or not, as described above, the copier goes into a standby state. During this state, the tray remains in the upper position.
- (2) If a cassette is removed and reinserted during standby, the corresponding cassette tray moves up again to check if there is paper or not.

#### [C] Bypass feeding operation

- · The bypass paper sensor detects the presence of paper.
- $\cdot$  The bypass-feed clutch is turned ON, causing the bypass pick-up and paper feed rollers to rotate.
- $\cdot\,$  The bypass pick-up roller moves down to start feeding paper.
- The leading edge of the paper turns ON the registration sensor, causing the paper to be aligned by the registration roller.
- The bypass feed clutch is turned OFF, causing the bypass pick-up and bypass feed rollers to stop rotating. The bypass pick-up roller moves up.
- · The registration motor is turned ON, causing the paper to be sent toward the transfer/transport unit.
- \* Depending on the paper type, when the registration motor is ON, the feed path clutch may also be turned ON in an instant and cause the bypass pick-up and bypass feed rollers to rotate.

### [D] Cassette feeding

- The cassette feed clutch, feed path clutch and pre-feed clutch (F) are turned ON, and the paper feed and transport rollers rotate, causing the paper to start being fed.
- · When the leading edge of the paper turns ON the cassette-feed jam sensor, the feed clutch is turned OFF.
- $\cdot$  The feed path clutch and the pre-feed clutch(F) are ON, causing the transport roller to rotate for once.
- The leading edge of the paper turns ON the registration sensor, and the paper is aligned by the registration rollers.
- $\cdot$  The feed path clutch and the pre-feed clutch(F) are turned OFF, causing the transport roller to stop.
- The registration clutch and the pre-feed clutch(R) are turned ON to send the paper toward the transfer/ transport unit.

# **12.3 Motor Drive Circuit**

# 12.3.1 Brush motor drive circuit

Cassette tray-up motor :

Driven by IC21 for the 1st cassette and IC34 for the 2nd cassette (TA8428K on the LGC PC board).

The following shows the block diagram of TA8428K.



IN1 and IN2 are input terminals to receive signals from the microcomputer. The control logic, based on signals from the microcomputer, controls the CW/CCW rotation and ON/OFF of the motor.

Inp	out	Output		Bomarke
IN1	IN2	M (+)	M (–)	Tiemarks
Н	Н	L	L	BRAKE
L	Н	L	Н	CCW (upward)
Н	L	Н	L	CW (downward)
L	L	OFF (High impedance)		STOP

### 12.3.2 Drive system of paper feed motor (Brushless DC motor)



- (1) LGC provides a signal to control the rotation of the paper feed motor: (FDMON: Motor rotation command)
- (2) The excitation phase switching section works to excite each phase of the paper feed motor→The paper feed motor starts rotating.
- (3) Hall elements A, B and C help to detect the rotational position of the motor (rotor).
- (4) The excitation phase switching section switches the excitation of each phase of the motor.(With the steps (2) to (4) repeated, the motor continues to rotate.)
- (5) Rotation of the paper feed motor causes FG pulse to be generated.
- (6) The FG pulse and the reference frequency from LGC are compared in terms of phase and speed, and the differences are added. Deflection in the power supply voltage is also added to the resultant signal (signal generation).
- (7) According to the signal thus obtained in the step (6), the timing of the excitation phase switching is changed:

= Control is performed to make the FG pulse and the reference frequency equal $\rightarrow$ The paper feed motor rotates at a fixed speed (locked range).

(8) When FDMON signal from LGC comes to the level "H", the paper feed motor comes to a stop. And when FDMBK signal comes to the level "L", the brake function which is for stopping the motor in the shortest time works.
<Control signal>

(1) FDMCLK signal (LGCnFED-MOT : Input)

This is a reference clock signal to make the paper feed motor rotate at a fixed speed. The frequency of the reference clock is 419 Hz.

When the period of the FG pulse is within  $\pm 6.25\%$  that of the reference frequency, it is provided that the motor is within a locked range (normal rotation), and the signal comes to the level "L". At this time, LED 'LD1' is lighted.

(2) FDMON signal (LGCnFED-MOT : Input)

This signal is used to turn the paper feed motor ON and OFF. When this signal comes to the level "L", the motor is turned ON.

(3) FDMBK signal (LGCnFED-MOT : Input)

This signal is used to stop the paper feed motor in the shortest time. When this signal comes to the level "L", the brake works to control the motor.

Signal name	Level "H"	Level "L"	
FDMCLK	Reference clock (419 Hz)		
FDMON	Motor OFF	Motor ON	
FDMBK	Brake OFF	Brake ON	

Signal levels of paper feed motor circuit:

## **12.4 Disassembly and Replacement**

## [A] Bypass feed unit

## (A-1) Bypass feed unit

- (1) Remove the feed-side upper cover.
- (2) Remove the feed-side upper inner cover.
- (3) Unscrew the screw and remove the bypass unit stopper plate.
- (4) Pull out the ø6 shaft upward.
- (5) Disconnect 2 connectors, take out the harness from the clamp and remove the bypass feed unit.

## (A-2) Bypass feed roller

(1) Unscrew 4 screws and remove the roller unit.









## (A-3) Bypass pick-up roller

- (1) Remove the clip.
- (2) Pull out the ø6 shaft in the direction of arrow.

#### Note:

Pay attention to the following points when reassembling the bypass pick-up roller and the bypass feed roller:

- 1. Set the timing belt securely on the pulleys and the belt tensioner.
- 2. Set the timing belt on the correct position (especially for the bypass pick-up roller).
- 3. Fit the clips securely into the groove of the shaft.
- 4. Confirm that there is no stain of oil etc. on the surface of timing belt, pulleys and rollers.
- 5. In case the spring clutch is removed, screw the arbor properly to the groove edge of the shaft to reinstall.
- 6. Pay attention to the color of rollers. Paper feed roller: Semitransparent

Separation roller: Blue



## (A-4) Bypass separation roller

(1) Remove the lower bracket (separation roller bracket) (1 screws).



(2) Unlock both sides of the separation roller to remove it from the bracket.



## [B] Registration unit/OHP unit

#### (B-1) Registration unit

- (1) Remove the bypass feed unit.
- (2) Disconnect the registration sensor connector.



- (3) Open the front cover and turn the lever to move down the transfer belt unit.
- (4) Remove the processing unit (  $\blacktriangleright$  Chapter 13).
- (5) Remove the right inner cover (3 screws, 1 connector).
- (6) Unscrew 2 screws and slide out the registration unit toward the front.



#### (B-2) Upper and lower registration rollers

- (1) Unscrew 2 screws, and remove the pre-registration guide.
- Pre-registration guide
- (2) Remove 2 screws and the clip, and then the front bracket of the registration unit.

- (3) Remove the front and rear registration pressure springs.
- (4) Remove 2 bushings and the upper registration roller.
- (5) Remove 2 bushings and the lower registration roller.





## (B-3) Paper-dust brush

(1) Unscrew the screw, and pull out the brush toward the front.

(The paper-dust brush can be removed with the registration unit installed.)



## (B-4) OHP unit

- (1) Disconnect the connector of OHP sensor.
- (2) Remove the OHP unit (1 screw on the feed side, 2 screws on the front side).





### [C] Cassette feed section

## (C-1) Cassette feed unit

- (1) Open the side door.
- (2) Remove the clip.
- (3) Remove the side door.
- (4) Disconnect the connector and disengage the harness from the clamp.



#### Note:

When the copier is equipped with LCT, use the procedure below to remove the LCT and the side door:

- 1. Remove the feed-side rear cover.
- 2. Disconnect 2 connectors and remove the groundwire (1 screw).
- 3. Remove the hinge stop bracket (1 screw).
- 4. Disconnect the connector (see step (4) above).
- 5. Remove the side door together with LCT.
- (5) Remove the feed side covers (front and rear).
- (6) Unscrew 2 screws and remove the harness cover.





(7) Disconnect the connector from the paper feed unit.



- (8) Slide out the cassette.
- (9) Disconnect the connector of the cassette detection switch.
- (10) Unscrew 2 screws and draw out the paper feed unit toward the front.

(11) Remove the clutch bracket (2 screws).







- (12) Remove the separation roller holder (2 screws).
- (13) Remove the pick-up roller from the arm.
- (14) Slide the paper feed roller in the direction of arrow A and pull out its shaft from the bushing.
- (15) Remove the clip and pick-up arm from the shaft, and pull out the paper feed roller.

- (16) Remove the lever from the holder and take out the separation roller along with its shaft.
- (17) Remove the cover, arbor, clutch spring and then separation roller from the shaft.

### Note:

When reassembling the rollers for pick-up, paper feed and separation, pay attention to the following points:

- 1. Fit the pin into the pulley.
- 2. Set the timing belt securely on the pulleys.
- 3. Be careful as the "lock" direction of each oneway clutch is different.



- 4. Fit the clips securely into the groove on the shaft.
- 5. Confirm that there is no stain of oil etc. on the surface of the timing belt, pulleys, and rollers.
- 6. Pay attention to the color of rollers.

Paper feed roller: Yellow Separation roller: Blue



## (C-2) Cassete detection switch

 Disconnect the connector and unscrew 2 screws. Then remove the cassette detection switch.



### (C-3) Cassette feed transport unit

- (1) Remove the cassette feed unit.
- (2) Remove the rear cover.
- (3) Remove the paper feed motor unit. (Refer to [D])
- (4) Disconnect the connector of the pre-feed clutch, and remove the pre-feed clutch bracket (3 screws).
- (5) Unscrew the screw and remove the harness cover.
- (6) Disconnect 4 connectors.









(8) Unscrew 3 screws and remove the gear unit.

(1) Unscrew 2 screws and remove the sensor unit.(2) Disconnect the connector and remove the cas-

(C-4) Cassette feed jam sensor

sette feed jam sensor.



```
Cassette feed jam sensor
```

### [D] Paper feed motor unit

(1) Remove the rear cover.

### (D-1) Paper feed motor

- (2) Disconnect 2 connectors.
- (3) Unscrew 2 screws and remove the paper feed motor.



- (1) Remove the paper feed motor.
- (2) Disconnect the relay connector.
- (3) Unscrew 2 screws and remove the registration motor.

Pull out the registration motor first and then lift it up to take it out.

## (D-3) Paper feed motor unit

- (1) Disconnect 2 connectors.
- (2) Unscrew 4 screws and remove the paper feed motor unit.







## (D-4) Pre-feed clutch bracket

- (1) Disconnect the connector.
- (2) Unscrew 3 screws and remove the pre-feed clutch bracket.



### (D-5) Drive gears

- (1) Detach 3 clips and remove 3 gears. Be careful not to loss the pin inserted into the gear A.
- (2) Unscrew 7 screws, and remove the feed motor unit cover 1.
- (3) Detach the clip, and remove 4 gears.

- (4) Remove 2 clips and unscrew 4 screws to remove the feed motor unit cover 2.
- Note: When reassembling, pay attention to the correct direction of the clips.

(5) Remove the clip (small), gears and electro-magnetic clutches.



Feed motor unit

cover 1



Gear A

Clips

Clip

[E] Paper-exit/duplex unit transport section

## (E-1) Paper exit unit

- (1) Remove the paper exit unit cover and exit-side rear cover.
- (2) Disconnect the connector.
- (3) Remove the clip and take out the paper exit unit.
- (4) Unscrew the screw and remove the lock-lever bracket.

- (5) Unscrew 2 screws and remove the vertical transport guide unit.
- (6) Remove the clip and bushing on the front side, as well as the gear and bushing on the rear side, and then remove the vertical transport roller.







(7) Remove the clip and bushing on the front side, as well as the gear, bushing and spring on the rear side, and then remove the paper-exit/duplex unit switching gate and paper exit roller.



### (E-2) Duplex unit switching unit

- Open the front covers and pull out the transfer/ transport unit.
- (2) Remove the left inner cover.
- (3) Disengage the positioning pin of the paper-exit unit (1 screw).
- (4) Unscrew 3 screws (2 on the front side and 1 on the exit side) and remove the vertical transport guide (main unit side).



(6) Unscrew 3 screws and remove the duplex switching unit.

(7) Unscrew 2 screws and remove the gate solenoid (the screws must be removed from the inside of the bracket).





Duplex switching unit

## (E-3) Duplex unit drive unit

(1) Disconnect the connector.



(2) Unscrew 4 screws and remove the duplex unit drive unit.



## (E-4) Horizontal transport unit

- (1) Open the front covers and draw out the transfer/transport unit.
- (2) Remove the left inner cover.
- (3) Unscrew 2 screws, disconnect the connector and remove the horizontal transport unit.

Horizontal transport unit

# 13. PROCESSING UNIT (EPU)

## **13.1 Construction**

This chapter describes about the processing unit (electrophotographic processing unit: EPU) which is comprised as shown below.







[Sectional view]









Used toner transport unit

[Rear side view]

## 13.2 Description of Functions

### (1) Drums

Comprised of a cylindrical aluminum substrate on which an organic photoconductive substance is coated in a thin film. Photoconductivity is a characteristic which certain substances possess. When such substance is illuminated with light, the lighted area acts as an electric conductor and shows decrease of the electrical resistance; while the other area which is not illuminated (unexposed area) behaves as an insulator. Substances possessing such a characteristic as this are called photoconductors.

#### (2) Main charger

Comprised of a U-shaped metal component, on each end of which an insulation block is provided and a charger wire placed between both blocks.

When high voltage is applied to the charger wire, the air around it is charged (or ionized), and the ionized air flows to the drum to make it charged. This phenomenon is called corona discharge. A uniform minus (negative) charge is applied to the surface of the drum by corona discharge from the main charger.

#### (3) Main charger wire cleaner

When the power is turned on, or when the door switch is turned on, or when 1000 copies or more have been made in total since the previous cleaning, the wire cleaner moves to the other end and then back to clean the charger wire.

#### (4) Discharge LED array

Discharging is a process in which electrostatic force formed on the surface of a drum is reduced or eliminated.

The discharge LED array performs two purposes: cleaning effect by lighting the drum surface to reduce its electric resistance and neutralize (or erase) the residual charge on the drum surface, and "pre-exposure" effect by maintaining the surface potential of the drum surface at a uniform level prior to subsequent exposure.

## (5) Developer material

The developer material is comprised of carrier and toner.

The carrier consists of approx.  $30 - 100 \,\mu m$  particles of iron powder and is electrically conductive.

The toner is made of approx.  $5 - 13 \,\mu m$  resin particles.

The ratio of toner by weight in the developer material is about 7.0%.

Since the developer material degrades in quality after long time use, it needs to be replaced periodically. (6) Mixing unit (mixer)

Mixes carrier and toner to make them rub against each other, causing the carrier to get charged to plus (positive) and the toner to minus (negative) potential, respectively. This will cause the toner to adhere to the carrier by electrostatic force.

(7) Developer sleeve (magnetic roller)

This is an aluminum roller with magnets inside it. These magnets attract developer material over its surface to form a magnetic brush for development. The magnets are fixed in place and the sleeve rotates around them. This rotation causes the magnetic brush on the sleeve to sweep the drum surface gently like a broom and accomplish development.

#### (8) Doctor blade

Controls the amount of developer material delivered by the sleeve so that the magnetic brush of the developer material makes proper contact with the drum surface.

#### (9) Scattered toner recovery roller

Works to recover the toner scattered to the area beneath the sleeve and return it to the developer case.

#### (10) Auto toner sensor

To obtain copies with proper density image consistently, it is necessary to maintain a constant ratio of toner to carrier in the developer unit. The auto toner sensor is set to detect the toner content in the developer material by means of a magnetic bridge circuit, and supply toner from a toner cartridge if the toner ratio decreases to a certain level.

#### (11) Cleaning blade

Pressed against the drum surface with a constant force by springs, this blade works to scrape residual toner off the drum surface.

#### (12) Recovery blade

Works to catch the residual toner scraped off by the cleaning blade.

#### (13) Toner recovery auger

Works to transport the residual toner scraped off to the toner bag through the used toner transport unit.

#### (14) Cleaner felt

Works to prevent the toner scraped off by the cleaning blade from dropping over the edges of the drum into areas outside the cleaner unit.

#### (15) Drum thermistor

The amount of charge placed on a drum varies greatly with its surface temperature. So, a thermistor is employed to detect the temperature of the drum surface so that the amount of charge placed on the drum surface can be controlled and maintained at a consistent level.

## 13.3 EPU Drive

## [Rear side]



[Front side]





## **13.4 Auto Toner Circuit**

## 13.4.1 General description

- (1) Function of the auto toner circuit
  - Detects the toner density in the developer material, and supplies toner when the density decreases below a certain level.
  - · Detects when the toner cartridge has run out of toner (toner-empty detection).
- (2) Construction of the auto toner circuit
  - · Auto toner sensor : Detects the toner density.
  - Control section : Controls so that the toner density in the developer material is maintained at a constant value.
  - · Toner motor : Supplies toner to the developer material.
  - Display : Indicates the toner-empty condition.



#### 13.4.2 Operation of the auto toner sensor

- (1) Funcion of the Auto Toner Sensor
  - 1 Initialization adjustment function —During unpacking or developer-material replacement Automatically adjusts the output value of the auto toner sensor (input value from the LGC-CPU), which corresponds to the toner density of the new developer material, so that the output value of the sensor falls within 3.50 to 4.50V, depending on the relative humidity.
  - 2 Toner density stabilization function During copying operation

Maintains the toner density at a constant value in the following flow of events:

The toner is consumed.

nThe toner density decreases.

nChange in the toner sensor output is detected.

nThe toner motor is driven.

\_nToner is supplied from the toner cartridge to the developer unit.

#### 3 Toner-empty detection and clearing function

Detects the emptiness of toner in the toner cartridge:

The toner motor is driven.

nThe auto toner sensor output does not change.

nThe toner density does not change.

nlt is determined that no toner is available (toner empty).

The toner-empty state is cleared:

The toner motor is driven.

nToner is supplied.

nThe auto toner sensor output changes.

nThe toner density returns to the normal value.

nThe toner-empty state is cleared.

### (2) Auto-toner sensor operation

The auto toner sensor is comprised of the following circuits:

- Drive winding : A magnetic head provided with a high-frequency magnetic field (primary), which helps to form a magnetic circuit in the developer material.
- Detection winding : Receives the change in magnetic resistance of the developer material through the magnetic circuit (secondary).
- DC conversion circuit : Converts a high-frequency output produced from the detection winding into a DC signal (auto toner output V<sub>ars</sub>).



—When the toner density becomes low—

The ratio of the toner to the carrier in the developer material decreases.

nThe magnetic resistance decreases.

nThe detected output increases.

nAuto-toner output  $V_{ATS}$  increases.

-When the toner density becomes high-

The ratio of the toner to the carrier in the developer material increases.

nThe magnetic resistance increases.

nThe detected output decreases.

nAuto-toner output  $V_{ATS}$  decreases.

## 13.5 Control Circuit for Main Charger Wire Cleaner

- (1) Purpose of the main charger wire cleaning circuit
  - · To avoid defective and uneven drum charging, the wire cleaner is periodically operated to make a
  - reciprocating motion to clean the main charger wire.
- (2) Structure of the main charger wire cleaning circuit
  - · Charger wire cleaning motor : Works to drive the wire cleaner.
  - Cleaner home position switch : Detects when the wire cleaner returns to its home position (front side).
  - Cleaner limit switch : Detects when the wire cleaner reaches its limit position (rear side).
  - Control section : Controls the cleaner drive unit so it performs wire cleaning.

**Note:** "Signal name" shown in the following chart and tables is actually preceded with Y, M, C or K, according to its color. (Examples: YCLNMA-1; YCLHP-0)



#### Drive unit control signals

	Signal name		Canditian	
	*CLNMA-1	*CLNMB-1	Condition	
Charger wire	Level "L"	Level "L"	OFF	
cleaning motor	Level "H"	Level "L"	Reverse rotation (Home positionnlimit)	
	Level "L"	Level "H"	Forward rotation (Limitnhome position)	
	Level "H"	Level "H"	Brake	

#### Input signals from the home-position/limit switch

Cignel name	Condition		
Signar name	Level "H"	Level "L"	
*CLHP-0 (Home position switch)	Undetected	Detected	
*CLLM-0 (Limit switch)	Undetected	Detected	

#### (3) Main charger wire cleaner operation

The main charger wire cleaner makes a reciprocating motion to clean the charger wire either when the power is turned on, or when the door switch is turned on, or when 1000 copies or more have been made in total since the previous cleaning and that copying operation stops.

#### · Detailed operation of the wire cleaning

A sequence of operation ① to ③ is performed:

#### ① Initializing operation

The drive unit is driven in a forward direction until the home position switch detects the wire cleaner. However, if the home position switch does not detect it for 20 seconds after the drive unit has started, the drive unit will be stopped and a CALL SERVICE message will be displayed.

### Cleaning operation (forward)

After the detection of the home position, the drive unit is driven in a reverse direction until the limit switch detects the wire cleaner. However, if the limit position switch does not detect it for 20 seconds after the drive unit has started, the drive unit will be stopped and a CALL SERVICE message will be displayed.

### <sup>3</sup> Cleaning operation (return)

After the detection of the limit position, the drive unit is driven in a forward direction until the home position switch detects the wire cleaner. However, if the home position switch does not detect it for 20 seconds after the drive unit has started, the drive unit will be stopped and the message "Call for service" will be displayed.

## **13.6 Drum Temperature Detection Circuit**

(1) Purpose of the drum temperature detection circuit

The amount of charge on the drum surface varies greatly with the surface temperature of the drum. So, a control method is provided whereby the drum surface temperature is detected to make the amount of charge on the drum surface consistent.

(2) Construction of the drum temperature detection circuit



Drum temperature detection circuit

As a drum temperature detection circuit, the circuit shown above is provided for each of Y (yellow), and K (black) drums. Here, the circuit for the Y drum is explained as an example.

The voltage developed across R18, thermistor and R17 is input via an analog multiplexer (IC48) to the temperature signal terminal of the microcomputer.

## 13.7 Disassembly and Replacement

Unless otherwise specified, you can use the same procedures to disassemble and replace each of units Y, M, C and K, and their components.

### [A] Developer material

With this model, the removing and filling of the developer material is performed automatically by operating the control panel. The old developer material is removed into the toner bag, and new developer material is filled into the developer unit from the developer cartridge.

<<**Replacing procedure>>** ( Service Handbook for the details.)

- (1) Open the front cover and remove the toner cartridge.
- (2) Detach the processing unit from the main unit to open the developer removal shutter. Then reinstall the processing unit to the main unit.
- (3) On the control panel, select the automatic developer removing mode and execute it.
- (4) Shake a developer cartridge well and install it into the machine.
- (5) On the control panel, select the automatic developer filling mode and execute it.
- (6) Remove the developer cartridge and reinstall the toner cartridge.
- (7) Detach the processing unit from the main unit to close the developer removal shutter. Then reinstall the processing unit to the main unit.

#### [B] Processing unit

- (1) Remove the toner cartridge.
- (2) Turn the lever to the right and lower the transfer belt unit .
- (3) Unscrew 2 screws, and draw out the processing unit by holding its handles.
- (4) After having drawn it out to the lock position, hold on both sides of the processing unit, and while pressing the blue lock button with your thumb, draw out the unit completely. Then, place it on a flat table.
- **Note:** When removing the processing unit, make sure that the transfer belt unit is already lowered.

The processing unit is as heavy as about 10 kg. Be careful when handling it.

### [C] Main charger unit

(1) Disengage 2 latches for each and remove the toner cartridge holders (4 pieces in total).







(2) Unscrew 2 screws, disengage 3 latches, and remove the procewssing unit cover. (Disengage the latches one by one by pressing the cover.)



(3) Remove the auxiliary metal plate (3 screws).

**Note:** Do not allow the harness to get caught in between when assembling. (See A and B in the figures on the right hand side.)



(4) Disengage 5 latches and detach the ozone duct by removing the rear side cover (when disengaging the latches, bend and lift them one by one in sequence starting from the one at the end).



- (5) Disconnect the connector.
- Note: There are 4 connectors in Y and K, and 3 connectors in M and C.

(6) Pull the holders upward and take them out (Y, M, C and K).

- (7) Lift the knob to release the lock.
  Holding the front and rear plastic parts of the charger, lift the front end and pull out the charger toward the front side to remove it.
- **Note:** The lock can be released by lifting up the lever knob. However, if too much force is used to pull out the unit without releasing the lock, this will cause damage.
- **Note:** Be careful not to allow the shape of the main charger grid to become deformed. After installing the main charger unit, make sure that the wire cleaner limit switch or the home position switch are connected properly, and that the actuator is correctly connected.



#### [D] Charger wire cleaning motor

- (1) Remove the flange of the drive pulley on the main charger wire.
- (2) Detach the timing belt from the pulley.
- (3) Unscrew 1 screw and take out the motor together with the bracket.



## [E] Charger wire

- Main charger wire: Length (387.5 mm); diameter (0.06 mm); material (tungsten oxide).
- (1) Remove the grid. When removing the grid, slide it in the direction of the arrow as show on the figure below.



#### (2) Remove the terminal covers.



(3) Remove the wire.



#### Precautions for stringing the wire

- 1. Fit the wire in the V-shaped grooves at both front and rear.
- 2. Do not allow the wire to twist or kink.



3. Do not touch the wire directly with your hand.
## [F] Main charger wire cleaner

- (1) Remove the main charger wire.
- (2) Remove the wire cleaner.

(Grip and tilt the mounted wire cleaner slightly with the radio pliers to pull it out.)

Note: When reassembling, the wire should be strung so that it runs on the side of the pad. The wire cleaner should be moved to and left at the front side.

## [G] Discharge LED array

- (1) Remove the main charger unit.
- (2) Unscrew the screw.
- (3) Slide and remove the discharge LED together with the holder.





## [H] Developer unit

- (1) Remove the main charger unit.
- (2) Disconnect the auto toner sensor connector.



- (3) Rotate the lower mixer shutter knob on the rear up to the stopper, with radio pliers, to close the developer removal shutter.
- Notes: 1. When removing the developer unit, be sure to close the developer removal shutter to prevent the developer material from spilling out.
  - 2. When turning the shutter knob, pull it slightly while turning.
  - When reinstall the developer unit, be sure to open the developer removal shutter to carry out "automatic removing of developer material" correctly.
- (4) Unscrew 4 screws to separate the developer unit from the processing unit frame, and place the developer unit on a flat table.
- Notes: 1. The removed developer units must be installed back to the previous place respectively. Remember to attach the cleaner stoppers for each color.
  - 2. When installing the developer unit, ensure that the stain of the drum would not attach to the toner scattering prevention seal.
  - 3. Install the developer unit in the order below:

 $\begin{array}{l} Cleaner \; K \to developer \; unit \; K \to developer \; unit \; C \to developer \; unit \; M \to developer \; unit \; Y \end{array}$ 

- 4. Before installing the developer unit K, C or M, apply patting powder onto the surface of the drum C, M or Y. After installing it, be sure to rotate the drum to see that the cleaning blade would not peel off and cleaning can be performed properly. After checking the above, start installing next developer unit.
- Before installing a developer unit, first rotate its corresponding drum and remove stains from the drum surface.







PROCESSING UNIT

## [I] Doctor blade and developer sleeve

- (1) Remove the developer unit cover (4 latches).
- **Notes:** 1. While pressing the developer unit cover in the direction of the arrow, bend the latches to the outside and release them in the order of a, b, c to d.
  - 2. When installing the developer unit cover, first attach the latches on the side A, and then lock the others on the side B.





- (2) Remove the toner scattering prevention seal holder by sliding it toward the front side (3 slide hooks; be careful not to cause damage to the hooks).
- (3) Remove the doctor blade (2 screws).
- **Note:** Be careful not to deform the urethan seal or the sponge seal set along the toner scattering prevention seal holder when you install the holder back in place.



- Note: Attach the seals to the developer unit in the following procedure.
  - 1. Insert the top of the sleeve side sheets F/R between the developer seal and the side sponges F/R.
  - 2. Place the front seal and the front Mylar sheet against the side sponge F and stick them there.
  - 3. Place the rear seal and the rear Mylar sheet against the side sponge R and stick them there.



- (4) Remove the stopper and latches and then remove 4 gears.
- (5) Remove the stopper and take out the shutter knob.
- (6) Unscrew 2 screws and remove the drive unit bracket.
- (7) Remove the stopper and take out the gear, bearing and collar.
- (8) Remove the bushing and plate pressure spring.

- (9) Remove the front pole-position adjuster (1 screw and 1 stopper).
- **Note:** Before removing the pole-position adjuster, be sure to mark its position.
- (10)Remove the plate pressure spring and bushing.
- (11)Remove the developer sleeve along with the sub-unit.
- (12)Remove the bearing and bushing, and then pull out the developer sleeve.
- **Note:** When cleaning off the developer material and/or toner adhering around the sleeve using a vacuum cleaner or air blower, be sure to remove the bearing first to prevent developer material and/or toner getting into it.









## [J] Auto toner sensor

- (1) Remove the developer unit.
- (2) Remove the auto toner sensor (1 screw).



## [K] Mixer bushing (oil seal)

- (1) Disengage the latches and remove 2 gears on the front.
- (2) Remove 2 bushings.

- $(3)\;$  Remove the E-ring and washer on the rear.
- (4) Pull out the upper and lower mixers from the front.
- (5) Remove the bushing and shutter (1 each; pull out the shutter from the front).





## [L] Cleaner K

- **Note:** Cleaners Y, M and C are joined together with developer units M, C and K, respectively.
- (1) Remove the main charger unit K.
- (2) Bend the latch and remove the cleaner K drive unit sliding it out from the rear.

**Bushings** 

- (3) Unscrew 4 screws and remove the cleaner K.
- Note: Before installing the cleaner K, apply patting powder onto the surface of the drum K. After installing it, be sure to rotate the drum to see that the cleaning blade would not peel off and cleaning can be performed properly.



**Note:** When the developer units M, C and K and the cleaner K are installed in the processing unit frame, the cleaning blade pressure lever will become as shown below. Check that the blade is always pressurized by the tension spring.



## [M] Cleaning blade

(1) Unscrew 2 screws and remove the cleaning blade.



## [N] Recovery blade

(1) Peel off the recovery blade.

Cleaning blade Mylar sheet Recovery blade Felt Base line for affixing recovery blade Felt Base line for affixing recovery blade Felt Base line for affixing recovery blade



- Notes: 1. The recovery blade is affixed with double-sided tape. Peel off the blade and the tape cleanly before affixing a new blade.
  - 2. When affixing a recovery blade, align its edge with the position shown in the illustration.
  - As any wave in the recovery blade can cause the recovered toner to drop, be sure to install the blade flatly.

## [O] Cleaner felt

(1) Peel off the cleaner felt.

- Notes: 1. The cleaner felt is affixed with doublesided tape. Peel off the cleaner felt and the tape cleanly before affixing a new felt.
  - 2. When affixing a cleaner felt, align its edge with the position shown in the illustration.



## [P] Mylar sheet

- Notes: 1. The mylar sheet is affixed with doublesided tape. Peel off the mylar sheet and the tape cleanly before affixing a new mylar.
  - 2. When affixing a mylar sheet, align its edge with the position shown in the illustration.
- **Note:** After affixing the recovery blade, cleaner felt and mylar sheet, check their position shown in the illustration.







## [Q] Drum

(1) Turn the drum shaft lock to the right to pull it out.



- (2) Pull out the drum shaft toward the rear.
- (3) Remove the drum. (Holding both sides of the drum, lift it out.)
- Notes: 1. When inserting or pulling out the drum shaft, do not do it forcefully so as to avoid the processing unit frame being deformed.

When inserting the drum shaft back in place, wipe off any stain from its surface before reinserting it.

 After replacing the drum, apply patting powder onto the drum surface before installing the cleaner K or any developer unit (to prevent the cleaning blade from peeling off).



# [R] Used toner transport unit (processing unit side)

- (1) Remove 4 main charger units, 4 developer units and the cleaner K.
- (2) Remove the used toner transport unit.



# 14. UNITS AROUND THE PROCESSING UNIT

## **14.1 Construction**

This chapter describes the units arranged around the processing units.

They are as follows:

- · Toner cartridge
- · Toner cartridge drive unit
- · Developer removal shutter open/close detection unit
- · Used toner transport relay unit
- · Used toner transport unit (main unit side)
- · Toner bag
- · Toner bag limit sensor
- · Exhaust fan unit
- · Ozone filter



## [Outline construction diagram]

## **14.2 Description of Functions**

## (1) Toner cartridge

The toner cartridge has a set of claws to be fitted into the corresponding projection pattern of the middle inner cover. Their coupling pattern depends on the color of the toner cartridge to prevent wrong installation.

**Note:** In such times as maintenance when the middle inner cover is removed, be sure to check the toner color before installing the cartridge.

## (2) Toner cartridge drive unit

This unit rotates the auger and paddles of the toner cartridge to supply toner to the developer unit. In addition, when filling the developer unit with developer, this unit detects the presence of the developer cartridge by the developer cartridge detection switch and drives it.

(3) Developer removal shutter open/close detection unit

This unit detects if the developer removal shutter inside the used toner transport unit (PCU side) is opened or closed when the developer is automatically removed.

## (4) Used toner transport relay unit

This is a relay unit for transporting used toner and developer from the PCU to the used toner transport unit (main unit side).

(5) Used toner transport unit (main unit side)This unit transports used toner and developer to the toner bag.

## (6) Toner bag

The used toner scraped off the drum by the cleaning blade and the used developer automatically removed from the developer unit are collected into this bag through the used toner transport unit (PCU side), used toner transport relay unit, and used toner transport unit (main unit side).

## (7) Toner bag limit sensor

A transmitting type, this optical sensor monitors the volume inside the toner bag, and detects when the bag is filled with a certain amount of used toner and developer.

## (8) Exhaust fan unit

This unit is comprised of an ozone exhaust fan which discharges the ozone generated from the PCU to the outside, a fuser-unit exhaust fan which cools the area around the fuser unit, and exhausts duct.

## (9) Ozone filter

The ozone generated by corona discharge from the main charger is collected by an ozone exhaust fan and goes into this filter to be dissolved by the catalyst in the filter.

## 14.3 Brush Motor Drive Circuit

## 14.3.1 Drive circuit for used-toner transport motor

The used-toner transport motor helps to transport the used toner and developer removed from the processing unit to the toner bag.

+24VD

This motor is driven by transistor 2SD1415 (LGC board: Q5).

The circuit construction is as shown below:



• The motor winding has its (+) terminal connected to +24V and (-) terminal to the collector of Q5.

- When (92) pin (USTNM0 signal) of LCA301 comes to the level "L",

- $\cdot$  Q11 is turned ON  $\rightarrow$  Q5 is turned ON.
- $\cdot$  A current flows from the +24V power supply through the motor winding to Q5  $\rightarrow$  The motor rotates.
- When the USTNM0 signal comes to the level "H",
  - $\cdot$  Q11 goes OFF  $\rightarrow$  Q5 goes OFF.
  - $\cdot$  The current that was flowing through the motor winding now flows through the diode D22.
- ~ This current gradually decreases according to the time constant determined by the inductance and resistance of the motor winding.
  - $\cdot$  The motor finally stops.

## 14.3.2 Toner motor drive circuit

The toner motor works to load new developer material and add toner to the developer unit as well. Each motor is driven independently for its respective color by the driving transistor.

The circuit construction of toner moter Y is shown below as an example:



 $\cdot$  LGC provides a control signal to rotate the toner motor.

The following shows a truth table for motor control:

	signal	conditions	
Toner motor *	* TNRMA	L	Н
		ON	OFF

**Note:** The above \* stands for the color name (Y, M,C or K). e.g. Toner motor Y , YTNRMA

## 14.4 Disassembly and Replacement

## [A] Developer removal shutter open/close detection unit

- (1) Remove the processing unit.
- (2) Draw out the transfer/transport unit.
- (3) Unscrew the screw, disconnect the connector, and remove the developer removal shutter open/ close detection unit.

## [B] Used toner transport unit (main unit side)

- (1) Draw out the transfer/transport unit.
- (2) Remove the exit-side rear cover, exit-side lower cover, and paper exit unit cover.
- (3) Remove the paper exit unit (1 clip and 1 connector).
- (4) Remove the left inner cover, and take out the positioning pin (1 screw) for the paper exit unit.
- (5) Remove the vertical transport guide (main unit side) (3 screws).
- (6) Remove the duplex unit switching unit (3 screws).
- (7) Remove the duplex unit drive unit (1 connector and 4 screws).
- (8) Remove the horizontal transport unit (2 screws and 1 connector).
- (9) Disconnect the connector of the used toner transport motor.
- (10) Unscrew 6 screws and remove the used toner transport unit (main unit side).
- Note: For the details about the above steps (3) to (8) ► "12. PAPER FEEDING SYSTEM".





(11) Remove the motor (2 screws).



#### [C] Used toner transport relay unit

- (1) Remove the used toner transport unit (main unit).
- (2) Unscrew the screw and remove the used toner transport relay unit.



## [D] Toner bag limit sensor

- (1) Remove the used toner transport unit (main unit side).
- (2) Remove the harness from the base frame (disengage the hooks of the 4 harness bands).
- (3) Remove the exit-side lower inner cover (6 screws).

\*Screws indicated with the ⇒ marks should be unscrewed from the front side.

(4) Disconnect the connector and disengage the latches to remove the sensor.





## [E] Toner bag

- (1) Open the left front cover.
- (2) Take out the toner bag.
- **Note:** Before installing a new toner bag in the machine, make sure that its cap has been removed.



## [F] Toner cartridge drive unit

- (1) Remove the toner cartridge.
- (2) Lower the transfer belt unit.
- (3) Remove the processing unit.
- (4) Remove the middle inner cover (4 screws).
- (5) Disconnect 8 connectors, unscrew 3 screws and remove the toner cartridge drive unit.
- (6) Remove the motors (2 screws for each).
- (7) Disengage the latches and remove the developer cartridge detection switches.





## [G] Ozone filter

- (1) Unscrew the screw and pull out the ozone filter holder.
- (2) Remove the ozone filter from the holder.



## [H] Ozone exhaust fan/fuser unit exhaust fan

- (1) Remove the rear cover.
- (2) Pull out the ozone filter holder.
- (3) Disconnect 3 connectors, unscrew 2 screws, and remove the exhaust fan unit.

- (4) Unscrew the screws from the ozone exhaust fan and the fuser unit exhaust fan (2 screws for each) to remove them.
  - \*Screws indicated with the I marks should be unscrewd from the back side.



# **15. TRANSFER/TRANSPORT UNIT**

## 15.1. Construction

This unit is designed to perform the following three functions: to transfer the toner image on the photoconductive drum onto the paper; to separate the paper from the drum; and to transport the paper to the fuser unit.

This unit is comprised of the following elements.







## **15.2 General Description of Operation**

- (1) The transfer belt makes the paper adhere to it electrostatically, allowing the transfer, separation and paper transport processes to be performed in sequence.
- (2) The transfer belt is charged by the suction charger beneath the driven roller to cause the paper to adhere onto the belt.
- (3) The transfer belt is provided with voltage from transfer transformer through the transfer roller.
- (4) The paper is transported from the transfer roller Y to the transfer roller K, thus allowing toner images to be transferred onto the paper.
- (5) During color copying, the transfer belt runs in contact with all the four drums.
- (6) During black copying, the transfer belt unit is tilted approx. 1° clockwise around a point near the transfer roller K, allowing the belt to separate from the drums Y, M and C (approx. 5 mm at the transfer roller Y).

## **15.3 Description of Functions**

- (1) Transfer belt unit
  - a. Transfer belt

Molded with high precision from resin which has a specified level of electrical resistance, the transfer belt has functions to retain and transport the paper sent from the feeding section, as well as to help transfer the toner on the drum surface onto the paper.

b. Transfer belt holding mechanism

Holds the transfer belt on the drive/driven rollers, applying some tension to the driven roller to add a certain level of tension to the transfer belt.

c. Meander restricting mechanism

Meander restricting plates are provided at the front and rear sides of the transfer belt, forcing the belt move inside the plates to prevent it from shifting out of position.

d. Transfer rollers

The four transfer rollers(Y,M,C and K) are mounted between the drive roller and the driven roller to transfer the toner on the drums onto the paper by means of the potential difference from the drums. Each transfer roller is supplied with 1100V of the bias voltage for plain paper copying at normal temperature and humidity.

High-voltage probe is required to measure this voltage.

e. Transfer belt cleaning mechanism

The transfer belt cleaning blade scrapes off residual toner from the transfer belt surface. Scraped toner is recovered by the recovery auger and then transported to the used-toner transport unit (on the main unit).

f. Transport guide 1

Transport guide 1 separates from the transfer belt the paper which is electrostatically adhering to the belt, and guides it to the transport guide 2. To perform the separation by means of dielectric force, the guide is made of a grounded metal plate and the ribs on the guide surface are made of insulating material such as resin.

## (2) Transfer belt tray section

a. Transfer belt push-up mechanism and lock/unlock mechanism

Transfer belt push-up mechanism is a system to raise up and down the transfer belt unit by 25 mm to make the belt contact the drum.

The lock/unlock mechanism is provided to lock the unit to prevent it from sliding out of position, as well as to allow the unit to be unlocked, lowered and pulled out during jam clearing.

- Facing the front side, turn the lever clockwise to the right (until 3 o'clock) and the unit can be drawn out.
- After reinstalling the transfer/transport unit properly into the machine, turn the lever counter-clockwise to the left (until 9 o'clock) as seen from the front and the unit moves up to be locked securely.
- If the transfer/transport unit is not properly installed into the machine, the lever cannot be turned counter-clockwise to the left.

The push-up mechanism can be operated independently on its paper exit side and feed side to allow the transfer belt unit perform the release movement during black mode copying.

b. Transfer belt drive section

The transfer belt unit has its drive roller shaft end formed like a spline, which has its counterpart in the main unit and allows the unit to be securely connected when installed.

The drive unit is located on the rear side of the main unit and equipped with the transfer belt motor and the fuser motor.

The transfer drive section transmits the driving force of the transfer belt motor through the timing belt and gears to the transfer belt drive roller. The connection to the drive roller is so structured that the up-and-down movement of the transfer belt unit can be accommodated.

#### c. Transfer belt contact/release mechanism

When the black mode is selected, the drums Y, M and C do not rotate, so if the transfer belt is not separated from them, the drums will be damaged. To protect against the damage, the transfer belt contact/release mechanism allows the transfer belt unit to turn approx. 1° clockwise around a point near transfer roller K, separating the belt from those three drums (about 5mm gap between the drum Y and the transfer roller Y).

- The drum Y side of the transfer belt push-up mechanism is moved up and down with an arm which is driven by the transfer belt contact/release motor in the transfer belt tray section.
- The contact position and release position of the transfer belt are controlled by the transfer belt home position switch and transfer belt limit switch.

## d. Suction charger

The suction charger charges the transfer belt by corona discharge to allow the belt to attract the paper transported from the paper feeding section.

#### e. Electrical supply section

Supplies power to the transfer rollers and suction charger, applying bias voltage.

#### f. Transport guide 2

Guides the paper sent from the transport guide 1 up to the fuser unit. It is made of material which prevents the occurrence of frictional electrification of the paper.

## **15.4 Disassembly and Replacement**

## [A] Transfer belt unit

- (1) Turn the lever to the right to lower the transfer belt unit, and draw out the transfer/transport unit.

(2) Unscrew 2 screws.

(3) Take out the transfer belt unit by holding its handles.



(4) Remove the transport guide 1 (2 screws).



(5) Remove the cleaner nozzle using a minus type screwdriver.

(6) Remove the transfer belt unit covers (4 screws

rear side cover).

for the front side cover, and 3 screws for the

- Cleaner nozzle
- (7) Remove the front and rear aluminum covers (1 screw for each).



- (8) Remove the transfer belt recovery blade (1 screw).
- (9) Remove the recovery auger (2 screws).



- (10) Lift up the drive side of the frame and fold it about 120°.
- (11) Remove the transfer belt cleaning blade. Turn it counter-clockwise as seen from the front side and pull it out toward the front.
- **Note:** Pull out the cleaning blade pressure spring together with the blade.
- (12) Remove the stay (2 screws).
- (13) Pull out the transfer belt from the front side of the frame.
- Note: When pulling it out, be sure not to damage the belt with the drive/driven rollers restricting plates.
- (14) Unscrew 2 screws and remove the drive roller cleaning felt, pulling it out downwards.







(15) Disengage the terminal latches on the back side of the unit and remove the transfer rollers.



## [B] Transfer transformer

- (1) Remove the transfer belt unit.
- (2) Disconnect the connector, unscrew 3 screws to remove the dump heater.(115V series)

(3) Unscrew 2 screws and unlock the PC board from 3 lock supports to remove it.







## [C] Suction charger

- (1) Remove the transfer belt unit.
- (2) Disconnect the power supply connector, remove the fixing pin and the groung wire (1 screw). Then take out the suction charger.

## [D] Transfer belt contact/release motor/switch

- (1) Remove the transfer belt unit.
- (2) Disconnect the connector, unscrew 3 screws and remove the dump heater.(115V series)
- (3) Unscrew 6 screws and disconnect 3 connectors to remove the transfer belt contact/release motor/switch unit.



## **16. FUSER UNIT**

## **16.1 Construction**



Heat and pressure are applied to the paper separated from the transfer belt to have the toner fused to the paper. The paper then exits through the exit section into the receiving tray.

The fuser unit is comprised of upper/lower heater lamps, upper/lower heat rollers, fuser roller, fuser belt, separation guide, separation fingers, oil roller, cleaning roller, upper/lower thermistors, upper/lower thermostats, upper/lower exit rollers, etc.

## **16.2 Description of Operation**

## (1) Fuser unit

Applies heat and pressure to the paper separated and transported by the transfer belt to have the toner fused to the paper.

