Color Printer

d-Color P325
d-Color P330

THEORY OF OPERATION

Code Y108600-3

PUBLICATION ISSUED BY:

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Italy

THEORY OF OPERATION TOTAL CONTENTS

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SAFETY AND IMPORTANT WARNING ITEMS

Read carefully the safety and important warning Items described below to understand them before doing service work.

IMPORTANT NOTICE

Because of possible hazards to an inexperienced person servicing this product as well as the risk of damage to the product, KONICA MINOLTA BUSINESS TECHNOLOGIES, INC. (hereafter called the KMBT) strongly recommends that all servicing be performed only by KMBT-trained service technicians.
Changes may have been made to this product to improve its performance after this Service Manual was printed. Accordingly, KMBT does not warrant, either explicitly or implicitly, that the information contained in this service manual is complete and accurate.
The user of this service manual must assume all risks of personal injury and/or damage to the product while servicing the product for which this service manual is intended.
Therefore, this service manual must be carefully read before doing service work both in the course of technical training and even after that, for performing maintenance and control of the product properly.
Keep this service manual also for future service.

DESCRIPTION ITEMS FOR DANGER, WARNING AND CAUTION

In this service manual, each of three expressions "⚠ DANGER", "⚠ WARNING", and "⚠ CAUTION" is defined as follows together with a symbol mark to be used in a limited meaning.
When servicing the product, the relevant works (disassembling, reassembling, adjustment, repair, maintenance, etc.) need to be conducted with utmost care.

⚠ **DANGER: Action having a high possibility of suffering death or serious injury**

⚠ **WARNING: Action having a possibility of suffering death or serious injury**

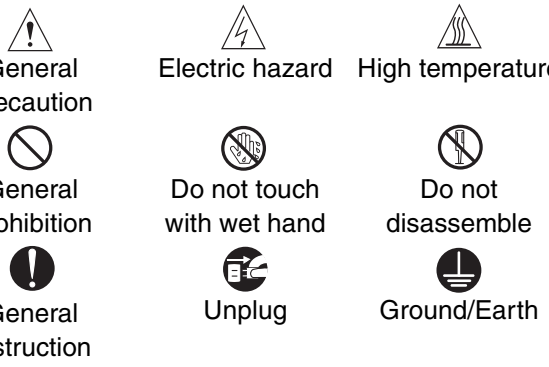
⚠ **CAUTION: Action having a possibility of suffering a slight wound, medium trouble, and property damage**

Symbols used for safety and important warning items are defined as follows:

△ :Precaution when servicing the product.

⃠ :Prohibition when servicing the product.

● :Direction when servicing the product.



SAFETY WARNINGS

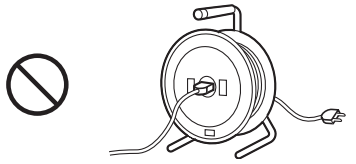
[1] MODIFICATIONS NOT AUTHORIZED BY KMBT, INC.

OLIVETTI brand products are renowned for their high reliability. This reliability is achieved through high-quality design and a solid service network.
Product design is a highly complicated and delicate process where numerous mechanical, physical, and electrical aspects have to be taken into consideration, with the aim of arriving at proper tolerances and safety factors. For this reason, unauthorized modifications involve a high risk of degradation in performance and safety. Such modifications are therefore strictly prohibited. the points listed below are not exhaustive, but they illustrate the reasoning behind this policy.

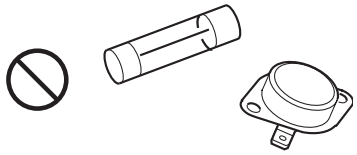
Prohibited Actions

⚠ DANGER

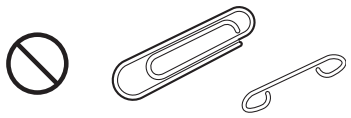
- Using any cables or power cord not specified by KMBT.



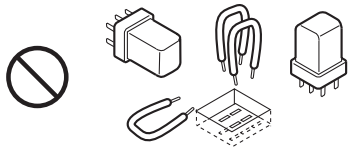
- Using any fuse or thermostat not specified by KMBT. Safety will not be assured, leading to a risk of fire and injury.



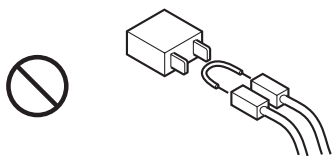
- Disabling fuse functions or bridging fuse terminals with wire, metal clips, solder or similar object.



- Disabling relay functions (such as wedging paper between relay contacts)

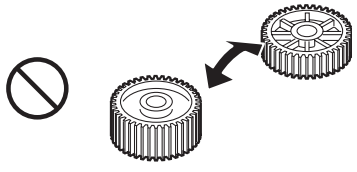


- Disabling safety functions (interlocks, safety circuits, etc.) Safety will not be assured, leading to a risk of fire and injury.



- Making any modification to the product unless instructed by KMBT

- Using parts not specified by KMBT



[2] POWER PLUG SELECTION

In some countries or areas, the power plug provided with the product may not fit wall outlet used in the area. In that case, it is obligation of customer engineer (hereafter called the CE) to attach appropriate power plug or power cord set in order to connect the product to the supply.

Power Cord Set or Power Plug

⚠ WARNING

- Use power supply cord set which meets the following criteria:
  - provided with a plug having configuration intended for the connection to wall outlet appropriate for the product's rated voltage and current, and
  - the plug has pin/terminal(s) for grounding, and
  - provided with three-conductor cable having enough current capacity, and
  - the cord set meets regulatory requirements for the area.

  Use of inadequate cord set leads to fire or electric shock.

- Attach power plug which meets the following criteria:
  - having configuration intended for the connection to wall outlet appropriate for the product's rated voltage and current, and
  - the plug has pin/terminal(s) for grounding, and
  - meets regulatory requirements for the area.

  Use of inadequate cord set leads to the product connecting to inadequate power supply (voltage, current capacity, grounding), and may result in fire or electric shock.

- Conductors in the power cable must be connected to terminals of the plug according to the following order:
  - Black or Brown: L (line)
  - White or Light Blue: N (neutral)
  - Green/Yellow: PE (earth)

  Wrong connection may cancel safeguards within the product, and results in fire or electric shock.

[3] CHECKPOINTS WHEN PERFORMING ON-SITE SERVICE

OLIVETTI brand products are extensively tested before shipping, to ensure that all applicable safety standards are met, in order to protect the customer and customer engineer (hereafter called the CE) from the risk of injury. However, in daily use, any electrical equipment may be subject to parts wear and eventual failure. In order to maintain safety and reliability, the CE must perform regular safety checks.

1. Power Supply

Connection to Power Supply

⚠ WARNING

- Check that mains voltage is as specified.

  Connection to wrong voltage supply may result in fire or electric shock.

- Connect power plug directly into wall outlet having same configuration as the plug.

  Use of an adapter leads to the product connecting to inadequate power supply (voltage, current capacity, grounding), and may result in fire or electric shock.

  If proper wall outlet is not available, advice the customer to contact qualified electrician for the installation.

- Plug the power cord into the dedicated wall outlet with a capacity greater than the maximum power consumption.

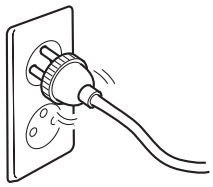
  If excessive current flows in the wall outlet, fire may result.

- If two or more power cords can be plugged into the wall outlet, the total load must not exceed the rating of the wall outlet.

  If excessive current flows in the wall outlet, fire may result.

- Make sure the power cord is plugged in the wall outlet securely.

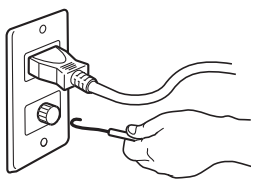
  Contact problems may lead to increased resistance, overheating, and the risk of fire.



- Check whether the product is grounded properly.

  If current leakage occurs in an ungrounded product, you may suffer electric shock while operating the product.

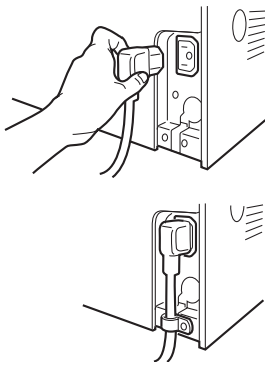
  Connect power plug to grounded wall outlet.



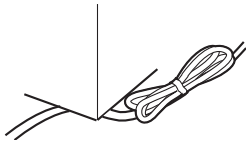
Power Plug and Cord

⚠ WARNING

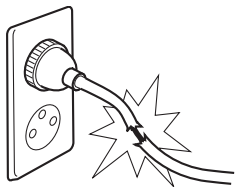
- When using the power cord set (inlet type) that came with this product, make sure the connector is securely inserted in the inlet of the product.
  When securing measure is provided, secure the cord with the fixture properly.
  If the power cord (inlet type) is not connected to the product securely, a contact problem may lead to increased resistance, overheating, and risk of fire.



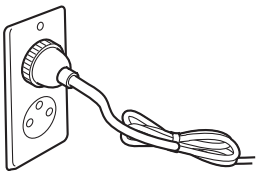
- Check whether the power cord is not stepped on or pinched by a table and so on.
  Overheating may occur there, leading to a risk of fire.



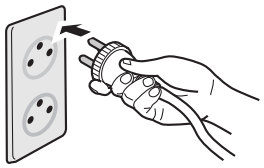
- Check whether the power cord is damaged. Check whether the sheath is damaged.
  If the power plug, cord, or sheath is damaged, replace with a new power cord (with plug and connector on each end) specified by KMBT. Using the damaged power cord may result in fire or electric shock.



- Do not bundle or tie the power cord.
  Overheating may occur there, leading to a risk of fire.

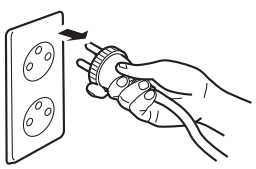


- Check whether dust is collected around the power plug and wall outlet.
  Using the power plug and wall outlet without removing dust may result in fire.



- Do not insert the power plug into the wall outlet with a wet hand.
  The risk of electric shock exists.

- When unplugging the power cord, grasp the plug, not the cable.
  The cable may be broken, leading to a risk of fire and electric shock.

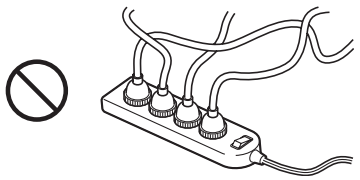


Wiring

⚠ WARNING

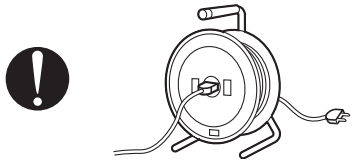
- Never use multi-plug adapters to plug multiple power cords in the same outlet.

  If used, the risk of fire exists.



- When an extension cord is required, use a specified one. Current that can flow in the extension cord is limited, so using a too long extension cord may result in fire.

  Do not use an extension cable reel with the cable taken up. Fire may result.



2. Installation Requirements

Prohibited Installation Places

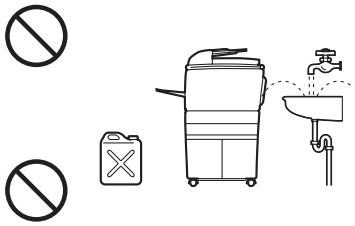
⚠ WARNING

- Do not place the product near flammable materials or volatile materials that may catch fire.

  A risk of fire exists.

- Do not place the product in a place exposed to water such as rain.

  A risk of fire and electric shock exists.

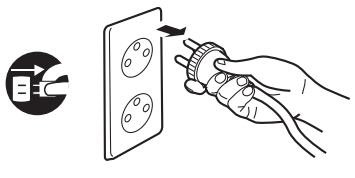


When not Using the Product for a long time

⚠ WARNING

- When the product is not used over an extended period of time (holidays, etc.), switch it off and unplug the power cord.

  Dust collected around the power plug and outlet may cause fire.



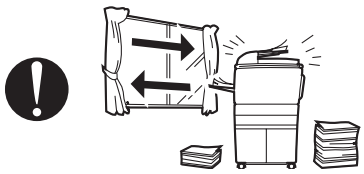
Ventilation

⚠ CAUTION

- The product generates ozone gas during operation, but it will not be harmful to the human body.

  If a bad smell of ozone is present in the following cases, ventilate the room.

  a. When the product is used in a poorly ventilated room
  b. When taking a lot of copies
  c. When using multiple products at the same time



Stability

⚠ CAUTION

- Be sure to lock the caster stoppers.

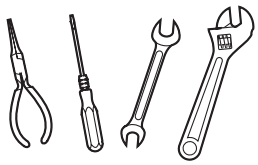
  In the case of an earthquake and so on, the product may slide, leading to a injury.

Inspection before Servicing

⚠ CAUTION

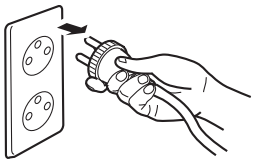
- Before conducting an inspection, read all relevant documentation (service manual, technical notices, etc.) and proceed with the inspection following the prescribed procedure in safety clothes, using only the prescribed tools. Do not make any adjustment not described in the documentation.

  If the prescribed procedure or tool is not used, the product may break and a risk of injury or fire exists.



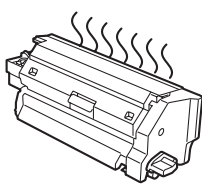
- Before conducting an inspection, be sure to disconnect the power plugs from the product and options.

  When the power plug is inserted in the wall outlet, some units are still powered even if the POWER switch is turned OFF. A risk of electric shock exists.



- The area around the fixing unit is hot.

  You may get burnt.

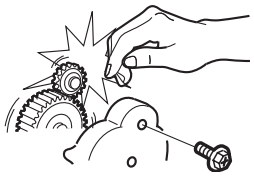


Work Performed with the Product Powered On

⚠ WARNING

- Take every care when making adjustments or performing an operation check with the product powered.

  If you make adjustments or perform an operation check with the external cover detached, you may touch live or high-voltage parts or you may be caught in moving gears or the timing belt, leading to a risk of injury.



- Take every care when servicing with the external cover detached.

  High-voltage exists around the drum unit. A risk of electric shock exists.

Safety Checkpoints

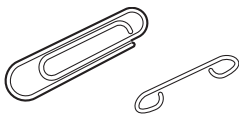
⚠ WARNING

- Check the exterior and frame for edges, burrs, and other damage.

  The user or CE may be injured.

- Do not allow any metal parts such as clips, staples, and screws to fall into the product.

  They can short internal circuits and cause electric shock or fire.



- Check wiring for squeezing and any other damage.

  Current can leak, leading to a risk of electric shock or fire.

- Carefully remove all toner remnants and dust from electrical parts and electrode units such as a charging corona unit.

  Current can leak, leading to a risk of product trouble or fire.

- Check high-voltage cables and sheaths for any damage.

  Current can leak, leading to a risk of electric shock or fire.

Safety Checkpoints

⚠ WARNING

- Check electrode units such as a charging corona unit for deterioration and sign of leakage.

  Current can leak, leading to a risk of trouble or fire.

- Before disassembling or adjusting the write unit (P/H unit) incorporating a laser, make sure that the power cord has been disconnected.

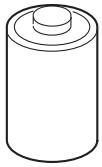
  The laser light can enter your eye, leading to a risk of loss of eyesight.

- Do not remove the cover of the write unit. Do not supply power with the write unit shifted from the specified mounting position.

  The laser light can enter your eye, leading to a risk of loss of eyesight.

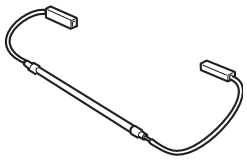
- When replacing a lithium battery, replace it with a new lithium battery specified in the Parts Guide Manual. Dispose of the used lithium battery using the method specified by local authority.

  Improper replacement can cause explosion.



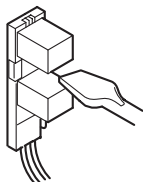
- After replacing a part to which AC voltage is applied (e.g., optical lamp and fixing lamp), be sure to check the installation state.

  A risk of fire exists.



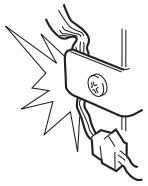
- Check the interlock switch and actuator for loosening and check whether the interlock functions properly.

  If the interlock does not function, you may receive an electric shock or be injured when you insert your hand in the product (e.g., for clearing paper jam).



- Make sure the wiring cannot come into contact with sharp edges, burrs, or other pointed parts.

  Current can leak, leading to a risk of electric shock or fire.



Safety Checkpoints

⚠ WARNING

- Make sure that all screws, components, wiring, connectors, etc. that were removed for safety check and maintenance have been reinstalled in the original location. (Pay special attention to forgotten connectors, pinched cables, forgotten screws, etc.)

  A risk of product trouble, electric shock, and fire exists.

Handling of Consumables

⚠ WARNING

- Toner and developer are not harmful substances, but care must be taken not to breathe excessive amounts or let the substances come into contact with eyes, etc. It may be stimulative.

  If the substances get in the eye, rinse with plenty of water immediately. When symptoms are noticeable, consult a physician.

- Never throw the used cartridge and toner into fire.

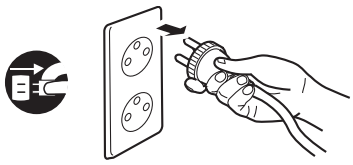
  You may be burned due to dust explosion.

Handling of Service Materials

⚠ CAUTION

- Unplug the power cord from the wall outlet.

  Drum cleaner (isopropyl alcohol) and roller cleaner (acetone-based) are highly flammable and must be handled with care. A risk of fire exists.



- Do not replace the cover or turn the product ON before any solvent remnants on the cleaned parts have fully evaporated.

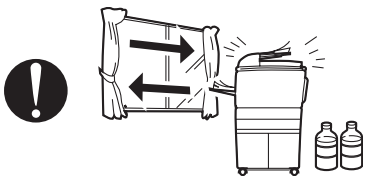
  A risk of fire exists.

Handling of Service Materials

⚠ CAUTION

- Use only a small amount of cleaner at a time and take care not to spill any liquid. If this happens, immediately wipe it off.
  A risk of fire exists.

- When using any solvent, ventilate the room well.
  Breathing large quantities of organic solvents can lead to discomfort.



[4] Used Batteries Precautions

ALL Areas

CAUTION

Danger of explosion if battery is incorrectly replaced.
Replace only with the same or equivalent type recommended by the manufacturer.
Dispose of used batteries according to the manufacturer's instructions.

Germany

VORSICHT!

Explosionsgefahr bei unsachgemäßem Austausch der Batterie.
Ersatz nur durch denselben oder einen vom Hersteller empfohlenen gleichwertigen Typ.
Entsorgung gebrauchter Batterien nach Angaben des Herstellers.

France

ATTENTION

Il y a danger d'explosion s'il y a remplacement incorrect de la batterie.
Remplacer uniquement avec une batterie du même type ou d'un type équivalent recommandé par le constructeur.
Mettre au rebut les batteries usagées conformément aux instructions du fabricant.

Denmark

ADVARSEL!

Lithiumbatteri - Eksplosionsfare ved fejlagtig håndtering.
Udskiftning må kun ske med batteri af samme fabrikat og type.
Levér det brugte batteri tilbage til leverandøren.

Finland, Sweden

VAROITUS

Paristo voi räjähtää, jos se on virheellisesti asennettu.
Vaihda paristo ainoastaan laitevalmistajan suosittelemaan tyyppiin.
Hävitä käytetty paristo valmistajan ohjeiden mukaisesti.

VARNING

Explosionsfara vid felaktigt batteribyte.
Använd samma batterityp eller en ekvivalent typ som rekommenderas av apparattillverkaren.
Kassera använt batteri enligt fabrikantens instruktion.

Norway

ADVARSEL

Eksplosjonsfare ved feilaktig skifte av batteri.
Benytt samme batteritype eller en tilsvarende type anbefalt av apparatfabrikanten.
Brukte batterier kasseres i henhold til fabrikantens instruksjoner.

[5] Laser Safety

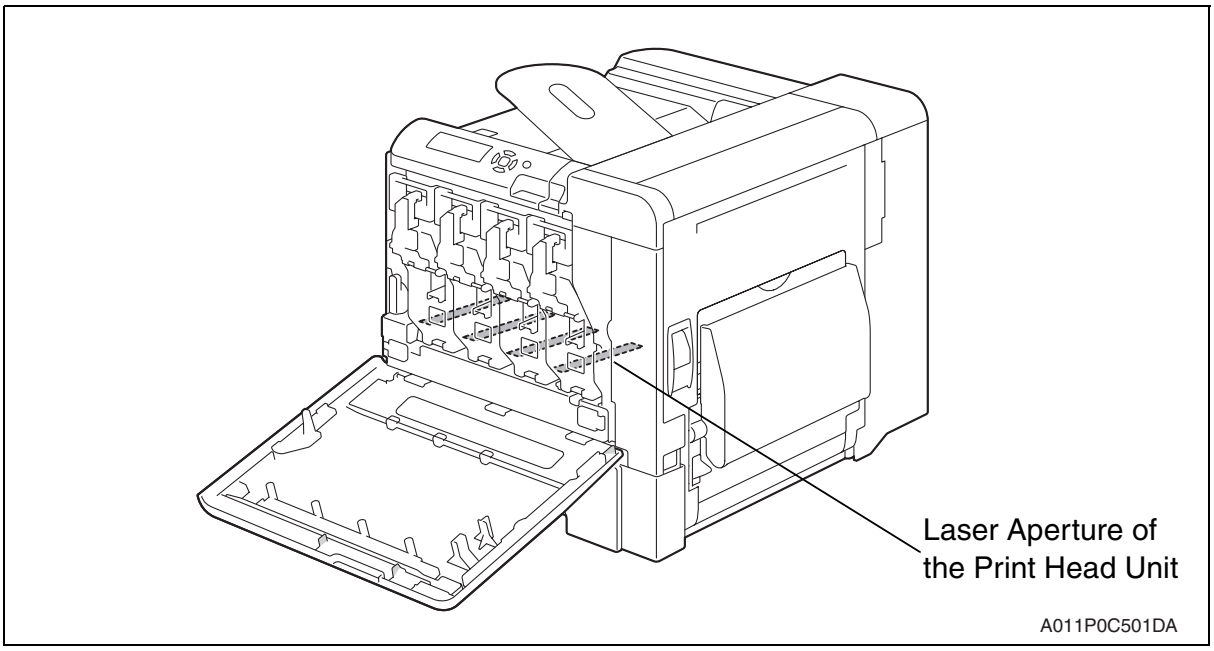
- This is a digital machine certified as a Class 1 laser product. There is no possibility of danger from a laser, provided the machine is serviced according to the instruction in this manual.

5.1 Internal Laser Radiation

semiconductor laser	
Maximum power of the laser diode	15 mW
Maximum average radiation power (*)	8.5 µW
Wavelength	770-800 nm

*at laser aperture of the Print Head Unit

- This product employs a Class 3B laser diode that emits an invisible laser beam. The laser diode and the scanning polygon mirror are incorporated in the print head unit.
- The print head unit is NOT A FIELD SERVICEABLE ITEM. Therefore, the print head unit should not be opened under any circumstances.



U.S.A., Canada
(CDRH Regulation)

- This machine is certified as a Class 1 Laser product under Radiation Performance Standard according to the Food, Drug and Cosmetic Act of 1990. Compliance is mandatory for Laser products marketed in the United States and is reported to the Center for Devices and Radiological Health (CDRH) of the U.S. Food and Drug Administration of the U.S. Department of Health and Human Services (DHHS). This means that the device does not produce hazardous laser radiation.

- The label shown on page S-16 indicates compliance with the CDRH regulations and must be attached to laser products marketed in the United States.

CAUTION
- **Use of controls, adjustments or performance of procedures other than those specified in this manual may result in hazardous radiation exposure.**

semiconductor laser	
Maximum power of the laser diode	15 mW
Wavelength	770-800 nm

All Areas

CAUTION
- **Use of controls, adjustments or performance of procedures other than those specified in this manual may result in hazardous radiation exposure.**

semiconductor laser	
Maximum power of the laser diode	15 mW
Wavelength	770-800 nm

Denmark

ADVARSEL
- **Usynlig laserstråling ved åbning, når sikkerhedsafbrydere er ude af funktion. Undgå udsættelse for stråling. Klasse 1 laser produkt der opfylder IEC60825-1 sikkerheds kravene.**

halvlederlaser	
Laserdiodens højeste styrke	15 mW
bølgelængden	770-800 nm

Finland, Sweden

LUOKAN 1 LASERLAITE
KLASS 1 LASER APPARAT

VAROITUS!
- **Laitteen käyttäminen muulla kuin tässä käyttöohjeessa mainitulla tavalla saattaa altistaa käyttäjän turvallisuusluokan 1 ylittävälle näkymättömälle laersäteilylle.**

puolijohdelaser	
Laserdiodin suurin teho	15 mW
aallonpituus	770-800 nm

VARNING!
- **Om apparaten används på annat sätt än i denna bruksanvisning specificerats, kan användaren utsättas för osynlig laserstrålning, som överskrider gränsen för laserklass 1.**

halvledarlaser	
Den maximala effekten för laserdioden	15 mW
våglängden	770-800 nm

VARO!
- **Avattaessa ja suojalukitus ohitettaessa olet alttiina näkymättomälle laersäteilylle. Älä katso säteeseen.**

VARNING!
- **Osynlig laserstråining när denna del är öppnad och spärren är urkopplad. Betrakta ej stråien.**

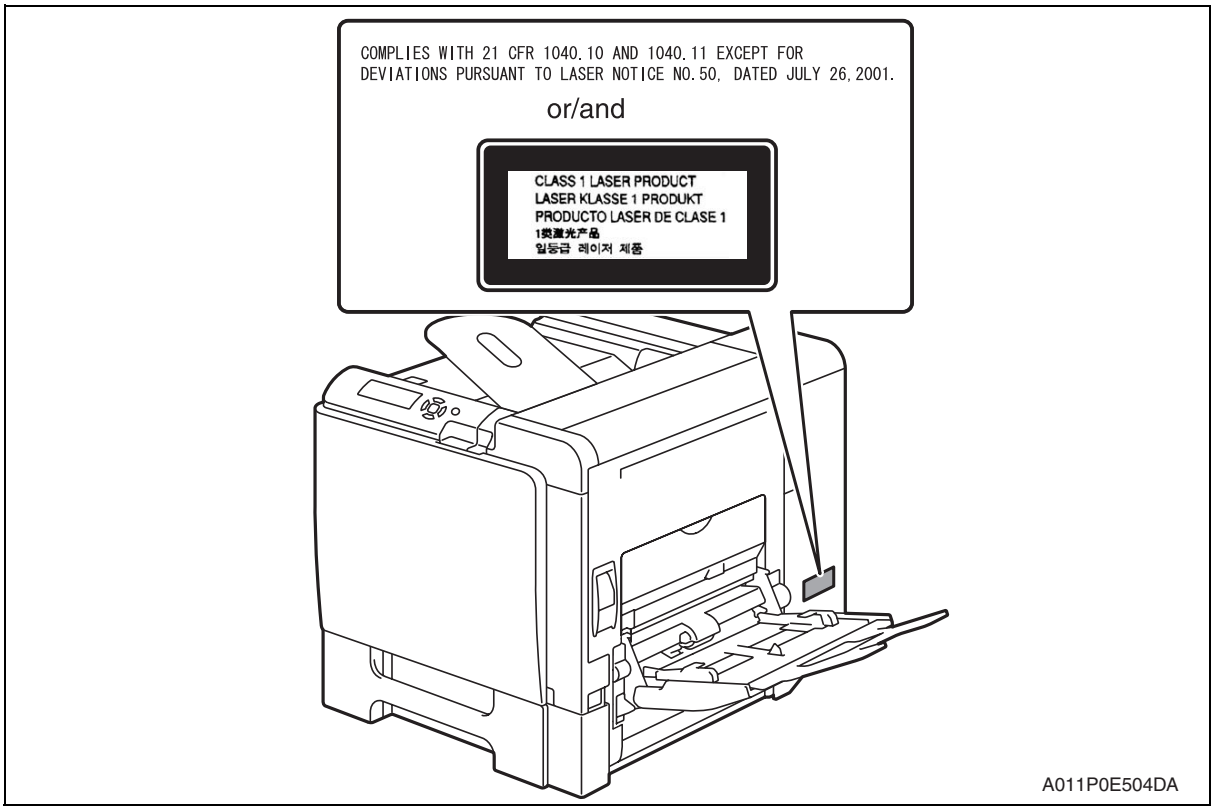
Norway

ADVERSEL
- **Dersom apparatet brukes på annen måte enn spesifisert i denne bruksanvisning, kan brukeren utsettes för unsynlig laserstrålning, som overskrider grensen for laser klass 1.**

halvleder laser	
Maksimal effekt till laserdiode	15 mW
bølgelengde	770-800 nm

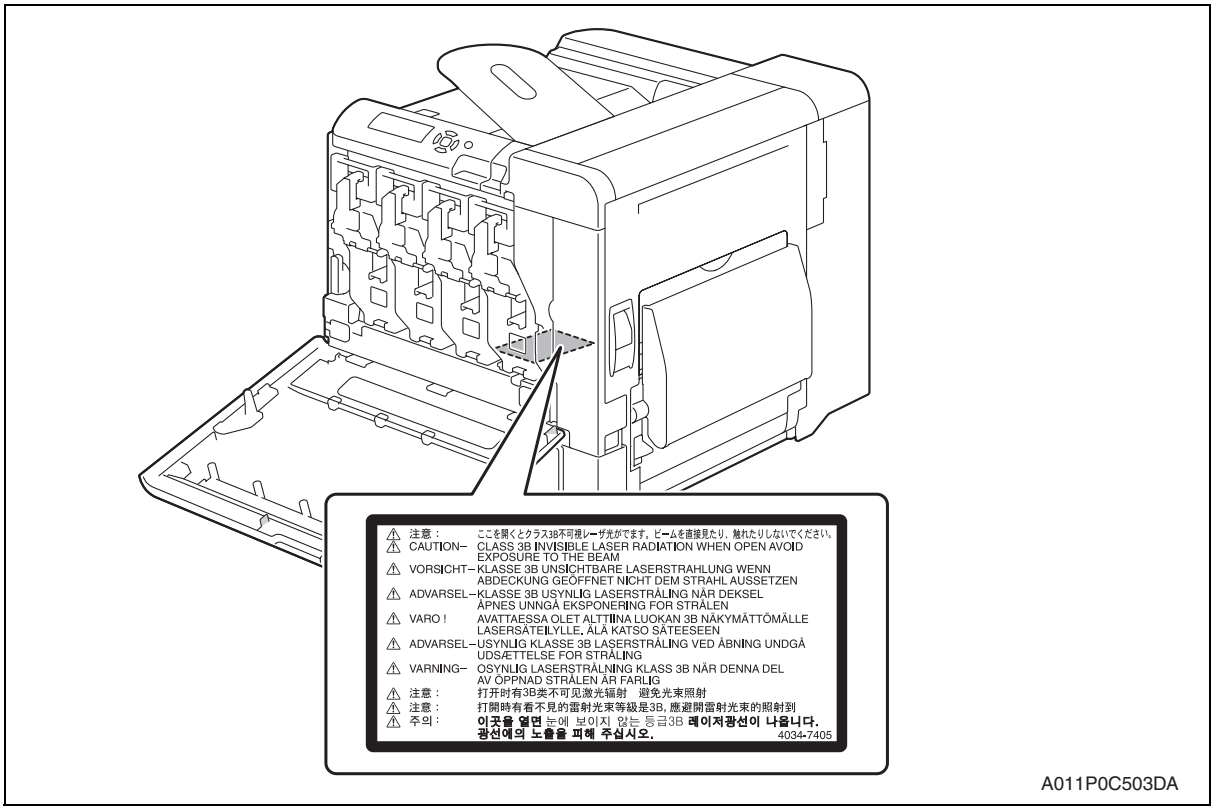
5.2 Laser Safety Label

- A laser safety label is attached to the inside of the machine as shown below.



5.3 Laser Caution Label

- A laser caution label is attached to the outside of the machine as shown below.

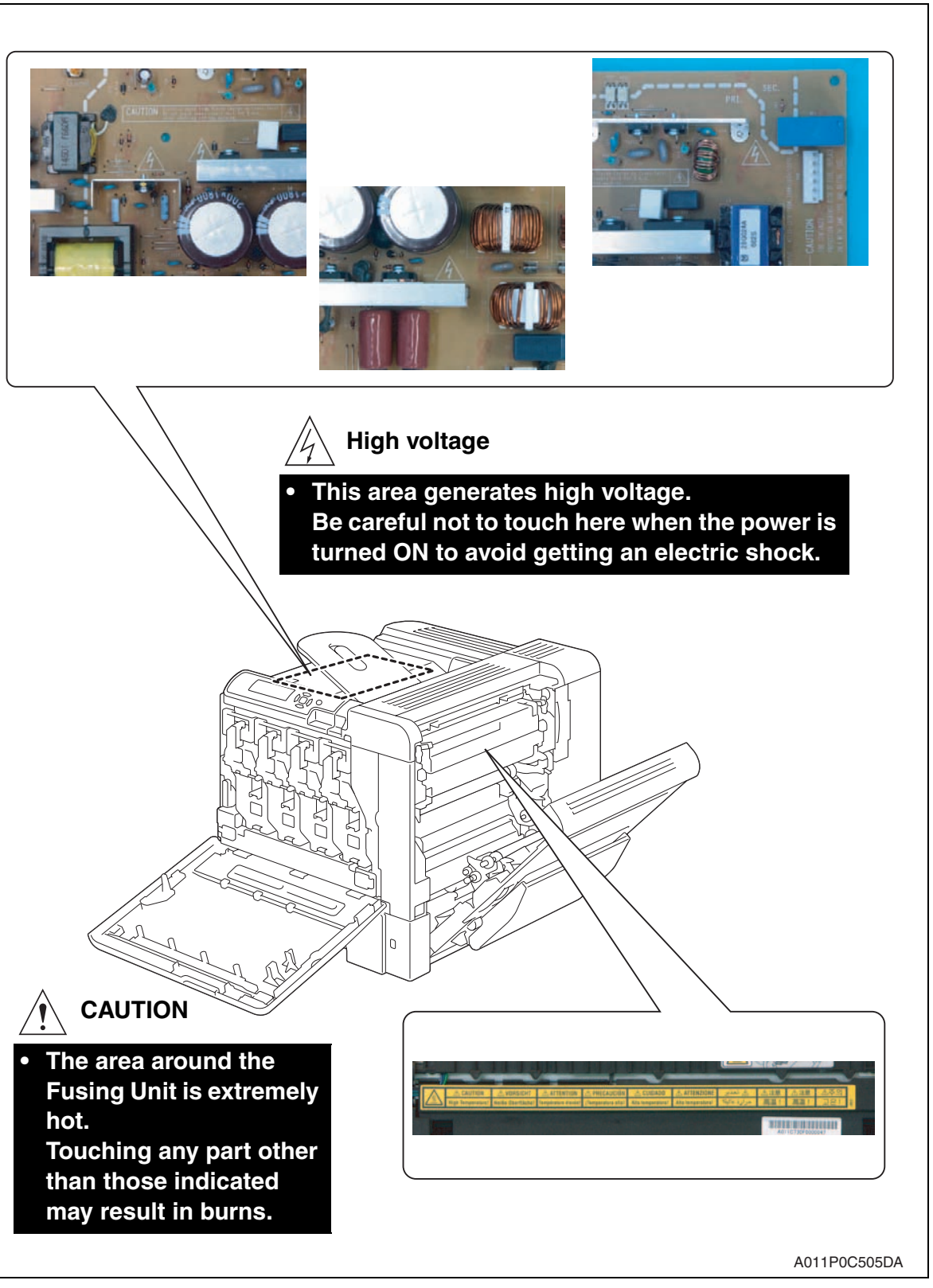


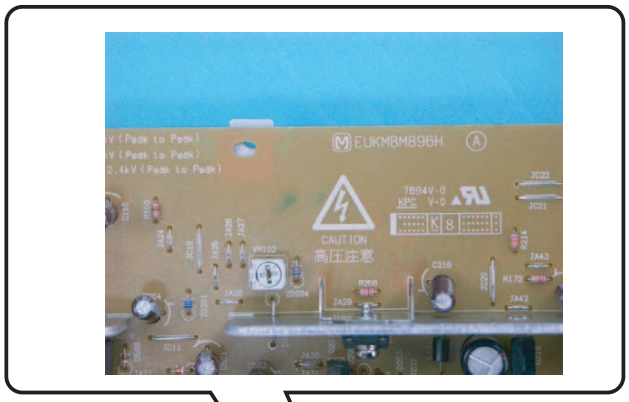
5.4 PRECAUTIONS FOR HANDLING THE LASER EQUIPMENT

- When laser protective goggles are to be used, select ones with a lens conforming to the above specifications.
- When a disassembly job needs to be performed in the laser beam path, such as when working around the printerhead and PC Drum, be sure first to turn the printer OFF.
- If the job requires that the printer be left ON, take off your watch and ring and wear laser protective goggles.
- A highly reflective tool can be dangerous if it is brought into the laser beam path. Use utmost care when handling tools on the user's premises.
- The Print Head is not to be disassembled or adjusted in the field. Replace the Unit or Assembly including the Control Board. Therefore, remove the Laser Diode, and do not perform Control Board trimmer adjustment.

WARNING INDICATIONS ON THE MACHINE

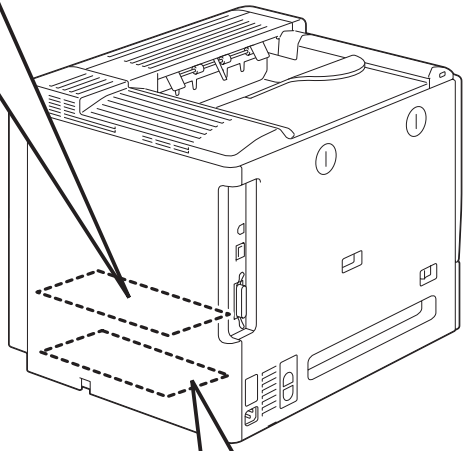
Caution labels shown are attached in some areas on/in the machine.
When accessing these areas for maintenance, repair, or adjustment, special care should be taken to avoid burns and electric shock.





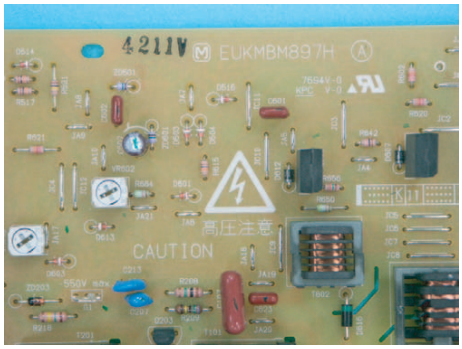
High voltage

- **This area generates high voltage. Be careful not to touch here when the power is turned ON to avoid getting an electric shock.**

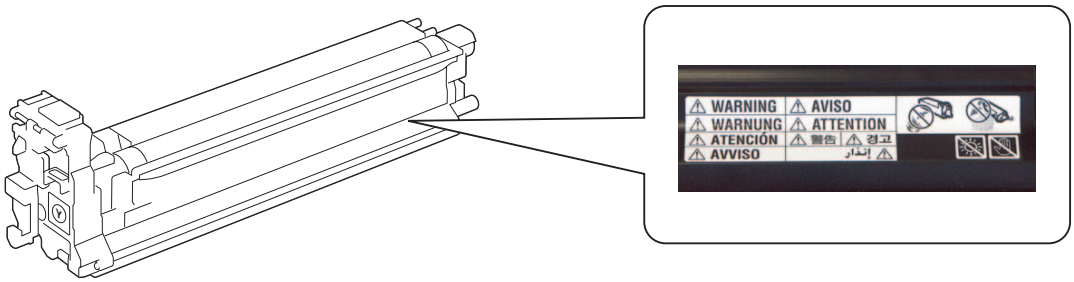


High voltage

- **This area generates high voltage. Be careful not to touch here when the power is turned ON to avoid getting an electric shock.**

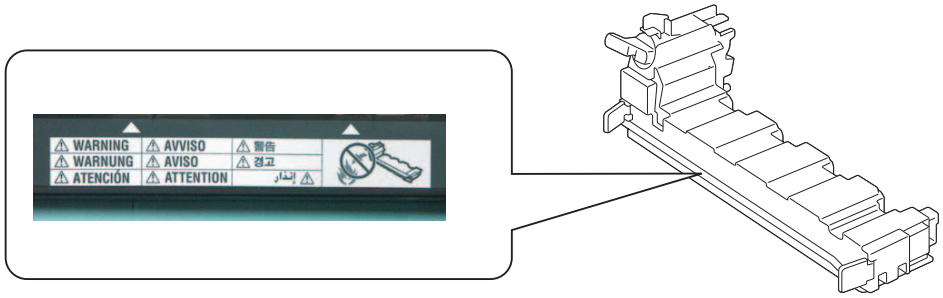


A011P0C506DA



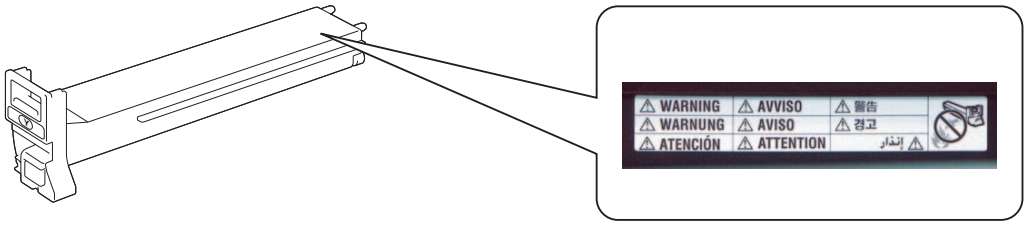
WARNING

- **Do not burn used Imaging Units.**
  Toner expelled from the fire is dangerous.



WARNING

- **Do not burn used Waste Toner Bottle.**
  Toner expelled from the fire is dangerous.



WARNING

- **Do not burn used Toner Cartridge.**
  Toner expelled from the fire is dangerous.

A011P0C507DA

CAUTION:

- **You may be burned or injured if you touch any area that you are advised not to touch by any caution label. Do not remove caution labels. If any caution label has come off or soiled and therefore the caution cannot be read, contact our Service Office.**

MEASURES TO TAKE IN CASE OF AN ACCIDENT

1. If an accident has occurred, the distributor who has been notified first must immediately take emergency measures to provide relief to affected persons and to prevent further damage.
2. If a report of a serious accident has been received from a customer, an on-site evaluation must be carried out quickly and KMBT must be notified.
3. To determine the cause of the accident, conditions and materials must be recorded through direct on-site checks, in accordance with instructions issued by KMBT.
4. For reports and measures concerning serious accidents, follow the regulations specified by every distributor.

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Composition of the service manual

This service manual consists of Theory of Operation section and Field Service section to explain the main machine and its corresponding options.

Theory of Operation section gives, as information for the CE to get a full understanding of the product, a rough outline of the object and role of each function, the relationship between the electrical system and the mechanical system, and the timing of operation of each part.

Field Service section gives, as information required by the CE at the site (or at the customer's premise), a rough outline of the service schedule and its details, maintenance steps, the object and role of each adjustment, error codes and supplementary information.

The basic configuration of each section is as follows. However some options may not be applied to the following configuration.

<Theory of Operation section>

OUTLINE:	Explanation of system configuration, product specifications, unit configuration, and paper path
COMPOSITION/OPERATION:	Explanation of configuration of each unit, operating system, and control system

<Field Service section>

GENERAL:	Explanation of system configuration, and product specifications
MAINTENANCE:	Explanation of service schedule, maintenance steps, service tools, removal/reinstallation methods of major parts, and firmware version up method etc.
ADJUSTMENT/SETTING:	Explanation of utility mode, service mode, and mechanical adjustment etc.
TROUBLESHOOTING:	Explanation of lists of jam codes and error codes, and their countermeasures etc.
APPENDIX:	Parts layout drawings, connector layout drawings, timing chart, overall layout drawing are attached.

Notation of the service manual

A. Product name

In this manual, each of the products is described as follows:

(1)	PCRB:	Print control board
(2)	d-Color P325/P330:	Main body
(3)	Microsoft Windows 95:	Windows 95
	Microsoft Windows 98:	Windows 98
	Microsoft Windows Me:	Windows Me
	Microsoft Windows NT 4.0:	Windows NT 4.0 or Windows NT
	Microsoft Windows 2000:	Windows 2000
	Microsoft Windows XP:	Windows XP
	When the description is made in combination of the OS's mentioned above:	
		Windows 95/98/Me
		Windows NT 4.0/2000
		Windows NT/2000/XP
		Windows 95/98/Me/ NT/2000/XP

B. Brand name

The company names and product names mentioned in this manual are the brand name or the registered trademark of each company.

C. Feeding direction

- When the long side of the paper is parallel with the feeding direction, it is called short edge feeding. The feeding direction which is perpendicular to the short edge feeding is called the long edge feeding.
- Short edge feeding will be identified with [S (abbreviation for Short edge feeding)] on the paper size. No specific notation is added for the long edge feeding.
  When the size has only the short edge feeding with no long edge feeding, [S] will not be added to the paper size.

<Sample notation>

Paper size	Feeding direction	Notation
A4	Long edge feeding	A4
	Short edge feeding	A4S
A3	Short edge feeding	A3

Color Printer

d-Color P325
d-Color P330

THEORY OF OPERATION

Code Y108600-3

Revision history

After publication of this service manual, the parts and mechanism may be subject to change for improvement of their performance.
Therefore, the descriptions given in this service manual may not coincide with the actual machine.

When any change has been made to the descriptions in the service manual, a revised version will be issued with a revision mark added as required.

Revision mark:

- To indicate clearly a section revised, show △1 to the left of the revised section.
  A number within △1 represents the number of times the revision has been made.

- To indicate clearly a section revised, show ▲1 in the lower outside section of the corresponding page.
  A number within ▲1 represents the number of times the revision has been made.

NOTE

Revision marks shown in a page are restricted only to the latest ones with the old ones deleted.

- When a page revised in Ver. 2.0 has been changed in Ver. 3.0:
  The revision marks for Ver. 3.0 only are shown with those for Ver. 2.0 deleted.
- When a page revised in Ver. 2.0 has not been changed in Ver. 3.0:
  The revision marks for Ver. 2.0 are left as they are.

CONTENTS

d-Color P325/P330 main body

Outline

Composition/Operation

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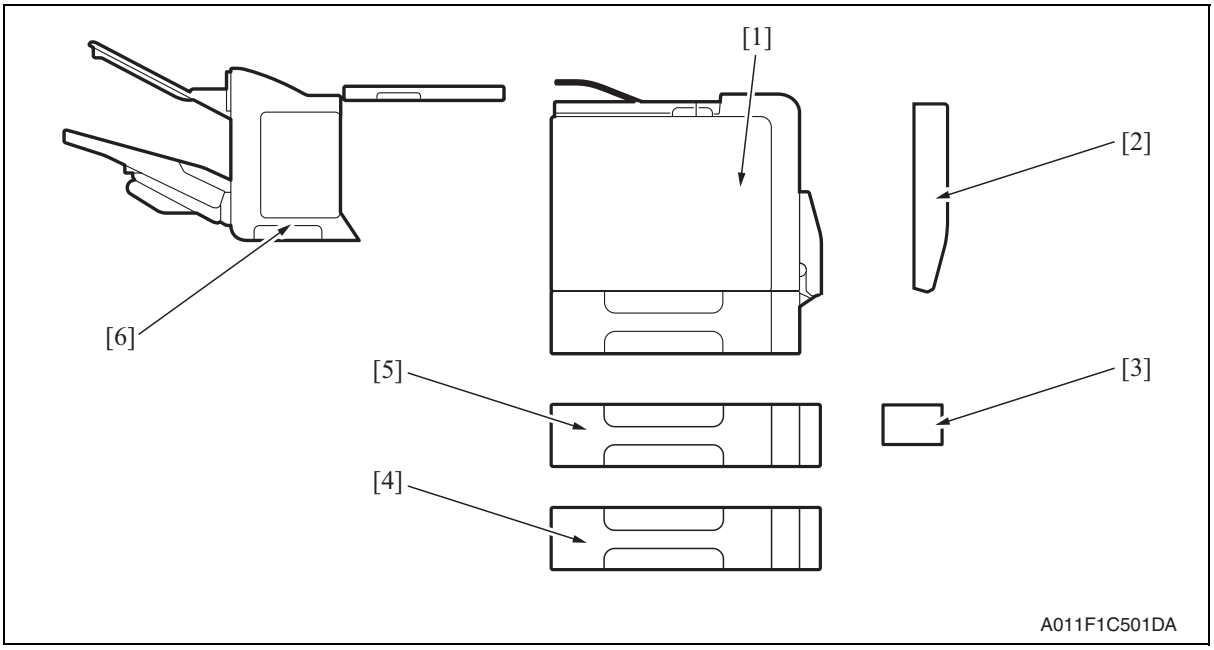
Outline

1. System configuration

System front view



[1] Main body
[2] Duplex option
[3] Hard disk kit
[4] Lower feeder unit
[5] Lower feeder unit
[6] Staple finisher

2. Product specifications

A. Type

Type	Desktop tandem full-color laser beam printer
Printing system	Semiconductor laser and electrostatic image transfer to media
Exposure system	4 laser diode and polygon mirror
PC drum type	OPC (organic photo conductor)
Photoconductor cleaning	Blade cleaning system
Print resolution	600 dpi x 600 dpi x 4 bit
Media feeding system	Two-way system (Tray 1: 100 sheets, Tray 2: 500 sheets) * Expandable up to a four-way system by adding lower feeder units (up to two)
Developing system	Single-element developing system
Charging system	Needle charging system (with ozone suctionfeature)
Image transfer system	Intermediate transfer belt system
Media separating system	Curvature separation + charge-neutralizing system
Fusing system	Belt fusing
Media exit system	Face down (Output tray capacity: A4S/Letter, 250 sheets)

B. Functions

Warm-up time	Average: 45 sec. or less (Power on to ready, at ambient temperature of 23° C/73.4° F and rated source voltage)
Process speed	d-Color P325 152 mm/sec (plain paper, full-color mode)
	d-Color P330 185 mm/sec (plain paper, full-color mode)
First-page-out-time	d-Color P325 14.2 second (Full-color mode, A4S/Letter, 1-sided mode, plain paper)
	d-Color P330 14.0 second (Full-color mode, A4S/Letter, 1-sided mode, plain paper)
Print speed	d-Color P330 Full-color mode : 27.0 pages/min. (Letter, 1-sided print, plain paper) 25.6 pages/min. (A4S, 1-sided print, plain paper) Monochrome mode : 31.7 pages/min. (Letter, 1-sided print, plain paper) 30.0 pages/min. (A4S, 1-sided print, plain paper)
	d-Color P330 Full-color mode : 31.7 pages/min. (Letter, 1-sided print, plain paper) 30.0 pages/min. (A4S, 1-sided print, plain paper) Monochrome mode : 37.0 pages/min. (Letter, 1-sided print, plain paper) 35.0 pages/min. (A4S, 1-sided print, plain paper)

Media sizes	Tray 1 Standard size: *SEF only • Legal, Letter, Government Letter, Statement, Executive, Folio, SP Folio, UK Quatro, Foolscap, Government, Legal • A4S, B5, B5(ISO), A5, A6, B6, Photo size • 16K, Kai16, Kai32 Envelope: • Com10, C5, C6, DL, Monarch • Youkei #4, Youkei 4, Choukei #3, Youkei 0, Choukei #4 Postcard: • Japanese postcard, Double postcard Custom size: • Minimum size /92 mm x 148 mm (3.6 inch x 5.8 inch) • Maximum size /218 mm x 356 mm (8.6 inch x 14.0 inch) • Long size paper /357 mm to 1,200 mm (14.0 inch x 47.2 inch) (1-sided mode only)
	Tray 2 A4S/LetterS
Media types	Tray 1 • Plain paper (60 to 90 g/m² / 16 to 24 lb) • Recycled paper (60 to 90 g/m² / 16 to 24 lb) • Thick stock 1 (91 to 150 g/m²/ 24 to 40 lb) • Thick stock 2 (128 to 210 g/m²/ 34 to 56 lb) • Glossy paper 1 (100 to 150 g/m²/ 26.6 to 40 lb) • Glossy paper 2 (128 to 210 g/m²/ 34 to 56 lb) • OHP transparencies • Letterhead • Envelopes • Labels • Postcards • Double postcards *1 • Long size paper (up to 1200 mm/47.2 inches) Tray 2 • Plain paper (60 to 90 g/m² / 16 to 24 lb) • Recycled paper (60 to 90 g/m² / 16 to 24 lb)
Tray capacities	Tray 1 Plain paper and recycled paper: 100 sheets Thick stock 1, thick stock 2,glossy paper 1, glossy paper 2, postcards, OHP transparencies, letterhead, labels, postcards and double postcards: 20 sheets Envelopes: 10 sheets Long size paper: 1 sheet * No indication of remaining media amount
	Tray 2 Plain paper and recycled paper: 500 sheets * Indication of remaining madia amount available
Interfaces	• Parallel (IEEE 1284) Support only an ECP mode • 10 Base-T/100 Base-TX/1000 Base-T (IEEE 802.3) Ethernet • USB 2.0 (High-Speed) • Host USB (PictBridge 1.0)
CPU	d-Color P325 Freescale PowerPC 7448, 733 MHz
	d-Color P330 Freescale PowerPC 7448, 866 MHz

Memory	Standard memory DDR-SDRAM 133 MHz 184 pin non ECC 256 MB (Expandable up to a 1024 MB)
Hard disk	Optional: 40 GB
Compact flash card	Commercially available compact flash cards of 256 MB, 512 MB, 1 GB or more storage capacity are supported. (Microdrive is not supported)

*1: Folded double postcards cannot be used.

Lower feeder unit: Only plain paper and recycled paper weighing 60 to 90 g/m^2 (16 to 24 lb) can be loaded.
Duplex option: Only plain paper and recycled paper weighing 60 to 90 g/m^2 (16 to 24 lb) can be fed through the unit.
For details, see the Service Manual for each option.

C. Maintenance

Machine durability	400,000 prints or 5 years, whichever comes first

D. Machine specifications

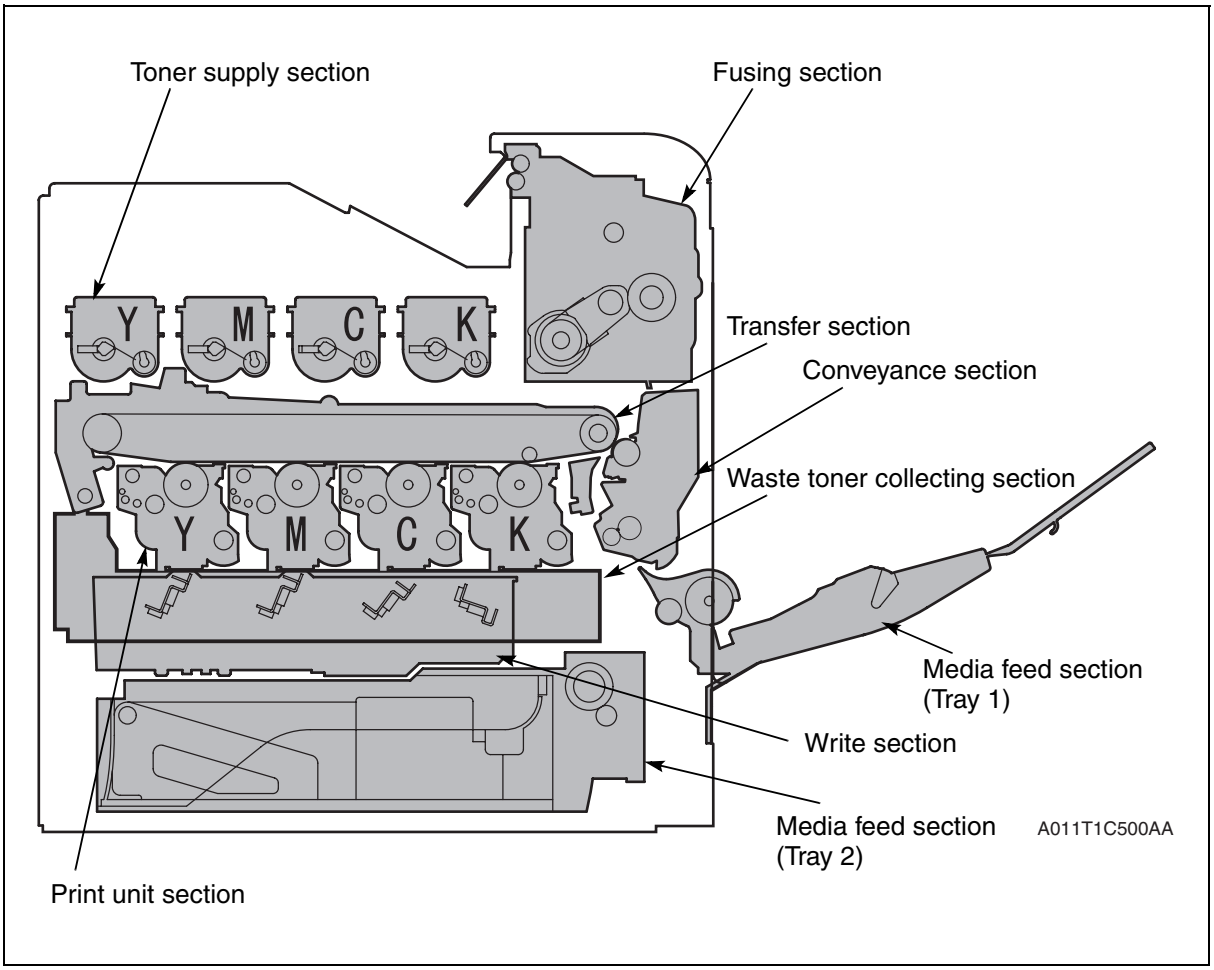
Power requirements Voltage:	AC 110 to 127 V, -10% +6% (AC 120 V -10% +10% : onry US / Canada) AC 220 to 240 V, -10% +10%
Frequency:	50 to 60 Hz ± 3 Hz
Max power consumption	1400 W or less
Dimensions	420 mm (W) x 526 mm (D) x 420 mm (H) 16.5 inch (W) x 20.7 inch (D) x 16.5 inch (H)
Weight	32.4 kg (71.4 lb) or less without consumables
Operating noise	During standby : 39 dB (A) or less During printing : 56 dB (A) or less

E. Operating Environment

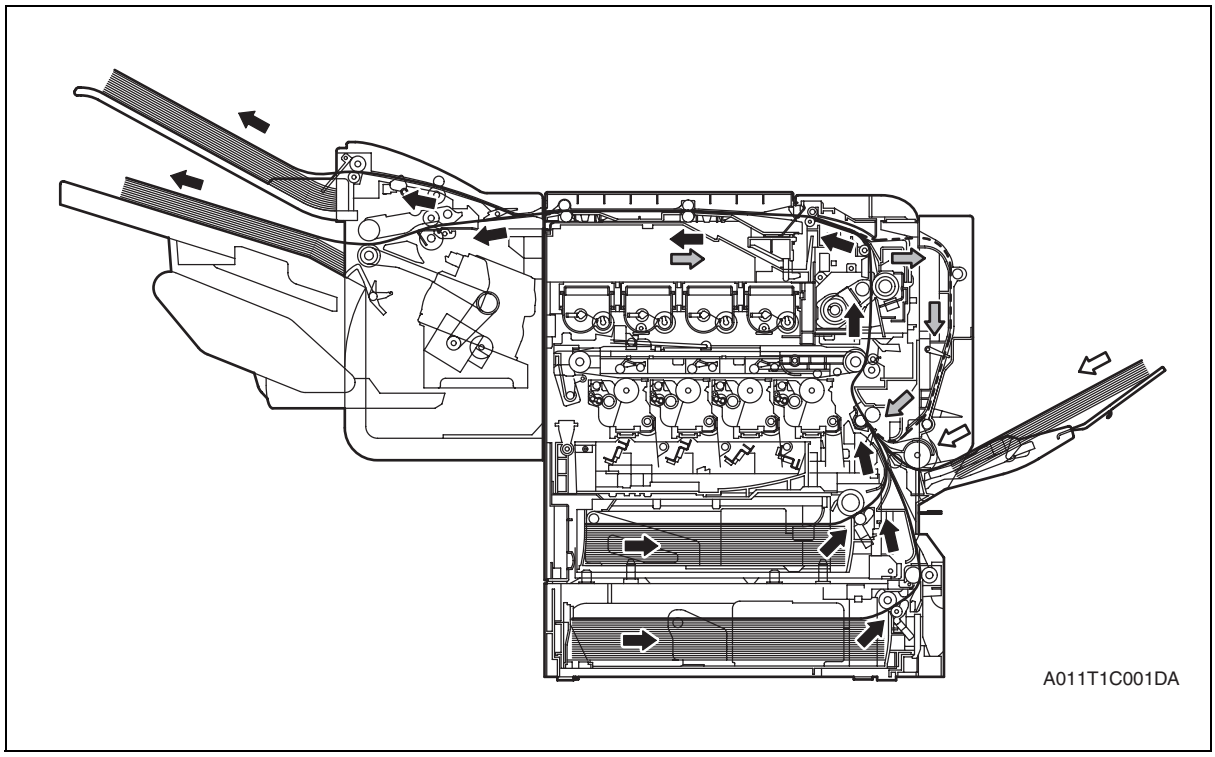
Temperature	10° to 35° C / 50° to 95° F (with a fluctuation of 10° C / 18° F or less per hour)
Humidity	15% to 85% (with a fluctuation of 20%/h)

NOTE
- **These specifications are subject to change without notice.**

3. Section configuration



4. Media path

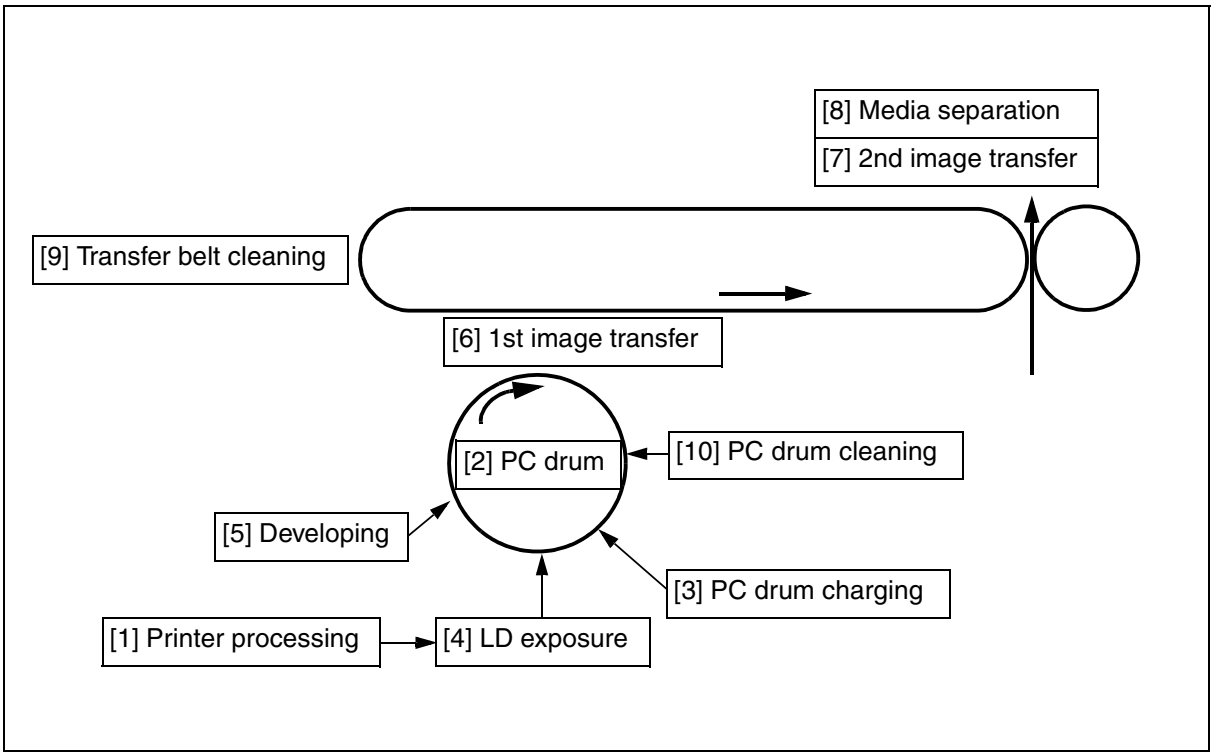


1-sided media path

2-sided media path

1-sided media path from the tray 1

5. Image creation process



[1]	Printer processing	• The intensity of the laser light is controlled based on the image signal transmitted from the host computer.
[2]	PC drum	• The image of the original projected onto the surface of the PC drum is changed to a corresponding electrostatic latent image.
[3]	PC drum charging	• Apply DC (-) charge to the photo conductor.
[4]	LD exposure	• The surface of the PC drum is irradiated with laser light, and an electrostatic latent image is thereby formed.
[5]	Developing	• The toner, agitated and negatively charged in the toner chamber, is attracted onto the electrostatic latent image formed on the surface of the PC drum. It is thereby changed to a visible, developed image.
[6]	1st image transfer	• A DC positive voltage is applied to the backside of the transfer belt, thereby allowing the visible, developed image on the surface of each of the PC drums (Y, M, C and K) to be transferred onto the transfer belt.
[7]	2nd image transfer	• A DC positive voltage is applied to the backside of the media, thereby allowing the visible, developed image on the surface of the transfer belt to be transferred onto the media.
[8]	Media separation	• The media, which has undergone the 2nd image transfer process, is neutralized so that it can be properly separated from the transfer belt.
[9]	Transfer belt cleaning	• The residual toner left on the surface of the transfer belt is scraped off.
[10]	PC drum cleaning	• The residual toner left on the surface of the PC drum is scraped off.

