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D179/D180/D181 DETAILED DESCRIPTIONS MANUAL

D179/D180/D181
DETAILED DESCRIPTIONS
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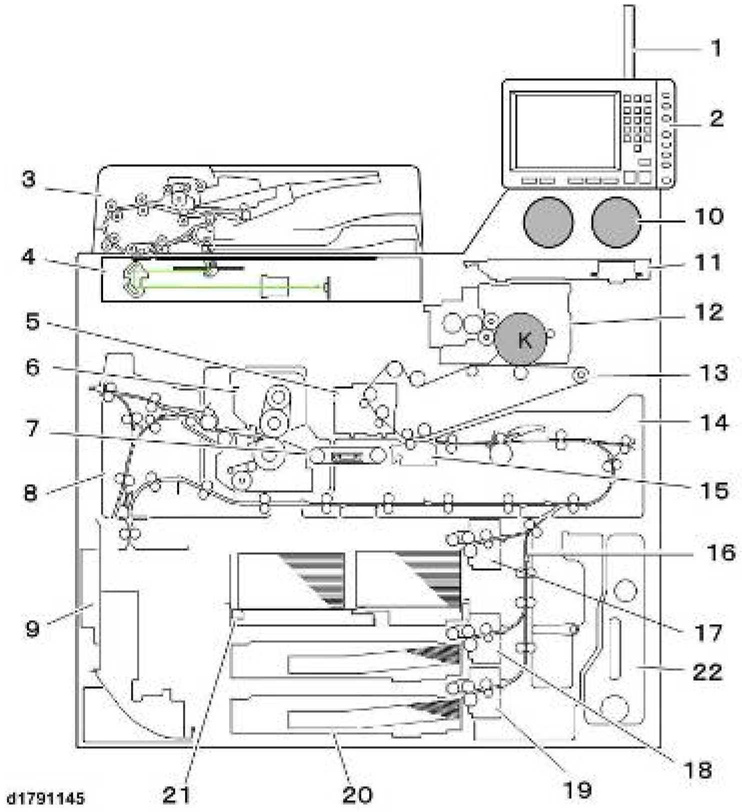
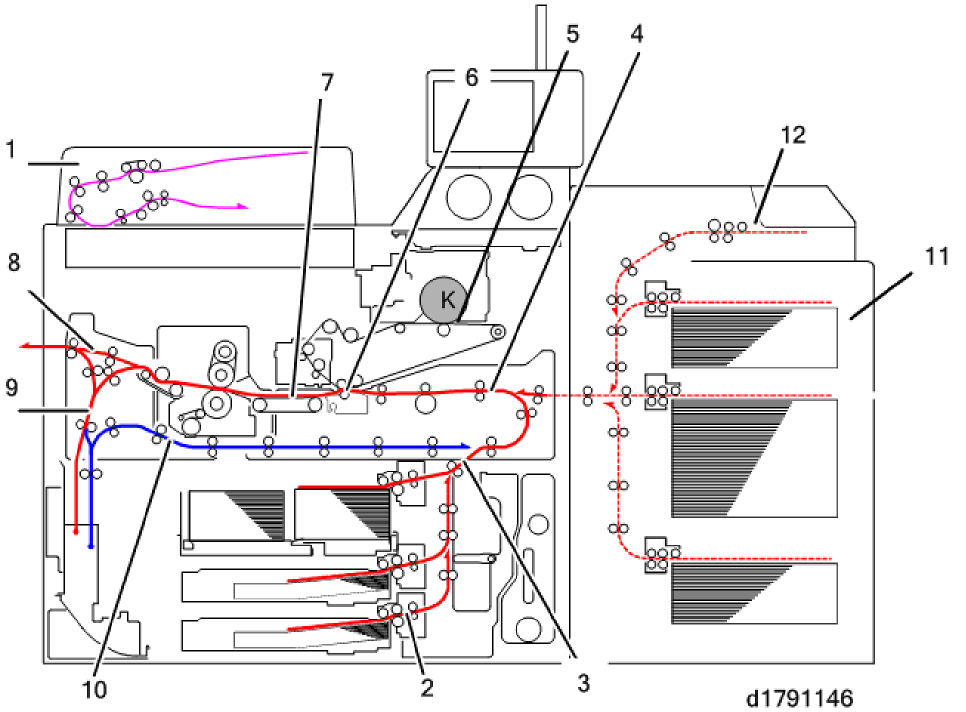
1. D179/D180/D181 OVERVIEW

1.1 GENERAL LAYOUT



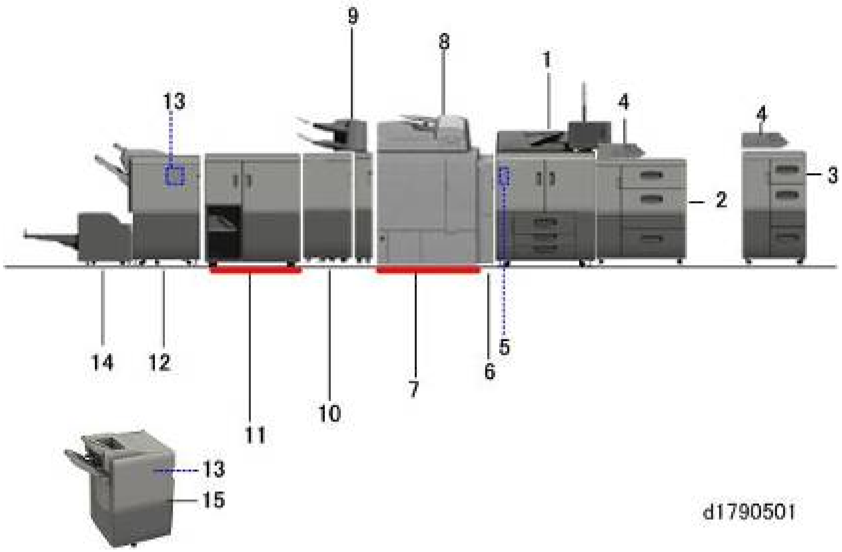
No.	Name	No.	Name
1	Status Light	12	PCDU
2	Operation Panel	13	ITB Unit
3	ADF	14	Registration Unit (Main Path)
4	Scanner	15	PTR Unit (Paper Transfer Roller)
5	ITB Cleaning Unit	16	Vertical Transfer Unit (VTU)
6	Fusing Unit	17	Tray 1 (FM 1)
7	PTB (Paper Transport Belt)	18	Tray 2 (FM 2)
8	Invert/Exit Unit	19	Tray 3 (FM 3)
9	Purge Path	20	Universal Trays (x2)
10	Toner Supply Unit	21	Tandem Tray
11	Laser Unit	22	Used Toner Bottle

1.2 PAPER PATHS



No.	Name	No.	Name
1	ADF	7	Paper Transport Belt
2	Paper Bank	8	Straight-through Path Exit
3	Vertical Transport Unit	9	Invert Exit
4	Registration Unit	10	Duplex Return Path
5	ITB Unit (Image Transfer)	11	LCIT (Option)
6	PTR Unit (Paper Transfer)	12	Multi Bypass Tray (Option)

1.3 PERIPHERAL CONFIGURATION RULES



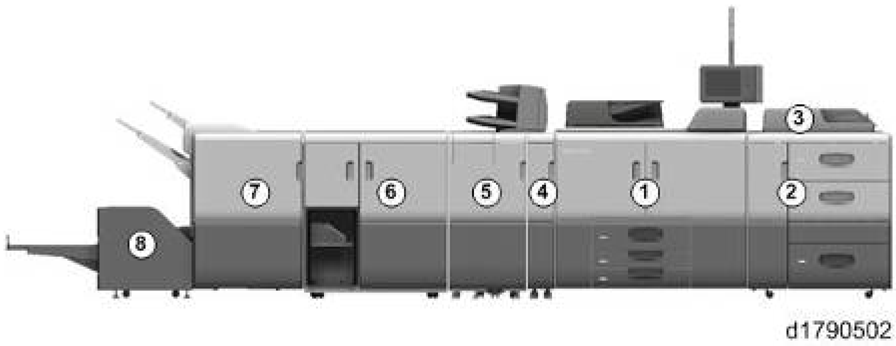
1	Main Machine D179/D180/D181
2	LCIT RT5080 D732
3	LCIT RT5070 D733
4	Multi Bypass Tray BY5010 D517
5	Decurl Unit DU5030 D741
6	Transit Pass Unit D391
7	Perfect Binder GB5010 D736
8	Cover Interposer Tray for Perfect Binder Type S1 D736
9	Cover Interposer Tray CI5030 D738
10	Multi-Folding Unit FD5020 D740
11	Ring Binder RB5020 D737
12	Booklet Finisher SR5060 D734 (Corner, center stapling)
13	Punch Unit PU 5020 – NA/EU/SC
14	Trimmer Unit TR5040 D520
15	Finisher SR5050 D735 (Corner stapling only)

- Either LCIT (2) can be installed on the right side of the main machine.
- The Multi Bypass Tray (3) can be installed on top of either LCIT
- The Decurl Unit (5) is installed inside the main machine..
- Either the Perfect Binder (7) or the Ring Binder (11) can be installed, but these units cannot be installed together in the same line.
- If Multi Folding Unit (10) is installed, the Booklet Finisher or Finisher (12) must be installed as the last unit downstream.
- The Trimmer Unit (14) can be attached only to the Booklet Finisher, not the Finisher (12).
- The booklet tray of the Booklet Finisher (12) must be removed in order to install the Trimmer unit (14).

If the Trimmer Unit (14) is not installed, the booklet tray of the Booklet Finisher (12) must be installed.

1.4 EXAMPLE CONFIGURATIONS

1.4.1 EXAMPLE 1

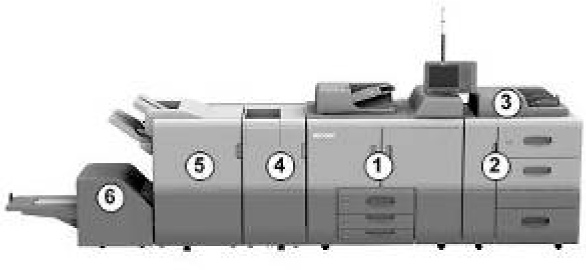


①	Main Machine
②	LCIT RT5080 (A3)
③	Multi Bypass Tray BY5010
④	Cover Interposer Tray CI5030
⑤	Multi-Folding Unit FD5020
⑥	Ring Binder RB5020
⑦	Booklet Finisher SR5060
⑧	Trimmer Unit TR5040

1.4.2 EXAMPLE 2

①	Main Machine
②	LCIT RT5080 (A3)
③	Multi Bypass Tray BY5010
④	Transit Pass Unit for Perfect Binder Type S1
⑤	Perfect Binder GB5010
⑥	Cover Interposer Tray for Perfect Binder Type S1
⑦	Booklet Finisher SR5060

1.4.3 EXAMPLE 3



d1790504

①	Main Machine
②	LCIT RT5080 (A3)
③	Multi Bypass Tray BY5010
④	Multi-Folding Unit FD5020
⑤	Booklet Finisher SR5060
⑥	Trimmer Unit TR5040

1.4.4 EXAMPLE 4

d1790505

①	Main Machine
②	LCIT RT5080 (A3)
③	Multi Bypass Tray BY5010
④	Cover Interposer Tray CI5030
⑤	Booklet Finisher SR5060

1.4.5 EXAMPLE 5

d1790506

①	Main Machine
②	LCIT RT5070
③	Finisher SR5050

2. ADF

2.1 MECHANISMS

2.1.1 BASIC SPECIFICATIONS

Type		Single/duplex automatic sheet through scanning (scans both sides with one pass	
Originals			
	Simplex	A3、A4、A5、B4、B5、B6、DLT、LG、LT、HLT 、 Long（up to 1260 mm）40 to 128g/m^2	
	Duplex	A3、A4、A5、B4、B5、(B6)、DLT、LG、LT、HLT 52 to 128g/m^2 B6: Smallest size	
	Mixed sizes	A3、A4、B4、B5、DLT、LG、LT、HLT 52 to 81.4g/m2	
Original standard position		Rear left corner	
Original setting		Image side face up	
Original feed order		From top to bottom of stack	
Original feed separation		Friction with feed belt and original separation roller	
Original scanning methods		Sheet-through duplex (Front: white guide plate, Back: Color CIS + white roller)	
Original tray capacity		250 sheets（64g/m^2）Stack less than 25 mm、Normal paper	
Target Line Speed		500 mm/s (B&W)	
Scanning productivity			
	Simplex	Copy/Scan	120 ipm (200/300 dpi) A4 LEF, 1:1 (B&W, Color)
	Duplex	Copy/Scan	220 ipm (200/300 dpi) A4 LEF, 1:1 (B&W, Color)
ADF magnification (front/back)		Step 66.7% (750 mm/s) only, System 25 to 400%	
Dimensions (w x d x h)		591 x 520 x 175 mm (23 x 21 x 7 in.)	
Weight		Less than 14 kg (31 lb.)	
Power supply		DC24 V、DC12 V、DC5 V (from main machine)	
Power consumption		Less than 82.5W	

ADF

2.1.2 COMPATIBLE ORIGINALS

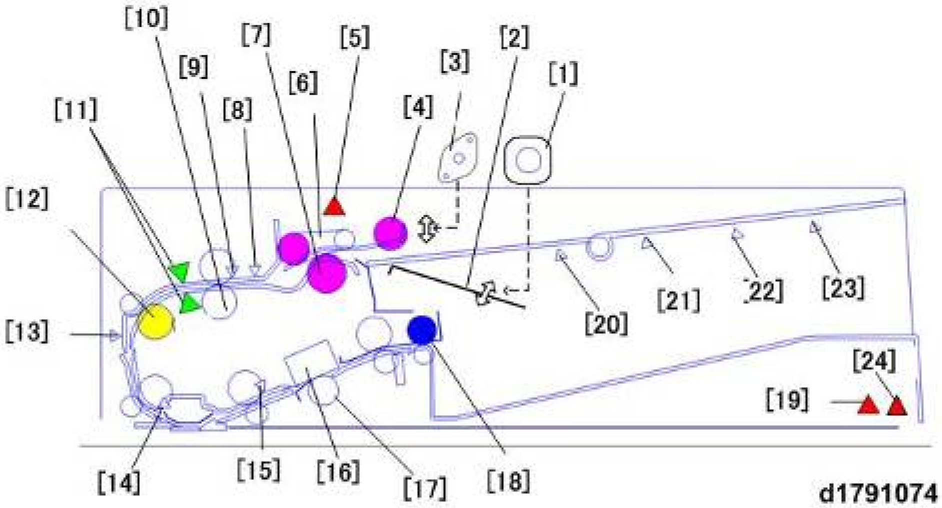
Thickness	35 kg	40 kg	45 kg	55 kg
	40.7	46.5	52.3	64
	g/m^2	g/m^2	g/m^2	g/m^2
	250	250	250	250
Paper Size				
A3/A4	---	---	◎	◎
A5	○	○	◎	◎
B4/B5	○	○	◎	◎
B6	---	---	◎	◎
DLT/LG	○	○	◎	◎
LT	○	○	◎	◎
HLT	○	○	◎	◎
F	○	○	◎	◎

Thickness	70 kg	90 kg	110 kg	Translucent
	81.4	105	128	TA、TE、TC
	g/m^2	g/m^2	g/m^2	
	220	190	150	1
Paper Size				
A3/A4	◎	◎	◎	△
A5	◎	◎	◎	---
B4/B5	◎	◎	◎	△
B6	◎	◎	◎	---
DLT/LG	◎	◎	◎	---
LT	◎	◎	◎	---
HLT	◎	◎	◎	---
F	◎	◎	◎	---

Comments

◎: Simplex, duplex both possible
○: Simplex mode only
△: SADF simplex mode only

2.1.3 CONFIGURATION

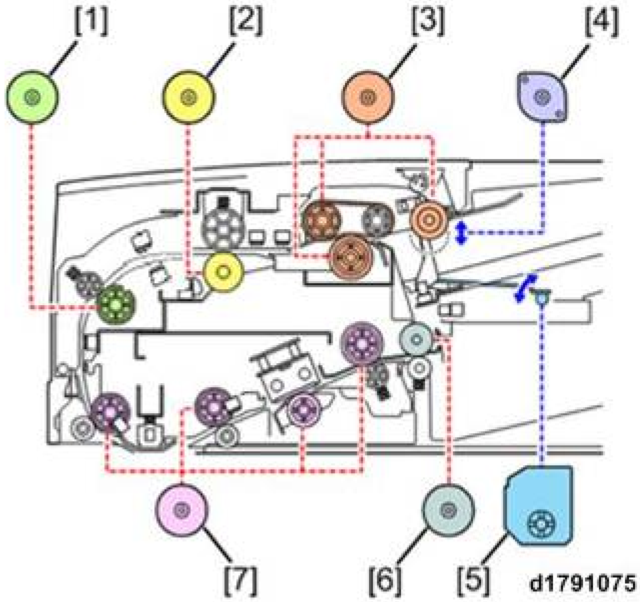


1	Bottom Plate Lift Motor	13	Scan Entrance Sensor
2	Bottom Plate	14	Registration Sensor
3	Pickup Roller Motor	15	Exit Sensor
4	Pickup Roller	16	CIS
5	Feed Cover Open Sensor	17	White Roller
6	Feed Belt	18	Exit Roller
7	Separation Roller	19	Open/Close Sensor
8	Separation Sensor	20	Original Size Sensor (A4 LEF, LT LEF)
9	Skew Correction Sensor	21	Original Size Sensor (B5)
10	Grip Roller	22	Original Size Sensor (A4)
11	Double-Feed Sensor (Lower: emitter, Upper: receiver)	23	Original Size Sensor (B5)
12	Relay Roller	24	Lift Interlock Switch

1. **Original Pickup Mechanism**. The original is picked up by the pickup roller.
2. **Paper Feed and Separatio**n. A feed belt and separation roller comprise the paper feed and separation mechanism.
3. **Original Size Detection**. Five width sensors and four length sensors comprise the original size detection mechanism.
4. **Duplex Scanning**. Each original is scanned with color CIS elements, one mounted above and one below the original feed path so both sides are scanned at the same time.
5. **Original Double-Feed Detection**. A pair of ultra-sound sensors, one mounted above and one mounted below the original path detect double feeding.

2.1.4 ADF DRIVE LAYOUT

Rollers driven by DC motors comprise the ADF drive.



1	Transport Motor	5	Bottom Plate Lift Motor
2	Entrance Motor	6	Exit Motor
3	Feed Motor	7	Scan Motor
4	Pickup Roller Lift Motor	-	—

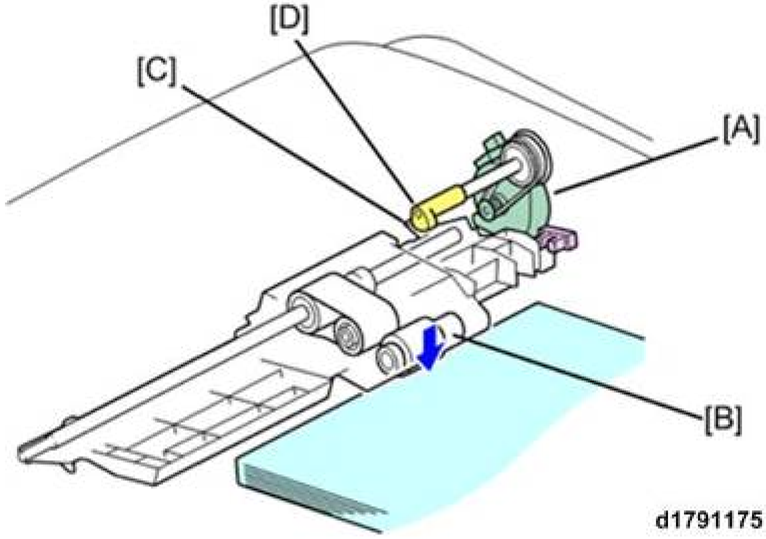
2.2 DETAILS

2.2.1 ORIGINAL PICKUP MECHANISM

Original Detection

- When the original is set in the original tray, the leading edge of the original pushes up the feeler of the original set sensor and the sensor detects the original.

Pickup Roller



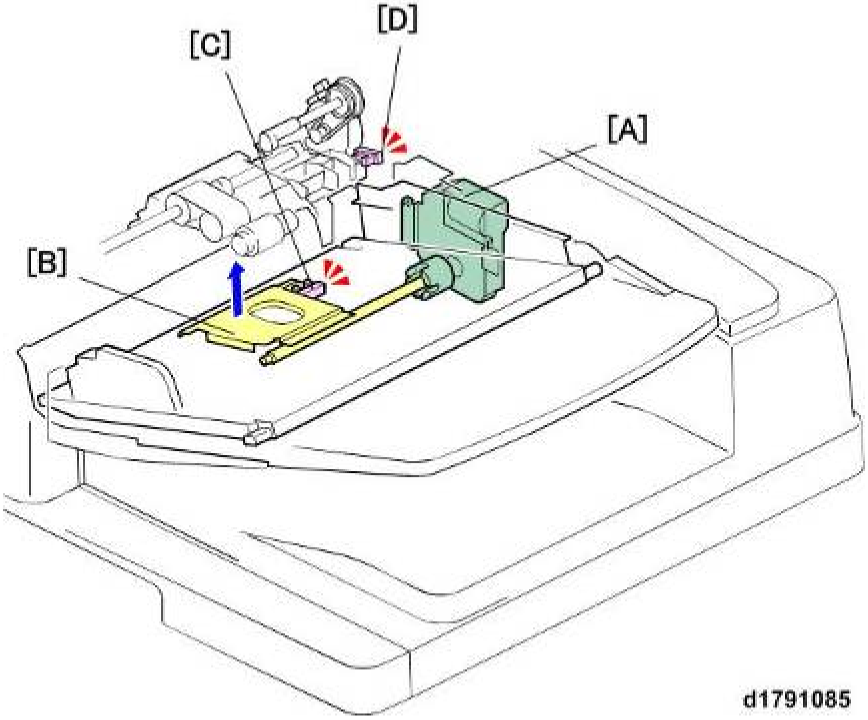
The pickup roller alternates between the standby position (up) and operating position (down).

- Standby (up) position: Lift cam [D] pushes the pickup lever [C] and this raises the pickup roller [B] to the standby (up) position.
- Operating (down) position: The lift cam [D] releases the pickup lever [C] and the pickup roller [B] drops to the operating (down) position.

The pickup roller lift motor [A] turns on and rotates lift cam [D], so the rotating side of the cam alternately raises and lowers pickup lever [C] to the standby and operating positions.

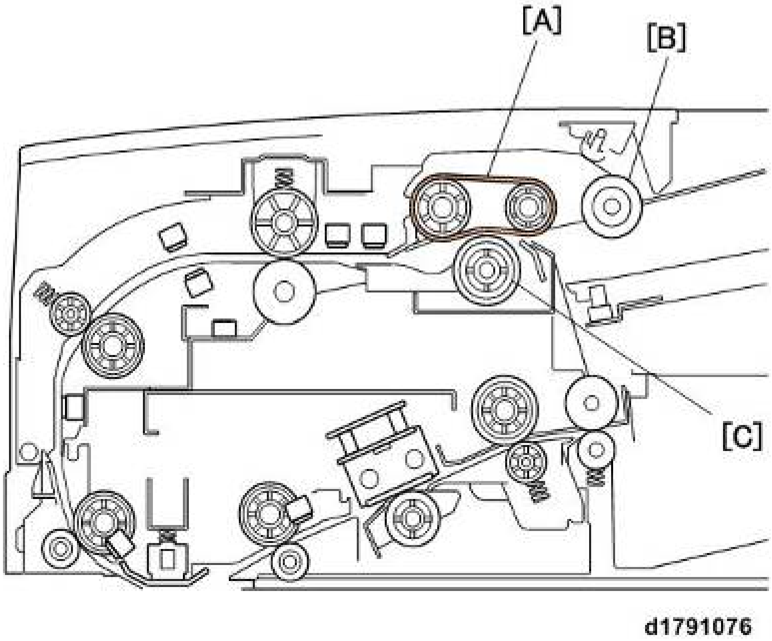
- Pickup Roller Standby Position (Up) Timing
  When the original is set on the tray its leading edge raises the feeler of the original set sensor.
  When the trailing edge of the original passes the skew correction sensor (however, it does not fall after the last original feeds, or when the leading edge of A4 SEF or LT SEF paper passes the registration sensor).
- Pickup Roller Operating Position (Down) Timing
  When the leading edge of the original passes the skew correction sensor at
  - At Power On
  - When Feed Cover Opens
  - This causes an original jam.

2.2.2 BOTTOM PLATE MECHANISM



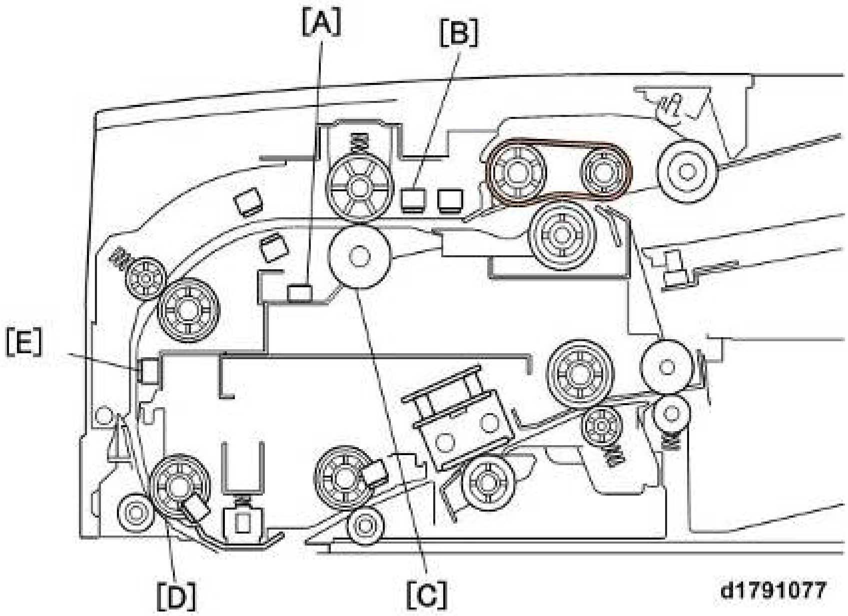
- When an original is placed in the original tray, after the pickup roller drops and the bottom plate position sensor goes OFF, bottom plate lift motor [A] turns ON and pushes lift lever [B] against the bottom plate to raise the bottom plate.
- When the bottom plate position [D] goes ON, the bottom plate lift motor [A] stops.
- When the height of the stack diminishes low enough during continuous original feed for the bottom plate position sensor [D] to go OFF, this signals the machine to switch the bottom plate lift motor [A] ON again to raise the tray.
- This mechanism keeps the position of the top of the stack (up to 250 sheets) at the correct position for continuous original feeding.
- After the last original is fed, the bottom plate descends as far as the bottom plate HP sensor [C], and the motor turns off.

2.2.3 ORIGINAL FEED MECHANISM



- A standard FRR system with separation and feed belt [A] and separation roller [C] comprises the original feed mechanism.
- When the original picked up by the pickup roller [B] is fed between the feed belt and separation roller [C] if there is more than one sheet between the belt and roller the separation roller will reverse feed and the sheets below the top sheet will be returned to the original tray..
- The thickness of the double-feed triggers creates a small torque that exceeds that of the torque limiter clutch of the separation roller, the clutch reverses the rotation of the separation roller briefly (to send the double fed sheets back to the tray), and then releases so the top sheet can continue to feed.

2.2.4 SKEW CORRECTION MECHANISM



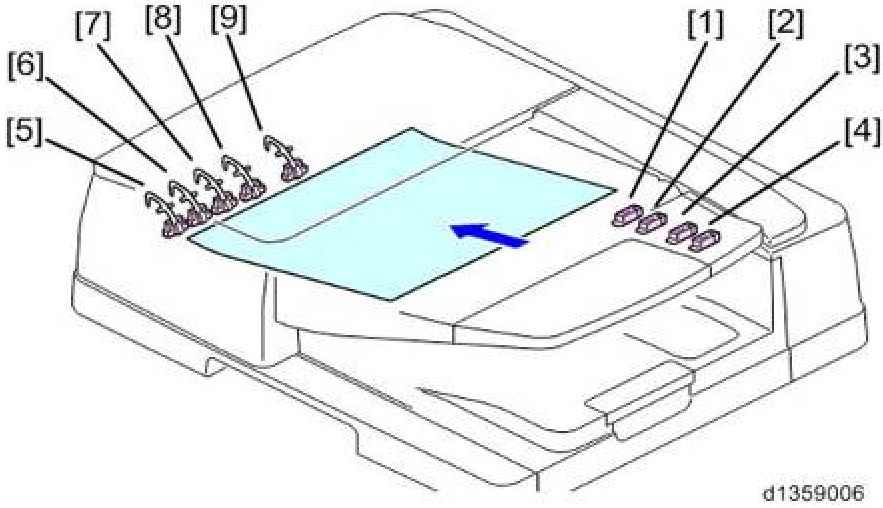
A	Original Width Sensors
B	Skew Correction Sensor
C	Grip Roller
D	Scan Entrance Sensor
E	Scan Entrance Sensor

- The skew correction sensor [B] detects the leading edge of the original after it passes the nip of the feed belt and separation roller.
- After detection, the original continues to feed for the prescribed number of pulses, and then the leading edge strikes the pull-out roller [C] which has stopped momentarily to align the leading edge and correct any skew.
- If the original is small (B6, A5, B5, HLT) (or during duplex scanning) after the scanning entrance sensor [E] detects the leading edge of the original, the scanning entrance roller [D] is stopped for the prescribed number of pulses long enough to buckle the edge of the original for the second skew correction.
- You can use SP6020-001 to make the scanning entrance roller stop for the second skew adjustment of any size paper (not just small paper).

2.2.5 ORIGINAL SIZE DETECTION

Five sensors are used to detect original width when the skew correction sensor detects the leading edge of the original.

- The length is detected by three sensors under the original table, and one more sensor above the bottom plate.
- The machine uses the readings of width sensors and the length sensors to determine the size of the original being fed.

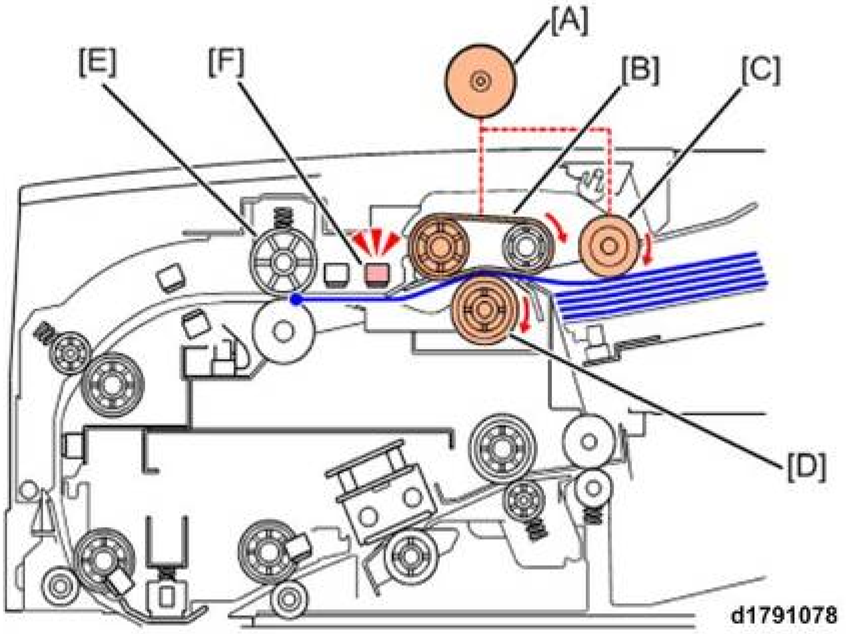


1	Original Size Sensor (A4 LEF, LT LEF)
2	Original Size Sensor (B5)
3	Original Size Sensor (A4)
4	Original Size Sensor (LG)
5	Width Size Sensor 5
6	Width Size Sensors 4
7	Width Size Sensor 3
8	Width Size Sensor 2
9	Width Size Sensor 1

Size	Width Sensor					Length Sensor			
	1	2	3	4	5	A4 LEF LT LEF	B5	A4	LG
A3（297×420）	ON	ON	ON	ON	ON	ON	ON	ON	ON
B4(257×364)	ON	ON	ON	-	-	ON	ON	ON	ON
A4 SEF (210x297)	ON	ON	-	-	-	ON	ON	ON	-
A4 LEF (297×210)	ON	ON	ON	ON	ON	-	-	-	-
B5 SEF (182×257)	ON	-	-	-	-	ON	ON	-	-
B5 LEF (257×182)	ON	ON	ON:	-	-	-	-	-	-
B6 SEF (128×182)	-	-	-	-	-	-	-	-	-
B6 LEF (182×128)	ON	-	-	-	-	-	-	-	-
11"×17" SEF (DLT)	ON	ON	ON	ON	-	ON	ON	ON	ON
11"×15"SEF	ON	ON	ON	ON	-	ON	ON	ON	ON
8 1/2"×11" SEF (LT)	ON	ON	-	-	-	ON	ON	-	-
11"×81/2" LEF (LT)	ON	ON	ON	ON	-	-	-	-	-

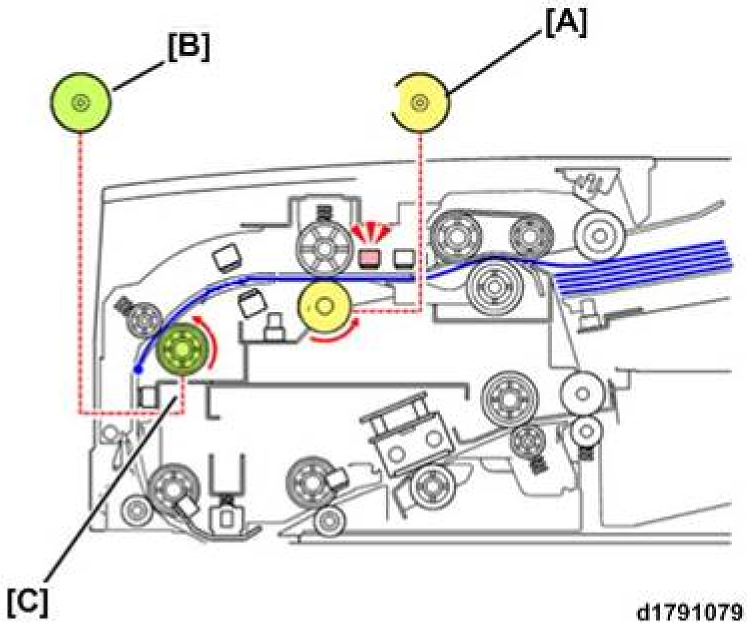
SP6016-001 can be used to choose size detection or either 11"x17" P or 11"x5"P,

2.2.6 ORIGINAL TRANSPORT

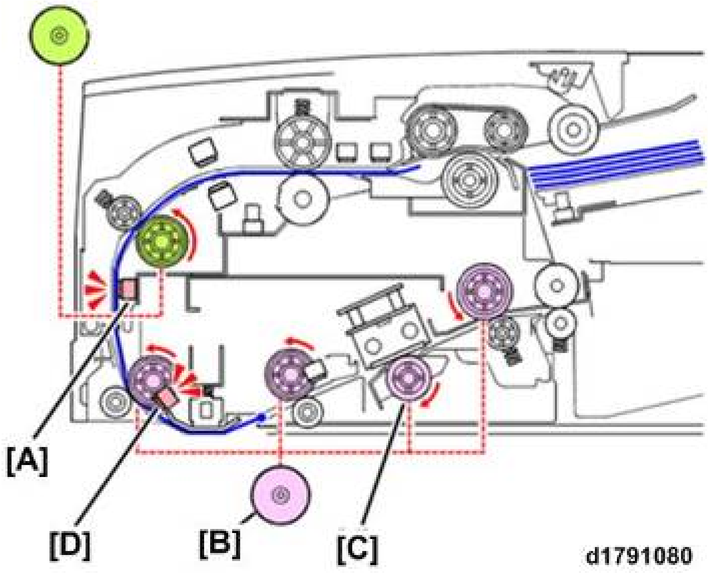


A	Feed Motor
B	Feed Belt
C	Pickup Roller
D	Separation Roller
E	Grip Roller
F	Separation Sensor

The feed motor [A] rotates the feed belt [B], pickup roller [C], and separation roller [D] to feed the original once the machine receives the command to feed. The fed original hits the grip roller. This prevents the paper from skewing diagonally in the original feed path.

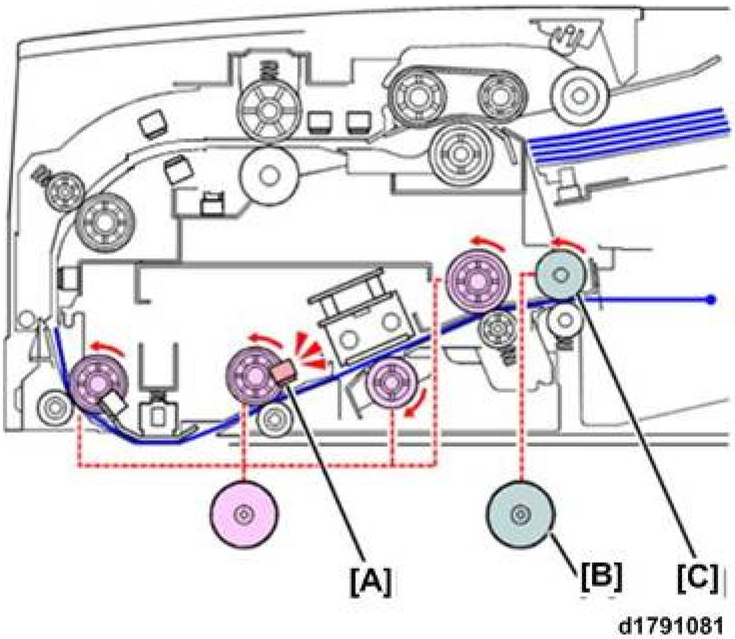


After skew adjustment at the grip roller, grip motor [A] and relay motor [B] turn the rollers [C] that feed the original to the scanner unit below.



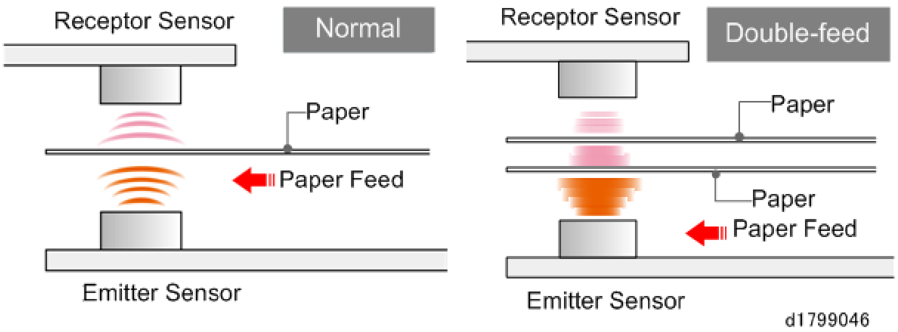
When the scanner entrance sensor [A] detects the original, the scanner motor [B] switches on and rotates the white roller [C] and feeds the original to the scanner unit, as the registration sensor [D] starts and maintains a pulse count between the detection of the leading edge and trailing edge of the original.
After the grip roller starts to rotate:

- The grip motor increases its rotation speed slightly in order to reduce the gap between the original and the downstream original being scanned.
- If this speed adjustment were maintained, the leading edge of the original would collide with the trailing edge of the downstream original.
- To compensate for the difference in speed, once the leading edge is detected at the skew correction sensor, the speed of the feed belt is reduced, and the line speed slows as the leading edge of the original reaches the nip of the pre-scanning roller.



When exit sensor [A] detects the original, exit motor [B] turns on and rotates exit rollers [C] which feed the original out onto the exit tray.

2.2.7 DOUBLE-FEED DETECTION



A pair of ultrasound sensors are mounted in the ADF, one below the original feed path (emitter) and the other above the path (receiver).

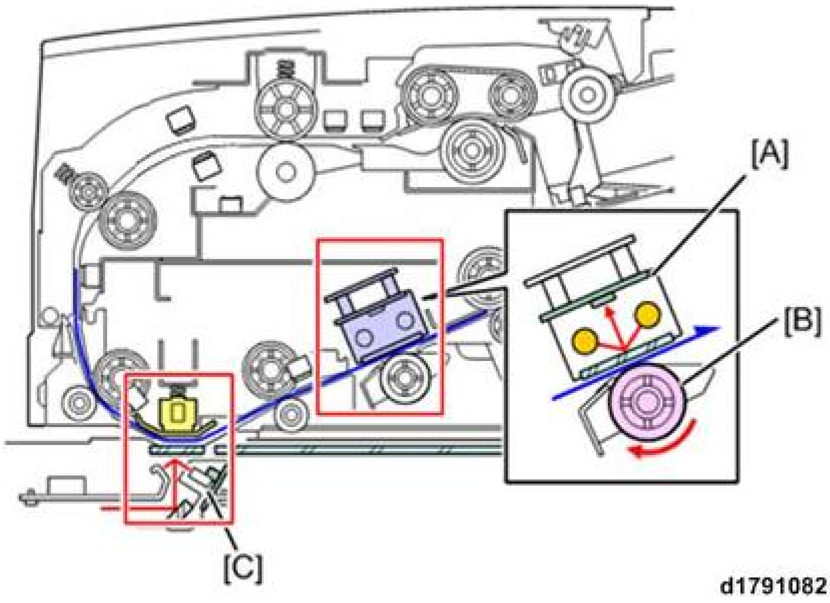
- When the original passes between the sensors, an ultra-sound wave from the emitter sensor below passes through the paper to the receiver above.
- The receiver converts the signal generated by the vibration of the signal against the paper to an electrical pulse and checks its level.
- If a double feed occurs, the space between the sheets will generate a lower signal. When the emitter detects this lower signal (lower than that of a single sheet) it causes the machine to issue Jam Code J099 (double-feed detected) and then original feed stops.

This double feed detection will not function with originals that have:

- Folds, wrinkles, tears
- Holes
- Imperfectly fused images
- Perforations
- Taped connections
- Taped surfaces

Feeding such originals could cause false detection of double-feeds.
Double-feed detection can be switched by the operator with an operator setting: Operator Adjustment > 1. Main: Image Position Adjustment > 0108 ADF Double Feed Detection Operation (On (default), Off).
The service technician can also switch double-feed detection off/on with SP60040-00 [0 to 1/**1**/1] (Default 1: On)

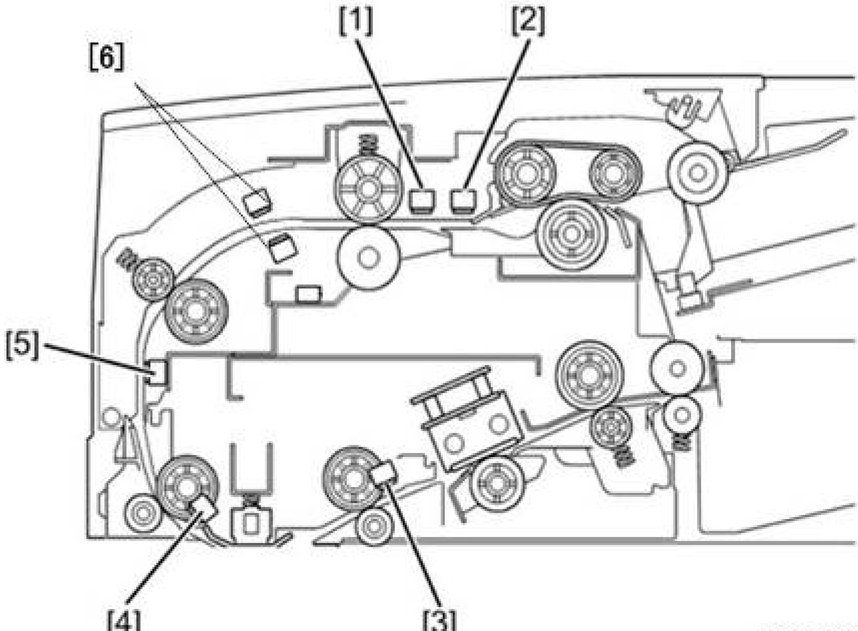
2.2.8 DUPLEX SCANNING



A	CIS
B	White Roller
C	Main Scanner LED

To improve productivity, this machine is equipped with a color CIS [A] to scan the back sides of original while the front side is being scanned.

2.2.9 JAM SENSOR LAYOUT



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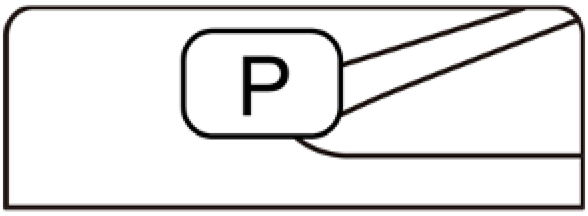


d1791315

1	Skew Correction Sensor
2	Separation Sensor
3	Exit Sensor
4	Registration Sensor
5	Skew Correction Sensor
6	Double-Feed Detection Sensor (Lower: emitter, Upper: receiver)

The six sensors listed above are used in jam detection. The readings of their output are used as described in the table below.

Code	Display	Jam Name	Jam Description
13	P	Separation sensor late jam	Leading edge did not arrive after paper feed motor started and operated long enough for 224 mm of feed.
14	P	Skew sensor late jam	Leading edge not detected within time for 46 mm of feed after detection by separation sensor.
15	P	Skew sensor late jam	Leading edge not detected after pull out started (grip motor) and enough time elapsed for 172 mm of feed.
16	P	Registration sensor late jam	Leading edge not detected after skew correction sensor detected leading edge and enough time elapsed for 96 mm of feed.
17	P	Exit sensor late jam	Leading edge not detected after registration sensor detected leading edge and enough time had elapsed for 130 mm of feed.
63	P	Separation sensor lag jam	This table shows how the amount of feed is calculated when the leading edge of the original is not detected after grip motor starts to pull out original. Standard value: -35.3)×1.5 However, if the operator changes the original length setting, the new specified value will be taken as standard.
64	P	Skew sensor lag jam	Trailing edge was not detected after separation sensor has detected trailing edge and enough time had elapsed for 46 mm of feed.
65	P	Skew sensor lag jam	Trailing edge not detected after relay motor stopped and enough time had elapsed for 82 mm of feed.
66	P	Registration sensor lag jam	Trailing edge not detected after skew correction sensor detected trailing edge and enough time had elapsed for 93 mm of feed.
67	P	Exit sensor lag jam	Trailing edge not detected after registration sensor detected trailing edge and enough time has elapsed for 130 mm of feed.
99	P	Double-feed jam	Double-feed sensor pair (ultrasound) detected a single weaker than that expected for the original is use and signaled double-feed.

Abnormality Detection

No.	Problem	Release	Cause
700-01	Bottom plate lift moor error	Cycle the machine off/on with main power switch	Bottom plate position sensor abnormal (output abnormal), Bottom plate HP sensor abnormal), Bottom plate lift motor abnormal (not operating), ADF control board abnormal
700-02	Paper pickup operation abnormal	Cycle the machine off/on with main power switch	Pickup HP sensor abnormal (output abnormal), Pickup motor abnormal (not operating), ADF control board abnormal
700-04	Feed motor error	Cycle main power switch off/on	Feed motor defective, Harness disconnected, Harness broken or defective, Motor blocked
700-05	Transport motor error	Cycle main power switch off/on	Feed motor defective, Harness disconnected, Harness broken or defective, Motor blocked
700-06	Transport motor error	Cycle main power switch off/on	Feed motor defective, Harness disconnected, Harness broken or defective, Motor blocked
700-07	Scan motor error	Cycle main power switch off/on	Feed motor defective, Harness disconnected, Harness broken or defective, Motor blocked
700-09	Exit motor error	Cycle main power switch off/on	Feed motor defective, Harness disconnected, Harness broken or defective, Motor blocked
701-02	Pickup roller motor drive board error	Cycle main power switch off/on	Motor drive IC abnormal
703-01	Double-feed detection not operating	Replace sensors	Double-feed circuit or sensor defective, Harness disconnected, broken, defective
185-00	CIS communicatio n error	Cycle main power switch off/on	Communication harness between ADF and CIS loose, broken, defective. ASIC in CIS abnormal ASIC boot in CIS abnormal
186-00	CIS light element abnormal	Cycle main power switch off/on	At power on One or both connectors of CIS LED damaged During original feed Leads of CIS LED damaged ADF main control board defective

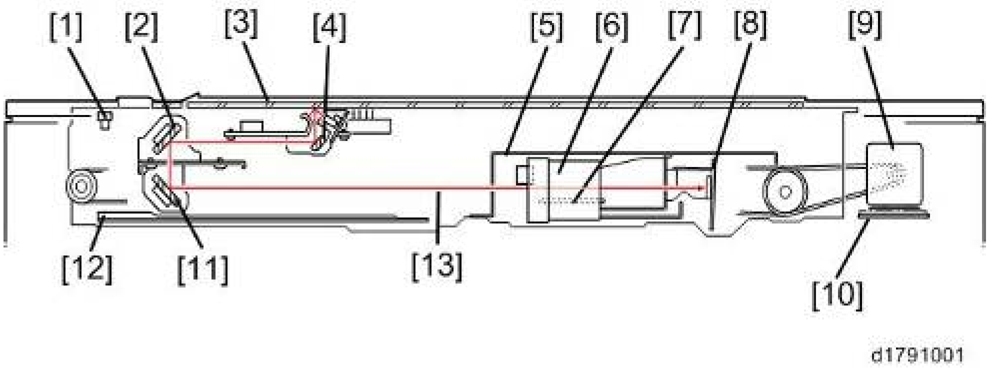
No.	Problem	Release	Cause
187-00	CIS black level confirmation error	Cycle main power switch off/on	CIS device abnormal
188-00	CIS white level confirmation error	Cycle main power switch off/on	CIS device abnormal CIS background white roller damaged, installed incorrectly
189-00	CIS gray balance adjustment error	Cycle main power switch off/on	CIS device abnormal Adjustment chart damaged, dirty, deteriorated

Note: Errors that occur twice in succession are treated as jams, three times in succession as SC errors.

3. SCANNER UNIT

3.1 MECHANISMS

3.1.1 LAYOUT



No.	Name	No.	Name
1	Scanner HP Sensor	8	SBU
2	2nd mirror	9	Scanner Motor
3	Exposure Glass	10	SIO
4	1st mirror	11	3rd mirror
5	Lens Block Cover	12	Anti-condensation Heater (option)
6	Lens Block	13	Scanning Path
7	IDB		

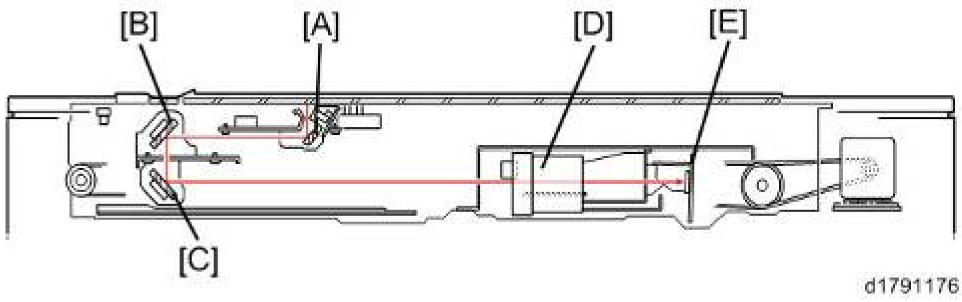
3.1.2 CONFIGURATION

Scanner	LED exposure lamp
	SBU (3-line CCD with 600 dpi resolution)
Scanning Mechanism	Scanner motor (dual-phase stepper motor)
	Wire pulleys
	Scanner HP sensor
Original Size Detection	APS (Length Sensor x1)
Miscellaneous	Anti-condensation heater (option)

3.2 DETAILS

3.2.1 SCANNER

This machine uses and LED lamp [A] as the light source. An LED lamp consumes little power, delivers ample amount of light after a short warm-up time, so it was selected over a Xenon lamp for this machine. The light from the exposure lamp to the CCD follows this path:

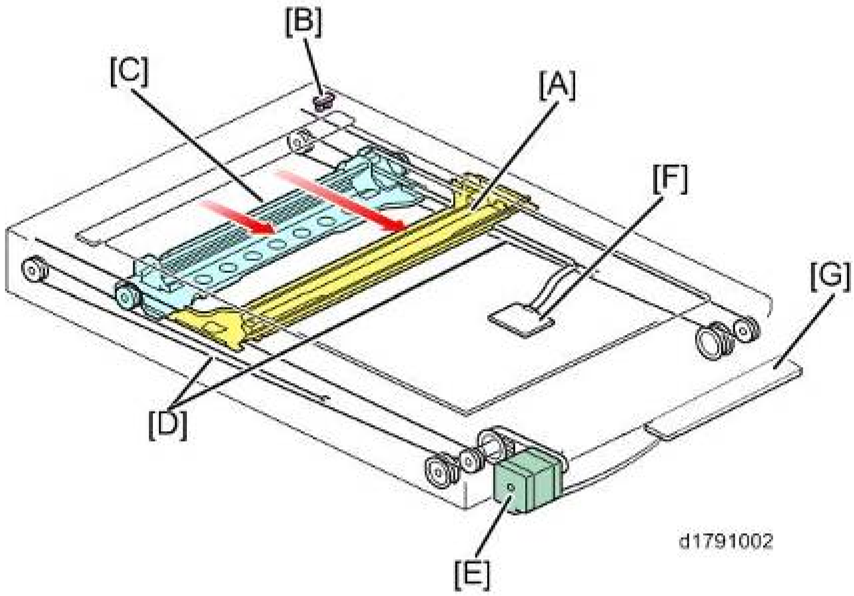


1st Mirror [A] > 2nd Mirror [B] > 3rd Mirror [C] > Lens [D] > CCD [E]

No.	Name
A	LED Lamp
B	Guide Plate
C	Reflector

- LED Lamp
  An LED lamp consumes little power, and delivers ample amount of light after a short warm-up time, so it was selected over a Xenon lamp for this machine.
- CCD
  Color CCD with three color mixing (RGB) with varied electric signals.
  Employs a CCD element capable of high 600 dpi resolution.
- Shading Correction
  A white standard seal is affixed to the rear scale which the machine uses to calibrate the white balance with light reflected from the LED exposure lamp as soon as the machine is turned on. Shading is done on the flatbed scanner one original at a time, regardless of whether the image is FC or B&W.
  When scanning with the ADF, shading correction is done before the first original is scanned, and then executed again at prescribed intervals (more than one minute), regardless of whether the originals are FC or B&W.

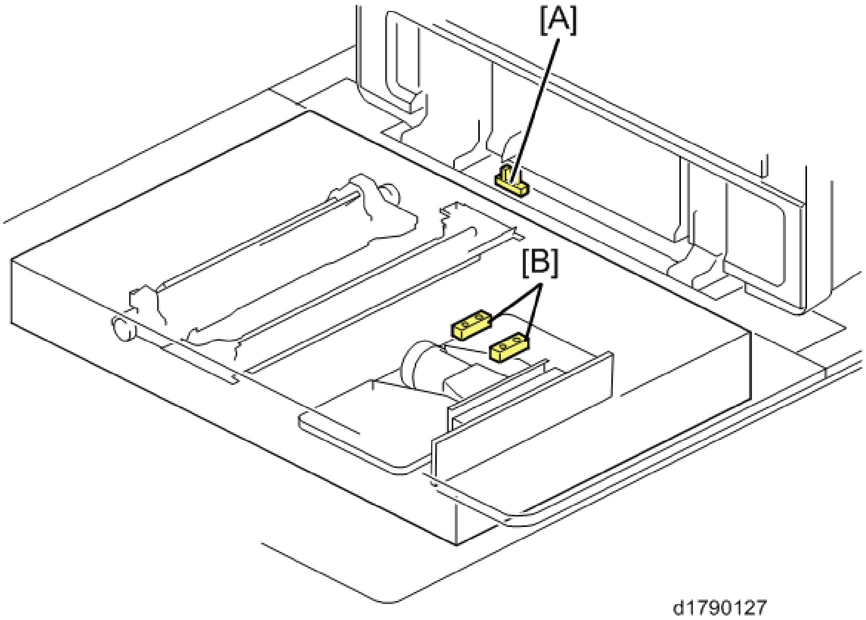
3.2.2 SCANNER DRIVE



No.	Name	No.	Name
A	1st Carriage	E	Scanner Motor
B	Scanner HP Sensor	F	IDB
C	2nd Carriage	G	SIO
D	Scanner Wire		

The movement of the scanner is controlled by wire pulleys driven by the scanner motor. The position of the scanner (1st carriage) [A] is controlled by the scanner HP sensor [B]. The scanner HP sensor [B] is positioned at the sheet-through document feeder scanning position.

3.2.3 ORIGINAL SIZE DETECTION



No.	Name
A	Platen Sensor
B	APS sensor

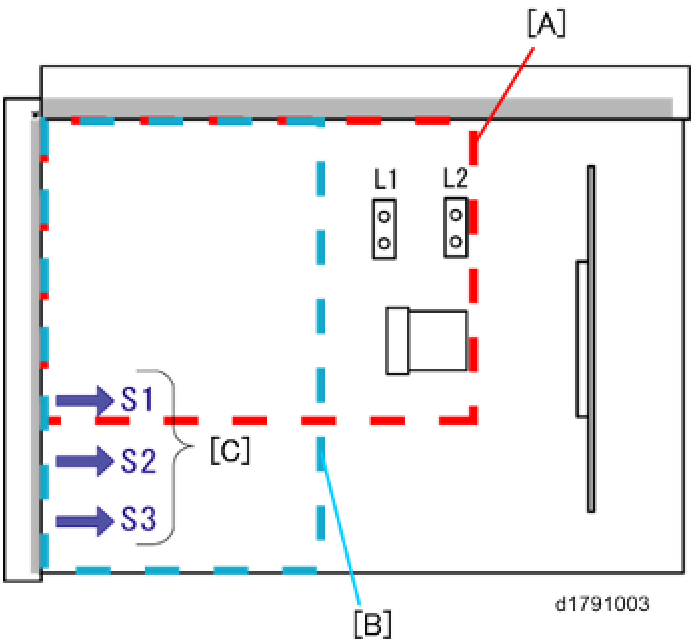
- The platen sensor [A] triggers original size detection when the platen is closed.
- One document length sensor [B] (a photosensor) is used to detect document length.
- The photosensor detects the area where shading is present and where it is absent, and then confirms the reading of the original length sensor as pre-scanning starts.
- When the status is "no shading", the original size detection data is used immediately after [Start] is pressed.

3.2.4 LENGTH DETECTION

The APS sensor detects original length. SP4301-001 (APS Confirm) can be used to confirm the status of each sensor used to detect original size. The displays for each original size viewed with SP4301-001 are described below.

Important

Due to the layout of the sensors, the sizes of originals smaller than B5 cannot be detected and the display shows only zeroes.



No.	Name
A	A4 SEF
B	A4 LEF
C	Original size detection area for pre-scanning

Size	L1 (APS)	L2 (APS)	SP4301-001 Display
A3/DLT	○	○	00000011
B4/LG	○	○	00000011
A4 SEF	○	○	00000011
LT SEF	○	—	00000001
A4 /LT LEF	—	—	00000000
B5 SEF	○	—	00000001
B5 LEF	—	—	00000000
A5/HLT SEF	—	—	00000000
A5/HLT LEF	—	—	00000000

3.2.5 WIDTH DETECTION

SP4310-001: Value of S1 position reading of R at CCD original scan	If the value is more than "18" then there is an original at S1.
SP4310-002: Value of S1 position reading of G at CCD original scan	
SP4310-003: Value of S1 position reading of B at CCD original	
SP4310-004: Value of S2 position reading or R at CCD original scan	If the value is more than 18, then there is an original at S2.
SP4310-005: Value of S2 position reading of G at CCD original scan	
SP4310-006: Value of S2 position reading of B at CCD original scan	
SP4310-007: Value of S3 position reading of R at CCD original scan	If the value is more than "18" then there is an original at S3.
SP4310-008: Value of S3 position reading of G at CCD original scan	
SP4-310-009：Value of S1 position reading of B at CCD original scan	

Size	Orient	S1	S2	S3
A3/DLT	SEF	—	—	○
B4/LG	SEF	—	○	—
A4/LT	SEF	○	—	—
A4/LT	LEF	—	—	○
B5	SEF	—	—	—
B5	LEF	—	○	—
A5/HLT	SEF	—	—	—
A5/HLT	LEF	○	—	—
B6	SEF	—	—	—
B6	LEF	—	—	—

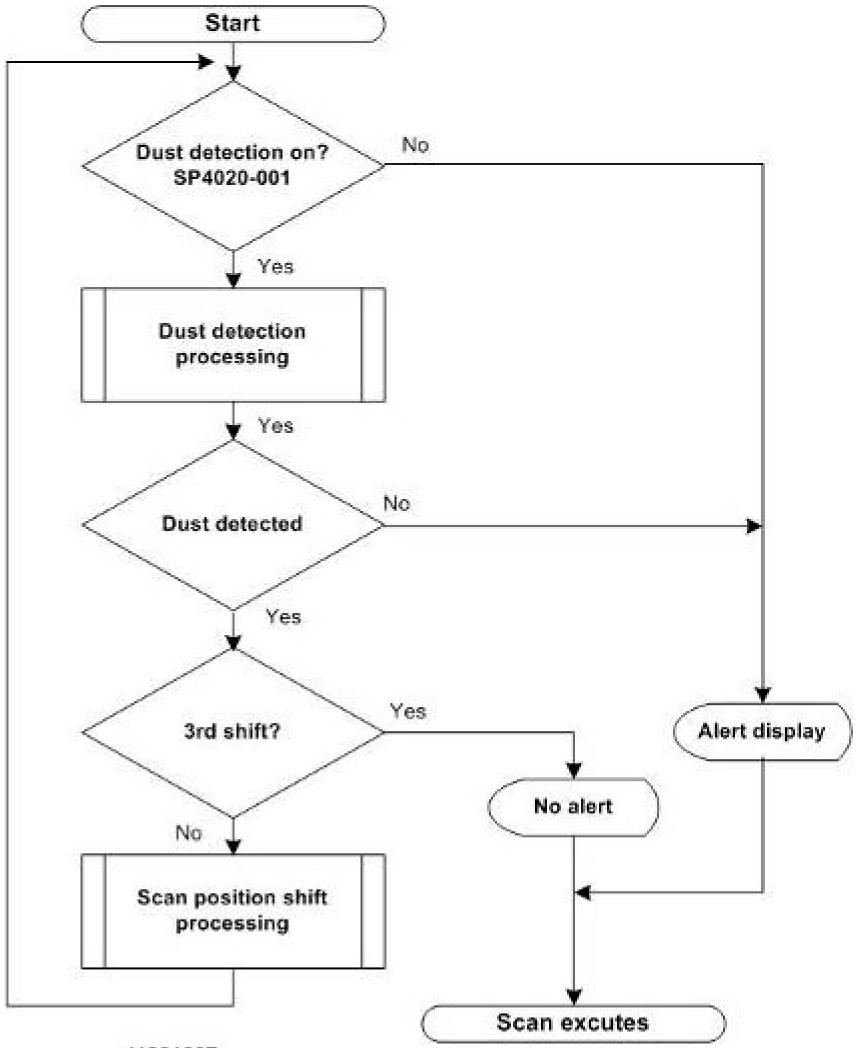
If the value detected by the CCD and displayed with SP4310-001 to 009 is greater than 18, then it is determined that an original is present in the width direction. The value that is displayed with this SP codes is always that of the most recent detection.

3.2.6 DUST, STREAK DETECTION

The machine checks for dust, streaking, and other matter at the ADF scan position after setting the original and pressing [Start]. Dust detection processing is done before starting feed of one job, and then it is determined if their are streaks in the image output. The operation flow is different, depending on how the following SP codes are set.

Related SP Codes

- **SP4020-001**: DF Dust Detection Setting. Select On/Off (Default: 0 DF dust detection OFF)
- **SP4020-002**: DF Dust Detection Setting Level Switching
- **SP4020-003**: DF Dust Detection Setting - Correction Level Switching
- **SP7852-001**: DF Scan Glass - Dust Detection Counter
- **SP7852-002**: DF Scan Glass - Dust Detection Counter



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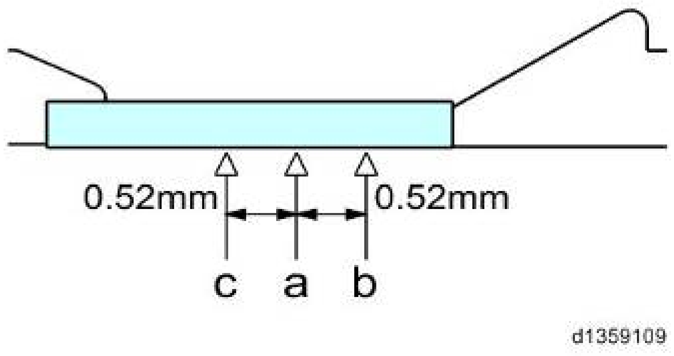
3.2.7 SCAN POSITION SHIFT

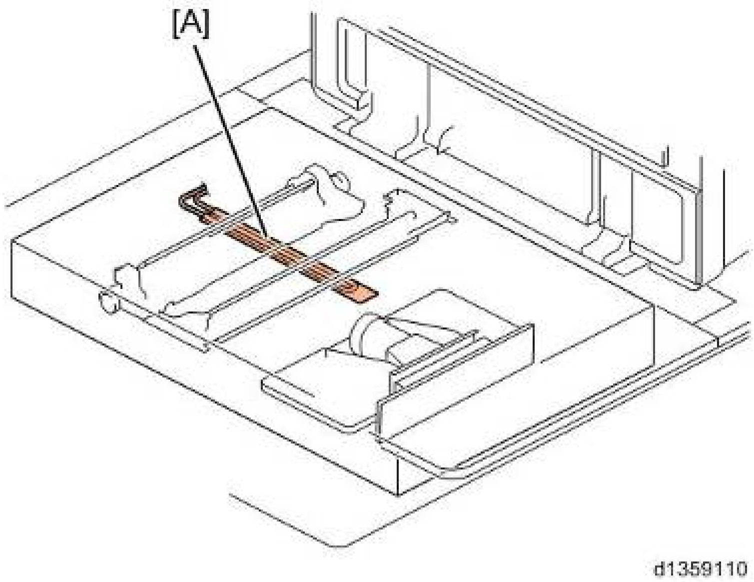
If it is determined that dust or streaking is present, the scanning position can shift to avoid the streaked area. The scanning area in the DF scan mode can be shifted from HP (default) to the right 0.52 mm (b), and to the left 0.52 mm (c):

a > b > c > a > b.



Normally, the shift is done a > b > c > a > b.

3.2.8 ANTI-CONDENSATION HEATER (OPTION)



No.	Name
A	Anti-condensation Heater

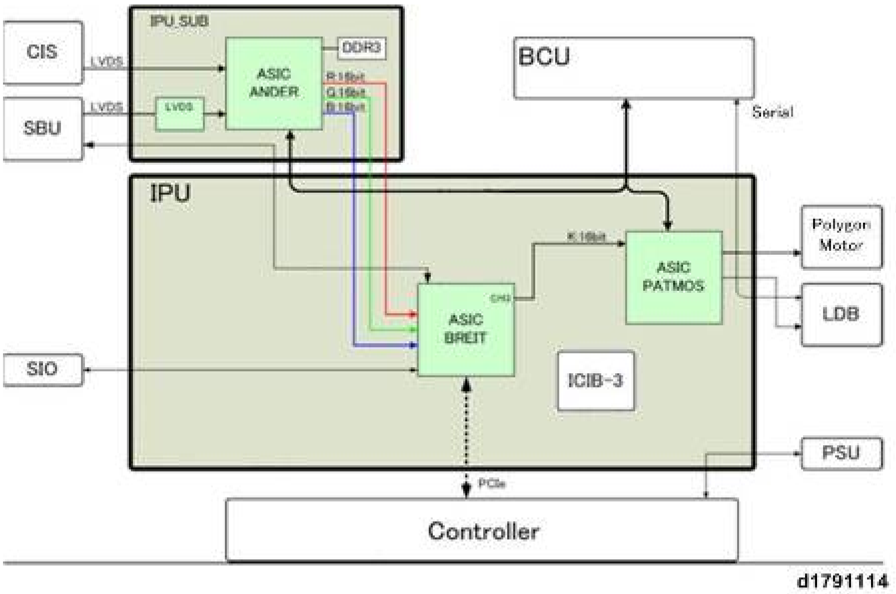
Condensation can form around the 1st, 2nd, and 3rd mirrors of the scanner after a cold start in areas where the ambient temperature is low, or condensation can form in areas where the humidity is very high, which can lead to streaking and other image quality problems.

- These problems can be solved by installation of a anti-condensation heater [A] directly under the scanner unit.
- When the machine is switched off with the operation switch at the end of the work day, the heater will switch on to prevent condensation from forming while the machine is idle.

4. IMAGE PROCESSING

4.1 OVERVIEW

4.1.1 BLOCK DIAGRAM



4.1.2 DETAILS

SBU (Sensor Board Unit)

The SBU converts CCD output to digital signals that are then sent to the IPU.

- **Scanner Data Processing**
  Scanner data processing includes the following AE functions: black level correction, white level correction, and gray balance correction.
- **Operation**
  Each of the 3-line (RGB) analog signals from the CCD is split into four (ODD, EVEN, F/L), sampled at the signal processing ASIC, and then converted to digital signals and stored by the 10-bit AD converter.
- **Stored Special Settings**
  The values of the SBU are stored in the BCU. These special values require readjustment after the lens block converts them.
  - SP4-008-001 Sub Scan Magnification Adjustment
  - SP4-010-001 Sub Scan Registration Adjustment
  - SP4-011-001 Main Scan Registration
  - SP4-688-002 Scan Image Density Adjustment 1
- **Preventing Dust Contamination with ADF Scanning**
  An SP code, SP4-688-002 (Scan Image Density Adjustment 1), is designed to prevent dust contamination of images scanned with the ADF.

- **Test Mode**
  An SP code can create and self-diagnostic test pattern for the SBU. To output this pattern from the scanner, select the SP code and then press [Start]. You can then visually check the quality of the print.

SP4-699-001 SBU Test Pattern Settings

0	Default - Normal Image Output
1	Test pattern output, fixed pattern output (682 digit)
2	Test pattern output, main scan gradation pattern (10-bit level, 2-step)
3	Test pattern output, sub scan gradation pattern (10-bit level, 2-line step)
4	Test pattern output, matrix pattern (20 x 10 mm grid pattern)

IPU (Image Processing Unit) Functions

- Scanner control
- Performs each type of processing required of the data signals from the SBU, and also outputs to the controller (memory) via the PCI bus.
- Receives image signals from the controller (memory) over the PCI bus, processes the signals, and then sends them to the LDB.
- Outputs ADF control signals during ADF scanning.
- Power and individual signal relay

- **Image Processing**
  The digital signal data sent from the SBU to the IPU board is processed for shading correction and line interval correction, and then the data is finally sent to the printer as 2-bit/pixel digital signals.
- **IPU Data Flow**
  For more about image processing flow, please refer to the block diagram above.

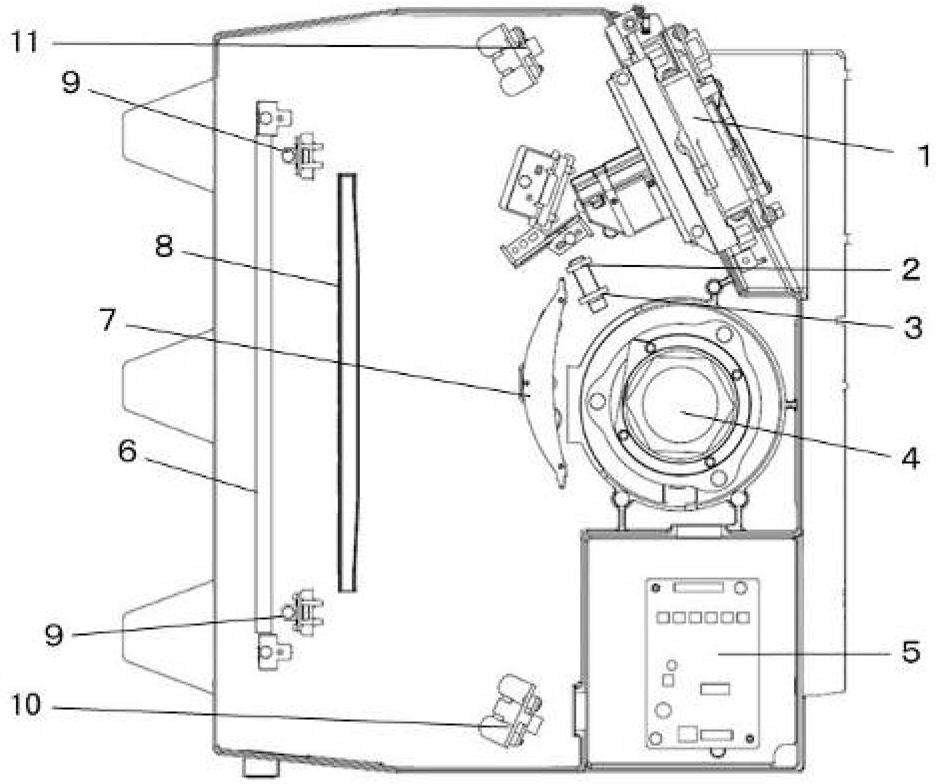
5. LASER UNIT

5.1 OVERVIEW AND MECHANISM

5.1.1 OVERVIEW

A polygon motor, LD unit, and laser synchronization detector (leading edge, trailing edge) comprise the laser unit of this machine.

5.1.2 LD UNIT LENSES, MOTOR, SENSORS



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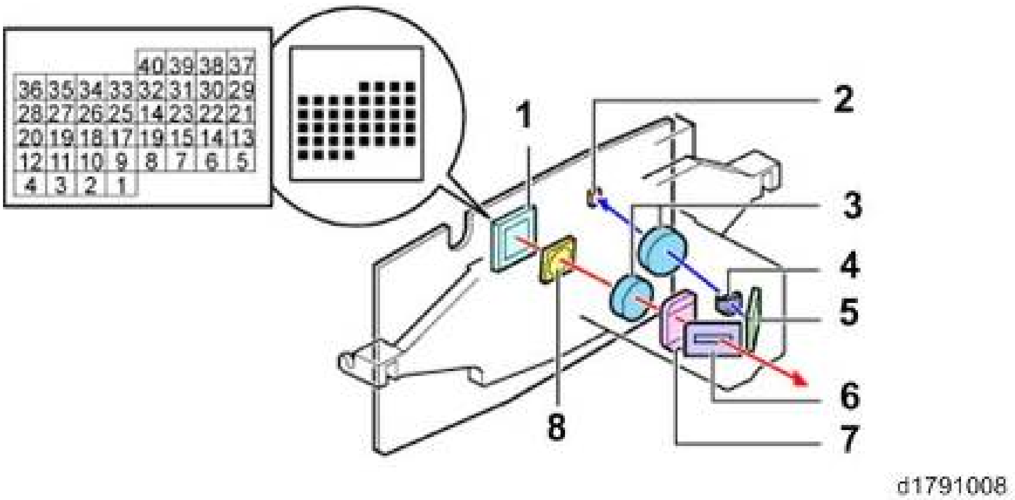
1	LD Unit	7	Lens1
2	Cylindrical Lens 1	8	Lens2
3	Cylindrical Lens 2	9	Beam Detector Mirror
4	Polygon Mirror	10	Synchronizing Detector Board (Leading Edge)
5	Polygon Motor PCB	11	Synchronizing Detector Board (Trailing Edge
6	1st Mirror		

5.2 DETAILS

Laser Unit

LD Unit	
▪ 40 Beam Exposure	40-beam technology uses VCSEL
▪ LD Safety Switches	Power circuit to LD unit cuts whenever front doors opened, toner bank door opened, or the front edge cover is removed
Line Scan Mechanism	
▪ Mirrors, Lenses	Each mirror, lens, reflects, guides laser beams
▪ Polygon Mirror Motor	Hexagonal mirror, rotates clockwise

5.2.1 LD UNIT MECHANISM



No.	Name	No.	Name
1	VCSEL	5	Mirror
2	Photosensor	6	Aperture
3	Collimating Lens	7	Lens (TCL)
4	Aperture	8	1/4 Wavelength Board

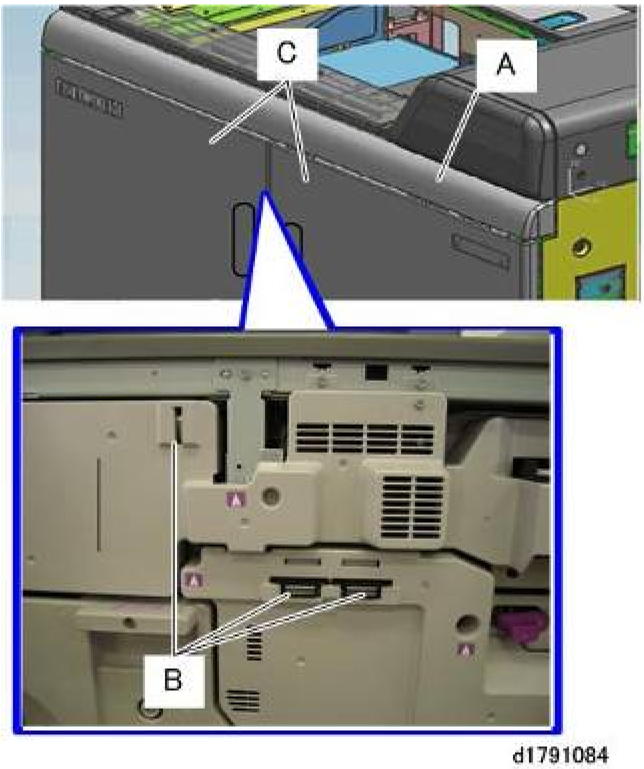
- The LD unit employs VCSEL (Vertical Cavity Surface Emitting Laser) technology. 40 channels (ch1 to ch4) emits 40 laser beams.
- Photosensors monitor laser output of the LD unit.
- Laser beams from the laser diode pass through and aperture, are reflected by mirrors, and then pass through the collimating lens where the photosensors detect the output.
- After the beams pass through the refraction grid, 1/4 wave length board, collimating lens, and aperture (slit), the sides of the polygon mirror in the path of the beams reflects them onto the drum.
- VCSEL slows the rotation of the polygon motor to suppress heat and electrical discharge.

5.2.2 40-BEAM LASER WRITING

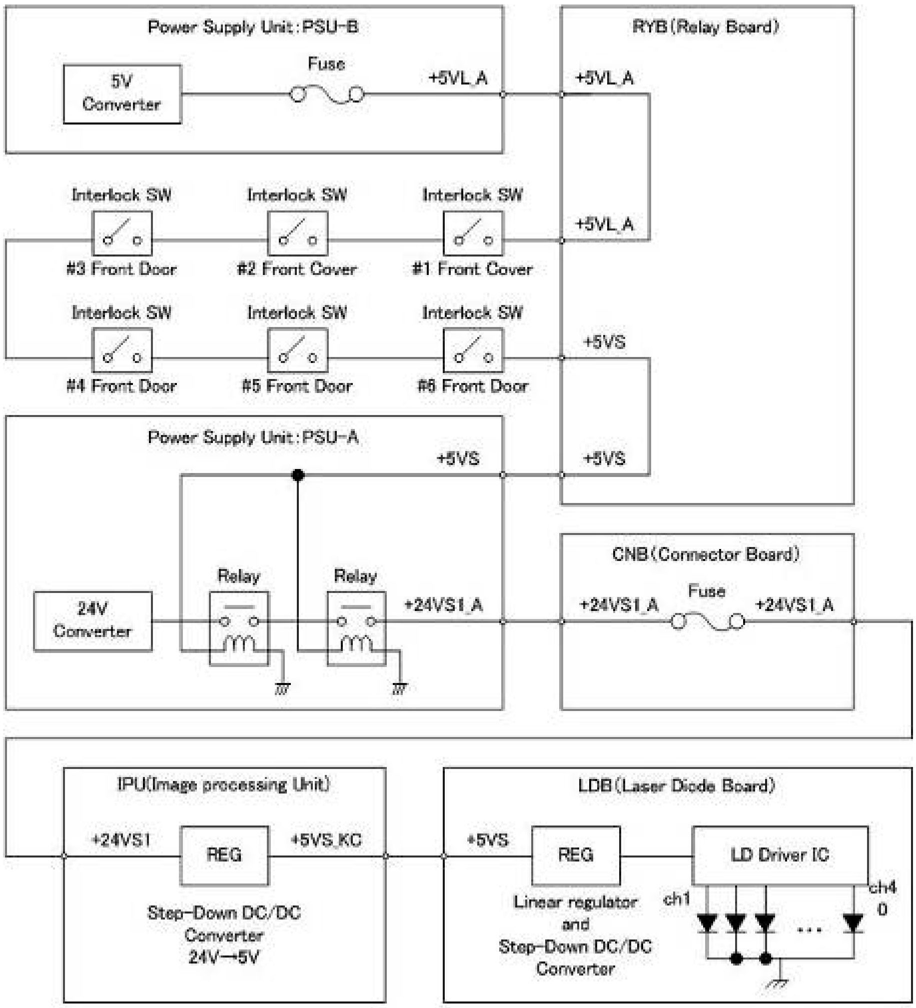
The following points highlight the VCSEL system.

- Low threshold current, low power consumption
- High resolution, precision scanning in sub scan direction (4800 dpi)
- Slowing the rotation of the polygon motor for 40-beam exposure (reducing heat) and noise reduction

5.2.3 LD SAFETY SWITCHES



When the front doors [C] are opened, or when the front edge cover [A] is removed, the safety switches [B] disable the laser unit to prevent it from accidentally firing. The safety switches are installed on the 5V power supply line from the PSU that supplies power to the laser unit. Opening either front door [C] or removing the front edge cover [A] opens the circuit and interrupts the power supply to the laser unit to prevent the laser from accidentally firing.



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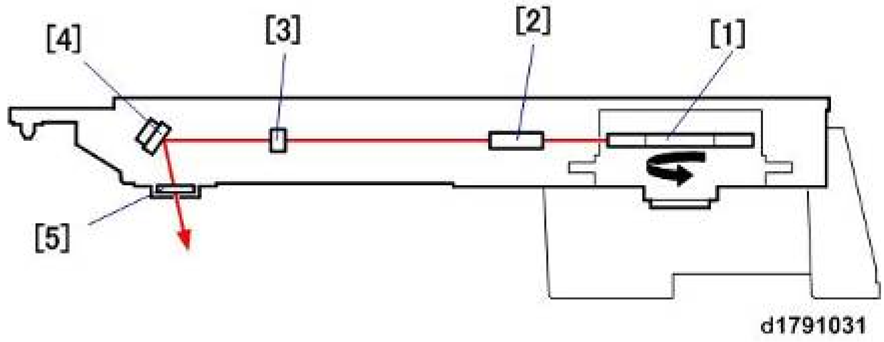
In this machine the mechanism that makes the laser unit operational is a 24V line interrupted using a 5V relay and then 24V is dropped to +5V using a regulator. To ensure the safety of the machine operators and service technicians, six switches prevent the laser beams from switching on accidentally. When either the right door or left door, or font cover (toner bank) is opened, or when the front edge cover is removed, the +5V line connecting each LD driver on the LD control board is disconnected to disable the laser units.

5.2.4 LINE SCANNING (MIRRORS, LENSES, POLYGON MIRROR MOTOR)



No.	Name	No.	Name
1	Polygon Mirror	4	1st mirror
2	Lens 1	5	Dust Prevention Glass
3	Lens 2	-	-

The operation of the LD unit is synchronized with the paper feed timing, and the laser beams fire through the cylindrical lens (where the beams are corrected), onto the facets of the polygon mirror (main scan writing), through lens 1 and lens 2, onto the 1st mirror, and finally through the dust protector glass onto the drum below.

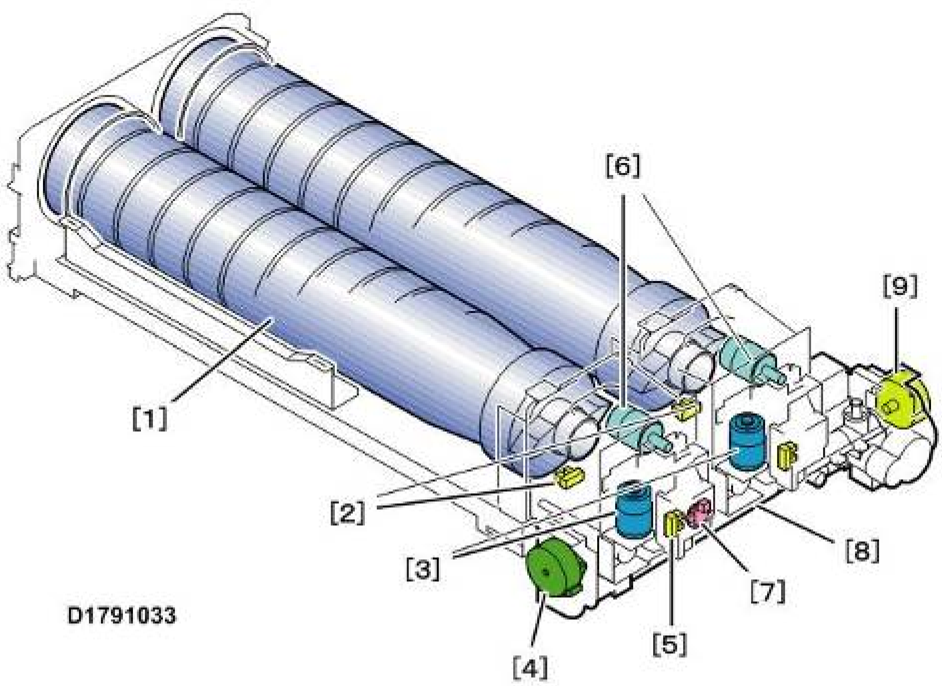
- The polygon mirror motor is the single motor that rotates the polygon mirror with 6 reflecting facets around its edge.
- Each facet on the edge of the rotating polygon mirror reflects 40 beams simultaneously onto the photoconductive surface of the drum.
- The speed of rotation of the polygon mirror motor for the models listed in the table below is the same for OHP transparency, thick paper, and normal paper feed.

Model	rpm
RICOH Pro 8100S	29156
RICOH Pro 8110S	29528
RICOH Pro 8120S	30236

6. TONER SUPPLY UNIT

6.1 OVERVIEW AND MECHANISMS

6.1.1 LAYOUT



No.	Name	No.	Name
1	Toner Bottles	6	Bottle Inner Cap Motors (x2)
2	Bottle Set Sensors	7	Toner End Sensors
3	Bottle Motors (x2)	8	Sub Hopper
4	Toner Agitator Motor	9	Toner Feed Motor
5	Bottle Inner Cap Sensors (x2)	—	—

6.2 DETAILS

Toner Supply Unit

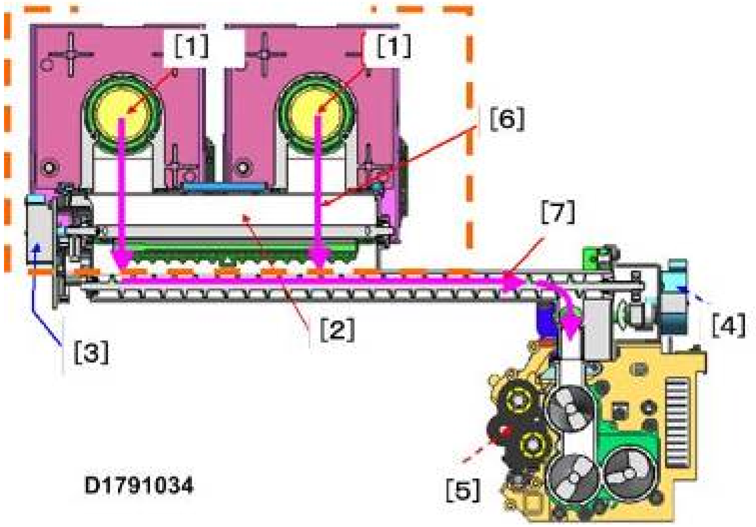
Toner Supply Mechanisms	
▪ Toner Bottle Drive	Bottle motors rotate toner bottles
▪ Sub Hopper	Toner agitator motor mixes toner in sub hopper
▪ Toner Transport	Toner feed motor supplies toner to development unit
▪ Toner Supply	Controlled with one of two methods: toner density active control method or pixel count method
▪ Bottle Lock Detection	Bottle set sensor detects when bottle is locked in place and ready for operation.

6.2.1 TONER BOTTLE DRIVE

When a toner bottle is set in its cradle:

- The toner hopper, the toner set sensor detects when it is locked in place, and then signals the inner cap motor to switch on and open the inner cap of the bottle.
- Each of the two toner bottles has its own bottle motor that rotates the bottle to feed toner from the bottle into the toner hopper.

6.2.2 TONER TRANSPORT



No.	Name	No.	Name
1	Toner Bottle	5	Development Unit
2	Sub Hopper	6	Toner filling from bottle to sub hopper
3	Toner Agitator Motor	7	From sub hopper to development unit
4	Toner Feed Motor		

The toner fed into the sub hopper is mixed by a coil driven by the toner agitator motor.