With the fuser belt in between, the fuser roller and the lower heat roller are constantly spring-loaded and are rotated by the driven force from the fuser motor. The fuser belt is also rotated at the same time and that leads to the rotation of the upper heat roller.

The upper and lower heat rollers each has a heater lamp installed. The lower heat roller applies heat from the lower side to the paper while the upper heat roller applies heat from the upper side via the fuser belt to have the toner fused on to the paper. The paper, after having fused, is smoothly separated from the lower heat roller and the fuser belt by the separation fingers and the separation guide. The temperature detection section consists of the thermistors to control the temperature of both heat rollers, and the thermostats to shut out the power to the heater lamps if the temperature becomes abnormally high.

## (2) Paper exit section

The paper which has finished the fusing is exited to the receiving tray through the upper and lower exit rollers of the fuser unit, the ADU/exit switching gate and the exit rollers.

## **16.3 Functions of Various Components**

## (1) Heater lamps

Placed inside each of the heat rollers, these heater lamps, which are halogen lamps, work to heat both rollers. They stay fixed even while the heat rollers are rotating.

## (2) Upper heat roller

The upper heat roller, which coated by fluorine with aluminum of a relatively high heat conductivity underneath, is heated by the upper heater lamp. The upper heat roller is pressed against the fuser belt and transfers the heat to the fuser belt. When the fuser belt is pressed against the paper, the toner is fused and is absorbed into the fibers of the paper for fusing.

## (3) Fuser belt

The fuser belt transfers the heat to the paper from the upper heat roller. By using a very thin fuser belt, a low heat capacaity of the heat roller is made possible while the warm-up time or the copy mode switching time can be shortened.

## (4) Lower heat roller

The lower heat roller, aluminum of a relatively high heat conductivity encircled by a silicone rubber and a fluororesin tube over it, is heated by the lower heater lamp. The lower heat roller is pressed against the fuser belt. To prevent the phenomenon of toner adhering to the fuser belt (called offsetting) and to facilitate toner separation from the lower heat roller, the lower heat roller has a coating over its surface. In addition, the hardness of the lower heat roller is made harder than that of the fuser roller so that the paper can come out of the rollers, slightly curling downward.

## (5) Fuser roller

The toner is fused by the heat from the lower heat roller and the fuser belt (upper heat roller). When the lower heat roller is pressed against the fuser roller, the generated pressure can increase the heat conductivity and also enable the toner to be absorbed into the fibers of the paper. Besides, to improve the fusing ability, the surface is made with sponge allowing a wider nipping area in between the rollers.

## (6) Separation fingers/guide

The separation fingers and the separation guide work to prevent the paper from sticking to the lower heat roller or the fuser belt.

## (7) Oil roller

The oil roller, impregnated with silicone oil, is installed in contact with the fuser belt. By allowing silicone oil to be deposited to the surface of the fuser belt by heat, the oil roller helps to prevent toner offsetting and also facilitate cleaning off toner and paper dust adhering to the fuser belt surface during the fusing process.

## (8) Cleaning roller

The cleaning roller is installed in contact with the oil roller to clean off the toner and paper dust from the oil roller, which the oil roller has removed from the fuser belt.

## (9) Exit rollers

The paper coming out from between the fuser belt and the lower heat roller is ejected into the receiving tray through the respective exit rollers of the fuser and reversing units.

## (10) Upper thermistor (center)

The upper heat roller temperature is detected by a upper thermistor (center) so that it can be maintained within a certain range, the lower limit of which is slightly higher than that which will cause poor fusing, and the upper limit of which is slightly lower than that which will cause toner offsetting. When the temperature has decreased below a specified value, the thermistor causes the heater lamp to energize to raise the temperature, and vice versa.

## (11) Upper thermistor (rear)

The temperature distribution over the upper heat roller surface can differ significantly between the center and end points along the lengthwise direction, due to various conditions. The temperature on the rear is also detected by the upper thermistor (rear).

When either the center or rear thermistor detects a temperature that is higher than the specified temperature, the heater lamp is turned OFF to always provide a controlled temperature.

## (12) Lower thermistor (center)

To maintain the lower heat roller temperature within a certain range, the temperature is detected and controlled by the lower thermistor (center). When the temperature has decreased below a specified value, the thermistor causes the heater lamp to energize to raise the temperature, and vice versa.

## (13) Lower thermistor (rear)

The temperature distribution over the lower heat roller surface can differ significantly between the center and end points along the lengthwise direction, due to various conditions. The temperature on the rear is detected by the lower thermistor (rear).

When either the center or rear thermistor detects a temperature that is higher than the specified temperature, the heater lamp is turned OFF to always provide a controlled temperature.

## (14) Upper and lower thermostats

They are set to shut off the power to the heater lamp if the temperature of the lower heat roller or the fuser belt (upper heat roller) rises abnormally high due to a broken thermistor, etc. The upper/lower thermostats are abnormal operation protective type; i.e. when it detects an abnormal condition, it turns itself OFF to shut off the power to the heater lamps, but cannot reset to be reused. So, the thermostat must be replaced along with the part(s) which has caused the abnormal condition.

## **16.4 Heater Control Circuit**

## 16.4.1 Temperature detection section

To keep the heat roller temperature constant, thermistors are used to detect its temperature and control the heater lamp ON and OFF. The abnormality of the thermistors and the heater can also be detected by the output of the thermistors.

(1) Abnormality detection during warming up

About 40 sec. after the heater lamps have been turned ON, if the temperature does not rise 5°C or more above the temperature when the heater lamps were turned ON (i.e. the thermistor output voltage does not increase approx.0.1V above the voltage when the heater lamps were turned ON), a service call (C41) is displayed.

(2) Abnormality detection during standby

After the copier has become ready, if a temperature below 70°C (which corresponds to a thermistor output voltage of approx. 0.7V) is detected for more than one sec. continuously, a service call (C43) is displayed.

(3) Thermistor/heater status counter control

 To enhance the safety of the fuser unit, CPU works to provide the following protection: after two consecutive C41 errors, if a third C41 error has occurred, the heater lamp cannot be turned on again no matter the power is OFF or ON and a C41 error will be displayed at once.

However, if the copier becomes ready normally with the thermistor/heater status counter displayed "1" or below, the counter will be cleared to "0".

 After service calls C41 to C48 occurred and the thermistor or the heater lamp have been repaired or replaced, if turning the power ON does not turn the heater lamp ON and an error occurs again, use code 700 in the 08 mode to check the thermistor/heater status counter, and clear it to "0" if necessary.

Upper heat roller surface temperature: 180°C (Thermistor resistance: 1128 Ω)

Lower heat roller surface temperature: 145°C (Thermistor resistance: 2630  $\Omega$ )

## Reference

- Relationship between the thermistor output voltage and heat roller temperature: Approx. 3.21V when the temperature is 180°C, approx. 2.66V when the temperature is 145°C and approx. 0.25V when the temperature is 40°C.
- 2. Relationship between the upper/lower heat rollers surface temperature and upper/lower thermistors (center) resistance:

Values in () are for the lower thermistor (center).

Temperature	Thermistor resistance	Heater lamp state
180 (145)°C or below	1128 Ω (2630 Ω) or over	ON
180 (145)°C	1128 Ω (2630 Ω)	The previous state kept intact
180 (145)°C or over	1128 Ω (2630 Ω) or below	OFF



#### 3. Temperature control for the upper/lower heat rollers ends

During multicopying, the temperature on the ends of the upper/lower heat rollers (non-paper passage areas) generally tends to become higher than that on the paper passage areas. This temperature is detected by the upper and lower thermistors (rear); i.e. when it detects a temperature of 220°C or over, the heater lamp is set to automatically turn itself OFF, regardless of the temperature on the paper passage areas.

## 16.4.2 Detection of open-circuited thermistors

- A thermistor is a device whose resistance decreases when it detects a high temperature. Therefore, if the heat roller thermistor becomes open-circuited, the control circuit would determine that the heat roller temperature is extremely low, and allow the heater lamp to continue being energized. As a result, the heat roller temperature would rise extremely high, possibly triggering the thermostat which is a safety protection device. To prevent this possibility in advance, CPU is set to detect if the thermistor is opencircuited or not.
- \* All the upper and lower thermistors (center and rear) use the same circuit. The following explanation is about the circuit of the upper thermistor (center).



- The input voltage is obtained by dividing the +5V among R74, upper thermistor (center) and R75.
- $\cdot\,$  The surface temperature of the upper heat roller varies.
  - Х
  - The resistance of the upper thermistor (center) changes.

Х

The input voltage changes.

· The LGC-CPU detects this change to determine if the thermistor is abnormal or not.

## 16.5 Heat Roller Temperature in Thick Paper/Thin Paper/OHP/Special paper Mode

Depending on the thickness of the paper, different modes are available for thick paper/thin paper/OHP/ Special paper as below, and the heat roller temperature setting is different in each mode.

Mode	Paper Thickness		Heat roller temperature setting	Speed ratio
THIN	64~79g/m <sup>2</sup>		Approx. 150°C	1/1
	17~20lb.		1	
THICK 1	THICK 1 106~163g/m <sup>2</sup> 29~60lb.cover /		Approx. 200°C	1/1
THICK 2	90lb.index		Approx. 205°C	1/1
	164~209g/m <sup>2</sup>			
THICK 3	91~110lb.index		Approx. 205°C	1/1
210~256g/m <sup>2</sup>				
OHP FILM	 257~280g/m <sup>2</sup>		Approx. 150°C	1/4
THICK 4			Approx. 205°C	1/1
SPECIAL	230g/m <sup>2</sup> /173g/m <sup>2</sup>	Small Size	Approx. 150°C	1/4
		Large Size	Approx. 205°C	1/1

The following table shows the heat roller temperature setting for the different paper modes.

#### Notes:

- 1. It takes 30 to 90 seconds for temperature adjustment when switching between any two of the following modes "PLAIN", "THICK 1", "THICK 2", "THICK 3", "THICK 4", "SPECIAL" and "OHP FILM".
- 2. It may take up to 240 seconds for temperature adjustment to switch between "THIN" and other modes.
- 3. In the OHP FILM mode, the paper is printed at normal speed until the K toner has completed transferring onto the OHP film. At the point where the trailing end of the OHP film leaves the K transfer section, the speed of the fuser unit, transfer belt and all drums drops to 1/4 of the normal speed, the toner is fused onto the OHP film at this speed.

Copy speed in the OHP FILM mode is approx. 3.3 sheets per minute to enable this speed control.

4. SPECIAL mode is used for gloss paper for POP (Point of Purchase).

In SPECIAL mode, the engine automatically changes the control depending on paper size. When small paper size is used (equal to or less than LT/A4 size), the engine slows down the fusing speed as it does in OHP mode. When large paper size is used (exceeds LT/A4 size, large size is including LT-R/A4-R size), the engine does not slow down. As adjustment codes corresponding to them, unique codes are assigned, to special 1 (small size), special 2(large size). The engine does not change control for a difference in thickness of gloss paper in SPECIAL Mode.

## 16.6 Disassembly and Replacement

## [A] Fuser unit

- (1) Draw out the transfer/transport unit.
- (2) Unscrew the screw.
- (3) Lift the fuser unit up horizontally and take it out.
- **Notes:** 1. When removing or installing the fuser unit, use the handles on the front and rear sides.
  - 2. Be careful when handling the fuser as it may become very hot.

## [B] Fuser covers (front and rear)

- (1) Unscrew 2 screws and remove the fuser cover (front).
- (2) Unscrew 2 screws and remove the fuser cover (rear).





## [C] Oil roller/ Cleaning roller

- (1) Remove the fuser covers (front and rear).
- (2) Unscrew 2 screws and remove the fuser cover (top).



- (3) Remove 2 clips, 2 bushings, 2 springs, and then take out the oil roller.
- (4) Remove 3 clips, 1 gear, 2 bushings and 2 springs, and then take out the cleaning roller.



## [D] Lower exit roller

- (1) Remove the clip and then the lower exit roller.
- (2) Remove the clip, gear, screw, handle, pin and 2 bushings from the shaft, and then replace the rollers.



## [E] Lower Thermostat

- (1) Remove the fuser covers (front, rear and upper).
- (2) Remove the upper inlet guide (2 screws).



- (3) Remove the lower inlet guide (2 screws).
- (4) Disconnect 2 faston terminals and unscrew 2 screws. Then remove the lower thermostat.


#### [F] Heater lamps

#### (F-1) Upper heater lamp

- (1) Remove the fuser covers (front and rear).
- (2) Remove the front lamp bracket (1 screw) and disconnect the front upper heater lamp connector.
- (3) Remove the rear lamp bracket (1 screw) and disconnect the rear upper heater lamp connector.
- (4) Draw out the heater lamp.

#### (F-2) Lower heater lamp

- (1) Remove the fuser covers (front and rear).
- (2) Remove the front lamp bracket (1 screw) and disconnect the front lower heater lamp connector.
- (3) Remove the rear lamp bracket (1 screw) and disconnect the rear lower heater lamp connector.
- (4) Draw out the heater lamp.
- **Notes:** 1. When installing the upper/lower heater lamps, make sure that the end of the heater lamps with red harness should be to the rear side.
  - 2. When installing the upper and lower heater lamps, check the rating indicated on the lamps, and then install them correctly. To distinguish the upper heater lamp from the lower one, note that the edge of the upper one is in orange color.
  - 3. Do not touch the lamp directly.



#### [G] Separation guide / Exit roller

 While lifting up the separation guide lever, draw it out in the direction of the arrrow.

(2) Unscrew 1 setscrew and remove 2 springs to

take off the separation guide.



Spring Separation guide Separation guide Rear side Front side



(3) Exit roller: ① Unfold the plate spring slightly to take off the exit roller.

Plate spring: <sup>(2)</sup> Hold on the fingers and remove the plate spring.

#### [H] Separation fingers

- (1) Take off the lower inlet guide.
- (2) Remove the spring to take off the separation fingers.



#### [I] Upper fuser unit

- (1) Remove the fuser cover (upper) and the heater lamp.
- (2) Unscrew 2 screws. (Note that the unit is pressurized at that moment.)

- (3) Unscrew 1 screw for each side (front and rear).
- (4) Lift the upper fuser unit to remove it.



- (1) Take out the upper fuser unit.
- **Notes:** 1. Be careful not to damage the fuser belt. The belt may crack and be broken.
  - 2. Do not allow any dirt to attach on the fuser belt. When handling the belt, be careful not to touch it directly. Sheets of paper should also be laid on the working table or the ground to protect the belt from sticking any dirt.
- (2) Remove the clip on the front side of the upper fuser unit and take off the bearing.
- (3) Remove the clip on the rear side of the upper fuser unit and take off 1 gear and 1 bearing.





Bearing

(4) Remove the wireharness cover brackets(Front/ Rear side).



**Note:** When installing the harness cover(A/B), be careful not to pinch wire harness.

Attach the harness locating between the harness cover(A/B) and the side frame, and pulling the harness in the direction of an arrow.

(5) Take off the fuser belt unit.

- (6) Install the jig.
  - Hold the jig with its R-marked side pointed to the front and insert it to the R side of the fuser belt unit.
  - Before inserting the jig into the fuser roller unit, shorten the distance between the shafts of the upper heat roller and the fuser roller.

- (7) Unscrew 1 screw to remove the bracket.
- **Note:** When assembling, be careful not to mistaken the installing direction of the bracket.



- (8) Remove the spring and the holder.
- Note: Take care of the holder as it is very fragile. When assembling, be careful not to mistaken the direction of the bearing.

- (9) Make the fuser roller and the upper heat roller come closer to each other and then take out the fuser belt.
- Note: Be careful not to damage the fuser belt. The belt may crack and be broken. When replacing a new fuser belt, make sure it does not have any damage or fold on its surface and edges.

## [K] Fuser roller, upper heat roller, upper thermistor and upper thermostat

- (1) Remove the fuser belt and the bearing.
- (2) Remove the fuser roller and then the spring and holder on the opposite side.
- Note: Take care of the holder as it is very fragile. When replacing the fuser roller, apply some silicon oil between the sealing surface of the heat roller and the bearing.







- (3) Remove the bracket (1 screw), stay (2 screws) and the bearing from the upper heat roller.
- **Note:** When assembling, be careful not to mistaken the direction of the bearing and the bracket.

(4) To prevent the thermostat from distorting, use a jig or something like that to place the stay on a working table.



- (5) Remove the upper thermistor (1 screw).
- **Note:** Be careful not to have the upper thermistor distorted.



- (6) Remove the upper thermostat (2 screws).
- Note: Be careful not to have the upper thermostat distorted.



- **Note:** When assembling the upper thermostat and the upper thermistor, pay attention to the follows:
  - Be careful not to have the upper thermistor and the upper thermostat distorted.
  - Do not let the harness of the upper thermistor contact with the edge of the metal plate.
  - To avoid the harness of the upper thermostat from contacting the edge of the metal plate, make sure to cover the tube properly.
  - The thermostat should be installed so that its contact surface is at a distance of 9.5±0.7mm from the stay as the illustration shown on the right.





#### [L] Lower heat roller

- (1) Remove the upper fuser unit.
- (2) Unscrew 1 screw and pull out the shaft of the drive gear. Then remove the gear.
- **Note:** When assembling, be careful not to mistaken the direction of the gear.
- (3) Remove the lower heater lamp.
- (4) Remove the lower heat roller.
- **Note:** To protect the lower heat roller from being damaged, wrap a sheet of paper around it.





(5) Remove the clip and take out the gear and the bearing.



(6) Remove the clip and take out the bearing.



#### [M] Lower thermistor

- (1) Remove the lower heat roller.
- (2) Disconnect the connector.



- (3) Unscrew 1 screw, remove the thermistor.
- Note: Be careful not to have the lower thermistor distorted.



#### [N] Drive unit

- (1) Remove the upper fuser unit.
- (2) Unscrew 1 screw and pull out the shaft of the drive gear. Then remove the gear.
- Note: When assembling, be careful not to mistaken the direction of the gear.
- (3) Unscrew 3 screws and shift the drive unit to the right to pull it out to the front.

- **Note:** When installing gears, make sure they are oriented and installed correctly (the one way clutch should be at the outside).
  - The gears should be placed in the order as shown on the right.
- (4) Remove the clip and take out the gear.









# **17. POWER SUPPLY UNIT**

# **17.1 Construction**

The power supply unit is comprised of an AC filter and insulation type DC output circuits.

(1) AC filter

Eliminates noise from the outside and prevents the noise generated by the copier from leaking to the outside.

(2) DC output circuits

The DC outputs are roughly divided into two lines of outputs:

- Main system
   Power supply used during image forming processes, consisting of the outputs of four voltages (+3.3V, +5.1V, +12V and +24V) which start up when the main switch is turned ON.
- ② Door switch system : Power supply used by the entire machine during image forming processes and supplied via the door switch, consisting of the outputs of two voltages (+5.1V and +24V) which start up when the main switch is turned ON with the two door switches ON.

# **17.2 Operation of DC Output Circuits**

#### (1) Start of operation

When the main switch of the copier is turned ON and if the door is closed, all the power supply systems start up at the same time.

#### (2) Stop of operation

When the main switch of the copier is turned OFF, a power-OFF signal (PWR-DN) is output after an instantaneous outage insurance time (20 ms mini.) has elapsed. After the power-OFF signal has been output, the main system power supply is allowed to retain its rated voltages for the minimum retaining time (10 ms or more) and then lets them start dropping.

#### (3) Output protection

Each output system includes an over-current protection circuit (a fuse and internal protection circuit) and an over-voltage protection circuit. This is to prevent abnormal operation or damage to the secondary circuit which may be caused by an over-current due to a shorted load or an over-voltage due to a shortcircuit between different voltages.

If the protection circuit has been activated and the fuse is not blown out, remove the cause of the shortcircuit and turn ON the power again to clear the circuit.

## 17.3 Output Channel

There are four output channels which are not linked with the door switches, as shown below.

- (1) 3.3V(M) For MPU on the SYS board, the image processing circuit, etc.
  - 3.3VA : Pins 4 and 5, J707

Output to: IMC board, SYS board, AI board (option, via the IMG board), IMG board, scrambler board (Option, Via the SYS board)

- 3.3VB : Pin 1, J708 Output to: SCM board
- (2) 5.1V(M) For mechanical control circuits on the LGC board, IMC board, SCM board, etc.
  - 5.1VA : Pins 3, 4 and 5, J706 Output to: LGC board
  - 5.1VB : Pins 6 and 7, J707

Output to: IMC board, SYS board, RLY board (via the IMC board),

Al board (option, via the IMG board), IMG board, scrambler board (Option, Via the SYS board)

- 5.1VC : Pins 1, 2, 3 and 4, J710 Output to: built-in printer controller (optional)
- 5.1VD : Pins 3 and 4, J708 Output to: SCM board
- (3) 12V(M) Mainly for analog circuits and the HDD (e.g. image quality sensor, color registration sensor)
  - 12VA : Pin 10, J706

Output to: LGC board, IMC board (via the LGC board),

image quality sensor (via the LGC board),

registration sensor (via the LGC board)

12VB : Pin 7, J708

Output to: SCM board, SDV board (via the SCM board), HDD

- 12VC : Pins 9, 10, 11 and 12, J710 Output to: built-in printer controller (optional)
- (4) 24V(M) For RADF, the finisher, fans, etc.
  - 24VH : Pin 1, J706

Output to: LGC board

- 24VI : Pin 9, J708 Output to: SCM board
- 24VJ : Pins 1 and 3, J709 Output to: finisher

There are two output channels which are linked with the door switches.

- (1) 5.1 V(D) For the laser diodes and the laser drivers
  - 5.1VA : Pin 7, J702 Output to: LGC board
  - 5.1VB : Pin 3, J705 Output to: IMC board, RLY board (via the IMC board), LDR board (via the IMC board)
- (2) 24V(D) For the motors, clutches, solenoids, fans, etc.

24VA~C :Pins 1, 2 and 3, J702

Output to: LGC board, paper feed motor (via the LGC board),

fuser motor (via the LGC board),

main high-voltage transformer (via the LGC board),

transfer transformer (via the LGC board)

- 24VD : Pins 1, 2 and 3, J703 Output to: developer motor
- 24VE : Pins 6 and 7, J703 Output to: paper feed motor
- 24VF : Pins 1 and 2, J704 Output to: SCM board
- 24VG : Pin 1, J705 Output to: IMC board, polygonal motor (via the IMC board), tilt motors (via the IMC board)
- 24VK : Pins 1, 3, 5, 7, 9, 11, 13, 15, 17 and 19, J711 Output to: LGC board

<Output connector>

Not linked with the door switch:

- J706 for the LGC board
- J707 for the IMC board, SYS board, RLY board and IMG board
- J708 for the scanner and RADF
- J709 for the finisher
- J710 for the built-in printer controller (optional)

Linked with the door switch:

- J702 for the LGC board
- J703 for the developer motor and the paper feed motor
- J704 for the scanner
- J705 for the IMC board, RLY board, LDR board and the polygonal motor
- J711 for the drum motors, the transfer belt motor and the LGC board

#### <Fuse rating>

F 1	12A/125V	Primary side
F 2	12A/125V	
F 3	12A/125V	Secondary side
F 5	4A/125V	
F 6	4A/125V	
F 7	5A/125V	
F 8	4A/125V	
F 9	5A/125V	
F10	4A/125V	
ICP3	12A/125V	
ICP4	3A/125V	
ICP5	3A/125V	
ICP6	3A/125V	





[Power supply sequence]

# SERVICE HANDBOCK

# GENERAL PRECAUTIONS REGARDING THE INSTALLATION AND SERVICE FOR THE COPIER

The installation and service should be done by a qualified service technician.

#### 1. Transportation/Installation

• When transporting/installing the copier, employ two persons and be sure to use the positions as shown on the right.

The copier is quite heavy and weighs approximately 191 kg (421 lb), therefore pay full attention when handling it.

Fixing the adjusters (stoppers)

There are two adjusters (stoppers) located in the front bottom part of the copier. After moving/installing the copier, be sure to turn the adjusters clockwise to fix them firmly on the floor.

• To unlock the adjusters when moving the copier, turn them anticlockwise.

If the copier is not steady, it may fall over and result in personal injury.

- Be sure to use a dedicated outlet with AC 115V or 120V/20A (127V/20A, 220V, 230V, 240V/10A) for its power source.
- The copier must be grounded for safety. Never ground it to a gas pipe or a water pipe.
- Select a suitable place for installation. Avoid excessive heat, high humidity, dust, vibration and direct sunlight.
- Also provide proper ventilation as the copier emits a slight amount of ozone.
- To insure adequate working space for the copying operation, keep a minimum clearance of 80 cm (32") on the left, 80 cm (32") on the right and 10 cm (4") in the rear.
- The socket-outlet shall be installed near the copier and shall be easily accessible.

#### 2. Service of Machines

- Basically, be sure to turn the main switch off and unplug the power cord during service.
- Be sure not to touch high-temperature sections such as the exposure lamp, the fuser unit, the damp heater and their periphery.
- Be sure not to touch high-voltage sections such as the chargers, high-voltage transformer, exposure lamp control inverter, inverter for the LCD backlight and power supply unit. Especially, the board of these components should not be touched since the electirc charge may remain in the condensers, etc. on them even after the power is turned OFF.
- Be sure not to touch rotating/operating sections such as gears, belts, pulleys, fan, etc.
- Be careful when removing the covers since there might be the parts with very sharp edges underneath.
- When servicing the machines with the main switch turned on, be sure not to touch live sections and rotating/operating sections. Avoid exposure to laser radiation.
- Use suitable measuring instruments and tools.
- Avoid exposure to laser radiation during servicing.
  - Avoid direct exposure to the beam.
  - Do not insert tools, parts, etc. that are reflective into the path of the laser beam.
  - Remove all watches, rings, bracelets, etc. that are reflective.
- Unplug the power cable and clean the area around the prongs of the plug once a year or more. A fire may occur when dust lies on this area.





#### 3. Main Service Parts for Safety

The breaker, door switch, fuse, thermostat, thermofuse, thermistor, etc. are particularly important for safety. Be sure to handle/install them properly.
If these parts are shorted circuit and/or made their functions out, they may burn down, for instance, and may result in fatal accidents.
Do not allow a short circuit to occur.

#### 4. Cautionary Labels

• During servicing, be sure to check the rating plate and the cautionary labels such as "Unplug the power cord during service", "Hot area", "Laser warning label" etc. to see if there is any dirt on their surface and whether they are properly stuck to the copier.

#### 5. Disposition of Consumable Parts/Packing Materials

- Regarding the recovery and disposal of the copier, supplies, consumable parts and packing materials, it is recommended to follow the relevant local regulations or rules.
- 6. When parts are disassembled, reassembly is basically the reverse of disassembly unless otherwise noted in this manual or other related documents. Be careful not to reassemble small parts such as screws, washers, pins, E-rings, star washers in the wrong places.
- 7. Basically, the machine should not be operated with any parts removed or disassembled.

#### 8. Precautions Against Static Electricity

• The PC board must be stored in an anti-electrostatic bag and handled carefully using a wristband, because the ICs on it may become damaged due to static electricity.

Caution: Before using the wristband, pull out the power cord plug of the copier and make sure that there are no uninsulated charged objects in the vicinity.

Caution :	Dispose of used batteries and RAM-ICs including lithium batteries according to the manufacturer's instructions.
Attention :	Se débarrasser de batteries et RAM-ICs usés y compris les batteries en lithium selon les instructions du fabricant.
Vorsicht :	Entsorgung des gebrauchten Batterien und RAM-ICs (inklusive der Lithium-Batterie) nach Angaben des Herstellers.

1. ERROR CODE AND SELF-DIAGNOSIS

2. ADJUSTMENT

# 3. PREVENTIVE MAINTENANCE (PM)

# 4. TROUBLESHOOTING

# 5. UPDATING THE FIRMWARE

6. POWER SUPPLY UNIT

7. WIRE HARNESS CONNECTION DIAGRAMS

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# 1. ERROR CODES AND SELF-DIAGNOSIS

# 1.1 Error Code List

While the "CLEAR PAPER" or "CALL SERVICE" symbol is flashing, pressing the [CLEAR] key and the digital key [8] at the same time shows one of the following error codes on the copy-quantity indicator as long as those keys are pressed.

Classification	Error code	Contents
Paper transport jam	E01	Paper leading edge not reaching the exit sensor
inside the copier	E02	Paper trailing edge not passing the exit sensor
	E03	Paper remaining inside the copier at power ON
	EB7	Restart time-out error
Paper feeding jam	E11	Paper misfeed from the duplex unit
	E12	Paper misfeed from the bypass tray
	E13	Paper misfeed from the 1st cassette
	E14	Paper misfeed from the 2nd cassette
	E15	Paper misfeed from the 3rd cassette
	E16	Paper misfeed from the 4th cassette
	E19	Paper misfeed from the LCT
Paper transport jam	E21	Paper transport jam from the LCT
(Paper not reaching the registration	E22	Paper transport jam from the 1st cassette
sensor after feeding)	E23	Paper transport jam from the 2nd cassette
	E24	Paper transport jam from the 3rd cassette
	E25	Paper transport jam from the 4th cassette
	E26	Paper transport jam from the bypass tray
Cover open jam	E41	Front cover opened during printing
	E42	Side door opened during printing
	E43	Duplex unit pulled out during printing
	E45	LCT jam access cover opened during printing
	E46	Bypass unit opened during printing
Paper transport jam in the ADU and	E50	Paper not reaching the duplex unit
reversing area	E51	Paper not restarting from the duplex unit stack
	E52	Paper not reaching the duplex unit path sensor
	E54	Duplex unit paper transport jam

Classification	Error code	Contents
Original jam in the ADF	E71	Original not reaching the aligning sensor
	E72	Original not reaching the exit sensor
	E73	Original not passing the exit sensor
	E79	Original pre-feed jam
Paper jam in the finisher	E9F	Punching jam
	EA1	Paper transport delay jam
	EA2	Paper transport stop jam
	EA3	Paper remaining inside the finisher at power ON
	EA4	Finisher front door opened during printing
	EA5	Finisher stapling jam
	EA6	Finisher early arrival jam
	EA8	Saddle stitcher stapling jam
	EA9	Saddle stitcher front door opened during printing
	EAA	Paper remaining in the saddle stitcher at power ON
	EAB	Saddle stitcher transport stop jam
	EAC	Saddle stitcher transport delay jam
	EAE	Finisher receive time-out jam
Special sheet jam	EC2	OHP film jams when not fed from bypass tray or 2nd cassette
	EC3	OHP film used in non-OHP mode
Drive system related service call	C05	Duplex unit motor rotation abnormal
	C06	Feed motor rotation abnormal
	C0A	Developer motor rotation abnormal
Paper feeding system related	C11	Duplex unit paper side guide operation abnormal
service call	C12	Duplex unit paper end guide operation abnormal
	C13	1st cassette tray operation abnormal
	C14	2nd cassette tray operation abnormal
	C15	3rd cassette tray operation abnormal
	C16	4th cassette tray operation abnormal
	C18	LCT tray operation abnormal
Scanner related service call C27 Carriage home position sensor not turning 6		Carriage home position sensor not turning OFF within a fixed time
	C28	Carriage home position sensor not turning ON within a fixed time
	C29	Exposure lamp disconnection detected

Classification	Error code	Contents
Copy process related service call	C31	Used toner transport motor rotation abnormal
	C33	Developer removal shutter abnormal
	C35	Transfer belt unit contact/release operation abnormal
	C38	Auto-toner error (K)
	C39	Auto-toner error (C)
	C3A	Auto-toner error (M)
	C3B	Auto-toner error (Y)
	C3C	Main charger wire cleaning abnormal (K)
	C3D	Main charger wire cleaning abnormal (C)
	C3E	Main charger wire cleaning abnormal (M)
	C3F	Main charger wire cleaning abnormal (Y)
Fuser unit related service call	C41	Thermistor or heater abnormal when warming-up is started
	C42	Thermistor abnormal after the copier has become ready
	C43	Thermistor abnormal during warming-up after abnormality
		judgment
	C44	Heater abnormal during warming-up after abnormality
		judgment
	C46	Heater abnormal (low temperature) after the copier has
		become ready
	C47	Rear thermistor abnormal after the copier has become
		ready
	C48	Heater abnormal (high temperature)
	C7	Error C7
Communications related service call	C57	Communications error between LGC-CPU and IPC board
	C5A	Communications error between LGC-CPU and printer controller
	C5B	LGC-CPU signal transmission error to IMC-CPU
	C5C	LGC-CPU signal reception error from IMC-CPU
ADF related service call	C72	Aligning sensor automatic adjustment error
	C73	EEPROM initializing error
	C74	Paper exit sensor automatic adjustment error
	C82	Communications error between scanner and ADF
Other service call (1)	C94	LGC-CPU abnormal
	C9A	Main memory abnormal
	C9B	LGC-CPU protocol abnormal
	C9D	IMC-CPU protocol abnormal
	C9E	IMC board connection abnormal

Classification	Error code	Contents
Laser optical unit related service call	CA1	Polygonal motor rotation abnormal
	CA2	H-SYNC abnormal
	CD1	Laser calibration error (K)
	CD2	Laser calibration error (C)
	CD3	Laser calibration error (M)
	CD4	Laser calibration error (Y)
Finisher related service call	CB1	Feed motor abnormal
	CB2	Delivery motor abnormal
	CB3	Tray lift motor abnormal
	CB4	Alignment motor abnormal
	CB5	Staple motor abnormal
	CB6	Stapler shift motor abnormal
	CB7	Height sensor abnormal
	CB8	Backup RAM data abnormal
	CB9	Saddle stitcher/paper pushing plate motor abnormal
	CBA	Saddle stitcher/stitcher motor (front) abnormal
	CBB	Saddle stitcher/stitcher motor (rear) abnormal
	CBC	Saddle stitcher/alignment motor abnormal
	CBD	Saddle stitcher/guide motor abnormal
	CBE	Saddle stitcher/paper folding motor abnormal
	CBF	Saddle stitcher/paper positioning plate motor abnormal
	CD5	Saddle stitcher/sensor connector connection error
	CD6	Saddle stitcher/microswitch abnormal
	CD7	Communication error between finisher and saddle stitcher
	CD9	Swing motor abnormal
	CDA	Horizontal registration motor abnormal
	CDB	Punch motor abnormal
Image quality related service call	CE1	Image quality sensor abnormal (OFF level)
	CE2	Image quality sensor abnormal (no pattern level)
	CE4	Image quality control test pattern abnormal
	CE5	Temperature/humidity sensor upper-limit abnormal
	CE6	Drum thermistor abnormal (Y)
	CE9	Drum thermistor abnormal (K)
	CF1	Color registration control abnormal
Other service call (2)	F07	Communications error between system-CPU and LGC-CPU
	F09	Communications error between system-CPU and scanner-CPU
	F10	HDD formatting error
	F11	Communications error between system-CPU and scanner-CPU
	F12	Communications error between system-CPU and scanner-CPU
	F13	Communications error between system-CPU and LGC-CPU
Image processing related service	F51	Communications error between system-CPU and AI board
call		during pre-scanning

#### <<Error history>>

In the setting mode (08-253), the latest twenty groups of error data will be displayed. Display example

	<u>EA1</u>	<u>01 08 26 17 57 32</u>	<u>64</u>	<u>64</u>	<u>236210000000</u>
	Error code	YY MM DD HH MM SS	MMM	NNN	ABCDEFHIJLOP
	3 digits	12 digits (Year is indicat	ed 3 digits	3 digits	12 digits
		with its last two digits.)			
А	Paper source				
	0: Not selected 1: E	Sypass feed 2: LCF 3: 1s	t 4:2nd 5	: 3rd 6: 4th	7: ADU feed
<b>D</b>	Deven sins and				
В	Paper size code	2. ST-B 3.1T 1. 41 5.	B5-B 6.IT-F	2 7· Δ1-B 8·	
	9: B5 A: FOLIO/CO	MP B:IG C:B4 D:ID	E: A3 E: 1	3"IG H: A6-R	I: Card Z: Not selected
С	Sort mode / staple m	ode			
	0: Non-sort/Non-stap	le 1: Group 2: Sort 7: I	- ront staple		
	8: Double staple 9:	Rear staple A: Saddle sti	tch		
D	ADF mode				
	0: Unused 1: AUTO	FEED (SADF) 2: STACK	FEED		
-					
E	APS / AMS mode	PS 2: AMS			
	0. Not selected 1. F				
F	Duplex mode				
	0: Not selected 1: B	ook 2: Two-sided / Single-s	ided 4: Two-	sided / Duplexe	b
	8: Single-sided / Dupl	exed			
G	Unused				
Н	Image shift				
	0: Unused 1: Book	2: Left 4: Right			
1	Editing				
	0: Unused 1: Maski	ng 2: Trimming 3: Mirror	image 4: Ne	egative / Positiv	e
1	Edgo oraço / Dual pa				
5	0: Unused 1: Edge	erase 2: Dual-page 3: F	doe erase & F	)ual-page	
			-g		
K	Unused				
L	Function				
	0: Copying 1: Unus	ed 2: Unused 3: Unused	4: Printing	5: Unused	
MMM	Primary scanning rep	production ratio (Display in h	exadecimal)		
	(Mx256)+(Mx16)+M		,		
NNN	Secondary scanning	reproduction ratio (Display i	n hexadecima	al)	
	(INX256)+(INX16)+N				
0	Color mode				
	0: Auto color 1: Full	color 2: Black 3: Monoc	olor		
Р	Al board				
	U. Unused I: USed				

## 1.2 Self-Diagnosis Mode

Mode	Starting	Contents	Exit
Control panel check	[0]+[1]+[POWER]	All control panel LEDs are lit,	[CLEAR] or
mode		and all LCD pixels are turned	[POWER]OFF/ON
		ON/OFF repeatedly.	
Test mode	[0]+[3]+[POWER]	Input/output signals are checked.	[POWER]OFF/ON
Test print mode	[0]+[4]+[POWER]	A test pattern print is made.	[POWER]OFF/ON
Adjustment mode	[0]+[5]+[POWER]	Adjustment of various items	[POWER]OFF/ON
Setting mode	[0]+[8]+[POWER]	Setting of various items	[POWER]OFF/ON
List printing mode	[9]+[START]+[POWER]	Printing of list of 05 and 08 code	[POWER]OFF/ON
		data	

**Note:** Starting for various modes:

While pressing simultaneously the two digital keys corresponding to the mode you want to set (for example, [0] and [5]), turn ON the main switch [POWER].

#### <Operation procedure>

• Control panel check mode (01) :



Notes: 1. During the "Check keys" state, [CLEAR] alone can exit. During the "LEDs light/LCD flashes" state, [CLEAR] can clear the mode.
2. Check keys :

> Any key with LED (when it is pressed, the LED goes out.) Any key without LED (when it is pressed, an indication is displayed in the message area.)

- Test mode (03) : Refer to "1.2.1 Input check (Test mode 03)" and "1.2.2 Output check (Test mode 03)".
- Test print mode (04) : Refer to "1.2.3 Test print mode (04)".
- Adjustment mode (05) : Refer to "1.2.4 Adjustment mode (05)".
- Setting mode (08) : Refer to "1.2.5 Setting mode (08)".

#### • List printing mode



- \*1 : During the activation of the "Control panel check mode", copying is not possible. But after pressing [CLEAR] to make the copier ready, you can make copies.
- \*2: After having used the self-diagnosis mode, be sure to turn OFF and then ON the power before returning the copier to the customer.

## 1.2.1 Input check (Test mode 03)

The status of each item can be checked by setting ON/OFF of each [FULL COLOR], [AUTO COLOR], [ENERGY SAVER], and then pressing each of the corresponding digital key in this test mode 03. **Note:** When icon is displayed with black letter on white background, it indicates the value is 0, while in reverse black and white, it indicates the value is 1.

Digital key	/ Icon Item		Condition
	А	—	
	В	—	
	С	—	
[4]	D	—	
[ [1]	Е	1st cassette paper-empty sensor	1: No paper
	F	1st cassette tray-up limit sensor	1: Tray is upper limit.
	G	1st cassette feed-jam sensor	1: Paper present
	Н	1st cassette detection switch	1: No cassette
	А	—	
	В	—	
	С	—	
[0]	D	—	
[2]	Е	2nd cassette paper-empty sensor	1: No paper
	F	2nd cassette tray-up limit sensor	1: Tray is upper limit.
	G	2nd cassette feed-jam sensor	1: Paper present
	Н	2nd cassette detection switch	1: No cassette
	А	—	
	В	_	
	С	_	
[0]	D	—	
[3]	Е	3rd cassette paper-empty sensor	1: No paper
	F	3rd cassette tray-up limit sensor	1: Tray is upper limit.
	G	3rd cassette feed-jam sensor	1: Paper present
	Н	3rd cassette detection switch	1: No cassette
	А	—	
[4]	В	—	
	С	—	
	D	_	
	Е	4th cassette paper-empty sensor	1: No paper
	F	4th cassette tray-up limit sensor	1: Tray is upper limit.
	G	4th cassette feed-jam sensor	1: Paper present
	Н	4th cassette detection switch	1: No cassette

#### [FULL COLOR]key: OFF, [AUTO COLOR]key: OFF, [ENERGY SAVER]key: OFF

Digital key	lcon	Item	Condition
	А	Bypass paper-width sensor 0	Refer to Table 1.
	В	Bypass paper-width sensor 1	Refer to Table 1.
	С	Bypass paper-width sensor 2	Refer to Table 1.
	D	_	
[5]	Е	Bypass paper sensor	1: No paper
	F	Bypass unit open/close switch	1: Unit is opened.
	G	Side door open/close switch	1: Side door is opened.
	Н	Bypass unit is installed or not	0: Unit is installed.
	А	LCT paper-empty sensor	1: No paper
	В	LCT lower-limit sensor	1: Tray limit (lower)
	С	LCT tray-up sensor	1: Tray limit (upper)
[0]	D	LCT tray-down switch	0: Switch is ON.
[6]	Е	LCT paper supply door sensor	1: Door is opened.
	F	LCT is installed or not	0: LCF is installed.
	G	Duplex unit motor rotation status	0: Normal rotation
		(Motor is rotating by output check 03)	
	Н	Duplex unit is installed or not	0: ADU is installed.
	А	Duplex unit paper-jam sensor	1: Paper present
	В	Duplex unit paper-empty sensor	0: No paper
	С	Duplex unit end switch	1: End guide is at home position.
[7]	D	Duplex unit side switch	1: Side guide is at home position.
[/]	Е	_	
	F	—	
	G	Key copy counter is installed or not	0: Key copy counter is installed.
	Н	_	
	А	Developer removal shutter home position sensor	0: Shutter is at closed position.
	В	—	
	С	Transfer belt unit is installed or not	0: Unit is installed.
	D	_	
	Е	—	
[8]	F	Developer motor rotation status	0: Normal rotation
		(Motor is rotating by output check 03)	
	G	Transfer belt limit switch	0: Transfer belt is in black mode position.
	Н	Transfer belt home position switch	0: Transfer belt is in color mode position.

Digital key	lcon	ltem	Condition
	А	External printer controller power ON/OFF	0: Controller power ON
	В	_	
	С	_	
[0]	D	Front cover switch	1: Front cover is opened.
[9]	Е	OHP sensor	0: Opaque paper is installed.
	F	_	
	G	Registration sensor	1 : Paper present
	Н	IPC board (Finisher installation kit) is installed or not	0: Board is installed.
[0]	Α	ADU path sensor	1: Paper present
	В	_	
	С	Exit sensor	1: Paper present
	D	Paper-exit unit open/close switch	1: Paper-exit unit is opened.
	Е	Toner bag limit sensor	1: Used toner full
	F	_	
	G	_	
	Н	_	

Table 1. Relation between bypass paper-width sensor status and paper-width size.

Bypass	Papar width aiza			
2	1	0	raper-width size	
1	0	0	A3/LD	
0	1	0	A4-R/LT-R	
1	0	1	A5-R/ST-R	
0	1	1	Card size	
0	0	0	B4/LG	
1	1	0	B5-R	

Digital key	Icon	Item	Condition
	Α	—	
	В	—	
	С	_	
[4]	D	_	
[1]	E	—	
	F	_	
	G	—	
	Н	—	
	Α	Developer cartridge Y is installed or not	0: Cartirdge is installed.
	В	Developer cartridge M is installed or not	0: Cartirdge is installed.
	С	Developer cartridge C is installed or not	0: Cartirdge is installed.
[0]	D	Developer cartridge K is installed or not	0: Cartirdge is installed.
[2]	E	Processing unit is installed or not	0: Unit is installed.
	F	Fuser unit is installed or not	0: Unit is installed.
	G	—	
	Н	—	
	Α	Wire cleaner home position switch Y	0: Cleaning pad is at home position.
	В	Wire cleaner home position switch M	0: Cleaning pad is at home position.
	С	Wire cleaner home position switch C	0: Cleaning pad is at home position.
[0]	D	Wire cleaner home position switch K	0: Cleaning pad is at home position.
[3]	E	Wire cleaner limit switch Y	0: Cleaning pad is at limit position.
	F	Wire cleaner limit switch M	0: Cleaning pad is at limit position.
	G	Wire cleaner limit switch C	0: Cleaning pad is at limit position.
	Н	Wire cleaner limit switch K	0: Cleaning pad is at limit position.
	Α	_	
	В	_	
	С	_	
	D	—	
[4]	E	_	
	F	_	
	G	_	
	Н		

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# [FULL COLOR]key: OFF, [AUTO COLOR]key: OFF, [ENERGY SAVER]key: ON

Digital key	lcon	Item	Condition
	А	_	
	В	_	
	С	_	
	D	_	
[5]	Е	_	
	F	_	
	G	—	
	Н	_	
	А	_	
	В	_	
	С	_	
101	D	_	
[6]	E	_	
	F	_	
	G	Front cover, paper-exit unit open/close check	1: Cover/unit is opened.
	Н	Polygonal motor rotation status	0: Normal rotation
		(Motor is rotating by output check 03)	
[7]	_	_	
[8]	_	Upper heat roller thermistor (center) check	Thermistor output value is displayed with 8 bits
[9]	_	Upper heat roller thermistor (rear) check	Thermistor output value is displayed with 8 bits
[0]	_	Lower heat roller thermistor (center) check	Thermistor output value is displayed with 8 bits.