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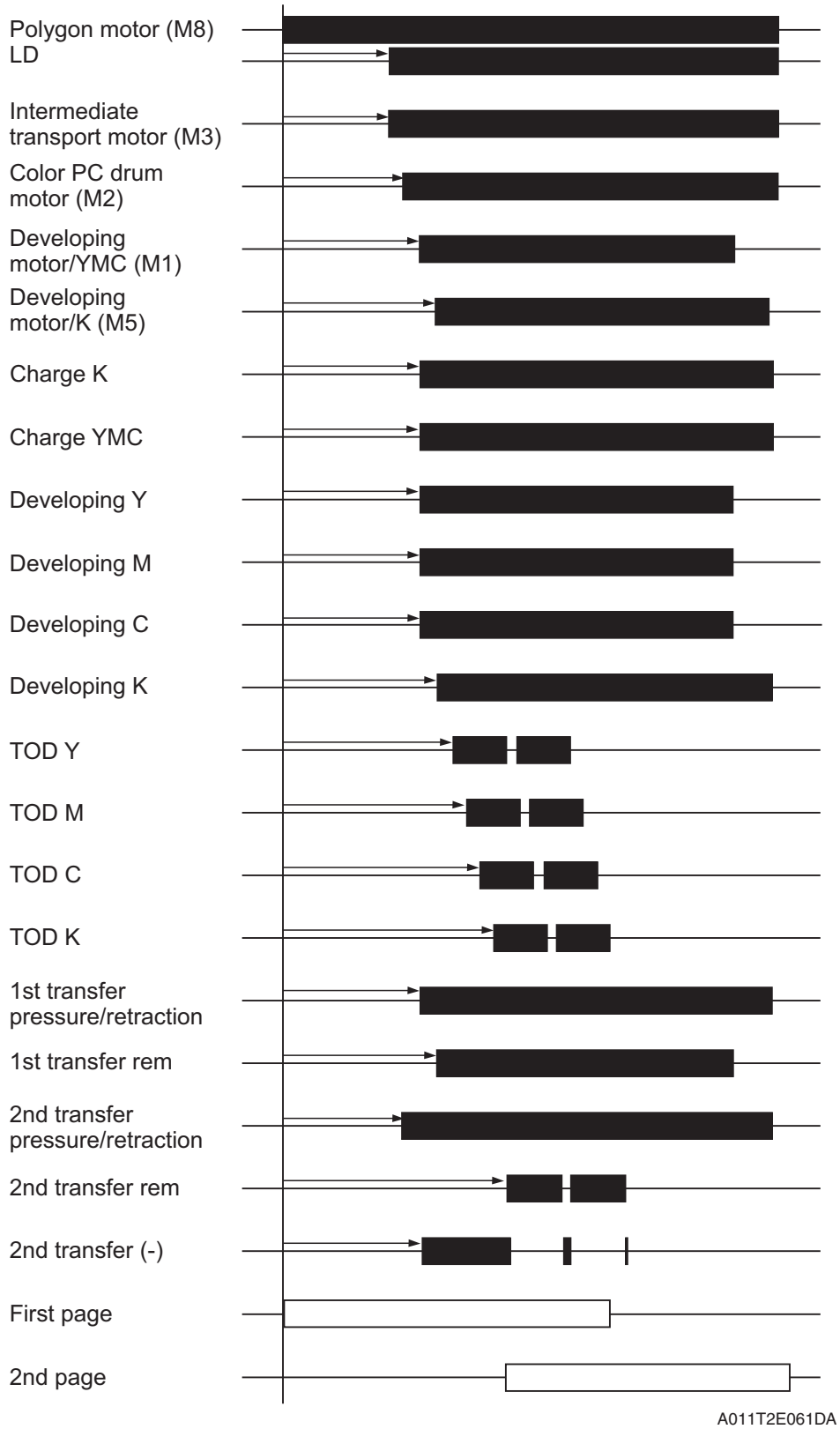
Composition/Operation

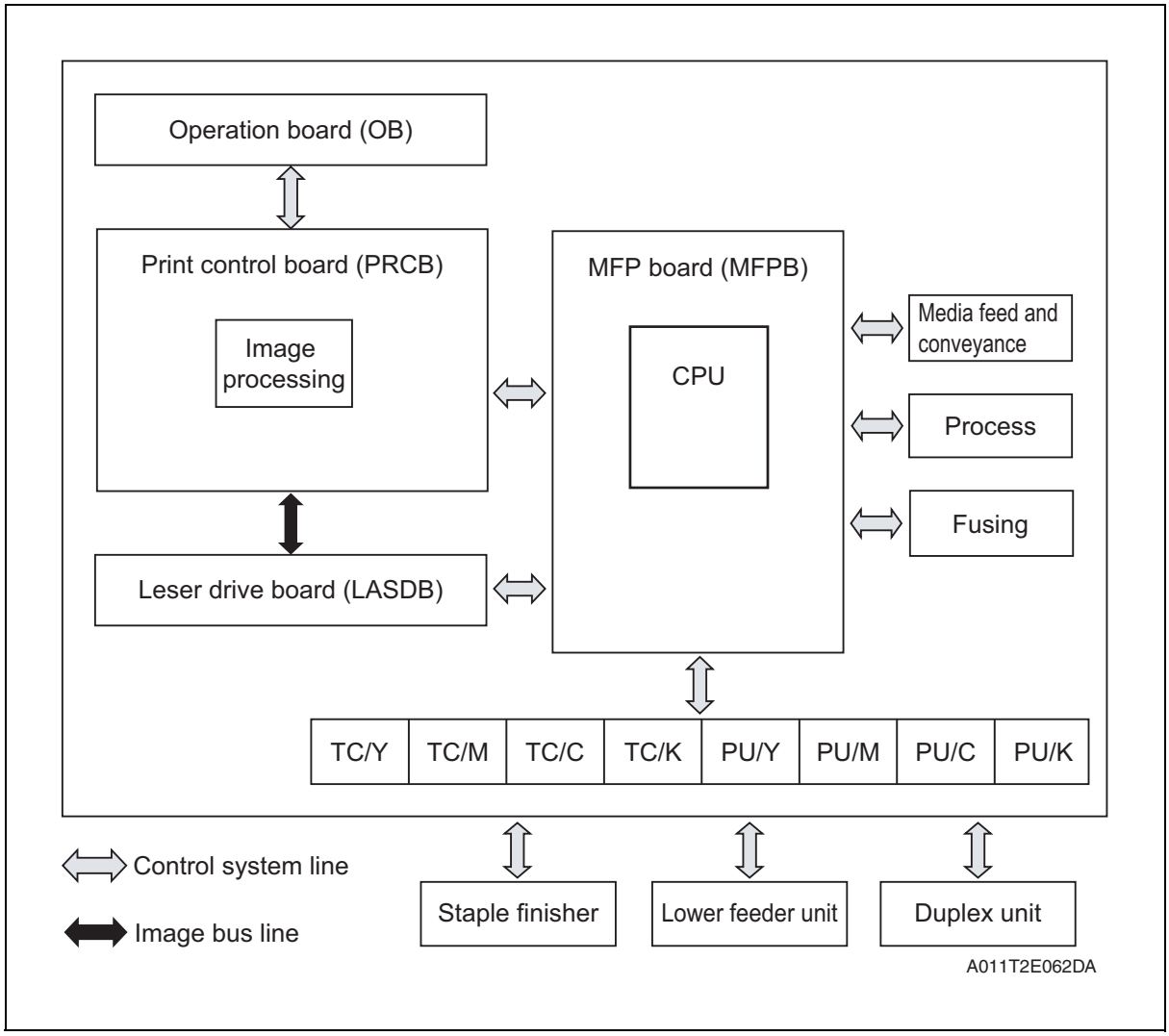
6. Overall composition

6.1 Timing chart at main body powerup

Conditions: A4S plain paper, 2 printed pages/job

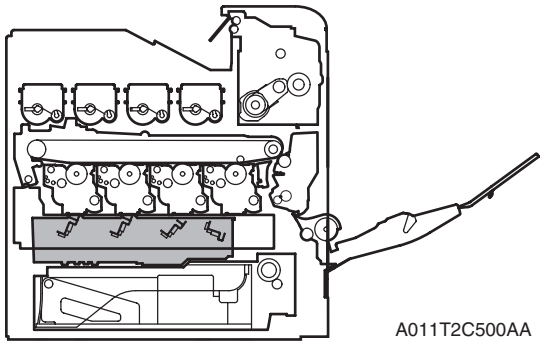


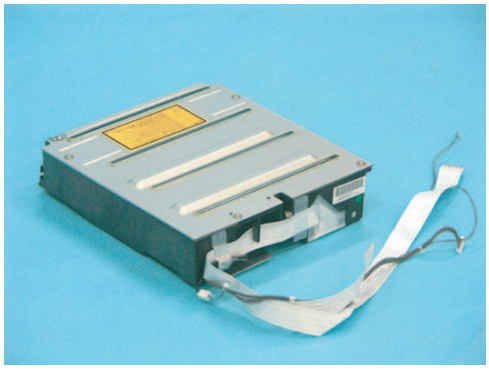
6.2 Control block diagram



7. Write section

7.1 Composition





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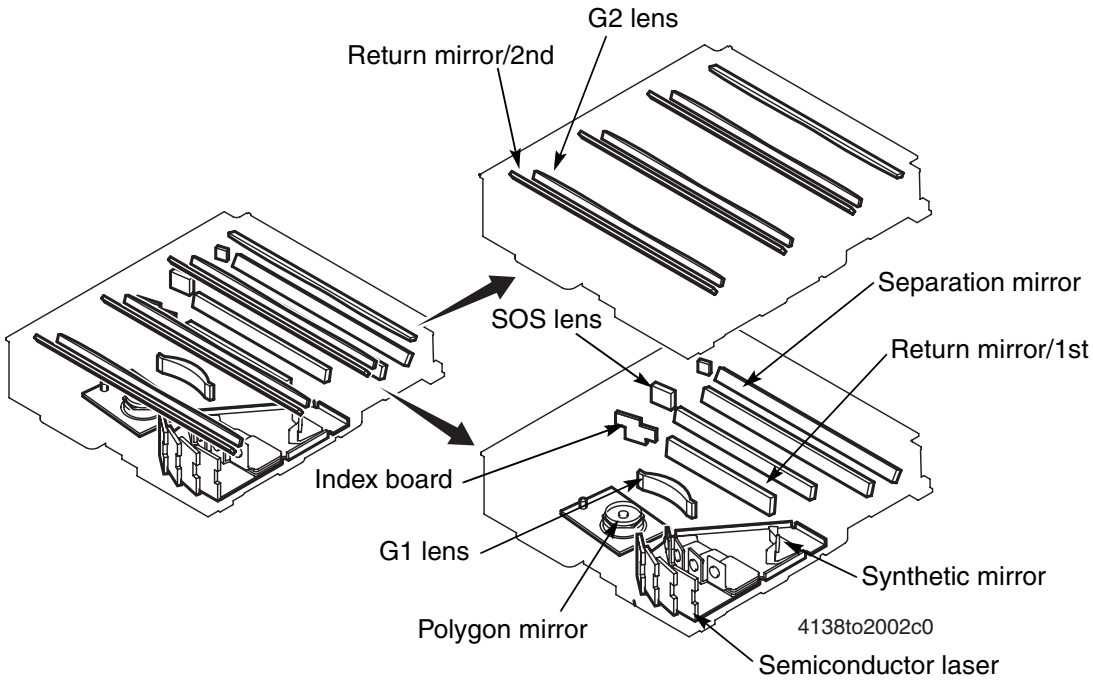


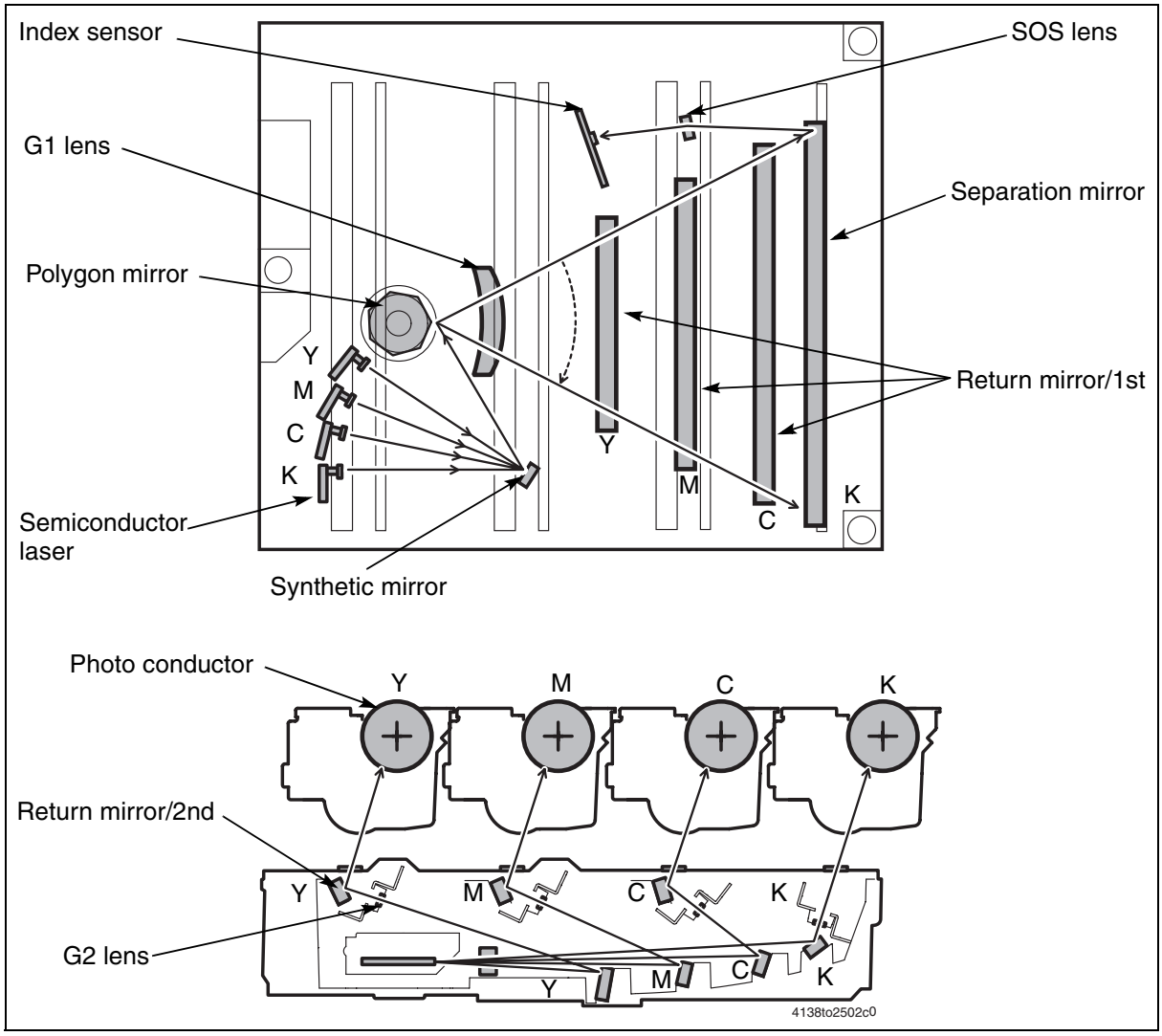
7.2 Operation

7.2.1 Overview

- Four semiconductor lasers provided, one for each of the four different colors. A single polygon motor is used to make a scan motion.
- Each photo conductor is irradiated with a laser light so that an electrostatic latent image is formed on it.

7.2.2 Laser exposure process

1. The laser light emitted by each of the semiconductor laser/Y, M, C, and K is reflected onto the polygon mirror via the synthetic mirror.
2. Since the angle of incidence for each color of laser light varies, the laser light reflected by the polygon mirror is reflected at a different angle for each color.
3. The condensing angle of each color of laser light is corrected by the G1 lens before reaching each return mirror.
4. The K laser light is condensed on the surface of the photo conductor through the separation mirror and G2 lens.
5. The Y, M, or C laser light is condensed on the photo conductor through the separation mirror, G2 lens, and return mirror.



7.2.3 Laser emission timing

- When a ready signal is detected after the lapse of a given period of time after the print cycle has been started, a laser ON signal is output from the MFP board.
- The laser ON signal triggers the firing of each laser light, which illuminates the index board via the polygon mirror, G1 lens, separation mirror (K), and SOS lens. This generates an SOS signal.
- This SOS (Start of Scan) signal unifies the timing at which the laser lights are irradiated for each main scan line.
- The SOS signal is generated only from the K laser light. For the other colors, the emission timing is determined with reference to K.

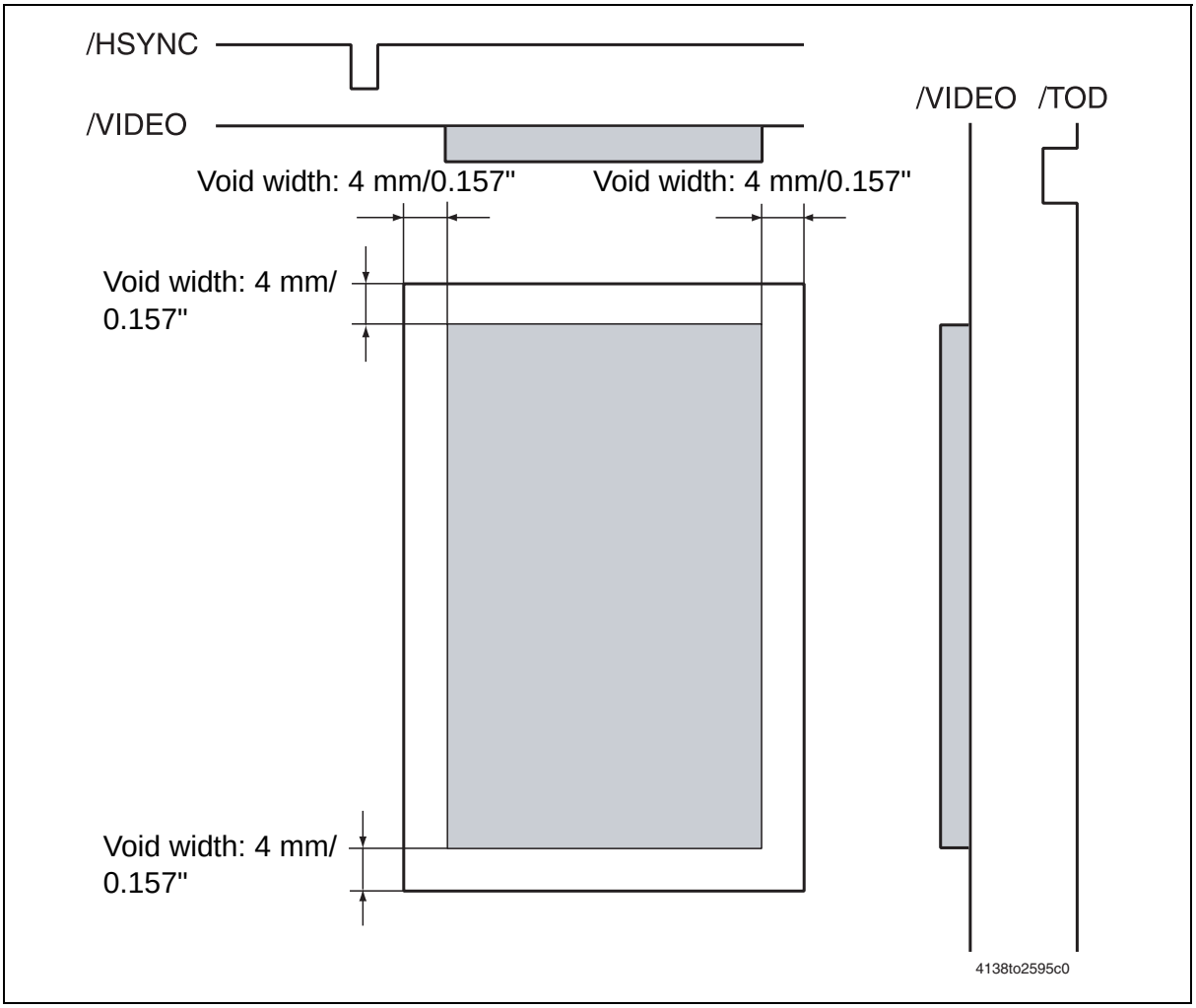
7.2.4 Laser emission area

A. Main scan direction (FD)

- The print start position in the FD direction is determined by the FD print start signal (HSYNC) that is output from the MFP board and the width of the media.
- The laser emission area is determined by the media size. However, there is a 4 mm/0.157" wide void area on both the both edges of the media.

B. Sub scan direction (CD)

- The print start position in the CD direction is determined by the CD print start signal (TOD) that is output from the MFP board and the length of the media. However, there is a 4 mm/0.157" wide void area on both edges of the media.
- The laser emission area is determined by the media size. However, there is a 4 mm/0.157" wide void area on both the leading and trailing edges of the media.



7.2.5 Laser light intensity control

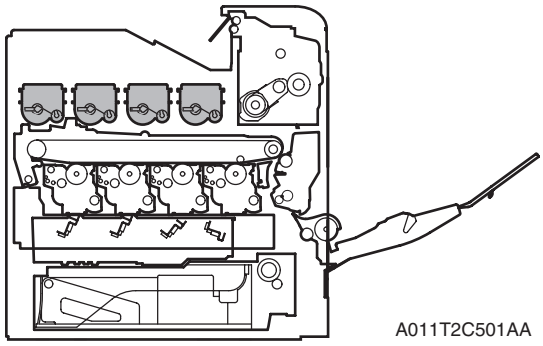
- The laser light intensity control corrects the target level of fluctuations in fine line reproduction and reverse image (white on black) reproduction that occur due to variations in photo conductor electrostatic characteristics, developing characteristics, and transfer characteristics (part-to-part variations, environment, durability).
- It is controlled integrally with other control items by the image stabilization control.
- The laser light intensity control is performed when there is a request made for execution of an image stabilization sequence.

7.2.6 Registration correction control

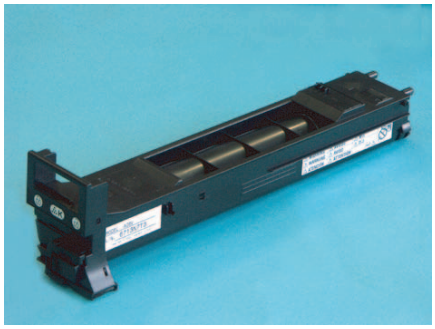
- In a tandem engine that has an image forming process for each color of toner, incorrect color registration tends to occur due to variations in parts of the main body used for regulating the drawing positions. The registration correction control automatically detects and corrects this incorrect color registration.
- It is controlled integrally with other control items by the image stabilization control.
- The registration correction control is performed when there is a request made for execution of image stabilization sequence.

8. Toner supply section

8.1 Composition



A011T2C501AA



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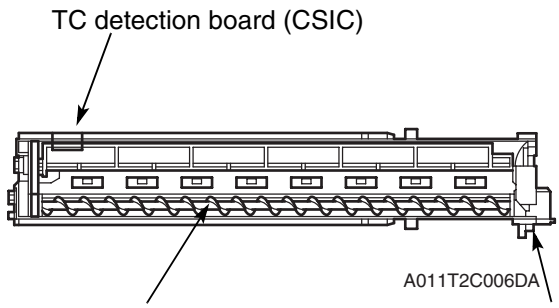
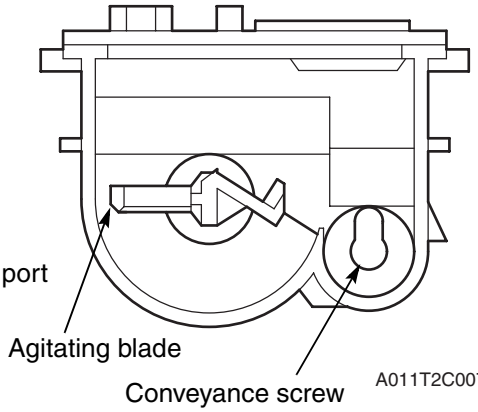


A011T2C006DA



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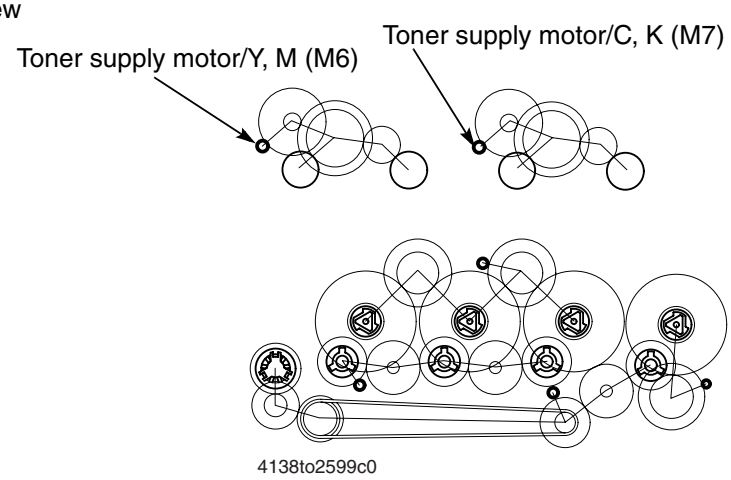
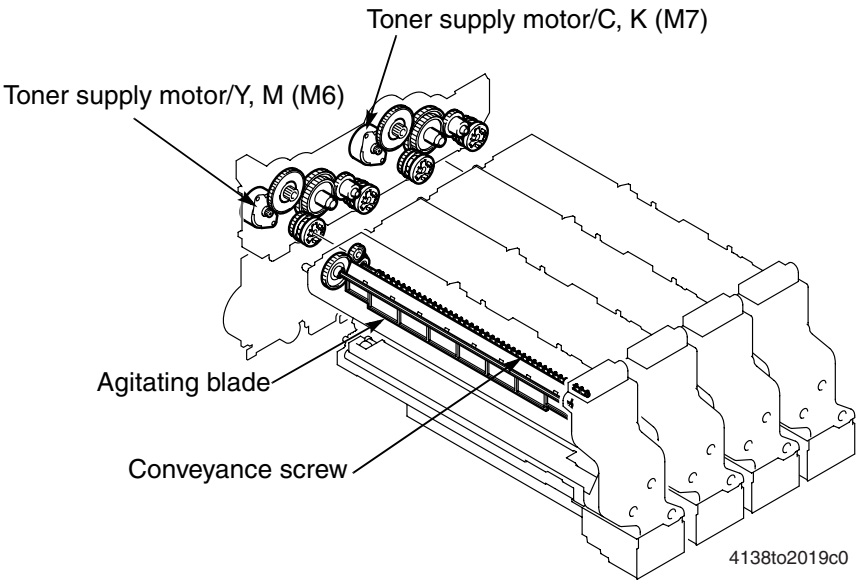
8.2 Drive

Front view



3D view



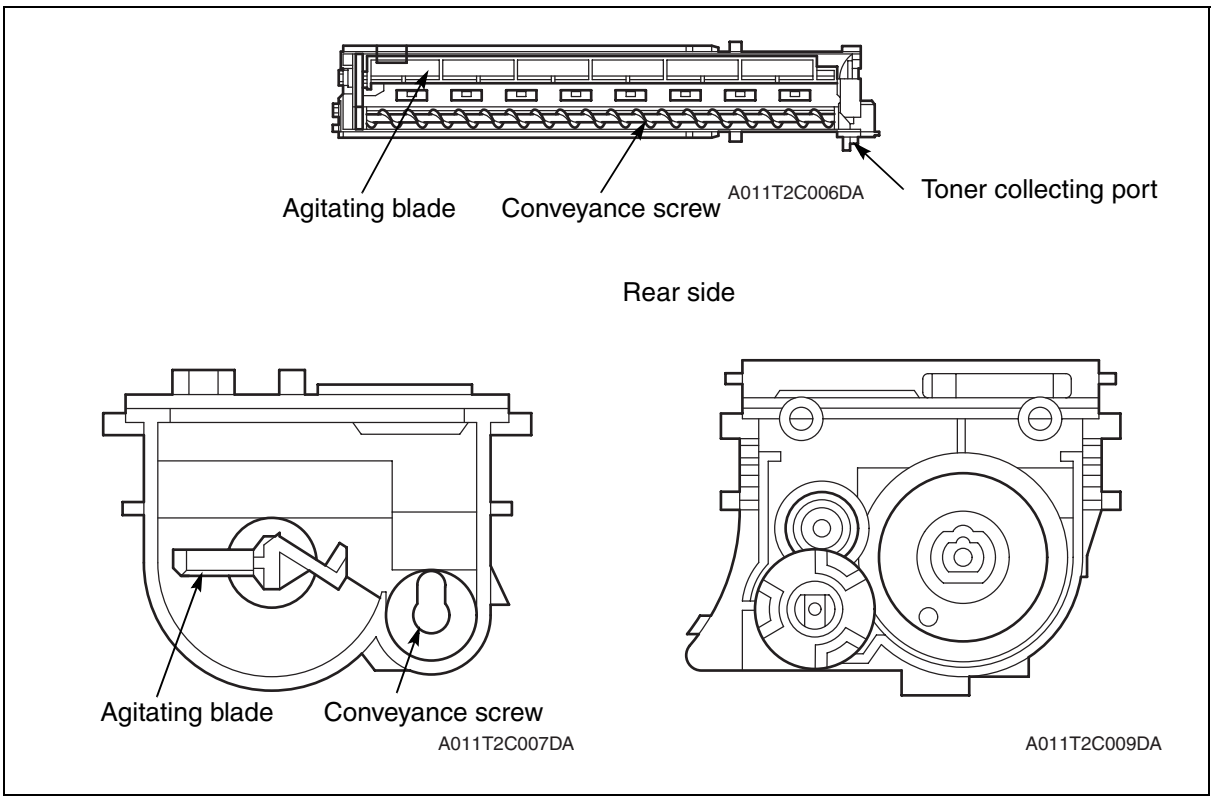
8.3 Operation

8.3.1 Toner cartridge capacity

- There are three different types of toner cartridges which contain a different toner amount.
- Toner cartridges shipped with main body: Quantity equivalent to 3,000 printed pages (Not equipped with TC detection board)
- Standard-capacity toner cartridges: Quantity equivalent to 6,000 printed pages
- High-capacity toner cartridges: Quantity equivalent to 12,000 printed pages

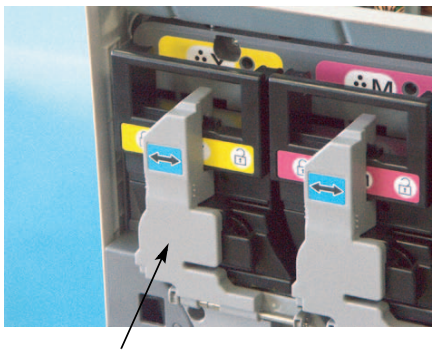
8.3.2 Toner conveying mechanism

- The toner supply motor is turned either forward or backward to drive the agitating blade and the conveyance screw.
- The agitating blade provided in the toner cartridge agitates and conveys toner to the conveyance screw.
- The toner conveyed by the agitating blade is conveyed to the toner collecting port sitting on the front side of the main body by the conveyance screw.

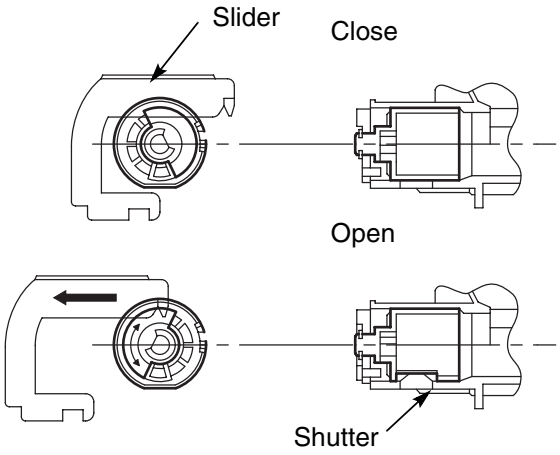


8.3.3 Toner collecting port shutter mechanism

- The toner collecting port is equipped with a shutter mechanism that prevents toner from being spilled out when the toner cartridge is removed from the main body.
- After installing the toner cartridge into the main body, placing the print unit release lever in its locked position opens the shutter of the toner collecting port. Then toner can be conveyed to the main body.
- Moving the print unit release lever to the right or left accompanies the synchronizing movement of the slider. This makes the gear connected to the shutter rotated and then makes the shutter opened or closed.
- To prevent the front door from getting closed while the shutter is open, the preventive mechanism works in the way that the front door cannot be closed by interfering with the release lever until the release lever is placed in the locked position (to the left in the picture).



A011T2C010DA



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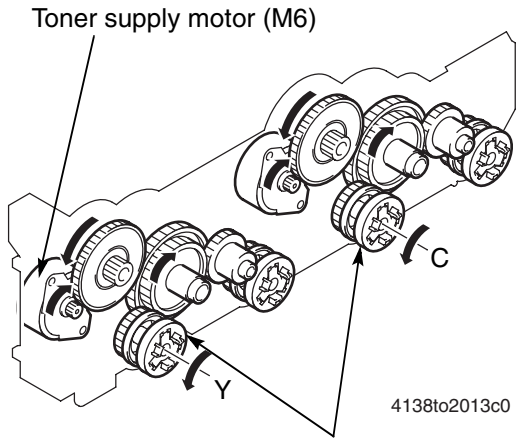
8.3.4 Toner replenishing mechanism

- The toner supply motor is energized according to the condition of the toner level sensor for each color of toner. Toner is then supplied from the toner cartridge to the print unit as necessary.
- A single toner supply motor is turned either forward or backward to accomplish supply of toner of two different colors (one motor is for Y and M, and the other for C and K). That is, M (K) toner cannot be supplied while Y (C) toner is being supplied.
- Toner is supplied only while the print unit is being driven. This is because of the following reason: if toner is supplied from the toner cartridge while the print unit remains stationary, toner stagnates at the print unit.

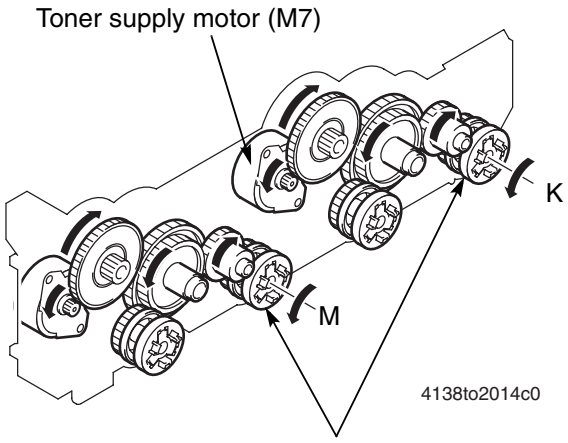
Toner supply motor	Direction of rotation (as viewed from above of motor shaft)	Toner supply (Agitating blade/conveyance screw)			
		Y	M	C	K
/Y, /M (M6)	Forward (clockwise)	Turned	Stationary	Stationary	Stationary
	Backward (counterclockwise)	Stationary	Turned	Stationary	Stationary
/C, /K (M7)	Forward (clockwise)	Stationary	Stationary	Turned	Stationary
	Backward (counterclockwise)	Stationary	Stationary	Stationary	Turned

When the motor turns forward



Y/C one-way clutch turns.

When the motor turns backward



M/K one-way clutch turns.

8.3.5 Toner level detection

- The toner level is determined by the accumulated time of rotation of the toner supply motor.
- The toner level can be checked through MENU/PRINT MENU/STATISTICS PAGE.

8.3.6 Toner near-empty condition detection

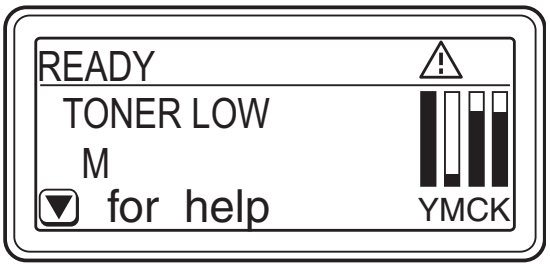
- The cumulative period of time through which the toner supply motor is energized is detected as the basis for determining whether there is a toner near-empty condition.
- The main body is designed to indicate a toner near-empty condition when the toner level remaining in the toner cartridge becomes approx. 40 percent.

Toner cartridge	Toner level (Targeted percent)	Pages that can be printed after toner near-empty detection (Targeted number of pages) *
Toner cartridge shipped with main body: Quantity equivalent to 3000 printed pages	40%	Approx. 1,200 sheets
Standard toner cartridge: Quantity equivalent to 6000 printed pages		Approx. 2,400 sheets
High-capacity toner cartridge: Quantity equivalent to 12,000 printed		Approx. 4,800 sheets

* for a standard original of a 5% coverage rate

- A toner near-empty condition is reset when a new toner cartridge is detected.

Display example: Toner near-empty indication (Magenta)



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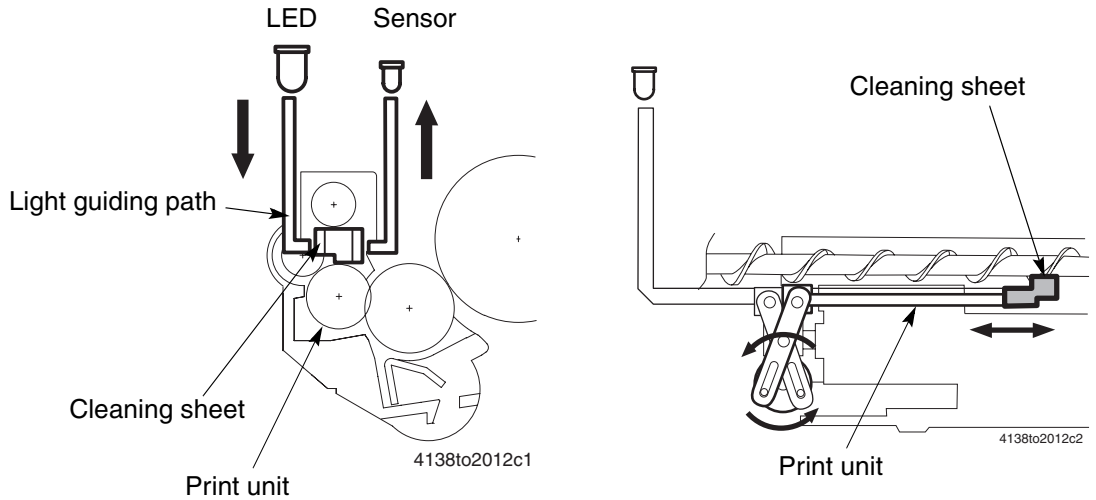
8.3.7 Toner empty condition detection

A. Toner empty condition detection mechanism

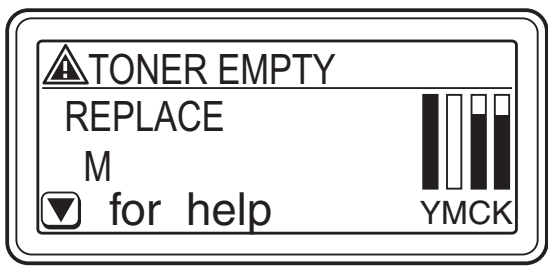
- The print unit has a toner empty condition detecting mechanism.
  Based on the amount of toner conveyed from the toner cartridge to the print unit, a toner empty condition is detected.
- A toner level in the print unit is detected by the LED and toner level sensor mounted on the toner level sensor board provided in the main body.
- Light emitted from the LED travels through the light guiding path and is guided into the print unit.
- The toner level sensor detects the intensity of the transmitted light guided through the light guiding path from the inside of the toner cartridge. The toner level is thereby estimated.
- To ensure correct detection of the intensity of transmitted light by the toner level sensor, a cleaning sheet is provided that cleans the window in the light guiding path periodically.



8.3.8 Toner empty condition detection control

- A sequence is started for detecting a toner empty condition when a toner near-empty condition is detected. (In starter cartridges shipped with a main body, the toner empty detection control always functions.)
- The main body determines that there is a toner empty condition when the toner level sensor output value remains below a predetermined value and if the following event is detected a predetermined number of consecutive times: the output value of the toner level sensor remains a predetermined value or lower for more than a predetermined period of time.
- The consecutive detection count is retained even when power is turned OFF.
- A toner empty condition is reset when a new toner cartridge is detected.

Display example: Toner empty indication (Magenta)



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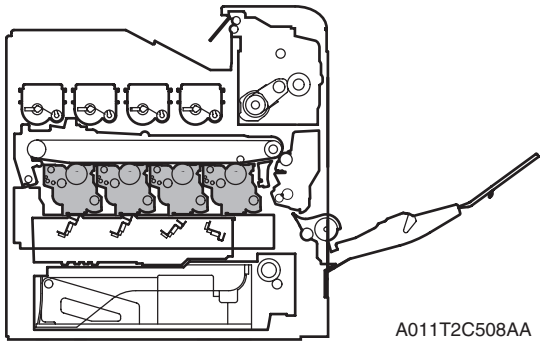
8.3.9 Toner cartridge life control

- Each toner cartridge is provided with a TC detection board that detects state of a toner cartridge placement, a new TC, a toner near-empty condition, and a toner empty condition.

9. Print unit section (overall composition)

9.1 Composition



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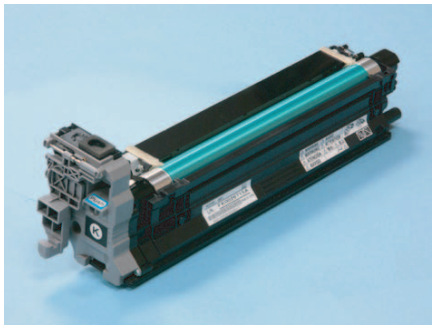

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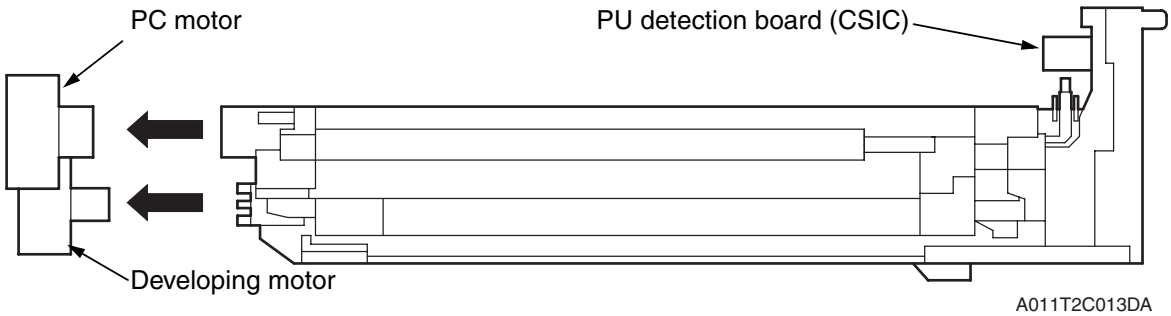

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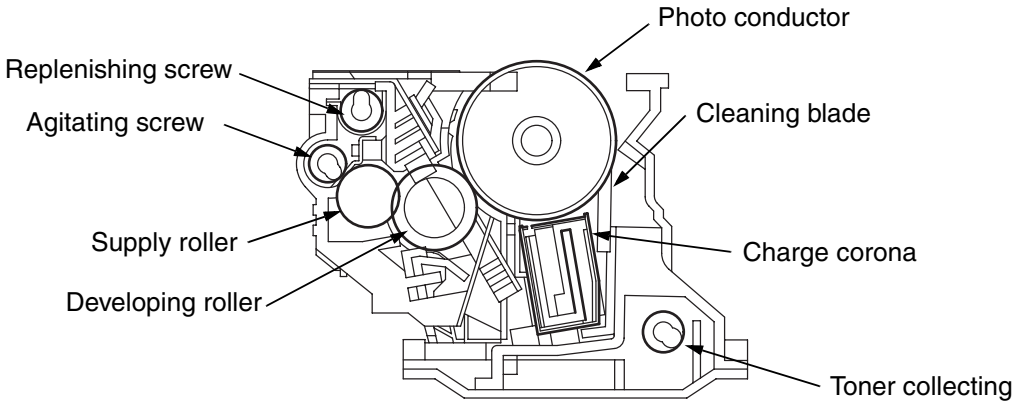

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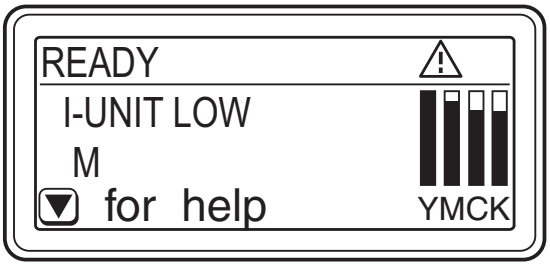
9.2 Operation

9.2.1 Print unit life detection

- Based on the photo conductor driving time, the cartridge life is determined.
- When the photo conductor driving time reaches its near life, the near life warning message appears.
- The main body is designed to indicate a near life condition when the life remaining in the print unit becomes 40 percent of the total 30,000 sheets after approx. 18,000 sheets have been printed.
  * for a standard original of a 5% coverage rate
- Approx. 12,000 pages can be printed at 5 % coverage with use of standard originals during the period of time that begins when a near-life condition is detected and ends when a life condition is detected.
- The near life display function can be disabled through System menu/Warning detection/I-unit near life. (Initial setting: Display)
- When the photo conductor driving time reaches its life time, the life warning message appears.

Display example:
Print unit near life indication (Magenta)



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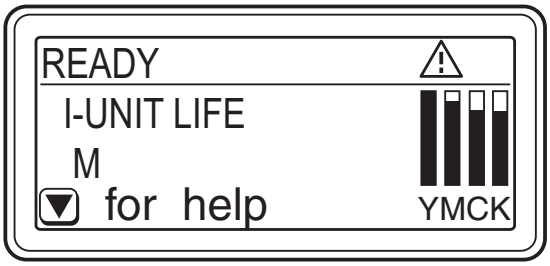
Display example:
Print unit life indication (Magenta)



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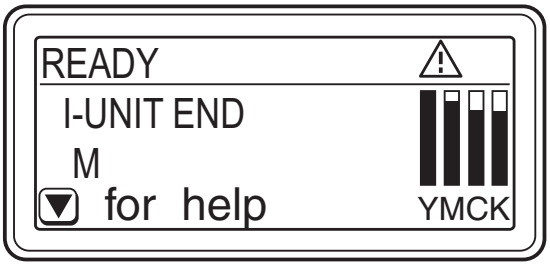
- If the photo conductor runs more than its life, a life end warning message appears. When the warning message appears, you cannot print.
- The life end message can be reset when the print unit is replaced.

Display example:
Print unit life end indication (Magenta)
(Print jobs waiting to be printed)



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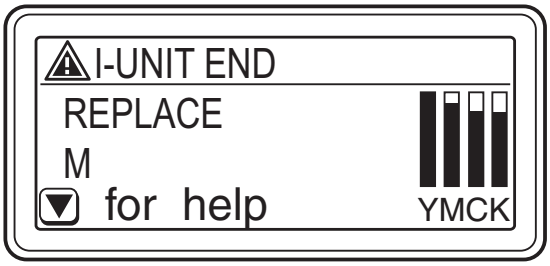
Display example:
Print unit life end indication (Magenta)
(Receiving a print job)



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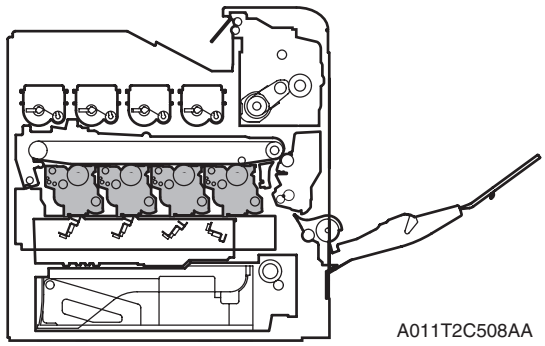
9.2.2 Print unit life control

- Each print unit is provided with a PU detection board that detects state of a toner cartridge placement, a new PU, a print unit life.
- The main body attempts to perform a detection sequence when the front door is closed.
- When a cartridge is detected as a new one, an image stabilization sequence starts.

10. Print unit section (photo conductor)

10.1 Composition



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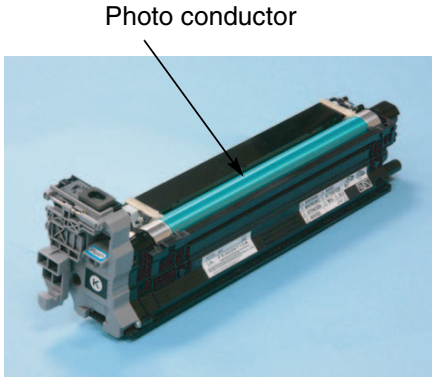

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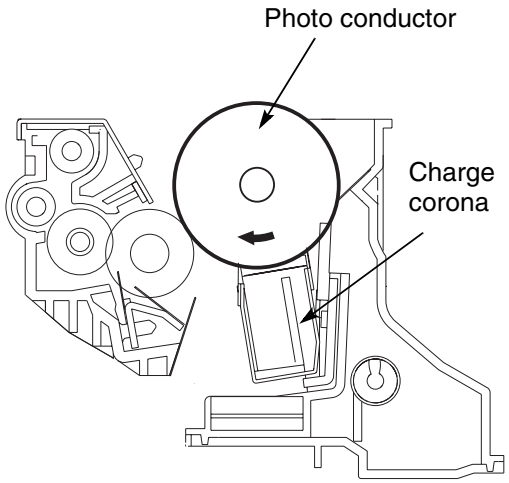

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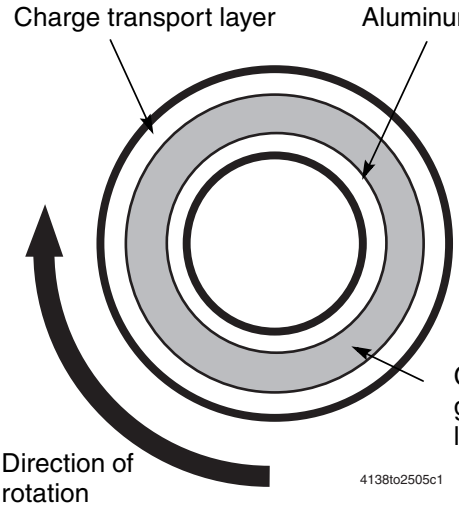

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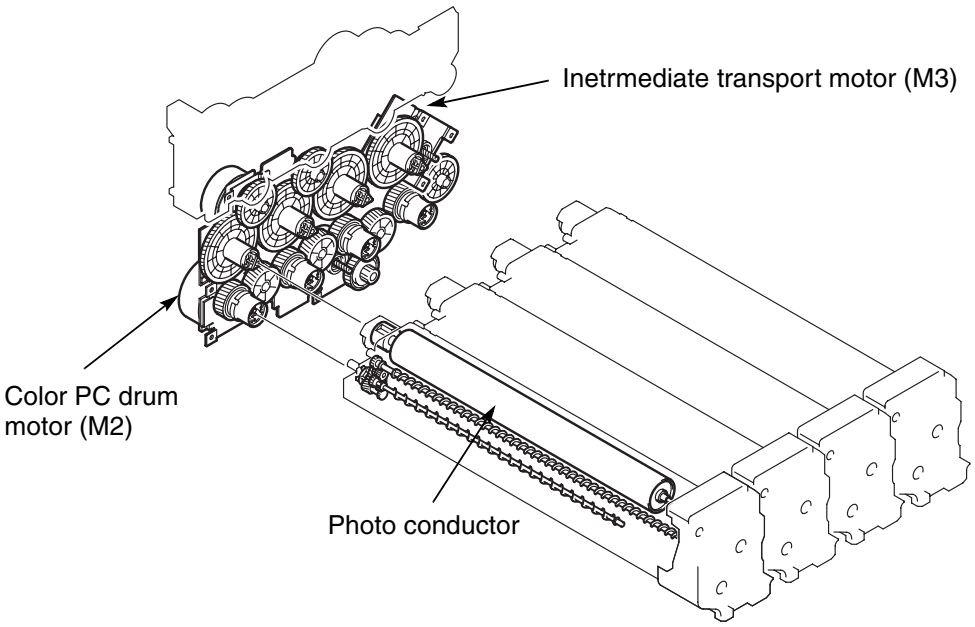
10.2 Drive



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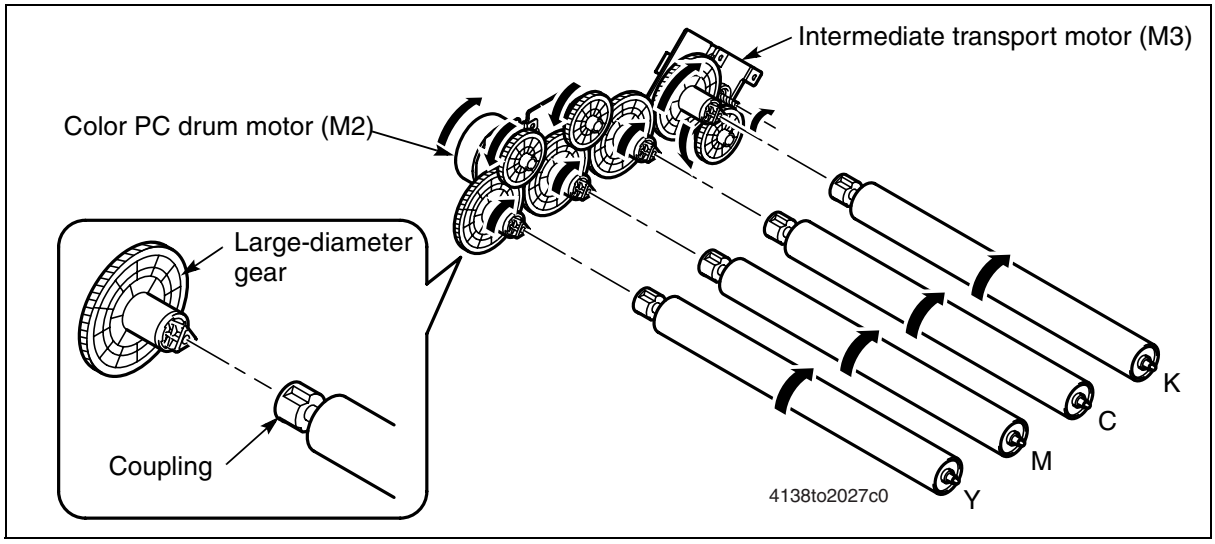
10.3 Operation

10.3.1 Photo conductor drive mechanism

- Motors are used for the drive mechanism independently of the developing system to suppress incorrect color registration and uneven pitch.
- To stop the drive for the color toner cartridges in the monochrome mode, different motors are used to drive the color photo conductors and black photo conductor.
- The color PC drum motor drives the photo conductor/Y, M, and C, while the intermediate transport motor drives the photo conductor/K.
- In addition to the photo conductor/K, the intermediate transport motor also drives the transfer system, media feed system, and synchronizing drive system.
- Gears having a large diameter are used to enhance rotating accuracy of the photo conductors.
- The use of gears having a large diameter provides a large number of gear teeth, which suppresses uneven pitch and eccentricity.
- Drive is transmitted to each of the photo conductors when the coupling on the drive end is engaged with that on the driven end.



10.3.2 Photo conductor post-exposure control

- The entire surface of the photo conductor is exposed to light before the photo conductor stops rotating during the stop sequence or color change sequence (from the color print to monochrome print) after a print cycle.
- Ozone stagnant in areas near the charge corona unit is adsorbed on the surface of the photo conductor. This reduces sensitivity of the photo conductor, causing white bands to occur in the image.
- To prevent this image failure from occurring, the entire surface of the photo conductor is exposed to light and thus neutralized. This effectively prevents the surface of the photo conductor from absorbing ozone.

10.3.3 Photo conductor total exposure control upon recovery

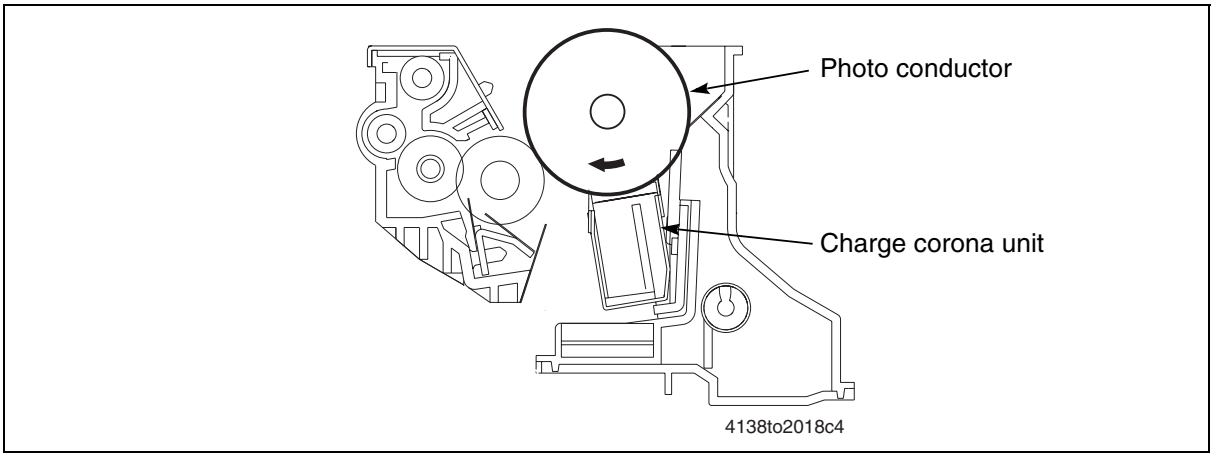
- If the “Photo conductor post-exposure control” described above is not correctly done, the entire surface of the photo conductor is exposed to light, thereby preventing ozone from being adsorbed on the surface of the photo conductor.
- If the “Photo conductor post-exposure control” is not performed due to a media misfeed or malfunction, the entire surface of the photo conductor is exposed to light at the same time that the “2nd transfer roller cleaning control” is performed during the recovery procedure from the media misfeed or malfunction.

10.3.4 Photo conductor small amount rotation control

- Ozone stagnant in areas near the charge corona unit reduces sensitivity of the photo conductors, causing white bands to occur in the image.
- To prevent this image problem, the photo conductor is turned so as to allow its surface facing the charge corona unit to deviate, thereby preventing the surface sensitivity from being reduced.

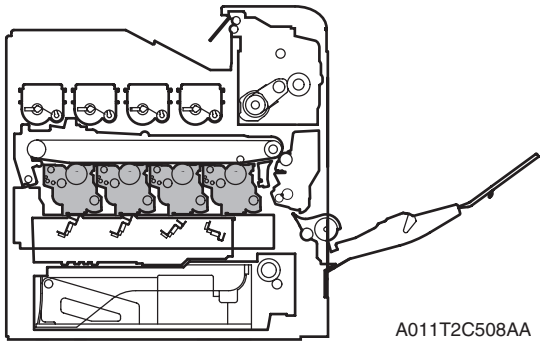
A. Photo conductor small amount rotation timing

- The number of execution sequences is determined when the post process following a print cycle is completed. The control is executed while the color PC drum motor or intermediate transport motor is in the standby state.
- If the color photo conductors need to be turned a small amount during the monochrome mode, the control is executed also for the color photo conductors.



11. Print unit section (charge corona)

11.1 Composition



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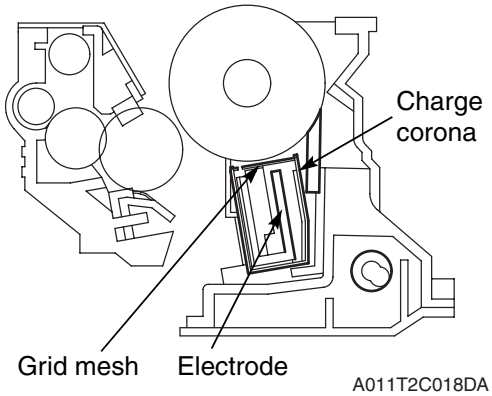

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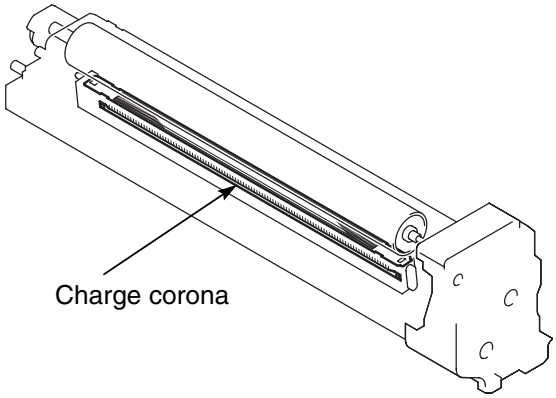

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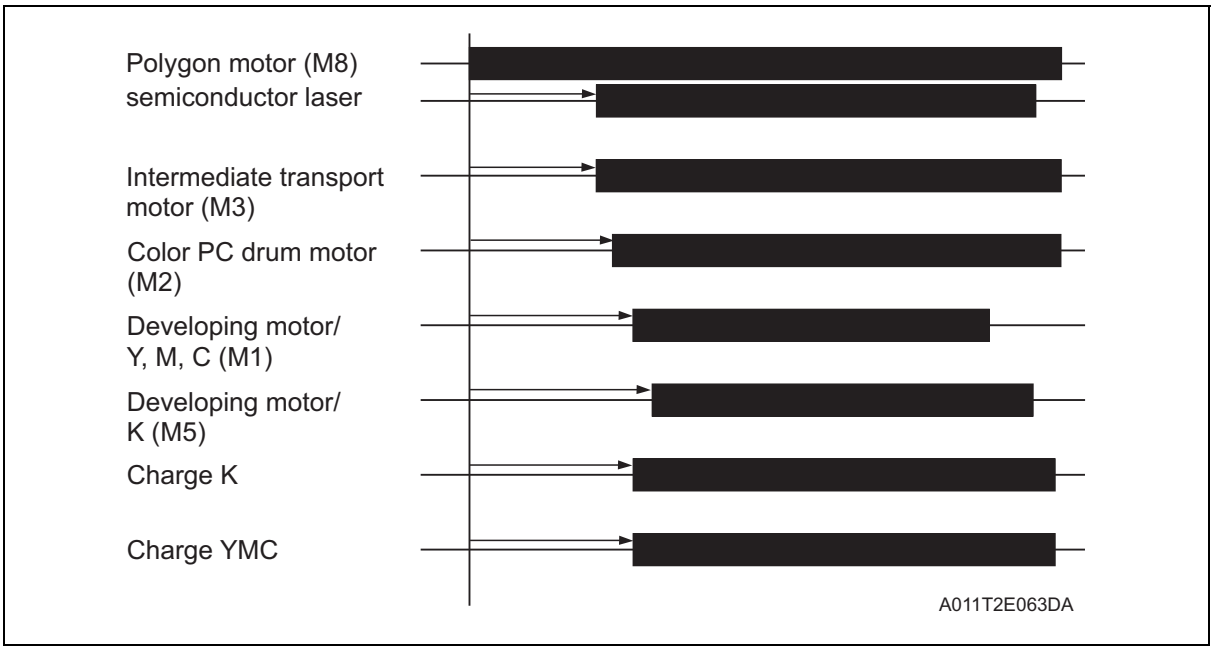
11.2 Operation

11.2.1 Charge corona unit ON/OFF control



11.2.2 Output during pre-process

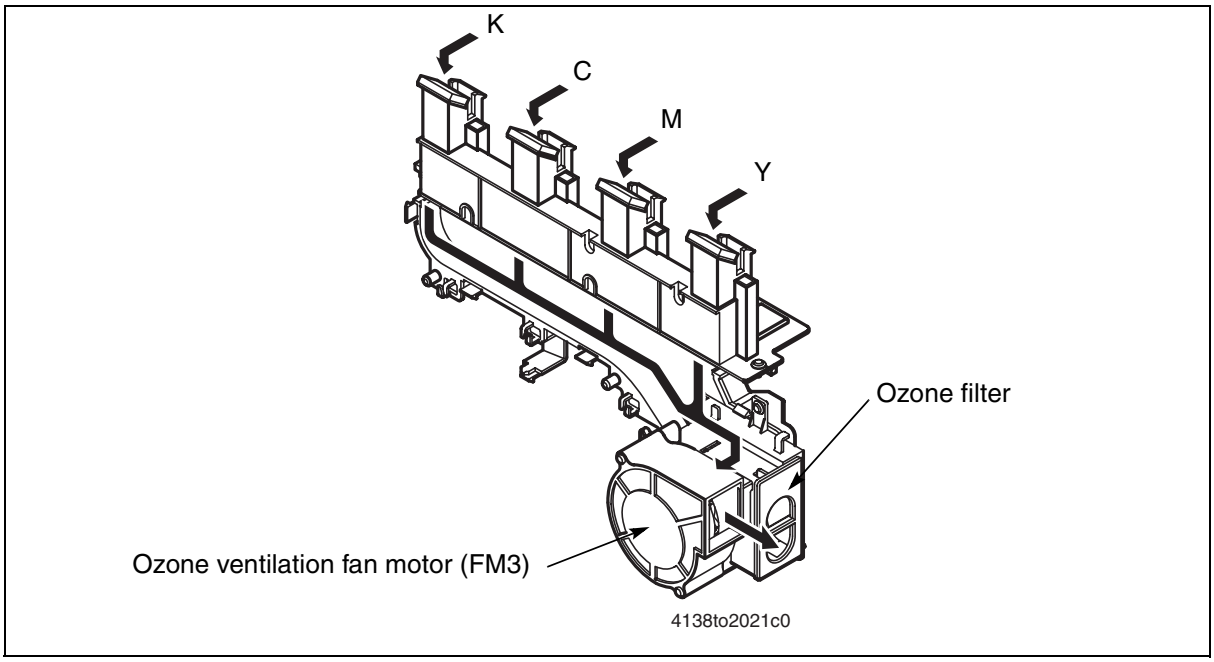
- Color mode: The charge corona voltage for all colors of toner is applied after rotation of the color PC drum motor has stabilized.
- Monochrome mode: The charge corona voltage for K is applied after rotation of the intermediate transport motor has stabilized.
- Image formation is possible for the area, to which the charge corona voltage is applied.

11.2.3 Output during post-process

- The output of the charge corona voltage is shut down when the entire exposed area of the photo conductor moves past the charge corona section after the 1st transfer process has been completed.

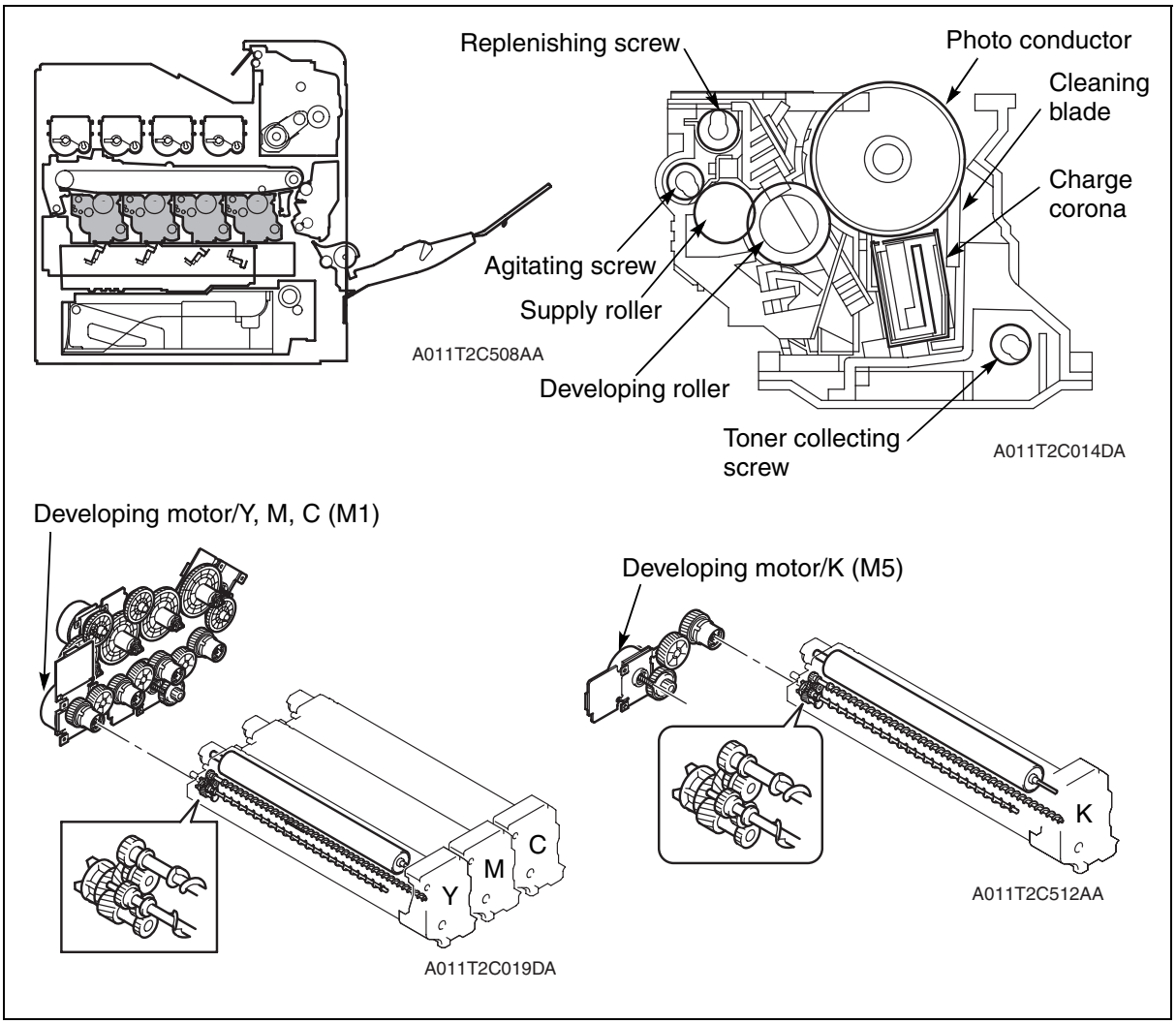
11.2.4 Ozone ventilation mechanism

- Ozone stagnant in areas near the charge corona unit reduces sensitivity of the photo conductor, causing white bands to occur in the image.
- The ozone filter is used to remove ozone produced by the charge corona unit, thereby preventing sensitivity of the photo conductor surface from being degraded.
- The urethane rubber affixed to the side face of the charge corona unit is brought into contact the photo conductor, which makes the charge corona unit in tight contact with the photo conductor.
- Outside air is drawn in through the opening provided at the front end of the charge corona unit and is discharged together with ozone through the opening provided in the rear.
- The ozone ventilation fan motor located in the rear of the main body draws air to allow the discharged ozone to be removed by the ozone filter.
- The ozone ventilation fan motor is kept energized for 3 min. after the print cycle has been completed.
- The ozone ventilation fan motor also functions to cool down the print head.



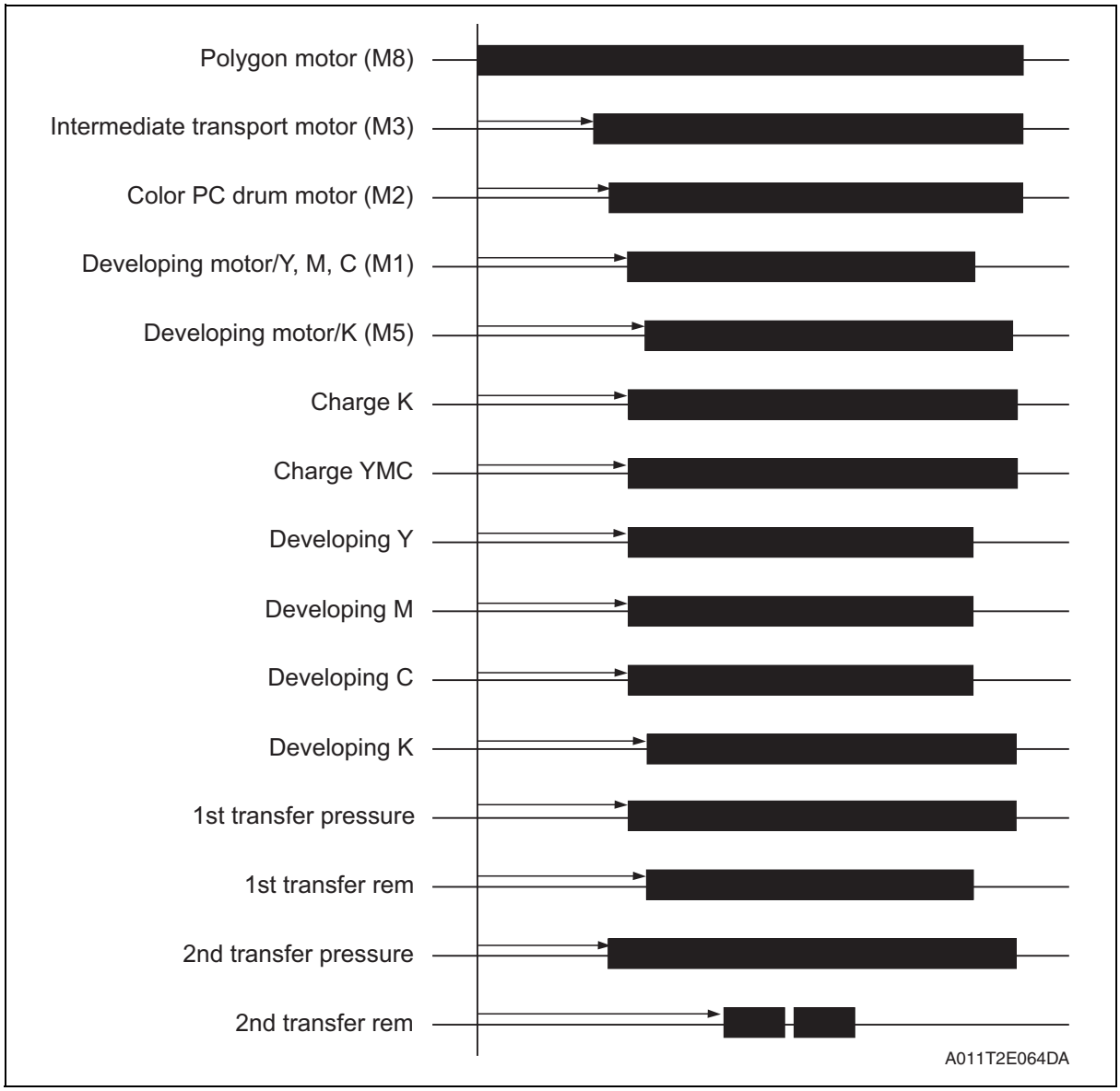
12. Print unit section (developing)

12.1 Composition



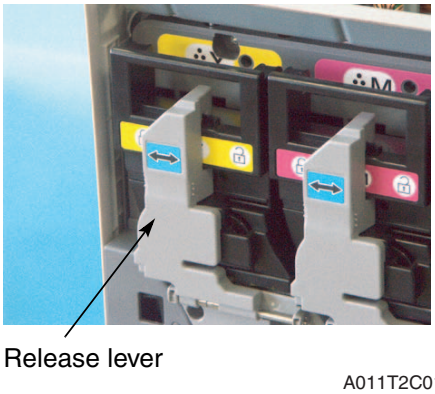
12.2 Operation

12.2.1 Developing drive control



12.2.2 Toner collecting port shutter mechanism

- The toner collecting port is equipped with a shutter mechanism that prevents toner from being spilled out when the print unit is removed from the main body.
- After installing the print unit and the toner cartridges into the main body, locking the print unit release lever opens the collecting port shutter. Then toner can be replenished from the toner cartridges.
- Moving the print unit release lever to the right or left accompanies the synchronizing movement of the slider. This makes the shutter opened or closed.
- To prevent the front door from getting closed while the shutter is open, the preventive mechanism works in the way that the front door cannot be closed by interfering with the release lever until the release lever is placed in the locked position (to the left in the picture).



