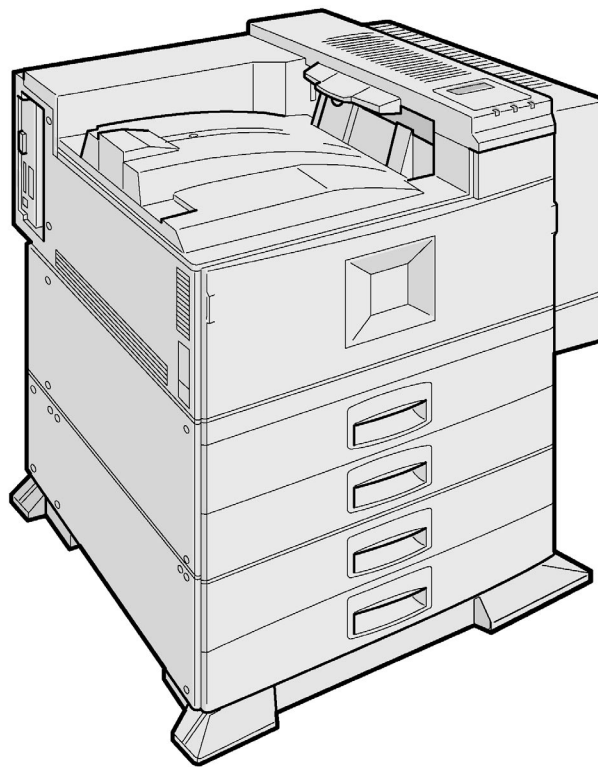


Gestetner® **LANIER** **RICOH**® **SAVIN**®



G065 **SERVICE MANUAL**

001269MIU



G065
SERVICE MANUAL

RICOH GROUP COMPANIES

Gestetner[®] **LANIER**  **RICOH**[®] **SAVIN**[®]

G065

SERVICE MANUAL

001269MIU

It is the reader's responsibility when discussing the information contained within this document to maintain a level of confidentiality that is in the best interest of Ricoh Corporation and its member companies.

***NO PART OF THIS DOCUMENT MAY BE REPRODUCED IN ANY
FASHION AND DISTRIBUTED WITHOUT THE PRIOR
PERMISSION OF RICOH CORPORATION.***

All product names, domain names or product illustrations, including desktop images, used in this document are trademarks, registered trademarks or the property of their respective companies.

They are used throughout this book in an informational or editorial fashion only and for the benefit of such companies. No such use, or the use of any trade name, or web site is intended to convey endorsement or other affiliation with Ricoh products.

WARNING

The Service Manual contains information regarding service techniques, procedures, processes and spare parts of office equipment distributed by Ricoh Corporation. Users of this manual should be either service trained or certified by successfully completing a Ricoh Technical Training Program.

Untrained and uncertified users utilizing information contained in this service manual to repair or modify Ricoh equipment risk personal injury, damage to property or loss of warranty protection.

Ricoh Corporation

LEGEND

PRODUCT CODE	COMPANY			
	GESTETNER	LANIER	RICOH	SAVIN
G065	P7145	2145	Aficio AP4510	MLP45

DOCUMENTATION HISTORY

REV. NO.	DATE	COMMENTS
*	12/2001	Original Printing

G065

TABLE OF CONTENTS

INSTALLATION

1. INSTALLATION.....	1-1
1.1 INSTALLATION REQUIREMENTS	1-1
1.1.1 ENVIRONMENT	1-1
1.1.2 MACHINE LEVEL	1-1
1.1.3 MACHINE SPACE REQUIREMENTS	1-2
1.1.4 POWER REQUIREMENTS.....	1-3
1.2 MACHINE INSTALLATION.....	1-3
1.3 OPTIONAL UNIT INSTALLATION.....	1-3
1.4 SYMBOLS USED IN TEXT.....	1-3
1.5 LCT INSTALLATION (A683).....	1-4
1.5.1 ACCESSORY CHECK.....	1-4
1.5.2 INSTALLATION PROCEDURE.....	1-5
1.6 BRIDGE UNIT INSTALLATION (B397).....	1-7
1.6.1 ACCESSORY CHECK.....	1-7
1.6.2 INSTALLATION PROCEDURE.....	1-8
1.7 1000-SHEET FINISHER INSTALLATION (A681).....	1-10
1.7.1 ACCESSORY CHECK.....	1-10
1.7.2 INSTALLATION PROCEDURE.....	1-11
1.8 3000-SHEET FINISHER INSTALLATION (A697).....	1-14
1.8.1 ACCESSORY CHECK.....	1-14
1.8.2 INSTALLATION PROCEDURE.....	1-15
1.9 PUNCH UNIT INSTALLATION (A812).....	1-19
1.9.1 ACCESSORY CHECK.....	1-19
1.9.2 INSTALLATION PROCEDURE.....	1-20
1.10 MAILBOX INSTALLATION (G909)	1-23
1.10.1 ACCESSORY CHECK.....	1-23
1.10.2 REQUIREMENT OPTIONS FOR MAIN MACHINE	1-23
1.10.3 INSTALLATION PROCEDURE.....	1-24
1.11 BRIDGE UNIT FOR MAILBOX INSTALLATION (G912).....	1-27
1.11.1 ACCESSORY CHECK.....	1-27
1.11.2 INSTALLATION PROCEDURE.....	1-28

PREVENTIVE MAINTENANCE

2. PREVENTIVE MAINTENANCE SCHEDULE.....	2-1
2.1 PM TABLES.....	2-1
2.1.1 PM TABLES FOR THE PRINTER	2-1
2.1.2 PM TABLES FOR OPTIONS	2-3

REPLACEMENT AND ADJUSTMENT

3. REPLACEMENT AND ADJUSTMENT.....	3-1
3.1 GENERAL CAUTIONS	3-1
3.1.1 LASER UNIT	3-1
3.1.2 USED TONER	3-1
3.2 SPECIAL TOOLS AND LUBRICANTS	3-2
3.2.1 SPECIAL TOOLS.....	3-2
3.2.2 LUBRICANTS	3-2
3.2.3 SYMBOLS USED IN TEXT	3-2
3.3 FRONT DOOR.....	3-3
3.4 DUPLEX UNIT	3-3
3.5 UPPER RIGHT COVER.....	3-4
3.6 BY-PASS TRAY UNIT	3-5
3.7 REAR COVERS.....	3-6
3.7.1 REAR UPPER COVER.....	3-6
3.7.2 REAR LOWER COVER	3-6
3.8 LEFT COVERS.....	3-7
3.8.1 LEFT UPPER COVER	3-7
3.8.2 OPERATION PANEL	3-8
3.8.3 PAPER OUTPUT TRAY	3-9
No Bridge Unit Installed	3-9
Bridge Unit Installed	3-9
3.9 LASER UNIT.....	3-10
3.9.1 CAUTION DECAL LOCATIONS	3-10
3.9.2 LASER UNIT	3-11
3.9.3 POLYGON MIRROR MOTOR	3-12
3.9.4 LASER SYNCHRONIZATION DETECTOR.....	3-13
3.9.5 LD UNIT	3-13
Laser Beam Pitch Adjustment	3-14
3.10 PCDU.....	3-15
3.10.1 PHOTOCONDUCTOR CLEANING/DEVELOPMENT UNIT	3-15
3.10.2 DRUM	3-16
3.10.3 PICK-OFF PAWLS.....	3-17
3.10.4 CHARGE ROLLER AND CLEANING ROLLER	3-18
3.10.5 DRUM CLEANING BLADE	3-19
3.10.6 ID SENSOR	3-20
3.11 DEVELOPMENT.....	3-21
3.11.1 DEVELOPMENT UNIT	3-21
3.11.2 DEVELOPMENT FILTER.....	3-22
3.11.3 DEVELOPMENT ROLLER.....	3-23
3.11.4 DEVELOPER.....	3-24
3.11.5 TD SENSOR.....	3-26
3.12 TRANSFER UNIT	3-27
3.12.1 TRANSFER BELT UNIT	3-27
3.12.2 TRANSFER BELT	3-28
3.12.3 CLEANING BLADE/TONER OVERFLOW SENSOR.....	3-29

Transfer Belt Cleaning Blade	3-29
Toner Overflow Sensor	3-29
3.13 PAPER FEED	3-30
3.13.1 PICK-UP, SEPARATION, AND FEED ROLLERS.....	3-30
3.13.2 LOWER RIGHT COVER.....	3-31
3.13.3 RELAY/UPPER PAPER FEED AND LOWER PAPER FEED CLUTCHES	3-32
3.13.4 UPPER PAPER FEED UNIT FOR TRAY 1.....	3-33
3.13.5 LOWER PAPER FEED UNIT FOR TRAY 2.....	3-34
3.13.6 PAPER END/PAPER LIFT/RELAY SENSORS.....	3-35
3.13.7 REGISTRATION SENSOR.....	3-36
3.13.8 TRAY LIFT MOTOR.....	3-38
3.13.9 FEED/DEVELOPMENT MOTOR.....	3-39
3.14 FUSING	3-40
3.14.1 FUSING UNIT	3-40
3.14.2 FUSING UNIT EXIT GUIDE.....	3-41
3.14.3 HOT ROLLER STRIPPERS.....	3-41
3.14.4 FUSING LAMPS	3-42
Left Side.....	3-42
Right Side	3-43
3.14.5 THERMISTORS AND THERMOSTATS	3-44
3.14.6 HOT ROLLER/PRESSURE ROLLER	3-45
3.15 BY-PASS TRAY.....	3-47
3.15.1 COVER REPLACEMENT	3-47
3.15.2 BY-PASS FEED/PICK-UP ROLLER.....	3-48
3.15.3 BY-PASS SEPARATION ROLLER REPLACEMENT	3-49
3.15.4 PAPER END SENSOR/PICK-UP SOLENOID	3-50
3.15.5 PAPER SIZE SENSOR BOARD REPLACEMENT	3-51
3.15.6 BY-PASS TABLE REMOVAL.....	3-52
3.15.7 PAPER FEED CLUTCH REPLACEMENT	3-53
3.16 DUPLEX UNIT	3-54
3.16.1 DUPLEX COVER REMOVAL	3-54
3.16.2 DUPLEX ENTRANCE SENSOR REPLACEMENT	3-55
3.16.3 DUPLEX EXIT SENSOR REPLACEMENT.....	3-56
3.17 DRIVE AREA	3-57
3.17.1 REGISTRATION/TRANSFER BELT CONTACT CLUTCHES	3-57
3.17.2 MAIN MOTOR.....	3-58
3.17.3 FUSING/EXIT MOTOR.....	3-59
3.17.4 FUSING/EXIT CLUTCH.....	3-60
3.17.5 TONER SUPPLY MOTOR.....	3-61
3.18 PRINTED CIRCUIT BOARDS	3-62
3.18.1 HIGH VOLTAGE POWER SUPPLY	3-62
3.18.2 I/O BOARD	3-63
3.18.3 BICU BOARD.....	3-64
3.18.4 PSU	3-64
3.19 HARD DISK/CONTROLLER BOARD	3-65
To Format the HDD.....	3-65
3.20 PRINTING ADJUSTMENTS	3-66
3.21 PARALLELOGRAM IMAGE ADJUSTMENT.....	3-67

TOUBLESHOOTING

4. TROUBLESHOOTING.....	4-1
4.1 SERVICE CALL CONDITIONS.....	4-1
4.1.1 SUMMARY.....	4-1
4.1.2 SC CODE DESCRIPTIONS.....	4-2
4.2 ELECTRICAL COMPONENT DEFECTS.....	4-13
4.2.1 SENSORS	4-13
4.2.2 SWITCHES	4-14
4.3 BLOWN FUSE CONDITIONS.....	4-15
4.4 LEDS	4-15
BICU	4-15
4.5 TEST POINTS	4-15
Controller Board	4-15

SERVICE TABLES

5. SERVICE TABLES.....	5-1
5.1 SERVICE PROGRAM MODE.....	5-1
5.1.1 ENTERING AND LEAVING THE SERVICE PROGRAM MODE	5-1
5.2 PRINTER CONTROLLER SERVICE MODE	5-2
5.2.1 CONTROLLER SERVICE MODE MENUS	5-2
5.2.2 BIT SWITCH PROGRAMMING	5-2
5.2.3 PRINTER CONTROLLER BIT SWITCH SETTINGS	5-3
5.3 PRINTER ENGINE SERVICE MODE	5-4
Leaving the SP Mode.....	5-5
5.3.1 SERVICE PROGRAM MODE TABLES	5-6
1. Feed (SP1000-00)	5-6
2. Drum (SP2000-00).....	5-10
3. Process (SP3000-00).....	5-20
4. HDD (SP4000-00).....	5-21
5. Mode (SP5000-00).....	5-21
6. Peripherals (SP6000-00)	5-25
7. Data Log (SP7000-00).....	5-26
5.3.2 TEST PATTERN PRINTING	5-29
Test Pattern Table: SP2902-03 Printing Test Patterns	5-30
5.3.3 INPUT CHECK.....	5-31
Table 1: By-pass Feed Table Paper Size.....	5-34
5.3.4 OUTPUT CHECK.....	5-35
SP5804 Output Check Table	5-36
5.3.5 MEMORY ALL CLEAR: SP5801	5-37
5.3.6 SMC PRINT OUT LISTS: SP5990	5-38
5.4 SOFTWARE DOWNLOAD	5-39
5.4.1 DOWNLOADING THE SOFTWARE	5-39
5.4.2 POWER FAILURE DURING SOFTWARE DOWNLOAD.....	5-40
5.5 SELF-DIAGNOSTIC MODE.....	5-41
5.5.1 SELF-DIAGNOSTIC MODE AT POWER ON	5-41

Self-Diagnostic Test Flow	5-41
5.5.2 DETAILED SELF-DIAGNOSTIC MODE	5-42
5.6 DIP SWITCHES.....	5-43
Controller: DIP SW2.....	5-43
I/O Board: DIP SW101	5-43

DETAILED DESCRIPTIONS

6. DETAILED SECTION DESCRIPTIONS.....	6-1
6.1 OVERVIEW	6-1
6.1.1 COMPONENT LAYOUT	6-1
Paper Path	6-2
DRIVE LAYOUT	6-3
6.2 BOARD STRUCTURE	6-4
6.2.1 BLOCK DIAGRAM	6-4
6.2.2 CONTROLLER	6-6
6.3 PRINTING PROCESS OVERVIEW	6-8
Drum Charge.....	6-8
Laser Exposure	6-8
Development.....	6-8
Image Transfer.....	6-9
Separation.....	6-9
ID Sensor	6-9
Cleaning.....	6-9
Quenching.....	6-9
6.4 LASER EXPOSURE	6-10
6.4.1 OVERVIEW	6-10
6.4.2 AUTO POWER CONTROL (APC)	6-11
6.4.3 DUAL BEAM WRITING.....	6-12
6.4.4 LASER BEAM PITCH CHANGE MECHANISM	6-13
6.4.5 LD SAFETY SWITCHES	6-14
6.5 PHOTOCONDUCTOR UNIT (PCU).....	6-15
6.5.1 OVERVIEW	6-15
6.5.2 DRIVE MECHANISM.....	6-16
6.5.3 DRUM PAWLS.....	6-16
6.5.4 DRUM TONER SEALS	6-16
6.6 DRUM CHARGE.....	6-17
6.6.1 OVERVIEW	6-17
6.6.2 CHARGE ROLLER VOLTAGE CORRECTION	6-18
Correction for Environmental Conditions.....	6-18
Correction for Paper Width and Thickness (By-pass Tray only).....	6-19
6.6.3 ID SENSOR PATTERN PRODUCTION TIMING	6-20
6.6.4 DRUM CHARGE ROLLER CLEANING	6-21
6.7 DEVELOPMENT.....	6-22
6.7.1 OVERVIEW	6-22
DRIVE MECHANISM	6-23
6.7.3 DEVELOPER MIXING	6-23
6.7.4 DEVELOPMENT BIAS.....	6-24

Mechanism.....	6-24
Correction for Paper Width and Thickness (By-pass Tray only).....	6-24
6.7.5 TONER SUPPLY	6-25
Toner Bottle Replenishment Mechanism	6-25
Toner Supply Mechanism	6-26
Toner Density Control	6-26
Sensor Control Mode	6-27
Image Pixel Count Mode.....	6-27
6.7.6 TONER NEAR END/END DETECTION.....	6-28
Standard Method.....	6-28
Adjustable Near-end Warning Method	6-28
6.7.7 TONER END RECOVERY.....	6-29
6.7.8 TONER SUPPLY WITH ABNORMAL SENSORS.....	6-29
6.8 DRUM CLEANING AND TONER RECYCLING	6-30
6.8.1 DRUM CLEANING.....	6-30
6.8.2 TONER RECYCLING	6-30
6.9 PAPER FEED	6-31
6.9.1 OVERVIEW	6-31
6.9.2 PAPER FEED DRIVE	6-32
6.9.3 PICK-UP/SEPARATION ROLLER RELEASE.....	6-32
6.9.4 PAPER LIFT	6-33
6.9.5 PAPER END DETECTION.....	6-34
6.9.6 PAPER REGISTRATION.....	6-34
6.9.7 PAPER SIZE DETECTION	6-35
6.9.8 PAPER HEIGHT DETECTION.....	6-36
6.10 BY-PASS TRAY.....	6-37
6.10.1 OVERVIEW	6-37
6.10.2 BY-PASS TRAY OPERATION.....	6-38
6.10.3 BY-PASS PAPER SIZE DETECTION.....	6-39
6.11 DUPLEX UNIT	6-40
6.11.1 OVERVIEW	6-40
6.11.2 DUPLEX DRIVE LAYOUT	6-41
6.11.3 DUPLEX BASIC OPERATION.....	6-42
Larger than A4 Lengthwise/LT Lengthwise (SEF).....	6-42
Up to A4 Lengthwise/LT Lengthwise (SEF)	6-42
6.11.4 DUPLEX UNIT FEED IN AND EXIT MECHANISM.....	6-43
Feed-in.....	6-43
Inversion and Exit.....	6-43
6.12 IMAGE TRANSFER AND PAPER SEPARATION	6-44
6.12.1 OVERVIEW	6-44
6.12.2 BELT DRIVE MECHANISM	6-45
6.12.3 TRANSFER BELT UNIT CONTACT MECHANISM	6-45
6.12.4 IMAGE TRANSFER AND PAPER SEPARATION MECHANISM.....	6-46
6.12.5 TRANSFER BELT CHARGE	6-47
Mechanism.....	6-47
Correction for Paper Width and Thickness.....	6-48
Transfer Currents to Leading Edge and Image Areas.....	6-49
6.12.6 TRANSFER BELT CLEANING MECHANISM.....	6-50

6.13 IMAGE FUSING AND PAPER EXIT	6-51
6.13.1 OVERVIEW	6-51
6.13.2 FUSING DRIVE	6-52
6.13.3 FUSING ENTRANCE GUIDE SHIFT MECHANISM	6-52
6.13.4 EXIT GUIDE PLATE AND DE-CURLER ROLLERS	6-53
6.13.5 PRESSURE ROLLER.....	6-53
6.13.6 CLEANING MECHANISM.....	6-53
6.13.7 FUSING TEMPERATURE CONTROL.....	6-54
Temperature Control	6-54
Fusing Idling Temperature	6-55
6.13.8 OVERHEAT PROTECTION.....	6-55
6.14 ENERGY SAVER MODE.....	6-56

BRIDGE UNIT B397

1. OVERALL MACHINE INFORMATION	7-1
1.1 SPECIFICATIONS.....	7-1
1.2 MECHANICAL COMPONENT LAYOUT.....	7-2
1.3 ELECTRICAL COMPONENT LAYOUT	7-3
1.4 ELECTRICAL COMPONENT DESCRIPTION	7-3
1.5 DRIVE LAYOUT	7-4
2. DETAILED DESCRIPTION.....	7-5
2.1 JUNCTION GATE MECHANISM.....	7-5
3. REPLACEMENT AND ADJUSTMENT.....	7-6
3.1 EXIT SENSOR REPLACEMENT.....	7-6

SPECIFICATIONS

8. SPECIFICATIONS.....	8-1
1. GENERAL SPECIFICATIONS.....	8-1
2. SUPPORTED PAPER SIZES	8-2
3. SOFTWARE ACCESSORIES.....	8-3
3.1 PRINTER DRIVERS	8-3
3.2 UTILITY SOFTWARE	8-3
4. MACHINE CONFIGURATION	8-4
4.1 SYSTEM COMPONENTS	8-4
4.2 INSTALLABLE OPTION TABLE	8-5
5. OPTIONS.....	8-6
5.1 BRIDGE UNIT.....	8-6
5.2 1000-SHEET FINISHER	8-6
5.3 3000-SHEET FINISHER	8-7
5.4 LARGE CAPACITY TRAY (LCT)	8-8
5.5 MAILBOX.....	8-8
5.6 PAPER TRAY UNIT	8-8

IMPORTANT SAFETY NOTICES

PREVENTION OF PHYSICAL INJURY

1. Before disassembling or assembling parts of the printer and peripherals, make sure that the printer power cord is unplugged.
2. The wall outlet should be near the printer and easily accessible.
3. Note that some components of the printer and the paper tray unit are supplied with electrical voltage even if the main power switch is turned off.
4. If any adjustment or operation check has to be made with exterior covers off or open while the main switch is turned on, keep hands away from electrified or mechanically driven components.
5. The inside and the metal parts of the fusing unit become extremely hot while the printer is operating. Be careful to avoid touching those components with your bare hands.

HEALTH SAFETY CONDITIONS

Toner and developer are non-toxic, but if you get either of them in your eyes by accident, it may cause temporary eye discomfort. Try to remove with eye drops or flush with water as first aid. If unsuccessful, get medical attention.

OBSERVANCE OF ELECTRICAL SAFETY STANDARDS

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

SAFETY AND ECOLOGICAL NOTES FOR DISPOSAL

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

LASER SAFETY

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

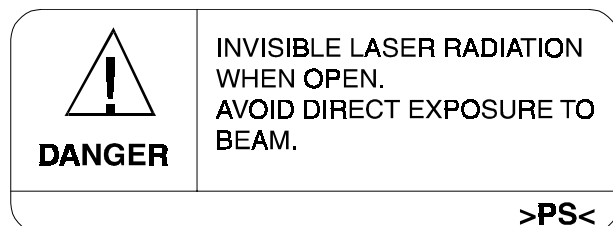
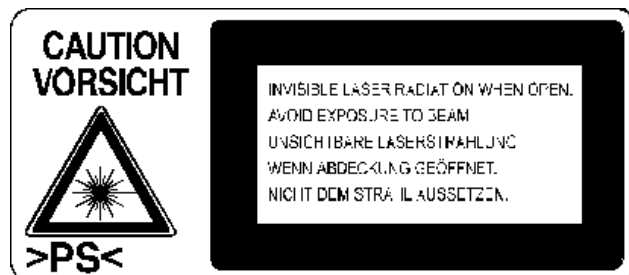
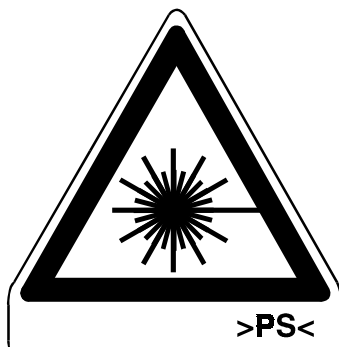
WARNING

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

WARNING

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

Caution Labels



Lithium Batteries (Memory Back-up)

CAUTION







The danger of explosion exists if a battery of this type is incorrectly replaced. Replace only with the same or an equivalent type recommended by the manufacturer. Discard used batteries in accordance with the manufacturer's instructions.

Warning Concerning Copyright

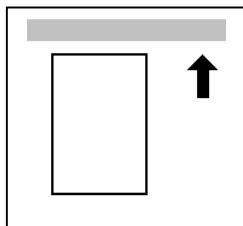
Many documents are copyrighted. Such documents may not be reproduced by copying or in any other form without the express permission of the copyright holder.

Conventions in this Manual

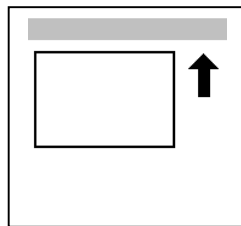
This manual uses several symbols and some simple abbreviations.

Symbol	What it means
	Refer to section number
	See Core Tech Manual for details
	Screw
	Connector
	E-ring
	C-ring
HP	Home Position
T/S	Transfer/Separation

The following notations are used in text to describe the direction of paper feed: lengthwise and sideways. The annotations “SEF” and “LEF” denote “Short Edge Feed” and “Long Edge Feed”. (The arrows indicate the direction of paper feed.)



Lengthwise (SEF)



Sideways (LEF)

INSTALLATION G065	
PREVENTIVE MAINTENANCE G065	
REPLACEMENT AND ADJUSTMENT G065	
TROUBLESHOOTING G065	
SERVICE TABLES G065	
DETAILED DESCRIPTIONS G065	
BRIDGE UNIT B397	
SPECIFICATIONS G065	

TAB POSITION 1
TAB POSITION 2
TAB POSITION 3
TAB POSITION 4
TAB POSITION 5
TAB POSITION 6
TAB POSITION 7
TAB POSITION 8

INSTALLATION

1. INSTALLATION

1.1 INSTALLATION REQUIREMENTS

1.1.1 ENVIRONMENT

1. Temperature Range: 10°C to 32°C (50°F to 89.6°F)
2. Humidity Range: 15 % to 80 % RH
3. Ambient Illumination: Less than 1,500 lux (do not expose to direct sunlight).
4. Ventilation: 3 times/hr/person
5. Avoid areas which are exposed to sudden temperature changes. This includes:
 - 1) Areas directly exposed to cool air from an air conditioner.
 - 2) Areas directly exposed to heat from a heater.
6. Do not place the machine in an area where it will be exposed to corrosive gases.
7. Do not install the machine at any location over 2,500 m (8,125 ft.) above sea level.
8. Place the machine on a strong and level base. (Inclination on any side should be no more than 5 mm.)
9. Do not place the machine where it may be subjected to strong vibrations.

1.1.2 MACHINE LEVEL

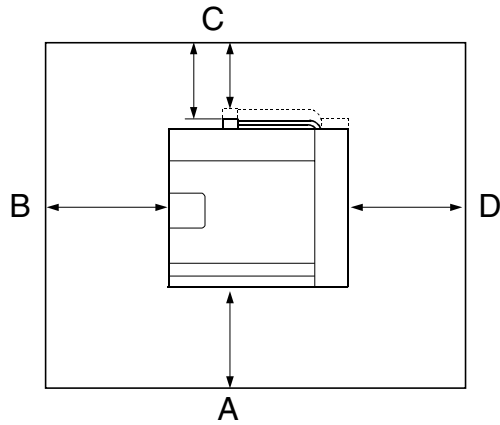
Front to back: Within 5 mm (0.2") of level

Right to left: Within 5 mm (0.2") of level

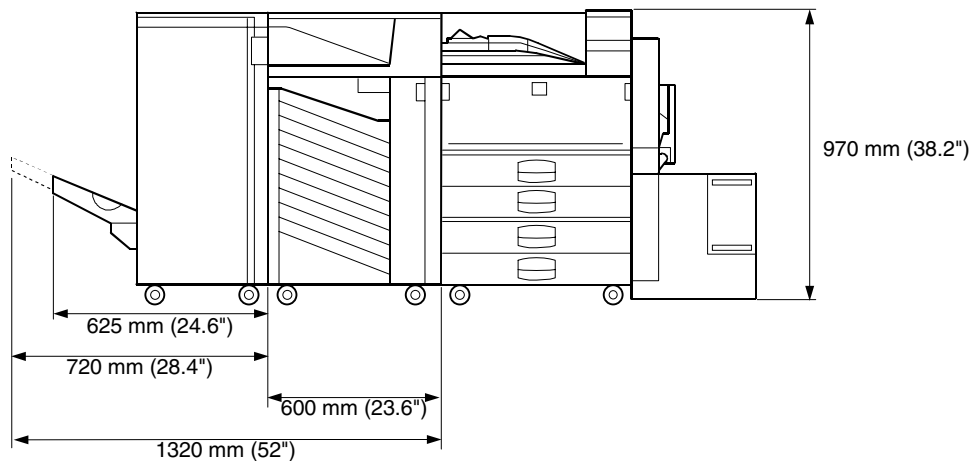
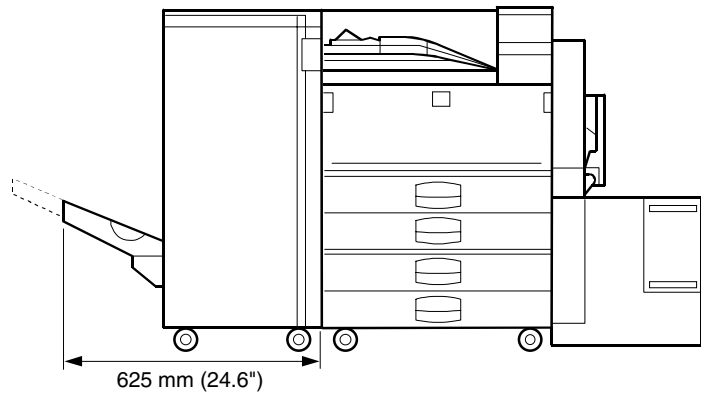
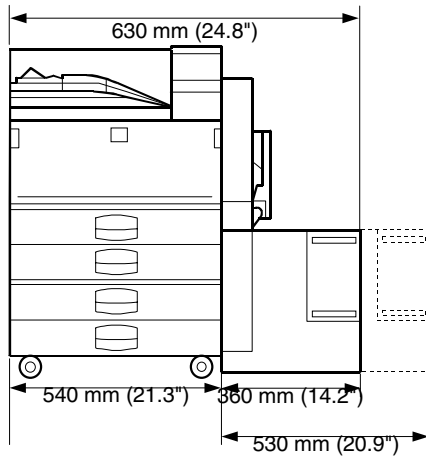
INSTALLATION REQUIREMENTS

1.1.3 MACHINE SPACE REQUIREMENTS

Place the printer near the power source, providing clearance as shown:



- A: In Front: > 75 cm (29.6")
- B: Left: > 10 cm (4")
- C: To Rear: > 10 cm (4")
- D: Right: > 45 cm (17.8")



The 75 centimeters recommended for the space at the front is for pulling out the paper tray only. If an operator stands in front of the printer, more space is required.

1.1.4 POWER REQUIREMENTS

⚠ CAUTION

1. Make sure the plug is firmly inserted in the outlet.
2. Connect the printer to an independent power source. Avoid connecting the printer to a power supply shared with another machine.
3. Always ground the machine.

1. Input voltage level: 120 V, 60 Hz: More than 12 A
220 V ~ 240 V, 50 Hz/60 Hz: More than 8 A
2. Permissible voltage fluctuation: $\pm 10\%$
3. Do not set anything on the power cord.

1.2 MACHINE INSTALLATION

Refer to the Operating Instructions for details.

1.3 OPTIONAL UNIT INSTALLATION

The following options are available for this machine. Refer to the Operating Instructions for how to install these options.

- PTU (Paper Tray Unit)
- 64/128/256 MB DIMMs
- HDD (Hard Disk)
- IEEE 1394

1.4 SYMBOLS USED IN TEXT

Screw:  Connector: 

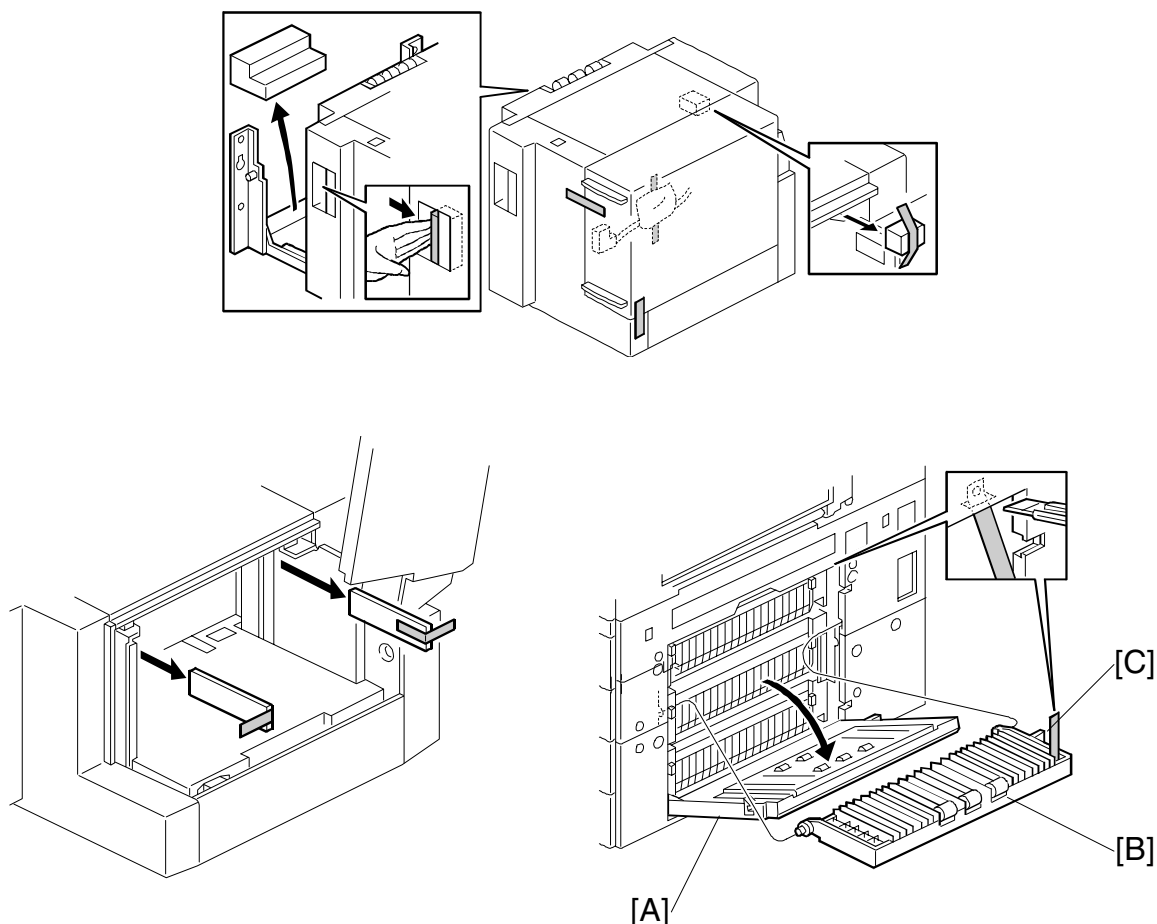
1.5 LCT INSTALLATION (A683)

1.5.1 ACCESSORY CHECK

Check the quantity and condition of the accessories in the box against the following list:

Description	Q'ty
1. Joint Pin.....	2
2. Stepped Screw - M3x18.....	4
3. Magnet Cover	1
4. NECR (-17, -27 machines).....	1
5. Installation Procedure	1

1.1.2 INSTALLATION PROCEDURE



⚠ CAUTION

Switch off the main machine and unplug its power cord before starting the following procedure.

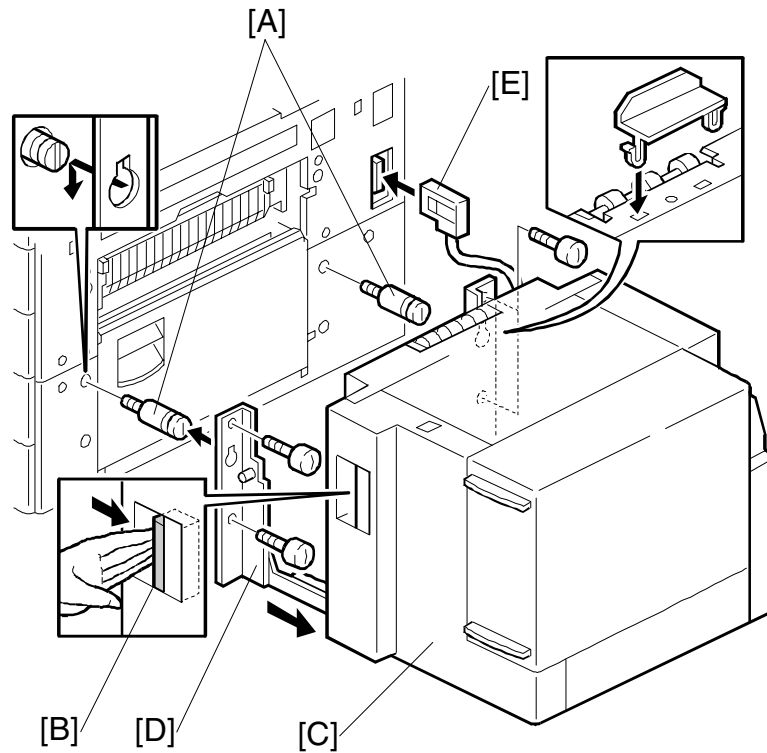
NOTE: The Paper Tray Unit (G520) must be installed before installing the LCT.

1. Unpack the LCT and remove the tapes.
2. Open the right cover [A] of the paper tray unit.
3. Open the lower right cover [B] and cut the holding band [C].

NOTE: When cutting the holding band, the upper part of the band should be cut as shown. Otherwise, paper jams may occur.

4. Remove the right lower cover.

LCT INSTALLATION (A683)



5. Install the joint pins [A].
6. Push the release lever [B] and slide the LCT to the right (front view).
7. Hang the LCT [C] on the joint pins, then secure the brackets [D] (⌀ x 4).
8. Return the LCT to the previous position and connect the LCT cable [E].
9. Open the LCT cover and load the paper.
10. Turn on the ac switch and check the LCT operation.

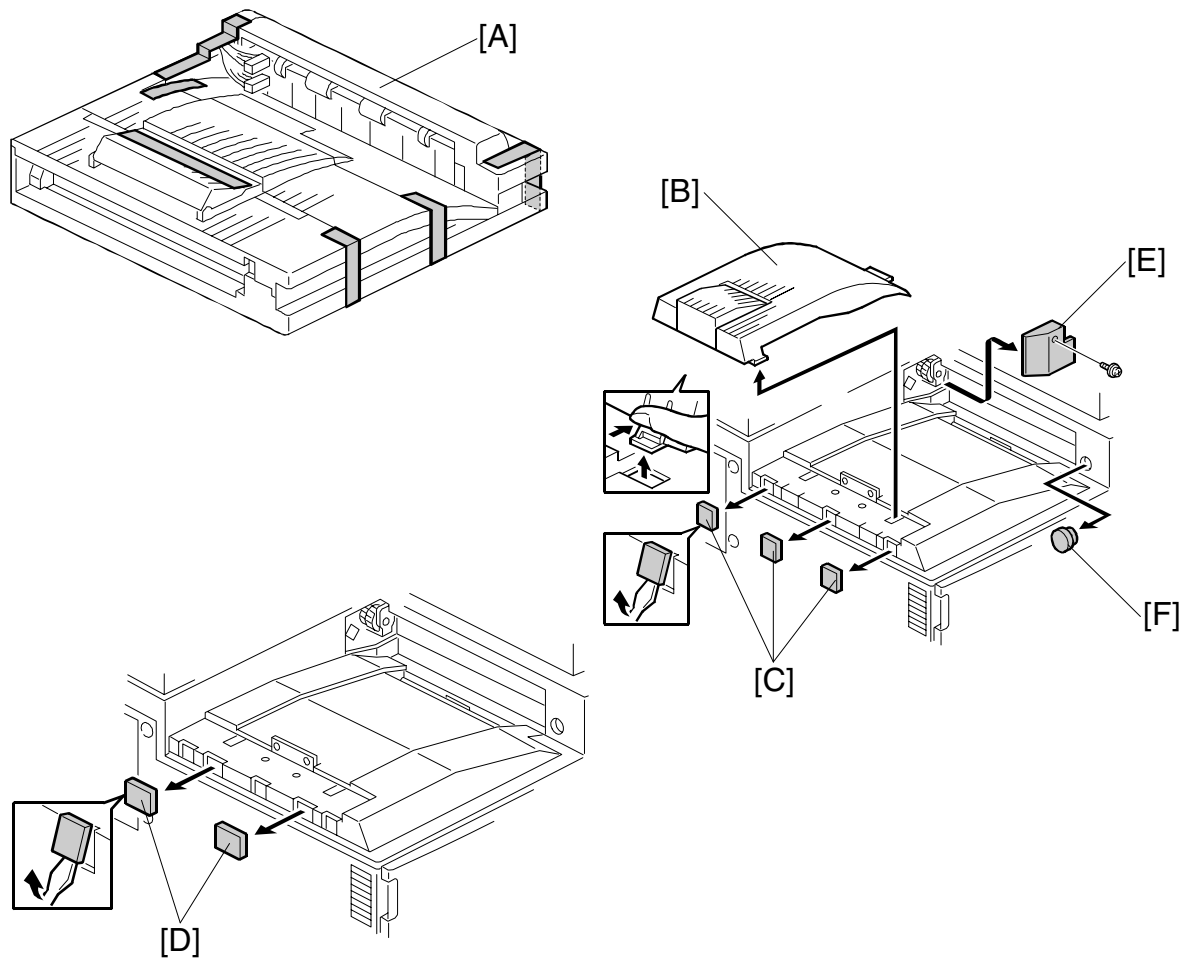
1.6 BRIDGE UNIT INSTALLATION (B397)

1.6.1 ACCESSORY CHECK

Check the quantity and condition of the accessories in the box against the following list:

Description	Q'ty
1. Stepped Screw	2
2. Connector Cover.....	1
3. Exit Mylar	2
4. Installation Procedure	1

1.1.2 INSTALLATION PROCEDURE



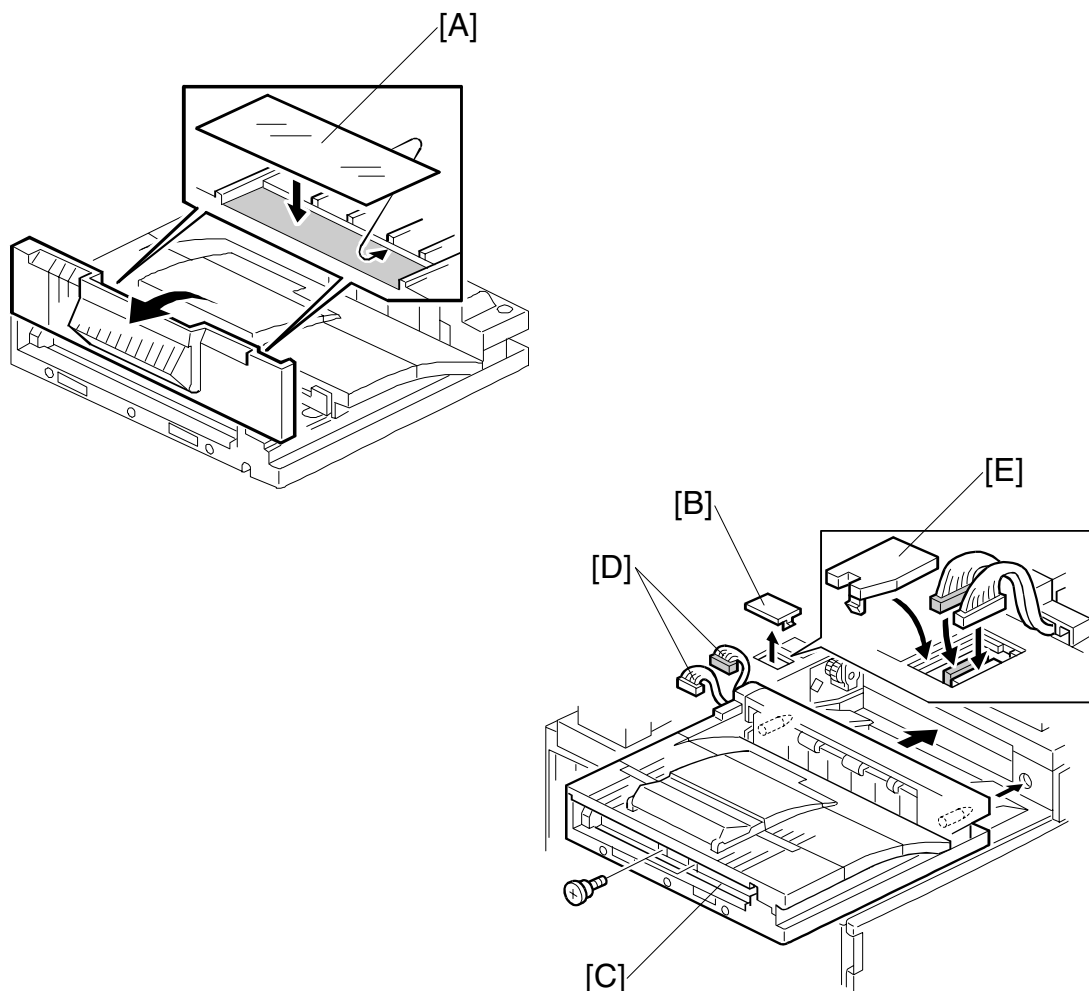
⚠ CAUTION

Switch off the main machine and unplug its power cord before starting the following procedure.

1. Unpack the bridge unit [A] and remove all tapes and shipping retainers.
2. Remove the inner tray [B].
3. On the side of the machine, remove the three small covers [C].

If the optional external output tray (A825) will be installed (instead of a finisher), do Step 4.

4. Remove the two small covers [D].
5. Remove the cover [E] (⚙ x 1)
6. Remove the cap [F].
7. Remove the paper height sensor (⚙ x 2, 📏 x 1)



8. If an optional finisher is to be installed, attach two mylars [A] to the bridge unit.
9. Remove the cover [B].
10. Install the bridge unit [C] (⚙ x 2).
11. Connect the bridge unit I/F harnesses [D] (🔌 x 2).
12. Install the connector cover [E].
13. Turn on the main switch and check the bridge unit operation (make sure that there are no paper jams).

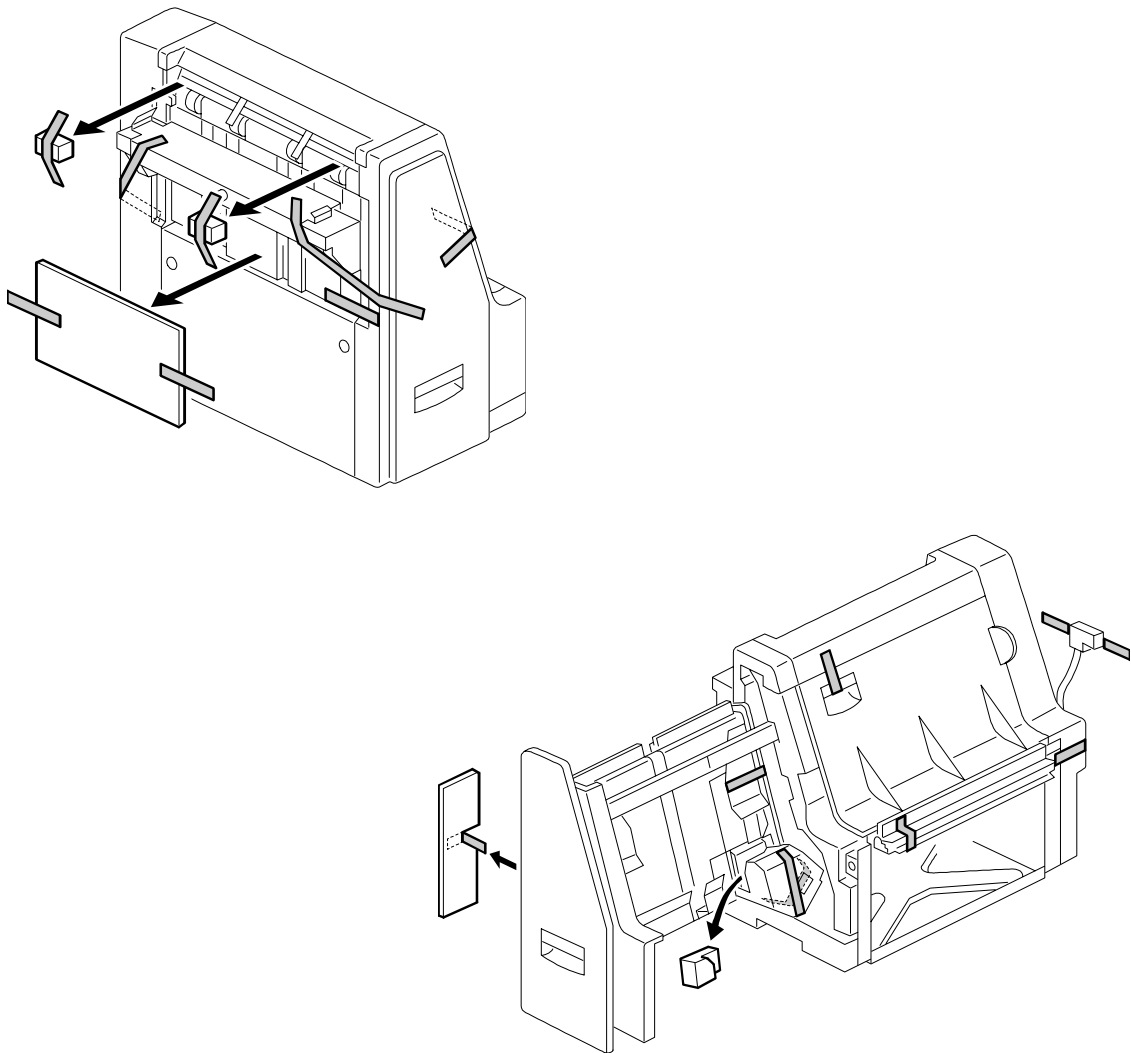
1.7 1000-SHEET FINISHER INSTALLATION (A681)

1.7.1 ACCESSORY CHECK

Check the quantity and condition of the accessories in the box against the following list:

Description	Q'ty
1. Front Stand	1
2. Rear Stand.....	1
3. Knob Screw	1
4. Screw - M4x12	6
5. NECR (-17 machine)	1
6. Installation Procedure	1
7. Screw - M4x10	1
8. Tray	1
9. Snap ring	1

1.1.2 INSTALLATION PROCEDURE



⚠ CAUTION

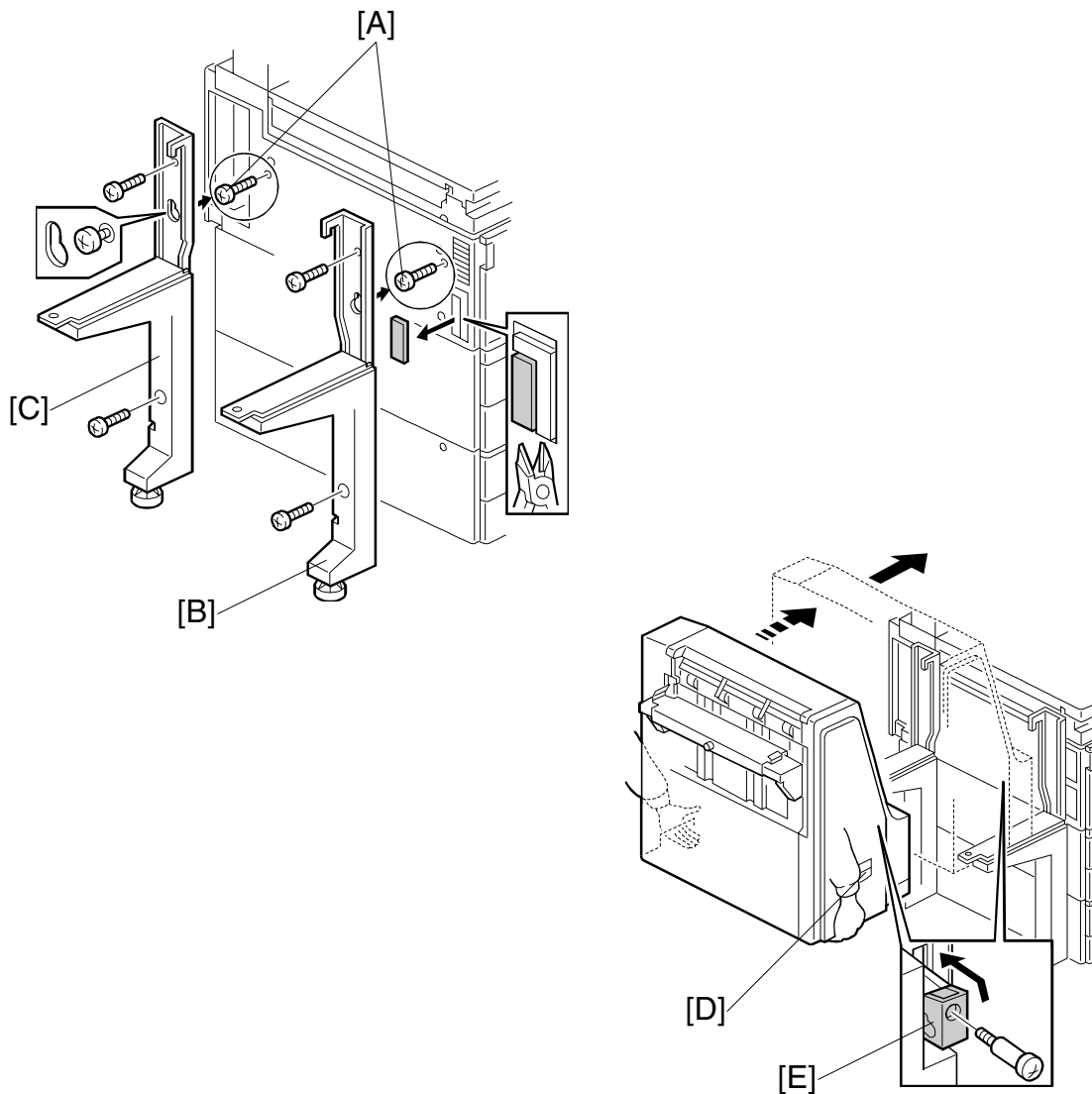
Switch off the main machine and unplug its power cord before starting the following procedure.

NOTE: The bridge unit (B397) and paper tray unit (G520) must be installed before installing this finisher.

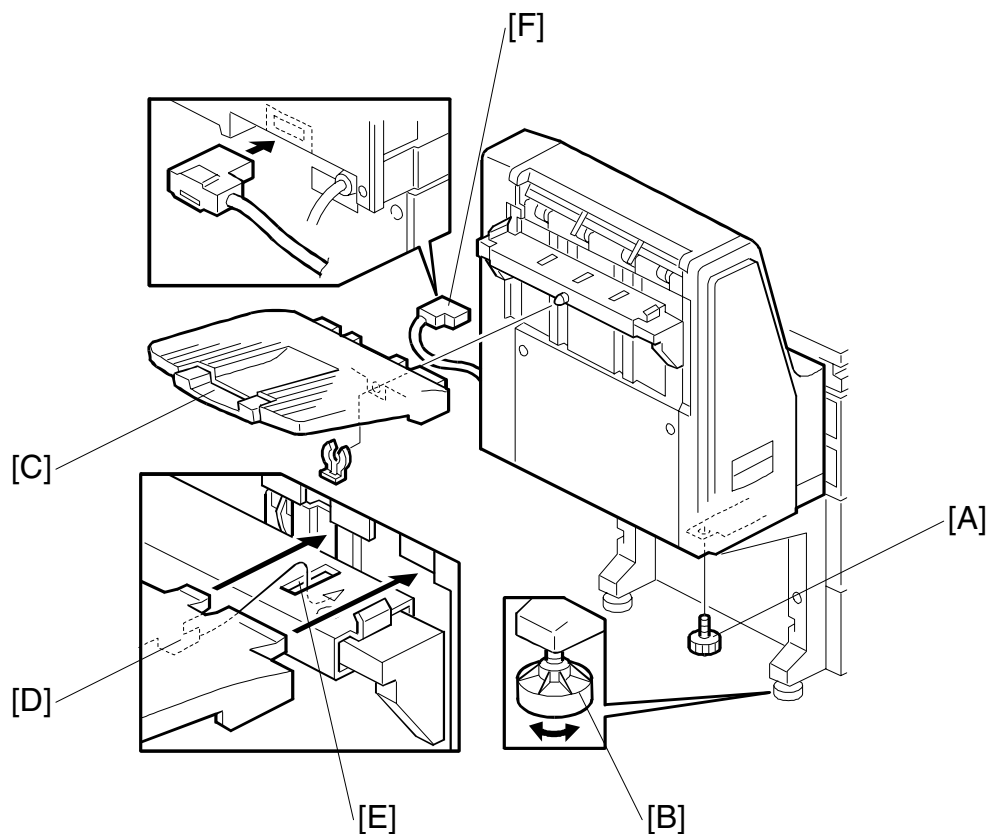
If the mailbox (G909) will be installed, first install the mailbox, then the bridge unit for the mailbox (G912), and finally install the finisher.

1. Unpack the finisher and remove the tapes and retainers.

1000-SHEET FINISHER INSTALLATION (A681)



2. Fasten [A] (⌀ x 2) loosely.
3. Hang the front stand [B] and rear stand [C] on the screws installed in step 2.
4. To secure the front and rear stands tighten [A] (⌀ x 2) and secure the stands (⌀ x 4).
5. At the front, use handle [D] to pull out the stapler unit.
6. Remove the locking lever [E] (⌀ x 1).
7. Align the finisher on the stands, and lock it in place by pushing the locking lever.
8. Secure the locking lever (⌀ x 1) and push the stapler unit into the finisher.



9. Secure the finisher [A] (⌀ x 1).
10. Adjust the securing knobs [B] under the front and rear stands until the finisher is perpendicular to the floor.
11. Install the shift tray [C] (snap ring x 1).
NOTE: Make sure that the three pegs [D] fit into the slots [E] properly.
12. Connect the finisher cable [F] to the main machine.
13. Turn on the main power switch and check the finisher operation.

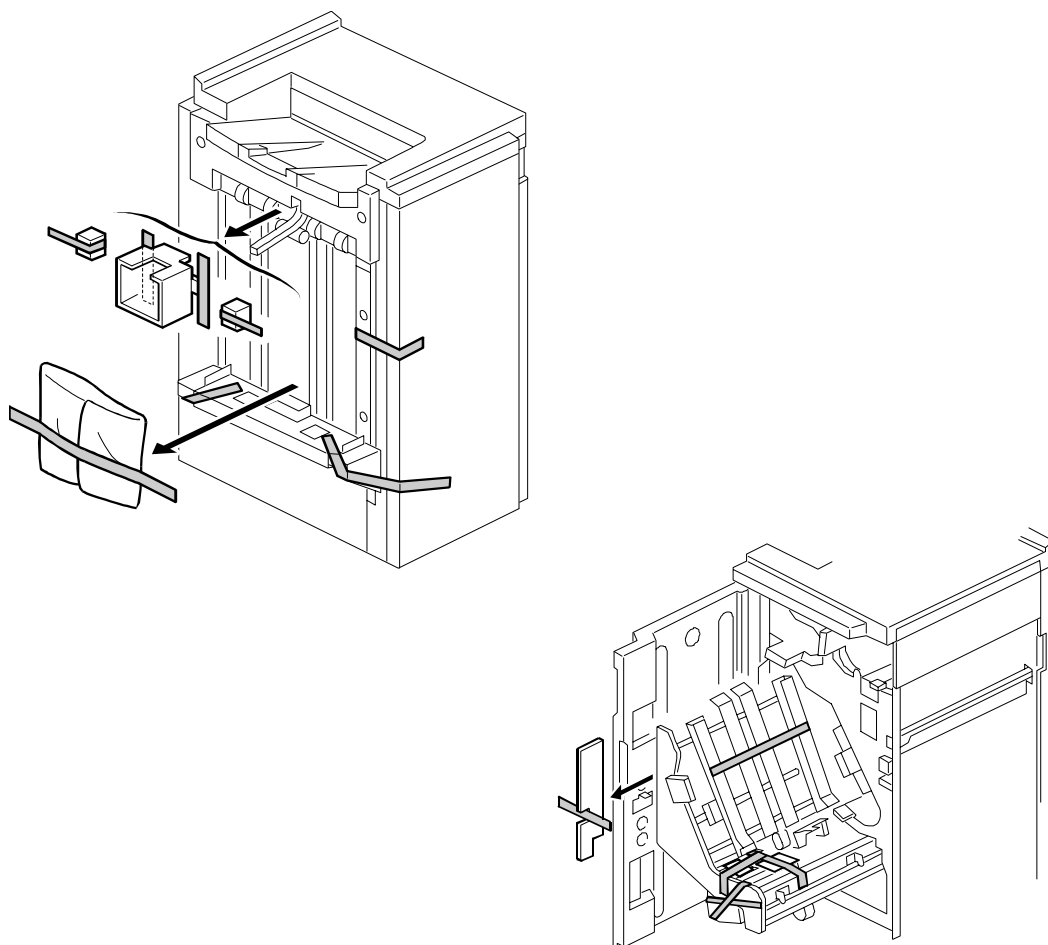
1.8 3000-SHEET FINISHER INSTALLATION (A697)

1.8.1 ACCESSORY CHECK

Check the quantity and condition of the accessories in the box against the following list:

Description	Q'ty
1. Front joint bracket	1
2. Rear joint bracket.....	1
3. Entrance guide plate	1
4. Shift tray.....	1
5. Shift tray guide.....	1
6. Staple position decal.....	1
7. Screw - M3x6	2
8. Screw - M4x14	4
9. Screw - M3x8	4
10. Cushion	1
11. Upper grounding plate	1
12. Lower grounding plate	2
13. NECR (-17 machine)	1
14. Installation procedure	1

1.1.2 INSTALLATION PROCEDURE



⚠ CAUTION

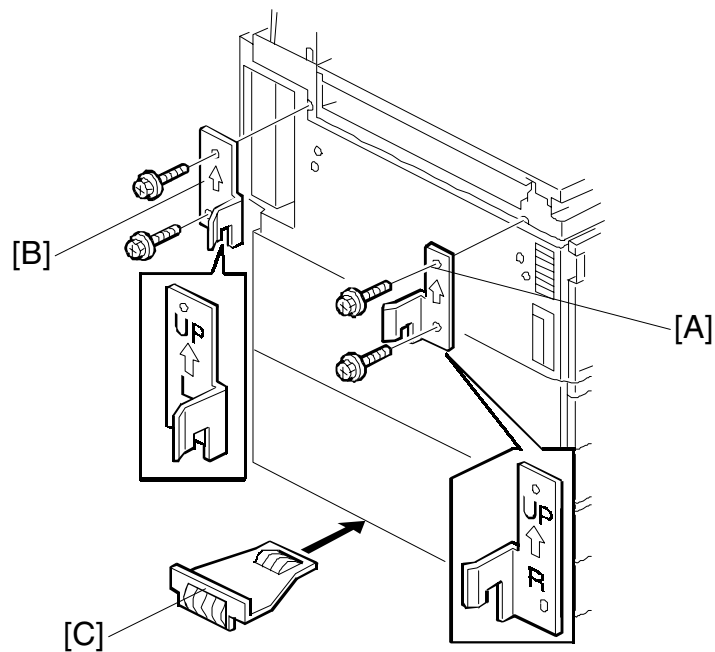
Unplug the main machine power cord before starting the following procedure.

NOTE: The bridge unit (B397) and paper tray unit (G520) must be installed before installing this finisher.

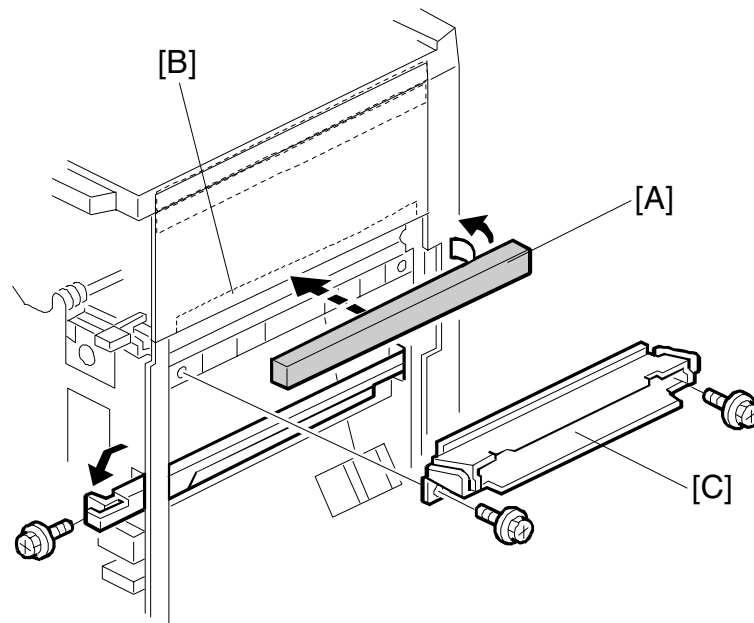
If the mailbox (G909) will be installed, first install the mailbox, then the bridge unit for the mailbox (G912), and finally install the finisher.

1. Unpack the finisher and remove the tapes.

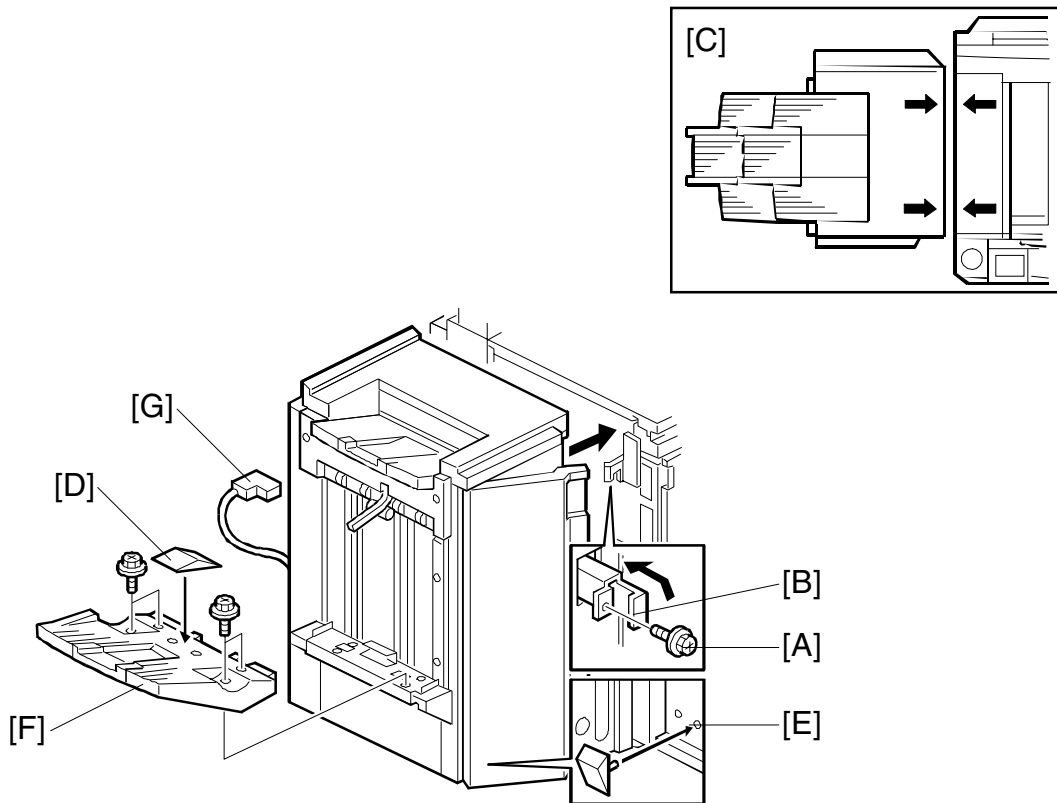
3000-SHEET FINISHER INSTALLATION (A697)



2. Install the front joint bracket [A] and rear joint bracket [B] (2 x 2 ea.).
3. Peel off the backing of the double-sided tape that is attached to the lower grounding plate [C].
4. Attach one lower grounding plate to the center position of the paper tray unit as shown.



5. Attach the cushion [A] at the position [B].
6. Install the entrance guide plate [C] (⌀ x 2).



7. If the customer requires the punch unit, install it now, before attaching the finisher to the machine. See 'Punch Unit Installation'.
8. Open the front door of the finisher, and remove the screw [A] that secures the locking lever [B]. Then pull the locking lever.
9. Align the finisher on the joint brackets, and lock it in place by pushing the locking lever.
NOTE: 1) Before securing the locking lever, make sure that the top edges of the finisher and the copier are parallel from front to rear as shown [C].
 2) Secure the locking lever (⌀ x 1) and close the front door.
10. Install the shift tray guide [D] on the shift tray. If the customer does not wish to install it on the shift tray, store it at the location [E].
NOTE: The shift tray guide helps to properly stack exiting paper. However, it reduces the capacity of the shift tray by 50, from 3,000 to 2,950.
11. Install the shift tray [F] (⌀ x 4).
12. Connect the finisher cable [G] to the main machine.
13. Turn on the main power switch and check the finisher operation.

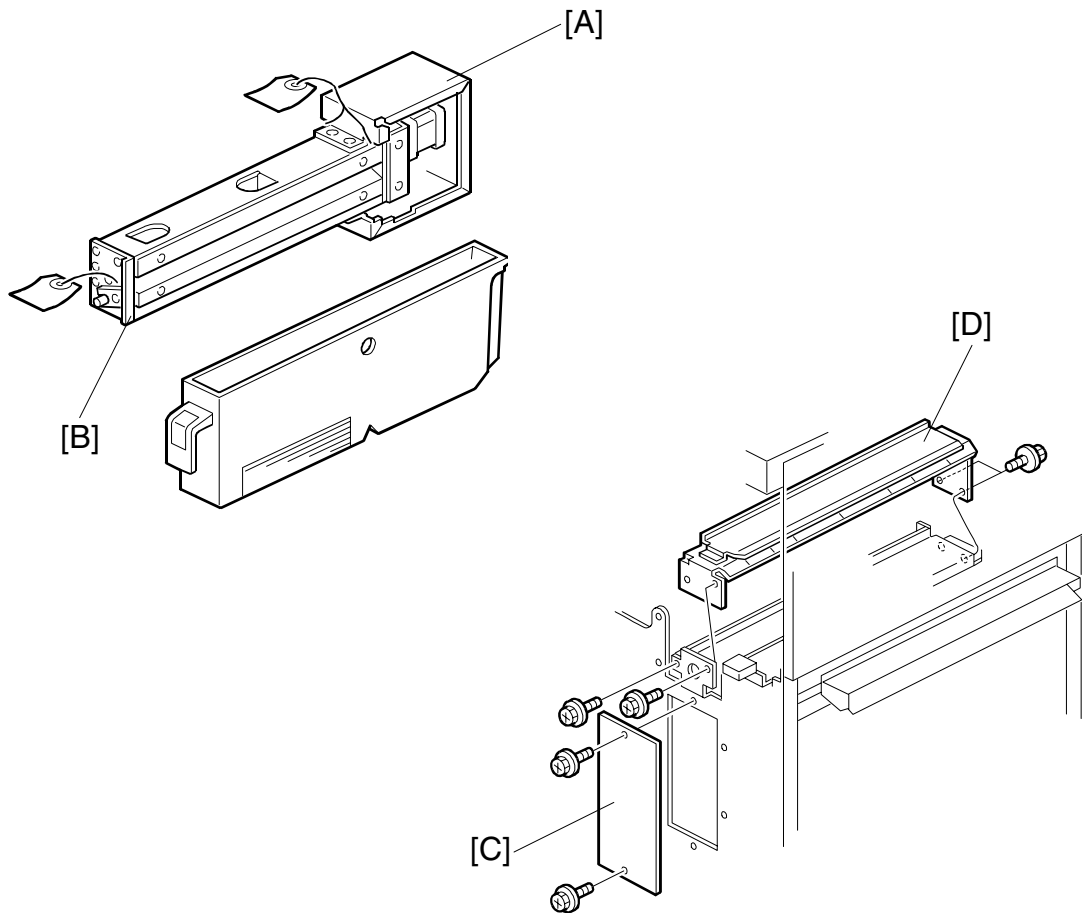
1.9 PUNCH UNIT INSTALLATION (A812)

1.9.1 ACCESSORY CHECK

Check the quantity and condition of the accessories in the box against the following list:

Description	Q'ty
1. Spacer - 2 mm	1
2. Spacer - 1 mm	2
3. Stepped screw - Short	1
4. Stepped screw - Long.....	1
5. Punch unit knob	1
6. Spring	1
7. Harness - Long	1
8. Harness - Short.....	1
9. Hopper.....	1
10. Punch position decal.....	1
11. Tapping screw - M4x10.....	2
12. Screw with flat washer - M4x6	1
13. NECR.....	1

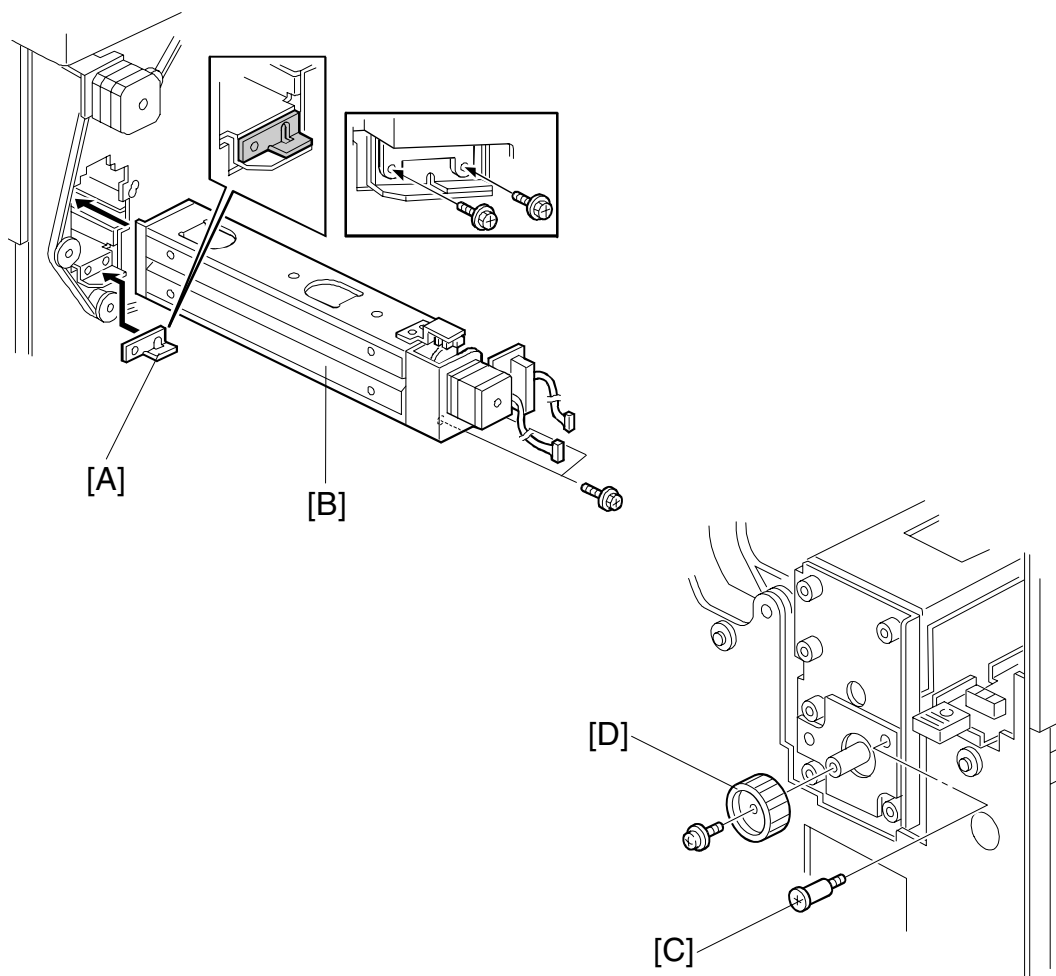
1.1.2 INSTALLATION PROCEDURE



⚠ CAUTION

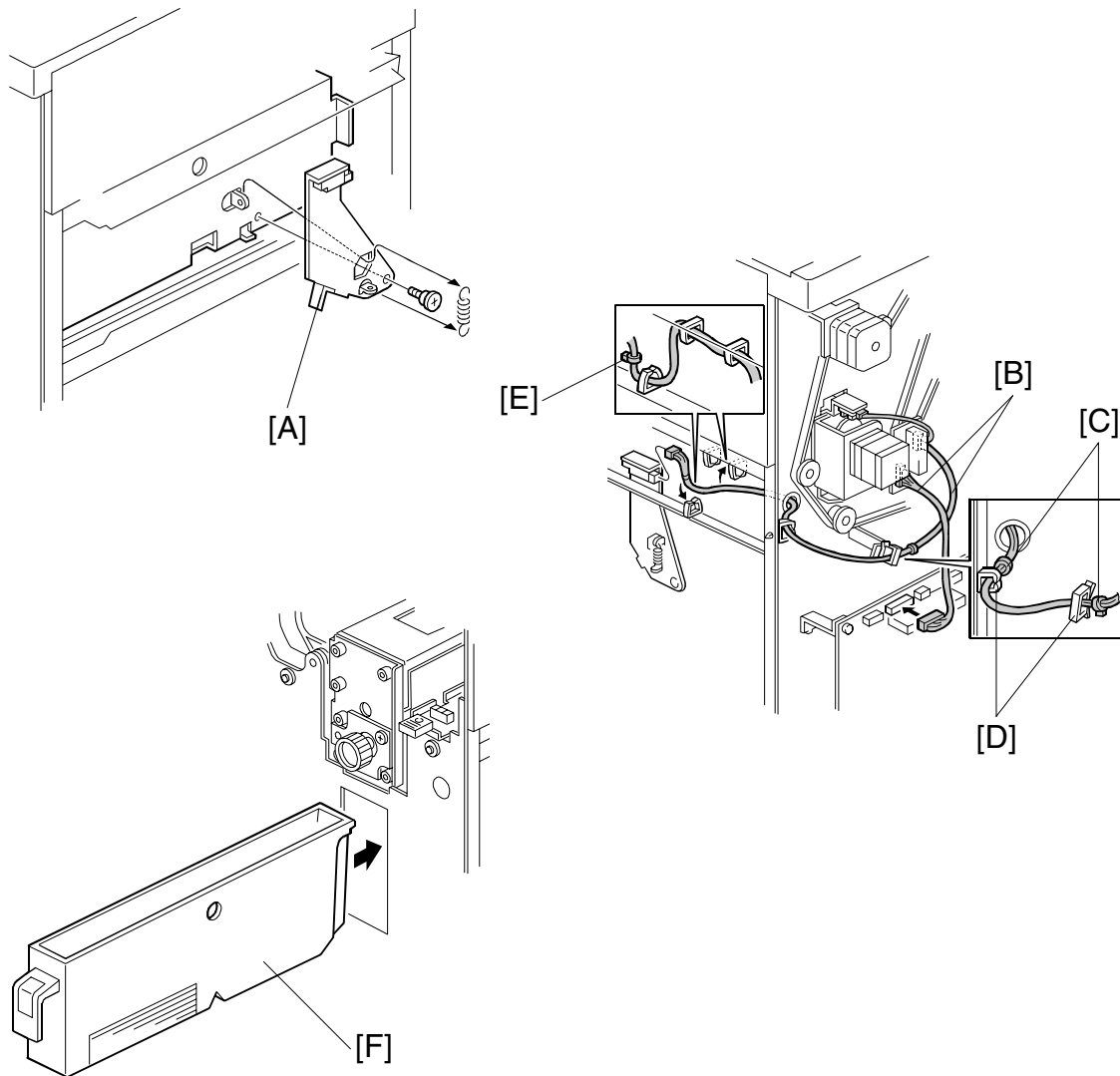
Unplug the copier power cord and remove the 3,000-sheet finisher from the copier before starting the following procedure.