# [FULL COLOR]key: OFF, [AUTO COLOR]key: ON, [ENERGY SAVER]key: OFF

Digital key	lcon	Item	Condition
[1]	_	Lower heat roller thermistor (rear) check	Thermistor output value is displayed with 8 bits.
[2]	_	Temperature sensor check	Sensor output value is displayed with 8 bits.
[3]	_	Humidity sensor check	Sensor output value is displayed with 8 bits.
[4]	_	Drum thermistor Y check	Thermistor output value is displayed with 8 bits.
[5]	_	_	
[6]	_	—	
[7]	_	Drum thermistor K check	Thermistor output value is displayed with 8 bits.
[8]	_	—	
[9]	_	—	
[0]	_	_	

Digital key	lcon	Item	Condition
[1]		_	
[2]		Color registration sensor (front)	"0" is displayed with reflection at
		(Sensor LED is turned ON by output check 03.) transfer belt.	
[3]	_	Color registration sensor (rear)	"0" is displayed with reflection at
		(Sensor LED is turned ON by output check 03.) transfer belt.	
[4]	_	Image quality sensor	Sensor output value is displayed with 10 bits.
[5]	_	—	
	А	ADF aligning sensor	1: Original present
	В	ADF exit sensor	1: Original present
	С	ADF open/close sensor	1: ADF is opened.
[0]	D	ADF empty sensor	1: Original present
[0]	Е	ADF size sensor 1	
	F	—	
	G	ADF size sensor 2	
	Н	ADF unit is installed or not	1: ADF unit is installed.
	А	—	
	В	_	
	С	—	
[7]	D	—	
[7]	Е	_	
	F	Carriage home position sensor	1: Carriages are at home position.
	G	—	
	Н	Platen sensor	1: Platen cover is closed.
	А	_	
	В	_	
	С	_	
[8]	D	APS sensor (APS-R)	1: Original present
	Е	APS sensor (APS-C)	1: Original present
	F	APS sensor (APS-3)	1: Original present
	G	APS sensor (APS-2) (for A4 series)	1: Original present
	Н	APS sensor (APS-1)	1: Original present
[9]	_	SCM board input 24V check	Output value is displayed with 8 bits.
[0]	_	—	

# [FULL COLOR]key: OFF, [AUTO COLOR]key: ON, [ENERGY SAVER]key: ON

## [FULL COLOR]key: ON, [AUTO COLOR]key: OFF, [ENERGY SAVER]key: OFF

Digital key	Icon	Item	Condition
[1]		Auto-toner sensor Y	Sensor output value is displayed with 8 bits.
[2]		Auto-toner sensor M	Sensor output value is displayed with 8 bits.
[3]	_	Auto-toner sensor C	Sensor output value is displayed with 8 bits.
[4]		Auto-toner sensor K	Sensor output value is displayed with 8 bits.
[5]	_	_	
[6]	_	_	
[7]		—	
[8]	_	—	
[9]	_	—	
[0]		_	

#### <Operation procedure>



Note: After initialization, the copier goes into the test mode.

<u>100%</u> Test 1	MODE		
A B C D	E F G H		

**Note:** When icon is displayed with white letter on black background on the control panel, it indicates the value is 1.
# 1. 2. 2 Output check (Test mode 03)

Output signal status can be checked by entering the following code in the test mode 03.

Code	Function	Code	Function	Procedure			
		150	All output OFF	1			
101	Drum motor and transfer belt motor rotation	151	Code No. 101 function OFF	1			
	with normal printing speed ON						
102	Drum motor and transfer belt motor rotation	152	Code No. 102 function OFF	1			
	with OHP printing speed (low) ON						
103	Paper feed motor ON	153	Code No. 103 function OFF	1			
104	Fuser motor ON	154	Code No. 104 function OFF	1			
105	Developer motor (color mode) ON	155	Code No. 105 function OFF	1			
106	Developer motor (black mode) ON	156	Code No. 106 function OFF	1			
107	Registration motor ON	157	Code No. 107 function OFF	1			
108	Used toner transport motor ON	158	Code No. 108 function OFF	1			
109	Duplex unit motor ON	159	Code No. 109 function OFF	1			
110	Toner motor Y ON	160	Code No. 110 function OFF	1			
111	Toner motor M ON	161	Code No. 111 function OFF	1			
112	Toner motor C ON	162	Code No. 112 function OFF	1			
113	Toner motor K ON         163         Code No. 113 function OFF						
114	Image quality sensor shutter solenoid ON 164 Code No. 114 function OFF						
130	Polygonal motor standby speed ON 180 Code No. 130 function O						
131	Polygonal motor normal speed ON 181 Code No. 131 function OFF						
132	Image quality sensor LED ON	182	Code No. 132 function OFF	1			
133	Color registration sensor LED (front) ON	183	Code No. 133 function OFF	1			
134	Color registration sensor LED (rear) ON	184	Code No. 134 function OFF	1			
135	Image quality sensor mode switching ON (Black mode)	185	Code No. 135 function OFF (Color mode	) 1			
201	1st cassette feed clutch ON/OFF			3			
202	2nd cassette feed clutch ON/OFF			3			
203	3rd cassette feed clutch ON/OFF			3			
204	4th cassette feed clutch ON/OFF			3			
205	Feed path clutch ON/OFF			2			
206	Bypass feed clutch ON/OFF			3			
207	1st cassette tray-up motor ON (tray goes up)			2			
208	2nd cassette tray-up motor ON (tray goes up)			2			
209	3rd cassette tray-up motor ON (tray goes up)			2			
210	4th cassette tray-up motor ON (tray goes up)			2			
211	Paper-exit gate solenoid ON/OFF			3			
213	Ozone exhaust fan motor ON/OFF			3			

Code	Function	Procedure
214	Fuser exhaust fan motor Low/High speed	3
215	PC board cooling fan motor ON/OFF	3
216	Wire cleaner drive motor Y CW/CCW (continuous reciprocating)	2
217	Wire cleaner drive motor M CW/CCW (continuous reciprocating)	2
218	Wire cleaner drive motor C CW/CCW (continuous reciprocating)	2
219	Wire cleaner drive motor K CW/CCW (continuous reciprocating)	2
220	Transfer belt contact/release motor CW/CCW (continuous reciprocating)	2
223	LCF paper feed motor ON/OFF	3
224	LCF tray motor ON/OFF	2
225	Duplex unit feed clutch ON/OFF	3
226	Duplex unit gate solenoid ON/OFF	3
227	Duplex unit side motor ON/OFF	3
228	Duplex unit end motor ON/OFF	3
229	Pre-feed clutch (front) ON/OFF	3
230	Pre-feed clutch (rear) ON/OFF	3
235	Main charger Y ON/OFF	3
236	Main charger M ON/OFF	3
237	Main charger C ON/OFF	3
238	Main charger K ON/OFF	3
243	Developer bias (Y) DC(-) ON/OFF	3
244	Developer bias (M) DC(-) ON/OFF	3
245	Developer bias (C) DC(-) ON/OFF	3
246	Developer bias (K) DC(-) ON/OFF	3
247	Developer bias (Y) AC ON/OFF	3
248	Developer bias (M) AC ON/OFF	3
249	Developer bias (C) AC ON/OFF	3
250	Developer bias (K) AC ON/OFF	3
251	Cleaning blade bias (Y) DC ON/OFF	3
252	Cleaning blade bias (M) DC ON/OFF	3
253	Cleaning blade bias (C) DC ON/OFF	3
254	Cleaning blade bias (K) DC ON/OFF	3
255	Transfer roller bias (Y) ON/OFF	3
256	Transfer roller bias (M) ON/OFF	3
257	Transfer roller bias (C) ON/OFF	3
258	Transfer roller bias (K) ON/OFF	3
259	Suction charger ON/OFF	3
260	Discharge lamp Y ON/OFF	3
261	Discharge lamp M ON/OFF	3
262	Discharge lamp C ON/OFF	3

Code	Function	Procedure
263	Discharge lamp K ON/OFF	3
280	Laser (Y) ON/OFF	3
281	Laser (M) ON/OFF	3
282	Laser (C) ON/OFF	3
283	Laser (K) ON/OFF	3
300	Carriage fan motor rotation at standby speed (high speed) ON/OFF	3
301	Carriage fan motor rotation at normal speed (low speed) ON/OFF	3
302	SCM fan motor Low/High speed	3
304	Scanner exposure lamp ON/OFF	4
331	ADF pick-up roller rotation ON/OFF	3
332	ADF aligning roller rotation ON/OFF	3
333	ADF transport belt CW rotation ON/OFF	3
334	ADF transport belt CCW rotation ON/OFF	3
351	Scan motor (carriages reciprocating once)	2
352	Document motor (indicator reciprocating once)	2

#### <Operation procedure>

Procedure 1



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### 1.2.3 Test print mode (04)

In the test print mode (04), you can print each test pattern by entering its corresponding code as follows.

Code	Types of test pattern	Remarks	Paper size
14	Gamma table check pattern	To check gradation	A3/LD
204	Grid pattern (Printer reproduction ratio/Registration	Pattern width: 1 dot, Pitch: 5mm	A3/LD
	adjustment pattern)	(same as the grid pattern printed	
		by adjustment mode $\rightarrow$ [1]	
		$\rightarrow$ [PRINTER/NETWORK])	
219	6% test pattern		A4/LT
220	8% test pattern		A4/LT
230	Gradation check pattern (2 pixels standard)	Pattern width: 10mm,	A3/LD
		32 gradation steps	
231	Gradation check pattern (3 pixels standard)	Pattern width: 10mm,	A3/LD
		32 gradation steps	
234	Halftone		A3/LD
270	Image quality control test patten	To check image quality control	A3/LD

Note: Full color (YMCK) mode is not available in 230, 231 and 234.

#### <Operation procedure>



**Notes:**1. When an error has occurred, it is indicated, but the recovery operation is not performed. So, turn the power OFF and then back ON to clear the error.

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2. During test printing, when "Wait adding toner" is displayed, the [STOP] key is disabled.

## 1. 2. 4 Adjustment mode (05)

In the adjustment mode (05), the following adjustment items can be corrected, changed or checked.

Adjustment mode (05)CodeDescription/ModeAccep- DefaultAccep- tableContentsProce- dure62Printability (thin line) of the controller output image00, 3Improves the printability (thin line) in the controller output image. By setting the value "3", the graphic can hold its sharp- ness during printing an output.1Set ValueImprovement of printability (thin line) in the controller output image1ValidInvalidRecommended Improvement of printability (thin set value, do not use them because you may have problems.*The intensity of the sharpness can also be adjusted from the printer driver menu.2.By setting the value to 3, you may have harmful results such as jaggy/rim image. Therefore, the users who can accept this should apply this setting.Set Value in the set value in th
CodeDescription/ModeAccep- tableContentsProce- dure62Printability (thin line) of the controller output image00, 3Improves the printability (thin line) in the controller output image. By setting the value "3", the graphic can hold its sharp- ness during printing an output.1Set ValueImprovement of printability (thin line) in the controller output image13ValidInvalidRecommended merovement of printability (thin line) in the controller output image-3ValidInvalidImprovement of printability (thin line) in the controller output image-Note)1.Athough the numbers other than 0 and 3 can be input as the set value, do not use them because you may have problems. 22.By setting the value to 3, you may have harmful results such as jaggy/rim image. Therefore, the users who can accept this should apply this setting
Code       Description/Mode       Default       table Value       Contents       Proce- dure         62       Printability (thin line) of the controller output image       0       0, 3       Improves the printability (thin line) in the controller output image. By setting the       1         Set Value       Image       Text       Graphic       Recommended       value       "3", the graphic can hold its sharp- ness during printing an output.       1         3       Valid       Invalid       Improvement of printability (thin line) in the controller output image       "The intensity of the sharpness can also be adjusted from the printer driver menu.       "The intensity of the sharpness can also         2.       By setting the value to 3, you may have harmful results such as jaggy/rim image. Therefore, the users who can accept this should apply this setting.       Subjusted from the printer driver menu.
Gure       Ualue       Cure         62       Printability (thin line) of the controller output image       0       0, 3       Improves the printability (thin line) in the controller output image. By setting the       1         Set Value       Image       Text       Graphic       Remark       Controller output image. By setting the       1         0       Valid       Invalid       Invalid       Recommended       controller output image.       value "3", the graphic can hold its sharp- ness during printing an output.       *The intensity of the sharpness can also         3       Valid       Invalid       Valid       Improvement of printability (thin line) in the controller output image         Note)1.       Although the numbers other than 0 and 3 can be input as the set value, do not use them because you may have problems.       *The intensity of the sharpness can also         2.       By setting the value to 3, you may have harmful results such as jaggy/rim image. Therefore, the users who can accept this should apply this setting.       stating
62       Printability (thin line) of the controller output image       0       0, 3       Improves the printability (thin line) in the controller output image. By setting the controller output image. By setting the value "3", the graphic can hold its sharpness during printing an output.       1         Set Value       Image       Text       Graphic       Remark       valid       valid       Invalid       Recommended         3       Valid       Invalid       Valid       Improvement of printability (thin line) in the controller output image       ness during printing an output.       *The intensity of the sharpness can also be adjusted from the printer driver menu.         0       By setting the value to 3, you may have harmful results such as jaggy/rim image. Therefore, the users who can accept this should apply this setting.       as jaggy/rim image.
output image       Text       Graphic       Remark         0       Valid       Invalid       Recommended         3       Valid       Invalid       Improvement of printability (thin line) in the controller output image         Note)1.       Although the numbers other than 0 and 3 can be input as the set value, do not use them because you may have problems.       *The intensity of the sharpness can also be adjusted from the printer driver menu.         2.       By setting the value to 3, you may have harmful results such as jaggy/rim image. Therefore, the users who can accept this should apply this setting.       The intensity of the printer driver menu.
Set Value       Image       Text       Graphic       Remark         0       Valid       Invalid       Invalid       Recommended         3       Valid       Invalid       Improvement of printability (thin line) in the controller output image         Note)1.       Although the numbers other than 0 and 3 can be input as the set value, do not use them because you may have problems.       *The intensity of the sharpness can also be adjusted from the printer driver menu.         2.       By setting the value to 3, you may have harmful results such as jaggy/rim image. Therefore, the users who can accept this should apply this setting.
<ul> <li>Valid Invalid Invalid Invalid Recommended</li> <li>Valid Invalid Valid Improvement of printability (thin line) in the controller output image</li> <li>Note)1. Although the numbers other than 0 and 3 can be input as the set value, do not use them because you may have problems.</li> <li>By setting the value to 3, you may have harmful results such as jaggy/rim image. Therefore, the users who can accept this should apply this setting.</li> </ul>
<ul> <li>3 Valid Invalid Valid Improvement of printability (mindline)</li> <li>3 Valid Invalid Valid Improvement of printability (mindline)</li> <li>3 Valid Invalid Valid Improvement of printability (mindline)</li> <li>8 Note) 1. Although the numbers other than 0 and 3 can be input as the set value, do not use them because you may have problems.</li> <li>2. By setting the value to 3, you may have harmful results such as jaggy/rim image. Therefore, the users who can accept this should apply this setting.</li> <li>*The intensity of the sharpness can also be adjusted from the printer driver menu.</li> </ul>
<ul> <li>Note)1. Although the numbers other than 0 and 3 can be input as the set value, do not use them because you may have problems.</li> <li>2. By setting the value to 3, you may have harmful results such as jaggy/rim image. Therefore, the users who can accept this should apply this setting.</li> </ul>
<ul> <li>set value, do not use them because you may have problems.</li> <li>By setting the value to 3, you may have harmful results such as jaggy/rim image. Therefore, the users who can accept this should apply this setting.</li> </ul>
as jaggy/rim image. Therefore, the users who can accept this should apply this setting.
this should apply this setting.
104     Reproduction ratio adjustment of     128     1~255     When the value increases by 1, the re-     1
secondary-scanning direction production ratio in the secondary-scan-
(scanner section) ning direction (vertical paper feeding di-
rection) increases by approx. 0.1522%.
105Image location adjustment of12885~171When the value increases by 1, the1
secondary-scanning direction image shifts by approx. 0.1213mm to-
(scanner section) ward the trailing edge of the paper.
106     Image location     For regular     180     5~251     When the value increases by 1, the     1
adjustment of prima- copy mode image shifts by approx. 0.042mm toward
ry-scanning direction the front side of the paper (machine).
108     (scanner section)     For full image     133     5~251     When you enter a value, which is 47     1
copy mode steps (equivalent to 2mm) smaller than
the set value of [106], the rear original
edge and the front copy edge match
(0.042mm/step).
135 ADF single-sided 8 $0 \sim 15$ Changes the position where the original 1
original stop position stops. When the value increases by 1,
136 two-sided 8 U~15 the original stop position shifts by 1mm
away from the original scale.
137 ADF sensor automatic adjustment – – By pressing the START key, WAIT is dis- 6
and EEPROM initialization played while the automatic adjustment
carried out when EEPROM, RADF PC
Doard of sensors are replaced.
200 Automatic limiting of Air (T, IVI, O, N) - $0.255$ Fills the developer from the developer $5$
$201$ ueveloper material $T$ $ 0^{-255}$ Calificate (about 5 min.) and them adjusts 5
$202$ and automatic au <sup>2</sup> ivi $ 0^{-255}$ time auto-toniel sensor output to set in the 203 justment of the auto-
200 justiment of the auto- 0 $-$ 0°200 failinge of 0.00°4.00 V (about 2 millin.). 5 204 toner sensor K $-$ 0~255 (As the value increases, the sensor out 5
LOT LOTE SETSON IN TO THE VALUE INCLEASES, THE SETSON OUL- 5
213 Display of auto-toper sensor output $0$ $0 \sim 1023$ Displays the auto-toper sensor output 10

	Adjustment mode (05)								
					Accep-		Broop		
Code	Description	Description/Mode			table	Contents	duro		
					Value		uure		
221	Automatic filling of	Color (Y,	M, C)	-	0~255	Fills the developer from the developer	5		
	developer material					cartridge (about 3 min.) and then adjusts			
	and automatic ad-					the auto-toner sensor output to set in the			
	justment of the auto-					range of 3.50~4.50V (about 2 min.).			
	toner sensor					(As the value increases, the sensor out-			
						put increases correspondingly.)			
223	Developer bias DC (-	)	Y	136	0~255	As the value increases, the transformer	1		
224	output adjustment		М	136	0~255	output increases. The adjustment value	1		
225			С	136	0~255	becomes effective only when the setting	1		
226			K	136	0~255	mode (08-400,401,409) is 0 (disabled).	1		
241	Main charger grid bias	6	Y	120	0~255	As the value increases, the transformer	1		
242	output adjustment		М	120	0~255	output increases. The adjustment value	1		
243			С	120	0~255	becomes effective only when the setting	1		
244			K	120	0~255	mode (08-400,401,409) is 0 (disabled).	1		
245	Automatic adjust-	All (Y,M,	C,K)	-	0~255	Auto-toner sensor output is adjusted	5		
246	ment of the auto-	Y		-	0~255	to set the output range within 3.50~	5		
247	toner sensor	М		-	0~255	4.50V automatically (about 2 min.). As	5		
248		С		-	0~255	the value increases, the sensor ouptut	5		
249		К		-	0~255	increases correspondingly.) (No deve-	5		
250		Color (Y,	M,C)	-	0~255	loper filling is carried out.)	5		
252-0	Main charger bias		Y	250	0~999	Actual output voltage of main charger	4		
252-1	output voltage 1 (lowe	er)	М	250	0~999	grid bias. After replacing the main high-	4		
252-2			С	250	0~999	voltage transformer, enter the value ac-	4		
252-3			K	250	0~999	cording to the supplementary data sheet.	4		
253-0	Main charger bias		Y	900	0~999		4		
253-1	output voltage 2 (uppe	er)	М	900	0~999		4		
253-2			С	900	0~999		4		
253-3			K	900	0~999		4		
257-0	Developer bias DC(-)		Y	100	0~999	Actual output voltage of the developer	4		
257-1	output voltage 1 (lowe	er)	М	100	0~999	bias. After replacing the main high-	4		
257-2			С	100	0~999	voltage transformer, enter the value ac-	4		
257-3			K	100	0~999	cording to the supplementary data sheet.	4		
258-0	Developer bias DC(-)		Y	700	0~999		4		
258-1	output voltage 2 (uppe	er)	М	700	0~999		4		
258-2			С	700	0~999		4		
258-3			К	700	0~999		4		

			ŀ	Adjustm	ent mod	e (05)	
					Accep-		
Code	Descrin	tion/Mode		Default	tabla	Contents	Proce-
Code	Description/wode			Delault		Contents	dure
					value		
315-0	Transfer bias offset adjustment		Y	4	-16~16	The offset value of the transfer bias is set.	4
315-1	(Thick paper 4)		М			-16:-2000V -15:-1900V -14:-1800V	
315-2			C			-13:-1700V -12:-1600V -11:-1500V	
315-3			K		10.10	-10:-1400V -9:-1300V -8:-1200V	
316-0	I ranster bias offset	adjustment	Y	4	-16~16	4: 800V 2: 700V 2: 600V	4
316-1	(Special paper 1: S	mall size)	M	-4		-4600V -3700V -2600V 1. 500V 0. 400V 1. 300V	
316-2				-6		2:-2001/ 3:-1001/ 4:01/	
310-3	Transfor biog offect	adjuatmont	n V	-12	16.16	5·+100V 6·+200V 7·+300V	4
217 1	(Special paper 2: 1		Y M		-10~10	8:+400V 9:+200V 10:+600V	4
317-1	(Special paper 2. La	ary size)		-		11.+200V 12.+800V 13.+900V	
317-2			к С	-		14:+1000V 15:+1100V 16:+1200V	
318	Transfer hias	Normal naner	V	59	0~255	The bias value of the transfer roller is	1
319	output adjust-	mode / Thin	M	59	0~255	set The higher the value, the larger the	1
320	ment	paper mode	C	59	0~255	transformer output becomes. The adjust-	1
321	(Full color)	paper meae	K	59	0~255	ment value becomes effective only when	1
326	(1 4.1 66161)	Thick paper 1	Y	59	0~255	the setting mode (08-400.401.409)is 0	1
327		mode	M	59	0~255	(disabled).	1
328			С	59	0~255		1
329			Κ	59	0~255		1
330		OHP mode	Y	59	0~255		1
331			М	99	0~255		1
332			С	109	0~255		1
333			K	139	0~255		1
334		Thick paper 2	Y	69	0~255		1
335		mode	М	69	0~255		1
336			С	69	0~255		1
337			K	69	0~255		1
346	Transfer bias outpu	t adjustment	Y	59	0~255		1
347	(Special paper 1: S	mall size)	M	99	0~255		1
348			C	109	0~255		
349	Turnefer bies subrut	Thick manage 4	K	139	0~255		1
354	I rarister blas output	Thick paper 4 r		79	0~255		1
300	adjustment(Black)	Special paper 1: Sn	iali size	69	0~255	The offect value of the transfer bigs in	
356-1	offect adjust	mode / Thin	T M	4	0~0	cot	4
356-2	ment	naper mode		4	0~0	8: 1200V -7: 1100V -6: 1000V	4
356-3	ment	paper mode	х О	4	0~8	-5: -900V -4: -800V -3: -700V -2: -600V	4
357-0		Thick paper 1	Y	4	-8~16	-1:-500V 0:-400V 1:-300V 2:-200V	4
357-1		mode	M	4	-8~16	3: -100V 4: 0V 5: +100V 6: +200V	4
357-2		inicae	C	4	-8~16	7: +300V 8: +400V 9: +500V 10: +600V	4
357-3			K	4	-8~16	11: +700V 12: +800V 13: +900V	4
358-0		Thick paper 2	Y	4	-8~16	14: +1000V 15: +1100V 16: +1200V	4
358-1		mode	М	4	-8~16		4
358-2			С	4	-8~16		4
358-3			K	4	-8~16		4
359-0		Thick paper 3	Y	4	-8~16		4
359-1		mode	М	4	-8~16		4
359-2			С	4	-8~16		4
359-3			K	4	-8~16		4
360-0		OHP mode	Y	4	0~8		4
360-1			М	4	0~8		4
360-2			С	4	0~8		4
360-3			K	4	0~8		4

	Adjustment mode (05)								
						Accep-			
Code	Descrip	otion/I	Mode		Default	table	Contents	Proce-	
						Value		dure	
361	Transfer bias	K	49	0~255	The bias value of the transfer roller is	1			
	output adjust-	moc	de / Thin				set. The higher the value, the larger the		
	ment (Black)	pap	er mode				transformer output becomes. This ad-		
363	( )	Thic	k paper 1	K	49	0~255	justment value becomes effective only	1	
		mod	de l				when the setting mode (08-400, 401,		
364		OHF	P mode	K	69	0~255	409) is 0 (disabled).	1	
365		Thic	k paper 2	K	59	0~255		1	
		mod	de l						
367-0	Transfer bias out	put		Y	589	0~5000	Actual output voltage of the transfer	4	
367-1	voltage 1 (lower)			М	589	0~5000	roller bias. After replacing the transfer	4	
367-2	<b>0</b> ( )			С	589	0~5000	transformer, enter the value according to	4	
367-3				K	589	0~5000	the supplementary data sheet.	4	
368-0	Transfer bias out	out		Y	3929	0~5000		4	
368-1	voltage 2 (upper)			М	3929	0~5000		4	
368-2	5 (11 )			С	3929	0~5000		4	
368-3				K	4715	0~5000		4	
381	Transfer bias out	out	Thick	Y	89	0~255	The bias value of the transfer roller is	1	
382	adjustment		paper 3	М	89	0~255	set. The higher the value, the larger the	1	
383	(Full color)		mode	С	89	0~255	transformer output becomes. The ad-	1	
384				K	89	0~255	justment value becomes effective only	1	
385	Transfer bias out	out	Thick	K	79	0~255	when the setting mode(08-400, 401,	1	
	adjustment		paper 3				409) is 0 (disabled).		
	(Black)		mode						
388	Transfer bias out	put	Special p	aper	79	0~255		1	
	adjustment(Black	)	2: Large	size					
391	Automatic removi	ing	Color (Y,	M, C)	_	_	The developer material in the developer	6	
392	of developer mate	ə-	K		_	_	unit is removed into the toner bag.	6	
	rial								
400	Reproduction ratio	o adji	ustment o	f	1222	1209~	When the value increases by 1, the re-	1	
	primary-scanning	direc	ction			1235	production ratio in the primary-scanning		
	(Fine adjustment	of po	lygonal m	otor			direction (horizontal paper feeding di-		
	rotation speed)						rection) decreases by approx. 0.082%.		
							(If the values of this code 400 is chang-		
							ed, the values of code 05-401,402,403,		
							404,410 and 474 are optimized.)		
401	Reproduction ratio	o adjı	ustment o	f	1787	1608~	When the value increases by 1, the re-	1	
	secondary-scann	ing di	irection			1965	production ratio in the secondary-scan-		
	(Fine adjustment	of dru	um motor/				ning direction (vertical paper feeding di-		
	transfer belt moto	or rota	ation spee	d)			rection) decreases by approx. 0.074%.		
							(If the values of this code 401 is chang-		
							ed, the values of code 05-402,403,404,		
							410 and 474 are optimized.)		
402	Fine adjustment of	of			3767	0~	When the value increases by 1, the rota-	1	
	fuser motor rotation	on sp	eed			65535	tion speed of fuser motor decreases		
							by 0.026%.		

	Adjustment mode (05)								
				Accep-		Proce-			
Code	Description/Mode			table	Contents	dure			
				Value		duro			
404	Fine adjustment of		9832	0~	When the value increases by 1, the rota-	1			
	feed motor rotation speed			65535	tion speed of the paper feed motor de-				
					creases by 0.023%.				
406	Registration motor speed adjustr	ment	-	—	The paper transport speed of registra-	15			
					tion roller in relation to the image print-				
					ing speed is set at the optimum value.				
					(If the value of this code 406 is perform-				
					ed, the values of the code 05-404 and				
					410 are optimized.)				
407	Forced performing of		-	-	Performs the color registration control.	6			
	color registration control								
408	Correction of fuser motor speed		0	0~20	In the thick paper 3 mode, when the	1			
	(For the Thick paper 3 mode )				value increases by 1, the fuser motor				
					rotation speed decreases by 0.026%.				
410	Fine adjustment of		2853	2567~	When the value increases by 1, the re-	1			
	registration motor rotation speed			3138	gistration motor rotation speed decreases				
					by 0.035%. (If the value of this code 410				
					is performed, the value of the code 05-404				
					is optimized.				
411	Transfer bias output adjustment	Y	89	0~255	The bias value of the transfer roller is set. The higher the	1			
412	(Special paper 2: Large size)	М	89	0~255	value, the larger the transformer output becomes.	1			
413		С	89	0~255	The adjustment value becomes effective only when the	1			
414		K	89	0~255	setting mode (08-400,401,409) is 0 (disabled).	1			
428	Adjustment of image trailing edg	e	160	0~255	When the value increases by 1, the mar-	1			
	margin				gin at the trailing edge along the paper				
					feeding direction becomes narrower by				
					approx. 0.042mm.				
429	Transfer bias output	Y	89	0~255	The bias value of the transfer roller is set. The higher	1			
430	adjustment	М			the value, the larger the transformer output becomes.				
431	(Thick paper 4 mode)	С			I his adjustment value becomes effective only when				
432		K							



Adjustment mode (05)									
					Accep-		_		
Code	Description/Mode				table	Contents	Proce-		
					Value		aure		
439	Paper aligning	1st	Long	20	0~40	When the value increases by 1, the ali-	1		
440	amount adjustment	cassette	Short	25	0~40	gning amount increases by about	1		
441		2nd	Long	20	0~40	0.8mm.	1		
442		cassette	Short	25	0~40		1		
443		3rd	Long	20	0~40	Notes:	1		
444		cassette	Short	25	0~40	Long (= Long size paper) :	1		
445		4th	Long	20	0~40	Paper length 330mm or longer	1		
446		cassette	Short	25	0~40	(A3/LD/A3 wide/FULL BLEED)	1		
447		ADU	Long	20	0~40	Short (= Short size paper) :	1		
448			Short	25	0~40	Paper length 220mm ~ 329mm	1		
449		LCF		25	0~40		1		
450		Bypass f	eed	35	0~40		1		
451		Thick pa	per 2	40	0~50		1		
452		Thick pa	per 3	40	0~50		1		
453	Paper aligning amount	Thick pa	per 4	40	0~50	When the value increases by 1, the aligning amount	1		
454	adjustment (Bypass feeding)	Special p	baper	40	0~50	increases by about 0.8mm.	1		
455	Adjustment of the pushing amount from behind	Thick pa	per 4	9	0~14	When the value increases by 1, the time period the bypass feed roller is driven when the paper has started	1		
456	(Bypass feeding)	Special	paper	9	0~14	to be transported from the registration section increases by 7ms.	1		
461	Color registration stat	us display		0	0~255	The value of Y(0) shows the error status	10		
						of the color registration sensor.			
						0 / 16 or above: Normal			
						1~14: Data abnormal (sensor normal)			
						15: Color registration pattern reading error			
470	Adjustment of primary	/-scan-	K	100	0~255	When the value increases by 1, the im-	1		
	ning laser writing star	rt position				age shifts by approx. 0.042mm toward			
						the right side of paper feed direction.			
474	Adjustment of second	lary-scan-		8	1~15	When the value increases by 1, the im-	1		
	ning laser writing sta	rt position				age shifts by approx. 0.6mm toward the			
						leading edge of paper feed direction.			
482	Reproduction ratio ad	justment o	f	127	112~	When the value increases by 1, the re-	1		
	the primary-scanning	direction			142	production ratio of the primary-scanning			
	(scanner section)					direction (paper feeding in horizontal			
						direction) decreases by 0.082%.			
491	Adjustment of the	Thick pap	ber 3	9	0~14	When the value increases by 1, the time	1		
	pushing amount	bypass fe	eding			period the bypass feed roller is driven			
	from behind					when the paper has started to be trans-			
						ported from the registration section in-			
						creases by 7ms.			
492	Paper aligning amout	adjustmer	nt	40	0~50	When the value increases by 1, the ali-	1		
	(OHP bypass feeding	)				gning amount increases by about			
						0.8mm.			

			A	Adjustm	ent mod	e (05)	
					Accep-		Dress
Code	Description/Mode [		Default	table	Contents	Proce-	
					Value		dure
493	Adjustment of the	OHP		9	0~14	When the value increases by 1, the time	1
	pushing amount	bypass	s feeding			period the bypass feed roller is driven	
	from behind					when the paper has started to be trans-	
						ported from the registration section in-	
						creases by 7ms.	
494		LCT		0	0~12	When the value increases by 1, the time	1
						period the LCF feed roller is driven	
						when the paper has started to be trans-	
						ported from the pre-feed roller section in-	
						creases by 50ms.	
495		Thin pa	aper	0	0~14	When the value increases by 1, the time	1
		bypass	feeding			period the bypass feed roller is driven	
496		Norma	l paper	9	0~14	when the paper has started to be trans-	1
		bypase	bypass feeding			ported from the registration section in-	
497		Thick paper 1		9	0~14	creases by 7ms.	1
		bypass feeding					
498		Thick paper 2		9	0~14		1
		bypass feeding					
550	Density	Full color	Text/Photo	128	0~255	When the value increases, images	1
551	adjustment		Text	128	0~255	made at center density become darker.	1
552	"Manual density"		Printed image	128	0~255		1
553	fine adjustment		Photo	128	0~255		1
554	(center setting)		Мар	128	0~255		1
555		Black	Text/Photo	128	0~255		1
556			Text	128	0~255		1
557			Printed image	128	0~255		1
558			Photo	128	0~255		1
559			Мар	128	0~255		1
560	Density	Full color	Text/Photo	20	0~255	When the value increases, images	1
561	adjustment		Text	20	0~255	made at the "dark" side become darker.	1
562	"Manual density"		Printed image	20	0~255		1
563	fine adjustment		Photo	20	0~255		1
564	(darker setting)		Мар	20	0~255		1
565		Black	Text/Photo	20	0~255		1
566			Text	20	0~255		1
567			Printed image	20	0~255		1
568			Photo	20	0~255		1
569			Мар	20	0~255		1

Adjustment mode (05)									
						Accep-		Broop	
Code	Descrip	Description/Mode			Default	table	Contents	FIUCE-	
						Value		dure	
570	Density	Full	color	Text/Photo	20	0~255	When the value increases, images	1	
571	adjustment			Text	20	0~255	made at the "light" side become lighter.	1	
572	"Manual density"			Printed image	20	0~255		1	
573	fine adjustment			Photo	20	0~255		1	
574	(lighter setting)			Мар	20	0~255		1	
575		Blac	ck	Text/Photo	20	0~255		1	
576				Text	20	0~255		1	
577				Printed image	20	0~255		1	
578				Photo	20	0~255		1	
579				Мар	20	0~255		1	
580	Density	Full	color	Text/Photo	128	0~255	When the value increases, images be-	1	
581	adjustment			Text	128	0~255	come darker.	1	
582	"Automatic			Printed image	128	0~255		1	
583	density" fine			Photo	128	0~255		1	
584	adjustment			Мар	128	0~255		1	
585		Blac	ck	Text/Photo	128	0~255		1	
586				Text	128	0~255		1	
587				Printed image	128	0~255		1	
588				Photo	128	0~255		1	
589				Мар	128	0~255		1	
609	Adjustment of		Spe	ecial paper	249	0~255	When the value decreases, images become lighter.	1	
610	maximum toner amou	Int	Thie	ck paper 4	237	0~255	Note: When the value increases, image offset may occur.	1	
612	Adjustment of		Nor	mal paper	255	0~255	When the value decreases, images	1	
613	maximum toner		Thie	ck paper 1	249	0~255	become lighter.	1	
614	amount		Thi	ck paper 2	237	0~255	Note: When the value increases, image	1	
615			Thie	ck paper 3	237	0~255	offset may occur.	1	
616			ОН	Р	230	0~255		1	
617			Thi	n paper	255	0~255		1	
643	Automatic gamma adjustment			-	-	Adjusts the gradation reproduction for	13		
							each color Y, M, C, K.		
675	Judgment thresh	old fo	or AC	S	104	0~255	When the value increases, originals	1	
							tend to be judged as monochrome, and		
							when the value decreases, they tend to		
							be judged as color in Auto color mode.		

	Adjustment mode (05)							
						Accep-		
Code	Descrip	otion/	Mode	Э	Default	table	Contents	Proce-
						Value		dure
678	AI mode setting		Disc	crimination	0	0~4	Sets the operation mode of discrimina-	1
	Ū		sett	ina			tion processing in AI mode.	
				0			0: Standard (for regular)	
							1: Photograph priority	
							2: Only judgment of original type	
							3: Only judgment of original type with	
							photograph priority	
							4. Discrimination is not performed in	
							Al mode	
682			Tim	e-out	63	11~99	Sets the maximum amount of processing	1
OOL			sott	ina		11 00	time for image discrimination	
			3011	ing			Two digits are designated: the 1st digit is	
							for setting A3/I D original and the 2nd di-	
							ait is for sotting A// T original (unit socond)	
600	Offect	Eul	oolor	Toyt/Dhoto	100	0255	When the value increases, the heak	4
600	Olisel	Fuii	COIOI	Text/FII010	120	0~200	around becomes deriver	1
700	ter beelvereured				120	0~255		1
700	IOF Dackground			Phileo Inage	120	0~255	_	1
701	processing			Photo	128	0~255		
702	(Adjustment of	Dias			128	0~255		1
703	background	Biad	ж	Text/Photo	128	0~255		1
704	density)			T ext	128	0~255		1
705				Printed image	128	0~255	-	1
706				Photo	128	0~255		1
707	Offerent and livest	E.J.		мар	128	0~255		1
708	Oliset adjust-	Full	COIOF	Text/Photo	128	0~255	when the value increases, the text be-	1
709	ment for book around				128	0~255	Comes darker.	1
710	for background			Printeo image	128	0~255		1
710	processing			Photo	128	0~255		1
712	(Adjustment of	Dias		IVIap	128	0~255		1
713	text density)	Biad	ж	Text/Photo	128	0~255		1
714				I ext	128	0~255	-	1
710				Printeo image	128	0~255		1
/10				Photo	128	0~255		1
/1/	Observations	<b>5</b>		Map Taut/Dhata	128	0~255		
737	Snarpness	Full	COIOr	Text/Photo	0	0~31	when the value increases, the image	1
738	adjustment			Text	0	0~31	becomes snarper. When the value	
/39				Printed image	0	0~31	decreases, the image becomes softer.	
/40				Photo	0	0~31	I ne smaller the value, the fewer the	
/41				Мар	0	0~31		
742		Blac	Ж	Text/Photo	0	0~31	1 ne detault value 0 is equivalent to 16	1
743				Fext	0	0~31	(center value).	1
744				Printed image	0	0~31	-	1
745				Photo	0	0~31		1
746				Мар	0	0~31		1

	Adjustment mode (05)							
					Accep-		_	
Code	Description	/Mode		Default	table	Contents	Proce-	
					Value		dure	
779-0	Color balance	Text/	L	128	0~255	When the value increases, the target	4	
779-1	adjustment	Photo	М	128	0~255	color, the original mode and the density	4	
779-2	(Y)		Н	128	0~255	area become darker.	4	
780-0		Text	L	128	0~255		4	
780-1			М	128	0~255	Notes:	4	
780-2			Н	128	0~255	L: Low density area	4	
781-0		Printed	L	128	0~255	M: Medium density area	4	
781-1		image	М	128	0~255	H: High density area	4	
781-2			Н	128	0~255		4	
782-0		Photo	L	128	0~255		4	
782-1			М	128	0~255		4	
782-2			Н	128	0~255		4	
783-0		Мар	L	128	0~255		4	
783-1			М	128	0~255		4	
783-2			Н	128	0~255		4	
784-0	Color balance	Text/	L	128	0~255	When the value increases, the target	4	
784-1	adjustment	Photo	М	128	0~255	color, the original mode and the density	4	
784-2	(M)		Н	128	0~255	area become darker.	4	
785-0		Text	L	128	0~255		4	
785-1			М	128	0~255	Notes:	4	
785-2			H	128	0~255	L: Low density area	4	
786-0		Printed	L	128	0~255	M: Medium density area	4	
786-1		image	M	128	0~255	H: High density area	4	
786-2			н	128	0~255		4	
787-0		Photo	L	128	0~255		4	
787-1			M	128	0~255		4	
787-2			н	128	0~255		4	
788-0		мар	L	128	0~255		4	
700.0			M	128	0~255		4	
700.0	Calar balance	Toyt/		128	0~255	When the value increases, the terret	4	
789-0	Color balance	Text/		128	0~255	when the value increases, the target	4	
709-1		Photo		120	0~255		4	
709-2	(C)	Toyt		120	0~255		4	
790-0		Text		120	0~255	Notos	4	
790-1				120	0~255	L: Low density area	4	
790-2		Printed	1	120	0~255	M: Medium density area	4	
791-0		image	M	120	0~255	H: High density area	4	
791-2		maye	Н	120	0~255		4	
792-0		Photo	1	120	0~255		4	
792-1			M	128	0~255		4	
792-2			н	128	0~255		4	
793-0		Man	1	128	0~255		4	
793-1			M	128	0~255		4	
793-2			H	128	0~255		4	
						1		

	Adjustment mode (05)								
					Accep-				
Code	Description	/Mode		Default	table	Contents	Proce-		
					Value		dure		
794-0	Color balance	Text/	L	128	0~255	When the value increases, the target	4		
794-1	adjustment	Photo	М	128	0~255	color, the original mode and the density	4		
794-2	(K)		H	128	0~255	area become darker.	4		
795-0		Text	L	128	0~255		4		
795-1			М	128	0~255	Notes:	4		
795-2			H	128	0~255	L: Low density area	4		
796-0		Printed	L	128	0~255	M: Medium density area	4		
796-1		image	М	128	0~255	H: High density area	4		
796-2		_	H	128	0~255		4		
797-0		Photo	L	128	0~255		4		
797-1			М	128	0~255		4		
797-2			H	128	0~255		4		
798-0		Мар	L	128	0~255		4		
798-1			М	128	0~255		4		
798-2			Н	128	0~255		4		
817	Output value display	When th	e light	_	0~1023	Displays the output value of image qua-	2		
	of image quality	source is	s OFF			lity sensor when the sensor light source			
	sensor					is OFF.			
818		Transfer	belt	-	0~1023	Displays the output value of image qua-	2		
		surface				lity sensor (when there is no test pattern)			
						on the transfer belt.			
819		Low-der	sity	_	0~1023	Displays the output value of image qua-	10		
		pattern				lity sensor when a low-density test pat-			
						tern is written.			
820		High-der	nsity	_	0~1023	Displays the output value of image qua-	10		
		pattern				lity sensor when a high-density test pat-			
						tern is written.			
821	Light amount adjustn	nent resul	ts of	_	0~255	This sensor's LED light amount adjust-	2		
	image quality sensor					ment value is the reference value for			
						setting the reflected light amount from			
						the belt surface.			
822	Output value	Medium-o	density	_	0~1023	Displays the output value of image qua-	10		
	display of image	pattern				lity sensor when a medium-density test			
	quality sensor					pattern is written.			
878	Forced performing of			_	_	Performs the image quality control.	6		
	image quality control								
879	Automatic initialization	n of		_	_	Performs the image quality control and	6		
	image quality control					restore the initial value.			
912-0	Magazine sort/	A4-R/L	.T-R	0	-14~14	When the value increases by 1, the	4		
912-1	fine adjustment of	B4		0	-14~14	folding and stapling position shift by	4		
912-2	folding and stapling	A3/L	.D	0	-14~14	approx. 0.25mm toward the right page.	4		
	position								

### <Operation procedure>

### Procedure 1







#### Procedure 10



Procedure 13



#### Procedure 15



## 1. 2. 5 Setting mode (08)

The following items can be set or changed in this mode (08).