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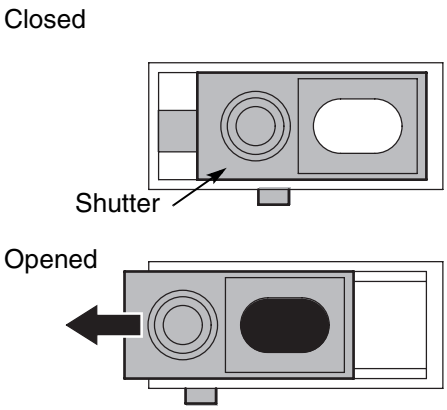

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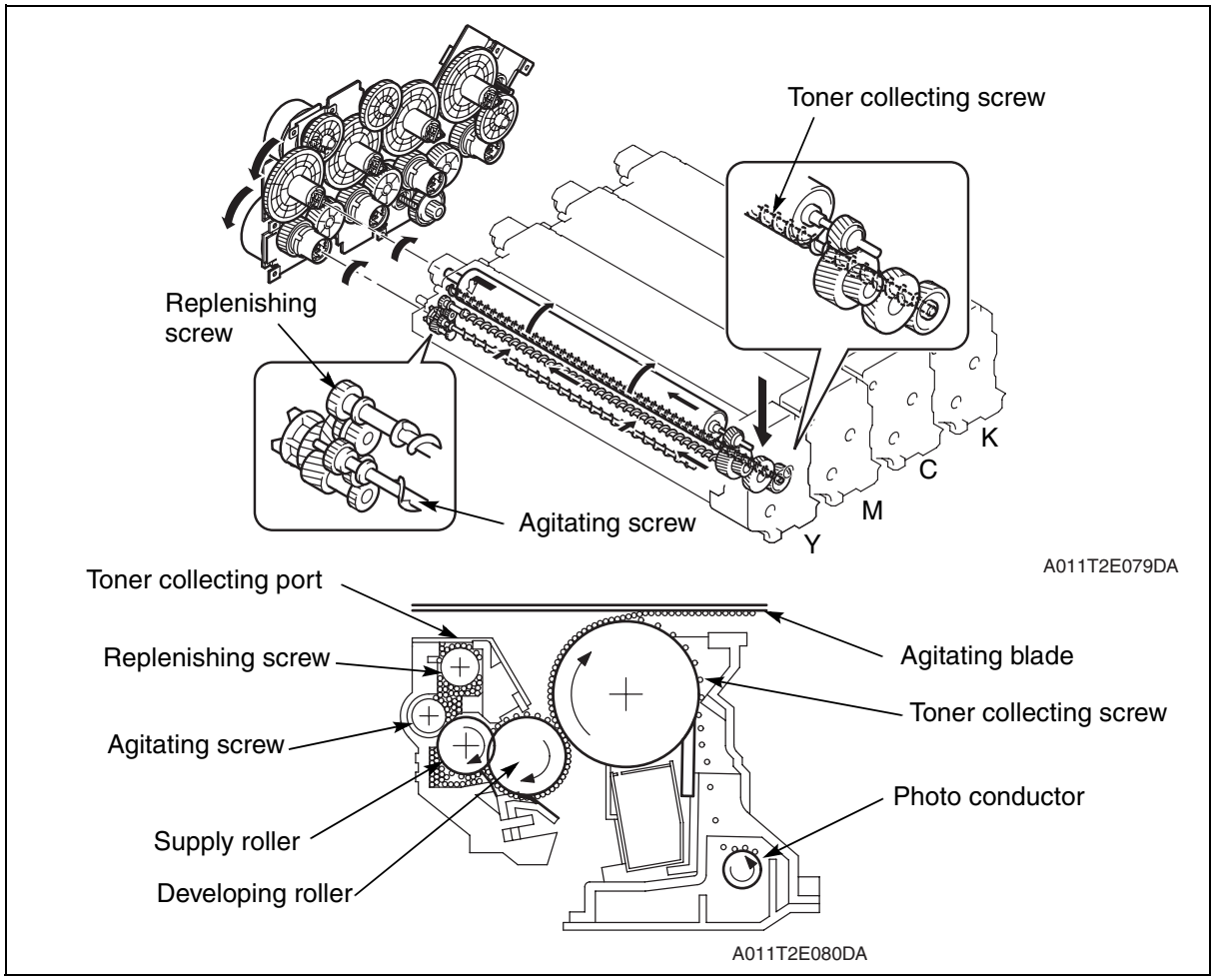
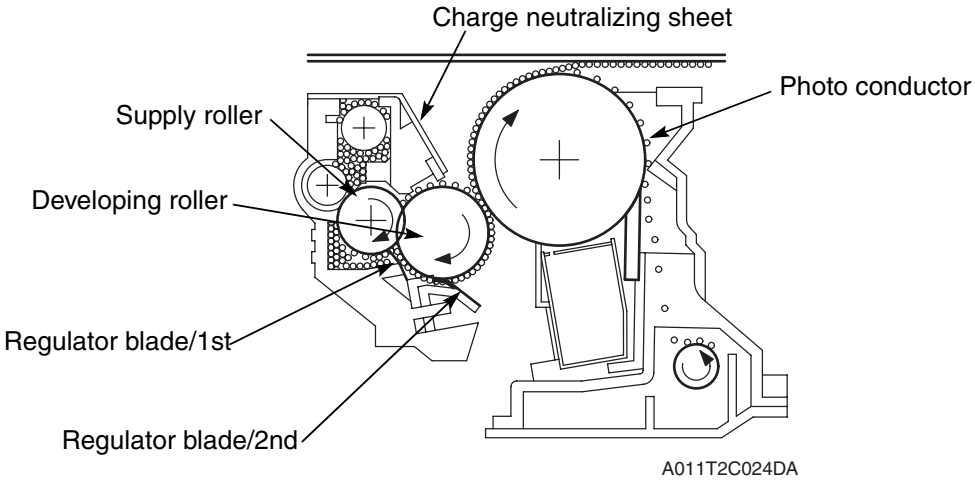
12.2.3 Toner flow

1. Toner stored in the toner cartridge is agitated by the agitating blade and conveyed onto the front side of the toner cartridge by the conveyance screw.
2. Toner conveyed onto the front side of the toner cartridge is conveyed through the toner collecting port and then conveyed to the print unit collecting port.
3. The toner conveyed to the collecting port is conveyed into the toner chamber by the replenishing screw.
4. The toner level detection system provided on the front side of the developing unit (the sensor is mounted on the main body side) detects, at this time, the level of toner still available for use in the toner chamber.
5. The toner conveyed to the toner chamber is agitated (charged) by the replenishing screw and agitating screw.
6. Toner conveyed onto the rear side of the toner chamber is fed to the supply roller.
7. Toner fed to the supply roller is conveyed onto the developing roller.
   At this time, the regulator blade/1st and /2nd regulate the height of toner on the surface of the developing roller.
8. Toner on the developing roller is fed to the electrostatic latent image formed on the surface of the photo conductor.
9. Toner left on the developing roller is neutralized and returned to the supply roller.
10. The toner on the surface of the photo conductor is transferred onto the transfer belt.
11. Toner left on the surface of the photo conductor is scraped off by the cleaning blade.
12. The toner scraped off by the cleaning blade is conveyed to the waste toner conveyance section by the toner collecting screw.
13. The toner conveyed by the toner collecting screw is conveyed and stored as waste toner in the waste toner bottle.



12.2.4 Developing system

- Two types of developing systems are used, a non-contact developing system and an alternating current application system.
  1. A negative charge (supply bias voltage Vr) is applied the supply roller to regulate the amount of toner sticking to the developing roller.
  2. A negative charge (blade bias voltage Vb1) is applied to the regulator blade/1st to negatively charge the toner and form a thin layer of toner.
  3. Toner on the surface of the developing roller is evened out by the regulator blade/ 2nd.
  4. During development, DC + AC developing bias voltage (Vb) is applied to developing roller. The AC component of the developing bias voltage is applied only during development. At any time other than the development, only the DC component of the developing bias voltage is applied.
  5. Toner sticks to the photo conductor when the AC component of the developing bias voltage (Vpp) is negative. The voltage and time length of the negative component (Vpp) determines the image density.
  6. A negative charge (charge neutralizing bias voltage: same potential as the developing bias) is applied to the charge neutralizing sheet to neutralize any toner left on the surface of the developing roller. The neutralized toner is returned to the supply roller.



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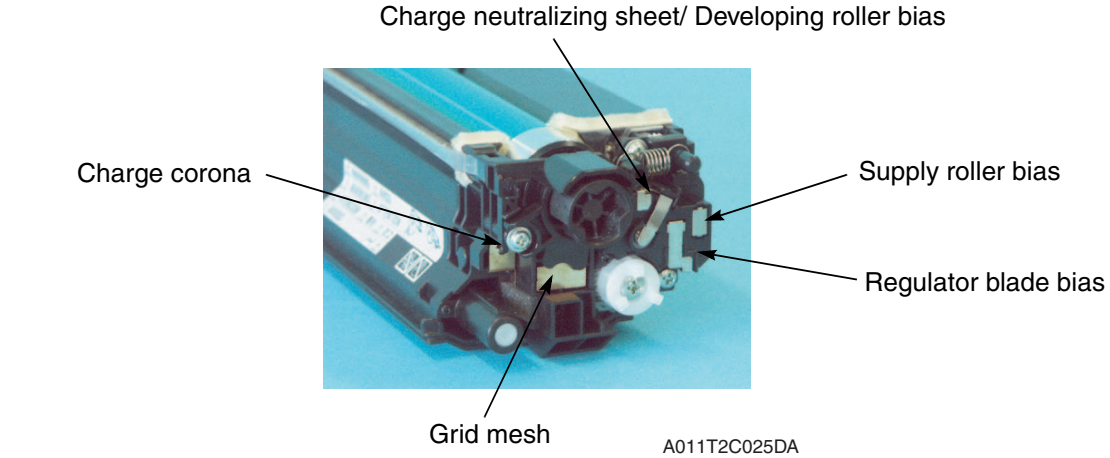

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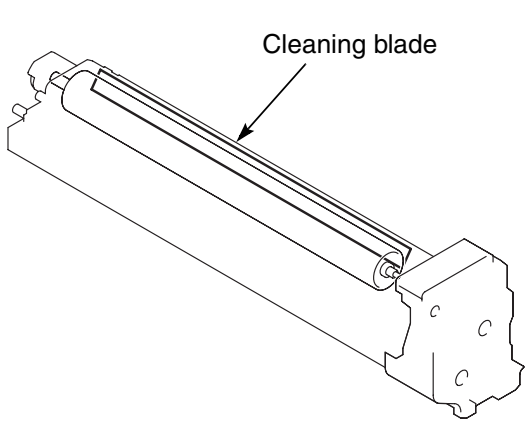
12.2.5 Cleaning mechanism

A. Cleaning operation

1. The cleaning blade is pressed against the surface of the photo conductor to remove toner left off the surface (fixed blade system).
2. The toner, which has been scraped off by the cleaning blade, is conveyed by the toner collecting screw and collected in the waste toner transport section.



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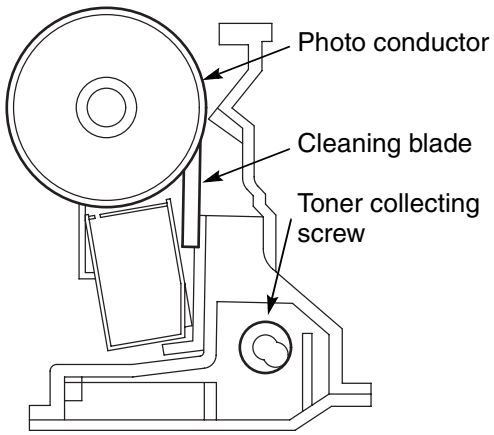

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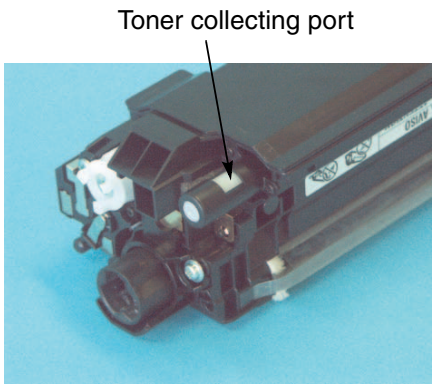
12.2.6 Toner collecting port shutter mechanism

- The toner collecting port is equipped with a shutter mechanism that prevents toner from being spilled out when the print unit is removed from the main body.
- When the print unit is installed into the main body, the shutter of the toner collecting port opens and toner can be discharged from the print unit.



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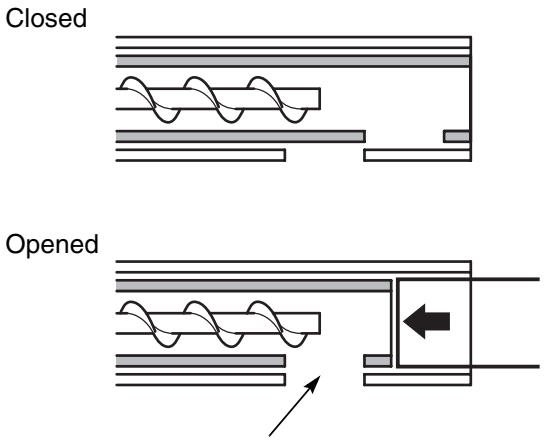

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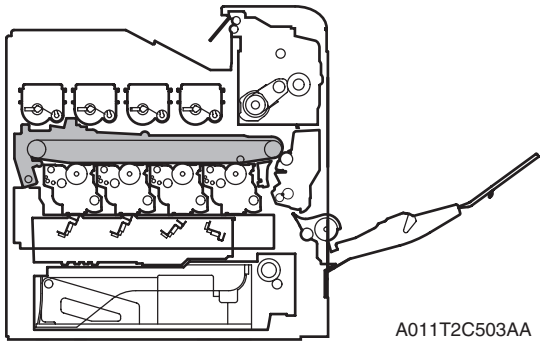
13. Transfer section (1st transfer)

13.1 Composition



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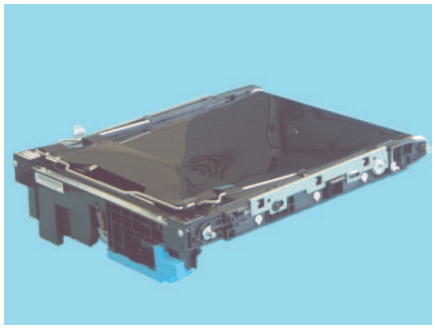

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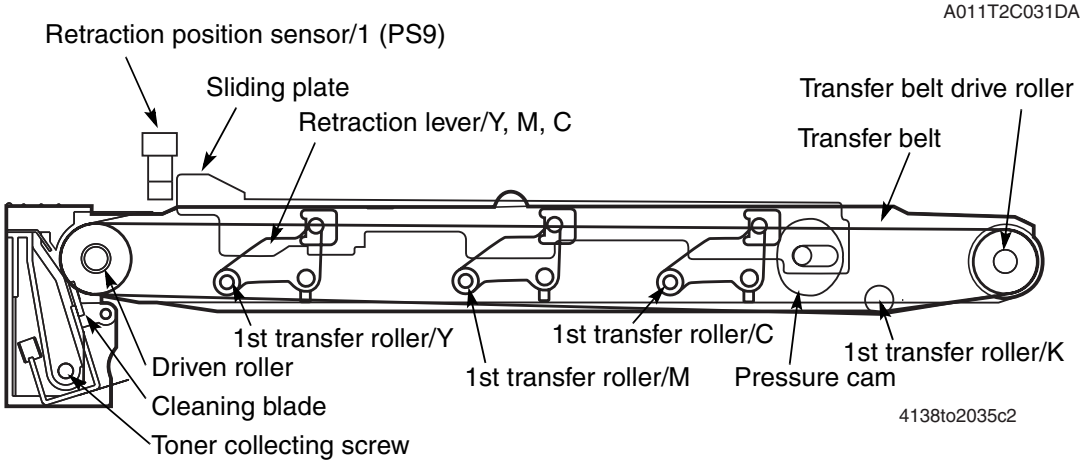

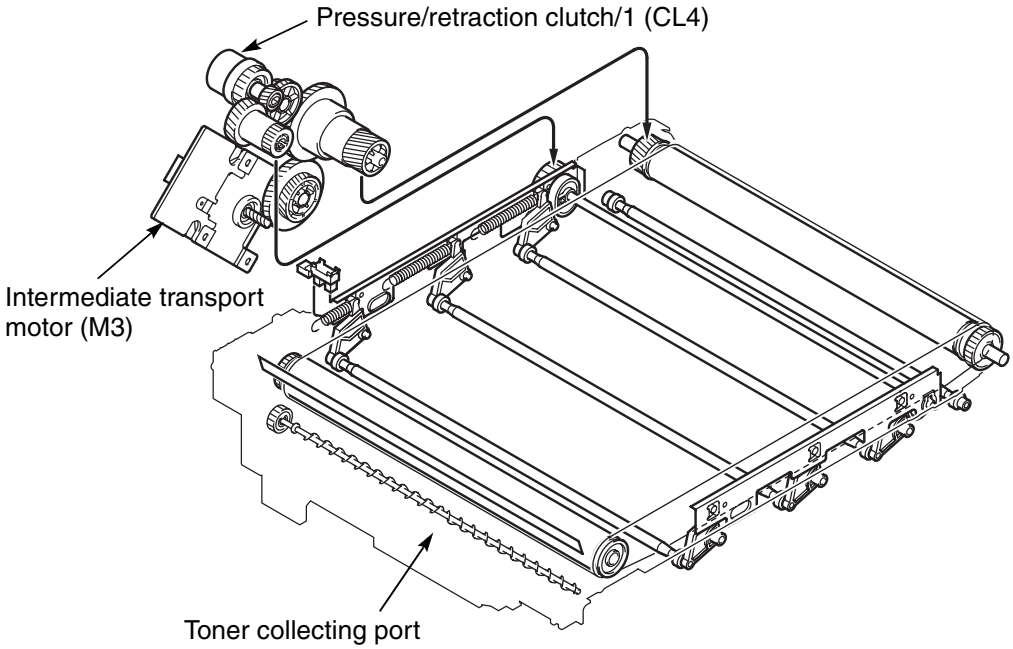

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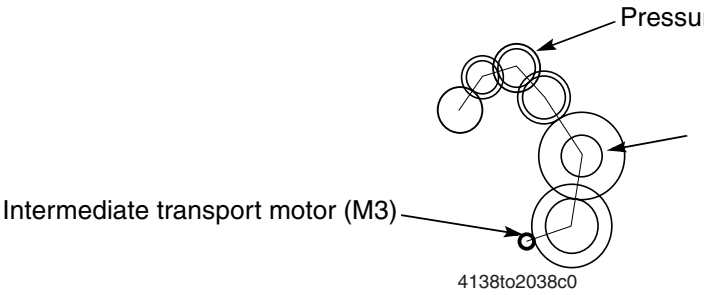
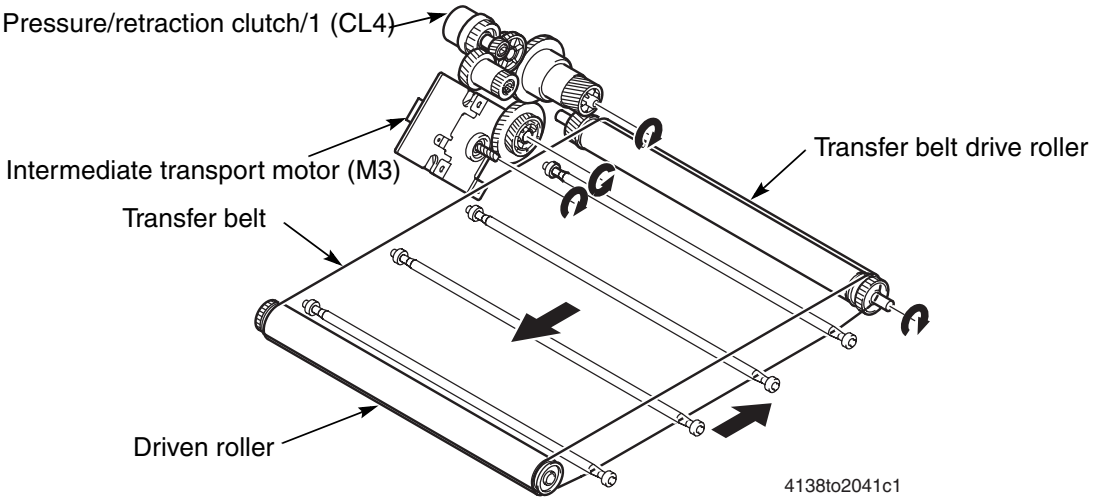
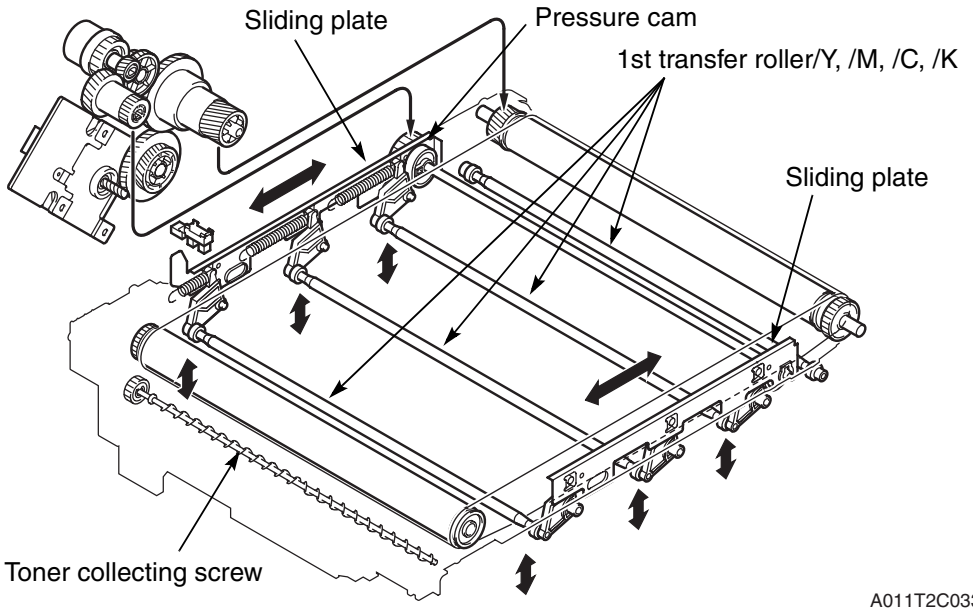
13.2 Drive



Mechanism for driving the belt



Mechanism for driving the pressure/retraction motion



13.3 Operation

13.3.1 1st transfer output control

- To transfer the toner image from the photo conductor to the transfer belt, the transfer voltage is applied to the 1st transfer roller.
- A charge of the same potential is applied to each of the 1st transfer rollers.
- The transfer voltage is applied after the 1st transfer roller/Y, M, C is pressed against the transfer belt for color mode.
- The transfer output is turned OFF after the last image moves past the 2nd transfer section.

13.3.2 1st transfer roller pressure/retraction control

- To extend the service life of the photo conductor/Y, M, C, the pressure position of the 1st transfer roller is changed between the monochrome mode and the color mode.
  The 1st transfer roller/K is not provided with a retraction mechanism; the transfer belt is pressed against the photo conductor/K at all times.
- The intermediate transport motor provides the drive for pressure/retraction operation of the 1st transfer roller/Y, M, C.

A. Monochrome mode

- The 1st transfer roller/Y, M, C is moved inward the unit (for retraction) and the photo conductor/Y, M, C is stopped. The transfer roller is moved (retracted) and the photo conductor is stopped also in the ordinary standby state.

B. Color mode

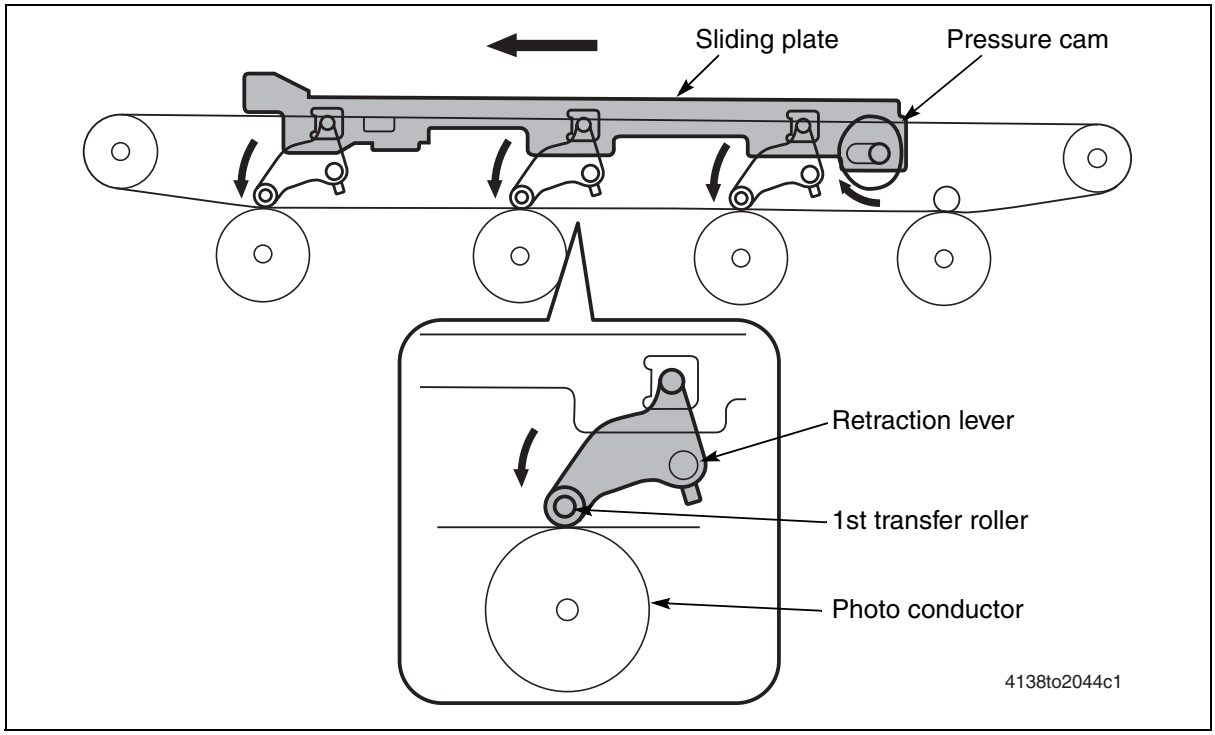
- During the 1st transfer in the color mode, the 1st transfer roller/Y, M, C is moved toward the photo conductor (pressed) so that transfer belt is pressed against the photo conductor.

C. Others

- The transfer roller is moved (retracted) and the photo conductor is stopped in the ordinary standby state.

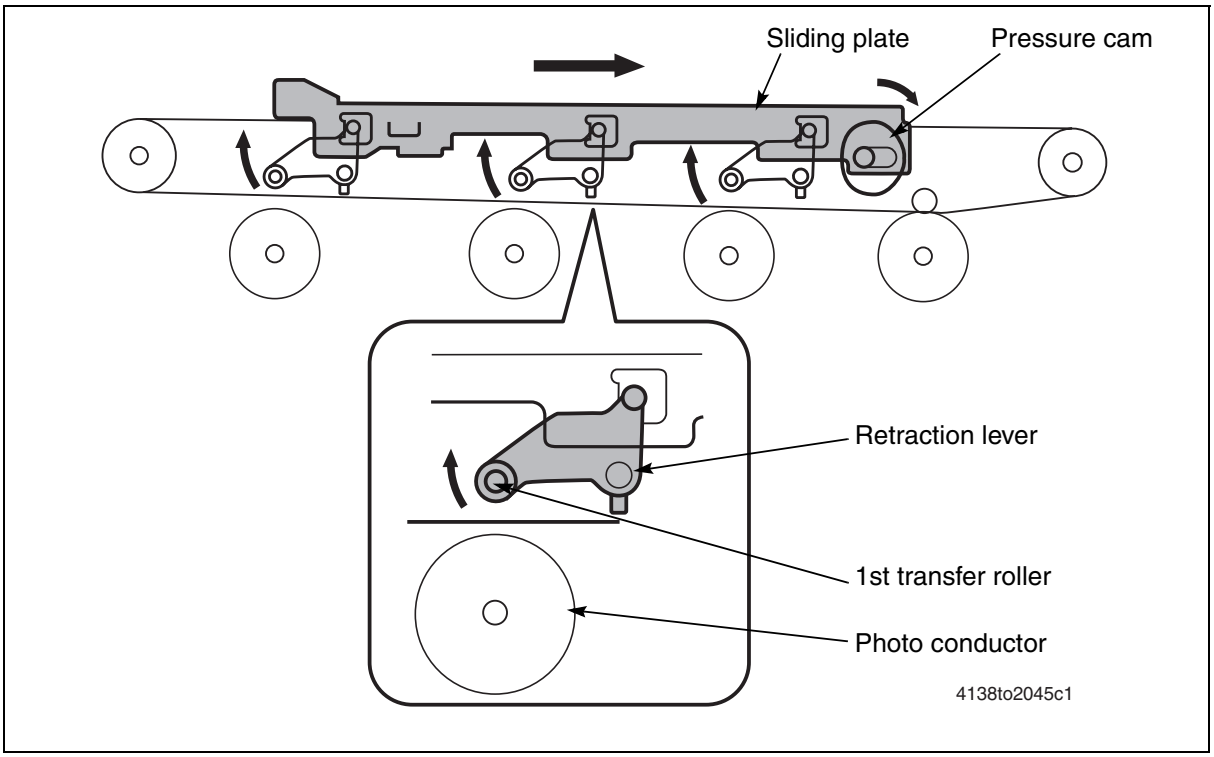
13.3.3 1st transfer roller pressure operation

1. Rotation of the intermediate transport motor is transmitted by a gear train to the pressure/retraction clutch/1.
2. Rotation of the pressure/retraction clutch/1 turns the pressure cam, which moves the sliding plate.
3. As the sliding plate moves, the retraction lever turns.
4. As the retraction lever turns, the 1st transfer roller is pressed against the transfer belt.



13.3.4 1st transfer roller retraction operation

1. Rotation of the intermediate transport motor is transmitted by a gear train to the pressure/retraction clutch/1.
2. Rotation of the pressure/retraction clutch/1 turns the pressure cam, which moves the sliding plate.
3. As the sliding plate moves, the retraction lever turns.
4. As the retraction lever turns, the 1st transfer roller is retracted from the transfer belt.



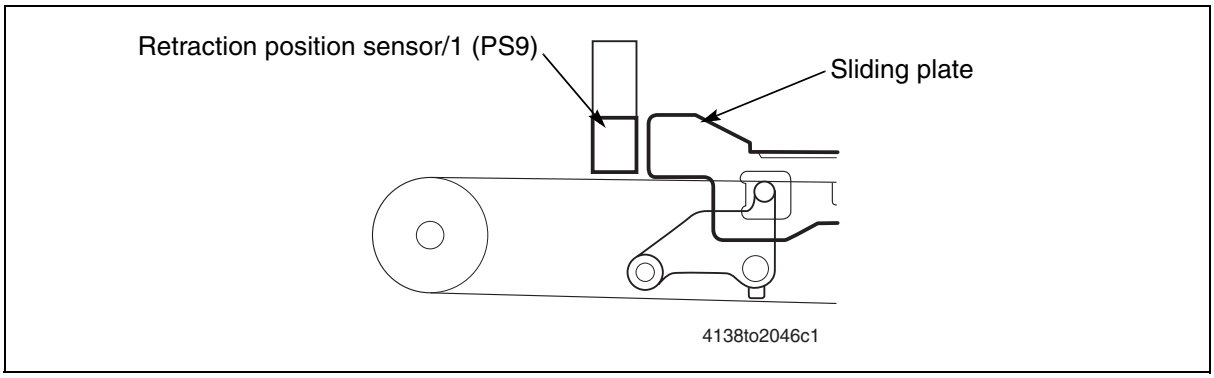
13.3.5 1st transfer roller pressure/retraction position control

A. Pressure position control

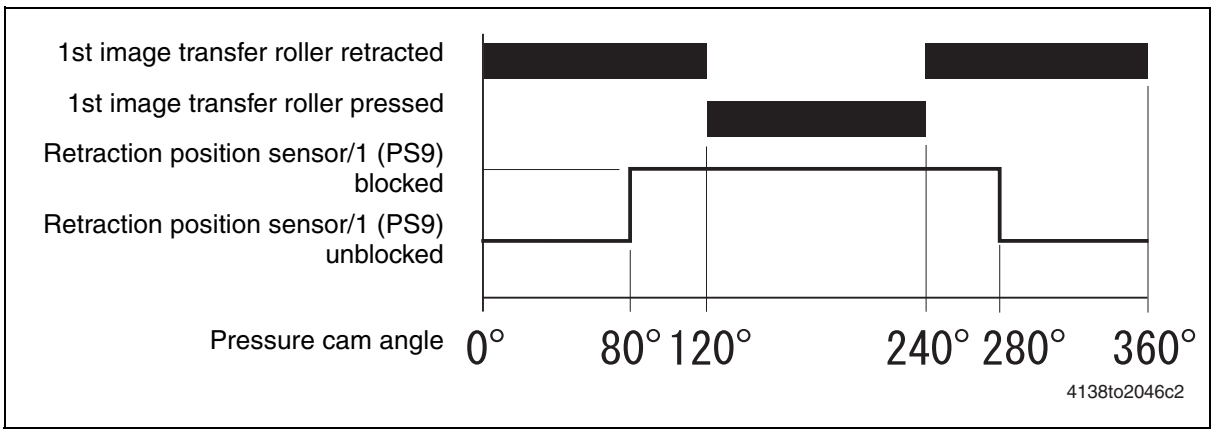
- The pressure and retraction operation of the 1st transfer roller is controlled as the retraction position sensor/1 detects the movement of the sliding plate.
  1. The pressure/retraction clutch/1 is energized.
  2. The sliding plate is moved to press the 1st transfer rollers up against the transfer belt, which blocks the retraction position sensor/1.
  3. After the lapse of a predetermined period of time after the retraction position sensor/1 has been blocked, the pressure/retraction clutch/1 is de-energized.

B. Retraction position control

- The pressure and retraction operation of the 1st transfer roller is controlled as the retraction position sensor/1 detects the movement of the sliding plate.
  1. The pressure/retraction clutch/1 is energized.
  2. The sliding plate is moved to retract the 1st transfer rollers from the transfer belt. As a result, the retraction position sensor/1, which has been blocked, is now unblocked.
  3. After the lapse of a predetermined period of time after the retraction position sensor/1 has been unblocked, the pressure/retraction clutch/1 is de-energized.

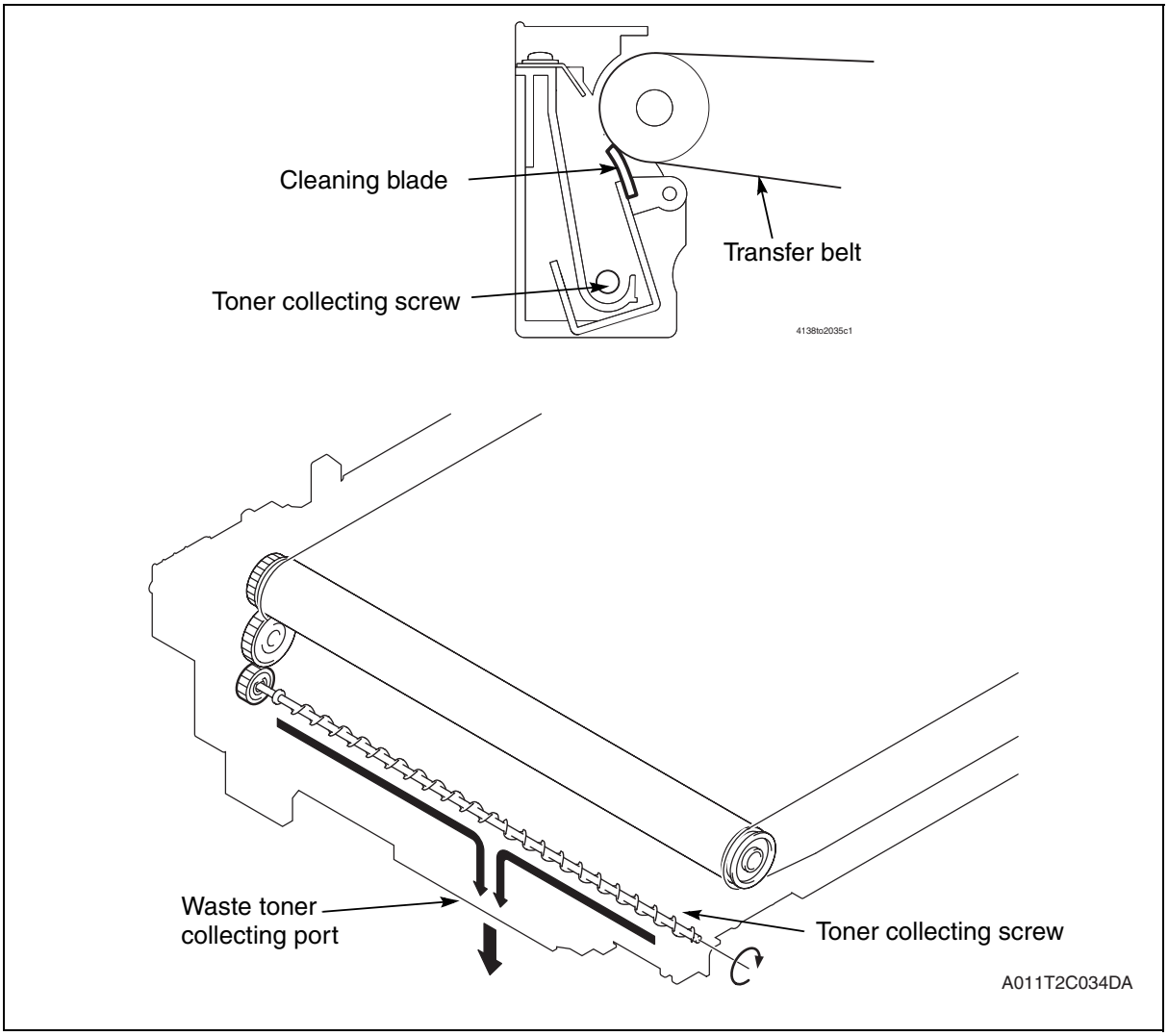


C. Pressure/retraction operation timing



13.3.6 Transfer belt cleaning mechanism

- To scrape residual toner off the surface of the transfer belt, the transfer belt is provided with a cleaning blade.
- The cleaning blade is in pressed contact with the transfer belt at all times. That is, it cleans the surface of the transfer belt as long as the belt turns.
- The toner scraped off by the cleaning blade is collected to the middle of the transfer belt by the toner collecting screw.
- The collected waste toner is conveyed through the waste toner collecting port located at the middle of the transfer belt unit and the suction transport unit, and brought to the waste toner box.

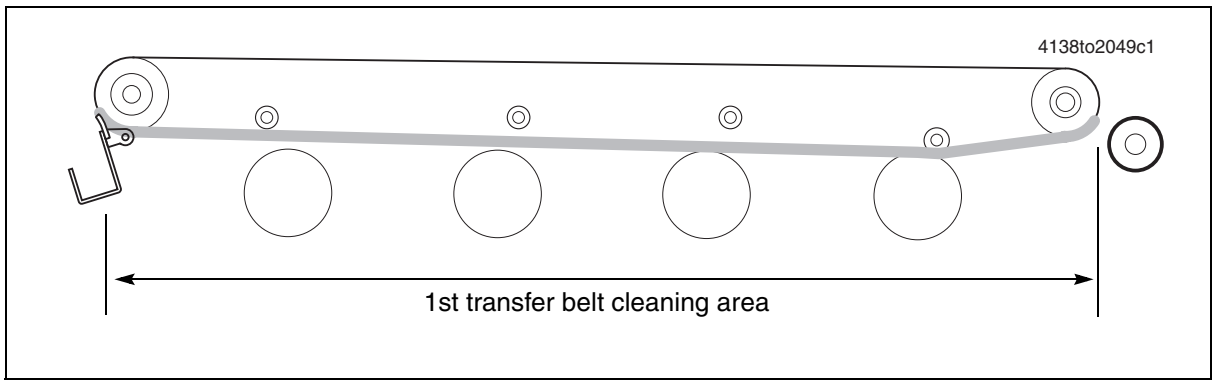


13.3.7 1st transfer belt cleaning control

- If there is a possibility of the main body being stopped with toner left on the surface of the transfer belt between the cleaning blade position and the 2nd transfer position (due to a media misfeed or malfunction), the intermediate transport motor is energized to turn the transfer belt. The residual toner is thereby removed from the transfer belt.
- No forced cleaning sequence is carried out to clean the entire surface of the transfer belt.

A. Operation timing

- The 1st transfer cleaning sequence is carried out before the 2nd transfer cleaning as part of the initial operation sequence.
- The 1st transfer cleaning sequence is carried out before the 2nd transfer cleaning operation is performed by the ATVC control system.



13.3.8 1st transfer belt backward rotation control

- To prevent media dust, toner, and other foreign matter from being wedged in the cleaning blade while the transfer belt remains stationary, the transfer belt is turned backward so that the foreign matter can be removed.
- Once the transfer belt is started turning backward, this operation takes precedence over any other request for energizing the intermediate transport motor. Such a request is honored after the backward rotation control is completed.
- The backward rotation control is not executed at high temperatures.

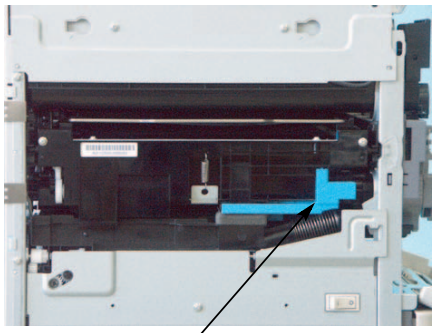
A. Operation timing

- The 1st transfer belt backward rotation is performed after a predetermined number of printed pages are produced after the execution of the last backward rotation control.

13.3.9 Toner collecting port shutter mechanism

- A shutter mechanism is provided to prevent waste toner from being spilled from the toner collecting port when the waste toner box is removed and reinstalled.
- Placing the shutter lever in the “locked” position (to the front side of the main body) closes the shutter of the toner collecting port.
- The transfer belt unit can be removed after removing the waste toner box, closing the shutter of the toner collecting port, and removing the fixing screws.
- A preventive mechanism works to stop the transfer belt unit from being removed with the toner collecting port opened. Due to the shutter lever interfering with the suction transport unit, the transfer belt unit cannot be removed until the shutter lever is placed in the locked position. Similarly, to install the transfer belt unit, the shutter lever needs to be placed in the locked position so that the shutter lever will not interfere with the suction transport unit.
- To prevent the toner collecting port shutter from leaving unopened after the installation of the transfer belt unit, installing the waste toner box pushes the shutter lever of the toner collecting port and opens the collecting port.

Unlocked



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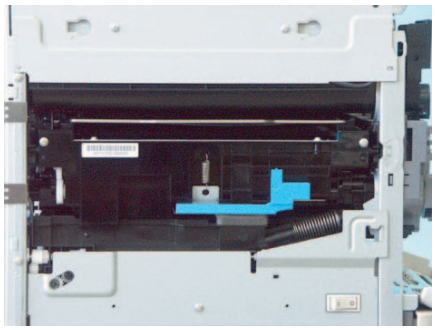
Locked



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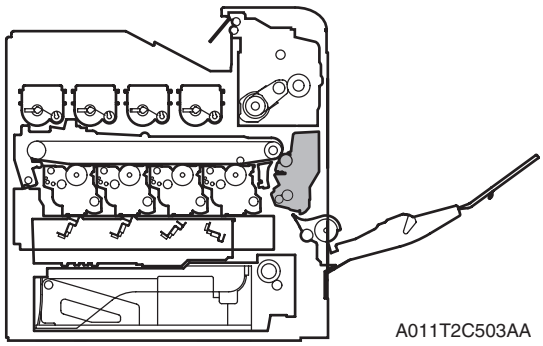
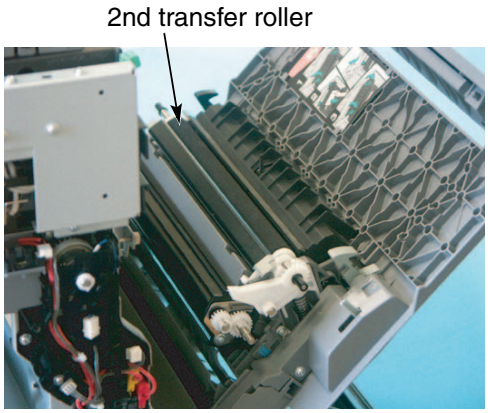
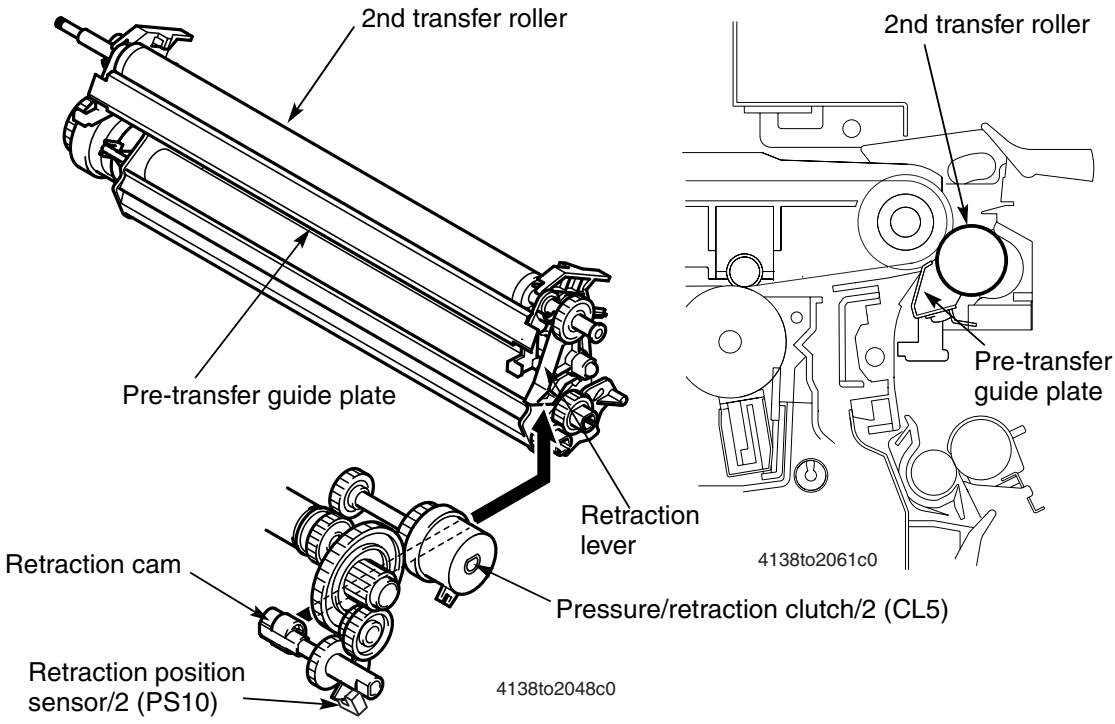
14. Transfer section (2nd transfer)

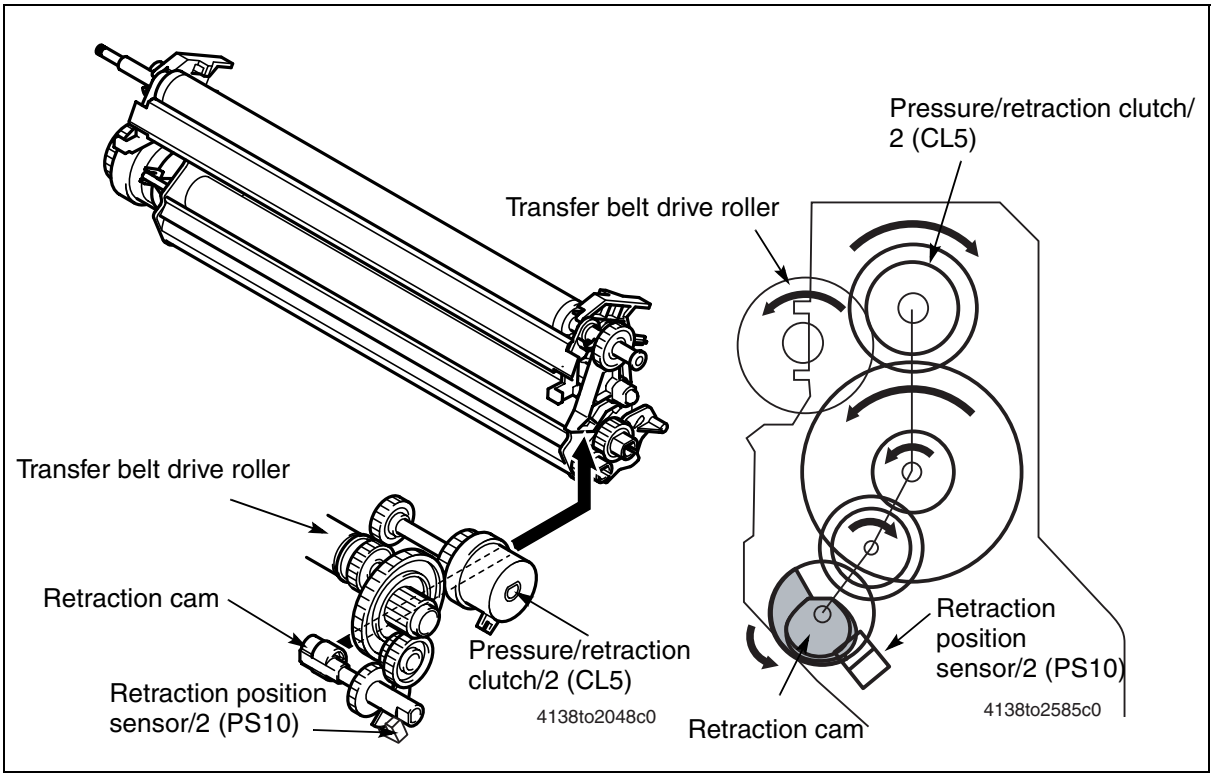
14.1 Composition







14.2 Drive



14.3 Operation

14.3.1 2nd transfer roller pressure mechanism

- The main body is provided with a mechanism that presses the 2nd transfer roller up against, and retracts it from, the transfer belt. This is done to prevent the 2nd transfer roller from being dirtied due to patterns produced for purposes other than an actual printing operation. Such patterns may be produced during the image stabilization sequence or another function.

A. 2nd transfer roller pressure

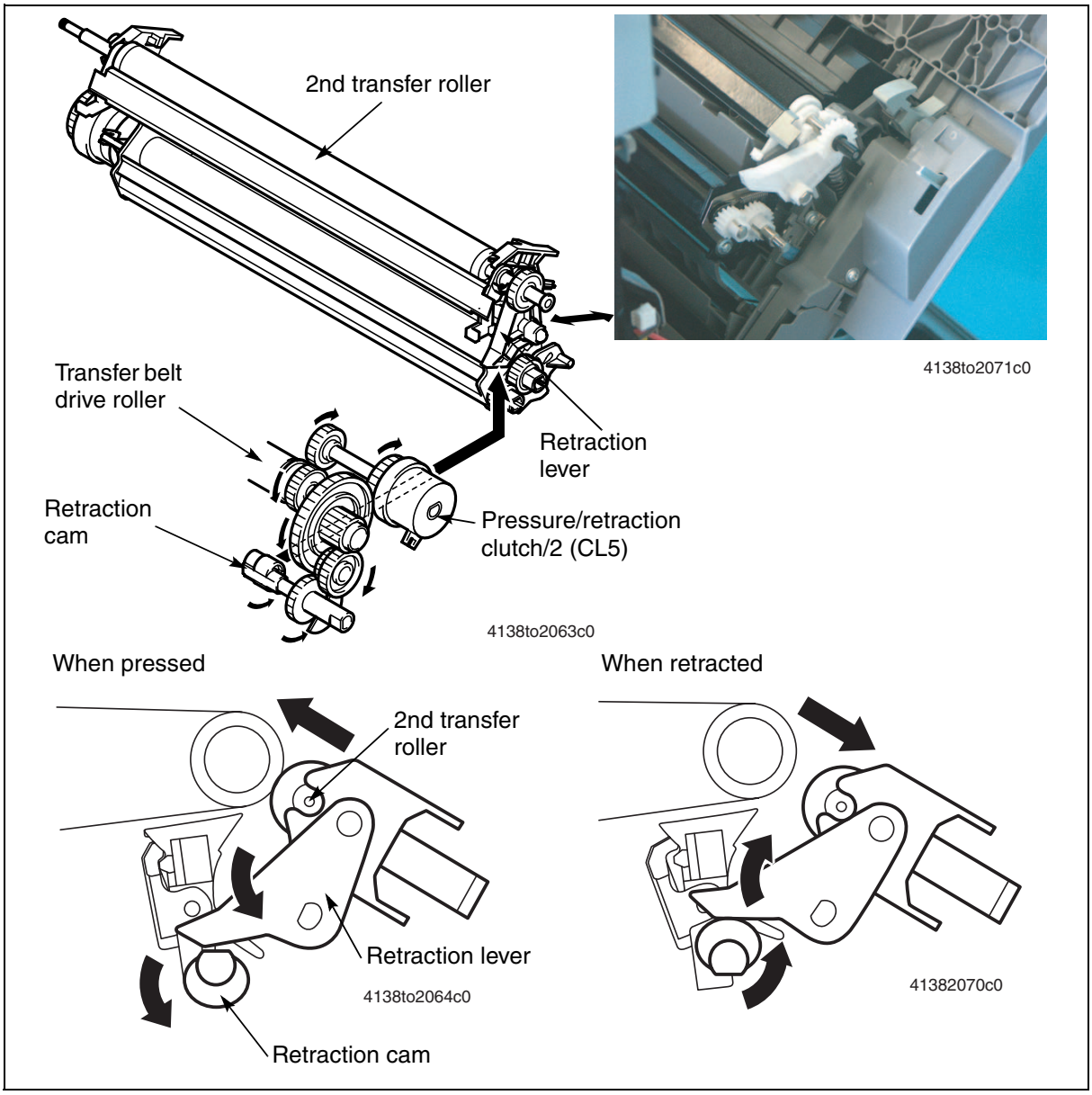
- The 2nd transfer roller is pressed against the transfer belt to allow the toner image on the transfer belt to be transferred onto the media.
- The 2nd transfer roller is pressed against the transfer belt to allow the roller to be cleaned.

B. 2nd transfer roller retraction

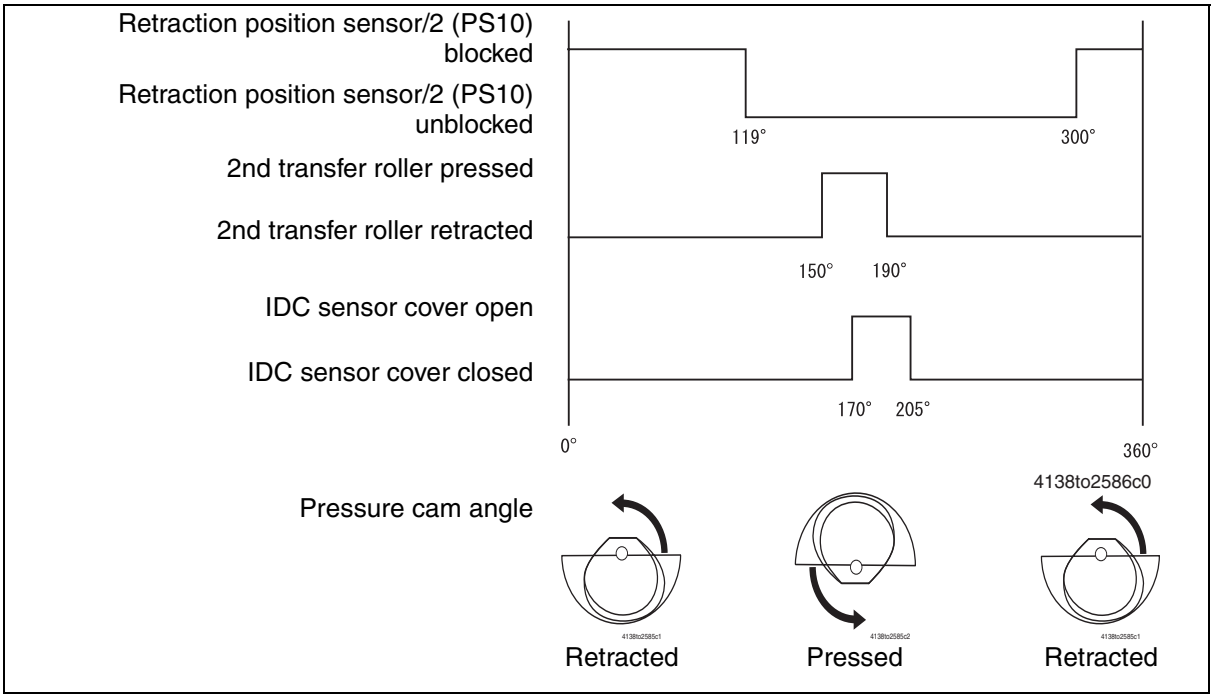
- The 2nd transfer roller is retracted from the transfer belt when a detection pattern is produced on the transfer belt for registration correction control, image stabilization control, or other control.
- The 2nd transfer roller is retracted from the transfer belt when the toner image on the transfer belt cannot be transferred to the media due to a media empty condition occurring during printing.
- The 2nd transfer roller is retracted from the transfer belt after the 2nd transfer of the last image is completed during a multi-print cycle.

C. Pressure/retraction operation

1. Rotation of the intermediate transport motor is transmitted to the drive roller of the intermediate transfer belt unit.
2. Rotation of the drive roller is transmitted to the pressure/retraction clutch/2.
3. When the pressure/retraction clutch/2 is energized, the rotation is transmitted to the pressure cam via a coupling gear.
4. When the pressure cam turns a half turn to push up the pressure lever, the 2nd transfer roller is pressed against the transfer belt.
5. At the same time, the IDC sensor lever is pushed up to open the IDC sensor cover.
6. The light blocking plate fitted on the shaft of the pressure cam blocks the retraction position sensor/2 and a pressed position of the 2nd transfer roller is detected.
7. When the pressure/retraction clutch/2 is energized a second time, the pressure cam is turned another half turn. This releases the pressure lever, causing the 2nd transfer roller to be retracted from the transfer belt. At the same time, the IDC sensor lever is released, which closes the IDC sensor cover.
8. The light blocking plate unblocks the retraction position sensor/2 and a retracted position of the 2nd transfer roller is detected.



D. Pressure/retraction operation

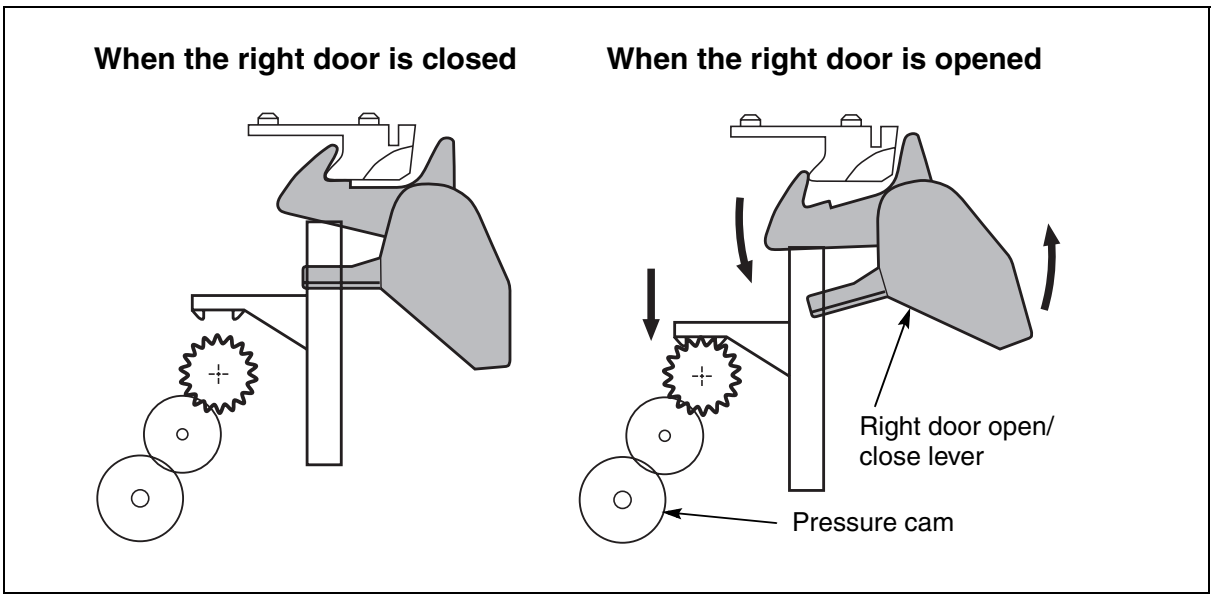


14.3.2 2nd transfer roller pressure position deviation preventive mechanism

- When the right door is opened and closed, the pressure cam is rotated to prevent the 2nd transfer roller from deviating from the pressure position.

A. Operation

- The lever moves up or down as the right door is opened or closed, thereby locking rotation of the coupling gear that drives the pressure cam.



14.3.3 2nd transfer voltage control

- The transfer voltage is applied to the 2nd transfer roller in order to transfer the toner image from the transfer belt to the media.
- The transfer voltage is applied after the 2nd transfer roller has been pressed against the transfer belt.

14.3.4 2nd transfer voltage setting control (ATVC: auto transfer voltage control)

- The transfer voltage is corrected to reduce effect from the transfer belt and environmental changes of toner.

A. Operation timing

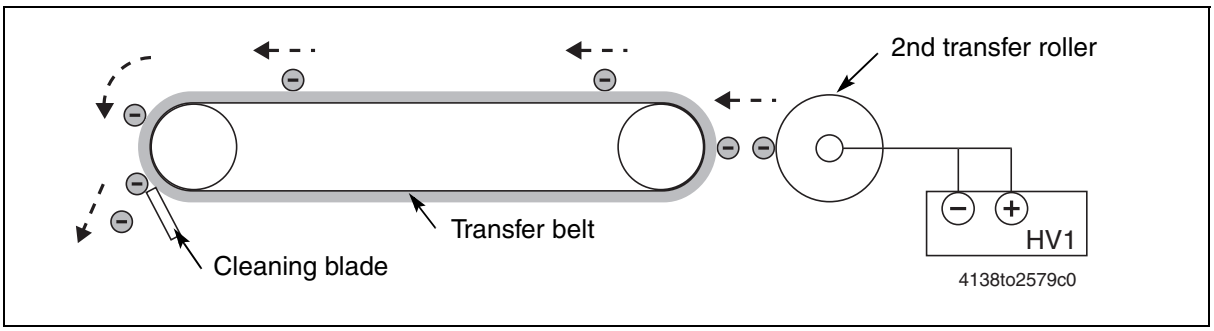
- A print request is accepted.
- The temperature inside the main body changes beyond the specified range during a multi print cycle.
- Image stabilization control is executed.
- 1000 to 2000 printed pages have been produced after the last 2nd transfer voltage control was performed.
- The transfer roller unit is replaced
- The temperature and humidity inside the main body change beyond the specified range for the first time after the last 2nd transfer voltage control was performed.

B. Control

1. 1. The 2nd transfer roller is pressed against the transfer belt.
2. A constant current is applied to the 2nd transfer roller.
3. The voltage of the 2nd transfer roller surface is detected.
4. Using a conversion formula, the output value of the transfer voltage is determined.
5. The current temperature inside the main body is detected and backed up.

14.3.5 2nd transfer roller cleaning control

- DC positive and negative transfer bias voltages are alternately applied to the 2nd transfer roller. This allows toner residue on the surface of the 2nd transfer roller to be transferred back to the transfer belt, thus cleaning the 2nd transfer roller.
- Any voltage for other control purposes is not applied during the cleaning procedure.
- The toner transferred back to the transfer belt is collected by the cleaning blade.

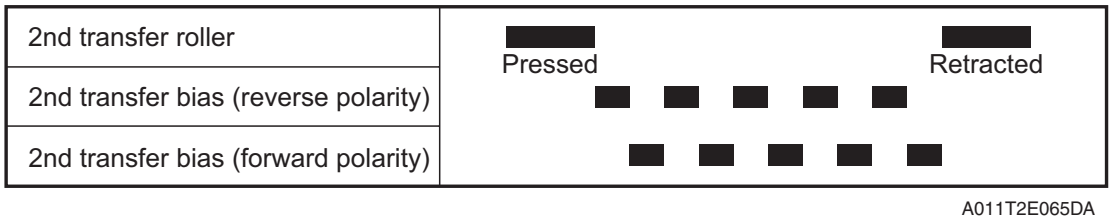


A. Operation timing

- The 2nd transfer roller cleaning sequence is carried out after the intermediate transfer belt has been cleaned during recovery from a media misfeed or malfunction.
- The cleaning sequence is carried out if 100 printed pages are produced after the last cleaning sequence.
- The cleaning sequence is carried out when a media size error occurs.

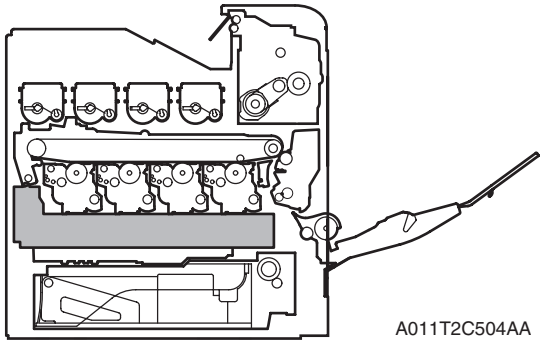
B. Control

1. The 2nd transfer roller is pressed.
2. The 2nd transfer bias voltage of reverse polarity is applied for the period of time corresponding to one revolution of the 2nd transfer roller.
3. The 2nd transfer bias voltage of forward polarity is applied for the period of time corresponding to one revolution of the 2nd transfer roller.
4. Steps 2 and 3 are repeated five times.
5. The 2nd transfer roller is retracted.

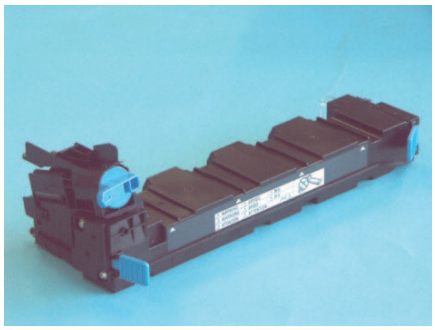


15. Waste toner collecting section

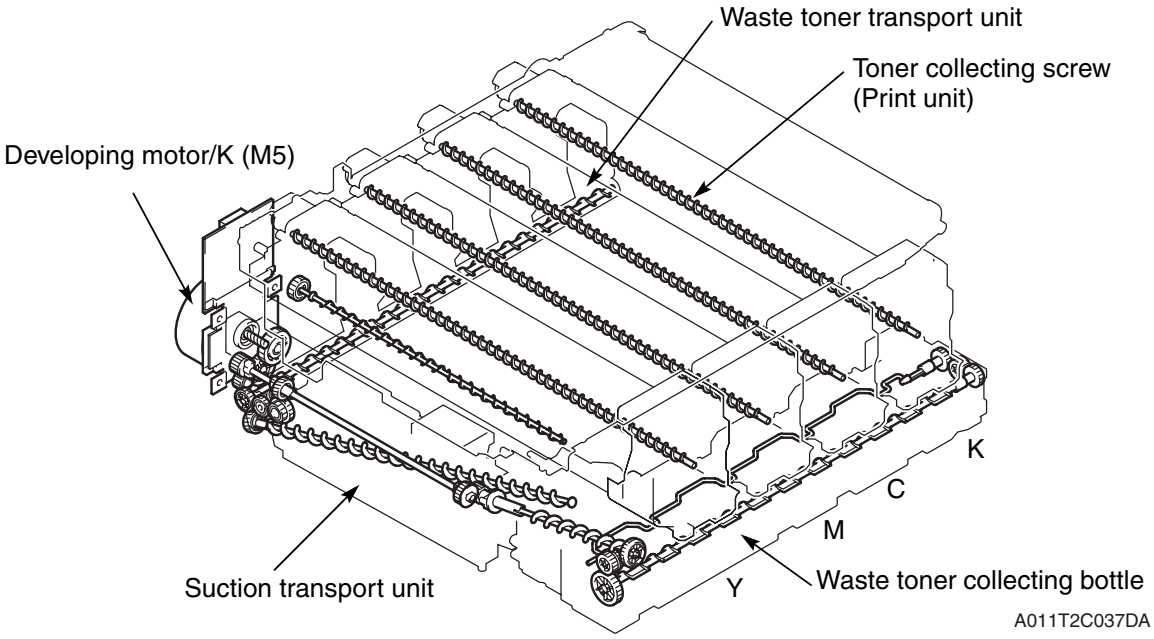
15.1 Composition



A011T2C504AA

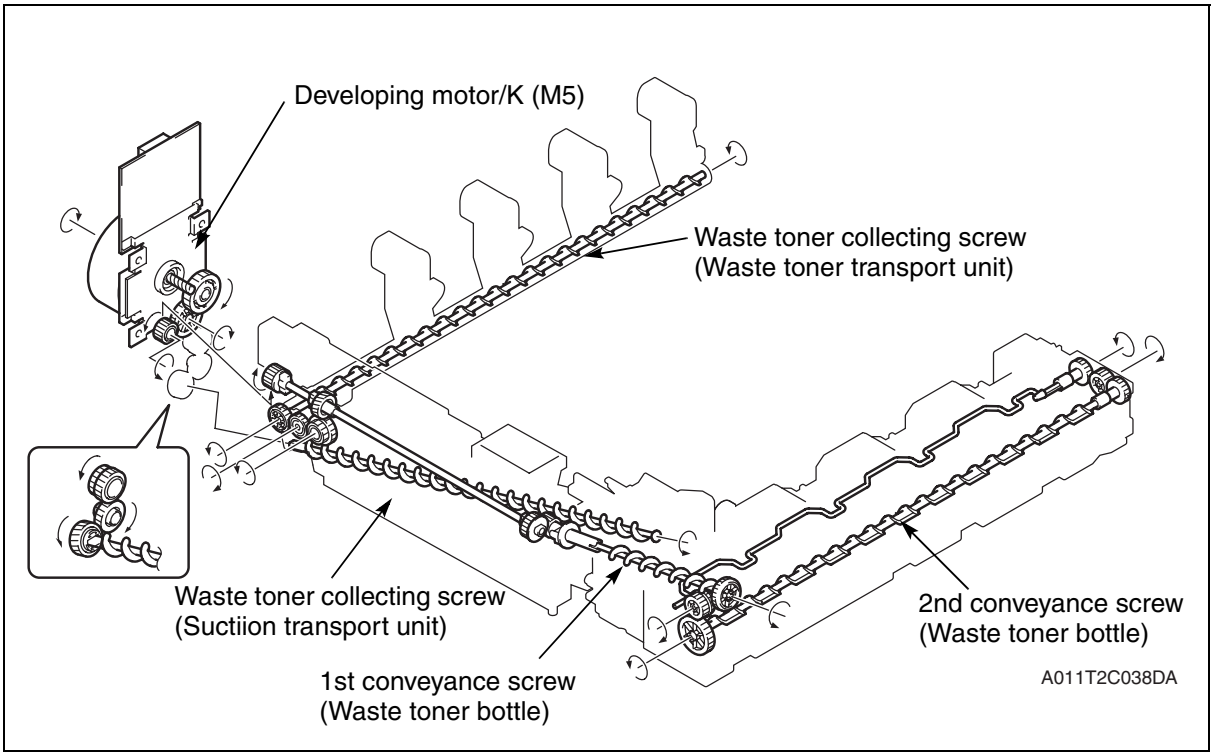


A011T2C059DA



A011T2C037DA

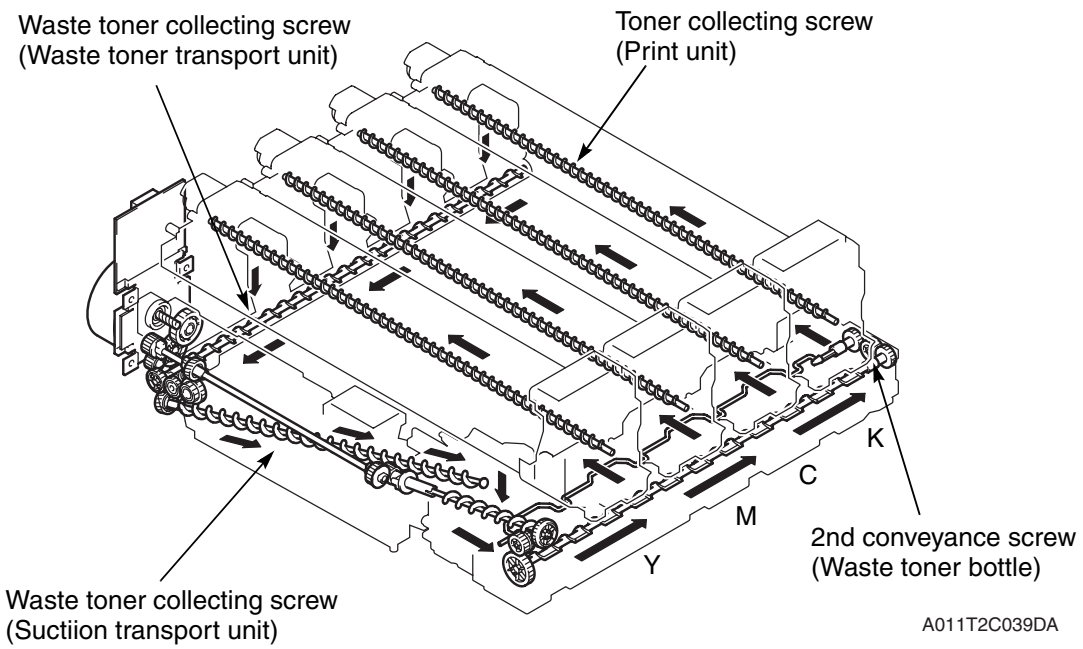
15.2 Drive


Developing motor/K (M5)
Waste toner collecting screw
(Waste toner transport unit)
Waste toner collecting screw
(Suctiion transport unit)
1st conveyance screw
(Waste toner bottle)
2nd conveyance screw
(Waste toner bottle)
A011T2C038DA

15.3 Operation

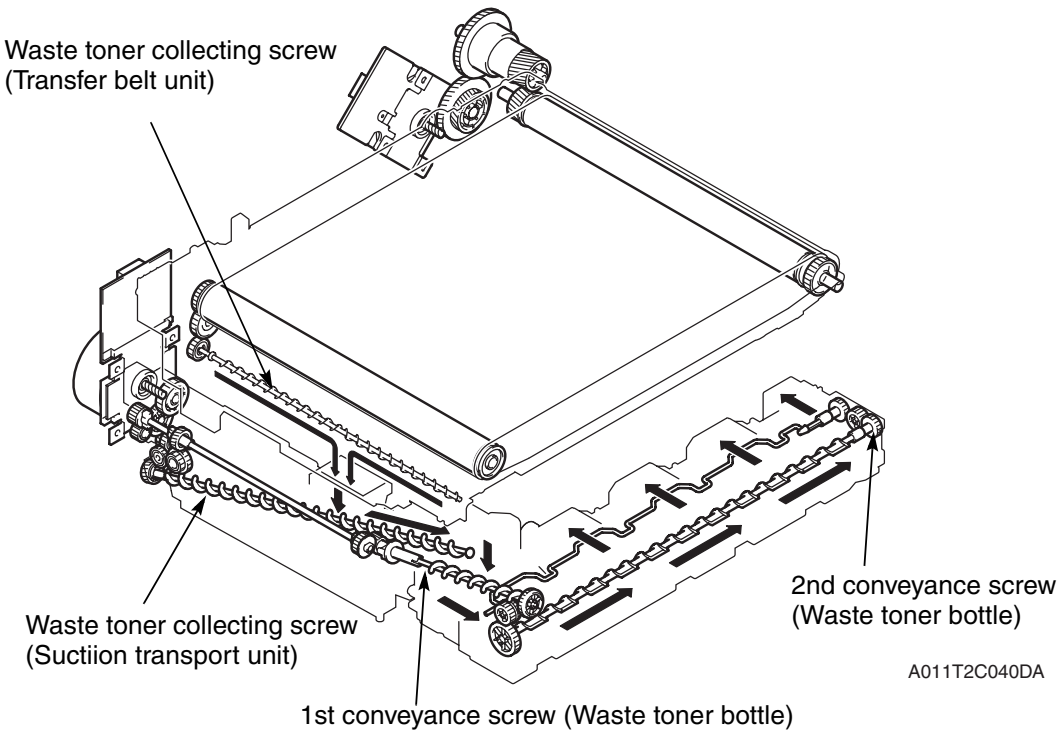
15.3.1 Toner flow at the 1st transfer section

1. Toner scraped off by the cleaning blade in the print unit is conveyed to the toner collecting port by the toner collecting screw.
2. The waste toner conveyed to the toner collecting port is conveyed to the waste toner transport unit.
3. The toner conveyed is carried to the suction transport unit by the transport roller provided in the waste toner transport unit.
4. The conveyed toner is carried to the toner collecting port of the waste toner box by the conveyance screw provided in the suction transport unit.
5. The toner conveyed is stored into in the waste toner box by the conveyance screw provided in the waste toner box.



