TOSHIBA

SERVICE MANUAL

MULTIFUNCTIONAL DIGITAL COLOR SYSTEMS

e-STUDIO2500c/3500c/3510c

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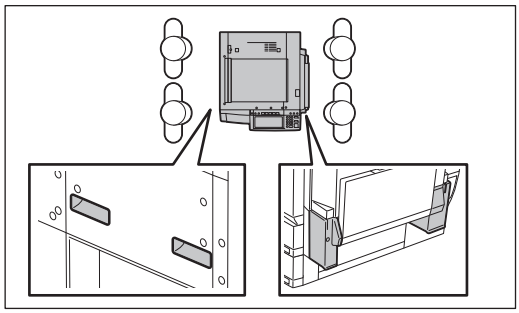
GENERAL PRECAUTIONS REGARDING THE SERVICE FOR e-STUDIO2500c/3500c/3510c

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

1) **Transportation/Installation**
   - When transporting/installing the equipment, employ four persons and be sure to hold the positions as shown in the figure.
     The equipment is quite heavy and weighs approximately 120 kg (264.55 lb.), therefore pay full attention when handling it.



   - Be sure not to hold the movable parts or units (e.g. the control panel, ADU or RADF) when transporting the equipment.
   - Be sure to use a dedicated outlet with AC 110 V / 13.2 A, 115 V or 127 V / 12 A, 220-240 V / 8 A for its power source.
   - The equipment must be grounded for safety.
   - Select a suitable place for installation. Avoid excessive heat, high humidity, dust, vibration and direct sunlight.
   - Provide proper ventilation since the equipment 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”) on the rear.
   - The equipment shall be installed near the socket outlet and shall be accessible.
   - Be sure to fix and plug in the power cable securely after the installation so that no one trips over it.

2) **General Precautions at Service**
   - Be sure to turn the power OFF and unplug the power cable during service (except for the service should be done with the power turned ON).
   - Unplug the power cable and clean the area around the prongs of the plug and socket outlet once a year or more. A fire may occur when dust lies on this area.
   - When the parts are disassembled, reassembly is the reverse of disassembly unless otherwise noted in this manual or other related documents. Be careful not to install small parts such as screws, washers, pins, E-rings, star washers, harnesses in the wrong places.
   - Basically, the equipment should not be operated with any parts removed or disassembled.
   - The PC board must be stored in an anti-electrostatic bag and handled carefully using a wristband since the ICs on it may be damaged due to static electricity.
     Caution: Before using the wristband, unplug the power cable of the equipment and make sure that there are no charged objects which are not insulated in the vicinity.

- Avoid expose to laser beam during service. This equipment uses a laser diode. Be sure not to expose your eyes to the laser beam. Do not insert reflecting parts or tools such as a screwdriver on the laser beam path. Remove all reflecting metals such as watches, rings, etc. before starting service.
- Be sure not to touch high-temperature sections such as the exposure lamp, fuser unit, damp heater and areas around them.
- Be sure not to touch high-voltage sections such as the chargers, transfer belt, 2nd transfer roller, developer, high-voltage transformer, exposure lamp control inverter, inverter for the LCD back-light and power supply unit. Especially, the board of these components should not be touched since the electric charge may remain in the capacitors, etc. on them even after the power is turned OFF.
- Make sure that the equipment will not operate before touching potentially dangerous places (e.g. rotating/operating sections such as gears, belts pulleys, fans and laser beam exit of the laser optical unit).
- Be careful when removing the covers since there might be the parts with very sharp edges underneath.
- When servicing the equipment with the power turned ON, be sure not to touch live sections and rotating/operating sections. Avoid exposing your eyes to laser beam.
- Use designated jigs and tools.
- Use recommended measuring instruments or equivalents.
- Return the equipment to the original state and check the operation when the service is finished.
- Be very careful to treat the touch panel gently and never hit it. Breaking the surface could cause malfunctions.

3) **Important Service Parts for Safety**
   - The breaker, door switch, fuse, thermostat, thermofuse, thermistor, batteries, IC-RAMs including lithium batteries, etc. are particularly important for safety. Be sure to handle/install them properly. If these parts are short-circuited and their functions become ineffective, they may result in fatal accidents such as burnout. Do not allow a short-circuit or do not use the parts not recommended by Toshiba TEC Corporation.

4) **Cautionary Labels**
   - During servicing, be sure to check the rating plate and cautionary labels such as “Unplug the power cable during service”, “CAUTION. HOT”, “CAUTION. HIGH VOLTAGE”, “CAUTION. LASER BEAM”, etc. to see if there is any dirt on their surface and if they are properly stuck to the equipment.

5) **Disposal of the Equipment, Supplies, Packing Materials, Used Batteries and IC-RAMs**
   - Regarding the recovery and disposal of the equipment, supplies, packing materials, used batteries and IC-RAMs including lithium batteries, follow the relevant local regulations or rules.

6) **When the option has been installed:**
   When the EFI printer board has been installed, be sure to unplug the power cable before performing maintenance and inspection, otherwise troubles such as a communication error may occur.

Caution:
Dispose of used batteries and IC-RAMs including lithium batteries according to this manual.
Attention:
Se débarrasser de batteries et IC-RAMs usés y compris les batteries en lithium selon ce manuel.
Vorsicht:
Entsorgung der gebrauchten Batterien und IC-RAMs (inclusive der Lithium-Batterie) nach diesem Handbuch.

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1. SPECIFICATIONS/ACCESSORIES/OPTIONS/SUPPLIES

1.1 Specifications

•Copy process ..... Indirect electrophotographic process (dry)
•Type..... Desktop type (Console type: when optional Paper Feed Pedestal (PFP) or optional Large Capacity Feeder (LCF) is installed.)
•Original table ..... Fixed type (the left rear corner used as guide to place originals)
•Accepted originals..... Original type: Sheets, books and 3-dimensional objects
Note that when the optional Reversing Automatic Document Feeder is used, carbon, bounded or stapled originals cannot be accepted, and paper type of the original should be 35-157g/m^2 (9.3 lb. Bond -58 lb. Cover) for single-sided copy and 50-157 g/m^2 (13.3 lb. Bond -58 lb. Cover) for double-sided copy.
Maximum size: A3/LD

- Copy speed (Copies/min.)
  Plain paper (64 g/m^2 to 105 g/m^2 / 17 lb. Bond to 28 lb. Bond)

e-STUDIO2500c

Paper supply / Paper size	Drawer	Bypass feed		PFP	LCF (A4/LT only)
		Size specified	Size not specified		
A4, LT	35 (25)	35 (25)	18 (15)	35 (25)	35 (25)
B5, A5-R, ST-R					-
A4-R, B5-R, LT-R	26 (20)	26 (20)	18 (15)	26 (20)	-
B4, LG, FOLIO, COMPUTER	22 (17)	22 (17)	18 (15)	22 (17)	-
A3, LD	18 (15)	18 (15)	18 (15)	18 (15)	-

e-STUDIO3500c

Paper supply / Paper size	Drawer	Bypass feed		PFP	LCF (A4/LT only)
		Size specified	Size not specified		
A4, LT	35 (35)	35 (25)	18 (15)	35 (11)	35 (35)
B5, A5-R, ST-R					-
A4-R, B5-R, LT-R	26 (26)	26 (20)	18 (15)	26 (26)	-
B4, LG, FOLIO, COMPUTER	22 (22)	22 (17)	18 (15)	22 (22)	-
A3, LD	18 (18)	18 (15)	18 (15)	18 (18)	-

e-STUDIO3510c

Paper supply / Paper size	Drawer	Bypass feed		PFP	LCF (A4/LT only)
		Size specified	Size not specified		
A4, LT	45 (35)	45 (35)	22 (18)	45 (35)	45 (35)
B5, A5-R, ST-R					-
A4-R, B5-R, LT-R	32 (26)	32 (26)	22 (18)	32 (26)	-
B4, LG, FOLIO, COMPUTER	26 (22)	26 (22)	22 (18)	26 (22)	-
A3, LD	22 (18)	22 (18)	22 (18)	22 (18)	-

* "-" means "Not acceptable".
* When originals are manually placed for single-sided, continuous copying.
* Plain paper is selected for the paper type.
* When the Reversing Automatic Document Feeder is used, the copying speeds of the equipment is only possible under the following conditions:
  - Original: A4 or LT (single-sided)
  - Mode: APS and Automatic density not selected, Plain paper mode
  - Reproduction ratio: 100%
* The values in ( ) can be realized in the color mode.

Thick paper / OHP film
e-STUDIO2500c/3500c/3510c
Thick1 (106 g/m^2 to 163 g/m^2 / 28 lb. Bond to 60 lb. Cover (90 lb. Index))

Paper supply / Paper size	Drawer	Bypass feed		PFP	LCF (A4/LT only)
		Size specified	Size not specified		
A4, LT	17.5 (17.5)	17.5 (17.5)	8.5 (8.5)	17.5 (17.5)	17.5 (17.5)
B5, A4-R, ST-R					-
A4-R, B5-R, LT-R	13 (13)	13 (13)	8.5 (8.5)	13 (13)	-
B4, LG, FOLIO, COMPUTER	10.5 (10.5)	10.5 (10.5)	8.5 (8.5)	10.5 (10.5)	-
A3, LD	8.5 (8.5)	8.5 (8.5)	8.5 (8.5)	8.5 (8.5)	-

* The LCF accepts paper weight from 64g/m^2 to 105g/m^2 (17 lb. Bond to 28 lb. Bond).

Thick 2 (164 g/m^2 to 209 g/m^2 / 61 lb. Cover to 77.3 lb. Cover (115.7 lb. Index))
Thick 3 (210 g/m^2 to 256 g/m^2 / 77.3 lb. Cover to 94.5 lb. Cover (141.4 lb. Index))
Thick 4 (257 g/m^2 to 280 g/m^2 / 94.5 lb. Cover to 100 lb. Cover (150 lb. Index))

Paper supply / Paper size	Drawer	Bypass feed		PFP	LCF (A4/LT only)
		Size specified	Size not specified		
A4, LT	-	17.5 (17.5)	8.5 (8.5)	-	-
B5, A4-R, ST-R					-
A4-R, B5-R, LT-R	-	13 (13)	8.5 (8.5)	-	-
B4, LG, FOLIO, COMPUTER	-	10.5 (10.5)	8.5 (8.5)	-	-
A3, LD	-	8.5 (8.5)	8.5 (8.5)	-	-

OHP film

Paper supply / Paper size	Drawer	Bypass feed		PFP	LCF (A4/LT only)
		Size specified	Size not specified		
A4, LT	-	14.5 (14.5)	-	-	-

* "-" means "Not acceptable".
* When originals are manually placed for single side, continuous copying.
* The bypass copying speed is measured with the paper size specified.
* The values in ( ) can be realized in the color mode.

* System copy speed

Copy mode		Sec.		
		e-STUDIO2500c	e-STUDIO3500c	e-STUDIO3510c
Single-sided originals ↓ Single-sided copies	1 set	24.35 (35.68)	24.35 (34.14)	19.75 (34.14)
	3 sets	60.13 (85.19)	60.13 (69.96)	48.00 (69.69)
	5 sets	94.15 (130.09)	94.15 (103.57)	74.37 (103.57)
Single-sided originals ↓ Double-sided copies	1 set	31.87 (46.43)	31.87 (42.58)	27.03 (42.58)
	3 sets	68.30 (92.00)	68.30 (78.86)	56.19 (78.86)
	5 sets	104.60 (139.03)	104.60 (115.84)	85.56 (115.84)
Double-sided originals ↓ Double-sided copies	1 set	65.34 (92.43)	65.34 (89.58)	62.43 (89.58)
	3 sets	138.60 (185.41)	138.60 (163.56)	120.69 (163.56)
	5 sets	211.12 (280.40)	211.12 (235.75)	179.31 (235.75)
Double-sided originals ↓ Single-sided copies	1 set	58.13 (84.28)	58.13 (83.29)	56.66 (83.29)
	3 sets	125.69 (177.34)	125.69 (151.25)	109.56 (151.25)
	5 sets	193.70 (271.88)	193.70 (218.54)	162.63 (218.54)

* Shows the period of time from when the [START] button is pressed until the message "Ready" is displayed. (10 sheets of A4/LT size original are set on the RADF and one of the copy modes above is selected.)
* Setting: when in the Text/Photo mode with Automatic density and APS/AMS set to OFF, or when in the sort mode with paper fed from the 1st drawer.
* The Saddle Stitch Finisher and hole punch unit not installed.
* The values in ( ) are the speeds of when in the color mode.

• Copy paper

	ADU	Drawer	PFP	LCF	Bypass copy
Size	A3 to A5-R, FOLIO, LD to ST-R, COMPUTER, 13”LG, 8.5”x8.5”, 8K, 16K, 16K-R, 305×457mm, Full Bleed (12”x18”)	A3 to A5-R, FOLIO, LD to ST-R, COMPUTER, 13”LG, 8.5”x8.5”, 8K, 16K, 16K-R		A4, LT	A3 to A5-R, FOLIO, LD to ST-R, COMPUTER, 13”LG, 8.5”x8.5”, 8K, 16K, 16K-R, A6-R, 305x457mm, Full Bleed (12”x18”), SRA3 (320x450mm), 320x460mm (Non-standard or user-specified sizes can be set.), Extra large copy paper (up to 305x1200mm) * * Printing Function only
Weight	64 g/m^2 to 256 g/m^2 17 lb. Bond to 94.5 lb. Cover		64 g/m^2 to 163 g/m^2 17 lb. Bond to 60 lb. Cover	64 g/m^2 to 105 g/m^2 17 lb. Bond to 28 lb. Cover	64 g/m^2 to 280 g/m^2 17 lb. Bond to 100 lb. Cover
Special paper	-	-	-	-	OHP film, Labels, Tab paper (Special paper recommended by Toshiba TEC)

•First copy time ..... e-STUDIO2500c: Approx. 6.5 sec. (Black), approx. 8.6 sec. (Color)
e-STUDIO3500c: Approx. 6.5 sec. (Black), approx. 8.6 sec. (Color)
e-STUDIO3510c: Approx. 5.2 sec. (Black), approx. 8.6 sec. (Color)
•Warming-up time ..... Approx. 99 sec. (Stand-alone, temperature: 20^{o}C)
•Scanning speed..... 45spm: Black (Text/Photo)
22spm: Black (Gray scale)
22spm: Color (Text/Photo)
(When scanning single-sided A4/LT landscape originals using RADF)
•Multiple copying..... Up to 999 copies; Key in set numbers

•Reproduction ratio ..... Actual ratio: 100%±0.5%
Zooming: 25 to 400% in increments of 1% (25 to 200% when using RADF)
•Resolution/Gradation..... Scanning: 600 dpi × 600 dpi
Printing: Equivalent to 2400 dpi × 600 dpi (black print, except gray scale)
600 dpi × 600 dpi (color print / gray scale)
•Eliminated portion..... Leading edges: 3.0±2.0 mm, Side/trailing edges: 2.0±2.0 mm (black copy)
Leading edges: 5.0±2.0 mm, Side/trailing edges: 3.0±2.0 mm (color copy)
Leading / trailing edges: 5.0±2.0 mm, Side edges: 5.0±2.0 mm (black / color print)
•Paper feeding ..... Standard drawers:
2 drawers (stack height 60.5 mm, equivalent to 550 sheets; 64 to 80 g/m^2 (17 to 22 lb. Bond))
PFP:
Option (One drawer or two: stack height 60.5 mm, equivalent to 550 sheets; 64 to 80 g/m^2 (17 to 22 lb. Bond))
LCF:
Option (Stack height 137.5 mm x 2: equivalent to 2500 sheets; 64 to 80 g/m^2 (17 to 22 lb. Bond))
Bypass feeding:
Stack height 11 mm: equivalent to 100 sheets; 64 to 80 g/m^2 (17 to 22 lb. Bond)
•Capacity of originals in the reversing automatic document feeder (Option)
..... A3 to A5-R, LD to ST-R:
100 sheets / 80 g/m^2 (Stack height 16 mm or less)
•Automatic duplexing unit ..... Stackless, Switchback type
•Toner supply ..... Automatic toner density detection/supply
Toner cartridge replacing method
•Density control..... Automatic density mode and manual density mode selectable in 11 steps
•Weight ..... Approximately 120 kg (264.55 lb.)
•Power requirements ..... AC 110 V / 13.2 A, 115 V or 127 V / 12 A
220-240 V / 8 A (50/60 Hz)
* The acceptable value of each voltage is ±10%.
•Power consumption..... 1.5 kW or less (100 V series), 17 kW or less (200 V series)
* The electric power is supplied to the RADF, Finisher, PFP and LCF through the equipment.
•Total counter..... Electronical counter
•Dimensions of the equipment..... See the figure below (W 699 x D 761 x H 759 (mm))
* When the tilt angle of the control panel is 45 degrees.

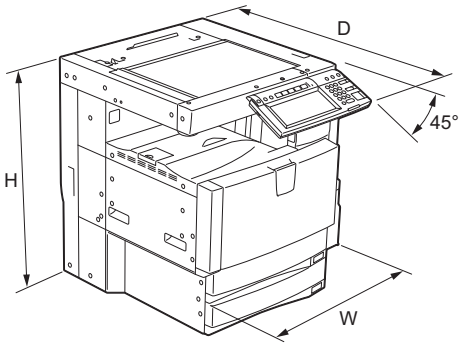


Fig. 1-1

1.2 Accessories

Unpacking/Setup instruction	1 set
Operator’s manual	1 set (except for ASU)
Operator's manual pocket	1 pc.
Power cable	1 pc.
Warranty sheet	1 pc. (for NAD)
Setup report	1 set (for NAD, MJD and CND)
PM sticker	1 pc. (for MJD)
Process unit	4 pcs.
Control panel stopper	1 pc.
Rubber plug	6 pcs.
Blind seal (small / large)	3 pcs. /1 pc.
CD-ROM	2 pcs. (except for ASU)
Developer material (Y, M, C, K)	1 pc. each (for CND)
Approval sheet	1 set (for CND)
Screw	1 pc.

* Machine version

NAD: North America, Brazil
MJD: Europe
AUD: Australia
ASD: Asia, Hong Kong, Latin America
TWD: Taiwan
SAD: Saudi Arabia
ASU: Saudi Arabia, Asia
CND: China
KRD: Korea
ARD: Argentina
JPD: Japan

1.3 Options

Platen cover	KA-3511PC
Reversing Automatic Document Feeder (RADF)	MR-3018
Large Capacity Feeder (LCF)	KD-1019A4/LT/C
Paper Feed Pedestal (PFP)	KD-1018/C
Drawer module	MY-1031/C
Finisher	MJ-1101
Saddle stitch finisher	MJ-1030
Hole punch unit	MJ-6101N/E/F/S (for MJ-1101) MJ-6004N/E/F/S (for MJ-1030)
Staple cartridge	STAPLE-2400 (for MJ-1101) STAPLE-2000 (for MJ-1030) STAPLE-600 (for saddle stitcher of MJ-1030)
Bridge kit	KN-3500
Work table	KK-3511
Damp heater kit	MF-3500CU/CE
EFI Printer board	GA-1210/E
FAX unit	GD-1210NA/EU/AU/AS/C/TW
2nd line for fax unit	GD-1160NA/EU-N/C/TW
512 MB Expansion memory (Main memory)	GC-1250
256 MB Expansion memory (Page memory)	GC-1260
512 MB Expansion memory	GC-1230 (for GA-1210/E)
Wireless LAN module	GN-1041
Bluetooth module	GN-2010
Antenna	GN-3010
Data overwrite kit	GP-1060/C
e-BRIDGE ID Gate (HID iCLASS)	KP-2004
e-BRIDGE ID Gate (MIFARE)	KP-2005
Harness kit for coin controller	GQ-1110
Desk	MH-1700

Notes:

- The bridge kit (KN-3500) is necessary for installation of the finisher (MJ-1101 or MJ-1030).
- The finisher (MJ-1101) is necessary for installation of the hole punch unit (MJ-6101N/E/F/S).
- The finisher (MJ-1030) is necessary for installation of the hole punch unit (MJ-6004N/E/F/S).
- The antenna (GN-3010) is necessary to enable the wireless LAN module (GN-1041) and the bluetooth module (GN-2010).
- The main memory can be expanded using 512 MB Expansion memory (GC-1250), and the Page memory can be expanded using 256 MB Expansion memory (GC-1260) respectively.

1.4 Supplies

Drum	OD-FC35
Developer material (K)	D-FC35K
Developer material (Y)	D-FC35Y
Developer material (M)	D-FC35M
Developer material (C)	D-FC35C
Toner cartridge (K)	PS-ZTFC35K (for North America, Central and South America) PS-ZTFC35EK (for Europe) PS-ZTFC35DK (for Australia and Asia) PS-ZTFC35CK (for China)
Toner cartridge (Y)	PS-ZTFC35Y (for North America, Central and South America) PS-ZTFC35EY (for Europe) PS-ZTFC35DY (for Australia and Asia) PS-ZTFC35CY (for China)
Toner cartridge (M)	PS-ZTFC35M (for North America, Central and South America) PS-ZTFC35EM (for Europe) PS-ZTFC35DM (for Australia and Asia) PS-ZTFC35CM (for China)
Toner cartridge (C)	PS-ZTFC35C (for North America, Central and South America) PS-ZTFC35EC (for Europe) PS-ZTFC35DC (for Australia and Asia) PS-ZTFC35CC (for China)
Toner bag	PS-TBFC35 (expect for Europe and China) PS-TBFC35E (for Europe) PS-TBFC35C (for China)

1.5 System List

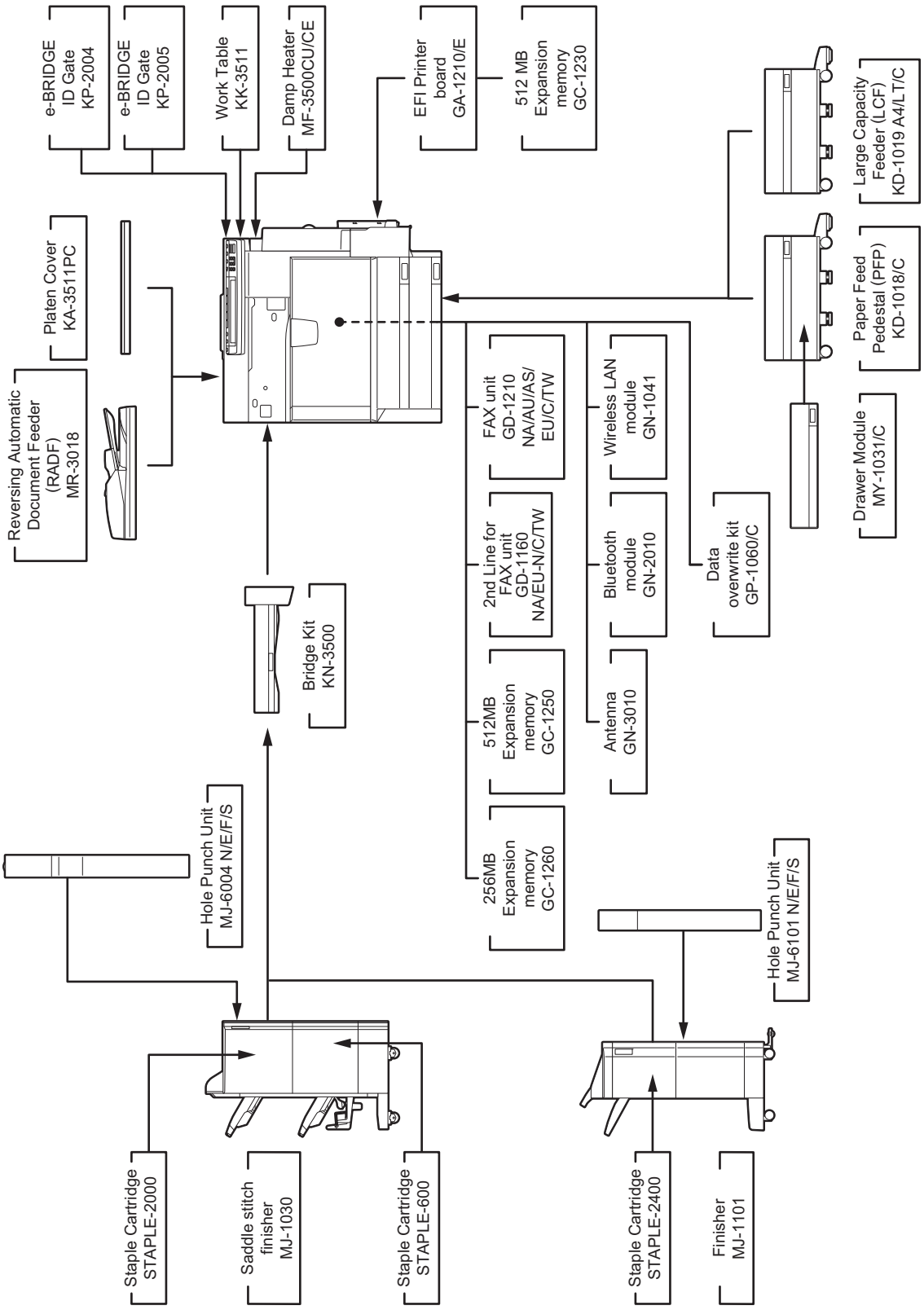


Fig. 1-2

2. OUTLINE OF THE MACHINE

2.1 Sectional View

1) Front side-1

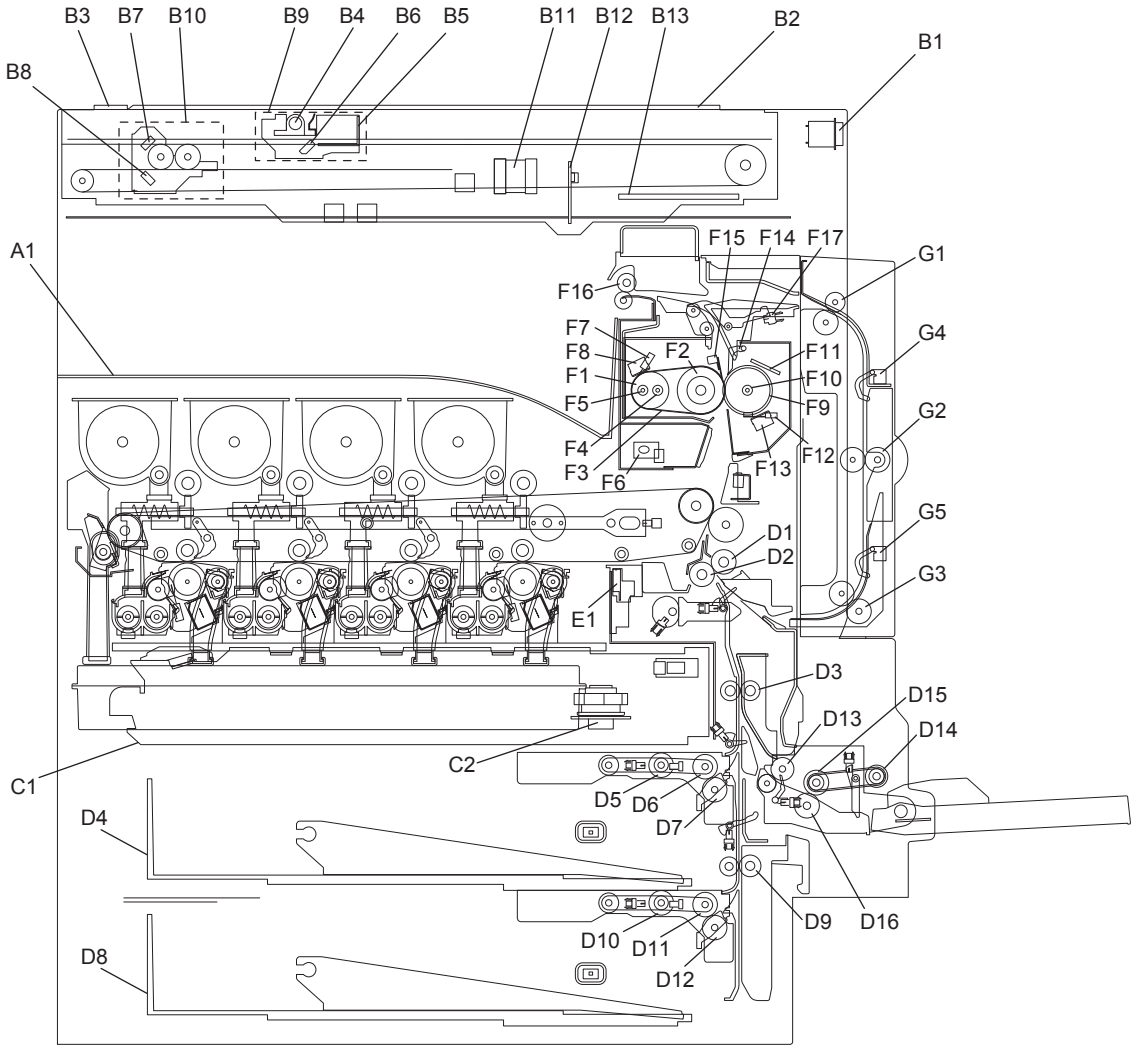


Fig. 2-1

A1	Inner tray	D13	Bypass transport roller
B1	Main switch	D14	Bypass pickup roller
B2	Original glass	D15	Bypass feed roller
B3	RADF original glass	D16	Bypass separation roller
B4	Exposure lamp	E1	Image quality sensor
B5	Inverter board	F1	Heat roller
B6	Mirror-1	F2	Fuser roller
B7	Mirror-2	F3	Fuser belt
B8	Mirror-3	F4	Center heater lamp
B9	Carriage-1	F5	Side heater lamp
B10	Carriage-2	F6	Fuser belt center/rear thermopile
B11	Lens	F7	Heat roller front thermistor
B12	CCD driving PC board	F8	Heat roller center/rear thermostat
B13	Scanning section control PC board	F9	Pressure roller
C1	Laser optical unit	F10	Pressure roller lamp
C2	Polygonal motor	F11	Pressure roller center thermistor
D1	Registration roller (rubber roller)	F12	Pressure roller rear thermistor
D2	Registration roller (metal roller)	F13	Pressure roller thermostat
D3	Transport roller	F14	Separation finger
D4	1st drawer	F15	Separation plate
D5	1st drawer pickup roller	F16	Exit roller
D6	1st drawer feed roller	F17	Exit sensor
D7	1st drawer separation roller	G1	Upper transport roller
D8	2nd drawer	G2	Middle transport roller
D9	Transport roller	G3	Lower transport roller
D10	2nd drawer pickup roller	G4	ADU entrance sensor
D11	2nd drawer feed roller	G5	ADU exit sensor
D12	2nd drawer separation roller		

2) Front side-2

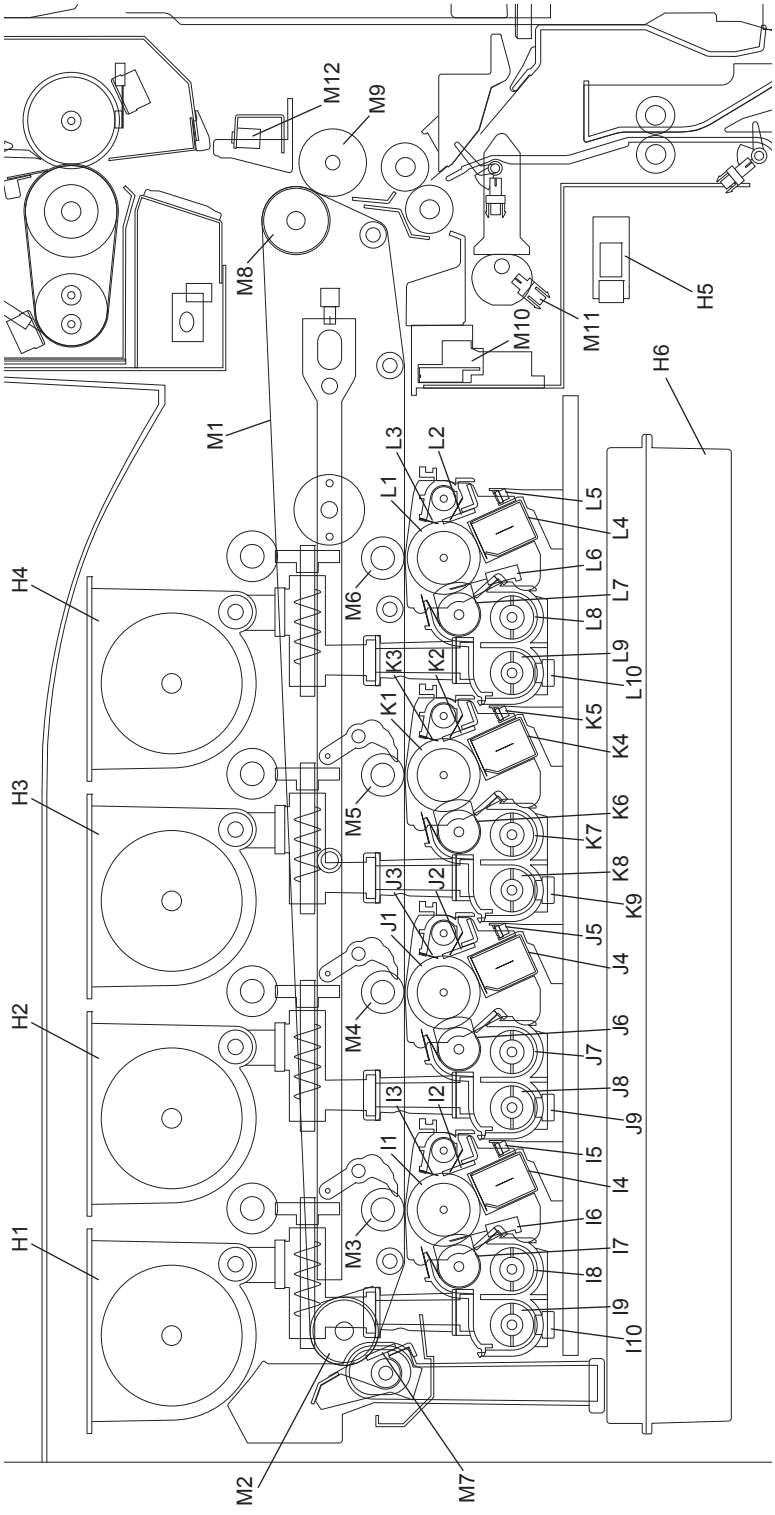


Fig. 2-2

H1	Toner (Y)	K4	Main charger unit (C)
H2	Toner (M)	K5	Discharge LED (C)
H3	Toner (C)	K6	Developer sleeve (C)
H4	Toner (K)	K7	Mixer-1 (C)
H5	Temperature/Humidity sensor	K8	Mixer-2 (C)
H6	Toner bag	K9	Auto-toner sensor (C)
I1	Drum (Y)	L1	Drum (K)
I2	Cleaning blade (Y)	L2	Cleaning blade (K)
I3	Recovery blade (Y)	L3	Recovery blade (K)
I4	Main charger unit (Y)	L4	Main charger unit (K)
I5	Discharge LED (Y)	L5	Discharge LED (K)
I6	Drum thermistor (Y)	L6	Drum thermistor (K)
I7	Developer sleeve (Y)	L7	Developer sleeve (K)
I8	Mixer-1 (Y)	L8	Mixer-1 (K)
I9	Mixer-2 (Y)	L9	Mixer-2 (K)
I10	Auto-toner sensor (Y)	L10	Auto-toner sensor (K)
J1	Drum (M)	M1	Transfer belt
J2	Cleaning blade (M)	M2	Transfer belt drive roller
J3	Recovery blade (M)	M3	1st transfer roller (Y)
J4	Main charger unit (M)	M4	1st transfer roller (M)
J5	Discharge LED (M)	M5	1st transfer roller (C)
J6	Developer sleeve (M)	M6	1st transfer roller (K)
J7	Mixer-1 (M)	M7	Transfer belt cleaning blade
J8	Mixer-2 (M)	M8	2nd transfer facing roller
J9	Auto-toner sensor (M)	M9	2nd transfer roller
K1	Drum (C)	M10	Image position aligning sensor (front / rear)
K2	Cleaning blade (C)	M11	2nd transfer roller position detection sensor
K3	Recovery blade (C)	M12	Paper clinging detection sensor

3) Rear side

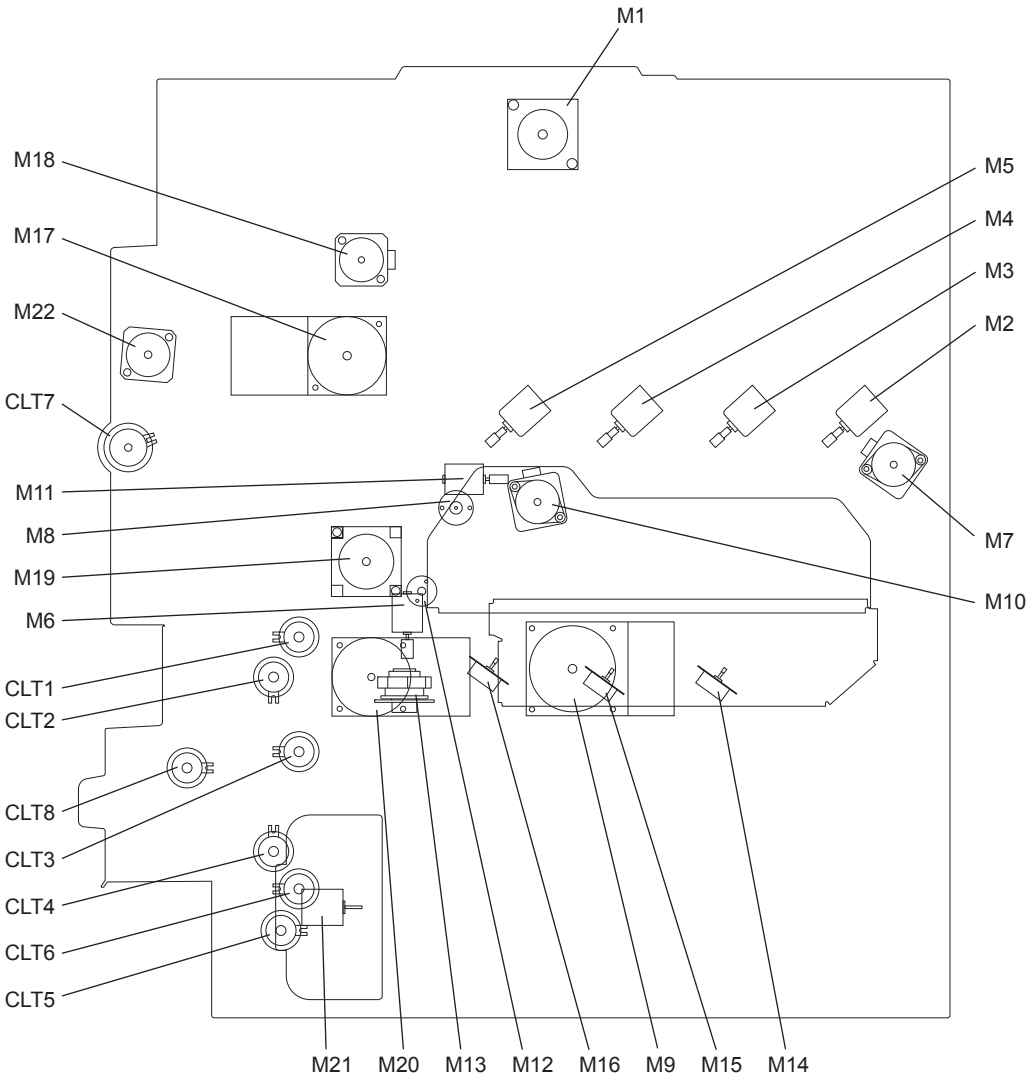


Fig. 2-3

M1	Scan motor	M16	Mirror motor-K
M2	Toner motor-Y	M17	Fuser motor
M3	Toner motor-M	M18	Exit motor
M4	Toner motor-C	M19	Registration motor
M5	Toner motor-K	M20	Feed/transport motor
M6	Used toner motor	M21	Tray-up motor
M7	Transfer belt motor	M22	ADU motor
M8	1st transfer roller cam motor	CLT1	1st drawer transport clutch (High speed)
M9	Developer unit motor	CLT2	1st drawer transport clutch (Low speed)
M10	Drum motor	CLT3	1st drawer feed clutch
M11	Drum switching motor	CLT4	2nd drawer transport clutch (Low speed)
M12	Shutter motor	CLT5	2nd drawer transport clutch (High speed)
M13	Polygonal motor	CLT6	2nd drawer feed clutch
M14	Mirror motor-M	CLT7	ADU clutch
M15	Mirror motor-C	CLT8	Bypass feed clutch

2.2 Electric Parts Layout

[A] Scanner unit, control panel

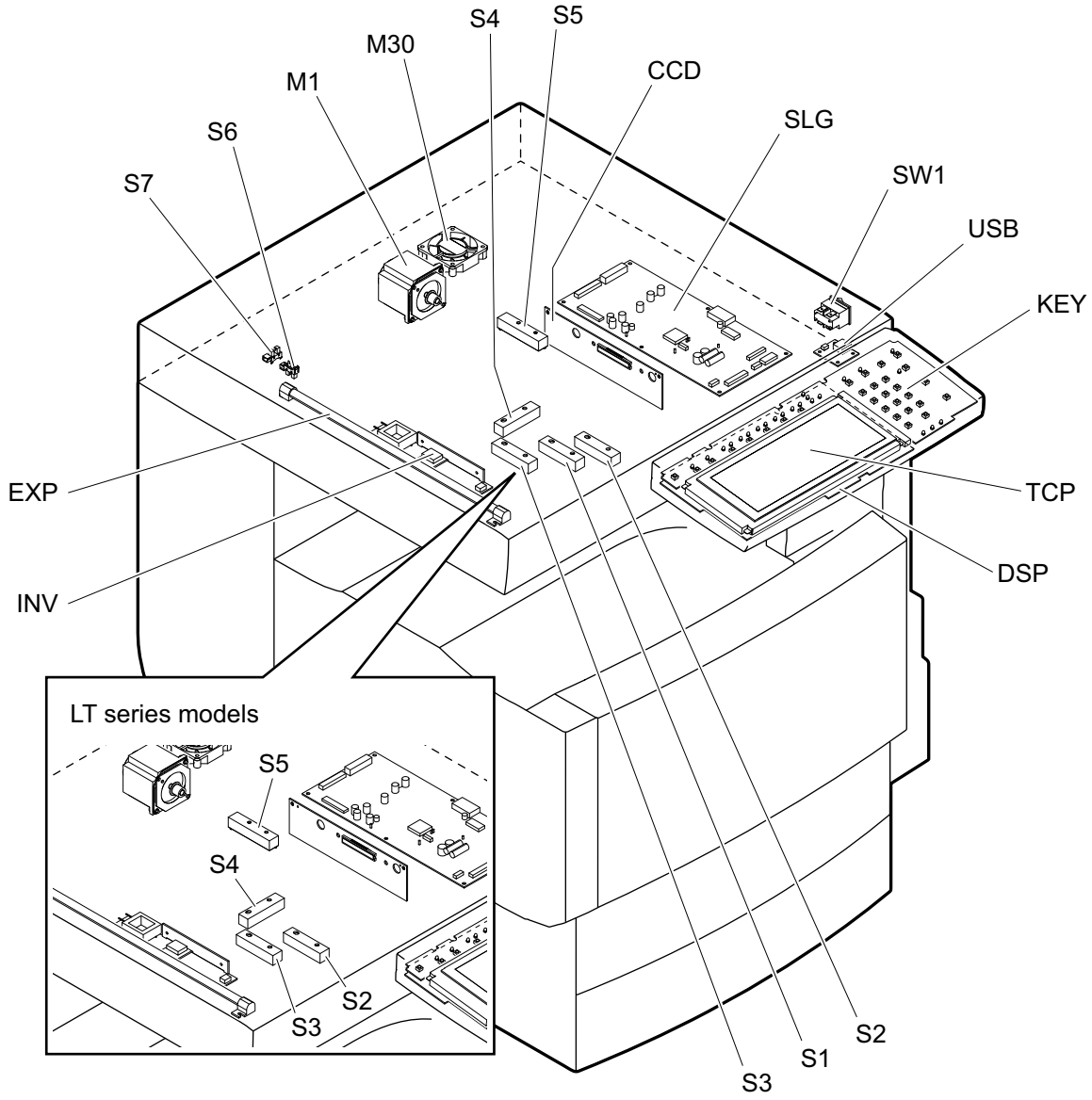


Fig. 2-4

[B] Toner cartridge, toner bag

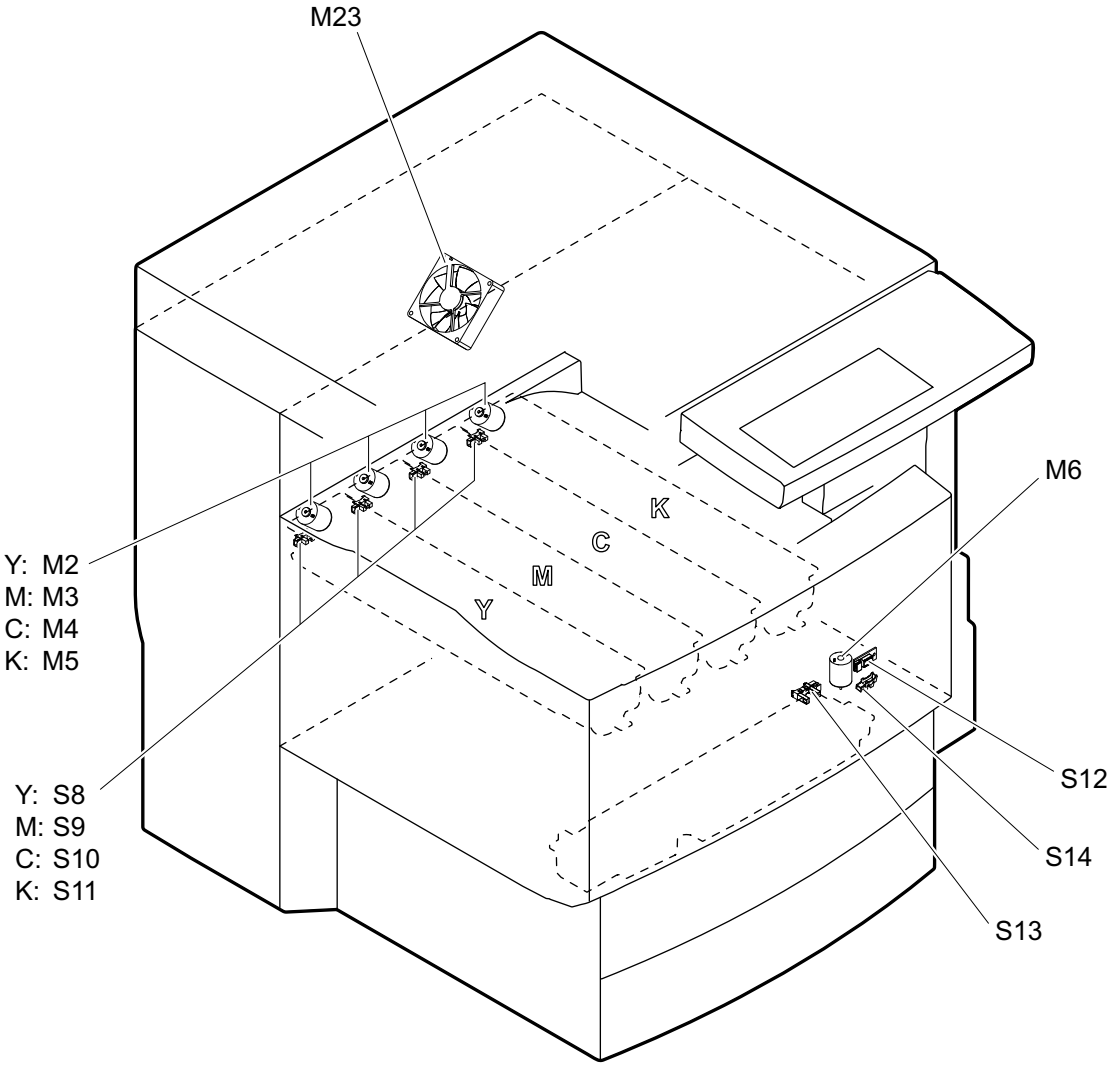


Fig. 2-5

[C] Transfer belt unit

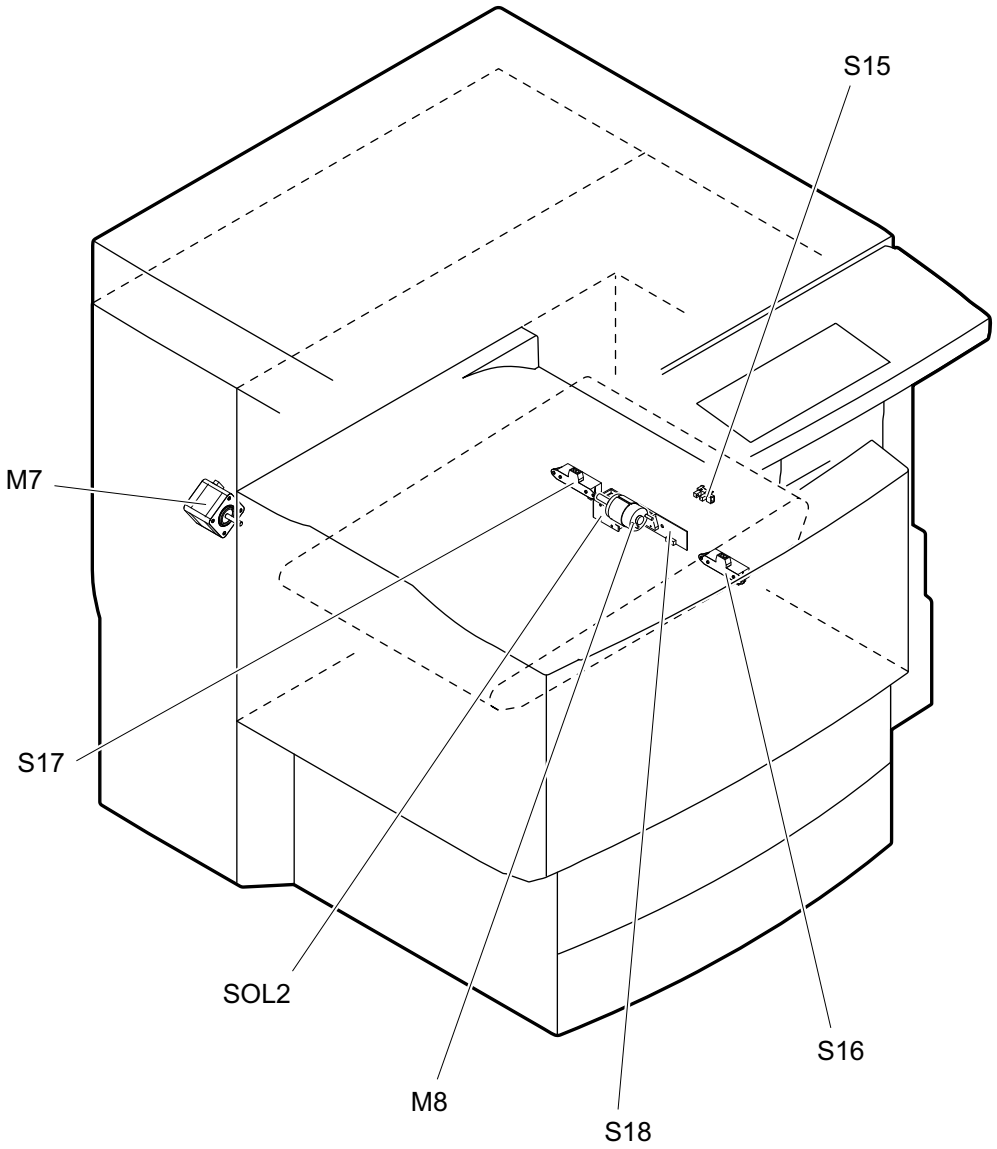


Fig. 2-6

[D] Developer unit

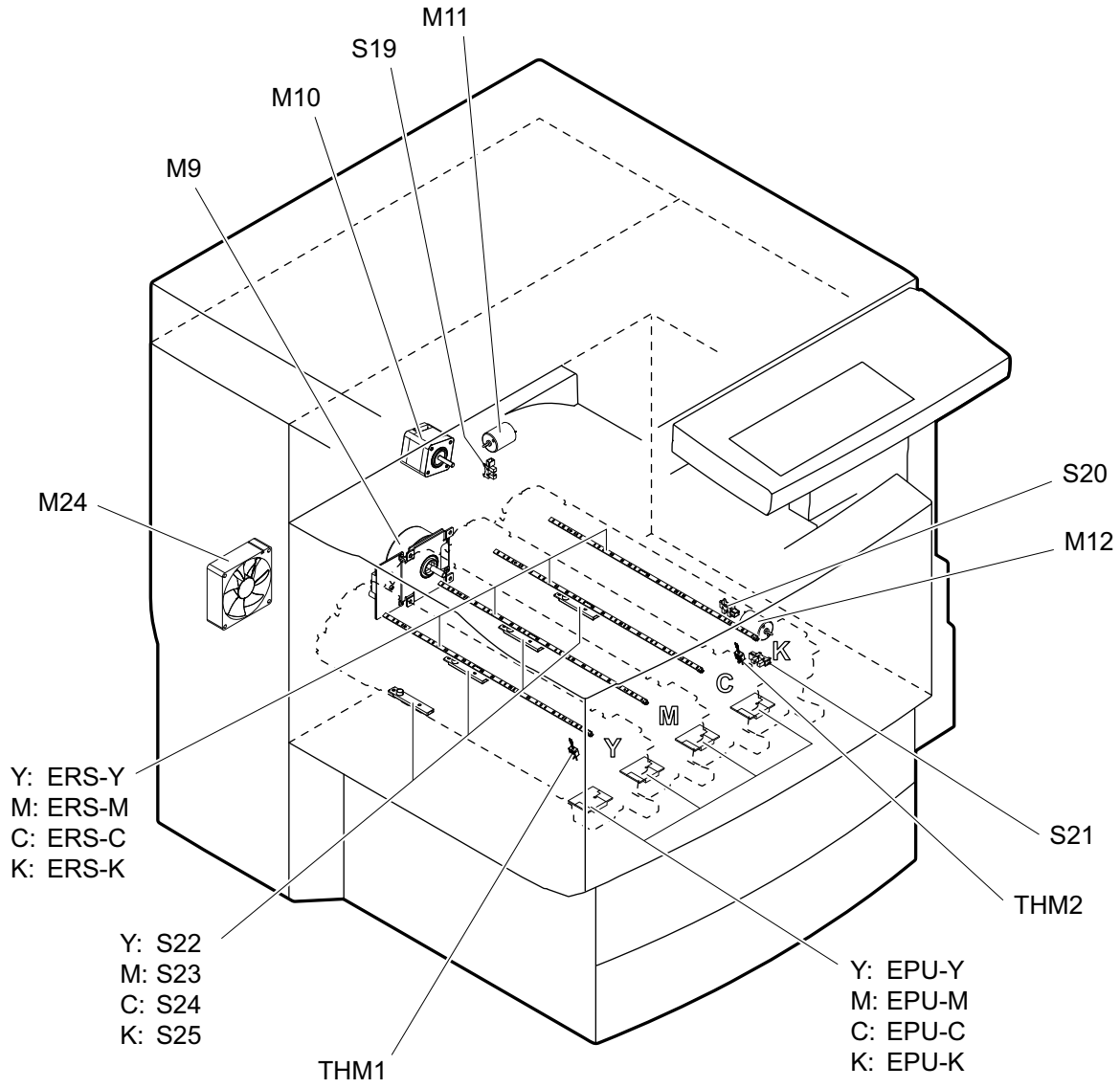


Fig. 2-7

[E] Laser unit

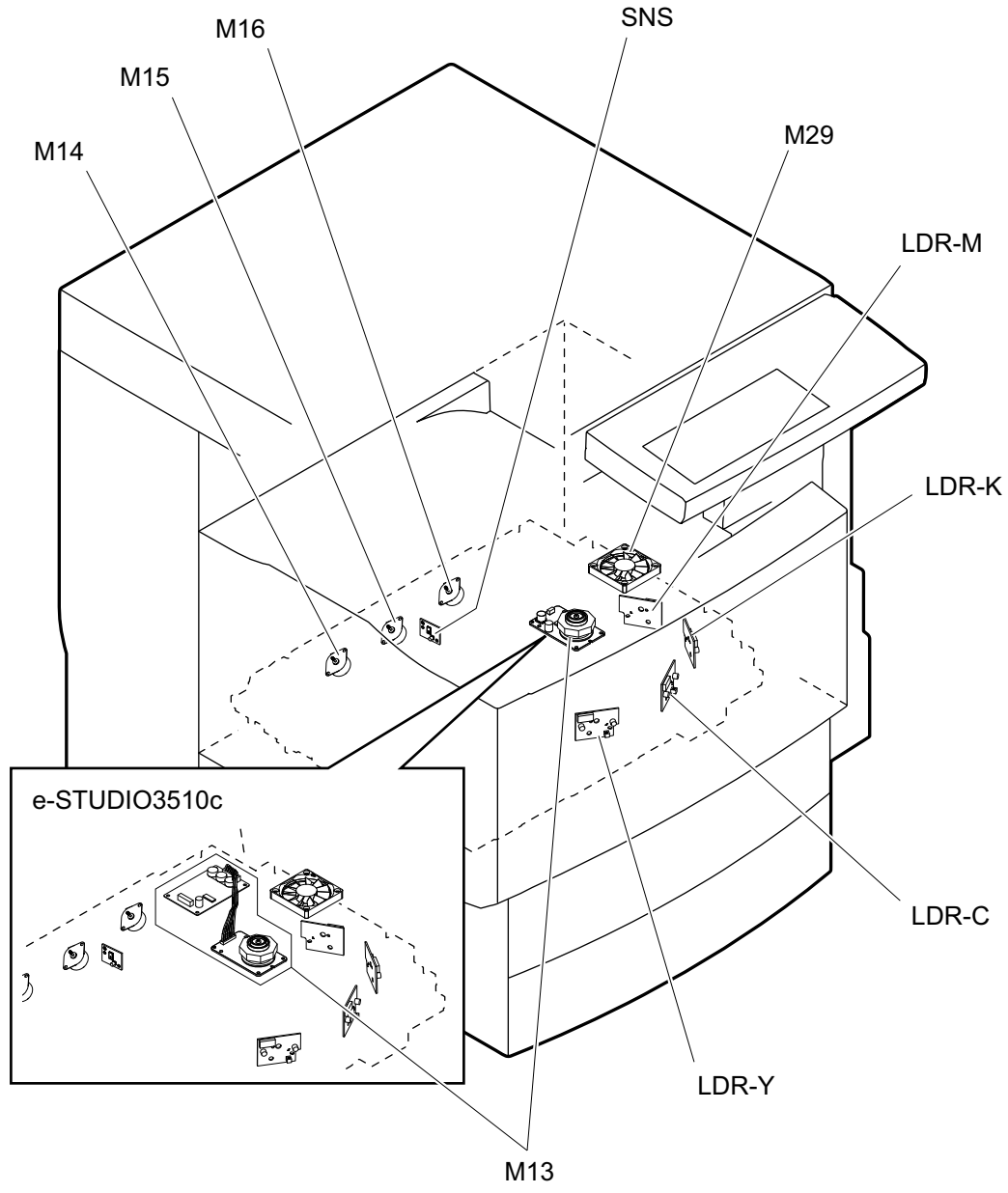


Fig. 2-8

[F] Fuser unit

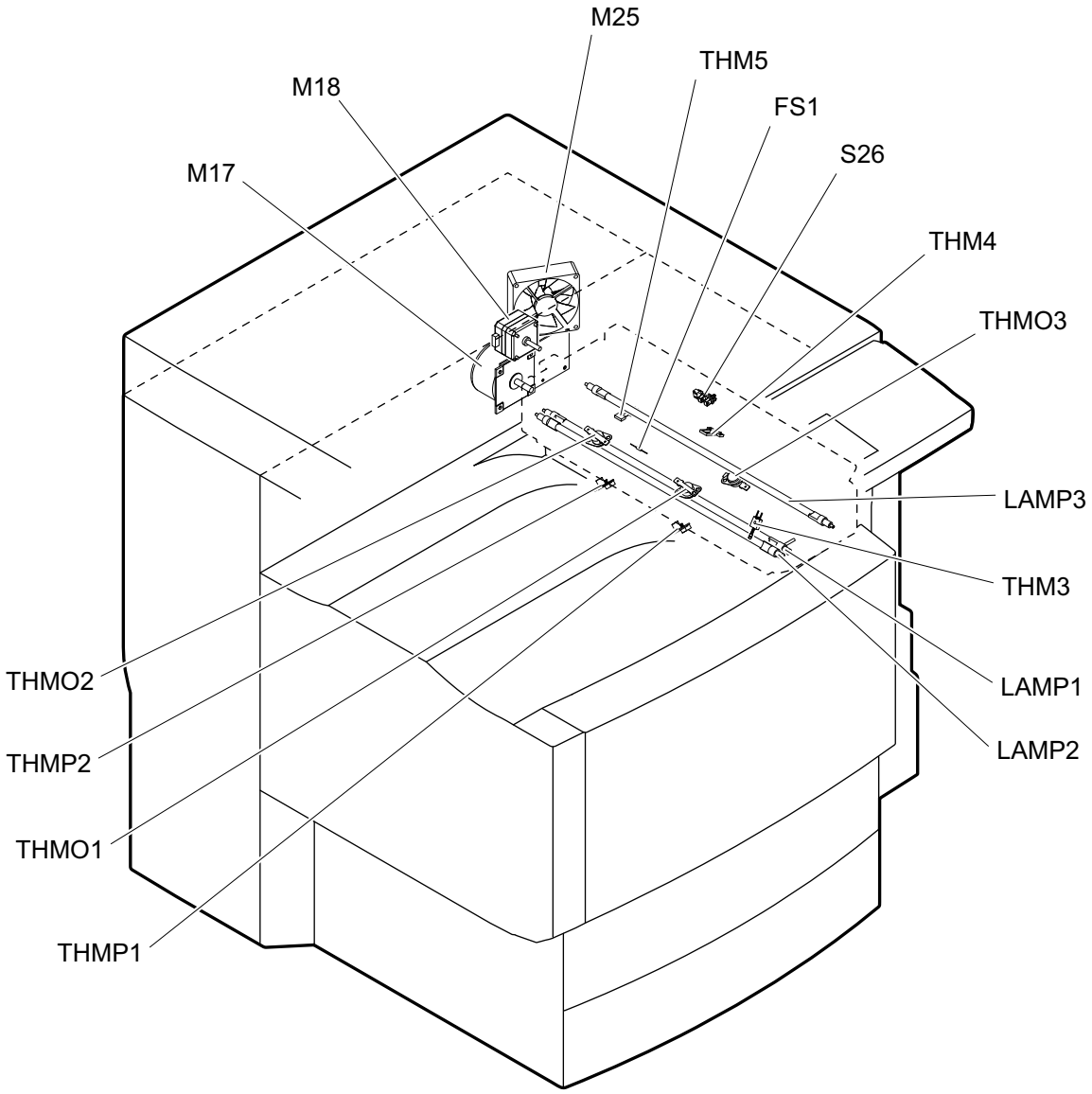


Fig. 2-9

[G] Transfer unit

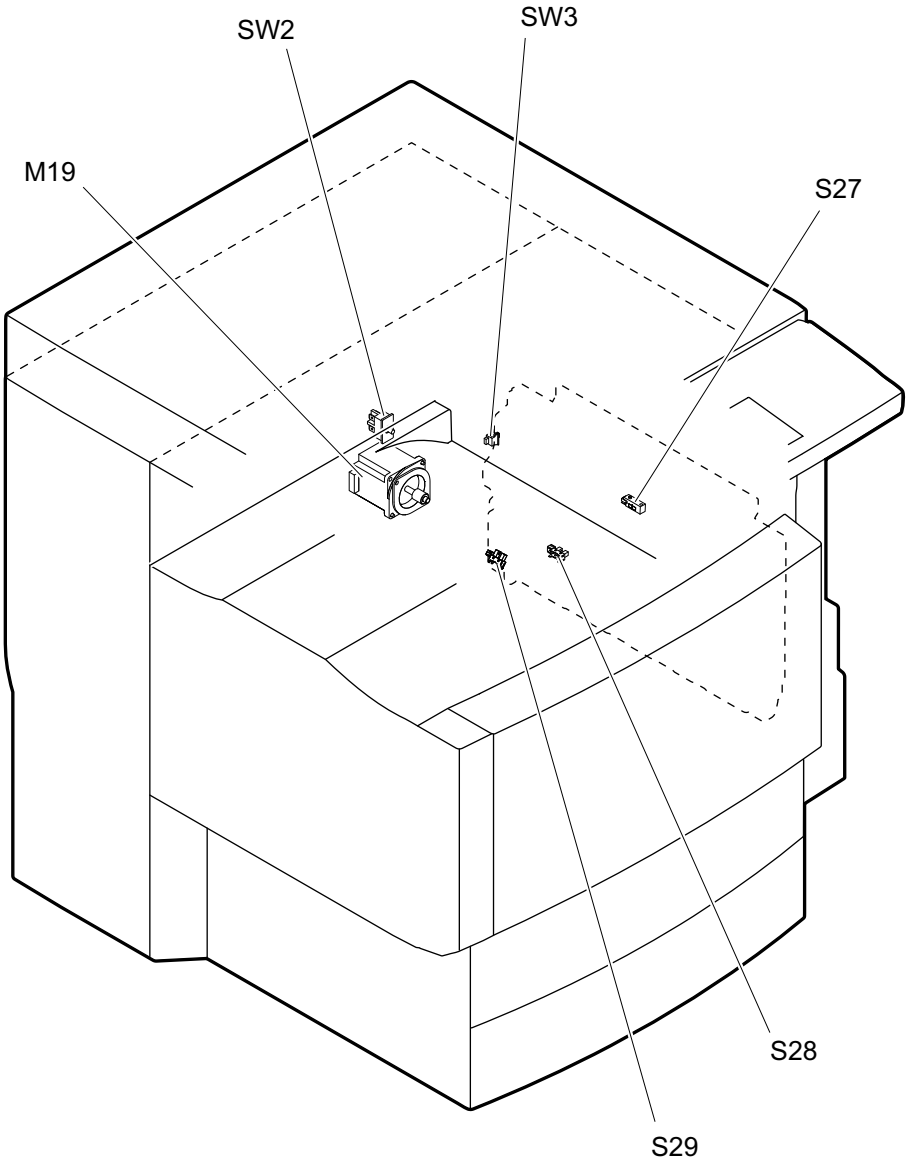


Fig. 2-10

[H] Paper feeding unit

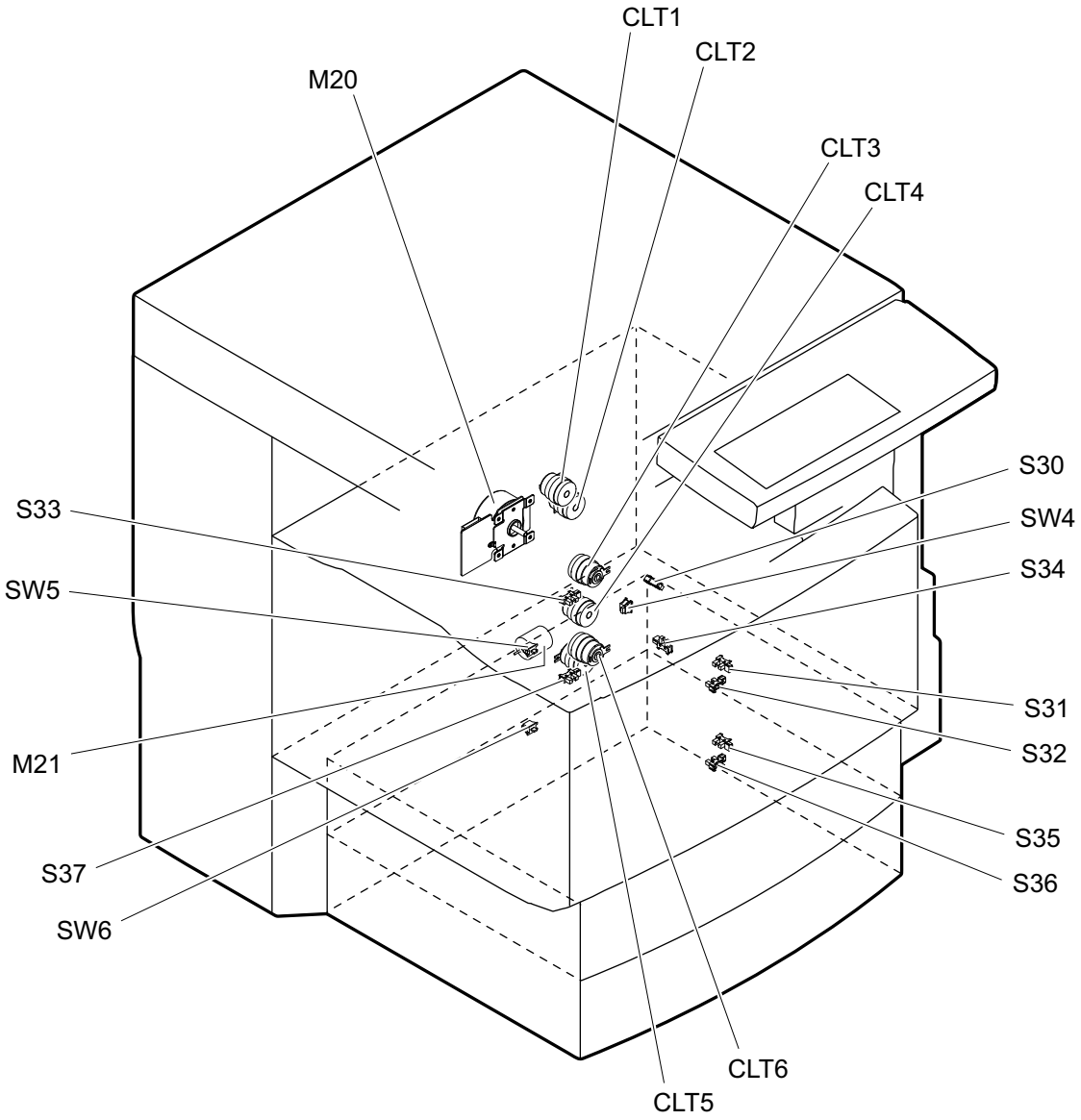


Fig. 2-11

[I] Automatic duplexing unit, bypass feed unit

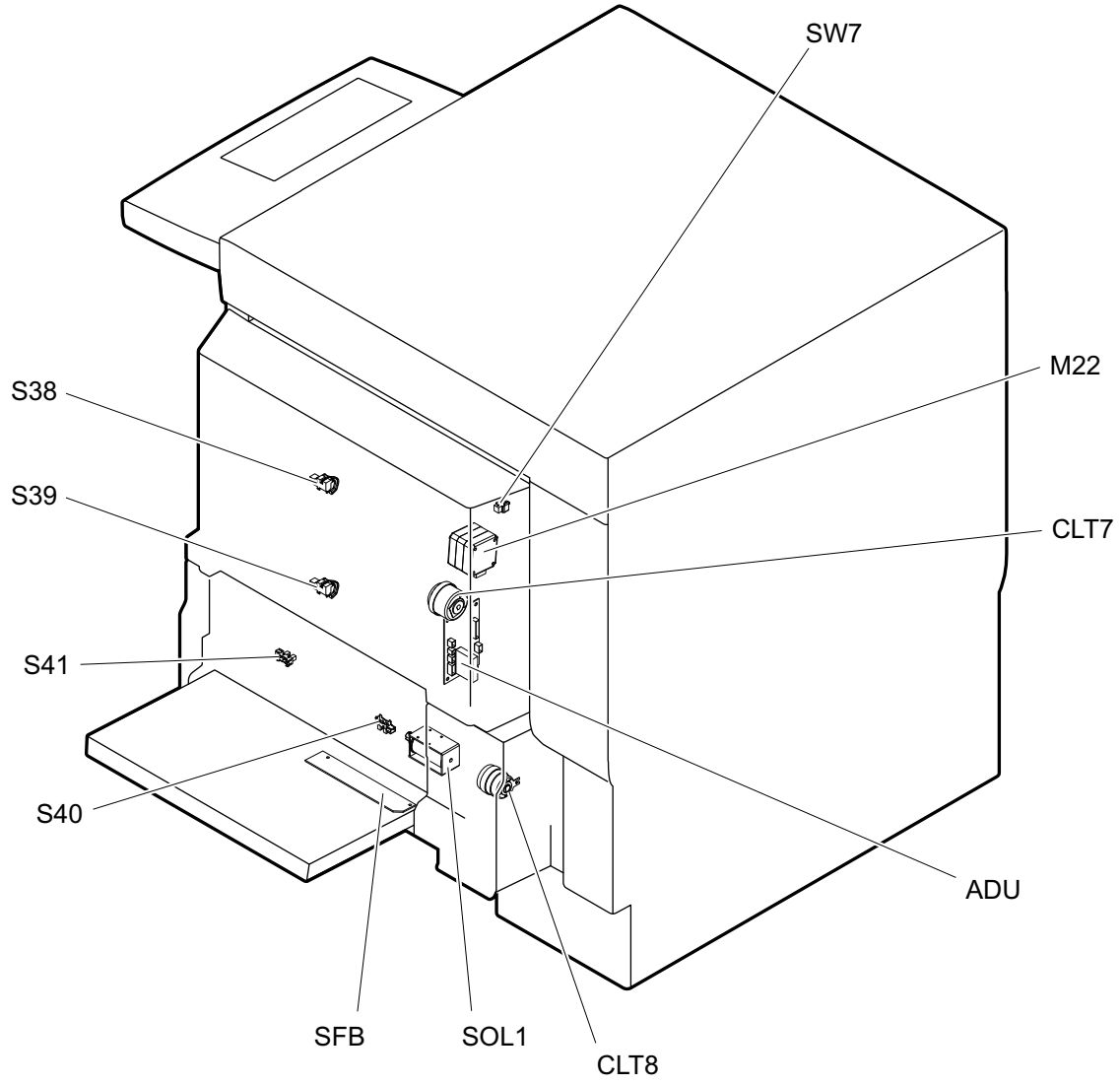


Fig. 2-12

[J] PC board, power supply

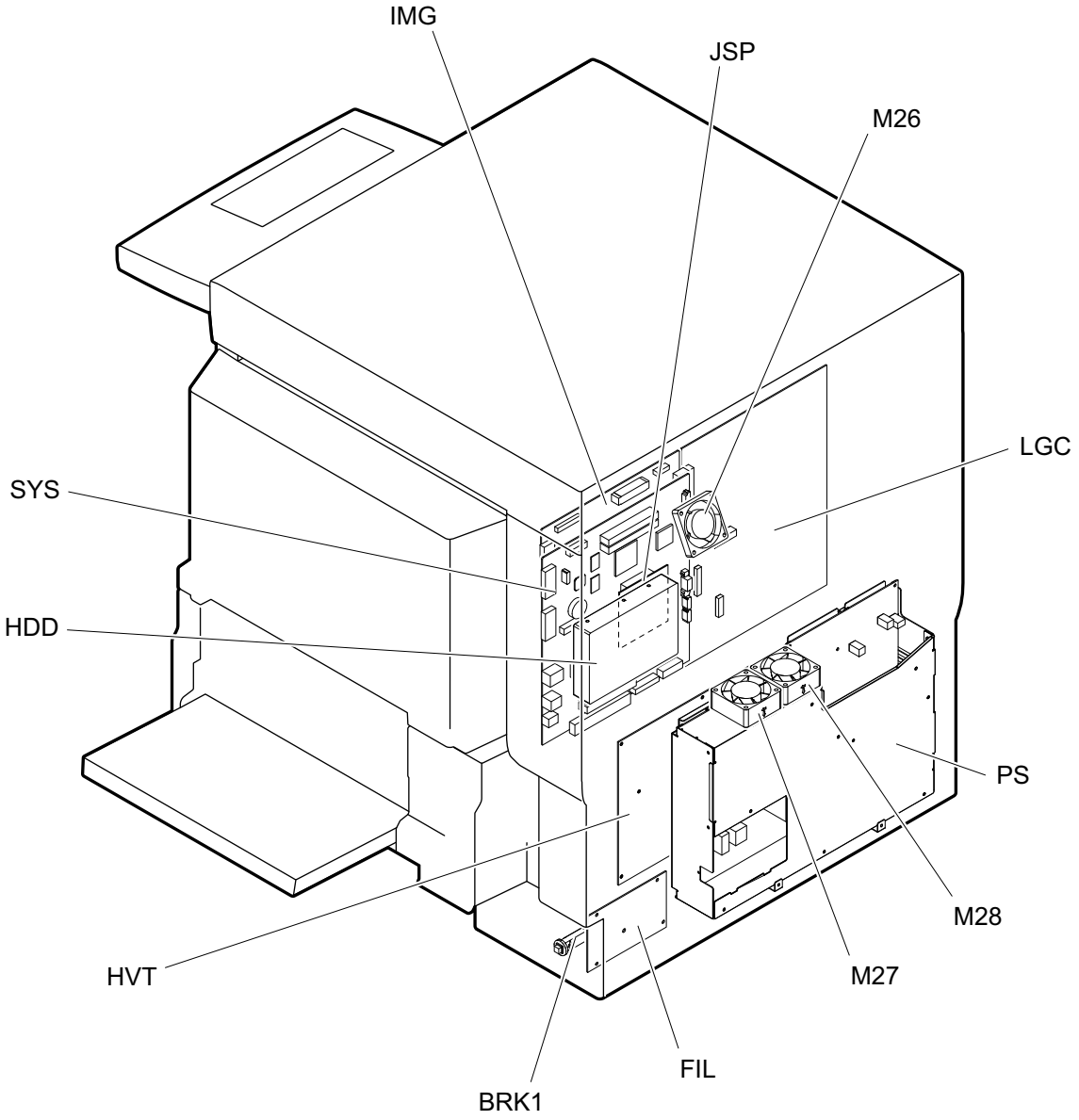


Fig. 2-13

[K] Damp heater

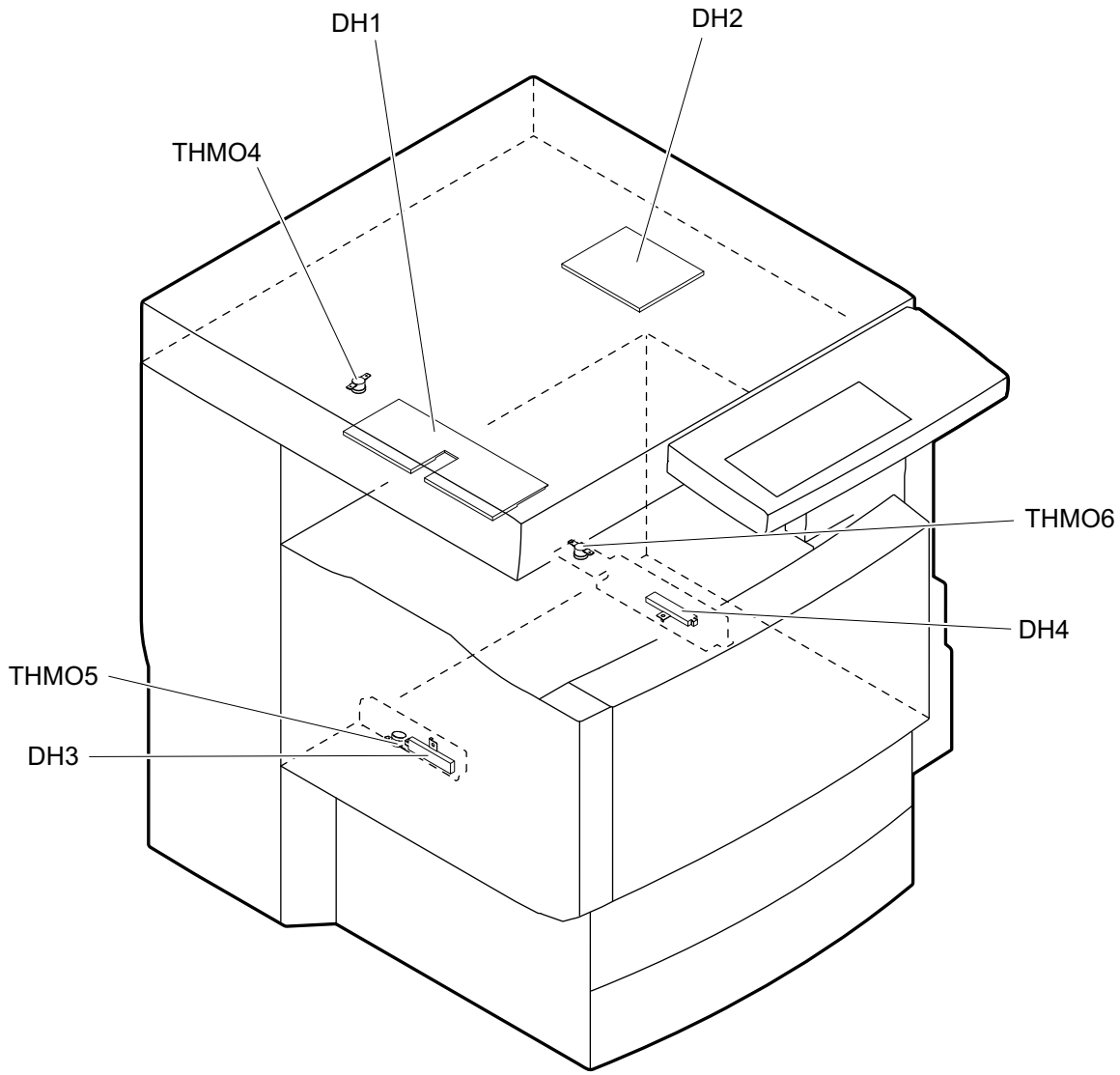


Fig. 2-14

2.3 Symbols and Functions of Various Components

The column "P-I" shows the page and item number in the parts list.

1) Motors

Symbol	Name	Function	Remarks	P-I
M1	SCAN-MOT Scan motor	Driving the carriages	Fig. 2-4	19-8
M2	TNR-MOT-Y Toner motor-Y	Transporting toner from the Y toner cartridge to the developer unit	Fig. 2-5	41-2
M3	TNR-MOT-M Toner motor-M	Transporting toner from the M toner cartridge to the developer unit	Fig. 2-5	41-2
M4	TNR-MOT-C Toner motor-C	Transporting toner from the C toner cartridge to the developer unit	Fig. 2-5	41-2
M5	TNR-MOT-K Toner motor-K	Transporting toner from the K toner cartridge to the developer unit	Fig. 2-5	41-2
M6	USD-TNR-MOT Used toner motor	Driving the paddle in the toner bag (agitating the accumulated used toner)	Fig. 2-5	42-18
M7	TBU-MOT Transfer belt motor	Driving the transfer belt	Fig. 2-6	15-13
M8	TR1-CAM-MOT 1st transfer roller cam motor	Driving the 1st transfer roller contact/release movement	Fig. 2-6	32-19
M9	DEV-MOT Developer unit motor	Driving the developer	Fig. 2-7	15-2
M10	DRM-MOT Drum motor	Driving the drum	Fig. 2-7	16-2
M11	DRM-SW-MOT Drum switching motor	Transmitting/releasing the drive to the Y/M/C drums	Fig. 2-7	16-22
M12	SHUT-MOT Shutter motor	Driving the laser emission outlet (slit glass) protective shutter	Fig. 2-7	36-2
M13	POL-MOT Polygonal motor	Driving the polygonal mirror	Fig. 2-8	11-3
M14	MIR-MOT-M Mirror motor-M	Adjusting the irradiation angle of the M laser	Fig. 2-8	11-3
M15	MIR-MOT-C Mirror motor-C	Adjusting the irradiation angle of the C laser	Fig. 2-8	11-3
M16	MIR-MOT-K Mirror motor-K	Adjusting the irradiation angle of the K laser	Fig. 2-8	11-3
M17	FUS-MOT Fuser motor	Driving the fuser	Fig. 2-9	18-4
M18	EXIT-MOT Exit motor	Driving the exit roller	Fig. 2-9	18-22
M19	RGST-MOT Registration motor	Driving the registration roller	Fig. 2-10	17-16
M20	FEED/TRNS-MOT Feed/transport motor	• Driving the feed roller and pickup roller of each drawer or the bypass feed unit • Driving the transport rollers of the 1st and 2nd drawers	Fig. 2-11	17-12
M21	CST-TRY-MOT Tray-up motor	Lifting up the trays in the 1st and 2nd drawers	Fig. 2-11	4-9

Symbol	Name	Function	Remarks	P-I
M22	ADU-MOT ADU motor	Driving the automatic duplexing unit	Fig. 2-12	47-18
M23	INTRNL-FAN-MOT Internal cooling fan	Cooling down inside of the equipment (around the toner cartridge)	Fig. 2-5	7-19
M24	OZN-FAN-MOT Ozone exhaust fan	Suctioning ozone generated at charging	Fig. 2-7	7-19
M25	FUS/EXIT-FAN-MOT Fuser/exit section cooling fan	Cooling down the fuser and exit section	Fig. 2-9	18-19
M26	SYS-FAN-MOT SYS board cooling fan	Cooling down the SYS board and hard disk	Fig. 2-13	10-5
M27	PS-FAN-MOT-1 Switching regulator cooling fan-1	Cooling down the switching regulator	Fig. 2-13	8-9
M28	PS-FAN-MOT-2 Switching regulator cooling fan-2	Cooling down the switching regulator	Fig. 2-13	8-9
M29	LSU-FAN-MOT Laser unit cooling fan	Cooling down the polygonal motor	Fig. 2-8	11-15
M30	SCAN-FAN-MOT Scanner unit cooling fan	Cooling down the scanner unit	Fig. 2-4	7-21

2) Sensors and switches

Symbol	Name	Function	Remarks	P-I
S1-5	APS1-3, APS-C, APS-R Automatic original detection sensor	Detecting original size *S1: only for A4 series models	Fig. 2-4	12-12 12-13
S6	HOME-SNR Carriage home position sensor	Detecting the carriage home position	Fig. 2-4	12-17
S7	PLTN-SNR Platen sensor	Detecting the opening/closing status of the platen cover or RADF	Fig. 2-4	19-10
S8	TNR-SNR-Y Toner cartridge detection sensor-Y	Detecting the presence of the Y toner cartridge	Fig. 2-5	41-101
S9	TNR-SNR-M Toner cartridge detection sensor-M	Detecting the presence of the M toner cartridge	Fig. 2-5	41-101
S10	TNR-SNR-C Toner cartridge detection sensor-C	Detecting the presence of the C toner cartridge	Fig. 2-5	41-101
S11	TNR-SNR-K Toner cartridge detection sensor-K	Detecting the presence of the K toner cartridge	Fig. 2-5	41-101
S12	TEMP/HUMI-SNR Temperature/humidity sensor	Detecting the ambient temperature/ humidity of the equipment	Fig. 2-5	42-19
S13	USD-TNR-FLL-SNR Toner bag full detection sensor	Detecting the full status of used toner in the toner bag	Fig. 2-5	42-104
S14	USD-TNR-LCK-SNR Used toner motor lock detection sensor	Detecting the lock status of used toner motor	Fig. 2-5	42-109
S15	TR1-SNR 1st transfer roller status detection sensor	Detecting contact/release status of the 1st transfer roller for each color	Fig. 2-6	32-105

Symbol	Name	Function	Remarks	P-I
S16	IMG-POS-SNR-F Image position aligning sensor (Front)	Detecting the front side position of a toner image (test pattern) developed on the transfer belt	Fig. 2-6	27-4
S17	IMG-POS-SNR-R Image position aligning sensor (Rear)	Detecting the rear side position of a toner image (test pattern) developed on the transfer belt	Fig. 2-6	27-4
S18	TNR-LVL-SNR Image quality sensor	Detecting the density of a toner image (test pattern) developed on the transfer belt surface	Fig. 2-6	27-5
S19	DRM-SW-SNR Drum switching detection sensor	Detecting contact/release status of the drive to the Y/M/C drums	Fig. 2-7	16-20
S20	SHUT-SNR Shutter status detection sensor	Detecting the status of the laser emission outlet (slit glass) protective shutter	Fig. 2-7	36-101
S21	CH-CLN-SNR Needle electrode cleaner detection sensor	Detecting the cleaning operation for the needle electrode (Detecting that the needle electrode cleaner has reached the limit position) (only for K)	Fig. 2-7	36-101
S22	ATTNR-SNR-Y Auto-toner sensor-Y	Detecting the toner density in the Y developer unit	Fig. 2-7	38-31
S23	ATTNR-SNR-M Auto-toner sensor-M	Detecting the toner density in the M developer unit	Fig. 2-7	38-31
S24	ATTNR-SNR-C Auto-toner sensor-C	Detecting the toner density in the C developer unit	Fig. 2-7	38-31
S25	ATTNR-SNR-K Auto-toner sensor-K	Detecting the toner density in the K developer unit	Fig. 2-7	38-31
S26	EXIT-SNR Exit sensor	Detecting paper exit	Fig. 2-9	45-101
S27	CLNG-SNR Paper clinging detection sensor	Detecting whether the paper is clinging to the transfer belt or not	Fig. 2-10	13-108
S28	RGST-SNR Registration sensor	Detecting paper transport at the registration roller section	Fig. 2-10	25-102
S29	TR2-SNR 2nd transfer roller position detection sensor	Detecting the contact/release status of the 2nd transfer roller	Fig. 2-10	11-102
S30	CST1-FEED-SNR 1st drawer feed sensor	Detecting paper transport and paper jam at the paper feeding system of the 1st drawer	Fig. 2-11	25-102
S31	CST1-TRY-SNR 1st drawer tray-up sensor	Detecting the lifting status of the tray in the 1st drawer	Fig. 2-11	20-30
S32	CST1-EMP-SNR 1st drawer empty sensor	Detecting the presence of paper in the 1st drawer	Fig. 2-11	20-30
S33	CST1-NEMP-SNR 1st drawer paper stock sensor	Detecting the paper remaining in the 1st drawer	Fig. 2-11	20-30
S34	CST2-FEED-SNR 2nd drawer feed sensor	Detecting paper transport and paper jam at the paper feeding system of the 2nd drawer	Fig. 2-11	26-101
S35	CST2-TRY-SNR 2nd drawer tray-up sensor	Detecting the lifting status of the tray in the 2nd drawer	Fig. 2-11	20-30

Symbol	Name	Function	Remarks	P-I
S36	CST2-EMP-SNR 2nd drawer empty sensor	Detecting the presence of paper in the 2nd drawer	Fig. 2-11	20-30
S37	CST2-NEMP-SNR 2nd drawer paper stock sensor	Detecting the paper remaining in the 2nd drawer	Fig. 2-11	20-30
S38	ADU-U-SNR ADU entrance sensor	Detecting transported paper at the automatic duplexing unit entrance section	Fig. 2-12	48-3
S39	ADU-L-SNR ADU exit sensor	Detecting transported paper inside the automatic duplexing unit	Fig. 2-12	47-31
S40	SFB-SNR Bypass paper sensor	Detecting the presence of paper on the bypass feed unit	Fig. 2-12	24-5
S41	SFB-FEED-SNR Bypass feed sensor	Detecting transported paper fed from the bypass feed unit	Fig. 2-12	24-5
SW1	MAIN-SW Main switch	Turning the power of the equipment ON/OFF	Fig. 2-4	12-28
SW2	COV-INTLCK-SW Cover interlock switch	Supplying or shutting off AC power to the switching regulator (voltage-generating circuit interlocked with these covers) according to the opening/closing status of the front cover or automatic duplexing unit (Cover open: Shut off)	Fig. 2-10	7-112
SW3	TR-COV-SW Transfer cover switch	Detecting the opening/closing status of the transfer cover	Fig. 2-10	6-106
SW4	SIDE-COV-SW Side cover switch	Detecting the opening/closing status of the side cover	Fig. 2-11	26-102
SW5	CST1-SW 1st drawer detection switch	Detecting the presence of the 1st drawer	Fig. 2-11	21-102
SW6	CST2-SW 2nd drawer detection switch	Detecting the presence of the 2nd drawer	Fig. 2-11	21-102
SW7	ADU-SET-SW ADU opening/closing switch	Detecting the opening/closing status of the automatic duplexing unit	Fig. 2-12	48-7

3) Electromagnetic spring clutches

Symbol	Name	Function	Remarks	P-I
CLT1	CST1-TR-H-CLT 1st drawer transport clutch (High speed)	Driving the transport roller of the 1st drawer (High speed)	Fig. 2-11	17-11
CLT2	CST1-TR-L-CLT 1st drawer transport clutch (Low speed)	Driving the transport roller of the 1st drawer (Low speed)	Fig. 2-11	17-11
CLT3	CST1-FEED-CLT 1st drawer feed clutch	Driving the feed roller and pickup roller of the 1st drawer	Fig. 2-11	20-29
CLT4	CST2-TR-L-CLT 2nd drawer transport clutch (Low speed)	Driving the transport roller of the 2nd drawer (Low speed)	Fig. 2-11	21-23
CLT5	CST2-TR-H-CLT 2nd drawer transport clutch (High speed)	Driving the transport roller of the 2nd drawer (High speed)	Fig. 2-11	21-23

Symbol	Name	Function	Remarks	P-I
CLT6	CST2-FEED-CLT 2nd drawer feed clutch	Driving the feed roller and pickup roller of the 2nd drawer	Fig. 2-11	20-29
CLT7	ADU-CLT ADU clutch	Driving the transport roller of the automatic duplexing unit	Fig. 2-12	47-16
CLT8	SFB-FEED-CLT Bypass feed clutch	Driving the transport roller, feed roller and pickup roller of the bypass feed unit	Fig. 2-12	23-20

4) Solenoids

Symbol	Name	Function	Remarks	P-I
SOL1	SFB-SOL Bypass pickup solenoid	Driving the lifting movement of the bypass pickup roller	Fig. 2-12	24-11
SOL2	SNR-SHUT-SOL Sensor shutter solenoid	Driving the sensor shutter of the image position aligning sensor (front / rear) and image quality sensor	Fig. 2-6	27-6

5) PC boards

Symbol	Name	Function	Remarks	P-I
CCD	PWA-F-CCD CCD driving PC board (CCD board)	Scanning originals with CCD	Fig. 2-4	12-11
SLG	PWA-F-SLG Scanning section control PC board (SLG board)	Controlling the scanning section	Fig. 2-4	12-38
DSP	PWA-F-DSP Display PC board (DSP board)	Controlling the whole control panel	Fig. 2-4	3-26
KEY	PWA-F-KEY Key PC board (KEY board)	Controlling the key switches and LEDs	Fig. 2-4	3-25
USB	PWA-F-USB USB PC board (USB board)	Connection interface of the USB storage device	Fig. 2-4	12-16
EPU-Y	PWA-F-EPU-Y EPU PC board-Y (EPU-Y board)	Storing information of the Y developer unit (EPU)	Fig. 2-7	37-5
EPU-M	PWA-F-EPU-M EPU PC board-M (EPU-M board)	Storing information of the M developer unit (EPU)	Fig. 2-7	37-5
EPU-C	PWA-F-EPU-C EPU PC board-C (EPU-C board)	Storing information of the C developer unit (EPU)	Fig. 2-7	37-5
EPU-K	PWA-F-EPU-K EPU PC board-K (EPU-K board)	Storing information of the K developer unit (EPU)	Fig. 2-7	37-5
LDR-Y	PWA-F-LDR-Y Laser driving PC board-Y (LDR-Y board)	Driving the Y laser diode	Fig. 2-8	11-3
LDR-M	PWA-F-LDR-M Laser driving PC board-M (LDR-M board)	Driving the M laser diode	Fig. 2-8	11-3
LDR-C	PWA-F-LDR-C Laser driving PC board-C (LDR-C board)	Driving the C laser diode	Fig. 2-8	11-3

Symbol	Name	Function	Remarks	P-I
LDR-K	PWA-F-LDR-K Laser driving PC board-K (LDR-K board)	Driving the K laser diode	Fig. 2-8	11-3
SNS	PWA-F-SNS H-sync detection PC board (SNS board)	Detecting the laser beam position	Fig. 2-8	11-3
ADU	PWA-F-ADU ADU control PC board (ADU board)	Controlling the automatic duplexing unit	Fig. 2-12	47-30
SFB	PWA-F-SFB Paper width detection PC board (SFB board)	Detecting the width of paper on the bypass tray	Fig. 2-12	22-13
SYS	PWA-F-SYS System control PC board (SYS board)	Controlling the whole system and image processing	Fig. 2-13	9-21
JSP	PWA-F-JSP CODEC PC board (JSP board)	Companding image data by CODEC	Fig. 2-13	9-22
LGC	PWA-F-LGC Logic PC board (LGC board)	Controlling the print engine section	Fig. 2-13	9-10
IMG	PWA-F-IMG Image processing PC board (IMG board)	Controlling the image processing	Fig. 2-13	9-4
FIL	PWA-F-FIL Filter PC board (FIL board)	• Filtering out the AC power noise • Power supplying to each damp heater	Fig. 2-13	8-2

6) Lamps and heaters

Symbol	Name	Function	Remarks	P-I
EXP	LP-EXPO Exposure lamp	Exposing originals	Fig. 2-4	29-6
ERS-Y	LP-ERS-Y Discharge LED-Y	Eliminating residual charge on the Y drum surface	Fig. 2-7	36-19
ERS-M	LP-ERS-M Discharge LED-M	Eliminating residual charge on the M drum surface	Fig. 2-7	36-19
ERS-C	LP-ERS-C Discharge LED-C	Eliminating residual charge on the C drum surface	Fig. 2-7	36-19
ERS-K	LP-ERS-K Discharge LED-K	Eliminating residual charge on the K drum surface	Fig. 2-7	36-19
LAMP1	LP-HTR-C Center heater lamp	Heating the center section of the fuser roller	Fig. 2-9	43-27
LAMP2	LP-HTR-S Side heater lamp	Heating the section of the both sides of the fuser roller	Fig. 2-9	43-28
LAMP3	LP-PR Pressure roller lamp	Heating the pressure roller	Fig. 2-9	43-26
DH1	SCN-DH-L Scanner damp heater (Left)	Preventing condensation of the mirrors of the carriage	Fig. 2-14	12-22
DH2	SCN-DH-R Scanner damp heater (Right)	Preventing condensation of the lens	Fig. 2-14	12-32

Symbol	Name	Function	Remarks	P-I
DH3	DRM-DH-L Drum damp heater (Left)	Preventing condensation of the drum	Fig. 2-14	42-110
DH4	DRM-DH-R Drum damp heater (Right)	Preventing condensation of the drum	Fig. 2-14	36-26

7) Thermistors, thermopiles, and thermostats

Symbol	Name	Function	Remarks	P-I
THM1	THMS-DRM-Y Drum thermistor-Y	Detecting the surface temperature of the drum for Y	Fig. 2-7	38-33
THM2	THMS-DRM-K Drum thermistor-K	Detecting the surface temperature of the drum for K	Fig. 2-7	38-33
THM3	THMS-FBLT-F Fuser belt front thermistor	Detecting the surface temperature of the front end of the fuser belt	Fig. 2-9	43-21
THM4	THMS-PR-C Pressure roller center thermistor	Detecting the surface temperature of the center of the pressure roller	Fig. 2-9	44-14
THM5	THMS-PR-R Pressure roller rear thermistor	Detecting the surface temperature of the rear end of the pressure roller	Fig. 2-9	44-14
THMP1	THMP-FBLT-C Fuser belt center thermopile	Detecting the surface temperature of the center of the fuser belt	Fig. 2-9	46-4
THMP2	THMP-FBLT-R Fuser belt rear thermopile	Detecting the surface temperature of the rear end of the fuser belt	Fig. 2-9	46-4
THMO1	THERMO-FBLT-C Fuser belt center thermostat	Preventing overheating of the center portion of the fuser belt	Fig. 2-9	43-20
THMO2	THERMO-FBLT-S Fuser belt rear thermostat	Preventing overheating of the rear portion of the fuser belt	Fig. 2-9	43-19
THMO3	THERMO-PR Pressure roller thermostat	Preventing overheating of the pressure roller in the fuser unit	Fig. 2-9	44-13
THMO4	THERMO-SCN-DH Scanner damp heater thermostat	Controlling the temperature of the scanner damp heater	Fig. 2-14	12-22
THMO5	THERMO-DRM-DH-L Drum damp heater thermostat (Left)	Controlling the temperature of the drum damp heater	Fig. 2-14	42-34
THMO6	THERMO-DRM-DH-R Drum damp heater thermostat (Right)	Controlling the temperature of the drum damp heater	Fig. 2-14	36-27

8) Transformer

Symbol	Name	Function	Remarks	P-I
HVT	PS-HVT High-voltage transformer	Generating high-voltage and supplying it to the following sections • Main charger needle electrode • Main charger grid • Developer bias • Transfer bias	Fig. 2-13	8-8

9) Others

Symbol	Name	Function	Remarks	P-I
INV	INV Lamp inverter board	Controlling the exposure lamp	Fig. 2-4	29-7
TCP	TCP Touch panel	Displaying and entering various kinds of information	Fig. 2-4	3-19
FS1	FUSE-FUS Fuser unit fuse	Determining the used status of the fuser unit (Determining whether a unit is new or used)	Fig. 2-9	43-32
HDD	HDD Hard disk	Saving program data and image data	Fig. 2-13	9-111
PS	PS-ACC Switching regulator	Generating DC voltage and supplying it to each section of the equipment	Fig. 2-13	8-9
BRK	BRK Breaker	Preventing overcurrent to the equipment	Fig. 2-13	8-106

2.4 System Block Diagram

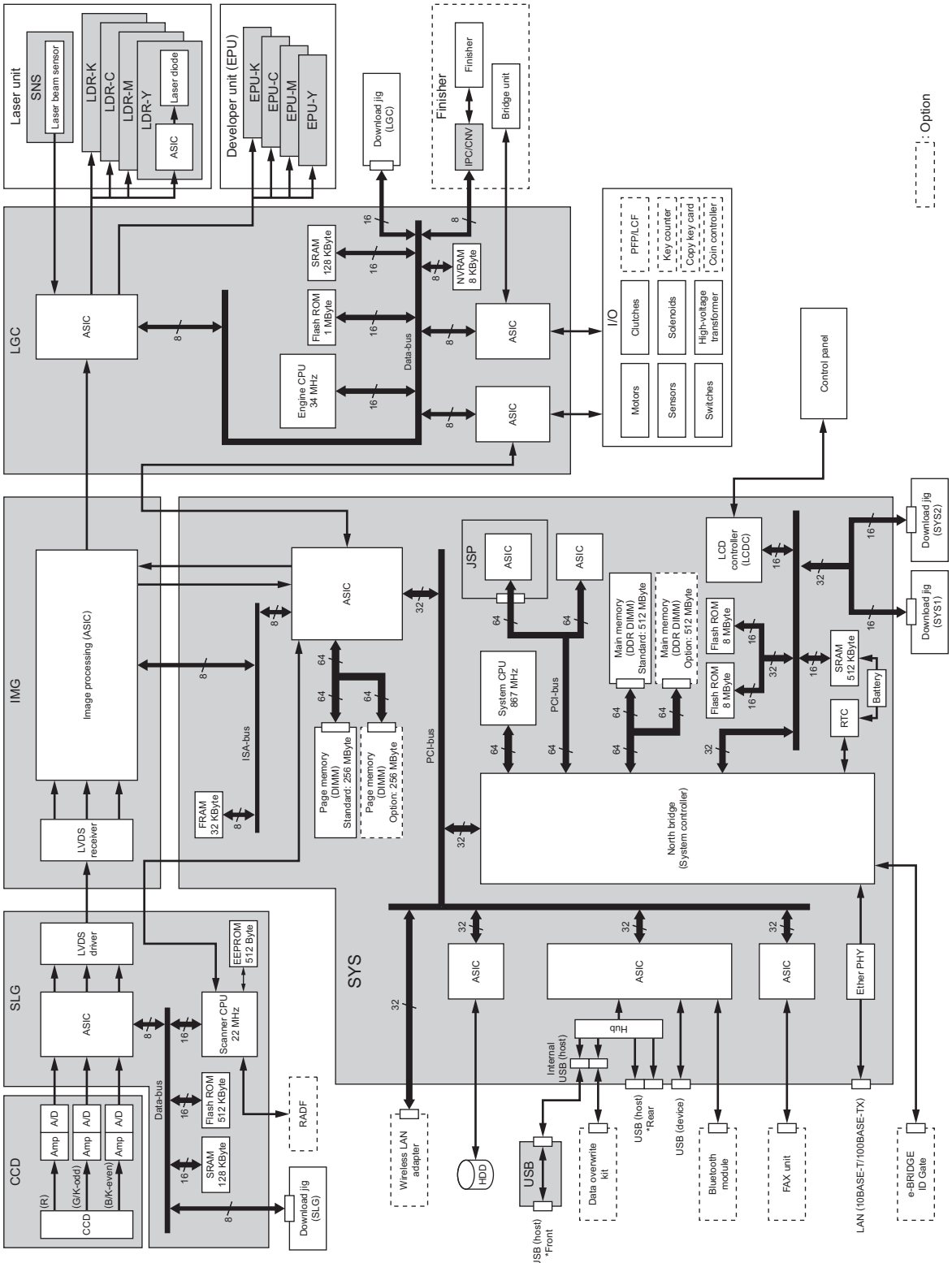


Fig. 2-15

2.5 Disassembly and Replacement of Covers

[A] Front cover

(1) Open the front cover.
(2) Remove the toner bag.
📖 P.12-11 "[A] Toner bag"
(3) Raise 2 hinge pins on the right and left, and then pull them out.
(4) Take off the front cover.

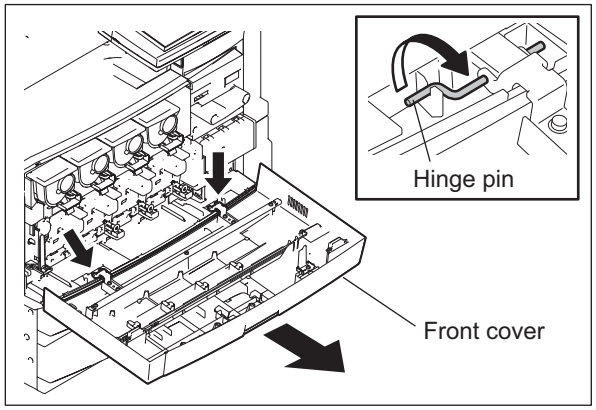


Fig. 2-16

[B] Inner tray

(1) Open the front cover.
(2) Remove 2 screws and take off the inner tray.

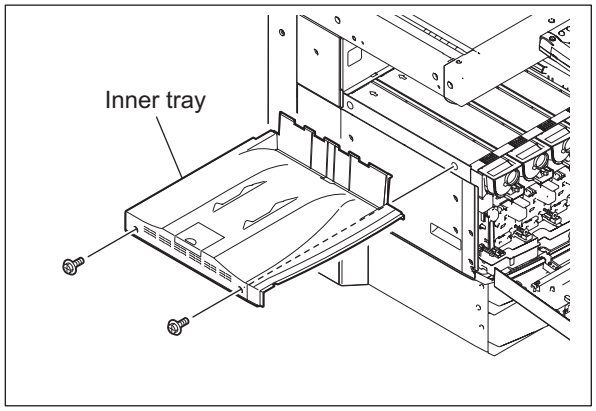


Fig. 2-17

[C] Tray back cover

(1) Take off the ozone filter-2.
📖 P.12-32 "[Q] Ozone filter-2"
(2) Take off the inner tray.
📖 P.2-27 "[B] Inner tray"
(3) Remove 1 screw and take off the tray back cover.

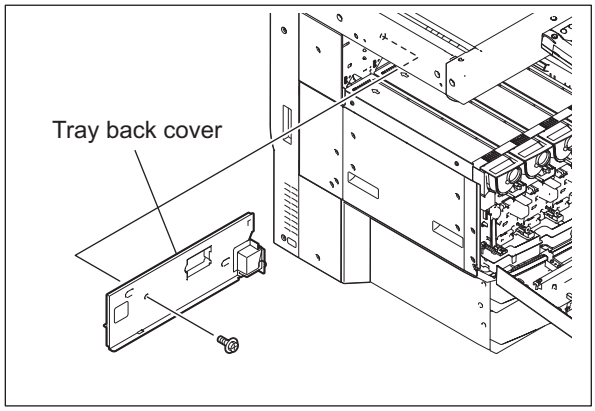


Fig. 2-18

[D] Front upper cover

(1) Remove 2 screws and take off the front upper cover.

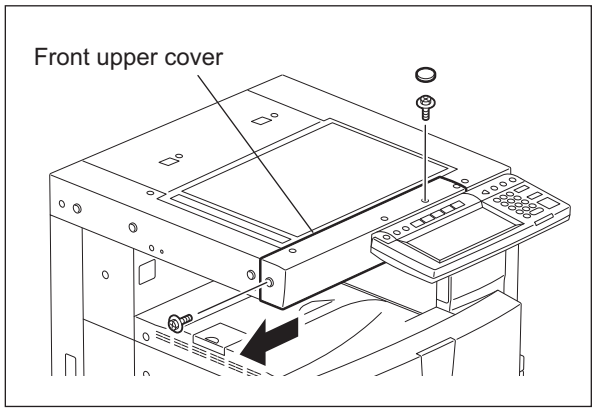


Fig. 2-19

[E] Front right cover

(1) Open the front cover and ADU.
(2) Remove 2 screws and take off the TBU lifting lever.

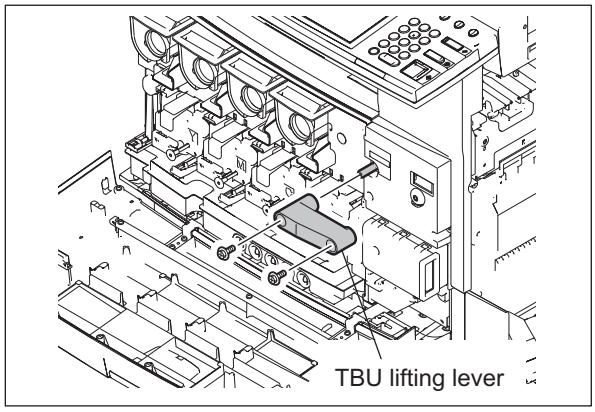


Fig. 2-20

(3) Release 2 latches and take off the front right cover.

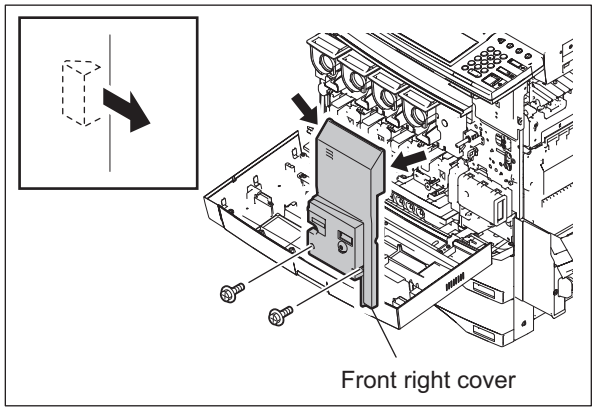


Fig. 2-21

[F] Left upper cover

(1) Remove 3 screws and take off the left upper cover.

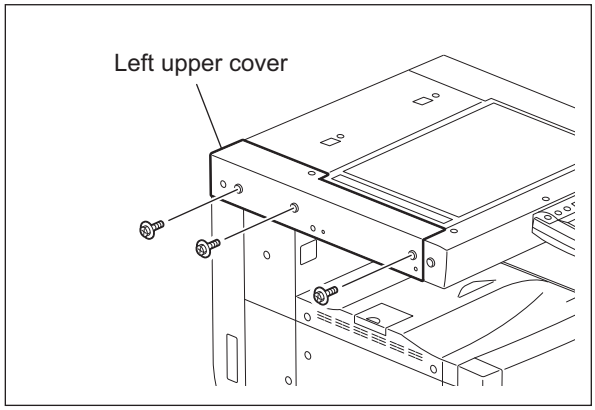


Fig. 2-22

[G] Left cover

(1) Remove 7 screws and take off the left cover.

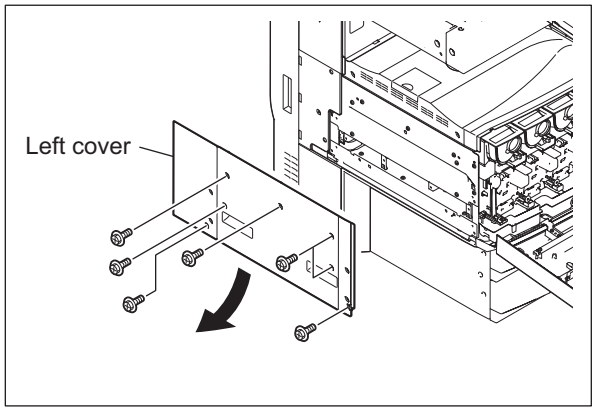


Fig. 2-23

[H] Left rear cover

(1) Take off the ozone filter-1.
📖 P.12-31 "[M] Ozone filter-1"
(2) Take off the left cover.
📖 P.2-30 "[G] Left cover"
(3) Remove 5 screws and take off the left rear cover.

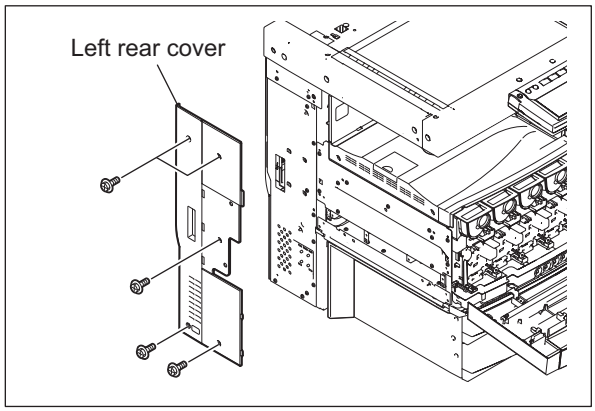


Fig. 2-24

[I] Left lower cover

(1) Take off the left rear cover.
📖 P.2-30 "[H] Left rear cover"
(2) Remove 2 screws and take off the left lower cover.

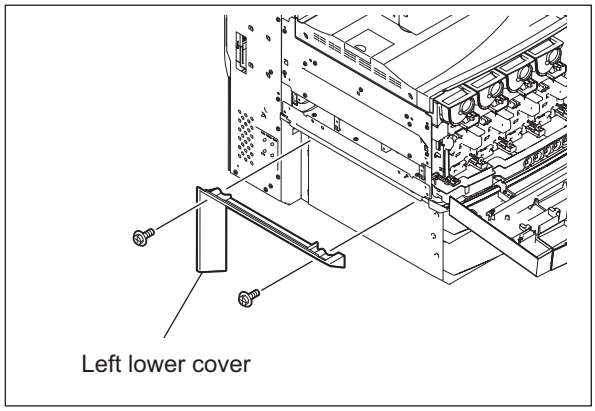


Fig. 2-25

[J] Right upper cover

(1) Remove 4 screws and take off the right upper cover.

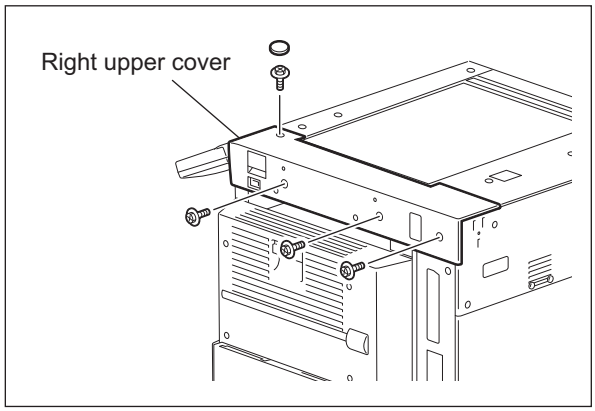


Fig. 2-26

[K] Right rear cover

(1) Remove 2 screws and take off the right rear cover.

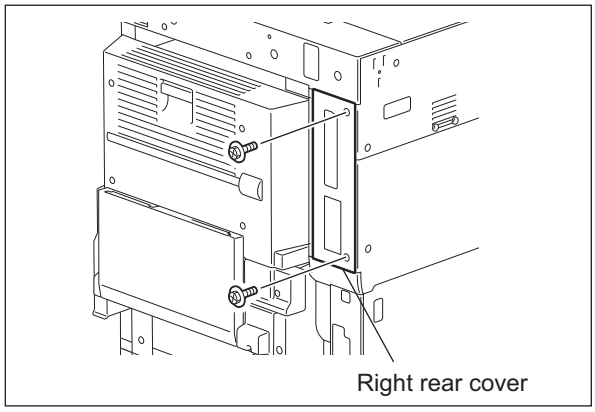


Fig. 2-27

[L] Right rear hinge cover

(1) Open the ADU.
(2) Remove 2 screws and take off the right rear hinge cover.

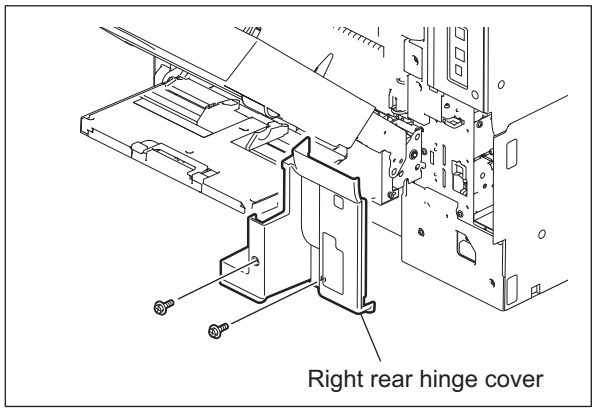


Fig. 2-28

[M] Right lower cover

(1) Take off the right rear hinge cover.
📖 P.2-33 "[M] Right lower cover"
(2) Remove 2 screws and take off the right lower cover.

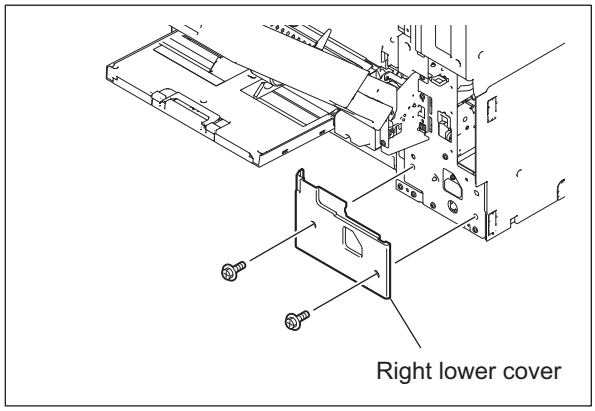


Fig. 2-29

[N] Right front hinge cover

(1) Pull out the upper and lower drawers.
(2) Remove 2 screws and take off the right front hinge cover.

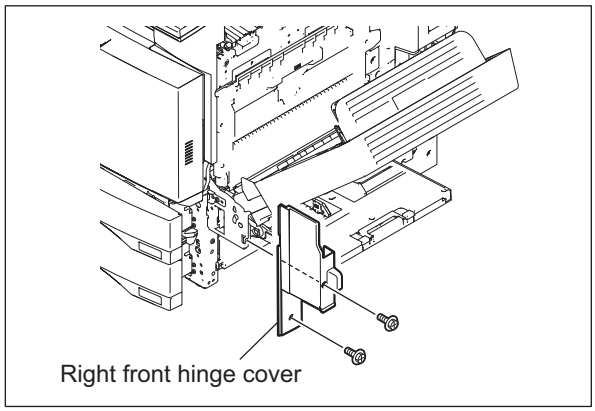


Fig. 2-30

[O] Bypass rear cover

(1) Remove 1 screw and take off the bypass rear cover.

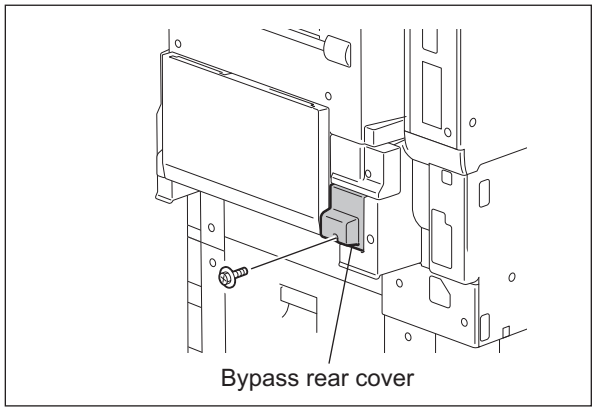


Fig. 2-31

[P] Right inner cover

(1) Open the ADU and 2nd transfer unit.
(2) Remove 3 screws and take off the right inner cover.

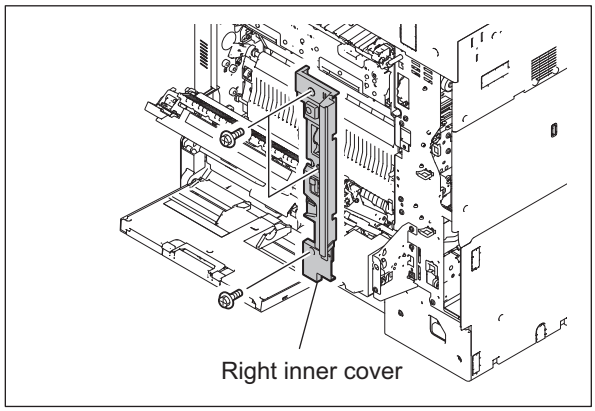


Fig. 2-32

[Q] Upper rear cover

(1) Take off the RADF or the platen cover.
(2) Take off the left upper cover.
📖 P.2-29 "[F] Left upper cover"
(3) Take off the right upper cover.
📖 P.2-31 "[J] Right upper cover"
(4) Remove 2 screws and take off the upper rear cover.

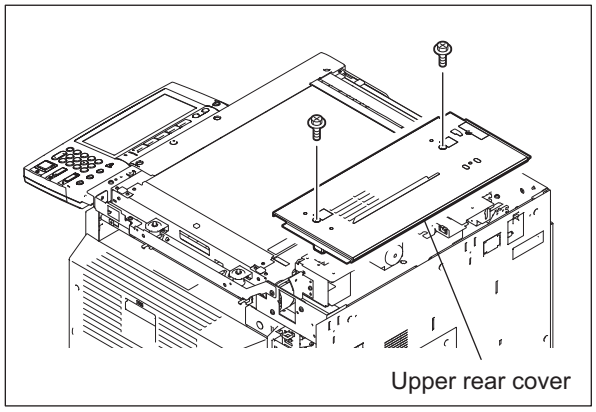


Fig. 2-33

[R] Rear cover-1

(1) Remove 2 screws and take off the rear cover-1.

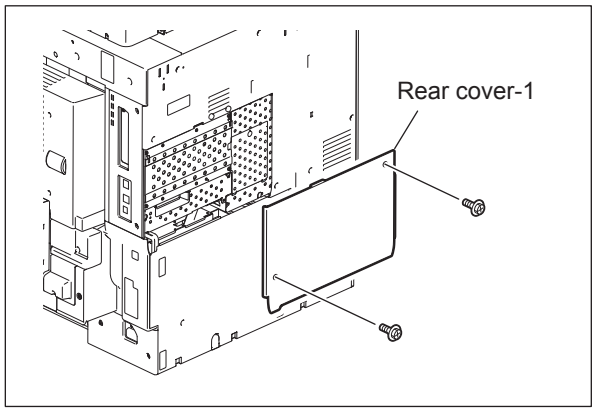


Fig. 2-34

[S] Rear cover-2

(1) Take off the rear cover-1.
📖 P.2-35 "[R] Rear cover-1"
(2) Remove 8 screws and take off the rear cover-2.

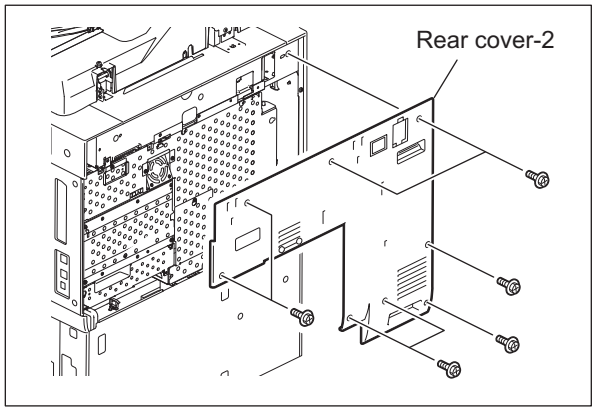


Fig. 2-35

[T] Rear cover-3

(1) Take off the rear cover-2.
📖 P.2-36 "[S] Rear cover-2"
(2) Remove 3 screws and take off the rear cover-3

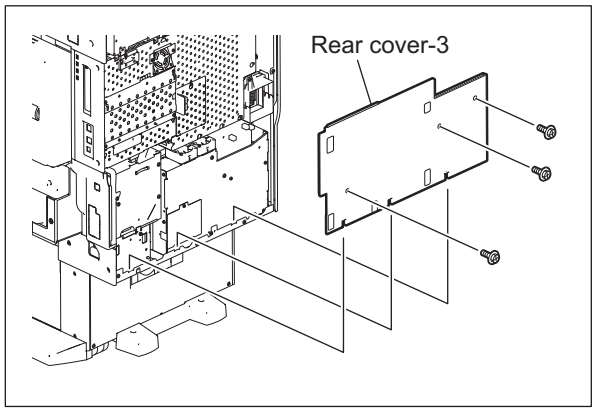


Fig. 2-36

2.6 Removal and Installation of Boards

Note:
When the PC board/HDD is replaced, refer to the respective Notes and Cautions of "Replacement of PC boards and HDD" in Chapter 5.3 of the Service Handbook.

[A] Hard disk (HDD)

(1) Take off the rear cover-1.
📖 P.2-35 "[R] Rear cover-1"
(2) Remove 4 screws.
(3) Disconnect 2 connectors and take off the HDD case.

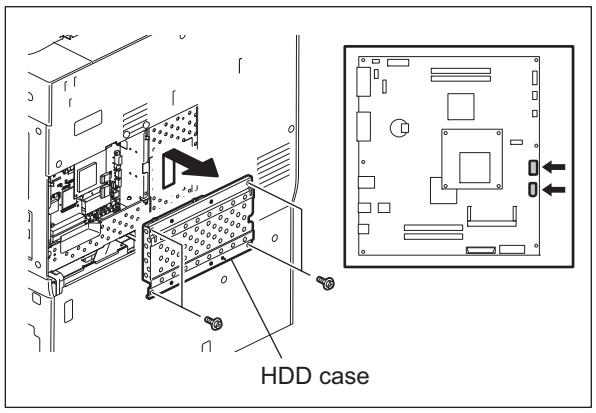


Fig. 2-37

(4) Remove 6 screws and take off the bracket.

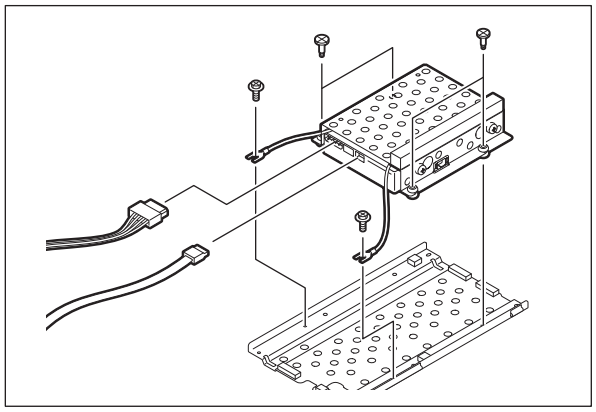


Fig. 2-38

(5) Remove 2 screws and the 2 ground wires.
(6) Remove 4 screws and take off the hard disk.

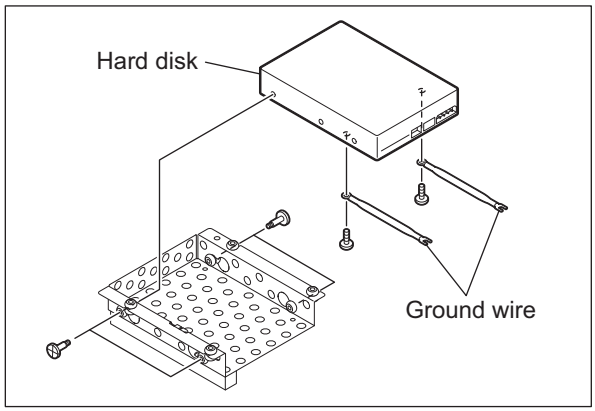


Fig. 2-39

[B] Board cover

(1) Take off the rear cover-2.
📖 P.2-36 "[S] Rear cover-2"
(2) Remove 1 screw and loosen 9 screws.

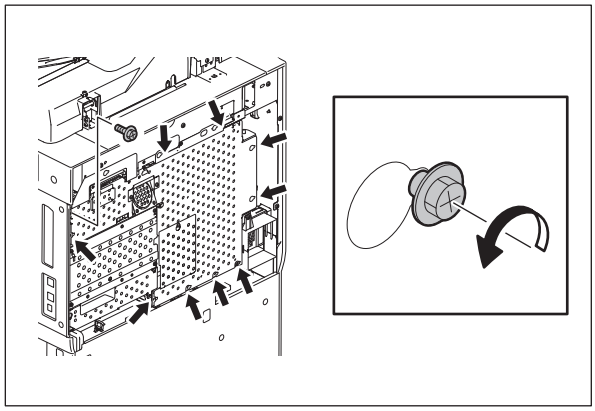


Fig. 2-40

(3) Slide the board cover, disconnect the connector of the fan, and take off the board cover.

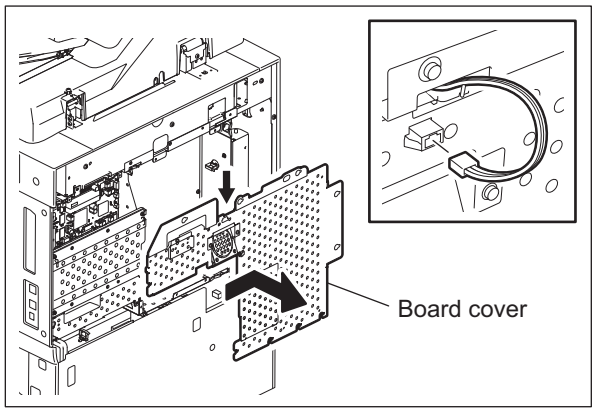


Fig. 2-41

[C] FAX cover

(1) Take off the rear cover-2.
P.2-36 "[S] Rear cover-2"
(2) Remove 2 screws and loosen 2 screws.
(3) Slide the FAX cover to take it off.

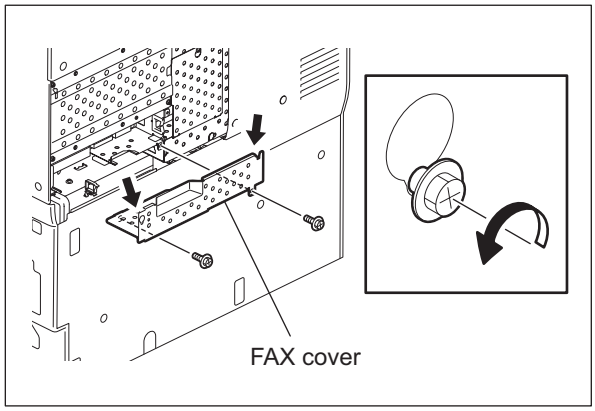


Fig. 2-42

[D] SYS board

(1) Take off the board cover.
P.2-38 "[B] Board cover"
(2) Take off the FAX cover.
P.2-39 "[C] FAX cover"
(3) Remove 2 screws and take off the metal plate.

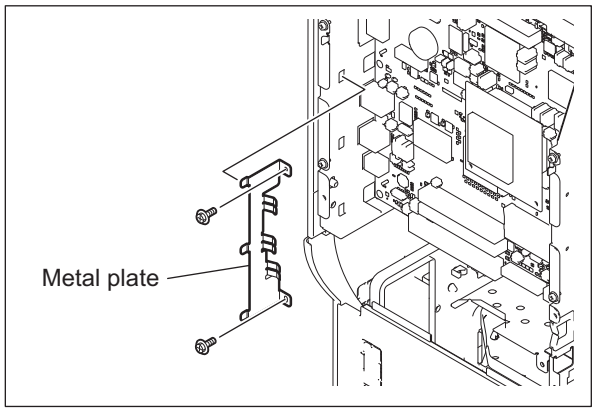


Fig. 2-43

(4) Disconnect 3 connectors and remove 1 harness clamp.
(5) Remove 4 screws and take off the SYS board.

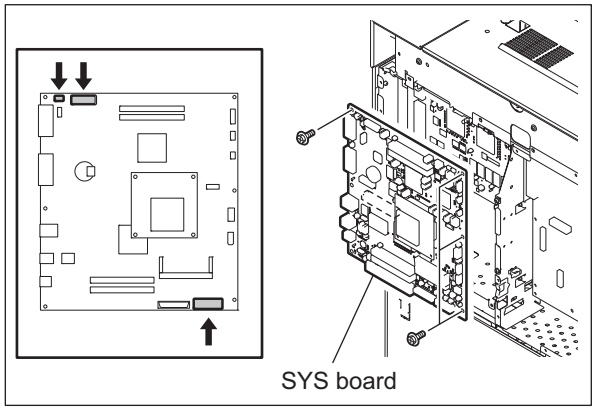


Fig. 2-44

[E] IMG board

(1) Take off the SYS board.
📖 P.2-39 "[D] SYS board"
(2) Disconnect 2 connectors.
(3) Remove 6 screws and slide the IMG board to take it off.

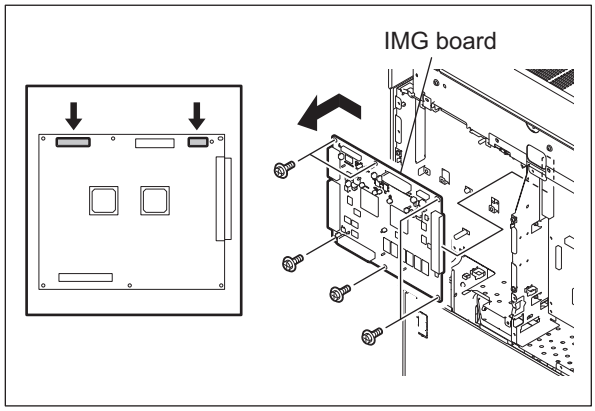


Fig. 2-45

[F] LGC board

(1) Take off the board cover.
📖 P.2-38 "[B] Board cover"
(2) Disconnect 20 connectors and take off 1 harness clamp.
(3) Remove 8 screws and slide the LGC board to take it off.

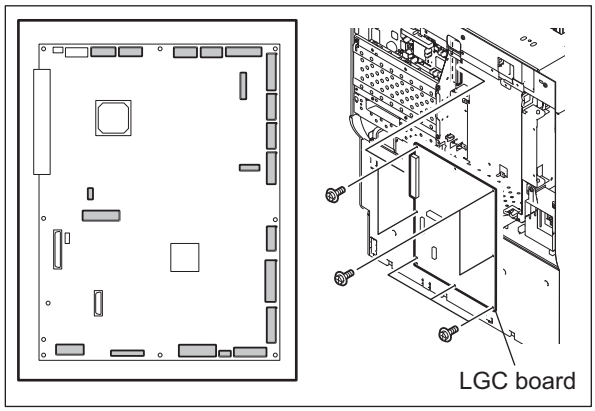


Fig. 2-46

[G] Switching regulator

(1) Take off the rear cover-3.
📖 P.2-36 "[T] Rear cover-3"
(2) Remove 1 screw and take off the connector cover.
(3) Disconnect 2 connectors.

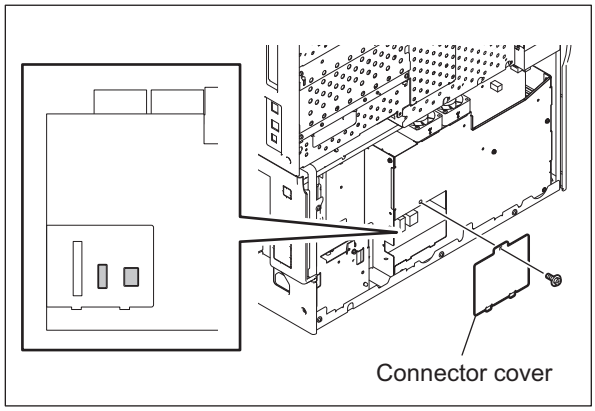


Fig. 2-47

(4) Disconnect 6 connectors.
(5) Remove 2 screws.
(6) Slightly lift up the switching regulator and release the hook to take it off.

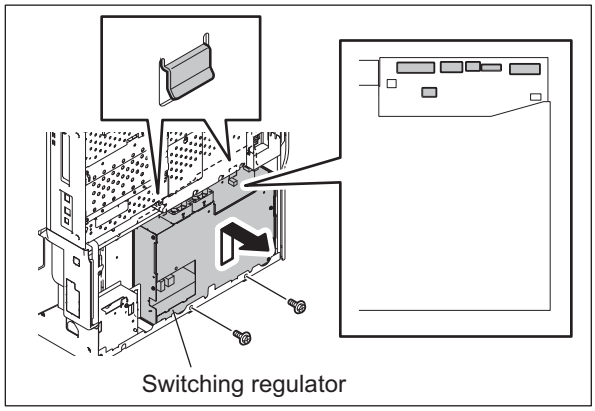


Fig. 2-48

[H] High-voltage transformer (HVT)

(1) Take off the switching regulator.
📖 P.2-41 "[G] Switching regulator"
(2) Disconnect 22 connectors.

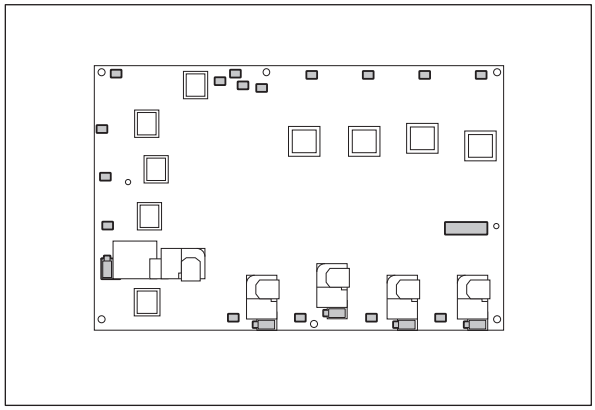


Fig. 2-49

(3) Remove 7 screws.
(4) Release 2 locking supports and take off the high-voltage transformer.

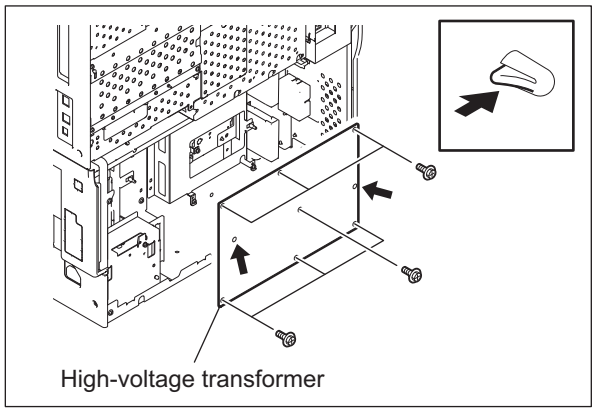


Fig. 2-50

[I] FIL board

(1) Take off the right lower cover.
🕮 P.2-33 "[M] Right lower cover"
(2) Take off the rear cover-3.
🕮 P.2-36 "[T] Rear cover-3"
(3) Release the optional harness from the filter bracket if it is connected.