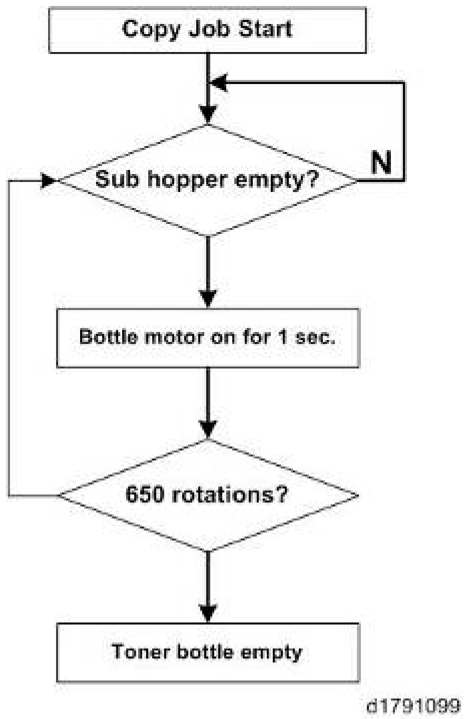
- The toner end sensor of the sub hopper detects when there is insufficient toner inside the sub hopper and signals the toner bottle motor to rotate the bottle and send more toner.
- The toner feed motor rotates the coil that feeds toner from the toner sub hopper to the development unit.

6.2.3 TONER END, NEAR END DETECTION

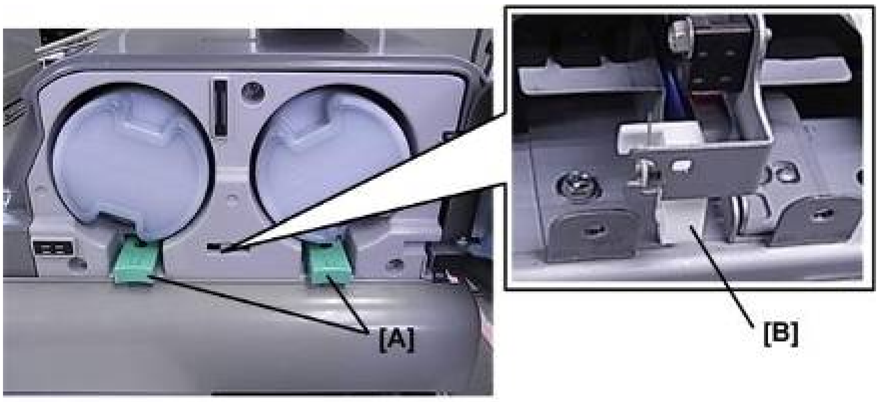
When the toner end sensor detects that there is no toner in the toner sub hopper:

- The bottle motor switches on for 1 sec. to rotate the toner bottle and dump more toner into the sub hopper.
- If the toner end sensor cannot detect toner in the sub hopper after 650 continuous rotations of the toner bottle , then the bottle is judged to be empty. When the bottle on the right is judged empty, toner supply switches to the bottle on the left.
- When both bottles are judged to be empty, or if only one toner bottle is installed and it is judged to be empty, then machine displays the near-end alert on the operation panel.
- Once the near-end alert appears, the machine can continue operating for approximately 1000 prints (A4 with 6% coverage), and then the toner end alert appears and the machine stops.

Toner Flow from Toner Bottle to Sub Hopper



6.2.4 BOTTLE LOCK DETECTION



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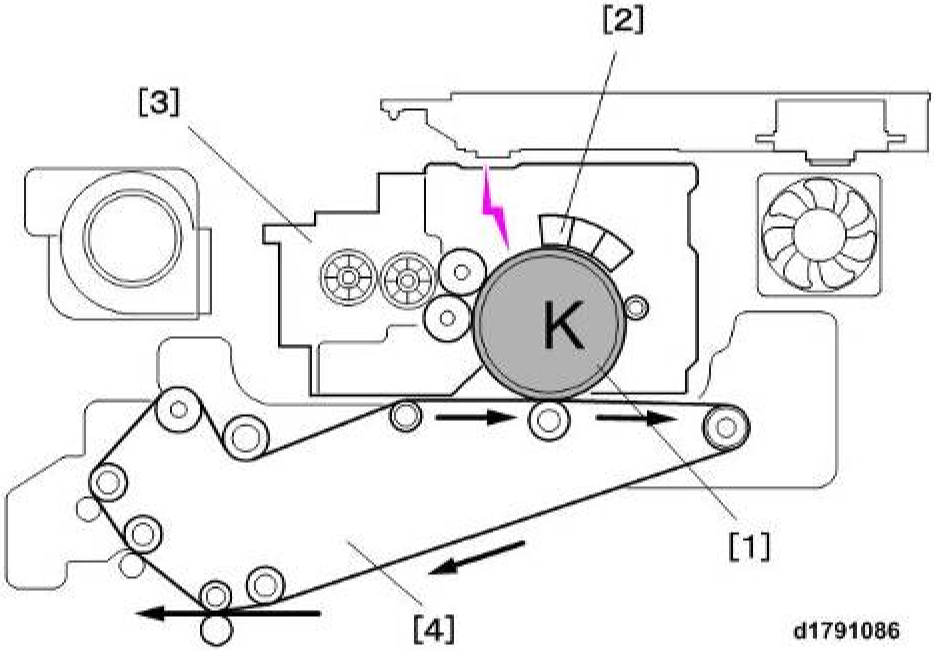
When the toner bottle is set, a lock mechanism locks it in place.

- Pressing release lever [A] unlocks the bottle so it can be removed.
- The interlock switch [B] detects when the toner bank door is opened to stop the rotation of the bottles, and this is also a safety device.
- The machine will continue to operate without pause after the toner near-end alert has appeared and the toner bank door is opened by the operator to replace the bottle.
- The operator should replace the bottle as quickly as possible because toner supply halts when the door is opened and will not resume until the door has been closed.

7. AROUND THE DRUM

7.1 MECHANISMS

7.1.1 LAYOUT



No.	Name
1	OPC Drum
2	CGB Unit
3	Development Unit
4	Image Transfer Unit

7.1.2 UNIT CONFIGURATION

Drum method	Drum charge method
Drum charge method	Three Scorotron wires suspended above crescent shaped wire mesh grid
Charge quenching method	LED quenching light
Drum cleaning method	Counter cleaning blade Lubricant bar, blade, brush method

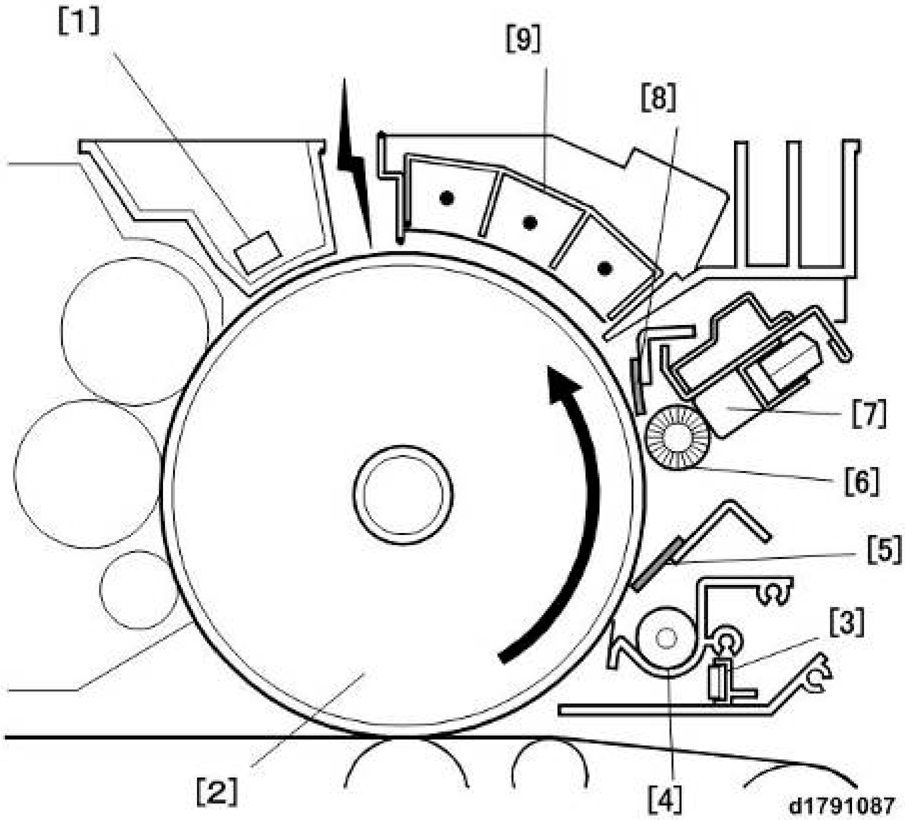
7.1.3 MECHANICAL CONFIGURATION

Around the Drum

Drum Charge Mechanism	
▪ Drum Charge, Quenching	Scorotron charge with drum charge quenching by LED
▪ Charge Wire Cleaning	Automatic cleaning of charge wire, electrical grid
Drum Drive	Drum motor drive
Drum Cleaning Unit	Counter blade method used in independent drum cleaning unit
Ventilation	Dust filter, fan provide clean ventilation for the unit
Development Unit	Ventilation with dust filter, ozone filter
▪ Toner	Pre-mixed developer, with replenishment at prescribed interval
▪ Toner Agitation Method	Three circulating augur screws transport toner to development unit
▪ Development Unit Drive	Development motor system
▪ Toner Density Control	TD sensor monitors toner density level
▪ Drum Ventilation	Cooling fans provide cooling
Lubricant End Detection	Two new lubricant end sensors on the ends of the cleaning unit

7.2 MECHANISMS AROUND THE DRUM

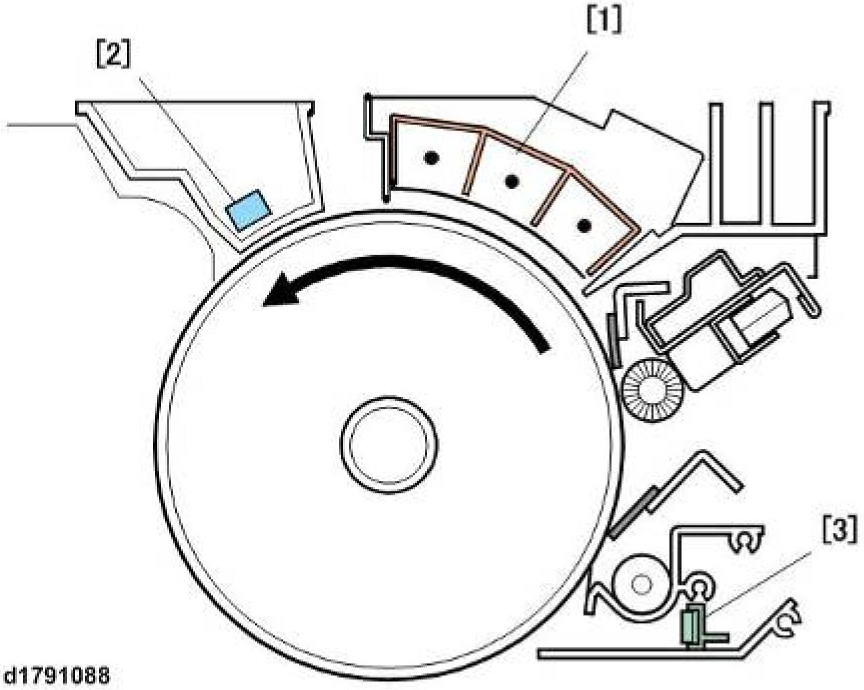
7.2.1 LAYOUT



No.	Name	No.	Name
1	Drum Potential Sensor	6	Lubricant Brush Roller
2	Drum	7	Lubricant Bar
3	Quenching Lamp	8	Lubricant Blade
4	Toner Collection Coil	9	Drum Charge Unit
5	Cleaning Blade		

7.3 DETAILS

7.3.1 DRUM CHARGE UNIT

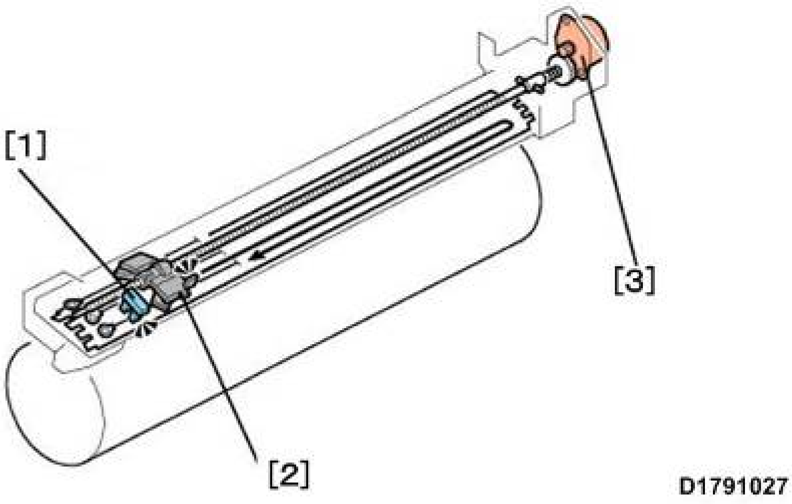


No.	Name
1	Drum Charge Unit
2	Drum Potential Sensor
3	Quenching Lamp

The drum charge system employs the Scorotron method, comprised of a charge wire and grid, to apply and even charge across the surface of the drum.

- A drum potential sensor above the drum monitors the charge evenly applied to the drum by charge wires and grid.
- The quenching lamp (an LED) mounted below the drum quenches the charge of the drum after every drum rotation to erase the drum for the next application of charge and image.

7.3.2 CHARGE WIRE CLEANING



No.	Name
1	Cleaning Unit HP Sensor
2	Wire Cleaner
3	Charge Wire Cleaner Motor

The charge unit uses a wire cleaning system to keep the charge corona wires clean and free of dust that can cause uneven charging of the drum service and lead to poor image quality.

- When the wire cleaner motor switches on, the wire cleaning pads move from rear to front along the length of the wires to clean the wires and grid.
- After cleaning the cleaning pads move to the cleaning pad HP sensor and then stop.
- The charge corona wires are cleaned automatically after every 6,000 printed pages.

7.3.3 RELATED SP CODES

- SP2-220-001 Charger Cleaner Operation Start
  Executing this SP code cleans the charge wire automatically.
- SP2-221-001 Charge Operation Mode
  Allows selection of the timing for automatic cleaning of the charge coronal wires.

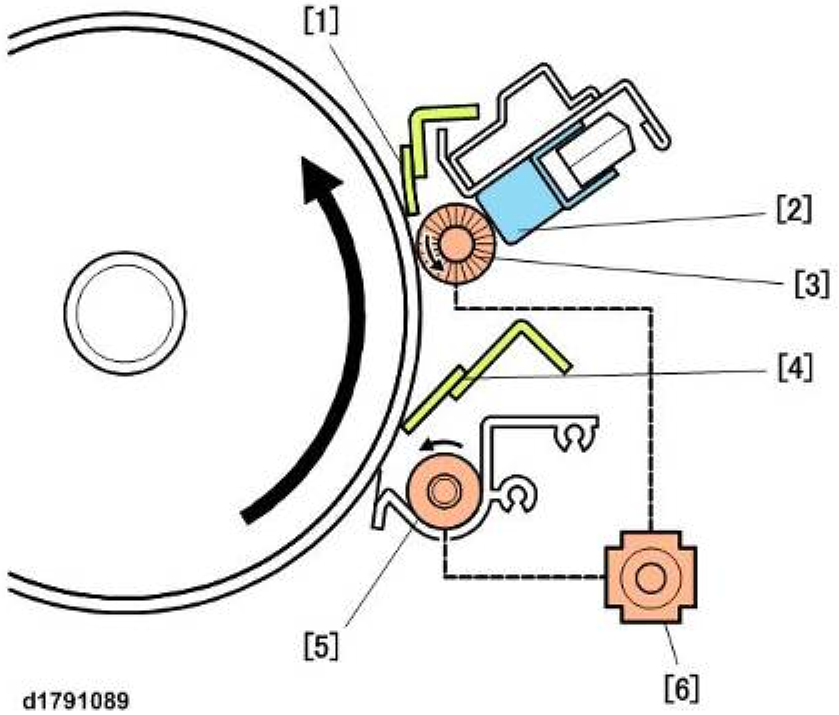
0:	No cleaning, charge corona wires can be cleaned by execution of SP2-220 only.
1:	Cleaning done when process control is executed after the prescribed number of prints (p). Wire cleaning precedes process control execution. Executes based on the number of pages prescribed by SP2-221-002.
2:	Cleaning executes automatically after count exceeds prescribed number of pages, at the end of job in progress. Executes based on the number of pages prescribed by SP2-221-002. Default: 6,000 prints

- SP2-221-002 Charger Cleaner Operation Interval
  This SP specifies the number of pages for the charge wire cleaning interval (p).
  Default: 6,000 pages Range: 100 to 100,000 pages Step: 100 pages
- SP2-221-003 Charge Cleaner Count Display
  Displays the total number of cleanings, both automatic and those done with SP2200-001..
- SP2-221-004 Charge Cleaner Count Clear
  This SP clears the charge cleaner count display (SP2-221-003 data). Clears the count for the number of cleanings performed after the charge cleaner unit is removed and then re-installed in the machine. This counter should be cleared immediately after charge unit or corona wire replacement.
- SP9-900-001 Total Charge Cleaner Unit Cleanings
  Displays the total number of pages (service life of the charge cleaning unit count).
- SP9-900-001 Total Charge Cleaner Unit Cleaning Clears
  This SP clears the charge cleaner count display of SP9-900-001.

7.3.4 DRUM DRIVE

The drum unit is driven by a dedicated drum motor. The same motor is not used to drive the development unit in order to reduce load on the motor to ensure improvement of image quality.

7.3.5 DRUM CLEANING UNIT



No.	Name	No.	Name
1	Lubricant Blade	4	Cleaning Blade
2	Lubricant Bar	5	Toner Collection Coil
3	Lubricant Brush Roller	6	Drum Cleaning Motor

A drum cleaning motor drives a common gear train which in turn drives the lubricant roller and toner collection coil.

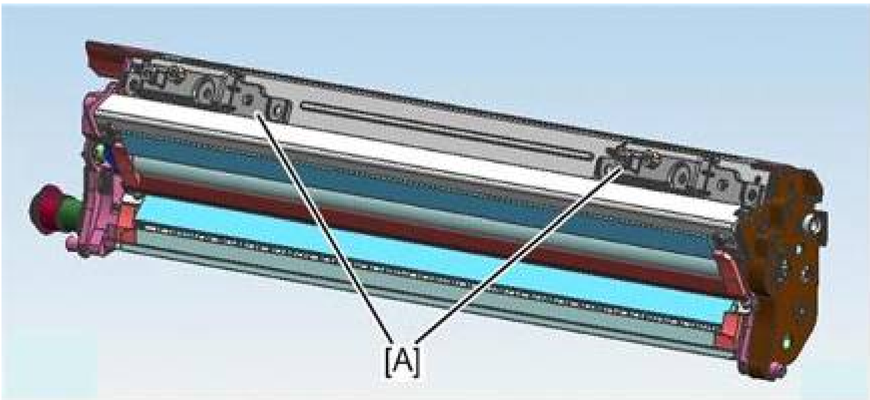
- A cleaning counter blade cleans paper dust and toner from the surface of the drum.
- A lubricant bar and lubricant roller apply lubricant to the surface of the drum to improve the efficiency of drum surface cleaning.
- Paper dust and toner cleaned from the surface of the drum drop into a rotating toner collection for transport to the toner collection bottle.

7.3.6 LUBRICANT END DETECTION

The drum cleaning unit is provided two devices to detect when the drum lubricant (provided on the lubricant bar to prevent deterioration of drum surface) is depleted.

Lubricant End Detection Specifications

Status	Content
Lubricant mechanical detect	Detects mechanical feeler pressing against bar
Lubricant near-end	After mechanical feeler detects, another 10 km (A4 LEF or about 25 kP) of machine running is allowed, and then a message on the operation panel alerts the operator that the lubricant bar is nearly gone.
Lubricant end	The lubricant end alert is issued 40 km (A4 LEF or about 100 kP) of machine usage past the appearance of the near-end alert and the machine stops. The machine alerts the operator that the lubricant bar must be replaced.



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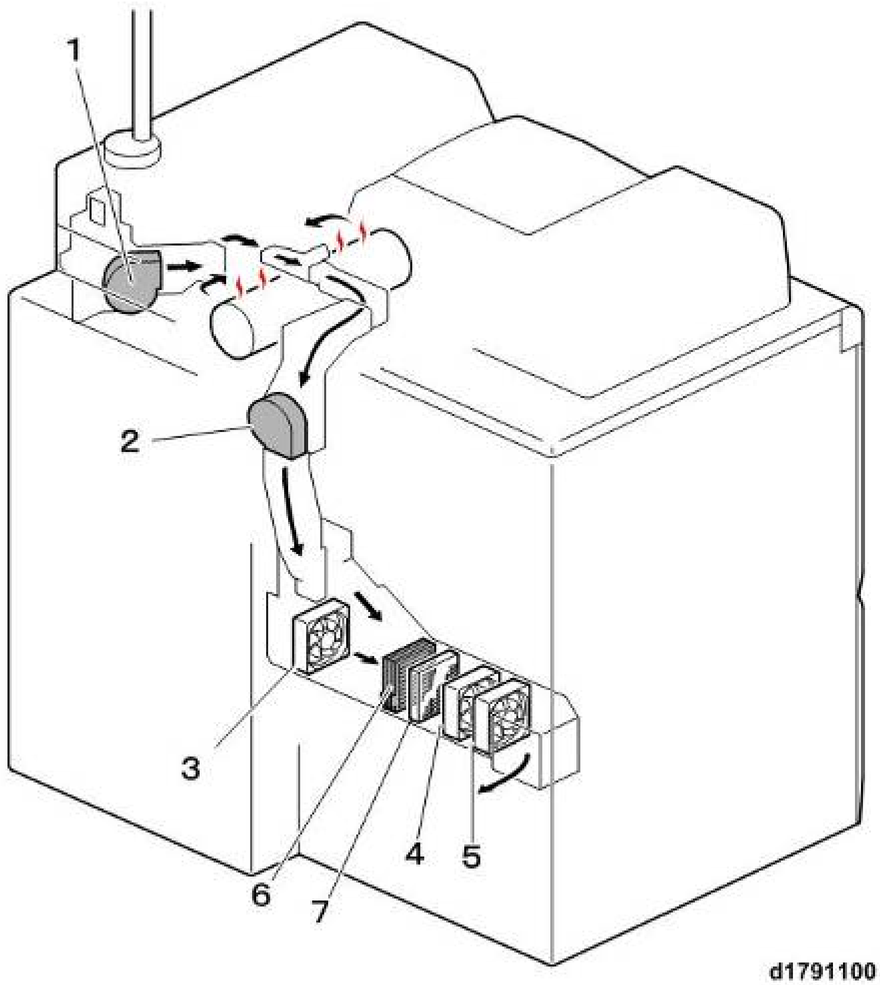
- The lubricant end sensors [A] are mounted at the top of the unit behind the lubricant blade.
- One is mounted at the front, and another at the rear, and either one can trigger a near-end alert.

7.3.7 VENTILATION



No.	Name
1	Ozone Air Intake Fan
2	Ozone Air Exhaust Fan
3	Fusing Transport Exhaust Fan
4	Fusing Exhaust Fan: Upper
5	Fusing Exhaust Fan: Lower
6	Fusing Exhaust Filters
7	Ozone Filters

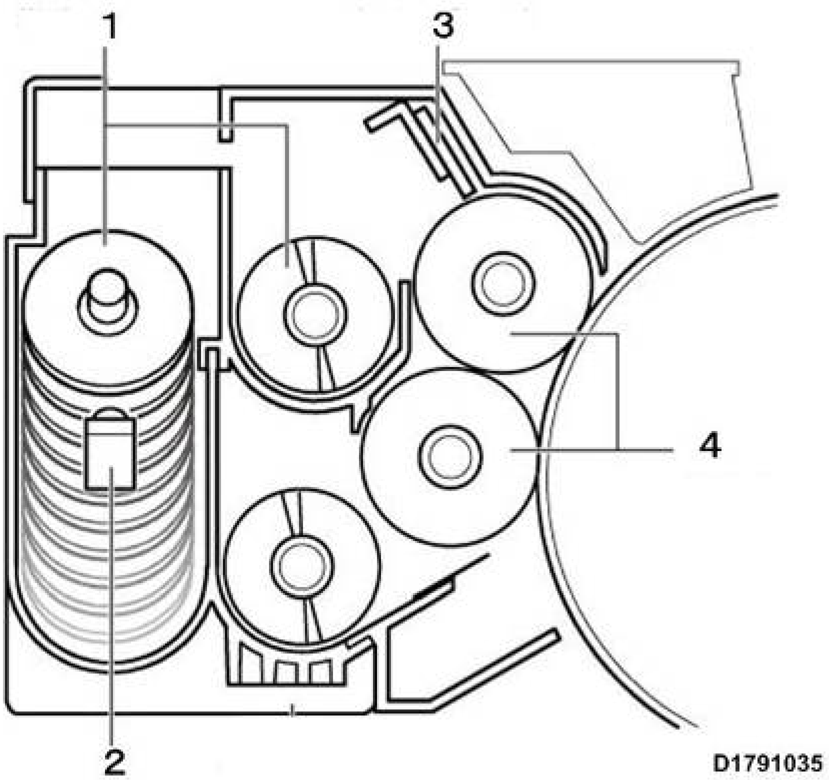
The drum cleaning unit has a fan and ozone filter to pull away heat and ozone generated by the charge corona unit and send it out of the machine.

- The ozone laden air is filtered through both an air filter [6] to remove dust and an ozone filter to neutralize the ozone.
- The air passes through another ozone filter in the air duct before it finally passes out of the machine.

8. DEVELOPMENT UNIT

8.1 DEVELOPMENT UNIT MECHANISM

8.1.1 LAYOUT (ROLLERS, MOTOR, SENSORS



No.	Name	No.	Name
1	Transport Augur	3	Doctor Blade
2	TD Sensor	4	Development Sleeve

8.1.2 UNIT CONFIGURATION

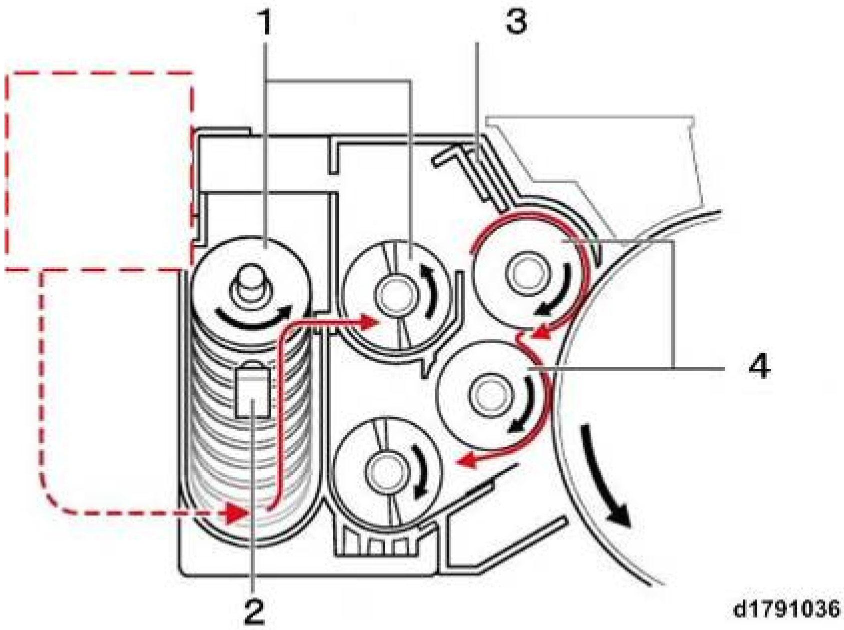
Development Method	Dual element, two-step development, circulating dry toner
Toner/developer mixing	Tri-axel augur method
Developer unit drive	Development motor comprises single, independent drive
Development bias	Applied with CGB power pack

8.1.3 DETAILS

The development system of this machine uses pre-mixed toner and developer to ensure the consistency of image density, and during machine operation older toner is replaced with newer toner.

- In the past developer has replaced at prescribed intervals in order to avoid problems with image quality experienced with earlier dual-element developers due to deterioration of the carrier over time.
- This practice resulted in replacing developer at shorter intervals which led to undesired fluctuation in image quality.
- In the toner supply system of this machine there is only a small amount of carrier mixed with the toner, and new developer is supplied in small increments to avoid deterioration of the carrier in order to stabilize image quality and prolong the service life of the developer.
- About 7% of the developer is carrier.

8.1.4 TONER AND DEVELOPER MIXING

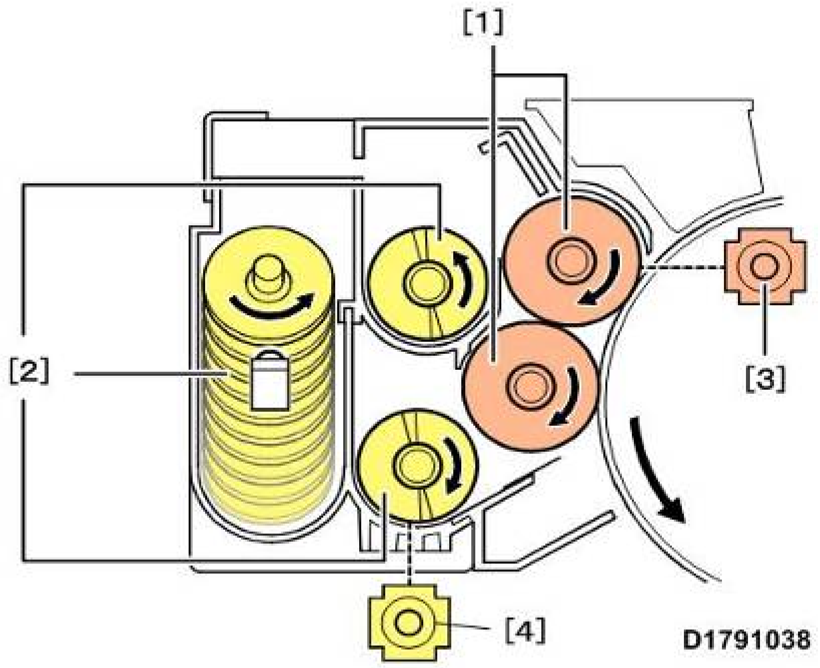


No.	Name	No.	Name
1	Transport Augur	3	Doctor Blade
2	TD Sensor	4	Development Sleeve

Toner that is moved from the toner bottle to the toner supply unit, and then to the development unit is transported by two augurs that mix the toner with the developer until the mixture reaches the development sleeve roller.

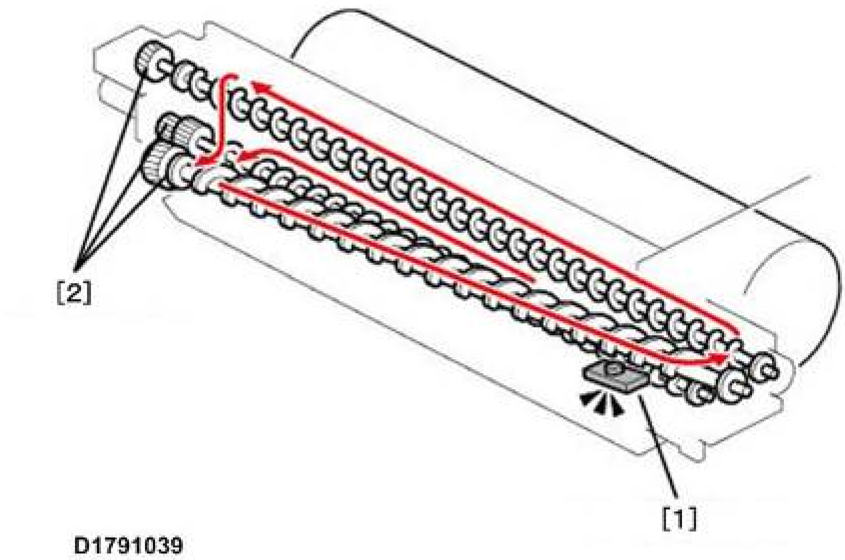
- The developer (toner carrier mixture) is smoothed to even thickness on the development sleeve by the doctor blade before the toner is passed onto the surface of the drum.
- There are two development sleeve rollers, if the supply of toner to the development sleeve above is insufficient then the development sleeve below can make up for the deficiency.
- Any carrier from the developer that adheres to the drum is removed collected by the toner collection roller.
- The developer transported y the development sleeve roller and toner collection roller falls into the transport augur below and is circulated.

8.1.5 DEVELOPER UNIT DRIVE



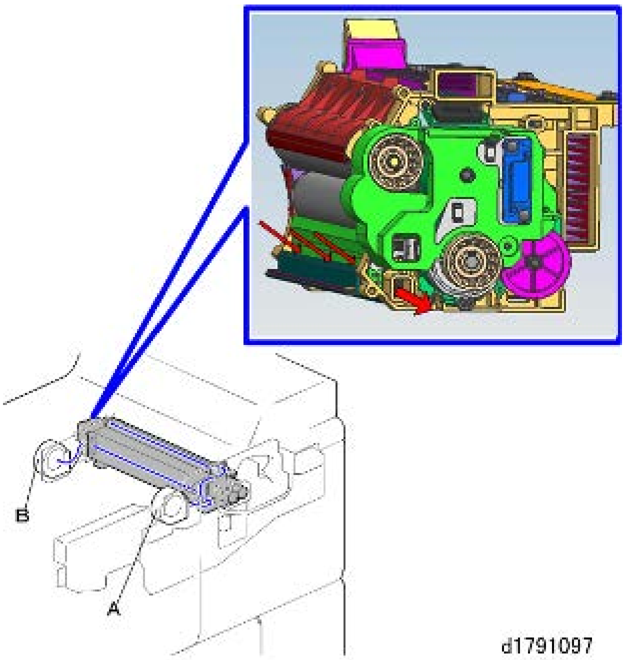
No.	Name	No.	Name
1	Development Roller	3	Development Motor
2	Transport Augers	4	Toner Agitator Motor

This shows how the two development sleeves, three transport augers, and toner collection coil are driven.



A toner density sensor [1] is located at the higher end of the canted toner collection coil, opposite the driven gears [2].

8.1.6 VENTILATION

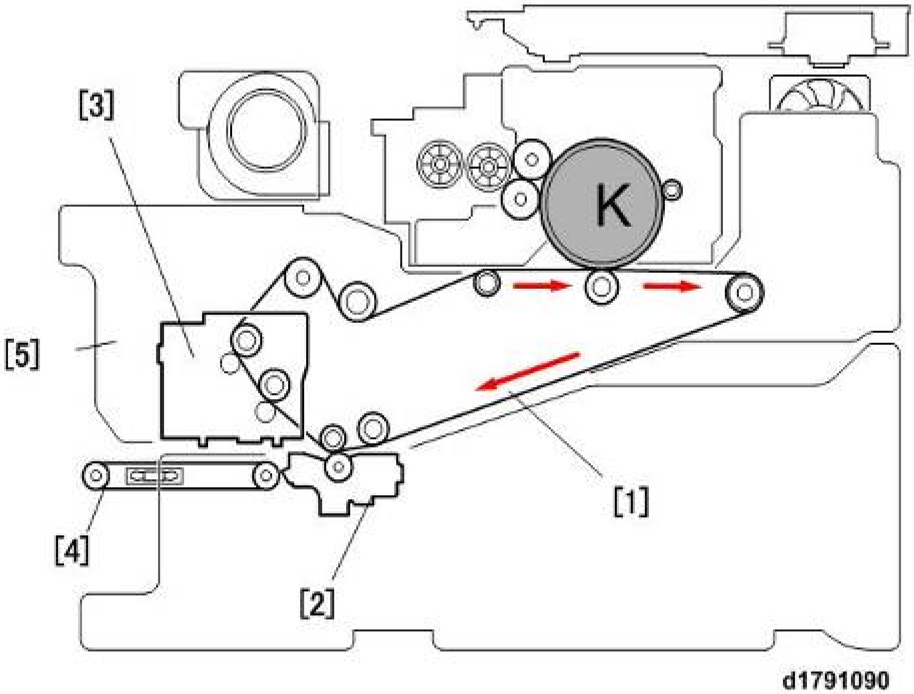


Two fans cool the development unit, one at the front [A] and one at the rear [B]. Fan [B] also prevents toner scatter by suctioning toner from below the development unit.

9. IMAGE TRANSFER UNIT

9.1 OVERVIEW AND MECHANISM

9.1.1 OVERVIEW



No.	Name
1	ITB (Image Transfer Belt
2	PTR (Paper Transfer Roller) Unit
3	ITB Cleaning Unit
4	PTB (Paper Transport Belt) Unit
5	ITB Unit

The image transfer belt (ITB) and ITB cleaning unit comprise the image transfer unit.

- The image is first transferred from the drum to the image transfer belt and then carried to the PTR unit. At the PTR unit the image on the image is taken from the belt and transferred to paper.
- The paper is separated from the ITB and then transported over the PTB unit to the fusing unit.

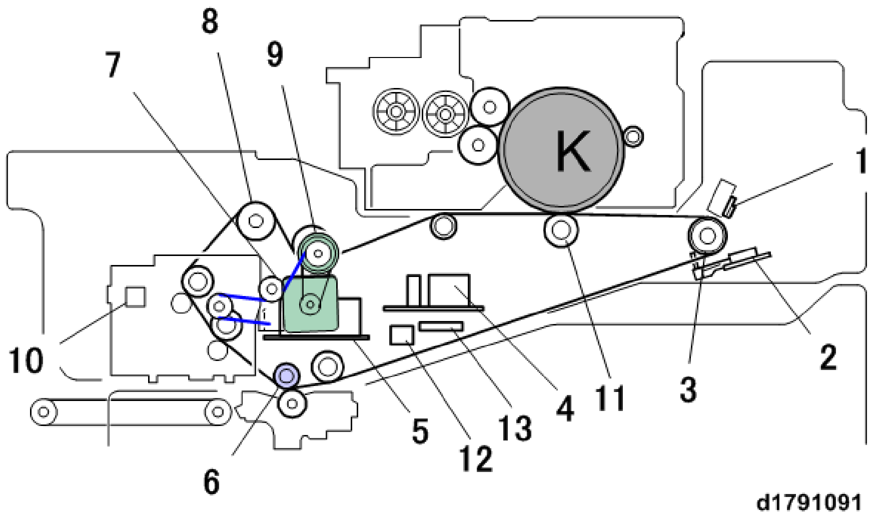
9.1.2 MECHANICAL CONFIGURATION

Image Transfer Unit

Image Transfer Mechanism	
▪ ITB Unit Drive	ITB is driven by the transfer belt motor
▪ Image Transfer Bias	Bias applied to the ITB
▪ Belt Position Correction	One motor to keep the belt centered
▪ Belt Ventilation	Cools the ITB unit
▪ ID Sensor Cleaning	A fan keeps the surface of ID sensor clean
Belt Cleaning Mechanism	
▪ ITB Cleaning	Counter blade system
▪ Belt Lubrication	Lubricant bar, lubricant brush roller, lubricant blade system
Paper Transfer Mechanism	
▪ Image to Paper Transfer	Bias applied to PTR pulls image from belt to paper
▪ Paper Separation from ITB	Applied quenching bias and curvature separation separate paper from ITB
▪ PTR Cleaning	Counter blade system
▪ PTR Lubrication	Lubricant bar, lubricant brush roller, lubricant blade system
▪ PTR Mechanism	Cam operated PTR separation
Transport to Fusing Unit	
▪ Transport Belts	

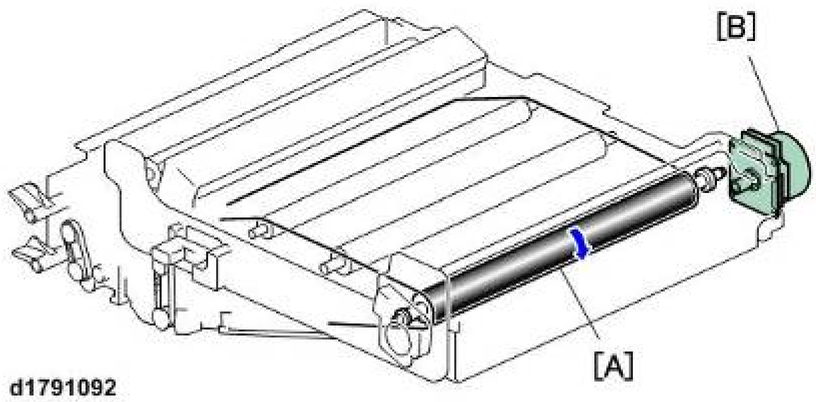
9.2 DETAILS

9.2.1 LAYOUT (BELT, MOTOR, SENSORS)



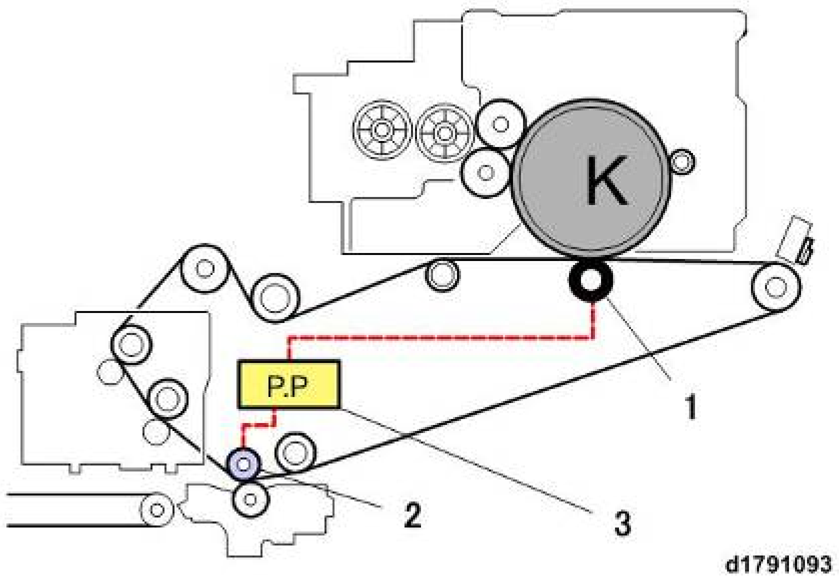
No.	Name	No.	Name
1	ID Sensor	8	Centering Roller
2	Belt Centering Sensor	9	Tension Roller
3	ITB Drive Roller	10	ITB Unit Set Sensor
4	TDRB (Transfer Drive Relay Board)	11	Image Transfer Roller
5	Transfer Power Pack	12	Thermostat
6	Transfer Roller Idle Roller	13	ITB Unit Heater
7	Belt Centering Motor		

9.2.2 DRIVE



The ITB is driven by gears, transport belt roller [A] and the transport belt motor [B]. The line speed of the belt is controlled by the drive board of the transport belt motor.

9.2.3 TRANSFER BIAS

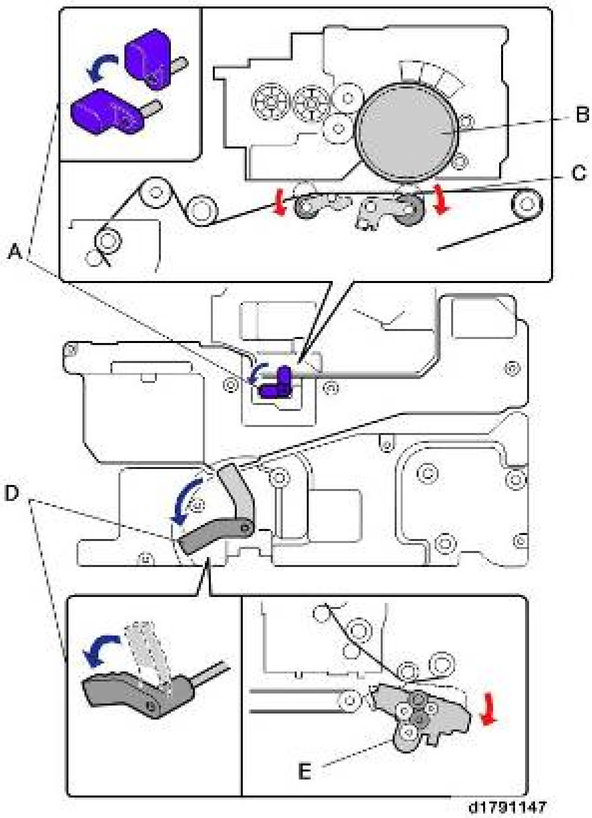


No.	Name
1	Image Transfer Roller
2	Transfer Roller Idle Roller
3	Transfer Power Pack

The bias charge that pulls the image from the drum onto the belt is applied by the transfer roller to the underside of the ITB.

- A negative bias is applied to the roller opposing the paper transfer roller to separate the paper from the belt (repulsive separation) in the PTR unit farther downstream.
- The bias at both points is supplied the same power pack, the transfer power pack.

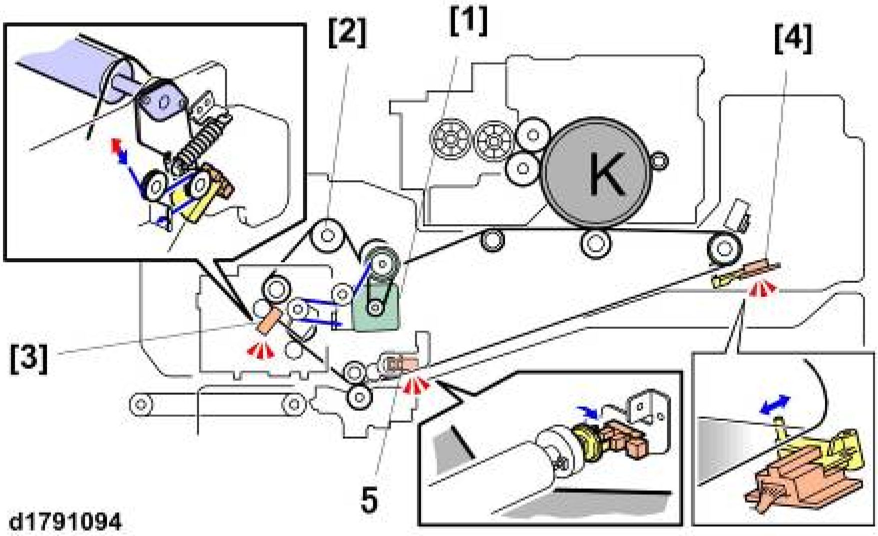
9.2.4 ITB AND DRUM SEPARATION



Normally the ITB is in contact with the ITB transfer roller and the drum (there is no motor mechanism to automatically change the position of the ITB).
There are two drum, transfer belt, and PTR separation mechanisms:

- Before the ITB unit is pulled out of the machine, pressure lever [A] must be lowered to separate the drum [B] and the belt [C], and the PTR unit must be removed to prevent scouring of the paper transfer roller.
- When lever [D] is lowered before pulling out the drawer, this separates the PTR from the drum and belt.

9.2.5 BELT CENTERING

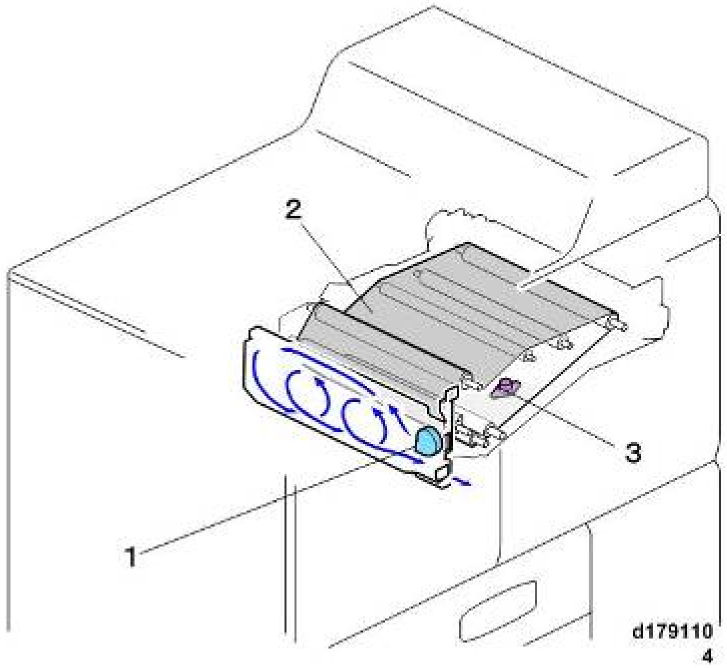


No.	Name
1	Belt Centering Motor
2	Belt Centering Roller
3	Belt Centering Roller HP Sensor
4	Belt Centering Sensor
5	PTR Separation Sensor

In this belt transfer system:

- The ITB must remain centered over the image transfer roller, so the unit is provided with a mechanism to do this.
- The belt centering sensor [4] monitors the rear edge of the ITB to make sure that it is straight.
- The belt centering sensor [4] switches on the belt centering motor [1] to operate the pulley that can nudge the belt centering roller [2] to straighten the belt.
- A belt steering HP sensor [3] switches off the belt centering motor after adjustment is done.
- If the position of the belt cannot be corrected with the belt steering roller HP sensor, or if there is no output from the belt centering sensor, the machine will issue SC471-01 (Belt Position Ready Timeout) and the machine will stop to prevent damage to the belt.

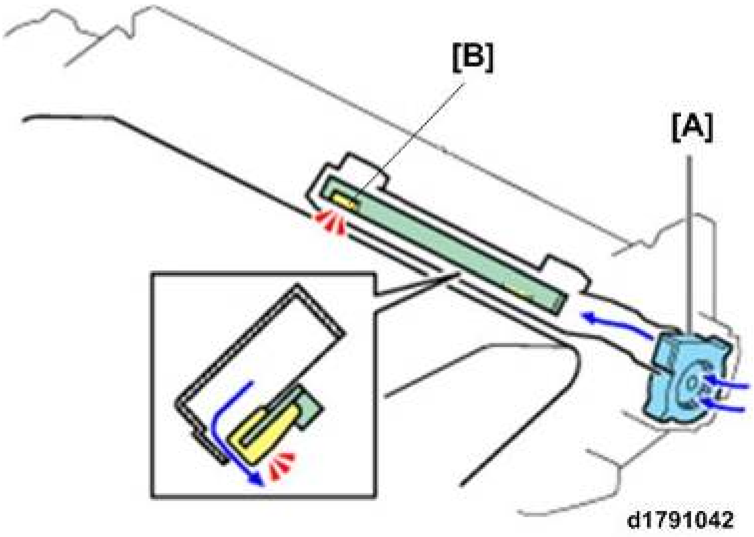
9.2.6 VENTILATION



1	Belt cleaning/cooling fan
2	ITB
3	Thermostat

A small fan both cleans and cools the area on the side of the ITB where the fusing unit generates heat. A thermostat [3] monitors the temperature around the ITB unit. This is a safety device. If the area around the ITB overheats, the thermostat will blow and shut down the system.

9.2.7 ID SENSOR CLEANING



A small fan [A] on the right side of the drawer keeps the detecting surface of the ID sensor [B] clean. The air blown over the surface of the ID sensor where it reads patterns on the belt below keeps it free of paper dust and other matter.

9.2.8 ITB HEATER, THERMOSTAT

The ITB unit is provided with a thermostat and heater.
The ITB heater is not connected before the machine leaves the factory.

- White spots in prints indicate that condensation has formed in the machine, and in this case the ITB heater should be connected.
- For example, this can occur when the machine is turned on in the morning after it has remained off during the night in a cold environment.
- The heater consumes about 5W after it is connected.

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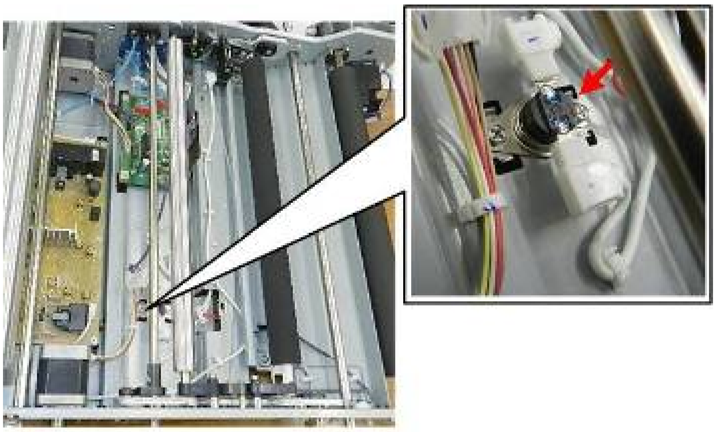
After the heater is connected at the back of the machine, operates as follows:

- The heater switches ON and heats the ITB when machine power is off, or when the machine is in low power mode, to prevent condensation from forming around the ITB unit.
- The heater switches OFF while the main power switch is on.
-



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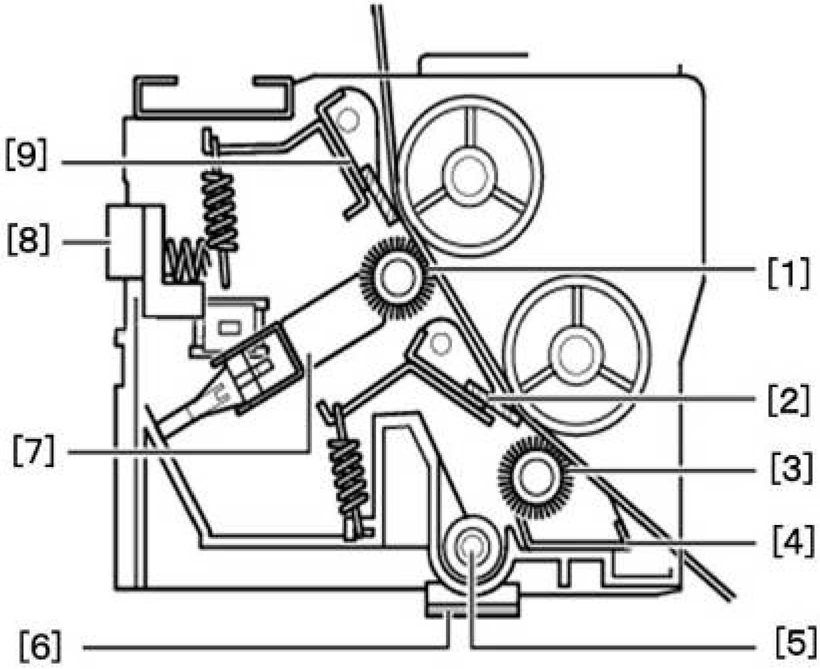
The thermostat monitors the temperature inside the ITB unit to prevent the unit from overheating.

- If the heater is OFF and machine temperature falls to 22^{o}C±5^{o}C, the ITB heater will switch ON.
- If the heater is ON and machine temperature rises to 32^{o}C±5^{o}C, the heater will switch OFF.

The thermostat performs no function when the heater is not connected.

10. ITB CLEANING UNIT

10.1 LAYOUT



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No.	Name	No.	Name
1	Lubricant Brush Roller	6	Used Toner Exit Port
2	Cleaning Blade	7	Lubricant Bar
3	Cleaning Roller	8	Stopper
4	Paper Dust Scraper	9	Lubricant Blade
5	Collection Coil		

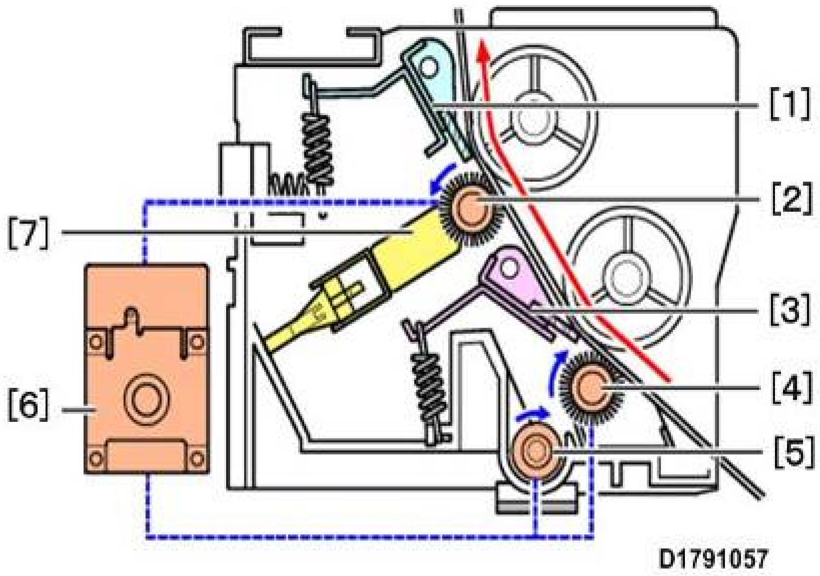
10.2 MECHANISM

10.2.1 ITB CLEANING

The ITB/PTR cleaning motor drives gears that rotate the cleaning roller, lubricant roller, and collection coil.

- Paper dust is cleaned from the ITB by the cleaning roller (a soft brush roller), and then the cleaning blade also cleans the surface of the roller.
- Paper dust and toner cleaned from the surface drop into a rotating collection coil for transport to the used toner collection bottle.

10.2.2 LUBRICANT APPLICATION



No.	Name	No.	Name
1	Lubricant Blade	5	Collection Coil
2	Lubricant Brush Roller	6	ITB/PTR Cleaning Motor
3	Cleaning Blade	7	Lubricant Bar
4	Cleaning Roller		

A cleaning blade and lubricant blade comprise the counter blade system. In order to improve cleaning, a light lubricant is applied evenly to the surface of the belt with the lubricant blade.

11. PROCESS CONTROL

11.1 OVERVIEW

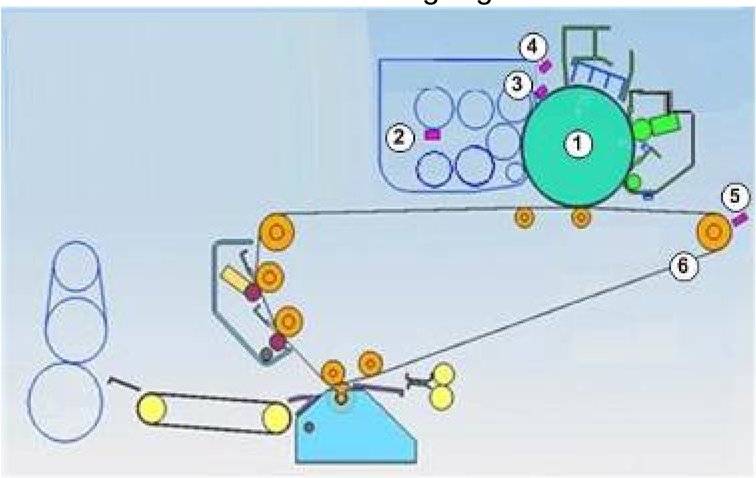
In the electrostatic copying process, many conditions such as changes in temperature, length of time the machine has remained idle, print mode selection (amount of toner on a page), etc., affect image quality, so the machine must frequently sample the machine's development ability (development gamma) at prescribed intervals, and then make adjustments based on these samplings in order to maintain optimum conditions for production of the best possible images.

This sampling of conditions around the drum, and then making adjustments in order to attain and maintain even, consistent image density is called process control. Process control can be divided into two separate phases:

- **Potential control**. Performs adjustments for development that affect basic image quality such as gradation levels, line width.
- **Toner supply control**. Standardizes the image density by controlling toner supply.

11.1.1 IMAGE CREATION COMPONENTS

The image creation engine of the machine employs an image-to-drum transfer system comprised of several elements working together.



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No.	Name
1	Drum
2	TD Sensor
3	Drum Potential Sensor
4	Temperature/Humidity Sensor (PCDU)
5	ID Sensor
6	ITB

The process control sensors are located around the drum. These sensors work together during potential control and toner supply control.

- **TD Sensor**. Mounted under the toner supply unit, measures the amount toner in the developer/toner mixture. This sensor as an embedded ID chip that records and stores information about the image density level.
- **Drum Potential Sensor**. A non-contact sensor above the drum that measures the surface electrical potential of the drum immediately after the drum has been charged by the charge unit.
- **Temperature/Humidity Sensors**. Two temperature/humidity sensors, one above the PCDU and one below the used toner bottle, monitor the temperature around the PCDU and ambient temperature.
- 

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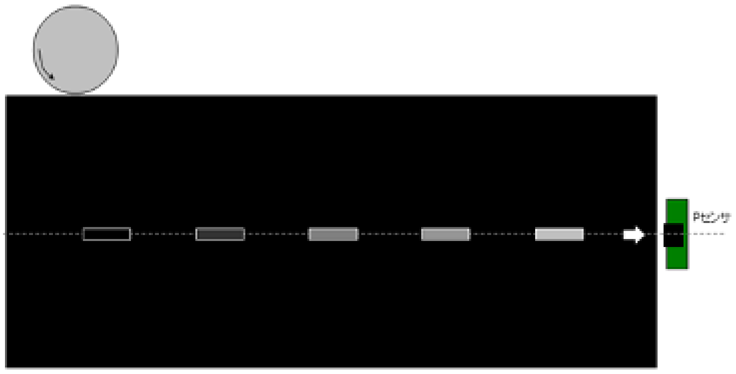
- **ID Sensor**. A non-contact sensor above the ITB that reads a pattern projected onto the drum to determine the amount of toner on the drum (level of image density).

11.2 PROCESS CONTROL PATTERNS



d1791051

Two image patterns projected onto the ITB are used in process control to sample the machine's current ability to create quality images. These are:

- **Gradation Pattern**. This pattern is used in the first adjustment for potential (Process Control 1: Potential Control) described later in this section.
- **Interval Patten**. This pattern is used in the second adjustment for potential (Process Control 2: Toner Supply Control) described later in this section. Process control is performed by projecting a pattern onto the ITB at the unexposed intervals between sheets of paper on the belt during printing (Default: 1 pattern per 20 A4 LEF sheets).

These two phases of process control that project images onto the image transfer belt are exclusively for process control sampling; paper on the image transfer belt remains unaffected. After the ID sensor reads these image patterns projected onto the belt, they are removed by first the ITB cleaning unit and then the PTR cleaning unit and then discarded as used toner.

11.3 DEFAULT SETTINGS

11.3.1 AT MACHINE INSTALLATION

The first time the machine is powered ON after completion of installation:

- Process control initialization is done automatically. There is no need to use an SP mode.
- **SP3012-001** confirms the results of the process control execution by SP3012-001.

11.3.2 DEVELOPER REPLACEMENT

After new developer has been installed and SP3024-001 successfully executed, closing the front door triggers initialization of the ID sensor automatically, and then process control also executes automatically. The results can be confirmed with the following SP codes.

- **SP3025-001**: Developer installation results display
- **SP3031-001**: ID sensor initialization results display (only needed if there was a problem with developer installation and it was necessary to initialize the ID sensor with SP3030-001)
- **SP3012-001**: Process control execution results display

Note

After the ID initial settings for new developer after replacement execute, the value for TD sensor setting is set automatically for standard toner density.
This initial setting is done automatically only once for new developer. There is no SP code to initialize new developer automatically.
If an error occurs, or in the absence of specific instructions (an SP code for example), do not try to correct the problem with the SP codes described below.

11.3.3 SP CODE EXECUTION

Here is a list of SP codes that can be used to adjust image quality.

- **SP3030-001** Toner density sensor (TD sensor) initial setting. Pressing [EXECUTE] turns on the developer/toner agitation augur and calibrates the TD sensor.
- **SP3050-001** Force Toner Supply. Pressing [EXECUTE] sends toner from the sub hopper of the toner unit to the development unit. The amount of toner sent can be set with SP3050-021. (Default: 0.5 wt%)
- **SP3051-001** Toner Filling. Pressing [EXECUTE] sends toner from the toner bottle to the sub hopper of the toner supply unit.
- **SP3011-001 to 002**. Pressing [EXECUTE] executes process control.
    - **SP3011-001.** Manual Process Control Execution: Executes normal process control. ***[1]**
    - **SP3011-002** Manual Process Control Execution - Toner Density Adjustment Process Control sets the initial setting for toner density. ***[1]**

***[1]** These two SP codes indicate “Process Control 1: Potential Control” describe below.

11.4 PROCESS CONTROL 1: POTENTIAL CONTROL

11.4.1 OVERVIEW

Potential control adjusts important elements of the image creation process (drum charge, development bias, and laser output) in order to achieve optimum target image quality.

- Gradation patterns are created on the drum and ITB belt at prescribed times (described below) and read by the ID sensor,
- The potential sensor reads the image from the drum surface, and then these readings are used to determine the development capacity (development gamma)
- Based on these readings the machine adjusts processing conditions around the drum to achieve the best image quality.

11.4.2 EXECUTION TIMING

Potential control executes at power on, during printing, and at the end of every job.

6. At power ON, or after returning from low power mode after machine has been idle for more than 6 hours, or when the front doors are closed
   Process control executes if one of these conditions is met since the last time the machine was powered OFF:
   - Idle time greater than or equal to the threshold value of SP3530-001, or if the page count of SP3530-007, -007 is greater than or equal to the interval setting of SP3530-005, -006 at power ON.
   - Amount of temperature change is greater than or equal to the temperature threshold setting (C) of SP3530-002.
   - Amount of relative humidity change is greater than or equal to the relative humidity threshold setting (%RH) of SP3530-003.
   - Amount of absolute humidity change is greater than or equal to the absolute humidity threshold setting (g/m^3) of SP3530-004.
7. During printing
   - The page count of SP3529-006 is greater than or equal to the interval setting of SP3533-002.
8. At end of print job
   - The page count of SP3529-006 is greater than or equal to the job end interval setting of SP3534-002.

However, if SP3500-002, which switches image adjustment On/Off, is set to OFF, then image adjustment does not execute automatically.
Setting the following SP codes to OFF cancels image quality adjustment, so leave them set to their default ON settings.

- **SP3500-001** Image Quality Adjustment ON/OFF All
- **SP3500-002** Image Quality Adjustment ON/OFF Process Control
- **SP3500-002** Image Quality Adjustment ON/OFF - TD Sensor Initialization

11.4.3 IMAGE CREATION CONDITIONS AT ENGINE STARTUP

When the engine starts up just before printing, the drum bias is set by the drum potential sensor.

Image create conditions	SP3600-001 Process, Potential Control	
	0: Fixed	**1: Auto**
DC bias	SP2-201	SP3-611
Development DC bias	SP2-212	SP3-612
LD power	SP2-211	SP3-613

- **SP3-600-001** sets process control potential control. Default: 1 (Auto).
- **If SP3-600-001** is set to “0”, the conditions for each image creation are set and controlled by individual SP codes.
- When **SP3-600-001** is set to “1”, the conditions for each image creation are set and adjusted to optimize the results.

11.5 PROCESS CONTROL 2: TONER SUPPLY CONTROL

11.5.1 OVERVIEW

Two methods of toner supply are used with this machine.

- Fixed supply
- PID (with Vtref correction)

SP3400-001 (Toner Supply Method Select) determines which method is used where the settings are "0" (Fixed Supply) or "1 (Active).

During toner supply control it is very difficult to determine the ideal toner/image density based only on pixel count because errors tend to accumulate due to changes in ambient temperature and humidity, deterioration of the sensitivity of the drum over time, and variation in development capacity (development gamma).

The "Active" setting (default) is used to control image density.

- ID sensor patterns are projected between pages at regular intervals (one pattern after every 20 pages of A4 LEF, for example).
- The ID sensor can read the reflectivity of the image (affected by how much toner is present), and then the machine uses these readings to adjust toner supply.

11.6 RESULTS CODES

11.6.1 POTENTIAL CONTROL RESULT CODES

Action	Code	Result Name	Meaning
00	0	No execution	SP default
10 Results normal	11	Succeeded	
15 Potential sensor	15	Potential sensor Vd detection abnormal (above limit)	Detected Vd < -800 V
	16	Potential sensor Vd detection abnormal (below limit)	Detected Vd < -500 V
20 ID sensor	21	ID sensor calibration abnormal	Vsg_reg=4.0±0.5［V］out of range
	22	ID sensor LED current abnormal (too high)	Ifsg＞27 mA
	23	ID sensor reflectivity output abnormal	Vsg_reg ＜0.5V
40 Potential sensor	41	TD sensor output too high	Vt ＞ 4.7 V
	42	TD sensor output too low	Vt ＜0.5 V
	43	TD sensor abnormal	Development Gamma （0.5≦Development Gamma≦2.0）、and Vt ＞4.7V
	44	TD sensor abnormal	Development gamma （0.5≦ Development Gamma≦2.0）、and Vt ＜0.5V
50 ID pattern detection	55	Development gamma abnormal (upper limit)	Gamma development ＞3.0 mg/cm^2/-kV
	56	Development gamma abnormal (lower limit)	Development Gamma ＜0.3mg/cm^2/-kV
	57	Dev. start voltage: Vk abnormal (upper limit)	Dev. start voltage: Vk >-300 V
	58	Dev. start voltage: Vk abnormal (upper limit)	Dev. start voltage: Vk >-300 V
	59	Insufficient data enabled	At least 2 points are needed for gamma correction
60 Potential adjustment	61	LD inoperative	ID sensor patterns not created
	62	Vr: Residual voltage abnormal	Vr ＞-200 V
	63	Vd: Charge potential target voltage	Vd out of range, cannot adjust to

Action	Code	Result Name	Meaning
			Vd*±8V
	64	Vpl: LD power adjustment	Vpl out of range, cannot adjust to Vpl*±5V
90 Results end	90	No potential adjustment	Potential control method is set to "1:Fixed".
	99	Forced end	Door open, machine OFF, or machine not ready

Result display examples.

- [00] No execution (SP default)
- [99] Adjustment start time
- [55] Development Gamma abnormal (High)
- [11] Succeeded
- [22] ID sensor LED current abnormal (too high)

11.6.2 ID SENSOR CALIBRATION RESULTS CODES

Code	Result Name	Meaning
0	No execution	SP default
1	Succeeded	
2	ID sensor calibration abnormal	Vsg_reg=4.0±0.5 V out of range
4	ID sensor LED current abnormal (too high)	Ifsg ＞ 27 mA
5	ID sensor reflectivity output abnormal	Vsg_reg ＜ 0.5 V
9	Forced end	Door open, machine OFF, or machine not ready

Result display examples.

- [0] No execution (SP default)
- [9] Adjustment start time
- [2] ID sensor calibration abnormal
- [1] Succeeded

11.6.3 TD SENSOR

Code	Result Name	Meaning
0	No execution	SP default
1	Succeeded	
2	Developer set incorrectly	
3	TD sensor calibration abnormal	Vtcnt cannot be adjusted to Vt target (2.89V±0.1V)
9	Forced end	Door open, machine OFF, or machine not ready

Result display examples. [0] No execution (SP default)

- [9] Adjustment start time
- [1] TD calibration at factory before shipping succeeded
- [3] TD calibration at factory before shipping failed
- [1] Next execution succeeded
- [0] NVRAM clear

11.6.4 DEVELOPER REPLACEMENT RESULTS CODES

Code	Result Name	Meaning
0	No execution	SP default
1	Succeeded	Finished
2	No developer output	TD sensor reading was > 1.5V before developer replaced, indicating developer present
3	No developer present	TD sensor reading was < 1.5V before developer replaced, indicating no developer present
4	Used toner full	Used toner bottle is full
5	Development Motor lock	Development motor is locked
6	Used toner motor lock	The used toner bottle motor in the main machine, or the motor inside the toner bottle is locked
9	Forced end	Forced end due to closing a door, switching power off

Result display examples.

- [0] No execution (SP default)
- [9] Developer installation after installation at the factory before shipping succeeded.
- [4] Developer replacement after installation at factory before shipping returned used toner full
- [1] Developer installation after installation at the factory before shipping succeeded.
- [3] Developer installation after installation at the factory before shipping failed (no developer).
- [1] Next execution succeeded

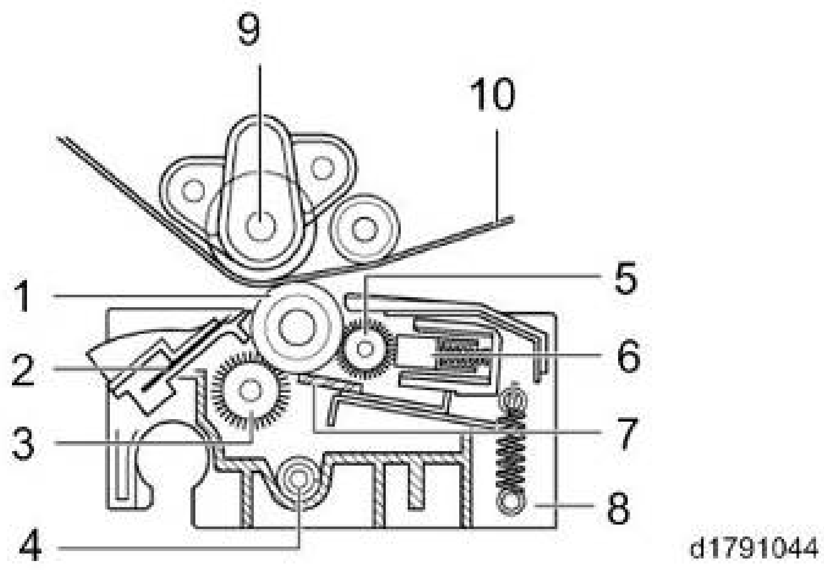
12. PAPER TRANSFER ROLLER UNIT

12.1 MECHANISMS, CONFIGURATION

12.1.1 OVERVIEW

The transfer separation power pack inside the ITB unit applies a bias charge not only to the transfer roller under the transfer belt for drum-to-belt image transfer but to the paper transfer roller as well for belt-to-paper image transfer. The paper transfer roller rotates an opposing paper transfer roller.

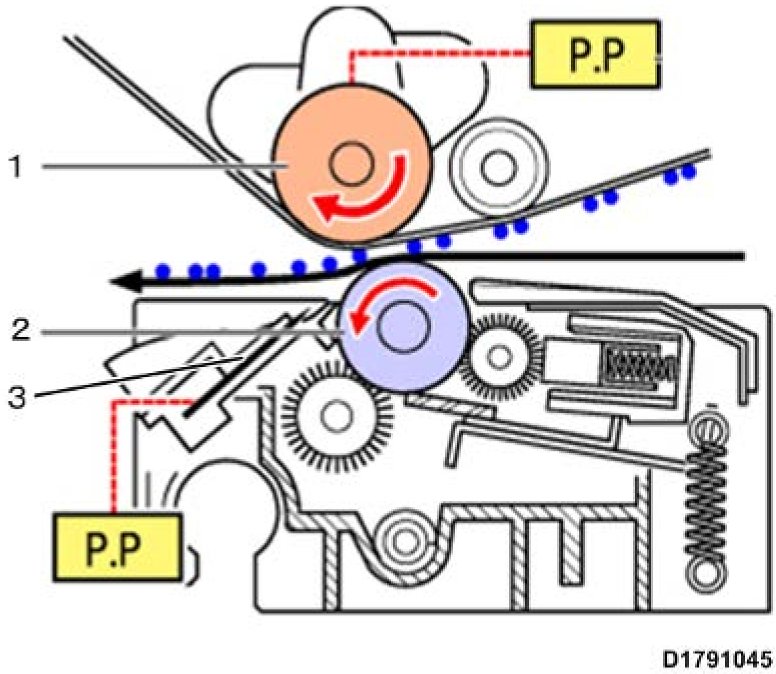
12.1.2 LAYOUT



No.	Name	No.	Name
1	Paper Transfer Roller (PTR)	6	Lubricant Bar
2	Anti-static brush	7	Cleaning Blade
3	Cleaning Roller	8	Paper Transfer Roller Unit
4	Used Toner Collection Coil	9	PTR Idle Roller
5	Lubricant Brush Roller	10	Image Transfer Belt (ITB)

12.2 DETAILS

12.2.1 PAPER SEPARATION MECHANISM



No.	Name
1	Paper Transfer Idle Roller
2	Paper Transfer Roller (PTR)
3	Paper Discharge Plate

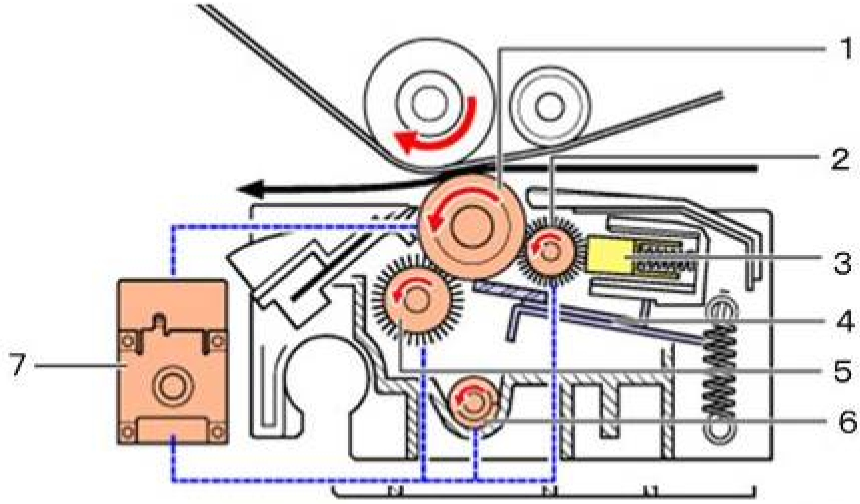
In addition to the DC bias applied to the back of the paper to neutralize the charge on the paper and belt, curvature separation helps the paper separate from the belt when the ITB makes an abrupt turn toward the top of the machine at the point where the ITB and PTR are in contact to transfer the image.
After the image has been transferred to the paper, the paper discharge plate (connected to the separation power pack) applies AC and DC charge to neutralize the charge on the paper and the ITB.

12.2.2 PTR CLEANING

The ITB/PTR cleaning motor drives the PTR roller, PTR cleaning roller, lubricant roller, and used toner collection coil. The PTR unit (like the ITB unit) has its own cleaning unit.

- Paper dust is cleaned from the PTR by the cleaning roller (a soft brush roller), and then the cleaning blade also cleans the surface of the roller.
- Paper dust and toner cleaned from the surface of the roller drop into a rotating toner collection coil for transport to the toner collection bottle.

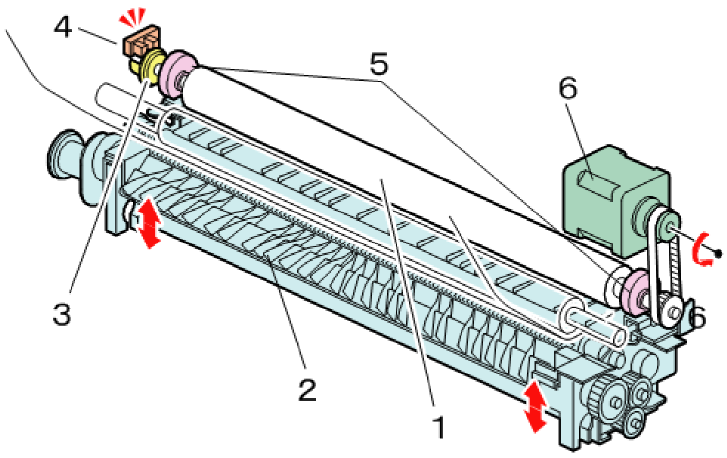
12.2.3 LUBRICANT APPLICATION



No.	Name	No.	Name
1	Paper Transfer Roller (PTR)	5	Cleaning Roller
2	Lubricant Roller	6	Used Toner Collection Coil
3	Lubricant Bar	7	ITB/PTR cleaning motor
4	Cleaning blade	—	—

A lubricant roller (a soft brush roller) picks up lubricant from the lubricant bar behind it an applies a very thin coat of lubricant to the surface of the PTR to ensure easier cleaning of the roller surface.

12.2.4 PTR LIFT AND SEPARATION



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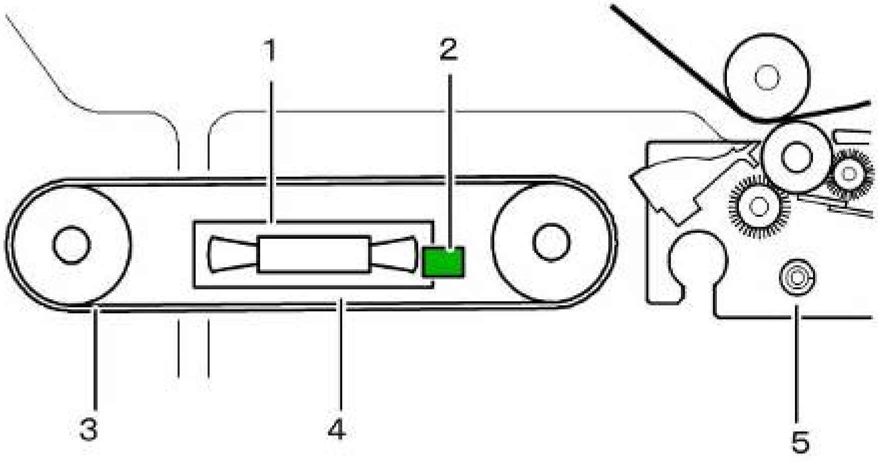
No.	Name
1	Pre-nip Roller
2	PTR Unit
3	Actuator
4	PTR Lift Sensor
5	Cam
6	PTR Separation Motor

The PTR separation motor in the ITB unit opens and closes the nip of the PTR idle roller PTR roller. (These rollers are on either side of the ITB.)

- A cam at each end of the PTR idle roller opens and closes the nip between the idle roller and the PTR below.
- The PTR separation motor opens the nip between the rollers, and a feeler on the shaft of the PTR idle roller falls into the gap of the PTR separation HP sensor (this is the home position).

13. PTB UNIT

13.1 LAYOUT

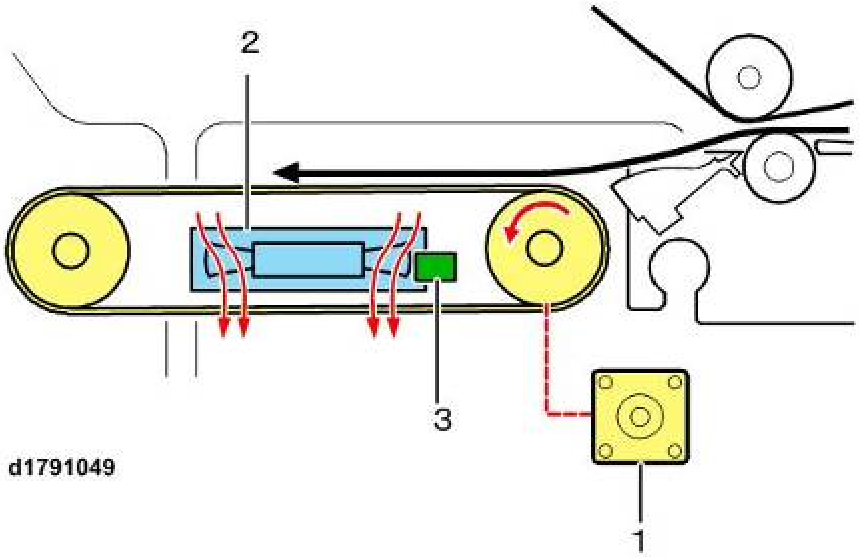


D1791048

No.	Name
1	Paper Transport Fans
2	PTB Sensor
3	Paper Transport Belt
4	PTB Unit
5	Paper Transfer Unit

13.2 DETAILS

13.2.1 AIR SUCTION TRANSPORT



No.	Name
1	PTB Motor
2	Paper Transport Fans
3	PTB Sensor

The PTB motor drives the gears that rotate the paper transport belts.

- This machine employs the suction of two large transport fans below the transport belts to hold the paper on the paper path as it is transported between the ITB unit and the fusing unit.
- This system keeps the paper with the unfixed toner on its surface on the paper transport path so it can enter straight into the fusing unit.
- The PTB sensor monitors the passing of the leading and trailing edges of the paper to check for a paper jam.

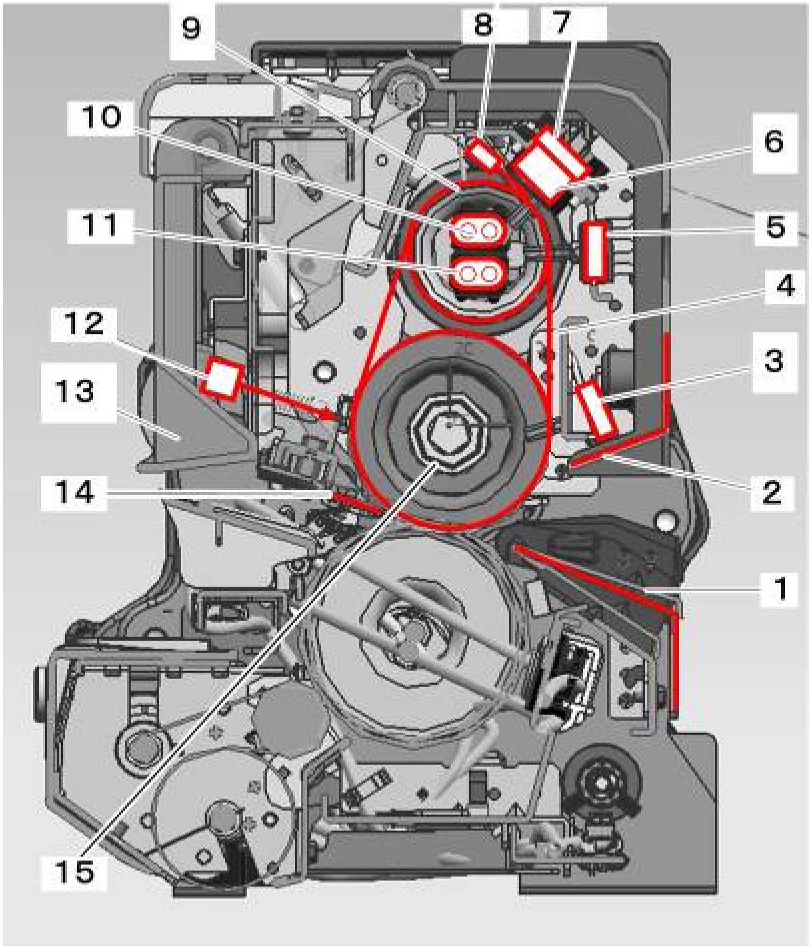
14. FUSING UNIT

14.1 MECHANISMS, CONFIGURATION

14.1.1 OVERVIEW

Paper transported from the PTB unit enters the fusing unit where the paper is pressed between the pressure roller and not roller to fuse the toner to the paper.