1. Unpack the punch unit and remove the shipping retainers [A] (⚙ x 4) and [B] (⚙ x 1).
2. Open the front door and remove the hopper cover [C] (⚙ x 2).
3. Remove the finisher rear cover (⚙ x 2) and remove the transport guide plate [D] (⚙ x 4).



4. Install the spacer [A] (thickness = 2 mm).
NOTE: There are three spacers in the accessory box. Do not lose the other two spacers (1-mm) because they are used for adjusting the punch hole position.
5. Install the punch unit [B] and secure it with a long stepped screw [C].
6. Install the punch unit knob [D] (🔩 x 1).
7. Secure the rear of the punch unit (🔩 x 2).

PUNCH UNIT INSTALLATION (A812)



8. Install the sensor bracket [A] (⚙ x 1, spring x1).

9. Connect the harnesses [B].

NOTE: 1) The harness binders [C] must not be between the harness clamps [D].
2) The harness binder [E] must be positioned to the left of the harness clamp.

10. **When a three-punch-hole unit is installed:** Turn on switch 1 of DIP SW 100 on the finisher control board.

11. Slide the hopper [F] into the finisher.

12. Reassemble the finisher and attach the 3000-sheet finisher to the copier, then check the punch unit function.

1.10 MAILBOX INSTALLATION (G909)

1.10.1 ACCESSORY CHECK

Check the quantity and condition of the accessories in the box against the following list:

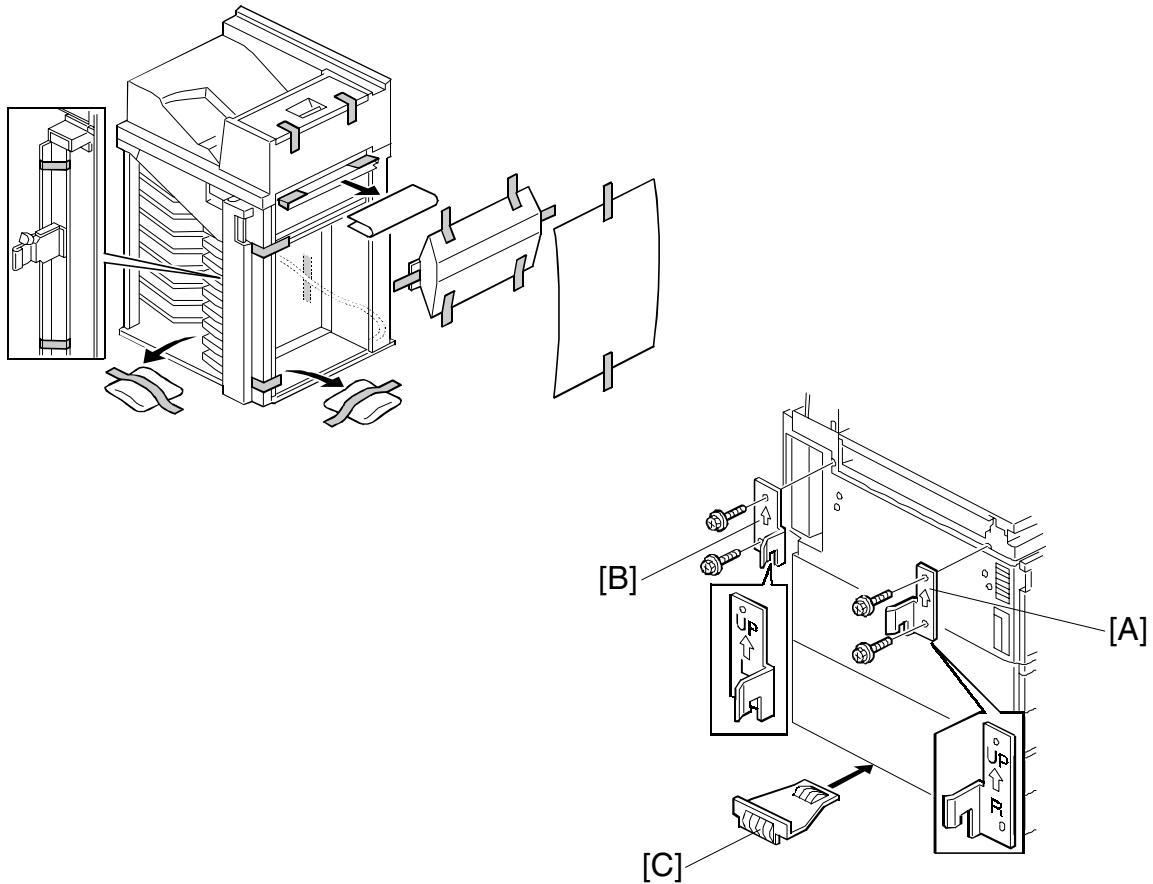
Description	Q'ty
1. Front joint bracket	1
2. Rear joint bracket.....	1
3. Exit guide mylar	1
4. Proof tray attachment	1
5. Upper grounding plate	1
6. Lower grounding plate	2
7. Cushion	1
8. Tapping screw - M4x14.....	4
9. Bin decals	1
10. Installation procedure	1

1.1.2 REQUIREMENT OPTIONS FOR MAIN MACHINE

When the mailbox is going to be installed on this printer, the following options must be installed first.

- Bridge unit type 450 (B397)
- Paper tray unit - PS430 (G520)

1.1.3 INSTALLATION PROCEDURE

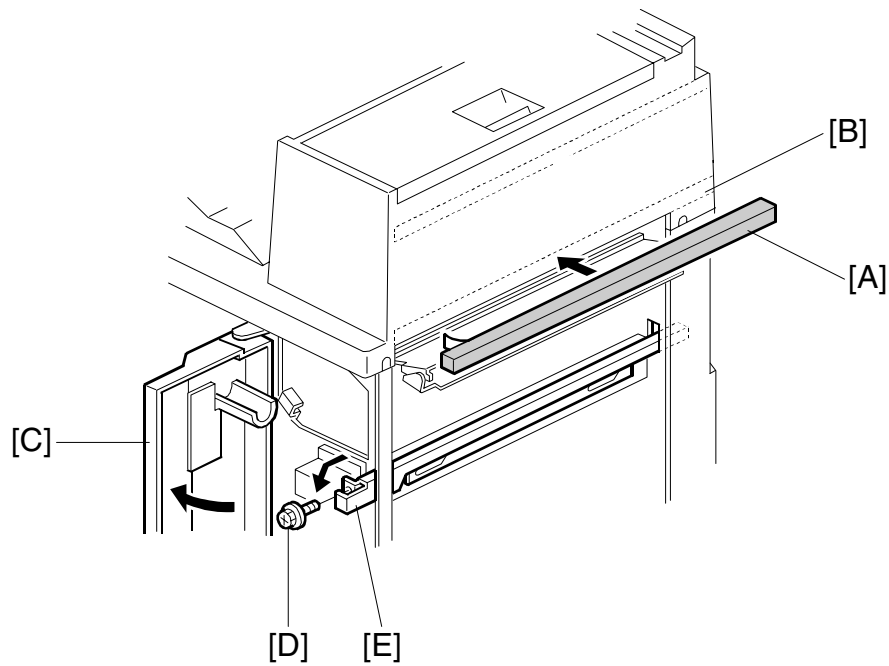


⚠ CAUTION

Unplug the main machine power cord before starting the following procedure.

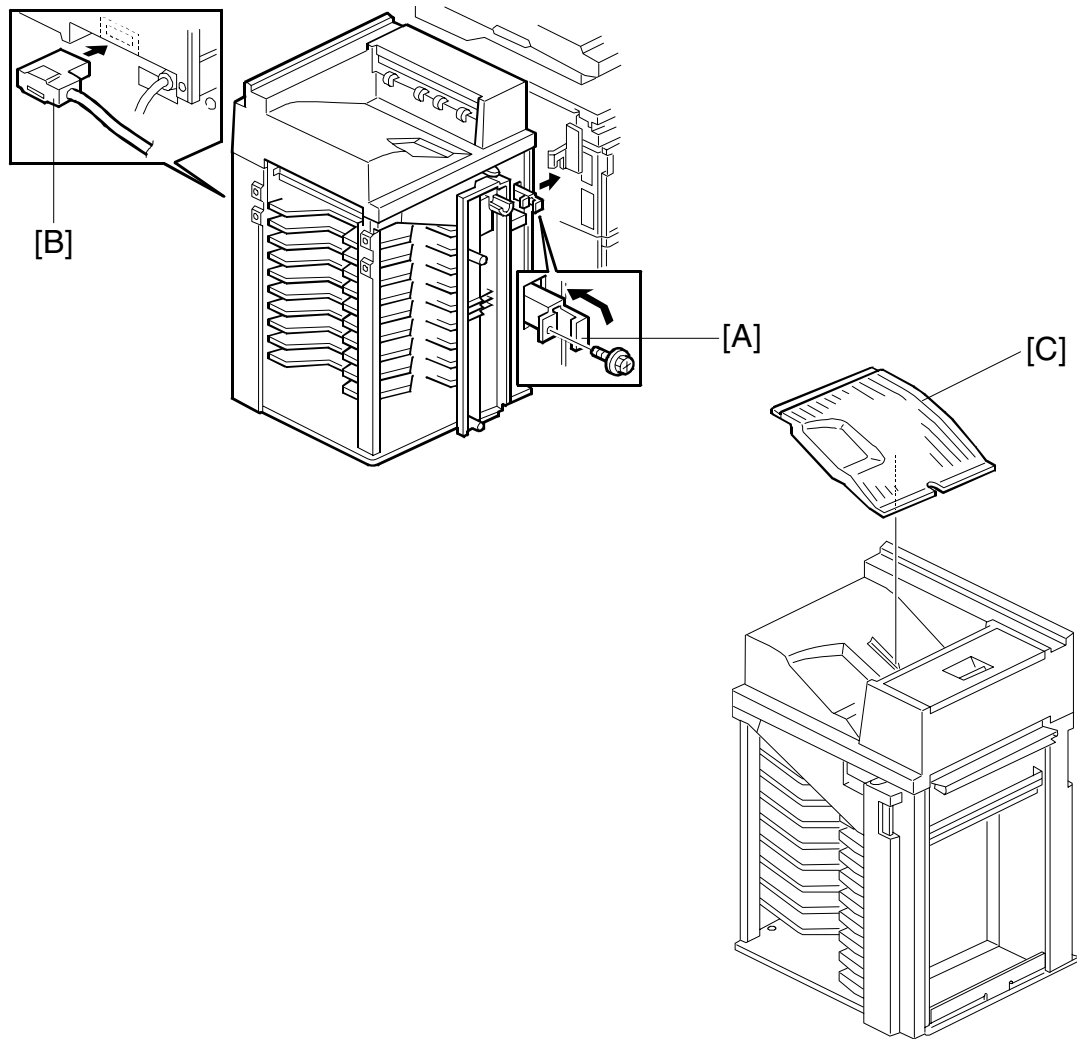
NOTE: If a finisher will be installed, first install this mailbox, then the bridge unit for the mailbox (G912), and finally install the finisher.

1. Unpack the finisher and remove the pieces of tape.
2. Attach the front joint bracket [A] and rear joint bracket [B] to the main machine (⌀ x 2 ea.).
3. Peel off the backing of the double-sided tape that is attached to the lower grounding plate [C].
4. Attach one lower grounding plate to the center of the bottom edge of the paper tray unit as shown.



5. Attach the cushion [A] to the position [B].
6. Open the front cover [C] of the mailbox, and remove the screw [D] that secures the locking lever [E]. Then pull the locking lever.

MAILBOX INSTALLATION (G909)



7. Align the mailbox on the joint brackets, and lock it in place by pushing the locking lever [A].
8. Secure the locking lever (⚙ x 1) and close the front door.
9. Connect the mailbox cable [B] to the main machine.
10. Peel off the backing of the double-sided tape that is attached to the proof tray attachment [C].
11. Install the proof tray attachment on the proof tray.
12. Turn on the main switch and check the mailbox operation.

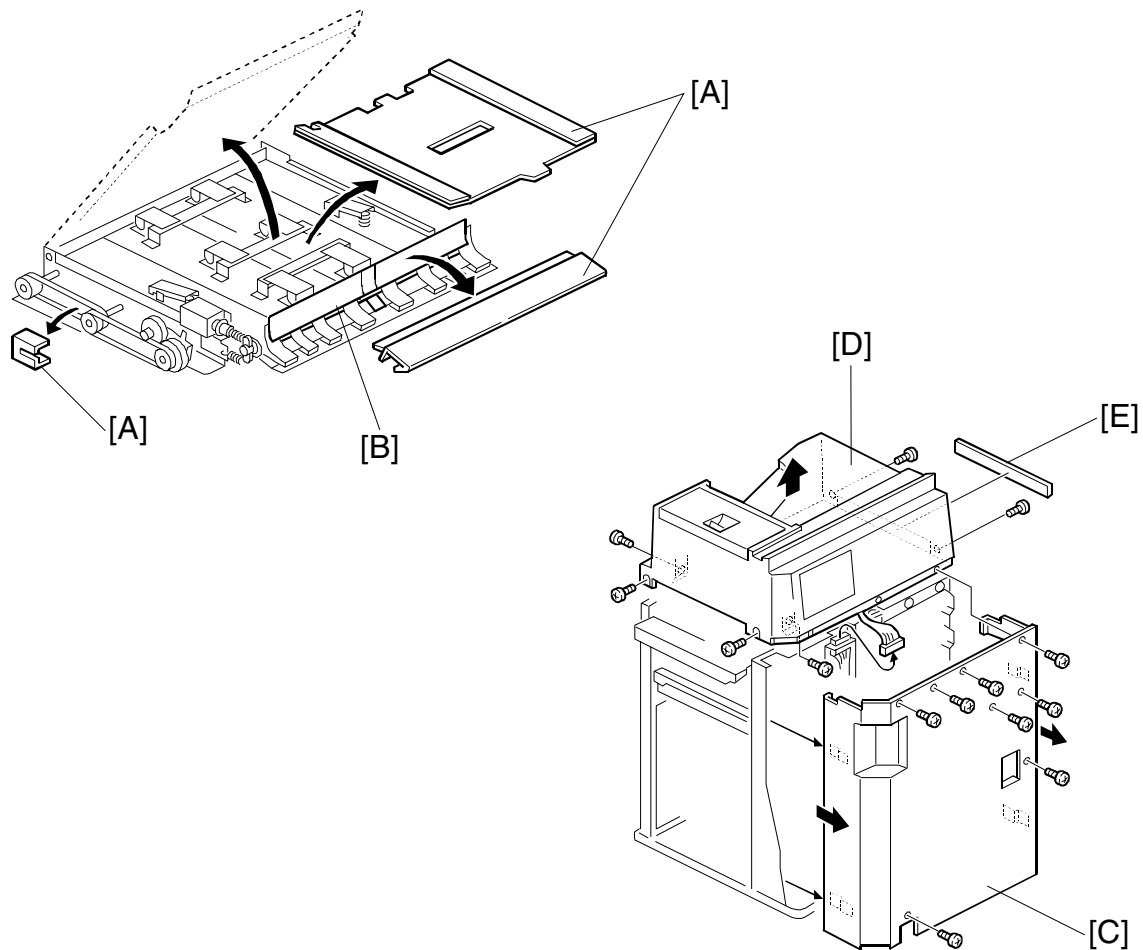
1.11 BRIDGE UNIT FOR MAILBOX INSTALLATION (G912)

1.11.1 ACCESSORY CHECK

Check the quantity and condition of the accessories in the box against the following list:

Description	Q'ty
1. Guide plate bracket	1
2. Cable	1
3. Cover switch.....	1
4. Grounding bracket.....	1
5. Finisher shielding plate.....	1
6. Screw - M4x8	9
7. Screw - M4x4	4
8. Screw - M3x6	2

1.11.2 INSTALLATION PROCEDURE



⚠ CAUTION

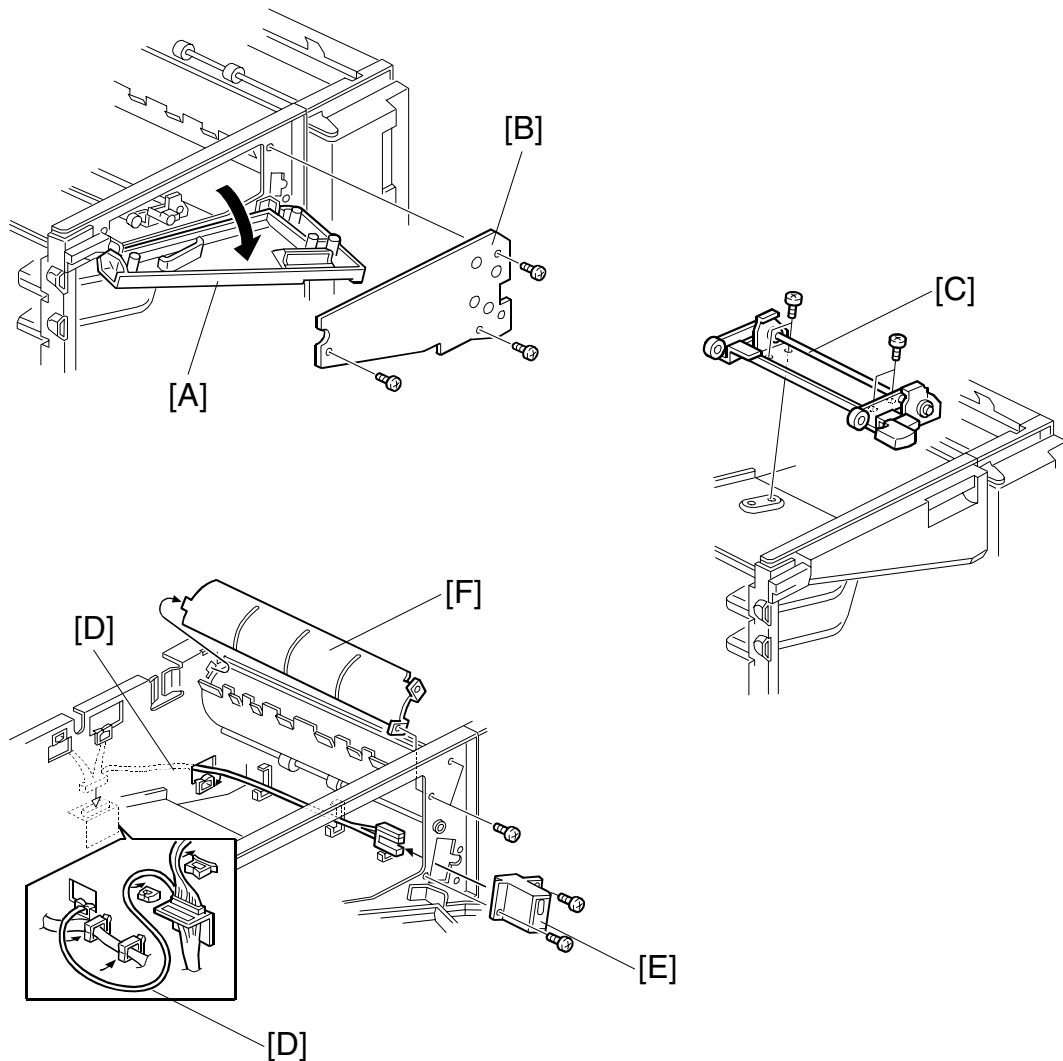
Unplug the main machine power cord before starting the following procedure.

NOTE: The bridge unit for the mailbox must be installed when both the mailbox and a finisher will be installed. Install the mailbox first, then this bridge unit, and finally the finisher

1. Unpack the bridge unit and remove the shipping retainers [A].

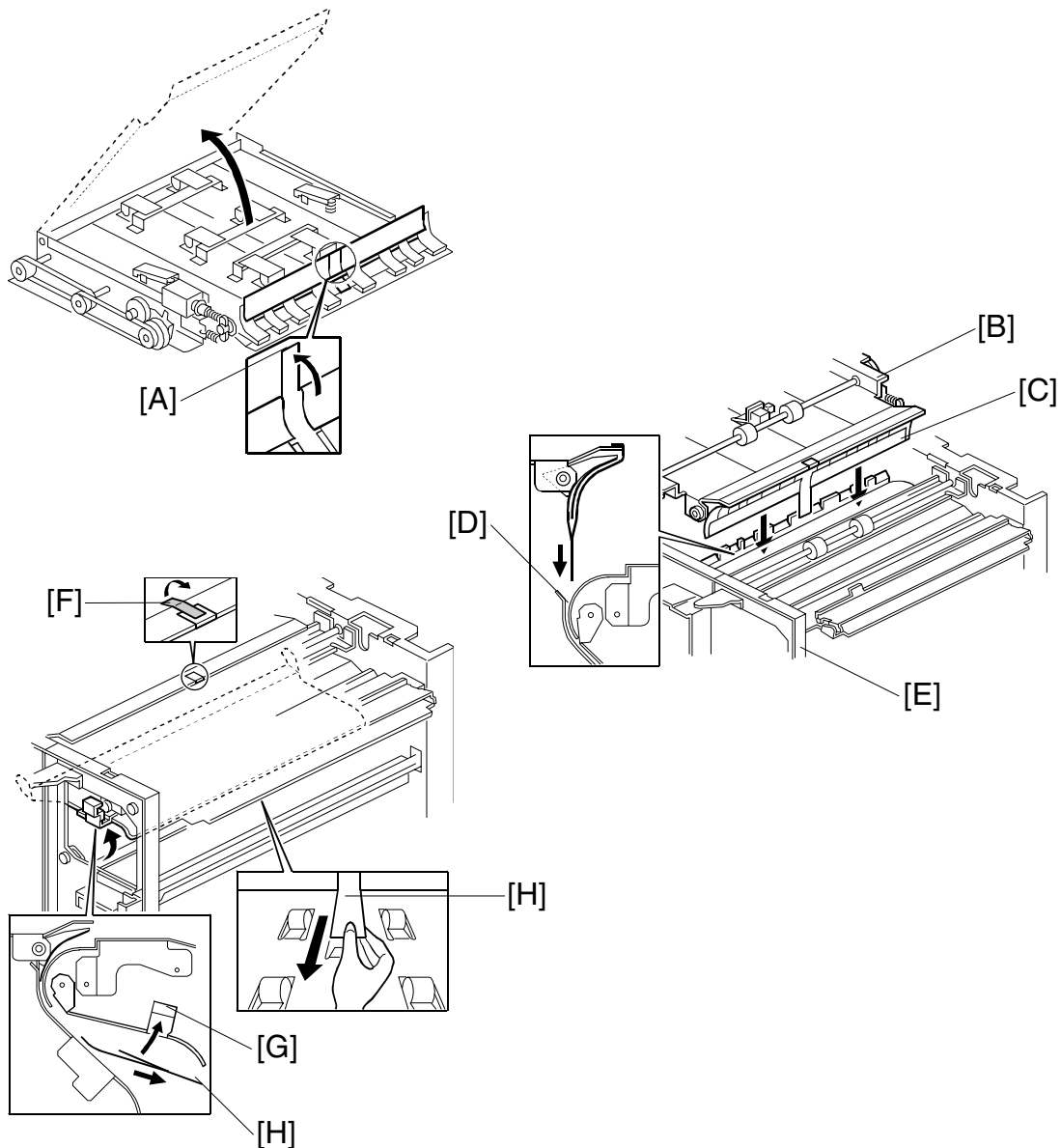
NOTE: Do not remove the protective sheet [B] at this time.

2. Remove the mailbox if it has been installed.
3. Remove the rear cover [C] of the mailbox (⚙ x 8).
4. Remove the proof tray unit [D] (⚙ x 6, 📄 x 1).
5. Remove the cover [E].



6. Open the left front cover [A] of the mailbox, and remove the inner plate [B] (⌀ x 3).
7. Install the guide plate bracket [C] (⌀ x 4 - M4x4).
8. Route the cable [D] and clamp it as shown.
9. Connect the cover switch [E] to the cable then install the cover switch (⌀ x 2 - M4x8).
10. Remove the paper guide plate [F] (⌀ x 2).

BRIDGE UNIT FOR MAILBOX INSTALLATION (G912)



11. Pull up the tab [A] of the protective sheet.

NOTE: 1) Do not remove the protective sheet at this time.

2) Make sure that all mylars are held between the two folded halves of the protective sheet.

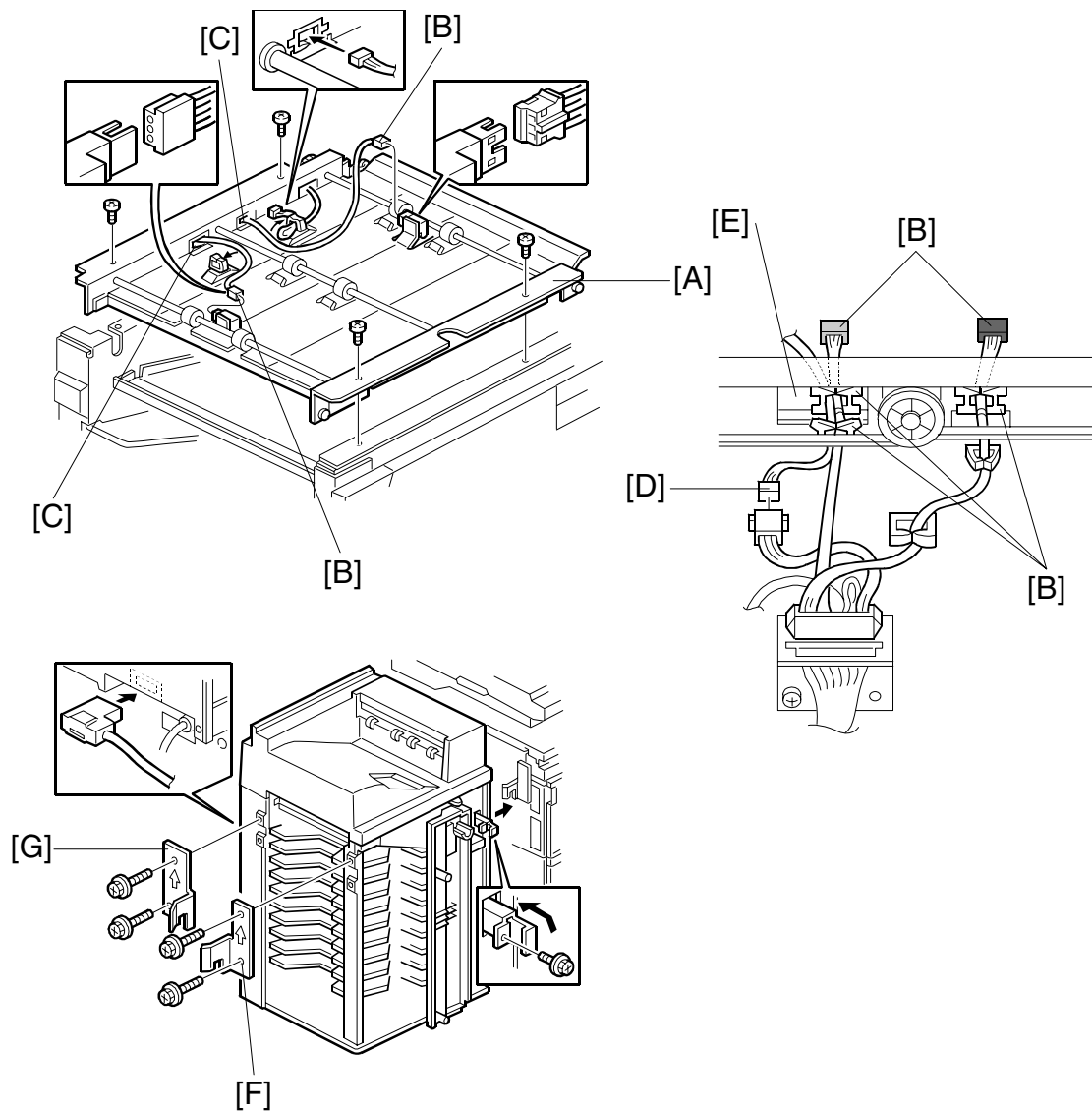
12. Turn over the bridge unit [B] and insert the protective sheet [C] into the gap [D] between the paper guides, then put the bridge unit on the mailbox [E].

NOTE: When holding the bridge unit, do not touch the timing belt. Otherwise the timing belt may come off the gear.

13. Remove the tape [F] for the protective sheet.

14. Open the upper paper guide [G] then pull out the protective sheet [H].

NOTE: Check that all mylars are set into the gap between the paper guides.

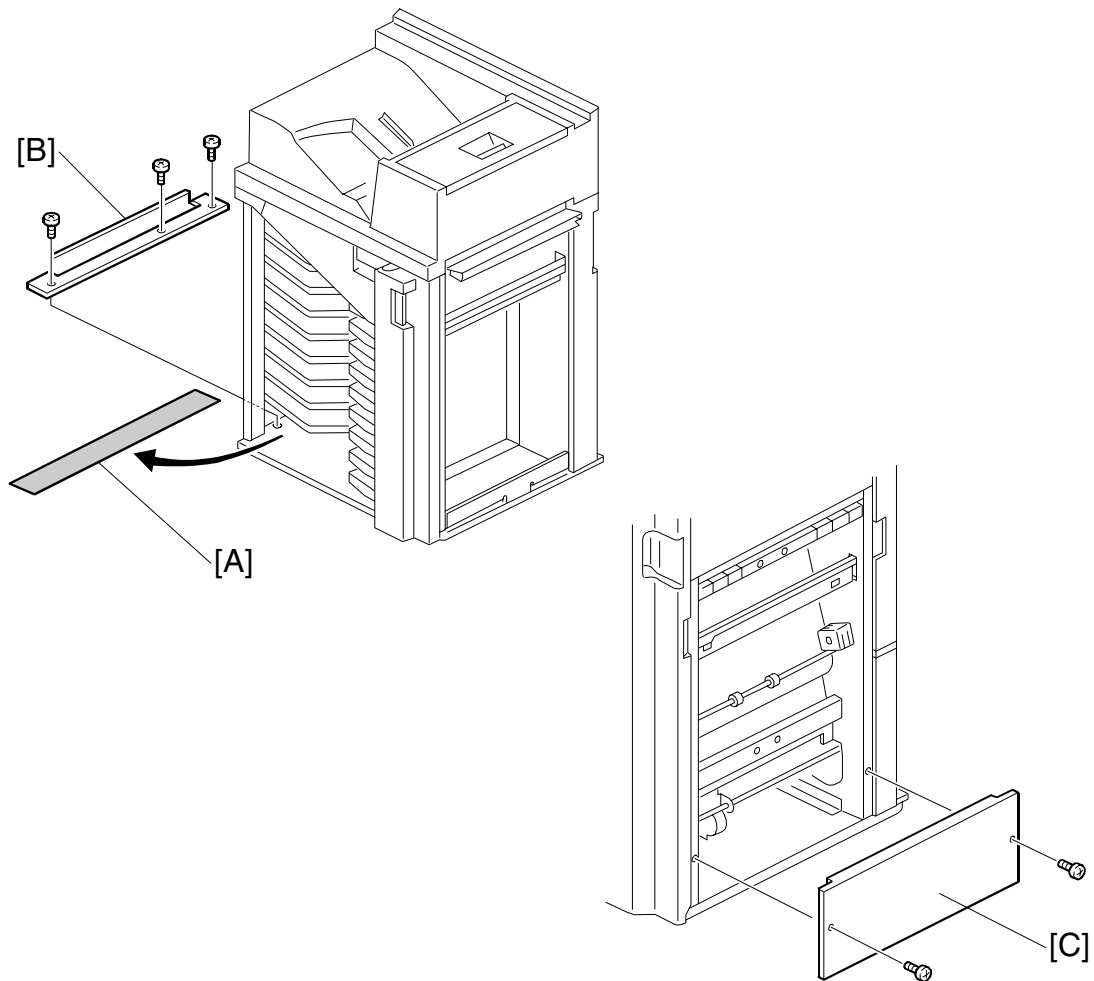


15. Secure the bridge unit [A] (⌀ x 4 - M4x8).
16. Route the cables [B] through the openings [C].
17. Route the solenoid harness [D] through the opening [E].
18. Connect the cables to the solenoid and sensors and clamp the cable as shown.
19. Reinstall the rear cover and proof tray unit.
20. Install the mailbox on the main machine (refer to the Mailbox Installation procedure for more detail).

If installing the 3000-sheet finisher (A697), do steps 21 to 25.

21. Install the front joint bracket [F] and rear joint bracket [G] which are contained in the finisher's accessory box.

BRIDGE UNIT FOR MAILBOX INSTALLATION (G912)



22. Remove the seal [A].
23. Attach the grounding bracket [B] (⚙ x 3 - M4x8).
24. Attach the shielding plate [C] to the finisher (⚙ x 2 - M3x8).
25. Attach the finisher to the mailbox (refer to the finisher installation procedure).
26. Turn on the main switch of the main machine and check the bridge unit operation. (Select a print mode that uses the finisher.)

PREVENTIVE MAINTANENCE

2. PREVENTIVE MAINTENANCE SCHEDULE

2.1 PM TABLES

2.1.1 PM TABLES FOR THE PRINTER

Two maintenance kits are provided for customers.

NAME	CONTENTS
Maintenance Kit Type 4510A	PCDU (Photo Conductor Cleaning/Development Unit)
Maintenance Kit Type 4510B	Fusing Unit and Transfer Unit

Components marked with an asterisk (*) should be inspected, serviced, and replaced without the maintenance kits.

NOTE: Amounts mentioned as the PM interval indicate the number of prints.

Symbol key: **C**: Clean, **R**: Replace, **L**: Lubricate, **I**: Inspect

	EM	150K	300K	450K	NOTE
PCDU					
DRUM (OPC) AREA					
Charge Roller*		R	R	R	
Cleaning Roller*		R	R	R	
Quenching Lamp			C		Dry cloth
Pick-off Paws*		R	R	R	
Spurs		C	C	C	Dry cloth or alcohol
ID Sensor		C	C	C	Perform SP3001-02 after blower brush cleaning.
CLEANING UNIT					
Drum Cleaning Blade*		R	R	R	
Cleaning Entrance Seal		C	C	C	Blower brush, replace if required.
Side Seal		I	I	I	
DEVELOPMENT					
Development Drive Gears		I	I	I	Replace every 5 PM (750 K)
Development Filter*		R	R	R	
Developer*		I	R	I	
Entrance Seal		I	I	I	
Side Seal		I	I	I	
Development Roller		C	C	C	Dry cloth

PM TABLES

	EM	150K	300K	450K	NOTE
PAPER FEED					
Registration Roller	C	C	C	C	Water or alcohol.
Paper Feed Roller*	I	R	R	R	Check counter value for each (SP7204). If ≥ 150 K, replace roller. After replacing the roller, do SP7816 to reset counter.
Separation Roller*	I	R	R	R	
Pick-up Roller*	I	R	R	R	
Paper Feed Roller (By-pass feed table)*	I	R	R	R	
Separation Roller (By-pass feed table)*	I	R	R	R	
Pick-up Roller (By-pass feed table)	I	R	R	R	
Paper Feed Guides		C	C	C	Water or alcohol.
Relay Rollers		C	C	C	Water or alcohol.
Bottom Plate Pad		C	C	C	Water or alcohol.
Bottom Plate Pad (By-pass feed)		C	C	C	Water or alcohol.
Registration Sensor		C	C	C	Blower brush
Paper Feed Roller Gear (By-pass feed)		L	L	L	Silicone Grease G-501.*
DUPLEX UNIT					
Upper Transport Roller		C	C	C	Water or alcohol.
Lower Transport Roller		C	C	C	Water or alcohol.
TRANSFER BELT UNIT					
Transfer Belt*	C	R	R	R	Dry cloth
Transfer Belt Cleaning Blade*		R	R	R	
Transfer Belt Rollers		C	C	C	Dry cloth
Entrance Seal		C	C	C	Dry cloth
Transfer Entrance Guide	C	C	C	C	Dry cloth
Used Toner Tank	I	C	C	C	Empty the tank.
FUSING UNIT/PAPER EXIT					
Fusing Entrance and Exit Guide Plates		C	C	C	Water or alcohol.
Hot Roller*		R	R	R	
Pressure Roller*		R	R	R	
Fusing Thermistors*		R	R	R	
Cleaning Roller		C	C	C	Water or alcohol.
Cleaning Roller Bushings		L	L	L	Grease: Barrierta JFE 55/2
Hot Roller Strippers*		C	R	C	Water or alcohol.
Paper Exit Guide Ribs		C	C	C	Water or alcohol.
Exit Sensor		C	C	C	Blower brush
DRIVE					
Drive Belts			I		Replace if necessary

2.1.2 PM TABLES FOR OPTIONS

NOTE: Amounts mentioned as the PM interval indicate the number of prints.

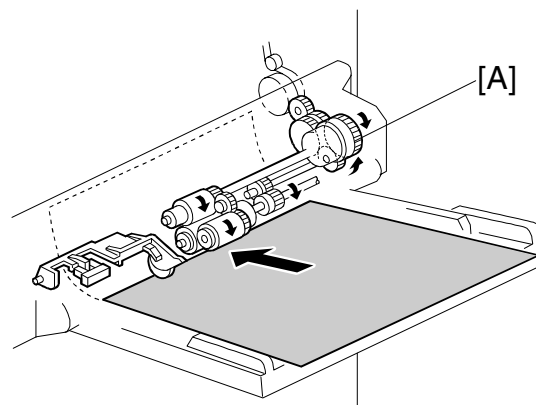
Symbol key: **C:** Clean, **R:** Replace, **L:** Lubricate, **I:** Inspect

	EM	150K	300K	450K	NOTE
PAPER TRAY UNIT G520					
Paper Feed Rollers		R	R	R	Check counter with SP7204. If ≥ 150 K, replace roller. After replacing the roller, do SP7816 to reset counter.
Pick-up Rollers		R	R	R	
Separation Rollers		R	R	R	
Relay Rollers		C	C	C	Dry or damp cloth
Bottom Plate Pad		C	C	C	Dry or damp cloth

	EM	150K	300K	450K	NOTE
LCT A683					
Paper Feed Roller		R	R	R	Check counter with SP7204. If ≥ 150 K, replace roller. After replacing the roller, do SP7816 to reset counter.
Pick-up Roller*		R	R	R	
Separation Roller*		R	R	R	
Bottom Plate Pad		C	C	C	Dry or damp cloth

	EM	150K	300K	450K	NOTE
1000-SHEET/3000-SHEET FINISHER					
Rollers	C				Water or alcohol.
Brush Roller (A681)	I	I	I	I	Replace if required.
Discharge Brush	C	C	C	C	Dry cloth
Sensors	C				Blower brush
Jogger Fences	I	I	I	I	Replace if required.
Punch Waste Hopper	I	I	I	I	Empty hopper.

* **Note:** Lubricate the paper feed clutch gear [A] with Silicone Grease G501 every P.M.



REPLACEMENT AND ADJUSTMENT

3. REPLACEMENT AND ADJUSTMENT

3.1 GENERAL CAUTIONS

⚠ CAUTION

To avoid damage to the transfer belt, drum, or development unit when it is removed or re-installed, never turn off either power switch while electrical components are active.

⚠ CAUTION

Turn off the main power switch and unplug the machine before attempting any of the procedures in this section.

Replacement
and
Adjustment

3.1.1 LASER UNIT

1. Do not loosen the screws that secure the LD drive board to the laser diode casing. Doing so would throw the LD unit out of adjustment.
2. Do not adjust the variable resistors on the LD unit, as they are adjusted in the factory.
3. The polygon mirror and F-theta lenses are very sensitive to dust. Do not open the optical housing unit.
4. Do not touch the glass surface of the polygon mirror motor unit with bare hands.
5. After replacing the LD unit, do the laser beam pitch adjustment. Otherwise, an SC condition will be generated.

3.1.2 USED TONER

1. Dispose of used toner in accordance with local regulations. Never throw toner into an open flame, for toner dust may ignite.

3.2 SPECIAL TOOLS AND LUBRICANTS




3.2.1 SPECIAL TOOLS

Part Number	Description	Q'ty
A2309003	Adjustment Cam – Laser Unit	1
A2309004	Positioning Pin – Laser Unit	1
A2309352	Flash Memory Card – 4MB	1
A2309351	Case – Flash Memory Card	1
G0219350	Parallel Loopback Connector	1

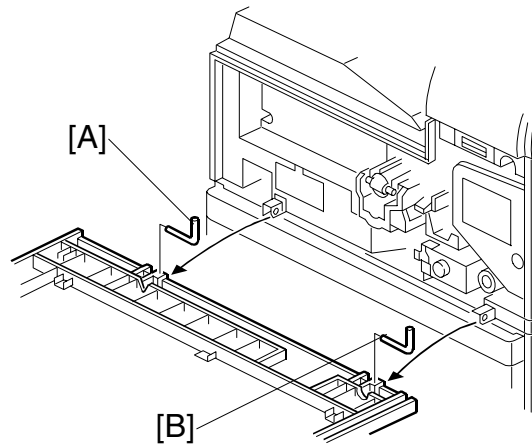
3.2.2 LUBRICANTS

Part Number	Description	Q'ty
A2579300	Grease Barrierta S552R	1
52039501	Silicone Grease G-501	1

3.2.3 SYMBOLS USED IN TEXT

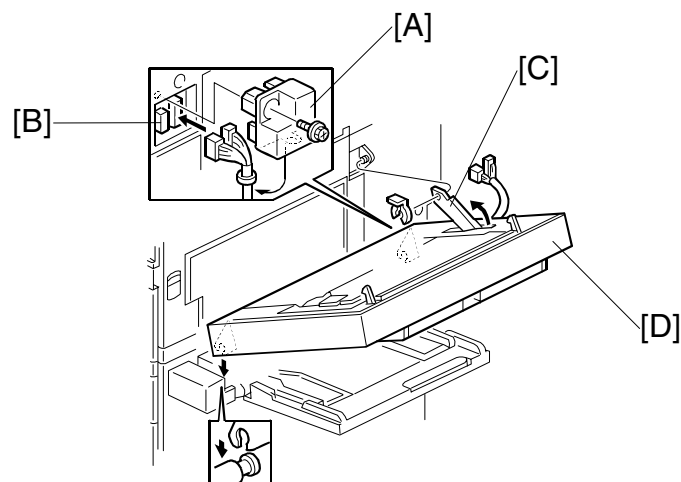
Screw:  Connector:  C-clamp (snap ring):  E-clamp: 

3.3 FRONT DOOR



1. Open front door.
2. Front door. Left pin [A], right pin [B].

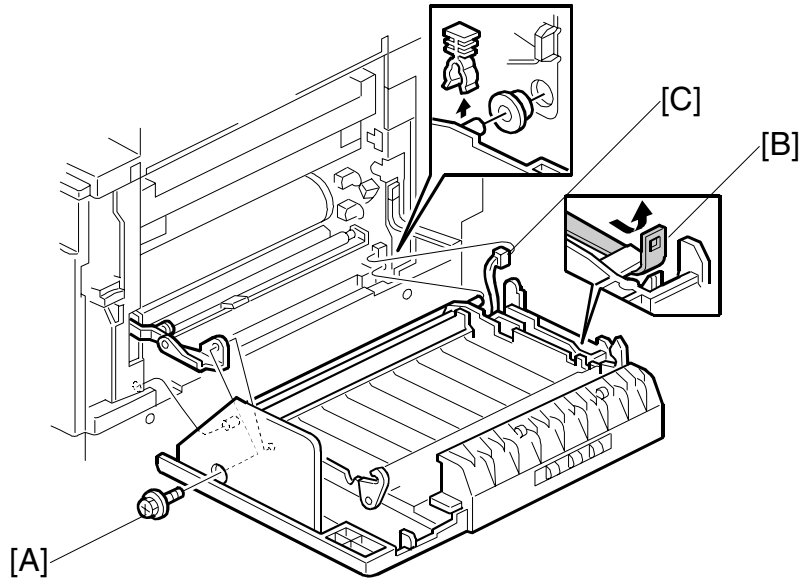
3.4 DUPLEX UNIT



1. Connector cover [A] (🔑 x 1)
2. Duplex connectors [B] (🔌 x 2)
3. Duplex support arm [C] (🌀 x 1)
4. Duplex unit [D]

NOTE: Grip the duplex unit with both hands, slowly rotate it towards you and then lift up.

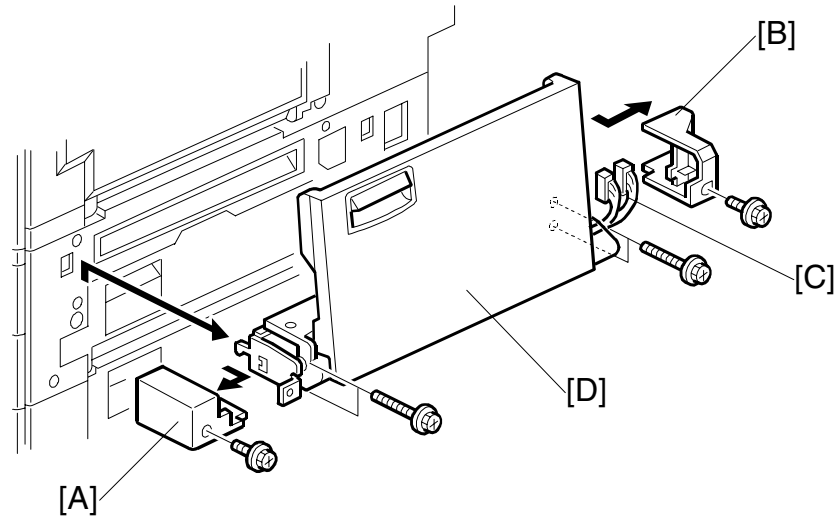
3.5 UPPER RIGHT COVER



NOTE: Work carefully to avoid damaging the development roller.

1. Duplex unit (☛ 3.4)
2. Transfer belt unit (☛ 3.12.1)
3. Metal support arm [A] (☛ x 1)
4. Band support arm [B] (loop fastener)
5. Connector [C] (☛ x 1)
6. Upper right cover (☛ x 1, bushing x 1)

3.6 BY-PASS TRAY UNIT



Replacement
and
Adjustment

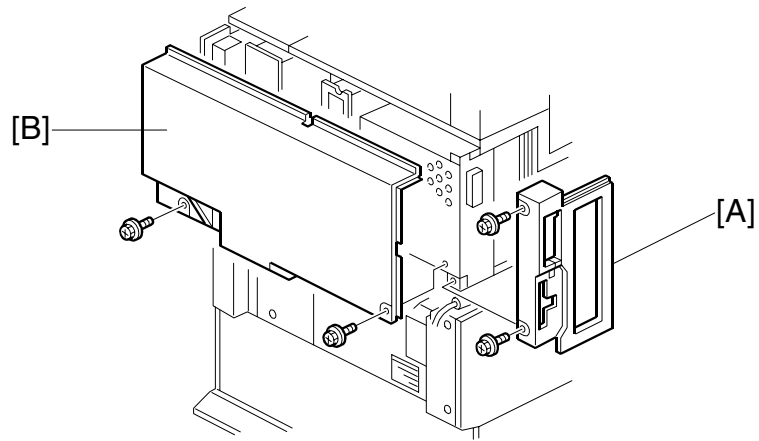
Use this procedure to remove the complete by-pass tray unit from the machine. If you wish to remove only the table, or some of the components of this unit, see 3.15.

1. Duplex unit (see 3.4)
2. Left cover [A] (1 x 1)
3. Right cover [B] (1 x 1)
4. Connectors [C] (2 x 2)
5. By-pass unit [D] (4 x 4)

NOTE: After removing the screws, lift to unhook the by-pass tray unit from the frame of the machine.

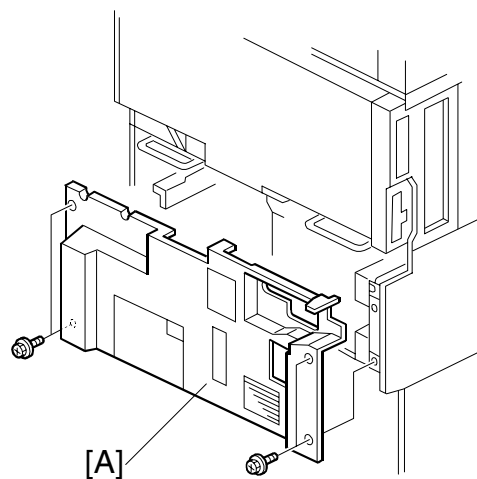
3.7 REAR COVERS

3.7.1 REAR UPPER COVER



1. Left corner cover [A] (⚙ x 2)
2. Rear upper cover [B] (⚙ x 2)

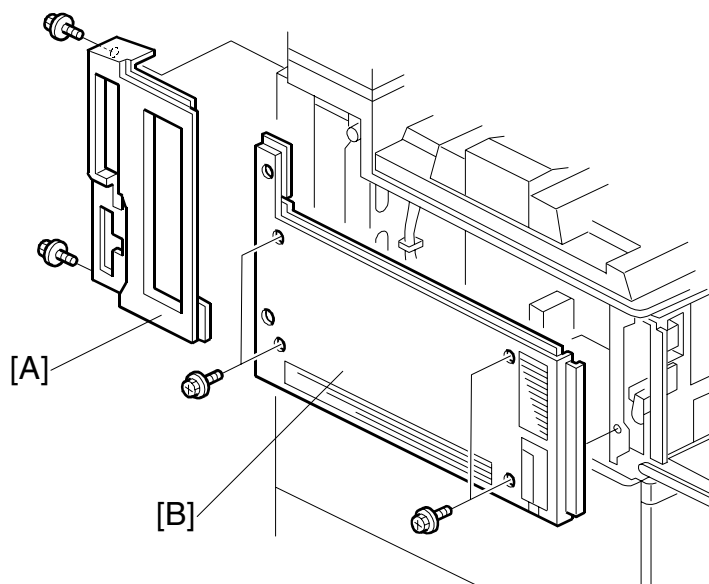
3.7.2 REAR LOWER COVER



1. Rear lower cover [A] (⚙ x 4)

3.8 LEFT COVERS

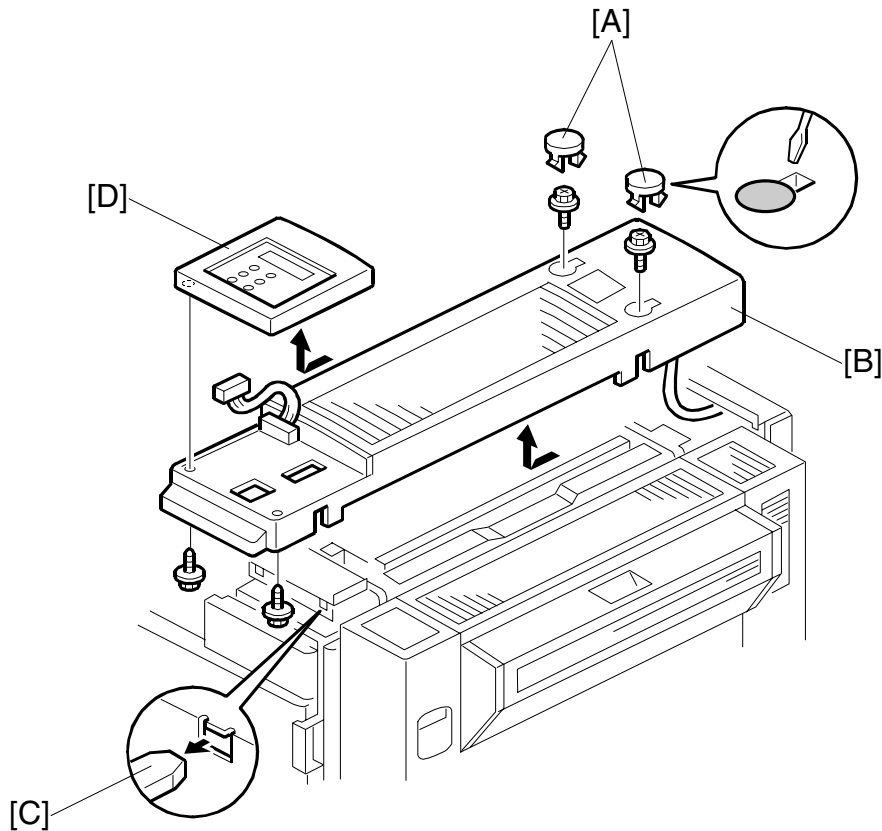
3.8.1 LEFT UPPER COVER



1. Rear left corner cover [A] (⌘ x 2)
2. Left upper cover [B] (⌘ x 4)




Replacement
and
Adjustment

3.1.2 OPERATION PANEL

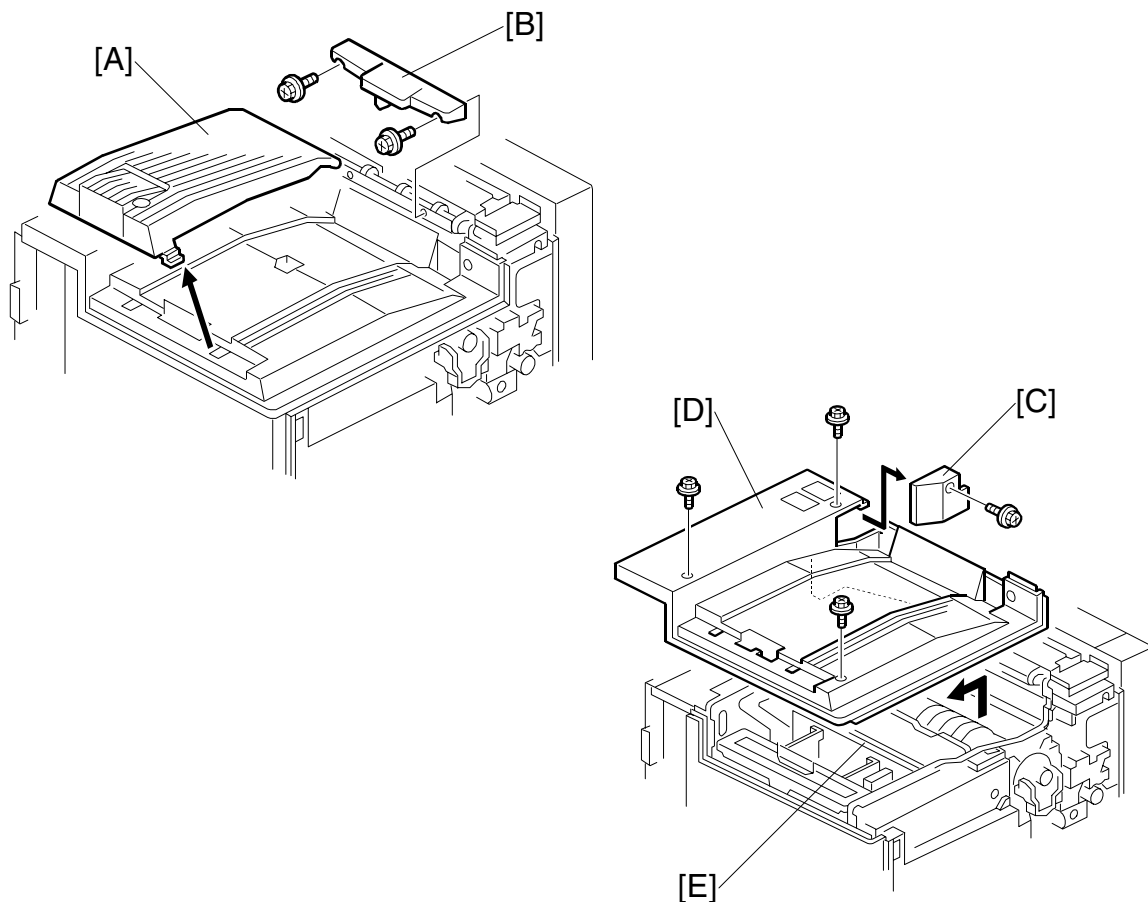


⚠ WARNING

The fusing unit below the cover is hot. Allow the machine to cool for a few minutes before you begin the procedure.

1. Fusing unit cover [A] (caps x 2,  x 2)
NOTE: Insert the tip of a screwdriver into the slot to release the plastic hook and lift. Exert very little pressure to avoid breaking the hooks.
2. After removing the screws, slide cover [B] forward to remove it.
NOTE: Before re-installing the cover, open the duplex unit and carefully insert the brackets on the bottom of the cover into the slots [C].
3. Operation panel [D] ( x 2,  x 2)
NOTE: Turn over the fusing unit cover and pull off the operation panel to expose the connector.

3.1.3 PAPER OUTPUT TRAY



Replacement
and
Adjustment

No Bridge Unit Installed

1. Sub copy tray [A]
2. Paper sensor ass'y [B] (⌘ x 2)
3. Cover [C] (⌘ x 1)
4. Paper output tray [D] (⌘ x 3)
5. If the duct on the bottom of the paper output tray base hangs up on the vertical support [E] below, reach under and pull the duct up over the support.

Bridge Unit Installed

1. Bridge unit [A] (⌘ x 2, ⌘ x 2)
2. Paper output tray [B] (⌘ x 3)
3. If the duct on the bottom of the paper output tray base hangs up on the vertical support [E] below, reach under and pull the duct up over the support.

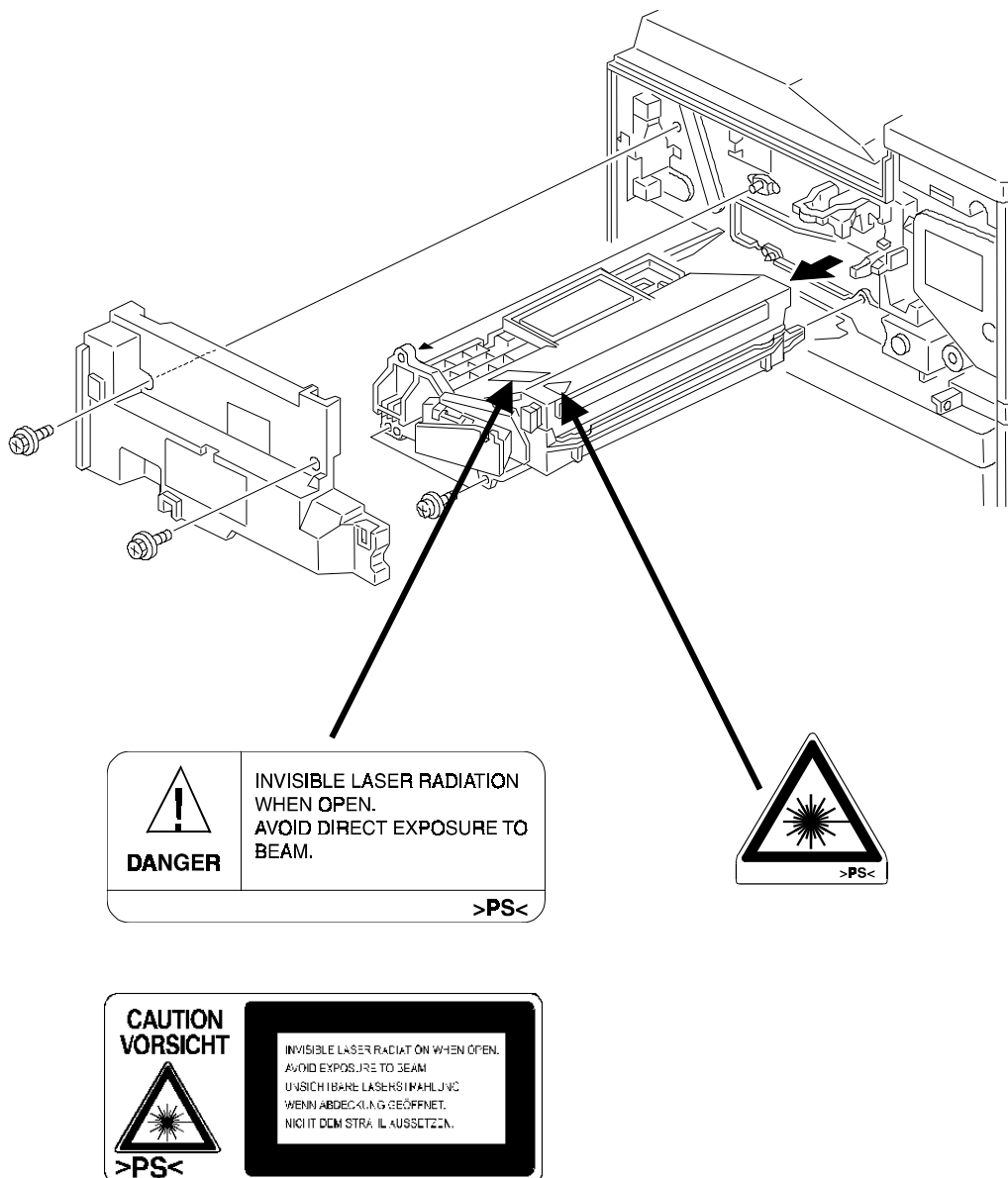
3.9 LASER UNIT

⚠ WARNING

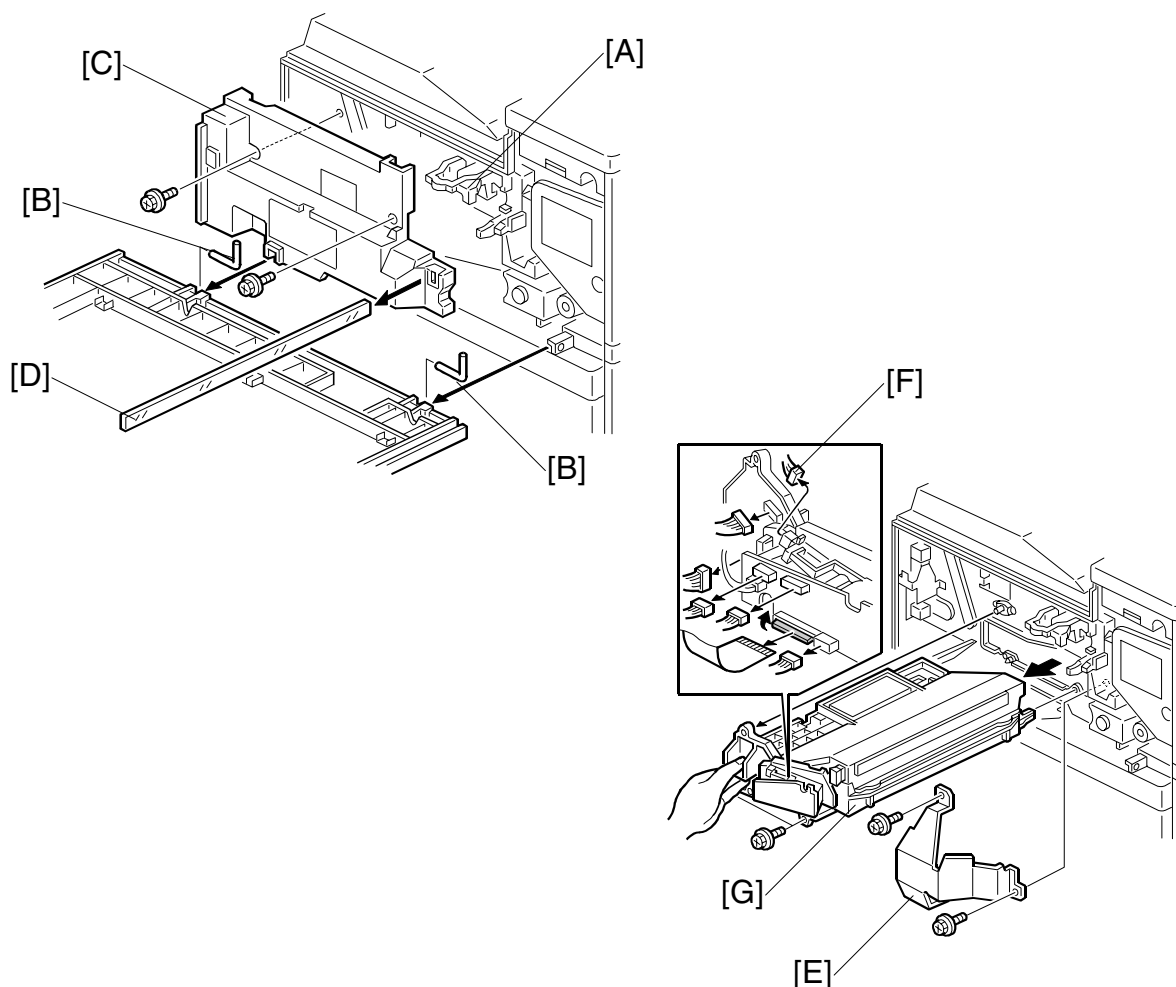
Turn off the main power switch and unplug the machine before attempting any of the procedures in this section. Laser beams can seriously damage your eyes.

3.9.1 CAUTION DECAL LOCATIONS

Two caution decals are located in the laser section as shown below. (See the next page for removal instructions.)



3.1.2 LASER UNIT



Replacement
and
Adjustment

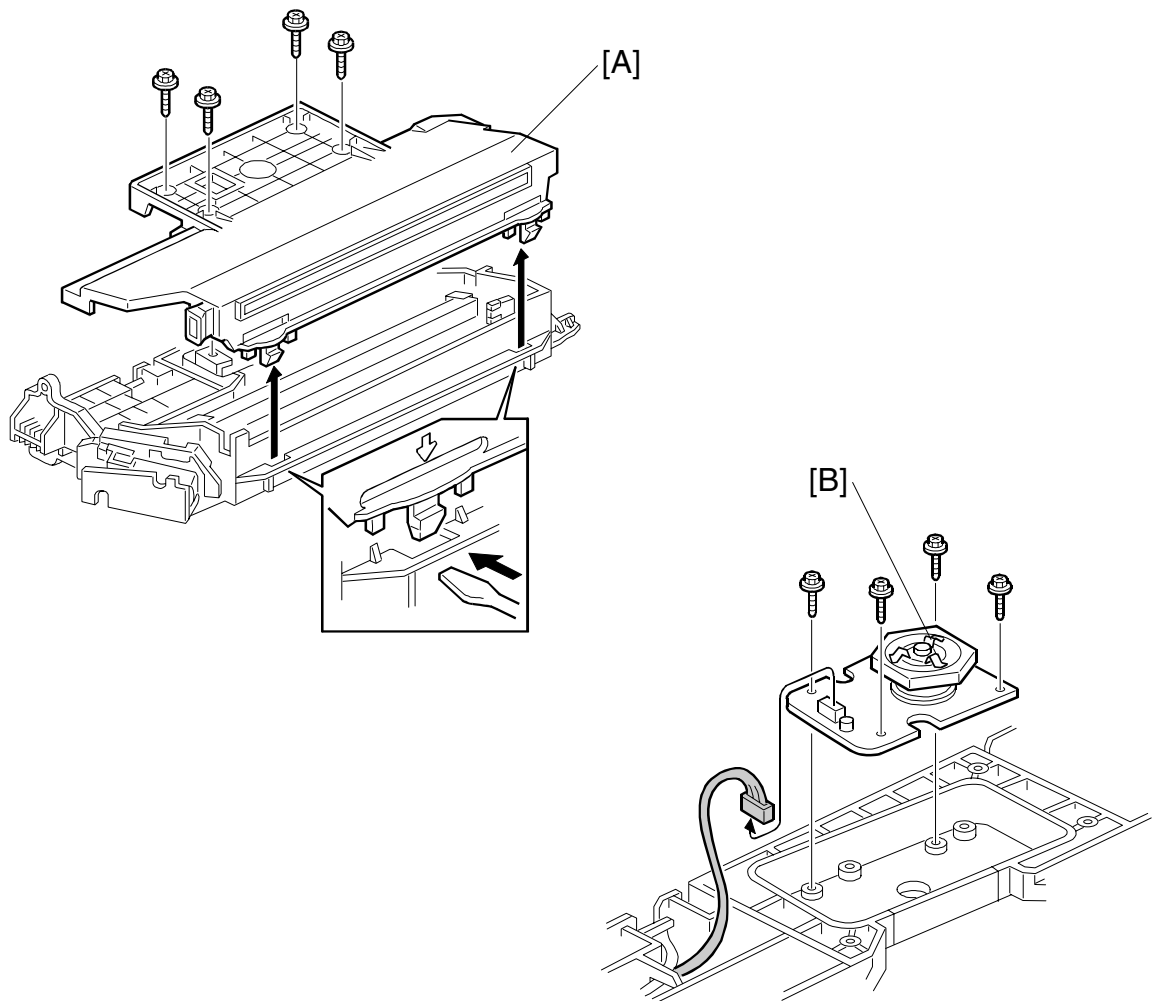
⚠ WARNING

Turn off the main power switch and unplug the machine before attempting this procedure. Laser beams can seriously damage your eyes.

1. Open the front door and raise the toner bottle holder handle [A].
2. Front door (pins [B] x 2)
3. Inner cover [C] (⚙ x 2, 🔧 x 2)
4. Shield glass [D]
5. Shield plate [E] (⚙ x 2)
6. Laser unit connectors [F] (🔌 x 5, 🔌 x 1 flat cable)
NOTE: Hold the LD board securely when disconnecting connectors.
7. Laser unit [G] (⚙ x 2)
NOTE: When sliding out the laser unit, do not hold the LD board. Hold the laser unit casing.

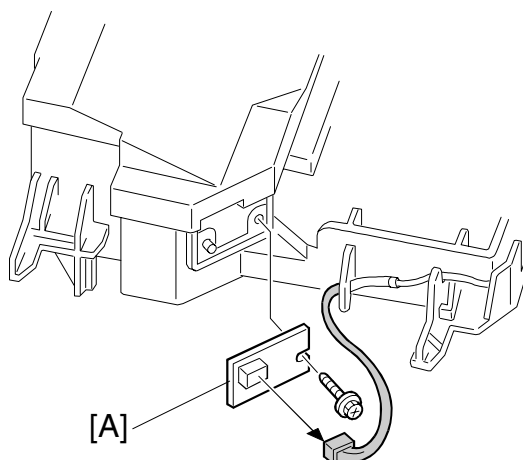
LASER UNIT

3.1.3 POLYGON MIRROR MOTOR



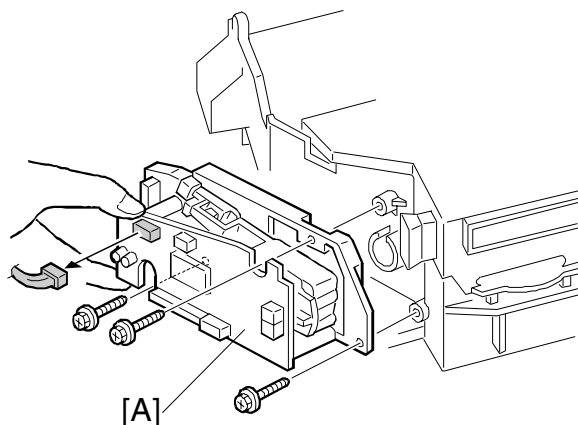
1. Laser unit (☞ 3.9.2)
2. Laser unit cover [A] (🔩 x 4, 2 hooks)
3. Polygon mirror motor [B] (🔩 x 4, 📏 x 1)
4. After replacing the motor, do the image adjustment. (☞ 3.20)

3.1.4 LASER SYNCHRONIZATION DETECTOR



1. Laser unit (☞ 3.9.2)
2. Laser synchronization detector [A] (🔩 x 1, 📡 x 1).

3.1.5 LD UNIT



1. Laser unit (☞ 3.9.2)
2. LD unit [A] (🔩 x 3, 📡 x 1)
NOTE: To avoid damaging the LD board, hold it securely when disconnecting the connectors. Hold the laser unit casing.
3. After replacing the LD board, perform SP2109 to adjust the laser beam pitch (described on the next page).