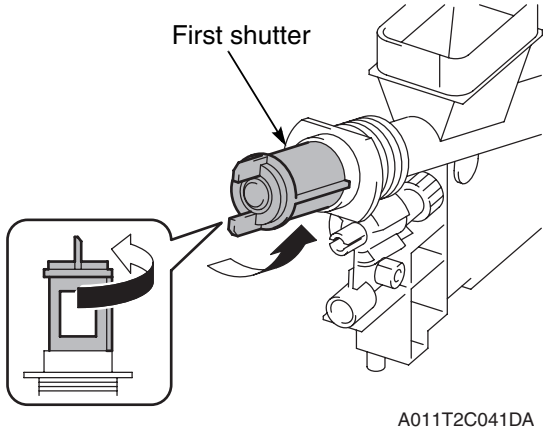
15.3.2 Toner flow at the 2nd transfer section

1. Toner scraped off by the cleaning blade provided in the transfer belt unit is collected onto the middle of the transfer belt unit by the toner collecting screw.
2. The toner collected is conveyed to the suction transport unit through the toner collecting port that is provided in the middle of the transfer belt unit.
3. The conveyed toner is carried to the toner collecting port of the waste toner box by the conveyance screw provided in the suction transport unit.
4. The toner conveyed is stored into in the waste toner box by the conveyance screw provided in the waste toner box.

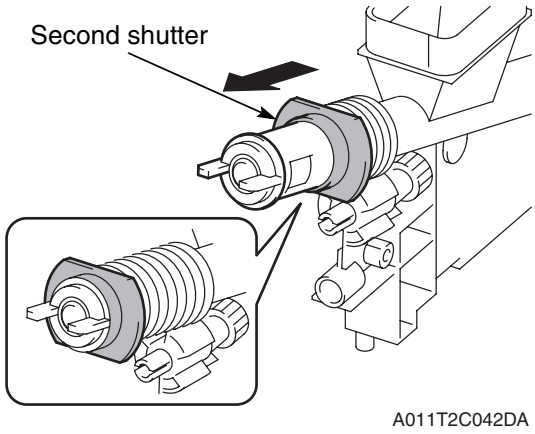


15.3.3 Toner collecting port shutter mechanism at the suction transport unit

- A dual-shutter is used to prevent waste toner from being spilled from the toner collecting port when the waste toner box is removed and reinstalled.
- Placing the box lock lever of the waste toner box in the “locked” position (the 9 o'clock position) closes the first shutter of the toner collecting port.
- Removing the waste toner box closes the second shutter.



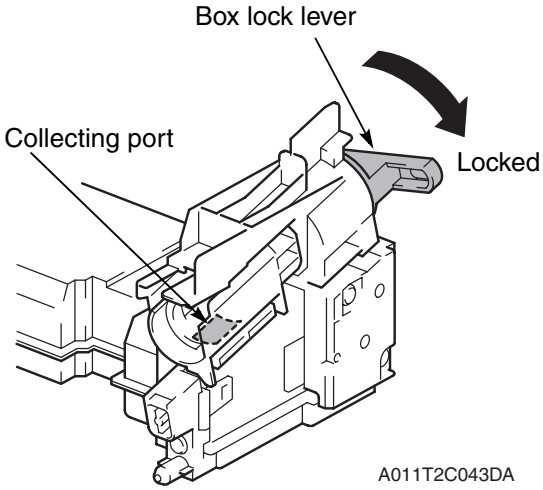
A011T2C041DA



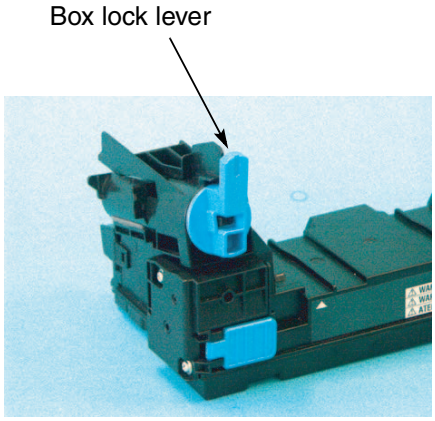
A011T2C042DA

15.3.4 Toner collecting port shutter mechanism of the waste toner bottle

- A shutter is used to prevent waste toner from being spilled from the toner collecting port when the waste toner box is removed and reinstalled.
- Placing the box lock lever of the waste toner box in the “locked” position (the 9 o'clock position) closes the shutter of the toner collecting port.



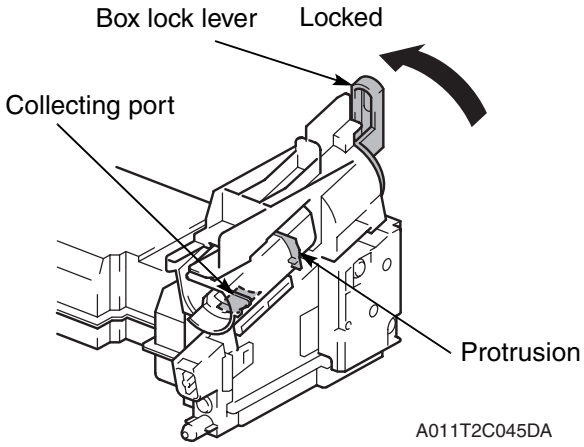
A011T2C043DA



A011T2C044DA

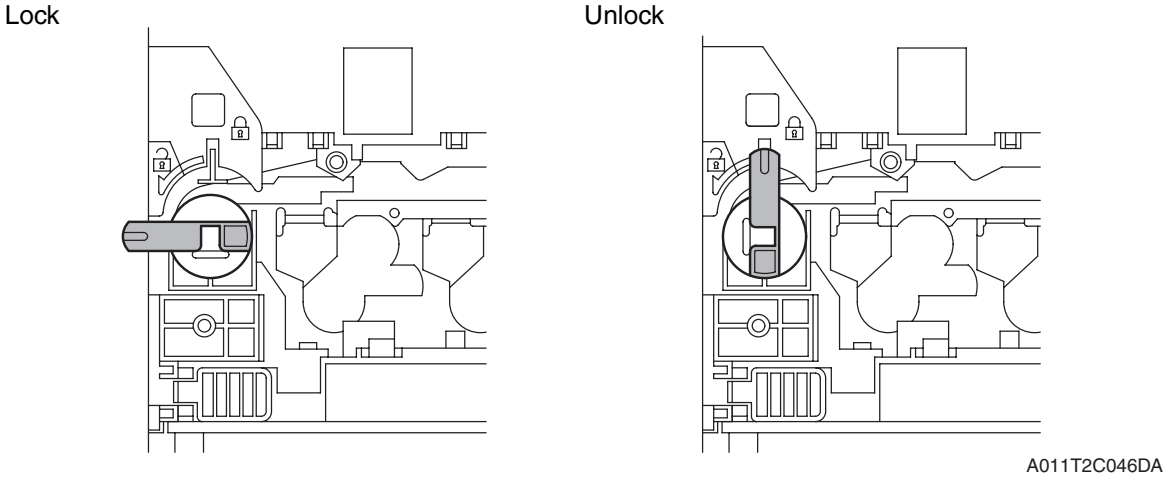
15.3.5 Waste Toner Box locking mechanism

- When the box lock lever is in the unlocked position (the 12 o'clock position), the protrusion provided at the toner collecting port interferes with the main body frame, thus preventing the waste toner box from being removed.
- When the box lock lever is in the locked position (the 9 o'clock position), the waste toner box can be removed.



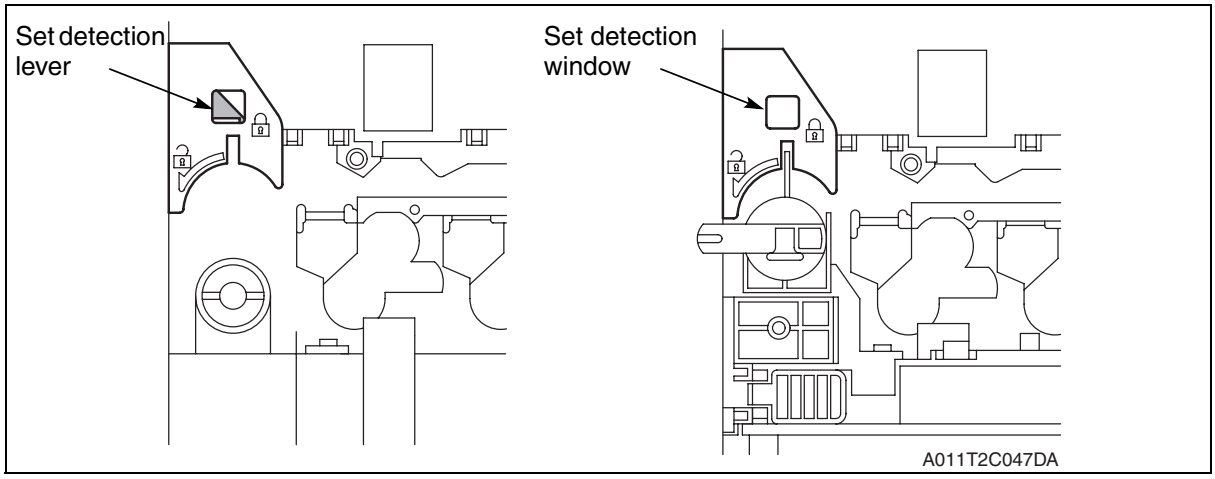
15.3.6 Waste toner box locked position detection mechanism

- When the box lock lever is in the locked position (the 9 o'clock position), the protrusion provided in the front door interferes with the box lock lever. As a result, the front door cannot be closed.
- When the box lock lever is in the unlocked position (the 12 o'clock position), the front door can be closed.



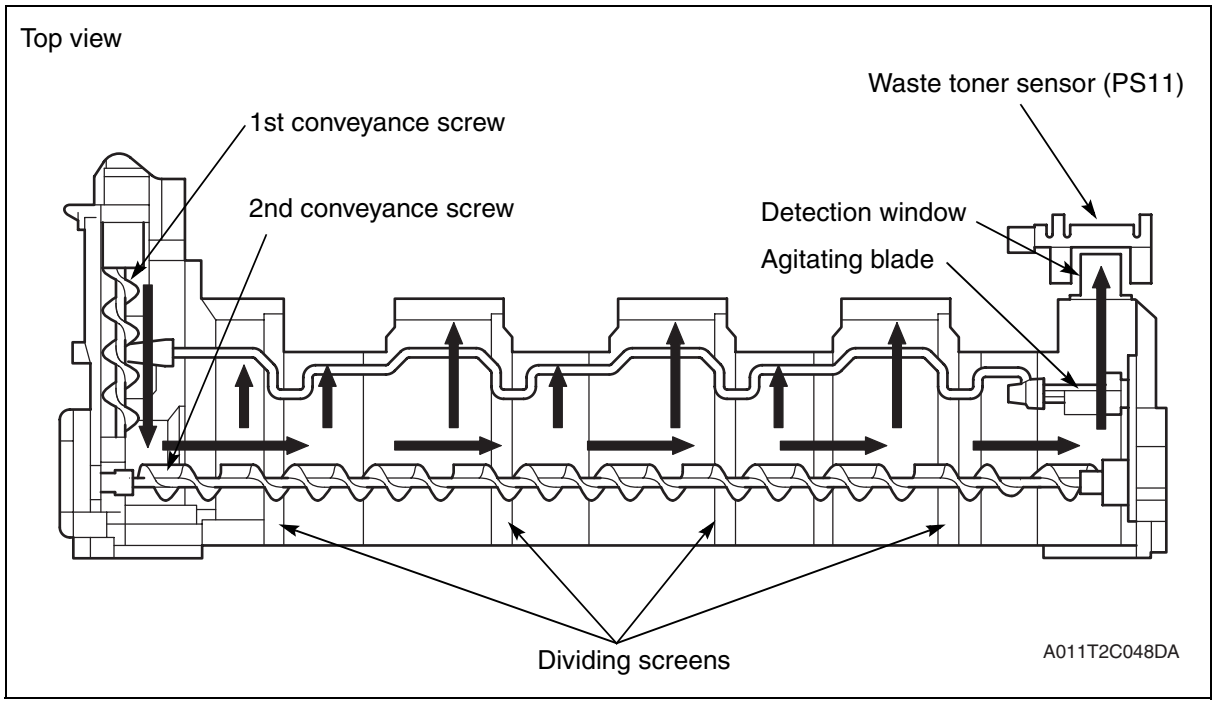
15.3.7 Waste toner box-in-position detection mechanism

- The waste toner box set detection lever is provided to detect a waste toner box loaded in position.
- When the waste toner box is not loaded, the set detection lever lowers by its own weight to plug the set detection window.
- The protrusion provided in the front door interferes with the set detection lever that plugs the set detection window. Then, the front door cannot be closed.
- When the waste toner box is loaded in position, it pushes up the set detection lever to uncover the set detection window.



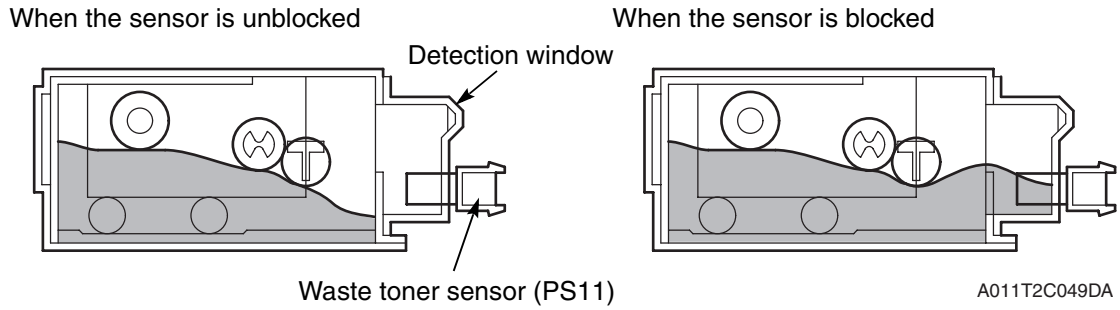
15.3.8 Waste toner flow in the waste toner box

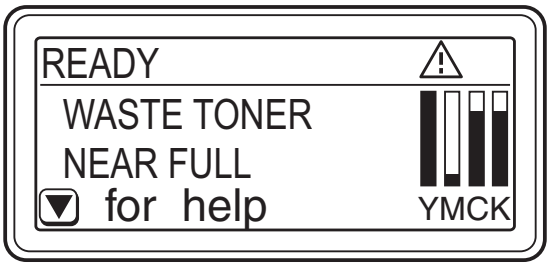
1. Toner conveyed to the toner collecting port is conveyed to the 2nd conveyance screw by the 1st conveyance screw provided in the waste toner box.
   he toner is conveyed into the waste toner box by the 2nd conveyance screw.
2. In order for waste toner to be accumulated from the left side, the waste toner box has the dividing screens.
3. Waste toner conveyed to the rear end of the box is conveyed up to the detection window by the agitating blade. When the waste toner conveyed to the detection window blocks the waste toner sensor, the waste toner near full condition is detected.



15.3.9 Waste toner near-full condition detection control

- A waste toner near-full condition is detected when the waste toner sensor continuously blocks for a predetermined period of time.
- At this time, a waste toner near-full condition warning is given on the panel.
- Approx. 1000 printed pages can be produced at 20 % coverage with use of standard originals during the period of time that begins when a near-life condition is detected and ends when a life condition is detected.





A011T2E077DA

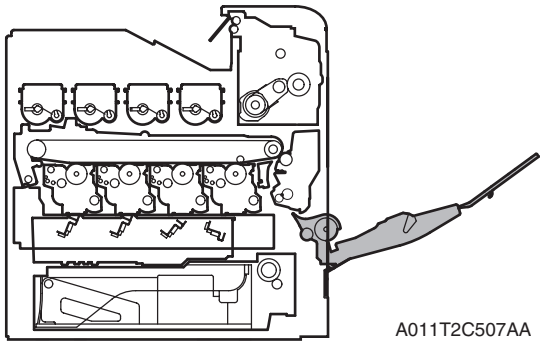
15.3.10 Waste toner full condition detection control

- A waste toner full condition is detected when the cumulative total number of print dots (waste toner detection dot count) exceeds a predetermined value after a waste toner box near-full condition has been detected.
- A waste toner full condition warning is given on the panel at this time.
- The main body accepts no print job after the waste toner full condition has been detected.
- The waste toner full warning indication disappears when a new waste toner bottle is installed.

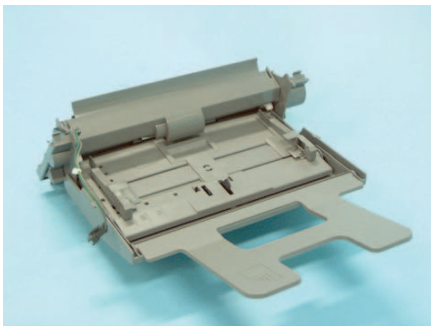
A011T2E078DA

16. Media feed section (Tray 1)

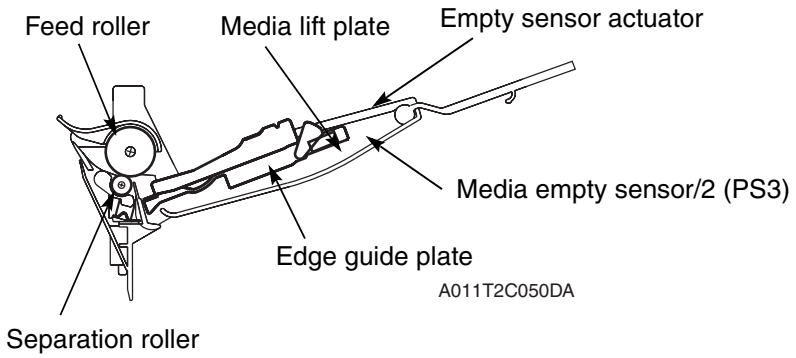
16.1 Composition



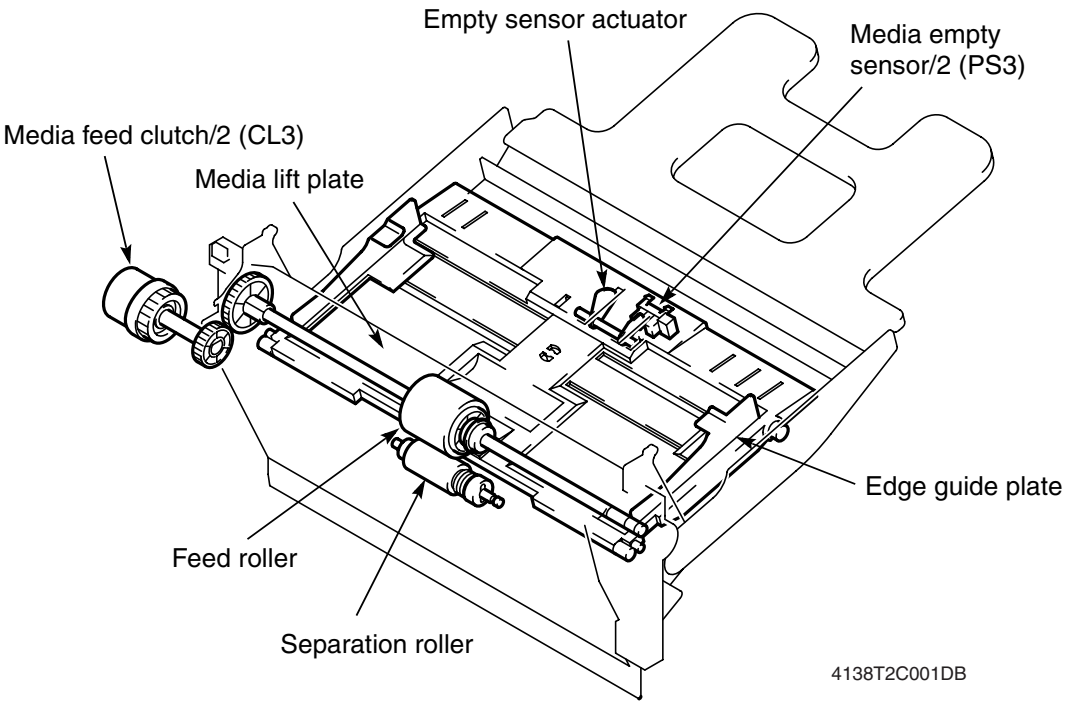
A011T2C507AA



A011T2C510AA

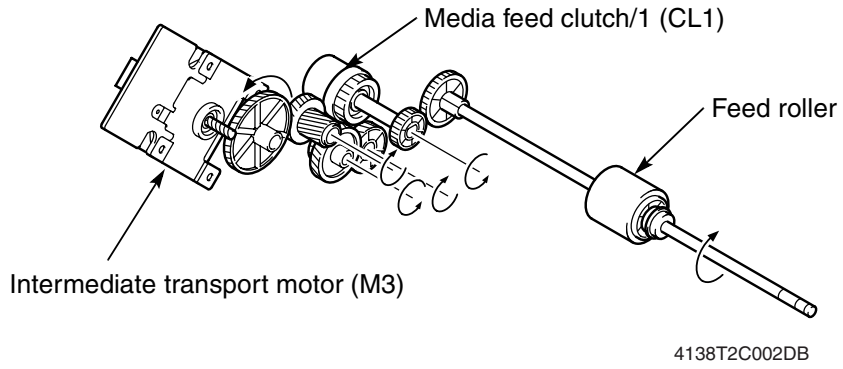


A011T2C050DA



4138T2C001DB

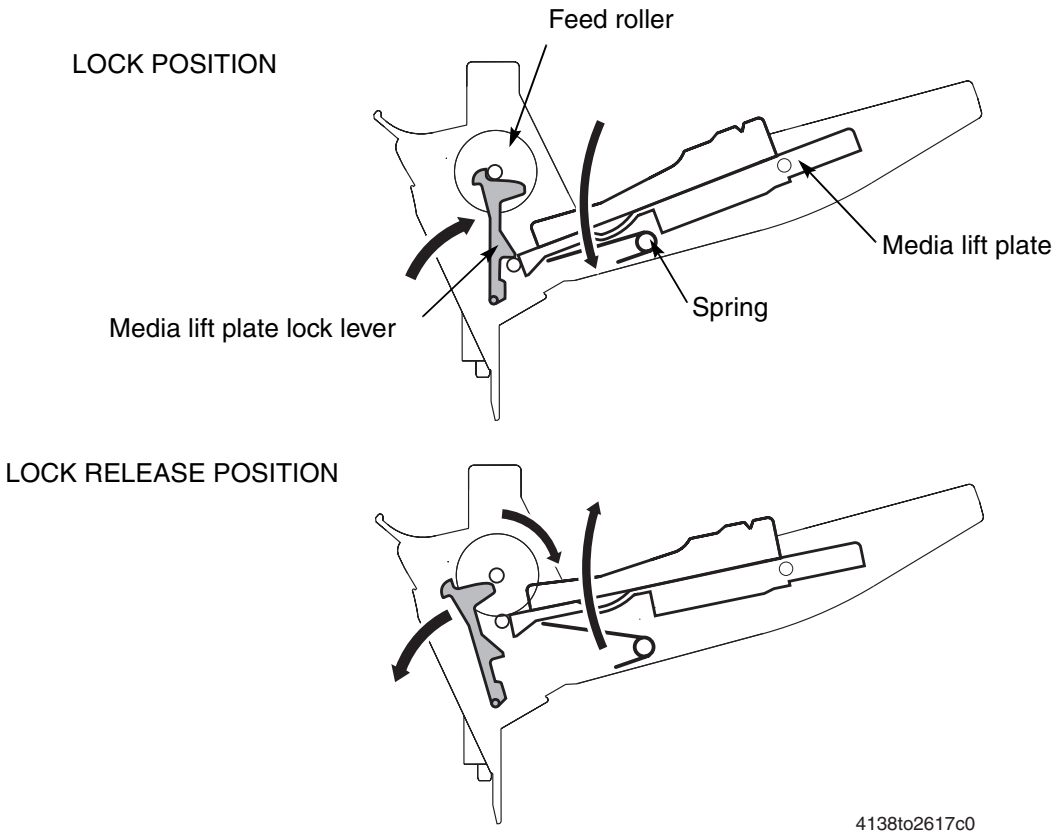
16.2 Drive



16.3 Operation

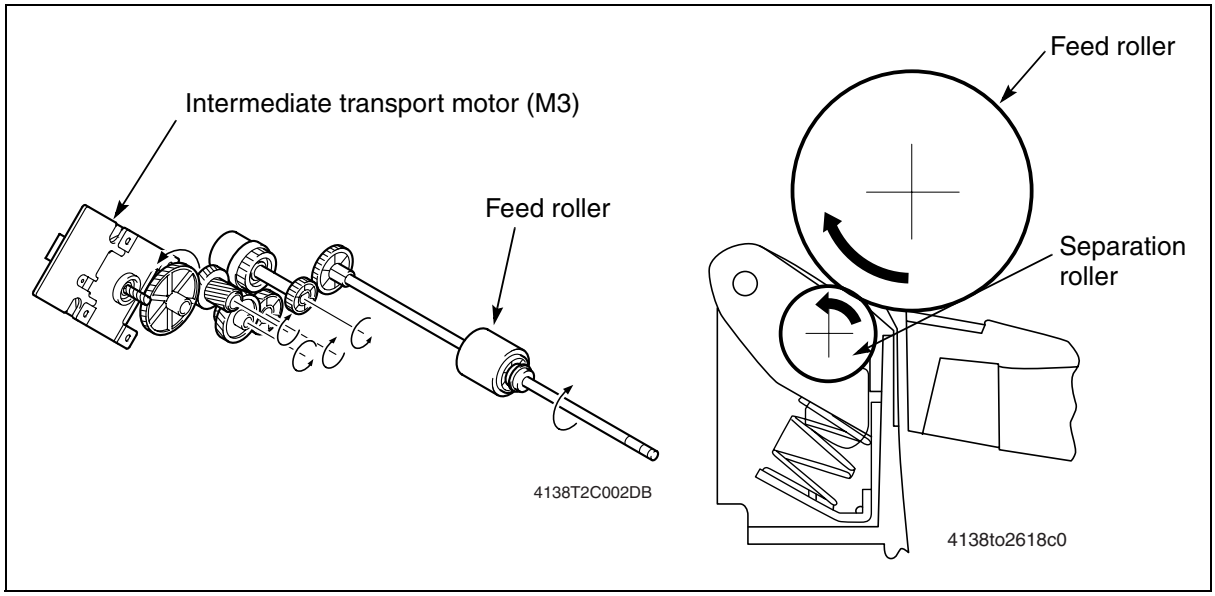
16.3.1 Media lift plate mechanism

- The media lift plate will be locked under the media lift plate lock lever by pressing it down (in which the media is loaded in position). The media lift plate lock lever will be pressed to the feed roller.
- The media feed clutch will rotate the feed roller to activate the lock release lever pressed to the feed roller, and the media lift plate will be unlocked.
- The media lift plate (media stack) is pressed against the feed roller.
- The media lift plate (media stack) is pressed upward by the springs at all times.



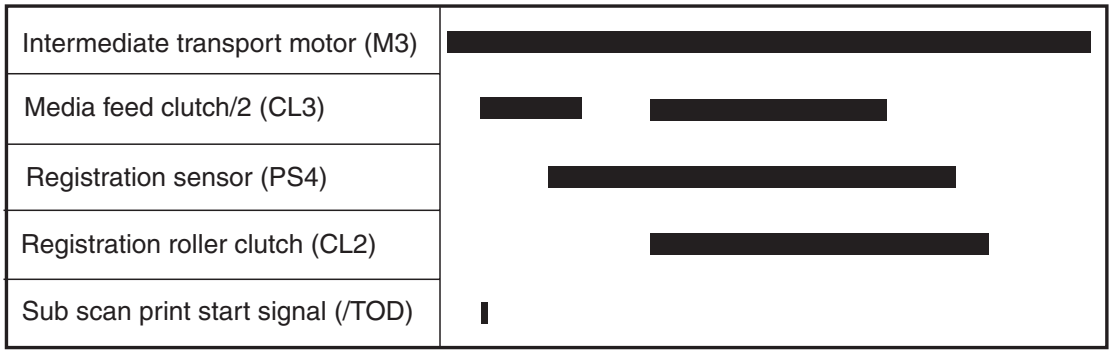
16.3.2 Media separation mechanism

- Drive from the intermediate transport motor is transmitted through the media feed clutch/1 to turn the feed roller.
- The feed roller rotates to take up and feed media into the main body.
- Double-feeding of media is prevented by the separation roller provided with a torque limiter.



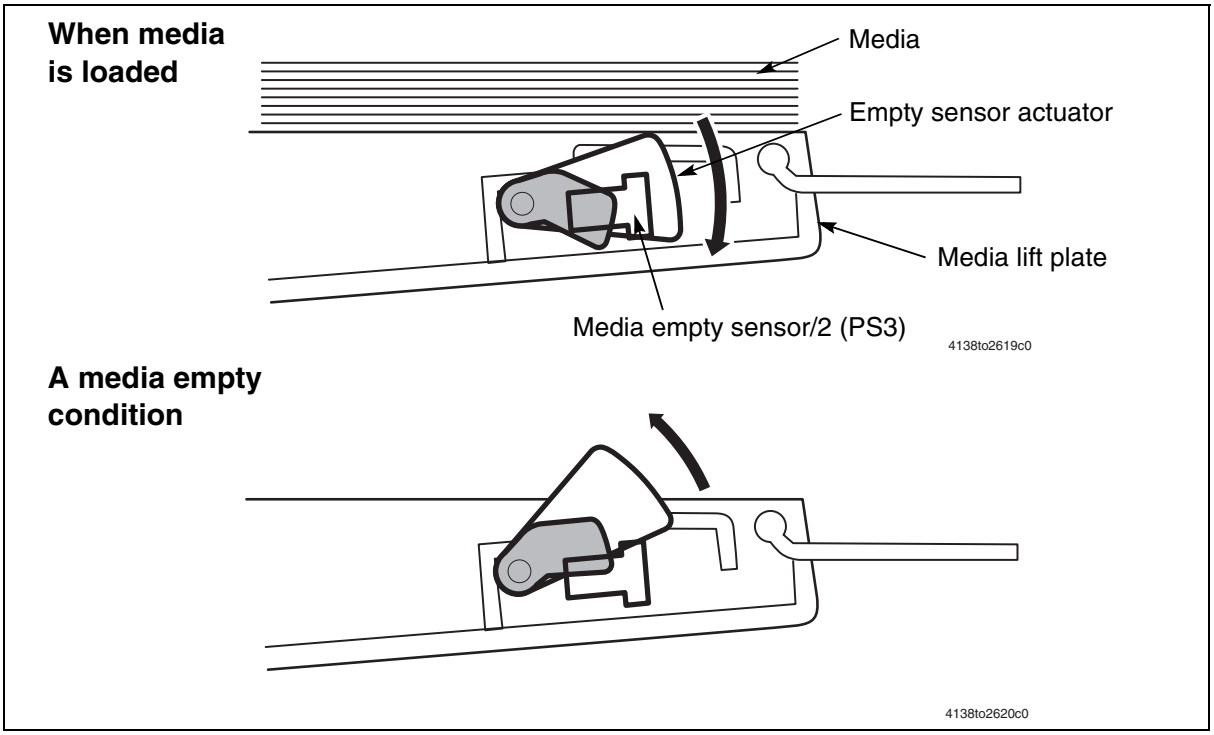
16.3.3 Media feed control

- Drive from the intermediate transport motor is transmitted through the media feed clutch/1 to turn the feed roller, thereby taking up and feeding the media.
- The media taken up and fed in is conveyed onto the registration roller.
- The media is pressed against the stationary registration roller so that a loop is formed in the media. The feed roller is then stopped. The loop thus formed in the media corrects any mechanical skew in the media.
- The registration roller is started [Registration roller clutch (CL2)] in synchronism with the sub scan print start signal (/TOD) of the controller to convey the media.
- At the same time that the registration roller is started [Registration roller clutch (CL2)], the feed roller is started again so that the media is conveyed further (this is done to reduce load otherwise placed on the media feed section when the media is conveyed).
- As the trailing edge of the media reaches a point immediately before the feed roller, the feed roller is stopped.



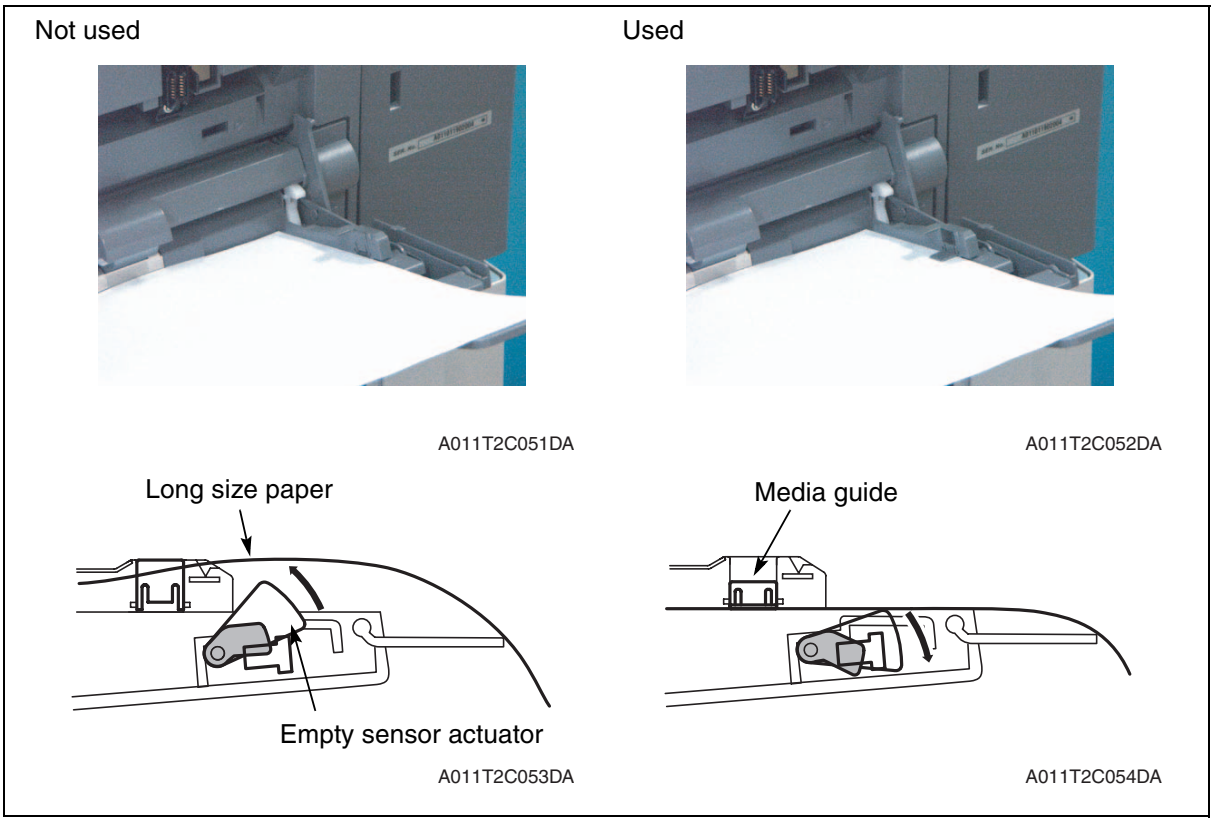
16.3.4 Media empty condition detection control

- A media empty condition is detected when the empty sensor actuator unblocks the media empty sensor/2.
- No mechanism is provided for detecting a media near-empty condition. The media supply level indicator serves this purpose.



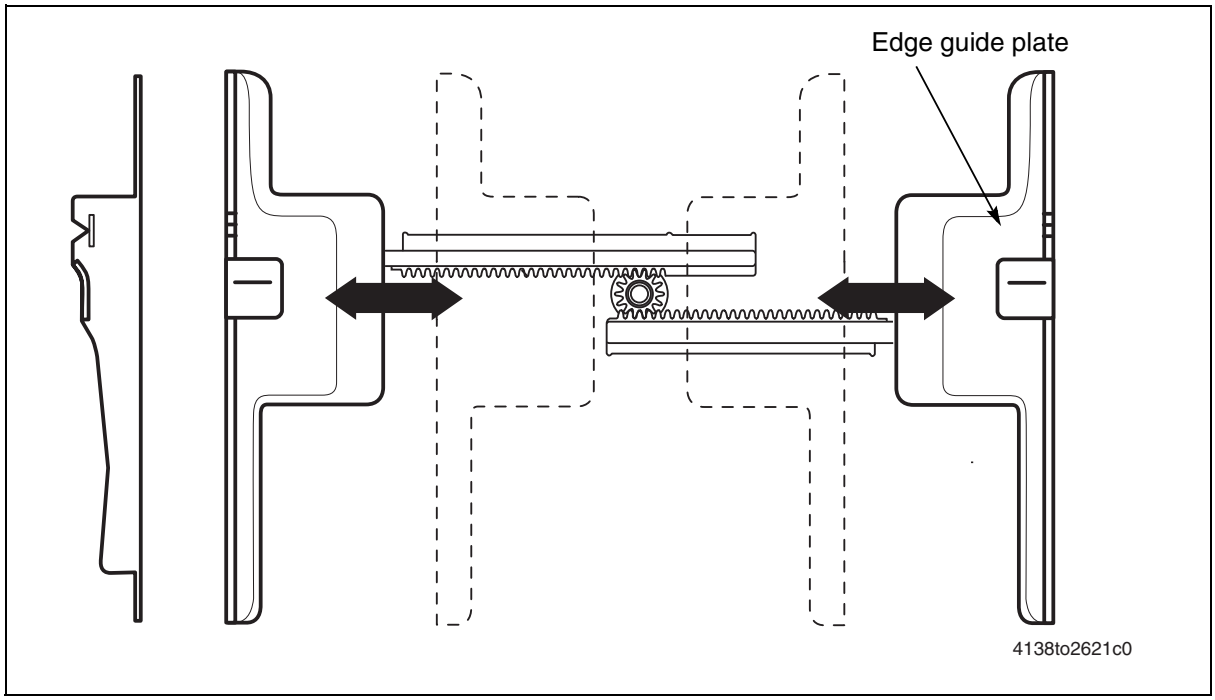
A. Long size paper guide mechanism

- The media guide is used to hold a stack of long size paper loaded onto the tray 1 in place. Using the media guide deletes an unwanted gap between the media empty sensor and a stack of long size paper and prevents the main body from making an incorrect media empty detection.



16.3.5 Edge guide plate

- The edge guide plate can be slid to the exact size in the width direction of the media to be loaded.
- No mechanism is provided for detecting a media size.

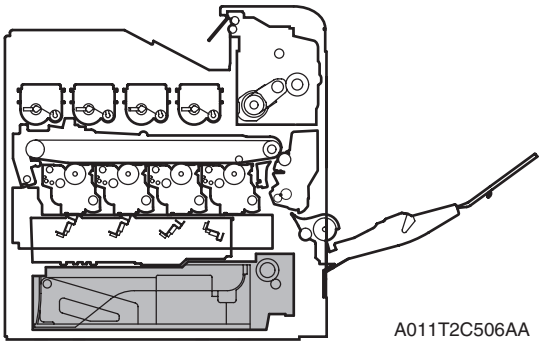


16.3.6 Media misfeed detection control

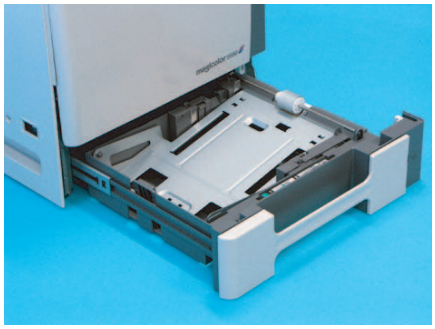
- If the registration sensor is not activated within a predetermined period of time after a media feed sequence has been started, the main body determines that there is a media misfeed. It then gives the message “PAPER JAM TRAY1” on the panel.
- The media misfeed display can be reset by opening and closing any of the doors.

17. Media feed section (Tray 2)

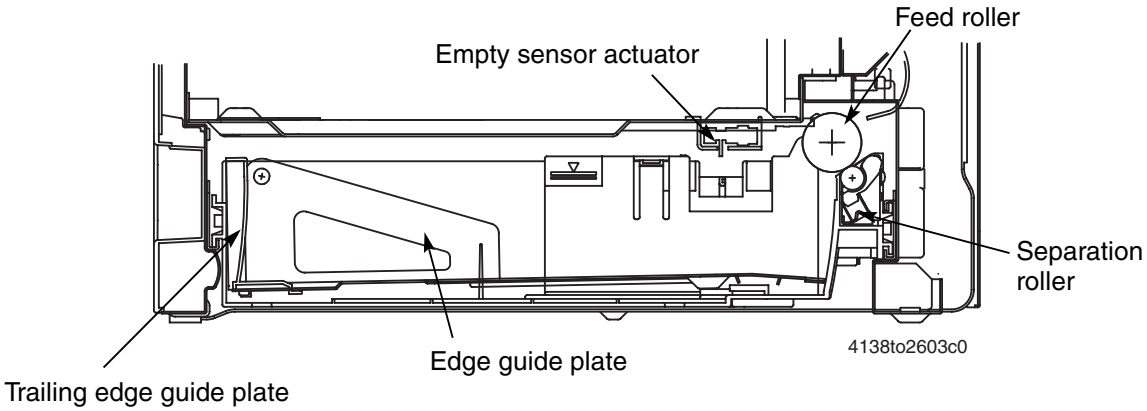
17.1 Composition

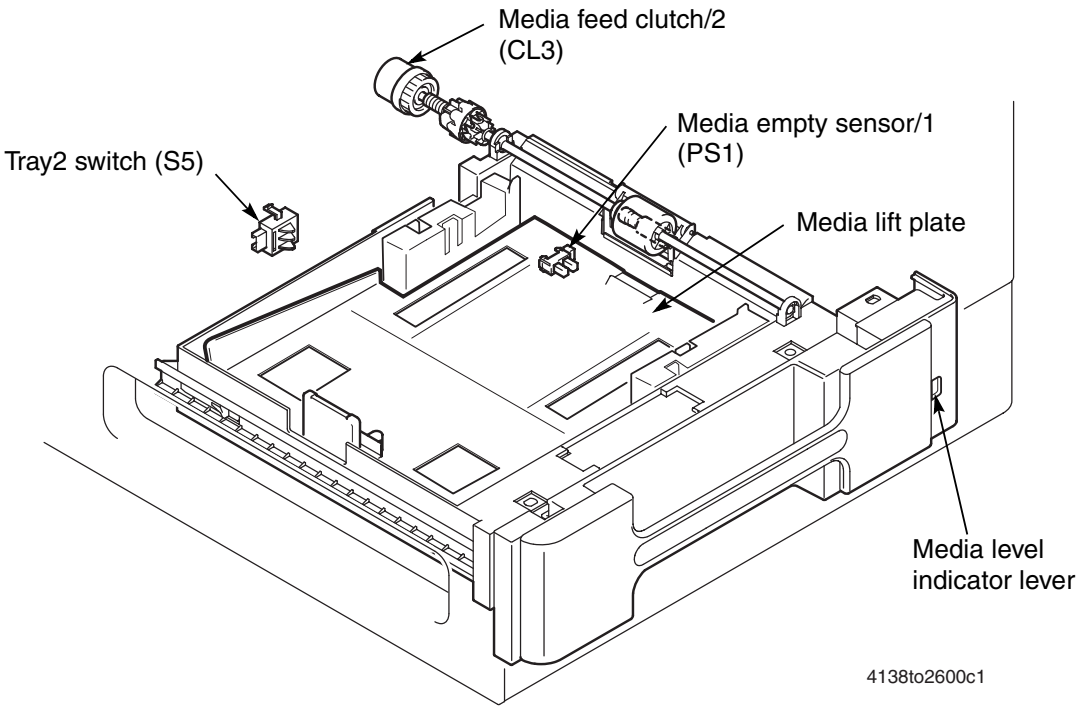


A011T2C506AA

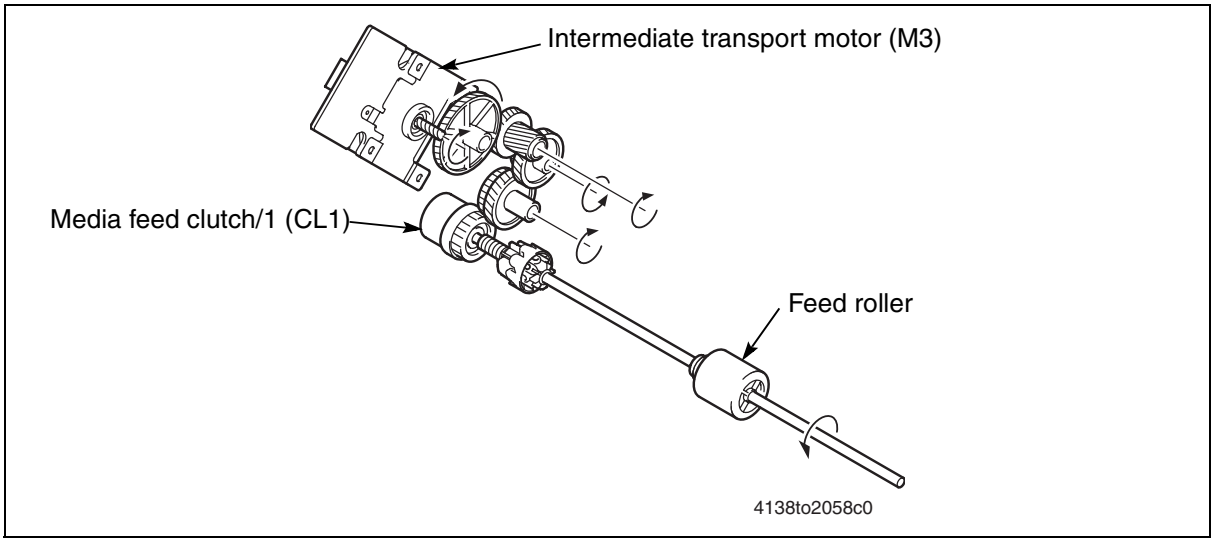


A011T2C509AA





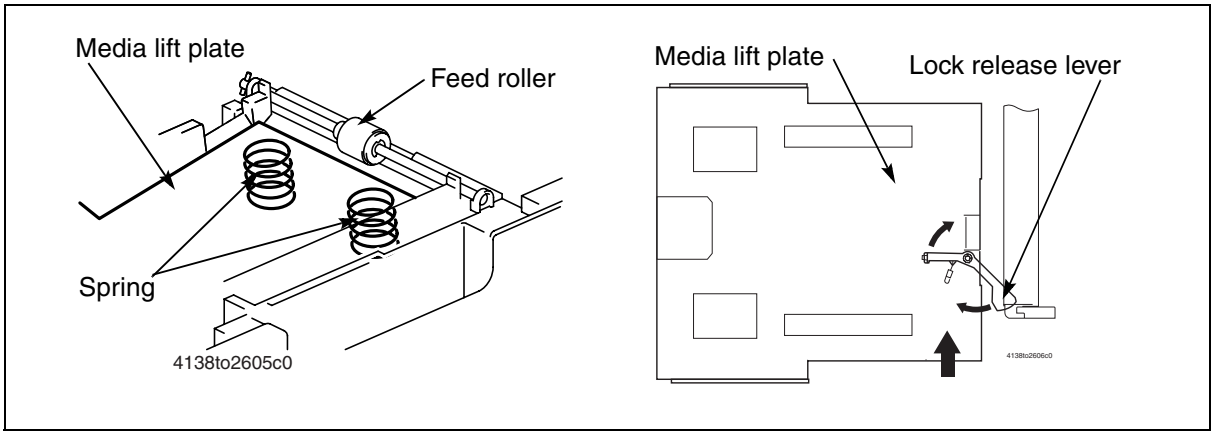
17.2 Drive



17.3 Operation

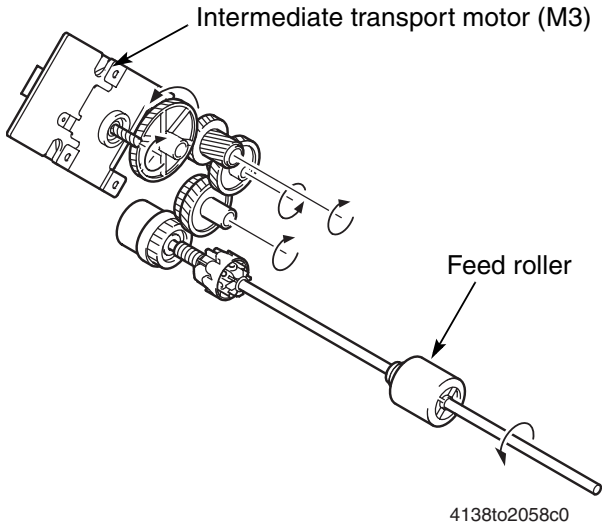
17.3.1 Media lift plate mechanism

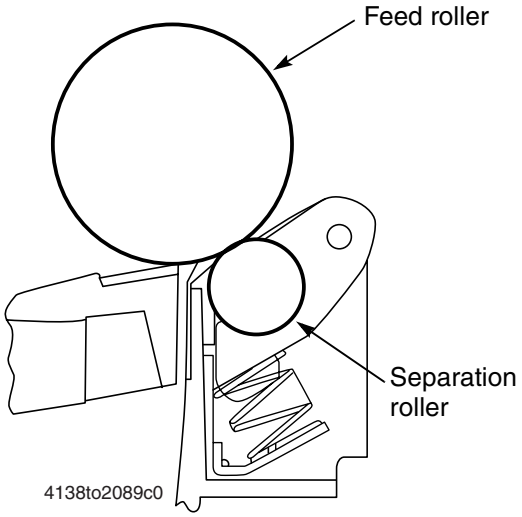
- The media lift plate is pressed down into the locked position (in which the media is loaded in position).
- Load a media stack and then slide the tray into the main body. This causes the lock release lever to unlock the media lift plate.
- The media lift plate (media stack) is pressed against the feed roller.
- The media lift plate (media stack) is pressed upward by the springs at all times.



17.3.2 Media separation mechanism

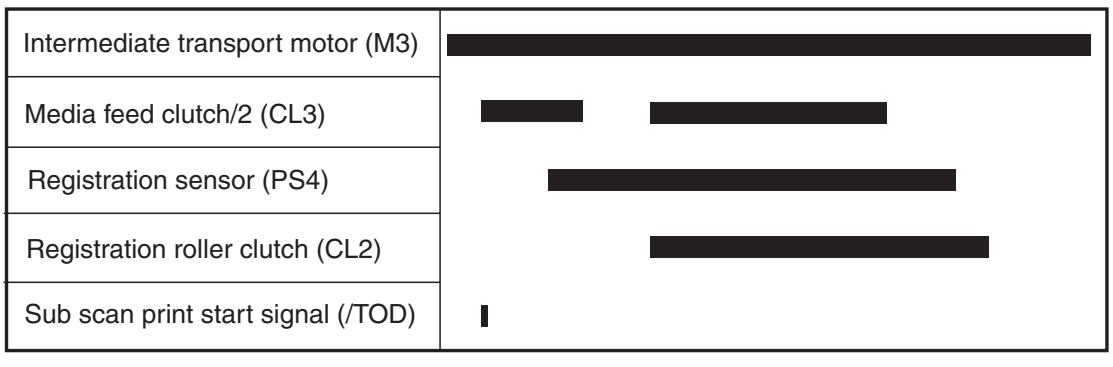
- Drive from the intermediate transport motor is transmitted through the media feed clutch/2 to turn the feed roller.
- The feed roller rotates to take up and feed media into the main body.
- Double-feeding of media is prevented by the separation roller provided with a torque limiter.





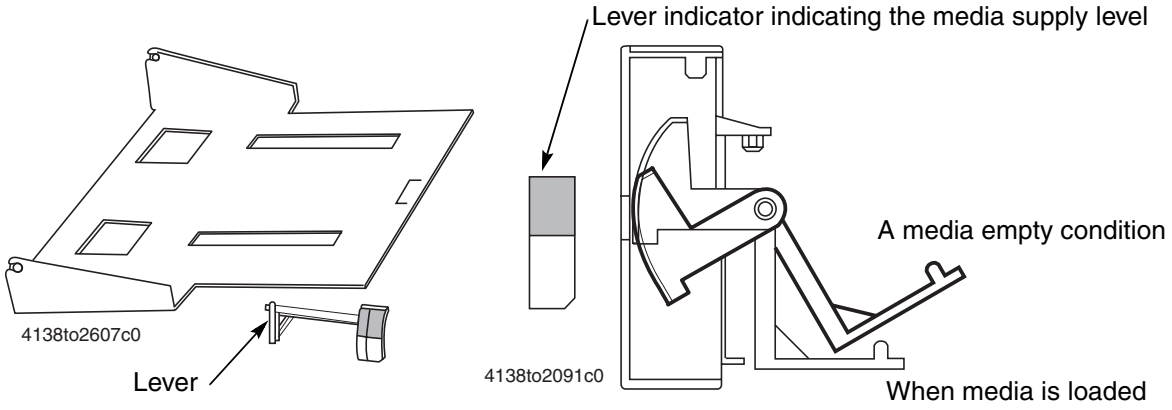
17.3.3 Media feed control

- Drive from the intermediate transport motor is transmitted through the media feed clutch/2 to turn the feed roller, thereby taking up and feeding the media.
- The media taken up and fed in is conveyed onto the registration roller.
- The media is pressed against the stationary registration roller so that a loop is formed in the media. The feed roller is then stopped. The loop thus formed in the media corrects any mechanical skew in the media.
- The registration roller is started [Registration roller clutch (CL2)] in synchronism with the sub scan print start signal (/TOD) of the controller to convey the media.
- At the same time that the registration roller is started [Registration roller clutch (CL2)], the feed roller is started again so that the media is conveyed further (this is done to reduce load otherwise placed on the media feed section when the media is conveyed).
- As the trailing edge of the media reaches a point immediately before the feed roller, the feed roller is stopped.



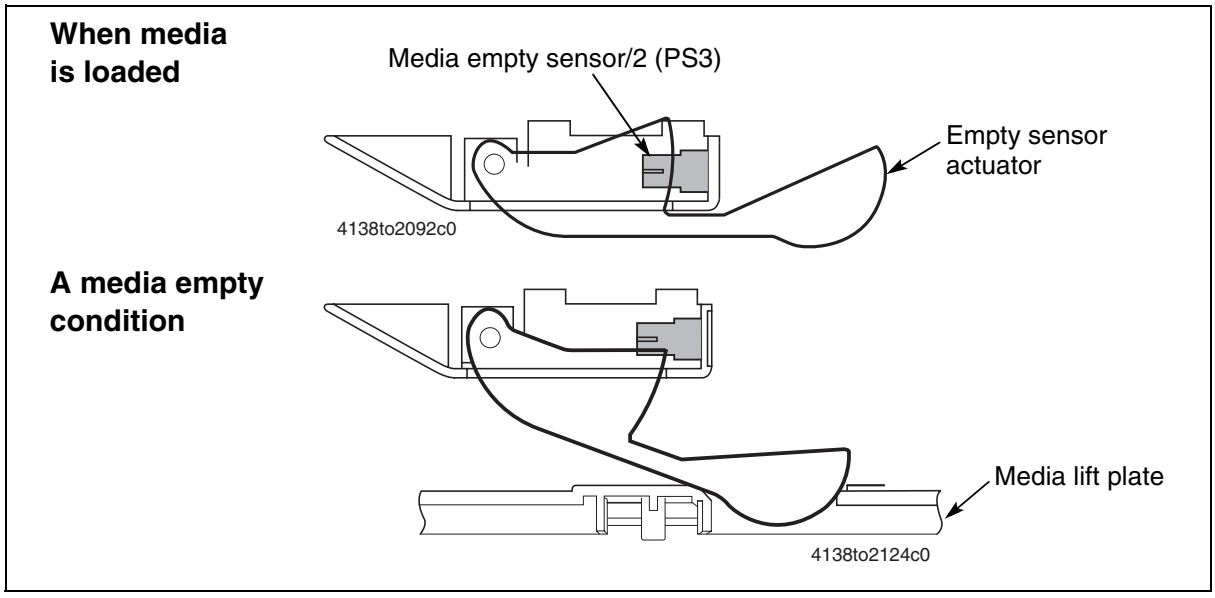
17.3.4 Media supply level detection control

- There is a window in the front cover of the cassette for indicating the media supply level.
- When the media lift plate goes up, a red lever appears in the window. The lower the level of the media stack, the more the red portion is visible.



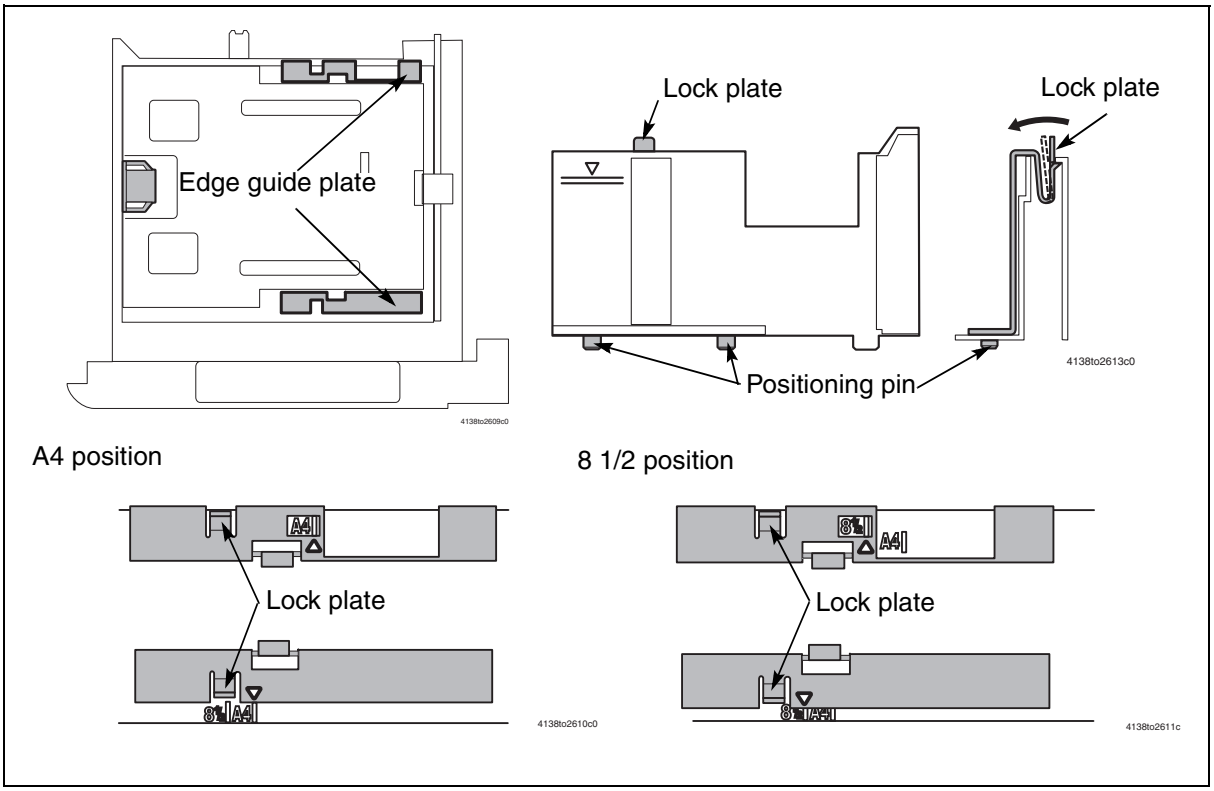
17.3.5 Media empty condition detection control

- The media empty message “PAPER EMPTY TRAY2” is displayed on the panel when the empty sensor actuator unblocks the media empty sensor/2.
- No mechanism is provided for detecting a media near-empty condition. The media supply level indicator replaces this function.



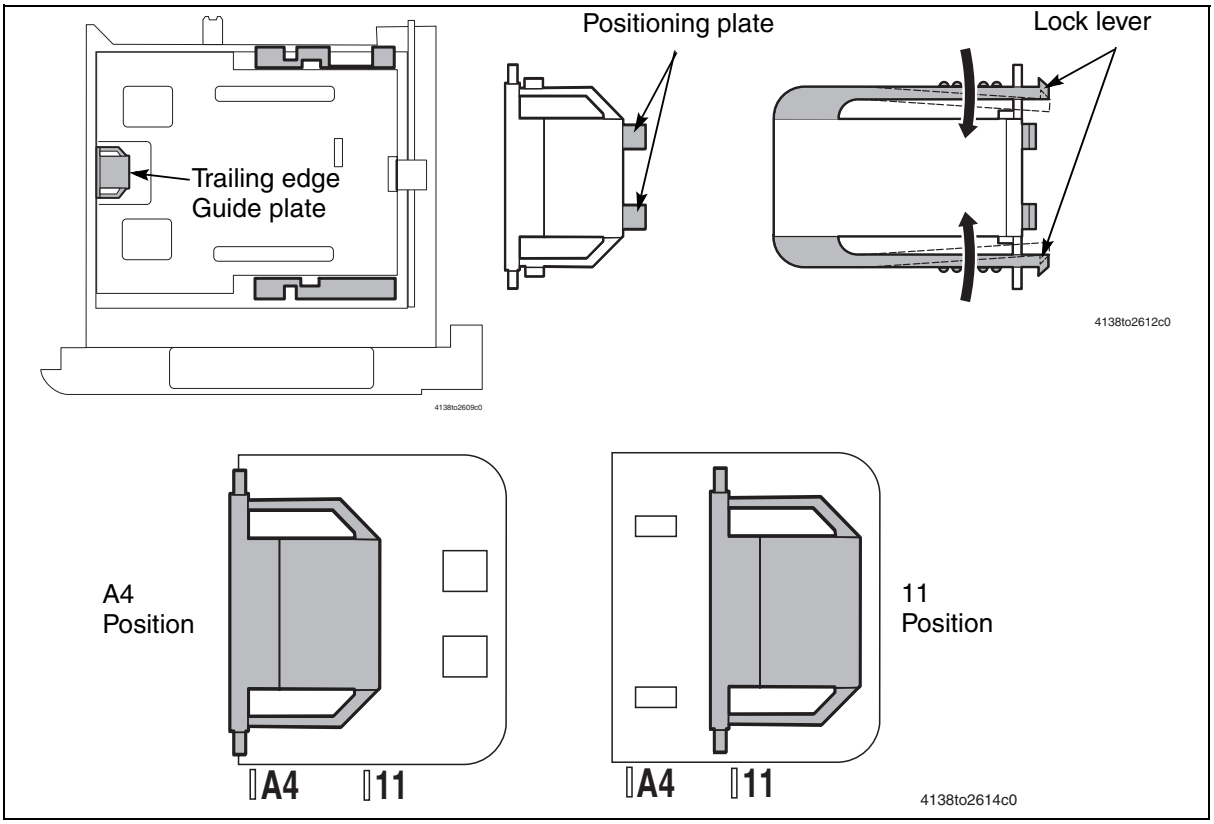
17.3.6 Edge guide plate

- Set the appropriate edge guide plate which corresponds to the width of the media to be loaded (A4 or 81/2).
- No mechanism is provided for detecting the media size.



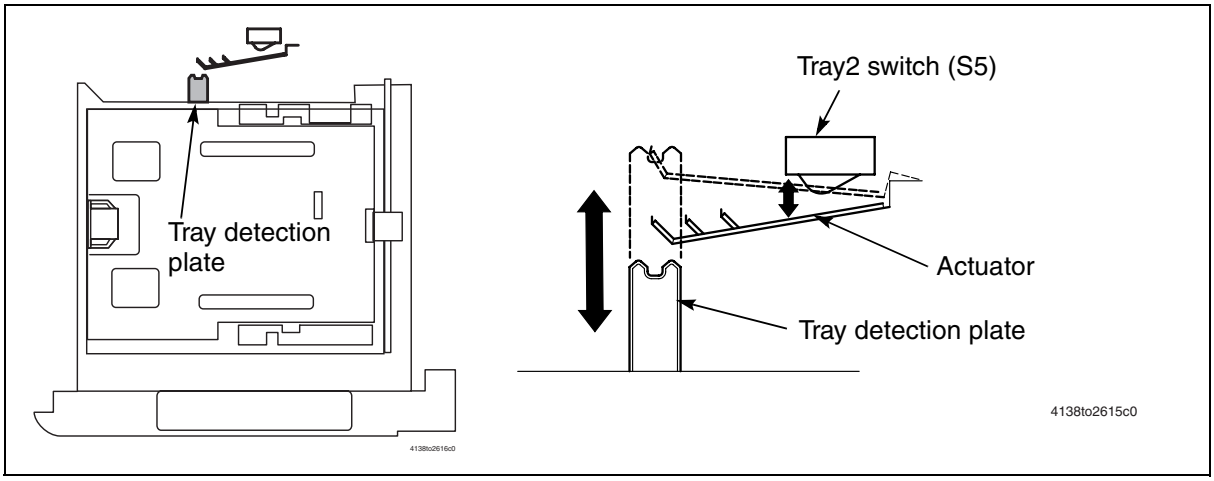
17.3.7 Trailing edge guide plate

- Set the appropriate trailing edge plate which corresponds to the length of the media (A4 or 11). The size detection function is not equipped.
- No mechanism is provided for detecting the media size.



17.3.8 Tray open/close detection control

- Whether tray is opened or closed is detected with the tray 2 switch.
  1. Closing the tray will make the detecting plate press and turn ON the actuator for the tray 2 switch mounted on the main body frame.
     The tray 2 switch will be ON if the tray is closed.
  2. The switch will be OFF if the tray is pulled out, and “PAPER EMPTY TRAY 2” will appear.

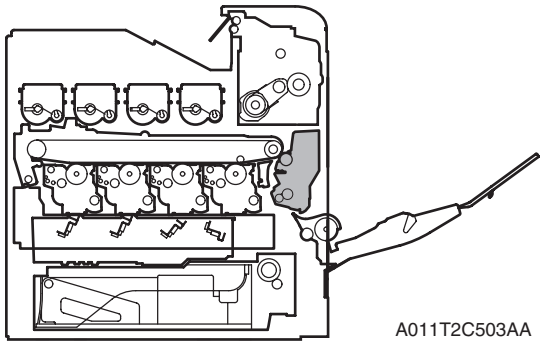


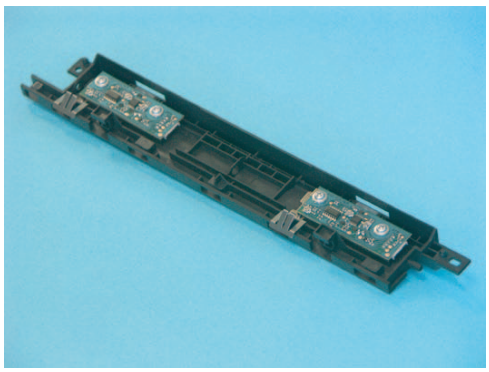
17.3.9 Media misfeed detection control

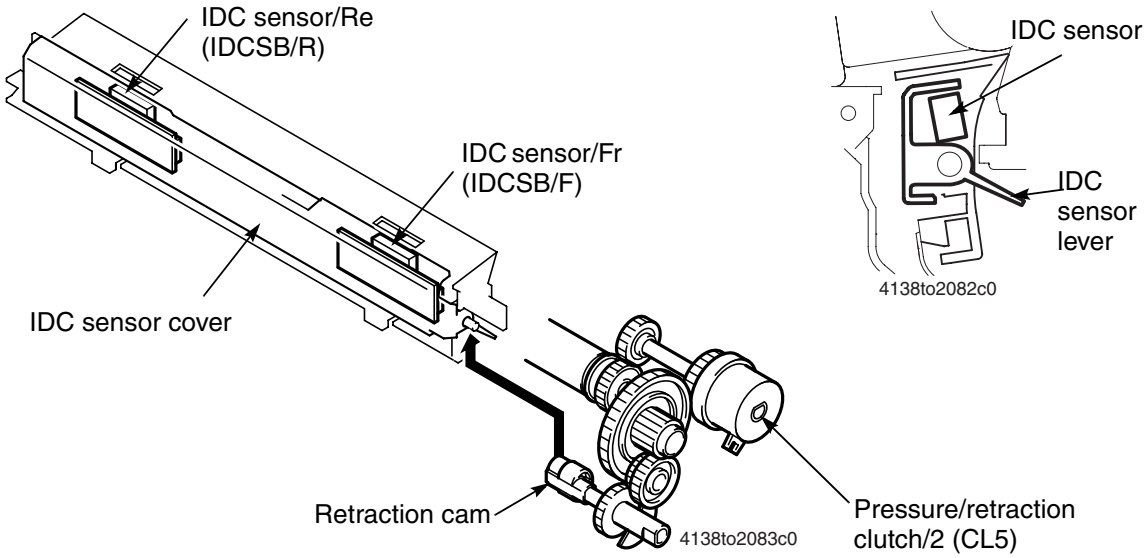
- If the registration sensor is not activated within a predetermined period of time after a media feed sequence has been started, the main body determines that there is a media misfeed. It then gives the message “PAPER EMPTY TRAY 2” on the panel.
- The media misfeed display can be reset by opening and closing any of the doors.