14.1.2 LAYOUT (MOTOR, SENSOR, ROLLER LOCATIONS)



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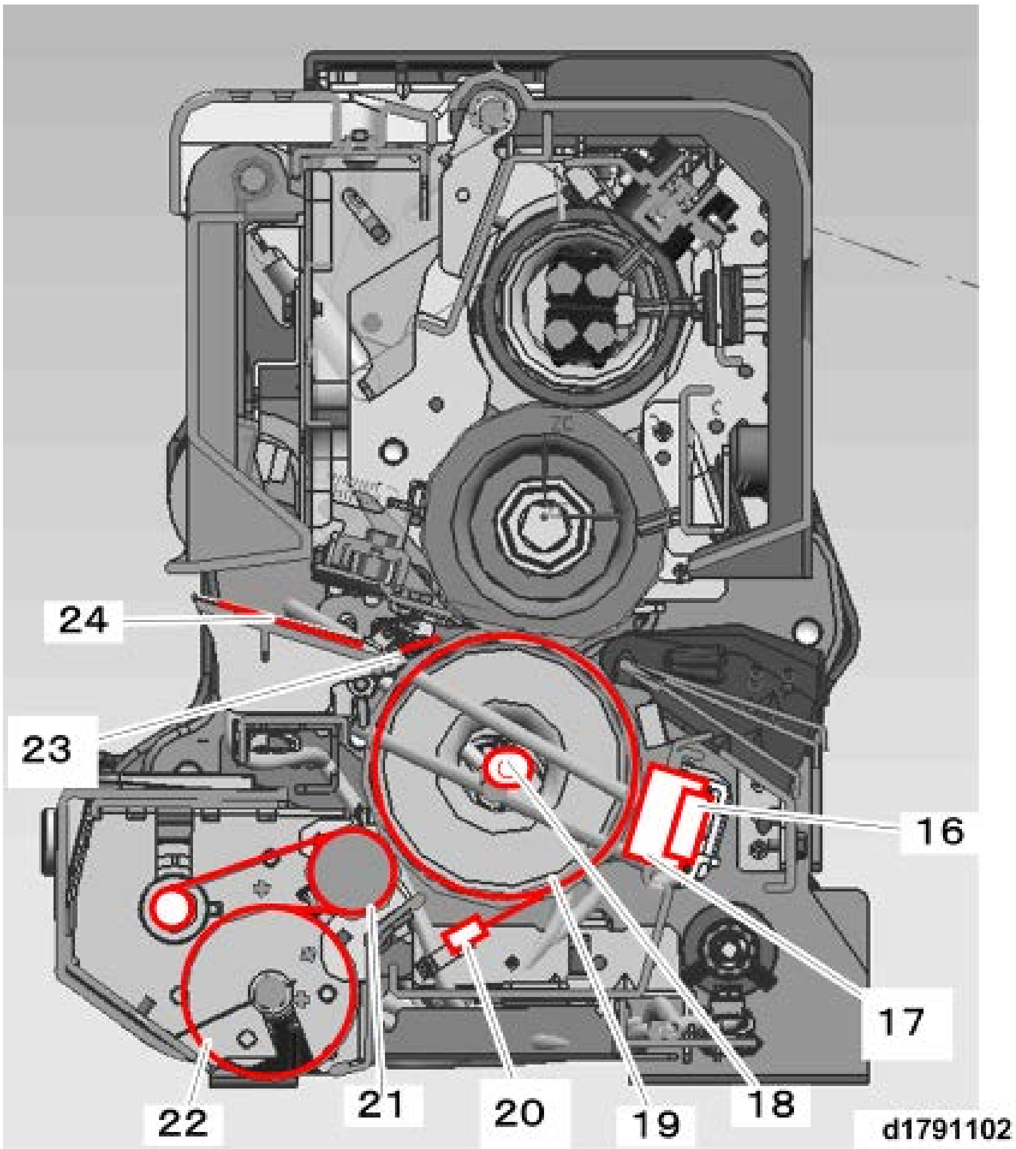
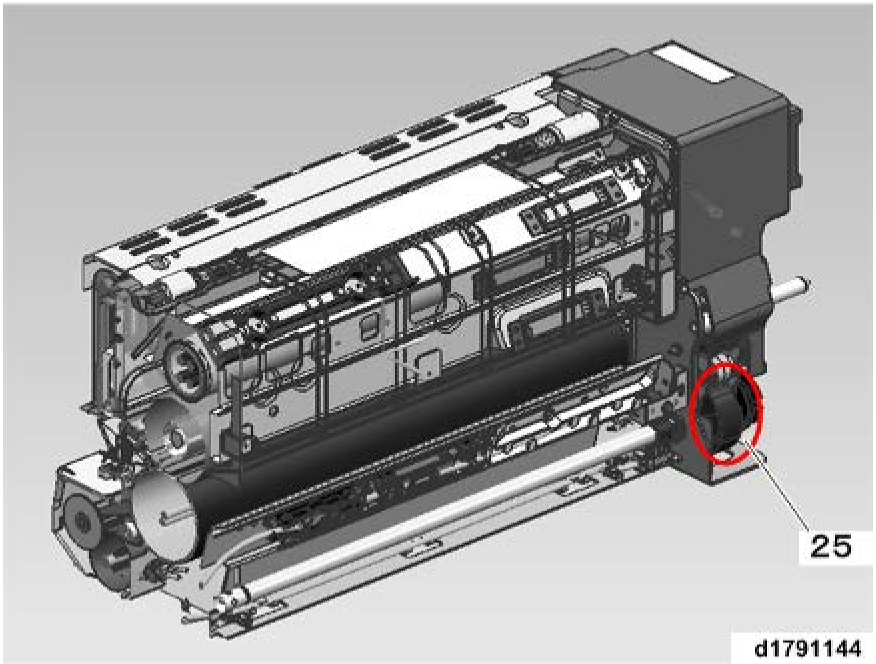
No.	Name	No.	Name
1	Entrance Guide (Lower)	8	Fusing Heat Thermistor (Rear)
2	Entrance Guide (Upper)	9	Heating Roller
3	Fusing Temperature Sensor	10	Heating Roller Lamps (1090/1000 W)
4	Fusing Belt	11	Heating Roller Lamps (1150/900 W)
5	Fusing Temperature Sensor	12	Fusing Belt Paper Sensor
6	Fusing Temperature Sensor	13	Fusing Exit Guide Plate
7	Heating Roller Thermostats (x2)	14	Stripper Pawls
		15	Hot Roller

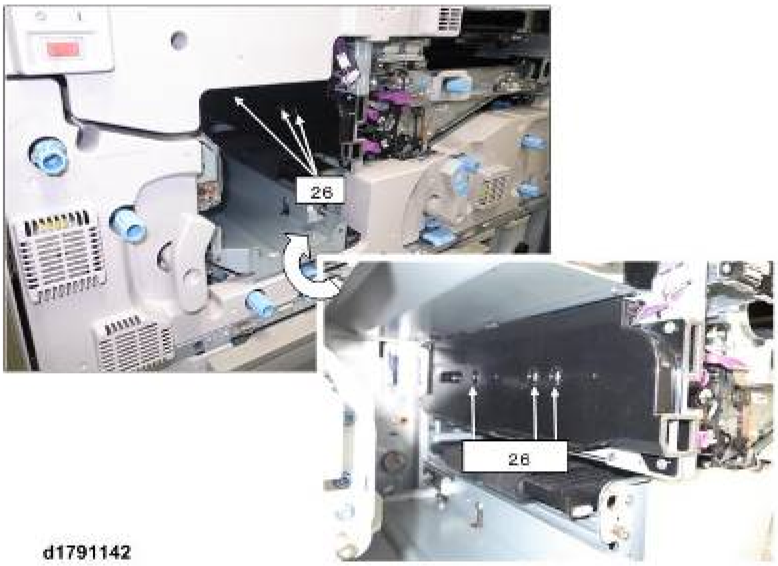


No.	Name	No.	Name
16	Fusing Temperature Sensor (Pressure Roller)	21	Retention Roller
17	Pressure Roller Thermostat	22	Cleaning Web
18	Pressure Roller Fusing Lamp	23	Pressure Roller Stripper Pawls
19	Pressure Roller	24	Pressure Roller Stripper Plate
20	Pressure Roller Thermistor		



No.	Name
25	Fusing Pressure Cam

Main Machine: Fusing Roller Removed



No.	Name
26	Thermopiles (Rear, Front, Near Front)

14.2 DETAILS

14.2.1 FUSING UNIT

Fusing Temperature Control	Thermistors, NC sensors, thermopiles (inside the main machine)
Drive	Fusing drive motors
Pressure Mechanism	Hot roller pressure motor fwd/rev drive
Jam Detection	Detection of accordion jams by photosensors
Cleaning Mechanism	Web cleaning unit

14.2.2 HEATING ROLLER AND PRESSURE ROLLER LAMPS

There are four heating lamps inside the heating roller of the fusing unit, and one lamp inside the pressure roller for a total of five lamps.

- Each lamp unit contains two lamps.
- Inside the heating roller, the upper lamp pair is comprised of a 1090W and 1000W lamp, and the lower pair a 1150W and 900W lamp.
- Inside the pressure roller there is one 800W lamp; the elements of the lamps in the heating rollers are used in combination for different paper sizes.
- The lamps inside the heating roller heat the roller, and then this heat is conducted to the fusing belt.
- The lamp inside the pressure roller keeps the pressure roller heated while the machine in standby mode waiting to start for the next job.

Fusing Lamp Voltages

Location	Element Site	Connector Color	Voltage
Upper	Center A	Green	1090 W
	Center B	White	1000 W
Lower	End-to-End	Blue	1150 W
	Ends Only	Yellow	900 W

Fusing Lamp Operation by Paper Size

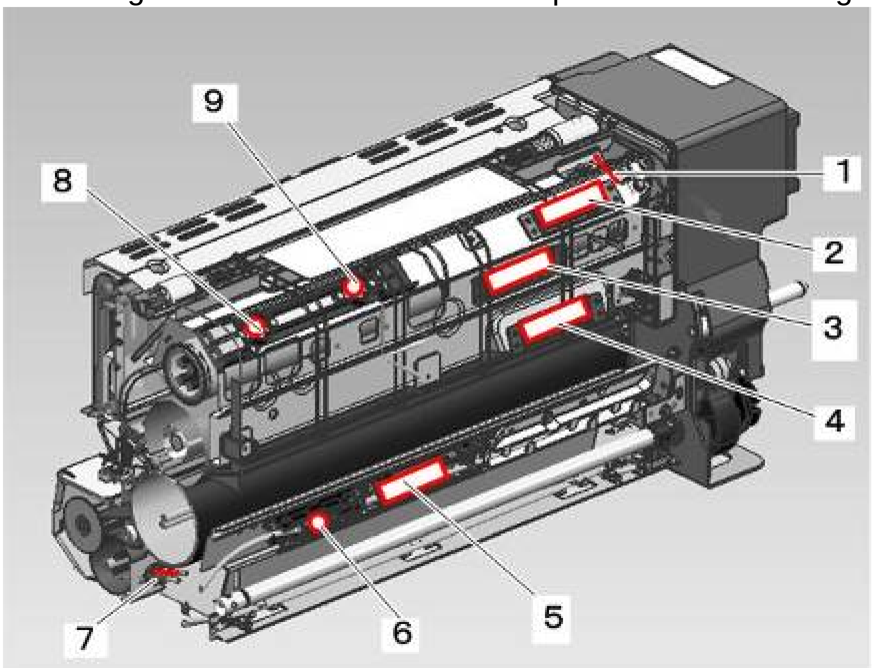
Size (L: Main Scan Direction)	Operating Fusing Lamps
L ≦148 mm	Center A
148 mm < L ≦ 225 mm	Center A, Center B
225 mm < L ≦ 304.8 mm	Center A, Center B, End-to-End
304.8 mm < L	Center A, Center B, End-to-End, Ends Only

Fusing Lamp Operation (Other Cases)

Machine Status	Operating Fusing Lamps
Machine boot	Center A, Center B, End-to-end, Ends only, Fusing lamp inside pressure roller.
Hot roller idling after reload temp.	
Before printing	
Before paper feed	
Ready	Ends only, Fusing lamp inside pressure roller
Low power mode	
After paper feed	Same as "Fusing Lamp Operation by Paper Size" table above/

14.2.3 FUSING TEMPERATURE CONTROL

There are thermistors, fusing NC sensors, and thermopiles (inside the machine) on and around the fusing that monitor and control temperature in the fusing unit.



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No.	Name	No.	Name
1	Fusing Heat Thermistor (Rear)	6	Pressure Roller Thermostat
2	Fusing Temperature NC Sensor (Heating Roller End)	7	Pressure Roller Thermistor
3	Fusing Temperature NC Sensor (Heating Roller Center)	8	Heating Roller Thermostat (End)
4	Fusing Temperature NC Sensor (Hot Roller Center)	9	Heating Roller Thermostat (Center)
5	Fusing Temperature NC Sensor (Pressure Roller - Center)	—	—

14.2.4 TYPES AND NUMBER OF SENSORS

NC Sensors

Sensor Type	NC Sensor (Fusing Temperature Sensor)	
Type	Infra-red, non-contact sensor	
Function	The machine controls the rotation of the fusing unit rollers at standby by reading the temperature of the fusing belt. The end and center of the fusing belt by are monitored by sensors to ensure that fusing unit temperature is always within a safe range. This sensor monitors the temperature of the pressure roller and controls the operation of the pressure roller lamp.	
Location, Function	Heating Roller	Two ▪ Fusing Temperature Sensor (Heating Roller End) ▪ Fusing Temperature Sensor (Heating Roller Center)
	Hot roller	One: Fusing Temperature NC Sensor (Hot Roller Center)
	Pressure Roller	One: Fusing Temperature Sensor (Pressure Roller Center)

Thermistors

Sensor Type	Thermistors	
Type	Contact sensor. A variation in temperature changes resistance which can be measured.	
Function	Monitors the temperature of the heating roller and pressure roller. These thermistors are also a safety device.	
Location, Function	Heating Roller	One: Fusing Heat Roller Thermistor (Rear)
	Hot roller	None
	Pressure Roller	One: Pressure Roller Thermistor

Thermostats

<table>
<tr><td>Sensor Type</td><td colspan="2">Thermostats</td></tr>
<tr><td>Type</td><td colspan="2">Two strips of metal of different conductivities are joined, heat warps the shape due to hysteresis and breaks the circuit.</td></tr>
<tr><td>Function</td><td colspan="2">These are provided as safety devices. If a high temperature trips either or both thermostats, power supply to the fusing lamps is shut down. This thermostat is also a safety device that monitors the temperature around the pressure roller.</td></tr>
<tr><td rowspan="3">Location, Function</td><td>Heating Roller</td><td>Two:
▪ Heating Roller Thermostat (Center)
▪ Heating Roller Thermostat (End)</td></tr>
<tr><td>Hot roller</td><td>None</td></tr>
<tr><td>Pressure Roller</td><td>One: Pressure Roller Thermostat</td></tr>
</table>

Thermopiles

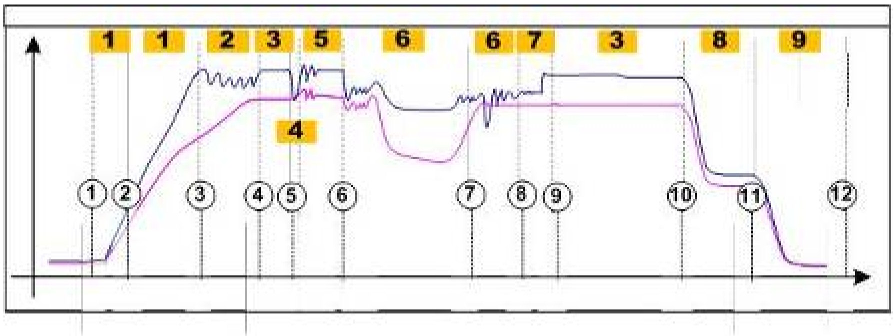
<table>
<tr><td>Sensor Type</td><td colspan="2">Thermopiles (in main machine above fusing unit)</td></tr>
<tr><td>Type</td><td colspan="2">Infra-red, non-contact sensor</td></tr>
<tr><td>Function</td><td colspan="2">These thermopiles are inside the main machine located above and to the right of the fusing unit. These are also safety devices.</td></tr>
<tr><td>Number/Name</td><td>Fusing Unit</td><td>Three:
▪ Thermopile: Heating Roller Center
▪ Thermopile: Heating Roller Front End
▪ Thermopile: Near Front End</td></tr>
</table>

Note

The NC sensors in the fusing unit and the thermopile attached to the main machine on the right side of the fusing unit both employ infra-red perform different functions The thermopile, extremely sensitive to temperature change, resides apart from the fusing unit. The NC sensors, slightly less sensitive to temperature than the thermopile, are located inside the fusing unit to control the fusing temperature.

14.2.5 TARGET TEMPERATURE

The target fusing temperature is calculated based on the readings of a temperature sensor at the PCDU. The operator can choose a different fusing temperature for the type of paper in use.



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In the diagram above:

- Blue line: Heating roller Temperature
- Magenta line: Pressure roller temperature

Comments (Circled Numbers Above)

①	Power on
②	Fusing control switches on
③	Reload temperature
④	Fusing roller rotations stop
⑤	Job setup by user, preparing to print
⑥	Permission to start printing
⑦	Switching to job paper feed mode
⑧	Job paper feed ends
⑨	Fusing roller rotation ends
⑩	Shift to low power mode
⑪	Shift to sleep mode
⑫	End

The temperature of the fusing unit is measured in the following steps.
The target temperature is set for each roller depending on detected ambient temperature as described below. Here is the key for the Environment and Machine Types referenced in the step-by-step descriptions below.

Environments

- **Environment A**：Low temp.: Can adjust with SP1111-001 if Machine Temp.≦17°C
- **Environment B**：Normal Temp. Can adjust with SP1111-001-002 if normal temp. 17C＜Machine Temp.＜30° C
- **Environment C**：High temp.: Can adjust with SP1111-002 if 30° C≦Machine Temp.
- **Environment A-1**: Low temp.: Cannot adjust with SP if Machine temp.≦10°C
- **Environment B-1**: Normal temp.: Cannot adjust with SP if Machine Temp.≦10°C
- **Environment B-2**: Normal temp. 2: Cannot adjust with SP if 23°C＜Machine Temp. ≦32° C
- **Environment C-1**: High Temp.: Cannot adjust with SP if 32°C≦Machine Temp.

Machine Type Key

Type a:	RICOH Pro 8100S
Type b:	RICOH Pro 8110S
Type c:	RICOH Pro 8120S

1 Warm-up Time

Machine start-up step after power on.

- Once the set temperature is reached, after the prescribed time shifts to next step, Reload Mode.
- The tables below describe the “Set Temperature” and “Adjust Temperature” for the heating roller and pressure roller for each environment.
- The Set Temperatures and Adjust Temperatures can be adjusted with the listed SP codes.

Environment A

Roller	Set Temp.				Adjust Temp.	
	Type a	Type b	Type c	SP	Default	SP
Heating	165°C	170°C	175°C	SP1101-002	+10°C	SP1111-003
Pressure	90°C	90°C	90°C	SP1101-003	+10°C	SP1111-003

Environment B

Roller	Set Temp.				Adjust Temp.	
	Type a	Type b	Type c	SP	Default	SP
Heating	165°C	170°C	175°C	SP1101-002	–	–
Pressure	90°C	90°C	90°C	SP1101-003	–	–

Environment C

Roller	Set Temp.				Adjust Temp.	
	Type a	Type b	Type c	SP	Default	SP
Heating	165°C	170°C	175°C	SP1101-002	–	–
Pressure	90°C	90°C	90°C	SP1101-003	–	–

14.2.6 RELOAD

After Step 1 is finished, the machine shifts to Reload mode. A message on the operation panel indicates that copying can begin, and then the machine immediately goes to the next step.

3. Roller Rotation After Reload

This step rotates the fusing belt so the heating roller can heat up the hot roller. he machine shifts to the next step Ready (Standby) mode after the time prescribed for rotation has elapsed. The tables below describe the “Set Temperature” and “Adjust Temperature” for the heating roller and pressure roller for each environment. The Set Temperatures and Adjust Temperatures can be adjusted with the listed SP codes.

Environment A

Roller	Set Temp.				Adjust Temp.	
	Type a	Type b	Type c	SP	Default	SP
Heating	165°C	170°C	175°C	SP1108-001	+10°C	SP1111-003
Pressure	90°C	90°C	90°C	SP1108-002	+10°C	SP1111-003

Environment B

Roller	Set Temp.				Adjust Temp.	
	Type a	Type b	Type c	SP	Default	SP
Heating	165°C	170°C	175°C	SP1108-001	–	–
Pressure	90°C	90°C	90°C	SP1108-002	–	–

Environment C

Roller	Set Temp.				Adjust Temp.	
	Type a	Type b	Type c	SP	Default	SP
Heating	165°C	170°C	175°C	SP1108-001	-5°C	SP1111-004
Pressure	90°C	90°C	90°C	SP1108-002	-5°C	SP1111-004

4. Ready (Standby)

This step rotates the fusing belt so the heating roller can heat up the hot roller. The machine shifts to the next step Ready (Standby) mode after the time prescribed for rotation has elapsed. The tables below describe the “Set Temperature” and “Adjust Temperature” for the heating roller and pressure roller for each environment. The Set Temperatures and Adjust Temperatures can be adjusted with the listed SP codes.

Environment A

Roller	Set Temp.				Adjust Temp.	
	Type a	Type b	Type c	SP	Default	SP
Heating	150°C	155°C	160°C	SP1107-001	+10°C	SP1111-003
Pressure	90°C	90°C	90°C	SP1107-002	+10°C	SP1111-003

Environment B

Roller	Set Temp.				Adjust Temp.	
	Type a	Type b	Type c	SP	Default	SP
Heating	150°C	155°C	160°C	SP1107-001	—	—
Pressure	90°C	90°C	90°C	SP1107-002	—	—

Environment C

Roller	Set Temp.				Adjust Temp.	
	Type a	Type b	Type c	SP	Default	SP
Heating	150°C	155°C	160°C	SP1107-001	-5°C	SP1111-004
Pressure	90°C	90°C	90°C	SP1107-002	-5°C	SP1111-004

5. Print Preparation

When a job is set up on the operation panel in the Ready mode, the machine goes to the Print Preparation step once the fusing unit is ready to begin the job.
The tables below describe the "Set Temperature" and "Adjust Temperature" for the heating roller and pressure roller for each environment. The Set Temperatures and Adjust Temperatures can be adjusted with the listed SP codes.

Environment A

Roller	Set Temp.				Adjust Temp.	
	Type a	Type b	Type c	SP	Default	SP
Heating	165°C	170°C	175°C	SP1107-007	+10°C	SP1111-003
Pressure	90°C	90°C	90°C	SP1107-008	+10°C	SP1111-003

Environment B

Roller	Set Temp.				Adjust Temp.	
	Type a	Type b	Type c	SP	Default	SP
Heating	165°C	170°C	175°C	SP1107-007	—	—
Pressure	90°C	90°C	90°C	SP1107-008	—	—

Environment C

Roller	Set Temp.				Adjust Temp.	
	Type a	Type b	Type c	SP	Default	SP
Heating	165°C	170°C	175°C	SP1107-007	-5°C	SP1111-004
Pressure	90°C	90°C	90°C	SP1107-008	-5°C	SP1111-004

6. Before Paper Pass

This is the step between the time after [Start] is pressed and the first sheet feeds from the paper bank to the nip of the fusing unit nip.

SP Information for Actual Cases

9. If these adjustments are done at the job site:
   - Adjust Temp.1: SP1111-005、SP1111-007
   - Adjust Temp. 2: SP1119-010 to 018

   In cases where adjustment must be done for "Adjust Temp. 2", the paper temperature settings can be done for a tray for different paper thickness (Thick 1 to 8) .
10. IMSS

An SP can be selected to adjust temperature for the user tool paper settings assigned for different paper thickness beforehand (allocated with Ricoh IMSS software).

Environment A-1

The target temperatures for the heating roller and pressure roller in this environment are calculated as:
[User Paper Type Set Temp. [*A]]+ [Adjust Temp. 1 [*B]] + [Adjust Temp. 2 [*C]].

Roller		Adjust Temp.1 [*B]			Adjust Temp.2 [*C]		
		Thk	Default	SP	Thk	Default	SP
Heating	*A	Thk0	10°C	SP1111-005	Thk0	5°C	SP1119-010
		Thk1	10°C	SP1111-005	Thk1	5°C	SP1119-011
		Thk2	10°C	SP1111-005	Thk2	5°C	SP1119-012
		Thk3	10°C	SP1111-005	Thk3	20°C	SP1119-013
		Thk4	10°C	SP1111-005	Thk4	20°C	SP1119-014
		Thk5	10°C	SP1111-007	Thk5	20°C	SP1119-015
		Thk6	10°C	SP1111-007	Thk6	25°C	SP1119-016
		Thk7	10°C	SP1111-007	Thk7	25°C	SP1119-017
		Thk8	10°C	SP1111-007	Thk8	25°C	SP1119-018
Pressure	*A	Thk0	10°C	SP1111-005	—	—	—
		Thk1	10°C	SP1111-005	—	—	—
		Thk2	10°C	SP1111-005	—	—	—
		Thk3	10°C	SP1111-005	—	—	—
		Thk4	10°C	SP1111-005	—	—	—
		Thk5	10°C	SP1111-007	—	—	—
		Thk6	10°C	SP1111-007	—	—	—
		Thk7	10°C	SP1111-007	—	—	—
		Thk8	10°C	SP1111-007	—	—	—

Note

The target temperatures for “Adjust Temp. 1 (*B) and “Adjust Temp. 2 (*C) are different so separate SP codes are provided so these adjustments can be switched on/off. For example “Adjust. Temp 2” (*C) can be used to adjust the initial temperature at the start of paper feed.

- Adjusted temperature *B: Compensates for ambient temperature (paper temperature)
- Adjusted temperature *C: Compensates for a drop in temperature at initial paper feed.

Environment B-1

The target temperatures for the heating roller and pressure roller in this environment are calculated as:
[User Paper Type Set Temp. [*A]]+ [Adjust Temp. 1 [*B]] + [Adjust Temp. 2 [*C]].

Roller		Adjust Temp.1			Adjust Temp.2		
		Thk	Default	SP	Thk	Default	SP
Heating	*A	Thk0	10°C*1	SP1111-005	Thk0	5°C	SP1119-010
		Thk1	10°C*1	SP1111-005	Thk1	5°C	SP1119-011
		Thk2	10°C*1	SP1111-005	Thk2	5°C	SP1119-012
		Thk3	10°C*1	SP1111-005	Thk3	20°C	SP1119-013
		Thk4	10°C*1	SP1111-005	Thk4	20°C	SP1119-014
		Thk5	10°C*1	SP1111-007	Thk5	20°C	SP1119-015
		Thk6	10°C*1	SP1111-007	Thk6	25°C	SP1119-016
		Thk7	10°C*1	SP1111-007	Thk7	25°C	SP1119-017
		Thk8	10°C*1	SP1111-007	Thk8	25°C	SP1119-018
Pressure	*A	Thk0	10°C*1	SP1111-005	—	—	—
		Thk1	10°C*1	SP1111-005	—	—	—
		Thk2	10°C*1	SP1111-005	—	—	—
		Thk3	10°C*1	SP1111-005	—	—	—
		Thk4	10°C*1	SP1111-005	—	—	—
		Thk5	10°C*1	SP1111-007	—	—	—
		Thk6	10°C*1	SP1111-007	—	—	—
		Thk7	10°C*1	SP1111-007	—	—	—
		Thk8	10°C*1	SP1111-007	—	—	—

Note

The target temperatures for “Adjust Temp. 1 (*B) and “Adjust Temp. 2 (*C) are different so separate SP codes are provided so these adjustments can be switched on/off. For example “Adjust. Temp 2” (*C) can be used to adjust the initial temperature at the start of paper feed.

- Adjusted temperature *B: Compensates for ambient temperature (paper temperature)
- Adjusted temperature *C: Compensates for a drop in temperature at initial paper feed.

Environment B-2

The target temperatures for the heating roller and pressure roller in this environment are calculated as:
[User Paper Type Set Temp. [*A]]+ [Adjust Temp. 1 [*B]] + [Adjust Temp. 2 [*C]].

Roller		Adjust Temp.1			Adjust Temp.2		
		Thk	Default	SP	Thk	Default	SP
Heating	*A	Thk0	0°C*2	SP1111-006	Thk0	5°C	SP1119-010
		Thk1	0°C*2	SP1111-006	Thk1	5°C	SP1119-011
		Thk2	0°C*2	SP1111-006	Thk2	5°C	SP1119-012
		Thk3	0°C*2	SP1111-006	Thk3	20°C	SP1119-013
		Thk4	0°C*2	SP1111-006	Thk4	20°C	SP1119-014
		Thk5	0°C*2	SP1111-008	Thk5	20°C	SP1119-015
		Thk6	0°C*2	SP1111-008	Thk6	25°C	SP1119-016
		Thk7	0°C*2	SP1111-008	Thk7	25°C	SP1119-017
		Thk8	0°C*2	SP1111-008	Thk8	25°C	SP1119-018
Pressure	*A	Thk0	0°C*2	SP1111-006	–	–	–
		Thk1	0°C*2	SP1111-006	–	–	–
		Thk2	0°C*2	SP1111-006	–	–	–
		Thk3	0°C*2	SP1111-006	–	–	–
		Thk4	0°C*2	SP1111-006	–	–	–
		Thk5	0°C*2	SP1111-008	–	–	–
		Thk6	0°C*2	SP1111-008	–	–	–
		Thk7	0°C*2	SP1111-008	–	–	–
		Thk8	0°C*2	SP1111-008	–	–	–

The target temperatures for “Adjust Temp. 1 (*B) and “Adjust Temp. 2 (*C) are different so separate SP codes are provided so these adjustments can be switched on/off. For example “Adjust. Temp 2” (*C) can be used to adjust the initial temperature at the start of paper feed.

- Adjusted temperature *B: Compensates for ambient temperature (paper temperature)
- Adjusted temperature *C: Compensates for a drop in temperature at initial paper feed.

Environment C-1

The target temperatures for the heating roller and pressure roller in this environment are calculated as:
[User Paper Type Set Temp. [*A]]+ [Adjust Temp. 1 [*B]] + [Adjust Temp. 2 [*C]].

Roller		Adjust Temp.1			Adjust Temp.2		
		Thk	Default	SP	Thk	Default	SP
Heating	*A	Thk0	0°C	SP1111-006	Thk0	5°C	SP1119-010
		Thk1	0°C	SP1111-006	Thk1	5°C	SP1119-011
		Thk2	0°C	SP1111-006	Thk2	5°C	SP1119-012
		Thk3	0°C	SP1111-006	Thk3	20°C	SP1119-013
		Thk4	0°C	SP1111-006	Thk4	20°C	SP1119-014
		Thk5	0°C	SP1111-008	Thk5	20°C	SP1119-015
		Thk6	0°C	SP1111-008	Thk6	25°C	SP1119-016
		Thk7	0°C	SP1111-008	Thk7	25°C	SP1119-017
		Thk8	0°C	SP1111-008	Thk8	25°C	SP1119-018
Pressure	*A	Thk0	0°C	SP1111-006	—	—	—
		Thk1	0°C	SP1111-006	—	—	—
		Thk2	0°C	SP1111-006	—	—	—
		Thk3	0°C	SP1111-006	—	—	—
		Thk4	0°C	SP1111-006	—	—	—
		Thk5	0°C	SP1111-008	—	—	—
		Thk6	0°C	SP1111-008	—	—	—
		Thk7	0°C	SP1111-008	—	—	—
		Thk8	0°C	SP1111-008	—	—	—

*1 The default (or the new temperature for new setting selected with the SP code) is calculated (23°C－Machine Temperature)/(23°C－10°C).

*2 The default (or the temperature selected with the SP code) is calculated: (Machine Temperature－23°C)/(32°C－23°C)

Note 1

Exercise caution in the adjustment of either of these settings:

- Adjust Temp.1: SP1111-005、SP1111-007
- Adjust Temp.2: SP1119-010 to 018

If they are adjusted at the same time, the ranges of the settings may overlap. For example, if the fusing temperature for Thk4 is raised with SP1111-005, other adjustments that reference the same SP code, Thk0 to 3 may also be affected (the increase in temperature could increase the amount curl in the paper).

Note 2

The target temperatures for “Adjust Temp. 1 (*B) and “Adjust Temp. 2 (*C) are different so separate SP codes are provided so these adjustments can be switched on/off. For example “Adjust. Temp 2” (*C) can be used to adjust the initial temperature at the start of paper feed.

- Adjusted temperature *B: Compensates for ambient temperature (paper temperature)
- Adjusted temperature *C: Compensates for a drop in temperature at initial paper feed.

7. During Job Paper Feed

This step is the time after Step 6 described above until job end.

Environment A-1

The target temperatures for the heating roller and pressure roller in this environment are calculated as: [User Paper Type Set Temp. [*A]]+ [Adjust Temp. 1 [*B]] + [Adjust Temp. 2 [*C]].

Roller		Adjust Temp.1			Adjust Temp.2		
		Thk	Default	SP	Thk	Default	SP
Heating	*A	Thk0	10°C	SP1111-005	—	—	—
		Thk1	10°C	SP1111-005	—	—	—
		Thk2	10°C	SP1111-005	—	—	—
		Thk3	10°C	SP1111-005	—	—	—
		Thk4	10°C	SP1111-005	—	—	—
		Thk5	10°C	SP1111-007	—	—	—
		Thk6	10°C	SP1111-007	—	—	—
		Thk7	10°C	SP1111-007	—	—	—
		Thk8	10°C	SP1111-007	—	—	—
Pressure	—	—	—	—	—	—	—

Environment B-1

The target temperatures for the heating roller and pressure roller in this environment are calculated as:
[User Paper Type Set Temp. [*A]]+ [Adjust Temp. 1 [*B]] + [Adjust Temp. 2 [*C]].

Roller		Adjust Temp.1			Adjust Temp.2		
		Thk	Default	SP	Thk	Default	SP
Heating	*A	Thk0	10°C	SP1111-005	—	—	—
		Thk1	10°C	SP1111-005	—	—	—
		Thk2	10°C	SP1111-005	—	—	—
		Thk3	10°C	SP1111-005	—	—	—
		Thk4	10°C	SP1111-005	—	—	—
		Thk5	10°C	SP1111-007	—	—	—
		Thk6	10°C	SP1111-007	—	—	—
		Thk7	10°C	SP1111-007	—	—	—
		Thk8	10°C	SP1111-007	—	—	—
Pressure	*A	Thk0	10°C	SP1111-005	—	—	—
		Thk1	10°C	SP1111-005	—	—	—
		Thk2	10°C	SP1111-005	—	—	—
		Thk3	10°C	SP1111-005	—	—	—
		Thk4	10°C	SP1111-005	—	—	—
		Thk5	10°C	SP1111-007	—	—	—
		Thk6	10°C	SP1111-007	—	—	—
		Thk7	10°C	SP1111-007	—	—	—
		Thk8	10°C	SP1111-007	—	—	—

Environment B-2

The target temperatures for the heating roller and pressure roller in this environment are calculated as:
[User Paper Type Set Temp. [*A]]+ [Adjust Temp. 1 [*B]] + [Adjust Temp. 2 [*C]].

Roller		Adjust Temp.1			Adjust Temp.2		
		Thk	Default	SP	Thk	Default	SP
Heating	*A	Thk0	0°C	SP1111-006	—	—	—
		Thk1	0°C	SP1111-006	—	—	—
		Thk2	0°C	SP1111-006	—	—	—
		Thk3	0°C	SP1111-006	—	—	—
		Thk4	0°C	SP1111-006	—	—	—
		Thk5	0°C	SP1111-008	—	—	—
		Thk6	0°C	SP1111-008	—	—	—
		Thk7	0°C	SP1111-008	—	—	—
		Thk8	0°C	SP1111-008	—	—	—
Pressure	*A	Thk0	0°C	SP1111-006	—	—	—
		Thk1	0°C	SP1111-006	—	—	—
		Thk2	0°C	SP1111-006	—	—	—
		Thk3	0°C	SP1111-006	—	—	—
		Thk4	0°C	SP1111-006	—	—	—
		Thk5	0°C	SP1111-008	—	—	—
		Thk6	0°C	SP1111-008	—	—	—
		Thk7	0°C	SP1111-008	—	—	—
		Thk8	0°C	SP1111-008	—	—	—

Environment C-1

The target temperatures for the heating roller and pressure roller in this environment are calculated as: [User Paper Type Set Temp. [*A]]+ [Adjust Temp. 1 [*B]] + [Adjust Temp. 2 [*C]].

Roller		Adjust Temp.1			Adjust Temp.2		
		Thk	Default	SP	Thk	Default	SP
Heating	*A	Thk0	0°C	SP1111-006	—	—	—
		Thk1	0°C	SP1111-006	—	—	—
		Thk2	0°C	SP1111-006	—	—	—
		Thk3	0°C	SP1111-006	—	—	—
		Thk4	0°C	SP1111-006	—	—	—
		Thk5	0°C	SP1111-008	—	—	—
		Thk6	0°C	SP1111-008	—	—	—
		Thk7	0°C	SP1111-008	—	—	—
		Thk8	0°C	SP1111-008	—	—	—
Pressure	*A	Thk0	0°C	SP1111-006	—	—	—
		Thk1	0°C	SP1111-006	—	—	—
		Thk2	0°C	SP1111-006	—	—	—
		Thk3	0°C	SP1111-006	—	—	—
		Thk4	0°C	SP1111-006	—	—	—
		Thk5	0°C	SP1111-008	—	—	—
		Thk6	0°C	SP1111-008	—	—	—
		Thk7	0°C	SP1111-008	—	—	—
		Thk8	0°C	SP1111-008	—	—	—

*1 The default (or the new temperature for new setting selected with the SP code) is calculated (23°C－Machine Temperature)/(23°C－10°C).

*2 The default (or the temperature selected with the SP code) is calculated: (Machine Temperature (Machine Temperature－23°C)/(32°C－23°C)

8. After Paper Passing

The target temperature is set for each roller depending on detected ambient temperature as described below. (See Step 3. Roller Rotation After Reload Temperature).

9 Lower Power Mode

Heating Roller Target Temperature

Model	Temperature	SP
Type a	155°C	SP1-107-005
Type b	160°C	
Type c	75°C	

Pressure Roller Target Temperature

Model	Temperature	SP
Type a	75°C	SP1-107-006
Type b	75°C	
Type c	65°C	

The power to the fusing motor switches off, and the pressure roller releases pressure on the hot roller.

Low Power Mode Recovery Time

Model	Recovery Time
Type a	35 sec.
Type b	35 sec.
Type c	75 sec.

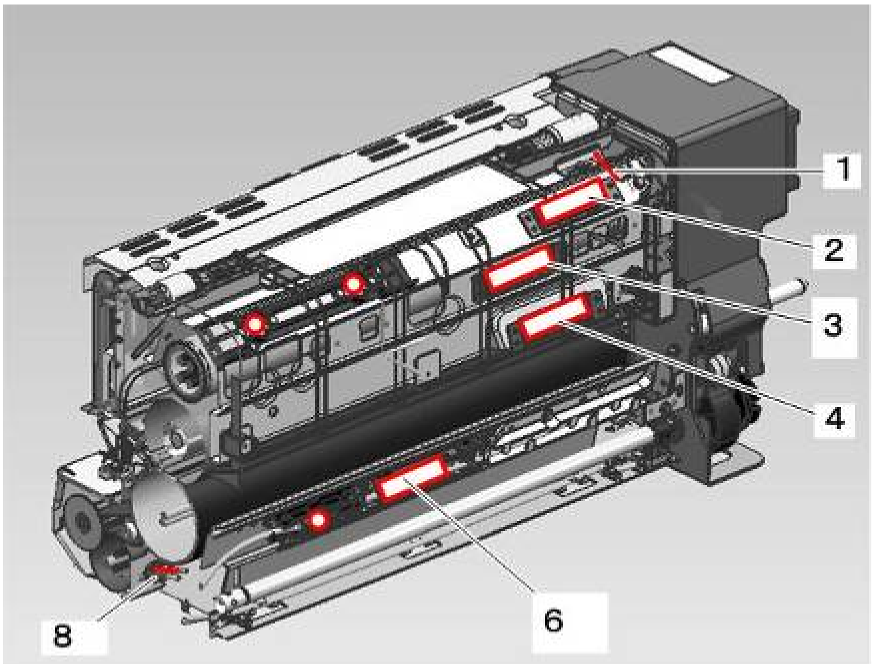
The low power mode temperature is fixed in order to minimize the recovery time. However, the low power mode temperature for Type c is set lower, so more time is necessary for recovery.

10 Off/Sleep Modes

The heating roller lamps, pressure roller lamp, and fusing motor are shut down, and the pressure roller remains up against the fusing belt.

14.2.7 FUSING SC CODES

Conditions in the fusing unit could cause the machine to issue the following SC codes. These are all Level A (fatal error) SC codes.
Here is a diagram and key for the tables below.



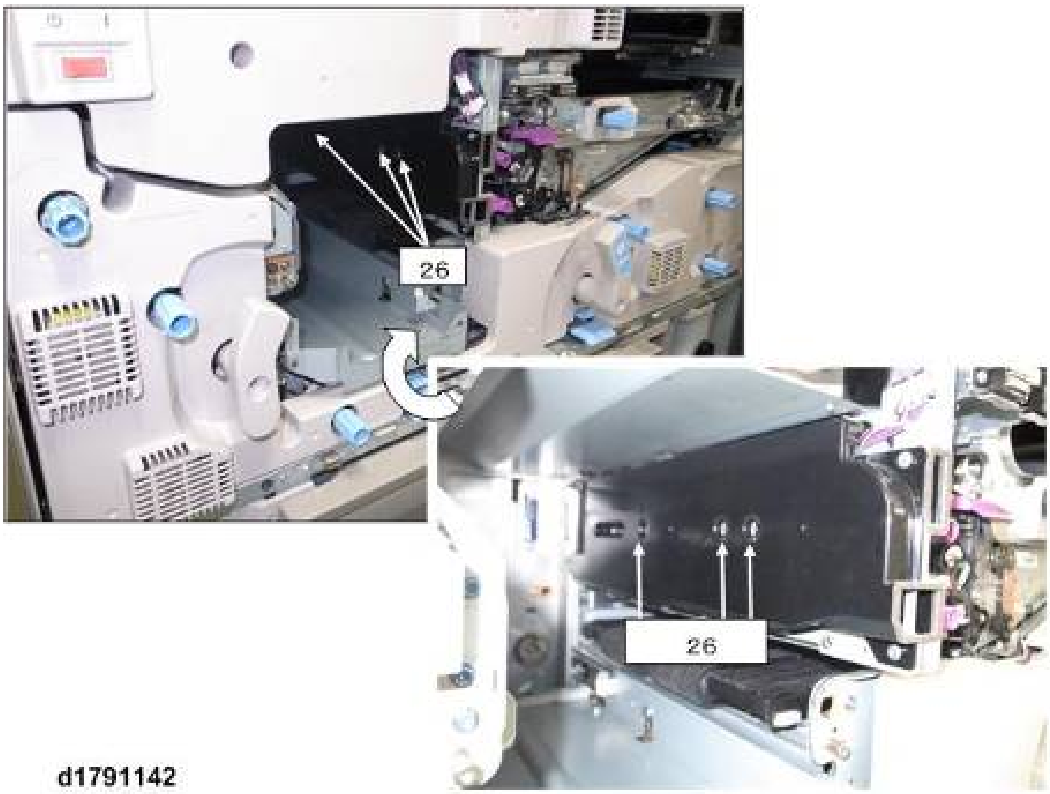
d1791121

1	Fusing Heat Thermistor (Rear)
2	Fusing Temperature NC Sensor (Heating Roller End)
3	Fusing Temperature NC Sensor (Heating Roller Center)
4	Fusing Temperature Thermistor (Hot Roller Center)
6	Fusing Temperature NC Sensor (Pressure Roller - Center)
8	Pressure Roller Thermistor

		No.1	No.6	No.8
SC	Sensor Cuts	566-00	561-00	558-00
	Reload Fail	—	562-01,02	—
	High Temp. Detect (SW)	567-00	563-00	—
	High Temp. Detect (HW)	568-00	—	564-00
	Continuous On	—	565-00	—
Sensor Func.	Fusing Lamp Temp. Control	—	○	—
	Safety Feature	○	—	○
		No.3	**No.2**	**No.4**
SC	Sensor Cuts	550-00	560-00	576-00
	Reload Fail	—	—	—
	High Temp. Detect (SW)	—	—	577-00
	High Temp. Detect (HW)	544-01	554-01	—
	Continuous On	—	—	—
Sensor Func.	Fusing Lamp Temp. Control	—	—	—
	Safety Feature	○	○	-

Important

The SC codes listed above can be released by cycling the machine off/on after entering the SP mode for releasing level A SC codes.



d1791142

		No.26		
		①	②	③
SC	Sensor Cuts	566-00	561-00	558-00
	Reload Failed	–	562-01/02	–
	High Temp. Detected (Software)	567-00	563-00	–
	High Temp. Detected (Hardware)	568-00	–	564-00
	Continuous On	–	565-00	–
Sensor Func.	Fusing Lamp Temp. Control	–	○	–
	Safety Feature	○	–	○

Here is a key for the table above:

①	Thermopile: Heating Roller Center
②	Thermopile: Heating Roller Front End
③	Thermopile: Near Front End

14.2.8 SENSOR FUNCTIONS

The tables below summarize the functions of the fusing unit sensors.

Note

The numbers correspond to the illustration in the previous illustration.

Illustration No.	**No.1**	**No.6**	**No.8**
Determine accum. temp. at warmup	No	Yes	No
Determine reload temp.?	No	Yes	No
Determine printing possible?	Yes	Yes	No
High temp. CPM down?*1	Yes	No	No
Hot roller idling?*2	No	No	No
Over temp. idling? *3	No	No	No
Illustration No.	**No.3**	**No.2**	**No.4**
Determine accum. temp. at warmup	No	No	No
Determine reload temp.?	No	No	No
Determine printing possible?	No	No	No
High temp. CPM down?*1	No	No	Yes
Hot roller idling?*2	No	No	Yes
Over temp. idling? *3	No	No	No

In the table above:

1	Fusing Heat Thermistor (Rear)
2	Fusing Temperature NC Sensor (Heating Roller End)
3	Fusing Temperature NC Sensor (Heating Roller Center)
4	Fusing Temperature Thermistor (Hot Roller Center)
6	Fusing Temperature NC Sensor (Pressure Roller - Center)
8	Pressure Roller Thermistor

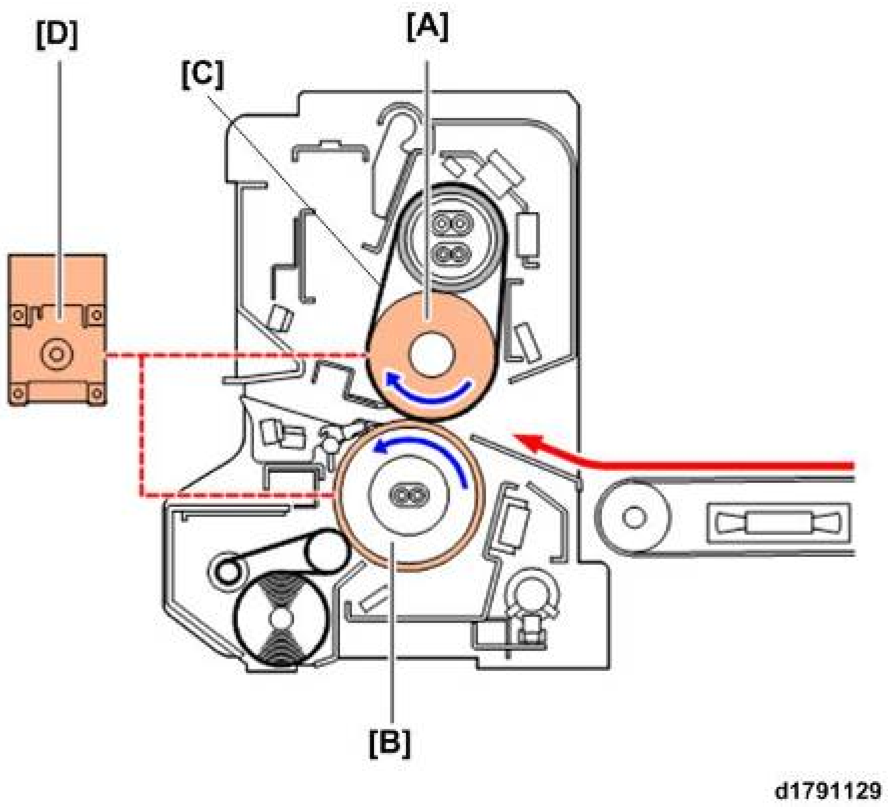
Illustration No.	**No.26**		
	①	②	③
Determine accum. temp. at warmup	Yes	No	No
Determine reload temp.?	Yes	Yes	Yes
Determine printing possible?	Yes	Yes	No
High temp. CPM down?*1	No	Yes	Yes
Hot roller idling?*2	No	No	No
Over temp. idling? *3	Yes	Yes	Yes

In the table above:

①	Thermopile: Heating Roller Center
②	Thermopile: Heating Roller Front End
③	Thermopile: Near Front End

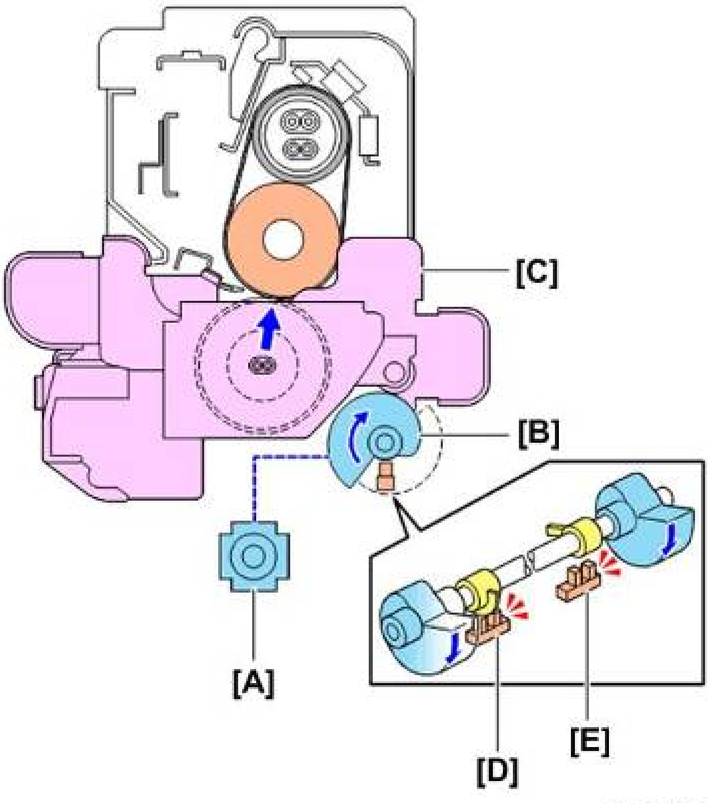
*1	High Temperature CPM Down
	If the fusing temperature exceeds the high temperature limit prescribed for these sensors, CPM down control changes the feed timing to create a wider interval between the sheets of paper feeding through the fusing unit.
*2	Hot Roller Idling
	In Ready mode the hot roller does not rotate constantly to maintain a correct even temperature on the hot roller, but if the machine remains in Ready mode for a long period, the hot roller may cool. If Fusing Temperature Thermistor (Hot Roller Center), which monitors the center of the hot roller, detects that temperature has dropped below its prescribed limit, this triggers hot roller idling for the prescribed interval to bring the temperature up to operational level.
*3	Idling to Prevent Overheating
	In the Ready mode, or when the machine returns from low power mode, if these sensors detect temperature above 215°C (default), the machine will not drive the hot roller and belt until temperature has fallen below the prescribed limit.

14.2.9 FUSING DRIVE LAYOUT



The hot roller [A], pressure roller [B] and the fusing belt [C] are rotated by gears driven by the fusing motor [D].

14.2.10 PRESSURE MECHANISM



The fusing unit is provided with a mechanism that can raise and lower the pressure roller, so the pressure roller can be pulled away slightly to widen the nip for thick paper and to prevent a rise in temperature.

- At the start of a job, the pressure roller lift motor [A] rotates two cams [B] under the pressure roller [C] to lift it up against the fusing belt and hot roller above.
- At the end of the job, the lift motor rotates the cams again to lower the pressure roller.

Two pressure roller lift sensors with actuators are mounted at each end of the pressure roller shaft to monitor the position of the pressure roller.

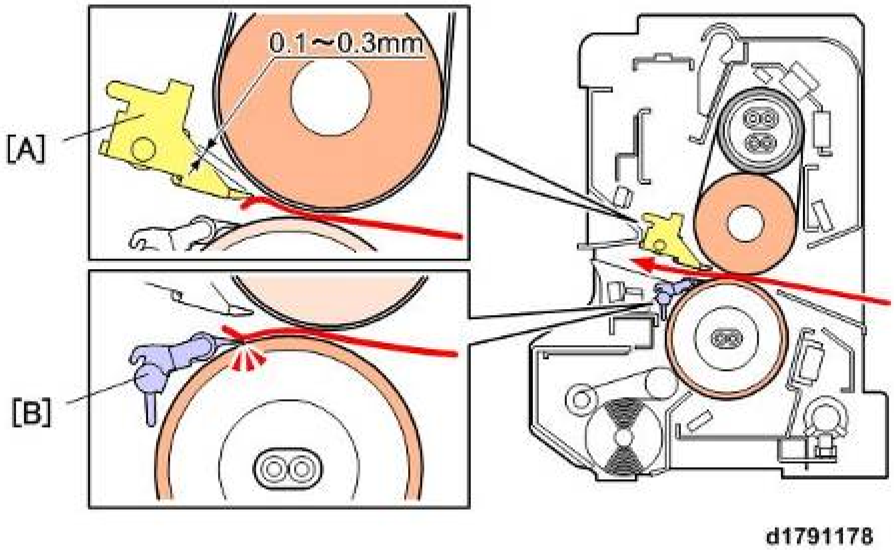
- Pressure roller cam HP sensor (front)
- This sensor detects the home position of the pressure cam.
- The lift sensor [E] at the rear detects if there is a problem with rotation of the cam.
- It detects when there is too much pressure on the pressure roller.

The following parts comprise the pressure roller unit.

- Entrance Guide (Lower)
- Pressure roller temperature control components
- Pressure roller, separation plate (applied pressure)
- Fusing Exit Guide Plate (Center)
- Sensors (Hot Roller Exit, Jammed Paper)
- Fusing Cleaning Unit

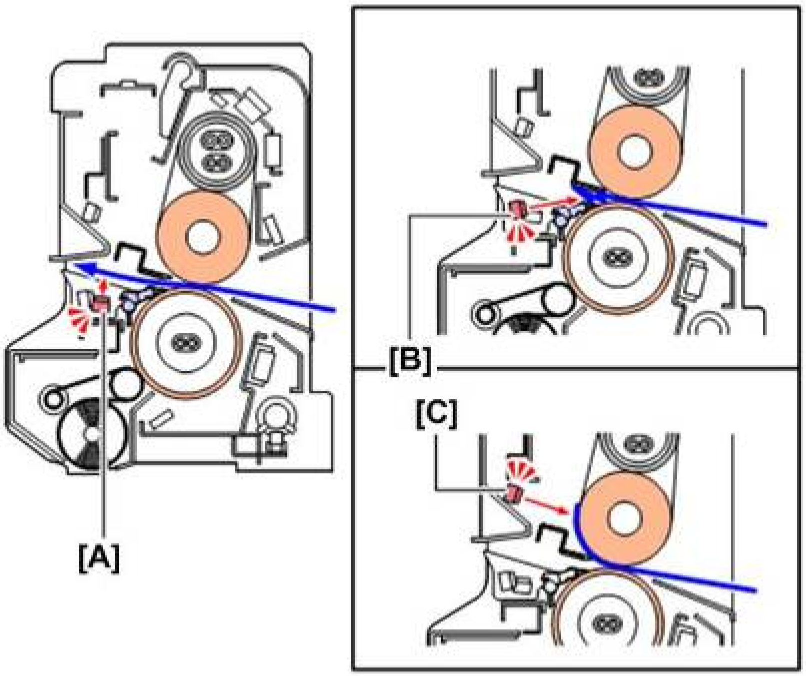
14.2.11 PAPER SEPARATION

The fusing unit is equipped with a separation plate and separation pawls that prevent paper from wrapping around the fusing belt and the pressure roller.



[A]	**Separation plate**. Separates paper that passes through the fusing nip from the surface of the fusing belt and guides it toward the fusing unit exit. The gap between the separation plate and the fusing belt is narrow enough (0.1 mm to 0.3 mm) to catch the leading edge of paper that floats up toward the fusing belt but wide enough to prevent contact and damage to the surface of the belt.
[B]	**Separation pawls**. Separate paper that passes through the fusing nip from the surface of the pressure roller and guide it toward the fusing unit exit. The tips of the pawls contact the surface of the pressure roller with very light pressure

14.2.12 JAM DETECTION

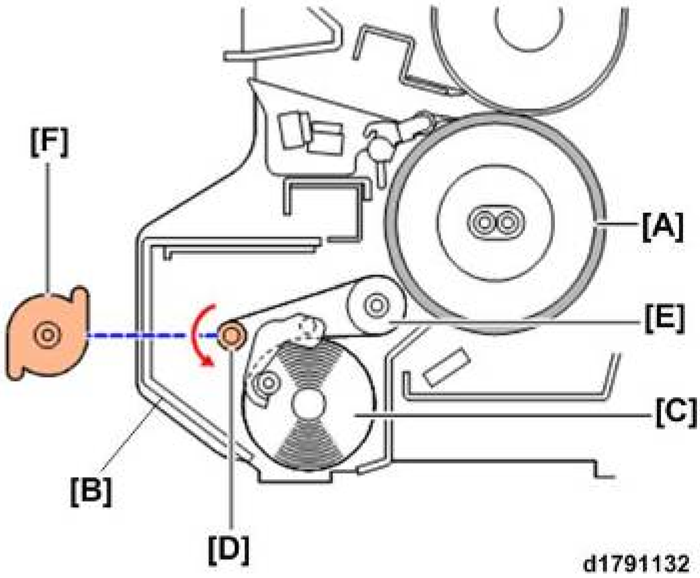


d1791131

Fusing Unit Paper Sensors

Sensor name	Fusing exit sensor [A]	Accordion jam sensor [B]	Fusing belt sensor [C]
Sensor type	Photo interrupt	Photo interrupt	Photo interrupt
Location	Below paper path at fusing unit exit	Below paper path at fusing unit exit	Above paper path at fusing unit exit
Function	Times the arrival and exit of paper to detect late and lag paper jams during paper feed.	Detects paper remaining at the fusing nip that has not separated at the separation plate.	Detects paper by comparing the reflectivity of paper and belt to detect paper that wraps around the belt.
Jam detection?	Yes	No	No
Paper remains detection?	Yes	Yes	Yes
	Detects paper that fails to leave the fusing unit exit.	Detects accordion jams at the fusing unit nip.	Detects paper that wraps around the fusing belt.

14.2.13 FUSING CLEANING UNIT



- The fusing cleaning unit [B] cleans the surface of the fusing belt picked up from paper and the pressure roller [A].
- The cleaning unit uses heat-resistant web cleaner.
- The cleaning web [C] unrolls from its supply roller onto a take-up roller [D] as it is used to accumulate paper dust and other matter. The web is treated with a small amount of silicone oil that coats the surface of the fusing belt as it is cleaned.
- A small DC motor [F] attached to the left bottom corner of the fusing unit drives the web cleaning unit; every time this motor turns on the web feeds a prescribed distance.
- The portion of the web that has already been used for cleaning is roller up onto a take-up roller to bring a fresh patch of the web into contact with the belt surface.

Note

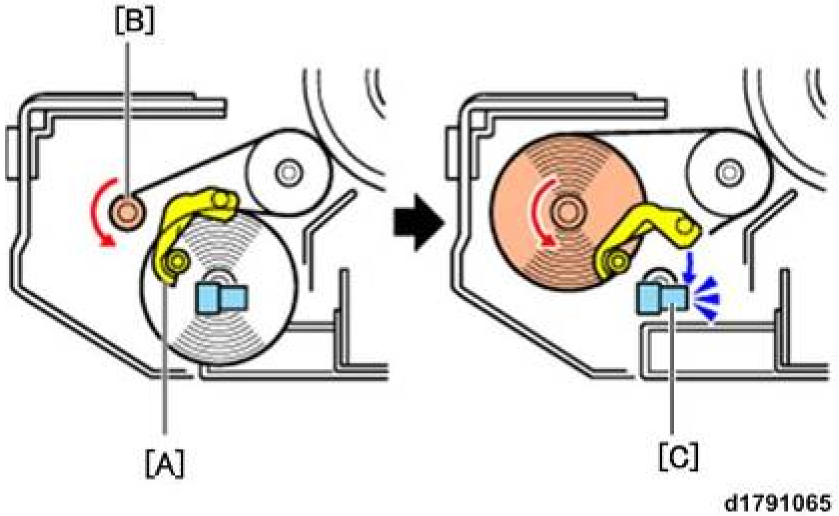
The width of the nip of between the hot roller and pressure roller is 15.9 mm and is not adjusted in the field.

The width of the nip is adjusted manually at the factory with a screwdriver by raising and lowering the pressure roller. (This method is the same as the Pro907EX Series machines.

14.2.14 WEB NEAR END

According to the setting of SP1902-004 that controls the web near-end alert, the machine signals the alert when the web is near the end of its service life. The default setting is 81% (percent of the web used). The total service life of the web is about 750 K.

14.2.15 WEB END



A feeler [A] remains suspended by the web stretched between the web supply roller [B] and web take-up roller. Once the web spools off the web supply roller, the feeler drops into the gap of the web end sensor [C]. The sensor signals the machine to issue the web end alert and the machine stops.

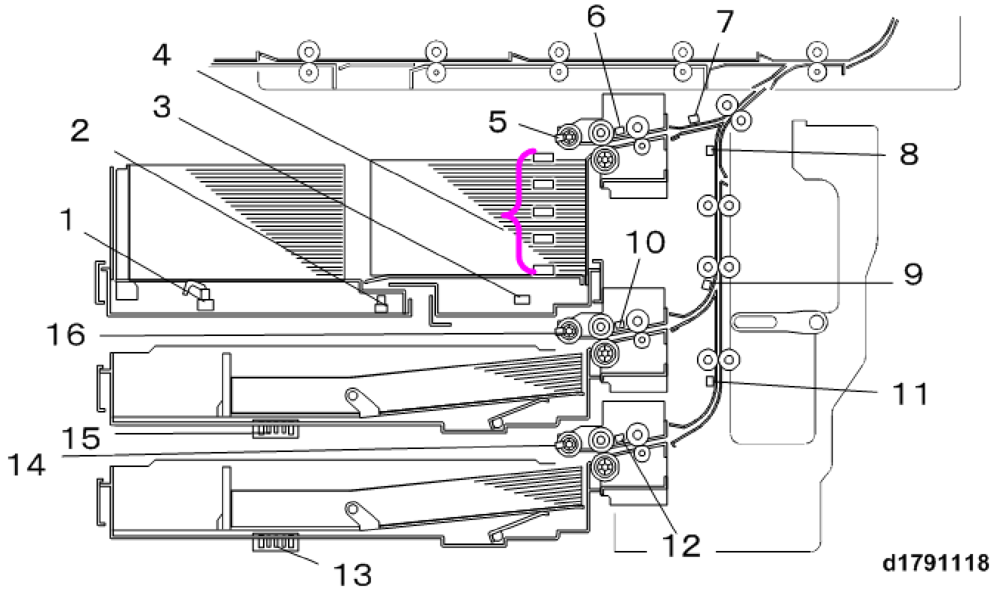
15. PAPER FEED

15.1 MECHANISM

15.1.1 OVERVIEW

The paper feed units feed paper from the paper bank of the main machine.

15.1.2 LAYOUT



No.	Name	No.	Name
1	Left Tray Paper End Sensor	9	2nd Transport Sensor
2	Rear Fence Return Sensor	10	2nd Feed Sensor
3	Lower Limit Sensor	11	3rd Transport Sensor
4	Paper Sensors 1 to 5	12	3rd Feed Sensor
5	1st Paper End Sensor	13	3rd Paper Size Sensor
6	1st Feed Sensor	14	3rd Paper End Sensor
7	Bank Exit Sensor	15	2nd Paper Size Sensor
8	Vertical Transport Sensor	16	2nd Paper End Sensor

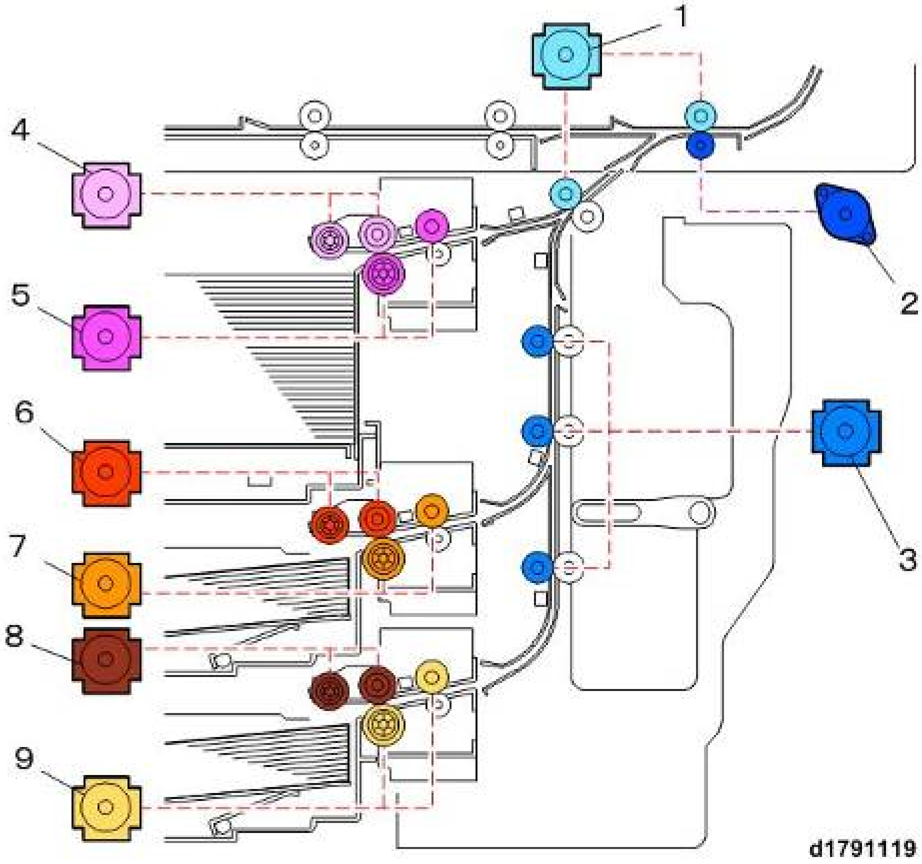
15.1.3 DETAILS

Paper Feed (Main Machine)

Paper Feed, Separation Mechanism	
▪ Paper Feed, Separation	FRR paper separation system (pickup, feed, separation rollers)
▪ Separation Roller Pressure Release	Taking the tray out and replacing it opens, closes nip of separation roller.
Tray 2, 3	Universal trays
▪ Tray Raising and Lowering	Bottom plates raised and lowered by tray lift motors.
▪ Upper Limit Detection	Detecting the height of pickup roller
▪ Paper End Sensor	Photosensor detects presence (and absence) of paper
▪ Paper Size Detection	Automatic size detection system (5 connected hard switches)
Tandem Tray	
▪ Paper Size Detection	SP mode settings
▪ Tray Raising and Lowering	Bottom plate raised and lowered by tray lift motor
▪ Paper Remaining Detection	4 interrupt sensors monitor paper height, 1 photosensor detects presence (and absence of paper)
▪ Right Tandem Tray Fence Operation	Solenoid opens and closes front/rear fences
▪ Tandem Tray Side Fence Operation	Rear fence motor operates front/rear fences
▪ Left Tray Rear Fence Operation	Rear fence drive motor operates left tray rear fence
▪ Left Tray Lock	Tray locking during paper stack shift from left to right to refill right tray
▪ Right Tray Lock	Right tray locking when left tray is removed during machine operation for paper replenishment
▪ Tandem Tray Operation	General tray operation
▪ Humidity Elimination	Anti-condensation heaters
Tray LED Display During Operation	Tray LED displays during machine operation
Tray Heaters	Tray locks of Tray 1, Tray 2, Tray 3 when trays opened and closed
Tray Handle Lock Mechanisms	Manual release lock mechanisms for each tray.

15.2 DRIVE LAYOUT

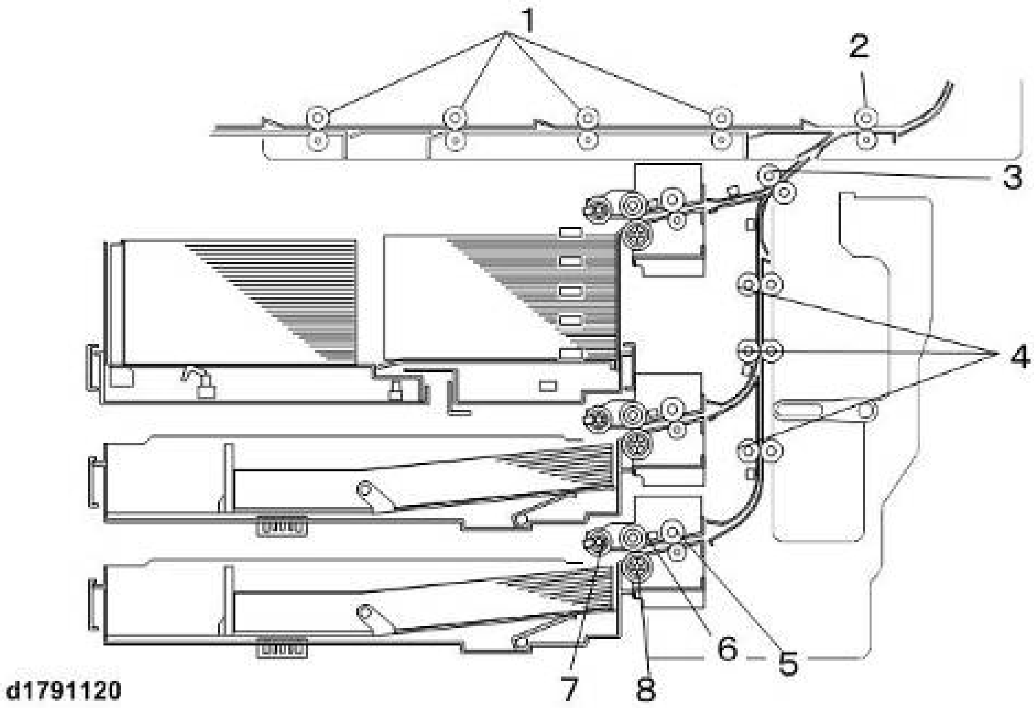
This machine uses and independent paper feed unit (PFU) for each paper feed station.



No.	Name	No.	Name
1	Bank Exit Motor	6	2nd Feed Motor
2	Main Relay Separation Motor	7	2nd Grip Motor
3	Vertical Transport Motor	8	3rd Feed Motor
4	1st Paper Feed Motor	9	3rd Grip Motor
5	1st Grip Motor		

15.3 PAPER TRANSPORT LAYOUT

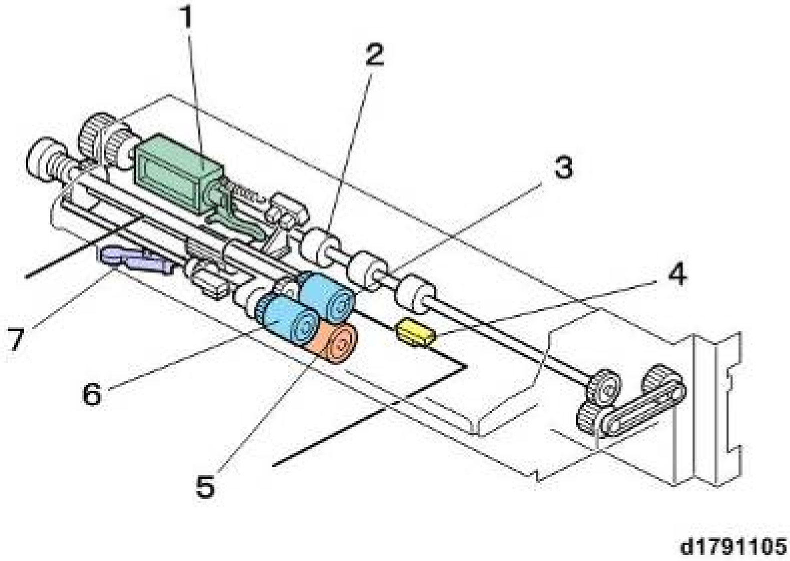
Paper is fed and transported from Tray 1, 2, 3 (F1, F2, F3) for simplex and duplex printing. The machine can feed thick paper quietly and smoothly from each paper feed unit to the vertical transport unit.



No.	Name
1	Duplex Transport Rollers
2	Main Relay Rollers
3	Bank Exit Rollers
4	Vertical Transport Rollers
5	3rd Transport Roller
6	3rd Feed Roller
7	3rd Pickup Roller
8	3rd Separation Roller

15.4 PAPER FEED AND SEPARATION MECHANISM

15.4.1 PAPER FEED AND SEPARATION

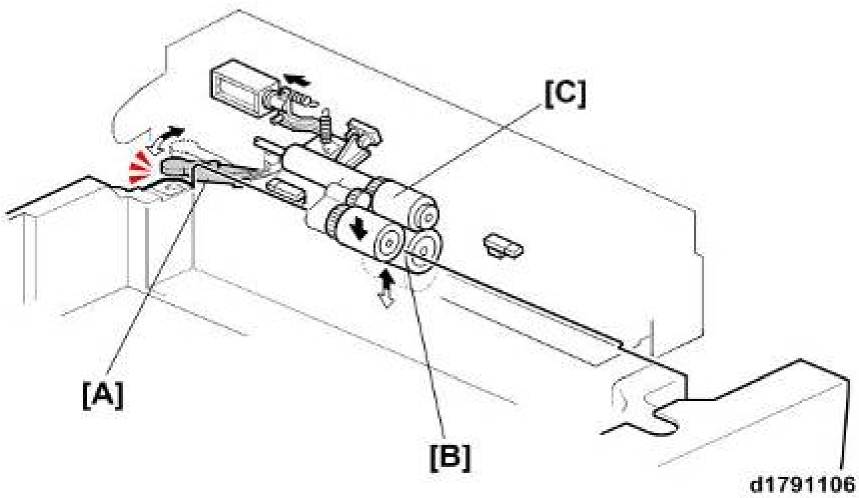


No.	Name	No.	Name
1	Pickup Solenoid	5	Separation Roller
2	Transport Rollers	6	Pickup Roller
3	Feed Roller	7	Pressure Slide Arm
4	Feed Sensor		

First, the paper transport motor switches on, and then the pickup solenoid switches on.

- The feed motor switches on and rotates the feed roller.
- The gear train rotates the pickup roller which feeds the first sheet from the top of the stack.
- The separation roller (equipped with a torque limiter) closes with the feed roller to form the nip where each sheet feeds.
- If more than one sheet of paper feeds, there will be no resistance between the extra sheet and the sheet above, and this lack of resistance will cause the separation roller to reverse slightly and flip the paper back into the paper tray.
- Next, the paper feed sensor (a photosensor) detects the paper, and then switches off the paper feed motor and pickup solenoid to raise the pickup roller and release the sheet of paper.
- The pressure slide arm lowers and raises the separation roller when the tray is removed and inserted so jammed paper can be removed easily.

15.4.2 SEPARATION ROLLER PRESSURE RELEASE

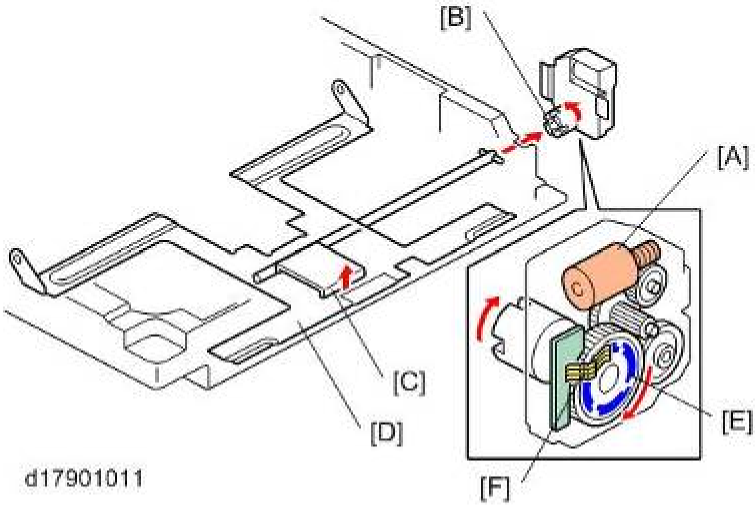


When a paper tray is pushed into the machine:

- The slider arm [A] forces the separation roller [B] up to close the nip between the separation roller and feed roller [C].
- When the paper tray lift motor switches on and lifts the bottom plate and stack, the tray is at paper feed standby position and ready to feed paper after the paper feed and transport motors switch on.

15.5 TRAY 2, 3 (UNIVERSAL TRAYS)

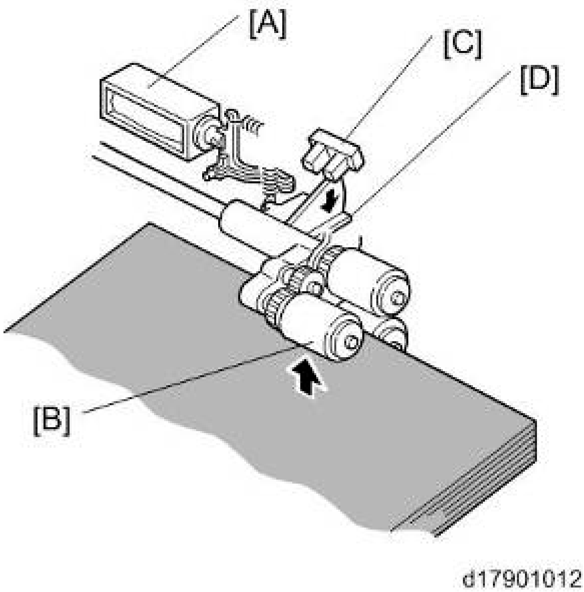
15.5.1 TRAY RAISING AND LOWERING



When the loaded tray is pushed into the machine:

- The tray lift motor [A] switches on and rotates a coupling [B] interlocked with a pin on the shaft of the arm [C] against the bottom of the tray [D] under the stack.
- The rotated shaft raises the arm and bottom plate.
- The tray motor coupling remains meshed and locked with the lift arm (to keep the stack raised), but disengages from the arm and automatically lowers the bottom plate and stack when the tray is opened.
- The amount of rotation to bring the stack to the optimum feed position is measured by a small metal plate [E] in contact with a gear [F] inside the motor mount (the amount of rotation tells the machine how much paper remains in the tray).

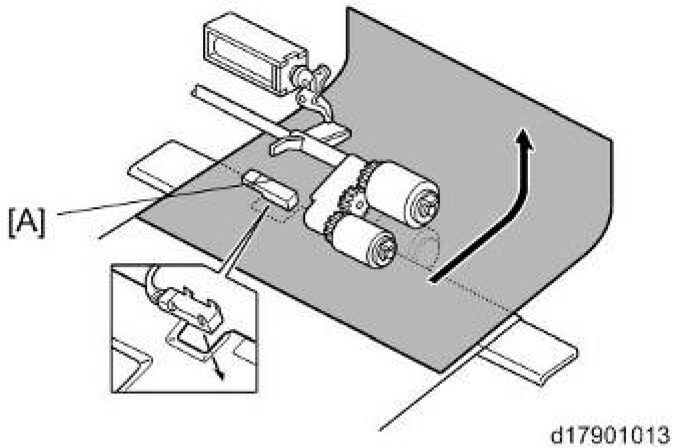
15.5.2 UPPER LIMIT DETECTION



When the tray is pushed into the machine:

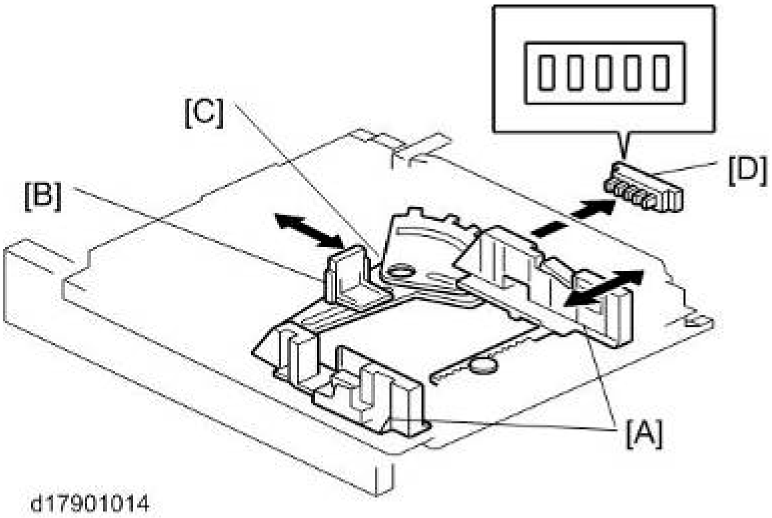
- The pickup solenoid [A] switches on and lowers the pickup arm and pickup roller [B]. With the pickup roller down on top of the paper stack, the machine raises the paper stack and roller.
- When the upper limit sensor [C] (an interrupt sensor) detects the actuator on the arm of the pickup roller, this switches the tray lift motor off with the top of the stack at the paper feed position.
- Next, in order to confirm that the top of the stack is at the optimum feed position, the lift motor reverses momentarily, the upper limit position sensor checks the position, and the lift motor reverses to correct raise the tray and correct the position.
- The tray lift sensor actuator [D] ascends gradually as sheets are fed for printing until it actuates the tray lift sensor and signals the machine to switch on the lift motor to raise the tray again to the correct paper feed position.

15.5.3 PAPER END SENSOR



Each PFU is equipped with a paper end sensor [A] (a photosensor) that signals when there is no more paper in the paper tray.

15.5.4 PAPER SIZE DETECTION



The machine can automatically detects the size of the paper when the operator adjusts the positions of the side fences and end fence to sides of the paper.

- Moving the side fences [A] and end fence [B] moves a metal wheel [C] that activates combinations of 5 micro-switches on a detection board [D] inside the tray.
- Each switch corresponds to a bit, and the readings of the detected positions (shown in the table below) detect the size is also and display it on the operation panel.

Paper Size	Sub Scan	Main Scan	A	B	C	D	E
12” x 18”	457.2	304.8	1	1	1	1	1
A3	420	297	1	1	0	0	1
B4	364	257	1	0	0	1	1
A4 SEF	297	210	0	1	0	0	1
A4 LEF	210	297	1	1	0	0	0
B5 SEF	257	182	1	0	1	0	1
B5 LEF	182	257	0	0	0	1	1
A5 SEF	210	148	1	1	1	0	1
A5 LEF	148	210	0	1	1	0	1
DLT (11” x 17”)	431.8	279.4	1	1	1	0	0
LG (8.5” x 14”)	355.6	215.9	1	0	1	1	0
LT SEF	279.4	215.9	1	1	0	1	0

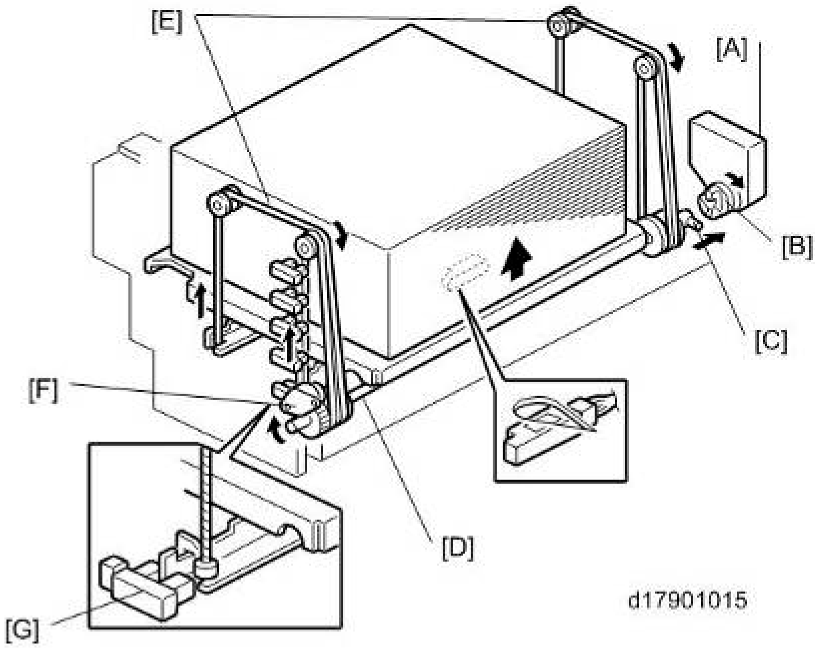
Paper Size	Sub Scan	Main Scan	A	B	C	D	E
LT LEF	215.9	279.4	0	1	1	0	0
HLT SEF	215.9	139.7	0	1	1	1	0
HLT LEF	139.7	215.9	1	1	1	1	0
F4 (8.5 x 13”)	330.2	215.9	1	1	0	1	1
Folio (8.25” x 13”)	330.2	209.55	0	1	0	1	1
F (8” x 13”)	330.2	203.2	0	1	1	1	1
Exec SEF (7.25” x 10.5”)	266.7	184.2	1	0	1	0	0
Exec LEF (7.25” x 10.5”)	184.2	266.7	0	0	1	1	1
8-Kai SEF	390	267	0	0	1	1	0
16-Kai SEF	267	195	1	0	0	1	0
16-Kai LEF	195	267	1	0	1	1	1

15.6 TANDEM TRAY

15.6.1 PAPER SIZE DETECTION

The tandem tray is dedicated for use with A4 LEF paper and has no automatic paper size detection feature. The tandem tray can be set for LT LEF paper by adjusting the side fences and end fences, but this new paper size setting must be set with **SP5019-002**.

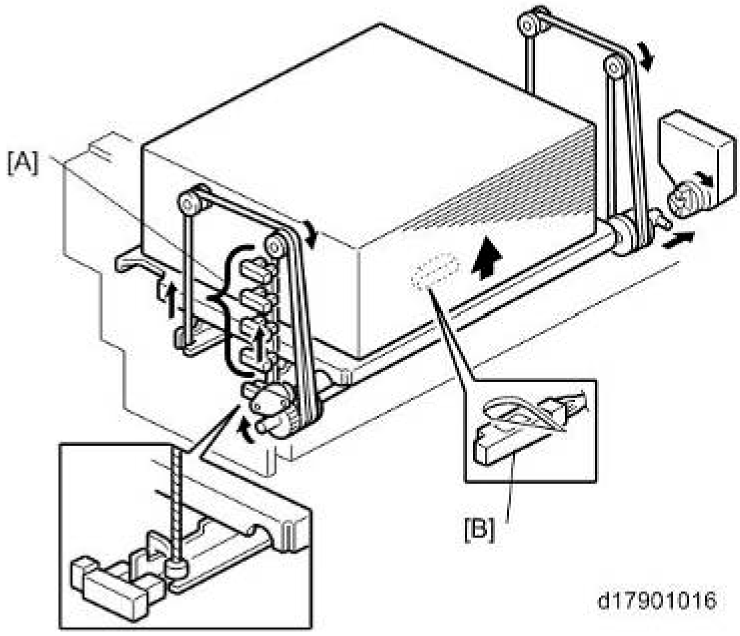
15.6.2 TRAY RAISING AND LOWERING



When the loaded tray is pushed into the machine:

- The tray lift motor [A] switches on and rotates a coupling [B] interlocked with a pin [C] on the bottom of the tray.
- This rotates the lift shaft [D] and operates the wire pulleys [E] that raise the bottom the tray and paper stack.
- The lift motor coupling remains meshed and locked with the pin of the shaft (to keep the stack raised), but disengages from the arm and automatically lowers the bottom plate and stack when the tray is opened.
- A damper [F] slows the speed of the descent to prevent the tray from falling too fast.
- The lower limit sensor [G] detects the bottom position of the tray.

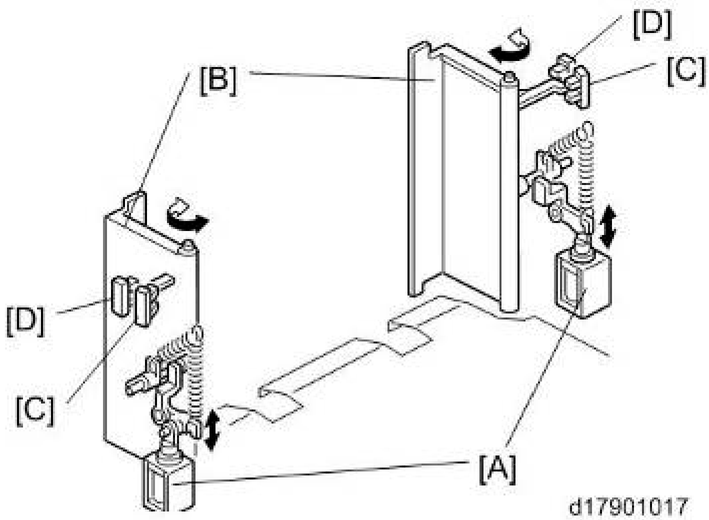
15.6.3 PAPER REMAINING DETECTION



Four paper height sensors [A] attached to the front of the right tray monitor the amount of paper that remains in the tray.

- As the actuator on the right support rod rises, it de-activates each sensor in turn to trigger 5 levels of paper remaining alerts on the operation panel.
- When the tray is full no sensors are de-activated (100%).
- The paper end sensor [B] indicates when the tray is out of paper after the last sheet feeds from the tray.

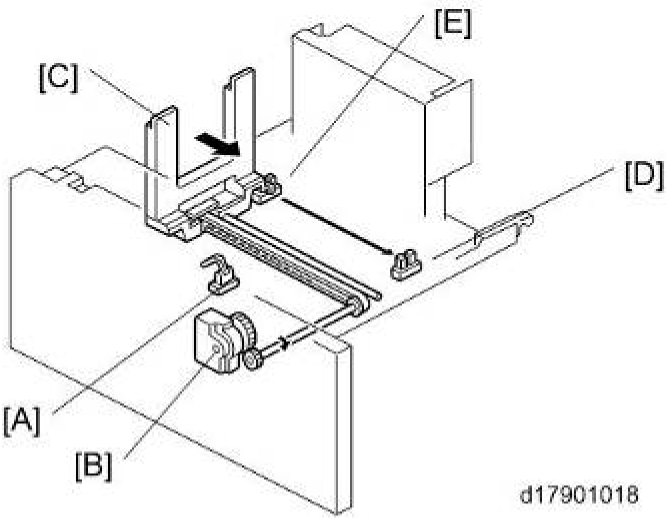
15.6.4 TANDEM TRAY SIDE FENCE OPERATION



The right tray is provided with two solenoids [A] at the front and back. When paper in the right tray runs out:

- The front and rear side fence solenoids switch on and open both fences [B] swing open until the front and back fence open sensors [C] switch on.
- When the rear fence of the left tray pushed paper into the right tray, the rear fence return sensor switches on and switches off the side fence solenoids and the side fences close.
- When the front and rear side fence closed sensors [D] activate after the side fences close, this triggers a message on the operation panel to tell the user to load paper into the left side of the tandem tray. If the fences do not close correctly, a message on the operation panel alerts the user to reset the tray.