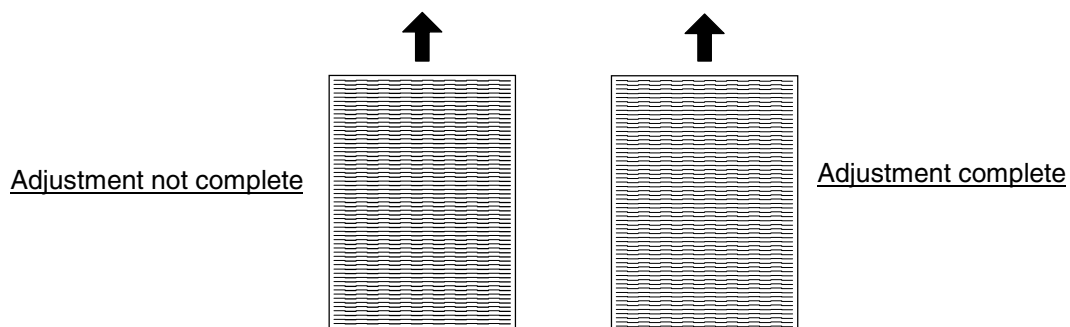
Laser Beam Pitch Adjustment

After replacing the LD board, do the laser beam pitch adjustment. There are two procedures: one for 400 dpi, and one for 600 dpi. These use the following SPs.

SP2110	Test Mode Dpi (0: 400 dpi, 8: 600 dpi)
SP2109-01	LD Beam Pitch Adjustment – 400 dpi
SP2109-02	LD Beam Pitch Adjustment – 600 dpi
SP2109-03	LD Beam Pitch Adjustment – 400 dpi Initial Setting
SP2109-04	LD Beam Pitch Adjustment – 600 dpi Initial Setting

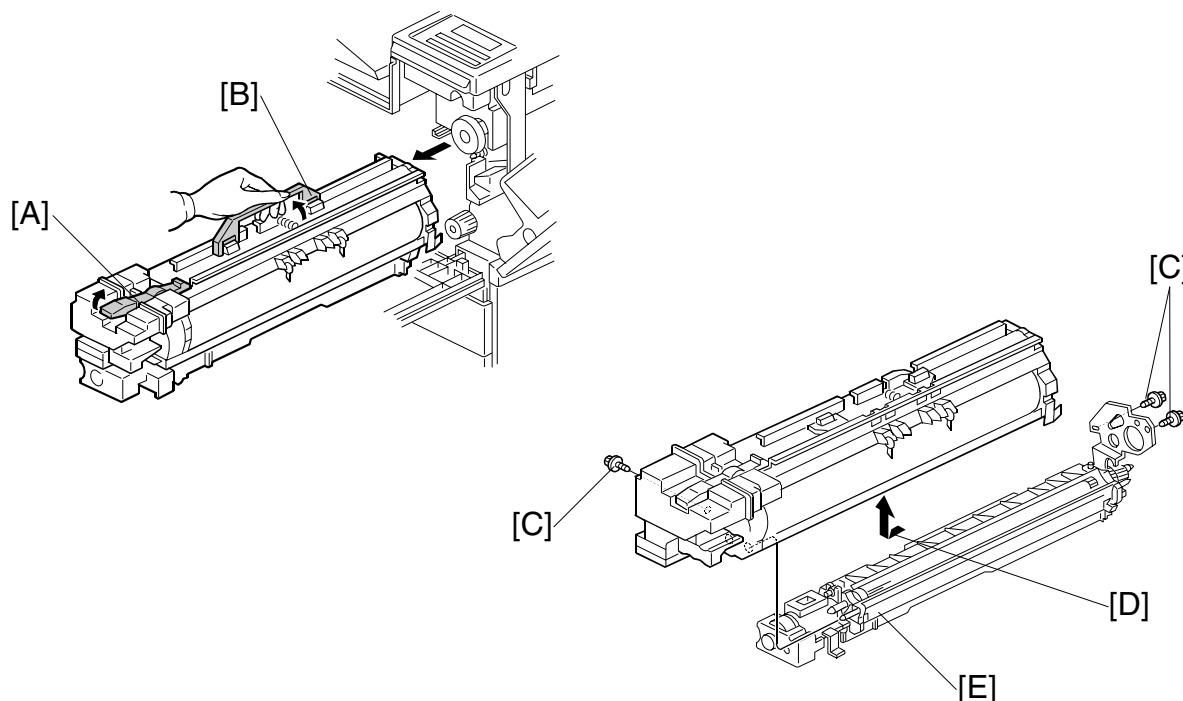
NOTE: If you do not have an SMC Report for reference, print the SMC Report so you can look up and match the SP numbers below with the correct name.

- Set SP2110 to 0 (for 400 dpi), or to 8 (for 600 dpi).
- Execute SP2109-08 to reset all the beam pitch data.
- For SP2109-01 input 144.
NOTE: The entry “144” is only a starting reference value that will allow the machine to operate. It is only a starting point for adjustment.
- Execute SP2109-03.
- Print the test pattern onto A3 (11" x 17") paper using SP2902-03 no.15. (☛ 5 Service Tables, 5.1.2 Test Pattern Printing (SP2902)).
- On the test pattern write 144, the value of SP2109-01.
- Change the value of SP2109-01 and then print another test pattern, repeating steps 2 to 6. Print about 5 patterns with different values for SP2109-01 (e.g. 48, 96, 192, 240).
- Check these test patterns. If the laser beam pitch is not correct, the image looks like a black vertical stripe pattern (see the diagrams below).
NOTE: For example, if the pattern made with the value 192 has fewer obvious stripes than the other printouts, the correct value is near 192.
- Fine adjustment: Do steps 2 to 6 to adjust the laser beam pitch position until thin lines are of uniform thickness (no stripes should appear on the printout).
NOTE: In step 3, input a value estimated to be correct (e.g., if 192 was the closest, try 182), then do steps 4 and 5, then if necessary go back to step 2 and try another value.
- After adjusting the laser beam pitch for 400 dpi, adjust it for 600 dpi, using the same procedure as for 400 dpi (use the SP modes for 600 dpi). Laser beam pitch for 600 dpi should be 24 ~ 48 more than for 400 dpi.



3.10 PCDU

3.10.1 PHOTOCONDUCTOR CLEANING/DEVELOPMENT UNIT



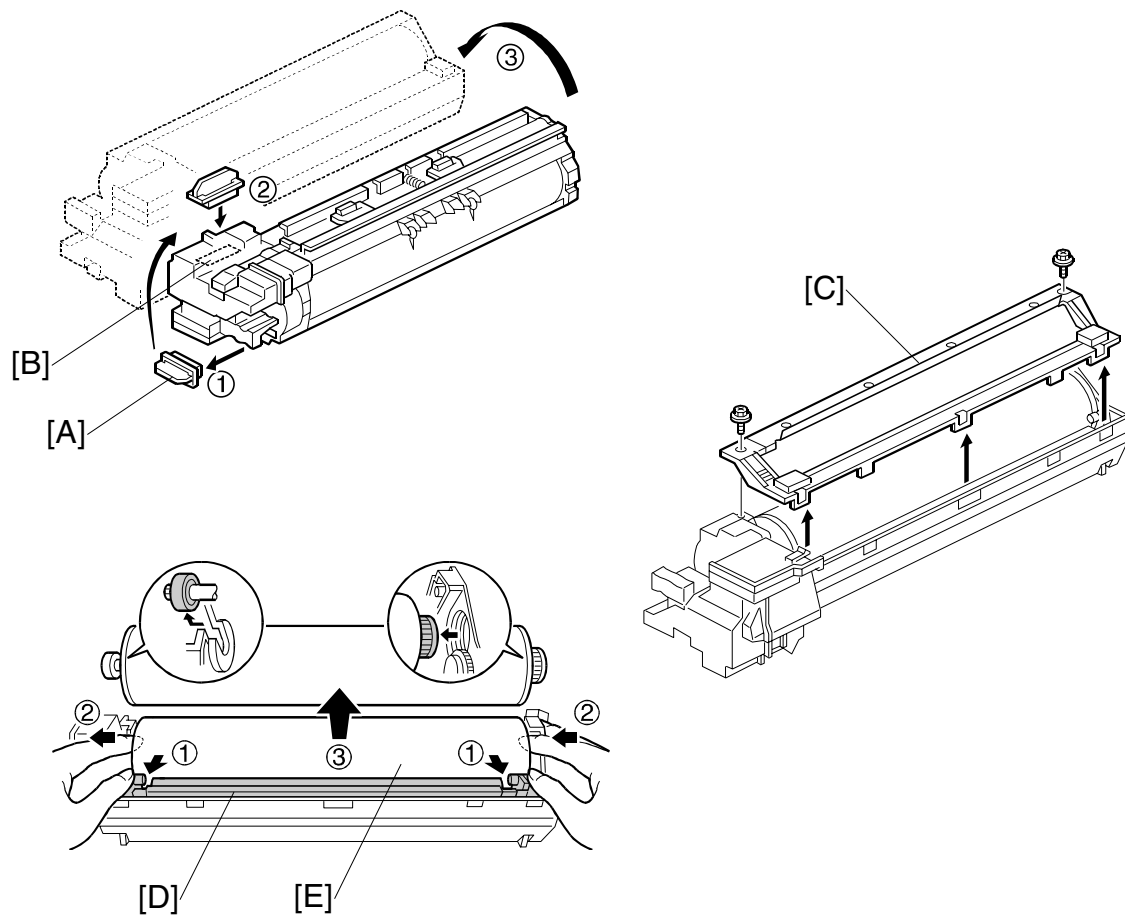
1. Open the front door.
2. Lower the by-pass tray, open the duplex unit, and open the transfer unit right cover.
3. Release the PCDU lock [A].
4. Hold the PCDU by the handle [B] and pull out slowly.
5. Remove the screws [C] (⌀ x 3).
6. Pull the PCU horizontally then up [D] to separate it from the development unit [E].
7. Cover the drum with a clean sheet of paper to protect it from exposure to light.

Assembly

1. With the PCU slightly offset, set it on top of the development unit, then carefully slide it horizontally to ensure that the end of the toner supply shutter at the toner supply port opens.
2. Check the exposed spring on the back of the PCDU.
 - If the spring is spread open, the supply port is open.
 - If the spring is not open, the supply port is shut. Slide the PCU back and engage it correctly.

NOTE: If the supply port remains closed, no toner will reach the drum.

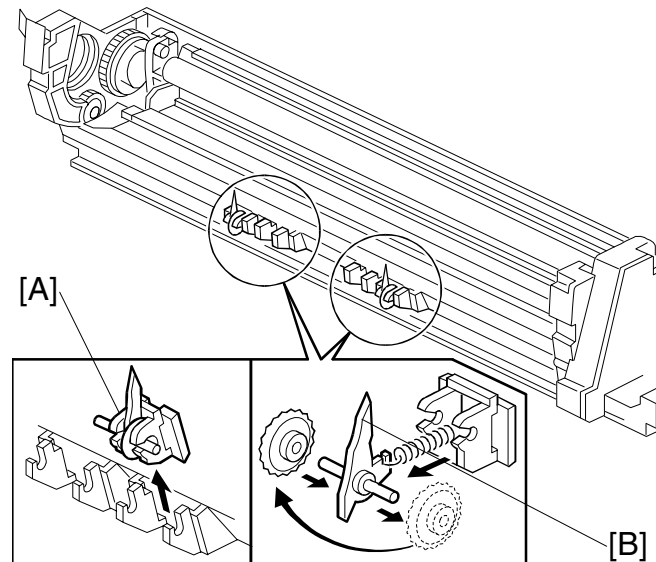
3.10.2 DRUM



1. PCDU (☞ 3.10.1)
CAUTION: Never touch the drum surface with bare hands.
2. Remove the toner cap [A] and use it to cover the toner port [B].
3. Turn the PCU upside down and remove the lower cover [C] (⚙ x 2, pawls x 3)
4. Press at ① to release the charge roller [D], release the charge roller ②, press the drum [E] to the front, and then remove the drum ③.
5. SP adjustments.

Charge Roller Bias Adjustment	2001-01	Set to the standard value to ensure carrier is not attracted to the drum.
ID Sensor Initial Setting	3001-02	Initializes the ID sensor.
Image Transfer Current – Image Face	2301 01	Set to the default settings.
Image Transfer Current – Image Back	2301 02	
Image Transfer Current – Lead Edge Face	2301 03	
Image Transfer Current – Image Face By-pass	2301 04	

3.10.3 PICK-OFF PAWLS



Replacement
and
Adjustment

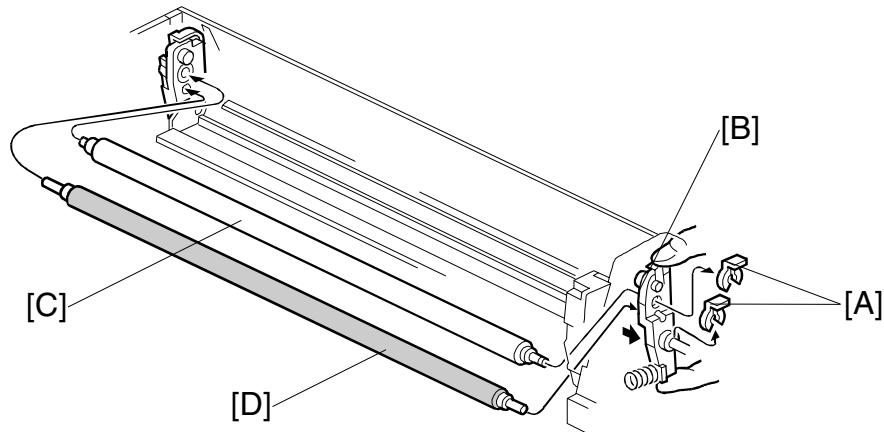
1. Remove the drum. (☛ 3.10.2)
2. Pawl assembly [A]
3. Pick-off pawl [B] (spring x 1, spur x 1)

Pick-off pawl position adjustment

If the pick-off pawl has marked the drum with a line, adjust the position by:

- Changing the spur position.
- Changing the pick-off pawl assembly position

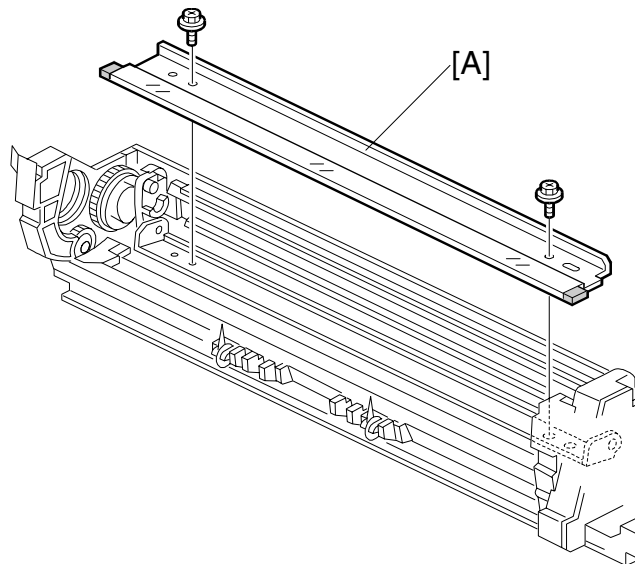
3.10.4 CHARGE ROLLER AND CLEANING ROLLER



1. Remove the drum. (☛ 3.10.2)
2. Two snap rings [A] (☞ x 2)
3. Charge roller holder [B]
4. Charge roller [C]
NOTE: Do not touch the charge roller.
5. Cleaning roller [D].
6. SP Adjustment:

Charge Roller Bias Adjustment	2001-01	Set to the standard value (-1,480 V) to ensure carrier is not attracted to the drum.
Image Transfer Current - Image Face	2301 01	Set to the default settings.
Image Transfer Current - Image Back	2301 02	
Image Transfer Current - Lead Edge Face	2301 03	
Image Transfer Current - Image Face By-pass	2301 04	

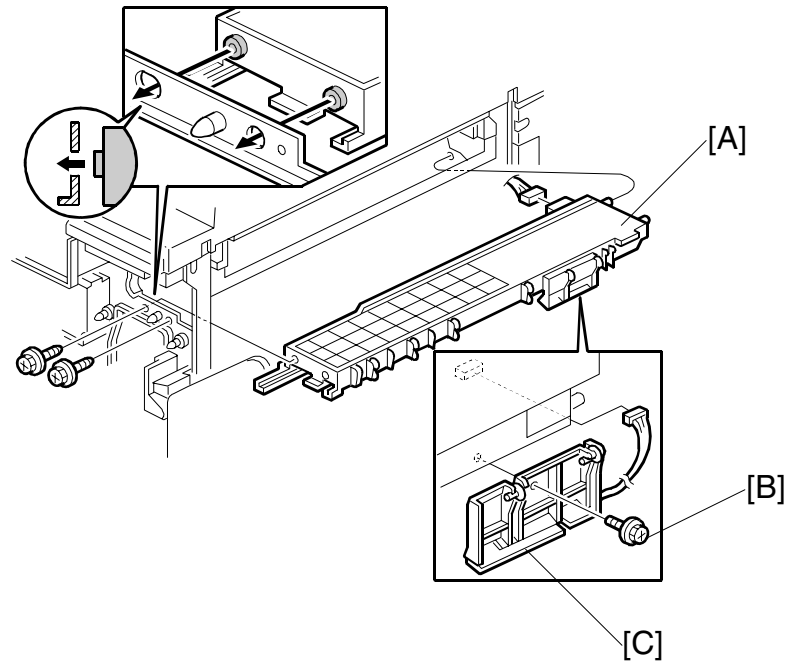
3.10.5 DRUM CLEANING BLADE



Replacement
and
Adjustment

1. Remove the drum. (➡ 3.10.2)
2. Remove the charge roller. (➡ 3.10.4)
3. Remove the drum cleaning blade [A] (🔧 x 2).

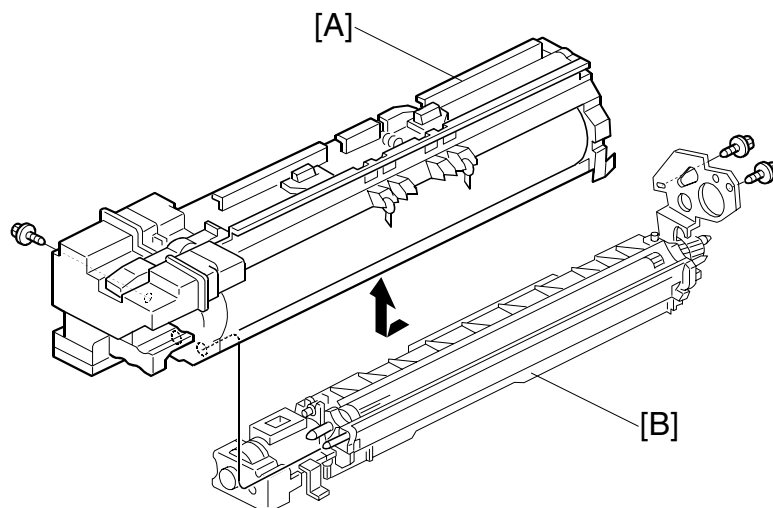
3.10.6 ID SENSOR



1. PCDU (☛ 3.10.1)
2. Fusing unit (☛ 3.14.1)
3. Development unit (☛ 3.11.1)
4. PCDU rail [A] (⚙ x 2, 📏 x 1)
5. ID sensor bracket [B] (⚙ x 1, 📏 x 1)
6. ID sensor [C] (⚙ x 1)
7. Perform the ID sensor initial setting with SP3001-2 (☛ 5. Service Tables)

3.11 DEVELOPMENT

3.11.1 DEVELOPMENT UNIT



Replacement
and
Adjustment

1. PCDU. (☞ 3.10.1)

NOTE: Spread paper on a clean flat surface that is free of pins, paper clips, staples, screws or any other metal objects.

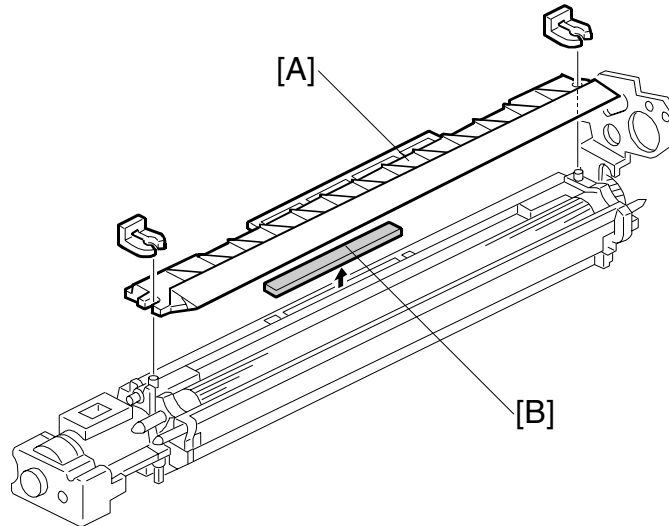
2. Separate the PCU [A] and development unit [B] (☞ x 3).
3. Set the development unit on the spread paper, and cover the exposed drum with a clean piece of paper.
4. SP adjustment if you are temporarily installing a used development unit for test purposes:

Vref Manual Set	SP2220	Set TD Sensor reference voltage to 4.0 V.
TD Sensor Manual Setting	SP2802-01	Adjusts TD sensor output.

(☞ 5. Service Tables)

DEVELOPMENT

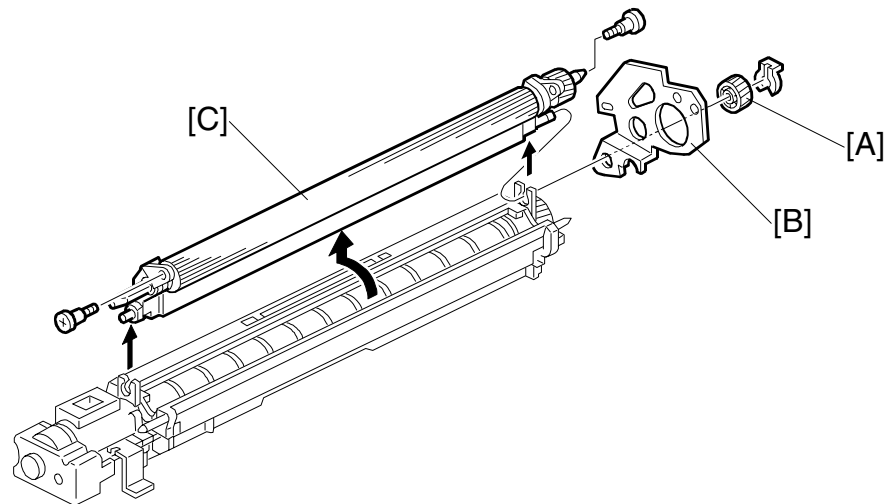
3.1.2 DEVELOPMENT FILTER



1. Development unit (☛ 3.11.1)
2. Upper development cover [A] (☞ x 2)
3. Development filter [B].

NOTE: Make sure that the surface with the red mark is facing up.

3.1.3 DEVELOPMENT ROLLER

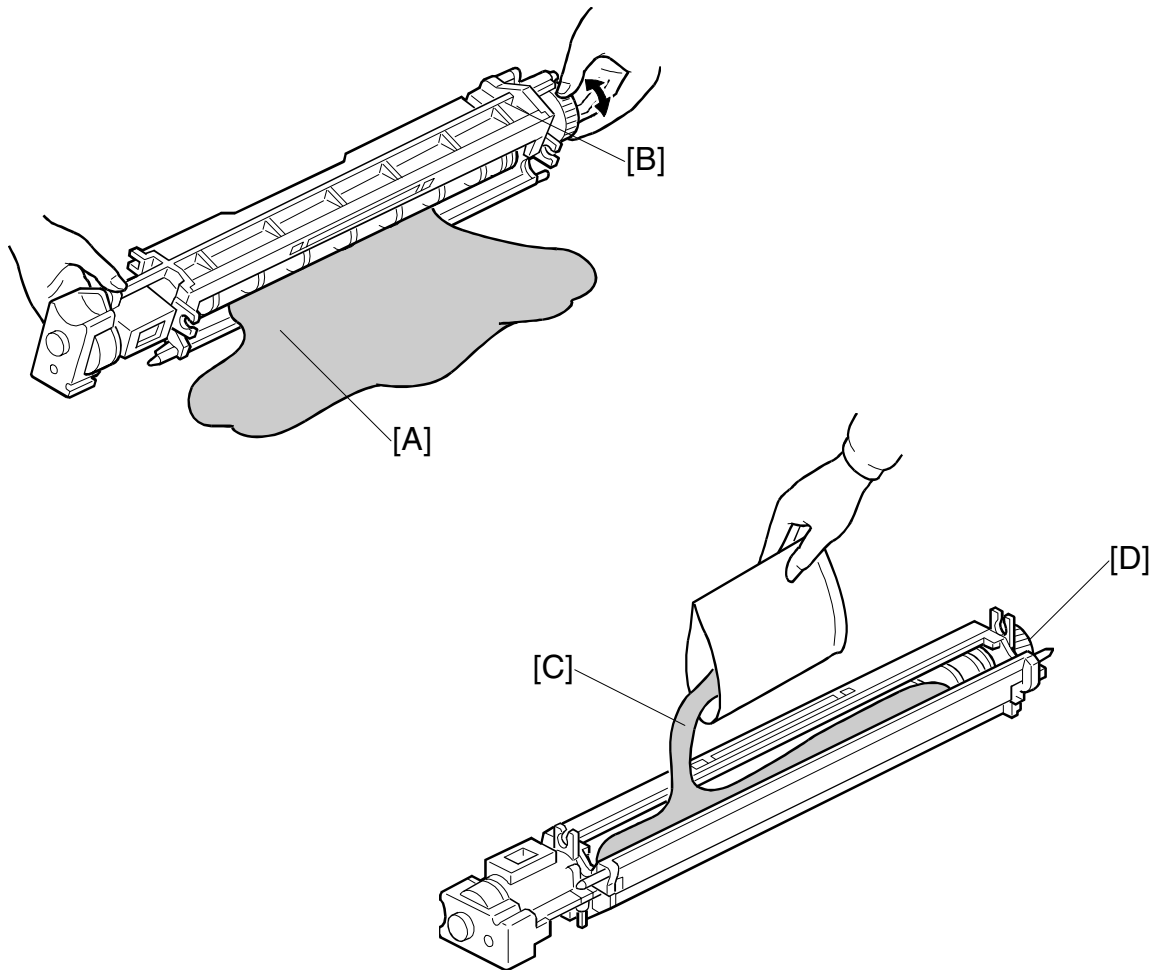


Replacement
and
Adjustment

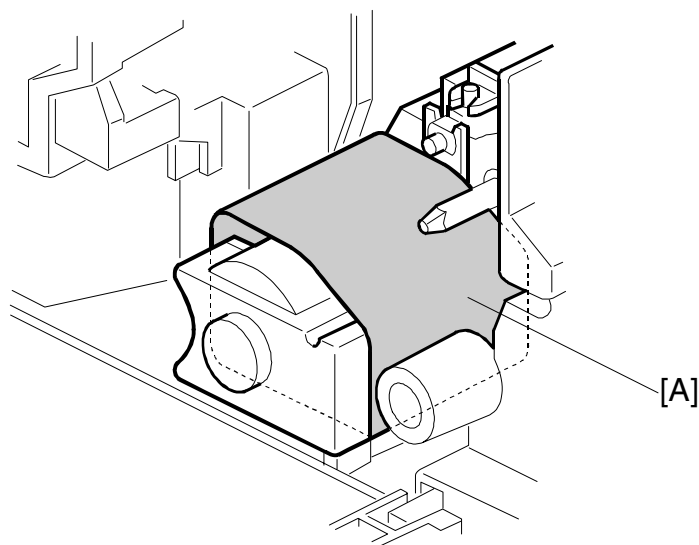
1. Development unit (☛ 3.11.2)
2. Upper development cover (☛ 3.11.2)
3. Gear [A] (⚙️ x 1)
4. Joint bracket [B]
5. Development roller [C] (🌀 x 2)

NOTE: 1) Work carefully to avoid scratching or nicking the development roller.
2) Make sure that the part is grounded correctly.

3.1.4 DEVELOPER

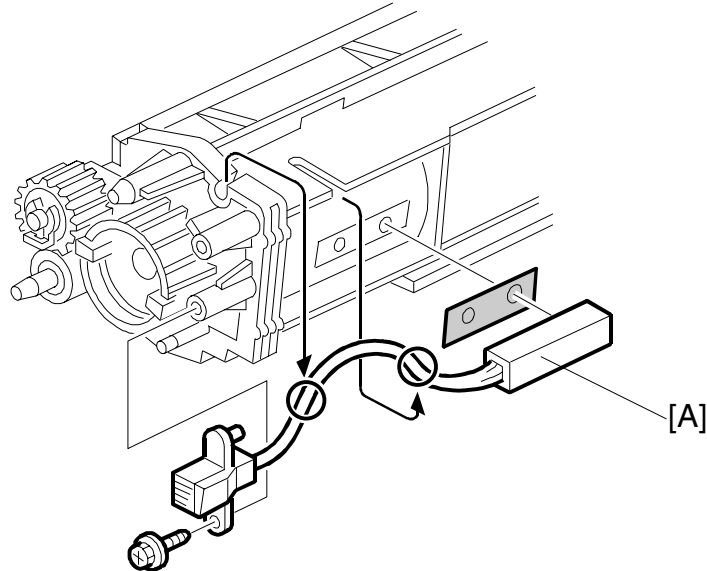


1. Development unit (➡ 3.11.1)
2. Remove the development roller (➡ 3.11.3)
3. Tip out the old developer [A]
4. Turn drive gear [B] to ensure that no developer remains in the unit or on the developer roller.
NOTE: Dispose of the used developer in accordance with local regulations.
Work carefully to avoid scratching or nicking the development roller.
5. Pour approximately 1/3 of the developer [C] evenly along the length of the development unit.
6. Rotate the drive gear [D] to work the developer into the unit. Repeat [C] and [D] until all toner is in the unit and level with the edges.



7. Reassemble the development unit
8. Cover the toner entrance hole [A] with a piece of paper.
9. Install the development unit in the machine.
10. Turn on the main power switch, make sure that the machine has warmed up, then perform the TD sensor initial setting using SP2801.
NOTE: When performing this setting, cover the toner entrance hole with a piece of paper. This prevents used toner falling from the PCU into the development unit during the TD sensor initial setting and interfering with the Vref setting (toner density reference voltage).
11. After performing the TD sensor initial setting, remove the sheet [A] from the development unit.

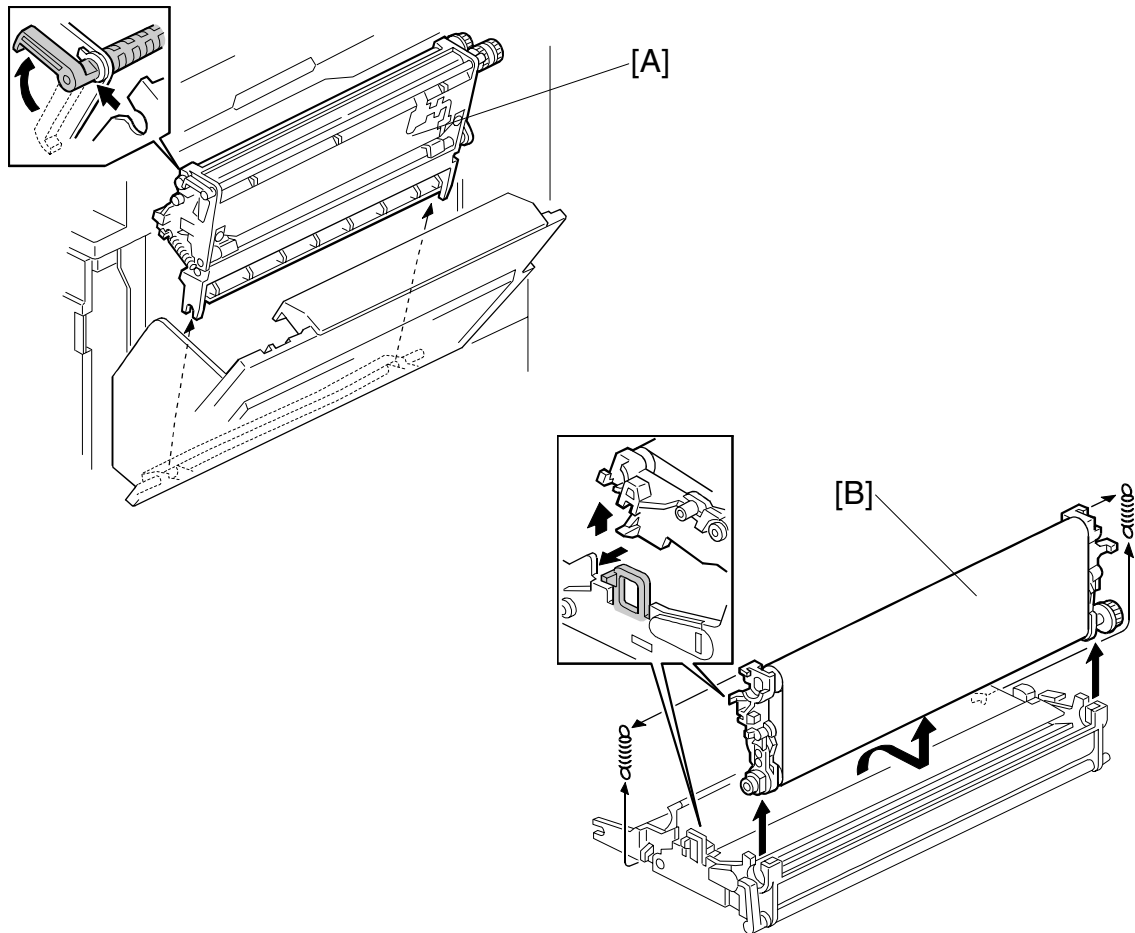
3.1.5 TD SENSOR



1. Remove the development unit (☛ 3.11.1)
2. Empty all developer from the development unit (☛ 3.11.4)
3. TD sensor [A] (🔧 x 1)
NOTE: The TD sensor is attached to the casing with double-sided tape. Pry it off with the flat head of a screwdriver. Use fresh double-sided tape to re-attach the sensor.
4. Pour new developer into the development unit and perform the TD sensor initial setting using SP2801.
NOTE: When performing the TD sensor initial setting, cover the toner entrance hole with a piece of paper (☛ 3.11.4).

3.12 TRANSFER UNIT

3.12.1 TRANSFER BELT UNIT



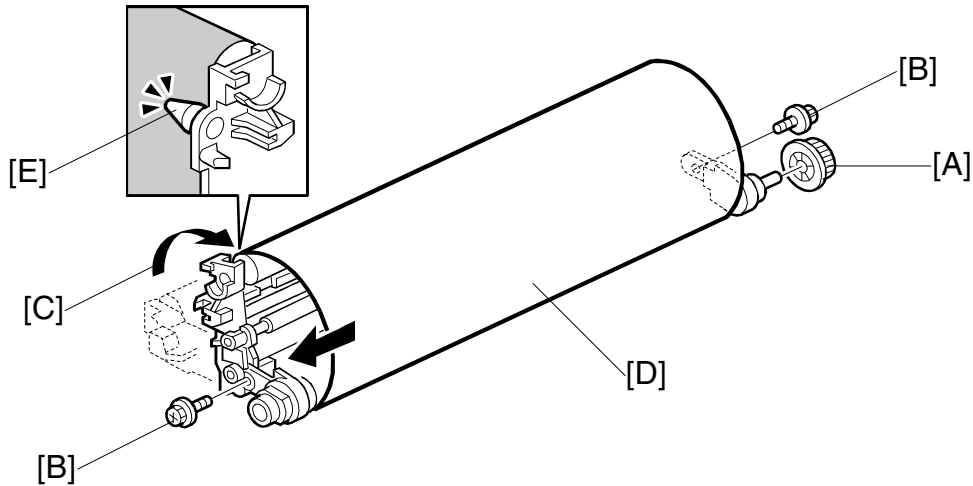
Replacement
and
Adjustment

NOTE: To avoid exposing the PCU drum to strong light, cover it with paper if the right cover will be open for a long period.

1. Lower the by-pass tray, open the duplex unit, and open the right cover.
2. Transfer unit [A] (1 hook)
3. Transfer belt [B] (springs x 2, 1 hook)

NOTE: Avoid touching the transfer belt surface.

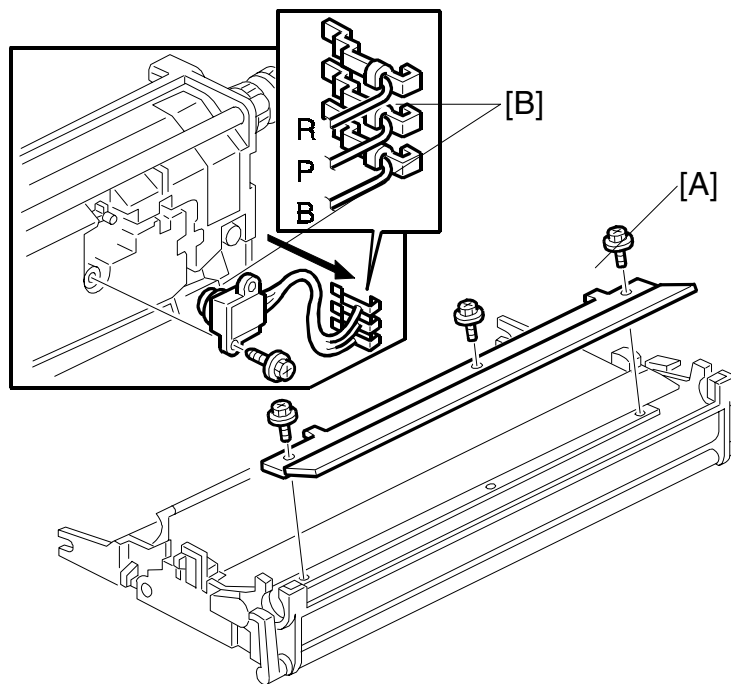
3.12.2 TRANSFER BELT



1. Remove the transfer belt unit. (➡ 3.12.1)
2. Belt drive gear [A]
3. Set screws [B] (⌀ x 2)
4. Lay on a flat, clean surface and fold the unit to release the tension on the belt [C].
5. Transfer belt [D]

NOTE: 1) Avoid touching the transfer belt surface.
2) Before installing the new transfer belt, clean all the rollers and shafts with alcohol to prevent the belt from slipping.
3) When reinstalling the transfer belt, make sure that the belt is under the pin [E].
4) To avoid damaging the transfer belt during installation, manually turn the rollers and make sure that the new transfer belt is not running over the edges of any of the rollers.

3.12.3 CLEANING BLADE/TONER OVERFLOW SENSOR



Replacement
and
Adjustment

Transfer Belt Cleaning Blade

1. Transfer belt unit. (☞ 3.12.1)
2. Transfer belt. (☞ 3.12.2)
3. Transfer belt cleaning blade [A] (🔧 x 3)

NOTE: Avoid touching the edge of the new blade. Check the new blade for dust or damage.

Toner Overflow Sensor

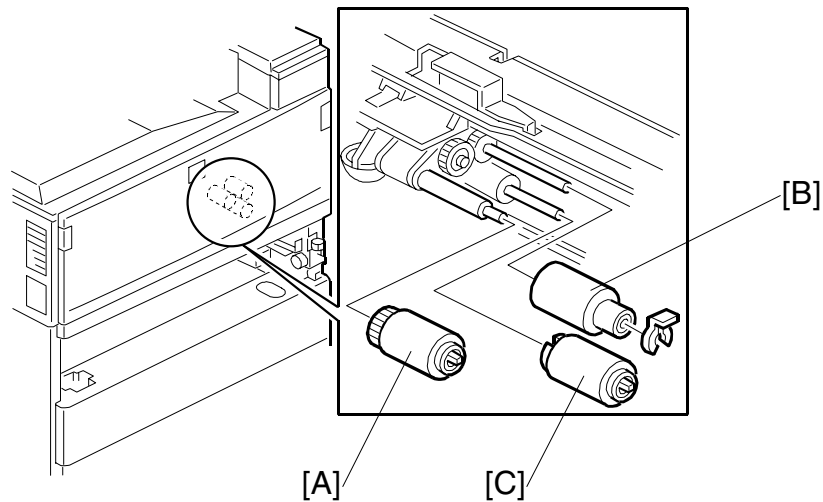
1. Transfer belt unit. (☞ 3.12.1)
2. Transfer belt. (☞ 3.12.2)
3. Transfer belt cleaning blade [A] (🔧 x 3)
4. Turn over the transfer unit and empty the used toner in the transfer unit.
5. Toner overflow sensor [B] (🔧 x 1, 📏 x 3)

TRANSFER UNIT

NOTE: Re-install the color-coded wires in the correct order.
R: Red, P: Purple, B: Blue

3.13 PAPER FEED

3.13.1 PICK-UP, SEPARATION, AND FEED ROLLERS

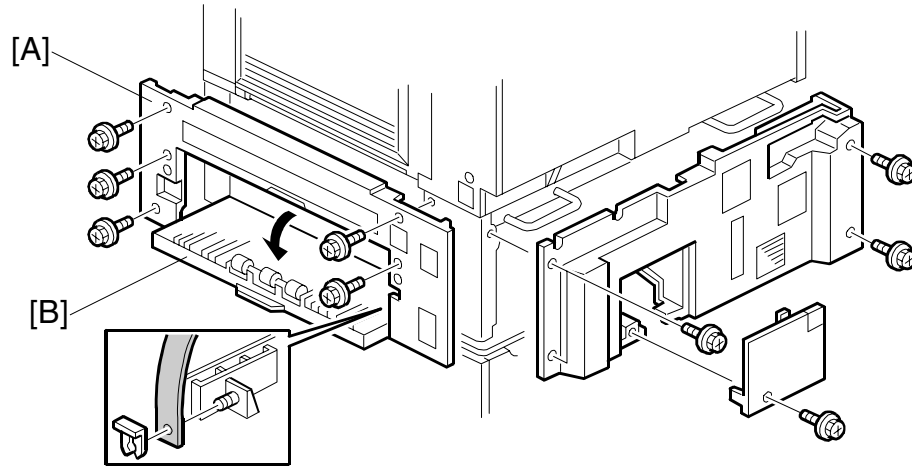


Replacement
and
Adjustment

1. Paper tray
2. Pick-up roller [A]
3. Feed roller [B] (⌀ x 1)
4. Separation roller [C] (⌀ x 1)

NOTE: Do not touch the roller surface with bare hands. After installing the new rollers, do SP7816 for the appropriate paper tray.

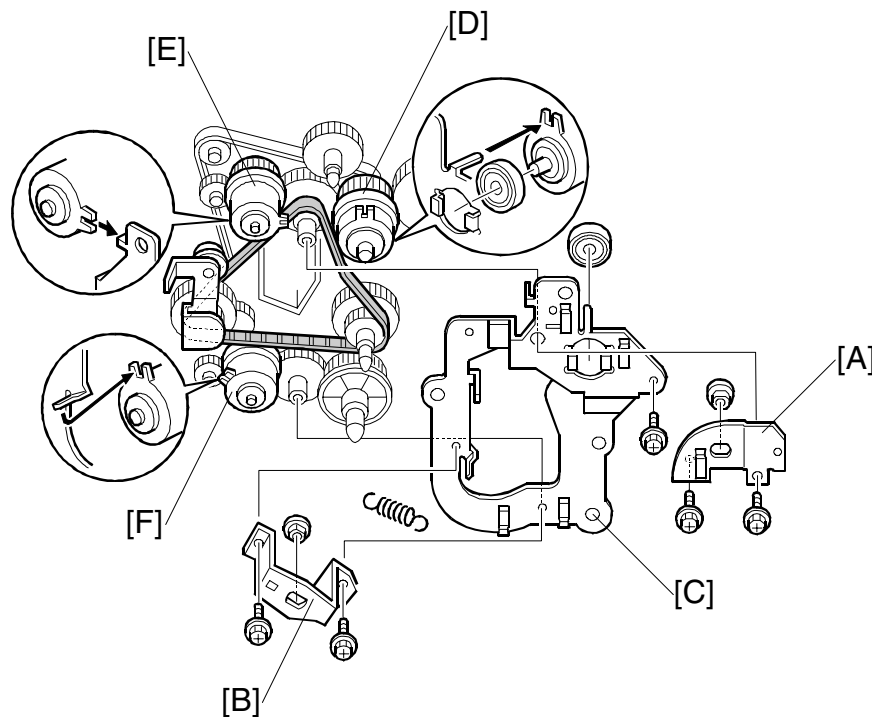
3.13.2 LOWER RIGHT COVER



1. Duplex unit (☛ 3.4)
2. By-pass tray (☛ 3.6)
3. LCT (if installed)
4. Lower right cover [A] (⚙ x 5)
5. Vertical transport cover [B]

NOTE: Push the cover completely to the left and then press in on the right tab to release the peg from the hole.

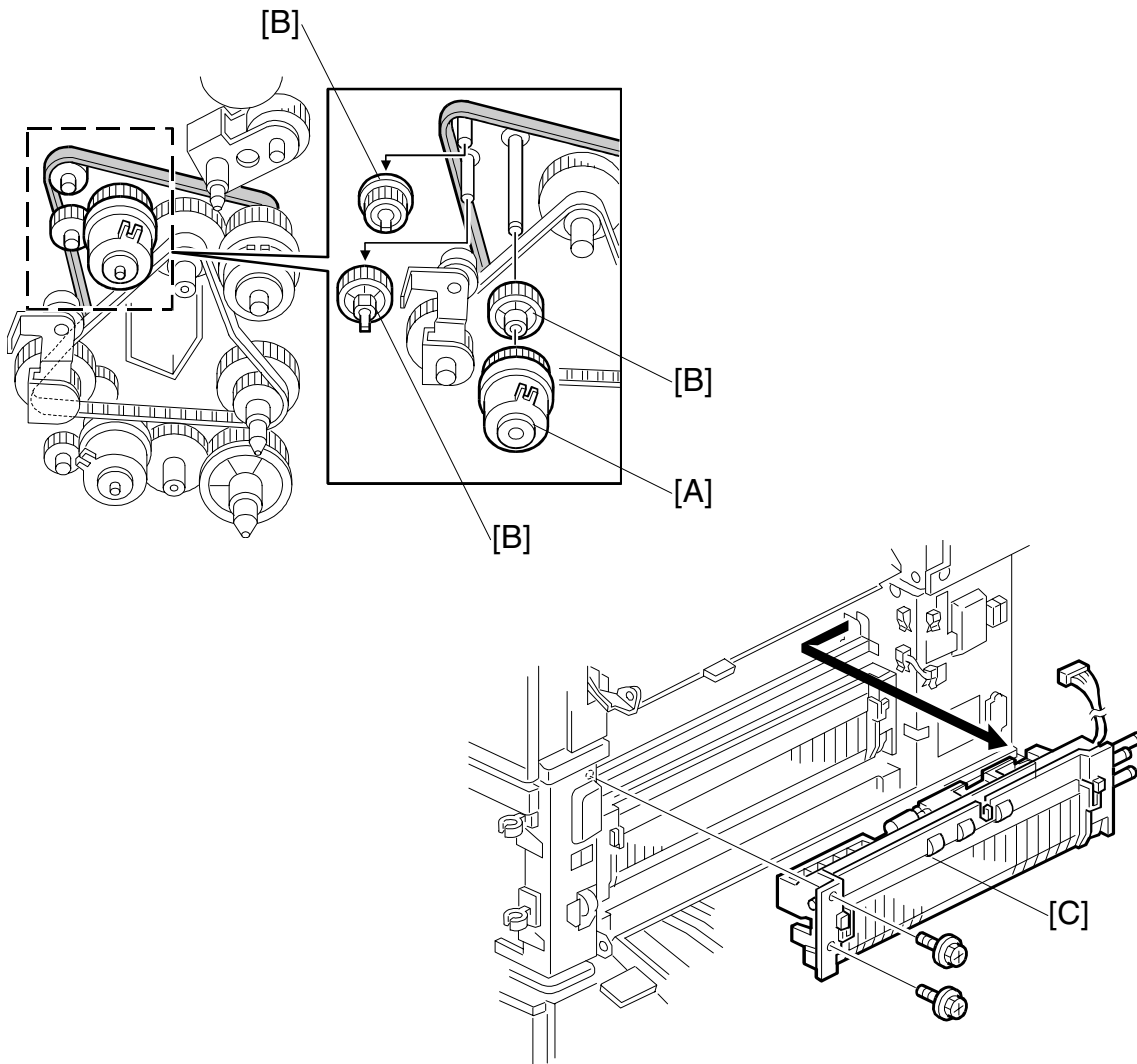
3.13.3 RELAY/UPPER PAPER FEED AND LOWER PAPER FEED CLUTCHES



Replacement
and
Adjustment

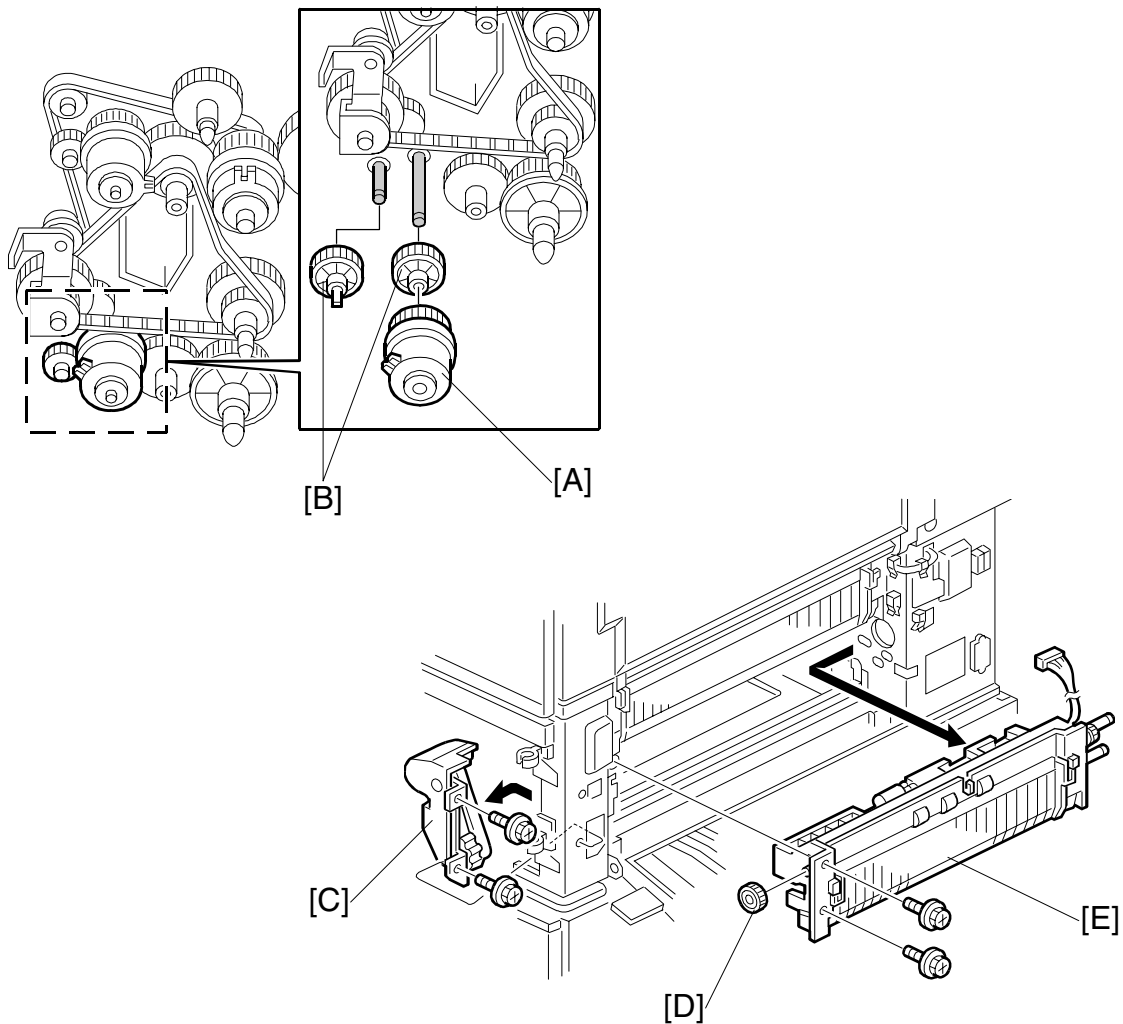
1. Rear lower cover (☛ 3.7.2)
2. First paper feed clutch bracket [A] (☛ x 2, bushing x 1)
3. Second paper feed clutch bracket [B] (☛ x 2, bushing x 1)
4. Drive bracket [C] (☛ x 1, spring x 1, bearing x 1)
5. Relay clutch [D] (☛ x 1)
6. Upper paper feed clutch [E] (☛ x 1)
7. Lower paper feed clutch [F] (☛ x 1)

3.13.4 UPPER PAPER FEED UNIT FOR TRAY 1



1. Upper paper tray
2. Right lower cover (☛ 3.13.2)
3. Upper right cover (☛ 3.5)
4. Upper paper feed clutch [A] (☛ 3.13.3)
5. 3 relay gears [B]
6. Upper paper feed unit [C] (⚙ x 2, ☛ x 1)

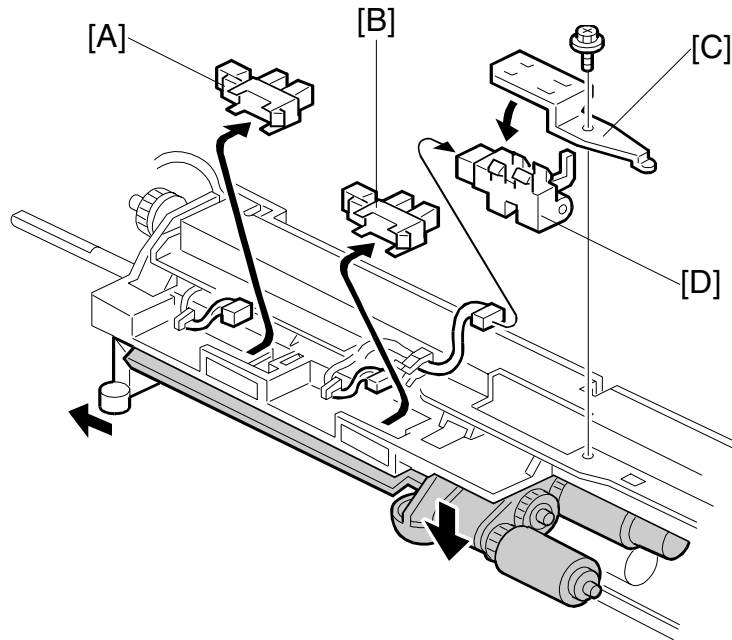
3.13.5 LOWER PAPER FEED UNIT FOR TRAY 2



Replacement
and
Adjustment

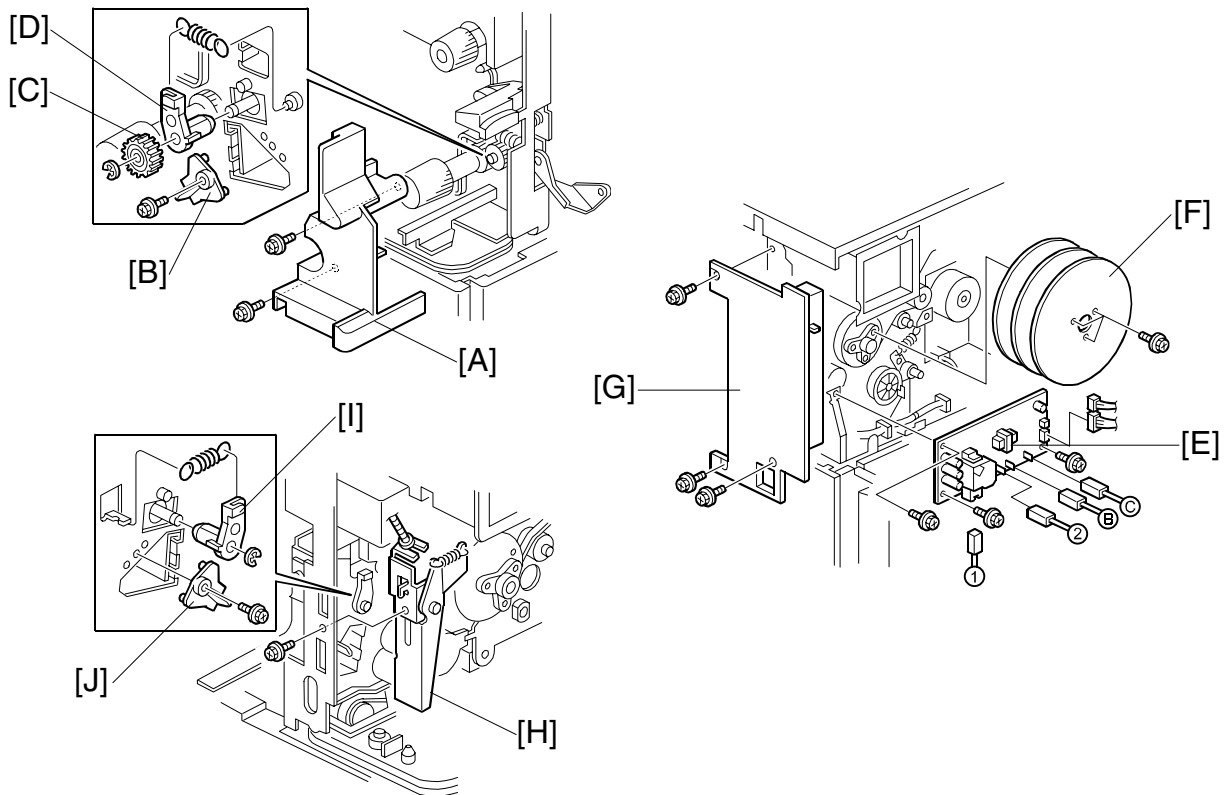
1. Lower the paper trays
2. Lower right cover (☛ 3.13.2)
3. Lower paper feed clutch [A] (☛ 3.13.3)
4. Relay gears [B] (x 3)
5. Cover [C] (☛ x 2)
6. Gear [D] (x 1)
7. Lower paper feed unit [E] (☛ x 2, ☛ x 1)

3.13.6 PAPER END/PAPER LIFT/RELAY SENSORS



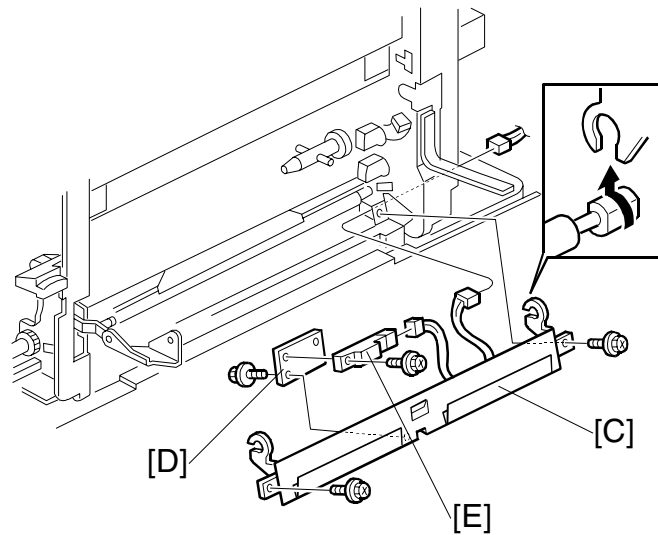
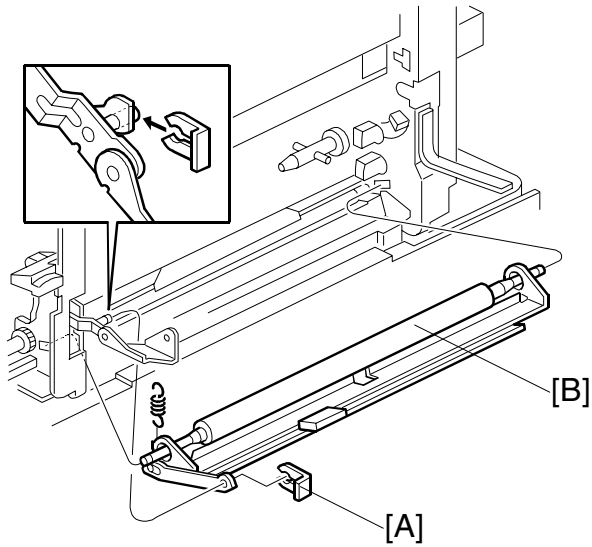
1. Appropriate paper feed unit (☛ 3.13.4, 3.13.5)
2. Paper lift sensor [A] (☞ x 1)
3. Paper end sensor [B] (☞ x 1)
4. Relay sensor bracket [C] (☛ x 1, ☞ x 1)
5. Relay sensor [D]

3.13.7 REGISTRATION SENSOR





1. Front door (☛ 3.3•)
2. Rear upper cover (☛ 3.7.1)
3. Right door and transfer belt unit (☛ 3.5, 3.12.1)
4. PCU (☛ 3.10.1)
5. Development unit (☛ 3.12.1)
6. Inner cover [A] (🔧 x 2)
7. Front registration holder [B] (🔧 x 1)
8. Front registration roller gear [C] (⌚ x 1)
9. Registration roller bushing [D] (spring x 1)
10. High voltage power supply board [E] (🔧 x 3, 📡 x 6)
11. Three flywheels [F] (🔧 x 3)
12. Right rear cover [G] (🔧 x 3)
13. Right cover switch bracket [H] (🔧 x 1)
14. Rear registration holder [I] (🔧 x 1)
15. Registration roller bushing [J] (⌚ x 1, spring x 1)

PAPER FEED



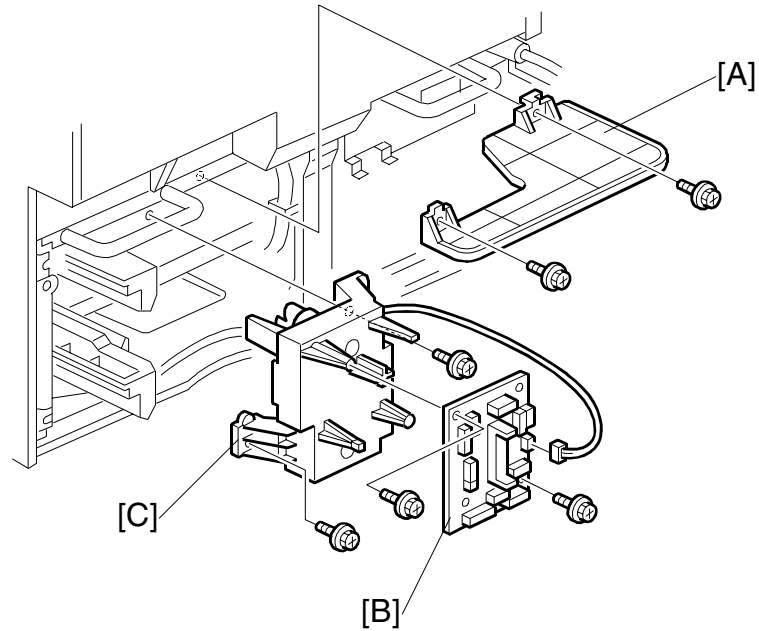
16. Guide plate [A] and registration roller [B] (spring x 1,  x 1)

17. Registration guide plate [C] ( x 2,  x 1)

18. Sensor bracket [D] ( x 1)

19. Registration sensor [E] ( x 1,  x 1)

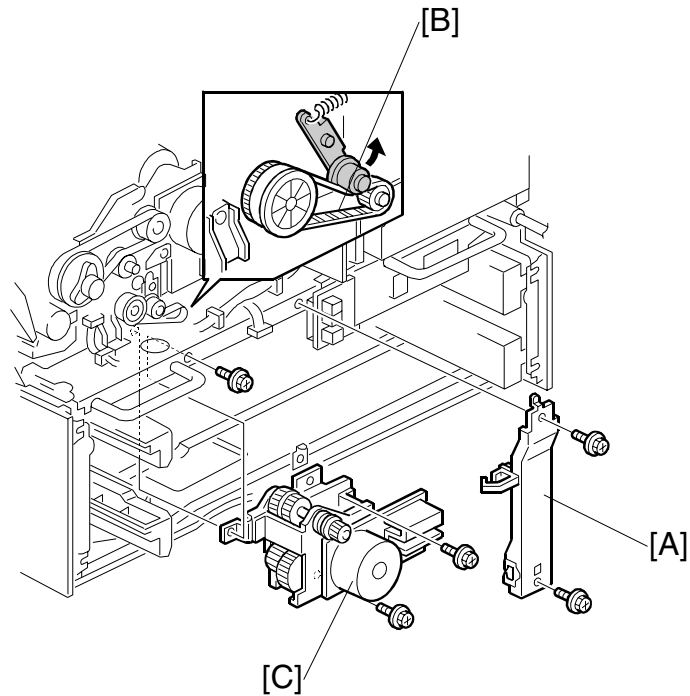
3.1.8 TRAY LIFT MOTOR



Replacement
and
Adjustment

1. Rear lower cover (☛ 3.7.2)
2. Bracket [A] (🔩 x 2)
3. Motor control board [B] (🔩 x 2, 📡 x 13)
4. Tray lift motor [C] (🔩 x 2)

3.1.9 FEED/DEVELOPMENT MOTOR



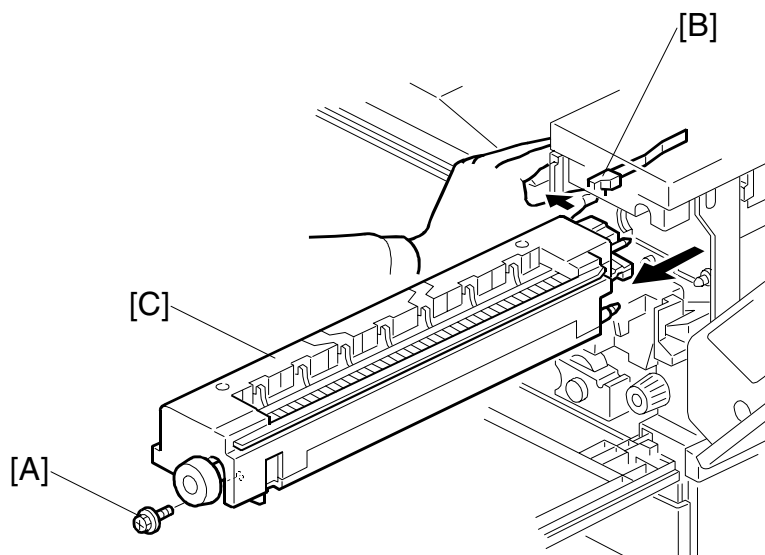
1. Rear lower cover (⚙ x 4) (➡3.7.2)
2. Rear upper cover (⚙ x 4) (➡3.7.1)
3. Tray lift motor (➡ 3.13.8)
4. Support [A] (⚙ x 2, harnesses x 2)
5. Timing belt [B] (Raise arm to release tension on belt.)
6. Feed/development motor [C] (⚙ x 3, 📡 x 2)

3.14 FUSING


3.14.1 FUSING UNIT

CAUTION

Allow the unit to cool before doing the following procedure.

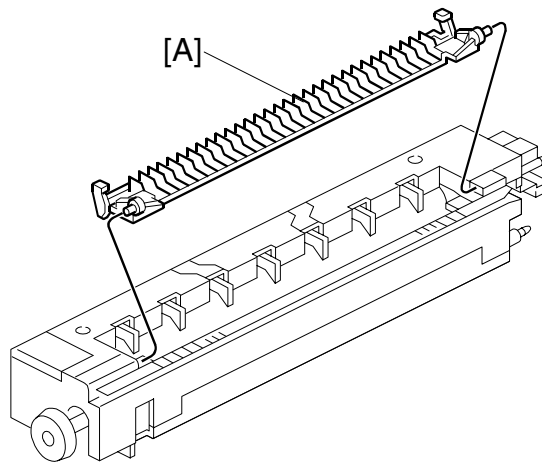


Replacement
and
Adjustment

1. Open the front door, duplex unit, and right door.
2. Set screw [A] ( x 1)
3. Fusing unit release lever [B]
4. Slide out the fusing unit [C]
NOTE: After removing the fusing unit, close the right cover.

FUSING

3.1.2 FUSING UNIT EXIT GUIDE

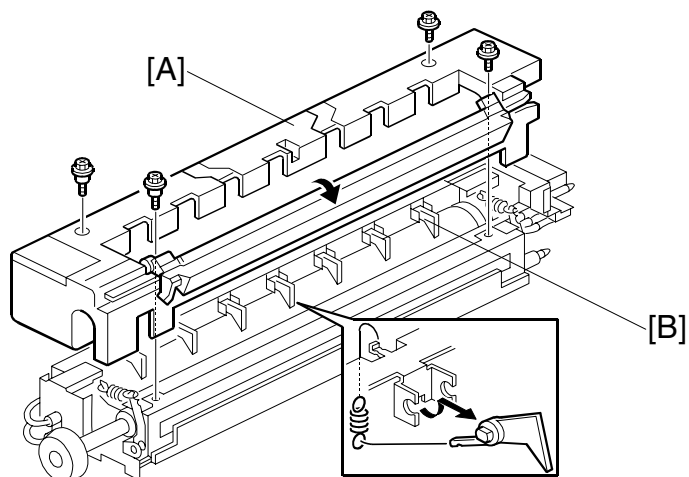


1. Fusing unit (☛ 3.14.1)

2. Exit guide [A]

NOTE: Press the guide to the left and then press on the right end to release the peg from the hole.

3.1.3 HOT ROLLER STRIPPERS



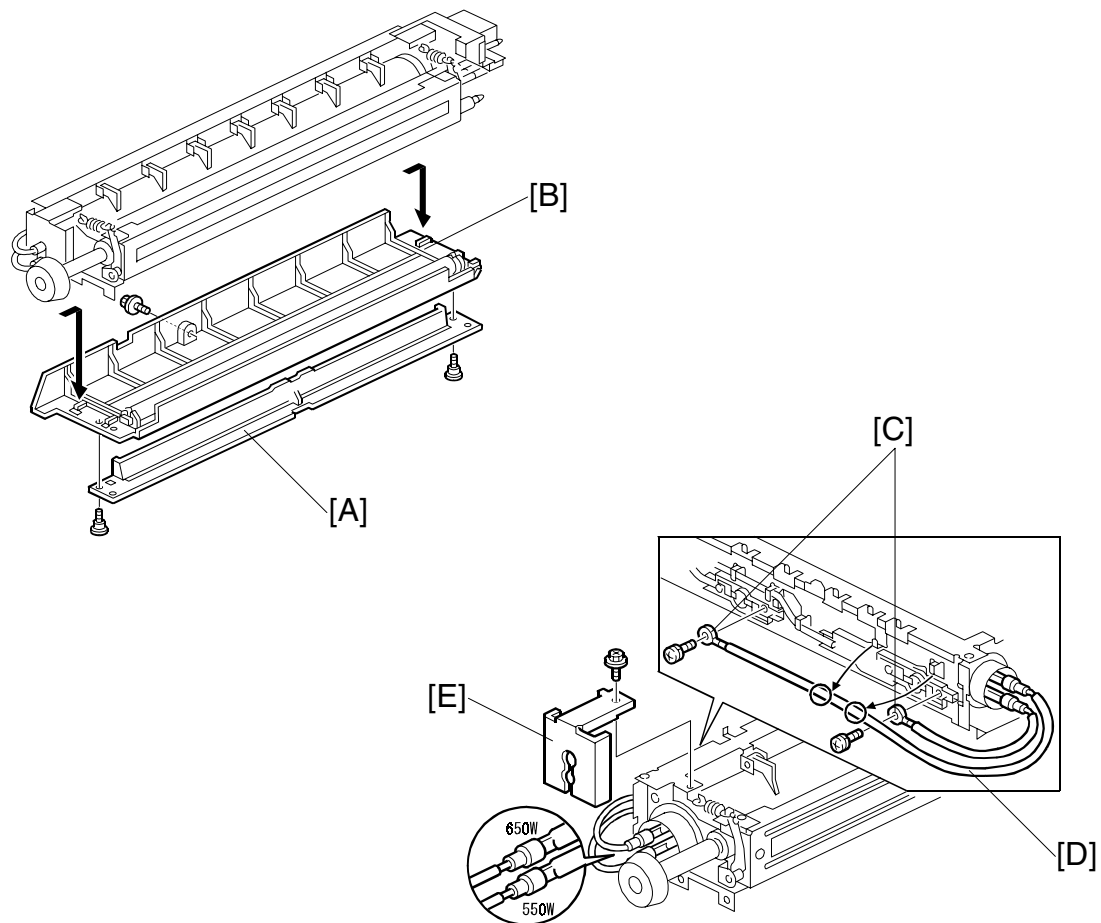
1. Fusing unit (☛ 3.14.1)

2. Fusing unit cover [A] (☛ x 4)

NOTE: Note the positioning of the step screws (x 2) and set screws (x 2).