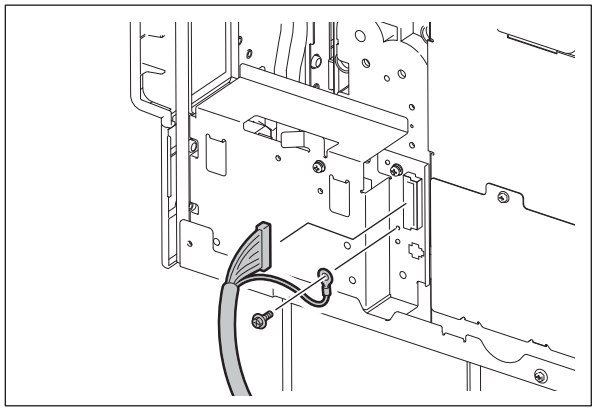


Fig. 2-51

(4) Disconnect 1 relay connector of the filter bracket.

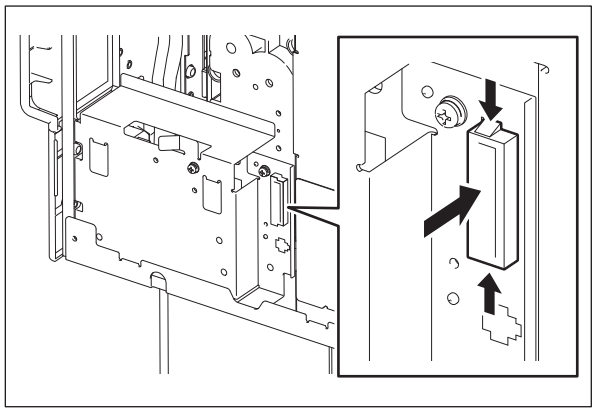


Fig. 2-52

(5) Release 2 clamps.

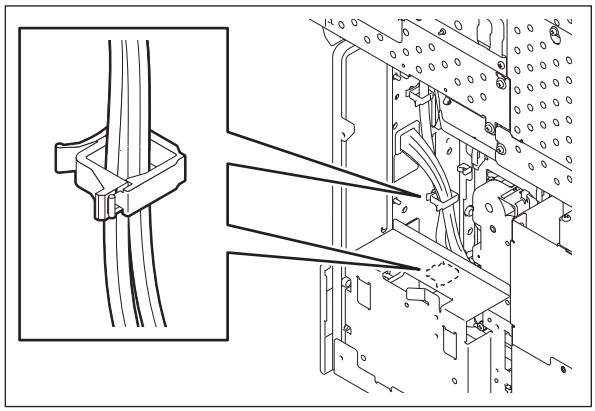


Fig. 2-53

(6) Remove 3 screws and pull out the filter bracket.

Note:
Do not pull it out too strongly because the harness is connected to it.

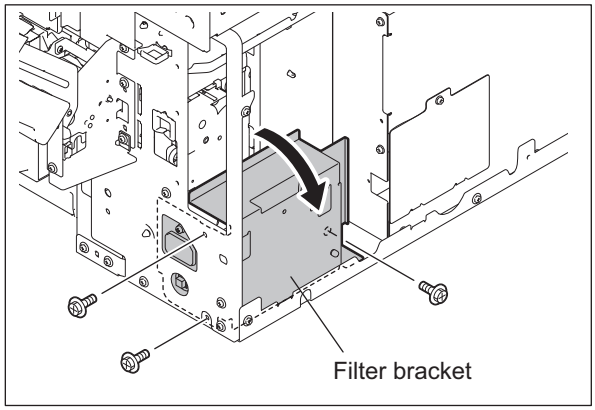


Fig. 2-54

(7) Disconnect 3 connectors from the FIL board and take off the filter bracket.
- The connector connected to CN497 on the FIL board can be disconnected on the relay connector side.

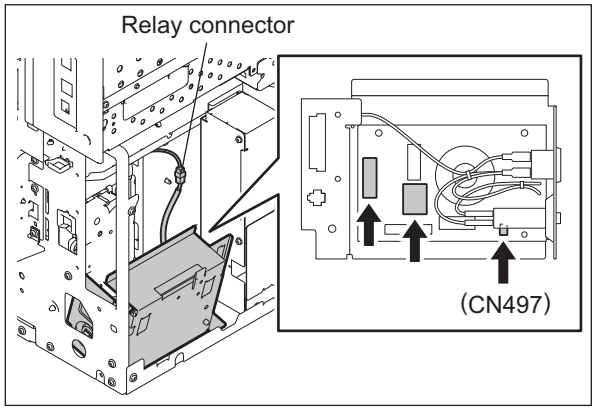


Fig. 2-55

(8) Remove 1 binding band.
(9) Remove 2 Faston terminals.

Note:
Be sure to use the correct harness (black or white) when assembling.

(10) Remove 2 screws, release 2 locking supports and take off the FIL board.

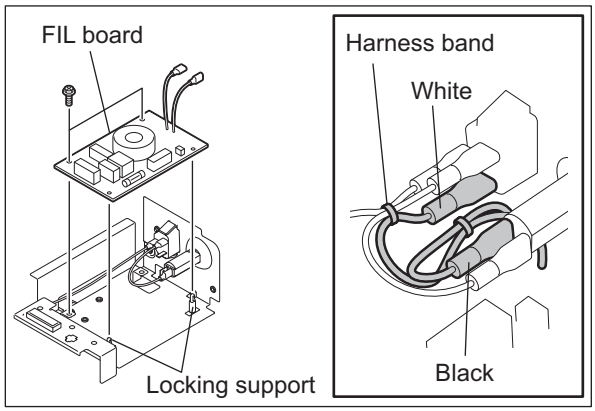


Fig. 2-56

[J] USB PC board

(1) Take off the right upper cover.
📖 P.2-31 "[J] Right upper cover"
(2) Remove 2 screws and disconnect 1 connector. Take off the USB PC board with the bracket.

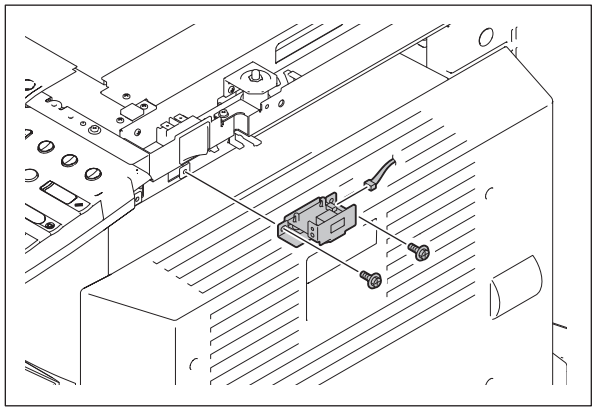


Fig. 2-57

(3) Remove 2 screws, release 2 locking supports and take off the USB PC board.

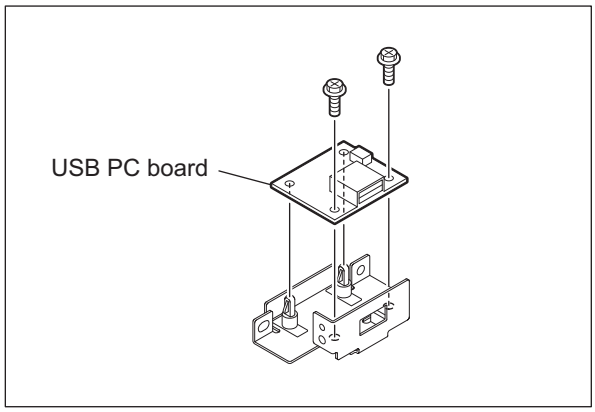


Fig. 2-58

[K] Board case

(1) Take off the board cover.
📖 P.2-38 "[B] Board cover"
(2) Remove 5 screws and disconnect 5 connectors.

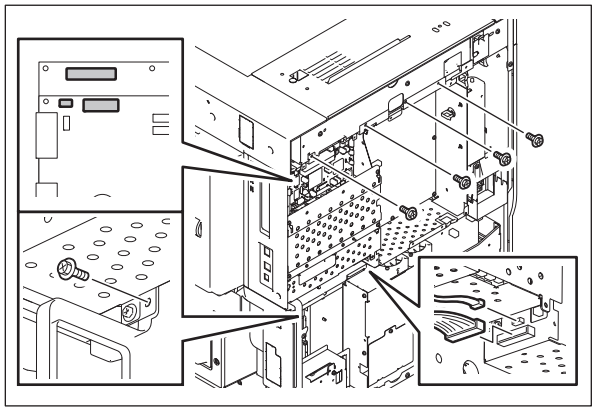


Fig. 2-59

(3) Open the board case.

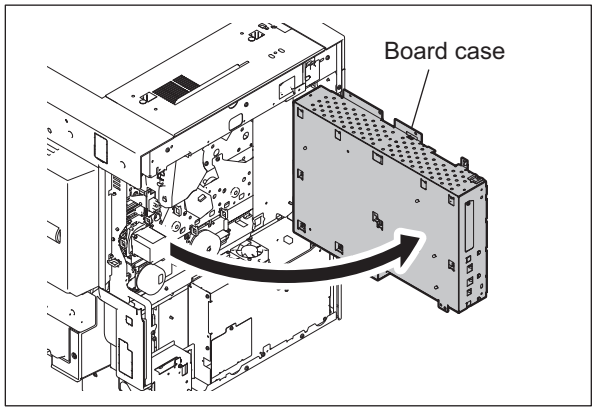


Fig. 2-60

2.7 Removal and Installation of Options

[A] MR-3018 (Reversing Automatic Document Feeder (RADF))

(1) Turn OFF the power and unplug the power cable.
(2) Take off the connector cover.

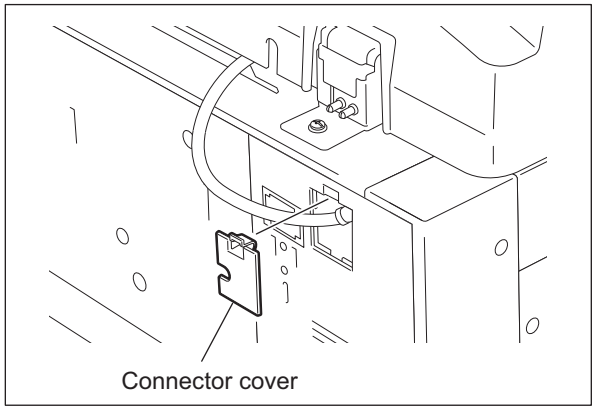


Fig. 2-61

(3) Disconnect the connector.

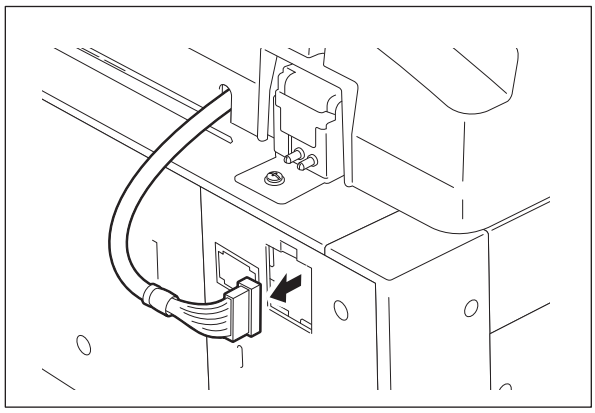


Fig. 2-62

(4) Remove 1 screw and 1 washer on the rear side.

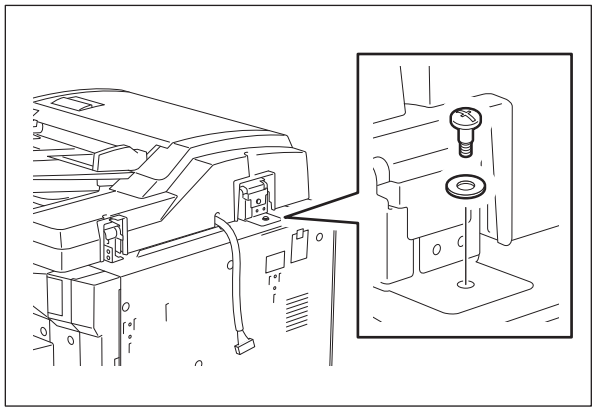


Fig. 2-63

(5) Remove 1 screw on the rear side.

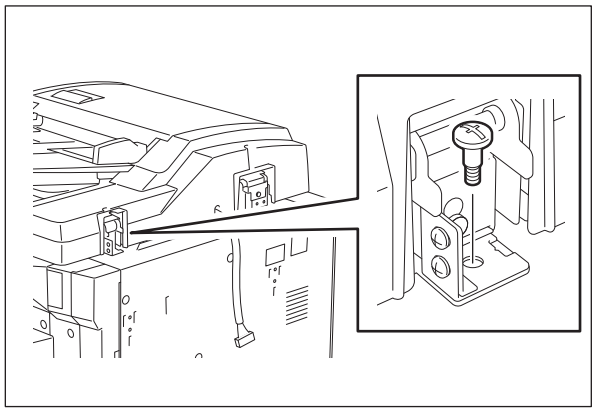


Fig. 2-64

(6) Open the RADF.

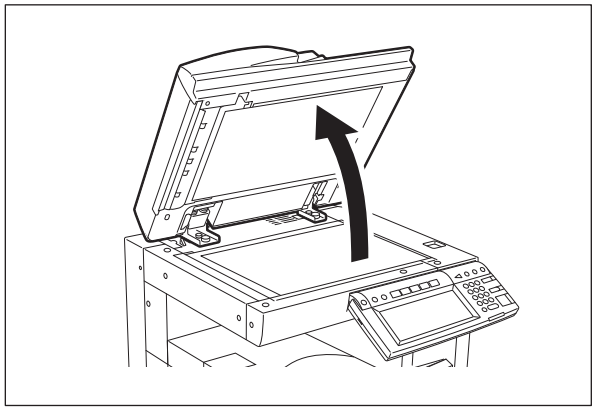


Fig. 2-65

(7) Remove 2 screws on the front side.

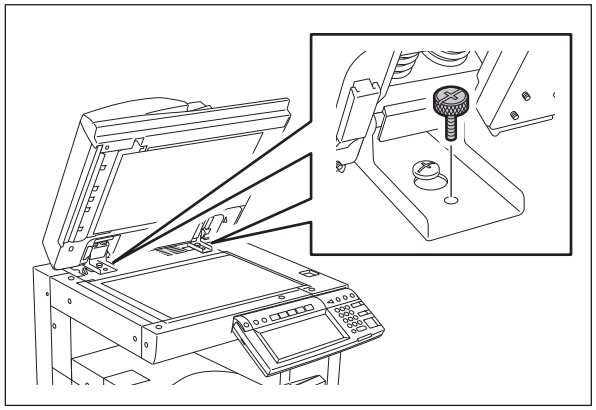


Fig. 2-66

(8) Slide the RADF backward and lift it up to take it off.

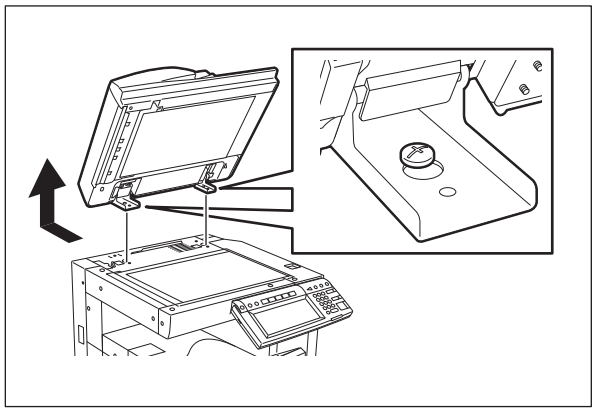


Fig. 2-67

Notes:

When taking off the RADF and installing the platen cover, or taking off the platen cover and installing the RADF, the position of the installing screw for the damper holding bracket of the scanner should be as follows.

1. Remove 1 screw and take off the gel cover.

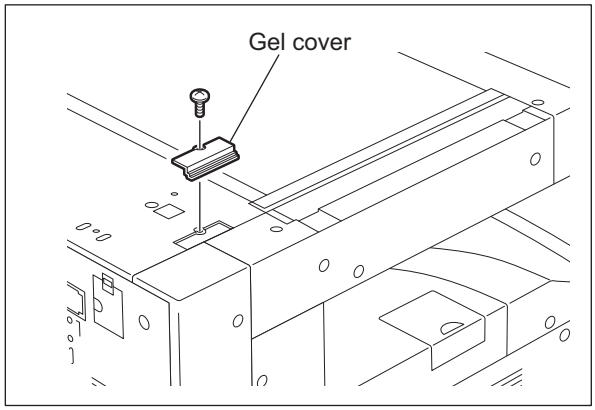


Fig. 2-68

2. Change the position of the installing screw for the damper holding bracket.
   Installing the RADF: A
   Installing the platen cover: B

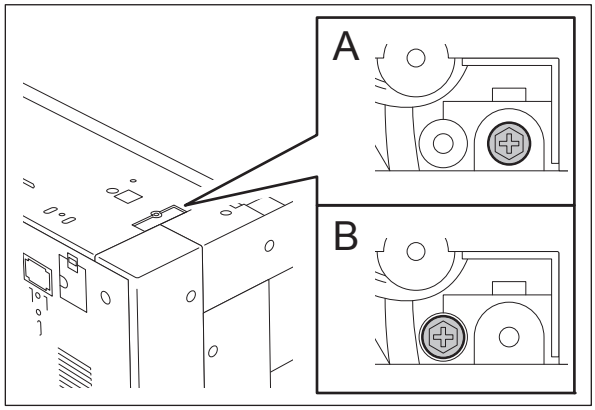


Fig. 2-69

[B] KD-1018 (Paper Feed Pedestal (PFP))

(1) Turn OFF the power and unplug the power cable.
(2) Remove 2 screws and take off the rear cover-1.

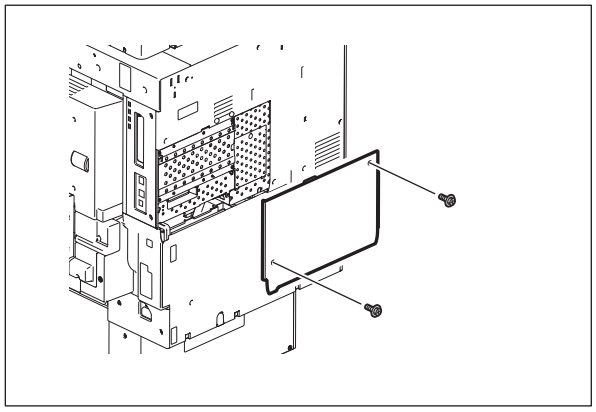


Fig. 2-70

(3) Remove 8 screws and take off the rear cover-2.

Note:
Disconnect the connector of the RADF first when the RADF is installed.

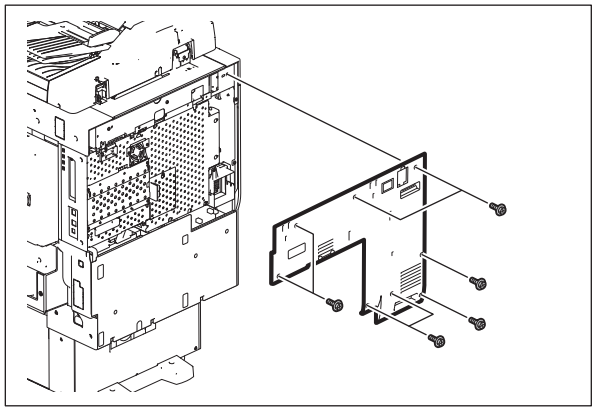


Fig. 2-71

(4) Remove 3 screws and take off the rear cover-3.

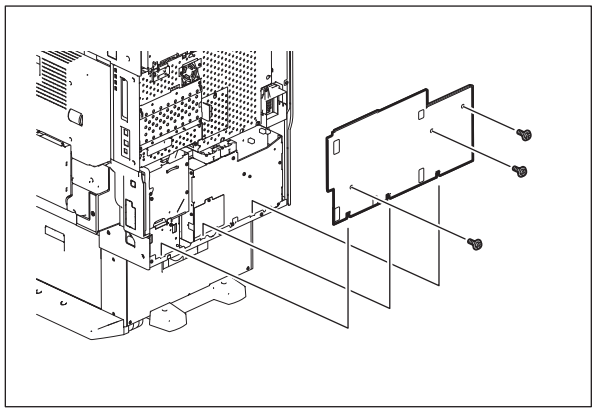


Fig. 2-72

(5) Remove 1 screw and the ground wire, and then disconnect 1 connector.

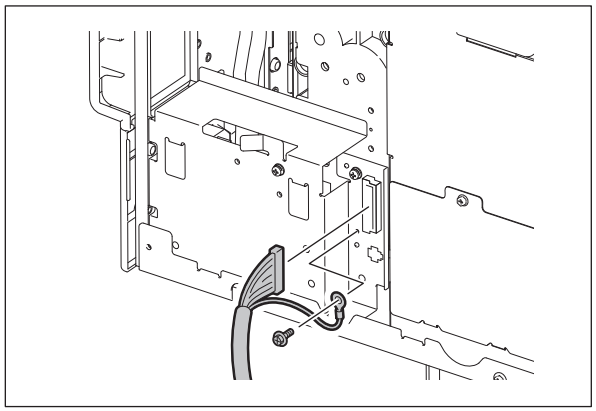


Fig. 2-73

(6) Remove 2 screws and take off 2 fixing brackets on the rear side.

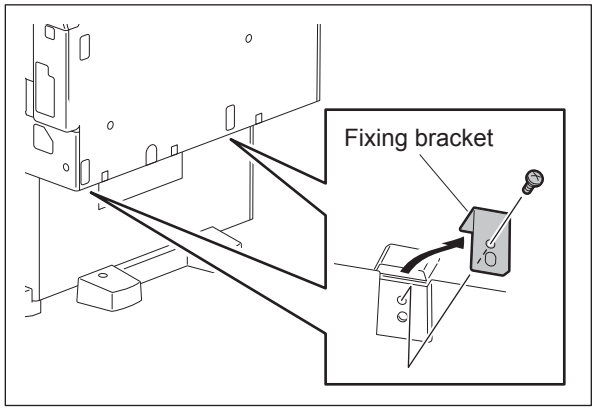


Fig. 2-74

(7) Take off the 2nd drawer of the equipment and PFP 1st drawer.

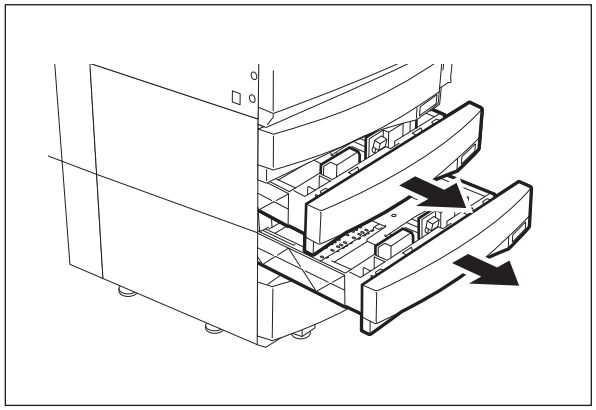


Fig. 2-75

(8) Remove 4 screws and take off 2 fixing brackets on the front side.

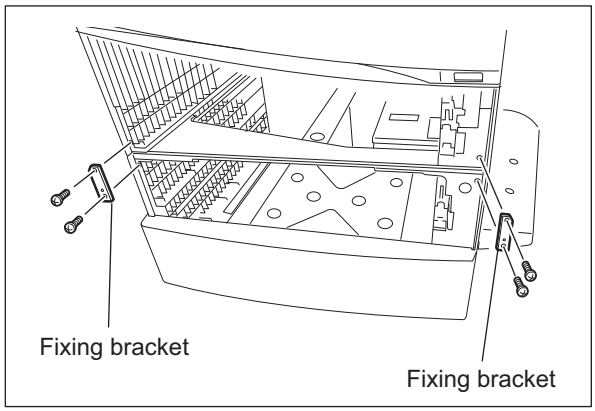


Fig. 2-76

(9) Lift up the equipment and take off the PFP.

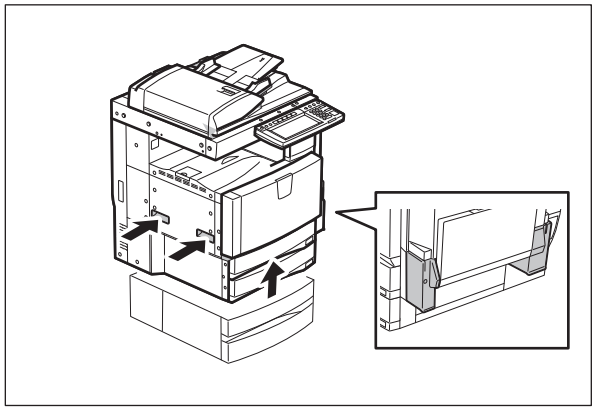


Fig. 2-77

[C] KD-1019 (Large Capacity Feeder (LCF))

(1) Turn OFF the power and unplug the power cable.
(2) Remove 2 screws and take off the rear cover-1.

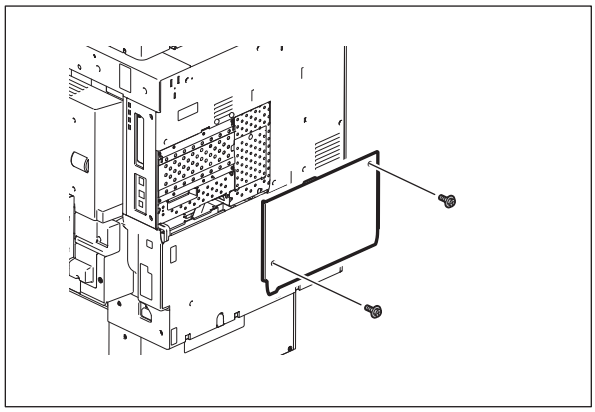


Fig. 2-78

(3) Remove 8 screws and take off the rear cover-2.

Note:
Disconnect the connector of the RADF first when the RADF is installed.

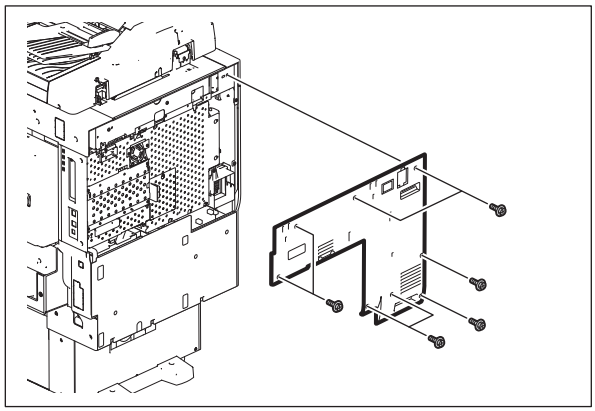


Fig. 2-79

(4) Remove 3 screws and take off the rear cover-3.

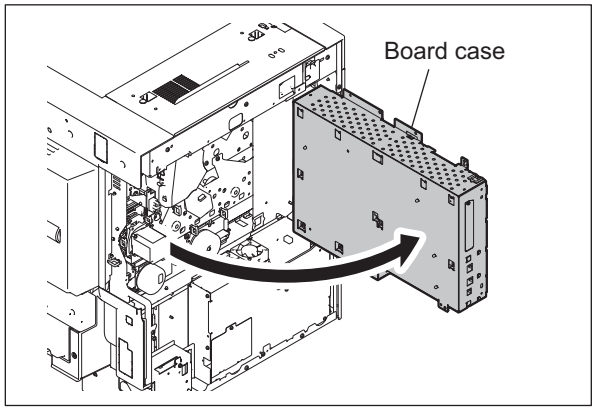


Fig. 2-80

(5) Remove 1 screw and the ground wire, and then disconnect 1 connector.

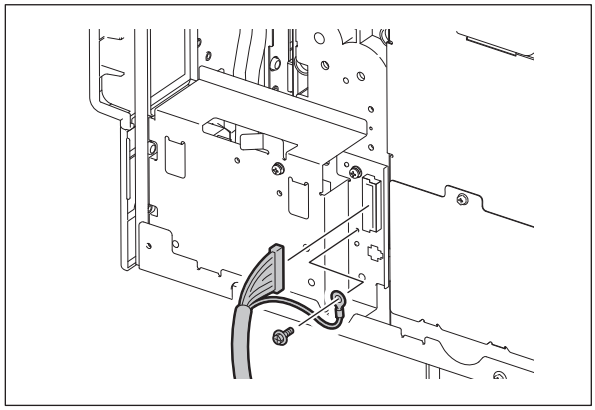


Fig. 2-81

(6) Remove 2 screws and take off 2 fixing brackets on the rear side.

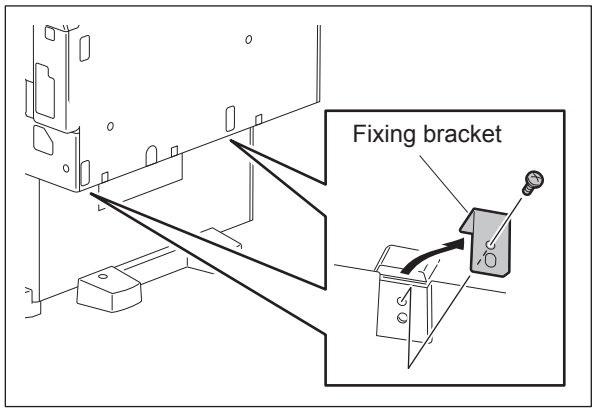


Fig. 2-82

(7) Take off the 2nd drawer of the equipment.

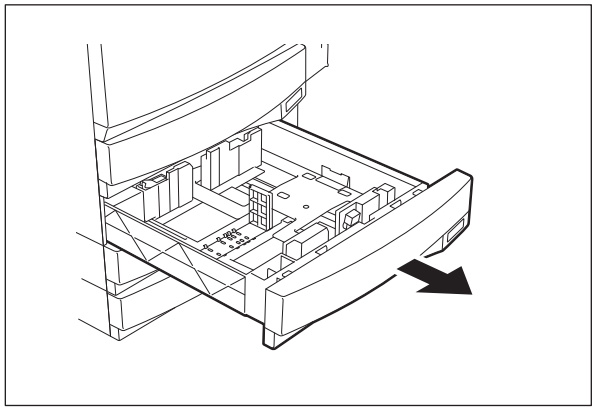


Fig. 2-83

(8) Pull out the LCF drawer.

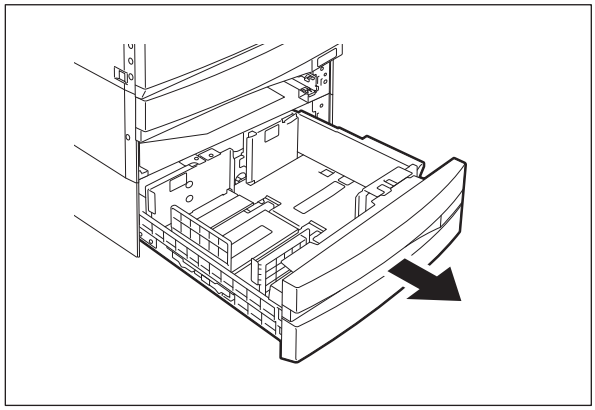


Fig. 2-84

(9) Remove 4 screws and take off 2 fixing brackets on the front side.

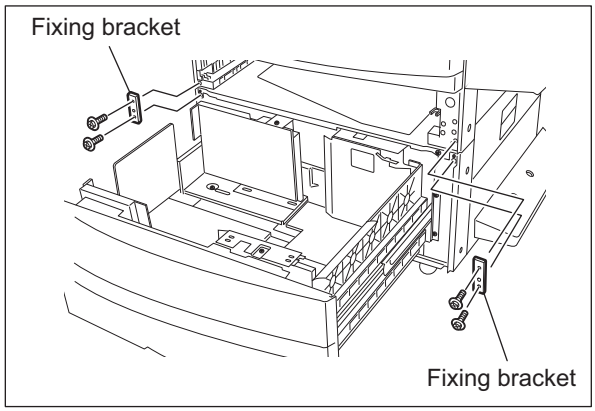


Fig. 2-85

(10) Lift up the equipment and take off the LCF.

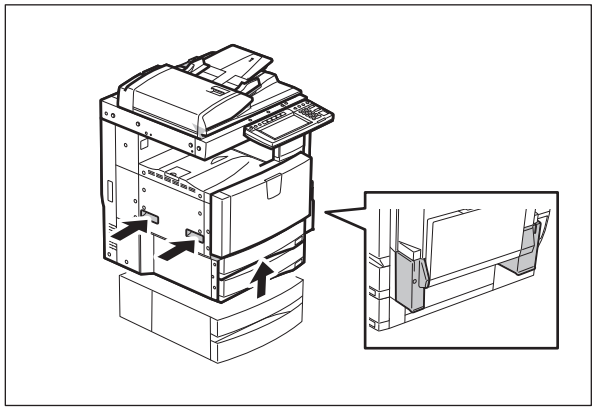


Fig. 2-86

[D] MJ-1030 (Finisher)

(1) Turn OFF the power and unplug the power cable.
(2) Take off the connector cover and disconnect the connector.

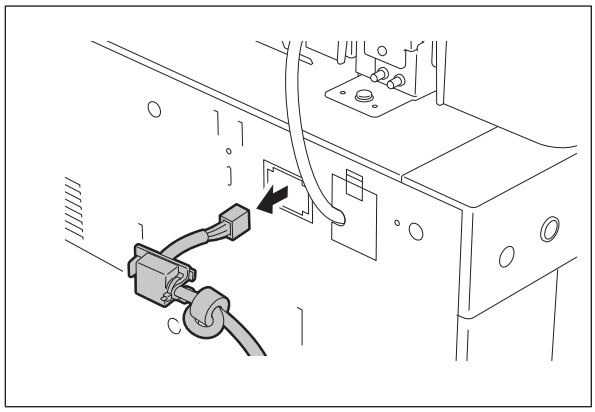


Fig. 2-87

(3) Open the finisher front cover and remove 1 screw.

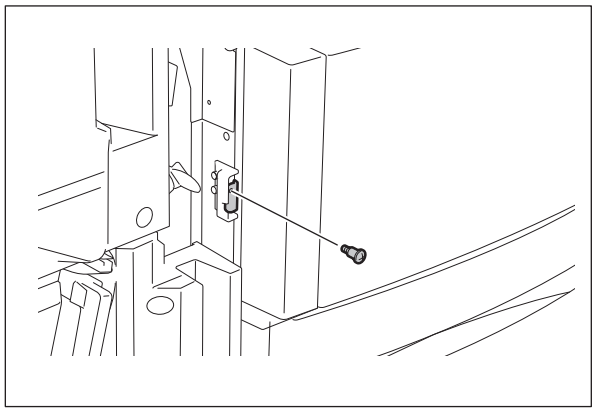


Fig. 2-88

(4) Remove 1 screw and take off the cover of the finisher rear side.

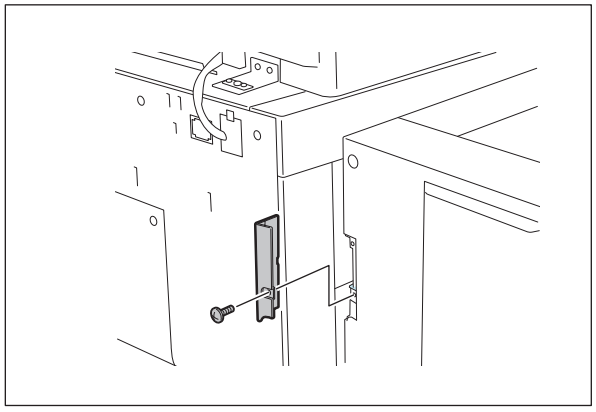


Fig. 2-89

(5) Remove 1 screw.

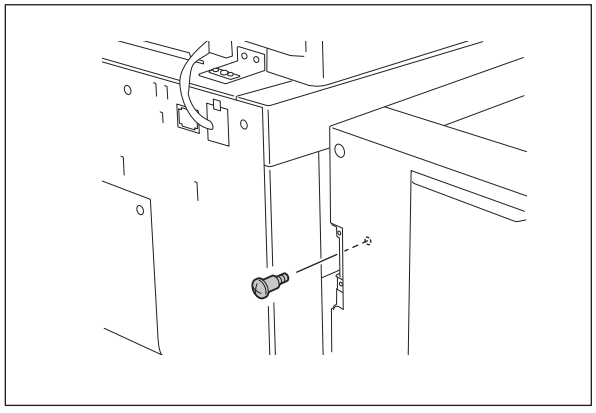


Fig. 2-90

(6) Take off the finisher.

Note:
Be careful not to fell the finisher when moving only the finisher unit.

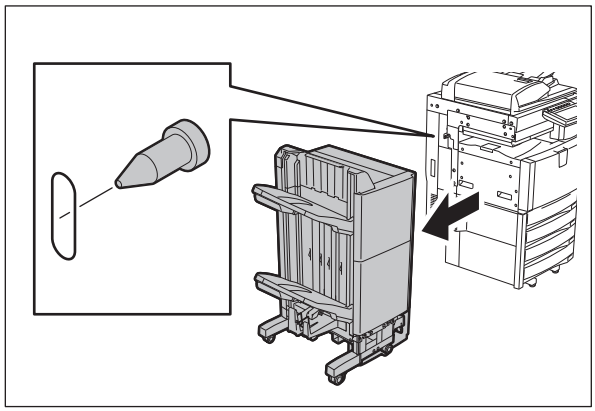


Fig. 2-91

[E] MJ-1101 (Finisher)

(1) Turn OFF the power and unplug the power cable.
(2) Take off the connector cover and disconnect the connector.

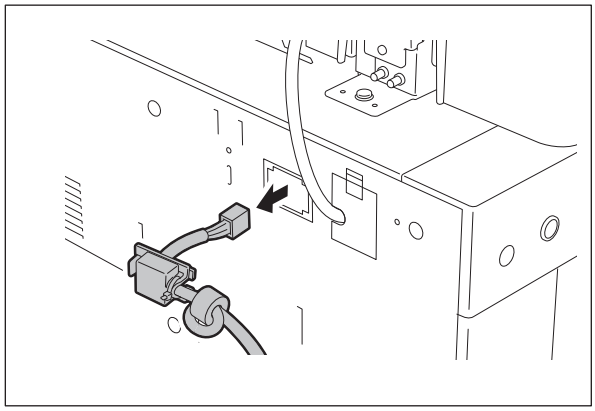


Fig. 2-92

(3) Remove 1 screw and the ground wire.

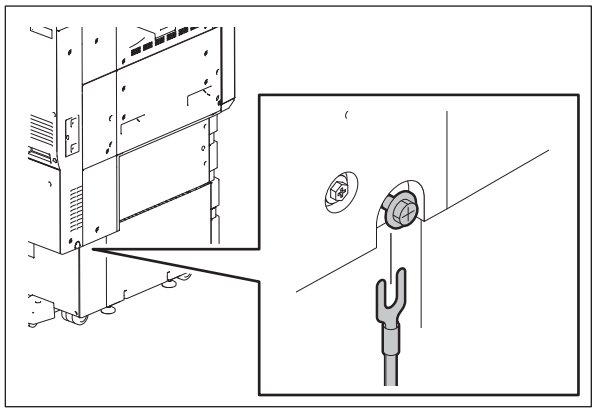


Fig. 2-93

(4) Remove 1 screw and take off the fixing plate.

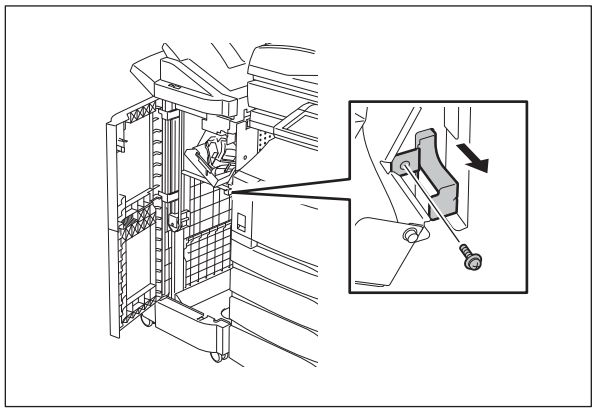


Fig. 2-94

(5) Take off the finisher.

Note:
Be careful not to fell the finisher when moving only the finisher unit.

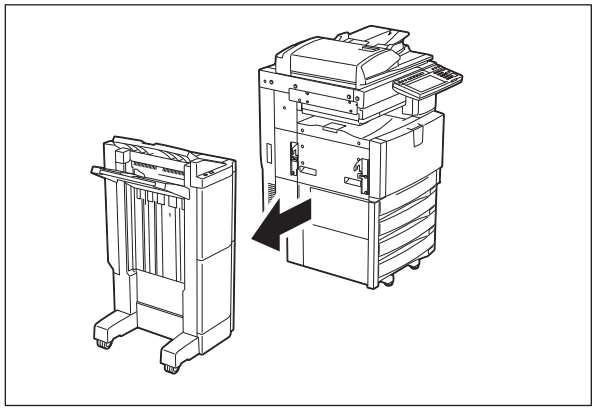


Fig. 2-95

[F] MJ-6004 (Hole punch unit)

(1) Turn OFF the power and unplug the power cable.
(2) Take off the connector cover and disconnect connector.

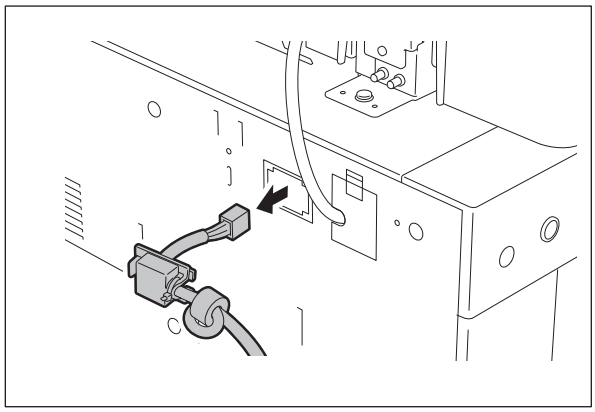


Fig. 2-96

(3) Open the front cover of the hole punch unit and remove 1 screw.

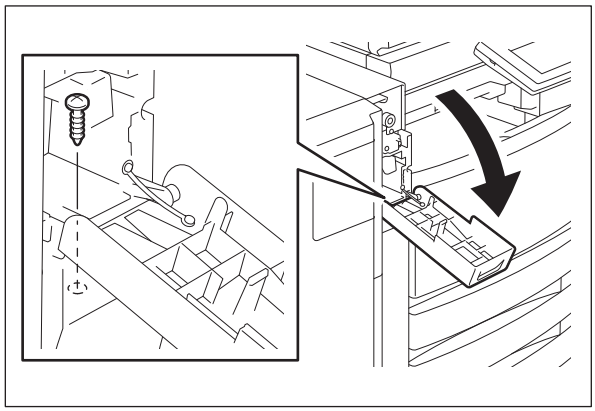


Fig. 2-97

(4) Take off the cover of the punch unit lower side.

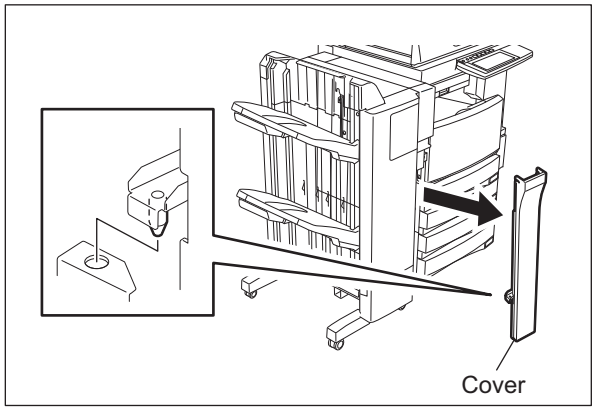


Fig. 2-98

(5) Remove 1 screw.

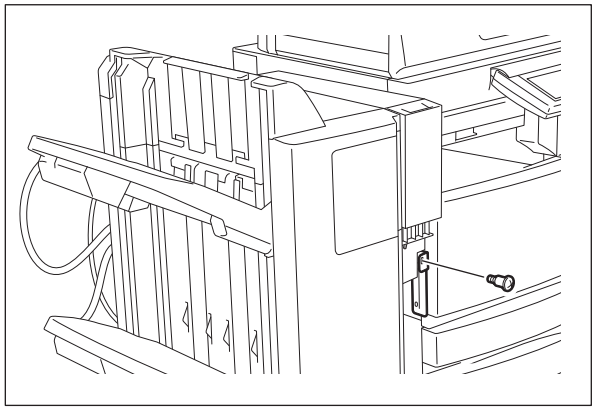


Fig. 2-99

(6) Remove 3 screws and take off the punch unit rear cover.

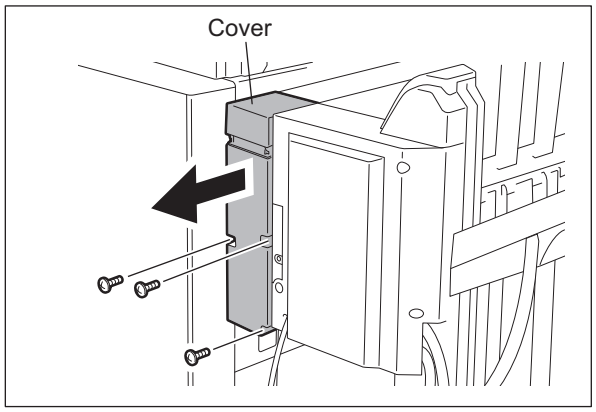


Fig. 2-100

(7) Remove 1 screw.

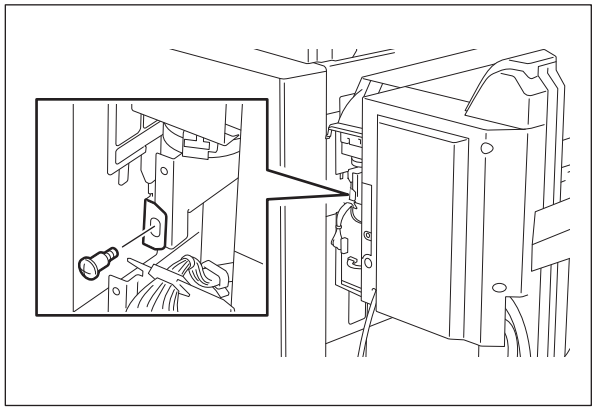


Fig. 2-101

(8) Take off the finisher with the hole punch unit.

Note:
Be careful not to fell the finisher when moving only the finisher unit.

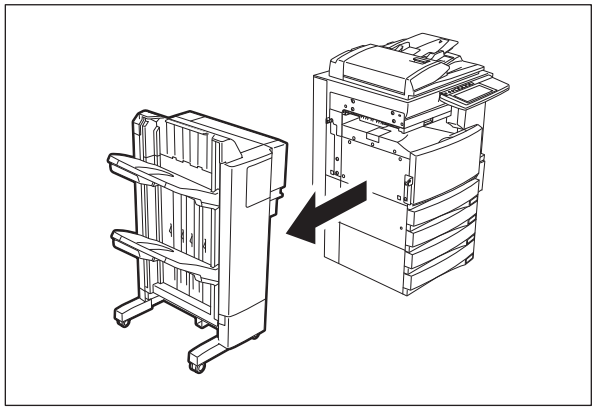


Fig. 2-102

(9) Disconnect 2 connectors.

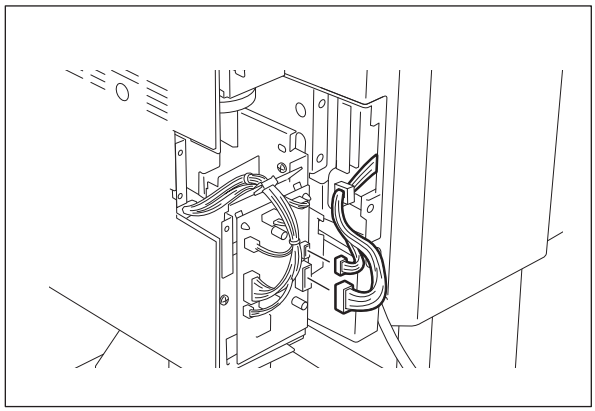


Fig. 2-103

(10) Remove 2 screws.

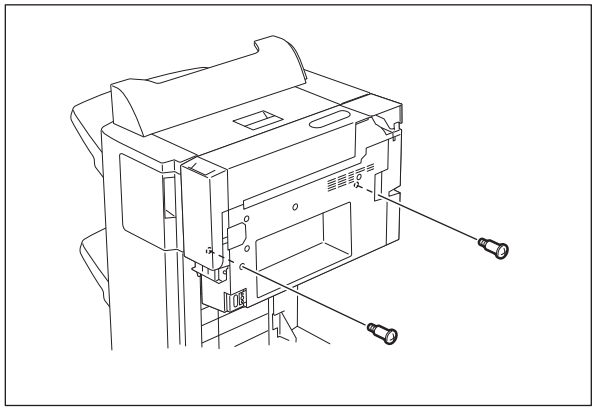


Fig. 2-104

(11) Lift up the punch unit and take it off.

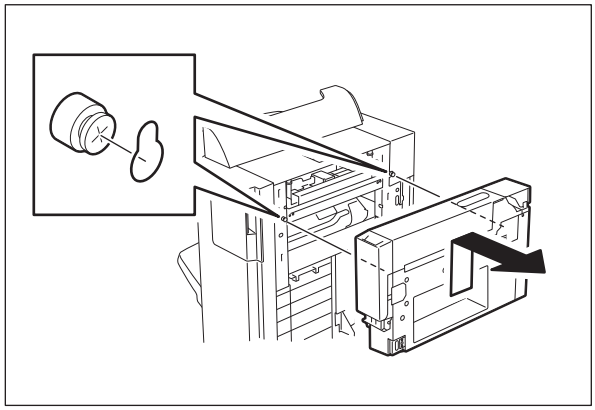


Fig. 2-105

[G] MJ-6101 (Hole punch unit)

(1) Turn OFF the power and unplug the power cable.
(2) Take off the connector cover and disconnect connector.

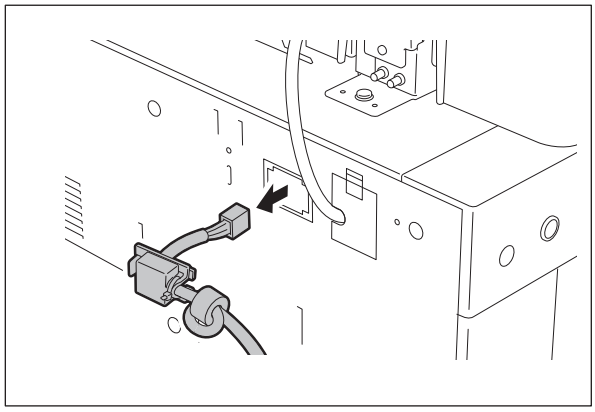


Fig. 2-106

(3) Remove 1 screw and the ground wire.

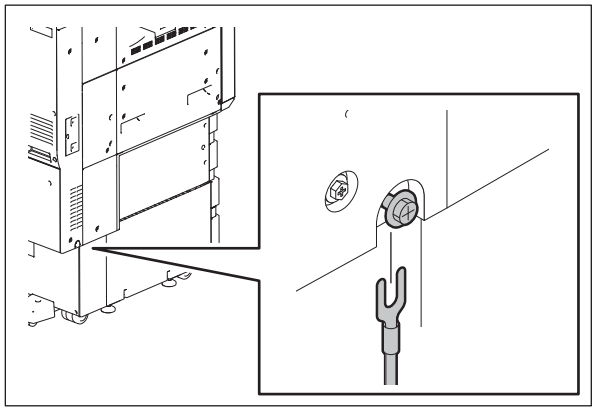


Fig. 2-107

(4) Take off the cover of the punch unit lower side.

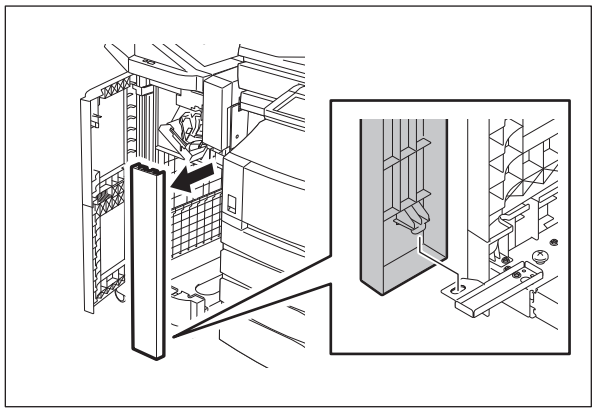


Fig. 2-108

(5) Remove 1 screw and take off the fixing plate.

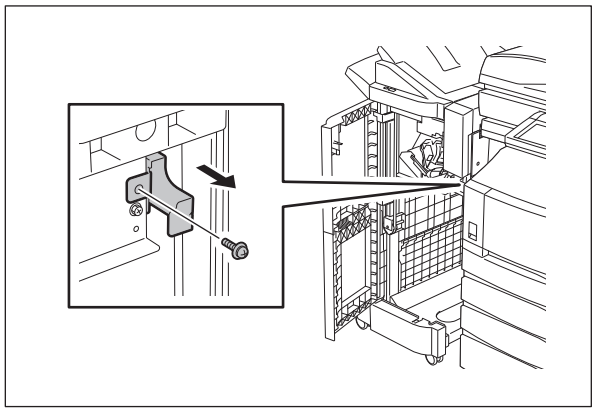


Fig. 2-109

(6) Take off the finisher with the hole punch unit.

Note:
Be careful not to fell the finisher when moving only the finisher unit.

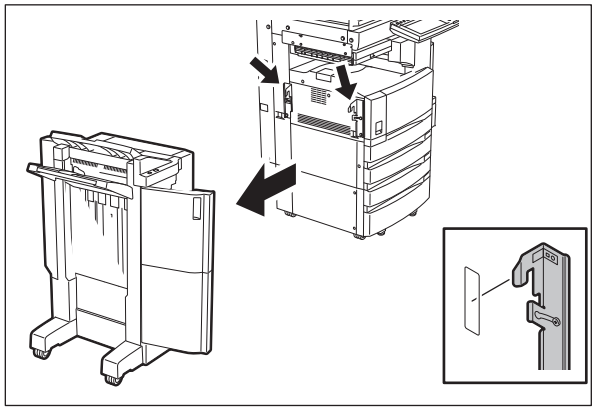


Fig. 2-110

(7) Remove 1 screw and take off the connector cover.

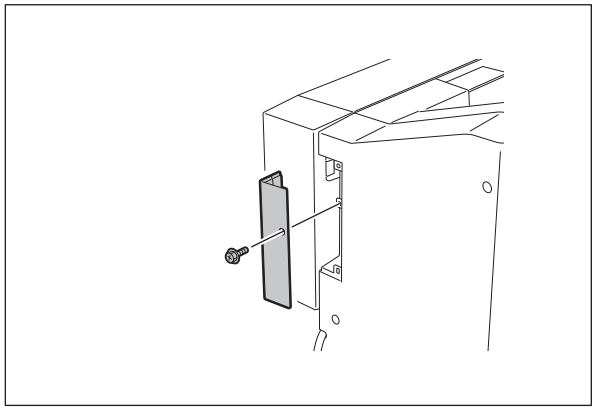


Fig. 2-111

(8) Disconnect 1 connector.

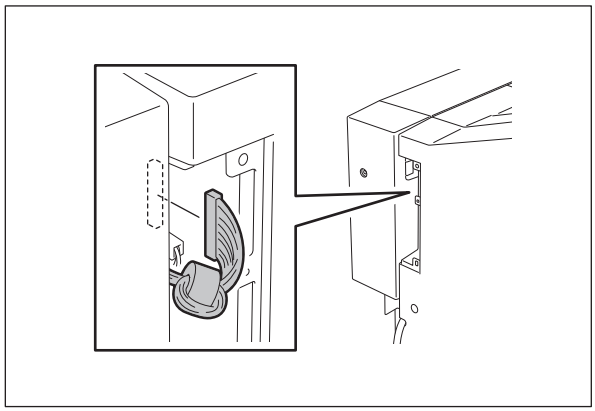


Fig. 2-112

(9) Take off the cover of the punch unit lower side.

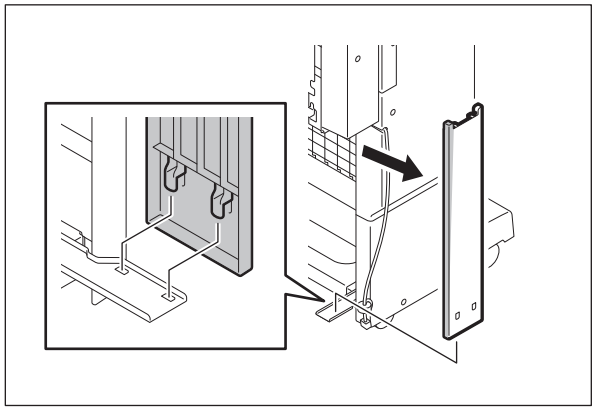


Fig. 2-113

(10) Remove 4 screws. Lift up the punch unit and take it off.

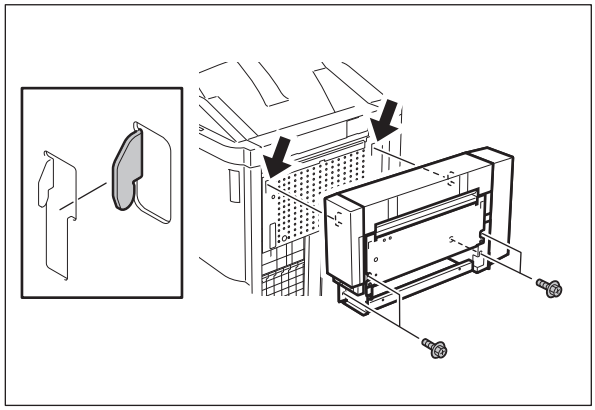


Fig. 2-114

[H] KN-3500 (Bridge unit)

(1) Turn OFF the power and unplug the power cable.
(2) Open the bridge unit. Remove 1 screw.

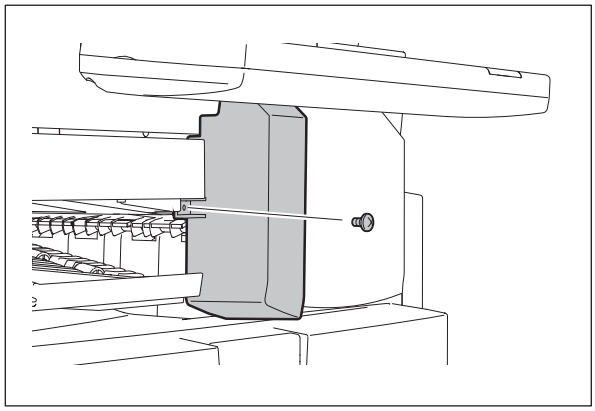


Fig. 2-115

(3) Take off the cover.

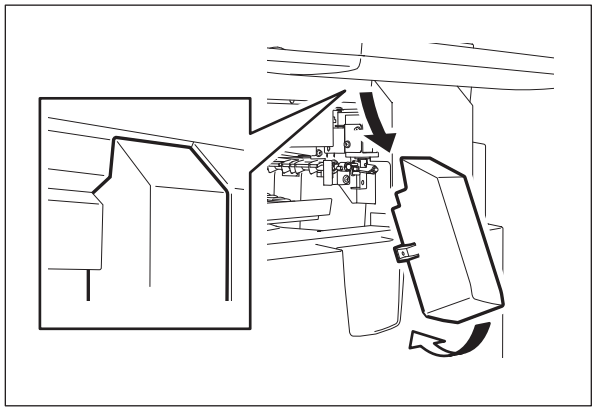


Fig. 2-116

(4) Remove 1 screw.

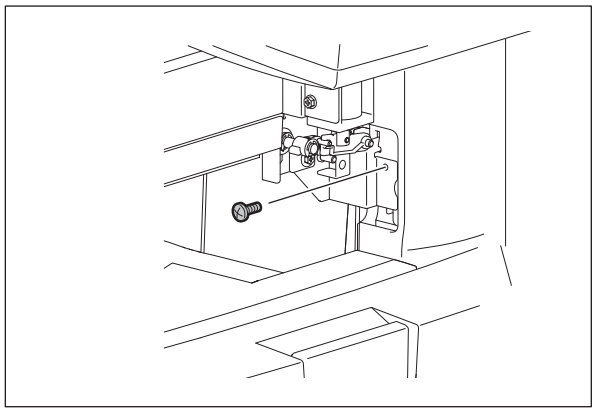


Fig. 2-117

(5) Remove 4 screws and take off the plate.

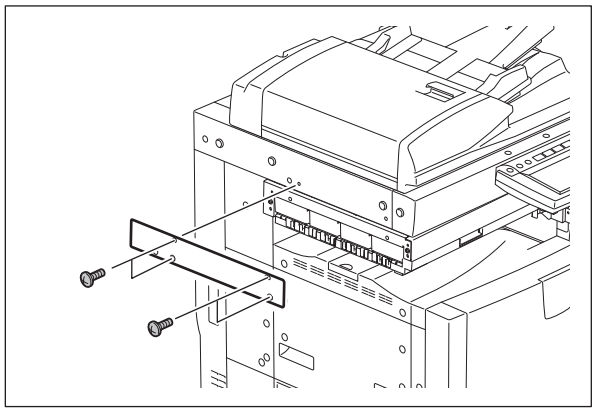


Fig. 2-118

(6) Disconnect 1 connector.

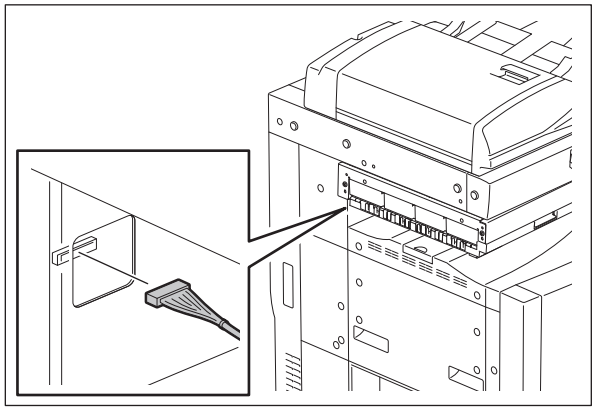
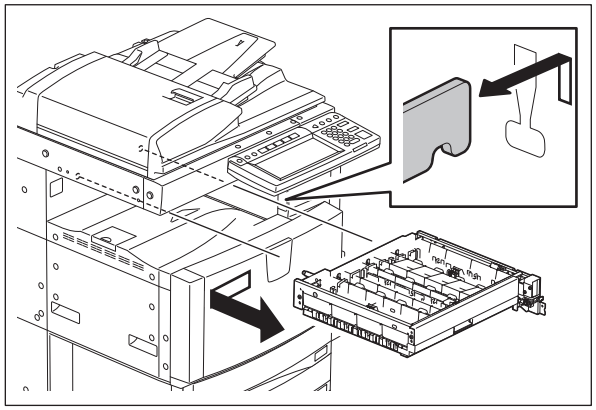


Fig. 2-119

(7) Lift up the bridge unit and release the hook. Take off the bridge unit toward the front.



2.8 Damp Heater Kit (MF-3500) Installation Procedure

[A] Preparation

Damp Heater Kit (check if all of the following parts are in it), tools

1. Scanner Damp Heater (Left)
2. Scanner Damp Heater (Right)
3. Bracket
4. Edge support
5. Drum Damp Heater (Right)
6. Drum Damp Heater (Left)
7. Fixing screw (for the scanner)
8. Fixing screw (for the drum: right)
9. Fixing screw (for the drum: left)

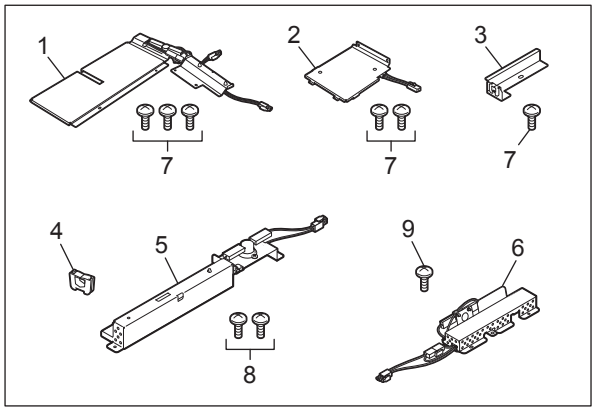


Fig. 2-120

Notes:

1. When installing the Damp Heater, ensure sufficient work space for disassembling the equipment.
2. Turn the power of the equipment OFF and unplug the power cable before the installation.
3. Take off the RADF (optional), the Finisher (optional), or the Hole Punch Unit (optional) before starting the installation, if installed.
4. Be sure not to drop small parts such as screws into the equipment.

[B] Procedure

(1) Remove 4 screws and take off the right upper cover.

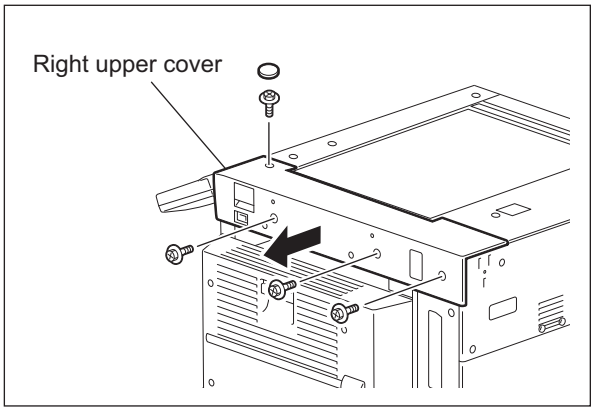


Fig. 2-121

(2) Remove 2 screws and take off the fixing bracket.

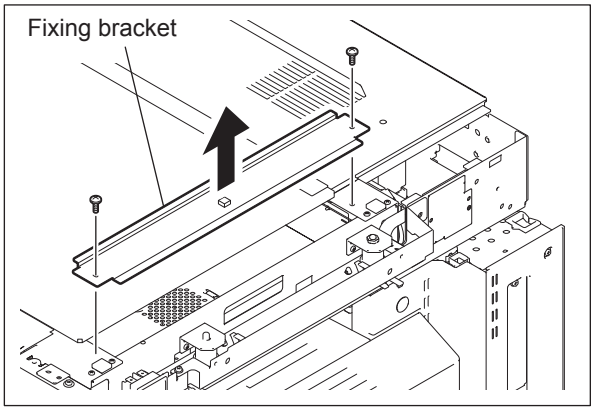


Fig. 2-122

(3) Take off the original glass.

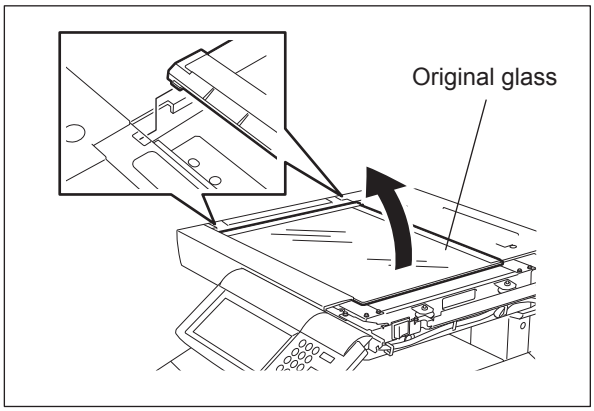


Fig. 2-123

(4) Remove 6 screws and take off the lens cover.

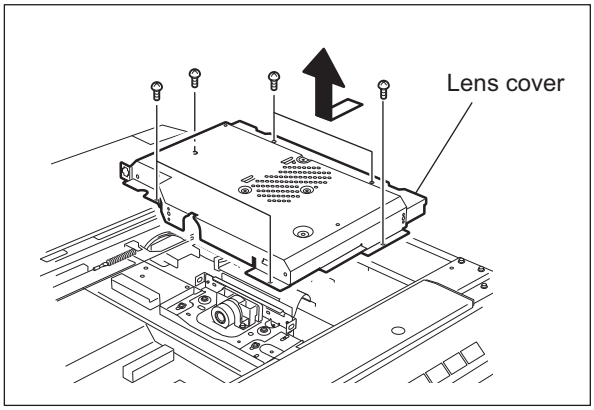


Fig. 2-124

(5) Install the edge support on the lens cover.

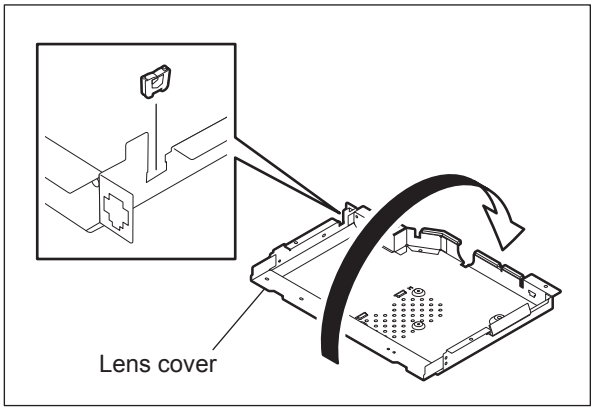


Fig. 2-125

(6) Install the Scanner Damp Heater (Right) on the lens cover with 2 screws and then insert the connector.

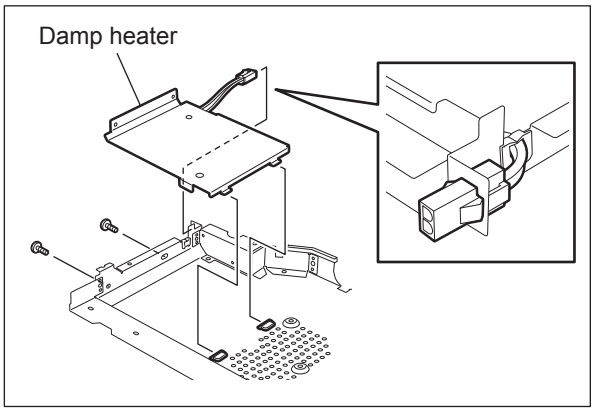


Fig. 2-126

(7) Install the lens cover with 6 screws.

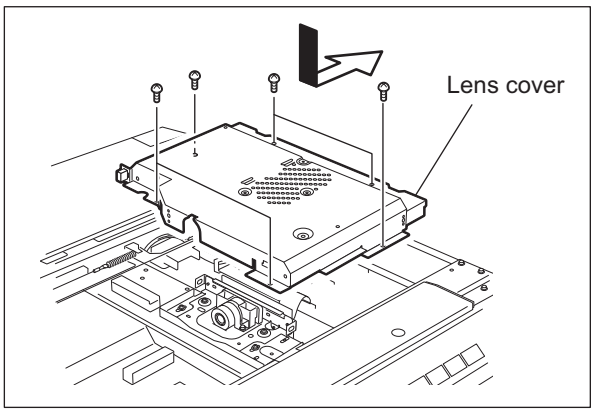


Fig. 2-127

(8) Install the bracket with 1 screw.

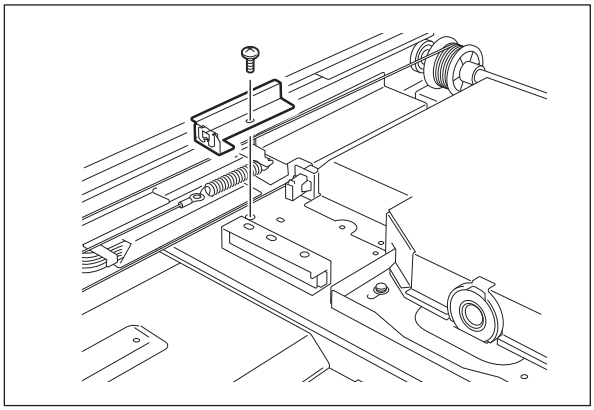


Fig. 2-128

(9) Rotate the pulley to move the carriage to the paper exit side.

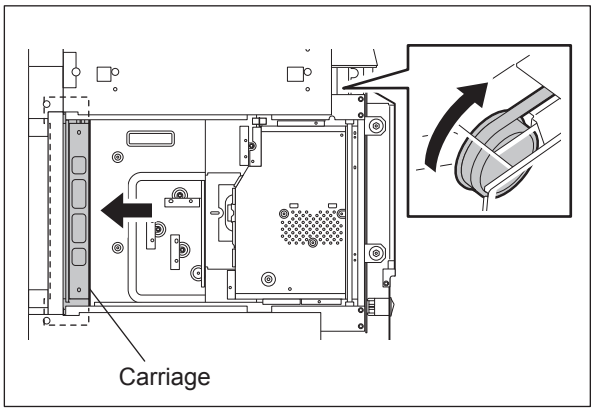


Fig. 2-129

(10) Install the Scanner Damp Heater (Left) with 2 screws.

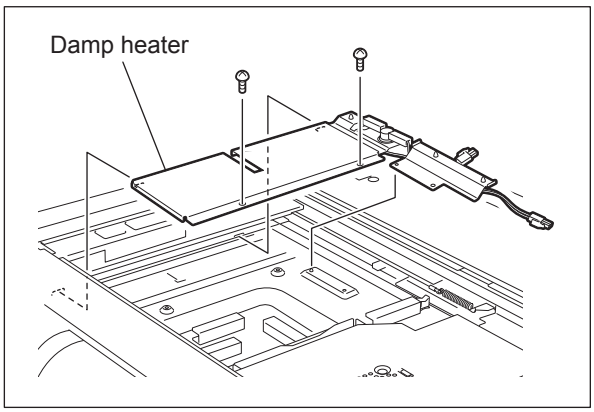


Fig. 2-130

(11) Fix the Scanner Damp Heater (Left) with 1 screw and then insert 2 connectors.

Note:
Check that no harnesses will be caught by moving the carriage.

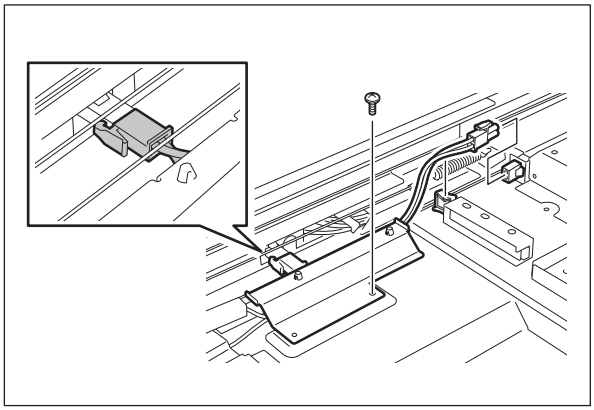


Fig. 2-131

(12) Install the original glass.

Note:
When installing, fit 2 small protrusions of the original glass in the groove of the equipment and fix the original glass with the fixing bracket by pushing it to the left rear direction.

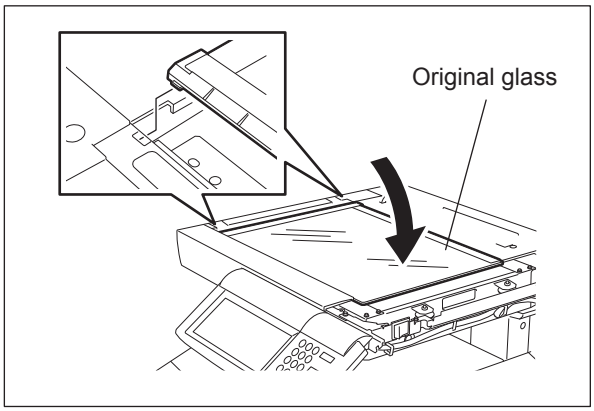


Fig. 2-132

(13) Install the fixing bracket with 2 screws.

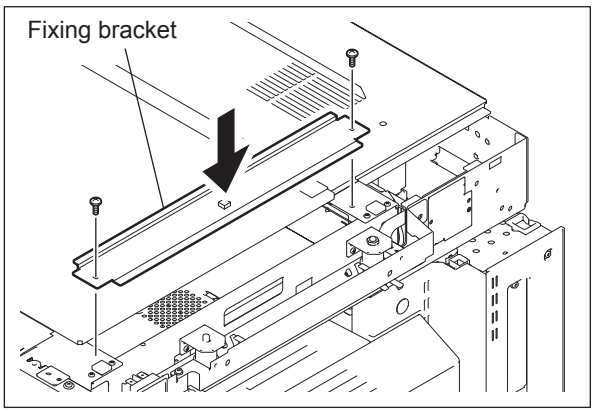


Fig. 2-133

(14) Install the right upper cover with 4 screws.

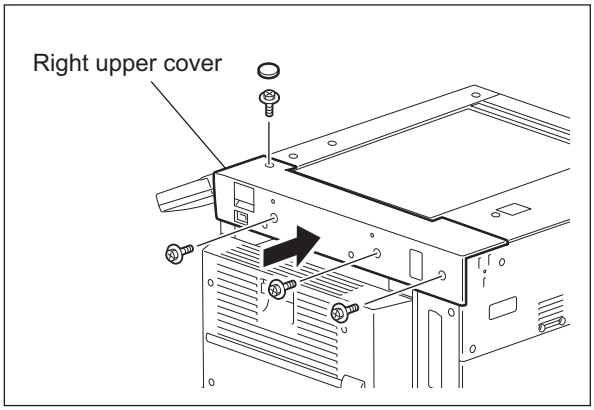


Fig. 2-134

(15) Open the front cover. Pull out the toner bag straight toward you.

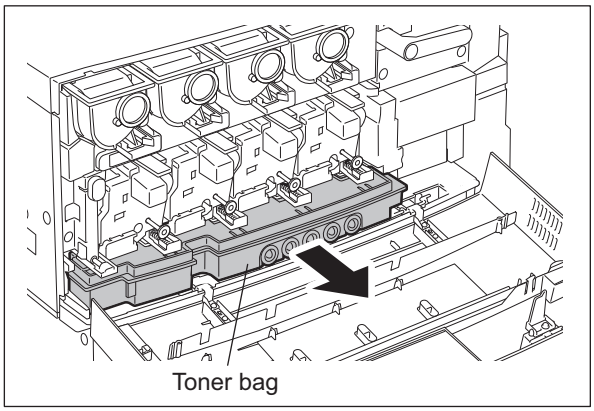


Fig. 2-135

(16) Raise 2 hinge pins on the right and left, and then pull them out.

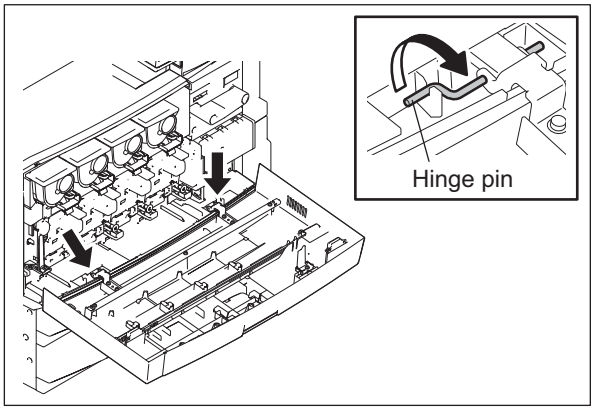


Fig. 2-136

(17) Take off the front cover.

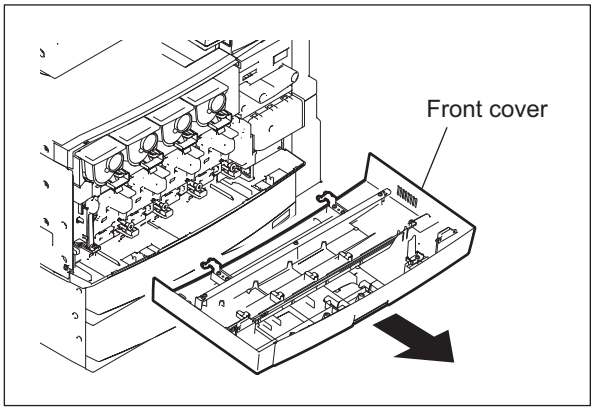


Fig. 2-137

(18) Remove 1 screw, and then turn the TBU lifting lever counterclockwise for 90 degrees.

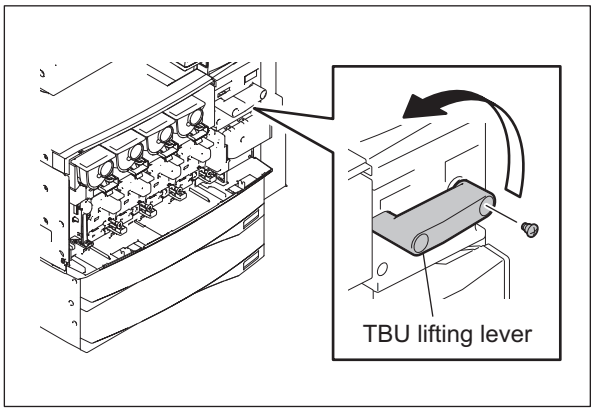


Fig. 2-138

(19) Remove the toner cartridge (Y).

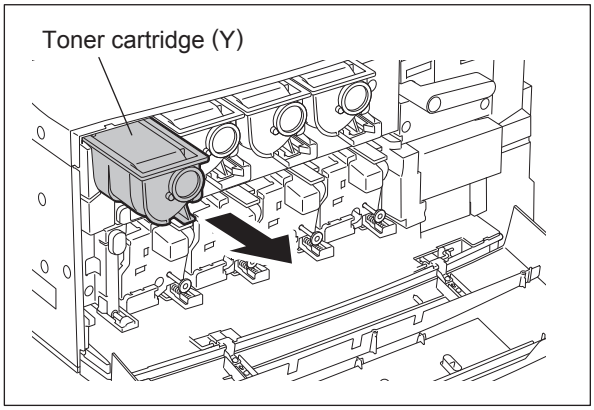


Fig. 2-139

(20) Remove all of the 4 process units (EPUs).

Note:
Hold the A part and B part of the process unit (EPU).

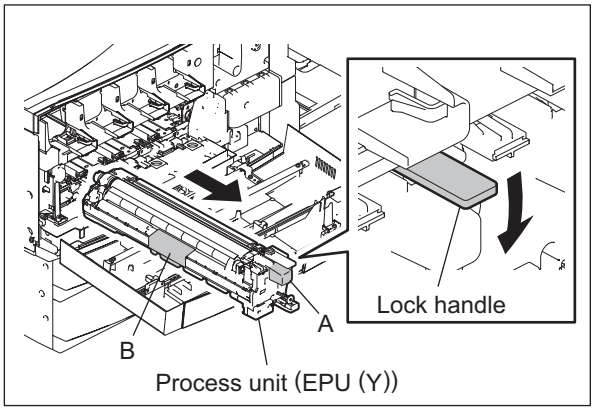


Fig. 2-140

(21) Insert a flathead screwdriver into a hole on the left side of the transfer belt cleaning duct, and then release the latch by pushing the screwdriver in the direction of arrow-A.Then release the right side latch by slightly pushing it to the direction of arrow-B. Then pull out the transfer belt cleaning duct toward you.

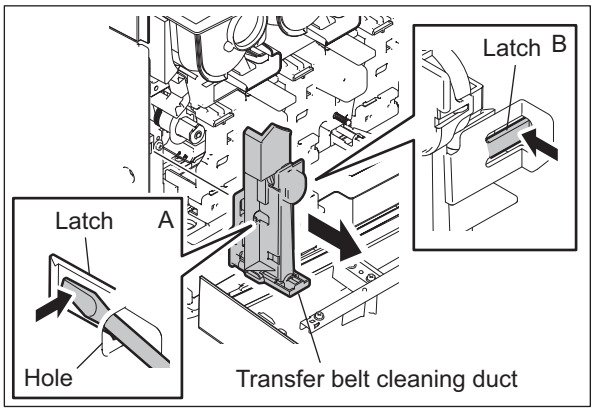


Fig. 2-141

(22) Turn the TBU lifting lever clockwise for 90 degrees.

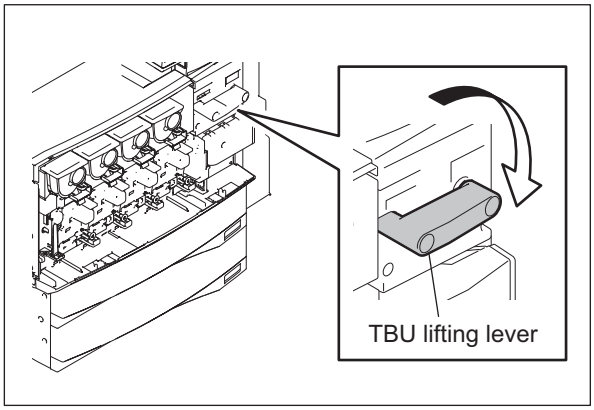


Fig. 2-142

(23) Turn the lever (sky blue) of the transfer belt cleaning unit counterclockwise and pull it out toward you.

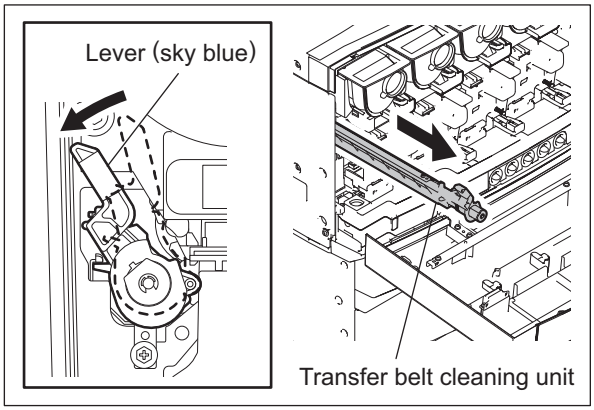


Fig. 2-143

(24) Remove 4 screws and take off the 4 ducts of the discharge LEDs.

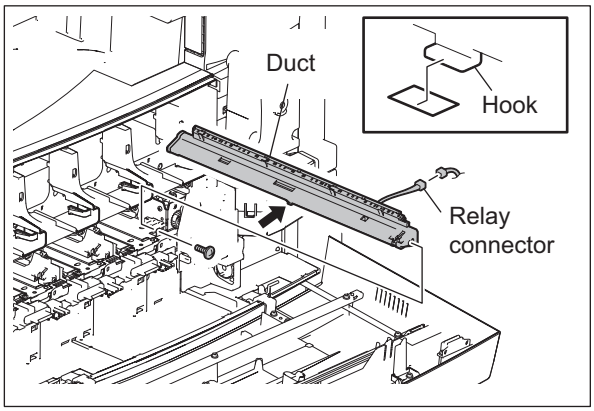


Fig. 2-144

(25) Remove 2 screws and take off the duct.

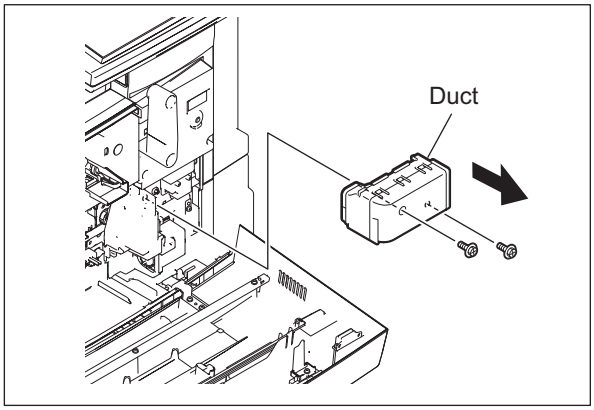


Fig. 2-145

(26) Disconnect 2 relay connectors and remove 1 screw. Then take off the used toner motor cover.

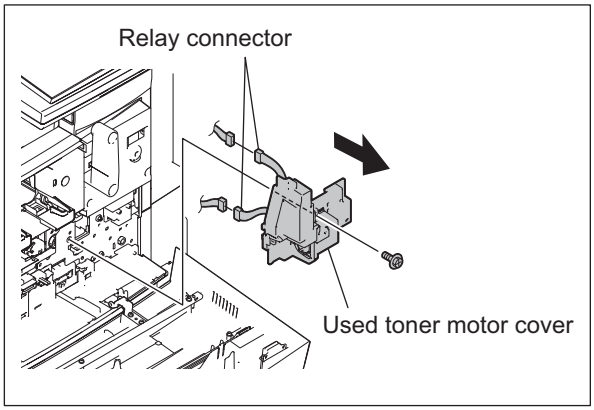


Fig. 2-146

(27) Disconnect 2 connectors.

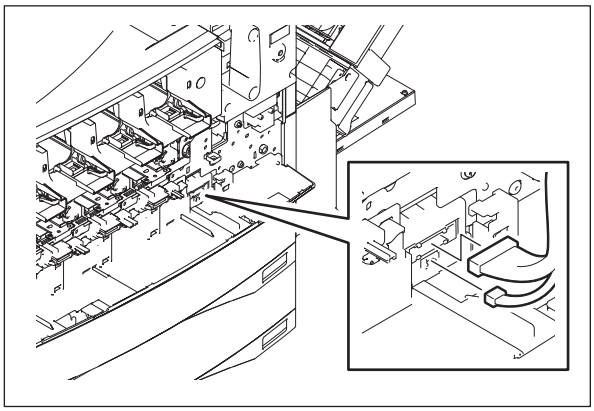


Fig. 2-147

(28) Remove 2 screws and take off the front hinge cover by releasing 8 hooks.

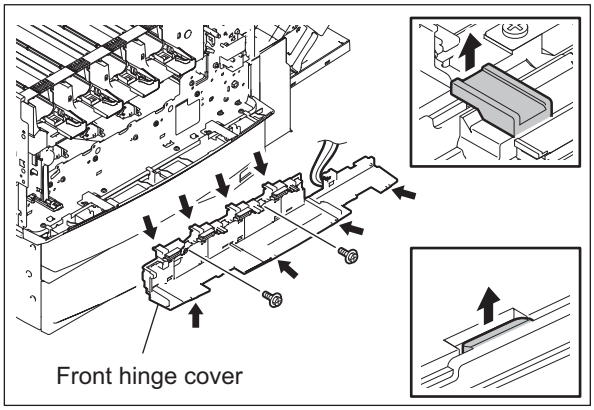


Fig. 2-148

(29) Open the automatic duplexing unit (ADU) and 2nd transfer unit (TRU).

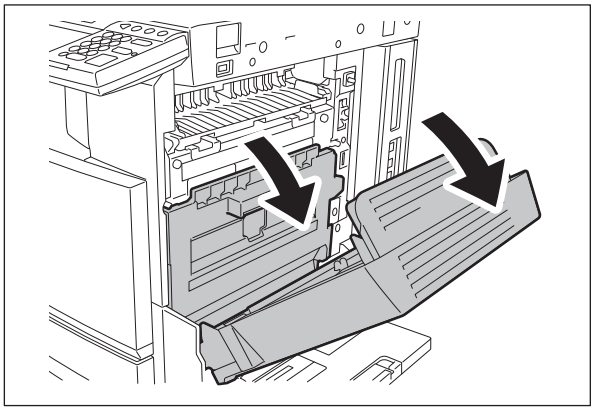


Fig. 2-149

(30) Remove 1 screw of the front hinge, and then take off the automatic duplexing unit (ADU) by lifting it up slightly and sliding it to the rear side.

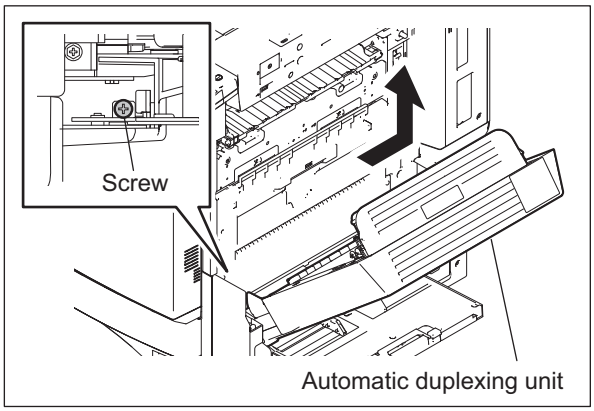


Fig. 2-150

(31) When installing, match the front and rear hinge holes of the equipment and the right and left hinge bosses of the automatic duplexing unit (ADU).

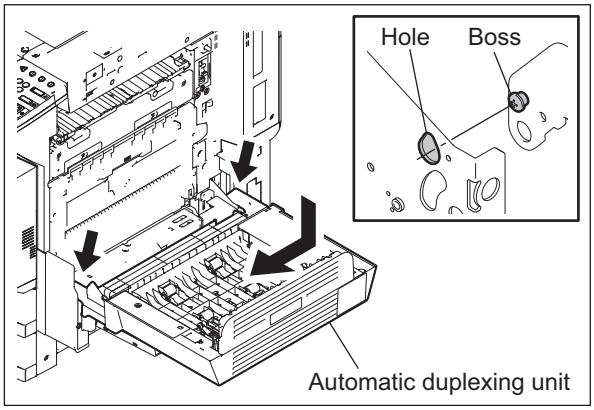


Fig. 2-151

(32) Open the middle guide by holding its knob. Disconnect 1 connector.

Note:
Do not hold the middle guide itself when opening and closing it.

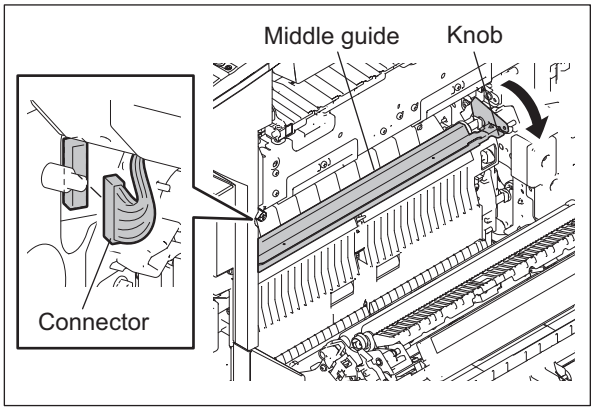


Fig. 2-152

(33) Then turn the TBU lifting lever counterclockwise for 90 degrees.

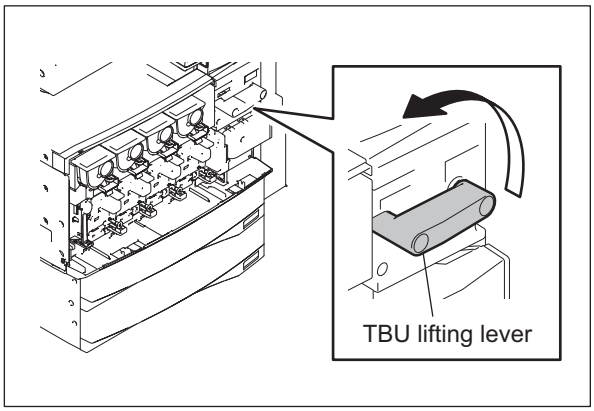


Fig. 2-153

(34) Hold the holder, and then pull out the transfer belt unit (TBU) toward you.

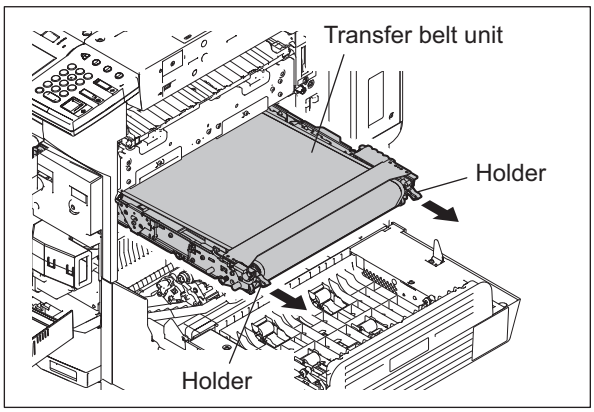


Fig. 2-154

(35) Raise the front handle, and then hold it together with the rear handle (light blue) to take off the transfer belt unit.

Note:

When taking off the transfer belt unit, be sure not to contact the bottom of this unit and the 2nd transfer unit to prevent the transfer belt from being scratched.

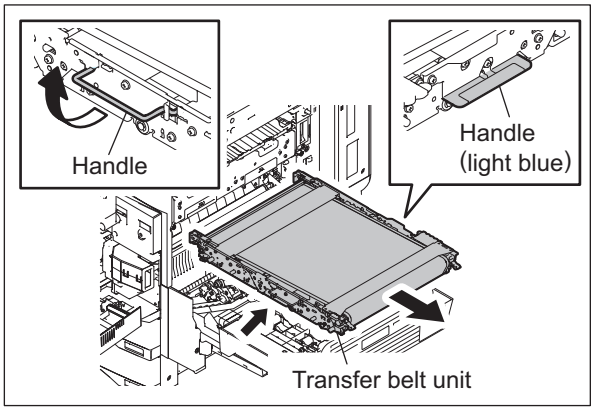


Fig. 2-155

(36) Remove 1 screw, and then take off the ozone filter-1.

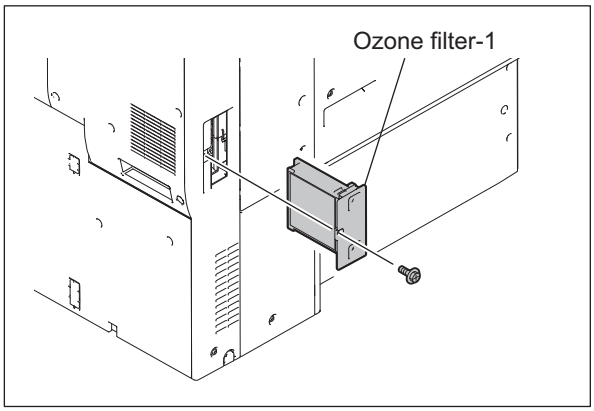


Fig. 2-156

(37) Remove 7 screws and take off the left cover.

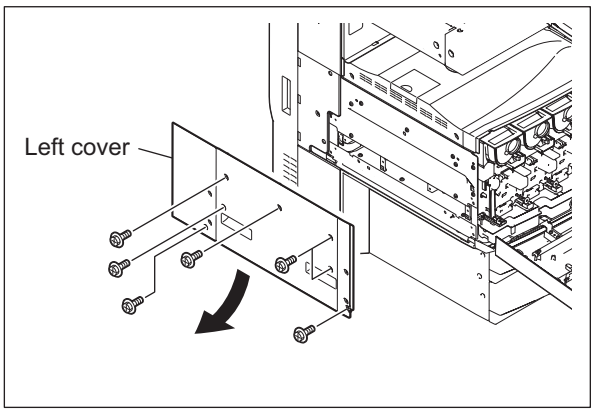


Fig. 2-157

(38) Remove 2 screws and take off the inner tray.

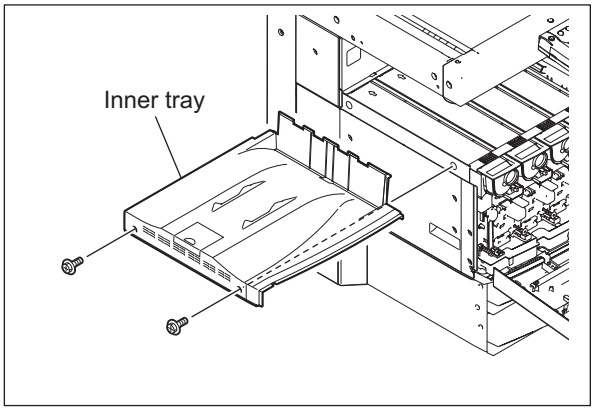


Fig. 2-158

(39) Remove 5 screws and take off the left rear cover.

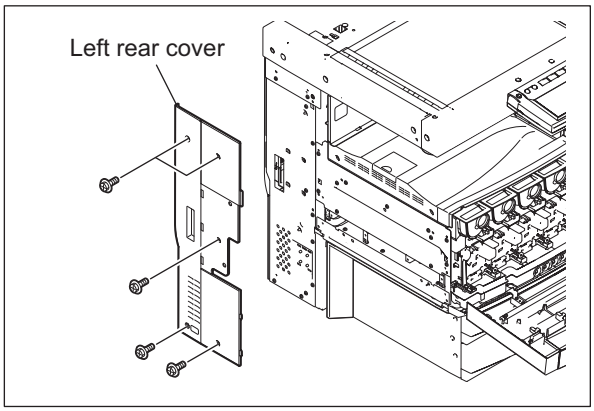


Fig. 2-159

(40) Remove 2 screws and take off the left lower cover.

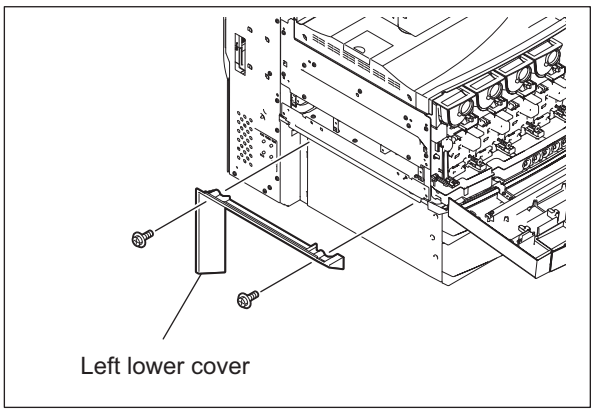


Fig. 2-160

(41) Remove 2 screws fixing the laser optical unit.

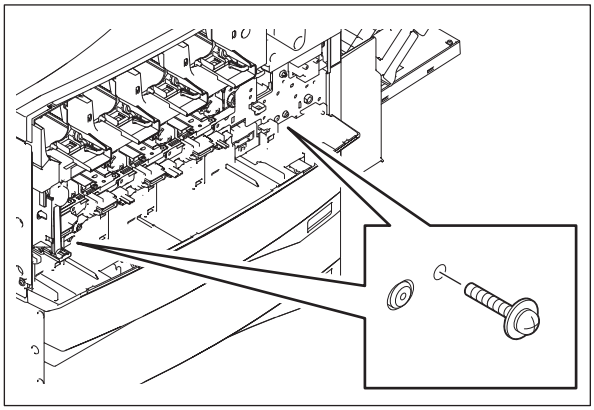


Fig. 2-161

(42) Disconnect 2 connectors and release the harness clamp.

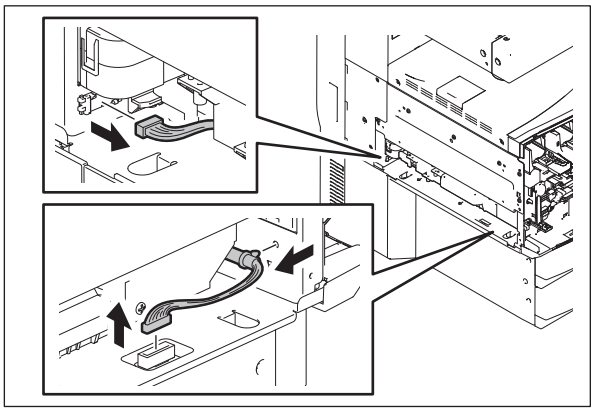


Fig. 2-162

(43) Pull out the laser optical unit.

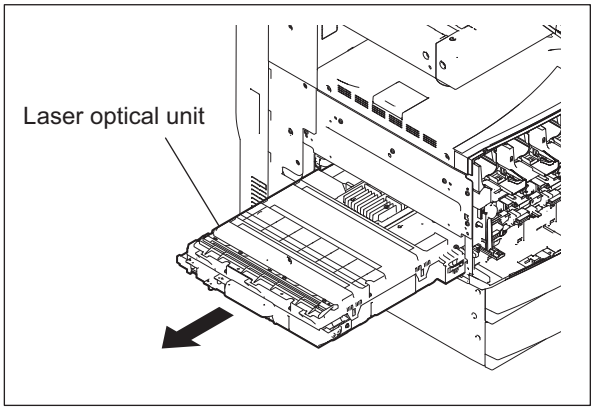


Fig. 2-163

(44) Remove 7 screws and take off the metal plate on the left side.

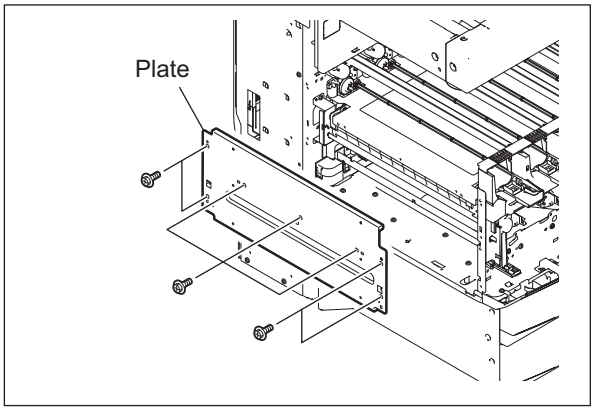


Fig. 2-164

(45) Remove 2 screws, slide the shutter unit to the front, and then pull it out to the exit side.

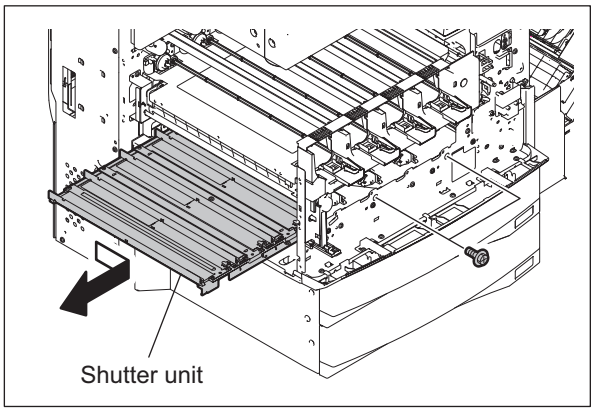


Fig. 2-165

(46) Remove 2 screws and take off the rear cover-1.

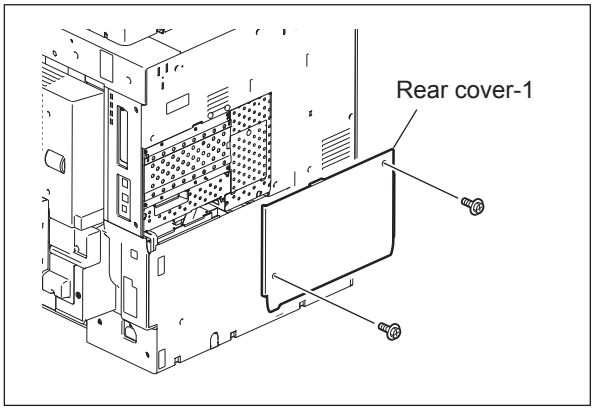


Fig. 2-166

(47) Remove 8 screws and take off the rear cover-2.

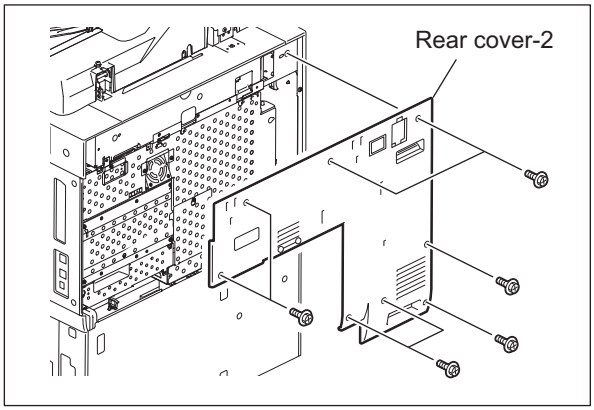


Fig. 2-167

(48) Remove 1 screw of the board cover and then loosen 9 screws.

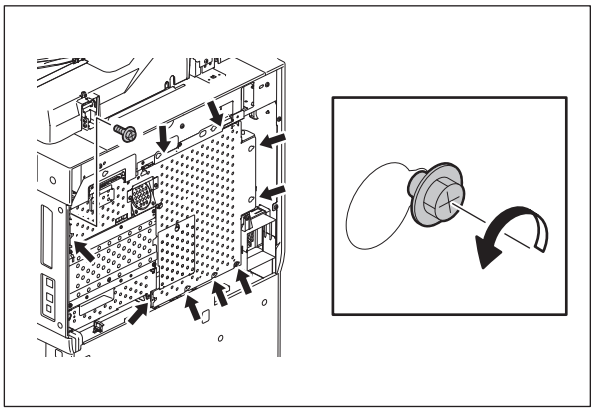


Fig. 2-168

(49) Slide the board cover, disconnect the connector of the fan, and take off the board cover.

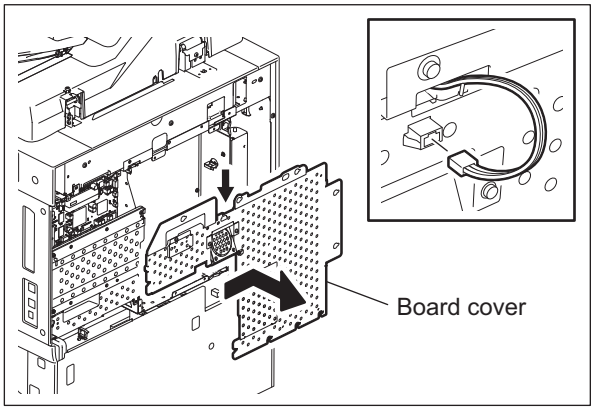


Fig. 2-169

(50) Remove 5 screws and disconnect 5 connectors.

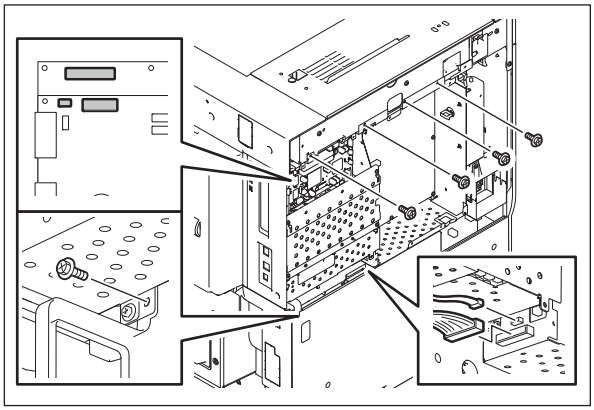


Fig. 2-170

(51) Open the board case.

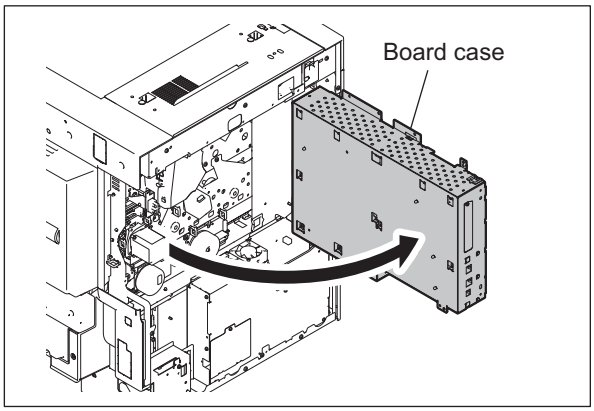


Fig. 2-171

(52) Install the Drum Damp Heater (Right) on the shutter unit with 2 screws.

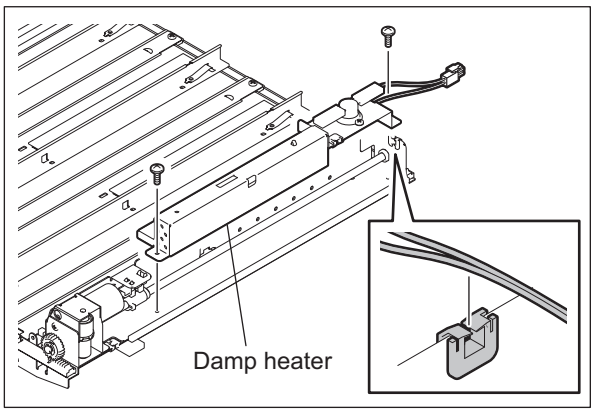


Fig. 2-172

(53) Insert the shutter unit halfway, and then insert the connector of the Drum Damp Heater (Right) into the hole.

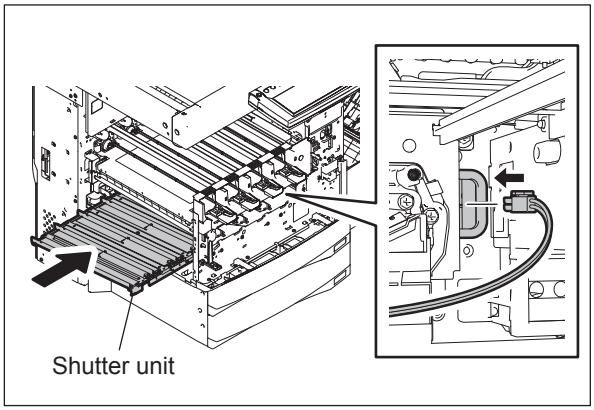


Fig. 2-173

(54) Pull out the connector of the Drum Damp Heater (Right) from the rear side of the equipment.

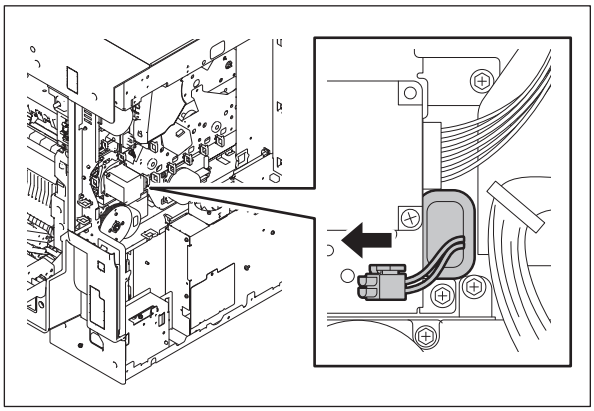


Fig. 2-174

(55) Install the shutter unit with 2 screws.

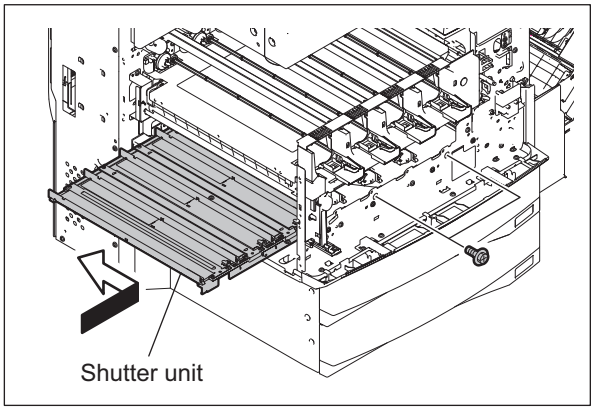


Fig. 2-175

(56) Connect the harness of the Drum Damp Heater (Right) to the connector on the rear side of the equipment. Then hold the harness with the clamps.

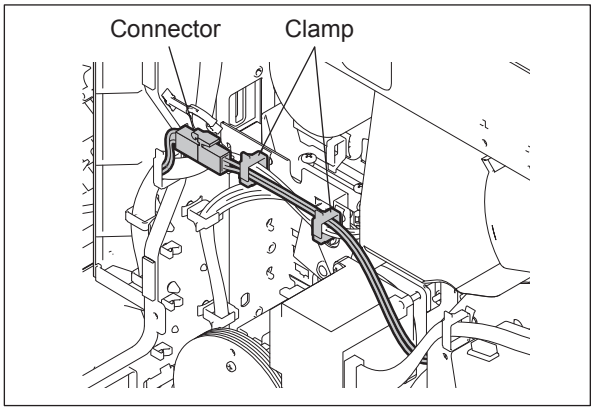


Fig. 2-176

(57) Close the board case.

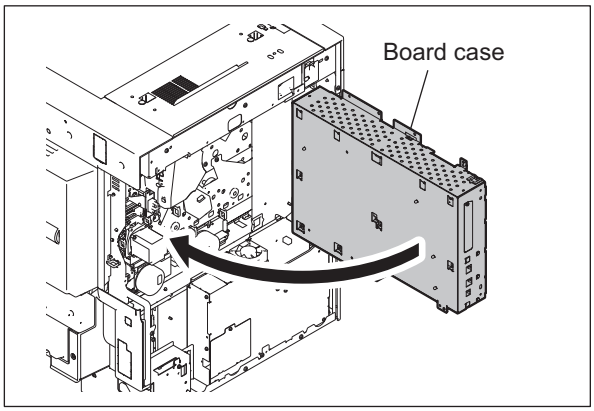


Fig. 2-177

(58) Fix the board case with 5 screws, and then install 5 connectors.

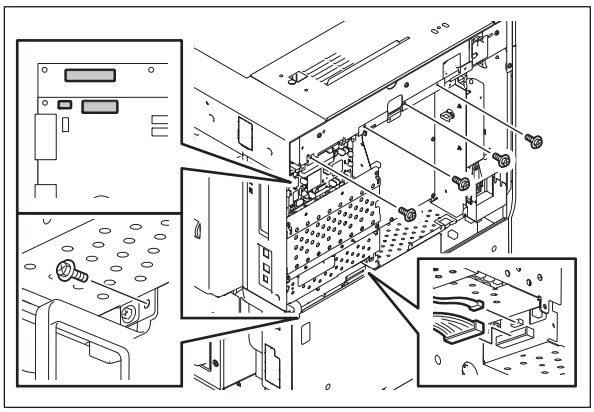


Fig. 2-178

(59) Install the board cover, and then insert the connector of the fan.

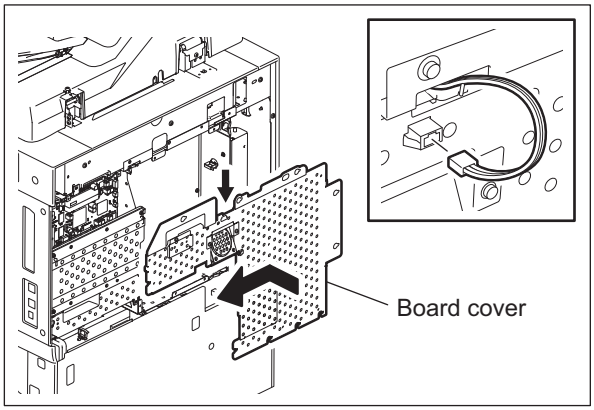


Fig. 2-179

(60) Install 1 screw and tighten 9 screws to fix the board cover.

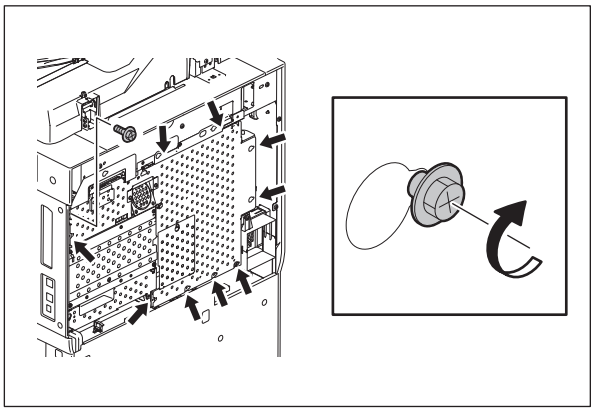


Fig. 2-180

(61) Install rear cover-2 with 8 screws.

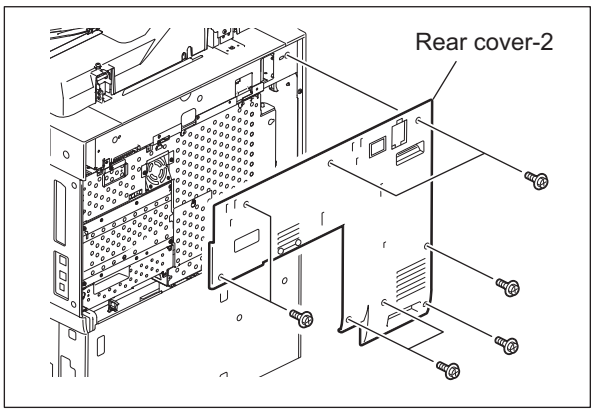


Fig. 2-181

(62) Install rear cover-1 with 2 screws.

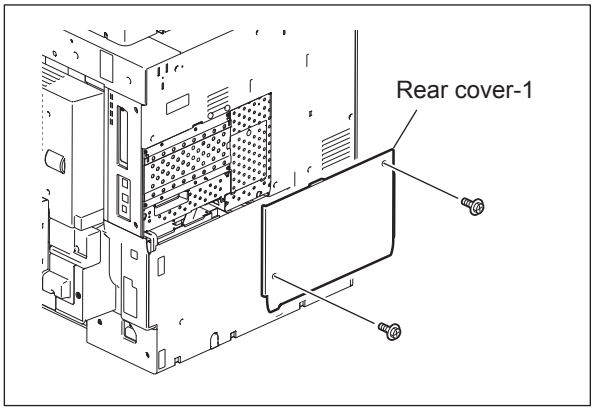


Fig. 2-182

(63) Install the laser optical unit.

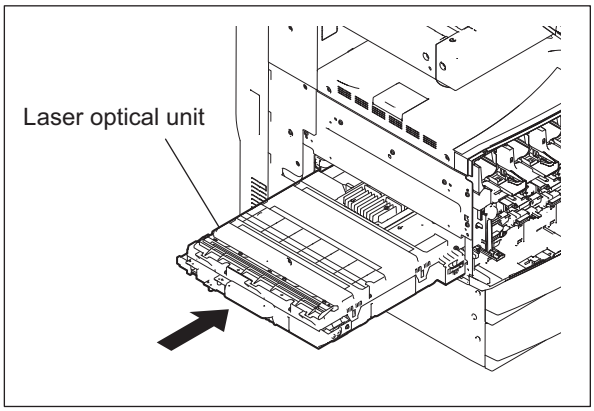


Fig. 2-183

(64) Install 2 connectors and harness clamp.

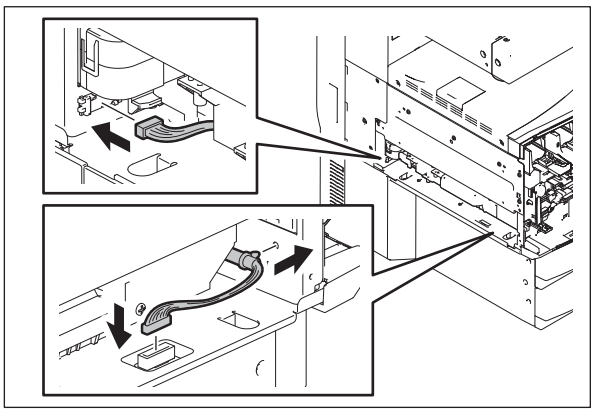


Fig. 2-184

(65) Fix the laser optical unit with 2 screws.

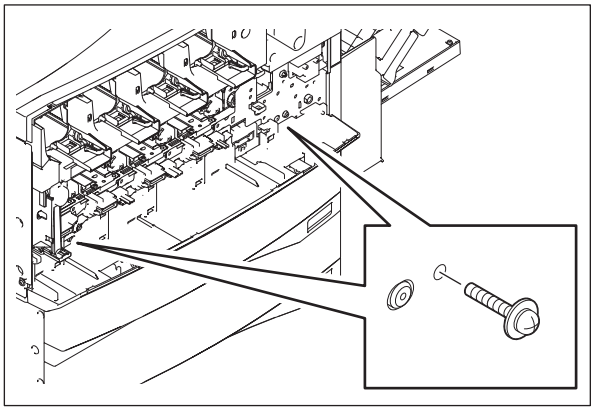


Fig. 2-185

(66) Install the Drum Damp Heater (Left) on the left metal plate with 1 screw.

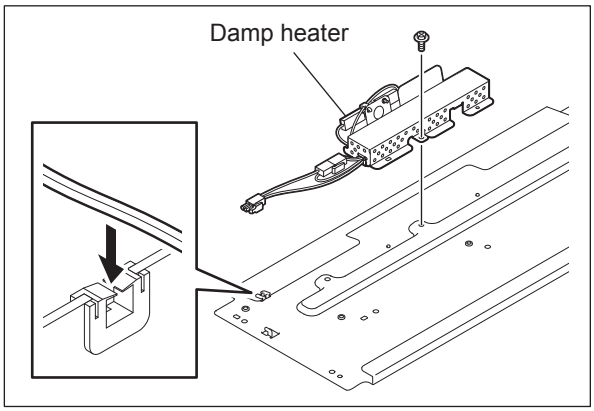


Fig. 2-186

(67) Install the left metal plate on the equipment with 7 screws.

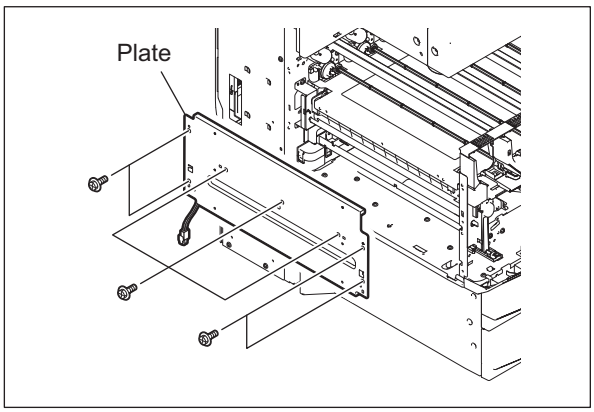


Fig. 2-187

(68) Insert the connector of the Drum Damp Heater (Left) into the connector on the left-hand side of the equipment.

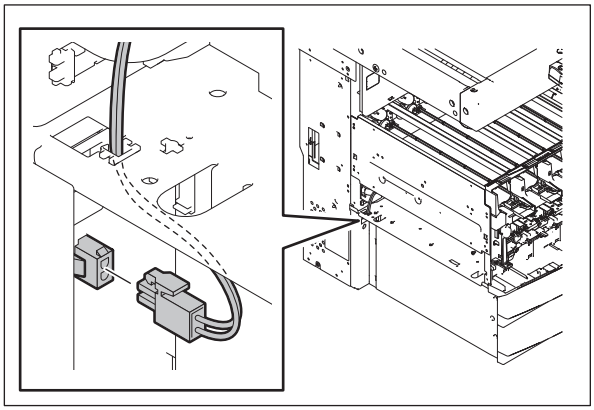


Fig. 2-188

(69) Install the left lower cover with 2 screws.

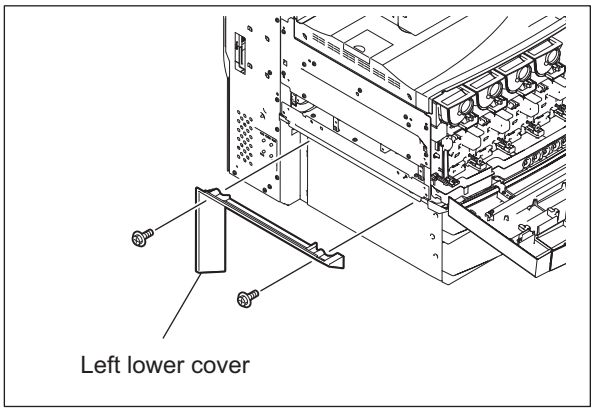


Fig. 2-189

(70) Install the left rear cover with 5 screws.

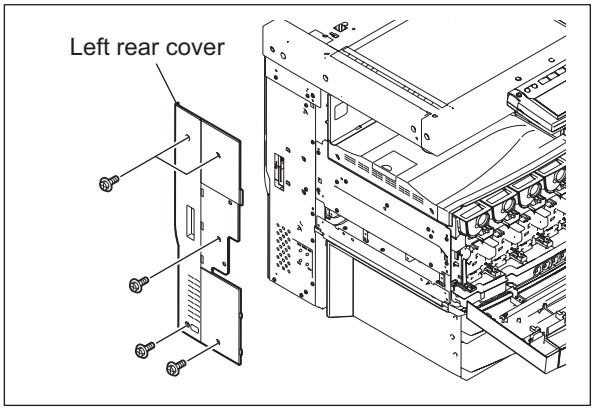


Fig. 2-190

(71) Install the inner tray with 2 screws.

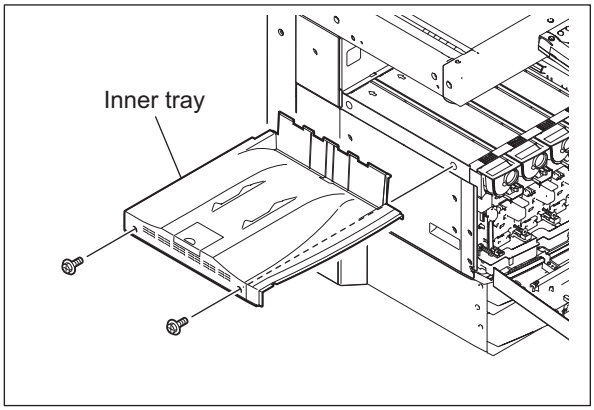


Fig. 2-191

(72) Install the left cover with 7 screws.

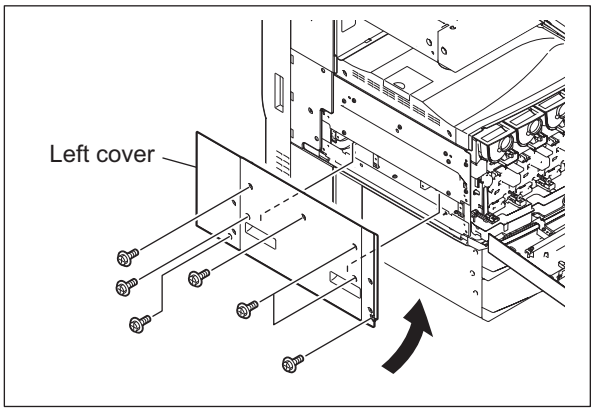


Fig. 2-192

(73) Install ozone filter-1 with 1 screw.

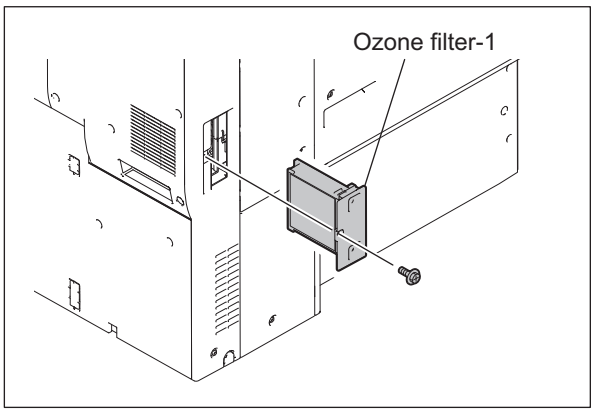


Fig. 2-193

(74) Install the front hinge cover with 2 screws.

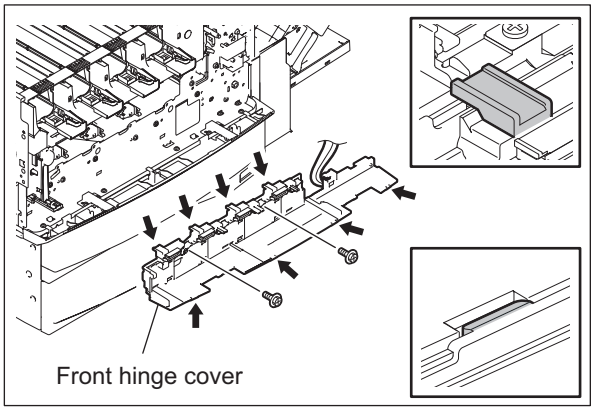


Fig. 2-194

(75) Install the used toner motor cover with 2 screws.

Note:
When installing the used toner motor cover, hang the 1 hook of the used toner motor cover on the hole of the frame.

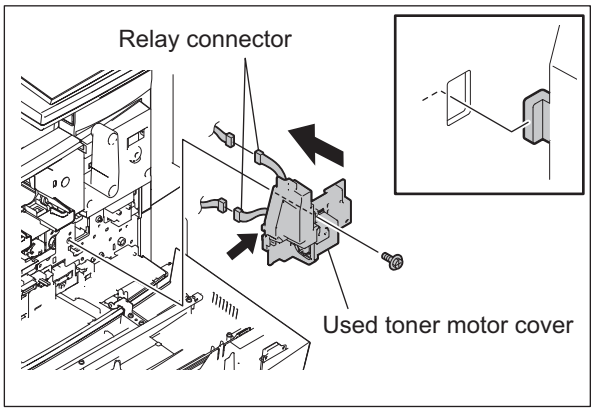


Fig. 2-195

(76) Install the duct of the laser unit cooling fan with 2 screws.

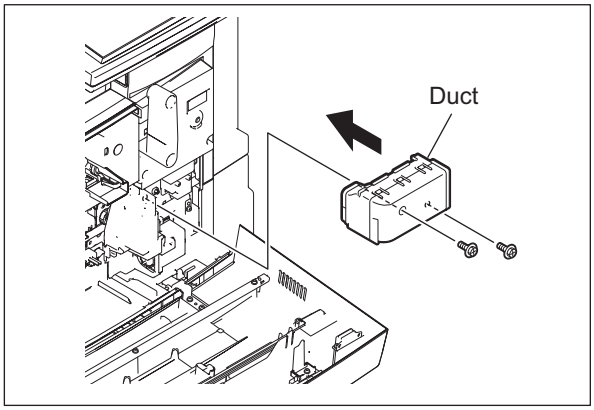


Fig. 2-196

(77) Install 4 ducts with the discharge LEDs (use 1 screw and 1 relay connector for each duct).

Notes:

1. When installing the duct, hang the 1 hook of the duct on the hole of the frame.
2. Be sure that the harness is not caught by the duct. It causes the gap between the duct and the main frame.
3. Be sure to install the duct with the discharge LED ERS-K on the proper position. Only this duct has an actuator.

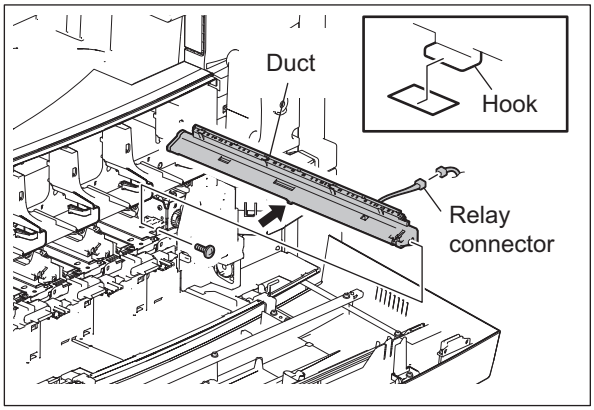


Fig. 2-197

(78) Turn the TBU cleaner pressure hook lever on the TBU to lock the TBU cleaner pressure hook.

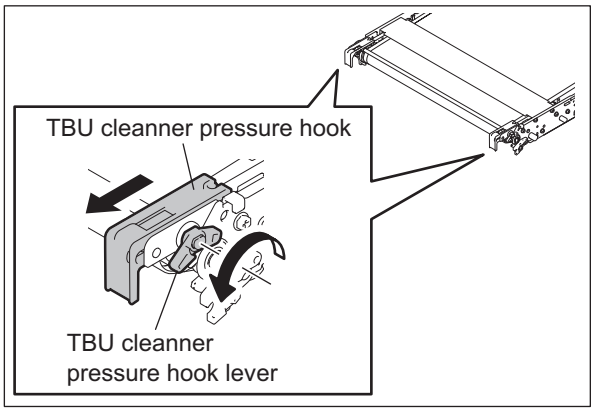


Fig. 2-198

(79) Insert the transfer belt unit (TBU) along the rail and check that the front handle returns to the original position.

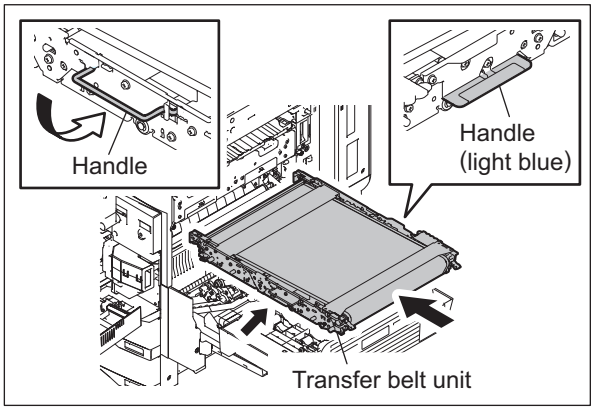


Fig. 2-199

(80) Push the holder until the TBU contacts the end.

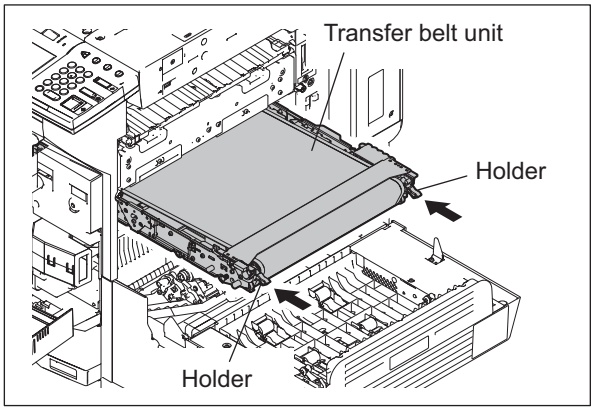


Fig. 2-200

(81) Close the middle guide, and then connect the connector.

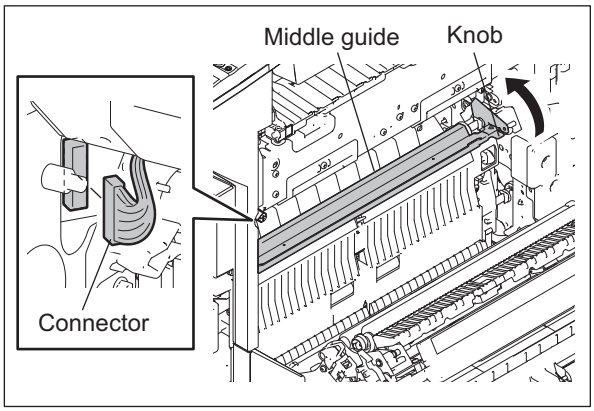


Fig. 2-201

(82) Turn the TBU lifting lever clockwise for 90 degrees.

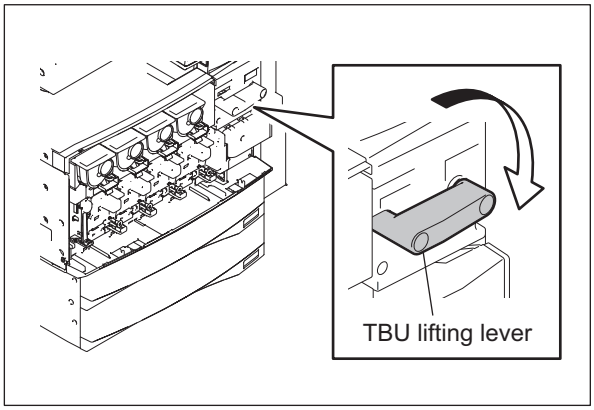


Fig. 2-202

(83) Check if the TBU cleaner pressure hook is fixed. If it is released, turn the TBU cleaner pressure hook lever to fix it as shown in the figure, otherwise the transfer belt cleaning unit cannot be installed.

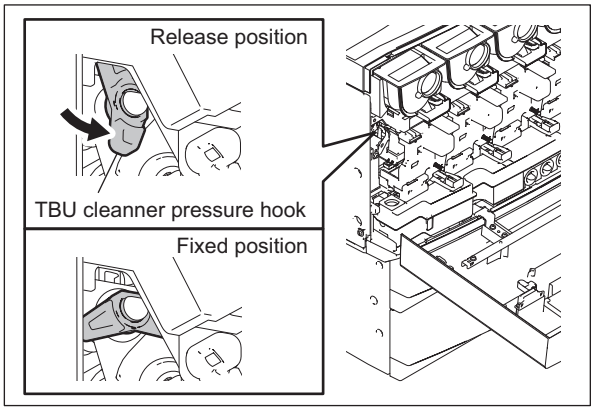


Fig. 2-203

(84) Insert portion (A) of the transfer belt cleaning unit beneath stay (B) of the main frame. Align portion (C) of the transfer belt cleaning unit with portion (D) of the main frame, then slide the transfer belt cleaning unit along stay (B) of the main frame all the way in. Turn the lever (sky blue) clockwise to lift it up until it clicks.