			Setting mo	de (08)	
Code	Name	Default	Accep-	Contents	Proce-
0000	Numo	Boldan	value	Contonio	dure
200	Date and time setting	_	13 digits	Year/month/date/day/hour/minute/second	1
				Example: 99:08:07:5:11:30:48	
201	Destination selection	EUR:0	0 ~ 2	0: Europe (A4/A3/Folio)	1
		UC:1		1: USA/Canada (Letter/Ledger)	
		JPN:2		2: Japan (A4/B4)	
202	Externally installed copy	0	0 ~ 3	0: No external copy counter/controller device	1
	counter/controller device			1: Coin controller 2: Copy key card	
				3: Key copy counter	
204	Auto-clear timer setting	3	0 ~ 10	When the [START] key is not pressed, the	1
				time lag before automatic clearing works to	
				clear settings to defaults.	
				0: Disabled 1 to 10: Set number x 15 seconds	
205	Energy saver timer setting	0	0 ~ 15	Timer for switching to Energy Saver mode se-	1
				lected in 08-618 when the copier is not used.	
				0: Disabled 1: 30sec. 2: 60sec.	
				3: 90sec. 4: 120sec. 5: 150sec.	
				6: 3min 7: 4min 8: 5min 9: 7min	
				10: 10min 11: 15min 12: 20min	
				13: 30min 14: 45min 15: 60min	
206	Automatic shutoff timer setting	20	0 ~ 20	Timer for switching to automatic shutoff state	1
				when the copier is not used. US Energy Star	
				Compliance	
				0: 3min 1: 5min 2: 10min 3: 15min	
				4: 20min 5: 25min 6: 30min	
				7: 40min 8: 50min 9: 60min	
				10: 70min 11: 80min 12: 90min	
				13: 100min 14: 110min 15: 120min	
				16: 150min 17: 180min 18: 210min	
				19: 240min 20: Disabled	
209	I imer for print job start-up time	1	1 ~ 10	Sets the period the control panel is not ope-	1
	trom copy mode when auto-			rated when the data of the printer function is	
	clear is disabled			sent before the print job starts. This function	
				is enabled when the auto-clear timer setting	
				(U8-2U4) is set as "U" (disabled).	
				(Set number x 15 seconds)	

		;	Setting mo	ode (08)	
			Accep-		Draga
Code	Name	Default	table	Contents	FIOCE-
			value		dure
217	Information of cassettes	15	0~15	0:1 cassettes 1:2 cassettes 2:3 cassettes	1
217	installation	15	0.13	2: 4 passettes 4: 1 passette (Eprojbly	1
	Installation			5.4 Casselles 4.1 Casselle(Forcibly	
000	Coloction of longuage (LU)		0.0	Installing OFF) 15. Automatic	
220	Selection of language (OI)		0~0	0. Language 1 1. Language 2	I
	on the display panel			2: Language 3 3: Language 4	
		JPIN:5		4: Language 5 5: Language 6	
				6: Language 7	
				Note: On the control panel,	
				EUR, JPN: language 1 to 6 are selectable.	
				UC: language 2 to 7 are selectable.	
225	Iransfer belt release control	0	0~1	Sets if the transfer belt is released when the	1
	in the duplex unit feeding mode			original for copying or print job is judged as	
				black-and-white.	
				0: Disabled 1: Enabled	
229	Paper size setting/	-	0~255	Paper size is selected with the icons on the	1
	bypass feed			LCD.	
230	Paper size setting/	EUR:A4	0~255	Paper size is selected with the icons on the	1
	1st cassette	UC:LT		LCD.	
		JPN:A4			
231	Paper size setting/	EUR:A3	0~255	Paper size is selected with the icons on the	1
	2nd cassette	UC:LD		LCD.	
		JPN:A3			
232	Paper size setting/	EUR:A4-R	0~255	Paper size is selected with the icons on the	1
	3rd cassette	UC:LT-R		LCD.	
		JPN:A4-R			
233	Paper size setting/	EUR:A4	0~255	Paper size is selected with the icons on the	1
	4th cassette	UC:LG		LCD.	
		JPN:B4			
250	Telephone number for "Call for	0	14	A telephone number up to 14 digits can be	1
	service"		digits	entered. Use the [HELP] key to enter hy-	
				phens (–).	
253	Error history display	-	-	The last twenty error records are displayed.	2
256	Paper size setting/	EUR:A4	0 ~ 255	Paper size is selected with the icons on the	1
	LCT	UC:LT		LCD.	
		JPN:A4			
257	Counter copy	-	1~2	1: Copies the original counter value to the	-
				backup counter.	
				2: Copies the backup counter value to the	
				original counter.	
				(► Page 1-48)	
263	Heat Roller Temperature(Thick paper 1)	6	1~6	Upper,Lower(HeatRoller)	1
264	Heat Roller Temperature(Thick paper 2)			1:180, 155 (degreeC) 2:185, 155 3:190, 155	
265	Heat Roller Temperature(Thick paper 3)	1		4:195, 155 5:200, 155 6:205, 155	
266	Heat Roller Temperature	3	1~6	Upper,Lower(HeatRoller)	1
	(OHP)			1:140, 125(degreeC) 2:150, 135	
				3:155, 140 4:160, 145	
				5:170, 155 6:185, 155	
267	C9B/C9D Error history display	_	_	Displays the errror status of [C9B] and [C9D].	2
270	Heat Roller Temperature	3	1~6	Upper,Lower(HeatRoller)	1
	(Thin paper)			1:135, 135(degreeC) 2:140, 135	
				3:145, 135 4:150, 135	
				5:155, 135 6:160, 135	

F

		:	Setting mo	ode (08)	
			Accep-		Brook
Code	Name	Default	table	Contents	duro
			value		uure
300	Maximum number of copies	0	0 ~ 2	0:999 1:99 2:9	1
	allowed				
302	Resettable/original counter	EUR: 3	0~3	Sets if the resettable and original counters	1
	display	UC: 0		are displayed.	
		JPN:0		0: Off 1: Resettable counter	
				2: Original counter	
210	Paparaiza (non standard)	422/	140.457/	3: Resettable/original counter	4
318	Paper size (non-standard)	432/	148~457/		4
260		279	100~305	Poversing the PADE transport belt during	1
300	ADI SWICH DACK	0	0.41	original transporting to align originals	1
				against the original scale	
				0: Disabled 1: Enabled	
361	ADF	0	0~1	When non-standard originals are used:	1
	non-standard size original			0: Non-standard - Copier will stop and	
	detection			prompt operator to select copy size.	
				1: Standard - Copier continues the current	
				job without stopping	
390	HDD error frequency counter	0	0~32767	Resets when formatting the HDD	2
400	Image quality control 1	1	0~1	Auto-performing of image quality control	1
				0: Disabled	
				1: Enabled (Performing 08-410,413)	
401	Image quality control 2	1	0 ~ 1	Auto-performing of image quality control	1
				0: Disabled 1: Enabled	
				* If Image quality control 1(08-400) is 0	
				(Disabled), this value must be set to 0	
				(Disabled).	
402	Image quality control 5	1	0~1	Auto-performing of image quality control	1
				U: Disabled 1: Enabled	
				If both image quality control 2 (08-401) and	
				4 (06-411) are 0 (Disabled), this value must	
404	Image quality control	1	0~1	After the last image quality control if the	1
-0-	auto-start (relative humidity	'		variation of the relative humidity inside the	
	changes)			copier becomes larger than the set value in	
	onangeo)			08-405, image quality control will be started	
				when the printing begins.	
405	Relative humidity difference	1	0~1	Sets the difference of the relative humidity	1
	setting at image qulity control			for image quality control auto-start (relative	
	auto-start			humidity changes).	
				0: 5%R.H. 1: 10%R.H. 2: 15%R.H.	
				3: 20%R.H. 4: 25%R.H. 5: 30%R.H.	
				6: 35%R.H.	

		ŝ	Setting mo	ode (08)	
			Accep-		Drees
Code	Name	Default	table	Contents	Proce-
			value		aure
406	Image quality control	1	0 ~ 1	After printing is finished and the time set in	1
	auto-start (standby time)			08-452 has passed, image quality control	
				will start when printing is started or the	
				energy saver key is pressed.	
				0: Disabled 1: Enabled	
407	Image quality control	0	0 ~ 1	During continuous printing, image quality	1
	auto-start (continuous printing)			control is started for every print volume set	
				in 08-453.	
				0: Disabled 1: Enabled	
408	Image quality control	1	0 ~ 1	When the accumulated print volume since	1
	auto-start (accumulated			the last image quality control has attained	
	print volume)			the amount set in 08-455, image quality	
				control automatically starts after the current	
				printing job.	
				0: Disabled 1: Enabled	
409	Image quality control 3	1	0~1	Auto-performing of image guality control	1
			•	0: Disabled	
				1: Enabled (Performing 08-410 413)	
410	Drum surface potential	1	0~1	Performing drum surface potential correction	1
	correction control		0.	by drum thermistor detection temperature for	
	by drum temperature			image quality control	
	by aram temperature			0: Disabled 1: Enabled	
				* This selection is reflected if 'Image quality	
				controls 1 and 3 (08-400 409)' have been	
				set to 1 (Enabled)	
411	Image quality control 4	1	0~1	Auto-performing of image quality control	1
	inage quanty control 1		0 1	0: Disabled 1: Enabled	
				* If image quality control 2 (08-401) is 0 (Dis-	
				abled) this value must be set to 0 (Disabled)	
/13	Transfer roller bias correction	1	0~1	Performing transfer roller bias correction	1
10	control by temperature and		0 1	by the temperature and humidity sensor for	
	humidity			image quality control	
	hamaty			0: Disabled 1: Enabled	
				* This selection is reflected if ilmage quality	
				controls 1 and 2 (08 400 400)' have been	
				controls 1 and 3 (00-400,409) have been	
115	Imaga quality control	0	0 - 16	Accumulated total of CE1_CE2_CE4	1
413	abnormal detection		0 - 10	(Max 16 times)	
	counter (V)			* Enabled when timede quality control 2	
				(08-401)' is 1(Encolod)	
110	Image quality control	0	0~16		4
410	abnormal detection		יי יי	(Max 16 times)	
				(WIAA. 10 (IIIIES)	
	display/o clearing			(Uo-4UT) IS T (⊏Nabled).	

		Ś	Setting mo	ode (08)	
			Accep-		<b>_</b>
Code	Name	Default	table	Contents	Proce-
			value		dure
417	Image quality control	0	0~16	Accumulated total of CE1. CE2. CE4	1
	abnormal detection			(Max 16 times)	
	counter (C)			* Enabled when 'Image quality control 3	
	display/0 clearing			(08-401)' is 1 (Enabled)	
418	Image quality control	0	0~16	Accumulated total of CE1_CE2_CE4	1
110	abnormal detection	Ŭ	0 10	(Max 16 times)	
	counter (K)			* Enabled when 'Image quality control 3	
	display/0 clearing			(08-401)' is 1 (Enabled)	
121	Lovel setting for fusing	5	1~6	Upper Lewer (HeatBeller)	1
404	temperature (Thick paper 4)	5	1.00	1:195 155(dogrooC) 2:105 155	
	temperature (Thick paper 4)			1.185, 155(degreeC) 2.195, 155	
				5.205, 155 4.205, 165	
405		-	1 0	5:205, 175 6:205, 185	
435	Level setting for fusing	3	1~6	Upper,Lower (HeatRoller)	1
	temperature			1:140, 125(degreeC) 2:150, 135	
	(Special paper 1: Small size)			3:155, 140 4:160, 145	
				5:170, 155 6:185, 155	
436	Level setting for fusing	5	1~6	Upper,Lower (HeatRoller)	1
	temperature			1:185, 155(degreeC) 2:195, 155	
	(Special paper 2: Large size)			3:205, 155 4:205, 165	
				5:205, 175 6:205, 185	
452	Image quality control auto-	4	0 ~ 24	Setting time (hour) of Image quality control	1
	start time setting (standby time)			auto-start (standby time)	
453	Image quality control	300	0 ~ 999	Setting print volume (number of sheets) to	1
	auto-start print volume setting			automatically start Image quality control	
	(continuous printing)			(continuous printing)	
455	Image quality control	10	0 ~ 30	Setting print volume (set value x 100 sheets)	1
	auto-start print volume setting			to automatically start Image quality control	
	(accumulated print volume)			(accumulated print volume)	
480	Paper source priority	0	0~5	0: A4/LT 1: LCF 2: 1st cassette	1
				3: 2nd cassette 4: 3rd cassette 5: 4th cassette	
481	Automatic paper source	1	0~2	Sets if the cassette is automatically switched to	1
	change			the other cassette which has the paper of the	
	-			same size when paper in the selected one	
				has run out.	
				0: Not switch	
				1: Switch if paper of the same size and	
				same direction presents (ex.A4 to A4).	
				2: Switch if paper of the same size presents	
				(different direction is acceptable) (ex A4	
				to A4-B)	
485	Polygonal motor rotation at	0	0~1	Setting of polygonal motor rotation at	1
,00	standhy			standby	
	standby			0:1 ow speed rotation (standby rotation)	
				1. Stop	

		:	Setting mo	ode (08)	
			Accep-		_
Code	Name	Default	table	Contents	Proce-
			value		dure
493	Feeding retry / Cassette, Thick paper 1	0	0~1	0: 1 time 1: 5 times	1
494	Feeding retry / LCF, Thick paper 1	0	0~1	0: 1 time 1: 5 times	1
495	Feeding retry / Bypass, Thick paper	0	0~1	0: 1 time 1: 5 times	1
496	Feeding retry / Bypass, OHP	0	0~1	0: 1 time 1: 5 times	1
497	Feeding retry / Cassette, OHP	0	0~1	0: 1 time 1: 5 times	1
501	Original mode priority	0	0~5	0: Text/photo 1: Text 2: Printed image	1
				3: Photo 4: Map 5:Al	
502	Original mode priority	0	0~5	0: Text/photo 1: Text 2: Printed image	1
	(Black)			3: Photo 4: Map 5:Al	
503	Density mode priority	1	0 ~ 1	0: Automatic 1: Manual (Center)	1
504	Color mode priority	2	0 ~ 2	0: Auto color 1: Black 2: Full color	1
600	Access code mode	0	0 ~ 2	0: Disabled 1: Enabled	1
				2: Department management	
602	Display setting for	EUR:1	0 ~ 1	0: Display OFF 1: Display ON	1
	Automatic energy saver /	UC:1			
	Automatic shutoff	JPN:0			
603	Automatic duplexing mode	0	0 ~ 3	0: Disabled	1
	priority (when using RADF)			1: Single-sided to duplexed	
				2: Two-sided to duplexed 3: User selection	
604	APS (Automatic Paper Selec	0	0 ~ 2	0: APS mode	1
	tion) / AMS (Automatic			1: AMS mode	
	Magnification Selection)			2: None	
	mode priority				
607	RADF feeding mode priority	0	0~1	0: Continuous feeding by START key	1
				1: SADF (Automatic feeding by setting	
				original)	
609	Original mode priority	2	2~3	The initial value of the original mode in the	1
	(scanning)			scan function is set.	
				2: Printed image 3: Photo	
610	Color mode priority	2	1~2	The initial value of the color mode in the	1
	(scanning)			scan function is set.	
011		0	0.1	1: Gray scale 2: Full color	4
611	Book duplexed copy original	0	0~1	U: Left page to right page	1
C10			0.10	1: Right page to left page	
612			0~10		1
613	[OTHER KEY] paper size	EURIIS	0~13	U: A3 1: A4 2: A4-R 3: A5-R 4: B4	I
	seung			5. 55 6. 55-R 7. LI 6. LI-R 9. LD	
		JEN.3		12: EQUID 14: AG P 15: Postoard	
617	BADE image shifting	0	0~1	Sets the datum position of image when the	1
	I I TADI I III aye si III lii iy			BADE is used	
				0: Without shift (center) 1: With shift (corpor)	
618	Energy saver mode	0	0~1	0: Energy saver mode with priority aim of	1
				energy saver mode with phonty and of	
				1: Energy saver mode with priority aim of	
				returning to standby (Refer to 08-713)	

ERROR CODES AND SELF-DIAGNOSIS

Setting mode (08)							
			Accept-		Drago		
Code	Name	Default	table	Contents	duro		
			value		dure		
619	Initial value setting of book	10	0 ~ 50	Set value x 1mm	1		
	center erase margin						
620	APS forced start setting /	0	0 ~ 2	0: Single press of key	1		
	selection			1: Double press of key 2: Disabled			
622	Reading resolution initial	2	0 ~ 2	The initial value of the read resolution in the	1		
	value setting			scan function is set.			
	(scanning)			0: 600dpi 1: 300dpi 2: 150dpi			
623	Permanent file format initial	1	0 ~ 1	When the data read by the scan function is	1		
	value setting			saved into the mail box, the initial value of			
	(scanning)			the file format is set.			
				0: PDF 1: JPEG 2: TIFF			
630	Automatic paper source	0	0~1	Sets if the paper source is switched to the	1		
	change from bypass tray			other casssette which has the paper of the			
				same size when the paper on the bypass			
				tray has run out.			
				0: Disabled 1: Enabled			
631	Transfer belt release control	0	0~1	Sets if the transfer belt is released when the	1		
	in the auto color mode			original is judged as black-and-white.			
				0: Disabled 1: Enabled			
632	Autoamtic calibration disclo-	1	0 ~ 2	Sets the disclosing level of automatic	1		
	sure level			calibration.			
				0: Service technician			
				1: Administrator 2: User			
634	Initial value setting of repeat	2	2 ~ 8	Set value = Repeat frequency	1		
	frequency in the image repeat						
	mode						
635	ADF mixed originals mode	0	0 ~ 1	0: Same original size 1: Mixed original size	1		
	setting priority						
640	Date printing format	EUR:1	0~2	Sets the date printing format at the list	1		
		UC:2		printing.			
		JPN:0		0:YYYY.MM.DD 1:DD.MM.YYYY			
				2: MM.DD.YYYY			
641	Automatic sorting mode	2	0 ~ 3	0: OFF 1: STAPLE 2: SORT	1		
	priority (when using ADF)			3: GROUP			
642	Sorter mode setting priority	0	0 ~ 3	0: NON SORT 1: STAPLE 2: SORT	1		
				3: GROUP			
643	E-mail transmission	1	0 ~ 2	Sets the default file format when the image	1		
	file format default setting			data read by the scan function is send by			
				E-mail.			
				0: PDF 1: JPEG 2: TIFF			
644	E-mail transmission	0	0 ~ 1	Sets the default attachment format when the	1		
	file attachment format default			image data read by the scan function is			
	setting			send by E-mail.			
				0: Attachment 1: URL			

		:	Setting mo	de (08)	
			Accep-		
Code	Name	Default	table	Contents	Proce-
			value		dure
645	Correction of reproduction	10		Sate the reproduction ratio for X in 1 conv	1
045	ratio in the editing copy mode		0.410	(including magazing cort) to "Poproduction	
	Tailo in the editing copy mode			(including magazine solt) to "heproduction"	
				$\frac{1}{2} \frac{1}{2} \frac{1}$	
				0.30% $1.31%$ $2.32%$ $3.35%$ $4.34%$	
				10:100%	
646	Image position in the editing	0	0~1	Sets the image pasting datum for each page	1
040	copy mode			in the X in 1 copy (including magazine sort)	
	copy mode			0: Corner (upper left) 1: Center	
647	Counting method of	0	0~1	Sets counting method of monocolor conv	1
047	monocolor copy in			O:Counts as full color	
	department management			1:Counts as Black and white	
648	Initializing of the finisher trav	0	0~1	Sets whether the finisher tray moves to the	1
040	at Auto-clear			1-bin or not at Auto-clear	
	al Auto-clear				
650	2 in $1/4$ in 1 setting	0	0~1	0: Horizontal writing original	1
050	2 III 17 4 III 1 Setting			1: Vertical writing original	
652	Diplay for toper cartridge	1	0~1	0:Invalid (Not displayed)	1
0.52	preparation	'		1:Valid (Displayed)	
653	Conjer administrator's	00000	00000 ~	Sets the password for administrator in the	1
000	nassword	00000	99999	department management	'
681	Cascade operation setting	0	0~1		1
	(printer)	Ŭ			
682	Magazine sort setting	0	0~1	0: Left page to right page	1
	0			1: Right page to left page	
683	Cascade operation setting	0	0~1	0: OFF 1: ON	1
	(copier)				
684	Summer time function	0	0 ~ 1	0: Not summer time	2
				1: Summer time	
690	HDD formatting	-	2	2: Normal format	1
691	HDD status display	-	0 ~ 2	0: Not formatted	2
				2: Normal formatted	
693	HDD standby mode	1	0 ~ 10	Sets the time lag before entering the HDD	1
				standby status.	
				* This value may need to be changed when	
				the HDD is replaced since the characteristics	
				of HDDs are different among makers.	
695	Erasing of the leading edge sha-	0	0~1	Switches the erasing of the leading edge shadow to enabled/	1
	dow when copying full image			disabled when copying in full image.	
				0: Copy the full image (no void).	
				1: Masking the shadow of the leading edge (4mm) Full image	
				reading will be done, the masking of the leading edge (4mm) will	
				be done during image processing.	
				Note) If book center erase function is used in A3-wide/Full bleed size, this	
				setup becomes disabled and the shadow cannot be masked.	

	Setting mode (08)									
			Accep-		_					
Code	Name	Default	table	Contents	Proce-					
			value		dure					
696	Checking with or without		0~1	0:Without 1:With	2					
000	installing the scrambler board				-					
697	Setting the key code size of	0	0~1	0: Available 1: Not available	1					
007	the scrambler board	Ŭ								
698	Displaying a screen for	_	32 digits	Displaying the screen which the user needs	5					
	entering the key code of the		o_ algito	to enter the key code.	Ū					
	scrambler board			Displaying the key code entering screen and						
				asking the user to enter the key code.						
				*To confirm the key code, it will be necessary						
				to enter the key code twice. For detailed						
				procedure, refer to the operator's manual						
600	Frasing all HDD data (Valid only			and the unpacking instructions for GP-1020.	2					
099	when scrambler board is	_	_	by the request of the user all of the data inside	5					
	installed)			the HDD can be erased by means of this code						
700	Fuser error status counter	0	0~9	0: Normal 1:[C41] error	1					
				2: Continuous [C41] error 3: -						
				4: [C43] error 5: [C44] error 6: [C42] error						
				7: [C46] error 8: [C47] error 9: [C48] error						
712	Fuser roller temperature for	3	0~17	0: OFF 1: 60°C 2: 65°C 3: 70°C	1					
	energy saver mode with			$4:75^{\circ}$ C $5:80^{\circ}$ C $6:85^{\circ}$ C $7:90^{\circ}$ C $9:45^{\circ}$ C $10:105^{\circ}$ C $11:110^{\circ}$ C						
	phonty aim of energy saving			12: 115°C 13: 120°C 14: 125°C						
				15: 130°C 16: 135°C 17: 140°C						
713	Fuser roller temperature for	13	0~17	0: OFF 1: 60°C 2: 65°C 3: 70°C	1					
	energy saver mode with			4: 75°C 5: 80°C 6: 85°C 7: 90°C						
	priority aim of returning to			8: 95°C 9: 100°C 10: 105°C 11: 110°C						
	standby			12: 115°C 13: 120°C 14: 125°C						
740	Color registration control	0	01	15: 130°C 16: 135°C 17: 140°C	1					
742	Color registration control	0	0~1	0: Automatic 1: Manual	1					
140	during the warming-up	'		0. Disabled 1. Enabled	'					
801	Electronic total counter	0	0 ~	Electronic counter counts the number of all printouts in	1					
	display		99999999	the copier/printer function. (Code 08-802 is reflected.)						
802	Large-size double count	EUR:0	0 ~ 2	0: Single count 1: Double count	1					
	setting	UC:1		2: Single count (Double count for key copy						
		JPN:0		counter)						
				"Double-counted paper size is set in code						
				counter reflect this setting						
803	Short-size counter display	0	0~	Counts the number of short-sized printouts.	1					
	(card~A4-R/LT-R)		99999999							
804	Long-size counter display	0	0 ~	Counts the number of long-sized printouts.	1					
	(B4/LG~A3 wide/FULL BLEED)		9999999							
808	Bypass counter display	0	0 ~	Counts the number of printouts in the bypass	1					
000			9999999	teed. (Single count for every paper size)	4					
809	LOT counter display		0~0	LCE (Single count for every paper size)						
813	Test print counter	0	0~	Counts the number of printouts in the test	1					
			99999999	print mode. (In the test print mode, only this						
				counter is counted. Code 08-802 is reflected.)						

Note: Codes 696 to 699 are maintenance codes but they will not be printed out in the 08 list. Refer to the service manual for GP-1020. When the scrambler board (GP-1020) is not installed, the code 699 cannot be operated (the operation is not allowed).

	Setting mode (08)							
				Accep-				
Code	Name		Default	table	Contents	Proce-		
				value		dure		
814	Single-sided print counter		0	0 ~	Counts the number of single-sided printouts.	1		
	display			9999999	(Single count for every paper size)			
815	Duplexed print counte	r display	0	0 ~	Counts the number of duplexd printouts.	1		
				9999999	(Single count for every paper size)			
817	Bypass jam counter di	splay	0	0 ~	Counts the frequency of paper jam in	1		
				9999999	bypass feeding. (Accumulated total of E12)			
818	Registration jam count	ter	0	0 ~	Jam on paper trailing edge at the	1		
	display			99999999	registration roller (Accumulated total of E01)			
820	Paper exit jam counter	<sup>r</sup> display	0	0 ~	Frequency of paper exit jam	1		
				99999999	(Accumulated total of E01, E02)			
822	Duplex unit counter dis	splay	0	0 ~	Counts the number of printouts fed from the	1		
				99999999	duplex stack. (Single count for every paper siz	e)		
824	ADF original counter of	lisplay	0	0 ~	Counts the number of originals fed from the	1		
	0	1 5		99999999	ADF. (Single count for every paper size)			
825	LCF jam counter displ	av	0	0 ~	Frequency of paper jam when paper fed	1		
	- <b>,</b>			99999999	from the LCT (Accumulated total of E19, E21)			
826	Duplex unit paper-feed iam		0	0~	Frequency of paper iam after paper fed from	1		
020	counter display		Ŭ	99999999	the duplex_stack (Accumulated total of F11_F5	4)		
827	Dupley unit stack iam counter		0	0~	Frequency of paper iam before paper reach the	1		
027				99999999	duplex stack (Accumulated total of E50, E51, E5	2)		
831	Setting the target for t	he kev	1	0 ~ 10		1		
	copy counter		•	Copy	ina Network printina	Ľ.		
			<key< td=""><td>counter</td><td><pre><key <key="" counter="" counter<="" pre=""></key></pre></td><td>nter</td></key<>	counter	<pre><key <key="" counter="" counter<="" pre=""></key></pre>	nter		
			conne	connected> not connected> connected> not connected>				
		1:	Copying	(Counted)N	lot allowed Printing (Counted) Printing	a		
		2:	Copying	(Counted)C	copyingPrinting (Counted) Not allowed	ad		
		3. 5.	Copying	Copying (Counted)Not allowed Printing (Counted) Not allow				
		10: C	Copying (N	pying (Not counted) Copying Printing (Counted) Not a				
022	1 et escepte counter d	icolov		0~	Counts the number of printouts fod from the			
032	TSI Casselle courier u	ispiay		0~00000	Let apparette (Single count for eveny paper size)			
000	Ond appointe counter of	lioplay	0	9999999	Tst cassette. (Single count for every paper size)	4		
000		lispiay		0~				
004	0			9999999	2nd cassette. (Single count for every paper size)			
834	34 3rd cassette counter display		0	0~	Counts the number of printouts fed from the			
				9999999	3rd cassette. (Single count for every paper size)			
835	5 4th cassette counter dispaly		0	0 ~	Counts the number of printouts fed from the	1		
				99999999	4th cassette. (Single count for every paper size)			
836	36   1st cassette jam counter		0	0 ~	Frequency of paper jam when paper fed	1		
	display			99999999	from the 1st cassette. (Accumulated total of			
					E13, E22)			
837	2nd cassette jam cour	nter	0	0 ~	Frequency of paper jam when paper fed	1		
	display			9999999	from the 2nd cassette. (Accumulated total of			
					E14, E23)			

	Setting mode (08)						
			Accep-		_		
Code	Name	Default	table	Contents	Proce-		
			value		dure		
838	3rd cassette jam counter	0	0 ~	Frequency of paper jam when paper fed	1		
	display		9999999	from the 3rd cassette. (Accumulated total of			
				E15, E24)			
839	4th cassette jam counter	0	0 ~	Frequency of paper jam when paper fed	1		
	display		99999999	from the 4th cassette. (Accumulated total of			
				E16, E25)			
840	Drum Y life counter	0	0 ~	Counts the number of sheets printed at	1		
	(display/0 clearing)		999999	drum Y. (Code 08-858 and 875 are reflected.)			
841	Drum M life counter	0	0 ~	Counts the number of sheets printed at	1		
	(display/0 clearing)		999999	drum M. (Code 08-858 and 875 are reflected.)			
842	Drum C life counter	0	0 ~	Counts the number of sheets printed at	1		
	(display/0 clearing)		999999	drum C. (Code 08-858 and 875 are reflected.)			
843	Drum K life counter	0	0 ~	Counts the number of sheets printed at	1		
	(display/0 clearing)		999999	drum K. (Code 08-858 and 875 are reflected.)			
844	Developer Y counter	0	0 ~	Counts the number of sheets printed by	1		
	(display/0 clearing)		99999999	developer Y. (Code 08-858 and 875 are reflected.)			
845	Developer M counter	0	0 ~	Counts the number of sheets printed by	1		
	(display/0 clearing)		99999999	developer M. (Code 08-858 and 875 are reflected.)			
846	Developer C counter	0	0 ~	Counts the number of sheets printed by	1		
	(display/0 clearing)		9999999	developer C. (Code 08-858 and 875 are reflected.)			
847	Developer K counter	0	0 ~	Counts the number of sheets printed by	1		
	(display/0 clearing)		9999999	developer K. (Code 08-858 and 875 are reflected.)			
853	Transfer belt unit counter	0	0 ~	Counts the number of printed sheets of the transfer	1		
	(display/0 clearing)		9999999	belt unit. (Code 08-858 and 875 are reflected.)			
854	Fuser unit counter	0	0 ~	Counts the number of printed sheets of the	1		
	(display/0 clearing)		9999999	fuser unit. (Code 08-858 and 875 are reflected.)			
855	Fuser oil roller counter	0	0 ~	Counts the number of printed sheets of thefuse	1		
	(display/0 clearing)		9999999	r oil roller. (Code 08-858 and 875 are reflected.)			
857	Counter setting for general	Refer to	0 ~	General maintenance counter value	1		
	PM	Contents	999999	(number of printouts)			
		column		<default value=""></default>			
				EUR: 60000 UC: 60000 JPN: 0			
858	OHP/Thick/Special paper double count	1	0 ~ 1	The counter for life management at the OHP/	1		
				Thick/Special paper mode;			
				0: Disabled - Counts up normally.			
				1: Enabled - Counts up doubly.			
867	Drum Y drive counter	0	0 ~	Rotation time (sec.) of color drum motor	1		
	(display/0 clearing)		999999				
868	Drum M drive counter	0	0 ~	Rotation time (sec.) of color drum motor	1		
	(display/0 clearing)		999999				
869	Drum C drive counter	0	0 ~	Rotation time (sec.) of color drum motor	1		
	(display/0 clearing)		999999				

	Setting mode (08)						
Code	Name	Default	Accep- table value	Contents	Proce- dure		
870	Drum K drive counter (display/0 clearing)	0	0 ~ 999999	Rotation time (sec.) of black drum motor	1		
871	Developer Y time counter	0	0 ~	Rotation time (sec.) of developer motor	1		
	(display/0 clearing)	_	999999				
872	Developer M time counter	0	0 ~	Rotation time (sec.) of developer motor	1		
	(display/0 clearing)		999999				
873	Developer C time counter	0	0 ~	Rotation time (sec.) of developer motor	1		
	(display/0 clearing)		999999				
874	Developer K time counter	0	0 ~	Rotation time (sec.) of developer motor	1		
	(display/0 clearing)		999999				
875	Life counter large-size	2	0 ~ 2	0: Disabled	1		
	double count setting			1: A3, LD, A3 wide, FULL BLEED			
				2: A3, LD, A3 wide, FULL BLEED, B4, LG, FOLIO, COMP			
876	Large-size counter display	0	0~	Counts the number of printouts of large-size	1		
	(Copier/Full color)		9999999	paper in the full color mode/copier function.			
				(Code 08-802 and 888 are reflected.)			
877	Small-size counter display	0	0~	Counts the number of printouts of small-size	1		
	(Copier/Full color)		9999999	9 paper in the full color mode/copier function.			
				(Code 08-888 is reflected.)			
878	Large-size counter display	0	0~	Counts the number of printouts of large-size	1		
	(Copier/Black)		99999999	paper in the black mode/copier function.			
				(Code 08-802 and 888 are reflected.)			
879	Small-size counter display	0	0~	Counts the number of printouts of small-size	1		
	(Copier/Black)		9999999	paper in the black mode/copier function.			
				(Code 08-888 is reflected.)			
880	Large-size counter display	0	0~	Counts the number of printouts of large-size	1		
	(Copier/Monocolor)		99999999	paper in the monocolor mode/copier function.			
				(Code 08-802 and 888 are reflected.)			
881	Small-size counter display	0	0~	Counts the number of printouts of small-size	1		
	(Copier/Monocolor)		99999999	paper in the monocolor mode/copier function.			
000				(Code 08-888 is reflected.)			
882	Large-size counter display	0	0~	Counts the number of printouts of large-size	1		
	(Printer/Full color)		99999999	paper in the full color mode/printer function.			
000	emall aiza sountar diartar		<u> </u>	(Coue 08-802 and 888 are reflected.)	4		
883	(Drinter/Full color)	0	0~	Counts the number of printouts of small-size			
	(FIIIIlei/Fuii Color)		39999999	(Code 08-888 is reflected )			
001	Largo cizo countor diaplas	0	0	Counto the number of printoute of large size	4		
004	Printer/Rlack)		9999999	naper in the black mode/printer function			
			3333333	(Code 08-802 and 888 are reflected )			
				$(0000 00^{-}002 and 000 are reflected.)$			

	Setting mode (08)							
			Accep-		Dress			
Code	Name	Default	table	Contents	Proce-			
			value		aure			
885	Small-size counter display	0	0~	Counts the number of printouts of small-size	1			
	(Printer/Black)		9999999	paper in the black mode/printer function.				
	· · · · ·			(Code 08-888 is reflected.)				
888	Large-size setting	2	1~2	1: A3/LD/A3 wide/FULL BLEED	1			
	5 5			2: A3/LD/A3 wide/FULL BLEED/B4/LG/FOLIO				
				/COMP				
892	Current value of general PM	0	0 ~	Total number of printouts (copier + printer)	1			
	counter (display/0 clearing)		999999	for life related (double count)				
				(Code 08-858 and 875 are reflected.)				
894	Drum drive total counter for	0	0 ~	Rotation time (sec.) of color drum motor	1			
	color PM life-time counter		9999999999					
	(display/0 clearing)							
896	Current value of color PM	0	0 ~	Total number of full color and monocolor	1			
	counter (display/0 clearing)		999999	printouts for life related (double count)				
				(Code 08-858 and 875 are reflected.)				
897	Counter setting for color PM	Refer to	0 ~	Color maintenance counter value	1			
	-	Contents	999999	(number of printouts)				
		column		<default value=""></default>				
				EUR: 60000 UC: 60000 JPN: 0				
898	Drum drive total counter for	0	0 ~	Rotation time (sec.) of black drum motor	1			
	general PM life-time counter		9999999999					
	(display/0 clearing)							
900	Firmware version	_	_	EUR: T318SEXXX	2			
	(Basic section ROM)			UC:T318SUXXX				
				JPN: T318SJXXX				
				Other: T318SXXXX				
902	Engine ROM version (LGC)	-	_	T318M-XX	2			
903	Printer ROM version (IMC)	-	-	T318IMC-XX	2			
904	Scanner ROM version (SCM)	-	_	T318SCM-XX	2			
905	Macro-discrimination/	_	_	T511MAC-XX	2			
	discrimination version (AI ROM)							
920	FROM basic section software	_	_	VX.X/Y.Y	2			
	version							
921	FROM program internal	_	_	VXXX.YYY	2			
	version							
922	UI data fixed section	_	_	VXXX.YYY Z	2			
	version			(Z: Language code, ► Page, 5-22)				
923	UI data common section	_	_	VXXX.YYY Z	2			
	version			(Z: Language code Page, 5-22)				
		1		· · · · · · · · · · · · · · · · · · ·	1			

Setting mode (08)						
			Accep-		Drago	
Code	Name	Default	table	Contents	Proce-	
			value		aure	
924	UI data 1st language version	-	_	VXXX.YYY Z	2	
	in HDD			(Z: Language code, ► Page. 5-22)		
925	UI data 2nd language version	-	_	VXXX.YYY Z	2	
	in HDD			(Z: Language code, ► Page. 5-22)		
926	UI data 3rd language version	-	_	VXXX.YYY Z	2	
	in HDD			(Z: Language code, ► Page. 5-22)		
927	UI data 4th language version	-	_	VXXX.YYY Z	2	
	in HDD			(Z: Language code, ► Page. 5-22)		
928	UI data 5th language version	-	_	VXXX.YYY Z	2	
	in HDD			(Z: Language code, ► Page. 5-22)		
929	UI data 6th language version	-	_	VXXX.YYY Z	2	
	in HDD			(Z: Language code, ► Page. 5-22)		
930	UI data version in FROM	-	_	VXXX.YYY Z	2	
	displayed at power ON			(Z: Language code, ► Page. 5-22)		
931	UI data 7th language version	-	_	VXXX.YYY Z	2	
	in HDD			(Z: Language code, ► Page. 5-22)		
956	[FUNCTION CLEAR] key	0	0 ~ 1	0: Enabled 1: Disabled	1	
	setting when the default paper					
	cassette is not set					
957	Icon for performing color	0	0 ~ 1	Displays the icon for performing the color	1	
	registration control display			registration control manually in the control		
				panel display.		
				0: Enabled 1: Disabled		
962	Finisher	0	0~2	0: 50 sheets 1: 30 sheets 2: 20 sheets	; 1	
	maximum number of sheets					
	for stapling (short size)					
963	Finisher	0	0~2	0: 30 sheets 1: 15 sheets 2: 10 sheets	; 1	
	maximum number of sheets					
	for stapling (long size)					
964	Saddle stitcher	0	0~1	0: 15 sheets 1: 8 sheets		
	maximum number of sheets			<b>Note:</b> The maximum number of the originals		
	for stapling			in the magazine sort mode is quadruple of		
				the set number of the sheets.		
965	Deceleration setting	0	0~1	Sets whether the transport speed is decelerated		
	tor special paper			at the special paper mode as it is decelerated		
				after transferring the black (K) toner at the OHP		
				mode or the speed is not decelerated at all.		
				Paper size corresponding to a slowdown mode		
				IS A4/LI or smaller.		
				0: Decelerated		
				1: Not decelerated		

Setting mode (08)							
			Accep-		Proce		
Code	Name	Default	table	Contents	dure		
			value		uure		
967	Setting of main charger wire	0	0~1	Sets whether the error detection is performed	1		
	breaking detection			(Enabled) or not performed (Disabled) when			
				the toner is adhered on the transfer belt at the			
				case such as breaking of the main charger wire.			
				0:Invalid 1:Valid			
989	Toner cartridge preparation	50400	0~999999	The message of toner cartridge preparation is set	1		
	display _ Threshold setting (Y)			to be displayed when the value of the total pixel			
990	Toner cartridge preparation	50400		counter has exceeded the threshold. However, the	1		
	display _ Threshold setting (M)			amount of remaining toner to display the message			
991	Toner cartridge preparation	50400		may differ depending on the condition and envi-	1		
	display _ Threshold setting (C)			ronment in which the user uses the copier. In this			
992	Toner cartridge preparation	108220		case or when the display timing needs to be	1		
	display _ Threshold setting (K)			changed, the threshold can be changed.			
997	Fee charging system counter	-		Displays the fee charging related counter.	2		
	display						
1005	Setting number of output	200	0~1000	Setting number of output pages when judging	1		
	pages for judging a new toner			whether a new cartridge has been replaced			
	cartridge			or not at the last 'Toner empty'			
1026	Total pixel counter (Y)	_	_	This counter displays the current value of	1		
1027	Total pixel counter (M)	-	_	pixel counter which has been accumulated.	1		
1028	Total pixel counter (C)	-	_		1		
1029	Total pixel counter (K)	-	_		1		

### <Operation procedure>

Procedure 1



Procedure 4



<<Procedure to copy the counter value (08-257)>>

- 1. Turn ON the power while [0] and [8] are pressed simultaneously.
- 2. Enter the code [257] with the digital keys and press the [START] key (the following is displayed).

Note: Before performing the following operations, note the current counter values.

(	)% 2	257			(	)%	257	
SYS	STEM MOI	DE			SY	STEM	MODE	
	ORIGINAL	BACKU	JP			ORIGINAL	E	BACKUP
801 876 877 878 878 879 880	999999999 99999999 99999999 99999999 9999	999999 999999 999999 999999 999999 99999	999 999 999 999 999 999	[<][>] key vn	883 884 885	999999999 99999999 999999999 999999999	9 9 9	19999 999 19999 999 19999 999
881 882	999999999 999999999	999999 999999	999 999					
	ICEL	1/2			CA	NCEL	2/2	

3. Enter the value "1" or "2" with the digital key and press the [START] key.

The value entered is displayed on the left of the "%", and the [SET] key is displayed.

**Note:** The value can be erased by pressing the [CLEAR] key to change as long as the [START] key is not pressed. (The value on the left of the "%" is reset to "0" by pressing the [CLEAR] key.)

0 0 /

• Enter "1" to copy the value of the original counter (LGC board) onto the value of the backup counter (SYS board).

	1%	<u>257</u>	]
ЗY	SIEM ORIGINAL	MODE > B	ACKUP
801 876 877 878 879 880 881 882	999999999 999999999 999999999 99999999	9. 9. 9. 9. 9. 9. 9. 9. 9. 9. 9. 9. 9. 9	99999999 99999999 99999999 99999999 9999
CAI		<b>SET</b> 1/2	

- Enter "2" to copy the value of the backup counter (SYS board) onto the value of the original counter (LGC board).
- 4. Press the [SET] key to complete overwriting of the counter value.
- **Note:** The screen returns to the code entry screen without copying (overwriting) the value when the [CANCEL] key is pressed.

	2 %0		27		
SY	STEM	MODI	£		
	ORIGINAL	<	BACŁ	KUP	
801	999999999		99999	9999	
876	999999999		99999	9999	
877	999999999		99999	9999	
878	999999999		99999	9999	
879	999999999		99999	9999	
880	999999999		99999	9999	
881	999999999		99999	9999	
882	999999999		99999	9999	
					· · · · · · · · · · · · · · · · · · ·
CAN		SET	1/2		

# 2. ADJUSTMENT

## 2.1 Adjustment Order (Image Related Adjustment)

The diagram below explains the main procedures for image related adjustment. When replacing components which have other specified instructions for adjustment, those specified instructions are to be obeyed in priority.

In the following diagram, the solid lines with arrow lead to essential adjustments, while the dotted lines lead to adjustments to be performed if necessary.


# 2.2 Adjustment of the Auto-Toner Sensor

## 2.2.1 Automatic removing of developer material

- **Notes:** 1. This procedure is not necessary if developer material is not filled at the time of unpacking.
  - 2. After the developer material has been removed, perform the maintenance of the processing unit (EPU) according to "3. PREVENTIVE MAINTENANCE (PM)"
- (1) Remove the toner cartridges.
- (2) Remove the processing unit (PCU) from the copier. Turn the knob of the developer removal shutter, corresponding to the developer color to be removed, on the rear side of the unit (see the illustration below).
  - **Note:** If the knob cannot be turned normally, this message will be displayed during the developer removing: " [C33] Developer removal shutter abnormal".



- (2-1) Turn the developer removal shutter lever and open the developer removal opening. (see above figure).
- (3) Return the processing unit (PCU) to the copier (be sure to fix it with screws) and then close the front cover.
- (4) Turn ON the power while digital keys [0] and [5] are pressed simultaneously to dispaly the following screen.



- (5) Enter a code with digital keys and press the [START] key.nThe developer material is removed.
  - Code 391 : All color developer materials (Y,M and C) are removed.
    - 392 : Only the developer material K is removed.

Notes: 1. Fully confirm that the developer material to be removed corresponds to the code entered.

2. If you receive an error message upon completing step (5), the removal shutter of 1 or more developer unit(s) is closed. Open the appropriate shutter(s) and repeat step(5).

- (6) After all developer materials are removed and "READY" is displayed, turn the power OFF.
  Time required for removing Color developer materials only : Approx. 6 min.
  Developer material K only : Approx. 3 min.
- (7) Open the front cover and take out the processing unit (PCU). Turn the knob of the developer removal shutter back to the center position.
- (7-1) Turn the developer removal shutter lever and close the developer removal opening. (see figure on previous page).
- (8) Return the processing unit (PCU) to the copier and close the front cover.

#### 2.2.2 Initialization of the auto-toner senor

- **Note:** This procedure shall be carried out when <u>no developer material is filled in</u> the processing unit (EPU). If material has been filled, follow the procedure of developer material removing in the previous heading.
- (1) Open the front cover to install the developer cartridge(s) and then close the front cover.
- (2) Turn ON the power while digital keys [0] and [5] are pressed simultaneously to dispaly the following screen.

[0] [5] [POWER]		100%	А	A3
	->	TEST MODE		

- (3) Enter a code with digital keys and press the [START] key.Code 200 : All developer materials 204 : Developer material K only
  - 221 : Color developer materials only

	100%	200	A3	
(Code) n [START] ->	TEST MODE			

(4) When the copier starts operating, a message "WAIT" is shown and the developer material filling starts (approx. 3 min.).

WAI	Т

(5) Approx. 2 minutes after the developer material filling is finished, the following display appears:

В	->	Y:6.30V	M:6.38V	C:6.38V	K:6.38V
С	->			58	3%
А	->	Y:4.00V	M:4.00V	C:4.00V	K:4.00V
		Upper line	B : Curren	t sensor vo	oltages (V)
		• •· · ·· ··	<b>.</b>		

Middle line C : Humidity (%)

Lower line A : Target values (V) for adjustment reference voltages

#### Notes:

- The current sensor voltages (V) shown in B automatically change, gradually approaching the target values for adjustment reference voltages shown in A.
- Values are displayed only for the developer materials being filled.
- (6) In 30 to 60 seconds, the current sensor voltages (V) in B are converged to those in A. The humidity shown in C disappears, and the sensor output control values (bit values) are shown instead.

В	->	Y:4	.00V	M:4	.00V	C:4	.00V	K:4	.00V
С	->	Y:	140	M:	140	C:	140	K:	140
Α	->	Y:4	.00V	M:4	.00V	C:4	.00V	K:4	.00V

Note: Be careful that the values in A, B and C vary with humidity.