3. Hot roller strippers [B] (x 7), springs (x 7)

3.1.4 FUSING LAMPS



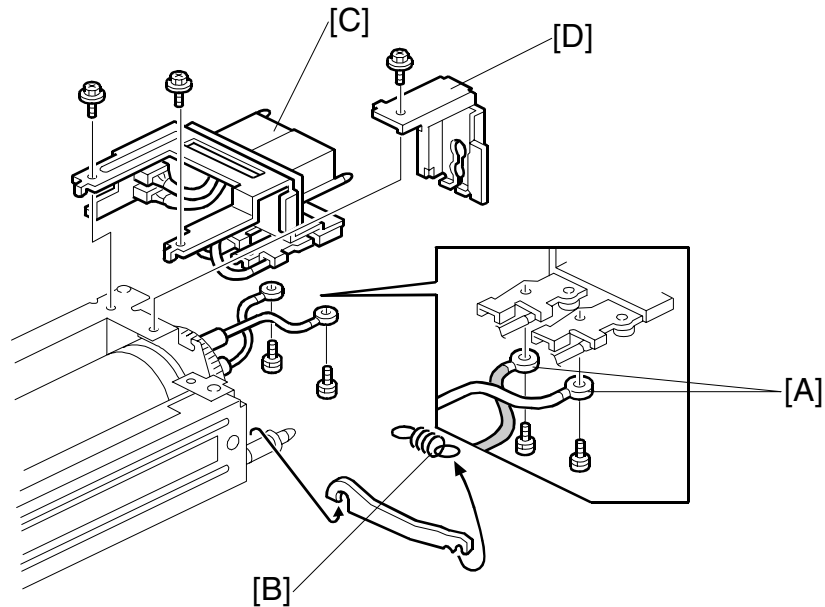
Replacement
and
Adjustment

1. Fusing unit (☞ 3.14.1)
2. Fusing unit cover (☞ • 3.14.3)
3. Fusing entrance guide [A] (🔩 x 2)
4. Lower cover [B] (🔩 x 1)

Left Side

5. Two terminals [C] (🔩 x 2)
6. Center fusing lamp lead [D] (3 clamps)
7. Bracket [E] (🔩 x 1)

FUSING



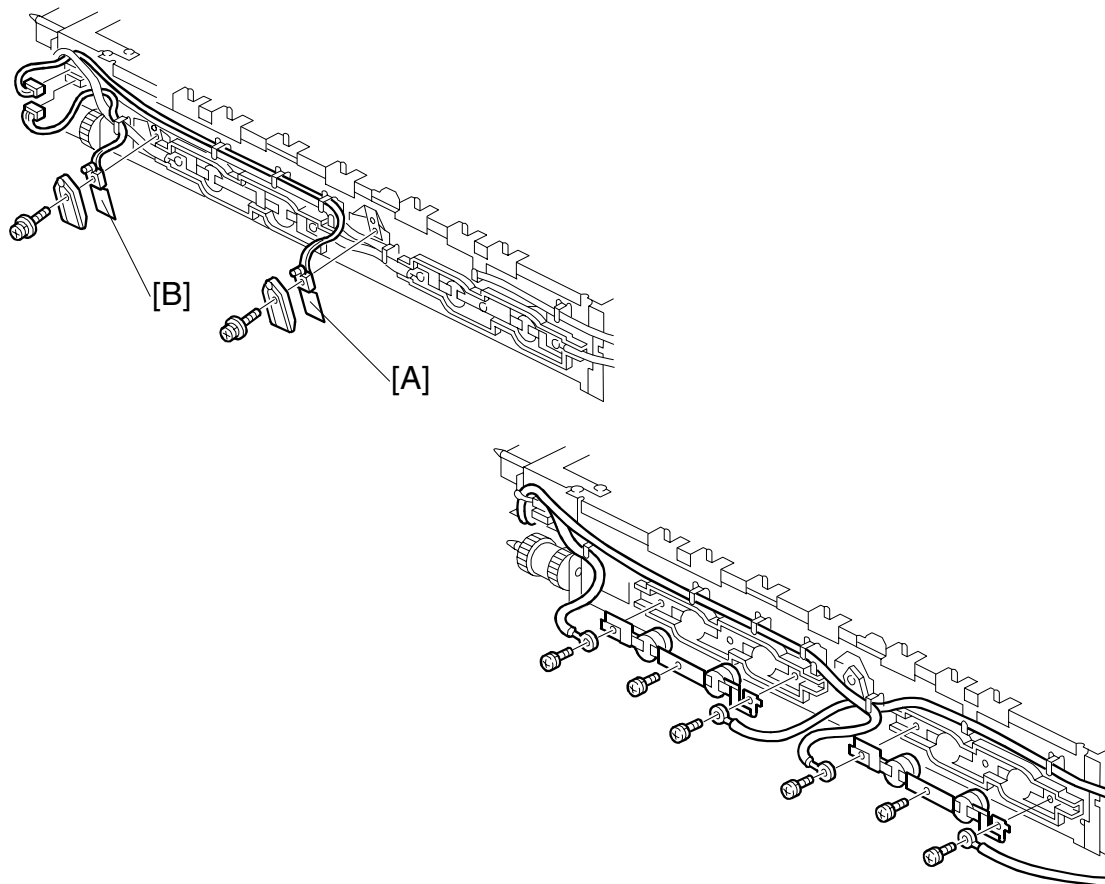
Right Side

1. Two terminals [A] (⌀ x 2)
2. Spring [B]
3. Connector bracket [C] (⌀ x 2)
4. Bracket [D] (⌀ x 2)

NOTE: To avoid breaking the fusing lamps, handle them with care. Avoid touching the lamps with your fingers. Note the top/bottom positioning of the fusing lamps as you remove them. The sizes of the holes in the holder match the sizes of the ends of the 650 W lamp (red) and 550 W lamp (brown).

5. Remove both fusing lamps.

3.1.5 THERMISTORS AND THERMOSTATS



Replacement
and
Adjustment

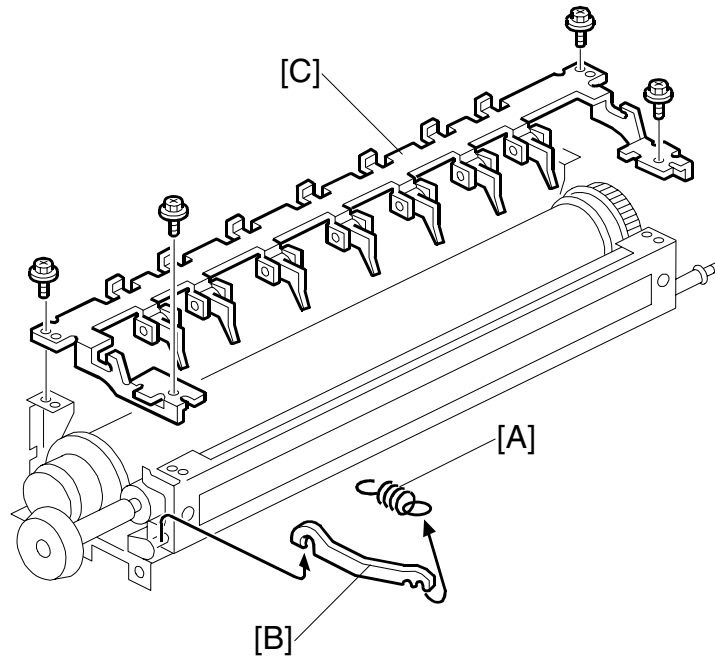
1. Fusing unit (☛ 3.14.1)
2. Fusing upper and lower cover (☛ 3.14.3, 3.14.4)
3. Center thermistor [A] (🔧 x 1, 📏 x 1, holder x 1)
4. End thermistor [B] (🔧 x 1, 📏 x 1, holder x 1)

CAUTION: The thermistors are thinly coated and extremely fragile. Handle with care to avoid damaging them. They should be replaced every 150K.

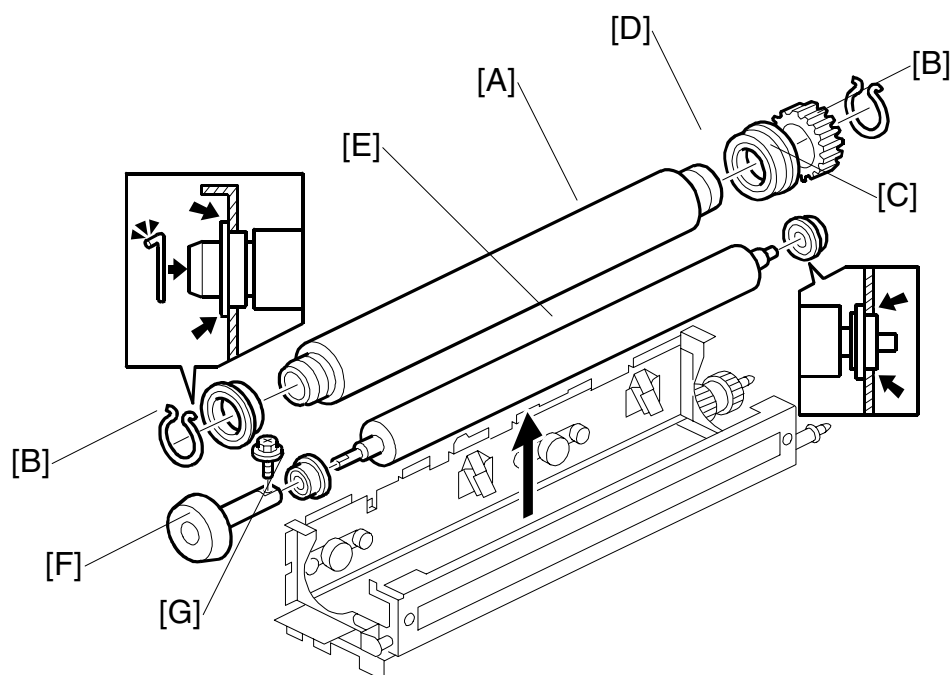
5. Center thermostat [C] (🔧 x 2)
6. End thermostat [D] (🔧 x 2)

FUSING

3.1.6 HOT ROLLER/PRESSURE ROLLER



1. Fusing unit (☛ 3.14.1)
2. Fusing upper and lower cover (☛ 3.14.3, 3.14.4)
3. Fusing lamp. (☛ 3.14.4)
4. Springs x 2 [A] (both sides)
5. Arms x 2 [B] (both sides)
6. Pawl bracket [C] (☛ x 4)



7. Hot roller [A]

CAUTION: The hot roller is easily damaged. Always handle it carefully.

8. C-rings x 2 [B] (both ends)

9. Drive gear [C]

10. Bushings x 2 [D] (both ends)

11. Pressure roller [E]

12. Fusing knob [F] (1 x 1)

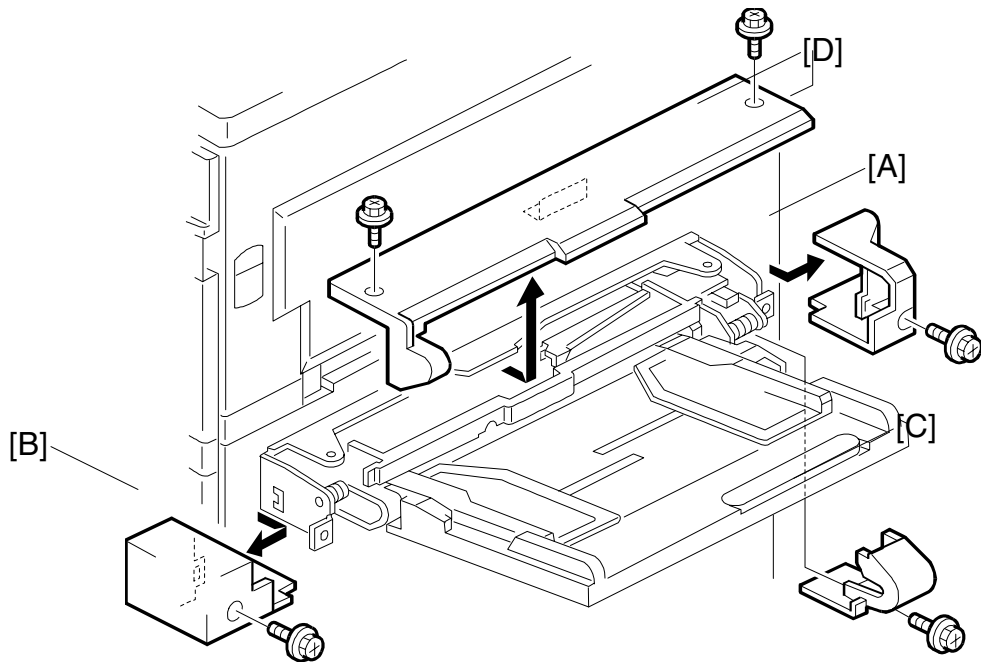
13. Bushings x 2 [G] (both ends)

NOTE:

- 1) Before installing the new hot roller, peel off 3 cm (1 inch) from both ends of the protective sheet on the new roller.
- 2) Never touch the surface of the rollers.
- 3) Work carefully to avoid damaging the surface of the hot roller.
- 4) The standard pressure roller spring position is the upper position.
- 5) When reinstalling the hot roller assembly and pressure roller assembly, make sure that the flange position of the bushings is as shown.

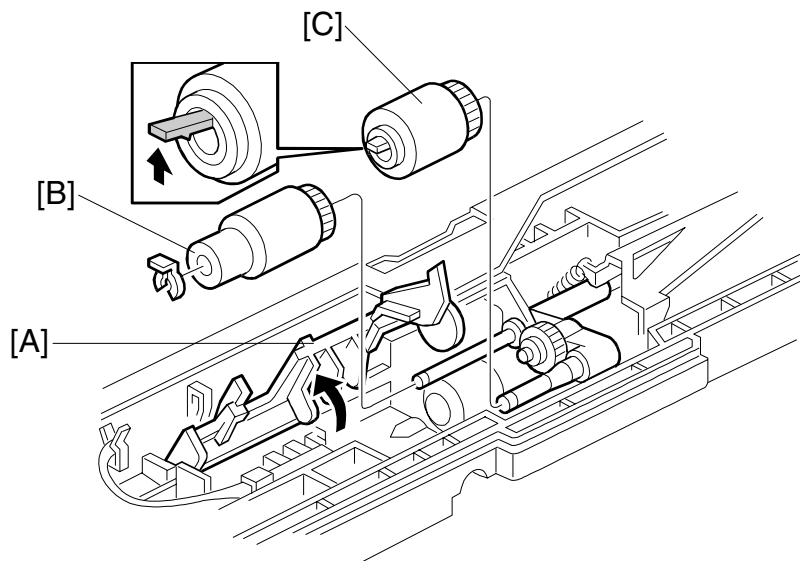
3.15 BY-PASS TRAY

3.15.1 COVER REPLACEMENT



1. Rear cover [A] (⌀ x 1)
2. Front cover [B] (⌀ x 1)
3. Hinge cover [C] (⌀ x 1)
4. Upper cover [D] (⌀ x 2)
5. Close duplex unit and pull out upper cover.

3.15.2 BY-PASS FEED/PICK-UP ROLLER

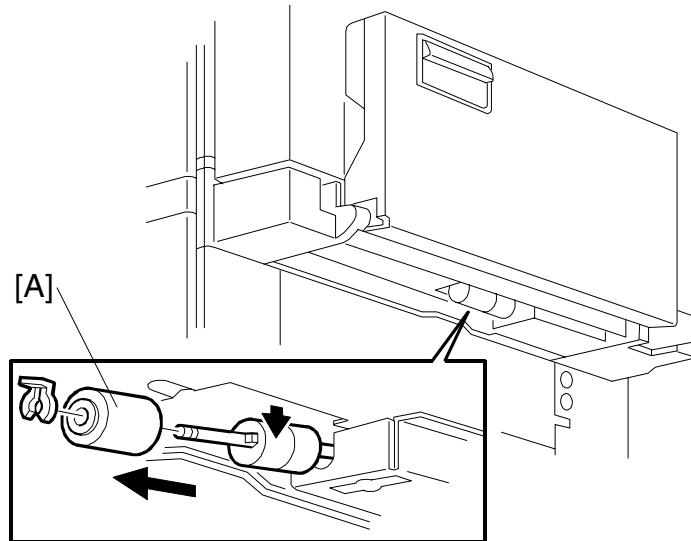


Replacement
and
Adjustment

1. Upper cover (☞ 3.15.1)
2. Lift up paper end feeler [A] to lock feeler in position.
NOTE: Before reinstalling the upper cover, return the paper end feeler to its original position.
3. Replace the paper feed roller [B] (☞ x 1)
4. Replace the pick-up roller [C].
NOTE: Do not touch the roller surface with bare hands. After installing the new rollers, do SP7816 for the bypass tray.

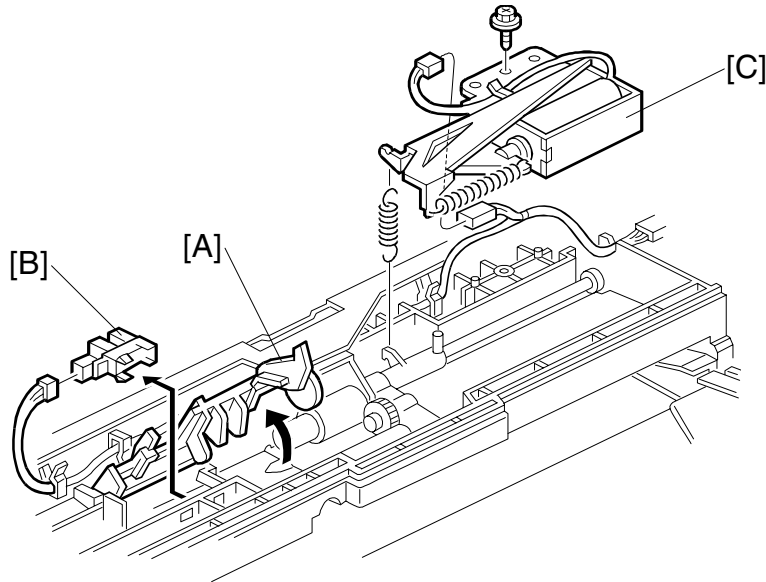
BY-PASS TRAY

3.1.3 BY-PASS SEPARATION ROLLER REPLACEMENT



1. Close the by-pass table.
2. Remove the separation roller [A] from the bottom (🔧 x 1)
NOTE: Do not touch the roller surface with bare hands. After installing the new rollers, do SP7816 for the bypass tray.

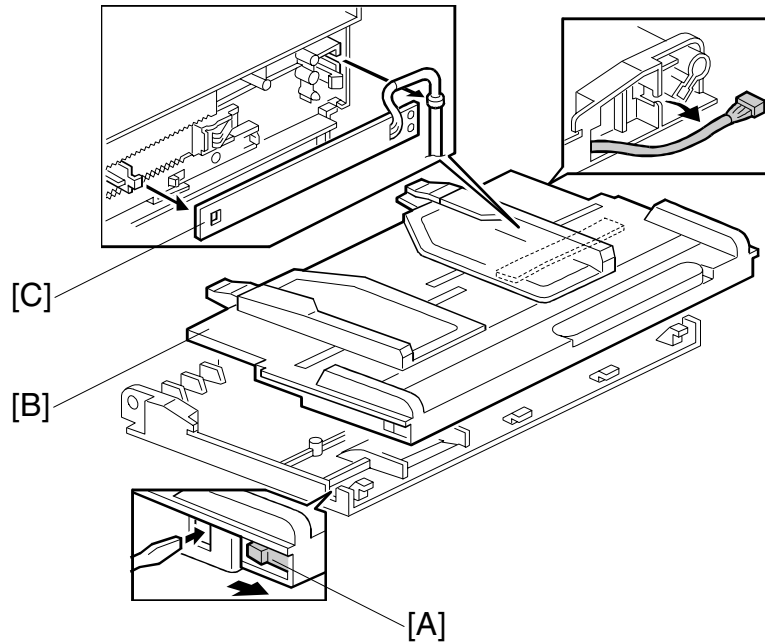
3.1.4 PAPER END SENSOR/PICK-UP SOLENOID



Replacement
and
Adjustment

1. Upper cover (☛ 3.15.1)
2. Lift paper end feeler [A].
NOTE: Before reinstalling the upper cover, return the paper end feeler to its original position.
3. Paper end sensor [B] (☛ x 1).
4. Pick-up solenoid [C] (☛ x 1, ☛ x 1, spring x 1)

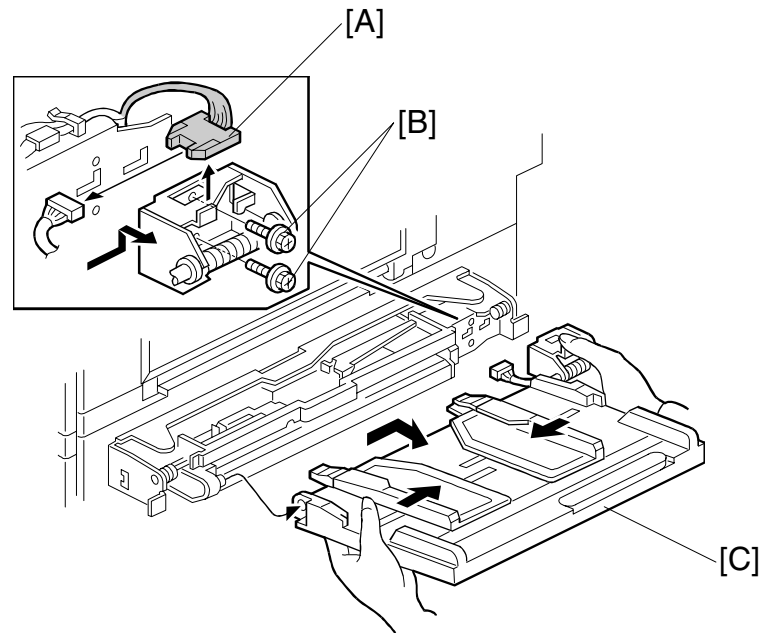
3.1.5 PAPER SIZE SENSOR BOARD REPLACEMENT



1. Hook [A]
2. Paper tray [B] (꺾 x 1).
3. Size sensor board [C].

NOTE: To avoid breaking the hook of the paper size sensor board, handle it carefully during removal.

3.1.6 BY-PASS TABLE REMOVAL



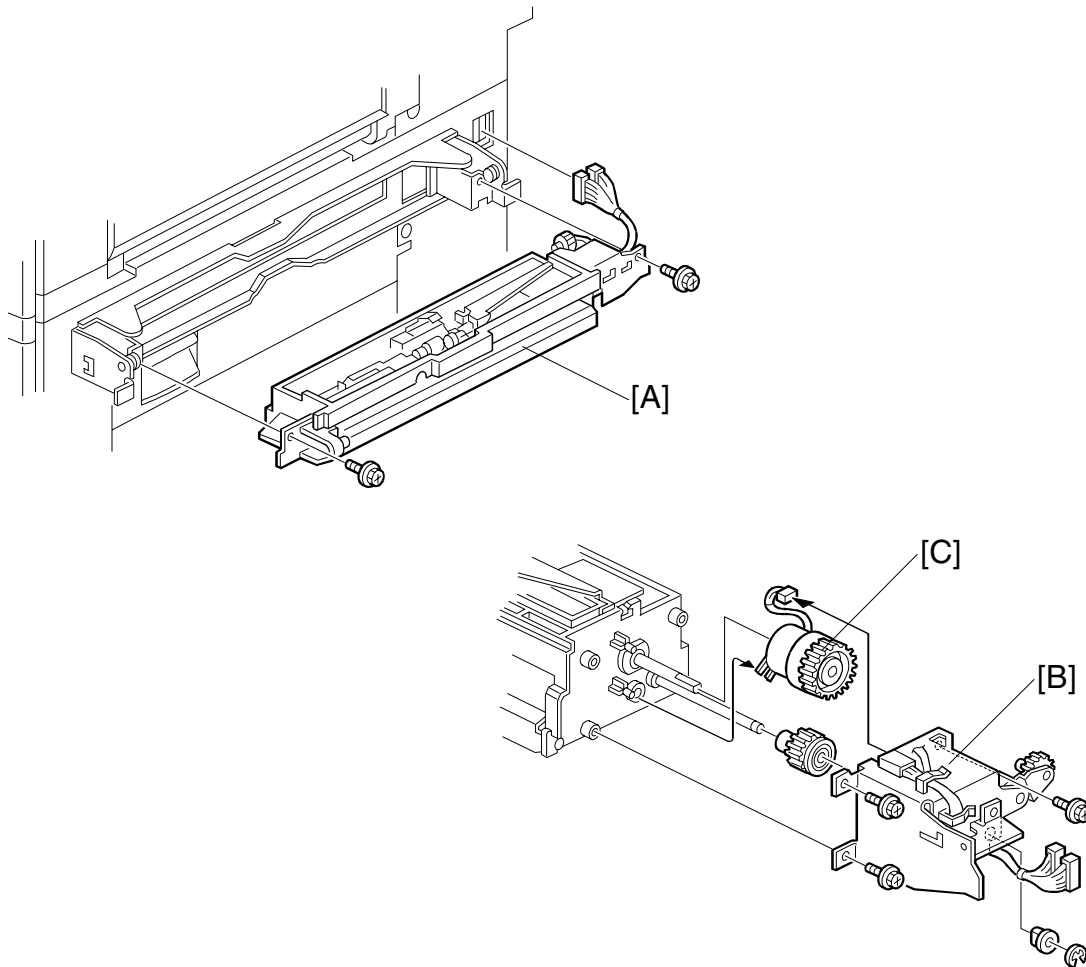
Replacement
and
Adjustment

Note: To remove the entire by-pass tray unit, and not just the table, ➡ 3.6

1. Hinge cover (➡ 3.15.1)
2. Harness [A] (🔌 x 1).
3. Screws [B] (🔩 x 2)
4. By-pass table [C].

CAUTION: To relieve pressure on the spring during removal, depress it as shown in the illustration.

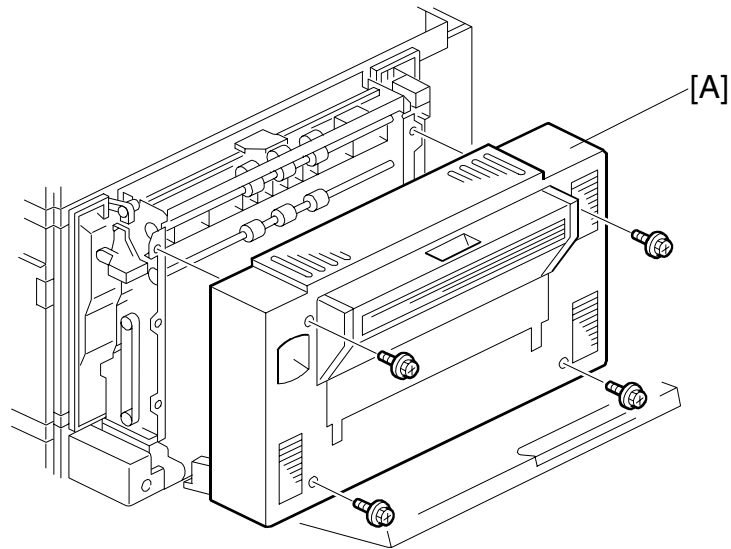
3.1.7 PAPER FEED CLUTCH REPLACEMENT



1. By-pass tray
2. Paper feed unit [A] (⚙ x 2, 🌀 x 1)
3. Rear bracket [B] (⚙ x 3, clip x 1, bushing x 1)
4. Paper feed clutch [C] (🌀 x 1)

3.16 DUPLEX UNIT

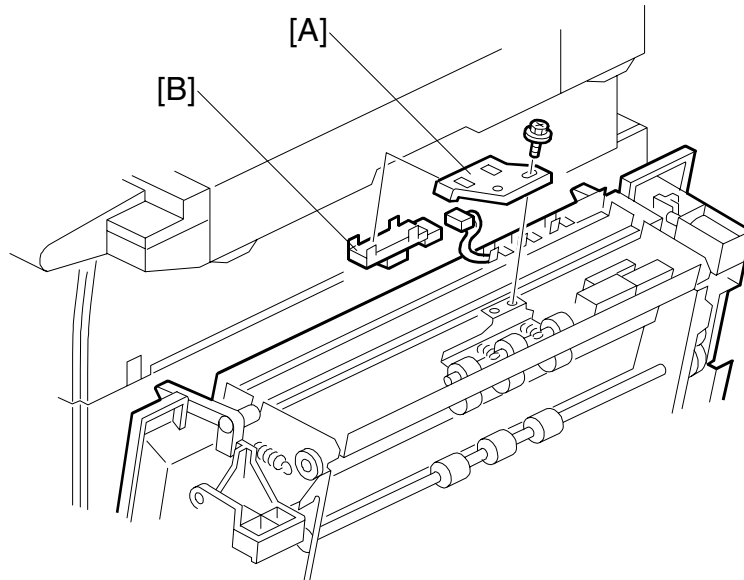
3.16.1 DUPLEX COVER REMOVAL



1. Duplex unit cover [A] (🔩 x 4)

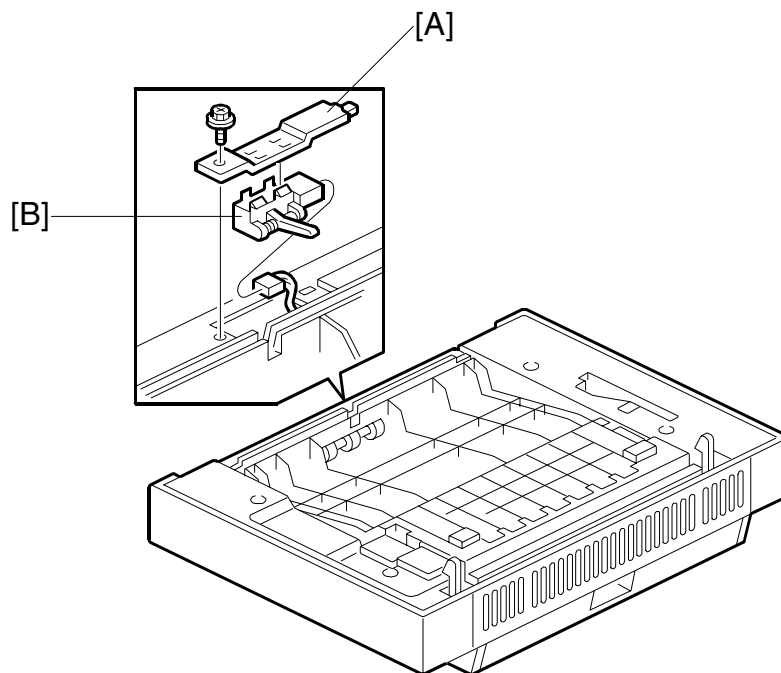
DUPLEX UNIT

3.16.2 DUPLEX ENTRANCE SENSOR REPLACEMENT



1. Duplex unit cover (☛ 3.16.1)
2. Sensor holder [A] (🔩 x 1)
3. Entrance sensor [B] (🔌 x 1)

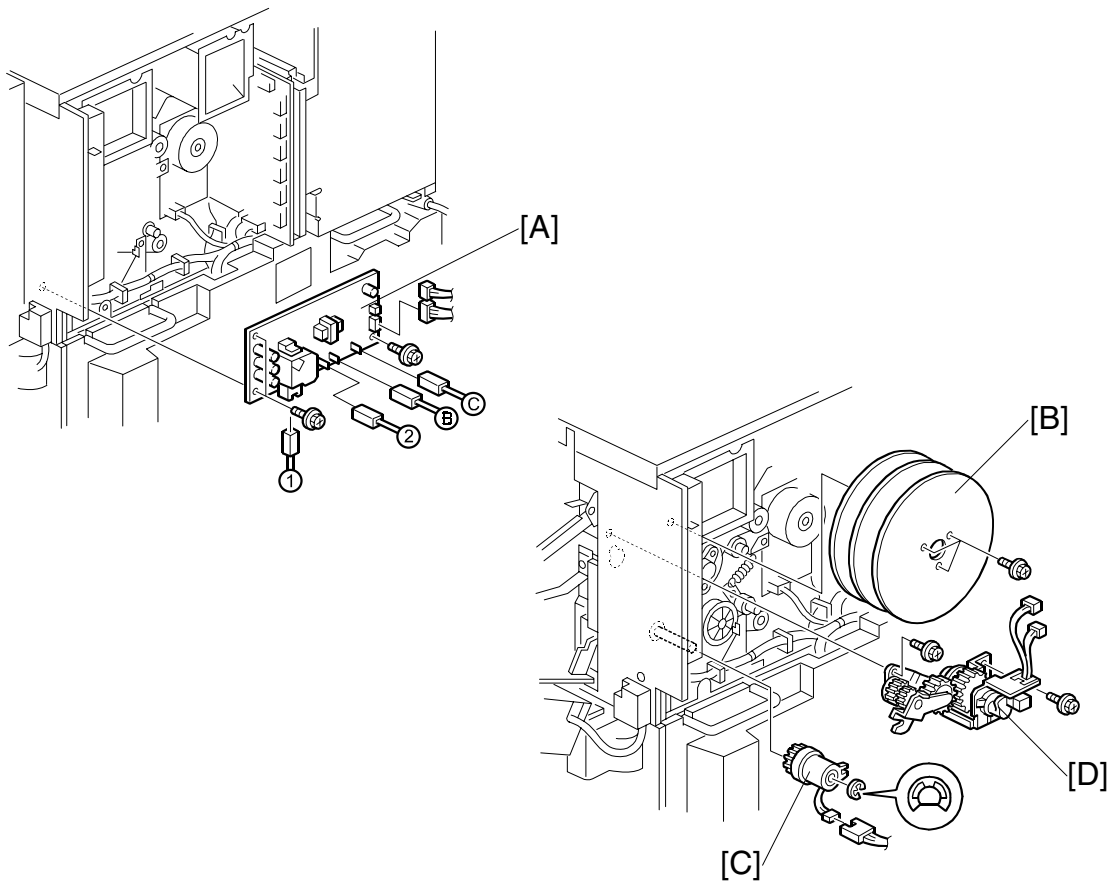
3.1.3 DUPLEX EXIT SENSOR REPLACEMENT



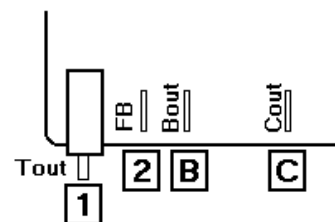
1. Duplex unit (●3.4)
2. Sensor bracket [A] (🔩 x 1)
3. Exit sensor [B] (🔌 x 1)

3.17 DRIVE AREA

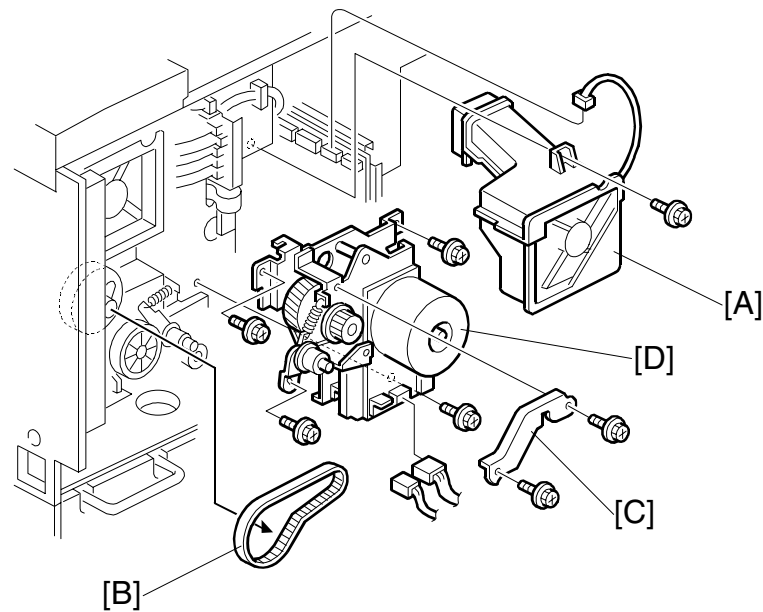
3.17.1 REGISTRATION/TRANSFER BELT CONTACT CLUTCHES



1. Rear upper cover (⚙️ x 2)
2. High voltage supply board [A] (🔌 x 6, ⚙️ x 6)
NOTE: Make sure that you re-connect the wires in the correct order.
 They are labeled 1 → 2 → B → C
3. Flywheels [B] (⚙️ x 3)
4. Registration clutch [C] (⌚ x 1, 🔌 x 1)
5. Transfer belt contact clutch [D] (🔌 x 2, ⚙️ x 2)



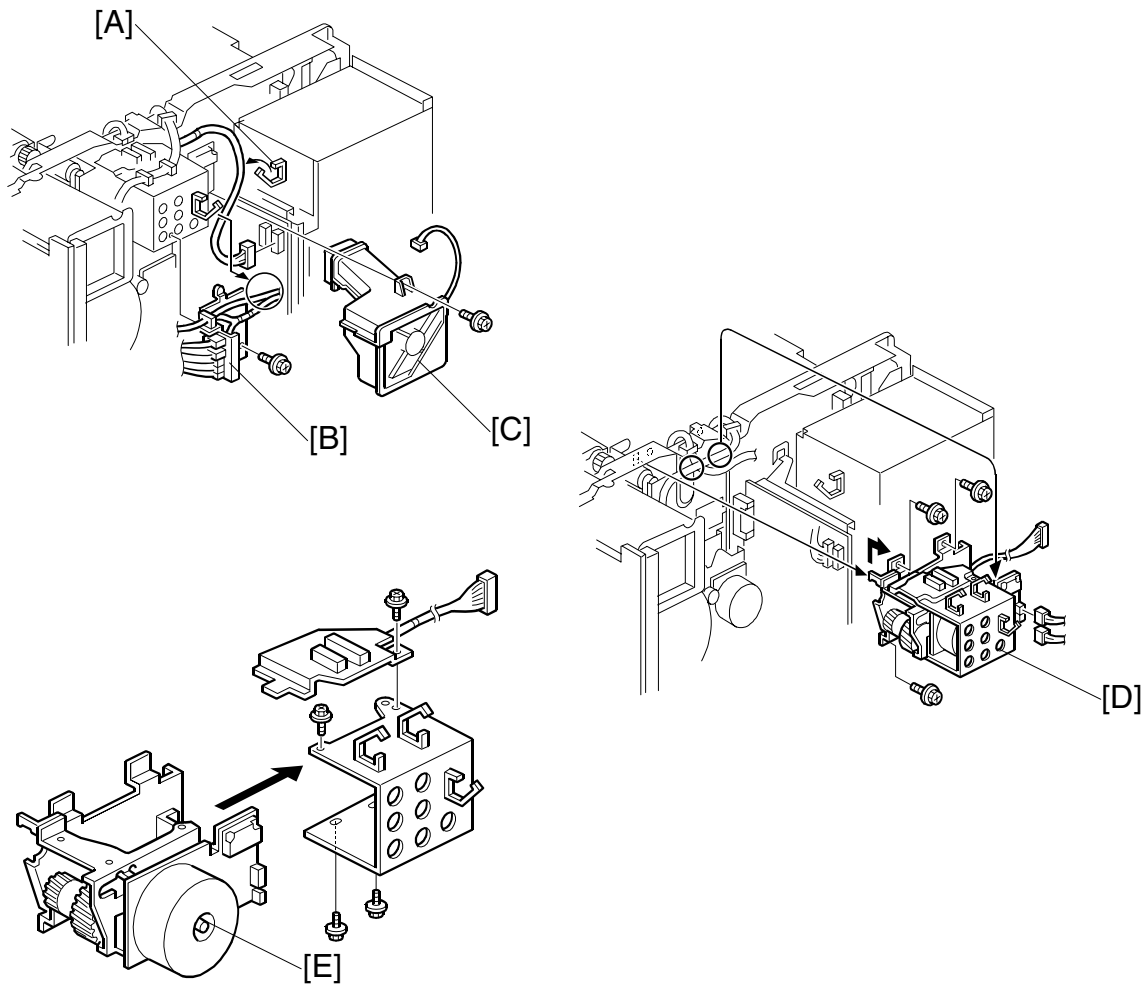
3.1.2 MAIN MOTOR



Replacement
and
Adjustment

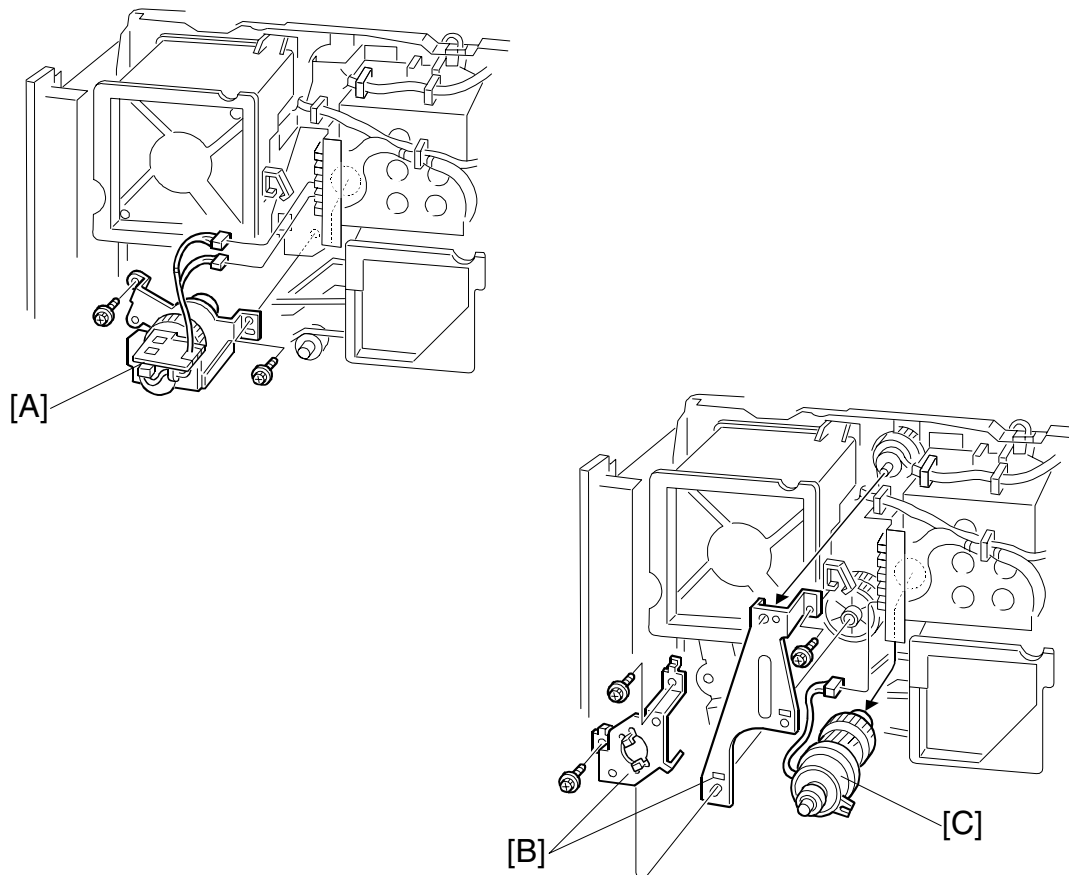
1. Rear upper cover, high voltage power supply, flywheels (➡ 3.17.1)
2. Remove the main cooling fan [A] (⚙ x 2).
3. Timing belt [B] x 1
4. Bracket [C] (⚙ x 2)
5. Main motor [D] (🔧 x 2, ⚙ x 3)

3.1.3 FUSING/EXIT MOTOR



1. Rear upper cover (☛3.7.1)
2. Fusing unit cover (☛3.8.2) (Do not disconnect.)
3. Paper output tray (☛3.8.3)
4. Harnesses [A] (x 3)
5. Connector bracket [B] (🔩 x 1, harness x 1)
6. Main fan [C] (🔩 x 1, 🌀 x 1)
7. Motor bracket [D] (🔩 x 1)
8. Fusing/exit motor [E] (🔩 x 5)

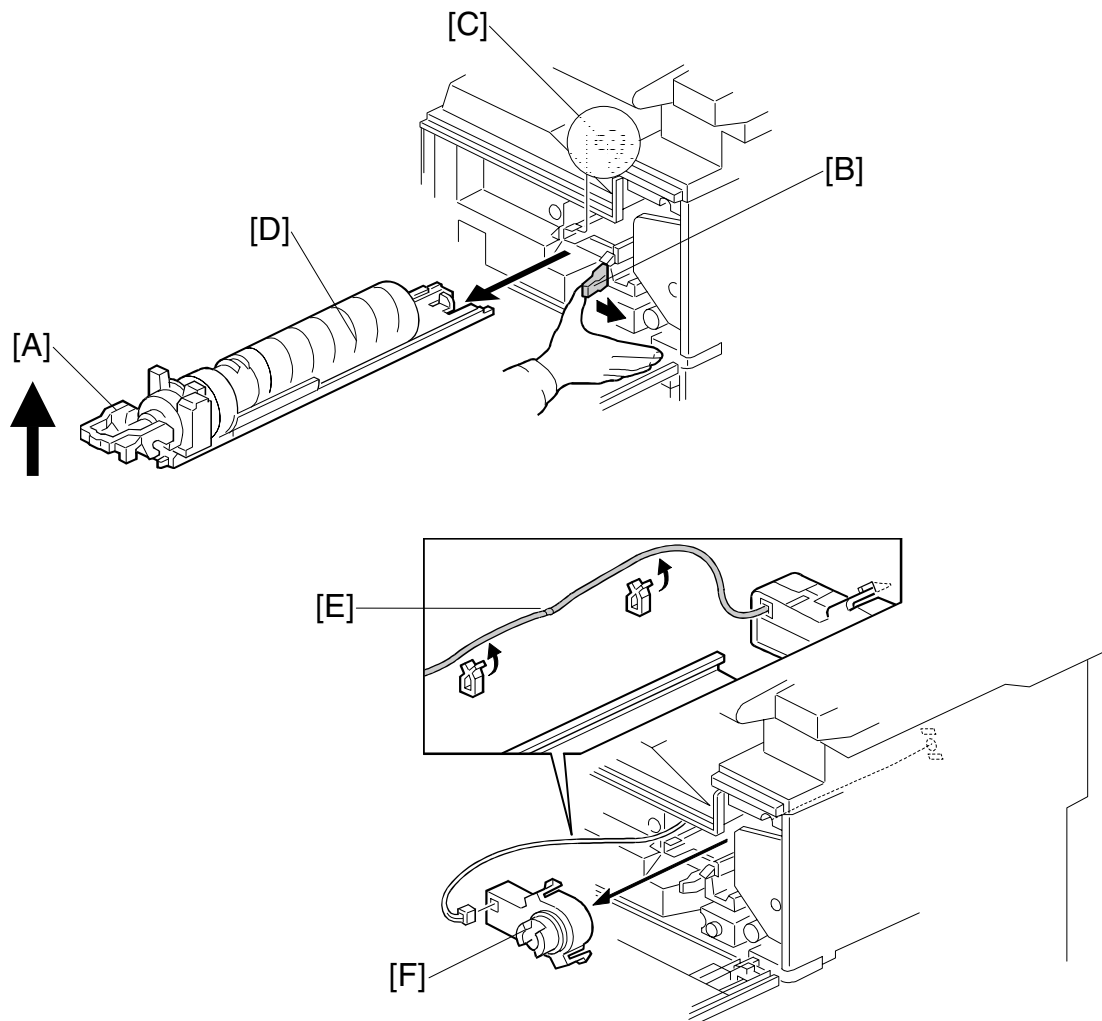
3.1.4 FUSING/EXIT CLUTCH




Replacement
and
Adjustment

1. Rear upper cover (☛3.7.1)
2. Fusing unit fan (harnesses x 2, ⚙ x 2, 🛠 x 1) (☛3.17.3)
NOTE: You may need to loosen the screws of the right upper cover to see the right screw of the fan bracket.
3. HVPS (High Voltage Power Supply) (⚙ x 3) (Do not remove connectors.) (☛3.17.1)
4. Flywheels (⚙ x 3) (☛3.17.1)
5. Transfer belt contact clutch [A] (⚙ x 2, 🛠 x 2)
6. Fusing/exit clutch brackets [B] (⚙ x 3)
7. Fusing/exit clutch [C] (🛠 x 1)

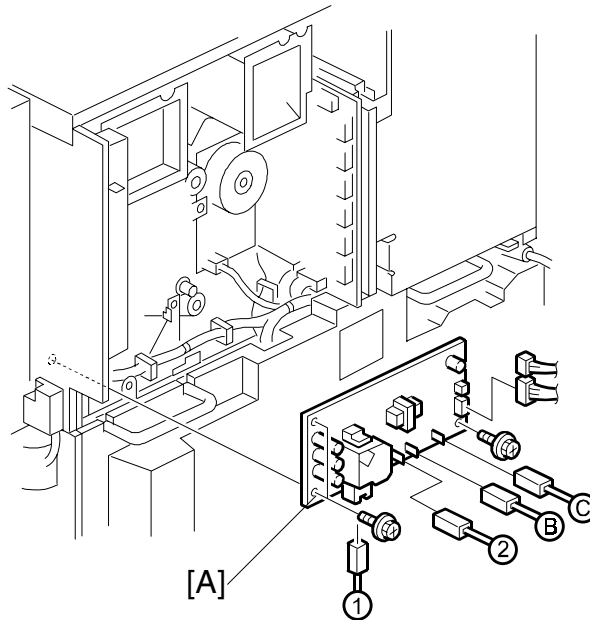
3.1.5 TONER SUPPLY MOTOR



1. Open the front door.
 2. Raise holder handle [A].
 3. Push the holder lever [B] to the right.
 4. Stopper [C]
 5. Toner bottle holder and bottle [D]
 6. Motor harness [E] (clamps x 2)
 7. Toner supply motor [F] (hooks x 2,  x 1)
- NOTE:** Press in on both sides of the motor to release it.

3.18 PRINTED CIRCUIT BOARDS

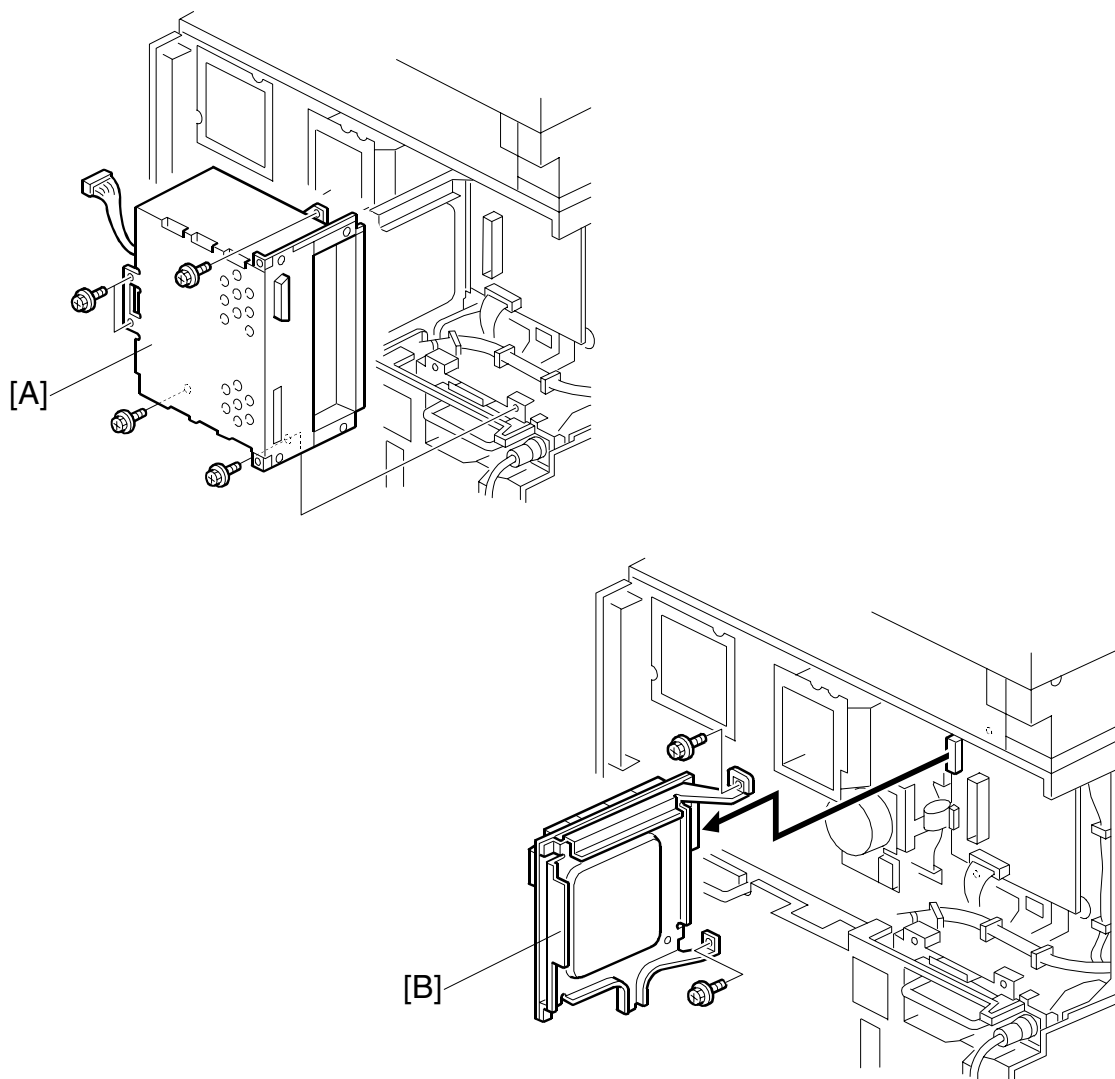
3.18.1 HIGH VOLTAGE POWER SUPPLY



1. Rear upper cover (☛ 3.7.1)
2. High voltage power supply [A] (☛ x 3, ☛ x 6)

PRINTED CIRCUIT BOARDS

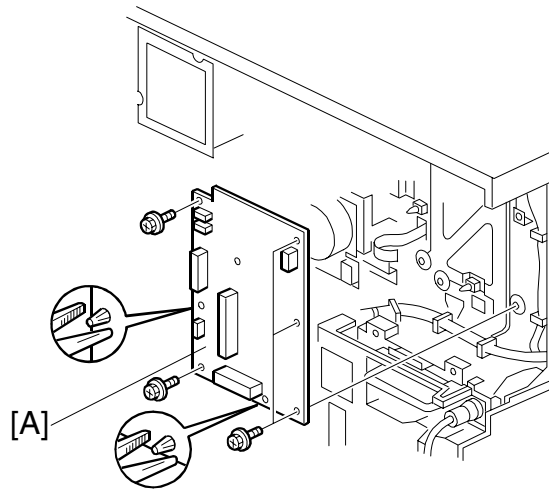
3.1.2 I/O BOARD



1. Rear upper cover (☛ 3.7.1)
2. Expansion box [A] (⚙ x 5, 📏 x 1)
3. I/O board [B] (⚙ x 2, 📏 x all)

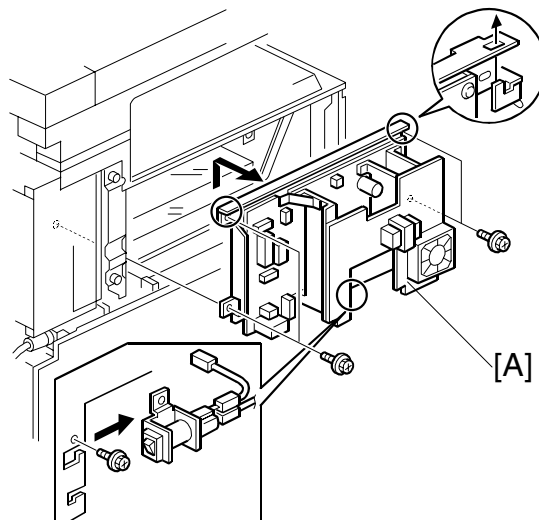
NOTE: Make sure that the DIP switch settings on the new board are the same as those on the old board.

3.1.3 BICU BOARD



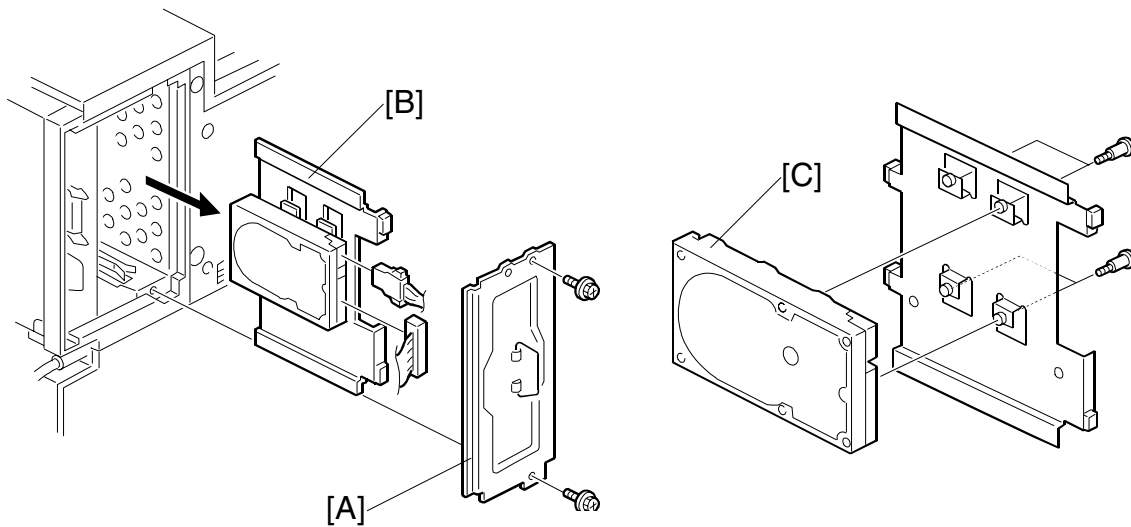
1. I/O board (➡ 3.18.2)
2. BICU board [A] (⚙ x 4, 🔌 x all)

3.1.4 PSU



1. Left upper cover (➡ 3.8.1)
2. PSU [A] (⚙ x 5, 🔌 x all)

3.19 HARD DISK/CONTROLLER BOARD






1. Left rear corner cover (☞ 3.8.1)
2. Expansion spacer [A] (⚙ x 2)
3. HDD unit bracket [B] (⚙ x 2)
4. HDD unit [C] (⚙ x 4)

NOTE: Work carefully to avoid dropping or hitting the HDD.

To Format the HDD

The first time the machine is powered on with the new HDD installed, a message prompts you to format the hard disk.

1. Press  (Menu).
2. Press  to display “Maintenance” and then press #(Enter).
3. Press  to display “HDD Format”, and then press #(Enter).
4. Press #(Enter).

HDD Format
Press # to Start

5. Press #(Enter).

Completed
Restart Printer

6. Switch the printer off and on.

3.20 PRINTING ADJUSTMENTS

Perform the appropriate adjustments after replacing any of the following items:

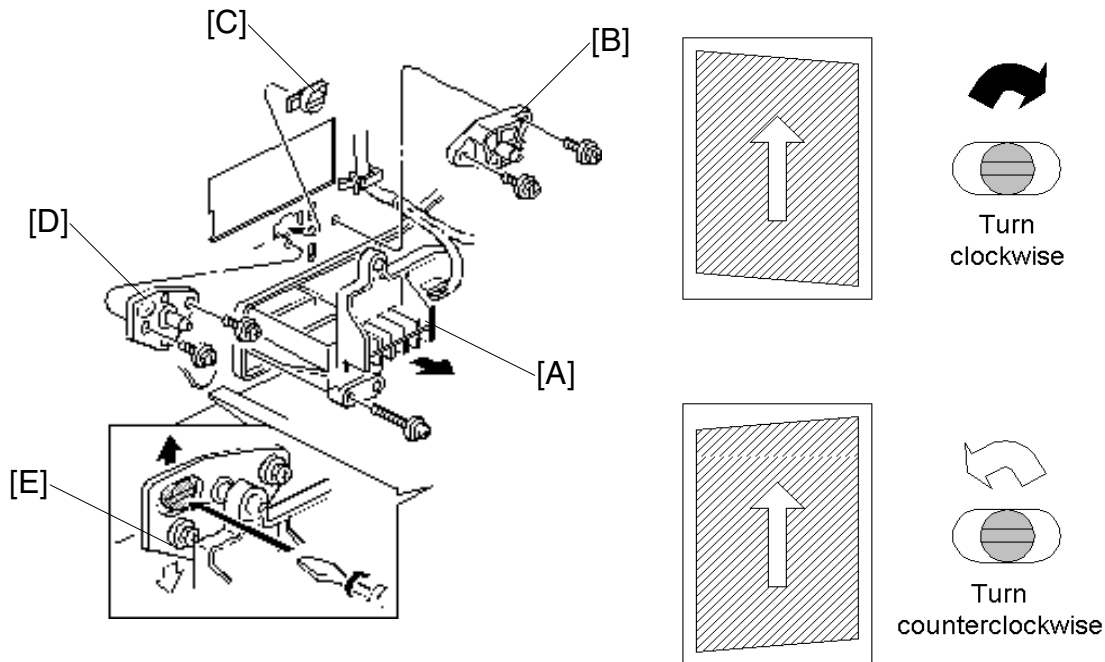
- Polygon mirror motor
- Paper side fence
- Memory all clear
- Rollers and gears
- Paper feed unit

For details about how to perform the adjustments, refer to the Operating Instructions. See 'Maintenance Menu' in Section 6 ('Making Printer Settings with the Operation Panel') of the Operating Instructions (Printer Reference).

3.21 PARALLELOGRAM IMAGE ADJUSTMENT

Do the following procedure if a parallelogram prints while adjusting the printing registration or printing margin using a trimming area pattern.

The following procedure should be done after adjusting the side-to-side registration for each paper tray station.



Use SP2902 03 No. 11 (Printing Test Pattern: Belt Pattern Trimming Area) to determine whether a parallelogram image appears. If the parallelogram pattern appears, perform the following procedure.

1. Laser unit [A]
2. Bracket [B] (x 2)
3. Install adjustment cam [C] (P/N: A2309003)
4. Secure positioning pin [D] (P/N: A2309004) with the two screws removed with the bracket [B]. Do not tighten the screws at this time.
5. To adjust the position of the laser unit [E]
 - 1) Adjust the laser unit position by turning the adjustment cam. (See the illustration above.)
 - 2) Tighten the adjustment bracket.
 - 3) Print the trimming area pattern to check the image. If the results are not satisfactory, repeat steps 5-1) to 5-3).

TROUBLESHOOTING

4. TROUBLESHOOTING

CAUTION

To avoid damaging the hard disk or memory, never turn off the main power switch when the Data In LED is lit or flashing.

4.1 SERVICE CALL CONDITIONS

4.1.1 SUMMARY

There are 4 levels of service call conditions.

Level	Definition	Reset Procedure
A	To prevent damage to the machine, the main machine cannot be operated until the SC has been reset by a service representative (see the note below).	Enter SP mode, execute SP5810, then exit the SP mode.
B	If the SC was caused by incorrect sensor detection, the SC can be reset by powering the main power switch off and on.	Turn the operation switch and main power switch off and on.
C	The main machine can be operated as usual, excluding the unit related to the service call.	Turn the operation switch off and on.
D	The SC history is updated. The machine can be operated as usual.	The SC will not be displayed. Only the SC history is updated.

- NOTE:** 1) If there is problem with one of the electrical circuit boards, before replacing the board, first disconnect then reconnect the connectors to see if this solves the problem.
- 2) If the problem concerns a motor lock, first check the mechanical load on the component before replacing motors or sensors.

4.1.2 SC CODE DESCRIPTIONS

SC	Level	Symptom	Possible Cause
CHARGE ROLLER			
302	C	Charge roller current leak	<ul style="list-style-type: none">• Charge roller damaged• High voltage supply board defective• PCU harness defective or disconnected
		A charge roller current leak signal was detected.	
304	C	Charge roller current correction error	<ul style="list-style-type: none">• ID sensor defective
		The charge roller bias correction is performed twice even if the maximum charge roller bias (−2kV) is applied to the roller.	
EXPOSURE UNIT			
320	C	Polygon motor error	<ul style="list-style-type: none">• Harness at the polygon mirror motor disconnected or defective• Polygon motor or polygon motor driver defective• Polygon motor drive pulse not output correctly• LOCK signal could not be detected
		The polygon motor does not reach the ready state (it does not reach operating speed within 25 seconds after the polygon motor on signal, or the lock signal is still activated for more than 2 seconds after the polygon motor off signal).	
321	C	F-GATE error (no laser writing signal)	<ul style="list-style-type: none">• BICU board defective• PCI harness between the controller board and the BICU defective or disconnected
		The laser writing signal (F-GATE) does not go LOW for more than 30 seconds after the paper reaches the registration sensor.	
322	C	1st laser synchronization error	<ul style="list-style-type: none">• Poor harness connection between the laser synchronization detector board and the LD unit.• Laser synchronization detector board out of position and angle of reflection not correct• Laser synchronization detector board defective• LD unit defective
		The LD1 synchronization signal cannot be detected by the main scan synchronization detector board even after the laser diodes are activated.	
323	C	LD (Laser Diode) drive current too high	<ul style="list-style-type: none">• LD unit defective (not enough power, due to aging)• Poor connection between the LD unit and the BICU board• BICU defective
		The LD drive board applies more than 110 mA to the LD.	
326	C	2nd laser synchronization error	<ul style="list-style-type: none">• Poor connection between the laser synchronization detector board and the LD unit.• Laser synchronization detector board out of position• Laser synchronization detector board defective• LD unit defective
		The LD2 synchronization signal cannot be detected by the main scan synchronization detector board even after the laser diodes are activated.	

SC	Level	Symptom	Possible Cause
327	B	LD unit H.P. error 1	<ul style="list-style-type: none">• H.P. sensor/harness defective• LD unit home position sensor defective• LD positioning motor harness defective• LD unit movement blocked because of incorrect connector routing
		The LD unit H.P. sensor does not detect the on condition when the LD unit moves to its home position.	
328	B	LD unit H.P. error 2	<ul style="list-style-type: none">• H.P. sensor/harness defective• LD positioning/harness motor defective• LD unit movement blocked because of incorrect connector routing
		The LD unit H.P. sensor does not detect an off condition when the LD unit moves from its home position.	
329	B	LD unit beam pitch adjusted incorrectly	<ul style="list-style-type: none">• After initialization of the SP modes, SP2109-03 or SP2109-04 was not executed.• The harness is blocking the LD drive (PCB), preventing adjustment of the pitch
		The LD unit H.P. sensor does not detect the ON condition while changing the LD unit position to correct the LD position or to adjust the dpi.	
ID SENSOR			
350	C	ID sensor pattern test error	<ul style="list-style-type: none">• ID sensor defective• ID sensor connector defective• Poor ID sensor connector connection• I/O board (IOB) defective• High voltage supply board defective• ID sensor dirty• Defect at ID sensor pattern writing area of the drum
		One of the following ID sensor output voltages was detected twice consecutively when checking the ID sensor pattern. Vsp ≥ 2.5 V Vsg ≤ 2.5 V Vsp = 0 V	
351	C	ID sensor Vsg test error	<ul style="list-style-type: none">• ID sensor defective• ID sensor connector defective• Poor ID sensor connection• I/O board (IOB) defective• Scanning system defective• High voltage supply board defective• ID sensor dirty• Defect at the ID sensor pattern writing area of the drum
		When ID sensor checks the drum surface, VSG = 0, or PWM = 0	
352	C	ID sensor edge detect pattern error	<ul style="list-style-type: none">• ID sensor defective• ID sensor connector defective• Poor ID sensor connector connection• I/O board (IOB) defective• High voltage supply board defective• Dirty ID sensor• Defect at the ID sensor pattern writing area of the drum
		At 800 ms intervals, the value of the ID sensor edge pattern voltage was not 2.5 V for 2 consecutive attempts.	

SERVICE CALL CONDITIONS

SC	Level	Symptom	Possible Cause
353	C	LED current abnormal at initialization during ID sensor adjustment	<ul style="list-style-type: none">• ID sensor defective• ID sensor harness defective• ID sensor connector defective• Poor ID sensor connection• I/O board (IOB) defective• Exposure system defective• High voltage supply board defective• Dirty ID sensor
		At ID sensor initialization, one of the following is detected: At PWM = 255, VSG < 4.0 V At PWM = 0, VSG ≥ 4.0 V	
354	C	ID sensor adjustment timeout error	<ul style="list-style-type: none">• ID sensor defective• ID sensor harness defective• ID sensor connector defective• I/O board (IOB) defective• Exposure system defective• Poor ID sensor connector connection• High voltage supply board defective• Dirty ID sensor
		Vsg out of the adjustment target range (4.0 ± 0.2 V) within 20 s at Vsg initialization.	
DEVELOPMENT UNIT			
390	C	TD sensor error: Test value abnormal	<ul style="list-style-type: none">• TD sensor defective• TD sensor not connected or connector damaged• Poor connection between the TD sensor and the I/O board (IOB)• I/O board (IOB) defective• Toner supply defective
		TD sensor output voltage is less than 0.5 V or more than 4.8 V after 10 consecutive times during printing.	
391	C	TD sensor error: Auto adjust error	<ul style="list-style-type: none">• TD sensor abnormal• TD sensor disconnected• Poor TD sensor connection• I/O board (IOB) defective• Toner supply defective
		At initialization of the TD sensor, VT < 1.8 V or VT > 4.8 V.	
395	C	Development bias abnormal	<ul style="list-style-type: none">• High voltage supply board defective• Poor connection at the development bias terminal• Poor connection at the high voltage supply board
		A development bias leak signal is detected. High voltage output to the development unit exceeded the upper limit (65%) for 60 ms.	
TRANSFER UNIT			
401	C	Transfer roller bias output abnormal	<ul style="list-style-type: none">• High voltage supply board defective• Poor cable connection or defective cable• Transfer connector defective
		A transfer roller current leak signal is detected.	
402	C	Transfer roller open error	<ul style="list-style-type: none">• High voltage supply board defective• Transfer connector cable defective• Transfer connector defective• Poor PCU connection
		The transfer roller current feedback signal is not detected.	

SC	Level	Symptom	Possible Cause
403	C	Transfer belt H.P. abnormal	<ul style="list-style-type: none">• Main motor/drive malfunction• Transfer belt contact clutch defective• Transfer belt position sensor defective• Harness disconnected
		H.P. is not detected after the T/S clutch is switched on twice.	
405	C	Transfer belt position abnormal	<ul style="list-style-type: none">• Main motor/drive malfunction• Transfer belt position sensor defective• Poor transfer belt position sensor connection• Transfer belt contact clutch defective
		The transfer belt does not separate from the drum during ID sensor pattern checking.	
MAIN DRIVE			
440	C	Main motor abnormal	<ul style="list-style-type: none">• Too much load on the drive mechanism• Main motor defective
		(1) During motor rotation before the start of printing, the H.P. of the T/S clutch is detected, the main motor lock signal (PLL) goes low, and 5 retries are not successful, resulting in an internal lock. (2) A main motor lock signal is not detected within 2 seconds after the main motor turns on.	
442	C	PCU new unit detection error	<ul style="list-style-type: none">• New unit detection sensor defective.• PCU defective
		After the main motor turns on, the PCU new unit detection sensor remains on for 2 or more seconds.	
450		Feed/Development motor abnormal	<ul style="list-style-type: none">• Feed/development motor defective
		(1) During motor rotation before the start of printing, the motor lock signal (PLL Lock) goes low, 5 retries are not successful, resulting in an internal lock. (2) A motor lock signal is not detected within 2 s after the main motor turns on.	
490	C	Exhaust fan motor lock	<ul style="list-style-type: none">• Too much load on the drive mechanism• Exhaust fan motor defective or a loose object is interfering with the fan• Poor fan motor connector connection
		An exhaust fan motor lock signal is detected within 5 seconds after the exhaust fan motor turns on.	
492	C	Cooling fan motor lock	<ul style="list-style-type: none">• Too much load on the drive mechanism• Cooling fan motor defective or a loose object is interfering with the fan• Poor fan motor connector connection
		A cooling fan motor lock signal is detected within 5 seconds after the cooling fan motor turns on.	

SERVICE CALL CONDITIONS

SC	Level	Symptom	Possible Cause
PAPER FEED			
501	C	1st tray lift malfunction	<ul style="list-style-type: none"> • Lift motor malfunction or disconnected • Height sensor abnormal, or connector loose • Loose paper or object between the tray and motor • Pick-up arm malfunction
		Paper height sensor does not activate after the tray lift motor is on for 10 s. If the main power switch is turned on when the paper is already at feed height, the paper height position is detected again, and the paper height sensor should deactivate within 5 s after the paper bottom plate starts to drop. If it does not deactivate within 5 s after 4 consecutive attempts, a message prompts the user to reset Tray 1. After two attempts to release the error by re-setting the paper tray, then this SC is issued.	
502	C	2nd tray lift malfunction	<ul style="list-style-type: none"> • Lift motor abnormal or disconnected • Height sensor defective or disconnected • Loose paper or object between the tray and motor • Pick-up arm malfunction
		Paper height sensor does not activate after the tray lift motor is on for 10 s. If the main power switch is turned on when the paper is already at feed height, the paper height position is detected again, and the paper height sensor should deactivate within 5 s after the paper bottom plate starts to drop. If it does not deactivate within 5 s after 4 consecutive attempts, a message prompts the user to reset Tray 1. After two attempts to release the error by re-setting the paper tray, then this SC is issued.	
503	C	3rd tray lift malfunction (optional paper tray unit)	<ul style="list-style-type: none"> • Tray lift motor defective or disconnected • Height sensor defective or disconnected
		Paper height sensor does not activate after the tray lift motor is on for 13 s. If the main power switch is on when the paper is already at the feed height, the paper height position is detected again, and the paper height sensor should deactivate within 5 s after the paper bottom plate starts to drop. If it does not deactivate within 5 s after four consecutive attempts, the tray lift motor halts. After two attempts to reset the paper tray, this SC is issued and tray control halts.	

SC	Level	Symptom	Possible Cause
504	C	4th tray lift malfunction (optional paper tray unit)	<ul style="list-style-type: none">• Tray lift motor defective or disconnected• Height sensor defective or disconnected
		Paper height sensor does not activate after the tray lift motor is on for 13 s. If the main power switch is on when the paper is already at the feed height, the paper height position is detected again, and the paper height sensor should de-activate within 5 s after the paper bottom plate starts to drop. If it does not deactivate within 5 s after four consecutive attempts, the tray lift motor halts. After two attempts to re-set the paper tray, this SC is issued and tray control halts.	
506	C	Paper tray unit main motor lock (optional paper tray)	<ul style="list-style-type: none">• Paper tray unit main motor defective• Paper tray unit main motor connection loose• Too much load on the drive mechanism
		A main motor lock signal is detected for more than 50 ms during rotation.	
507	C	LCT main motor lock (optional LCT)	<ul style="list-style-type: none">• LCT main motor defective• Paper tray unit main motor connection loose• Too much load on the drive mechanism
		A main motor lock signal is detected for more than 50 ms during rotation.	
510	C	LCT tray malfunction	<ul style="list-style-type: none">• LCT lift motor defective or disconnected.• Upper limit sensor defective or disconnected• Pick-up solenoid defective or disconnected• Paper end sensor defective
		<ul style="list-style-type: none">• LCT lift sensor does not activate within 18 seconds after the LCT lift motor turns on.• After paper end, LCT lift sensor does not activate within 4 s after 4 consecutive attempts.• After lowering, tray motor does not switch off within 5 s.	
520	C	Fusing/Exit	<ul style="list-style-type: none">• Too much load on the drive mechanism• Fusing/Exit motor defective
		A Fusing/Exit motor lock signal is detected within 2 seconds after the Fusing/Exit motor turns on.	
FUSING UNIT			
NOTE: When an SC error is issued for the fusing system (SC54x), the printer cannot be released from the SC status by cycling the machine off and on. The service technician must execute SP5810 to restore the printer to normal operation.			
541	A	Fusing thermistor open	<ul style="list-style-type: none">• Fusing thermistor disconnected• Fusing thermistor connector defective• Fusing thermistor damaged or warped• Fusing temperature signal –15% less than the standard input voltage
		<ul style="list-style-type: none">• The fusing temperature detected by the thermistor was below 7°C (44.6°F) for 5 seconds• 2 seconds after reaching 45°C (113°F) the temperature does not reach an additional 15°C (59°F) after checking twice.	