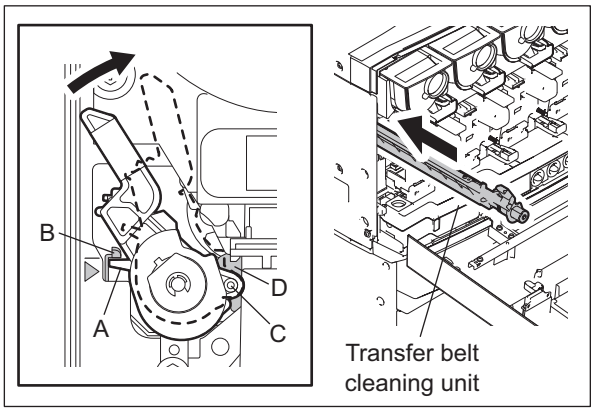


Fig. 2-204

(85) Install the transfer belt cleaning duct.

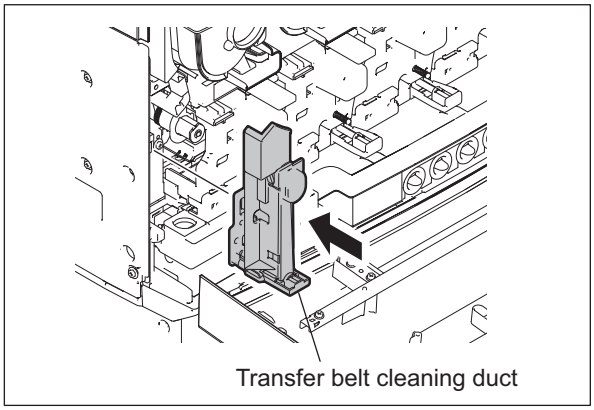


Fig. 2-205

(86) Then turn the TBU lifting lever counterclockwise for 90 degrees.

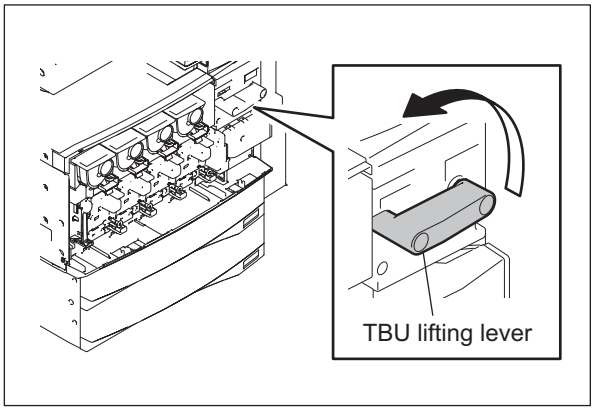


Fig. 2-206

(87) Install the 4 process units (EPUs).

Note:
Hold the A part and B part of the process unit (EPU).

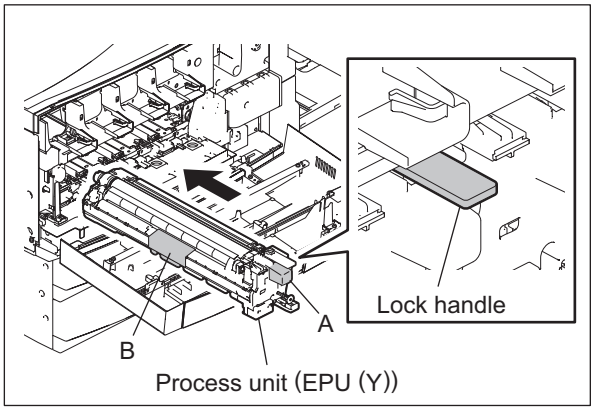


Fig. 2-207

(88) Install the toner cartridge (Y).

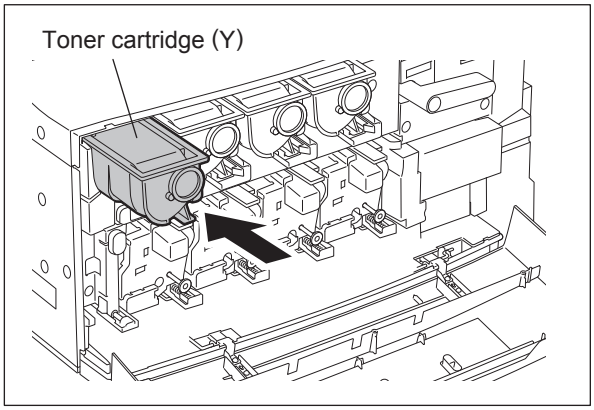


Fig. 2-208

(89) Close the 2nd transfer unit (TRU).

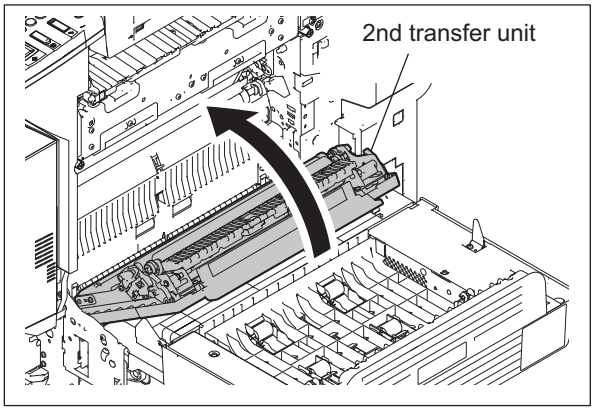


Fig. 2-209

(90) Reinstall the automatic duplexing unit (ADU) on the normal position.

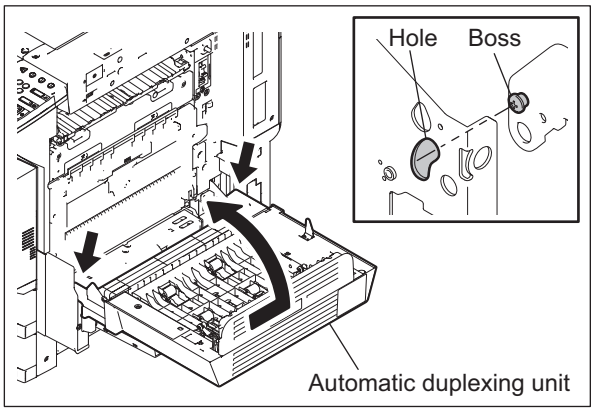


Fig. 2-210

(91) Install 1 screw and close the automatic duplexing unit (ADU).

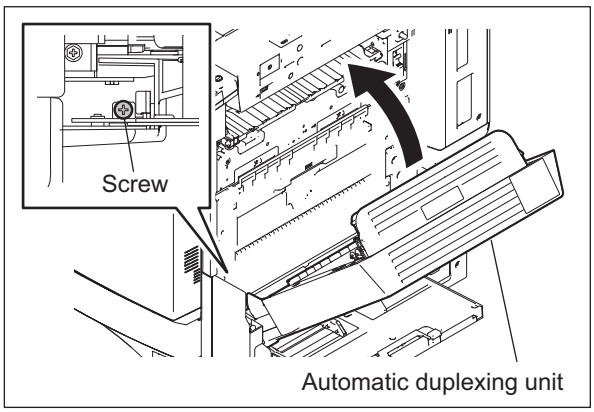


Fig. 2-211

(92) Turn the TBU lifting lever clockwise for 90 degrees and fix it with 1 screw.

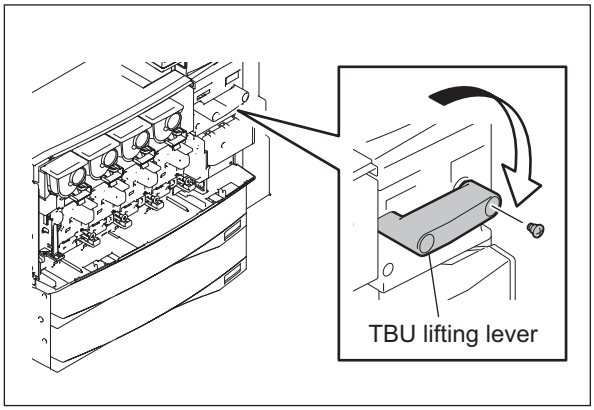


Fig. 2-212

(93) Insert 2 hinge pins and install the front cover.

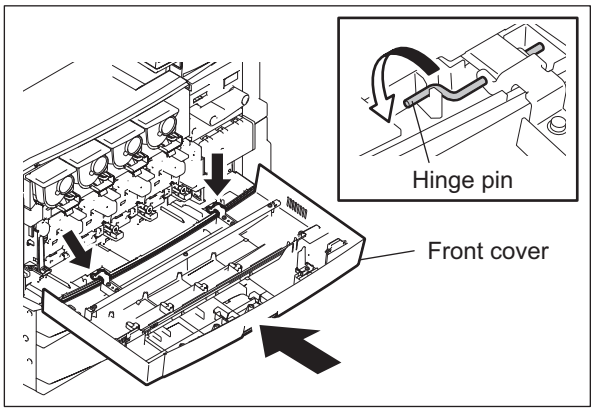


Fig. 2-213

(94) Install the toner bag and close the front cover.

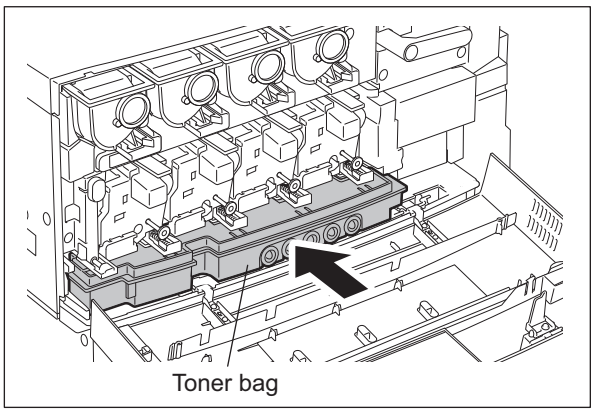


Fig. 2-214

[C] Check the followings after the installation of the Damp Heater

1) Image quality
2) Abnormal heating
3) Any screws not installed

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.

This equipment has accomplished to improve reproducibility by adding black toner to the mixture of the above three colors at proper ratio.

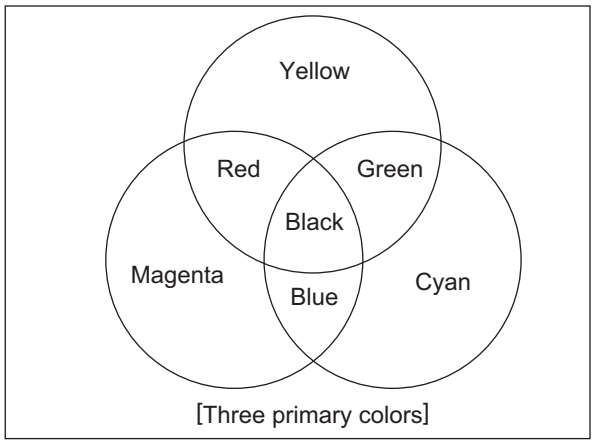


Fig. 3-1

In this equipment, 4 color process units (EPU), which include a drum, a developer unit and a main charger, for yellow, magenta, cyan and black are placed in parallel. Colors are developed in the order of Yellow (Y) →Magenta (M) →Cyan (C) →Black (K). An image with the 4 developed colors is transferred on the transfer belt by layering the colors one by one (1st transfer). Then the image is formed on a sheet by being transferred from the transfer belt by the 2nd transfer roller (2nd transfer).

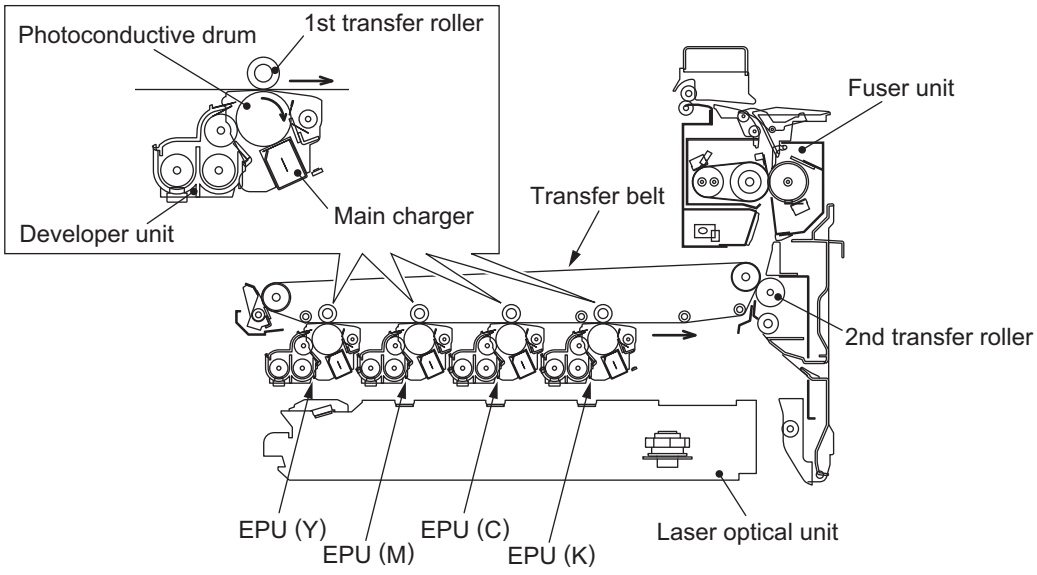


Fig. 3-2

3.2 Details of Copying Process

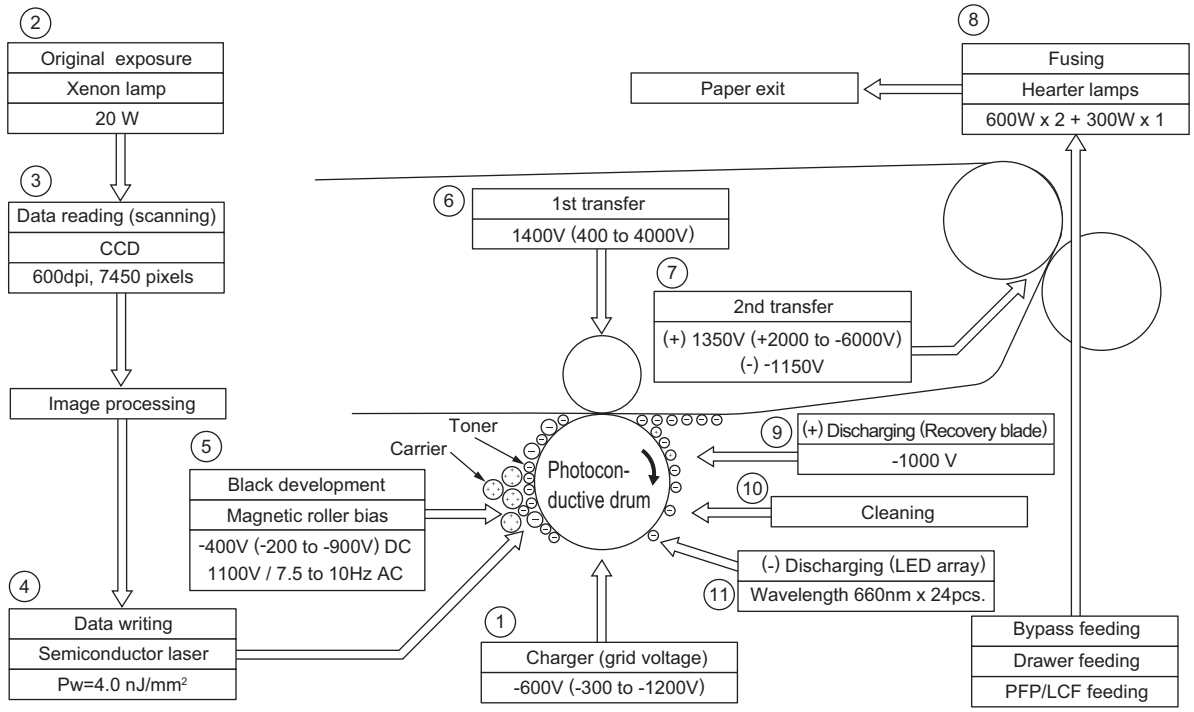


Fig. 3-3

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

↓

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

↓

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

↓

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

↓

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

↓

(6) 1st transfer: Transfers the visible image (toner) on photoconductive drum to the transfer belt.

↓

(7) 2nd transfer: Transfers the visible image (toner) on the transfer belt to paper.

↓

(8) Fusing: Fuses the toner image to the paper by applying heat and pressure.

↓

(9) (+) Discharging: The conductive recovery blade eliminates the (+) charges on the photoconductive drum applied during the transfer stage.

↓

(10) Blade cleaning: While scraping off the residual toner from the drum by the blade.

↓

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

3.3 Details of Copying Process

1) Photoconductive drum

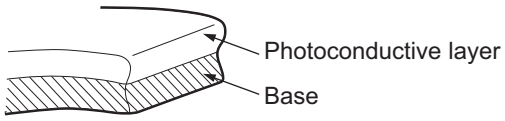
The photoconductive drum consists of two layers.

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 light→Decreases resistance (works as a conductor.)
- Weak incident light→Increases resistance (works as an insulator.)



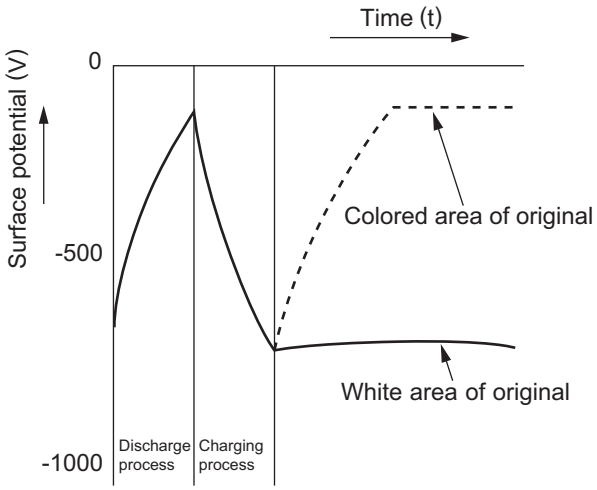
Structure of the photoconductive drum
(Example of OPC)

Fig. 3-4

[Formation of electrostatic latent images]

In the processes of charging, data reading, data writing, and 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 it forms 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.”



Electric potential of the photoconductive drum

Fig. 3-5

2) Charging
Charging is a process to apply charge evenly to the drum surface.
The needle electrode produces negative corona discharge, which is controlled by the grid so that the drum surface is evenly 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.

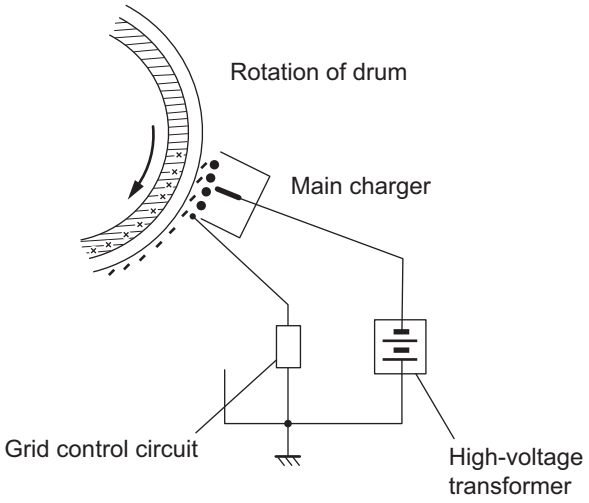


Fig. 3-6

3) Data reading (scanning)
Data reading is a 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 transmitted to the image processing section via the scanning section control PC board.

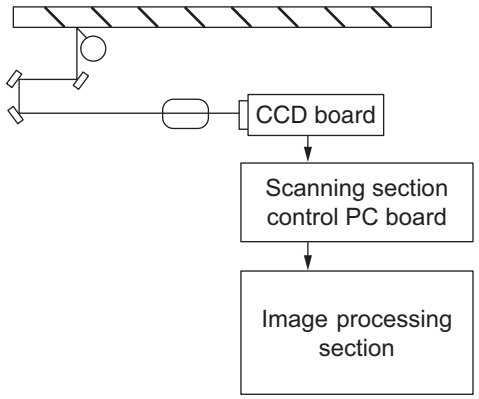


Fig. 3-7

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 transmitted to the image processing section.

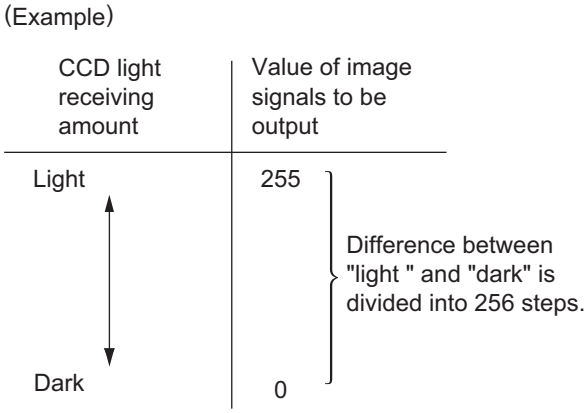


Fig. 3-8

4) Data writing

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

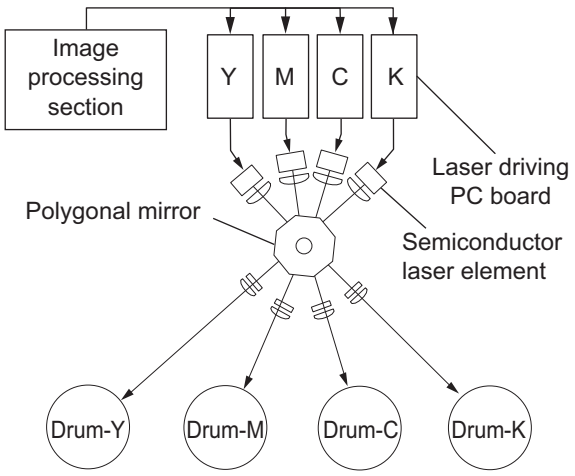


Fig. 3-9

5) Development

Development is a 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).

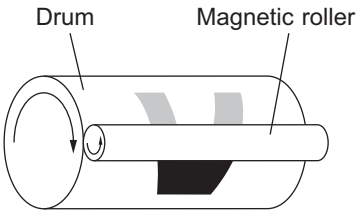


Fig. 3-10

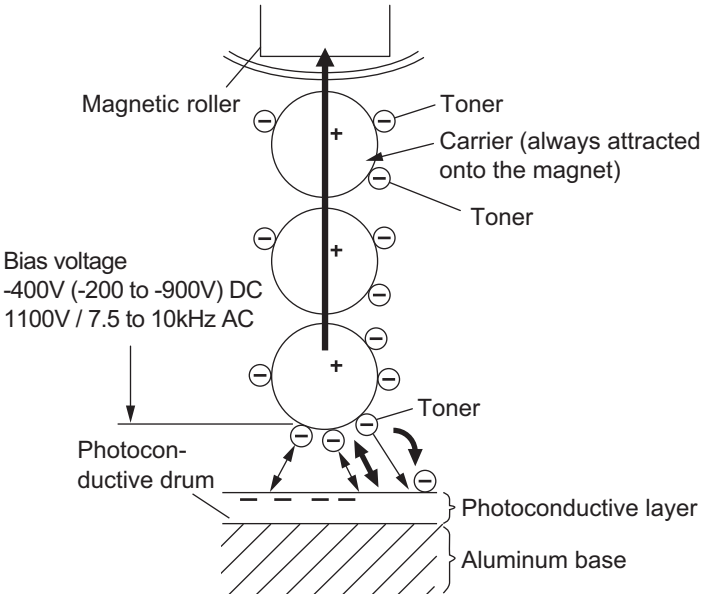


Fig. 3-11

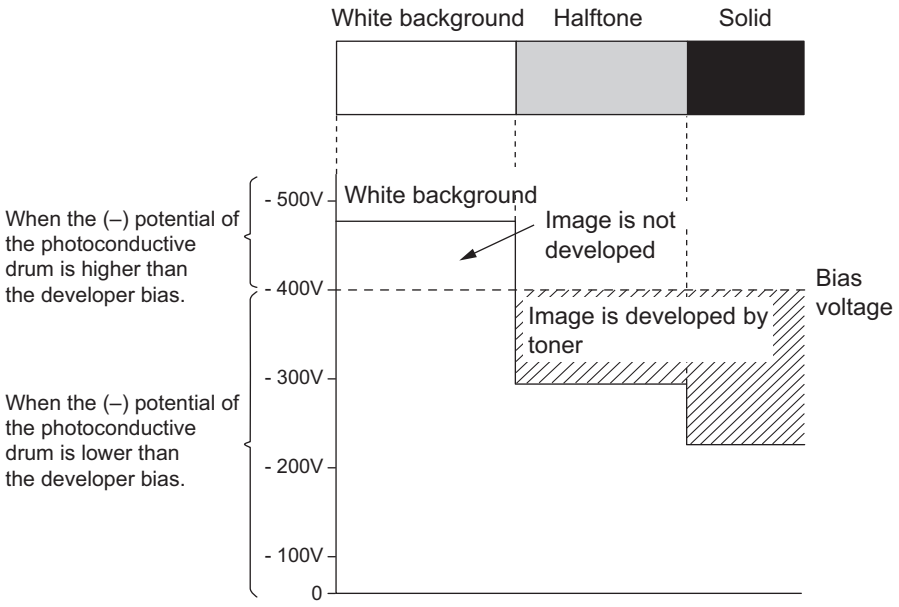


Fig. 3-12

- 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.

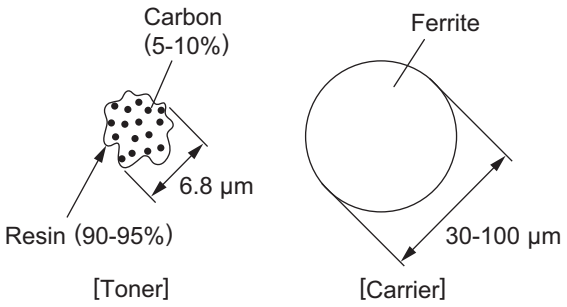


Fig. 3-13

Note:
If the developer material is used for a long period of time (beyond its normal life span), toner will become caked onto the carrier.
↓
The performance of the carrier is lowered.
Result:
1. Image density is lowered.
2. Toner scattering occurs.
3. Background fogging occurs.

Solution: Replace the developer material.

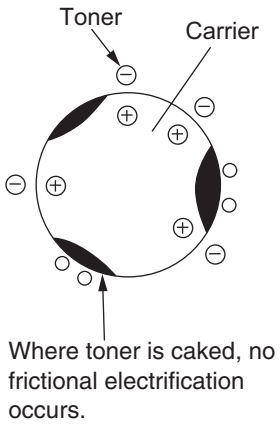


Fig. 3-14

- Magnetic roller
  - Magnetic brush development technique

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

  ↓

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

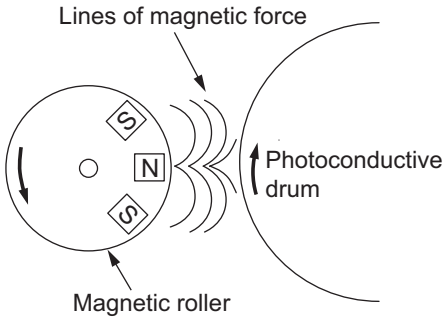


Fig. 3-15

6) 1st transfer

- 1st transfer is a process of transcribing the toner image (visible image) formed on the photoconductive drum to the transfer belt. A positive bias is applied to the 1st 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 photoconductive layer of the photoconductive drum (grounded), thus making the toner image transferred to the transfer belt. In the copy process of this equipment, images are transferred in the order of Y→M→C→K on the transfer belt.

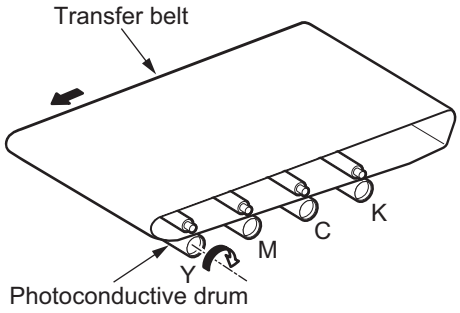


Fig. 3-16

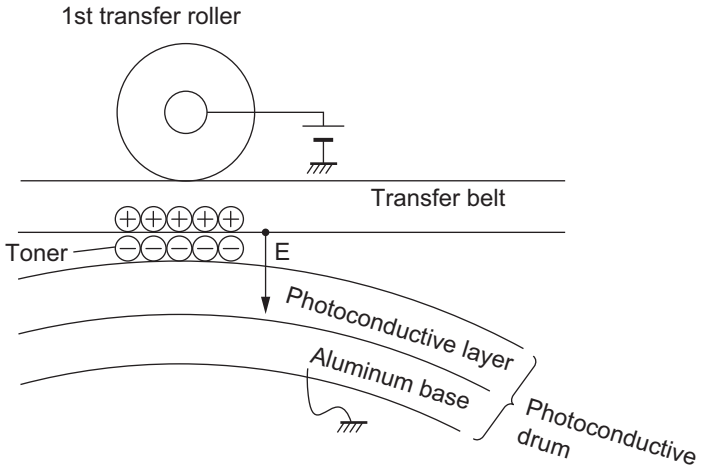


Fig. 3-17

7) 2nd transfer
   - An electric field is formed between the 2nd transfer roller and the 2nd transfer facing roller, which generates a paper polarization and thus the toner is transferred from the belt to the paper. When the negative bias is applied to the 2nd transfer facing roller, the 2nd transfer roller is charged (positive), and thus the toner is transferred from the belt to paper.

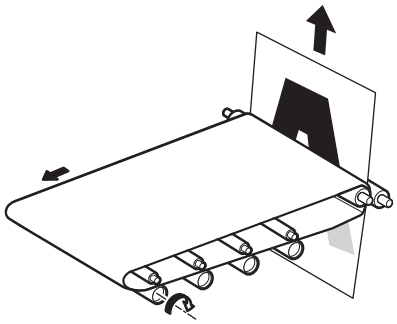


Fig. 3-18

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

   Method:
   The softening point of the toner (main component: resin) is 105-120°C.
   ↓
   (Heat)
   Toner is melted by the fuser belt.
   +
   (Pressure)
   The fuser belt is pressed against the pressure roller by the springs to increase adherence of the melted toner to the paper.
   ↓
   The paper is subjected to the heat and pressure when passing through the fuser belt and the pressure roller.
   ↓
   (Fusing)
   The toner on the paper is fused to it.

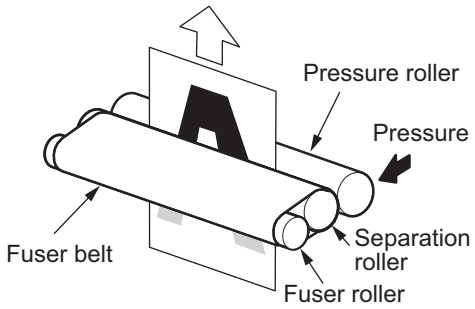


Fig. 3-19

9) (+) Discharging process

Eliminating the (+) charge on the photoconductive drum applied during the transfer stage.

- Elimination of transfer charge

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

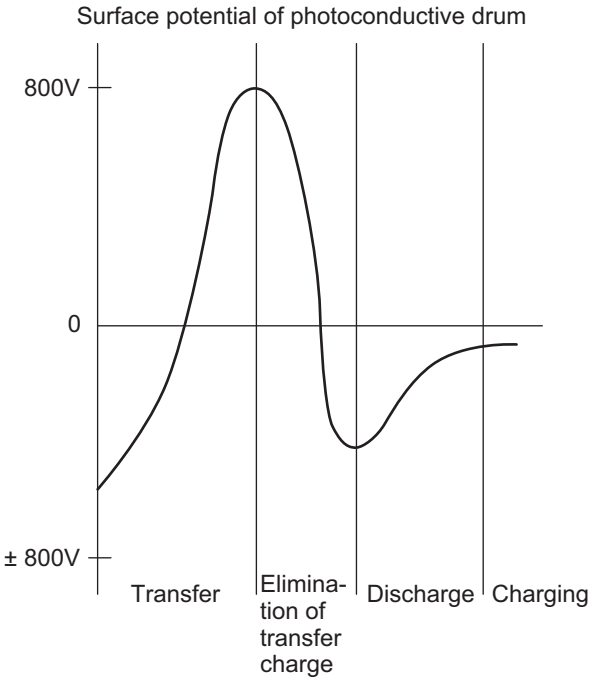


Fig. 3-20

10)Cleaning

The edge of the cleaning blade is pressed against the photoconductive drum surface to scrape off residual toner. The toner removed is then caught by the conductive recovery blade in order to prevent the toner from scattering to outside of the cleaner.

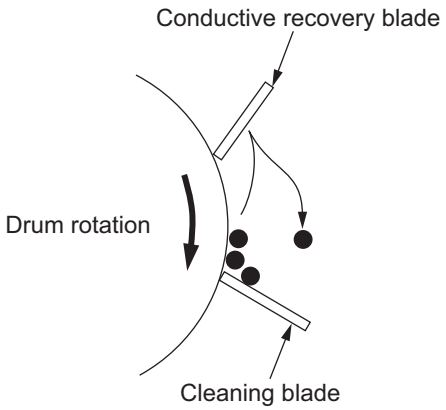


Fig. 3-21

11)(–) Discharging process

Discharging is a 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 phenomenon would occur:

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

↓

The next copy obtains a double image. (The preceding image remains.)

To prevent this:

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

↓

The photoconductive drum becomes electrically conductive.

↓

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 9)).

↓

Preparation for the next copying process is completed.

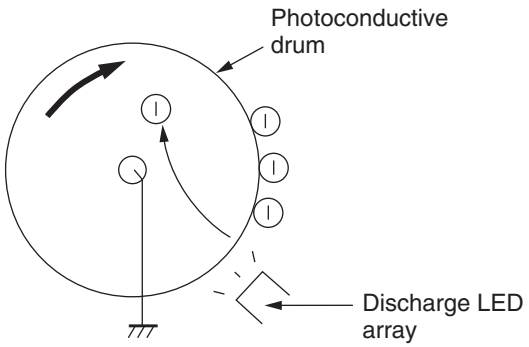


Fig. 3-22

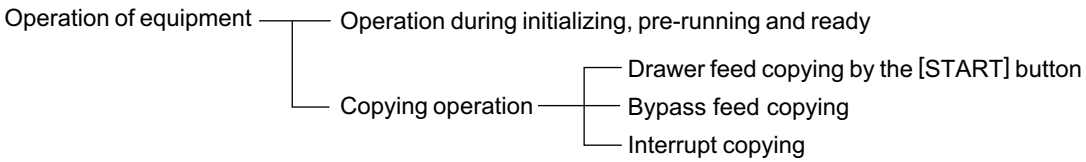
3.4 Comparison with e-STUDIO281c/351c/451c

Process	e-STUDIO281c/351c/451c	e-STUDIO2500c/3500c/3510c
1. Photoconductive drum 1) Sensitivity	OD-3511N (OPC drum) 1) Highly sensitized drum (ø90)	OD-FC35 (OPC drum) 1) Highly sensitized drum (ø30)
2. Charging	Scorotron type -300 to -1200 V (grid voltage) (adjusting by image quality control)	Scorotron type -300 to -1200 V (grid voltage) (adjusting by image quality control)
3. Data writing 1) Light source 2) Light amount	 1) Semiconductor laser 2) 4.0 nJ/mm^2	 1) Semiconductor laser 2) 4.0 nJ/mm^2
4. Image control	Image quality control by detecting toner adhesion amount	←
5. Development 1) Magnetic roller 2) Auto-toner detection 3) Toner supply 4) Toner-empty detection 5) Toner 6) Developer material 7) Developer bias	 1) One magnetic roller 2) Black: Magnetic bridge-circuit method Color: Optical reflection sensor method 3) Toner cartridge replacing method 4) Density detection method 5) NAD T-281C-K, T-281C-Y T-281C-M, T-281C-C MJD T-281CE-K, T-281CE-Y T-281CE-M, T-281CE-C TWD T-3511T-K, T-3511T-Y T-3511T-M, T-3511T-C CND T-3511C-K, T-3511C-Y T-3511C-M, T-3511C-C Others T-3511D-K, T-3511D-Y T-3511D-M, T-3511D-C (K: Black, Y: Yellow, M: Magenta, C: Cyan) 6) D-3511-K (black) D-281C-Y (yellow) D-281C-M (magenta) D-281C-C (cyan) 7) DC -100 to -900 V (adjusting by image quality control) Color: AC 1.0 kV / 10 kHz Black: AC 1.2 kV / 10 kHz	 1) One magnetic roller 2) Magnetic bridge-circuit method 3) Toner cartridge replacing method 4) Density detection method 5) NAD T-FC35-K, T-FC35-Y T-FC35-M, T-FC35-C MJD T-FC35E-K, T-FC35E-Y T-FC35E-M, T-FC35E-C TWD T-FC35T-K, T-FC35T-Y T-FC35T-M, T-FC35T-C CND T-FC35C-K, T-FC35C-Y T-FC35C-M, T-FC35C-C Others T-FC35D-K, T-FC35D-Y T-FC35D-M, T-FC35D-C (K: Black, Y: Yellow, M: Magenta, C: Cyan) 6) D-FC35K (black) D-FC35Y (yellow) D-FC35M (magenta) D-FC35C (cyan) 7) DC -200 to -900V (adjusting by image quality control) AC 1100 V / 7.5 to 10 kHz
6. Transfer	1) 1st transfer: Transfer belt method 2) 2nd transfer: Transfer roller method	← ←
7. Separation	Self-separation by transfer belt and 2nd transfer roller	←
8. Photoconductive drum cleaning 1) Method 2) Recovered toner 3) Transfer charge removal	 1) Blade cleaning 2) Non-reusable 3) Simultaneous cleaning and discharging by the conductive blade	 1) ← 2) ← 3) Discharging by the conductive recovery blade
9. Transfer belt cleaning	Blade cleaning (contact/release mechanism)	Blade cleaning
10.Discharge	LED array (red)	←

Process	e-STUDIO281c/351c/451c	e-STUDIO2500c/3500c/3510c
11.Fusing		
1) Method	1) Belt fusing system - Fuser roller: Fluorinated iron roller (ø40) (IH coil: 700 to 1300 W) - Pressure roller: Silicon sponge roller (Surface-PFA tube) Discharge brush - Fuser belt: PFA tube belt (ø55) - Separation roller: Sponge roller (ø20)	1) Belt fusing system - Fuser roller: Aluminium roller (ø30) (Heater lamp: 600 W x 2) - Pressure roller: Silicon rubber roller (Surface-PFA tube)(ø40) (Heater lamp: 300 W x 1) - Fuser belt: PFA tube belt (ø60) - Fuser roller: Sponge roller (ø38)
2) Cleaning	2) Oil roller method - Oil roller (ø18) - Cleaning roller (ø16)	2) None
3) Heater temperature	3) ON/OFF control and power control by thermistor	3) ←
4) Heater	4) IH coil	4) Heater lamp

4. GENERAL OPERATION

4.1 Overview of Operation



4.2 Description of Operation

4.2.1 Warming-up

1) Initialization
   → Power ON
   → Heater lamps (LAMP1,2,3) ON
   → Set number “1”, reproduction ratio “100%” and “Wait Warming Up” are displayed.
   → Fan motors ON
   → Initialization of laser optical system
   - The polygonal motor (M13) rotates in high speed.

   → Initialization of feeding system
   - Each drawer tray goes up.

   → Pre-running operation is stopped after five seconds.
   → Cleaning of transfer belt
   - Transfer belt motor (M7) is turned ON.
   - (Performs color registration control.)*1
   - (Performs image quality control.)*1

   → Initialization of scanning system
   - The carriage moves to the home position.
   - The carriage moves to the peak detection position.
   - The exposure lamp (EXP) is turned ON.
   - Peak detection (white color is detected by the shading correction plate)
   - The exposure lamp (EXP) is turned OFF.

   → The polygonal motor (M13) rotates in low speed.
   → “READY (WARMING UP)” is displayed.

2) Pre-running operation
   Pre-running operation is started when the temperature of the fuser belt surface reaches a certain temperature.
   →Fuser motor (M17) is turned ON.
   - Fuser roller rotation.

3) When the temperature of the fuser belt surface becomes sufficient for fusing,
   → “READY” is displayed.

*1: Image quality control and color registration control should be performed only at change of environment or periodical performing timing.

4.2.2 Ready (ready for copying)

→ Buttons on the control panel enabled
→ When no button is pressed for a certain period of time,
  - Set number “1” and reproduction ratio “100%” are displayed. Equipment returns to the normal ready state.

4.2.3 Drawer feed copying (1st drawer paper feeding)

1) Press the [START] button ON
→ "READY" changes to "COPYING"
→ Exposure lamp (EXP) turned ON
→ Scan motor (M1) turned ON→Carriages-1 and -2 move forward
→ The polygonal motor (M13) rotates in high speed.
→ Drum motor (M10), transport motor (M20), transfer belt motor (M7), developer unit motor (M9), fuser motor (M17) and exit motor (M18) turned ON
- Drum, transfer belt, fuser unit, developer unit and exit roller are driven

2) Drawer paper feeding
→ Fans rotated in high speed and 1st drawer feed clutch (CLT1) turned ON
- Pickup roller, feed roller, separation roller and transport roller start to rotate
→ Paper reaches the 1st drawer feed sensor (S30)
- 1st drawer feed sensor (S30) is turned ON
→ Paper reaches the registration roller
- Registration sensor (S28) is turned ON and aligning is performed
→ 1st drawer feed clutch (CLT1) is turned OFF after a certain period of time

3) A certain period of time passed after the carriage operation
→Registration motor (M19) is turned ON after a certain period of time→Paper is transported to the transfer area
→Copy counter operates

4) Completion of scanning
→Exposure lamp (EXP) turned OFF
→Scan motor (M1) turned OFF
→Registration motor (M19) turned OFF (after the trailing edge of the paper passed the registration roller)
→"READY (PRINTING)" is displayed

5) Printing operation
1) Color printing operation
→ Drum switching motor (M11) turned ON
- The drum switching detection sensor (S19) checks whether the equipment is in the color or black printing status, and if it is in the black printing status, the motor (M11) is turned ON to switch the status to color printing.

→ Drum motor (M10), transfer belt motor (M7), discharge LED-Y, -M, -C, -K (ERS) and cleaning blade bias turned ON
→ Main charger bias turned ON
→ 1st transfer roller cam motor (M8) turned ON
- Contact the 1st transfer rollers (Y, M and C) to the transfer belt
→ YMCK developer bias (DC) and developer unit motor (M9) turned ON
→ Registration motor (M19) turned ON
- Contact the 2nd transfer roller to the transfer belt
→ 2nd transfer bias turned ON
→ YMC and K developer bias (AC) turned ON
→ Laser emission (yellow image)
→ 1st transfer bias (Y) turned ON
- 1st transfer of yellow image (Yellow image is transferred to the transfer belt)
→ 1st transfer bias (Y) turned OFF
→ Laser emission (magenta image)
→ 1st transfer bias (M) turned ON
- 1st transfer of magenta image (Magenta image is transferred to the transfer belt)
→ 1st transfer bias (M) turned OFF

→ Laser emission (cyan image)
→ 1st transfer bias (C) turned ON
- 1st transfer of cyan image (Cyan image is transferred to the transfer belt)
→ 1st transfer bias (C) turned OFF
→ Laser emission (black image)
→ 1st transfer bias (K) turned ON
- 1st transfer of black image (Black image is transferred to the transfer belt)
→ 1st transfer bias (K) turned OFF
→ 1st transfer roller cam motor (M8) turned OFF
- Release the 1st transfer rollers (Y, M and C) from the transfer belt
→ 2nd transfer of YMCK image (YMCK image on the transfer belt is transferred to the paper)
→ Main charger turned OFF
→ Developer unit motor (M9) and developer bias (YMC and K) turned OFF
→ Registration motor (M19) turned ON
- Release the 2nd transfer roller from the transfer belt
→ 2nd transfer bias turned OFF
→ Drum motor (M10), transfer belt motor (M7), discharge LED-Y, -M, -C, -K (ERS) and cleaning blade bias turned OFF

2) Black printing operation
→ Drum switching motor (M11) turned ON
- The drum switching detection sensor (S19) checks whether the equipment is in the color or black printing status, and if it is in the color printing status, the motor (M11) is turned ON to switch the status to black printing.

→ Drum motor (M10), transfer belt motor (M7), discharge LED-K (ERS) and cleaning blade bias turned ON
→ Main charger bias turned ON
→ K developer bias (DC) and developer unit motor (M9) turned ON
→ Registration motor (M19) turned ON
- Contact the 2nd transfer roller to the transfer belt
→ 2nd transfer bias turned ON
→ K developer bias (AC) turned ON
→ Laser emission (black image)
→ 1st transfer bias (K) turned ON
- 1st transfer of black image (Black image is transferred to the transfer belt)
→ 1st transfer bias (K) turned OFF
→ 2nd transfer of K image (K image on the transfer belt is transferred to the paper)
→ Main charger turned OFF
→ Developer unit motor (M9) and developer bias (K) turned OFF
→ Registration motor (M19) turned ON
- Release the 2nd transfer roller from the transfer belt
→ 2nd transfer bias turned OFF
→ Drum motor (M10), transfer belt motor (M7), discharge LED-K (ERS) and cleaning blade bias turned OFF

6) Paper exiting
→ The exit sensor (S26) detects the trailing edge of the paper
→ Toner recovery auger, discharge LED (ERS) and cleaning blade bias turned OFF
→ Drum motor (M10), transfer belt motor (M7), transport motor (M20), developer unit motor (M9), fuser motor (M17) and exit motor (M18) turned OFF
→ The polygonal motor (M4) rotates in low speed.
→ Drum, fuser unit and developer unit are stopped
- Fans return to rotate at the normal rotation speed
→ “READY” is displayed and the equipment enters into ready mode

Timing chart for copying (A4/LT size, 1 sheet from 1st drawer)

1) Color copy

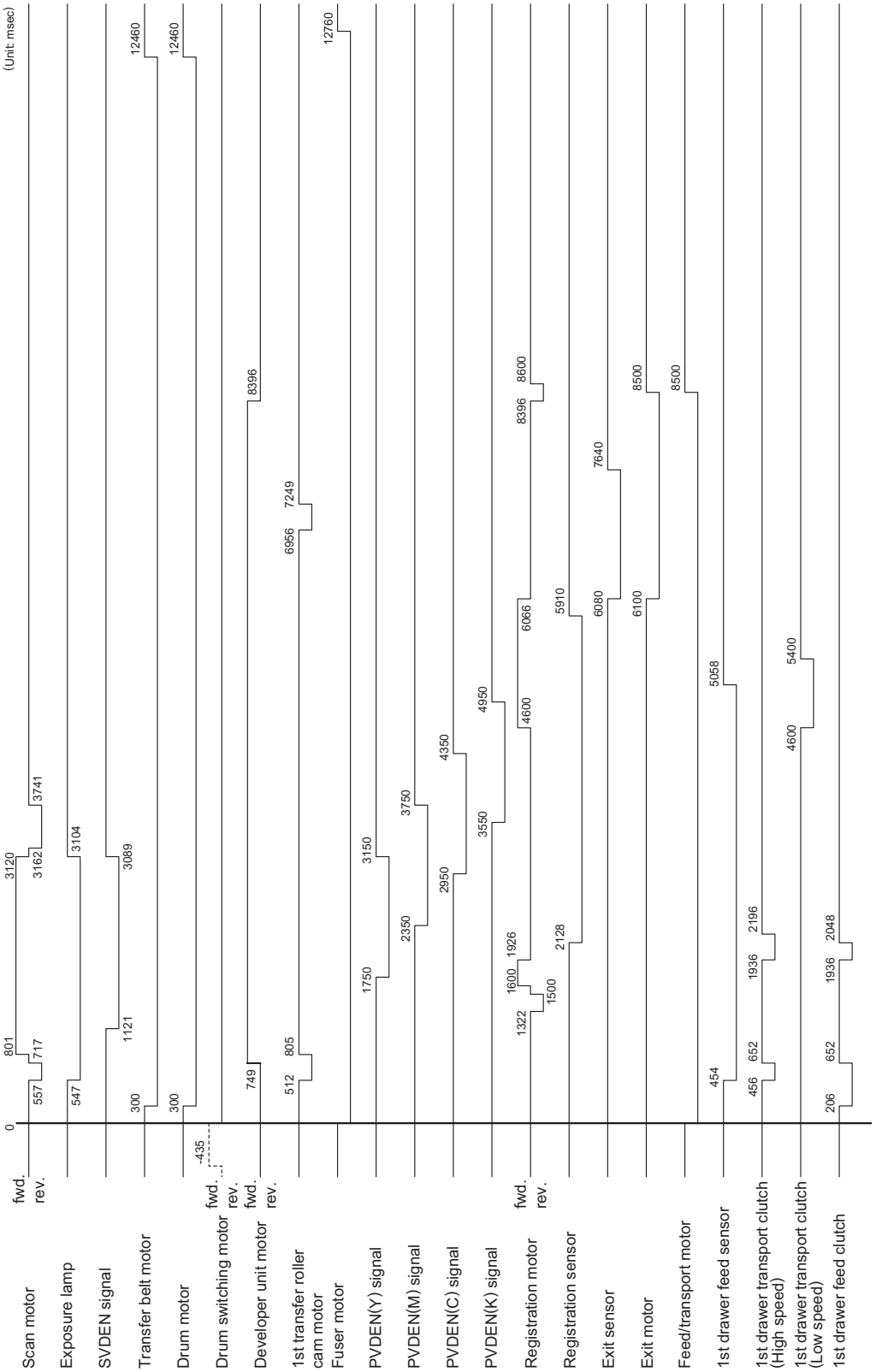


Fig. 4-1

2) Black copy

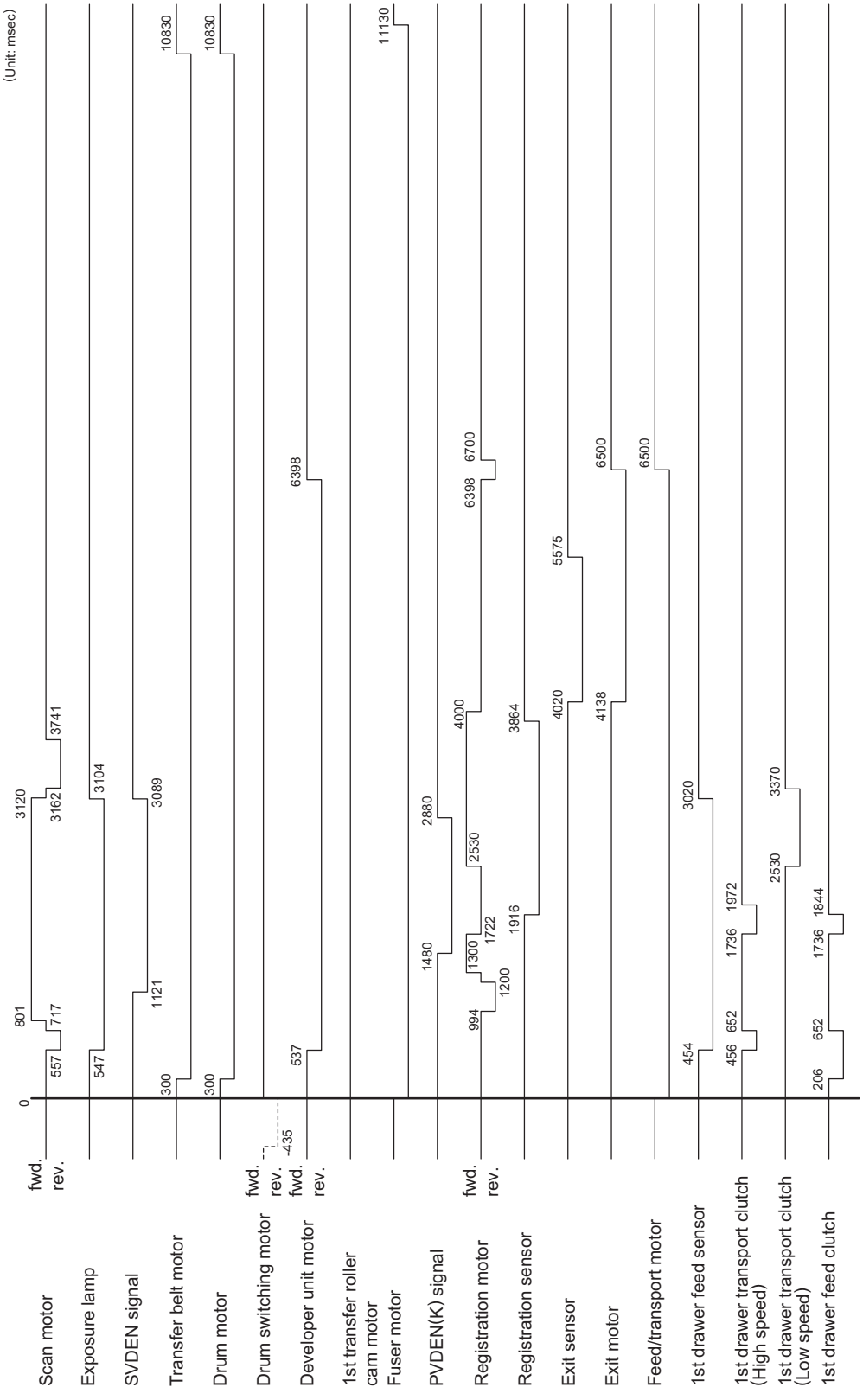


Fig. 4-2

4.2.4 Bypass feed copying

1) Insert a paper into the bypass tray.
   → Bypass paper sensor (S40) is turned ON.
   - "Ready for bypass feeding" is displayed.
   → Carriages move to the home position.

2) Press the [START] button ON
   → "Ready for bypass feeding" changes to "COPYING".
   → Exposure lamp (EXP) ON
   → Scan motor (M1) ON → Carriages-1 and -2 move forward.
   → Drum motor (M10), transfer belt motor (M7), transport motor (M20), developer unit motor (M9), fuser motor (M17) and exit motor (M18) turned ON
   - The drum, transfer belt, fuser unit, developer unit and exit roller are driven.

3) Bypass feeding
   → Fans rotate in high speed.
   → Bypass feed clutch (CLT8) turned ON.
   - The bypass pickup roller is lowered.
   → Bypass pickup solenoid (SOL1) turned ON.
   - The bypass pickup roller, feed roller and separation roller start to rotate.
   → Aligning operation
   → Paper reaches the registration roller.
   → After a certain period of time, the bypass feed clutch (CLT8) turned OFF.

4) Hereafter, operations (3) through (6) of "4.2.3. Drawer feed copying" are repeated.

4.2.5 Interruption copying

1) Press the [INTERRUPT] button
   → LED "INTERRUPT" is turned ON.
   → Copying operation in progress is temporarily stopped, and the carriages-1 and -2 return to appropriate positions.
   → "Job interrupted job 1 saved" is displayed.
   → Automatic density and reproduction ratio 100% are set. Set number remains the same.

2) Select the desired copy condition

3) After interruption copying is finished:
   → "Press interrupt to resume job 1" is displayed.
   → LED "INTERRUPT" is turned OFF by pressing the [INTERRUPT] button, and the equipment returns to the status before the interruption.
   → "Ready to resume job 1" is displayed.

4) Press the [START] button
   The copying operation before the interruption is resumed.

4.3 Detection of Abnormality

When something abnormal has occurred in the equipment, symbols corresponding to the type of abnormality are displayed.

4.3.1 Types of abnormality

1) Abnormality cleared without turning OFF the door switch
   (A) Add paper
   (B) Paper misfeed in bypass

2) Abnormality not cleared without turning OFF the door switch
   (C) Misfeed in equipment
   (D) No toner in the cartridge
   (E) EPU not installed properly
   (F) Toner bag replacement

3) Abnormality not cleared without turning OFF the main switch
   (G) Call for service

4.3.2 Description of abnormality

(A) Add paper

[In case of the equipment drawer or PFP drawer] (When drawer is not installed)

Drawer not detected

↓

Drawer is not installed:
Drawer is installed but there is no paper in it:

↓

No paper

↓

A signal sent to the control circuit

↓

Drawer area of the control panel blinks
(When the drawer is selected)

↓

[START] button is disabled.

[In case of the equipment, PFP or LCF drawers] (When drawer is installed)
Based on the combination of the tray-up motor (M10) movement and the status of tray-up sensor and empty sensor, CPU detects the presence of paper.

- When the power is turned ON or LCF drawer is inserted (When the power is turned ON or equipment/PFP drawers are inserted).
  LCF performs initialization.

  ↓

  Detects the presence of paper
  Tray-up motor ON - The tray goes up

  ↓

  At this time, the tray-up sensor and LCF empty sensor are OFF.

  → When the tray-up sensor is not turned ON in a fixed period of time it means that the tray is in abnormal condition
  "Add paper" is displayed regardless of presence/absence of paper.

  → Cleared by turning the power ON/OFF

  → Tray-up sensor is turned ON in a fixed period of time
  - The tray-up motor stops.

  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.

  ↓

  Drawer area of the control panel blinks.
  (When the drawer is selected)

- When the paper in the drawer gets short during copying,

  → The tray-up sensor turned OFF

  → The tray-up motor turned ON - Tray goes up

  → Tray-up sensor turned ON

  → Tray-up motor stopped

- Empty sensor turned OFF during the copying in spite of the tray-up sensor is ON

  ↓

  It is judged that there is no paper.

  ↓

  Drawer area of the control panel blinks.
  (When the drawer is selected)

  ↓

  The copying operation is stopped.

(B) Paper misfeed in bypass

- During bypass feeding
  Bypass feed clutch (CLT8) is turned ON

  ↓

  Registration sensor (S28) is turned ON
  * Registration sensor (S28) is not turned ON in a fixed period of time (E120)

    ↓

    Bypass misfeeding

    ↓

    Bypass misfeed symbol is displayed

    ↓

    The copying operation is disabled.

    ↓

    Solution: The bypass sensor (S40) is turned OFF by removing the paper from the bypass tray.

(C) Misfeed in equipment

- Exit sensor (S26) detects jamming of the leading edge of paper

  ↓

  Registration motor (M19) turned ON

  ↓ Approx 1.6 sec.

  Exit sensor (S26) turned ON
  If the exit sensor (S26) is not turned ON after approx 1.6 seconds,

  ↓

  Paper jam (E010) → The copying operation is stopped.

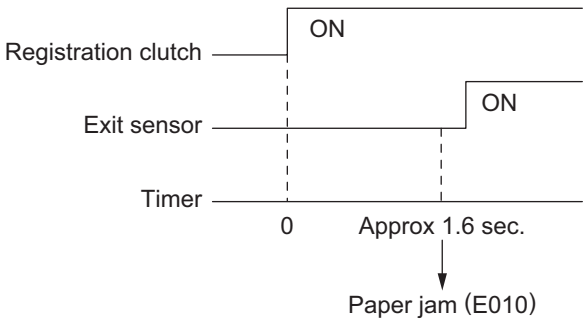


Fig. 4-3

- Exit sensor (S26) detects jamming of the trailing edge of paper

  Registration motor (M19) turned OFF

  ↓ Approx 1.7 sec.

  Exit sensor (S26) turned OFF
  If the exit sensor (S26) is not turned OFF after approx 1.7 seconds,

  ↓

  Paper jam (E020) → The copying operation is stopped.

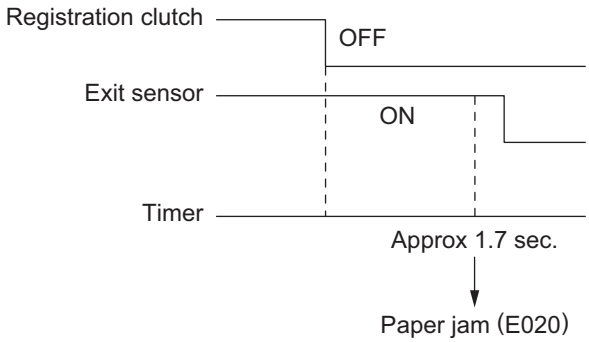


Fig. 4-4

- Immediately after the power ON

  ↓

  Any of all sensors on paper transport path detects paper (ON)

  ↓

  Paper jam (E030)

- Front cover is opened during copying

  ↓

  Paper jam (E410)

- Registration sensor (S28) detects jamming of the leading edge of paper:
  The registration sensor (S28) is not turned ON in a fixed period of time after the leading edge of paper passed the transport roller.

  ↓

  Paper jam (E120, E200, E210, E300, E330 and E3C0)

- During paper feeding from ADU:
  The registration sensor (S28) is not turned ON in a fixed period of time after the ADU clutch (CLT7) is turned ON.

  ↓

  Paper jam (E110)

- During paper transporting from ADU:
  ADU entrance/exit sensors (S38/S39) do not detect the paper at the fixed timing

  ↓

  Paper jam (E510 and E520)

- During paper feeding from the equipment or PFP:
  The registration sensor (S28) is not turned ON in a fixed period of time after the feed clutch is turned ON.

  ↓

  Paper jam (E220, E310, E320, E340 to E360, E3D0 and E3E0: Error code defers depending on the paper source.)

(D) No toner in the cartridge

Toner density becomes low

↓

Auto-toner sensor (S22/S23/S24/S25) detects the absence of the toner

↓

Control circuit → “Install new ** toner cartridge” is displayed: the copying operation disabled

Solution: Open the front cover and replace the toner cartridge with new one.
Toner is supplied → copying operation enabled

(E) EPU not installed properly

Disconnection of the connectors of the EPU

↓

“Latch the developer unit” is displayed.

Solution: Install the EPU and close the front cover.

(F) Toner bag replacement

- Toner bag is full of used toner

  ↓

  Toner bag full detection sensor (S13) ON

  ↓

  “Dispose of used toner” is displayed

- Toner bag full detection sensor (S13) is turned ON during printing

  ↓

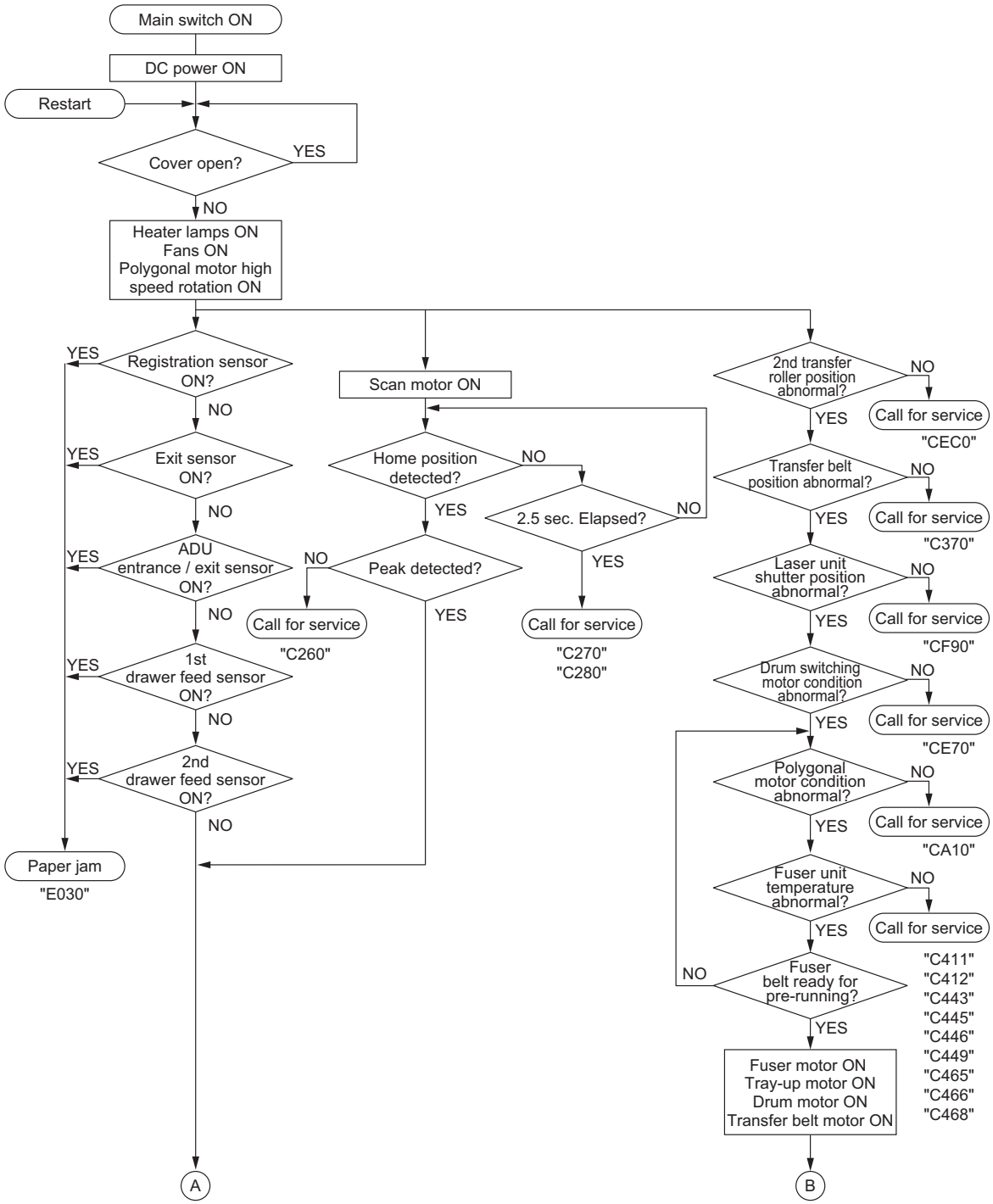
  Printing is stopped after the paper being printed is exited
  Solution: Replace the toner bag with new one and close the front cover.

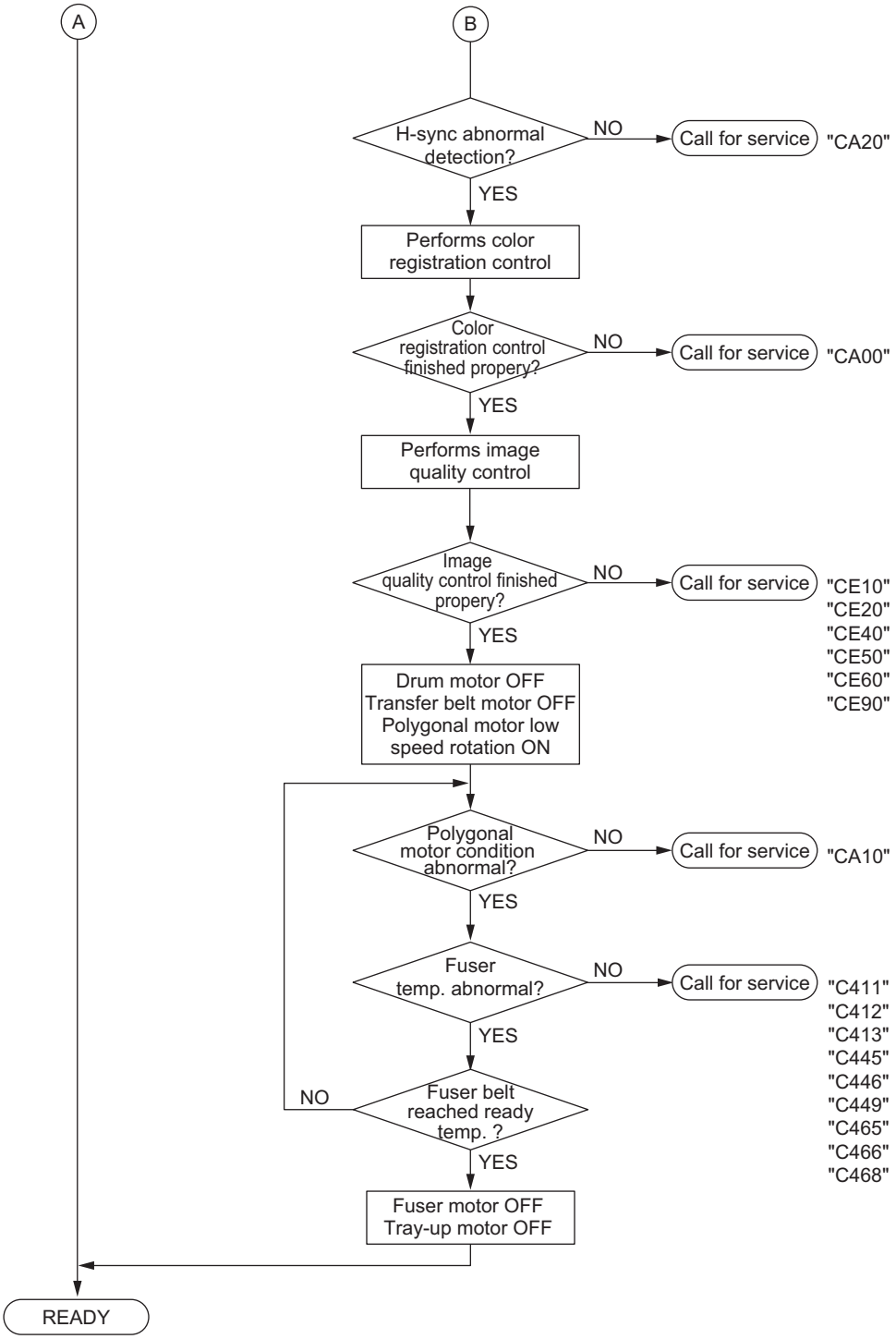
(G) Call for service

Check the error code displayed on the control panel when “Call for service” appears, and handle the abnormality in reference to the error code table in Service Handbook.

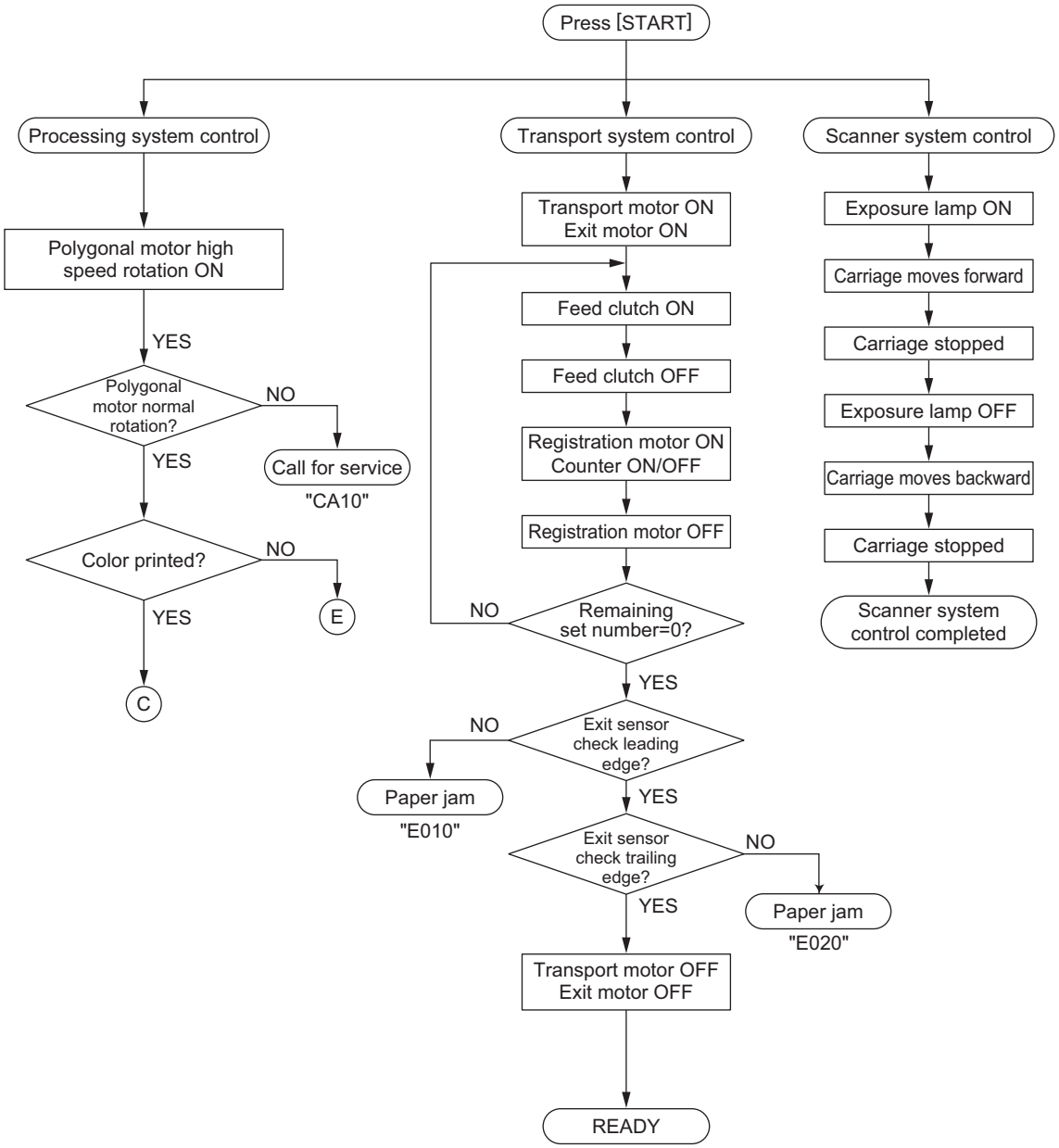
4.4 Flow Chart

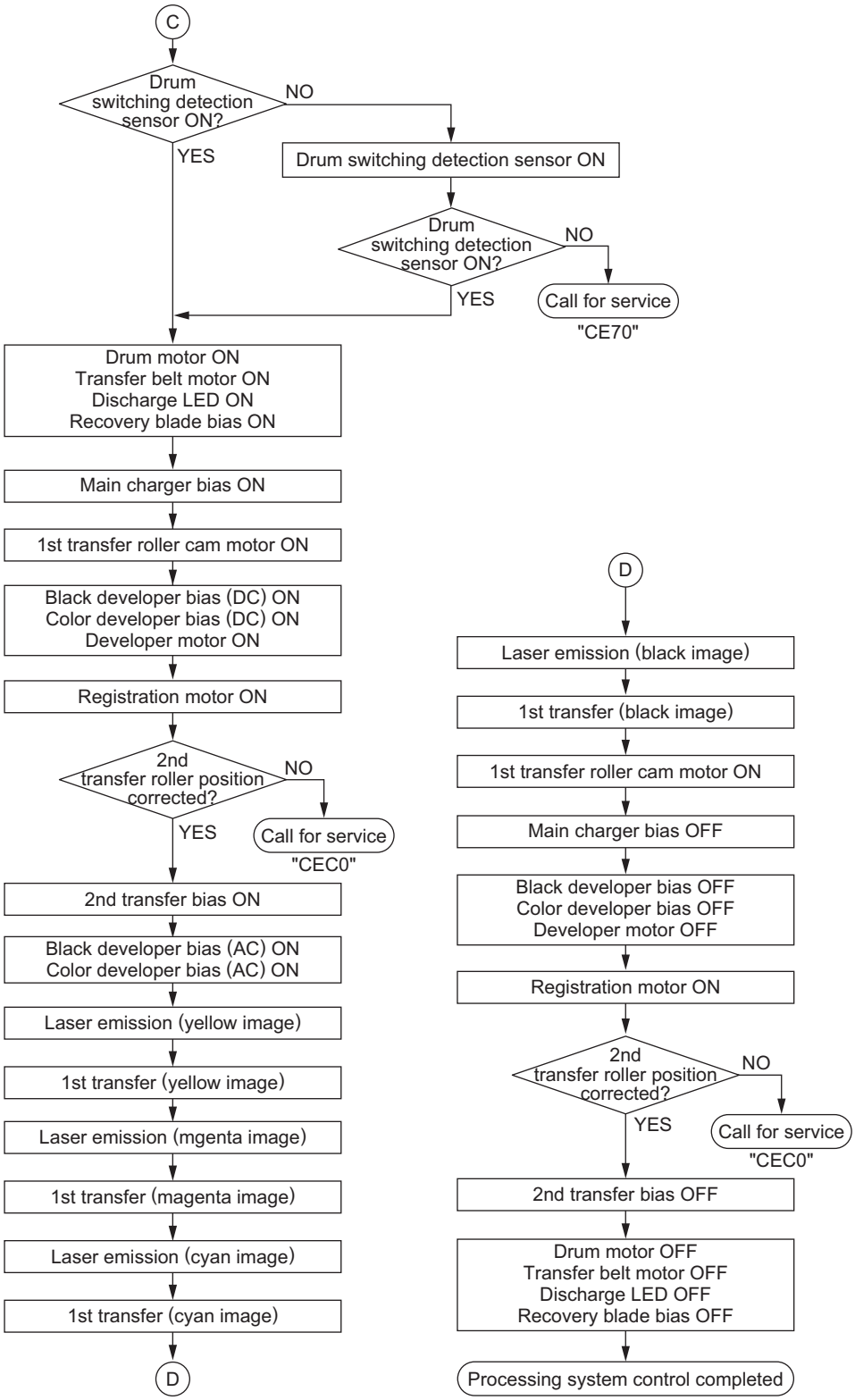
4.4.1 Power ON to ready

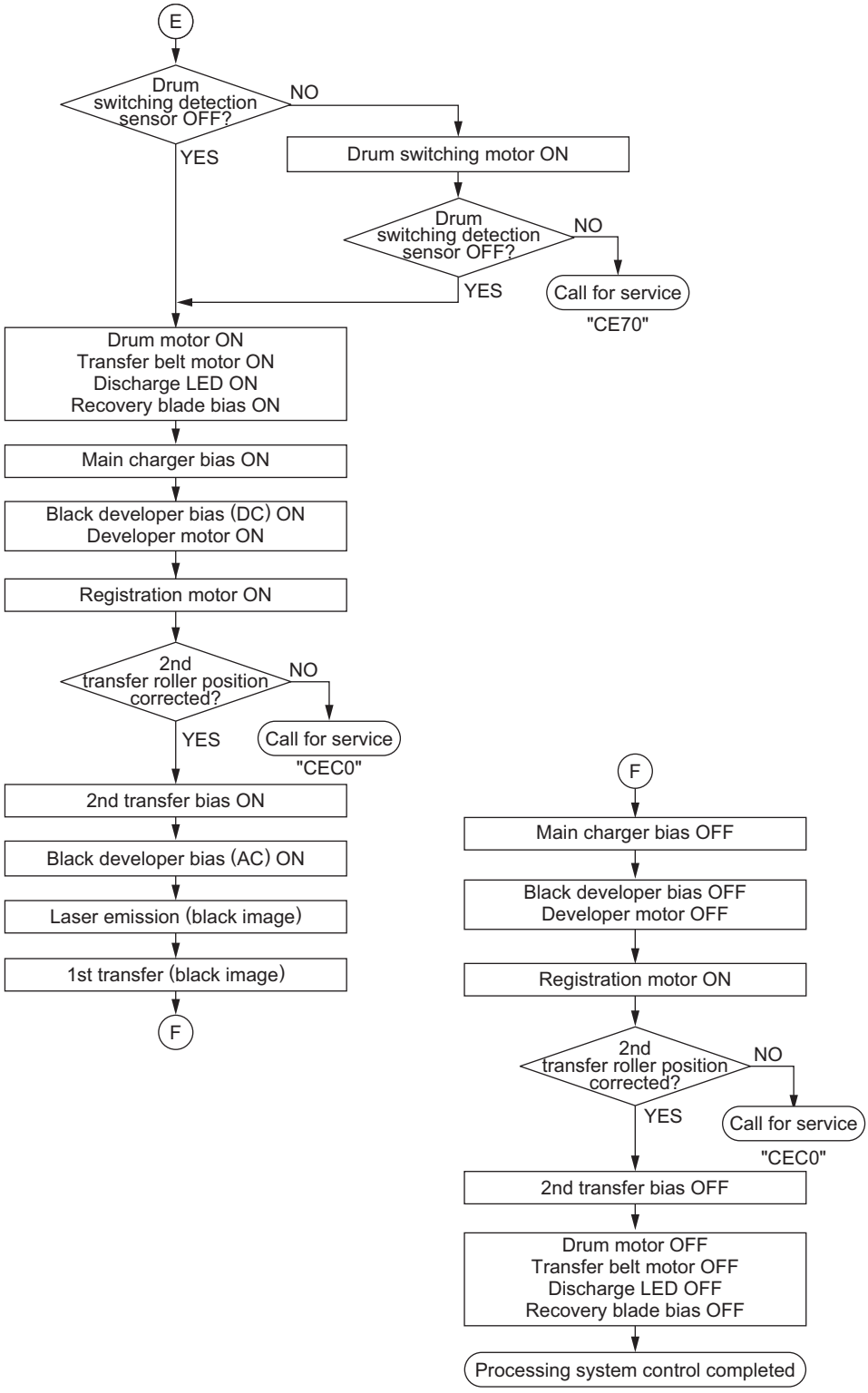




4.4.2 Automatic feed copying







5. CONTROL PANEL

5.1 General Description

The control panel consists of button switches and touch-panel switches to operate the equipment and select various modes, and LEDs and an LCD to display the state of the equipment or the messages. When the operator's attention is required, graphic symbols light or blink with messages explaining the condition of the equipment in the LCD panel. When paper jams and "Call for service" occur, error codes are also displayed to notify users of the problem.
A color LCD is used in this equipment so that visibility and operability are improved.

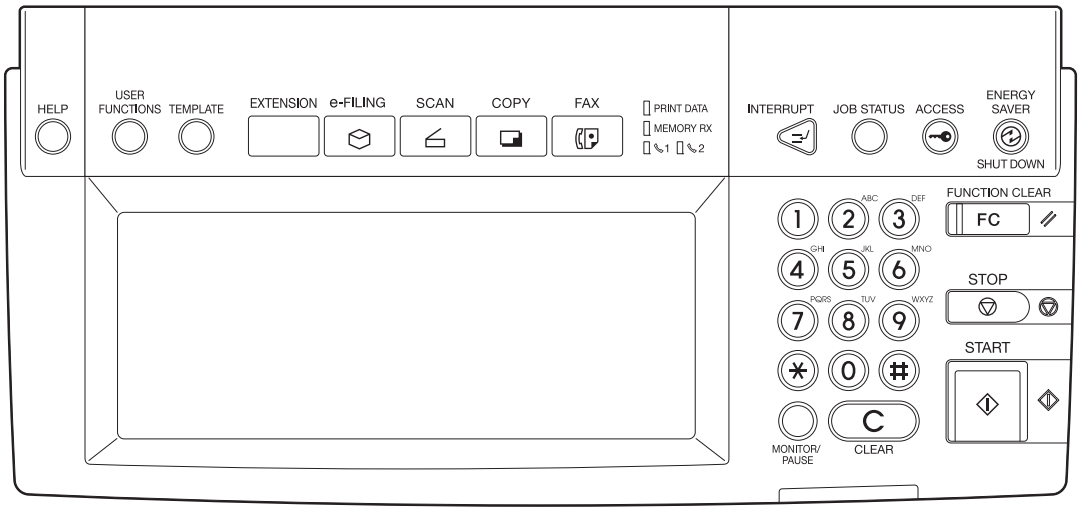


Fig. 5-1

5.2 Items Shown on the Display Panel

5.2.1 Display

1) Basic display
   Displays buttons and messages.

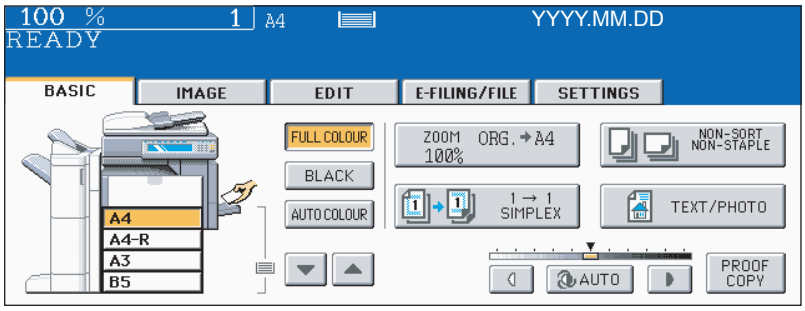


Fig. 5-2

2) Paper jam / service call display
   Displays error code, paper jam position and paper jam release guidance, etc.

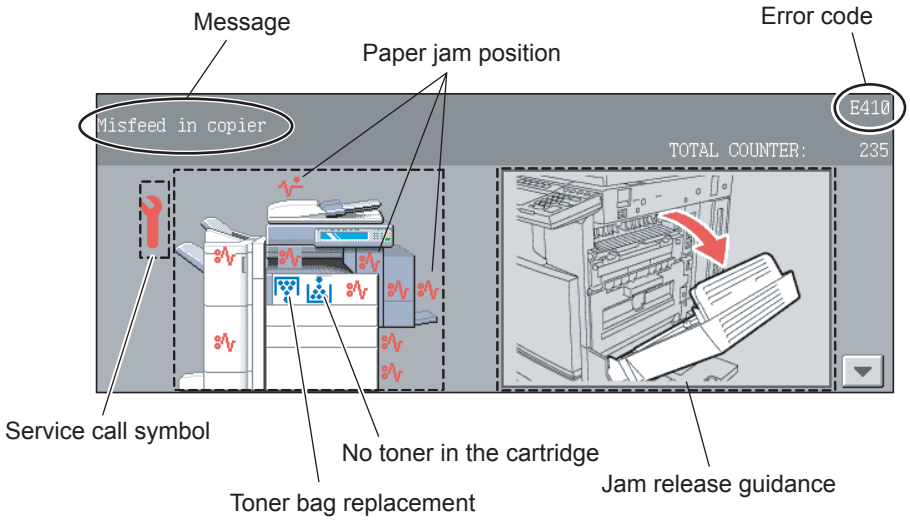


Fig. 5-3

5.2.2 Message

No.	Message	State of equipment	Note
1	-	Power is OFF (at Sleep Mode)	Press [START] button or function button to clear
2	Saving energy - press START button	At Energy Saving Mode	Press [START] button to clear
3	Wait Warming Up	Scanner warming up • Displayed until the equipment becomes ready to start scanning	Auto Start can be set
4	Wait Warming Up Auto Start	Scanner warming up • Displayed when Auto Start is set	Press [STOP] button to clear the Auto Start.
5	WAIT	Displayed when performing the controlling function to keep the equipment at the best condition	
6	Wait adding toner	Supplying toner • Equipment becomes the toner supply state	Recovers when the toner supply has finished
7	Performing Auto Calibration	Displayed at image quality control	Recovers when the image quality control has finished
8	READY	Ready for copying • Waiting for the operation	
9	READY Press START button to copy	Copying job interrupted	Press [START] button to resume copying or press [MEMORY CLEAR] button to delete the job
10	READY (WARMING UP)	Scanner warming up • Ready to scan the original	
11	READY (PRINTING)	Printing out the data • Scanning is enabled	
12	READY (ADDING TONER)	Supplying toner • Scanning is enabled	
13	READY (INNER TRAY FULL)	Inner tray in the equipment is full • Scanning is enabled	- When the bridge unit is installed - Resumes printing by removing papers from the tray
14	READY (CHECK STAPLER)	No staples in finisher • Scanning is enabled	Cleared by supplying the staples
15	READY (CHECK STAPLER)	Stapling jam occurred in finisher	
16	READY (CHECK SADDLE STITCH STAPLER)	No staples in saddle stitcher • Scanning is enabled	Cleared by supplying staples
17	READY (ADD PAPER) Press JOB STATUS button	No paper in drawer • Scanning is enabled	Cleared by supplying papers
18	READY (FINISHER FULL)	Finisher is full of paper • Scanning is enabled	Resumes printing by removing paper from the finisher
19	READY (HOLE PUNCH DUST BIN IS FULL)	Punching dust box is full • Scanning is enabled	Resumes printing by removing punching dust from the dust box
20	READY (SADDLE STITCH TRAY FULL)	Saddle stitcher tray is full of paper • Scanning is enabled	
21	READY (CHANGE DRAWER TO CORRECT PAPER SIZE)	Incorrect paper size setting	
22	Ready for bypass feeding	Paper is set on the bypass tray	
23	COPYING	At the copying state	

No.	Message	State of equipment	Note
24	Auto Start	Auto Start is set during printing	Cleared by pressing [FUNCTION CLEAR] button
25	Close Large Capacity Feeder	LCF drawer is not installed when feeding from LCF is set	Cleared by installing LCF drawer
26	Close Large Capacity Feeder Door	LCF cover is open when feeding from LCF is set	Cleared by closing the cover
27	Place Doc. Feeder in the down position	RADF is open when original is placed on RADF	Cleared by closing RADF
28	Place originals in the document feeder	Displayed when the conditions are set and [START] button is pressed with no original placed	Cleared by setting the original
29	Change direction of original	Displayed when the direction of original placed is different from the setting	
30	Place last %d originals in doc. feeder entrance tray	Paper jam occurred during copying (RADF scanning)	
31	Cannot copy this original	Displayed when the original which is not allowed to be copied is placed	Not printed out
32	Add paper	Displayed when the paper in selected drawer is running out	
33	Cannot duplex this size	Displayed when the paper size which is not specified for duplex copying is set	
34	Cannot use this media type	Displayed when the paper size which is not specified for the functions such as stapling or hole punching is set	
35	Copy size: A4/LT only	Displayed when the paper size which is not specified for “Book-type duplex copying” or “Dual-page” is set	
36	Copy size: A4/LT and A4-R/LT-R	Displayed when the paper size which is not specified for “Rotate Sort”	
37	CHANGE DRAWER TO CORRECT PAPER SIZE	Displayed when the selected paper size is not in the drawer	
38	Change drawer to correct media type	Displayed when the selected media type is not in the drawer	
39	Select a paper size for bypass feeding	Displayed when paper size needs to be specified for bypass feeding such as duplex copying	
40	Place the blank sheets in bypass tray and select the paper size	Displayed when no paper is in the selected feeder at Cover Copying Mode	
41	Place the blank sheets in the same direction as the originals	Displayed when the direction of cover page is different from that of other pages at Cover Copying Mode	
42	Place the same size blank sheets as the originals	Displayed when the paper size of cover page is different from that of other pages at Cover Copying Mode	
43	Place insertion sheets in the bypass tray and select the paper size	Displayed when no insertion sheet is in the selected drawer at Sheet Insertion Mode	
44	Select the same size insert1 sheets as the originals	Displayed when the size of insertion sheet (sheet 1) is different from that of other pages at Sheet Insertion Mode	

No.	Message	State of equipment	Note
45	Select the same size insert2 sheets as the originals	Displayed when the size of insertion sheet (sheet 2) is different from that of other pages at Sheet Insertion Mode	
46	Set insert1 sheets in the same direction as the originals	Displayed when the direction of insertion sheet (sheet 1) is different from that of other pages at Sheet Insertion Mode	
47	Set insert2 sheets in the same direction as the originals	Displayed when the direction of insertion sheet (sheet 2) is different from that of other pages at Sheet Insertion Mode	
48	Set transparency film in A4/LT direction	Displayed when the selected paper size is other than A4/LT at OHP mode	
49	CHECK PAPER IN LARGE CAPACITY FEEDER	Papers in LCF are set incorrectly	
50	CANNOT PUNCH THIS SIZE PAPER	Displayed when the selected paper size is not specified for hole punching	
51	Remove paper from the finisher	Displayed when the paper sizes are mixed at Staple Sorting Mode	
52	Cannot staple this size	Displayed when the paper size is not specified for stapling at Staple Sorting Mode	
53	Remove paper from the saddle stitch unit	Finisher is full of papers	
54	Examine stapler	Trouble in the stapler unit in finisher	
55	Check staple cartridge	No stapler in finisher section	
56	Check staple cartridge in the saddle stitch unit	No stapler in saddle stitch unit	
57	Job interrupted job 1 saved	Interrupt copying is accepted	
58	Ready to resume job 1	Interrupt copying is cancelled (finished)	
59	Cannot use AMS mode	Displayed when reproduction ratio is set to be over 200% at AMS Mode on RADF	Set the reproduction ratio 200% or below manually
60	More than 200% is not available	Displayed when reproduction ratio is set manually to be over 200% on RADF	Set the reproduction ratio 200% or below
61	Updated the template setting	Displayed when the template stored is recalled by pressing [TEMPLATE] button	
62	Enter Department Code	Displayed when a button is pressed while the department management setting is available	
63	Cannot copy BLACK mode Check DEPARTMENT COUNTER	Displayed when the number of printouts exceeds the limit number of department counter	
64	Cannot copy FULL COLOR mode Check DEPARTMENT COUNTER	Displayed when the number of printouts exceeds the limit number of department counter	
65	Cannot copy TWIN COLOR mode Check DEPARTMENT COUNTER	Displayed when the number of printouts exceeds the limit number of department counter	

No.	Message	State of equipment	Note
66	Cannot copy Check DEPARTMENT COUNTER	Displayed when the number of print-outs exceeds the limit number of department counter	
67	Not enough memory to store original(s) Will you print out stored originals?	Displayed when confirming the user to print out the data as much as stored at memory - full state	
68	Not enough memory to store original(s) Will you send stored originals in?	Displayed when confirming the user to send the FAX data as much as stored at memory - full state	Displayed only in FAX Function
69	Not enough memory to store original(s) Will you save stored originals in?	Displayed when confirming the user to save the scanning data as much as stored at memory-full state	Displayed only in FAX Function
70	The number of originals exceeds the limits Will you copy stored originals?	Displayed when confirming the user to print out the data as much as stored at memory-full state	
71	The number of originals exceeds the limits. Will you send stored originals?	Displayed when confirming the user to send the FAX data as much as stored at memory-full state	Displayed only in FAX Function
72	The number of originals exceeds the limits. Will you save stored originals?	Displayed when confirming the user to save the scanning data as much as stored at memory-full state	Displayed only in Scanning Function
73	Install new Black toner cartridge	No black toner in the cartridge	Displayed when black toner is running out even if other toner still remain. Copying not enabled
74	Install new Yellow toner cartridge	No yellow toner in the cartridge	Black copying is available Other button functions are available
75	Install new Magenta toner cartridge	No magenta toner in the cartridge	Black copying is available Other button functions are available
76	Install new Cyan toner cartridge	No cyan toner in the cartridge	Black copying is available Other button functions are available
77	Install new Y and M toner cartridge	No yellow and magenta toner in the cartridges	Black copying is available Other button functions are available
78	Install new Y and C toner cartridge	No yellow and cyan toner in the cartridges	Black copying is available Other button functions are available
89	Install new M and C toner cartridge	No magenta and cyan toner in the cartridges	Black copying is available Other button functions are available
80	Install new color toner cartridge	Three colors of toner are running out in the cartridges	Black copying is available Other button functions are available
81	Time for periodic maintenance	PM cycle • Displayed at the time for maintenance • Copying is available	Maintenance and inspection are performed by qualified service technician.
82	READY (CHANGE DRAWER TO CORRECT MEDIA TYPE)	Displays when the printing is stopped because of media type mismatch	
83	PRESS [BASIC] and select normal paper size	Displays the warning that the copy is not enabled when any drawer but bypass feed is selected at Cover Sheet Mode or Sheet Insertion Mode.	

No.	Message	State of equipment	Note
84	Misfeed in copier Press [HELP]	Paper jam in the equipment • Displayed when paper jam occurred in the equipment	Remove the paper in the equipment according to the messages displayed on the panel.
85	Call for service	Displayed when motor, sensor, switch, etc. do not work properly	Turn OFF the power and solve the problem, then turn ON the power.
86	Please try again after a while	Displayed when the Department Code can no be keyed in immediately after power-ON.	Leave it for a while and key in the code again
87	Set standard size	Displayed when the paper size which is not acceptable is set (depends on the setting)	Reset the paper size
88	Time for Slit glass and Main charger cleaning	Appears when the time for main charger cleaning comes (at every output of approx. 10,000 sheets)	If the message is not cleared after the cleaning, check if there is any detection error, breakage or poor connection of the needle electrode cleaner detection sensor.
89	Readjust from IQC-Adjustment	Appears when performing image quality control is required	Perform “Automatic initialization of image quality control (05-396)”

5.3 Relation between the Equipment State and Operator's Operation

	During READY status	During warming-up	Auto job start reserved	Scanning original/ Scanning original and printing out the copy
Press [ENERGY SAVER] button	Switches to energy saving mode	Display not changed	Display not changed	Display not changed
Press [ACCESS] button	Displays department code entry screen (when department management is available)	Displays department code entry screen (when department management is available)	Display not changed	Display not changed
Press [JOB STATUS] button	Displays print job list screen	Display not changed	Display not changed	Displays print job list screen
Press [INTERRUPT] button	Switches to interrupt mode	Display not changed	Display not changed	Display not changed (LED blinking)
Press [FUNCTION CLEAR] button after setting the copy mode	Copy mode is cleared after the copy mode is set	Copy mode is cleared after the copy mode is set	Auto job start cancelled	Display not changed
Press [STOP] button	Display not changed	Display not changed	Auto job start cancelled	Scanning or printing out stops, and "READY Press START to copy" and "MEMORY CLEAR" are displayed
Press [CLEAR] button after setting the copy mode	Number of printouts changes to 1 while the setting remains unchanged after the copy mode is set	Number of printouts changes to 1 while the setting remains unchanged after the copy mode is set	Display not changed	Display not changed
Press [CLEAR] button after keying in numbers (digital keys)	Number keyed in changes to 1 after being entered	Number keyed in changes to 1 after being entered	Display not changed	Display not changed
Press [MONITOR/ PAUSE] button	Display not changed	Display not changed	Display not changed	Display not changed
Press [FAX] button	Displays FAX screen	Display not changed	Display not changed	Display not changed
Press [COPY] button	Display not changed	Display not changed	Display not changed	Display not changed
Press [SCAN] button	Displays SCAN screen	Display not changed	Display not changed	Display not changed
Press [e-FILING] button	Displays e-FILING screen	Display not changed	Display not changed	Display not changed
Press [EXTENSION] button	Display not changed	Display not changed	Display not changed	Display not changed
Press [TEMPLATE] button	Displays TEMPLATE screen	Display not changed	Display not changed	Display not changed
Press [USER FUNCTIONS] button	Displays USER FUNCTIONS screen	Display not changed	Display not changed	Display not changed

	During READY status	During warming-up	Auto job start reserved	Scanning original/ Scanning original and printing out the copy
Press [HELP] button	Displays HELP screen	Displays HELP screen	Display not changed	Display not changed
Press [START] button with the original set on RADF	Displays “COPYING”	“Wait Warming Up Auto Start” is displayed	Display not changed	Display not changed

	Printing out the copy	During paper jam	When interrupting	When displaying HELP screen	During energy saving mode
Press [ENERGY SAVER] button	Display not changed	Display not changed	Display not changed	Switches to energy saving mode	Energy saving mode is cleared and displays BASIC screen
Press [ACCESS] button	Displays department code entry screen (when department management is available)	Display not changed	Displays department code entry screen (when department management is available)	Displays department code entry screen (when department management is available)	Display not changed
Press [JOB STATUS] button	Displays print job list screen	Display not changed	Displays print job list screen	Displays print job list screen	Display not changed
Press [INTERRUPT] button	Display not changed (LED blinking)	Display not changed	Returns to the status before interrupting	Switches to interrupting mode	Display not changed
Press [FUNCTION CLEAR] button after setting the copy mode	Copy mode is cleared after the copy mode is set	Display not changed	Copy mode is cleared after the copy mode is set	Displays BASIC screen after the copy mode is set and then cancelled	Display not changed
Press [STOP] button	Printing out stops, and “READY Press START to copy“ and “MEMORY CLEAR” are displayed	Display not changed	Display not changed	Display not changed	Display not changed
Press [CLEAR] button after setting the copy mode	Number of printouts changes to 1 while the setting remains unchanged after the copy mode is set	Display not changed	Number of printouts changes to 1 while the setting remains unchanged after the copy mode is set	Number of printouts changes to 1 while the setting remains unchanged after the copy mode is set	Display not changed
Press [CLEAR] button after keying in numbers (digital keys)	Number keyed in changes to 1 after being entered	Display not changed	Number keyed in changes to 1 after being entered	Number keyed in changes to 1 after being entered	Display not changed
Press [MONITOR/ PAUSE] button	Display not changed	Display not changed	Display not changed	Display not changed	Display not changed
Press [FAX] button	Displays FAX screen	Display not changed	Display not changed	Displays FAX screen	Displays FAX screen

	Printing out the copy	During paper jam	When interrupting	When displaying HELP screen	During energy saving mode
Press [COPY] button	Display not changed	Display not changed	Display not changed	Display not changed	Displays COPY screen
Press [SCAN] button	Displays SCAN screen	Display not changed	Display not changed	Displays SCAN screen	Displays SCAN screen
Press [e-FILING] button	Displays e-FILING screen	Display not changed	Display not changed	Displays e-FILING screen	Displays e-FILING screen
Press [EXTENSION] button	Display not changed	Display not changed	Display not changed	Display not changed	Display not changed
Press [TEMPLATE] button	Displays TEMPLATE screen	Display not changed	Display not changed	Displays TEMPLATE screen	Display not changed
Press [USER FUNCTIONS] button	Displays USER FUNCTIONS screen	Display not changed	Display not changed	Displays USER FUNCTIONS screen	Display not changed
Press [HELP] button	Displays HELP screen	Display not changed	Displays HELP screen	Switches to the screen previously displayed	Display not changed
Press [START] button with the original set on RADF	Displays “COPYING” and RADF starts feeding	Display not changed	Displays “COPYING” and RADF starts feeding	Displays “COPYING” and RADF starts feeding	Energy saving mode is cleared and displays BASIC screen

5.4 Description of Operation

5.4.1 Dot matrix LCD circuit

1) Structure

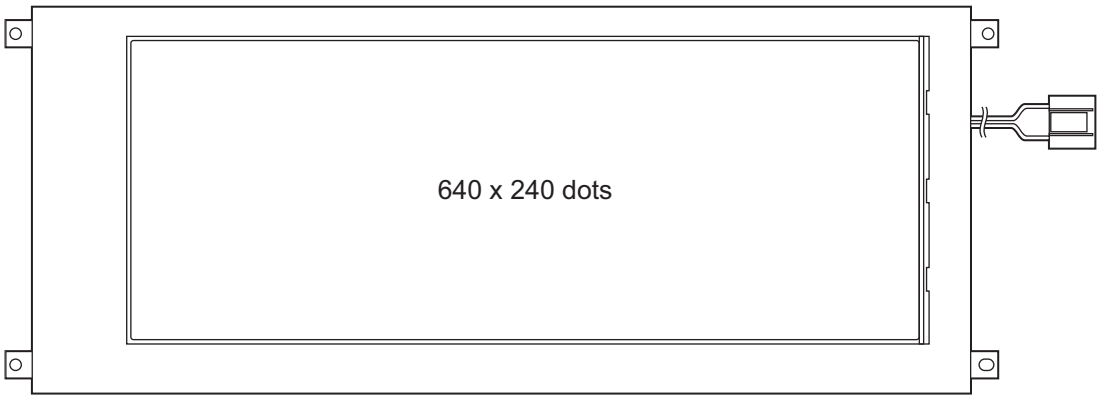


Fig. 5-4

The DSP-LCD-380 is an STN type LCD with (640 x R, G, B) x 240-dot display capacity. It consists of a driver LSI, frame, printed circuit board, and lateral type CCFL backlight.

* STN: Super Twisted Nematic
* CCFL: Cold Cathode Fluorescent Lamp

2) Block diagram

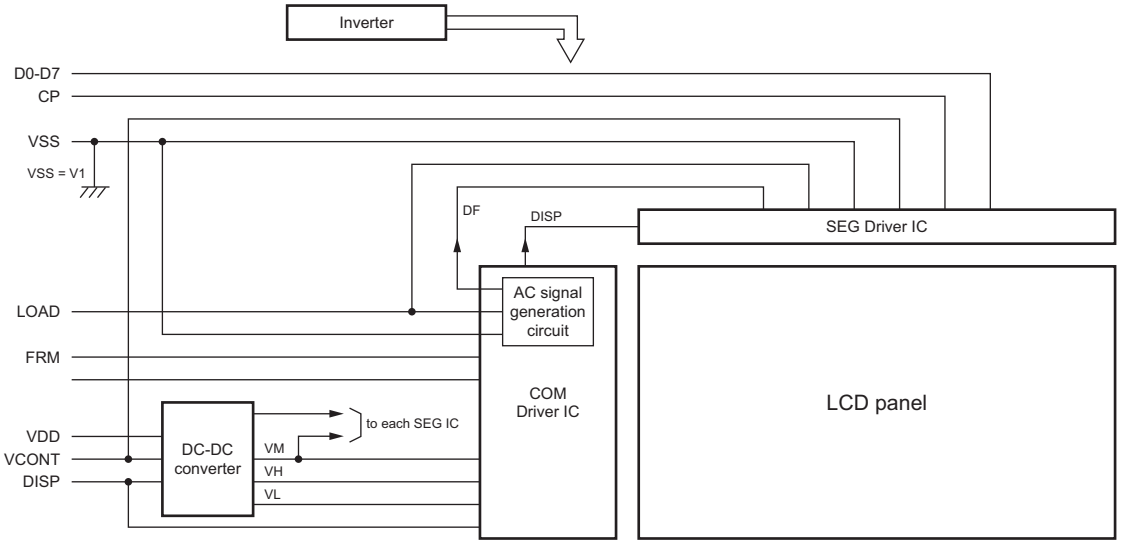


Fig. 5-5

3) System diagram

Signals flowing between the control panel and the SYS board are indicated in the chart below. When the panel processing CPU detects that the control panel is operated, the operational contents are transmitted to the SYS board through the serial data. The state of the equipment and the messages from the SYS board are received by the LCD controller and then displayed on the LCD. The LED and buzzers are switched to ON/OFF with the signals output from the panel processing CPU, based on serial data transmitted from the SYS board.

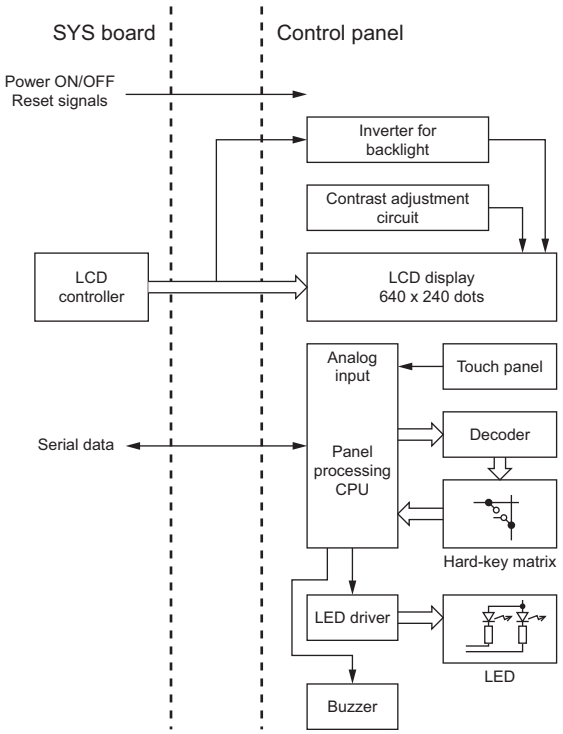


Fig. 5-6

4) Data Transmission

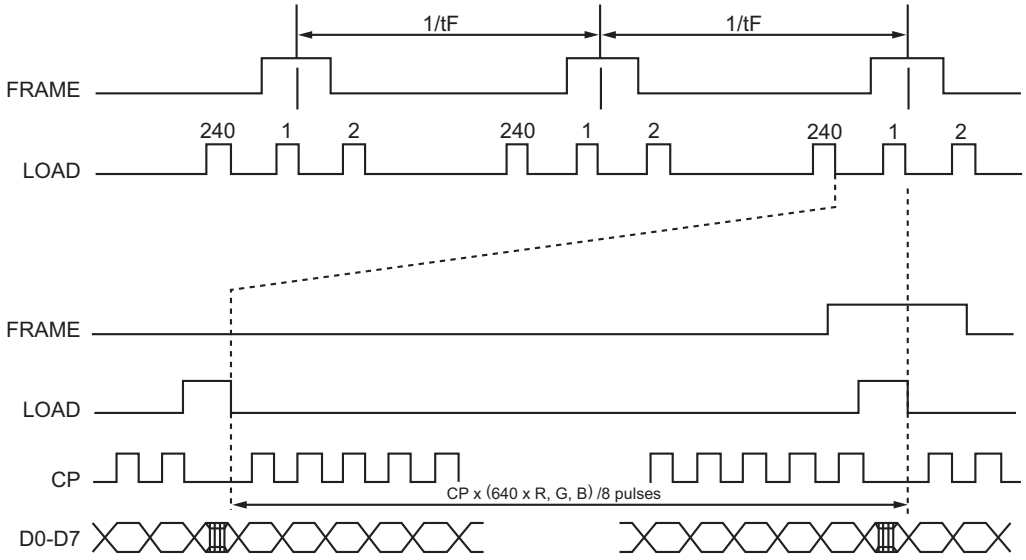


Fig. 5-7

5.4.2 LED display circuit

Method of LED display
Example: Displaying "COPY"

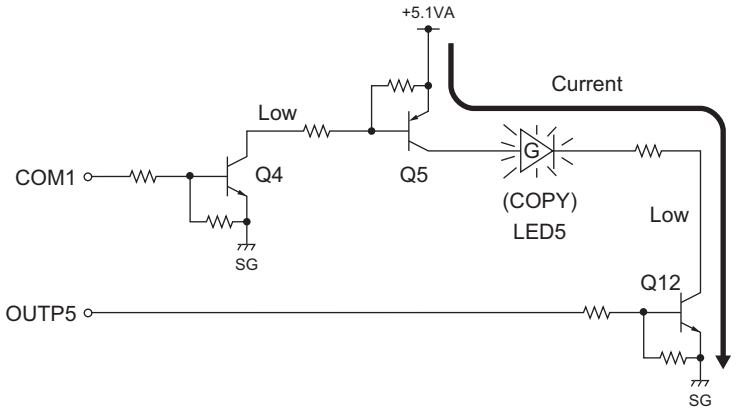


Fig. 5-8

The transistors (Q4 and Q5) are turned ON when the COM1 signal becomes Low level.
Also, when OUTP5 signal changes to Low level, the current flows from +5.1VA via the transistor (Q5) to the LED5 (COPY) to turned ON the LED5.

Conditions to turn ON the LED
1) The transistor (Q5) connected to the LED anode is ON.
2) The transistor (Q12) connected to the LED cathode side is ON.
The LED is turned ON when 1) and 2) are satisfied.

5.5 Disassembly and Replacement

Note:
When taking off the control panel, check the position of the stopper; if the stopper is at the position “b”, remove the stopper or move it to the position “a”.

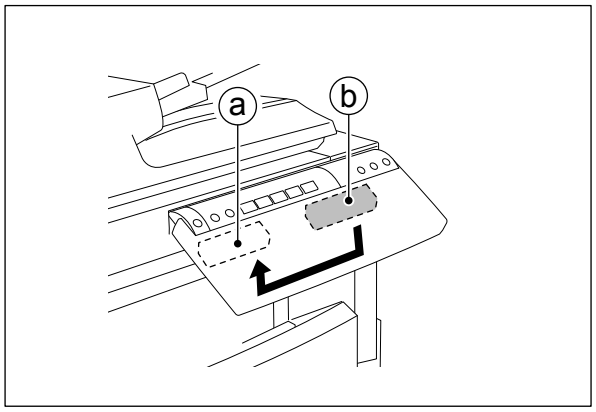


Fig. 5-9

[A] Stopper

(1) Slide the stopper and pull it out.

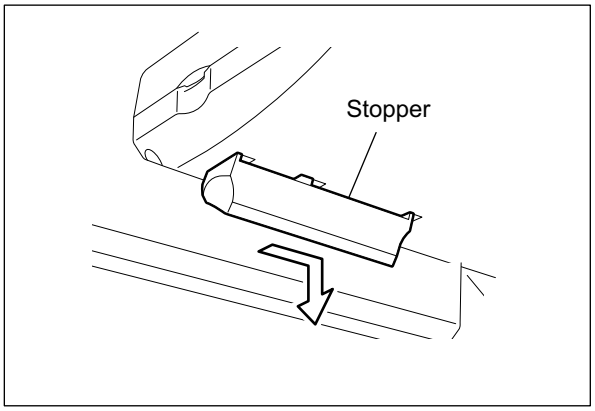


Fig. 5-10

[B] Control panel unit

(1) Take off the right upper cover.
📖 P.2-31 "[J] Right upper cover"
(2) Disconnect 1 connector.
(3) Release the harness from 5 harness clamps.

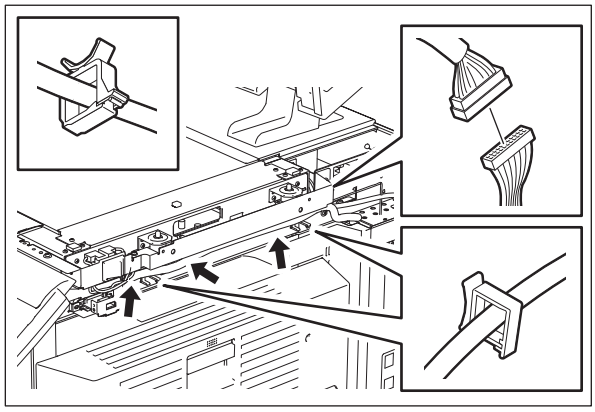


Fig. 5-11

(4) Lower the control panel and remove 2 screws.
(5) Take off the control panel unit while sliding it.

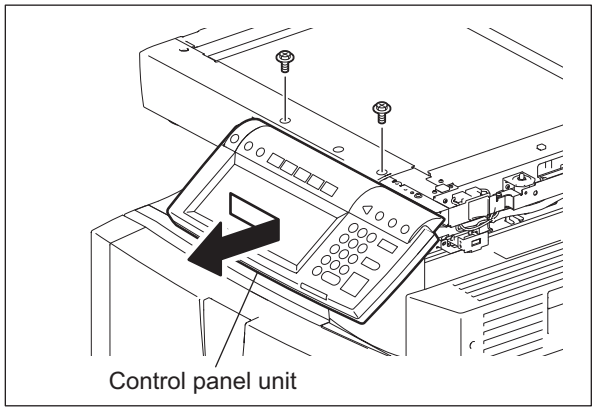


Fig. 5-12

(6) Remove 3 screws and take off the cover.

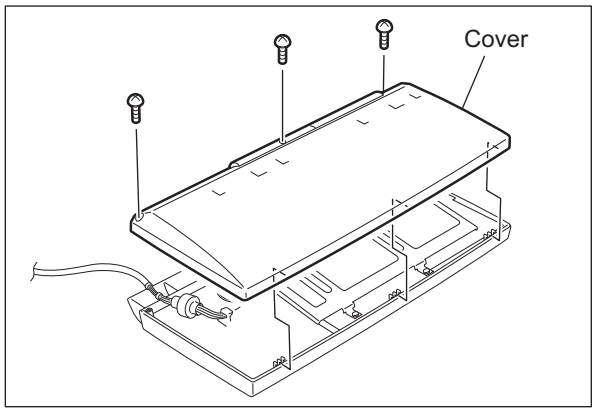


Fig. 5-13

(7) Remove 5 screws and take off the hinge bracket.

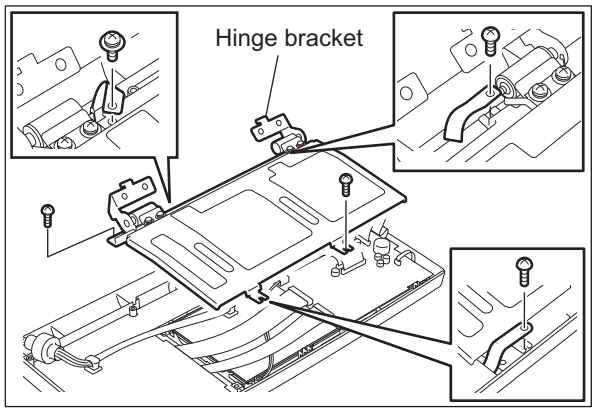


Fig. 5-14

(8) Disconnect 5 connectors.
(9) Release the harness from 2 harness clamps.
(10) Remove 1 screw and take off the DSP board.

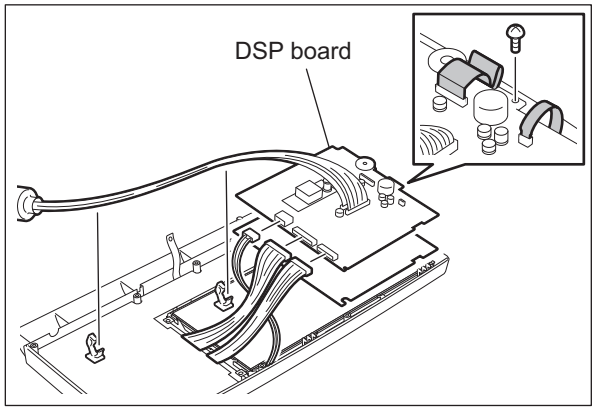


Fig. 5-15

(11) Remove 4 screws and take off the LCD.

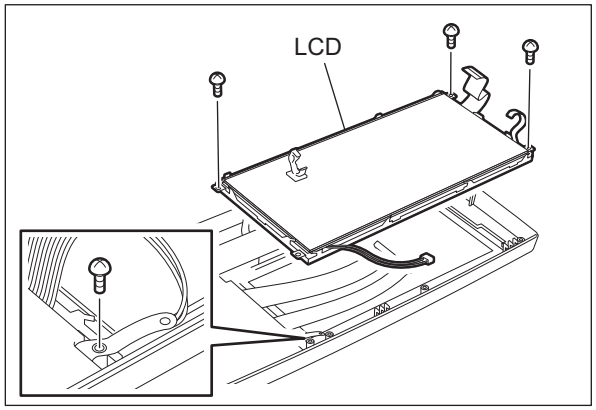


Fig. 5-16

(12) Remove 16 screws and take off the KEY board.

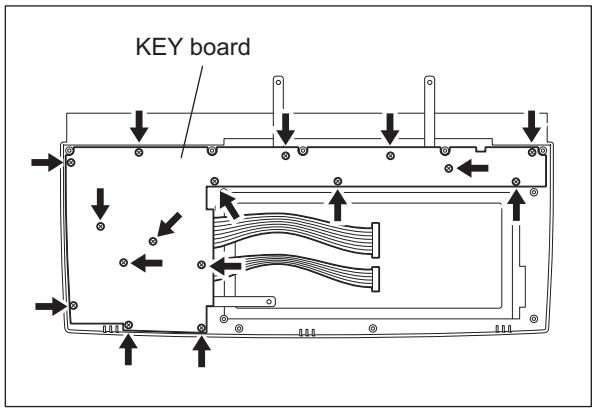


Fig. 5-17

6. SCANNER

6.1 General Description

In the scanning section of this equipment, the surface of an original is irradiated with a direct light and the reflected light is led through mirrors, a lens and a slit to CCD where optical-to-electrical conversion is performed, converting the optical image data into an electrical (analog) 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 transmitted to the data writing section.
In this equipment, a reduction-type CCD for color processing is used. What this CCD differs from black-and-white CCDs is that its devices are arranged in 4 lines and covered with color filters (Red, Green, and Blue). These lines are composed with 3-line color devices and black-and-white device with no filter.

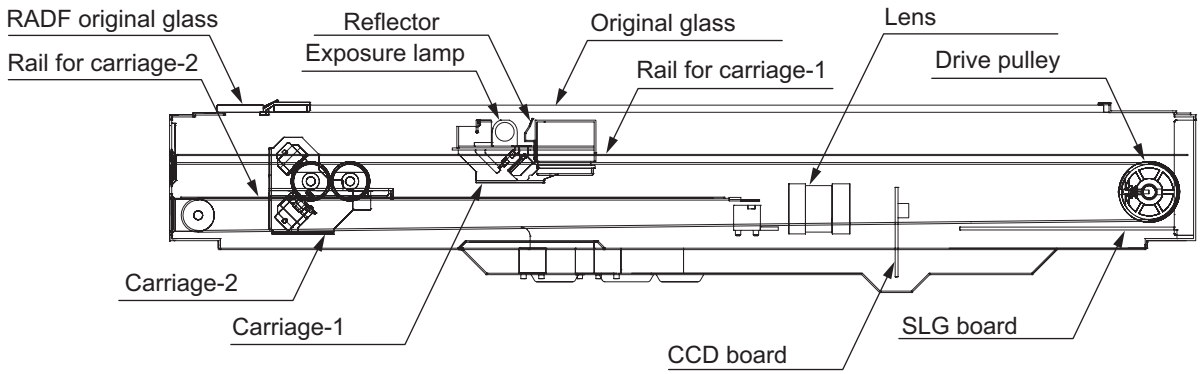


Fig. 6-1

6.2 Construction

Scanner		
Original glass	Original glass	
	RADF original glass	
Carriage-1	Exposure lamp (EXP)	Xenon lamp (20W)
	Inverter board (INV)	
	Reflector	
	Mirror-1	
Carriage-2	Mirror-2	
	Mirror-3	
Lens unit		
CCD driving PC board (CCD)		
Automatic original detection sensor (S1-5)		
Driving section	Scan motor (M1)	• 2-phase stepping motor • Wire drive • Driving the carriage-1 and carriage-2
Other	Scanning section control PC board (SLG)	
	Carriage home position sensor (S6)	
	Platen sensor (S7)	
	Main switch (SW1)	
	Rubber damper	

6.3 Functions

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

1) Original glass
   This is a glass for placing original. The light from the exposure lamp (EXP) is irradiated to the original through this glass.
   The ADF original glass is used when original is read with the Automatic Document Feeder. Original is transported on the ADF original glass by the Automatic Document Feeder, and the transported original is read under the ADF original glass by the carriage. Do not use such solvents as alcohol when cleaning the surface of the ADF original glass, because it is coated so as not to be scratched by originals.

2) Carriage-1
   Carriage-1 consists of the exposure lamp (EXP), Inverter board (INV), reflector, mirror-1, etc. It is driven by the scan motor (M1) and scans an original on the glass.

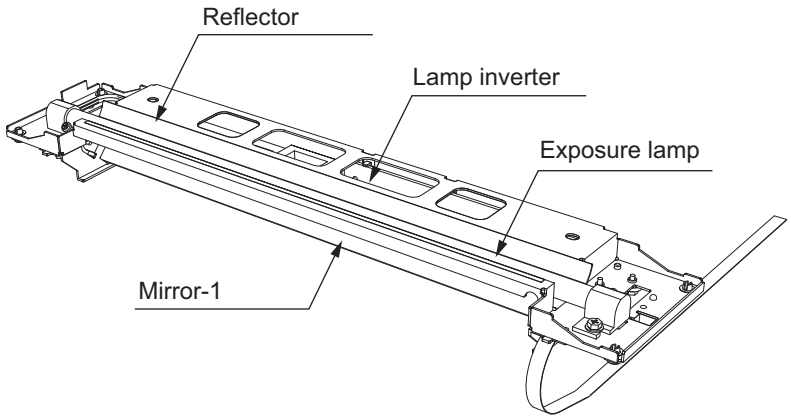


Fig. 6-2

- Exposure lamp (EXP)
  This lamp is the light source to irradiate the original on the glass. (One 20 W xenon lamp)
- Inverter board (INV)
  Controls lighting of the exposure lamp (EXP).
- Reflector
  This is a plate to efficiently direct the light from the exposure lamp (EXP) to the surface of the original on the glass.

- Mirror-1
  This mirror directs the light reflected from the original to the mirror-2 described later.

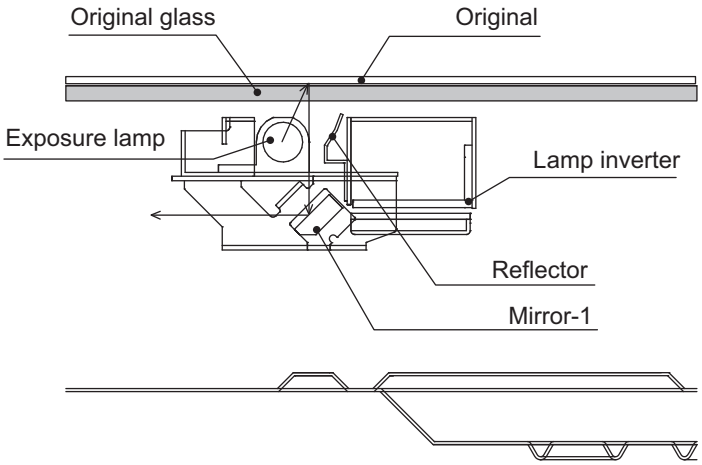


Fig. 6-3

3) Carriage-2
   Carriage-2 mainly consists of the mirror-2, mirror-3, etc. and directs the reflected light from the mirror-1 through the mirrors-2 and -3 to the lens.
   This carriage is driven by the same scan motor (M1) as that for the carriage-1 at half the scanning speed of the carriage-1 (The scanning distance is also half that of the carriage-1).

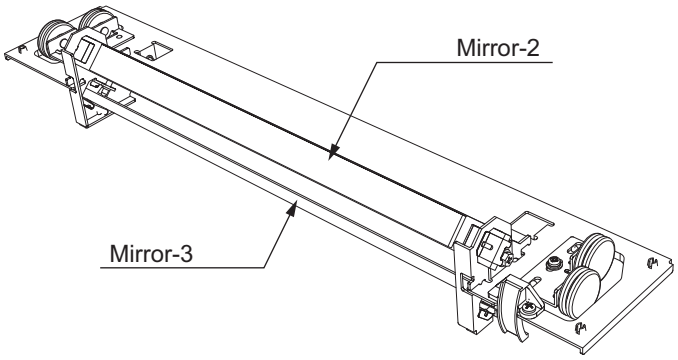


Fig. 6-4

4) Lens unit
   The light reflected from the mirror-3 is led to the CCD placed at the focal point of the lens which is fixed in a position.

5) CCD driving PC board (CCD)
Processes such as signal amplification, signal integration and A/D conversion are applied on the electrical signal which was converted by CCD.

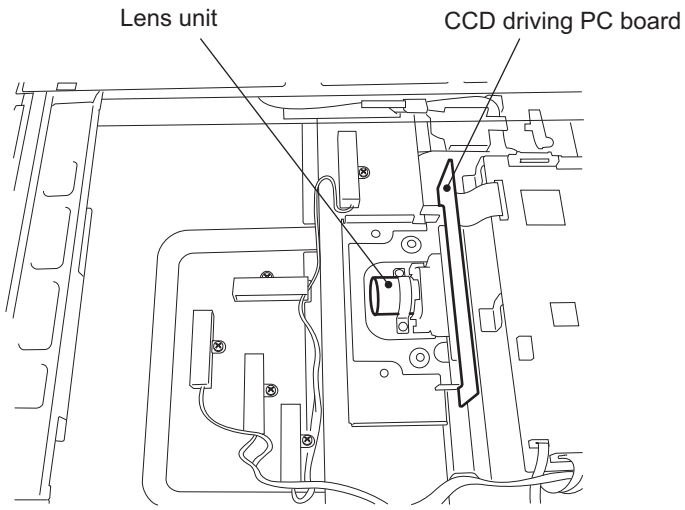


Fig. 6-5

6) Scanning section control PC board (SLG)
This is a board to perform the image correction, such as the shading correction and 3-line correction, and control the scan motor (M1).

7) Automatic original detection sensor (S1-5)
The size of an original placed on the glass is instantly detected using the automatic original detection sensors (S1-5) fixed on the base frame without moving the carriage-1.

6.4 Description of Operation

6.4.1 Scanning operation

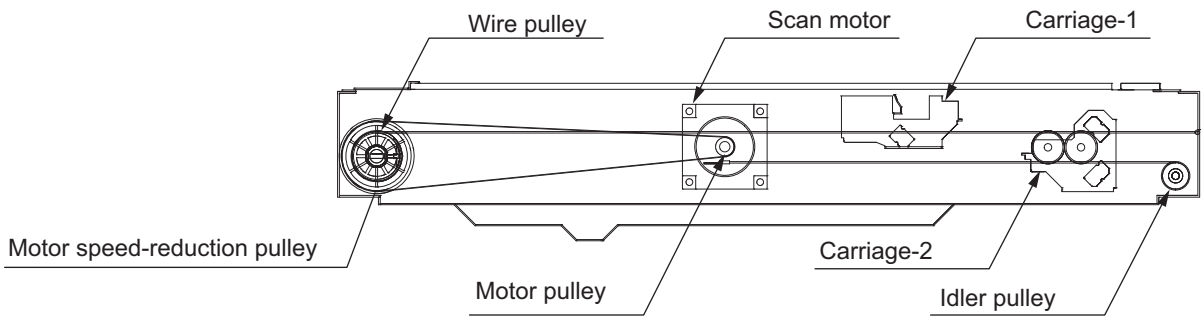


Fig. 6-6

- Scanning of an original placed on the original glass
  This motor drives the carriages-1 and -2 through the timing belt and carriage wire. First, the scan motor 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 (S6). When the [START] button is pressed, the both carriages start to move and scan the original on the glass.

- Scanning of an original placed on the RADF
  The carriage-1 stays at the shading position during shading correction, and at the scanning position during scanning operation.

- Scanning velocity
  The scanning velocity at color modes is reduced to a half of it at the Black Mode.

6.4.2 Initialization at power-ON

The carriage moves to its home position and performs the peak detection.
Then it moves to the carriage waiting position and waits.

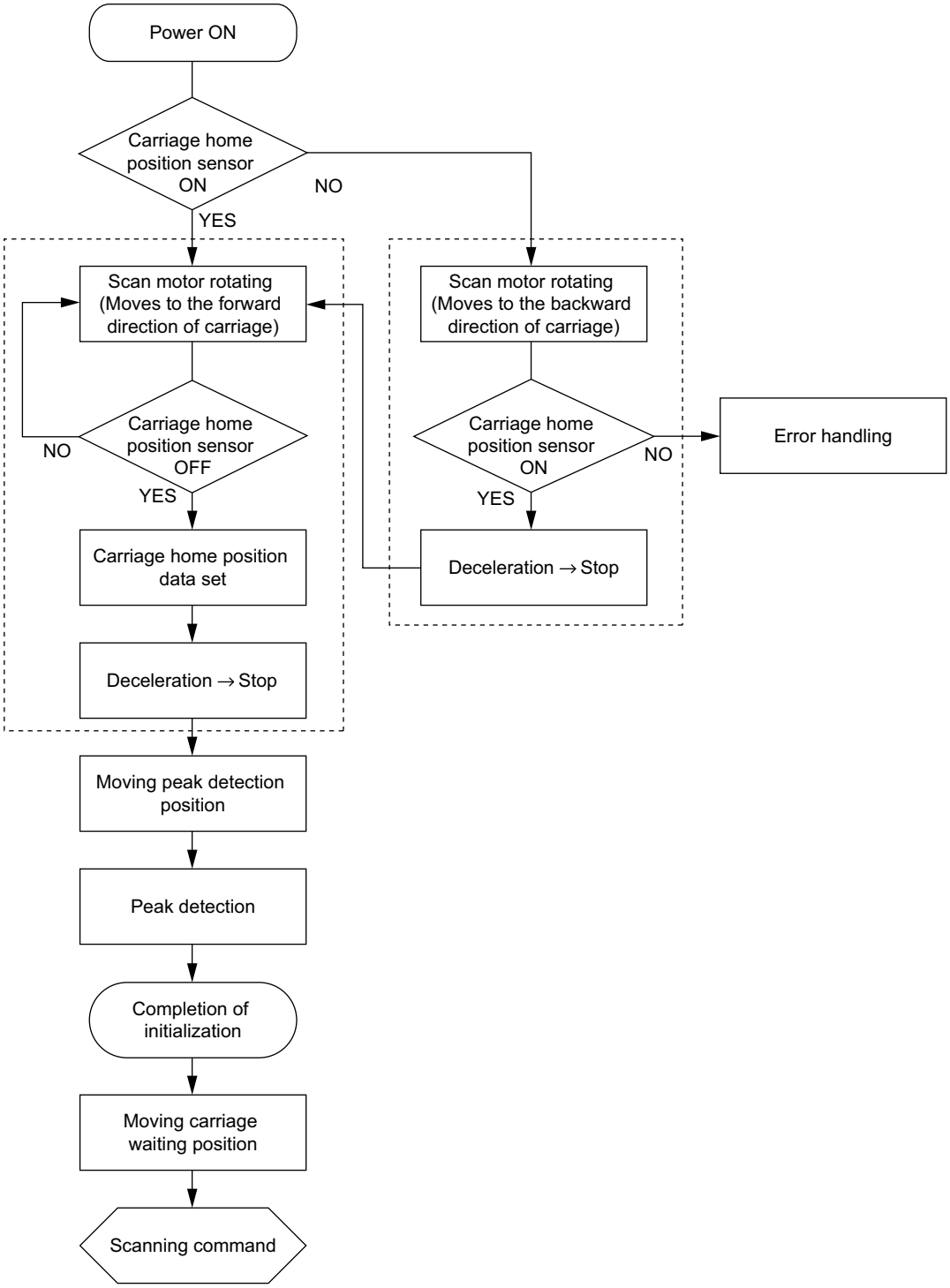


Fig. 6-7

6.5 Electric Circuit Description

6.5.1 Scan motor control circuit

The scan motor is a stepping motor driven by the control signal output from the scanner CPU on the SLG board and drives carriage-1 and -2.
The scan motor is driven by the pulse signal (SCNM-A, SCNM-AB, SCNM-B, SCNM-BB) output from the motor driver. These pulse signals are formed based on the reference clock (MOTCLK) and output only when the enable signal (MOTEN) is a low level. Also, the rotation speed or direction of the motor can be switched by changing the output timing of each pulse signal.

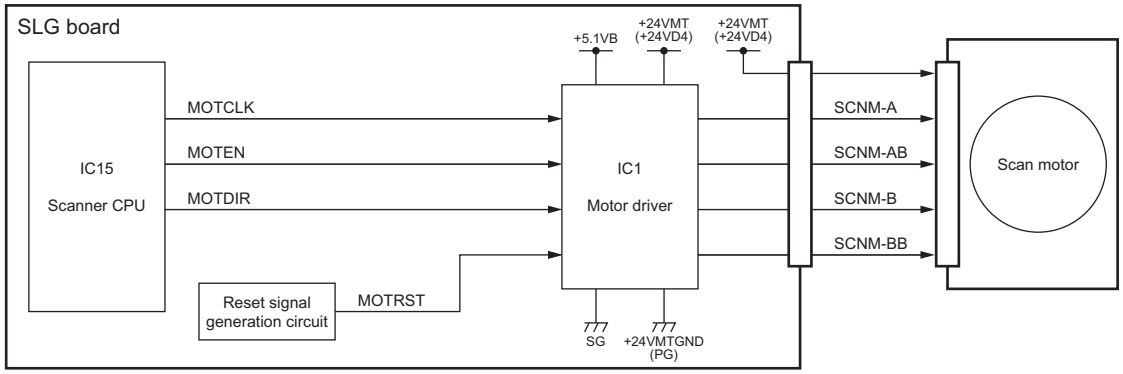


Fig. 6-8

Control signal

Signal	Function	Status	
		High level	Low level
MOTCLK	Reference clock	---	---
MOTEN	Enable signal	ON	OFF
MOTDIR	Rotation direction signal	CCW	CW
MOTRST	Reset signal	Normal operation	Reset

* CW: Clockwise rotation, CCW: Counter clockwise rotation viewing from the axis

6.5.2 Exposure Lamp Control Circuit

[1] General description

Control circuit for the exposure lamp consists of the following two blocks:

1) Lighting device for the exposure lamp (Inverter board)
   Turns ON/OFF the exposure lamp.

2) CCD board
   This circuit converts the reflected light amount from the original surface and the shading correction plate to electrical signals. The exposure amount is controlled in two ways:
   - White reference formation - reads the reflected light amount from the white shading correction plate
   - Black reference formation - reads the light amount at the regulation position with the exposure lamp lights OFF

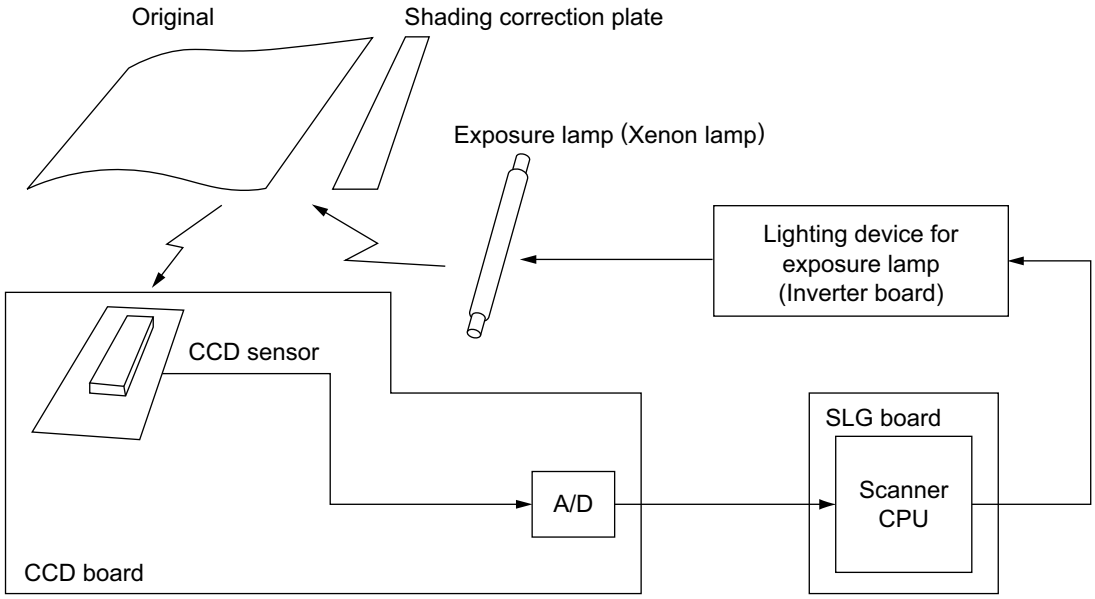


Fig. 6-9

[2] Exposure lamp

External electrode type xenon fluorescent lamp is used as an exposure lamp in this equipment.

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.