Humidity (%)	Y	М	С	К
~29.9	3.60	3.60	3.50	3.50
30.0~44.9	3.84	3.84	3.74	3.74
45.0~59.9	4.00	4.00	4.00	4.00
60.0~74.9	4.27	4.27	4.27	4.27
75.0~	4.50	4.50	4.50	4.50

#### A : Target value (V) for adjustment reference voltage

## B : Current sensor voltage (V)

Humidity (%)	Y	М	С	K
~29.9	3.55~3.65	3.55~3.65	3.45~3.55	3.45~3.55
30.0~44.9	3.79~3.89	3.79~3.89	3.69~3.79	3.69~3.79
45.0~59.9	3.95~4.05	3.95~4.05	3.95~4.05	3.95~4.05
60.0~74.9	4.22~4.32	4.22~4.32	4.22~4.32	4.22~4.32
75.0~	4.45~4.55	4.45~4.55	4.45~4.55	4.45~4.55

(7) If an adjustment error occurs, values of the color in problem displayed in A, B or C are replaced with " $_{* * *}$ ".

As for properly adjusted colors, press the [INTERRUPT] key to store their adjustment results in memory.

(8) Press the [INTERRUPT] key to store the adjustment results in memory. The screen returns to the initial display.

	100%	А	A3	
[INTERRUPT] ->	TEST MODE			

- (9) Remove the developer cartridge(s).
- (10) Install the toner cartridge(s).

<Troubleshooting in auto-toner sensor adjustment> (measures against adjustment error)

Check which color is in adjustment error.



Press the [INTERRUPT] key to store the adjustment results in the memory.

# 2.3 Adjustment of Image Quality Control

- At the time of unpacking
  Prior to image dimensional adjustment, perform the "Automatic initialization of image quality control (05-879)" procedure.
- (2) When any of the following parts is replaced, be sure to perform the "Automatic initialization of image quality control (05-879)" procedure.
  - Processing unit (PCU) Transfer belt unit (TBU) Photoconductive drum
  - Developer material
     - Laser optical unit
     - Image quality sensor

**Note:** When performing "Automatic gamma adjustment" in addition, "Automatic initialization of image quality control" should be done first.

(3) When performing "Automatic gamma adjustment" in cases other than the above ones, do the "Forced performing of image quality control (05-878)" procedure before "Automatic gamma adjustment".

Code	Adjustment item	Contents		
878	Forced performing of	<procedure></procedure>		
	image quality control	(1) While pressing [0] and [5] simultaneously, turn the power ON. n		
		Adjustment mode		
		(2) Enter [878] with digital keys and press the [START] key.		
		(3) When the adjustment finishes normally, the copier will return to		
		the adjustment mode's initial state.		
		If an error has occurred, take appropriate action by referring to "4.		
		TROUBLESHOOTING".		
879	Automatic initialization of	<procedure></procedure>		
	image quality control	(1) While pressing [0] and [5] simultaneously, turn the power ON. $\ensuremath{n}$		
		Adjustment mode		
		(2) Enter [879] with digital keys and press the [START] key.		
		(3) When the adjustment finishes normally, the copier will return to		
		the adjustment mode's initial state.		
		If an error has occurred, take appropriate action by referring to "4.		
		TROUBLESHOOTING".		

# 2.4 Adjustment of Color Registration Control

After having finished the "Automatic initialization of image quality control (05-879)" procedure, perform the "Forced performing of color registration control adjustment (05-407)" procedure.

Code	Adjustment item	Contents	
407	Forced performing of	<procedure></procedure>	
	color registration control	(1) While pressing [0] and [5] simultaneously, turn the power ON. n	
		Adjustment mode	
		(2) Enter [407] with digital keys and press the [START] key.	
		(3) When the adjustment finishes normally, the copier will return to	
		the adjustment mode's initial state.	
		If an error has occurred, take appropriate action by referring to "4.	
		TROUBLESHOOTING".	

# 2.5 Image Dimensional Adjustment

There are several adjustment items in the image dimensional adjustment, as listed below. Prior to this image dimensional adjustment, perform the "Automatic initialization of image quality control (05-879)". When adjusting these items, the following adjustment order should strictly be observed.

	Adjustment item Code in mode 05				
y Paper a	y Paper alignment (paper buckle) at the registration roller 439 – 452, 492				
x Registr	ation motor speed adjustment	406			
ant	(a) Reproduction ratio adjustment of primary-scanning direction	400			
stme	(Fine adjustment of polygonal motor rotation speed)				
ectio	(b) Adjustment of primary-scanning laser writing start position	470			
er se ted a	(c) Reproduction ratio adjustment of secondary-scanning direction	401			
rinte	(Fine adjustment of drum motor/transfer belt motor rotation speed)				
с С	(d) Adjustment of secondary-scanning laser writing start position 4				
(a) Fine adjustment of fuser motor rotation speed* 402					
V	(b) Fine adjustment of registration motorrotation speed* 410				
pé	(a) Image distortion adjustment -				
elate	(b) Image skewing adjustment	-			
on r	(c) Reproduction ratio adjustment of primary-scanning direction	482			
secti djus	(d) Reproduction ratio adjustment of secondary-scanning direction	104			
a.	(e) Image location adjustment of primary-scanning direction	106, 108			
canr	(f) Image location adjustment of secondary-scanning direction	105			
ې م	(g) Adjustment of image trailing edge margin	428			

\* "Fine adjustment of each fuser and registration motor rotation speed" should be adjusted after printer section related adjustment. (► Page. 4-64~68)

In accordance with the procedure described below, make adjustment of each adjustment item so that the measured values obtained from test copies satisfy the specification. By pressing the [ENERGY SAVER] key, immediately after starting the adjustment mode (05), single-sided test copying can be performed (normal copy mode).



## 2.5.1 Paper alignment (paper buckle) at the registration roller

<Operation procedure> (Use codes 439 to 452 and 492 in adjustment mode (05).)



- (2) Check for any transfer void or "Z" fold. If a transfer problem is present, try the values in descending order as "31"n"30"n"29"... until the transfer void disappears. At the same time, confirm that any paper jam has not occurred. Also, when the aligning amount has been increased, this may increase the scraping sound which occurs when the paper scrapes on the mylar sheet as it is transferred by the registration roller. If this scraping sound is irritating, try reducing the aligning amount.
- (3) Do the same for dduplex unit, LCT, bypass feeding, thick paper 2, thick paper 3 and OHP bypass feeding.



#### Note:

When paper thinner than specified is used, paper jams may occur frequently at the registration section. In this case, it is advisable to change (or reduce) the aligning amount.

However, if the aligning amount is reduced too much, this could cause the leading edge margin to vary adversely. So, when adjusting the aligning amount, try to choose the appropriate amount while checking the leading edge margin at the same time.

If the paper feed roller has prematurely become defective, it is possible to extend its service life, if necessary, by increasing the aligning amount, as a temporary measure until a replacement becomes available.

## 2.5.2 Regiatration motor speed adjustment

The paper transport speed of the registration roller vis-a-vis the image pirnt speed can be set to the optimum value.

#### <Procedure>

- (1) While pressing the digital keys [0] and [5] simultaneously, turn the power ON. n (Adjustment mode)
- (2) Set five sheets of A4-R /LT-R paper into the bypass tray.
- (3) Enter [10] and press the [PRINTER/NETWORK] key to perform the continuous printing of five "adjustment charts" from the bypass tray.
- (4) Since the printed sheets of "adjustment charts" are slightly shrunk after being fused, it it required to wait one to two minutes to cool them for precise adjustment. Then, set those five sheets again into the bypass tray in the same print direction, with the chart face upward.
- (5) Without changing the adjustment mode, enter [406] and press the [START] key.While the "adjustment chart" sheets are fed and transported, the pitches in the black belt zone are read.
- (6) Step (5) is to be repeated five times automatically.The displayed set value does not change until the fourth round and at the fifth round, a newly set value is displayed.
- (7) When a newly set value for aligning is displayed at the fifth round, press the [INTERRUPT] key to update the set value.

If error or jam occurs when feeding the adjustment charts, press the [CLEAR] key and perform step (2) to step (7) again.

## 2.5.3 Printer section related adjustment

- (a) Reproduction ratio adjustment of primary-scanning direction (Fine adjustment of polygonal motor rotation speed)
- 1. While pressing the digital keys [0] and [5] simultaneously, turn ON the power. n (Adjustment mode)
- 2. Press [1]n[PRINTER/NETWORK]. (A grid pattern with 10 mm squares is printed out. Use A3/LD from the 2nd cassette.)
- 3. Measure the distance A from the first grid line at the rear to the 21st of the grid pattern.
- 4. Check if the distance A is within 200±0.5 mm or not.
- 5. If it is not, use the following procedure to change values and repeat step 2. to 4. above.
- <Procedure> (Adjustment mode) n (Enter code [400] with digital keys) n [START]

n (Enter a value (acceptable values: 1209 to 1235) with digital keys)

- n [SET] or [INTERRUPT] (Stored in memory)
- n (Enter code [407] with digital keys) n [START]
- n Forced performing of color registration control
- \*The larger the adjustment value, the shorter the distance A becomes (0.082 %/step = 0.164 mm/ step).
- (b) Adjustment of primary-scanning laser writing start position
- 1. While pressing the digital keys [0] and [5] simultaneously, turn ON the power. n (Adjustment mode)
- 2. Press [1]n[PRINTER/NETWORK]. (A grid pattern with 10 mm squares is printed out. Use A3/LD from the 2nd cassette.)
- 3. Measure the distance B from the front edge of the paper to the 1st grid line from the front of the grid pattern.
- 4. Check if the distance B is within  $5\pm0.5$  mm or not.
- 5. If it is not, use the following procedure to change values and repeat step 2. to 4. above.
- <Procedure> (Adjustment mode) n (Enter code [470] with digital keys) n [START]

n (Enter a value (acceptable values: 0 to 255) with digital keys)

n [SET] or [INTERRUPT] (Stored in memory).

n (Enter code [407] with digital keys) n [START]

n Forced performing of color registration control

\*The larger the adjustment value, the longer the distance B becomes (0.0423 mm/step).

- (c) Reproduction ratio adjustment of secondary-scanning direction (Fine adjustment of drum motor/transfer belt motor rotation speed)
- 1. While pressing the digital keys [0] and [5] simultaneously, turn ON the power. n (Adjustment mode)
- 2. Press [1]n[PRINTER/NETWORK]. (A grid pattern with 10mm squares is printed out. Use A3/LD from the 2nd cassette.)
- 3. Measure the distance C between the 6th (down from the leading edge of the paper) and the 26th grid lines of the grid pattern.
- 4. Check if the distance C is within 200±0.5 mm or not.
- 5. If it is not, use the following procedure to change values and repeat step 2. to 4. above.
- <Procedure> (Adjustment mode) n (Enter code [401] with digital keys) n [START] n (Enter a value (acceptable values: 1608 to 1965) with digital keys) n [SET] or [INTERRUPT] (Stored in memory) n (Enter code [407] with digital keys) n [START] n Forced performing of color registration control

\*The larger the adjustment value, the shorter the distance C becomes (0.074 %/step = 0.15 mm/step).

- (d) Secondary-scanning laser writing start position adjustment
- 1. While pressing the digital keys [0] and [5] simultaneously, turn ON the power. n (Adjustment mode)
- 2. Press [1] n [PRINTER/NETWORK]. (A grid pattern with 10mm squares is printed out. Use A3/LD from the 2nd cassette.)
- 3. Measure the distance D from the leading edge of the paper to the 6th grid line of the grid pattern.
- 4. Check if the distance D is within  $55\pm0.5$  mm or not.
- 5. If it is not, use the following procedure to change values and repeat step 2. to 4. above.
- <Procedure> (Adjustment mode) n (Enter code [474] with digital keys) n [START]

n (Enter a value (acceptable values: 1 to 15) with digital keys)

- n [SET] or [INTERRUPT] (Stored in memory)
- n (Enter code [407] with digital keys) n [START]
- n Forced performing of color registration control

\*The larger the adjustment value, the shorter the distance D becomes (0.6 mm/step).

- **Note:** The reproduction ratio adjustment and the laser writing start position adjustment in the primary- and secondary-scanning directions have a connection as shown below.
  - 1. When 05-400 is adjusted, 05-401, 402, 403, 404, 410 and 474 are automatically adjusted.
  - 2. When 05-401 is adjusted, 05-402, 403, 404, 410 and 474 are automatically adjusted.
  - 3. When 05-406 is adjusted, 05-404 and 410 are automatically adjusted.
  - 4. When 05-410 is adjusted, 05-404 is automatically adjusted.



[Grid pattern]

<Adjustment order>

[0] [5] [power ON] n [1] n [PRINTER/NETWORK] (2nd cassette, A3/LD)

- A: 05-400 n 200±0.5 mm (0.164 mm/step) n 05-407
- B: 05-470 n 5±0.5 mm (0.042 mm/step) n 05-407
- C: 05-401 n 200±0.5 mm (0.15 mm/step) n 05-407
- D: 05-474 n 55±0.5 mm (0.6 mm/step) n 05-407

## 2.5.4 Scanner related adjustment

(a) Image distortion adjustment

Note: The screws on the rear side of mirror-1 and -3 must not be adjusted.



#### <Procedure>

Remove the original glass and the left top cover, and then move carriage-1 toward the paper exit side until it stops. Insert a plus type screwdriver through the hole of the indicator unit to adjust the screws as per step 1 to step 2 below.

#### <u>Step 1</u>

In case of A: Tighten the mirror-2 adjustment screw (CW). n Go to C

In case of B: Loosen the mirror-2 adjustment screw (CCW). n Go to D



#### <u>Step 2</u>

In case of C: Tighten the mirror-1 adjustment screw (CW). n Normal image

#### In case of D:

Loosen the mirror-1 adjustment screw (CCW).

n Normal image

Note: After the image distortion adjustment, when the adjustment screws of mirror-1 and -2 are turned, lock the adjustment screws using the adhesive "BOND-1324" for screw locking .

[Application Method of the Adhesive for the Screw Locking]

- (1) Adjust the image distortion.
- (2) Remove the original glass and the indicator unit.
- (3) Move carriage-1 toward the paper exit side.
- (4) Apply the adhesive (BOND-1324) to the adjustment screws of carriage-1 and -2.







\*Apply good quantity of the adhesive to the "Application area".

\*The adhesive needs 12 hours to harden completely.

(5) Confirm that there is no dust or stain on mirror-

1, -2 or -3 or the shading correction plate.

(6) Install the indicator unit and the original glass.



#### (b) Image skewing adjustment



If the copy image is tilted even when the original is placed precisely against the original scale, adjust the original scale to correct this problem.

## When the image is tilted as in A :

Move the original scale in the direction of the arrow A →.

## When the image is tilted as in B :

• Move the original scale in the direction of the arrow B ◀•••.



#### Make test chart shown in page 2-22 and adjust following items.

- (c) Reproduction ratio adjustment of primary-scanning (Scanner section)
- 1. While pressing the digital keys [0] and [5] simultaneously, turn the power ON. n (Adjustment mode)
- 2. Place Test Chart on the original glass (with the arrow positioned at the left rear side).
- 3. Press [ENERGY SAVER] n [START] to make a copy in the mode of A4/LT, 100%, full color and text/ photo.
- 4. Measure the distance A on the copy with a ruler.
- 5. Check if the distance A is within a range of 200±0.5 mm or not.
- 6. If it is not, change values using the following procedure, and repeat step 3. to 5. above.

<Procedure> (Adjustment mode) n (Enter code [482] with digital keys) n [START]

n (Enter a value (acceptable values : 112 to 142) with digital keys)

n [SET] or [INTERRUPT] (Stored in memory)

- n (Enter code [407] with digital keys) n [START]
- n Forced performing of color registration control
- \* The larger the adjustment value, the shorter the distance A becomes (0.2 mm/step).
- (d) Reproduction ratio adjustment of secondary-scanning (Scanner section)
- 1. While pressing the digital keys [0] and [5] simultaneously, turn the power ON. n (Adjustment mode)
- 2. Place Test Chart on the original glass (with the arrow positioned at the left rear side).
- 3. Press [ENERGY SAVER] n [START] to make a copy in the mode of A4/LT, 100%, full color and text/ photo.
- 4. Measure the distance B on the copy with a ruler.
- 5. Check if the distance B is within a range of 150±0.5 mm or not.
- 6. If it is not, change values using the following procedure, and repeat step 3. to 5. above.
- <Procedure> (Adjustment mode) n (Enter code [104] with digital keys) n [START]
  - n (Enter a value (acceptable values : 1 to 255) with digital keys)
  - n [SET] or [INTERRUPT] (Stored in memory)
  - n (Enter code [407] with digital keys) n [START]
  - n Forced performing of color registration control
  - \* The larger the adjustment value, the longer the distance B becomes(0.23 mm/step).
- (e) Image location adjustment of primary-scanning direction (Scanner section)
- 1. While pressing the digital keys [0] and [5] simultaneously, turn the power ON. n (Adjustment mode)
- 2. Place Test Chart on the original glass (with the arrow positioned at the left rear side).

- 3. Press [ENERGY SAVER] n [START] to make a copy in the mode of A4/LT, 100%, full color and text/ photo.
- 4. Measure the distance C from the left paper edge to the 5 mm line of left grid pattern on the copy with a ruler.
- 5. Check if the distance C is within a range of  $5\pm0.5$  mm or not.
- 6. If it is not, change values using the following procedure, and repeat step 3. to 5. above.
- <Procedure> (Adjustment mode) n (Enter code [106] with digital keys) n [START] n (Enter a value (acceptable values : 5 to 251) with digital keys) n [SET] or [INTERRUPT] (Stored in memory)

\*The larger the adjustment value, the shorter the distance C becomes (0.042 mm/step).

- 7. When the distance C is within the acceptable range, perform the following procedure.
- <Procedure> (Adjustment mode) n (Enter code [108] with digital keys) n [START] n (Enter a value with digital keys, deducting 47 from the value set in the 05-106 ) n [SET] or [INTERRUPT] (Stored in memory)
- (f) Image location adjustment of secondary-scanning direction (Scanner section)
- 1. While pressing the digital keys [0] and [5] simultaneously, turn the power ON. n (Adjustment mode)
- 2. Place Test Chart on the original glass (with the arrow positioned at the left rear side).
- 3. Press [ENERGY SAVER] n [START] to make a copy in the mode of A4/LT, 100%, full color and text/ photo.
- 4. Measure the distance D from the top paper edge to the 10 mm line of top grid pattern on the copy with a ruler.
- 5. Check if the distance D is within a range of  $10\pm0.5$  mm or not.
- 6. If it is not, change values using the following procedure, and repeat step 3. to 5. above.
- <Procedure> (Adjustment mode) n (Enter code [105] with digital keys) n [START] n (Enter a value (acceptable values : 85 to 171) with digital keys) n [SET] or [INTERRUPT] (Stored in memory)

\*The larger the adjustment value, the longer the distance D becomes (0.12 mm/step).

- (g) Adjustment of image trailing edge margin
- 1. While pressing the digital keys [0] and [5] simultaneously, turn the power ON. n (Adjustment mode)
- 2. Place Test Chart on the original glass (with the arrow positioned at the left rear side).

- 3. Press [ENERGY SAVER] n [START] to make a copy in the mode of A4/LT, 100%, full color and text/ photo.
- 4. Measure the margin width on the bottom edge of the copy image with a ruler using E line.
- 5. Check if the margin width is within a range of  $2.5\pm0.5$  mm or not.
- 6. If it is not, change values using the following procedure, and repeat step 3. to 5. above.
- <Procedure> (Adjustment mode) n (Enter code [428] with digital keys) n [START] n (Enter a value (acceptable values : 0 to 255) with digital keys)
  - n [SET] or [INTERRUPT] (Stored in memory)

\*The larger the adjustment value, the smaller the margin width on the bottom edge becomes (0.042 mm/step).



<Adjustment order>

[0][5][Power ON] n (Chart TCC-1) n [ENERGY SAVER] n [START] (A4/LT, 100%, full color and text/photo)

A: 05-482 n 200±0.5 mm (0.2 mm/step) n 05-407

- B: 05-104 n 150±0.5 mm (0.23 mm/step) n 05-407
- C: 05-106 n 5±0.5 mm (0.042 mm/step)
- D: 05-105 n 10±0.5 mm (0.12 mm/step)

bottom margine(E): 05-428 n 2.5±0.5 mm (0.042 mm/step)

# <Memo>

## 2.6 Image Quality Adjustment

## 2.6.1 Automatic gamma adjustment

(1) At the time of unpacking:

When the reproduction of gradation is not appropriate, the gradation reproducibility of all colors Y, M, C and K can be corrected by performing this automatic gamma adjustment. Check the image, and if the gradation reproduction is not satisfactory, make this adjustment as described below.

- (2) When any of the following parts has been replaced, be sure to make this adjustment:
  - Laser optical unit
    Photoconductive Drum
    Developer material
- (3) When any of the following parts are replaced or adjusted, make a copy and check the image to determine if adjustment is necessary:
  - Main charger
    Transfer belt
- **Note:** Be sure that this adjustment be made after performing the image adjustment in "2.3 Adjustment of Image Quality Control", "2.4 Adjustment of Color Registration Control" and "2.5 Image Dimensional Adjustment".

Code	Adjustment item	Contents
643	Automatic gamma	<procedure></procedure>
	adjustment	(1) While pressing [0] and [5] simultaneously, turn the power ON. n
		Adjustment mode
		(2) Select the A3 cassette. Press [4] n [PRINTER/NETWORK] key
		and output a "Patch chart for gamma adjustment".
		(3) Place the patch chart for adjustment produced in step (2) face
		down on the original glass, with its side, on which a black band
		is present, aligned against the original scale.
		(4) Enter code [643] with digital keys and press the [START] key.
		n The scanner reads the chart automatically and performs
		automatic gamma adjustment calculation (approx. 30 sec.).
		(5) When the adjustment has finished normally, "SCAN COM-
		PLETE" is shown. Press the [START] key to have the adjust-
		ment results reflected. (To cancel the reflection of adjustment
		results, press the [STOP] key.)
		Note: After the [START] key is pressed, the printer section will oper-
		ate for about 15 seconds and the density of the standard pattern for
		Image quality control will be measured.
		In the case of an abnormal ending, "ADJUSTMENT ERROR" is
		snown. Press the [STOP] key to clear the error display. When it
		is cleared, the control panel display will return to the standby
		state. Then, check if the patch chart of the original glass is
		original glass, and then repeat step (3) and afterward

## 2.6.2 Density adjustment

The center density and the density variation controlled by density adjustment keys can be adjusted as follows.

0.1		Oriç	ginal mode				Remarks
mode	Text/photo	Text	Printed image	Photo	Мар	Items to be adjusted	
	550	551	552	553	554	Manual density	The larger the value, the
						center value	darker the image becomes.
<u> </u>		561	562	563	564	Manual density	The larger the value, the darker
colo	560					"dark" step value	the "dark" side becomes.
Fullo	570	571	572	573	574	Manual density	The larger the value, the lighter
						"light" step value	the "light" side becomes.
	580	581	582	583	584		The larger the value, the
						Automatic density	darker the image becomes.
	555	556	557	558	559	Manual density	The larger the value, the
						center value	darker the image becomes.
	565	565 566	567	568	569	Manual density	The larger the value, the darker
Black						"dark" step value	the "dark" side becomes.
	575	575 576	577	578	579	Manual density	The larger the value, the lighter
						"light" step value	the "light" side becomes.
	585			588	589		The larger the value, the
		585 58	586 587			Automatic density	darker the image becomes.

Make a test copy and compare the image obtained with the current settings; if necessary, make adjustment using the following procedure.

#### <Procedure>

- (1) While pressing [0] and [5] simultaneously, turn the power ON.
- (2) Enter the code of required mode (color mode, original mode, item to be adjusted) with digital keys and press the [START] key.
- (3) Enter an adjustment value with digital keys (acceptable values: 0 to 255).(To correct an entered value, press the [CLEAR] key.)
- (4) Press the [SET] or [INTERRUPT] key to store the value. n The copier goes back to the standby state.
- (5) Press the [ENERGY SAVER] key and then press the [START] key to make a test copy.
- (6) If the desired image density has not been attained, repeat step (2) to (5).

## 2.6.3 Color balance adjustment

	Original mode						
	Text/ photo	Text	Printed image	Photo	Мар	adjusted	Remarks
Adjustment code	779	780	781	782	783	Yellow	The larger the value,
	0	0	0	0	0	Low density	the darker the color to
Sub-code	1	1	1	1	1	Medium density	be adjusted becomes.
	2	2	2	2	2	High density	Acceptable values: 0 to
Adjustment code	784	785	786	787	788	Magenta	255.
	0	0	0	0	0	Low density	
Sub-code	1	1	1	1	1	Medium density	
	2	2	2	2	2	High density	
Adjustment code	789	790	791	792	793	Cyan	
	0	0	0	0	0	Low density	
Sub-code	1	1	1	1	1	Medium density	
	2	2	2	2	2	High density	
Adjustment code	794	795	796	797	798	Black	
	0	0	0	0	0	Low density	
Sub-code	1	1	1	1	1	Medium density	
	2	2	2	2	2	High density	]

Make a test copy and compare the image obtained with the current settings; if necessary, make adjustment using the following procedure.

Note: Be sure that this adjustment be made after performing "2.6.1 Automatic gamma adjustment".

<Procedure>

- (1) While pressing [0] and [5] simultaneously, turn the power ON.
- (2) Enter the code of required mode (color mode, original mode, item to be adjusted) with digital keys and press the [START] key.
- (3) Select the density area to be adjusted with digital keys (0, 1 or 2), and press the [START] key.

```
0 : Low density (L) 1 : Medium density (M) 2 : High density (H)
```

(4) Enter an adjustment value with digital keys.

(To correct an entered value, press the [CLEAR] key.)

- (5) Press the [SET] key to have the value memorized. n Returns to the display in step (3).
- (6) For resetting the value, repeat step (3) to (5).
- (7) Press the [SET] or [INTERRUPT] key to store the value in memory. n The copier goes back to the standby state.
- (8) Press the [ENERGY SAVER] key and then press the [START] key to make a test copy.
- (9) If the desired image density has not been attained, repeat step (2) to (8).

# 2.6.4 Offset adjustment for background processing

Calar	Original mode						
mode	Text/photo	Text	Printed image	Photo	Мар	Item to be adjusted	Remarks
Full color	698	699	700	701	702	Density adjustment	The larger the value, the darker
						for background	the background becomes.
	708	709	710	711	712	Density adjustment	The larger the value, the darker
						for text	the text becomes.
Black	703	704	705	706	707	Density adjustment	The larger the value, the darker
						for background	the background becomes.
	713	713 714 715	_/_			Density adjustment	The larger the value, the darker
			/16	/1/	for text	the text becomes.	

The density of background and text can be adjusted as follows.

Make a test copy and compare the image obtained with the current settings; if necessary, make adjustment using the following procedure.

#### <Procedure>

- (1) While pressing [0] and [5] simultaneously, turn the power ON.
- (2) Enter the code of required mode (color mode, original mode, item to be adjusted) with digital keys and press the [START] key.
- (3) Enter an adjustment value with digital keys.(To correct an entered value, press the [CLEAR] key.)
- (4) Press the [SET] or [INTERRUPT] key to store the value in memory. n The copier goes back to the standby screen.
- (5) Press the [ENERGY SAVER] key and then press the [START] key to make a test copy.
- (6) If the desired image density has not been attained, repeat step (2) to (5).

## 2.6.5 Judgment threshold for ACS

The judgment level is adjusted for the automatic identification of whether the original set on the glass is black-and-white or color. Namely, this is to adjust the judgment level used when "Auto color" is selected in the color mode.

Code	Adjustment item	Contents
675	Judgment threshold	The larger the value, the more an original tends to be judged to be
	for ACS	black-and-white, and the smaller the value, the more it tends to be
		judged to be color.

## 2.6.6 Al mode setting

(a) AI mode discrimination setting

Select the discrimination level in the AI mode as follows:

Code	Adjustment item	Contents		
678	Al mode	<procedure></procedure>		
	discrimination setting	(1) While pressing [0] and [5] simultaneously, turn ON the power.		
		(2) Enter code [678] with digital keys.		
		(3) Enter a setting value:		
		0: Standard (for regular)		
		1: Photograph priority		
		2: Only judgment of original type		
		3: Only judgment of original type with photograph priority		
		4: No AI discrimination		
		(4) Press the [SET] or [INTERRUPT] key to store the setting value.		

## (b) AI mode time-out setting

Set the maximum processing time allowable in the AI mode.

**Note:** In case discrimination does not finish within specified time, AI mode discrimination stops and copy operation is performed in the selected copy mode.

Two kinds of setting are made; one for originals of A4/LT or smaller sizes, and the other for originals larger than A4/LT.

Code	Adjustment item	Contents
682	Al mode	<procedure></procedure>
	time-out setting	(1) While pressing [0] and [5] simultaneously, turn ON the power.
		(2) Enter code [682] with digital keys.
		(3) Enter a setting value:
		The setting value should be in two digits; the first digit is the
		time-out period for A3/LD original size while the second digit is
		the time-out period (seconds) for A4/LT original size. Both digits
		should be in the range of 1 to 9. However, time is set in proportion
		to original sizes for originals larger than A4/LT, based on A4/LT
		and A3/LD setting value.
		(4) Press the [SET] or [INTERRUPT] key to store the setting value.

## 2.6.7 Sharpness adjustment

If you want to make copy images look softer or sharper, perform the following adjustment. The adjustment can be made for each of the color modes and original modes independently.

Code	Color mode	Original mode	Contents
737	Full color	Text/photo	The larger the value, the sharper the image
738		Text	becomes; while the smaller the value, the softer the
739		Printed image	image becomes.
740		Photo	The smaller the value, the less moire tends to
741		Мар	appear.
742	Black	Text/photo	The acceptable values are 0 to 31.
743		Text	The center value is 16.
744		Printed image	However, 0 is equivalent to the center value.
745		Photo	Note: You have to make adjustment by compromising
746		Мар	between moire and sharpness.

Make a test copy and compare the image obtained with the current settings; if necessary, make adjustment using the following procedure.

#### <Procedure>

- (1) While pressing [0] and [5] simultaneously, turn the power ON.
- (2) Enter the code of required mode (color mode or original mode) with digital keys and press the [START] key.
- (3) Enter an adjustment value with digital keys.(To correct an entered value, press the [CLEAR] key.)
- (4) Press the [SET] or [INTERRUPT] key to store the value in memory. n The copier goes back to the standby state.
- (5) Press the [ENERGY SAVER] key and then press the [START] key to make a test copy.
- (6) If the desired image sharpness has not been attained, repeat step (2) to (5).

# 2.7 High-Voltage Transformer Settings

# 2.7.1 Overview

This machine uses four main high-voltage transformers for charging/development/discharging and one transfer transformer for transfer/suction.

The main high-voltage transformers are used each for one of the colors Y, M, C and K, giving a total of four units.

The transfer transformer supplies high-voltage for the transfer rollers Y, M, C and K and the suction charger to be used in black mode.

The main high-voltage transformers have the following high-voltage outputs.

CH1: main charger wire CH2: main charger grid bias CH3: developer bias CH4: cleaning blade bias

The transfer transformer has the following high-voltage outputs.

CH1: transfer roller bias (Y) CH2: transfer roller bias (M) CH3: transfer roller bias (C) CH4: transfer roller bias (K) CH5: suction charger

\* CH5 is used in black mode only.

Note: The main high-voltage transformer and transfer transformer for service parts are supplied with the data sheets to be used for the following setup. Be careful not to lose them.
 Output adjustment is performed when the devices are shipped, so under any circumstances, do not move the fixed volumes of resistors.

## 2.7.2 Settings after replacing main high-voltage transformers

After replacing a main high-voltage transformer, be sure to enter the data shown on the supplementary data sheet (main charger grid bias and developer bias) according to the procedure below.

<Settings for main charger grid bias>

- (1) Turn the power ON while pressing [0] and [5] simultaneously.
- (2) Enter code 252 and press the [START] key.

n The lower limit value for main charger grid bias is displayed for each Y, M, C and K.

- (3) Enter the sub-code (0: Y, 1: M, 2: C, 3: K) and press the [START] key.
- (4) Enter a value according to the supplementary data sheet and press the [SET] or [INTERRUPT] key.

- (5) Enter code [253] and press the [START] key.
  - n The upper limit value for main charger grid bias is displayed for each Y, M, C and K.
- (6) Enter the sub-code (0: Y, 1: M, 2: C, 3: K) and press the [START] key.
- (7) Enter a value according to the supplementary data sheet and press the [SET] or [INTERRUPT] key.
- (8) Turn the power OFF.
- < Settings for developer bias >
- (1) Turn the power ON while pressing [0] and [5] simultaneously.
- (2) Enter code [257] and press the [START] key.
  - n The lower limit value for developer bias is displayed for each Y, M, C and K.
- (3) Enter sub-code (0: Y, 1: M, 2: C, 3: K) and press the [START] key.
- (4) Enter a value according to the supplementary data sheet and press the [SET] or [INTERRUPT] key.
- (5) Enter code [258] and press the [START] key.
  - n The upper limit value for developer bias is displayed for each Y, M, C and K.
- (6) Enter the sub-code (0:Y, 1: M, 2: C, 3: K) and press the [START] key.
- (7) Enter a value according to the supplementary data sheet and press the [SET] or [INTERRUPT] key.
- (8) Turn the power OFF.

## 2.7.3 Settings after replacing transfer transformer

After replacing a transfer transformer, be sure to enter the data shown on the supplementary data sheet (transfer bias) according to the procedure below.

<Settings for transfer bias>

- (1) Turn the power ON while pressing [0] and [5] simultaneously.
- (2) Enter code [367] and press the [START] key.
  - n The lower limit value for transfer bias is displayed for each Y, M, C and K.
- (3) Enter the sub-code (0: Y, 1: M, 2: C, 3: K) and press the [START] key.
- (4) Enter a value according to the supplementary data sheet, and press [SET] or [INTERRUPT].
  - $^{\ast}$  Perform the operation in steps (3) and (4) for each of Y, M, C and K.
- (5) Enter code [368] and press the [START] key.

n The upper limit value for transfer bias is displayed for each Y, M, C and K.

- (6) Enter the sub-code (0: Y, 1: M, 2: C, 3: K) and press the [START] key.
- (7) Enter a value according to the supplementary data sheet, and press [SET] or [INTERRUPT].
  - \* Perform the operation in steps (6) and (7) for each of Y, M, C and K.
- (8) Turn the power OFF.

## 2.8 Adjustment of the Developer Unit

## 2.8.1 Doctor-to-Sleeve Gap

Adjustment tool to use : Doctor-sleeve jig Adjusting procedure :

 Remove the developer unit from the processing unit (EPU), and then remove the developer unit cover and toner-scattering prevention seal holder from the developer unit.

(2) Loosen the 2 screws for fixing the doctor blade (M3), and insert the gauge "0.65" of the jig into the gap between the developer sleeve and the doctor blade to adjust the gap.

Fasten the screws for fixing the doctor blade after adjusting.

(3) Insert the gauge "0.60" of the jig into the gap between the sleeve and the doctor, and make sure that the gauge can move smoothly in the frontor rear direction. In addition, confirm that the gauge "0.70" cannot be inserted into the gap.





#### Notes :

- 1. When confirming and adjusting the gap between the developer sleeve and the doctor blade, insert the gauges into the gap after rotating the developer sleeve so that its marking faces the doctor blade.
- 2. While reinstalling the toner-scattering prevention seal holder, insert the slide hooks securely.
- 3. After reinstalling the toner-scattering prevention seal holder, make sure that each of the side mylar sheets (on the front and rear) is between the 2 urethane rubber sheets.
- 4. While reinstalling the developer unit cover, fit the latches securely.

# 2.9 Adjustment of the Scanner Section

## 2.9.1 Carriages

(a) Installing carriage drive wires

When replacing the carriage drive wires with new wires, proceed as illustrated below:





- **Notes:**1. Since the carriage drive wires are applied with proper tension by tension springs, there is no need for tension adjustment.
  - 2. Check that the wire tension is identical for both front and rear wires and is properly applied.

- (b) Adjusting the positions of carriage-1 and -2
- 1. Loosen 2 screws (on the front and rear) which are fixing carriage-1 to the wires, and another 1 screw (on the front) which is fixing carriage-2 to the wires.
- 2. Move carriage-2 to the exit side. Insert the carriage jigs into the jig-insertion holes, one on each side (front and rear) of carriage-2, and fasten the screw on the front side of carriage-2.
- 3. While placing the protruding parts of carriage-1 against the carriage jigs, fasten 2 screws on front and rear sides to fix the carriage-1 to the wire on both front and rear sides.



4. Pull out the carriage jigs.



ADJUSTMENT

(c) Installing the carriage drive wires to the wire pulleys

#### Winding the wire to the wire pulleys:

- Fit the 3-mm ball terminal in the center of the wire into the hole of the wire pulley. The wire should be positioned so that the hook at its end faces upward with its crimped side.
- Wind the wires onto the wire pulleys on the front and rear. The number of turns to be wound are as follows (see the illustrations below):
  - $\cdot$  One turn on the inside of the boss.
  - $\cdot$  Six turns on the outside of the boss.

After winding the wires on the pulleys, fix the wires with wire holder jigs to prevent them from unwinding.





#### Notes :

- When winding the wires on the pulleys, take the following precautions:
  - Do not wind the wire on the pulley with the wire twisted.
  - Wind the wire strongly so that all the turns of the wire are in firm contact with the surface of the pulley.
  - Each time you wind a turn on the pulley, push it to the preceding turn so that all the turns are closely wound.
- 2. When fitting wire holder jigs, take care so that the turns wound on the pulleys do not move or unwind.

No gap should exist.



e.g. Front side

#### <Relationship between wound turns and wire holder jigs>



## 2.9.2 Lens unit

(a) Replacing the lens unit

- Since the lens unit was precisely adjusted at the factory, it must not be readjusted in the field or some of its components must not be replaced. If necessary, the lens unit should be replaced as a unit.
- While replacing with a new lens unit, never loosen or remove the six screws indicated with arrows below. They are locked with adhesive.



· Use sufficient care when handling the lens unit. Never hold the precision-adjusted area of the lens unit.


### (b) Installing the lens unit

Use the positioning pins to install the lens unit. By that the installing position of the lens unit is fixed, and therefore there is no need to adjust the magnification ratio of the lens.

### <Procedure>

- 1. Insert the positioning pins (front and rear)into the holes of the lens unit (as A in the illustration below), and install the unit to the base of the scanner unit (note that the shapes of the front positioning pins are different from that of the rear ones).
- 2. Fix the 2 long holes (as B in the illustration below) with the screws.



# 2.10 Adjustment of the Paper Feeding System

# 2.10.1 Cassette sidewise deviation

- (1) Loosen 5 screws for fixing the cassette front cover, and the sidewise deviation can be adjusted toward the front or the rear by a maximum of 3 mm.
- (2) If the image is shifted toward the rear of paper, adjust the cassette front cover toward the front by the amount of the shift, and fasten the screws.
- (3) If the image is shifted toward the front of paper, adjust the cassette front cover toward the rear by the amount of the shift, and fasten the screws.



# 2.11Toner Cartridge Preparation Display Function

# 1. General description

This copier has the function which displays on the control panel that the preparation of new toner cartridge is needed when the toner in the toner cartridge is decreased by estimating the remaining toner amount using the pixel counter.

### <Message>

*** toner decreased.	
Prepare new toner cartridge.	

The pixel counter counts up the number of pixels which are printed based on the laser emission signal. Since there is a mutual relation between the laser emission count and amount of toner adhered, approximate toner consumption can be estimated by the value of the pixel counter. However, the estimate may differ from the actual toner consumption depending on the condition and environment in which the user uses the copier. In this case, change the threshold (08-989, 990, 991 and 992) for more accurate estimate from the next use of toner cartridge.

# 2. Control procedure

The flow chart below shows the procedure of the toner cartridge preparation display.

- [1] Replace the toner cartridge with a new one.
- [2] Reset the total pixel counter.

The counter is reset when the user performs it manually from the control panel, or the counter is automatically reset when the fixed number of pages has been output.

[3] The value of the pixel counter is accumulated.

NO

NO

- [4] Compare the value with the threshold.(Has the total pixel counter value (accumulated value) exceeded the threshold?)
- [5] The message notifying the necessity of toner cartridge preparation is displayed.
- [6] "Toner empty" is determined ("ADD TONER" symbol flashes).

YES

YES

# 3. Accuracy of estimate

The message is set to be displayed when the amount of remaining toner becomes approximately 1/3 in the color toner cartridge and approximately 1/5 in the black toner cartridge. However, the amount of remaining toner to display the message may differ depending on the condition and environment in which the user uses the copier.

# 4. Other information

### <<Toner cartridge replacement and counter reset>>

The counter is reset when the user performs it manually from the control panel at the replacement of toner cartridge, or the counter is automatically reset when the fixed number of pages has been output after the flashing of "ADD TONER" symbol. The pixel counter value is accumulated again for the toner cartridge preparation display after the counter reset.

Note:In case the toner cartridge is replaced before the flashing of "ADD TONER" symbol, the pixel counter starts to accumulate by pressing the [NEAR EMPTY] key.

Items can be changed by the setting

# <<Setting by the user>>

(1) ON/OFF of the display can be set from the control panel.

# <<Setting by the service technician>>

(2) Threshold of each color to determine the timing of toner cartridge preparation display can be set (Setting code (08)).

# \*\*08-989 (Y), 990 (M), 991 (C) and 992 (K)

# Toner cartridge preparation display ? Threshold setting

The message of toner cartridge preparation is set to be displayed when the value of the total pixel counter has exceeded the threshold. However, the amount of remaining toner to display the message may differ depending on the condition and environment in which the user uses the copier. In this case or when the display timing needs to be changed, the threshold can be changed.

# <Rough standard>

When the threshold increases 1000 counts, the toner in the cartridge decreases approx. 4 g. Change the threshold referring the table below.

		Delault Setting	
	Toner capacity in cartridge	Rough standard of remaining toner	Default value
YMC	300g	100g	50400
К	540g	100g	108220

# Default actting

Note: This pixel counter accumulation function is for the toner cartridge preparation display and is not for measuring the actual toner consumption. Use this function only as a rough standard.

# \*\* 08-1026 (Y), 1027 (M), 1028 (C) and 1029 (K)

# \*\*\*Total pixel counter

This counter displays the current value of pixel counter which has been accumulated. The message for toner cartridge preparation is displayed comparing with this value and threshold. The total pixel counter is reset when the user performs it manually from the control panel, or the counter is automatically reset when the fixed number of pages has been output.

### \*\* 08-1005

# Setting number of output pages for judging a new cartridge

If the cartridge has been replaced at the last "Toner empty" and also the number of output pages has exceeded the number set in the setting code (08-1005), the cartridge has been used is judged as a new one. If the number of output pages has not exceeded the number set in the code (08-1005) and "Toner empty" occurred during the use, the cartridge has been used is judged as a used one.

Default: 200, Acceptable value: 0-1000

# 3. PREVENTIVE MAINTENANCE (PM)

# 3.1 Types of Preventive Maintenance

The following two types of preventive maintenance should be performed:

(1) General maintenance (General PM)

General maintenance should be performed based on the value of the general PM counter (08-857). This maintenance, which covers the black developer unit as well as the entire machine, should be conducted in conjunction with the replacement cycle (every 60K sheets) of the black developer material.

(2) Color maintenance (Color PM)

Color maintenance should be performed based on the value of the color PM counter (08-897). This maintenance, which is performed with a focus on the color developer units, should be conducted in conjunction with the replacement cycle (every 60K sheets) of the color developer materials. The cycle (counter value) of color maintenance is determined by the ratio of color printouts to black printouts, as shown by the following table, "Variation in PM cycles due to color/black printout ratios".

Color	Black	General PM (sheets)	Color PM (sheets)
100%	0%	60.0K	60.0K
90%	10%	60.0K	66.7K
80%	20%	60.0K	75.0K
70%	30%	60.0K	85.7K
60%	40%	60.0K	100.0K
50%	50%	60.0K	120.0K

Variation in PM cycles due to color/black printout ratios

\* Therefore, parts replacing, cleaning and lubrication for the paper feeding system, scanner section, transfer/transport unit, fuser unit, etc. should all be performed in conjunction with the replacement cycle of the black developer material.

e.g.) Replacing the lower heat roller	:At the 2nd cycle of replacing black developer material
	(120K copies)
Replacing the transfer belt :	At the 2nd cycle of replacing
	black developer material
	(120K copies)
Example of the first of the first state of the second	and the state of t

\* For the details of maintenance items, refer to the checklist described later.

\* Yields are based on factory defaults.

# 3.2 Outline of the Maintenance Order

- (1) Preparation
  - a. Discuss current machine conditions with the key operator and note them down.
  - b. Before starting maintenance, make a few sample copies and keep them for later reference purposes.
  - c. Turn OFF the power switch, and be sure to unplug the copier.
- (2) Perform preventive maintenance following the checklist shown below. During maintenance, refer to the illustrations attached and the Service Manual as required.
- (3) After having finished the maintenance, plug in the copier, turn ON the power switch, and make a few copies to confirm that the copier is working normally.