SERVICE CALL CONDITIONS

SC	Level	Symptom	Possible Cause
542	A	Fusing temperature warm-up error	<ul style="list-style-type: none">• Fusing lamp defective• Poor fusing unit connector• Thermistor warped or broken• Thermostat has tripped• BICU defective• Power supply board defective
		<ul style="list-style-type: none">• Fusing temperature does not reach fusing standby temperature of 45°C (113°F) within 14 s at main power on or closing the front cover.• 20 seconds after reaching 50°C the fusing roller does not reach warm-up temperature.	
543	A	Fusing overheat error (software detection)	<ul style="list-style-type: none">• Power supply unit defective• I/O board (IOB) defective• BICU defective• Fusing thermistor defective
		Fusing temperature of over 230°C (446°F) is detected for 5 s by the fusing thermistors at center or either end of the fusing roller.	
544	A	Fusing overheat error (hardware circuit detection)	<ul style="list-style-type: none">• Power supply unit defective• I/O board (IOB) defective• BICU defective• Fusing thermistor defective
		Dual-monitor circuitry of the BICU detects an extremely high temperature of 240°C (464°F) and trips the relay circuit off.	
545	A	Fusing lamp remains on	<ul style="list-style-type: none">• Thermistor out of position.
		After reaching warm-up temperature with main motor on, the end fusing lamp remains on at full power for 15 s, or the center fusing lamp remains on at full power for 10s	
546	A	Fusing ready temperature unstable	<ul style="list-style-type: none">• Thermistor connection loose• Fusing unit connector loose
		After reaching warm-up temperature, temperature fluctuations of 50°C (122°F) within 1 s occur 2 times or more.	
547	B	Zero cross signal malfunction	<ul style="list-style-type: none">• Power supply board defective• Noise on the ac power line
		The applied power supply ac frequency detection is over 66 Hz or below 45 Hz, and the zero cross signals are not detected within 500 ms after the main power on.	
548	A	Fusing unit installation error	<ul style="list-style-type: none">• Fusing unit is not installed, or is installed incorrectly• Fusing unit connection loose
		The machine cannot detect the fusing unit when the front cover and right cover are closed.	
COMMUNICATION AND CONTROL			
620	C	Communication timeout error between BICU and finisher or mailbox	<ul style="list-style-type: none">• Serial line connecting BICU and finisher unstable• External noise• BICU board and finisher main board connection defective or loose• Finisher main board defective• BICU board defective
		The BICU does not receive a response after 3 attempts within 100 ms to send data to the finisher or mailbox.	

SC	Level	Symptom	Possible Cause
621	C	Communication timeout error between BICU and finisher or mailbox	<ul style="list-style-type: none"> Serial line connecting BICU and finisher unstable External noise
		A break (low) signal is received from the finisher or the mailbox.	
623	C	Communication timeout error between BICU and paper tray unit	<ul style="list-style-type: none"> Serial line connecting BICU and paper tray unit unstable External noise BICU board and paper tray main board connection defective or loose Paper tray main board defective BICU board defective
		The BICU does not receive a response after 3 attempts within 100 ms to send data to the paper tray unit.	
624	C	Communication break error between BICU and paper tray unit	<ul style="list-style-type: none"> Serial line connecting BICU and paper tray unit unstable External noise BICU board and LCT main board connection defective or loose Optional paper feed unit interface board defective BICU board defective
		The BICU cannot communicate with the paper tray unit because it has received a break signal.	
626	C	Communication timeout error between BICU and LCT	<ul style="list-style-type: none"> Serial line connecting BICU and LCT unit unstable External noise BICU board and LCT main board connection defective or loose LCT interface board defective BICU board defective
		The BICU does not receive a response after 3 attempts within 100 ms to send data to the LCT.	
627	C	Communication break error between BICU and LCT	<ul style="list-style-type: none"> Serial line connecting BICU and LCT unit unstable External noise BICU board and LCT main board connection defective or loose LCT interface board defective BICU board defective
		The BICU cannot communicate with the LCT unit because it has received a break signal.	
640	D	BICU control data transfer sumcheck error	<ul style="list-style-type: none"> Controller board defective External noise BICU board defective
		A sampling of control data sent from the BICU to the controller reveals a sumcheck error. Only the logging count is performed.	
641	D	BICU control data transfer abnormal	<ul style="list-style-type: none"> Controller board defective External noise BICU board defective
		Data send from BICU to controller failed after 3 attempts.	
670	C	Engine response error	<ul style="list-style-type: none"> BICU defective Controller board defective
		After powering on the machine, a response is not received from the engine within the specified time.	
690	A	GAVD block I ² C bus error	<ul style="list-style-type: none"> I²C bus on BICU defective
		An error is detected in the GAVD communication I ² C control register of the GABIC2.	

SERVICE CALL CONDITIONS

SC	Level	Symptom	Possible Cause
691	A	GAVD FCI block I ² C bus error	<ul style="list-style-type: none"> I2C bus on BICU defective
		An error is detected in the FCI communication I ² C control register of the GABIC2.	
692	A	CDIC GAVD block I ² C bus error	<ul style="list-style-type: none"> I2C bus on BICU defective
		An error is detected in the CDIC communication I ² C control register of the GABIC2.	
722	B	Finisher jogger motor error	<ul style="list-style-type: none"> Jogger H.P. sensor defective Jogger motor defective
		The finisher jogger H.P. sensor does not return to the home position, or move out of the home position, within the specified time.	
724	B	Finisher staple hammer motor error	<ul style="list-style-type: none"> Staple jam Stapler overload caused by trying to staple too many sheets Staple hammer motor defective
		Stapling not complete within 600 ms after the staple hammer motor turns on.	
725	B	Finisher stack feed-out motor error	<ul style="list-style-type: none"> Stack feed-out H.P. sensor defective Stack feed-out motor overload Stack feed-out motor defective
		The stack feed-out belt H.P. sensor does not activate within the specified time after the stack feed-out motor turns on.	
726	B	Finisher shift tray 1 lift motor error	<ul style="list-style-type: none"> Shift motor defective or overloaded Shift tray lift motor defective or overloaded
		<ul style="list-style-type: none"> Tray shift does not finish within the specified time after the shift motor turns on Stack height sensor does not activate within the specified time after the shift tray lift motor turns on. 	
727	B	Finisher stapler rotation motor error	<ul style="list-style-type: none"> Stapler rotation motor defective or overloaded Stapler rotation motor connection loose or connector defective
		The H.P. sensor does not switch on or off within the specified time, i.e. stapler rotation does not finish within the specified time after the staple rotation motor turns on, or the stapler does not return to its H.P. within the specified time after stapling finishes.	
729	B	Finisher punch motor error	<ul style="list-style-type: none"> Punch motor defective or overloaded Punch H.P. sensor defective Punch motor connection loose or connector defective
		After the punch motor turns on, the punch H.P. sensor does not activate within the specified time.	

SC	Level	Symptom	Possible Cause
730	B	Finisher stapler positioning motor error	<ul style="list-style-type: none"> • Stapler positioning motor defective or overloaded • Stapler H.P. sensor defective • Stapler positioning motor connection loose or connector defective
		The stapler H.P. sensor does not switch on or off within the specified time, i.e. after the stapler motor turns on, the stapler does not return to its H.P. within the specified time, or the stapler H.P. sensor does not activate within the specified time after the stapler motor turns on.	
731	B	Finisher exit guide open/close motor error	<ul style="list-style-type: none"> • Finisher exit guide open/close motor defective • Open/close sensor defective
		After the finisher exit guide open/close motor is turned on, the open/close sensor does not activate within the specified time.	
732	C	Finisher upper tray shift motor error	<ul style="list-style-type: none"> • Upper tray shift motor defective or overloaded • Upper tray shift sensor defective
		The upper tray shift motor does not stop within the specified time.	
733	C	Finisher lower tray lift motor error	<ul style="list-style-type: none"> • Lower tray lift motor defective or overloaded • Upper stack height sensor defective • Lower tray lower limit sensor defective
		The stack height sensor does not activate within the specified time, i.e. the lower tray lift motor does not stop.	
734	C	Finisher lower tray shift motor error	<ul style="list-style-type: none"> • Lower tray shift motor defective or overloaded • Lower tray shift sensor defective
		The lower tray shift sensor does not activate with the specified time, i.e. the lower tray shift motor driving the lower tray does not stop.	
800	B	Startup without video output end error	<ul style="list-style-type: none"> • Controller board defective
		Video transfer to the engine is started, but the engine did not issue the video transmission end command within the specified time.	
818	B	Watchdog error	<ul style="list-style-type: none"> • Controller board defective • Software malfunction –download controller firmware again
		The CPU does not access the watchdog register within the specified time.	
819	B	Kernel mismatch error	<ul style="list-style-type: none"> • Software application error
		Software bug	
822	B	Self-Diagnostic Error: HDD	<ul style="list-style-type: none"> • HDD defective • HDD connector defective • Controller board defective
		The hard disk drive returned an error during the self-diagnostic test.	
823	B	Self-diagnostic Error: NIB	<ul style="list-style-type: none"> • Network interface board defective • Controller board defective
		The network interface board returned an error during the self-diagnostic test.	

SERVICE CALL CONDITIONS

SC	Level	Symptom	Possible Cause
829	B	Self-diagnostic Error: Optional RAM	<ul style="list-style-type: none">• RAM DIMM defective• Controller board defective
		The optional RAM returned an error during the self-diagnostic test.	
835	B	Self-Diagnostic Error: Parallel Interface	<ul style="list-style-type: none">• Loopback connector not detected• IEEE1284 connector defective• Controller board defective
		Loopback test error.	
836	B	Self-diagnostic Error: Resident Font ROM	<ul style="list-style-type: none">• Controller board defective
		The resident font ROM returned an error during the self-diagnostic test.	
850	B	Network I/F Abnormal	<ul style="list-style-type: none">• NIB defective• Controller board defective
		NIB interface error.	
851	B	IEEE 1394 I/F Abnormal	<ul style="list-style-type: none">• IEEE1384 interface board defective• Controller board defective
		IEEE1394 interface error	
860	C	No HDD detection at main power on	<ul style="list-style-type: none">• Cable between controller board and HDD loose or defective• HDD power connector loose or defective• HDD defective• Controller board defective
		Hard disk is not detected.	
861	C	No HDD detection when recovering from Energy Saver Mode	<ul style="list-style-type: none">• Cable between controller board and HDD loose or defective• HDD power connector loose or defective• HDD defective• Controller board defective
		Hard disk is not detected.	
862	A	Maximum number of bad sectors detected on HDD	<ul style="list-style-type: none">• Defective HDD
		101 bad sectors have been detected, i.e. SC863 has occurred 101 times, which is the maximum allowable number.	
863	B	Bad sector	<ul style="list-style-type: none">• Damaged data (potentially defective HDD).
		HDD sector data cannot be read correctly.	
864	B	HDD data CRC error	<ul style="list-style-type: none">• Abnormal data transfer when reading from the HDD.
		HDD reports CRC error during HDD operation.	
865	B	HDD access error	<ul style="list-style-type: none">• HDD defective
		HDD error detected other than SC863 and SC864.	
CONTROLLER			
820	B	Self-Diagnostic Error: CPU	<ul style="list-style-type: none">• Controller board defective• Software defective
		The central processing unit returned an error during the self-diagnostic test.	

SC	Level	Symptom	Possible Cause
821	B	Self-Diagnostic Error: ASIC	<ul style="list-style-type: none">Controller board defective
		The ASIC returns an error during the self-diagnostic test at power on because the ASIC and CPU timer interrupts were compared and determined to be out of range.	
824	B	Self-diagnostic Error: NVRAM	<ul style="list-style-type: none">NVRAM damaged or abnormalBackup battery has dischargedNVRAM socket damaged
		The resident non-volatile RAM returns an error during the self-diagnostic test at power on.	
827	B	Self-diagnostic Error: RAM	<ul style="list-style-type: none">Memory malfunction
		The resident RAM returned a verify error during the self-diagnostic test at power on.	
828	B	Self-diagnostic Error: ROM	<ul style="list-style-type: none">Controller board defectiveFirmware defective
		The resident read-only memory returned an error during the self-diagnostic test at power on.	
OTHER			
900	B	Electronic total count error	<ul style="list-style-type: none">NVRAM defective
		<ul style="list-style-type: none">The value of the total count has already exceeded its limit (9,999,999)During counting, a defect was detected at the mechanical counter.	
951	C	F-GATE error at write request	<ul style="list-style-type: none">Software defectiveBICU defective
		After the IPU receives an F-GATE signal, it receives another F-GATE signal (software timeout error)	
954	B	Printer setting error	<ul style="list-style-type: none">Software defective
		The IPU does not respond with the settings required to start printer image processing.	
955	C	Memory setting error	<ul style="list-style-type: none">Software defective
		The IPU does not respond with the settings required to start memory image processing.	
966		No ready signal from the polygon motor.	<ul style="list-style-type: none">Defective polygon mirror motor
		At the start of printing, no ready signal is received for the polygon motor from the LD unit.	
984	B	Print image data transfer error	<ul style="list-style-type: none">Controller board defectiveBICU defectiveConnectors between BICU and controller loose or defective
		The image transfer from the controller to the engine via the PCI bus does not end within 15 s after startup.	

SERVICE CALL CONDITIONS

SC	Level	Symptom	Possible Cause
986	C	Software write parameter setting error	<ul style="list-style-type: none"> • Software defective
		An unstable area at the storage destination in the settings table is set NULL for the parameter received by the write module.	
990	B	Software performance error	<ul style="list-style-type: none"> • Software defective • Internal parameter incorrect • Insufficient working memory • When this SC occurs, the file name, address, and data will be stored in NVRAM. Note the above data and the situation in which this SC occurs. Report this information to the technical control center.
		The software attempted to perform an unexpected operation.	
991	D	Software continuity error	<ul style="list-style-type: none"> • Software bug • Internal parameter incorrect • Insufficient working memory
		The software attempted to perform an unexpected operation. Unlike SC990, continuity of the software is the problem.	

4.2 ELECTRICAL COMPONENT DEFECTS

4.2.1 SENSORS

Component (Symbol)	CN	Condition	Symptom
LD Unit Home Position (S6)	220-2 (IOB)	Open	SC328 is displayed when the laser beam pitch is changed.
		Shorted	SC327 is displayed when the laser beam pitch is changed.
Toner Density (TD) (S7)	205-5 (IOB)	Open	The Add Toner indicator blinks even if there is toner in the development unit.
		Shorted	SC390 is displayed.
Paper Exit (S8)	203-B2 (IOB)	Open	The Paper Jam indicator lights whenever a print is made.
		Shorted	The Paper Jam indicator lights even if there is no paper.
Registration (S9)	207-B2 (IOB)	Open	The Paper Jam indicator lights even if there is no paper.
		Shorted	The Paper Jam indicator lights whenever a print is made.
Image Density (ID) (S10)	219-5 (IOB)	Open	SC352 is displayed after printing.
		Shorted	SC350 is displayed after printing.
Upper Paper Height (S11)	235-2 (PFB)	Open	Add Paper is displayed even if there is paper. If this condition occurred four times, SC501 will be displayed.
		Shorted	SC501 is displayed.
Lower Paper Height (S12)	236-2 (PFB)	Open	Add Paper is displayed even if there is paper. If this condition occurred four times, SC502 will be displayed.
		Shorted	SC502 is displayed.
Upper Paper End (S13)	235-8 (PFB)	Open	The Paper End indicator lights even if paper is placed in the upper paper tray.
		Shorted	The Paper End indicator does not light even if there is no paper in the upper paper tray.
Lower Paper End (S14)	236-8 (PFB)	Open	The Paper End indicator lights even if paper is placed in the lower paper tray.
		Shorted	The Paper End indicator does not light even if there is no paper in the lower paper tray.
Upper Relay (S15)	235-5 (PFB)	Open	The Paper Jam indicator lights whenever a print is made.
		Shorted	The Paper Jam indicator lights even if there is no paper.
Lower Relay (S16)	236-5 (PFB)	Open	The Paper Jam indicator lights whenever a print is made.
		Shorted	The Paper Jam indicator lights even if there is no paper.
Transfer Belt Position (S17)	203-A10 (IOB)	Open	No symptom
		Shorted	SC403 is displayed

ELECTRICAL COMPONENT DEFECTS

4.2.2 SWITCHES

Component (Symbol)	CN	Condition	Symptom
Right Lower Cover (SW1)	232-3 (PFB)	Open	“Doors/Covers Open” is displayed even if the right lower cover is closed.
		Shorted	LCD goes blank when the lower cover is opened.
Main (SW3)	102-1~4 (PSU) 107-1	Open	The machine does not turn on.
		Shorted	The machine does not turn off.
Front Cover Safety (SW4)	107-1 (PSU)	Open	“Doors/Covers Open” is displayed even if the front cover is closed.
		Shorted	“Doors/Covers” Open is not displayed even if the front cover is opened.

4.3 BLOWN FUSE CONDITIONS

Fuse	Rating		Symptom at power on
	115 V	210 ~ 230 V	
Power Supply Board			
FU1	6.3 A/125 V	6.3 A/250 V	“Doors/Covers Open” is displayed
FU2	6.3 A/125 V	6.3 A/250 V	“Doors/Covers Open” for the finisher is displayed
FU3	6.3 A/125 V	4 A/250 V	Paper end condition
FU4	6.3 A/125 V	6.3 A/250 V	SC121 is displayed
FU5	6.3 A/125 V	6.3 A/250 V	SC302, or SC403, or SC405 displayed
FU101	15 A/125 V	—	No response
FU102	10 A/12 5V	5 A/250 V	No response
FU103	2 A/125 V	1 A/250 V	Normal operation (optional heaters do not work)

4.4 LEDS

BICU

Number	Monitored Signal
LED101	Monitors whether the program is working normally or not. The LED blinks in normal conditions.
LED102	Flashes during program downloading.

Trouble-
shooting

4.5 TEST POINTS


Controller Board

No.	Monitored Signal
TP1	GND
TP2	—
TP3	GND
TP4	—
TP5	—
TP6	GND
TP7	+3.3 VCG
TP8	DB0 RXD
TP9	DB0 TXD
TP10	GND
TP11	+5 VE
TP12	GND
TP13	+5 V
TP14	+5 VE
TP15	GND
TP16	R.FGATE
TP17	W.FGATE
TP18	+2.5 V
TP19	+1.65 VCP
TP20	+3.3 V

SERVICE TABLES

5. SERVICE TABLES

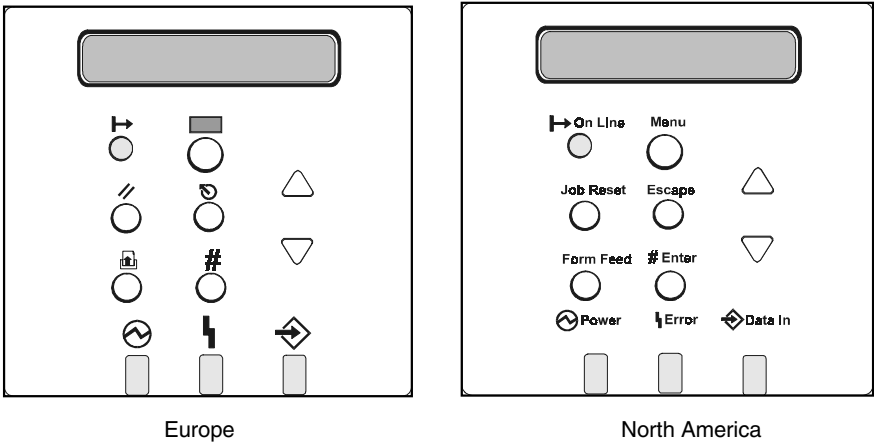
5.1 SERVICE PROGRAM MODE










CAUTION



Before entering the service menu, make sure that the Data In lamp is off. If the Data In lamp is lit or flashing, wait for it to go off. It will remain on until the current print job has completed.









5.1.1 ENTERING AND LEAVING THE SERVICE PROGRAM MODE



- To set the printer in the service mode:
If the printer is off, press and hold down  (Online) and  (Escape) then switch the printer on.
Release the buttons when you see “1. Service” in the LCD.
-or-
If the printer is on, press and hold down  and  for over 5 seconds and release.
Press  (Enter). You will see “1. Service” in the LCD. The printer is in the service mode.

- Press  or  to display the menu titles.

1.Service	Controller service settings.	 5.2)
2.Engine	Engine service settings.	 5.3)
3.End	Leave the SP mode and return to normal operation.	

- With the item that you want to open displayed in the LCD, press  (Enter).
- Press  or  to display all the menus on the same level, then press  (Enter) to open the submenus.
- Press  (Escape) to the highest level,  or  to display “3.End” then press  (Enter).

5.2 PRINTER CONTROLLER SERVICE MODE

5.2.1 CONTROLLER SERVICE MODE MENUS

The controller service mode menu (1.Service) is the first item on the menu.

Item	What It Does
Bit Switch	Adjusts the bit switch settings.
Clear Setting	Initializes the settings for the “System” menu of the user mode.
Print Summary	Prints a summary of all the controller settings.
Display Version	Displays the current version number of the controller firmware.

5.2.2 BIT SWITCH PROGRAMMING

1. Enter the SP mode, select “1.Service”, and press #(Enter) twice.

```
SP1001-001
Bit Switch 1 Set
```

2. Press ▲ or ▼ to select the bit switch setting to change.

```
SP1001-002
Bit Switch 2 Set
```

3. Press #(Enter).

```
Sw#2      00000000
bit0      _
```

4. Select the “0” or “1” for each position. The leftmost digit is 7 and the rightmost is 0.
 - Press ▲ or ▼ to move the cursor to the right or left to position the it at the digit to change.
 - Press #(Enter) then press ▲ or ▼ to toggle the digit between “1” and “0”.
 - With the digit for entry displayed on the second line, press #(Enter). The selected digit is entered into the position above.
 - Repeat this procedure to set all the digits.
5. When you are finished, press ⏏(Escape) to return to the previous level. The new settings for the bit switch are now stored.

5.2.3 PRINTER CONTROLLER BIT SWITCH SETTINGS

Position:	7	6	5	4	3	2	1	0
Display:	0	0	0	0	0	0	0	0

Bit Switch 1	Default	
0	0	Do not change.
1	0	
2	1	
3	0	
4	0	
5	0	
6	0	
7	0	
Bit Switch 2		
0	0	Do not change.
1	0	
2	0	
3	0	PDL Sniffing. See PUB(C)-051 for details.
4	0	Do not change.
5	0	
6	0	
7	0	
Bit Switch 3		
0	0	PS Fonts Download. See PUB(C)-045 for details.
1	0	Do not change.
2	0	
3	0	
4	0	
5	0	
6	0	
7	0	
Bit Switch 4		
0	0	Do not change.
1	0	
2	0	
3	0	
4	0	
5	0	
6	0	
7	0	

5.3 PRINTER ENGINE SERVICE MODE

The Printer Engine Service mode is used to check electrical data, change modes, and adjust values.

Here is a quick summary of how to enter and use the Printer Engine Service mode to change the settings listed in the Service Program Mode Tables. (➡ 5.3.1)

1. Press ▲ and ▼ together, hold down for over 5 seconds, release and then press #(Enter).
2. Press ▲ or ▼ to display “2.Engine”.
3. Press #(Enter).
4. Press ▼ or ▲ to display the SP code groups.

1. Feed	SP1000
2. Drum	SP2000
3. Process	SP3000
4. HDD	SP4000
5. Mode	SP5000
6. Periphs	SP6000
7. Data Log	SP7000

5. Press ▲ or ▼ to select the group, and then press #(Enter).
NOTE: The 2-line display is rotational. If you press ▲ with “1.Feed” displayed, the display will jump to “7.Data Log”, the last selection. Similarly, if you press ▼ with “7.Data Log” displayed, the display will jump to “1.Feed”, the first selection.
6. While referring to the Service Program Mode Tables, press ▲ or ▼ to select the SP that you want to change, and then press #(Enter).
NOTE: If you see > or >> to the right of a selection name, this means a menu sublevel exists.
7. Follow one of the procedures below to change a setting.
 - **To change a single-digit number setting:**
 Press #(Enter). A number replaces the cursor.
 Press ▲ or ▼ to increase or decrease the number.
 Press #(Enter). The number selected on the 2nd line replaces the number above.
 Press ⏏(Escape) to return to the previous level.

- To change a multiple-digit number setting
 Press ▲ or ▼ to move the cursor to the digit that you want to change.
 Press #(Enter). A number replaces the cursor.
 Press ▲ or ▼ to increase or decrease the number.
 Press #(Enter). The number selected on the 2nd line replaces the number above.
 Repeat the procedure to enter numbers for the other digits.
 Press #(Escape) to return to the previous level.
- **To select an item from a list**
 The current selection is marked with a large asterisk (*).
 Press ▲ or ▼ to display on the 2nd line the item to select.
 With the item that you want to select displayed on the second line, press #(Enter). The selected item is marked with an asterisk.
 Press #(Escape) to return to the previous level.

Leaving the SP Mode

1. When you are finished with SP selection, press ⏏(Escape) until you see "2.Engine".
 2. Press ▼ to display "3.End".
 3. Press #(Enter) to display "Offline".
 4. Press ⏏(On Line) to set the printer online.
- NOTE:** Powering the printer off and on leaves the SP mode, and returns the printer online in normal operation mode.

5.3.1 SERVICE PROGRAM MODE TABLES

Service Table Key

Notation	What it means
[range / default / step]	Example: [-9 ~ +9 / +3.0 / 0.1 mm step]. The setting can be adjusted in the range ± 9 , value reset to +3.0 after an NVRAM reset, and the value can be changed in 0.1 mm steps with each key press.
italics	Comments added for reference.
*	Value stored in NVRAM. After a RAM reset, this default value (factory setting) is restored.
DFU	Denotes "Design or Factory Use". Do not change this value.
Japan only	The feature or item is for Japan only. Do not change this value.
(S)	Sideways feed direction (LEF)
(L)	Lengthwise feed direction (SEF)

1. Feed (SP1000-00)

SP1	Mode Number	Function and [Setting]
1001*	Sub-Scan Registration Adjustment	Adjusts the printing leading edge registration using the trimming area pattern (SP2902-03, No.11). [+9 ~ -9 / 3.0 / 0.1 mm] Use #(Enter) to toggle between \pm before entering the value. Specification: 3 \pm 2 mm
1002*	Side-to-Side Registration	Adjusts the printing side-to-side (main scan) registration. Changing this setting adjusts the printing starting position. These settings should be adjusted after the optical unit or laser synchronization detection board is replaced. Reduce the value to move the image closer to the operation panel side of the machine.
	01 Tray 1	[-9 ~ +9/ +3.0 mm / 0.1 mm step]
	02 Tray 2	
	03 Tray 3	[-9 ~ +9/ +2.0 mm / 0.1 mm/step]
	04 Tray 4	
	05 Duplex Tray	[-9 ~ +9/ +0.0 mm / 0.1 mm/step]
	06 By-pass Tray	[-9 ~ +9/ +3.0 mm / 0.1 mm/step]
	07 LCT	[-9 ~ +9/ +1.5 mm / 0.1 mm/step]
1003*	Registration Buckle Adjustment	
	01 Paper Feed Trays, LCT	Adjusts the relay clutch timing at registration. Relay clutch timing determines the amount of paper buckle at registration. (A "+" setting causes more buckling.) [-9 ~ +9 / +0.0 mm (1 mm for 1st Tray Feed) / 0.1 mm step]
	02 Duplex Tray	
	03 By-pass Tray	
	04 Tray 1	
	05 By-pass Thick	

SP1	Mode Number		Function and [Setting]
1012*	Exit Junction Solenoid Timing		Adjusts the operation timing of the solenoids at the entrance and exit of the paper exit section to accommodate the increased speed of the duplex unit. This SP has been added to compensate for the increased operation speed of the duplex unit for this machine. Increase the value if the leading edges are jamming. Decrease the value if trailing edges are bending at the entrance.
	1	Exit Junction Start Solenoid	[200 ~ 450 / 370 / 10 ms]
	2	Exit Junction End Solenoid	[200 ~ 450 / 370 / 10 ms]
1103*	Fusing Idling		Switches hot roller idling on/off. When on (1), the hot roller will rotate until enough time has elapsed so the hot roller can reach optimum temperature to ensure even heat on the hot roller.
	01	0:Off 1:On	In a cold environment, switch on and then set the idling time with SP1103-02 to ensure the quality of the first prints. [0 ~ 1 / 0 / 1 step] 0: No rotation 1: Rotation <i>Switch on if fusing on the 1st and 2nd prints is incomplete (this may occur if the room is cold.)</i>
	02	Fusing Idling Interval (s)	Sets the idling time before the machine starts to print. [0 ~ 60 sec. / 30 sec. / 1 sec.] SP1103 01 must be set on before this setting can be performed.
1104*	01	Fusing Temperature Control	Selects the fusing temperature control mode. [0~1 / 0 / 1 step] 0: Enables the On/Off Control method with the thermistor and CPU. 1: Enables the Phase Control method. Generally, phase control is used only if the customer has a slightly unstable power supply. Selecting phase control could cause and increase in electrical noise or cause the controller to emit a low pitch noise. <i>The machine must be cycled off and on to enable this setting after it is changed.</i>
1105*	Fusing Temperature Adjustment		Allows adjustment of the hot roller temperature at the center and ends of the roller for the quality or thickness of the paper. The hot roller in this machine has two fusing lamps: one heats the center of the roller, and the other heats both ends. Each fusing lamp can be adjusted separately. Use SP1105-03, 04 to adjust for feeding standard paper from the by-pass tray, and use SP1105-07, 08 to adjust for feeding thick paper from the by-pass tray.
	01	Center (Roller Center)	[120°C ~ 200°C / 180°C / 1°C step]
	02	Ends (Roller Ends)	[120°C ~ 200°C / 185°C / 1°C step]
	03	Center (By-pass)	[120°C ~ 220°C / 190°C / 1°C step]

PRINTER ENGINE SERVICE MODE

SP1	Mode Number		Function and [Setting]
1105*	04	Ends (By-pass)	[120°C ~ 220°C / 190°C / 1°C step]
	05	Center (Reload)	Adjusts the temperature for re-heating the center of the hot roller: Reload Temp. = Fusing. Temp – SP Value [0°C ~ 60°C / 30°C / 1°C step] When the fusing temperature exceeds this setting, the machine can operate. <i>Do not set a reload temperature (Spec. Temp – SP Value) higher than the SP1105-02 setting.</i>
	06	Ends (Reload)	Adjusts the temperature for re-heating the ends of the hot roller: Reload Temp. = Fusing. Temp – SP Value [0°C ~ 60°C / 30°C / 1°C step] When the fusing temperature exceeds this setting, the machine can operate. <i>Do not set a reload temperature (Spec. Temp – SP Value) higher than the SP1105-02 setting.</i>
	07	Roller Center (By-pass) Thick Paper	Adjusts the temperature of the center of the hot roller for feeding thick paper with the by-pass tray. [120°C ~ 220°C / 200°C / 1°C step]
	08	Roller Ends (By-pass) Thick Paper	Adjusts the temperature of the ends of the hot roller for feeding thick paper with the by-pass tray. [120°C ~ 220°C / 200°C / 1°C step]
	09	Roller Center (Thick Paper)	Adjusts the temperature for re-heating the center of the hot roller for feeding thick paper: Reload Temp. = Fusing. Temp – SP Value [0°C ~ 60°C / 5°C / 1°C step] When the fusing temperature exceeds this setting, the machine can operate. <i>Do not set a reload temperature (Spec. Temp – SP Value) higher than the SP1105-02 setting.</i>
	10	Roller Ends (Thick Paper)	Adjusts the temperature for re-heating the ends of the hot roller for feeding thick paper: Reload Temp. = Fusing. Temp – SP Value [0°C ~ 60°C / 5°C / 1°C step] When the fusing temperature exceeds this setting, the machine can operate. <i>Do not set a reload temperature (Spec. Temp – SP Value) higher than the SP1105-02 setting.</i>
1106	Temperature Display		
	Sets the temperature display to show the fusing temperature (monitored by thermistors) for the center or ends of the hot roller, or the temperature of the I/O Board at power on.		
	01	Roller Center	Monitors and displays temperature (°C) of the hot roller center.
	02	Roller Ends	Monitors and displays temperature (°C) of the hot roller ends.
	03	I/O Temp.	Monitors and displays the temperature (°C) of the I/O board at power on.

PRINTER ENGINE SERVICE MODE

SP1	Mode Number		Function and [Setting]
1109*	01	Fusing Nip Band Check	DFU
1111*	01	Switchback Timing	Adjusts the reverse timing of paper in the duplex unit (stopping the rotation of the reverse roller after the trailing edge of the paper passes the duplex entrance sensor). [+5 ~ -5 / 0 mm / 1 mm step] Adjust the timing if paper frequently jams at the inverter gate in the duplex unit.

2. Drum (SP2000-00)

SP2	Mode Number		Function and [Setting]
2001*	Charge Roller Bias Adjustment		
	01	Image Pattern	Adjusts the voltage applied to the charge roller for the image area to maintain a charge of -800 V on the OPC drum surface. [$-1,000 \sim -2,000$ / $-1,480$ V / 10 V step]
	02	ID Sensor Pattern	Adjusts the voltage applied to the charge roller when making the ID sensor pattern (for charge roller voltage correction). The actual charge roller voltage is this value plus the value of SP2001-01. [$0 \sim 700$ / 200 V / 10 V step] The default is adjusted automatically based on the number of prints. 00 K \sim 10 K: 200 V 10 K \sim 50 K: 230 V 50 K \sim 150 K: 340 V
2005*	Charge Roller Voltage		
	01	Correction 1	Adjusts the lower threshold value for the charge roller correction. DFU <i>When the value of V_{SP}/V_{SG} is greater than this value, the charge roller voltage increases by 30 V (e.g., from $-1,480$ to $-1,510$).</i> [$0.1 \sim 1.0$ / 0.85 / 0.05 step]
	02	Correction 2	Adjusts the upper threshold value for the charge roller correction. DFU <i>When the value of V_{SP}/V_{SG} is greater than this value, the charge roller voltage decreases by 30 V (absolute value).</i> [$0.1 \sim 1.0$ / 0.9 / 0.05 step]
	03	Adjustment 1	Adjusts the lower limit value for charge roller voltage correction. DFU [$-1,000 \sim -2,000$ / $1,480$ V / 10 V step]
	04	Adjustment 2	Adjusts the upper limit value for charge roller voltage correction. DFU [$-1,000 \sim -2,000$ / $2,000$ V / 10 V step]
	05	Step	Adjusts the correction voltage adjustment step size. DFU [$0 \sim 100$ V / 30 V / 10 V step]
2101*	Printing Erase Margin		Adjusts the leading edge (top), trailing edge (bottom), left, and right margins.
	01	Leading Edge	[$0 \sim 9.0$ / 3 / 0.1 mm step]
	02	Trailing Edge	Specification: ± 2 mm
	03	Right Edge	[$0 \sim 9.0$ / 2 / 0.1 mm step]
	04	Left Edge	Specification: ± 1.5 mm
	05	Trailing Edge – Back side	Adjusts the trailing edge erase margin on the reverse side of duplex prints. [$0 \sim 9.0$ / 1.2 / 0.1 mm step] <i>Recommended: 2 ± 1.5 mm</i>

PRINTER ENGINE SERVICE MODE

SP2	Mode Number		Function and [Setting]
2101*	06	Back Side – Right	Adjusts the right side erase margin in the reverse side of duplex prints. [0 ~ 9.0 / 0.3 / 0.1 mm step] <i>Recommend: 2 ±1.5 mm</i>
	07	Back Side – Left	Adjusts the left side erase margin in the reverse side of duplex prints. [0 ~ 9.0 / 0.3 / 0.1 mm step] <i>Recommended: 2 +2.5/-1.5 mm</i>
2103*	LD Power Adjust		Adjusts the intensity of the laser for the printer. The printer and fax settings can be adjusted separately. DFU
	01	LD1 Print Control	(-55 ~ +64 / -20 / 1 LSB step)
	02	LD2 Print Control	<i>Approx. 50/128 = 0.4%</i>
	03	LD1 Printer	(-55 ~ +64 / -5 / 1 LSB step)
	04	LD2 Printer	<i>Approx. 50/128 = 0.4%</i>
	05	LD1 Adjustment Start/End	DFU
	06	LD2 Adjustment Start/End	DFU
2109*	LD Beam Pitch Adjustment		Adjusts the beam gap for the dual beam system. After replacing the LD unit or replacing or clearing the NVRAM, use this SP mode to adjust the laser beam pitch. <i>This adjustment is performed by specifying the number of pulses to the stepper motor that will adjust the angle of rotation of the LD unit from the home position.</i>
	01	400 dpi	Adjusts the laser beam pitch value for 400 dpi resolution. 400 dpi: [8 ~ 262 / 144 / 1 pulse step] <i>After replacing the LD unit or replacing or clearing NVRAM, use this SP and SP2109-03 to adjust the laser beam pitch.</i>
	02	600 dpi	Adjusts the laser beam pitch value for 600 dpi resolution. 600 dpi: [28 ~ 284 / 168 / 1 pulse step] <i>After replacing the LD unit or replacing or clearing NVRAM, use this SP and SP2109-04 to adjust the laser beam pitch.</i>
	03	400 dpi Initial Setting	Initializes the laser beam pitch for 400 dpi using the value for SP2109-01. <i>After entering a value for SP2109-1, this SP must be executed.</i>
	04	600 dpi Initial Setting	Initializes the laser beam pitch for 600 dpi using the value for SP2109-02. <i>After entering a value for SP2109-02, this SP must be executed.</i>
	05	Auto Interval Set	Sets the interval for automatic laser beam pitch adjustment. [0 ~ 65,535 / 10,000 / 1 step] <i>When the number of times that the resolution has been changed reaches this value, the laser unit position is automatically corrected.</i>

PRINTER ENGINE SERVICE MODE

SP2	Mode Number		Function and [Setting]
2109*	06	LD Unit Position	Displays the current LD unit position (number of pulses from home position). If this is different from the value of SP2109-01 or SP2109-02, LD unit positioning has failed.
	07	Pitch Change Count	Displays how many times the LD unit position has been changed (how many times the resolution has changed.) <i>When the laser beam pitch adjustment is done, this counter is reset to zero.</i>
	08	Beam Pitch Data Reset	Resets the values of SP2109-06 and SP2109-07. <i>After replacing the LD unit, this SP mode must be performed. See section 3.9.5.</i>
2110	01	Test Mode dpi	Sets the scanning resolution (dpi). [See below / 8 / 0 ~ 18] <u>Range</u> 0: 400 x 400 dpi 1: 391 x 406 dpi 2: 406 x 391 dpi 4: 300 x 300 dpi 8: 600 x 600 dpi 15: 439 x 430 dpi 16: 476 x 476 dpi 17: 483 x 465 dpi 18: 465 x 483 dpi
2112	01	Polygon Motor Off Timer	Input the time that the polygon motor is to switch off after the printer has remained idle for the specified time and entered the standby mode. <i>If set to zero, the polygon motor never switches off in standby mode. However, if the machine enters the energy saver mode, the polygon motor will ignore the zero setting and switch itself off.</i> [0~60 s / 10 s / 5 s step]
2201*	Development Bias		
	01	Image Development Bias	Adjusts the development bias for printing. <i>Use as a temporary measure to correct faint images printed with an aging drum.</i> [–200 ~ –700 / 540 V / 10 V step]
	02	ID Sensor Pattern	Adjusts the development bias for the ID sensor pattern for VSP (ID sensor output after reading the ID sensor pattern). [–200 ~ –700 / 380 V / 10 V step]
2207	01	Forced Toner Supply	Forces the toner bottle to supply toner at 1-second intervals for up to 30 seconds. To start, press #(Enter) .

PRINTER ENGINE SERVICE MODE

SP2	Mode Number		Function and [Setting]
2208*	01	Toner Supply Mode	<p>Selects the toner mode.</p> <p>0: Sensor control 1: Image pixel count.</p> <p><i>If you select 1, set SP2209-02 to its default value. Use image pixel count mode only as a temporary measure if the ID or TD sensor is defective and a replacement is not available.</i></p>
2209*	Toner Supply Rate		Adjusts the toner supply rate.
	01	Toner Rate	<p>Sets the amount of toner supplied every second by the toner supply motor.</p> <p><i>Increasing this value reduces the toner supply clutch on time. Use a lower value if the user tends to make lots of prints that have a high proportion of black.</i></p> <p>[10 ~ 800 mg/s / 60 mg/s / 5 mg steps]</p>
	02	Toner Rate (Supply Correction Data)	<p>Displays the toner supply correction coefficient (K). It can also be used to adjust K, but the value is changed again when V_T (V_{TD}, the output of the TD sensor) is measured for the next print.</p> <p><i>The toner supply rate depends on the amount of toner in the toner bottle. This change is corrected using this coefficient. This SP can be used to check the toner supply condition. The lower the value of K, the lower the toner density.</i></p> <p>[0.25 ~ 3.0 / 3.0 / 0.25 steps]</p>
2210*	01	Pattern Interval (ID Sensor)	<p>Sets the interval between ID sensor pattern prints for toner control. This setting allows adjustment for customers who do not make many prints daily. Selecting zero cancels creation of the ID sensor pattern.</p> <p>[0 ~ 200 / 10 / 1 print step]</p> <p><i>The ID sensor reads the sensor pattern and outputs this reading as V_{sp} and sends it to the CPU where it is used to calculate V_{ref} ($V_{sp}/V_{sg} = V_{ref}$).</i></p> <p><i>If the total count exceeds 10 during a print job, for example "15", the pattern is created and read at completion of the print job.</i></p>

PRINTER ENGINE SERVICE MODE

SP2	Mode Number		Function and [Setting]
2210*	02	Large Job	<p>Sets the interval between ID sensor pattern prints with the halftone pattern added. The ID sensor reads the halftone pattern and outputs it as Vsm to the CPU. The Vsm value is used in the calculation V_{sm}/V_{sg} to adjust the power to the LD.</p> <p>[2 ~ 999 / 200 / 1 print step]</p> <p><i>This SP executes at 200 prints (or at the adjusted count) regardless of whether the print job has completed. This method of adjusting the power output and the amount of light emitted by the LD ensures standard quality images by ensuring that prints do not become faint, slows the deterioration of the OPC drum over time, and reduces scatter.</i></p>
2213*	01	Toner End Count	<p>Selects the number of prints that can be printed once the copier has detected the toner near-end condition.</p> <p>[0 ~ 2 / 0 / 1 step]</p> <p>0: 90 prints 1: No prints 2: 10 prints</p> <p><i>Select 1 or 2 if the customer normally makes prints of high density.</i></p>
2220*	01	Vref Manual Set	<p>Allows manual adjustment of Vref, the targeted voltage for the TD sensor.</p> <p>[1.0 ~ 5.0 V / 4.0 V / 0.01 V step]</p>
	<p><i>Change this value after replacing the development unit with another unit that contains toner.</i></p> <ol style="list-style-type: none"> <i>1. Check the value of SP2220 in the machine containing the test unit and the machine that you are going to move it to.</i> <i>2. Install the test development unit, and then input the VREF for this unit into SP2220.</i> <i>3. After the test, put back the old development unit, and change SP2220 back to the original value.</i> 		
2223*	01	Vt Previous Copy	Displays the TD sensor output voltage for the immediately previous print.
	02	Vt Previous 10 Averaged	Displays the average of the most recent TD sensor outputs (from the previous 10 prints).
	03	Vt Change Rate	Displays the rate of change in the TD sensor output.
	04	Vt Gain	Displays the GAIN value used to calculate the on time for the toner supply motor.
	05	Image Pixel Count	Displays the image pixel count.
2301*	Transfer Current Adjustment		Adjusts the current applied to the transfer belt during printing the 5 phases listed below.
	01	Image Face (1st Side of Paper)	<p>Printing the first side of the paper (image area).</p> <p><i>If the user uses thicker paper, the current may have to be increased to ensure sufficient transfer of toner.</i></p> <p>[20 ~ 100 μA / 45 / 1 μA step]</p>

SP2	Mode Number		Function and [Setting]
2301*	02	Image Back (2nd Side of Paper)	Printing the second side of the paper (image area) during duplex printing. [20 ~ 100 μ A / 45 / 1 μ A step]
	03	Leading Edge. Face	Printing at leading edge of the paper. <i>Increase the current to separate the paper from the drum properly in high humidity and high temperature conditions.</i> [20 ~ 100 μ A / 45 / 1 μ A step]
	04	Image Face By-pass (By-pass Feed)	Printing from the by-pass tray (image area). <i>If the user normally feeds thicker paper from the bypass tray, use a higher setting.</i> [20 ~ 100 μ A / 45 / 1 μ A step]
	05	Leading Face By-pass (Leading Edge By-pass Feed)	Printing at the leading edge of paper fed from the by-pass tray. <i>Increase the current to separate the paper from the drum properly in high humidity and high temperature conditions.</i> [20 ~ 100 μ A / 60 / 1 μ A step]
2309*	Transfer Current Correction		
	01	a (Paper Lower Width)	Adjusts the lower paper width threshold for the transfer current, charge voltage, and development bias corrections. DFU <i>Use this SP when an image problem (e.g., insufficient toner transfer) occurs with a small width paper. If the paper width is smaller than this value, the transfer current will be multiplied by the factor in SP2309-03 (paper tray) or SP2309-05 (by-pass).</i> [0 ~ 297 / 150 / 1 mm step]
	02	b (Paper Upper Width)	Adjusts the upper paper width threshold for the transfer current, charge voltage, and development bias corrections. DFU <i>As for SP2309-01, but the factors are in SP2309-04 (paper tray) and SP2309-06 (by-pass).</i> [0 ~ 297 / 216 / 1 mm step]
	03	Alpha (Tray)	Adjusts the transfer current correction coefficient used if the paper width is less than the setting of SP2309-01. DFU [1.0 ~ 3 / 1.2 / 0.1 mm step]
	04	Beta (Tray)	Adjusts the transfer current correction coefficient used if the paper width is less than the setting of SP2309-02. DFU [1.0 ~ 3 / 1.2 / 0.1 mm step]
	05	Gamma (By-pass)	Adjusts the transfer current correction coefficient used if the paper width is less than the setting of SP2309-01. DFU [1.0 ~ 3 / 1.5 / 0.1 mm step]
	06	Delta (By-pass)	Adjusts the transfer current correction coefficient used if the paper width is less than the setting of SP2309-02. DFU [1.0 ~ 3 / 1.5 / 0.1 mm step]

PRINTER ENGINE SERVICE MODE

SP2	Mode Number		Function and [Setting]
2801*	TD Sensor Initial Setting		Performs the TD sensor initial setting. This SP mode controls the voltage applied to the TD sensor to make the TD sensor output about 4.0 V. Press #(Enter) to start. After execution the TD sensor output voltage is displayed. <i>Use this mode only after installing the machine, changing the TD sensor, or adding new developer.</i>
2802*	TD Sensor Manual Setting		Allows you to adjust the TD sensor output VT manually for the initial, maximum, and minimum settings.
	01	Initial Vt	Adjusts the TD sensor output (VT). <i>Change this value after replacing the development unit with another one that already contains toner.</i> <i>For example, when using a development unit from another machine for test purposes. To adjust VT, use a similar procedure as for SP2220.</i> [1.0 ~ 5.00 V / 4.78 V / 0.02 V step]
	02	Vt Max	Adjusts the maximum value for SP2802-01. [1.0 ~ 5.00 V / 4.78 V / 0.02 V step]
	03	Vt Min	Adjusts the minimum value for SP2802-01. [1.0 ~ 5.00 V / 1.0 V / 0.02 V step]
2805	01	Initialize Process Control Setting	Initializes all the process control settings.
2902	03	Test Pattern (Printing)	Prints the printer test patterns. Select the number of the test pattern that you want to print. (☛ 5.3.2) [0~38 / 0 / 1 step] <i>This SP mode is useful for finding whether the LDB (Laser Diode Board) or the BICU is defective. If the printout is not satisfactory, the LDB is defective.</i>
2909	02	Print Main Scan Magnification – Printer	Adjusts the magnification in the main scan direction when printing from a personal computer. [–2.0 ~ +2.0 / 0 / 1% step]
2911	Transfer Current Timing		Adjusts the transfer current timing for the three items below.
	01	La (On Timing)	On timing at leading edge. [–30 ~ +30 / 0 mm / 1 mm step]
	02	Lb (Off Timing)	Transfer current switch timing. This determines when the leading edge stops and the image area current begins (☛ SP2301). [0 ~ +30 / 10 mm / 1 mm step]
	03	Lc (Off Timing)	Transfer current timing (e.g. –5 mm) is 5 mm after the trailing edge. [–30 ~ +30 / – 5 mm / 1 mm step]

SP2	Mode Number		Function and [Setting]
2912	01	Drum Reverse Rotation Interval	Adjusts the time the drum and belt are reversed in order to prevent paper dust and toner from collecting at the blade. DFU [0 ~ 10 / 3 / 1 step] <i>Example 1: If you enter 3, then: 3/2 = 2 (rounded up) x 10 + 10 = 30 ms</i> <i>Example 2: If you enter 10, then: 10/2 = 5 x 10 + 10 = 60. However, the limit is 50 ms so in this case, 60 ms is reduced to 50 ms.</i>
2913*	01	Test Pattern Density	Sets the print density for the patterns printed with SP2902-03. DFU [0 ~ 15 / 15 / 1]
2914*	Process Control Setting		Adjusts the charge roller voltage for the following items.
	01	C alpha	Adjusts the charge roller voltage used when paper with a small width is fed from the by-pass tray. The paper width below which the correction starts depends on the value of SP2309-01. <i>Use this SP when an image problem (such as white spots at the center of black dots or breaks in thin black lines) occurs when paper with a small width is fed from the by-pass feed tray.</i> [0 ~ 400 / 150 / 10 V step]
	02	C beta	Adjusts the charge roller voltage used when paper with a small width is fed from the by-pass tray. The paper width below which the correction starts depends on the value of SP2309-02. <i>Use this SP when an image problem (☛ SP2914-01) occurs when paper with a small width is fed from the by-pass feed tray.</i> [0 ~ 400 / 0 / 10 V step]
	03	B gamma	Adjusts the development bias used when paper with a small width is fed from the by-pass tray. The paper width below which the correction starts depends on the value of SP2309-01. <i>Use this SP when an image problem (☛ SP2914-01) occurs when paper with a small width is fed from the by-pass feed tray.</i> [0 ~ 300 / 200 / 10 V step]
	04	B delta	Adjusts the development bias used when paper with a small width is fed from the by-pass tray. The paper width below which the correction starts depends on the value of SP2309-02. <i>Use this SP when an image problem (☛ SP2914-01) occurs when paper with a small width is fed from the by-pass feed tray.</i> [0 ~ 300 / 50 / 10 V step]
2920	01	LD Off Check	Used to confirm that the laser diode shuts off when the cover is opened. DFU
2960*	01	Toner Overflow Sensor	Selects whether the toner overflow sensor is activated or not. 0 = No, 1 = Yes

PRINTER ENGINE SERVICE MODE

SP2	Mode Number		Function and [Setting]
2964*	01	Transfer Cleaning Blade Forming	Applies a pattern of toner to the transfer belt at a defined interval between sheets on the transfer belt in order to reduce friction between the belt surface and the cleaning blade. [0 ~ 30 / 3 / 1 sheet] Under conditions of high temperature and high humidity, the density control feature may reduce the amount of toner, which also reduces the amount of toner on the surface of the transfer belt. With less toner on the belt, the friction between the belt and the blade increases, and could cause the blade to bend or scour the surface of the belt.
2971	01	Toner Full Count	Counter that confirms that the contact of the waste toner full sensor is operating normally. Execution of SP5801 initializes this value by setting it to 0. DFU
2972*	Grayscale Limit		Controls the halftone density level to prevent deterioration of the OPC. The halftone density is detected by the ID sensor, and the machine adjusts the intensity of the LD beam according to the upper/lower limit setting.
	01	Upper Limit	Defines the upper limit for grayscale control. <i>A larger value allows a wider range of halftones at the pale end of the scale. If the image contains pale areas with fuzzy borders surrounded by dark areas, reduce this value to make the borders clearer.</i> [0 ~ 100 / 85 / 1 step]
	02	Lower Limit	Defines the lower limit for grayscale control. <i>A smaller value allows a wider range of halftones at the dark end of the scale.</i> [0 ~ 100 / 65 / 1 step]
2973*	01	Grayscale Check Interval	Determines how often (number of copies in the copy cycle) the grayscale (intermediate halftone) pattern is written on the drum and read by the ID sensor. After the specified number of copies has been exceeded, when the copy job ends, the machine adds the intermediate halftone pattern to the ID sensor pattern, reads it and outputs as the value Vsm. The reading for Vsm is used to calculate Vsm/Vsg, then this value is used to adjust the LD power output. [0 ~ 1,000 / 100 / 10 step] <i>The intermediate halftone pattern is also read and the LD power adjusted when the machine front door is opened and closed.</i>
2974*	01	Image Density Adjustment	Adjusts image density. Changing this setting adjusts development bias and ID sensor output voltage that in turn raises or lowers image density. [1 ~ 5 / 3 / 1 step]

PRINTER ENGINE SERVICE MODE

SP2	Mode Number		Function and [Setting]
2975	01	Toner End Time	<p>Sets a time limit for issuing the toner near end warning on the operation panel. The time may need to be shortened for customers who run especially large print jobs to ensure earlier warning of the toner near end condition.</p> <p>[0 ~ 2,000 / 0 / 10 s step]</p> <p>0: Normal end detection (90 sheets after near-end detected – SP2213)</p> <p><i>Setting for 1300 s allows about 26 K prints at 5% coverage starting with a new cartridge, before the toner near-end warning is issued.</i></p>
2976	01	Toner Bottle On Count	<p>Displays the total ON time of the toner supply motor, calculated from when the toner bottle was replaced. Use this to check that the toner end count when using SP2975 is working properly.</p> <p>[0 ~ 2,000,000 / 0 / 1 ms Step]</p> <p><i>When SP2975 is set to any value other than “0”, this value is displayed when it matches the setting set for SP2975. When SP2975 is set to “0”, SP2976 is disabled. SP2976 is automatically set to zero by toner end recovery.</i></p>
2980*	01	Charge Counter	<p>Sets the number of pages to print after toner and carrier initialization before the charge input is increased to compensate for deterioration over time in the polarity of the carrier.</p> <p>[1 ~ 1,000K / 0 / 1 step]</p> <p><i>The strength in the polarity of the carrier in the toner will eventually decrease and cause lower charge output. Setting the charge output to increase after a specified number of prints can compensate for this effect.</i></p>

3. Process (SP3000-00)

SP3	Mode Number		Function and [Setting]
3001*	ID Sensor Initial Setting		
	01	ID Sensor PWM Setting	Allows you to reset the PWM (Pulse Width Modulation) of the ID sensor LED to avoid a service call error after clearing NVRAM or replacing the NVRAM. [0 ~ 255 / 100 / 1 step] <i>The PWM data is stored by executing SP3001-02.</i>
	02	ID Sensor Initialization	Executes the ID sensor initial setting. ID sensor output for the bare drum (Vsg) is adjusted automatically to 4.0 ± 0.2 V. <i>Press # to start. Perform this setting after replacing or cleaning the ID sensor, replacing the drum, or clearing NVRAM.</i>
3103*	ID Sensor Output Display		Displays the current Vsg, Vsp, Vsdp, and grayscale control in the range 0 V ~ 5.00 V. Press #(Enter), press ▲▼ to select the item to display, then press #(Enter). <i>This SPs are for display only; you cannot adjust the settings.</i>
	01	Vsg	Vsg is the ID sensor output after reading the bare drum surface. Normal display: 4 ± 0.5 V <i>SC350 (ID Sensor Pattern Test Error) is issued if this reading is abnormal.</i>
	02	Vsp	Vsp is the ID sensor output after reading the ID sensor pattern: Normal display: 0.1 ~ 0.3 <i>SC351 (ID Sensor Vsg Test Error) is issued if this reading is abnormal.</i>
	03	Vsdp	Vsdp is the ID sensor output immediately after Vsp output when the charge potential drops. This reading is used for design purposes to determine the development characteristics. DFU Normal display: 3.4 ~ 4.0 <i>SC352 (ID Sensor Edge Detect Pattern Error) is issued if this reading is abnormal.</i>
	04	Vsm/Vsg	Vsm is the ID sensor output after reading the intermediate halftone pattern (grayscale) portion of the ID sensor pattern. Normal display: 65% ~ 85% (SP2972) <i>The addition of the intermediate halftone pattern to the ID sensor pattern is a new feature. Vsm is used (Vsm/Vsg) to determine the power level adjustment of the LD. The LD power level is adjusted automatically to ensure the quality of images, slow deterioration of the OPC over time, and reduce scatter.</i>

4. HDD (SP4000-00)

SP4	Mode Number		Function and [Setting]
4911	01	Format HDD	Formats the hard disk. After execution, you must cycle the machine off and on with the power switch.

5. Mode (SP5000-00)

SP5	Mode Number		Function and [Setting]
5024*	01	mm/inch Display	Selects the unit of measurement. After selection, turn the main power switch off and on. 0: mm , 1: inch
5104*	01	A3/DLT Double Count	Specifies whether the counter is doubled for A3/DLT. 0: No, 1: Yes <i>If 1 is selected, the total counter and the current user code counter count up twice when A3 or DLT paper is used.</i>
5129	01	F Paper Selection	Three selections are available for F-size paper. [0 ~2 / 0 / 1 step] 0: Foolscap 8" x 13" Lengthways (SEF) 1: Foolscap 8 1/2" x 13" Lengthways (SEF) 2: Folio 8 1/4" x 13" Lengthways (SEF)
5131*	01	Paper Size Type Selection	Selects the paper size type for printing.. [0~2 / DIP SW setting / 1 step] 0: Japan 1: North America 2: Europe <i>After changing the setting, turn the copier off and on. If the paper size of the archive files stored on the HDD is different, abnormal prints could result.</i>
5501	03	PCU Count	Sets the timing of the display warning for replacing the PCU. When printing reaches this total, the replace PCU warning is issued. [40 ~ 150 / 150 / 10K step] <i>Using the default setting, when the number of prints reaches 150,000 (150 x 1,000) the warning is issued with the PM Counter Display (SP7803).</i>
5801*	Memory Clear		Resets all correction data for process control and all software counters, and returns all modes and adjustments to their default values. (☛ 5.3.5) <i>Use this SP only after replacing the NVRAM, or after the printer has malfunctioned due to a damaged NVRAM.</i>

PRINTER ENGINE SERVICE MODE

SP5	Mode Number		Function and [Setting]
5802*	Printer Free Run		Performs a free run. The printer prints the number of blank prints requested for testing. [0 ~ 1 / 0 / 1 step] 0: Free run mode off. 1: Free run mode on.
5803*	Input Check		Displays the signals received from sensors and switches. (☛ 5.3.3)
5804*	Output Check		Turns on the electrical components individually for test purposes. (☛ 5.3.4)
5807*	Option Connection Check		Checks the connectors to the optional peripheral devices. Execution will return either a "1" or "0": 0: Device not connected correctly. 1: Device connected correctly.
	02	Bank	
	03	LCT	
	04	Finisher	
5810	SC Clear		When an SC error is issued for the fusing system (SC54x), the printer cannot be released from the SC status by cycling the machine off and on. The service technician must execute SP5810 to restore the printer to normal operation.
5811*	01	Machine Serial Number	Used to input the machine serial number (limit: 11 digits). This is normally done at the factory. DFU
5812	02	Service Fax Number	Enter the telephone number of the service representative. The fax number is printed automatically when a service call error occurs. <i>The number entry is limited to 20 digits, including hyphens.</i>
5828*	25	Network Software Switch	Sets the information for the software used on the network. [00000000h ~ FFFFFFFFh / 00000000h / 1 hex]
	27	Network SYSLOG Server Address Setting	Sets the address for the Syslog Server. [00000000h ~ FFFFFFFFh / 7F000001h / 1 step] <i>7F000001h (127.0.0.1)</i>
	28	Network Time Server Address Setting	Sets the time server address. [00000000h / 00000000h / 1 step]
	30	Network Direct Port Number Setting	Sets the port number for TCP direct printing. [1024 ~ 65535 / 9100 / 1 step]
	32	Network IPX Address Setting (NetWare)	Sets the IPX address used by NetWare on the network. (Allowed entry: 12 numerics)
	34	Network Software Switch Setting (NetWare)	Sets the NetWare software information used by the network. [0000h ~ FFFFh / 0003h / 1 hex]
	36	Network AppleTalk Module Setting	Sets the mode for the operation of AppleTalk on the network with multiple protocols. 2: EtherTalk Phase2
	37	Network NetNo Setting (AppleTalk)	Sets NetNo information using AppleTalk on a network using multiple protocols. (Range: 12 characters)
	38	Network Object Name Setting (AppleTalk)	Sets the object AppleTalk object name for a network using multiple protocols.

SP5	Mode Number		Function and [Setting]														
5828*	47	Network Job Analysis Timeout Setting (Centronics)	Sets the Centronics job analysis timeout for the network. [0 ~ 4,200 s / 3 s / 1 sec. step]														
	48	Network Job Timeout Setting (Centronics)	Sets the Centronics job timeout for the network. [0 ~ 4,200 s / 0 s / 1 sec. step]														
	49	Network Noise Cancel Setting (Centronics)	Sets the noise cancel level for the network. [4 ~ 7 / 4 / 1 clock per step]														
	50	Network 1284 Compatibility Setting (Centronics)	Switches Centronics IEEE1284 compatibility on/off for the network. 0: Disabled, 1: Enabled <i>Selecting "0" disables bi-directional data transmission.</i>														
	51	Network Data Transfer Speed Setting (Centronics)	Sets the Centronics transfer speed for the network. 0: Slow, 1: Fast <i>If you select "0" there will be a 120 μs delay from the STP signal to the data transfer. (With 1: FAST there is no delay.)</i>														
	52	Network ECP Setting (Centronics)	Switches the ECP setting for Centronics off/on. 0: Disabled, 1: Enabled <i>With "1" selected, SP5828-50 must be enabled for 1284 mode compatibility.</i>														
	53	Network Transmission Speed Setting	Selects the Ethernet transmission speed. [0x00 ~ 0x03 / 0x00 / 0x01 step] <table><tr><th>Bit 1</th><th>Bit 2</th><th>Speed</th></tr><tr><td>0</td><td>0</td><td>Auto Sense</td></tr><tr><td>0</td><td>1</td><td>10Base-T</td></tr><tr><td>1</td><td>0</td><td>100Base-T</td></tr><tr><td>1</td><td>1</td><td>Auto</td></tr></table>	Bit 1	Bit 2	Speed	0	0	Auto Sense	0	1	10Base-T	1	0	100Base-T	1	1
Bit 1	Bit 2	Speed															
0	0	Auto Sense															
0	1	10Base-T															
1	0	100Base-T															
1	1	Auto															
5839	66	Start Time Job Spool Clear	When the printer is powered off, spooled print jobs on the hard disk remain there until the next time the printer is powered on. This setting determines whether to print spooled jobs from the previous printing session the next time the printer is powered on. [0 ~ 1 / 1 / 1 step] 0: Job clear. Clears spooled jobs on the hard disk when the printer is switched on. 1: Print jobs. Prints spooled jobs on the hard disk when the printer is powered on.														
	07	IEEE1394	IEEE 1394 settings.														
	08	BCR Mode															
	09	1394a Check for IRM															
	10	Unique ID Enumeration															
	11	Force Logout															
	12	Exclusive Login															
	13	Maximum Initiator Number for Login															

PRINTER ENGINE SERVICE MODE

SP5	Mode Number		Function and [Setting]
5907*	01	Plug & Play	Sets the brand name and the production name for Windows Plug & Play. This information is stored in NVRAM. If the NVRAM is defective or has been replaced, these names should be registered again. <i>To set the plug and play model name, enter the model number, and then press #(Enter).</i>
5915	01	Mechanical Counter Detection	Checks whether the mechanical counter inside the inner cover is connected or not. Display: 0: Not detected 1: Detected 2: Unknown
5930	Meter Charge		This is a total count system for the PCU, fusing unit, etc. When this setting is set, the PCU replace time status is not issued from the engine. However, the internal copy count continues to function.
5958	Feed Clutch Timing		Adjusts the clutch timing to optimize the intervals between fed sheets to reduce jams in the feed unit. DFU [35 ~ 57.5 / 42.5 / 2.5mm step]
5970	Debug Serial Output		DFU
5990	SMC Printouts		DFU
	1	All (Data List)	Prints all of the system parameter lists for the item selected.
	2	SP (Mode Data List)	
	4	Provisionally	
	5	Diagnosis Report	
	7	NIB Summary	

6. Peripherals (SP6000-00)

SP6	Mode Number		Function and [Setting]
6105*	01	Staple Adjustment	Adjusts the staple position in the main scan direction when using the 3000-sheet finisher. [−3.5 ~ +3.5 / 0 / 0.5 mm step] <i>A larger value shifts the staple toward the edge of the paper.</i>
6113*	Punch Position Adjustment		Adjusts the punch hole position. [−7.5 ~ +7.5 / 0 / 0.5 mm steps] <i>A larger value shifts the holes toward the edge of the paper.</i>
	01	2 Hole	2-hole punches for Japan, North America, Europe, and 4-hole punches for Northern Europe.
	02	3 Hole	3-hole punches for North America, and 4-hole punches for Europe.

PRINTER ENGINE SERVICE MODE

7. Data Log (SP7000-00)

SP7	Mode Number		Function and [Setting]
7001*	01	Main Motor Operation Time	The number of prints and drive time for drum revolutions can be obtained by counting the main motor revolution time. If the amount of the time required for the drum to revolve to print 1 copy increases, this data combined with the number of prints can be used to analyze problems and could be useful for future product development. Display: 00000000 ~ 99999999 min.
7003*	01	Total Counter	Select a number to display the total print count for the selected item.
	04	Counter	
	05	Others	
7007	Charge Counter		Displays the count total for the selected item.
	01	Duplex Count	
	02	A3/DLT Count	
	03	Staple Count	
7101*	Print Count		Displays the total number of prints by paper size.
	005	A4 H (Sideways)	
	006	A5 H (Sideways)	
	014	B5 H (Sideways)	
	038	LT H (Sideways)	
	044	HLT H (Sideways)	
	132	A3 V (Lengthwise)	
	133	A4 V (Lengthwise)	
	134	A5 V (Lengthwise)	
	141	B4 V (Lengthwise)	
	142	B5 V (Lengthwise)	
	160	DLT V (Lengthwise)	
	164	LG V (Lengthwise)	
	166	LT V (Lengthwise)	
	172	HLT V (Lengthwise)	
	255	Others	
7204*	Tray Print Count		Displays the total number of sheets fed from each paper feed tray.
	01	Paper Tray 1	Printer
	02	Paper Tray 2	Printer
	03	Paper Tray 3	Paper Tray Unit (Option)
	04	Paper Tray 4	Paper Tray Unit (Option)
	05	LCT	Large Capacity Tray (Option)
	06	By-pass	Copier
7206*	01	Staple Counter – Normal Staple	Displays the total number of staples fired.
7209*	01	Punch Counter	Displays the total times the punch has fired.
7401*	01	Total SC Count	Displays the total number of service calls that have occurred. Display range: 0000 ~ 9999
7502*	01	Jam Count Total	Displays the total number of copy jams. Display range: 0000 ~ 9999

SP7	Mode Number	Function and [Setting]																																																																																							
7504*	Jam Count by Location	<p>Displays the total number of copy jams by location. Display range: 0000 ~ 9999 <i>A "Paper Late" error occurs when the paper fails to activate the sensor at the precise time. A "Paper Lag" paper jam occurs when the paper remains at the sensor for longer than the prescribed time.</i></p> <table border="1"> <thead> <tr> <th>Paper Late Error No.</th><th>Paper Lag Error No.</th><th>Error</th></tr> </thead> <tbody> <tr><td>01</td><td></td><td>Power on</td></tr> <tr><td>03</td><td></td><td>Tray 1 Misfeed</td></tr> <tr><td>04</td><td></td><td>Tray 2 Misfeed</td></tr> <tr><td>05</td><td></td><td>Tray 3 Misfeed</td></tr> <tr><td>06</td><td></td><td>Tray 4 Misfeed</td></tr> <tr><td>07</td><td>57</td><td>LCT Tray Sensor</td></tr> <tr><td>08</td><td>58</td><td>Relay Sensor 1</td></tr> <tr><td>09</td><td>59</td><td>Relay Sensor 2</td></tr> <tr><td>10</td><td>60</td><td>Relay Sensor 3</td></tr> <tr><td></td><td>61</td><td>Relay Sensor 4</td></tr> <tr><td>13</td><td>63</td><td>Registration Sensor</td></tr> <tr><td>14</td><td>64</td><td>Fusing Exit Sensor</td></tr> <tr><td>16</td><td>66</td><td>Exit/Entrance Sensor</td></tr> <tr><td>17</td><td>67</td><td>Relay Sensor 1 (option)</td></tr> <tr><td>18</td><td>68</td><td>Relay Sensor 2 (option)</td></tr> <tr><td>19</td><td>69</td><td>Duplex Entrance Sensor</td></tr> <tr><td>23</td><td>73</td><td>Duplex Exit Sensor</td></tr> <tr><td>24</td><td>74</td><td>1-Bin Tray Sensor</td></tr> <tr><td>25</td><td></td><td>Finisher Entrance</td></tr> <tr><td>26</td><td></td><td>Finisher Proof Tray</td></tr> <tr><td>27</td><td></td><td>Finisher Shift Tray</td></tr> <tr><td>28</td><td></td><td>Finisher Staple Tray</td></tr> <tr><td>29</td><td></td><td>Finisher Tray</td></tr> <tr><td>30</td><td></td><td>Mailbox Entrance Sensor</td></tr> <tr><td>31</td><td></td><td>Mailbox Proof Sensor</td></tr> <tr><td>32</td><td></td><td>Mailbox Relay Sensor</td></tr> <tr><td>33</td><td></td><td>Mailbox Exit Sensor</td></tr> <tr><td>35-41</td><td></td><td>Booklet Finisher (Japan Only)</td></tr> </tbody> </table>	Paper Late Error No.	Paper Lag Error No.	Error	01		Power on	03		Tray 1 Misfeed	04		Tray 2 Misfeed	05		Tray 3 Misfeed	06		Tray 4 Misfeed	07	57	LCT Tray Sensor	08	58	Relay Sensor 1	09	59	Relay Sensor 2	10	60	Relay Sensor 3		61	Relay Sensor 4	13	63	Registration Sensor	14	64	Fusing Exit Sensor	16	66	Exit/Entrance Sensor	17	67	Relay Sensor 1 (option)	18	68	Relay Sensor 2 (option)	19	69	Duplex Entrance Sensor	23	73	Duplex Exit Sensor	24	74	1-Bin Tray Sensor	25		Finisher Entrance	26		Finisher Proof Tray	27		Finisher Shift Tray	28		Finisher Staple Tray	29		Finisher Tray	30		Mailbox Entrance Sensor	31		Mailbox Proof Sensor	32		Mailbox Relay Sensor	33		Mailbox Exit Sensor	35-41		Booklet Finisher (Japan Only)
Paper Late Error No.	Paper Lag Error No.	Error																																																																																							
01		Power on																																																																																							
03		Tray 1 Misfeed																																																																																							
04		Tray 2 Misfeed																																																																																							
05		Tray 3 Misfeed																																																																																							
06		Tray 4 Misfeed																																																																																							
07	57	LCT Tray Sensor																																																																																							
08	58	Relay Sensor 1																																																																																							
09	59	Relay Sensor 2																																																																																							
10	60	Relay Sensor 3																																																																																							
	61	Relay Sensor 4																																																																																							
13	63	Registration Sensor																																																																																							
14	64	Fusing Exit Sensor																																																																																							
16	66	Exit/Entrance Sensor																																																																																							
17	67	Relay Sensor 1 (option)																																																																																							
18	68	Relay Sensor 2 (option)																																																																																							
19	69	Duplex Entrance Sensor																																																																																							
23	73	Duplex Exit Sensor																																																																																							
24	74	1-Bin Tray Sensor																																																																																							
25		Finisher Entrance																																																																																							
26		Finisher Proof Tray																																																																																							
27		Finisher Shift Tray																																																																																							
28		Finisher Staple Tray																																																																																							
29		Finisher Tray																																																																																							
30		Mailbox Entrance Sensor																																																																																							
31		Mailbox Proof Sensor																																																																																							
32		Mailbox Relay Sensor																																																																																							
33		Mailbox Exit Sensor																																																																																							
35-41		Booklet Finisher (Japan Only)																																																																																							

PRINTER ENGINE SERVICE MODE

SP7	Mode Number		Function and [Setting]
7506*	Jam Count by Copy Size		Displays the total number of copy jams by paper size.
	05	A4 H (Sideways)	
	06	A5 H (Sideways)	
	14	B5 H (Sideways)	
	38	LT H (Sideways)	
	44	HLT H (Sideways)	
	132	A3 V (Lengthwise)	
	133	A4 V (Lengthwise)	
	134	A5 V (Lengthwise)	
	141	B4 V (Lengthwise)	
	142	B5 V (Lengthwise)	
	160	DLT V (Lengthwise)	
	164	LG V (Lengthwise)	
	166	LT V (Lengthwise)	
	172	HLT V (Lengthwise)	
	255	Other	
7803*	02	PM Counter Display	Displays the PM counter since the last PM and resets the counter for PCU replacement to zero. When the count exceeds the setting for SP5501-03, the PCU count warning for replacement is displayed.
7807	SC/Jam Counter Reset		Resets the SC and jam counters. To reset, press #(Enter).
7808	Counter Reset		Resets all counters excluding SP7003-***, 7006-***, 7007-***. Press #(Enter) to reset.
7816	Print Counter Reset		Resets the total copy count by paper tray. To reset, press #(Enter). Use these SP modes when replacing the pick-up, feed, and separation rollers.
	01	Tray 1	
	02	Tray 2	
	03	Tray 3	
	04	Tray 4	
	05	LCT	
	06	By-pass	
7832	Self-Diagnosis Result Display		Displays the results of self-diagnostic testing. When there are no errors, 00/00 is displayed. If an error occurred, the display will show the SC number.
7910	ROM Number		Acquires the ROM section number and records it, and prints the number in the SMC Report. <i>The ROM section number is not displayed on the operation panel. This SP appears only in the SMC report.</i>
	01	System	
	02	Engine	
	07	Finisher	
	09	Bank	
	10	LCT	
	11	Print Post	

5.1.2 TEST PATTERN PRINTING

Enter the SP mode and select SP2902.

1. Press ▲▼ together (5s), release, then press #(Enter).

```
System Ver.1.00
1. Service
```

2. Press ▼

```
System Ver. 1.00
2. Engine
```

3. Press #(Enter).

```
<Engine>
1. Feed
```

4. Press ▼.

```
<Engine>
2. Drum
```

5. Press #(Enter).

```
SP2001>>
Charge Roll Bias
```

6. Press ▼ to display "Test Pattern"

```
SP2902
Print T Pattern
```

7. Press #(Enter).

```
00
—
```

8. Press ▲▼ together (5s), release, then press #(Enter).

```
01
—
```

9. Press ☐ (Escape) twice then print an SMC Report. (☞ 5.3.6)

10. Repeat this procedure to print as many test prints as needed.

NOTE: 1) After you enter a Print Test Pattern number, when you execute the SMC Report print procedure, the test pattern prints, not the SMC Report.
 2) The machine will remain in this mode until you leave the Service Mode, or switch the printer off an on.
 3) After leaving the re-entering the Service Mode, or after cycling the machine off an on, the SMC Report feature is restored to normal operation.