18. Conveyance section (IDC sensor)

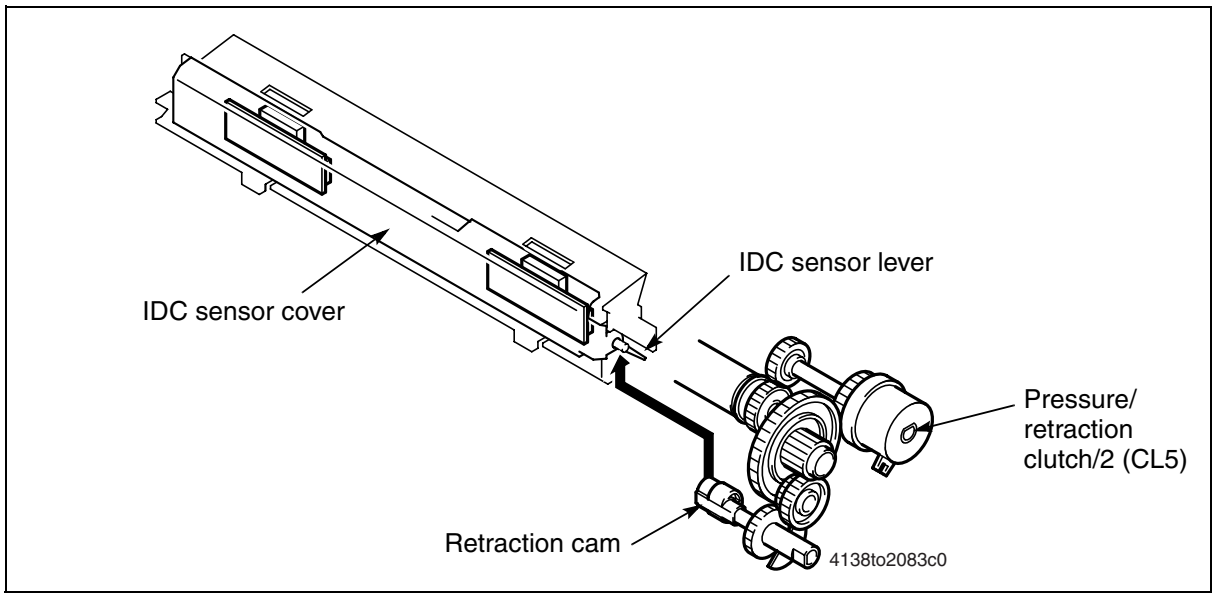
18.1 Composition







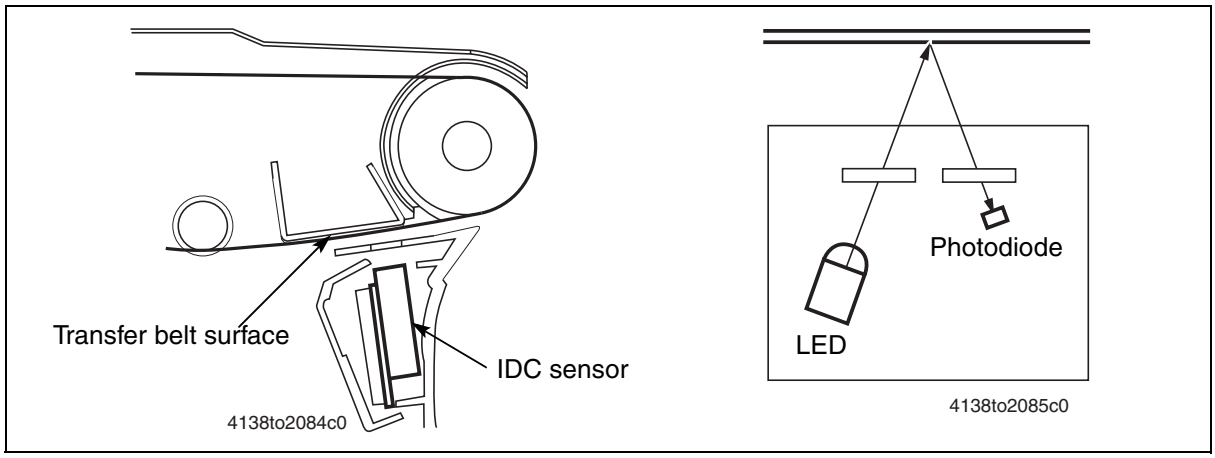
18.1.1 Drive



18.2 Operation

18.2.1 Toner density detection control

- A reflective sensor is used for the IDC sensor that detects the amount of toner sticking to the surface of the transfer belt. Image stabilization is performed based on the value detected.
- The detection pattern (toner image) produced on the surface of the transfer belt is irradiated with light emitted by the LED of the sensor.
- The photodiode of the sensor detects the light reflected off the toner pattern on the surface of the transfer belt.



- A voltage corresponding to the intensity of the light reflected off the toner pattern is output to the MFP board.

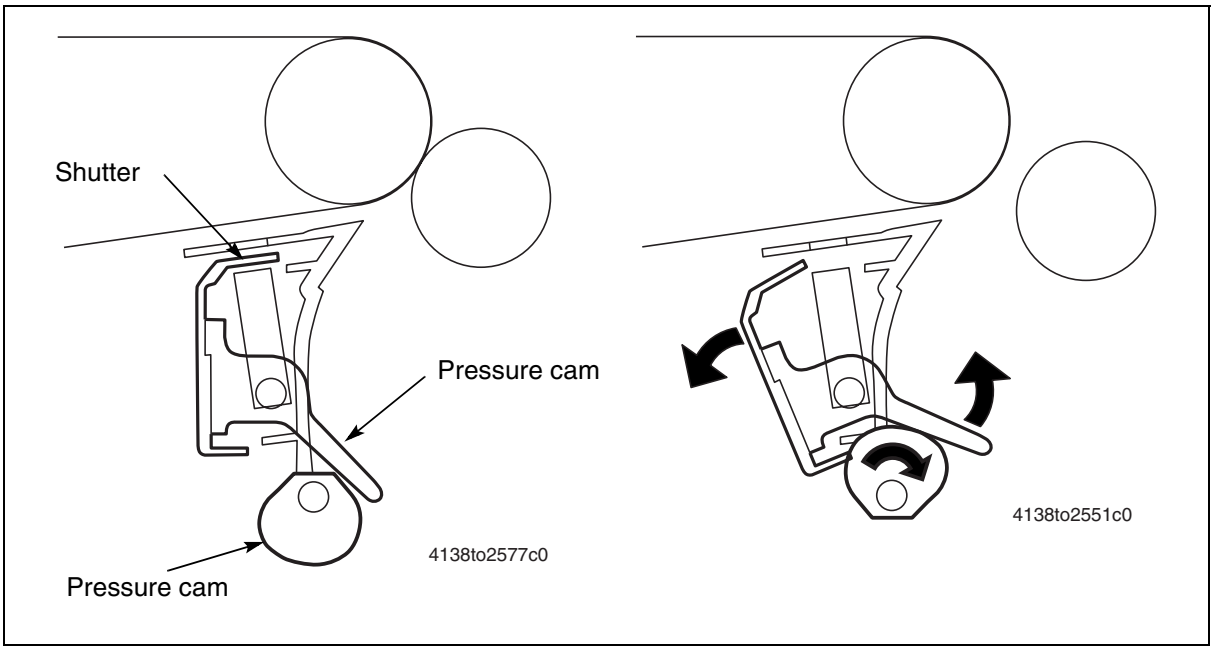
Amount of toner sticking	Intensity of light reflected	Output
Large	Small	Low
Small	Great	High

18.2.2 IDC sensor calibration control

- Changes in various types of characteristics due to change with time of the IDC sensor (deteriorated LED, dirty sensor surface), part-to-part variations in the sensors, and change of environment affect the IDC sensor output corresponding to the clear transfer belt surface. To correct fluctuations in the output, the sensor LED intensity is adjusted so as to keep constant the IDC sensor output value.

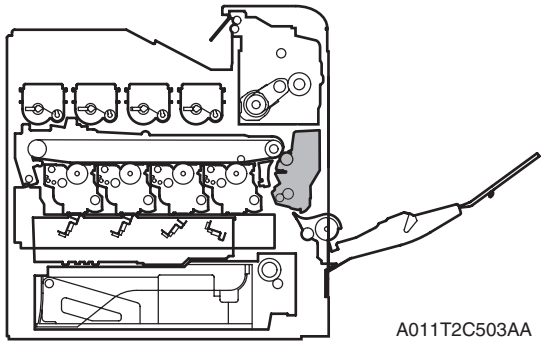
18.2.3 IDC sensor shutter mechanism

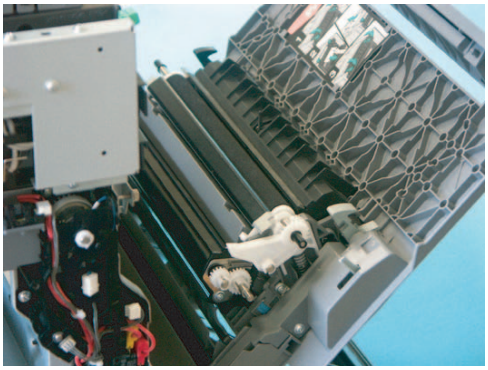
- Since the IDC sensor is installed below the transfer belt, it can be dirtied with toner or other foreign matter. A shutter mechanism is therefore provided above the IDC sensor to prevent it from being dirtied.
- The shutter is opened or closed in synchronism with the pressure or retraction motion of the 2nd transfer roller. When the 2nd transfer roller is pressed, the pressure cam pushes up the sensor lever, which opens the shutter above the IDC sensor.
- When the 2nd transfer roller is released, the shutter above the IDC sensor is closed by the tension of a spring.



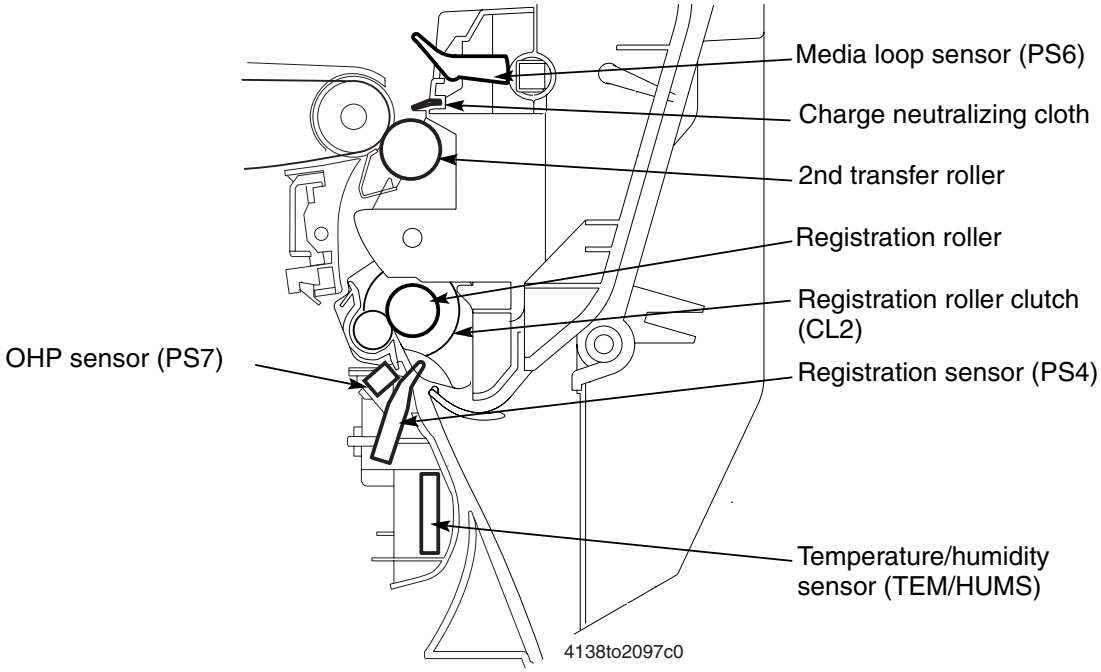
19. Conveyance section (Registration roller)

19.1 Composition

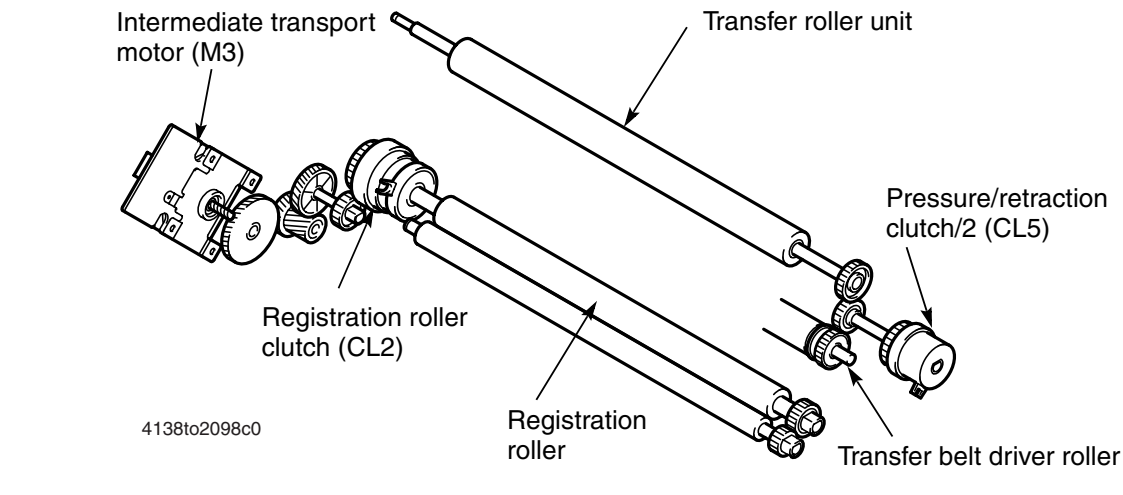




4138to2096c0



19.2 Drive



19.3 Operation

19.3.1 Conveyance speed control

- The intermediate transport motor provides drive for the conveyance section.
- The conveyance speed is variable in four steps and the appropriate one is selected according to the media type and print mode as detailed below.

Media type/print mode	Conveyance speed		Reason
	d-Color P325	d-Color P330	
Plain paper (monochrome print)	185 mm/s	216 mm/s	
Plain paper (color print)	152mm/s	185 mm/s	
Thick stock, envelopes, postcards, label, OHP transparencies, glossy paper, plain paper in the glossy paper mode, thick stock 1 in the glossy paper mode, long size paper	76 mm/s		To ensure good fusing performance
Thick stock 2 in the glossy paper mode	61.7 mm/s		To ensure good glossy performance

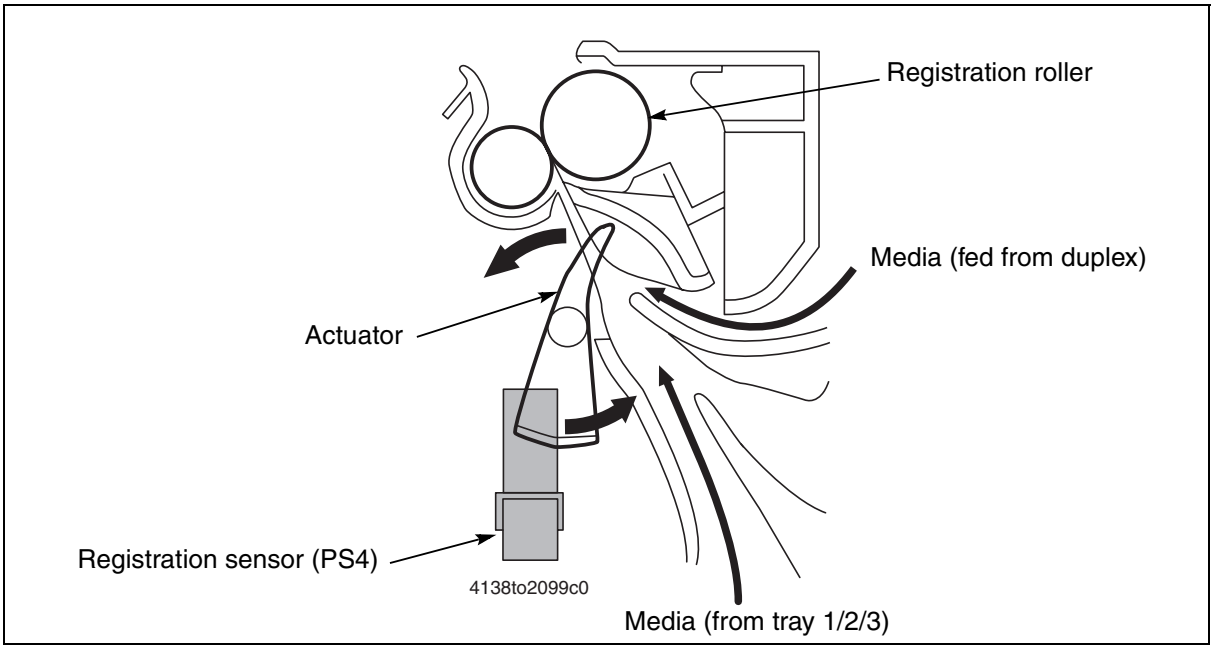
- For the first print, the main body makes the above decision before starting a print/media feed sequence and, based on the established speed, starts the print/media feed sequence.

19.3.2 Registration roller control

- When the media taken up and fed in by the feed roller reaches the registration roller, a loop is formed in the media and media conveyance is temporarily stopped. Conveyance skew is corrected by this loop.
- The registration sensor detects whether or not the media has reached the registration roller.
- The media fed in is synchronized with the image before media conveyance is restarted.

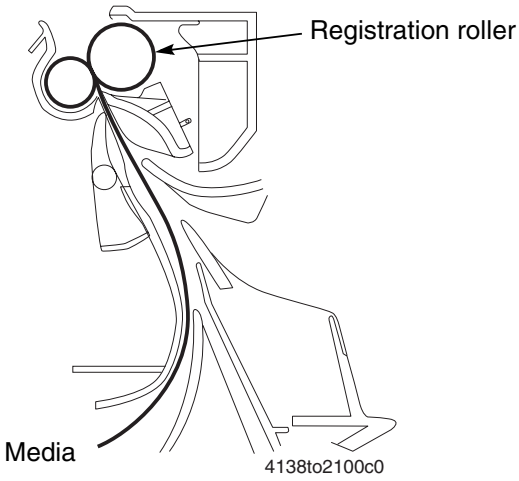
A. Media detection control

- When the media fed from the feed roller pushes up the actuator of the registration sensor, the sensor is unblocked. With this event occurring, the main body determines that the media has reached the position before the registration roller.



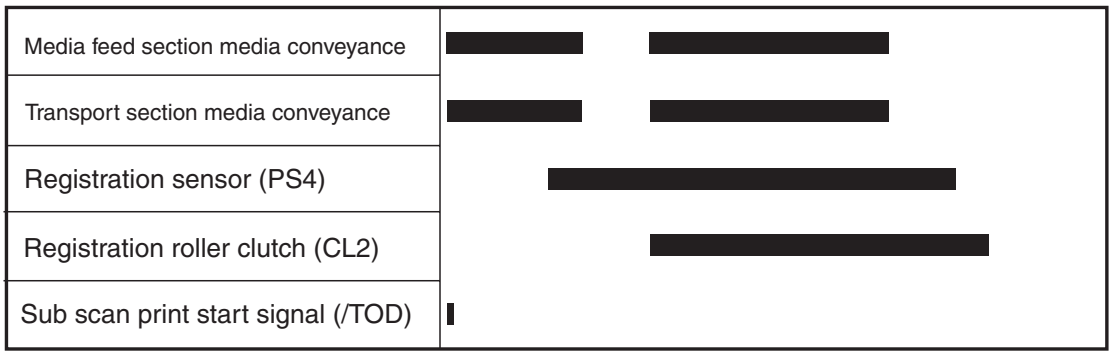
19.3.3 Control of loop formed before registration roller

- Media conveyance is stopped after the lapse of a predetermined period of time after the leading edge of the media fed from the feed roller has reached the registration roller. This forms a loop in the media.
- The loop in the media corrects skew in the media.



A. Media conveyance temporary stop control

- <Media conveyance stop>
  A given period of time after the registration sensor has detected the leading edge of the media, media conveyance in the media feed/conveyance section is stopped.
- <Restart>
  Media conveyance in the media feed/transport section is restarted in synchronism with the sub scan print start signal (/TOD) of the controller.

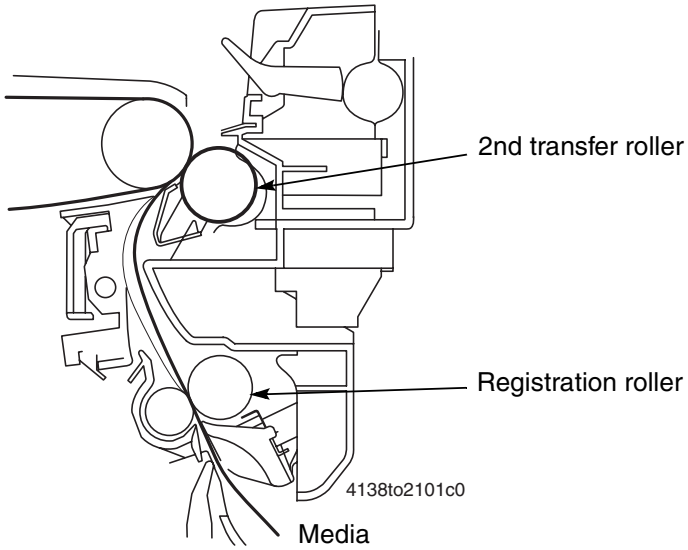


B. Registration roller clutch control

- In synchronization with the leading edge of the image [the sub scan print start signal (/TOD) of the controller] after the leading edge of the media has reached the registration roller and a loop has been formed in the media, the registration roller clutch is energized to start turning the registration roller.
- After the lapse of a predetermined period of time after the registration sensor has been deactivated by the media, the registration roller clutch is de-energized to stop the registration roller.

19.3.4 Control of loop formed before 2nd transfer

- A loop is formed in the media by the difference between the 2nd transfer roller media conveyance speed (1.000) and the registration roller media conveyance speed (1.006).
- The loop formed in the media absorbs effect from the registration roller side, thus preventing it from being transferred to the 2nd transfer section.



19.3.5 Control of loop formed before fusing section

- The difference between the fusing speed and media conveyance speed is corrected to prevent double transferred images and brush effects from occurring.
- The media loop sensor detects the length of the loop formed in the media between the 2nd transfer roller and the fusing pressure roller. The fusing speed is then varied according to the length of the loop detected. By varying the fusing speed, any effects from the fusing pressure roller side (part-to-part variations, change of parts over time) are prevented from being transferred to the 2nd transfer section.
- No loop control is provided to perform the fusing process when envelopes are used (to prevent wrinkles).

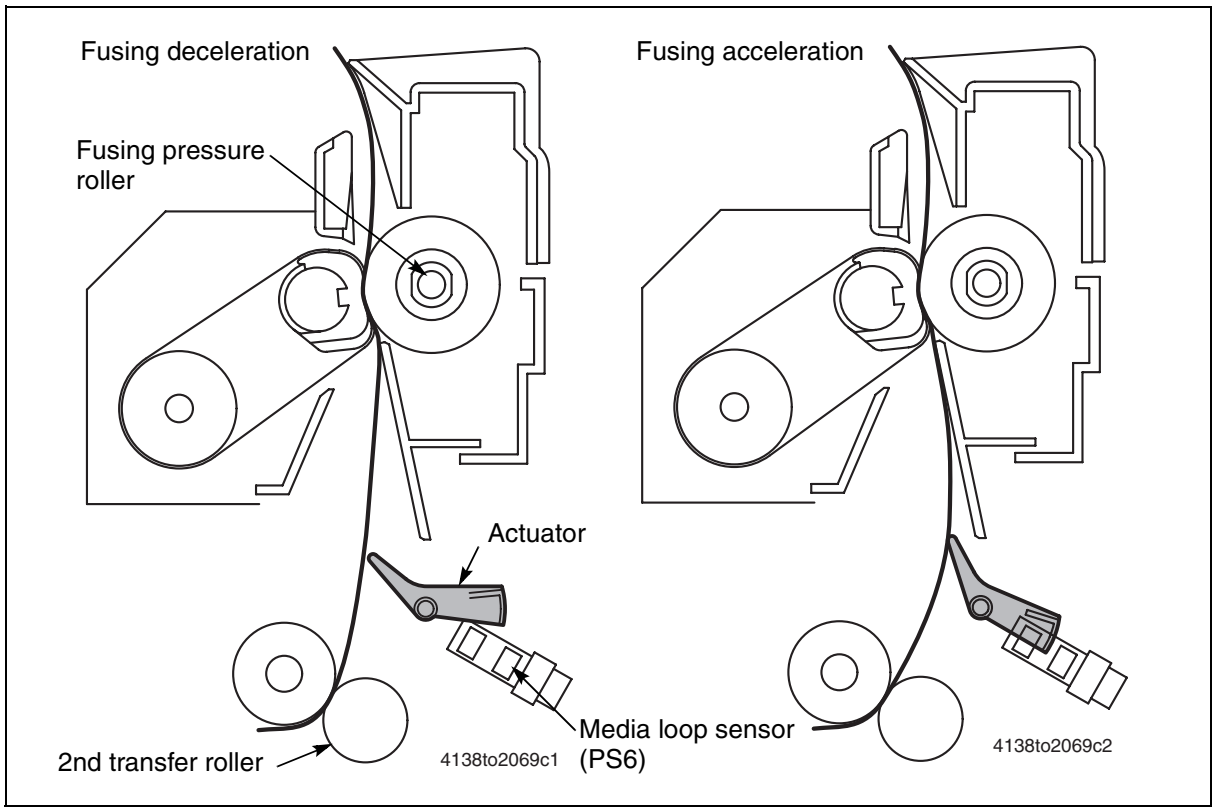
See P.89

A. Fusing deceleration (low speed):

- When the media loop length is small, the actuator of the media loop sensor is pushed up a small amount and the sensor is unblocked. When the sensor is unblocked, the fusing speed is decelerated (-3%*).
  * For the second side in the duplex mode, the speed decreases by 1.0%.

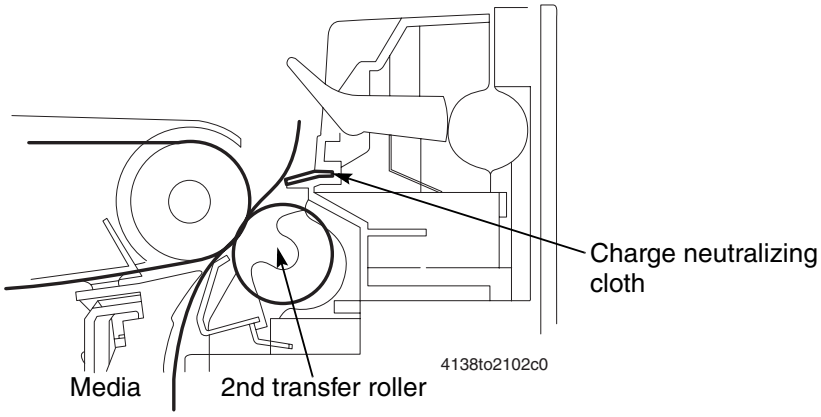
B. Fusing acceleration (high speed):

- When the media loop length is large, the actuator of the media loop sensor is pushed up a large amount and the sensor is blocked. When the sensor is blocked, the fusing speed is accelerated (+3%*).
  * For the second side in the duplex mode, the speed increases by 1.5%.



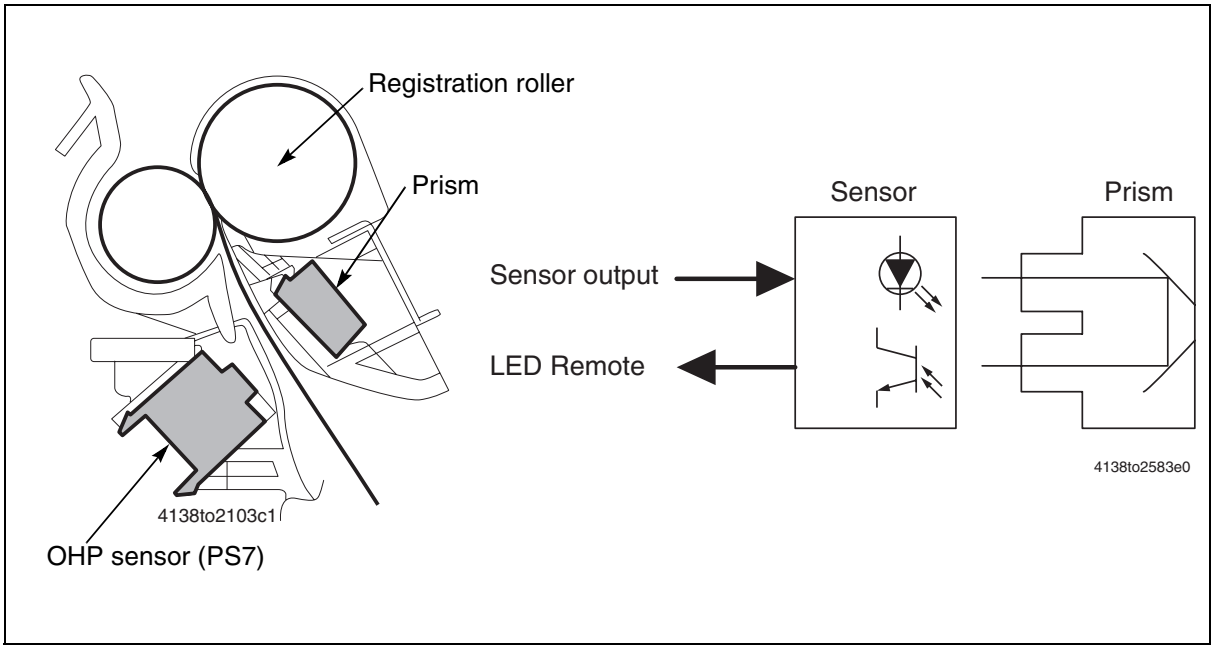
19.3.6 Media neutralization

- The charge neutralizing cloth neutralizes any charge left in the media after the 2nd transfer process.
- The charge residue is grounded through the charge neutralizing cloth to the main body frame.



19.3.7 OHP transparencies detection control

- To prevent incorrect prints on OHP transparencies, the type of the media being conveyed is detected by the OHP sensor.
- The OHP detection is made after the loop has been formed in the media before the registration roller.
- If the output voltage of the OHP sensor is less than a predetermined value, the main body considers that the media is a type other than OHP transparencies. If the output voltage is the predetermined value or more, the main body determines that the media is OHP transparencie.



- If the media type setting does not match the results of OHP detection, the main body suspends the print cycle and displays the message “TRAYX TYPE ERROR” on the panel.
- The media that has caused type error is fed out of the main body after going through the 2nd transfer and fusing processes. The subsequent sheets of media are subjected to the following operation.

Media state			Feed operation	Print operation	Exit operation
Media type error			Feed	Print	Exit
Subsequent sheets	Yet to be printed	Yet to be fed	Suspend	Suspend	Suspend
	Printed		Feed	Print	Exit
	Yet to be printed	Fed	Feed	Print	Exit
	Printed		Feed	Print	Exit

19.3.8 Media size error detection control

- To prevent incorrect printed pages, the size of the media being conveyed is detected using the registration sensor and media feed sensor.
- The length of the media is detected based on the value calculated using the period of time that begins when the sensor is activated and ends when it is deactivated for each media source.
- For the lower feeder unit, even if the media feed sensor does not detect a media size error, the downstream registration sensor makes an error check again.

Media source	Media length detection sensor	Starting point	Ending point
Tray 1	Registration sensor (PS4)	Registration roller clutch CL2: ON	Registration sensor PS4: OFF
Tray 2	Registration sensor (PS4)	Registration roller clutch CL2: ON	Registration sensor PS4: OFF
Tray 3 (Lower feeder unit)	Media feed sensor (PS2: Tray 3)	Media feed sensor PS2: ON	Media feed sensor PS2: OFF
	Registration sensor (PS4)	Registration roller clutch CL2: ON	Media feed sensor PS2: OFF
Tray 4 (Lower feeder unit)	Media feed sensor (PS2: Tray 4)	Media feed sensor PS2: ON	Media feed sensor PS2: OFF
	Registration sensor (PS4)	Registration roller clutch CL2: ON	Media feed sensor PS2: OFF
Duplex unit	No media length is detected.		

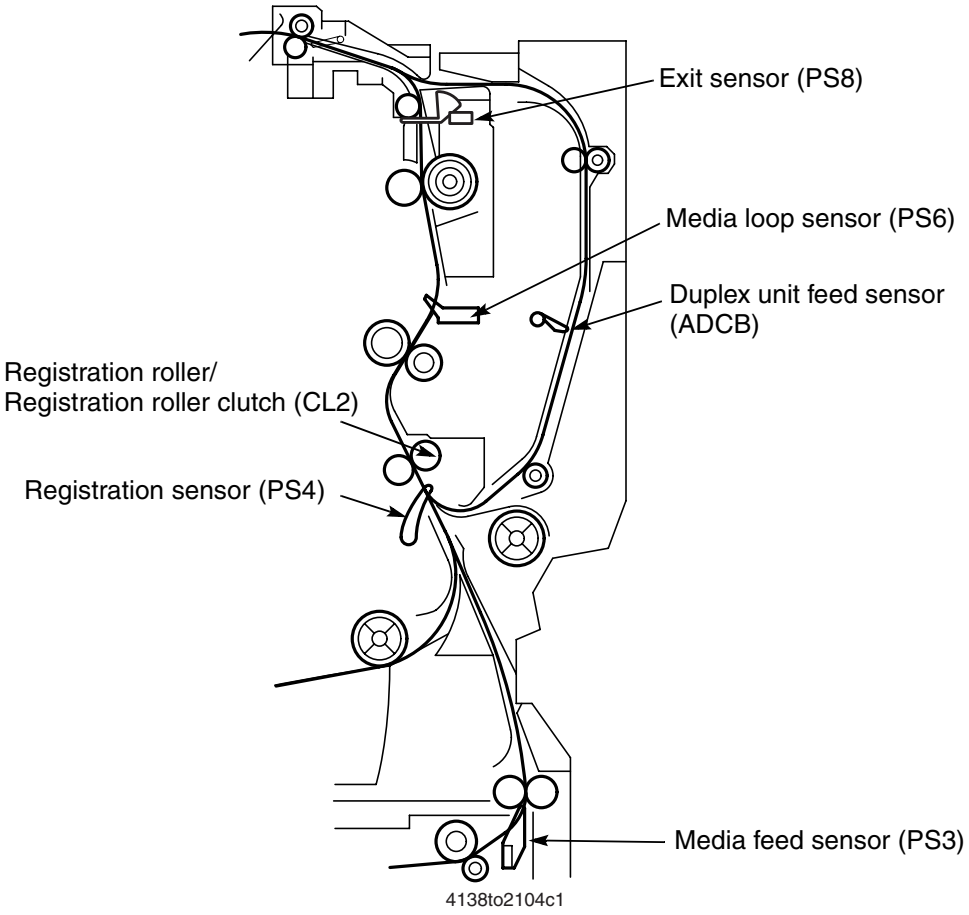
- If there is a mismatch between the media size setting and the results of media size detection, the main body suspends the print cycle and displays the message or “PAPER ERROR” on the panel.
- The media that has caused size error is fed out of the main body after going through the 2nd transfer and fusing processes.
- The subsequent sheets of media are subjected to the following operation.

Media state			Feed operation	Print operation	Exit operation
Media type error			Feed	Print	Exit
Subsequent sheets	Yet to be printed	Yet to be fed	Suspend	Suspend	Suspend
	Printed		Feed	Print	Exit
	Yet to be printed	Fed	Feed	Print	Exit
	Printed		Feed	Print	Exit

- The size error display can be reset when the power switch is turned OFF and ON, or by a reset command (media size error reset).
- If a media size error is detected during 2-sided printing, the main body determines that there is a media misfeed and stops operating.

19.3.9 Conveyance system media misfeed detection control

- In the feeding section, a specific sensor is assigned for each media source. Based on the time elapsed before the sensors become activated, misfeed is detected.
- A specific sensor is assigned for each section of the conveyance system to detect a media misfeed that could occur along the path.
- When a media misfeed is detected, the main body suspends the print cycle and gives the message “PAPER JAM” on the panel. The main body thereafter attempts to detect any sheet of media left inside it.



Misfeed type		Misfeed detection starting point	Misfeed detection condition
Misfeed at feeding section	Tray 1	Feed clutch/1 (CL1) ON	Registration sensor (PS4) not activated within a predetermined time
	Tray 2	Feed clutch/2 (CL3) ON	
	Tray 3	Feed clutch (CL1: Tray 3) ON	Media feed sensor (PS2: Tray 3) not activated within a predetermined time
	Tray 4	Feed clutch (CL1: Tray 4) ON	Media feed sensor (PS2: Tray 4) not activated within a predetermined time
	2nd side in duplex printing	Transfer motor (M1 Duplex unit) ON	Registration sensor (PS4) not activated within a predetermined time
	All trays	Registration roller clutch (CL2) ON	When registration roller clutch (CL2) activated, media feed clutch/1 (CL1), media feed clutch/2 (CL3), and media feed clutch (CL1: Tray 3, Tray 4) also activated.
Misfeed at vertical conveyance section		Media feed sensor (PS2: Tray 3) ON	Registration sensor (PS4) not activated.
			Media feed sensor (PS2: Tray 3) not deactivated.
		Media feed sensor (PS2: Tray 4) ON	Registration sensor (PS4) not activated.
			Media feed sensor (PS2: Tray 4) not deactivated.
Misfeed at 2nd transfer section	Media other than long size paper	Registration sensor (PS4) activated	PS4 not deactivated
			PS8 not activated
		Registration roller clutch (CL2) activated	PS4 not deactivated
	Long size paper	Registration sensor (PS4) ON	After long size media registration sensor (PS4) and registration sensor (PS4) activated, they are not deactivated in two seconds.
Misfeed at exit/fusing section		Exit sensor (PS8) activated	PS8 not deactivated
		Exit sensor (PS8) deactivated	ADCB not activated
Misfeed at duplex unit		Duplex unit feed sensor activated	PS4 not activated
			ADCB not deactivated

- The media misfeed display can be reset when all doors are closed after any of the doors has been open. At the same time, the information on media left is cleared. Thereafter, the main body attempts to detect any sheet of media left inside it again.

19.3.10 Remaining media detection control when the main power switch is turned ON

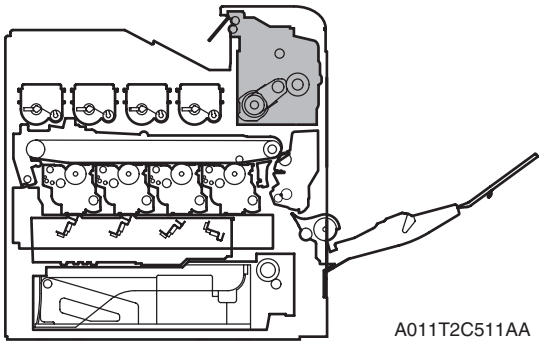
- Any sheet of media left inside the main body is checked when the power switch is turned ON or a door is opened and closed.
- The main body checks sensors sequentially and, if a sensor is found to be activated, determines that there is a sheet of media left there inside the main body. Then, the main body gives the message of “PAPER JAM” on the panel.
- This detection control is also executed when a cover is closed.

19.3.11 Temperature/humidity sensor

- The temperature/humidity sensor detects temperature and humidity inside the main body.
- The detected data are used for image stabilization control, ATVC control, and transfer output control.

20. Fusing section

20.1 Composition



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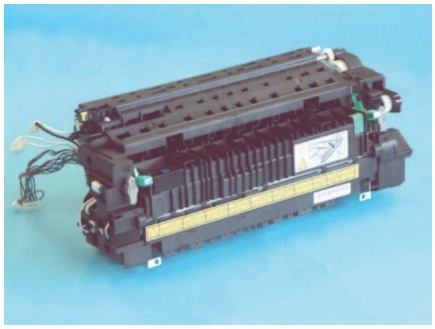
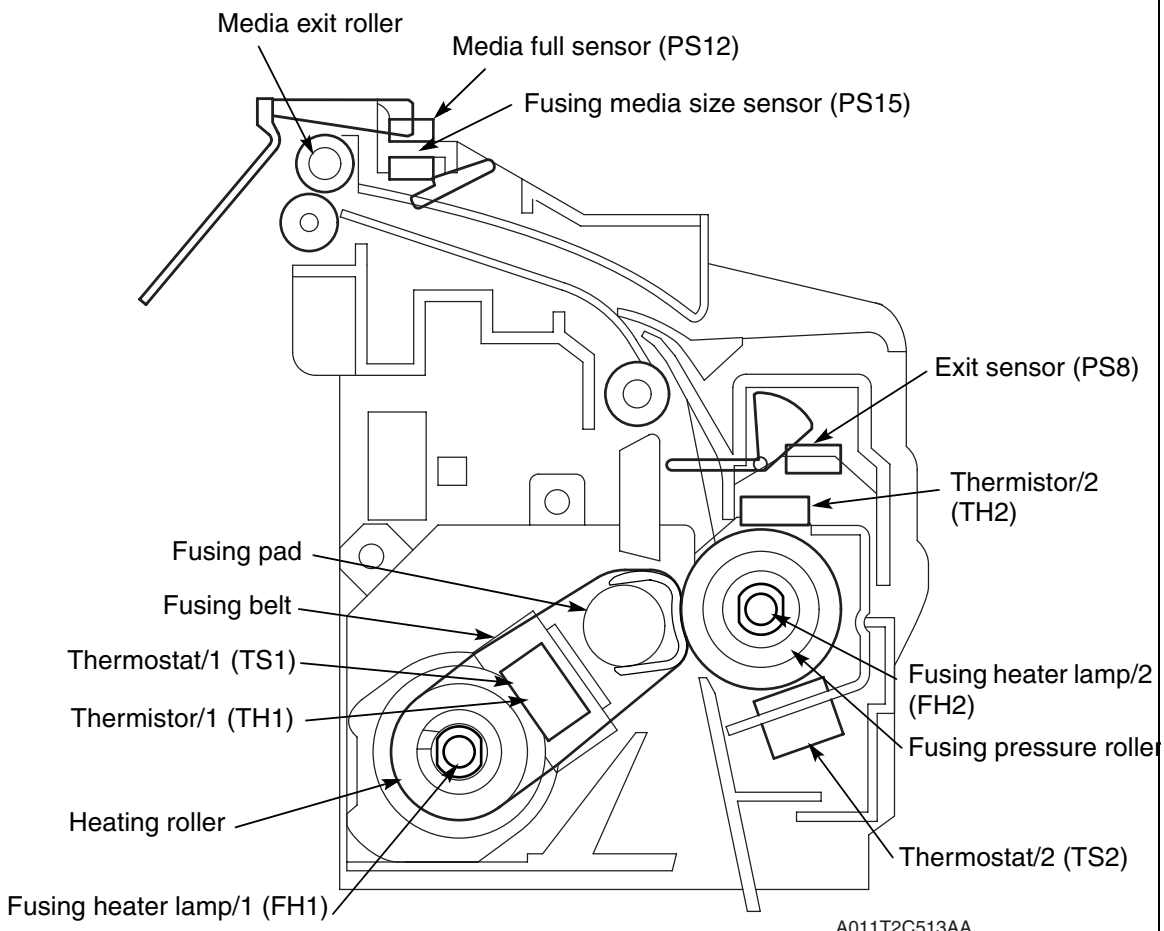


A011T2C056DA



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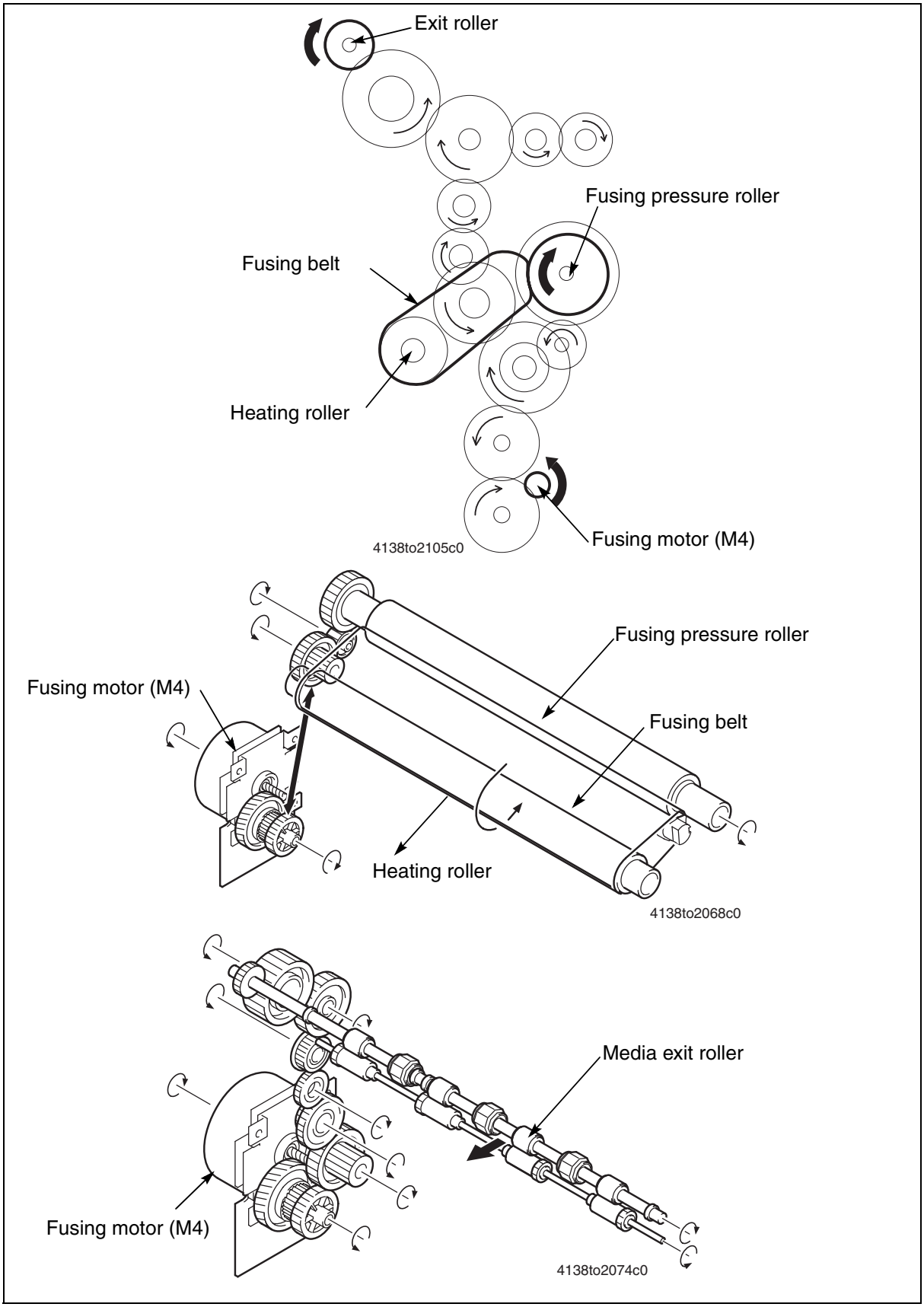
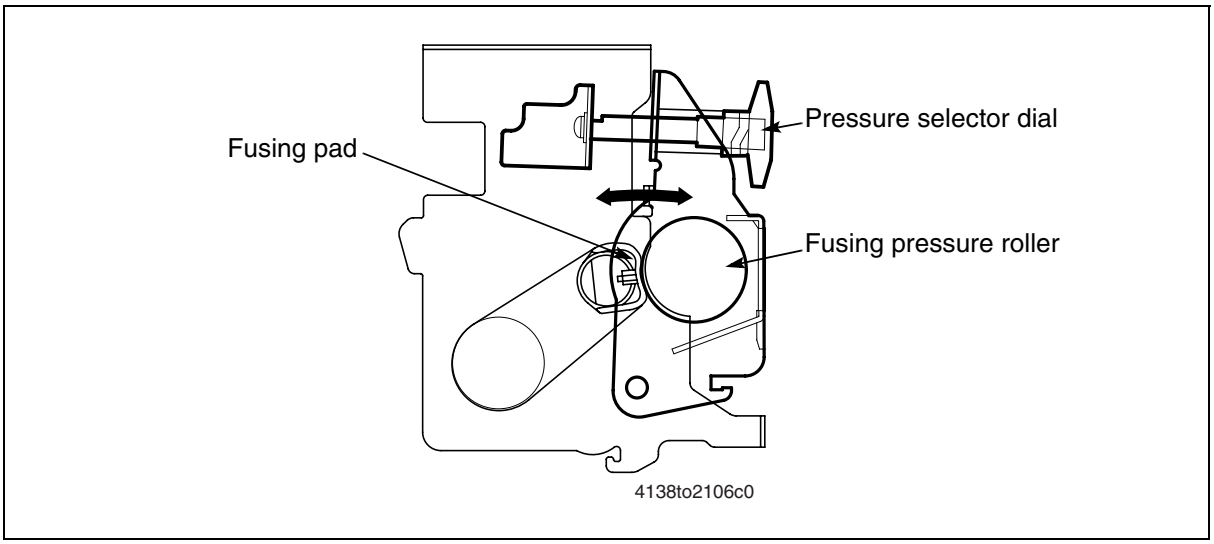
20.2 Drive


Exit roller
Fusing pressure roller
Fusing belt
Heating roller
Fusing motor (M4)
4138to2105c0
Fusing pressure roller
Fusing motor (M4)
Fusing belt
Heating roller
4138to2068c0
Media exit roller
Fusing motor (M4)
4138to2074c0

20.3 Operation

20.3.1 Fusing pressure roller pressure selection mechanism

- The pressure applied by the fusing pressure roller is selected appropriately to prevent media wrinkles during printing of envelopes.
- A pressure selection mechanism is provided to vary the pressure in two steps.
- The pressure is selected by placing the pressure selector dial in either of the two positions that are 180 degrees apart from each other.
- Placing the dial in the appropriate position selects the corresponding pressure applied by the fusing pressure roller to the fusing pad.
- Place the dial in the top position when printing is to be done on plain paper or a similar type of media (for a high pressure).
- Place the dial in the bottom position when printing is to be done on envelopes (for a low pressure).
- Whenever printing on envelopes, the pressure selector dial must be placed in the appropriate position. When the print cycle using envelopes is completed, be sure to place the dial back in the original position.
- If the print cycle is started without first selecting the appropriate position of the dial, envelopes are very likely to be wrinkled, and the image could be poorly fused on plain paper and similar media.



20.3.2 Fusing pressure roller drive control

A. Fusing speed selection control

- The fusing motor provides drive for the fusing section.
- The appropriate fusing speed is selected according to the media type and print mode to prevent fusing failure.
- In the glossy paper mode, the appropriate fusing speed is selected according to the media type.

- d-Color P330

Media		Plain paper (mm/s)	Thick stock 1/ Envelopes/Glossy paper 1/OHP transparencies (mm/s)	Thick stock 2/ Postcards (mm/s)	Glossy paper 2 (mm/s)
Printing mode	Full-color	185	76	76	61.7
	Monochrome	216	76	76	61.7
	Monochrome low PPM	185	76	76	61.7
	Glossy	76	76	61.7	61.7

- d-Color P325

Media		Plain paper (mm/s)	Thick stock 1/ Envelopes/Glossy paper 1/OHP transparencies (mm/s)	Thick stock 2/ Postcards (mm/s)	Glossy paper 2 (mm/s)
Printing mode	Full-color	152	76	76	61.7
	Monochrome	185	76	76	61.7
	Monochrome low PPM	152	76	76	61.7
	Glossy	76	76	61.7	61.7

B. Fusing speed control (control of loop before fusing)

- To prevent double transferred images and brush effects from occurring, the difference between the fusing speed and the media conveyance speed during image transfer is corrected.
- The media loop sensor detects the length of the loop formed in the media between the 2nd transfer roller and the fusing pressure roller. The fusing speed is then varied according to the length of the loop detected. By varying the fusing speed, any effects from the fusing pressure roller side (part-to-part variations, change of parts over time) are prevented from being transferred to the 2nd transfer section.
- No loop control is provided to perform the fusing process when envelopes are used (to prevent wrinkles).

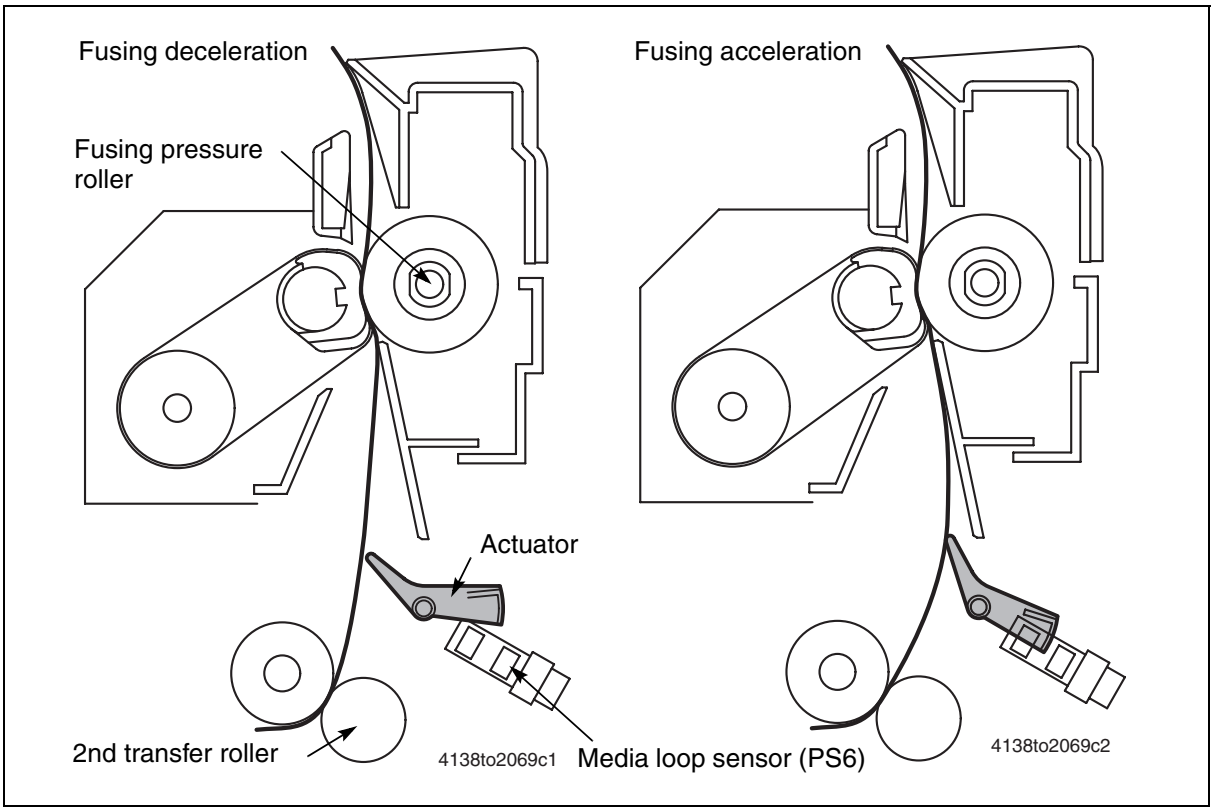
See P.78

C. Fusing deceleration (low speed):

- When the media loop length is small, the actuator of the media loop sensor is pushed up a small amount and the sensor is unblocked. When the sensor is unblocked, the fusing speed is decelerated (-3%*).
  * For the second side in the duplex mode, the speed decreases by 1.0%.

D. Fusing acceleration (high speed):

- When the media loop length is large, the actuator of the media loop sensor is pushed up a large amount and the sensor is blocked. When the sensor is blocked, the fusing speed is accelerated (+3%*).
  * For the second side in the duplex mode, the speed increases by 1.5%.



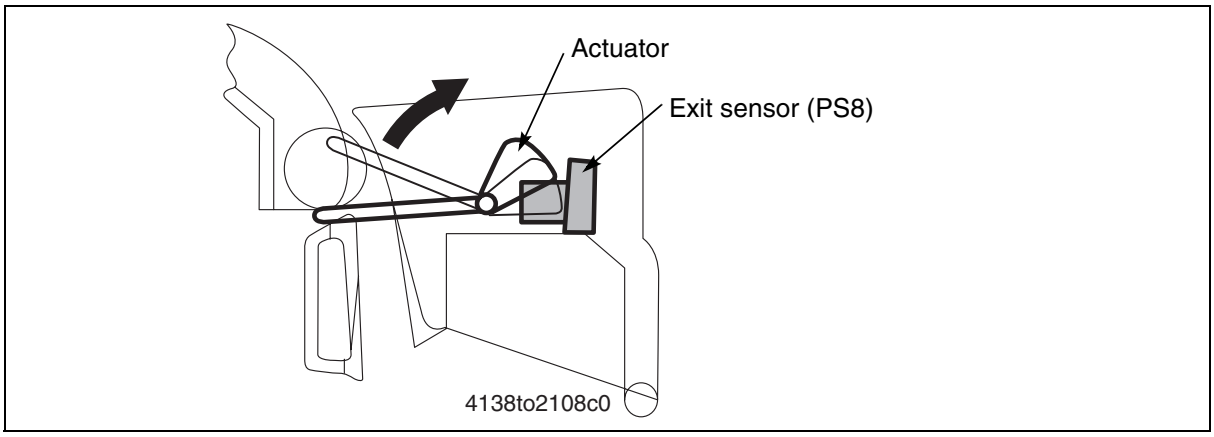
E. Fusing pressure roller deformation prevention control

- To prevent the fusing pressure roller from being deformed, the fusing pressure roller is forcibly turned if it is left idle for a predetermined period of time.
- Operation timing
  1. If the main body remains in the standby state for more than 13 hours, the fusing motor is turned for 1 sec.
  2. If the main body remains in the power save mode for more than 14 days, the temperature adjustment is started. After the temperature goes up to 80 degrees or more, the fusing motor is turned for 1 sec.

See P.99

F. Media exit detection control

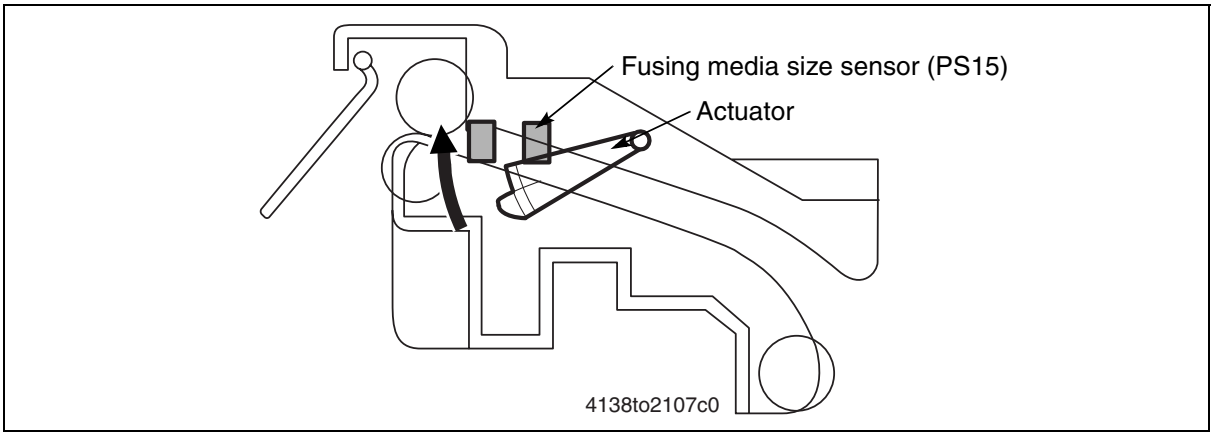
- The exit sensor detects the media conveyed from the fusing belt and fusing pressure roller.
- The exit sensor is placed right after the fusing pressure roller in order to detect the media jam and prevent the media from being wound to the fusing pressure roller.



G. Media width detection control

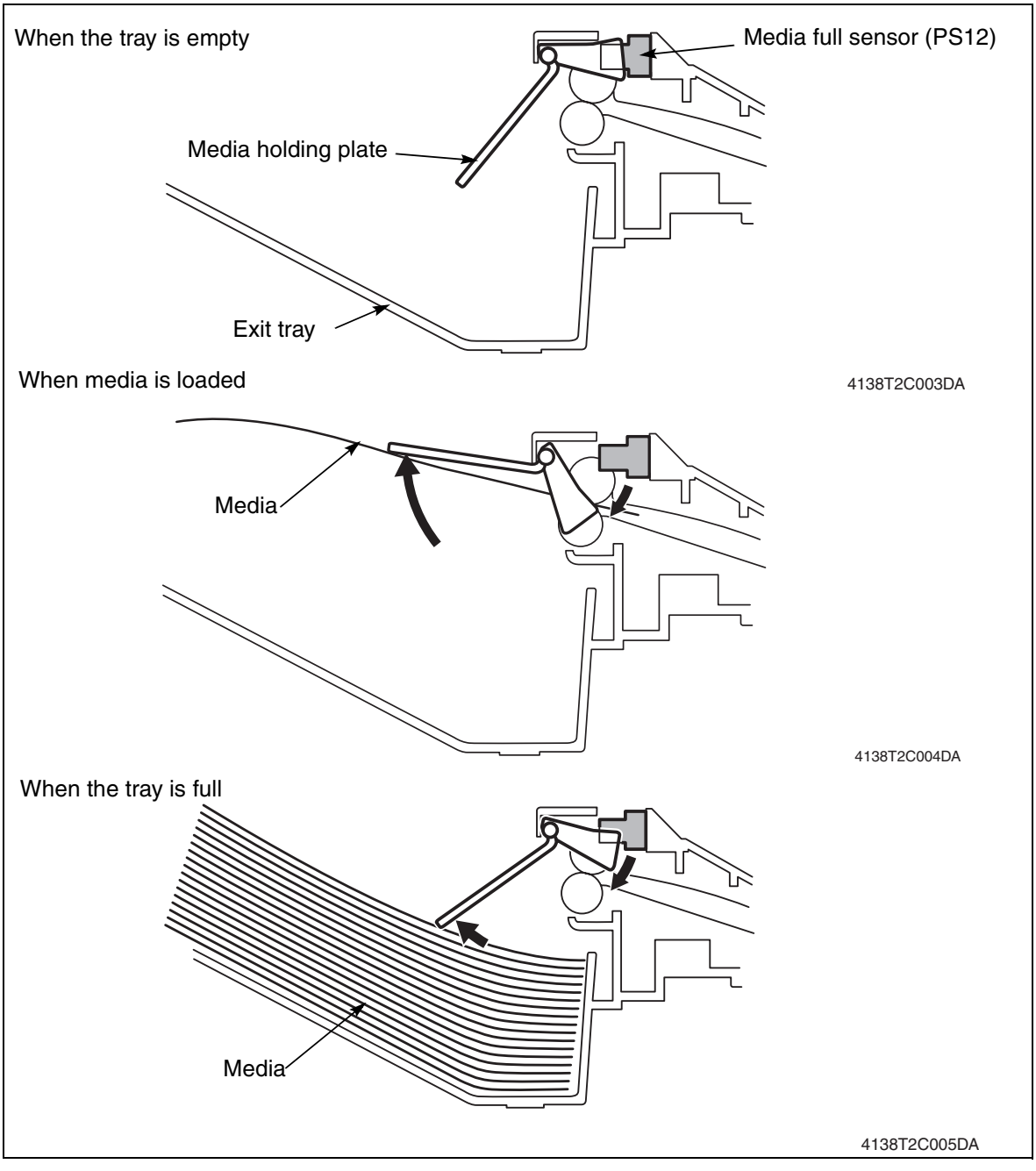
- The fusing media size sensor detects the width of the media being conveyed.
- If the width of the media that has moved past the fusing media size sensor is 210 mm (A4 width) or more, the leading edge of the media pushes up the actuator of the sensor, thus blocking the sensor. When the sensor is blocked, the main body considers that the width of the media is equivalent to A4 width or more.
- If the width of the media that has moved past the fusing media size sensor is less than 210 mm (A4 width), the actuator of the sensor is not moved and the sensor is left unblocked. When the sensor is unblocked, the main body considers that the width of the media is a small size (B5 size or less).
- For media size detection, the main body recognizes the media size using the media size setting made in the controller and determines it after the media has actually been fed through. The media size detection results are used in the “PPM control,” to be described later.

See P.100



H. Detection of media full in the exit tray

- The media full sensor detects the load capacity of output media in the exit tray.
- When the media holding plate is low, the edge of the media holding plate shades the media full sensor.
- When printing starts, the output media pushes up the media holding plate and the edge of the plate activates the media full sensor.
- After all media is discharged, the media holding plate goes down and the edge of the plate shades the media full sensor. If the sensor is shaded, the printed media is judged to not have reached the maximum load capacity yet.
- After all media is discharged, if the output media in the exit tray keeps the media holding plate up and the media full sensor remains activated, the printed media is judged to have reached the maximum load capacity, and the operation panel displays the message "OUTPUT FULL REMOVE PAPER."
- If the sensor detects that the exit tray is full, printing is stopped.
- The message "OUTPUT FULL REMOVE PAPER" is removed when the output media is removed from the exit tray, which again shades the media full sensor.



I. Proactive control

- To shorten the time period that begins when a print request is accepted and ends when the fusing sequence starts, the fusing motor is turned beforehand.
- Control start timing
- When a print request is accepted in print ready condition after the warm up cycle was complete.
- Control termination timing
- After the lapse of a predetermined time, at the start of a print cycle, when a malfunction occurs or at the start of the sleep mode.

J. Print start wait control

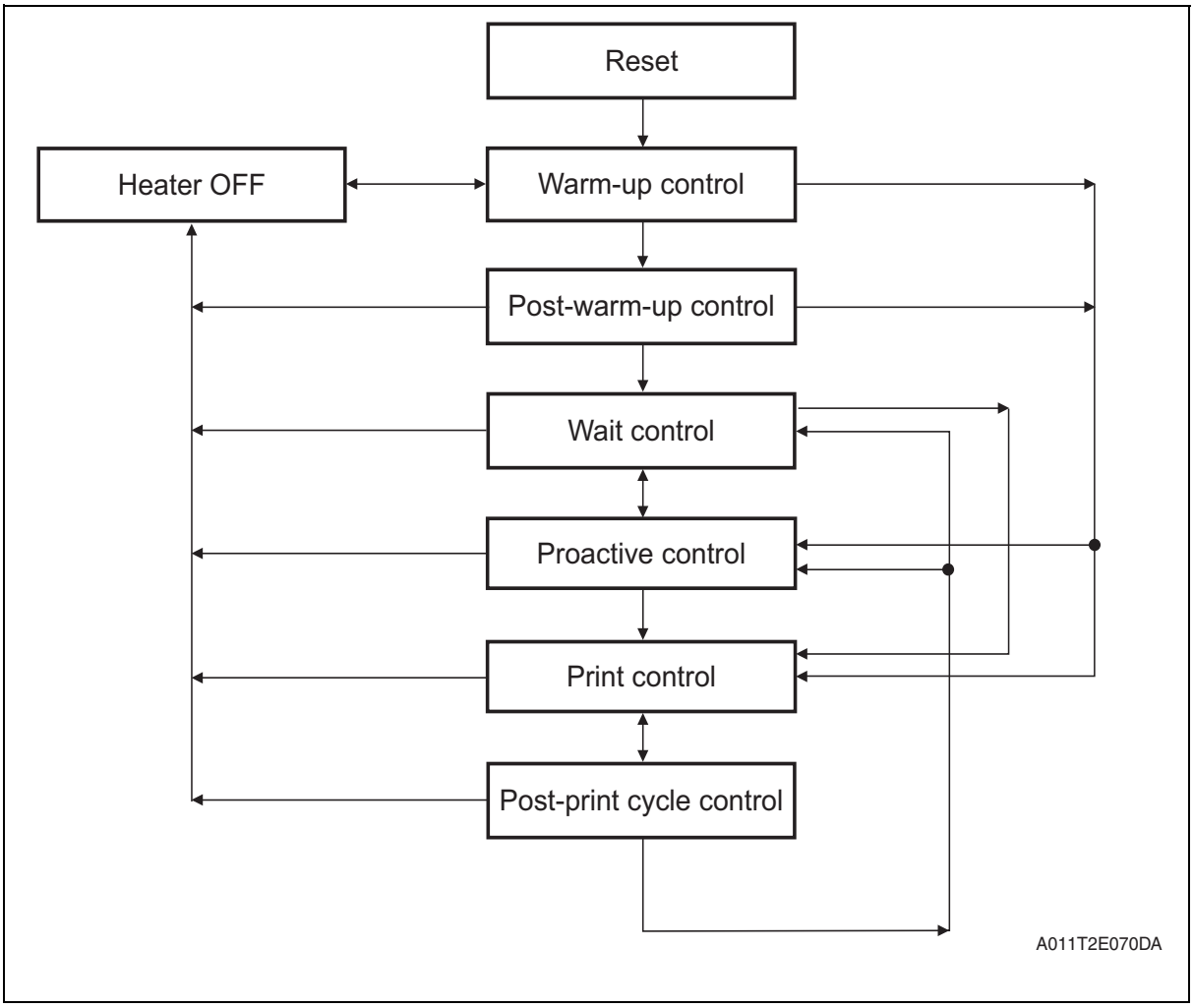
- To ensure good fusing performance for the first print, the print start timing is retarded.
- The control also prevents the media from sticking during printing on OHP transparencies in the color mode.
- <Operation>
  The print start timing is retarded using the value of either one of the two wait periods, whichever is longer, calculated under the following two conditions.
  1. Using the data provided by the temperature/humidity sensor and other sensors, the period of time that begins when the print control (print start timing control) is started and ends when the first sheet of media reaches the fusing belt is calculated.
  2. If the first print is produced on OHP transparencies in the color mode, the wait time is calculated to ensure that the media interval is the specified value.

20.3.3 Fusing temperature control

- To fuse the toner image on the media (image yet to be permanently fixed) properly into the media, the heater lamps are turned ON and OFF as necessary to bring the fusing temperature to an appropriate level.
- Thermistors are used to detect the surface temperatures of the heating roller and fusing pressure roller. The heater lamps are then turned ON and OFF as necessary to achieve the set temperature.
- The control temperature in the print command wait state is called the standby temperature, while that for permanently fix the toner image on media into the media is called the print temperature.

20.3.4 Fusing temperature control management

- The appropriate type of temperature control is provided according to the main body status.



A. Conditions enabling shift to warm-up control
- The power switch is turned ON.
- A malfunction or media misfeed is reset.
- The main body leaves the power save mode.
- A door is closed.

B. Condition enabling shift to post-warm-up control
- At the end of the warm-up control (no print request)

C. Conditions enabling shift to wait control
- At the end of the warm-up control (no print request)
- At the end of the post-print cycle control
- At the end of a proactive control

D. Condition enabling shift to the proactive control
- A print request is accepted.

E. Condition enabling shift to print control
- A print request is accepted.

F. Condition enabling shift to post-print cycle control
- At the end of the print control

G. Condition enabling shift to heater OFF control

- A malfunction or media misfeed occurs.
- A power save mode signal is received.

20.3.5 Warm-up control

- Control is provided until the heating roller reaches the predetermined level.
- The power save mode is not accepted during a warm-up cycle.

A. Control start timing

- The power switch is turned ON.
- A malfunction or media misfeed is reset.
- The main body leaves the power save mode.
- A door is closed.

B. Control termination timing

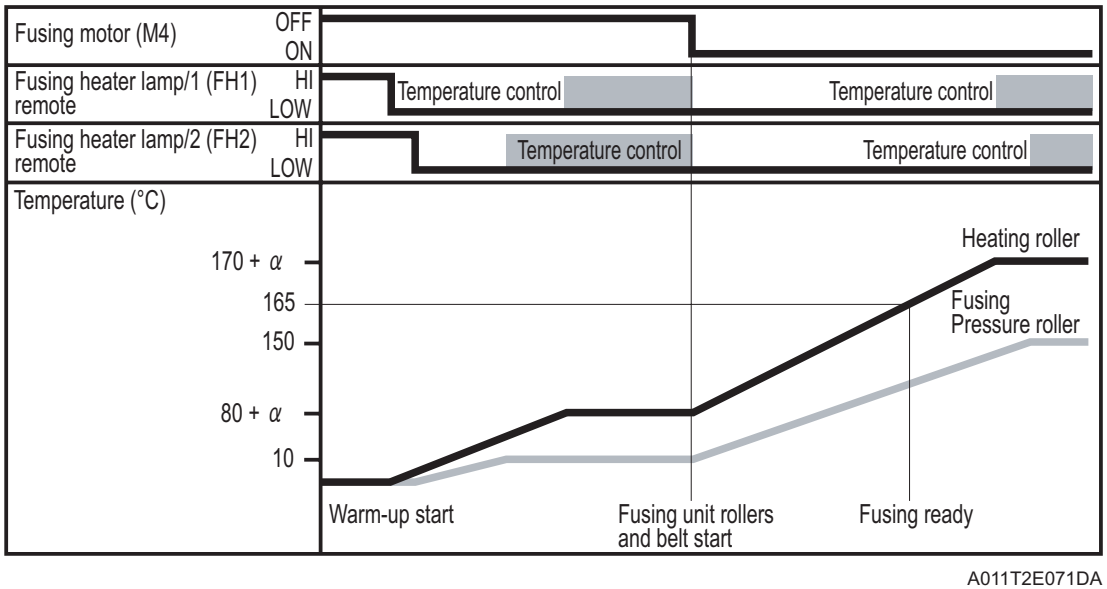
- The heating roller reaches a predetermined temperature.
- A malfunction or media misfeed is reset.
- A door is opened.

C. Control start decision

- Either of the following two controls with a different target temperature is performed depending on the temperature detected by the temperature/humidity sensor (TEM/HUMS).
- If the information provided by the temperature/humidity sensor is less than a predetermined value, the low temperature start control is provided.
- If the information provided by the temperature/humidity sensor is the predetermined value or more, the ordinary start control is provided.