# 3.3 Preventive Maintenance Checklist

			•				
	Cleaning		Lubrication		Replacement	Operation check	Date
Α	Cleaning with alcohol	W	White grease	Valu	es indicate the	O After cleaning	User's name
0	Cleaning with soft pad,		(Molykoat)	repla	acement cycle.	or replacing,	Serial No.
	cloth or vacuum cleaner	AV	Alvania No.2	(Val	ue x 1000 sheets)	check for no	Inspector's
						abnormality.	name
				$\triangle$	Replace if		Remarks
					deformed or		
					damaged		

#### Symbols used in the checklist

**Notes:** 1. Values under "Cleaning" and "Replacement" indicate the cleaning and replacement cycles.

- 2. Lubricate every 60,000 sheets . Lubricate to the replacement parts according to the replacement cycle.
- 3. Do not stain any oil on the rollers, belts and belt pulleys.
- 4. The replacement cycle of the parts in the feeding section depends on the number of sheets fed from each paper source.
- 5. <P-I> under "Remarks" indicates page and item number in the Parts List.

# **General Maintenance Checklist**

Section	Item to inspect	Cleaning (X 1000)	Lubri- cation	Replace- ment (X 1000)	Opera- tion check	Remarks <p-i></p-i>	Reference counter
	1. Developer material			60		*8	
	2. Doctor blade	(60)		Δ		*1	Developer K
	3. Developer unit drum seal	○ (60)		Δ		*9	counter
	4. Front/rear sides of developer unit	○ (60)				*2	(08-847)
	5. Oil seal portion		AV				
	6. Drum cleaning blade			60		*3	
						<p23-i13></p23-i13>	
	7. Recovery blade	(60)		Δ		*4	
Processing	8. Felt seals on both ends	O (60)		Δ			
unit (PCU)	of the cleaning blade						
	9. Entire developer/cleaner unit	(60)				*7	
(Only Black	10. Main charger case	O (60)				*6	Drum K
related parts)	11. Discharge LED	(60)					life counter
	12. Wire cleaning pad			60	0	<p22-i16></p22-i16>	(08-843)
	13. Main charger wire			60		*6	
						<p22-i15></p22-i15>	Note:
	14. Main charger grid			60		<p22-i24></p22-i24>	Clear "Drum
	15. Main charger contact	<b>○ (60)</b>					K drive cou-
	16. Drum			60		► ch.3.6.2	nter(08-870)"
						<p22-i38></p22-i38>	when drum
	17. Drum shaft	<b>○ (60)</b>					has been
	18. Drum thermistor	<b>○ (60)</b>					replaced.
	19. Toner recovery auger drive	<b>○ (60)</b>	W				
	20. Toner cartridge drive gear		W				
	21. Ozone filter			60		*5	
Around PCU						<p6-i37></p6-i37>	
area	22. Toner bag			60		Key-operator's	
						item	
						<p33-i33></p33-i33>	
	23. Fuser belt			120		► ch.3.6.6	
						<p28-i24></p28-i24>	
	24. Upper heat roller	A (120)		$\triangle$			
	25. Fuser roller			120		► ch.3.6.5	
						<p28-i17></p28-i17>	Fuser unit
Fuser unit	26. Lower heat roller			120		► ch.3.6.6	counter
						<p27-i14></p27-i14>	(08-854)
	27. Belt guide			120		<p28-i16></p28-i16>	
	28. Separation guide	A (120)		$\triangle$			
	29. Separation fingers			120		*10	
						<p28-i28></p28-i28>	
	30. Oil roller			60		► ch.3.6.7	
						<p28-i44></p28-i44>	

Section	Item to inspect	Cleaning (X 1000)	Lubri- cation	Replace- ment (X 1000)	Opera- tion check	Remarks <p-i></p-i>	Reference counter
	31. Cleaning roller			60		► ch.3.6.7 <p28-i45></p28-i45>	
	32. Upper thermistors	A (120)		Δ			Fuser unit
Fuser unit	33. Lower thermistors	A (120)		$\triangle$			counter
	34. Fuser inlet guide	A (120)					(08-854)
	35. Fuser exit guide	A (120)					
	36. Paper exit roller	Α					
Image quality control	37. Image quality sensor's area	<b>○ (60)</b>				*11	Drum K
Color	38. Color registration sensor	(60)					life counter
registration							(08-843)
Laser unit	39. Slit glass	(60)					
	40. Pick-up roller	A (60)		90		<p14-i13></p14-i13>	
	41. Feed roller	A (60)		$\triangle$			
	42. Separation roller	A (60)					
	43. Bypass pick-up roller	A (60)		90		<p17-i52></p17-i52>	
Paper feeding	44. Bypass feed roller	A (60)		Δ			
system	45. Bypass separation roller	A (60)		Δ			—
	46. Registration roller	A (60)		Δ			
	47. Paper guide	(60)		Δ			
	48. Paper dust removal brush	⊖ (/60)		Δ			
	49. Drive gears (tooth face)		W				
	50. Registration unit support bushings		W				
	51. Original glass	🔿 or A (60)					
	52. Platen cover	🔿 or A (60)					
	53. Mirror-1	(60)					
	54. Mirror-2	(60)					
	55. Mirror-3	(60)					
Scanner	56. Reflector	(60)					—
	57. Lens	(60)					
	58. Exposure lamp			Δ	0		
	59. Original-width indicator				0		
	60. Automatic original detection unit				0		
	61. Slide sheet						
	62. Air filter	(60)		$\triangle$			
	63. Transfer belt			120		<p30-i2></p30-i2>	
Transfer/	64. Transfer roller (Y, M, C, K)			120		<p30-i22></p30-i22>	
transport	65. Drive roller cleaning felt			120		<p30-i27></p30-i27>	Transfer belt
unit	66. Transfer belt cleaning blade			120		<p30-i46></p30-i46>	unit counter
(TBU)	67. Transfer belt recovery blade	(120)					(08-853)
	68. Transfer belt drive roller	(120)					
	69. Transfer belt driven roller	(120)					

# **Color Maintenance Checklist**

Section	Item to inspect	Cleaning (X 1000)	Lubri- cation	Replace- ment (X 1000)	Opera- tion check	Remarks <p-l></p-l>	Reference counter
	1. Developer material (Y,M,C)			40/60		*8	DeveloperY,
	2. Doctor blade	(60)		Δ		*1	M,C counter
	3. Developer unit drum seal	<b>○ (60)</b>		$\triangle$		*9	(08-844,845,
	4. Front/rear sides of developer unit	O (60)				*2	846)
	5. Oil seal portion		AV				
	6. Drum cleaning blade			60		*3	
						<p23-i13></p23-i13>	
	7. Recovery blade	(60)		$\triangle$		*4	
Processing	8. Felt seals on both ends	<b>○ (60)</b>					Drum Y,M,C
unit (PCU)	of the cleaning blade						life counter
	9. Entire developer/cleaner unit	(60)				*7	(08-840,841,
(Color(Y,M,C)	10. Main charger case	<b>○ (60)</b>				*6	842)
related parts)	11. Discharge lamp	(60)					
	12. Wire cleaning pad			60	0	<p22-i16></p22-i16>	Note:
	13. Main charger wire			60		*6	Clear "Drum
						<p22-i15></p22-i15>	Y,M,C drive
	14. Main charger grid			60		<p22-i24></p22-i24>	counter (08-
	15. Main charger contact	○ (60)					867,868,
	16. Drum			60		► ch.3.6.2	869)" when
						<p22-i38></p22-i38>	drums have
	17. Drum shaft	O (60)					been re-
	18. Drum thermistor (Y)	O (60)					placed.
	19. Toner recovery auger drive	<b>○ (60)</b>	W				
Image quality	37. Image quality sensor's area	O (60)				*11	
control							
Color	38. Color registration sensor	○ (60)					
registration							
Laser unit	39. Slit glass	○ (60)					



[Front sectional view]



[Processing unit (EPU)]



[Front side drive system]

# \* Notes on the Preventive Maintenance Checklist

\* 1. Doctor blade cleaning

Note: This cleaning should be done subsequent to "Automatic removing of developer material".

- Move the developer removal shutter lever in the direction of the arrow shown to close the developer removal opening.
- (2) Remove the developer unit from the EPU.

- (3) Remove the developer unit cover. Insert the doctor blade cleaning jig between the doctor blade and the sleeve and move the jig back and forth along the edge 3 times to clean the doctor blade.
- (4) After the cleaning, return the developer removal shutter lever to open the developer removal opening (move the lever in a direction reverse to (1)).
- (5) Making the developer removal opening point downward, remove the developer material remaining in the developer unit. (Shake the developer unit to the right and left, and rotate the mixer and the sleeve alternately.)
- (6) The same presedure as (1): Move the developer removal shutter lever in the direction of the arrow shown in figure to close the developer removal opening.







#### \*2 Front/rear sides of developer unit

Clean off any toner accumulating on the developer sleeve ends indicated with arrows and in the area beneath the scattered toner recovery roller.



#### \*3 Cleaning blade

If poor cleaning has occurred due to such causes as adhesion of paper dust, etc. prior to the specified number of printouts for replacement, replace the cleaning blade as required because the blade edge may have been damaged.

\*4 Recovery blade

If the blade edge has been marred, replace the blade regardless of the number of printouts that have been made so far.

\*5 Ozone filter

If the ozone filter is heavily dirty, replace it.

\*6 Main charger case and charger wire

To clean the inside of the main charger case and the charger wire, use a cloth which should be soaked in water and then wrung lightly.

- \*7 Developer unit and cleaner unit Check if the outside surfaces including the bottom surfaces are dirty, and clean if necessary.
- \*8 Developer material

When the developer material is replaced, be sure to perform "automatic adjustment of the autotoner sensor" (adjustment mode 05-200, 204, 221).

\*9 Drum seal

Use a cloth which should be soaked in water and then wrung strongly to clean the front seal.

\*10 Separation fingers

Replace the finger if its tip is damaged, regardless of the specified number of printouts for replacement. If toner is fused tightly on the tip, the tip may be damaged if you try to scrape the toner off forcefully. So, replace it that is heavily dirty with toner.

\*11 Image quality sensor's area

Clean the shutter of the image quality sensor and around it. Don't touch the sensor head inside the shutter.

# 3.4 PM Kit

No PM kit avilable.

# 3.5 List of Adjustment Tools

Name
Door switch keep-ON jig
Wire holder jig
Doctor - sleeve gap adjustment jig
Cleaning brush
Doctor blade cleaning jig
Scanner carriage jig (front)
Scanner carriage jig (rear)
Lens unit positioning pin (front)
Lens unit positioning pin (rear)
Fuser belt replacing jig
Downloading jig (DLM board)
Downloading jig (DLS board)

# 3.6 Precautions for Storing/Handling Supplies and Parts

# 3.6.1 Precautions for storing supplies

# A. Toner and developer

Toner and developer should be stored in a shaded place where the ambient temperature is between 10 to 35°C (no condensation), and should also be protected against direct sunlight during transportation.

# B. Photoconductive drum

Like toner and developer, Photoconductive drums should be stored in a dark place where the ambient temperature is between 10 to 35°C (no condensation). Be sure to avoid places where drums may be subjected to high humidity, chemicals and/or chemical gas.

# C. Drum cleaning blade, transfer belt cleaning blade

Blades should be stored "horizontally" on a flat surface where the ambient temperature is between 10 to 35°C, and should also be protected against high humidity, chemicals and/or chemical gas.

D. Transfer belt, transfer roller, fuser belt, fuser roller, lower heat roller Avoid places where the belts and rollers may be subjected to high humidity, chemicals and/or chemical gas.

# E. Oil roller, cleaning roller

Avoid places where the rollers may be subjected to high humidity, chemicals and/or chemical gas. They should also be stored "horizontally" on a flat surface.

# F. Copy paper

Avoid storing copy paper in places where it may be subjected to high humidity. After a package is opened, be sure to place and store it in a storage bag.

# 3.6.2 Checking and cleaning of the photoconductive drum

# (1) Use of gloves

If fingerprints or oil stain the OPC drum surface, the characteristics of the photoconductor may degrade, affecting the quality of the image. So, do not touch the drum surface with your bare hands.

# (2) Handling precautions

As the OPC drum surface is very delicate, be sure to handle the drum carefully when installing and removing it so as not to damage its surface.

When the drum is replaced with a new one, be sure to apply "patting powder" (lubricant) to the entire surface of the new drum before installing. After installing, the drum counter corresponding to the replaced durm must be cleared to 0 (zero) by operating the setting mode (08 - 867~870).

#### Notes:

- 1. Application of the patting powder is for reducing the friction between the drum and the cleaning blade. If the application of patting powder is neglected, the drum and the cleaning blade may be damaged.
- 2. When some fibers adhere to the cleaning blade edge, they may reduce the cleaning efficiency and, in addition, may damage the blade and the drum. Be sure to remove any fibers found adhering to the blade.

(3) Handling at installing of the copier and replacing of the drum

At installing the copier and replacing the drum, do not leave the drum in a brightly lit place for a long time. Otherwise, the drum will be fatigued, producing some background fogging on the image after being installed in the copier. However, this effect will decrease as time elapses.

#### (4) Cleaning of the drum

At preventive maintenance, wipe softly the entire surface of the drum using the designated cleaning cotton (dry soft pad). Use sufficiently thick cleaning cotton so as not to touch the drum surface inadvertently with your fingertips or nails. Also, remove your rings and wristwatch before starting cleaning work to prevent accidental damage to the drum.

Do not use organic solvents such as alcohol or silicone oil as they will have an adverse effect on the drum. Never use selenium refresher, either.

#### (5) Scratches on photoconductive drum surface

If the surface is scratched to such a degree that the aluminum base is exposed, black spots or streaks will be produced on images and can also damage the cleaning blade. So, replace the drum with a new one.

#### (6) Recovery of used photoconductive drums

Regarding the recovery and disposal of used drums, you should follow your relevant local regulations and rules.

# 3.6.3 Checking and cleaning of the drum cleaning blade and transfer belt cleaning blade

### (1) Handling precautions

Since the edge of the cleaning blade performs the cleaning operation, pay special attention when handling it:

- Do not allow any hard object to hit or rub against the blade edge. Do not rub the edge with a cloth or soft pad.
- Do not stain the edge with any oil or fingerprints, etc.
- Do not allow solvents such as paint thinner to touch the blade.
- Do not leave any lint or dirt on the blade edge.
- Do not place the blade near a heat source.

# (2) Cleaning procedure

Clean the blade edge lightly with a cloth moistened with water.

# 3.6.4 Checking and replacing the transfer belt

(1) Handling precautions

- Do not touch the belt surface with your bare hands.
- Prevent oil or other foreign matter from staining the belt surface.
- Do not allow alcohol or any other organic solvent to come into contact with the transfer belt.
- Do not apply external pressure that might scratch the transfer belt.

# 3.6.5 Checking and replacing the transfer roller and fuser roller

(1) Handling precautions

- Do not touch the roller surface with your bare hands.
- Be carefull not to leave any scratch or dent on the roller surface.

# 3.6.6 Checking and cleaning of the fuser belt and lower heat roller

#### (1) Handling precautions

Fuser belt

- Take great care not to let the belt surface be folded.
- Do not touch the belt surface with your bare hands.
- Prevent oil or other foreign matter from staining the belt surface.
- Do not allow alcohol or any other organic solvent to come into contact with the fuser belt.
- Do not apply external pressure that might scratch the fuser belt.

Lower heat roller

- Do not leave any oil (fingerprints, etc.) on the lower heat roller.
- Be careful not to allow any hard object to hit or rub against the lower heat roller, or it may be damaged, possibly resulting in poor cleaning.

#### (2) Checking

- Check for stain and damage on the fuser belt and lower heat roller and clean if necessary.
- Clean the separation guide and fingers and check for chipped tips.
- Check the cleaning effect of the cleaning roller.
- Check the thermistors for proper contact with the upper and lower heat rollers.
- Check the fused and fixed condition of the toner.
- Check the gap between the inlet guide and lower heat roller.
- Check the fuser belt for proper transportation.
- Check the lower heat roller for proper rotation.

### (3) Cleaning procedure for fuser belt and lower heat roller

When fuser belt and lower heat roller become dirty, they will cause jamming. If this happens, wipe the surface clean with a suitable cloth. For easier cleaning, clean the belt and roller while they are still warm.

#### Note:

Be careful not to rub the fuser belt and lower heat roller surface with your nails or hard objects because it can be easily damaged. Do not use silicone oil on the fuser belt and lower heat roller.

#### (4) Checking after the assembly of the fuser belt unit

After the assembly, rotate the fuser belt for a round to confirm that the belt is neither folded nor damaged. A folded or damaged belt may be broken when it is in use.

# 3.6.7 Checking and replacing the oil roller and cleaning roller

(1) Handling precautions

Never allow solvents such as paint thinner to touch to the oil/cleaning rollers.

#### (2) Poor cleaning and corrective treatment

Judgment should be made depending on how much toner has been deposited on the fuser belt surface. When its surface is stained with toner, examine the oil roller and cleaning roller. If toner is heavily adhered on the oil/cleaning rollers, it means the cleaning performance is declined and the oil/cleaning rollers should be replaced with new ones.

The oil/cleaning rollers are gradually degraded due to subjection to the heat from the fuser belt over a long period of time. Replace them after the specified number of printouts have been made.

# 4. TROUBLESHOOTING

# <CAUTION IN REPLACING PC BOARDS>

The ID for each machine is registered on the LGC board, the IMC board, the IMG board and the SYS board. So, if their replacement is required, be sure to replace only one board at a time.

If more than one of the LGC board, the IMC board, the IMG board and the SYS board require replacement, replace them in the following procedure.

- 1. First, replace one of the boards to be replaced.
- 2. Turn the power ON and confirm that "READY" is displayed.
- 3. Turn the power OFF.
- 4. Replace another board that requires replacement.
- 5. Repeat step 2. to 4.

# 4.1 Diagnosis and Prescription for Each Error Code

# 4.1.1 Paper transport jam inside the copier

- [E01] Paper leading edge not reaching the exit sensor
- [E02] Paper trailing edge not passing the exit sensor



#### Where was the paper stopped?



#### [E03] Paper remaining inside the copier at power ON

Is any paper remaining inside the copier?

NO  $\stackrel{\text{YES}}{\longrightarrow}$  Remove the paper.

Refer to [E01], [E02] and [E11] to [E26].

### [EB7] Restart time-out error

Turn the power OFF and back ON.

In case that this error occurs frequently, confirm the contents of the following items in the setting mode and report them.

08-900 Firmware version (Basic section ROM)

08-902 Engine ROM version (LGC)

08-903 Printer ROM version (IMC)

Condition at error occured (original size, paper size, copy mode, etc.)

# 4.1.2 Paper feeding jam

# [E11] Paper misfeed from the duplex unit

Is any paper remaining in the paper feed area inside the duplex unit?



#### [E12] Paper misfeed from the bypass



- [E13] Paper misfeed from the 1st cassette
- [E14] Paper misfeed from the 2nd cassette
- [E15] Paper misfeed from the 3rd cassette
- [E16] Paper misfeed from the 4th cassette

Open the side door; does any paper remain in the paper path from the cassette?

YES Remove the paper.

Is the width of the side guide set too narrow for the paper width?

YES

NO

NO

YES Set the side guide wider.

(When the tray is being lifted, make sure that a gap is left between the paper and the side guide.)

Is the harness between the LGC board and the cassette feed-jam sensor open-circuited? Is the cassette feed-jam sensor connector or the connector J106 or J107 on the LGC board disconnected?



- 1. Replace the cassette feed-jam sensor.
- 2. Replace the LGC board.

# [E19] Paper misfeed from the LCT

Open the side door; does any paper remain in the paper path from the LCT?

NO YES Remove the paper.

Is the harness between the LGC board and the cassette feed-jam sensor open-circuited? Is the cassette feed-jam sensor connector or the connector J105 or J107 on the LGC board disconnected?



PES
 Reconnect the connector. Replace the harness.

- 1. Replace the cassette feed-jam sensor.
- 2. Replace the LGC board.

# 4.1.3 Paper transport jam (Paper not reaching the registration sensor after feeding)

- [E21] Paper transport jam from the LCT
- [E22] Paper transport jam from the 1st cassette
- [E23] Paper transport jam from the 2nd cassette
- [E24] Paper transport jam from the 3rd cassette
- [E25] Paper transport jam from the 4th cassette
- [E26] Paper transport jam from the bypass feed unit

Open the side door; does any paper remain in the paper path up to the registration roller?

NO Is the harness between the LGC board and the cassette feed-jam sensor open-circuited? Is the harness between the LGC board and the registration sensor open-circuited? Is the cassette feed-jam sensor connector, registration sensor connector, or the connector J107 or J108 on the LGC board disconnected? YES

- Reconnect the connector. Replace the harness.
- 1. Replace the cassette feed-jam sensor or the registration sensor.
- 2. Replace the LGC board.

NO

# 4.1.4 Cover open jam

# [E41] Front cover opened during printing

\* To avoid electrical hazards, the following checks must be made after unplugging the power cord.

Is the front cover or the paper-exit unit open?

NO  $\bigvee$  Close the front cover or the paper-exit unit.

Is the AC harness between the main switch, front cover switch, paper-exit unit switch and switching power supply open-circuited?

Is any of the faston terminals (front cover switch, paper-exit unit switch, main switch) and the connector J701 of the switching power supply disconnected?



- 1. Replace the front cover switch or the paper-exit unit switch.
- 2. Replace the main switch.
- 3. Replace the switching power supply.

# [E42] Side door opened during printing

Is the side door open?

NO YES Close the side door.

<u>Is the harness between the LGC board and the side door open/close switch open-circuited?</u> <u>Is the side door open/close switch connector or the connector J107 on the LGC board disconnected?</u>

YES Reconnect the connector. Replace the harness.

- 1. Replace the side door open/close switch.
- 2. Replace the LGC board.

NO

### [E43] Duplex pulled out during printing



#### [E45] LCT jam access cover opened during printing



Close the LCT jam access cover.

Is the harness between the LGC board and the LCT unit open-circuited? Is the relay connector of the harness between the LGC board and the LCT unit or the connector J105 on the LGC board disconnected?

- NO Reconnect the connector. Replace the harness.
- 1. Replace the LGC board.
- 2. Replace the LCT unit.

# [E46] Bypass unit opened during printing



NO YES Close the bypass unit.

Is the harness between the LGC board and the bypass unit open/close switch open-circuited? Is the bypass unit open/close switch connector or the connector J108 on the LGC board disconnected?

NO

NO

Reconnect the connector. Replace the harness.

- 1. Replace the bypass unit open/close switch.
- 2. Replace the LGC board.

# 4.1.5 Paper jam in duplex unit and reversing area

- [E50] Paper not reaching the duplex unit
- [E51] Paper not restarting from the Aduplex unit stack
- [E54] Duplex unit paper transport jam



### [E52] Paper not reaching the ADU path sensor

Is the harness between the LGC board and the duplex unit path sensor open-circuited? Is the duplex unit path sensor connector or the connector J123 on the LGC board disconnected?

YES Reconnect the connector. Replace the harness.

- 1. Replace the duplex unit path sensor.
- 2. Replace the LGC board.

NO

# 4.1.6 Original jam in the ADF

- [E71] Original not reaching the aligning sensor
- [E72] Original not reaching the exit sensor
- [E73] Original not passing the exit sensor
- [E79] Original pre-feed jam

#### [Two or more originals are fed simultaneously.]



# [The original does not reach the aligning roller.]



# [The original stops, skewed on the original glass.]



# [The side edges of the original are out of alignment with the side edges of the copy.]

 Is the slides set too wide in relation to the width of the original?

 NO

 YES

 Align the slides with the width of the original.

Shift the original feeding tray back or forth to adjust.

# 4.1.7 Paper jam in the finisher

# [E9F] Punching jam

Is there any paper remaining on the transport path in the finisher or copier?

NO **YES** Remove the paper.

Is either of the connectors J1 or J3 on the punch driver PC board disconnected? Is the harness connecting the punch driver PC board and punch home position sensor (PI3P) open-circuited?

NO VES Connect the connector securely. Replace the harness. Is the punch home position sensor working properly? NO 1. Connect the connector of the punch home position sensor securely. 2. Replace the punch home position sensor.

Replace the punch driver PC board.

### [EA1] Finisher paper transport delay jam



Replace the finisher controller PC board.

# [EA2] Finisher paper transport stop jam

Is there any paper remaining on the transport path in the finisher or copier?

NO

NO

Remove the paper.

Is any of the connectors J17, J24, J9 and J11 on the finisher controller PC board disconnected? Is any of the harnesses connecting between the finisher controller PC board and sensors (inlet sensor (PI1), buffer path inlet paper sensor (PI17), buffer path paper sensor (PI14), stapling tray sensor (PI4) and delivery sensor (PI3)) open-circuited?

YES ► Connect the connector securely. Replace the harness.

Are the inlet sensor, buffer path inlet paper sensor, buffer path paper sensor, stapling tray sensor and delivery sensor functioning properly? (Do the actuators return normally?)



 $\stackrel{\text{NO}}{\longrightarrow}$  1. Connect the connectors of the sensors securely.

- 2. Attach the actuators if they have come off.
- 3. Replace the sensors.

Replace the finisher controller PC board.

# [EA3] Paper remaining inside the finisher at power ON

Is there any paper remaining on the transport path in the finisher?

NO  $\checkmark$  Remove the paper.

Is any of the connectors J17, J24 and J11 on the finisher controller PC board disconnected? Is any of the harnesses connecting between the finisher controller PC board and sensors (inlet sensor (PI1), buffer path inlet paper sensor (PI17), buffer path paper sensor (PI14) and delivery sensor (PI3)) open-circuited?

 $\rightarrow$  Connect the connector securely. Replace the harness.

Are the inlet sensor, buffer path inlet paper sensor, buffer path paper sensor and delivery sensor functioning properly? (Do the actuators return normally?)



2. Attach the actuators if they have come off.

3. Replace the sensors.

Replace the finisher controller PC board.

YES

# [EA4] Finisher front door opened during printing



Is the connector J5 on the punch driver PC board disconnected?

Is the harness connecting between the punch driver PC board and front door switch (MS2P) opencircuited?



Replace the finisher controller PC board.

# [EA5] Finisher stapling jam

Is there any paper remaining on the transport path in the finisher or copier, or on the stapling tray?

NO YES Remove the paper.

Is the jam cleared by taking off the staple cartridge from the finisher and removing the staple sheet slided from the staple case?

<u>Is the connector J8 on the finisher controller PC board disconnected?</u> <u>Is the harness connecting the finisher controller PC board and staple home position sensor</u> (PI22) open-circuited?

YES Connect the connector securely. Replace the harness.

Is the staple home position sensor working properly?

$$\mathbb{NO}$$
 Replace the stapler unit.

YES

Replace the finisher controller PC board.
### [EA6] Finisher early arrival jam

Is there any paper remaining on the transport path in the finisher or copier?



Replace the finisher controller PC board.

### [EA8] Saddle stitcher stapling jam

Is there any paper remaining on the transport path in the finisher, saddle stitcher section or copier, or on the stapling tray?

YES Remove the paper.

Is the jam cleared by taking off the staple cartridge from the saddle stitcher and removing the staples stuck in the stapling unit?

YES End

Is the connector J8 on the saddle stitcher controller PC board disconnected? Is the harness connecting the saddle stitcher controller PC board and stitcher home position switch (rear: MS5S, front: MS7S) open-circuited?



NO

NO

YES Connect the connector securely. Replace the harness.

Are the stitcher home position switches working properly?

NO Replace the stapler unit.

Replace the saddle stitcher controller PC board.

YES

# [EA9] Saddle stitcher door opened during printing

Is there any paper remaining on the transport path in the finisher, saddle stitcher section or copier?



Is either of the connectors J10 or J11 on saddle stitcher controller PC board disconnected? Is any of the harnesses connecting between the saddle stitcher controller PC board and cover opening sensors (PI2S: front door opening/closing sensor, PI3S: delivery cover sensor, PI9S: inlet cover sensor) open-circuited?



NO 1. Connect the connectors of the cover opening sensors securely.
 2. Replace the cover opening sensors.

Replace the saddle stitcher controller PC board.

### [EAA] Paper remaining at the saddle stitcher at power ON

Is there any paper remaining on the transport path in the finisher or saddle stitcher section?

NO YES Remove the paper.

Is any of the connectors J10, J13 and J9 on the saddle stitcher controller PC board disconnected? Is any of the harnesses connecting between the saddle stitcher controller PC board and sensors (No.1 paper sensor (PI18S), No.2 paper sensor (PI19S), No.3 paper sensor (PI20S), vertical path paper sensor (PI17S) and delivery sensor (PI11S)) open-circuited?

NO

YES

YES

YES Connect the connector securely. Replace the harness.

Are the No.1 paper sensor, No.2 paper sensor, No.3 paper sensor, vertical path paper sensor and delivery sensor functioning properly? (Do the actuators return normally?)



- 2. Attach the actuators if they have come off.
- 3. Replace the sensors.

Replace the saddle stitcher controller PC board.

## [EAB]Saddle stitcher transport stop jam

Is there any paper remaining on the transport path in the finisher, saddle stitcher section or copier?

NO Is either of the connectors J10 or J9 on the saddle stitcher controller PC board disconnected? Is any of the harnesses connecting between the saddle stitcher controller PC board and sensors (No.1 paper sensor (PI18S), No.2 paper sensor (PI19S), No.3 paper sensor (PI20S) and delivery

sensor (PI11S)) open-circuited?

YES Connect the connector securely. Replace the harness.

Are the No.1 paper sensor, No.2 paper sensor, No.3 paper sensor and delivery sensor functioning properly? (Do the actuators return normally?)



NO

 $\stackrel{\text{NO}}{\longrightarrow}$  1. Connect the connectors of the sensors securely.

- 2. Attach the actuators if they have come off.
- 3. Replace the sensors.

Replace the saddle stitcher controller PC board.

## [EAC] Saddle stitcher transport delay jam



YES Remove the paper.

Is any of the connectors J6, J9 and J10 on the saddle stitcher controller PC board disconnected? Is any of the harnesses connecting between the saddle stitcher controller PC board and the sensors (No.1 paper sensor (PI18S), No.2 paper sensor (PI19S), No.3 paper sensor (PI20S), delivery sensor (PI11S), and paper positioning plate paper sensor (PI8S)) open-circuited?



YES\_

NO

YES Connect the connector securely. Replace the harness.

Are the No.1 paper sensor, No.2 paper sensor, No.3 paper sensor, delivery sensor, and paper positioning plate paper sensor functioning properly? (Do the actuators return normally?)



- 2. Attach the actuator if it has come off.
- 3. Replace the sensor.

Replace the saddle controller controller PC board.

### [EAE] Finisher receiving time time-out jam

Is the finisher working?

NO Replace the finisher controller PC board.

- 1. Check if the voltage (24V) is being supplied to the finisher.
- 2. Check the connection of the LGC board and IPC board.
- 3. Check if the harness connecting the IPC board and finisher I/F connector of the copier side is open-circuited.
- 4. Check if the harness connecting the I/F connector of the finisher side and finisher controller PC board is open-circuited.
- 5. Replace the finisher controller PC board.

# 4.1.8 Special sheet jam

## [EC2] OHP film used except from bypass tray and 2nd cassette

Use the 2nd cassette or the bypass tray as the feeding source of OHP film.

#### [EC3] OHP film used in non-OHP mode

Set the specified type of paper as selected on the control panel in the paper source.

# 4.1.9 Drive system related service call

### [C05] Duplex unit motor rotation abnormal



## [C06] Paper feed motor rotation abnormal

Is the paper feed motor rotating properly?



Are the pins A6 and A10 of the connector J109 on the LGC board always at the level "L"?

- NO 1. Check if the connector J41 of the paper feed motor is disconnected.
  - 2. Check if the connector J109 on the LGC board is disconnected.
  - 3. Check if any conductor pattern on the LGC board is open- or short-circuited.
  - 4. Check if any harness is open-circuited or any connector pin is disconnected.
  - 5. Replace the LGC board.
  - 6. Replace the paper feed motor.
- 1. Check if any conductor pattern on the LGC board is open- or short-circuited.
- 2. Replace the LGC board.

YES

3. Replace the paper feed motor.

#### [C0A] Developer motor rotation abnormal

Is the developer motor rotating properly?



- 1. Check if any conductor pattern on the LGC board is open- or short-circuited.
- 2. Replace the LGC board.
- 3. Replace the developer motor.

# 4.1.10 Paper feeding system related service call

## [C11] Duplex unit paper side guide operation abnormal



#### [C12] duplex uni paper end guide operation abnormal



- [C13] 1st cassette tray operation abnormal
- [C14] 2nd cassette tray operation abnormal
- [C15] 3rd cassette tray operation abnormal
- [C16] 4th cassette tray operation abnormal

Is the cassette pushed in properly to the copier?

YES Push in the cassette properly to the copier.

Is the harness between the LGC board and the cassette tray-up limit sensor open-circuited? Is the harness between the LGC board and the cassette tray-up motor open-circuited? Is the cassette tray-up limit sensor connector, cassette tray-up motor connector, or connector J106 on the LGC board disconnected?



4. Replace the LGC board.

## [C18] LCT operation abnormal

<u>Is the harness between the LGC board and the LCT unit open-circuited?</u> <u>Is the relay connector of the harness between the LGC board and the LCT unit or the connector</u> <u>J105 on the LGC board disconnected?</u>

NO VES Reconnect the connector. Replace the harness. Are the switches and sensors in the LCT unit working properly? VES 1. Replace the LCT motor. 2. Replace the LGC board. 1. Replace the sensors and switches.

- 2. Replace the LCT drive PC board or the LCT tray-down switch PC board.
- 3. Replace the LGC board.

# 4.1.11 Scanner related service call

#### [C27] Carriage home position sensor not turning OFF within a fixed time [C28] Carriage home position sensor not turning ON within a fixed time

Remove the original glass, move the carriages to the paper feed side, turn ON the power switch, and then proceed to check the following items.

[C27] Are the carriages stuck at a point other than the home position?

• Check the SCM and SDV boards for any abnormal circuit.

- 1. Check if any connector pin is disconnected, or any harness is open- or short-circuited.
- 2. Check the scan motor drive pulley if its screws are loose.
- 3. Check if any conductor pattern on the SDV board is open- or short-circuited.
- 4. Check if any conductor pattern on the SCM board is open- or short-circuited.
- 5. Replace the SDV board.
- 6. Replace the SCM board.

#### [C28] Do the carriages, after arriving at its home position, make a big noise?



NO

YES Since the carriage home position sensor has not been turned ON,

- 1. Check if the sensor connector is disconnected.
- 2. Check the SDV and SCM boards for any abnormal circuit.

Since the carriages do not move,

- 1. Check if any connector pin is disconnected, or any harness is open- or short-circuited.
- 2. Check if any conductor pattern on the SDV board is open- or short-circuited.
- 3. Check if any conductor pattern on the SCM board is open- or short-circuited.
- 4. Replace the SDV board.
- 5. Replace the SCM board.

## [C29] Exposure lamp disconnection detected

Does the exposure lamp light?

 $\rightarrow$  1. Check the CCD and SCM boards for any disconnected connector.

- 2. Check the shading correction plate of the original-width indicator unit if it is dusty.
- 3. Check the CCD board for any open- or short-circuited conductor pattern.
- 4. Check the SCM board for any open- or short-circuited conductor pattern.
- 5. Replace the SCM board.
- 6. Replace the lens unit.
- Check if the lamp connector is disconnected.
- 2. Check the SCM board if any pin of connectors J7-1, -2 and -3 is disconnected or any harness is open- or short-circuited.
- 3. Check the SCM board for any open- or short-circuited conductor pattern.
- 4. Replace the SCM board.
- 5. Replace the inverter.
- 6. Replace the exposure lamp.

NO

# 4.1.12 Copy process related service call

#### [C31] Used toner transport motor rotation abnormal

Is the harness between the LGC board and the used toner transport motor open-circuited? Is the connector J123 or J102 on the LGC board, the relay connector or the used toner transport motor connector disconnected?

NO Replace the harness. Reconnect the connector.

Is used toner jammed? Is any abnormal mechanical load found?



- 1. Replace the used toner transport motor.
- 2. Replace the LGC board.

\* Since the used toner jamming can cause a serious damage to PCU, be sure to check that the PCU functions normally.

#### [C33] Developer removal shutter function abnormal

Reduce the mechanical load by adjusting the drive system. Remove any foreign matter.

Replace the LGC board.

## [C35] Transfer belt unit contact/release function abnormal

Reduce the mechanical load by adjusting the drive system. Remove any foreign matter.

Is the harness between the LGC board and the transfer/transport unit drawer connector, or the harness inside the transfer/transport unit open-circuited?

Is the transfer belt contact/release drive motor connector, LGC board connector J115 or J102, transfer belt home position switch connector, or transfer belt limit switch connector disconnected?

Is the transfer belt home position switch or the transfer belt limit switch defectively installed?

YES 1. Replace the harness. Reconnect the connector.
2. Reinstall the transfer belt home position switch or the transfer belt limit switch

NO

NO

- 1. Replace the transfer belt home position switch and the transfer belt limit switch.
- 2. Replace the transfer belt contact/release drive motor.

securely.

3. Replace the LGC board.

[C38] Auto-toner error (K) [C39] Auto-toner error (C) [C3A] Auto-toner error (M) [C3B] Auto-toner error (Y)

> Is the harness between the LGC board and the PCU drawer connector open-circuited? Is any harness inside the PCU or the auto-toner sensor harness open-circuited? Is the auto-toner sensor connector or the connector J120 on the LGC board disconnected?

YES ► Reconnect the connector. Replace the harness.

1. Replace the auto-toner sensor.

2. Replace the LGC board.

- [C3C] Main charger wire cleaning abnormal (K)
- [C3D] Main charger wire cleaning abnormal (C)
- [C3E] Main charger wire cleaning abnormal (M)
- [C3F] Main charger wire cleaning abnormal (Y)

Is the harness between the LGC board and the PCU drawer connector or any harness inside the PCU open-circuited?

Is the wire cleaner drive motor connector, the connector J120 on the LGC board, the connector of the wire cleaner home position switch, or the connector of the wire cleaner limit switch disconnected?

Has the wire cleaner home position switch or the wire cleaner limit switch defectively installed or come off?



3. Replace the LGC board.

## 4.1.13 Fuser unit related service call

- [C41] Thermistor or heater abnormal when warming-up is started
- [C42] Thermistor abnormal after the copier has become ready
- [C43] Thermistor abnormal during warming-up after abnormality judgment
- [C44] Heater abnormal during warming-up after abnormality judgment
- [C46] Heater abnormal (low temperature) after the copier has become ready
- [C47] Rear thermistor abnormal after the copier has become ready

#### [C48] Heater abnormal (high temperature)

- \* To avoid any hazards, be sure to unplug the power cable before proceeding to check the items in 1. and 2. below.
- \* Be sure that the fuser unit is set in place securely.

#### 1. Checking the thermistors

- (1) Is any thermistor connector disconnected?
- (2) Are the thermistors (upper/lower, center/rear) in proper contact with the upper and lower heat rollers?
- (3) Are the harnesses for the thermistors (upper/lower, center/rear) open-circuited?

#### 2. Checking the heater lamps and SSRs

- (1) Check if the upper or lower heater lamp is open-circuited.
- (2) Check if the upper or lower heater lamp connector is disconnected.
- (3) Check if the thermostat is blown out.
- (4) Check if the upper heat roller or lower heat roller SSR connector is disconnected.
- (5) Check if the AC harness is open-circuited.
- (6) Check if SSR or the switching power supply is broken.

#### 3. Checking the LGC board

- (1) Check the LGC board if the connector J123 is disconnected.
- (2) Check if the conductor pattern on the LGC board is open- or short-circuited.
- (3) Replace the LGC board.

## 4. Clearing the status counter

After completing the repair of what caused the error, proceed to do the following:

- (1) While pressing [0] and [8] simultaneously, turn ON the power.
- (2) Enter [700] with digital keys, then press the [START] key.
- (3) Rewrite the status counter to "0", then press the [SET] or [INTERRUPT] key. The status counter is dispalyed as follows:
   [C41]: "1" or "2" [C42]: "6" [C43]: "4" [C44]: "5"

C41]: "1" or "2"	[C42]: "6"	[C43]: "4"	[C44]: "5
C46]: "7"	[C47]: "8"	[C48]: "9"	

(4) Turn OFF the power and then back it ON again, and make sure that the copier gets ready normally.

# [C7] Error C7

- \* To avoid any hazards, be sure to unplug the power cord before proceeding to check the items in 1. and 2. below.
- \* Be sure that the fuser unit is set in place securely.
- 1. Check if any thermistor connector is disconnected.
- 2. Check if any harness of the thermistors (center/rear, upper/lower) is open-circuited.
- 3. Check the LGC board if the connector J122 is disconnected.
- 4. After completing the repair of what caused the [C7] problem, proceed to rewrite the status counter (08-700) to "0", following the same procedure as for [C41] to [C48].

# 4.1.14 Communications related service call

### [C57] Communication error between LGC-CPU and IPC board

- (1) Check if any conductor pattern on the LGC board, mainly around IC23, IC72, IC74 and J125, is short- or open-circuited.
- (2) Check if the conductor pattern on the IPC board is short- or open-circuited.
- (3) Replace the IPC board.
- (4) Replace the LGC board.

### [C5A] Communications error between LGC-CPU and printer controller

#### <<For a built-in type printer controller>>

- 1. Check if the printer controller unit is securely mounted on the copier.
- 2. Check if the harness between the LGC and IMC boards is open-circuited, and if the connector J113 on the LGC board and the connector J182 on the IMC board are disconnected.
- 3. Check if the harness between the switching power supply and the printer controller is opencircuited.
- 4. Check if the connector J710 of the switching power supply is disconnected.
- 5. Check if any conductor pattern on the IMC, IMG, MTH2 and LGC boards is open- or shortcircuited .
- 6. Replace the LGC board.
- 7. Replace the IMG board.
- 8. Replace the IMC board.
- 9. Replace the MTH2 board.

#### <<For an external type printer controller>>

- 1. Check if the printer controller power is turned ON.
- 2. Check if the harness between the PIF board and the printer controller is open-circuited.
- 3. Check if the PIF board is firmly connected to the MTH2 board.
- 4. Check if the harness between the LGC and IMC boards is open-circuited, and if the connector J113 on the LGC board and the connector J182 on the IMC board are disconnected.
- 5. Check if any conductor pattern on the PIF, IMG, MTH2, IMC and LGC boards is open- or short-circuited.
- 6. Replace the PIF board.
- 7. Replace the LGC board.
- 8. Replace the IMG board.
- 9. Replace the IMC board.
- 10. Replace the MTH2 board.

### [C5B] LGC-CPU signal transmission error to IMC-CPU [C5C] LGC-CPU signal reception error from IMC-CPU

- 1. Check if the harness between the LGC and IMC boards is open-circuited, and if the connector J113 on the LGC board and the connector J182 on the IMC board are disconnected.
- 2. Replace the LGC board.
- 3. Replace the IMC board.

# 4.1.15 ADF related service call

#### [C72] Aligning sensor automatic adjustment error

- 1. Check if any foreign matter is present between the aligning sensor and the reflecting mirror, and if the reflecting mirror is stained.
- 2. Check if the harness between the aligning sensor and the ADF PC board is open-circuited.
- 3. Check if any conductor pattern on the RADF PC board is open- or short-circuited mainly around IC1, IC14 and CN14.
- 4. Replace the aligning sensor.
- 5. Replace the ADF PC board.
- 6. Initialize the ADF's EEPROM and perform the sensor automatic adjustment.

### [C73] EEPROM initializing error

- 1. Check if any conductor pattern on the ADF PC board is open- or short-circuited mainly around IC7.
- 2. Replace the ADF PC board.
- 3. Initialize the ADF's EEPROM and perform the sensor automatic adjustment.

### [C74] Paper exit sensor automatic adjustment error

- 1. Check if any foreign matter is present between the exit sensor and the reflecting mirror, and if the reflecting mirror is stained.
- 2. Check if the harness between the exit sensor and the ADF PC board is open-circuited.
- 3. Check if any conductor pattern on the ADF PC board is open- or short-circuited mainly around IC1, IC14 and CN8.
- 4. Replace the exit sensor.
- 5. Replace the ADF PC board.
- 6. Initialize the ADF's EEPROM and perform the sensor automatic adjustment.

#### [C82] Communications error between scanner and ADF

- 1. Check if the connectors are disconnected or the harnesses are open-circuited between the SCM board and ADF PC board (includindg the relay connector).
- 2. Replace the ADF PC board.
- 3. Replace the SCM board.

# 4.1.16 Other service call (1)

## [C94] LGC-CPU abnormal

Is "Call for service" displayed again even after the copier is turned OFF and then back ON?

YES

 $\stackrel{\text{NO}}{\longrightarrow}$  Observe the condition for a while.

- 1. Check if the conductor pattern between LGC-CPU (IC32) and FROM (IC24) is open- or short-circuited.
- 2. If this problem recurs frequently, replace the LGC board.

## [C9A] Main memory abnormal

Is "Call for service" displayed again even after the copier is turned OFF and then back ON?

- NO Deserve the condition for a while. YES
- 1. Check if the conductor pattern between the LGC-CPU (IC32), FROM (IC24), SRAM (IC35) and BC-RAM (IC36) is open- or short-circuited.
- 2. If this problem recurs frequently, replace the LGC board.

## [C9B] LGC-CPU protocol error [C9D] IMC-CPU protocol error

Turn the power OFF, and back ON.

In case that these errors occur frequently, confirm the contents of the following items in the setting mode and report them.

08-267 C9B/C9D error history display

08-900 Firmware version (Basic section ROM)

- 08-902 Engine ROM version (LGC)
- 08-903 Printer ROM version (IMC)

# [C9E] IMC board connection abnormal

Is "Call for service" displayed again even after the copier is turned OFF and then back ON?

 $\xrightarrow{\text{NO}}$  Observe the condition for a while.