Test Pattern Table: SP2902-03 Printing Test Patterns

No.	Test Pattern
00	None
01	Vertical Line (1-dot)
02	Horizontal Line (1-dot)
03	Vertical Line (2-dot)
04	Horizontal Line (2 dot)
05	Grid Pattern (1-dot)
06	Grid Pattern (1-dot pair)
07	(not used)
08	(not used)
09	Full Dot Pattern
10	Black band
11	Trimming Area
12	Trimming Area (2-dot)
13	Argyle Pattern
14	Argyle Pattern (2-dot_)
15	Hound's Tooth Check (2-dot Horizontal)
16	Checked Flag Pattern
17	Point Black Pattern
18	Black Band (Vertical)
19	Independent Pattern (4-dot)
20	Horizontal Line (1-dot) (Reversed LD1, LD2)
21	Grid Pattern (1-dot) (Reversed LD1, LD2)
22	Grid Pattern (1-dot pair) (Reversed LD1, LD2)
23	Independent Pattern (1-dot) (Reversed LD1, LD2)
24	3 Grayscale
25	Grayscale (Horizontal)
26	Grayscale (Vertical)
27	Grayscale (Vertical/Horizontal)
28	Grayscale (Grid)
29	Grayscale (Horizontal Extension)
30	Grayscale (Vertical Extension)
31	Grayscale (Horizontal Margin)
32	Grayscale (Vertical Margin)
33	Grayscale (Vertical/Horizontal Margin)
34	Grayscale (Horizontal Extension Margin)
35	Grayscale (Vertical Extension Margin)
36	White Pattern
37	Grid (1-dot pair) (OR Outside Data 1)
38	Trimming Area (OR Outside Data)

5.1.3 INPUT CHECK

Enter the SP mode and select SP5803.

1. Press ▲▼ together (5s), release, then press #(Enter).

```
System Ver.1.00
1. Service
```

2. Press ▼.

```
System Ver. 1.00
2. Engine
```

3. Press #(Enter).

```
<Engine>
1. Feed
```

4. Press ▼ to display "5. Mode".

```
<Engine>
5. Mode
```

5. Press #(Enter).

```
SP5024
mm/inch Display
```

6. Press ▲ to display "Input Check".

```
SP5803 >>
Input Check
```

7. Press #(Enter).

```
SP5803-001
Paper Feed 1
```

8. Press ▲ or ▼ to select the item to check.

```
SP5803-013
Full Exit Tray 2
```

9. Press #(Enter). Refer to the table on the next page.

```
Full Exit Tray 2
(7)00001010(0)
```

PRINTER ENGINE SERVICE MODE

Number	Bit	Description	Reading	
			0	1
SP5803-001 Paper Feed 1 (Upper Tray)	7	Fusing Exit Sensor	Activated	Deactivated
	6	Paper Height Sensor 2	Activated	Deactivated
	5	Paper Height Sensor 1	Activated	Deactivated
	4	Not used	—	—
	3	Paper Size Sensor 4	Activated	Deactivated
	2	Paper Size Sensor 3	Activated	Deactivated
	1	Paper Size Sensor 2	Activated	Deactivated
	0	Paper Size Sensor 1	Activated	Deactivated
SP5803-002 Paper Feed 2 (Lower Tray)	7	Duplex Unit Set Sensor	Unit set	Unit not set
	6	Paper Height Sensor 2	Activated	Deactivated
	5	Paper Height Sensor 1	Activated	Deactivated
	4	Not used	—	—
	3	Paper Size Sensor 4	Activated	Deactivated
	2	Paper Size Sensor 3	Activated	Deactivated
	1	Paper Size Sensor 2	Activated	Deactivated
	0	Paper Size Sensor 1	Activated	Deactivated
SP5803-003 Regist/Others	7	Zero Cross Signal	Detected	Not detected
	6	Transfer Belt Position Sensor	Not present	Present
	5	Exhaust Fan Lock Signal	Not locked	Locked
	4	Cooling Fan Lock Signal	Not locked	Locked
	3	Main Motor Lock Signal	Not locked	Locked
	2	Toner Overflow Sensor	Tank not full	Tank full
	1	Cover Open	Cover closed	Cover opened
	0	Registration Sensor	Paper detected	Paper not detected
SP5803-004 By-pass Feed	7	Duplex reverse path door	Closed	Open
	6	Paper End Sensor	Paper detected	Paper not detected
	5	Not used	—	—
	4	Paper Size Sensor 4, By-pass	Activated	Deactivated
	3	Paper Size Sensor 3, By-pass	Activated	Deactivated
	2	Paper Size Sensor 2, By-pass	Activated	Deactivated
	1	Paper Size Sensor 1, By-pass	Activated	Deactivated
	0	Unit Set Signal	Yes	No
SP5803-005 Relay Unit (Bridge Unit)	7	Not used	Yes	No
	6	Unit Set Signal	Connected	Not connected
	5	Paper Sensor	Paper detected	Paper not detected
	4	Relay Sensor	Paper detected	Paper not detected
	3	Exit Sensor	Paper detected	Paper not detected
	2	Left Cover Switch	Switch pressed (cover closed)	Switch not pressed
	1	Middle Cover Switch	Switch pressed (cover closed)	Switch not pressed
	0	Right Cover Switch	Switch pressed (cover closed)	Switch not pressed

Number	Bit	Description	Reading	
			0	1
SP5803-006 Unit Set (Detection)	7	Feed Motor Lock	No	Yes
	6	F-Gate Signal	Active	Not active
	5	Height Sensor	Feed height	Not feed height
	4	Paper Exit Sensor	Paper detected	Paper not detected
	3	Fusing Unit	Detected	Not detected
	2	Total Counter	Not detected	Detected
	1	Key Counter	Detected	Not detected
	0	Key Card Present	Detected	Not detected
SP5803-007 Paper End	7	Front cover/open closed	Open	Closed
	6	Vertical feed path	Clear	Not clear
	5	2nd Tray Lift Sensor	Paper not at upper limit	Paper at upper limit
	4	1st Tray Lift Sensor	Paper not at upper limit	Paper at upper limit
	3	Lower Relay Sensor	Paper detected	Paper not detected
	2	Upper Relay Sensor	Paper detected	Paper not detected
	1	Lower Paper End Sensor	Paper not detected	Paper detected
	0	Upper Paper End Sensor	Paper not detected	Paper detected
SP5803-008 DIP Switch	7	Dip Switch - 8	On	Off
	6	Dip Switch - 7	On	Off
	5	Dip Switch - 6	On	Off
	4	Dip Switch - 5	On	Off
	3	Dip Switch - 4	On	Off
	2	Dip Switch - 3	On	Off
	1	Dip Switch - 2	On	Off
	0	Dip Switch - 1	On	Off
SP5803-009 Duplex Unit	7	Not used		
	6	Right cover open/closed	Closed	Open
	5	1-Bin Unit Set	Detected	Not detected
	4	LD, H.P. sensor	Positioned	Not positioned
	3	Exit Sensor (Jam)	Paper detected	Paper not detected
	2	Entrance Sensor (Jam)	Paper detected	Paper not detected
	1	Paper End Sensor	Paper detected	Paper not detected
	0	Duplex Unit Switch	Cover closed	Cover open
SP5803-010 Remainder of Feed Tray-1	7	Tray 4: Bit 1	Bit 1 Bit 2 Capacity 1 1 Full 1 0 50% or more 0 1 10% or more 0 0 Out, or tray not set	
	8	Tray 4: Bit 0		
	5	Tray 3: Bit 1		
	4	Tray 3: Bit 0		
	3	Tray 2: Bit 1		
	2	Tray 2: Bit 0		
	1	Tray 1: Bit 1		
	0	Tray 1: Bit 0		

PRINTER ENGINE SERVICE MODE

Number	Bit	Description	Reading																											
			0		1																									
SP5803-011 Remainder of Feed Tray 2	7	By-pass Yes/No	<table><tr><th>Bit 2</th><th>Bit 1</th><th>Bit 0</th><th>Capacity</th></tr><tr><td>1</td><td>1</td><td>1</td><td>Full</td></tr><tr><td>1</td><td>0</td><td>0</td><td>80% or more</td></tr><tr><td>0</td><td>1</td><td>1</td><td>50% or more</td></tr><tr><td>0</td><td>1</td><td>0</td><td>30% or more</td></tr><tr><td>0</td><td>0</td><td>0</td><td>10% or more</td></tr></table>				Bit 2	Bit 1	Bit 0	Capacity	1	1	1	Full	1	0	0	80% or more	0	1	1	50% or more	0	1	0	30% or more	0	0	0	10% or more
	Bit 2	Bit 1					Bit 0	Capacity																						
	1	1					1	Full																						
	1	0					0	80% or more																						
	0	1					1	50% or more																						
	0	1					0	30% or more																						
	0	0					0	10% or more																						
	6	Not used																												
5	Not used																													
4	Not used																													
3	Not used																													
2	LCT: Bit 2																													
1	LCT: Bit 1																													
0	LCT: Bit 0																													
SP5803-012 Full Exit Tray 1	7	Mailbox: Bin 9	Not full or no tray		Full																									
	6	Mailbox: Bin 8	Not full or no tray		Full																									
	5	Not used	—		—																									
	4	Not used	Not full or no tray		Full																									
	3	Finisher: Shift Tray	Not full or no tray		Full																									
	2	Not used	—		—																									
	1	1-Bin Exit	Not full or no tray		Full																									
	0	Machine Exit	Not full or no tray		Full																									
SP5803-013 Full Exit Tray 2	7	Mailbox: Bin 7	Not full or no tray		Full																									
	6	Mailbox: Bin 6	Not full or no tray		Full																									
	5	Mailbox: Bin 5	Not full or no tray		Full																									
	4	Mailbox: Bin 4	Not full or no tray		Full																									
	3	Mailbox: Bin 3	Not full or no tray		Full																									
	2	Mailbox: Bin 2	Not full or no tray		Full																									
	1	Mailbox: Bin 1	Not full or no tray		Full																									
	0	Mailbox: Proof Tray	Not full or no tray		Full																									

Table 1: By-pass Feed Table Paper Size

Number.	Bit 4	Bit 3	Bit 2	Bit 1	Paper Width
4: By-pass	1	1	1	1	Post Card
	1	1	1	0	B6 lengthwise
	1	1	0	1	B5 lengthwise
	1	1	0	0	A5 lengthwise/5.5"
	1	0	1	1	B4 lengthwise
	1	0	0	1	A4 lengthwise/8.5"/8"
	0	1	1	1	A3 lengthwise
	0	0	1	1	11" x 17"

5.1.4 OUTPUT CHECK

NOTE: Motors keep turning in this mode regardless of upper or lower limit sensor signals. To prevent mechanical or electrical damage, do not keep an electrical component on for a long time.

Enter the SP mode and select SP5804.

1. Press ▲▼ together (5s), release, then press #(Enter).

```
System Ver.1.00
1. Service
```

2. Press ▼.

```
System Ver. 1.00
2. Engine
```

3. Press #(Enter).

```
<Engine>
1. Feed
```

4. Press ▼ to display “5. Mode”.

```
<Engine>
5. Mode
```

5. Press #(Enter).

```
SP5024
mm/inch Display
```

6. Press ▲ repeatedly to display “Output Check”.

```
SP5804 >>
Output Check
```

7. Press #(Enter).

```
SP5804-001
1st.PaperFeedCl.
```

8. Press ▲ or ▼ to display the item to check.

```
SP5804-027
Fuser Exit Motor
```

9. Press #(Enter).

```
<Fuser Exit Motor>
```

10. Press #(Enter) to switch the component on, then press #(Enter) to switch it off.

```
Fuser Exit Motor
Fuser Exit Motor
```

11. Press ⌫(Escape) then repeat Steps 8 to 11 to check other items.

12. When you are finished press ⌫(Escape) until you see “2.Engine” then select “3.End”.

SP5804 Output Check Table

No.	Description	No.	Description
1	1st Paper Feed CL	43 ~ 44	Not used
2	2nd Paper Feed CL	45	Duplex Junction Gate SOL
3	3rd Paper Feed CL (PTU)	46	Not used
4	4th Paper Feed CL (PTU)	47	Relay Junction Gate SOL
5	By-pass Feed CL	48 ~ 49	Not used
6	LCT Paper Feed CL	50	Tray Junction Gate SOL
7 ~ 10	Not used	51	Stapler Junction Gate SOL
11	1st. Paper Tray (Lift Motor)	52	Positioning Roller SOL (Finishers)
12	2nd. Paper Tray (Lift Motor)	53 ~ 54	Not used
13	By-pass Pick-up SOL	55	Polygon Motor
14	LCT Pick-up SOL	56	Toner Supply Motor
15 ~ 16	Not used	57	Transfer Belt CL
17	Transport Motor 1 (Finisher)	58 ~ 61	Not used
18	Transport Motor 2 (Finisher)	62	Quenching Lamp
19	Exit Motor 1 (Finisher)	63	Charge Bias
20	Staple Motor 1 (Finisher)	64 ~ 66	Not used
21	Punch Motor 1 (Finisher)	67	Development Bias
22 ~ 24	Not used	68	Not used
25	LCT Motor	69	Transfer Belt (Bias)
26	Bank Motor (PTU)	70	ID Sensor LED
27	Fusing/Exit Motor	71 ~ 74	Not used
28	Main Motor	75	Exhaust Fan Motor
29	Duplex Transport (Motor)	76	Cooling Fan Motor (High Speed)
30	Duplex Inverter Motor – Rev.	77	Cooling Fan Motor (Low Speed)
31	Duplex Inverter Motor – Fwd	78	Bridge Unit Fan Motor
32	Development Motor	79 ~ 84	Not used
33 ~ 34	Not used	85	Total Counter
35	Bank Relay CL	86 ~ 91	Not used
36	Relay CL	92	Shift Lift Motor (Finisher)
37	Fusing/Exit CL	93	Jogger Motor (Finisher)
38	LCT Relay CL	94	Stapler Unit Motor (Finisher)
39	Registration CL	95	Stack Feed Out Motor (Finisher)
40	Development CL	96	Shift Motor (Finisher)
41	Exit Junction Gate SOL (Upper Unit)	97	Stapler Rotation Motor (Finisher)
42	Duplex Junction Gate SOL (Lower Unit)	98 ~ 99	Not used

5.1.5 MEMORY ALL CLEAR: SP5801

Executing Memory All Clear resets all the settings stored in the NVRAM to their default settings except the following:

SP7003-1:	Electrical total counter value
SP5811-1:	Machine serial number
SP5907:	Plug & Play Brand Name and Production Name Setting

1. Press ▲ and ▼ together, hold down for over 5 seconds, release and then press #(Enter).
2. Press ▲ or ▼ to display “2.Engine”.
3. Press #(Enter).
4. Press ▼ or ▲ to display “5.Mode” then press #(Enter).
5. Press ▼ or ▲ to display “Memory Clear” then press #(Enter).
6. With “Clear All” displayed, press #(Enter), then press #(Enter) again to execute.

<p><Clear All> Result=OK</p>
--

Here is a summary of all the settings.

No.	Item	Function
01	Clear All	Initializes all items below.
02	Clear Engine	Initializes all registration settings for engine adjustments and processing settings.
03	Clear SCS	Initializes default system settings and ROM update information.
08	Clear Printer	Initializes the printer defaults, the printer SP Bit SW, and printer CSS counter.
11	Clear NCS	Initializes the system defaults and interface settings (IP addresses also), SmartNetMonitor for Admin., Web Status Monitor settings, and the TELNET settings.

7. After clearing all settings make sure that you perform the following settings:
 - Do the laser beam pitch adjustment (SP2109). See section 3.9.5.
 - Referring to the SMC Report, re-enter any values, which had been changed from their factory settings.
 - Execute SP3001-2 (ID Sensor Initial Setting).

5.1.6 SMC PRINT OUT LISTS: SP5990

1. Enter the SP Engine Mode.

```
<Engine>
1.Feed
```

2. Press ▲ or ▼ until you see "5.Mode".

```
<Engine>
5.Mode
```

3. Press #(Enter).

```
SP5024
mm/inch Display
```

4. Press ▲ to select SP5990.

```
SP5990 >>
SMC Printout
```

5. Press #(Enter).

```
SP5990-001
All Group
```

6. Press ▲ or ▼ to select what to print.

1	All Group	All reports
2	SP Mode	SMC Report for SP codes
4	Logging Data	SP Codes for SP7000-00 only.
5	Provisionally	Self-Diagnosis Report.
7	NIB Summary	Network Configuration Report

7. For example, to print the SP Mode list, press ▲ or ▼ to display SP Mode and press #(Enter).

```
<SP Mode>
Execute?
```

8. Press #(Enter).

```
<SP Mode>
Processing
```

9. The report prints.
10. Repeat from Step 6 to print another report.

5.4 SOFTWARE DOWNLOAD

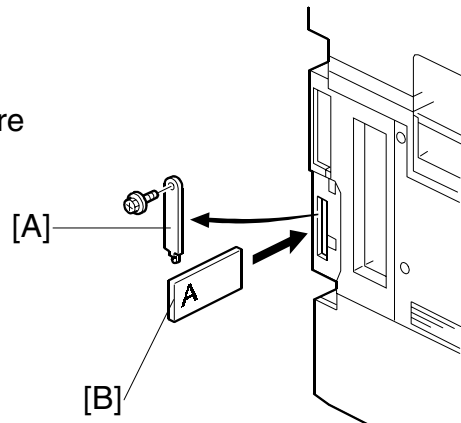
5.4.1 DOWNLOADING THE SOFTWARE

Before downloading the software, please note:

- If you are downloading the Engine software for the BICU, 1 card is required.
- If you are downloading the Controller software, 2 cards are required.
- Follow the basic procedure described below to install the software for either the Engine or the Controller.

1. Turn off the main power switch.
2. Remove the IC card [A] cover.
3. Insert the IC card [B] containing the software to download into the card slot of the controller.
4. Turn on the main power.

Onboard Sys. 1/2



5. Press #(Enter). An asterisk appears in the LCD.
6. Press ▼ to display “Update Data”, then press #(Enter) to start writing the data from the card to the printer.
7. Monitor the downloading status on the operation panel. While downloading is in progress, the LCD will display some dashes, slowly replaced by asterisks (***-----) moving left to right.

⚠ CAUTION

Never switch off the power while downloading. Switching off the power while the new software is being downloading will damage the boot files in the controller.

After confirming that downloading is completed, the LCD displays:

Updated
Power Off/On

8. Turn off the main power and remove the IC card.
9. If you are installing the software for the Engine (BICU), go to the next step. If you are installing the software for the Controller, you must repeat the procedure for the second card.
10. After all the software has been downloaded, turn the main power on and confirm that the new software loads and that the machine starts normally.

5.1.2 POWER FAILURE DURING SOFTWARE DOWNLOAD

If a power failure occurs before downloading is completed, you will not be able to continue downloading with the Controller cards or the Engine card using the operation panel.

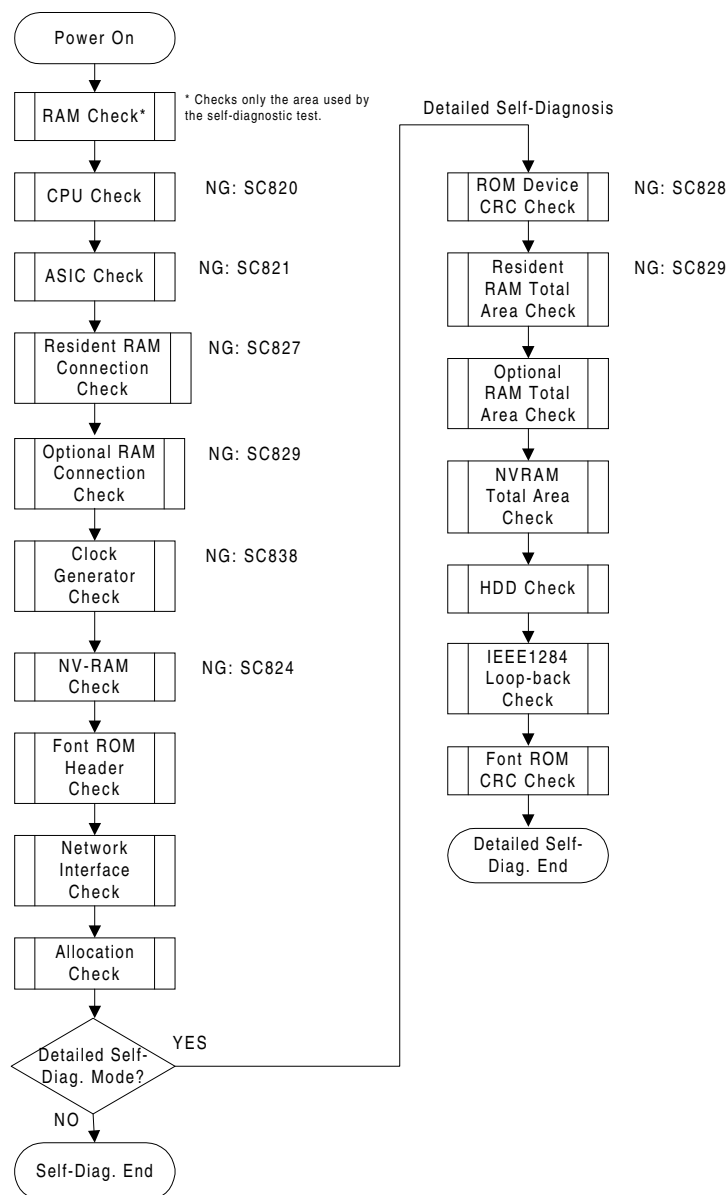
1. If a power failure occurs before downloading, leave the card inserted in the slot and set the power switch to off.
2. If you were downloading from either Controller card, on the Controller Board set DIP Switch 1 to ON.
-or-
If you were downloading from the Engine card, on the I/O Board set DIP Switch 8 to ON.
3. After restoring the power supply to the printer, switch it on.
4. The downloading will complete but nothing will be displayed on the operation panel until downloading has completed.
5. When the display returns to normal, switch the printer off.
6. If you were downloading from either Controller card, on the Controller Board reset DIP Switch 1 to OFF.
-or-
If you were downloading from the Engine card, on the I/O Board reset DIP Switch 8 to OFF.
7. Switch on the printer to confirm normal operation.

5.5 SELF-DIAGNOSTIC MODE

5.5.1 SELF-DIAGNOSTIC MODE AT POWER ON

As soon as the main machine is powered on, the controller waits for the initial settings of the copy engine to take effect and then starts an independent self-diagnostic test program. The self-diagnostic test follows the path of the flow chart shown below and checks the CPU, memory, HDD, and so on. An SC code is displayed in the touch panel if the self-diagnostic program detects any malfunction or abnormal condition.

Self-Diagnostic Test Flow



5.5.2 DETAILED SELF-DIAGNOSTIC MODE

In addition to the self-diagnostic test initiated every time the main machine is powered on, you can set the machine in a more detailed diagnostic mode manually in order to test other components or conditions that are not tested during self-diagnosis after power on.

The following device is required in order to put the printer in the detailed self-diagnosis mode.

No.	Name
G0219350	Parallel Loopback Connector

Follow this procedure to execute detailed self-diagnosis.

1. Switch off the printer.
2. Press and hold down the **⏏**(On line) and **#**(Enter) buttons together, then switch on the printer.
3. Release the buttons when you see:

DIAGNOSE 0100

4. The number will change automatically as the self-diagnostic test runs. After about 30 seconds, the initial display returns and a self-diagnostic report prints. A report like the one below is printed every time a detailed self-diagnostic test is executed, whether errors were detected or not.

MODEL NAME XXXX

Serial No

Firmware P/# : ACP82XXXX

[1/1]

Self-Diagnosis Report

Firmware Version: 0.38

Fri Sep 7 05:45:18 2001

[System Construction]

Kernel Version : NetBSD 1.3.3 (HAKONE_RAM) #11: Sep 4 11:18:48 JST 2001

CPU System BusClock : 124.0 MHz

CPU Pipeline Clock : 248.0 MHz

Board Type : 12

ASIC Version : 1128608306

RTC Existence : existence

RAM Capacity : 67:108864 MB

HDD Existence : existence

HDD Model :

[TotalCounter]

0001000

[Error List]

SCCODE	(ERRORCODE)	SC CODE	(ERROR CODE)	SC CODE	(ERROR CODE)	SC CODE	(ERROR CODE)
SC835 (1120)							

5.6 DIP SWITCHES

Controller: DIP SW2

DIP SW No.	ON	OFF
1	IC Card Boot	System ROM Boot
2	Keep at "OFF"	
3		
4		

I/O Board: DIP SW101

DIP SW No.	Function	ON		OFF	
1	Not used.	Off (Do not change)			
2	Jam Detection (see Note)	Off		On	
3	SC Generation	Disabled		Enabled	
4	Not used	OFF (Do not change)			
5	Not used	OFF (Do not change)			
6	Destination	OFF Japan	ON North America	OFF Europe	ON Not used
7		OFF	OFF	ON	ON
8	Software Download	Software download from IC card for the engine.		Normal position.	

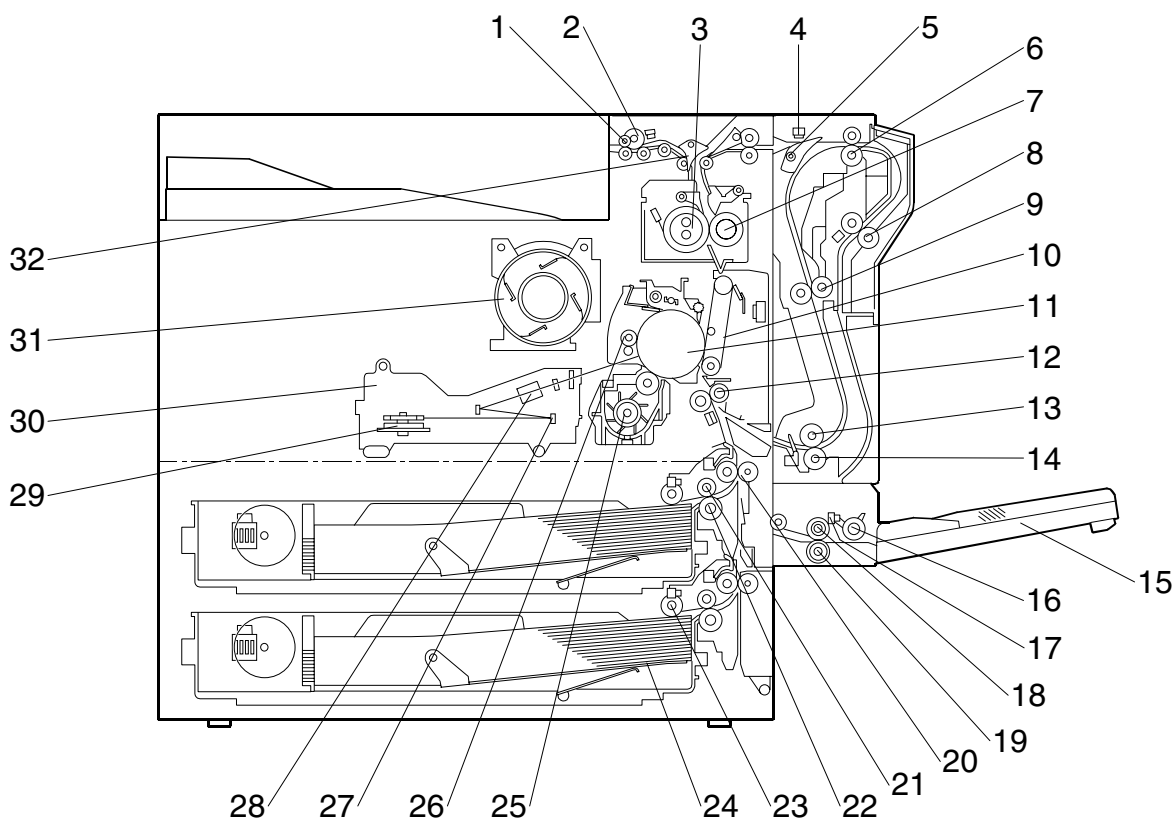
NOTE: Disabling jam detection is effective only for the main machine (not for the options).

DETAILED DESCRIPTIONS

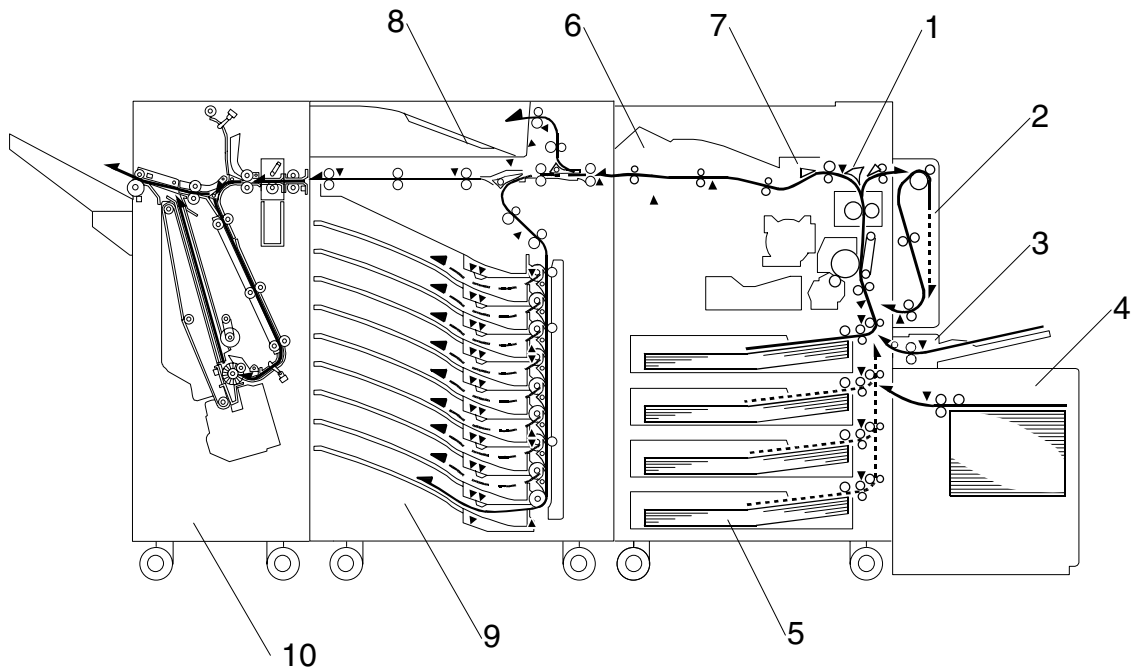
6. DETAILED SECTION DESCRIPTIONS

6.1 OVERVIEW

6.1.1 COMPONENT LAYOUT

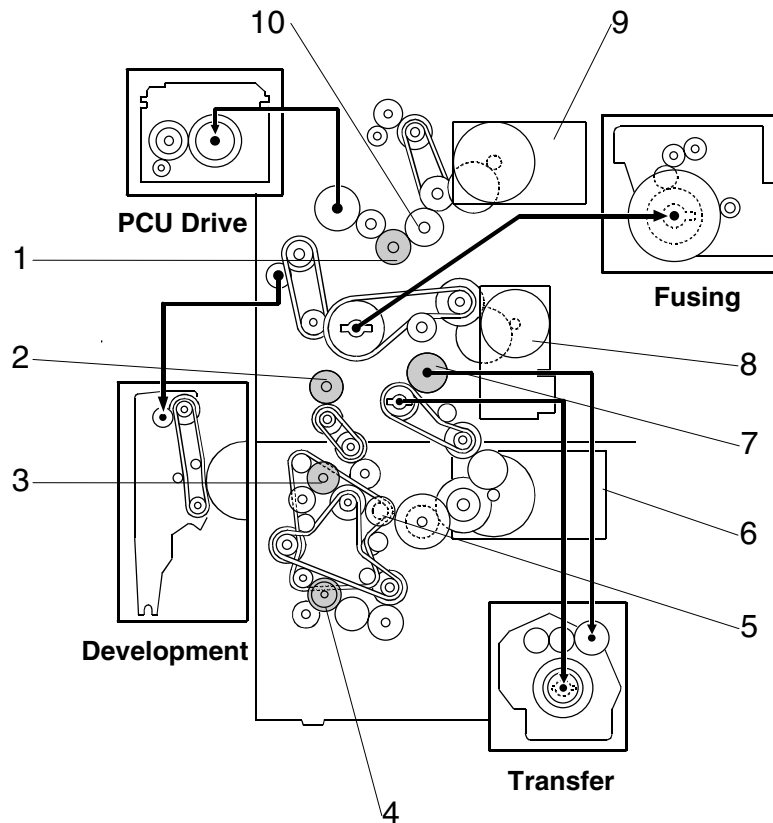


- | | |
|---------------------------------|--------------------------------|
| 1. Exit Roller | 17. By-pass Paper End Sensor |
| 2. Paper Exit Sensor | 18. By-pass Paper Feed Roller |
| 3. Hot Roller | 19. By-pass Separation Roller |
| 4. Entrance Sensor | 20. Upper Relay Roller |
| 5. Inverter Gate | 21. Feed Roller |
| 6. Inverter Roller | 22. Separation Roller |
| 7. Pressure Roller | 23. Pick-up Roller |
| 8. Transfer Belt Cleaning Blade | 24. Bottom Plate |
| 9. Upper Transport Roller | 25. Development Unit |
| 10. Transfer Belt | 26. Charge Roller |
| 11. OPC Drum | 27. F θ Mirror |
| 12. Registration Roller | 28. Barrel Toroidal Lens (BTL) |
| 13. Lower Transport Roller | 29. Polygonal Mirror Motor |
| 14. Duplex Exit Sensor | 30. Laser Unit |
| 15. By-pass Tray | 31. Toner Bottle Holder |
| 16. By-pass Pick-up Roller | 32. Exit Junction Gate |

Paper Path

1. Interchange unit
2. Duplex unit
3. By-pass tray
4. Large capacity tray (LCT)
5. Paper tray unit
6. Bridge unit
7. 1-bin shift tray
8. Mailbox bridge unit
9. Mailbox
10. Finisher

6.1.2 DRIVE LAYOUT

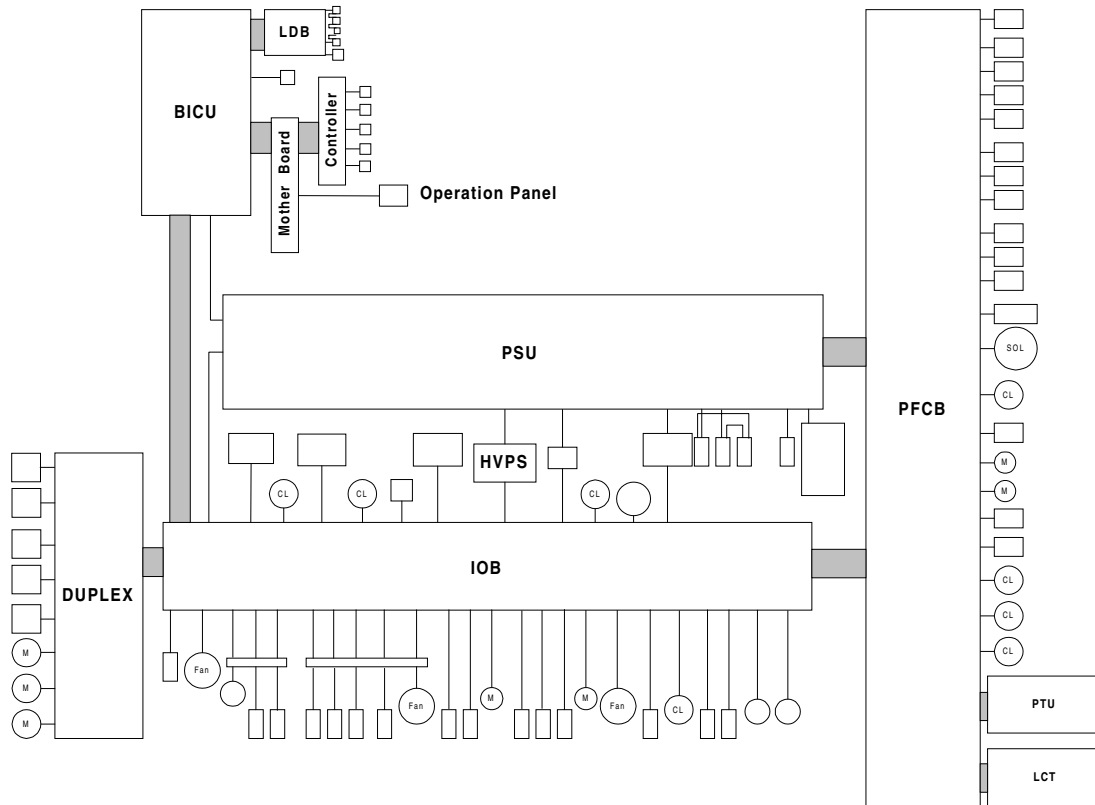


- | | |
|---------------------------------|---------------------------------|
| 1. Transfer Belt Contact Clutch | 6. Paper Feed/Development Motor |
| 2. Registration Clutch | 7. Development Clutch |
| 3. Upper Paper Feed Clutch | 8. Main Motor |
| 4. Lower Paper Feed Clutch | 9. Fusing/Exit Motor |
| 5. Relay Clutch | 10. Fusing/Exit Clutch |

In this machine, the development unit is provided with its own motor, separate from the main motor.

6.2 BOARD STRUCTURE

6.2.1 BLOCK DIAGRAM



This machine employs the GW (Grand Workware) architecture, which allows the printer to be expanded by installing simple modular components (ROM DIMMs) on the controller board.

Here is a brief summary of the boards and their functions. For more details, refer to the Point-to-Point diagram and list of components supplied with the printer.

BICU (Base Engine and Image Control Unit)

Controls all machine functions both directly and through other control boards.

LDB (Laser Diode Board)

Powers the laser diode. Output level is controlled to compensate for changes in temperature and humidity to maintain constant light intensity.

Controller (CB)

Controls memory and all peripheral devices. The Controller Board is equipped with slots to accommodate the following interfaces: HDD, PCMCIA, NIB, IEEE1284, IEEE1394.

Mother Board

Interfaces the BICU and Controller. The operation panel connects directly to the Mother Board.

Operation Panel

Controls the LCD user interface and button controls.

PSU (Power Supply Unit)

Provides dc power to the system and ac power to the fusing lamp.

HVPS (High Voltage Power Supply)

Supplies high voltage to the drum charge roller, development roller, and transfer belt.

IOB (Input/Output Board)

Controls the mechanical parts of the printer (excluding the paper feed section), and the fusing lamp power. Specifically, the IOB controls:

- All main drive sensors, motors, and solenoids.
- PWM (Pulse Width Modulation) of the HVPS.
- Serial interfaces of all peripherals.
- Fusing.

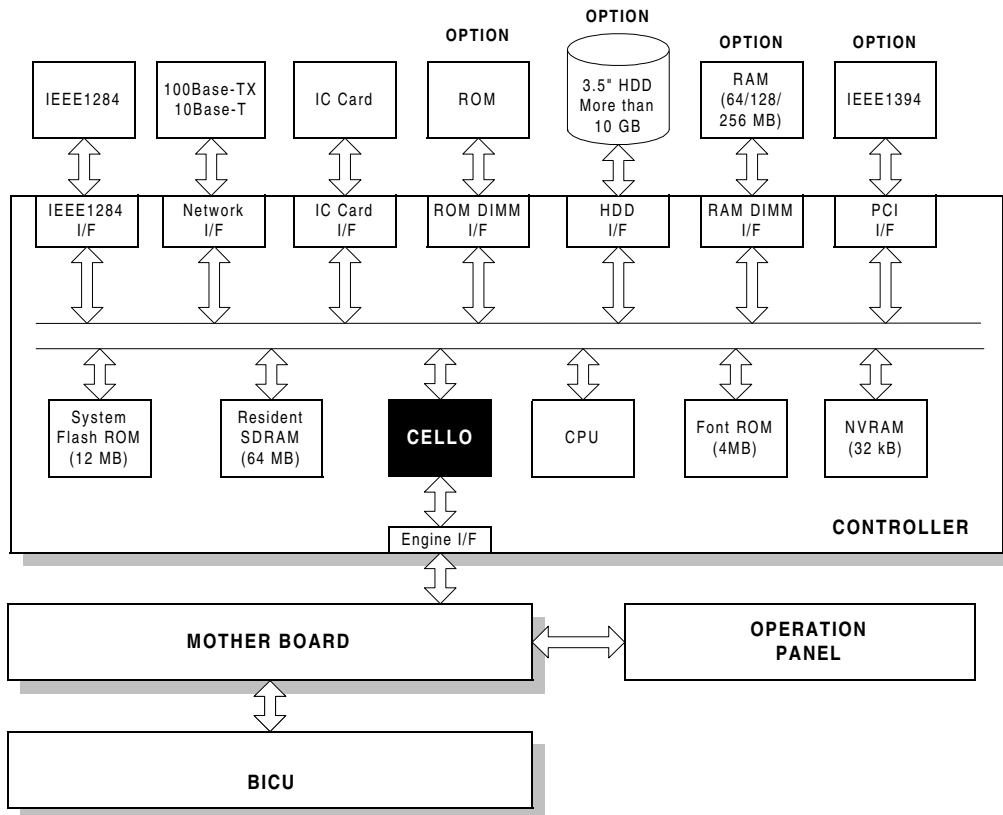
PFCB (Paper Feed Control Board)

Controls the mechanical parts of all paper feed sections.

Duplex

Provides the system interface for all electronic components, i.e. sensors, switches, motors, and solenoids for the attached duplex unit.

6.2.2 CONTROLLER



The controller employs GW (Grand Workware) architecture that allows the controller board to control the engine and printer applications.

The following software can be downloaded from the Controller IC Card.

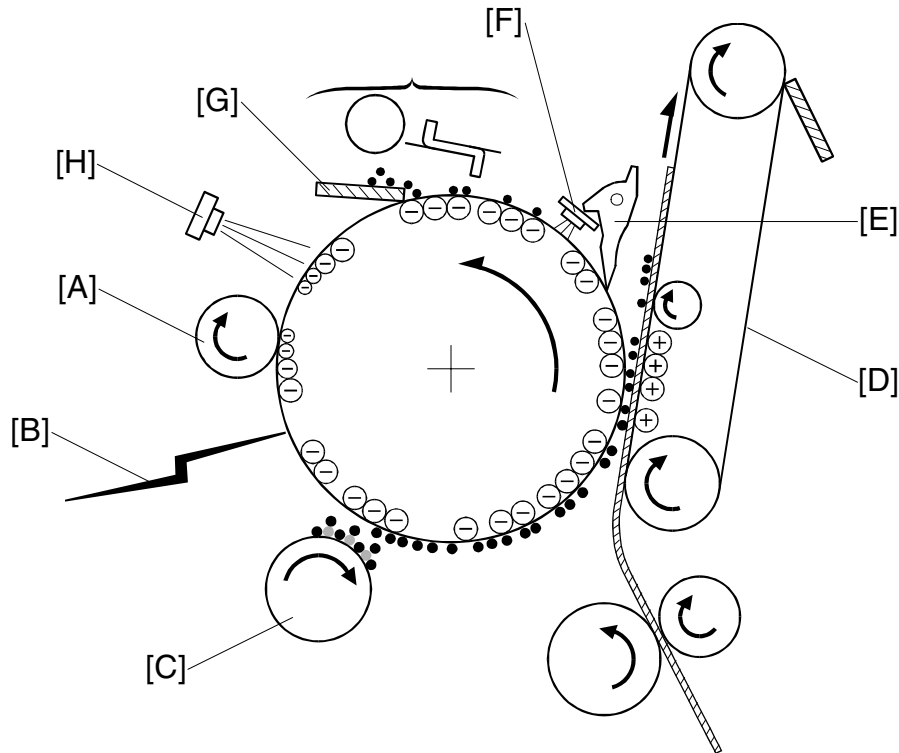
- Controller (Including System OS, MIB, PJP, RPCS, PostScript3 and PCL6)
- BICU (engine control)

For details about how to download software from an IC card, see "Software Download" in "5. Service Tables".

1. **CPU.** Employs RM7000A-300. Clock frequency: 300 MHz.
2. **ASIC: CELLO.** Uses a dedicated chip developed for use with GW architecture. These components perform CPU and I/F control and also control: memory, local bus, interrupts, PCI bus, video data, HDD, network, operation panel, and IEEE1284.
3. **SDRAM.** Comprises a 64 MB RAM chip, expandable with a 64 MB or 128 MB or 256 MB SDRAM.
4. **System Flash ROM.** Provided with an 12 MB Flash ROM for the system OS, MIB, PjL, RPCS, PostScript3 and PCL6.
5. **NVRAM.** 32 KB of NVRAM are provided for the system. The NVRAM stores many settings, including OS system log information settings, calendar settings, current system settings, all printer settings, and network settings. The NVRAM also employs an RTC (Real Time Clock) for time management.
6. **HDD.** A 3.5" HDD (more than 10 GB) can be connected using an IDE I/F. The hard disk is partitioned as shown in the table below.

Area	Size	Usage	Remarks
File System 1	500 MB	Font download, form registration.	Remain after power off/on.
File System 2	500 MB	Job spool area.	Erased at power off.
Image TMP1	2000 MB	Collation, sample print and locked print.	Erased at power off.
Image TMP2	500 MB	Collation	Erased at power off.
Image TMP3	500 MB	Collation and locked print.	Erased after power off.
Job Log	10 MB	Job log.	Remain after power off/on.

6.3 PRINTING PROCESS OVERVIEW



Drum Charge

The charge roller [A] gives a negative charge to the organic photoconductive (OPC) drum. The charge remains on the surface of the drum because the OPC layer has a high electrical resistance in the dark.

Laser Exposure

The image data is projected onto the drum by two laser beams [B], which form an electrostatic latent image on the drum surface. The amount of charge remaining as a latent image on the drum depends on the laser beam intensity, controlled by the BICU.

Development

The magnetic developer brush on the development roller [C] contacts the latent image on the drum. Toner particles are electrostatically attracted to the areas of the drum surface where the laser reduced the negative charge on the drum.

Image Transfer

Paper is fed into the area between the drum surface and the transfer belt [D] at the proper time to align it with the image on the drum. The transfer bias roller applies a high positive charge to the reverse side of the paper through the transfer belt. This positive charge pulls the toner particles from the drum surface onto the paper while the paper is electrostatically attracted to the transfer belt.

Separation

Paper separates from the drum as a result of the electrical attraction between the paper and the transfer belt. Pick-off pawls [E] help separate the paper from the drum.

ID Sensor

The ID sensor [F] measures the reflectivity of the pattern formed by the laser on the surface of the drum. This output signal is used for toner supply control and also measures the drum surface reflectivity, which is used for charge roller voltage control.

Cleaning

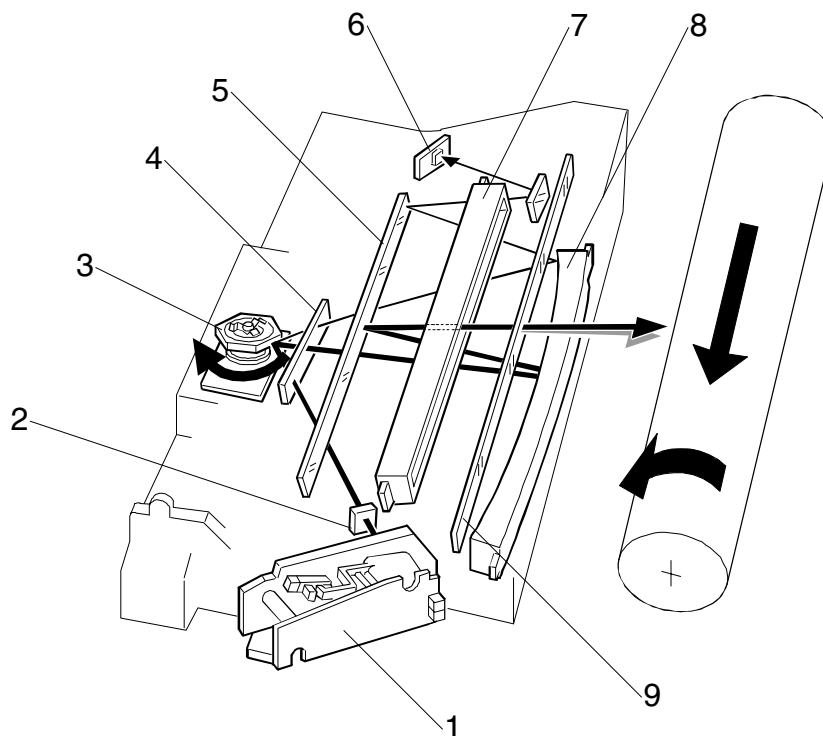
The drum cleaning blade [G] removes any toner remaining on the drum surface after the image is transferred to the paper.

Quenching

Finally, the light from the quenching lamp [H] electrically neutralizes the charge on the drum surface.

6.4 LASER EXPOSURE

6.4.1 OVERVIEW



- | | |
|---------------------|-----------------------------------|
| 1. LD unit | 6. Laser synchronization detector |
| 2. Cylindrical lens | 7. BTL (Barrel Toroidal Lens) |
| 3. Polygonal mirror | 8. F-theta mirror |
| 4. Shield glass | 9. Toner shield glass |
| 5. Mirror | |

This machine uses two laser diodes to produce electrostatic images on an OPC drum. The laser diode unit converts image data from the BICU board into laser pulses, and the optical components direct these pulses to the drum. To produce a high quality image, these are 256 gradations for the laser power.

The output path from the laser diode to the drum is shown above. The LD unit outputs two laser beams to the polygon mirror through the cylindrical lens and the shield glass.

Each surface of the polygon mirror reflects two full main scan lines. The laser beams go to the F-theta mirror, mirror, and BTL (barrel toroidal lens). Then these laser beams go to the drum through the toner shield glass. The laser synchronization detector determines the main scan starting position.

NOTE: The front door and upper right door (transfer door) are equipped with safety switches that automatically shut down the laser unit when either door is opened.

6.4.2 AUTO POWER CONTROL (APC)

The LD board drives the laser diode. Even if a constant electric current is applied to the laser diode, the intensity of the output light changes with the temperature. The intensity of the output decreases as the temperature increases.

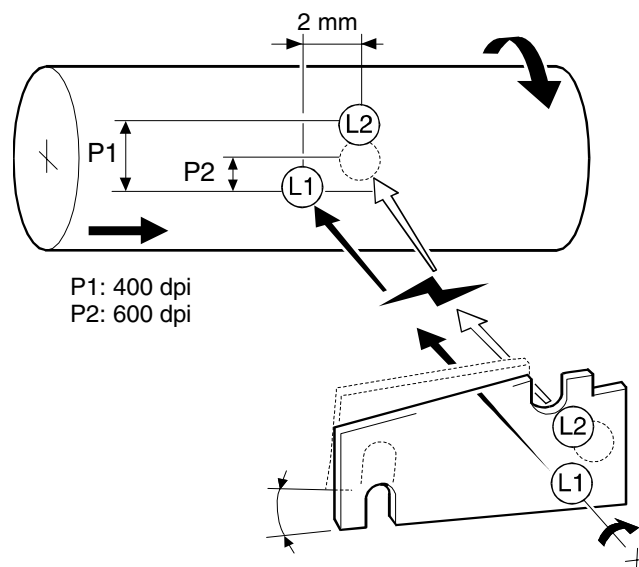
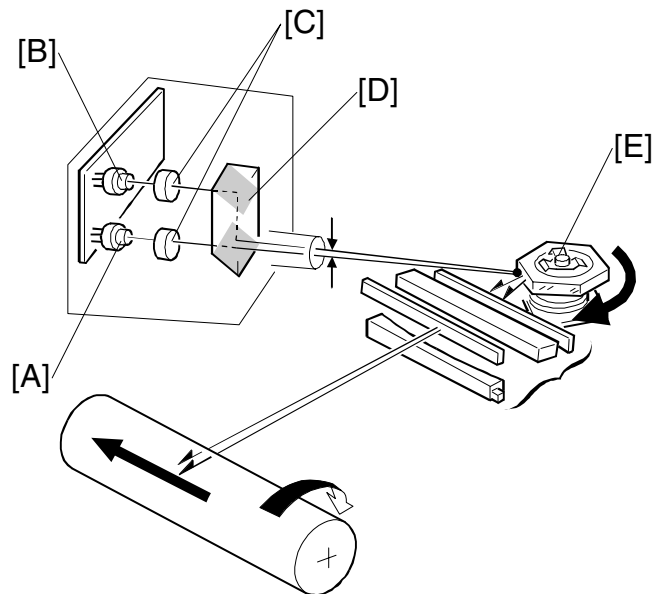
In order to keep the output level constant, the LD board monitors the electrical current passing through the photodiode (PD). Then it increases or decreases the current to the laser diode as necessary, comparing it with the reference level. This auto power control is done just after the machine is turned on and during printing while the laser diode is active.

The reference levels are adjusted on the production line. Do not touch the variable resistors on the LD board in the field.

6.4.3 DUAL BEAM WRITING

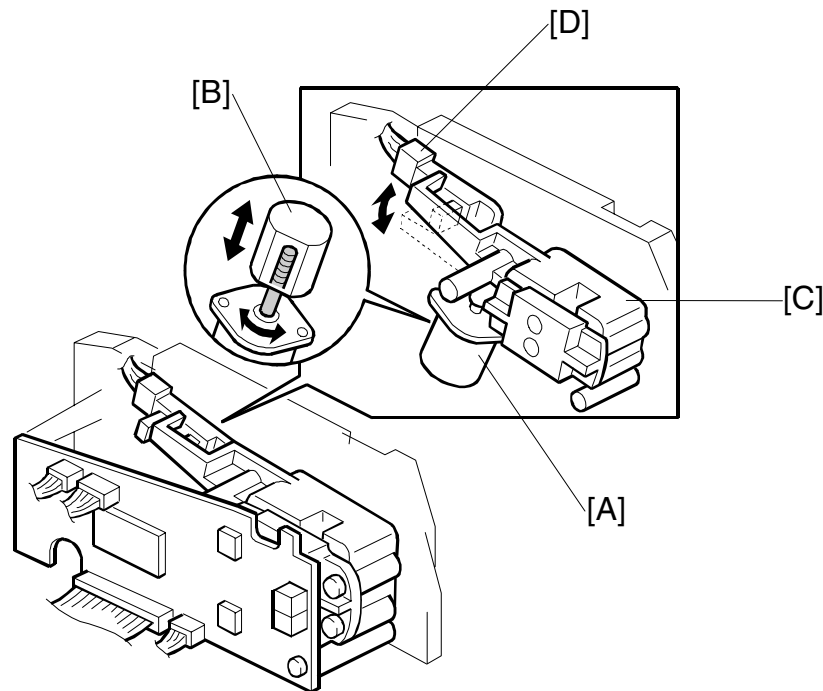
This LD unit employs two laser diodes [A] (LD) and [B] (L2). Each face of the polygon mirror writes two main scan lines, and twelve main scans are produced when the polygon mirror rotates once. This reduces polygon motor rotation speed, reduces noise generated by the polygon motor, and reduces the frequency of the image data clock.

The two laser beams follow the path: collimating lenses [C] → prism [D] → polygon mirror [E]



The two laser beams arrive on the drum surface about 2 mm apart in the main scan direction and about 0.06 mm apart (at 400 dpi) in the sub scan direction. The two-mm difference in the main scan direction allows the machine to detect the laser synchronization signal for each beam.

6.4.4 LASER BEAM PITCH CHANGE MECHANISM

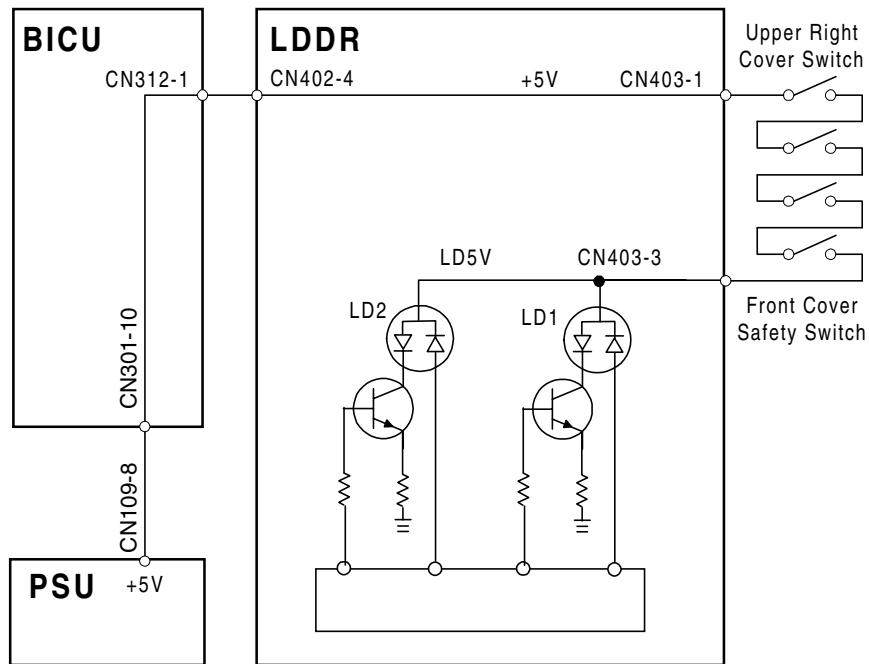


When the LD positioning motor [A] turns, the metal block [B] in contact with the LD unit housing [C] moves up and down and changes the position of L2 (L1 does not move).

Both LD unit positions are at fixed distances from the LD unit home position sensor [D].

Usually, the LD unit moves directly to the proper position. However, when the number of times that the resolution has changed reaches the value of SP2109 07 (Pitch Change Count), the LD unit moves to the home position, and this re-calibrates the LD unit positioning mechanism.

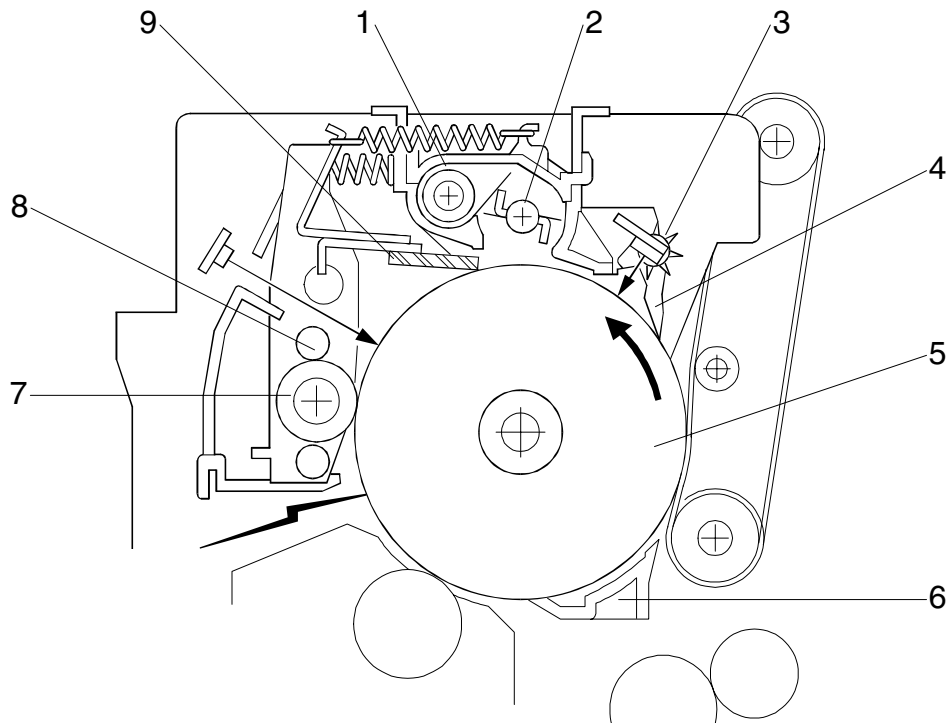
6.4.5 LD SAFETY SWITCHES



To ensure personal safety and to prevent the laser beam from inadvertently switching on during servicing, power to the laser diode is switched off when the front cover or upper right cover is opened. Four safety switches are installed in series on the LD5 V line from the power supply unit (PSU) via the BICU board.

6.5 PHOTOCONDUCTOR UNIT (PCU)

6.5.1 OVERVIEW

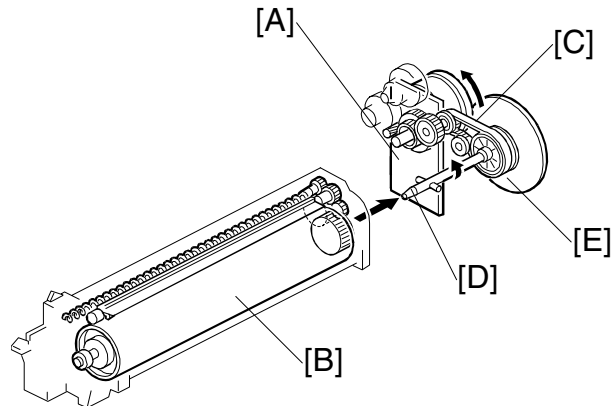


- | | |
|-----------------------------|----------------------------|
| 1. Toner Collection Coil | 6. Transfer Entrance Guide |
| 2. Toner Collection Plate | 7. Charge Roller |
| 3. Spur | 8. Brush Roller |
| 4. Pick off Pawl | 9. Cleaning Blade |
| 5. OPC Drum ($\phi 60$ mm) | |

6.5.2 DRIVE MECHANISM

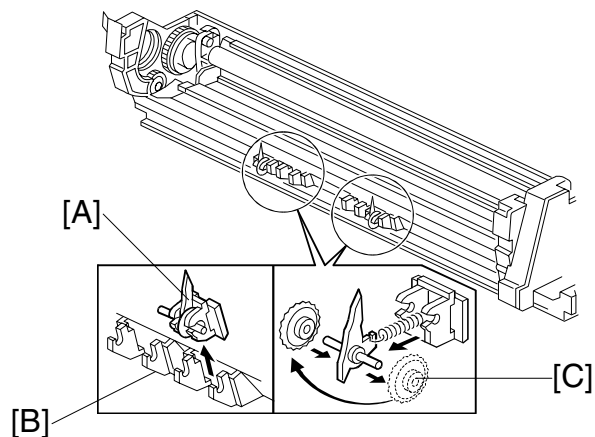
The drive from the main motor [A] is transmitted to the drum [B] through a series of gears, a timing belt [C], and the drum drive shaft [D].

The main motor has a drive controller, which outputs a motor lock signal when the rotation speed is out of the specified range. The flywheel [E] on the end of the drum drive shaft stabilizes the rotation speed (this prevents banding and jitter on copies).



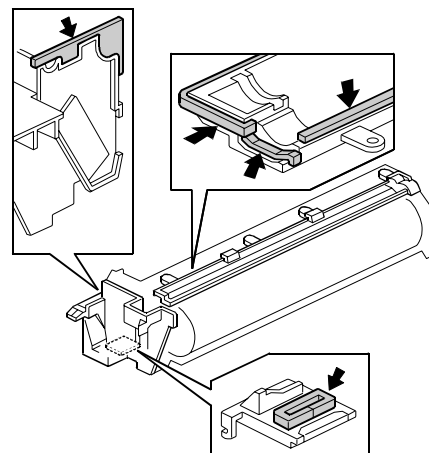
6.5.3 DRUM PAWLS

The pick-off pawls [A], mounted in the holders [B] on the drum and in contact with the drum, strip paper from the drum if it has not yet separated. The gears [C] are removable, and the positions of the holders can be adjusted.



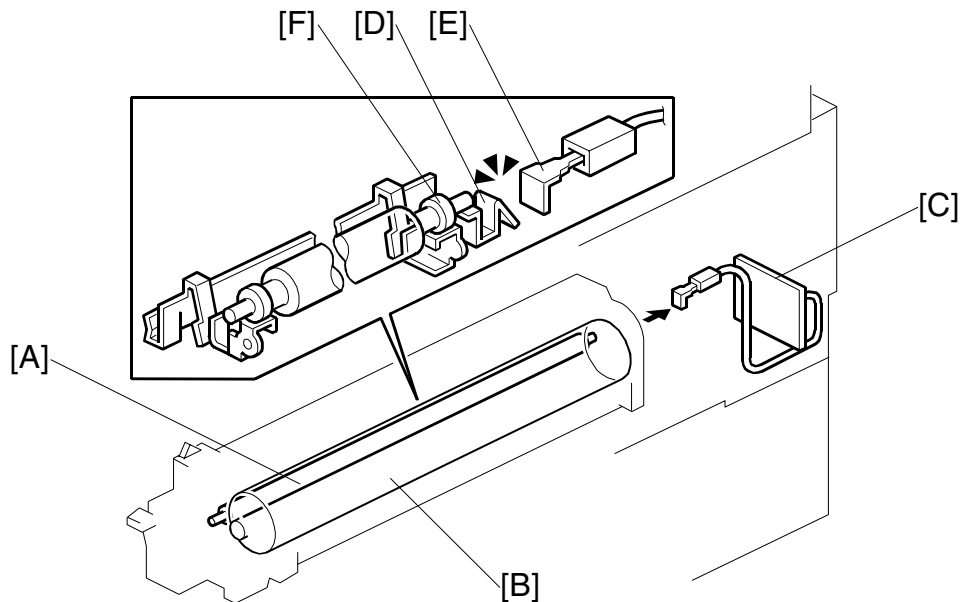
6.5.4 DRUM TONER SEALS

Seals have been added to the structure of the PCU (photoconductor unit) to further prevent toner leakage.



6.6 DRUM CHARGE

6.6.1 OVERVIEW

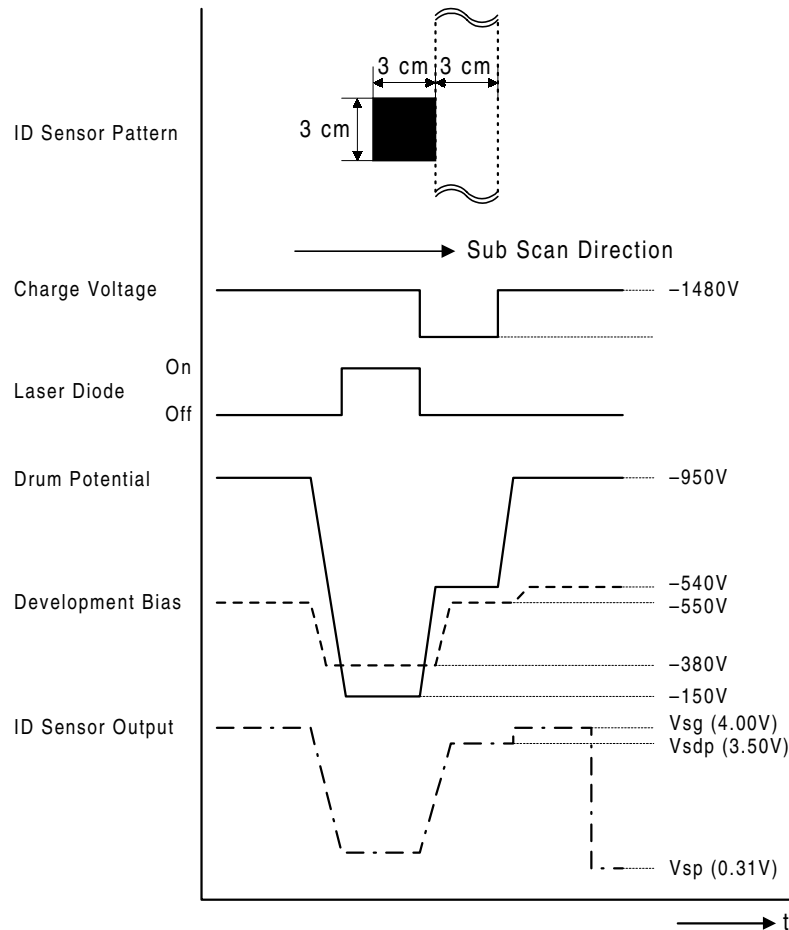


This machine uses a drum charge roller to charge the drum.

The drum charge roller [A] contacts the surface of the drum [B] to give it a negative charge. The high voltage supply board [C] supplies a negative dc voltage to the drum charge roller through the charge roller terminal [D], bias plate [E], and the rear roller bushing [F] to give the drum surface a negative charge of -950V .

6.6.2 CHARGE ROLLER VOLTAGE CORRECTION

Correction for Environmental Conditions



The voltage transferred from roller to drum could vary with the temperature and humidity around the drum charge roller. The lower the temperature or humidity, the higher the applied voltage required.

The ID sensor measures the effects of ambient conditions, and any small change in drum potential caused by changes in temperature/humidity is reflected in the amount of toner transferred to the drum.

This measurement is done immediately after the ID sensor pattern for toner density control. After creating ID sensor pattern [A], another pattern [B] is made. To do this, the LD switches off, the charge roller voltage drops, and the drum potential is reduced to -600 V. At the same time, development bias returns to -550 V. The drum potential is now slightly higher than the development bias, so only a very small amount of toner transfers to the drum. The ID sensor measures the density of pattern [B], and V_{sdp} , the output voltage, is compared with V_{sg} which was read from the bare drum at the same time.

Correction for Paper Width and Thickness (By-pass Tray only)

The by-pass tray can be used for non-standard paper narrower than sizes accepted by the paper trays. Thicker paper, OHP sheets, etc. can also be loaded in the by-pass tray but adjustments must be performed with the SP modes listed below in order to avoid jams and quality problems.

SP Mode	SP Name	
SP2001-01	Charge Roller Bias Adjustment	Default: -1,480 V
SP2309-01	Paper Lower Width [a]	Width limit. Default: 150 mm
SP2309-02	Paper Upper Width [b]	Width limit. Default: 216 mm
SP2914-01	C α	Adjust 10 V/step. Default: +150 V
SP2914-02	C β	Adjust 10 V/step. Default: 0

The way that these SP modes are used is shown below.

0 mm	SP2309-01 Default: 150 mm	SP2309-02 Default: 216 mm	297 mm
Voltage: SP2001-01 + SP2914-01 Default: -1,480 + 150	Voltage: SP2001-01 + SP2914-02 Default: -1,480 + 0	Voltage: SP2001-01 Default: -1,480	

For example, with the default settings, if the paper width fed from the by-pass tray is 100 mm, the charge roller voltage will be -1,480 + 150 V.

6.6.3 ID SENSOR PATTERN PRODUCTION TIMING

At certain times, an ID sensor pattern is created on the drum. The ID sensor reads the sensor pattern and outputs this reading as V_{sp} and sends it to the CPU where it is used to calculate V_{ref} ($V_{sp}/V_{sg} = V_{ref}$).

These times are as follows:

Every time the system is powered up

After every 10 prints

- This number of prints can be adjusted with SP2210-01 (Pattern Interval – ID Sensor).
- When the number of prints exceeds 10 during a print job, the ID sensor pattern is not created and read until after the print job completes.

After every 100 prints

- This number of prints can be adjusted with SP2973-01.
- When the number of prints exceeds 100 during a print job, the ID sensor pattern is not created and read until after the print job completes.
- At this time, a halftone pattern is added to the standard ID sensor pattern. The reading from this pattern, V_{sm} , is used with V_{sg} (V_{sm}/V_{sg}) to calculate the value to be used to determine the amount of LD (laser diode) power adjustment required. This method improves consistent greyscale reproduction, slows the deterioration of the OPC drum, and reduces scatter.

After every 200 prints

- The halftone pattern is added to the standard ID sensor pattern every 200 prints. This interval can be changed with SP2210-02 (Large Job).
- When 200 prints is reached, even if in the middle of a job, the ID sensor pattern will be made. For example, if the job contains 1,100 sheets, the ID sensor patterns will be made every 200 sheets, and at the end of the job.

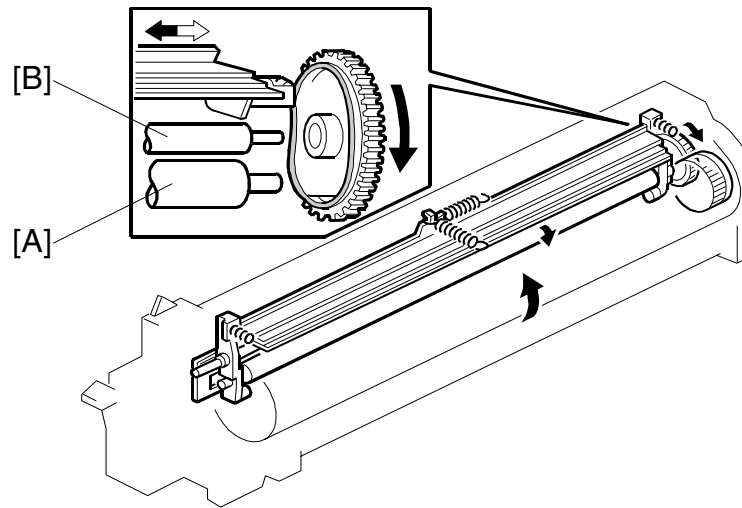
When the front door of the machine is opened and closed

- The halftone pattern is added to the standard ID sensor pattern at this time also.

The following SP codes are also used for greyscale control. Refer to the SP code table for full details.

SP Code	Name	What It Does
2973-01	Grayscale Copy Interval Check	Determines how often the halftone pattern is added to the standard ID sensor pattern. Default setting: 100
2972-01	Grayscale Upper Limit	Sets the upper limit for LD adjustment based on the V_{sm}/V_{sg} calculation.
2972-02	Grayscale Lower Limit	Sets the lower limit for LD adjustment based on the V_{sm}/V_{sg} calculation.
3103-04	V_{sm}/V_{sg} (Immediate Grayscale Post-Pattern Output)	Displays value used to determine the LD power adjustment (Normally, $V_{sm}/V_{sg} = 65\% \sim 85\%$)

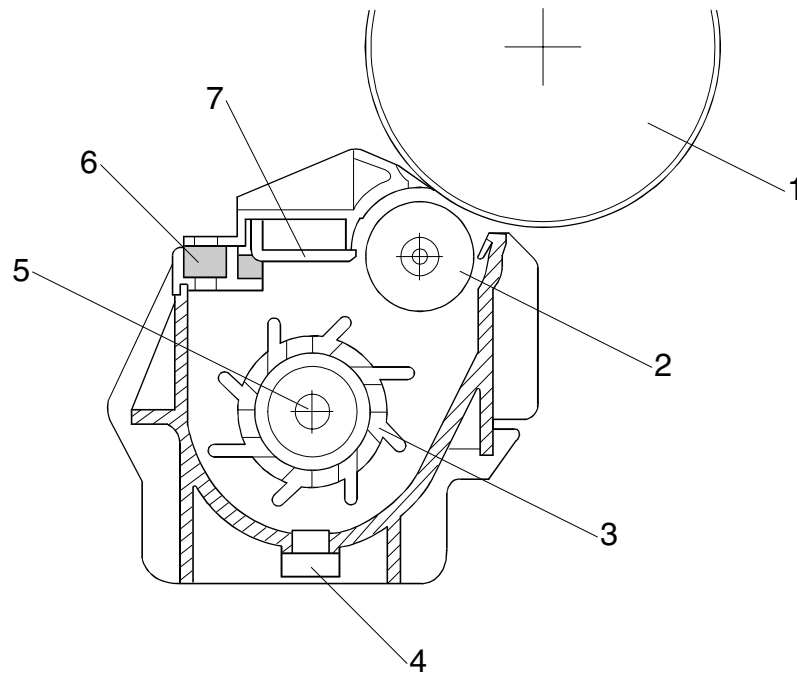
6.6.4 DRUM CHARGE ROLLER CLEANING



The drum charge roller [A], always in contact with the drum, get dirty easily, so the brush roller [B] also remains in contact with the charge roller to clean it.