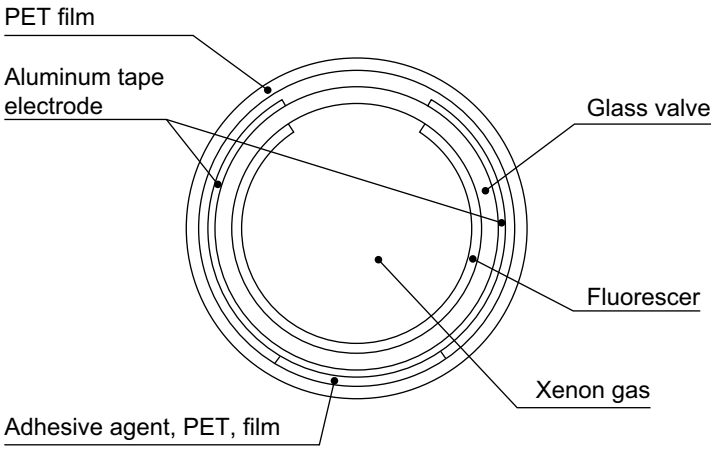
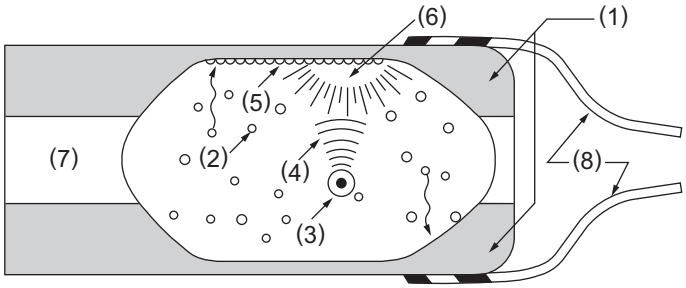


Fig. 6-10

2) Behavior inside the lamp

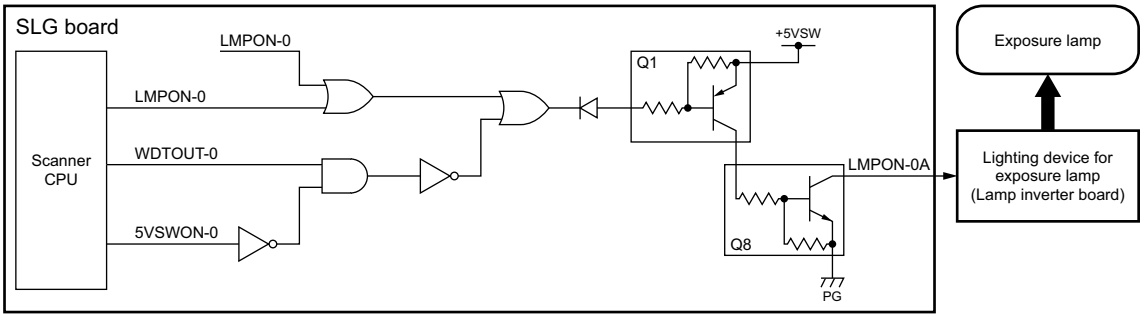
The electron inside the pipe is led to the electric field by applying voltage to the pair of the external electrodes, and discharge is started. Electrons then flow and clash with the xenon atoms inside the pipe to excite them, and generate the ultraviolet rays. These ultraviolet rays excite the fluorescent substance to generate visible light.



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

Fig. 6-11

[3] Exposure lamp control circuit



Signal	Function
LMPON-0	Exposure lamp ON signal
WDTOUT-0	Wachdog timer signal
5VSOW-0	+5VSW ON signal
LMPEN-0	Exposure lamp enable signal

LAMPON-0	WDTOUT-0	5VSOW-0	LMPEN-0	+5VSW	Q8	Exposure lamp	State of equipment
L	H	L	L	ON	ON	ON	Normal operation
H	H	L	L	ON	OFF	OFF	
---	L	---	---	OFF	OFF		Scanner CPU overdriving
---	H	H	---	OFF	OFF		Call for service
---	---	---	H	---	OFF		Abnormality detected (Check sum error)

6.5.3 General Description of CCD Control

[1] Opto-electronic conversion

A CCD (Charge-Coupled Device) is used to produce electrical signal corresponding to the reflected light amount from the original. CCD is a one-chip opto-electronic conversion device, comprised of several thousand light-receiving elements arranged in a line, each one of them is a few micron square. This equipment includes a CCD which has 7,450 light-receiving elements.
Each element of the light-receiving section consists of semiconductive layers P and N. When the light irradiates the element, light energy produces a (-) charge in the layer P; the amount of the charge produced is proportional to the energy and irradiating time. The charges produced in the light-receiving section are then sent to the transfer section where they are shifted by transfer clock from left to right as shown in the figure below, and are finally output from the CCD. At this time, to increase the transfer speed of the CCD, image signals in the even-number and odd-number elements are separated and output in parallel via two channels.

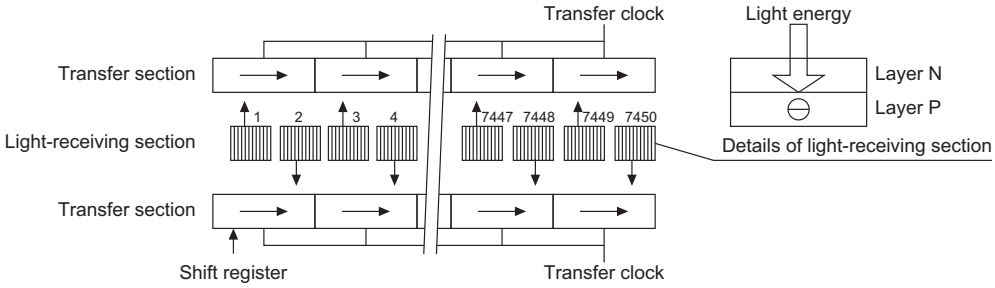


Fig. 6-12

[2] Shading correction

Signal voltages read by the CCD have the following characteristics:

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 longest at ends. This causes difference in the amount of light reaching the CCD (i.e. the light amount is maximum at the CCD center, gradually decreases toward ends).

3) Each of the 7,450 elements varies in opto-electronic conversion efficiency.

These variation need to be corrected and this correction is referred to as shading correction. Shading correction is performed by applying normalization process using the following formula on the black and white data obtained in advance to correct lighting variance and element variation of the image data.

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

k: Coefficient
S: Image data before correction
K: Black data (stored in "Black" memory)
W: White data (stored in "White" memory)

6.5.4 Automatic Original Size Detection Circuit

This circuit detects the size of original (standard sizes only) using the reflection type photosensors arranged on the base frame of the scanner unit.

[1] Principle of original size detection

Reflection type photosensors are placed on the base frame of the scanner unit as shown in the figure below. 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 original glass, light beams from the LEDs are reflected by the original and led to the phototransistors. This means that the presence of the original is detected by the presence of reflection (when scanning black image).

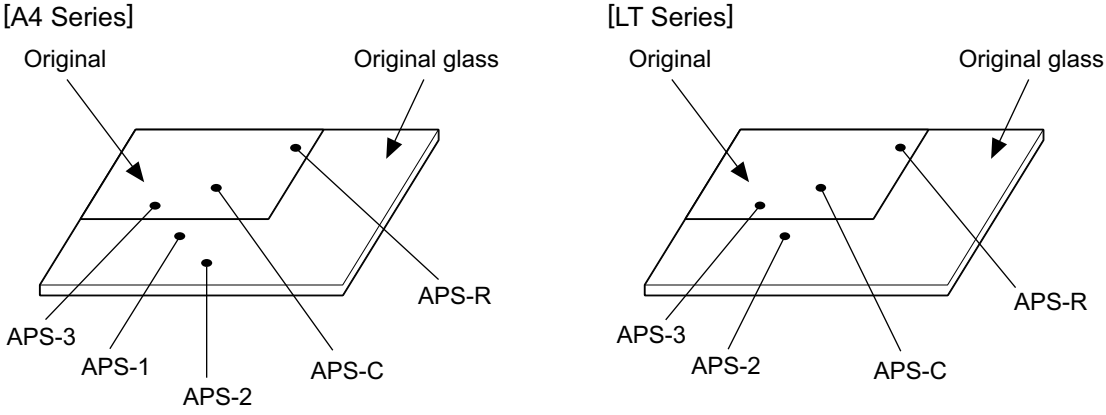


Fig. 6-13

[2] Process of detection of original size

1) When the equipment is in the original size detection mode, carriage-1 is set at its home position.

2) When the RADF or platen cover is opened, the sensors receive the light reflected from the original and if one of the matrix conditions shown in 4) for original sizes are met, the size of the original is instantly detected.

3) The output signal from each sensor is input to Scanner CPU on the SLG board to determine the size of the original.

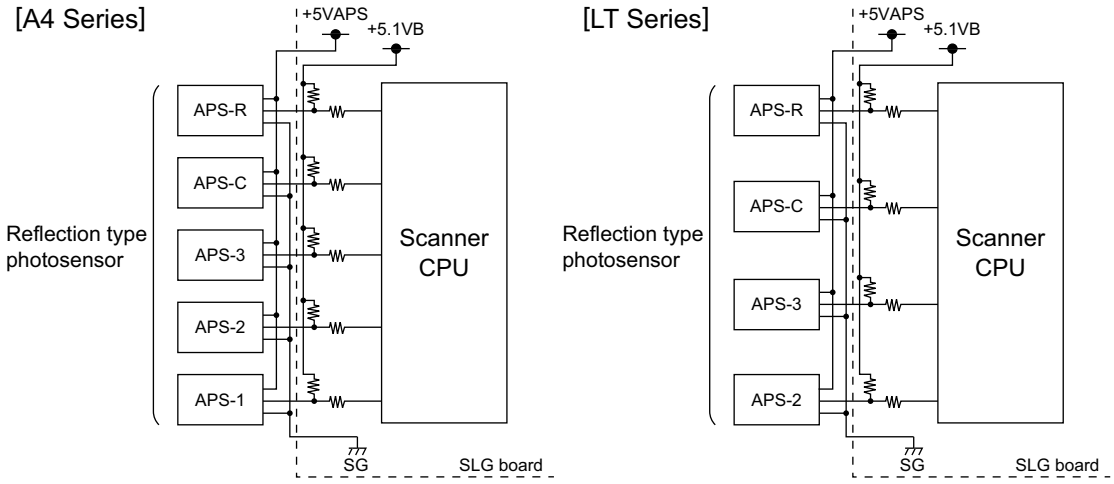


Fig. 6-14

Sensor detection points
[A4 Series]

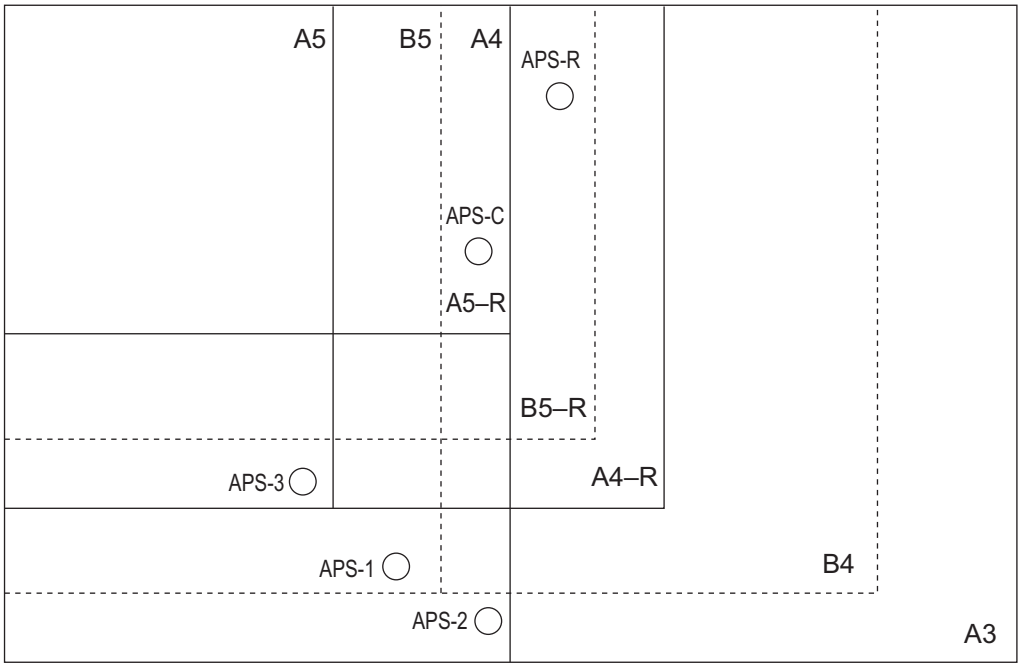


Fig. 6-15

[LT Series]

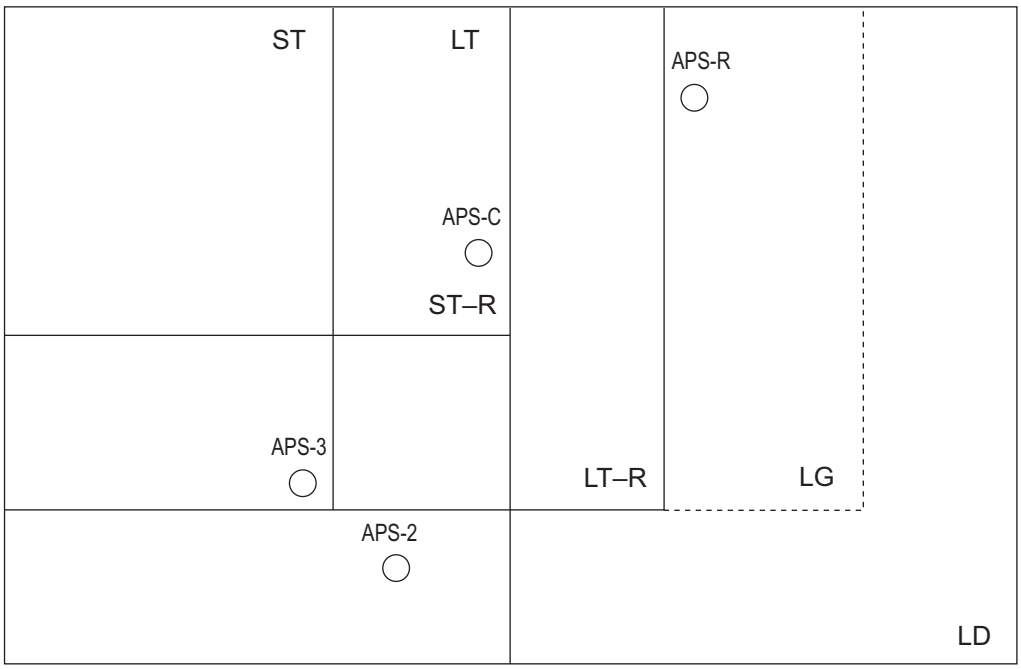


Fig. 6-16

4) Original size is determined by the combination of the signals output from each detection point. Combination charts for size determination of A4 series and LT series are as follows.

[A4 Series]

Size judgement	APS-C	APS-R	APS-1	APS-2	APS-3
A3	0	0	0	0	0
A4	0	1	0	0	0
B4	0	0	0	1	0
B5	1	1	0	1	0
A4-R	0	0	1	1	0
A5	1	1	1	1	0
B5-R	0	0	1	1	1
A5-R	0	1	1	1	1

[LT Series]

Size judgement	APS-C	APS-R	APS-2	APS-3
LD	0	0	0	0
LT	0	1	0	0
LG	0	0	1	0
LT-R	0	1	1	0
ST	1	1	1	0
ST-R	0	1	1	1

Code	Output signal	Original
1	H	Not available
0	L	Available

* When the platen sensor (S7) is OFF;
- The followings are determined by output signals from the APS sensors.
  - Size (The combination of the signals satisfy any in the above chart)
    Size is displayed on the control panel and a specific paper or reproduction ratio is selected.
  - Size retention (The combination of the signals do not satisfy the above chart)
    The latest original size recognized (or no original state) until new paper size is recognized.
  - No original (Output from all the sensors are “1”.)
    Reproduction ratio and paper are not selected.
- Size change is always observed and detected.
- The carriage-1 stays at the standby position even if the reproduction ratio changes corresponding to the change of the original size.

* When the platen sensor (S7) is ON;
The latest original size (or no original state) recognized right before the platen sensor (S7) is turned ON is retained regardless of the status the APS sensor output signals.

About 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.

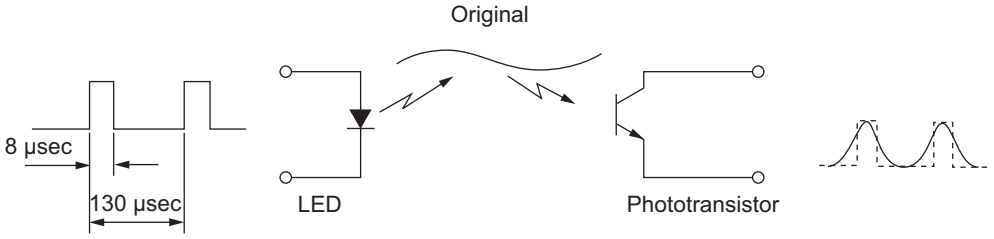


Fig. 6-17

The light emitting diode is driven by a pulse having a 130 µsec. cycle and an 8 µsec. ON time. When the phototransistor receives the same signal as this pulse, it is determined that there is an original. The pulse modulation is performed inside the reflection type phototransistor.

6.6 Disassembly and Replacement

[A] Original glass

(1) Take off the right upper cover.
📖 P.2-31 "[J] Right upper cover"
(2) Remove 2 screws and take off the fixing bracket.

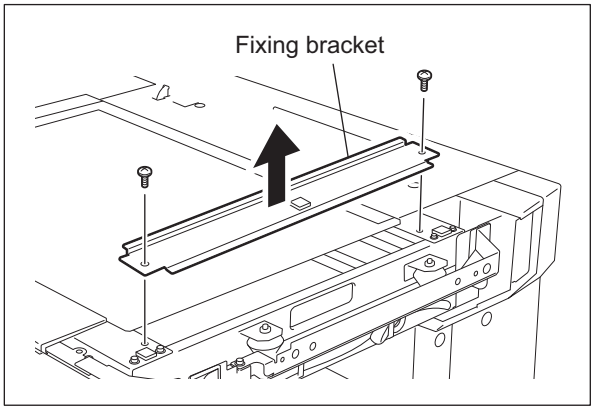


Fig. 6-18

(3) Take off the original glass.

Note:
When installing, fit 2 small protrusions of the original glass in the groove of the equipment and fix the original glass with the fixing bracket by pushing it to the left rear direction.

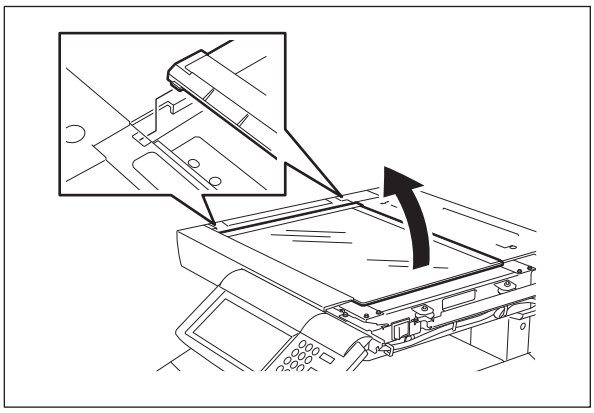


Fig. 6-19

[B] Lens cover

(1) Take off the original glass.
📖 P.6-18 "[A] Original glass"
(2) Remove 6 screws and take off the lens cover.

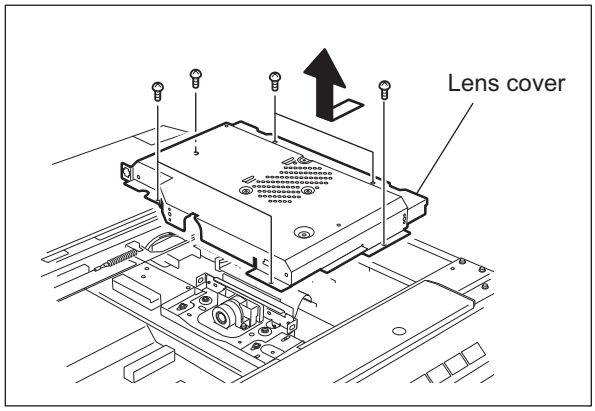


Fig. 6-20

[C] Automatic original detection sensor (APS sensor)

[C-1] A4 series (APS-1, -2, -3, -C, -R)

(1) Take off the original glass.
📖 P.6-18 "[A] Original glass"
(2) Disconnect 1 connector and remove 1 screw for each APS sensor. Take off 5 APS sensors.

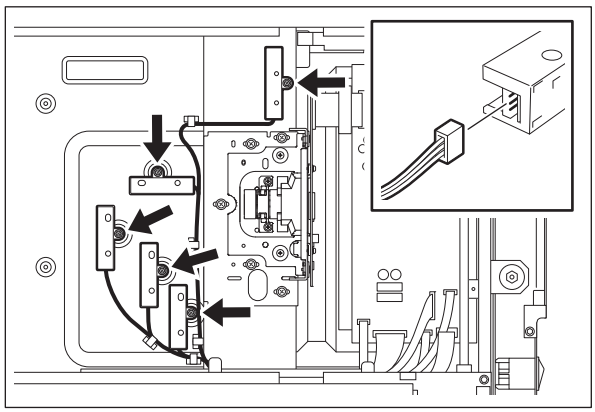


Fig. 6-21

[C-2] LT series (APS-1, -3, -C, -R)

(1) Take off the original glass.
📖 P.6-18 "[A] Original glass"
(2) Disconnect 1 connector and remove 1 screw for each APS sensor. Take off 4 APS sensors.

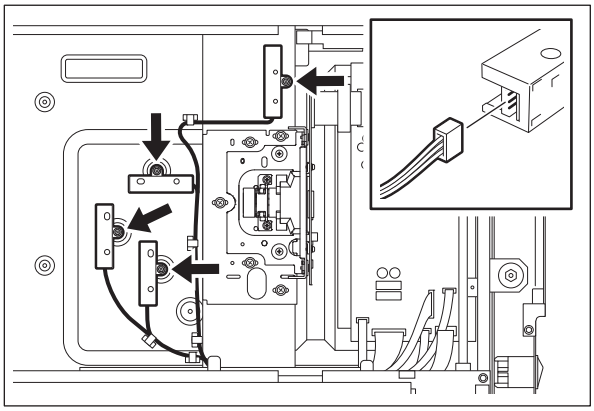


Fig. 6-22

[D] Exposure lamp (EXP)

(1) Take off the original glass and front upper cover.
📖 P.6-18 "[A] Original glass"
📖 P.2-28 "[D] Front upper cover"
(2) Move the carriage-1 to the center position.

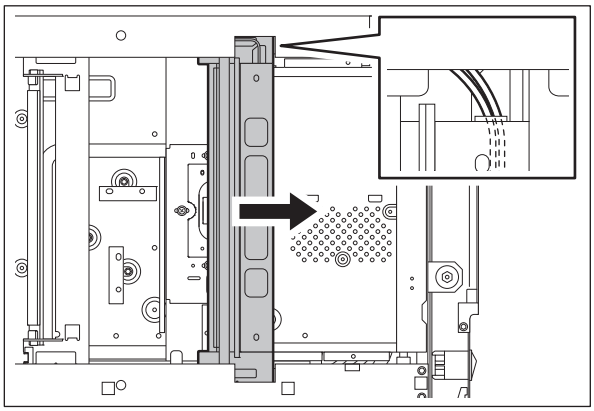


Fig. 6-23

(3) Disconnect the connector of the exposure lamp.

Note:
When disconnecting the connector, pay attention not to give load to the carriage frame.

(4) Release the harness from the harness clamp.

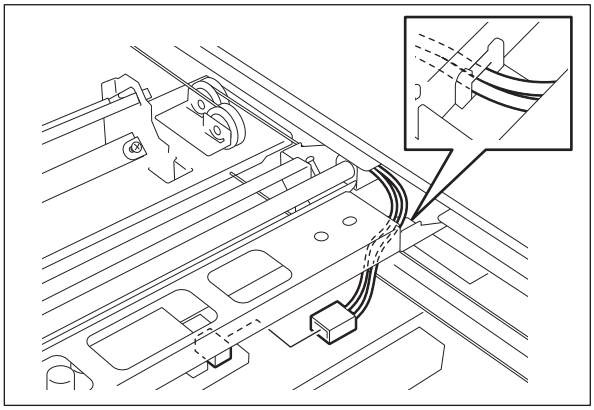


Fig. 6-24

(5) Move the carriage-1 to the position where the side of the frame is cut out.

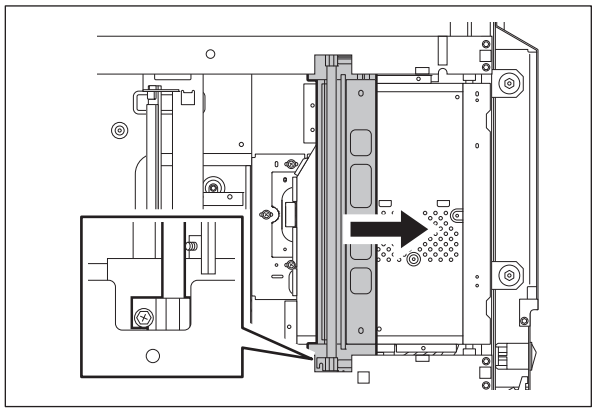


Fig. 6-25

(6) Remove 1 screw.
(7) Lift up the front side of the exposure lamp and take off by sliding it.

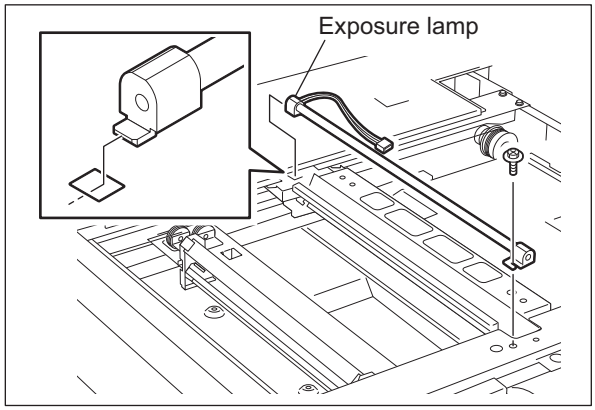


Fig. 6-26

[E] Lens unit

(1) Remove the lens cover.
📖 P.6-19 "[B] Lens cover"
(2) Disconnect 1 connector and remove 5 screws, then take off the lens unit.

Notes:

1. When installing the lens unit, fix it while pushing it to the rear direction.
2. For adjustment, refer to “3.12.2 Lens Unit” in the Service Handbook.

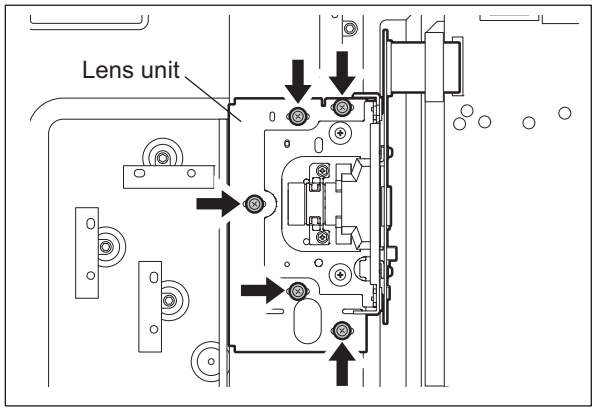


Fig. 6-27

3. Do not touch 8 screws shown with the arrows when replacing the lens unit.

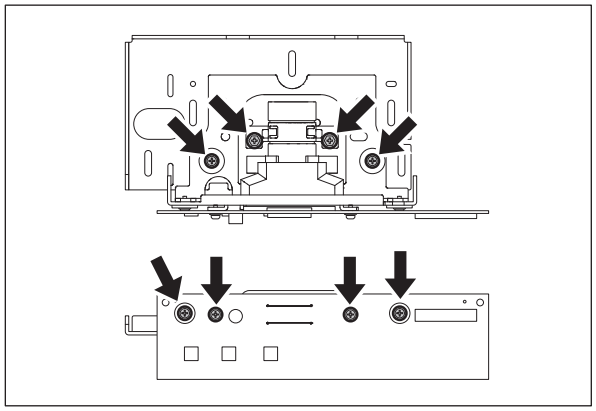


Fig. 6-28

4. Handle the unit with care. Do not touch the adjusted area and lens. (Hold the unit as the right figure.)

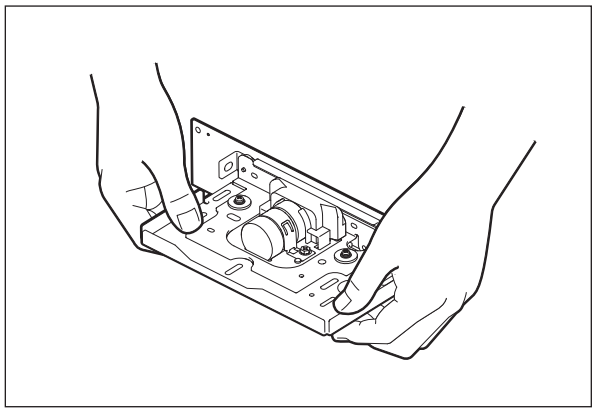


Fig. 6-29

[F] Scan motor (M1)

(1) Take off the upper rear cover.
📖 P.2-35 "[Q] Upper rear cover"
(2) Take off the rear cover-1.
📖 P.2-35 "[R] Rear cover-1"
(3) Disconnect 1 connector.

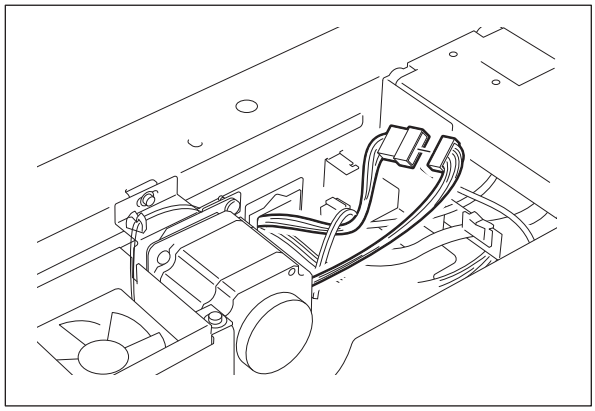


Fig. 6-30

(4) Release the harness from the harness clamp.
(5) Remove 3 screws and take off the scan motor with the whole bracket.

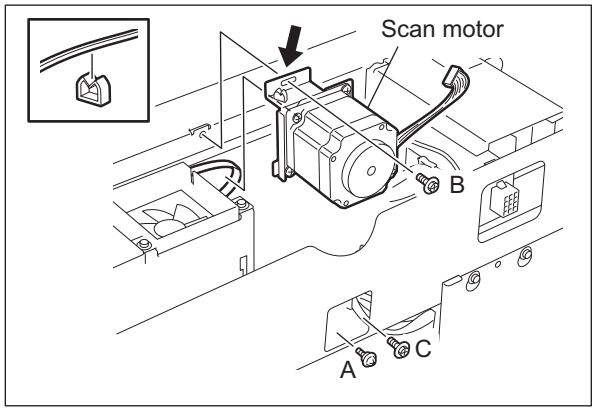


Fig. 6-31

Notes:

When installing the scan motor, use the belt tension jig (spring). The procedure is as follows.

1. Fix the screw A. (P.6-23 "Fig. 6-31")
2. Temporarily fix the screw B and C. (P.6-23 "Fig. 6-31")
3. Hook the belt tension jig to the motor bracket and the flame.
4. The scan motor is pulled by the belt tension jig. Fix the screw B and then C at the stopped position.
5. Remove the belt tension jig.

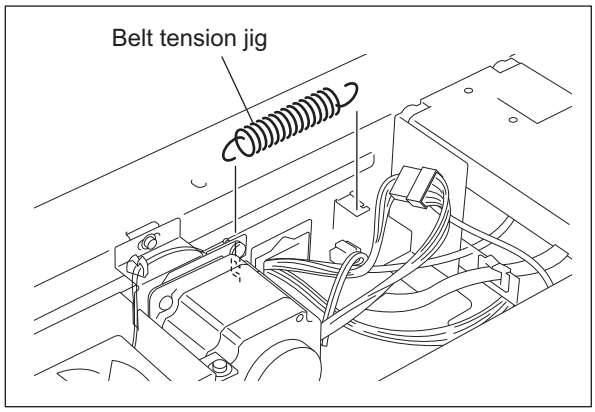


Fig. 6-32

[G] Carriage-1

(1) Take off the original glass, upper rear cover and front upper cover.

🕮 P.6-18 "[A] Original glass"
🕮 P.2-35 "[Q] Upper rear cover"
🕮 P.2-28 "[D] Front upper cover"

(2) Move the carriage and position the holes of the carriage to the holes of the frame.
(3) Remove 2 screws and take off the brackets fixing the carriage-1 to the wire.

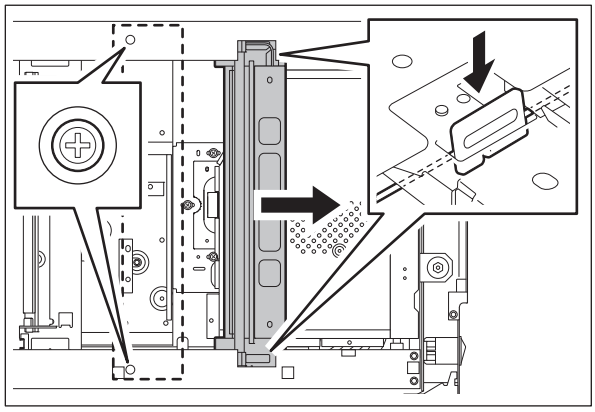


Fig. 6-33

(4) Remove the square seal fixing the lamp harness to the base. Disconnect the connector of the lamp harness from the SLG board

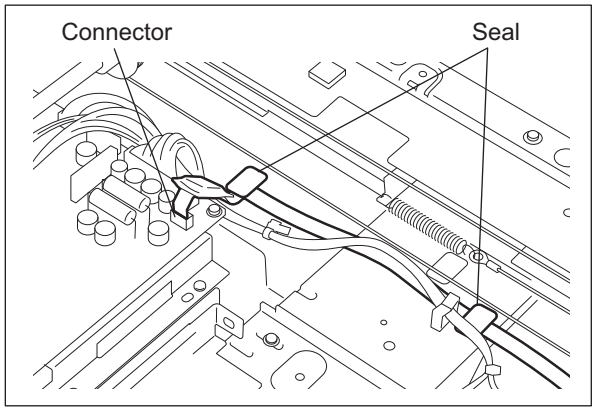


Fig. 6-34

Notes:

Be sure to install the lamp harness by following the procedure below.

1. Clean the seal adhering surface with alcohol.
2. Align the black line on the lamp harness with the position as shown in the figure, and fix it with a seal.

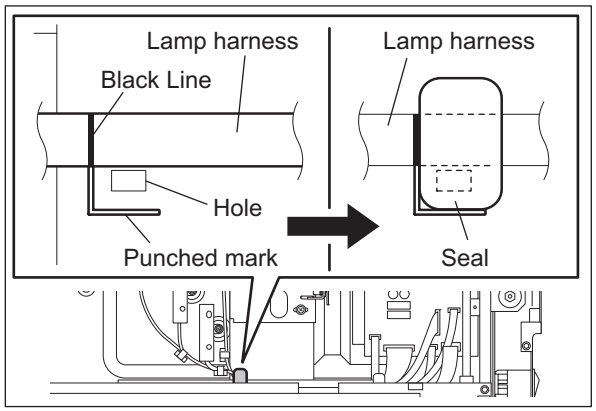


Fig. 6-35

3. Align the bent portion of the lamp harness with the position as shown in the figure, and fix it with a seal.
4. After the installation, move carriage-1 towards the left and confirm that there is no abnormality in the lamp harness, such as twisting.

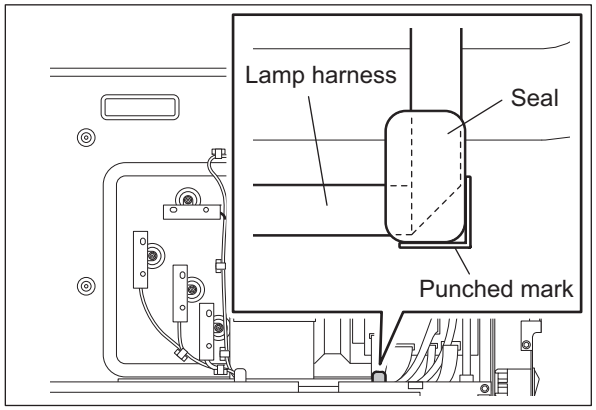


Fig. 6-36

(5) Rotate the carriage-1 in the direction shown in the figure at right, not to touch the mirror. Then take off the carriage-1.

Note:

When replacing the mirror-1, replace the carriage-1 together with mirror-1.
Mirror-1 should not be removed.

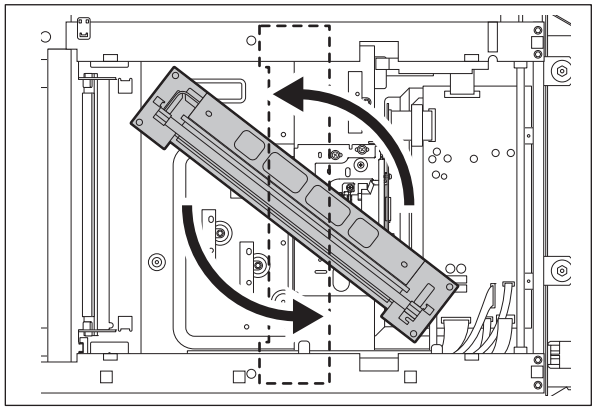


Fig. 6-37

Note:

When installing carriage-1, fix the bracket temporarily at the position (A). Then move it to the direction (B), push it to the end and fix securely.

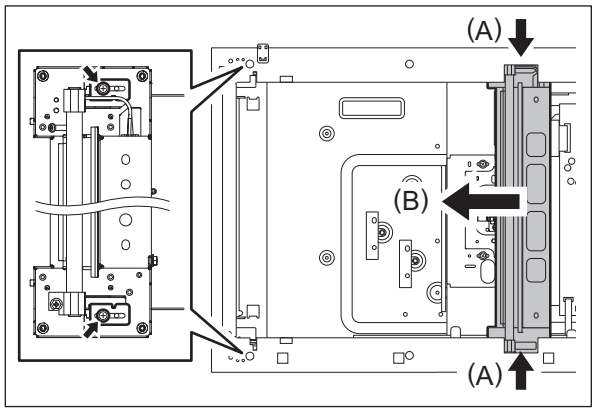


Fig. 6-38

[H] Inverter board (INV)

(1) Take off the carriage-1.
📖 P.6-24 "[G] Carriage-1"
(2) Disconnect 2 connectors. Remove 2 screws and take off the inverter board.

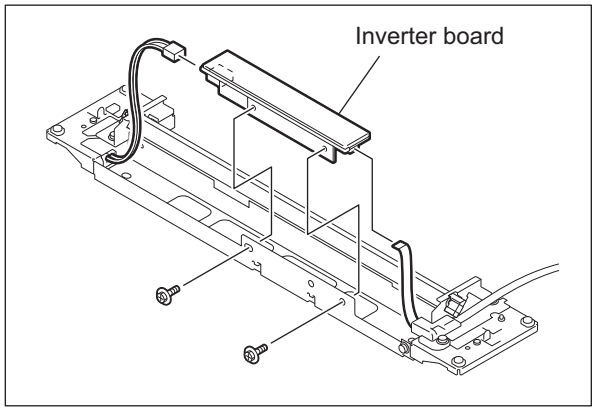


Fig. 6-39

[I] Carriage wire / carriage-2

(1) Take off the carriage-1.
📖 P.6-24 "[G] Carriage-1"
(2) Attach the wire holder jigs to the pulleys to prevent the wires from loosening.

Note:

Refer to “3.12 Adjustment of the Scanner Section” in the Service Handbook for the direction of the wire holder jigs.

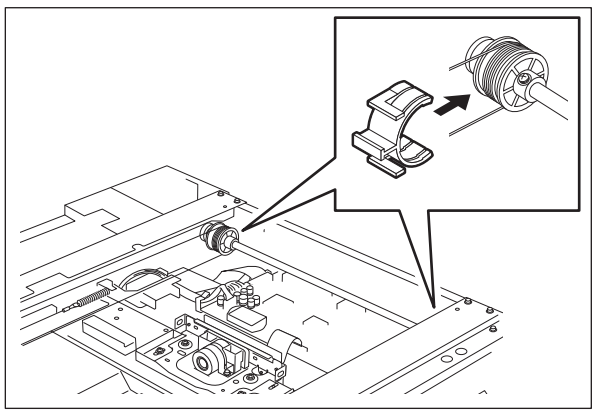


Fig. 6-40

(3) Detach the tension springs of the front and rear sides.
(4) Remove the carriage wires.

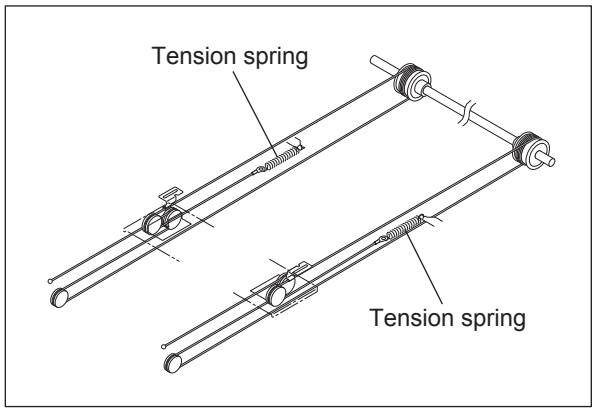


Fig. 6-41

(5) Rotate the carriage-2 in the direction where the inside of the frame is dented shown in the figure at right, not to touch the mirrors. Then take off the carriage-2.

Notes:

1. When replacing the mirrors-2 and -3, replace the carriage-2 together with mirrors-2 and -3. Mirrors-2 and -3 should not be removed.
2. When installing carriage-2, fix the bracket temporarily at the position (A). Then move it to the direction (B), push it to the end and fix securely.
(📖 P.6-26 "Fig. 6-38 ")

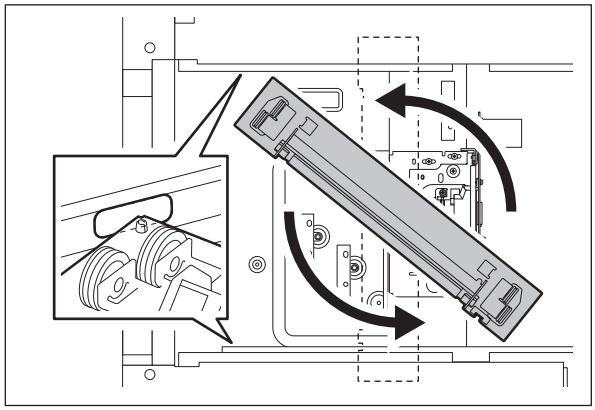


Fig. 6-42

[J] Platen sensor (S7) / Carriage home position sensor (S6)

(1) Take off the upper rear cover.
📖 P.2-35 "[Q] Upper rear cover"
(2) Disconnect 1 connector. Release the latches and take off the platen sensor.
(3) Remove the seal.
(4) Disconnect 1 connector. Release the latches and take off the carriage home position sensor.

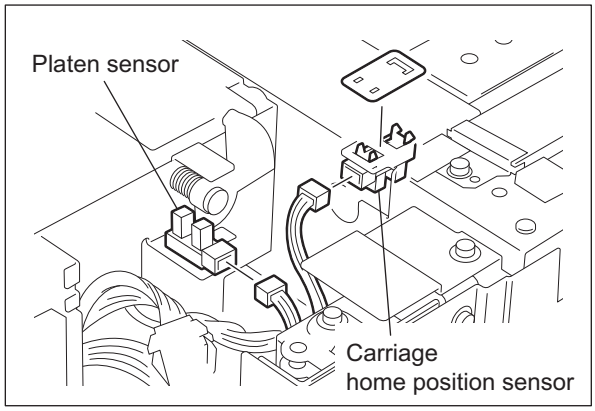


Fig. 6-43

[K] SLG board (SLG)

(1) Take off the lens cover.
📖 P.6-19 "[B] Lens cover"
(2) Disconnect 8 connectors, remove 6 screws and take off the SLG board.

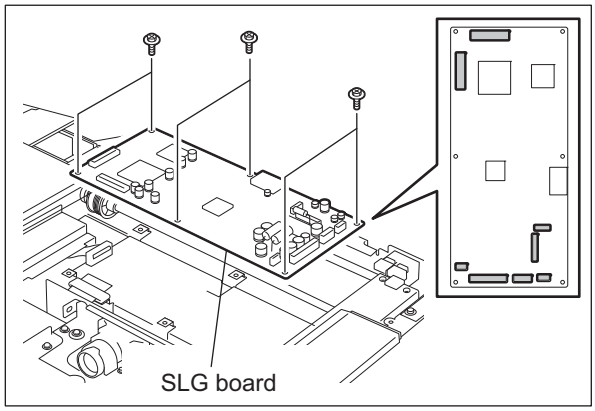


Fig. 6-44

[L] Scanner unit cooling fan (M30)

(1) Take off the upper rear cover.
📖 P.2-35 "[Q] Upper rear cover"
(2) Disconnect 1 connector. Release the harness from the harness clamp. Remove 2 screws and take off the scanner unit cooling fan.

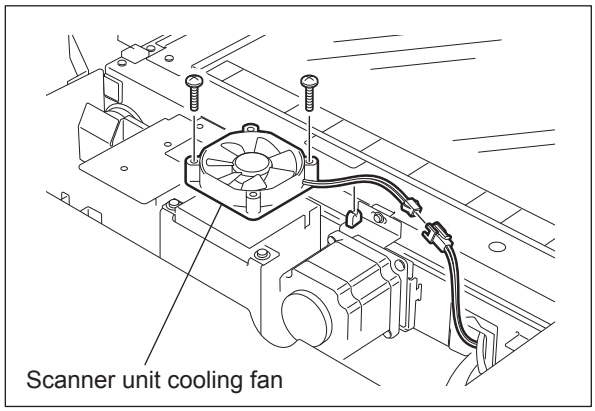


Fig. 6-45

7. IMAGE PROCESSING

7.1 General Description

The following diagram shows the process of this equipment from the input data to writing data on the photoconductive drum surface.

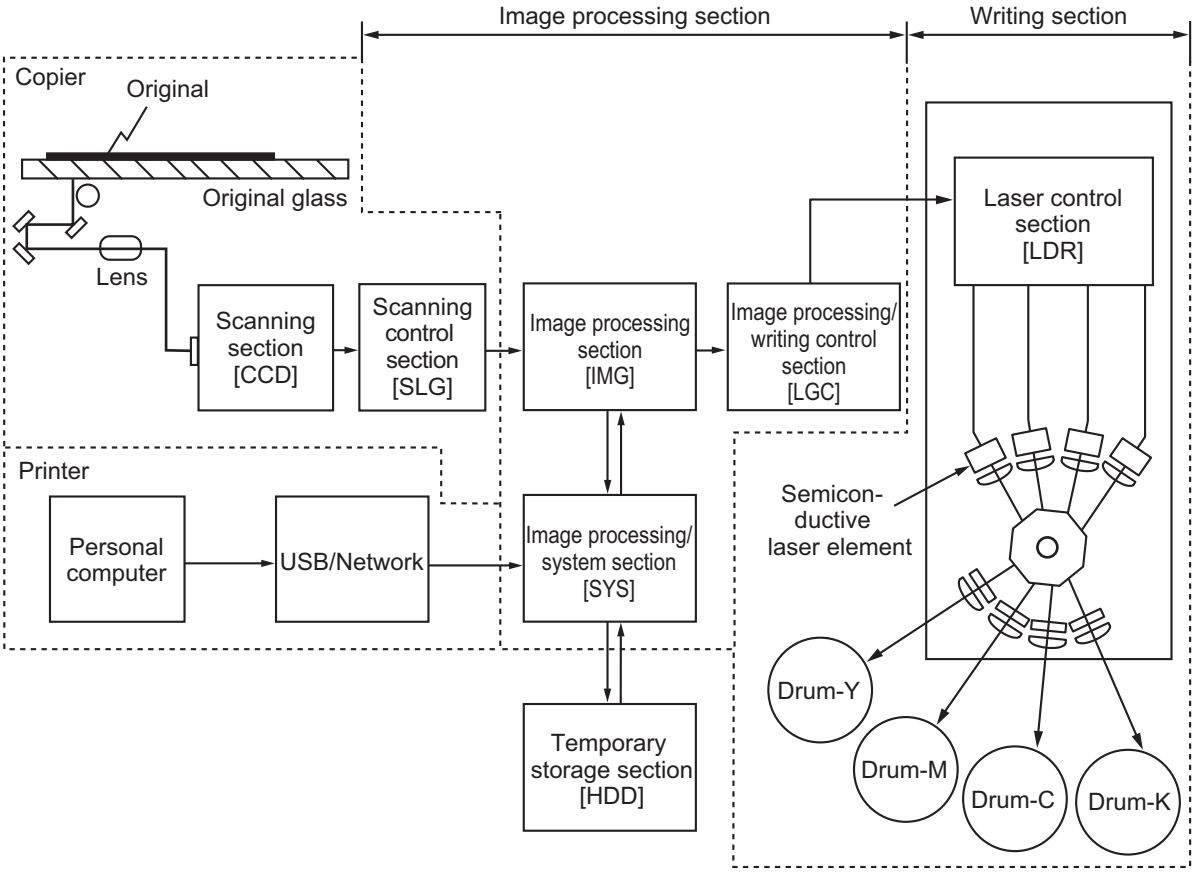


Fig. 7-1

The followings are the boards used for image processing.

Board	Function
IMG board	ACS, color conversion, high quality image processing, image memory editing, rectangular area signal generation, editing processing, gamma correction, gradation processing, compression/expansion, black component generation, scanner high quality image processing and printer high quality image processing
SYS board	Black over print, pure black/pure gray, chroma adjustment, brightness adjustment and contrast adjustment
LGC board	Smoothing processing, image area control and laser related control

Image of an original placed on the original glass is scanned by the optical system. The CCD (Charge Coupled Device) reads the optical image signals and converts them into the electrical signals. The electrical signals are amplified and undergo analog-to-digital conversion, then are changed into digital signals. Shading correction (correction of variance in CCD elements and the light source) is performed and the digital signal is output as an image signal from the scanning section.

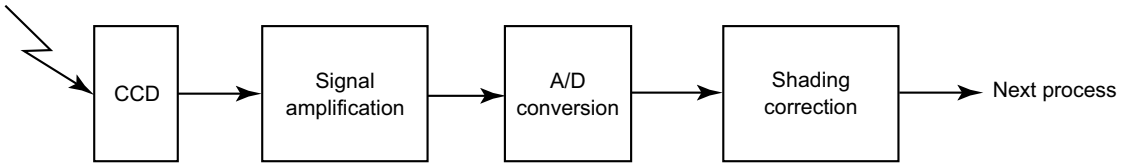


Fig. 7-2

The image processing section inputs the image signal from the scanning section and applies various image processing on the signal, then transmits the output result to the writing section.
Images are processed by the IMG board, SYS board and LGC board in this equipment. Also, the image signals read with the Scanning Function and the printer image signals are processed in the IMG board and SYS board.

7.2 Configuration

The following diagram shows the image processing section of this equipment.

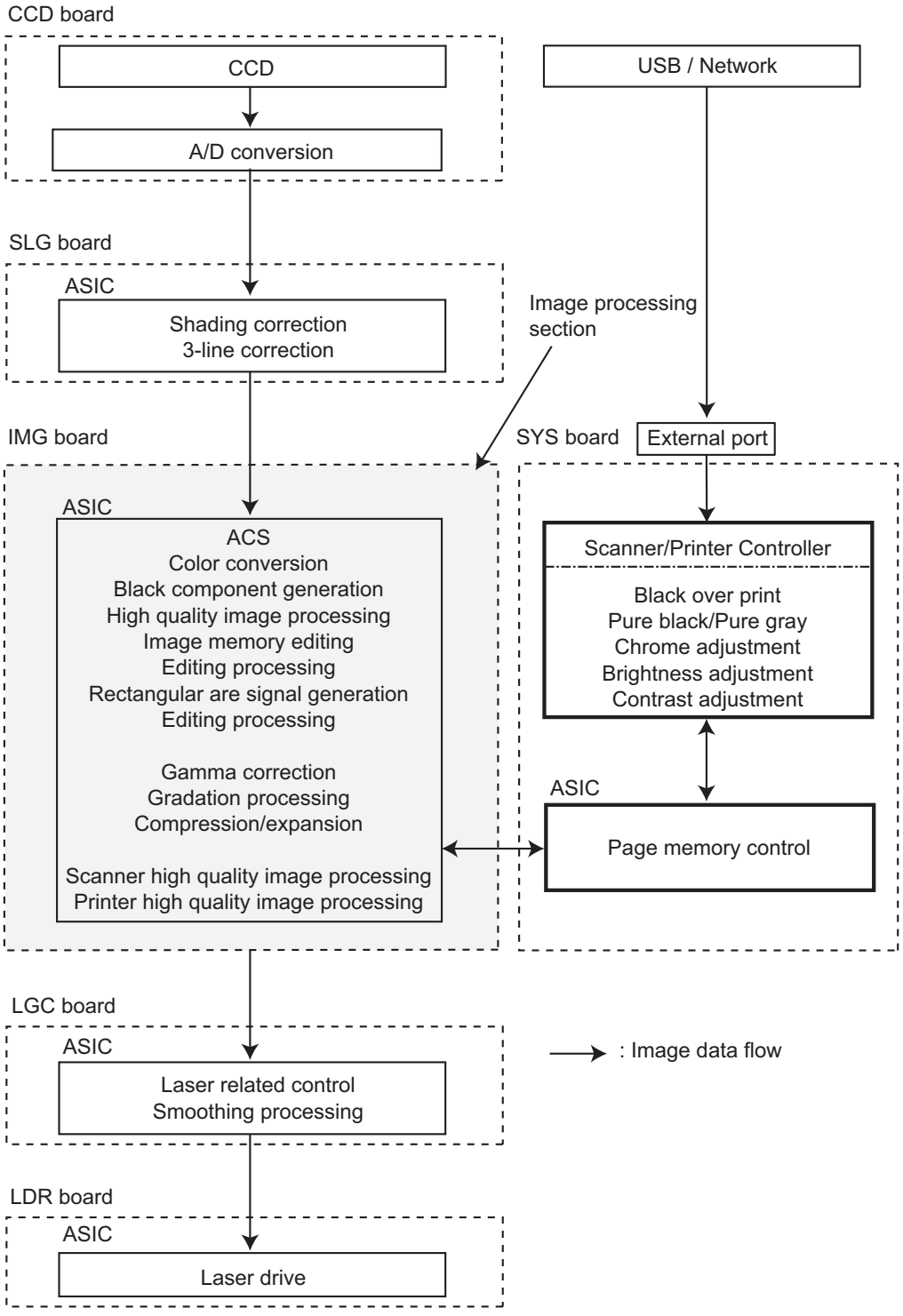


Fig. 7-3

7.3 IMAGE PROCESSING PC BOARD (IMG)

7.3.1 Features

1) The image processing section is controlled by the CPU on the IMG board.

2) The image processing PC board realizes the following functions:
   - ACS
   - Color conversion (CMY image data processing)
   - Black component generation
   - High quality image processing
   - Image memory editing
   - Rectangular area signal generation
   - Editing processing
   - Gamma correction
   - Gradation processing
   - Compression/expansion
   - Scanner high quality image processing
   - Printer high quality image processing

7.3.2 Functions of image processing circuit

1) ACS (Auto Color Selection)
   This function determines whether the original to be scanned is colored or monochrome, based on the analysis of the R, G and B signals output from the CCD.

2) Color conversion (CMY image data processing)
   When functioning the copier, the RGB image data is converted to CMY image data. (When functioning the scanner, it is converted to RGB image data.)
   The image data taken in by the scanner represents the intensities of reflection from 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 printing (=CMY image data processing).

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

4) High quality image processing
   - Background processing function
     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 when copying originals which have a certain level of background density, such as newspapers.

<Example>

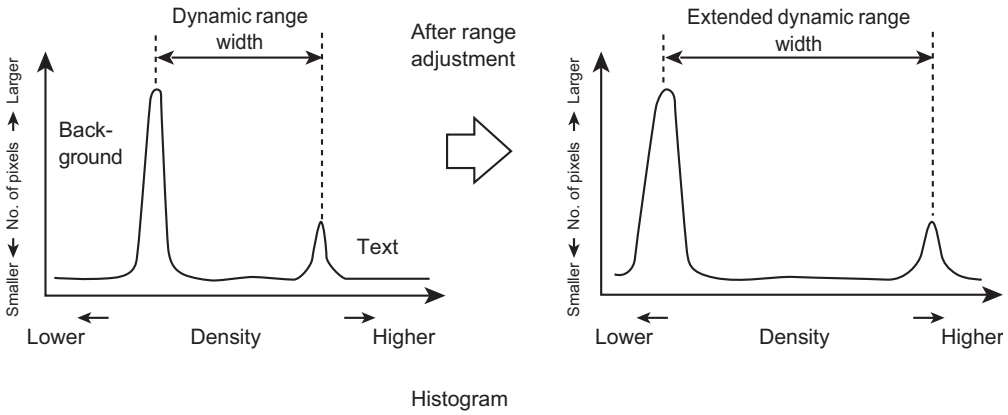


Fig. 7-4

- Image discrimination
  By determining the magnitude of density variation in a block (n x n dot), the target pixels are judged whether they are text or photograph. If they are determined to be text, they are further judged whether they are black or color text, using the differences in the levels of CMY signals.
- Filtering
  This function is enabled by low-pass filter processing and high-pass filter processing.
  Low-pass filter processing
  This processing removes image/electrical noise and decreases moire by performing averaging operation between the image signals of the targeted pixel and those of the neighboring pixels to enhance the reproducibility of original.

  <Example>
  Density of the targeted pixel position is X. Density of pixel positions at front and back of the targeted pixel are “a” and “b” respectively. X is converted to X’ through the low pass filtering.

  When the matrix is (3 x 1):

a	x	b

$$x' = \frac{a+b+x}{3}$$

The above averaging operation is performed for all the pixels to accomplish the high reproducibility of original.
(The following is the case that the low pass filtering is applied on the primary scanning pixel.)

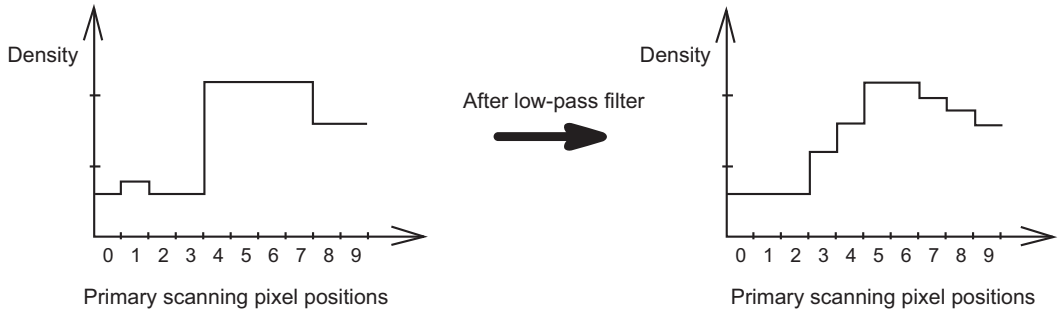


Fig. 7-5

High-pass filter processing
Character outline blurs when the original, such as text, with big difference in density among the pixels is optically scanned and output from the CCD. Characteristic of the lens and other factors cause this phenomenon. In this equipment, processing such as edge enhancement is applied between the targeted pixel and the neighboring pixels to eliminate this phenomenon and realize high reproducibility of original.

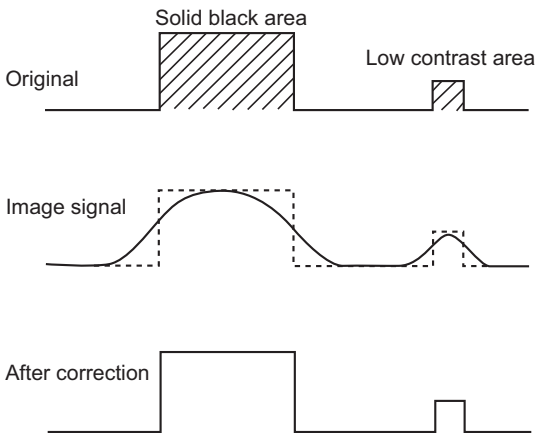


Fig. 7-6

5) Image memory editing
This function performs editing such as enlargement/reduction, mirror imaging, etc., by using a line memory. Pixel data for one line in the primary scanning direction is stored in the line memory and the memory is renewed at each line.

- Enlargement/Reduction
Enlargement/Reduction is accomplished by using the line memory control function in the process of the image processing operation.

- Mirror image
This is accomplished by reading and outputting data from its end.

6) Rectangular area signal generation
When a rectangular coordinate position is selected, the corresponding rectangular area signals are generated. Using these signals, various edit processing related to the area specification can be performed.

7) Editing processing
This function performs trimming and masking.
- Trimming
  Using rectangular area signals, the image signals inside the rectangular area are left and the other image signals are eliminated.
- Masking
  Using rectangular area signals, the image data inside the rectangular area are erased.

8) Gamma correction
This function corrects the input/output characteristics of the scanner/printer and adjusts the image signals so that the input/output characteristics would match with the copy mode.

9) Gradation processing
In case of color copying, this function switches the type of gradation processing depending on the copy mode: A type which selects the printer characteristics giving the priority to resolution such as for text data, and another which selects the printer characteristics giving the priority to reproducibility of gradation such as for photographic images.
In case of black copying, this function selects the gradation processing which reproduces the halftone image such as photograph more precisely. Also the gradation processing which makes text data clearer is selected in black copying mode.

10) Compression/expansion
To lessen the data amount of the color image signals, this function effects the compression/expansion on the data.

11) Scanner high quality image processing
This function corrects the image signals scanned by the scanner and reproduces them in a higher image quality.

12) Printer high quality image processing
This function reproduces the image signals output from the printer controller in a higher image quality.

7.4 SYSTEM CONTROL PC BOARD (SYS)

7.4.1 Features

1) Image processing functions realized on the SYS board are controlled by the CPU on the SYS board.
2) The image processing functions of the SYS board realizes the followings:
   - Black over print (PostScript)
   - Pure black / Pure gray (PostScript) / Pure gray (PCL6C)
   - Chroma adjustment (PCL6C)
   - Brightness adjustment (PCL6C)
   - Contrast adjustment (PostScript / PCL6C)

7.4.2 Functions of image processing circuit

On the SYS board, the following image processing functions are realized.

1) Black over print (PostScript)
   When black data of text or graphic object are formed on a certain background with no written data underneath them, the color of the paper comes out around the black data when “out-of-color registration” is occurring. To prevent this phenomenon, this process enables to keep the background color around the black data formed as a part of the text or the graphic object on the printer data.

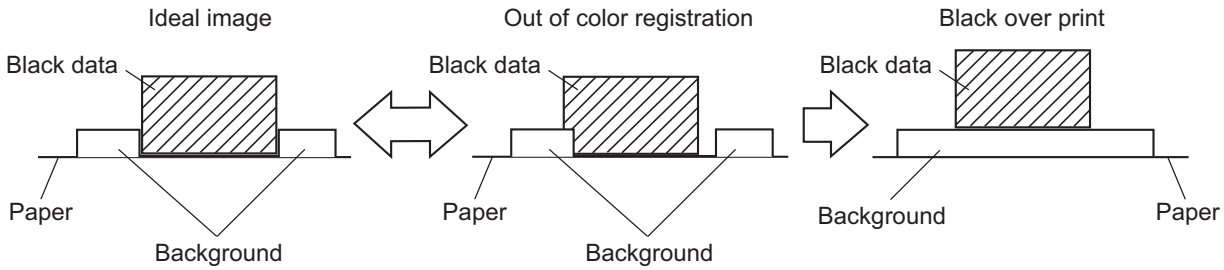


Fig. 7-7

2) Pure black / Pure gray (PostScript) / Pure gray (PCL6C)
   This function is to printout the text and graphics formed as black data with black toner only on the printer data, not using 4 color toner. The gray text/graphics are also printed out with black toner only.

3) Chroma adjustment (PCL6C)
   This function adjusts chromaticness of the printer data.

4) Brightness adjustment (PCL6C)
   This function adjusts brightness of the printer data.

5) Contrast adjustment (PostScript, PCL6C)
   The contrast adjustment is applied to the print data.

7.5 LOGIC PC BOARD (LGC)

7.5.1 Features

1) The image processing ASIC on the LGC board is controlled by CPU mounted on the LGC board.
2) The image processing functions of the LGC board realizes the followings:
   - Smoothing processing
   - Image area control
   - Laser related control

7.5.2 Functions of image processing circuit

An image processing ASIC mounted on the LGC board enables the following functions:

1) Smoothing processing
   This function removes jaggy and smooths character outline of images and output them.
2) Image area control
   This function sets the effective image area in horizontal and vertical directions to be output.
3) Laser related control
   This function performs the APC (Auto Power Control).

8. LASER OPTICAL UNIT

8.1 General Description

The laser optical unit radiates the laser beam onto the photoconductive drum responding to the digital image signals transmitted from the scanner, USB, network, etc. to create the latent image. Image signal is converted into the light emission signal of the laser diode on the laser driving PC board (LDR), then radiated on the drum through the optical elements such as cylinder lenses, polygonal mirror and fθ lens. The unit must not be disassembled in the field as they are very sensitive to dust and finely adjusted at the factory.
The polygonal motor in e-STUIO3510c is different from the one in e-STUDIO2500c/3500c, and rotates faster. In order to avoid effects by the consequently increased heat and current, in e-STUDIO3510c, the driving PC board is placed outside the laser unit instead of being unified with the polygonal motor.

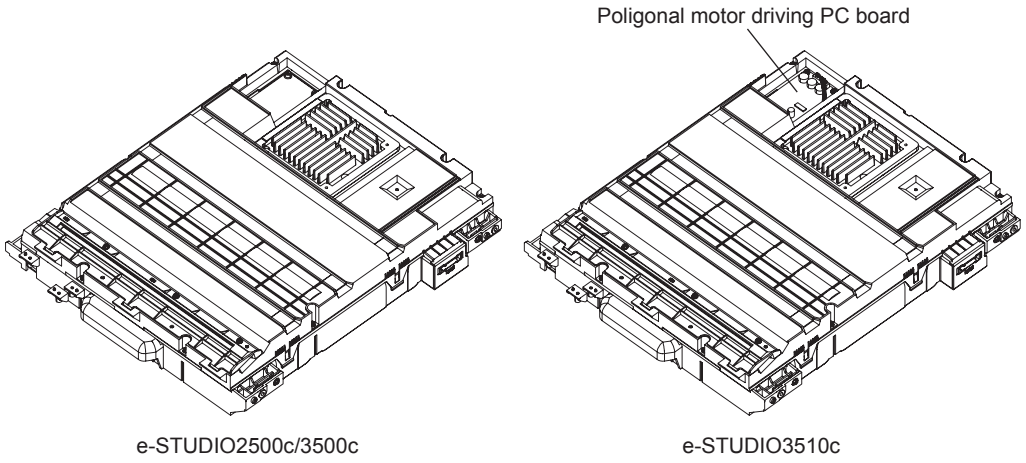


Fig. 8-1

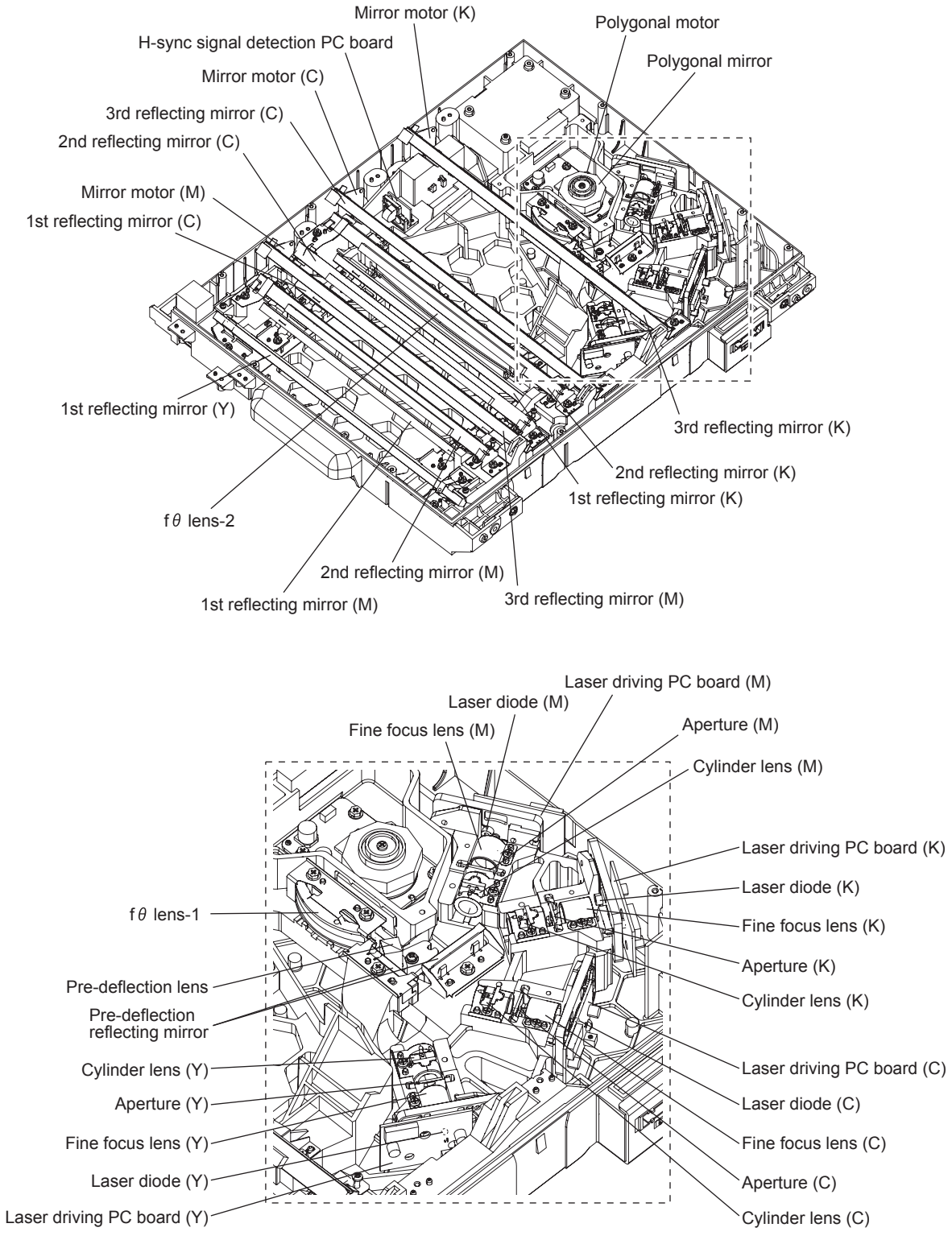


Fig. 8-2

8.2 Structure

Laser optical unit (4 beams)		
Laser emission unit	Laser diode	Wavelength: Approx.790 nm Output power rating: 20 mW
	Fine focus lens	
	Aperture	
	Cylinder lens	
	Laser driving PC board (LDR)	
Polygonal motor unit	Polygonal motor	
	Polygonal mirror	8 planes
	Polygonal mirror cover / base	
fθ lens-1		
fθ lens-2		
Mirror		
Slit glass		
H-sync signal detection PC board (SNS)		

1) Laser emission Unit
   This unit consists of the laser diode, finite focus lens, aperture and cylinder lens.
   - Laser diode
     This laser diode features low droop, small laser variation and low threshold current.
     Aperture determines the shape of the laser beam at laser emission position of the primary scanning and secondary scanning.
     Laser diode radiates the laser beams responding to the laser emission control (ON/OFF) signals from the laser driving PC board (LDR). Laser beams which passed through the finite focus lens are focused on the drum surface.

   - Laser precautions
     A laser diode is used for this equipment and radiates an invisible laser beam.
     Since it is not visible, be extremely careful when handling the laser optical unit components, performing operations or adjusting the laser beam. Also never perform the procedure with other than the specified manuals because you could be exposed to the laser radiation.
     The laser unit is completely sealed with a protective cover. As long as only the operations of specified manuals are performed, the laser beam is not leaked and you are in no danger of being exposed to laser radiation.

The following cautionary label for the laser is attached to the front right cover.

Fig. 8-3

Cautions:

- Avoid expose to laser beam during service. This equipment uses a laser diode. Be sure not to expose your eyes to the laser beam. Do not insert reflecting parts or tools such as a screwdriver on the laser beam path. Remove all reflecting metals such as watches, rings, etc. before starting service.
- When servicing the equipment with the power turned ON, be sure not to touch live sections and rotating/operating sections. Avoid exposing your eyes to laser beam.
- During servicing, be sure to check the rating plate and cautionary labels such as "Unplug the power cable during service", "CAUTION. HOT", "CAUTION. HIGH VOLTAGE", "CAUTION. LASER BEAM", etc. to see if there is any dirt on their surface and if they are properly stuck to the equipment.

2) Polygonal motor unit
This unit consists of the polygonal motor, polygonal mirror and polygonal mirror cover.

a. Polygonal motor
This motor rotates the polygonal mirror in high speed. The DC motor controls the rotation speed of the mirror motor as follows:
- e-STUDIO2500c/3500c
  During ready: 10,000.000 rpm
  During printing
  : 26,574.803 rpm (600dpi)
  : 27,175.379 rpm (FAX 15.4x16.0dot/mm)
  : 26,156.300 rpm (FAX 16.0x15.4dot/mm)
- e-STUDIO3510c
  During ready: 10,000.000 rpm
  During printing
  : 35,433.071 rpm (600dpi)
  : 36,233.839 rpm (FAX 15.4×16.0 dot/mm)
  : 34,875.070 rpm (FAX 16.0×15.4 dot/mm)

b. Polygonal mirror
Four laser beams emitted from the laser diodes are reflected by this mirror. As the polygonal mirror is rotated by the polygonal motor, the reflected laser lights moves in sync with the rotation. The direction of the movement is the primary scanning direction of the image. One scan is performed on one plane of the polygonal mirror.
As the polygonal mirror has eight planes, eight scans are performed in one rotation of the polygonal mirror.

c. Polygonal mirror cover / base
Polygonal mirror cover reduces the windage loss and noise, prevents adhesion of foreign matters onto the mirror surface and releases heat.

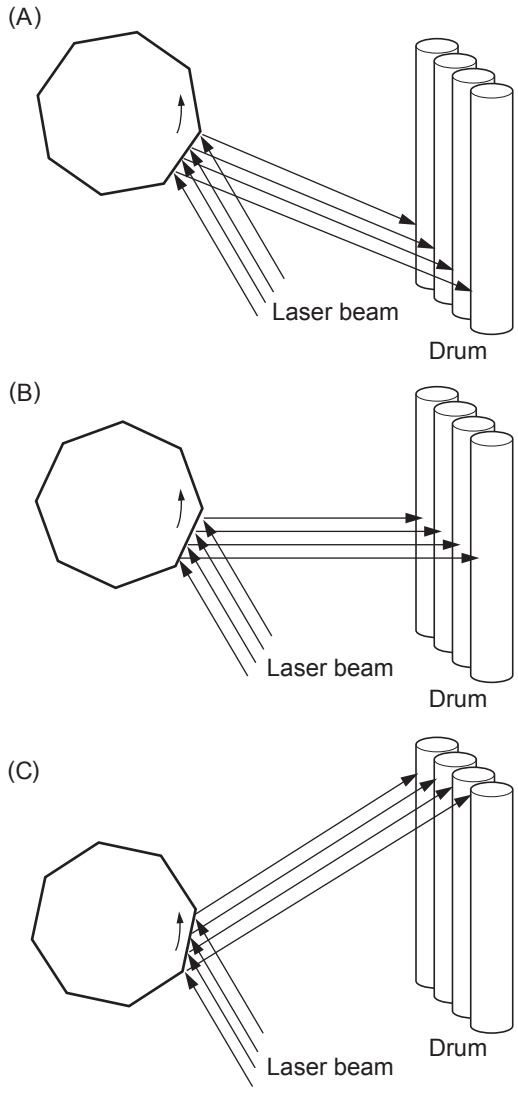


Fig. 8-4

One scan is completed by completion of steps (A) to (C). One scan is performed on one plane of the polygonal mirror. Eight scans can be made with one rotation of the polygonal mirror.

3) fθ lenses-1 and -2
These two lenses perform the following adjustment on the laser beams reflected by 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 fθ lenses help to correct this difference, making all the dot-to-dot pitches equal on the drum surface.

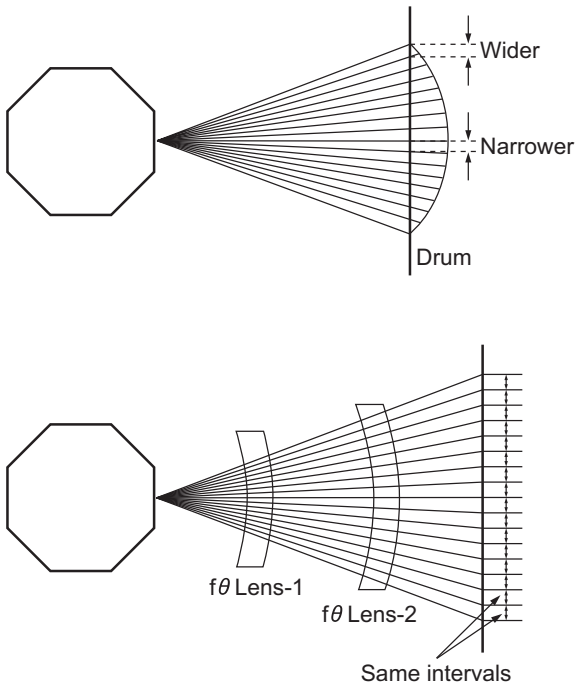


Fig. 8-5

b. Face tilt correction
The reflecting face of the polygonal mirror is tilted slightly to one side against the perfect vertical. Horizontal deviation of the laser light which is caused by the tilt is corrected.

c. Sectional shape of laser beam
The shape of the laser beam spotted on the drum is adjusted.

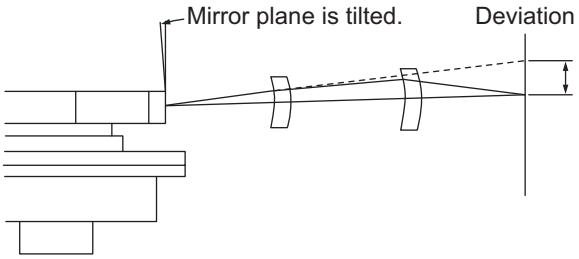


Fig. 8-6

4) H-Sync signal detection PC board (SNS)
The laser light which is started to be scanned from one of the reflected plane of the polygonal mirror is reflected by the H-Sync detection mirror and enters the PIN diode on the H-Sync signal detection PC board (SNS). The primary scanning synchronizing signal is generated based on this reflection.

5) Slit glass
The slit glass is located where the laser beams are output from the laser optical unit, and it protects the unit from dust.
Also, the shutter is attached to the upper side of the slit glass in order to prevent toner or dust from adhering to the slit glass, and it is normally closed. It is closed/opened by the shutter motor (M12). It is opened just before the laser beams are emitted and it closes just after the emission is finished.
Because the image quality may be significantly affected by a dirty slit glass with adhering toner or dust, a message is set to appear (every 10k copies) prompting a user to clean the glass. Ask a user to perform cleaning when it appears. Although the slit glass cleaning pad is not a preventive maintenance part, replace it if it becomes dirty.

6) Reflecting mirrors
These reflecting mirrors reflect and lead the laser beams scanned by the polygonal mirror and corrected by the fq lenses to the drum. The laser beams of Y, M, C and K colors are directed to the drum by respectively different routes using one mirror for Y color beam and three each for M, C and K color beams.

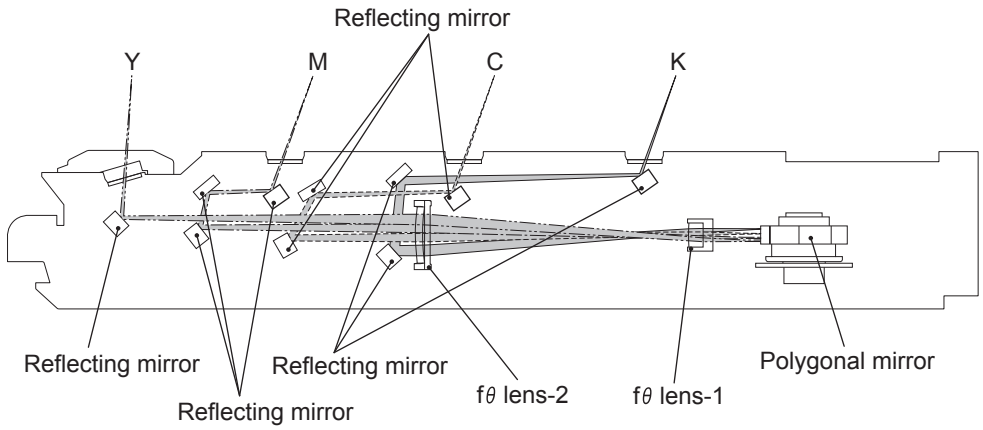


Fig. 8-7

7) Mirror motor (M14, M15, M16)
At each of the third reflecting mirrors for M, C and K color laser beams, a mirror motor is installed to make tilt adjustment for the mirror. The parallel correction for the four scanning lines is performed by adjusting the tilt of mirrors in the following manner:
a. A test pattern is written on the transfer belt. This is read by the Image position aligning sensors (S16, S17) to recognize the error in scanning lines.
b. With the Y color scanning line as a standard, a mirror motor installed at each of the M, C and K color beam mirrors is driven to adjust the degree of laser beam parallelization by inclining the mirror.

8.3 Electric Circuit Description

8.3.1 Laser diode control circuit

This equipment uses an AlGaAs type semiconductive laser with 20 mW of optical output power rating. This laser emits a beam in a single transverse mode in approx. 790 nm wavelength. Si photo diode for monitoring optical output in this laser controls the laser intensity.
The relation between the forward current and optical output of a semiconductive laser is as shown below. Beam emission starts when the forward current exceeds a threshold current, and then the laser outputs a monitor current which is proportionate to the optical output. Since semiconductive lasers have an individual variability in their threshold current and monitor current, the optical output needs an adjustment to be maintained at a certain value.
The optical output of a semiconductive laser decreases as the laser temperature rises. Therefore APC (Auto Power Control) needs to be performed to maintain a constant optical output.

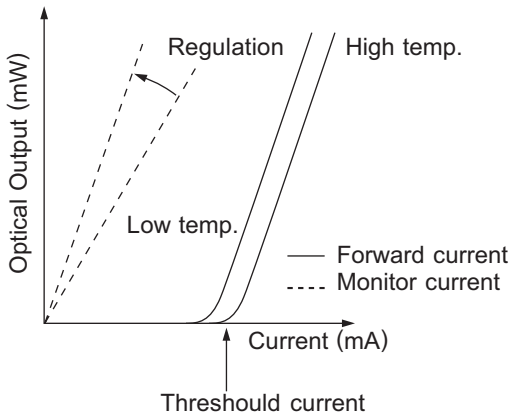


Fig. 8-8

A block diagram of the semiconductive laser control circuit is shown below. The semiconductive laser performs a monitor efficiency regulation (a process to control a monitor current for beam emission amount). The initial beam emission is adjusted to be approx. 5.5 mW (322 µW on the drum surface). The voltage of the monitor output, which has been regulated by this adjustment, is then fed back to a laser power comparison circuit.
In the laser power comparison circuit, this voltage fed back and a laser power voltage set for the control circuit are compared for every scanning. As the result of this, a laser driver circuit increases its forward current when the laser power is insufficient and decreases it when the laser power is excessive to maintain a constant optical output.

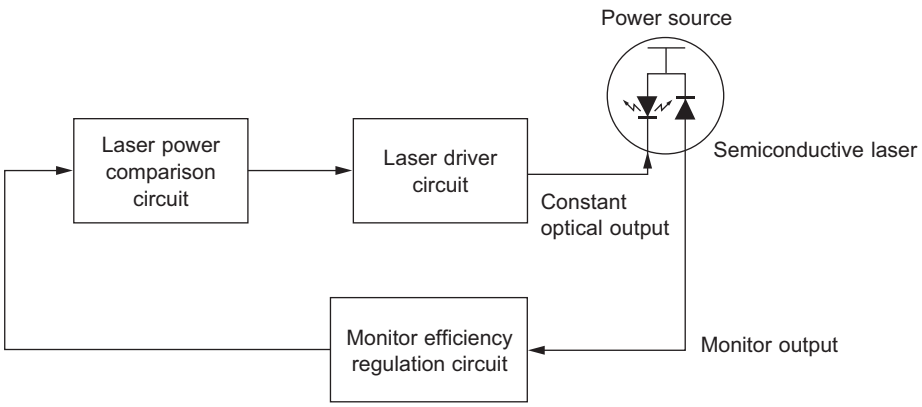


Fig. 8-9

8.3.2 Polygonal motor control circuit

The polygonal motor is a DC motor rotated by a clock signal (PMCK) output from the ASIC. This motor is controlled under PLL (Phase Locked Loop) to realize an accurate and constant rotation. Its rotation status is converted to a status signal (PMSNC) and then output to the ASIC. PMSNC signal moves to a low level only when the rotation status of the motor is constant. The ASIC detects the rotation status with this signal, and emits a laser beam only when the rotation status is constant.

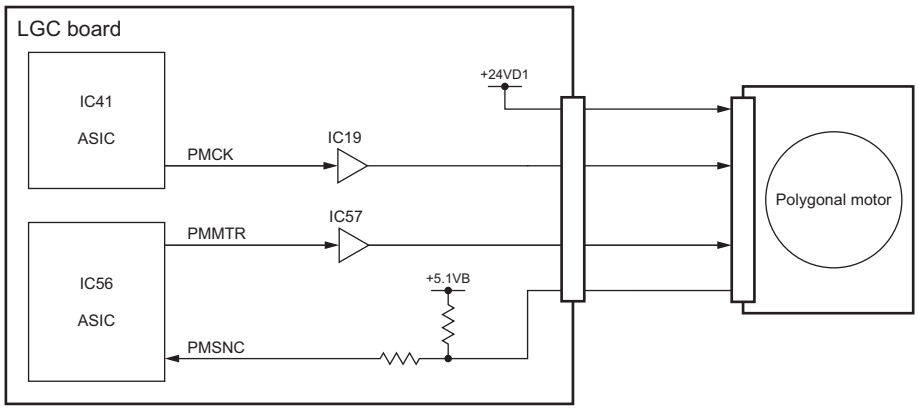


Fig. 8-10

Conrol signal

Signal	Function	Status	
		High level	Low level
PMMTR	Motor ON signal	OFF	ON
PMCK	Refernce clock	---	---
PMSNC	PLL control signal	Stopping or error	Locked (Rotating at a constant speed)

8.3.3 Mirror motor control circuit

The mirror motor is a stepping motor driven by the control signal output from the ASIC on the LGC board and drives the tilt adjustment system of the reflection mirror.
The mirror motor is driven by each phase of the pulse signal (TILT0, TILT1, TILT2, TILT3) output from the ASIC. The rotation speed or direction of the motor can be switched by changing the output timing of each pulse signal.
Also, the pulse signal is used for each mirror motor of M, C and K color in common. Selecting the level of the enable signal (TILTM, TILTC, TILTK) sends the signal only to the mirror motor to be driven.

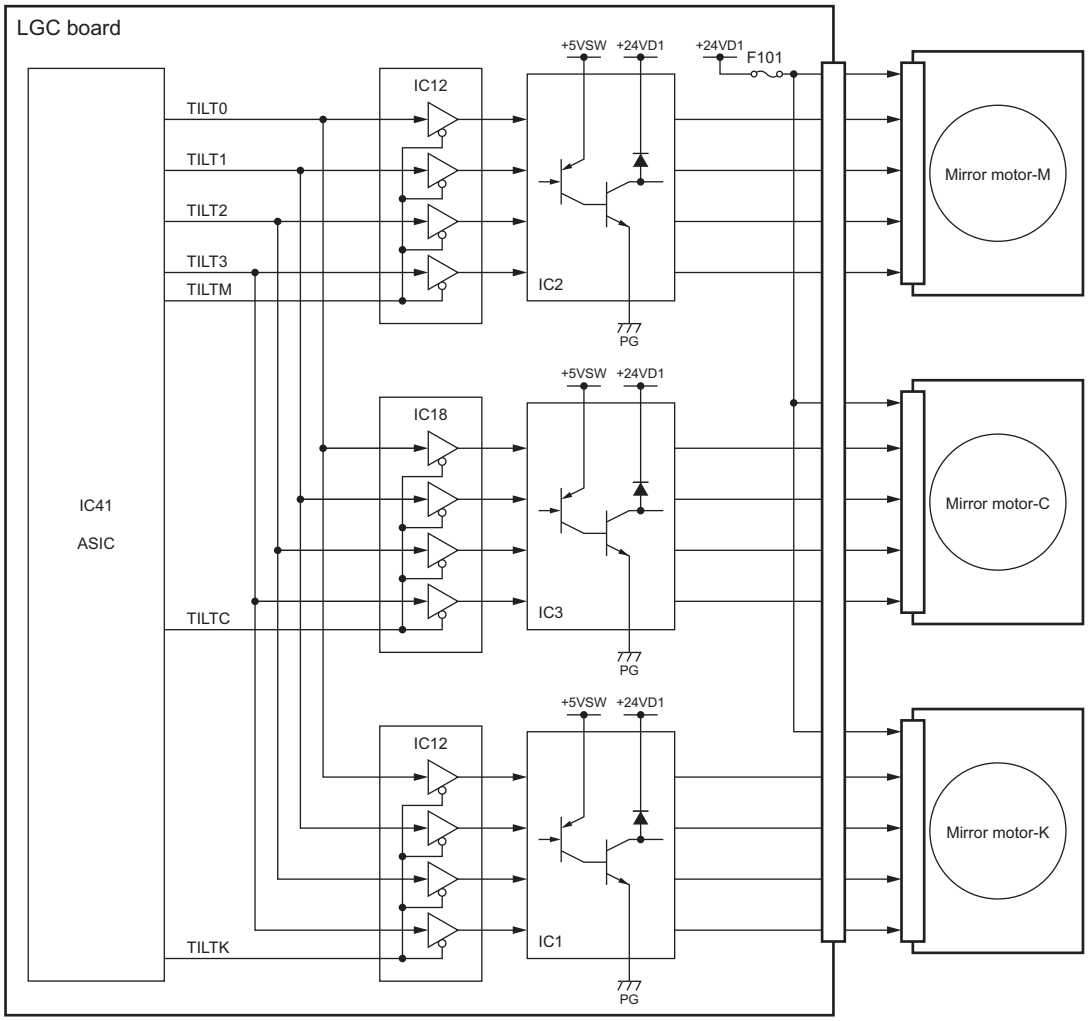


Fig. 8-11

Control signal

Signal	Function	Status	
		High level	Low level
TILT0/1/2/3	Mirror motor phase signal	---	---
TILTM/C/K	Enable signal	OFF	ON

Relation between enable signal and motor to be driven

Signal			Motor to be driven
TILTM	TILTC	TILTK	
L	H	H	Mirror motor-M
H	L	H	Mirror motor-C
H	H	L	Mirror motor-K
H	H	H	None (No tilt adjustment)

* Not available in the above combination

8.4 Disassembly and Replacement

[A] Laser optical unit

Note:
Perform step (7) only when the Damp Heater Kit (optional) is installed.

(1) Take off the toner bag.
📖 P.12-11 "[A] Toner bag"
(2) Take off the used toner motor cover.
📖 P.12-24 "[C] Used toner motor cover"
(3) Disconnect 2 connectors of the laser optical unit.

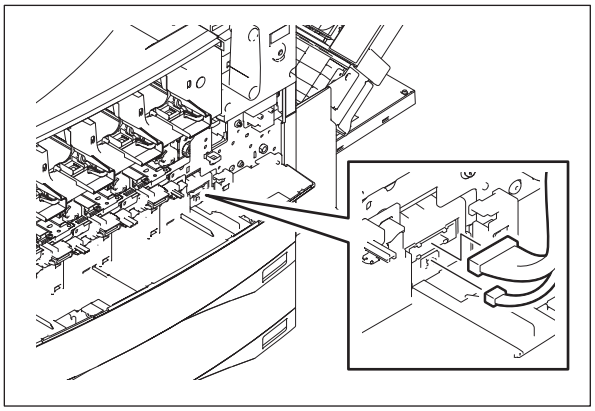


Fig. 8-12

(4) Remove 2 screws.

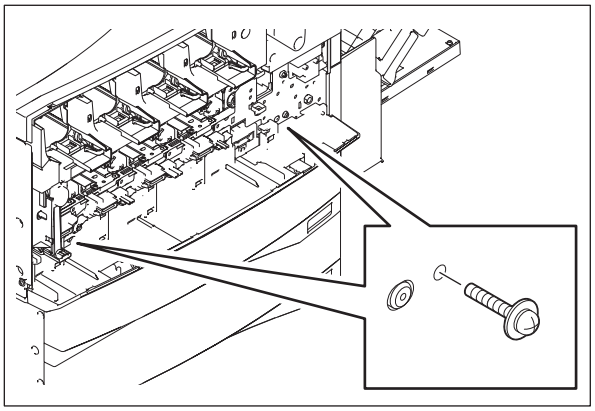


Fig. 8-13

(5) Take off the left cover.
📖 P.2-30 "[G] Left cover"
(6) Disconnect 2 connectors and 1 harness clamp.
(7) Place the harness of the Damp Heater Kit (optional) on the rear side of the kit.

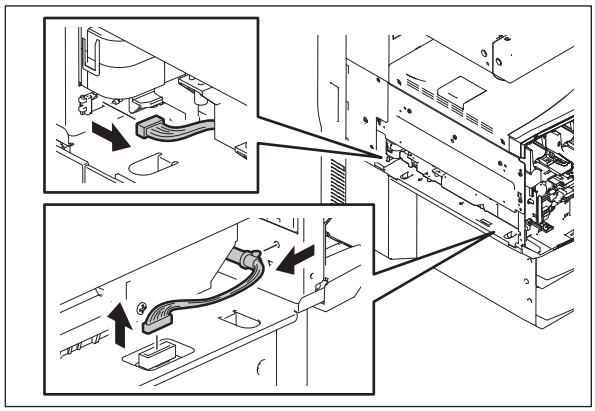


Fig. 8-14

(8) Pull out the laser optical unit.

Note:
When the laser optical unit is replaced, start the equipment in the adjustment mode and perform the adjustment code 05-4721 before the normal start-up.

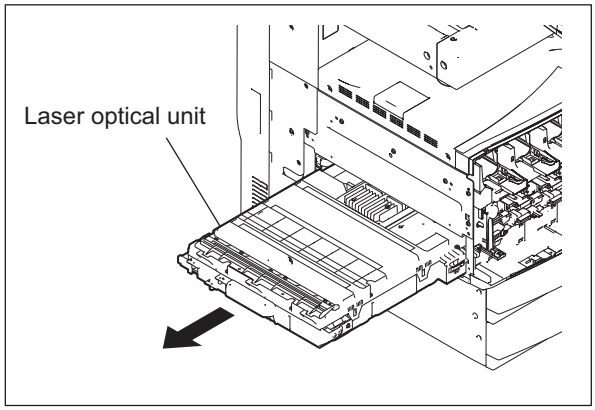
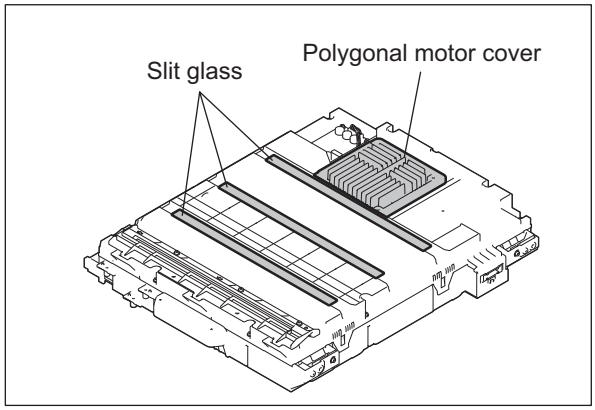


Fig. 8-15

Notes:
1. Do not leave fingerprints or stain on the slit glass of the laser optical unit.
2. Pay close attention not to make an impact or vibration on the laser optical unit because it is a precise apparatus.
3. Place the removed laser optical unit so as not to load on the polygonal motor.
4. Do not disassemble the laser optical unit in the field because it is precisely adjusted and very sensitive to dust and stain.
5. Hold the laser optical unit vertically. Do not press the top of the unit (the cover) where the slit glass and the polygonal motor are installed with your hands or other things.



[B] Laser unit cooling fan (M29)

(1) Take off the paper dust holder.
📖 P.10-41 "[Q] Paper dust holder"
(2) Disconnect 1 connector, and then take off the laser unit cooling fan.

Note:
When installing the laser unit cooling fan, face its labeled side down and insert it all the way in.

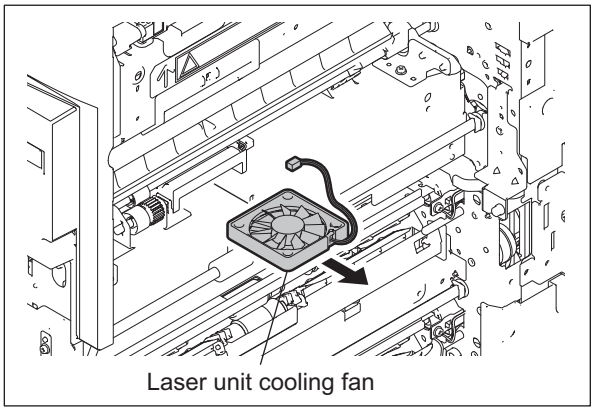


Fig. 8-16

[C] Shutter unit

Note:
Perform steps (1) and (2) only when the Damp Heater Kit (optional) is installed.

(1) Open the board case.
📖 P.2-45 "[K] Board case"
(2) Disconnect 1 connector of the Damp Heater Kit (optional).

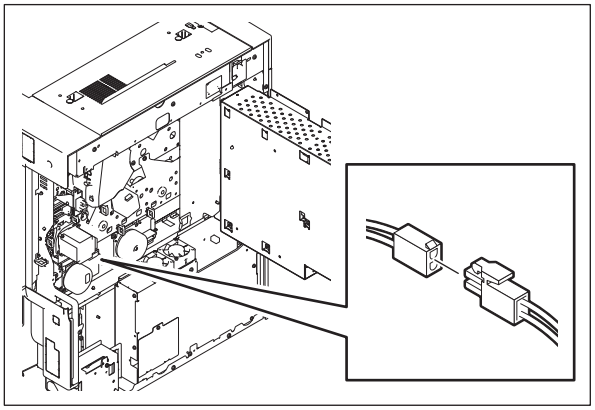


Fig. 8-17

(3) Take off the laser optical unit.
🕮 P.8-12 "[A] Laser optical unit"
(4) Take off the 4 ducts of the discharge LEDs.
🕮 P.11-19 "[D] Discharge LED (ERS-Y, ERS-M, ERS-C, ERS-K)"
(5) Disconnect 2 connectors and remove 2 screws. Then take off the front hinge cover by releasing 8 hooks.

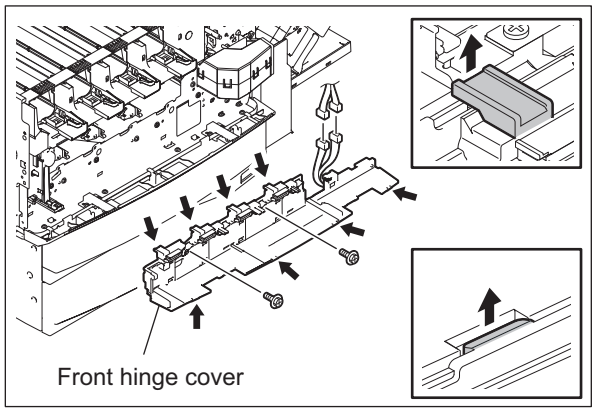


Fig. 8-18

(6) Take off the left lower cover.
🕮 P.2-31 "[I] Left lower cover"
(7) Disconnect 1 connector.

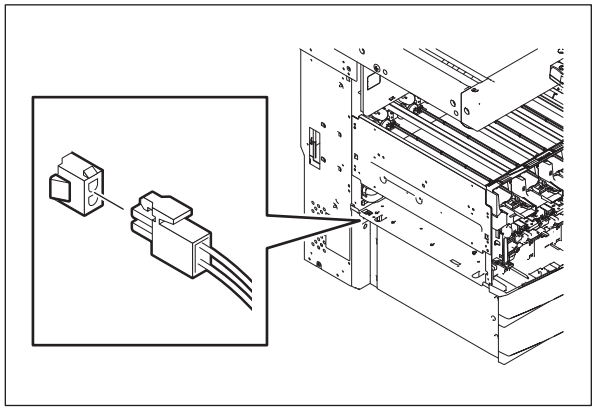


Fig. 8-19

(8) Remove 7 screws and take off the metal plate on the left side.

Note:
Check printed images after assembling the unit.

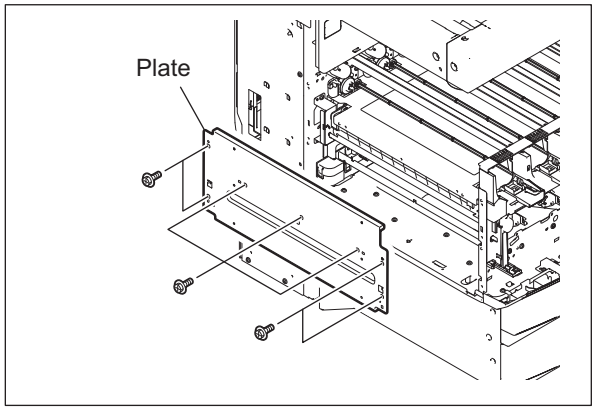


Fig. 8-20

(9) Remove 2 screws, slide the shutter unit to the front, and then pull it out to the exit side.

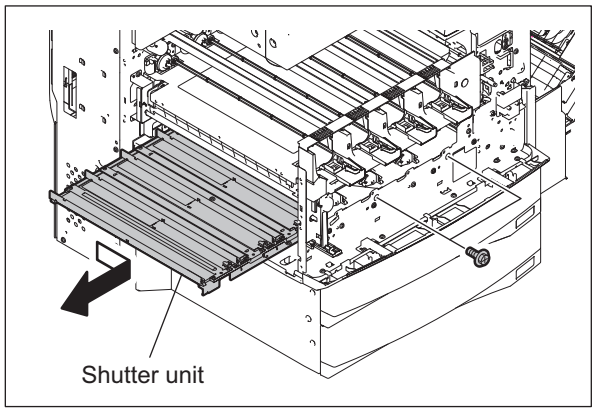


Fig. 8-21

[D] Shutter motor (M12)

(1) Take off the shutter unit.
P.8-14 "[C] Shutter unit"
(2) Disconnect 1 connector, remove 3 screws and take off the shutter motor with the bracket.

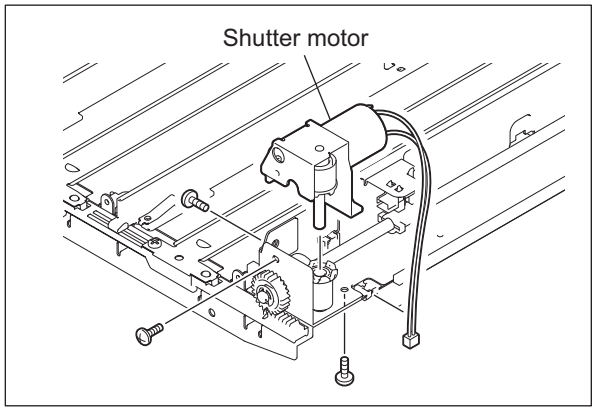


Fig. 8-22

(3) Remove the E-ring. Then remove 1 gear, 1 spring and 1 polyslider.

Note:
When assembling the unit, be sure to install the polyslider.

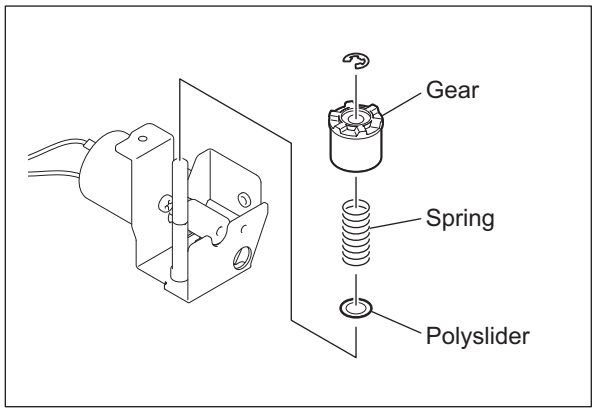


Fig. 8-23

(4) Remove 2 screws and take off the shutter motor.

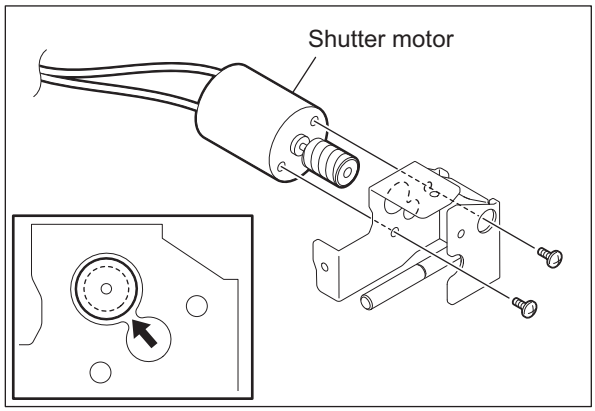


Fig. 8-24

[E] Shutter status detection sensor (S20)

Note:
Perform step (2) only when the Damp Heater Kit (optional) is installed.

(1) Take off the shutter unit.
📖 P.8-14 "[C] Shutter unit"
(2) Remove 2 screws, and then take off the Damp Heater Kit (optional).

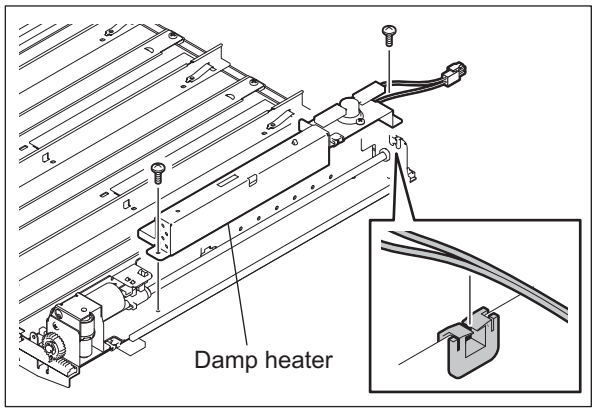


Fig. 8-25

(3) Remove 1 clip, and then slide the actuator to the rear side.

Note:
Be sure not to lose the removed pin.

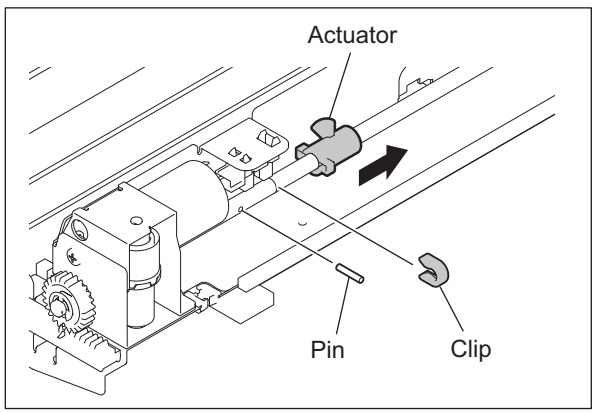


Fig. 8-26

(4) Disconnect 1 connector, release the latch and take off the shutter status detection sensor.

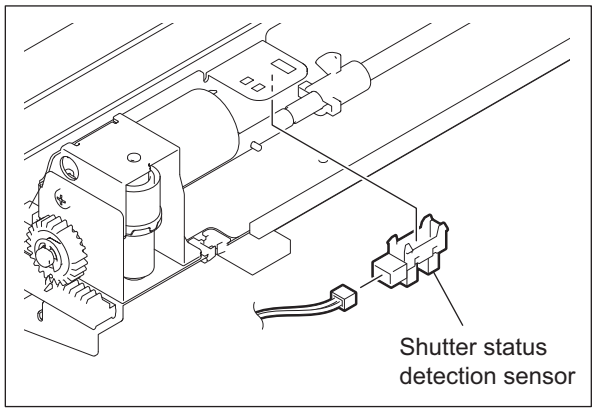
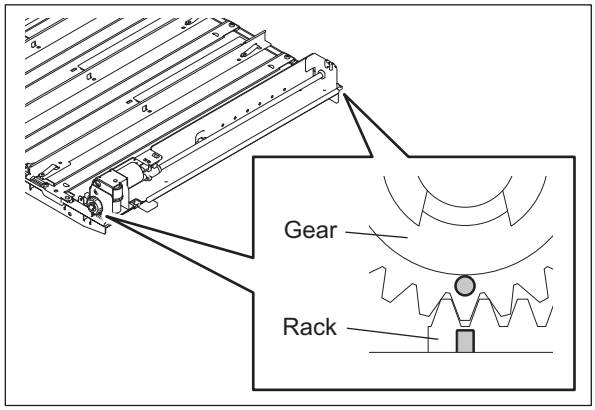


Fig. 8-27

Note:
If the gears (front/rear) of the shutter unit have been removed, be sure to align the mark on the gears with the one on each side of the rack respectively when reassembling them.



[F] Slit glass cleaning pad

(1) Open the front door. Then take off the slit glass cleaner.
(2) Press 2 latches to the inner side, and then remove the slit glass cleaning pad.

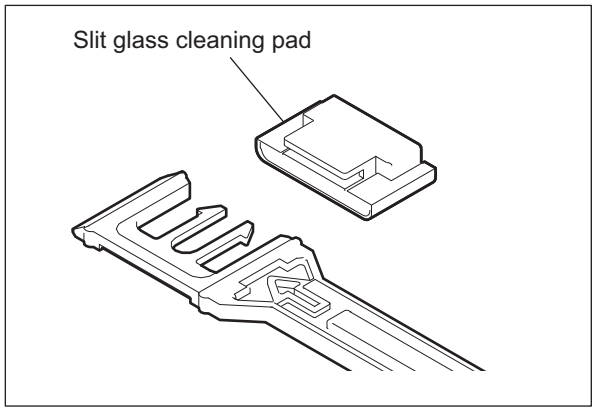


Fig. 8-28

[G] Polygonal motor

Note:

Polygonal motor replacement is not recommended in the field; the image quality is not guaranteed in such a case.

(1) Take off the laser optical unit.
📖 P.8-12 "[A] Laser optical unit"

(2) Remove 3 screws and take off the polygonal motor cover.

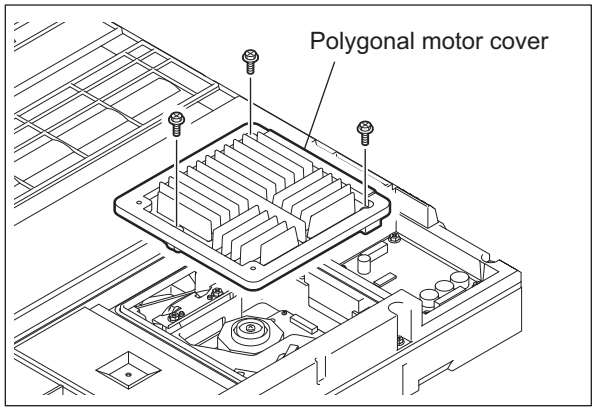


Fig. 8-29

Notes:

1. Treat the polygonal motor gently.
2. The polygonal motor for e-STUDIO2500c/3500c differs from the one for e-STUDIO3510c. Be sure to use the correct one.
3. Never touch the surface of the polygonal mirror or glass. If you do so, wipe the dirt off using a clean and soft cloth, taking care not to scratch the surface.

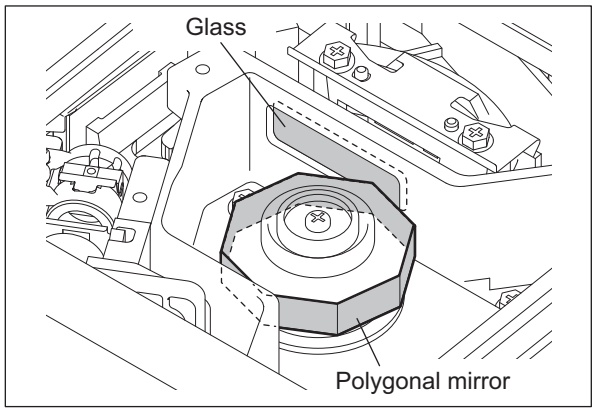


Fig. 8-30

(3) Disconnect 1 connector, remove 4 screws and then take off the polygonal motor.

Note:

Check that all 4 fixing screws for the polygonal motor contact the base before fixing the motor.

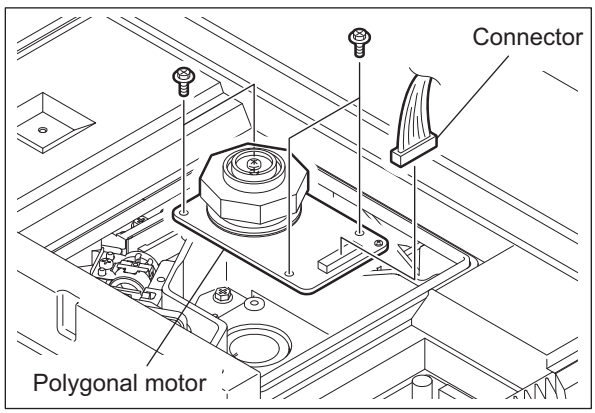


Fig. 8-31

9. DRIVE SYSTEM

9.1 General Description

Respective units and movable parts of the equipment are operated by corresponding motors.
The following list describes which part or unit is driven by each motor.

Motor	Operated section	
Scan motor (M1)	Carriage-1 and -2	Ch.6.
Toner motor (M2 - M5)	Toner cartridge	Ch.12.
Used toner motor (M6)	Toner bag	Ch.12.
Transfer belt motor (M7)	• Transfer belt • Used toner auger of transfer belt	Ch.13.
1st transfer motor (M8)	1st transfer roller-Y, -M and -C (contact / release movement)	Ch.13.
Developer unit motor (M9)	Developer unit-Y, -M, -C and -K (magnet roller, mixer)	Ch.12.
Drum motor (M10)	• Drum-Y, -M, -C and -K • Used toner auger of drum-Y, -M, -C and -K	Ch.11.
Drum switching motor (M11)	Transmitting/releasing the drive to the drum-Y, -M, and -C	Ch.11.
Shutter motor (M12)	Slit glass protective shutter	Ch.8.
Polygonal motor (M13)	Polygonal mirror	Ch.8.
Mirror motor (M14 - M16)	Laser unit third reflecting mirrors for M, C and K	Ch.8.
Fuser motor (M17)	• Fuser unit (Fuser roller, Pressure roller and Fuser roller) • Bridge unit (option)	Ch.15.
Exit motor (M18)	Exit roller	Ch.15.
Registration motor (M19)	• Registration roller • 2nd transfer roller (contact / release movement)	Ch.10. Ch.13.
Feed/transport motor (M20)	• 1st drawer transport clutch (Low / High speed): 1st drawer transport roller • 1st drawer feed roller • 1st drawer pickup roller • 2nd drawer transport clutch (Low / High speed): 2nd drawer transport roller • 2nd drawer feed roller • 2nd drawer pickup roller • Bypass feed clutch: Bypass transport roller, bypass feed roller and bypass pickup roller	Ch.10.
Tray-up motor (M21)	• 1st drawer tray • 2nd drawer tray	Ch.10.
ADU motor (M22)	ADU (Upper, middle and lower transport roller)	Ch.16.

10. PAPER FEEDING SYSTEM

10.1 General Descriptions

This chapter explains how the system works to pick up paper from the drawer or bypass tray and transport it to the 2nd transfer position.
The paper feeding system mainly consists of the pickup roller, feed roller, separation roller, transport roller, registration roller, bypass paper sensor (S40), drawer empty sensor (S32, 36), drawer paper stock sensor (S33, 37), bypass feed sensor (S41), drawer feed sensor (S30, 34), registration sensor (S28) and drive system for these components. The feed/transport motor (M20) and registration motor (M19) drives the above rollers.

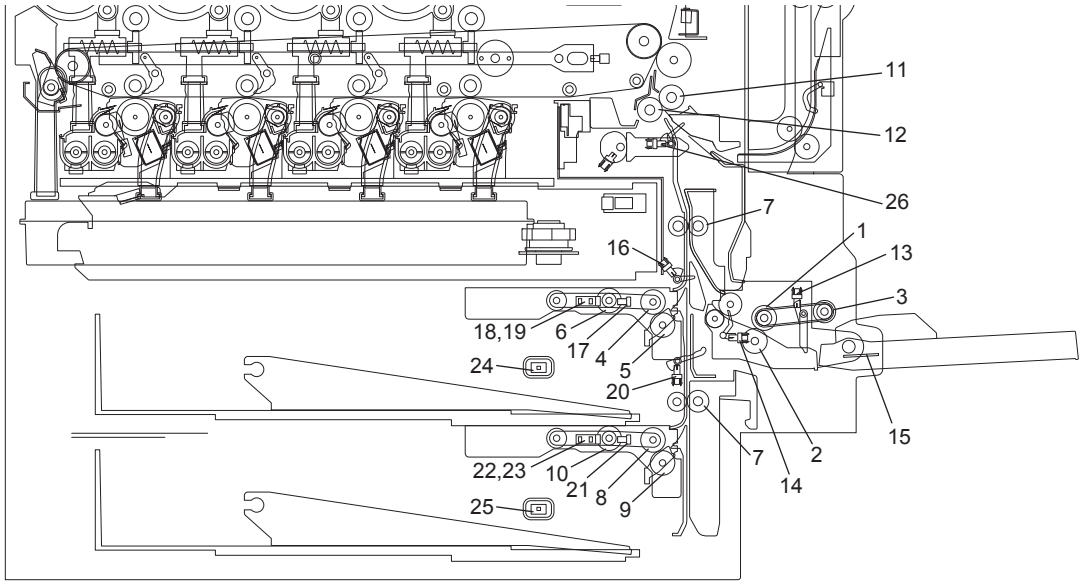


Fig. 10-1

No.	Name	No.	Name
1	Bypass feed roller	14	Bypass feed sensor (S41)
2	Bypass separation roller	15	Paper width detection PC board (SFB)
3	Bypass pickup roller	16	1st drawer feed sensor (S30)
4	1st drawer feed roller	17	1st drawer tray-up sensor (S31)
5	1st drawer separation roller	18	1st drawer empty sensor (S32)
6	1st drawer pickup roller	19	1st drawer paper stock sensor (S33)
7	1st/2nd drawer transport roller	20	2nd drawer feed sensor (S34)
8	2nd drawer feed roller	21	2nd drawer tray-up sensor (S35)
9	2nd drawer separation roller	22	2nd drawer empty sensor (S36)
10	2nd drawer pickup roller	23	2nd drawer paper stock sensor (S37)
11	Registration roller (rubber roller)	24	1st drawer detection switch (SW5)
12	Registration roller (metal roller)	25	2nd drawer detection switch (SW6)
13	Bypass paper sensor (S40)	26	Registration sensor (S28)

10.2 Composition

Feeding system		
1st drawer feeding unit / 2nd drawer feeding unit	1st / 2nd drawer pickup roller	PM parts
	1st / 2nd drawer feed roller	PM parts
	1st / 2nd drawer separation roller	PM parts
	1st / 2nd drawer feed clutch	CLT3/CLT6
	1st / 2nd drawer tray-up sensor	S31/S35
	1st / 2nd drawer empty sensor	S32/S36
	1st / 2nd drawer paper stock sensor	S33/S37
1st / 2nd drawer transport clutch (High speed)		CLT1/CLT5
1st / 2nd drawer transport clutch (Low speed)		CLT2/CLT4
1st / 2nd drawer transport roller		
1st / 2nd drawer feed sensor		S30/S34
1st / 2nd drawer detection switch		SW5/SW6
Bypass unit	Bypass pickup roller	PM parts
	Bypass feed roller	PM parts
	Bypass separation roller	PM parts
	Bypass paper sensor	S40
	Bypass feed sensor	S41
	Bypass pickup solenoid	SOL1
	Bypass tray slide guide width detection PC board	SFB
	Bypass feed clutch	CLT8
Feed/transport motor		M20
Registration motor		M19
Registration roller		
Registration sensor		S28
Tray-up motor		M21

10.3 Functions

1) Pickup roller (Drawers and bypass feed)
   This roller moves up and down and draws out the paper from the bypass tray or drawer and transport it to the feed roller.

2) Feed roller (Drawers and bypass feed)
   This roller is placed against the separation roller. It transports the paper from the pickup roller to the transport roller.

3) Separation roller (Drawers and bypass feed)
   This roller is placed against the feed roller. When two sheets of paper or more are transported from the pickup roller, the load of the torque limiter of the separation roller is heavier than the frictional force between the sheets. As the result, the separation roller is stopped and the lower paper is not advanced any further. When only one sheet is transported from the pickup roller, the separation roller rotates following the feed roller.

4) Transport roller (Drawers and bypass feed)
   This roller transports the paper sent from the feed roller to the registration roller.

5) Registration roller
   Paper transported from the transport roller is pushed against the registration roller which aligns the leading edge of the paper.
   Then, the registration rollers rotate to transport the paper to the transfer unit.

6) Bypass paper sensor (S40)
   This sensor detects if paper is set in the bypass tray. If it is, bypass feeding always comes before drawer feeding.

7) Empty sensor (1st drawer (S32) / 2nd drawer (S36))
   This is a transmissive-type sensor and detects the availability of paper in the drawer by using an actuator. When there is no paper in the drawer, the actuator blocks the light path of the sensor, and the sensor determines that there is no paper.

8) Paper stock sensor (1st drawer (S33) / 2nd drawer (S37))
   This is a transmissive-type sensor which detects the amount of the remaining paper in the drawer using an actuator. When the remaining paper is consumed and becomes around 100 sheets, the actuator blocks the light path for the transmissive-type sensor to notify that the paper is getting fewer.

9) Feed sensor (1st drawer (S30) / 2nd drawer (S34) / bypass (S41))
   This sensor detects if the leading edge or trailing edge of the paper has passed the feed roller. It also detects jamming such as misfeeding.

10) Registration sensor (S28)
    This sensor detects that the leading edge of the paper has reached the registration roller and the trailing edge of the paper has passed the registration roller.

11) Drawer tray-up sensor (1st drawer (S31) / 2nd drawer (S35))
    This sensor stops the tray at the predetermined height when the tray is moved up. When the tray-up sensor is turned ON, the tray-up motor is turned OFF to stop the upward movement of the tray.

12) Drawer detection switch (1st drawer (SW5) / 2nd drawer (SW6))
    This switch detects if the drawer is fully inserted.

13)Feed clutch (1st drawer (CLT3) / 2nd drawer (CLT6) / Bypass (CLT8))
This is a clutch used to transmit the drive from the feed/transport motor to the drawer pickup roller and drawer feed roller.

14)Drawer transport clutch (High speed) (1st drawer (CLT1) / 2nd drawer (CLT5))
This is a clutch used to transmit the drive from the feed/transport motor to the transport roller. When the clutch is turned ON, the transport roller rotates at high speed to transport paper.

15)Drawer transport clutch (Low speed) (1st drawer (CLT2) / 2nd drawer (CLT4))
This is a clutch used to transmit the drive from the feed/transport motor to the transport roller. After the paper is aligned by the registration roller, the drawer transport clutch (High speed) is turned OFF and this clutch is turned ON. Then the transport roller rotates at low speed to transport the paper.

16)Feed/transport motor (M20)
This motor drives the pickup rollers, feed rollers and transport rollers of the drawers and bypass tray.

17)Registration motor (M19)
This motor drives the registration roller. Normal rotation of the motor rotates the registration roller while the reverse rotation of the motor creates the contact/release movement of the 2nd transfer roller with the transfer belt.

18)Tray-up motor (M21)
When this motor rotates normally, the tray in the 1st drawer moves up, and when the motor rotates reversely, the tray in the 2nd drawer moves up.

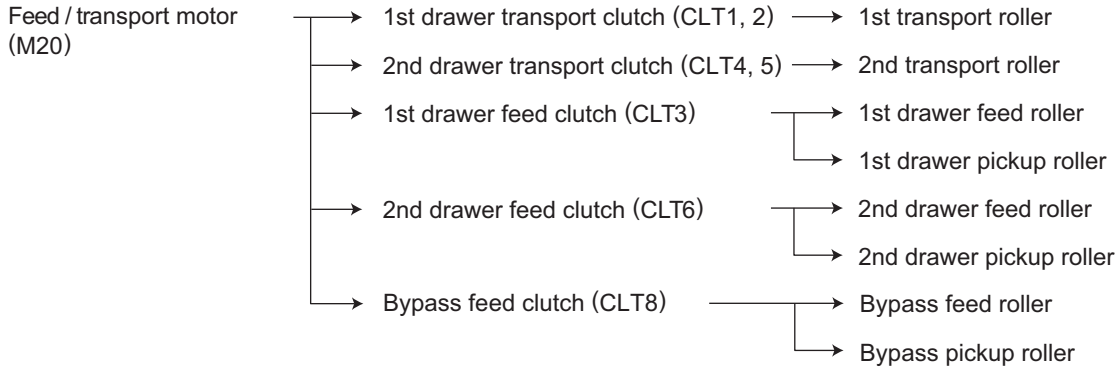
19)Bypass pickup solenoid (SOL1)
This is a solenoid to move down the bypass pickup roller.

20)Paper width detection board (SFB)
This sensor works directly with the sidewalls of the bypass tray to detect the paper width on the tray.

10.4 Description of Operation

10.4.1 Drive of rollers

The drive of each motor in the paper feeding area activates the paper transfer roller as follows.



Registration motor (M19) → Registration roller

Tray-up motor (M21) → Trays in 1st/2nd drawer

10.4.2 Operation of bypass pickup roller

When the bypass pickup solenoid (SOL1) is turned ON, the plunger is pulled, and then the lever is rotated. The pickup arm is then brought down with its own weight. When the bypass pickup solenoid (SOL1) is turned OFF, the pickup arm is brought up by the spring force.
The driving force transmitted through the bypass feed clutch (CLT8) is transmitted to the bypass feed roller through the shaft and then to the bypass pickup roller through the timing belt. The roller is rotated by this driving force.

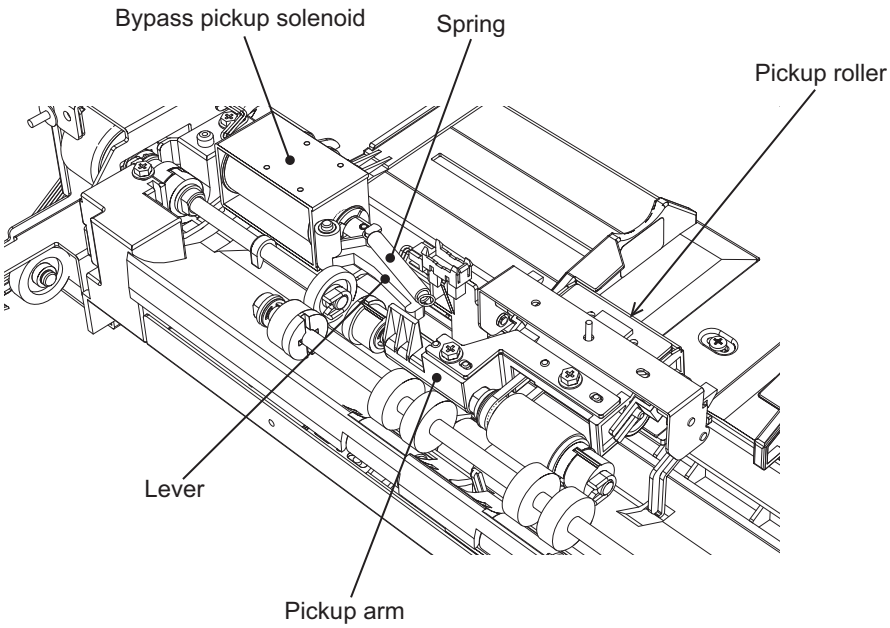


Fig. 10-2

10.4.3 Operation of drawer pickup roller

When the drawer is inserted, the protrusion at the rear side of the drawer moves up the lever (a) to the direction of A. The pickup roller and roller holder are then lowered by it's own weight.

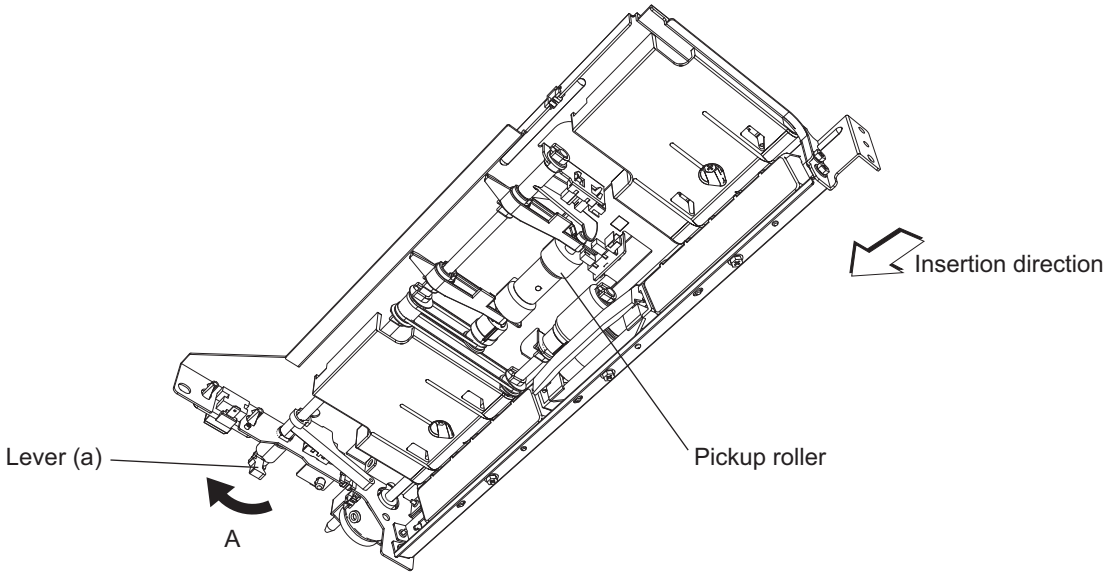


Fig. 10-3

10.4.4 Separation of paper

The separation roller in this equipment works to separate the sheets being fed. The separation roller unit consists of the feed roller, separation roller, spring joint, etc., as shown below.
The feed roller is rotated by the feed clutch in the direction of the white arrow at the same timing as the pickup roller rotation.
The P.10-8 "Fig. 10-4" shows how duplicate feeding is prevented: Since the friction between two sheets is small, the lower sheet is not transported any further while the upper sheet is transported by the feed roller in the direction of the black arrow.

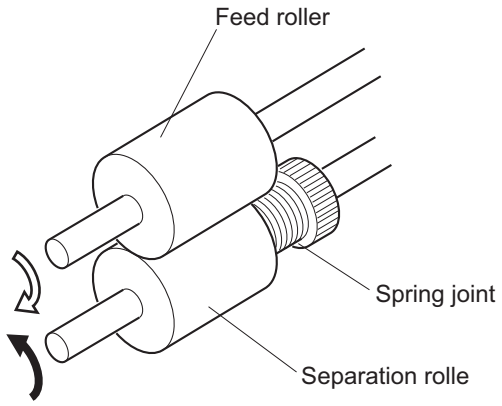


Fig. 10-4

[Example]
When only one sheet enters between the rollers: Since the transporting force of the feed roller is greater than the braking force of the separation roller, the separation roller follows the feed roller, making the sheet go forward to the registration roller.
When two sheets enter between the rollers at the same time:
Since the transporting force of the feed roller and the breaking force of the separation roller are greater than the frictional force between two sheets, the paper A is transported to the direction of the black arrow and the paper B is braked by the separation roller and is not transported any further.

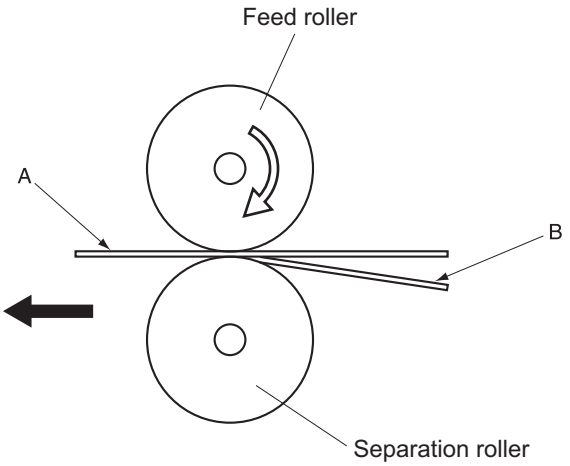


Fig. 10-5

10.4.5 General operation

[A] From power-ON to ready status

1) When the equipment is turned ON, the tray-up motor (M21) is activated and the 1st drawer tray starts to rise. When the tray-up sensor (S31) is turned ON (L→H), the tray-up motor (M21) is turned OFF, and the tray is stopped. At this time, if the empty sensor (S32) is OFF (L), it is judged that there is no paper in the drawer.
   If the empty sensor (S32) is ON (H), there is paper in the drawer. The tray stops at raised position regardless of availability of paper. The tray-up motor (M21) then starts to rotate in reverse and the 2nd drawer is raised. The 2nd drawer is stopped in the same manner as the 1st drawer, and the empty sensor (S36) detects if there is any paper in the drawer.

2) If the drawer is not completely inserted when the equipment is turned ON, the tray for that drawer is not raised. When the drawer is inserted completely, the tray is raised and checks the availability of the paper.

3) If either of the sensors on the transport path is ON (means there is paper on the transport path) when the equipment is turned ON, it is determined that a paper jam has occurred and no operation is enabled until the paper is removed.

[B] Ready status

1) After the tray is moved up and availability of paper is checked as described above, the equipment enters the ready status.
   At ready status, the tray remains at raised position.

2) When a drawer is inserted or removed at ready status, the tray is raised again to check the availability of paper.

[C] Bypass feeding

- The bypass paper sensor (S40) detects availability of paper.
- The bypass pickup solenoid (SOL1) is turned ON and the bypass pickup roller is lowered.
- The bypass feed clutch (CLT8) is turned ON and then the bypass pickup roller, bypass feed roller and bypass transport roller are rotated and start feeding.
- The leading edge of paper turns ON the bypass feed sensor (S41) and bypass pickup solenoid (SOL1) is turned OFF. Then the bypass pickup roller is raised.
- The leading edge of paper turns ON the registration sensor (S28) and the paper is aligned by the registration roller.
- The bypass feed clutch (CLT8) is turned OFF, and then the bypass pickup roller, bypass feed roller and bypass transport roller are stopped.
- The registration motor (M19) is turned ON and the paper is transported to the 2nd transfer position.

[D] Drawer feeding

[D-1] 2nd drawer

- The feed clutch (CLT6) and the transport clutch (high speed) (CLT1, 5) are turned ON, and the pickup roller, feed roller and transport roller are rotated to start feeding paper.
- Passing of the leading edge of the paper turns ON the 2nd drawer feed sensor (S34), then the feed clutch (CLT6) and transport clutch (high speed) (CLT1, 5) is turned OFF then back ON.
- Passing of the leading edge of the paper turns ON the registration sensor (S28) and the paper is aligned by the registration roller.
- The transport clutch (high speed) (CLT1, 5) is turned OFF and the transport roller is stopped.
- The registration motor (M19) and transport clutch (low speed) (CLT2, 4) are turned ON and the paper is transported to the 2nd transfer position.

[D-2] 1st drawer

- The feed clutch (CLT3) and the transport clutch (high speed) (CLT1) are turned ON, and the pickup roller, feed roller and transport roller are rotated to start feeding paper.
- Passing of the leading edge of the paper turns ON the 1st drawer feed sensor (S30), then the feed clutch (CLT3) and the transport clutch (high speed) (CLT1) are turned OFF then back ON.
- Passing of the leading edge of the paper turns ON the registration sensor (S28) and the paper is aligned by the registration roller.
- The feed clutch (CLT3) and the transport clutch (high speed) (CLT1) is turned OFF and the transport roller is stopped.
- The registration motor (M19) and transport clutch (low speed) (CLT2) are turned ON and the paper is transported to the 2nd transfer position.

10.5 Electric Circuit Description

10.5.1 Tray-up motor control circuit

The tray-up motor is a DC brush motor driven by the control signal output from the ASIC on the LGC board and moves up the tray in each drawer.
The motor driver outputs the drive signal (CS1TUMA -0A, CS1TUMB-1A) to the motor based on the control signal (CS1TUMA-0C, CS1TUMB-1C) output from the ASIC. The motor operates the rotation, stop or brake according to the status of these drive signals.

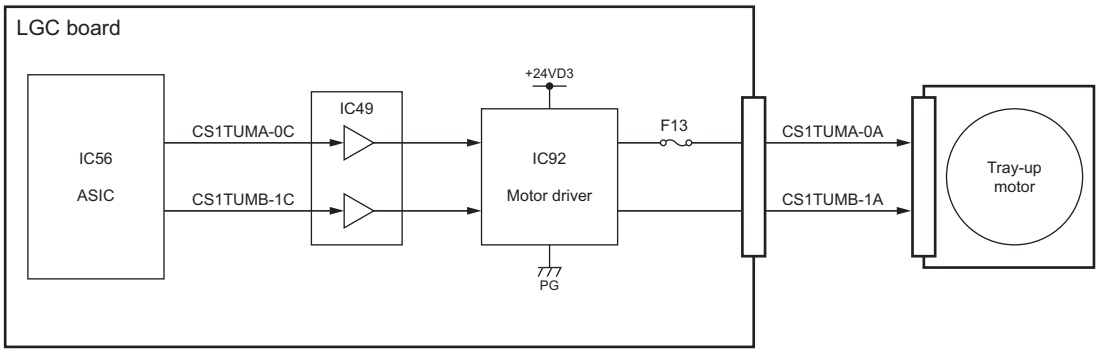


Fig. 10-6

Control signal

Signal				Motor status
ASIC output		Motor driver output		
CS1TUMA-0C	CS1TUMB-1C	CS1TUMA-0A	CS1TUMB-1A	
L	L	OFF (high impedance)		Stop
L	H	L	H	CW (Tray-up of 2nd drawer)
H	L	H	L	CCW (Tray-up of 1st drawer)
H	H	H	H	Brake

* CW: Clockwise rotation, CCW: Counter clockwise rotation viewing from the axis

10.5.2 Registration motor control circuit

The registration motor is a stepping motor driven by the control signal output from the engine CPU on the LGC board and rotates the registration roller.
The registration motor is driven by the pulse signal (RGTMA, RGTMB, RGTMC, RGTMD) output from the motor driver. These pulse signals are formed based on the reference clock (RGMCK) and output only when the enable signal (RGMEN) is a high level. Also, the rotation speed or direction of the motor can be switched by changing the output timing of each pulse signal.

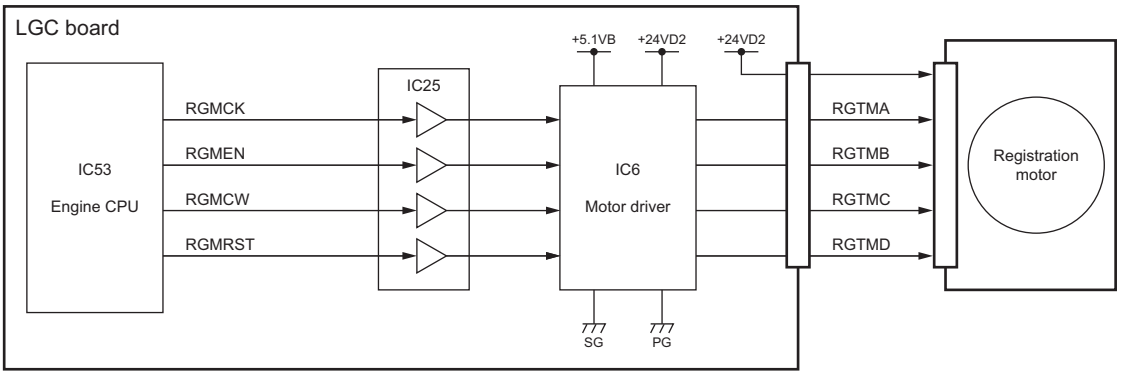


Fig. 10-7

Control signal

Signal	Function	Status	
		High level	Low level
RGMCK	Reference clock	---	---
RGMEN	Enable signal	ON	OFF
RGMCW	Rotation direction signal	CCW	CW
RGMRST	Reset signal	Normal operation	Reset

* CW: Clockwise rotation, CCW: Counter clockwise rotation viewing from the axis

10.5.3 Feed/Transport motor control circuit

The feed/transport motor, which is a brush-less DC motor driven by control signals from the ASIC on the LGC board, drives the feed roller, pickup roller and transport roller in each drawer and the bypass unit.