- YES
- 1. Check if the IMC board, SYS board and the IMG board are firmly connected to the MTH1
- board.
- 2. Check if the connector J181, J182, J185 or J188 on the IMC board is disconnected.
- 3. Check if the connector J161 on the IMG board is disconnected.
- 4. Check if the connector J1 on the SCM board is disconnected.
- 5. Check if the harness connected to the IMC board is open- or short-circuited or if any connector pin is disconnected.
- 6. Check if the harness between the SCM and IMG boards is open-circuited or if any connector pin is disconnected.
- 7. If this problem recurs frequently, replace the IMC board.

# 4.1.17 Laser optical unit related service call

### [CA1] Polygonal motor rotation abnormal



- 1. Check if any conductor pattern on the IMC board is open- or short-circuited .
- 2. Replace the IMC board.
- 3. Replace the laser optical unit.

### [CA2] H-SYNC abnormal

Is the polygonal motor rotating? YES NO→ Refer to "[CA1] Polygonal motor rotation abnormal". Are both 10th and 12th pins of the connector J188 on the IMC board always at the level "L"? YES NO→ Refer to "[CA1] Polygonal motor rotation abnormal". Is the harness between the RLY and IMC boards open-circuited? Are the connector J185 on the IMC board or the connector J201 on the RLY board disconnected? NO YES Replace the harness. Reconnect the connectors. 1. Replace the IMC board. 2. Replace the laser optical unit.

[CD1] Laser calibration error (K) [CD2] Laser calibration error (C) [CD3] Laser calibration error (M) [CD4] Laser calibration error (Y)

Replace the IMC board.

# 4.1.18 Finisher related service call

## [CB1] Feed motor abnormal





Replace the finisher controller PC board.

#### [CB2] Delivery motor abnormal

Rotate the delivery motor by hand. Does it rotate smoothly? YES Correct the mechanism. Is the delivery motor clock sensor (PI10) working normally? YES Replace the sensor. Does the voltage between J11-4 and -5 on the finisher controller PC board become 24V when the delivery motor starts rotating? YES Replace the finisher controller PC board. Is the wiring between the delivery motor and finisher controller PC board correct? NO Correct the wiring. Replace the motor.

## [CB3] Tray lift motor abnormal



Replace the tray lift motor (M5).



Does the tray reach the tray upper limit detecting switch (MS5)?



Is the tray upper limit detecting switch (MS5) working normally?

YES Replace the switch.

Is the wiring between the finisher controller PC board and the tray upper limit detecting switch correct?

YES Correct the wiring.

Replace the finisher controller PC board.



Does the tray move up/down?



Replace the finisher controller PC board.

### [CB4] Alignment motor abnormal



#### [CB5] Staple motor abnormal



### [CB6] Stapler shift motor abnormal



## [CB7] Height sensor abnormal



[Procedure 2]



### [CB8] Backup RAM data abnormal



#### [CB9] Saddle stitcher/paper pushing plate motor abnormal





## [CBA]Saddle stitcher/stitcher motor (front) abnormal [CBB]Saddle stitcher/stitcher motor (rear) abnormal



Check the wiring between the stitcher and saddle stitcher controller PC board. If there is no problem, replace the controller PC board.

## [CBC]Saddle stitcher/alignment motor abnormal



### [CBD]Saddle stitcher/guide motor abnormal



### [CBE]Saddle stitcher/paper folding motor abnormal



## [CBF]Saddle stitcher/paper positioning plate motor abnormal



### [CD5] Saddle stitcher/sensor connector connection error



Is the connector of guide home position sensor (PI13S) connected to the connector on the saddle stitcher controller PC board?



[Procedure 2]

Is the connector of paper pushing plate home position sensor (PI14S) connected to the connector on the saddle stitcher controller PC board?



[Procedure 3]

Is the connector of paper pushing plate top position sensor (PI15S) connected to the connector on the saddle stitcher controller PC board?



## [CD6] Saddle stitcher/microswitch abnormal



Check and correct the wiring between J19 on the finisher controller PC board and J1 on the saddle stitcher controller PC board. If there is no problem, replace the saddle stitcher controller PC board.



# [CD7] Communication error between finisher and saddle stitcher



### [CD9] Swing motor abnormal


[Procedure 3]

Is the swing motor clock sensor (PI20) working normally?

Does the voltage between J11-6 and -7 on the finisher controller PC board become 24V when the swing motor starts rotating?

Replace the swing motor.

#### [CDA]Horizontal registration motor abnormal



Replace the finisher controller PC board.

#### [CDB]Punch motor abnormal



Replace the finisher controller PC board.

## 4.1.19 Image quality related service call

- (1) After checking [CE1], [CE2] and [CE4], and taking appropriate action, perform the forced performing of image quality control.
  - 1. While pressing [0] and [5] simultaneously, turn ON the power.
  - 2. Enter [878] with digital keys, and then press the [START] key.
  - 3. Turn OFF and then back ON the power, and check that the copier becomes ready normally.
- (2) After confirming the items in (1), clear the abnormal detection counter of image quality control.
  - 1. While pressing [0] and [8] simultaneously, turn ON the power.
  - 2. Enter [415] with digital keys, and then press the [START] key.
  - 3. Rewrite the displayed status counter from "1" ~ "16" to "0", and then press the [SET] or [INTERRUPT] key.
  - 4. Enter [416] with digital keys, and then press the [START] key.
  - 5. Rewrite the displayed status counter from "1" ~ "16" to "0", and then press the [SET] or [INTERRUPT] key.
  - 6. Enter [417] with digital keys, and then press the [START] key.
  - 7. Rewrite the displayed status counter from "1" ~ "16" to "0", and then press the [SET] or [INTERRUPT] key.
  - 8. Enter [418] with digital keys, and then press the [START] key.
  - 9. Rewrite the displayed status counter from "1" ~ "16" to "0", and then press the [SET] or [INTERRUPT] key.
  - 10. Turn OFF and then back ON the power, and check that the copier becomes ready normally.

#### [CE1] Image quality sensor abnormal (OFF level)

Is the connector of the image quality sensor, or the connector J113, J114, J115 or J119 on the LGC board, or the connector J182 on the IMC board disconnected?

Is the harness between the LGC board and the image quality sensor, or the harness between the LGC board and the IMC board, or the harness between the LGC board and the switching power supply open-circuited?

YES Reconnect the connector. Replace the harness.

Is LED (D17) on the LGC board lit? Is the output voltage from the 12V-power supply normal?

NO Check the power supply system and replace the switching power supply.

- 1. Replace the image quality sensor.
- 2. Replace the LGC board.
- 3. Replace the IMC board.

NO

#### [CE2] Image quality sensor abnormal (no pattern level abnormal)

- 1. Check that the transfer belt unit is fully raised.
- 2. Check that the transfer/transport unit is securely inserted.
- 3. Check for any abnormal stain, large flaw or break on the transfer belt surface.
- 4. Check that the drum and transfer belt are operating. If abnormal, correct any mechanical problem.

Is any of the connectors J113, J114, J115, J119 or J123 on the LGC board disconnected? Is the connector J182 on the IMC board disconnected?

Is the harness between the LGC board and the IMC board open-circuited?

Is the connector of the image quality sensor disconnected or stained?

Is the harness between the LGC board and the image quality sensor open-circuited?

Is the main high-voltage transformer connector disconnected?

Is the harness between the LGC board and the main high-voltage transformer open-circuited? Is the transfer transformer connector disconnected?

Is the harness between the LGC board and the transfer transformer open-circuited?

Is any of the high-voltage contact points of the transfer belt unit in faulty contact? Is any contact points stained?

Is the harness of the main high-voltage transformer or the transfer transformer disconnected or open-circuited?

YES ► Reconnect the connector. Replace the harness. Clean the connector or contact point. Correct the contact point.

NO

NO

Is LED (D17) on the LGC board lit? Is the output voltage from the 12V-power supply normal?

YES Check the power supply system, and replace the switching power supply.

- 1. Replace the image quality sensor.
- 2. Replace the LGC board.
- 3. Replace the IMC board.

#### [CE4] Image quality control test pattern abnormal

- (1) Use "Image quality control abnormal detection counter Y~K display/0 clearing (08-415~418)" to check the abnormal occurring condition for each color.
- (2) Check "Output value display of image quality sensor/Low-density pattern (05-819)" to confirm if the value is under 300 (low-density pattern abnormal) for each color.



- (3) Check "Output value display of image quality sensor/High-density pattern (05-820)" to confirm if the value is 600 or above (high-density pattern abnormal) and identify the color which pattern is abnormal.
- (4) Set the values of "Image quality control 2(08-401)", "Image quality control 5(08-402)" and "Image quality control 4(08-411)" to "0" (disabled).
- (5) Output the image quality control test pattern (04-270) and check the patch of the color identified in step (3) to see if the image is abnormal (image omitted, all blank, all solid, etc.).



- (6) Replace the image quality sensor.
- (7) Set the values of "Image quality control 2 (08-401)", "Image quality control 5 (08-402)" and "Image quality control 4 (08-411)" to "1" (enabled).
- (8) Perform "Forced performing of image quality control (05-878)" and make sure it is completed normally (Error [CE4] does not appear).
- (9) Clear all "Image quality control abnormal detection counter Y~K display/0 clearing (08-415~418)".
- (10) If any of the specified parts has been replaced, perform "Automatic initialization of image quality control (05-879)" (► Chapter 2.3) and then perform "Automatic gamma adjustment (05-643)" (► Chapter 2.6.1).

#### [CE5] Temperature/humidity sensor upper-limit abnormal

<u>Is the harness between the LGC board and the temperature/humidity sensor disconnected ?</u> <u>Is the connector J108 on the LGC board or the connector of the temperature/humidity sensor</u> <u>disconnected ?</u>

NO Reconnect the connector. Replace the harness.

1. Replace the temperature/humidity sensor.

2. Replace the LGC board.

#### [CE6] Drum thermistor Y abnormal [CE9] Drum thermistor K abnormal

Is the harness between the LGC board and the drawer connector for PCU disconnected ? Is the harness inside of the PCU and the harness of the drum thermistor Y or K disconnected ? Is the connector J120 on the LGC board, or the connector of the drum thermistor Y or K disconnected ?

NO Reconnect the connector. Replace the harness.

1. Replace the drum thermistor Y or K.

2. Replace the LGC board.

#### [CF1] Color registration control abnormal

<Check of the status of color registration sensor error>

- 1. While pressing [0] and [5] simultaneously, turn the power ON.
- 2. Enter [461] with digital keys and press the [START] key.
- 3. The color registration control result is displayed in four values (Y(0), M(1), C(2), K(3)).
- 4. Check the value for Y(0) displayed in 3..

When [CF1] has occured, a value from 1 to 15 is displayed (normal if 0 or 16 or above).

- 1-14: Data error (color registration sensor is normal)
- 15: Reading error of color registration test pattern

<Disabling the color registration control>

- 5. While pressing [0] and [8] simultaneously, turn the power ON.
- 6. Enter [742] with digital keys and press the [START] key.
- 7. Set the color registration control setting to "1" (manual).
- 8. Enter [743] with digital keys and press the [START] key.
- 9. Set the color registration control during the warming-up to "0" (disabled).
- 10.Turn the power OFF.

<Check by the forced performing of color registration control >

- 11. While pressing [0] and [5] simultaneously, turn the power ON.
- 12.Enter [407] with digital keys and press the [START] key. n (Forced performing of color registration control)
  - \* At this time, use a digital tester to monitor the test point **TP91** (front color registration sensor output) and **TP93** (rear color registration sensor output) on the LGC board.

- If the outputs are normal -

Before starting the forced performing of color registration control, a voltage of approximately 0.7V DC is displayed.

After starting it, the voltage changes to approximately 4.4V DC, and this may drop instantaneously down to 0.7V DC. (There may be no fluctuations in voltage, depending on the reaction speed of the digital tester.)

When the forced performing of color registration control is finished, the voltage returns to approximately 0.7V DC.

Voltage before forced performing of color registration control

DC 0.7V	Normal
DC 0V	Check if the harness between the LGC board and the color regis- tration sensor or the harness between the LGC board and the IMC board is open- or short-circuited. Check if any of the connectors (J182 on the IMC board, J113 and J114 on the LGC board) or the color registration sensor connec- tor is disconnected. If there is no abnormality, check the color registration sensor.
DC 5V	Check if the harness between the LGC board and the color regis- tration sensor is open- or short-circuited. Check if any of the the connectors (J113 and J114 on the LGC board) or the color registration sensor connector is disconnected.
DC 4.4V	Check if the harness between the LGC board and the color regis- tration sensor or the harness between the LGC board and the IMC board is open- or short-circuited. Check if any of the connectors (J182 on the IMC board, J113 and J114 on the LGC board) or the color registration sensor connec- tor is disconnected. If there is no abnormality, check the color registration sensor.

Voltage during forced performing of color registration control

Normally DC 4.4V. Instantaneously may drop down to 0.7V DC	
Normally DC 0.7V	Check if there is any charge abnormality or exposure errors onto the photoconductive drum (errors in the laser optical unit). Follow the next check item 13. and after.
Normally DC 4.4V	Reading error of color registration test pattern. Follow the next check item 13. and after.

<Check by the grid pattern>

- 13. While pressing [0] and [5] simultaneously, turn the power ON.
- 14. Enter "1" with digital key and press the [PRINTER/NETWORK] key.
- 15. Check the output grid patterns of yellow, magenta, cyan and black if there is image density difference among the front/center/rear areas or abnormality in the overall image.
  - \* At this time, there is no problem even if the Y, M, C and K grid patterns are out of alignment.
    - If there is difference in tonal balance between the front and rear areas -
      - Check the state of contact of the photoconductive drum and the transfer belt.
      - Check the quantity of developer (check whether developer material is properly supplied onto the surface of the developer sleeve).

 If there is any streak of yellow, magenta, cyan or black streak in the secondary-scanning direction –

- Check if there is any stain or dust on the main charger wire that corresponds to the color of the streak.
- If there is any white streak in the secondary-scanning direction -
  - Check if there is any stain or dust on the slit glass of the laser optical unit.
- If the entire page is solid in a specific color -
  - Abnormality of the main high-voltage transformer corresponding to that color or abnormality of the laser optical unit.

Of the four main high-voltage transformers, exchange the main high-voltage transformer considered to be abnormal for other main high-voltage transformer considered to be normal, and then output the chart again.

If the solid color over the entire page changes as the result of exchanging the main high-voltage transformer, that main high-voltage transformer is abnormal.

If the solid color over the entire page does not change, check whether there is any disconnection of the harness between the LGC board and the main high-voltage transformer or whether the power supplys to the main charger (disconnection of high-voltage harness or contact defects). If there is no problem, check the laser optical unit.

If the density is low on both front and rear sides and any of the above abnormalities are not found, make the following check.

<Check by the gradation pattern>

- 16. While pressing [0] and [5] simultaneously, turn the power ON.
- 17. Enter "4" with digital key and press the [PRINTER/NETWORK] key.
- 18. Check the output gradation images for gamma adjustment if there is any abnormality in the gradation of yellow, magenta, cyan and black.
  - If there are any abnormalities -
  - (1) Check if the photoconductive drum and transfer belt are operating. If not, correct any mechanical problems.
  - (2) Check if the transfer belt unit is raised fully upward.
  - (3) Check if the transfer/transport unit is inserted securely.
  - (4) Check the surface of the transfer belt for any abnormal stain, large flaw or break.
  - (5) Check if the connector of the transfer transformer is disconnected.
  - (6) Check if any of the high-voltage harnesses of the main high-voltage transformer/ transfer transformer is disconnected.
  - (7) Check the harness between the LGC board and the transfer transformer if it is opencircuited.
  - (8) Check the high-voltage contacts of the transfer belt unit if they are contacting properly or if they are not dirty.
  - (9) Check if any of the high-voltage harnesses is disconnected.
  - (10) Check if the connector J113, J114 or J119 on the LGC board is disconnected.
  - (11) Check if the connector J181, J182, J185 or J188 on the IMC board is disconnected.
  - (12) Check if the harness between the LGC board and the color registration sensor is open-circuited.
  - (13) Check if the color registration sensor connector is disconnected.
  - (14) Check if any of the main high-voltage transformer connectors is disconnected.
  - (15) Check if any of the harnesses between the LGC board and the main high-voltage transformers is open-circuited.
  - (16) Replace the transfer transformer.
  - (17) Replace the main high-voltage transformer.
- 19. Check the sensor detection area of the transfer belt for any damage, and if damaged, replace the transfer belt.
- 20. Check the emitting/receiving area of the color registration sensor if it is not dirty.
- \* Be sure to do the following after having made checks and corrections:
  - 1. While pressing [0] and [8] simultaneously, turn ON the power.
  - 2. Enter [742] with digital keys and press the [START] key.
  - 3. Set the color registration control setting to "0" (automatic).
  - 4. Enter [743] with digital keys and press the [START] key.
  - 5. Set the color registration control during warming-up setting to "1" (enabled).
  - 6. Turn OFF the power.

#### [F07][F13] Communications error between system-CPU and LGC-CPU

Did the error occur immediately after updating the firmware?



11. Replace the LGC board.

#### [F10] HDD formatting error

- (1) Format the HDD. (Enter "2" into 08-690)
- (2) Check if the HDD is mounted.
- (3) Check if the specified HDD is mounted.
- (4) Check if the connector pins of the HDD are bent.
- (5) Check if the power supply connector is disconnected.
- (6) Check if the connector J144 on the SYS board is disconnected.
- (7) Replace the HDD.
- (8) Replace the SYS board.
- (9) Replace the harness.

\* When changing a HDD, do the following operations after replacing a new one.

1. Formatting of the HDD

<Procedure>

- (1) Turen ON the power while the digital keys [0] and [8] are pressed simultaneously.
- (2) Confirm that "Test Mode" is displayed on the control panel. Enter the code "690" and press the [START] key. The display changes to "System Mode".
- (3) Enter "2" and press the [SET] or [INTERRRUPT] key.
- (4) [WAIT] is displayed.
- (5) Turn OFF the power after the message [REBOOT THE MACHINE] is displayed.
- 2. Downloading of the UI data
  - (► Chapter. 5)

## [F09] [F11] Communications error between system-CPU and scanner-CPU

# [F12] Communications error between system-CPU and scanner-CPU (Adjustment/setting value of scanner improper)

Did the error occur immediately after updating the firmware?



- 8. Check the scanner related setting values (08-360 and 361).
- 9. Replace the SYS board.
- 10. Replace the IMG board.
- 11. Replace the SCM board.

#### 4.1.21 Image processing related service call

#### [F51] Communications error between system-CPU and AI board during pre-scanning

- 1. Check if the AI board is securely connected to the connector on the IMG board.
- 2. Check if the IMG board is securely connected to the MTH1 board.
- 3. Check if the SYS board is securely connected to the MTH1 board.
- 4. Check if FROM is mounted on the IC8 on the AI board.
- 5. Check if FROM is mounted in the proper direction on the AI board.
- 6. Replace the AI board.
- 7. Replace the IMG board.
- 8. Replace the SYS board.
- 9. Replace the MTH1 board.
- \* Service call [F51] occurs only when copying with the original mode "AI" selected. The other original modes are operable.

# 4.2 Troubleshooting of Image

(1) Color deviation

<Symptoms>

- 7 1			
Original mode	Location	Phenomena	
All modes	Color blurred in outline of	Color	
	white text or illustration	deviation	
	on a colored background		
Text mode	Outline in black text on a	White void	
Text/Photo mode	colored background		 ABC
Photo mode	Color blurred in outline of	Color	
Map mode	line or text	deviation	
	-		

Section	Stor		Cause		Chock Itom	Critoria
Section	Sie	Main-Classification	Sub-Classification	Specific-Classification	Check item	Gillena
	1				Output the built-in grid pattern on A3/LD.	Perform following procedures from 2 and after.
Color registration control	2	Control error or poor optimization			Check the grid pattern.	Are the grid lines out of alignment?
Paper transport system	3	Paper transport speed in regist-	Low speed	Adjustment error	Check the grid pattern.	Are the lines of the primary-scanning direction out of alignment and parallel in order of Y-M-C-K from the exit side in the whole image?
		ration section	Low speed	Registration roller aging change		
			Low speed	Registration roller life (worn out)	Check the condition of registration rubber roller surface.	Does the roller surface lack in friction and is it slippery?
			High speed	Adjustment error	Check the grid pattern	
	4	Paper transport speed in fuser	High speed	Adjustment error	Check the grid pattern.	Are the lines of the primary-scanning direction out of alignment and parallel in order of Y-M-C-K from the exit side in the latter half of the image?
		unit			Feed paper with the front door open and check the paper transport between the transfer belt and fuser unit.	Is paper tightened?
					No problem is in normal paper mode, but in the thick paper 3 mode, deviation occurs in (Y)MCK order, at the trailing edge of A3/LD sheet.	Is paper tightened?
Drum drive system	5	Drum rotation	Unstable	Motor abnormal	Check drum motor operation in the test mode (03)	
				Control circuit abnormal	Check drum motor operation in the test mode (03).	
		Drum motor rotation speed	Inadequate	Adjustment error	Re-check values set for drum motor rotation speed.	Is the value significantly different from the default value 1787? (The value shifts one step each in connection with transfer belt speed.)
		Drum coupling	Loose coupling		Check the grid pattern.	
			Damage Deformation			
Transfer belt system	6	Transfer belt	Deformation or damage		Check the grid pattern. Check the condition of transfer belt edge.	Is the misalignment of the secondary-scanning direction varied? Is the belt edge damaged or folded?
		Drive roller	Slipping	Stain	Check the grid pattern. Check the condition of roller surface.	Is the misalignment of the primary-scanning direction varied? Is there any stain?
		Large driving	Used toner	Over capacity	Check the grid pattern.	Is the misalignment of the primary-scanning direction varied?
		load	Cleaning blade	Peeling		
Laser optical unit	7	Tilt adjustment mechanism	Adjustment me- chanism defect		Check the grid pattern.	Are the lines of the primary-scanning direction out of alignment at front or rear?
		Reflection mirror warp			Check the grid pattern.	Are the lines of the primary-scanning direction warped?
		fθlens characte- ristic defect			Check the grid pattern.	Are the lines of the primary-scanning direction warped?

TROUBLESHOOTING

#### Measures

Forced performing of color registration control

Readjust registration motor speed. \* See P. 4-68.

Readjust registration motor speed. \* See P. 4-68.

Replace the registration roller.

Readjust registration motor speed. \* See P. 4-68. By fine adjustment (a few steps at a time), slacken paper slightly, not tighten it (to a straight line in side view) between the transfer belt and fuser unit.

Increase the value of 05-408 (correction of fuser motor rotation speed for the thick paper 3 mode), by finely adjusting a few steps at a time.

Troubleshoot the drum drive system. Troubleshoot the drum drive system.

Reset drum motor speed to 1787.

Tighten the screws. Replace the couplings. Replace the couplings. Replace the belt (troubleshoot the transfer belt).

Clean it.

Troubleshoot the used toner system. Replace the cleaning blade (troubleshoot the transfebelt). Replace the unit.

Replace the unit.

Replace the unit.

# (2) Uneven pitch and jitter image

# <Symptoms>

_				. '
	Original mode	Location	Phenomenon	
	All modes	Occurs cyclically at right angles to paper feeding direction	Uneven pitch	



Section	Stor	Cause			Check item		Criteria		
Section	Sieh	Main-Classification	Sub-Classification	Specific-Classification	Check liem	Criteria			
	1				Output the built-in halftone and grid		Perform following procedures from 2 and after.		
					patterns on A3/LD.				
Paper transport	2	Paper transport	Low speed	Adjustment error	Check the grid pattern.		Is there uneven pitch extending 2.5 mm to 3 mm within an area		
syetem		speed in regist-					about 130 mm wide from the leading edge of the image?		
		ration section	Low speed	Registration roller					
				aging change					
			Low speed	Registration roller	Check the condition of registration		Does the roller surface lack in friction and is it slippery?		
				life (worn out)	rubber roller surface.				
			High speed	Adjustment error	Check the grid pattern.				
	3	Paper transport	High speed	Adjustment error	Check the grid pattern.		Is there uneven pitch extending approx. 2.9 mm within an area		
		speed in fuser					about 150 mm wide from the trailing edge of the image?		
		unit			Feed paper with the front door open		Is paper tightened?		
					and check the paper transport between				
					the transfer belt and fuser unit.				
Drum drive system	4	Drum	Surface condition		Check the halftone pattern.		Are there uneven pitches approx. 94 mm in the whole image?		
				Damage	Check the drum surface.		Is there any damage?		
				Attached foreign	Check the drum surface.		Is there any attached foreign matter?		
				matter					
	5	Drum rotation	Unstable	Motor abnormal	Check drum motor operation in test mode (03).				
				Control circuit	Check drum motor operation in test mode (03).				
				abnormal					
		Drum motor	Inadequate	Adjustment error	Re-check values set for drum motor		Is the value significantly different from the default value		
		rotation speed			rotaion speed.		1787? (The value shifts one step each in connection		
							with transfer belt speed)		
		Drum coupling	Drum coupling	Drum coupling	Loose coupling		Check the halftone pattern.		
			Damage						
			Deformation						
Transfer belt system	6	Drive unit	Timing belt	Tension looseness	Check the halftone pattern.		Are there uneven pitches approx. 2.5 mm in the whole image?		
	7	Transfer belt	Deformation or		Check the halftone pattern.		Are there uneven pitches approx. 75 mm in the whole image?		
			damage		Condition of transfer belt edge.		Is the belt edge damaged or folded?		
		Drive roller	Slipping	Stain	Check the halftone pattern.		Are there uneven pitches approx. 75 mm in the whole image?		
					Check the condition of roller surface.		Is there any stain?		
		Large driving	Used toner	Over capacity	Check the halftone pattern.		Are there uneven pitches approx. 75 mm in the whole image?		
		load	Cleaning blade	Peeling					
Laser optical unit	8	Polygonal mirror	Surface inclined	Deformation	Check the halftone pattern.		Are there uneven pitches approx. 0.3 mm in the whole image?		

Measures
Readjust registration motor rotation speed. * See P. 4-68.
Readjust registration motor rotation speed. * See P. 4-68.
Replace the registration roller.
Readjust registration motor rotation speed. * See P. 4-68.
By fine adjustment (a few steps at a time), slacken paper slightly, not tighten it (to a straight line in side view) between the transfer belt and fuser unit.
Replace the drum.
Replace the drum.
Clean or replace the drum.
Troubleshoot the drum drive system.
Troubleshoot the drum drive system.
Reset drum motor rotation speed to 1787.
Re-fasten the screws.
Replace the couplings.
Replace the couplings.
Re-fasten the screws to fix the tension arm.
Replace the transfer belt (troubleshoot the transfer belt).
Clean it.
Troubleshoot the used toner system.
Replace the cleaning blade (troubleshoot the transfer belt).
Replace the unit.

#### \* Fine adjustment of registration roller paper transport speed

The optimized value against jitter and color misalignment is not always obtained because fine error is generated in automatic adjustment.

If uneven color is generated in the secondary-scanning direction of the image and further adjustment is necessary, perform the following procedure from 1. to 7..

- 1. Start up with the test print mode (04).
- 2. Select the A3/LD size paper.
- 3. Enter the code [234] (select the halftone pattern).
- 4. Select [M] on the control panel and press the [START] key. Since the halftone image is to be continuously printed out, press the [STOP] key when the first sheet starts being fed, to make only one print.
- 5. Repeat procedures 3. and 4. above to print out the halftone image of cyan (C) and black (K).
- 6. Judge the paper transport speed status by image.
  Uneven color of 2.5mm pitch in halftone image is generated. n Paper transport speed is low.
  Uneven color is partially generated at 120mm with magenta, 195mm with cyan and 270mm with black from the trailing edge. n Paper transport speed is high.
- 7. Adjust "Fine adjustment of registration motor rotation speed (05-410)" by one step, assuming the speed status from the grid pattern image and the image criteria in procedure 6. above. After adjusting, repeat procedures 1. to 6. above. When the step value decreases, the paper transport speed becomes higher. When the step value increases, the paper transport speed becomes lower.

The speed should not be too low or too high because either case has harmful effect. (The step value should be approx. within 2853±30.)

**Note:** First perform the adjustments "Fine adjustment of drum motor/transfer belt motor and fuser motor (05-401 to 402)", before proceeding to "Fine adjustment of registration motor rotation speed (05-410)". If the adjustment "Registration motor speed adjustment (05-406)" is performed, the values of "Fine adjustment of registration motor rotation speed (05-410)" and "Fine adjustment of feed motor rotation speed (05-404)" are changed. Therefore, perform the settings of 05-404 again.

#### \*\* Improvement of color mis-registration

Some people such as graphic users who have particularly stringent requirements regarding image quality may sometimes point out color mis-registration.

This is often the case when white letters are in a high background density with various mingled colors. And the colors which should not be seen originally can be visible around the white letters. Such a situation can sometimes be improved by fine-tuning the rotation speed of the fuser motor and the registration motor.

[Adjustment Procedure]

- 1. Prepare a set value table of 05-402 (Fine adjustment of fuser motor rotation speed) and 05-410 (Fine adjustment of registration motor rotation speed). (See below.)
- 2. Make each adjustment value bigger than the current set one. (0, +2, +4...)
- 3. Write down evaluations for each set value of the color mis-registration output image. For example, write down the level (A, B, C...) for your visual evaluations.
- 4. Based on the result, set the combination which had the least color mis-registration.

05-402		05-410					
	0	+2	+4	+6	+8		
0							
+10							
+20							
+30							

(3) Poor image density, color reproduction and gray balance

Cause/Section	Step	Check items	Measures	Remarks
Density/Color reprodu-	1	Check the image density/color	Perform the automatic gamma	
ction/Gray balance		reproduction/gray balance.	adjustment.	
Printer section *1	2	Check the printer output image.	Output the test print pattern for	See step 6 if
			each color (04-231) and check it.	defect occurs.
Parameter adjustment	3	Check the image processing	Adjust the color balance.	
value *2		parameters.	Adjust the image density.	
Scanner	4	Is the original glass or mirrors	Clean it.	
		or lens dirty?		
Printer density	5	Check the density of printer output	Perform the forced performing	
abnormal *1		image.	image quality control (05-878).	
			Output the test print pattern in	
			each color (04-231) and check it.	
Printer output image	6	Is there any faded image (low	Perform troubleshooting proced-	
abnormal *2		density)?	ures against the faded image.	
		Is there any fog in the back-	Perform troubleshooting proced-	
		ground?	ures against the background fogging.	
		Is there any blotch image?	Perform troubleshooting proced-	
			ures against the blotch image.	
		Is there any poor transfer?	Perform troubleshooting proced-	
			ures against the poor transfer.	
		Is there any poor cleaning of the	Correct the transfer belt area.	
		transfer belt?	(Refer to Service Manual)	
		(Check inside the copier.)		

\*1 When adjusting printer section, perform "Forced performing of image quality control " and then "automatic gamma adjustment".

\*2 When adjusting parameters, perform "Automatic gamma adjustment".

#### (4) Background fogging

Cause/Section	Step	Check items	Measures	Remarks
Density reproduction	1	Check the gradation reproduction.	Perform the automatic gamma	
			adjustment.	
Printer section	2	Check the printer output image.	Output the test print pattern for	See step 5
			each color (04-231) and check it.	if defects
				occur.
Parameter adjustment	3	Check the image processing	Check the value of offset amount	
value		parameters.	of processing background.	
	4	Adjust the image processing	While checking the lightest position	h
		parameters.	of color graduation pattern, adjust	
			the reproduction level by the offset	
			amount adjustment of processing	
			background.	
Scanner	5	Is the original glass or mirrors	Clean it.	
		or lens dirty?		
Auto-toner	6	Is the auto-toner sensor normal?	Check the operation of auto-toner	
			sensor and readjust.	
	7	Is the toner supply operating constantly?	Check the motor and circuits.	
Main charger output	8	Is the main charger output normal?	Check the circuits. *	
Developer bias	9	Is the developer bias proper?	Check the circuits. *	
Developer unit	10	Is the contact between the drum	Check the doctor-to-sleeve gap	
		and developer material proper?	and pole position.	
Developer material	11	Is the developer's life finished?	Replace developer material.	
Drum cleaning blade	12	Is it cleaned properly?	Check drum cleaning blade pressure.	
Toner dusting	13	Is toner accumulated on the seals	Remove toner and clean.	
		of the developer unit?		
				Í

\* If the main charger and developer bias outputs seem to be abnormal, exchange the main high-voltage transformer of the color likely to be abnormal for another transformer of another color likely to be normal, and then, output the chart again.

If the same color remains abnormal, check if there is any disconnection of harness between the LGC board and the main high-voltage transformer, disconnection of high-voltage harness, the power supply abnormal, or stain on the main charger wire.

If the color changes as the result of exchanging the main high-voltage transformer, this fogging trouble is caused by the main high-voltage transformer defect. Therefore, replace the main high-voltage transformer of the abnormal color with new one.

After this checking, return the other main high-voltage transformer back to the original color position.

Moire

Cause/Section	Ston	Check items	Measures	Bomarks
Oause/Section	Olep	Offect items	NiedSuleS	Пенакз
Density reproduction	1	Check the gradation	Perform the automatic gamma	
		reproduction.	adjustment.	
Parameter adjustment	2	Check the image proces-	Check the sharpness adjustment	
value		sing parameters.	value.	
	3	Adjust the image proces-	While checking the photo image	
		sing parameters.	and color graduation pattern,	
			decrease moire by sharpness	
			adjustment.	
Printer section	4	Check the printer output	Output the test print pattern (04-	When defects occur,
		image.	231) for each color and check it.	perform the corres-
		5	,	nonding trouble-
				snooting procedures.

### Lack of sharpness

Cause/Section	Step	Check items	Measures	Remarks
Density reproduction	1	Check the gradation	Perform the automatic gamma	
		reproduction.	adjustment.	
Parameter adjustment	2	Check the image proces-	Check the sharpness adjustment	
value		sing parameters.	value.	
	3	Adjust the image proces-	While checking the above encir-	
		sing parameters.	cled image A, increase sharpness	
			by sharpness adjustment.	
Printer section	4	Check the printer output	Output the test print pattern (04-	When defects occur,
		image.	231) for each color and check it.	perform the corres-
				ponding trouble-
				shooting procedures.



Toner offset (Shadow image appears approx. 220 mm behind the high density image.)

Cause/Section	Step	Check items	Measures	Remarks
Density	1	Is the density too high?	Perform the automatic gamma	
			adjustment.	
Fuser unit	2	Is the pressure between the fuser	Check the pressure removal parts	
		roller and lower heat roller proper?	and pressure mechanism.	
	3	Is the thermostat in contact?	Establish its contact.	
	4	Is there scratch on the fuser belt	Replace the fuser belt or the	
		or lower heat roller surface?	lower heat roller.	
	5	Is the fuser belt or lower heat	Replace the fuser belt or the	
		roller life ended?	lower heat roller.	
	6	Are the upper/lower heat rollers	Check and correct the control	
		temperature proper?	circuit.	
Paper	7	Check the paper type and mode.	Select proper paper type and mode.	
	8	Is non-recommended paper used?	Use recommended paper.	
Developer material	9	Is the specified developer used?	Use the specified developer and toner.	
Scanner	10	Are mirrors or original glass or lens dirty?	Clean them.	
Printer section	11	Check the printer output image.	Output the test print pattern (04-	See steps
			231) and check it.	12 and 13 if
				defect occurs.
Printer density	12	Is the density of printer output	Perform the image quality control	Repeat 2-3
abnormal*		image too high?	forcibly (05-878). Output and	times if
			check the test print pattern (04-231).	necessary.
Image quality control	13	Is the control activated?	Check the image quality control	
			related codes.	

\* When adjusting printer section, perform "image quality control forced performing" and then "automatic gamma adjustment".



Cause/Section	Step	Check items	Measures
Scanner	1	Is the scanner bedewed?	Clean it.
Drum	2	Is the drum bedewed or dirty?	Wipe the drum with dry cloth.
			* Be sure never use alcohol or other orga-
			nic solvents because they have bad effect on the drum



Cause/Section	Step	Check items	Measures
Heater lamp unlighted	1	Is poor contact at the terminal point?	Correct it.
	2	Is the heater lamp open-circuited?	Replace it.
Pressure between	3	Are the pressure springs working	Check/adjust the pressure springs.
fuser roller and low-		properly?	
er heat roller improper			
Thermistor, LGC board	4	Is the temperature of upper/lower heat	Check/correct the related circuit.
		rollers too low?	
Paper	5	Is paper damp?	Change paper.

Feeding direction

Cause/Section	Step	Check items	Measures
High-voltage transformer	1	Is the high-voltage transformer output	Adjust the output and correct the circuit, or
(transfer roller/		defective?	replace the transformer.
developer bias)			
Processing unit (EPU)/	2	Is the processing unit (EPU) or the	Check/correct the developer sleeve coupling
developer unit set position		developer unit installed securely?	engaging. Check the EPU sliding mechanism.
Developer drive system	3	Do the developer sleeve and mixer rotate?	Check/correct the developer drive system.
Developer material	4	Is developer material properly trans-	Remove foreign matter from developer
		ported?	material, if any.
Developer pole position	5	Is there any magnetic brush phase error?	Check the developer pole position.
Doctor blade position	6	Is the doctor sleeve gap incorrect?	Adjust the gap with the doctor-sleeve jig.
Drum	7	Is the drum rotating?	Check that the drum shaft is inserted.
			Check the drum drive system.
Harnesses for SCM,	8	Are the connectors securely connected?	Re-connect the connectors securely.
SYS, IMG, IMC and		Is any harness between the boards	Replace the harness.
LGC boards		open-circuited?	

·			

Cause/Section	Step	Check items	Measures
Exposure lamp	1	Does the exposure lamp light?	Check the contact of the inverter connector.
Inverter			If the inverter does not work, replace it.
			If the lamp does not work, replace it.
Main charger	2	Is the main charger securely installed?	Reinstall it securely.
	3	Is the main charger wire open-circuited?	Replace it.
High-voltage transformer	4	Is the high-voltage transformer output	Adjust the output and correct the circuit, or
(Main charger)		defective?	replace the high-voltage transformer.
Harnesses for SCM,	5	Are the connectors securely connected?	Re-connect the connectors securely.
SYS, IMG, IMC and		Is any harness between the boards	Replace the harness.
LGC boards		open-circuited ?	
Scanner	6	Is there foreign matter in the optical	Remove it.
		path?	
Bedewing of scanner	7	Is the scanner or the drum bedewed?	Clean the mirrors, lens and drum.
and drum			Keep the power cord plugged so that the damp
			heater can work.



Cause/Section	Step	Check items	Measures
Laser optical unit	1	Is there foreign matter or dust on the	Clean the slit glass.
		slit glass?	
Main charger grid	2	Is there foreign matter on the charger	Remove foreign matter.
	-	grid ?	-
Developer unit	3	Is there foreign matter inside the doc-	Remove foreign matter.
		lor blade?	
	4	Is there foreign matter on the drum seal?	Remove foreign matter.
	5	Is the drum seal of developer unit in	Modify the position of drum seal or replace it.
		proper contact with the drum?	
Drum	6	Is there any abnormalities on the drum surface?	Replace the drum.
Transport path	7	Does the toner image touch foreign matter after transfer, before entering the fuser unit?	Remove foreign matter.
Discharge lamp	8	Has any LED of discharge lamp gone out?	Replace the discharge lamp.
Scanner	9	Is there foreign matter or dust in the optical path	Clean the lens and mirrors.



Cause/Section	Step	Check items	Measures
Main charger	1	Is there foreign matter on the charger?	Remove foreign matter.
	2	Is terminal contact poor?	Clean or adjust terminals.
Drum	3	Is there any abnormalities on the drum surface?	Replace the drum.
Discharge lamp	4	Is the discharge lamp lighting prop-	Replace the discharge lamp or clean term-
		erly?	inals.
Developer unit	5	Is the developer sleeve rotating cor-	Check the developer drive system, or clean
		rectly? Is there any abnormalities on	the sleeve surface.
		the sleeve surface?	
Drum and scanner	6	Is the drum or scanner jittery?	Check each drive system.
drive systems			
High-voltage transformer	7	Is the high-voltage transformer output	Check/correct any electric leakage and related
(main charger and		defective?	circuits.
transfer roller)			If the high-voltage transformer does not work,
			replace it.

# (13) Skew (slantwise copying)



Cause/Section	Step	Check items	Measures
Cassette	1	Is the cassette or LCT properly in-	Reinstall the cassette or LCT properly.
LCF		stalled?	
	2	Is too much paper loaded in the cas-	Reduce paper to 600 sheets or less.
		sette or LCT?	(1500 sheets or less for LCT)
	3	Is the paper corner folded?	Change the paper direction and reinsert it.
	4	Are cassette or LCT side guides prop-	Adjust side guides.
		erly set?	
Paper feed roller	5	Is the surface of paper feed roller dirty?	Clean the roller surface with alcohol, or re-
			place the roller.
Rollers	6	Is each roller improperly fixed to the	Check and fasten E-rings, pins, clips and
		shaft?	setscrews.
Registration roller	7	Is the registration roller spring out of	Mount the spring correctly. Clean the roller if it
		place?	is dirty.
Pre-registration guide	8	Is the pre-registration guide improp-	Correct it.
		erly installed?	
Original scale	9	Is the original scale slanted?	Adjust it.



Cause/Section	Step	Check items	Measures
Scanner	1	Is there foreign matter in the optical	Clean the slit, lens and mirrors.
		path?	
	2	Is there dust or stain on the shading	Clean the plate.
		correction plate?	
Main charger	3	Is there foreign matter on the charger	Remove foreign matter.
		grid?	
	4	Is the charger grid dirty or deformed?	Clean or replace the charger grid.
	5	Is there foreign matter on the main	Remove foreign matter.
		charger?	
	6	Is the charger wire dirty or deformed?	Clean or replace the charger wire.
	7	Is there foreign matter inside the	Remove foreign matter.
		charger case?	
	8	Is the inner surface of charger case	Clean inside.
		dirty?	
Cleaner	9	Is there paper dust on the cleaning	Clean or replace the paper dust removal brush
		blade edge?	for the registration roller.
			Clean or replace the cleaning blade.
	10	Is the cleaning blade contact im-	Correct it.
		proper?	
	11	Is toner recovery defective?	Clean the toner recovery auger section.
Fuser unit	12	a. Is there dirt or scratches on the fuser	a. Clean or replace them.
		belt and lower heat roller surface?	
		b. Is the thermistor dirty?	b. Clean the thermistor.
Drum	13	Are there scratches on the drum sur-	Replace the drum.
		face?	
Laser optical unit	14	Is there foreign matter or dust on the	Remove foreign matter or dust.
		slit glass?	

(15) Color banding (at right angles to feeding direction)



Cause/Section	Step	Check items	Measures
Main charger	1	Is the charger wire dirty or deformed?	Clean or replace the charger wire.
Fuser unit	2	Is the fuser belt, lower heat roller or	Clean them.
		oil roller dirty?	
High-voltage transformer	3	Is the high-voltage transformer output	Check the circuit and replace the high-volt-
(main charger/		defective?	age transformer if not working.
transfer roller)			
Drum	4	Is there deep scratch on the drum sur-	Replace the drum, especially if the scratch has
		face?	reached the aluminum base.
	5	Are there fine scratches on the drum	Check and correct the contact of cleaning
		surface (drum pitting)?	blade and recovery blade.
Scattered toner recove-	6	Is electrical continuity secured be-	If not, replace the developer bias supply
ry roller of developer		tween the developer bias supply	spring.
unit		spring and the recovery roller?	
Scanner carriage section	7	Is there foreign matter on the carriage	Remove foreign matter.
		rail?	



Cause/Section	Step	Check items	Measures
Developer unit/	1	Is the toner density of developer ma-	Check and correct the auto-toner sensor and
Toner cartridge		terial proper?	toner supply operation.
			Check whether the amount of toner is suffi-
			cient in the toner cartridge.
	2	Is the doctor-sleeve gap proper?	Adjust the gap.
Main charger	3	Is there foreign matter on the charger?	Remove it.
	4	Is the charger wire dirty or deformed?	Clean or replace the charger wire.
High-voltage transformer	5	Is the high-voltage transformer output	Adjust the output.
(main charger/ develo-		defective?	
per bias/transfer roller)			
Developer material	6	Is the developer material life ended?	Replace developer material.



Cause/Section	Step	Check items	Measures
Transfer belt	1	Is the transfer belt dirty?	Clean it.
	2	Is the transfer belt in proper contact	Correct it.
		with the drum ?	
	3	Is there any deformation or abnormali-	Replace the belt.
		ties on the transfer belt?	
Paper	4	Is paper in the cassette or LCT curled?	Reinsert paper with reverse side up or
			change paper.
	5	Is paper in the cassette or LCT damp?	Change paper.
			* Avoid storing paper in damp place.
Registration roller	6	Is the registration roller mal-function-	Clean the roller, re-mount the spring, or re-
		ing?	place defective clutch-related parts.
			Readjust the roller speed.
High-voltage transformer	7	Is the high-voltage transformer output	Check the circuit and adjust the transformer
(transfer roller)		defective?	output.



Cause/Section	Step	Check items	Measures
Main charger	1	Is the main charger dirty?	Clean it or replace the charger wire.
Transfer belt	2	Is the transfer belt dirty?	Clean the belt.
	3	Is the transfer belt in proper contact	Correct it.
		with the drum?	
	4	Is there any abnormalities or deforma-	Replace the belt.
		tion on the belt?	
Laser optical unit	5	Is there foreign matter or dust on the	Clean the slit glass.
		slit glass?	
Discharge lamp	6	Is the discharge lamp dirty?	Clean it.
	7	Has any LED of discharge lamp gone	Replace it.
		out?	
Developer unit	8	Is the magnetic brush in proper con-	Adjust the doctor-sleeve gap.
		tact with the drum?	
	9	Is the developer unit pressure mecha-	Check the mechanism.
		nism malfunctioning?	
	10	Is the transport of developer material	Remove foreign matter if any.
		poor?	
Scanner section	11	a. Is the platen cover open?	a. Close the platen cover.
		b. Are original glass, mirrors, or lens	b. Clean them.
		dirty?	