6.7 DEVELOPMENT

6.7.1 OVERVIEW



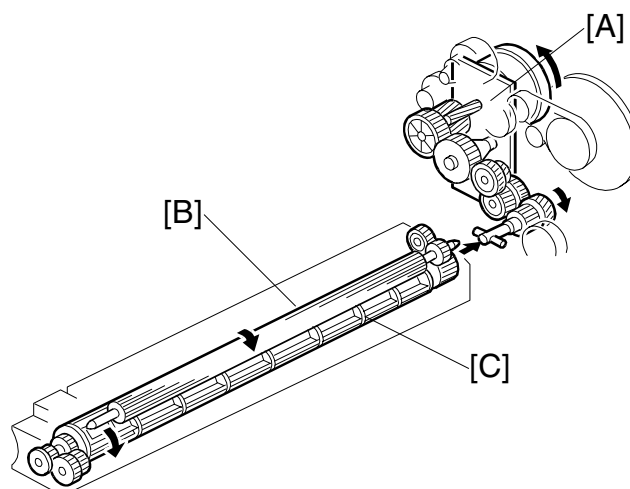
- | | |
|-----------------------|-----------------------|
| 1. Drum | 5. Mixing Auger |
| 2. Development Roller | 6. Development Filter |
| 3. Paddle Roller | 7. Doctor Blade |
| 4. TD Sensor | |

6.7.2 DRIVE MECHANISM

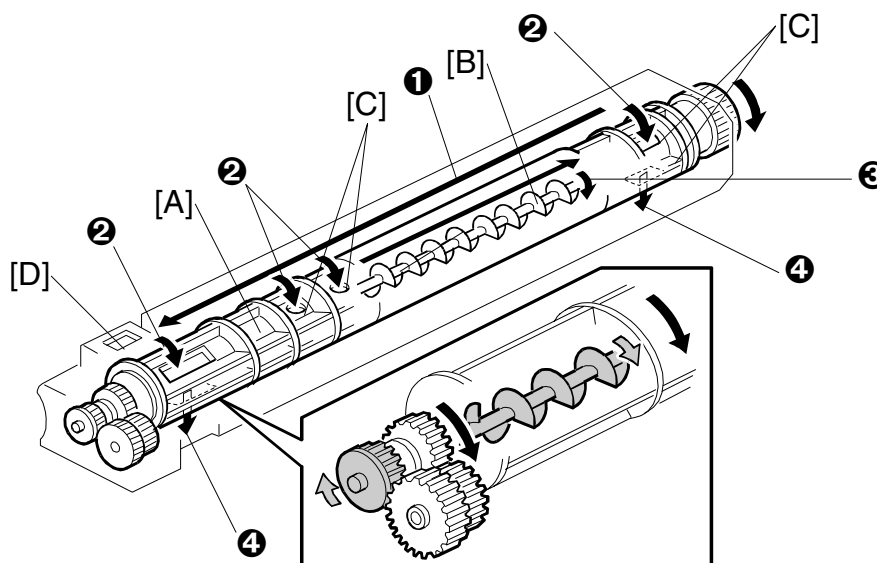
The feed/development motor [A] drives the development roller [B] through the gears and the paddle roller gear [C].

The drive shaft engages and disengages the paddle roller gear when the development unit is inserted into and removed from the machine.

NOTE: The development drive gears are helical gears, quieter than normal gears.



6.7.3 DEVELOPER MIXING



The dual mixing roller consists of the outer paddle [A] and the inner auger [B].

The outer paddle moves developer to the front ① and supplies it to the development roller. Developer that spills off by the doctor blade ② passes through the holes [C] in the outer paddle, and is transported to the rear ③ by the inner auger.

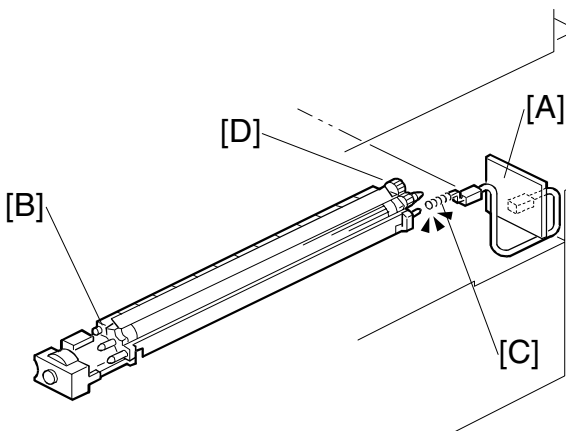
While the dual mixing roller is moving the developer, some developer also passes back to the development unit through the holes in the bottom of the paddle roller ④. New toner from the toner bottle and recycled toner from the toner collection coil both enter the development unit at [D].

6.1.4 DEVELOPMENT BIAS

Mechanism

Black areas of the latent image are at a low negative charge (about -150 V) and white areas are at a high negative charge (about -950 V).

To attract negatively charged toner to the black areas of the latent image on the drum, the high voltage supply board [A] applies a bias of -540 volts to the development roller throughout the image development process. The bias is applied to the development roller shaft [B] through the bias terminal spring [C] and bias terminal [D].



The development bias voltage (-540 V) can be adjusted with SP2201 (Development Bias).

Correction for Paper Width and Thickness (By-pass Tray only)

The by-pass tray can be used for non-standard paper narrow than sizes accepted by the paper trays. Thicker paper, OHP sheets, etc. can also be loaded in the by-pass tray but adjustments must be performed with the SP modes listed below in order to avoid jams and misfeeds.

SP Mode	SP Name	
SP2201-01	Development Bias	Default: -540 V
SP2309-01	Paper Lower Width [a]	Width limit. Default: 150 mm
SP2309-02	Paper Upper Width [b]	Width limit. Default: 216 mm
SP2914-03	Process Control Setting (B γ)	Adjust 10 V/step. Default 210 V
SP2914-04	Process Control Setting (B δ)	Adjust 10 V/step. Default 50 V

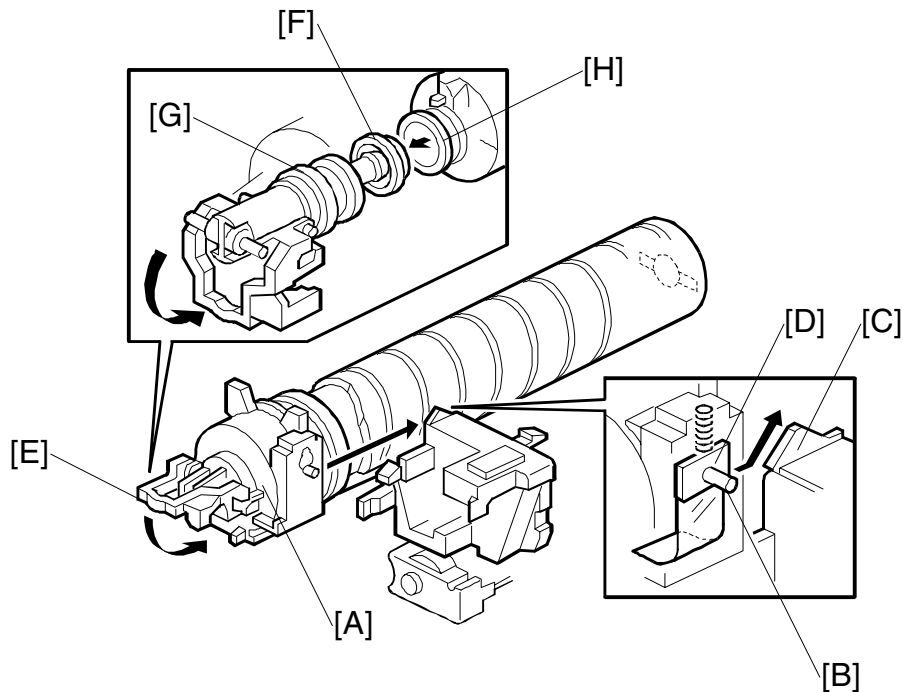
The way that these SP modes are used is shown below.

0 mm	SP2309-01 Default: 150 mm	SP2309-02 Default: 216 mm	297 mm
Voltage: SP2201-01 + SP2914-03 Default: -540 + 200	Voltage: SP2201-01 + SP2914-04 Default: -540 + 50	Voltage: SP2201-01 Default: -540	

For example, with the default settings, if the paper width fed from the by-pass tray is 200 mm, the development bias voltage will be -540 + 50 V.

6.1.5 TONER SUPPLY

Toner Bottle Replenishment Mechanism



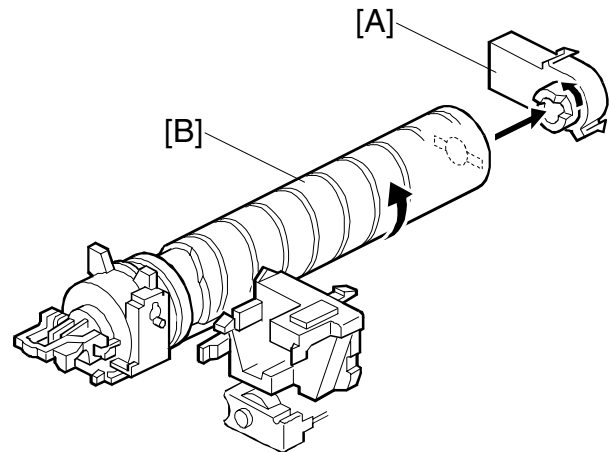
When the toner bottle is installed in the bottle holder [A], pin [B] slides up the side of the PCU [C], pulling out the toner shutter [D]. When the toner bottle holder lever [E] is returned to its original position, the cap [F] pulls away and is kept in place by the chuck [G].

The toner bottle holder lever [E] cannot be lowered when a toner bottle is not installed in the holder. This prevents toner falling out of the holder unit as a result of lowering the handle with no toner bottle installed.

The toner bottle has a spiral groove [H], which rotates the bottle to move toner to the development unit. When the bottle holder unit is pulled out, the chuck [G] releases the toner bottle cap and the toner shutter [D] closes and blocks the opening.

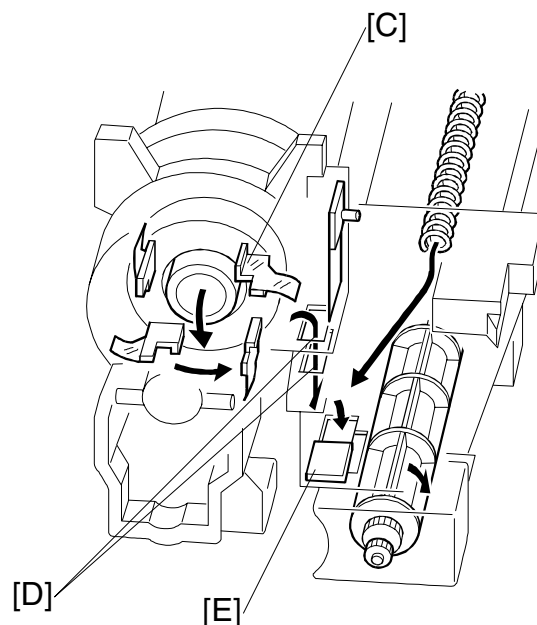
Toner Supply Mechanism

The toner supply motor [A] rotates the toner bottle [B] and the mylar blades [C] (see below).



Toner falls into the toner bottle holder, and the toner supply mylar blades [C] transfer the toner to slit [D]. Installing the PCU opens the shutter [E].

The toner falls into the development unit through the slit.



Toner Density Control

There are two modes for controlling and maintaining constant toner supply: sensor control (both direct and indirect) and image pixel count control. The mode can be changed with SP2208-01 (Toner Supply Mode).

NOTE: The factory setting is sensor control mode; image pixel count mode should only be used temporarily until a defective TD or ID sensor can be replaced.

Sensor Control Mode

In the sensor control mode, the amount of toner required to print the page is calculated by the CPU; it adds up the image data value of each pixel and converts the sum to a value between 0 and 255. (255 would mean a completely black page.)

The machine must vary toner supply for each print in order to maintain the correct amount of toner in the developer and to account for changes in drum reflectivity due to changes in temperature and humidity. The CPU uses data from the TD sensor and ID sensor to determine whether or not the toner supply motor should be switched on and to calculate how long it should remain on in order to supply more toner to the mixture in the development unit.

TD Sensor

When new developer of standard toner concentration is installed, namely 20 g of toner per 500 g of developer (4.0% by weight), the TD sensor must be set to its initial setting of 4.0 V with SP2801. This initial setting is used as the toner supply reference voltage or V_{ref} . For every print cycle, the TD sensor directly checks the toner density in the developer mixture, and after 10 copies these 10 readings are averaged and this value becomes TD sensor output voltage $V_t(10)$.

The machine compares $V_t(10)$ with V_{ref} . If $V_t(10)$ is greater than V_{ref} , the toner concentration in the development unit judged to be low. When $V_t(10)$ is detected to be greater than V_{ref} 20 times, then this indicates that the toner concentration is consistently low, V_{ref} is incremented by 0.1 V, and the conditions are checked again. The result of this check determines the value of K , the toner supply rate coefficient, which is one of the factors that is used in the toner supply motor on-time calculation.

ID Sensor

In addition to comparing $V_t(10)$ from the TD sensor and V_{ref} , after every 10 copies the ID sensor, located at the lower right area of the drum, checks both the reflectivity (V_{sg}) and the pattern on the drum (V_{sp}), created by the laser diodes and charge roller. If the reflected light is too strong, this indicates that toner is low and toner is added to the development unit. (The frequency of these checks can be adjusted with SP2210; see section 6.8.3. for full details.)

Image Pixel Count Mode

This mode should only be used only as a temporary measure while waiting for replacement parts, such as a TD sensor. This mode controls the toner supply amount using the same method for determining the toner bottle motor on time. However, the values that were in effect when the toner density control mode was changed over to image pixel count mode with SP2208-01 (Toner Supply Mode) remain in effect and cannot be changed.

6.1.6 TONER NEAR END/END DETECTION

Standard Method

The toner near-end condition is detected based on the $V_t(10)$ output from the TD sensor. If the difference between V_{ref} (toner supply reference voltage) and $V_t(10)$ is less than or equal to -0.45 , then toner concentration is judged be very low and K (the toner supply coefficient) is set to 0.25 , the machine enters the toner near end condition and the machine switches on the toner supply motor.

If a difference greater than -0.45 is detected, then toner concentration is judged as low but the machine does another test by comparing V_{ref} and $V_t(10)$. If the machine determines that $V_t(10)$ is greater than V_{ref} 40 times, the toner supply motor switches on and remains on for twice the time that $V_t(10)$ was greater than V_{ref} . If the toner concentration is still low, then the machine enters the toner near end condition.

The final toner end is detected using the ID sensor. If the ID sensor detects that the ID sensor pattern is very light (V_{sp} drops below 2.0 V), then the sensor triggers the toner end condition.

If V_{sp} is less than 2.0 V, the density of the ID sensor pattern is very light, so the machine detects the toner end condition. However, if V_{sp} remains higher than 2.0 V but 90 copies have been made after toner near end was determined, the machine enters the toner end condition.

NOTE: The number of copies between toner near-end and toner end can be changed with SP2213. The default is 90 copies.

Adjustable Near-end Warning Method

By storing a value in SP2975, a near-end warning can be set up to appear on the LCD when the toner supply motor has rotated for a certain amount of time from after a new toner cartridge was installed. This allows the user to be prepared much earlier than just 90 prints to change the cartridge. Refer to the SP table for more.

6.1.7 TONER END RECOVERY

If the front door is opened and then closed while a toner near end/end condition exists, the machine will attempt to recover. When the front door is closed, the toner supply motor turns on to supply toner. The machine checks the TD sensor output 2 seconds after the main motor turns on (V_{tp}), and the sensor is checked again every 1 second (V_{tp}^1)

The machine detects the toner concentration using V_{ref} , V_t (10), V_{tp} , and V_{tp}^1 . If the toner concentration is still too low, the toner supply motor remains on for another 10 seconds while the machine checks V_t . If toner concentration is judged to be at the standard level, then the toner near end/end condition is cancelled and K (toner supply coefficient) is reset. If toner concentration has not reached the standard level, the toner supply motor rotates continuously until it does (maximum motor on time is 16 seconds) and then it will switch off.

6.1.8 TONER SUPPLY WITH ABNORMAL SENSORS

The TD sensor is checked every print. If the readings from the TD sensor become abnormal during a print job, the machine holds the GAIN factor constant (GAIN is normally calculated from TD sensor readings) to allow toner supply to vary with only pixel count for the rest of the print job. Then at the end of the print job, an SC code is generated and the machine must be repaired.

The ID sensor is checked every 10 copies (see section 6.8.3 for full details on ID sensor pattern intervals). If readings become abnormal, an SC code is generated and the machine must be repaired. If this happens during a print job, V_{ref} is not changed, the print job is allowed to finish, and then the SC code is generated.

If spare parts are not available, the technician can use SP2208-1 to temporarily put the machine in image pixel count mode. (➡ 5. Service Tables)

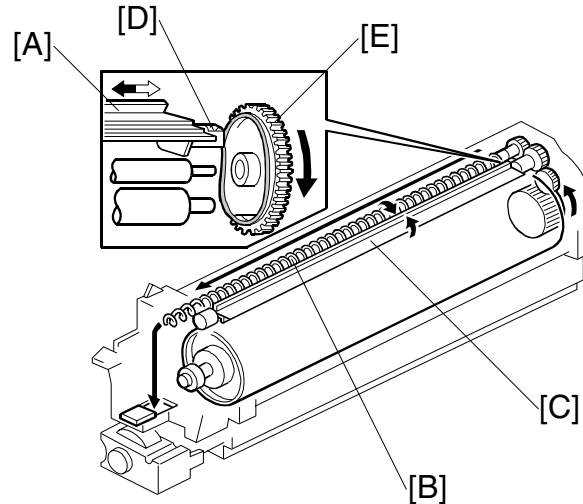
6.8 DRUM CLEANING AND TONER RECYCLING

6.8.1 DRUM CLEANING

This machine employs a counter blade system. After the image is transferred to paper, a cleaning blade [A] removes any toner remaining on the drum. The toner collection coil [B] carries scraped off toner to the toner collection plate [C].

The collar [D] on the cleaning blade bracket contacts the outer rim of cam gear [E], which moves the cleaning blade side to side. This side-to-side movement disperses accumulated toner to prevent early blade edge wear at one location.

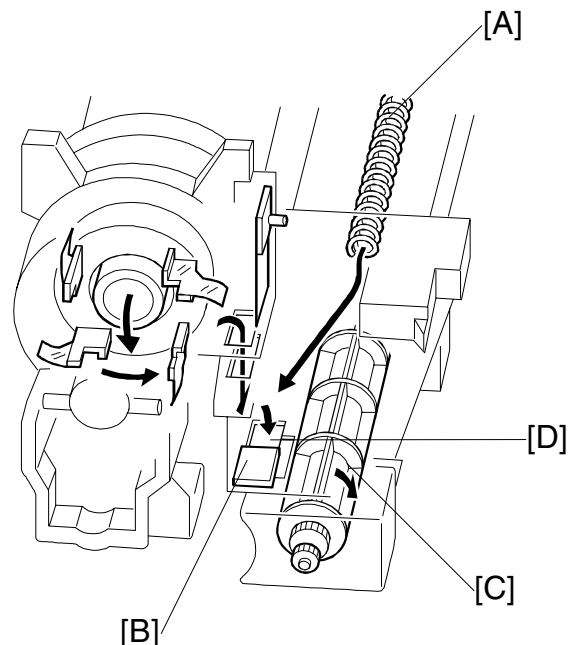
The drum reverses about 5 mm after every print job to remove particles on the edge of the cleaning blade.



6.8.2 TONER RECYCLING

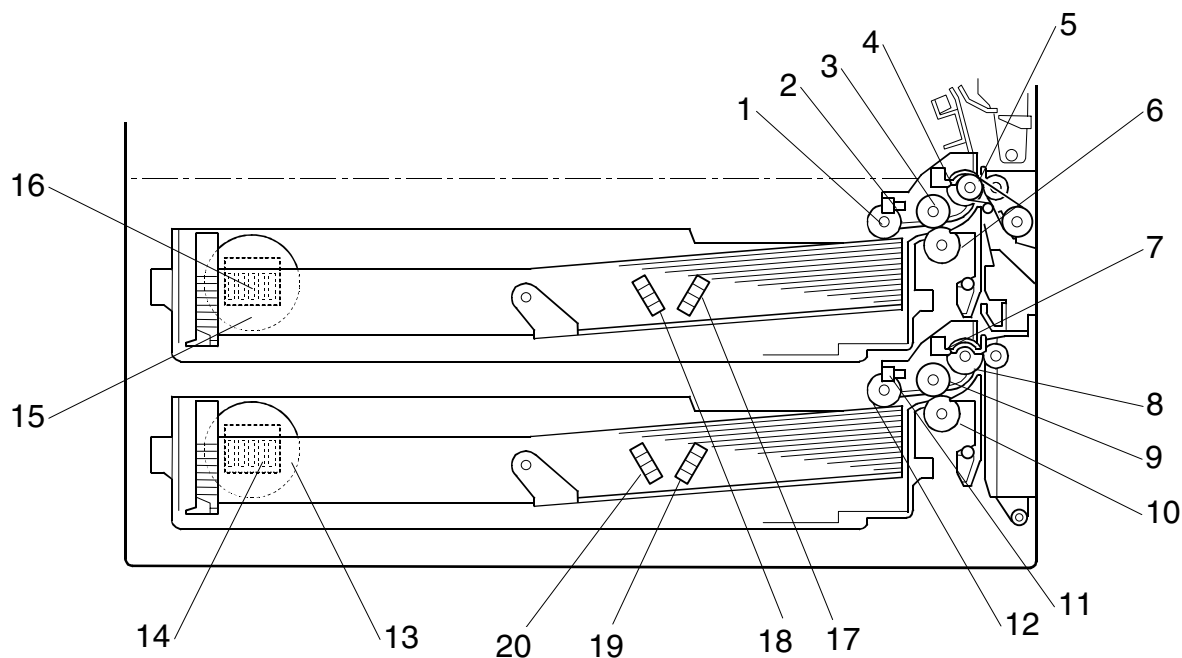
Toner collected by the toner collection coil [A] is transported to the opening [B]. This toner falls into the development unit with new toner coming from the toner bottle. The paddle roller [C] mixes the collected toner with the new toner.

NOTE: A screen filter [D] has been added to strain out paper dust and other foreign matter.



6.9 PAPER FEED

6.9.1 OVERVIEW



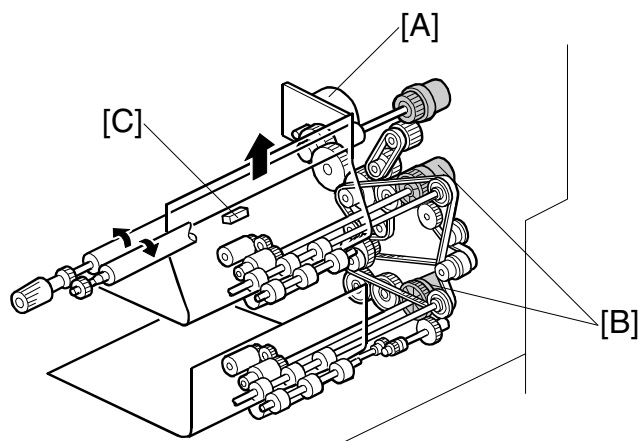
- | | |
|-----------------------------|---------------------------------|
| 1. Upper pick-up roller | 11. Lower paper lift sensor |
| 2. Upper paper lift sensor | 12. Lower pick-up roller |
| 3. Upper paper feed roller | 13. Lower paper size dial |
| 4. Upper relay sensor | 14. Lower paper size switch |
| 5. Upper relay roller | 15. Upper paper size dial |
| 6. Upper separation roller | 16. Upper paper size switch |
| 7. Lower relay sensor | 17. Upper paper height 2 sensor |
| 8. Lower relay roller | 18. Upper paper height 1 sensor |
| 9. Lower paper feed roller | 19. Lower paper height 2 sensor |
| 10. Lower separation roller | 20. Lower paper height 1 sensor |

Each paper tray, which employs the FRR system, can hold 500 sheets. Two relay sensors, positioned above each set of relay rollers, detect paper jams. A selection dial allows you to select the setting for the size of the paper loaded in the tray.

6.9.2 PAPER FEED DRIVE

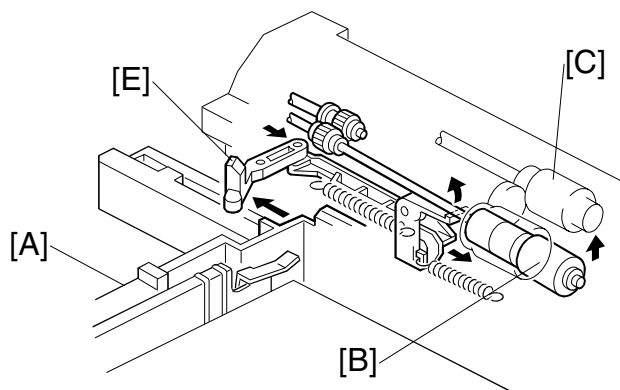
The feed/development motor [A] drives the pick-up and feed mechanism of both the upper and second paper feed stations through gears and the paper feed clutches [B].

When the paper feed clutch turns on, the pick-up roller, paper feed roller, and separation roller start rotating to feed the paper. The paper feed clutch stays on until shortly after the registration sensor [C] actuates.

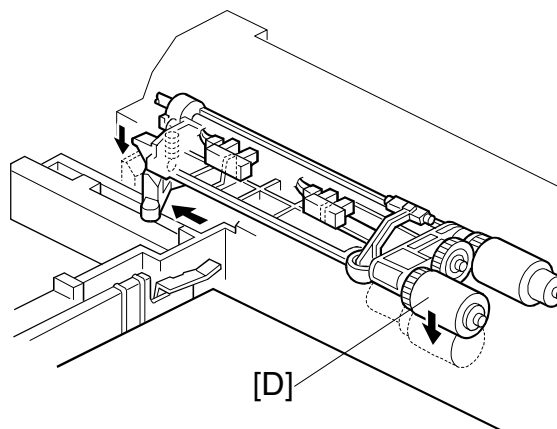


6.9.3 PICK-UP/SEPARATION ROLLER RELEASE

When the paper tray [A] is not inside the machine, the separation roller [B] is away from the paper feed roller [C] and the pick-up roller [D] stays in the upper position.

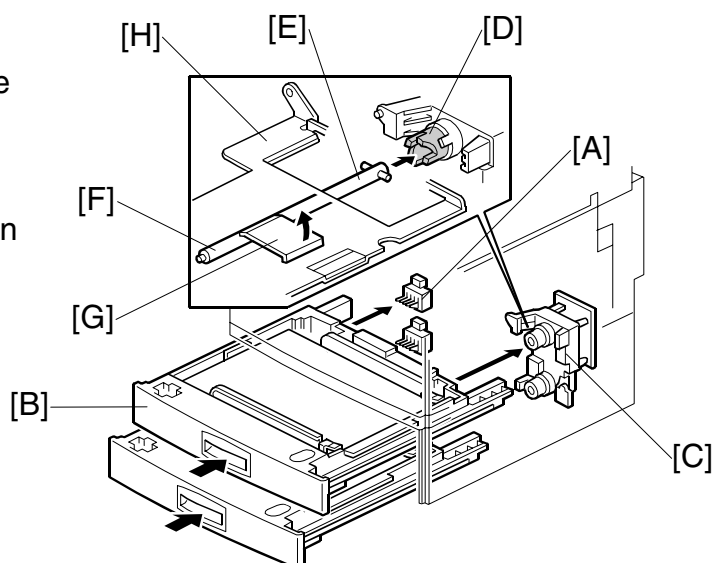


When the paper tray is set into the machine, it pushes the release lever [E]. This causes the pick-up roller [D] to go down and the separation roller [B] to move up and contact the paper feed roller.

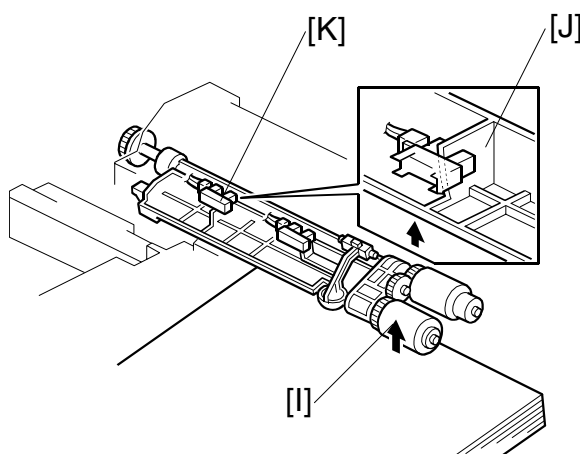


6.9.4 PAPER LIFT

The paper size switch [A] detects when the paper tray [B] is set in the machine, and the tray lift motor [C] rotates, and the coupling gear [D] on the tray lift motor engages the pin [E] on the lift arm shaft [F]. Then the tray lift arm [G] lifts the tray bottom plate [H].



When the paper tray is set in the machine, the pick-up roller [I] lowers. When the top sheet of paper reaches the proper height for paper feed, the paper pushes up the pick-up roller, and the actuator [J] on the pick-up roller supporter activates the paper lift sensor [K] to stop the tray lift motor.



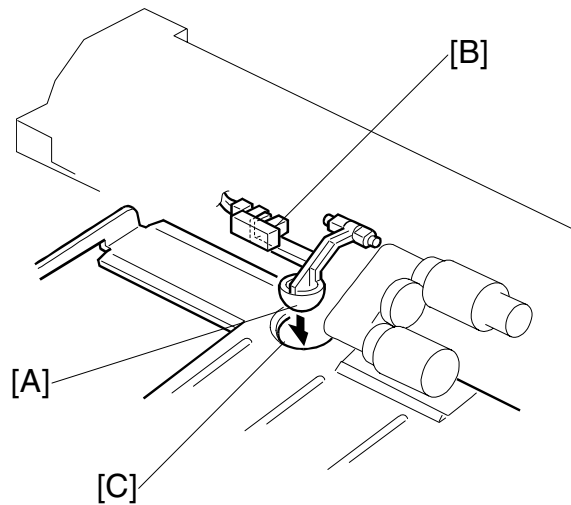
After several paper feed cycles, the paper level gradually lowers and the paper lift sensor is de-activated. The tray lift motor turns on again until this sensor is activated again.

When the paper tray is removed from the machine, the tray lift motor coupling gear disengages the pin on the lift arm shaft, and the tray bottom plate then drops under its own weight.

6.9.5 PAPER END DETECTION

If there is paper in the paper tray, the paper end feeler [A] is raised by the paper stack, and the paper end sensor [B] is deactivated.

When the paper tray runs out of paper, the paper end feeler drops into the cutout [C] in the tray bottom plate and the paper end sensor is activated.



6.9.6 PAPER REGISTRATION

The registration drive roller [A] and idle roller [B] correct the skew of the transferred paper to ensure that the leading edge of the paper is positioned correctly on the OPC.

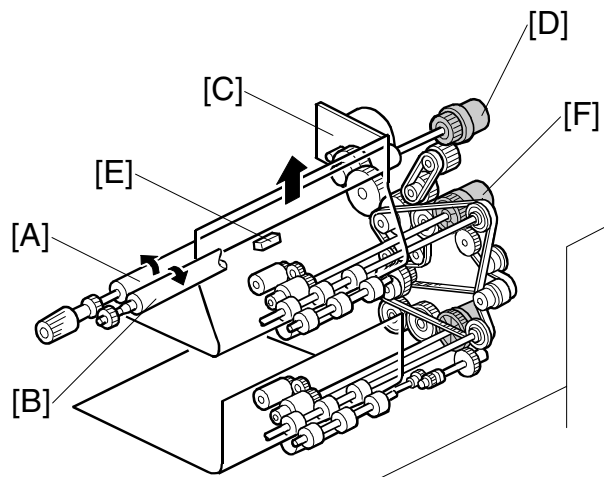
The paper feed/development motor [C] drives the registration mechanism.

The registration sensor [E] is positioned just before the registration rollers. When the leading edge activates the registration sensor, the registration clutch is off and the registration rollers are not turning.

However, the relay clutch [F] remains on slightly longer. This delay allows time for the paper to press against the registration rollers and buckle slightly to correct skew.

Next, the registration clutch [D] actuates and the relay clutch re-actuates at the proper time to align the paper with the image on the drum. The registration rollers then feed the paper to the image transfer section.

NOTE: The registration sensor is also used for paper misfeed detection.



6.9.7 PAPER SIZE DETECTION

The paper size switch includes four microswitches. Actuators behind the paper size dial actuate the sensors.

Each paper size has its own actuator, with a unique combination of notches. To determine the paper size, the CPU reads which switches the actuator has turned off.

The CPU disables paper feed from a tray if the paper size cannot be detected. If the paper size actuator is broken, or if there is no tray installed, the printer control board recognizes that the paper tray is not installed.

When the paper size actuator is at the “*” mark, the paper tray can be set up to accommodate one of a wider range of paper sizes by using one of the user tools on the machine’s operation panel.

Models		Paper Size Switch			
North America	Europe/Asia	1	2	3	4
8 1/2" x 13" Portrait	A3 Portrait	ON	ON	OFF	ON
A4 Landscape	A4 Landscape	ON	ON	ON	ON
A4 Portrait	A4 Portrait	ON	OFF	ON	ON
11" x 17" Portrait	A5 Portrait	OFF	OFF	ON	ON
8 1/2" x 14" Portrait	8" x 13" Portrait	ON	OFF	OFF	OFF
8 1/2" x 11" Portrait	8 1/2" x 11" Portrait	ON	ON	OFF	OFF
8 1/2" x 11" Landscape	8 1/2" x 11" Landscape	ON	OFF	ON	OFF
*	*	ON	ON	ON	OFF

ON: Pushed OFF: Not Pushed

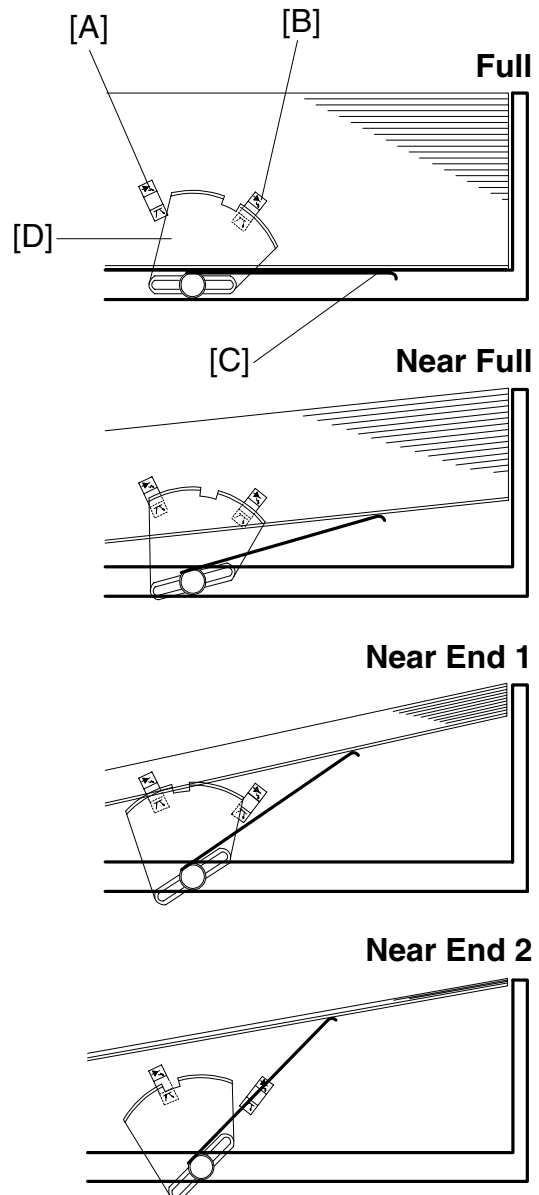
6.1.8 PAPER HEIGHT DETECTION

Two paper height sensors [A] and [B], working in combination, detect the amount of paper in the tray.

When the amount of paper decreases, the bottom plate pressure lever [C] moves up and the actuator [D] mounted on the same drive shaft as the pressure lever rotates.

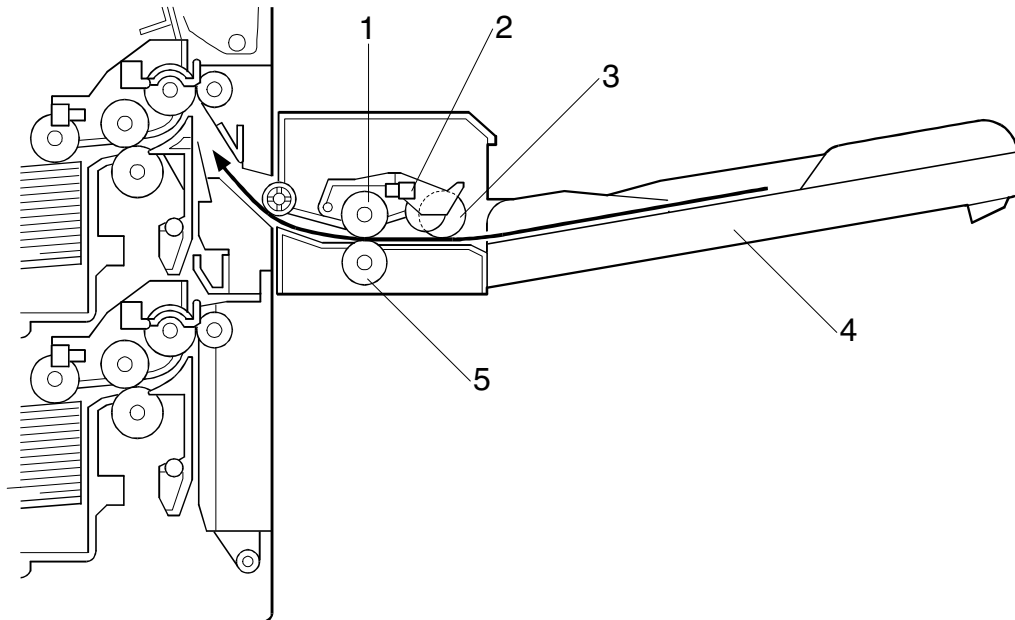
The following combinations of sensor signals are sent to the printer controller.

Amount of Paper	Paper Height Sensor [A]	Paper Height Sensor [B]
Full	OFF	ON
Near Full	ON	ON
Near End 1	ON	OFF
Near End 2	OFF	OFF



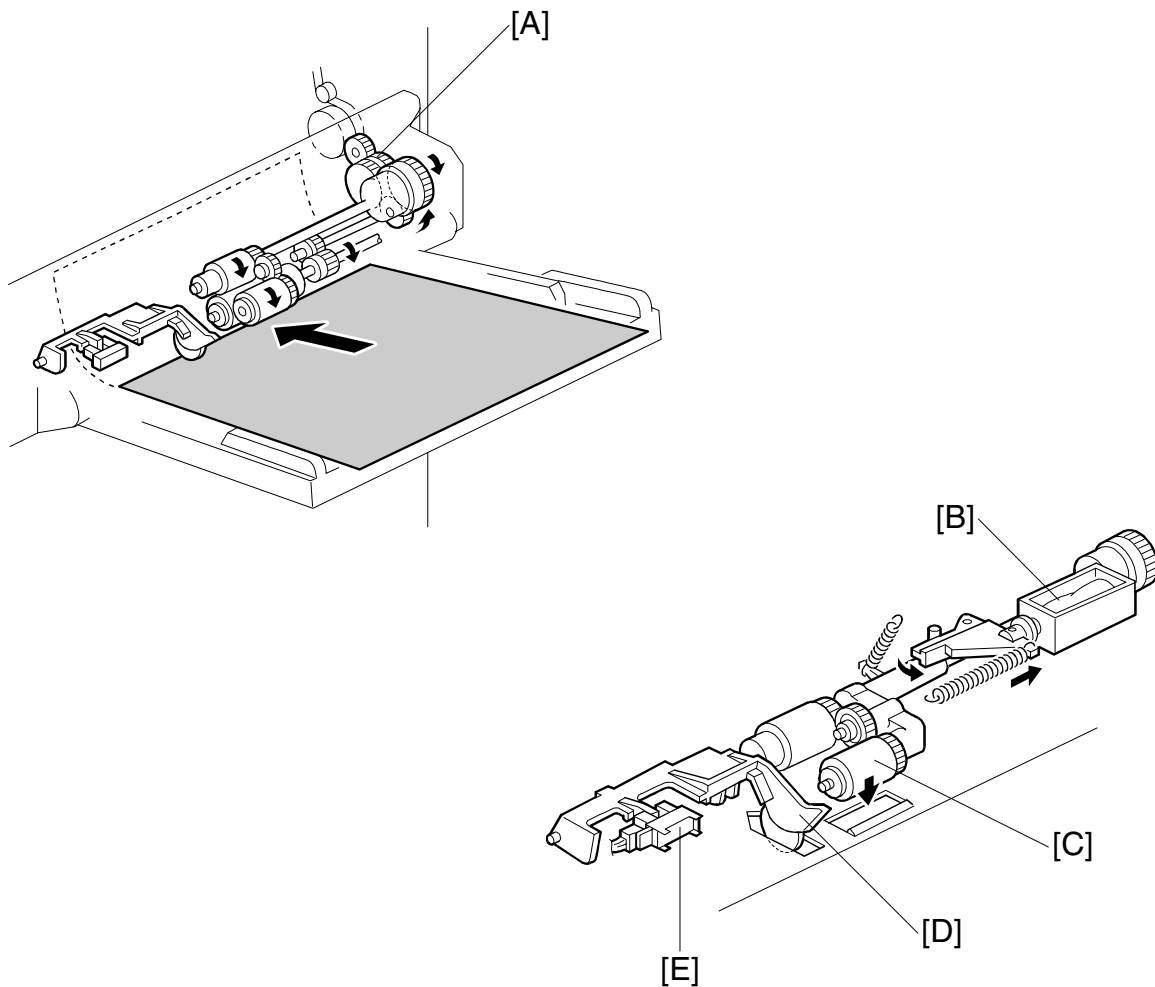
6.10 BY-PASS TRAY

6.10.1 OVERVIEW



1. Paper feed roller
2. Paper end sensor
3. Pick-up roller
4. By-pass tray
5. Separation roller

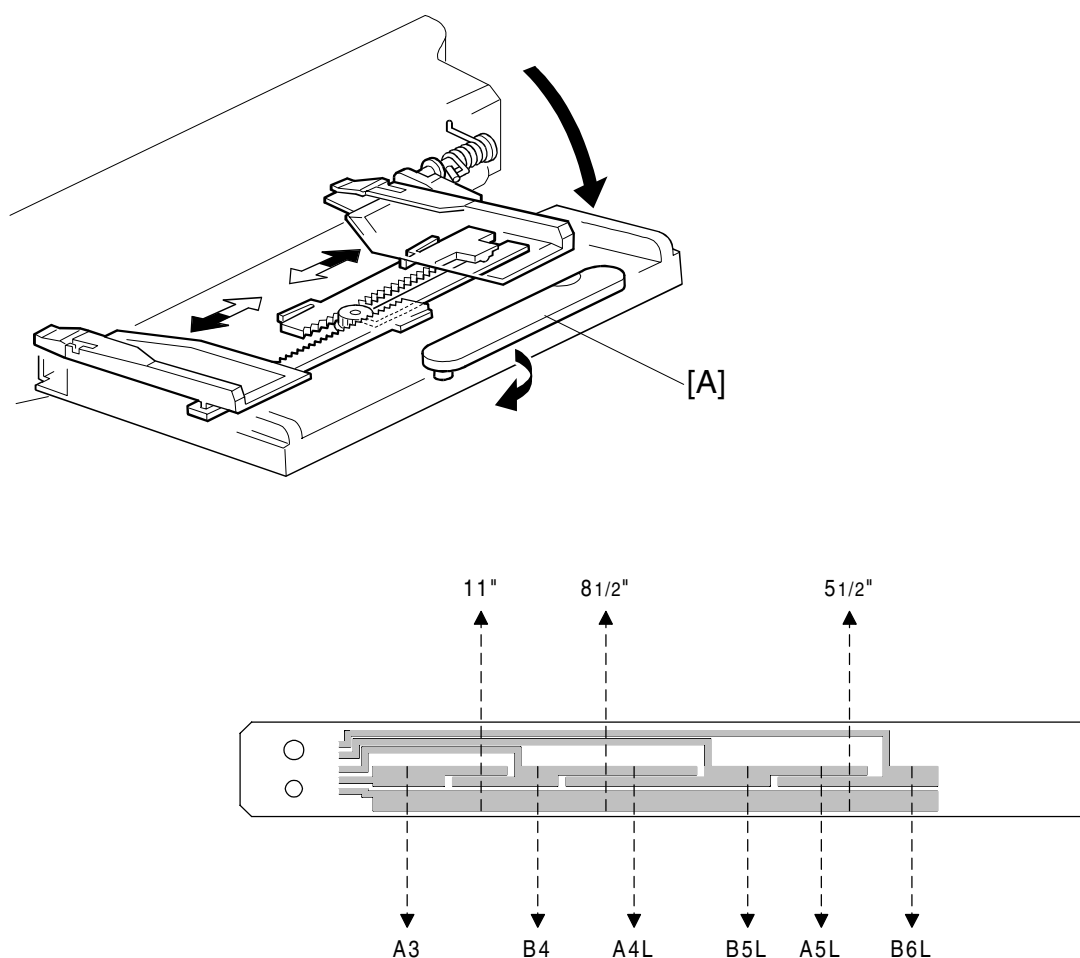
6.10.2 BY-PASS TRAY OPERATION



The by-pass unit is directly driven by the machine through gear [A].

When the print key is pressed, the pick-up solenoid [B] turns on and the pick-up roller [C] moves onto the paper. When the by-pass tray runs out of paper, the paper end feeler [D] drops into the cutout in the by-pass tray and the paper end sensor [E] is activated.

6.10.3 BY-PASS PAPER SIZE DETECTION

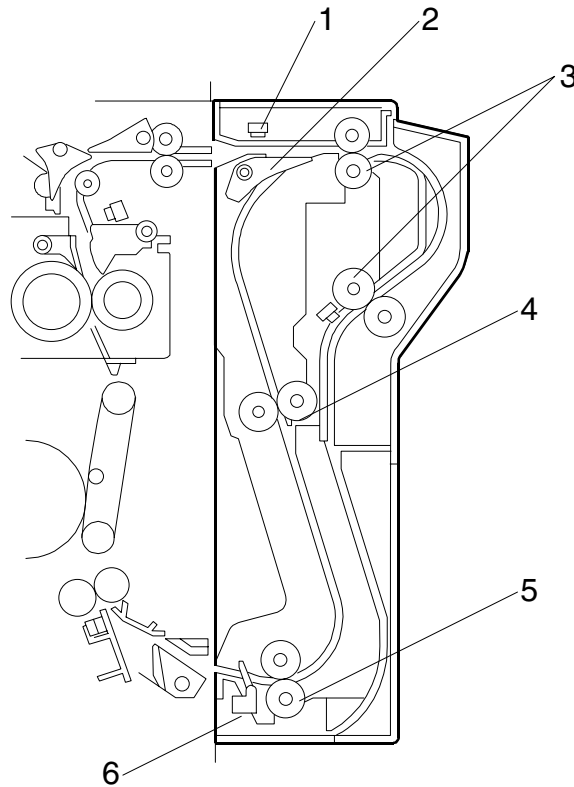


The paper size sensor board [A] monitors the paper width.

The rear side fence is connected to the terminal plate. The pattern for each paper width is unique. Therefore, the machine determines which paper has been placed in the by-pass tray by the signal output from the board. However, the machine does not determine the paper length from the by-pass tray hardware.

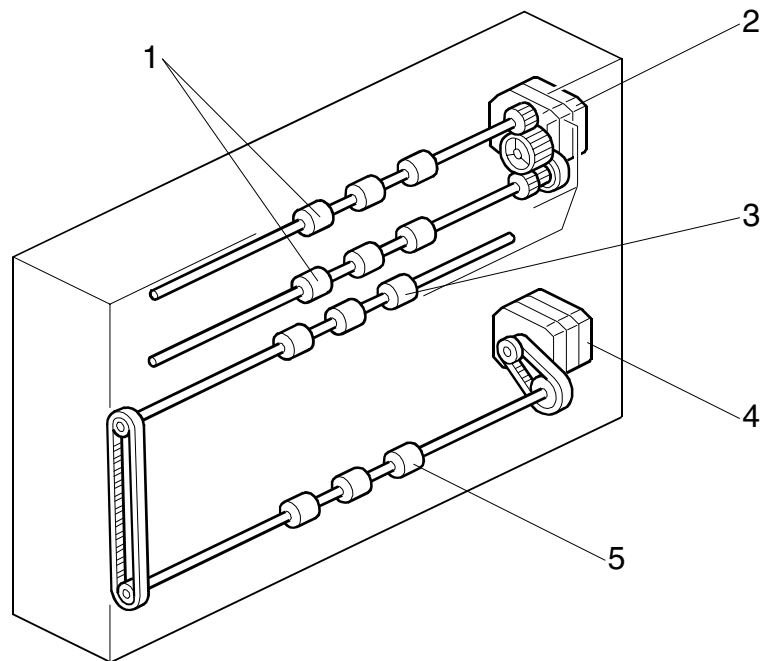
6.11 DUPLEX UNIT

6.11.1 OVERVIEW



1. Entrance sensor
2. Inverter gate
3. Inverter roller
4. Upper transport roller
5. Lower transport roller
6. Exit sensor

6.11.2 DUPLEX DRIVE LAYOUT



1. Inverter roller
2. Inverter motor
3. Upper transport roller
4. Transport motor
5. Lower transport roller

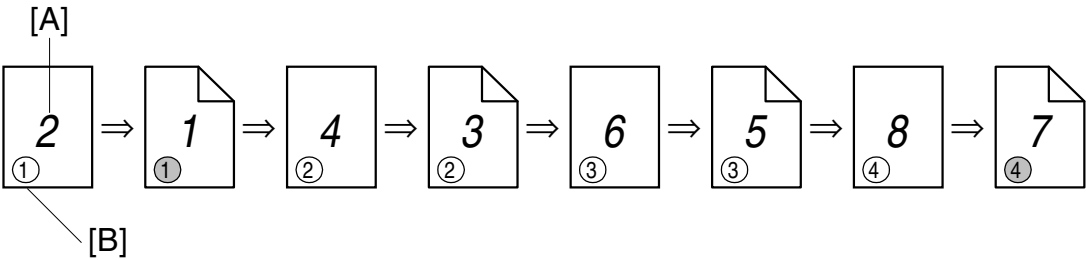
6.11.3 DUPLEX BASIC OPERATION

To increase the productivity of the duplex unit, copies are printed as follows.

Larger than A4 Lengthwise/LT Lengthwise (SEF)

The duplex unit can store only one sheet of paper.

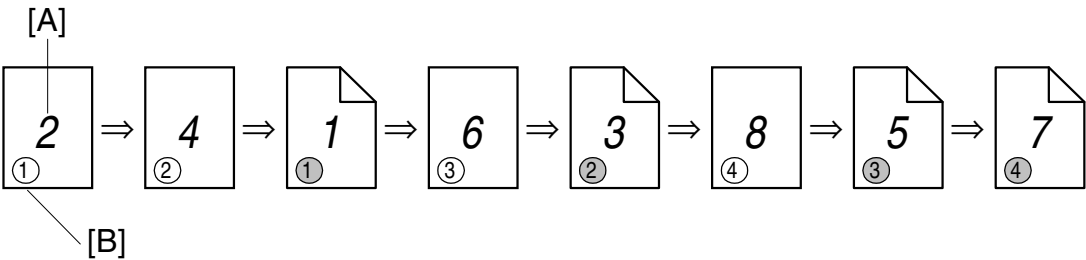
Example: 8 pages. The number [A] in the illustration shows the order of pages. The number [B] in the illustration shows the order of sheets of paper (if shaded, this indicates the second side).



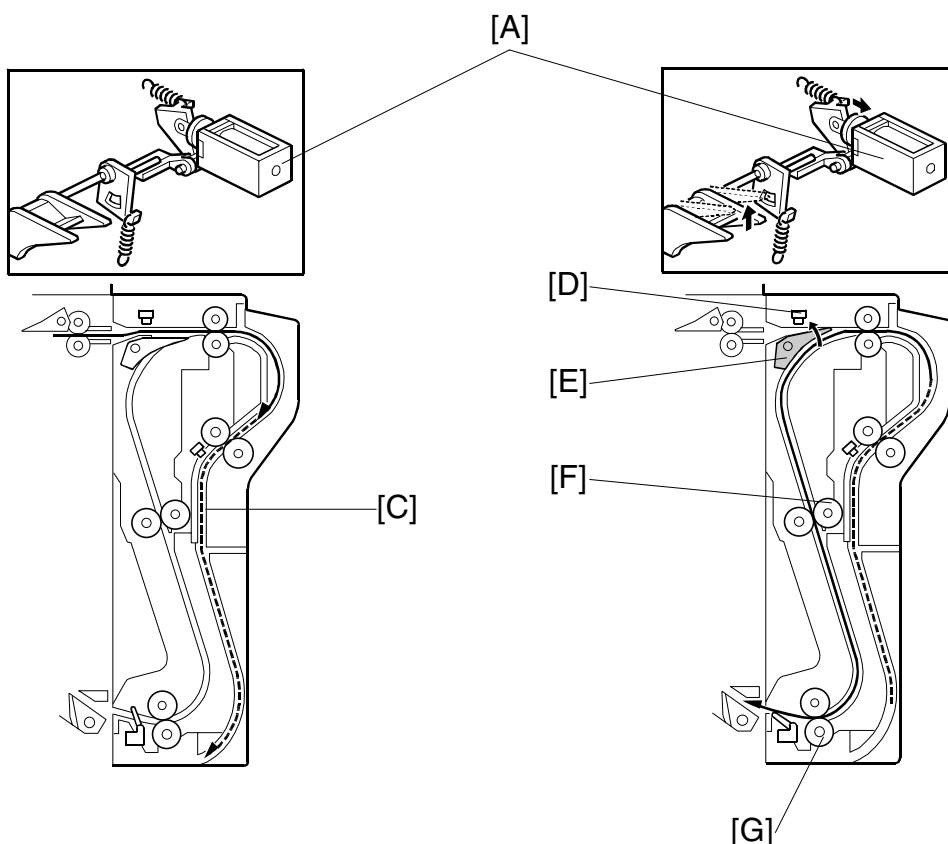
Up to A4 Lengthwise/LT Lengthwise (SEF)

The duplex unit can store two sheets of paper

Example: 8 pages. The number [A] in the illustration shows the order of pages. The number [B] in the illustration shows the order of sheets of paper (if shaded, this indicates the second side).



6.11.4 DUPLEX UNIT FEED IN AND EXIT MECHANISM



Feed-in

The inverter gate solenoid [A] stays off and the inverter rollers [B] rotate clockwise. A sheet of paper is sent to the inverter section [C].

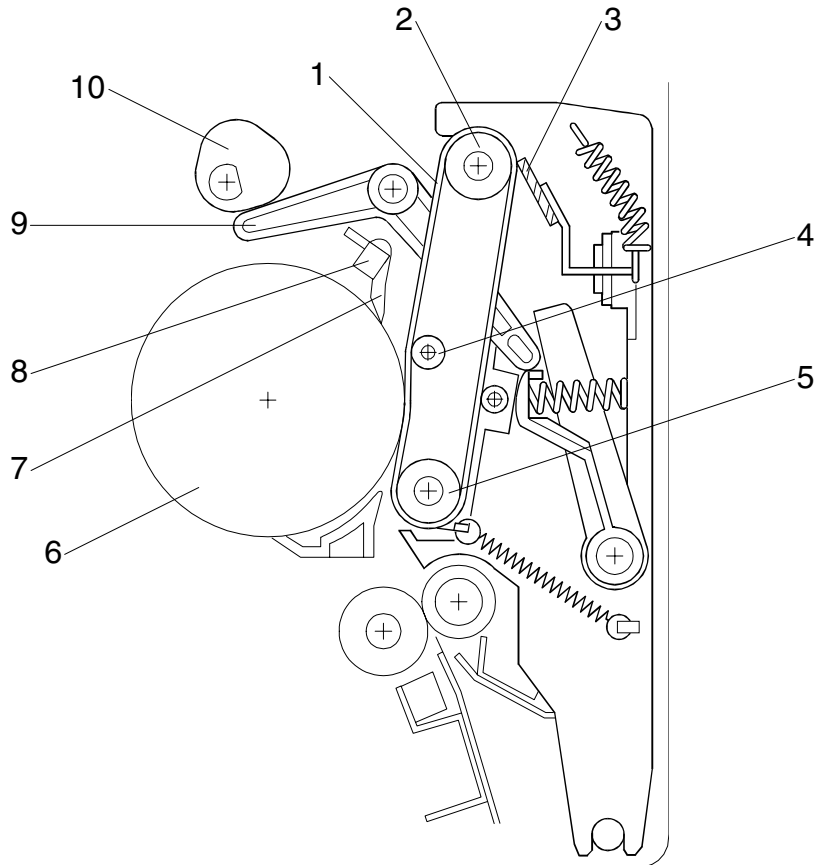
NOTE: The cover guide has been eliminated in order to accommodate paper sizes longer than A4/LT in the reverse feed path which has been lengthened in the design of this machine.

Inversion and Exit

The inverter gate solenoid turns on and the inverter motor turns on in reverse shortly after the trailing edge of the paper passes through the entrance sensor [D]. As a result, the inverter gate [E] is opened and the inverter roller rotates counterclockwise. The paper is sent to the machine through the upper and lower transport rollers [F, G].

6.12 IMAGE TRANSFER AND PAPER SEPARATION

6.12.1 OVERVIEW



- | | |
|---------------------------------|--|
| 1. Transfer belt | 6. OPC |
| 2. Drive roller | 7. Pick-off pawls |
| 3. Transfer belt cleaning blade | 8. ID sensor |
| 4. Transfer roller | 9. Contact lever |
| 5. Idle roller | 10. Transfer belt contact clutch and cam |

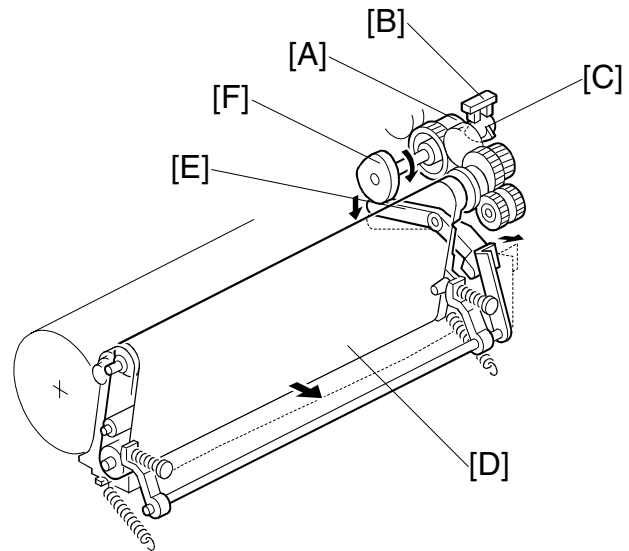
6.12.2 BELT DRIVE MECHANISM

After the main motor switches on during printing, the transfer belt contact clutch [A] switches on after a specified interval and the cam [F] makes a half-turn to raise the contact lever [E] and bring the transfer belt [D] into contact with the drum.

The actuator [C], on the same axis as the cam, and the transfer belt position sensor [B] detect whether the drum and transfer belt are in contact.

When the main motor is off, or when the ID sensor pattern is being measured, the transfer belt unit separates from the drum.

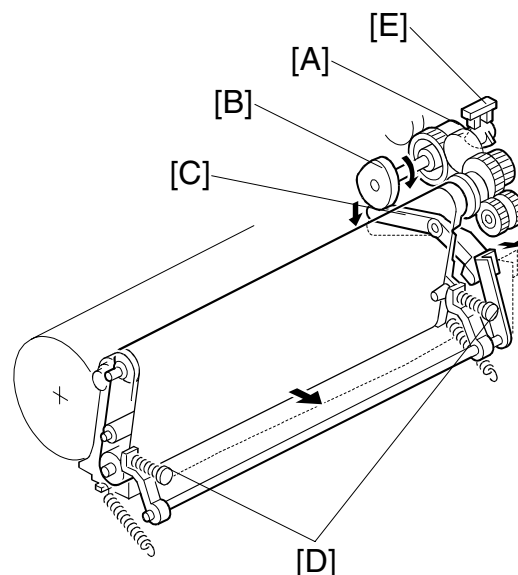
The ID sensor pattern must not be transferred to the belt. Also, the transfer belt and drum must not remain in contact for too long, to prevent contamination of the drum with oil or other foreign material from the transfer belt.



6.12.3 TRANSFER BELT UNIT CONTACT MECHANISM

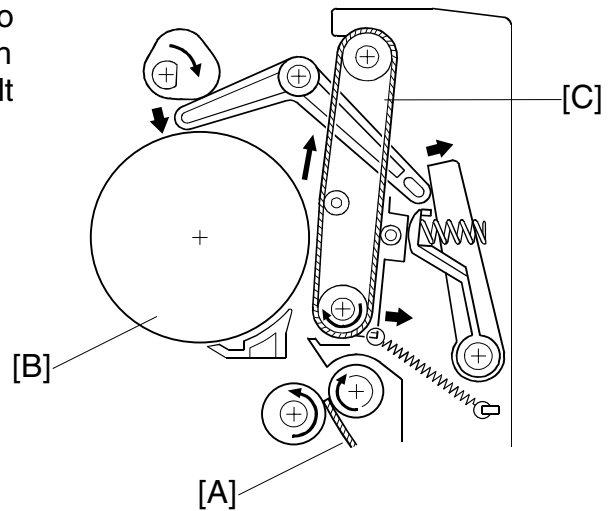
The belt contact and release mechanism consists of the belt contact clutch [A], cam [B], and contact lever [C]. The belt contact clutch turns on and the cam attached to the clutch rotates half a complete rotation. The contact lever, riding on the cam, is lifted up and the springs [D] push the belt into contact with the drum.

The transfer belt position sensor [E] detects the home position of the cam (this is when the belt is away from the drum). The belt must be released from the drum between print jobs in order to prevent the ID sensor pattern from being rubbed off and to prevent contamination of the drum from the surface of the belt.

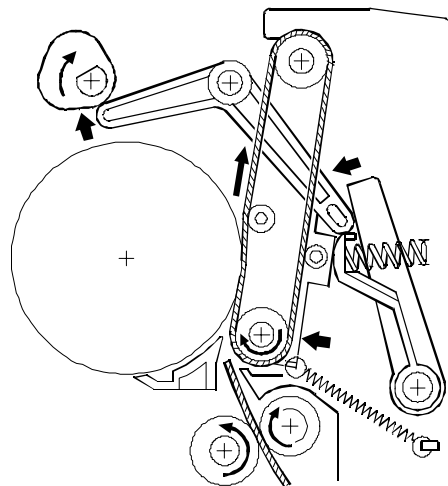


6.12.4 IMAGE TRANSFER AND PAPER SEPARATION MECHANISM

When the registration clutch switches on to align the leading edge of the paper [A] with the image on the drum [B], the transfer belt [C] is away from the drum.

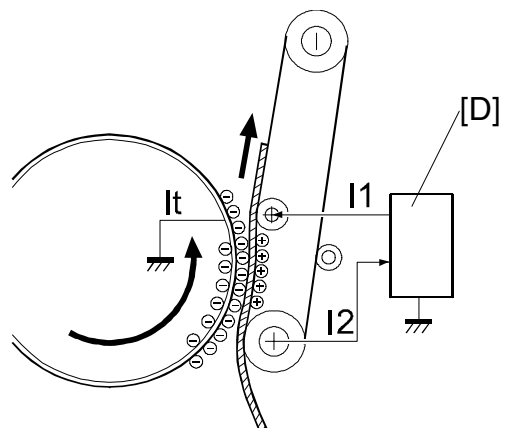


At the designated time after the main motor switches on, the transfer belt contact clutch switches on and the transfer belt touches the drum.



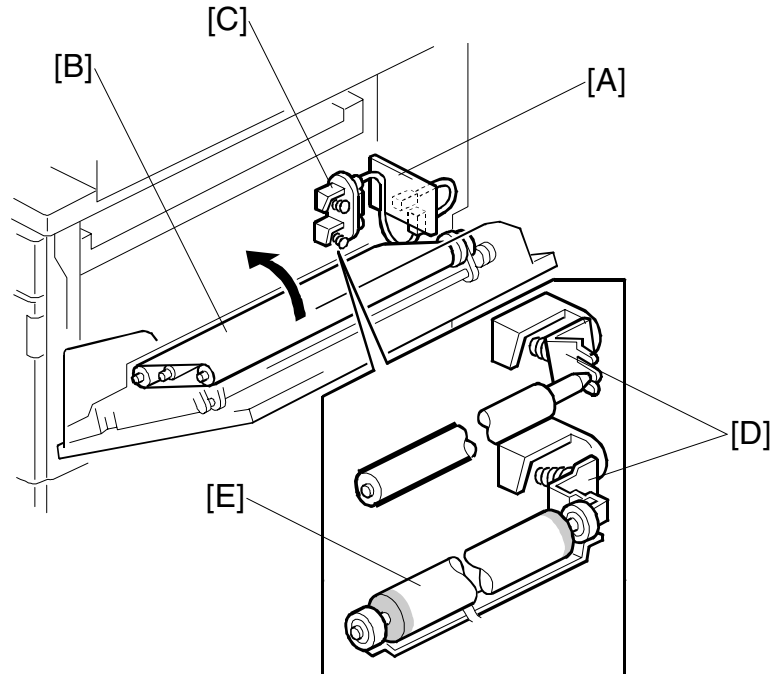
When the paper enters the gap between the belt and the drum, the high voltage supply board [D] applies a high positive current to the belt to transfer the image to the paper.

After receiving the image from the drum, the paper is fed by the belt. The paper moves to the end of the transfer belt unit, where it separates from the belt as the belt curves away and the paper moves on to the fusing unit.



6.12.5 TRANSFER BELT CHARGE

Mechanism



The high voltage supply board [A] applies a positive current to the transfer belt [B] through the terminal block [C], terminal plate [D], and the bias roller [E].

The high voltage supply board adjusts the current to the roller to keep a small but constant current flow to ground through the belt, paper, and drum. If this current is not kept constant, efficiency of toner transfer and paper separation will vary with paper thickness, type, environmental condition, or changes in transfer belt surface resistance.

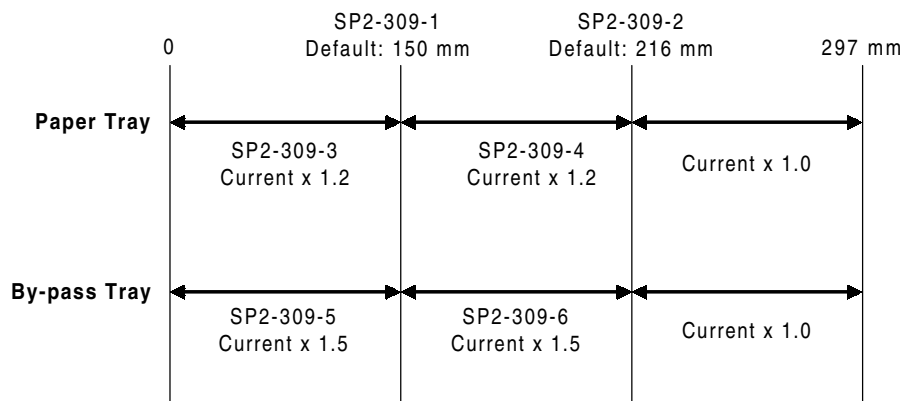
Correction for Paper Width and Thickness

A range of SP modes is available in order to adjust the machine so it can handle papers of non-standard size and thickness.

For paper width, there are two thresholds. The factory settings are 150 mm (5.9") and 216 mm (8.5"). Below 216 mm, the transfer current can be increased. By default, the current is multiplied by 1.2 for the main machine paper trays. For paper widths below 150 mm, the transfer current can be set higher, but by default it is kept the same as the current for paper widths below 216 mm. The higher current allows for the tendency of the current to flow directly from the transfer belt to the drum and not through the paper which could cause an insufficient amount of toner to transfer to narrow width paper.

Thick paper must be fed from the by-pass tray because SP modes are available only for the by-pass tray in order to accommodate thick paper. By default, the current for paper narrower than 216 mm is 1.5 times the normal current.

This illustration shows the SP modes, which control these currents. The base transfer current ('current' in the diagram) depends on SP2301. This is different for various parts of the image, and is different for the by-pass tray; see the next page for details.



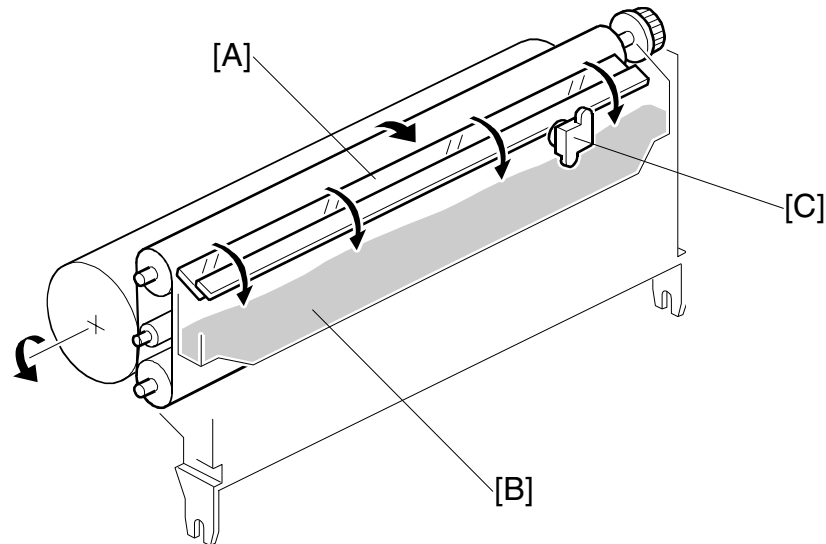
Transfer Currents to Leading Edge and Image Areas

Transfer current can also be adjusted for the leading edge and the image area, and for by-pass feed. The timing for starting to apply leading edge current, for the switchover from leading edge current to image area current, and for switching off at the trailing edge can also be changed.

The table below lists the SP modes you can use to adjust these settings.

SP2301 Transfer Current Adjustment		
Image areas	SP2301-01	1st Side of Paper
	SP2301-02	2nd Side of Paper
	SP2301-04	By-pass Feed
Leading edge areas	SP2301-03	Leading Edge
	SP2301-05	Leading Edge By-pass Feed
SP2911 Transfer Current Timing		
Timing	SP2911-01	On Timing at Leading Edge
	SP2911-02	Switch Timing from Leading Edge to Image Area
	SP2911-03	Off Timing at Trailing Edge

6.12.6 TRANSFER BELT CLEANING MECHANISM

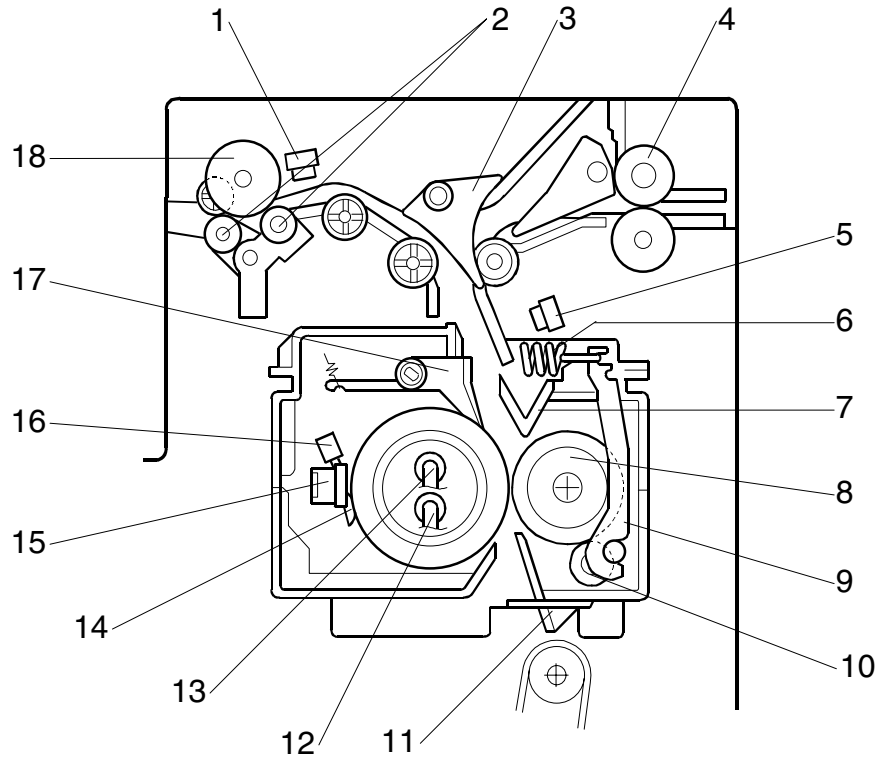


The cleaning blade [A], always in contact with the transfer belt, scrapes off toner and paper dust remaining on the transfer belt.

Scraped off toner and paper dust falls into the toner collection tank [B] in the transfer belt unit. This toner is not recycled. When the toner overflow sensor [C] detects toner overflow, the toner overflow indicator lights. Up to 999 copies can be made before the toner overflow condition shuts down the machine.