D. Low temperature start control

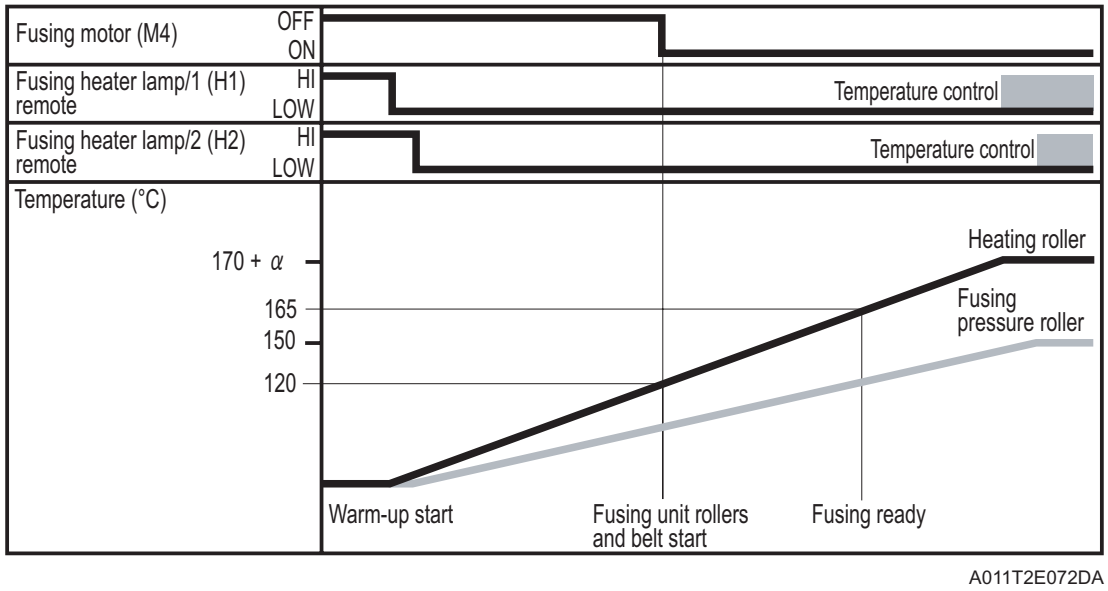
1. Temperature adjustment is started with the target temperature of the fusing heater lamp/1 set at 80 °C + correction value.
2. The control proceeds to “ordinary start control” after the lapse of a predetermined period of time after the heating roller temperature has reached the target value.



Warm-up cycle control diagram during low temperature start

E. Ordinary start control

1. The temperature adjustment is started with the target temperature of the fusing heater lamp/1 set at 170°C. At the same time, the temperature adjustment is started with the target temperature of the fusing heater lamp/2 set at 150°C.
2. If the heating roller temperature reaches a level of 120°C or more, both the fusing pressure roller and fusing belt are turned at the specified speed. Or, when a predetermined period of time elapses, the fusing pressure roller and fusing belt are turned at the specified speed.
3. If the control has proceeded from “low temperature start control,” the fusing pressure roller and fusing belt are turned at the specified speed when the main body has already detected the completion of the finisher’s initial operation. For the main body with the duplex unit, the conveyance motor is also turned at the same time.
4. If the heating roller temperature becomes 165°C or more and the fusing pressure roller temperature becomes 70°C or more after the lapse of a predetermined period of time after the fusing unit rollers and belt have been rotated, the “fusing Ready” state is set. in this bout the conveyance motor rotation is stopped.
5. If a print request is received after the “fusing ready” state, the control proceeds to “print control (print start control).”



Warm-up cycle control diagram during ordinary start

20.3.6 Post-warm-up control

- After the warm-up cycle has been completed, the fusing pressure roller and fusing belt are turned to achieve a uniform temperature.
- If the heating roller and the fusing pressure roller have reached their respective required temperatures, the main body considers that the fusing unit rollers and belt have reached the specified temperatures. It then terminates the post-warm-up control sequence.

A. Control start timing

- At the end of the warm-up control (no post-warm-up control sequences are performed if a print request is received)

B. Control termination timing

- A predetermined period of time elapses after the post-warm-up control has been started.
- The temperature of the heating roller reaches 170°C and that of the fusing pressure roller reaches 150°C or more.
- A power save mode signal is received.

C. Control operation timing

1. The fusing pressure roller and fusing belt are turned at the specified speed.
2. The temperature adjustment is started with the target temperature of the fusing heater lamp/1 set at 170°C + correction value. At the same time, the temperature adjustment is started with the target temperature of the fusing heater lamp/2 set at 150°C.
3. If a predetermined period of time elapses after the postwarm-up control has been started or if the fusing pressure roller and the fusing belt temperatures reach the specified levels, the control proceeds to “wait control.”

20.3.7 Wait control

- Control is provided to ensure that the temperatures at different parts of the fusing unit reach a constant level during the wait state.

A. Control start timing

- At the end of the post-warm-up control
- At the end of the post-print cycle control (print start control)
- At the end of the proactive control.

B. Control termination timing

- A print request is received.
- A malfunction or media misfeed occurs.
- A power save mode signal is received.

C. Control operation timing

1. The temperature adjustment is started with the target temperature of the fusing heater lamp/1 set at 170°C + correction value. At the same time, the temperature adjustment is started with the target temperature of the fusing heater lamp/2 set at 150°C.
2. If a print request is received during the wait state, the control proceeds to “print control.”
3. If a malfunction or media misfeed occurs or a power save request is made during the wait state, the control proceeds to “heater OFF control.”

20.3.8 Proactive control

- To shorten the time period that begins when a print request is accepted and ends when a copy is printed out, the proactive rotation of the fusing motor is controlled.

A. Control start timing

- A print request is received.

B. Control termination timing

- After the lapse of a predetermined time, at the start of a print cycle, when a malfunction occurs or at the start of the power save mode.

C. Control operation timing

1. The fusing pressure roller and the fusing belt are rotated at the specified speeds.
2. If a print start request is accepted during the proactive control, the control proceeds to “print control.”
3. If a malfunction or media misfeed occurs or a power save request is made during the proactive control, the control proceeds to “heater OFF control.”

20.3.9 Print control

- To ensure a good fixing level and light transmission performance of the OHP transparencies, the fusing speed, fusing pressure roller temperature, and fusing belt temperature are controlled.

A. Control start timing

- A print request is received.

B. Control termination timing

- A malfunction or media misfeed occurs.

C. Control operation timing

1. The fusing pressure roller and fusing belt are turned at the specified speed.
2. The temperature adjustment is started with the target temperature of the Heating roller heater lamp set at the appropriate level for each media to be printed. Similarly, the temperature adjustment is started with the target temperature of the pressure heater set at the appropriate level for each media to be printed.
3. When the leading edge of the first sheet of media moves past the registration roller, the fusing pressure roller and fusing belt are turned at the specified speed corresponding to the type of the media.
4. If there is another sheet of media to be printed when the trailing edge of the preceding sheet of media moves past the fusing pressure roller/fusing belt, the fusing heater lamp/1 temperature, fusing heater lamp/2 temperature, and the fusing speed are changed to the settings that correspond to that particular piece of media.
5. After the trailing edge of the last sheet of media moves past the exit roller, the control proceeds to “post-print cycle control.”

- To prevent fusing failure that may happen just after the main power switch is turned ON, the fusing temperature is set to higher than normal until the specified time elapses or the specified number of printed pages is produced after the warm-up cycle has been completed.
- When a print cycle is started, the temperature control is reset to normal after a predetermined number of printed pages is produced.
- If the stand-by condition remains, the temperature control is reset to normal after a predetermined time elapses.

20.3.10 Post-print control

- To prevent the fusing temperature from rising after the print cycle has been run, a stepwise control is provided using an intermediate temperature between the print temperature and the wait temperature.

A. Control start timing

- There is no new print request received when the trailing edge of the last sheet of media has moved past the exit roller.

B. Control termination timing

- A predetermined period of time elapses after the post-print cycle control has been started.
- A print request is received.
- A door is opened, or an error or malfunction occurs.

C. Control operation timing

1. The fusing pressure roller and fusing belt are turned at the specified speed.
2. The temperature adjustment is started with the target temperature of the fusing heater lamp/1 set at 160°C + correction value. At the same time, the temperature adjustment is started with the target temperature of the fusing heater lamp/2 set at 140°C.
3. The fusing pressure roller and fusing belt are stopped after the lapse of a predetermined period of time after the post-print cycle control has been started.
4. The control proceeds to “wait control” after the lapse of another predetermined period of time after the post-print cycle control has been started.

20.3.11 Heater OFF control

- Heater control is suspended when a malfunction or media misfeed occurs or a power save mode signal is received.

A. Control start timing

- A door is opened or an error or malfunction occurs.
- A power save mode signal is received.

B. Control termination timing

- All of the following events are reset: an open door, an error or malfunction that has occurred, a power save mode signal that has been received.

C. Control operation details

1. A request for heater forced turning OFF control is made for heater control.
2. A request is made for stopping rotation of the fusing pressure roller and fusing belt.
3. A request is made for stopping rotation of the reverse roller.

20.3.12 PPM control

- The PPM control is performed to prevent the fusing pressure roller and the fusing belt temperatures from going down during a multi-print cycle as well as to prevent the temperatures of the roller and belt edges from going up.
- When a multi-print cycle is run, the temperature of the fusing pressure roller and the fusing belt decrease, resulting in the fusing performance of the printed image being degraded.
  To prevent this problem, fusing performance is estimated based on the surface temperature of the fusing pressure roller; the distance between sheets of media is widened according to the media length and fusing speed, thereby allowing the fusing pressure roller and the fusing belt to recover the required temperature; the fusing performance of the printed toner image is thus ensured.
- If a multi-print cycle is run using media of a small size, a difference is produced in temperature between the center portion of the roller/belt (the surface over which the media moves past) and the edges of the roller/belt (where no part of the media moves past). Since the thermistor is located at the center portion, the main body determines that there is a drop in roller temperature and turns ON the heater to increase the roller temperature. This also heats the edges of the roller, at which a high temperature is still maintained. This increases the overall temperature.
  To inhibit this situation, the distance between sheets of media is widened and the temperature of the fusing pressure roller and fusing belt is thereby made uniform.

A. Control start timing

- In an ambience of low temperature and low humidity
- In an ambience of high temperature and high humidity
- Media of a small size is detected through media width detection control.

See P.91

- The heating roller temperature becomes lower than a predetermined level.

B. Control termination timing

- The control proceeds to “wait control” or “heater OFF control” during the PPM control.
- The media that requires no PPM control is fed through during PPM control.

20.3.13 Protection against abnormally high temperature

- The main body provides protection at three different stages to prevent abnormally high temperature of the fusing unit.
  1. Soft protection
  2. Hard protection
  3. Thermostat protection

A. 1st stage: soft protection

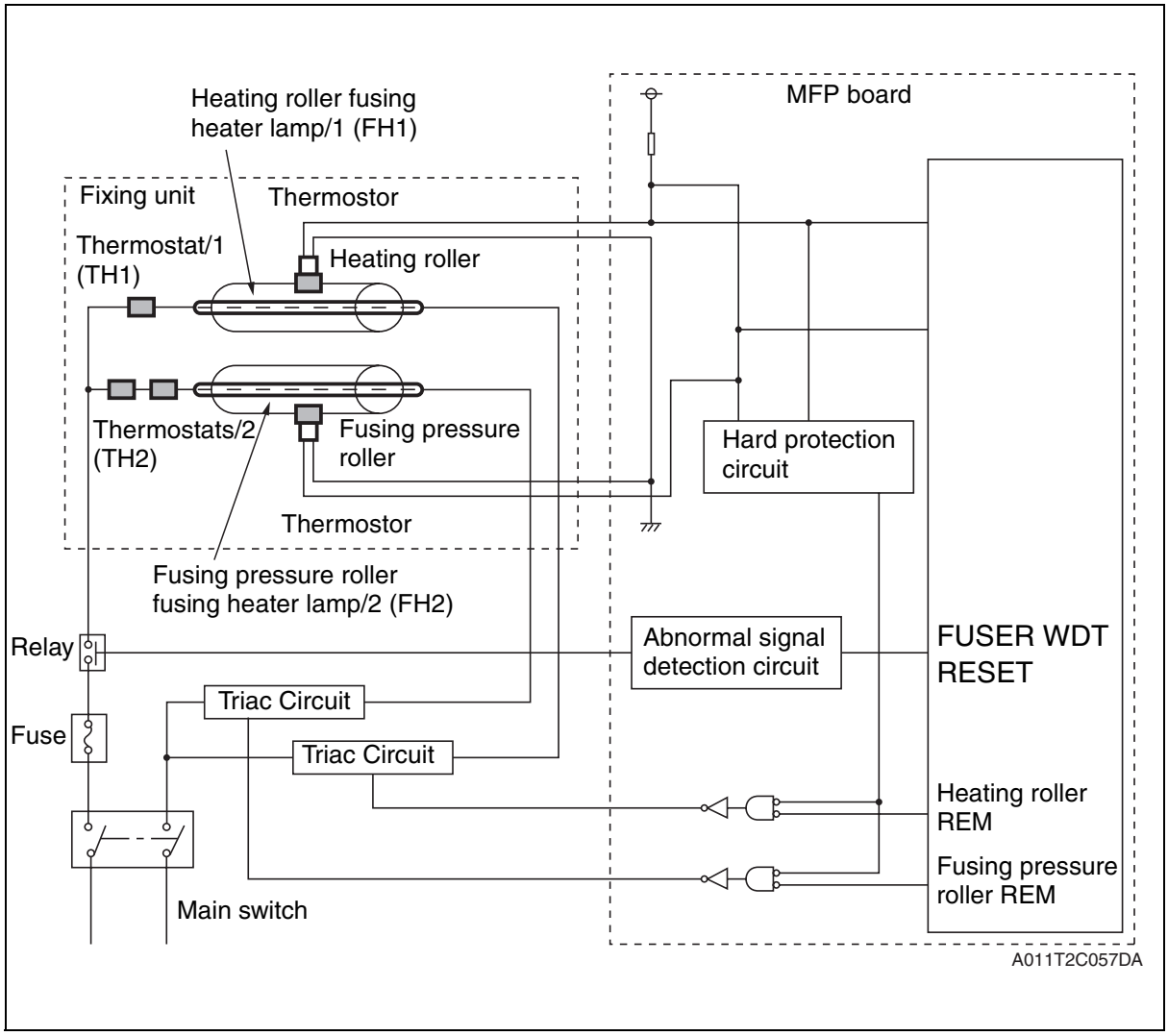
- If the thermistor/1 or the thermistor/2 detect a temperature exceeding a predetermined value, the malfunction code representing abnormally high temperature is displayed. At this time, the heater lamps are turned OFF forcibly and the initiation of any new print cycle is prohibited (abnormally high temperature detection control).

B. 2nd stage: hard protection

- The following hard protection control is provided if the CPU overruns and becomes unable to detect an abnormally high temperature.
  1. The thermistor/1 or thermistor/2 detect a temperature exceeding a predetermined value.
  2. The remote signal for the corresponding heater lamp of the DC power supply is forcibly turned OFF through the MFP board.
  3. The triac on the DC power supply is turned OFF to shut down the power supply to the corresponding heater lamp.
  4. The heater lamp is forcibly turned OFF.
  5. The temperature detected by the thermistor/1 or thermistor/2 is decreased to a level below the predetermined value.
  6. The remote signal forcible OFF of the corresponding heater lamp is reset so that power supply to the heater lamp is resumed. This operation is repeated until the CPU recovers to be able to detect the abnormally high temperature condition. This control allows the power supply to the corresponding heater lamp to be shut down before the thermostat operates, inhibiting the fusing unit from being damaged.

C. 3rd stage: Thermostat protection

- If neither the soft protection nor hard protection can detect an abnormally high temperature due to a defective thermistor, the thermostat/1 and thermostat/2 operate at the specified temperature. This shuts down the power supply to the fusing heater lamp/1 and fusing heater lamp/2, thus forcibly turning them OFF.



21. Image stabilization control

- To ensure that a stabilized output image is produced at all times, a comprehensive control is provided for the developing bias voltage, laser light intensity, registration correction, gamma characteristics detection, and other parameters.

21.1 Overview of image stabilization control

- Image stabilization control may be divided into three types: complete correction control, simplified correction control, and individual registration control. The following explain specific details of each type of control.

21.1.1 Complete correction control

- Controls 1 through 6 below are collectively called the “complete correction control.”
- For details of each of these controls, see the relevant page.

	Control name	Purpose
1	IDC sensor calibration control See P.73	Changes in various types of characteristics due to change with time of the IDC sensor (deteriorated LED, dirty sensor surface), part-to-part variations in the sensors, and change of environment affect the IDC Sensor output corresponding to the clear transfer belt surface. To correct fluctuations in the output, the sensor LED intensity is adjusted so as to keep constant the IDC sensor output value.
2	Developing bias Vpp control	If the developing bias voltage (Vpp) is too high for the Ds distance in each toner cartridge, a leak image (background leak, image area leak) results. If Vpp is excessively low, halftone reproducibility becomes poor. This control detects a Vpp range, in which no image failure occurs, to set the optimum Vpp.
3	Developing bias duty control (control of the maximum amount of toner sticking to the transfer belt)	To correct the target amount of toner sticking to the transfer belt to form the solid image.
4	Laser light intensity control See P.14	To correct the target level of fluctuations in fine line reproduction and reverse image (white on black) reproduction that occur due to variations in photo conductor electrostatic characteristics, developing characteristics, and transfer characteristics (part-to-part variations, environment, durability).
5	Gamma characteristics detection control	To correct the tone by using the IDC sensor to measure the density of a gradation pattern produced on the transfer belt and sending the results of the measurement to the controller.
6	Registration correction control See P.14	To correct incorrect color registration that occurs due to variations in parts of the main body used for regulating different drawing positions.

21.1.2 Simplified correction control

- If the simplified correction control is not effective in making a good correction, the complete correction control is executed.

	Control name	Purpose
1	IDC sensor offset value check	To check the low gain output value and offset voltage value of the IDC sensor when the shutter is closed.
2	IDC sensor reflection output	To check the low gain output value of the IDC sensor using the intensity value set last for the clear transfer belt surface on which no toner sticks.
3	Developing bias control (simplified Vpp check)	To determine whether there is a leak based on the measurement value taken last.
4	Developing bias duty control (control of the maximum amount of toner sticking to the transfer belt)	To correct the amount of toner based on the measurement value taken last.
5	Laser light intensity control (simplified correction control) See P.14	To correct based on the measurement value taken last.
6	Registration correction control (simplified control) See P.14	To correct incorrect color registration that occurs due to variations in parts of the main body used for regulating different drawing positions. The simplified control uses a simplified registration pattern to make the correction.

21.1.3 Individual registration control

	Control name	Purpose
1	IDC sensor reflection output	To check the low gain output value of the IDC sensor using the intensity value set last for the clear transfer belt surface on which no toner sticks.
2	Registration correction control (simplified control) See P.14	To correct incorrect color registration that occurs due to variations in parts of the main body used for regulating different drawing positions.

21.1.4 Image stabilization control execution request

- A request for execution of the complete correction control, simplified correction control, or individual registration control is made at the following timing.

Stabilization request timing		Stabilization request detection timing	Execution processing
Upon replacement of unit	When a new IU is detected When a other used IU is detected	When the power switch is turned ON	Complete correction control
	When the transfer belt unit is replaced *1	When the front/right door is closed	Complete correction control
By main body status	When the power switch is turned ON	Power the switch is turned ON	Depending on each condition
	When there is a great change in environmental conditions from those when the last stabilization sequence was executed.	Power the switch is turned ON/When the front/right door is closed/At the end of a job/When the sleep mode is deactivated	Complete correction control
	When there is a temperature change inside the PH unit	When the front/right door is closed/At the end of a job/during a job/When the sleep mode is deactivated	individual registration control
	At the end of a print cycle of given conditions *2	At the end of a job/When the front/right door is closed	Simplified correction control
	When a malfunction is reset	• When the power switch is turned ON	Complete correction control
Special situation	When all trays get empty	Power the switch is turned ON	Complete correction control
User selection	When engine/engine service/calibration is selected	When engine/engine service/calibration is selected	Complete correction control

*1: Since the main body is not provided with a function that detects a new transfer belt unit, engine/engine service/calibration must be selected and complete correction control executed whenever the unit has been replaced with a new one.

*2: See the following for the conditions that enable execution of the stabilization control at the end of a print cycle of given conditions.

21.1.5 Conditions enabling execution of stabilization control at the end of a print cycle of given conditions

- The time equivalent to the number of printed pages produced by each TC is counted after the execution of the last image stabilization sequence.
- The equivalent time counter of all TCs is reset after the execution of the image stabilization sequence.

A. Calculation of equivalent printed page time

- The period of time through which the developing unit is driven is used for the equivalent printed page time.
- Half of the developing unit driving time involved with 2P/J is one printed page time.

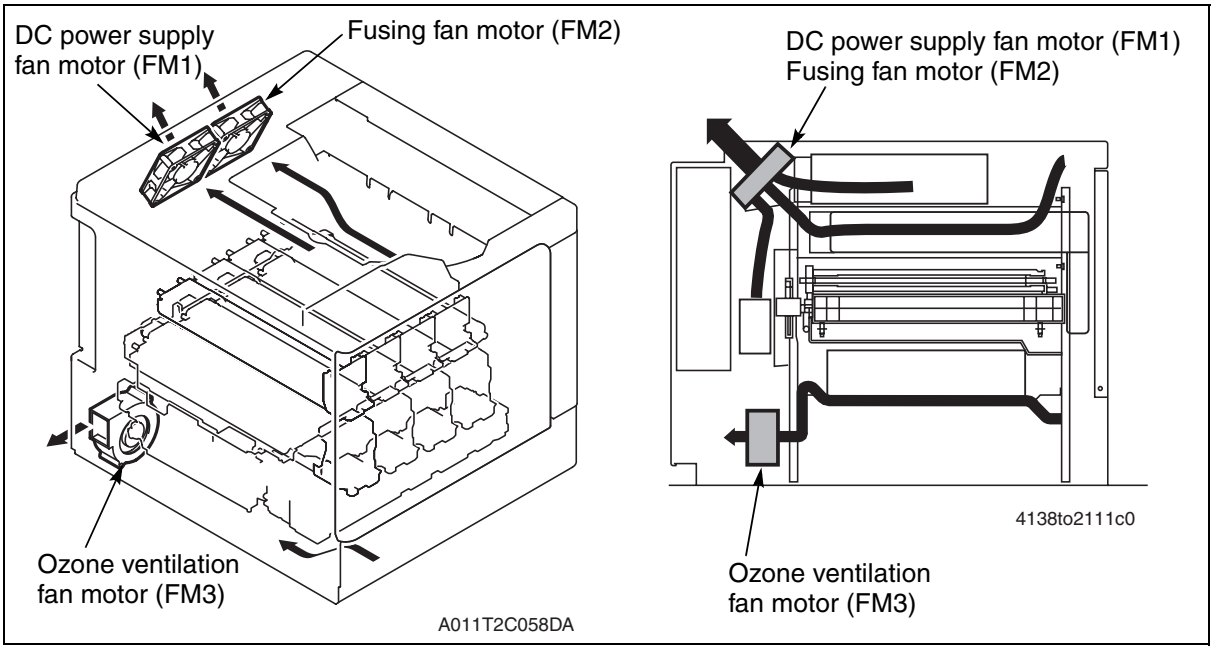
21.1.6 Combination and execution sequence of different sub-controls

Control name		Simplified image stabilization	Complete image stabilization	individual registration control
IDC sensor calibration control See P.73	Check	①	①	
	Correction		②	
IDC sensor reflection output	Check	②		①
Developing bias Vpp control	Check	③		
	Full adjustment		③	
Developing bias duty control (control of the maximum amount of toner sticking to the transfer belt)	Fine adjustment	④		
	Full adjustment		④, ⑥	
Laser light intensity control See P.14	Fine adjustment	⑤		
	Full adjustment		⑤, ⑦	
Gamma characteristics detection control	Full adjustment	⑦	⑧	
Registration correction control See P.14	Fine adjustment	⑥		
	Full adjustment		⑨	②

22. Miscellaneous

22.1 Fan control

22.1.1 Composition



22.1.2 Function

A. Fusing fan motor

- Fusing fan motor discharges heat generated from the interior parts (including the DC power supply, fusing unit, toner cartridges/K, and motor drives) out of the main body to prevent the interior temperature from rising inordinately.
- Air passageway is formed on top of the DC power supply, in the duct inside the toner cartridge rail, and below the print head housing. No air flows through areas around the toner cartridges. This effectively prevents toner from scattering.

B. DC power supply fan motor

- Discharges heat generated from the interior parts (including the DC power supply, intermediate transfer belt section, toner cartridges/C, M, Y, and motor drives) from the main body to prevent the interior temperature from rising inordinately.

C. Ozon fan motor

- Discharges heat generated from the print head from the main body to prevent the print head temperature from becoming inordinately high.
- Removes ozone produced from the toner cartridges and charging section.
- Air passageway is formed on top of the DC power supply, in the duct inside the toner cartridge rail, and below the print head housing. No air flows through areas around the toner cartridges. This effectively prevents toner from scattering.

22.1.3 Control

A. DC power supply fan motor control

<Full speed rotation conditions>

- For the period of time that begins when the warm-up cycle is started and ends when a predetermined period of time elapses after the warm-up cycle has been completed.
- For the period of time that begins when a print cycle starts and ends when a predetermined period of time elapses after the print cycle has been completed.
- For the period of time during when the fusing pressure roller deformation prevention control is performed under the power save mode.
- For the period of time when the thermistor/3 provided in the print head detects the temperature of 42 degrees or more.

<Half speed rotation conditions>

- The motor runs at a half speed during any time other than above.
- The motor runs at a half speed only when printing in monochrome mode without a duplex option, optional lower feed unit or staple finisher.

<Stop conditions>

- Stopped in the power save mode. The motor is, however, run while the ozone ventilation fan motor is running and stopped after the ozone ventilation fan motor has been stopped. At this time, the motor is run at full speed for a predetermined period of time after the intermediate transport motor has been stopped and is run at half speed thereafter.

<Forced stop condition>

- A malfunction occurs, but not when an error occurs.

B. Fusing fan motor control

<Full speed rotation conditions>

- For the period of time that begins when a print cycle starts and ends when a predetermined period of time elapses after the print cycle has been completed.
- For the period of time when the thermistor/3 (TH3) provided in the print head detects the temperature of 42 degrees or more.

<Half speed rotation conditions>

- The motor runs at a half speed during any time other than above.
- The door is opened during the warm up cycle. However, the motor does not run at a half speed when image stabilization sequence is being executed even if a door is opened during the warm up cycle.

<Stop conditions>

- Stopped in the power save mode. However, the motor is not stopped for a predetermined period of time after a print cycle has been completed.
- The temperature of the heating roller is below the specified one.

<Forced stop condition>

- For the period of time that begins when the warm-up cycle is started and ends when the warm-up cycle is complete.
- A malfunction occurs, but not when an error occurs.

C. Ozone ventilation fan motor

<Full speed rotation conditions>

- At the start of a warm-up cycle
- During a print cycle
- During when the image stabilization control is performed
- For the period of time when the thermistor/3 provided in the print head detects the temperature of 42 degrees or more

<Stop conditions>

- A predetermined period of time elapses after a warm-up cycle is completed
- At the end of a print cycle
- During when the image stabilization control is performed
- During the power save mode. The motor is not, however, stopped for a predetermined period of time after a predrive is complete.

<Forced stop condition>

- A malfunction occurs, but not when an error occurs.

Blank Page

Color Printer

Duplex Option

THEORY OF OPERATION

Code Y108600-3

Revision history

After publication of this service manual, the parts and mechanism may be subject to change for improvement of their performance.
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CONTENTS

Duplex option

Outline

Composition/Operation

Blank Page

Outline

1. Product specifications

A. Type

Name	Duplex unit
Type	Switchback and circulating duplex unit
Installation	Mounted on the right side door of main body
Reversing system	Exit roller switchback
Tracfer system	Rubber roller + driven rolls
Document alignment	Center

B. Media type

Media size	B5/A4S/LetterS/Legal
Media type	• Plain paper: 60 to 90 g/m^2 (16 to 24 lb) • Recycled paper: 60 to 90 g/m^2 (16 to 24 lb)

C. Machine specifications

Power requirements	DC 24 V ± 10% (supplied from the main body)
	DC 5 V ± 5% (supplied from the main body)
Max. power consumption	35 W
Dimensions	394 mm (W) × 320 mm (D) × 58 mm (H) 15.5 inch (W) × 12.6 inch (D) × 2.3 inch (H)
Weight	Approx. 1.8 kg (4.0 lb)

D. Operating environment

Temperature	10° C to 30° C/50° F to 86° F (with a fluctuation of 10° C/h (18° F/h))
Humidity	15% to 85% (with a fluctuation of 20%/h)

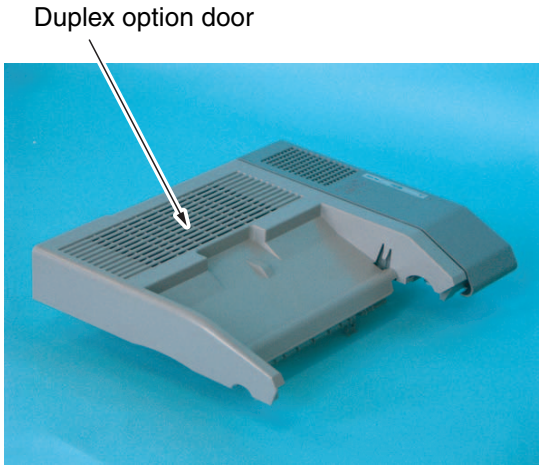
NOTE

- **These specifications are subject to change without notice.**

Blank Page

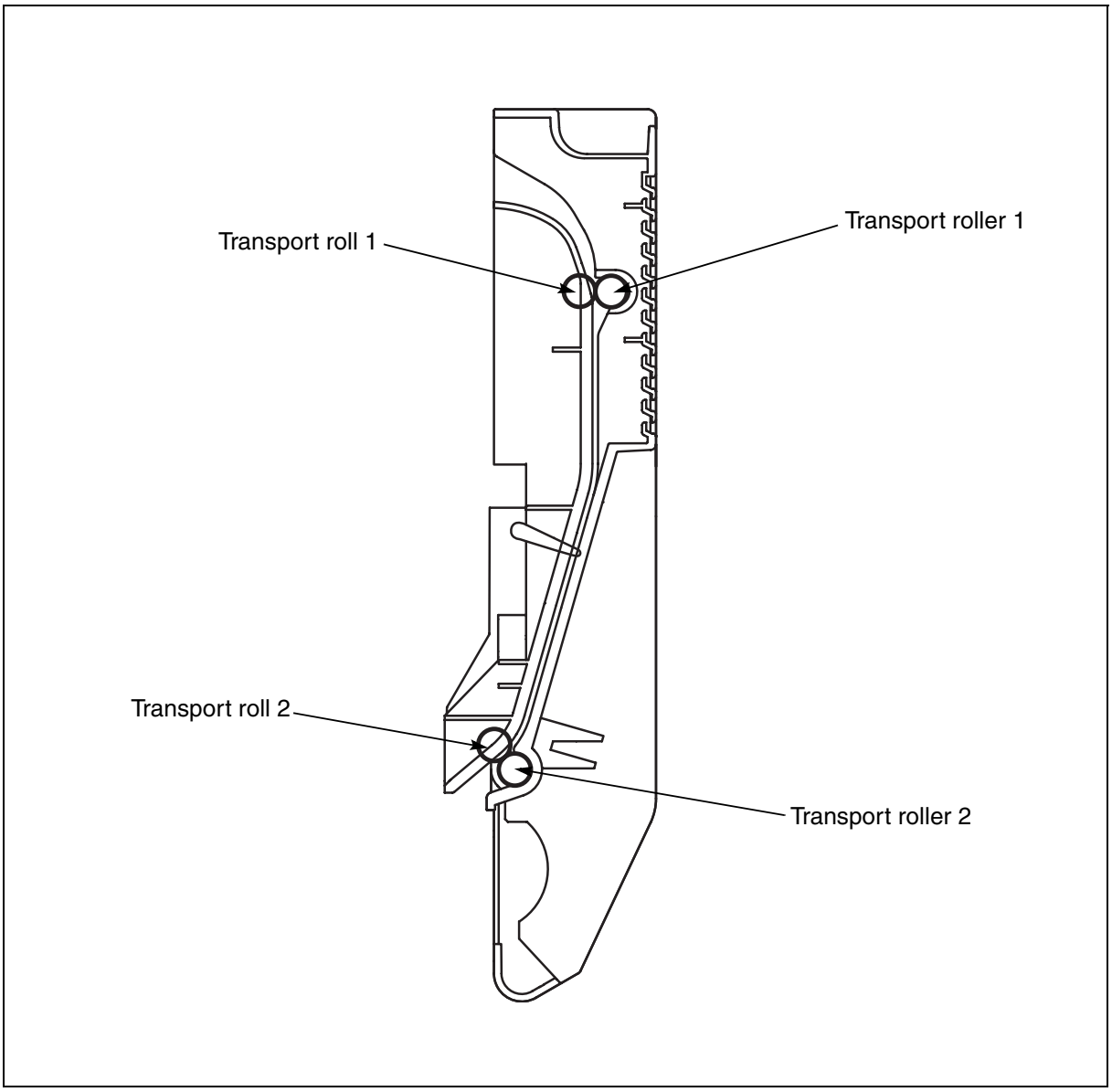
Composition/Operation

2. Overall composition

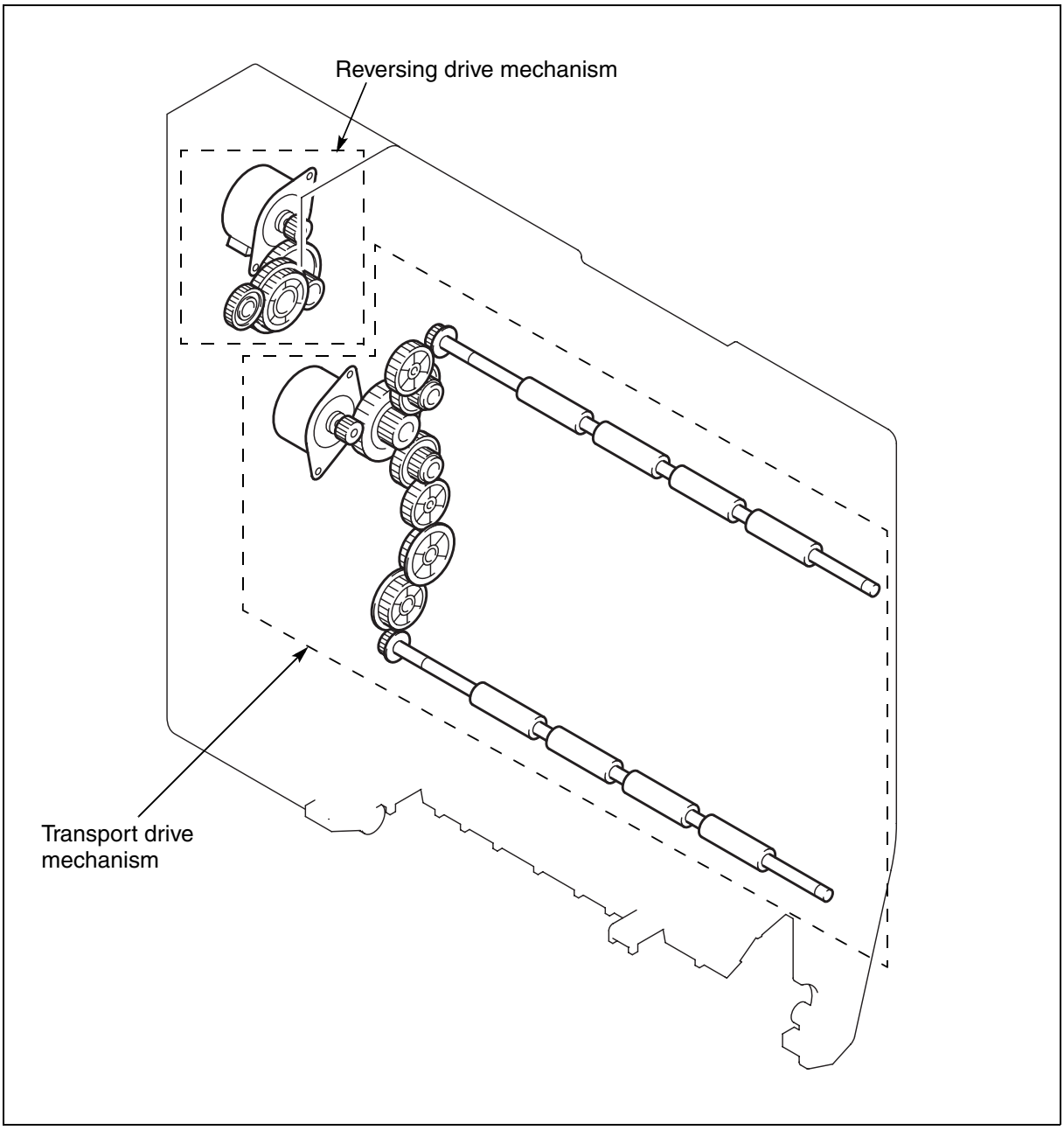


4538T2C001DA

3. Center cross section



4. Drive system

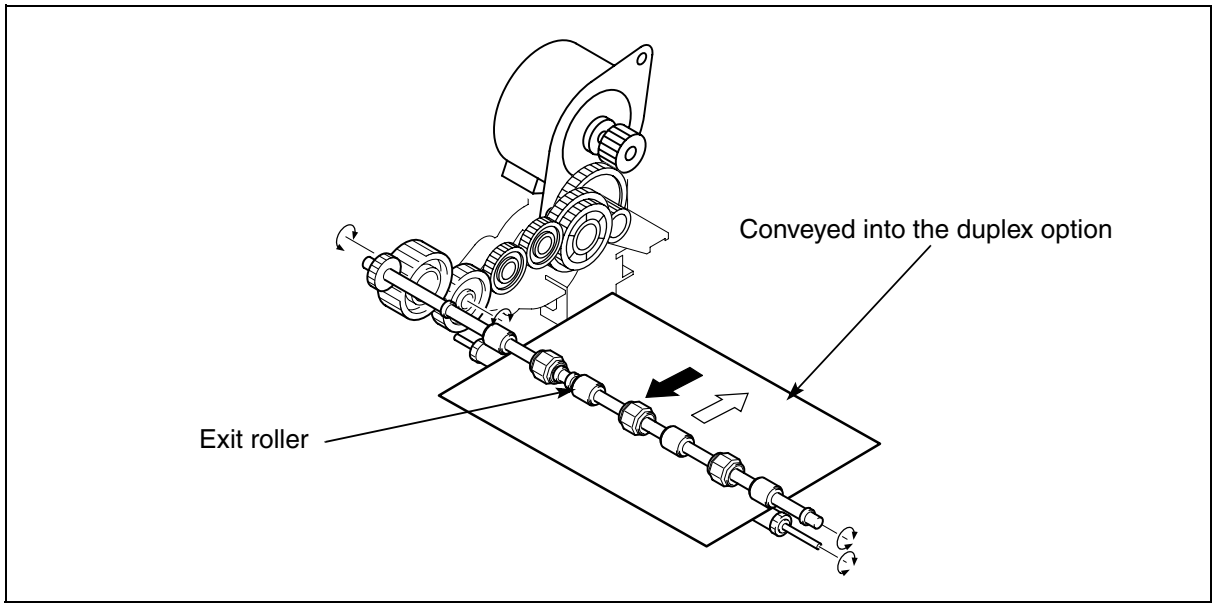


5. Mechanical operations

5.1 Reversing mechanism

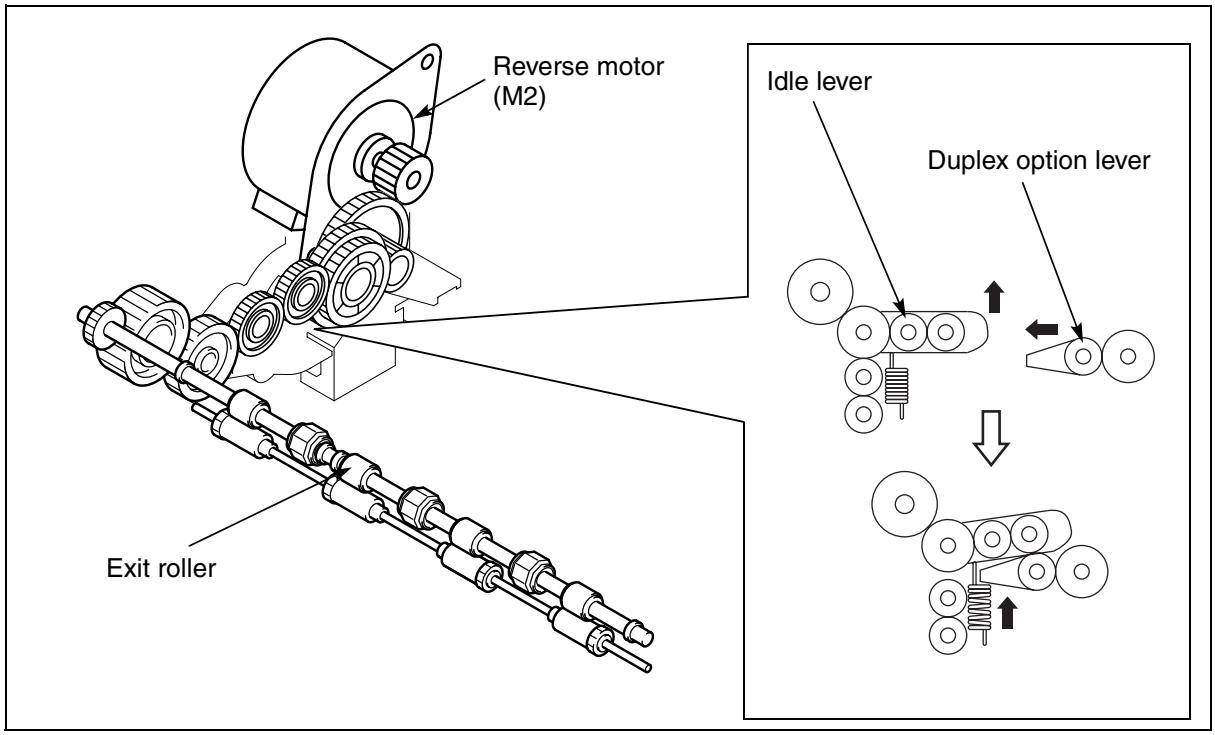
5.1.1 Reversing operation

- The 1-sided printed page is subjected to a reversing operation performed by the exit roller in the main body and conveyed into the duplex option.



5.1.2 Media exit roller drive coupling mechanism

- When the duplex option is mounted, the leading edge of the duplex option lever raises the idle lever, thus disconnecting the drive from the main body. The exit roller is driven by the reverse motor.



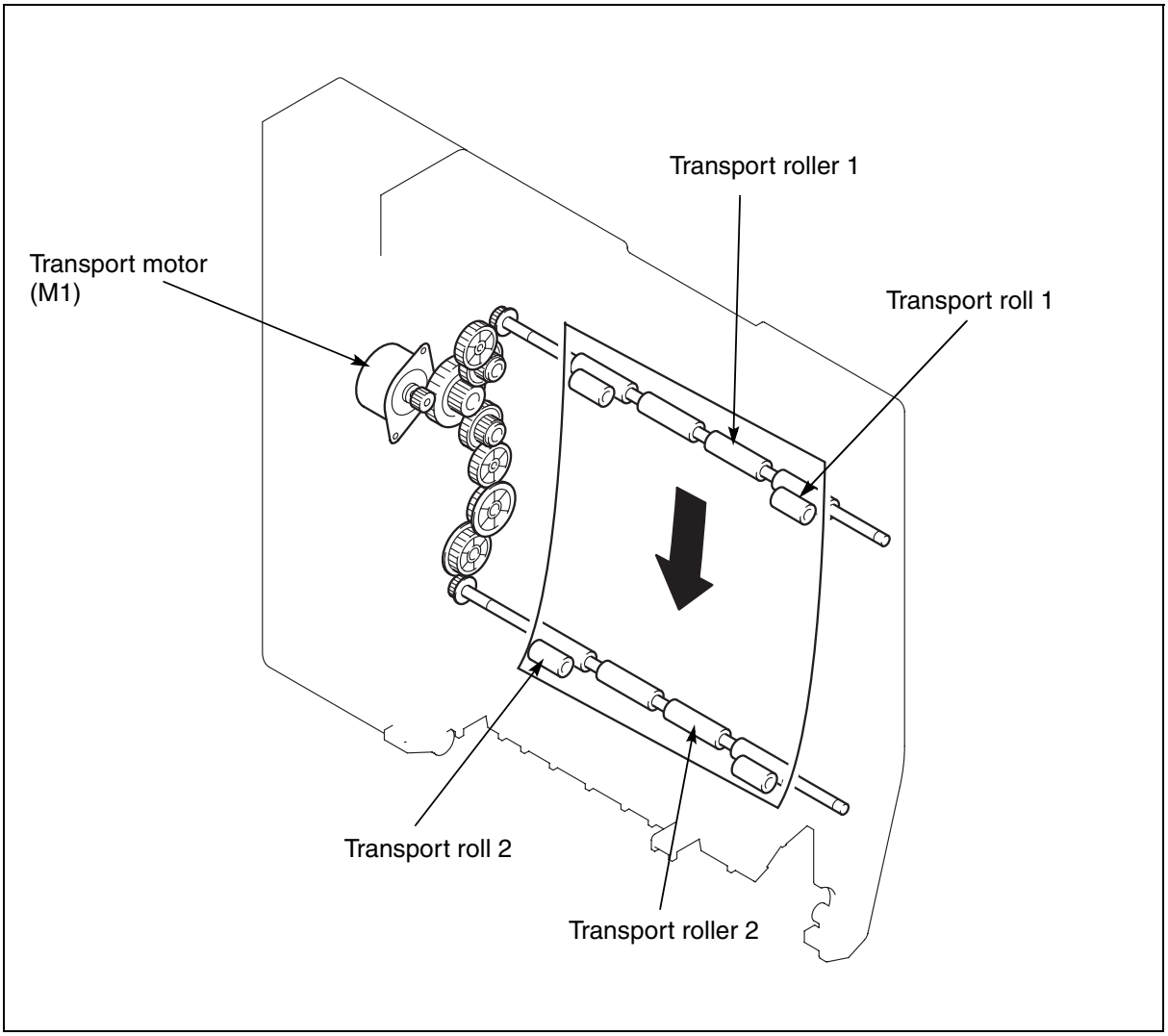
5.1.3 Reverse motor control

- The signal output from the AD control board is used to control rotation of the duplex reverse motor.

5.2 Conveyance and duplex media feed mechanism

5.2.1 Conveyance and duplex media feed operation

- The transport motor provides the drive for the duplex option.



5.2.2 Transport motor control

- The signal output from the AD control board is used to control the rotation of the transport motor.

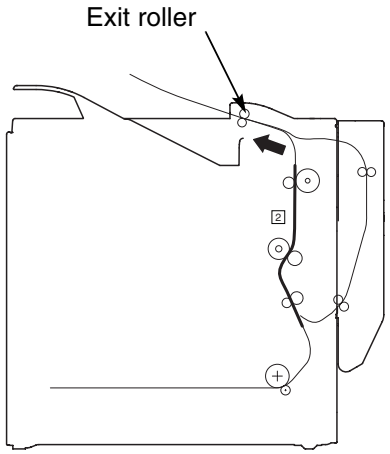
5.3 2-sided printing method

- The following two types of 2-sided printing methods are available.

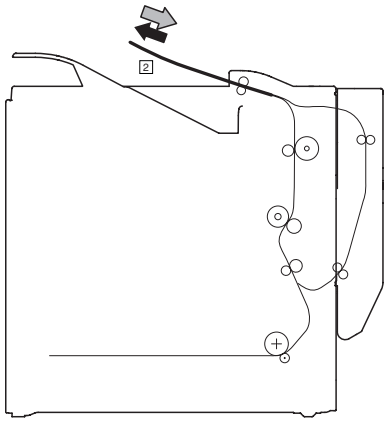
2-sided printing method
- 2-sided printing with a single sheet of media resident in the system
- 2-sided printing with two sheets of media resident in the system (for letter and smaller sizes)

5.3.1 Process of 2-sided printing with a single sheet of media resident in the system

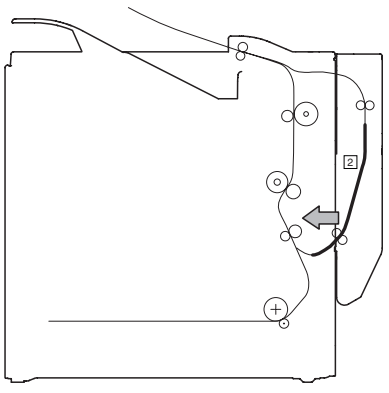
Operation 1
- A sheet of media is fed in and the image of the second page of the print job is printed.



Operation 2
- Just before the 1-sided printed page moves past the exit roller, the direction of rotation of the exit roller is reversed and the 1-sided printed page is conveyed into the duplex option.

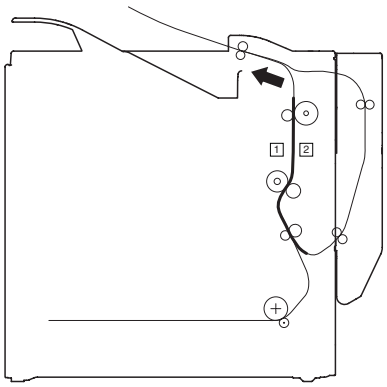


Operation 3
- The 1-sided printed page being transported through the duplex option is stopped briefly and then fed into the main body.



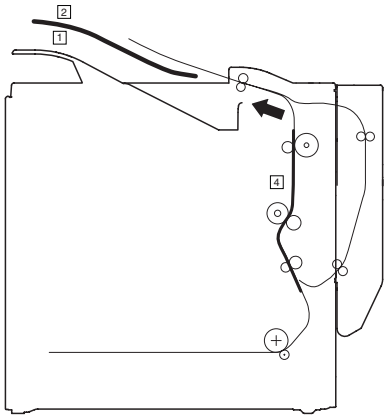
Operation 4

- The image of the first page of the print job is printed on the 1-sided printed page fed out of the duplex option.



Operation 5

- As the 2-sided printed page is being fed out of the main body, the image of the fourth page of the print job is printed on the second sheet of media.

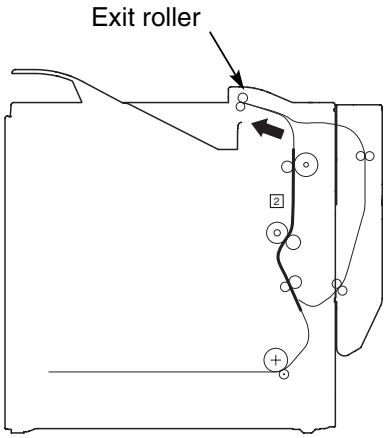


- Steps 2 through 5 are repeated until all pages of the job are printed.

5.3.2 Process of 2-sided printing with two sheets of media resident in the system

Operation 1

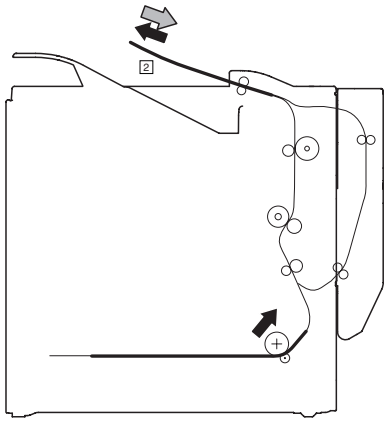
- The first sheet of media is fed in and the image of the second page of the print job is printed.



4538to2502c1

Operation 2

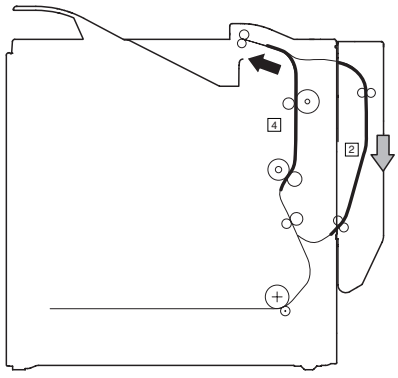
- Just before the 1-sided printed page moves past the exit roller, the direction of rotation of the exit roller is reversed and the first 1-sided printed page is conveyed into the duplex option.
- The second sheet of media is fed alongside.



4538to2513c1

Operation 3

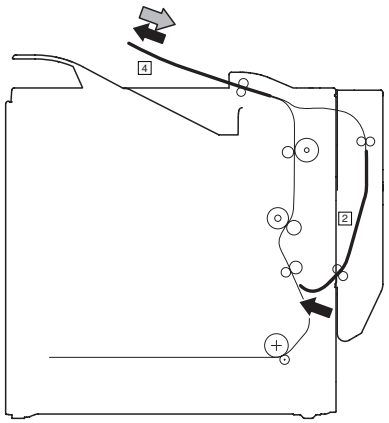
- The first 1-sided printed page is conveyed through the duplex option.
- The image of the fourth page is printed on the second sheet of media fed alongside.



4538to2514c1

Operation 4

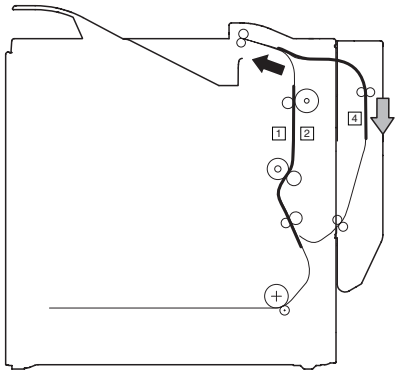
- Immediately before the second sheet of media exits the feed roller, the rotating direction of the feed roller changes and the second sheet of media is transported into the duplex option.
- The first sheet of media is fed alongside again. The second sheet of media is fed alongside.



4538to2515c1

Operation 5

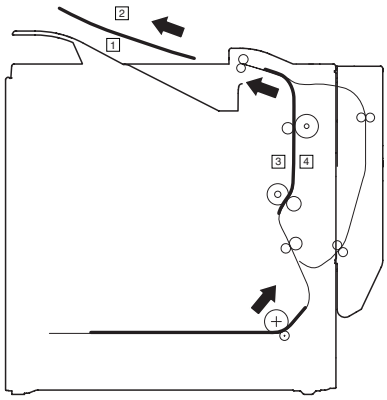
- The image of the first page is printed on the first sheet of media as it is fed again.



4538to2508c1

Operation 6

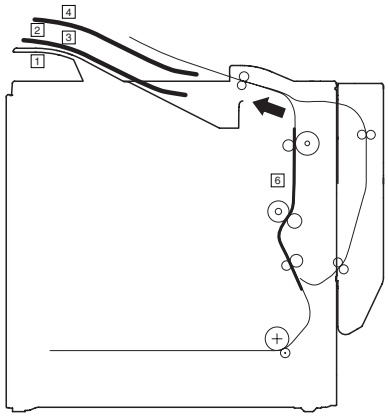
- The image of the third page is printed on the second sheet of media as the first sheet of media is discharged.
- The third sheet of media is fed alongside.



4538to2509c1

Operation 7

- As the second sheet of media is fed out of the main body, the image of the sixth page of the print job is printed on the third sheet of media.
- Steps 6 through 7 are repeated until all pages of the job are printed.



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Color Printer

Lower Feeder Unit

THEORY OF OPERATION

Code Y108600-3

Revision history

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CONTENTS

Lower feeder unit

Outline

Composition/Operation

Blank Page

Outline

1. Product specifications

A. Type

Name	Add-on 500-sheet media feed cassette
Type	Front-loading type
Installation	Desk type
Media feeding system	Media separation by a small-diameter roller with torque limiter
Document Alignment	Center

B. Media type

Media size	B5S(JIS)/Executive/LetterS/A4S/Letter Plus/G-Legal/Legal
Media type	• Plain paper: 60 to 90 g/m^2 (16 to 24 lb) • Recycled paper: 60 to 90 g/m^2 (16 to 24 lb)
Capacity	500 sheets

C. Machine specifications

Power Requirements	DC 24 V ± 10% (supplied from the main body)
	DC 5 V ± 5%
Max. Power Consumption	16 W
Dimensions	448 mm (W) × 520 mm (D) × 111.5 mm (H) 17.6 inch (W) × 4.4 inch (D) × 20.5 inch (H)
Weight	Approx. 6.5 kg (14.25 lb)

D. Operating environment

Temperature	10° to 30° C/50° to 95° F (with a fluctuation of 10° C/h (18° F/h))
Humidity	15% to 85% (with a fluctuation of 20%/h)

NOTE

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Blank Page

Composition/Operation

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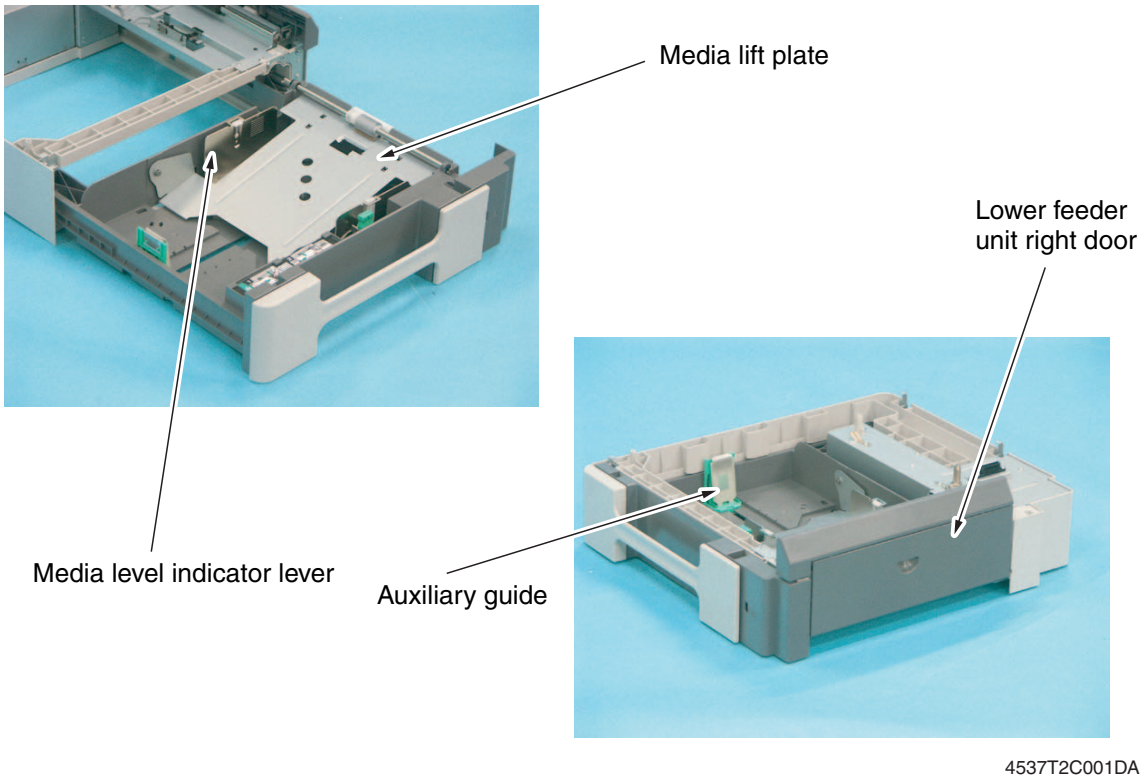
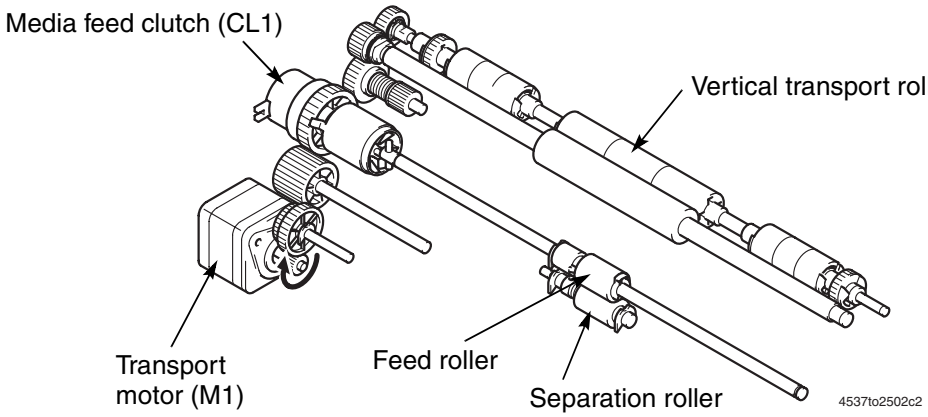
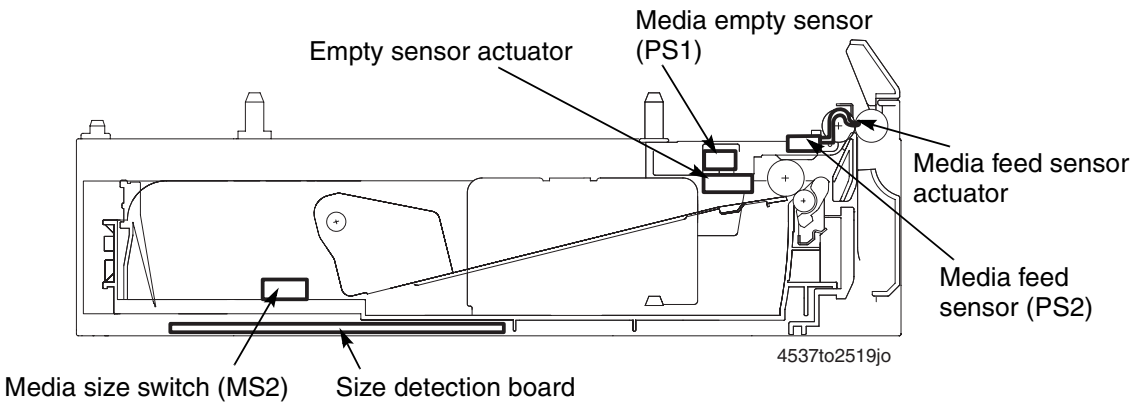
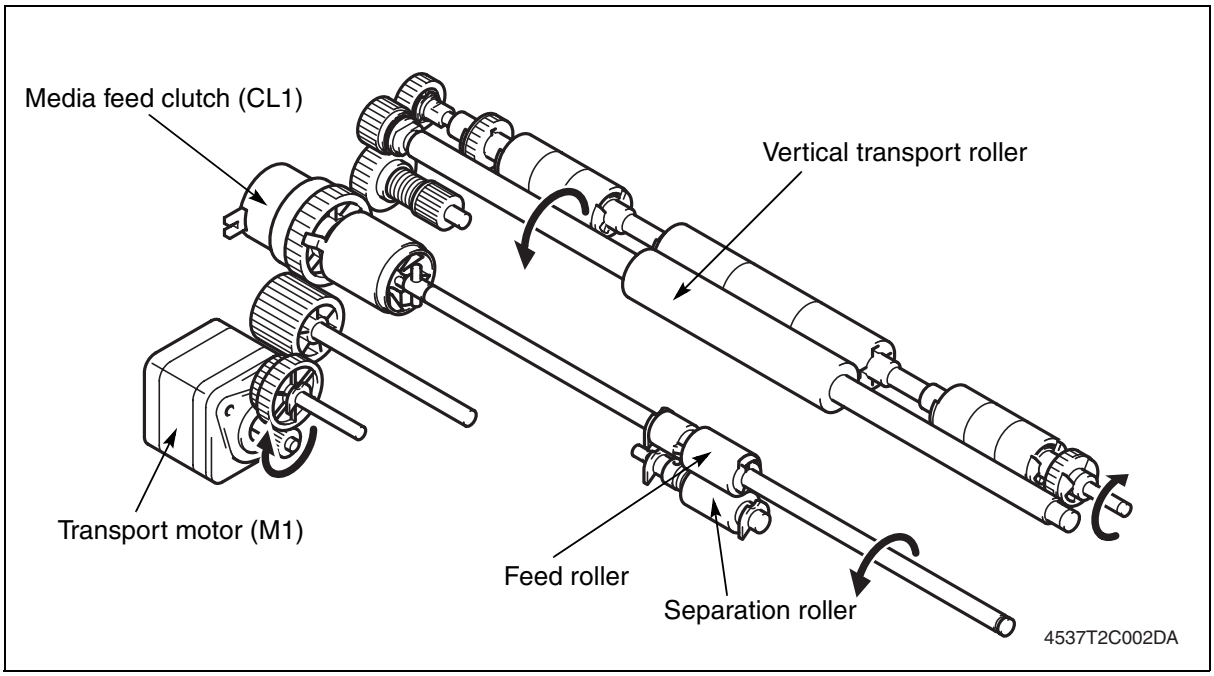






3. Drive

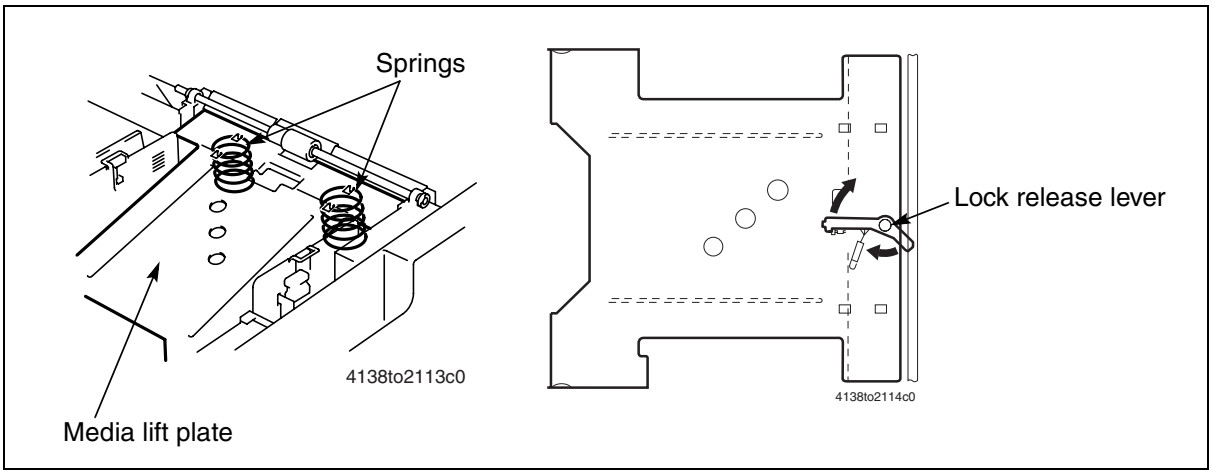


4. Operations

4.1 Media feed control

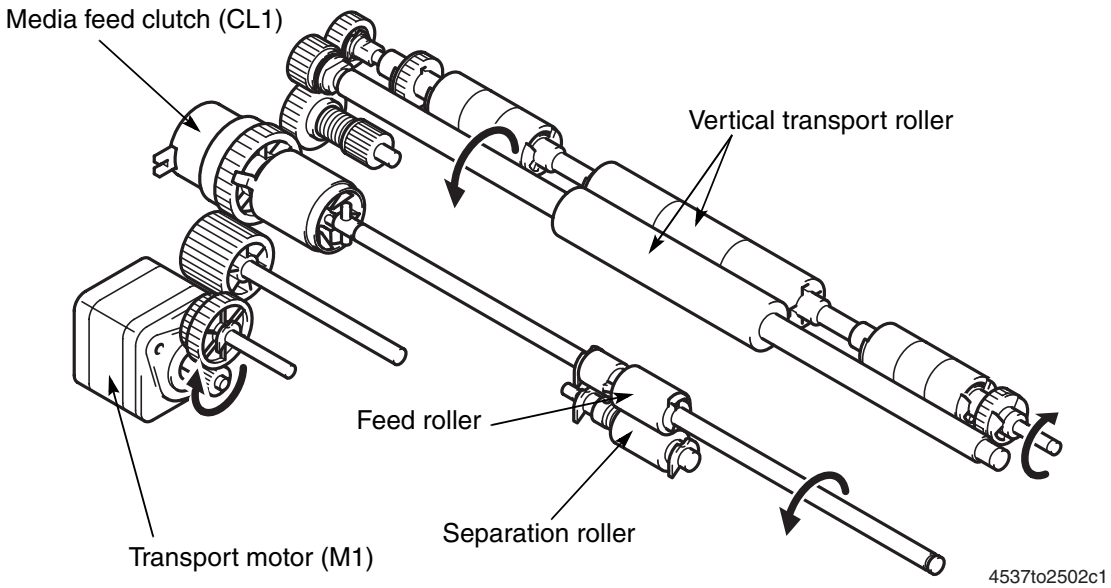
4.1.1 Media lift plate mechanism

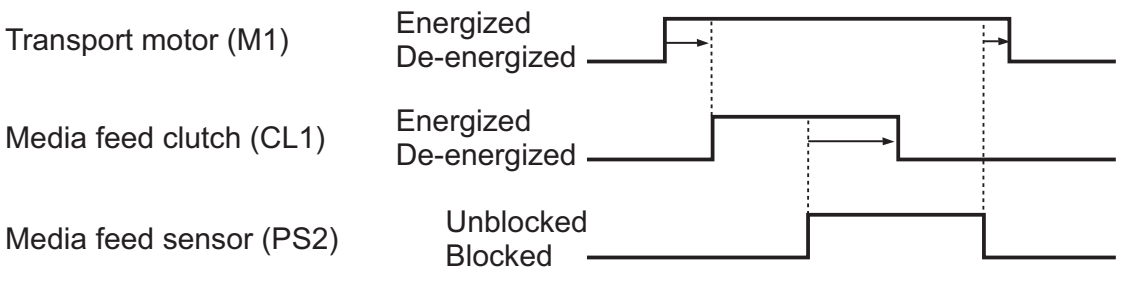
- The media lift plate is pressed down into the locked position (in which the media is loaded in position).
- Load a media stack and then slide the tray into the main body. This unlocks the media lift plate.
- The media lift plate (media stack) is pressed against the feed roller.
- The media lift plate (media stack) is pressed upward by the springs at all times.



4.1.2 Feed roller/vertical transport roller control

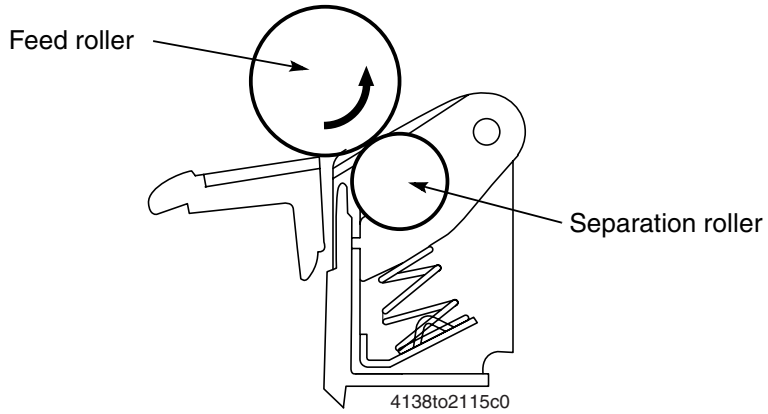
- The feed roller and vertical transport roller are rotated, which feeds media from the lower feeder unit and conveys it further into the inside of the main body
  1. The transport motor is energized to turn the vertical transport roller.
  2. The media feed clutch is energized to turn the feed roller.
  3. The media is fed in by the feed roller.
  4. The media fed in by the feed roller is conveyed onto the synchronizing roller of the main body by the vertical transport roller.
  5. When the media feed sensor is activated and then the media is conveyed onto a predetermined point in the media path, the media feed clutch is de-energized, thus bringing the feed roller to a stop. The vertical transport roller thereafter takes charge of conveying media further.
  6. When the trailing edge of the last sheet of media moves past the registration sensor, the transport motor is de-energized to bring the vertical transport roller to a stop.





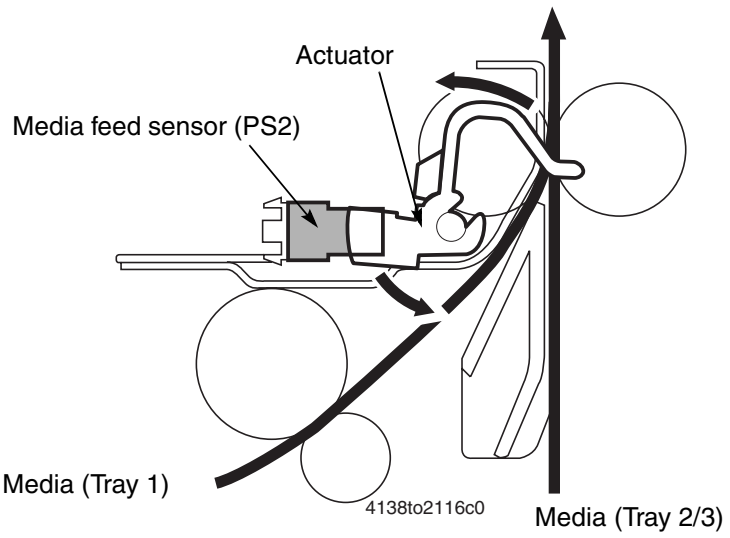
4.1.3 Media separation mechanism

- A separation roller provided with a torque limiter is used to prevent double feeding of media.