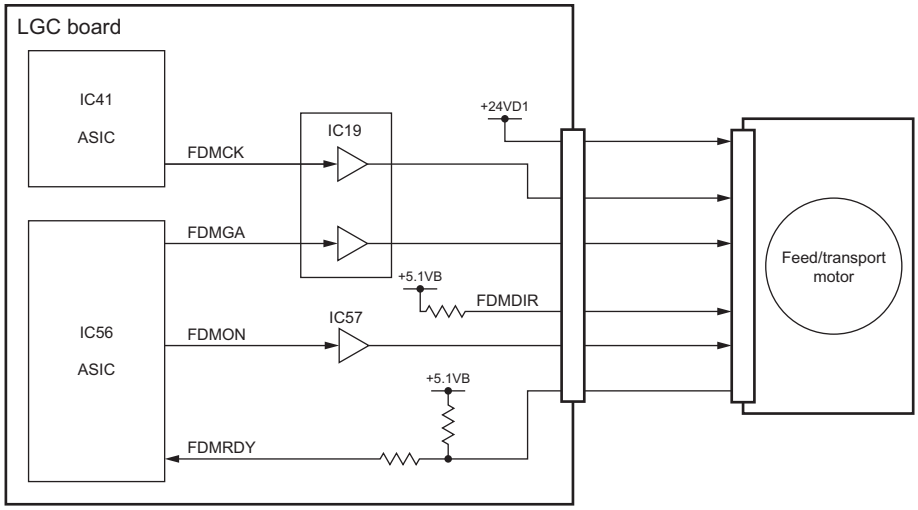


Fig. 10-8

Control signal

Signal	Function	Status	
		High level	Low level
FDMON	Motor ON signal	OFF	ON
FDMDIR	Rotation direction signal	CCW	CW (unused)
FDMGA	Speed switching signal	High speed	Low speed
FDMCK	Reference clock	---	---
FDMRDY	Rotation lock detection signal	Unlocked	Locked (Rotating at a constant speed)

* CW: Clockwise rotation, CCW: Counter clockwise rotation viewing from the axis
* FDMDIR signal is fixed at a high level and rotates only counter clockwise.
* When thick paper or OHP sheet is used, the clock frequency of FDMCK signal is changed to reduce the motor speed in half and lower the paper transport speed so that the fusibility of toner is improved.
* When the rotation speed of the motor is set to a low speed, FDMGA signal is changed to a low level to suppress the rotation fluctuation of the motor.

10.6 Disassembly and Replacement

[A] Bypass unit

[A-1] Bypass unit

(1) Take off the right front hinge cover.
📖 P.2-33 "[N] Right front hinge cover"
(2) Take off the right rear hinge cover.
📖 P.2-32 "[L] Right rear hinge cover"
(3) Remove 1 screw of ground wires. Disconnect 1 connector and release the harnesses from 1 harness clamps.

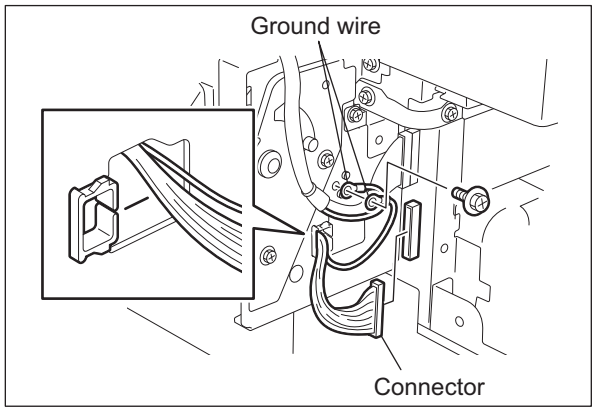


Fig. 10-9

(4) Remove 1 screw and take off the bypass feed rear cover.

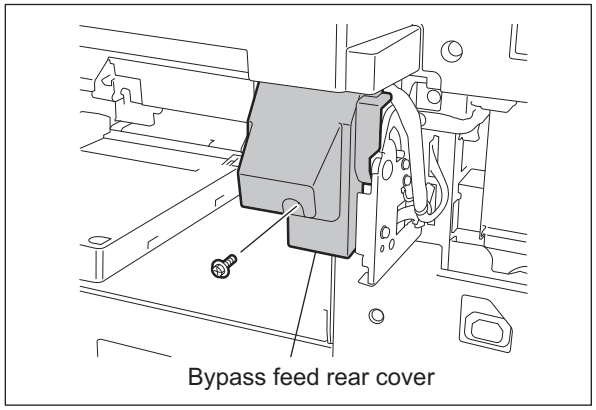


Fig. 10-10

(5) Open the side cover.
(6) Remove 2 screws. Lift up the bypass unit and take it off toward you.

Note:
When installing the bypass unit, make sure that the ADU is closed in advance since the bypass unit occasionally does not slide smoothly.

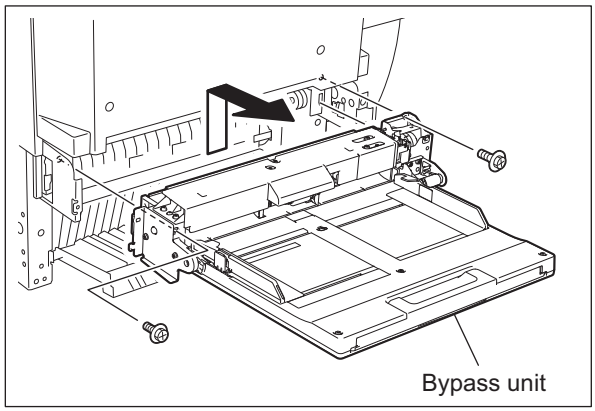


Fig. 10-11

[A-2] Hinge assembly

(1) Take off the bypass unit.
📖 P.10-14 "[A-1] Bypass unit"
(2) Disconnect 1 connector and release the harness from the harness clamp.

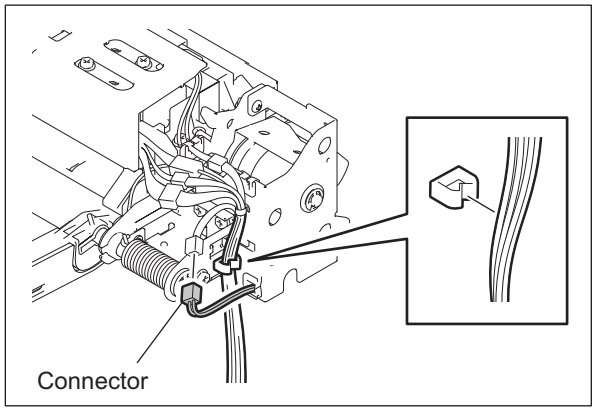


Fig. 10-12

(3) Release the spring from the hook.

Note:
Release it while the tray is standing so as to weaken the tension of the spring.

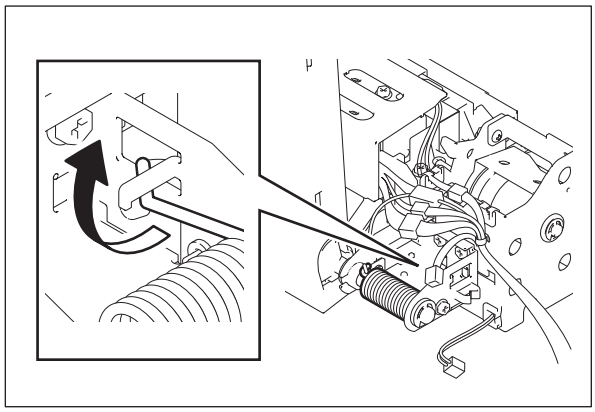


Fig. 10-13

(4) Remove 2 screws, and then take off the hinge by sliding it.

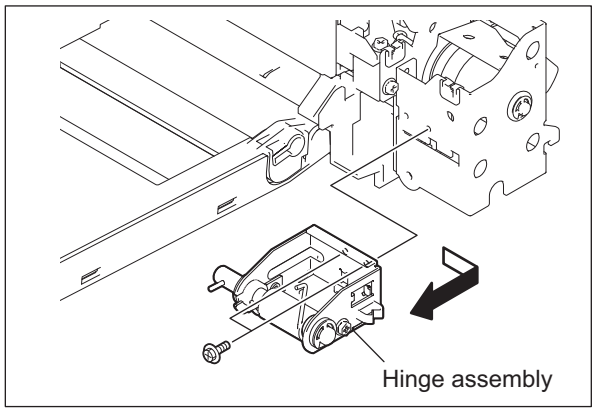


Fig. 10-14

(5) Take off the tray from the bypass unit.

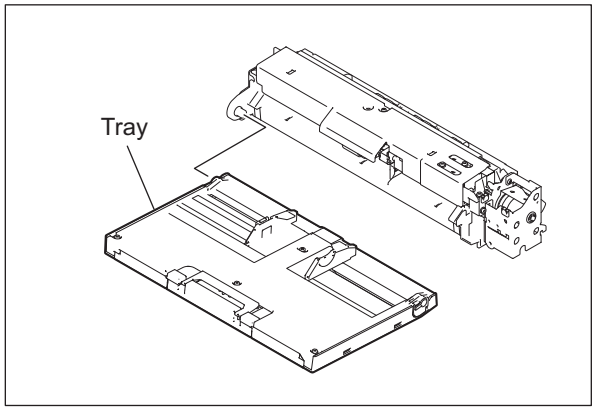


Fig. 10-15

[A-3] SFB board (SFB)

(1) Take off the hinge assembly.
📖 P.10-15 "[A-2] Hinge assembly"
(2) Remove 5 screws and take off bypass tray upper cover.

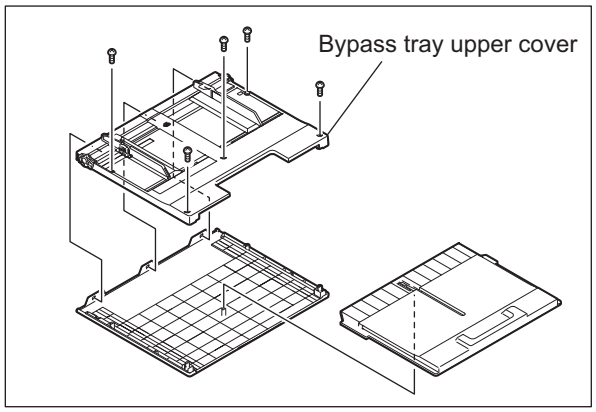


Fig. 10-16

(3) Remove 1 screw for the plate spring. And remove 1 screw on the tray side and take off the bracket.

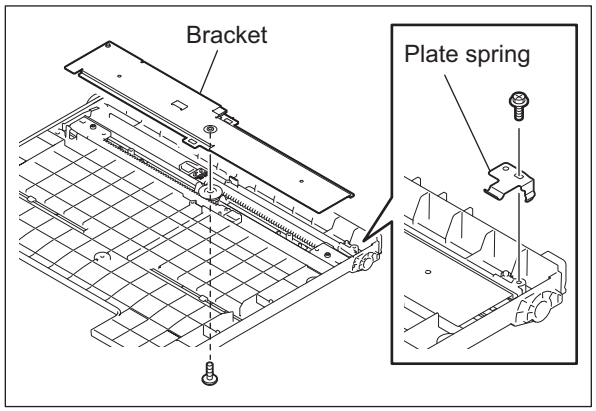


Fig. 10-17

Note:
Install the bracket so that its pointer is placed at the same position as before.

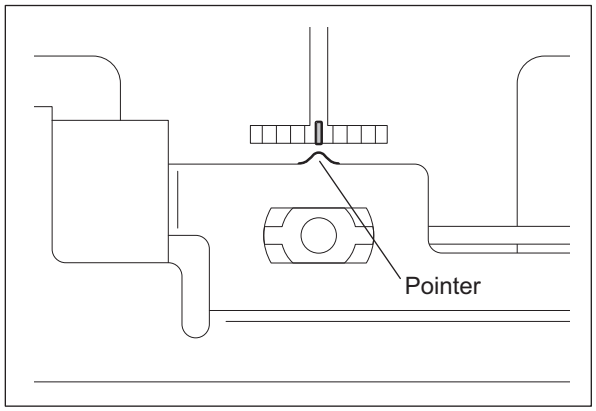


Fig. 10-18

(4) Disconnect 1 connector, remove 1 screw and take off the SFB board.

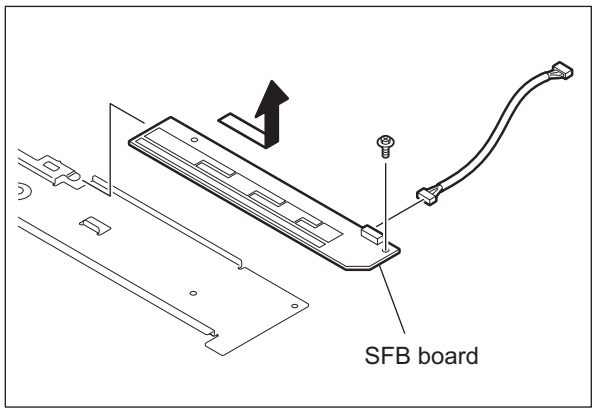


Fig. 10-19

[A-4] Bypass feed upper cover

(1) Take off the bypass unit.
📖 P.10-14 "[A-1] Bypass unit"
(2) Remove 1 screw and slide the bypass feed upper cover to take it off.

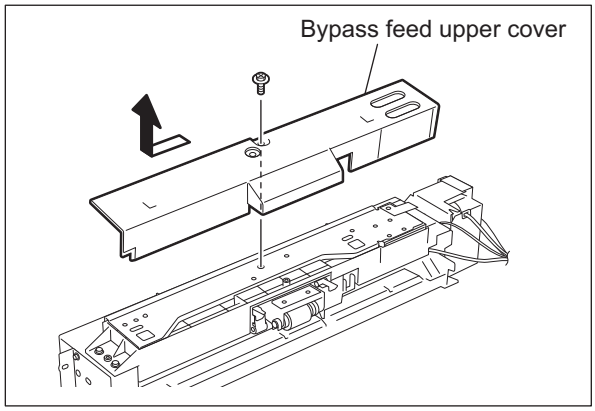


Fig. 10-20

[A-5] Bypass upper guide

(1) Take off the bypass feed upper cover.
📖 P.10-18 "[A-4] Bypass feed upper cover"
(2) Remove 4 screws and take off the bypass upper guide.

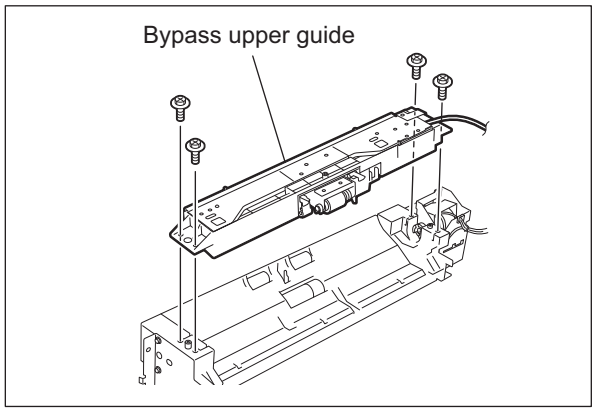


Fig. 10-21

[A-6] Bypass pickup solenoid (SOL1)

(1) Take off the bypass feed upper cover.
🕮 P.10-18 "[A-4] Bypass feed upper cover"
(2) Remove 4 screws and take off the upper plate.

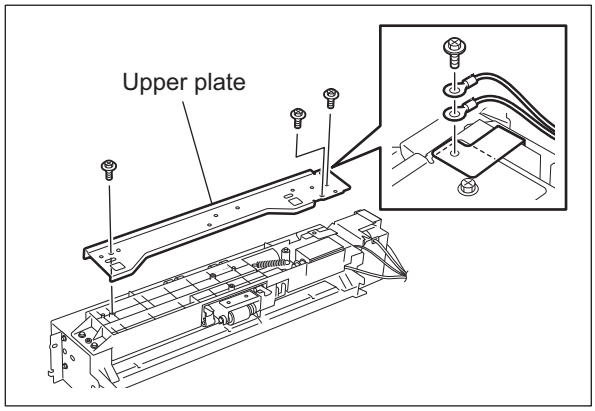


Fig. 10-22

(3) Remove 1 spring. Disconnect 1 connector and take off the bypass pickup solenoid with the solenoid arm.

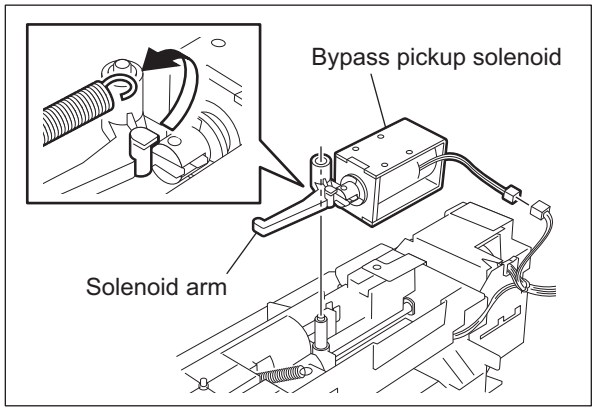


Fig. 10-23

[A-7] Bypass paper sensor (S40)

(1) Take off the bypass feed upper cover.
🕮 P.10-18 "[A-4] Bypass feed upper cover"
(2) Remove 4 screws and take off the upper plate.

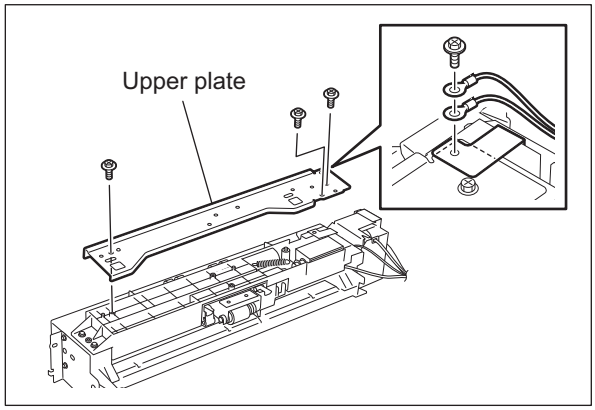


Fig. 10-24

(3) Take off the sensor arm.

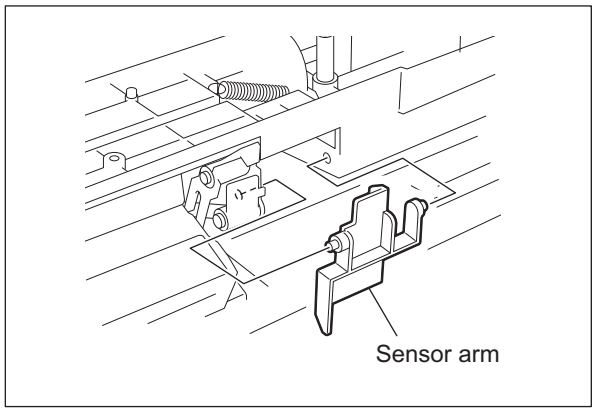


Fig. 10-25

(4) Disconnect the connector from the sensor and release the latch to take off the bypass paper sensor.

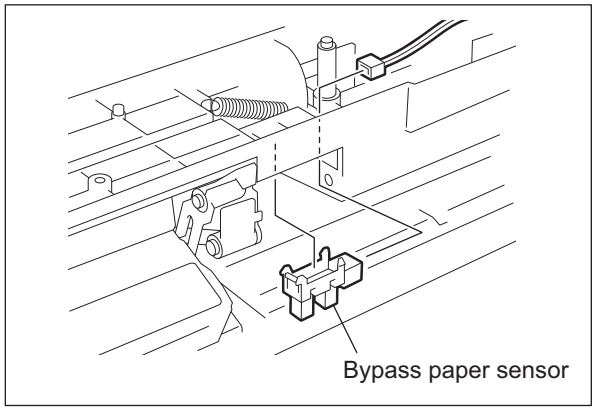


Fig. 10-26

[A-8] Bypass pickup roller (PM)

(1) Take off the bypass upper guide.
📖 P.10-18 "[A-5] Bypass upper guide"
(2) Remove the clip, pull out the shaft and take off the bypass pickup roller.

Notes:

Make sure the following items when assembling the bypass pickup roller.

1. Set the timing belt to the pulley securely.
2. Do not put the wrong position when setting the timing belt.
3. Be sure to insert the clip into the groove of shaft.
4. Check that there is no stain such as oil on the surface of timing belt, the pulley and the roller.
5. Install the bypass pickup roller and the bypass feed roller in the correct direction.

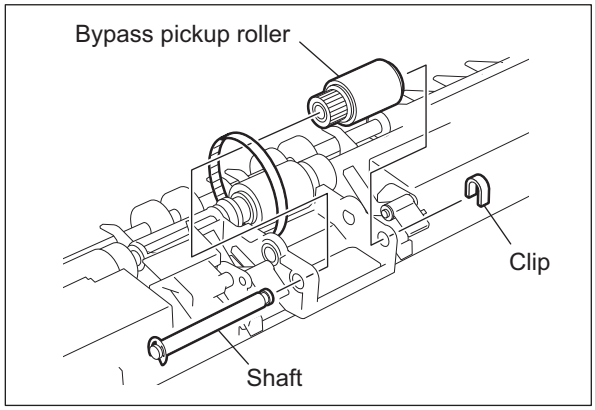


Fig. 10-27

[A-9] Bypass feed roller PM

(1) Take off the bypass upper guide.
📖 P.10-18 "[A-5] Bypass upper guide"
(2) Remove the clip and take off the bypass feed roller.

Notes:
Make sure the following items when assembling the bypass feed roller.
1. Set the timing belt to the pulley securely.
2. Do not put the wrong position when setting the timing belt.
3. Be sure to insert the clip into the groove of shaft.
4. Check that there is no stain such as oil on the surface of timing belt, the pulley and the roller.
5. Install the bypass pickup roller and the bypass feed roller in the correct direction.

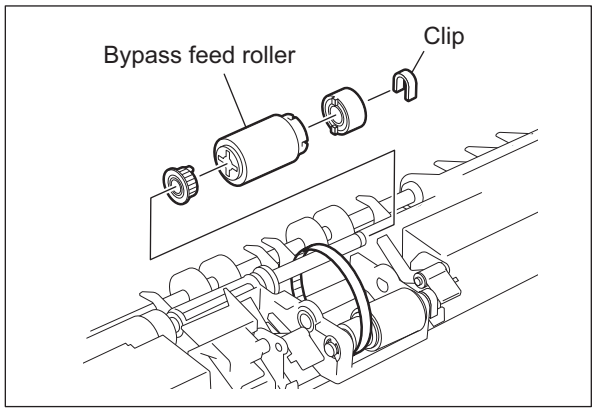


Fig. 10-28

[A-10] Bypass transport roller

(1) Take off the bypass upper guide.
📖 P.10-18 "[A-5] Bypass upper guide"
(2) Remove the E-ring, pull out the shaft and take off the bypass transport roller.

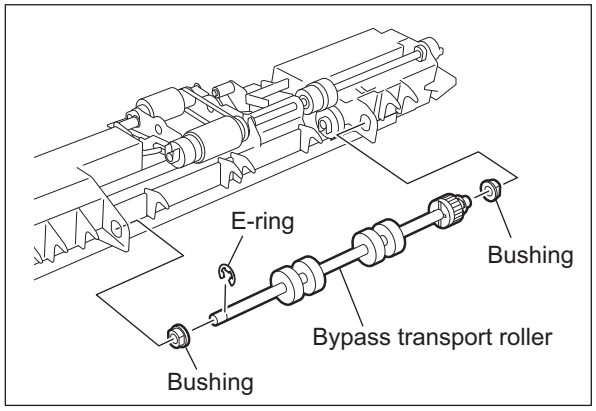


Fig. 10-29

[A-11] Bypass feed clutch (CLT8)

(1) Take off the bypass tray and hinge assembly.
📖 P.10-15 "[A-2] Hinge assembly"
(2) Disconnect 1 connector and release the harness clamp.

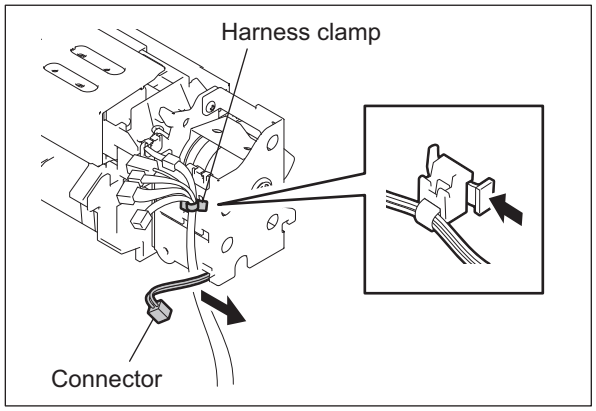


Fig. 10-30

(3) Remove the E-ring and the bushing.
(4) Remove 3 screws and take off the bracket.
(5) Remove the bushing and the bypass feed clutch.

Note:
Match the protruding portion of the clutch and bracket for assembling.

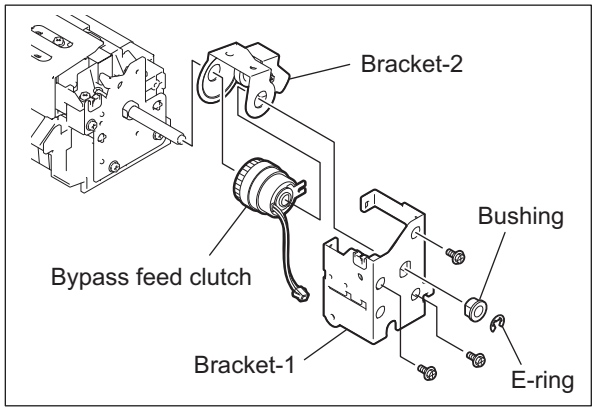


Fig. 10-31

[A-12] Bypass separation roller PM

(1) Take off the bypass unit.
📖 P.10-14 "[A-1] Bypass unit"
(2) Remove 3 screws and take off the lower plate.

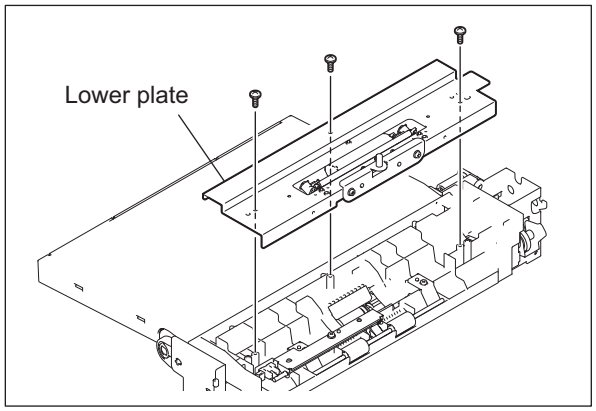


Fig. 10-32

(3) Take off the bypass separation roller assembly.

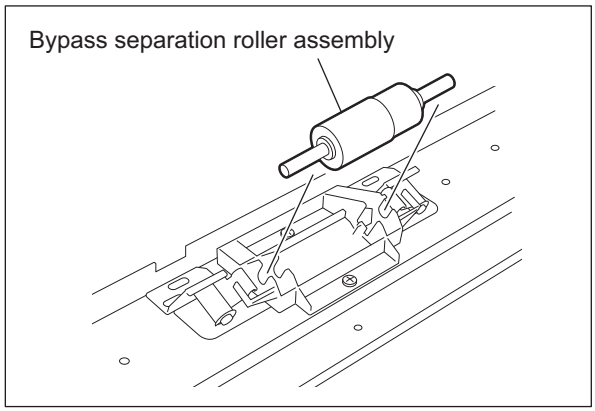


Fig. 10-33

(4) Detach the cover, the arbor, and the clutch spring from the shaft, and then take off the bypass separation roller.

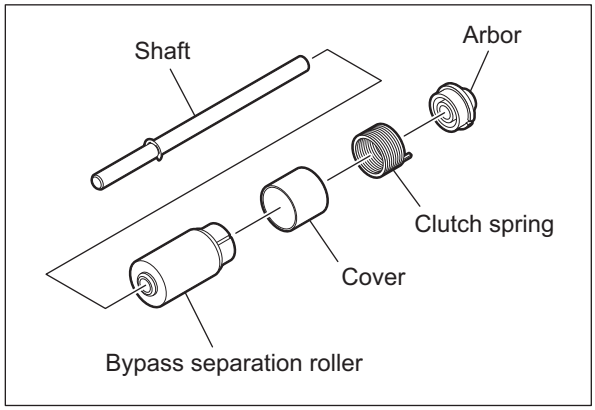


Fig. 10-34

[A-13] Bypass feed sensor (S41)

(1) Take off the bypass unit.
📖 P.10-14 "[A-1] Bypass unit"
(2) Remove 3 screws and take off the lower plate.

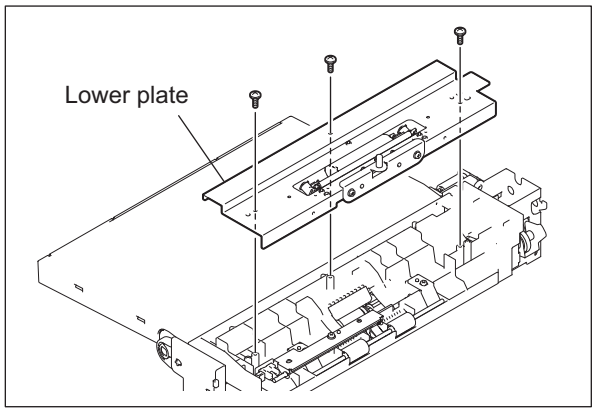


Fig. 10-35

(3) Disconnect 1 connector. Remove 1 screw and take off the sensor plate.

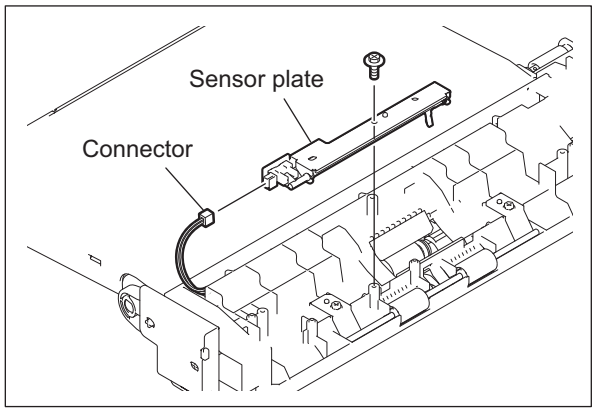


Fig. 10-36

(4) Release the latch to take off the bypass feed sensor.

Note:
Be careful not to come off the sensor arm and the sensor spring after taking off the sensor.

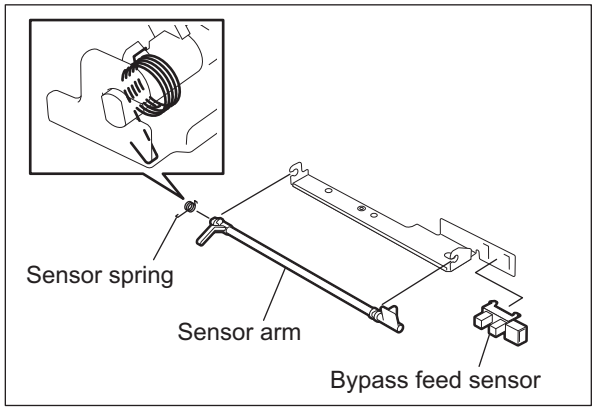


Fig. 10-37

[B] Drawer feeding unit

[B-1] Drawer feeding unit

(1) Take off the upper and lower drawers.
(2) Remove 1 screw and take off the drawer feeding unit by sliding it to the front side.

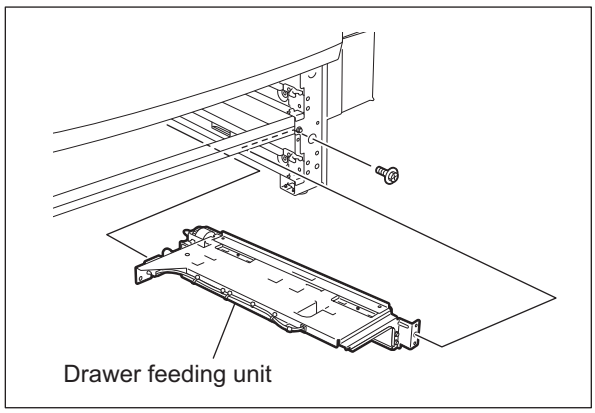


Fig. 10-38

[B-2] Tray-up sensor (S31/S35) / Empty sensor (S32/S36)

(1) Take off the drawer feeding unit.
📖 P.10-24 "[B-1] Drawer feeding unit"
(2) Disconnect the connector and release the latch to take off the tray-up sensor.
(3) Disconnect the connector and release the latch to take off the empty sensor.

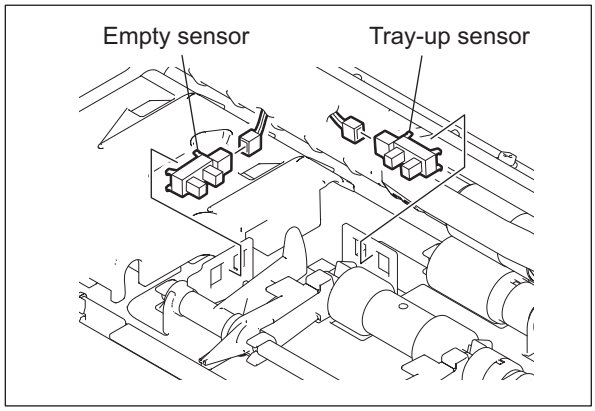


Fig. 10-39

[B-3] Paper stock sensor (S33/S37)

(1) Take off the drawer feeding unit.
📖 P.10-24 "[B-1] Drawer feeding unit"
(2) Pull up the paper stock sensor arm.
(3) Disconnect the connector and release the latch to take off the paper stock sensor.

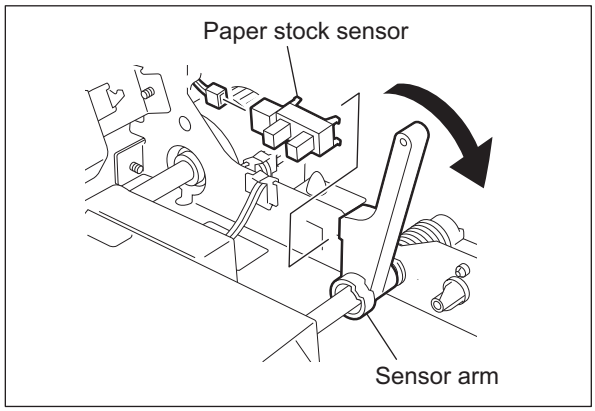


Fig. 10-40

[B-4] Separation roller PM

(1) Take off the drawer feeding unit.
P.10-24 "[B-1] Drawer feeding unit"
(2) Remove 1 screw and take off the separation roller holder.

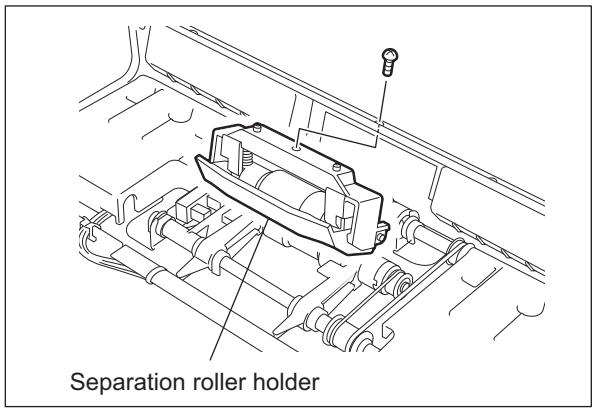


Fig. 10-41

(3) Detach the lever from the holder and take off the separation roller with the shaft.

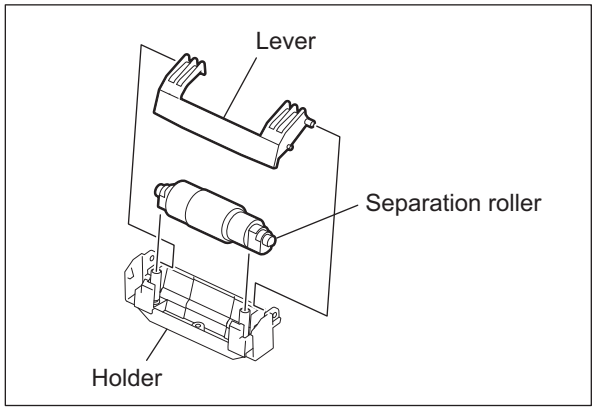


Fig. 10-42

(4) Detach the cover, the arbor and the clutch spring from the shaft, and then takeoff the separation roller.

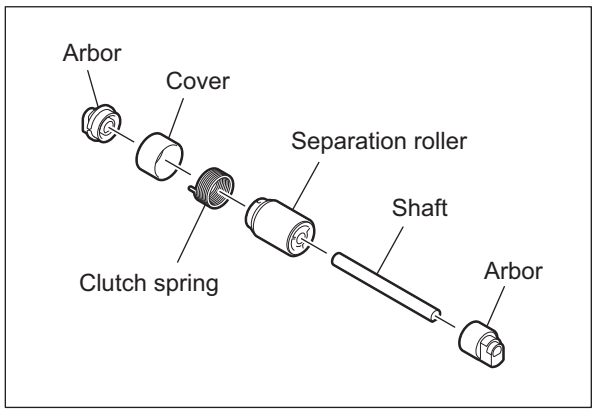


Fig. 10-43

[B-5] Feed roller PM

(1) Take off the separation roller holder.
📖 P.10-26 "[B-4] Separation roller"
(2) Remove the clip and take off the feed roller.

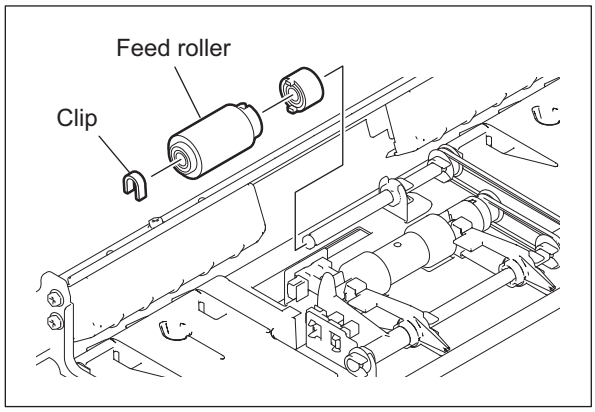


Fig. 10-44

[B-6] Pickup roller PM

(1) Take off the drawer feeding unit.
📖 P.10-24 "[B-1] Drawer feeding unit"
(2) Remove the pickup roller assembly from the pickup arms and take off the belt.

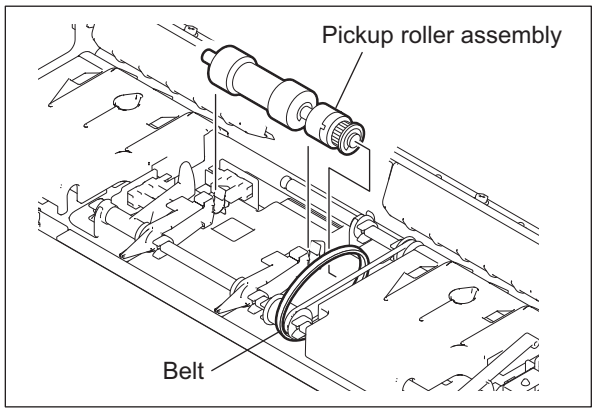


Fig. 10-45

(3) Remove 3 E-rings, pulley, one-way clutch and take off the pickup roller.

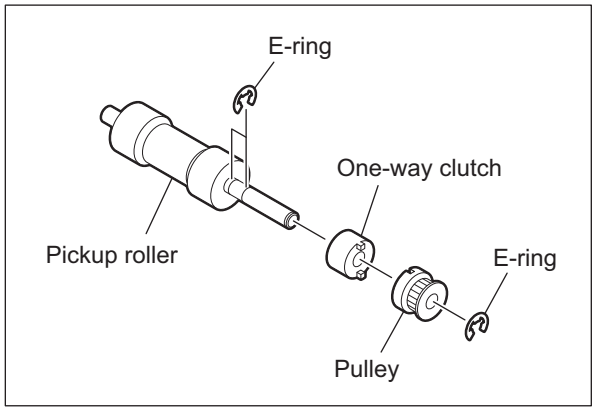


Fig. 10-46

[B-7] Drawer feed clutch (CLT3/CLT6)

(1) Take off the drawer feeding unit.
📖 P.10-24 "[B-1] Drawer feeding unit"
(2) Disconnect the connector and release the harness from the harness clamp.

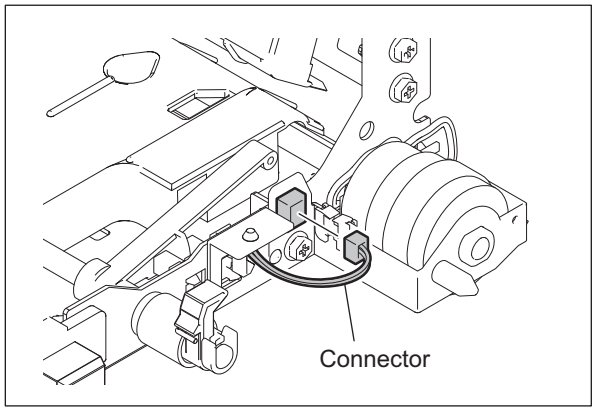


Fig. 10-47

(3) Remove 2 screws and take off the clutch with the bracket.

Note:
Match the protruding portion of clutch with the position shown in the figure for assembling

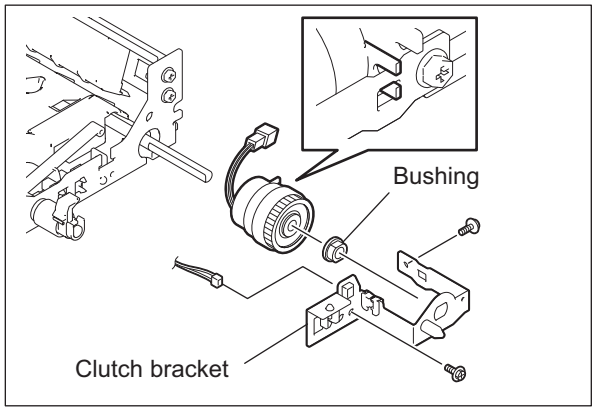


Fig. 10-48

[C] Tray drive unit

[C-1] Tray-up motor (M21)

(1) Remove the upper and lower drawers.
(2) Take off the filter bracket.
📖 P.2-42 "[I] FIL board"
(3) Disconnect 1 connector. Remove 4 screws and take off the tray drive unit.

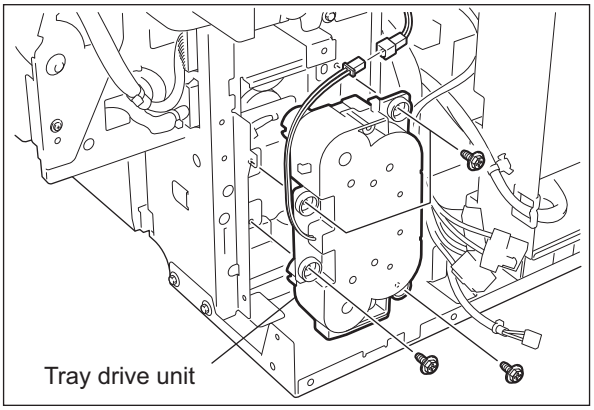


Fig. 10-49

(4) Place the unit with its coupling up and release 6 latches to take off the cover.

Note:
Be careful in taking off the cover because there is a spring in the tray drive unit.

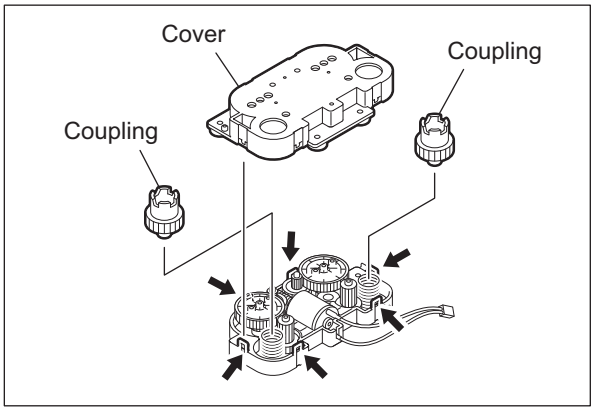


Fig. 10-50

(5) Take off the tray-up motor.

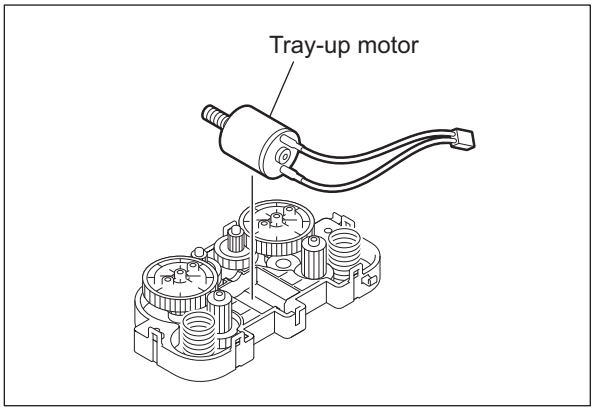


Fig. 10-51

Note:

Match the boss of the gear with the hole of the cover when installing the motor.

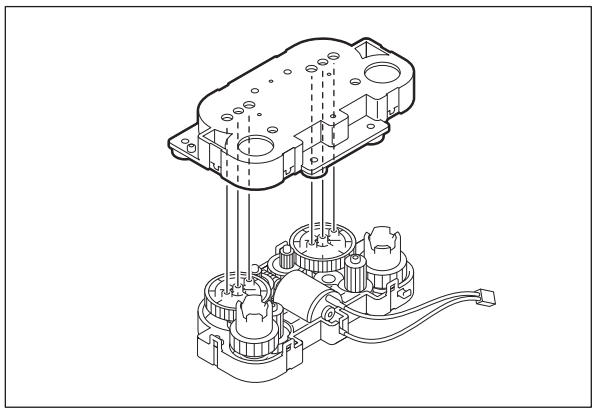


Fig. 10-52

[C-2] Tray drive unit

(1) Remove the upper and lower drawers.
(2) Take off the filter bracket.
📖 P.2-42 "[I] FIL board"
(3) Disconnect 1 connector. Remove 4 screws and take off the tray drive unit with the bracket.

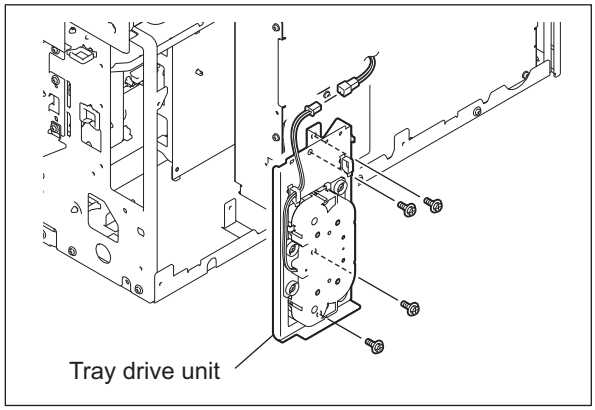


Fig. 10-53

[D] 2nd drawer transport clutch (Low speed) (CLT4)

(1) Take off the tray drive unit.
📖 P.10-30 "[C-2] Tray drive unit"
(2) Disconnect 1 connector and remove 1 clip to take off the 2nd drawer transport clutch (low speed).

Note:

When assembling the clutch, match the protruded portion of the clutch with the position shown in the figure.

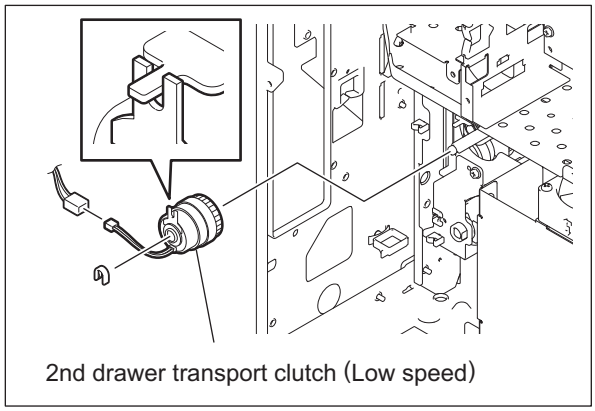


Fig. 10-54

[E] 2nd drawer transport clutch (High speed) (CLT5)

(1) Take off the tray drive unit.
📖 P.10-30 "[C-2] Tray drive unit"
(2) Disconnect 1 connector and remove 2 screws to take off the whole set of the clutch.
(3) Take off the bracket, shaft, gear and 2 bushings.

Note:
When assembling the clutch, match the protruded portion of the clutch with the position shown in the figure.

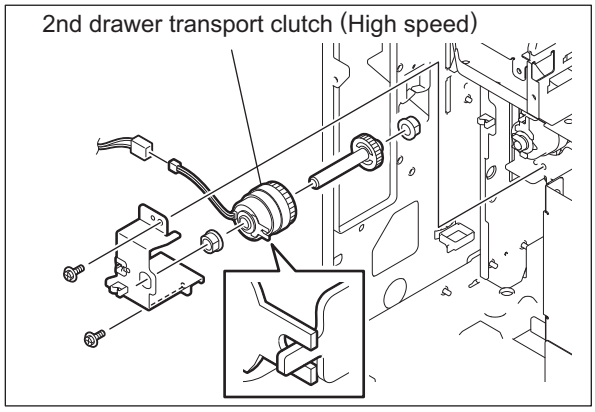


Fig. 10-55

[F] 1st drawer detection switch (SW5) / 2nd drawer detection switch (SW6)

(1) Take off the tray drive unit.
📖 P.10-30 "[C-2] Tray drive unit"
(2) Disconnect 1 connector each from both switches. Then release 2 latches to take off the switches by pushing them out toward the drawer.

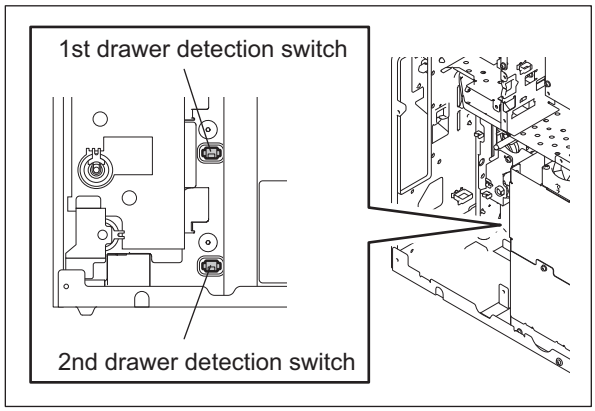


Fig. 10-56

[G] Paper feed guide assembly

(1) Take off the ADU.
🕮 P.16-14 "[B] Automatic Duplexing Unit (ADU)"
(2) Take off the bypass unit.
🕮 P.10-14 "[A] Bypass unit"
(3) Take off the 2nd transfer unit.
🕮 P.13-25 "[C-1] 2nd transfer unit (TRU)"
(4) Disconnect 1 connector, and then release the harness from 2 hooks.
(5) Remove 3 screws, and then take off the paper feed guide assembly by sliding it to the rear side slightly.

Note:
When installing the assembly, be sure not to deform the Mylar on the transport path.

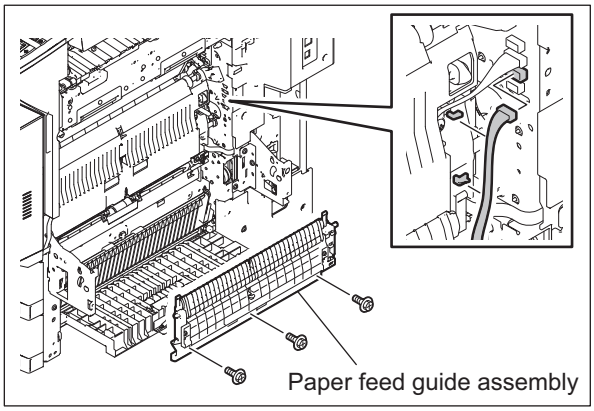


Fig. 10-57

[H] 2nd drawer feed sensor (S34)

(1) Take off the paper feed guide assembly.
🕮 P.10-32 "[G] Paper feed guide assembly"
(2) Remove the seal and disconnect 1 connector to take off the 2nd drawer feed sensor.

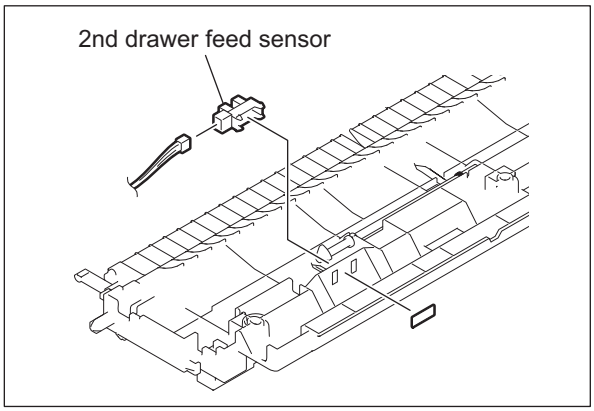


Fig. 10-58

[I] Side cover switch (SW4)

(1) Take off the paper feed guide assembly.
📖 P.10-32 "[G] Paper feed guide assembly"
(2) Remove 2 screws, and then take off the paper feed guide A by sliding it.

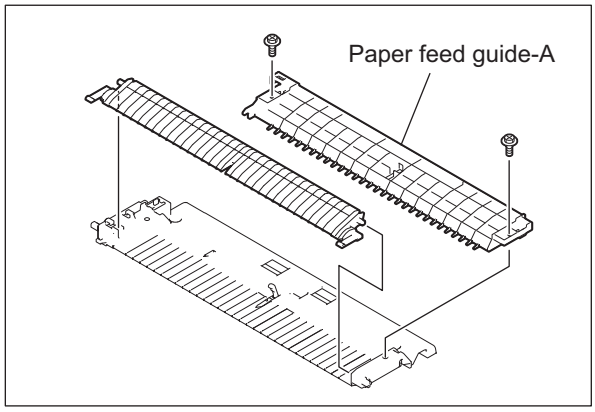


Fig. 10-59

(3) Disconnect 1 connector, and then release 2 latches to take off the side cover switch.

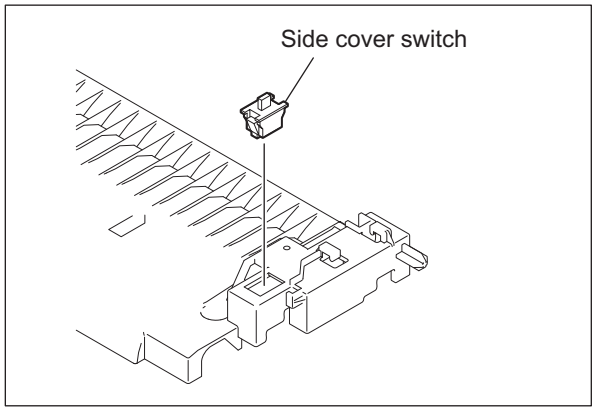


Fig. 10-60

[J] Registration guide

(1) Perform the output check (03-239) to set the plunger at the receded position before taking off the registration guide.

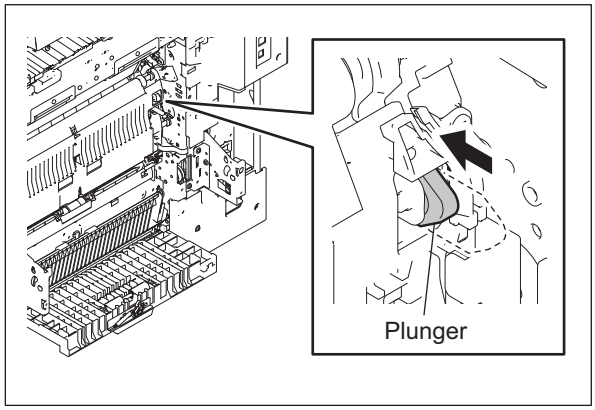


Fig. 10-61

(2) Take off the paper feed guide assembly.
📖 P.10-32 "[G] Paper feed guide assembly"
(3) Take off each cover of the both sides of the registration guide.

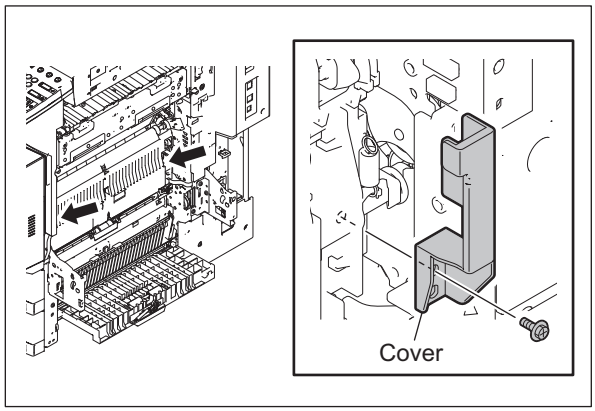


Fig. 10-62

(4) Remove the spring by releasing the front side hook, and remove the wire and cam.

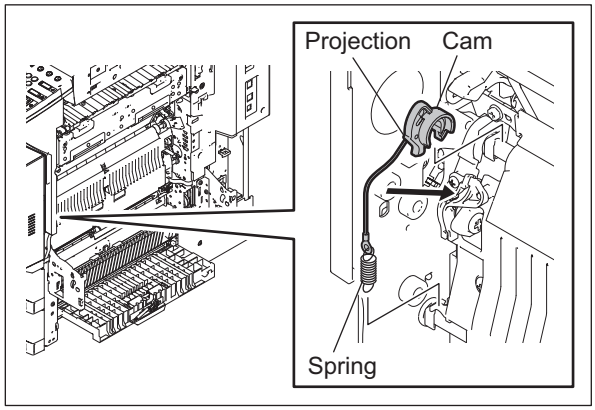


Fig. 10-63

(5) Remove the spring by releasing the rear side hook, and remove the wire and cam.

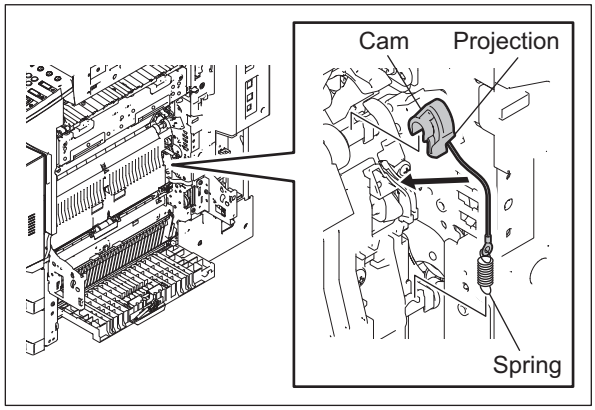


Fig. 10-64

Notes:

Keep the following points in mind when assembling.

1. Since the shape of the front and rear side cam is different, be careful not to assemble the wrong one.
2. Make sure that you route the wire along the correct wiring route.
3. After assembling, check that the front and rear side cams move smoothly.
4. Make sure that the protrusions of the cams are on the upper side of the registration guide.

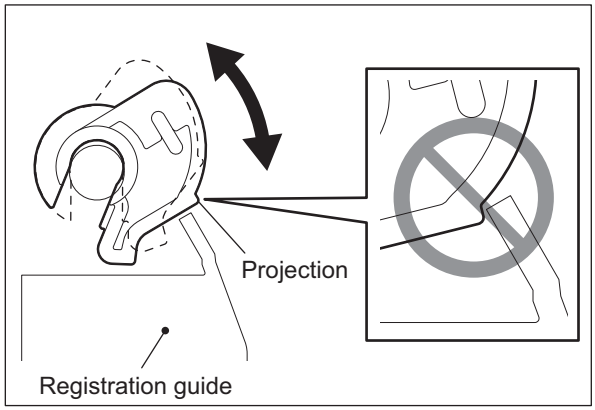


Fig. 10-65

(6) Disconnect 1 connector and remove 3 screws. Then take off the registration guide.

Note:

The outer 2 of these 3 screws are stepped screws.

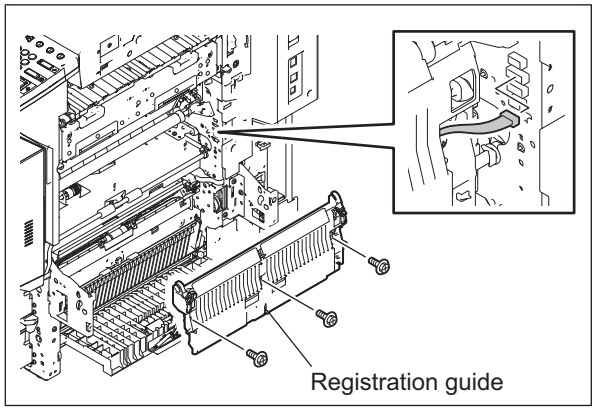


Fig. 10-66

[K] Registration sensor (S28)

(1) Take off the registration guide.
P.10-33 "[J] Registration guide"

(2) Disconnect 1 connector and remove 1 screw. Then take off the registration sensor with its bracket.

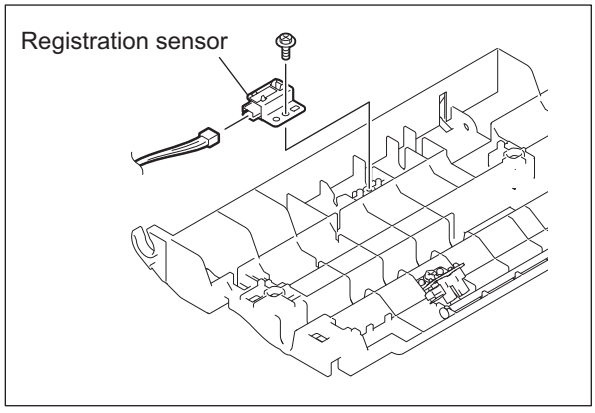


Fig. 10-67

(3) Remove the seal, and then take off the registration sensor.

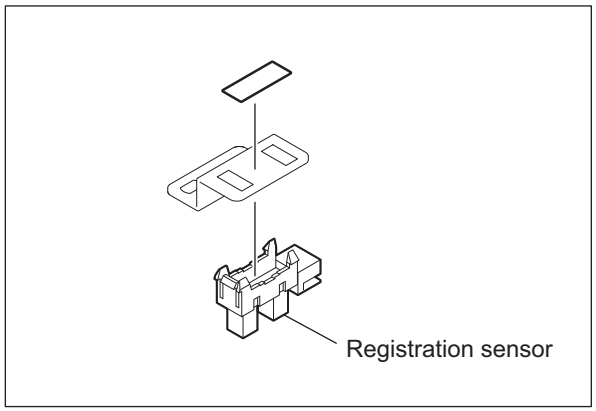


Fig. 10-68

[L] 1st drawer feed sensor (S30)

(1) Take off the registration guide.
📖 P.10-33 "[J] Registration guide"
(2) Disconnect 1 connector and remove 1 screw. Then take off the 1st drawer feed sensor with its bracket.

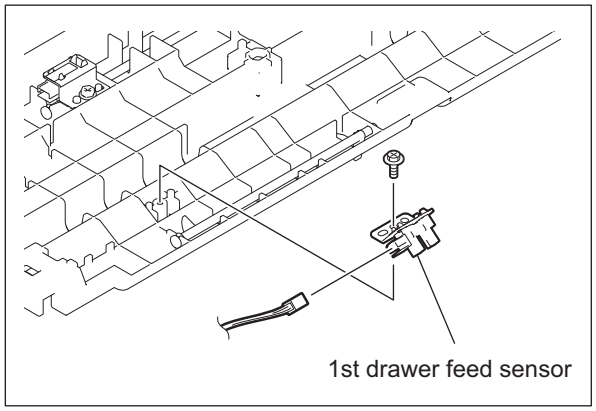


Fig. 10-69

(3) Remove the seal, and then take off the 1st drawer feed sensor.

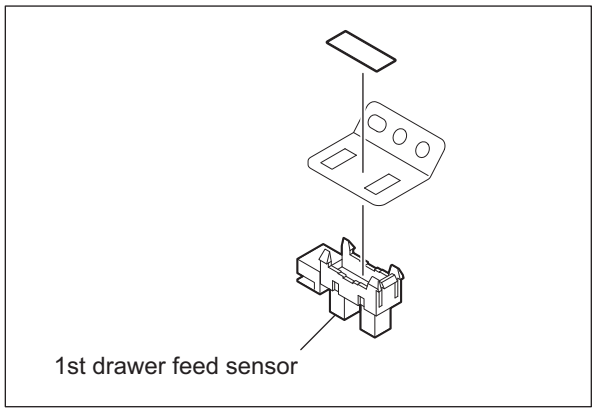


Fig. 10-70

[M] Registration roller (Rubber)

(1) Open the 2nd transfer unit.
(2) Remove 1 screw on the front side, and then remove the holder and spring.
(3) Remove 1 screw on the rear side, and then remove the holder and spring.

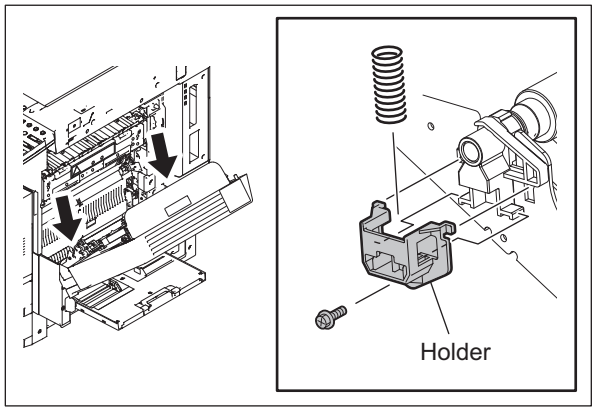


Fig. 10-71

(4) Take off the registration roller (rubber) with its holder.

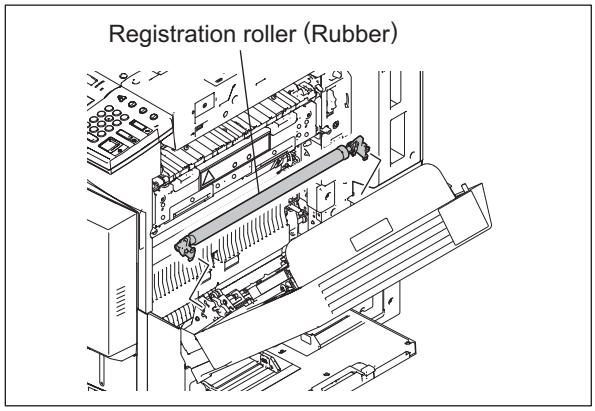


Fig. 10-72

(5) Remove 2 holders, 3 E-rings, 1 gear and the grounding plate.

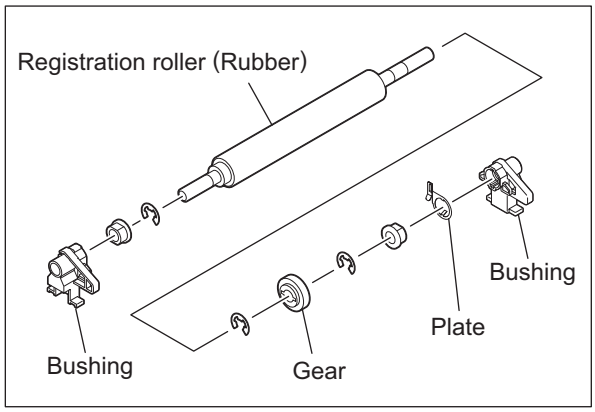


Fig. 10-73

[N] Registration motor unit

(1) Open the board case.
📖 P.2-45 "[K] Board case"
(2) Disconnect 1 connector and remove 4 screws. Then take off the registration motor unit.

Note:
Be sure not to drop the bushing.

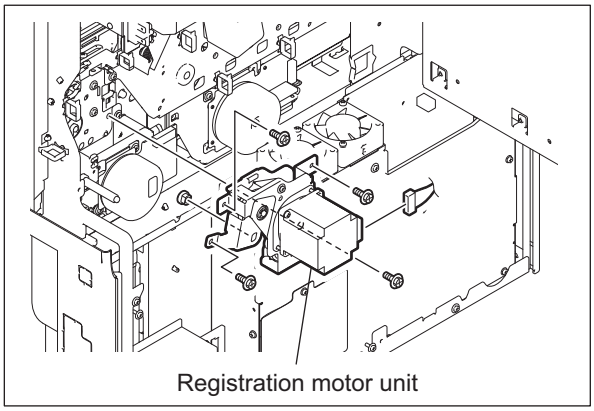


Fig. 10-74

[O] Registration motor (M19)

(1) Open the board case.
📖 P.2-45 "[K] Board case"
(2) Take off the registration motor unit.
📖 P.10-41 "[R] 1st drawer transport clutch (Low speed) (CLT2)"
(3) Remove 3 screws to take off the plate.

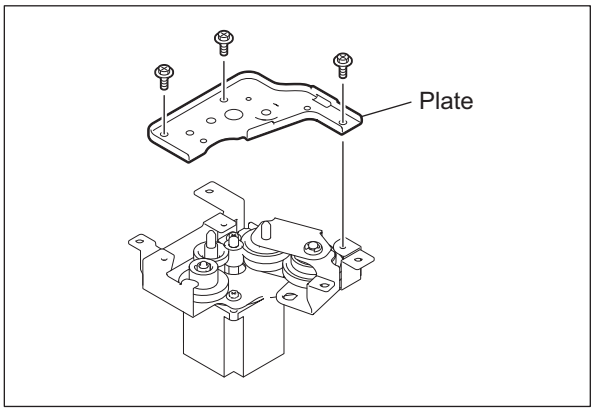


Fig. 10-75

(4) Remove 1 screw, 3 gears and the bracket with gear.

Note:
Replace the registration motor with the damper and the bracket installed.

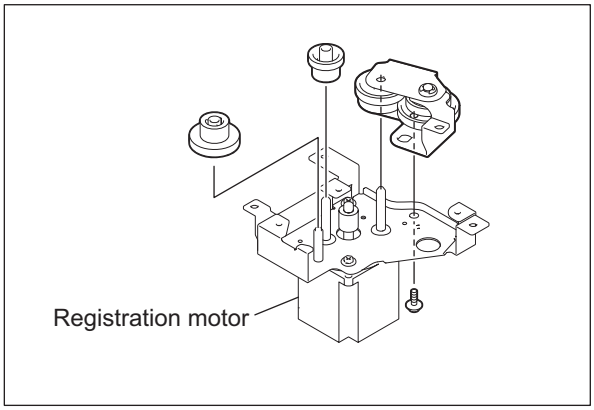


Fig. 10-76

Note:
Never attempt to loosen 4 screws with lock paint.

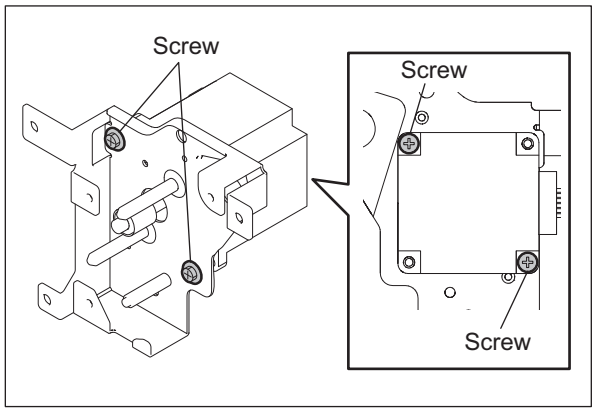


Fig. 10-77

[P] Registration roller (Metal)

(1) Take off the registration motor unit.
🕮 P.10-38 "[N] Registration motor unit"
(2) Take off the registration guide.
🕮 P.10-33 "[J] Registration guide"
(3) Take off the middle guide.

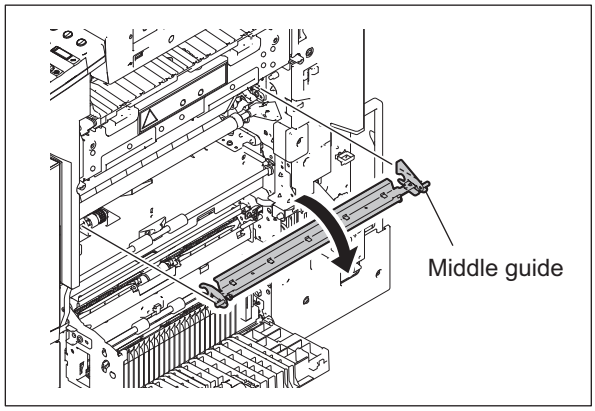


Fig. 10-78

(4) Remove the clip on the rear side of the registration roller (metal). Then remove the gear and parallel pin.

Note:
Be sure not to drop the parallel pin.

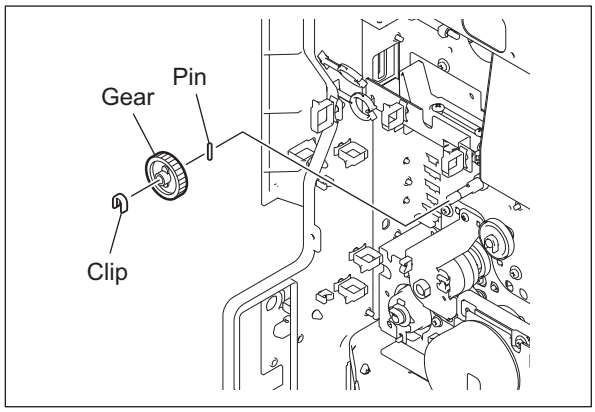


Fig. 10-79

(5) Remove 2 screws, and then take off the duct.

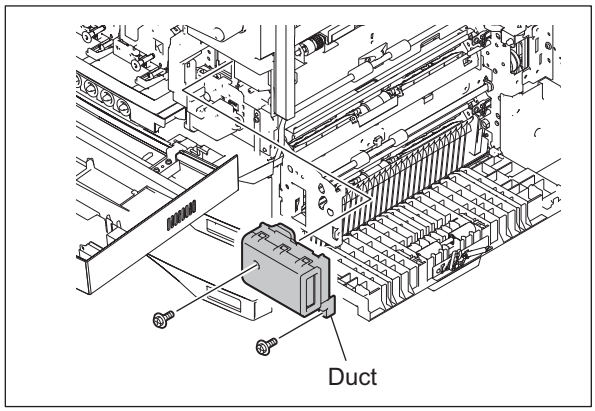


Fig. 10-80

(6) Remove 1 screw, and then take off the cover.

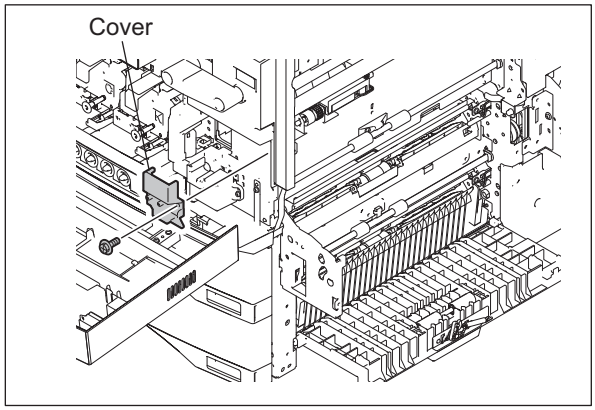


Fig. 10-81

(7) Remove each 1 screw fixing the both front and rear holders.
(8) Remove 2 clips, and then move the front and rear holders and bushings to the inner side.
(9) Move the registration roller (metal) to the rear side, and then take it off from the front side.

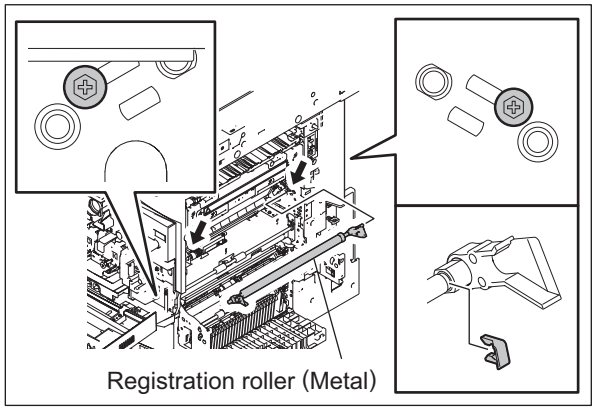


Fig. 10-82

[Q] Paper dust holder

(1) Take off the registration roller (metal).
📖 P.10-39 "[P] Registration roller (Metal)"
(2) Remove 2 screws, and then take off the paper dust holder.

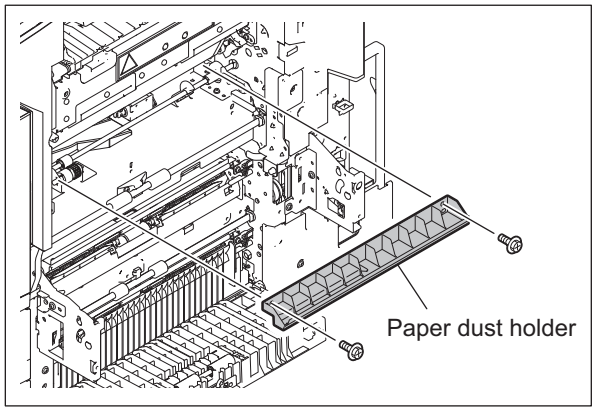


Fig. 10-83

[R] 1st drawer transport clutch (Low speed) (CLT2)

(1) Open the board case.
📖 P.2-45 "[K] Board case"
(2) Remove 2 screws and take off the bracket.
(3) Disconnect 1 connector and take off the 1st drawer transport clutch (Low speed).

Note:
When assembling the clutch, match the protruded portion of the clutch with the position shown in the figure.

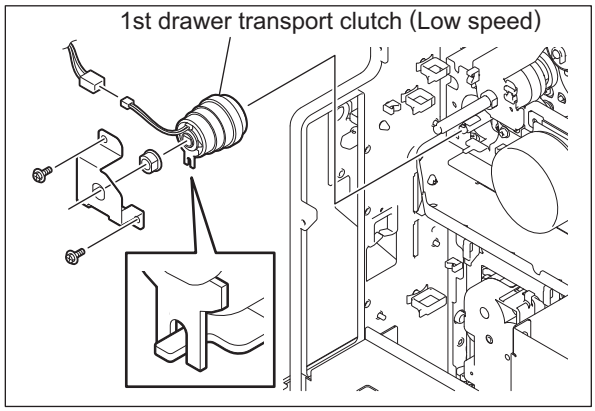


Fig. 10-84

10

[S] Feed/transport motor (M20)

(1) Open the board case.
📖 P.2-45 "[K] Board case"
(2) Disconnect 1 connector and remove 4 screws to take off the feed/transport motor.

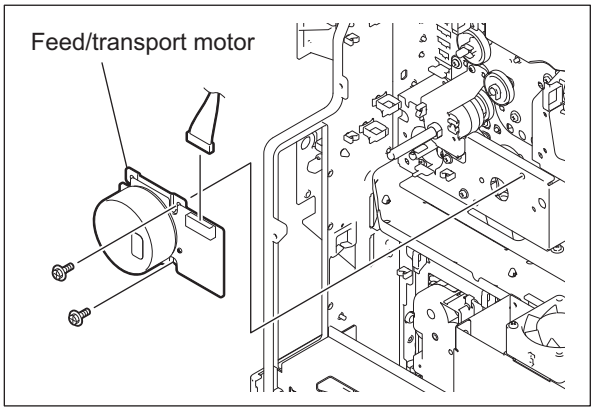


Fig. 10-85

[T] Feed/transport gear unit

(1) Take off the feed/transport motor.
📖 P.10-42 "[S] Feed/transport motor (M20)"
(2) Take off the 1st drawer transport clutch (Low speed).
📖 P.10-41 "[R] 1st drawer transport clutch (Low speed) (CLT2)"
(3) Disconnect 1 connector, and then release the harness out of the clamp.
(4) Remove 4 screws, and then take off the feed/transport gear unit.

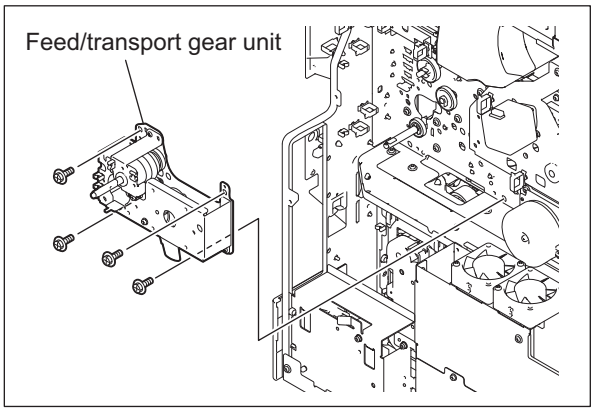


Fig. 10-86

[U] 1st drawer transport clutch (High speed) (CLT1)

(1) Take off the feed/transport gear unit.
📖 P.10-42 "[T] Feed/transport gear unit"
(2) Remove 2 screws, and then take off the 1st drawer transport clutch (High speed) with its bracket.
(3) Remove the shaft and gear from the 1st drawer transport clutch (High speed).

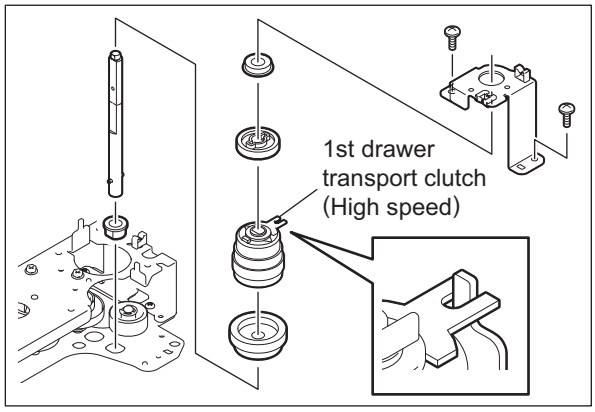


Fig. 10-87

[V] 1st drawer transport roller

(1) Take off the registration guide.
📖 P.10-33 "[J] Registration guide"
(2) Take off the feed/transport motor.
📖 P.10-42 "[S] Feed/transport motor (M20)"
(3) Remove 2 clips to move 2 bushings to the inside.
(4) Lift up the 1st drawer transport roller and take it off to the rear side.
(5) Remove 1 E-ring, 1 gear and 2 bushings from the 1st drawer transport roller.

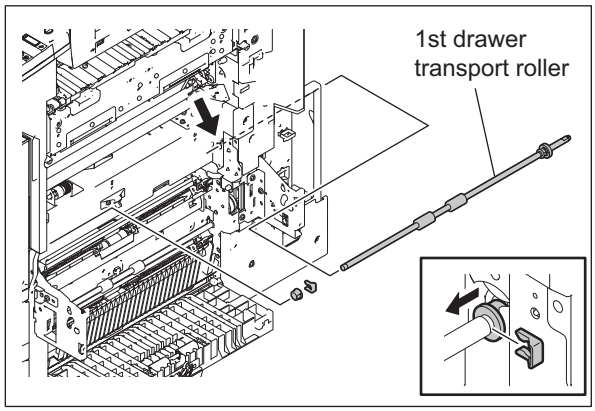


Fig. 10-88

[W] 2nd drawer transport roller

(1) Take off the paper feed guide assembly.
📖 P.10-32 "[G] Paper feed guide assembly"
(2) Take off the tray drive unit.
📖 P.10-30 "[C-2] Tray drive unit"
(3) Take off the 2nd drawer transport clutch (low speed).
📖 P.10-30 "[D] 2nd drawer transport clutch (Low speed) (CLT4)"
(4) Remove 1 clip, and then remove the gear and parallel pin.

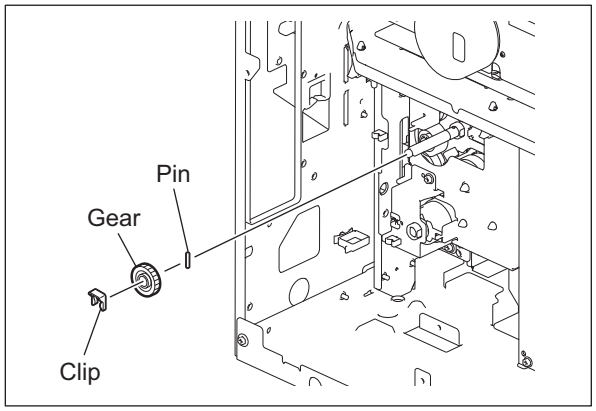


Fig. 10-89

(5) Remove 2 clips, and then take off the 2nd drawer transport roller by moving it to the rear side slightly.

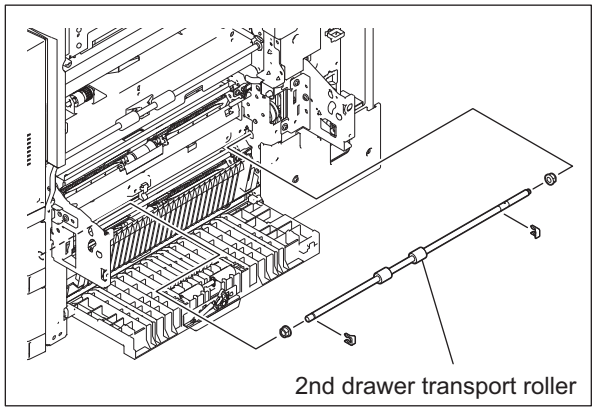


Fig. 10-90

11. PROCESS UNIT RELATED SECTION

11.1 General description

The equipment has 4 process units (EPU: Electrographic Processing Unit). Each process unit consists of the drum cleaner unit and developer unit which are unified, and it corresponds to the image forming process of Y, M, C, K colors. Also, the main charger unit is installed with the cleaner unit, and the discharge LEDs are installed on the ozone duct.
This chapter explains about the process unit and parts around this unit which are provided for image formation. Except the developer unit, which is one of units composing the process unit, is described in chapter 12 in detail.

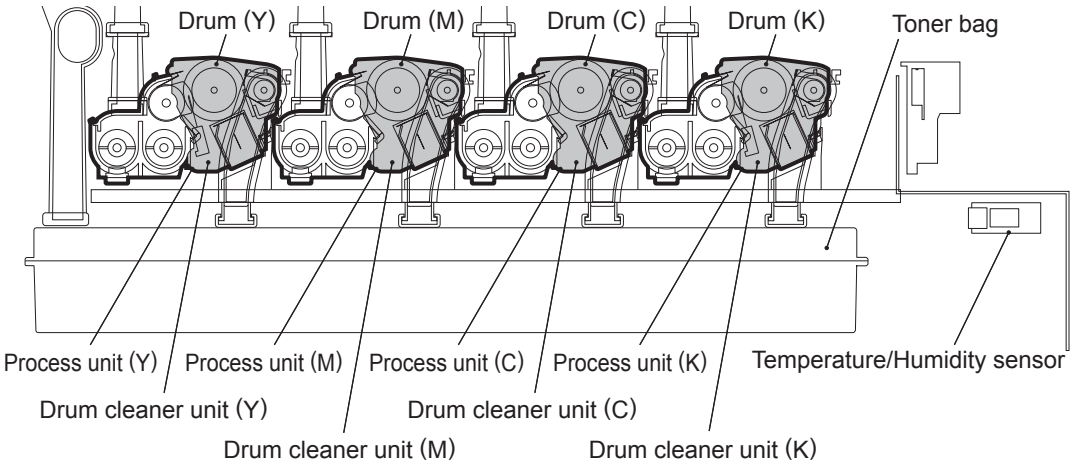


Fig. 11-1

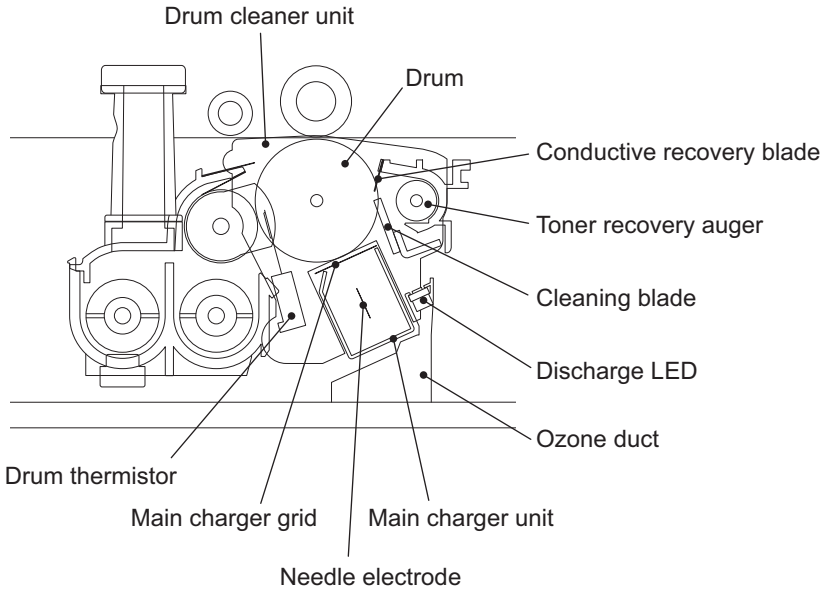


Fig. 11-2

11.2 Composition

Process unit (Y, M, C, K)	Drum cleaner unit	Drum	PM parts
		Cleaning blade	PM parts
		Conductive recovery blade	
		Toner recovery auger	
	Main charger unit	Main charger grid	PM parts
		Needle electrode	PM parts
		Needle electrode cleaner	PM parts
	Developer unit		Ch.12
		Drum thermistor-Y, -K	THM1, THM2
	EPU board		EPU-Y, -M, -C, -K Ch.12
Discharge LED			ERS-Y, -M, -C, -K
Temperature/Humidity sensor			S12
Ozone filter-1, -2			PM parts
Ozone exhaust fan			M24
High-voltage transformer			
Drum motor			M10
Drum switching motor			M11

11.3 Functions

1) Drum
   Drum is made of a cylindrical aluminum base coated with thin film of organic photoconductive substance. Photoconductive object becomes insulative (high electrical resistance) when it is not exposed to lights and becomes conductive (low electrical resistance) when it is exposed to lights. This object is called photoconductor.

2) Drum cleaner unit
   - Cleaning blade
     This blade is pressed against the drum surface with a constant force by pressure springs, and scrapes off the residual toner on the drum surface.
   - Conductive recovery blade
     This blade prevents the toner which was scraped off by the cleaning blade from being scattered to the outside. Negative bias is applied on this blade to remove positive charge on the photoconductive drum.
   - Toner recovery auger
     This auger carries the residual toner scraped off to the toner bag.

3) Main charger
   The main charger in this equipment consists of a metal rod with U-shaped section, insulated terminals at both ends of the rod and a needle electrode attached between them. When a high voltage is applied to the needle electrode, the air around it is charged (ionized). The ionized air then flows into the drum causing it to be charged. This phenomenon is called “corona discharge”. At the same time, a control bias is applied to the main charger grid to control the charging amount. In a dark place, negative charge is evenly applied onto the drum surface by the corona discharge and this grid. In addition, a cleaner is installed to clean up the dust attached on the needle electrode.
   - Needle electrode
     The needle electrode has aligned needles and their points perform the corona discharge. These points (electrodes) discharge toward the drum in one direction to realize the more efficient discharging comparing to the charger wire which discharges in a radial direction. Therefore, the needle electrode enables to reduce the ozone amount.

4) Drum thermistor (THM1, THM2)
   Since the photoconductive characteristic of the drum surface changes depending on the temperature of the drum surface, the drum thermistor detects the temperature of the drum surface and controls to gain the charging potential according to the environment.
   The equipment uses 2 drum thermistors and they detect surface temperature of K and Y drums respectively.

5) Discharge LED (ERS-Y, -M, -C, -K)
   Discharge is a process to decrease or eliminate the static electricity on the drum surface.
   The electrical resistance of the photosensitive layer is decreased by the light, and the residual charge on the drum surface is neutralized and eliminated (cleaned). Electrical potential of the drum surface is fixed to a certain amount before the drum is charged.

6) Temperature/humidity sensor (S12)
   This sensor measures the environment inside the equipment. The values of the temperature and humidity detected inside the equipment are output to the LGC board.

7) Ozone filter
   Ozone produced by corona discharge of the main charger is exhausted through this filter.
   The catalyzer of the ozone filter degrades the ozone.

8) Ozone exhaust fan (M24)
This fan exhausts air through the ozone filter-1.

9) High-voltage transformer (HVT)
A circuit generates the output control voltage Vc of the main charger bias, main charger grid bias, 1st transfer roller bias, 2nd transfer roller bias, developer bias and cleaning blade bias.

10) Drum motor (M10)
This motor drives each drum and toner recovery auger. The drive of the motor is transmitted to each drum by gears in the following 2 lines: Drum motor →K drum, drum motor →C drum →M drum → Y drum
The gears and drum couplings are assembled with high precision in order to improve accuracy of color overlay.

11) Drum switching motor (M11)
This motor switches ON/OFF the transmission of drive to the Y, M, C drums. When the motor rotates normally or reversely, the gear of the motor moves the rack to shift the guides. And this movement of the guides controls the transmission of the drive by engaging and disengaging gears which transmit the drive to the Y, M, C drums. Additionally, the drum switching sensor detects the phase of the guide to control the drum switching motor, and checks whether the drive is transmitted to the Y, M, C drums or not.

11.4 Electric Circuit Description

11.4.1 High-voltage transformer control circuit

[1] General description

The high-voltage transformer is controlled by the on-off signal of each bias output from the ASIC on the LGC board, the clock signal for generating AC bias and the reference voltage signal (VR) output through a D/A converter. The high-voltage transformer generates the output current or voltage of each bias, based on the input +24V voltage (+24VD3).

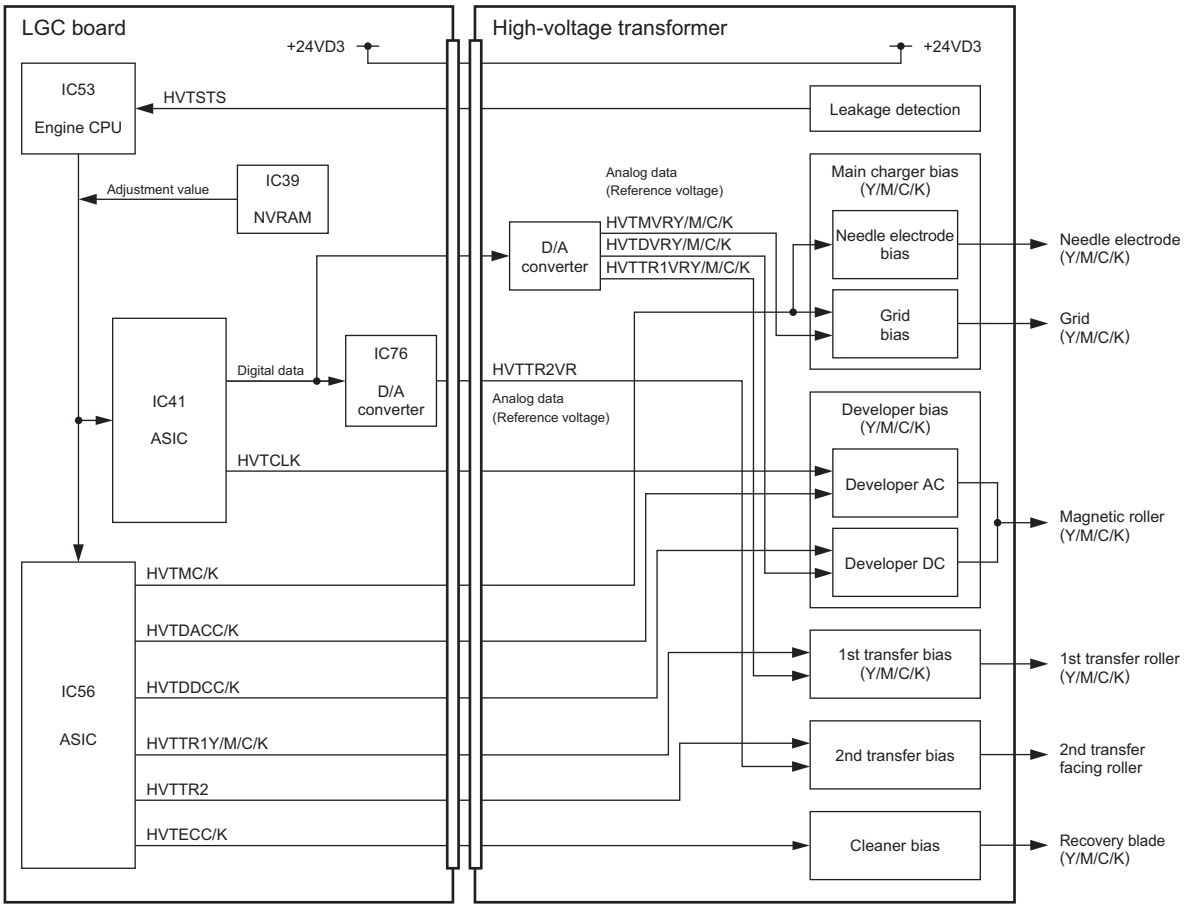


Fig. 11-3

[2] Description of operation

The function and operation of each signal are as follows.

- On-off signal (HVTMC/K, HVTDACC/K, HVTDDCC/K, HVTTR1Y/M/C/K, HVTTR2, HVTECC/K):
  These signals are the on-off signals of each output to the main charger (needle electrode and grid), developer bias (AC/DC), 1st transfer bias (1st transfer roller), 2nd transfer bias (2nd transfer facing roller) and cleaner bias (recovery blade). When these signals move to a low level, the generating circuit of each bias on the high-voltage transformer becomes ON status, thus the current or voltage is output.

- Reference voltage (HVTMVRY/M/C/K, HVTDVRY/M/C/K, HVTTR1VRY/M/C/K, HVTTR2VR):
  These analog voltages are the reference for each output of the main charger grid, developer bias (DC),1st transfer bias and 2nd transfer bias. Each output of the high-voltage transformer can be changed linearly by changing these reference voltages.

  The output procedure of the reference voltages is shown below.
  - The adjusted values of the main charger bias, developer bias and transfer bias in the NVRAM are output to the ASIC.
    ↓
  - The data of the reference voltage is output from the ASIC to the D/A converter.
    ↓
  - Digital-to-analog conversion at the D/A converter
    ↓
  - The reference voltage of each bias is output to the generating circuit of each bias.
    ↓
  - The circuit of each bias generates the output current or output voltage proportionate to the reference voltage.

  * The reference voltage can be adjusted in the Adjustment Mode (05).

- Developer AC bias generating clock (HVTDACK):
  This clock signal is a reference for the AC component of the developer bias.

- Leak detection signal (HVTSTS):
  This signal detects the abnormality (leakage) of the high-voltage transformer output. When the abnormality is detected, the signal moves to a low level.

11.4.2 Drum Temperature Detection Circuit

The drum temperature detection circuit is composed as shown in the figure below. It converts the input voltage from the drum thermistor into a digital signal by means of the A/D converter on the LGC board. The drum thermistor is a device whose resistance value is smaller when the temperature is higher. Therefore, when the temperature becomes higher, the input voltage to the A/D converter becomes lower.

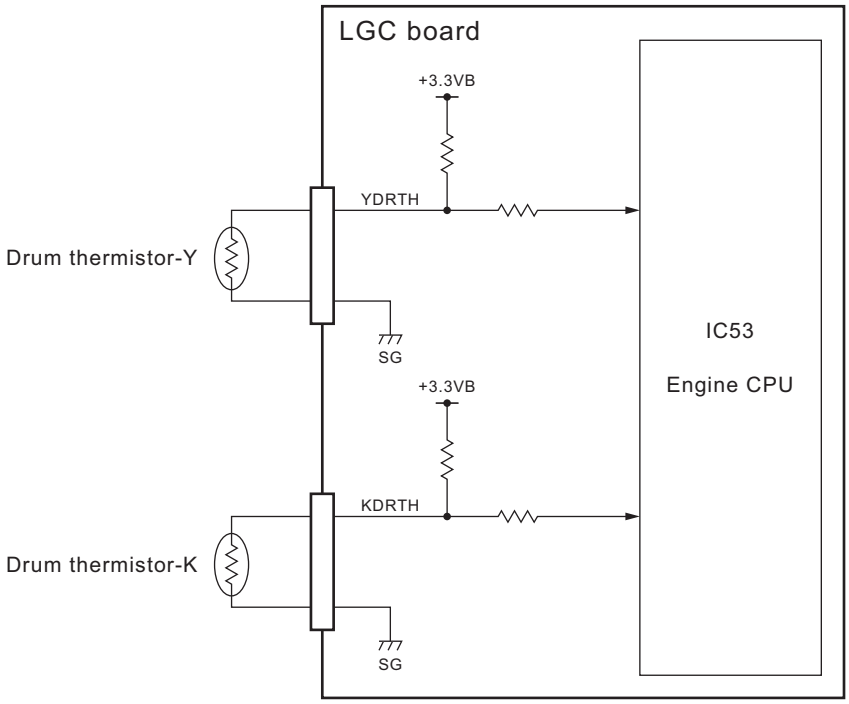


Fig. 11-4

11.4.3 Drum motor control circuit

The drum motor is a stepping motor driven by the control signal output from the ASIC on the LGC board and rotates the drum.
The drum motor is driven by the pulse signal (DRMA, DRMB, DRMC, DRMD) output from the motor driver. These pulse signals are formed based on the reference clock (DMCK) and output only when the enable signal (DMEN) is a high level. Also, the rotation speed or direction of the motor can be switched by changing the output timing of each pulse signal.

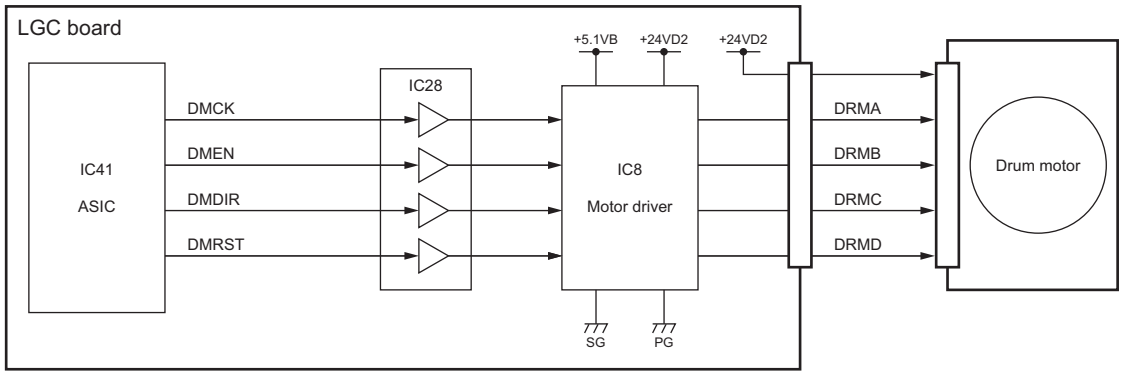


Fig. 11-5

Control signal

Signal	Function	Status	
		High level	Low level
DMCK	Reference clock	---	---
DMEN	Enable signal	ON	OFF
DMDIR	Rotation direction signal	CCW	CW
DMRST	Reset signal	Normal operation	Reset

* CW: Clockwise rotation, CCW: Counter clockwise rotation viewing from the axis

11.4.4 Drum switching motor control circuit

The drum switching motor is a DC brush motor driven by the control signal output from the ASIC on the LGC board and moves the guide to engage/disengage the gear which transmits the driving force of the drum motor.
The motor driver outputs the drive signal (CKMMA-0A, CKMMB-1A) to the motor based on the control signal (CKMMA-0C, CKMMB-1C) output from the ASIC. The motor operates the rotation, stop or brake according to the status of these drive signals.

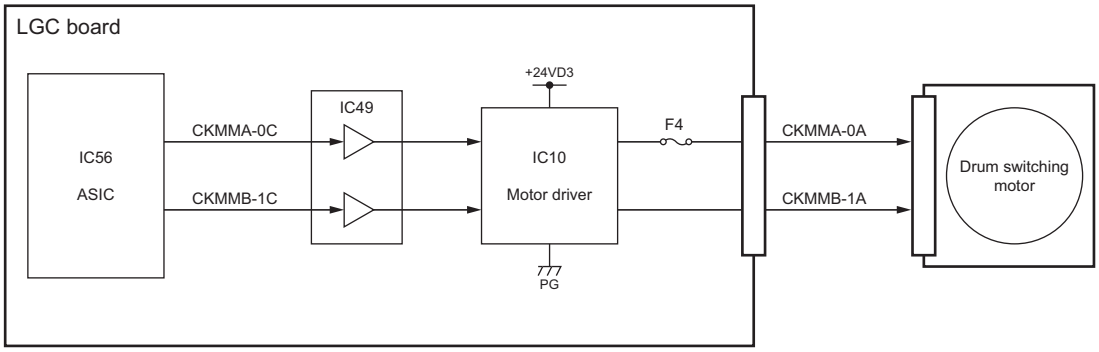


Fig. 11-6

Control signal

Signal				Motor status
ASIC output		Motor driver output		
CKMMA-0C	CKMMB-1C	CKMMA-0A	CKMMB-1A	
L	L	OFF (high impedance)		Stop
L	H	L	H	CW (Gear engaged)
H	L	H	L	CCW (Gear disengaged)
H	H	H	H	Brake

* CW: Clockwise rotation, CCW: Counter clockwise rotation viewing from the axis

11.5 Disassembly and Replacement

[A] Process unit (EPU)

(1) Open the front cover.
(2) Remove 1 screw, and then turn the TBU lifting lever counterclockwise for 90 degrees.

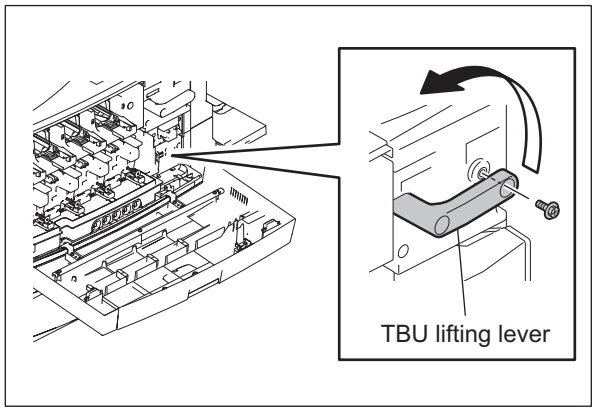


Fig. 11-7

(3) Hold the A part of the process unit and pull it out while pushing the lock handle down. Then hold the B part and take off each process unit of EPU (Y), EPU (M), EPU (C) and EPU (K).

Notes:

- Be sure not to touch, spit or scratch on the drum surface.
- Check if the shutter of the toner supply opening on the removed process unit is closed.
- Avoid a direct sunlight onto the drum. Move it to a dark place as soon as it is taken off.

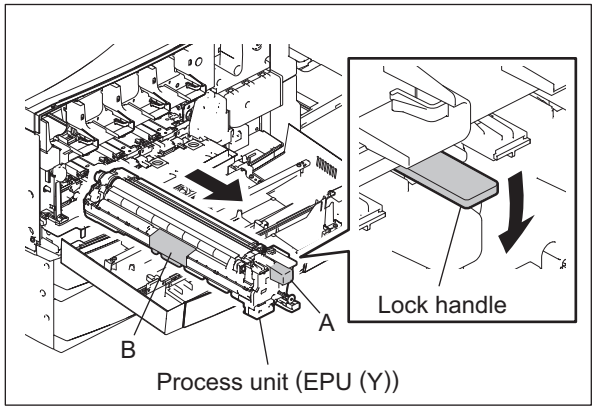


Fig. 11-8

Note:

When installing, wipe out toner on the drawer connector of the equipment because toner attached on the contacts of the connector will cause conduction blockage.

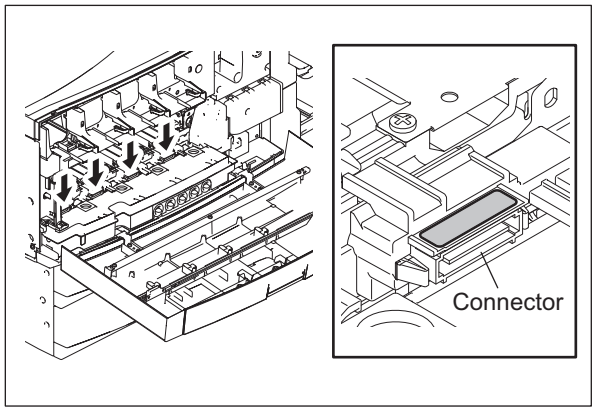


Fig. 11-9

[B] Process cover

(1) Take off the process unit (EPU).
📖 P.11-10 "[A] Process unit (EPU)"
(2) Take off the main charger cleaner handle.

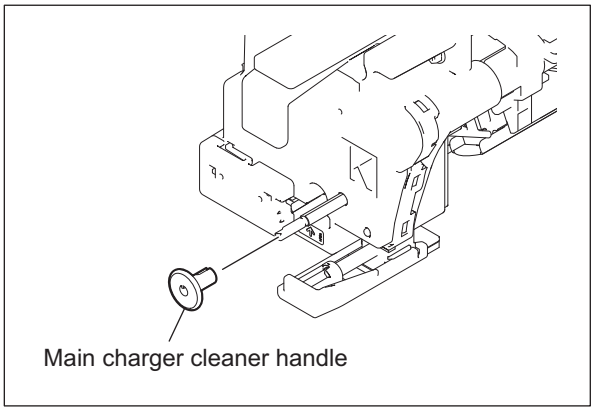


Fig. 11-10

(3) Turn the process unit (EPU) to place with the used toner exit hole comes lower side as shown in the Figure.
(4) Disconnect the connectors. (Disconnect 2 connectors each for the process units (EPU (Y)) and EPU (K), and 1 connector each for EPU (M) and EPU (C).)

Notes:
- Be sure to place the process unit (EPU) in the correct position as shown in Figure to avoid the damage on the drum.
- When installing, be sure not to have harnesses being loosened.

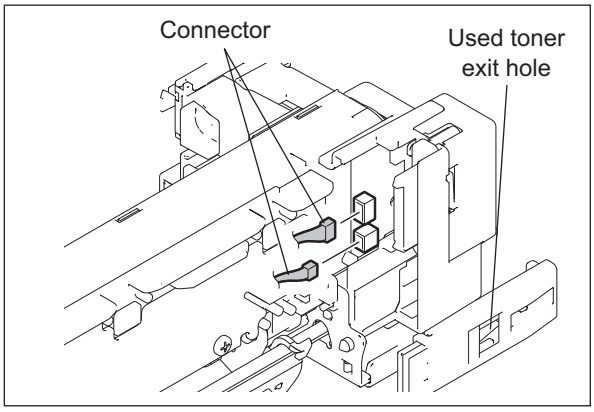


Fig. 11-11

(5) Turn the process unit (EPU) to place with the used toner exit hole comes bottom side as shown in the Figure.
(6) Remove 2 screws.
(7) Release the latch, and then take off the process cover.

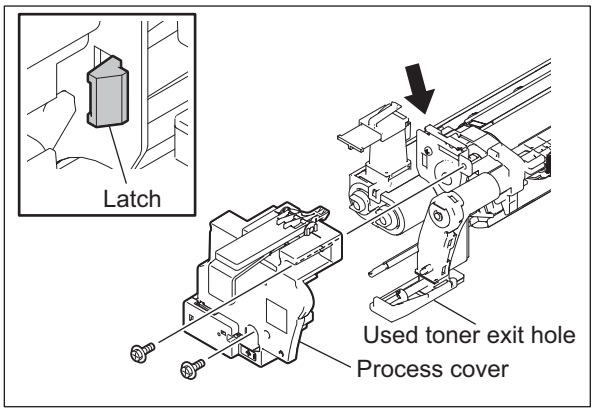


Fig. 11-12

Note:

When installing, fit 2 bosses of the process cover and 1 boss of the used toner drain into respective boss holes securely.

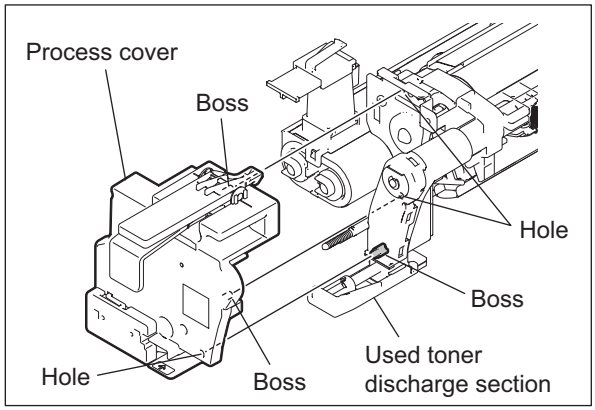


Fig. 11-13

[C] Cleaning unit/ Developer unit

[C-1] Cleaning unit/ Developer unit

(1) Take off the process cover.
📖 P.11-11 "[B] Process cover"

(2) Remove 2 screws and take off the front retainer.

Note:

Be sure not to lose the bearing installed on the front retainer.

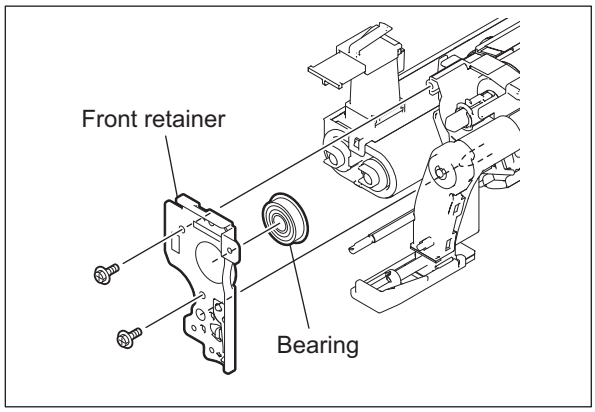


Fig. 11-14

(3) Release 1 latch on the rear side of the developer unit to open the cleaner unit in the direction of the arrow. Slide the cleaning unit to the rear side to separate it from the developer unit.

Notes:

- Be sure not to touch, spit or scratch on the drum surface.
- Avoid a direct sunlight onto the drum. Move it to a dark place as soon as it is taken off.

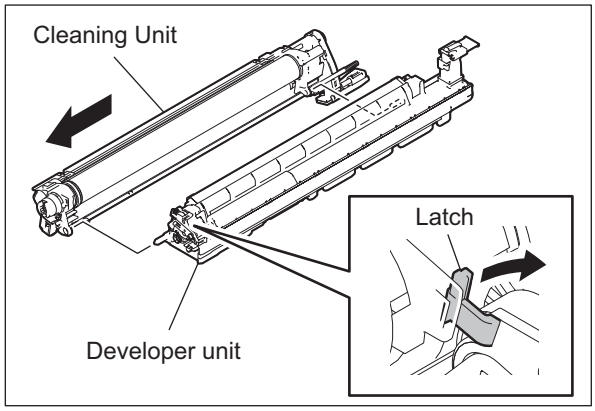


Fig. 11-15

[C-2] Main charger assembly

(1) Take off the cleaning unit.
📖 P.11-12 "[C-1] Cleaning unit/ Developer unit"
(2) Hold (A) part on the front side of the main charger assembly, lift the cleaner case up and take off the main charger assembly.

Notes:
- Be sure not to touch, spit or scratch on the drum surface.
- Avoid a direct sunlight onto the drum. Move it to a dark place as soon as it is taken off.

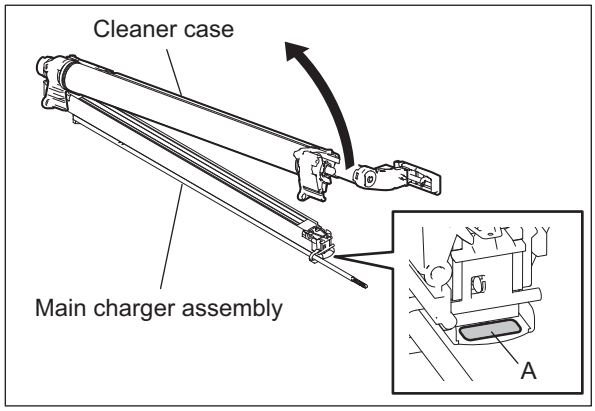


Fig. 11-16

[C-3] Main charger cleaner PM

(1) Take off the main charger assembly.
📖 P.11-13 "[C-2] Main charger assembly"
(2) Remove the main charger cleaner rod from the guide.
(3) Turn the main charger cleaner rod for 90 degrees to take it off.

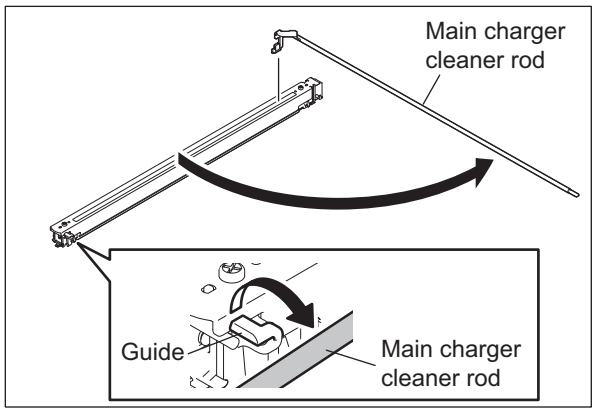


Fig. 11-17

Note:
Be sure to insert the main charger cleaner rod all the way in before turning it 90 degrees, otherwise the needle electrodes may be damaged.

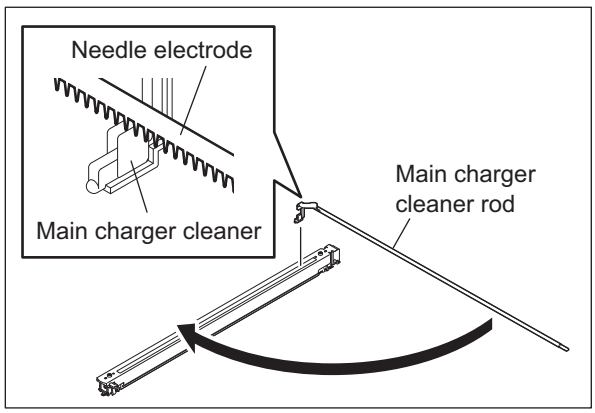


Fig. 11-18

(4) Peel 2 main charger cleaner off the main charger cleaner rod.

Note:
Attach the main charger cleaner with its sides contacting the rib of the main charger cleaner rod as indicated by arrows shown in the figure.

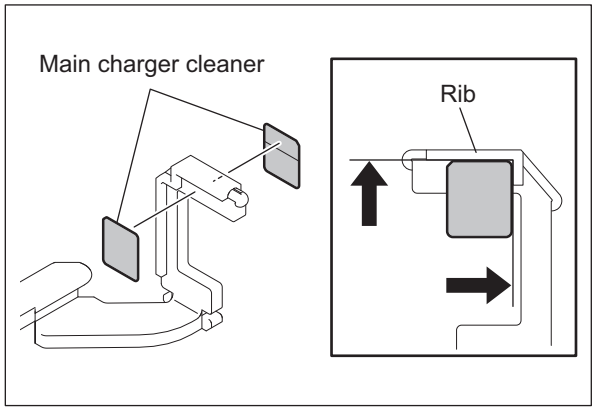


Fig. 11-19

[C-4] Main charger grid PM

(1) Take off the Main charger cleaner.
📖 P.11-13 "[C-3] Main charger cleaner"
(2) Lift it up the arm of the front terminal, and then take off the main charger grid.

Notes:
- Do not touch the mesh area of the grid.
- There are 2 holes on the rear side of the main charger grid for determining which is the front or back surface. Be sure to place the grid so that the 2 holes come as shown in the figure.

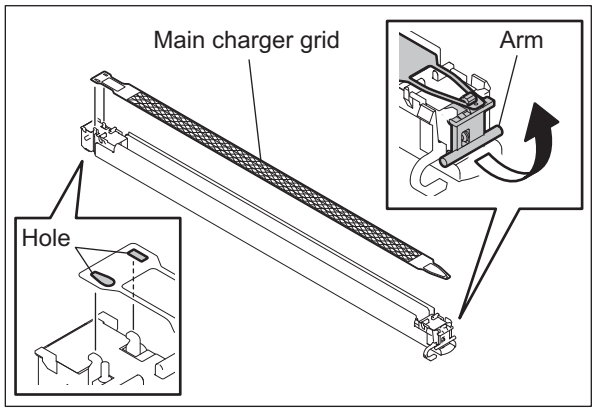


Fig. 11-20

[C-5] Needle electrode PM

(1) Take off the main charger grid.
📖 P.11-14 "[C-4] Main charger grid"
(2) Take off each terminal cover on both front and rear sides.

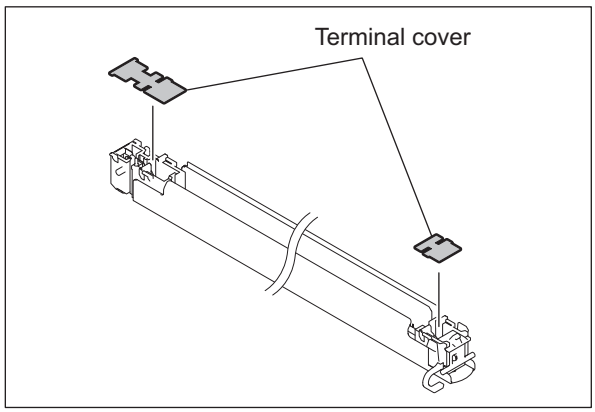


Fig. 11-21

(3) Remove the arm from the front terminal.
(4) Take off the spring.
(5) Hold the front side of the main charger to lift it up, and then take it off from the rear terminal.

Notes:
When installing the needle electrode, be sure of the following:
- Be sure that its needle comes at its top side.
- Hook the needle electrode and the spring on both front and rear terminals securely.
- Do not twist the needle electrode.
- Do not touch the needle electrode directly with bare hands.

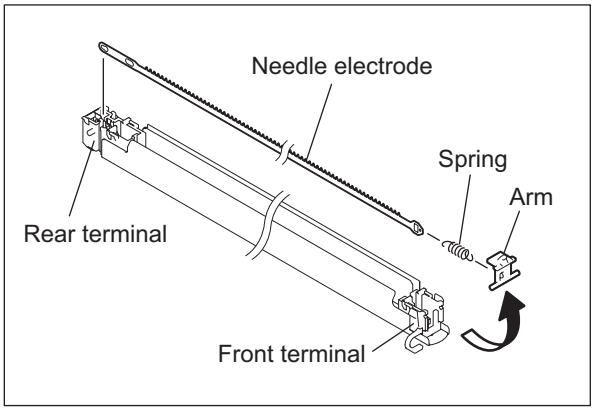


Fig. 11-22

[C-6] Drum PM

(1) Take off the main charger assembly.
📖 P.11-13 "[C-2] Main charger assembly"
(2) Release the 2 latches, and then take off the bushing.

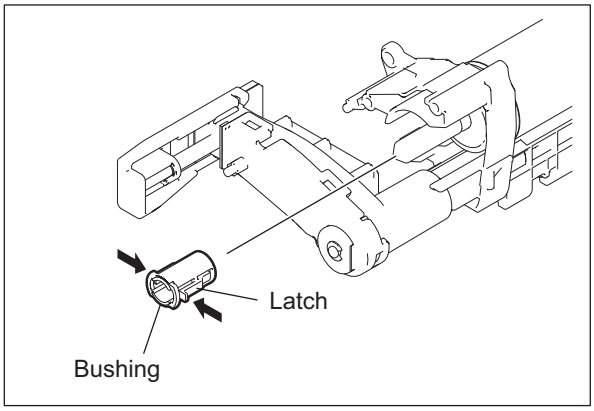


Fig. 11-23

(3) Pull out the shaft from the rear side, then hold the gear part of the drum and take it off.

Notes:
- Be sure not to lose the sleeve which will remain on the shaft or rear side of the drum.
- Be sure not to lose the bearing installed on the frame.
- Be sure not to touch, spit or scratch on the drum surface.
- Avoid a direct sunlight onto the drum. Move it to a dark place as soon as it is taken off.
- Be sure not to touch or scratch the edge of the drum cleaning blade.

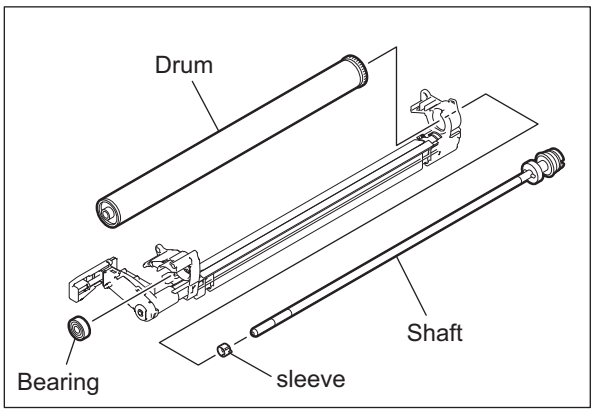


Fig. 11-24

Note:

When the retainer installed on the drum shaft has been taken off, be sure to install it while aligning the direction of the ribs of the coupling with the pin on the drum shaft.

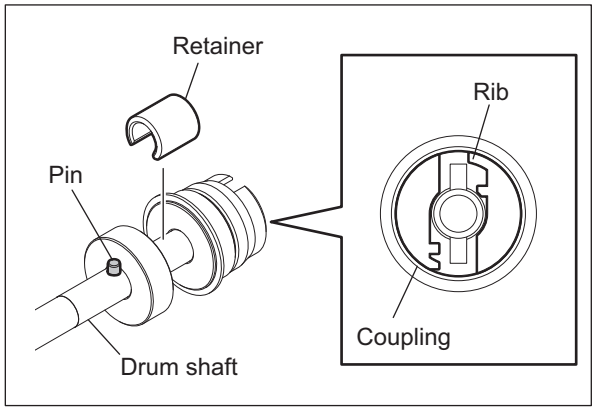


Fig. 11-25

Note:

When installing the drum, not use a patting powder.
Install the drum, shaft and sleeve by means of the following procedure.

1. Install the drum to the cleaner case with its front side boss aligned with the seal on the case. Be careful not to have the seal on the rear side come off of the drum.

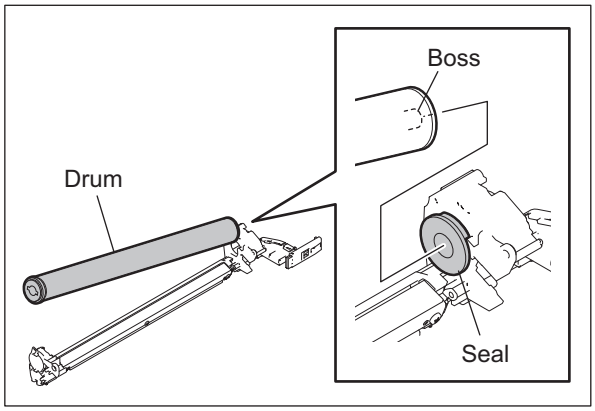


Fig. 11-26

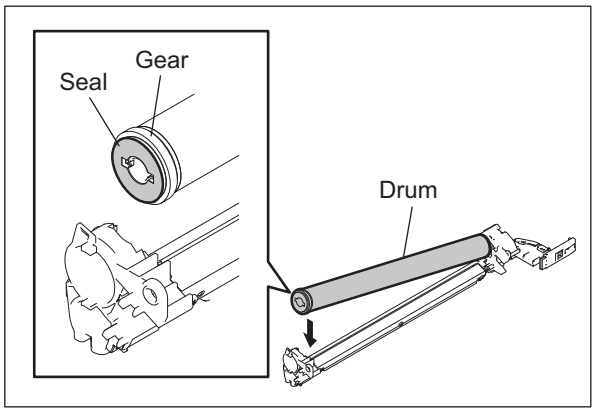


Fig. 11-27

2. Install the sleeve with its groove aligned with the pin on the drum shaft.

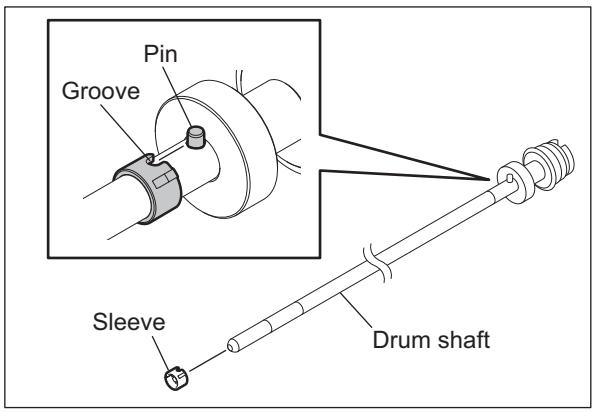


Fig. 11-28

3. Insert the drum shaft to the drum while aligning the position of the pin on the shaft with the groove of the drum. After they are aligned, push the shaft fully in to engage the groove and pin with the sleeve.

Note:
Be sure to align the position before inserting the shaft. If the drum or drum shaft is rotated with the sleeve engaged with the groove and pin, sleeve may be deformed.

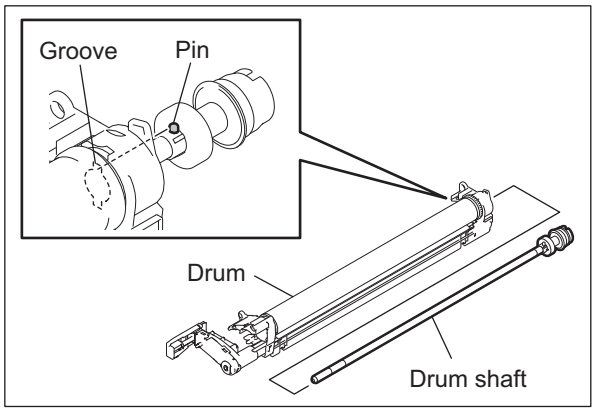


Fig. 11-29

4. Install the bearing on the front side of the drum shaft.

[C-7] Drum cleaning blade PM

(1) Take off the Drum.
P.11-15 "[C-6] Drum"
(2) Remove 3 screws and take off the drum cleaning blade.

Note:
Be sure not to touch or scratch the edge of the cleaning blade.

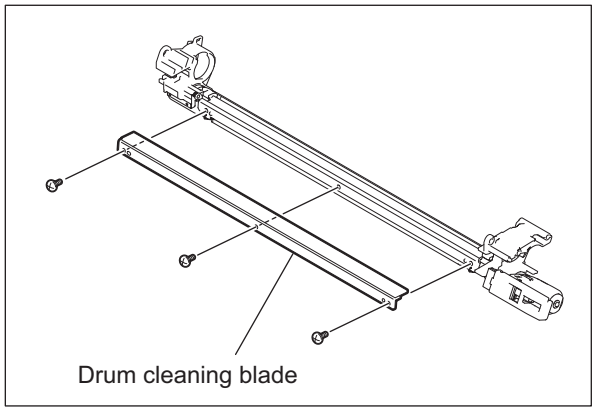


Fig. 11-30

Note:

When replacing the drum cleaning unit, check if there is no gap between the blade and pad on both ends. If there is, or when the pads put pressure to the cleaning blade, reattach the pads on the position shown in the figure (by slightly pushing them to the direction of the arrows).

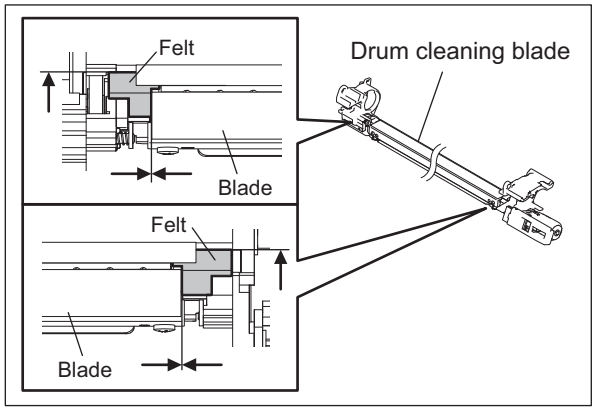


Fig. 11-31

[C-8] Drum thermistor (THM1, THM2)

The drum thermistors are installed in the process units (EPU (Y) and EPU(K)).

- Process unit (EPU (Y)): Drum thermistor (THM1)
- Process unit (EPU (K)): Drum thermistor (THM2)

(1) Take off the corresponding process unit, and then take off the developer unit.

📖 P.11-10 "[A] Process unit (EPU)"
📖 P.11-12 "[C-1] Cleaning unit/ Developer unit"

(2) Remove 1 screw and take off the drum thermistor.

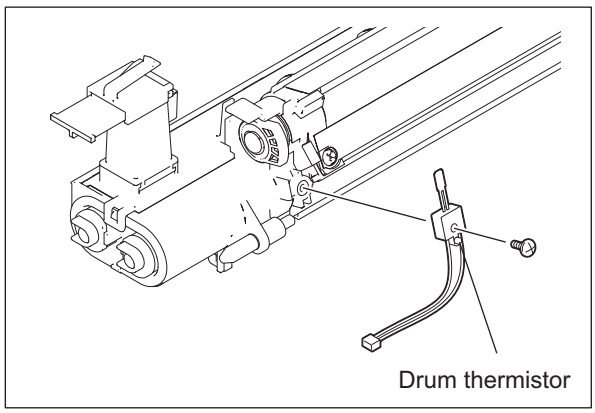


Fig. 11-32

[D] Discharge LED (ERS-Y, ERS-M, ERS-C, ERS-K)

Dedicated discharge LEDs which correspond to the process units (EPU (Y, M, C, K)) respectively are installed.

- Process unit (EPU (Y)): Discharge LED (ERS-Y)
- Process unit (EPU (M)): Discharge LED (ERS-M)
- Process unit (EPU (C)): Discharge LED (ERS-C)
- Process unit (EPU (K)): Discharge LED (ERS-K)

Take off the corresponding the discharge LED.

(1) Take off the process unit (EPU).
📖 P.11-10 "[A] Process unit (EPU)"

(2) Disconnect 1 relay connector from the discharge LED. Remove 1 screw and take off the duct.

Notes:

- When installing the duct, hang the 1 hook of the duct on the hole of the frame.
- When installing the duct, be sure to hold the harness between the duct and main frame in order not to have the duct lose contact with the main frame.
- Since the actuator is installed on the duct for the discharge LED (ERS-K), be sure to install it in the correct position.

(3) Remove the discharge LED from the protrusion of the duct, and slide it to take it off.

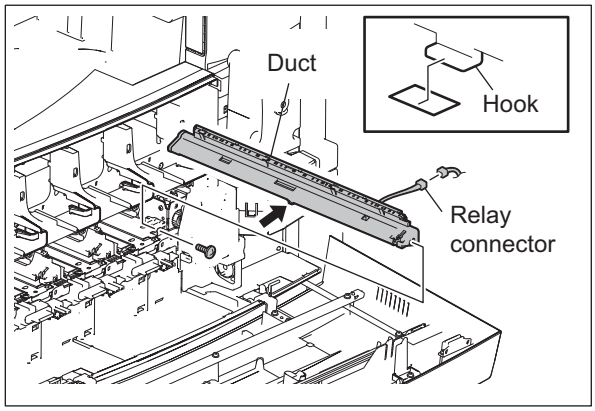


Fig. 11-33

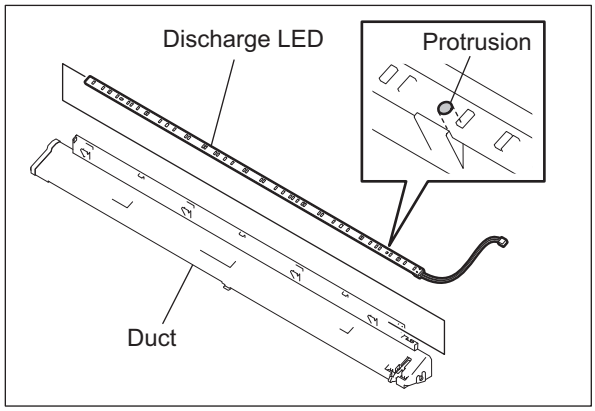


Fig. 11-34

[E] Needle electrode cleaner detection sensor (S21)

(1) Take off the shutter unit.
📖 P.8-14 "[C] Shutter unit"
(2) Take off the duct of the discharge LED (ERS-K).
📖 P.11-19 "[D] Discharge LED (ERS-Y, ERS-M, ERS-C, ERS-K)"
(3) Disconnect 1 connector. Release the latch, and take off the needle electrode cleaner detection sensor.

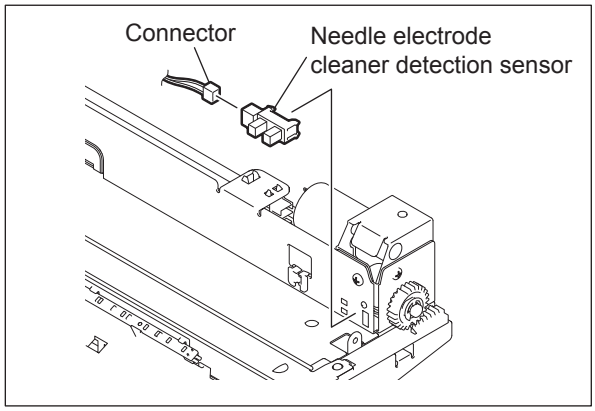


Fig. 11-35

[F] Drum drive unit

(1) Take off the ozone exhaust duct.
📖 P.12-31 "[N] Ozone exhaust duct"
(2) Remove 1 screw on the right side of the drum drive unit.

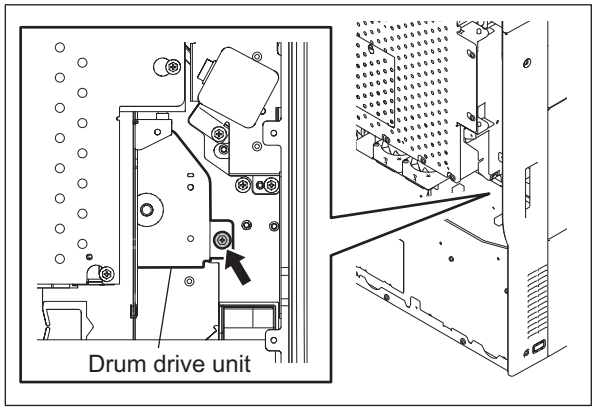


Fig. 11-36

(3) Open the board case.
📖 P.2-45 "[K] Board case"
(4) Release the harness from the 3 harness clamps.
(5) Disconnect the 1 connector and 2 relay connectors.
(6) Remove 3 screws and take off the drum drive unit.