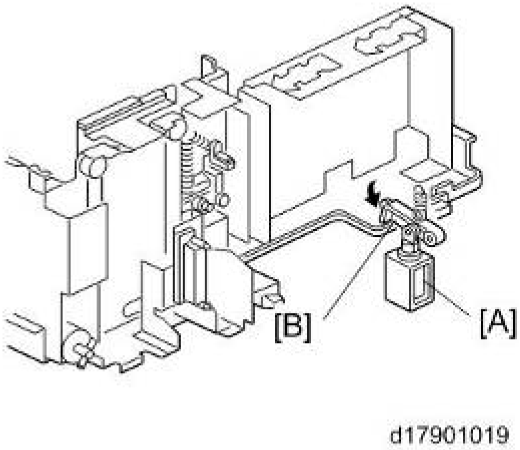
15.6.5 LEFT TRAY REAR FENCE OPERATION



When the left tray paper end sensor [A] detects paper in the left tray and the right tray paper end sensor detects no paper in the right tray:

- The rear fence drive motor [B] switches on and pushes the rear fence [C] against the side of the paper stack to move it to the right tray.
- When the actuator on the rear fence activates the rear fence return sensor [D], the rear fence drive motor reverses to retract the rear fence.
- The motor switches off when rear fence HP sensor [E] detects the rear fence at its home position.

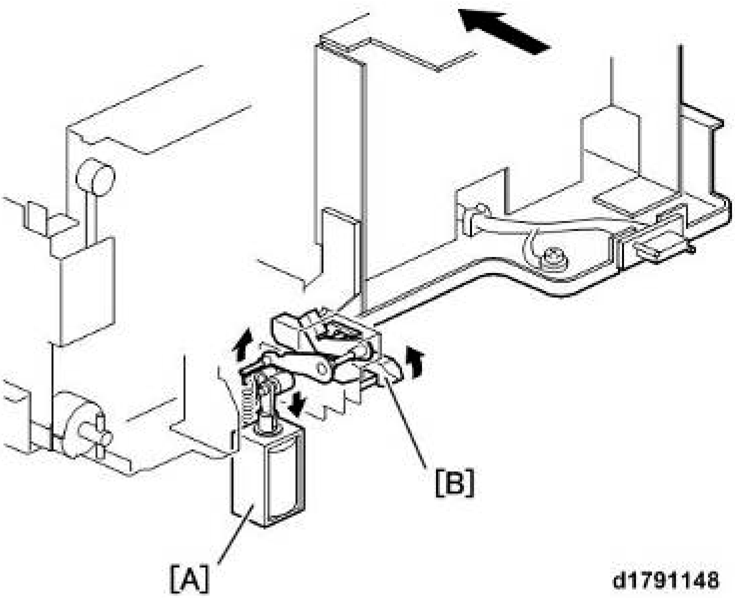
15.6.6 LEFT TRAY LOCK



While the rear fence is in motion moving to the right:

- The left tray lock solenoid [A] is on to lock the tray and prevent the operator from opening the tray.
- When the paper stack starts to move from the left tray, the lock solenoid goes on and moves lever [B] to the lock position to lock the tray.
- After the stack has been moved to the right tray and the rear fence has returned to its home position of the left, the lock solenoid goes off and unlocks the tray.
- This mechanism prevents the tandem tray from being opened while the right tray is being re-supplied with paper.

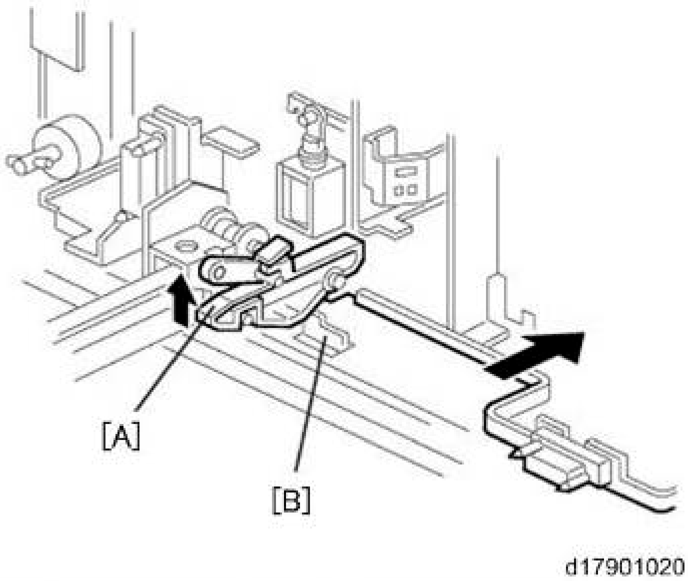
15.6.7 RIGHT TRAY LOCK

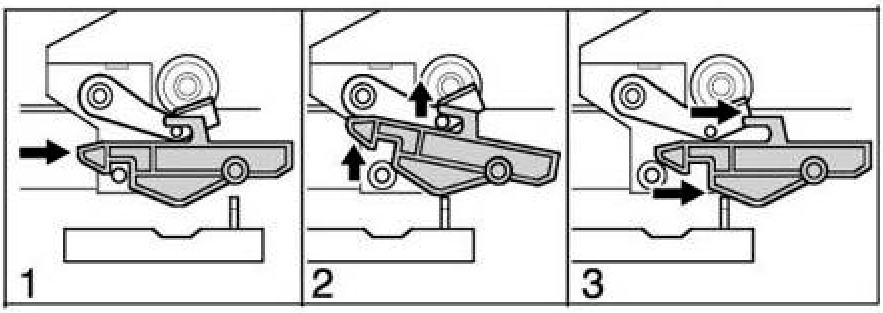


When lock release solenoid [A] goes on, lock lever [B] opens.

- The lock lever on the left tray catches on the pin of the right tray, so only the left tray is caught and opens.

- With the lock release solenoid off, the tip of the lock lever catches and both trays catch and open together.



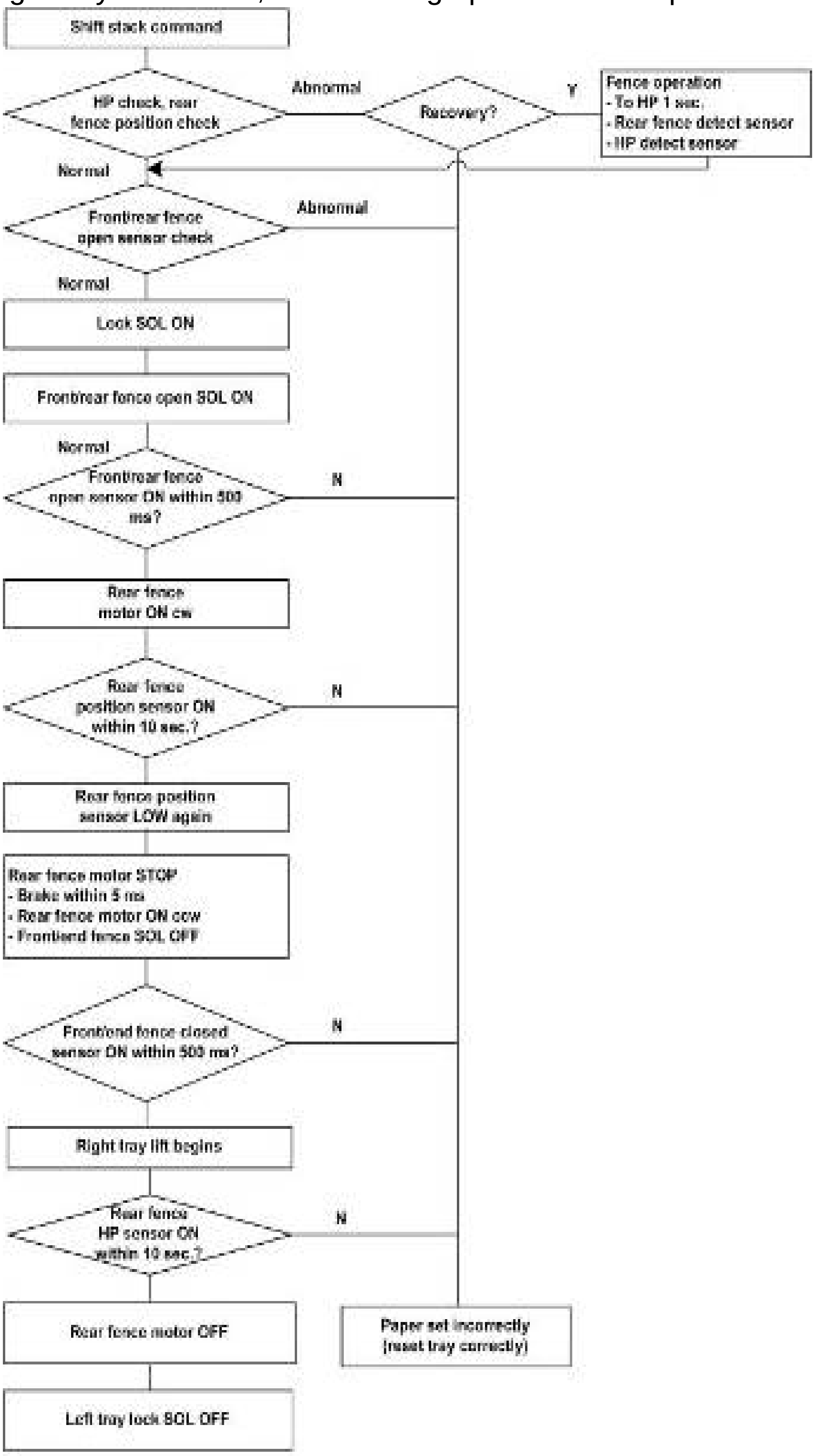


Normally, the left lock tray lock lever [A] catches pin [B] of the right tandem tray.

- If there is no paper in the left tray during printing, the right tray lock solenoid turns on to release the tray lock lever so the left and right trays can be separated.
- This allows the left tray to be pulled out to load more paper while paper is still feeding from the right tray.

15.6.8 TANDEM TRAY OPERATION

After the tandem tray is closed and the bottom plate is raised, or when the right tray paper end sensor detects no paper, and there is paper in the left tray, after the bottom plate of the right tray is lowered, the following operation takes place.



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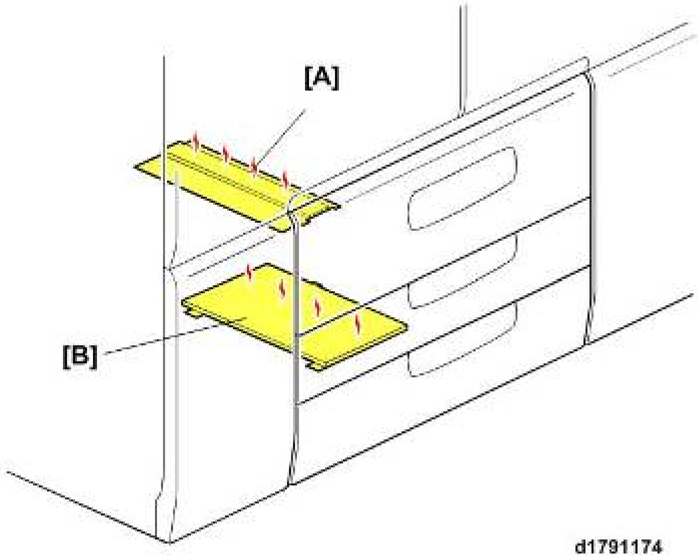
15.6.9 TRAY DISPLAY DURING OPERATION

All trays are provided with LEDs. Each LED lights during copying and printing to alert the operator that the paper trays cannot be opened during machine operation.

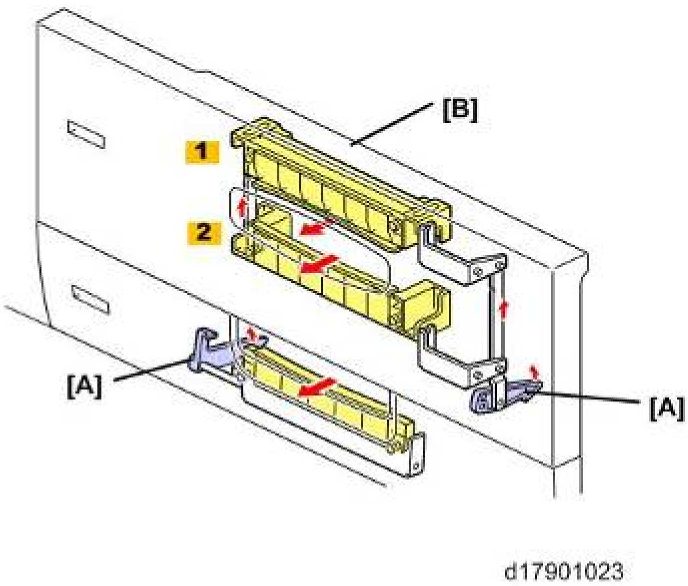
- LED On Timing
  The LED of the tray selected for paper feed switches on at the start of the job.
- LED Off Timing
  The LED goes off once the trailing edge of the last sheet leaves the fusing unit exit sensor. However, the LED does not go off during duplex printing until the last duplex printed sheet has left the fusing exit sensor.
- Paper End During Operation
  Tandem Tray. The LED of the right paper tray goes off when the right tray paper end sensor detects no paper. The left tray LED remains on, and then the right tray LED goes on again once paper has been moved from the left tray to the right tray.
  Tray 2, Tray 3. LED goes off at paper end.
- Paper Jam, Other Problem
  LED goes off when a paper jam or other problem occurs (SC codes other than logging SC codes).
- When Tray Is Removed
  LED on/off status continues even if tray is removed.

15.6.10 TRAY HEATERS



There are two anti-condensation heaters available for the paper bank, one below Tray 1 [A] and one below Tray 3 [B]. Depending on how the trays are connected they can be set to remain on 24 hours a day, or they can be set to remain on only when the machine is switched off. For more details, please refer to "Installation". These heaters require installation.

15.6.11 TRAY HANDLE LOCK MECHANISM



In order to open Tray 1, 2, or 3, the operator must grip the handle and squeeze to disengage a lock lever [A].

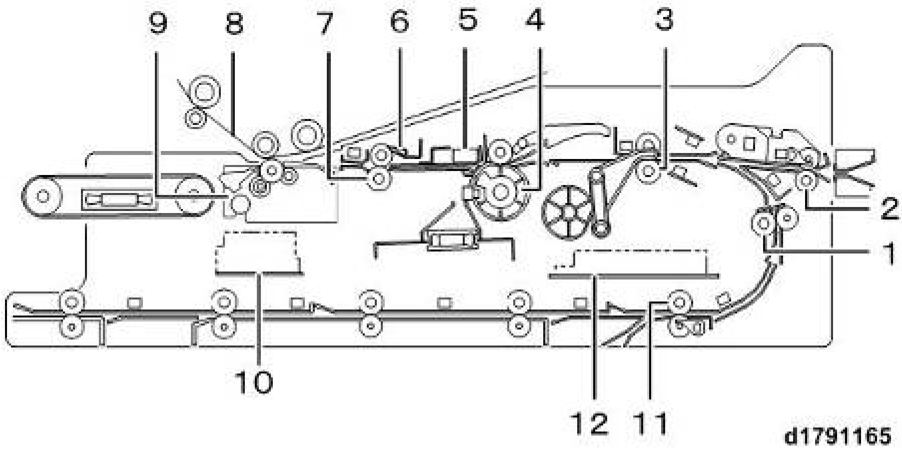
- Tray 1 [B] (the top tray) is provided with two handle releases.
- Squeezing and pulling either handle will it release for opening.

16. MAIN PAPER PATH, PAPER REGISTRATION

16.1 OVERVIEW AND MECHANISM

16.1.1 OVERVIEW

The following functions occur in the main machine paper path after paper is fed from the paper bank or the LCT: Skew correction in both main scan and sub scan directions, image-to-paper transfer, and then duplex printing (if selected).



No.	Name	No.	Name
1	Registration Entrance Roller	7	Transfer Timing Roller
2	LCT Relay Roller	8	Image Transfer Belt (ITB)
3	Registration Timing Roller	9	PTR Unit
4	Registration Gate Roller	10	Paper Separation Power Pack
5	CIS	11	Main Relay Roller
6	Paper Dust Tray	12	DRB

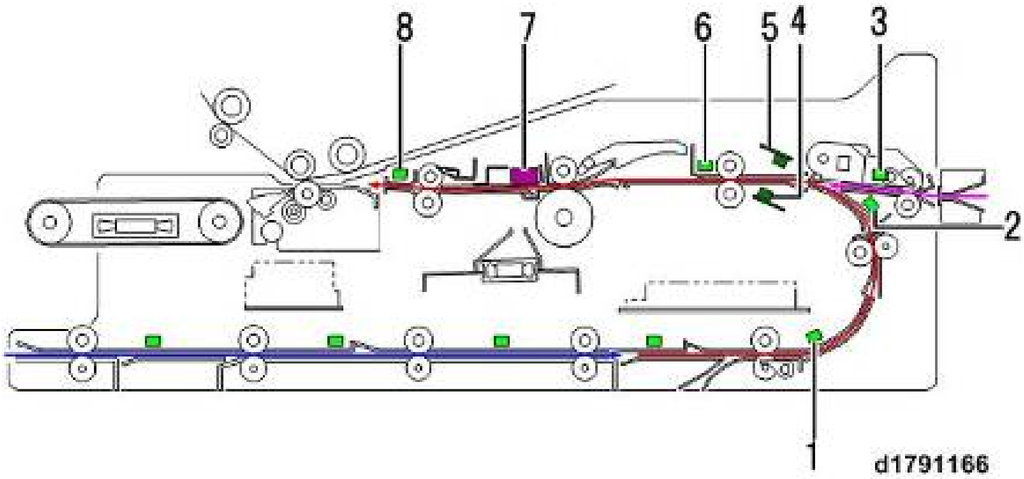
16.1.2 MECHANICAL CONFIGURATION

Transport Unit

Double-Feed Detection	Ultrasound sensor method
Roller Release	Open roller nips to free paper for skew correction, paper registration
Skew Correction	Skew correction with registration gate roller
Main Scan Registration	Leading edge registration with the registration gate roller
Sub Scan Registration	Side-to-side registration with the dual shift rollers
Paper Dust Collection	Collection of dust from transfer timing roller with a mylar and into a tray
CIS Cleaning	Cleaning the CIS that reads the edges of sheets in the registration unit

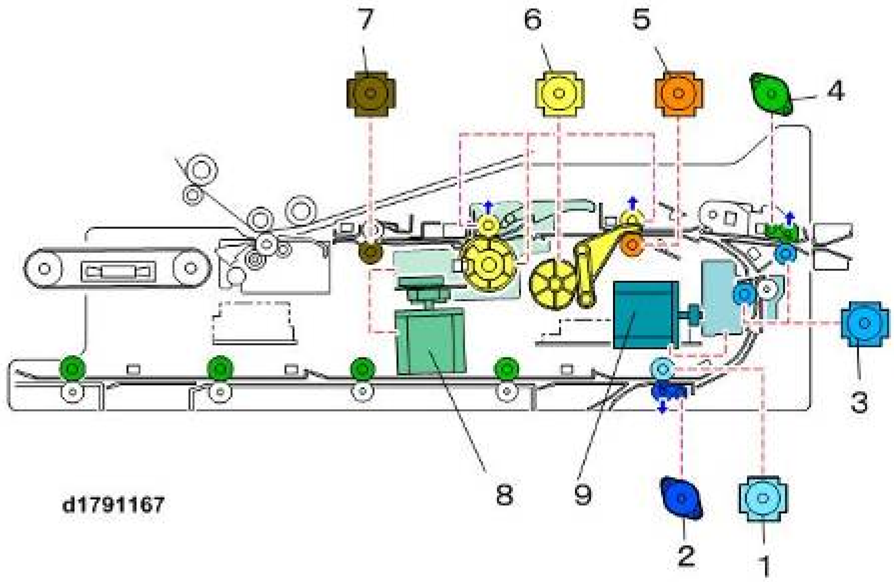
16.1.3 TRANSPORT PATH, SENSOR LAYOUT

- The paper fed from each paper bank tray is first transported to the vertical feed unit (VTU) and then to the paper registration unit.
- After each sheet is tested for double-feeding, each sheet is corrected for skew, positioned correctly for paper registration in both main scan and sub scan directions, and then is sent to the PTR unit where the image is transferred from drum to paper.
- The two paper feed sources are the three paper trays of the main unit paper bank, or an optional large capacity tray (LCT) unit installed on the right side of the machine.
- During duplex printing, once the paper leaves the fusing unit (after the first side is printed) the paper is sent down into the inverter path and then reverse fed back across the machine to the junction of the VTU and then sent once more through the paper registration unit above.



No.	Name	Content
1	Main Relay Sensor	Monitors movement of paper to check for paper jams.
2	Registration Entrance Sensor	Monitors movement of paper to check for paper jams.
3	LCT Relay Sensor	Monitors movement of paper to check for paper jams.
4	Double-feed Sensor (Emitter)	Mounted below the double-feed sensor (receptor), the paper passes through the gap between these two sensors for the double-feed check.
5	Double-feed Sensor (Receptor)	Mounted above the double-feed sensor (emitter), the paper passes through the gap between these two sensors for the double-feed check.
6	Registration Timing Sensor	Determines the timing of the rotation of the registration gate roller to stop paper in the paper path, also checks for paper jams.
7	CIS	Checks paper position in the path to determine the amount of correction needed.
8	Transfer Timing Sensor	Monitors paper movement for jam detection and controls the timing of paper release to the PTR unit.

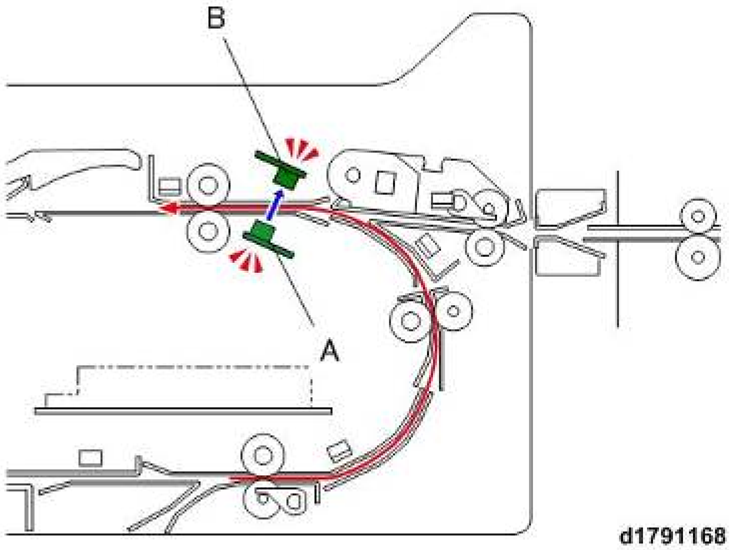
16.1.4 DRIVE LAYOUT



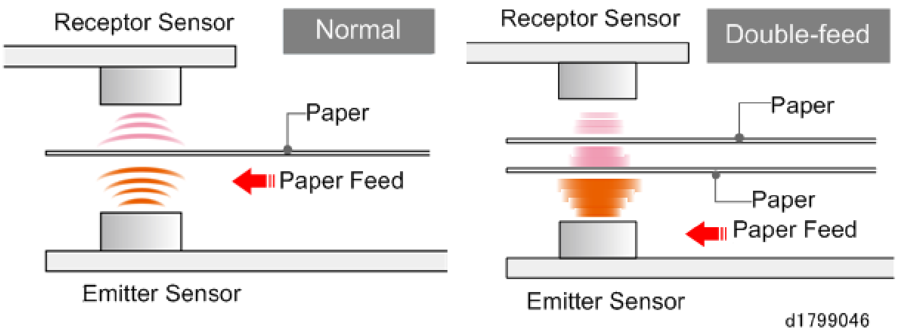
No.	Name	No.	Name
1	Bank Exit Motor	6	Registration Gate Motor
2	Main Relay Separation Motor	7	Transfer Timing Motor
3	Registration Entrance Motor	8	Registration Shift Motor (LE)
4	LCT Relay Separation Motor	9	Registration Shift Motor (TE)
5	Registration Timing Motor		

16.2 DETAILS

16.2.1 DOUBLE-FEED DETECTION



A pair of ultra-sound sensors are mounted in the paper registration unit, one below (emitter) [A] and one above (receiver) [B] the paper feed path.
When the paper passes through the gap between the sensors, the signal between them detects the original with sound waves and converts the reading to voltage, and if the output level is determined to exceed threshold for the type of original being fed, paper feed stops.

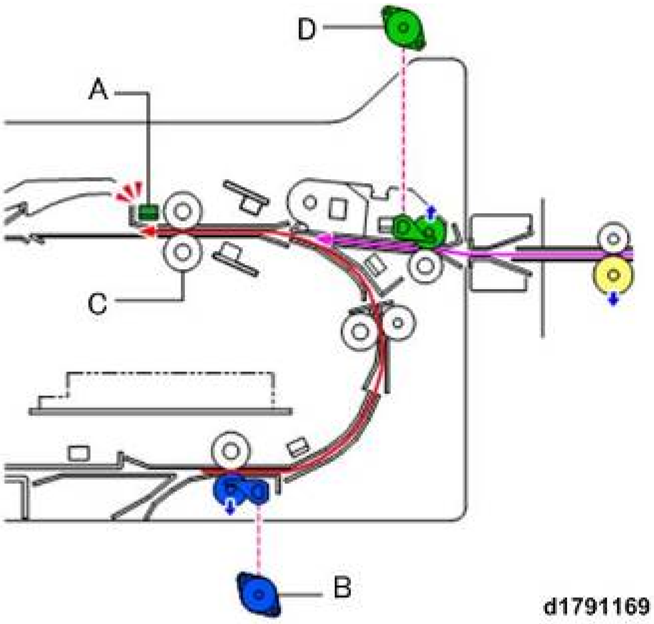


- When the paper passes between the sensors, an ultra-sound wave from the emitter sensor below passes through the paper to the receiver above.
- The receiver converts the signal generated by the vibration of the signal against the paper to an electrical pulse and checks its level.
- If a double feed occurs, the space between the sheets will generate a lower signal. When the emitter detects this lower signal (lower than that of a single sheet) it causes the machine to issue Jam Code J099 (double-feed detected) and the paper is fed to the purged paper tray..

Double-feed Related SP Code

SP No.	Name	Range/Settings
SP1302-001 to 007	Double Feed Detect Trays 1 to 7	[0 to 1/**1**/1] 1: On 0: Off
SP1303-001	Dbl-Feed Detect After Dbl-Feed Detect	[0 to 1/**1**/1 0: Jam alarm 1: Purge tray

16.2.2 ROLLER RELEASE

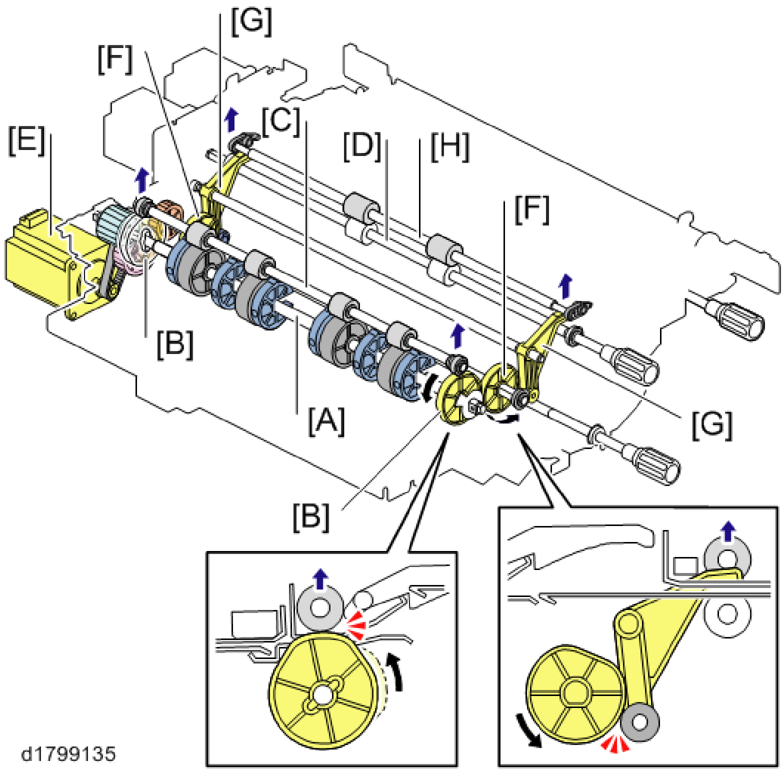


Main Machine Relay Roller and LCT Relay Roller

When a sheet of paper is fed one of the main machine paper trays, or when sheet is fed on its second pass for printing on the second side during duplex printing, the registration timing sensor [A] detects the leading edge of the sheet. This signals the main relay separation motor [B] to turn on and open the nip between the relay drive and idle roller.

When a sheet of paper is fed from the LCT (option) on the right side of the machine, the registration timing sensor [A] detects the leading edge of the sheet and signals the LCT relay motor [D] to open the nip of the LCT relay rollers.

In both cases the paper is released in front of the registration timing roller [C] so it is free to move for image registration in the main scan direction.



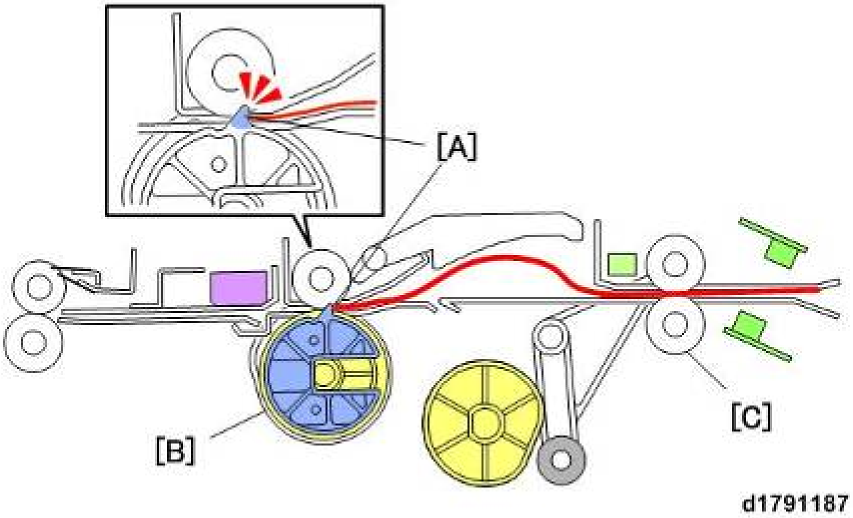
Registration Gate Roller and Registration Timing Roller

The rotation and release of the registration gate roller, rotation of the registration timing roller, and release of the registration timing drive roller, are all controlled by the rotary gate motor [E].

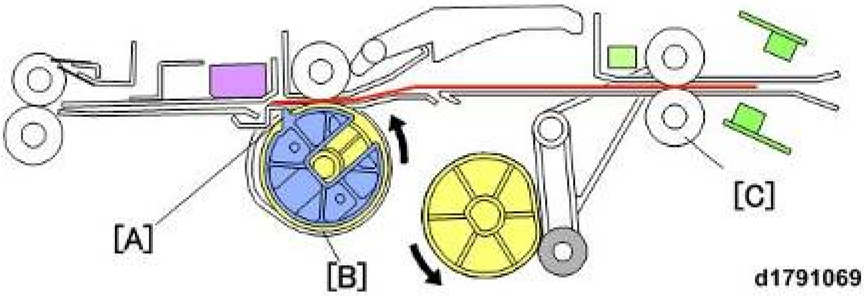
The raising and lowering of the rotary gate roller [A] is driven by a cam [B] attached to the shaft drive roller [C].

The raising and lowering of the registration timing roller [D] is controlled by three gears driven by the rotary gate motor [E] that rotate cam [F]. The lever [G] attached to the cam raises drive roller [H] to separate it

16.2.3 SKEW CORRECTION

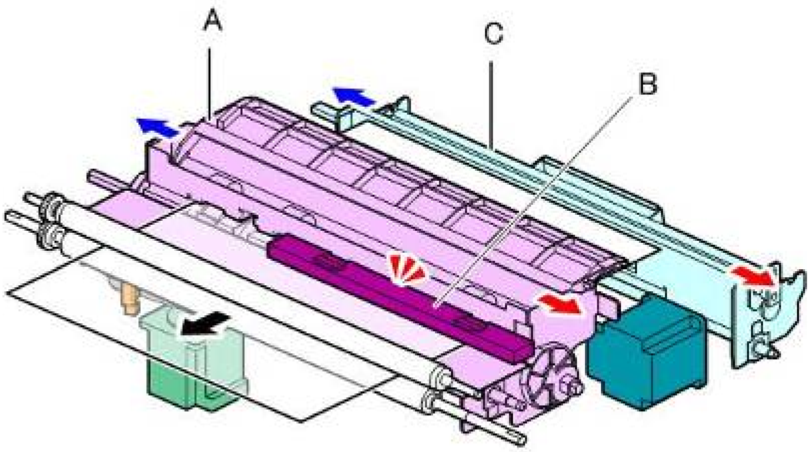


The leading edge of the paper fed by the registration timing roller [C] strikes the raised gate [A] of the registration gate roller [B]. This buckles the paper slightly and aligns its leading edge with the gate and corrects any skew.



After skew correction the rotary gate roller is rotates, grips the paper, and then feeds it to the leading edge shift unit.

16.2.4 MAIN SCAN REGISTRATION (IMAGE VERTICAL)



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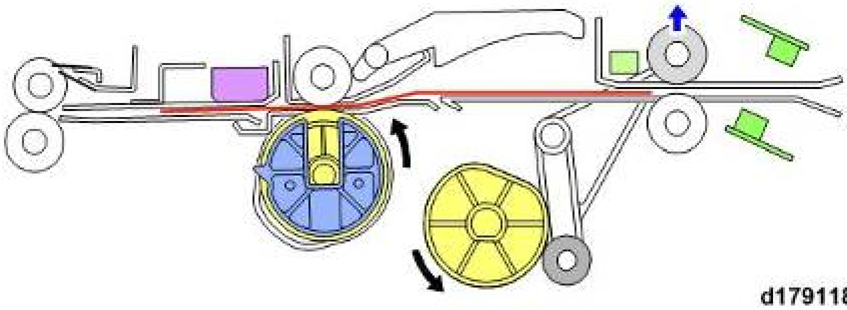

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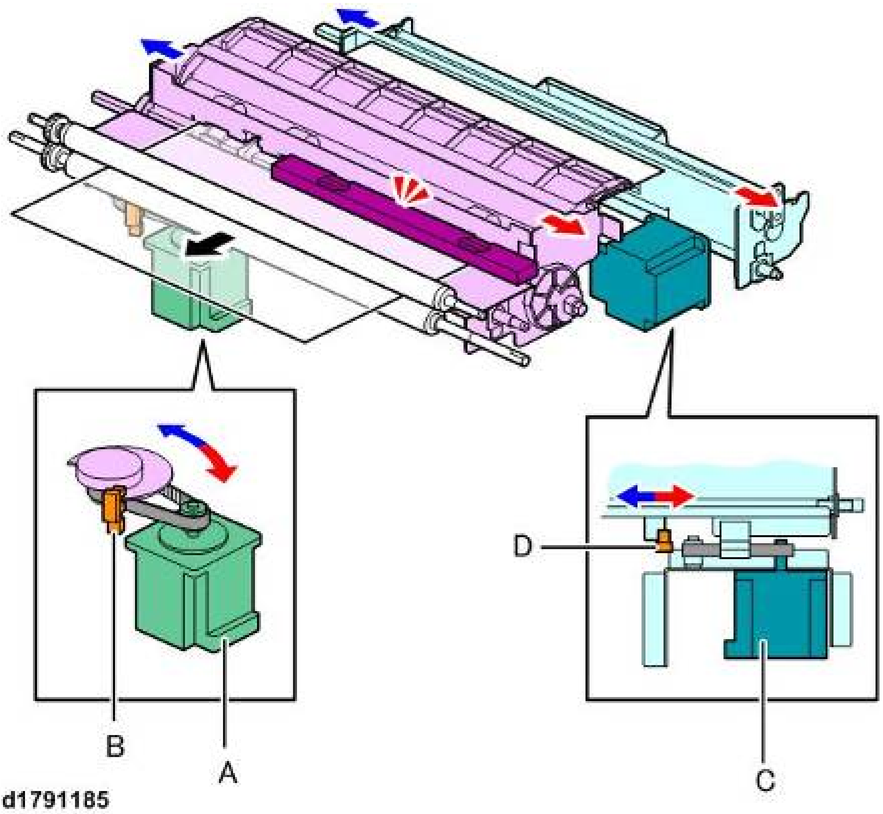
The paper that has been corrected for skew is fed to the LE (leading edge) shift unit [A] for image registration in the main scan direction.
The LE shift unit is equipped with a CIS (Contact Image Sensor) [B] that detects the position of the edge of the paper. The reading of the paper edge by the CIS is used to calculate the amount of deviation from the correct position, and then the amount of movement by the LE shift unit required to correct the position of the paper is calculated. The LE shift unit moves slightly to the front or rear so the image will be positioned correctly on the paper.
At this time the paper is held only by the LE shift unit. The paper is still free because the nip of the registration timing roller is open.
If paper longer than A4 SEF (297 mm) has been fed, the TE (trailing edge) shift unit [C] moves with the LE shift unit to correct paper registration in the main scan direction.



The LE registration shift motor [A] moves the LE shift unit to the front and rear. The LE shift unit HP sensor [B] determines the home position of the LE shift unit where the shift unit resides while it is idle.

The TE registration shift motor [C] moves the TE shift unit to the front and rear. The TE shift unit HP sensor [D] determines the home position of the TE shift unit where the shift unit resides while it is idle.

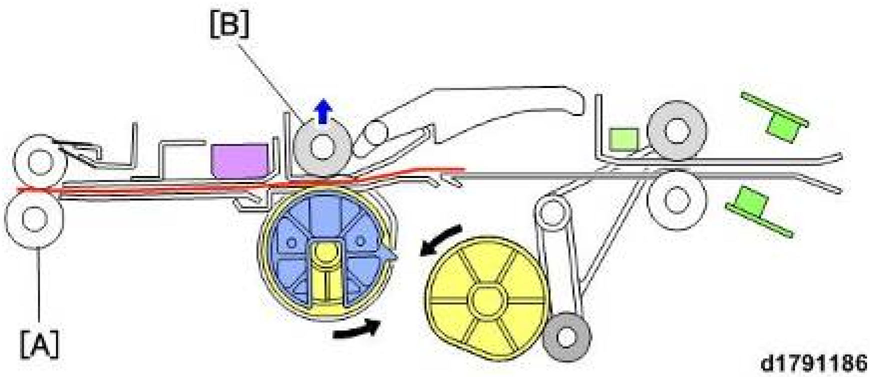
16.2.5 RELATED SP CODES

Here is a list of SP codes related to paper registration.

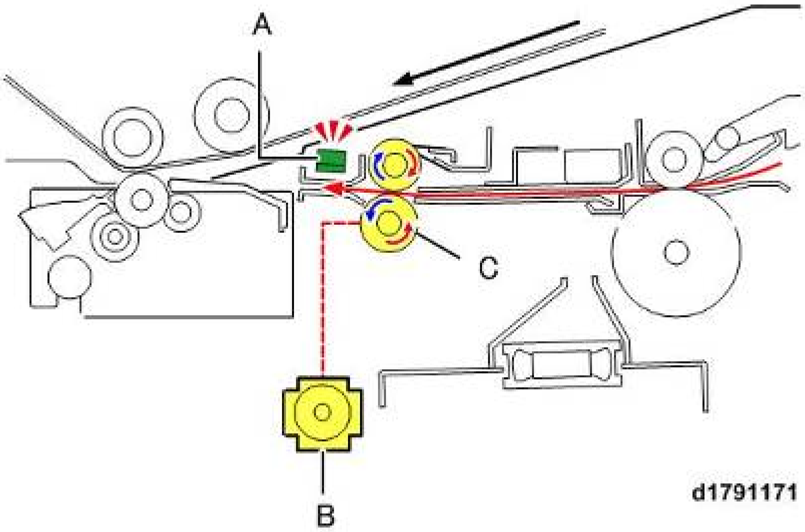
SP1-917-001 to 008	Side-to-Side Registration – Disable Tray 1 to 7, Duplex Unit [0 to 1/**0**/1] 0: Enable – Image shift operates (not disabled) 1: Disable – No image shift operation
SP1-957-001 to 100	Side-to-Side Registration – Custom Paper [0 to 1/**0**/1] 0: Enable – Image shift operates (not disabled) 1: Disable – No image shift operation

Note: The SP1-917 settings take priority over the SP1-957 settings

16.2.6 SUB SCAN REGISTRATION (IMAGE HORIZONTAL)

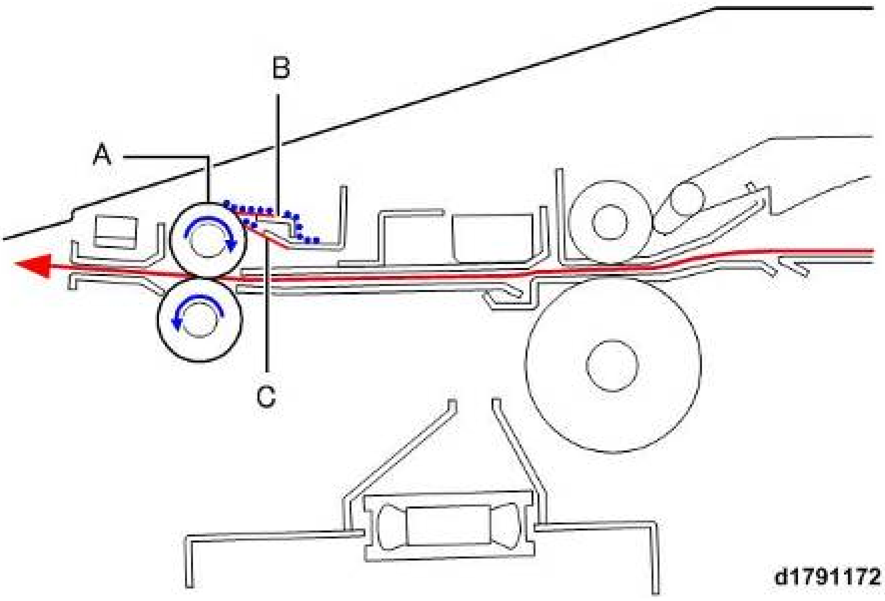


After image correction in the main scan direction by the shift units, the paper is fed to the transfer timing roller [A]. The nip of the registration gate roller [B] opens to free the paper.



The transfer timing sensor [A] detects the leading edge of the sheet to start the sub scan registration.
In order to adjust feed of the leading edge so it aligns correctly with the start of image transfer, after the transfer timing sensor goes ON, machine will calculate the amount of time to start paper feed so the image will be positioned correctly on the sheet in the sub scan direction. Based on the results of these calculations, the speed of the transfer timing motor [B] is increased or decreased to adjust the rotation speed of the transfer timing rollers [C] for the ideal timing to feed the paper to the PTR unit.

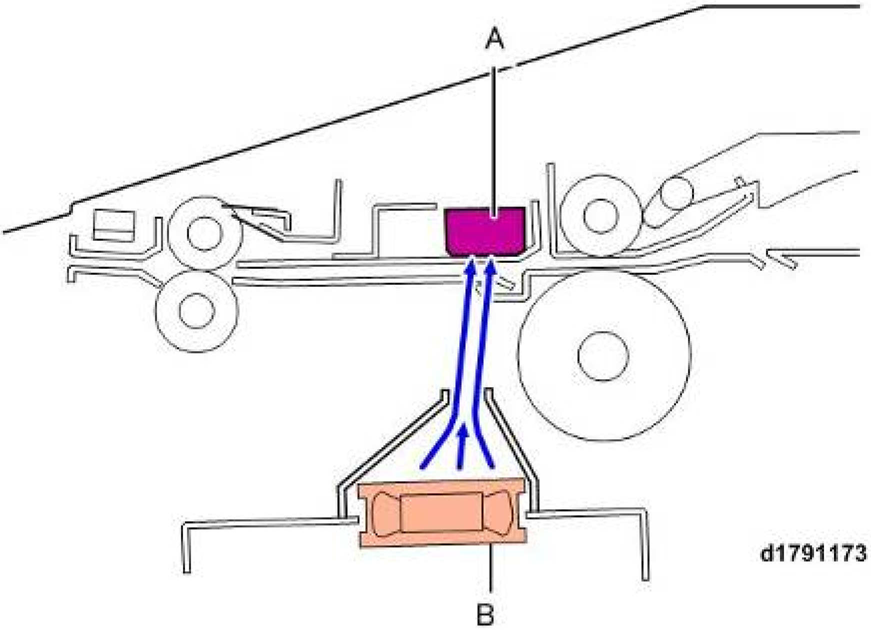
16.2.7 PAPER DUST COLLECTION



A mechanism is provided to collect paper dust from the transfer timing idle roller [A].

- Two mylar scrapers are used on the surface of the idle roller.
- Scraper [A] cleans the surface of the idle roller.
- Scraper [B] picks up and removes any paper dust missed by the first scraper.
- The paper dust scraped away from the roller falls down into a tray.
- The can be easily removed and emptied.

16.2.8 CIS CLEANING



The CIS [A] is mounted above the paper path, so it can collect paper dust and other matter.

- In order to prevent paper dust from collecting, the bottom of the CIS is cleaned by the CIS cleaning fan [B] to keep it clear of dust.
- The cleaning fan blows air over the CIS to prevent dust from collecting on the surface of the paper were the image will be written onto the paper.

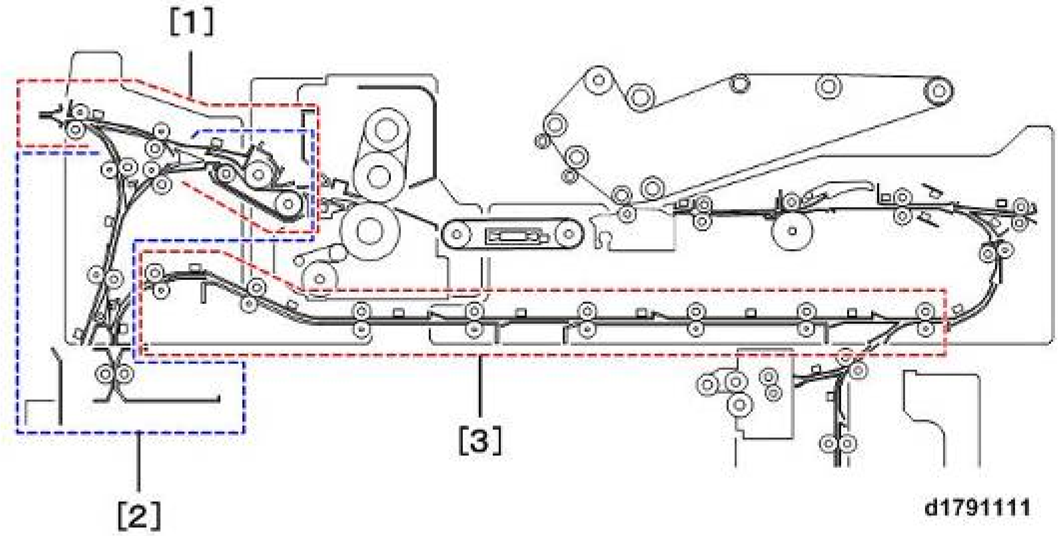
17. PAPER INVERT, EXIT, DUPLEX

17.1 OVERVIEW AND MECHANISM

17.1.1 OVERVIEW

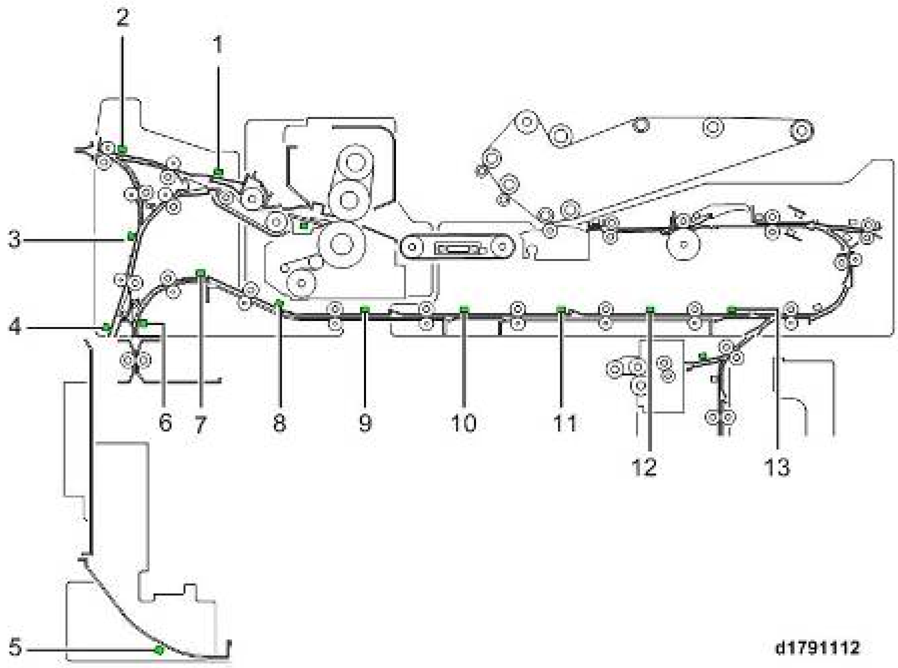
The following mechanisms comprise the invert, exit, and duplex section.

- PTB unit that transports the paper from the PTR unit to fusing unit
- Invert/exit mechanisms
- Duplex transport path



No.	Name
1	Straight-through Exit Unit
2	Invert/Exit Unit
3	Duplex Exit Unit

17.1.2 LAYOUT



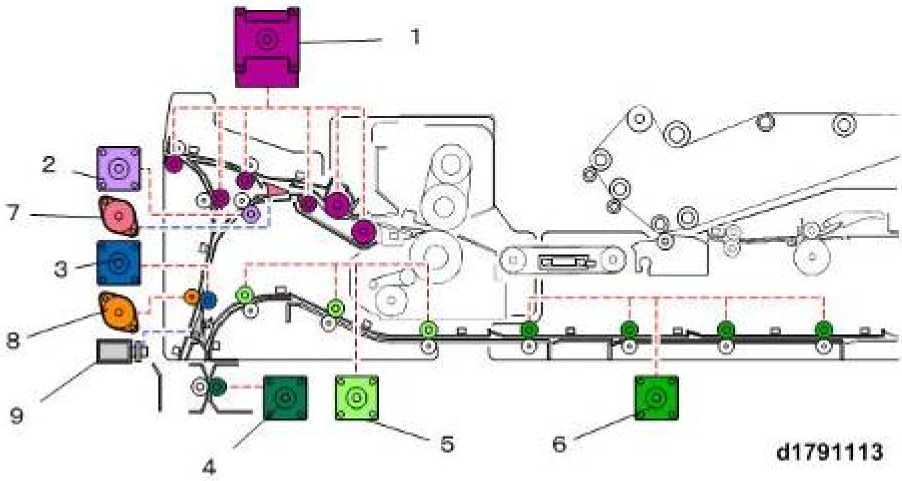
No.	Name	No.	Name
1	Exit JG Sensor	8	Duplex Transport Sensor 2
2	Exit Sensor	9	Duplex Transport Sensor 3
3	Exit/Invert Sensor	10	Duplex Transport Sensor 4
4	Purge Relay Sensor	11	Duplex Transport Sensor 5
5	Purged Paper Sensor	12	Duplex Transport Sensor 6
6	Duplex Invert Sensor	13	Duplex Exit Sensor
7	Duplex Transport Sensor 1		

17.2 DETAILS

Invert, Exit, Duplex Section

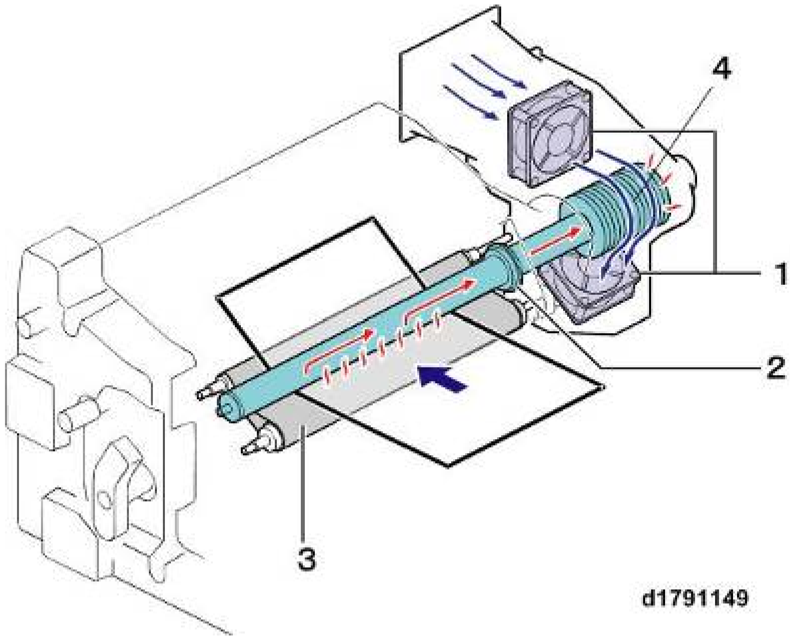
Invert Exit	Two paper paths: invert/exit, straight-through exit
• Drive	Exit motor, invert entrance motor, exit/invert motor, main relay release motor
• Paper Cooling	Heat pipe
• Ventilation	Paper cooling with heat pipe
• Straight-through and exit	Exit roller path with exit JG open
• Invert/exit (face-down delivery)	Invert paper path with exit motor, exit/invert motor
Paper Purge	Purging paper in main machine paper path when a jam occurs downstream
Duplex	
• Drive	Duplex/invert motor, duplex transport motor 1, 2
• Duplexing	Switchback system
Interleave	Interleave control system (5-sheet interleave with LT LEF and smaller paper sizes

17.2.2 DRIVE



No.	Name	No.	Name
1	Exit Motor	6	Duplex Transport Motors 2
2	Invert Entrance Motor	7	Exit JG Motor
3	Exit/Invert Motor	8	Exit/Invert Separation Motor
4	Duplex/Invert Motor	9	Invert JG Solenoid
5	Duplex Transport Motors 1		

17.2.3 PAPER COOLING



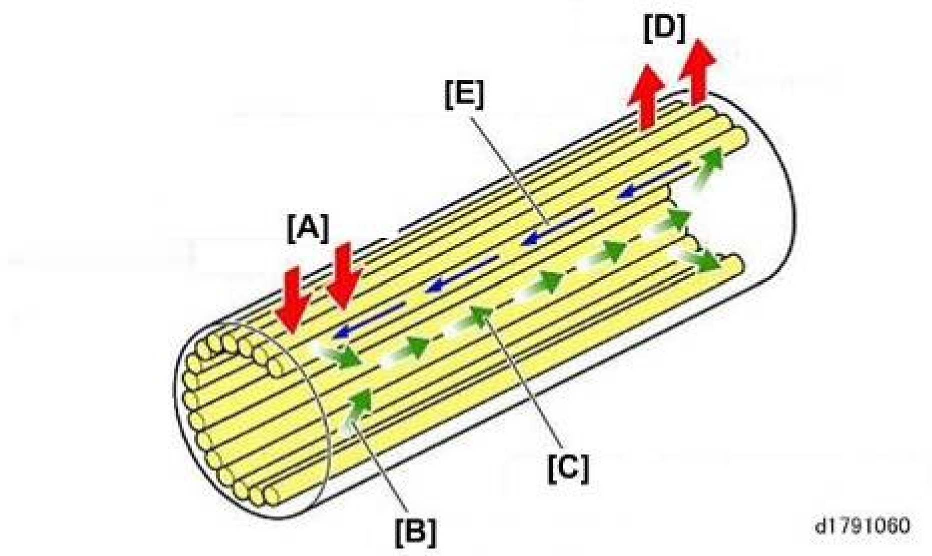
No.	Name
1	Cooling Fan
2	Heat Pipe
3	Paper Transport Belt
4	Heat Sink Fins

A heat pipe cools the fused paper immediately after it exits the fusing unit. Layered fins on the end of the heat pipe form a baffle exposed to air blown through them to dissipate heat absorbed from the paper.

- The paper on the paper transport belt (3) passes under the heat pipe (2).
- The heat pipe has an intricate system of small capillary tubes filled with water running along the inside of the paper cooling pipe.
- The hot paper leaving the fusing unit heats the parts of the cooling pipe that it touches. This heats the water inside the tubes.
- The principle of heat transference moves the heated water to toward the cooler rear end of the cooling pipe where where a heat sink with fins (4) is attached.
- The fins of the baffle conduct heat away from the water in the pipe. Air moving around the fins dissipates the heat into the air.
- Paper cooling fans (1) in the duct dissipate the heat around the fins.

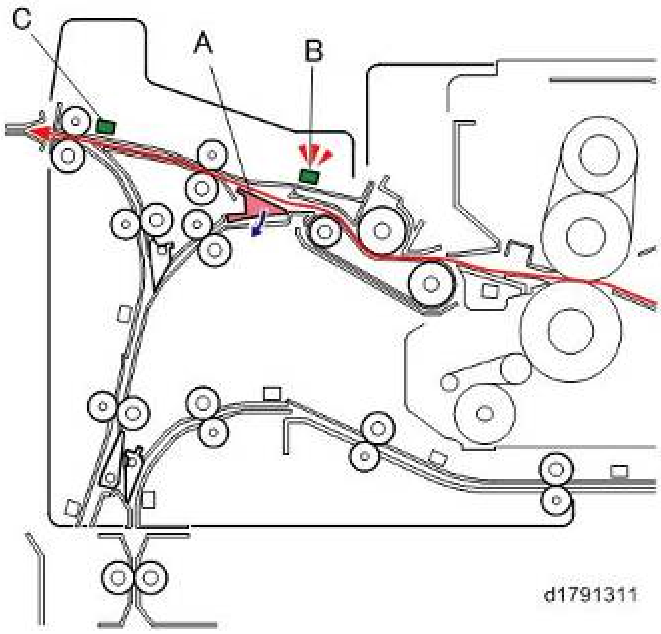
17.2.4 HEAT PIPE

The heat pipe is a metal pipe constructed of a lattice of sealed capillary tubes that contain a very small amount of water. When one end of the pipe is heated, the coolant moves to the cooler end of the pipe where the liquid cools and condenses. The condensation is pushed pack to the heated end of the pipe by the super heated water behind it. This cycle from heating > evaporation > condensation and re-heating sets up a convection current from the front end of the pipe to the rear.



[A]	The end of the pipe where hot paper touches it brings water to boil.
[B]	Because the small amount of water is sealed in vacuum, the boiling point is very low.
[C]	Due to the small difference in pressure caused by the heat at the front, the coolant flows from the front to the rear.
[D]	The coolant condenses and heat the is lost through the surface of the pipe and into the fins at the back.
[E]	The coolant is pushed from rear to front by the super heated water and steam behind it and the cycle repeats.

17.2.5 STRAIGHT-THROUGH OUTPUT

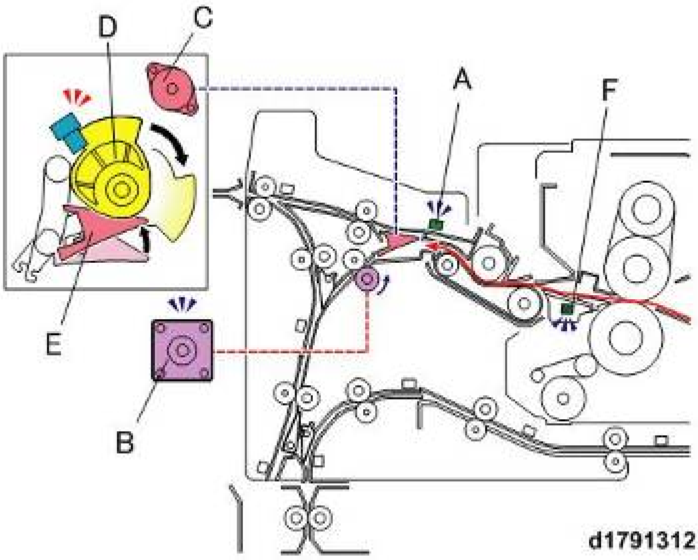


No.	Name
A	Exit Junction Gate
B	Exit JG Sensor
C	Exit Sensor

In straight-through output the paper leaves the fusing unit and then passes below the heat pipe.

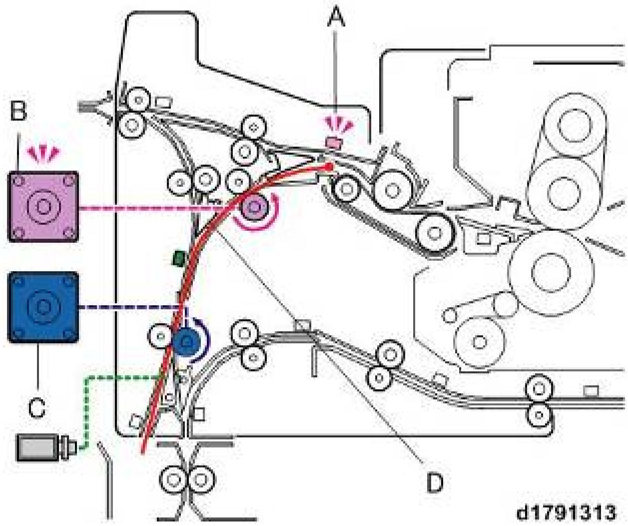
- When the exit/invert motor goes on, a cam depresses the pawl of the exit junction gate [A] and the paper passes through to the exit roller.
- The exit JG sensor [B] in the exit path detects the arrival and passing of the paper.
- The exit sensor [C] detects the leading edge and trailing edge of the paper as it exits the machine.

17.2.6 INVERT/EXIT (FACE-DOWN DELIVERY)



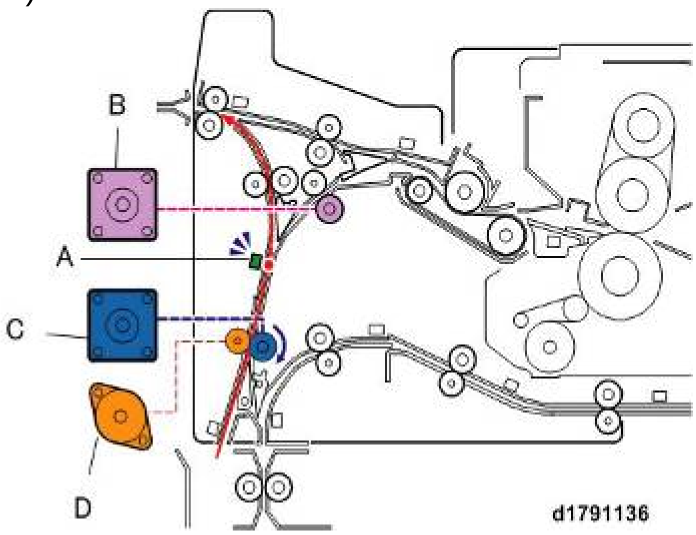
In invert/exit mode for face-down delivery:

- After the paper passes under the heat pipe, the exit junction guides the paper to the invert/exit path.
- When the invert/exit sensor [A] detects the leading edge of the paper, the invert entrance motor [B] turns on and feeds the paper down into the inverter unit.
- When the leading edge of the paper passes the exit junction gate sensor [F] the exit junction gate motor [C] rotates cam [D] which opens exit junction gate [E] and opens the invert path.



When the exit JG sensor [A] detects the trailing edge of the paper:

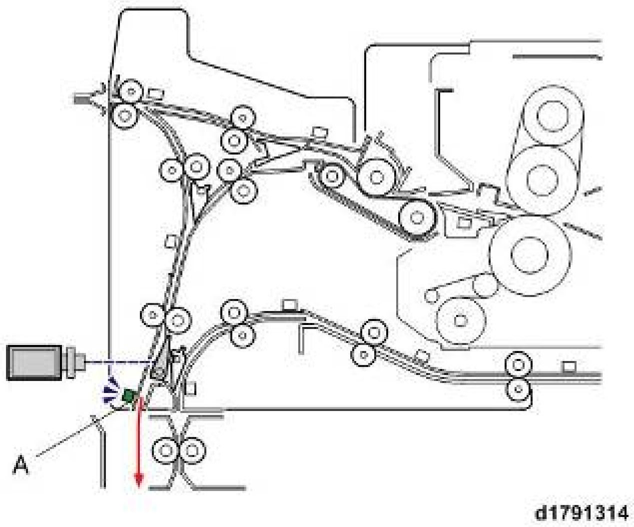
- The invert entrance motor [B] and exit invert motor [C] speed up slightly and feed the paper. (The junction gate [D] normally closes the path on the right, but paper can move past it.)



When the exit JG sensor [A] detects the trailing edge of the paper:

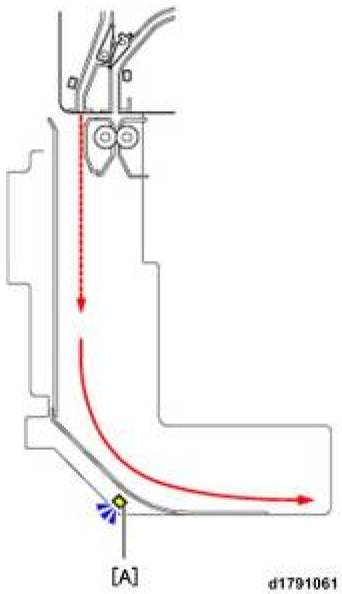
- The invert entrance motor [B] stops
- The exit/invert motor [C] reverses, and then feeds the paper to the exit above.
- After the paper passes the invert/exit roller, the exit/invert separation motor [D] turns on and separates the exit/invert rollers.

17.2.7 PAPER PURGE



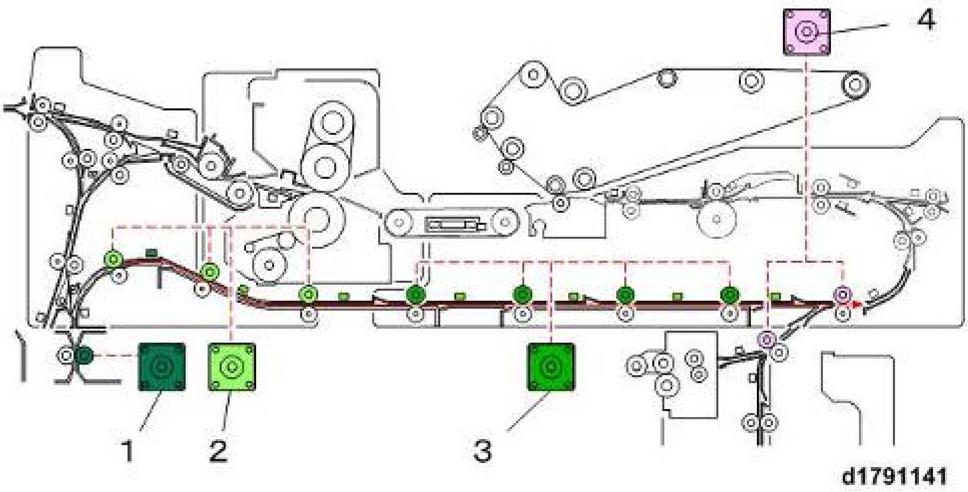
When a jam occurs:

- All paper in the main machine paper path is shunted to the purge unit.
- The purged paper relay sensor [A] detects the leading and trailing edge of each sheet shunted to the purge unit.



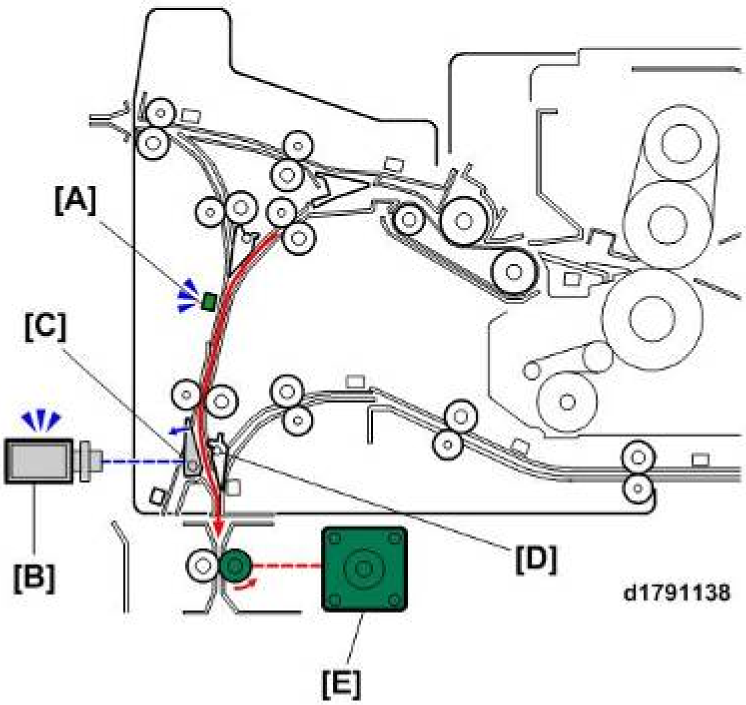
The purged paper sensor [A] detects when paper has been shunted into the purge tray after a jam occurs in the line.

17.2.8 DUPLEX DRIVE



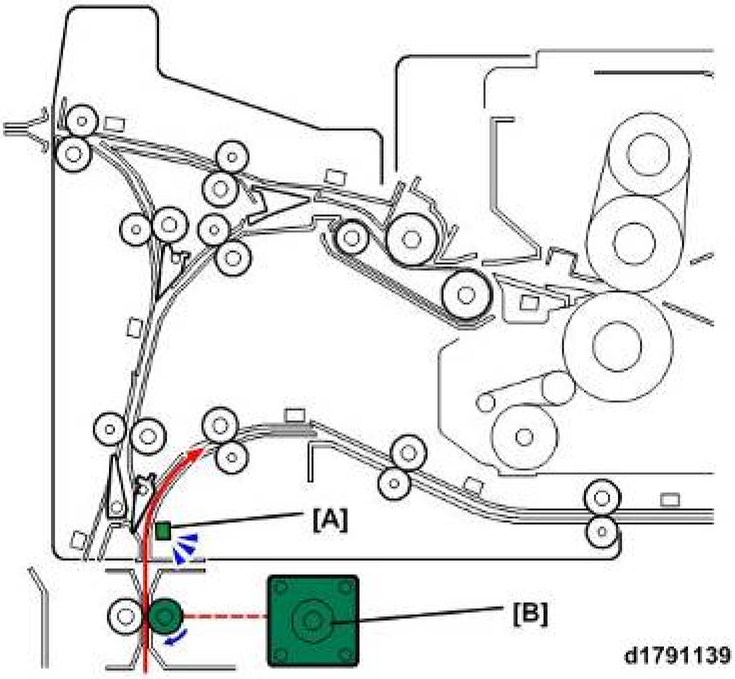
No.	Name
1	Duplex/Invert Motor
2	Duplex Transport Motor 1
3	Duplex Transport Motor 2
4	Bank Exit Motor (in VTU)

17.2.9 DUPLEX TRANSPORT



When the duplex/invert sensor [A] detects the trailing edge of the paper:

- The invert JG solenoid [B] goes on.
- The invert junction gate [C] opens.
- The paper brushes past transfer junction gate [D].
- The duplex invert motor [E] feeds the paper down.



When the duplex invert sensor [A] detects the trailing edge of the paper, the duplex inverter motor [A] reverses and feeds the paper up past the open junction gate above. This is the "switchback" operation.

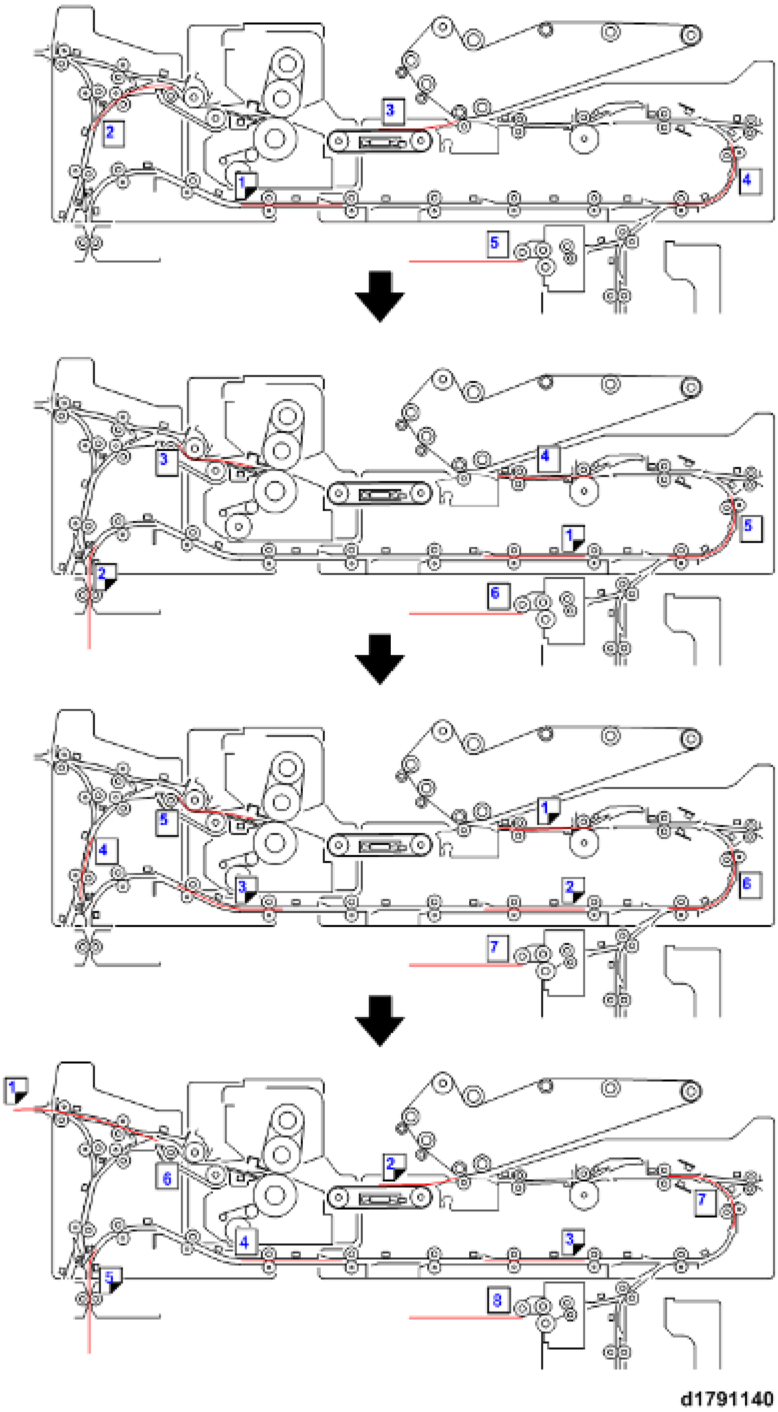
17.2.10 INTERLEAVE

The interleave process during duplexing is slightly different, depending on the size of the paper as described below.

Paper Length (mm)	Interleave Sheets
Longer than 139.7（HLT LEF）shorter than 216（LT LEF)	5
Longer than 216（LT LEF）shorter than 297（A4 SEF)	4
Longer than 297（A4 SEF）shorter than 364（B4 SEF)	3
Longer than 364（B4 SEF）shorter than 432（DLT SEF）	
Longer than 432（DLT SEF）shorter than 457.2（12"x18")	
Longer than 457.2（12×18in）shorter than 487.7（13"x19.2")	

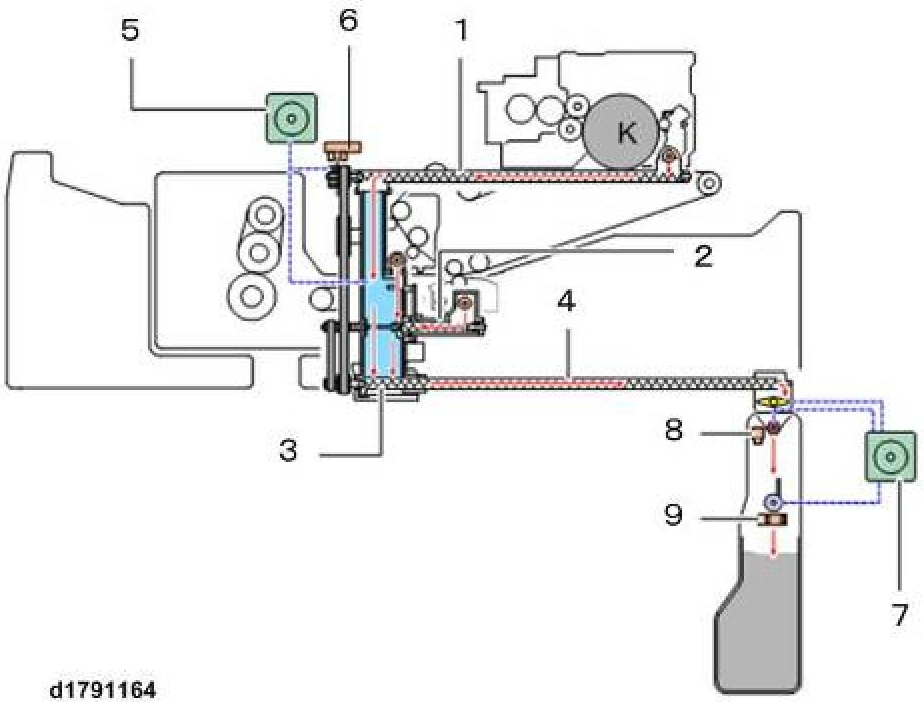
Five Interleave Sheet Flow

In this example, the flow follows this sequence: 1st front side > 2nd front side > 3rd front side > 4th front side > 5th front side > 6th back side > 2nd back side > 7th front side > 3rd back side > 8th front side > 4th back side > 9th front side, and so on. Refer to the illustration below.



18. USED COLLECTION UNIT

18.1 OVERVIEW



No.	Name	No.	Name
1	Upper Horizontal Path	6	Lock Sensor
2	PTR Path	7	Bottle Motor
3	Vertical Path	8	Bottle Full Sensor
4	Lower Horizontal Path	9	Bottle Near Full Sensor
5	Used Toner Collection Motor		

Paper dust and excess toner from the drum, ITB unit, and PTR unit is collected and transported automatically to the used toner bottle.

There are four sections in the used toner path:

- Horizontal path
- PTR path
- Vertical path
- Lower path

18.2 MECHANICAL CONFIGURATION: USED TONER COLLECTION

Used Toner Transport	Used toner transport paths: belt cleaning, vertical transport, lower transport
Used Toner Bottle	Toner collection path coils, toner bottle coils
Sensors	Three sensors
Used Toner Bottle Drive	Used toner bottle motor
Used Toner Bottle Near-Full, Full Detection	Monitored by sensors.

18.3 USED TONER TRANSPORT MECHANISM

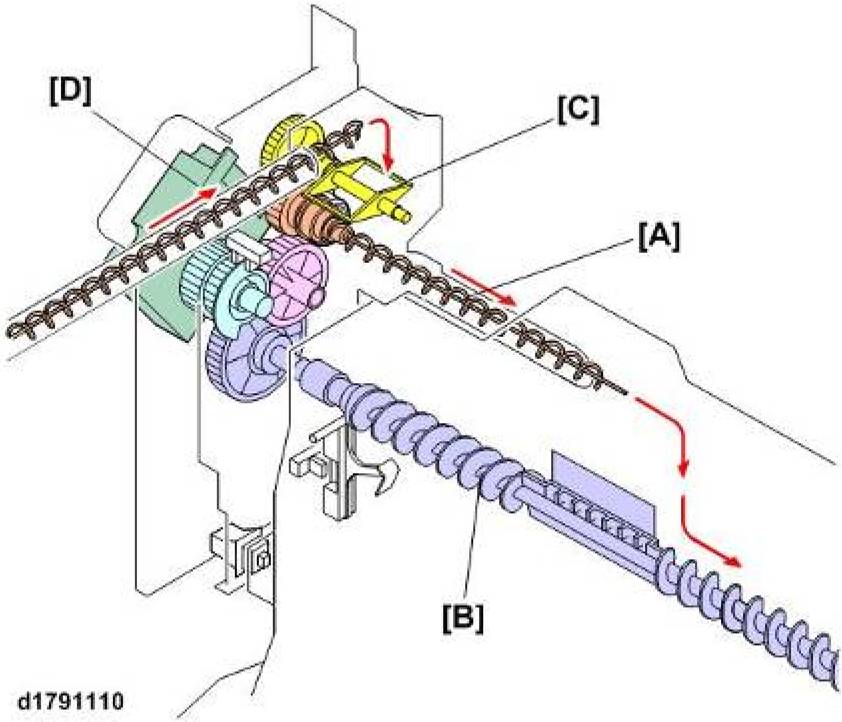
18.3.1 USED TONER PATH

The used toner collection path can be divided into four parts:

- **Upper horizontal path**. Used toner from the drum cleaning unit.
- **PTR cleaning unit path**. Used toner from the PTR cleaning unit.
- **Vertical Path**. Used toner and paper dust from the ITB cleaning unit, paper dust, upper path and PTR path also empty into this duct.
- **Lower horizontal path**. Collection point for all the sources of used toner, paper dust from other paths for transport to the used toner bottle.

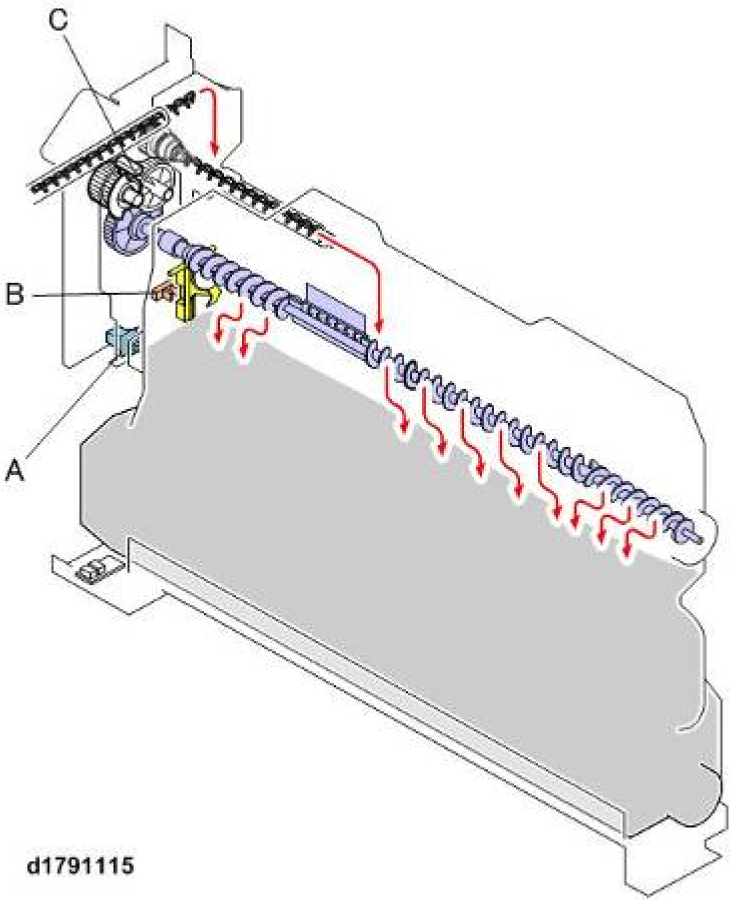
If one of the transport coils becomes jammed in the used toner path, the used toner lock sensor will signal an alert and stop the used toner transport motor, and the machine will issue SC488 (Used toner transport abnormal).

18.3.2 USED TONER COLLECTION BOTTLE TRANSPORT



- Used toner and paper dust transported from the lower path to the used toner bottle by the used toner unit transport coil [A] drops into the transport coil [B] of the used toner bottle, and then falls into the used toner bottle.
- An agitator [C] creates a mild vibration so the used toner dumped into the bottle does not clump.
- The agitator, collection unit toner coil, and used toner bottle coil are all driven by the used toner bottle motor [D].

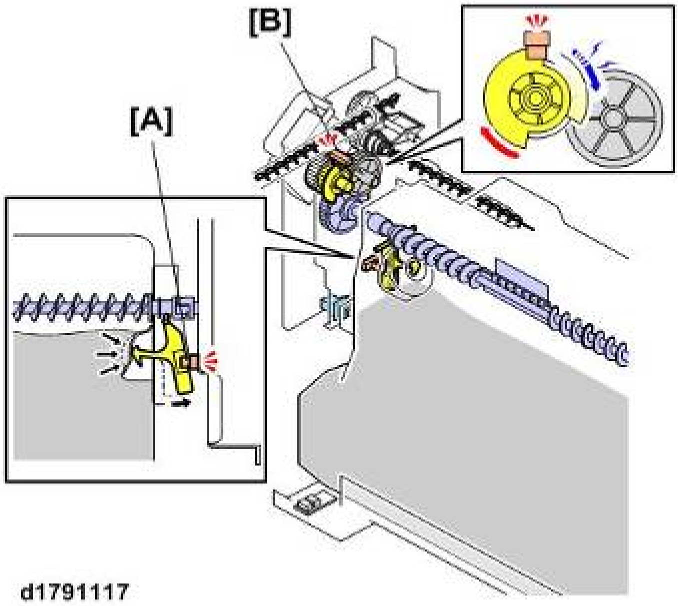
18.3.3 SWITCHES AND SENSORS



To ensure that the top of the used toner in the bottle remains flat, the toner is dispersed evenly from rear to front. There is one switch and two sensors in the used toner bottle.

- **Used toner bottle set switch**. The used toner bottle set switch [A] (a micro-switch) detects whether the bottle is set correctly or not.
- **Near-full sensor.** The near-full sensor [B] detects when the used toner bottle is almost full and displays an alert on the operation panel so the operator can make preparation to replace the bottle. After the alert is issued, the machine can continue to be used for 290 K prints (A4 SEF 8% coverage),.
- **Full sensor**. The full sensor [C] detects when the used toner bottle comes full. Once the machine detects the full condition and issues the alert, the machine stops and cannot be used until the used toner bottle has been replaced.

18.3.4 USED TONER BOTTLE NEAR-FULL, FULL DETECTION



Used toner bottle near-end detection

- When the level of the used toner inside the bottles accumulates high enough to reach the actuator of the near-full sensor [A], this switches the near-full sensor on, and if it remains on for more than 3 sec., this will trigger the bottle near-full alert.

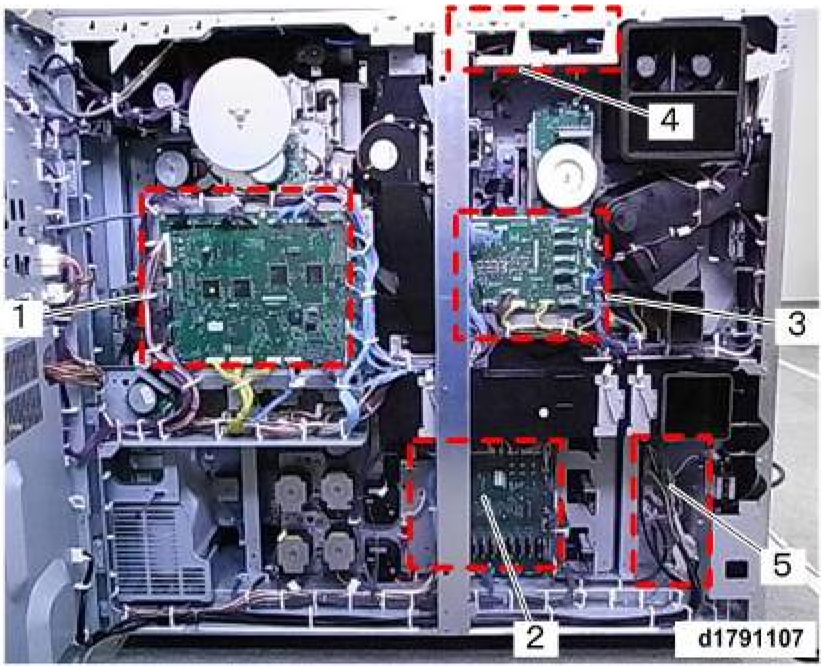
Used toner bottle full detection

- The full sensor [B] detects when the used toner bottle is full by monitoring the rotation of the used toner transport coil.
- Normally, the used toner bottle sensor switches on/off repeatedly during the rotation of the toner path and bottle transport coils.
- When the used toner bottle becomes full this places a load on the transport coils. If the torque limiter of the drive gear can no longer turn (the signals no longer alternate on/off), and if this condition continues for longer than 3 sec., this signals that the used toner bottle is full.
- As soon as the machine issues the bottle full alert, the machine stops.
- If there is a job in progress it will shut down immediately and an alert will appear on the operation panel.
- The capacity of the used toner bottle is about 1200 K sheets.