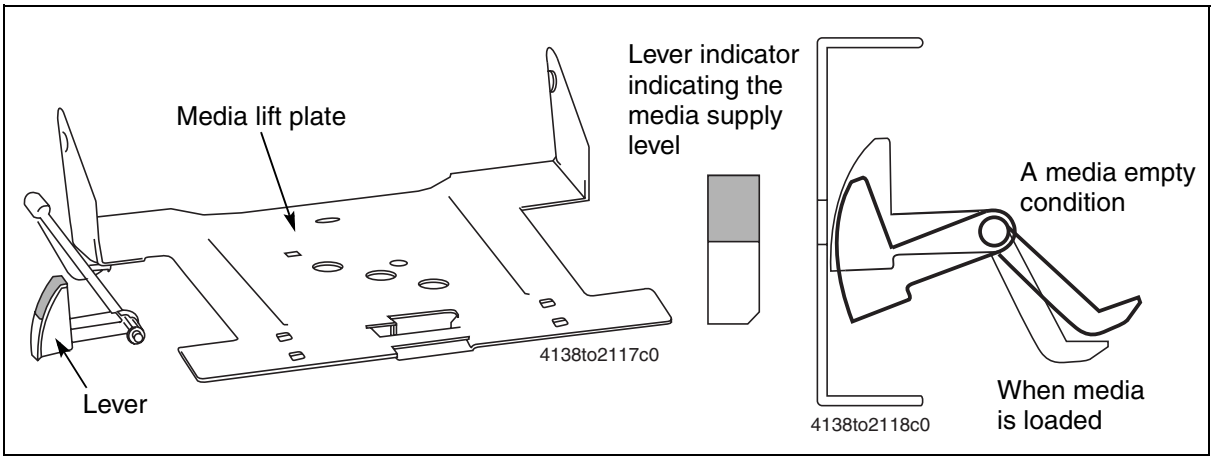
4.1.4 Media detection mechanism

- The media feed sensor detects the media fed in by the feed roller.
- When two lower feeder units are installed, the sensor detects the media fed off from tray 3.
- When the media feed sensor actuator unblocks the media feed sensor, the main body considers that the media has reached the sensor position.



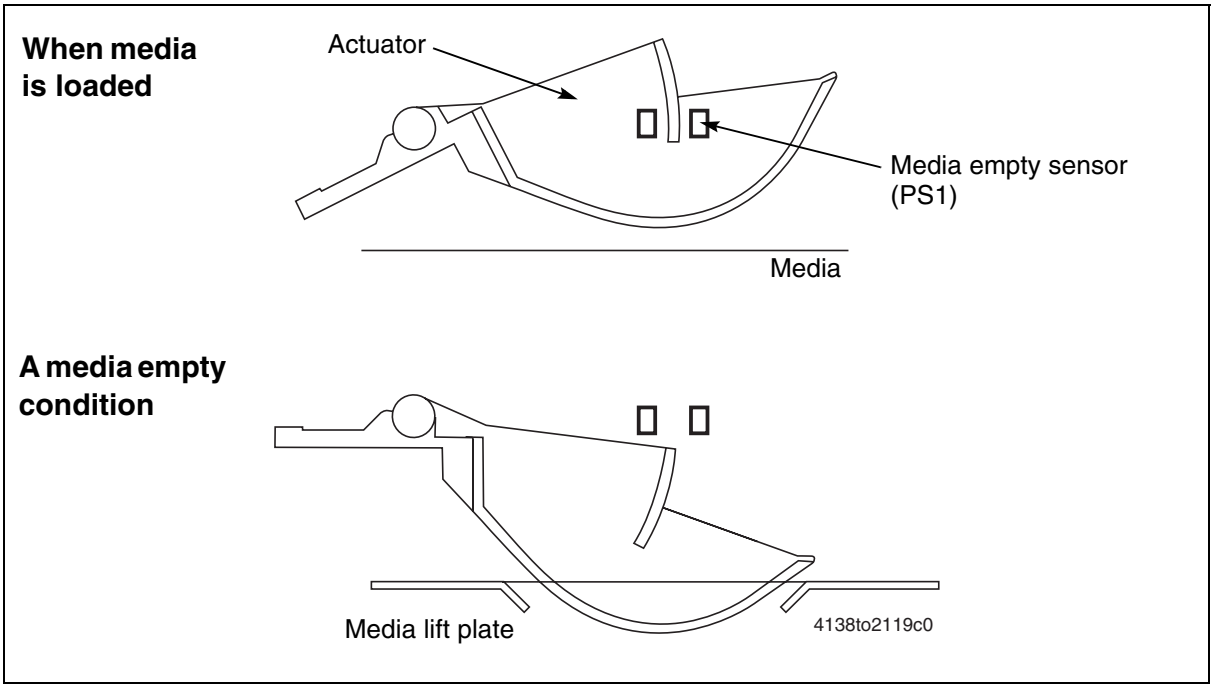
4.1.5 Media supply level detection control

- There is a window in the front cover of the cassette for indicating the media supply level.
- When the media lift plate goes up, a red lever appears in the window. The lower the level of the media stack in the tray, the more red that is visible.



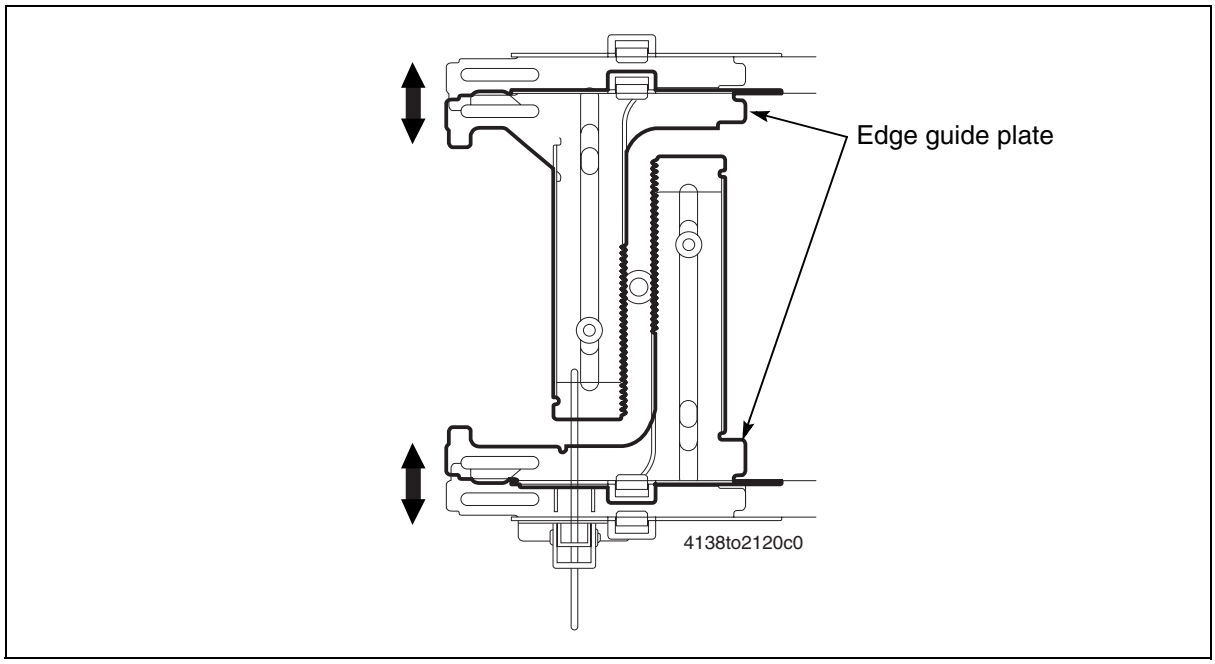
4.1.6 Media empty condition detection control

- The media empty message is displayed on the panel when the empty sensor actuator unblocks the media empty sensor.
- No mechanism is provided for detecting a media near empty condition. The media supply level indicator serves this purpose.



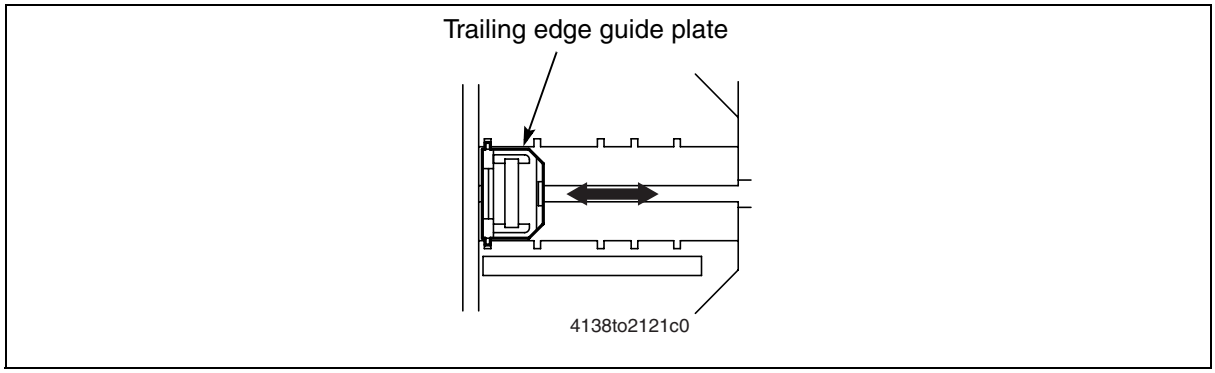
4.1.7 Edge guide plate

- The edge guide plate can be slid to the exact size in the width direction of the media to be loaded (A4, B5, 8/12).



4.1.8 Trailing edge guide plate

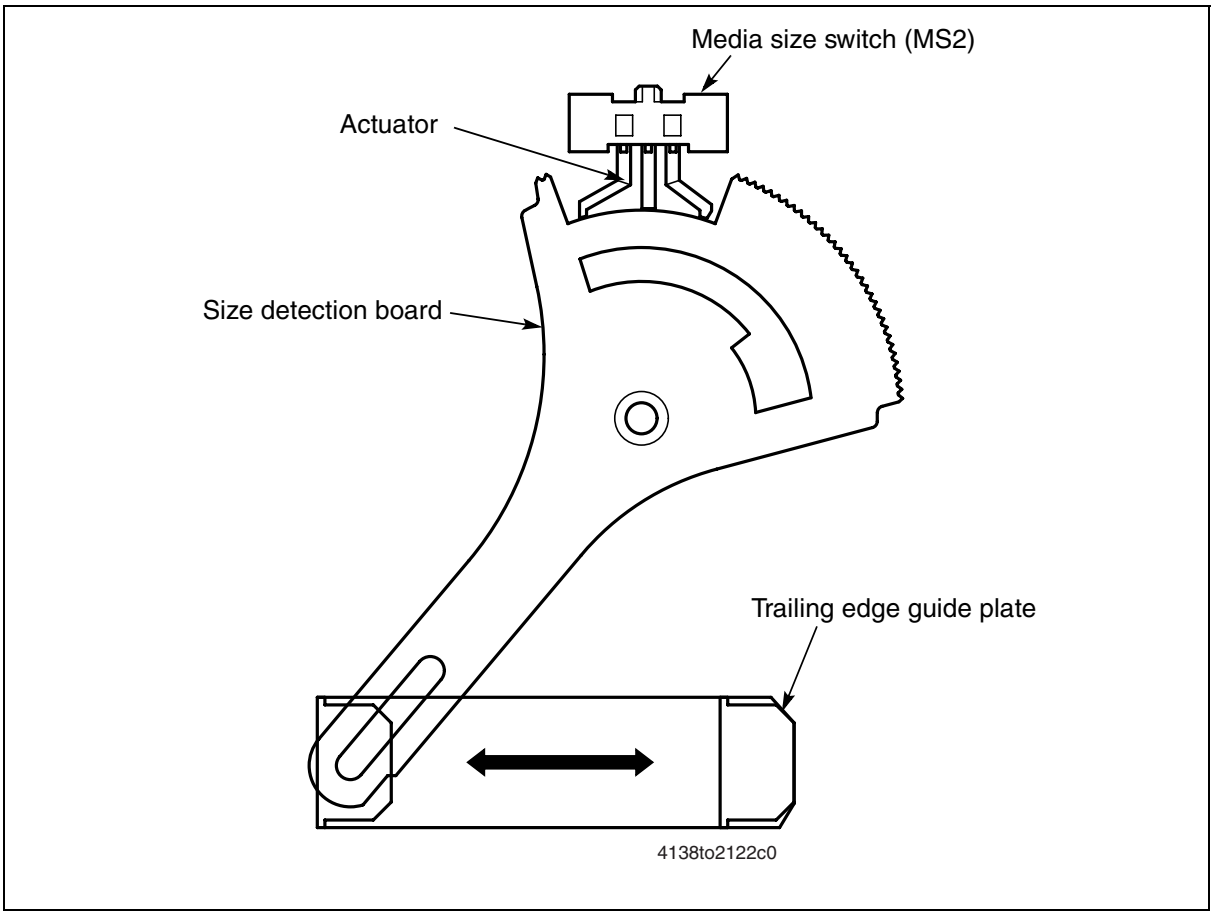
- The trailing edge guide plate can be slid to the exact size in the length direction of the media to be loaded (14 inch, 13 inch, $12^{7}/_{10}$ inch, A4, 11, $10^{1}/_{2}$ inch, B5).



4.1.9 Media size detection control

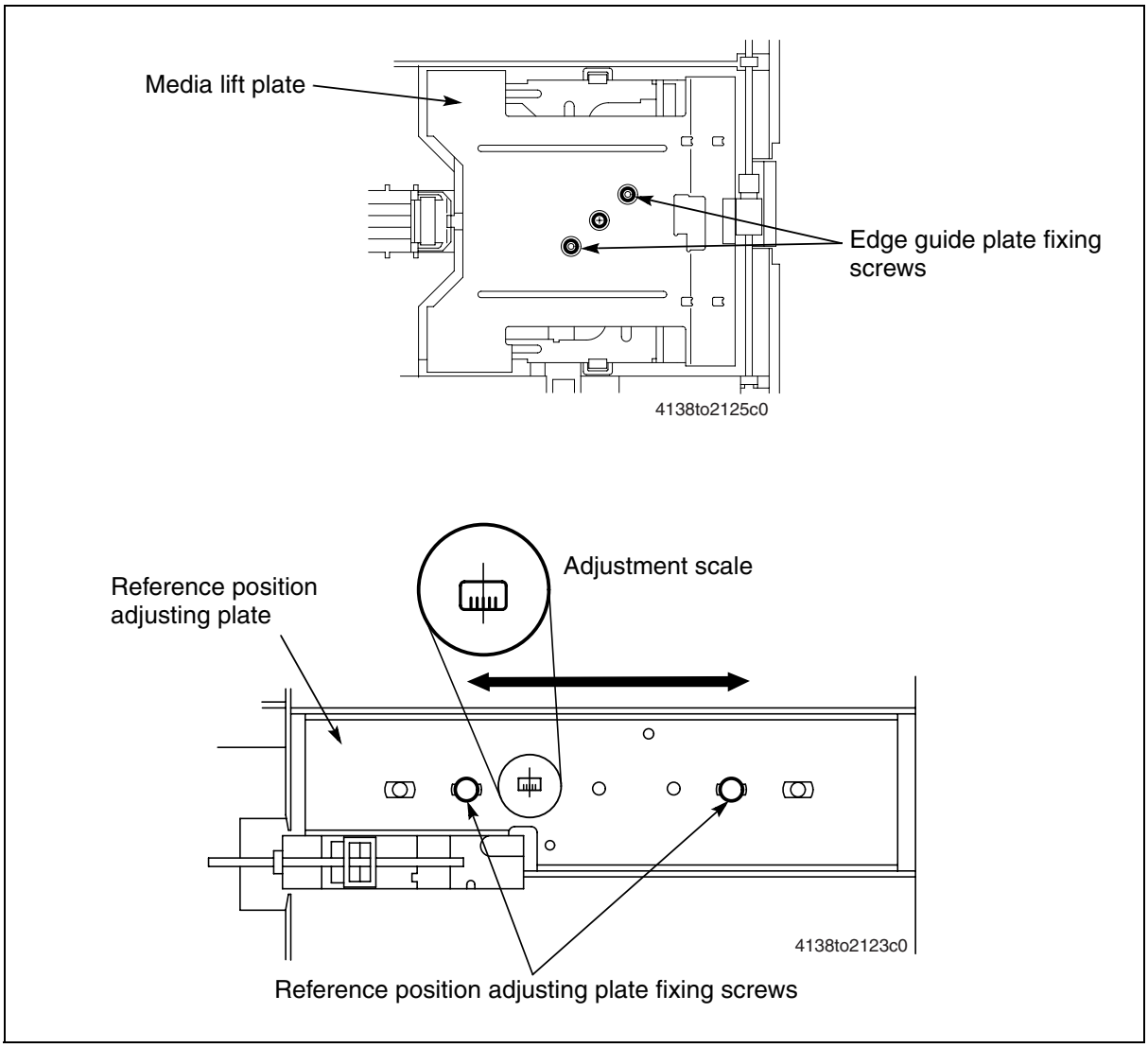
- The media size switch detects the length size (FD) of the media.
  1. The size detection board turns as the trailing edge guide plate is moved.
  2. When the tray is slid into the main body, the size detection board pushes the actuator of the media size switch installed to the main body frame, thus turning ON the switch.
  3. The combination of ON/OFF positions of the sub-switches of the media size switch determines the specific media size that can be either one of the seven different sizes.
  4. If the tray is not slid into position, all of the sub-switches are OFF and the message “OUTPUT FULL REMOVE PAPER (MAIN TRAY)” appears.

Lower feeder media size switch			Media size
SW1	SW2	SW3	
OFF	ON	ON	Legal (8.5” × 14”)
ON	ON	ON	Government legal letter plus
ON	ON	OFF	A4
ON	OFF	OFF	Letter (8.5” × 11”)
OFF	OFF	ON	B5
OFF	OFF	OFF	Lower feeder unit not installed



4.1.10 Media reference position adjustment mechanism

- The edge guide plate can be moved to allow the print start reference position for the media to be adjusted.
  1. Through a hole in the media lift plate on top of the tray, loosen two screws that secure the edge guide plate.
  2. Accessing the tray from its bottom surface, loosen two screws that secure the reference position adjusting plate.
  3. Slide the reference position adjusting plate as necessary as indicated on the scale.
  4. From the bottom surface of the tray, tighten the two screws that secure the reference position adjusting plate.
  5. Through the hole in the media lift plate on top of the tray, tighten the two screws that secure the edge guide plate.



4.1.11 Media misfeed detection control

- If the media feed sensor is not activated within a predetermined period of time after a media feed sequence has been started, the main body determines that there is a media misfeed. It then displays a media misfeed message on the panel.
- The media misfeed display can be reset by opening and closing any door.

Color Printer

Staple Finisher

THEORY OF OPERATION

Code Y108600-3

Revision history

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CONTENTS

Staple finisher

Outline

Composition/Operation

Outline

1. Product specifications

A. Type

Type	Staple finisher suspended on the main body
Installation	Suspended on the main body
Document alignment	Center
Media ejection system	Face down, Output from the back end
Consumables	Staples

B. Functions

Modes	Sub tray	Sort, group
	Main tray	Sort, group, Sort offset, group offset, Sort stable

C. Media type

(1) Non sort, sort, group

Type	Size	Weight	Max. Capacity (Sub tray, Main tray)		
			5 x 7-1/4S, B6S or less	8-1/2 x 11S, A4S or less	Media length: longer than 300 mm
Plain paper Recycled paper	A6S, A5S, B5S, A4S 5-1/2 x 8-1/2S, 8-1/2 x 11S, 8-1/2 x 14 Max.: 216 mm x 356 mm 8.5 x 14 inch Min.: 92 mm x 148 mm 3.5 x 5.75 inch	60 to 90 g/m² 16 to 24 lb	-	Sub: 100 sheets Main: 500 sheets	Sub: 50 sheets Main: 250 sheets
Postcard		-	Sub: 100 sheets Main: 100 sheets	Sub: 20 sheets Main: 20 sheets	Sub: 20 sheets Main: 20 sheets
Envelope		-			
OHP Film		-			
Glossy paper		-			
Label		-			
Letterhead		-			
Thick paper 1		91 to 150 g/m² 24.25 to 40 lb			
Thick paper 2		151 to 210 g/m² 40.25 to 55.75 lb			

(2) Sort offset, group offset

Type	Size	Weight	Max. Capacity (Main tray)	
			8-1/2 x 11S, A4S or less	Media length: longer than 300 mm
Plain paper Recycled paper	B5S, A4S 8-1/2 x 11S, 8-1/2 x 14 Max.: 216 mm x 356 mm 8.5 x 14 inch Min.: 182 mm x 257 mm 7.25 x 10 inch	60 to 90 g/m² 16 to 24 lb	500 sheets or 50 sets	250 sheets or 25 sets

(3) Sort stable

<Normal mode>

Type	Size	Weight	Max. Capacity (Main tray)		No. of sheets to be stapled
			8-1/2 x 11S, A4S or less	Media length: longer than 300 mm	
Plain paper Recycled paper	B5S, A4S 8-1/2 x 11S, 8-1/2 x 14 Max.: 216 mm x 356 mm 8.5 x 14 inch Min.: 182 mm x 257 mm 7.25 x 10 inch	60 to 90 g/m² 16 to 24 lb	400 sheets or 40 sets	200 sheets or 20 sets	30 sheets *

*: The number of sheets to be stapled is limited for high-density images.
(Color wise 3: 20 sheets x 20 sets)

<Cover mode>

Type	Size	Weight	Max. Capacity (Main tray)		No. of sheets to be stapled
			8-1/2 x 11S, A4S or less	Media length: longer than 300 mm	
Plain paper Recycled paper	B5S, A4S 8-1/2 x 11S, 8-1/2 x 14 Max.: 216 mm x 356 mm 8.5 x 14 inch Min.: 182 mm x 257 mm 7.25 x 10 inch	60 to 210 g/m² 16 to 55.75 lb	—	—	28 sheets (2 sheets or less for thick paper)

D. Stapling

Staple filling mode	Dedicated Staple Cartridge (5000 staples)
Staple detection	Available (Near empty: 20 remaining staples)
Stapling position	Rear corner (49 degrees)
Media size	B5S, A4S, 8-1/2 x 11S, 8-1/2 x 14
Manual staple	None

E. Machine specifications

Power requirements	DC 24 V ± 10% (supplied from the main body)
Max. power consumption	48 W or less
Dimensions	Stapling unit: 475 (W) × 462 (D) × 360 (H) mm 18.75 (W) × 18.25 (H) × 14.25 (D) inch Relay unit: 284 (W) × 394 (D) × 360 (H) mm 11.0 (W) × 15.5 (D) × 14.0 (D) inch
Weight	Stapling unit: 10.0 kg (22 lb) Relay unit: 2.0 kg (4.5 lb) (Excluding items furnished with the unit.)

F. Operating environment

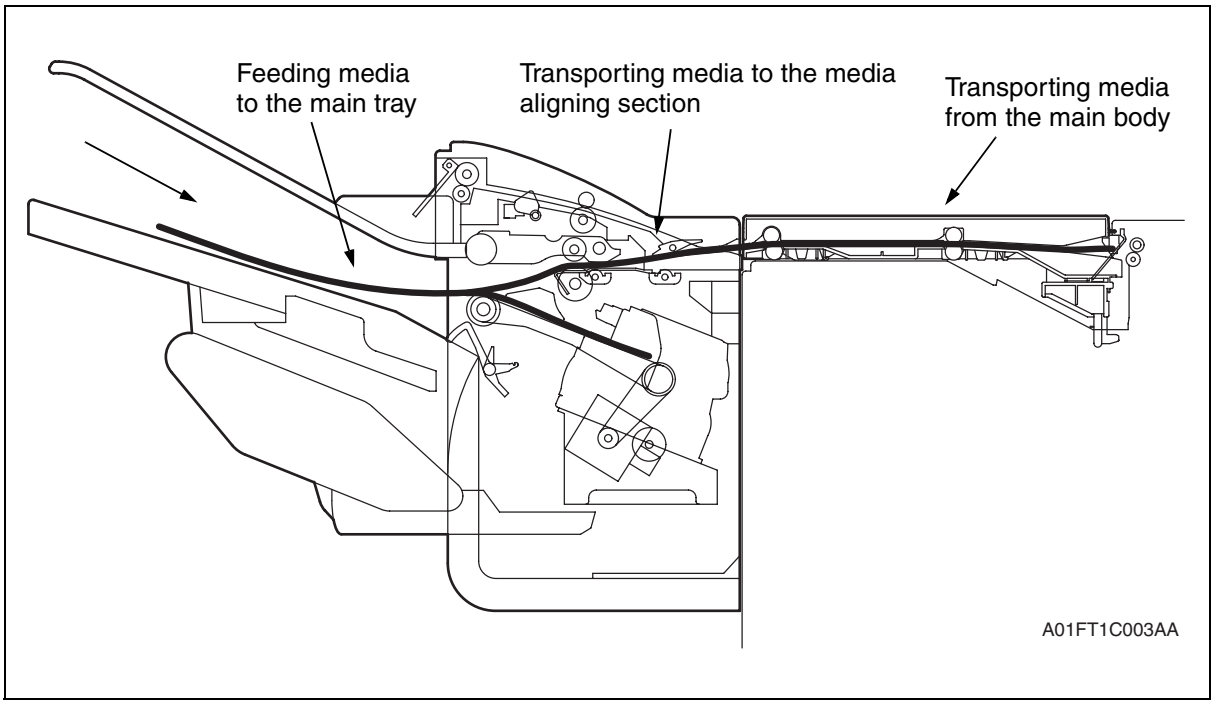
- Conforms to the operating environment of the main body.

NOTE

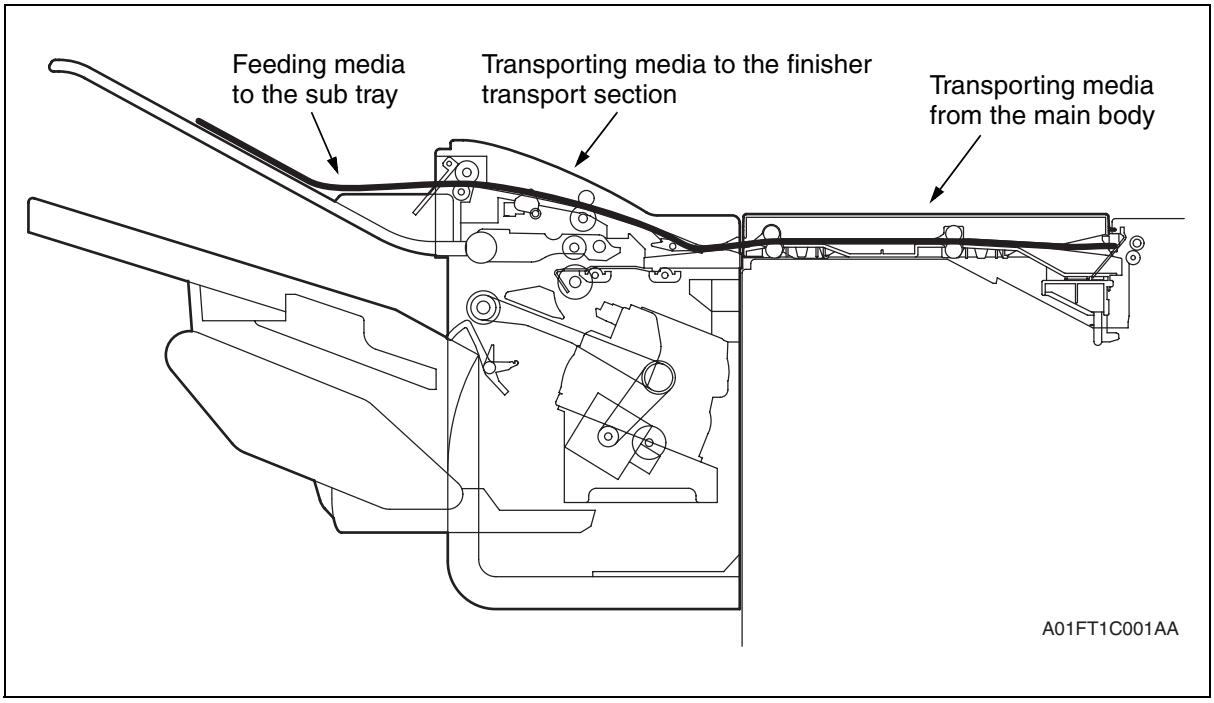
- **These specifications are subject to change without notice.**

2. Media path

2.1 Feeding media to the main tray

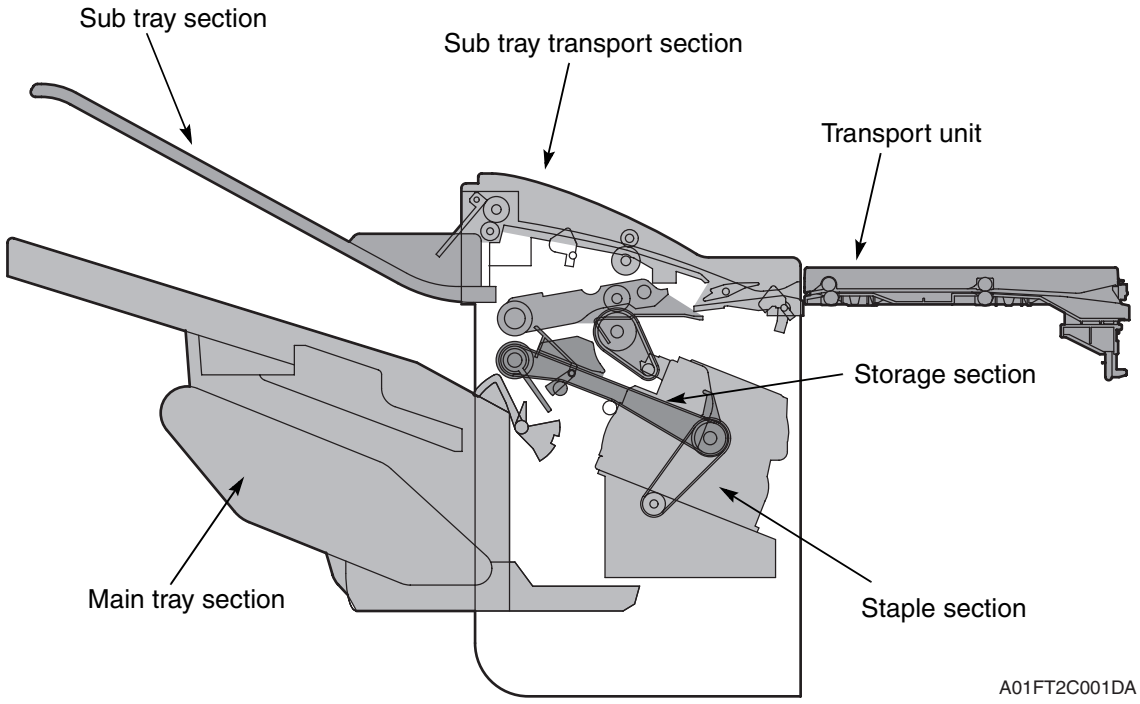


2.2 Feeding media to the sub tray



Composition/Operation

3. Composition



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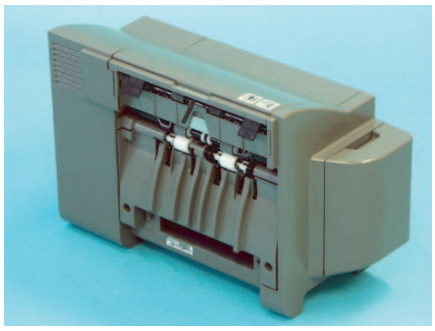
Finisher



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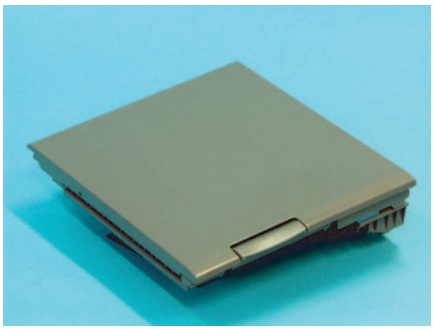
Transport unit



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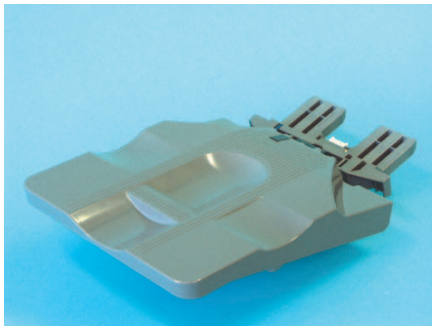
Main tray section



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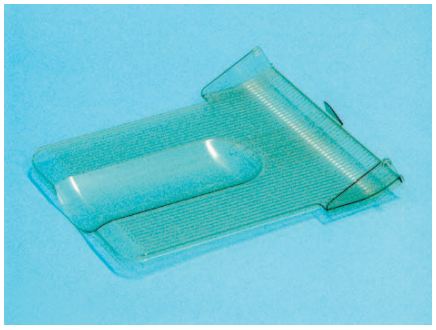
Sub tray section



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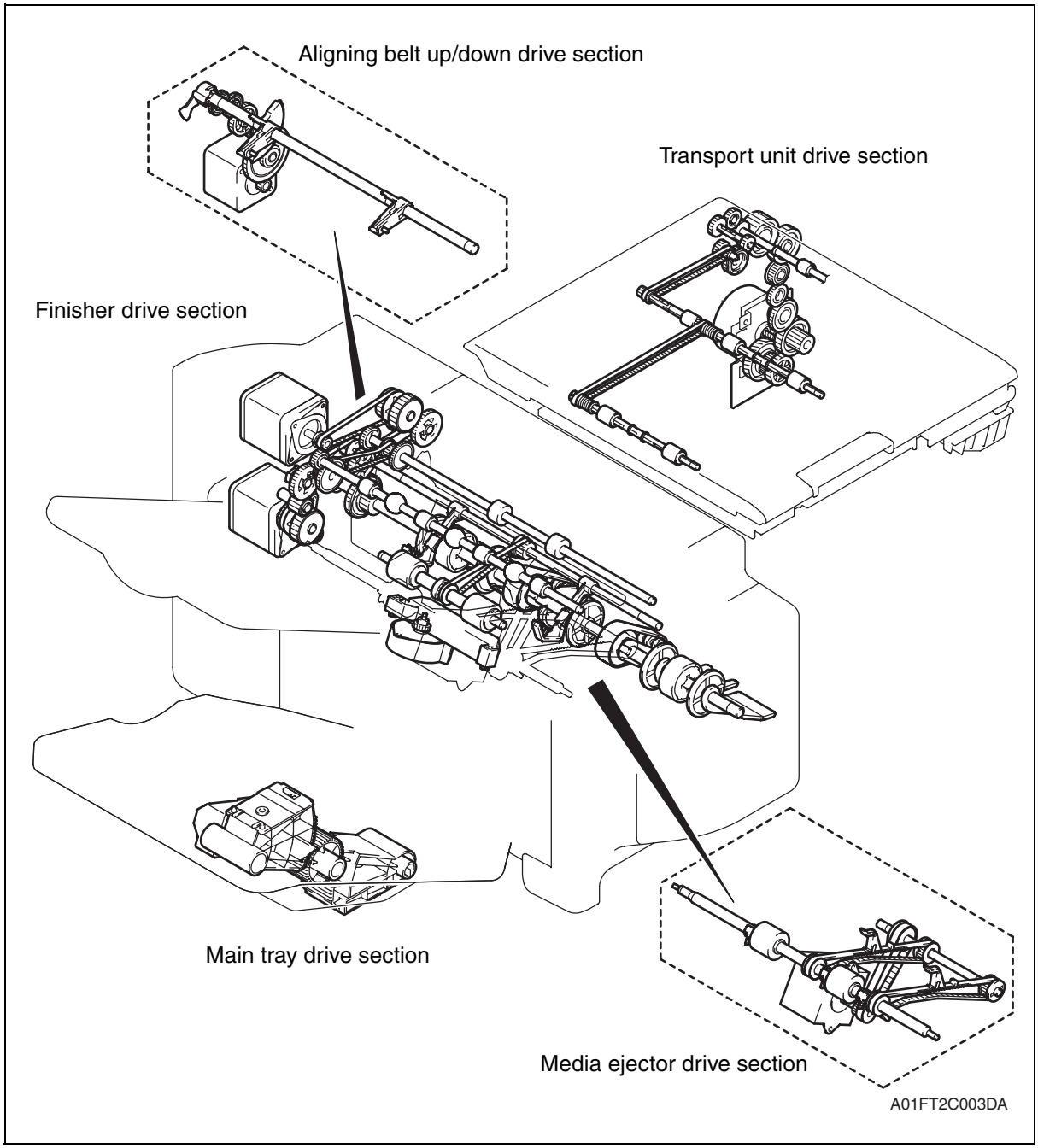
4. Drive


Aligning belt up/down drive section
Transport unit drive section
Finisher drive section
Main tray drive section
Media ejector drive section
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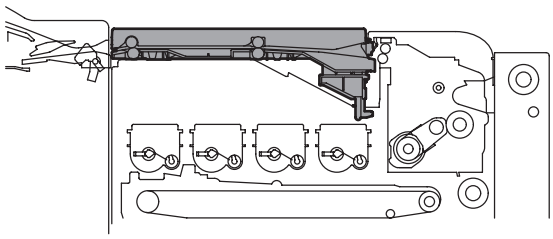
5. Operations

5.1 Transport unit section

- The transport unit controls transport of media fed out from the main body, switchback operations for the media during 2-sided printing, and drive for feeding media out into the finisher section.



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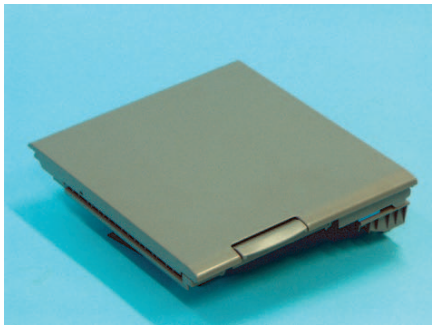

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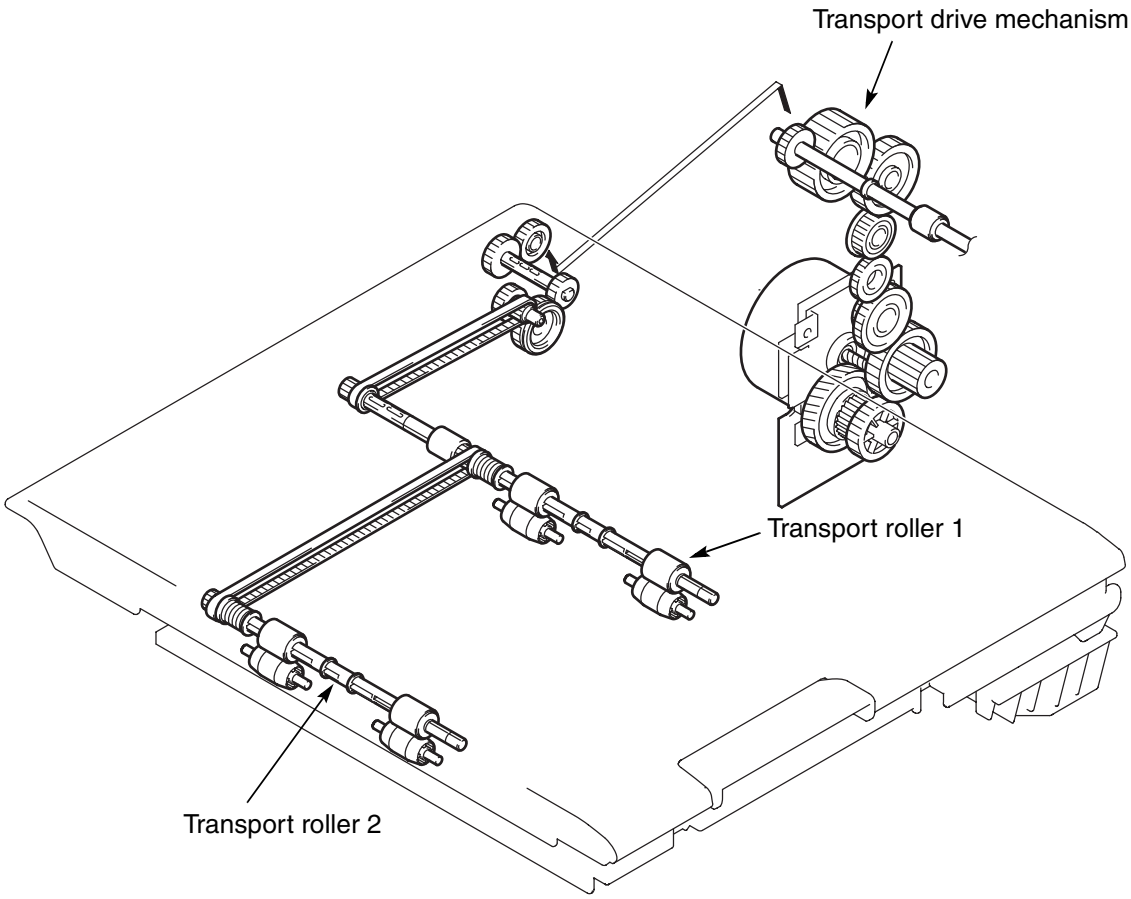

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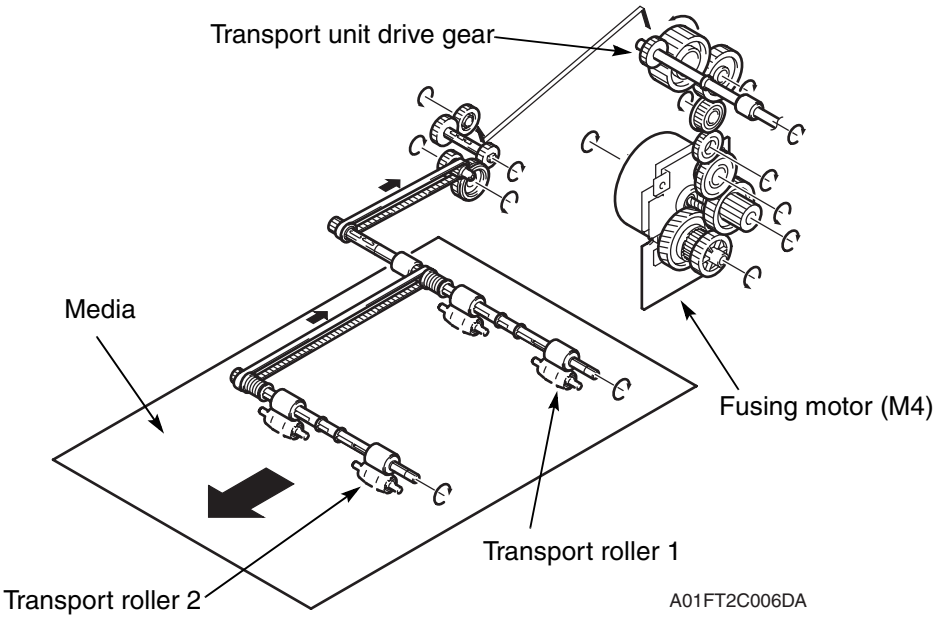
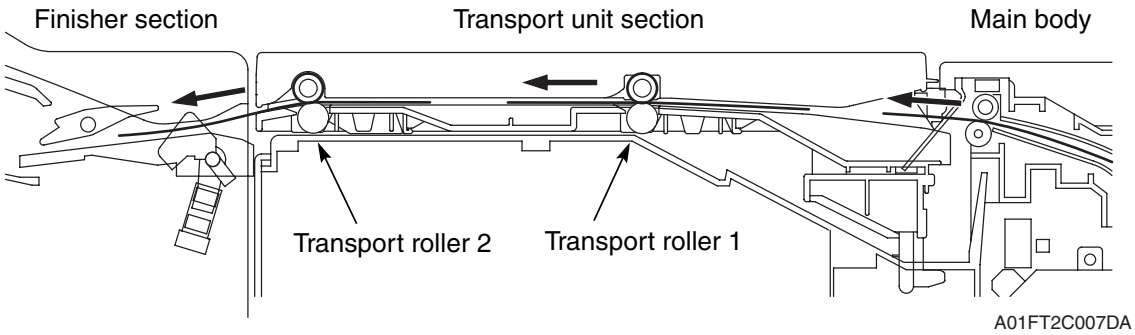
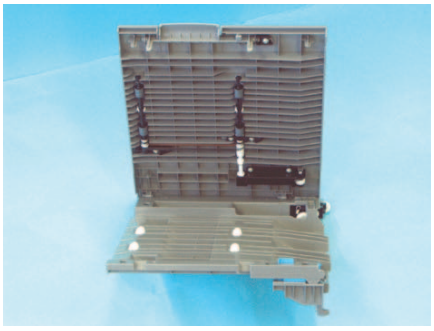
5.1.1 Media transport

- Transport rollers 1 and 2 transport 1-sided printed media and 2-sided printed media to be fed out of the main body to the finisher section.
- The 1-sided printed media to be subjected to the second print process is not transported to the finisher section, but is switched back into the main body.
- Media transport is accomplished by the drive of the fusing motor of the main body.
- If the optional duplex option is mounted on the main body, media transport is accomplished by the drive of the reverse motor built into the duplex option.
- The transport unit is not provided with any sensors for detecting the transport condition of the media. The entrance sensor of the finisher section performs the function of detecting the transport condition of the media.



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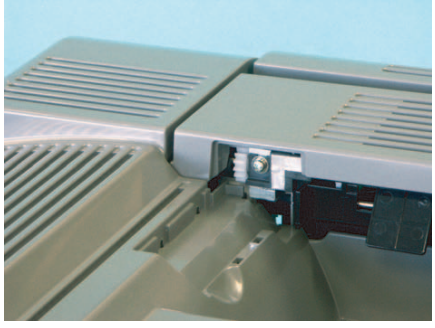
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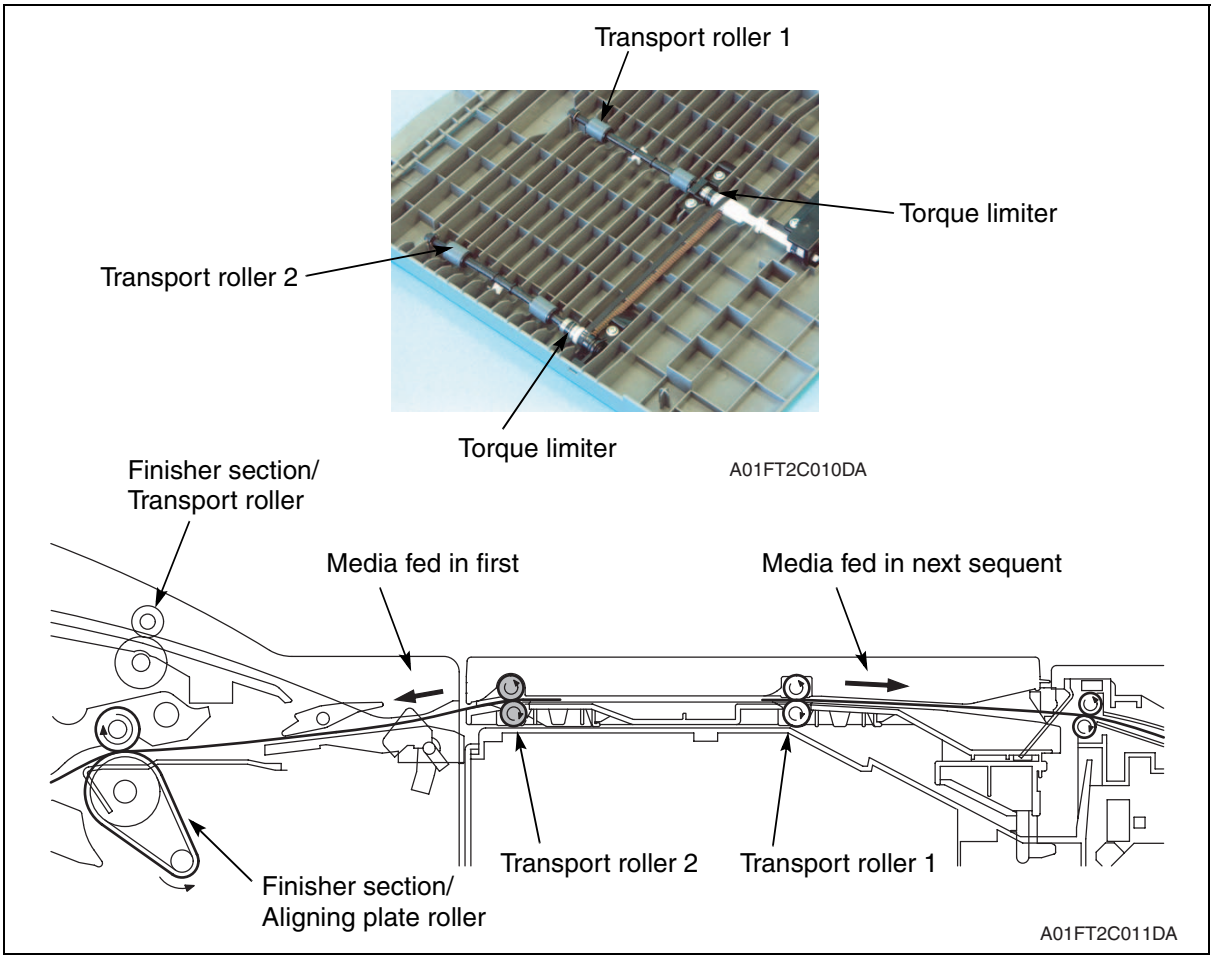
5.1.2 Transport roller drive mechanism

- For the 1-sided printed media and 2-sided printed media, the motor drive force rotates the transport rollers 1 and 2 in the forward direction via a torque limiter, thereby transporting the media in the forward direction.
- For the media to be subjected to the first print process, the motor drive force rotates the transport rollers 1 and 2 in the forward direction via a torque limiter, thereby transporting the media in the forward direction. When fusing of the first print process is completed, the motor starts rotating in the backward direction, turning transport rollers 1 and 2 in the backward direction. The media is thereby subjected to the switchback operation, in which the media is fed backward.

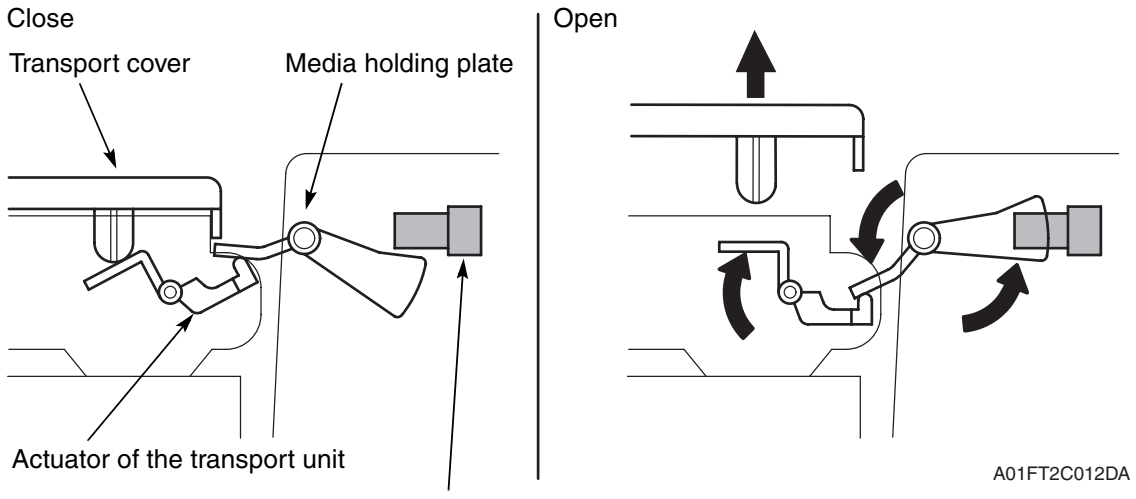
5.1.3 Transport roller slip mechanism

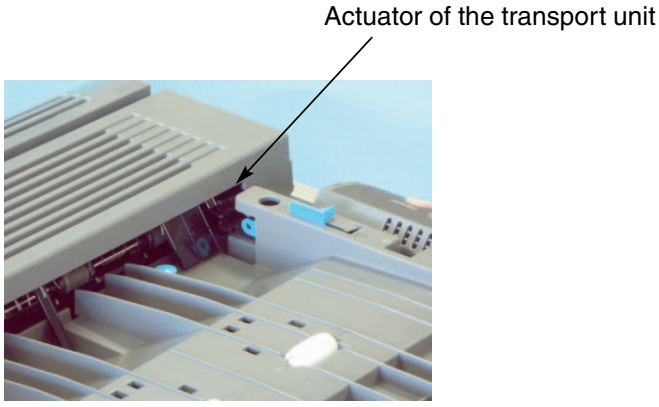
- The drive force of the transport roller is transmitted via a torque limiter.
- During forward rotation, the torque limiter transmits drive to the transport roller at all times. During backward rotation, on the other hand, the torque limiter causes the transport roller to slip (that is, turn idly) when a force equivalent to, or more than, a predetermined value is applied in the forward direction.
- Under special conditions during a 2-sided print process, at a time when the trailing edge of a sheet of media is yet to reach transport roller 2, transport rollers 1 and 2 start rotating backward for the subsequent sheet of media so that it can be returned backward. The leading edge of the media reaches the transport roller in the finisher section. The transport roller then attempts to transport the media in the forward direction. As a result, transport forces in two directions in the forward and backward direction are applied to the media.
  At this time, the transport roller in the transport unit slips and the media fed in first is transported in the forward direction by the force of the transport roller in the finisher.



5.1.4 Transport cover open/close detection

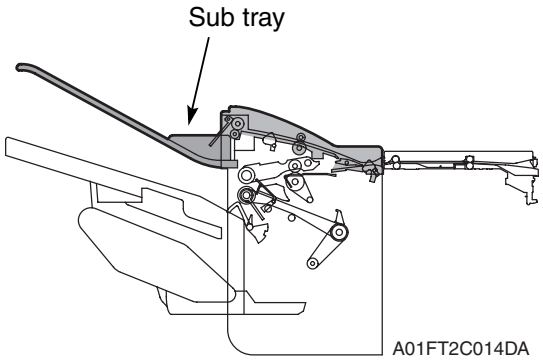
- The transport unit is not provided with any sensors for detecting the open or closed position of the transport cover. The media full sensor located at the fusing section of the main body functions to detect the open or closed position of the transport cover.
  Mounting the staple finisher on the main body changes the function assigned to the media full sensor to that of detecting the open or closed position of the transport cover. In addition, the media full sensor mounted in the finisher section performs the function of detecting a media full condition when the staple finisher is mounted on the main body.
- Opening the transport cover raises the leading edge of the actuator of the transport unit. This results in the other end of the actuator being lowered.
  The lowering of the actuator of the transport unit lowers the media holding plate at the exit section of the main body. As the media holding plate of the exit section of the main body is lowered, the media full sensor at the exit section of the main body is blocked. When the media full sensor of the exit section of the main body is blocked, opening of the transport cover is detected.

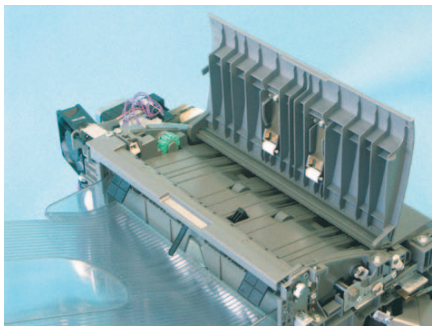




5.2 Sub tray transport section

- The sub tray transport section controls drive for transporting media from the transport unit out onto the sub tray.
- The media fed onto the sub tray does not undergo shift or stapling process.





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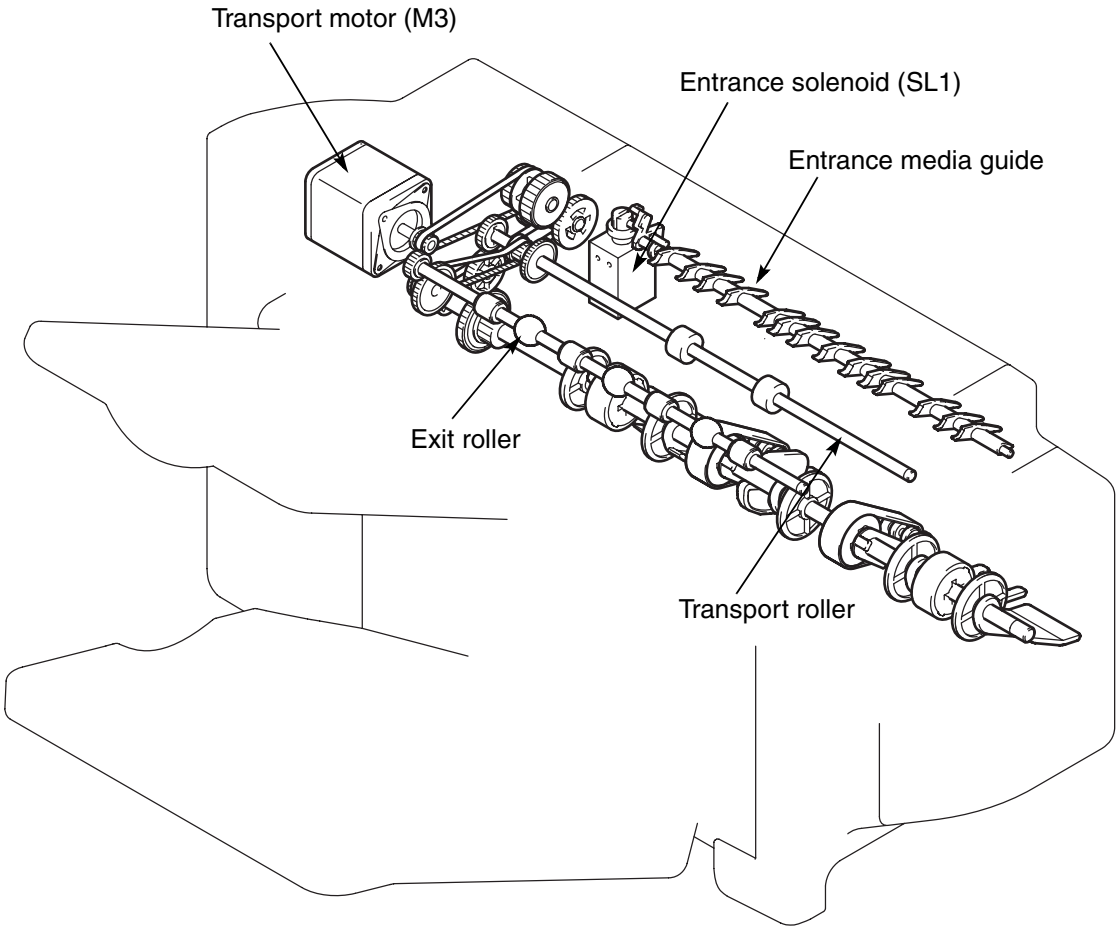
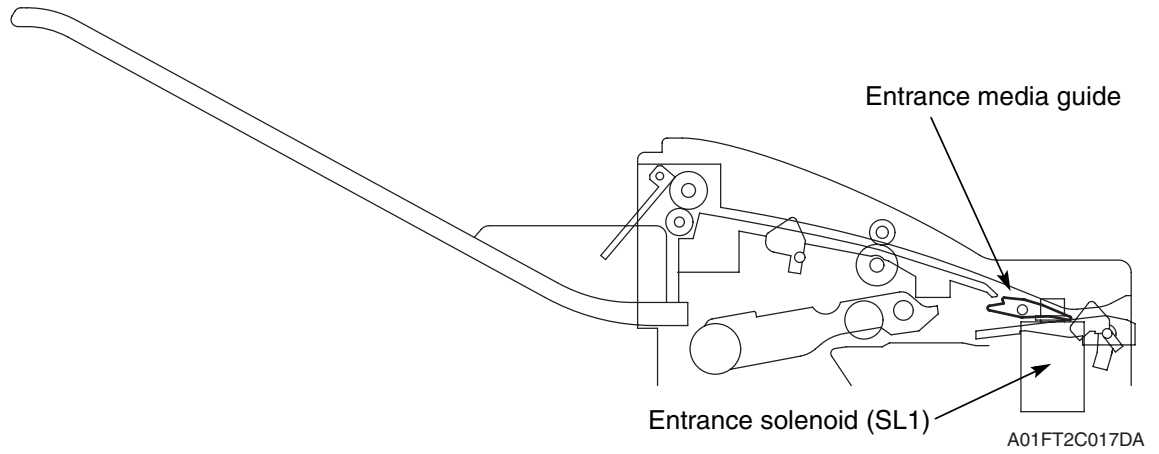
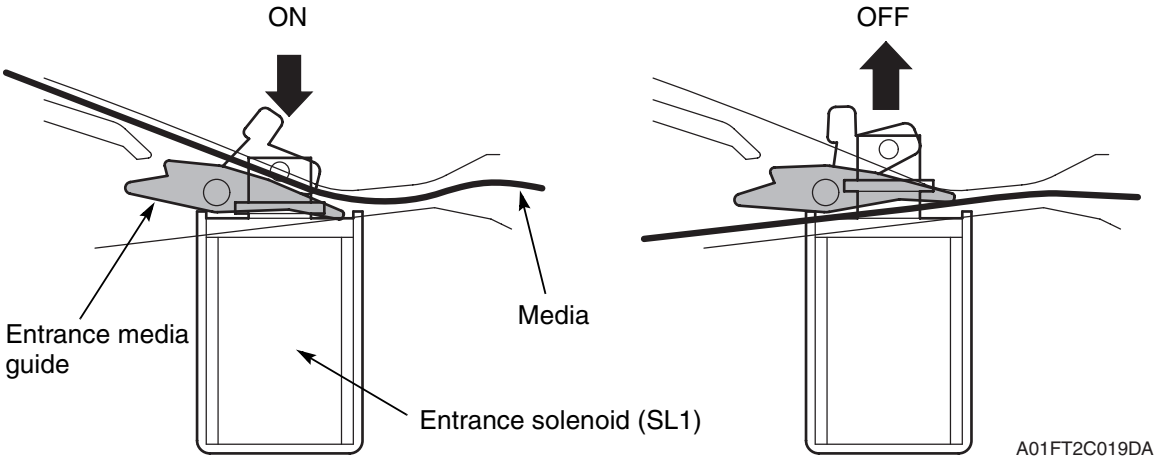
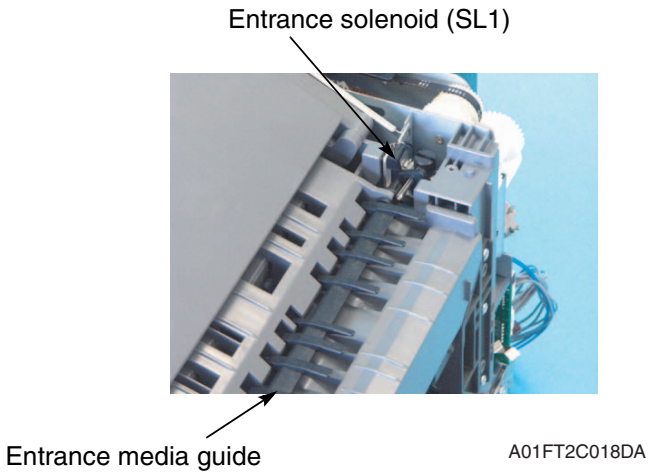


5.2.1 Entrance switch

- The media path for the media transported from the transport unit is changed so that the media may be fed into the sub tray transport section.
- The transport motor provides the drive for media transport.
- When the entrance solenoid is energized, the entrance media guide is swung down so that the media path leading to the sub tray transport section is established.

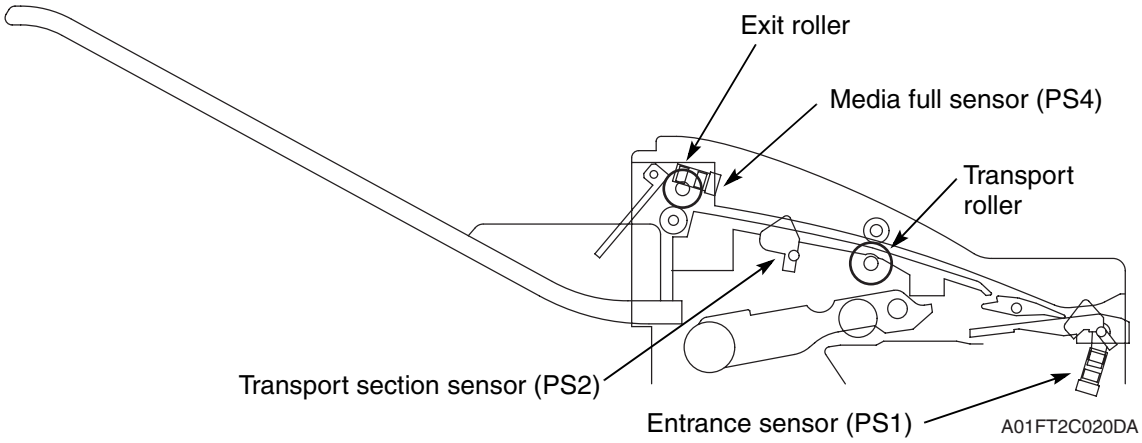


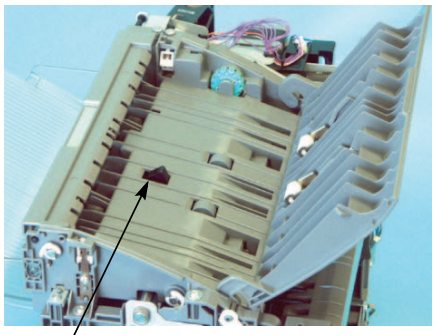


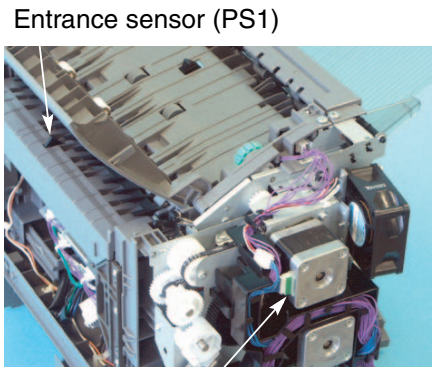


5.2.2 Media transport

- Media transported from the transport unit is transported to the sub tray.
- The transport motor provides the drive for transporting the media.
- When the transport motor is energized, the transport roller and exit roller are driven to rotate.
- The entrance sensor and the transport section sensor detect media in the sub tray transport section.



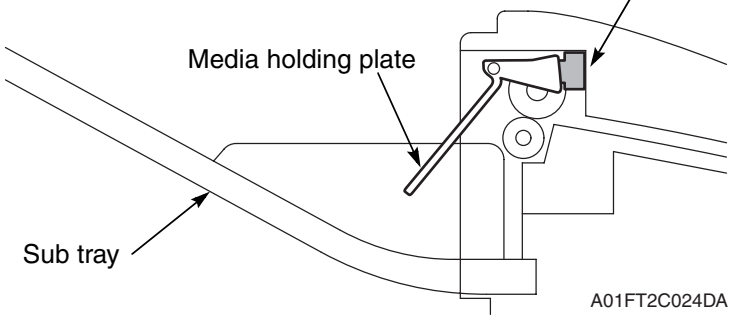




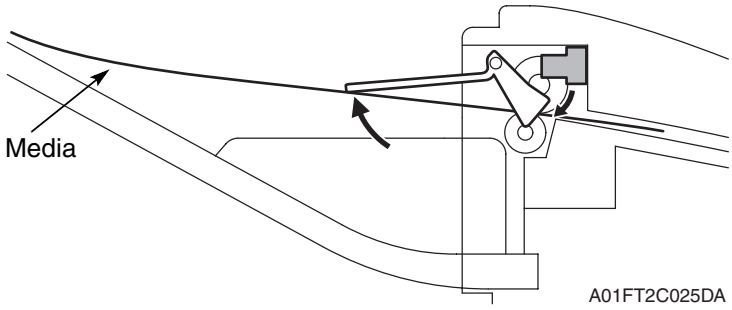
5.2.3 Media full detection

- The media full sensor detects the load capacity of output media in the sub tray.
- When the media holding plate is low, the edge of the media holding plate shades the media full sensor.
- When printing starts, the output media pushes up the media holding plate and the edge of the plate activates the media full sensor.
- After all media is discharged, the media holding plate goes down and the edge of the plate shades the media full sensor. If the sensor is shaded, the printed media is judged to not have reached the maximum load capacity yet.
- After all media is discharged, if the output media in the sub tray keeps the media holding plate up and the media full sensor remains activated, the printed media is judged to have reached the maximum load capacity, and the operation panel displays the message "OUTPUT FULL REMOVE PAPER (SUB TRAY)."
- If the sensor detects that the Exit Tray is full, printing is stopped.
- The message "OUTPUT FULL REMOVE PAPER (SUB TRAY)" is removed when the output media is removed from the sub tray, which again shades the media full sensor.

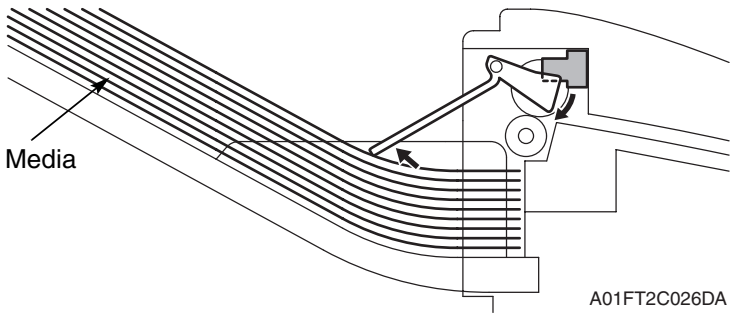
When the tray is empty



When media is loaded

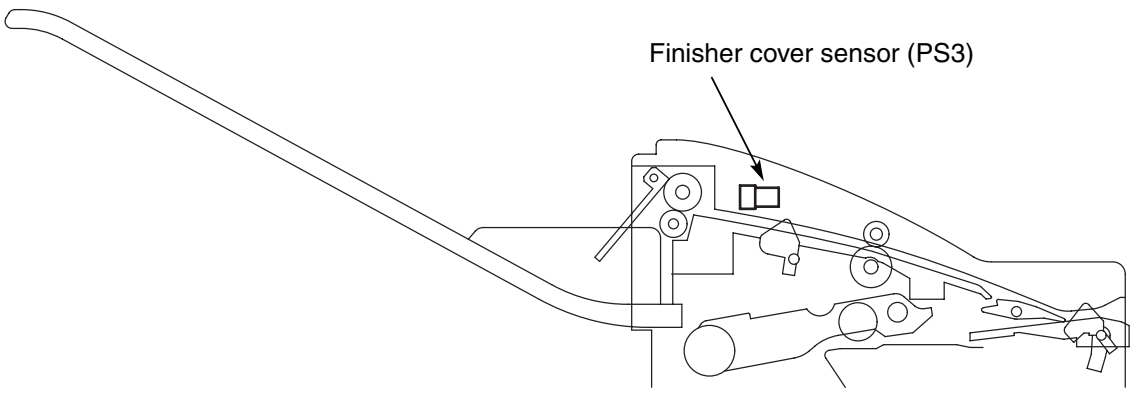


When the tray is full



5.2.4 Finisher cover open/close detection

- The finisher cover sensor detects the open or closed position of the finisher cover.
- Opening the finisher cover unblocks the finisher cover sensor. At this time, the finisher cover sensor detects that the finisher cover is opened.



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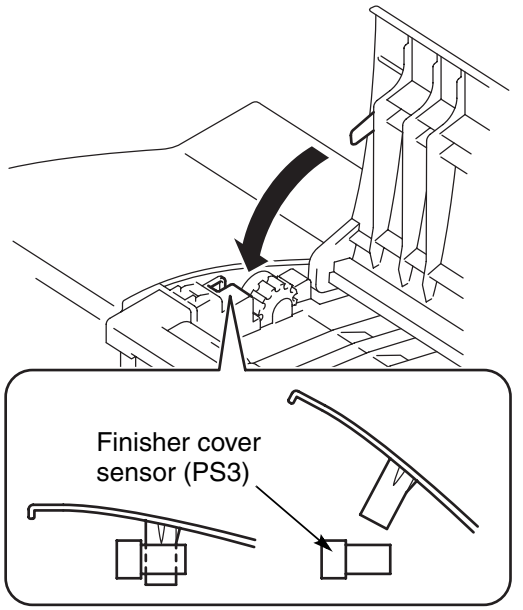

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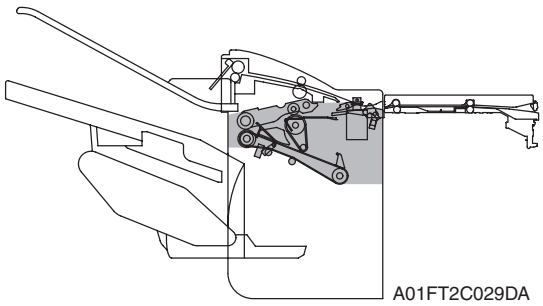
5.3 Main tray transport section

- The main tray transport section controls drive for transporting the media from the transport unit into the main tray and for shift and stapling operations performed on the media from the transport unit.
- The following describe the media transport operation for feeding media straight out into the main tray. Details of shift and stapling operations will be given later in the section describing the storage section.