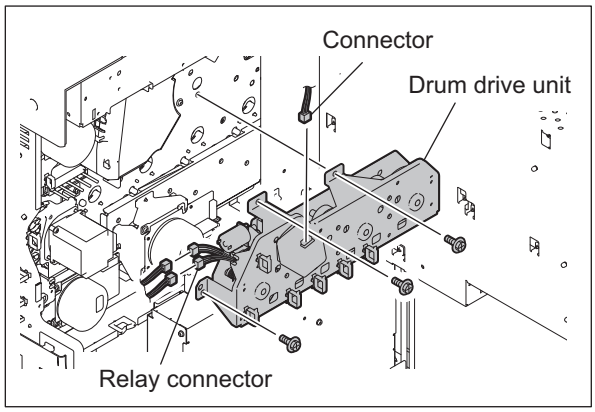


Fig. 11-37

[G] Drum motor (M10)

Note:

Never remove the damper fixed on the drum drive unit with 2 screws (red).
When the drum motor is replaced, discard the dumper attached to the new motor and install it to the existing dumper on the frame instead.

(1) Take off the Drum drive unit.
📖 P.11-20 "[F] Drum drive unit"
(2) Remove 2 screws and take off the drum motor.

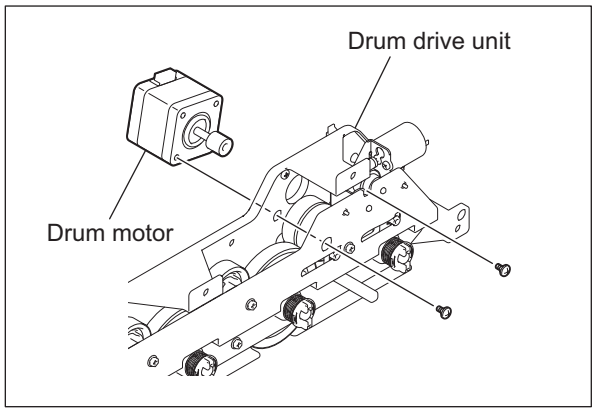


Fig. 11-38

[H] Drum switching motor (M11)

(1) Take off the Drum drive unit.
📖 P.11-20 "[F] Drum drive unit"
(2) Remove 1 screw and take off the drum switching motor.

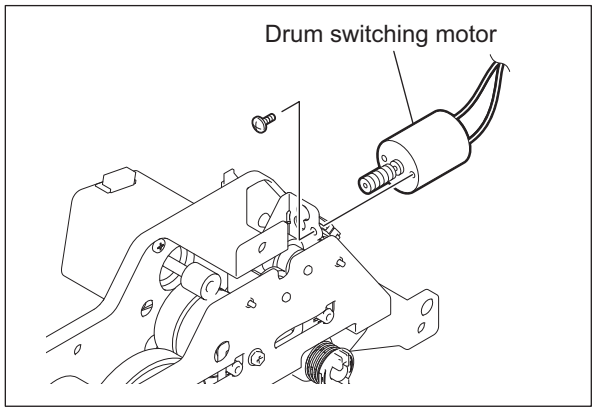


Fig. 11-39

Notes:

After assembling, if the rotation is not smooth when the motor gear is turned manually, carry out the following check.

1. Reinstall the motor while pushing it upward.

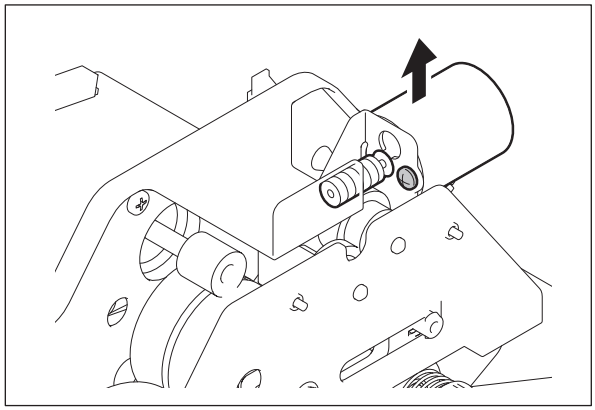


Fig. 11-40

2. If the rotation is still not smooth, remove the motor and try to move the guide. If the guide does not move properly, check if there is anything wrong with the guide or the plate.

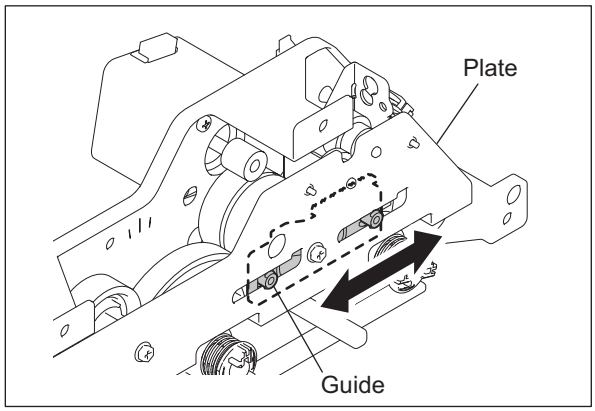


Fig. 11-41

[I] Drum switching detection sensor (S19)

(1) Take off the Drum drive unit.
📖 P.11-20 "[F] Drum drive unit"
(2) Push the 4 couplings to pull out the 4 pins.
(3) Remove the 4 couplings and 4 springs.

Note:

When installing, take care of the direction of the spring.

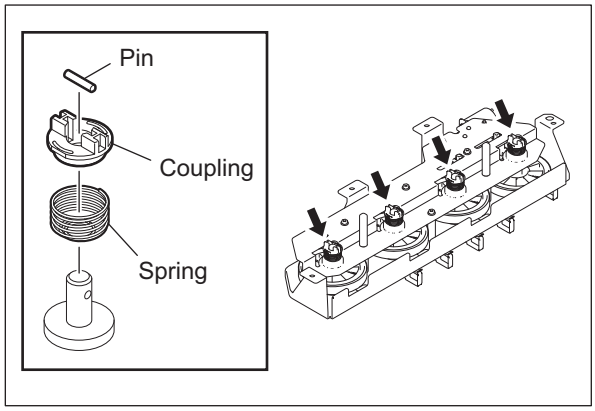


Fig. 11-42

Note:

When installing the coupling, rotate the gear until the mark appears, and then align the mark with the narrower rib of the coupling.

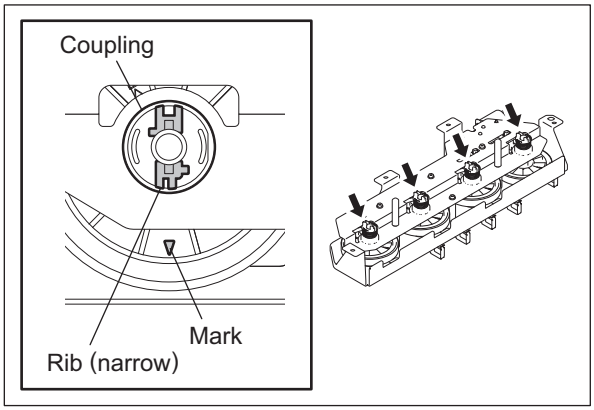


Fig. 11-43

(4) Remove 4 screws, and then take off the plate.

Notes:

- When installing, take care of the direction of the spring.
- Be careful not to damage the gear of the drum drive unit.

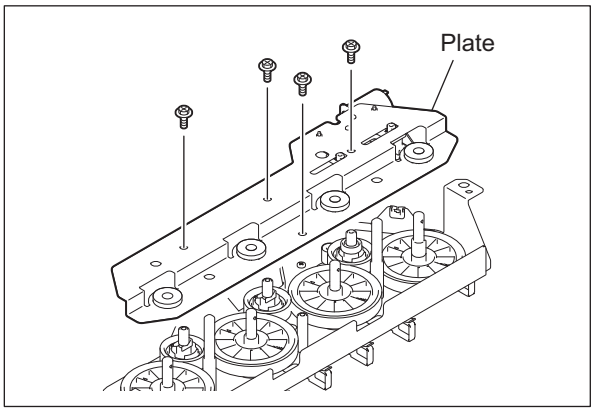


Fig. 11-44

Note:

If the gear of the drum drive unit has been disassembled, install it with the mark on the gear aligned within the area of the punched mark on the frame.

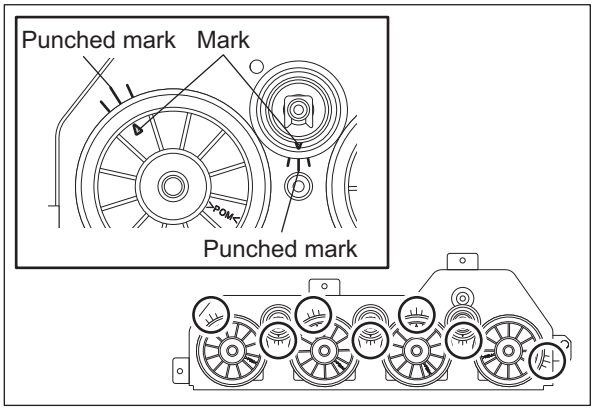


Fig. 11-45

(5) Remove 2 screws, and then take off the sensor bracket.

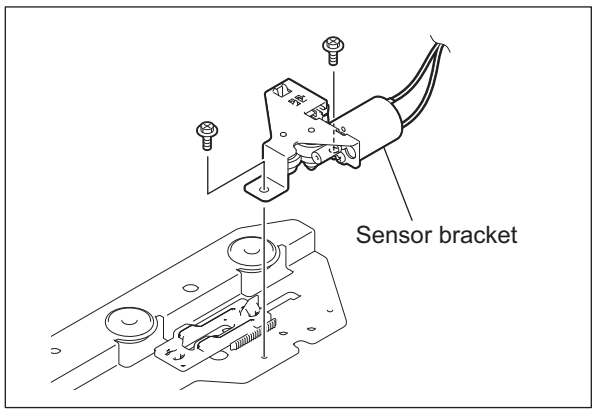


Fig. 11-46

(6) Disconnect 1 connector, and then release the latch to take off the drum switching detection sensor.

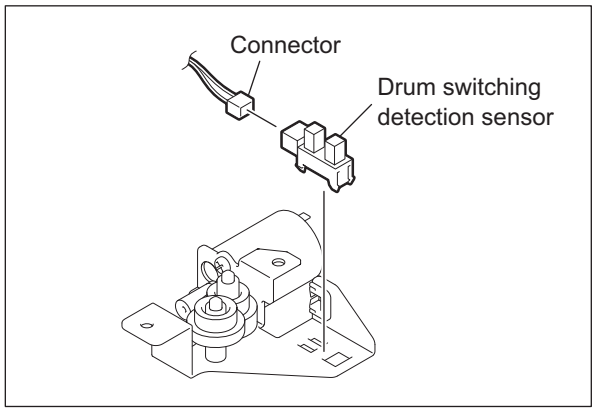


Fig. 11-47

12. DEVELOPER UNIT

12.1 General Description

The equipment has 4 process units (EPU: Electrographic Processing Unit). Each process unit consists of the drum cleaner unit and developer unit which are unified, and it corresponds to the image forming process of Y, M, C and K colors. This chapter describes the development (developer unit) which is a process of making toner adhere to the drum.
The developer material which is comprised of a mixture of toner and carrier, and is filled in the developer unit of each color. 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 in the developer unit. The charged toner is supplied to the photoconductive drum surface by means of a magnetic roller, allowing it 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. Through this process, the latent images are formed on the photoconductive drum surface.

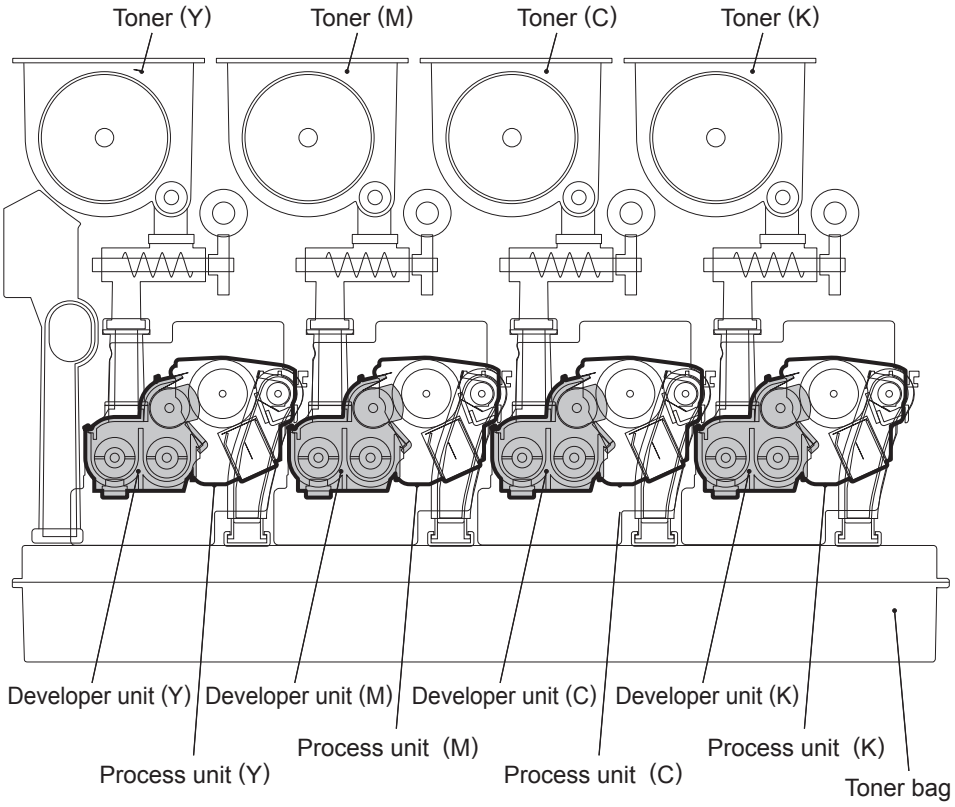


Fig. 12-1

12.2 Composition

Process unit (Y, M, C, K)	Drum cleaner unit		Ch.11
	Main charger unit		Ch.11
	Developer unit	Developer material	PM parts
		Developer filter	PM parts
		Mixer	
		Developer sleeve (Magnetic roller)	
		Doctor blade	
		Auto-toner sensor	S22, 23, 24, 25
	EPU board		EPU-Y, -M, -C, -K
Developer unit motor			M9

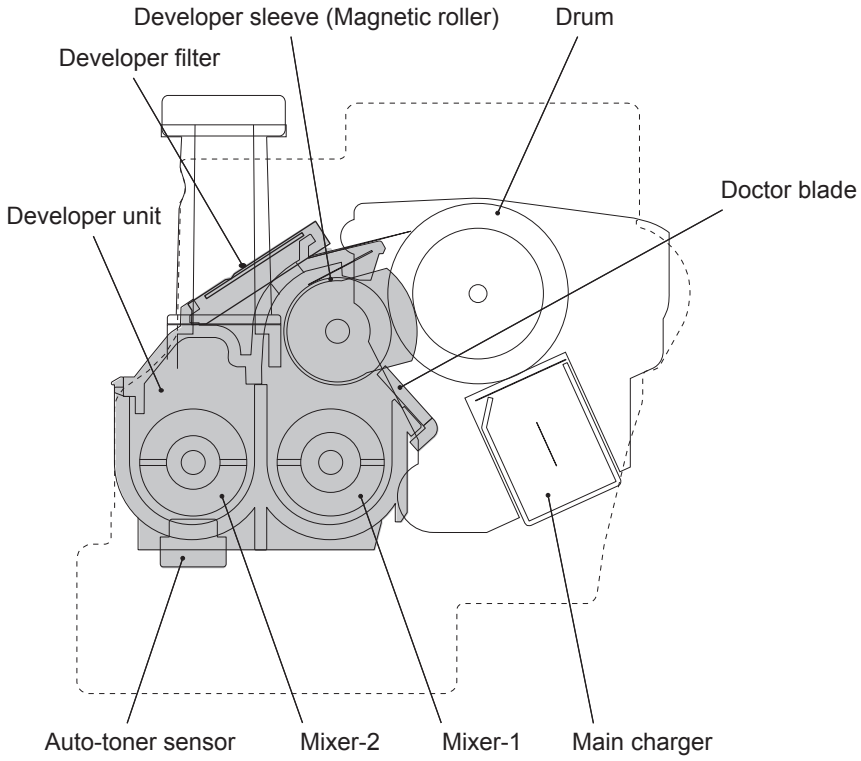


Fig. 12-2

12.3 Functions

1) Developer material
The developer material consists of the carrier and toner. The carrier is made of electrically conductive ferrites which is 30-100 µm and the toner is made of the resin particle which is approx. 6.8 µm. Since the developer material deteriorates after a long time use, periodic replacements are needed.

2) Mixer
The carrier and toner are frictionized each other when the developer material is stirred. Then the carrier is positively charged (+) and the toner is negatively charged (–), and the toner is adhered by the electrostatic force.

3) Developer sleeve (Magnetic roller)
These aluminum rollers have magnets inside. The developer material is pulled by these magnets to form a magnetic brush. The magnets are fixed at their position so only the sleeve rotates. By this rotation, the developer material is transported to the developer sleeve.
Then the magnetic brush formed at the developer sleeve sweeps over the drum surface and thus development is performed.

4) Doctor blade
The doctor blade controls the amount of the developer material from the developer sleeve so that the magnetic brush of the developer material can contact with the drum surface properly.

5) Auto-toner sensor (S22, 23, 24, 25)
To print out a precise image, the proportion (toner density ratio) of the carrier and the toner in the developer material needs to be always constant. The magnetic bridge circuit in the black auto-toner sensor detects the toner ratio in the developer material. This sensor supplies the toner from the toner cartridge.

6) EPU board (EPU-Y, -M, -C, -K)
The data whether the EPU is unused or not is written on the EPU board.

7) Developer unit motor (M9)
This motor rotates the Y, M, C, K developer units. The drive of the motor is transmitted to each developer unit by gears in the following 2 lines: Developer motor →K developer unit, developer motor →C developer unit →M developer unit →Y developer unit
The one-way clutch is installed in the gear which links the drive. When the motor rotates normally, all the Y, M, C, K developer units rotate, when the motor rotates reversely, only the K developer unit rotates.

8) Toner motor (M2/M3/M4/M5)
These motors drive the paddles and auger in the toner cartridge and transport the toner filled in the cartridge to the developer unit. Each toner cartridge of Y, M, C and K mounts one toner motor correspondingly.

9) Used toner motor (M6)
This motor rotates the paddles mounted in the toner bag to level the used toner accumulated in the bag. When the used toner motor (M6) is locked by the used toner motor lock detection sensor (S14), "Reboot the machine" appears. Also, if it is detected twice in a row, a service call (CD70) occurs.

10)Toner bag full detection sensor (S13)
This sensor is a transmissive sensor to monitor the edge of the toner bag. When the toner bag becomes full of used toner and the accumulated used toner shields the sensor path, this sensor detects that the toner bag is full.

11)Toner bag
This collects the residual toner scraped off on the drum surface by the cleaning blade and residual toner scraped off on the transfer belt by the transfer belt cleaning blade.

12)Developer filter
This filter equalizes pressure in the developer unit to prevent toner from blowing out of the unit.

12.4 Electrical Circuit Description

12.4.1 Temperature/humidity detection circuit

The temperature/humidity detection circuit detects the temperature and humidity inside of the equipment by means of the corresponding sensor so that the printing quality is not changed due to their adverse influence where the equipment is set up, and corrects the output of the auto-toner sensor or similar according to the result.
The temperature/humidity detection circuit is composed as shown in the figure below. It converts the voltage of each analog signal output from the temperature/humidity sensor into a digital signal by means of the A/D converter on the LGC board. The lower the temperature and the higher the humidity, the higher the voltage of each analog signal output from the temperature/humidity sensor becomes.

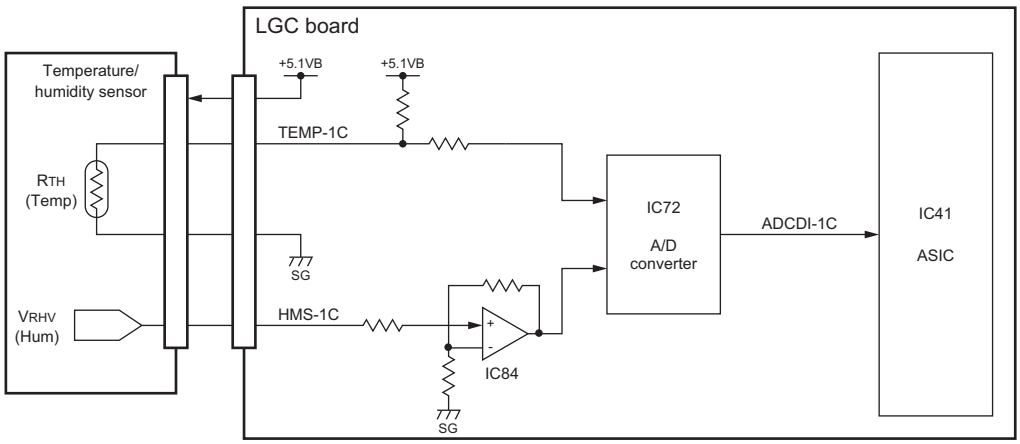


Fig. 12-3

Control signal

Signal	Function
TEMP-1C	Temperature detection signal (analog)
HMS-1C	Humidity detection signal (analog)

12.4.2 Toner motor control circuit

The toner motor is a DC brush motor driven by the control signal output from the ASIC on the LGC board and rotates the mixing paddle and toner supply auger in each toner cartridge.

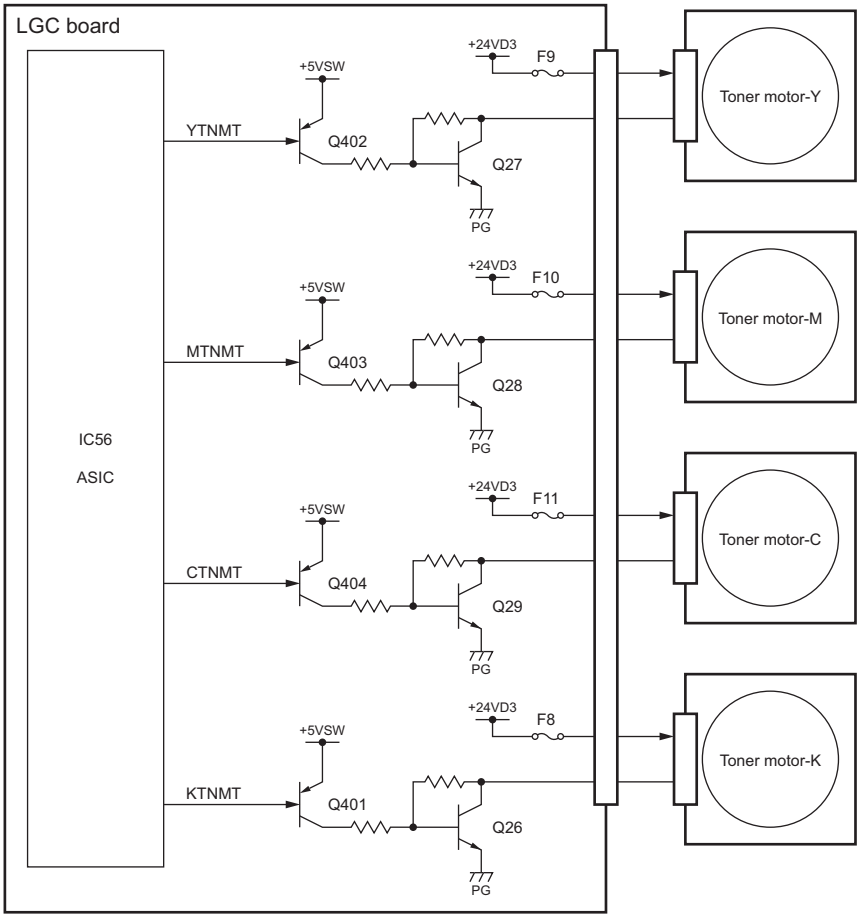


Fig. 12-4

Control signal

Signal	Function	Status	
		High level	Low level
YTNMT	Toner motor-Y ON signal	Stop	Rotate
MTNMT	Toner motor-M ON signal		
CTNMT	Toner motor-C ON signal		
KTNMT	Toner motor-K ON signal		

12.4.3 Used toner motor control circuit

The used toner motor is a DC brush motor driven by the control signal output from the ASIC on the LGC board and rotates the mixing paddle in the toner bag.

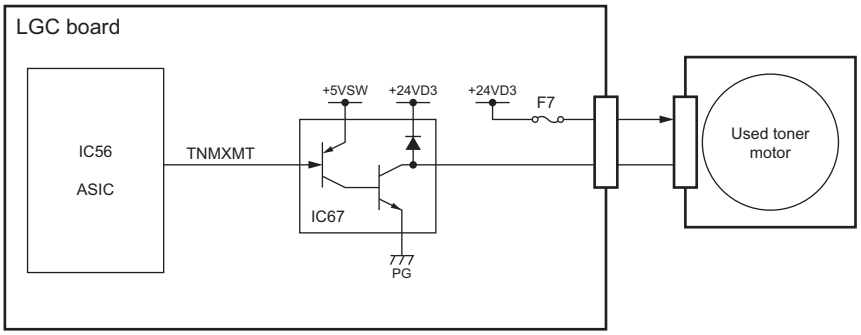


Fig. 12-5

Control signal

Signal	Function	Status	
		High level	Low level
TNMXMT	Used toner motor ON signal	Stop	Rotate

12.4.4 Auto-toner Circuit

[1] General description

[1-1] Function of the auto-toner circuit

- Detects the toner density in the developer material for each color, and supplies toner when the density is lowered to a certain level.
- Detects that there is no toner left in the developer unit for each color.

[1-2] Configuration of the auto-toner circuit

- Auto-toner sensor (Y/M/C/K): Detects the toner density.

- Control section:
  Controls each section to keep the toner density of the developer material constant.

- Control panel:
  Displays a status that the toner cartridge is nearly empty.

- Toner supply section:
  Toner is supplied from the toner cartridge to the developer unit by the toner supply motor in this section.

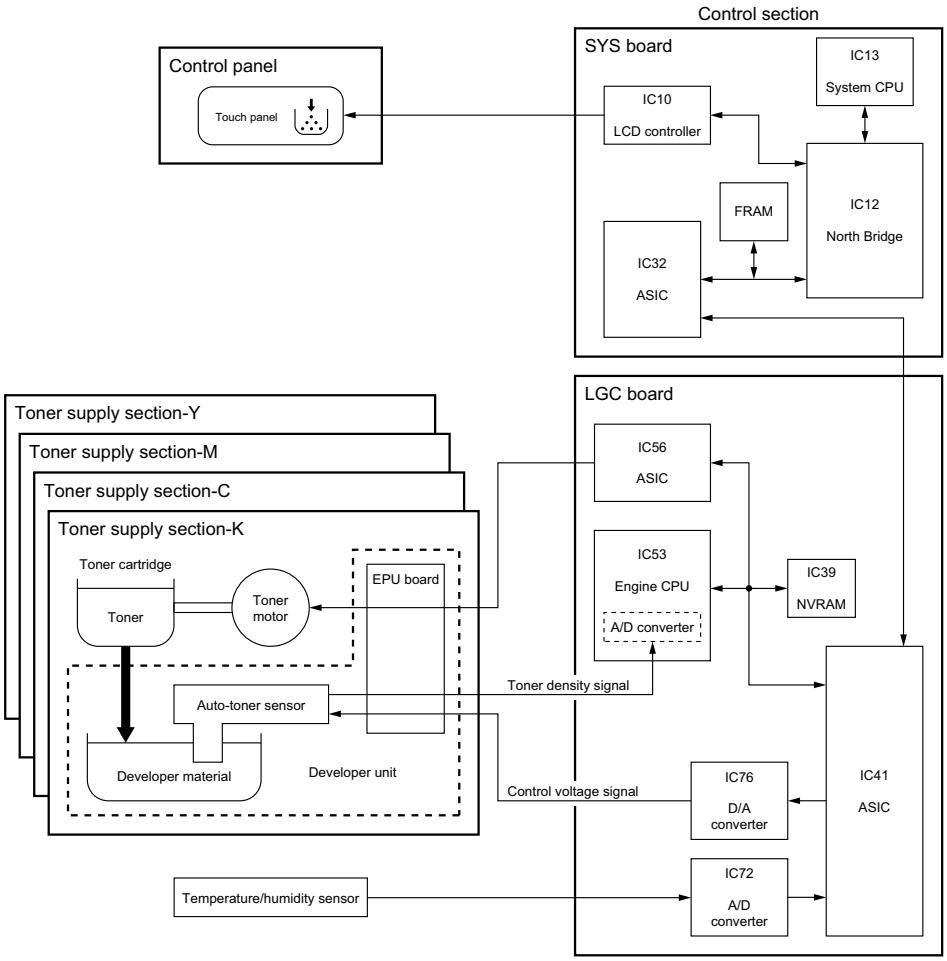


Fig. 12-6

[2] Operations of black auto-toner sensor

[2-1] Functions of the auto-toner sensor

- Initializing function: When unpacking and replacing the developer material
  The automatic adjustment is made so that the output of the auto-toner sensor will be 1.42 V to 1.99 V for the toner density of new developer material.

- Toner density stabilizing function: During the printing operation
  Through the following phases, the toner density is kept constant.
  Toner is consumed.
  → Toner density decreases.
  → Output change of the auto-toner sensor is detected depending on the humidity.
  → Drives toner motor.
  → Supplies toner to the developer unit from the toner cartridge.

- Toner-empty detection/clear function:
  Detects toner being empty in the toner cartridge.
  Drives toner motor.
  → Output of the auto-toner sensor is not changed.
  → Toner density is not changed.
  → Detects toner being empty.

  Toner-empty clear
  Drives toner motor.
  → Supplies toner from the toner cartridge.
  → Output of the auto-toner sensor changes.
  → Toner density recovers to its normal value.
  → “Toner-empty” is cleared.

[2-2] Auto-toner sensor control circuit

The auto-toner sensor is composed of the following circuits.

- Drive winding:
  Magnetic head (primary side) with a high-frequency magnetic field, which forms a magnetic circuit in the developer material

- Detection winding:
  Receiving the changes in the magnetic resistance of the developer material via a magnetic circuit (secondary side)

- DC conversion circuit:
- Converting the high-frequency output from the detection winding to a DC signal (auto-toner output ATSN)

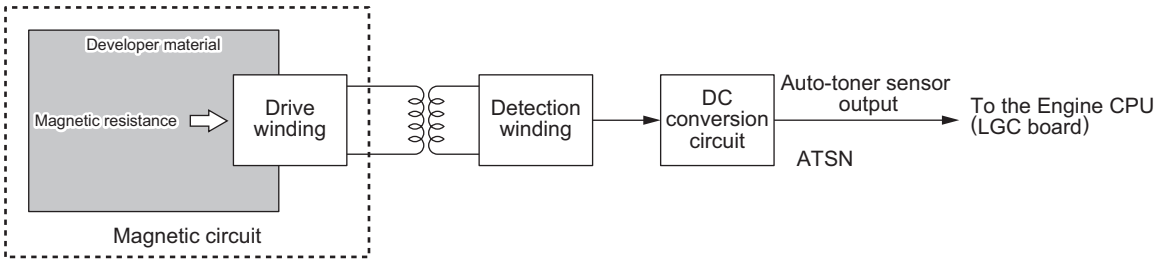


Fig. 12-7

- When the toner density is low:
  Toner ratio to the carrier in the developer material decreased
  → Magnetic resistance decreased
  → Detection output increased
  → Auto-toner output ATSN increased

- When the toner density is high:
  Toner ratio to the carrier in the developer material increased
  → Magnetic resistance increased
  → Detection output decreased
  → Auto-toner output ATSN decreased

12.5 Disassembly and Replacement

[A] Toner bag

(1) Open the front cover.
(2) Pull out the toner bag straight toward you.

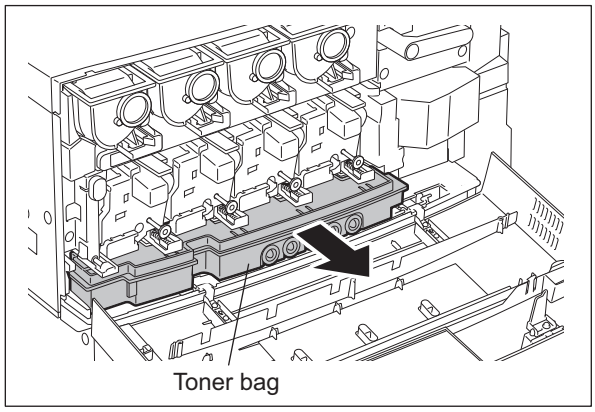


Fig. 12-8

[B] Developer unit

[B-1] Developer unit

(1) Take off the Developer unit.
📖 P.11-12 "[C-1] Cleaning unit/ Developer unit"

[B-2] Developer filter PM

(1) Take off the Developer unit.
📖 P.11-12 "[C-1] Cleaning unit/ Developer unit"
(2) Push the protrusions on the both edges of the developer filter in the direction of the arrow, and then take off the developer filter by sliding it.

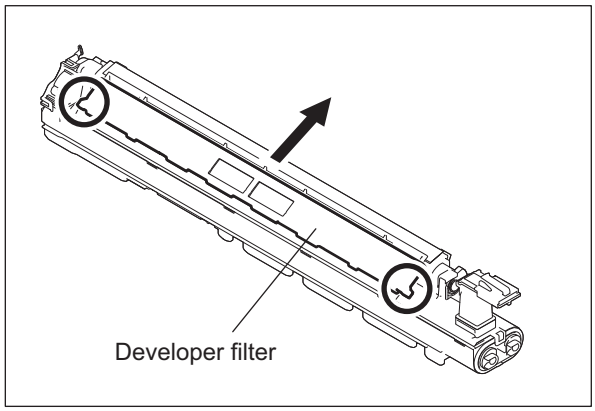


Fig. 12-9

[B-3] Developer material PM

(1) Take off the Developer unit.
📖 P.11-12 "[C-1] Cleaning unit/ Developer unit"

(2) Lift up the latch on the front side of the upper cover as shown in the figure A, and release it by pulling the toner supply section in the direction shown in the figure B.

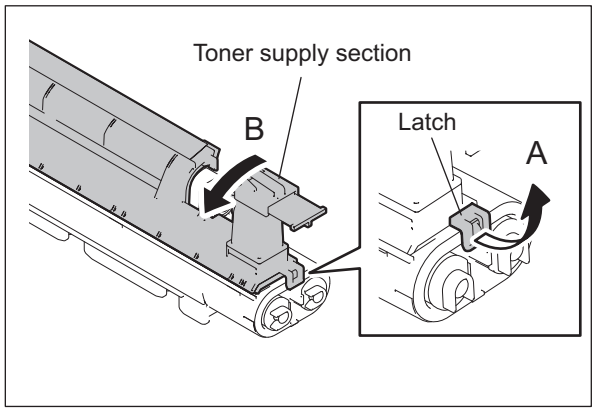


Fig. 12-10

(3) Insert the flat head screwdriver between the latch and the frame on the front side of the upper cover, and pull the toner supply section toward the front while turning the screwdriver in the direction of the arrow shown in the figure C to release the latch shown in the figure D.

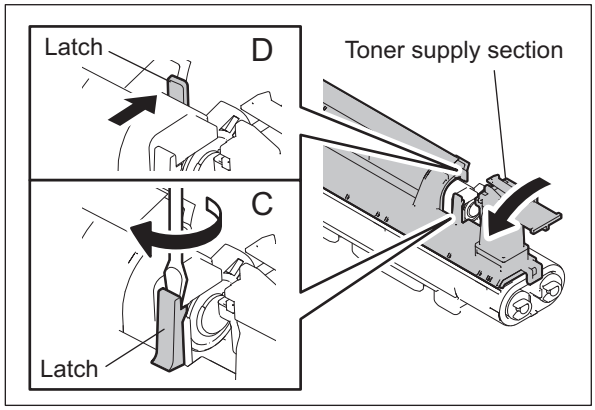


Fig. 12-11

(4) Insert the flat head screwdriver between the latch and the frame on the rear side of the upper cover as shown in the figure E, and release it by pulling down the screwdriver in the direction of the arrow in the figure to make a gap between the latch and the frame. The latch shown in the figure F is also released accordingly.

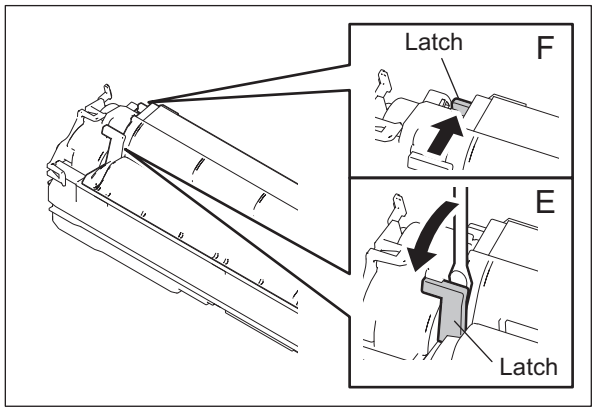


Fig. 12-12

(5) Take off the upper cover.

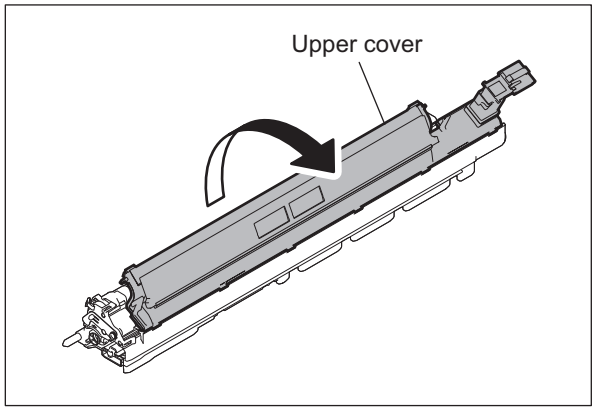


Fig. 12-13

(6) Discharge the developer material.

Notes:

- Make sure not to have developer material adhering to the drive gears or bushings.
- If the developer material on the developer sleeve is hard to come off, use a brush (jig) to clean it off.
  4407915710 BRUSH-33

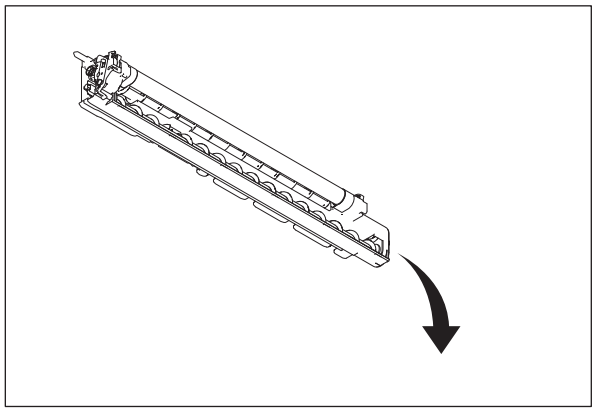


Fig. 12-14

(7) Shake the developer bottle and attach the nozzle to it.

(8) Fill up the mixer section under the developer sleeve with the developer.

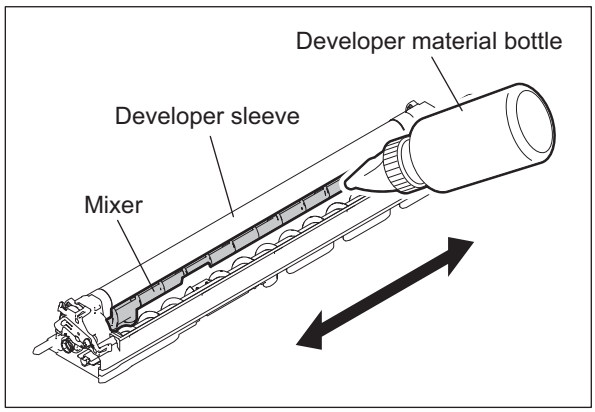


Fig. 12-15

(9) Rotate the knob in the direction described in the figure until the developer adheres on the surface of the developer sleeve evenly.

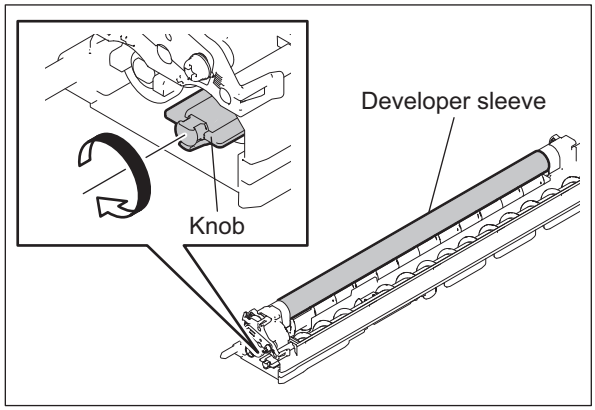


Fig. 12-16

(10) Lift up the rear side of the developer unit so that the developer material is moved to the front side of the mixer section under the developer sleeve.

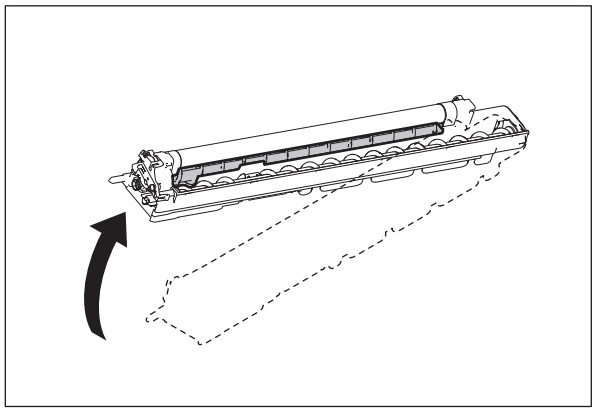


Fig. 12-17

(11) Fill up the mixer section under the developer sleeve with the developer again.

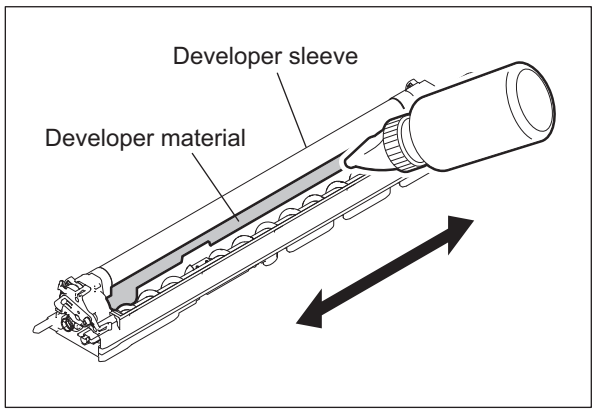


Fig. 12-18

(12) Fill the other mixer section with all the remained toner.

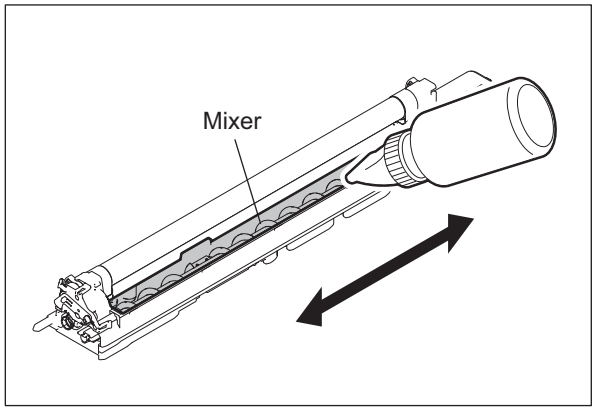


Fig. 12-19

Notes:

- Fill the developer material in the mixer section under the developer sleeve as much as possible.
- Check if the developer does not adhered to the joint of the upper cover indicated in the figure.

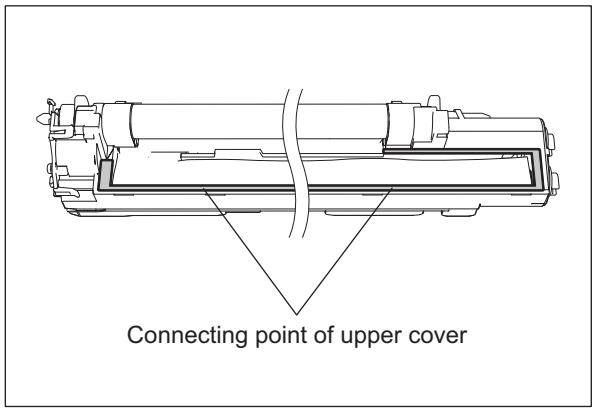


Fig. 12-20

(13) Fit the protrusions on the upper cover in the 6 concaves on the developer unit. Press each 2 portions on the front and rear side indicated by arrows to lock 4 latches while pushing the protrusions on the upper cover to the 6 concaves to fit them securely.

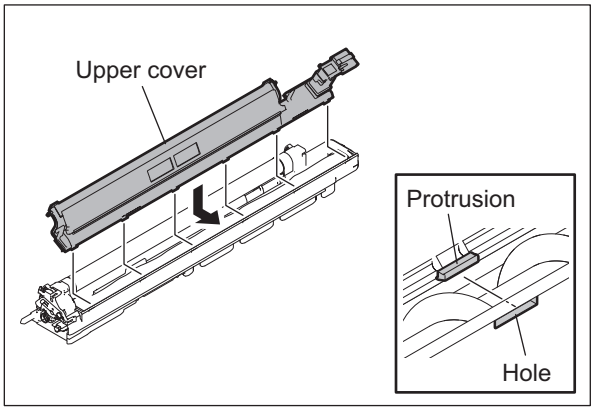


Fig. 12-21

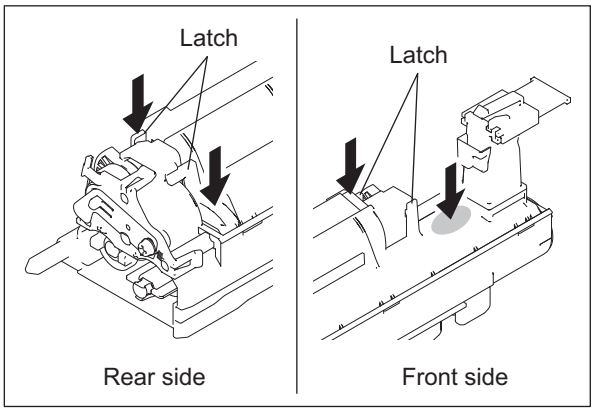


Fig. 12-22

(14) Press the portion indicated by the arrow in the figure to lock the front side latch of the upper cover.

Note:
After the installation, check that all the protrusions and latches are fitted and locked securely.

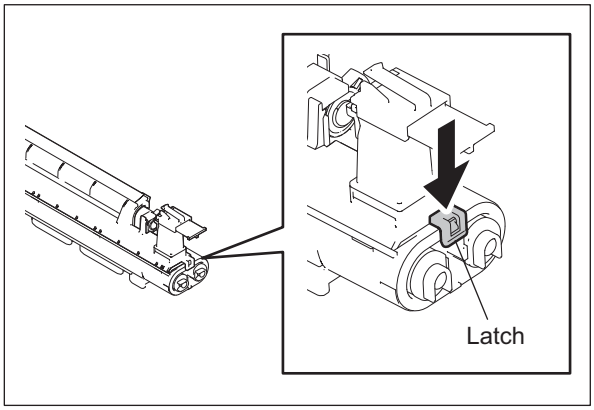


Fig. 12-23

[B-4] Doctor blade

(1) Discharge the developer material.
📖 P.12-12 "[B-3] Developer material"
(2) Remove the urethan seal (both front and rear sides).

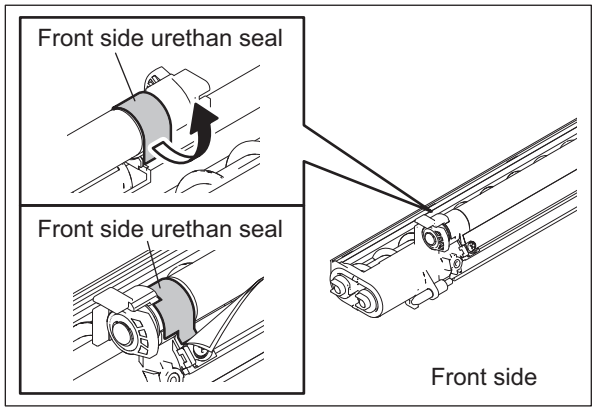


Fig. 12-24

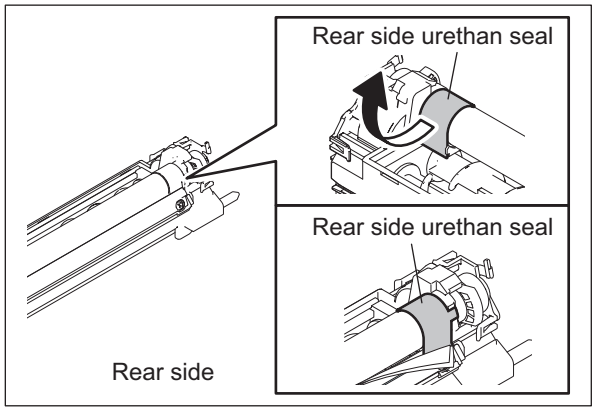


Fig. 12-25

(3) Remove 2 screws and take off the doctor blade.

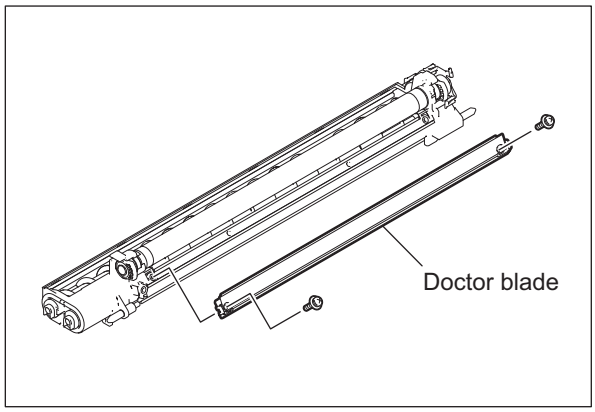


Fig. 12-26

Note:

When the urethan seal are being attached, attach them on the position shown in the figure (by slightly pushing it to the direction of the arrow).

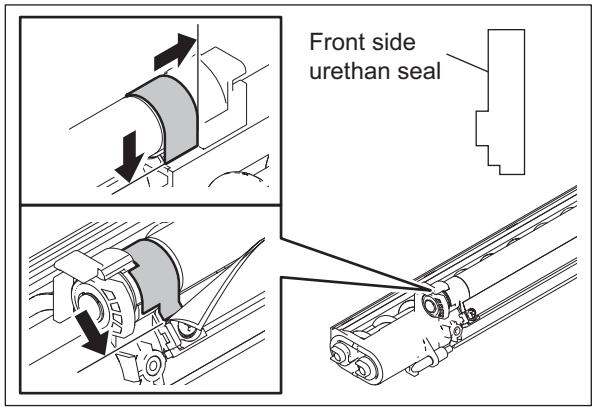


Fig. 12-27

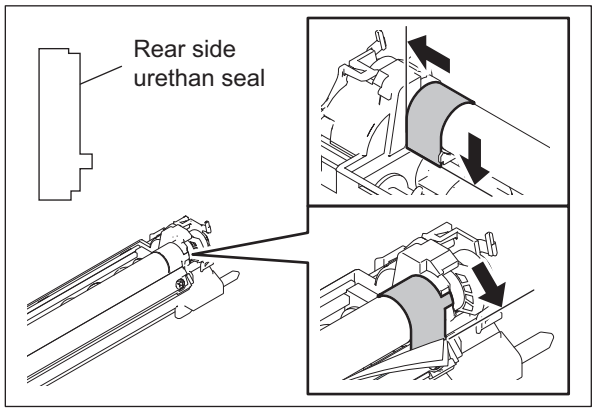


Fig. 12-28

[B-5] EPU PC board (EPU-Y, EPU-M, EPU-C, EPU-K)

The EPU PC boards are installed in the process units (EPU (Y, M, C, K)).

- Process unit (EPU (Y)): EPU PC board (EPU-Y)
- Process unit (EPU (M)): EPU PC board (EPU-M)
- Process unit (EPU (C)): EPU PC board (EPU-C)
- Process unit (EPU (K)): EPU PC board (EPU-K)

(1) Take off the corresponding the process unit (EPU), and then take off the process cover.
📖 P.11-10 "[A] Process unit (EPU)"
📖 P.11-11 "[B] Process cover"

(2) Release the latch, and then take off the EPU connector cover.

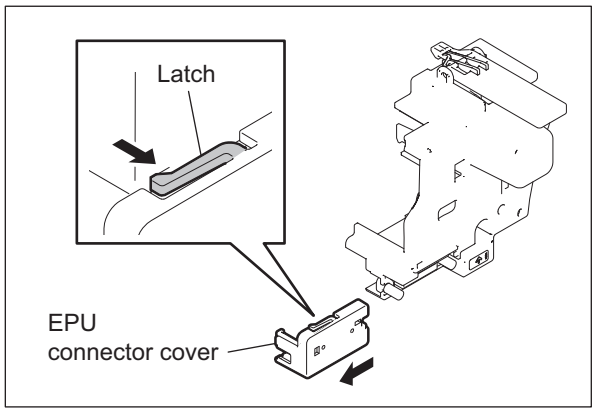


Fig. 12-29

(3) Disconnect the connector.

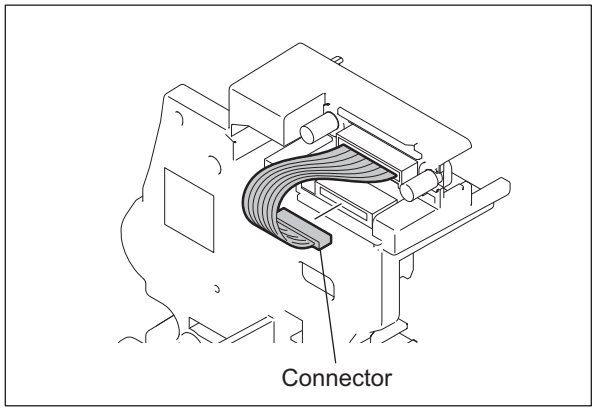


Fig. 12-30

(4) Release the latch, and then take off the EPU PC board.

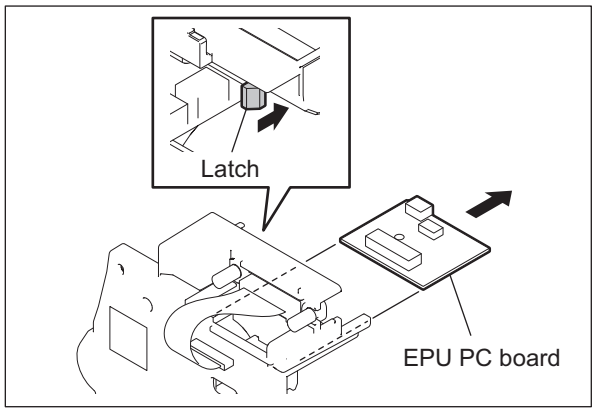


Fig. 12-31

[B-6] Auto-toner sensor (S22, S23, S24, S25)

The auto-toner sensors are installed in the process units (EPU (Y, M, C, K)).

- Process unit (EPU (Y)): Auto-toner sensor (S22)
- Process unit (EPU (M)): Auto-toner sensor (S23)
- Process unit (EPU (C)): Auto-toner sensor (S24)
- Process unit (EPU (K)): Auto-toner sensor (S25)

(1) Take off the corresponding the process unit (EPU), and then take off the developer unit to remove the developer material out of the unit.
📖 P.11-10 "[A] Process unit (EPU)"
📖 P.11-12 "[C-1] Cleaning unit/ Developer unit"
📖 P.12-12 "[B-3] Developer material"

(2) Disconnect the connector.

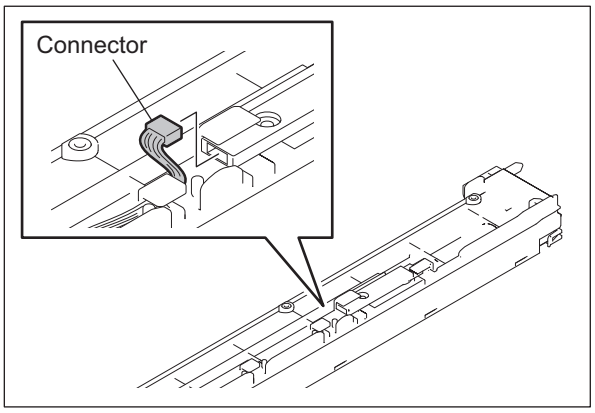


Fig. 12-32

(3) Hold the locking part to lift it up, and then turn the auto-toner sensor counterclockwise for 90 degrees to take it off.

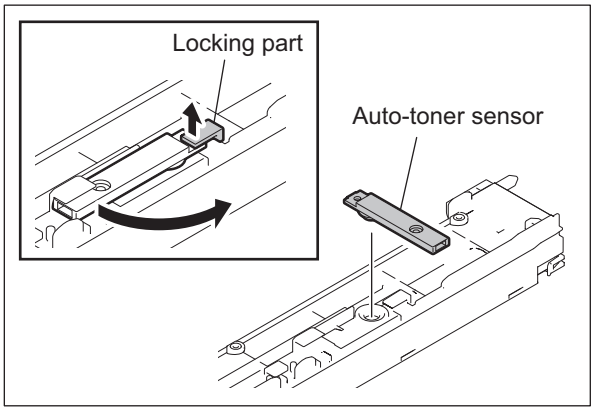


Fig. 12-33

[B-7] Developer sleeve

(1) Take off the doctor blade.
📖 P.12-17 "[B-4] Doctor blade"

(2) Rear side: Remove 1 screw and take off the polarity adjustment plate.

Note:
Before disassembling, record (mark if any) the scale pointed by the polarity adjustment lever. Then match the polarity adjustment plate at the scale previously recorded when reassembling.

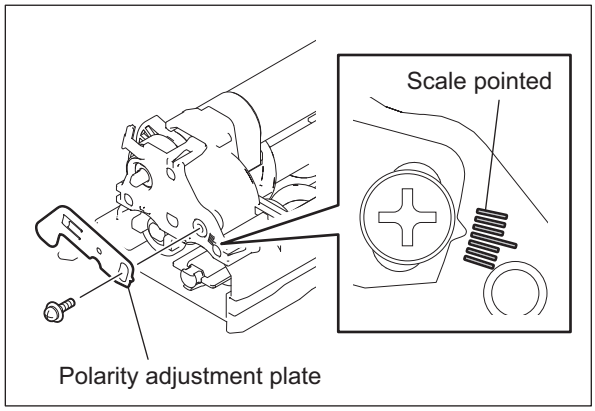


Fig. 12-34

(3) Release the 3 latches and take off the gear holder.

Note:
When installing the developer sleeve, match the positions of the idler gear shaft and the hole of the gear holder.

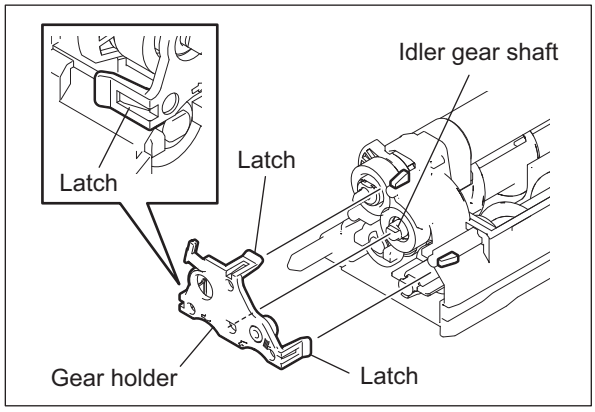


Fig. 12-35

(4) Remove the idler shaft and 2 idler gears, and then remove the parts installed on the developer sleeve shaft (in order of the C-ring, gear, developer guide, and bearing).

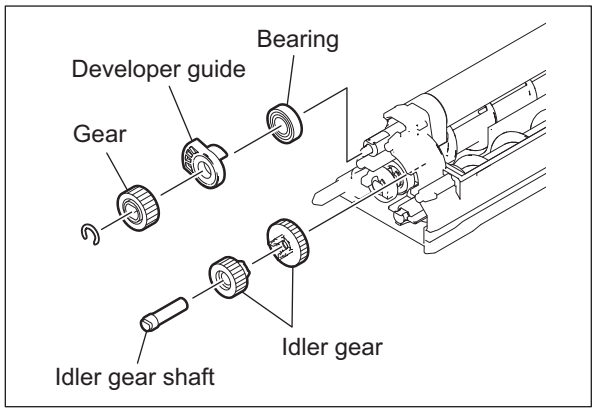


Fig. 12-36

(5) Rear side: Remove the parts installed on the developer sleeve shaft (the C-ring, developer guide, bearing and oil seal). Then take off the developer sleeve.

Note:
When installing, adjust the gap between the developer sleeve and the doctor blade.
📖SERVICE HANDBOOK "3.14 Adjustment of the doctor-to-sleeve gap"

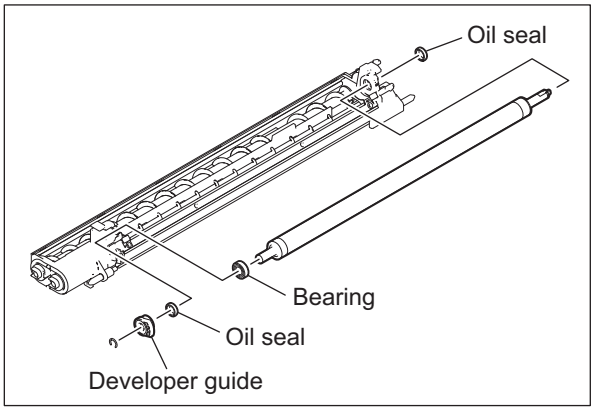


Fig. 12-37

Notes:
Be sure not to lose the oil seal left on the front side of the frame.

<<Procedure for replacing an oil seal>>
1. Take off the oil seal by hooking out its inside with a fine screwdriver and such.
2. Push in a new oil seal parallel to the frame, bushing and so on with paying attention to its direction (as shown y the figure at right).
3. Spread the grease (Alvania No.2; about 2 ricegrain's amount) all around the inside diameter. Wipe off the grease which has run off to the inner side of the oil seal.

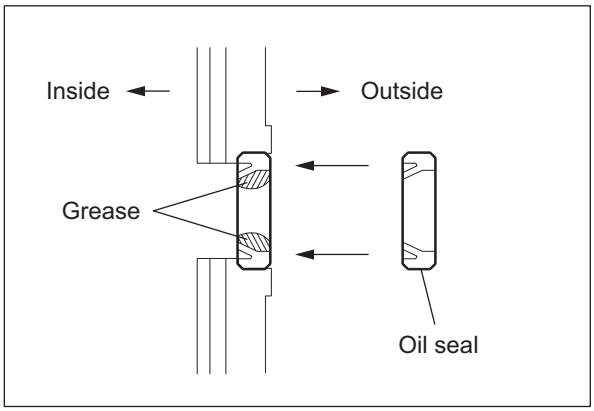


Fig. 12-38

[B-8] Mixer

(1) Discharge the developer material.
📖 P.12-12 "[B-3] Developer material"
(2) Rear side: Remove 1 screw and take off the polarity adjustment plate.

Note:
Before disassembling, record (mark if any) the scale pointed by the polarity adjustment lever. Then match the polarity adjustment plate at the scale previously recorded when reassembling.

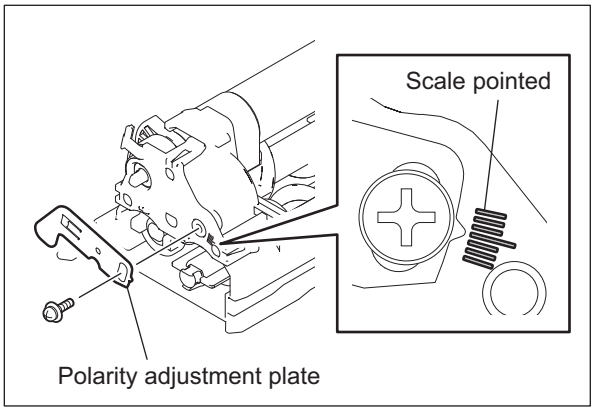


Fig. 12-39

(3) Release the 3 latches and take off the gear holder.

Note:
When installing the mixer, match the positions of the idler gear shaft and the hole of the gear holder.

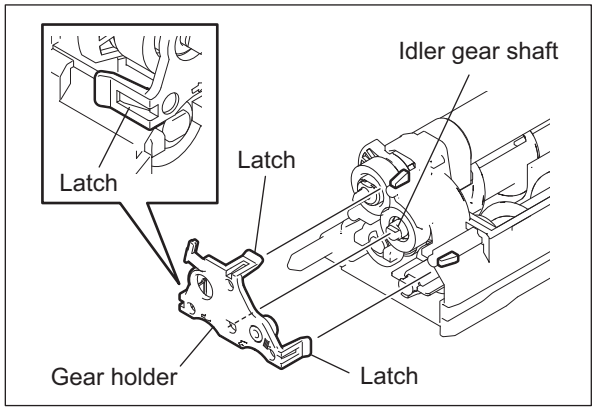


Fig. 12-40

(4) Remove 1 clip and take off the bushing and the spring.
(5) Remove 1 clip and take off the gear.
(6) Release the 1 latch and take off the gear.

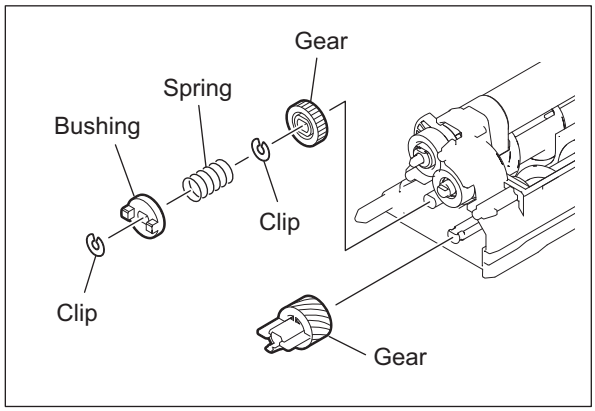


Fig. 12-41

(7) Front side: Remove 2 clips and take off the 2 bushings and the front bushing holder.

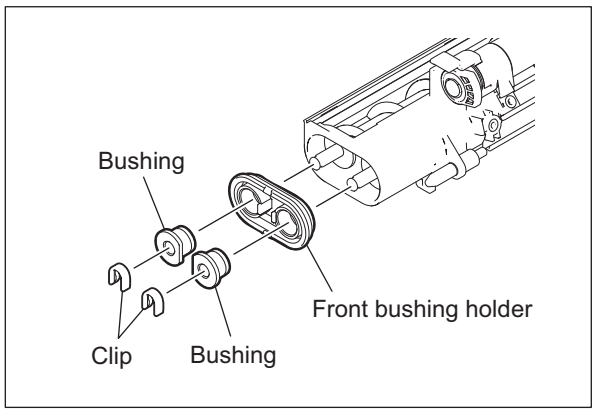


Fig. 12-42

12

(8) Take off the mixer from the hole of front side.

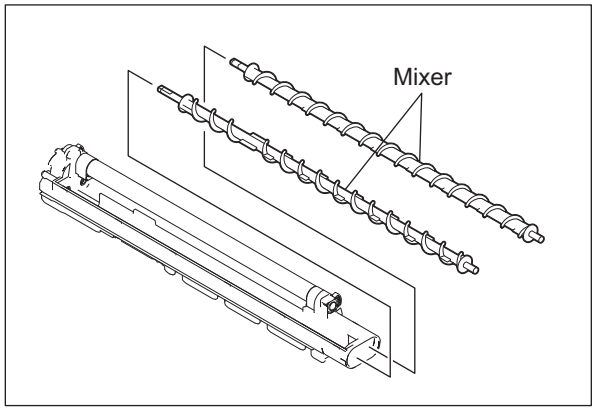


Fig. 12-43

[C] Used toner motor cover

(1) Open the front cover and take out the toner bag.
📖 P.12-11 "[A] Toner bag"
(2) Remove 2 screws and take off the duct.

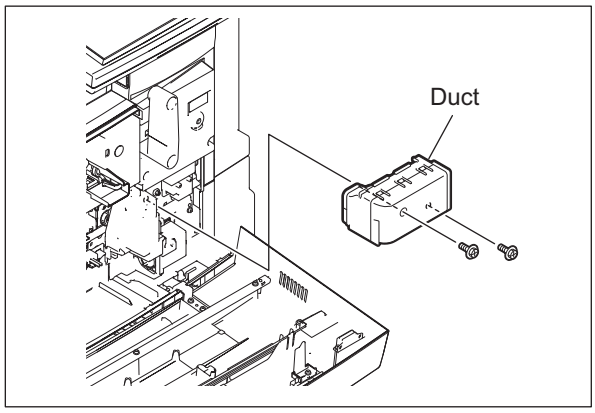


Fig. 12-44

(3) Disconnect 2 relay connectors and remove 1 screw. Then take off the used toner motor cover.

Note:
When installing the used toner motor cover, hang the 1 hook of the used toner motor cover on the hole of the frame.

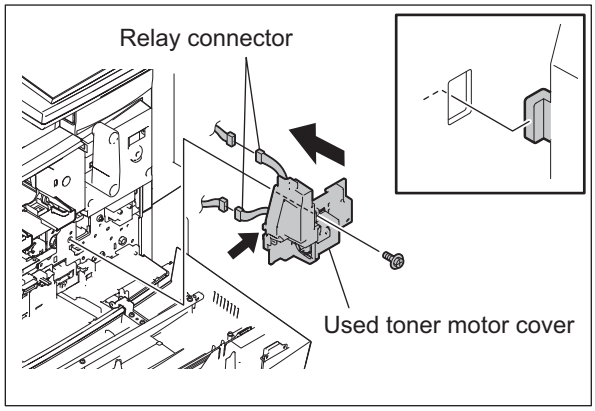


Fig. 12-45

[D] Temperature / humidity sensor (S12)

(1) Take off the used toner motor.
📖 P.12-24 "[C] Used toner motor cover"
(2) Release the 2 latches. Disconnect the 1 connector and take off the temperature / humidity sensor.

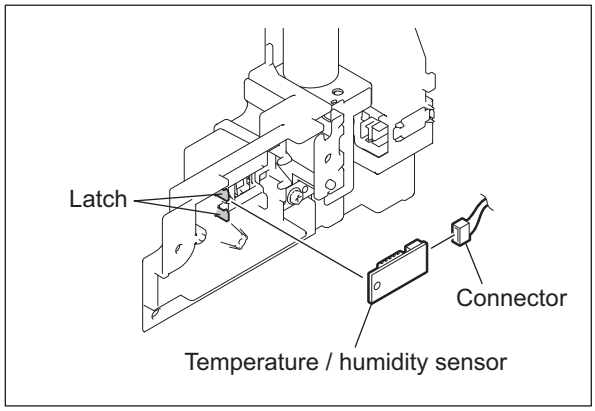


Fig. 12-46

[E] Toner bag full detection sensor (S13)

(1) Take off the used toner motor.
📖 P.12-24 "[C] Used toner motor cover"
(2) Remove the seal. Release the latch, and then take off the toner bag full detection sensor.

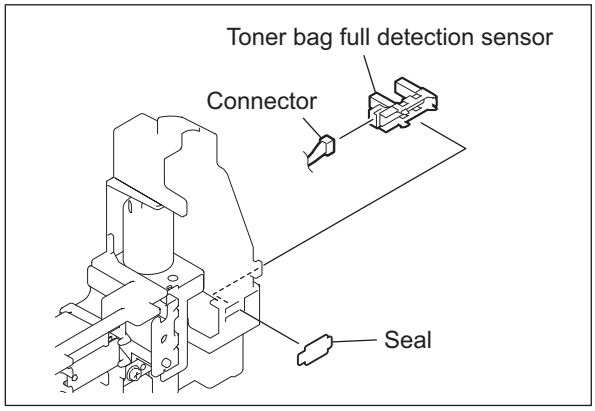


Fig. 12-47

[F] Used toner motor lock detection sensor (S14)

(1) Take off the used toner motor.
📖 P.12-24 "[C] Used toner motor cover"
(2) Remove 1 screw and take off the sensor cover.

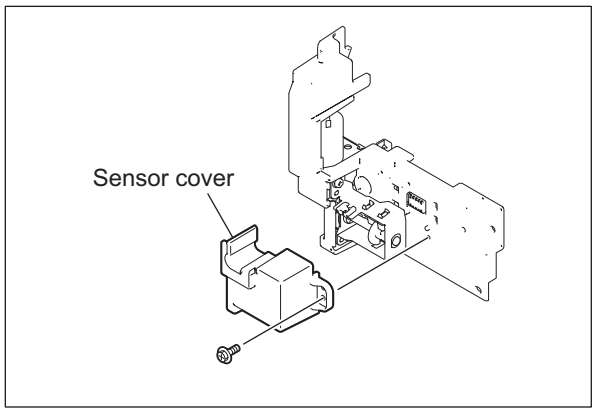


Fig. 12-48

(3) Remove 2 screws. Disconnect 1 connector and take off the 2 bushings, actuator, gear and sensor bracket.

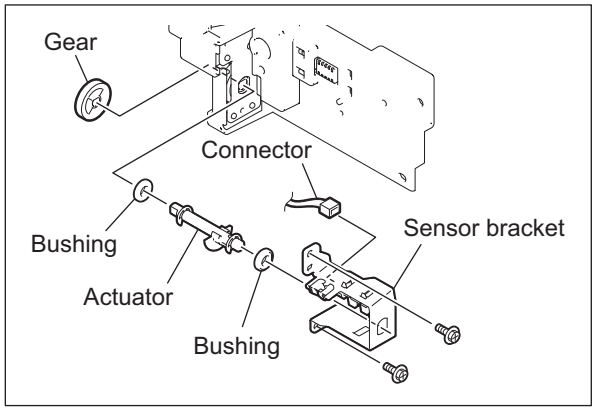


Fig. 12-49

(4) Remove the seal.
(5) Release the latch, and then take off the used toner motor lock detection sensor.

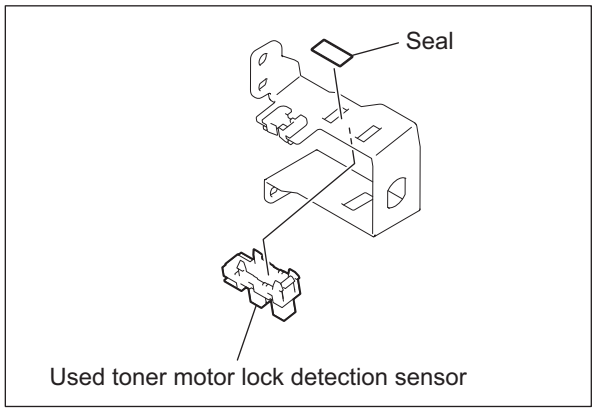


Fig. 12-50

[G] Used toner motor (M6)

(1) Take off the toner bag full detection sensor and used toner motor lock detection sensor.
📖 P.12-25 "[E] Toner bag full detection sensor (S13)"
📖 P.12-25 "[F] Used toner motor lock detection sensor (S14)"
(2) Remove 1 screw. Disconnect 1 relay connector, and take off the used toner motor bracket.

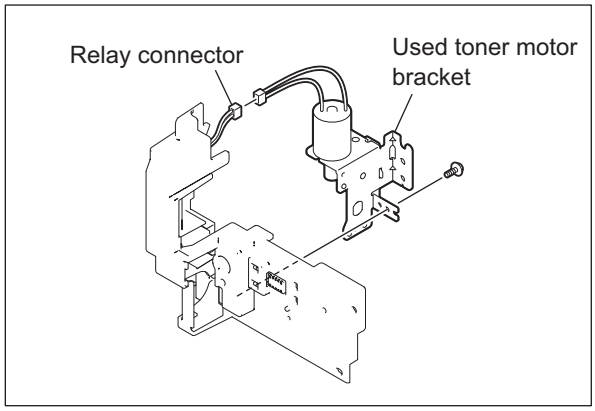


Fig. 12-51

(3) Remove 2 screws and take off the used toner motor.

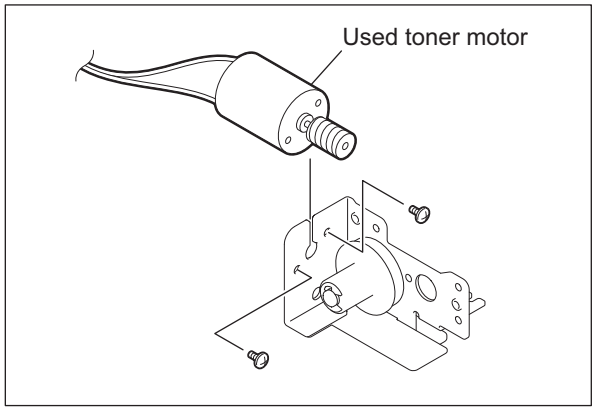


Fig. 12-52

[H] Developer unit motor (M9)

(1) Take off the switching regulator.
📖 P.2-41 "[G] Switching regulator"
(2) Open the board case.
📖 P.2-45 "[K] Board case"
(3) Remove 2 screws. Disconnect the 1 connector and take off the developer unit motor.

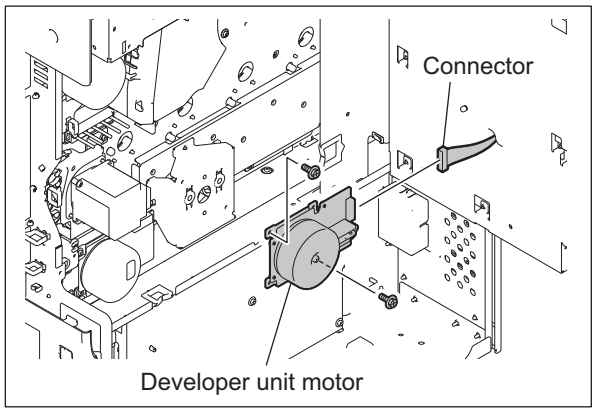


Fig. 12-53

[I] Developer drive unit

(1) Take off the switching regulator and drum drive unit.
📖 P.2-41 "[G] Switching regulator"
📖 P.11-20 "[F] Drum drive unit"
(2) Remove 1 screw on the right side of the developer drive unit.

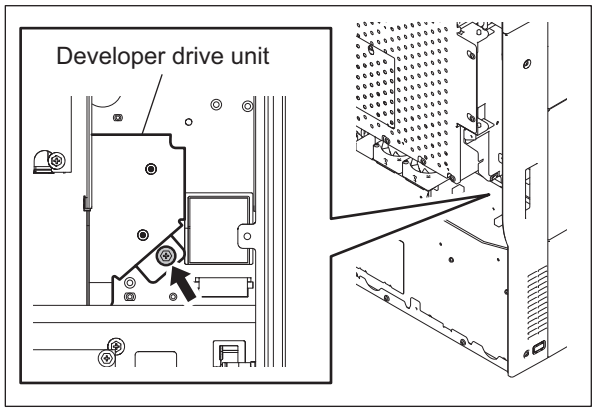


Fig. 12-54

(3) Disconnect the 1 connector on the developer unit motor.
(4) Remove 2 screws and take off the developer drive unit.

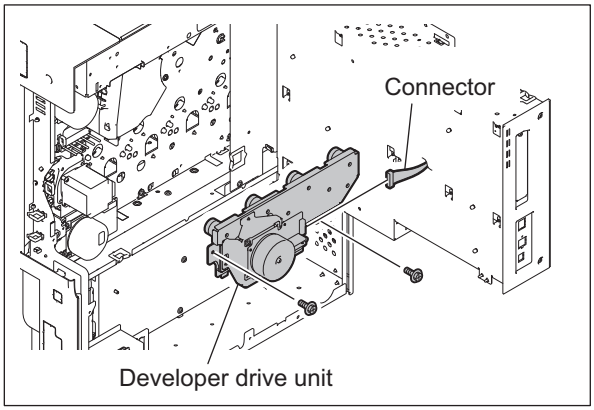


Fig. 12-55

[J] Toner motor assembly

Dedicated toner motors and toner cartridge detection sensors which correspond to the process units (EPU (Y, M, C, K)) respectively are installed.

- Process unit (EPU (Y)): Toner motor (M2), Toner cartridge detection sensor (S8)
- Process unit (EPU (M)): Toner motor (M3), Toner cartridge detection sensor (S9)
- Process unit (EPU (C)): Toner motor (M4), Toner cartridge detection sensor (S10)
- Process unit (EPU (K)): Toner motor (M5), Toner cartridge detection sensor (S11)

Take off the corresponding toner motor assembly.

(1) Take off the tray back cover and transfer belt cleaning unit".
📖 P.2-28 "[C] Tray back cover"
📖 P.13-11 "[A-1] Transfer belt cleaning unit"
(2) (2) Remove 2 screws and take off the toner cover.

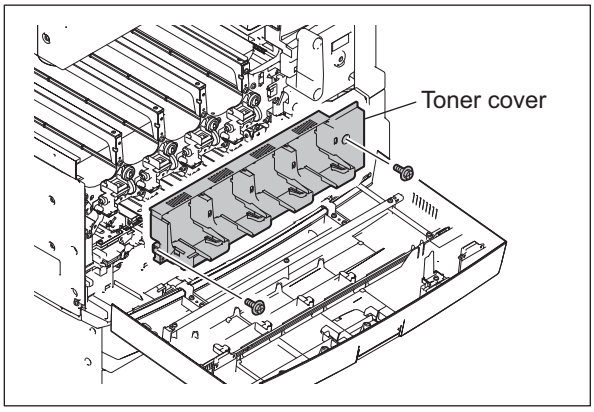


Fig. 12-56

(3) Remove 2 screws and take off the toner supply section.

Note:
Remove the toner supply section by turning it so that its notch and the rib of the toner transport gear are engaged.
Be careful not to scatter the toner inside the toner supply section.

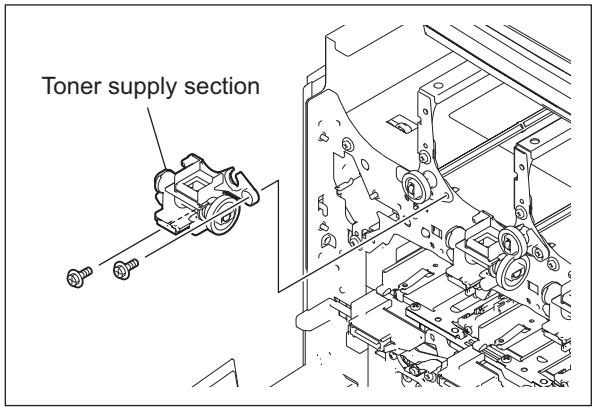


Fig. 12-57

(4) Remove 1 clamp, and then disconnect 1 relay connector.

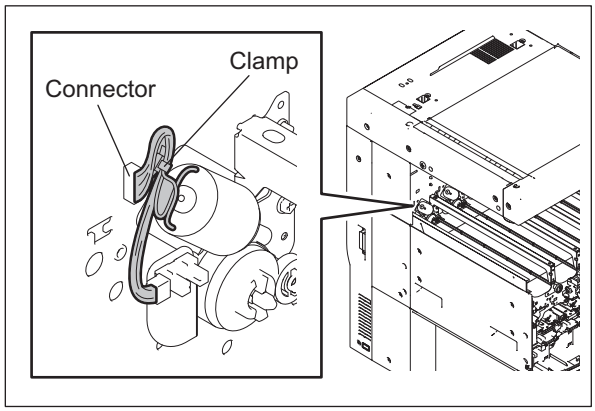


Fig. 12-58

(5) Remove 1 screw.
(6) Pull out the toner rod to the front of the equipment. Remove 1 clip and take off the toner motor assembly from the toner rod.

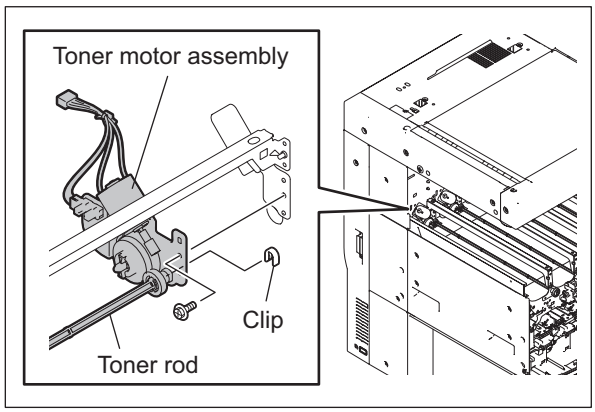


Fig. 12-59

[K] Toner motor (M2, M3, M4, M5)

(1) Take off the toner motor assembly.
📖 P.12-28 "[J] Toner motor assembly"
(2) Release the 2 latches and take off the gear.

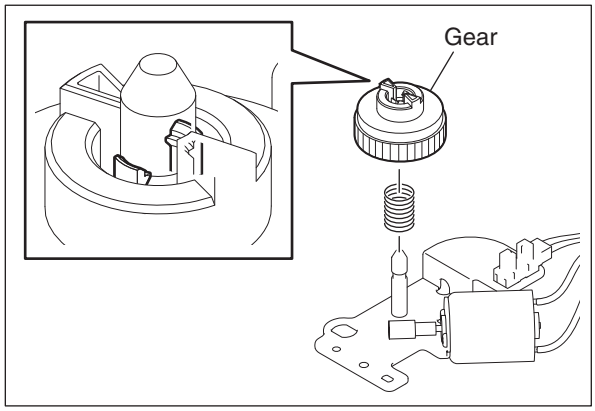


Fig. 12-60

(3) Remove 2 screws and take off the toner motor.

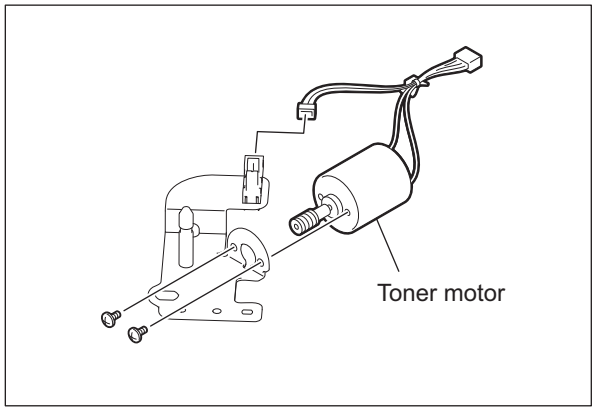


Fig. 12-61

[L] Toner cartridge detection sensor (S8, S9, S10, S11)

(1) Take off the toner motor assembly.
📖 P.12-28 "[J] Toner motor assembly"
(2) Disconnect 1 connector, and then release the latch to take off the Toner cartridge detection sensor.

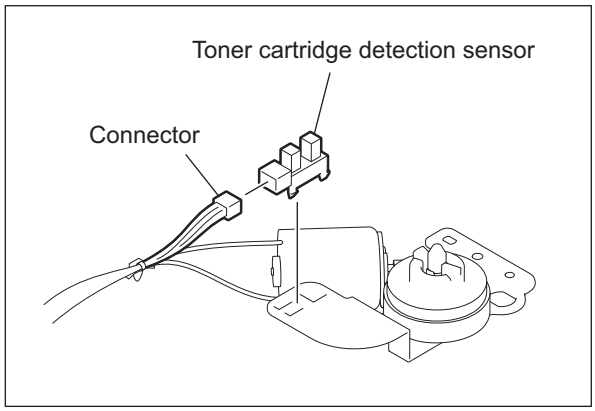


Fig. 12-62

[M] Ozone filter-1 PM

(1) Remove 1 screw, and then take off the ozone filter-1.

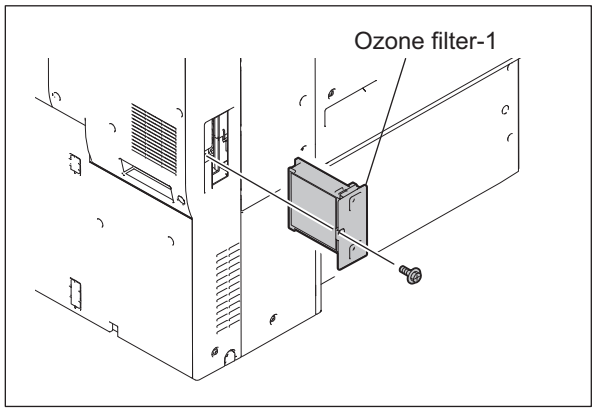


Fig. 12-63

[N] Ozone exhaust duct

(1) Take off the ozone filter-1 and rear cover-2.

📖 P.12-31 "[M] Ozone filter-1"
📖 P.2-36 "[S] Rear cover-2"

(2) Remove 1 screw. Disconnect the 1 relay connector, and then take off the ozone exhaust duct.

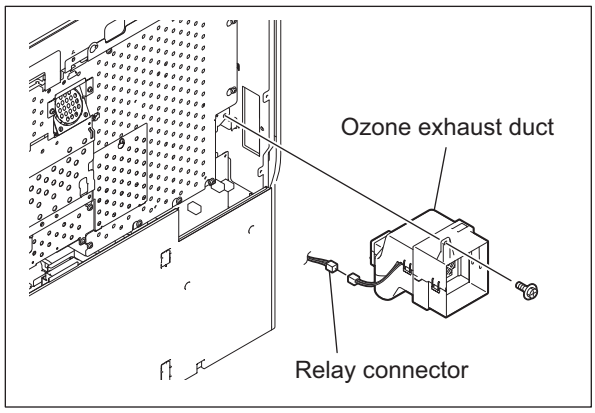


Fig. 12-64

[O] Ozone exhaust fan (M24)

(1) Take off the ozone exhaust duct.

📖 P.12-31 "[N] Ozone exhaust duct"

(2) Release the 7 latches and take off the ozone exhaust fan.

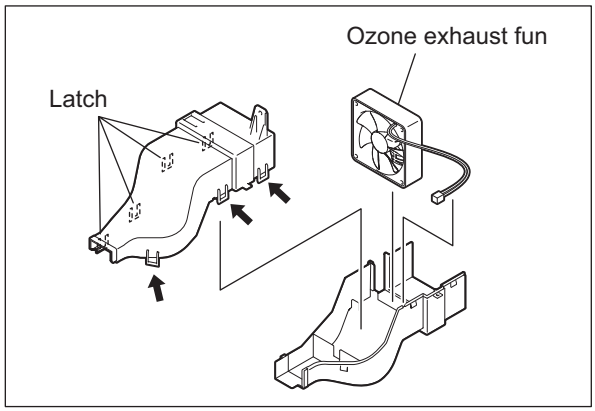


Fig. 12-65

[P] Internal cooling fan (M23)

(1) Open the board case.
📖 P.2-45 "[K] Board case"
(2) Remove 2 screws. Disconnect 1 relay connector, and take off the internal cooling duct.

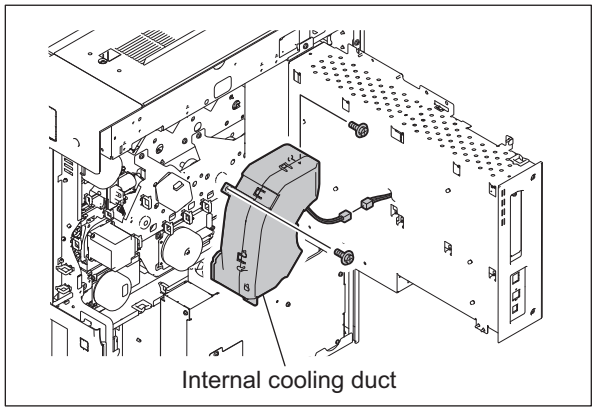


Fig. 12-66

(3) Release the 7 latches and take off the internal cooling fan.

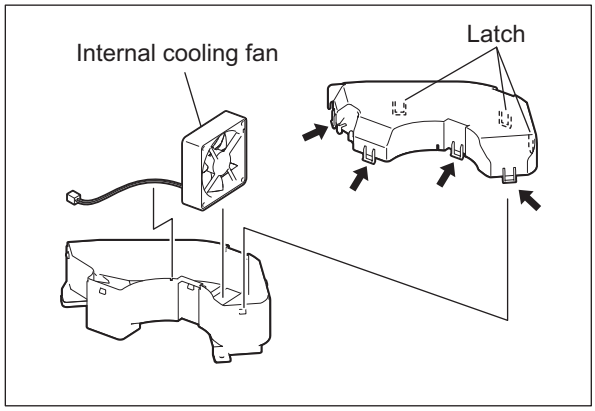


Fig. 12-67

[Q] Ozone filter-2 PM

(1) Remove 1 screw, and then take off the filter cover.

Note:
When installing the filter cover, be sure to install it with 2 hooks on the cover inserted to respective holes on the frame.

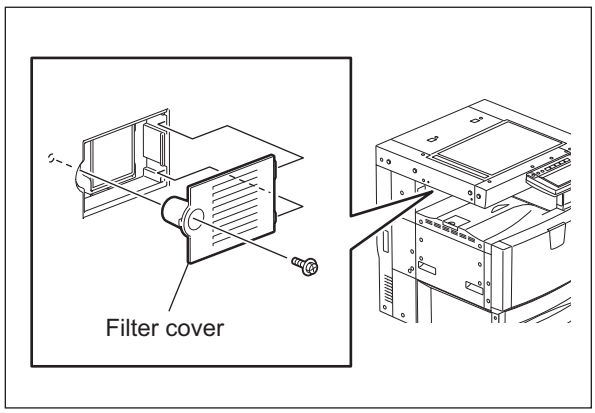


Fig. 12-68

(2) Remove the ozone filter-2.

Note:

When installing the ozone filter-2, be sure to insert it all the way in and be careful not to damage the mesh.

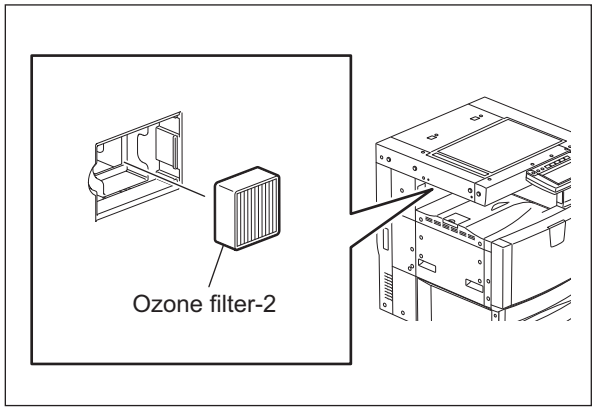


Fig. 12-69

13. TRANSFER UNIT

13.1 General Descriptions

Transfer is a process of decaling a toner image from the photoconductive drum onto paper.
A toner image formed on the photoconductive drum is temporarily transferred onto the transfer belt, and the toner image is then transferred from the transfer belt onto paper. The first transfer from the drum to the transfer belt is called the 1st transfer, and the second transfer from the transfer belt to paper is called the 2nd transfer. To form a color image, the images of yellow (Y), magenta (M), cyan (C) and black (K) are transferred and overlaid on the transfer belt in order, and then the overlaid images are transferred onto paper.
After the completion of the 2nd transfer, the residual toner on the transfer belt is scraped off by the transfer belt cleaning blade and then transported to the used toner bag.

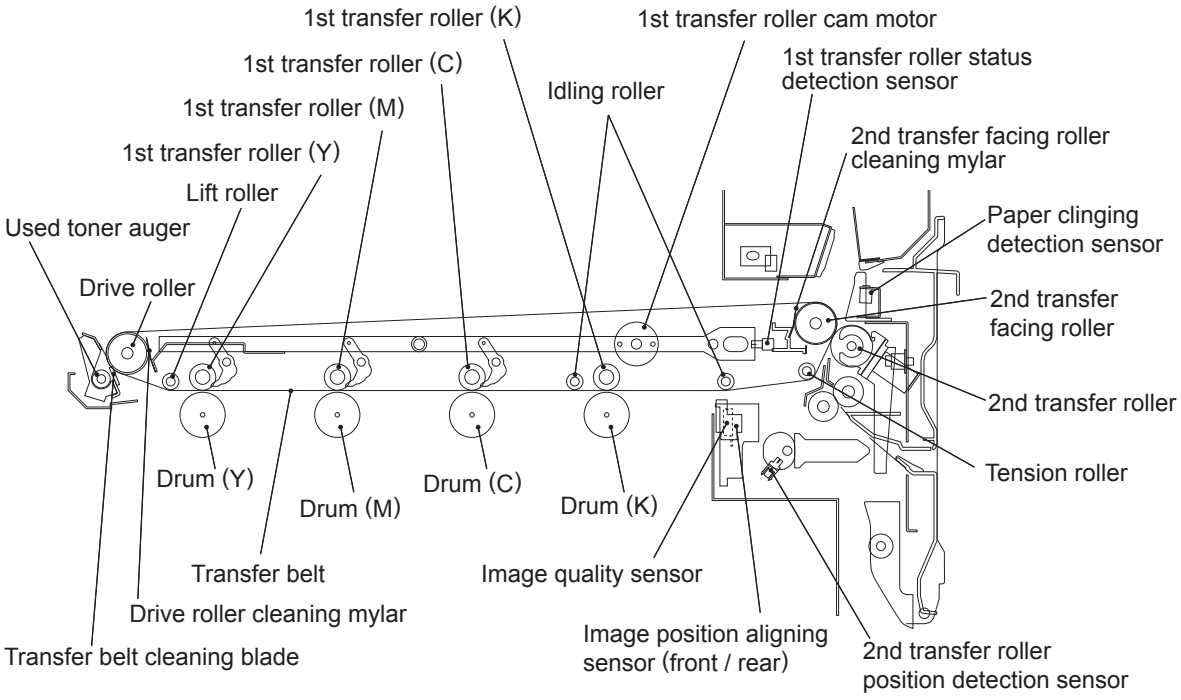


Fig. 13-1

13.2 Composition

Transfer belt unit	Transfer belt	
	1st transfer roller	Y, M, C, K
	Drive roller	
	Tension roller	
	2nd transfer facing roller	
	Lift roller	
	Idling roller	
	1st transfer roller cam motor	M8
	1st transfer roller status detection sensor	S15
	Drive roller cleaning mylar	PM parts
	2nd transfer facing roller cleaning mylar	PM parts
Transfer belt cleaning	Transfer belt cleaning blade	PM parts
	Used toner auger	
Transfer belt motor		M7
2nd transfer unit	2nd transfer roller	PM parts
	2nd transfer roller position detection sensor	S29
	Paper clinging detection sensor	S27
Image position aligning sensor (front / rear)		S16 / S17
Image quality sensor		S18 (Chapter 14)
Registration motor		M19 (Chapter 10)

13.3 Functions

1) Transfer belt
This belt, made of electrical resistance resin, is formed in a highly-precise technique. The drive of the transfer belt motor rotates the drive roller and thus the transfer belt is rotated.
The length of the transfer belt may vary depending on environments such as temperature or humidity. When the belt length varies, the leading position of an image also varies. Therefore, check image position in the secondary scanning direction after installation or parts replacement because there is difference between the environments of an installation site and a factory where the equipment was shipped. (Although image adjustment is already performed at the shipment from the factory, this adjustment must be performed again in the installation site.) If required, perform “Leading edge position adjustment / Common items (05-408)”. Refer to the Service Handbook for the details of this adjustment.

2) 1st transfer roller
When the 1st transfer bias from the high-voltage transformer is applied to this roller, a toner image is transferred from the photoconductive drum onto the transfer belt. The spring of this roller presses the transfer belt and the photoconductive drum to contact each other.

3) Drive roller
This roller rotates the transfer belt with the drive transmitted from the transfer belt motor. It also supports an easy contact between the transfer belt cleaning blade and the transfer belt.

4) Tension roller
This roller applies tensile force to the transfer belt with its spring.

5) 2nd transfer facing roller
This roller contacts with the 2nd transfer roller, holding the transfer belt between them to nip paper. When the 2nd transfer bias (negative polarity) is applied from the high-voltage power supply to the 2nd transfer facing roller, a toner image is transferred onto paper.
To clean off the toner adhered on the 2nd transfer roller, positive bias is applied on the 2nd transfer facing roller to transport the positively charged toner on the 2nd transfer roller to the transfer belt, and then negative bias is applied to transport the negatively charged toner on the 2nd transfer roller to the transfer belt.

6) Lift roller
This roller retains the contacting position of the transfer belt and the photoconductive drum.
When only a black (K) image is being developed, the 1st transfer roller cam motor lifts up the 1st transfer rollers of yellow (Y), magenta (M) and cyan (C), together with this roller.

7) Idling roller
This roller retains the contacting position of the transfer belt and the photoconductive drum.

8) 1st transfer roller cam motor (M8)
This motor lifts up the 1st transfer rollers (Y), (M) and (C) when only a black (K) image is being developed. Installed in the transfer belt unit, this motor drives the cam and also moves the linked lever to lift up the 1st transfer rollers (Y), (M) and (C).

9) 1st transfer roller status detection sensor (S15)
This sensor installed in the transfer belt unit detects the timing to apply brake on the 1st transfer roller cam motor, and also detects if the 1st transfer rollers are at their contacting or releasing position.

10)Transfer belt cleaning blade

This blade removes the residual toner, paper dust or foreign objects on the transfer belt surface. It is pressed onto the transfer belt unit by its spring. The recovery blade and urethan seal prevent the removed residual toner or other objects from leaking out of the transfer belt cleaning unit.

11)Used toner auger

This auger transports the residual toner, paper dust or foreign objects scraped off by the transfer belt cleaning blade to the toner bag.

12)Transfer belt motor (M7)

This two-phase stepping motor drives the drive roller of the transfer belt unit and the used toner auger.

13)2nd transfer roller

This metal roller, covered with sponge and an NBR tube, is located to face the 2nd transfer facing roller through the transfer belt. When the registration motor is rotated reversely, the drive from the registration motor is transmitted to this roller through the cam and arm, and thus this roller contacts with or releases from the transfer belt.

14)2nd transfer roller position detection sensor (S29)

This photointerrupter detects if the 2nd transfer roller is contacted with or released from the transfer belt.

15)Paper clinging detection sensor (S27)

This sensor detects thin paper clinging to the transfer belt. When a sheet of thin paper which is not allowed in the specification is fed, this thin paper may cling to the transfer belt. The clung paper causes a service call because it cannot be removed in a normal jam releasing process. This sensor forestalls such case and helps to remove it as a normal paper jam.

13.4 General description of operation

13.4.1 Printing in the color modes

[A] 1st transfer

1) Printing starts and the photoconductive drums, developer units and transfer belt start the rotation.

2) The 1st transfer rollers (Y), (M) and (C) move to a position contacting with the photoconductive drum, with the transfer belt nipped between them.

3) A voltage is applied through the 1st transfer roller (Y) and a toner image on the photoconductive drum (Y) is transferred onto the transfer belt.

4) A voltage is applied through the 1st transfer roller (M) and a toner image on the photoconductive drum (M) is transferred onto the transfer belt to be overlaid on the toner image (Y).

5) A voltage is applied through the 1st transfer roller (C) and a toner image on the photoconductive drum (C) is transferred onto the transfer belt to be overlaid on the toner images (Y) and (M).

6) A voltage is applied through the 1st transfer roller (K) and a toner image on the photoconductive drum (K) is transferred onto the transfer belt to be overlaid on the toner images (Y), (M) and (C).

7) When the printing operation is completed, the 1st transfer rollers of Y, M and C move to a position released from the drum.

[B] 2nd transfer

1) The 2nd transfer roller waits at the position released from the transfer belt during the equipment's waiting period.

2) Printing starts and then the 2nd transfer roller moves to the position contacting with the transfer belt.

3) The transfer belt rotates and then a toner image on the transfer belt surface is moved to the 2nd transfer position.

4) The registration rollers align paper and then the paper is transported to the 2nd transfer roller.

5) A bias is applied to the 2nd transfer roller and then the toner image on the transfer belt surface is transferred onto the transported paper.

6) After the completion of the 2nd transfer, the 2nd transfer roller is escaped to the releasing position.

7) When the toner image has been transferred onto the paper in the 2nd transfer process, the residual toner on the transfer belt is scraped off by the transfer belt cleaning blade.

13.4.2 Printing in the black mode

[A] 1st transfer

1) Printing starts (The 1st transfer rollers (Y), (M) and (C) have moved to the position released from the photoconductive drum.)

2) The photoconductive drum (K), developer unit (K) and transfer belt start the rotation.

3) A voltage is applied through the 1st transfer roller (K) and a toner image on the photoconductive drum (K) is transferred onto the transfer belt.

4) Completion of printing.

[B] 2nd transfer

1) The 2nd transfer roller waits at the position released from the transfer belt during the equipment's waiting period.

2) Printing starts and then the 2nd transfer roller moves to the position contacting with the transfer belt.

3) The transfer belt rotates and then a toner image on the transfer belt surface is moved to the 2nd transfer position.

4) The registration rollers align paper and then the paper is transported to the 2nd transfer roller.

5) A bias is applied to the 2nd transfer roller and then the toner image on the transfer belt surface is transferred onto the transported paper.

6) After the completion of the 2nd transfer, the 2nd transfer roller is escaped to the releasing position.

7) When the toner image has been transferred onto the paper in the 2nd transfer process, the residual toner on the transfer belt is scraped off by the transfer belt cleaning blade.

13.4.3 Color registration control

In this equipment, color registration control method is used to correct any registration deviation in any of the four colors. This color registration control is performed during warming-up, and at fixed intervals (every 30 min.). 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 equipment after warming-up. However, there are cases such as when the equipment 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. For such cases, the temperature of the fuser belt (heat roller) is checked when the power is turned ON, and if it is within the allowable temperature range, color registration control at the warming-up will be omitted.

Color registration control is performed in the following order.

1) A built-in 4-color test pattern is printed on the transfer belt several times.*

2) This printed test pattern is read by the rear and front registration sensors each time 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 amount is judged from the result of calculation, and then the correction for the laser write position (correction of primary and secondary scanning deviation) and the tilt angle adjustment of laser beam reflection mirrors will be made.

5) After the correction is made, the amount of deviation is checked whether it is within-spec or not. If the value is within-spec, the color registration control will be completed, and if it is out-of-spec, the color registration control will be restarted from step 1).

* After the test patterns are printed, if the specified number of data is unable to be read successfully, an error (CA00) is generated.

The test patterns for the 4 colors illustrated below 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 color registration sensors.
Corrections will be made after four types of deviation are calculated according the measurement: parallel 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

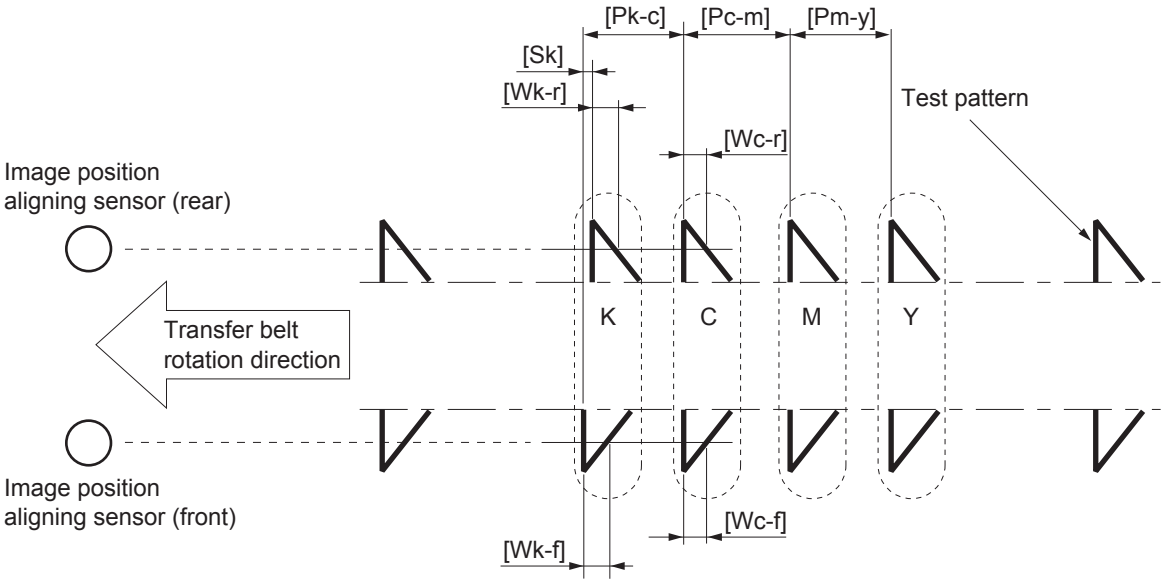


Fig. 13-2

Deviation	Measurement/Calculation Pitch (x=m, c, k)	Object of Correction
Parallel deviation in the secondary-scanning direction	[Pk-c], [Pc-m], [Pm-y]	Laser write start position (secondary-scanning direction)
Deviation of write start position in the primary-scanning direction	[Wx-r]-[Wy-r]	Laser write start position (primary-scanning direction)
Deviation of reproduction ratio in the primary-scanning direction	([Wx-r]+[Wx-f])-([Wy-r]+[Wy-f])	Image writing frequency
Tilt deviation	[Sx]	Angle of reflection mirror in the laser unit

Because the color registration control of the equipment optimizes the laser write start position to correct the deviation of 4 colors that appears uniformly on the paper, it cannot correct the following deviations that fluctuate.

- Deviation caused by drum rotation errors
  Deviation in the secondary-scanning direction of approximately 94 mm pitch caused by eccentricity of the driving parts from the drum motor to the drum, or etc.

- Deviation caused by fluctuations in transfer belt speed
  Fluctuating deviation in the secondary-scanning direction resulted from fluctuations in transfer belt speed 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

- Deviation caused by meandering of the transfer belt
  Fluctuating deviation in the primary-scanning direction caused by meandering of the transfer belt

13.5 Electric Circuit Description

13.5.1 Transfer belt motor control circuit

The transfer belt motor is a stepping motor driven by the control signal output from the ASIC on the LGC board and rotates the drive roller.
The transfer belt motor is driven by the pulse signal (TBMA, TBMB, TBMC, TBMD) output from the motor driver. These pulse signals are formed based on the reference clock (TBMCK) and output only when the enable signal (TBMEN) is a high level. Also, the rotation speed or direction of the motor can be switched by changing the output timing of each pulse signal.

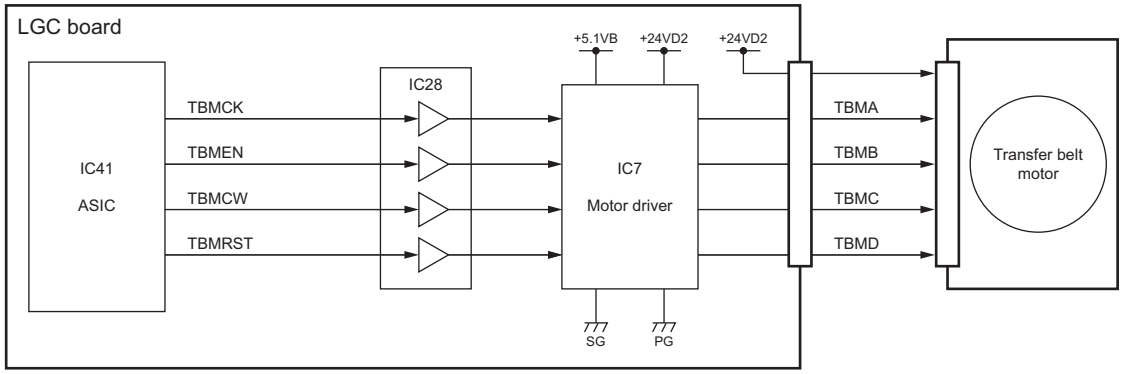


Fig. 13-3

Control signal

Signal	Function	Status	
		High level	Low level
TBMCK	Reference clock	---	---
TBMEN	Enable signal	ON	OFF
TBMDIR	Rotation direction signal	CCW	CW
TBMRST	Reset signal	Normal operation	Reset

* CW: Clockwise rotation, CCW: Counter clockwise rotation viewing from the axis

13.5.2 1st transfer roller cam motor control circuit

The 1st transfer roller cam motor is a DC motor driven by the control signal output from the ASIC on the LGC board and rotates the 1st transfer roller cam to contact/release each 1st transfer roller for Y, M and C color to/from the transfer belt.
The motor driver outputs the drive signal (TBLTM1A-0A, TBLTM1B-1A) to the motor based on the control signal (TBLTM1A-0C, TBLTM1B-1C) output from the ASIC. The motor operates the rotation, stop or brake according to the status of these drive signals.

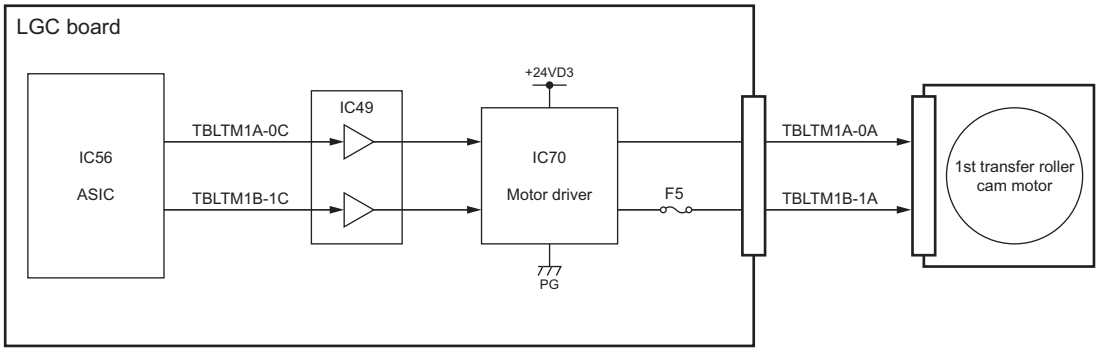


Fig. 13-4

Control signal

Signal				Motor status
ASIC output		Motor driver output		
TBLTM1A-0C	TBLTM1B-1C	TBLTM1A-0A	TBLTM1B-1A	
L	L	OFF (high impedance)		Stop
L	H	L	H	Rotation
H	L	H	L	Unused
H	H	H	H	Brake

13.6 Disassembly and Replacement

[A] Transfer belt cleaning unit

[A-1] Transfer belt cleaning unit

(1) Open the front cover. Take off the process unit (EPU(Y)).
📖 P.11-10 "[A] Process unit (EPU)"

(2) Insert the flat head screwdriver to the hole in the left side of the transfer belt cleaning duct, and release the latch by pushing the screwdriver in the direction of the arrow-A. Then release the right side latch by pushing it in the direction of the arrow-B, and pull the transfer belt cleaning duct toward the front to take it off.

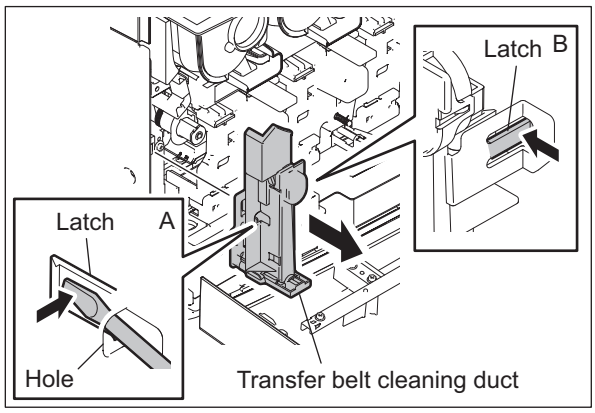


Fig. 13-5

(3) Turn the TBU lifting lever clockwise for 90 degrees.

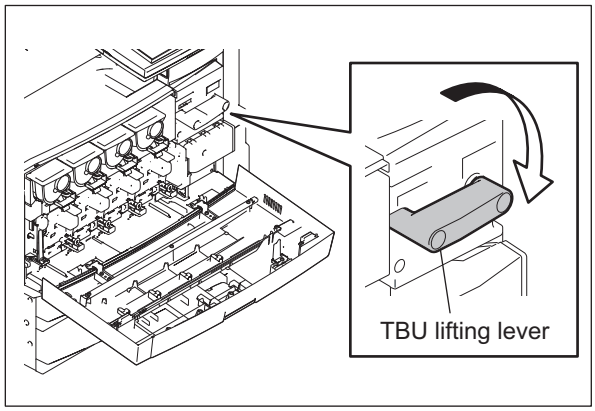


Fig. 13-6

(4) Rotate the lever (sky blue) counterclockwise and pull it to the front to take it off.

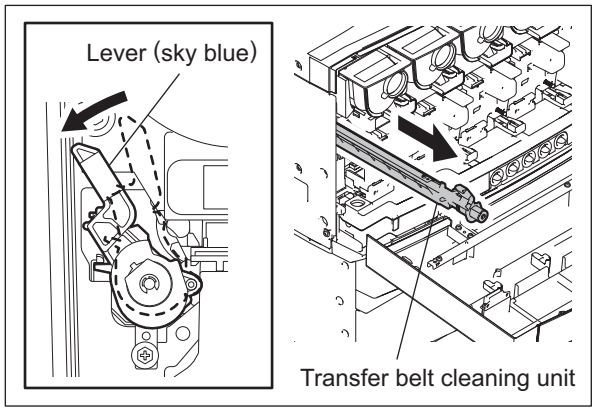


Fig. 13-7

Notes:

Follow the procedure below for the installation.

1. When installing, be sure to check if the TBU separation lever is at the fixed position (horizontal position) with the transfer belt installed.
2. Check if the TBU cleaner pressure hook is locked. If it is released, rotate the TBU cleaner pressure hook lever to lock it as shown in the figure, otherwise the transfer belt cleaning unit cannot be installed.

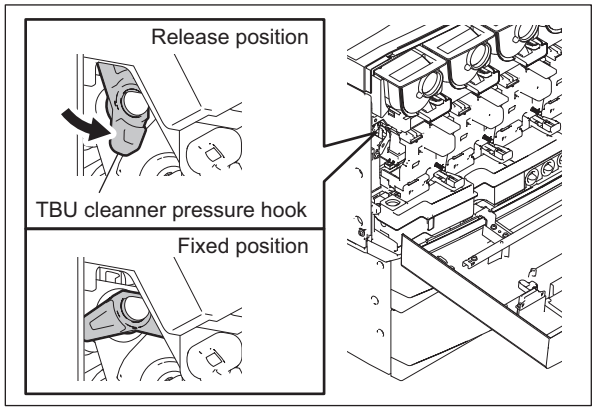


Fig. 13-8

3. Insert the A portion of the transfer belt cleaning unit beneath the stay (B) of the main frame.
4. Align the portion (C) of the transfer belt cleaning unit with the portion (D) of the main frame, then slide the transfer belt cleaning unit along the stay (B) of the main frame all the way in.
5. Rotate the lever E (sky blue) clockwise to lift it up until it clicks.

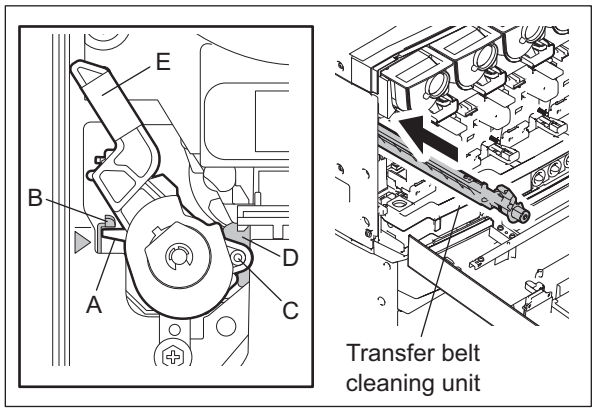


Fig. 13-9

6. Be sure to turn the TBU lifting lever counterclockwise for 90 degrees before installing the process unit (EPU(Y)).

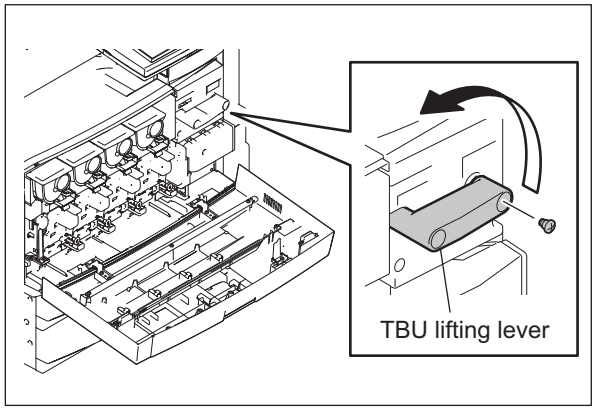


Fig. 13-10

[A-2] Transfer belt cleaning blade PM / Blade seal PM

(1) Take off the transfer belt cleaning unit.
📖 P.13-11 "[A-1] Transfer belt cleaning unit"
(2) Remove 2 screws, and then take off the transfer belt cleaning blade.
(3) Remove 2 screws, and then take off the recovery plate.

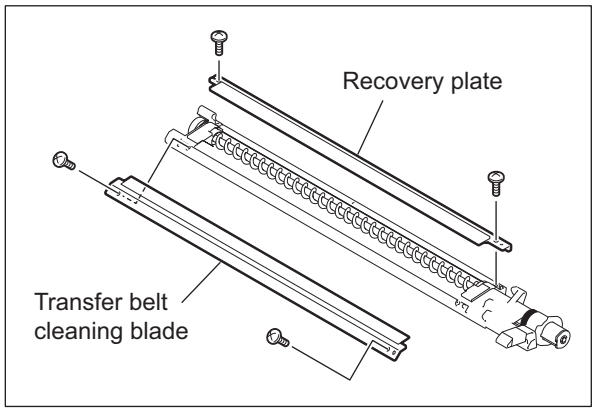


Fig. 13-11

(4) Remove the blade seals (both front and rear sides).

Notes:
1. When the blade seals are being attached, attach them on the position shown in the figure (by slightly pushing it to the direction of the arrow).
2. After the blade seals have been attached, be sure that no gap is left between the blade seals and the edge of the transfer belt cleaning blade.

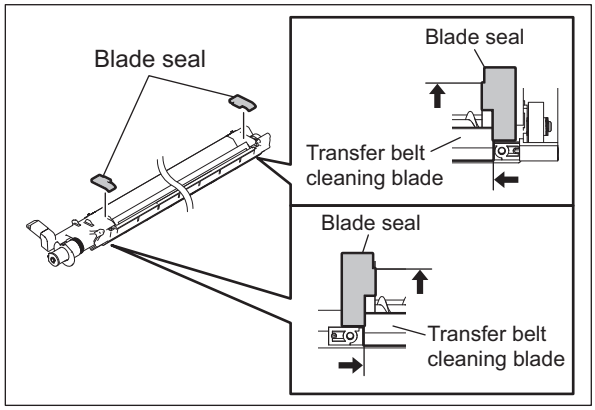


Fig. 13-12

13

[B] Transfer belt unit (TBU)

[B-1] Transfer belt unit (TBU)

Notes:

It is recommended to wear gloves to avoid a direct touch on the belt surface. When any of the following maintenance works has been done, be sure to adjust the axis gap of the TBU drive gear.
📖SERVICE HANDBOOK "3.15 Adjustment of the axis gap of the TBU drive gear"

- Replacing the transfer belt .
- Disassembling the roller or frame of the transfer belt unit (except when only the transfer belt or drive roller is disassembled).

(1) Take off the transfer belt cleaning unit.
📖 P.13-11 "[A-1] Transfer belt cleaning unit"
(2) Remove 1 screw, and then turn the TBU lifting lever counterclockwise for 90 degrees.

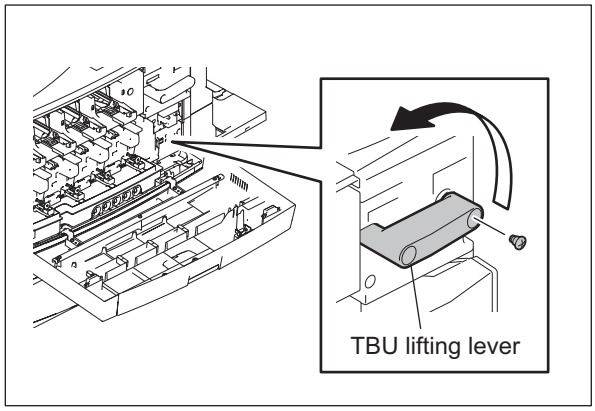


Fig. 13-13

(3) Move the automatic duplexing unit to its maintenance position.
📖 P.16-13 "[A] ADU maintenance position"
(4) Open the 2nd transfer unit and ADU.
(5) Open the middle guide by holding its knob.

Note:

Do not hold the middle guide itself when opening and closing it.

(6) Disconnect the 1 connector.

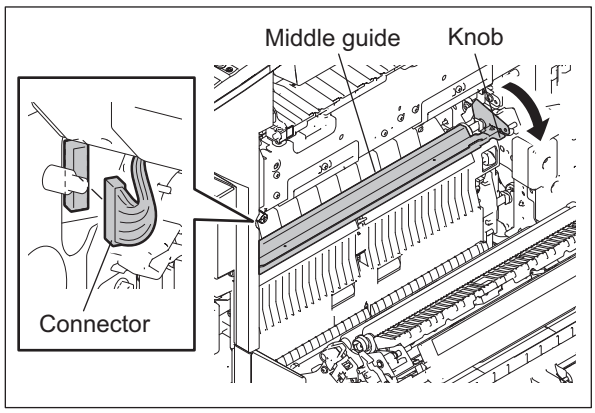


Fig. 13-14

(7) Hold the holder, and then pull out the transfer belt unit toward you.

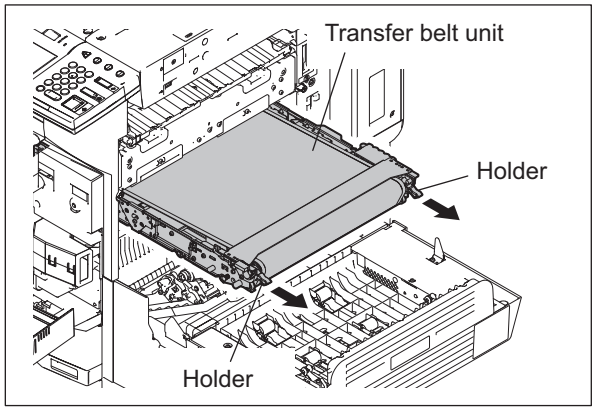


Fig. 13-15

(8) Raise the front handle, and then hold it together with the rear handle (light blue) to take off the transfer belt unit.

Note:
When taking off the transfer belt unit, be sure not to contact the bottom of this unit and the 2nd transfer unit to prevent the transfer belt from being scratched.

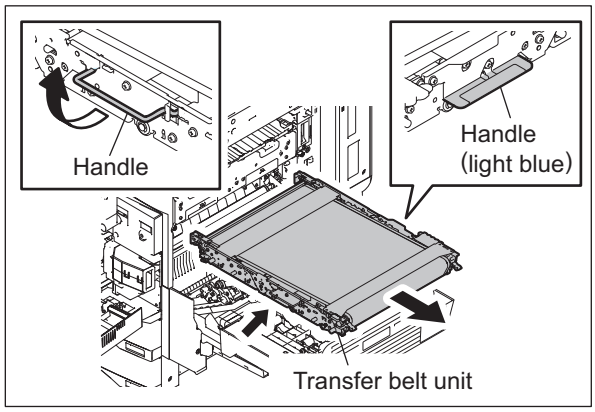


Fig. 13-16

Note:
Be careful not to deform the spring when removing/installing the transfer belt unit.

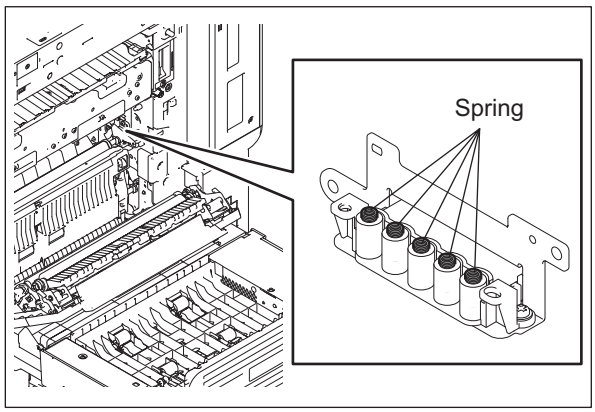


Fig. 13-17

13

Notes:

Follow the procedure below for the installation.

1. Rotate the TBU cleaner pressure hook lever on the transfer belt unit to lock the TBU cleaner pressure hook.
2. Check if the TBU release lever is at the release position (vertical position).
3. Check that the middle guide of the unit is opened.
4. Insert the transfer belt unit by sliding the unit along the rail.
5. Store the front handle, and then push the holder all the way in until it comes to a stop.
6. When the unit has been securely inserted, close the middle guide.

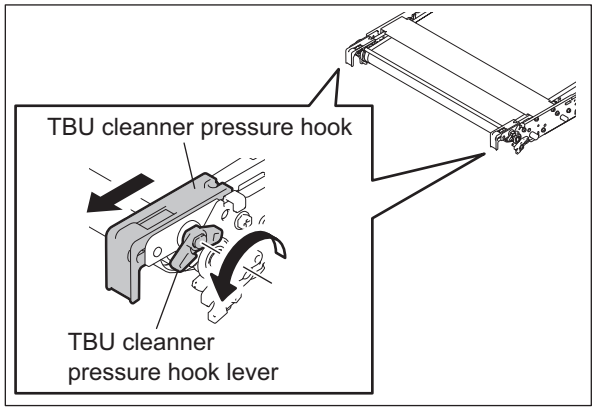


Fig. 13-18

[B-2] Transfer belt

Note:

It is recommended to wear gloves to avoid a direct touch on the belt surface.

(1) Take off the transfer belt unit.
📖 P.13-14 "[B-1] Transfer belt unit (TBU)"

(2) Remove 8 screws, and then take off the 2 stays.

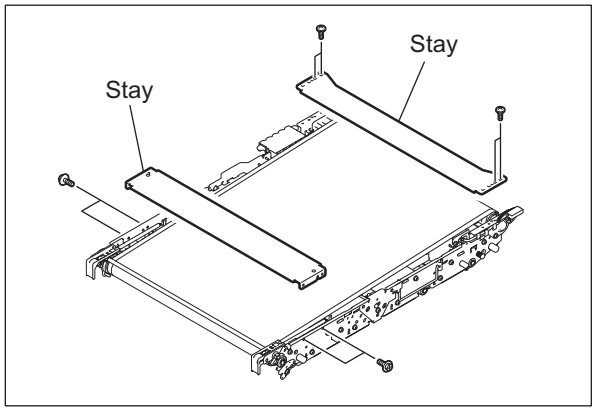


Fig. 13-19

(3) Remove 2 screws, and then take off the TBU cleanner pressure hook assembly and 2 springs.

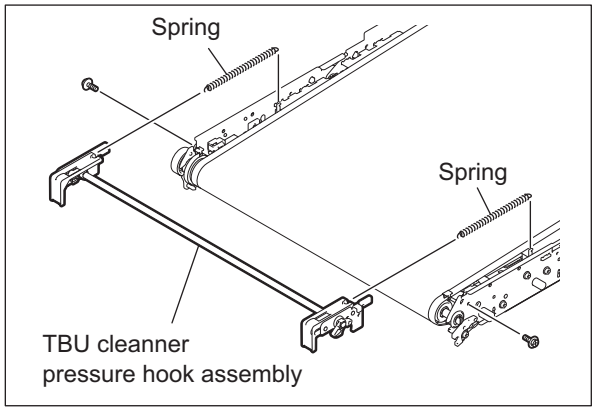


Fig. 13-20

(4) Push the stopper while pushing the arm of the tension roller, and then release the tension of the transfer belt.

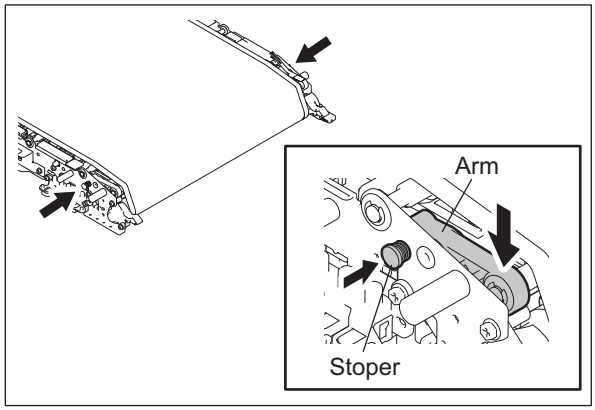


Fig. 13-21

(5) Remove 1 screw, and then take off the front bracket and handle.

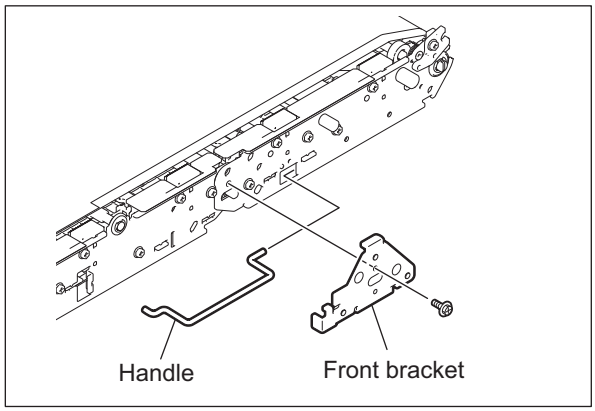


Fig. 13-22

(6) Remove 2 screws, and then take off the rear bracket.

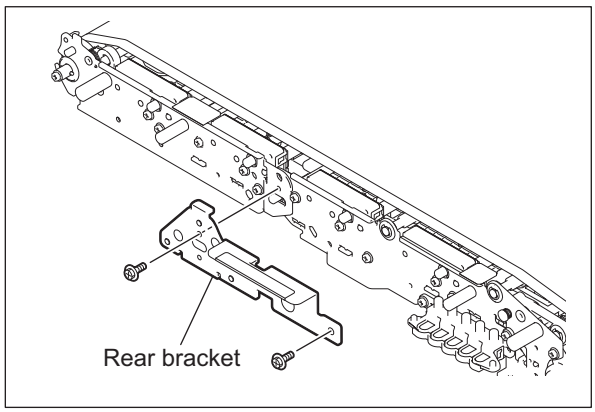


Fig. 13-23

(7) Fold the frame with its rear side up.

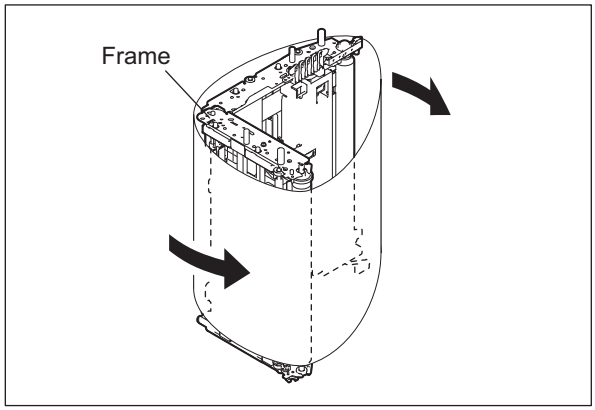


Fig. 13-24

(8) Pull out the transfer belt.

Notes:

1. Install the transfer belt in the middle so that it does not move to one side.
2. Install the transfer belt with the reflection tape on the inner side of the belt come at the rear side.
3. Do not touch the belt surface directly with bare hands.
4. Be sure not to scratch the belt surface.
5. When the belt is being replaced, clean its drive roller, 2nd transfer facing roller, tension roller and idling roller with alcohol.
6. Check if the rib on both ends of the transfer belt does not run on the rollers.
7. After the transfer belt has been installed, apply the tension to the transfer belt by pushing the stopper of the tension roller. If the tension is not applied, the transfer belt may deviate to cause unstable image.

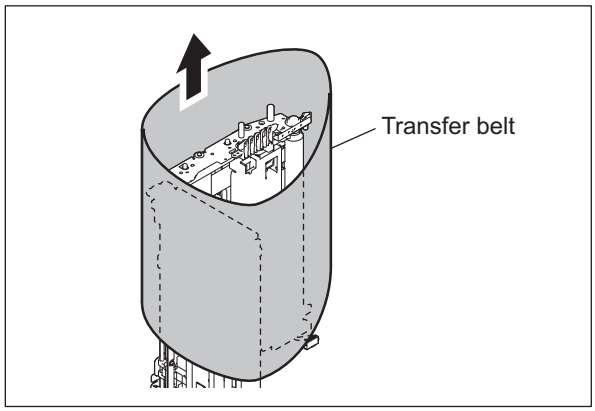


Fig. 13-25

[B-3] Drive roller / Drive roller cleaning mylar PM

(1) Take off the transfer belt.
📖 P.13-16 "[B-2] Transfer belt"

(2) Remove 1 E-ring, 1 bearing on the front side of the drive roller.

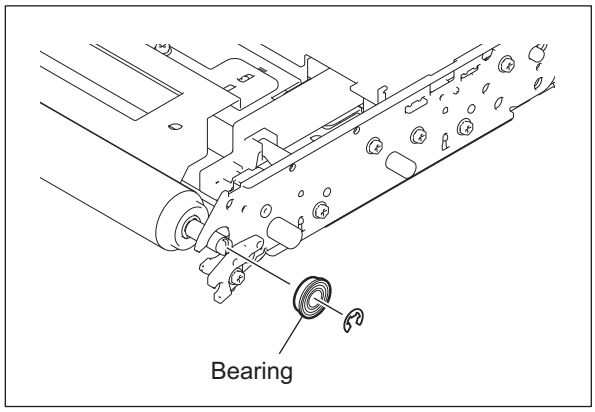


Fig. 13-26

(3) Take off the drive roller.

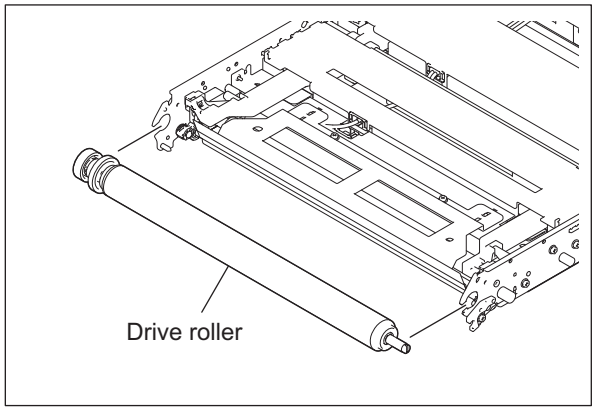


Fig. 13-27

(4) Remove 1 screw, 2 gears, 2 pins and 1 bearing on the rear side of the drive roller.

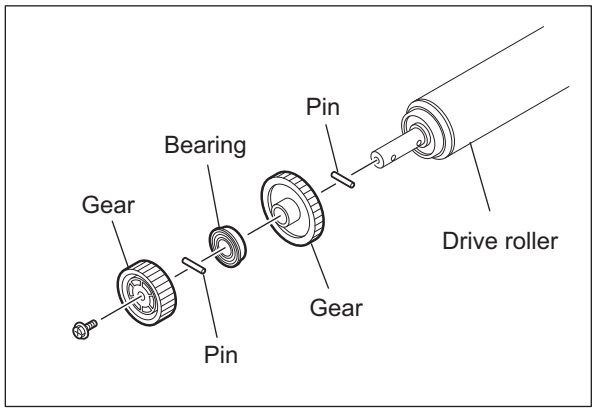


Fig. 13-28

(5) Remove 2 screws, and then take off the Drive roller cleaning bracket.

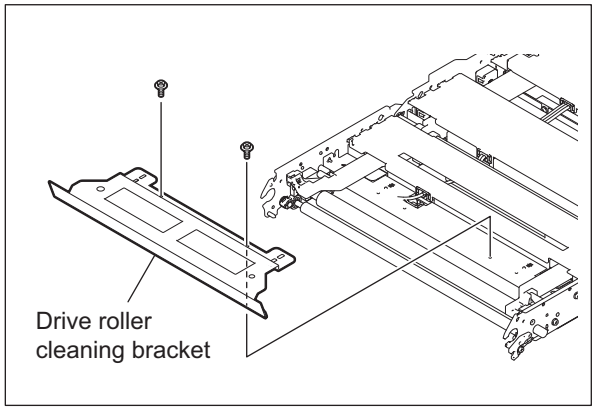


Fig. 13-29

13

(6) Peel the drive roller cleaning mylar.