19. BOARDS

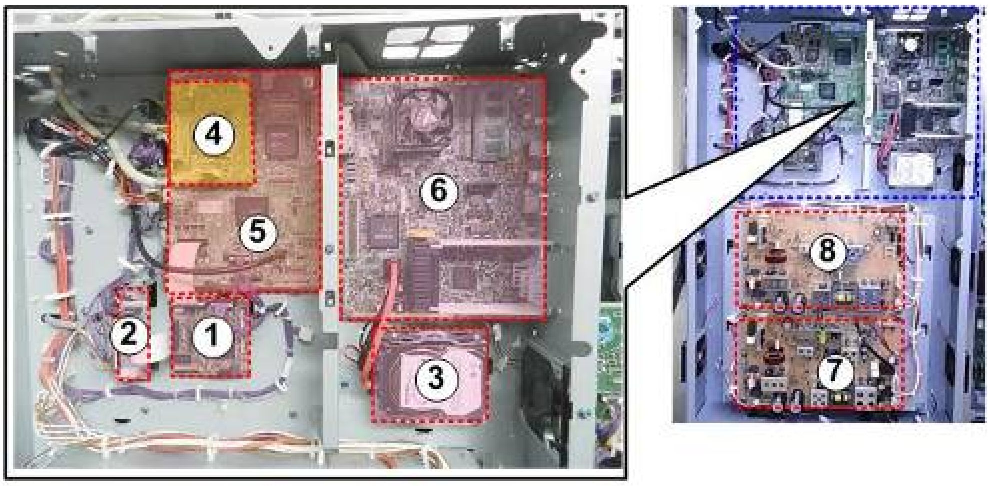
19.1 LAYOUT

19.1.1 MAIN MACHINE: REAR



No.	Name
1	IOB
2	RYB
3	EDRB
4	CGB Power Pack
5	AC Drive

19.1.2 CONTROLLER BOX



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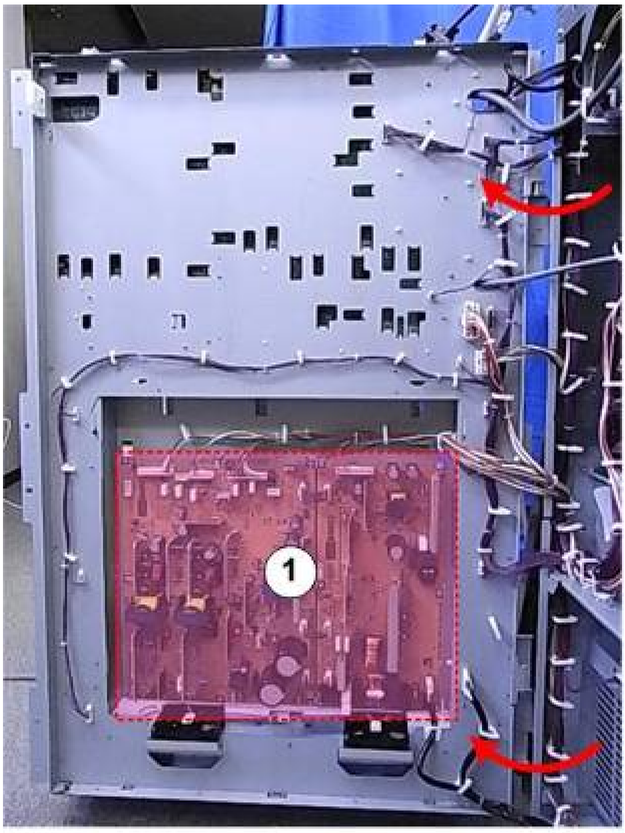
No.	Name	No.	Name
1	BCU	5	IPU
2	CNB	6	Controller Board
3	HDD	7	PSU-A
4	IPU Sub Board	8	PSU-B

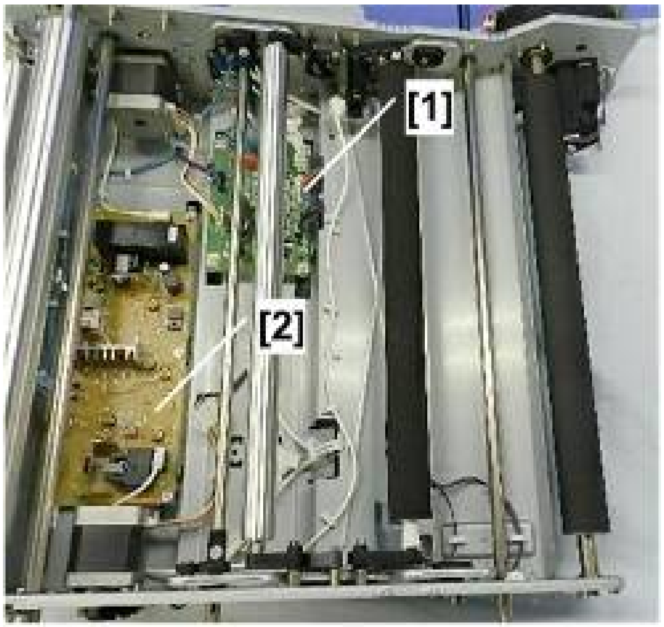
19.1.3 CONTROLLER BOX (REVERSE SIDE)



d1791109

No.	Name
1	PSU-C

19.1.4 ITB UNIT



d1791188

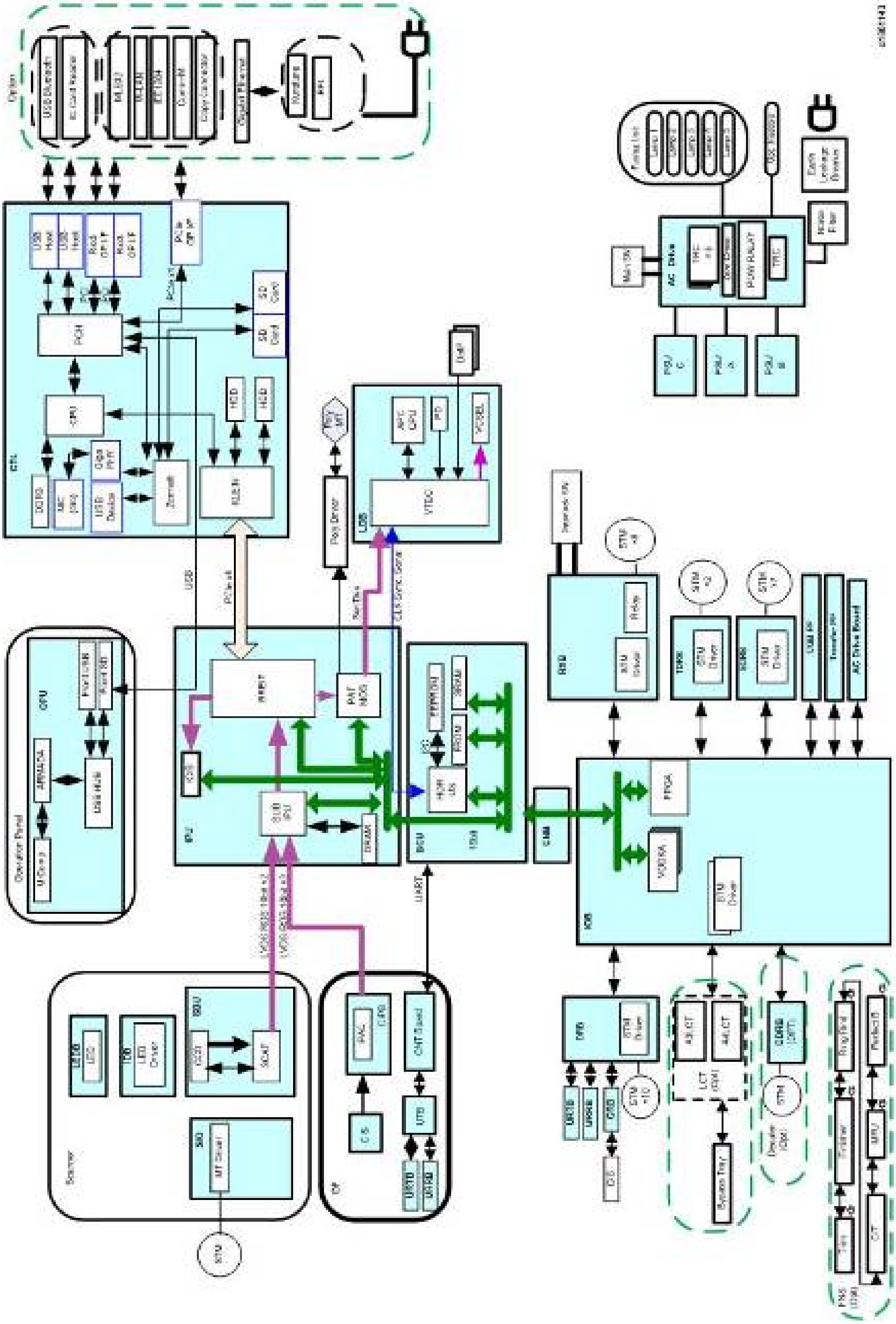
No.	Name
1	TDRB
2	Transfer Power pack

19.1.5 REGISTRATION UNIT

d1791189

No.	Name
1	DRB

19.2 BOARD CIRCUIT DIAGRAM



19.3 SUMMARY OF BOARD FUNCTIONS

- **IOB (Input/Output Board)**. Contains the I/O ASIC and controls all the mechatronics in the machine.
- **BCU (Base Control Unit)**. Holds the engine CPU and firmware, controls the machine engine.
- **IPU (Imaging Processing Unit)**. Contains large-scale integrated circuits that process the image data.
- **Controller Board**. Incorporates the GW architecture that controls the entire system.
- **TDRB (Transfer Drive Board)**. Controls ITB unit motors circuits.
- **RYB (Relay Board)**. Controls power relay to DC electrical components and controls motors and circuits of the paper bank.

RYB Fuses: Rating 200V to 240V

Fuse	Rated 200 to 240V	Fuse Blows at Power On (Displayed SC Code
FU2	10A	Fusing Unit. SC590-04
FU3	10A	Main machine paper feed, drawer unit DDRB. SC 520-00
FU4	10A	Image transfer unit, exit unit. SC590-02

- **SIO (Scanner Interface Board)**. Controls motors and circuits of the scanner unit..
- **SBU (Sensor Board Unit)**. Contains the CCD that processes analog image data and converts it to digital data.
- **CGB (Charge, Grid, Bias) Power Pack**. The high voltage power pack that takes DC24V and PWM signal input and generates the DC current for image creation.
- **Transfer Power Pack**. The high voltage power pack that takes DC24V and PWM signal input and generates DC current supply to the image transfer unit
- **Separation Power Pack**. The high voltage power pack that takes DC24V and PWM signal input and generates DC output for the paper transfer unit.
- **DRB (Drive Board)**. Controls the motors and circuits of the registration unit.
- **LDB (Laser Drive Board)**. Controls operation of the LD unit, including VCSEL.
- **OPU (Operation Panel Unit)**. Controls the operation of the operation panel..
- **AC Drive Board**. Supplies AC power the PSU units, fusing lamps, and anti-condensation heaters.
- **PSU A, B, C (Power Supply Units)**. Convert AC (AC 200V to 240V) to DC (5V, 24V).

  PSU-A supplies power for the operation panel, laser writing, paper transport drive mechanisms, and the fusing unit.

  PSU-B supplies 5V power for the machine in low energy mode, and supplies power to the LCT (option).

  PSU-C supplies power for image creation components and finishers.

AC Drive Board Fuses: Rating 200V to 240V

Fuse	Rated	What Happens When a Fuse Blows
FU401	5A	PSU-A. Machine will not power on.
FU403	5A	PSU-B. Freezes at “Please Wait”, machine does not boot.
FU404	8A	PSU-C. Freezes at “Please Wait”, displays SC670-00

PSU-B Fuses: Rating 200V to 240V

Fuse	Rated	What Happens When a Fuse Blows
FU3	10A	24V Not Used
FU4	10A	24V for ADF (ADF disabled)
FU5	10A	24V for scanner unit (scanner unit disabled)

PSU-C Fuses: Rating 200V to 240V

Fuse	Rated	What Happens When a Fuse Blows
FUS001	8A	Main power. Machine does not boot.

- HDD. Scanned image data is compressed and held here temporarily. Also, provides storage space required for: user data, font downloads, form downloads, electronic sorting, money charges, job history data, print job spooling, address book, sort output, job logs, etc.

Capacity	500 GB (250 GB x2)
Local storage	Printing: approx. 15,000
Temporary storage	Copying: electronic sorting: approx. 5,000 pages
	Scanning: approx. 2,200 pages
	Printing: electronic sorting: approx. 20,000 pages
	Copying: electronic sorting: approx. 5,000 pages)

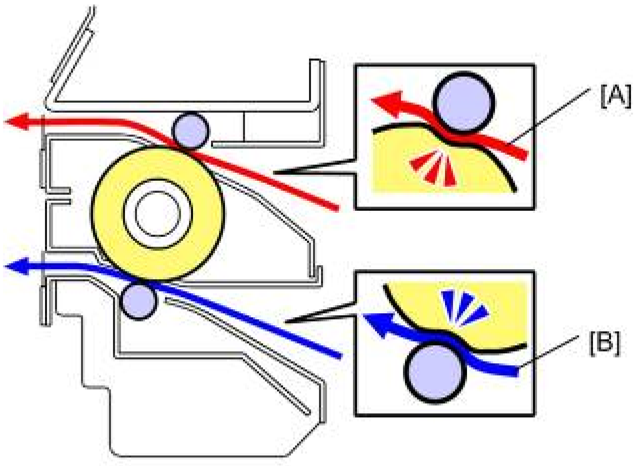
- **EDRB (Exit Drive Board)**. Controls operation of the motors in the exit unit on the left side of the drawer.
- **CNB (Connector Board)**. Sorts and routes signals on harnesses between the BCU and IOB.
- **URRB (Ultra-sonic Receive Board).** This is the small PCB on the double-feed sensor mounted above the original path in the ADF. Receives the signal from the other double-feed sensor below the original paper path in the ADF.
- **URTB (Ultrasonic Transfer Board)**. This is the small PCB on the double feed sensor mounted below the original path in the ADF. In issues the signals received by the double-feed sensor above the original paper path in the ADF.

20. DECURL UNIT DU5030 (D741)

20.1 SPECIFICATIONS

Dimensions (w x d x h)	71 mm x 509 mm x 181 mm 2.8 x 20 x 7 in.
Weight	5 kg (11 lb.)
Power source	DC 5V, DC 24V (Supplied from main machine)
Paper weight	40 to 350.0 g/m^2
Paper size	A3 SEF, A4 LEF SEF, A5 LEF SEF, A6 SEF, B4 SEF, B5 LEF SEF, B6 SEF, 11"x17" SEF, 8 1/2"x14" SEF, 8 1/2"x13" SEF, 8 1/2"x11" LEF SEF, 8 1/4"x14" SEF, 8 1/4"x13" SEF, 8"x13" SEF, 8"x10 1/2" LEF SEF, 8"x10" LEF SEF, 7 1/4"x10 1/2" LEF SEF, 5 1/2"x8 1/2" LEF SEF, 182x210 mm LEF SEF, 170x210 mm LEF SEF, 210x340SEF, Postcard SEF, 8KSEF, 16K LEF SEF, 12"x18" SEF, 11"x15" SEF, 11"x14" SEF, 10"x15" SEF, 10"x14" SEF, 13"x19 1/5" SEF, 13"x19" SEF, 12 3/5"x19 1/5" SEF, 12 3/5"x18 1/2" SEF, 13"x18" SEF, SRA3 SEF, SRA4 LEF SEF, Custom Size

20.2 DECURL UNIT OPERATION



There are two decurl paths in the decurl unit.

- The upper path [A] is used to correct back curl
- The lower path [B] is used to correct face curl.

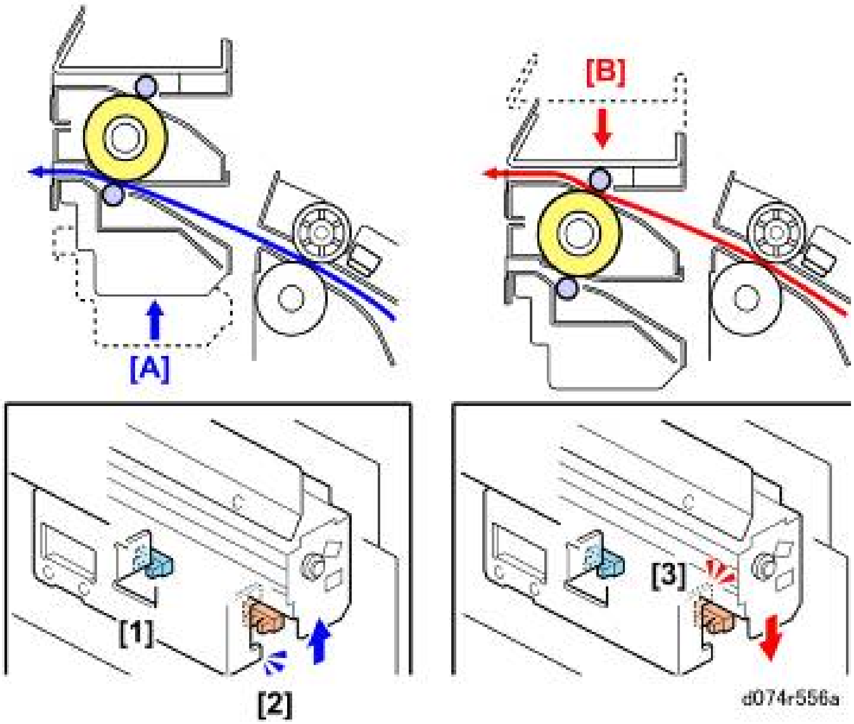
The upper path is used for all printing modes and paper types, adjustable with **SP1906-1 to 7**. There is one SP setting for each of the seven paper feed sources: Tray 1, 2, 3 (main machine), Trays 4, 5, 6 (LCIT), and Tray 7 (Multi Bypass). The decurl unit settings are following below.

User setting	Decurl Path	Decurl Roller Nip
Face curl correction (weak)	Lower path	1.5 mm
Face curl correction (strong)	Lower path	1.8 mm
Normal (not selected)	Upper path	0.3 mm
Back curl correction (weak)	Upper path	1.5 mm
Back curl correction (strong)	Upper path	1.8 mm

20.2.1 DECURL UNIT MOVEMENT

The illustration shows the decurl unit removed from the left side of the main machine.

- The decurl feed motor [A] drives the rollers that feed paper through the decurl unit.
- The decurl unit motor [B] drives the timing belt and gear that raise and lower the decurl unit on the paired rack and pinions at the rear [C] and front [D].



▪

The up and down movement of the decurl unit is controlled by two sensors.

- Before a print job, the decurl unit HP sensor [1] detects the home position of the decurl unit.
- To correct back curl, the unit is raised [A] the distance specified by the user. If the decurl unit limit sensor [2] detects the bottom actuator, this triggers the over limit error (**SC582**).
- To correct front curl, the unit is lowered [B] the distance specified by the user. If the decurl unit limit sensor [3] detects the top actuator, this triggers the over limit error (**SC582**).

Moving the decurl roller up or down changes the amount pressure applied to the paper to correct paper curl. The maximum range of the decurl unit movement is ±13.15 mm from the home position of the decurl unit.

The amount of pressure applied to correct paper curl can be adjusted with the "Adjustment Settings for Skilled Operators".

11. Press the [User Tools] button on the operation panel.
12. Touch "Adjustment Settings for Skilled Operators" and log in.
13. Touch "0310 Adjust Paper Curl".
    - The next screen presents options for adjusting the amount of curl applied (Weak or Strong) for all the trays (Tray 1 to 7).
    - To adjust the amount of pressure applied for "Weak" or "Strong", use SP1906-1 to 7.

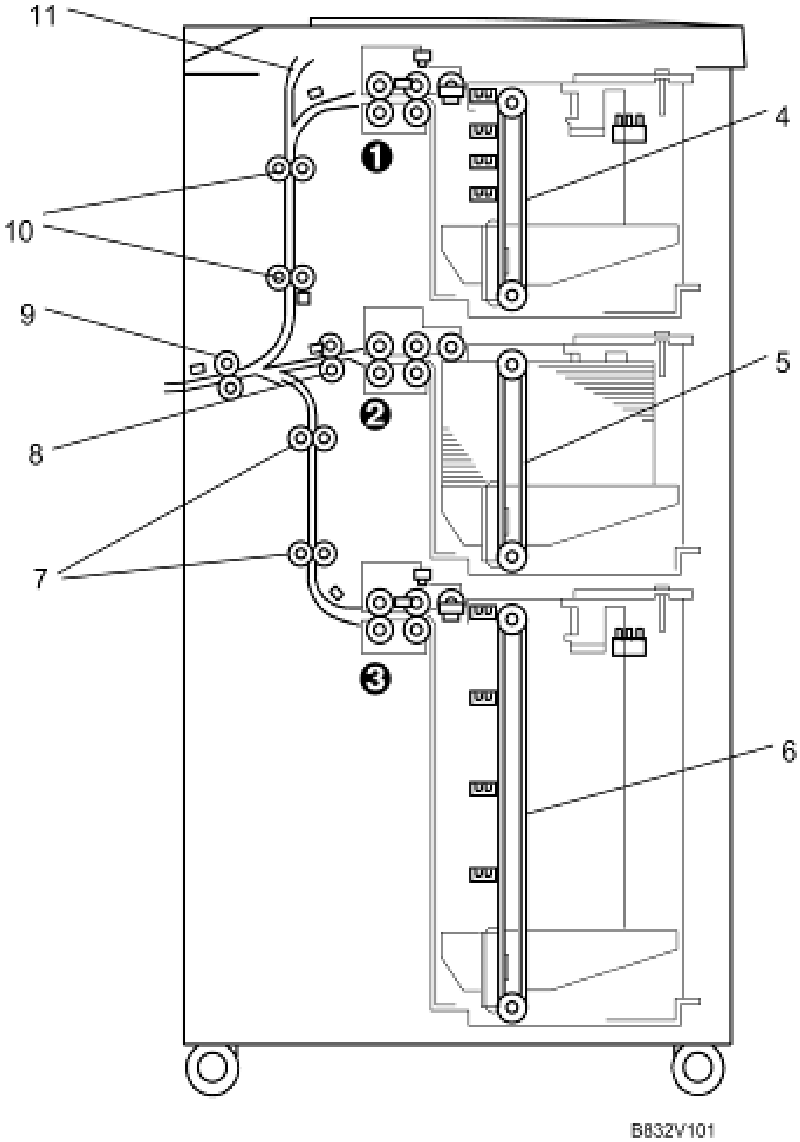
21. LCIT RT5070 (D733)

21.1 OVERVIEW

21.1.1 SPECIFICATIONS

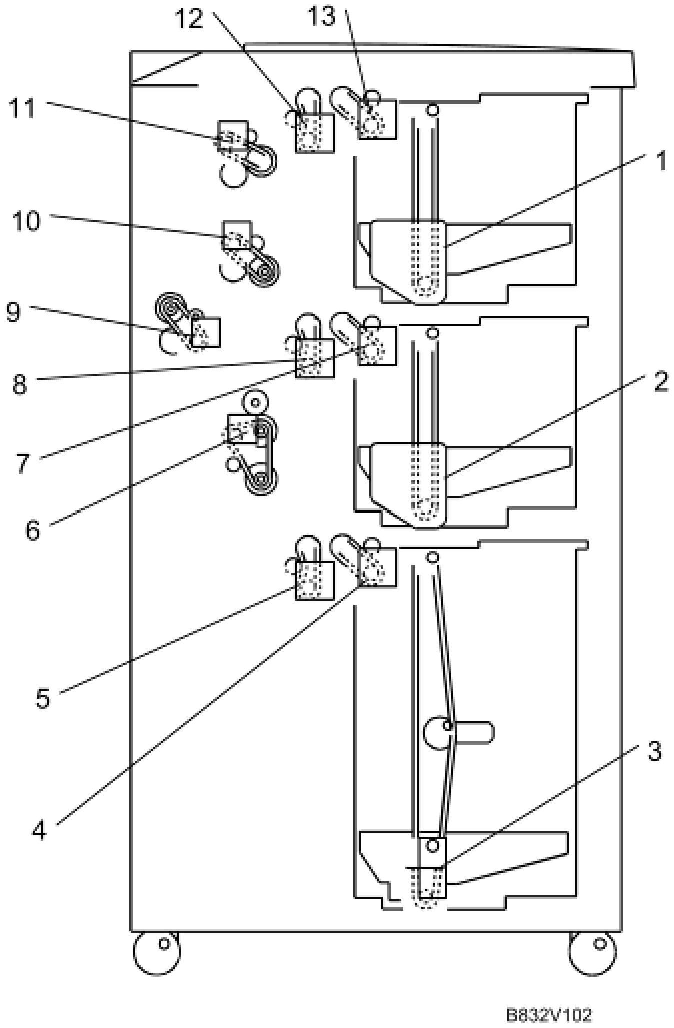
Configuration	Console, attached to right side of main machine	
Paper feed method	FRR	
Trays	Three trays, front loading	
Tray capacity	Tray 4	1,100 sheets (110 mm) Thickness 0.1 mm
	Tray 5	1,100 sheets (110 mm) Thickness 0.1 mm
	Tray 6	2,800 sheets (280 mm) Thickness 0.1 mm
Paper weight	Tray 4	52.3 to 216 g/m^2
	Tray 5	52.3 to 216 g/m^2
	Tray 6	52.3 to 163 g/m^2
Paper size	A4 LEF, B5 LEF, A5 LEF, A5 SEF, LT LEF, HLT LEF, HLT SEF (full bleed 305 mm wide)	
Power source	DC24V±10% supplied from main machine	
Power consumption	Less than 224W	
Dimensions (w x d x h)	540 x 730 x 1000 mm (21 x 29 x 39 in.)	
Weight	Less than 106 (233 lb.)	

21.2 MECHANICAL COMPONENT LAYOUT



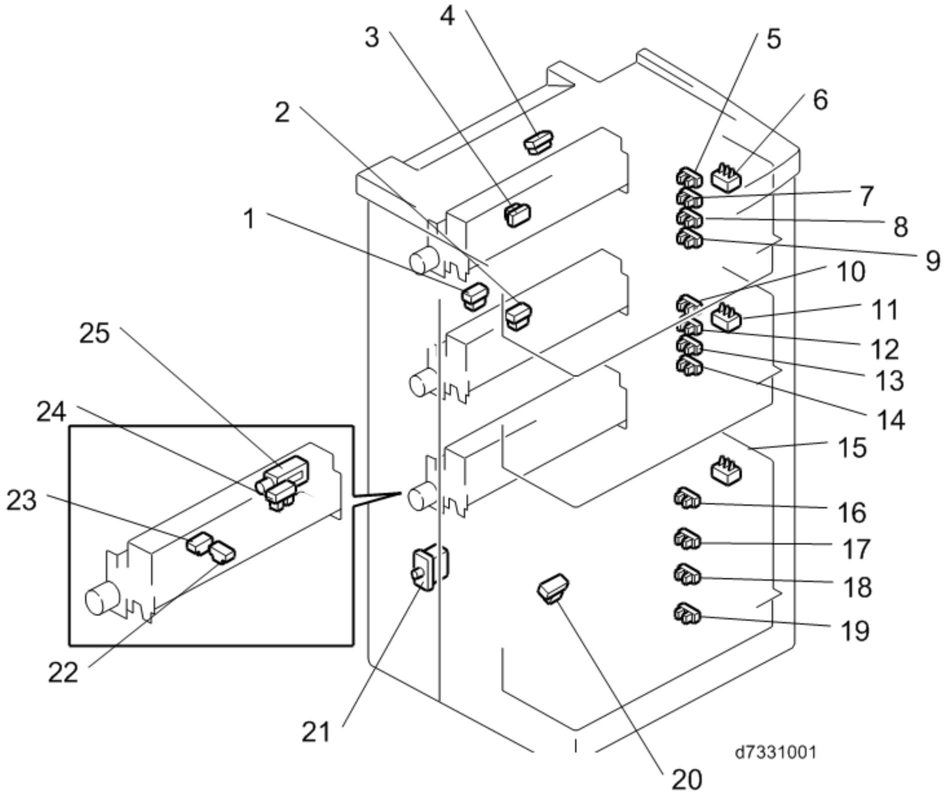
1	4th Paper Feed Unit	7	Lower Transport Rollers
2	5th Paper Feed Unit	8	Horizontal Transport Roller
3	6th Paper Feed Unit	9	LCT Exit roller
4	4th Tray Drive Belt	10	Upper Transport Rollers
5	5th Tray Drive Belt	11	Feed Slot (from Bypass Tray)
6	6th Tray Drive Belt		

21.3 DRIVE LAYOUT



1	4th Lift Motor	8	5th Grip Motor
2	5th Lift Motor	9	LCT Exit Motor
3	6th Lift Motor	10	5th Transport Motor
4	6th Paper Feed Motor	11	4th Transport Motor
5	6th Grip Motor	12	4th Grip Motor
6	6th Transport Motor	13	4th Paper Feed Motor
7	5th Paper Feed Motor		

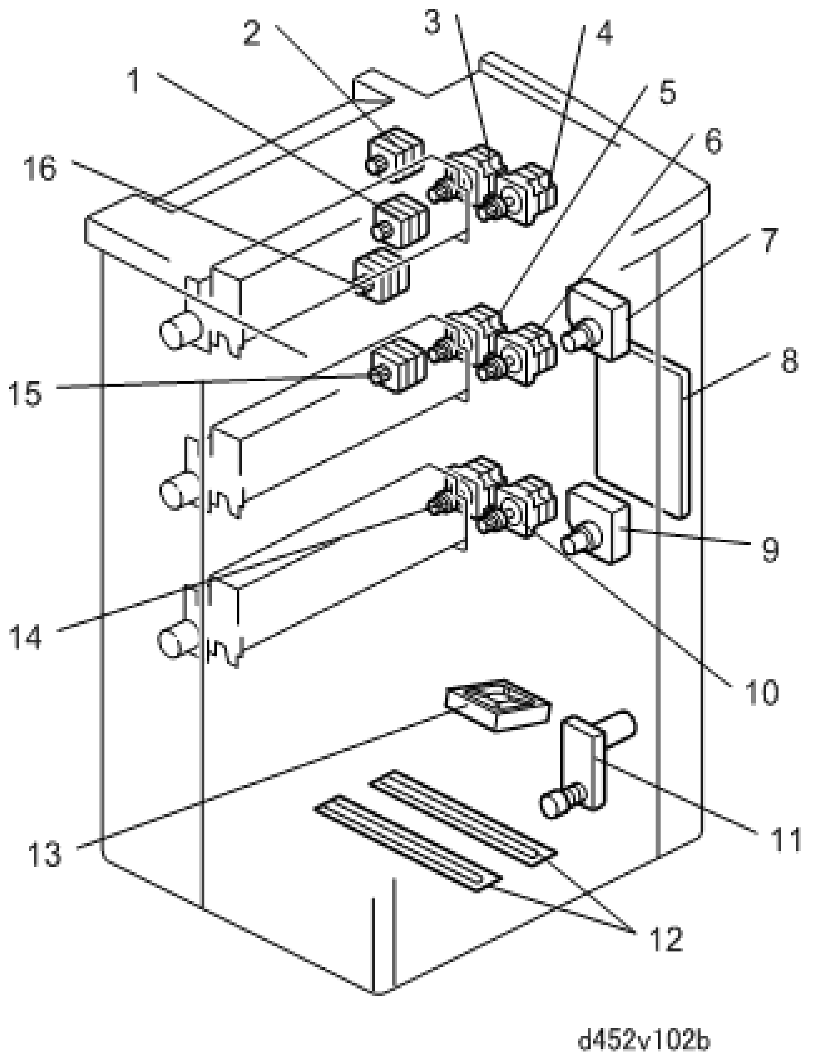
21.3.1 ELECTRICAL COMPONENTS



1	Pressure Release HP sensor	14	5th Paper Height Sensor 1
2	5th Transport Sensor	15	6th Paper Size Sensors
3	4th Relay Sensor	16	6th Paper Height Sensor 4
4	4th Transport Sensor	17	6th Paper Height Sensor 3
5	4th Paper Height Sensor	18	6th Paper Height Sensor 2
6	4th Paper Size Sensors	19	6th Paper Height Sensor 1
7	4th Paper Height Sensor 3	20	6th Transport Sensor
8	4th Paper Height Sensor 2	21	Door Safety Switch
9	4th Paper Height Sensor 1	22	6th Paper End Sensor
10	5th Paper Height Sensor 4	23	6th Paper Feed Sensor
11	5th Paper Size Sensors	24	6th Lift Sensor
12	5th Paper Height Sensor 3	25	6th Pick-up Solenoid
13	5th Paper Height Sensor 2		

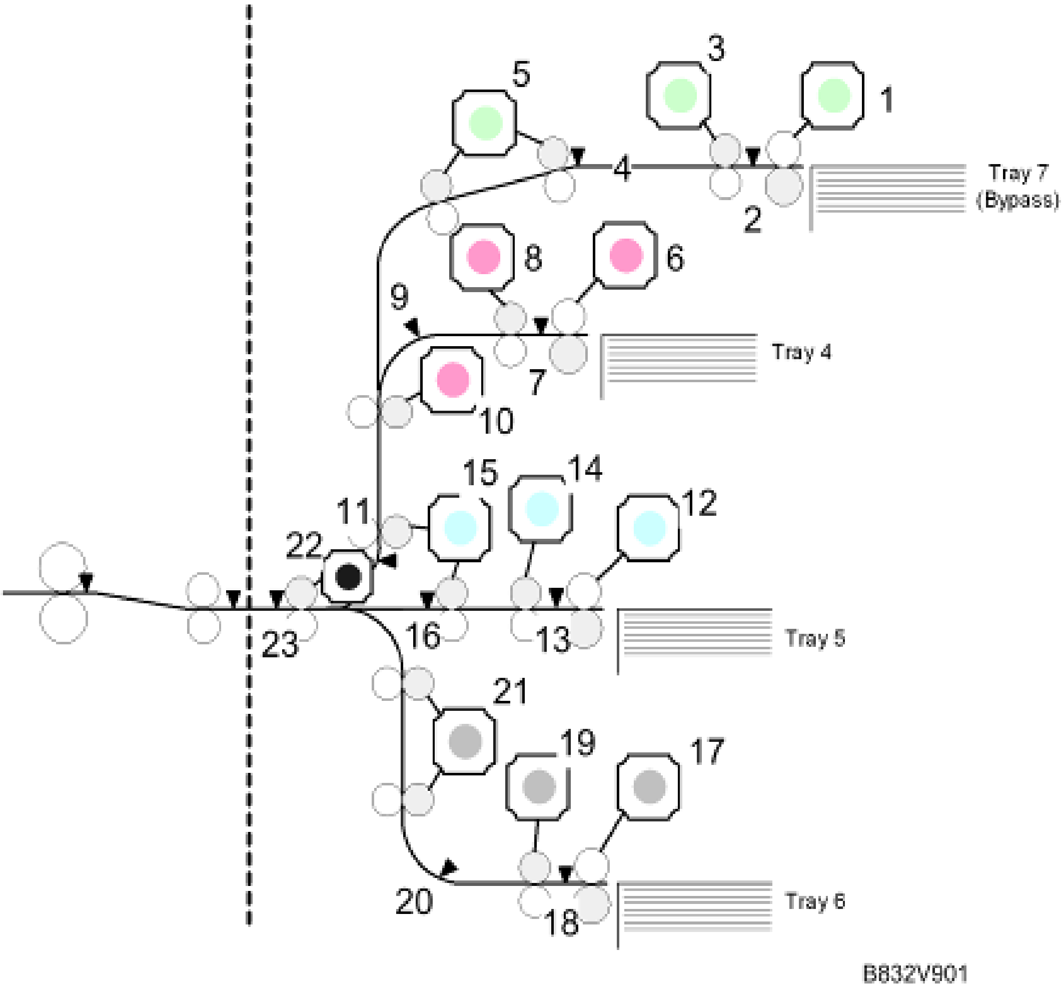
Note

Items 22, 23, 25 and 26 are duplicated in the 4th and 5th units.



1.	5th Transport Motor	9.	5th Lift Motor
2.	4th Transport Motor	10.	6th Paper Feed Motor
3.	4th Grip Motor	11.	6th Lift Motor
4.	4th Paper Feed Motor	12.	Anti-Condensation Heaters
5.	5th Grip Motor	13.	Cooling Fan
6.	5th Paper Feed Motor	14.	6th Grip Motor
7.	4th Lift Motor	15.	6th Transport Motor
8.	Main Control Board	16.	LCT Exit Motor

21.4 A4/LT LCT D733 LAYOUT (WITH BYPASS)



1	Paper Feed Motor (Bypass)	13	5th Paper Feed Sensor
2	Paper Feed Sensor (Bypass)	14	5th Grip Motor
3	Grip Motor (Bypass)	15	5th Transport Motor
4	Transport Sensor (Bypass)	16	5th Transport Sensor
5	Transport Motor (Bypass)	17	6th Paper Feed Motor
6	4th Paper Feed Motor	18	6th Paper Feed Sensor
7	4th Paper Feed Sensor	19	6th Grip Motor
8	4th Grip Motor	20	6th Transport Sensor
9	4th Transport Sensor	21	6th Transport Motor
10	4th Transport Motor	22	LCT Exit Motor
11	4th Relay Sensor	23	LCT Exit Sensor
12	5th Paper Feed Motor		

21.5 ELECTRICAL COMPONENT SUMMARY

Motors

No.	Name	Description
M1	4th Grip Motor	Drives the separation roller and the grip roller of the 4th tray.
M2	4th Lift Motor	Drives the bottom plate of the 4th tray up and down.
M3	4th Paper Feed Motor	Drives the pick-roller and feed roller that picks up each sheet and starts to feed it out of the 4th tray.
M4	4th Transport Motor	Drives the rollers in the vertical feed path that feed the paper from the 4th tray to the LCT exit motor.
M5	5th Grip Motor	Drives the separation roller and the grip roller of the 5th tray.
M6	5th Lift Motor	Drives the bottom plate of the 5th tray up and down.
M7	5th Paper Feed Motor	Drives the pick-roller and feed roller that picks up each sheet and starts to feed it out of the 5th tray.
M8	5th Transport Motor	Drives the transport rollers in the vertical feed path that feed the paper from the 4th tray and the 5th tray to the LCT exit motor.
M9	6th Grip Motor	Drives the separation roller and the grip roller of the 6th tray.
M10	6th Lift Motor	Drives the 5th tray up and down.
M11	6th Paper Feed Motor	Drives the pick-roller and feed roller that picks up each sheet and starts to feed it out of the 6th tray.
M12	6th Transport Motor	Drives the rollers in the vertical feed path that feed the paper from the 6th tray to the LCT exit motor.
M13	LCT Exit Motor	Feeds the paper out the LCT and into the entrance of the copier.

PCBs

No.	Name	Description
PCB1	Main Control Board	Controls the operation of all motors and sensors in the LCT unit.

Sensors

No.	Name	Description
S1	4th Lift Sensor	Detects when the paper in the 4th tray is at the correct height for paper feed and switches the 4th lift motor off.
S2	4th Paper End Sensor	Detects when the last sheet feeds from the 4th tray.
S3	4th Paper Feed Sensor	Detects the paper when it arrives at the 4th paper feed roller and checks for misfeeds.
S4	4th Paper Height Sensor 1	4th from the bottom of the 4th tray, detects stack height: 100%
S5	4th Paper Height Sensor 2	5th from the bottom of the 4th tray, detects stack height: 75%
S6	4th Paper Height Sensor 3	6th from the bottom of the 4th tray, detects stack height: 50%
S7	4th Paper Height Sensor 4	4th from the bottom of the 4th tray, detects stack height: 25% and signals near-end.
S8	4th Paper Length Sensor (D732)	Detects the length of the paper in the 4th tray (used in combination with the paper width sensors).
S9	4th Paper Width Sensor 1 (D732)	1 of a set of 3 sensors that detect the width of the paper in the 4th tray.
S10	4th Paper Width Sensor 2 (D732)	1 of a set of 3 sensors that detect the width of the paper in the 4th tray.
S11	4th Paper Width Sensor 3 (D732)	1 of a set of 3 sensors that detect the width of the paper in the 4th tray.
S12	4th Paper Size Sensor 1 (D733)	1 of a set of 3 sensors that detect the width of the paper in the 4th tray.
S13	4th Paper Size Sensor 2 (D733)	1 of a set of 3 sensors that detect the width of the paper in the 4th tray.
S14	4th Paper Size Sensor 3 (D733)	1 of a set of 3 sensors that detect the width of the paper in the 4th tray.
S15	4th Relay Sensor	Detects the leading and trailing edges of the paper in the paper path near the bottom of the 4th tray. Checks the timing of the feed and signals a jam if the paper is late or lags at this location.
S16	4th Relay Sensor - Upper (D732)	Detects the leading and trailing edges of the paper in the paper path near the top of the 4th tray. Checks the timing of the feed and signals a jam if the paper is late or lags at this location.
S17	4th Transport Sensor	Detects jams in the paper path where the transport motor feeds the paper from the 4th tray.
S18	5th Lift Sensor	Detects when the paper in the 5th tray is at the correct height for paper feed and switches the 4th lift motor off.
S19	5th Paper End Sensor	Detects when the last sheet feeds from the 5th tray.
S20	5th Paper Feed Sensor	Detects the paper when it arrives at the 5th paper feed roller and checks for misfeeds.
S21	5th Paper Height Sensor 1	4th from the bottom of the 5th tray, detects stack height: 100%
S22	5th Paper Height Sensor 2	5th from the bottom of the 5th tray, detects stack height: 75%
S23	5th Paper Height Sensor 3	6th from the bottom of the 5th tray, detects stack height: 50%
S24	5th Paper Height Sensor 4	4th from the bottom of the 5th tray, detects stack height: 25% and signals near-end.

No.	Name	Description
S25	5th Paper Length Sensor (D732)	Detects the length of the paper in the 5th tray (used in combination with the paper width sensors).
S26	5th Paper Width Sensor 1 (D732)	1 of a set of 3 sensors that detect the width of the paper in the 5th tray.
S27	5th Paper Width Sensor 2 (D732)	1 of a set of 3 sensors that detect the width of the paper in the 5th tray.
S28	5th Paper Width Sensor 3 (D732)	1 of a set of 3 sensors that detect the width of the paper in the 5th tray.
S29	5th Paper Size Sensor 1 (D733)	1 of a set of 3 sensors that detect the width of the paper in the 5th tray.
S30	5th Paper Size Sensor 2 (D733)	1 of a set of 3 sensors that detect the width of the paper in the 5th tray.
S31	5th Paper Size Sensor 3 (D733)	1 of a set of 3 sensors that detect the width of the paper in the 5th tray.
S32	5th Relay Sensor (D732)	Detects the leading and trailing edges of the paper in the paper path near the 5th tray. Checks the timing of the feed and signals a jam if the paper is late or lags at this location.
S33	5th Transport Sensor	Detects jams in the paper path where the transport motor feeds the paper from the 5th tray.
S34	6th Lift Sensor	Detects when the paper in the 6th tray is at the correct height for paper feed and switches the 4th lift motor off.
S35	6th Paper End Sensor	Detects when the last sheet feeds from the 6th tray.
S36	6th Paper Feed Sensor	Detects the paper when it arrives at the 6th paper feed roller and checks for misfeeds.
S37	6th Paper Height Sensor 1	4th from the bottom of the 6th tray, detects stack height: 100%
S38	6th Paper Height Sensor 2	5th from the bottom of the 6th tray, detects stack height: 75%
S39	6th Paper Height Sensor 3	6th from the bottom of the 6th tray, detects stack height: 50%
S40	6th Paper Height Sensor 4	4th from the bottom of the 6th tray, detects stack height: 25% and signals near-end.
S41	6th Paper Length Sensor (D732)	Detects the length of the paper in the 6th tray (used in combination with the paper width sensors).
S42	6th Paper Width Sensor 1 (D732)	1 of a set of 3 sensors that detect the width of the paper in the 6th tray.
S43	6th Paper Width Sensor 2 (D732)	1 of a set of 3 sensors that detect the width of the paper in the 6th tray.
S44	6th Paper Width Sensor 3 (D732)	1 of a set of 3 sensors that detect the width of the paper in the 6th tray.
S45	6th Paper Size Sensor 1 (D733)	1 of a set of 3 sensors that detect the width of the paper in the 6th tray.
S46	6th Paper Size Sensor 2 (D733)	1 of a set of 3 sensors that detect the width of the paper in the 6th tray.
S47	6th Paper Size Sensor 3 (D733)	1 of a set of 3 sensors that detect the width of the paper in the 6th tray.
S48	6th Relay Sensor (D732)	Detects the leading and trailing edges of the paper in the paper path near the 6th tray. Checks the timing of the feed and signals a jam if the paper is late or lags at this location.
S49	6th Transport Sensor	Detects jams in the paper path where the transport motor feeds the paper from the 6th tray.
S50	LCT Exit Sensor	Detects jams at the exit of the LCT unit.

Solenoids

No.	Name	Description
SOL1	4th Pick-up Solenoid	Engages/disengages rotation of the pick-up roller in the 4th tray.
SOL2	4th Separation Solenoid	Controls up-down movement of the separation roller in the 4th tray.
SOL3	5th Pick-up Solenoid	Engages/disengages rotation of the pick-up roller in the 5th tray.
SOL4	5th Separation Solenoid	Controls up-down movement of the separation roller in the 5th tray.
SOL5	6th Pick-up Solenoid	Engages/disengages rotation of the pick-up roller in the 6th tray.
SOL6	6th Separation Solenoid	Controls up-down movement of the separation roller in the 6th tray.

Switches

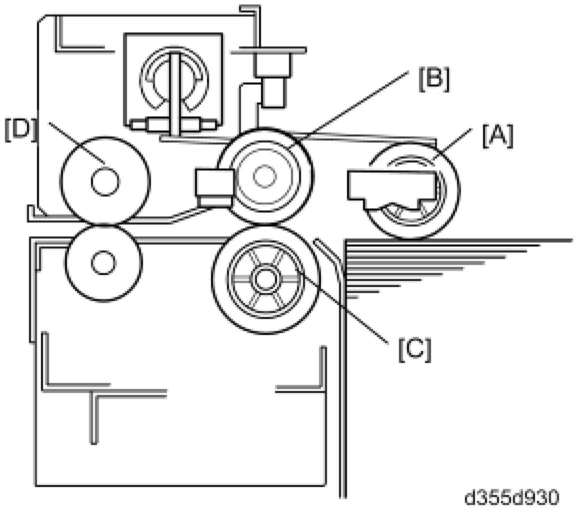
No.	Name	Description
SW1	Door Safety Switch	An interlock safety switch that detects when the front door is opened and closed.

Other

No.	Name	Description
H1, H2	Anti-Condensation Heaters	Evaporates moisture around the trays in the LCT (230V 18W).

21.6 PAPER HANDLING

21.6.1 PAPER FEED ROLLERS

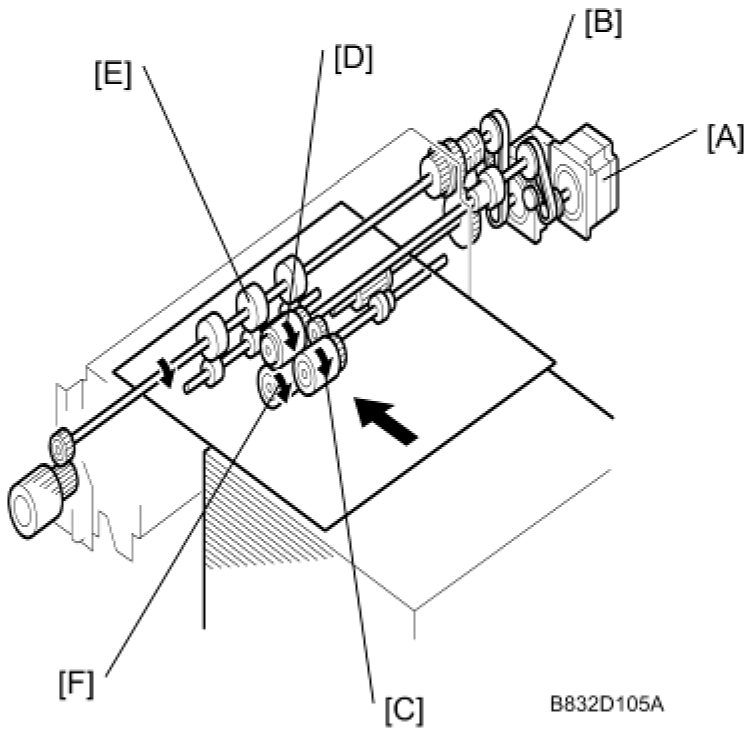


This LCT has three paper tray feed stations:
The 4th and 5th tray each hold 1,000 sheets of paper. The 6th tray holds 2,550 sheets of paper. Total: 4,550 sheets
Each tray contains four rollers:
[A] Pick-up roller
[B] Paper feed roller
[C] Separation roller
[D] Grip roller

Note

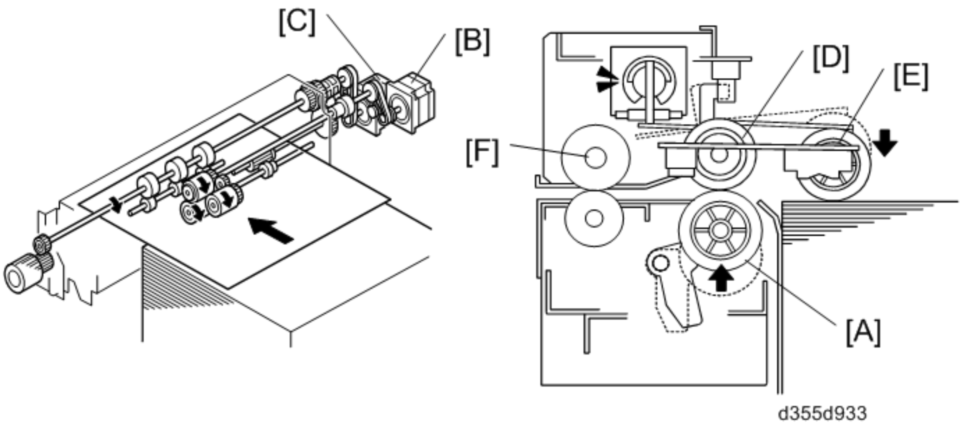
The pick-up roller, paper feed roller, and separation roller are a standard FRR paper feed system.

21.6.2 PAPER FEED MOTORS



Two stepper motors control the paper feed drive:
[A] Paper feed motor
[B] Grip motor
The paper feed motor drives the pick-up roller [C] and the paper feed roller [D].
The grip motor drives the grip roller [E] that feeds the paper out of the tray, and the separation roller [F].

21.6.3 PICK-UP AND FEED



When a paper feed station is not selected, separation roller [A] turns freely.

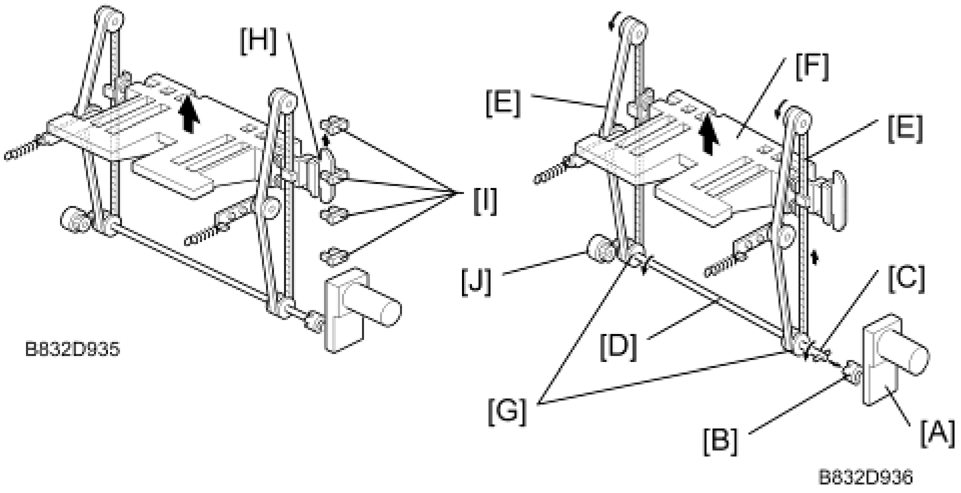
- When the paper feed station is selected for a job, Paper feed motor [B] and grip motor [C] turn on.
- When the feed motor [B] turns on, it drives the feed roller [D]. It also drives the pick-up roller [E] because the pick-up roller is linked to the feed roller by an idle gear.
- When the paper feed station is set in the machine, the separation roller lift lever rises. As a result, the separation roller [A] contacts the paper feed roller [D] and turns with the feed roller, unless more than one sheet of paper is fed.
- The three trays of the LCT unit use the standard FRR mechanism.
- When the paper feed motor turns on, the pick-up solenoid turns on and the pick-up roller [E] lowers until it contacts the top sheet of the paper stack and then sends it to the paper feed and separation rollers.
- When the paper feed sensor detects the leading edge of the paper, the paper feed motor switches off, the pick-up roller lifts, and the grip rollers [F] feed the paper out of the tray.

21.6.4 TRAY DETECTION

When a tray is set in the machine, the tray detection method used depends on the tray:

- The upper tray and middle tray are detected when any one of the paper size switch signals is low.
- The lower tray is detected when the switch 1 signal of the paper size switch is low.

21.6.5 LIFT MECHANISM

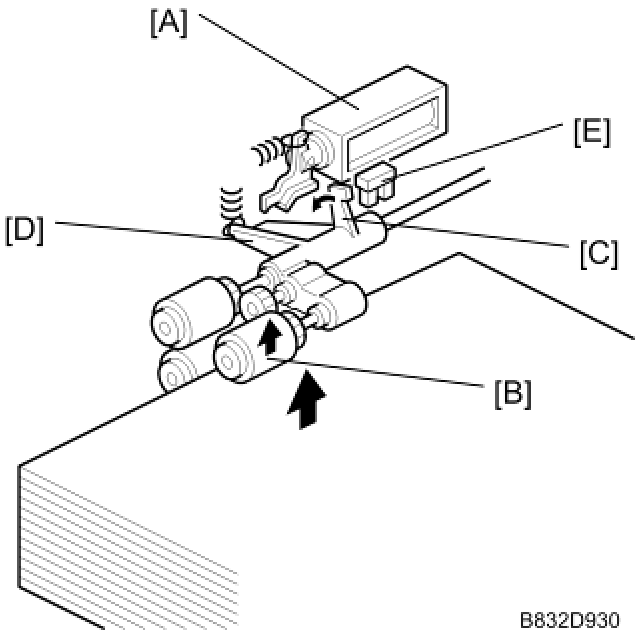


When the machine detects that the paper tray is set in the machine, the tray lift motor [A] rotates and the coupling gear [B] on the tray lift motor engages the pin [C] of the lift drive shaft [D]. The tray drive belts [E] are connected to the tray bottom plate [F] and are driven by the tray lift motor via the lift drive shaft [D] and tray drive pulleys [G]. When the lift motor turns counterclockwise, the tray bottom plate [F] moves up. The tray goes up until the top of the paper stack pushes up the pick-up roller and the lift sensor in the feed unit is de-activated.

When the actuator [H] on the rear end of the bottom plate activates the paper height sensors [I], the remaining paper capacity is detected.

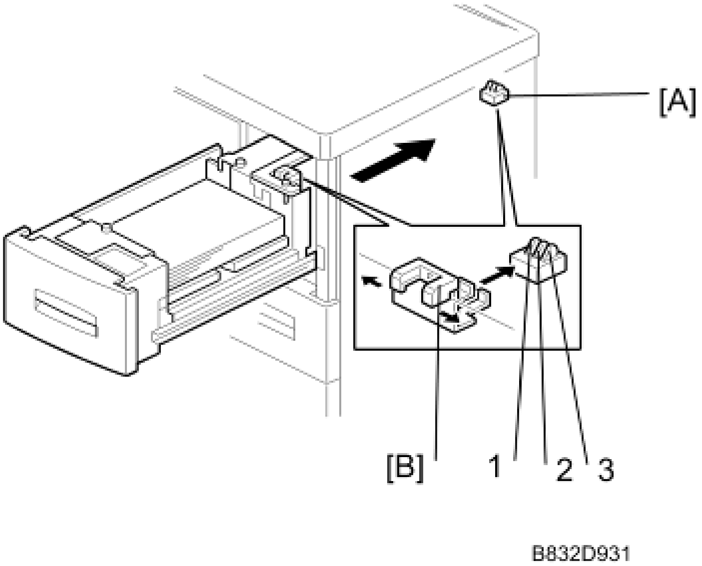
When pulling out the tray, the coupling gear [B] separates from the pin [C], so that the tray bottom plate moves downward. In the bottom tray, the damper [J] lets the tray bottom plate drop slowly.

21.6.6 LIFT SENSOR



When the lift motor turns on, the pick-up solenoid [A] activates to lower the pick-up roller [B]. When the top sheet of paper reaches the proper paper feed level, the paper pushes up the pick-up roller and the actuator [C] on the pick-up roller supporter [D] de-activates the lift sensor [E] to stop the lift motor.
After several paper feeds, the paper level gradually lowers, then the lift sensor is activated and the lift motor turns on again until the lift sensor is de-activated again.

21.6.7 PAPER SIZE DETECTION



	A4-LEF	B5-LEF	A5-LEF	A5-SEF	LT-LEF	HLT-LEF	HTL-SEF
SW1	0	1	0	0	0	1	1
SW2	1	0	1	0	0	0	1
SW3	1	1	0	1	0	0	0

1: HIGH, 0: LOW

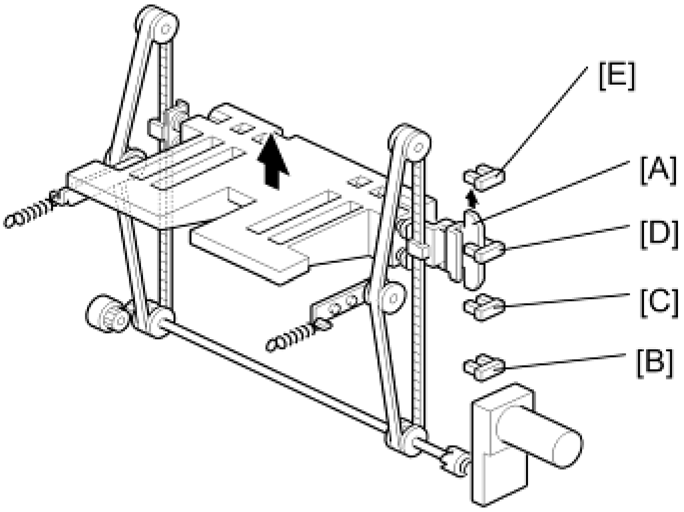
Top Tray (Tray 4) and Middle Tray (Tray 5)

For the top and middle trays, the paper size switch [A] detects the paper size. The paper size switch contains three micro-switches. The paper size switch is actuated by an actuator plate [B] at the rear of the tray. Each paper size has its own unique combination as shown in the table and the CPU determines the paper size by the combination.

Bottom Tray (Tray 6)

The bottom tray has the same switch as the top and middle trays. However, it is only used for detecting when the tray is pushed in.
For the bottom tray, the paper size must be selected with SP5019-007:

21.6.8 REMAINING PAPER DETECTION



The amount of paper remaining in the tray is detected by the three paper height photo-interrupter sensors on the left rail as the bottom plate rises. Five states, determined by the position of the actuator are possible.

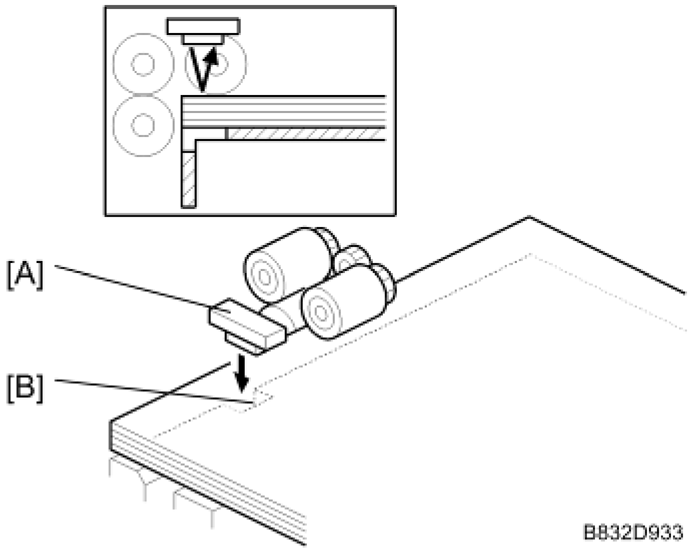
14. With the actuator [A] below paper height sensor 1 [B], no sensor is actuated and the display indicates 100%.
15. When the actuator passes paper height sensor 1 [B] , the display indicates 75% of the paper supply remaining.
16. When the actuator passes paper height sensor 2 [C], the display indicates 50% of the paper supply remaining.
17. When the actuator passes paper height sensor 3 [D], the display indicates 25% of the paper supply remaining.

Note

When the actuator enters the gap of the near end sensor [E], the machine signals near end.

Finally, when the last sheet feeds, the paper end sensor signals that the tray is empty.

21.6.9 PAPER END DETECTION



The paper end sensor [A] detects the top sheet of the paper in the tray by monitoring the reflected light. When the paper tray runs out of paper, the paper end sensor does not receive the reflected light due to the cutout [B]. Then, the tray lift motor rotates backwards 2 seconds to drop the tray bottom plate.

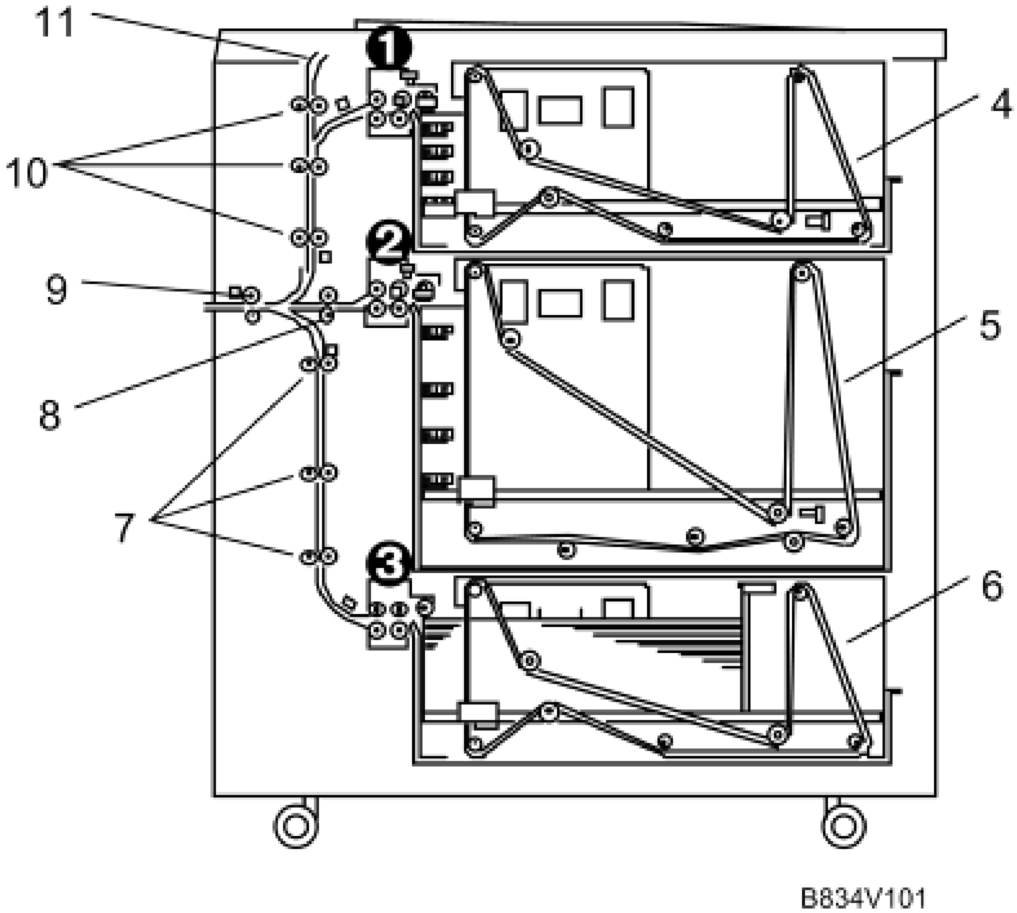
22. LCIT RT5080 (D732)

22.1 OVERVIEW

22.1.1 SPECIFICATIONS

Configuration	Console, attached to right side of main machine	
Paper feed method	FRR-CF	
Paper weight	Tray 4	52.3 to 256.0g/m^2（45.0 to 220.0 kg）
	Tray 5	40 to 300.0g/m^2（34.4 to 258 kg）
	Tray 6	52.3 to 256.0g/m^2（45.0 to 220.0 kg）
Paper size	A3 SEF, A4 LEF SEF, A5 LEF SEF, A6 SEF, B4 SEF, B5 LEF SEF, B6 SEF, 11"x17” SEF, 8 1/2"x14” SEF, 8 1/2"x13” SEF, 8 1/2"x11” LEF SEF, 8 1/4"x14” SEF, 8 1/4"x13” SEF, 8"x13” SEF, 8"x10” LEF SEF, 7 1/4"x10 1/2” LEF SEF, 5 1/2"x8 1/2” SEF, 226x310 mm LEF SEF, 310x432 SEF, Postcard SEF, 8KSEF, 16K LEF SEF, 12"x18” SEF, 11"x15” SEF, 11"x14” SEF, 10"x15” SEF, 10"x14” SEF, 13"x19 1/5” SEF, 13"x19” SEF, 12 3/5"x19 1/5” SEF, 12 3/5"x18 1/2” SEF, 13"x18” SEF, SRA3 SEF, SRA4 LEF SEF, Custom Size: SEF：100 to 330.2 mm, LEF：139.7 to 487.7 mm	
Paper tray capacity	Tray 4	1,100 sheets
	Tray 5	2,200 sheets
	Tray 6	1,100 sheets
Power source	DC 24V±10%, AC 200 to 240V Supplied from main machine	
Power consumption	Less than 324 W max.	
Dimensions (w x d x h)	865 x 730 x 1000 mm (34 x 29 x 44 in.)	
Weight	Less than 185 kg (407 lb.)	
Paper feed method	FRR. Improved paper feed with air assist mechanism in the horizontal paper path, and maintenance free, magnetic separation rollers in feed trays	
Paper size switching, detection	Adjustable side fences, end fence for paper width, length adjustment with automatic paper size detection	
Tray lifting, lowering	Paper lift motors for tray lifting, free fall tray lowering	
Paper remains detection	4 photo interrupt sensors monitor the level of the tray bottom plates	
Paper end detection	Photosensors mounted above each paper feed unit detect paper out	
Motor drive	Stepper motor control only (no clutches)	
Heater (option)	Two heaters (200 to 240V 18W)	

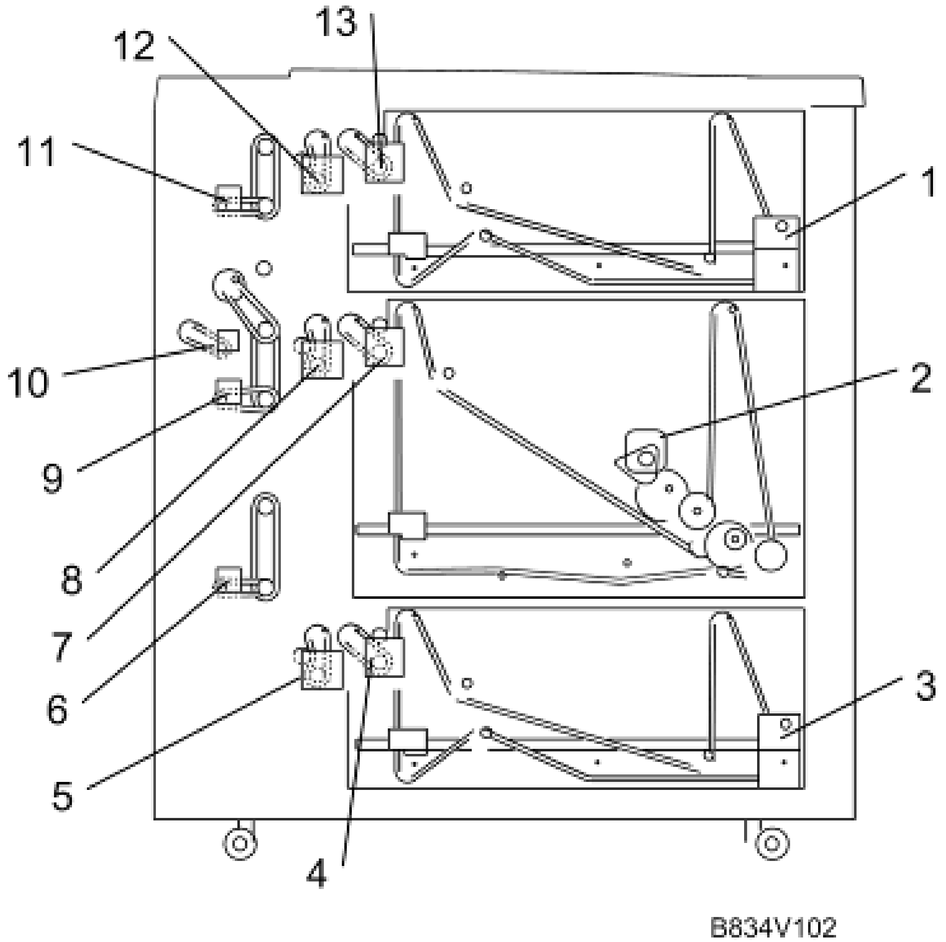
22.2 MECHANICAL COMPONENT LAYOUT



1. 4th Paper Feed Unit*	7. Lower Transport Rollers
2. 5th Paper Feed Unit	8. Horizontal Transport Roller
3. 6th Paper Feed Unit	9. LCT Exit roller
4. 4th Tray Drive Belt	10. Upper Transport Rollers
5. 5th Tray Drive Belt	11. Feed Slot (from Bypass Tray)
6. 6th Tray Drive Belt	

* Each feed unit has 1 paper feed motor that drives the pick-up roller and paper feed roller, and 1 grip motor that drives the separation roller and grip roller.

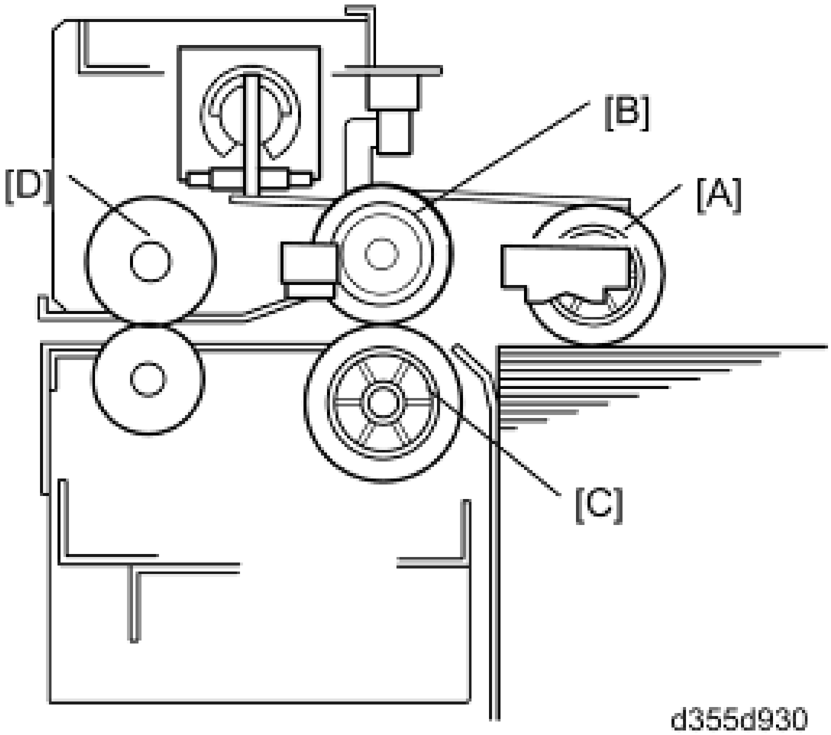
22.3 DRIVE LAYOUT



1. 4th Lift Motor 2. 5th Lift Motor 3. 6th Lift Motor 4. 6th Paper Feed Motor 5. 6th Grip Motor 6. 6th Transport Motor 7. 5th Paper Feed Motor	8. 5th Grip Motor 9. 5th Transport Motor 10. LCT Exit Motor 11. 4th Transport Motor 12. 4th Grip Motor 13. 4th Paper Feed Motor

22.4 PAPER HANDLING

22.4.1 PAPER FEED ROLLERS

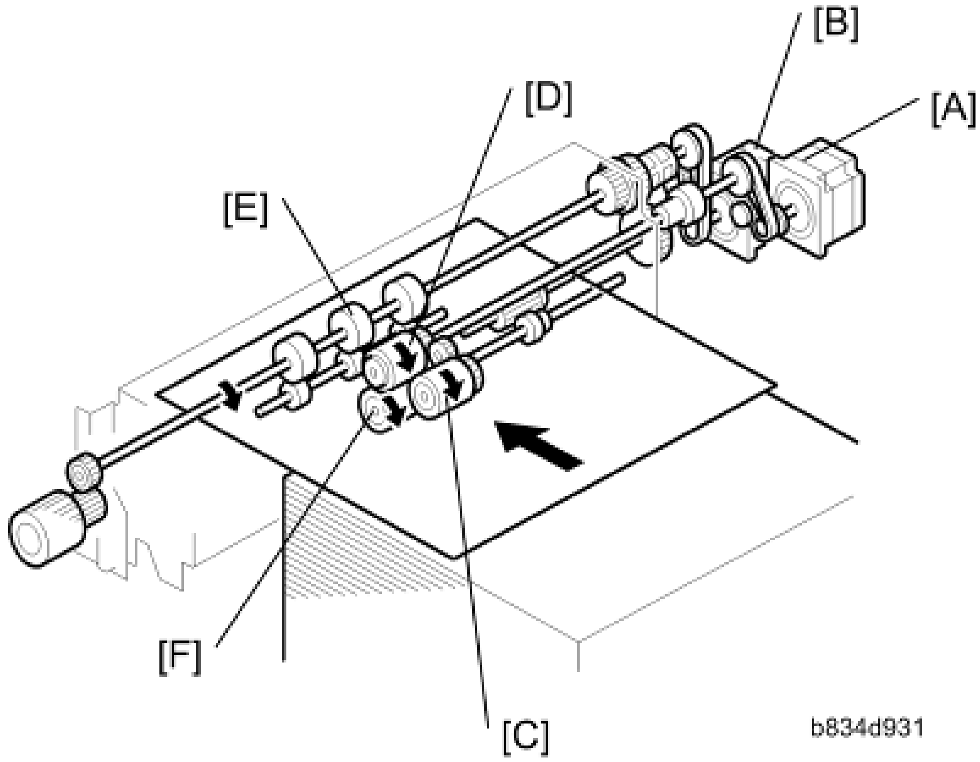


This LCT has three paper tray feed stations:
The 4th and 6th tray each hold 1,000 sheets of paper. The 5th tray holds 2,000 sheets of paper. Total: 4,000 sheets
Each tray contains four rollers:

- [A]: Pick-up roller
- [B]: Paper feed roller
- [C]: Separation roller
- [D]: Grip roller

The pick-up roller, paper feed roller, and separation roller are a standard FRR paper feed system.

22.5 PAPER FEED MOTORS

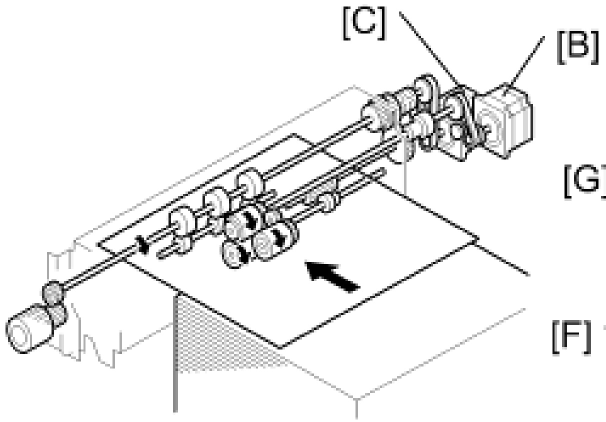


Two stepper motors control the paper feed drive:

- [A] Paper feed motor
- [B] Grip motor

The paper feed motor drives the pick-up roller [C] and the paper feed roller [D].
The grip motor drives the grip roller [E] that feeds the paper out of the tray, and the separation roller [F].

22.6 PAPER SEPARATION



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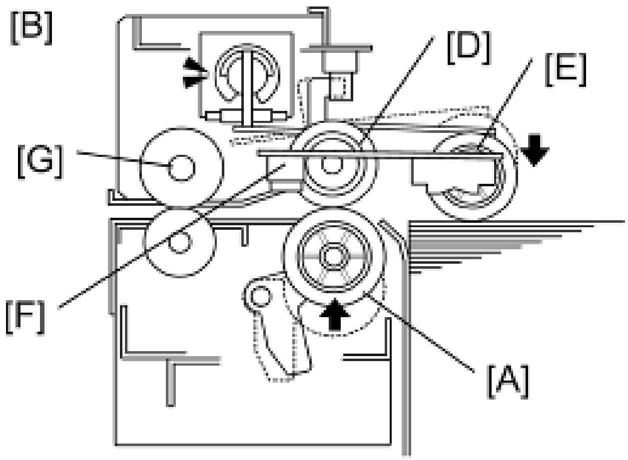

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When the paper feed station is selected for a job, the paper feed motor [B] and grip motor [C] turn on.

- When the feed motor [B] turns on, it drives the feed roller [D]. It also drives the pick-up roller [E] because the pick-up roller is linked to the feed roller by an idle gear.
- When the paper feed station is set in the mainframe, the separation lift lever rises. As a result, the separation roller [A] contacts the paper feed roller [D] and turns with the feed roller, unless more than one sheet of paper is fed. The two trays of the LCT unit use the standard FRR mechanism.
- When the paper feed motor turns on after the pick-up solenoid has turned on, the pick-up roller [E] lowers until it contacts the top sheet of the paper stack and then sends it to the paper feed and separation rollers.

The paper assist function is set for “Auto”. This means that it will switch on or off depending on for the type and thickness of paper selected. The assist function can also be set with the following SP codes to remain on (or off) for a selected tray.

1-923-001	LCT Pickup Assist ON/OFF A3LCT Tray4
1-923-002	LCT Pickup Assist ON/OFF A3LCT Tray5
1-923-003	LCT Pickup Assist ON/OFF A3LCT Tray6
	[0 to 2/0/1] 0: Auto 1: Force ON 2: Force OFF

When the pick up assist function is on:

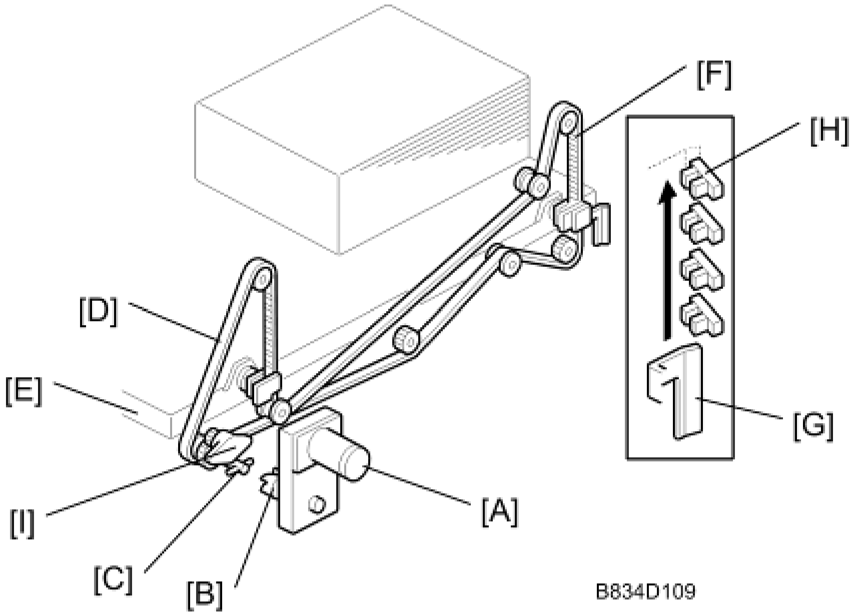
- When the paper feed sensor [F] detects the leading edge of the paper, the paper feed motor switches off to prevent double-feeds.
- The pick-up roller remains down.
- Next, the paper feed motor switches on again (with the pick-up roller rotating) to feed the paper to the grip rollers [G] which pull the paper out of the tray.

If the pick up assist function is off:

- When the paper feed sensor [F] detects the leading edge of the paper, the paper feed motor switches off to prevent double-feeds
- The pick-up roller raises.
- Next, the paper feed motor switches on to feed the paper to the grip rollers [G] which pull the paper out of the tray.

22.7 PAPER DETECTION AND LIFT

22.7.1 MECHANISM



22.7.2 DETECTION

When the tray set in the machine, the tray is detected by the drawer connector on the back side of the tray.

22.7.3 LIFT

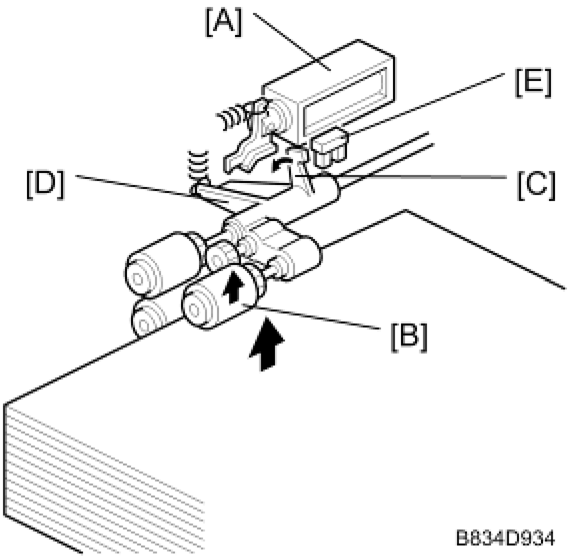
When the machine detects that the paper tray is set in the machine:

- The tray lift motor [A] rotates forward
- Coupling gear [B] on the tray lift motor engages pin [C] of the lift drive shaft.
- The tray drive belts [D], connected to the tray bottom plate [E], are driven by the tray lift motor via the lift drive shaft and tray lift pulleys [F].
- When the lift motor rotates forward, the tray bottom plate [E] rises. The tray rises until the top of the paper stack pushes up the pick-up roller and the lift sensor in the feed unit is de-activated.
- When the actuator [G] on the rear end of the bottom plate activates the paper height sensors [H], the remaining paper capacity is detected.

When the tray is pulled out:

- Coupling gear [B] separates from pin [C] and the tray bottom plate goes down.
- A damper [I] slows the descent of the bottom plate. For the D732, all three trays have this damper.

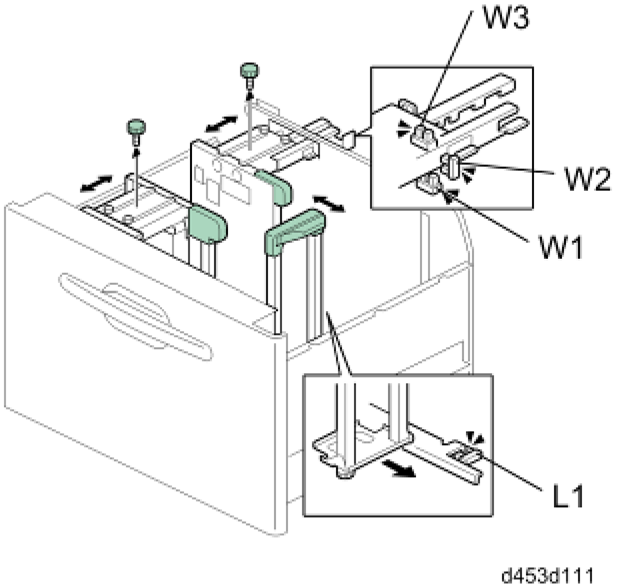
22.8 LIFT SENSOR



When the lift motor turns on, the pick-up solenoid [A] activates to lower the pick-up roller [B]. When the top sheet of paper reaches the proper paper feed level, the paper pushes up the pick-up roller and the actuator [C] on the pick-up roller supporter [D] de-activates the lift sensor [E] to stop the lift motor.

After several paper feeds, the paper level gradually lowers, then the lift sensor is activated and the lift motor turns on again until the lift sensor is de-activated again.

22.9 PAPER SIZE DETECTION



W3	Paper Width Sensor 3
W2	Paper Width Sensor 1
W1	Paper Width Sensor 2
L1	Paper Length Sensor

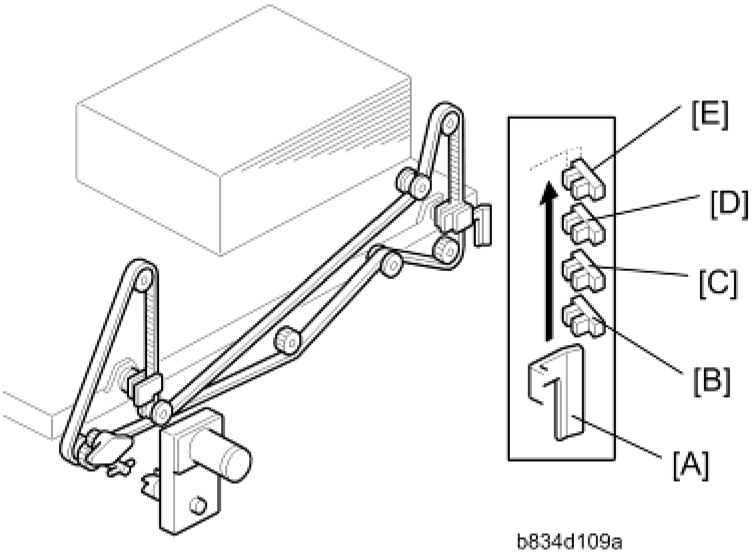
Each tray has three paper width sensors and one paper length sensor. The illustration above shows how four sensors are arranged in the tray.

This table describes how the three width sensors and one length sensor are used to determine the paper size in the 4th, 5th, and 6th paper trays.

Paper Size		**Width Sensors**			**Length Sensor**	**Area**	
		W1	**W2**	**W3**	**L1**	**NA**	**EU**
Large Size	12"×18"	L	L	L	H	YES	YES
	13"×19"					NO	NO
	320×450 mm					NO	NO
A3 SEF	297×420 mm	L	L	H	H	YES	YES
A4 LEF	297×210 mm	L	L	H	L	YES	YES
DLT SEF	11"×17"	L	H	L	H	YES	YES
LT LEF	11"×8½"	L	H	L	L	YES	YES
B4 SEF	257×364 mm	L	H	H	H	YES	YES
B5 LEF	257×182 mm	L	H	H	L	YES	YES
A4 SEF	210×297 mm	H	L	L	H	NO	YES
LT SEF	8½"×11"	H	L	L	H	YES	NO
A5 LEF	210×148 mm	H	L	L	L	NO	YES
HLT LEF	8½"×5½"	H	L	L	L	YES	NO
B5 SEF	182×257 mm	H	L	H	H	NO	NO
F SEF	8"×13"	H	L	H	H	YES	YES
A5 SEF	148×210 mm	H	H	L	L	YES	YES
HLT SEF	5½"×8½"	H	H	H	L	YES	YES

YES: Detected automatically
NO: Not detected automatically. Requires size setting change with the "Tray Paper Setting" key on the copier operation panel to detect the desired paper size.
H: Sensor OFF
L: Sensor ON

22.10 REMAINING PAPER DETECTION



[A] Paper Height Sensor Actuator
[B] 4th Paper Height Sensor 4
[C] 4th Paper Height Sensor 3
[D] 4th Paper Height Sensor 2
[E] 4th Paper Height Sensor 1 (Near End)

Each tray has four paper height sensors. The illustration above shows the paper height sensors in the 4th tray. This arrangement is duplicated in the 5th and 6th trays.

The amount of paper remaining in the tray is detected by the three paper height photo-interrupter sensors on the left rail as the bottom plate rises. Five states, determined by the position of the actuator [A] are possible.

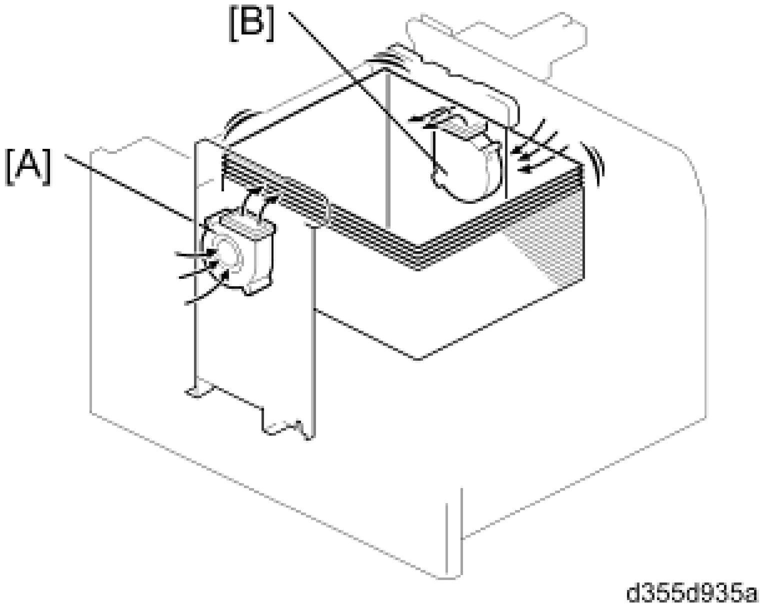
18. With the actuator [A] below paper height sensor 4 [B], no sensor is actuated and the display indicates 100%.
19. When the actuator passes paper height sensor 4 [B] , the display indicates 75% of the paper supply remaining.
20. When the actuator passes paper height sensor 3 [C], the display indicates 50% of the paper supply remaining.
21. When the actuator passes paper height sensor 2 [D], the display indicates 25% of the paper supply remaining.