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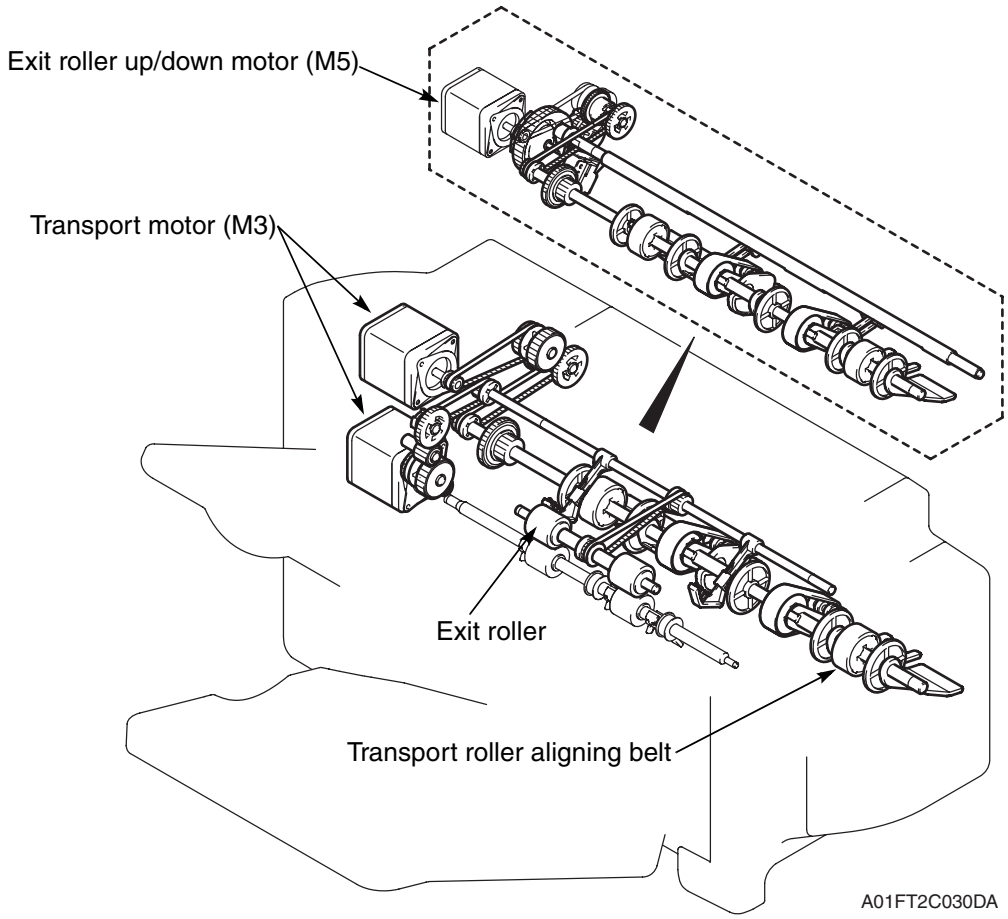

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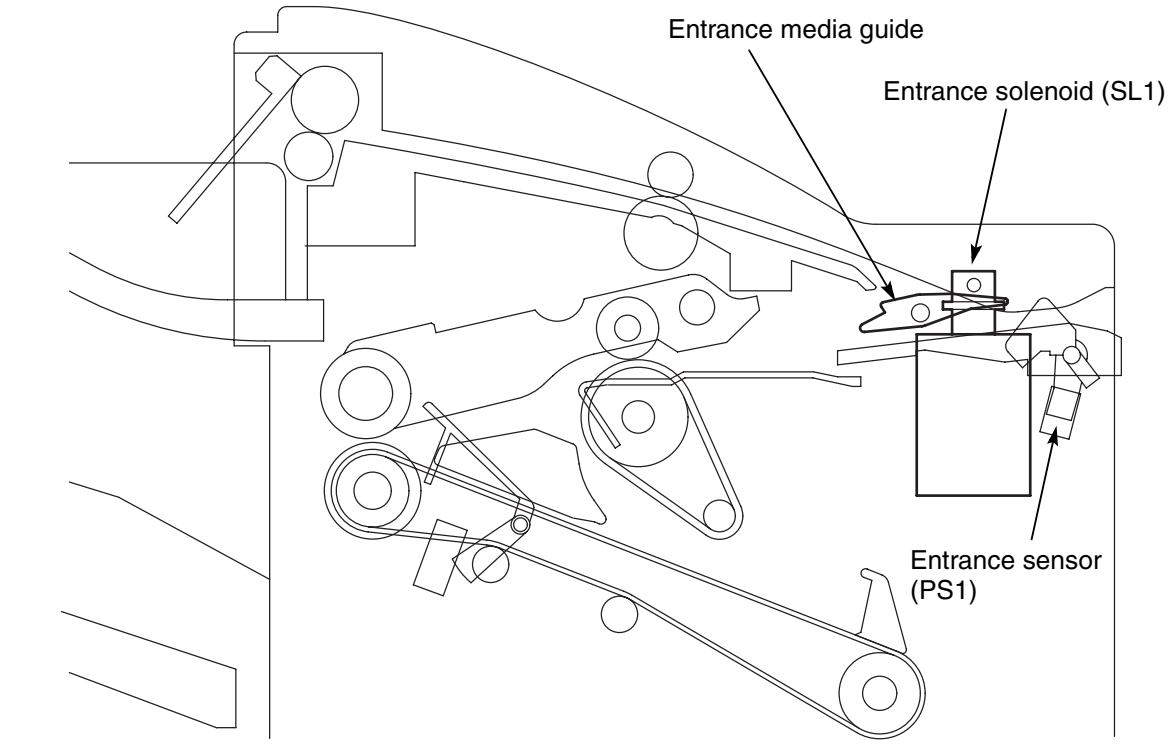
5.3.1 Entrance switch

- The media path for the media transported from the transport unit is changed so that the media may be fed into the storage section.
- The transport motor provides the drive for media transport.
- When the entrance solenoid is interrupted (Initial condition), the entrance media guide is swung down so that the media path leading to the storage section is established.



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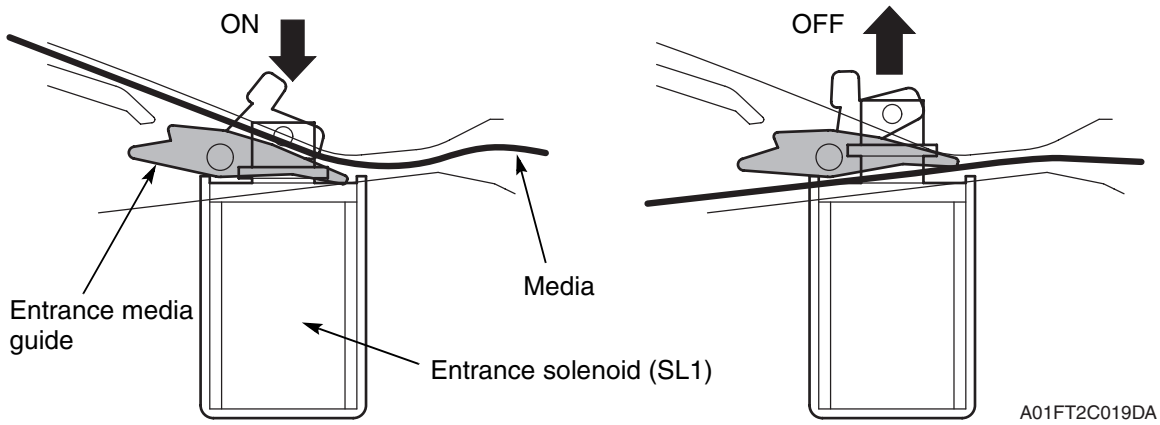

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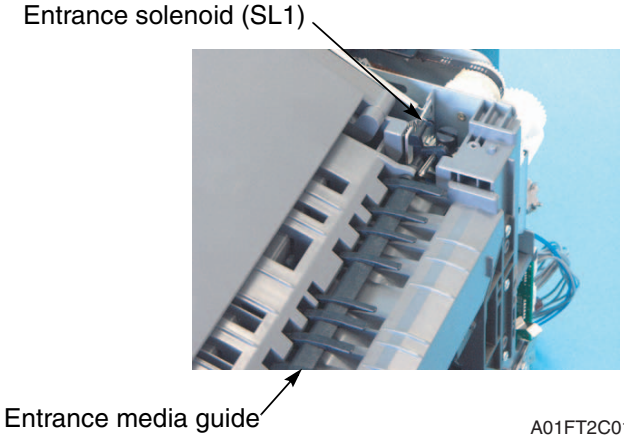

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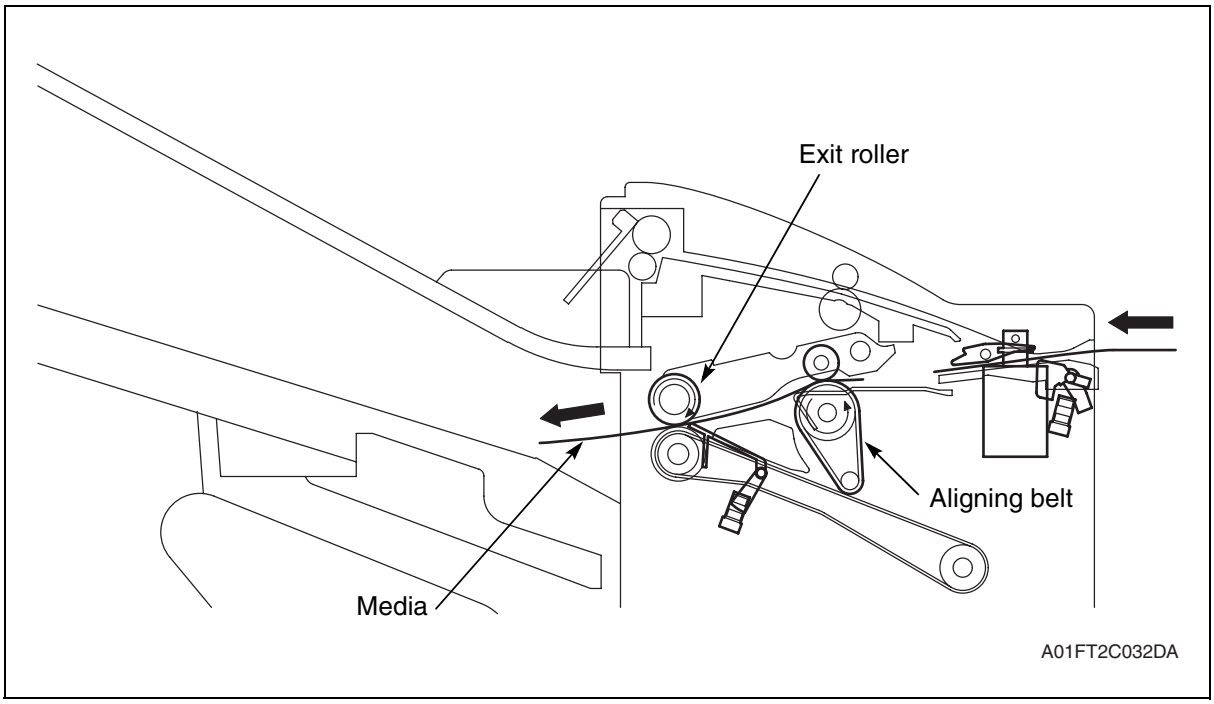
5.3.2 Media transport

- The media fed off from the transport unit is transported to the main tray section.
- The transport motor and exit motor provide drive for media transport.
- The entrance sensor and storage section sensor detect media.

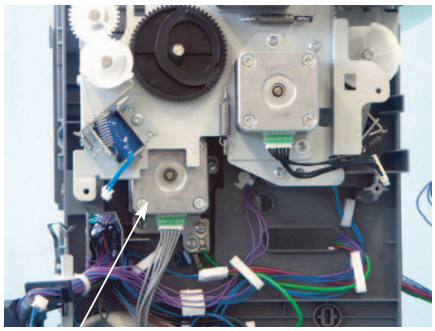
A. Operation

1. The transport motor drives the aligning belt to transport the media to the exit roller.
2. The exit roller up/down motor is energized to lower the exit roller.
3. The transport motor drives the exit roller. The exit roller and the aligning belt then feed the media onto the main tray.



5.3.3 Upper exit roller up/down motion mechanism

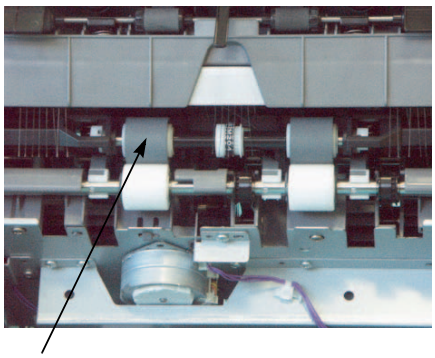
- The upper exit roller is lowered when the media is fed straight into the main tray or stored in the finishing tray.
- When a printed media stack/set is fed out, the upper exit roller is raised to be away from the lower exit roller, so that there is an unblocked media path between the upper and lower exit rollers.
- The upper exit roller is pressed against, or separated from, the lower exit roller by the drive provided by the exit roller up/down motor.
- The exit roller sensor detects the position of the exit roller.



Exit roller up/down motor (M5)

A01FT2C033DA

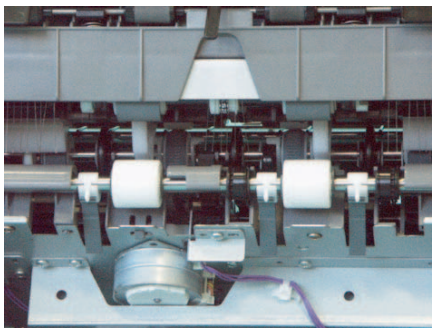
Pressed



Exit roller

A01FT2C034DA

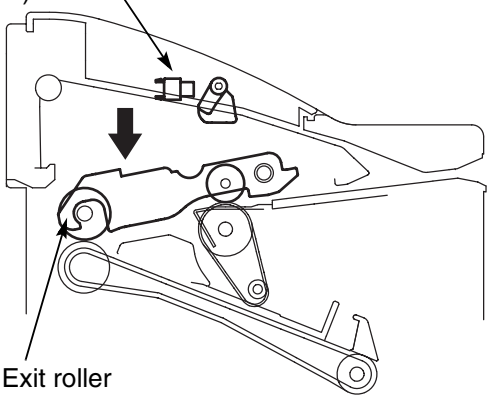
Separated



A01FT2C035DA

Exit roller sensor (PS8)

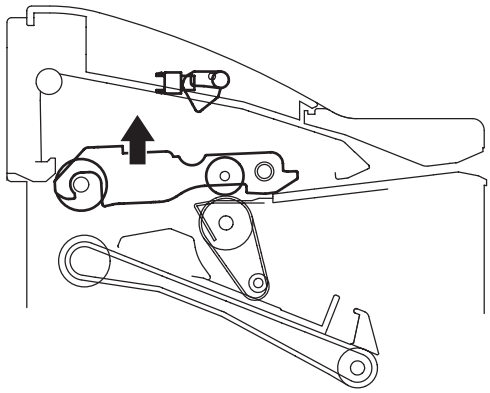
Pressed



Exit roller

A01FT2C036DA

Separated

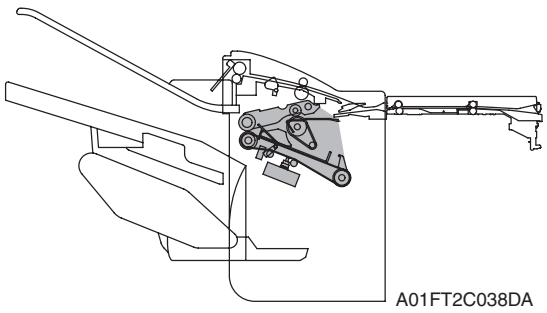


A01FT2C037DA

5.4 Storage section

5.4.1 Media aligning mechanism

- The printed media stack/set is aligned and stapled together in the storage section before being fed out into the main tray.
- The storage section sensor detects media in the finishing tray.
- The aligning belt is driven by the transport motor.
- The exit roller is driven by the exit motor.
- The upper exit roller is moved up or down by the exit roller up/down motor.
- The aligning plate is driven by the align motor.



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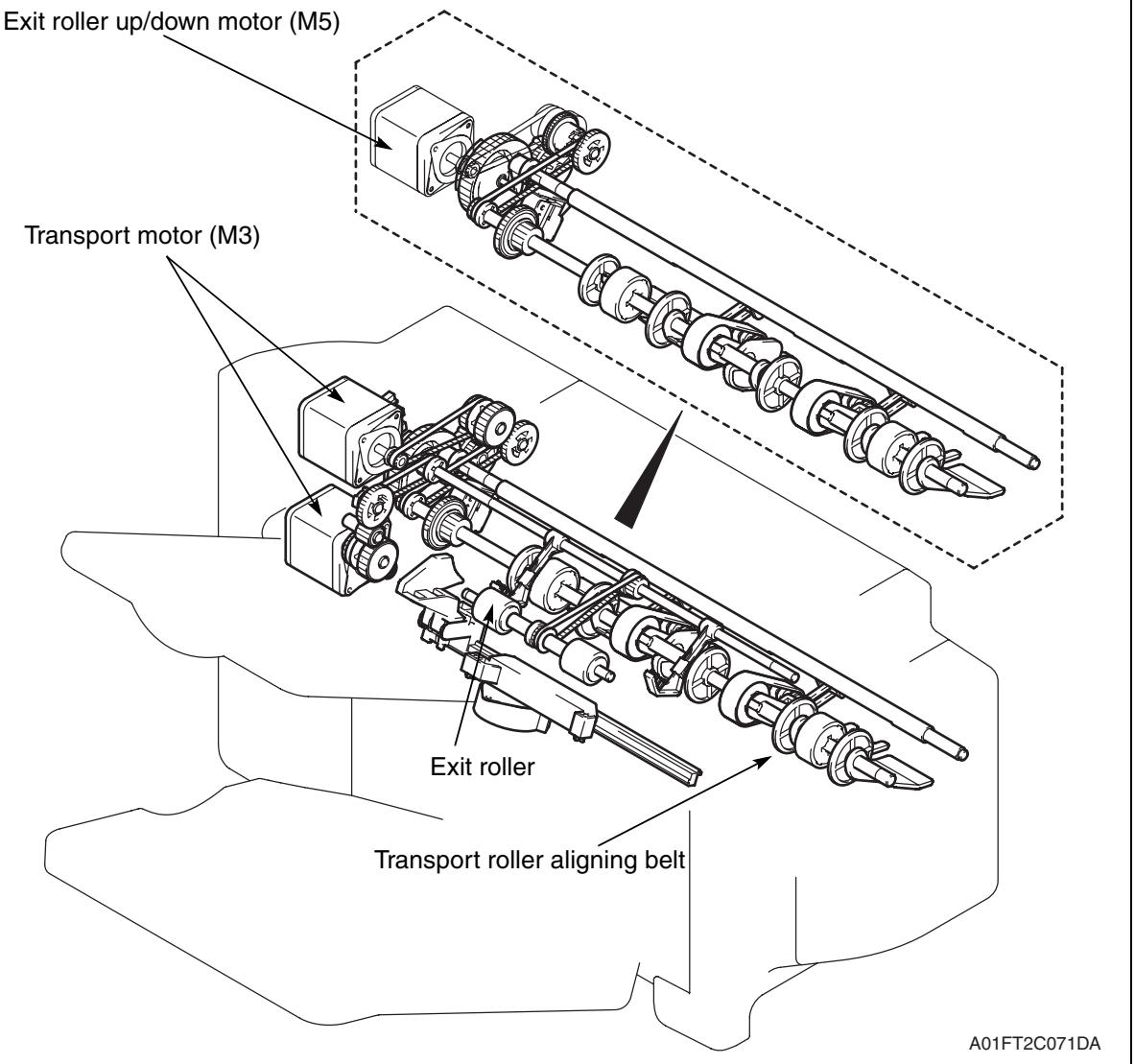
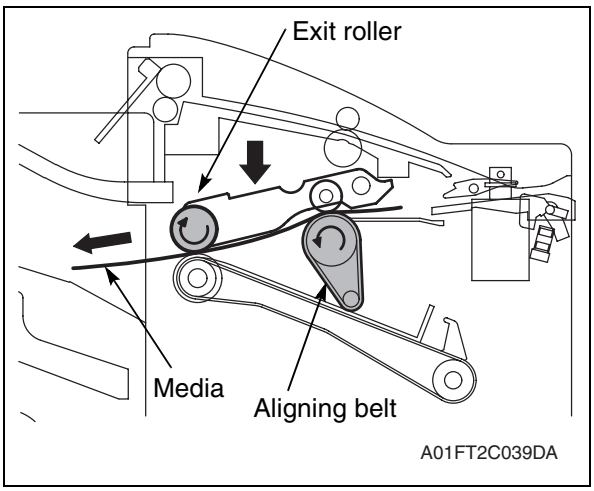
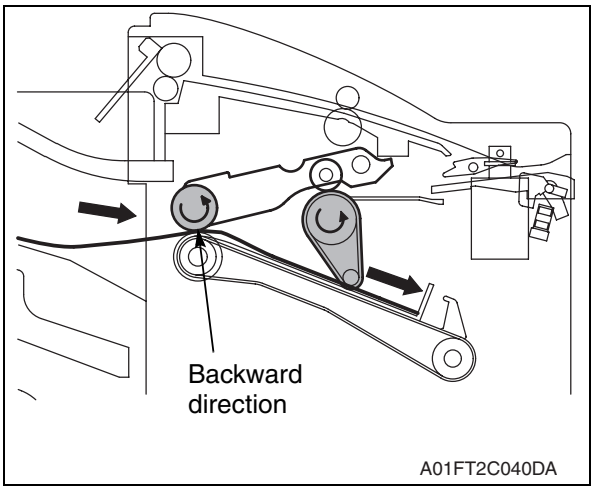


A01FT2C071DA

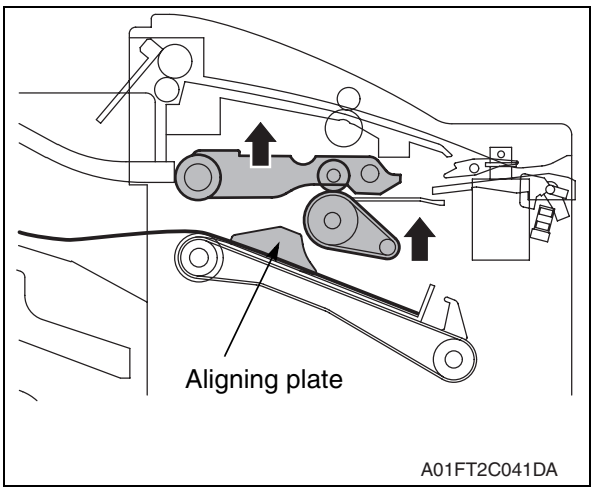
A. Operation



1. The transport motor drives the aligning belt, so that the media is transported up to the position of the exit roller.
2. When the trailing edge of the media moves past the aligning belt, the exit roller up/down motor starts rotating to lower the upper exit roller.



3. The exit motor rotates in the direction of storing media, causing the exit roller to rotate in the direction of storing media. The exit roller and aligning belt makes the media make a switchback operation, so that the media is stored in the finishing tray. The media is pressed up against the stopper so as to be aligned properly (in the feeding direction).



4. When the media is stored in place, the exit roller up/down motor starts rotating to raise the upper exit roller.
5. The aligning belt up/down solenoid is energized so that the aligning belt is raised.
6. The aligning motor starts rotating to press the aligning plate up against the media. This aligns the media properly (in the crosswise direction).
7. The aligning belt up/down solenoid is energized to lower the aligning belt.
8. In staple mode, the printed media stack/set is stapled together after the media aligning sequence.

5.4.2 Finishing tray media full detection on staple mode

- The number of printed media that can be stored in the finishing tray on staple mode varies depending on the length of media.

Media length	Plain paper
300 mm or under	30 sheets
Over 300 mm	20 sheets

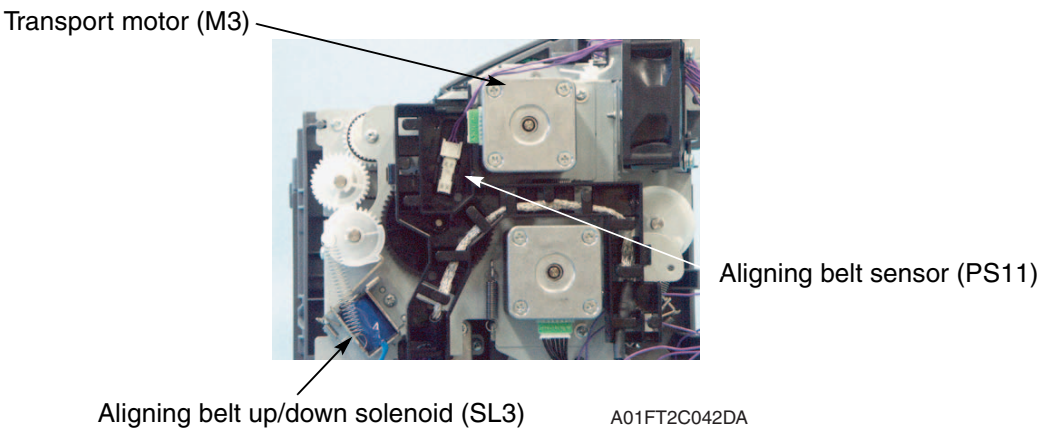
- If the media length is 300 mm or less, the count is taken according to the definitions given below when a job is received from the main body. It is determined that the finishing tray capacity has been reached when the count reaches 30.
- If the media length exceeds 300 mm, the count is taken according to the definitions given below when a job is received from the main body. It is determined that the finishing tray capacity has been reached when the count reaches 20.

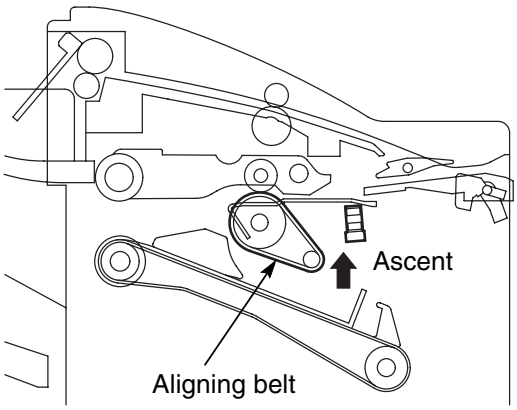
Media length	Plain paper	Finishing tray full count value
300 mm or under	+1	30
over 300 mm		20

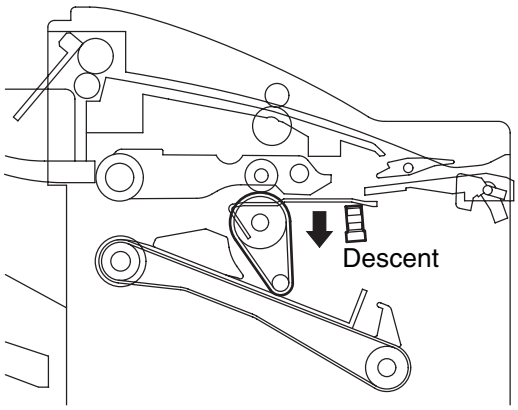
- If it is determined that the maximum finishing tray capacity is reached in the middle of a print job, the staple finisher forces the remaining sheets of media out.

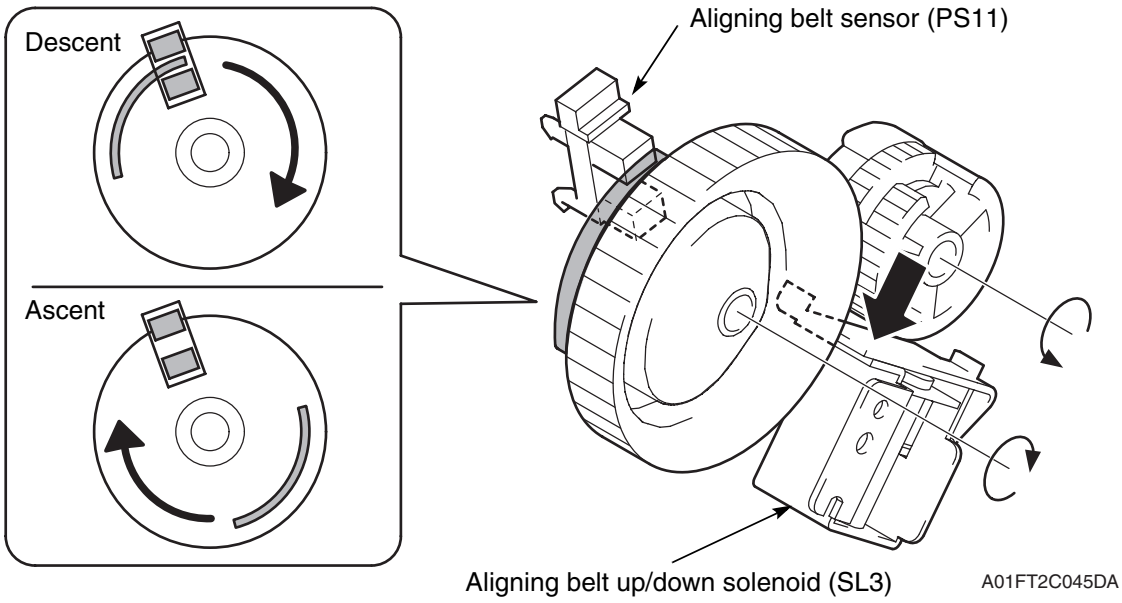
5.4.3 Aligning belt up/down mechanism

- When the aligning plate and media ejector are operated, the aligning belt is made to leave the media.
- The aligning belt is moved up or down through drive from the transport motor.
- When the aligning belt up/down solenoid is energized while the transport motor is rotating, the drive from the transport motor is transmitted to the aligning belt up/down gear. As a result, the aligning belt is moved up or down.
- The aligning belt sensor detects the position of the aligning belt.







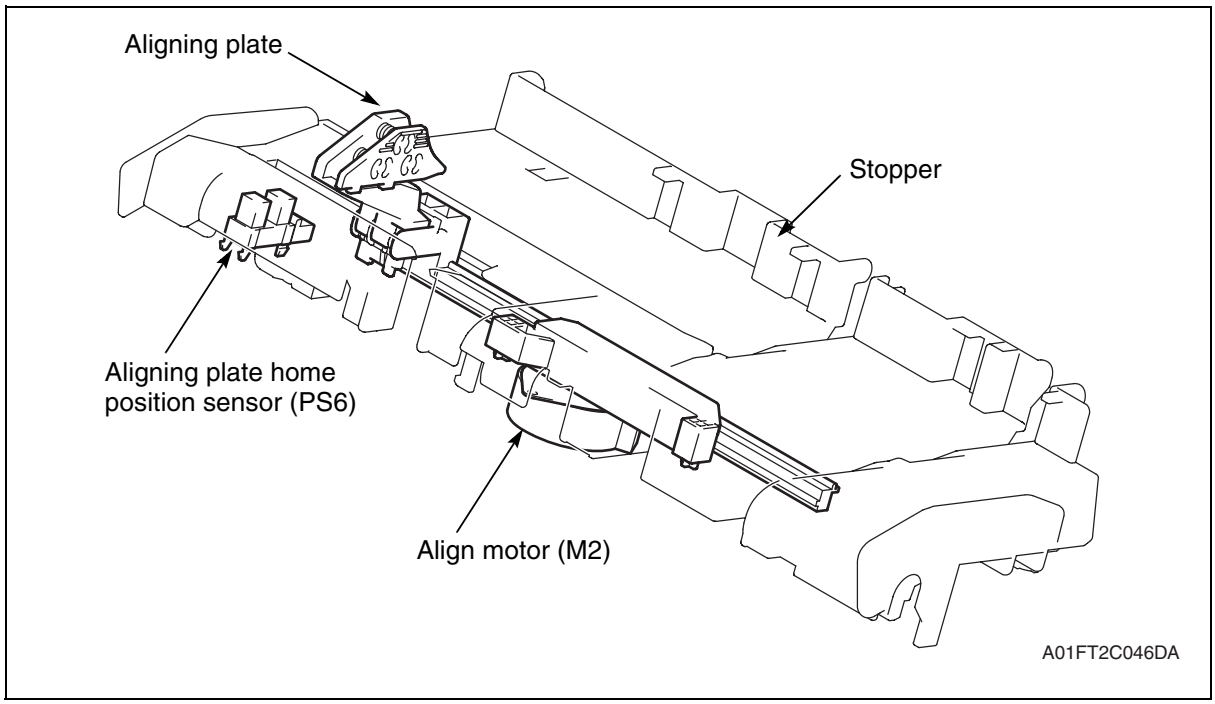


5.4.4 Aligning plate mechanism

- The aligning plate is moved to align media in the crosswise direction.
- Media aligning is accomplished by the align motor and the aligning plate.

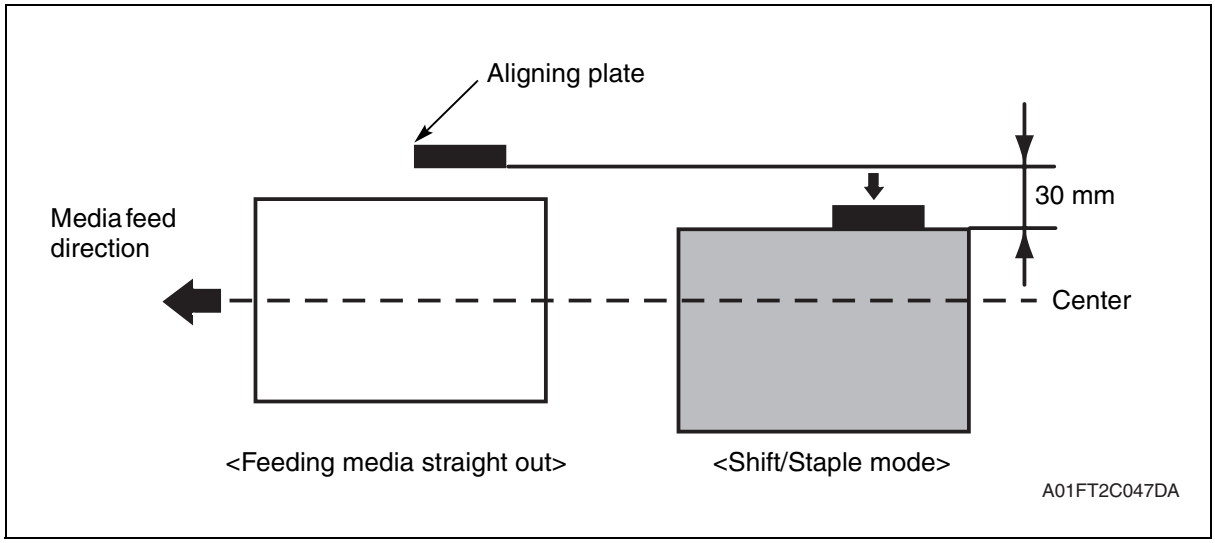
A. Aligning plates

- The aligning plates are moved to the front or rear in accordance with the media size.
- The aligning plate home position sensor controls the position of aligning plate.



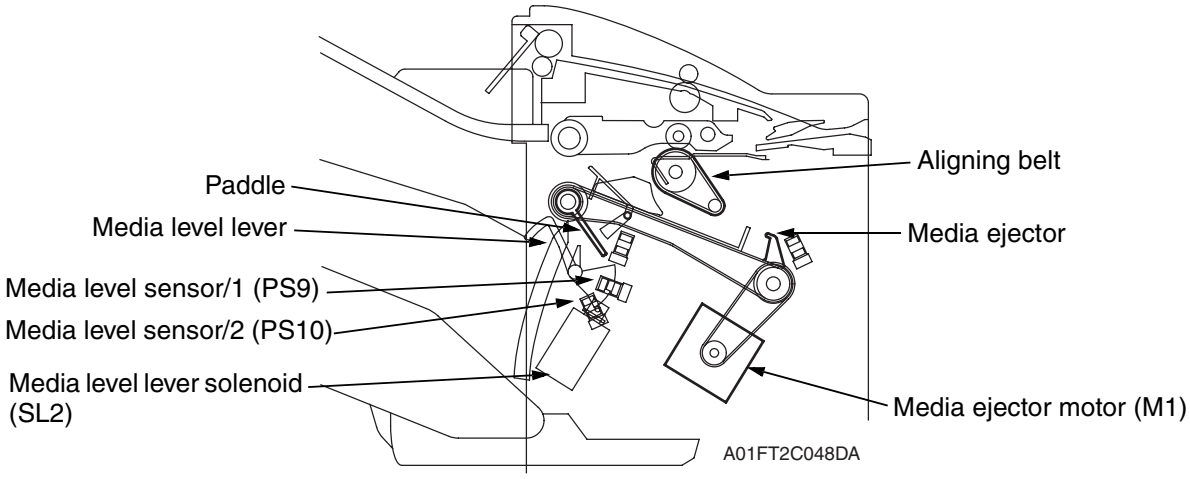
B. Media aligning sequence

- In a mode in which media is fed straight out (without involving shift or stapling operation), the media is fed out centrally.
- In the shift/stapling mode, the aligning plate pushes the media about 30 mm toward the front.



5.4.5 Exit mechanism

- The printed media stack/set aligned in the storage section is fed out into the main tray.
- The aligning belt is moved up or down by the aligning belt up/down solenoid.
- The media ejector belt is driven by the media ejector motor.
- The media level lever is driven by the media level lever solenoid.
- The paddle is driven by the paddle solenoid and exit motor.



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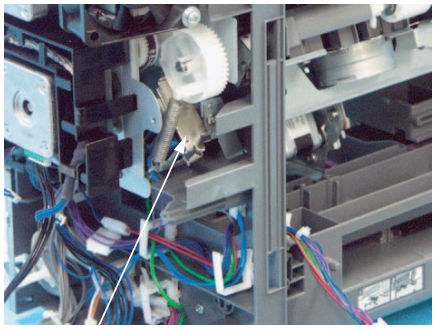

Paddle solenoid (SL4)

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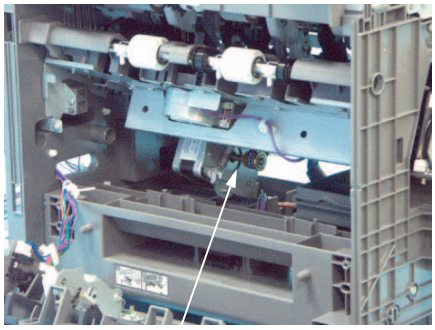

Media ejector motor (M1)

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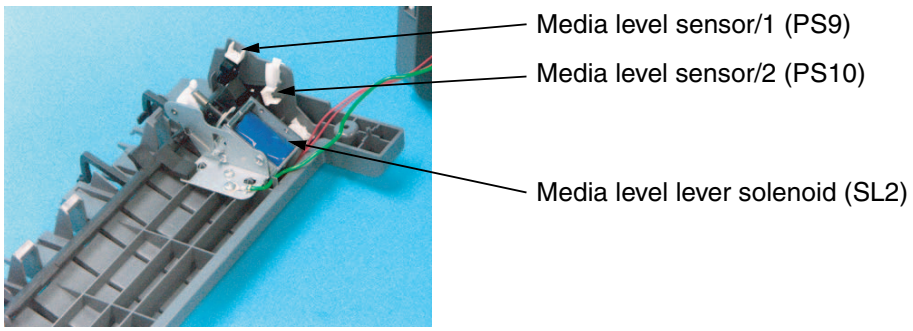

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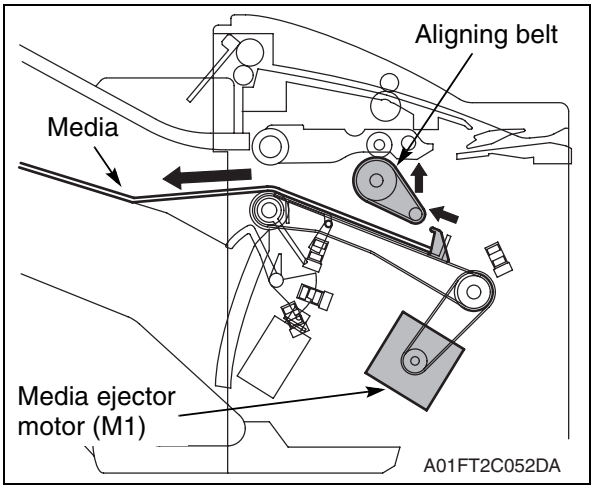
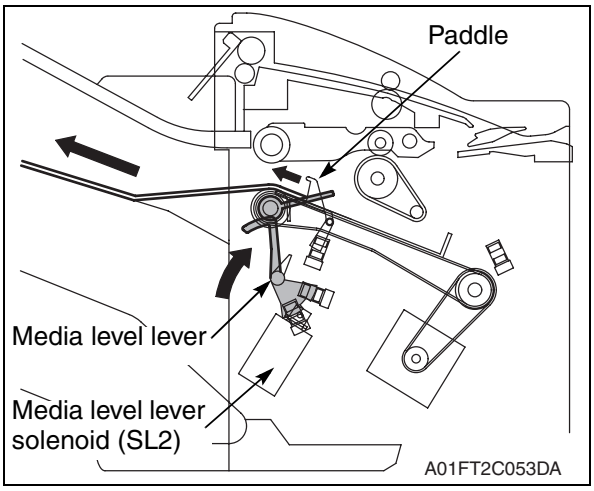
A. Operation

NOTE

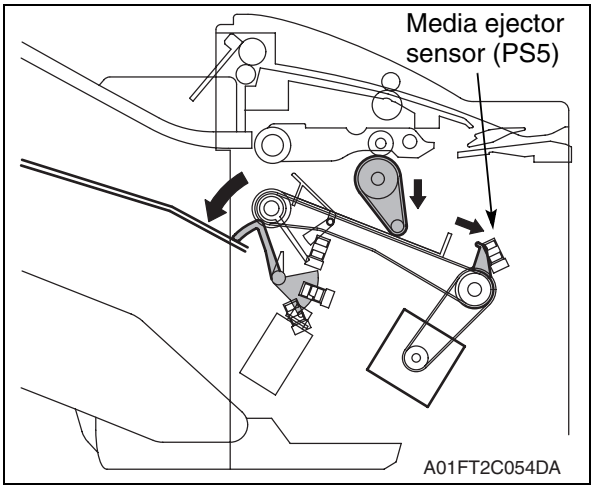
- **The following describe the operation in the shift mode. The operation in the stapling mode basically follows the same steps with some performed in different orders.**



1. When the media aligning sequence is completed, the aligning belt up/down solenoid is energized so that the aligning belt is raised.
2. The media ejector motor starts rotating so that the media ejector transports the media up to the exit roller.



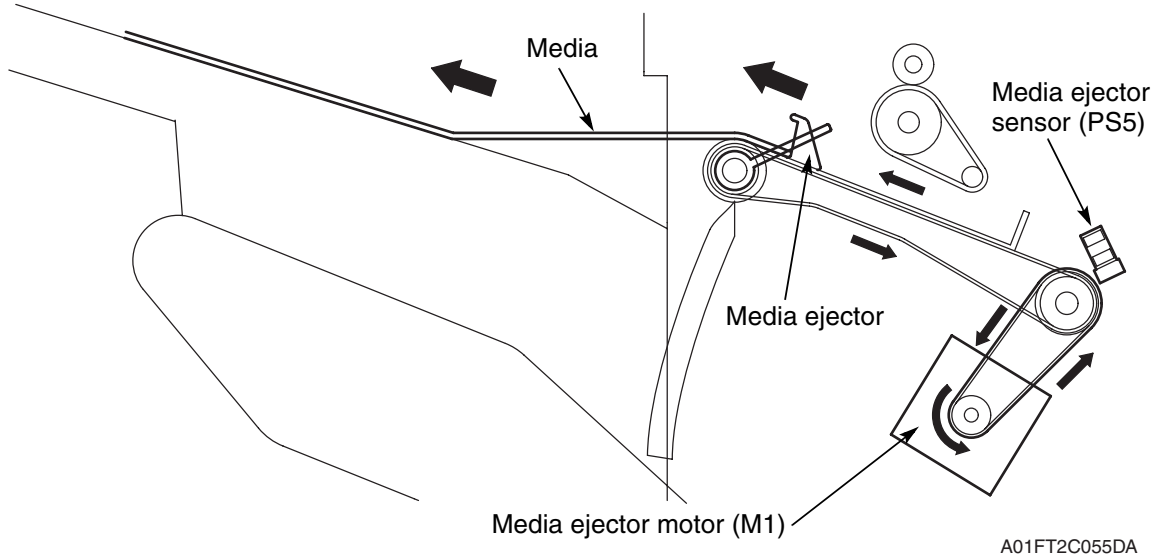
3. The media level lever solenoid is energized to retract the media level lever.
4. The paddle solenoid is energized to rotate the paddle. The paddle feeds the media out into the main tray.
5. The media ejector motor is rotated backward to move the media ejector toward its home position.



6. The media level lever solenoid is energized to advance the media level lever to a position above the media.
7. When the media ejector blocks the media ejector sensor, the media ejector motor is deenergized.
8. The aligning belt up/down solenoid is energized to lower the aligning belt.

5.4.6 Media ejector mechanism

- The printed media stack/set stored in the finishing tray is fed out into the main tray.
- The media ejector is advanced or retracted by the drive from the media ejector motor.
- Rotation of the media ejector motor in the forward direction causes the media ejector belt to rotate in the forward direction. This causes the media ejector to advance (or move in the direction of feeding the media stack/set out).
- Rotation of the media ejector motor in the backward direction causes the media ejector belt to rotate in the backward direction. This causes the media ejector to retract (or move toward the home position).
- The media ejector sensor detects the media ejector at its home position.



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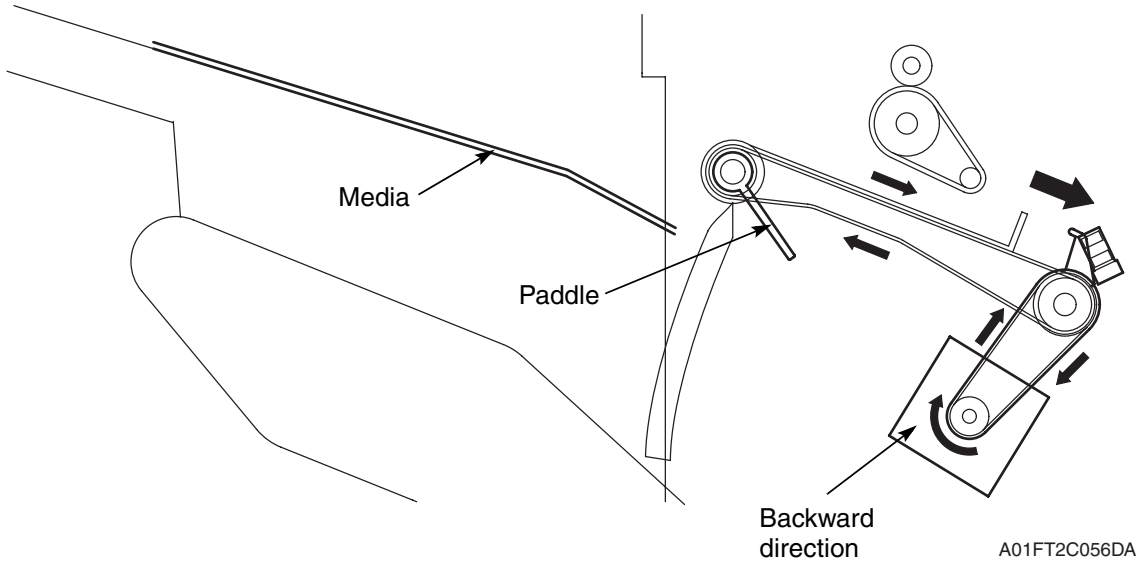

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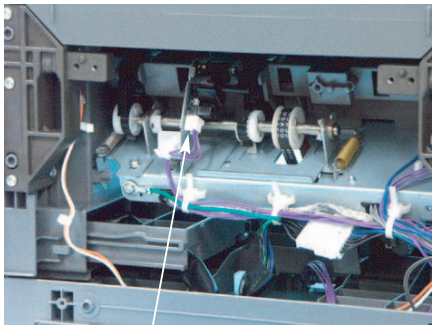

Media ejector sensor (PS5)

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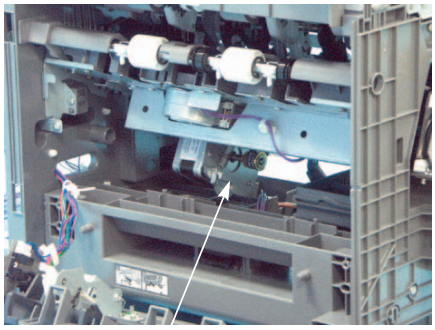

Media ejector motor (M1)

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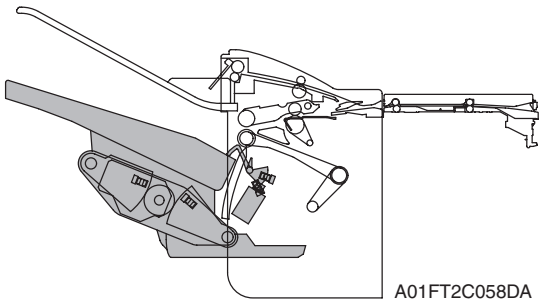
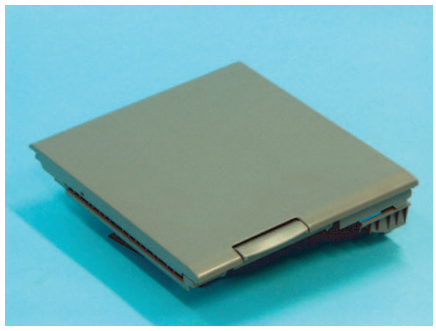
5.5 Main tray section

- The main tray section controls the media level and detection of a media full condition in order to accommodate properly media fed out of the staple finisher.





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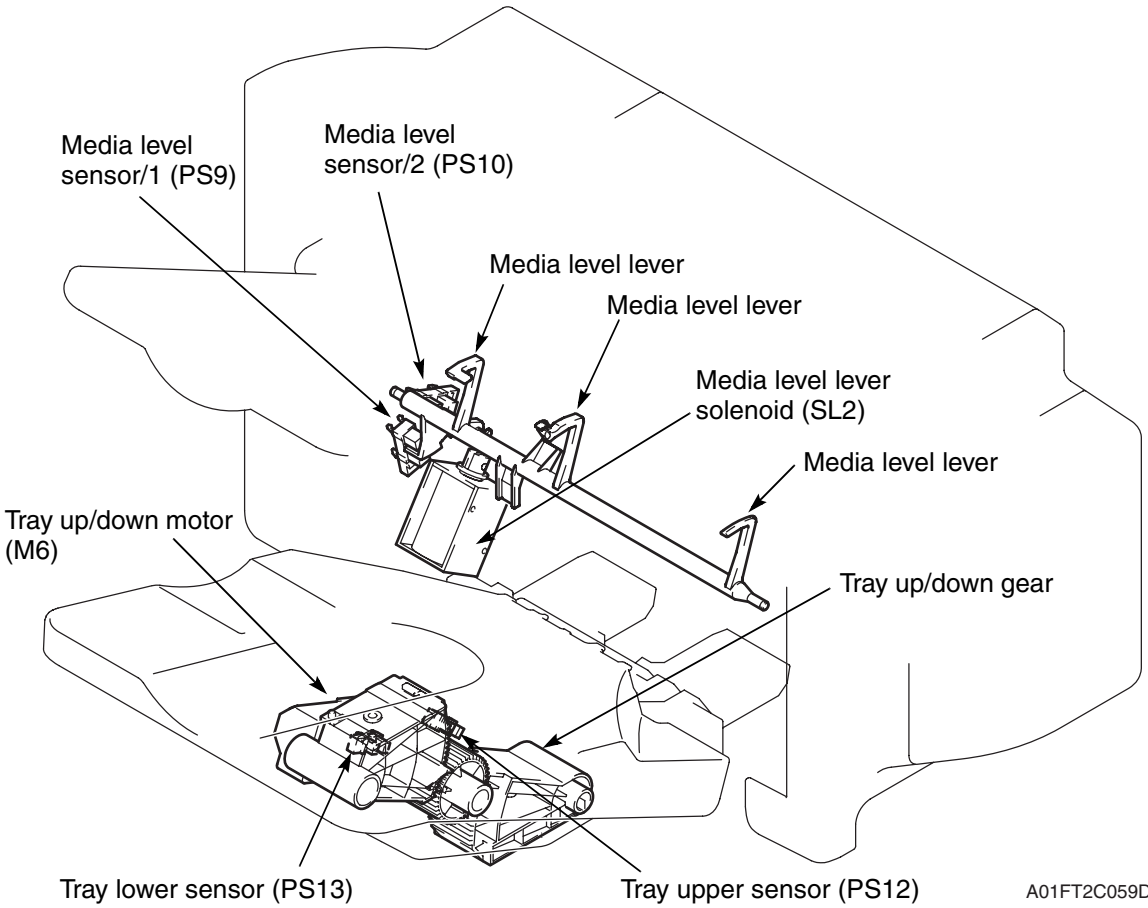
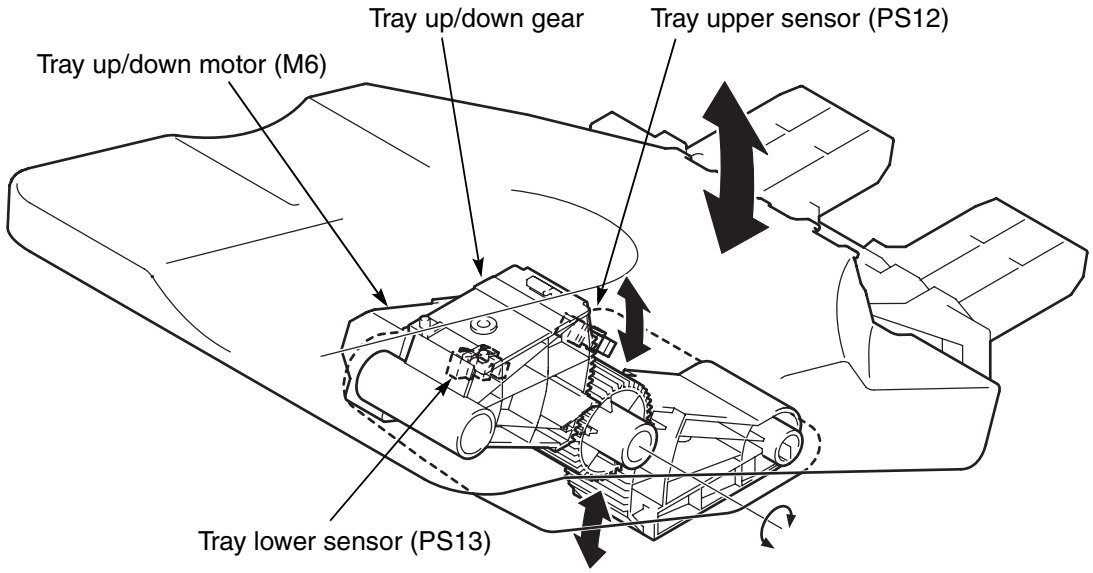


5.5.1 Main tray ascent/descent

- Rotation of the tray up/down motor in either the forward or backward direction drives the tray up/down gear to move the main tray up or down.
- The tray upper sensor detects the main tray at its upper limit position.
- The tray lower sensor detects the main tray at its lower limit position.



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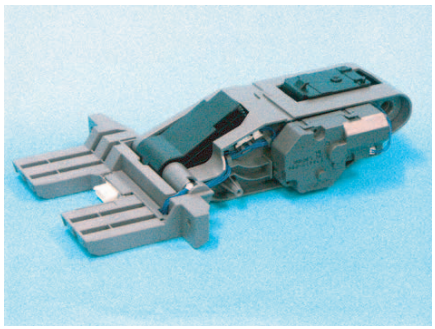

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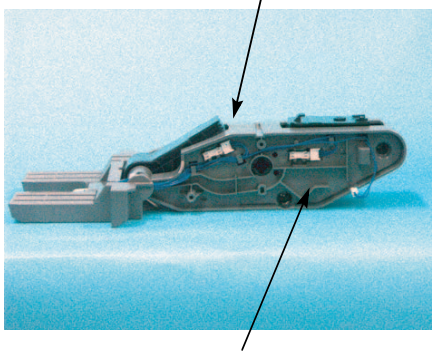

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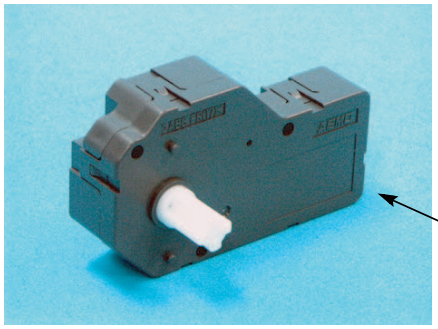

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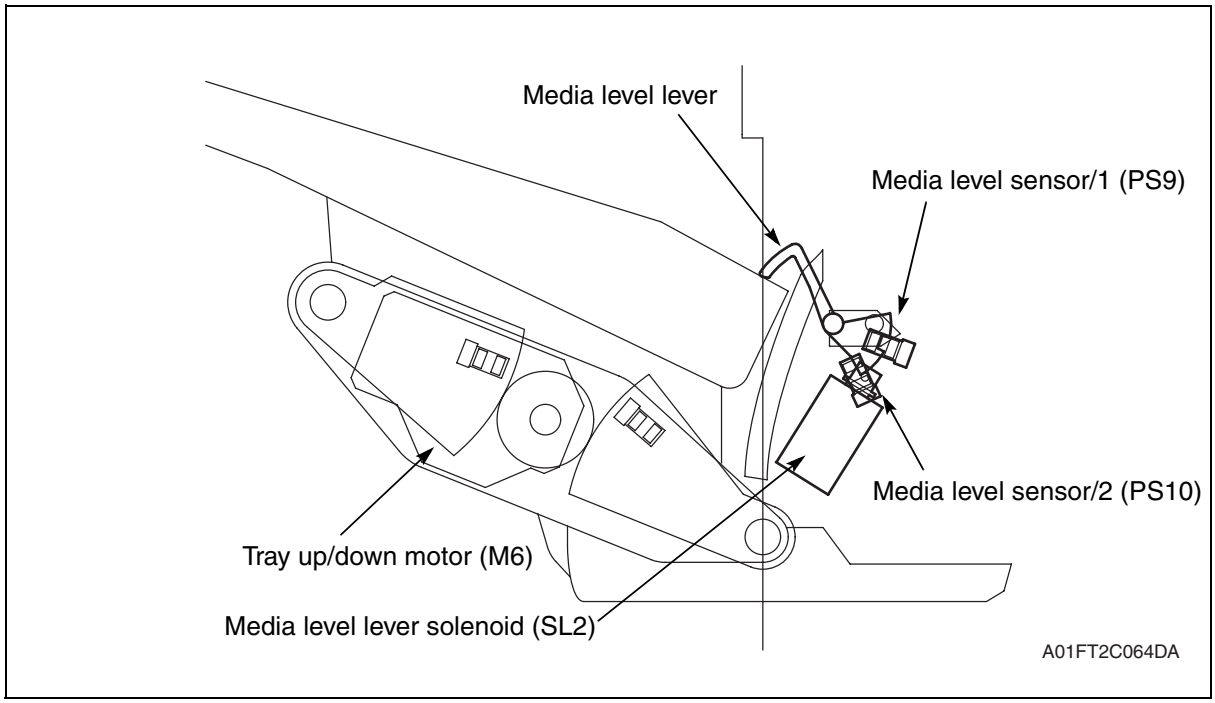
5.5.2 Media level detection mechanism

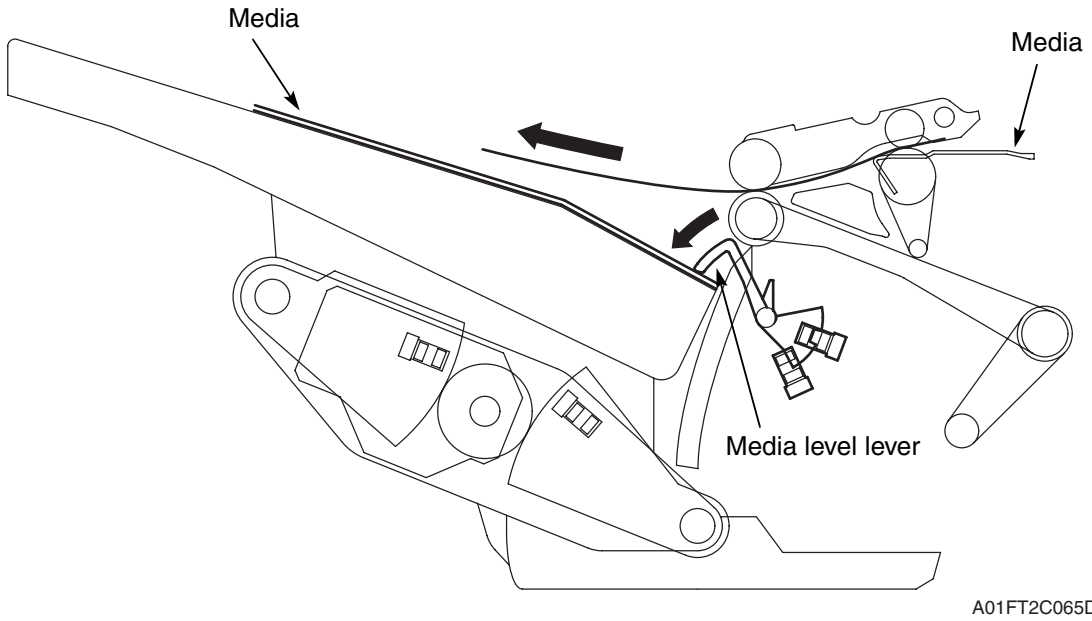
- The main tray moves up or down according to the amount of media fed onto it.
- media level sensor/1 and media level sensor/2 control the media level each time a sheet of media is fed out, so that the level of the media fed onto the tray remains constant at all times.
- When the media level lever solenoid is energized, the media level lever advances to a position above the main tray.
  When the media level lever solenoid is deenergized, the media level lever is retracted.
- The angle of the media level lever is changed according to the height of the main tray. When the media level lever is located at a specific position, media level sensor/1 or media level sensor/2 is blocked/unblocked.
- According to the combination of the different states detected of media level sensor/1 and media level sensor/2, the height of the main tray is determined.
- If it is determined that the media level is higher than a predetermined range, the tray up/down motor is energized until to lower the tray until the predetermined tray height is reached.
- If it is determined that the media level is lower than the predetermined range, the tray up/down motor is energized until to raise the tray until the predetermined tray height is reached.

Media level sensor/1	Media level sensor/2	Evaluation	Tray up/down motor
Unblocked	Blocked	Falling within the specified range	Deenergized
Unblocked	Unblocked	Higher than the specified range	Energized for lowering
Blocked	Blocked	Lower than the specified range	Energized for raising



5.5.3 Media holding mechanism

- The media level lever serves also for holding media down on the main tray while printed media stacks/sets are fed out (except for the stapling mode), thereby preventing the media stacks/sets which have previously been fed onto the main tray from being pushed out and dropped by a new media stack/set being fed out.
- The subsequent stack/set of printed media is fed out with the preceding stack/set of printed media held down by the media level lever.



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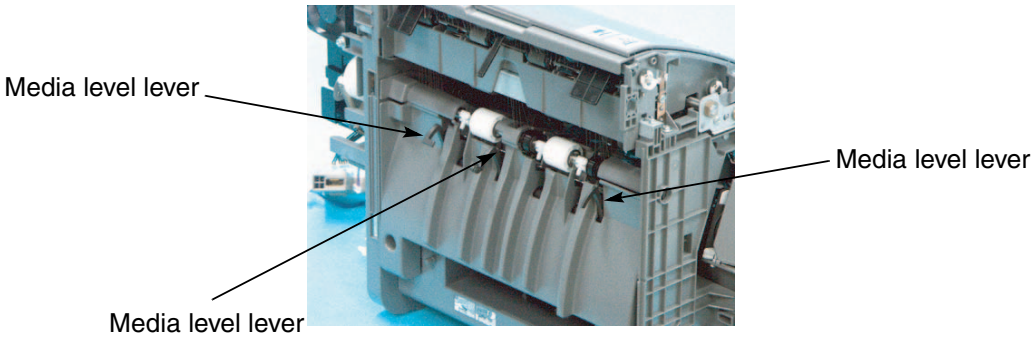

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5.5.4 Media full detection

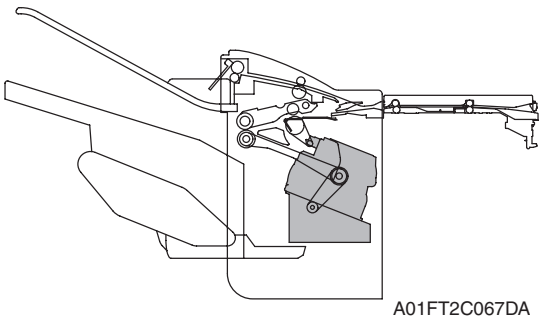
- The amount of media fed out into the main tray is detected by the media level sensor/1, media level sensor/2, and the tray lower sensor.
- When the corresponding sensor detects either condition 1 or 2 described below, the staple finisher determines that the maximum capacity of the printed media on the main tray has been reached, giving the following message on the control panel.
  – “OUTPUT FULL REMOVE PAPER (MAIN TRAY)”

Conditions	Media level sensor/1	Media level sensor/2	Tray lower sensor	Evaluation
1	Unblocked	Blocked	Blocked	Media full
2	Unblocked	Unblocked	Blocked	

- If the sensor detects that the exit tray is full, printing is stopped.
- The message “OUTPUT FULL REMOVE PAPER (MAIN TRAY)” is reset when the media is removed from the main tray.

5.6 Staple section

- The staple section controls the stapling unit for stapling the printed media stack/set aligned neatly and staple empty detection.



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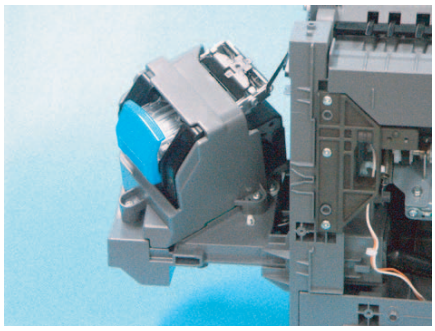

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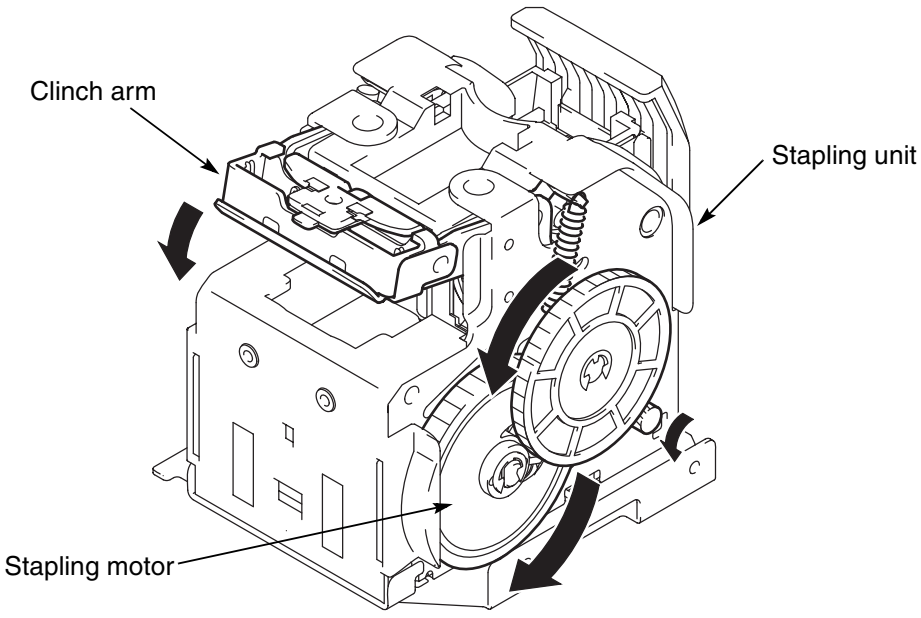
5.6.1 Stapling mechanism

- Stapling is performed by the stapling unit.
- When the stapling motor is rotated, the clinch arm lowers. The stapler thereafter goes up to drive a staple in the media.
- Stapling is performed at one point at the rear corner of the media stack/set.



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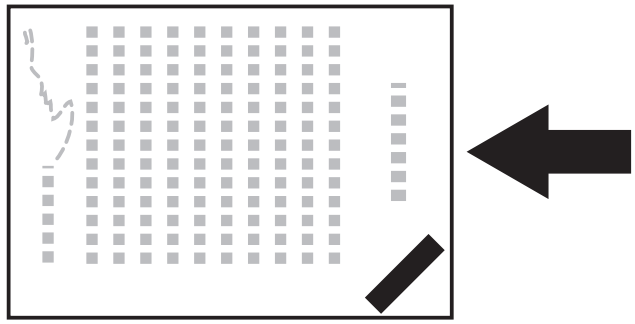
5.6.2 Stapling position

- When the staple finisher is mounted on the main body, the printed media is fed out face down with its trailing edge first.
- The staple is driven into the media stack/set at an angle of 49 degrees relative to the printed surface at the rear corner.

<Typical stapling positions>



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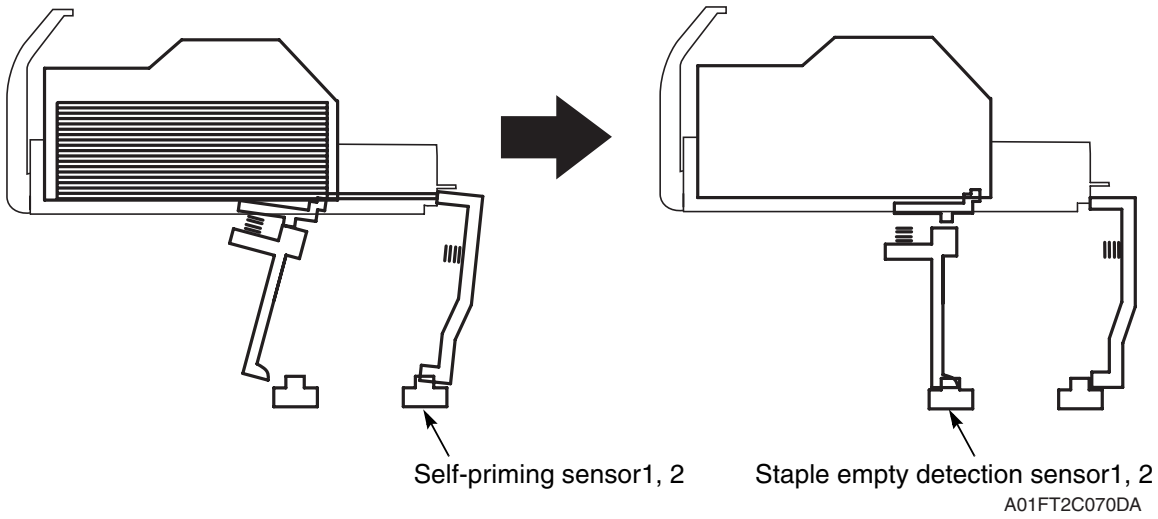
5.6.3 Staple sheet empty detection

- Staple empty detection sensor 1, 2 detect whether or not there is a staple sheet still left.
- When the number of staples left in the staple cartridge becomes about 20, a staple sheet empty condition results, causing a corresponding empty message to appear on the control panel.
- When the empty condition is detected, the corresponding empty indication is given on the control panel. At the same time, the Stapling Unit moves to the front.
- When a new staple cartridge is loaded, the stapling motor is energized until the self priming sensor detects a staple, which results in the staple to be fed up to the stapling position.



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