Note:

Attach the drive roller cleaning mylar on the position shown in the figure within the error of 1 mm or less (by slightly pushing it to the 2 edges of the drive roller cleaning blade in the direction of the arrow).

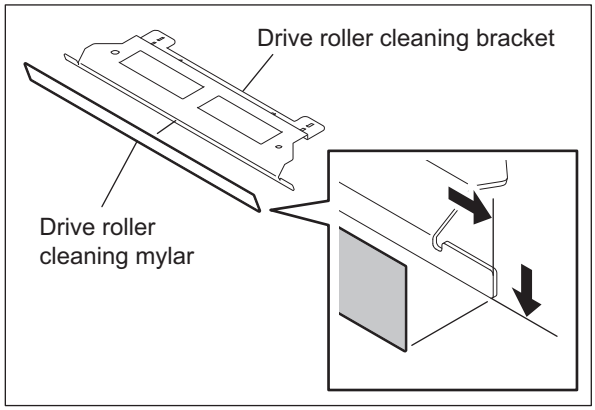


Fig. 13-30

[B-4] 1st transfer roller

(1) Take off the transfer belt.
📖 P.13-16 "[B-2] Transfer belt"

(2) Rotate the gear of the 1st transfer roller cam motor with your fingers to move 6 lift levers up.

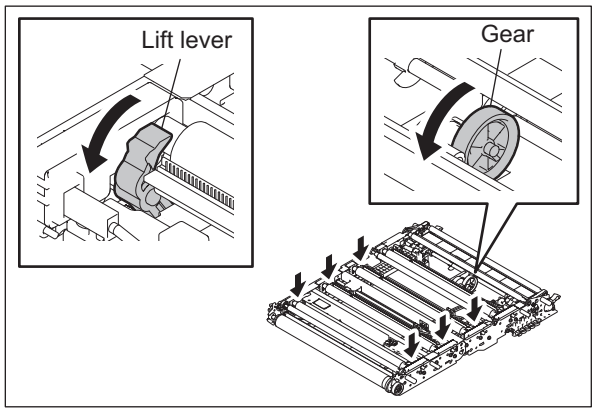


Fig. 13-31

(3) Remove 4 screws.

(4) Then remove 4 of the 1st transfer rollers and 4 front terminals.

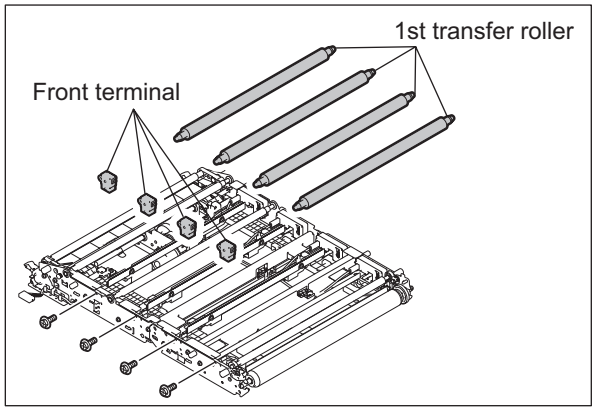


Fig. 13-32

[B-5] 2nd transfer facing roller / 2nd transfer facing roller cleaning mylar PM

(1) Take off the transfer belt.
📖 P.13-16 "[B-2] Transfer belt"
(2) Remove 2 screws, and then take off the 2nd transfer facing roller front holder. Then take off the 2nd transfer facing roller and 1 bearing.

Note:
Be sure not to damage the earth plate of 2nd transfer facing roller rear holder.

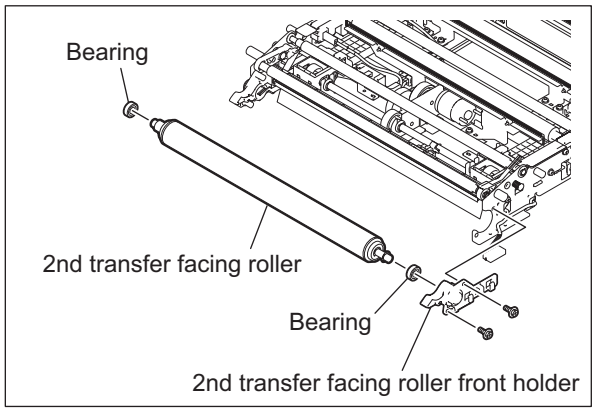


Fig. 13-33

(3) Peel the 2nd transfer facing roller cleaning mylar.

Note:
Attach the 2nd transfer facing roller cleaning mylar to the position shown in the figure within the error of 0.5 mm or less (by slightly pushing it to the 2 edges of the 2nd transfer facing roller cleaning holder in the direction of the arrow).

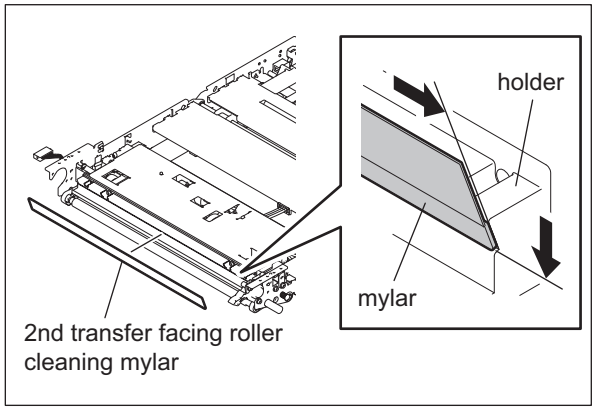


Fig. 13-34

[B-6] Tension roller

(1) Take off the transfer belt.
📖 P.13-16 "[B-2] Transfer belt"
(2) Remove 2 E-rings, and then take off the tension roller. Then take off the bushing and 2 bearings.

Note:
Be careful not to deform the earth plate of the tension roller arm on the front side.

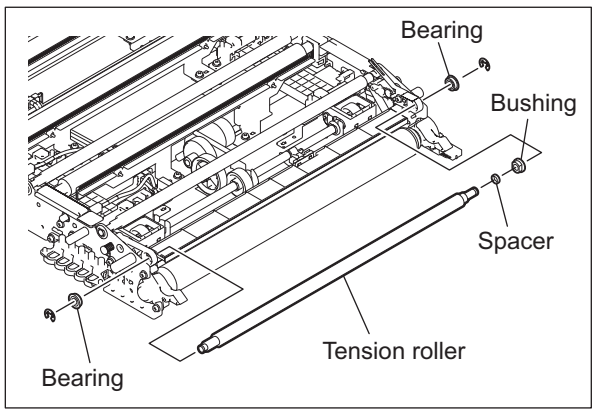


Fig. 13-35

(3) Remove the E-rings and springs of both front and rear tension roller arms. Then take off the tension roller arms.

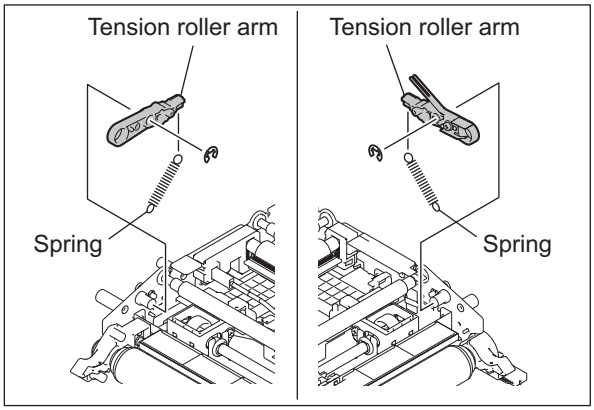


Fig. 13-36

[B-7] 1st transfer roller cam motor (M8)

(1) Take off the transfer belt.
📖 P.13-16 "[B-2] Transfer belt"

(2) Remove 2 E-rings, and then take off the idler roller. Then take off the 2 bushings and 2 bearings.

Note:
Be careful not to deform the earth plate of the tension roller arm on the front side.

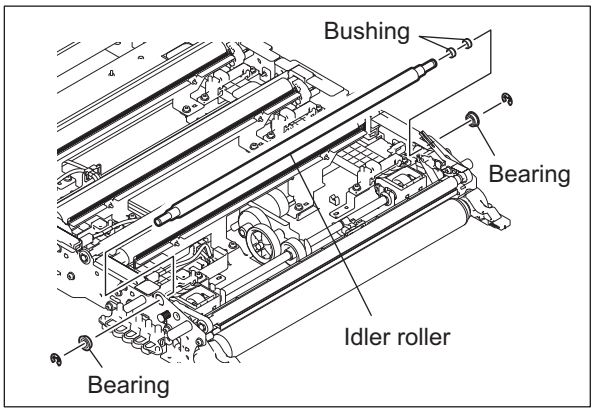


Fig. 13-37

(3) Remove 3 E-rings, and then slide the 3 bushings of the cam shaft.

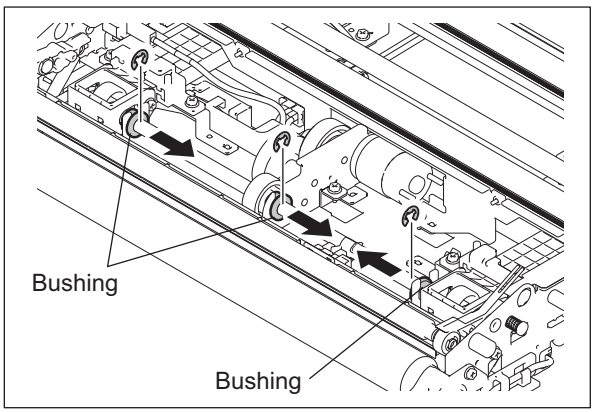


Fig. 13-38

(4) Remove 2 screws, and then take off the TBU brush bracket.

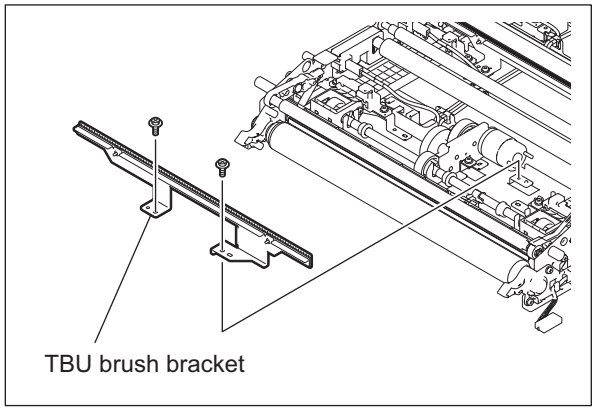


Fig. 13-39

(5) Remove 1 screw and then disconnect 1 relay connector to take off the 1st transfer roller cam motor assembly.

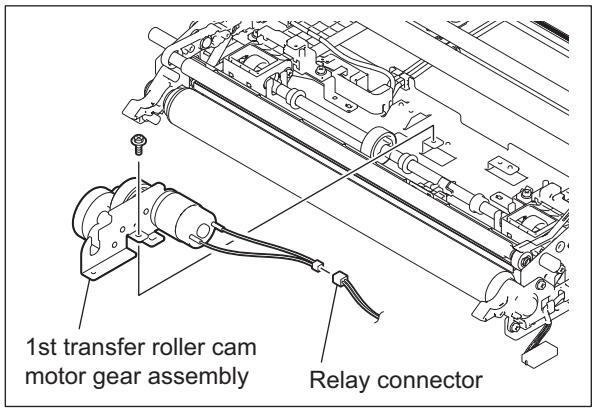


Fig. 13-40

(6) Release the 1 latch and take off the 3 gears.

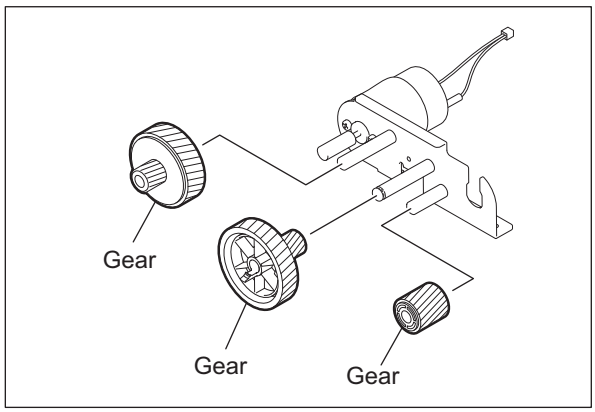


Fig. 13-41

13

(7) Remove 2 screws, and then take off the 1st transfer roller cam motor.

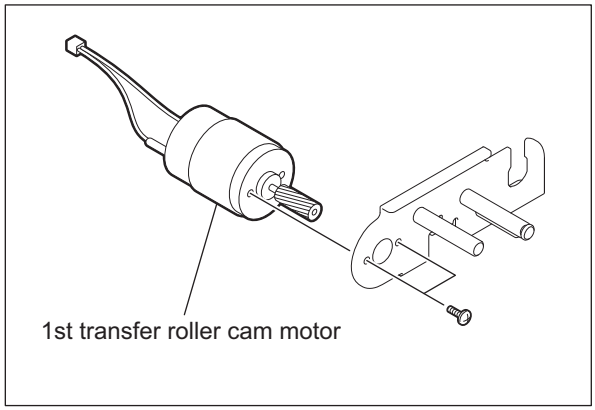


Fig. 13-42

[B-8] 1st transfer roller status detection sensor (S15)

(1) Take off the 2nd transfer facing roller and 2nd transfer facing roller cleaning mylar.
P.13-21 "[B-5] 2nd transfer facing roller / 2nd transfer facing roller cleaning mylar"
(2) Remove 2 screws, and then take off the 2nd transfer facing roller cleaner.

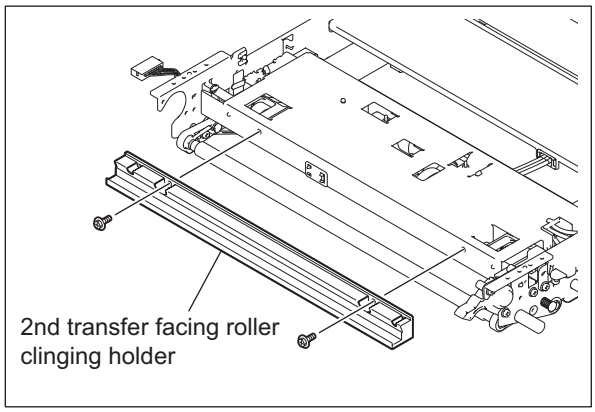


Fig. 13-43

(3) Remove the seal.
(4) Release the latch and disconnect the connector to take off the 1st transfer roller status detection sensor.

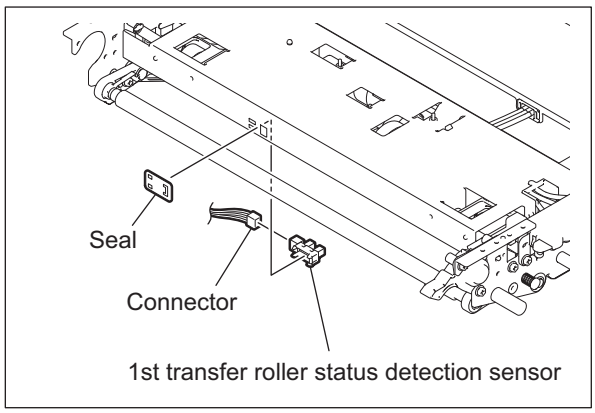


Fig. 13-44

[C] 2nd transfer unit (TRU)

[C-1] 2nd transfer unit (TRU)

(1) Move the automatic duplexing unit to its maintenance position.
📖 P.16-13 "[A] ADU maintenance position"
(2) Take off the right front hinge cover.
📖 P.2-33 "[N] Right front hinge cover"
(3) Remove 1 screw and take off the connector cover.

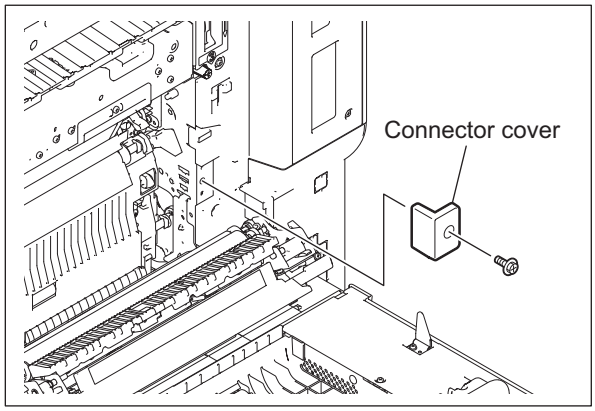


Fig. 13-45

(4) Disconnect 1 connector, and then remove 2 clamps.

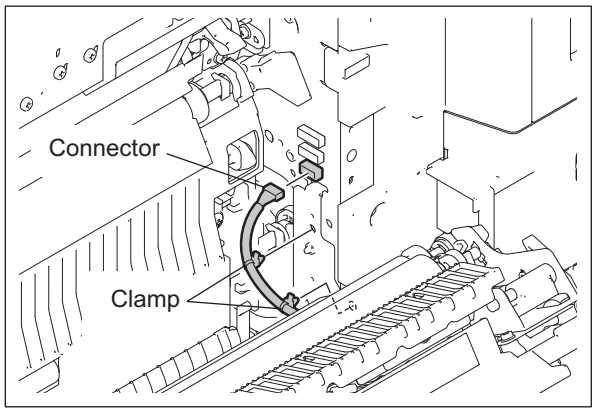


Fig. 13-46

(5) Remove 1 screw, and then take off the 2nd transfer unit hinge stay.

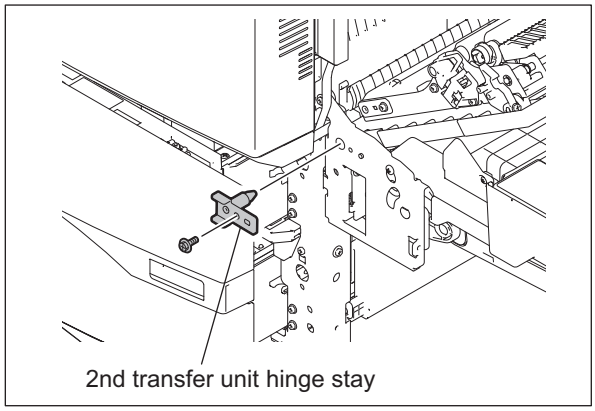


Fig. 13-47

(6) Lift up the 2nd transfer unit slightly, and then take it off by sliding it to the front side.

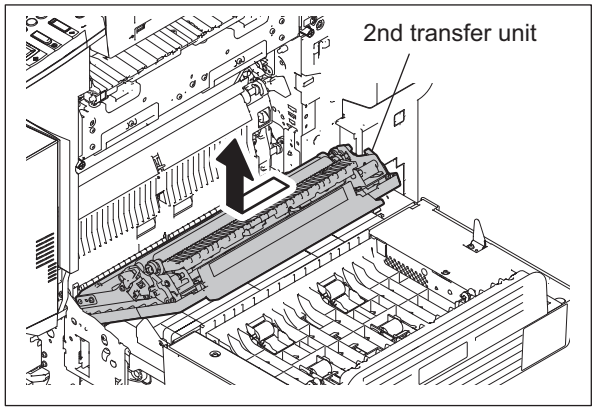


Fig. 13-48

[C-2] 2nd transfer roller PM

(1) Open the 2nd transfer unit.
(2) Remove 1 clip, 1 bearing and 1 bushing (with bearing) on the front side of the 2nd transfer roller.
(3) Remove 1 clip, 1 bearing and 1 bushing (with bearing) on the rear side of the 2nd transfer roller.
(4) Take off the 2nd transfer roller.

Note:
Be careful not to drop the clip, bearing and bushing into the inside of the 2nd transfer unit.

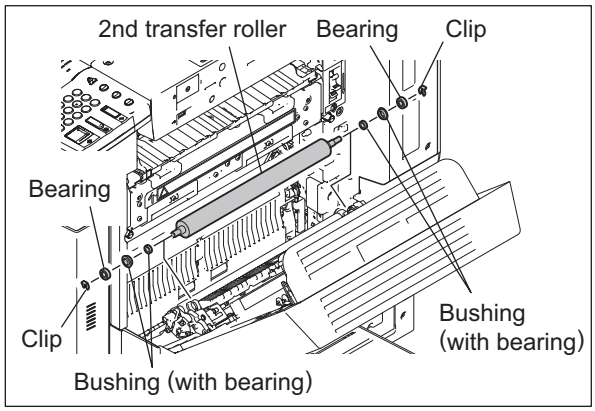


Fig. 13-49

[C-3] TRU cover

(1) Take off the 2nd transfer unit.
P.13-25 "[C-1] 2nd transfer unit (TRU)"
(2) Remove 4 screws and take off the TRU cover.

Note:
When installing the TRU cover, be sure not to damage the mylar.

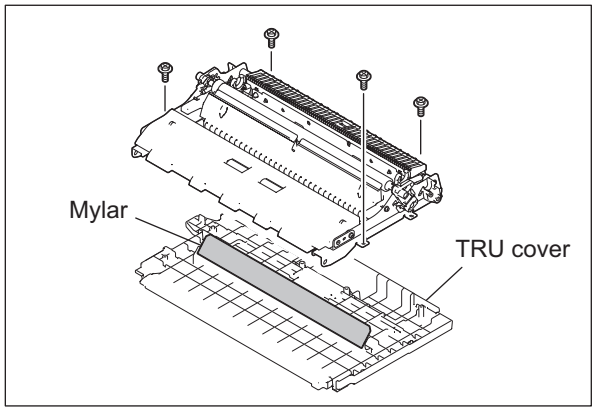


Fig. 13-50

[C-4] Paper clinging detection sensor (S27)

(1) Take off the TRU cover.
📖 P.13-26 "[C-3] TRU cover"
(2) Remove 1 screw, and then disconnect the connector to take off the sensor bracket.

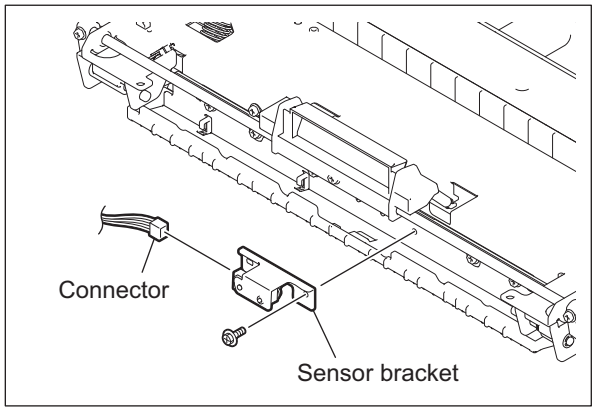


Fig. 13-51

(3) Remove 1 screw and take off the paper clinging detection sensor.

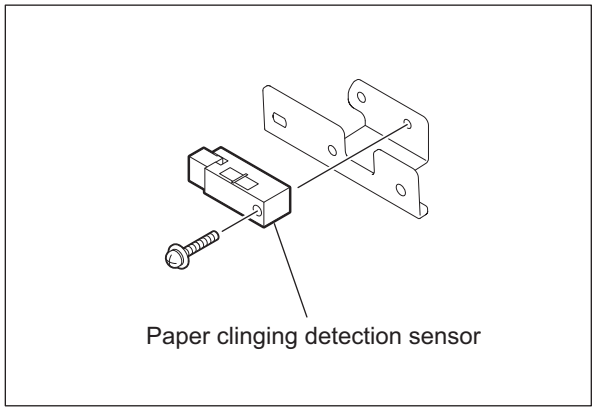


Fig. 13-52

[C-5] TRU earth plate

(1) Take off the TRU cover.
📖 P.13-26 "[C-3] TRU cover"
(2) Disconnect the connector of paper clinging detection sensor, and release the harness out of 2 hooks.

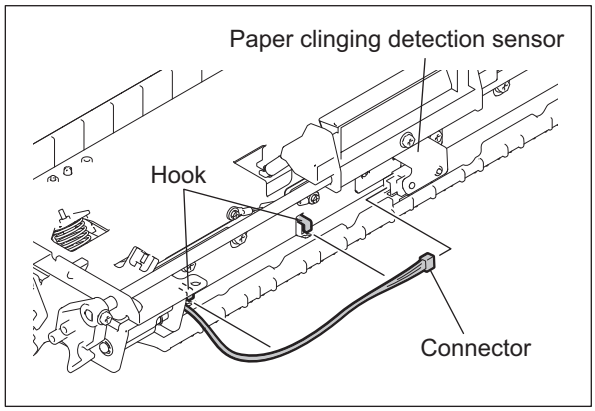


Fig. 13-53

(3) Remove 2 screws and take off the resistor.

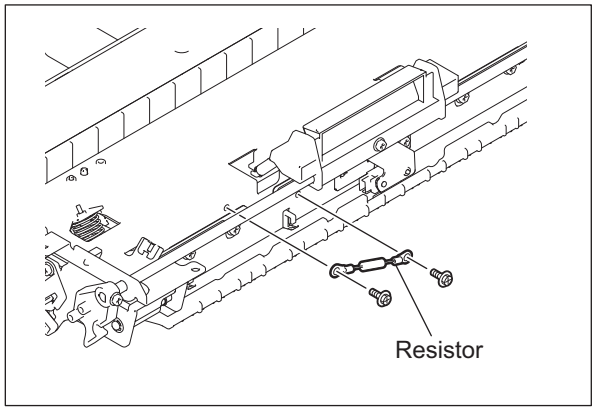


Fig. 13-54

(4) Remove 2 screws and take off the TRU guide assembly.

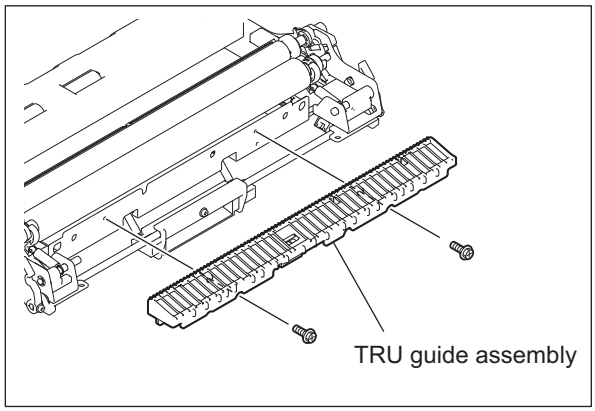


Fig. 13-55

(5) Remove 2 screws and take off the TRU earth plate.

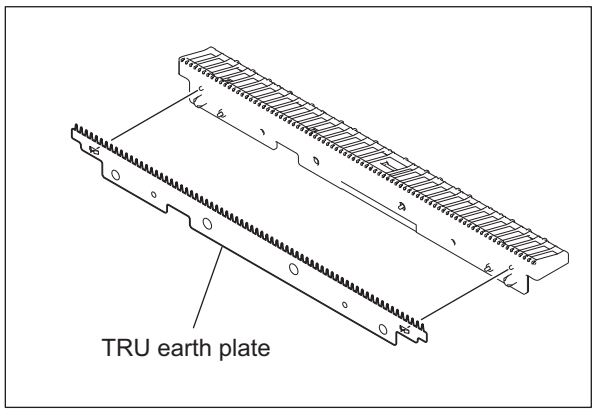


Fig. 13-56

[D] 2nd transfer roller position detection sensor (S29)

(1) Take off the paper dust holder.
📖 P.10-41 "[Q] Paper dust holder"
(2) Disconnect the connector, release the latch and take off the 2nd transfer roller position detection sensor.

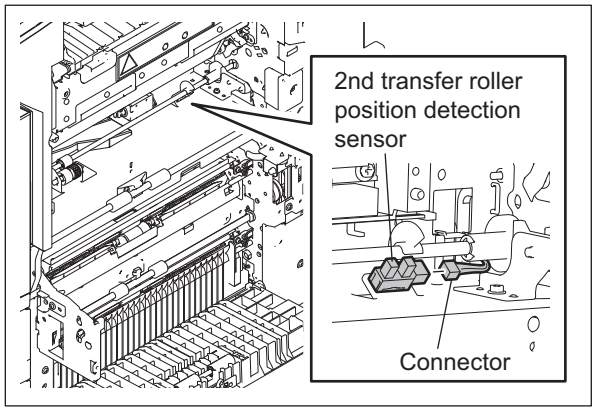


Fig. 13-57

[E] Transfer belt motor (M7)

Note:

Never remove the damper fixed on the transfer belt motor unit with 2 screws (red).
When the transfer belt motor is replaced, discard the dumper attached to the new motor and install it to the existing dumper on the frame instead.

(1) Take off the ozone exhaust fan.
P.12-31 "[O] Ozone exhaust fan (M24)"
(2) Remove 1 spring.
(3) Remove 3 screws, and then disconnect the connector to take off the transfer belt motor.

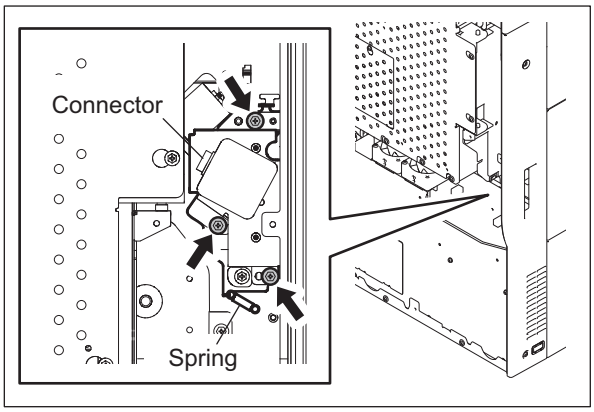


Fig. 13-58

(4) Release the upper hook to take off the transfer belt motor unit.

Note:

When installing the transfer belt motor, make sure that the TBU separation lever is at the fixed position (horizontal position) with the transfer belt unit installed. Secure the hook of the transfer belt motor unit onto the equipment and fix it with 3 screws temporarily. Attach the spring to apply tension and tighten the 3 screws.

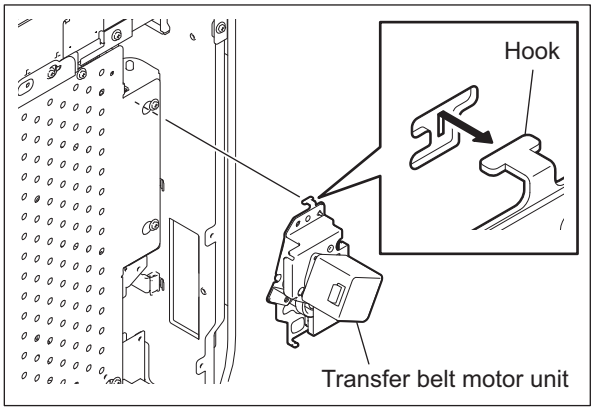


Fig. 13-59

(5) Remove 2 screws and take off the transfer belt motor.

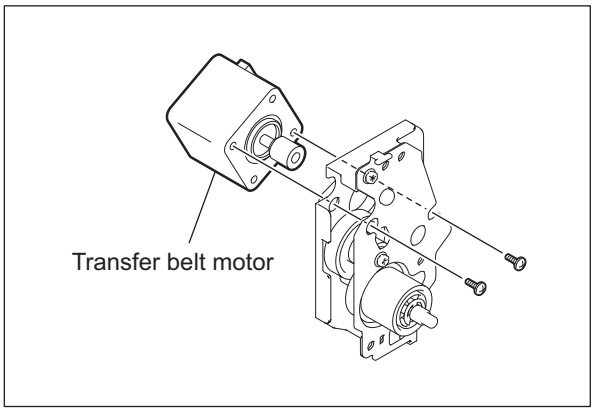


Fig. 13-60

[F] Transfer cover switch (SW3)

(1) Open the board case.
📖 P.2-45 "[K] Board case"
(2) Take off the right inner cover.
📖 P.2-34 "[P] Right inner cover"
(3) Release the 2 latches, and then disconnect the connector to take off the transfer cover switch.

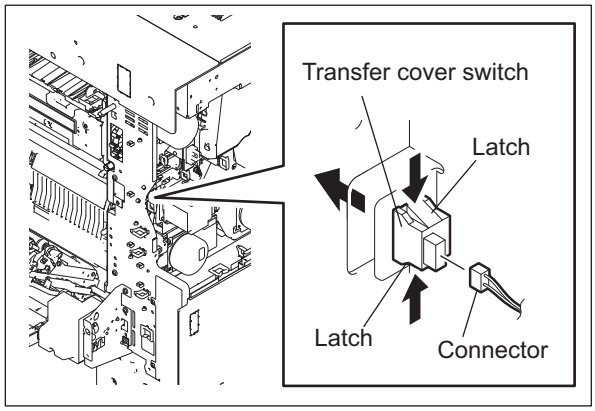


Fig. 13-61

13

14. IMAGE QUALITY CONTROL

14.1 General Description

In this equipment, image quality is controlled by the image quality sensor (S18). At this control, image forming conditions are automatically adjusted so as to minimize the change in the image density or tone reproduction caused by the fluctuation of working environment or life of supply items.
At first, the image quality sensor (S18) operates to output reflected light amount voltage when no toner image is formed on the transfer belt. The output voltage is then converted analog-to-digital to be output as the reflected light amount signal. The light source amount voltage of the sensor is adjusted to correspond with the value set in advance and the output value of reflected light amount signal at this adjustment is stored. This output value is considered as the reading of the belt surface. Next, the sensor outputs the reflected light amount signal when a test pattern is developed on the transfer belt. This output value is considered as the reading of the toner image.
The difference between the reading of the transfer belt and that of the toner image is defined as toner adhesion amount. Image forming conditions are determined in approximating this toner adhesion amount to the value set in advance.
In addition, a shutter operated by the sensor shutter solenoid (SOL2) is equipped on the light receiving/emitting surfaces to prevent stain to the sensor.

14.2 Composition

Image quality sensor:	Projects the amount of light on the transfer belt and outputs the voltage corresponding to the reflected light amount from the transfer belt or the toner image on the transfer belt.
Image quality sensor:	Projects the amount of light on the transfer belt and outputs the voltage.
D/A converter:	Converts light source amount signal into the voltage to the sensor.
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 outputs them to the CPU.
Image forming process:	Performs charging, laser exposing and developing processes.
ASIC:	Performs steps [1] to [10] described in chapter 14.4.

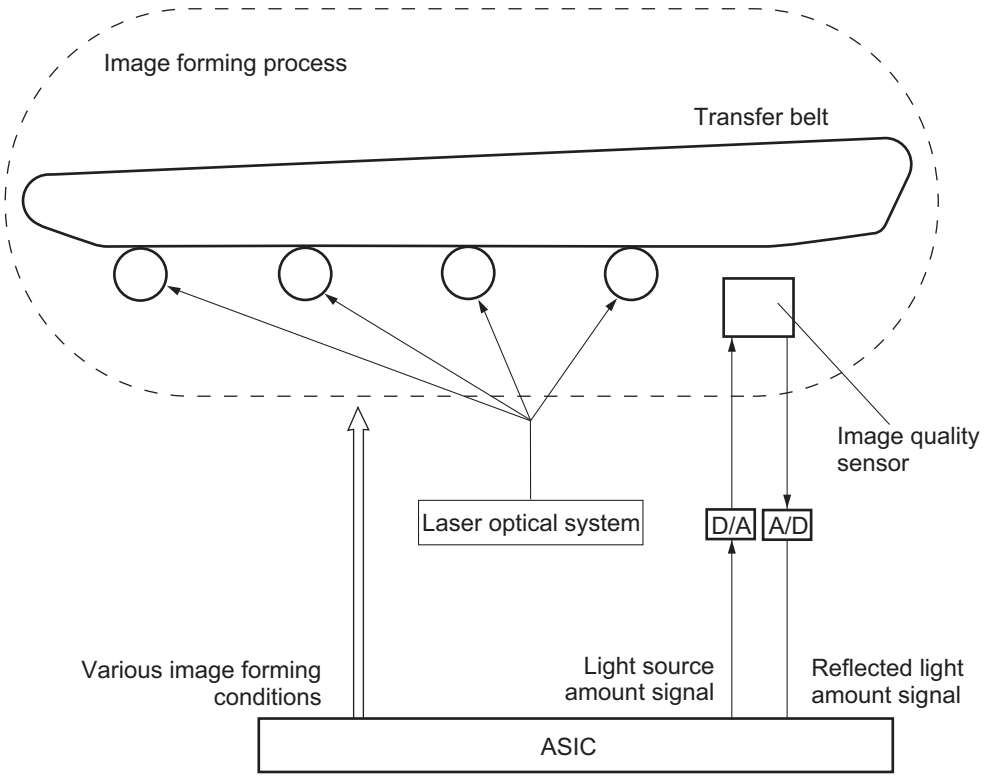


Fig. 14-1

14.3 Principle of the Sensor

Image quality sensor (S18) projects light onto the transfer belt and the toner image (test pattern) developed on the transfer belt to output a voltage corresponding to the reflected light amount.
The output voltage is then converted analog-to-digital into reflected light amount signal. The engine ASIC calculates the toner adhesion amount to control the image forming conditions.

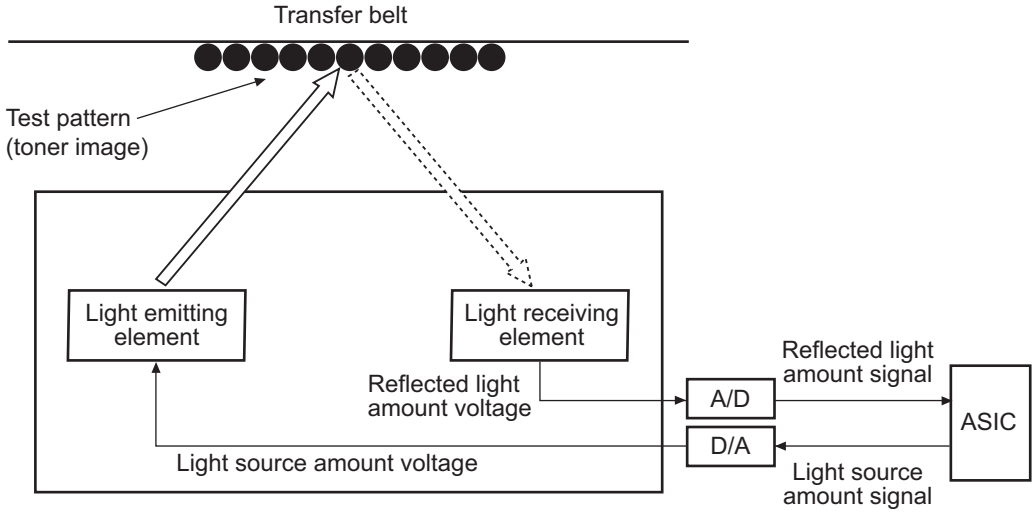
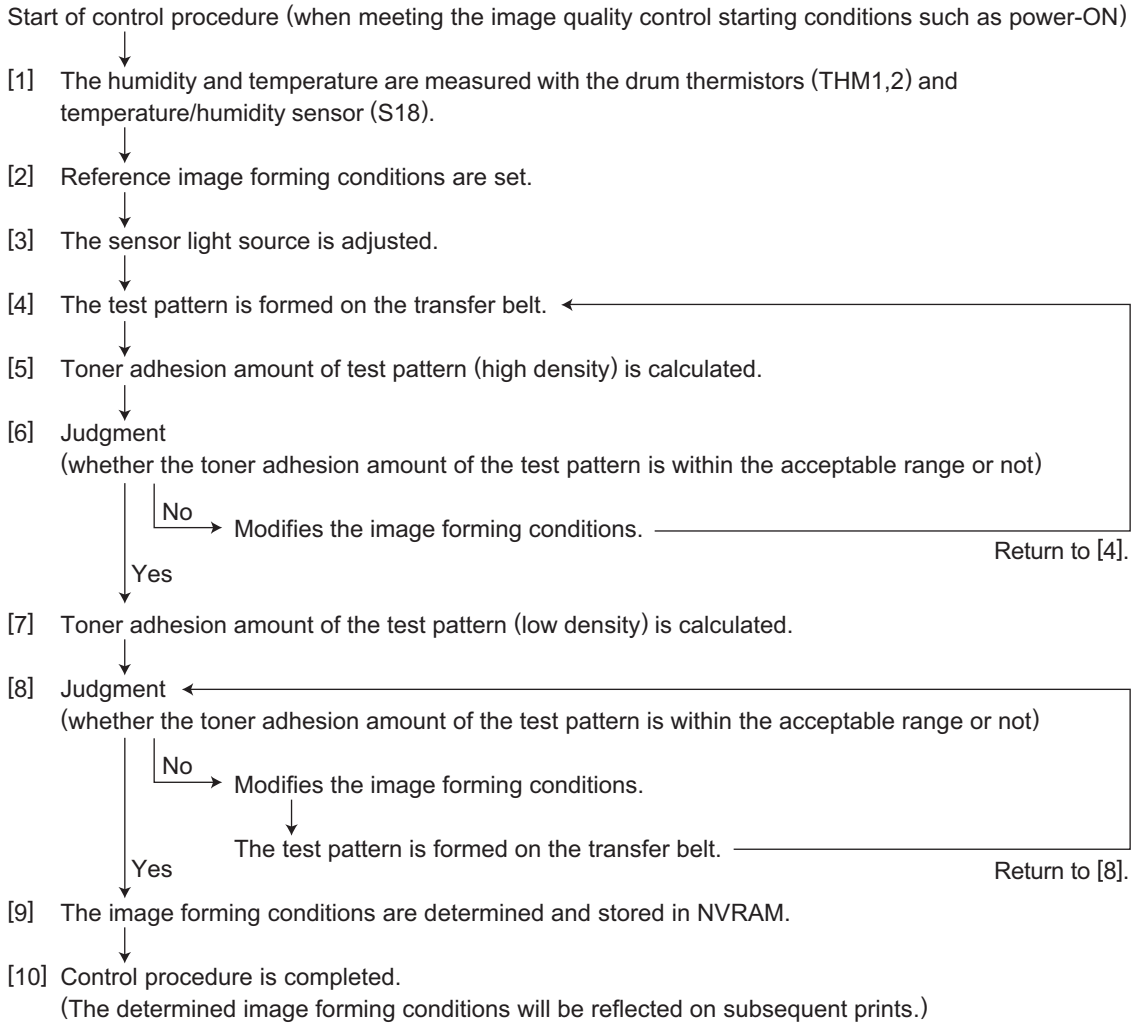


Fig. 14-2

14

14.4 Flow Chart of Control Procedure



14.5 Disassembly and Replacement

[A] Image quality control unit

(1) Take off the paper dust holder.
📖 P.10-41 "[Q] Paper dust holder"
(2) Remove 3 screws.
(3) Disconnect 3 connectors and 1 relay connector. Then take off the image quality control unit.

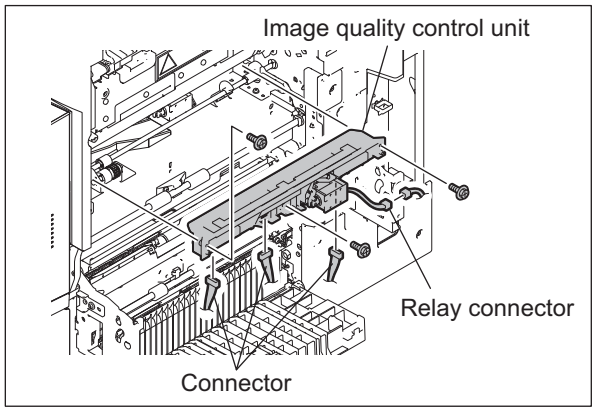


Fig. 14-3

[B] Image position aligning sensor (front) (S16)

(1) Take off the image quality control unit
📖 P.14-5 "[A] Image quality control unit"
(2) Remove 2 screws and take off the image position aligning sensor (front).

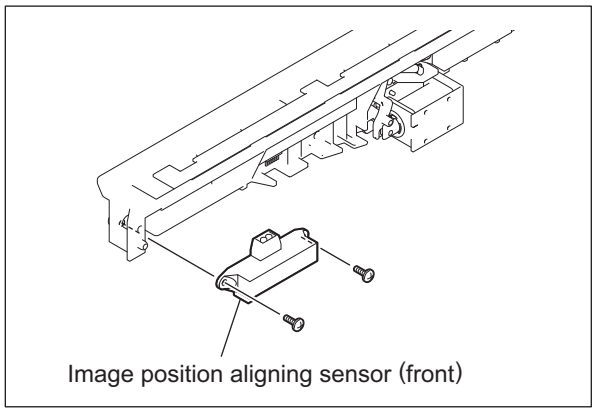


Fig. 14-4

14

[C] Image position aligning sensor (rear) (S17)

(1) Take off the image quality control unit
📖 P.14-5 "[A] Image quality control unit"
(2) Remove 2 screws and take off the image position aligning sensor (rear).

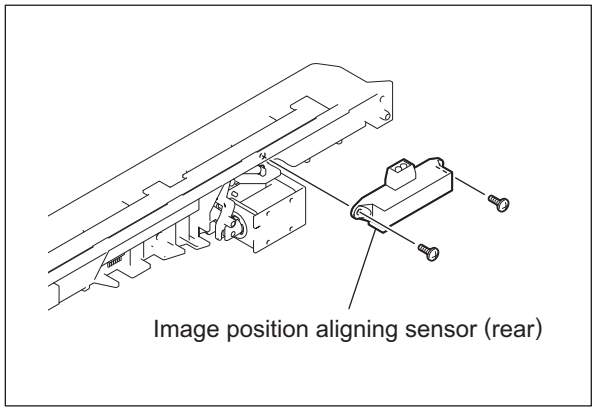


Fig. 14-5

[D] Image quality sensor (S18)

(1) Take off the image quality control unit
📖 P.14-5 "[A] Image quality control unit"
(2) Remove 2 screws and take off the image quality sensor.

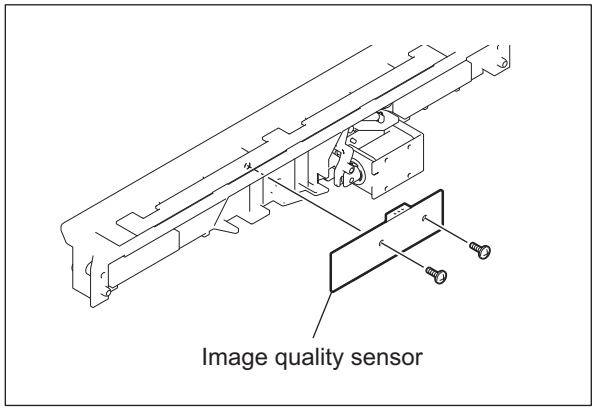


Fig. 14-6

[E] Sensor shutter solenoid (SOL2)

(1) Take off the image quality control unit
📖 P.14-5 "[A] Image quality control unit"
(2) Remove 2 screws and take off the sensor shutter solenoid.

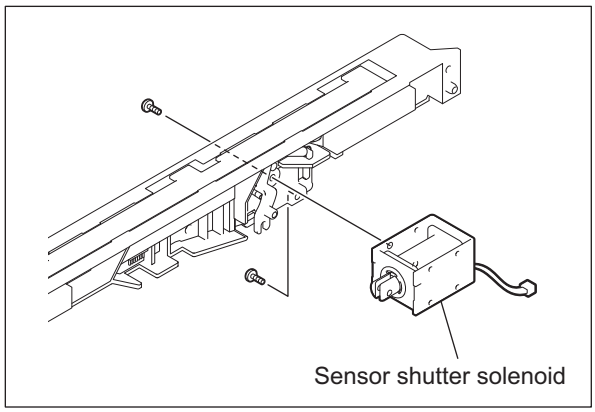


Fig. 14-7

15. FUSER UNIT / PAPER EXIT SECTION

15.1 General Description

Toner is fused by applying heat and pressure on the transferred image on the paper which is transported to the fuser unit. The paper is then transported to the inner tray, paper exiting options or ADU. The fuser unit consists of the heater lamps, heat roller, fuser roller, fuser belt, pressure roller, separation fingers, separation plate, thermopiles, thermistors, thermostats, etc.
The heat roller, fuser roller and pressure roller in the fuser unit are driven by the fuser motor, and the exit roller is driven by the exit motor.

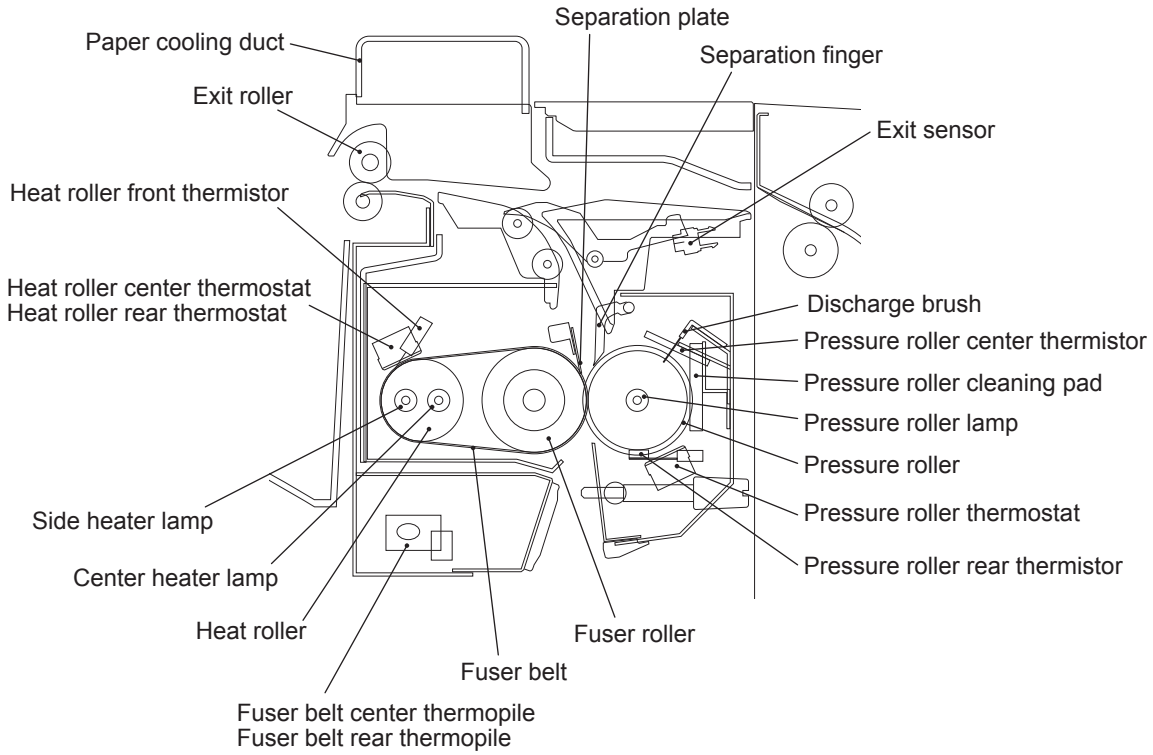


Fig. 15-1

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15.2 Composition

Fuser belt unit	Fuser belt	PM parts
	Fuser belt guide	PM parts
	Fuser roller	PM parts
	Heat roller	
Center heater lamp		LAMP1 (600W)
Side heater lamp		LAMP2 (600W)
Fuser belt center thermopile		THMP1
Fuser belt rear thermopile		THMP2
Heat roller front thermistor		THM3
Heat roller center thermostat		THMO1
Heat roller rear thermostat		THMO2
Pressure roller		PM parts
Pressure roller lamp		LAMP3 (300W)
Pressure roller center thermistor		THM4
Pressure roller rear thermistor		THM5
Pressure roller thermostat		THMO3
Pressure roller cleaning pad		PM parts
Separation finger		PM parts
Separation plate		
Fuser motor		M17
Exit sensor		S26
Exit roller		
Exit motor		M18

15.3 Functions

1) Center heater lamp (LAMP1) / Side heater lamp (LAMP2)
   The heater lamps are halogen lamps to apply heat to the heat roller. The fuser unit of the equipment has 2 heater lamps installed in the heat roller and 1 in the pressure roller.
   The 2 heater lamps in the heat roller have their respective functions. One has a coil wound up on its center and this part generates heat. The other one has coils wound up on its both ends and these parts generate heat. The one has a coil on its center is called the center heater lamp and the one has coils on its both ends is called the side heater lamp. The heater lamps are fixed on the inside of the heat roller to heat it up. The heater lamps do not rotate even when the heat roller is rotating.

2) Heat roller
   The heat roller is an alminium roller which conducts heat generated by the heater lamp to the fuser belt. The heat roller in this equipment is a thin roller which enhances heat conduction, and thus the warming-up time is shortened.

3) Fuser belt
   The fuser belt couples the heat roller with the fuser roller, and it conducts heat from the heat roller to the fuser roller and paper to melt toner on the paper.
   The thin fuser belt enables to reduce warming up time and mode changing time. To prevent the fuser belt from adhering toner, the surface of the fuser belt is fluorinated.

4) Fuser roller
   The fuser roller is pressed against the pressure roller with the fuser belt in-between. By this pressure between the fuser roller and pressure roller, the heat conduction to the paper is enhanced so that toner becomes easier to be melted, and melted toner is soaked into the paper. In order to improve the fusing ability, the fuser roller with sponge surface is employed to expand the nip width.

5) Pressure roller
   The pressure roller is a rubber roller which ensures proper nip width between the pressure roller and fuser roller / fuser belt, and it is pressed on the fuser roller / fuser belt by springs in order to fuse toner effectively to the paper.
   Also, a heater lamp is fixed on the inside of the pressure roller to stabilize the surface temperature of the pressure roller. The heater lamp does not rotate even when the pressure roller is rotating.

6) Pressure roller lamp (LAMP3)
   The pressure roller lamp is a halogen lamp which is turned ON/OFF constantly to maintain the preset temperature in order to stabilize the surface temperature of the pressure roller, reduce warming up time and enhance fusing ability. Unlike the center heater lamp / side heater lamp, the whole part of the pressure roller lamp generates heat.

7) Fuser belt center thermopile (THMP1) / Fuser belt rear thermopile (THMP2)
   The thermopiles are high-sensitivity infrared thermistors to detect the surface temperature of the fuser belt. Non-contact type thermistors are used in order not to damage the paper contact surface of the fuser belt. One thermopile fixed each on the center and rear-side of the frame detects the temperature of the center and edge of the fuser belt, and controls the center heater lamp / side heater lamp.
   These thermopiles detect the temperature of the fuser belt to maintain it in a certain temperature range (actually around 160°C) between the lower limit causing the poor fusing and the upper limit causing the high temperature offsetting. When the temperature of the fuser belt is lower than the preset temperature, it turns ON the power supply to the heater lamps, and when it is higher than the preset temperature, it cuts off the supply.

8) Heat roller front thermistor (THM3)
It detects the temperature abnormality at the both ends of the fuser belt. This area may be overheated without heat absorption by paper since paper does not pass through this area.
This thermistor is not related to the temperature control of the fuser belt.

9) Heat roller center thermostat (THMO1) / Heat roller rear thermostat (THMO2)
These thermostats cuts off the power supply to the heater lamps by opening itself if the fuser belt becomes abnormally hot as a result of the problem such as thermistor malfunction.
These thermostats for the equipment are used to prevent abnormal operation. When the thermostat detects any abnormality, it must be replaced as well as the other damaged parts in the fuser unit.

10) Pressure roller center thermistor (THM4)
This thermistor detects the surface temperature of the center of the pressure roller and controls the pressure roller lamp. A non-contact type thermistor is used in order not to damage the paper contact surface of the pressure roller.

11) Pressure roller rear thermistor (THM5)
This is a contact type thermistor which detects the surface temperature of the pressure roller ends. It detects the temperature abnormality at the both ends of the pressure roller. This area may be overheated without heat absorption by paper since paper does not pass through this area. This thermistor is not related to the temperature control of the pressure roller.

12) Pressure roller thermostat (THMO3)
The thermostat cuts off the power supply to the pressure roller lamp by opening itself if the pressure roller becomes abnormally hot as a result of the problem such as thermistor malfunction. The thermostat for this equipment is used to prevent abnormal operation.
When the thermostat detects any abnormality, it must be replaced as well as the other damaged parts in the fuser unit.

13) Separation fingers
Five separation fingers are installed above the pressure roller to separate the paper stuck on the pressure roller.

14) Separation plate
The separation plate is installed above the fuser belt (heat roller) to cover the insufficient separation often occurs at color printing the mode that the toner is much adhered.

15) Exit sensor (S26)
This sensor detects the arrival of the leading or trailing edge of the paper at the exit roller. It also detects paper jams in the fuser unit paper exit section and trailing edge of paper turned over for duplex printing.

16) Exit roller
This roller transports the paper from the fusing section to the inner tray, paper exiting options or the ADU and is driven by the exit motor.

17) Fuser motor (M17)
This motor drives the fuser unit and the optional bridge unit.

18) Exit motor (M18)
This motor drives the exit roller. It rotates reversely to switch back paper when the equipment is in the reverse operation.

19)Pressure roller cleaning pad

This pad is used for cleaning the pressure roller to prevent rubber scrapings from adhering on paper (wide paper such as SRA3) when it is scraped off by the pressure roller rear thermistor.

15.4 Description of Operation

The fuser belt is located between the fuser roller and pressure roller. The fuser roller is pressed with the spring force from the pressure roller side, and it is rotated by the fuser motor (M17) drive. The fuser belt also rotates simultaneously. Then the paper transported to the fuser unit is hold between the fuser belt and pressure roller and the toner is fused on the paper with heat and pressure. After this, the separation fingers and separation plate separate the paper from the fuser belt. Then the paper is transported to the inner tray, paper exiting options or ADU through the exit roller.

The fuser unit of the equipment has 2 heater lamps (center heater lamp / side heater lamp) installed in the heat roller and 1 (pressure roller lamp) in the pressure roller.
The pressure roller lamp is turned ON/OFF constantly to maintain the preset temperature in order to stabilize the surface temperature of the pressure roller, reduce warming up time and enhance fusing ability.

The fuser belt center thermopile (THMP1) and fuser belt rear thermopile (THMP2) control the temperature of heat roller and the heat roller center thermostat (THMO1) and heat roller rear thermostat (THMO2) detect the temperature abnormalities of heat roller. If the temperature becomes excessively high, the heat roller front thermistor (THM3) is opened to stop the power supply to the center and side heater lamps (LAMP1 / LAMP2).
Also, the pressure roller center thermistor (THM4) and pressure roller rear thermistor (THM5) control the temperature of pressure roller. If the temperature becomes excessively high, the pressure roller thermostat (THMO3) is opened to stop the power supply to the pressure roller lamp (LAMP3).

When transporting OHP film or thick paper, the transport speed is reduced by 1/2 of the normal one in order to improve fusing efficiency.

15.5 Electric Circuit Description

15.5.1 Fuser unit control circuit

[1] Configuration

In this equipment, 2 heater lamps (center and side) which have different heat-generating positions are installed in the heat roller to heat up the fuser belt. Also, one heater lamp (pressure roller lamp) is installed in the pressure roller. The fusing temperature is controlled by turning ON/OFF these heater lamps with the command from the ASIC on the LGC board.
The surface temperature of the fuser belt is detected by a thermistor (fuser belt front thermistor) and 2 thermopiles (fuser belt center and rear thermopiles: non-contact type sensors), and the surface temperature of the pressure roller is detected by 2 thermistors (pressure roller center and rear thermistors). And then the information of these temperatures is output to the ASIC through an A/D converter.
Based on the detected temperature, the ASIC transmits the control signal of the heater lamp to the drive circuit (TRC: Triac) of each heater lamp on the switching regulator via the heater lamp control circuit. The power supply to each heater lamp is thus controlled by driving TRC.
The forcible power-OFF circuit detects the overheating of the fuser belt and pressure roller by each thermistor/thermopile other than the pressure roller rear thermistor. In case that the surface temperature of the fuser belt or the pressure roller has exceeded the specified temperature, the forcible power-OFF circuit transmits an overheat detection signal to the ASIC and the heater lamp control circuit and transmits a reset signal to the power switch to turn the power OFF forcibly.
In addition, if these control circuits do not function due to thermistor abnormality or for other reasons and the fuser belt or the pressure roller is abnormally overheated as the result, 3 thermostats (fuser belt center and rear thermostats, pressure roller thermostat) shut off the power supply to the heater lamps to protect the equipment.

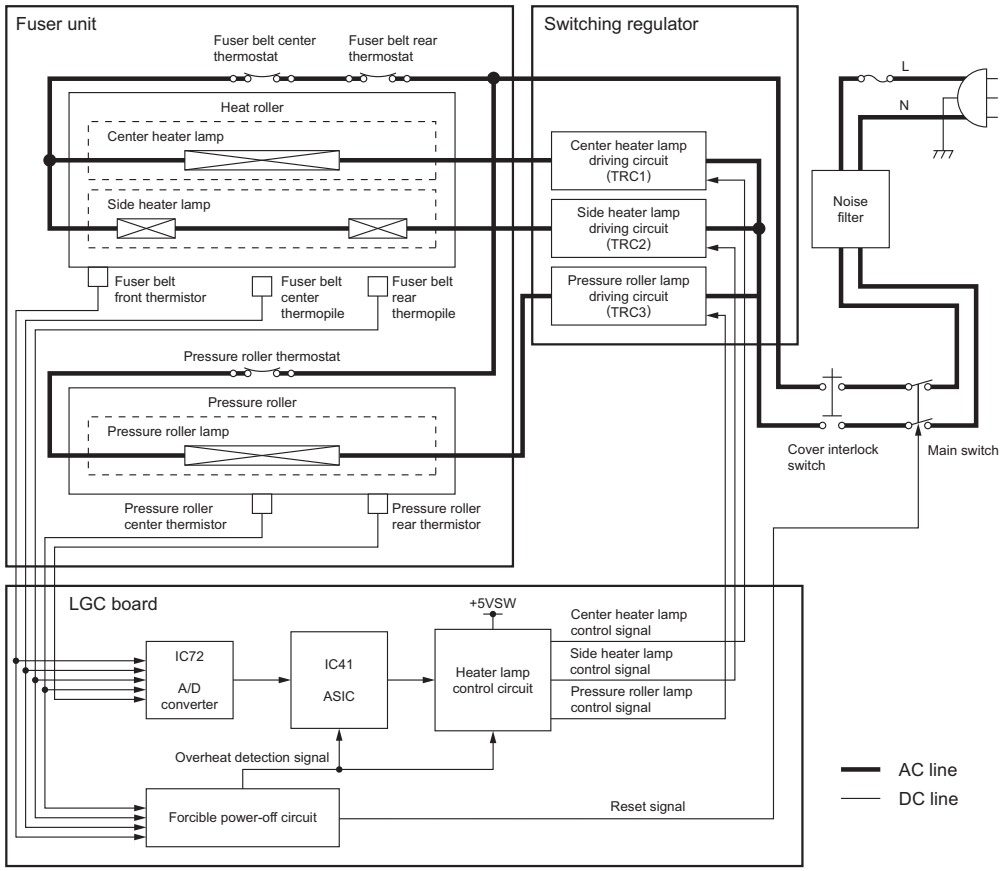

Fig. 15-2

[2] Temperature detection section

[2-1] Relation between the thermistor/thermopile output voltage and the surface temperature of the fuser belt

Output voltages (V)		Surface temperatures of fuser belt (°C)
Fuser belt front thermistor	Fuser belt center/ rear thermopile	
Approx. 0.3	Approx. 1.3	40
Approx. 2.6	Approx. 1.9	120
Approx. 3.6	Approx. 2.4	160

[2-2] Relation between the thermistor output voltage and the surface temperature of the pressure roller

Output voltages (V)	Surface temperatures of pressure roller (°C)
Pressure roller center/ rear thermistor	
Approx. 0.3	40
Approx. 1.2	80
Approx. 3.0	130

[2-3] Surface temperature control for the fuser belt and pressure roller

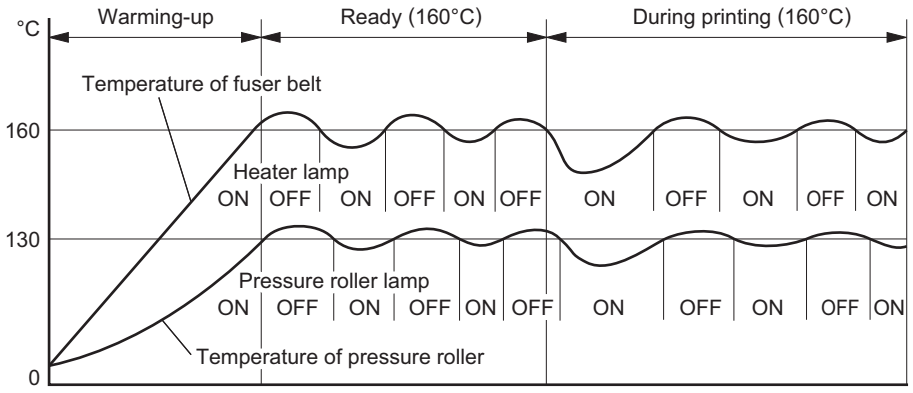

Fig. 15-3

Remark:

During warming-up before the pressure roller lamp is turned ON, the center and side heater lamps are turned ON to raise the surface temperature of the fuser belt. When the pressure roller lamp is ON, the equipment is in ready or printing status, each heater lamp is turned ON/OFF alternately to maintain the surface temperature of the fuser belt at a certain level (setting temperature of each status).

[2-4] Temperature control for the ends of the fuser belt and pressure roller

During continuous printing, the temperature of the end of the fuser belt or the pressure roller (area where the paper does not pass on) generally tends to be higher than that of other areas where the paper passes on. For this reason, the fuser belt front thermistor detects the temperature of the end of the fuser belt, and the pressure roller rear thermistor detects the temperature of the end of the pressure roller. When these thermistors detect the abnormal temperature (230ºC for the end of the fuser belt, 210ºC for the end of the pressure roller), the heater lamps are turned OFF regardless of the temperature of the area where the paper passes on.

[2-5] Temperature control at energy saving mode

This equipment has the following two types of temperature control for saving energy and returns to ready status to perform printing in each mode upon printing request.
The period of time from the printing request to this mode can be set in the Setting Mode (08) or by an from administrator.

Administrator setting procedure:
[USER FUNCTIONS] button →[ADMIN] (input of administrator's password) →[GENERAL] → [ENERGY SAVER]

Auto Power Save Mode (Setting Mode (08-205)):
When the printing is not performed in a specified period of time (default setting: 15 min.) after the previous printing is completed, the equipment enters to Auto Power Save Mode. ON/OFF of heater lamp is controlled to maintain the fuser belt surface temperature at 50°C.

Auto Shut Off Mode (Setting Mode (08-206)):
When the printing is not performed in a specified period of time (default setting: 15 min.) after the equipment entered to Auto Power Save Mode, the equipment then enters to Auto Shut Off Mode to turn OFF the heater lamp.

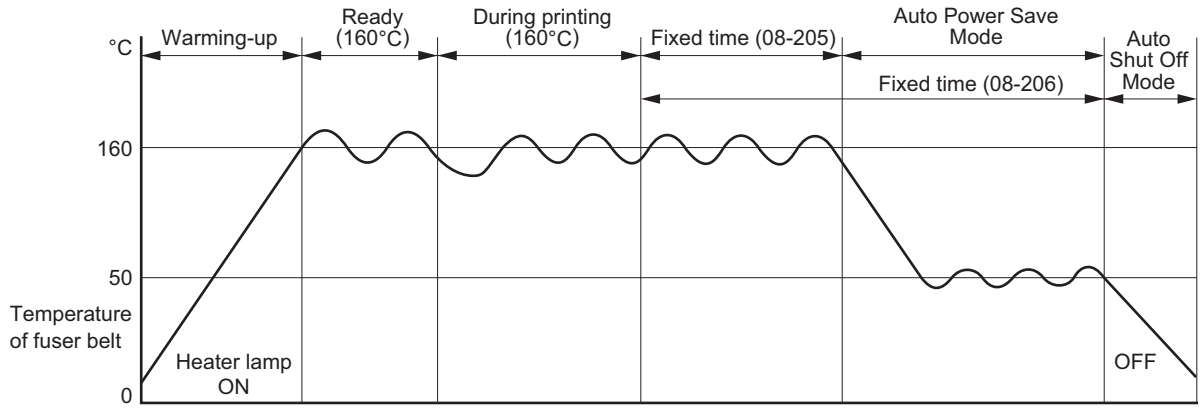

Fig. 15-4

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[2-6] Fuser unit error status counter control

- To enhance the safety of the fusing section unit, engine CPU provides the following protection: When the third [C411] error has occurred after two consecutive [C411] errors, the heater lamp is not turned ON and error [C412] is displayed immediately even if an operator turns OFF the power and back ON. However, if the equipment goes into a ready state normally with the fuser unit error status counter "1" or below, the counter is cleared to "0".

- If the error codes [C411] to [C468] are displayed and still not cleared even though the thermistor, thermopile, thermostat and heater lamp have been repaired (and the power ON/OFF does not clear the error), check the Setting Mode (08-400) to set the fuser unit error status counter to "0".

  Remark:
  The fuser unit error status counter (Setting Mode (08-400)) never has values other than 0 to 65.

- If the heater lamps do not turn ON and the service call [C411] or [C412] is displayed immediately after the power is ON, ensure the fuser unit error status counter is "2" or over. If it is "2" or over, be sure to check the thermistor, thermopile, thermostat and heater lamp. Reset the counter to "0" after repairing them, then turn ON the power.

- If the fuser unit error status counter is "66" or over (e.g., 70), the data in NVRAM or NVRAM itself may possibly have been ruined due to causes such as leakage from the chargers.
  Check the bias, high-voltage transformers and needle electrodes to see if any of them is defective, and also look through all the data in the NVRAM.

- When the thermistors detect overheating, the engine CPU decides the error code and counter value of the fuser unit error status. After turning OFF each output (the heater lamp, exposure lamp, control panel display, motors and so on), the engine CPU turns OFF the power to protect the fuser unit.

  Error code: C449, C468 ([C] and [8])
  Counter value of the fuser unit error status: 8, 9, 18 to 23, 25 to 29 (08-400)

  Thermistors and thermopiles continue detecting the abnormal temperature even after the error codes and counter values are decided. Even if the power is turned ON immediately, it is automatically turned OFF again when the surface temperature of the fuser belt is still higher than the abnormal temperature detected.
  Wait until the surface temperature of the fuser belt is lowered enough, and turn ON the power to check the counter value while it is turned OFF again. After confirming that it is the fuser unit abnormality, correct the abnormality and reset the counter value (08-400) to "0" to start up the equipment normally.

[2-7] Temperature detection circuit

The therrmistor is a device whose resistance varies according to the detected temperature, and the thermopile is a device whose output voltage varies according to the detected temperature. The ASIC detects voltages output from these devices, and judges whether the operation of the fuser unit is normal or abnormal from the changes in voltages.

If one of the thermistors and thermopiles is broken, the control circuit judges that the temperature of the fuser belt or pressure roller is extremely low and keeps turning the heater lamps ON. As a result, the temperature of the fuser belt or pressure roller rises, and possibly activates the thermostat which is a safety protection device. To prevent this in advance, the ASIC works to detect whether each thermistor and thermopile is broken or not.

Also, the the control circuit constantly checks the temperature of the heat roller and the pressure roller to prevent them from excessive heating by circuit abnormality or thermistor abnormality, and automatically shuts OFF the power when one of these temperatures exceeds the specified temperature.

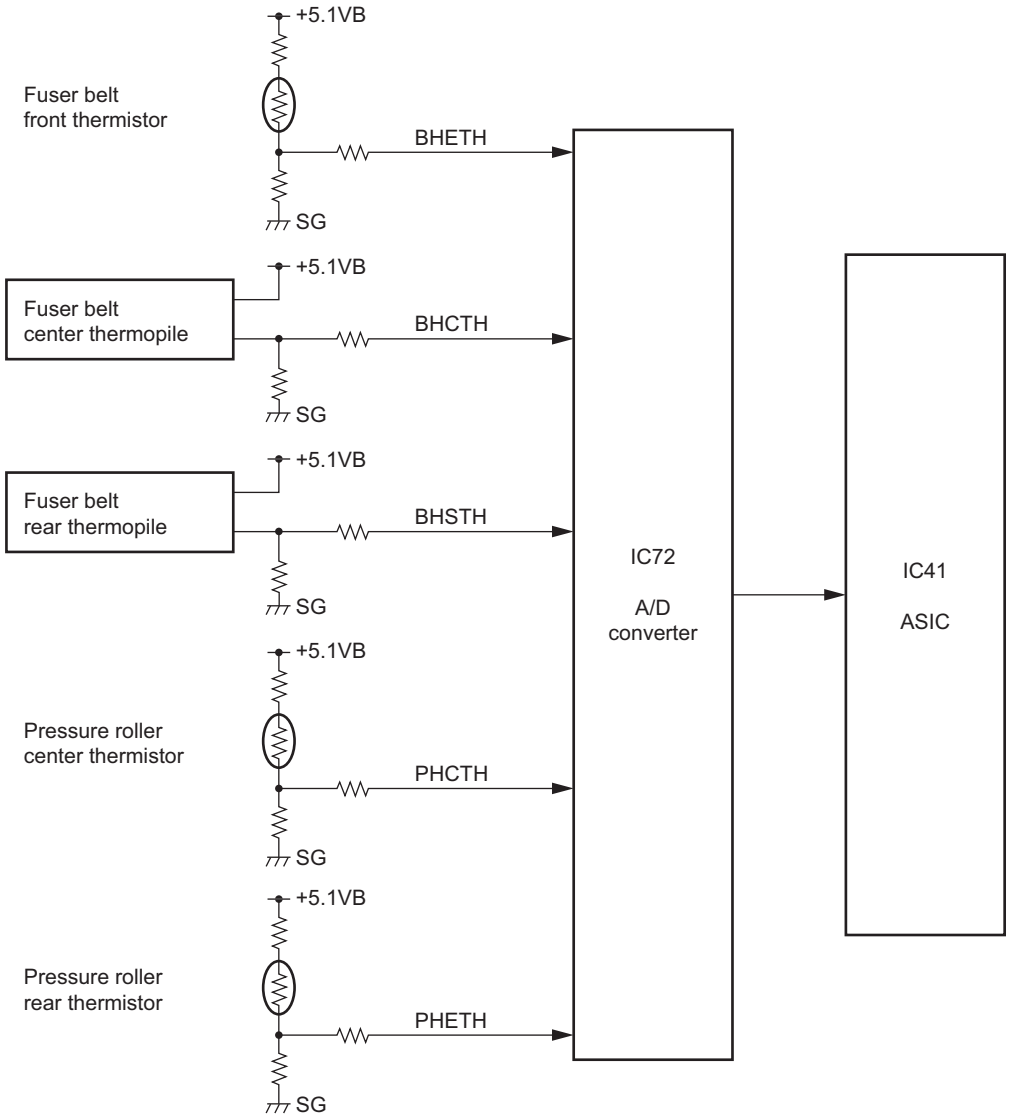

Fig. 15-5

[2-8] Abnormality detection by the thermistors and thermopiles

The following table shows the conditions for judging the temperature abnormality of the fuser belt and pressure roller, and the detecting timing.

Check timing	Condition	Temperature judged					Error code	Counter (08-400)	Error judging timing
		Fuser belt thermistor / thermopile			Pressure roller thermistor				
		Front	Center	Rear	Center	Rear			
Power ON	1	230°C or above	---	---	---	---	C449	9	Power ON
		---	230°C or above	---	---	---			
		---	---	230°C or above	---	---			
		---	---	---	210°C or above	---	C468	8	
		---	---	---	---	210°C or above			
	2	---	40°C or below	150°C or above	---	---	C412	2	
		---	150°C or above	40°C or below	---	---			
Detecting 40°C	1	230°C or above	---	---	---	---	C449	19	On usual
		---	230°C or above	---	---	---			
		---	---	230°C or above	---	---			
		---	---	---	210°C or above	---	C468	18	
		---	---	---	---	210°C or above			
	2	---	40°C or below	---	---	---	C412 (C411)	2 (1)	Fixed time
		---	---	40°C or below	---	---			

Check timing	Condition	Temperature judged					Error code	Counter (08-400)	Error judging timing
		Fuser belt thermistor / thermopile			Pressure roller thermistor				
		Front	Center	Rear	Center	Rear			
Detecting 120°C	1	230°C or above	---	---	---	---	C449	21	On usual
		---	230°C or above	---	---	---			
		---	---	230°C or above	---	---			
		---	---	---	210°C or above	---	C468	20	
		---	---	---	---	210°C or above			
	2	---	120°C or below	---	---	---	C446 (C443)	6 (3)	Fixed time (From “Detecting 40°C” to “Detecting 120°C”)
		---	---	120°C or below	---	---			
	3	---	---	*3	---	---	C448 (C443)	61 (42)	On usual
	4	*1	*2	---	---	---		63 (52)	
	5	---	120°C or below	120°C or below	---	---	C446 (C443)	64 (56)	Fixed time (From “Power ON” to “Detecting 120°C”)

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Check timing	Condition	Temperature judged					Error code	Counter (08-400)	Error judging timing
		Fuser belt thermistor / thermopile			Pressure roller thermistor				
		Front	Center	Rear	Center	Rear			
When pre-running end temperature or ready temperature is detected	1	230°C or above	---	---	---	---	C449	22	On usual
		---	230°C or above	---	---	---			
		---	---	230°C or above	---	---			
		---	---	---	210°C or above	---	C468	20	
		---	---	---	---	210°C or above			
	2	---	Ready temperature or below	---	---	---	C446 (C445)	6 (5)	Fixed time
		---	---	Ready temperature or below	---	---			
		---	---	---	Ready temperature or below	---	C466 (C465)	6 (5)	Fixed time
		---	---	---	---	---			
	3	---	*4	---	*5	---	C448 (C445)	65 (59)	From 40 to 100 seconds when the pre-running operation starts

Check timing	Condition	Temperature judged					Error code	Counter (08-400)	Error judging timing
		Fuser belt thermistor / thermopile			Pressure roller thermistor				
		Front	Center	Rear	Center	Rear			
During ready	1	230°C or above	---	---	---	---	C449	23	On usual
		---	230°C or above	---	---	---			
		---	---	230°C or above	---	---			
		---	---	---	210°C or above	---	C468	26	
		---	---	---	---	210°C or above			
	2	40°C or below	---	---	---	---	C447	7	
		---	40°C or below	---	---	---			
		---	---	40°C or below	---	---			
		---	---	---	40°C or below	---	C467	33	
		---	---	---	---	40°C or below			
	3	200°C or more: 60 seconds 210°C or more: 30 seconds		---	---	---	C448 (C445)	Stopping: 53 (52) Rotating: 55 (54)	
During printing	1	230°C or above	---	---	---	---	C449	25	On usual
		---	230°C or above	---	---	---			
		---	---	230°C or above	---	---			
		---	---	---	210°C or above	---	C468	26	
		---	---	---	---	210°C or above			
	2	40°C or below	---	---	---	---	C447	24	
		---	40°C or below	---	---	---			
		---	---	40°C or below	---	---			
		---	---	---	40°C or below	---	C467	34	
		---	---	---	---	40°C or below			

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Check timing	Condition	Temperature judged					Error code	Counter (08-400)	Error judging timing
		Fuser belt thermistor / thermopile			Pressure roller thermistor				
		Front	Center	Rear	Center	Rear			
At energy saving mode	1	230°C or above	---	---	---	---	C449	27	On usual
		---	230°C or above	---	---	---			
		---	---	230°C or above	---	---			
		---	---	---	210°C or above	---	C468	26	
		---	---	---	---	210°C or above			
At paper jam	1	230°C or above	---	---	---	---	C449	29	On usual
		---	230°C or above	---	---	---			
		---	---	230°C or above	---	---			
		---	---	---	210°C or above	---	C468	28	
		---	---	---	---	210°C or above			

* The figures in the "Condition" field denote the priority of error checking.
* The figures in the "Error code" and "Counter" fields with parentheses denote that an error status has not yet been determined (= error status is detected only once).

*1: Temperature difference from the center: 50°C or more
*2: Temperature difference from the front: 50°C or more
*3: 50°C or more higher than the temperature of the center: 2 seconds
*4: 10°C or more lower than the temperature of the pressure roller center thermistor
*5: 10°C or more higher than the temperature of the fuser belt center thermopile

15.5.2 Fuser motor control circuit

The fuser motor, which is a brush-less DC motor driven by control signals from the ASIC on the LGC board, drives the pressure roller.

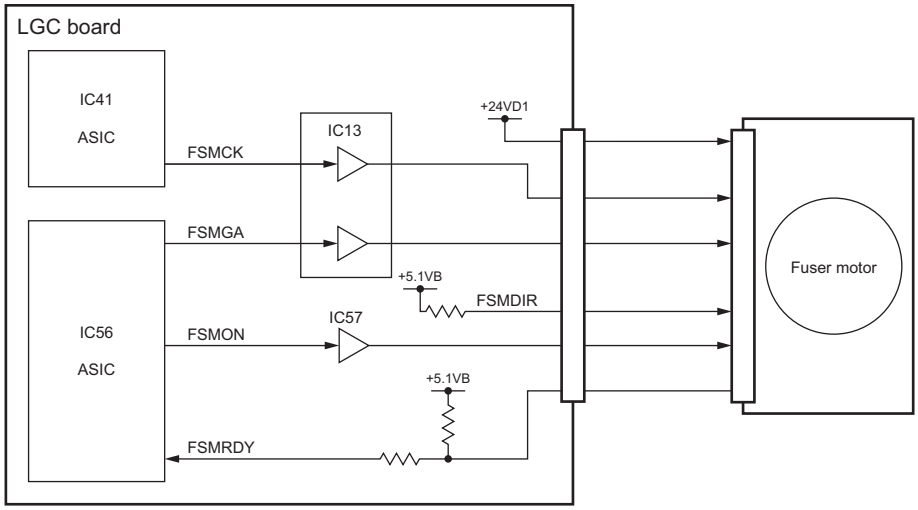


Fig. 15-6

Control signal

Signal	Function	Status	
		High level	Low level
FSMON	Motor ON signal	OFF	ON
FSMDIR	Rotation direction signal	CCW	CW (unused)
FSMGA	Speed switching signal	High speed	Low speed
FSMCK	Reference clock	---	---
FSMRDY	Rotation lock detection signal	Unlocked	Locked (Rotating at a constant speed)

* CW: Clockwise rotation, CCW: Counter clockwise rotation viewing from the axis
* FSMDIR signal is fixed at a high level and rotates only counter clockwise.
* When thick paper or OHP sheet is used, FSMGA signal moves to a low level to reduce the motor speed in half and lower the paper transport speed so that the fusibility of toner is improved.

15.5.3 Exit motor control circuit

The exit motor is a stepping motor driven by the control signal output from the engine CPU on the LGC board and rotates the exit roller.
The exit motor is driven by the pulse signal (EXTMA, EXTMB, EXTMC, EXTMD) output from the motor driver. These pulse signals are formed based on the reference clock (EXMCK) and output only when the enable signal (EXMEN) is a high level. Also, the rotation speed or direction of the motor can be switched by changing the output timing of each pulse signal.

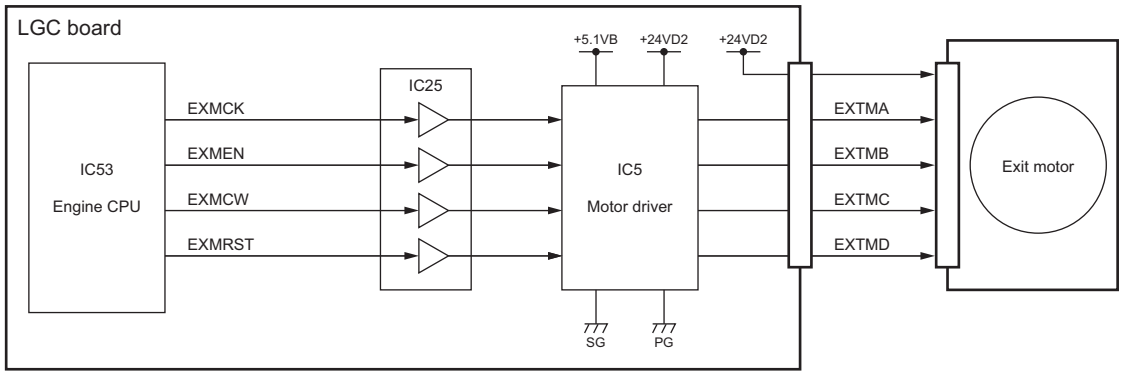


Fig. 15-7

Signal	Function	Status	
		High level	Low level
EXMCK	Reference clock	---	---
EXMEN	Enable signal	ON	OFF
EXMCW	Rotation direction signal	CCW	CW
EXMRST	Reset signal	Normal operation	Reset

* CW: Clockwise rotation, CCW: Counter clockwise rotation viewing from the axis

15.5.4 Fuser unit use status determining circuit

The fuser unit fuse is installed in the fuser unit. The fuser unit use status determining circuit determines whether a fuser unit is new or used by detecting the status of the fuse. In addition, when the circuit detects that a new fuser unit is connected, it supplies current to blow out the fuser unit fuse to clear the fuser-related life counters.

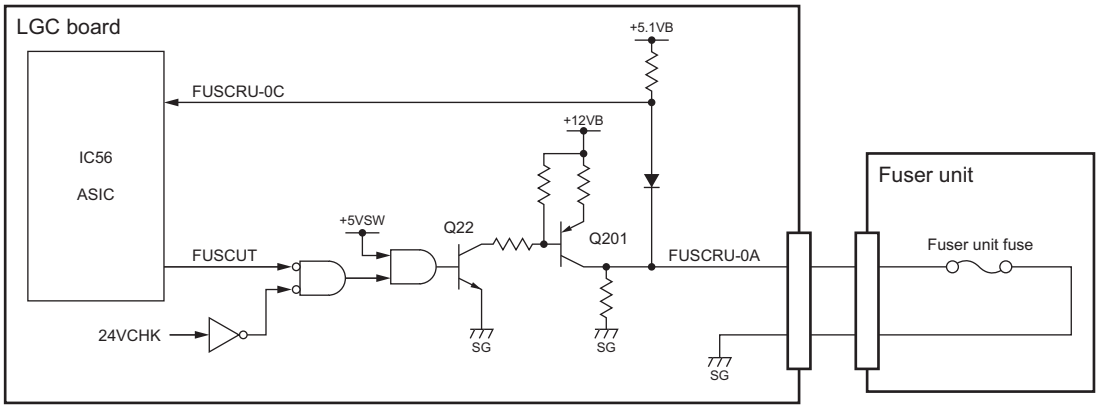


Fig. 15-8

Control signal

Signal	Function	Status	
		High level	Low level
FUSCRU-0C	Fuser unit use status Determining signal	Used	New
FUSCUT	Fuser unit fuse blow-out signal	OFF	ON (Fusing)
24VCHK	Cover opening/closing detection signal (24 V direct current detection signal)	Cover closed	Cover opened

Notes:

- A C4C0 error occurs when the fuser unit fuse is not blown out even if the fuser unit use status determining circuit has determined that the fuser unit connected is new.
- When a new fuser unit is installed, be sure to check whether the fuser-related life counter values have been cleared in the list printing mode, PM supporting mode or the setting mode (08). When they are not cleared, check that the value of the code 08-4549 is set at “0”. If the value is “1”, turn the power OFF and then back ON after changing the value to “0”, and then check the counter values again.
- Life counters to be cleared at blow-out of the fuser unit fuse are shown below.
  - Pressure roller 08-1250
  - Pressure roller separation finger 08-1270
  - Fuser belt 08-1272
  - Fuser roller 08-1274
  - Fuser belt guide 08-1276

15.6 Disassembly and Replacement

[A] Fuser unit

[A-1] Fuser unit

Note:

When a new fuser unit is installed, be sure to check whether the fuser-related life counter values have been cleared in the list printing mode, PM supporting mode or the setting mode (08).

📖 P.15-19 "15.5.4 Fuser unit use status determining circuit"

(1) Open the automatic duplexing unit (ADU) and 2nd transfer unit (TRU).
(2) Loosen 2 screws, and then take off the fuser unit.

Note:

The fuser unit is extremely hot. When taking off the fuser unit, hold the handles of the unit to avoid a direct touch on the unit.

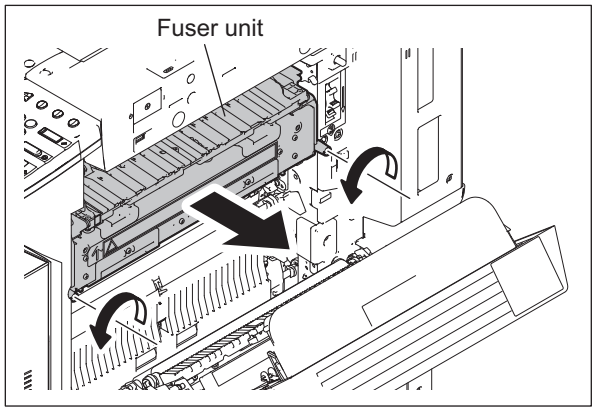


Fig. 15-9

Notes:

Follow the procedure below for the installation.

1. Insert the fuser unit into the equipment and tighten the screws. At this time, turn the handle to engage the gears of the equipment and the fuser unit.
2. Fix the 2 screws securely with a coin or a flathead screwdriver.
3. Check that they are engaged properly by turning the handle.

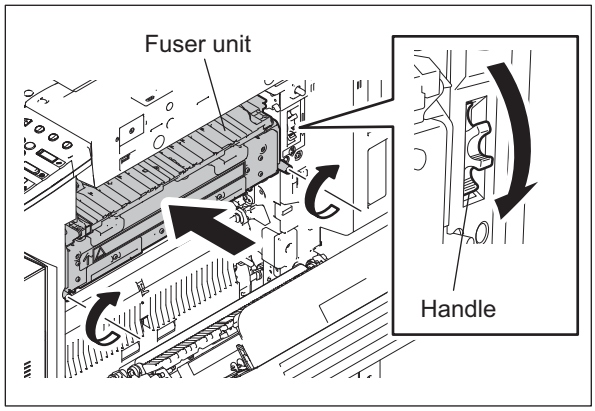


Fig. 15-10

[A-2] Front side cover

(1) Take off the fuser unit.
📖 P.15-20 "[A-1] Fuser unit"
(2) Remove 2 screws, and then take off the front side cover.

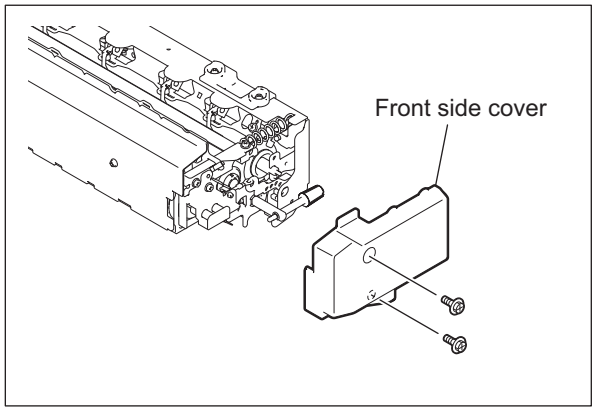


Fig. 15-11

[A-3] Rear side cover

(1) Take off the fuser unit.
📖 P.15-20 "[A-1] Fuser unit"
(2) Remove 2 screws, and then take off the rear side cover.

Note:
When installing the rear side cover, pull the harness out of the cover as shown in the figure so that the harness will not be caught by the cover.

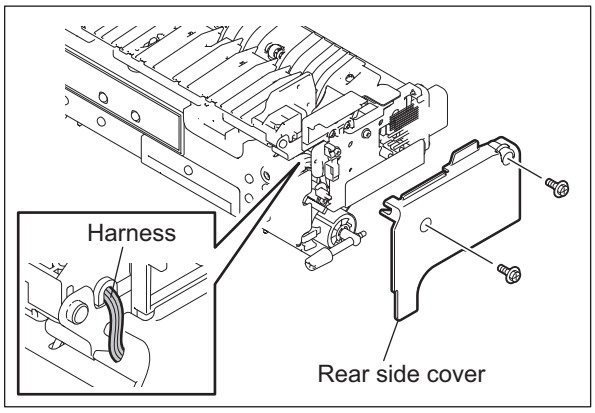


Fig. 15-12

Note:
When installing, fit the harness in the groove of the fuser unit as shown in the figure so that it will not be caught by the cover, and then wrap it around the clamp once.

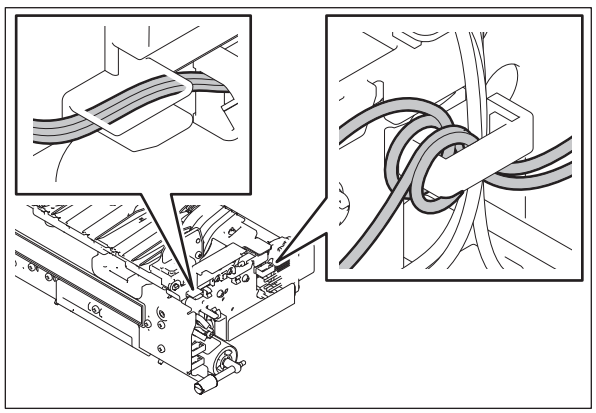


Fig. 15-13

[A-4] Pressure roller cover

(1) Take off the fuser unit.
📖 P.15-20 "[A-1] Fuser unit"
(2) Remove 2 screws (one on the rear side is a shoulder screw) and take off the pressure roller cover.

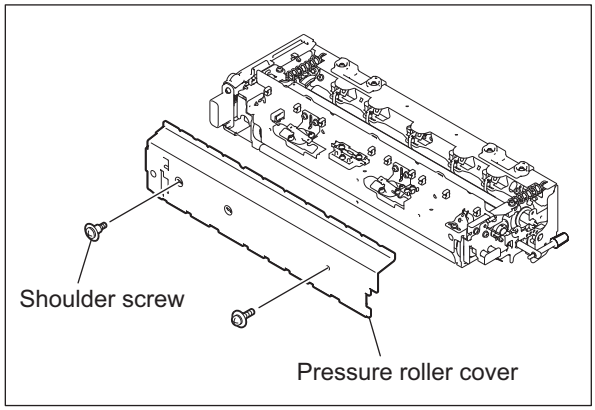


Fig. 15-14

[A-5] Transport guide

(1) Take off the rear side cover.
📖 P.15-21 "[A-3] Rear side cover"
(2) Release the harness out of the clamp, and then disconnect 1 relay connector.

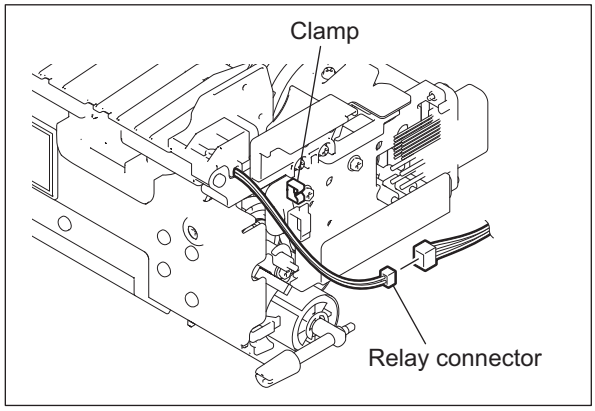


Fig. 15-15

(3) Remove 2 screws and take off the transport guide.

Note:
When installing the transport guide, hook the 3 latches of the transport guide onto the holes of the frame.

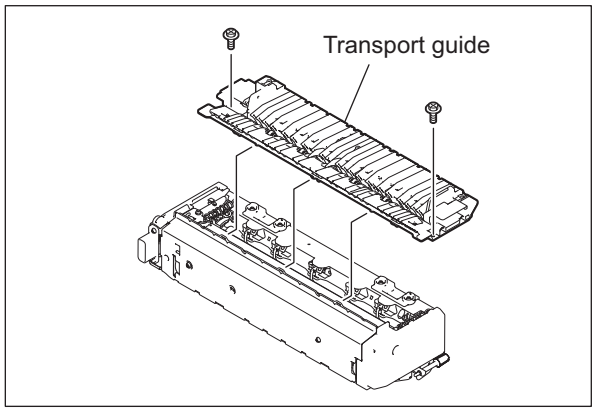


Fig. 15-16

[A-6] Separation finger unit / Separation finger PM

(1) Take off the front side cover and transport guide.
📖 P.15-21 "[A-2] Front side cover"
📖 P.15-22 "[A-5] Transport guide"

(2) Loosen 2 pressure screws, and then remove 2 springs.

Note:
When installing, tighten the 2 pressure screws securely until they are no longer moved.

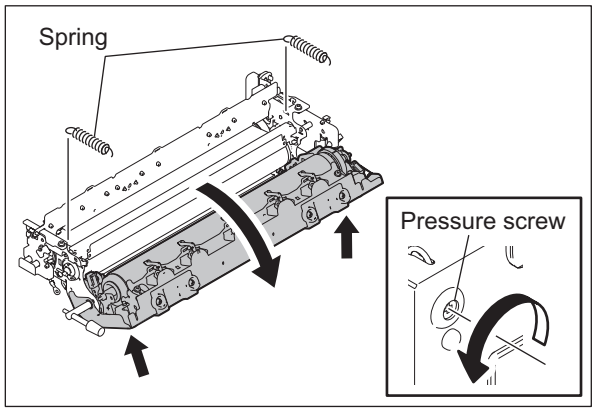


Fig. 15-17

(3) Loosen 2 screws, and then take off the separation finger unit.

Notes:
- When installing the separation finger unit, slide the unit to the rear side of the equipment and fix it at that position.
- When installing the separation finger unit, be sure not to scratch the transfer belt and the pressure roller.

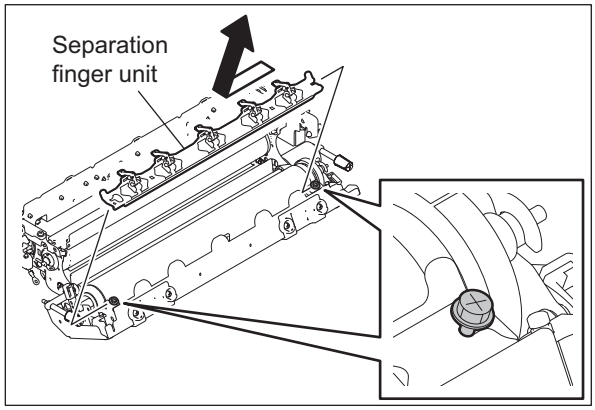


Fig. 15-18

(4) Remove the spring, and then take off the separation fingers.

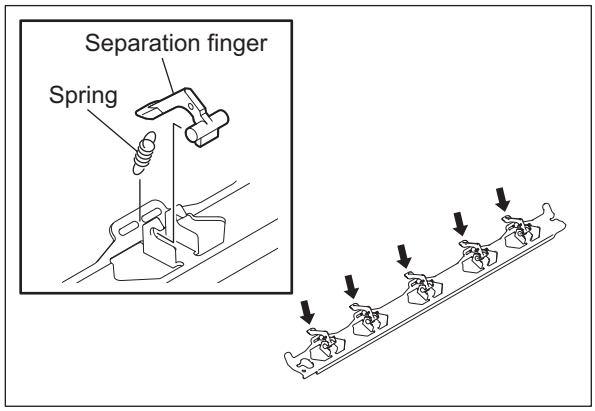


Fig. 15-19

15

[A-7] Pressure roller PM / Pressure roller lamp (LAMP3)

(1) Take off the separation finger unit.
📖 P.15-23 "[A-6] Separation finger unit / Separation finger"

(2) Release the harness on the front side out of 1 clamp, and then disconnect 1 relay connector.

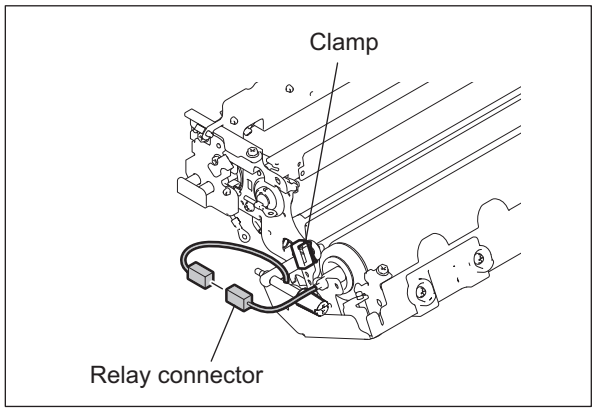


Fig. 15-20

(3) Release the harness on the rear side out of 3 clamps, and then disconnect 1 relay connector.

Note:
When installing them, pull the harness under the stay.

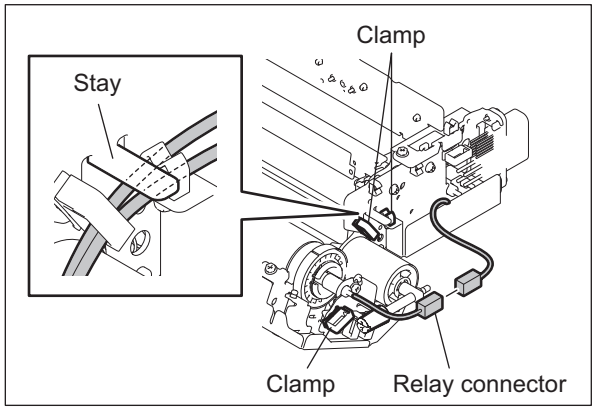


Fig. 15-21

(4) Loosen 1 screw, and then slide the bracket to unfix the pressure roller lamp.

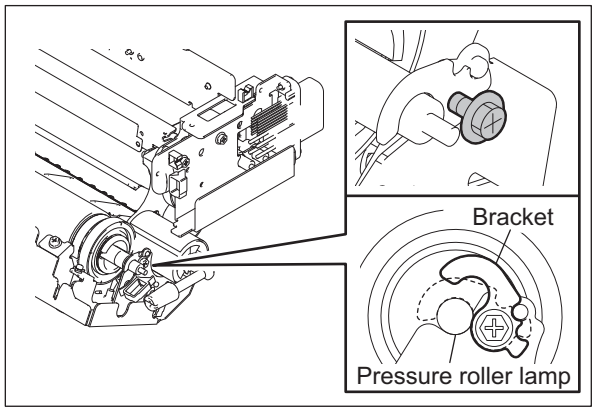


Fig. 15-22

(5) Slide the pressure roller lamp to the rear side to take it off from the front bracket. Then take off the pressure roller by lifting it up.

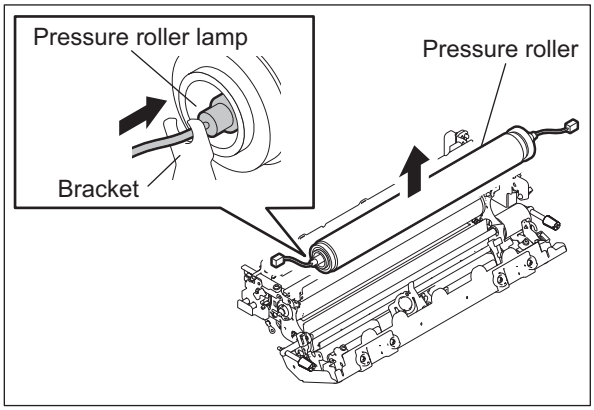


Fig. 15-23

(6) Take off the pressure roller lamp and the bearing from the pressure roller.

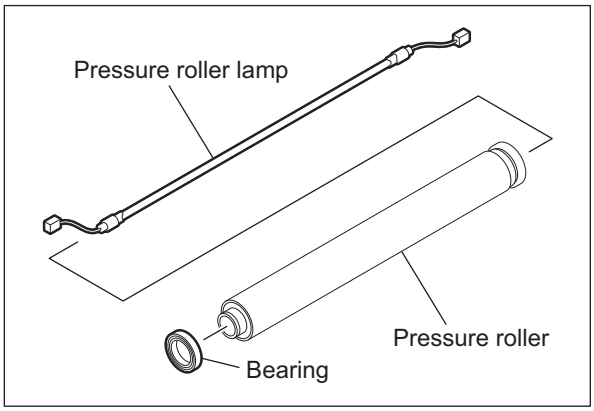


Fig. 15-24

(7) Remove the C-ring, and then take off the gear and the bearing from the pressure roller.

Note:
When installing the pressure roller, check if the C-ring is securely engaged into the groove of the pressure roller.

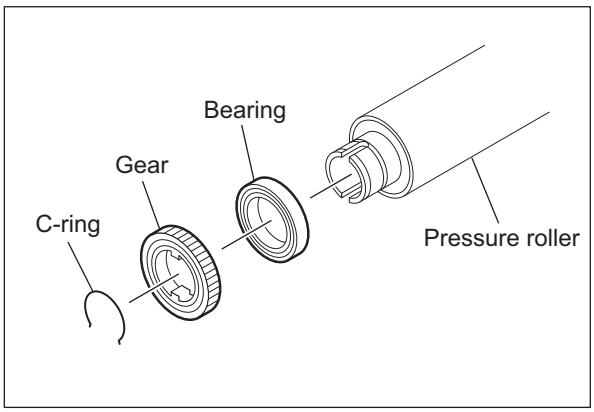


Fig. 15-25

15

[A-8] Separation plate / Fuser belt unit / Center heater lamp (LAMP1) / Side heater lamp (LAMP2)

(1) Take off the front side cover, pressure roller cover and transport guide.

📖 P.15-21 "[A-2] Front side cover"
📖 P.15-22 "[A-4] Pressure roller cover"
📖 P.15-22 "[A-5] Transport guide"

(2) Loosen 2 pressure screws, and then remove 2 springs.

Note:
When installing, tighten the 2 pressure screws securely until they are no longer moved.

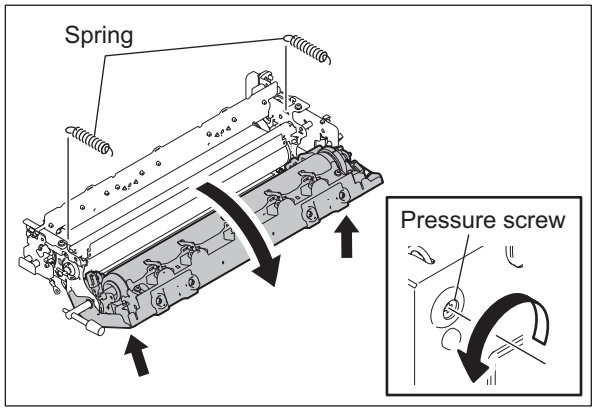


Fig. 15-26

(3) Remove 2 screws and take off the 2 leaf springs.

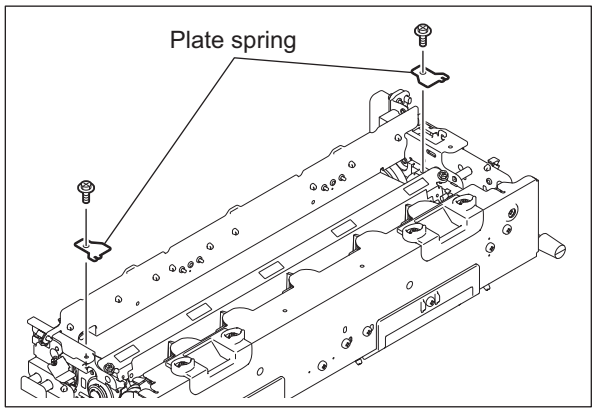


Fig. 15-27

(4) Raise the separation plate, and then take it off upward.

Note:
When installing, check that the gap between the pressure roller and separation plate is within the range of 0.6 mm to 1 mm when the fuser unit temperature is in the normal state. If the gap is out of the specified value, be sure to adjust it.
📖SERVICE HANDBOOK ”3.16 Adjustment of the separation plate gap (Fuser Unit)”

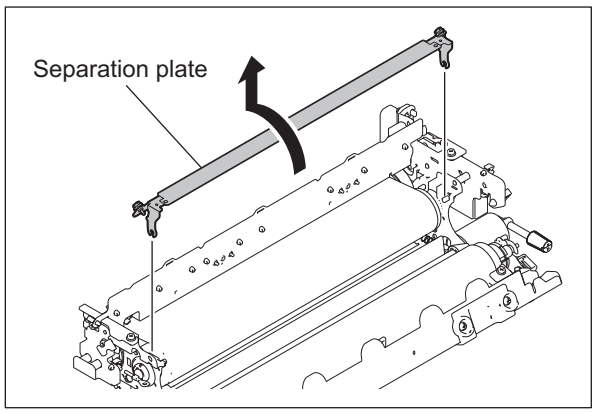


Fig. 15-28

(5) Release the harness on the rear side out of 3 clamps, and then disconnect 4 relay connectors.

Note:
When installing them, pull the harness under the stay.

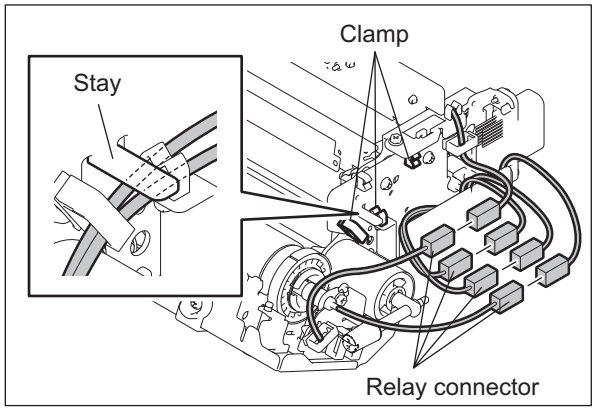


Fig. 15-29

(6) Remove 2 screws, and then release the harness out of 4 clamps.

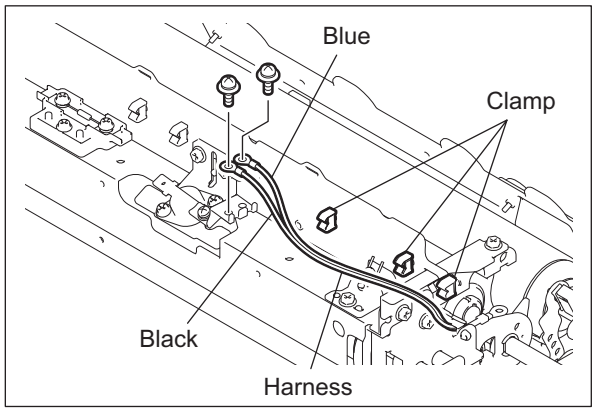


Fig. 15-30

(7) Release 2 harnesses from the clamp, and then take off the lamp front bracket by loosening 1 screw.

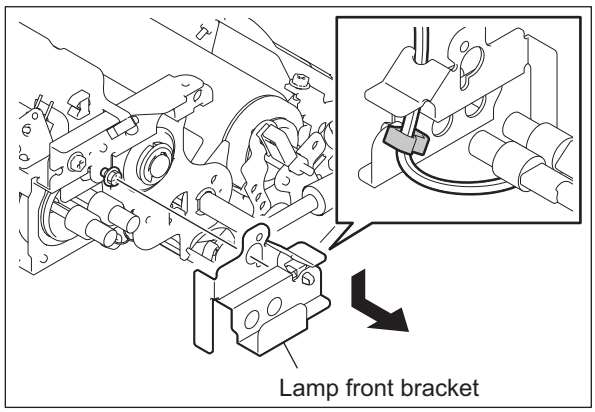


Fig. 15-31

15

(8) Take off the center heater lamp and the side heater lamp.

Note:
Handle the center heater lamp and side heater lamp with care because they are made of glass.

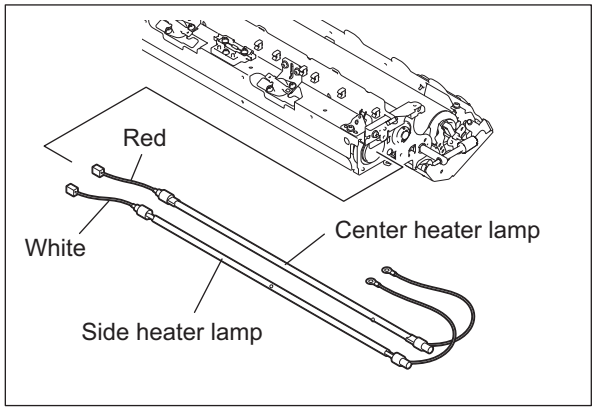


Fig. 15-32

(9) Remove 4 screws, and then release the harness out of 1 clamp to take off the fuser belt sensor bracket and the lamp rear bracket.

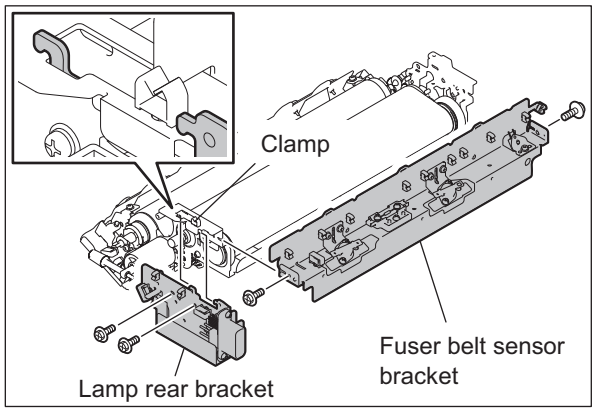


Fig. 15-33

(10) Remove 2 E-rings from the fuser roller. Then remove 2 washers, 2 bushings and 2 bearings.

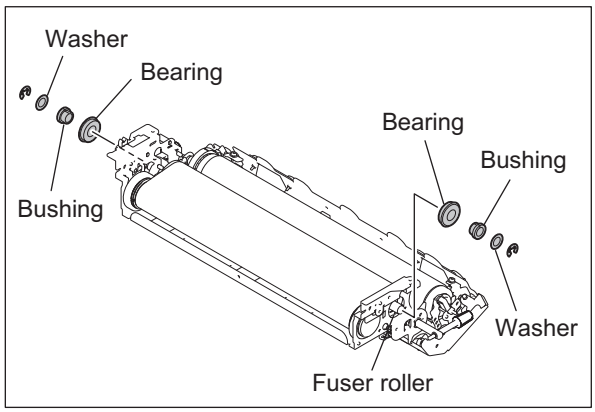


Fig. 15-34

(11) Raise the fuser roller, and then take off the fuser belt unit by lifting it up.

Notes:

- Be careful not to scratch the fuser belt unit. Lay the fuser belt on the clean place to prevent the belt from the dust.
- When installing the fuser belt unit, place the longer shaft of the fuser roller on the rear side.

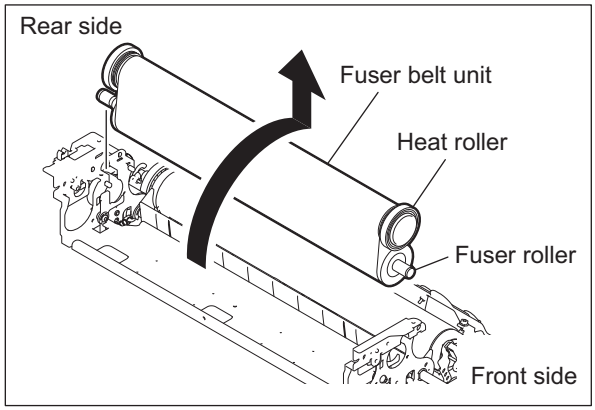


Fig. 15-35

Note:

Refer to "[A-9] Center heater lamp / Side heater lamp assembly" for the procedure of the center heater lamp and side heater lamp assembly.

[A-9] Center heater lamp / Side heater lamp assembly

(1) Perform assembling in advance except the front side cover, rear side cover and pressure roller cover.
(2) Place the fuser unit as shown in the figure.
(3) Insert the center heater lamp and fit it in the hole of the lamp rear bracket.

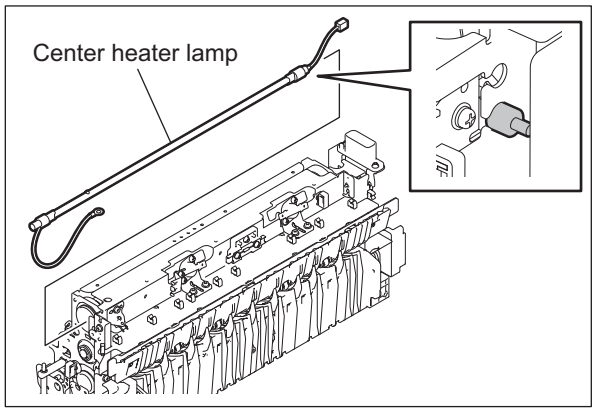


Fig. 15-36

(4) Insert the side heater lamp and fit it in the hole of the lamp rear bracket.

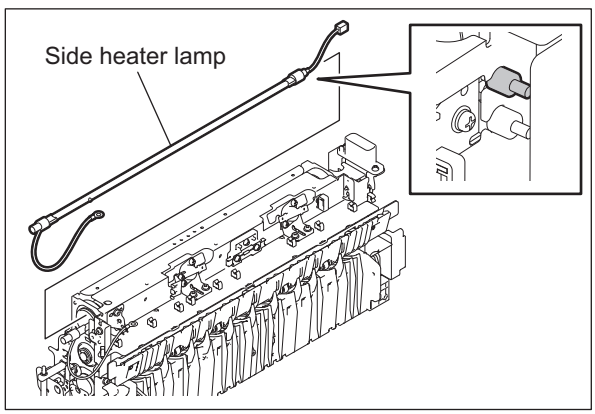


Fig. 15-37

15

(5) Secure the lamp front bracket and fix it with 1 screw.

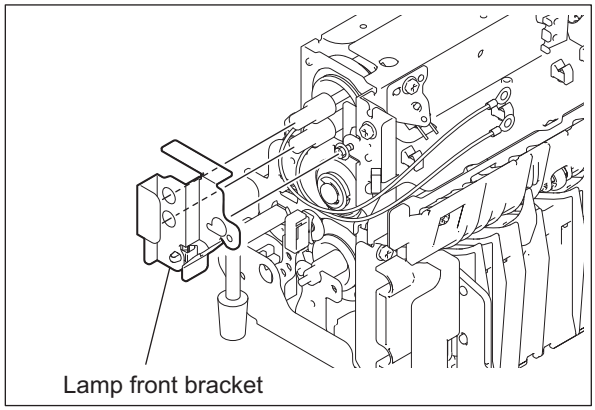


Fig. 15-38

(6) Hold the harness on the front side of each heater lamp with the clamp and fix it with 2 screws.
(7) Connect the connector on the rear side of each heater lamp.
(8) Install the front side cover, rear side cover and pressure roller cover.

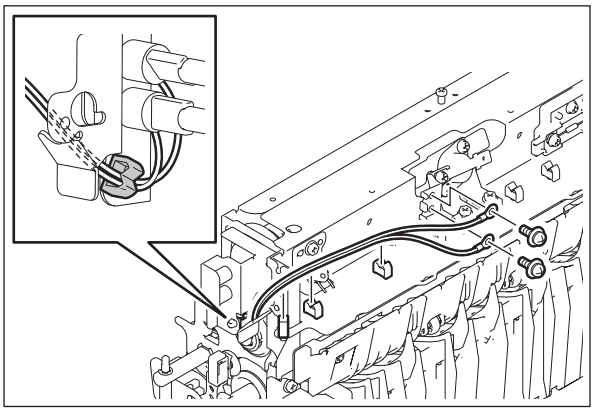


Fig. 15-39

[A-10] Fuser belt PM / Heat roller / Fuser belt guide PM/ Fuser roller PM

(1) Take off the fuser belt unit.
📖 P.15-26 "[A-8] Separation plate / Fuser belt unit / Center heater lamp (LAMP1) / Side heater lamp (LAMP2)"
(2) Remove 2 bearings from each side of the heat roller.

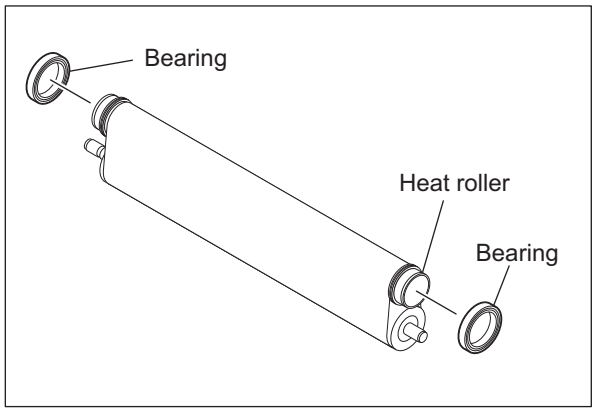


Fig. 15-40

(3) Take off the heat roller and fuser roller from the fuser belt.

Note:
Be careful not to scratch the fuser belt. Lay the fuser belt on the clean place to prevent the belt from the dust.

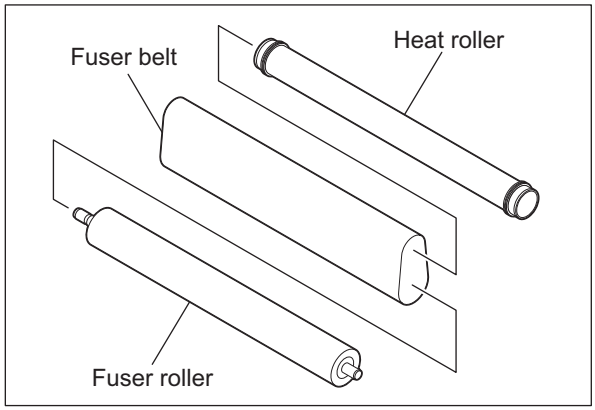


Fig. 15-41

(4) Remove 2 C-rings and 2 fuser belt guides from the heat roller.

Notes:
When insaling the fuser belt guide and C-ring, be sure of the folowing.
- Be sure that the fuser belt guide is placed with its flat face inside contacting the fuser belt (with the mold mark outside).
- Check that the fuser belt guide is securely fitted in the groove of the heat roller.
- Check that the C-ring is also securely fitted in the groove of the fuser belt guide and avoid the convex portion.

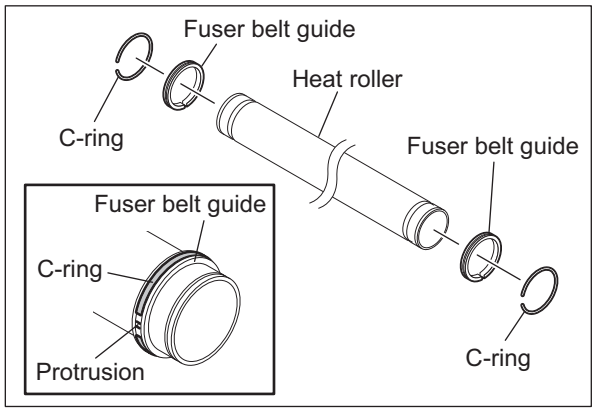


Fig. 15-42

[A-11] Pressure roller thermostat (THMO3)

(1) Take off the front side cover and transport guide.

📖 P.15-21 "[A-2] Front side cover"
📖 P.15-22 "[A-5] Transport guide"

(2) Front side: Release the harness out of the 1 clamp, and then disconnect the 1 relay connector.

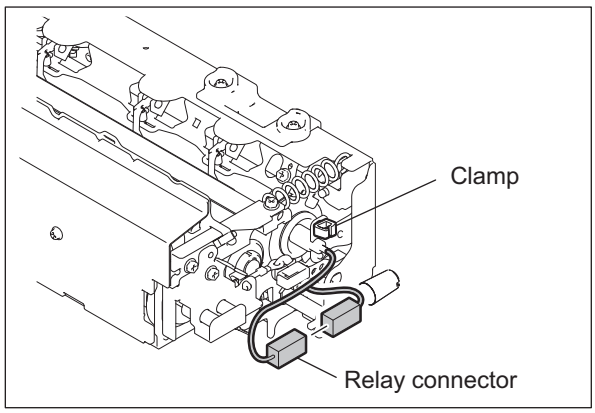


Fig. 15-43

(3) Rear side: Release the harness out of the 5 clamps, and then disconnect the 1 relay connector and 1 connector.

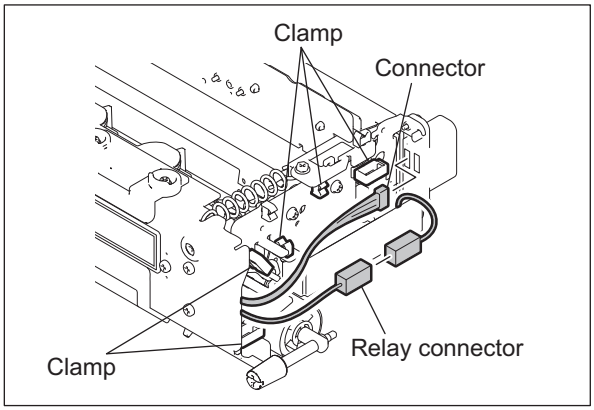


Fig. 15-44

Note:
When installing, fit the harness in the groove of the fuser unit as shown in the figure so that it will not be caught by the rear side cover, and then wrap it around the clamp once.

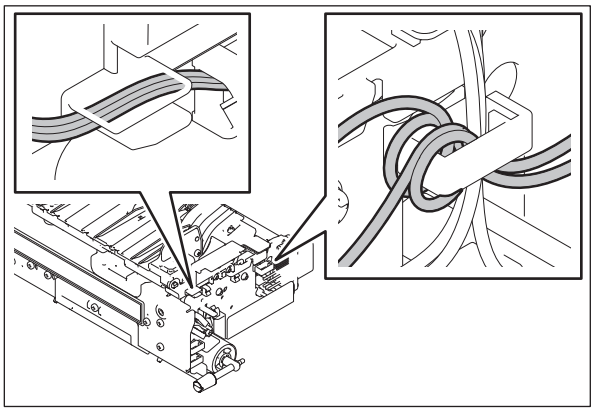


Fig. 15-45

(4) Loosen 2 pressure screws.

Note:
When installing, tighten the 2 pressure screws securely until they are no longer moved.

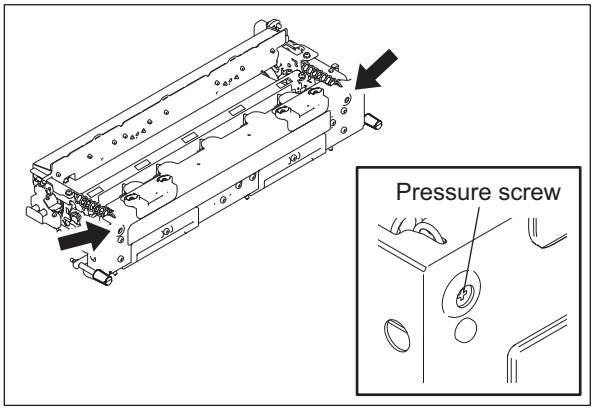


Fig. 15-46

(5) Remove 4 screws and take off the heat roller cover.

Note:
Be careful not to let the harness be caught by the heat roller cover during installation.

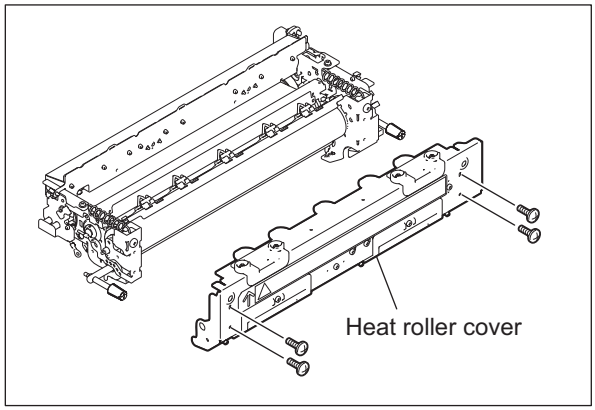


Fig. 15-47

(6) Remove 1 screw. Release the harness out of the 6 clamps, and take off the pressure roller thermostat bracket.

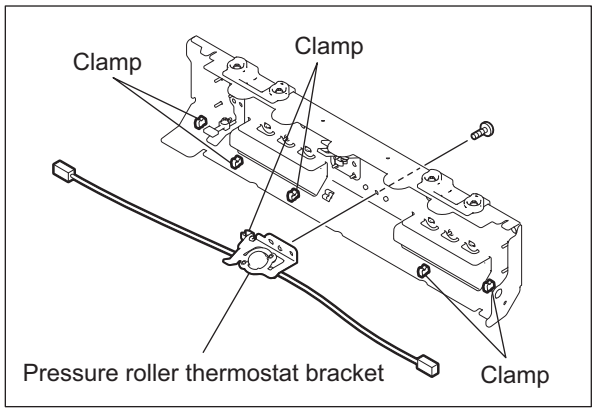


Fig. 15-48

(7) Remove 2 screws, and then take off the pressure roller thermostat from its bracket by releasing the harness out of the 2 terminals.

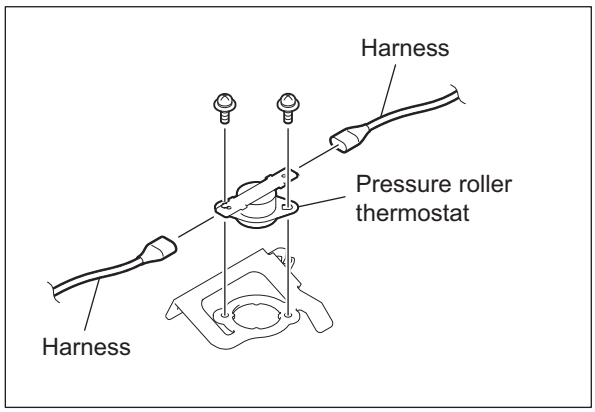


Fig. 15-49

Notes:

When installing the pressure roller thermostat, check the gap between the pressure roller thermostat and the pressure roller while they are being pushed each other.

1. Remove 2 screws, and take off the entry guide.

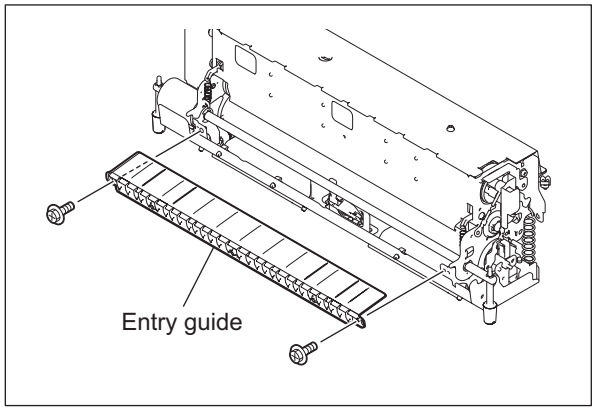
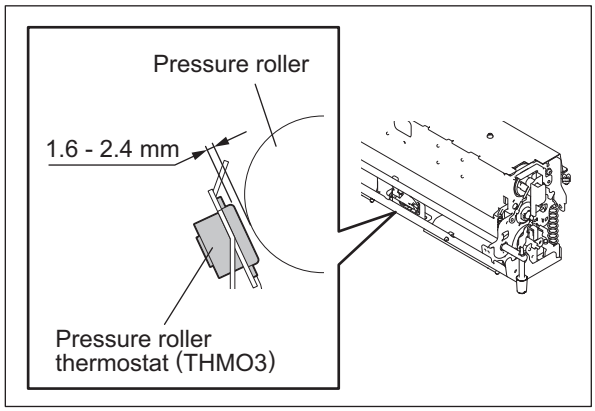


Fig. 15-50

2. Check that the gap between the pressure roller thermostat and the pressure roller is 1.6 - 2.4 mm through the opening.



[A-12] Pressure roller center thermistor (THM4) / Pressure roller rear thermistor (THM5)

(1) Take off the heat roller cover.
P.15-31 "[A-11] Pressure roller thermostat (THMO3)"
(2) Release the harness out of the 5 clamps.
(3) Remove the 2 screws of each thermistor, and then take off the both brackets of the pressure roller center thermistor and the pressure roller rear thermistor.

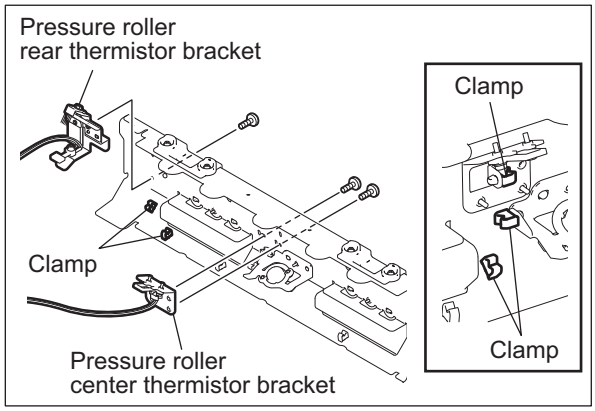


Fig. 15-51

(4) Remove 2 screws and take off the pressure roller center thermistor.
(5) Remove 1 screw and take off the pressure roller rear thermistor.

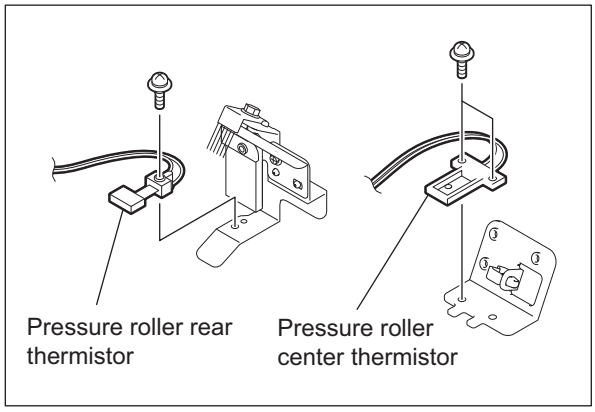


Fig. 15-52

15

Notes:

When installing the thermistors, be sure not to deform them. Also check if the thermistors are contacted with the fuser belt while they are pressed. Check the gap between the thermistors and the pressure roller while they are being pushed each other in the following procedure:

1. Remove 2 screws, and take off the entry guide.

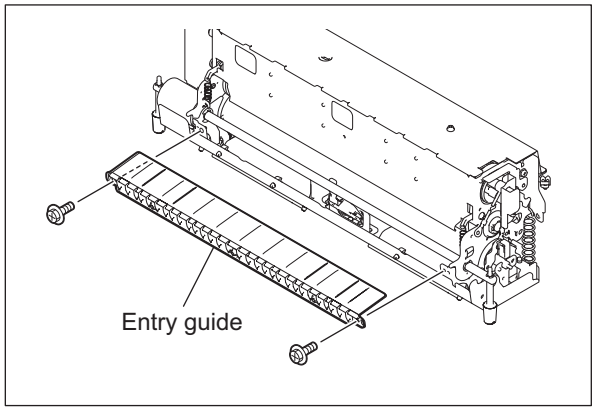


Fig. 15-53

2. Check that the thermistor is contacted with the fuser belt through the opening.

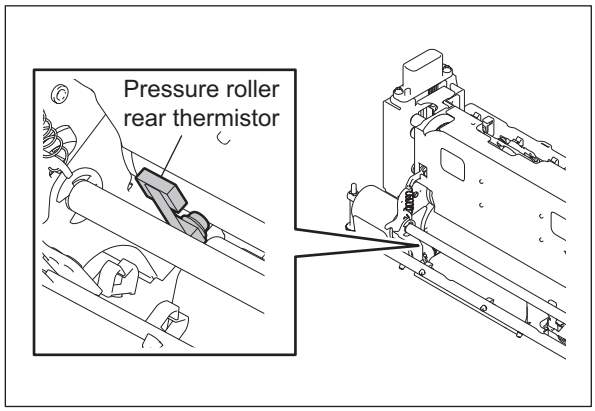


Fig. 15-54

3. Take off the separation finger unit.
   📖 P.15-23 "[A-6] Separation finger unit / Separation finger"
4. Check that the gap between the pressure roller center thermistor and the pressure roller is 1.5 - 2.5 mm through the opening.

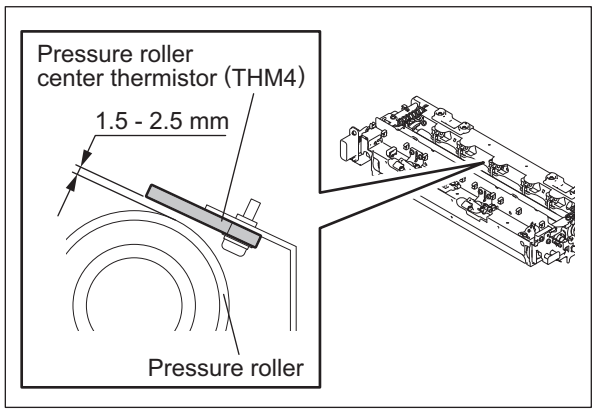


Fig. 15-55

[A-13] Fuser belt center thermostat (THMO1)

(1) Take off the front side cover, pressure roller cover and transport guide.

📖 P.15-21 "[A-2] Front side cover"
📖 P.15-22 "[A-4] Pressure roller cover"
📖 P.15-22 "[A-5] Transport guide""

(2) Release the harness out of 2 terminals of the fuser belt center thermostat.

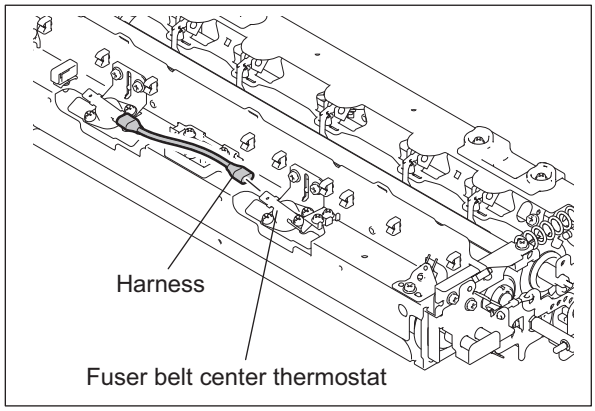


Fig. 15-56

(3) Remove 3 screws and take off the fuser belt center thermostat.

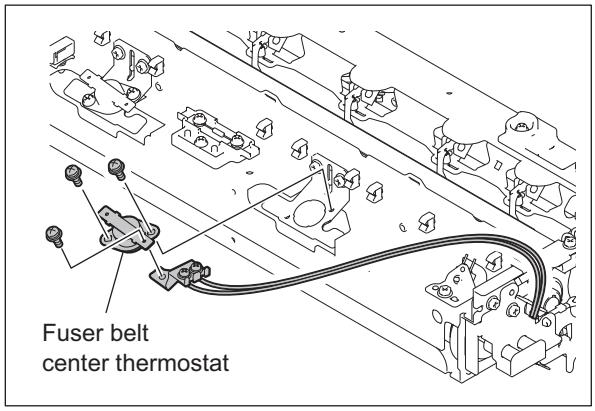


Fig. 15-57

Notes:
- When installing them, fix the thermostat, and then fix the terminal of the harness.
- Check that the gap between the fuser belt center thermostat and the fuser belt is 1.6 - 2.4 mm while they are being pushed each other, through the opening.

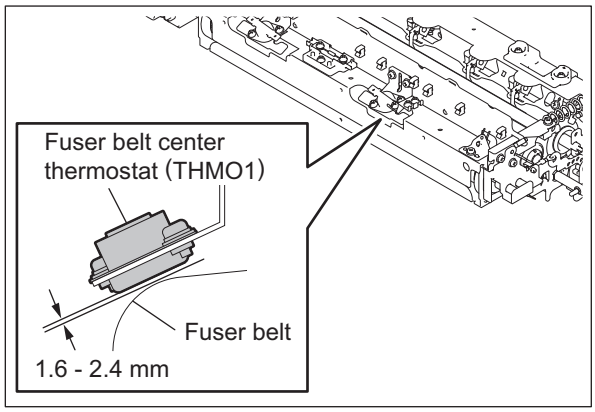


Fig. 15-58

[A-14] Fuser belt rear thermostat (THMO2)

(1) Take off the front side cover, pressure roller cover and transport guide.