6.13 IMAGE FUSING AND PAPER EXIT

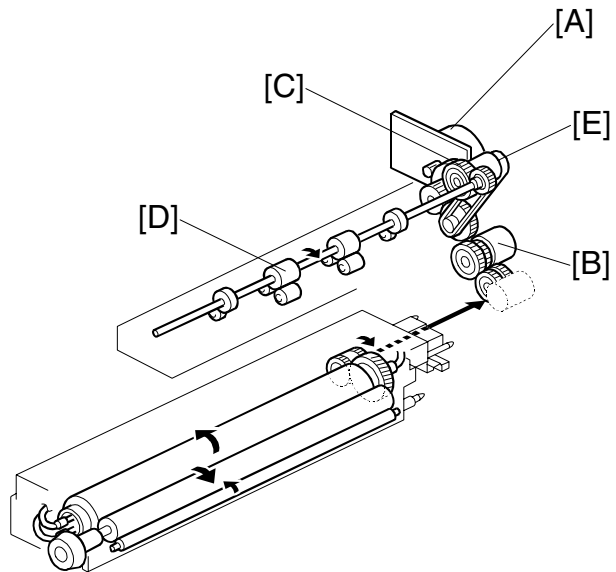
6.13.1 OVERVIEW



- | | |
|------------------------------|-------------------------------|
| 1. Paper exit sensor | 10. Cleaning roller |
| 2. De-curler rollers | 11. Entrance guide |
| 3. Junction gate | 12. Fusing lamp (center) |
| 4. Idle roller (duplex unit) | 13. Fusing lamp (ends) |
| 5. Fusing unit exit sensor | 14. Thermistors (central/end) |
| 6. Spring | 15. Thermostat (central/end) |
| 7. Fusing exit guide plate | 16. Hot roller |
| 8. Pressure roller | 17. Hot roller strippers |
| 9. Pressure arm | 18. Exit roller |

6.13.2 FUSING DRIVE

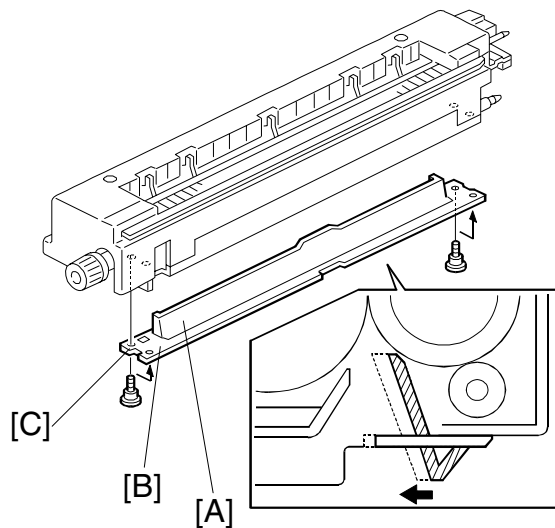
The fusing/paper exit motor [A] drives the fusing unit through the clutch [B] and the gears [C], and also drives the paper exit rollers [D] through a gear and a timing belt [E].



6.13.3 FUSING ENTRANCE GUIDE SHIFT MECHANISM

The entrance guide [A] has two holes on each side to adjust for paper thickness to prevent creasing. Normally, the left screw hole [C] on each side is used.

For *thin* paper, use screw holes [B] to move the entrance guide to the left. This setting allows more direct access to the gap between the hot and pressure rollers, and prevents thin paper from buckling against the hot roller which can cause blurring at the leading edge of the print.

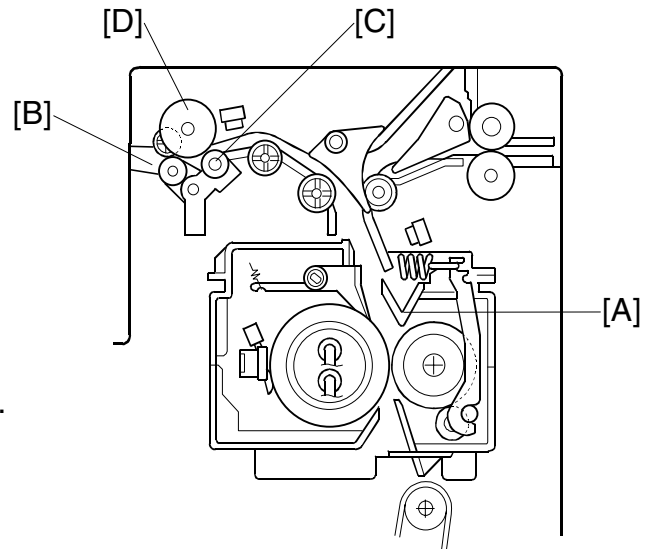


6.13.4 EXIT GUIDE PLATE AND DE-CURLER ROLLERS

The exit guide plate [A] also functions as a pressure roller stripper. The exit guide plate can be moved in order to remove jammed paper.

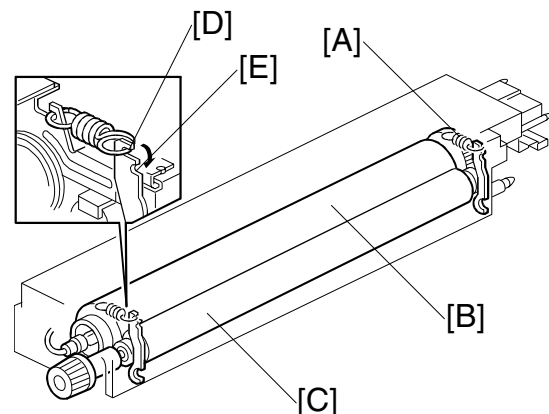
Stacking has been improved by mounting a face-curl correction mechanism at the paper exit roller.

Two de-curler rollers [B] and [C] have been added under the exit roller [D] to correct the curl that paper acquires during transport through the fusing unit.



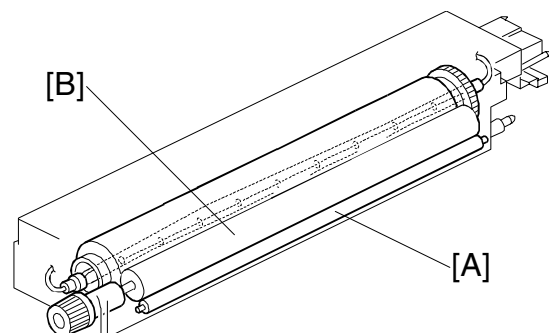
6.13.5 PRESSURE ROLLER

The pressure springs [A] apply constant pressure between the hot roller [B] and the pressure roller [C]. The applied pressure can be changed by adjusting the position of the pressure springs. The left position [D] is the normal setting, and the right position [E] increases the pressure to prevent insufficient fusing by the fusing unit.



6.13.6 CLEANING MECHANISM

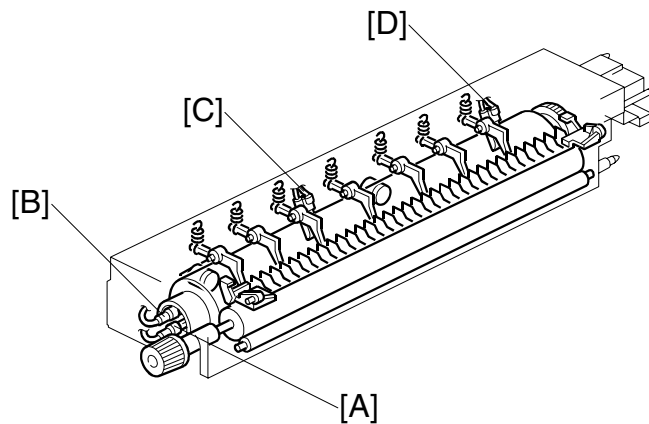
The cleaning roller [A], in constant contact with the pressure roller [B], collects toner and paper dust from the surface of the pressure roller. Because the cleaning roller is metal, it can collect adhering matter better than the pressure roller, which is coated with Teflon.



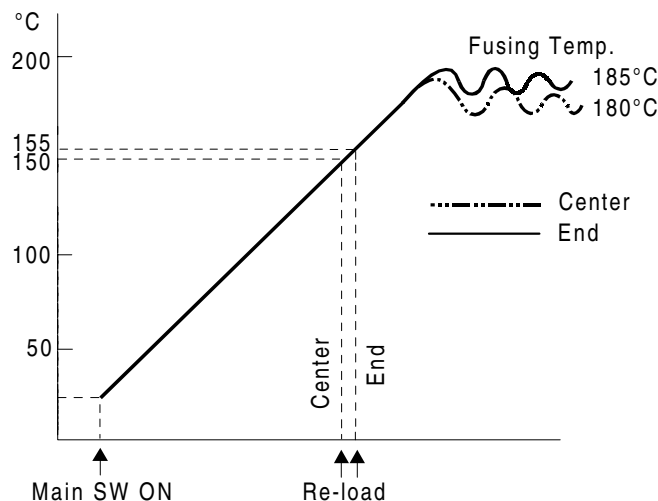
6.13.7 FUSING TEMPERATURE CONTROL

There are two fusing lamps: the first fusing lamp (center: 650 W) [A] heats the center of the hot roller, and the second fusing lamp (ends: 550 W) [B] heats both ends of the hot roller. This arrangement ensures even heat on all surfaces of the roller.

In order to control the temperature of the roller, two high response thermistors are attached to the unit, one near the center [C] and one at the end [D] of the hot roller.



Temperature Control



There are two types of temperature control: On/off control (Default), and Phase control.

Either mode can be selected with SP1104 (Fusing Temperature Control).

After the machine is powered on, the CPU checks the ac frequency for 500 ms, in case phase control is selected later for the temperature control, and then switches on the fusing lamp.

As soon as both the center and end thermistors detect the print ready temperature (also known as the “re-load” temperature), the machine can operate. The “reload” temperature is 30°C below the fusing temperature (this depends on SP1105-05, 06). As soon as the thermistors detect the fusing temperature, the CPU switches the lamps off but frequently switches on/off again in order to maintain the fusing temperature.

Fusing Idling Temperature

If copies are not sufficiently fused soon after the main power switch is turned on, fusing idling should be enabled with SP1103-01.

When fusing idling is enabled, it is done when the temperature reaches the re-load temperature. The re-load temperature can be adjusted with SP1105-05, 06.

In the opposite case, even if fusing idling is disabled, it is done if the temperature at power-up $\leq 15^{\circ}\text{C}$

The fusing idling time is as follows.

Temperature at power-on	Fusing Idling Mode		
	0: Disabled	1: Enabled	
15°C or less	30 s	30 s	SP1103-01
Higher than 15°C	Not done	30 s	SP1103-02

6.13.8 OVERHEAT PROTECTION

If the hot roller temperature becomes greater than 250°C, the CPU cuts off the power to the fusing lamp, and SC543 (Fusing Overheat Error) will be displayed.

Even if the thermistor overheat protection fails, there is a thermostat in series with the common ground line of the fusing lamp. If the temperature of the thermostat reaches 210°C, the thermostat opens, removing power from the fusing lamp. At the same time, the machine stops operating. At this time, SC542 (Fusing Temperature Warm-up Error) will be displayed.

6.14 ENERGY SAVER MODE

If the printer remains idle for the selected time interval, the machine automatically enters the energy saver mode and switches off the fusing lamps to reduce power consumption.

The customer can select the idle time interval or switch the energy saver mode off. The Energy Saver selector setting is in the System menu, which can be accessed at the printer operation panel.

User Tool	Settings
Energy Saver On/Off	On (default)
E.Saver Time	1 minute (default), 5 minutes, 15 minutes, 30 minutes, 45 minutes, 60 minutes

- After the machine remains idle for the specified time, the CPU switches off the fusing lamps.
- The machine leaves the energy saver mode and returns to normal operation when any key on the operation panel is pressed, when the printer receives a print job from the computer, or after the printer is switched off and on.
- The time from receiving the print start command to making the first print is longer than when powering up from normal standby mode.

For details, see the Operating Instructions.

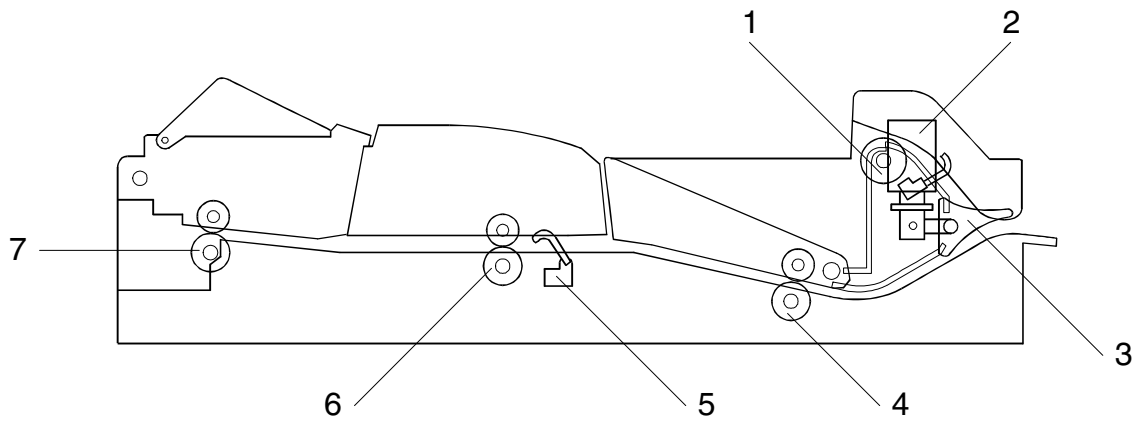
BRIDGE UNIT
B397

1. OVERALL MACHINE INFORMATION

1.1 SPECIFICATIONS

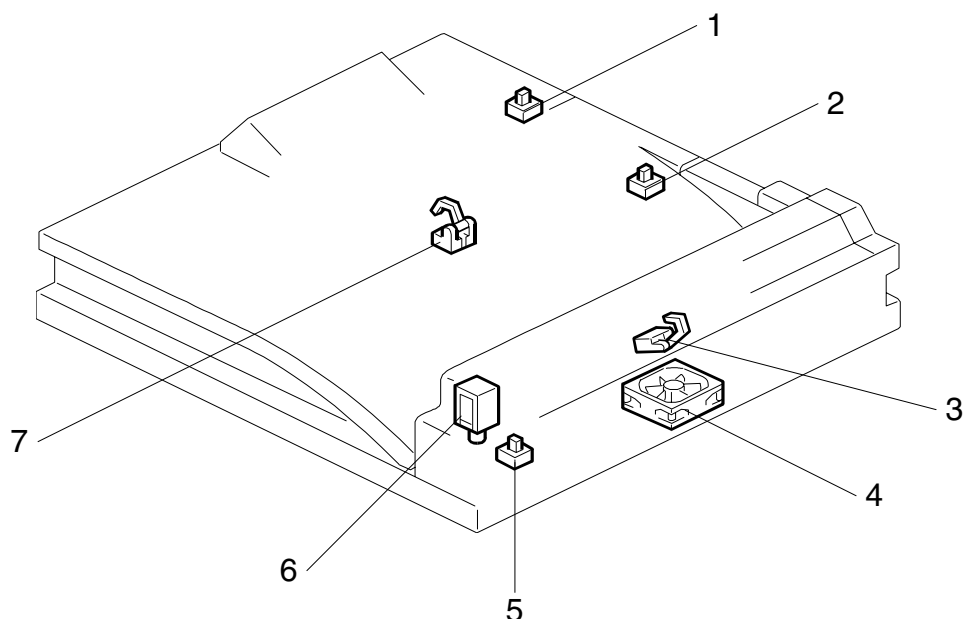
Paper Size:	Standard sizes
	A6 lengthwise to A3
	HLT to DLT
	Non-standard sizes
	Width: 100 to 305 mm
	Length: 148 to 432 mm
Paper Weight:	52 g/m ² ~ 135 g/m ² , 16 lb ~ 42 lb

1.2 MECHANICAL COMPONENT LAYOUT



- | | |
|---------------------------|-------------------------|
| 1. Upper Exit Roller | 5. Relay Sensor |
| 2. Junction Gate Solenoid | 6. 2nd Transport Roller |
| 3. Junction Gate | 7. Left Exit Roller |
| 4. 1st Transport Roller | |

1.3 ELECTRICAL COMPONENT LAYOUT



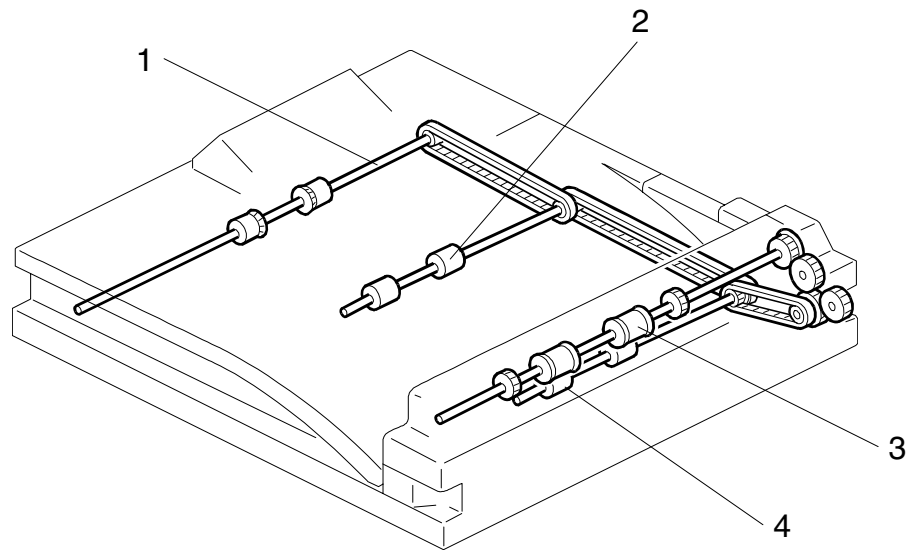
- | | |
|-----------------------|---------------------------|
| 1. Left Guide Switch | 5. Tray Exit Unit Switch |
| 2. Right Guide Switch | 6. Junction Gate Solenoid |
| 3. Tray Exit Sensor | 7. Relay Sensor |
| 4. Cooling Fan Motor | |

1.4 ELECTRICAL COMPONENT DESCRIPTION

Symbol	Name	Function	Index No.
Motors			
M1	Cooling Fan	Cools the transport unit.	4
Sensors			
S1	Tray Exit	Checks for misfeeds.	3
S2	Relay	Checks for misfeeds.	7
Switches			
SW1	Tray Exit Unit	Detects when the tray exit unit is opened.	5
SW2	Right Guide	Detects when the right guide is opened.	2
SW3	Left Guide	Detects when the left guide is opened.	1
Solenoids			
SOL1	Junction Gate	Moves the junction gate to direct the paper to the upper or left tray.	6

DRIVE LAYOUT

1.5 DRIVE LAYOUT



1. Left Exit Roller

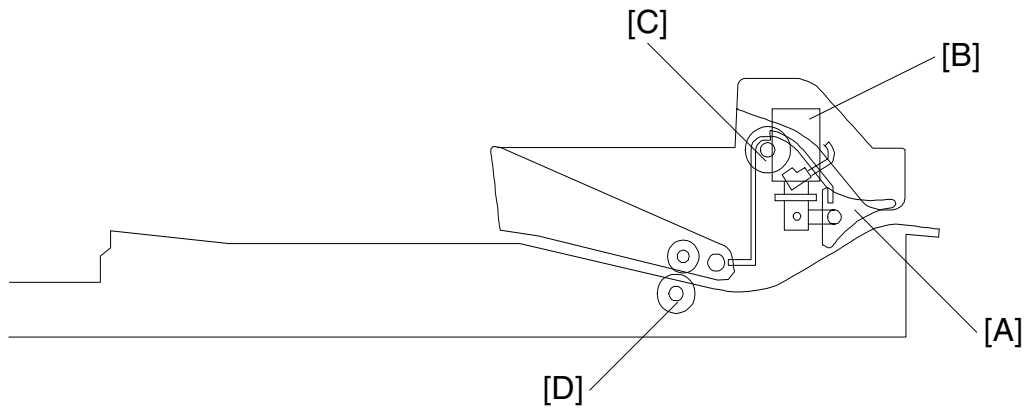
2. 2nd Transport Roller

3. Upper Exit Roller

4. 1st Transport Roller

2. DETAILED DESCRIPTION

2.1 JUNCTION GATE MECHANISM



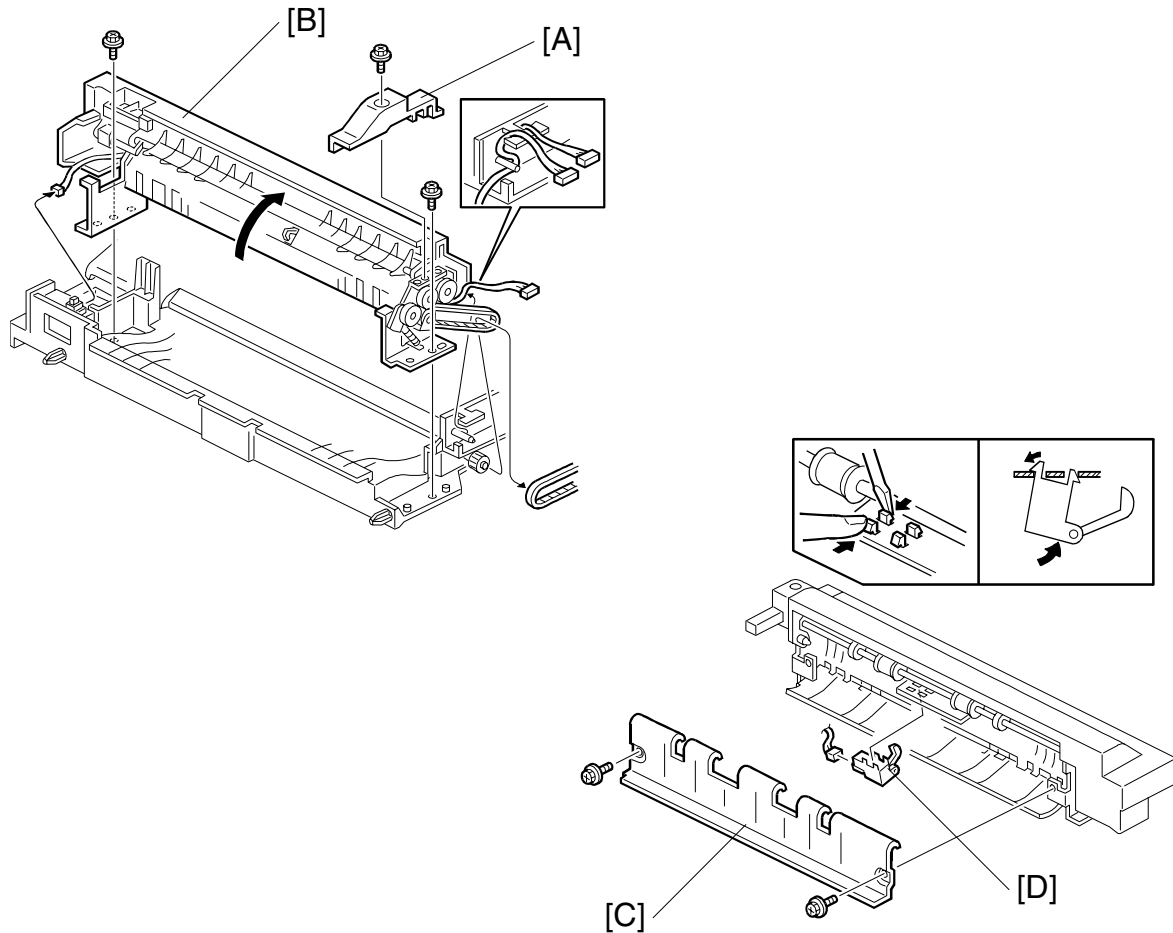
Depending on the selected mode, the copies are directed up or down by the junction gate [A], which is controlled by the junction gate solenoid [B].

When the upper tray is selected, the junction gate solenoid turns on and the paper is sent to the upper tray through the upper exit roller [C].

When the left tray or the finisher is selected, the junction gate stays off and the paper is sent to the left tray or the finisher through the transport rollers [D] and the left exit roller.

3. REPLACEMENT AND ADJUSTMENT

3.1 EXIT SENSOR REPLACEMENT



1. Remove the whole unit from the copier.
2. Remove the rear upper cover [A] (1 screw).
3. Remove the upper cover unit [B] (2 screws, 2 connectors).
4. Remove the exit guide plate [C] (2 screws).
5. Replace the exit sensor [D] (1 connector).

SPECIFICATIONS

SPECIFICATIONS

1. GENERAL SPECIFICATIONS

Configuration:	Desktop
Print Process:	Laser beam scanning and electro-photographic printing Dual component development
Printing Speed:	Max. 45 ppm, A4, 8 1/2" x 11", LEF, simplex/duplex
Parallel Interface:	I/F: 36-pin connector, standard Mode: IEEE 1284 compatible, ECP, Nibble
Network:	Topology: Ethernet 10BASE-T/100BASE-TX Protocol: IPX/SPX, TCP/IP, AppleTalk, IPP, NetBEUI Cable: 10BASE-T/100BASE-TX shielded twisted pair
Resolution:	600 dpi: PCL5e, PCL6, PostScript 3 300 dpi: PCL5e
Printer Language:	PCL5e, PCL5e emulation, PCL6 (5e+XL) emulation, Adobe Postscript Level 3, RPCS
Resident Fonts:	PCL5e, PCL6: 35 Intellifonts, 10 TrueType, 1 Bitmap PostScript: 136 Adobe Type 1 Fonts
Printing Paper Size:	Paper Cassettes: A3/DLT ~ A5 SEF/ HLT SEF By-pass Tray: A3/DLT ~ A6 SEF
Power Source:	220 ~ 240 V, 50/60 Hz, 8 A or more 120 V, 60 Hz, 12 A or more

Power Consumption
(Printer only):

	120 V (North America)	220 ~ 240 V (Europe)
Maximum	1,280 W or less	1,350 W or less
Printing	770 W or less	790 W or less
Energy Saver	8 W or less	9 W or less

Power Consumption
(Full system):

	120 V (North America)	220 ~ 240 V (Europe)
Maximum	1,400 W or less	1,450 W or less
Printing	850 W or less	870 W or less
Energy Saver	8 W or less	9 W or less

Power Consumption
(Full system):

	Printer Only	Full System
Sound Power Level		
Printing	70 dB (A)	74 dB (A)
Standby	42 dB (A)	—

Note: The above measurements were made in accordance with ISO 7779 at the operation position. "Full System" includes the printer with a finisher and large capacity tray (LCT) installed.

Dimensions (W x D x H):	Printer (By-pass tray closed): 670 x 640 x 560 mm (26.4" x 25.2" x 22.0")
Temperature:	Operating: 10°~32°C (50°~89.6°F), 15%~80% rH (no condensation) Storage: 30°C ~ 40°C (22°~104°F), less than 80% rH (no condensation)
Weight:	63 kg (138.9 lb.)
Warm-up Time (Standard):	Less than 20 s at 20°C (68°F)
Paper Output Capacity:	500 sheets (80g/m ² , 20 lb.)
Memory:	64 MB (standard), expandable up to 320 MB

SPECIFICATIONS

2. SUPPORTED PAPER SIZES

Name	Feed	Size (W x L)	Paper Tray Unit		By-pass Tray		LCT	Duplex
			NA	EU	NA	EU	NA/EU	NA/EU
A3	SEF	297 x 420 mm	*	D	*	*	N	Y
B4	SEF	257 x 364 mm	*	*	*	*	N	Y
A4	SEF	210 x 297 mm	D	D	*	*	N	Y
A4	LEF	297 x 210 mm	D	D	*	*	D	Y
B5	SEF	182 x 257 mm	*	*	*	*	N	Y
B5	LEF	257 x 182 mm	*	*	*	*	N	Y
A5	SEF	148 x 210 mm	*	D	*	*	N	Y
A5	LEF	210 x 148 mm	N	N	*	*	N	N
B6	SEF	128 x 182 mm	N	N	S	S	N	N
B6	LEF	182 x 128 mm	N	N	N	N	N	N
A6	SEF	105 x 148 mm	N	N	*	*	N	N
A6	LEF	148 x 105 mm	N	N	N	N	N	N
DLT	SEF	11 x 17 in.	D	*	*	*	N	Y
Legal	SEF	8 1/2 x 14 in.	D	*	*	*	N	Y
Letter	SEF	8 1/2 x 11 in.	D	D	*	*	N	Y
Letter	LEF	11 x 8 1/2 in.	D	D	*	*	D	Y
Half Letter	SEF	5 1/2 x 8 1/2 in.	*	*	*	*	N	Y
Half Letter	LEF	8 1/2 x 5 1/2 in.	N	N	N	N	N	N
Executive	SEF	7 1/2 x 10 1/2 in.	*	*	*	*	N	Y
Executive	LEF	10 1/2 x 7 1/2 in.	N	N	*	*	N	N
F/GL	SEF	8 x 13 in.	*	*	*	*	N	Y
Foolscap	SEF	8 1/2 x 13 in.	D	*	*	*	N	Y
Folio	SEF	8 1/2 x 13 in.	*	*	*	*	N	Y
Com10	SEF	4 1/2 x 9 1/2 in.	N	N	Y	Y	N	N
Monarch	SEF	3.875 x 7.5 in.	N	N	N	N	N	N
C6	SEF	114 x 162 mm	N	N	Y	Y	N	N
C5	SEF	162 x 229 mm	N	N	Y	Y	N	N
DL Env.	SEF	110 x 220 mm	N	N	Y	Y	N	N
Custom	SEF	100 ~ 297 mm	N	N	S	S	N	N
Custom	LEF	148 ~ 432 mm	N	N	S	S	N	N

Notes: **D:** Paper size specified with dial.
*****: Paper size specified from operation panel after dial is set to *.
S: Paper size entered on operation panel.
Y: Supported.
N: Not supported.

3. SOFTWARE ACCESSORIES

Printer drivers and utility software are provided on one CD-ROM. An automatic run installer allows you to select which components to install.

3.1 PRINTER DRIVERS

Printer Language	Windows 95/98/Me	Windows NT4.0	Windows 2000	Macintosh
PCL6	Yes	Yes	Yes	No
PCL5e	Yes	Yes	Yes	No
PostScript 3	Yes	Yes	Yes	Yes
RPCS	Yes	Yes	Yes	No

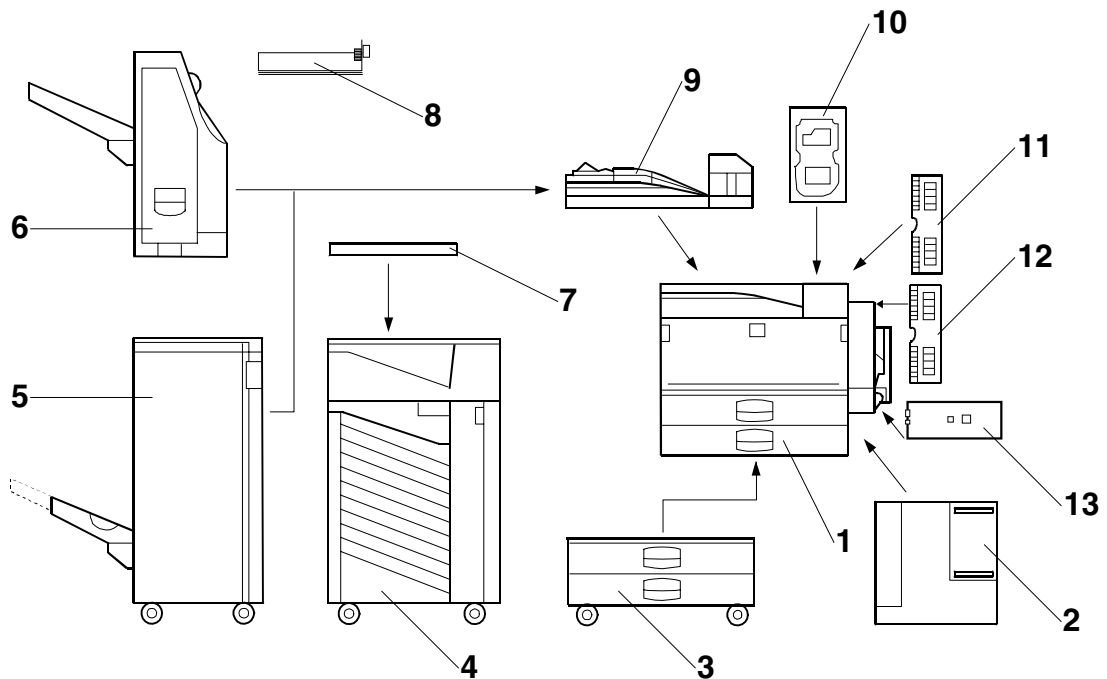
- NOTE:** 1) Windows NT 4.0 printer drivers are for the Intel x 86 platform. There is no Windows NT 4.0 printer driver for the PowerPC, Alpha, or MIPS platforms.
- 2) PS3 drivers are all genuine Adobe PostScript drivers, excluding Windows 2000 which uses Microsoft PS. A PPD file for each operating system is provided with the driver.
- 3) The PostScript 3 driver for the Macintosh supports Mac OS 7.6 or later.
- 4) The supported Unix versions change from time to time, so please consult service support staff for the latest information.

3.2 UTILITY SOFTWARE

Software	Description
Agfa Font Manager (Windows 95/98/Me/, NT40.0, 2000)	Font management utility with screens fonts for printer.
Smart NetMonitor for Client (Windows 95/98/Me, NT4.0, 2000)	Printer management utility for client users. Also includes peer-to-peer printing utility and parallel/recovery printing.
Desktop Binder V2 Lite (Windows 95/98/Me, NT4.0, 2000)	Utility for document management.
Printer Utility for Macintosh	Provides several convenient functions for printing from Macintosh clients.

4. MACHINE CONFIGURATION

4.1 SYSTEM COMPONENTS



No.	Item	Machine Code
1	Printer	G065
2	LCT (option)	A683
3	Paper Tray Unit (option)	G520
4	Nine-bin Mailbox (option)	G909
5	3000-sheet Finisher (option)	A697
6	1000-sheet Finisher (option)	A681
7	Mailbox Bridge Unit (option)	G912
8	Punch Unit (option for 3000-sheet Finisher)	A812-17 (3-hole) A812-27 (2-hole)
9	Bridge Unit (option)	B397
10	HDD (option)	G334
11	DIMM 64/128/256 MB (option)	G330/G331/G332
12	Barcode Font DIMM (option)	G627
13	IEEE 1394 Interface (option)	G336

NOTE: The Bridge Unit is required for the finisher (1000 or 3000-sheet), and for the mailbox.

4.2 INSTALLABLE OPTION TABLE

Option		Note
Paper Tray Unit	●	
Large Capacity Tray (LCT)	▲	Requires Paper Tray Unit.
By-pass Feed Unit	○	
Duplex Unit	○	
Bridge Unit	●	
1000-Sheet Finisher	▲	Requires Paper Tray Unit, Bridge Unit (also Mailbox Bridge Unit if Mailbox is present)
3000-Sheet Finisher	▲	Requires Paper Tray Unit, Bridge Unit (also Mailbox Bridge Unit if Mailbox is present)
Punch Unit	▲	Requires 3000-sheet Finisher
Mailbox	▲	Requires Bridge Unit, Paper Tray Unit (also Mailbox Bridge Unit if a Finisher is present)
Mailbox Bridge Unit	▲	Requires Mailbox.

○: Standard

●: Available

▲: Requires another option

SPECIFICATIONS

5. OPTIONS

5.1 BRIDGE UNIT

Paper Size: Standard:
A6 Lengthwise (SEF) to A3, HLT to DLT
Non-Standard:
Width: 100 to 305 mm
Length: 148 to 432 mm
Paper Weight: 52 g/m² ~ 135 g/m², 16 lb. ~ 42 lb.

5.2 1000-SHEET FINISHER

Paper Size: Staple Mode Off: A3 to A6 (L)
DLT to HLT (L)
Staple Mode On: A3, B4, A4, B5
DLT to LT
Paper Weight: Staple Mode Off: 52 ~ 157 g/m² (14 ~ 42 lb.)
Staple Mode On: 64 ~ 80 g/m² (17 ~ 20 lb.)
Stapler Capacity: 20 sheets (A3, B4, DLT, LG)
30 sheets (A4, B5, LT)
Paper Capacity: Staple Mode Off:
1,000 sheets (A4/LT or smaller: 80 g/m², 20 lb.)
500 sheets (A3, B4, DLT, LG: 80 g/m², 20 lb.)
Staple Mode On:
(80 g/m², 20 lb., number of sets)

Set Size Size	2 to 10		11 to 20	21 to 30
	2 to 5	6 to 10		
A4/LT (S) B5 (S)	100	85	40	25
A4/LT (L)	50		25	15
A3, B4, DLT, LG	50		25	—

Staple Positions 1
Staple Replenishment: Cartridge (3,000 staples/cartridge)
Power Source: 24 Vdc, 5 Vdc (from the copier/printer)
Power Consumption: 48 W
Weight: 21 kg (46.3 lbs)
Dimensions(W x D x H): 568 mm x 520 mm x 625 mm (22.4" x 20.5" x 24.6")

5.3 3000-SHEET FINISHER

Paper Size:

Punch Mode Off: Shift Tray: A3 to B5/DLT to LT (B6 lengthwise (SEF), shift mode off, staple mode off)

Punch Mode On: Upper Tray: A3 to A6 lengthwise (SEF)/DLT to HLT

2 holes: A3 to A5/DLT to LT

3 holes: A3, B4, A4, B5, DLT, LT all sideways (LEF)

Paper Weight:

Punch Mode Off: Staple mode Off: 52 g/m² ~ 157 g/m², 14 ~ 42 lb.

Punch Mode On: Staple mode On: 64 g/m² ~ 80 g/m², 17 ~ 21 lb.

Punch Mode On: 2 holes: 52 g/m² ~ 128 g/m², 14 ~ 34 lb.

3 holes: 52 g/m² ~ 105 g/m², 14 ~ 28 lb

Tray Paper Capacity:

Shift tray/no staple mode (80 g/m², 20 lb.):

	Punch mode	No punch mode
A4 sideways (LEF)	2,500 sheets	3,000 sheets
LT sideways (LEF)		
Other sizes	1,500 sheets	1,500 sheets

Shift/staple mode/punch mode (80 g/m², 20 lb.)

	Pages/set	Sets
B5, A4 lengthwise (SEF)	2 to 9	150
LT lengthwise (SEF)	10 to 40	150 to 37
A4 sideways (LEF)	2 to 9	150
LT sideways (LEF)	10 to 40	250 to 63
Other sizes	2 to 9	100
	10 to 25	150 to 60

Shift/staple mode/no punch mode (80 g/m², 20 lb.)

	Pages/set	Sets
B5, A4 lengthwise (SEF)	2 to 9	150
LT lengthwise (SEF)	10 to 50	150 to 30
A4 sideways (LEF)	2 to 9	150
LT sideways (LEF)	10 to 50	300 to 60
Other sizes	2 to 9	100
	10 to 30	150 to 50

Shift/staple mode/no punch mode (80 g/m², 20 lb.)

	Punch mode	No punch mode
A4/LT or smaller	200 sheets	250 sheets
Larger than A4/LT	50 sheets	50 sheets

Stapler Tray Capacity:

Pages/set, 80 g/m², 20 lb.

	Punch mode	No punch mode
A4/LT or smaller	40 sheets	50 sheets
Larger than A4/LT	25 sheets	30 sheets

Staple Position:

1 staple: 3 positions (Front, Rear, Rear-Oblique)

2 staples: 1 position

Staple Replenishment:

Cartridge (5,000 staples)

Power Source:

24 Vdc (from printer)

Power Consumption:

48 W

Weight:

45 kg (99 lb.)

Size (W x D x H):

625 x 545 x 960 mm (24.6" x 21.5" x 37.8")

SPECIFICATIONS

5.4 LARGE CAPACITY TRAY (LCT)

Paper Size:	A4 sideways (LEF)/LT sideways (LEF)
Paper Weight:	60 g/m ² ~ 105 g/m ² , 16 lb. ~ 28 lb.
Tray Capacity:	1,500 sheets (80 g/m ² , 20 lb.)
Remaining Paper Detection:	5 steps (100%, 75%, 50%, 25%, Near end)
Power Source:	24 Vdc, 5 Vdc (from copier)
Power Consumption:	40 W
Weight:	17 kg (37.4)
Size (W x D x H):	390 mm x 500 mm x 390 mm (15.5" x 19.7" x 15.4")

5.5 MAILBOX

Number of Trays:	9 trays + proof tray
Tray Capacity:	Trays and proof tray: 100 sheets (80 g/m ² , 20 lb.)
Paper Size for Trays:	Trays: Max.: A3 or 11" x 17" Min.: A5 (S) or 11" x 8 1/2" Proof tray: Max.: A3 or 11" x 17" Min.: A6 (SEF) or 11" x 8 1/2"
Paper Weight:	Trays: 60 ~ 90 g/m ² (16 ~ 24 lb.) Proof tray: 52 ~ 157 g/m ² (14 ~ 42 lb.)
Power Consumption:	48 W or less (average)
Power Source:	DC24 V, 5 V (from the main unit)
Dimensions (W x D x H):	600 mm x 550 mm x 960 mm (23.6" x 21.7" x 37.8")
Weight:	40 kg (88.2 lb)

5.6 PAPER TRAY UNIT

Paper Size:	A5 lengthwise (SEF) to A3 HLT lengthwise (SEF) to DLT
Paper Weight:	64 g/m ² ~ 105 g/m ² (20 lb. ~ 28 lb.)
Tray Capacity:	500 sheets (80 g/m ² , 20 lb.)
Paper Feed System:	FRR
Paper Height Detection:	4 steps (100%, 70%, 30%, Near end)
Power Source:	24 Vdc, 5 Vdc (from the copier) 120 Vac: 115 V version (from the copier) 220 ~ 240 Vac: 224/240 V version (from the copier)
Power Consumption:	50 W
Weight:	Less than 25 kg (55.1 lb.)
Size (W x D x H):	540 mm x 600 mm x 270 mm (21.3" x 23.6" x 10.6")

TECHNICAL SERVICE BULLETINS

BULLETIN NUMBER: G065 – 001**04/30/2002****APPLICABLE MODEL:****GESTETNER – P7145****RICOH – AFICIO AP4510****SAVIN – MLP45****SUBJECT: G065 LOCKUPS WHILE USING THE NETWORK****SYMPTOM:**

The printer may hang up while using a local area network under the follow conditions:

- The G065 is connected to a repeater HUB (non-switching HUB).
- The network is very busy.

CAUSE:

When the Rx FIFO of the controller board overflows, the controller board sets the overflow flag and stops receiving.

SOLUTION:

To prevent the machine from hanging up, the controller firmware has been modified from version 1.02 to version 1.04.

The controller firmware version 1.04 or higher (**G065_Controller_VERD.EXE**) can be downloaded through the Technology Solution Center FTP Site <http://tsc.ricohcorp.com>.

NOTE: Refer to Facts Line Bulletin # FL002 and Publication Bulletin #023 for more information about the FTP Internet Web Site and EPROM / Flash Card Exchange program.

UNITS AFFECTED:

G065 serial numbers cut-in are not available at time of publication.

Note: This copy is intended as a master original for reproduction of additional bulletins.

**FIRMWARE**

BULLETIN NUMBER: G065 - 002**02/03/2003****APPLICABLE MODEL:****GESTETNER - P7145****RICOH - AFICIO AP4510****SAVIN - MLP45****SUBJECT: NOTICE FOR TONER BOTTLE INSTALLATION****GENERAL:**

We would like to inform you of this symptom as a potential concern related to the toner bottle installation.

SYMPTOM:

When a new toner bottle is shaken with the cap in the unscrewed position, the inner cap pops off. This may occur under the following conditions:

1. The toner bottle has been stored for a long period of time in a low temperature environment (such as in an unheated warehouse during the winter).
2. The temperature around the toner bottle suddenly increases by more than 25 degrees Celsius.
3. The toner bottle has been installed between 1 to 9 hours after one or both of the above conditions have occurred.

CAUSE:

The source of the symptom is as follows:

1. The toner bottle has been stored at a very low temperature. Therefore, the air in the bottle cools and the bottle's internal air pressure decreases.
2. Outside air slowly leaks into the bottle until the bottle's internal pressure is equal to the atmospheric pressure.
3. The bottle has been moved to a warmer environment (with a temperature variation of over 25°C.). Therefore, the air in the bottle warms and the internal pressure increases.
4. When the bottle cap has been removed, internal air pressure pops off the inner cap.

NOTE: *This problem does not occur for toner bottles that have been stored at normal room temperatures.*

Note: This copy is intended as a master original for reproduction of additional bulletins.

■ GENERAL
INFORMATION

Continued...

SOLUTION:

The toner bottle has been modified to change the opening process.

ACTION:

1. When moving toner bottles from a very low temperature environment to a much higher temperature environment, store the bottles for more than 1 day before usage. This will allow the bottle's internal pressure to equalize with the atmospheric pressure.
2. If it is not possible to take the above action, please perform the following steps before installing the toner bottle.
3. Hold the toner bottle upright. (Do not shake it.)
4. Loosen the bottle cap (do not remove the cap completely at this time) and hold down the cap for more than 20 seconds (to prevent the cap from coming off).
5. Remove the cap and the inner cap slowly. (To reduce the air pressure in the toner bottle)
6. Reinsert the inner cap into the bottle and then install the bottle in the machine.

BULLETIN NUMBER: G065 – 003**02/03/2003****APPLICABLE MODEL:****GESTETNER – P7145****RICOH – AFICIO AP4510****SAVIN – MLP45****SUBJECT: NOISE GENERATED FROM BY-PASS FEED SECTION****SYMPTOM:**

Noise from by-pass Feed Section

CAUSES:

- Noise generated by vibration of the Electrical Clutch Feed Shaft and Drive Gear:
- Noise from the Bushing of the Driven Roller Shaft:

SOLUTION:

The following changes have been made to reduce noise.

1. To support the free end of the shaft a bushing has been added:

- The Length of the Feed Shaft has been changed from 229mm to 249mm.
- A Bushing and e-ring has been added.
- The shape of the Tightening Bracket has been modified to accommodate the new bushing (hole added).

2. To hold the clutch firmly in place:

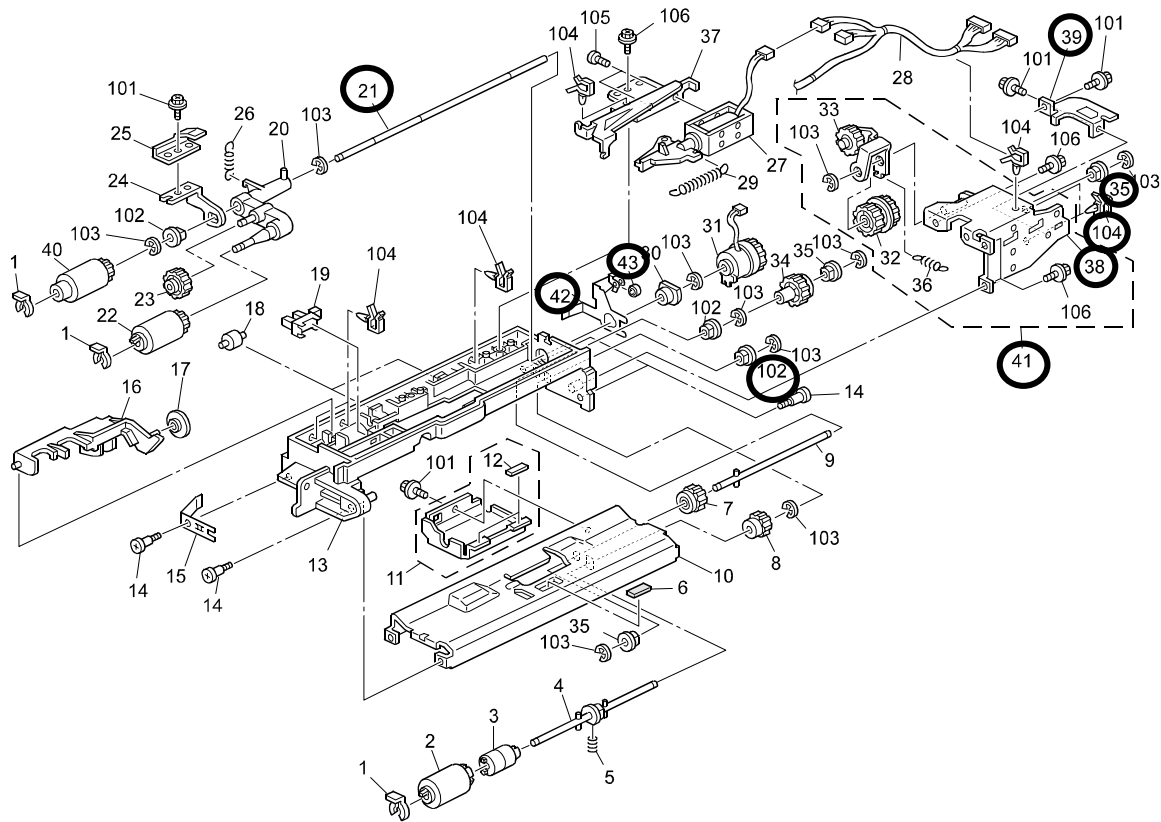
- A roller has been added to apply pressure against the clutch.
- A Pressure Plate was also added.

3. The material of the bushing has been changed.

Note: This copy is intended as a master original
for reproduction of additional bulletins.

**MECHANICAL****PARTS**

Continued...



						REFERENCE	
OLD PART NO.	NEW PART NO.	DESCRIPTION	QTY	INT	PAGE	ITEM	
AA140660	AA140753	Feed Shaft	1-1	3/S	11	21	
A2326061	G0656801	Tightener Bracket	1-1	3/S	11	38	
A2326057	G0656800	Bracket-by-pass Feed Drive	1-1	1	11	41	
A2326065	G0656802	Rail By-pass Feed	1-1	3/S	11	39	
-	GA080002	Bushing – 6mm	0-1	3/S	11	35	
-	07200040E	Retaining Ring – M4	0-1	-	11	104	
-	B0046062	Pressure Plate	0-1	-	11	42	
-	AF040575	Driven Roller	0-1	-	11	43	
08053480	GA080002	Bushing – 6mm	1-1	3/S	11	102	

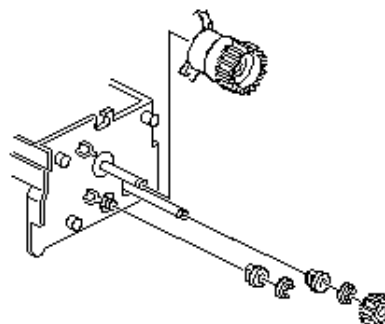
NOTE: Whenever replacing the old Feed Shaft with the new one, the following parts from the above list must all be replaced together as a set:

AA140753 – Feed Shaft
G0656801 – Tightener
G0656802 – Rail By-Pass Feed
GA080002 – Bushing 6MM
07200040E – Retaining Ring M4

Continued...

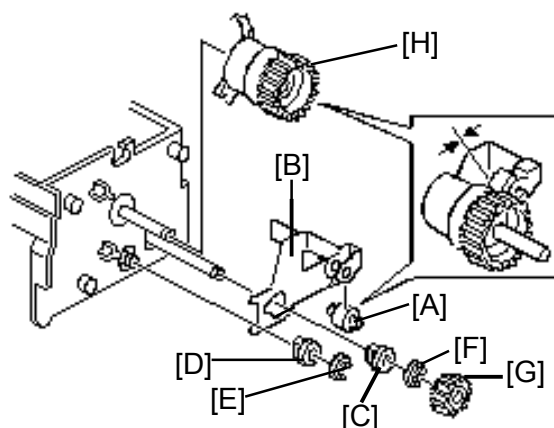
PREPARATION:

Remove the Tightened Bracket, Retaining Ring, Bushing and Electrical Clutch as shown below.



REPLACEMENT PROCEDURE

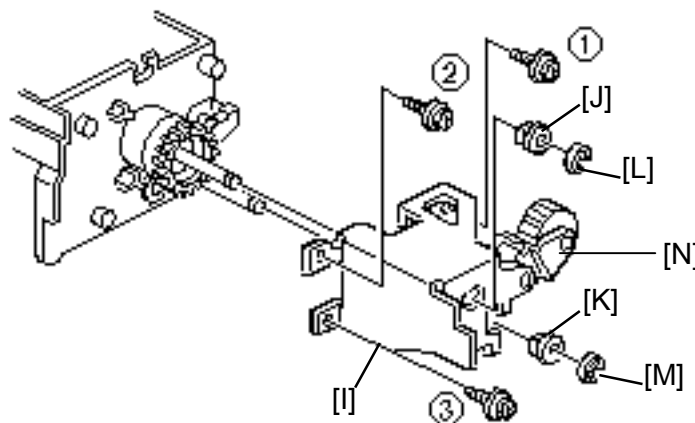
1. Replace the Feed Shaft with AA140753.



2. Attach the Driven Roller [A] to the Pressure Plate [B], and then peel off the outer layers of the double-sided tape (2 places) on the Pressure Plate.
3. Set the Bushing [C] in the hole in the Pressure Plate, and then mount the two together onto the Feed Shaft.

NOTE: Be careful not to let the exposed double-sided tape contact the Side Plate.

4. Set Bushing [D] in the cutout on the side of the Pressure Plate, then push in the Pressure Plate along with the two bushings. After it is set in position, attach e-rings [E] and [F].
5. Press the Pressure Plate firmly against the Side Plate so that the double-sided tape catches and secures the two together.
6. Attach the Gear [G].
7. Attach the Electrical Clutch [H].



Continued...

8. Remove the Arm Tightener [N], Gear and Spring (not shown) attached to the original Tightener Bracket removed in the Prep stage, and attach them to the new Tightener Bracket [I].
9. Attach the new Tightener Bracket [I] and Bushing [J] and new bushing [K]. Then, the tighten screws in the order shown. (1,2 then 3)
10. Attach e-rings [L] and [M].

UNITS AFFECTED:

All G065 printers manufactured after the Serial Numbers listed below will have the new style Feed Shaft and Tightener Bracket installed during production.

MODEL NAME	SERIAL NUMBER
Savin MLP45	P7226300158
Gestetner P7145	
Ricoh Aficio AP4510	P7226300169

INTERCHANGEABILITY CHART:

0	OLD and NEW parts can be used in both OLD and NEW machines.	2	NEW parts CAN NOT be used in OLD machines. OLD parts can be used in OLD and NEW machines.
1	NEW parts can be used in OLD and NEW machines. OLD parts CAN NOT be used in NEW machines.	3	OLD parts CAN NOT be used in NEW machines. NEW parts CAN NOT be used in OLD machines.
3/S	Must be installed as a set on units manufactured prior to the S/N cut-in. On units manufactured after the S/N cut-in or previously modified, use the new part numbers individually.		

BULLETIN NUMBER: G065 – 004
02/14/2003
APPLICABLE MODEL:
GESTETNER – P7145
RICOH – AFICIO AP4510
SAVIN – MLP45
SUBJECT: FIRMWARE MODIFICATION
GENERAL:

The latest firmware version can be downloaded at the Technology Solution Center FTP Site <http://tsc.ricohcorp.com>. Be sure to check the README file for important notes and explanations.

NOTE: Refer to Facts Line Bulletin # FL002 and Publication Bulletin #023 for more information about the FTP Internet Web Site and EPROM/Flash Card Exchange program.


FIRMWARE

Note: This copy is intended as a master original for reproduction of additional bulletins.

G065 FIRMWARE MODIFICATION (CONTROLLER)			
DESCRIPTION OF MODIFICATION	FIRMWARE LEVEL	SERIAL NUMBER	FIRMWARE VERSION
<ul style="list-style-type: none"> SP7-807 SC/Jam Counter Reset does not reset the counters. PS: <ul style="list-style-type: none"> The controller freezes when an Acrobat document is printed out from UNIX. The printing speed of a PS job slows down after a PS3 job is reset. When 3-hole punching is selected in the driver but the actual unit installed is a 2&4 punch unit, the Punch function is not disabled. Punching is canceled once during a job, but multiple entries for "Punch Cancelled" appear on the Error Log sheet for that one job. PCL: <ul style="list-style-type: none"> CAD data is not printed out correctly. 	G0656041 G	August 2002 Production	1.07

Continued...

DESCRIPTION OF MODIFICATION	FIRMWARE LEVEL	SERIAL NUMBER	FIRMWARE VERSION
<p>1. SNMP security vulnerabilities reported by CERT on Feb.12, 2002 have been confirmed and fixed through the PROTOS c06-snmpv1 test suite.</p> <ul style="list-style-type: none"> CERT: http://www.cert.org/advisories/CA-2002-03.html PROTOS c06-snmpv1 test Suite: http://www.ee.oulu.fi/research/ouspg/protos/testing/c06/snmpv1/ <p>2. When making duplex copies onto letterhead paper with an odd number of originals, the last original is copied onto the rear side of the last sheet.</p> <p>Functions added: Added symbol sets PC-858, Latin 9 and Roman 9 for display of the EURO currency symbol.</p>	G0656041 F	April 2002 Production	1.06

G065 FIRMWARE MODIFICATION (BICU)			
DESCRIPTION OF MODIFICATION	FIRMWARE LEVEL	SERIAL NUMBER	FIRMWARE VERSION
<ul style="list-style-type: none"> Fusing-related SC codes (541, 542) and/or incomplete fusing occur when making copies first thing in the morning (esp. in cold environments). 	G0655112 E	June 2002 Production	1.33

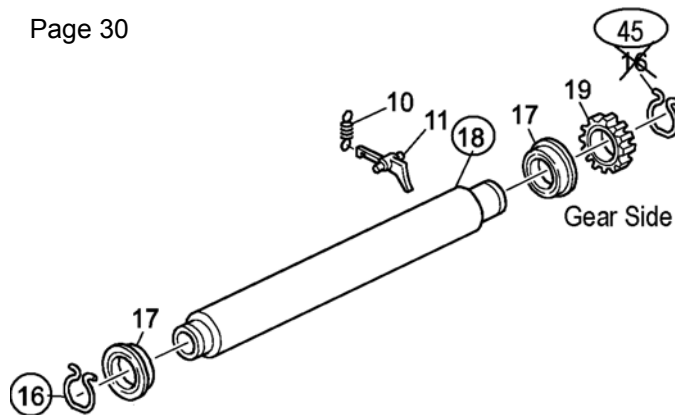
BULLETIN NUMBER: G065 - 005
03/07/2003
APPLICABLE MODEL:
GESTETNER - P7145
RICOH - AFICIO AP4510
SAVIN - MLP45
SUBJECT: HOT ROLLER & C RING
GENERAL:

A pressure-release device was added to the fusing unit maintenance kit to prevent deformation of the Pressure Roller during long periods of storage. However, there have been cases in the field where this device was not properly removed, and the Hot Roller C-ring detaches when the fusing knob is turned.

To prevent this from occurring, the shape of the C-ring located on gear side has been changed so that it will stay in place even in such cases. Although this only occurs with the maintenance kit, this modification was made because the C-ring is common to both the maintenance kit and mainframe. The outer diameter of the Hot Roller has also been increased by 0.2 mm to allow the new C-ring to fit properly.

The following parts updates are being issued for all G065 Parts Catalogs. Please update your parts catalog with the following information.

Page 30



					REFERENCE	
OLD PART NO.	NEW PART NO.	DESCRIPTION	QTY	INT	PAGE	ITEM
A2324064	-	C Ring - Hot Roller	2→1	0	31	16
-	G0654140	C Ring - Hot Roller	1	1	31	45 *
AE011064	AE011071	Hot Roller 39.8mm – T0.4	1	0	31	18

* DENOTES NEW ITEM NUMBER

UNITS AFFECTED:

All G065 printers manufactured after the serial numbers listed below will have the new style Hot Roller and C Ring installed during production.

MODEL NAME	SERIAL NUMBER
Gestetner P7145	P7226500064
Ricoh Aficio AP4510	P72267xxxxx
Savin MLP45	P7226500064



BULLETIN NUMBER: G065 – 006
03/13/2003
APPLICABLE MODEL:
GESTETNER – P7145
RICOH – AFICIO AP4510
SAVIN – MLP45
SUBJECT: FIRMWARE MODIFICATION – CONTROLLER
GENERAL:

The latest firmware version can be downloaded at the Technology Solution Center FTP Site <http://tsc.ricohcorp.com>. Be sure to check the README file for important notes and explanations.

NOTE: Refer to Facts Line Bulletin # FL002 and Publication Bulletin #023 for more information about the FTP Internet Web Site and EPROM/Flash Card Exchange program.


FIRMWARE

Note: This copy is intended as a master original for reproduction of additional bulletins.

G065 CONTROLLER FIRMWARE MODIFICATION			
DESCRIPTION OF MODIFICATION	FIRMWARE LEVEL	SERIAL NUMBER	FIRMWARE VERSION
Corrects the following: The machine hangs up when a G065 is connected to a LAN under the following conditions. 1. The G065 is connected to the repeater HUB (Not switching HUB). 2. The traffic of network is busy.	G0656041 D	Not Available	1.04
Corrects the following: 1. An EX error occurs when using a PCL XL mini driver. 2. When PLL Auto Continue is ON, the image printed out is rotated 90 degrees. 3. When using the PCL5e driver with Windows 98, certain Chinese fonts are not printed out. 4. When the Hungarian display language is selected, the actual display is in Czech. 5. While downloading PS fonts to a machine with the HDD option installed, the correct PS serial number cannot be output. 6. When an undefined command "<ESC>&k#w" is received, the machine prints it on the output as a character string – e.g. "<ESC>&k6w". Functions added: 1. PC858 has been added to the symbol set supported by PCL5e. 2. The total printing area of the PCL5e Edge-to-Edge function is now the same as the HP9000. 3. Font DIMM selection added.	G0656041 E	Not Available	1.05

BULLETIN NUMBER: G065 - 007

06/27/2003

APPLICABLE MODEL:

GESTETNER - P7145

LANIER - 2145

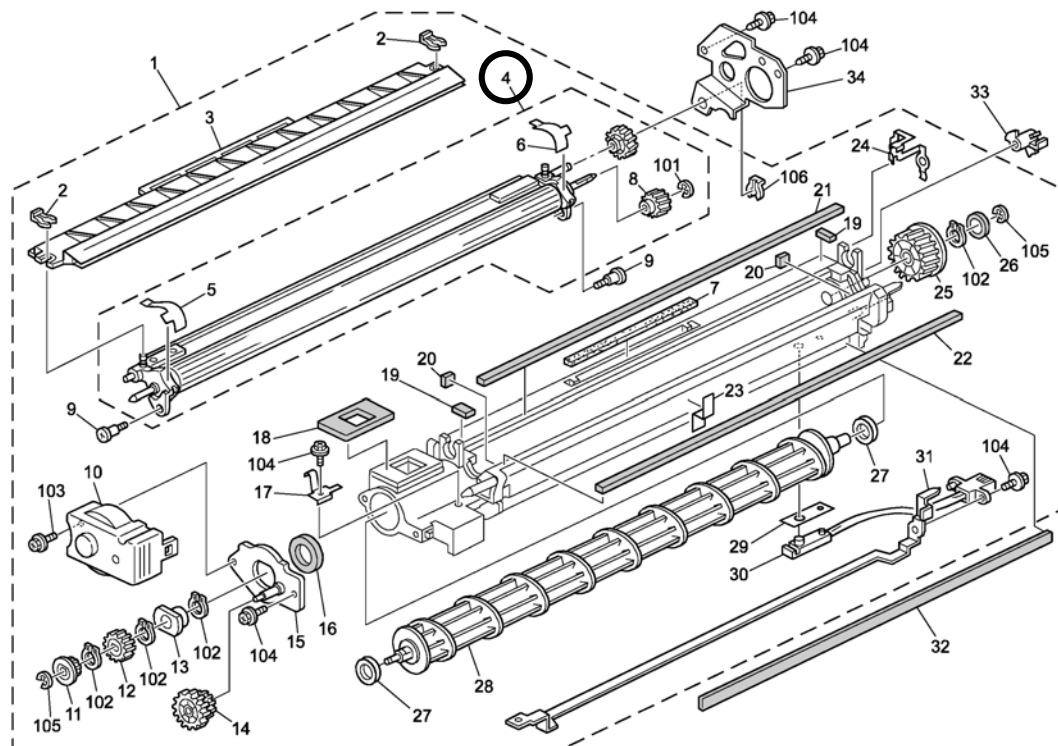
RICOH - AFICIO AP4510

SAVIN - MLP45

SUBJECT: DEVELOPMENT ROLLER ASSEMBLY

GENERAL:

The DG has been narrowed from $0.4 \pm 0.5\text{mm}$ to $0.38 \pm 0.03\text{mm}$ to prevent toner from sticking to the operator side of the development roller. The following part update is being issued for all G065 Parts Catalogs.



						REFERENCE	
OLD PART NO.	NEW PART NO.	DESCRIPTION	QTY	INT	PAGE	ITEM	
B0043100	B0043101	Development Roller Assy	1	0	29	4	

UNITS AFFECTED:

All G065 printers manufactured after the serial numbers listed below will have the new part installed during production.

MODEL NAME	SERIAL NUMBER
Lanier 2145 AG	P72361xxxxx
Savin MLP45	P7227200094
Gestetner P7145	
Ricoh Aficio AP4510	P7227200094

INTERCHANGEABILITY CHART:

0	OLD and NEW parts can be used in both OLD and NEW machines.	2	NEW parts CAN NOT be used in OLD machines. OLD parts can be used in OLD and NEW machines.
1	NEW parts can be used in OLD and NEW machines. OLD parts CAN NOT be used in NEW machines.	3	OLD parts CAN NOT be used in NEW machines. NEW parts CAN NOT be used in OLD machines.
3/S	Must be installed as a set on units manufactured prior to the S/N cut-in. On units manufactured after the S/N cut-in or previously modified, use the new part numbers individually.		

TECHNICAL SERVICE BULLETIN

BULLETIN NUMBER: G065 - 008

10/09/2003

APPLICABLE MODEL:

GESTETNER - P7145

LANIER - 2145

RICOH - AFICIO AP4510

SAVIN - MLP45

SUBJECT: SERVICE MANUAL - INSERT

The Service Manual pages listed below must be replaced with the pages supplied.

The revised areas have been highlighted by an arrow ⇒.

PAGES:

- 5-3 Updated Information (Printer Controller Bit Switch Settings)



**SERVICE
MANUAL**

5.2.3 PRINTER CONTROLLER BIT SWITCH SETTINGS

Position:	7	6	5	4	3	2	1	0
Display:	0	0	0	0	0	0	0	0

Bit Switch 1	Default	
0	0	Do not change.
1	0	
2	1	
3	0	
4	0	
5	0	
6	0	
7	0	
Bit Switch 2		
0	0	Do not change.
1	0	
2	0	
3	0	PDL Sniffing. See PUB(C)-051 for details.
4	0	Do not change.
5	0	
6	0	
7	0	
Bit Switch 3		
0	0	PS Fonts Download. See PUB(C)-045 for details.
1	0	Do not change.
2	0	
3	0	
4	0	
5	0	
6	0	
7	0	
Bit Switch 4		
0	0	Do not change.
1	0	
2	0	
3	0	
4	0	
5	0	
6	0	
7	0	

BULLETIN NUMBER: G065 - 009

10/17/2003

APPLICABLE MODEL:

GESTETNER - P7145

LANIER - 2145

RICOH - AFICIO AP4510

SAVIN - MLP45

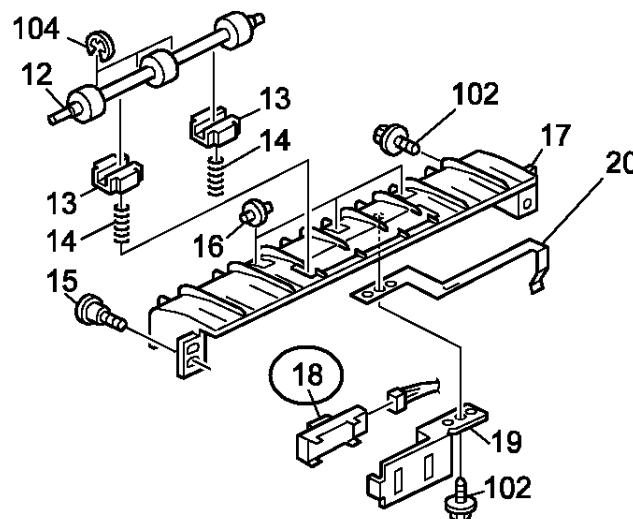
SUBJECT: FUSING EXIT SENSOR

GENERAL:

The Fusing Exit Sensor has been changed to Chromium-free components to further minimize potential impact on the environment. Also, the specification of the sensor has been changed to eliminate false Jam Code 14 – Fusing Exit Sensor jams. The following part update is being issued for all G065 Parts Catalogs. Please update your parts catalog with the following information.



■ PARTS



					REFERENCE	
OLD PART NO.	NEW PART NO.	DESCRIPTION	QTY	INT	PAGE	ITEM
AW010090	AW010061	Exit Sensor - Fusing	1-1	0	27	18

INTERCHANGEABILITY CHART:

0	OLD and NEW parts can be used in both OLD and NEW machines.	2	NEW parts CAN NOT be used in OLD machines. OLD parts can be used in OLD and NEW machines.
1	NEW parts can be used in OLD and NEW machines. OLD parts CAN NOT be used in NEW machines.	3	OLD parts CAN NOT be used in NEW machines. NEW parts CAN NOT be used in OLD machines.
3/S	Must be installed as a set on units manufactured prior to the S/N cut-in. On units manufactured after the S/N cut-in or previously modified, use the new part numbers individually.		

FIRMWARE HISTORY

PUBLISHED DATE: 06/10/2003

PRODUCT CODE: G065

APPLICABLE MODEL:

GESTETNER – P7145

LANIER – 2145

RICOH – AFICIO AP4510

SAVIN – MLP45

GENERAL:

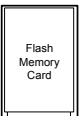
The latest firmware version can be downloaded at the Technology Solutions Center FTP Site at <http://tsc.ricohcorp.com>. Be sure to check the README file for important notes and explanations.

NOTE: Refer to Facts Line Bulletin # FL002 and Publication Bulletin #023 for more information about the FTP Internet Web Site and EPROM/Flash Card Exchange program.

The revised areas have been highlighted by an arrow ⇒.

TABLE OF CONTENTS:

CONTROLLER FIRMWARE HISTORY:	2
BICU FIRMWARE HISTORY:	5



■ FIRMWARE

CONTROLLER FIRMWARE HISTORY:



Version	Program No.	C. SUM	Effective Date
1.02	G0656041C	On board 1 : 9342 On board 2 : 0485	1st Mass Production
1.04	G0656041D	On board 1 : DDAA On board 2 : 980E	December 2001 production.
1.05	G0656041E	On board 1: FC4E On board 2: 3311	February 2002 production.
1.06	G0656041F	On board 1: 8C55 On board 2: CE77	April 2002 production.
1.07	G0656041G	On board 1: 2A9A On board 2: C022	August 2002 production.
1.08	G0656041H	On board 1: 50EC On board 2: 21E3	October 2002 production.
1.09	G0656041J	On board 1: CCFC On board 2: F42A	November 2002 production.
1.10	G0656041K	On board 1: 1704 On board 2: 4047	December 2002 production.
1.11	G0656041L	On board 1: 480D On board 2: ACB0	March 2003 production.



FIRMWARE LEVEL	DESCRIPTION OF MODIFICATION
1.11	<ol style="list-style-type: none"> PCL <ul style="list-style-type: none"> - Barcodes are separated (shifted) when printed out. - The downloaded PCL Barcode fonts are not printed correctly on the PCL font list. - Duplex face settings (front/rear) are not applied correctly when specified with PCL commands). - Selecting HDD fonts or DIMM fonts may reduce the amount of available memory. - CAD print files: <ul style="list-style-type: none"> • Increased the number of available pen selections from 8 to 256. Note: BitSW #3, -3 must be turned ON. • The "null" character is ignored when contained in the HP/GL2 data • The status flag for the bold selection command is refreshed when contained in the HP/GL2 data. <p>Functions added:</p> <ul style="list-style-type: none"> - Supports mixed binding orientations with duplex jobs using cover sheets - Supports SAP Barcode & OCR printing. PS <ul style="list-style-type: none"> -PS error occurs when unknown media type is specified -Slow Printing from AutoCAD -PS print file is printed out as a text file, i.e. not recognized as a PS file <p>Functions added:</p> <ul style="list-style-type: none"> - PJJ commands added for Edge to Edge printing: <ul style="list-style-type: none"> • ON = "PJJ SET EDGETOEDGE=YES" • OFF = "PJJ SET EDGETOEDGE=NO" System <ul style="list-style-type: none"> - Slow printing when feeding from Tray 3 or 4.
1.10	<ol style="list-style-type: none"> PCL <ul style="list-style-type: none"> - Some downloaded fonts are not printed out. - The dither pattern for PCL XL is sometimes rotated with respect to the image. - Some characters overlap when using scalable fonts.
1.09	<ol style="list-style-type: none"> PCL <ul style="list-style-type: none"> - "θ" cannot be printed when selecting a Bitmap font. - When a font in the DIMM is specified using the LB command of GL/2, it cannot be printed correctly. GPS <ul style="list-style-type: none"> - Form line setting cannot be held on the PCL menu. System <ul style="list-style-type: none"> - A failure occurs with the cluster recovery processing for a certain system area after an SC863 (HDD error), and the SC cannot be cleared with power off/on. - Wording correction: "Replace tonerwaste-toner" to "Replace Toner Bottle".
1.08	<p>Euro symbol is not printed when using the PS driver.</p> <p>For the workaround procedure.→ See Pub(c)-045 Euro symbol is not printed with the PS driver.</p>

FIRMWARE LEVEL	DESCRIPTION OF MODIFICATION
1.07	<p>1. SP7-807 SC/Jam Counter Reset does not reset the counters.</p> <p>2. PS:</p> <ul style="list-style-type: none"> - The controller freezes when an Acrobat document is printed out from UNIX. - The printing speed of a PS job slows down after a PS3 job is reset. - When 3-hole punching is selected in the driver but the actual unit installed is a 2&4 punch unit, the Punch function is not disabled. - Punching is canceled once during a job, but multiple entries for "Punch Cancelled" appear on the Error Log sheet for that one job. <p>3. PCL:</p> <ul style="list-style-type: none"> - CAD data is not printed out correctly.
1.06	<p>1. SNMP security vulnerabilities reported by CERT on Feb.12, 2002 have been confirmed and fixed through the PROTOS c06-snmpv1 test suite.</p> <ul style="list-style-type: none"> -CERT: http://www.cert.org/advisories/CA-2002-03.html -PROTOS c06-snmpv1 test Suite: http://www.ee.oulu.fi/research/ouspg/protos/testing/c06/snmpv1/ <p>2. When making duplex copies onto letterhead paper with an odd number of originals, the last original is copied onto the rear side of the last sheet.</p> <p>Functions added:</p> <ul style="list-style-type: none"> 1. Added symbol sets PC-858, Latin 9 and Roman 9 for display of the EURO currency symbol.

BICU FIRMWARE HISTORY:

Version	Program No.	Effective Date
1.34	G0655112F	December 2002 prod.
1.33	G0655112E	June 2002 prod.
1.32	G0655112D	April 2002 prod.
1.31	G0655112C	December 2001 prod.
1.30	G0655112B	1st mass production

FIRMWARE LEVEL	DESCRIPTION OF MODIFICATION
1.34	Thermostat is activated after small paper sizes (B5 or smaller) are fed continuously from the bypass tray as undefined sizes.
1.33	Fusing-related SC codes (541, 542) and/or incomplete fusing occur when making copies first thing in the morning (esp. in cold environments).
1.32	SC545 (Fusing Lump Remains On) sometimes occurs when printing out onto a large number of small sheets (e.g. 200 or more, A5 SEF). The print speed with A5/HLT at SEF is slow compared to that of A4/LT at LEF.
1.31	"Close Lower Right Cover" is displayed when an error occurs with Trays 1 or 2, and "Tray Error" is then displayed when the lower right cover is closed.
1.30	1st Mass Production.