Note

When the actuator enters the gap of the near end sensor [E] and the paper height sensor 2 [D] does not detect the actuator, the machine signals near end.

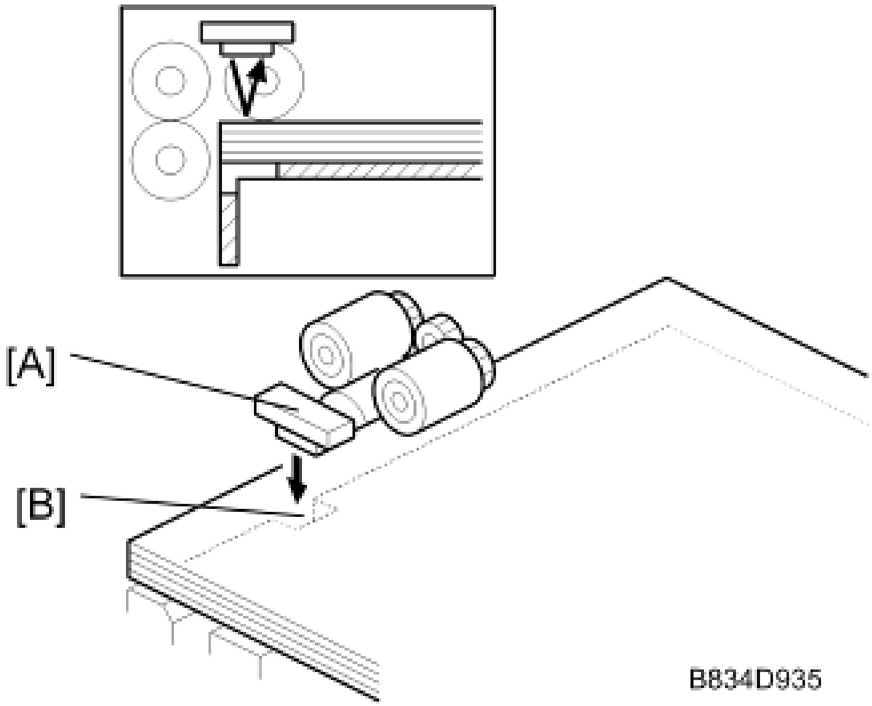
22. Finally, when the last sheet feeds, the paper end sensor signals that the tray is empty.

22.11 AIR ASSIST FEED MECHANISM



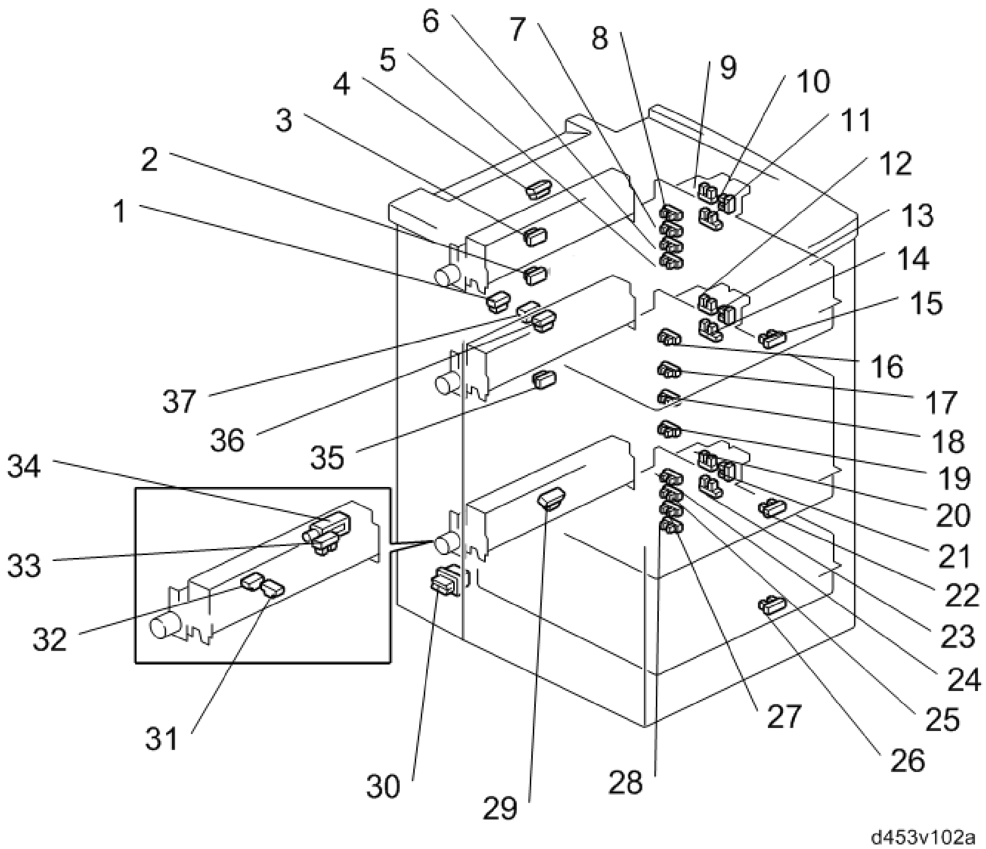
Two air assist fans [A] and [B] comprise the air assist mechanism.
The air flow created by the opposing fans floats the first sheet off the top of the stack. This assists in the separation of the top sheet from the sheet below and prevents double-feeding.
This only works when feeding the following paper types: Thick 2, Thick 3, Special 2, Coated Paper 1, Coated Paper 2 and Coated Paper 3.

22.12 PAPER END DETECTION

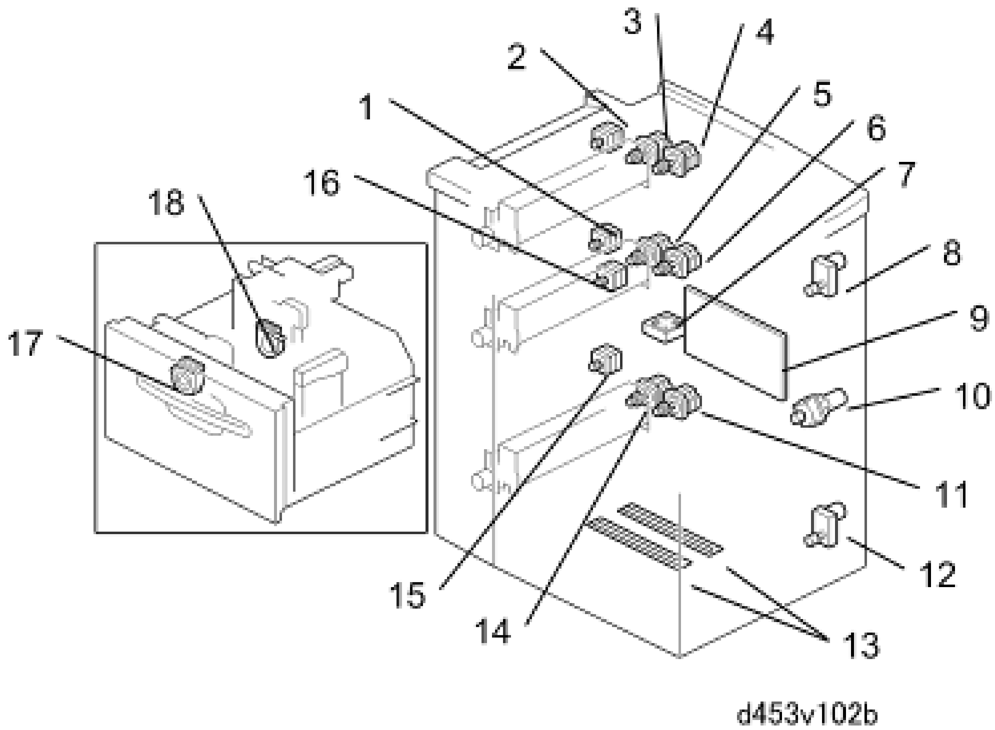


The paper end sensor [A] detects the top sheet of the paper in the tray by monitoring the reflected light. When the paper tray runs out of paper, the paper end sensor does not receive the reflected light due to the cutout [B]. Then, the tray lift motor rotates backwards 2 seconds to drop the tray bottom plate.

22.13 ELECTRICAL COMPONENTS



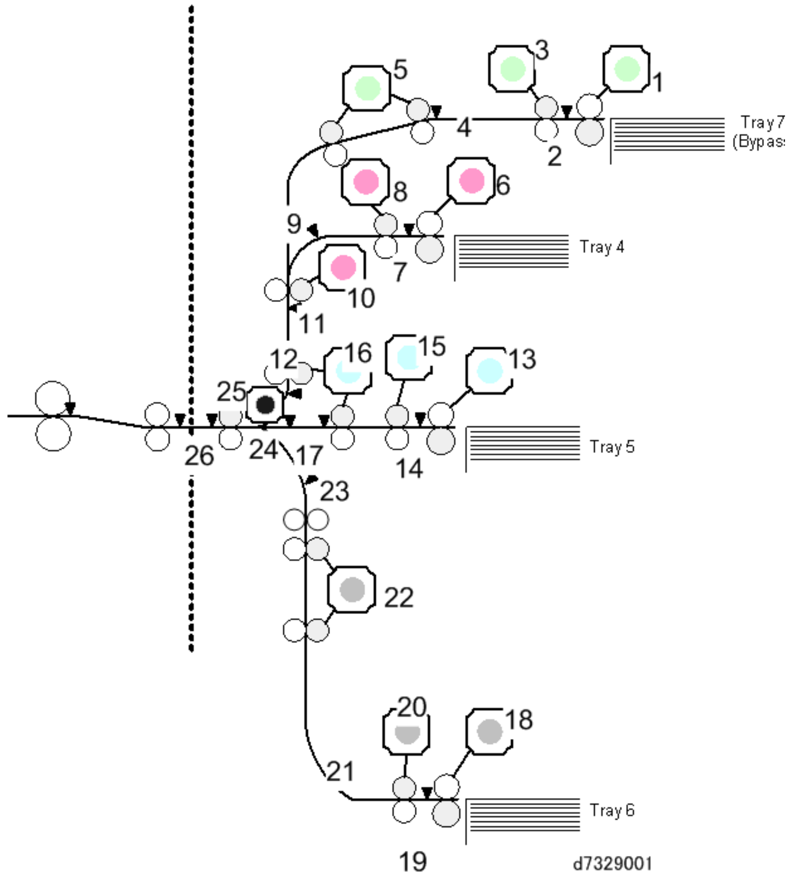
1. LCT Exit Sensor	20. 6th Paper Width Sensor 3
2. 4th Relay Sensor	21. 6th Paper Width Sensor 1
3. 4th Relay Sensor - Upper	22. 5th Paper Length Sensor
4. 4th Transport Sensor	23. 6th Paper Width Sensor 2
5. 4th Paper Height Sensor 4	24. 6th Paper Height Sensor 4
6. 4th Paper Height Sensor 3	25. 6th Paper Height Sensor 3
7. 4th Paper Height Sensor 2	26. 6th Paper Length Sensor
8. 4th Paper Height Sensor 1	27. 6th Paper Height Sensor 2
9. 4th Paper Width Sensor 3	28. 6th Paper Height Sensor 1
10. 4th Paper Width Sensor 2	29. 6th Transport Sensor
11. 4th Paper Width Sensor 1	30. Door Safety Switch
12. 5th Paper Width Sensor 3	31. 6th Paper End Sensor
13. 5th Paper Width Sensor 1	32. 6th Paper Feed Sensor
14. 5th Paper Width Sensor 2	33. 6th Lift Sensor
15. 4th Paper Length Sensor	34. 6th Pick-up Solenoid
16. 5th Paper Height Sensor 4	35. 6th Relay Sensor
17. 5th Paper Height Sensor 3	36. 5th Transport Sensor
18. 5th Paper Height Sensor 2	37. 5th Relay Sensor
19. 5th Paper Height Sensor 1	



1. 5th Transport Motor
2. 4th Transport Motor
3. 4th Grip Motor
4. 4th Paper Feed Motor
5. 5th Grip Motor
6. 5th Paper Feed Motor
7. LCIT Cooling Fan
8. 4th Lift Motor
9. Main Control Board
10 5th Lift Motor
11. 6th Paper Feed Motor
12. 6th Lift Motor
13. Anti-Condensation Heaters
14. 6th Grip Motor
15. 6th Transport Motor
16. LCT Exit Motor
17. Tray Front Fan
18. Tray Rear Fan

Each of the three trays is provided with a front fan (17) and rear fan (18).

22.14 A3/DLT LCT D732 LAYOUT (WITH BYPASS)



1. Paper Feed Motor Bypass)	14. 5th Paper Feed Sensor
2. Paper Feed Sensor Bypass)	15. 5th Grip Motor
3. Grip Motor Bypass)	16. 5th Transport Motor
4. Transport Sensor Bypass)	17. 5th Transport Sensor
5. Transport Motor Bypass)	18. 6th Paper feed Motor
6. 4th Paper Feed Motor	19. 6th Paper Feed Sensor
7. 4th Paper Feed Sensor	20. 6th Grip Motor
8. 4th Grip Motor	21. 6th Transport Sensor
9. 4th Transport Sensor	22. 6th Transport Motor
10. 4th Transport Motor	23. 6th Relay Sensor
11. 4th Relay Sensor – Upper	24. 5th Relay Sensor
12. 4th Relay Sensor – Lower	25. LCT Exit Motor
13. 5th Paper feed Motor	26. LCT Exit Sensor

22.15 ELECTRICAL COMPONENT SUMMARY

Motors		
No.	**Name**	**Description**
M1	4th Grip Motor	Drives the separation roller and the grip roller of the 4th tray.
M2	4th Lift Motor	Drives the bottom plate of the 4th tray up and down.
M3	4th Paper Feed Motor	Drives the pick-roller and feed roller that picks up each sheet and starts to feed it out of the 4th tray.
M4	4th Transport Motor	Drives the rollers in the vertical feed path that feed the paper from the 4th tray to the LCT exit motor.
M5	5th Grip Motor	Drives the separation roller and the grip roller of the 5th tray.
M6	5th Lift Motor	Drives the bottom plate of the 5th tray up and down.
M7	5th Paper Feed Motor	Drives the pick-roller, feed rollers of the 5th tray, and also drives the transport rollers below 6th relay sensor.
M8	5th Transport Motor	Drives the transport rollers in the vertical feed path that feed the paper from the 4th tray and the 5th tray to the LCT exit motor.
M9	6th Grip Motor	Drives the separation roller and the grip roller of the 6th tray.
M10	6th Lift Motor	Drives the 5th tray up and down.
M11	6th Paper Feed Motor	Drives the pick-roller and feed roller that picks up each sheet and starts to feed it out of the 6th tray.
M12	6th Transport Motor	Drives the rollers in the vertical feed path that feed the paper from the 6th tray to the LCT exit motor.
M13	LCT Exit Motor	Feeds the paper out the LCT and into the entrance of the copier.

PCBs		
No.	**Name**	**Description**
PCB1	Main Control Board	Controls the operation of all motors and sensors in the LCT unit.

Sensors		
No.	**Name**	**Description**
S1	4th Lift Sensor	Detects when the paper in the 4th tray is at the correct height for paper feed and switches the 4th lift motor off.
S2	4th Paper End Sensor	Detects when the last sheet feeds from the 4th tray.
S3	4th Paper Feed Sensor	Detects the paper when it arrives at the 4th paper feed roller and checks for misfeeds.
S4	4th Paper Height Sensor 1	4th from the bottom of the 4th tray, detects stack height: 100%
S5	4th Paper Height Sensor 2	5th from the bottom of the 4th tray, detects stack height: 75%
S6	4th Paper Height Sensor 3	6th from the bottom of the 4th tray, detects stack height: 50%
S7	4th Paper Height Sensor 4	4th from the bottom of the 4th tray, detects stack height: 25% and signals near-end.
S8	4th Paper Length Sensor (D732)	Detects the length of the paper in the 4th tray (used in combination with the paper width sensors).
S9	4th Paper Width Sensor 1 (D732)	1 of a set of 3 sensors that detect the width of the paper in the 4th tray.
S10	4th Paper Width Sensor 2 (D732)	1 of a set of 3 sensors that detect the width of the paper in the 4th tray.
S11	4th Paper Width Sensor 3 (D732)	1 of a set of 3 sensors that detect the width of the paper in the 4th tray.
S12	4th Paper Size Sensor 1 (D733)	1 of a set of 3 sensors that detect the width of the paper in the 4th tray.
S13	4th Paper Size Sensor 2 (D733)	1 of a set of 3 sensors that detect the width of the paper in the 4th tray.
S14	4th Paper Size Sensor 3 (D733)	1 of a set of 3 sensors that detect the width of the paper in the 4th tray.
S15	4th Relay Sensor	Detects the leading and trailing edges of the paper in the paper path near the bottom of the 4th tray. Checks the timing of the feed and signals a jam if the paper is late or lags at this location.
S16	4th Relay Sensor - Upper (D732)	Detects the leading and trailing edges of the paper in the paper path near the top of the 4th tray. Checks the timing of the feed and signals a jam if the paper is late or lags at this location.
S17	4th Transport Sensor	Detects jams in the paper path where the transport motor feeds the paper from the 4th tray.
S18	5th Lift Sensor	Detects when the paper in the 5th tray is at the correct height for paper feed and switches the 4th lift motor off.
S19	5th Paper End Sensor	Detects when the last sheet feeds from the 5th tray.
S20	5th Paper Feed Sensor	Detects the paper when it arrives at the 5th paper feed roller and checks for misfeeds.
S21	5th Paper Height Sensor 1	4th from the bottom of the 5th tray, detects stack height: 100%

Sensors		
No.	**Name**	**Description**
S22	5th Paper Height Sensor 2	5th from the bottom of the 5th tray, detects stack height: 75%
S23	5th Paper Height Sensor 3	6th from the bottom of the 5th tray, detects stack height: 50%
S24	5th Paper Height Sensor 4	4th from the bottom of the 5th tray, detects stack height: 25% and signals near-end.
S25	5th Paper Length Sensor (D732)	Detects the length of the paper in the 5th tray (used in combination with the paper width sensors).
S26	5th Paper Width Sensor 1 (D732)	1 of a set of 3 sensors that detect the width of the paper in the 5th tray.
S27	5th Paper Width Sensor 2 (D732)	1 of a set of 3 sensors that detect the width of the paper in the 5th tray.
S28	5th Paper Width Sensor 3 (D732)	1 of a set of 3 sensors that detect the width of the paper in the 5th tray.
S29	5th Paper Size Sensor 1 (D733)	1 of a set of 3 sensors that detect the width of the paper in the 5th tray.
S30	5th Paper Size Sensor 2 (D733)	1 of a set of 3 sensors that detect the width of the paper in the 5th tray.
S31	5th Paper Size Sensor 3 (D733)	1 of a set of 3 sensors that detect the width of the paper in the 5th tray.
S32	5th Relay Sensor (D732)	Detects the leading and trailing edges of the paper in the paper path near the 5th tray. Checks the timing of the feed and signals a jam if the paper is late or lags at this location.
S33	5th Transport Sensor	Detects jams in the paper path where the transport motor feeds the paper from the 5th tray.
S34	6th Lift Sensor	Detects when the paper in the 6th tray is at the correct height for paper feed and switches the 4th lift motor off.
S35	6th Paper End Sensor	Detects when the last sheet feeds from the 6th tray.
S36	6th Paper Feed Sensor	Detects the paper when it arrives at the 6th paper feed roller and checks for misfeeds.
S37	6th Paper Height Sensor 1	4th from the bottom of the 6th tray, detects stack height: 100%
S38	6th Paper Height Sensor 2	5th from the bottom of the 6th tray, detects stack height: 75%
S39	6th Paper Height Sensor 3	6th from the bottom of the 6th tray, detects stack height: 50%
S40	6th Paper Height Sensor 4	4th from the bottom of the 6th tray, detects stack height: 25% and signals near-end.
S41	6th Paper Length Sensor (D732)	Detects the length of the paper in the 6th tray (used in combination with the paper width sensors).
S42	6th Paper Width Sensor 1 (D732)	1 of a set of 3 sensors that detect the width of the paper in the 6th tray.
S43	6th Paper Width Sensor 2 (D732)	1 of a set of 3 sensors that detect the width of the paper in the 6th tray.
S44	6th Paper Width Sensor 3 (D732)	1 of a set of 3 sensors that detect the width of the paper in the 6th tray.

Sensors		
No.	**Name**	**Description**
S45	6th Paper Size Sensor 1 (D733)	1 of a set of 3 sensors that detect the width of the paper in the 6th tray.
S46	6th Paper Size Sensor 2 (D733)	1 of a set of 3 sensors that detect the width of the paper in the 6th tray.
S47	6th Paper Size Sensor 3 (D733)	1 of a set of 3 sensors that detect the width of the paper in the 6th tray.
S48	6th Relay Sensor (D732)	Detects the leading and trailing edges of the paper in the paper path near the 6th tray. Checks the timing of the feed and signals a jam if the paper is late or lags at this location.
S49	6th Transport Sensor	Detects jams in the paper path where the transport motor feeds the paper from the 6th tray.
S50	LCT Exit Sensor	Detects jams at the exit of the LCT unit.

Solenoids		
No.	**Name**	**Description**
SOL1	4th Pick-up Solenoid	Engages/disengages rotation of the pick-up roller in the 4th tray.
SOL2	5th Pick-up Solenoid	Engages/disengages rotation of the pick-up roller in the 5th tray.
SOL3	6th Pick-up Solenoid	Engages/disengages rotation of the pick-up roller in the 6th tray.

Switches		
No.	**Name**	**Description**
SW1	Door Safety Switch	An interlock safety switch that detects when the front door is opened and closed.

Other		
No.	**Name**	**Description**
H1, H2	Anti-Condensation Heaters	Evaporates moisture around the trays in the LCT (230V 18W).

23. BOOKLET FINISHER SR5060/FINISHER SR5050 (D734/D735)

23.1 SPECIFICATIONS

Booklet Finisher SR5060

Power source	NA: 120V 50/60 Hz 2.0A 2450W EU: 220-240V 50/60 Hz 1.2A 250W
Max. power consumption	approx. 150W or less (with booklet finishing)
Dimensions (w x d x h)	1113 x 730 x 1192 mm (44 x 29 x 47 in. (Proof/shift trays extended)
Weight	approx. 130 kg (286 lb.)
Booklet stapling	Book centered, two staples
Book stapling position	Centered

Paper sizes: To proof tray

No Z-fold	A3 SEF, A4 LEF, SEF, A5 LEF, SEF, A6 SEF, B4 SEF, B5 LEF, SEF, B6 SEF, 11"x17" SEF, 8 1/2"x14" SEF, 8 1/2"x13" SEF, 8 1/2"x11" LEF, SEF, 8 1/4"x14" SEF, 8 1/4"x13" SEF, 8"x13" SEF, 8"x10" LEF, SEF, 7 1/4"x10 1/2" LEF, SEF, 5 1/2"x8 1/2" LEF, SEF, Postcard SEF, 8K SEF, 16K LEF, SEF, 12"x18" SEF, 11"x15" SEF, 11"x14" SEF, 10"x15" SEF, 10"x14" SEF, 13"x19 1/5" SEF, 13"x19" SEF, 12 3/5"x19 1/5" SEF, 12 3/5"x18 1/2" SEF, 13"x18" SEF, SR A3 SEF, SR A4 LEF, SEF, 226x310 mm LEF, SEF, 310x432 mm SEF, Custom Size
With Z-fold	A3 SEF, B4 SEF, A4 SEF, 12x18 SEF, 11"x17" SEF, 8 1/2"x14" SEF, 8 1/2"x11" SEF, 8K SEF

Paper capacity: Proof tray (Normal paper)

No Z-fold	A4, 8 1/2"x11" less than 250 sheets B4, 8 1/2"x14" more than 50 sheets
With Z-fold	B4, 8 1/2"x14" more than: 30 sheets A4, 8 1/2"x11" less than: 20 sheets

Paper weights: Proof tray

No Z-fold	52.3 to 216.0g/m^2（45.0 to 185.7 kg）
With Z-fold	64.0 to 105.0g/m^2（55.1 to 90.3 kg）

Paper sizes: Shift tray

No Z-fold	A3 SEF, A4 LEF, SEF, A5 LEF, SEF, B4 SEF, B4 SEF, B5 LEF, SEF, 11"x17" SEF, 8 1/2"x14" SEF, 8 1/2"x13" SEF, 8 1/4"x14" SEF, 8 1/4"x13" SEF, 8"x13" SEF, 8 1/2"x11" LEF, SEF, 8"x10" SEF, 7 1/4"x10 1/2" LEF, SEF, 5 1/2"x8 1/2" LEF, SEF, 8K SEF, 16K LEF, SEF, 12"x18" SEF, 11"x15" SEF, 11"x14" SEF, 10"x15" SEF, 10"x14" SEF, 13"x19 1/5" SEF, 13"x19" SEF, 12 3/5"x19 1/5" SEF, 12 3/5"x18 1/2" SEF, 13"x18" SEF, SR A3 SEF, SR A4 LEF, SEF, 226x310 mm LEF, SEF, 310x432 mm SEF, Custom Size
With Z-fold	A3 SEF, B4 SEF, A4 SEF, 12"x18" SEF, 11"x17" SEF, 8 1/2"x14" SEF, 8 1/2"x11" SEF, 8K SEF

Shift tray paper capacity (Normal paper): No Z-folded sheets

No stapling	A4 LEF, B5 LEF, 8 1/2"x11" LEF: 2,500 sheets A3 SEF, A4 SEF, B4 SEF, B5 SEF, 11"x17" SEF, 8 1/2"x14" SEF, 8 1/2"x11" SEF, SR A4 LEF, SEF, 226x310 mm LEF, SEF: 1,500 sheets 12"x18" SEF, 13"x19 1/5" SEF, SR A3 SEF, 13"x19" SEF, 12 3/5"x19 1/5" SEF, 12 3/5"x18 1/2" SEF, 13"x18" SEF, 310x432 mm SEF: 1,000 sheets A5 LEF, 5 1/2"x8 1/2" LEF: 500 sheets A5 SEF, 5 1/2"x8 1/2" SEF: 100 sheets
Stapling	A3 SEF, B4 SEF, 11"x17" SEF, 8 1/2"x14" SEF: 10 to 50 sheets book staple: 150 to 30 doc. 2 to 9 sheets book staple: 150 doc. A4 LEF, B5 LEF, 8 1/2"x11" LEF: 20 to 100 sheets book staple: 125 to 25 doc.10 to 19 sheets book staple: 200 to 105 doc. 2 to 9 sheets book staple: 150 doc. 20 to 100 sheets book staple: 150 to 30 doc. A4 SEF, B5 SEF, 8 1/2"x11" SEF: 10 to 100 sheets book staple: 150 to 15 doc. 2 to 9 sheets book staple: 150 doc. Mixed sizes: 2 to 50 sheets book staple: 30 doc.（A3 SEF/A4 LEF, B4 SEF/B5 LEF, 11"x17" SEF/8 1/2"x11" LEF, 8K SEF/16K LEF）

Shift tray capacity: Z-fold sheets (Normal paper)

No stapling	30 sheets
Stapling	1 to 10 sheets book staple: 30 to 3 doc.（Z-folded A3 SEF, A4 LEF, Z-folded B4/B5 LEF, Z-folded 11"x17" SEF/8 1/2"x11" LEF, Z-folded 8K SEF/16K LEF）

Shift tray paper thicknesses

No Z-fold	40.0 to 350.0g/m^2（45.0 to 258.0 kg）
With Z-fold	64.0 to 105.0g/m^2（55.1 to 90.3 kg）

Paper sizes for stapling

No Z-fold	A3 SEF, B4 SEF, A4 LEF, SEF, B5 LEF, SEF, 11"x17" SEF, 8 1/2"x14" SEF, 8 1/2"x11" LEF, SEF, 8 1/4"x14" SEF, 8 1/2"x13" SEF, 8 1/4"x13" SEF, 8"x13" SEF, 8"x10" SEF, 7 1/4"x10 1/2" LEF, SEF, 8K SEF, 16K LEF, SEF, 11"x15" SEF, 11"x14" SEF, 10"x15" SEF, 10"x14" SEF
With Z-fold	A3 SEF, B4 SEF, 11x17 SEF, 8K SEF
Z-fold mixed sizes	A3 SEF/A4 LEF B4 SEF/B5 LEF 11"x17" SEF/8 1/2"x11" LEF 8K SEF/16K LEF

Staple paper size

No Z-fold	A4 LEF, SEF, B5 LEF, SEF, 8 1/2"x11" LEF, SEF, 8"x10 1/2" LEF, SEF, 8"x10" LEF, SEF, 8 1/2"x13" SEF, 8 1/4"x13" SEF, 7 1/4"x10 1/2" LEF, SEF, 182x210 mm LEF, SEF, 16K LEF, SEF: 100 sheets A3 SEF, B4 SEF, 11"x17" SEF, 11"x15" SEF, 11"x14" SEF, 10"x15" SEF, 10"x14" SEF, 8 1/2"x14" SEF, 8 1/2"x13" SEF, 8 1/4"x14" SEF, 8 1/4"x13" SEF, 8" x13" SEF, 210x340 mm SEF, 8K SEF: 50 sheets
With Z-fold	10 sheets
Mixed sizes	50 sheets A3 SEF/A4 LEF B4 SEF/B5 LEF 11"x17" SEF/8 1/2"x11" LEF 8K SEF/16K LEF

Staple paper thickness

No Z-fold	64.0 to 80 g/m^2
	Paper thickness up to 200 g/m^2 (55 to 172 kg), and two sheets of A4 or 8 1/2x11 can be inserted as covers and booklet stapled once, but overall stack thickness must be less than 11 mm.
Z-fold	64.0 to 105g/m2（55.0 to 90.3 kg）

Stapling positions	Up x1, Left x2, Up x2, Down x1, Diagonal x1, Upper right x1, Left x1, Booklet staple
Center book stapling	20 sheets (Normal paper) 64 to 80 g/m^2 max. 20 sheets 80.1 to 90.0 g/m^2 max. 15 sheets
Paper sizes for center book stapling	
A3 SEF, B4 SEF, A4 SEF, B5 SEF, 11"x17" SEF, 8 1/2"x14" SEF, 8 1/2"x11" SEF, 13"x19 1/5" SEF, 13"x19" SEF, 12 3/5"x19 1/5" SEF, 12 3/5"x18 1/2" SEF, 13"x18" SEF, SR A3 SEF, 8 1/2"x13" SEF, 8 1/4"x14" SEF, 8 1/4"x13" SEF, 8"x13" SEF, 7 1/4"x10 1/2" SEF, 8K SEF, 16K SEF, 12"x18" SEF, 11"x15" SEF, 11"x14" SEF, 10"x15" SEF, 10"x14" SEF, SR A4 SEF, 226x310 mm SEF, 310 x 432m SEF, Custom Size	

Booklet tray capacity: Book stapled documents (Normal paper)

・2 to 5 sheets (approx. 45 doc.) ・6 to 10 sheets (approx. 23 doc.) ・11 to 15 sheets (approx. 25 doc.) ・16 to 20 sheets (approx. 10 doc.)	
Paper thickness: Book stapling	64 to 90 g/m^2（54.1 to 140 kg）
One sheet of paper (thickness 90.1 to 163 g/m^2 (77.5 to 140 kg) can be inserted as a cover and stapled once. Folded paper max.: 6 sheets	
Multi center folded (no booklet stapling): 6 sheets 64 to 90 g/m^2	

Finisher SR5050

Power source	NA: 120V 50/60 Hz 2.0A 2450W EU: 220-240V 50/60 Hz 1.2A 250W
Max. power consumption	approx. 150W or less
Dimensions (w x d x h)	1113 x 730 x 1192 mm (44 x 29 x 47 in. (Proof/shift trays extended)
Weight	approx. 112 kg (246 lb.)
Staple positions	Up x1, Left x2, Up x2, Down x1, Diagonal, Upper right x1, Right x1

Paper sizes: To proof tray

No Z-fold	A3 SEF, A4 LEF, SEF, A5 LEF, SEF, A6 SEF, B4 SEF, B5 LEF, SEF, B6 SEF, 11"x17" SEF, 8 1/2"x14" SEF, 8 1/2"x13" SEF, 8 1/2"x11" LEF, SEF, 8 1/4"x14" SEF, 8 1/4"x13" SEF, 8"x13" SEF, 8"x10"LEF, SEF, 7 1/4"x10 1/2" LEF, SEF, 5 1/2"x8 1/2" LEF, SEF, Postcard SEF, 8K SEF, 16K LEF, SEF, 12"x18" SEF, 11"x15" SEF, 11"x14" SEF, 10"x15" SEF, 10"x14" SEF, 13"x19 1/5" SEF, 13"x19" SEF, 12 3/5"x19 1/5" SEF, 12 3/5"x18 1/2" SEF, 13"x18" SEF, SR A3 SEF, SR A4 LEF, SEF, 226x310 mm LEF, SEF, 310x432 mm SEF, Custom Size
With Z-fold	A3 SEF, B4 SEF, A4 SEF, 12"x18" SEF, 11"x17" SEF, 8 1/2"x14" SEF, 8 1/2"x11" SEF, 8K SEF

Paper capacity: Proof tray (Normal paper)

No Z-fold	A4, 8 1/2"x11" less than 250 sheets B4, 8 1/2"x14" more than 50 sheets
With Z-fold	B4 SEF, 8 1/2"x14" SEF more than 30 sheets A4 SEF, 8 1/2"x11" SEF less than 20 sheets

Paper weights: Proof tray

No Z-fold	52.0 to 216.0g/m^2（45.0 to 185.7 kg）
With Z-fold	64.0 to 105.0g/m^2（55.1 to 90.3 kg）

Paper sizes: Shift tray

No Z-fold	A3 SEF, A4 LEF, SEF, A5 LEF, SEF, B4 SEF, B5 LEF, SEF, 11"x17" SEF, 8 1/2"x11" LEF, SEF, 8 1/2"x14" SEF, 8 1/2"x13" SEF, 8 1/4"x14" SEF, 8 1/4"x13" SEF, 8"x13" SEF, 8"x10" SEF, 7 1/4"x10 1/2" LEF, SEF, 5 1/2"x8 1/2" LEF, SEF, 8K SEF, 16K LEF, SEF, 12"x18" SEF, 11"x15" SEF, 11"x14" SEF, 10"x15" SEF, 10"x14" SEF, 13"x19 1/5" SEF, 13"x19" SEF, 12 3/5"x19 1/5" SEF, 12 3/5"x18 1/2" SEF, 13"x18" SEF, SR A3 SEF, SR A4 LEF, SEF, 226x310 mm LEF, SEF, 310x432 mm SEF, Custom Size
With Z-fold	A3 SEF, B4 SEF, A4 SEF, 12"x18" SEF, 11"x17" SEF, 8 1/2"x14" SEF, 8 1/2"x11" SEF, 8K SEF

Shift tray capacity (Normal paper)

No stapling	A4 LEF, B5 LEF, 8 1/2"x11" LEF: 3,000 sheets A3 SEF, B4 SEF, A4 SEF, B5 SEF, 11"x17" SEF, 8 1/2"x14" SEF, 8 1/2"x11" SEF, SR A4 LEF, SEF, 226x310 mm LEF, SEF: 1,500 sheets 12"x18" SEF, 13"x19 1/5" SEF, SR A3 SEF, 13"x18" SEF, 12

	3/5"x18 1/2" SEF, 12 3/5"x19 1/5" SEF, 13"x19" SEF, 310x432 mm SEF: 1,000 sheets A5 LEF, 5 1/2"x8 1/2" LEF: 500 sheets A5 SEF, 5 1/2"x8 1/2" SEF: 100 sheets
Stapling	A3 SEF, B4 SEF, 11"x17" SEF, 8 1/2"x14" SEF :10 to 50 sheets book staple: 150 to 30 doc. 2 to 9 sheets book staple: 150 doc. A4 LEF, B5 LEF, 8 1/2"x11" LEF: 10 to 19 sheets book staple: 200 to 105 doc. 20 to 100 sheets book staple: 150 to 30 doc. 2 to 9 sheets book staple: 150 doc. A4 SEF, B5 SEF, 8 1/2"x11" SEF: 10 to 100 sheets book staple: 150 to 15 doc. 2 to 9 sheets book staple: 150 doc. A3 SEF, B4 SEF, 11"x17" SEF, 8 1/2"x14" SEF: 10 to 50 sheets book staple: 150 to 30 doc. Mixed sizes: 2 to 50 sheets book staple: 30 doc.（A3 SEF/A4 LEF, B4 SEF/B5 LEF, 11"x17" SEF/8 1/2"x11" LEF, 8K SEF/16K LEF）

Shift tray capacity: Z-folded sheets (Normal paper)

No stapling	30 sheets
Stapling	Mixed sizes: 1 to 10 sheets Book stapled: 30 to 3 doc.（Z-folded A3 SEF, A4 LEF, Z-folded B4/B5 LEF, Z-folded 11"x17" SEF, 8 1/2"x11" LEF, Z-folded 8K SEF, 16K LEF）

Shift tray paper thicknesses (no stapling)

No Z-fold	40 to 350 g/m^2
With Z-fold	64.0 to 105.0g/m^2

Staple paper sizes

No Z-fold	A3 SEF, B4 SEF, A4 LEF, SEF, B5 LEF, SEF, 11"x17" SEF, 8 1/2"x14" SEF, 8 1/2"x11" LEF, SEF, 8 1/4"x14" SEF, 8 1/2"x13" SEF, 8 1/4"x13" SEF, 8"x13" SEF, 8"x10" SEF, 7 1/4"x10 1/2" LEF, SEF, 8K SEF, 16K LEF, SEF, 11"x15" SEF, 11"x14" SEF, 10"x15" SEF, 10"x14" SEF
With Z-fold	A3 SEF, B4 SEF, 11"x17" SEF, 8K SEF
Z-fold size	A3 SEF/A4 LEF B4 SEF/B5 LEF 11"x17" SEF/8 1/2"x11" LEF 8K SEF/16K LEF

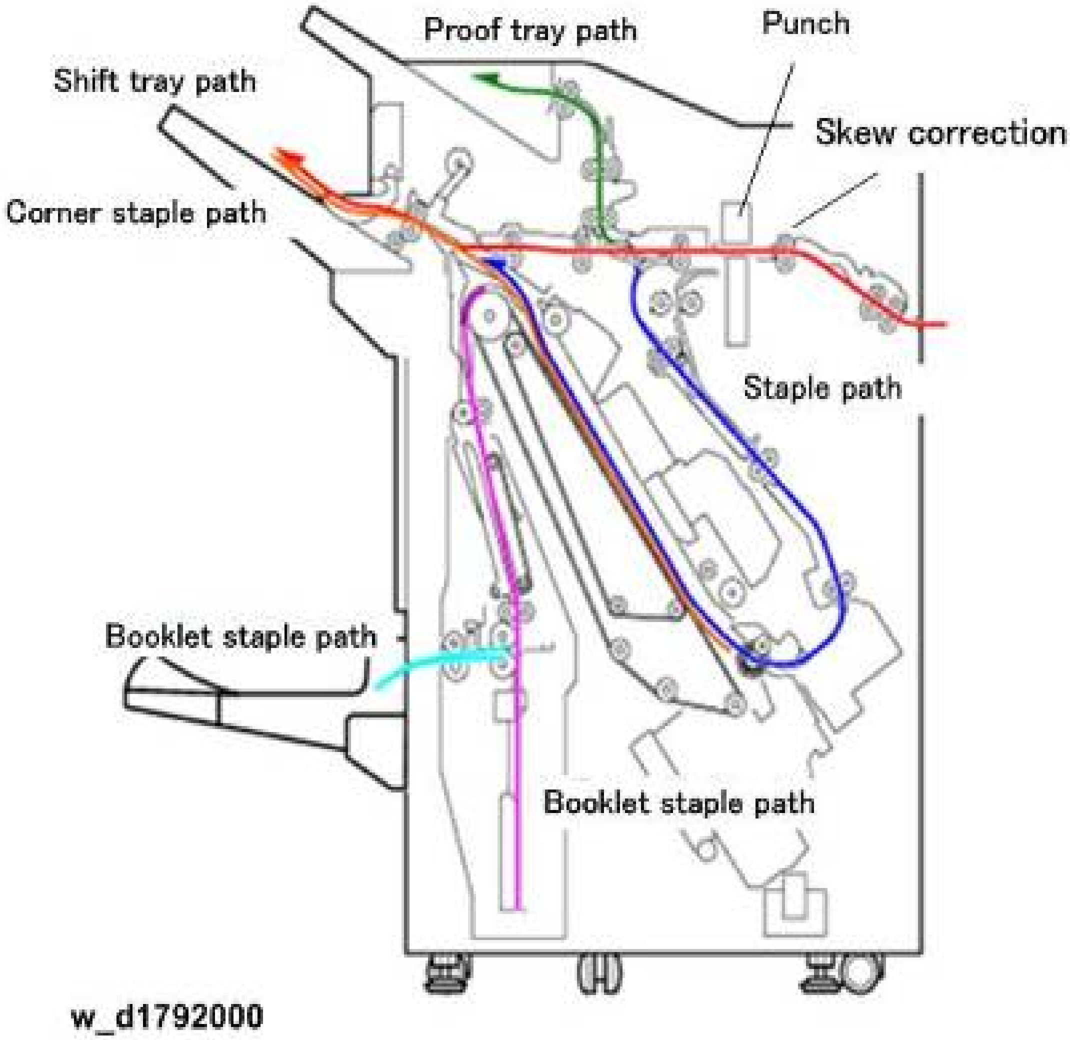
Stapling stack thicknesses

No Z-fold	A4 LEF, SEF, B5 LEF, SEF, 8 1/2"x11" LEF, SEF, 8"x10" SEF, 7 1/4"x10 1/2" LEF, SEF, 16K LEF, SEF: 100 sheets, A3 SEF, B4 SEF, 11"x17" SEF, 11"x15" SEF, 11"x14" SEF, 10"x15" SEF, 10"x14" SEF, 8 1/2"x14" SEF, 8 1/2"x13" SEF, 8 1/4"x14" SEF, 8 1/4"x13" SEF, 8" x13" SEF, 8K SEF: 50 sheets	
Z-fold	10 sheets	
Mixed sizes	A3 SEF, A4 LEF: 50 sheets; B4 SEF, B5 LEF: 50 sheets; 11"x17" SEF, 8 1/2"x11" LEF: 50 sheets; 8K SEF, 16K LEF: 50 sheets	
	Z-folds	No Z-folds
	10	0
	9	0 to 10
	8	0 to 20
	7	0 to 30
	6	0 to 40
	5	0 to 50
	4	0 to 60
	3	0 to 70
	2	0 to 80
	1	1 to 90

Staple paper thickness

No Z-fold	64.0 to 80.0 g/m^2 (55.0 to 77.4 kg)
	Paper thickness up to 200 g/m2 (55 to 172 kg), and two sheets of A4 or 8 1/2x11 can be inserted as covers and booklet stapled once, but overall stack thickness must be less than 11 mm.
Z-fold	64.0 to 105g/m^2（55.0 to 90.3 kg）

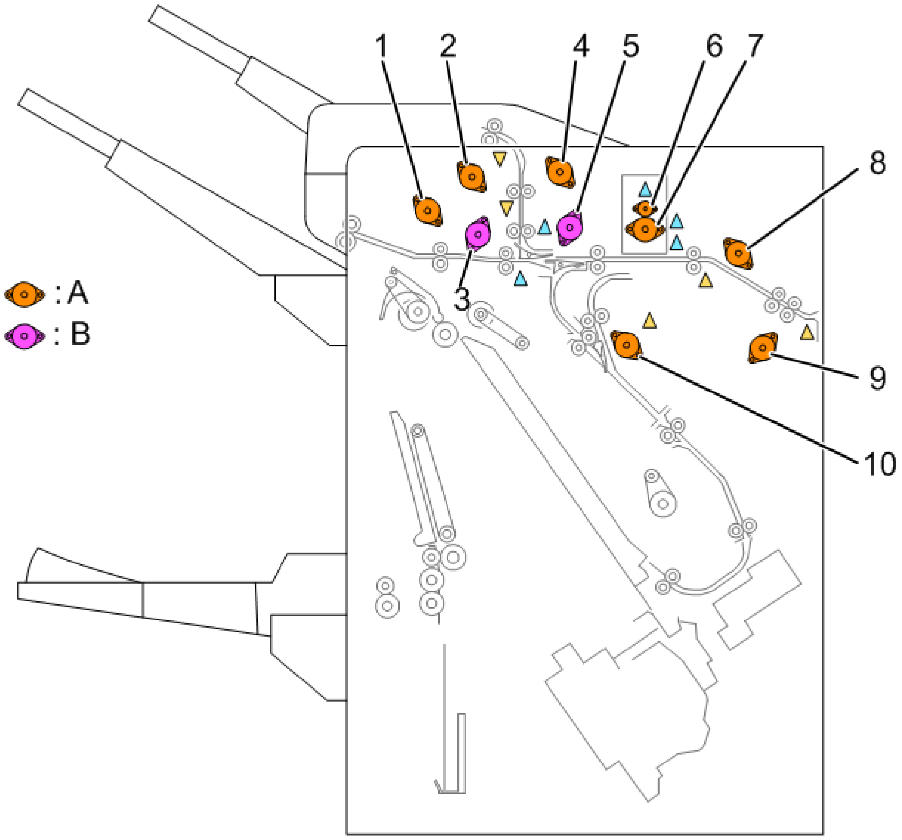
23.2 DRIVE LAYOUT



Main Mechanisms

Item	Overview
Transport mechanism	Roller transport system. Paper routing by high-speed junction gates driven by DC motors.
Punch unit	Hole punch unit driven by punch motor (option)
Skew correction	Correction done by CIS and shift unit
Staple mechanism	Sheets aligned by independently driven jogger mechanism. Stack aligned vertically with leading edge stopper and positioning roller.
Shift mechanism	Stacked output shifted with movable tray. Stacks are raised and lowered by tray.
Pre-stacking mechanism	Pre-stacking employs switch-back transport. Large size paper pre-stacking employs switch-back transport and roller-release mechanisms.
Booklet Stapling Mechanism	Booklet stapling, and folding are done in the same unit.

23.3 ENTRANCE, PROOF TRAY, SHIFT TRAY TRANSPORT



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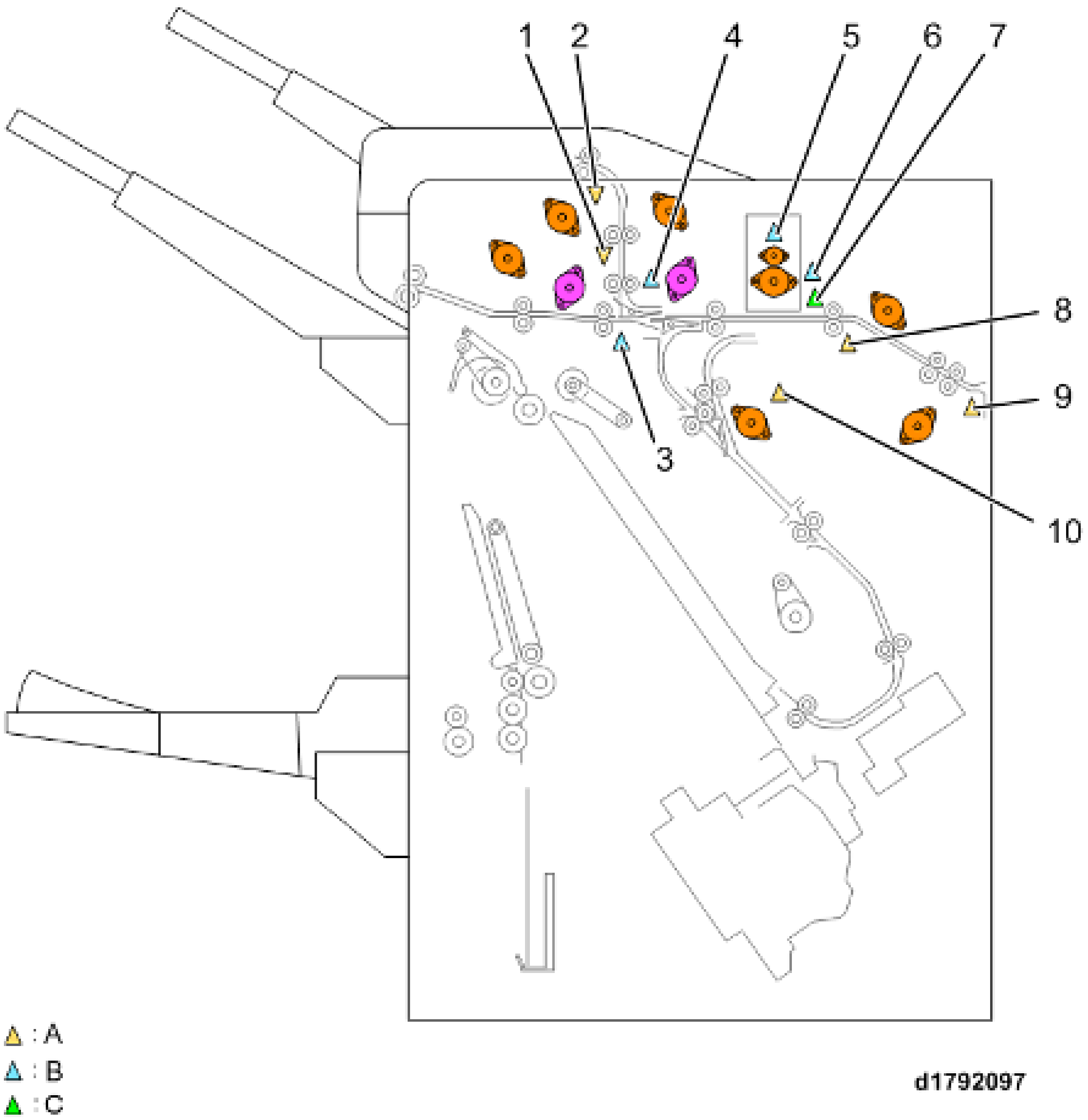
No.	Name	Function
1	Shift exit motor	Drives the shift tray exit rollers.
2	Proof tray exit motor	Operates the rollers that feed paper to the proof tray.
3	Junction gate motor (proof/shift tray)	Operates the junction gate (between proof tray and shift tray) that guides paper to either upper proof tray or shift tray.
4	Exit guide motor	Opens and closes the exit guide.
5	Junction gate motor (shift/staple)	Operates the junction gate (between shift and staple tray) that guides paper to either staple tray or shift tray.
6	Punch junction gate motor*[1]	Switches the punch mechanism for number of holes selected for punching.
7	Punch motor*[1]	Drives the paper punch mechanism inside the punch unit.
8	Registration motor	Drives the registration roller.
9	Entrance Motor	Drives the entrance roller.
10	Horizontal transport motor	Drives the transport roller on the downstream side of the punch unit.

*[1] Punch unit is an option

23.4 SENSORS

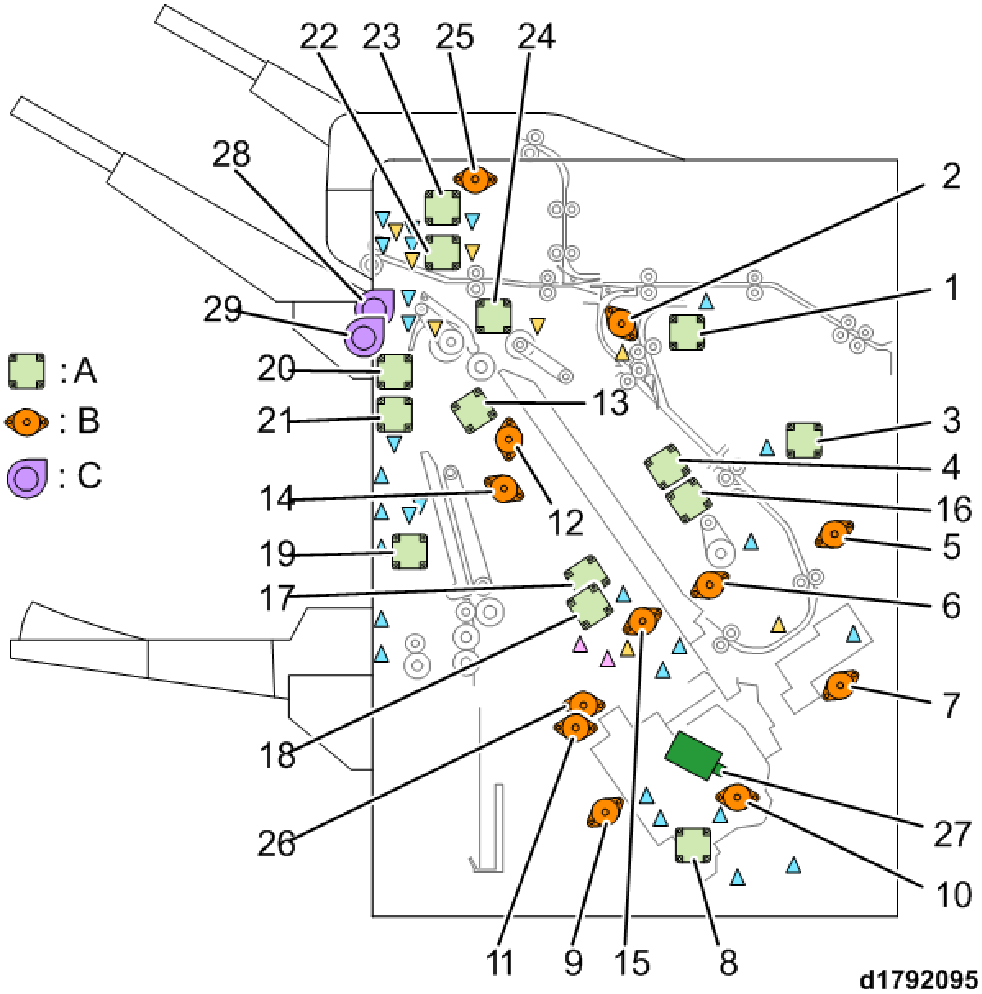


A: Reflective sensor
B: Permeable sensor
C: CIS (Contact Image Sensor)

No.	Name	Function
1	Proof tray full sensor	Detects when the proof tray is full.
2	Proof tray exit sensor	Detects each sheet of paper as it exits onto the proof tray.
3	JG HP sensor (proof/shift)	Detects when the upper tray junction gate (proof tray/shift tray) is in or out of its home position.
4	JG HP sensor (shift/staple)	Detects when the upper tray junction gate (shift tray/staple tray) is in or out of its home position.
5	Punch motor encoder sensor	Controls the start and stop timing of the punching operation by counting rotations of the punch motor.
6	Punch HP sensor	Detects when the punch blade in or out of its home position.
7	Punch Horizontal Registration Sensor	Controls the movement of the punch when it is positioned for punching.
8	Punch vertical registration sensor	Mounted above the paper path in the punch unit, detects the passing of the paper below.
9	Entrance Sensor	Detects the leading edge of each sheet as it enters the finisher.
10	Punchout hopper full sensor	Detects when the punch-out hopper is full and when the hopper is out of the finisher.

23.5 STAPLER TRANSPORT, STAPLE, JOGGER, SHIFT UNITS

23.5.1 MOTORS



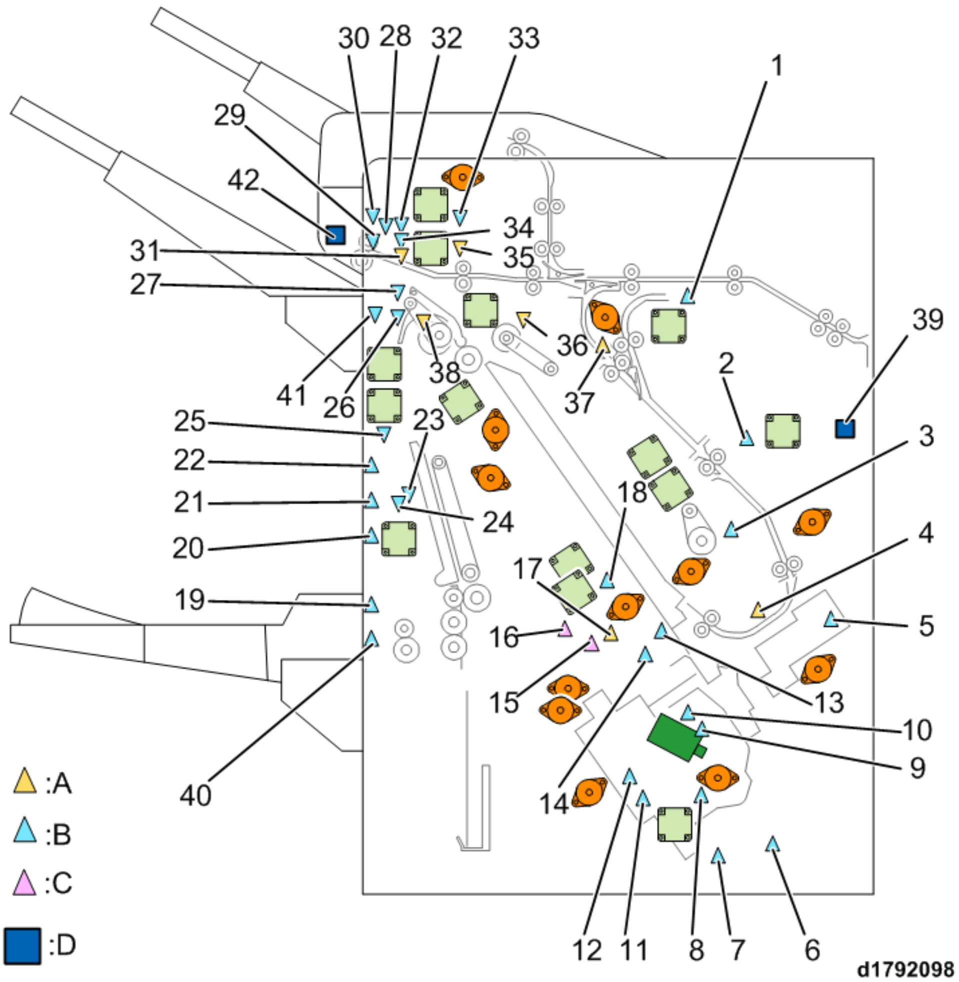
A: Stepper motor (HB type
B: DC motors
C: Fan motors

No.	Name	Function
1	Punch movement motor*1	Operates the left/right and front/back movement of the punch unit.
2	Junction gate transport motor	Drives the transport rollers.
3	Pre-stack release motor	Opens the nip of the pre-stack roller to release the stack.
4	Positioning roller lift motor	Drives the positioning roller that positions paper in the stapling tray.
5	Pre-stack motor	Drives the pre-stack roller.
6	Stapler entrance motor	Drives the rollers that feed paper into the stapling tray.
7	Trailing edge press	Operates the pressure plate that presses against

No.	Name	Function
	motor	trailing edge of the stack on the stapling tray just before the stack is stapled.
8	Corner stapler motor	Rotates the corner stapling for diagonal stapling.
9	Stapler movement motor	Moves the corner stapler front and back on its rail.
10	Booklet stapler motor	Operates the stapler.
11	Base fence lift motor	Moves the entire base fence in the sub scan (vertical) direction.
12	Stack transport motor	Drives the transport rollers that feed stacks into the booklet stapler feed path.
13	Stack transport unit motor	Lifts and releases rollers that feed the stack to the booklet stapler.
14	Feed-out belt motor	Drives the feed-out belt that feeds corner stapled stacks to the shift tray.
15	Leading edge stopper motor	Operates the top fence that aligns the leading edge of the paper stack on the stapling tray.
16	Positioning roller rotation motor	Rotates the positioning roller that positions each sheet of paper in the stapling tray.
17	Jogger motor (rear)	Operates the rear jogger fence that aligns the paper stack rear-to-front on the stapling tray.
18	Jogger motor (front)	Operates the front jogger fence that aligns the paper stack is aligned front-to-rear on the stapling tray.
19	Shift motor	Moves the shift tray to the rear and front.
20	Drag roller motor error	Drives the rotation of the drag roller and also operates the shutter inside the exit fan duct and trailing edge press lever.
21	Drag roller movement motor	Moves the drag roller left and right.
22	Shift jogger fence retract motor	Raises the shift jogger fences during alignment of the front and back edges of the stack on the shift tray.
23	Shift jogger motor	Moves the shift jogger fences forward and back during alignment of the front and back edges of the stack on the shift tray.
24	Turn guide motor	Operates the junction gate in the booklet path.
25	Shift tray lift motor	Raises and lowers the shift tray.
26	Base fence movement motor	Moves the base fence rear-to-front.
27	Trimmings shutter solenoid	Operates the shutter that opens and closes the chute where staple trimmings drop to the staple trimmings hopper below.
28	Exit fan motor (rear)	These are the air assist fans positioned at the shift tray exit. They provide a weak cushion of air below each sheet of paper to make it easier to exit the finisher.
29	Exit fan motor (front)	

*1 Punch unit is an option

23.5.2 BOOKLET STAPLE SENSORS



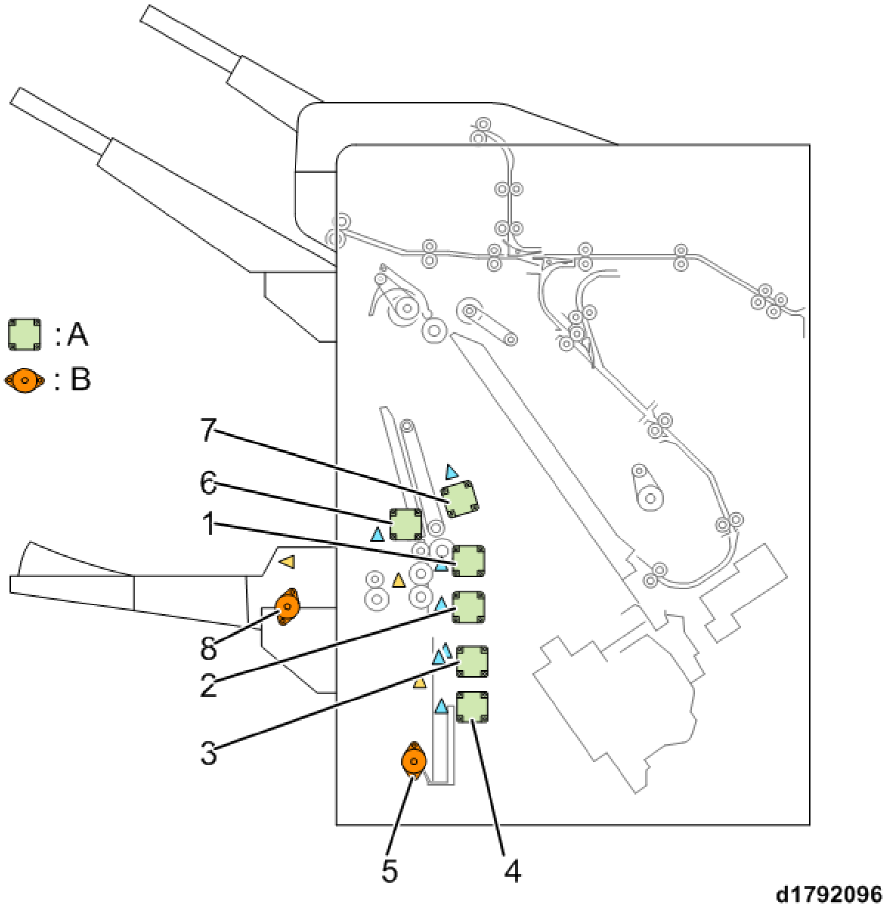
A: Reflective sensor
B: Permeable sensor
C: Photo interrupt sensor
D: Microswitch

No.	Name	Function
1	Punch Unit HP sensor	Operates the left/right and front/back movement of the punch unit.
2	Pre-stack release sensor	
3	Positioning roller HP sensor	Detects when the positioning roller above the stapling tray is at its home position.
4	Staple tray entrance sensor	Detects each sheet of paper as it passes the entrance to the staple tray.
5	Trailing edge press plate HP sensor	At the bottom fence of the stapling tray, detects when the bottom fence is in or out of its home position.
6	Staple trimmings hopper full sensor	Detects when the hopper is full of staple trimmings.
7	Staple trimmings hopper set sensor	Detects when the staple trimmings hopper is in or out of the unit.
8	Stapler HP sensor	Detects when the corner stapler unit is at its home position.

No.	Name	Function
9	Staple out sensor	Detects when the stapler is full or empty of staples.
10	Self-priming sensor	
11	Corner stapler HP sensor	Detects when the corner stapler is at its home position.
12	Stapler rotation HP sensors (front, rear)	Detects when the corner stapler has rotated to its home position at the front, or the rear.
13	Base fence up-down HP sensor	Detects when the base fence that moves the trailing edge of the stack up-down is in or out of its home position.
14	Base fence front-back HP sensor	Detects when the base fence that moves the trailing edge of the stack front-back is in or out of its home position.
15	Stack feed-out belt HP sensor	Detects when the pawl on the stack feed-out belt is in or out of its home position.
16	Top fence HP sensor	Detects when the top fence that jogs the leading edge of the stack in the stapling tray is in or out of its home position.
17	Staple tray paper sensor	Detects paper in the stapling tray.
18	Jogger fence HP sensors (front, rear)	Detects when the jogger fence that moves the trailing edge of the stack front-back is in or out of its home position.
19	Shift tray full sensor (2500)	Detects when the shift tray is full of SR A3 paper (1000) sheets.
20	Shift tray full sensor (1500)	
21	Shift tray full sensor (1000)	
22	Shift tray full sensor (500)	
23	Shift movement HP sensor (rear)	The HP sensor that detects the tray at its rear HP position.
24	Shift movement HP sensor (front)	The HP sensor that detects the tray at its front HP position.
25	Drag roller HP sensor	Detects when the drag roller at the shift tray exit is in or out of its home position.
26	Pressure plate HP sensor	Detects when pressure plate is a the home position.
27	Paper height sensor (TE)	Detects the height of the stack on the shift tray.
28	Shift Tray Full Sensor (Z)	Detects when the shift tray is full of Z-folded paper.
29	Shift jogger retract HP sensor	Detects the home positions of the shift jogger fences after they raised up during alignment of the front and back edges of the stack on the shift tray.
30	Shift tray jogger HP sensor	Detects the actuator on the rear shift jogger fence and switches off the shift jogger motor and signals to turn on the shift jogger left motor to raise the fences at the end of a job.
31	Shift tray exit sensor long	Detects paper as it is fed to the shift tray in staple mode.
32	Paper height sensor (shift)	Detects the height of the stack on the shift tray.

No.	Name	Function
33	Exit guide HP sensor	Detects when the exit guide plate is at its home position.
34	Paper height sensor (staple)	Detects the height of the stack on the shift tray.
35	Shift tray exit sensor (short)	Detects paper as it is fed to the shift tray.
36	Stack transport unit HP sensor	Detects when the press guide plate is at its home position.
37	Pre-stack sensor	Detects paper at the pre-stack position.
38	Stack JG HP sensor	Detects when the stack JG plate is at its home position.
39	Door safety switch (interlock switch)	Cuts the 24V power supply to the finisher when the front door is opened.
40	Shift tray full sensor (3000)	Detects when the shift tray is full (D735 only).
41	Shift tray limit switch	Detects when the shift tray is at its highest position.
42	Emergency stop switch	Stops paper output the shift tray.

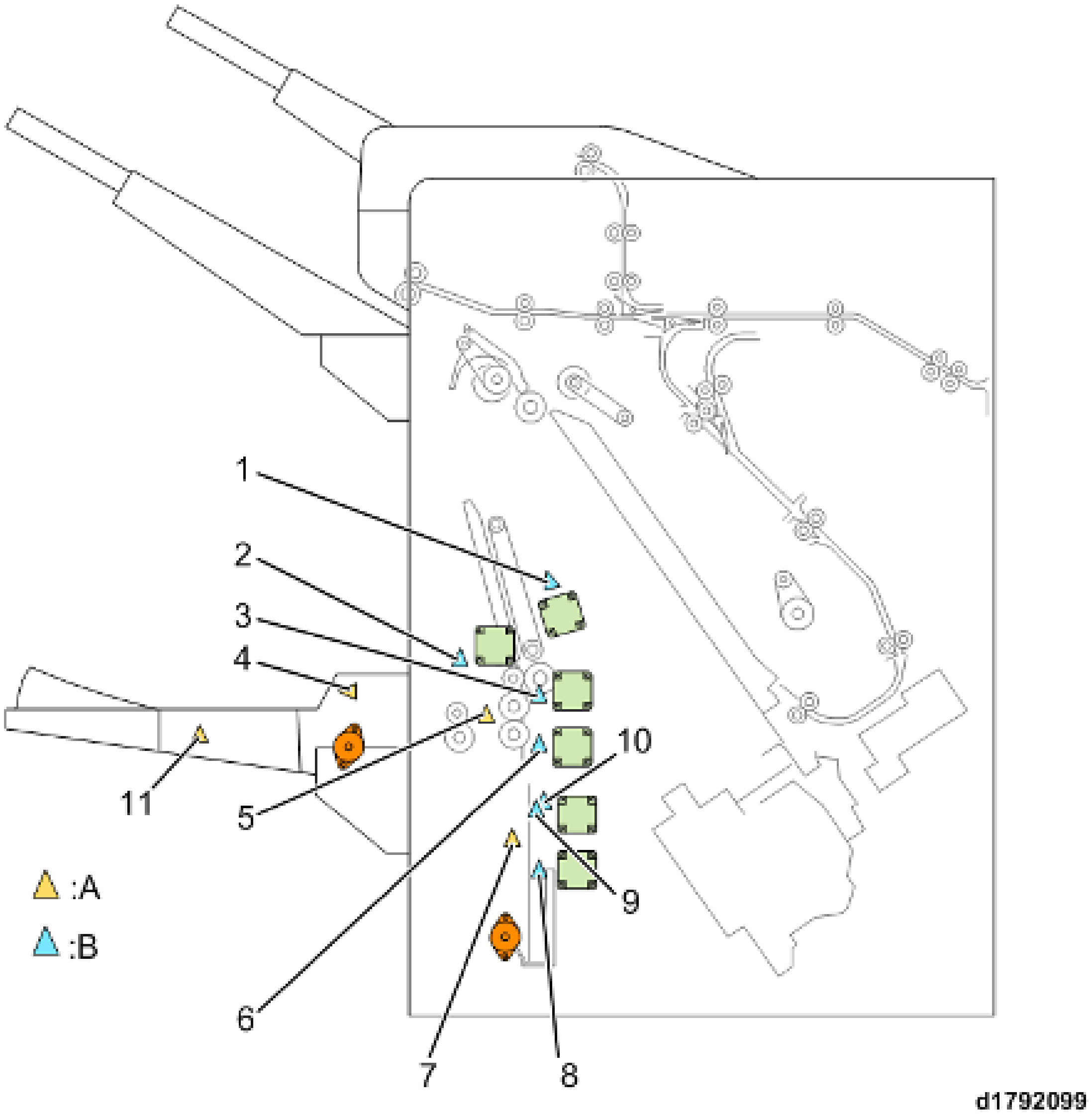
23.5.3 BOOKLET STAPLE MOTORS



A: Stepper motor (HB type)
B: DC motor

No.	Name	Function
1	Fold roller motor	Operates the roller that folds the stack into halves during center folding in the folder unit.
2	Fold plate motor	Operates the fold plate pushed into the center of the stack to start center folding.
3	Booklet stapler bottom fence motor	Operates the jogger fence at the leading edge to align the leading edge of the stack in the direction of paper feed for stapling in the booklet stapler unit.
4	Booklet stapler side fence motor	Operates the jogger fences that align the front and back edges of the stack for stapling in the booklet stapler unit.
5	Booklet stapler motor	Operates the booklet stapler.
6	Booklet stapler clamp roller motor	Moves the booklet stapler clamp roller to release pressure on the stack. Also drives the horizontal fold roller.
7	Booklet bottom fence motor	Operates the jogger fence that aligns the trailing edge of the stack for stapling in the booklet stapler unit.
8	Booklet stack tray motor	The small motor inside the booklet tray that drives the belts of the tray.

23.5.4 BOOKLET STAPLE SENSORS

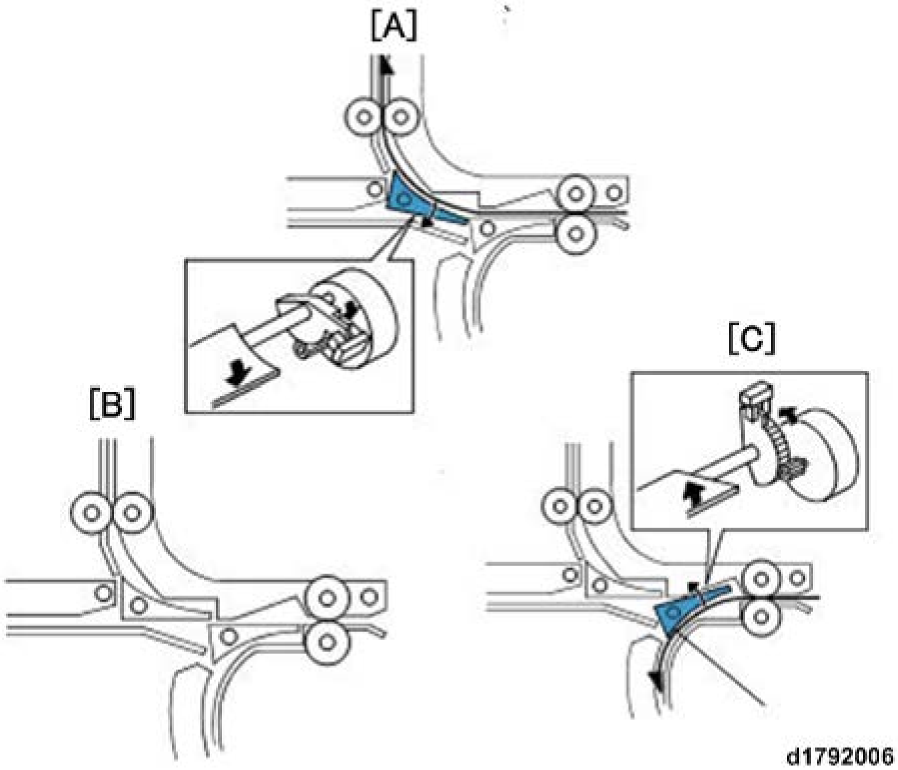


A : Reflective sensor
B: Permeable sensor

No.	Name	Function
1	Booklet stapler bottom fence HP sensor	Detects when the pawl that aligns the stack in the booklet stapler in the direction of paper feed is in or out of its home position.
2	Booklet stapler clamp roller HP sensor	Detects when the booklet stapler transport roller has been moved to release pressure on the stack.
3	Fold plate cam HP sensor	Detects when the cam that operates the fold plate is in or out of its home position.
4	Booklet tray full sensor	Detects when the booklet tray is full.
5	Booklet stapler exit sensor	Detects when paper passes between the fold roller and the booklet stapler exit.
6	Fold plate HP sensor	Detects when the fold plate in the booklet stapler unit is in or out of its home position.
7	Fold unit entrance sensor	Detects when a stack arrives in the booklet stapler.
8	Booklet stapler bottom fence HP sensor	Detects when the trailing edge fence that aligns the trailing edge of the stack on the booklet stapling tray is in or out of its home position.
9	Booklet stapler side fence HP sensor (front)	Detects when the front jogger fence that aligns the front edge of the stack for booklet stapling is in or out of its home position.
10	Booklet stapler side fence HP sensor (rear)	Detects when the rear jogger fence that aligns the trailing edge of the stack for booklet stapling is in or out of its home position.
11	Booklet tray paper sensor	Detects the presence of paper on the booklet tray.

23.6 JUNCTION GATES, STACKING

23.6.1 JUNCTION GATE MECHANISM



A: Proof mode
B: Shift mode
C: Staple mode

The junction gate diverts the paper into one of three paths.

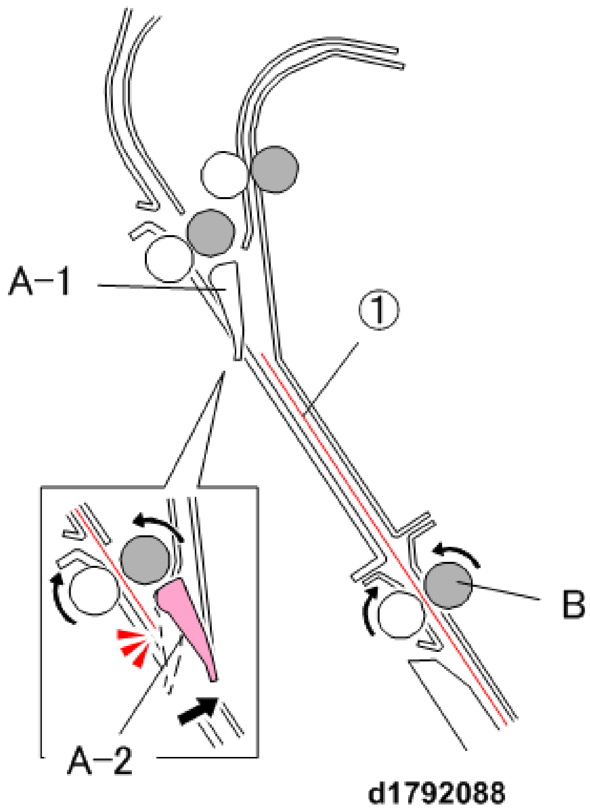
- In proof mode the junction gate guides the paper up to the proof tray.
- In shift mode the junction gate does not move and remains level so paper feeds straight and level to the shift tray.
- In the staple mode, the junction gate guides to paper down to the stack/staple unit.

23.7 PRE-STACKING MECHANISM

This machine uses two methods to pre-stack paper. The former method is the same as that employed in the previous units, Booklet Finisher SR5040 (2500) and Finisher SR5030 (3000). The former method stacked sheets in the stapling tray with their leading edges not completely aligned, but the new method greatly improves the accuracy of stack alignment in the stapling tray with the addition of a 3rd pre-stack roller and timing adjustments to align the leading edges of the standby sheet and next sheet before they are sent to the stapling tray.
Here is a description of both methods.

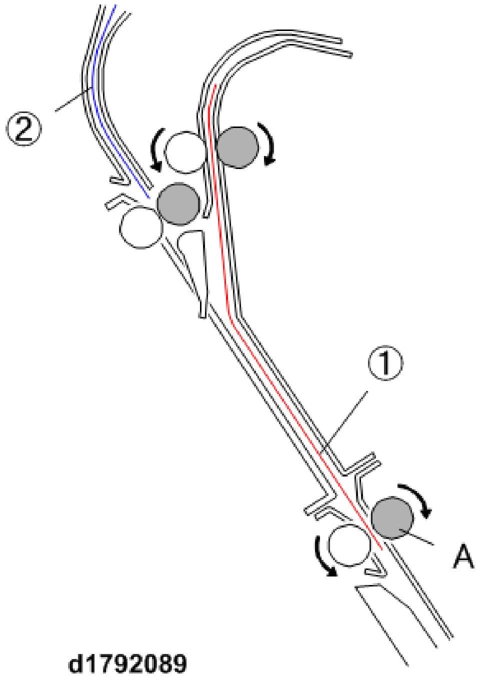
23.7.1 OLD METHOD

1) Small-size Paper (A4 and smaller)



a) The paper fed to the finisher ① in the staple mode (red), passes the pre-stack junction gate [A-1] and is sent to the 1st pre-stack roller.

- When a sheet of paper feeds, its leading edge strikes the pre-stack gate and forces it open against the weak spring that normally holds it in place [A-1].
- After the paper passes [A-2] the spring pulls the gate back to its original closed position.



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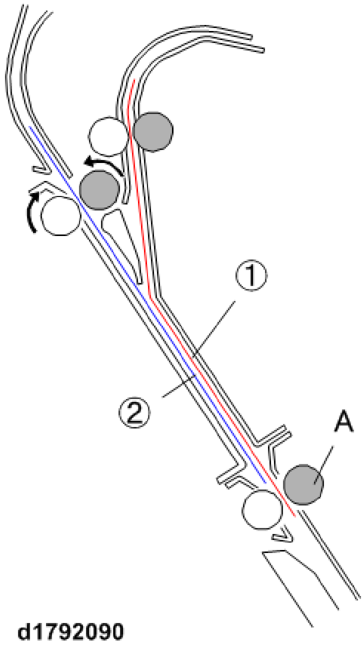
b) When the trailing edge of sheet ① passes, the pre-stack motor reverses and the 1st pre-stack roller [A] feeds the sheet ① into the standby path. Next, just before the leading edge of sheet ① passes the 1st pre-stack roller, the pre-stack motor stops with sheet ① in the nip of the 1st pre-stack roller and pauses (standby), and then waits for the next sheet ② to feed.



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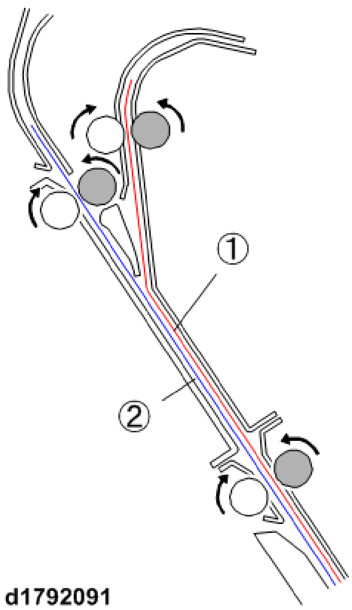

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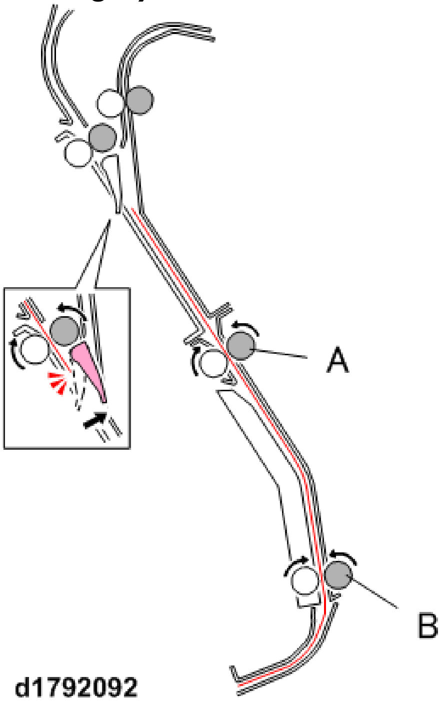
c) Just before the leading edge of sheet ② (blue) passes the 1st pre-stack roller [A], the pre-stack motor starts to rotate forward to drive the 1st pre-stack roller which feeds sheet ① at standby and stacks it onto sheet ② blue.

- Thereafter, it becomes possible to stack several sheets through repetition of this operation (pre-stacking).
- One or the other mode is employed, depending on the paper size, stapling mode, and the number of sheets to be pre-stacked.

2) Large-size Paper (B4 and larger)



The 2nd pre-stack roller at the rear [B] performs the same function for large paper (B4 SEF and larger) as that performed by the 1st pre-stack roller [A] for small paper (A4 SEF and smaller) described above.

- The reverse feed time (and distance) after the paper passes the pre-stack gate is shortened in order to improve the efficiency of the job.
- When the paper is reverse fed, the nip of 1st pre-stack roller is opened so the paper feeds more smoothly.

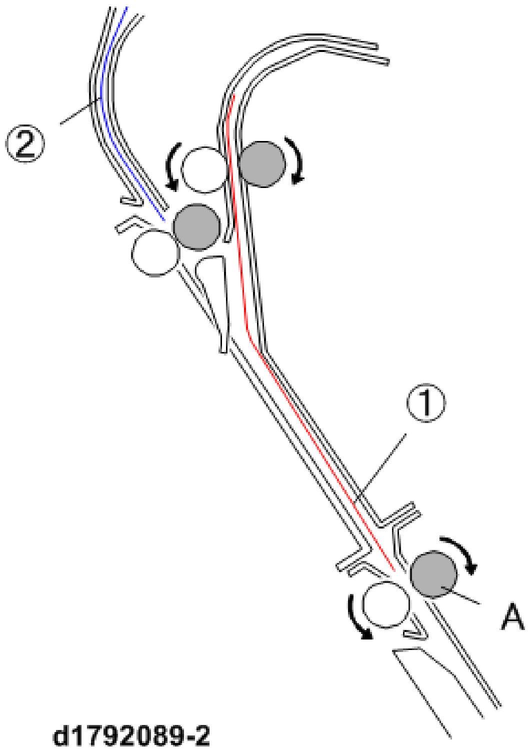
23.7.2 NEW METHOD

The old method of feeding, stacking, and stapling has been improved by adding a new method that improves the efficiency of jogging the sides of a stack for booklet stapling.

- With the previous method, the next sheet of paper fed with the first paper waiting in the nip of the 1st pre-stack rollers, but with the new method in order to prevent mis-alignment, the first sheet waits outside the nip.
- Also, because the nip is standing by closed with the paper, the 3rd pre-stack roller has been added.

1) Small-size Paper (A4 and smaller)

a) Same operation as former method a) described above.



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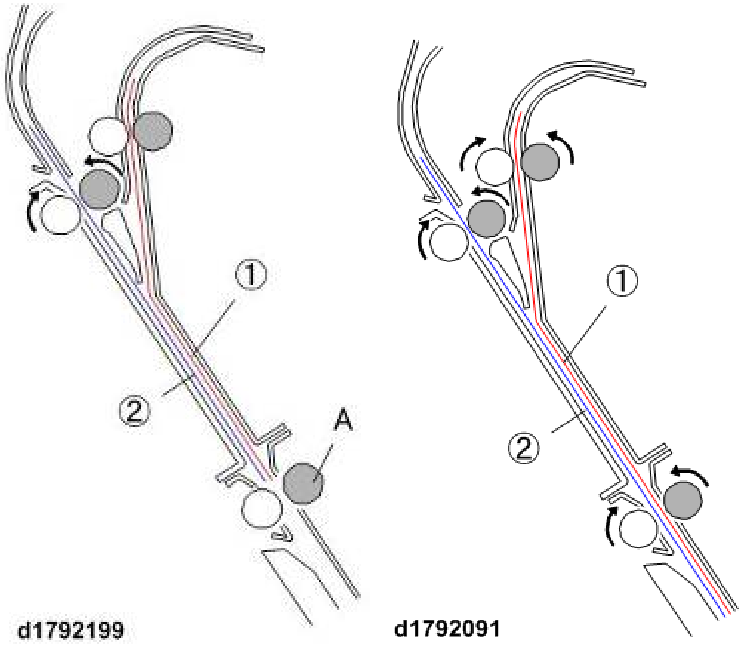
b) When the trailing edge of sheet ① passes, the pre-stack motor reverses and the 1st pre-stack roller [A] and 3rd pre-stack roller feed the sheet ① (red) into the standby path.

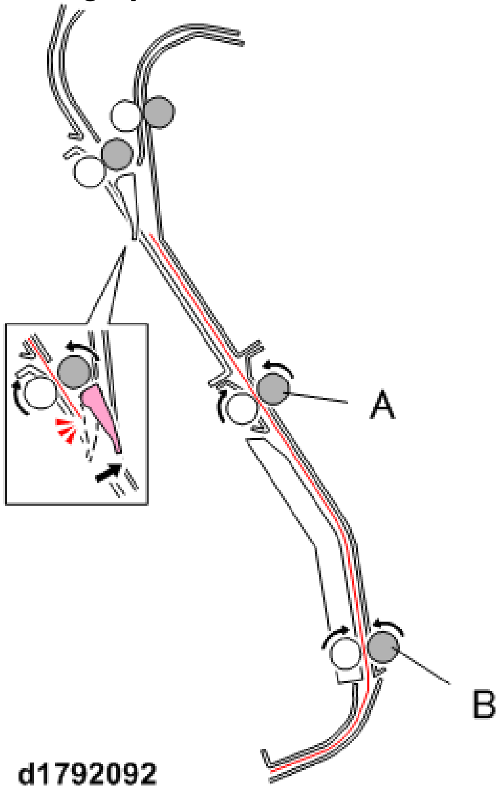
- Next, just after the leading edge of sheet ① passes the 1st pre-stack roller, the pre-stack motor stops with leading edge of sheet ① out of the nip of the 1st pre-stack roller and pauses (standby), and then waits for the next sheet ② (blue) to feed.
- At this time, the next sheet and sheet ① are made to wait at the 3rd pre-stack roller.



c) Just before the leading edge of sheet ② (blue) passes the 1st pre-stack roller [A], the pre-stack motor starts to rotate forward to drive the 1st pre-stack roller and 3rd pre-stack roller [B] that feed sheet ① (red) at standby, stacks it onto sheet ② blue, and sends it on to the staple tray.

- At this time, the leading edge of sheet ① (red) that was at standby and the leading edge of sheet ② that was just fed are aligned, and then the sheets are fed together.
- Thereafter, it becomes possible to stack several sheets through repetition of this operation (pre-stacking).
- One or the other mode is employed, depending on the paper size, stapling mode, and the number of sheets to be pre-stacked.