📖 P.15-21 "[A-2] Front side cover"
📖 P.15-22 "[A-4] Pressure roller cover"
📖 P.15-22 "[A-5] Transport guide"

(2) Release the harness out of 2 terminal of the fuser belt rear thermostat.

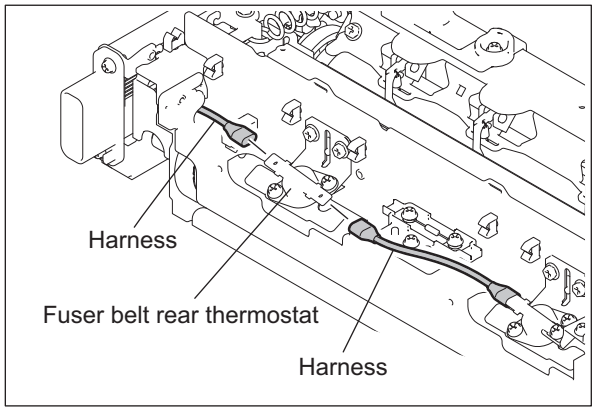


Fig. 15-59

(3) Remove 2 screws and take off the fuser belt rear thermostat.

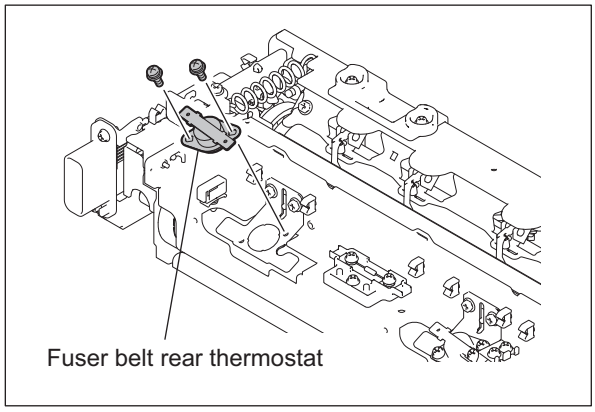


Fig. 15-60

Notes:
- When installing them, fix the thermostat, and then fix the terminal of the harness.
- Check that the gap between the fuser belt rear thermostat and the fuser belt is 1.6 mm - 2.4 mm while they are being pushed each other, through the opening.

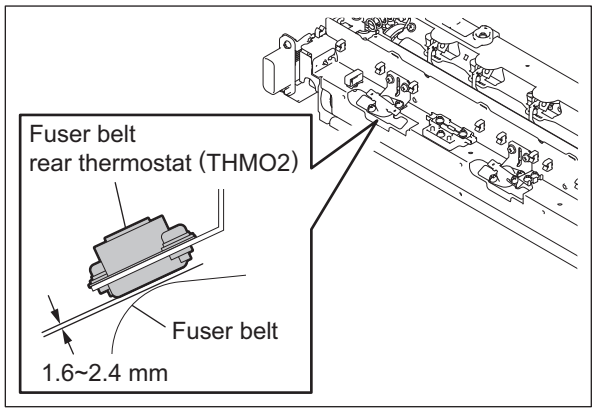


Fig. 15-61

[A-15] Fuser belt front thermistor (THM3)

(1) Take off the front side cover, pressure roller cover and transport guide.

📖 P.15-21 "[A-2] Front side cover"
📖 P.15-22 "[A-4] Pressure roller cover"
📖 P.15-22 "[A-5] Transport guide"

(2) Release the harness out of clamps, and then disconnect the relay connector.

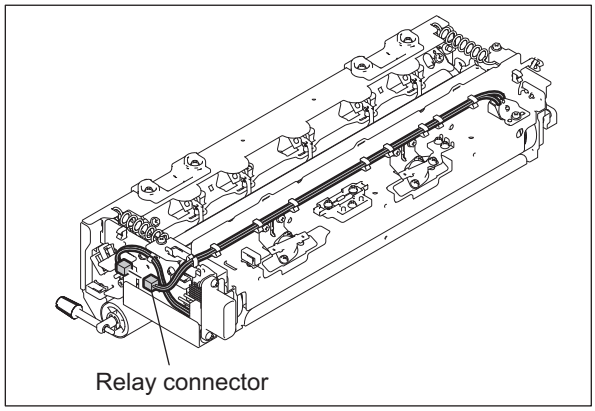


Fig. 15-62

(3) Remove 1 screw and take off the fuser belt front thermistor bracket.

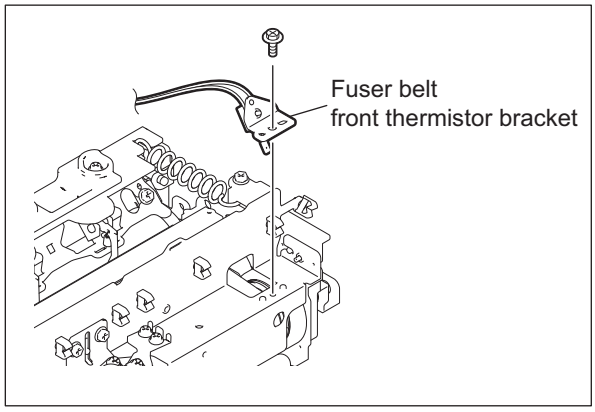


Fig. 15-63

(4) Remove 1 screw and take off the fuser belt front thermistor.

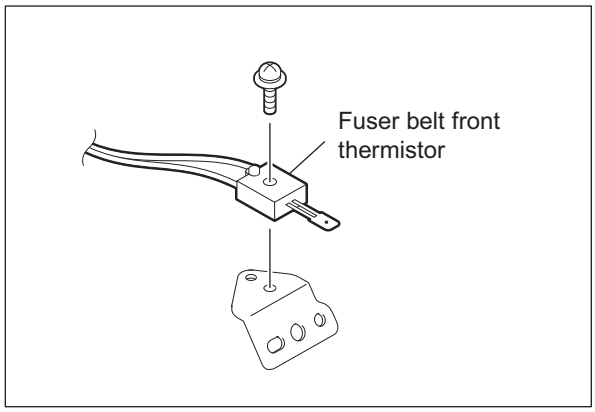


Fig. 15-64

15

Note:

When installing the thermistors, be sure not to deform them. Also check if the thermistors are contacted with the fuser belt while they are pressed.

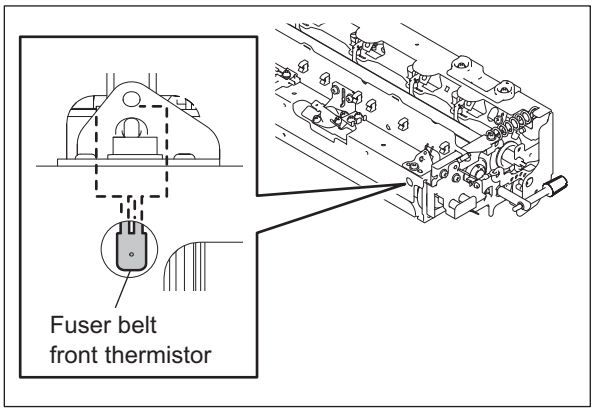


Fig. 15-65

[A-16] Exit sensor (S26)

(1) Take off the fuser unit.
📖 P.15-20 "[A-1] Fuser unit"

(2) Open the jam access cover.

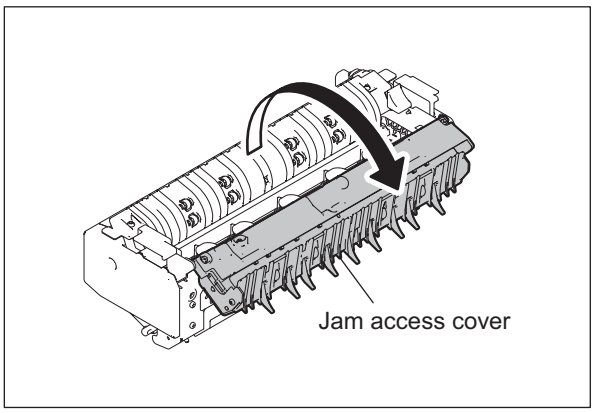


Fig. 15-66

(3) Remove 3 screws and take off the cover (A).

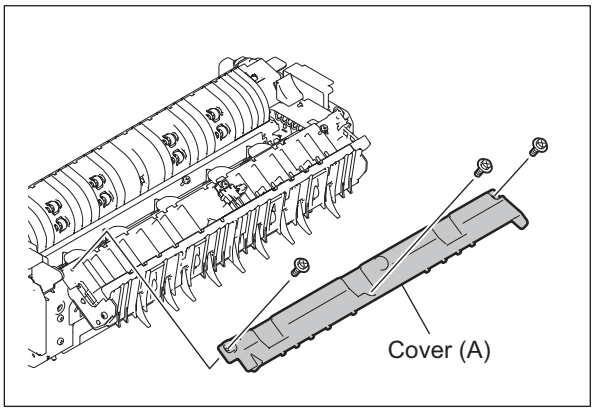


Fig. 15-67

(4) Remove 1 screw and bracket.
(5) Disconnect 1 connector and take off the exit sensor.

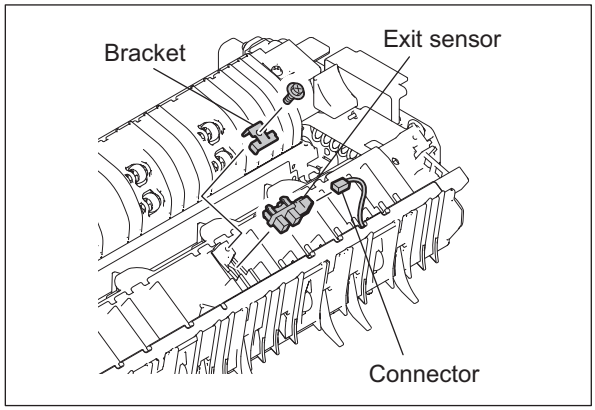


Fig. 15-68

[A-17] Pressure roller cleaning pad PM

(1) Take off the pressure roller.
P.15-24 "[A-7] Pressure roller / Pressure roller lamp (LAMP3)"
(2) Remove 1 screw and take off the cleaning pad bracket.

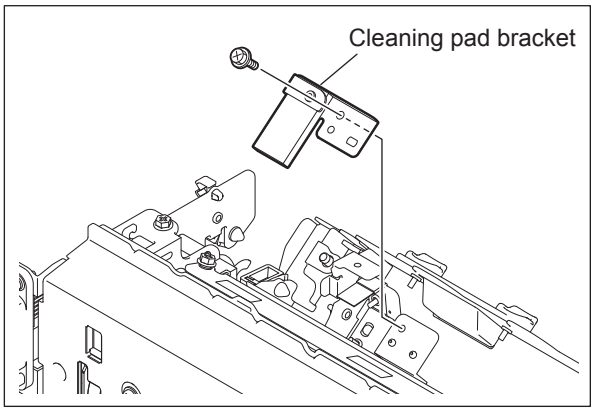


Fig. 15-69

(3) Remove 1 screw and take off the holding plate and the pressure roller cleaning pad.

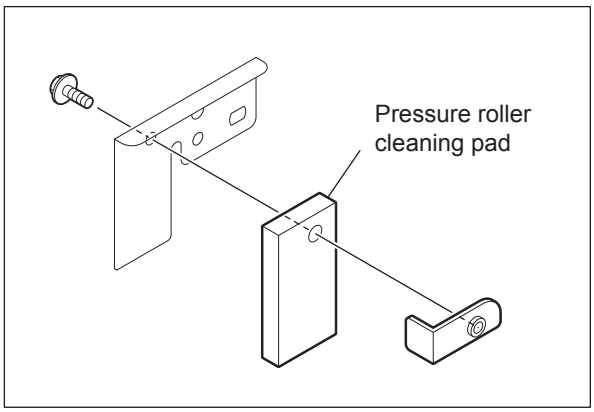


Fig. 15-70

15

[B] Fuser belt center thermopile(THMP1) / Fuser belt rear thermopile(THMP2)

Note:

Be sure not to touch the lens of the thermopile. If it is dirty, use a cloth with a small amount of alcohol to clean it.

(1) Take off the fuser unit.
📖 P.15-20 "[A-1] Fuser unit"

(2) Loosen 2 screws and take off the Fuser belt thermopile cover.

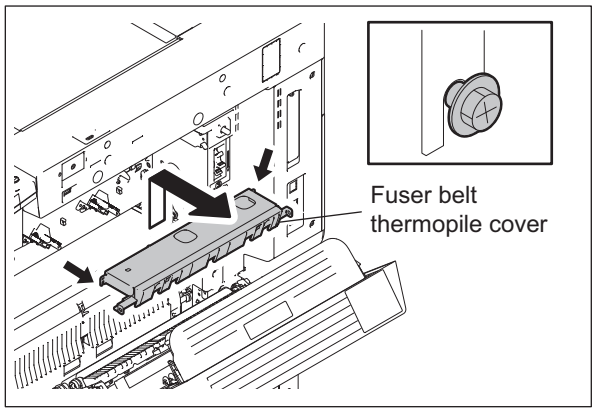


Fig. 15-71

(3) Loosen 1 screw of each thermopile. Then disconnect the connector to take off the thermopile bracket.

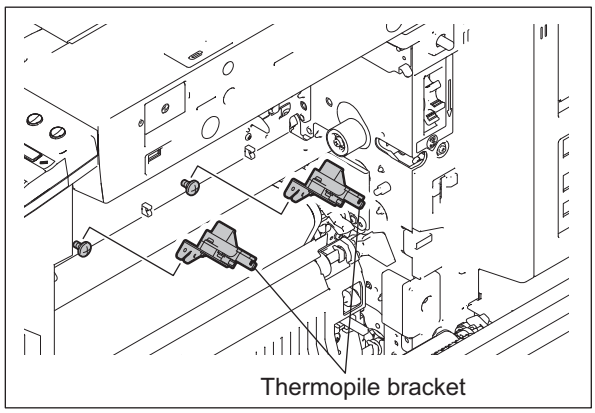


Fig. 15-72

(4) Remove 1 screw of each thermopile. Then take off the thermopiles from their brackets and covers.

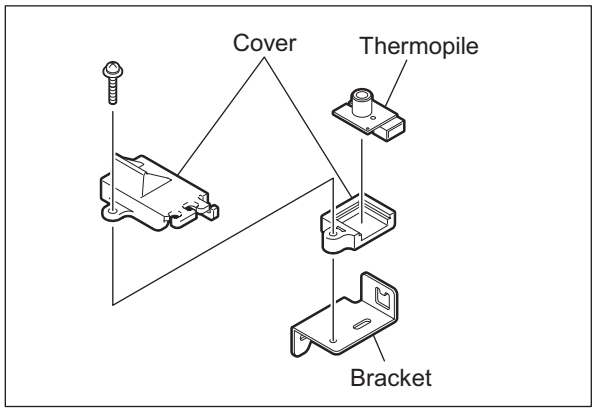


Fig. 15-73

[C] Exit unit

[C-1] Exit unit

(1) Take off the fuser unit.
📖 P.15-20 "[A-1] Fuser unit"
(2) Remove 2 screws and take off the exit duct.

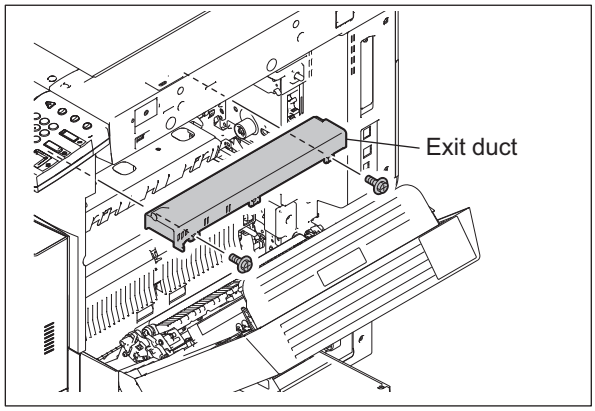


Fig. 15-74

(3) Loosen 2 screws and take off the exit unit.

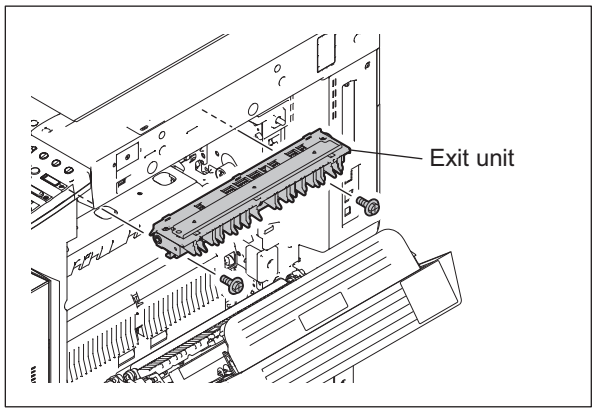


Fig. 15-75

[C-2] Upper exit roller / Lower exit roller

(1) Take off the exit unit.
📖 P.15-43 "[C-1] Exit unit"
(2) Remove 2 screws.
(3) Remove the exit flame from the exit duct base.

Note:
When installing the exit flame, hook the flame of the exit flame onto the 2 hooks of the exit duct base.

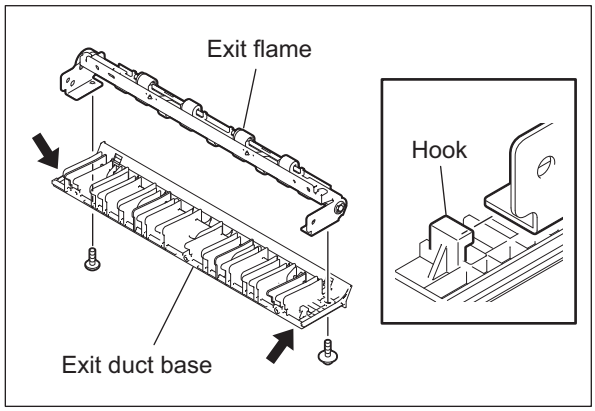


Fig. 15-76

(4) Remove 2 screws and take off the 2 leaf springs.

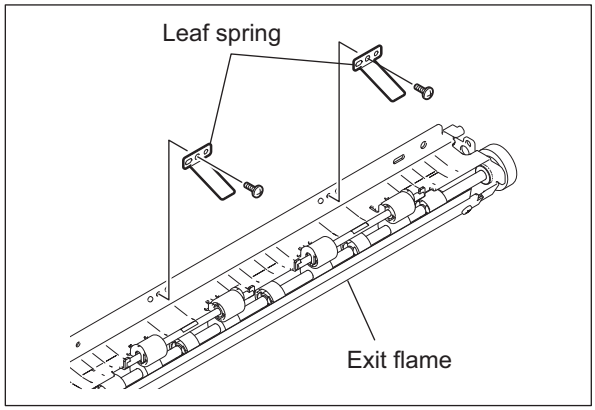


Fig. 15-77

(5) Remove 1 E-ring and take off the gear.
(6) Remove 2 E-rings and take off the 2 bushing and upper exit roller.

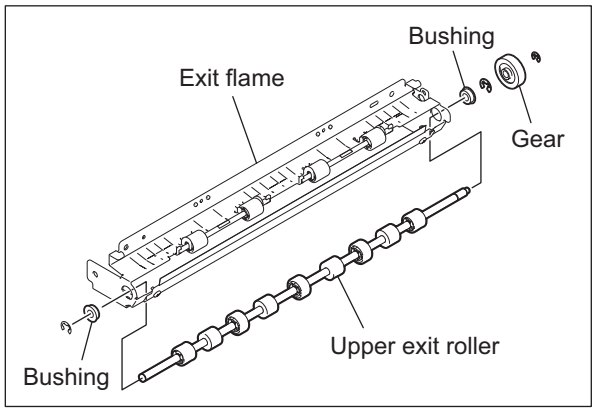


Fig. 15-78

(7) Remove the lower exit roller from the exit flame. Slide the 4 lower exit rollers to separate it from the 2 shafts.

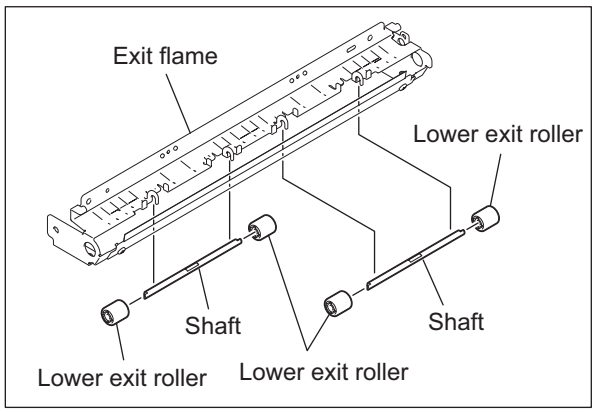


Fig. 15-79

[D] Fuser motor (M17)

(1) Take off the fuser unit.
🕮 P.15-20 "[A-1] Fuser unit"
(2) Open the board case.
🕮 P.2-45 "[K] Board case"
(3) Remove 2 screws, and then disconnect the connector to take off the fuser motor.
(4) Release 1 locking support, and then take off the fuser motor.

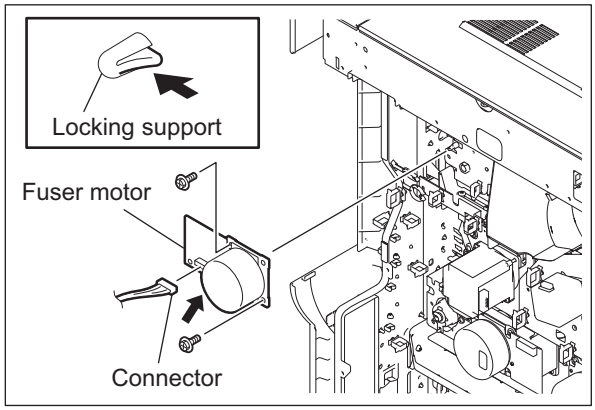


Fig. 15-80

[E] Fuser drive unit

(1) Take off the fuser unit, exit section drive unit, fuser motor and internal cooling fan.
🕮 P.15-20 "[A-1] Fuser unit"
🕮 P.15-45 "[F] Exit section drive unit"
🕮 P.15-45 "[D] Fuser motor (M17)"
🕮 P.12-32 "[P] Internal cooling fan (M23)"
(2) Remove 3 screws and take off the harness from 3 harness clamps. Slide the fuser drive unit in the upper right direction to take it off.

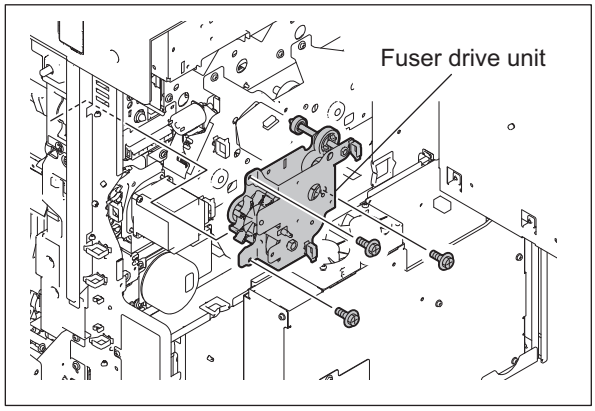


Fig. 15-81

[F] Exit section drive unit

(1) Open the board case.
🕮 P.2-45 "[K] Board case"
(2) Release the harness out of the clamp, and then disconnect the 2 connectors.
(3) Remove 2 screws and take off the exit section drive unit.

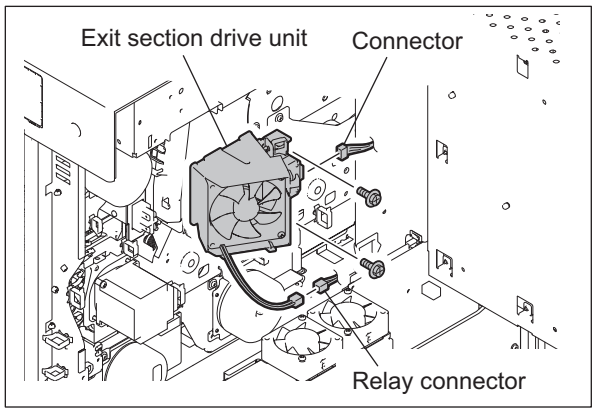


Fig. 15-82

[G] Fuser/exit section cooling fan (M25) / Exit motor (M18)

(1) Take off the exit section drive unit.
📖 P.15-45 "[F] Exit section drive unit"
(2) Remove 2 screws and take off the fuser/exit section cooling fan.

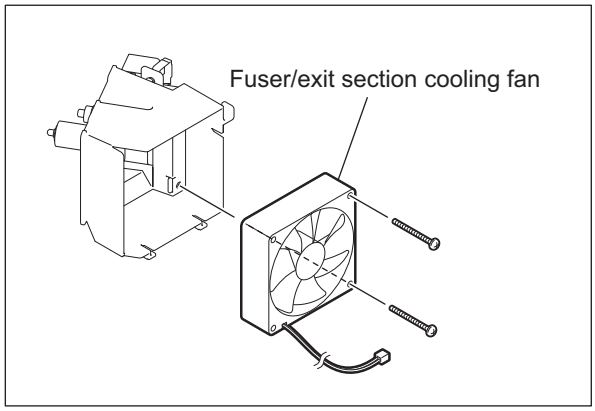


Fig. 15-83

(3) Remove 2 E-rings 1 pully and 1 belt and take off the exit motor.

Notes:
- Replace the rexit motor with the bracket installed.
- Never attempt to loosen 2 screws fixing exit motor.

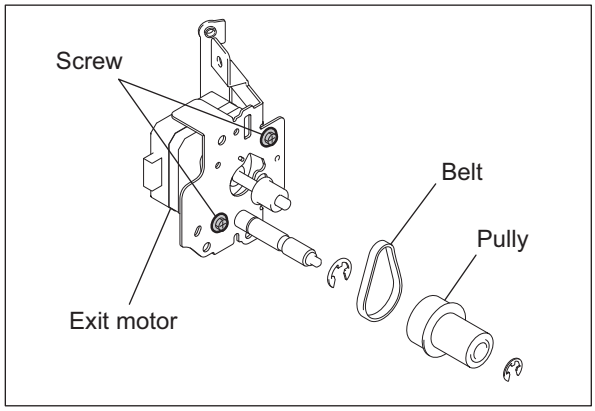


Fig. 15-84

16. AUTOMATIC DUPLEXING UNIT (ADU)

16.1 General Description

The Automatic Duplexing Unit (ADU) is a unit to automatically print on both sides of paper. A switch-back method using the exit roller is adopted for the ADU of this equipment.
A sheet of paper is switchbacked by the exit roller right after the printing operation (fusing operation) on one side is completed, and the reversed sheet is transported to the registration section for the other side of the sheet to be printed.
The ADU mainly consists of the transport rollers and their drive system, paper guide and ADU entrance / exit sensor.

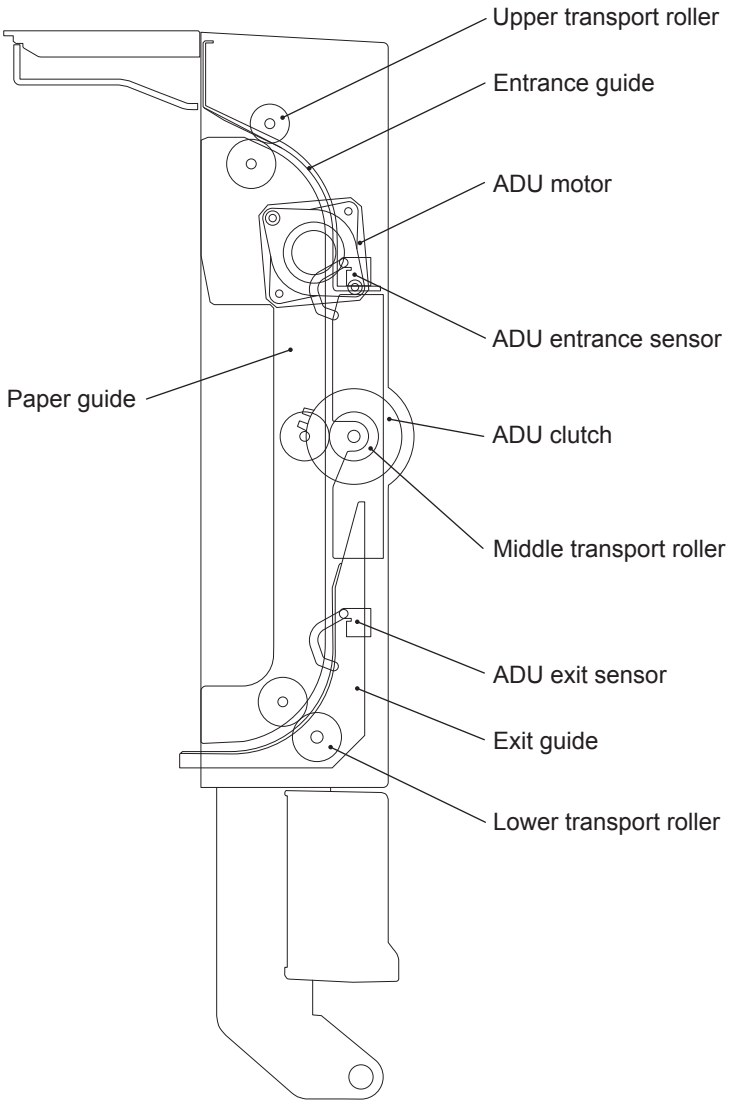


Fig. 16-1

16.2 Composition

Automatic Duplexing Unit (ADU)	
ADU motor	M22:Stepping motor
ADU clutch	CLT7
ADU entrance sensor	S38
ADU exit sensor	S39
ADU opening/closing switch	SW7
ADU driving PC board	ADU
Upper transport roller	
Middle transport roller	
Lower transport roller	

16.3 Functions

1) ADU motor (M22)
   This motor drives the ADU upper, middle and lower transport roller.

2) ADU clutch (CLT7)
   This clutch transfers the drive of the ADU motor (M22) to the upper and middle transport roller.
   When the ADU clutch (CLT7) is turned ON, the upper and middle transport roller starts rotating.

3) ADU entrance sensor (S38)
   This sensor detects input paper of the ADU transportation.

4) ADU exit sensor (S39)
   This sensor detects output paper of the ADU transportation.

5) ADU opening/closing switch (SW37)
   This switch detects whether the ADU is open or not.

6) Upper transport roller / Middle transport roller / Lower transport roller
   This roller transports paper into the ADU.

16.4 Drive of ADU

When the ADU motor (M22) rotates to the direction A, the upper transport roller is rotated driven by the gears and belt. The ADU clutch (CLT7) is then turned ON and the middle transport roller and lower transport roller are rotated.

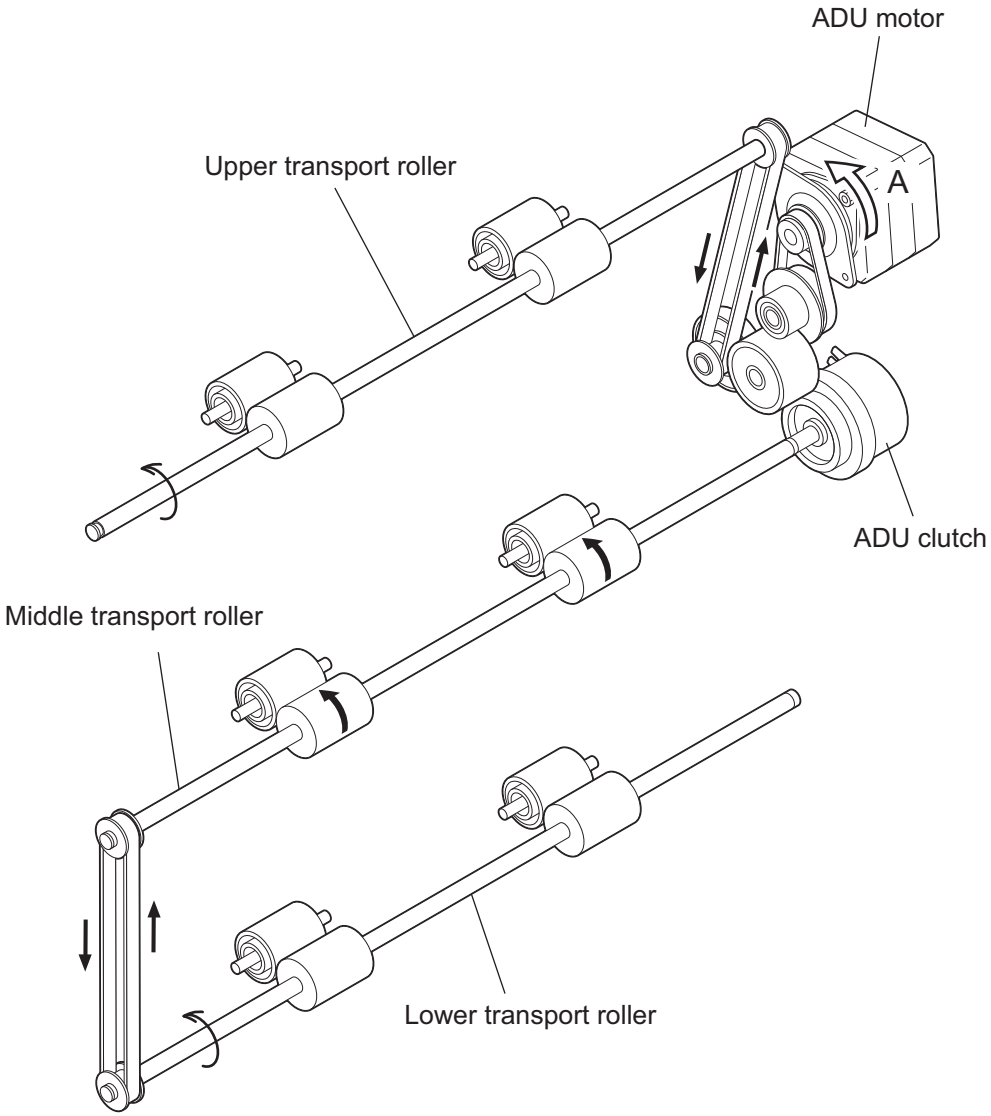


Fig. 16-2

16.5 Description of Operations

The back side printing (recording data of the back side of paper) is performed first by selecting duplex printing mode and pressing the [START] button. When the trailing edge of the paper passes the exit gate, the paper is switchbacked by the exit roller and transported into the ADU (the exit gate is closed with its own weight), and then the switchbacked paper is transported with acceleration. The transportation decelerates when the ADU exit sensor (S39) detects the paper. The front side printing (recording data of the front side of paper) is performed at the registration section. The paper passes through the exit gate again and is transported to the inner tray to complete duplex printing.

There are three methods of judging a paper jam: (1) whether the ADU entrance sensor (S38) is turned ON or not in a specified period of time after the switchback to the ADU started (E510). (2) whether the ADU exit sensor (S39) is turned ON or not in a specified period of time after the ADU entrance sensor (S38) is turned ON (E520). (3) whether the registration sensor (S28) is turned ON or not in a specified period of time after the paper feeding from the ADU to the equipment (E110).

If the ADU is opened during duplex printing, the ADU motor (M22) and ADU clutch (CLT7) are stopped, namely, ADU open jam occurs (E430).

The equipment is never to be stopped during printing by interruption in any case except paper jam or service call, if paper remains in the ADU.

The operation of the duplex printing differs depending on the size of the paper; single-paper circulation and alternateness circulation. The figures in the following pages show the circulating operations during duplex copying. The numbers in the figures indicate the page numbers.

1) Single-paper circulation
With the paper larger than A4/LT size, duplex printing (back-side printing→front-side printing) is performed for one sheet at a time as shown below.

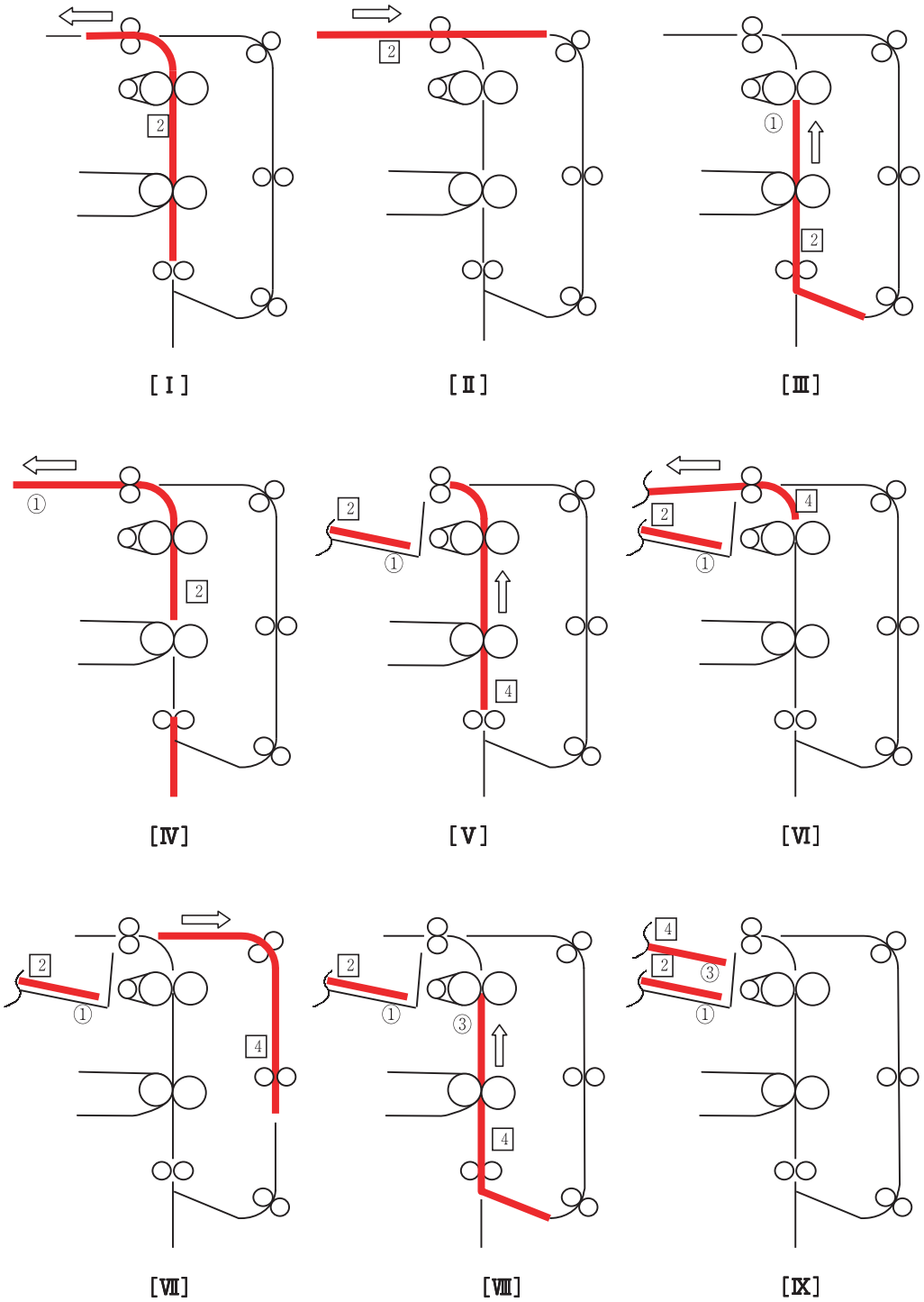


Fig. 16-3

2) Double-paper alternateness circulation
With A4/LT size paper or smaller, duplex printing is performed for two sheets at a time as shown below.
Back side of the 1st sheet→Back side of the 2nd sheet→Front side of the 1st sheet→Front side of the 2nd sheet

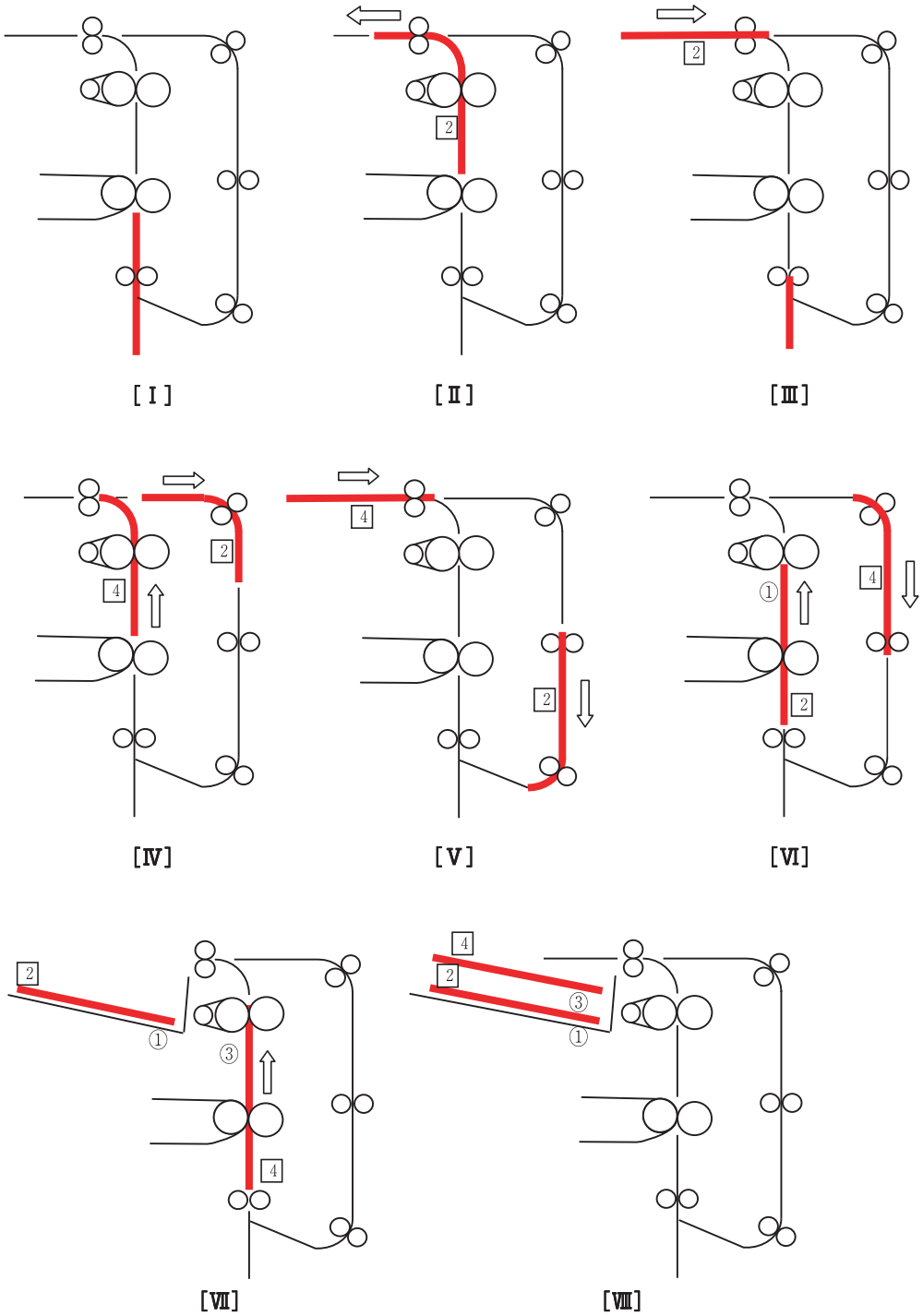


Fig. 16-4

3) Multiple-paper circulation

With more than one sheet of A4/LT size paper or smaller, duplex printing is performed as shown below in a following order:

(In case of 5 sheets)

Back side of the 1st sheet (2) →Back side of the 2nd sheet (4) →Front side of the 1st sheet (1) → Back side of the 3rd sheet (6) →Front side of the 2nd sheet (3) →Back side of the 4th sheet (8) → Front side of the 3rd sheet (5) →Back side of the 5th sheet (10) →Front side of the 4th sheet (7) → Front side of the 5th sheet (9)

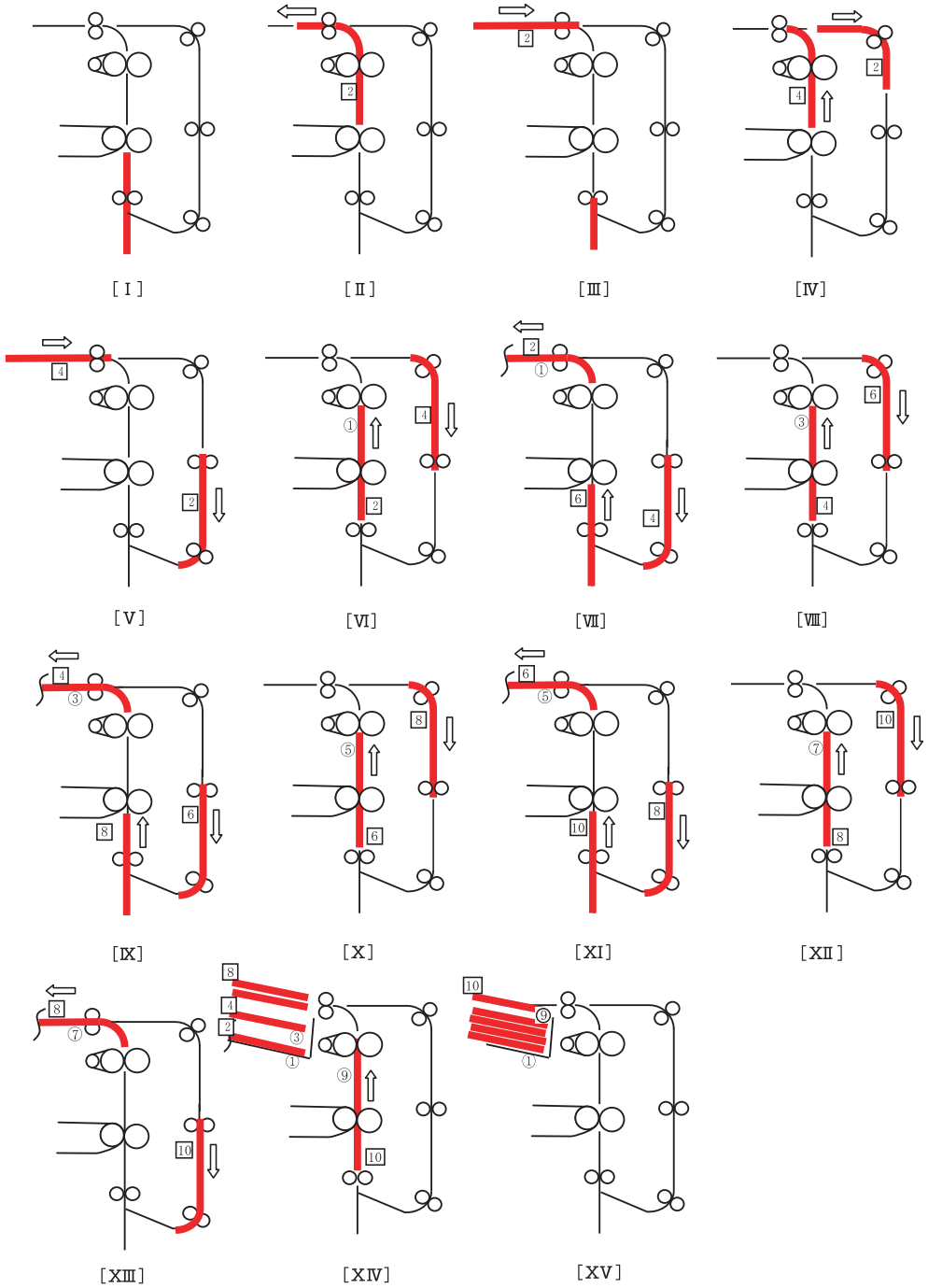


Fig. 16-5

Timing chart for duplex copying from 1st drawer (A4, 3 sheets)

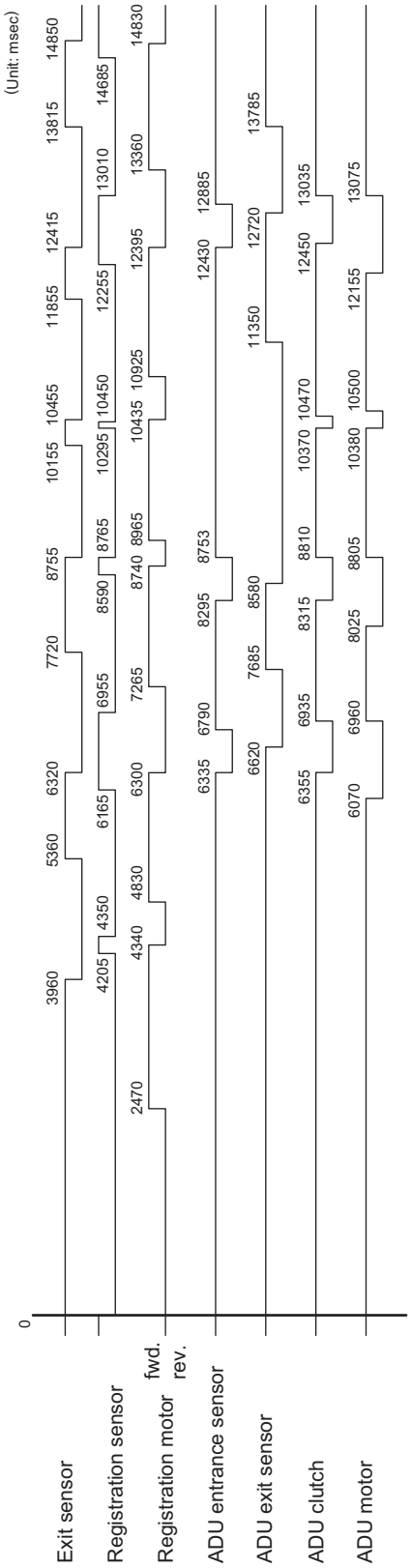


Fig. 16-6

Timing chart for duplex copying from 1st drawer (A3, 1 sheet)

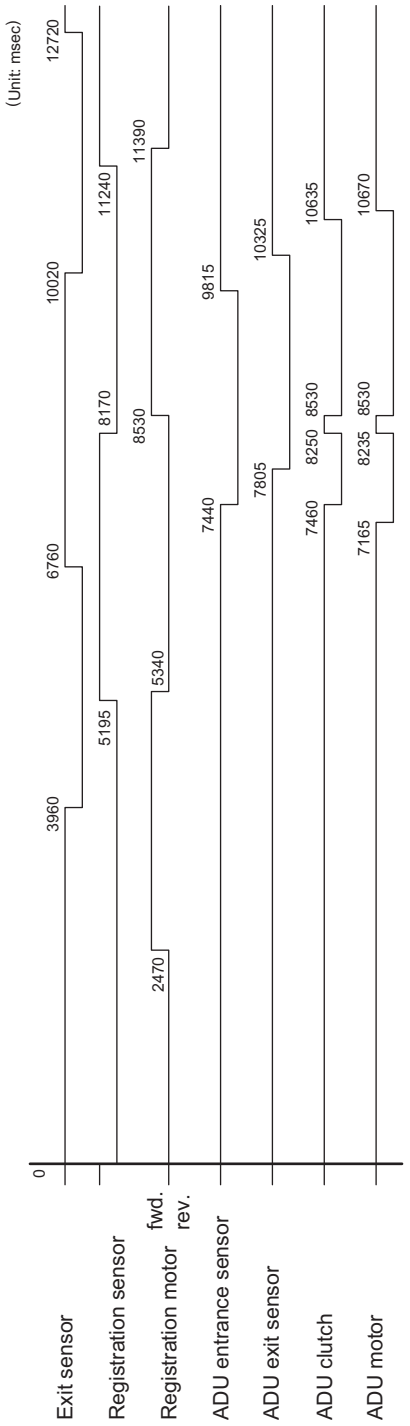
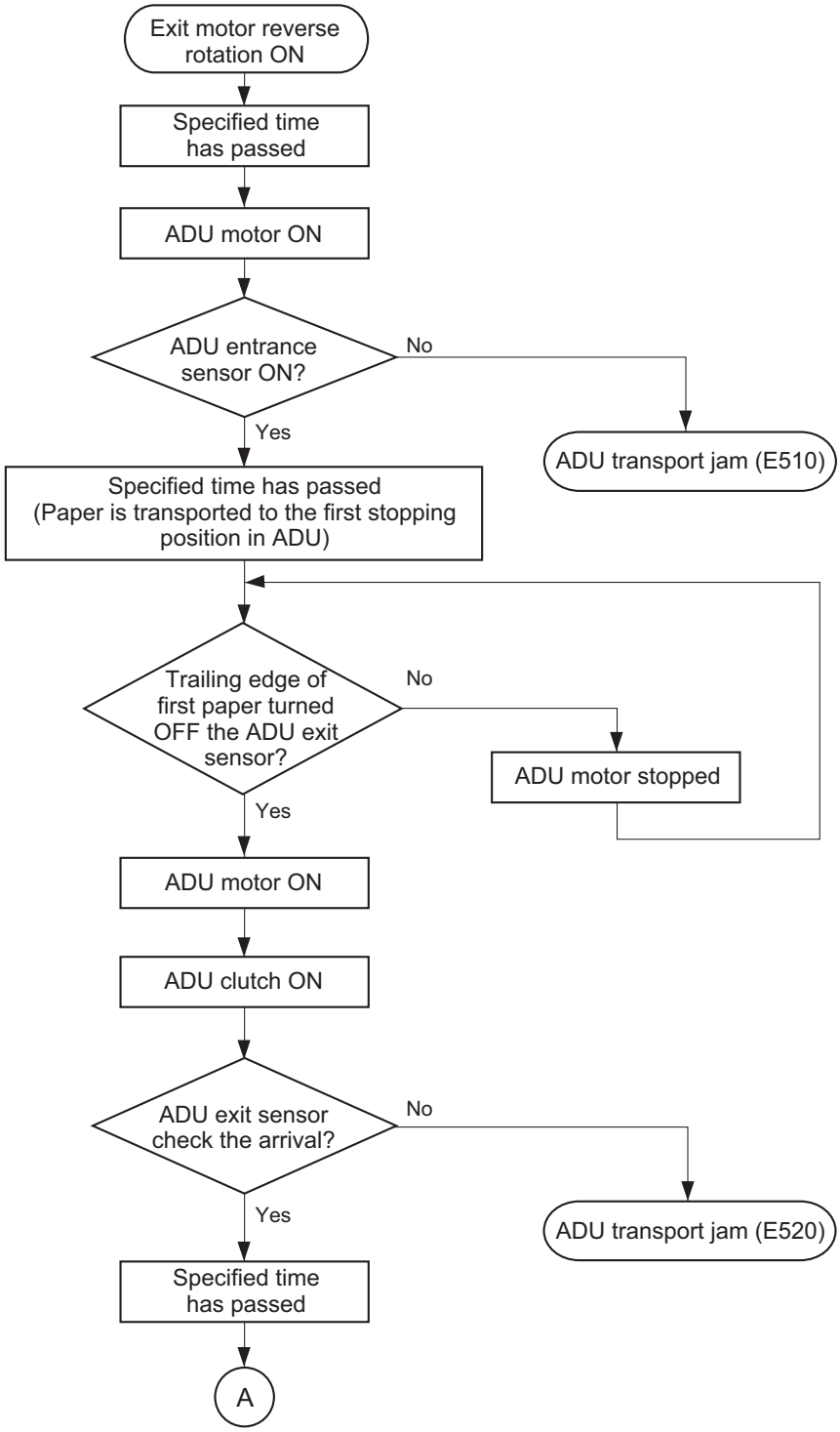
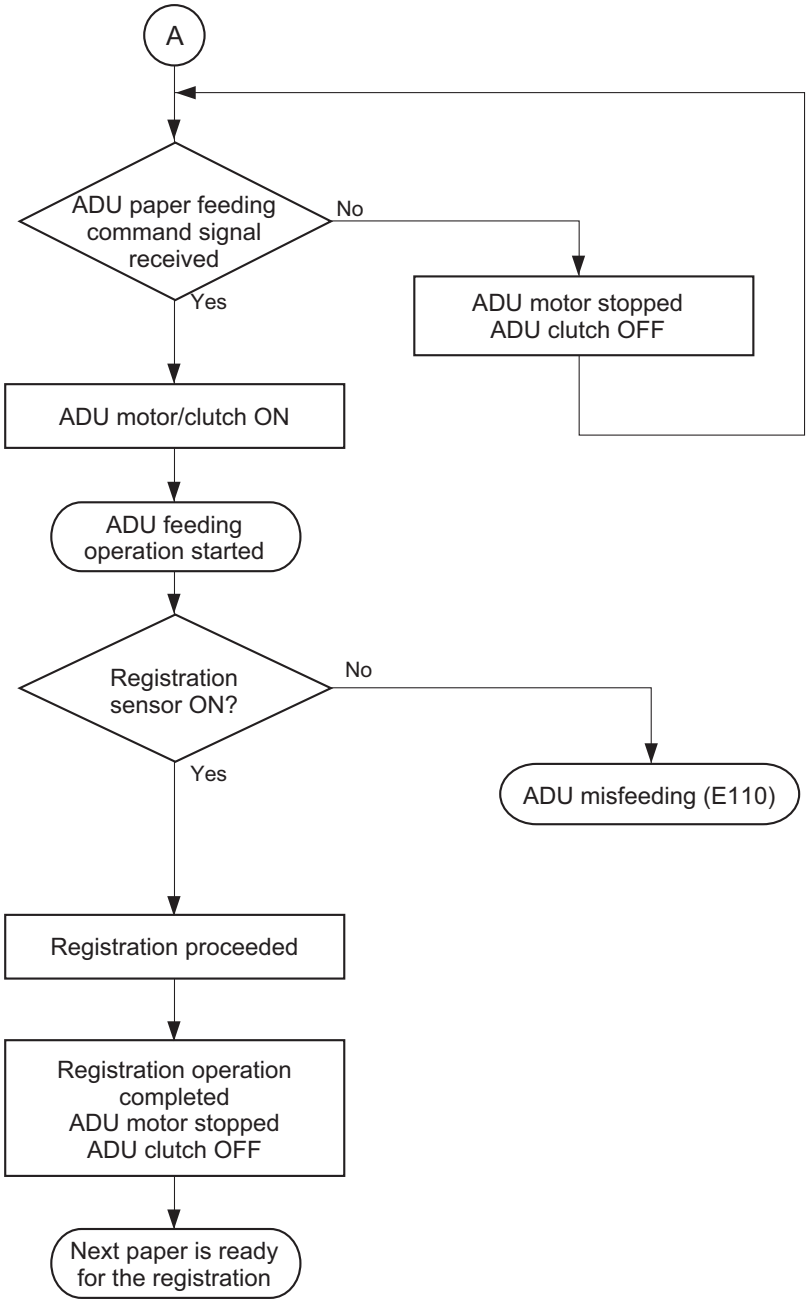


Fig. 16-7

16.6 Flow Chart





16.7 Disassembly and Replacement

[A] ADU maintenance position

Note:

The removal of the transfer belt unit or the 2nd transfer unit can be easily performed at the ADU maintenance position without taking off the automatic duplexing unit (ADU). When the ADU is at its maintenance position, do not close the ADU because it may be damaged.

(1) Open the automatic duplexing unit.
(2) Remove 1 screw of the front hinge, and then take off the automatic duplexing unit by lifting it up slightly and sliding it to the rear side.

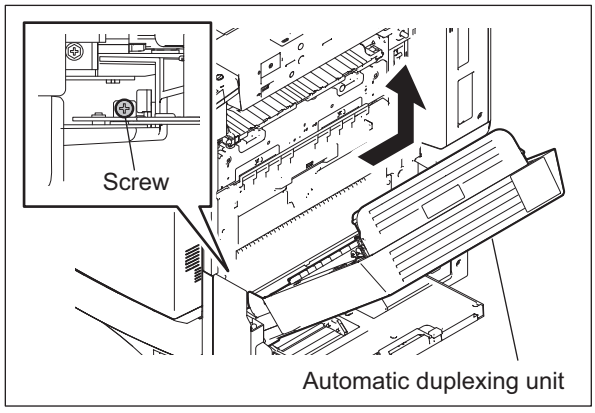


Fig. 16-8

(3) When installing, match the front and rear hinge holes of the equipment and the right and left hinge bosses of the ADU.

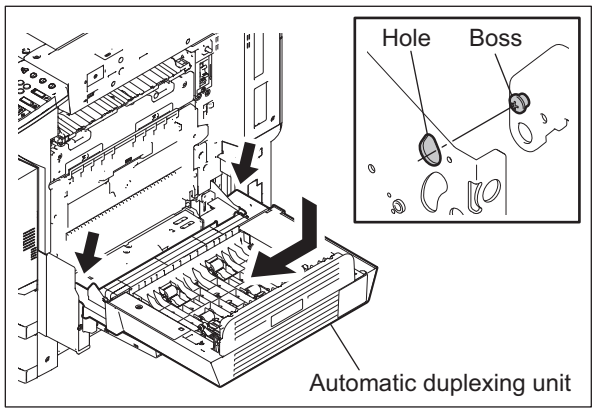


Fig. 16-9

16

[B] Automatic Duplexing Unit (ADU)

(1) Take off the right rear hinge cover.
📖 P.2-32 "[L] Right rear hinge cover"
(2) Disconnect 1 connector and remove 1 screw fixing the ground wires.

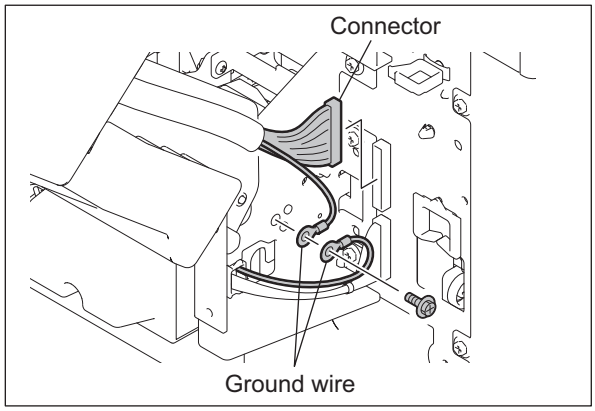


Fig. 16-10

(3) Remove 1 screw of the front hinge, and then take off the automatic duplexing unit by lifting it up slightly and sliding it to the rear side.

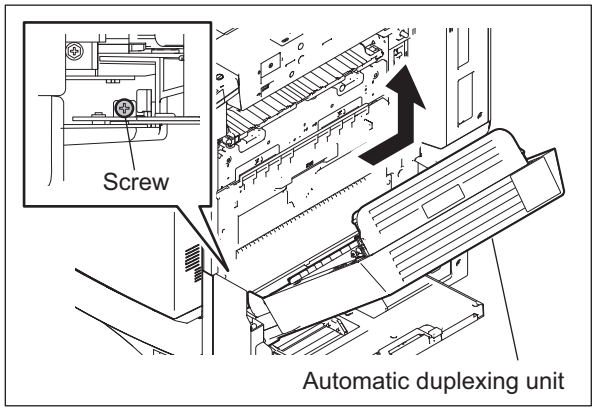


Fig. 16-11

Note:
When installing the ADU, match the front and rear hinge bosses of the equipment and the hinge holes of the ADU.

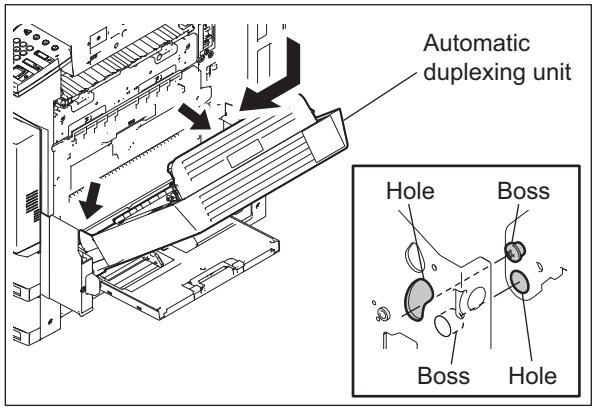


Fig. 16-12

[C] ADU inside rear cover

(1) Open the automatic duplexing unit.
(2) Remove 2 screws and take off the ADU inside rear cover.

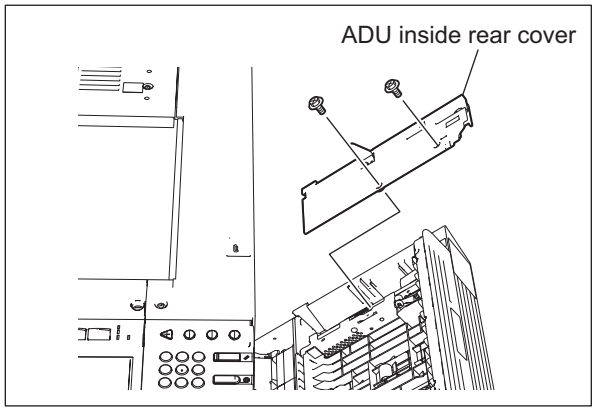


Fig. 16-13

[D] ADU opening/closing switch (SW7)

(1) Take off the ADU inside rear cover.
📖 P.16-15 "[C] ADU inside rear cover"
(2) Disconnect the connector and release the latch to take off the ADU opening/closing switch.

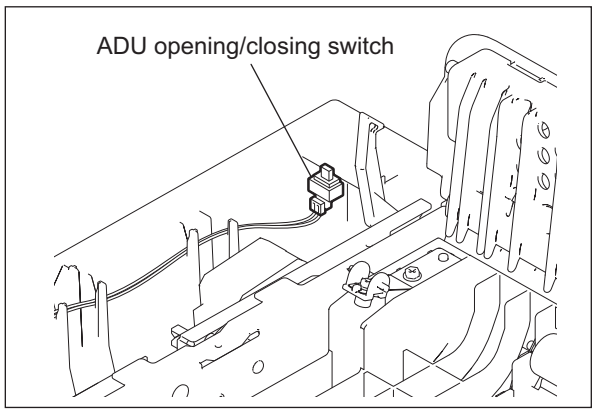


Fig. 16-14

[E] ADU board (ADU)

(1) Take off the automatic duplexing unit and ADU inside rear cover.
📖 P.16-14 "[B] Automatic Duplexing Unit (ADU)"
📖 P.16-15 "[C] ADU inside rear cover"
(2) Disconnect 6 connectors from the ADU board. Release 3 lock supports and take off the ADU board.

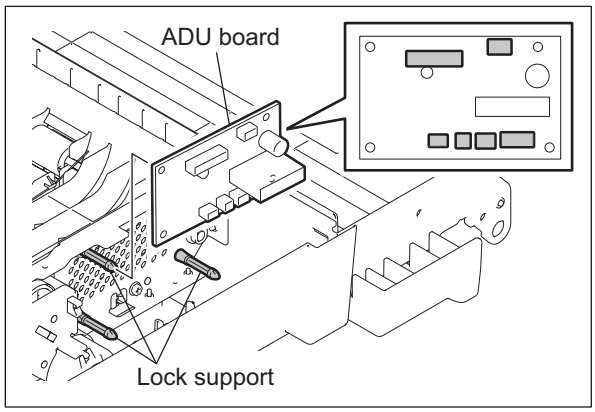


Fig. 16-15

[F] ADU cover

(1) Take off the ADU opening/closing switch.
📖 P.16-15 "[D] ADU opening/closing switch (SW7)"
(2) Remove 4 screws and take off the ADU cover.

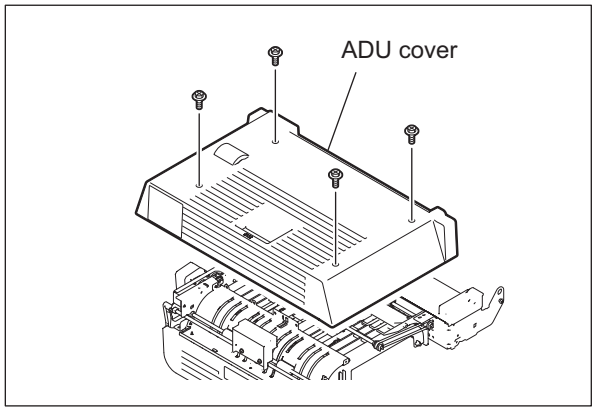


Fig. 16-16

[G] Paper guide

(1) Open the automatic duplexing unit.
(2) Open the paper guide.
(3) Release the fulcrum on the front side and take off the paper guide.

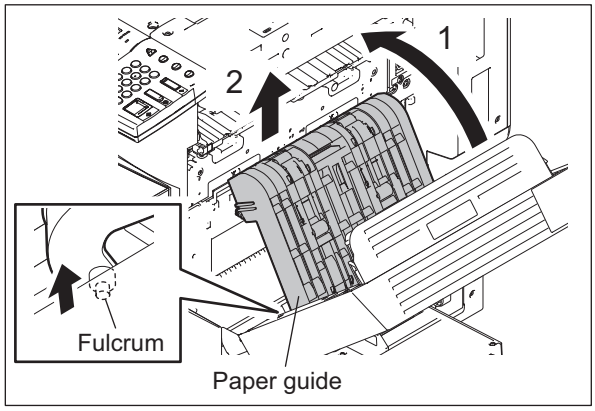


Fig. 16-17

[H] ADU clutch (CLT7)

(1) Take off the automatic duplexing unit and ADU cover.
📖 P.16-14 "[B] Automatic Duplexing Unit (ADU)"
📖 P.16-16 "[F] ADU cover"
(2) Remove 1 E-ring. Cut off a binding band and disconnect 1 connector. Then take off the ADU clutch.

Notes:
- When installing the ADU clutch, attach a rotation protection.
- When installing the E-ring, make sure that the latches of both ends of E-ring are on the flat part of the shaft.

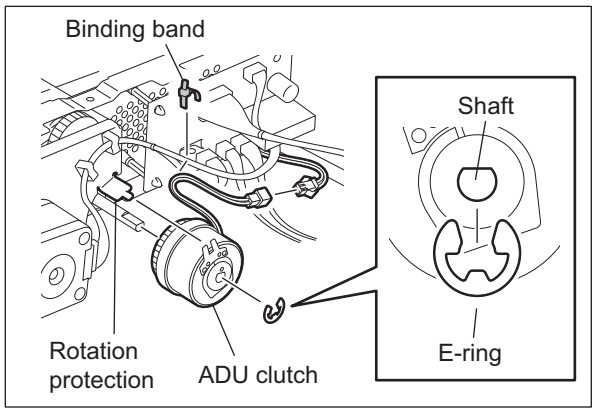


Fig. 16-18

[I] ADU drive unit / ADU motor (M22)

(1) Take off the ADU clutch.
📖 P.16-16 "[H] ADU clutch (CLT7)"
(2) Remove the spring.

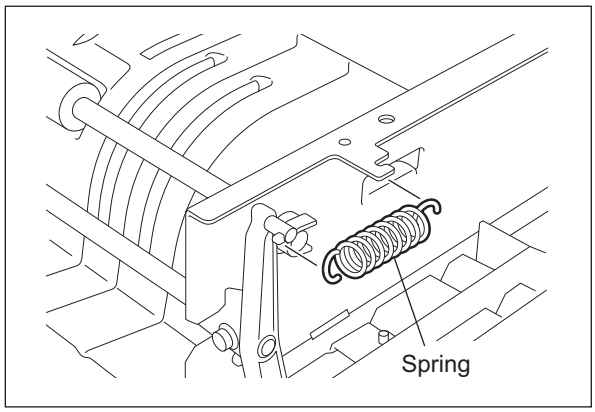


Fig. 16-19

(3) Remove 1 screw and take off the ADU rear latch.

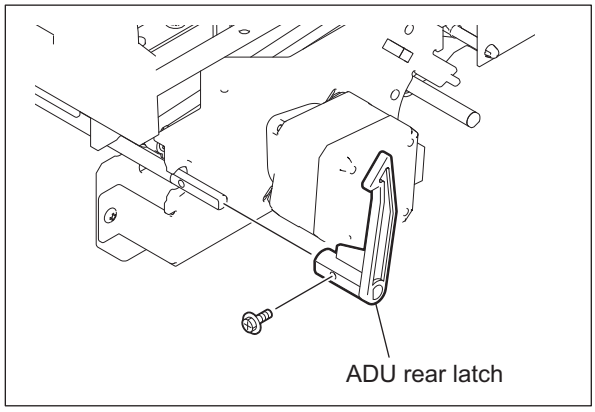


Fig. 16-20

(4) Disconnect 1 connector. Release the harness from 2 harness clamps. Remove 2 screws and take off the ADU drive unit.

Note:
Be sure not to lose the belt.

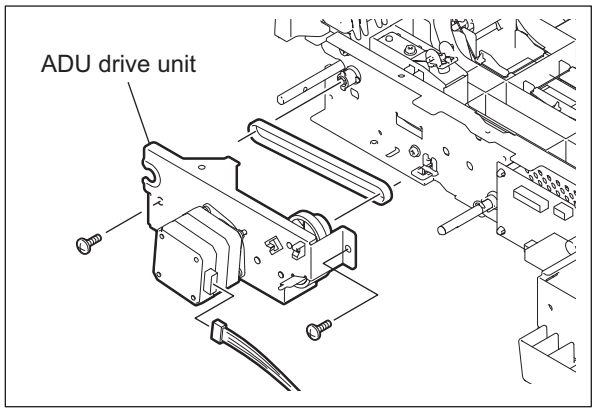


Fig. 16-21

(5) Remove 2 screws and take off the ADU motor.

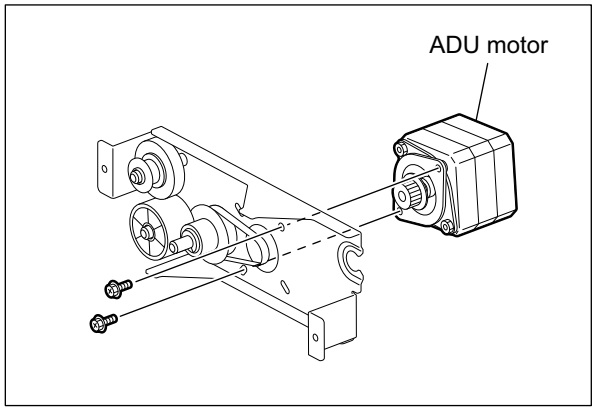


Fig. 16-22

(6) Take off the 1 E-ring. Then take off the 3 gears and timing belt from the ADU drive unit.

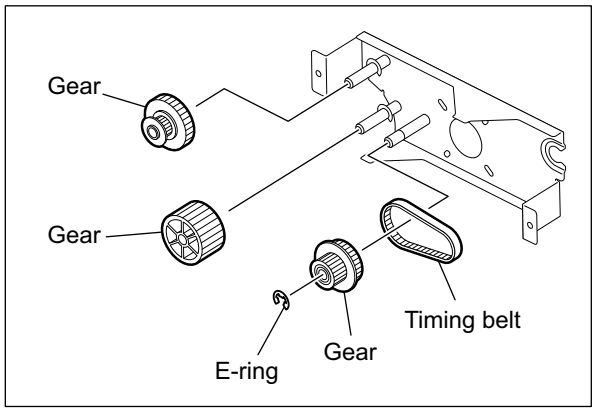


Fig. 16-23

[J] Upper transport roller

(1) Take off the ADU drive unit.
📖 P.16-17 "[I] ADU drive unit / ADU motor (M22)"
(2) Remove 1 E-ring on the rear side. Then take off 1 pulley.

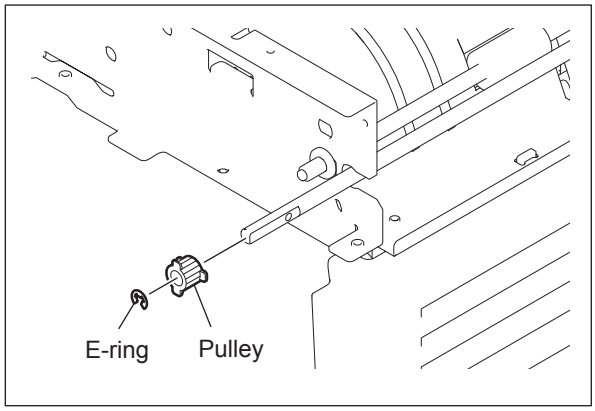


Fig. 16-24

(3) Remove 1 clip on the front side.
(4) Remove 2 bushings and take off the upper transport roller.

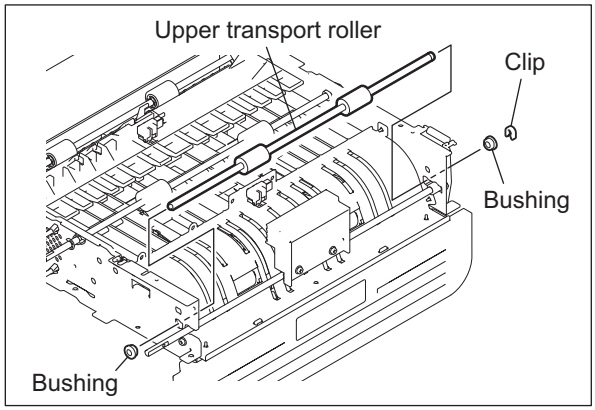


Fig. 16-25

[K] Middle transport roller

(1) Take off the ADU drive unit.
📖 P.16-17 "[I] ADU drive unit / ADU motor (M22)"
Remove 2 clips, 2 pulleys and 2 pins on the front side. Then take off the timing belt.
(2) Remove 2 clips, 2 pulleys and 2 pins on the front side. Then take off the belt.

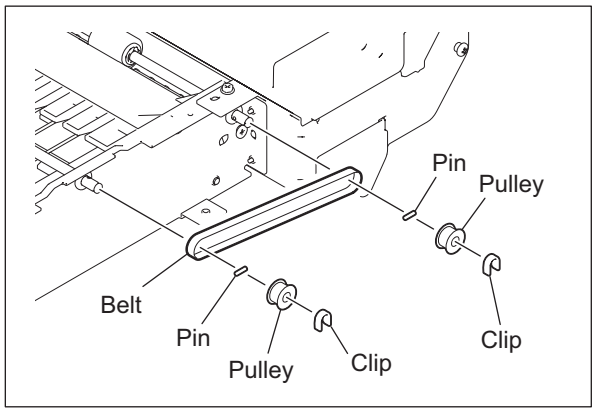


Fig. 16-26

(3) Remove 1 E-ring, 1 clip and 1 bushing on the rear side.
(4) Take off 1 bushing on the front side. Then take off the middle transport roller.

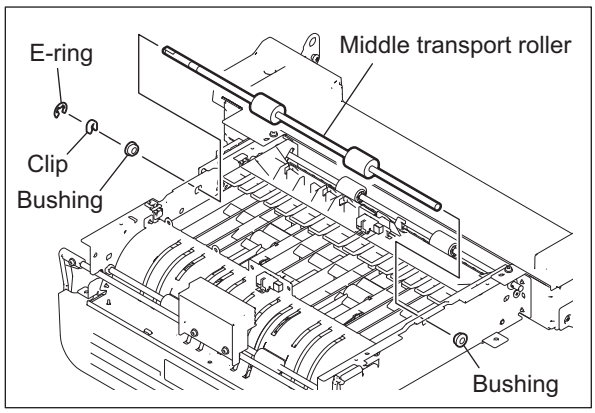


Fig. 16-27

[L] Lower transport roller

(1) Take off the ADU board and ADU cover.
🕮 P.16-15 "[E] ADU board (ADU)"
🕮 P.16-16 "[F] ADU cover"
(2) Remove 2 clips, 2 pulleys and 2 pins on the front side. Then take off the belt.

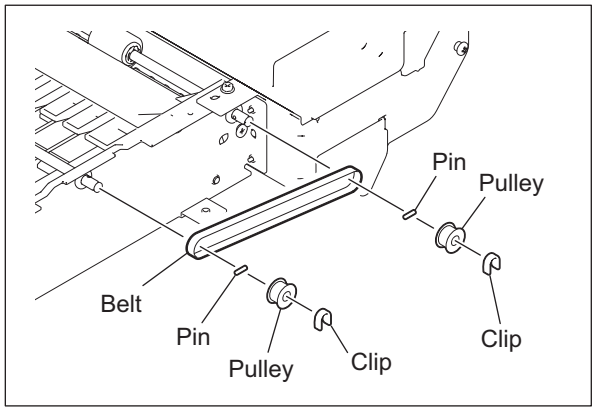


Fig. 16-28

(3) Remove 1 clip and 1 bushing on the rear side.
(4) Remove 1 bushing on the front side. Then take off the lower transport roller.

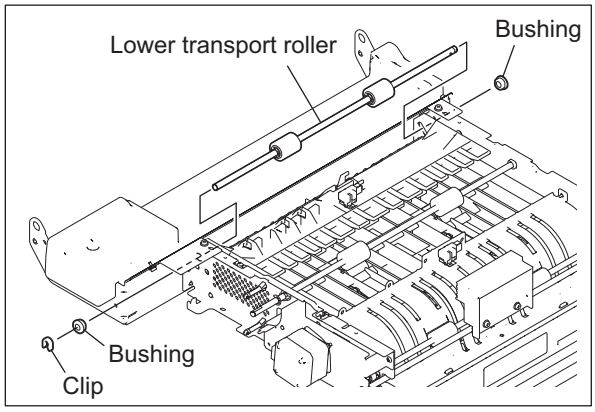


Fig. 16-29

[M] ADU entrance sensor (S38)

(1) Take off the ADU cover.
🕮 P.16-16 "[F] ADU cover"
(2) Disconnect 1 connector. Release the latches and take off the ADU entrance sensor.

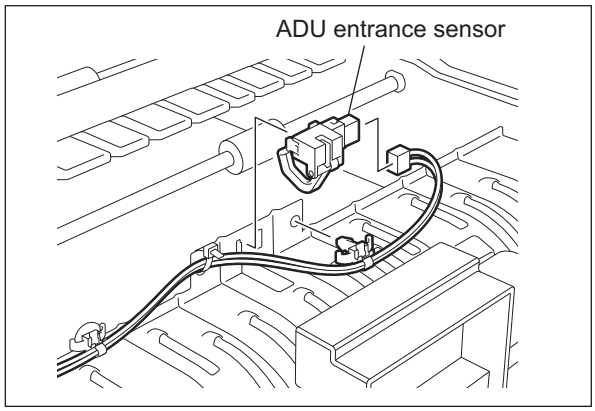


Fig. 16-30

[N] ADU exit sensor (S39)

(1) Take off the ADU cover.
📖 P.16-16 "[F] ADU cover"
(2) Disconnect 1 connector. Release the latches and take off the ADU exit sensor.

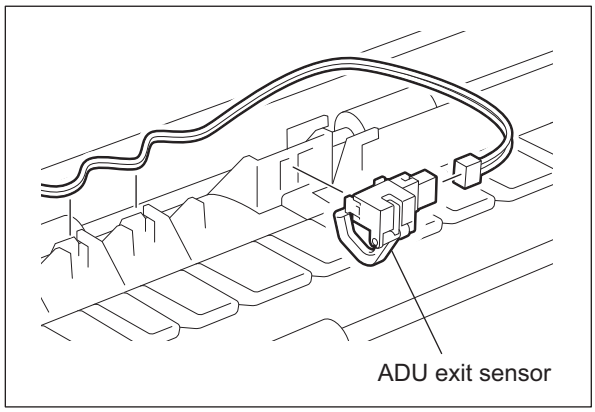


Fig. 16-31

[O] ADU lower cover

(1) Open the bypass unit.
(2) Remove 2 screws and take off the ADU lower cover.

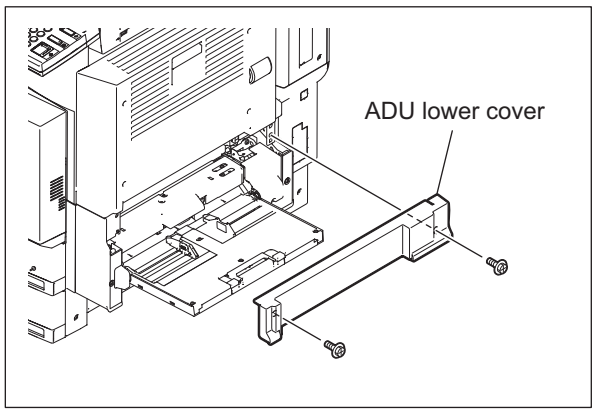


Fig. 16-32

[P] ADU upper cover assembly

(1) Open the automatic duplexing unit.
(2) Remove 2 screws and take off the ADU upper cover assembly.

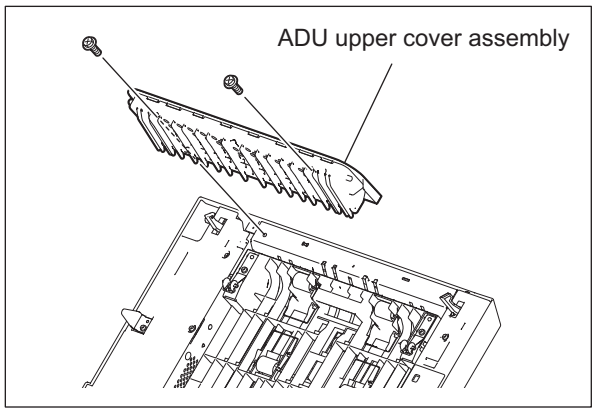


Fig. 16-33

[Q] Cover interlock switch (SW2)

(1) Open the board case.
📖 P.2-45 "[K] Board case"
(2) Take off the right inner cover.
📖 P.2-34 "[P] Right inner cover"
(3) Release the harness out of the 2 clamps, and then disconnect 1 connector.
(4) Remove 1 clamp.
(5) Remove 3 screws, and then take off the bracket.

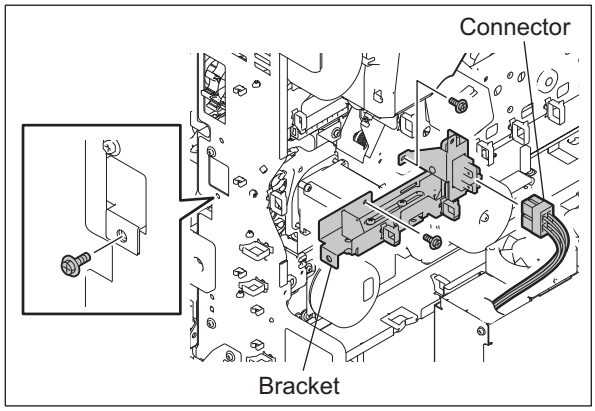


Fig. 16-34

(6) Remove 1 E-ring, and take off the shaft and switch guide.

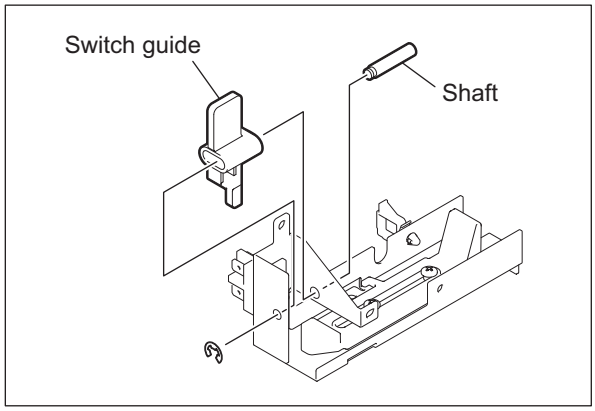


Fig. 16-35

(7) Release the latch, and then take off the Cover interlock switch.

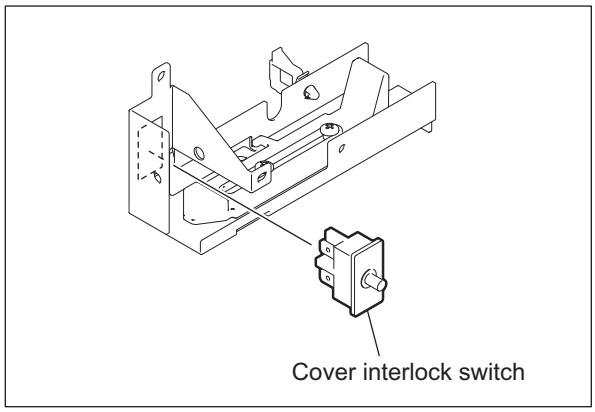


Fig. 16-36

17. POWER SUPPLY UNIT

17.1 Construction

The power supply unit consists of the AC filter, insulation type DC output circuits and heater lamp control circuit.

1) AC filter
   Eliminates noise from the outside and prevents the noise generated by the equipment from leaking to the outside.

2) DC output circuits
   Converts AC voltage input from outside to DC voltage and supplies it to each electric part. The DC voltage is divided into the following two lines.

   a. Main switch line: Power supply used in the entire equipment during image forming process. Three kinds of voltage (+3.3 V, +5.1 V and +12V) are output when the main switch of the equipment is turned ON.

   b. Cover switch line: Power supply used in the entire equipment during image forming process, being supplied via the cover switch. Two kinds of voltage (+5.1VD and +24VD) are output only when the main switch of the equipment is turned ON and two covers (front cover and automatic duplexing unit) are closed.

3) Heater lamp control circuit
   TRC (Triac) is driven by the heater control signal (BHCON, BHSON, PHON) from the LGC board and then AC power is supplied to each heater lamp (center heater lamp, side heater lamp, pressure roller lamp) in the fuser unit.

17.2 Operation of DC Output Circuits

1) Starting line output
   When the main switch of the equipment is turned ON, power starts supplying to all the lines only when two covers (front cover and automatic duplexing unit) are closed.

2) Stopping line output
   When the main switch of the equipment is turned OFF, PER-DN signal is output after the instantaneous outage insurance time (20 ms or more) elapses and then the supply of each voltage stops. If the supply of voltage of the main switch line (+3.3VA, +5.1VA, +12VA) stops earlier than the 24 V line does, it may cause the damage of the electron device on each control circuit. To prevent this, the supply of these voltages stops after the PWR-DN signal is output and the minimum retaining time (+3.3VA/+5.1VA: 50 ms or more, +12VA: 5 ms or more) elapses.

3) Output protection
   Each output system includes an overcurrent and overvoltage protection circuits (a fuse and internal protection circuit). This is to prevent the defectives (damage or abnormal operation of the secondary circuit) which may be caused by an overcurrent due to a short circuit or an overvoltage due to a short circuit between different voltages. If the protection circuit is activated (except the case the fuse is blown out), remove the causes such as short-circuit. Turn ON the power again 1 minute later to clear the overcurrent protection.

17.3 Output Channel

The following are 3 output channels for the main switch line.

1) +3.3 V

+3.3VA:	CN402 Pins 9 and 10
	Output to the SYS board
+3.3VA:	CN405 Pin 1
	Output to the IMG board
+3.3VB:	CN402 Pin 13
	Output to the SYS board
+3.3VB:	CN403 Pins 1 and 2
	Output to the LGC board
+3.3VB:	CN404 Pin 3
	Output to the SLG board
+3.3VB:	CN405 Pins 2, 3 and 4
	Output to the IMG board

2) +5.1 V

+5.1VA:	CN402 Pins 19, 20, 21and 22
	Output to the SYS board
+5.1VB:	CN402 Pin 17
	Output to the SYS board
+5.1VB:	CN403 Pin 7
	Output to the LGC board, PFP/LCF (via LGC board), Bridge unit (via LGC board)
+5.1VB:	CN404 Pins 1 and 2
	Output to the SLG board, RADF
+5.1VB:	CN406 Pin 4
	Output to the finisher
+5.1VB:	CN412 Pin 1
	Output to the FIL board

3) +12 V

+12VA:	CN402 Pin 5
	Output to the SYS board
+12VB:	CN402 Pin 3
	Output to the SYS board
+12VB:	CN403 Pin 9
	Output to the LGC board
+12VB:	CN408 Pin 1
	Output to the FAX unit

The following are 2 output channels for the cover switch line.

1) +5.1 V

+5.1VD: CN403 Pin 21
Output to the LGC board

2) +24 V

+24VD: CN410 Pin 1
Output to the switching regulator cooling fan-1

+24VD: CN411 Pin 1
Output to the switching regulator cooling fan-2

+24VD1: CN403 Pins 19 and 20
Output to the LGC board, PFP/LCF (via LGC board)

+24VD2: CN403 Pins 17 and 18
Output to the LGC board

+24VD3: CN403 Pins 13 and 15
Output to the LGC board, high-voltage transformer (via LGC board), bridge unit (via LGC board)

+24VD4: CN404 Pins 11, 12, 13 and 14
Output to the SLG board, RADF

+24VD4: CN406 Pin 2
Output to the Finisher

Output voltage by the type of connector

Main switch line

Connector	Destination	Voltage
CN402	For the SYS board	+3.3VA, +3.3VB, +5.1VA, +5.1VB, +12VA, +12VB
CN403	For the LGC board, PFP/LCF (via LGC board), bridge unit (via LGC board)	+3.3VB, +5.1VB, +12VB
CN404	For the SLG board, RADF	+3.3VB, +5.1VB
CN405	For the IMG board	+3.3VA, +3.3VB
CN406	For the finisher	+5.1VB
CN408	For the FAX unit	+12VB
CN412	For the FIL board	+5.1VB

Cover switch line

Connector	Destination	Voltage
CN403	For the LGC board, PFP/LCF (via LGC board), high-voltage transformer (via LGC board), bridge unit (via LGC board)	+5.1VD, +24VD1, +24VD2, +24VD3
CN404	For the SLG board, RADF	+24VD4
CN406	For the finisher	+24VD4
CN410	For the switching regulator cooling fan-1	+24VD
CN411	For the switching regulator cooling fan-2	+24VD

17.4 Fuse

When the power supply secondary fuse is blown out, confirm that there is no abnormality with each part using the following table.

Voltage	Board/Unit	Part		Fuse type
+24VD1	LGC board	Developer motor	M9	F201: 6.3 A (Semi time-lag)
		Polygonal motor	M13	
		Mirror motor-M	M14	
		Mirror motor-C	M15	
		Mirror motor-K	M16	
		Fuser motor	M17	
		Feed/transport motor	M20	
		ADU motor	M22	
	PFP/LCF			
+24VD2	LGC board	Transfer belt motor	M7	F202: 6.3 A (Semi time-lag)
		Drum motor	M10	
		Exit motor	M18	
		Registration motor	M19	
		ADU clutch	CLT7	
+24VD3	LGC board	Toner motor-Y	M2	F203: 6.3 A (Semi time-lag)
		Toner motor-M	M3	
		Toner motor-C	M4	
		Toner motor-K	M5	
		Used toner motor	M6	
		Shutter motor	M12	
		Internal cooling fan	M23	
		Ozone exhaust fan	M24	
		Fuser/exit section cooling fan	M25	
		Laser unit cooling fan	M29	
		Auto-toner sensor-Y	S22	
		Auto toner sensor-M	S23	
		Auto toner sensor-C	S24	
		Auto toner sensor-K	S25	
		Main switch	SW1	
		1st drawer transport clutch (Low speed)	CLT1	
		1st drawer transport clutch (High speed)	CLT2	
		1st drawer feed clutch	CLT3	
		2nd drawer transport clutch (Low speed)	CLT4	
		2nd drawer transport clutch (High speed)	CLT5	
		2nd drawer feed clutch	CLT6	
		Bypass feed clutch	CLT8	
		Bypass pickup solenoid	SOL1	
		Discharge LED-Y	ERS-Y	
		Discharge LED-M	ERS-M	
		Discharge LED-C	ERS-C	
		Discharge LED-K	ERS-K	
		High-voltage transformer	HVT	
	Bridge unit			
	Key copy counter, copy key card, coin controller			
+24VD4	SLG board	Scan motor	M1	F204: 6.3 A (Semi time-lag)
		Lamp inverter board	INV	
	RADF			
	Finisher			

17.5 Configuration of Power Supply Unit

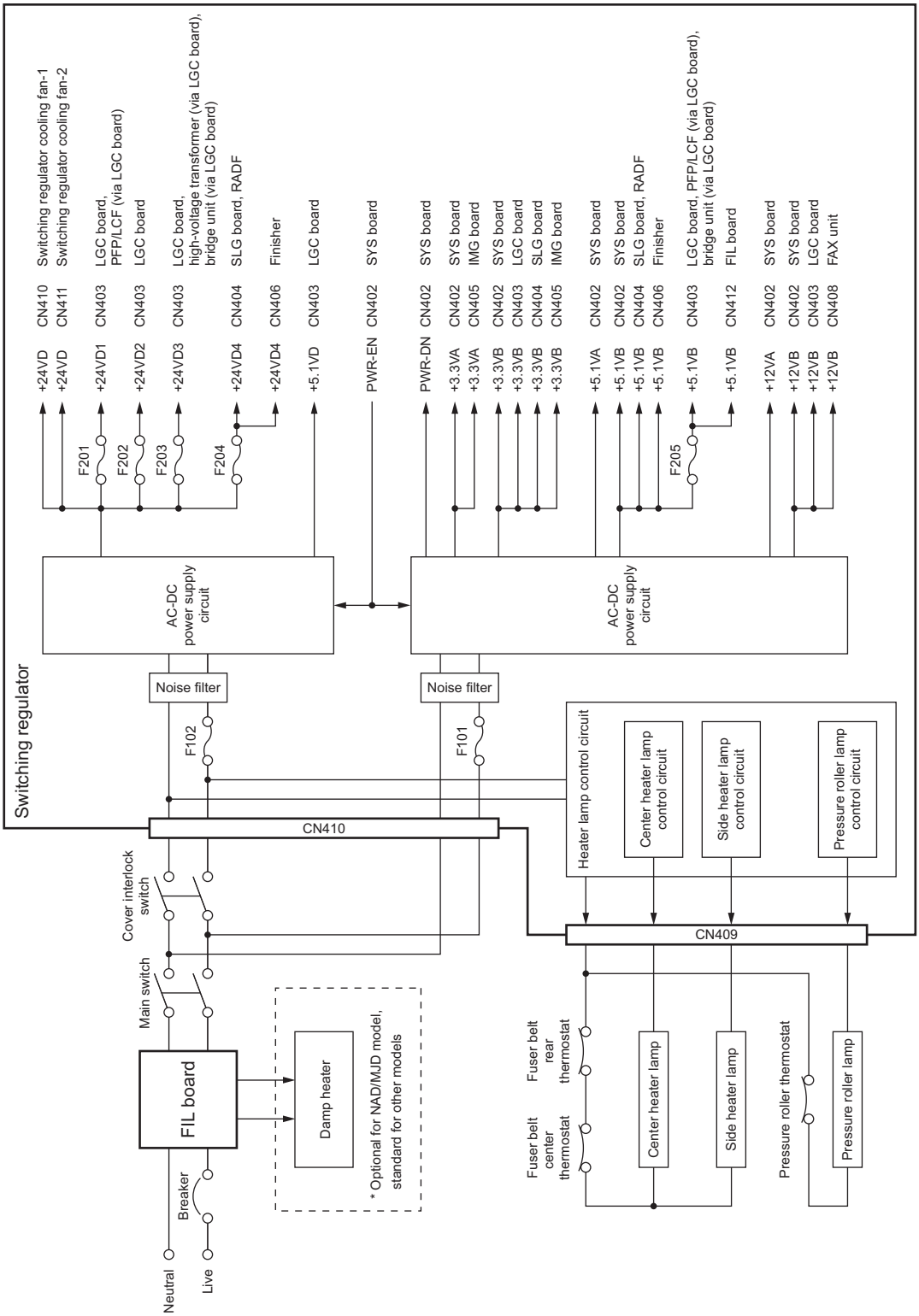


Fig. 17-1

17.6 Sequence of Power Supply

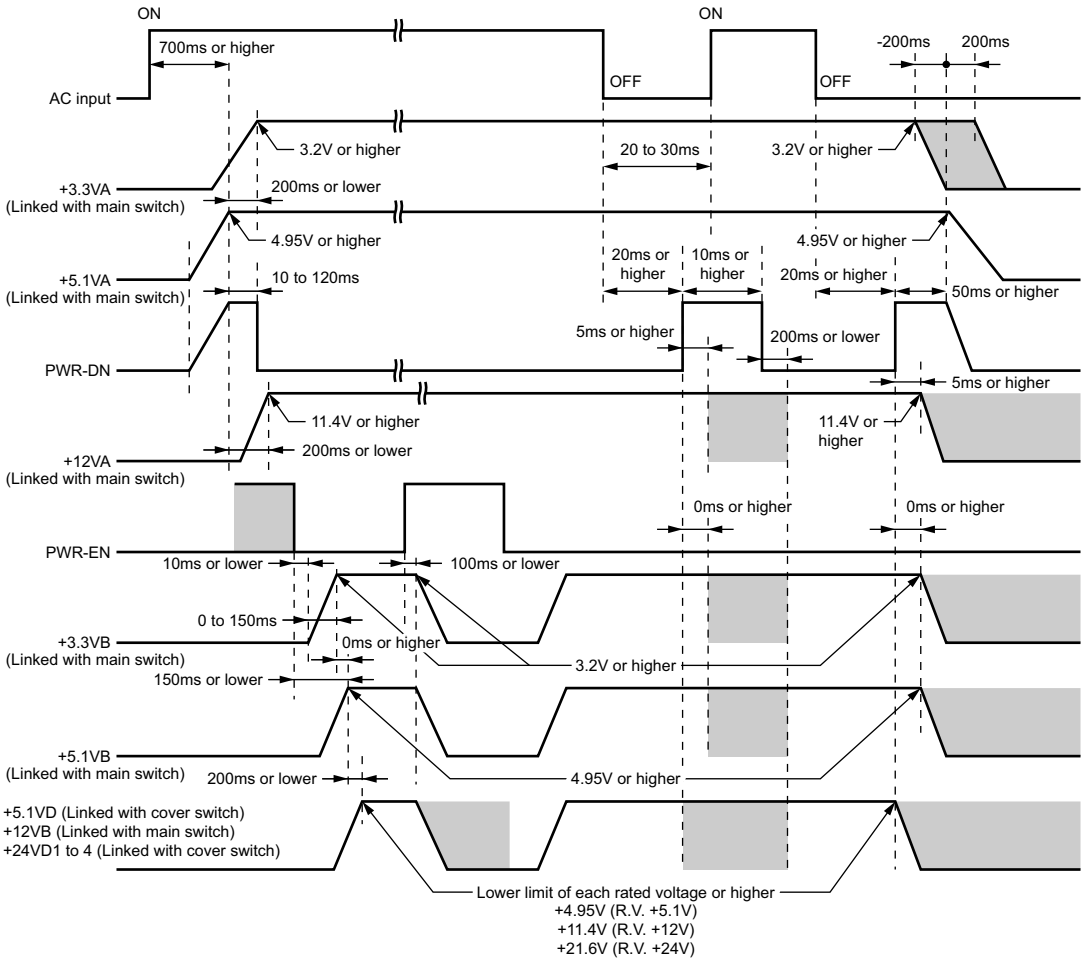


Fig. 17-2

17.7 AC Wire Harness

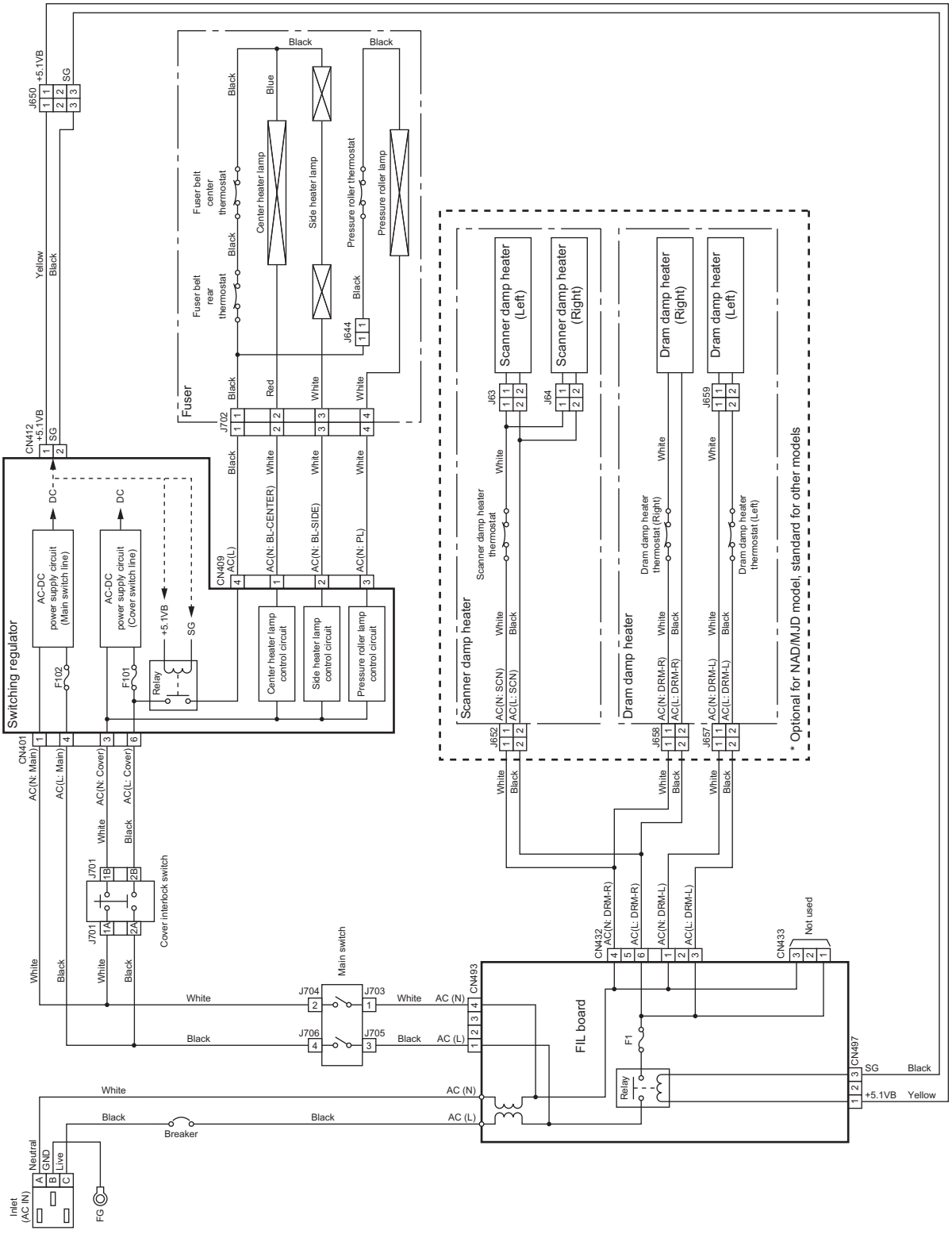


Fig. 17-3

18. PC BOARDS

1) PWA-F-SYS

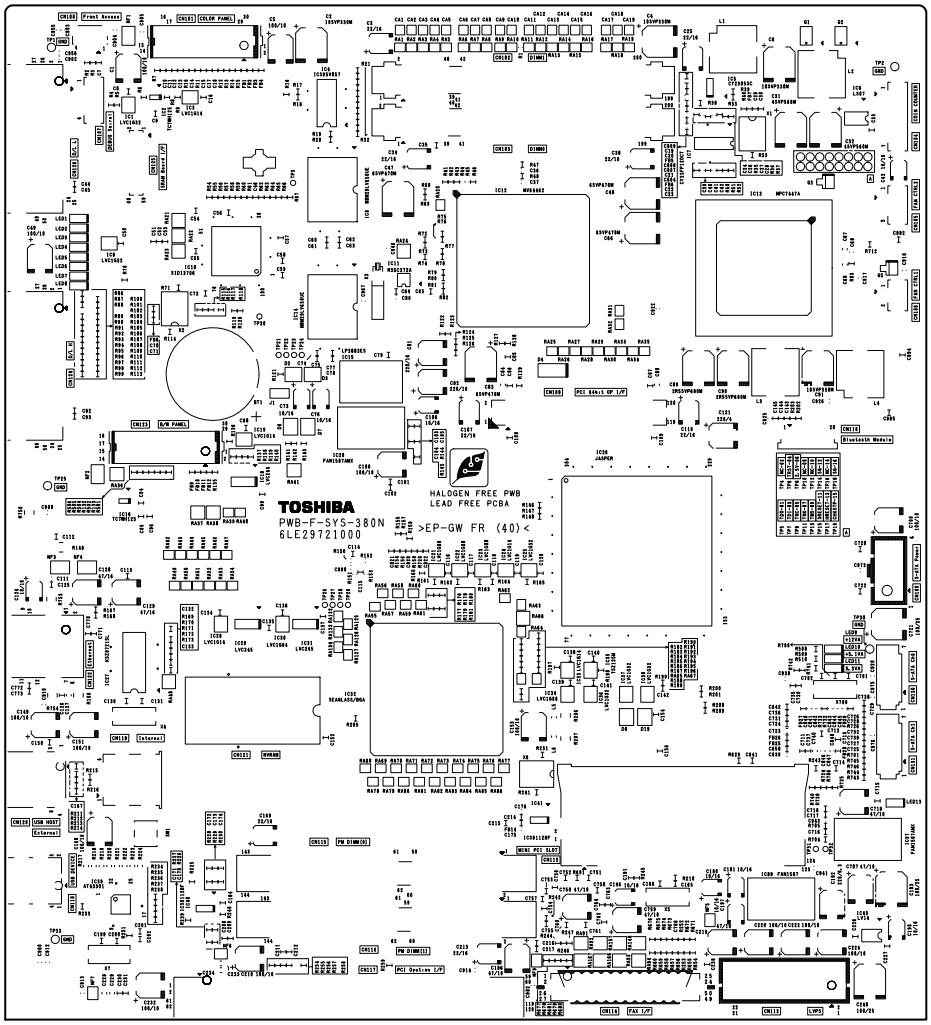


Fig. 18-1

2) PWA-F-IMG

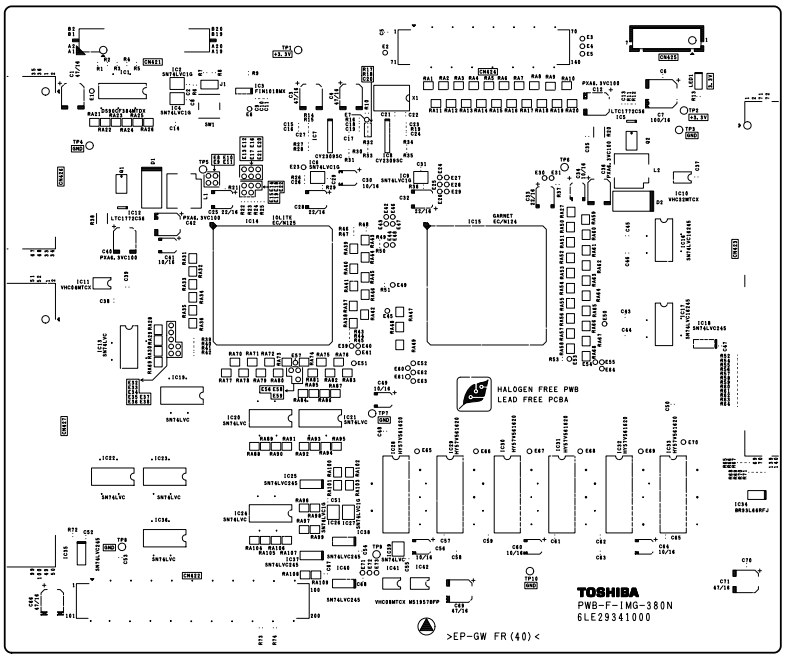


Fig. 18-2

3) PWA-F-LGC

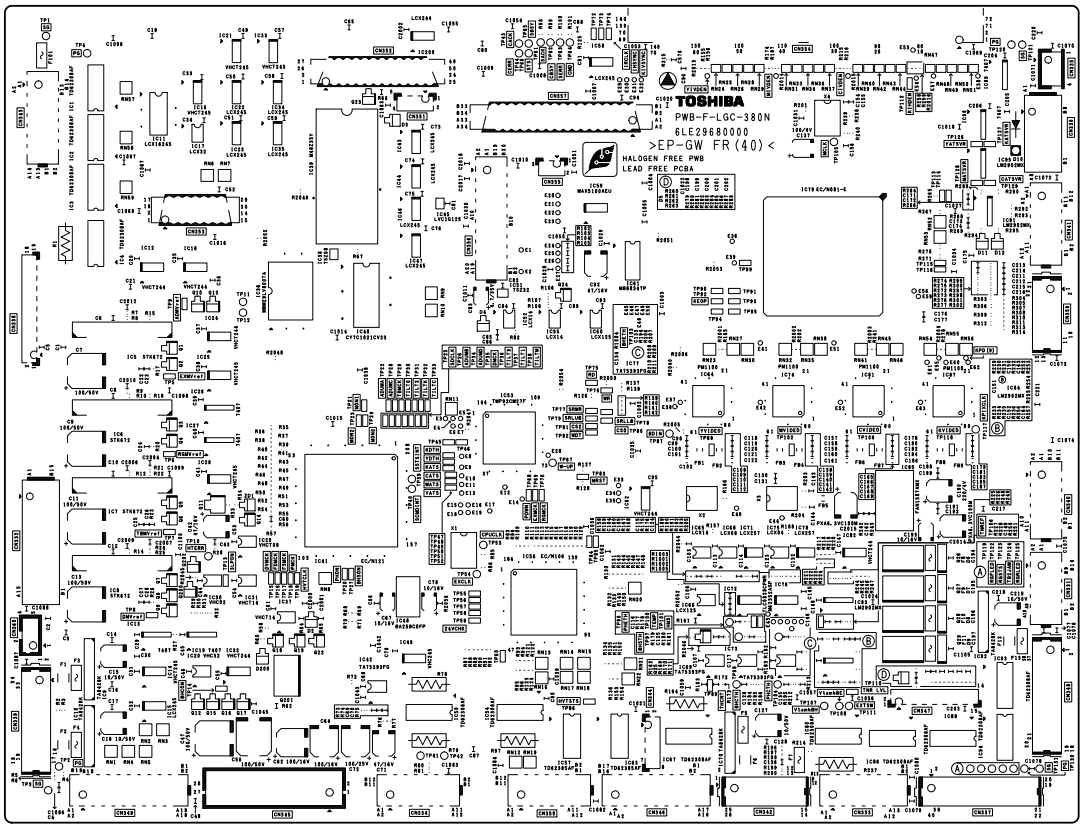


Fig. 18-3

4) PWA-F-JSP

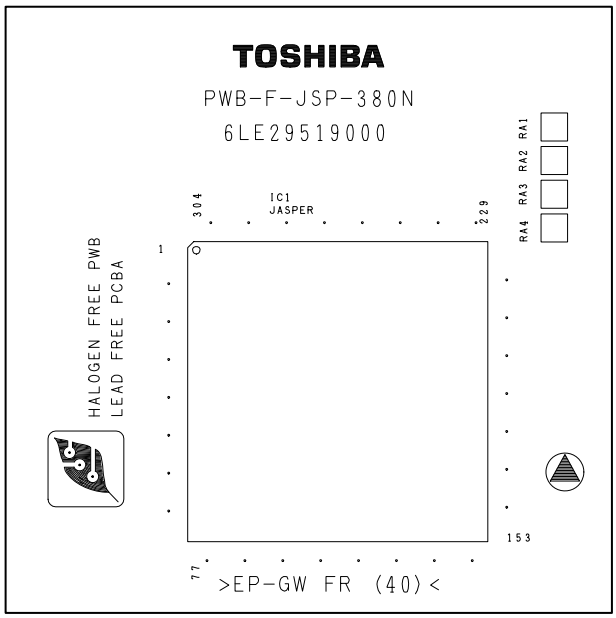


Fig. 18-4

5) PWA-F-USB

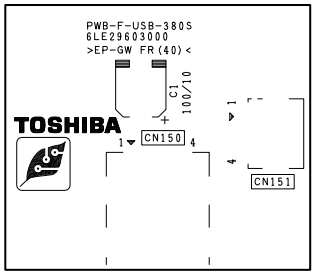


Fig. 18-5

6) PWA-F-CCD

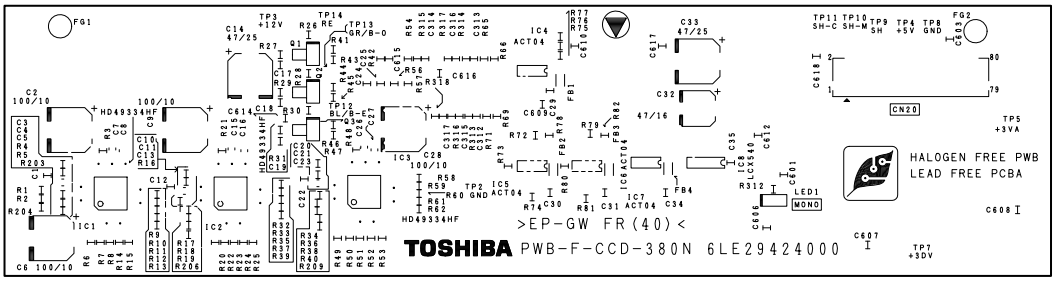


Fig. 18-6

7) PWA-F-SLG

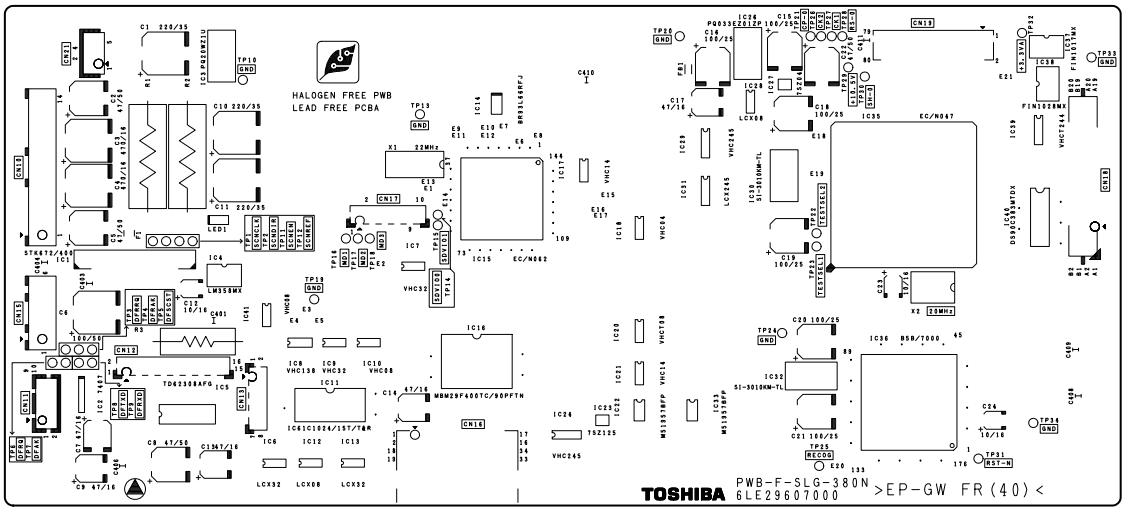


Fig. 18-7

8) PWA-F-DSP

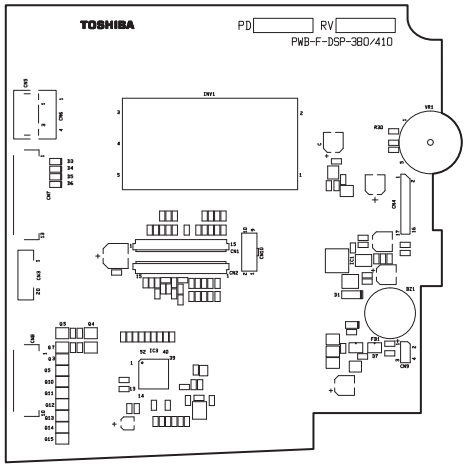


Fig. 18-8

9) PWA-F-KEY

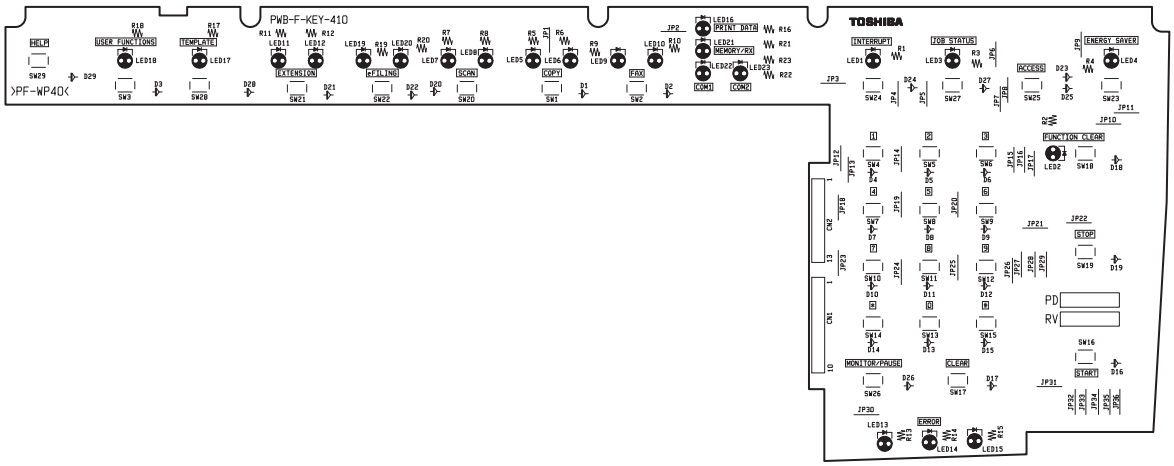


Fig. 18-9

10)PWA-F-ADU

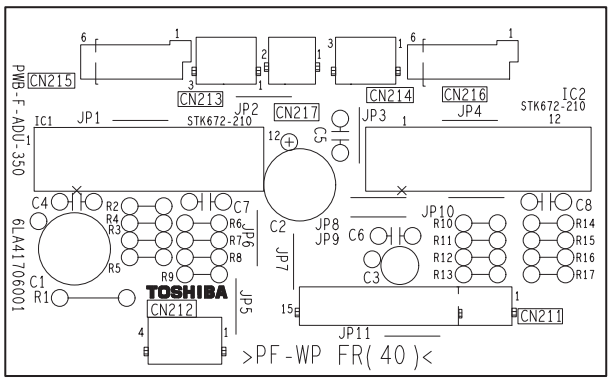


Fig. 18-10

18

11)PWA-F-EPU

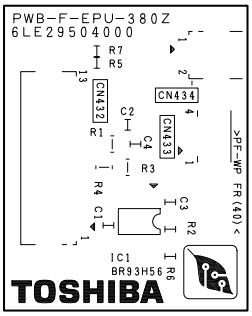


Fig. 18-11

12)PWA-F-FIL

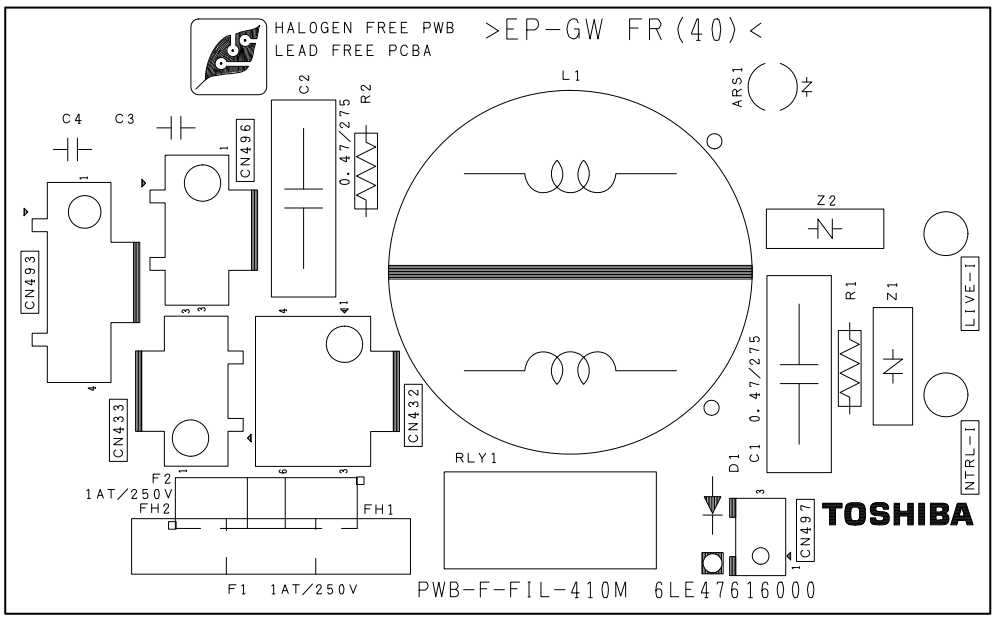


Fig. 18-12

19. EXTERNAL COUNTERS

19.1 Outline

This specification describes the interface between external counters, such as Key Card (DoculyzerNW), Coin Controller and Key Counter.

19.2 Signal

Note:
Regarding the output signals of TD62385 (CTRON), use 24V supplied from the equipment side as power.

[A] Pin Layout

1) Connector on the LGC board: CN336 (AMP-made 1-292252-6) (Key Card / Coin Controller)

Pin No.	I/O	Signal name	Function	Voltage level	Remarks	Coin Controller	Key Card	Key Counter
A1	Power	+24V	24V line	DC24V+10%, -5%	When cover opened: OFF	In use	In use	-
A2	Out	CTRON	Total Counter On Signal	Open Collector (TD62385F)	L: ON	In use	In use	-
A3	In	CTRCNT	Copy permission Signal 1	L=0V, H=DC5V	L: Allowed	In use	In use	-
A4	Out	MCRUN	Ready to Copy Signal	Open Collector (Equiv. DM7407M)	L: Operating	In use	In use	-
A5	Out	EXTCTR	Exit Sensor On Signal	Open Collector (Equiv. DM7407M)	L: ON	In use	-	-
A6	GND	PG	Power ground	0V		In use	-	-
A7	Out	BKCTR	Black mode Counter Signal	Open Collector (Equiv. DM7407M)	L: ON	-	In use	-
A8	Out	MNCTR	Mono color mode Counter Signal	Open Collector (Equiv. DM7407M)	L: ON	-	In use	-
B1	Out	FLCTR	Full color mode Counter On Signal	Open Collector (Equiv. DM7407M)	L: ON	-	In use	-
B2	GND	SG	Signal Ground	0V		-	In use	-
B3	Out	SIZE3	Paper size Signal	Open Collector (Equiv. DM7407M)	L: ON	-	In use	-
B4	Out	SIZE2	Paper size Signal	Open Collector (Equiv. DM7407M)	L: ON	-	In use	-
B5	Out	SIZE1	Paper size Signal	Open Collector (Equiv. DM7407M)	L: ON	-	In use	-
B6	Out	SIZE0	Paper size Signal	Open Collector (Equiv. DM7407M)	L: ON	-	In use	-
B7	Power	+5V (Sleep)	5V line	DC5V±3%	At the sleep mode:OFF	In use	In use	-
B8	-	N.C.	-	-		-	-	-

2) Connector on the SYS board: CN104 (JST-made B7B-PH-SM4) (Coin Controller)

Pin No.	I/O	Signal name	Function	Voltage level	Remarks	Coin Cont-roller	Key Card	Key Coun ter
1	Out	LARGE / SMALL	Paper size Signal	Open Collector (DM7407M)	L: Large size	In use	-	-
2	Out	FULL COLOR	Full color mode Signal	Open Collector (DM7407M)	L: Full color	In use	-	-
3	Out	TWN/ MON COLOR	Twin color / Mono color Mode Signal	Open Collector (DM7407M)	L: Twin colors	In use	-	-
4	Out	B/W	Black mode Signal	Open Collector (DM7407M)	L: Black	In use	-	-
5	-	N.C.	-	-		-	-	-
6	GND	GND	Signal Ground	-		In use	-	-
7	-	N.C.	-	-		-	-	-

3) Counter on the LGC board: CN355 (AMP-made 292132-4) (Key Counter)

Pin No.	I/O	Signal name	Function	Voltage level	Remarks	Coin Cont-roller	Key Card	Key Coun ter
1	GND	SG	Signal Ground	0V		-	-	In use
2	In	KCTRC	Key Counter Connection Signal	L=0V, H=DC5V	L: Connected H: Not connected	-	-	In use
3	Power	+24V	24V line	DC24V+10%, -5%	When cover opened: OFF	-	-	In use
4	Out	KCTRON	Key Counter On Signal	Open Collector (TD62308F)	L: ON	-	-	In use

[B] Details of the signals

1) CTRON signal and KCTRON signal (output signals)
These signals are synchronized with electronic counter of the equipment and they become "Low" when one sheet of paper is counted up. They are common signals for key card and coin controller, and output from the LGC board. Since TD62385 and TD62308 are used as the driver, the mechanical counter can be driven directly.
Only with the KCTRON signal, the counter will make "Double count" if 08-352 (count setting of large size paper) is set to "1" or "2".

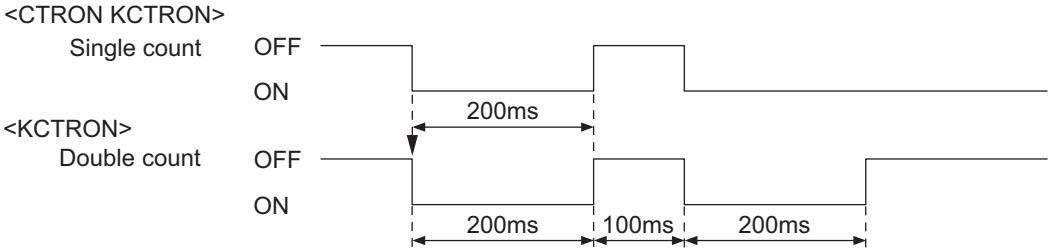


Fig. 19-1

2) CTRCNT signal and KCTRC signal (input signals)
The CTRCNT signal enables to accept copies when the coin controller or key card is connected, and copies can be accepted with "Low". In case of "High", "Set Key Counter" appears and copies cannot be made.
The KCTRC signal enables to accept copies when the key counter is connected, and copies can be accepted with "Low". In case of "High", "Set Key Counter" appears and copies cannot be made.

3) MCRUN signal (output signal)
The MCRUN signal is changed to "Low" during copying. It becomes "Low" at 30 ms or more before the CTRON signal becomes ON, and becomes “High” at 50 ms or more after the EXTCTR signal becomes OFF.
However, if copying is interrupted due to forced toner supply or similar, this signal is “High” until the copying is available.
This is the common signal for the coin controller and the key card.

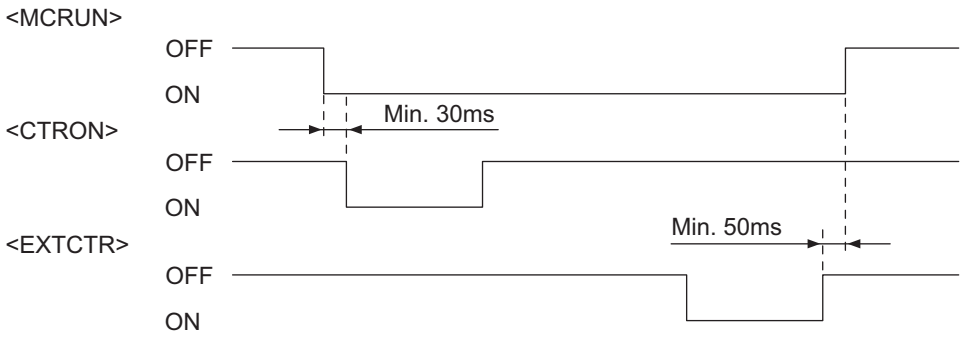


Fig. 19-2

19

4) EXTCTR signal (output signal)
The EXTCTR signal is synchronized with "Exit sensor ON" and becomes "Low" (ON) for 200 ms. The coin controller counts the number of times with this signal.
This is the signal only for the coin controller.

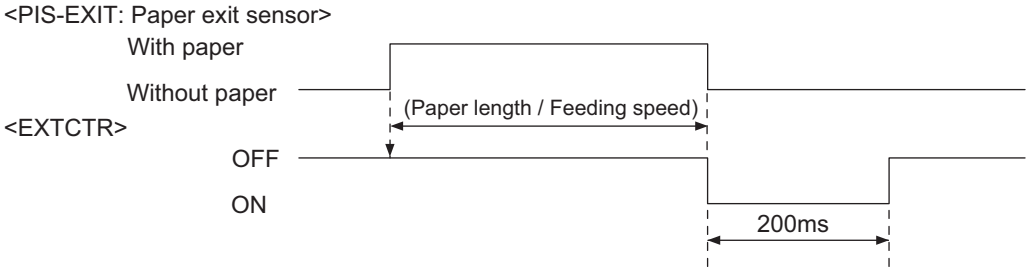


Fig. 19-3

5) BKCTR signal, MNCTR signal and FLCTR signal (output signals)
These signals are synchronized with the CTRON signal and are turned ON when copying is performed in each of Black, Mono color and Full color mode. The pulse length is 200 ms. Even if the CTRON signal is set to "Double count", the output synchronized with the second count signal will not be made.
This is the signal only for the key card.

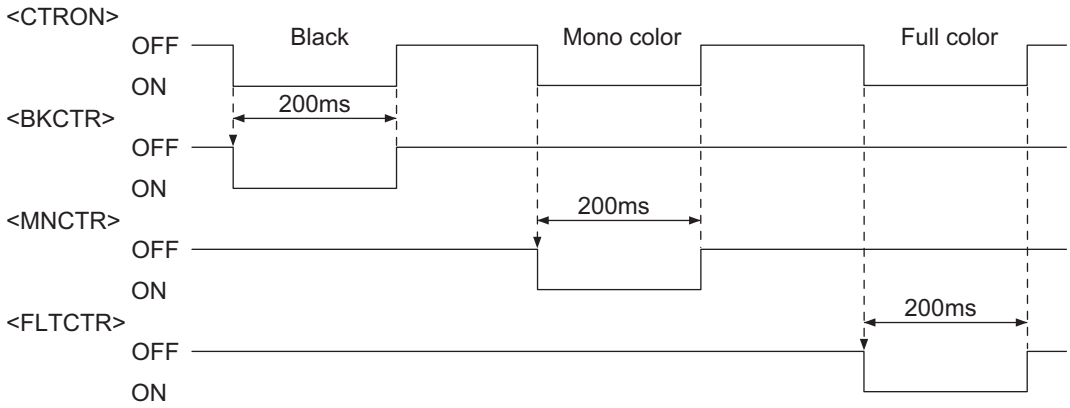


Fig. 19-4

6) SIZE3, SIZE2, SIZE1 and SIZE0 signal (output signals)
The paper size to be copied is chosen by the combination of the following 4 signals.
This is the signal only for the key card.

SIZE3	SIZE2	SIZE1	SIZE0	Code	Paper Size
L	H	L	L	0100: 4	A3
L	H	L	H	0101: 5	A4/A4-R
L	H	H	L	0110: 6	A5-R
H	H	L	L	1100: 12	B4
H	H	L	H	1101: 13	B5/B5-R
L	L	L	L	0000: 0	Others

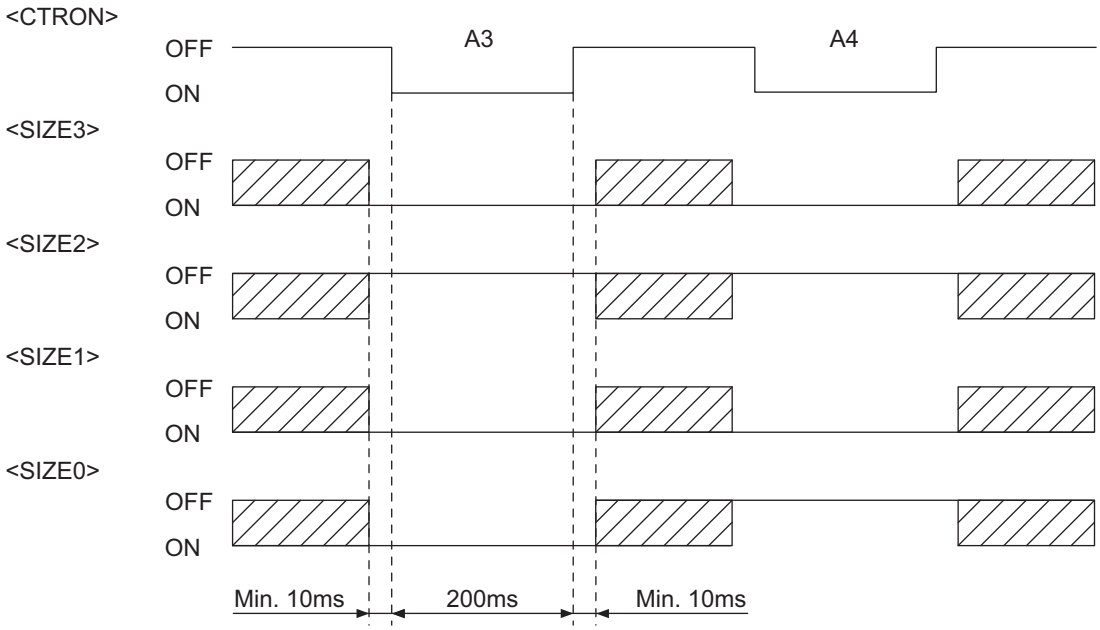


Fig. 19-5

7) LARGE/SMALL signal (output signal)
When large size paper (A3 / A3 wide / LD) is selected or paper size is not specified with the manual feeding, it outputs "Low" in real time. In other cases, it outputs "High". The setting change for large size paper is performed with F/W.
This is the signal only for the coin controller.

8) FULL COLOR signal (output signal)
If the full color mode is selected, it outputs "Low" in real time. In other cases, it outputs "High". By default, it outputs "Low" since it is set as full color mode.
This is the signal only for the coin controller.

9) TWN / MON COLOR signal (output signal)
If the twin color or mono color mode is selected, it outputs "Low" in real time. In other cases, it outputs "High". This is the signal only for the coin controller.

10)B/W signal (output signal)
If the black mode is selected, it outputs "Low" in real time. In other cases, it outputs "High". This is the signal only for the coin controller.

19.3 Notices

[A] Setting code

Each signal will be enabled by configuring the setting code "08-202" (Counter installed externally).

08-202
0: No external counter (Default)
1: Coin controller
2: Copy key card (This value is valid only when "2" (For Japan) is set to 08-201.)
3: Key copy counter
4: Key card for OEM1

[B] Setting value change and restrictions when using the Key Card

1) Setting value
   - 08-202 (Counter installed externally): Set to "2" (Copy key card).
   - 08-381 (Setting for counter installed externally): It should be charged precisely according to the usage.
     Example: To charge only when copies are made, set to "1".

2) Restrictions
   - 08-352 (Large size double count setting): Set to "0" (Single count).

[C] Setting value change and restrictions when using the coin controller

1) Setting value
   - 08-202 (Counter installed externally): Set to "1" (Coin controller).
   - 08-381 (Setting for counter installed externally): It should be charged precisely according to the usage.
     Example: To charge only when copies are made, set to "1".

2) Restrictions
   For 08-353 (Large size double count setting), set to "0" when A3 and LD are specified as the large size, and set to "1" when B4, LG, FOLIO and COMP are specified as the large size in addition to A3 and LD.

[D] Setting value change and restrictions when using the key counter

1) Setting value
   - 08-202 (Counter installed externally): Set to "3" (key counter)
   - 08-381(Setting for counter installed externally): It should be charged precisely according to the usage.
     Example: To charge only when copies are made, set to "1".

2) Restrictions
   For 08-353 (Large size double count setting), set to "0" when A3 and LD are specified as the large size, and set to "1" when B4, LG, FOLIO and COMPUTER are specified as the large size in addition to A3 and LD.

[E] Installation of External Counter

It is not allowed to install more than one external counter (Key Counter, Key Card and Coin Controller) at the same time. Physically, the key card and coin controller cannot be installed together since the output signals are in common.

TOSHIBA

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