Cause/Section	Step	Check items	Measures
Toner empty	1	Is the "ADD TONER" symbol flashing?	Replace the toner cartridge.
Auto-toner circuit	2	Is there enough toner in the cartridge?	Check the auto-toner circuit function.
	3	Is the toner density of developer ma-	
		terial too low?	
Toner motor	4	Is the toner motor malfunctioning?	Check the motor drive circuit.
Toner cartridge	5	Are there any abnormalities in the	Replace the toner cartridge.
		toner cartridge?	
Developer material	6	Is the developer material life ended?	Replace developer material.
Developer unit	7	Is the magnetic brush in proper con-	Check the developer unit installation.
		tact with the drum?	Check the doctor-sleeve gap and pole posi-
			tion.
Main charger	8	Is the main charger dirty?	Clean it or replace the charger wire.
Drum	9	Is there film forming on the drum sur-	Clean or replace the drum.
		face?	
High-voltage transformer	10	Is the high-voltage transformer output	Adjust the high-voltage transformer output.
(developer bias)		settings improper?	



Cause/Section	Step	Check items	Measures
Adjustment error of	1	Is same dislocation on every copy?	Adjust the scanner/printer using the adjust-
scanner or printer section			ment mode.
Registration roller	2	Is the registration roller dirty, or the	Clean the roller with alcohol.
		spring out of place?	Reinstall the spring.
	3	Is the registration motor mal-function-	Adjust or replace the gears, etc. if they are not
		ing?	engaged properly.
Paper feed motor	4	Is the paper feed motor mal-function-	Check the circuit or the motor and replace
		ing?	them if necessary.
Pre-registration guide	5	Is the pre-registration guide improp-	Reinstall the guide.
		erly installed?	

# (21) Image jittering



Cause/Section	Step	Check items	Measures
—	0	Is the toner image on the drum proper?	If proper, perform step 1 to 3; otherwise per-
			form step 4 and after.
Registration roller	1	Is the registration roller rotating nor-	Check the registration roller section and its
		mally?	springs.
Transfer belt	2	Is the transfer belt operating normally?	Check the drive system and replace the trans-
			fer belt if necessary.
Fuser unit	3	Are the upper/lower heat rollers and	Check the drive system.
		fuser roller rotation proper?	Replace the fuser belt, upper/lower heat roll-
		Is the fuser belt transportation proper?	ers and fuser roller if necessary.
Drum	4	Is there large scratch on the drum?	Replace the drum.
Carriage operation	5	Is the slider sheet defective?	Replace it.
	6	Are there any abnormalities on the	Replace the feet.
		carriage feet?	
	7	Is the tension of timing belt in-appro-	Adjust the tension.
		priate?	
	8	Is the carriage drive system mal-func-	Check the carriage drive system.
		tioning?	
Scanner	9	Are any mirrors loosely installed?	Install them properly.
Drum drive system	10	Is the drum drive system mal-function-	Check the drum drive system.
		ing?	Clean or replace the belts, pulleys, bushings
			if they have dirt or scratches.
Processing unit (EPU)	11	Is the EPU load too high?	Check the EPU.

#### (22) Poor cleaning



Cause/Section	Step	Check items	Measures
Developer material	1	Is the specified developer material	Use the specified developer material and toner.
		used?	
Cleaning blade	2	Is there paper dust on the cleaning	Clean it.
		blade edge?	
	3	Is the cleaning blade peeled?	Replace the blade.
			Check and replace the drum.
Toner recovery auger	4	Is toner recovery defective?	Clean toner recovery auger.
			Check the cleaning blade pressure.
Fuser unit	5	Is the cleaning roller or the oil roller	Replace the defective rollers.
		damaged or their life ended?	
	6	Is there any bubble-like defect on the	Replace the fuser belt. Check and modify the
		fuser belt (220mm pitch on the copy)?	heater control circuit.
	7	Are the fuser belt and the lower heat	Replace them.
		roller life ended?	
	8	Is the pressure between the fuser	Check and adjust the pressure mechanism.
		roller and the lower heat roller proper?	
	9	Is the temperature of upper/lower heat	Check and correct the circuit.
		rollers proper?	



Cause/Section	Step	Check items	Measures
Original glass	1	Is the original glass dirty?	Clean the glass.
Main charger wire	2	Is the main charger wire dirty?	Clean or replace the wire.
Discharge lamp	3	Is the discharge lamp dirty?	Clean it.
Scanner	4	Are the reflector, exposure lamp, mir-	Clean them.
		rors, lens, etc. dirty?	
Exposure lamp	5	Is the exposure lamp tilted?	Adjust the installed position of the lamp.
	6	Is the lamp discolored or degraded?	Replace it.


Cause/Section	Step	Check items	Measures
Paper	1	Does the paper mode correspond to	Check the paper type and mode.
		the paper type?	
	2	Is paper too dry?	Change paper.
Transfer belt		Is the transfer belt in proper contact	Correct it.
		with the drums?	
	4	Are there any abnormalities on the	Clean or replace the belt.
		belt?	
High-voltage transformer	5	Is the high-voltage transformer output	Adjust the output. Replace the transformer, if
(transfer roller)		abnormal?	necessary.

# 5. UPDATING THE FIRMWARE

#### <<Caution>> –

Only the minimum firmware required for updating by the PC is installed in the system control PC board (SYS board), printer control PC board (IMC board), logic PC board (LGC board) and scanner control PC board (SCM board) provided as service parts.

When any of the above PC boards is replaced with a new one in the field, confirm the other firmware version to ensure the most suitable firmware is installed.

\* Never use an unsuitable combination of firmware since it can cause abnormalities.

- The official name of Windows 98 is Microsoft Windows 98 Operating System.
- Microsoft, Windows and the brand names and product names of other Microsoft products are trademarks or registered trademarks of US Microsoft Corporation in the US and other countries.
- Copyright on the software of Windows 95/98 are held by US Microsoft Corporation.
- Some of the screens used in this manual to describe operations are of Windows 95/98.

<sup>•</sup> The official name of Windows 95 is Microsoft Windows 95 Operating System.

# 5.1 Installing Software for Firmware Update

## 5.1.1 Outline

The procedure to update the software of the SYS, IMC, LGC and SCM board using the PPP (Point-to-Point Protocol) and FTP (File Tranfer Protocol) is described in this section.

\* This procedure is described based on the Windows 95/98. Information and necessary files corresponding to other OSs are supplied by the other service information.

## 5.1.2 Requirements

The following environment is necessary to update the firmware.



Software Requirements for PC

- Microsoft Windows95/98
- Virtual modem
- FTP Server / tools (ex. War FTP Daemon)

Use a serial cable for the DTE-DTE connection to connect the PC and SYS board.

(Update cannot be performed with the cable for the DCE-DCE connection)

See below for the connection lines.



Pin No.	Signal	Meaning	I/O
1	CD	Reception carrier detection	I
2	RXD	Reception data	I
3	TXD	Transmission data	0
4	DTR	Data terminal ready	0
5	GND	Signal ground	
6	DSR	Data setting ready	Ι
7	RTS	Transmission request	0
8	CTS	Transmission enabled	Ι
9	CI	Called indication	I

RS232C DTE-DTE Cross Cable Lines (D-SUB 9pin)

Protocol specifications between the PC and SYS board

BAUD RATE	115200bps
DATA BIT	8 BITS
PARITY	NONE
STOP BIT	1 BIT
FLOW CONTROL	NONE
ECHO	OFF

## 5.1.3 Dial-up networking function

The settings necessary for the PPP are described in this section. The dial-up networking function is used to perform the PPP connection on the Windows 95/98.

#### (1) Virtual modem

Since a modem is supposed to be used for the Windows 95/98 dial-up networking, download a virtual modem to enable the connection performed directly with a serial cable.

(2) Installation of virtual modem

Download the following file from the web.

#### URL:http://www.kevin-wells.com/net/mdmcbx4.inf

After the above file was downloaded, install the modem as follows.

Click the "Modems" button on the Control Panel to display the following window, then click [Add].

Modems Properties		?×			
General Diagnostics	1				
🔉 The follow	ing modems are set up	p on this computer:			
Direct Connectio	in				
Add Remove Properties					
Dialing preferences Dialing from: New Location					
Click Dialing Properties to modify how your calls are dialed.					
	<u>D</u> ialing Properties				
· · · · · · · · · · · · · · · · · · ·	ОК	Cancel			

#### The Modem Wizard is opened.

Check "Don't detect my modem; I will select it from a list", and click [Next].



Click [Have Disk], then select a folder in which the downloaded file has been stored.

Install New Modem						
Click the manufacturer and model of your modem. If your modem is not listed, or if you have an installation disk, click Have Disk.						
Manufacturers:       Models         Standard Modem Types)       Dial-Up Networking Parallel Cable between 2 PCs         Scom       Dial-Up Networking Serial Cable between 2 PCs         Scom       Standard 300 bps Modem         Sx       Standard 1200 bps Modem         Accton Technology Corpor       Standard 2400 bps Modem         Standard 9600 bps Modem       Standard 9600 bps Modem         Standard 14400 bns Modem       Standard 14400 bns Modem						
< <u>B</u> ack Next > Cancel						

Select "Direct Connection", then click [Next].

ł	Install New	w Modem
-	چ چ	Click the manufacturer and model of your modem. If your modem is not listed, or if you have an installation disk, click Have Disk.
•	Mode <u>l</u> s Direct Co	nnection
		Have Disk
		< <u>B</u> ack Next> Cancel

Select "Communications Port (COM1)", then click [Next].

Install New Modem	
	You have selected the following modem: Direct Connection Select the port to use with this modem: Communications Port (COM1) ECP Printer Port (LPT1)
	Virtual Infrared CDM Port Virtual Infrared LPT Port
	< <u>B</u> ack Next> Cancel

Click the [Finish] button to complete the virtual modem installation.



## 5.1.4 Installing dial-up networking

Your computer might be already set up to use a network. If the Windows prompts you for a network password at the startup and if the Network Neighborhood icon appears on the Windows desktop, the network function is already set up. In this case, you can skip this section.

In the "Network" dialog box, click the "Configuration" tab. Confirm that "Dial-Up Adapter" and "TCP/IP" are displayed.

Network
Configuration   Identification   Access Control
The following network components are installed:
E Client for Microsoft Networks ■ Dial-Up Adapter TCP/IP
Add Remove Properties Primary Network Logon:
Client for Microsoft Networks
Eile and Print Sharing
Description
OK Cancel

If your PC does not have "Dial-Up Adapter", click [Add].

Select "Microsoft" from the "Manufacturers" list and "Dial-Up Adapter" from the "Network Adapters" list, then click [OK].

TCP/IP Protocol components are automatically installed together with "Dial-Up Adapter".

Select Netwo	rk adapters	×
Click you	k the Network adapter that matches your hardware, and then cli have an installation disk for this device, click Have Disk.	ck OK. If
Manufacturers Microdyne Microsoft Microsoft Miron Mitron National D Mitron	Network Adapters:   Network Adapters:  Network Adapter  Nicrosoft Virtual Private Networking Adapter  Datacomm Semiconductor	pter
	<u>Н</u> аче С ОКС	Disk

## 5.1.5 Setting dial-up networking

Double-click "My Computer". If the "Dial-Up Networking" icon is not in the window, open [Add/Remove Programs] in the Control Panel to install it.



Double-click "Dial-up Networking" and then "Make New Connection".

ľ	😰 Dial-U	p Ne	etworki	ng					
	<u> </u>	Edit	⊻iew	<u>G</u> o	F <u>a</u> vorites	<u>C</u> onnecti	ons <u>H</u> el	p	
	+ Back	Ŧ	<b>⇒</b> Forwa	rd	t_ Up	©∕ Create	<i>S</i> Dial		/ » e .t
	A <u>d</u> dress	19 (	Dial-Up I	Netwo	rking				•
:	Make Ne Connecti	on							
I	l object(s)								

Enter a name in the box "Type a name for the computer you are dialing", and then select "Direct Connection" for "Select a device". Then, click [Configure].

Make New Connection	×
	Ivpe a name for the computer you are dialing:          My Connection         Select a device:         Image: Direct Connection         Image: Direct Connection         Image: Direct Connection
	< <u>₿</u> ack <u>N</u> ext > Cancel

Click the "General" tab in the "Direct Connection Properties" dialog box. Select "115200" for "Maximum speed", and check "Only connect at this speed".

Direct Connection Properties	? ×
General Connection Options	
Direct Connection	
Port: Communications Port (COM1)	
<u>Speaker volume</u>	
Off High	
_ <u>M</u> aximum speed	
115200	
☑ Only connect at this speed	
OK Car	icel

Click the "Connection" tab, confirm that no item in "Call preferences" is selected, and then click [Ad-vanced].

Direct Connection Properties
General Connection Options
Connection preferences
Data bits: 8
Parity: None 💌
Stop bits: 1
Call preferences
☐ Wait for dial tone before dialing
. <u>C</u> ancel the call if not connected within <u>60</u> secs
Disconnect a call if idle for more than 30 mins
Port Settings Advanced
OK Cancel

Confirm that no item in the "Advanced Connection Settings" dialog box is selected. Click the [OK] button to return to the "Make New Connection" dialog box and click [Next].

Advanced Connection Settings	<u>? ×</u>
Use error control  Bequired to connect  Compress data  Use cellular protocol	Use flow control  Hardware (RTS/CTS)  Software (XON/XOFF)
_ <u>M</u> odulation type Standard	
Extra settings	
L Append to log	OK Cancel

Make New Connection	×
	Type the phone number for the computer you want to call: Area code: Ielephone number:
	< <u>B</u> ack <u>N</u> ext> Cancel

Enter "#39" in the "Telephone number" box.

Select an appropriate country code, then click [Next].

Make New Connection	×
	You have successfully created a new Dial-Up Networking connection called: My Connection Click Finish to save it in your Dial-Up Networking folder. Double-click it to connect. To edit this connection later, click it, click the File menu and then click Properties.
	< <u>B</u> ack Finish Cancel

Click [Finish] to complete the setting for the "Dial-up Networking".

## 5.1.6 Installing software for FTP server

Install free software [War FTP Daemon Version 1.65] to use it as an FTP server. War FTP Daemon can be downloaded from the following website.

## FTP: ftp://ftp.jgaa.com/pub/products/Windows/WarFtpDaemon/1.6\_Series/ward165.exe HTTP: http://download.jgaa.com/ftp/pub/products/Windows/WarFtpDaemon/1.6\_Series/ward165.exe

Some files are extracted by double-clicking the [ward165.exe] icon. Double-click [Setup.exe] to start installation.

Create a new folder "C:\WEBSHARE\FTPROOT".

Double-click [war-ftpd.exe] in the [war-ftpd] folder.

COTTUME WARTER	1.66		치미지
N IENA D			
R Login Name		[ State	System Attributes Dery all logins (except for administrator) Dir bio anonymous logins Max Users 50 Anon 10 Prinamber and post 133,115,48,210 21 Messages hore the users
15 1999-08 23 18 321 works	FTPD 1.65 Capyright (s	(1996, 1997) by gas. WW	ن ا ا ا ا ا ا ا ا ا ا ا ا ا ا ا ا ا ا ا

Select [Properties]-[Security]-[Edit User].

Interesting of the	16	
and the second se	The second second second	*
C Ender (dery lage)	Storty [fin.huma]	Annk
401	_	Paravel

Click [Add] and type in "dppc" in the "New name" box.

Name of new user	×	Name of
New name	OK Cancel	New na

Type in "dppc" in the "New Password" and "Verify Password" boxes, then click [OK].

×		sword	New P
	OK	assword	New
	Cancel		
		assword	Verif

New Password	×
New Password	ОК
	Cancel
Verify Password	

Select "dppc" and click the "File Access" tab. Then, click [Add].

Line	Security File Assess		
C Dente Harrison	Field Table	Fax.	K
acceptors	[] [] [] [] [] [] [] [] [] [] [] [] [] [	F	Cercel
		Denhami I <sup>II</sup>	
	L	lipsoint IT	Figore Balkcom
AN Day		F Partie	Faction

×

OK Cancel

#### Double-click "Webshare".

Select Directory	×
C:V	
ACPIBIOS.UPD download Message_converter MSDIffice Program Files RECYCLED Setup WEBSHARE WINDOWS Windows Update Setup Files Work	OK Cancel << Back Update

Double-click "Ftproot" and click [OK].

Select Directory C:\WEBSHARE	<u>×</u>
FTPROOT	OK Cancel
	<< Back
	Update

Check the "Read", "Write", "Delete", "Execute", "List", "Create" and "Remove" boxes. Confirm that the check marks are not gray but black.

Check "Root", "Home" and "Recursive" in the "Special" box as well. Click [Apply] and then [OK].

(#)		Security File Access		
Dicable (derg ) nonyrout	agin)	Path [default persistions] MONTREEMAL	Files F Read F Wate F Delete F Execute	OK Apply Cancel
			Deschoses F Lie (dd) F Create F Renove	
Add	Casy	Add Delete	Special IF DENY IF Root IF Hone IF Mapping	Reports De Appens Root/Home

Enter the "ONLINE" mode by clicking the *starting* button before starting the firmware update.

Lugin Name	State	Error Andreas     F     Error of logies transpil for advance     No anonymoust logies     Error Inc.     To
		Mar Upen 1 <sup>24</sup> (proc. 1 <sup>24</sup> ) P moder and per [1331195.482315 [21 Messages from the users
60 1 2 1 1 2 1 1 2 1 2 1 2 1 2 1 2 1 2 1	1 (1996, 1997) by gas, Wi	

# 5.2 Operation Procedure in [3][9] Mode

## 5.2.1 Outline

Connect the copier and PC with a serial cable and turn ON the power while pressing the digital keys [3] and [9] simultaneously to start the "Firmware Update Mode". The system firmware, UI data and engine firmware (printer ROM, engine ROM and scanner ROM) can be updated in this mode.

**Note**: In the [3] [9] mode, the version of system firmware and UI data can be displayed, but the version of engine firmware cannot be displayed. Therefore, confirm the version of engine firmware in the setting mode (08).

## 5.2.2 Preparation

The following need to be prepared or performed in advance to update the firmware.

(1) Software installation

"Virtual modem" and "War FTP Daemon" have to be installed in the PC.

Refer to "5.1 Installing Software for Firmware Update"

"War FTP Daemon" has to be in the "ONLINE" mode when updating the firmware.

### (2) New file

Prepare files for updating in the PC.

New files with the preset directory and names are provided in the following folder.

#### 📾 Ftproot - 🗆 🗵 <u>F</u>ile <u>E</u>dit <u>V</u>iew 1 <u>G</u>o F<u>a</u>vorites <u>H</u>elp Paste X Cut Сору t Up ✓ Links » Address 🗋 C:\WEBSHARE\FTPROOT ۶**A** ۳**A** sysfirm.tz uidataF.tz uidata0.tz uidata1.tz uidata2.tz B B B ۳**A** <u>ا</u> uidata3.tz uidata4.tz uidata5.tz uidata6.tz uidata7.tz imcfirm.tz mfirm.tz scmfirm.tz 13 object(s) 🛄 My Computer

## C:\WEBSHARE\FTPROOT

New files:

-	System firmware	sysfirm.tz
-	UI data fixed section	uidataF.tz
-	UI data common section	uidata0.tz
-	1st language UI data	uidata1.tz
-	2nd language UI data	uidata2.tz
-	3rd language UI data	uidata3.tz
-	4th language UI data	uidata4.tz
-	5th language UI data	uidata5.tz
-	6th language UI data	uidata6.tz
-	7th language UI data (American English)	uidata7.tz
-	Engine firmware (Engine ROM)	mfirm.tz
-	Engine firmware (Printer ROM)	imcfirm.tz
-	Engine firmware (Scanner ROM)	scmfirm.tz

(3) Connection between the SYS board and PC

The SYS board and PC are connected with a cross cable.

For the PC, connect the cable to the connnector corresponding to the serial communication port (eg.

COM1) which is specified when the virtual modem is set up.

For the SYS board, connect the cable to the MMF(FSMS) port.

Note: Do not connect serial cable with machine power turned ON.

## 5.2.3 Updating firmware

Update the firmware in the [3][9] mode as follows:

- 1. Turn ON the power of the copier while the digital keys [3] and [9] are pressed simultaneously.
- 2. The following is displayed on the control panel of the copier.

Firmware Version Up Mode
> Make a connection from PC.

Make a serial connection using the dial-up networking function of the PC.
 Refer to "5.1 Installing Software for Firmware Update" for the dial-up network connection.
 Double-click the defined icon for connection in the "Dial-up Networking" dialog box to perform the connection processing.

😰 Dial-Up Networking	
<u>] File E</u> dit <u>V</u> iew <u>G</u> o F <u>a</u> vorites <u>C</u> onnections <u>H</u> e	lp D
←     →     ↓     1     Image: Second s	S S S S S S S S S S S S S S S S S S S
Address 😰 Dial-Up Networking	
Make New Connection	
2 object(s)	
$\overline{\Box}$	
Image: Second to     Image: Second to	Enter "#39" in the "Phone number" box.
Earne gundee: #39 Dialing from New Location Real Connect Cancel	

4. The following is displayed if the serial connection was completed successfully.



You can press [HELP] to confirm the current version (the version before the copier is updated).

\*The engine firmware version cannot be displayed in this screen. Use the setting mode to confirm them.

08-902: Engine ROM version (LGC)

08-903: Printer ROM version (IMC)

08-904: Scanner ROM version (SCM)

Press [HELP] again to return to the above screen.



The "target" number indicates the following.

- 1: System firmware
- 2: UI data fixed section
- 3: UI data common section
- 4: 1st language UI data
- 5: 2nd language UI data
- 6: 3rd language UI data
- 7: 4th language UI data
- 8: 5th language UI data
- 9: 6th language UI data
- 10:7th language UI data

The version number is displayed as "XXX.YYY".

"XXX" indicates the major version and "YYY" is the minor version.

The "code" indicates the following.

- A. The "code" for the System firmware ("target": 1) denotes the destination.
  - U: USA and Canada
  - E: European countries
  - X: Australia and Asian countries
- B. The "code" for the UI data ("target": 2-10) denotes the language.

Code	Language	Code	Language
2	Japanese	13	Finnish
3	American English	14	Norwegian
4	English	15	Australian English
5	—	16	Polish
6	French	17	Czech
7	German	18	Greek
8	Swedish	19	Romanian
9	Dutch	20	Bulgarian
10	Italian	21	Portuguese
11	Spanish	22	Hungarian
12	Danish	23	—

## 5. Select the area to be updated using the digital keys and [INTERRUPT] key.

(Press the [INTERRUPT] key to enter "#".)

The selected number is displayed at upper right of the screen, next to "Target:". The relation between the selected number and area to be updated is as follows.

- 1 : System firmware
- 2 : UI data fixed section
- 3 : UI data common section
- 4 : 1st language UI data
- 5 : 2nd language UI data
- 6 : 3rd language UI data
- 7 : 4th language UI data
- 8 : 5th language UI data
- 9 : 6th language UI data
- 10: 7th language UI data
- 11 : Engine firmware (Engine ROM)
- 12 : Engine firmware (Printer ROM)
- 13 : Engine firmware (Scanner ROM)
- #1 : System firmware and all UI data (1 to 10)
- #2 : All UI data (2 to 10)
- #3 : All language UI data (4 to 10)
- #4 : All data (1 to 13)
- #5 : Engine firmware (Engine ROM and printer ROM) (11 and 12)

6. The copier starts updating when the [START] key is pressed.

Do not turn OFF the power of the copier or PC, or disconnect the cable after the [START] key has been pressed.

Interruption during the file transmisson to the copier will destroy the file in the FROM of the copier. The data must be reinstalled after checking and performing the following items.

- Connect the serial cable correctly.
- Restart the copier and PC.
- Change the "War FTP Daemon" to "ONLINE" mode.
- Copy the new files to the PC again.

In case of target 1 - 13 :



\* During writing the data corresponding to the target 11 - 13, the transmission rate is displayed.

  The following will be displayed when the firmware update is completed successfully. In case of target 1 - 13:

If you continue to update the other areas, press the [START] key and perform the step 5 and the followings for each area.

Turn OFF the power or press the [CLEAR] key to exit the update screen.



In case of target #1 - #5:

The following is displayed when the updating is finished.



8. Press the [CLEAR] key to cancel the updating process.

However, it cannot be canceled once the data elimination process on the flash ROM is started.

Firmware Version Up Mode	T	1
Program canceled.	larget:	T

 The following error message is displayed when the firmware was not updated successfully. (If "- device erase error", "- device write error" or "- verify error" occurs, the "Recovery mode" is automatically activated when the power is turned ON next time. See 10.: Recovery mode)



10. Recovery mode

The following is displayed when the power is turned OFF and then back ON after an error has occurred during the updating process.

Firmware Version Up Mode
Recovery mode : target 3-10 failed.
> make a connection from PC

The display changes as follows if the dial-up network connection (see procedure 3) was made successfully.



Further operations and displays are the same as those of the normal sequence.

\* If an error occurs while the processing of automatically sequenced writing of #4, do the following operations after completing the update in a recovery mode.

Target	Area of error	Operation
#4	1~10	After completing the update to the target 10 in a recovery mode, update the
		target 11 to 13 in a writing processing with the area definition.
#4	11~12	After completing the update to the target 12 in a recovery mode, update the
		target 13 in a writing processing with the area definition.

## 5.2.4 Display

The following screens are displayed in the mode [3][9].







In case target of #1- #5:



#### In case of target of 1 - 13:



# 5.3 Updating the Firmware Using the Downloading Jig

In this model, it is possible to update the firmware automatically by connecting the downloading jig using the dedicated connector and turning the power of the copier ON.

The downloading jig consists of the programmed ROM and jig board. Two types of the jig board are available as follows.

Firmware	PC board	Jig board to be used
System firmware	System control PC board (SYS board)	K-PWA-DLS-320
Engine firmware	Logic PC board (LGC board)	
(engine ROM, scanner ROM	Scanner control PC board (SCM board)	K-PWA-DLM-320
and printer ROM)	Printer control PC board (IMC board)	







## 5.3.1 System firmware

(1) ROM type

There are two types of ROM to be downloaded.

### (a) ROM for application downloading

The area in the FROM on the SYS board is updated. This ROM is used for the normal update.

The data to be overwritten by this ROM are as follows.

- System software basic section
  - \* This area cannot be downloaded using PC.
- Program internal application
- UI data fixed section
- UI data common section
- Language(UI) on the display panel

#### (b) ROM for UI data downloading

The language data in the HDD are updated.

The data to be updated by this ROM are as follows.

• UI data: The 1st to 7th languages

When downloading is performed using the ROM for UI data downloading, only UI data in the HDD are updated.

To make the result of updating effective, it is necessary to copy the updated data into the FROM by selecting a desired language in the setting mode "Selection of language(UI) on the display panel (08-220)".

(2) Jig board

Two types of the ROM mentioned above use the jig board K-PWA-DLS-320. (► Page. 5-32)

**Note:** Pay attention to the position and direction of the ROM when it is attached to the jig board.

### (3) Procedure of downloading

### (a) Connect the jig and perform downloading

Attach the ROMs on the jig board and connect the board with the connector of the copier.

- Take off the feed side upper and upper inner cover as well as the metal shield cover.
   (► Service Manual ch. 2.5.2)
- 2. Connect the downloading jig with the jig connector on the SYS board (ROM attached side downward).

Note: Turn OFF the power before connecting or disconnecting the jig.



Turn ON the power (downloading is automatically started).

**Note:** Do not turn OFF the power during the downloading.

The processing status is displayed on the control panel during the downloading.

Download Board Firm	ware Update Mode
Download Board -> F	ROM Update Start.
Check Devices Update FROM Data Check	<ul> <li>Completed</li> <li>Installing</li> </ul>

"Update Completed!!" is displayed on the control panel when the downloading is completed. Turn OFF the power of the copier and disconnect the downloading jig.

Download Board Firm	ware Update Mode
Download Board -> F	ROM Update Start.
Check Devices Update FROM Data Check	<ul><li>Completed</li><li>Completed</li><li>Completed</li></ul>
Update C	completed!!

"Update Failed." is displayed on the control panel when the downloading was not completed successfully. Turn OFF the power, check the downloading jig and copier and attempt the downloading again.

Download Board Firmware Update Mode	
Download Board -> FROM Update Start.	
Check Devices - Completed Update FROM - Failed Data Check -	
Update Failed.	

Note: Check the following in case that the downloading was not performed successfully.

- Check if the ROM is attached properly.
- Check if the ROM data were written correctly.
- Check if the downloading jig is connected properly.
- Check if the HDD is connected properly. (for UI data downloading)

When the UI data and the applications are updated at the same time, perform the downloading successively.

When UI data downloading is performed, the UI data in the HDD are updated but the display UI at power ON in the FROM is not changed. To make the result of updating effective for the display UI at power ON, it is necessary to copy the updated data into the FROM by selecting a language in the setting mode (08-220).
## (b) Confirmation of the downloaded data

Check each data version when the downloading is completed to confirm that the downloading was performed correctly. Check the version in the setting mode (08). Confirm that the version numbers shown by entering the following codes match the specified version numbers.

Confirmation for application downloading:

- 08-900 : System firmware version
- 08-920 : Basic section software version
- 08-921 : Program internal (application) version
- 08-922 : UI data fixed section version
- 08-923 : UI data common section version
- 08-930 : Version of language(UI) on the display at power ON in FROM

## Confirmation for UI data downloading:

- 08-924 : Version of UI data 1st language in HDD
- 08-925 : Version of UI data 2nd language in HDD
- 08-926 : Version of UI data 3rd language in HDD
- 08-927 : Version of UI data 4th language in HDD
- 08-928 : Version of UI data 5th language in HDD
- 08-929 : Version of UI data 6th language in HDD
- 08-931 : Version of UI data 7th language in HDD

### (4) Screens displayed during the download

## (a) Application downloading

The screens change as follows during the application downloading.



### (b) UI data downloading

The screens change as follows during the UI data downloading.



# 5.3.2 Engine firmware

The procedure to update the engine firmware (engine ROM/LGC board, scanner ROM/SCM board and printer ROM/IMC board) is described in this section.

## (1) Jig board

The engine ROM/LGC board uses ROM upgrade board - SYS, the scanner ROM/SCM board and the printer ROM/IMC board use ROM upgrade board -SCN as a jig board to update the engine firmware.

When updating the engine ROM/LGC board, use only the socket for ROM1 of ROM upgrade board - SYS.

(The socket for ROM2 is not used.) ( ► Page. 5-32)

**Note:** Pay attention to the position and direction of the ROM when it is attached to the jig board.

- (2) Downloading
- (a) Attach the ROM to the jig board and connect the board with the jig connector of the copier.

<<Engine ROM/LGC board>>

- 1. Take off the rear cover. ( Service Manual ch. 2.5.1)
- 2. Connect the downloading jig with the jig connector on the LGC board (ROM attached side leftward).



<<Scanner ROM/SCM board>>

Note: Remember that the damp heater, lens cover, etc. are hot.

1. Take off the right top cover and feed side upper cover. ( ► Service Manual ch. 2.5.2)

Then, remove 2 screws to take off the connector cover (plate cover).

2. Connect the downloading jig with the jig connector on the SCM board (ROM attached side upward).



<<Printer ROM/IMC board>>

- 1. Take off the feed side upper and upper inner cover as well as the metal shield cover.
  - ( Service Manual ch. 2.5.2)

2. Connect the downloading jig with the jig connector on the IMC board (ROM attached side upward).



- (b) Turn ON the power while [0] and [8] are pressed simultaneously (downloading is automatically started).
- (c) Turn OFF the power when the LED on the jig board starts flashing. Remove the downloading jig.
- (d) Check the version of the ROM in the setting mode (08) (engine ROM: 08-902, scanner ROM: 08-904, printer ROM: 08-903).
  - **Notes:** It is assumed that the downloading was failed if the LED on the jig board does not start flashing even though 30 seconds have elapsed since the downloading was started. Check if the ROM is attached properly, if the ROM data were written correctly and if the downloading jig is connected properly.
    - After the downloading, clean the mirror-1, -2 and -3, the underside of shading correction plate and the original glass if any dust or oil stains on them.

# 6. POWER SUPPLY UNIT

# 6.1 Output Channel

There are four output channels which are not linked with the door switches, as shown below.

- (1) 3.3V(M) For MPU on the SYS board, the image processing circuit, etc.
  - 3.3VA : Pins 4 and 5, J707
    Output to: IMC board, SYS board, AI board (option, via the IMG board, optional), IMG board, scrambler board (option, via the SYS board)
  - 3.3VB : Pin 1, J708 Output to: SCM board
- (2) 5.1V(M) For mechanical control circuits on the LGC board, IMC board, SCM board, etc.
  - 5.1VA : Pins 3, 4 and 5, J706 Output to: LGC board
  - 5.1VB : Pins 6 and 7, J707

Output to: IMC board, SYS board, RLY board (via the IMC board),

Al board (option, via the IMG board, optional), IMG board, scrambler board (option, via the SYS board)

- 5.1VC : Pins 1, 2, 3 and 4, J710 Output to: built-in printer controller (optional)
- 5.1VD : Pins 3 and 4, J708 Output to: SCM board
- (3) 12V(M) Mainly for analog circuits and the HDD (e.g. image quality sensor, color registration sensor)
  - 12VA : Pin 10, J706

Output to: LGC board, IMC board (via the LGC board),

image quality sensor (via the LGC board),

registration sensor (via the LGC board)

12VB : Pin 7, J708

Output to: SCM board, SDV board (via the SCM board), HDD

- 12VC : Pins 9, 10, 11 and 12, J710 Output to: built-in printer controller (optional)
- (4) 24V(M) For ADF, the finisher, fans, etc.
  - 24VH : Pin 1, J706

Output to: LGC board

- 24VI : Pin 9, J708
- Output to: SCM board 24VJ : Pins 1 and 3, J709

Output to: finisher

There are two output channels which are linked with the door switches.

- (1) 5.1 V(D) For the laser diodes and the laser drivers
  - 5.1VA : Pin 7, J702 Output to: LGC board
  - 5.1VB : Pin 3, J705 Output to: IMC board, RLY board (via the IMC board), LDR board (via the IMC board)

(2) 24V(D) — For the motors, clutches, solenoids, fans, etc.

24VA~C : Pins 1, 2 and 3, J702

Output to: LGC board, paper feed motor (via the LGC board),

fuser motor (via the LGC board),

main high-voltage transformer (via the LGC board),

transfer transformer (via the LGC board)

- 24VD : Pins 1, 2 and 3, J703 Output to: developer motor
- 24VE : Pins 6 and 7, J703 Output to: paper feed motor
- 24VF : Pins 1 and 2, J704 Output to: SCM board
- 24VG : Pin 1, J705 Output to: IMC board, polygonal motor (via the IMC board), tilt motors (via the IMC board)
- 24VK : Pins 1, 3, 5, 7, 9, 11, 13, 15, 17 and 19, J711 Output to: LGC board

#### <Output connector>

Not linked with the door switch:

- J706 for the LGC board
- J707 for the IMC board, SYS board, RLY board and IMG board
- J708 for the scanner and ADF
- J709 for the finisher
- J710 for the built-in printer controller (optional)

Linked with the door switch:

- J702 for the LGC board
- J703 for the developer motor and the paper feed motor
- J704 for the scanner
- J705 for the IMC board, RLY board, LDR board and the polygonal motor
- J711 for the drum motors, the transfer belt motor and the LGC board

# <Fuse rating>

F 1	12A/125V	Primary side
F 2	12A/125V	
F 3	12A/125V	Secondary side
F 5	4A/125V	
F 6	4A/125V	
F 7	5A/125V	
F 8	4A/125V	
F 9	5A/125V	
F10	4A/125V	
ICP3	12A/125V	
ICP4	3A/125V	
ICP5	3A/125V	
ICP6	3A/125V	



# 7. WIRE HARNESS CONNECTION DIAGRAMS

# 7.1 AC Wire Harness



April 2004

# <Appendix> SPECIFICATIONS · ACCESSORIES · OPTIONS · SUPPLIES

ROM upgrade board - SYS

# 1. Specifications

- Copy process
  Indirect electrophotographic process (dry)
- Type Console type
- Original table
  Fixed table (the left rear corner used for Standard original placement)
- Acceptable originals Type: Sheets, books and 3-dimensional objects. However, the automatic document feeder only accepts sheets of paper (64~105 g/m<sup>2</sup>, or 17~28 lb.), excluding carbon paper, pasted sheets and stapled sheets. Size : A3/LD max.

• Copy speed

(Copies/min.)

Paper supply			Bypass	feeding		
		Cassette	Size specification	Size specification	LCT	
	Paper size		YES	NO		
er	A4, LT	31(31)	21(21)	10.3(10.3)	21(31)	Ξ
Pap	B5	31(31)	23(23)	13(13)	_	
nal	A5-R, ST-R	31(31)	24(24)	24(24)	_	
Por	A4-R, B5-R, LT-R	23(23)	17(17)	17(17)	-	
r / ľ	B4, LG	19(19)	13(13)	13(13)	-	
ape	A3, LD	16(16)	10.3(10.3)	10.3(10.3)	-	
<u>Б</u> .	Full bleed (12" x 18")	_	9.0(9.0)	9.0(9.0)	-	
님	A6-R	-	24(24)	24(24)	-	
	A4, LT	10.3(10.3)	9.5(9.5)	9.5(9.5)	10.3(10.3)	
-	B5, A5-R, ST-R	10.3(10.3)	10.3(10.3)	10.3(10.3)	_	
be	A4-R, B5-R, LT-R	9.3(9.3)	8.7(8.7)	8.7(8.7)	-	
Ра	B4, LG	8.5(8.5)	7.4(7.4)	7.4(7.4)	_	
<u>S</u>	A3, LD	7.9(7.9)	6.5(6.5)	6.5(6.5)	_	
님	Full bleed (12" x 18")	-	6.3(6.3)	6.3(6.3)	-	
	A6-R	-	10.3(10.3)	10.3(10.3)	-	
	Thick Paper 2(All size)	_	2~6 (2~6)	2~6 (2~6)	_	
5	Thick Paper 3(All size)	-	2~6 (2~6)	2~6 (2~6)	_	
Ţ	OHP films (A4, LT)	3.3(3.3)	2~6(2~6)	-	-	
0	Thick Paper 4	_	2~6 (2~6)	2~6 (2~6)	_	1
	Special Paper	_	2~6 (2~6)	2~6 (2~6)	_	

\*Thin paper:64~79 g/m<sup>2</sup>, or 17~20 lb.

\*Normal paper:80~105 g/m<sup>2</sup>, or 21~28 lb.

\*Thick paper 1:106~163 g/m², or 29lbs.~60 lb. cover/90lb. index

\*Thick paper 2: 164g/m<sup>2</sup> ~209 g/m<sup>2</sup>, or 91~110 lb. index

\*Thick paper 3:  $210 \sim 256 \text{ g/m}^2$ , or  $111 \sim 140 \text{ lb. index}$ 

\*Thick paper 4: 257~280 g/m<sup>2</sup>, or ~104 lb. cover

\*Special Paper: "Special Paper" means the gloss paper for POP (Point of Purchase)

- \* Values in parentheses ( ) are the copy speed in the black mode copying.
- \* "--" means "not available".
- \* The copy speeds listed are available when originals are manually placed for single-side, multiple copying.
- \* When the document feeder is used, the copy speed is only available under the following conditions:
  - Original/Mode: Single-side originals of A4/LT size, not selecting auto color, APS, automatic density and advance image enhancement mode
  - Number of sheets set: 31 or over
  - Paper feeding: 2nd cassette
  - Reproduction ratio: Actual ratio
- Reverse side copying speed of the automatic duplexing unit (When specific paper size is selected)

A4, B5, A5-R, LT, ST-R:	31 sheets/min.
A4-R, B5-R, LT-R:	23 sheets/min.
B4, LG:	19 sheets/min.
A3, LD:	16 sheets/min.

### \* System copy speed

Copy mode		Copies/min.
Single-sided originals	1 set	18
х	3 sets	25
Single-sided copies	5 sets	27
Single-sided originals	1 set	9
х	3 sets	17
Two-sided copies	5 sets	21
Two-sided originals	1 set	7
х	3 sets	15
Two-sided copies	5 sets	18
Two-sided originals	1 set	11
х	3 sets	19
Single-sided copies	5 sets	23

- The copy speeds are applicable when 10 A4sized originals are set in the automatic document feeder and are copied with any of the modes listed on the left. The first copy time is included.
- \* These values are attained in full color mode copying.

## Copy paper

	Cassette	Duplex copy	LCF	Bypass copy	Remarks
Size	A3~A5R		A4, LT	A3~A5-R	In the bypass mode,
	LD~ST-R			LD~ST-R	either irregular sizes or
					arbitrary sizes can be set.
Weight	64~163g/m <sup>2</sup>	<sup>2</sup> 64~105g/m <sup>2</sup>	64~163g/m <sup>2</sup>	64~280g/m <sup>2</sup>	
	17lb~60lb.cover	17~28 lb.	17lb~60lb.cover	17lb~104lb.cover	
	~90lb.index		~90lb.index		
Special paper	_	_	_	Recommended OHP	
				films, sticker labels and	
				gloss paper for POP	
				(Point of Purchase)	

• First copy time ...... Approx. 9.5 seconds (A4/LT, the first cassette, 100%)

• Warming-up time ..... Approx. 4 minutes

• Multiple copying ...... Up to 999 copies;entry by digital keys

Reproduction ratio ..... Actual ratio: 100±0.5%

	Zoomina:	25~400% in increments of 1%
Resolution/Gradation	Read:	600 dpi (10 bit)
	Write:	Corresponding to 600 dpi x 600 dpi
		(primary scanning only : 256 division smoothing)
• Excluded image width	Leading edge:	5.0±2.0 mm, Trailing edge: 2.5±2.0 mm
	Side edge:	2.0±2.0 mm
Paper feeding	Automatic feeding	ng: Cassettes – 2 pieces standard (expandable up to 4
		pieces by installing optional cassettes)
		LCT – Optional (Stack height 165 mm : equivalent to 1500
		sheets of 80 g/m <sup>2</sup> , 20 lb.)
	Bypass feeding:	: (Stack height 21 mm : equivalent to 130 sheets of 80 g/m <sup>2</sup> , 20 lb.)

(Optional automatic document feeder)

40 sheets (91~105g/m<sup>2</sup>) (25~28 lb.)

B4, Folio, LG, Comp: 35 sheets (64~90g/m<sup>2</sup>) (17~24 lb.)

25 sheets (91~105g/m<sup>2</sup>) (25~28 lb.)

A3, LD: 25 sheets (64~90g/m<sup>2</sup>) (17~24 lb.)

20 sheets (91~105g/m<sup>2</sup>)(25~28 lb.)

• Stacking capacity of sheets Paper weight 64~105 g/m<sup>2</sup>, 17~28 lb.: 30 sheets (Optional automatic duplexing unit)

Toner supplying ...... Automatic toner-density detection and supply

Toner cartridge replacing method

- Density control ...... Automatic density mode and manual density mode selectable in 11 steps
- Weight ..... Approx. 187 kg/413lb.
- Power requirements ...... AC 115V/16A, 127V/16A, AC 220 240V/9A
- Power consumption ......2.0 kW or less (115V series, 200V series)
  - \* The automatic document feeder, automatic duplexing unit and LCT are supplied with electric power through the copier.
- · Power consumption and warm-up time at energy saving mode

	Mode		Power Consumption	Warm-up time	Efficiency
115)/ 00-100		Level 1	Approx.100W	Approx. 2 min 30 sec.	Approx. 56%
	Energy saving mode		(Approx.135W)		(Approx. 48%)
		Level 2	Approx.160W	Approx. 1 min 15 sec.	Approx. 29%
1134 261162			(Approx.195W)		(Approx. 25%)
	Normal standby		Approx. 225W	0	0%
			(Approx.260W)		(0%)
200V series	Energy saving mode	Level 1	Approx.100W	Approx. 2 min 15 sec.	Approx. 57%
			(Approx.135W)		(Approx. 49%)
		Level 2	Approx.160W	Approx. 1 min 15 sec.	Approx. 30%
			(Approx.195W)		(Approx. 26%)
	Normal standby		Approx. 230W	0	0%
			(Approx.265W)		(0%)

\* Values in parentheses ()) are when the copier is with full options: The automatic document feeder, automatic duplexing unit, large-capacity feeder, finisher, hole punch unit, cassette modules, scrambler board and AI board

\* Level 1: Energy saver mode with priority aim of energy saving

Level 2: Energy saver mode with priority aim of returning to standby

• Dimensions ...... See the figure below (W868 x D750 x H997mm)



# 2. Accessories

Setup instructions	1 pc.		
Operator's manual	1 pc. (not available for MJD)		
Color copy guide	1 pc. (not available for MJD)		
PM sticker	1 pc. (for MJD)		
Setup report	1 set. (for NAD and MJD)		
CS card	1 pc. (for MJD)		
Drum	4 pcs.		
Operator's manual pocket	1 pc.		
Detachable code	1 pc. (for ASD, AUD, MJD and CND)		
Copy receiving tray	1 pc.		
Preventive maintenance check list	1 pc. (for MJD)		
Toner bag symbol sticker	1 pc. (for MJD)		
Warranty sheet	1 pc. (for NAD)		
DF level up kit	1 pc.		

\* Machine version

NAD: North America

MJD: Europe

AUD: Australia

ASD: Asia

CND: China