Large-size Paper (B4 and larger)



The 2nd pre-stack roller [B] at the rear and 3rd pre-stack roller are used to align the leading edges of the paper and send them to the stapling tray in the same way that the 1st pre-stack roller [A] is used in the older method to perform the same task.

23.7.3 CONTROL OF BOTH METHODS

The size of the paper, specifically the length of the paper, is used to select automatically the method of control as shown in the table below. (The paper sizes are fixed and cannot be switched with SP codes or by other means.)
The paper length, measured in the sub scan direction (direction of paper feed), can adversely affect paper feed and productivity of the new method. The older method is used for such paper.

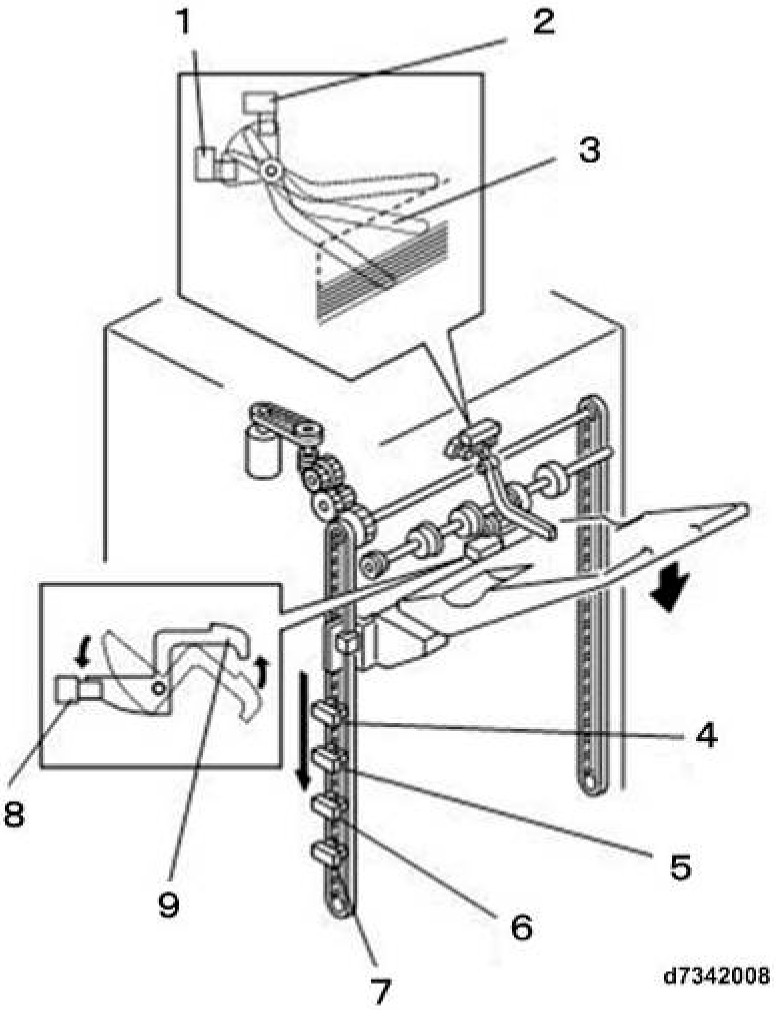
Custom Size	New Control	Pre-stack Sheets	
		2 Book Staples	1 Corner Staple
B5, 16-kai LEF	Old Method	6	3
A4, LT LEF	New Method	6	3
B5, 16-kai SEF	New Method	4	2
LT, A4 SEF	Old Method	4	2
LG, B4 SEF	Old Method	4	3
8-kai, A3, DLT SEF	New Method	4	3

However, the number of sheets that are pre-stacked can be selected with SP codes.

SP	Name	Settings
6-225-001	Adj Pre Stack Number A3 SEF	[0 to 4/**4**/1]
6-225-002	Adj Pre Stack Number B4 SEF	[0 to 4/**4**/1]
6-225-003	Adj Pre Stack Number A4 SEF	[0 to 4/**4**/1]
6-225-004	Adj Pre Stack Number A4 LEF	[0 to 6/**6**/1]
6-225-005	Adj Pre Stack Number B5 SEF	[0 to 4/**4**/1]
6-225-006	Adj Pre Stack Number B5 LEF	[0 to 6/**6**/1]
6-225-007	Adj Pre Stack Number DLT	[0 to 4/**4**/1]
6-225-008	Adj Pre Stack Number LG	[0 to 4/**4**/1]
6-225-009	Adj Pre Stack Number LT SEF	[0 to 4/**4**/1]
6-225-010	Adj Pre Stack Number LT LEF	[0 to 6/**6**/1]
6-225-011	Adj Pre Stack Number 8-Kai SEF	[0 to 4/**4**/1]
6-225-012	Adj Pre Stack Number 16-Kai SEF	[0 to 4/**4**/1]
6-225-013	Adj Pre Stack Number 160-Kai LEF	[0 to 6/**6**/1]
6-225-014	Adj Pre Stack Number Other	[0 to 9/**0**/1]

23.8 PAPER AND STACK OUTPUT

23.8.1 SHIFT TRAY OPERATION



No.	Name	No.	Name
1	Shift paper height sensor	6	Shift tray full sensor (1500)
2	Paper height sensor (staple)	7	Shift tray full sensor (low limit)
3	Paper height sensor feeler	8	Paper height sensor (shift)
4	Shift tray full sensor (500)	9	Paper height sensor feeler
5	Shift tray full sensor (1000)		

Tray Shift Mechanism

In the shift mode each copy is staggered as it exits onto the shift tray.

During shift operation a crank gear rotates as far as the next HP position and then moves back to the left and right in order to shift the position of the tray. The amount of shift is 15 mm.

Raising and Lowering the Shift Tray

The shift tray is raised and lowered, depending on how many copies exit from the finisher onto the tray detected by a paper height sensor feeler that touches to the top of the stack.

Raising the Shift Tray

When a stack of copies are removed from the shift tray, the paper height sensor goes ON, the shift tray rises, and then stops when the sensor goes OFF.

Lowering (Shift Mode)

When the paper height sensor goes OFF after it detects the top of the paper stack on the shift tray, the tray lift motor goes ON, and then lowers the stack until the sensor goes OFF again.

Lowering (Staple Mode)

When the staple motor goes ON, the tray lift motor also switches on for a brief prescribed time to lower the tray. After the stapled stack is output onto the tray, the tray is lifted as far as its home position or until the paper height sensor (staple) switches from ON to OFF. This operation is done for stack output. However, there are three lower limit sensors but only one is used, depending on the size of the paper used for the job and displayed on the operation panel.

Target: Large size: B4 and larger 1000 sheets; Small size (up to B4) 2500 sheets

Drag Roller Operation

A drag roller mechanism is mounted above the tray to improve the precision of paper alignment. Each sheet is aligned as the drag roller drive motor rotates the drag roller which pulls each sheet back to the flat side of the finished.

Improving Paper Exit with Air Assist Fans

This finisher employs air assist fans that to separate sheets of coated paper and large-size paper which has a tendency to cling on the paper tray so they exit the finisher more easily.

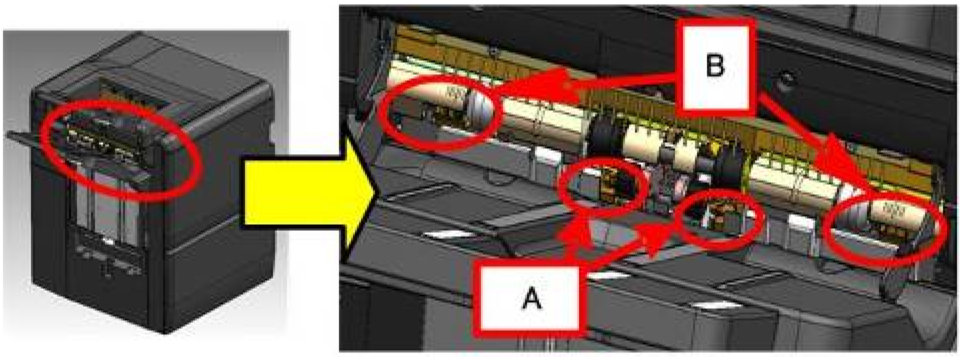
- A trailing edge press lever depresses the trailing edge of a sheet as it exits to keep it from slipping, and then a steam of air blowing below the sheet as it exits cushions the paper to prevent it from sticking.
- The exit fans switch on and blow air when the upstream exit sensors switch ON, and then are switched OFF again by a signal from the main machine.

The air assist fan can be set to operate with the tray settings or User Tool settings, but is also set to operate automatically if the following sizes or type of paper is selected for a job:

- Paper is longer than 364.1 mm in the direction of paper feed
- Coated paper

The operation of the air assist fans can also be set with SP6245-001 (Paper Fan Exit Setting). There are three selections available: 0, 1, 2

- **0**: Default. The air assist fan operates only if paper longer than 364.1 mm in the direction of paper feed or coated paper is selected for the job.
- **1**: The air assist fan always operates, regardless of the size or type of paper selected for the job.
- **2**: The air assist fan remains off.



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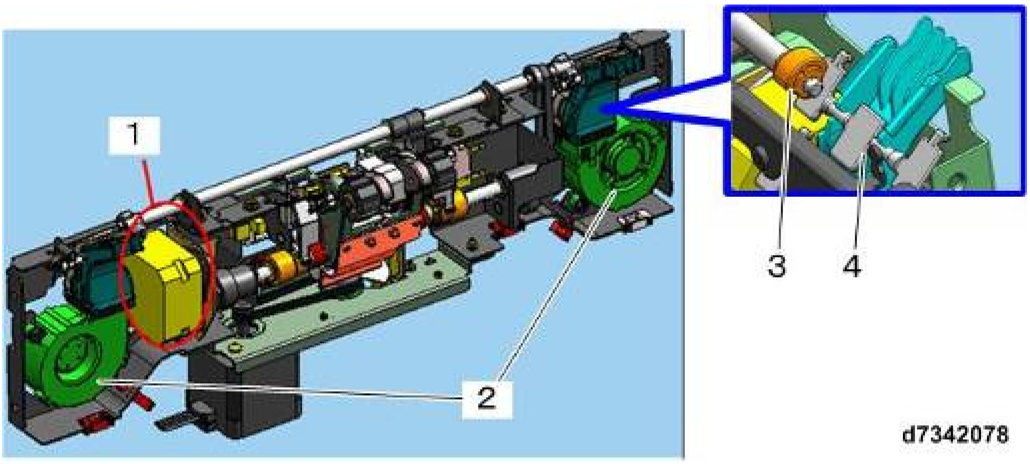
A	Trailing edge press lever
B	Air vents

Configuration



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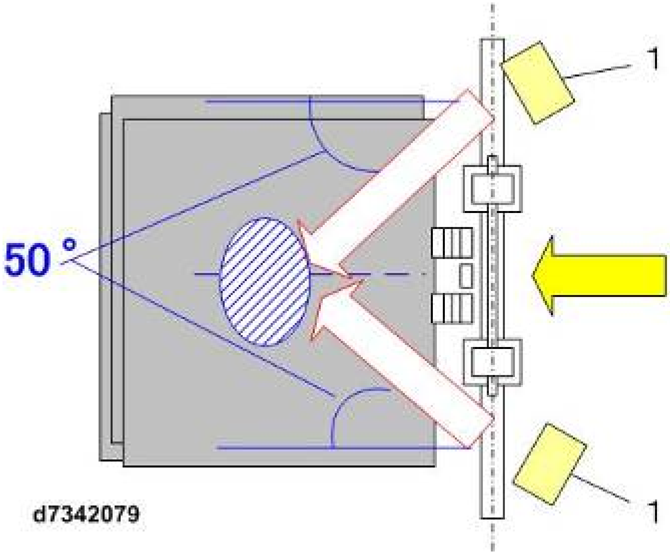
No.	Name
1	Drag roller motor
2	Exit fan
3	Cam
4	Shutter

23.9 AIR VENT MECHANISM

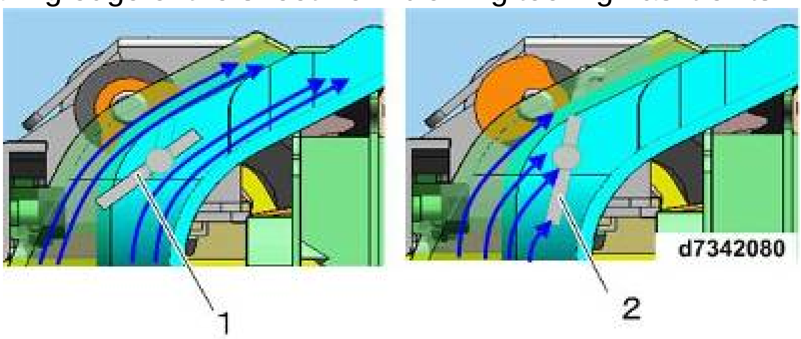
23.9.1 AIR VENTING DIRECTION



No.	Name
1	Sirocco fans

23.9.2 BLOW ADJUST MECHANISM

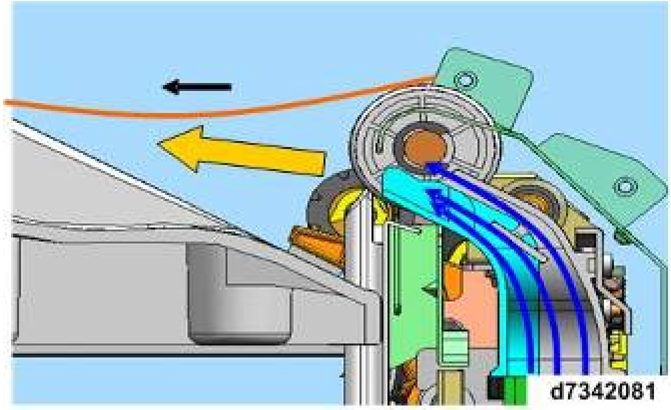
The movement of the shutter inside the air vent is synchronized with the timing of the operation of the trailing edge lever to reduce the amount of air from the fans to prevent the trailing edge of the sheet from blowing too high as it exits.



No.	Name
1	Shutter open
2	Shutter closed

23.9.3 OPERATION SEQUENCE

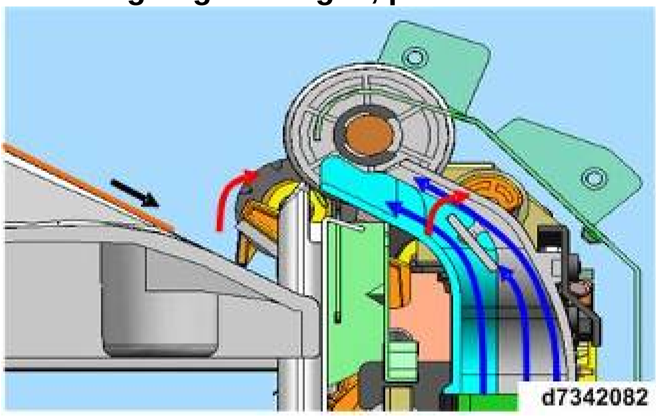
- **Step 1: 1st Sheet Exit Start**



Air layer between the 1st exit sheet highest exit position

Shutter/press lever position	Shutter	Press Lever
	Open	Down

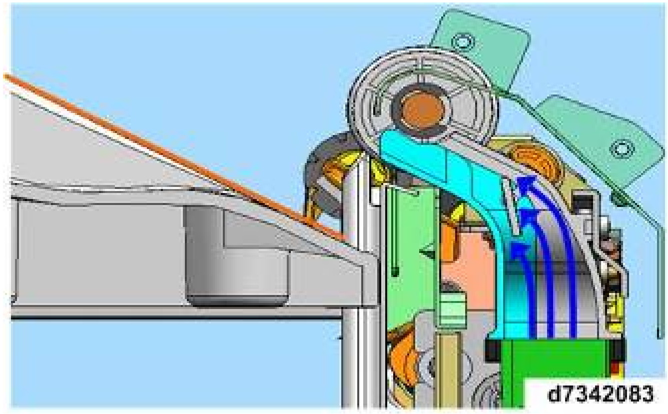
- **Step 2: 1st sheet trailing edge emerges, press lever starts to retract**



Press lever and shutter joint movement

Shutter/press lever position	Shutter	Press Lever
	Open > Close	Down > Up

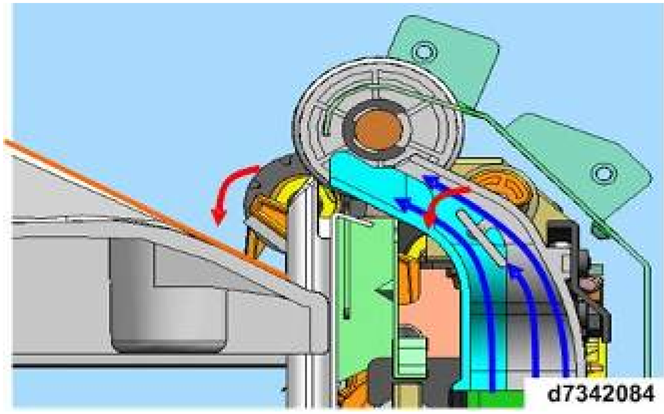
- **Step 3: 1st Sheet Exit End**



Air stream diminishes, prevents trailing edge of sheet from rising on completion of exit

Shutter/press lever position	Shutter	Press Lever
	Closed	Retract

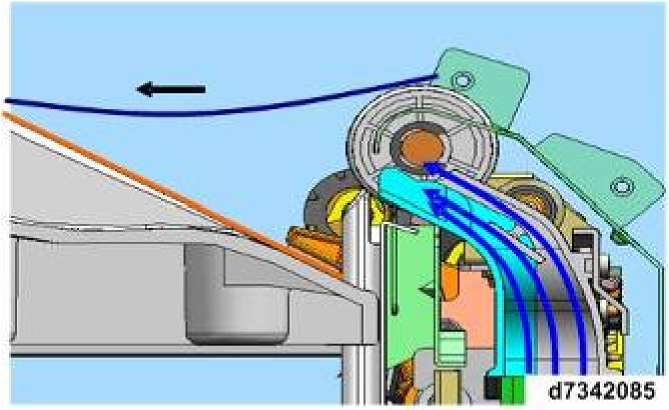
- **Step 4: Press lever operation start**



Press lever and shutter joint movement at cover operation

Shutter/press lever position	Shutter	Press Lever
	Open > Close	Down > Up

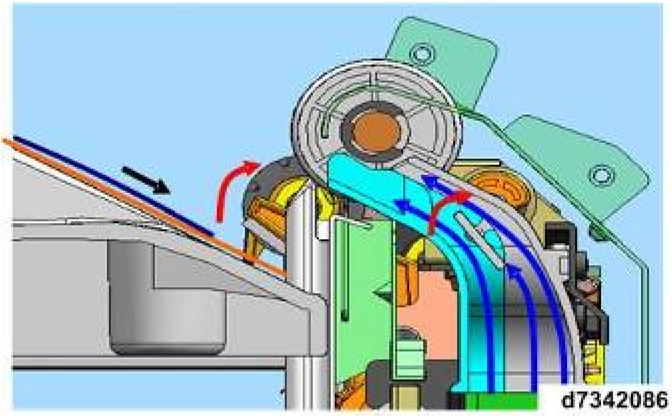
- **Step 5: 2nd Sheet Exit Start**



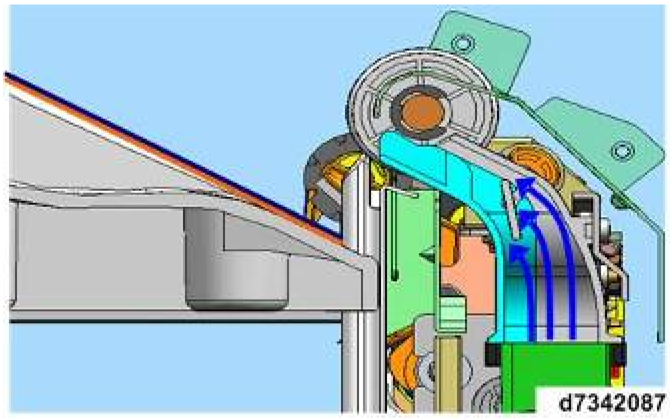
Press lever presses down trailing edge to prevent slippage

Shutter/press lever position	Shutter	Press Lever
	Open	Down

- **Step 6: 2nd sheet trailing edge emerges, press lever starts to retract**
-



Shutter/press lever position	Shutter	Press Lever
	Open > Close	Down > Up

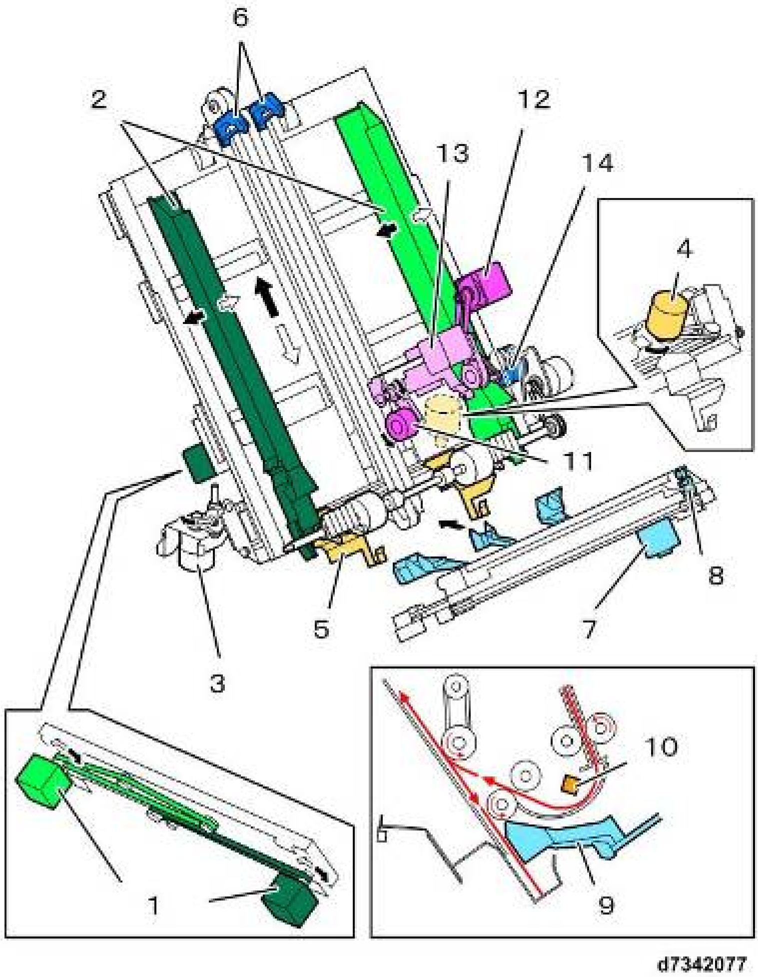
- **Step 7: 2nd Sheet Exit End**
- 

Shutter/press lever position	**Shutter**	**Press Lever**
	Closed	Retract

- **The sequence repeats for subsequent sheets 4, 5, 6, 7 and so on.**

23.10 STACKING AND JOGGING

23.10.1 STAPLE TRAY JOG MECHANISM



No.	Name	No.	Name
1	Jogger motor (rear) (front)	8	Trailing edge press plate HP sensor
2	Side Fence	9	Trailing edge press plate
3	Base fence lift motor	10	Stapler tray exit sensor
4	Base fence movement motor	11	Positioning Roller
5	Base fence	12	Positioning roller rotation motor
6	Leading edge Stopper	13	Positioning roller lift motor
7	Trailing edge press motor	14	Leading edge stopper motor

23.11 STACKING MECHANISM

Paper going past the junction gate on its way to the staple tray passes the brush roller.

- At the pre-stacking of standard size paper, leading edge of the sheets are aligned by the leading edge stopper.
- The positioning roller below can support 80 sheets of small-size paper (less than 350 mm), or 25 sheets of large-size paper (over 350 mm).
- In other cases where pre-stacking is not done, after the staple exit sensor goes OFF (within 94 to 119 ms, size of the stack not withstanding), the positioning roller drive motor rotates a prescribed distance, the sheets drop onto the tray base fence where the leading edges of the stack are aligned.
- At this time, the brush roller brush and the exit guide fulfill the function as guides for the falling sheets.

The rear and forward movement of the stapler in this finisher in the main scan direction, and the up and down movement of the entire base fence unit in the sub scan direction enables adjustment of the stack position for booklet stapling. Also, the base fence can be moved to the rear and front for the size of the paper in the main scan direction, and this front to rear movement, coupled with the front to rear movement of the stapler, allows accommodation of paper sizes in the main scan direction (with the trailing edge firmly clamped), greatly improves the efficiency of stapling.

23.12 JOGGER MECHANISM

During the stacking operation, once the trailing edges of the sheets have been aligned, the sides are aligned by the jogging operation.

- First, at the beginning of the job ("Copy Start") the jogger fences are moved to within 7.2 mm of the left and right side of an area equal to the width of the paper size selected for the job.
- After the trailing edge of the feeding sheet passes the staple exit sensor, the jogger fences close 3.7 mm, the paper slides between the fences, and then the trailing edge is aligned.
- Next, on the booklet stapling side the jogger fences close in 7 mm to achieve horizontal alignment. However, the front and rear jogger fences on either end each have a motor that can position the sides of the stack for booklet stapling.
- At the end of the jogging operation, the jogger fences once again open 7.2 mm wider than the paper so the stack can move to the standby position.
- Springs are attached at the front and rear of the jogger fences to compensate for drift from precise alignment positioning.

Movement Adjustment of Jogger Fences During Horizontal Alignment

Front booklet stapling	Front 7 mm
Rear (diagonal) booklet stapling	Rear 7 mm
Dual stapling (Booklet, B5 SEF) booklet	Front and rear 3.5 mm

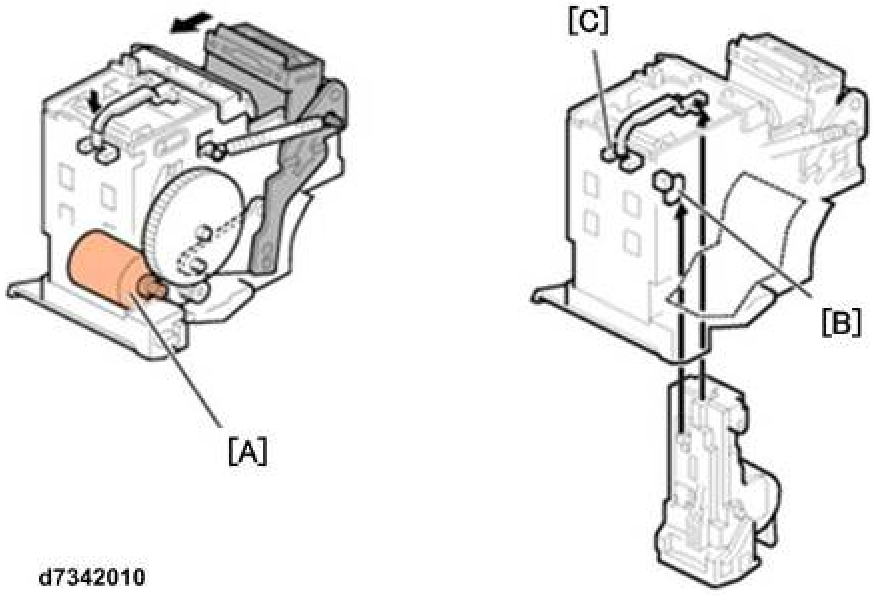
Paper Press Mechanism

A stack must be compressed at the trailing edge in order to achieve stapling a stack maximum size (100 sheets).

- After jogger moves to the paper edge position, the trailing edge jogger motor switches ON and operates the trailing edge press plate to press down and remove any air between the sheets.
- After the next sheet switches the stapler tray exit sensor OFF, once again the trailing edge press motor switches ON and the press plate returns to its standby position. The trailing edge press plate HP sensor detects the plate at its home position. This operation cycle is done for each sheet that feeds onto the staple tray.
- At this time, as the trailing edge is depressed the stapler is moving front and back, and before and after each compression of the trailing edge, the edge is compressed to remove curl.
- Front and rear compression of the trailing edge is not done at the booklet stapling position.

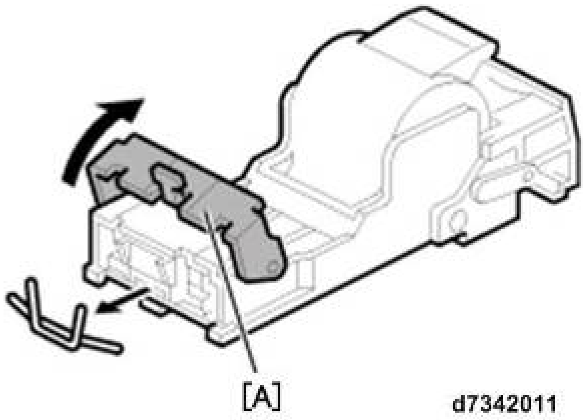
23.13 CORNER STAPLING

23.13.1 CORNER STAPLER



The stapling operation is driven by the edge/booklet stapler motor [A] inside the stapler unit. The stapler is provided with a stapler end sensor [B] and staple cartridge set sensor [C].

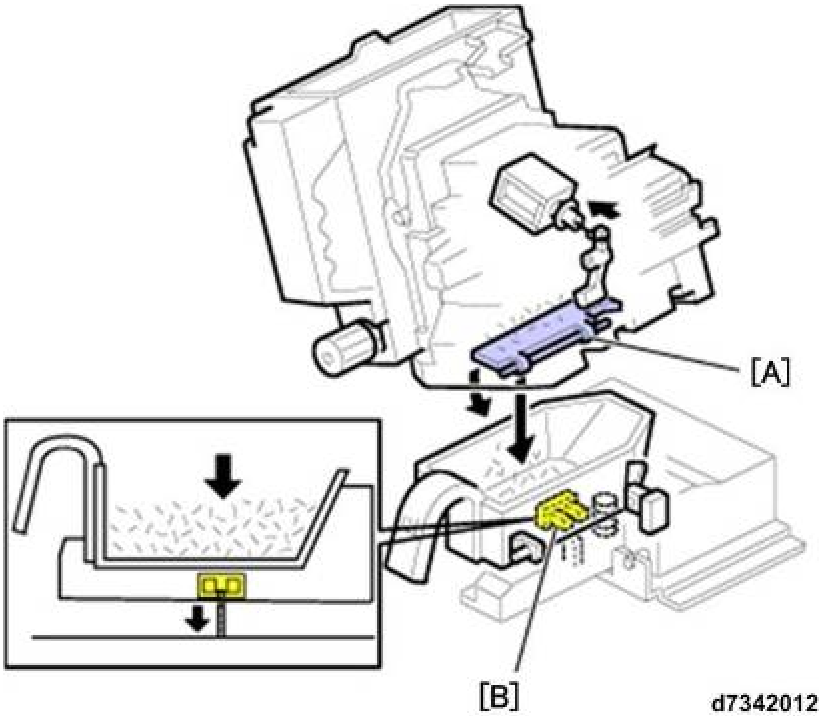
- When the staple cartridge is inserted, and actuator is pushed into the gap of the cartridge set sensor to signal ON.
- If the stapler signals staple end, or staple cartridge set sensor OFF, this triggers an alert on the operation panel that the cartridge is out of staples or out of the machine.
- If the stapler detects staples out during a job, this triggers the staples out message on the operation panel and the job stops.
-



If a staple jams the stapling mechanism, bracket lever [A] slides in the direction of the arrow so the jammed staple can be removed from the staple cartridge.

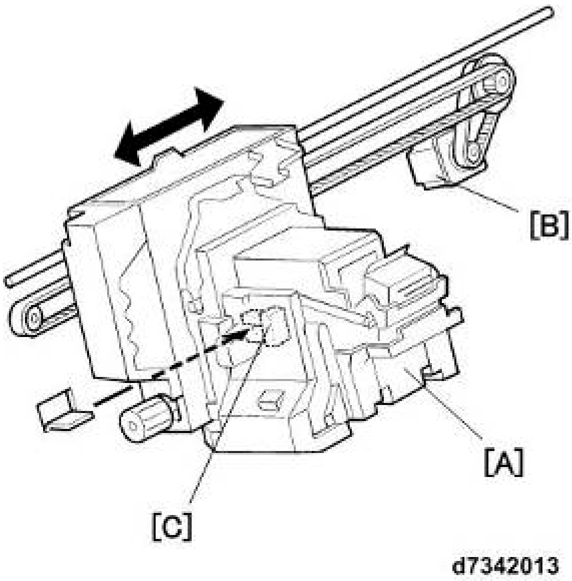
23.13.2 STAPLE CUTTING

This stapler can staple a stack up to 100 sheets thick, so long staples are used. The staples are bent and trimmed to prevent them from overlapping on smaller stacks that are stapled. The excess length of the staples is trimmed during the staple operation.



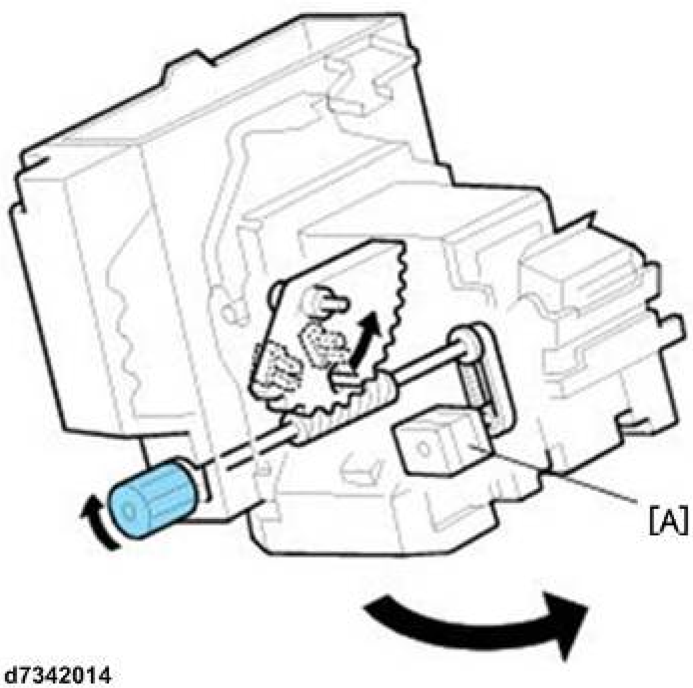
- The metal trimmed from the staples falls into the staple trimmings tray [A]. At the end of the job, the solenoid on the side of the stapler opens a lever and the staple trimmings fall into the trimmings hopper.
- The staple trimmings hopper full sensor [B] below the hopper signals when the hopper is full, and then triggers a message on the operation panel to alert the operator that the hopper needs to be emptied. The hopper capacity is about 15,000 trimmed scraps.

23.13.3 CORNER STAPLER MOVEMENT



Stapler [A], driven by the stapler movement motor [B], operates in four staple modes. The stapler, supported on a rod, is driven by a belt that moves the stapler to the front and rear. The stapler home position is at the front, and when stapling at two locations, it staples first at the front and then moves to rear to staple at the rear. The position of the stapler is monitored by the stapler movement HP sensor [C].

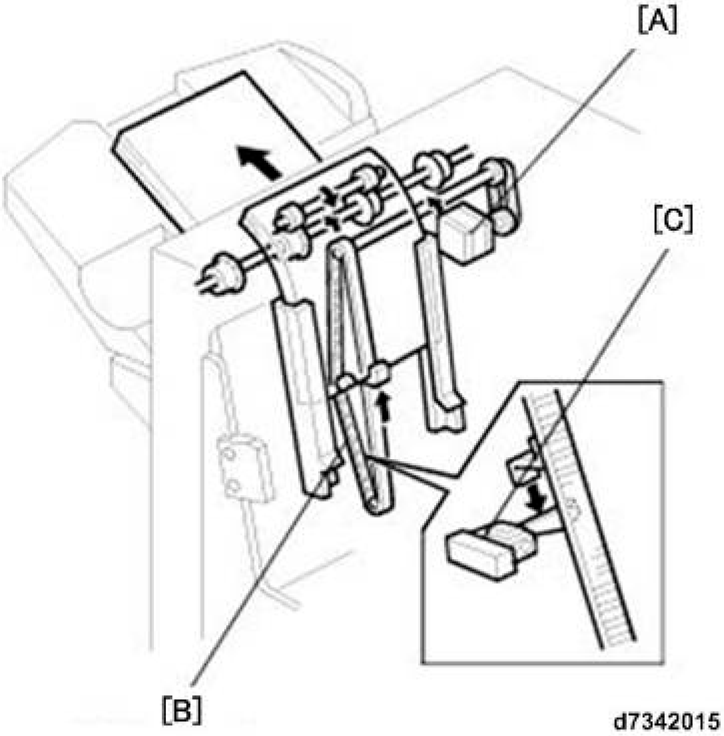
23.13.4 CORNER STAPLER ROTATION



When diagonal-stapling at one corner, after the stapler moves to the stapling position it is rotated before it staples. The rotation is performed by the stapler rotation motor [A].

23.13.5 EXIT OPENING/CLOSING, FEED-OUT MECHANISM

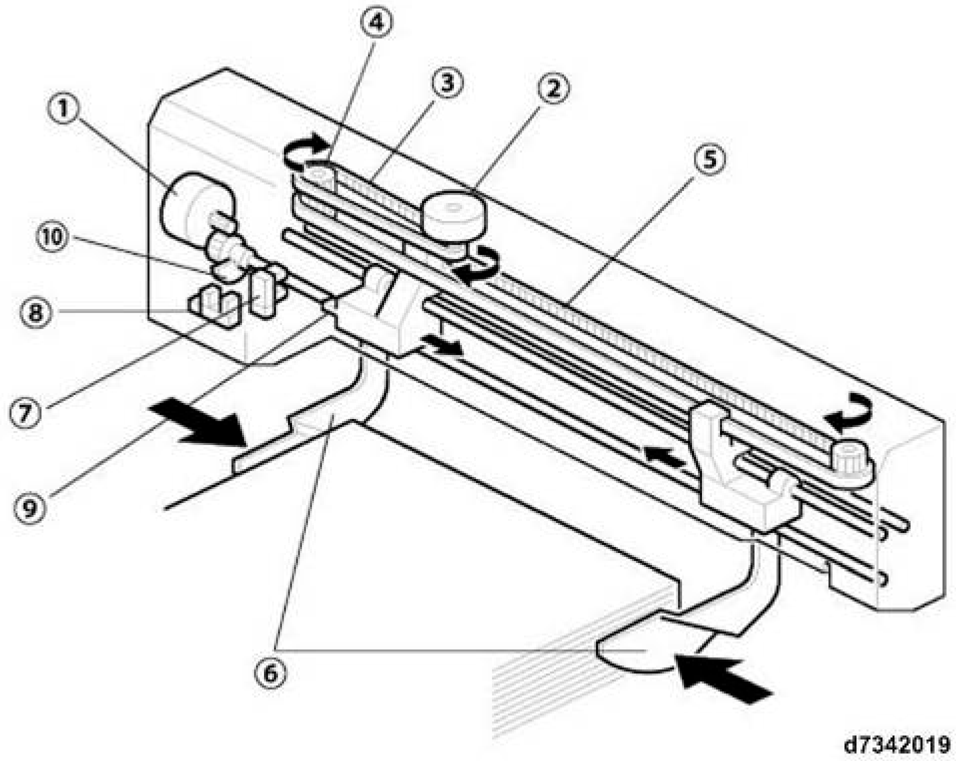
In order to staple 100 sheets (the maximum allowed), the finisher is equipped with a mechanism that does not allow the paper exit to open or to output or to output the stapled document onto the tray.



- When staple is ON, the exit guide plate motor goes ON and opens the paper exit, then after staple goes OFF the feed-out belt motor [A] goes ON and the stack hooked by the pawl on the moving feed-out belt [B] is transported to the paper ext and then on to the shift tray.
- At this time if the stack is large (move than 350 mm thick), the stack is output supported by the positioning roller.
- Once the operation of the feed-out belt motor feeds the stack the prescribed distance, the paper exit motor switches ON and starts rotating the paper exit roller, and this rotation together with the feed-out belt pawl on the belt moves the stack out the paper exit and then on to the shift tray.
- After the paper exit motor switches ON the stack feeds the prescribed distance, the exit guide plate motor switches ON and the exit guide closes. This operation of the paper exit roller moves the stack out of the finisher onto the shift tray.
- The paper exit opens and closes in staple mode when more than 16 stacks are output.
- A rotation of a disc mounted above the exit guide plate motor controls the OFF timing of the exit guide plate motor that operates the opening and closing of the exit.
- Also, the position of the feed-out belt is monitored by the feed-out belt HP sensor [C].

23.14 PAPER JOGGING AT EXIT

The home position of the jogger fences is at the standby position above the paper exit. The arms lower just before a sheet exits the finisher and align the sides of the stack (this is repeated for every sheet).



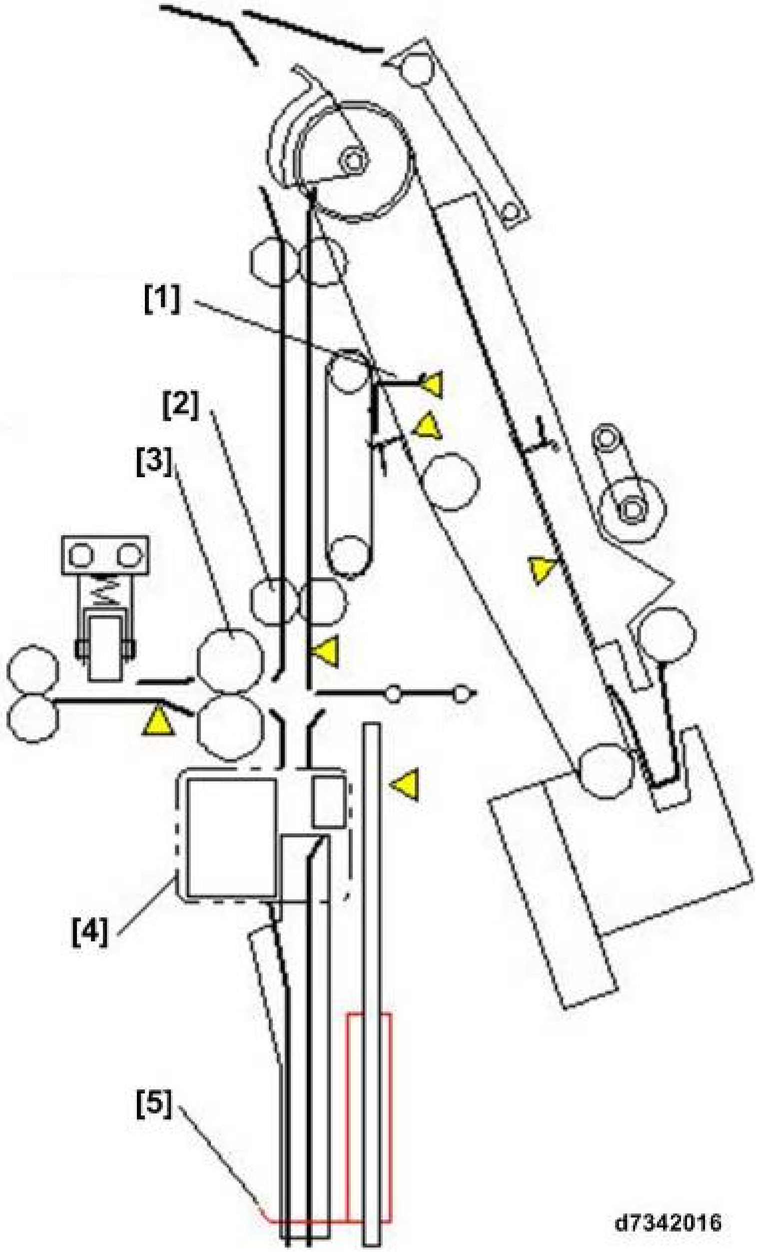
No.	Part Name:	Function
1	Shift jogger fence retract motor	Raises and lowers the front and rear fences.
2	Shift jogger motor	Moves the front and rear fences forward and backward.
3	Main drive belt	Transmits the drive of the shift jogger motor to the gear that drives the relay belt.
4	Gear	Transmits the rotation of the main belt to the relay drive belt.
5	Relay drive belt	Drives the front and rear jogger fences front and back against the sides of the stack.
6	Jogger fences	Open and close to align the sides of the stack as each sheet exits the finisher.
7	Shift tray jogger HP sensor	Detects home position of the front and rear jogger fences (wide, away from the sides of the stack).
8	Shift jogger retract HP sensor	Detects home position of the front and rear jogger fences (up).
9	Shift tray jogger HP sensor actuator	Switches the shift jogger HP sensor off/on.
10	Shift jogger retract HP sensor actuator	Switches the shift jogger retract HP sensor off/on.

The front and rear fences raise and lower repeatedly to jog the sides of the stack as each sheet exits the finisher. After the last sheet exits both arms rise, stop, and then remain up at the home position (standby position). The standard paper sizes that can be jogged and aligned upon exit (with no folding) are the standard sizes A3 to A5, DLT to HLT, 12"x18", 13"x14".

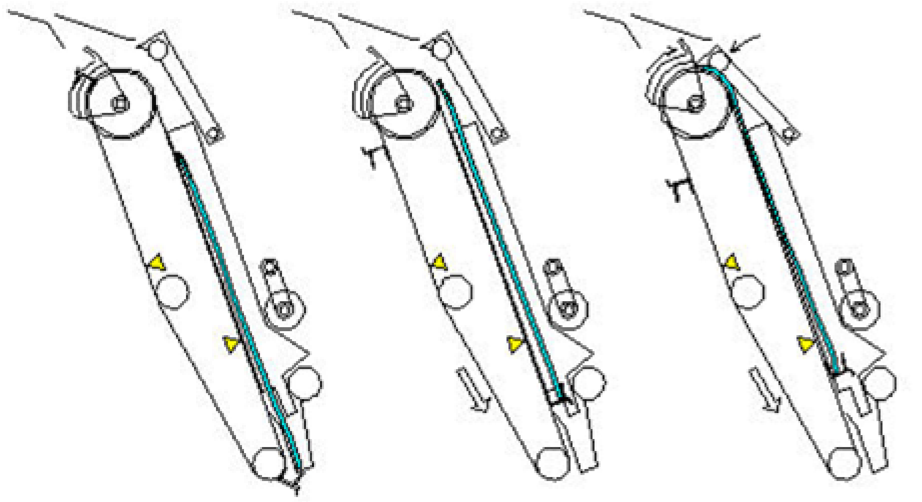
23.15 BOOKLET STAPLING

23.15.1 BOOKLET STAPLE UNIT

After the sides of a stack are aligned by the side fences on the stacking tray, it is hooked by the feed-out pawl moved up toward the paper exit on the left side of the finisher. Sensors and rollers comprise the junction gate that sends the stack into the booklet stapling unit.



[1]	Leading edge stopper
[2]	Transport roller – idle roller
[3]	Fold roller idle roller
[4]	Booklet stapler unit
[5]	Trailing edge fence



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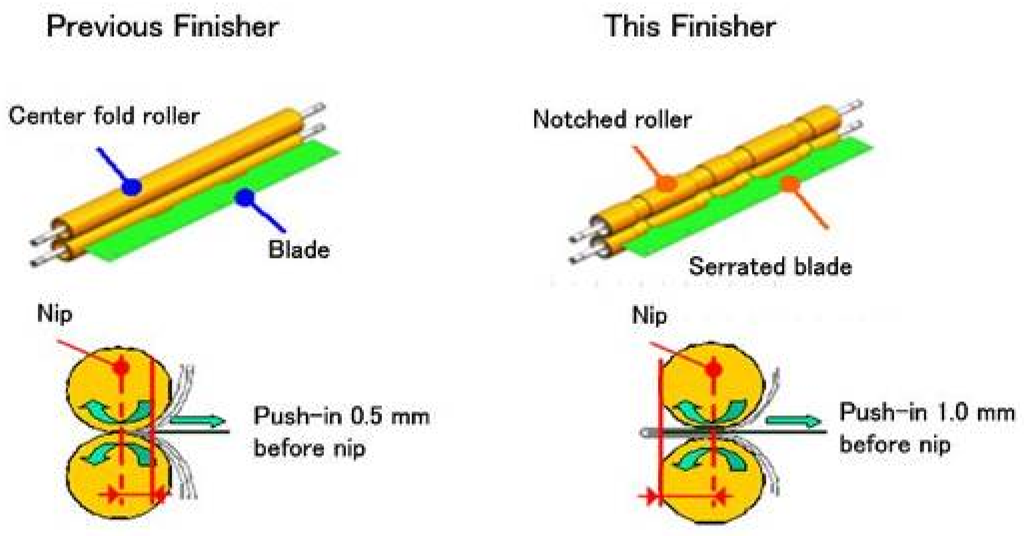
The entrance sensor detects the leading edge of the stack, and then a motor opens the junction gate.

- The trailing edge fence remains down as the stack reaches the stapling position, and then the transport roller lowers as far as the trailing edge fence.
- The transport motor opens the roller nip so the leading edge stopper can jog the leading edge of the stack.
- The leading edge fence returns to its home position, and then the same fence raises the stack.



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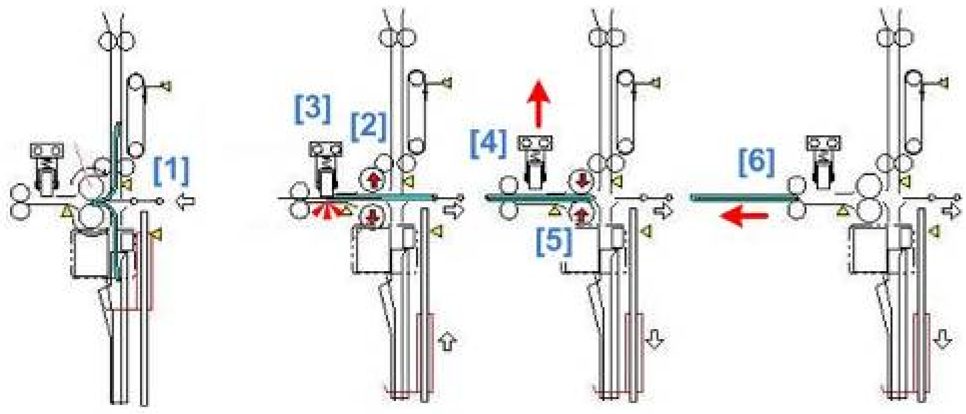
Important Differences

1	The new blade of this finisher has serrated wide teeth.
2	The new center fold roller has wide notches.
3	With the new mechanism, the crease can be pushed farther into the nip of the center fold roller.
4	With the new mechanism, multiple sheets can be center folded, even if they are not to be booklet stapled.
5	With this finisher up to 6 sheets of paper (64 to 90 gsm2) can be creased.



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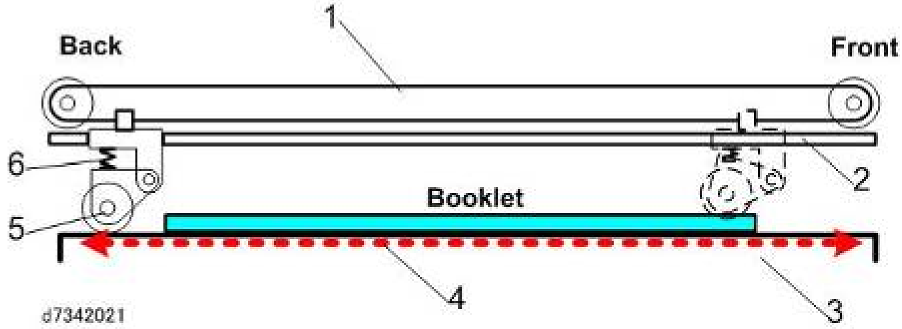
- As the fold plate [1] thrusts forward, the fold roller keeps rotating to force the plate into the center of the stack.
- When the horizontal fold roller reaches the paper fold position, the fold roller nip [2] opens, and then the fold roller motor moves the fold roller [3] back and forth to sharpen the crease of the fold..
- The horizontal fold roller is raised [4], and the nip [5] closes.
- Finally, the fold rollers [6] feed the stack through the exit..
- In this finisher by making the fold roller rounded and the fold plate comb shaped, up to 6 sheets (64 to 90 g/m^2) can be inserted 1.0 mm into the nip for folding.
- The horizontal fold roller is spring loaded, so that when it is forced to the rear the crease of the fold in the sheets is increased.

Here is a side view of the crease roller mechanism.



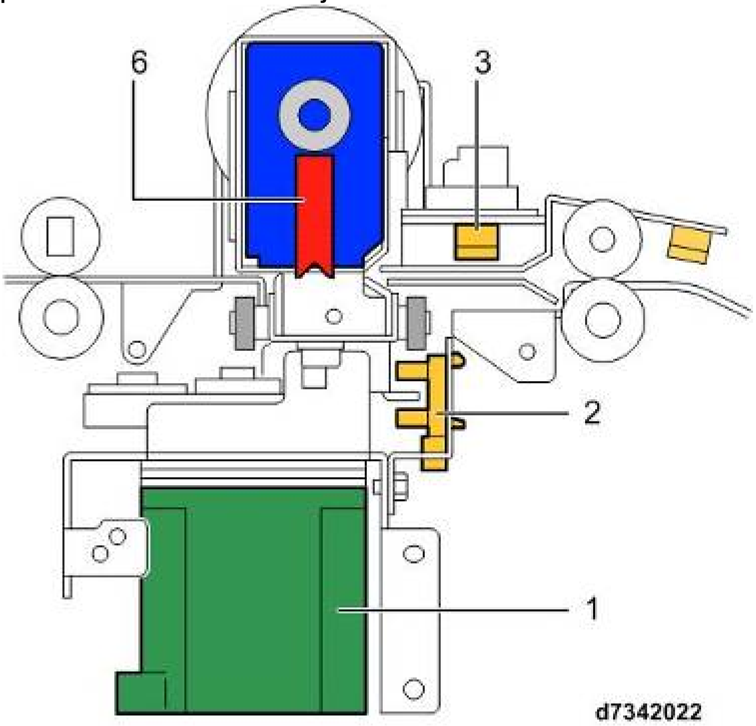
1	Timing belt	4	Crease roller (range of movement)
2	Guide shaft	5	Crease roller
3	Guide plate	6	Spring

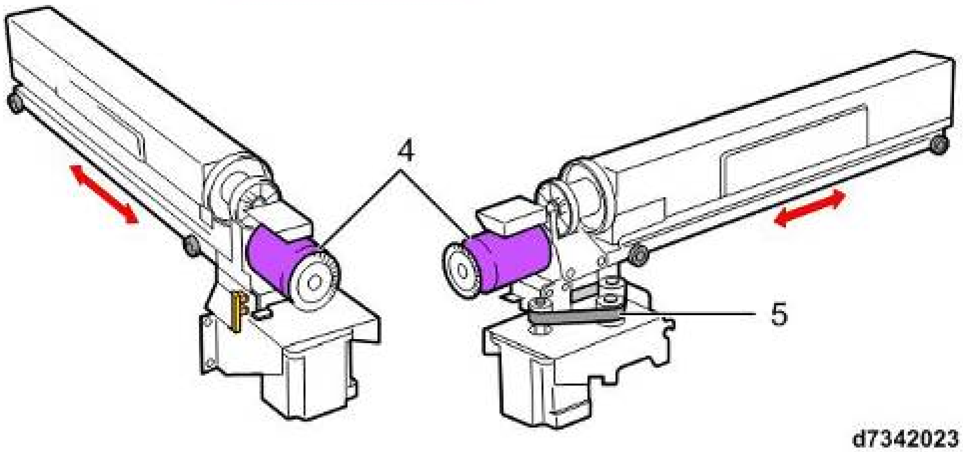
The spring loaded crease roller mounted on a steel guide shaft applies pressure to the stapled and folded edge as it is driven rear to front and the front to rear.

23.16 PUNCHING

23.16.1 PUNCH UNIT

The punch motor drives the punch unit so the rotation of the punch shaft matches the timing of paper feed for punching. The punch shaft waits at the standby position, and when paper punching is selected for the job once the registration sensor go OFF after detecting the trailing edge of the paper, paper will stop briefly under the punch position and wait for the punch motor to switch ON and punch the paper. The positions of the punch holes can be adjusted with SP codes and shims.

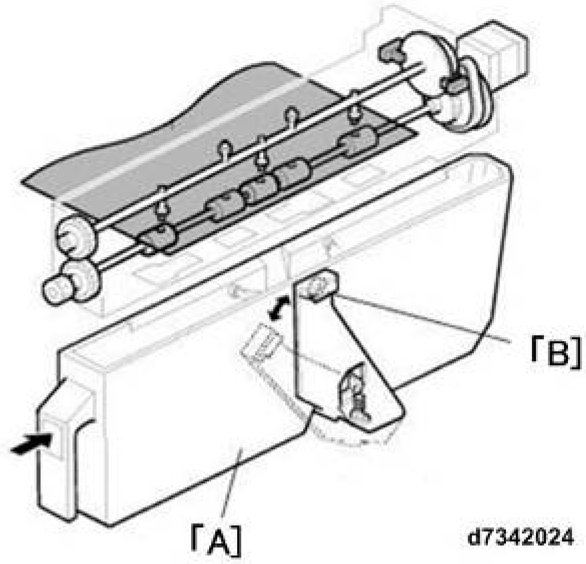




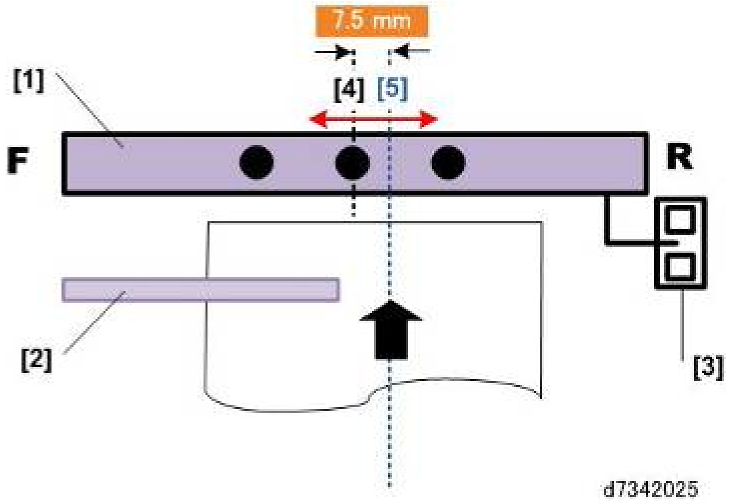
No.	Name	No.	Name
1	Punch movement motor	4	Punch motor
2	Punch Unit HP sensor	5	Timing Belt
3	Punch Horizontal Registration Sensor	6	Punch Position

23.17 PUNCH-OUT COLLECTION

Punch-outs are collected in a punch-out hopper [A] located under the punch unit. The hopper is provided with a punch-out full sensor [B], and when the level of collected punch-outs reach this sensor, it signals that the hopper is full. If a job is in progress when the hopper becomes full, the hopper full alert will not display on the operation panel until after completion of the job.
Also, there is a set sensor for the punch-out hopper that triggers a hopper not set alert when the hopper is out of the unit.



23.18 PUNCH UNIT HORIZONTAL REGISTRATION



[1]	Punch unit
[2]	Paper position sensor (CIS)
[3]	HP sensor
[4]	Center punch hole
[5]	Paper path center

The paper position sensor (CIS) is located upstream of the punch unit [2].

- This sensor detects the paper position, and then based on this sensor reading the position of the punch unit is moved to the front or rear to adjust to the center of the paper (horizontal registration).
- Normally, the punch unit is at standby at it home position 7.5 mm to the front of center of the center of the paper path.
- When the CIS detects the paper position, the punch unit moves and adjusts its position based on the CIS reading
- After the punch unit is positioned over the paper, the unit punches the paper.
- After the holes have been punched, the punch unit returns to its home position and waits for the next sheet to feed.
- As soon as the CIS detects the position of the next sheet, it is punched in the same was as the first sheet (the position of the punch unit is adjusted for each sheet based on the CIS reading).
- The position of the punch unit is positioned in this way before each sheet of paper is punched.

23.19 JAM CODES

23.19.1 JAM CODE TABLE

Code	Jam Name	Affect Sensors, Switches
100	Door open jam	Door interlock switch
101	Display non-performing jam	No sensor to trigger this jam. (This is a jam where the display on the main machine operation panel is a display that reflects I/F specifications.)
102	Disable paper stop jam	No sensor to trigger this jam. (When a jam like a double-feed jam occurs during output to the proof tray, even if there is a disable error on the main machine operation panel, the paper cannot be output to the designated tray.)
103	Software internal error	No sensor to trigger this jam. (An internal software error has caused the jam.)
104	Entrance late jam	Entrance Sensor
105	Entrance lag jam	Entrance Sensor
106	Proof tray exit late jam	Proof Tray Exit Sensor
107	Proof tray exit lag jam	Proof Tray Exit Sensor
108	Shift tray exit late jam	Shift Tray Exit Sensor
109	Shift tray exit lag jam	Shift Tray Exit Sensor
110	Staple tray exit late jam	Staple tray entrance sensor
111	Staple tray exit lag jam	Staple tray entrance sensor
112	Pre-stack late jam	Pre-stack sensor
113	Pre-stack lag jam	Pre-stack sensor
114	Feed-out jam	Feed-out belt sensor jam
115	Center stapler late jam	Fold unit entrance sensor
116	Center stapler lag jam	Fold unit entrance sensor
117	Center stapler exit late jam	Booklet stapler exit sensor
118	Center stapler exit lag jam	Booklet stapler exit sensor
119	Paper transport jam	Junction gate HP sensor (proof tray, shift tray, stapler), paper transport motor drive board defective
120	Tray lift jam	Paper height sensor (stapler, shift tray, trailing edge)
121	Jogger fence jam	Jogger fence HP sensor (front, rear), leading edge stopper HP sensor
122	Shift operation jam	Exit guide plate HP sensor, shift HP sensor (front, rear), jogger fence HP sensor, jogger retraction HP sensor, drag roller HP sensor
123	Stapling jam	Stapler movement motor HP sensor, stapler rotation HP sensor (front, rear), bottom fence HP sensor, corner stapler HP sensor

Code	Jam Name	Affect Sensors, Switches
124	Feed-out belt operation	Stack feed-out belt HP sensor
125	Punch drive jam	Punch HP sensor, punch movement HP sensor, punch hole switch sensor
126	Jogger fence error	Trailing edge press plate HP sensor (front, back), positioning roller HP sensor
127	Pre-stack operation	Pre-stack release sensor
128	Stack transport jam	Stack transport unit HP sensor, stack junction gate HP sensor
129	Center stapler jam	Center stapler junction gate HP sensor, center stapler HP sensor, center stapler jogger HP sensor (front, rear), center stapler trailing edge fence HP sensor
130	Fold jam	Horizontal fold HP sensor, fold cam HP sensor, fold plate HP sensor

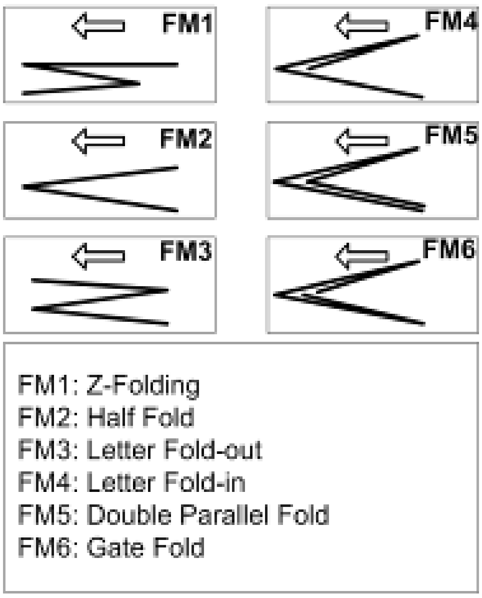
24. MULTI-FOLDING UNIT FD5020 (D740)

24.1 SPECIFICATIONS

Type	Console	
Operating Environment	Temperature and humidity ranges: Same as main machine.	
Service Life	Expected: 5 years or 60,000 K (A4 LEF)	
Paper Weight	40 to 300 g/m^2	
Paper Weight (Folding)	64 to 105 g/m^2	
Speed	Straight-Through	100 to 758 mm/s
	Folding	169 to 758 mm/s
Straight-Through Feed	Size	Postcard to 13x19.2"
	Type	Used paper: A3, A4, B4, B5 OHP: A4, B5 Tap paper: A4 LEF, LT LEF

Power Supply	NA	AC 120V 50/60 Hz, 2.0A	
	EU	AC 220 to 240V, 50/60 Hz 1.2	
Power Consumption	240 W		
Size (w x d x h)	470 x 1000 x 730 mm (18.5 x 39.4 x 28.7”)		
Level	Less than 5 mm deviation at front/back, left/right		
Weight	92 kg (203 lb)		
Noise Level (dB A)	Mode	Alone	System
	No Folding	< 72 dB	---
	Folding	< 72 dB	< 76 dB

Folding Methods (Six: FM1 to FM6)



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Paper Sizes (Straight Through)	---	Postcard to 13 x 19.2 in. 40 to 400 g/m^2
Special Paper		Transparency: A3, A4, B4, B5; OHP: A4, B4; Index: A4 LEF, LT LEF
Paper Sizes & Weight (Folding)	FM1	A3, B4, DLT, LG, LT, 12x18, 8-kai (64 to 105 g/m^2)
	FM2	A3, B4, DLT, LG, A4, B5, LT, 12x18", 12.6x18.5", 12.6x19.2", 13x18", 13x19", 13x19.2", 226x310 mm, 310x432 mm, SRA3, SRA4, 8-kai; (64 to 105 g/m^2)
	FM3	A3, B4, DLT, LG, A4, LT, B5, 12x18, 8-kai (64 to 105 g/m^2)
	FM4	
	FM5	A3, B4, DLT, LG, A4, LT,B5, 12x18, 8-kai (64 to 105 g/m^2)
	FM6	
Multiple Folding	FM1	Not allowed
	FM2	Max. 3 (64 to 80 g/m^2 only)
	FM3	Max. 3 (64 to 80 g/m^2 only)
	FM4	Max. 3 (64 to 80 g/m^2 , B4, A4, LT, B5 only)
	FM5	Not allowed
	FM6	

Line Speed for Folding

Note: Only FM1 (Z-folded paper) can exit downstream.

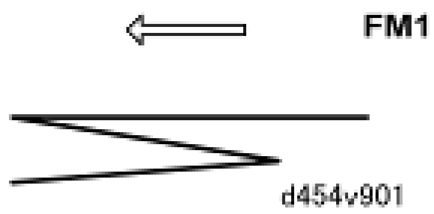
No Fold	350 mm/sec. to top tray To downstream: Same as main machine.
FM1	758 mm/sec. to top tray (paper < 355.6 mm long) 450 mm/sec. to top tray (paper < 355.6 mm long) To downstream: Same as main machine.
FM2	1 Sheet: Same as main machine 2-3 Sheets: 454 mm/sec. 758 mm/sec. to top tray (paper <355.6 mm long) 350 mm/sec. to top tray (paper < 279.4 <355.6 mm long) 250 mm/sec. to top tray (paper < 279.4 mm long)
FM3 FM4	1 Sheet: Same as main machine 2-3 Sheets: 454 mm/sec. to top tray 350 mm/sec. to top tray (paper < 420 mm long) 250 mm/sec. to top tray (paper < 420 mm long)
FM5	1 Sheet: Same as main machine 350 mm/sec. to top tray (paper < 420 mm long) 250 mm/sec. to top tray (paper < 420 mm long)
FM6	1 Sheet: Same as main machine as far as 3rd Stopper. At 3rd stopper feeds 50 mm at 100 mm/sec. 350 mm/sec. to top tray (paper < 420 mm long) 250 mm/sec. to top tray (paper < 420 mm long)

24.1.1 TRAY CAPACITY

The capacity of the tray on top of the unit for folded paper is determined by these variables:

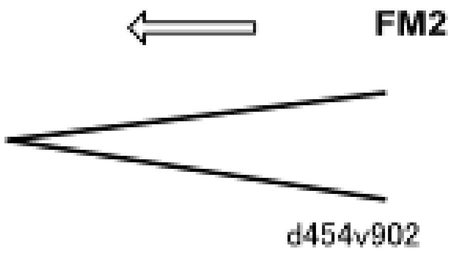
- Folding Methods (FM1 to FM6)
- Paper size
- Paper weight

Folding Mode FM1



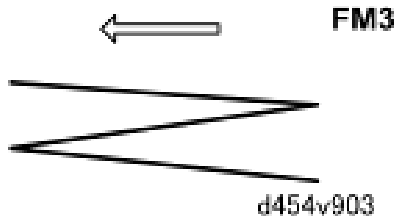
Size	Weight (Standard) 64 to 80 g/m^2	Weight (Heavy) 64 to 80 g/m^2
8-kai	35	20
12x18"	35	20
A3 SEF	35	20
DLT	35	20
B4 SEF	35	20
LG SEF	35	20
A4 SEF	30	20
LT SEF	30	20

Folding Mode FM2



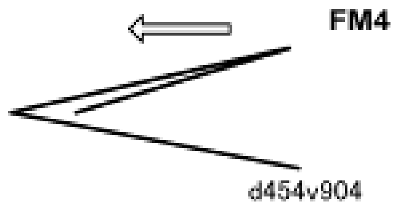
Size	Weight (Standard) 64 to 80 g/m^2	Weight (Heavy) 64 to 80 g/m^2
13x19.2"	40	25
13x19"	40	25
12.6x19.2"	40	25
12.6x18.5"	40	25
13x18"	40	25
SRA3 (320x450 mm)	40	25
SRA4 (225x320 mm)	40	25
226x310 mm	40	25
310x432 mm	40	25
8-kai	40	25
12x18"	40	25
A3 SEF	40	25
DLT	40	25
B4 SEF	40	25
LG SEF	40	25
A4 SEF	50	50
LT SEF	50	50
B5 SEF	50	50

Folding Mode FM3



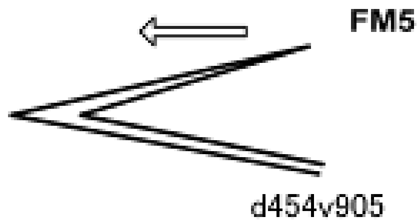
Size	Weight (Standard) 64 to 80 g/m^2	Weight (Heavy) 64 to 80 g/m^2
8-kai	30	20
12x18"	30	20
A3 SEF	30	20
DLT	30	20
B4 SEF	30	20
LG SEF	30	20
A4 SEF	40	30
LT SEF	40	30
B5 SEF	40	30

Folding Mode FM4



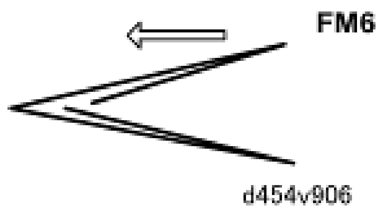
Size	Weight (Standard) 64 to 80 g/m^2	Weight (Heavy) 64 to 80 g/m^2
8-kai	40	20
12x18"	40	20
A3 SEF	40	20
DLT	40	20
B4 SEF	40	20
LG SEF	40	20
A4 SEF	50	40
LT SEF	50	40
B5 SEF	50	40

Folding Mode FM5



Size	Weight (Standard) 64 to 80 g/m^2	Weight (Heavy) 64 to 80 g/m^2
8-kai	30	20
12x18"	30	20
A3 SEF	30	20
DLT	30	20
B4 SEF	30	20
LG SEF	30	20
A4 SEF	30	30
LT SEF	30	30
B5 SEF	30	30

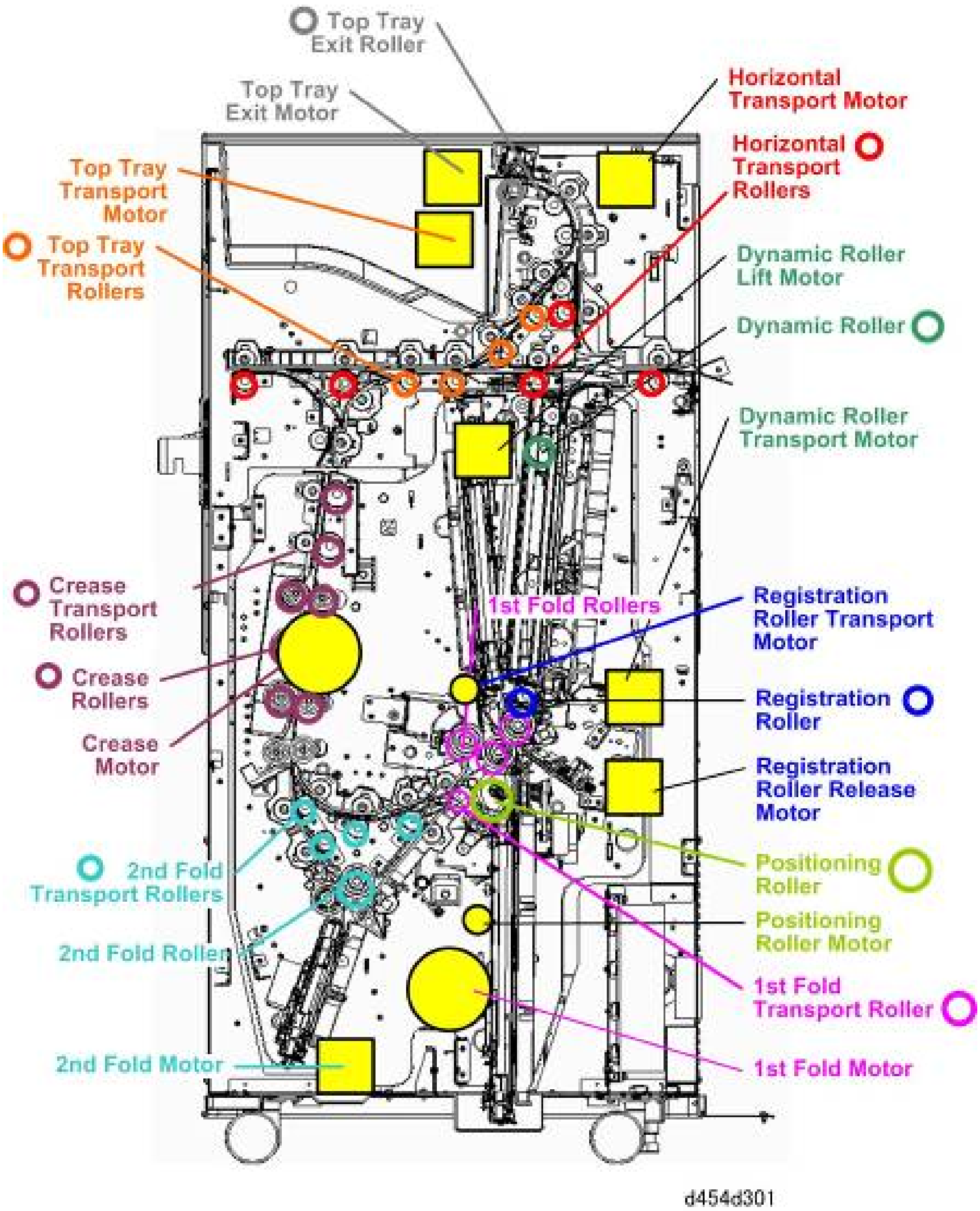
Folding Mode FM6



Size	Weight (Standard) 64 to 80 g/m^2	Weight (Heavy) 64 to 80 g/m^2
8-kai	50	20
12x18"	50	20
A3 SEF	50	20
DLT	50	20
B4 SEF	50	20
LG SEF	50	20
A4 SEF	30	30
LT SEF	30	30
B5 SEF	30	30

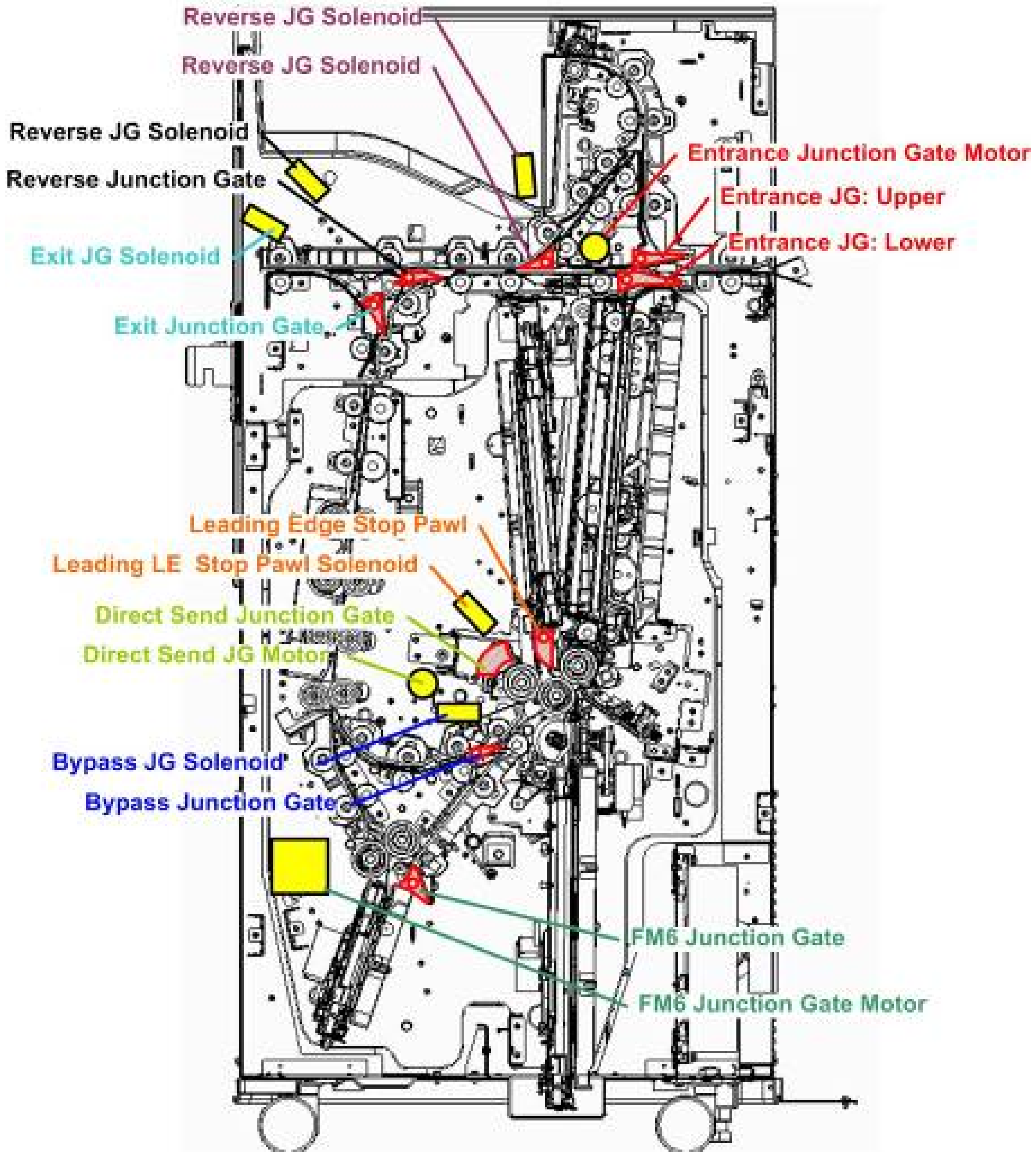
24.2 OVERVIEW

24.2.1 MOTORS, ROLLERS



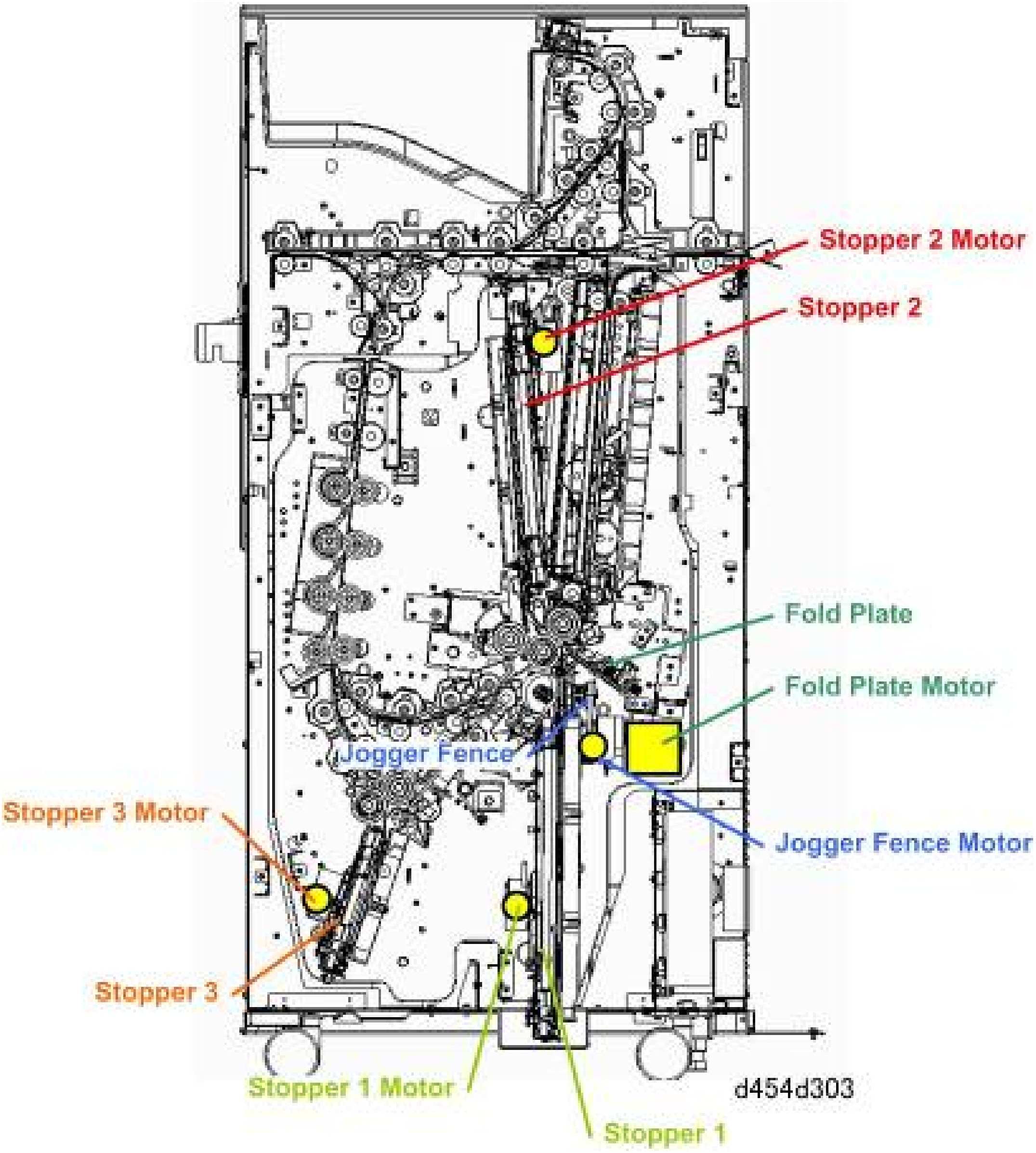
The illustration above shows the roller groups and their related motors.

24.2.2 JUNCTION GATES, JUNCTION GATE SOLENOIDS



The illustration above shows the paper path junction gates and the solenoids and motors that operate them.

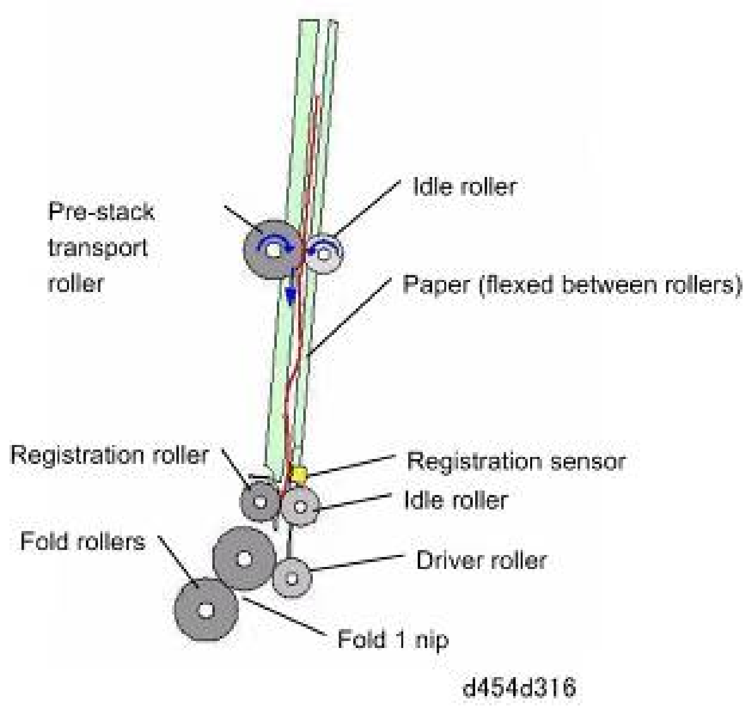
24.2.3 STOPPERS, STOPPER MOTORS



The illustration above shows the stoppers and the motors that operate them.

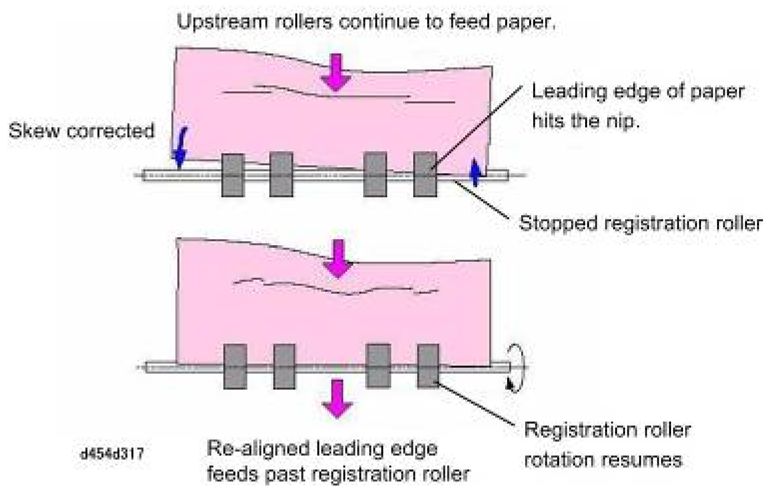
24.3 PAPER PATH

24.3.1 PAPER REGISTRATION

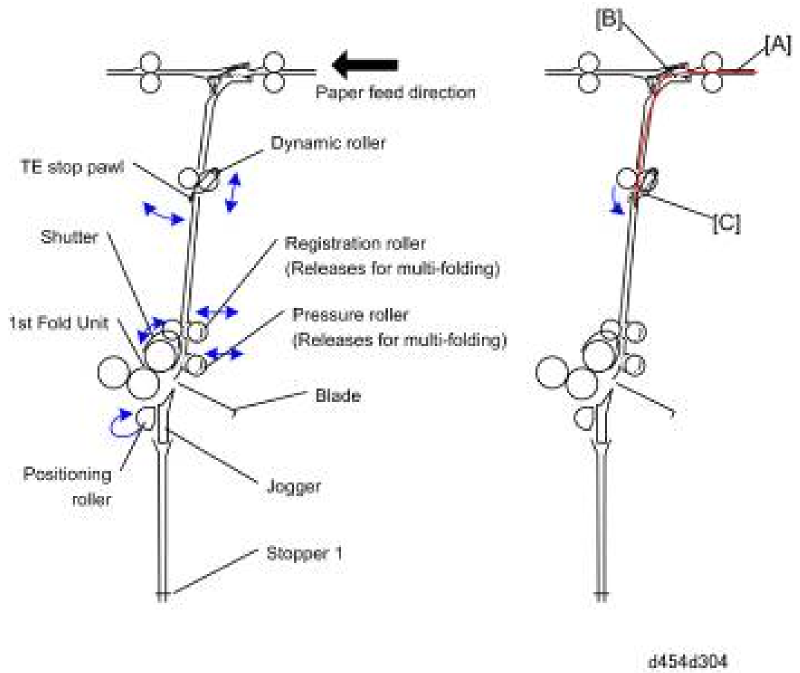


When paper is fed to the pre-stacker, the position of each sheet in the paper path is adjusted to correct skew:

- Leading edge of the sheet hits the registration roller and stops.
- The upstream rollers continue to rotate 5 mm.
- The leading edge of the paper buckles against the stationary registration roller to correct skew.
- The registration roller starts rotating again after the paper has been straightened in the paper path.

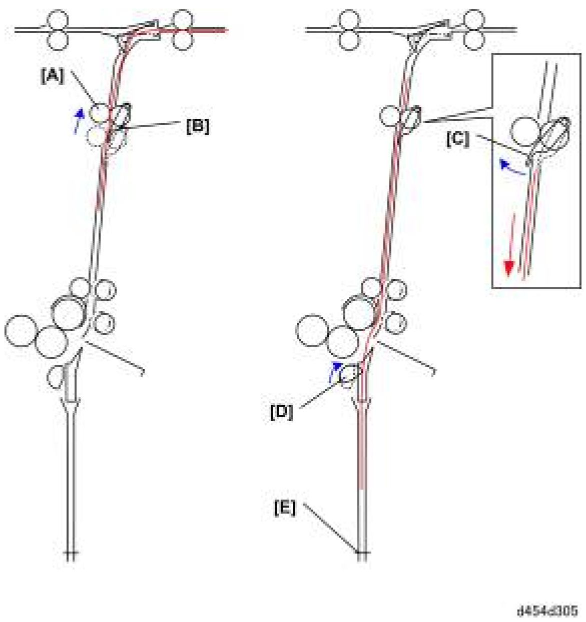


24.3.2 PRE-STACKING

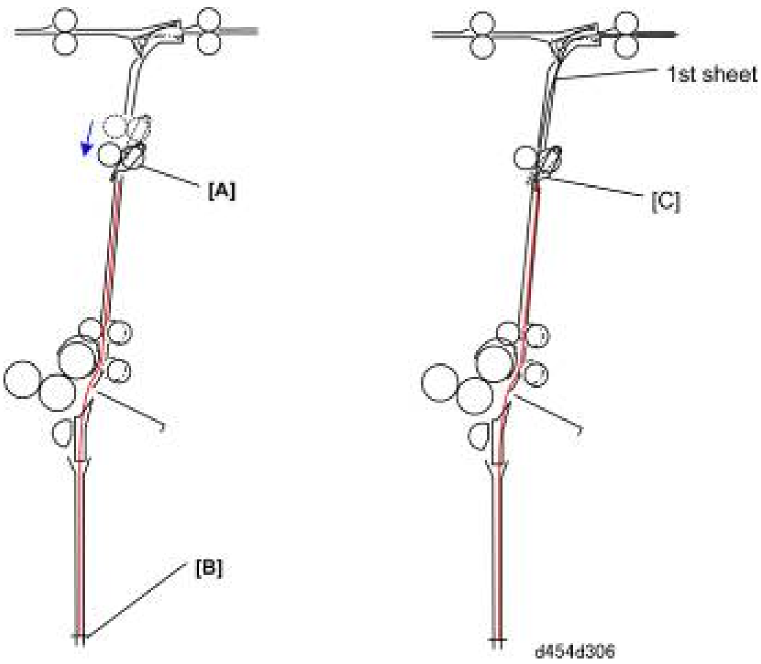


Up to three sheets of paper can be pre-stacked for folding.
The left illustration shows the parts that operate during pre-stacking.

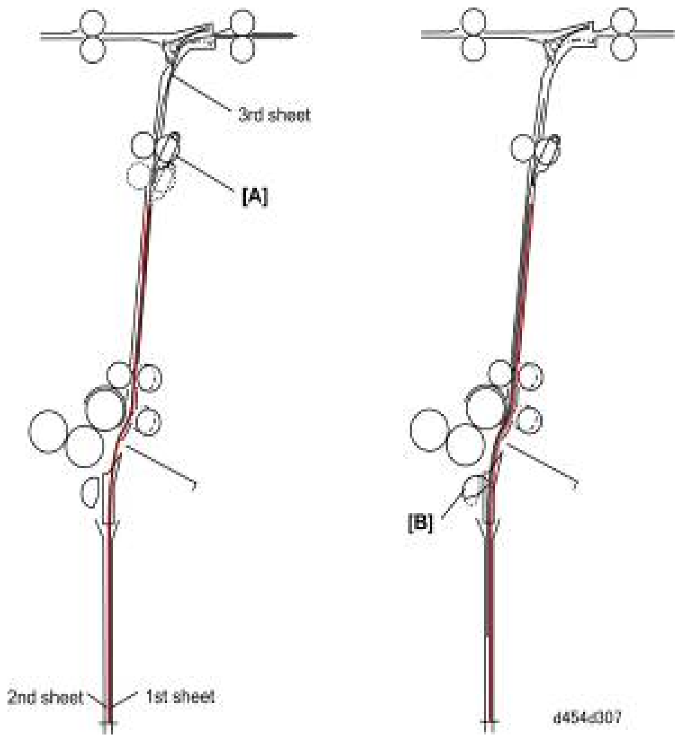
- The paper enters the machine [A].
- The lower entrance junction gate [B] opens and guides the paper to the TE stop pawl [C].
- The paper pushes the TE stop pawl aside so it can pass.
-



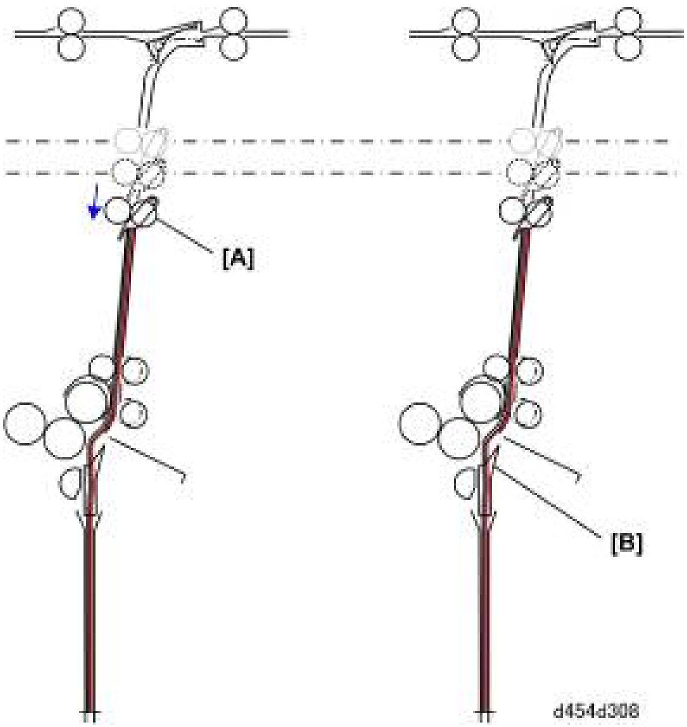
The dynamic roller [A] raises after the leading edge of the paper passes the TE stop pawl [B]. The TE stop pawl returns to its home position [C] after the trailing edge of the sheet passes.
After the trailing edge of the paper passes the dynamic roller, the positioning roller [D] starts to rotate and feeds the paper as far as stopper 1 [E].



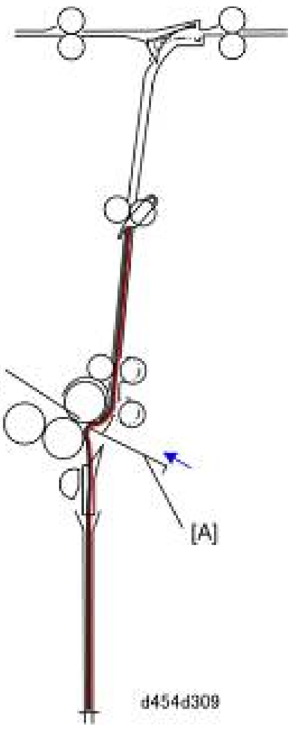
The dynamic roller [A] lowers when the leading edge reaches stopper 1 [B] within the time prescribed for feeding for the size of the paper selected for the job.
The TE stop pawl [C] presses on the 1st sheet to prevent the leading edge of the 2nd sheet from hitting it. The operation sequence for stacking the 2nd and 3rd sheets is the same as that of the 1st sheet.



The dynamic roller [A] raises after the leading edge of the 3rd (and last sheet) passes the TE stop pawl. The position roller [B] rotates twice only after the last sheet has been pre-stacked.

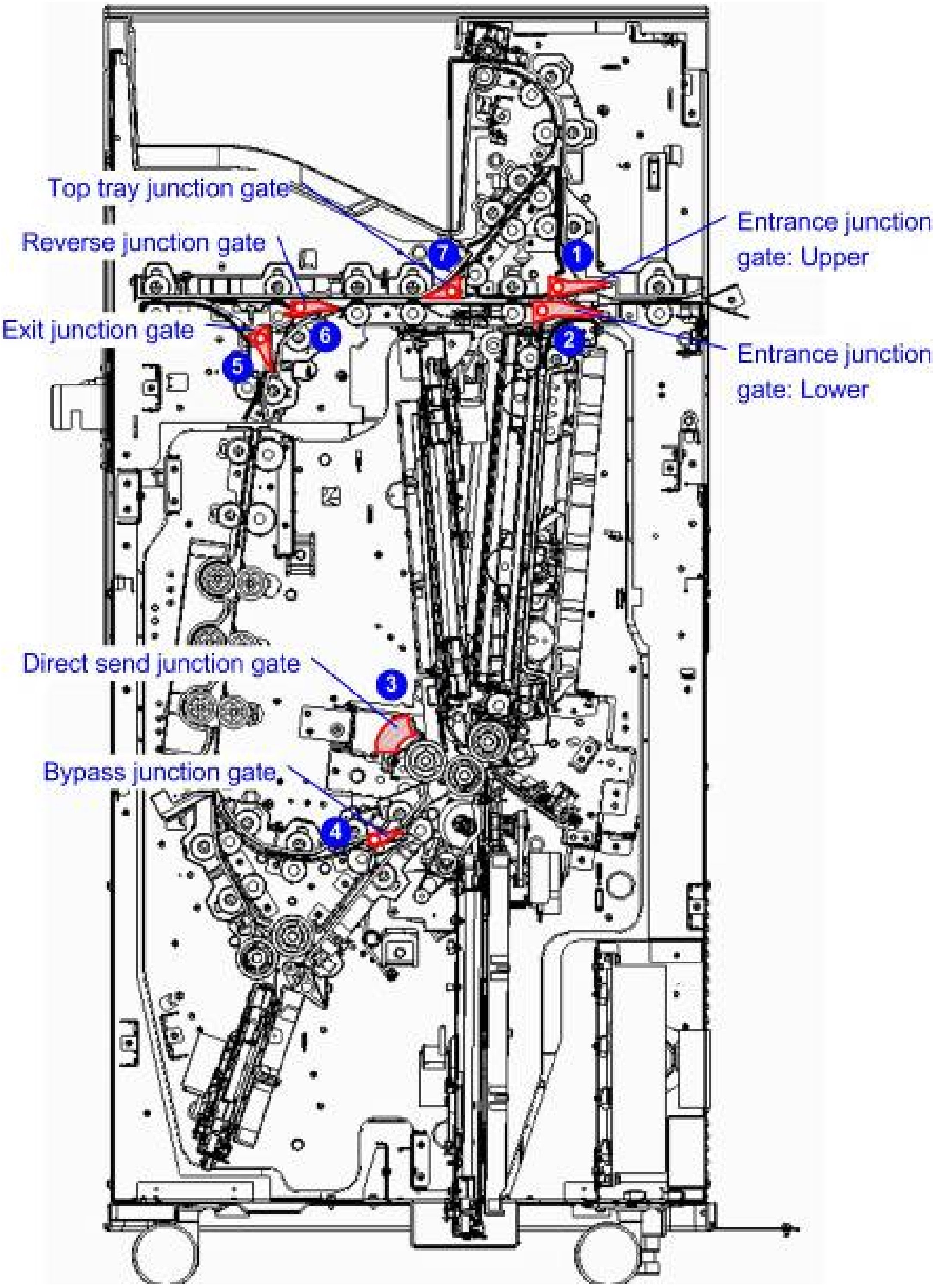


After the last sheet has been pre-stacked, the TE stop pawl [A] lowers and the sheets are jogged vertically (top to bottom).
Next, with the TE stop pawl pressing down on the trailing edges of the stacked sheets, the stack [B] is jogged horizontally (front to back).

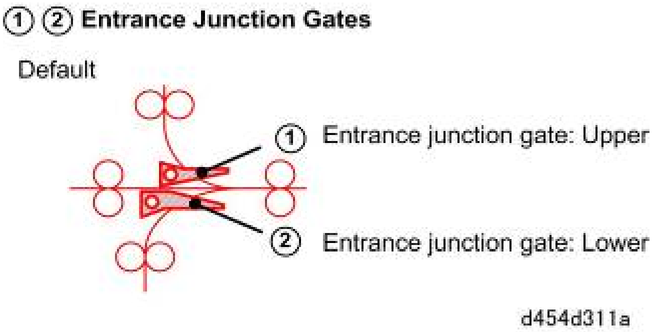


Finally, after all three sheets have been pre-stacked and jogged, the fold blade [A] pushes the stacked sheets into the nip of the fold rollers [B].

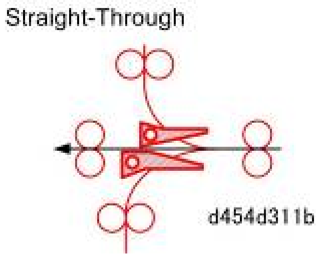
24.4 JUNCTION GATES



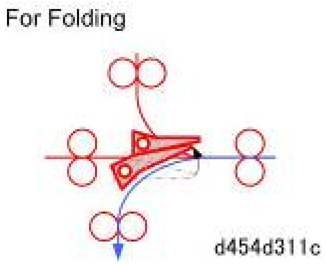
24.4.1 ENTRANCE JUNCTION GATES



There are two junction gates in the paper path at the entrance of the multi-folder.

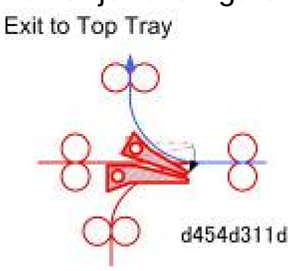


Both junction gates remain at their home positions when paper is fed straight through the multi-fold unit to the next unit downstream.



When folding is selected, the lower entrance junction gate raises and guides the paper to the fold units below:

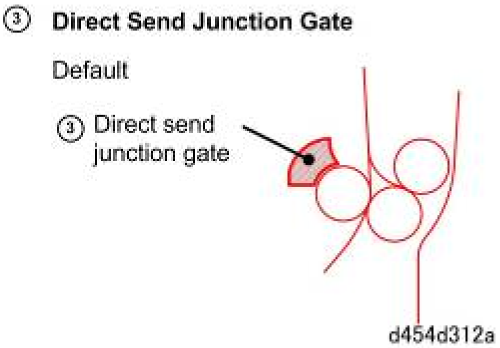
- Upper entrance junction gate remains at default position.
- Lower junction gate rotates up and guides paper down.



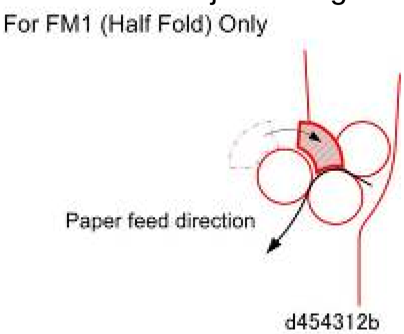
When draft copies are sent to the top tray:

- The upper entrance junction gate rotates down.
- The lower junction gate remains at default position.

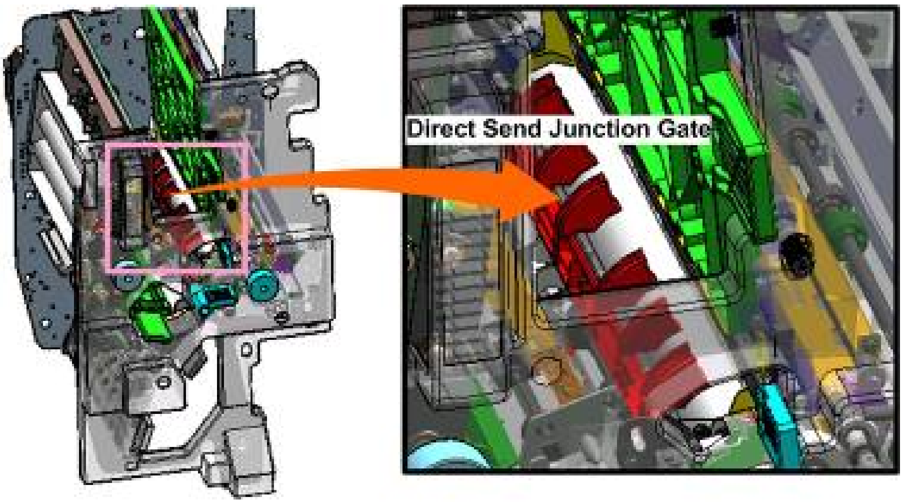
24.4.2 DIRECT SEND JUNCTION GATE



This is the direct send junction gate at its home position.



The junction gate rotates to the right and paper is sent downstream without passing stopper 2. This is down for FM2 mode only when the paper is folded into equal halves.



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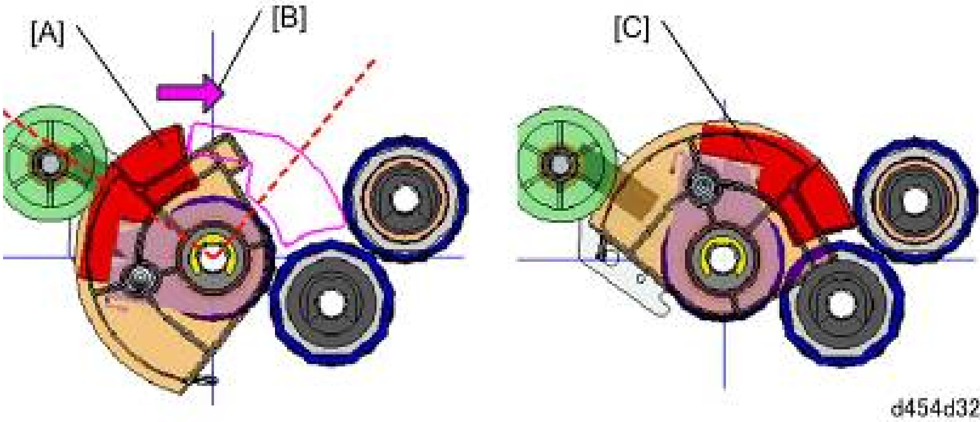
The illustration above shows the actual location and appearance of the direct send junction gate.



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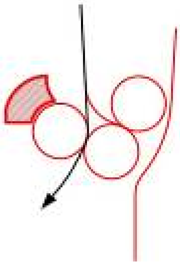
For all fold modes other than FM2 (Half Fold) the direct send junction gate remains at its home position.

- For FM2 the direct send junction gate motor rotates the junction gate [B] to position [C].
- After the job is finished the motor rotates the junction gate back to its home position [A].

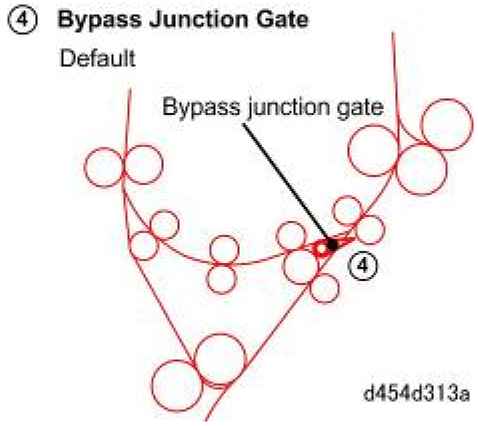
Other Fold Modes



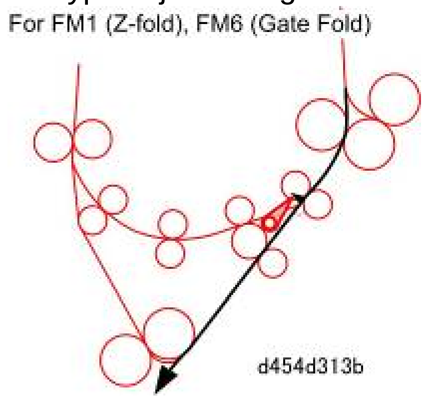
d454d312c

For the other fold modes (FM1, FM3 to FM6) the junction gate remains at its home position and does not touch the paper.

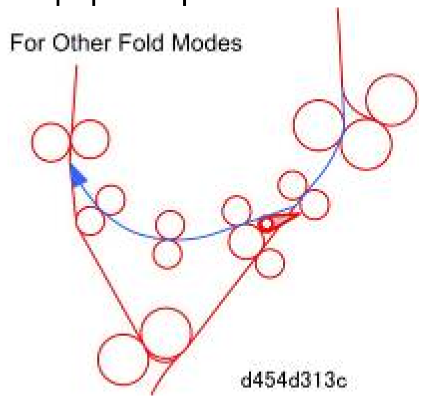
24.4.3 BYPASS JUNCTION GATE



This is the bypass junction gate at its home position.

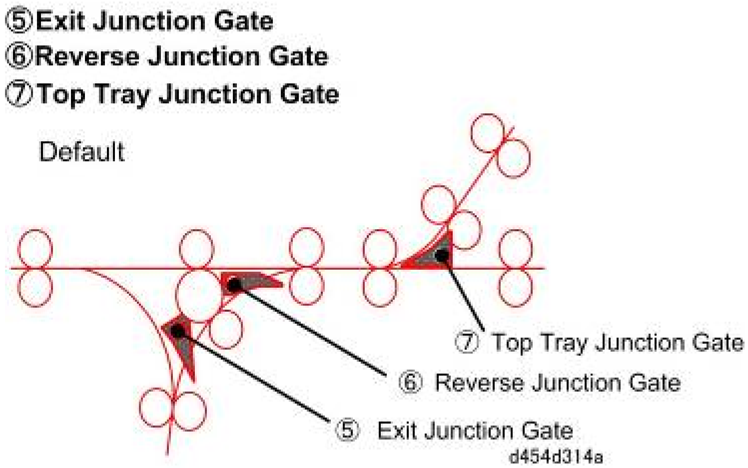


When FM1 (Z-fold) or FM6 (Gate Fold) is selected, the bypass junction gate raises and allows paper to pass to folder unit 2.

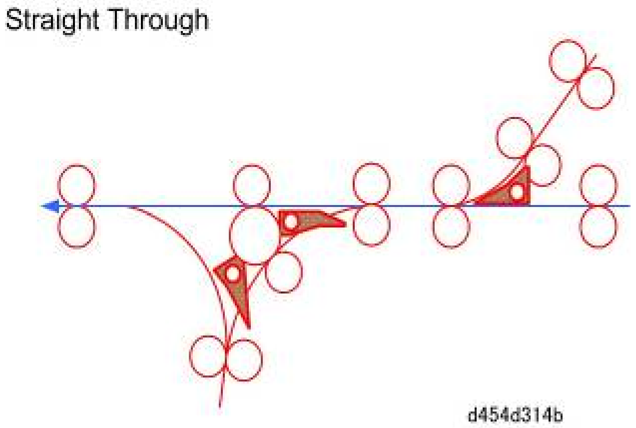


For fold modes other than FM1, FM6 the bypass junction gate remains at it default position. Paper passes over the top of the bypass junction gate and into the bypass paper path.

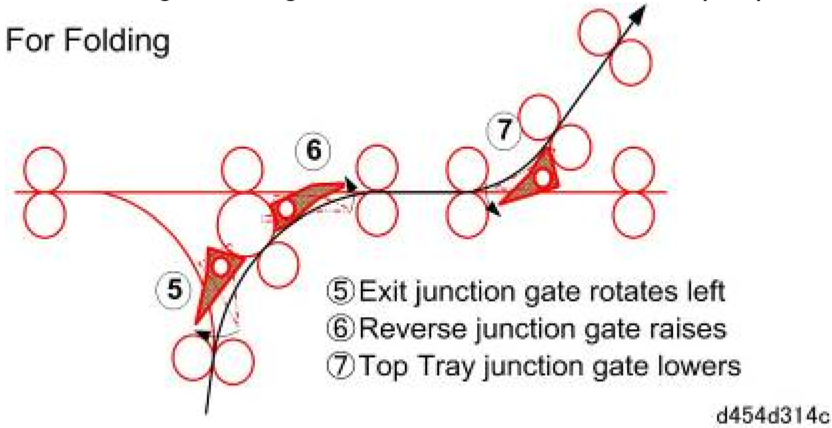
24.4.4 EXIT, REVERSE, AND TOP TRAY JUNCTION GATES



These three junction gates are shown above at their default positions.



For straight-through paper feed the junction gates remain at their home positions. Paper passes straight through the multi-folder to the next peripheral unit downstream.



All three junction gates operate to guide folded paper to the top tray:

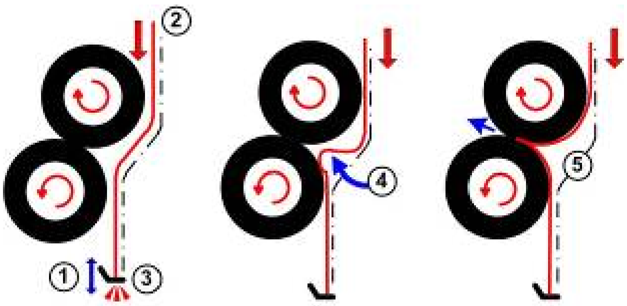
- Exit junction gate rotates left
- Reverse junction gate raises
- Top tray junction gate lowers

This sequence guides the folded paper to the top tray.

Note: Only Z-folded paper is allowed to exit the multi-folder and pass downstream to other peripheral units. In this case, the junction gates remain at their default positions. The exit junction gate sensor (5) guides the paper toward the multi-folder exit above.

24.5 PAPER FOLDING

24.5.1 FLEX-NIP FOLDING



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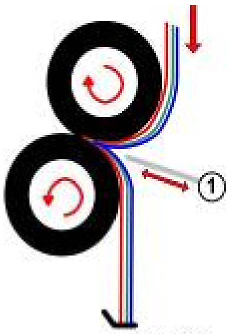
This machine uses the flex-nip method to fold paper.
In this method of folding a stopper fence ① is raised or lowered to the correct height for the size of the paper and the type of fold to be done. A sheet of paper ② descends, hits the stopper and stops. However, the upstream rollers continue to rotate. This causes the paper ④ to bulge and flex toward the nip of the rotating fold rollers on the left. When the paper ⑤ reaches the rotating rollers it feeds into the nip. The rollers catch the paper, pull it into the nip, and form the fold.
In this machine:

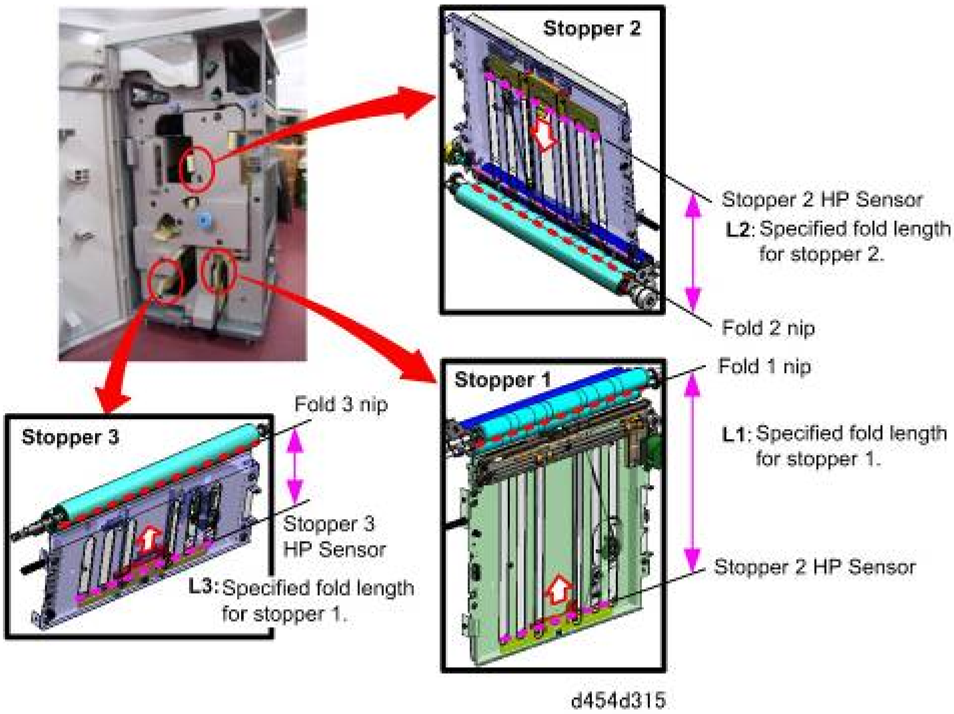
- There are three fold stoppers placed at strategic positions in the fold path.
- Not all the stoppers are used for folding. Only the stoppers needed for the type of folding are used.



d454d918

When two or more sheets are fed together, a fold assist plate ① pushes the flexed paper toward the rotating fold rollers. The fold plate is used only when more than one sheet of paper is fed at a time. Up to three sheets can be fed.

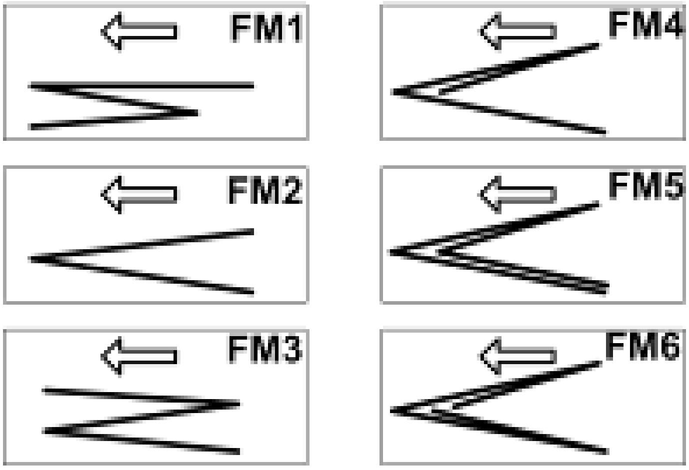
24.5.2 STOPPER LOCATIONS



The illustration above shows the stopper locations. Note the locations of Stopper 1, Stopper 2, and Stopper 3.

24.6 FOLDING METHODS

There are six Folding Methods (FM):



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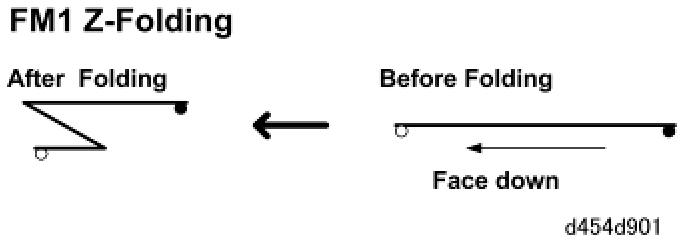
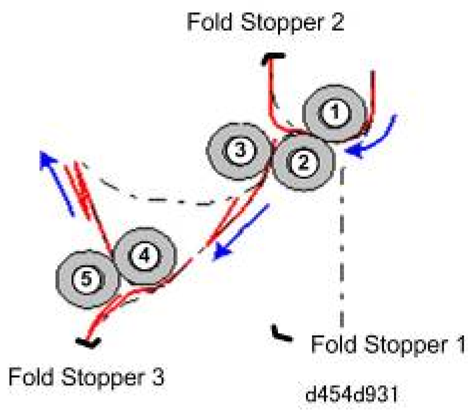
FM1	Z-Folding
FM2	Half Fold
FM3	Letter Fold-out
FM4	Letter Fold-in
FM5	Double Parallel Fold
FM6	Gate Fold

24.6.1 FM1 Z-FOLDING

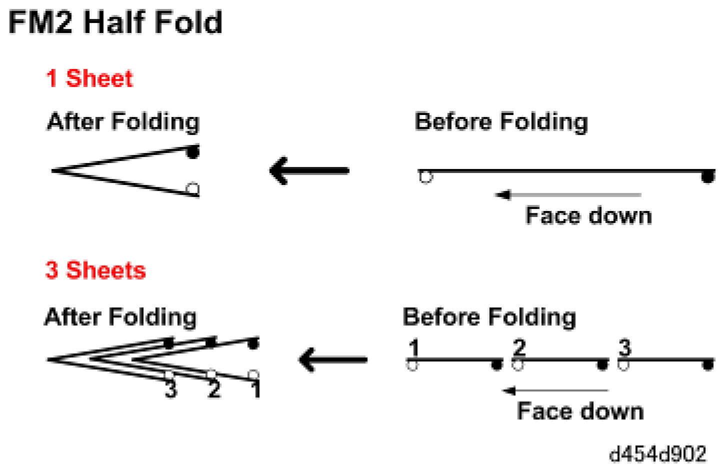


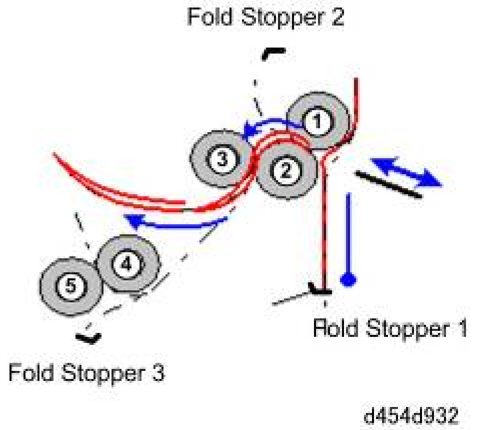


In Fold Method 1 (FM1):

- The leading edge of the paper feeds into the nip of fold rollers ① and ②.
- The paper is stopped by Fold Stopper 2. The paper flexes toward the nip of fold rollers ② and ③ which performs the first fold.
- Next, the paper is stopped by Fold Stopper 3. The paper flexes toward the nip of fold rollers ④ and ⑤ which performs the second fold and feeds the paper into the exit path.
- Fold Stopper 1 is not used.

24.6.2 FM2 HALF FOLD

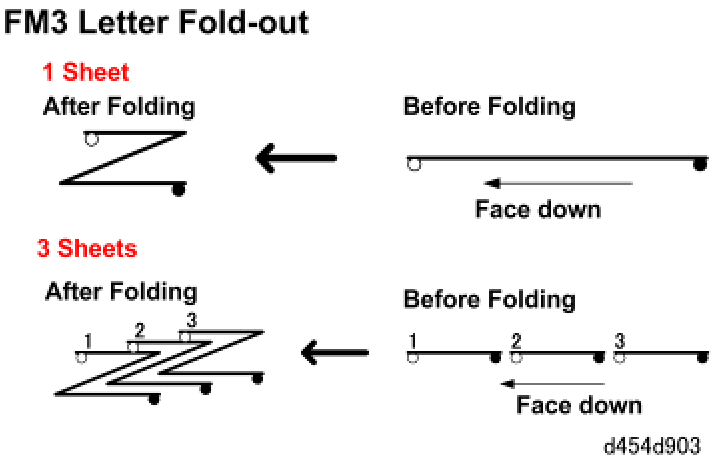


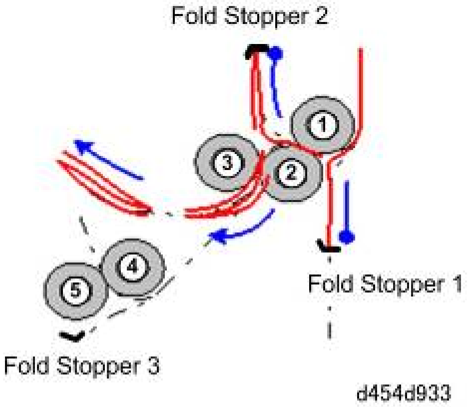


In Fold Method 2 (FM2):

- The leading edge of the paper is stopped by Fold Stopper 1.
- The paper flexes toward the nip of fold rollers ① and ② which performs the first fold and feeds the folded edge of the paper into the nip of fold rollers ② and ③.
- Fold rollers ② and ③ feed the paper into the exit path.
- Fold Stoppers 2, and 3 are not used.

24.6.3 FM3 LETTER FOLD-OUT

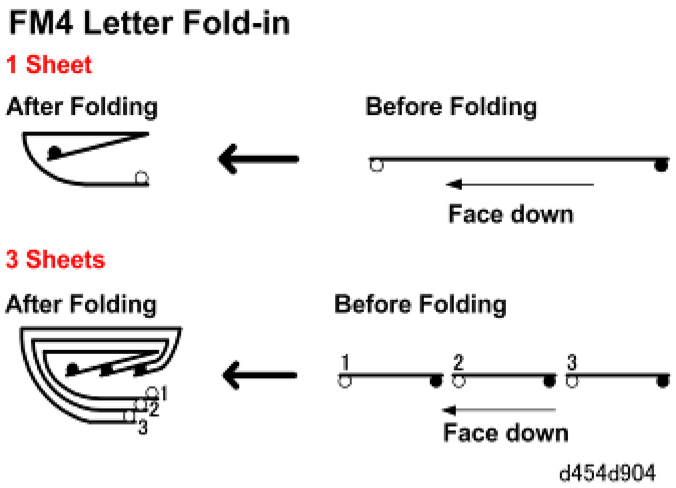


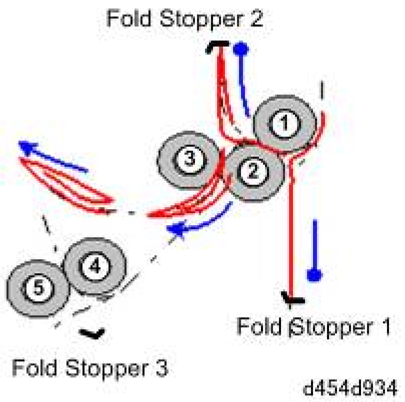


In Fold Method 3 (FM3):

- The leading edge of the paper is stopped by Fold Stopper 1.
- The paper flexes toward the nip of fold rollers ① and ② which performs the first fold.
- Fold Stopper 2 stops the paper and flexes it into the nip of fold rollers ② and ③.
- Fold rollers ② and ③ perform the second crease and feed the folded paper in exit path.
- Fold Stoppers 3 is not used.

24.6.4 FM4 LETTER FOLD-IN





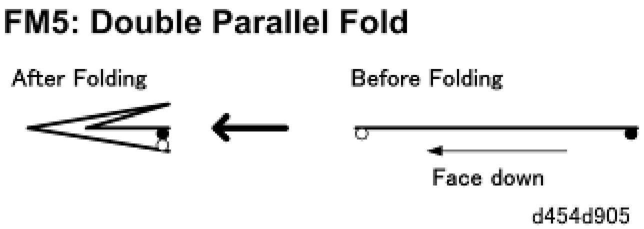
In Fold Method 4 (FM4):

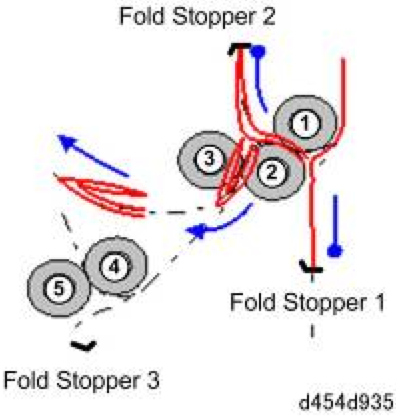
- The leading edge of the paper is stopped by Fold Stopper 1.
- The paper flexes toward the nip of fold rollers ① and ② which performs the first fold.
- Fold Stopper 2 stops the paper and flexes it into the nip of fold rollers ② and ③.
- Fold rollers ② and ③ perform the second crease and feed the folded paper in exit path.
- Fold Stopper 3 is not used.

FM3 and FM4 follow the same sequence but the resultant fold is different:

- In FM3 Fold Stopper 1 is positioned high so a short length of paper is allowed to feed before flexing toward the nip starts.
- In FM4 Fold Stopper 1 is positioned low so a long length of paper is allowed to feed before flexing toward the hip starts.
- This positioning of Fold Stopper 1 accounts for the difference in folding at the next nip.

24.6.5 FM5 DOUBLE PARALLEL FOLD





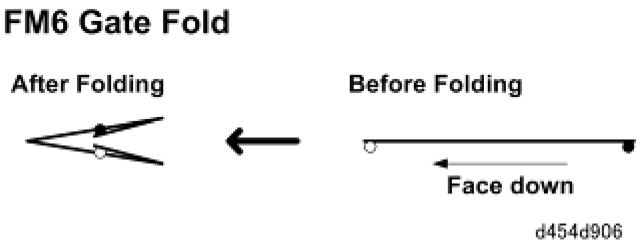
In Fold Method 5 (FM5):

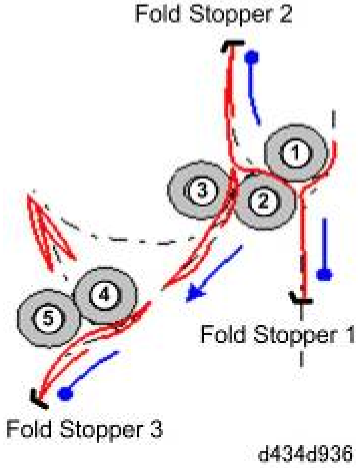
- The leading edge of the paper is stopped by Fold Stopper 1.
- The paper flexes toward the nip of fold rollers ① and ② which performs the first fold.
- Fold Stopper 2 stops the paper and flexes it into the nip of fold rollers ② and ③.
- Fold rollers ② and ③ perform the second crease and feed the folded paper in exit path.
- Fold Stopper 3 is not used.

FM3, FM4, and FM5 follow the same sequence but the resultant fold is different:

- In FM5 Fold Stopper 1 is positioned so the paper will fold into halves when it enters the first nip.
- This critical positioning of Fold Stopper 1 accounts for the difference in folding at the next nip.

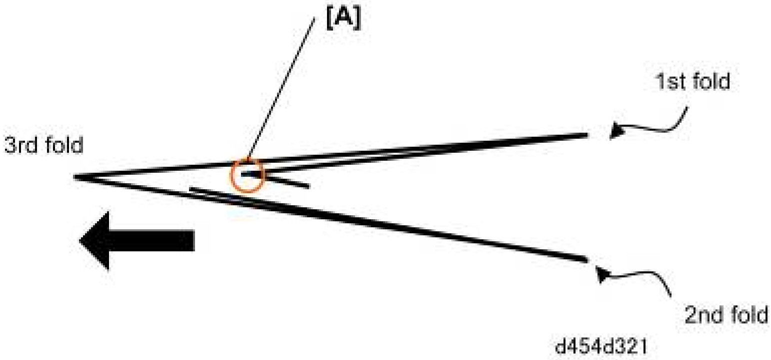
24.6.6 FM6 GATE FOLD



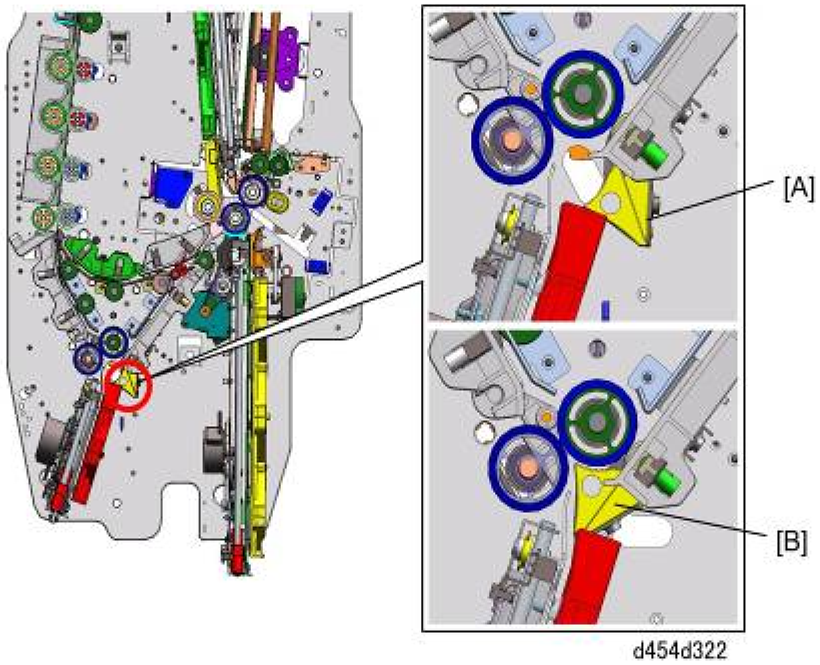


In Fold Method 6 (FM6):

- The leading edge of the paper is stopped by Fold Stopper 1.
- The paper flexes toward the nip of fold rollers ① and ② which performs the first fold.
- Fold Stopper 2 stops the paper and flexes it into the nip of fold rollers ② and ③.
- Fold rollers ② and ③ perform the second fold and feed the folded paper to Stopper 3.
- Fold Stopper 3 stops the paper and flexes it into the nip of fold roller ④ and ⑤.
- Fold roller ④ and ⑤ form the third crease and feed the folding paper into the exit path.
- All three stoppers are used with this method.

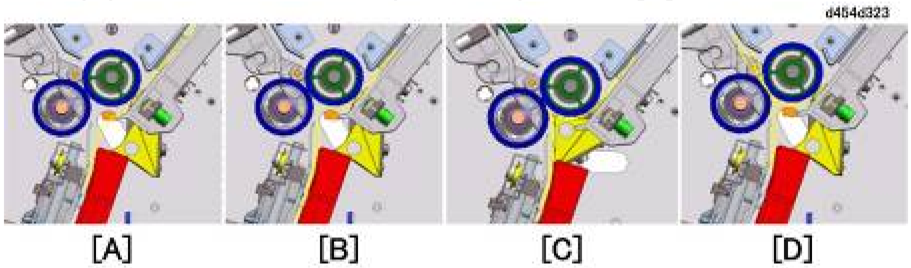


A mechanism is provided to prevent the leading edge from catching and folding over on itself [A] when the 3rd fold is done.



Operation sequence for folding three sheets:

- At power on (initialization) the FM6 junction gate [A] moves to home position.
- The three sheets are pre-stacked then the first two folds are done
- The FM6 stop pawl moves to the operation position [B].



[A]	After the 2nd fold the sheet(s) are sent to the 3rd stopper for the last fold.
[B]	The leading edge of the sheets(s) hit stopper 3 and the upstream rollers continue rotate (equivalent to 18 mm of feed) to flex paper toward the fold rollers.
[C]	The edge of the FM6 pawl is raised to flatten the leading edge so it cannot bend back on itself as the paper enters the nip of the fold rollers.
[D]	When the 3rd fold starts the FM6 pawl returns to its home position.

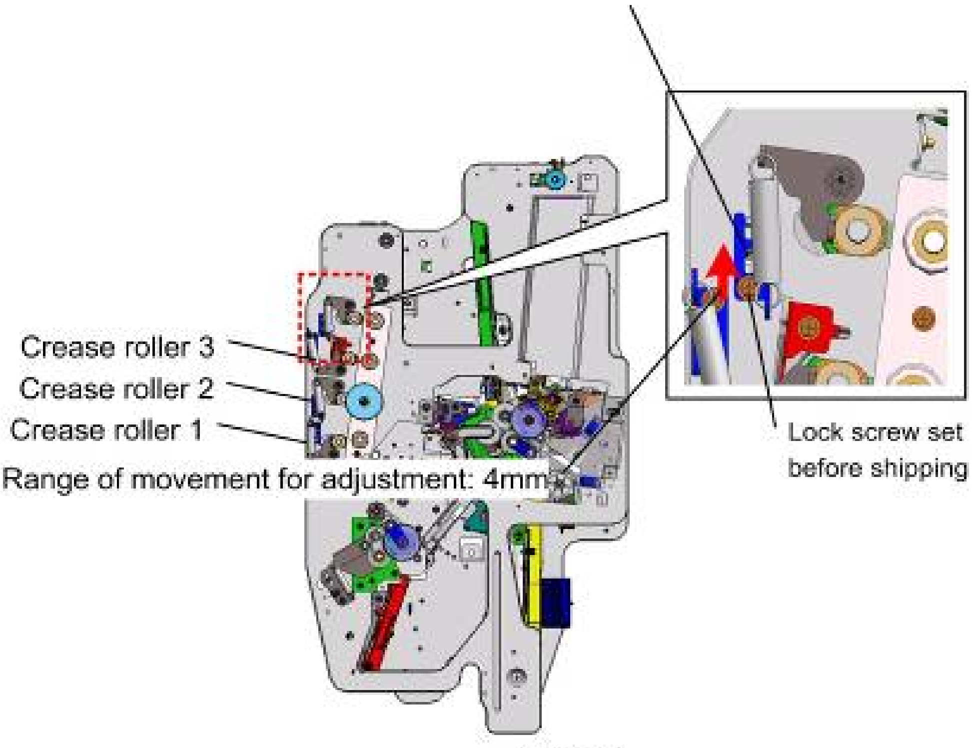
24.6.7 FOLD ADJUSTMENTS WITH SP CODES

The fold positions can be adjusted in the User Tools (Operators, Skilled Operators) and the engine SP mode.

Mode	Name	Fold	User Tools*[1]	SP*[2]
FM1	Z-Fold	1st	---	6750
		2nd	---	6751
FM2	Equal Halves	1st	0701	6752
FM3	LT Fold Out	1st	0702	6753
		2nd	0703	6754
FM4	LT Fold In	1st	0704	6755
		2nd	0705	6756
FM5	Double Parallel	1st	---	6757
		2nd	---	6758
FM6	Gate Fold	1st	---	6759
		2nd	---	6760
		3rd	---	6761

*[1]: These numbers are the same for Operators, Skilled Operators.
*[2]: The ranges for these SP codes are the same: [-4 to +4 / **0** / 0.2 mm]

24.7 CREASE ROLLERS



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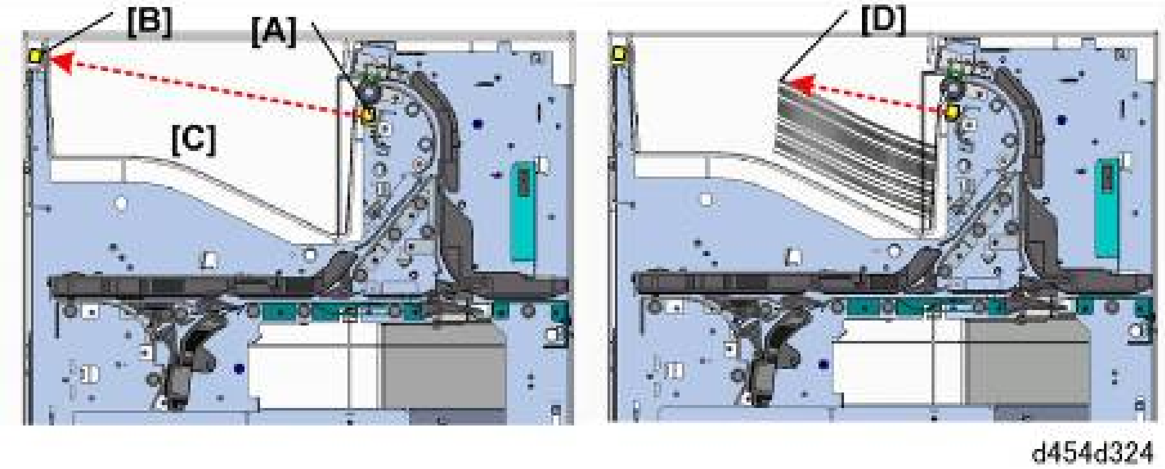
The amount of pressure exerted by the crease rollers can be adjusted. This can be done to eliminate splitting that can occur with coated paper and other types of media. The adjustment is a manual adjustment done on springs.]

Adjustment range

	R1	R2	R3	R4
Default Load	26 N	45 N		
Load Adjustment Possible (Hook 4 mm Distance)	-4.5 N	-9.5 N		

A projection fixed in slot and attached to a spring shortens the length to roller can be lowered. There are four crease rollers. Springs at the front and rear ends of each roller can be adjusted.

24.8 TRAY FULL

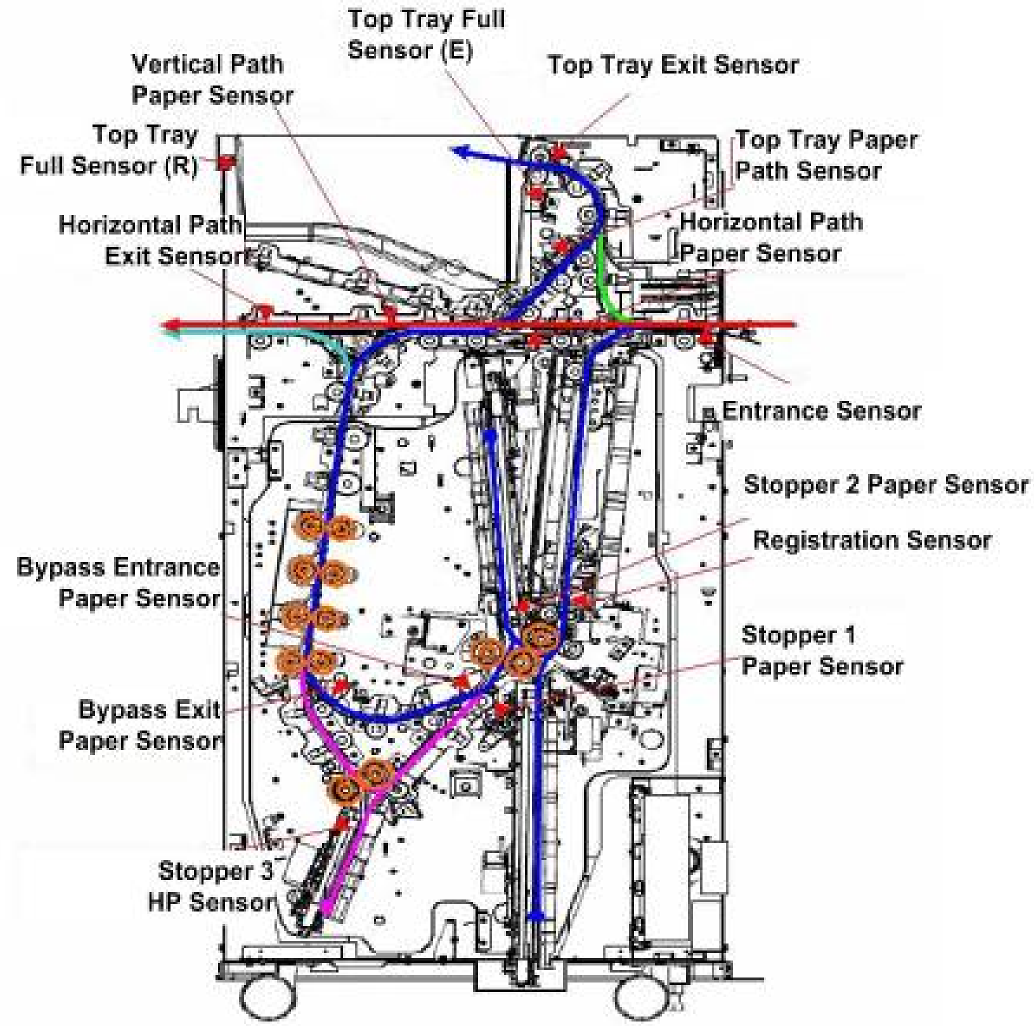


A pair sensors are used to detect the tray full condition. At the start of every job:

- Tray full sensor (Emitter) [A] emits a signal to tray full sensor (Receptor) [B].
- As long as the signal remains unbroken the multi-folder will continue to operate and feed folded paper to the top of the unit [C].
- When the top of the stack grows high enough to interrupt the signal between the tray full sensors [D], this will signal the machine to shut down the line temporarily.
- After the operator removes the stack from the top tray, folding and paper exit will resume.

24.9 ELECTRICAL COMPONENTS

24.9.1 TRANSPORT SENSORS



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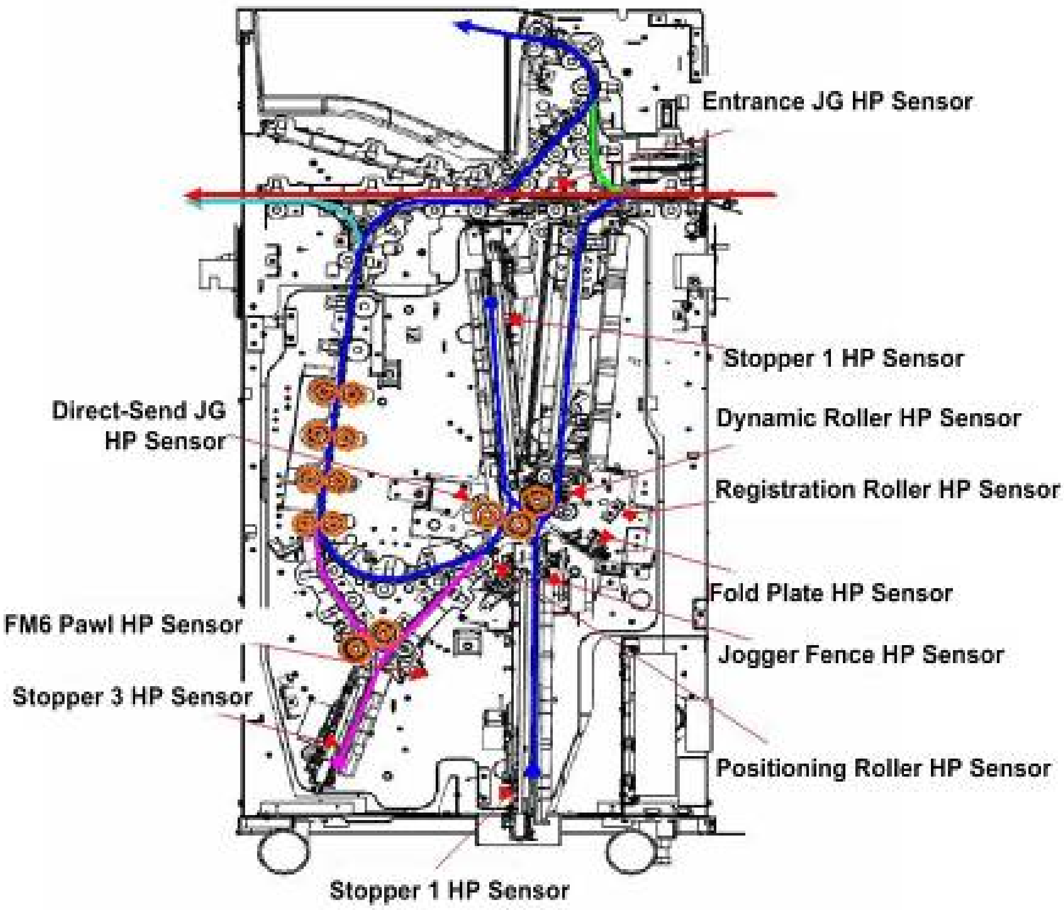
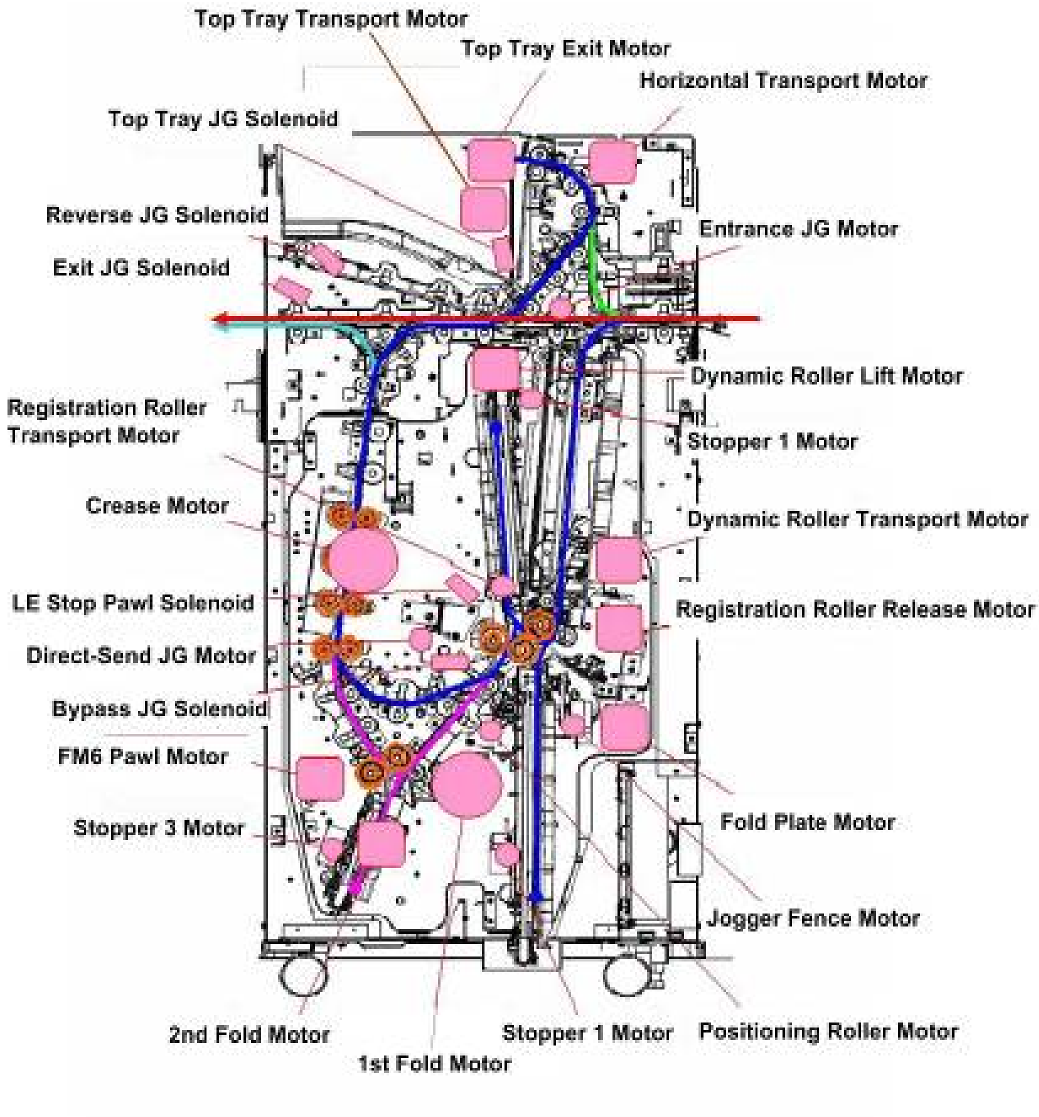
24.9.2 OPERATION SENSORS



24.9.3 MOTORS, SOLENOIDS



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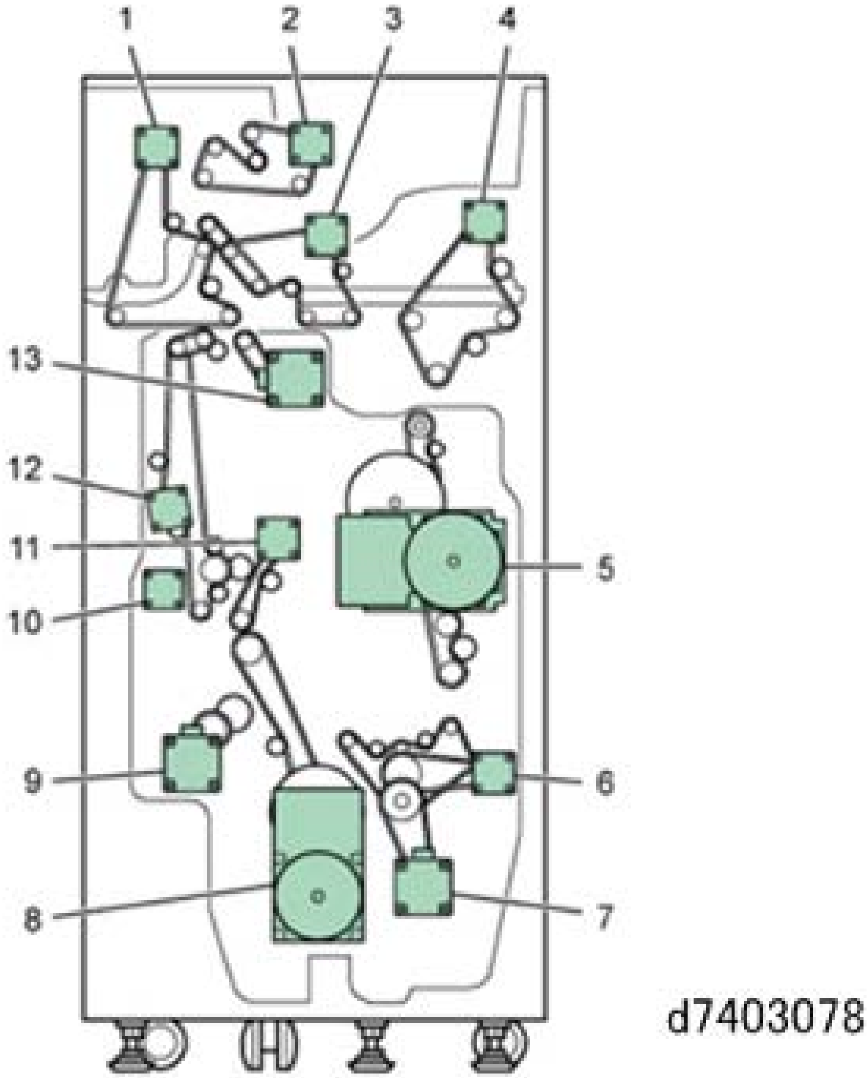
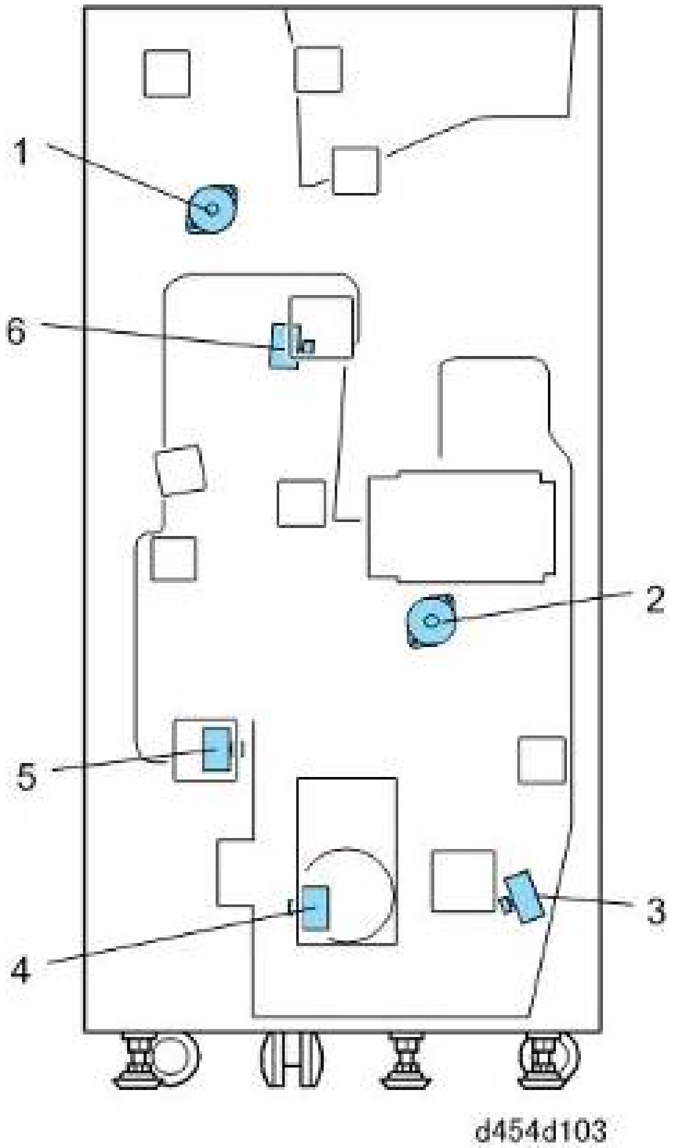
24.10 PAPER TRANSPORT MOTORS



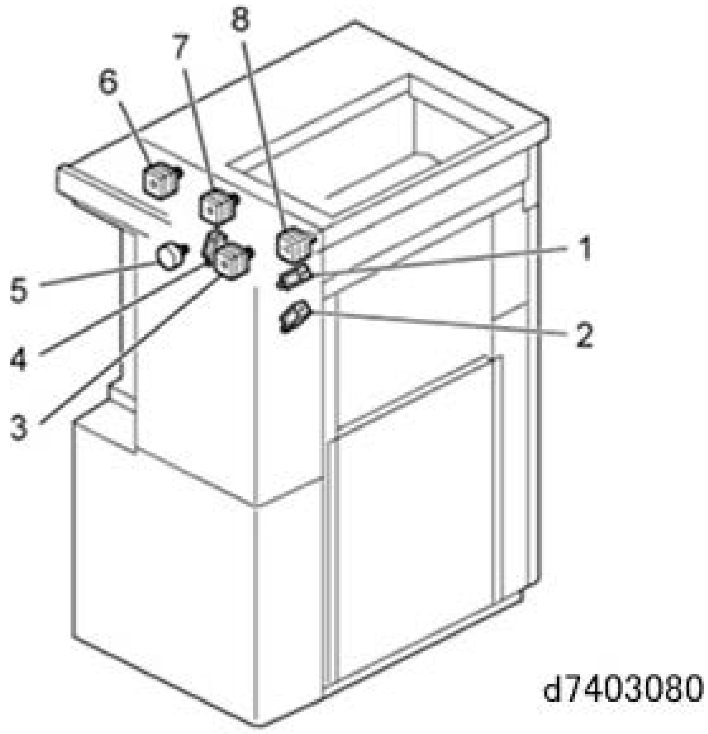
1.	Horizontal Transport Motor	8.	2nd Fold Motor
2.	Top Tray Exit Motor	9.	Fold Plate Motor
3.	Top Tray Transport Motor	10.	Registration Roller Transport Motor
4.	Horizontal Exit Motor	11.	Registration Roller Release Motor
5.	Crease Motor	12.	Dynamic Roller Transport Motor
6.	FM6 Pawl Motor	13.	Dynamic Roller Lift Motor
7.	1st Fold Motor		

24.11 FOLD MOTORS



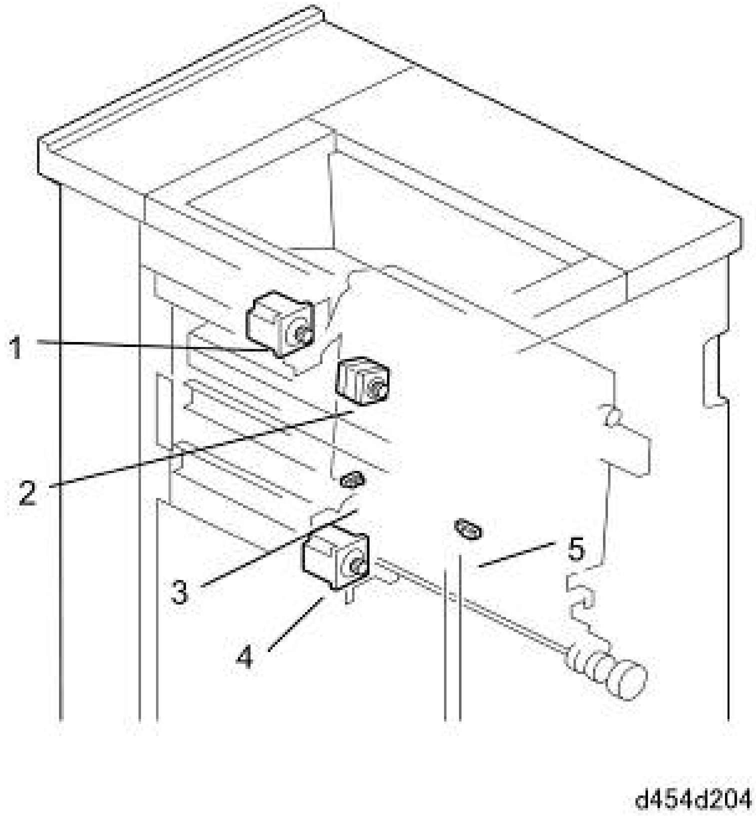
1.	Entrance JG Motor
2.	Direct Send JG Motor
3.	Stopper 3 Motor
4.	Stopper 1 Motor
5.	Jogger Fence Motor
6.	Stopper 2 Motor

24.12 MOTORS, SOLENOIDS AROUND THE TOP TRAY



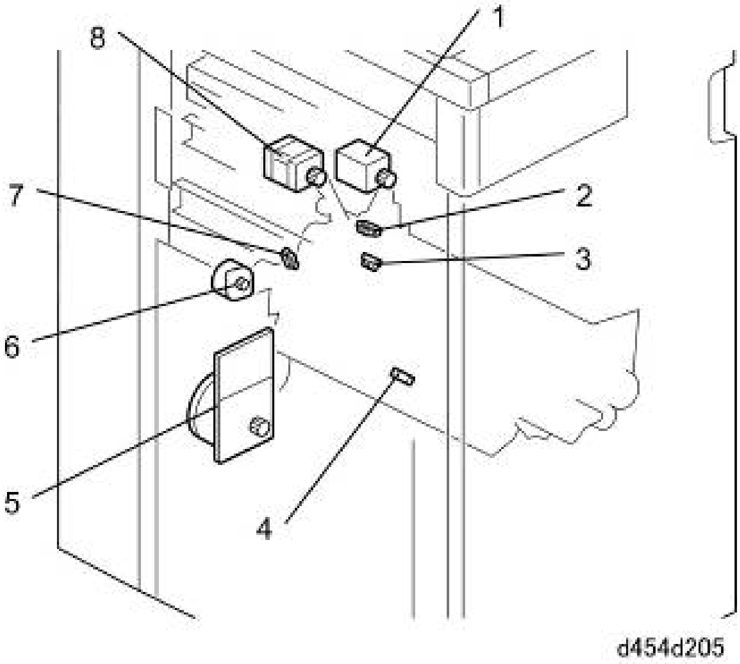
1	Reverse JG Solenoid
2	Exit JG Solenoid
3	Top Tray Transport Motor
4	Top Tray JG Solenoid
5	Entrance JG Solenoid
6	Horizontal Transport Motor
7	Top Tray Exit Motor
8	Horizontal Exit Motor

24.13 MOTORS, SENSORS TOP



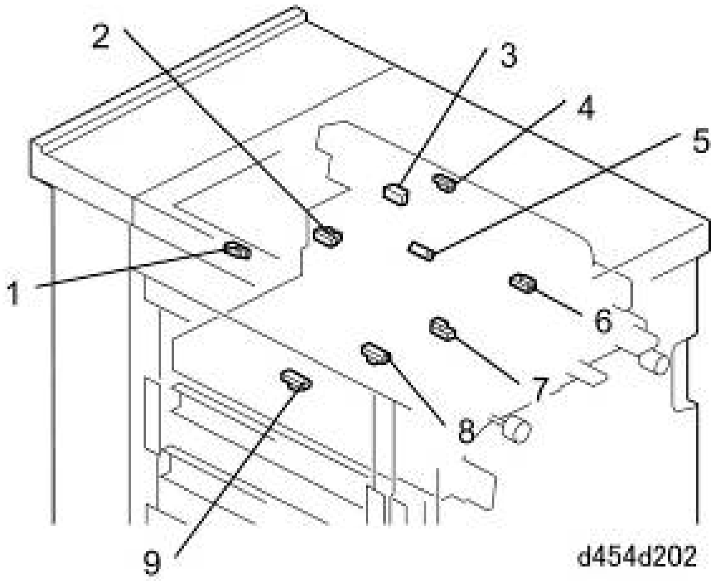
1.	Dynamic Roller Lift Motor
2.	Dynamic Roller Transport Motor
3.	Dynamic Roller HP Sensor
4.	Fold Plate Motor
5.	Registration Sensor

24.14 MOTORS, SENSORS BOTTOM



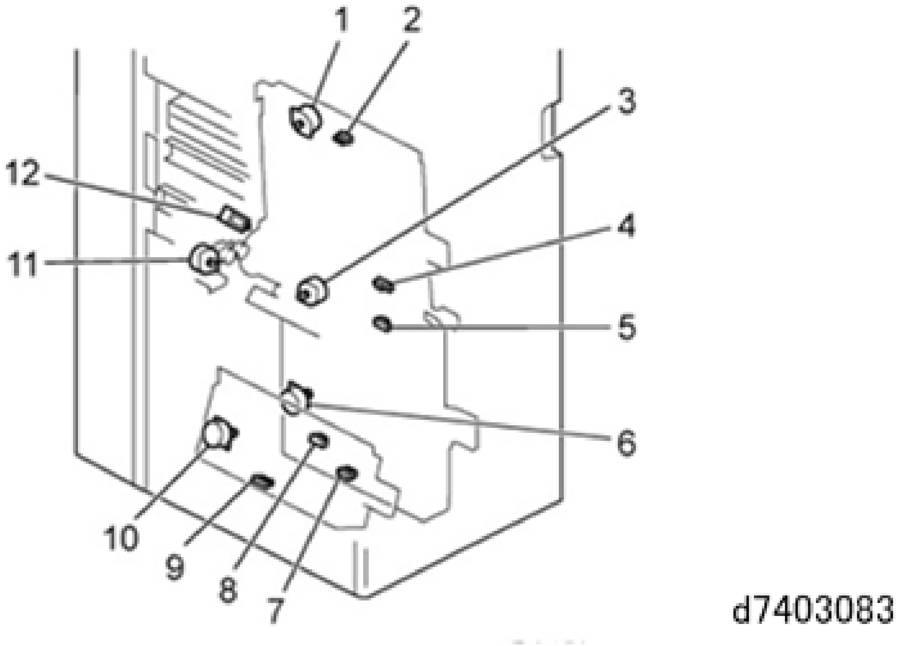
1.	Registration Roller Release Motor
2.	Jogger Fence HP Sensor
3.	Fold Plate HP Sensor
4.	FM6 Pawl HP Sensor
5.	1st Fold Motor
6.	Direct Send JG HP Sensor
7.	Registration Roller Transport Motor

24.15 SENSORS AROUND TOP TRAY

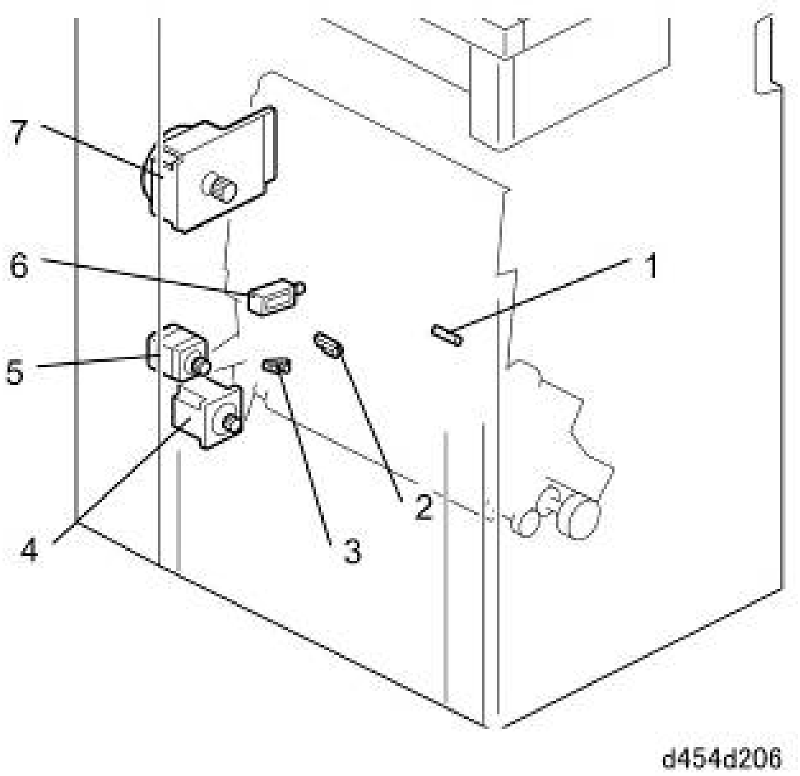


1.	Top Tray Full Sensor (R)
2.	Entrance JG HP Sensor
3.	Top Tray Full Sensor (E)
4.	Top Tray Exit Sensor
5.	Top Tray Paper Path Sensor
6.	Entrance Sensor
7.	Horizontal Path Paper Sensor
8.	Vertical Path Paper Sensor
9.	Horizontal Path Exit Sensor

24.16 FOLD MOTORS, SENSORS, SOLENOIDS

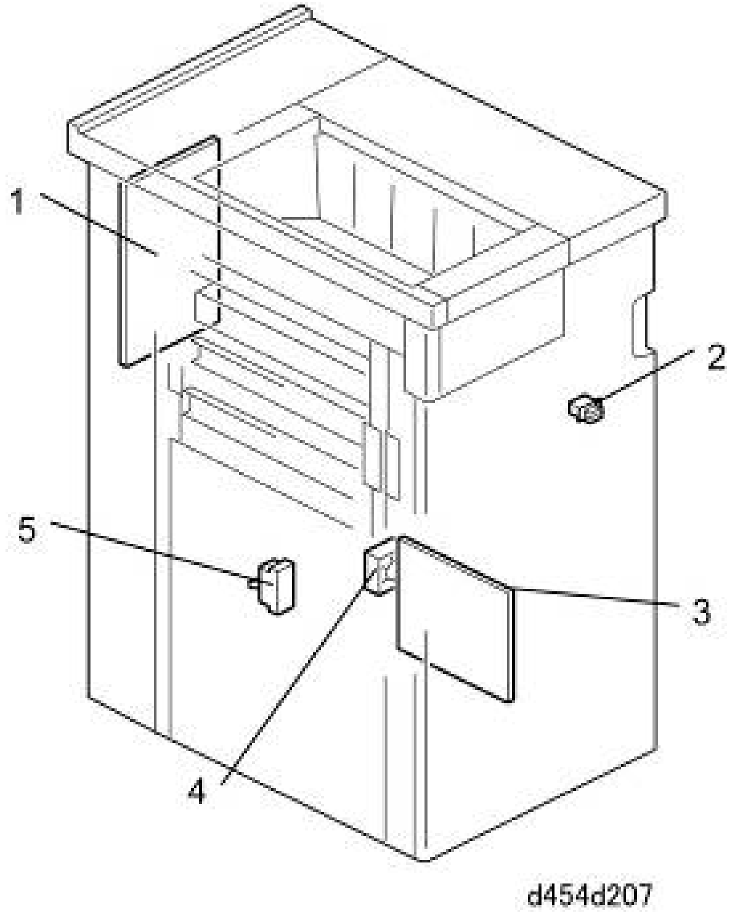


1.	Stopper 2 Motor	7.	Stopper 1 HP Sensor
2.	Stopper 2 HP Sensor	8.	Stopper 3 Paper Sensor
3.	Jogger Fence Motor	9.	Stopper 3 HP Sensor
4.	Stopper 2 Paper Sensor	10.	Stopper 3 Motor
5.	Stopper 1 Paper Sensor	11.	Direct Send JG Motor
6.	Stopper 1 Motor	12.	LE Stop Pawl Solenoid



1.	Bypass Entrance Paper Sensor
2.	Bypass Exit Paper Sensor
3.	FM6 Pawl HP Sensor
4.	2nd Fold Motor
5.	FM6 Pawl Motor
6.	Bypass JG Solenoid
7.	Crease Motor

24.17 BOARDS, SWITCHES, FAN



1.	Main Board
2.	Front Door Switch
3.	PSU
4.	PSU Fan
5.	Breaker Switch

24.18 COMPONENT LIST

Motors		
M	Entrance JG Motor	Operates the entrance junction that directs paper from the upstream device to the 1) horizontal paper path, 2) paper fold path, 3) top tray.
M	Top Tray Transport Motor	Drives the transport rollers that feed unfolded paper to the downstream unit. Reverses and feeds folded paper to the folded paper tray.
M	Horizontal Transport Motor	Drives the entrance roller at the entrance where the paper from the upstream device is received. Drives the exit roller that feeds the paper out to the downstream unit. Drives other transport rollers in the horizontal paper path.
M	Top Tray Exit Motor	Drives the exit roller that feeds paper into the top tray.
M	1st Fold Motor	Drives the 1st fold roller.
M	Jogger Fence Motor	Moves the jogger fence according to the width of the paper to align its edges.
M	Stopper 1 Motor	Moves Stopper 1 to the correct position for folding according to the paper size.
M	Fold Plate Motor	Operates the fold plate for the first fold during multi-sheet folding. Operates Stopper 1 1 during Z-folding.
M	Registration Roller Release Motor	Releases the pressure of the registration roller so paper can be stacked for multi-sheet folding.
M	Dynamic Roller Lift Motor	Raises and lowers the dynamic roller to the correct position for folding.
M	Stopper 2 Motor	Moves Stopper 2 to the correct position for folding according to the paper size.
M	Dynamic Roller Transport Motor	Drives the Dynamic roller.
M	Registration Roller Transport Motor	Drives the registration roller.
M	Direct-Send JG Motor	Operates the direct send junction gate to the Stopper 2.
M	FM6 Pawl Motor	Drives the double-flap pawl that prevents bending of the leading edge when the 3rd fold is executed for FM6 folding (Fourths with 2 Flaps In)
M	Stopper 3 Motor	Moves Stopper 3 to the correct position for folding according to the paper size.
M	2nd Fold Motor	Drives 3rd fold roller. Reverses when the paper does not pass through the 3rd fold unit.
M	Crease Motor	Drives the crease rollers.

Sensors		
S	Top Tray Exit Sensor	Checks for the presence of paper at power on. Detects paper jams at the exit of the top tray. Used to create timing for control of paper fed to the top tray.
S	Entrance Sensor	Checks for the presence of paper at power on. Detects paper jams of paper fed from the upstream unit. Used to create timing for operation of the shift roller during multiple-sheet folding.
S	Entrance JG HP Sensor	Detects when the entrance junction gate is in and out of its home position.
S	Horizontal Path Paper Sensor	Checks for the presence of paper at power on.
S	Top Tray Paper Path Sensor	Checks for the presence of paper at power on. Also checks for jams during paper feed.
S	Top Tray Full Sensor (E)	Detects when the top tray is full.
S	Top Tray Full Sensor (R)	Detects when the top tray is full.
S	Horizontal Path Exit Sensor	Checks for the presence of paper at power on. Checks for paper jams when paper exits to the downstream unit. Used to create timing for paper exit to the downstream unit.
S	Vertical Path Paper Sensor	Checks for the presence of paper at power on.
S	Stopper 1 Paper Sensor	Checks for the presence of paper at power on. Also checks for jams during paper feed. Detects the condition of the stacked sheets during multi-sheet folding.
S	Stopper 1 HP Sensor	Detects when Stopper 1 is in and out of its home position.
S	Jogger Fence HP Sensor	Detects when jogger fence is in and out of its home position.
S	FM6 Pawl HP Sensor	Detects when the FM! pawl is in and out of its home position.
S	Registration Sensor	Checks for the presence of paper at power on. Also checks for jams during paper feed. Used to create timing for registration buckle adjustment during paper feed. Detects the condition of the stacked sheets during multi-sheet folding.
S	Registration Roller HP Sensor	Detects when registration roller is in and out of its home position.
S	Dynamic Roller HP Sensor	Detects when dynamic roller is in and out of its home position.
S	Fold Plate HP Sensor	Detects when the fold plate is in and out of its home position.
S	Direct-Send JG HP Sensor	Detects when the direct-send junction gate is in and out of its home position.
S	Stopper 2 Paper Sensor	Checks for the presence of paper at power on. Also checks for jams during paper feed. Used to create operation timing of the LE pawl solenoid.
S	Stopper 2 HP Sensor	Detects when Stopper 2 is in and out of its home position.
S	Bypass Exit Paper Sensor	Checks for the presence of paper at power on.
S	Bypass Entrance	Checks for the presence of paper at power on.

Sensors		
	Paper Sensor	
S	Stopper 3 Paper Sensor	Checks for the presence of paper at power on. Also checks for jams during paper feed. Used to create the timing that operates the 2nd fold motor during FM6 folding..
S	Stopper 3 HP Sensor	Detects when Stopper 3 is in and out of its home position.

Switches		
SW	Breaker Switch	-
SW	Front Door Switch (SW1)	Detects when the front door is opened or closed. When the front door is opened the interlock switch cuts off the 24V power supply.

Solenoids		
SOL	Top Tray JG Solenoid	Operates the junction gate that sends the paper to the top tray after the direction of the paper has been reversed up and out of the horizontal paper path.
SOL	Exit JG Solenoid	Operates the exit junction gate that directs paper from the multi-fold unit to the exit for the downstream unit or to the exit for the folded paper tray.
SOL	Reverse JG Solenoid	Operates the junction gate that opens the horizontal feed path to paper sent from the fold crease unit.
SOL	LE Stop Pawl Solenoid	Operates the pawl that prevents bending of the leading edge while the paper is being folded in the 2nd fold unit.
SOL	Bypass JG Solenoid	Operates the bypass junction gate which directs paper from the 2nd fold unit to either the bypass or the 3rd fold unit.

Boards		
PCB	PSU	Supplies the 24V power for the operation of the motors and solenoids, and the 5V power for the main board and sensors.
PCB	PSU Fan	Cools the PSU.
PCB	Main Board	Controls operation of the motors, solenoids, sensors, and interface with the main machine.

25. PERFECT BINDER GB5010 (D736)

25.1 SPECIFICATIONS

25.1.1 COVER INTERPOSER (INSERTER)

Feed System	Automatic Paper Feed
Trays	Two. Tray A (upper), Tray B (lower)
Cover Setting	Face-up stacking
Feed	Top to bottom
Transport Mode	Simplex
Cover Paper Type	Standard PPC, Color Paper, Coated Paper
	Paper type mixing not recommended
Cover Size	Standard: A4 SEF, A4 LEF, B5 SEF, B5 LEF, LT SEF, LT LEF, EXE SEF
	Width: 257 to 330.2 mm
	Length: 182 to 487.7 mm
	Recommended: 13"x19.2", 13"x19", 13"x18", A3, B4
Tray A, B Capacity	Up to 200 covers (80 g/m^2)
	Maximum stack thickness: 24 mm
Paper Weight	64 g/m^2 to 300 g/m^2
Paper Positioning	Center aligned
Paper Size Detection	Width: Adjustable slide-fence contact sensors
	Tray A, Tray B: 1 sensor each
	Length: Pulse count photo-sensors
Size (w x d x h)	621 x 679 x 213 mm (24.5 x 26.7 x 8.4 in.)
Weight	Approximately 17 kg (37.4 lb)
Power Supply	DC 24V (supplied from host machine via Perfect Binder)
Power Consumption	Less than 103 W (maximum at operation)

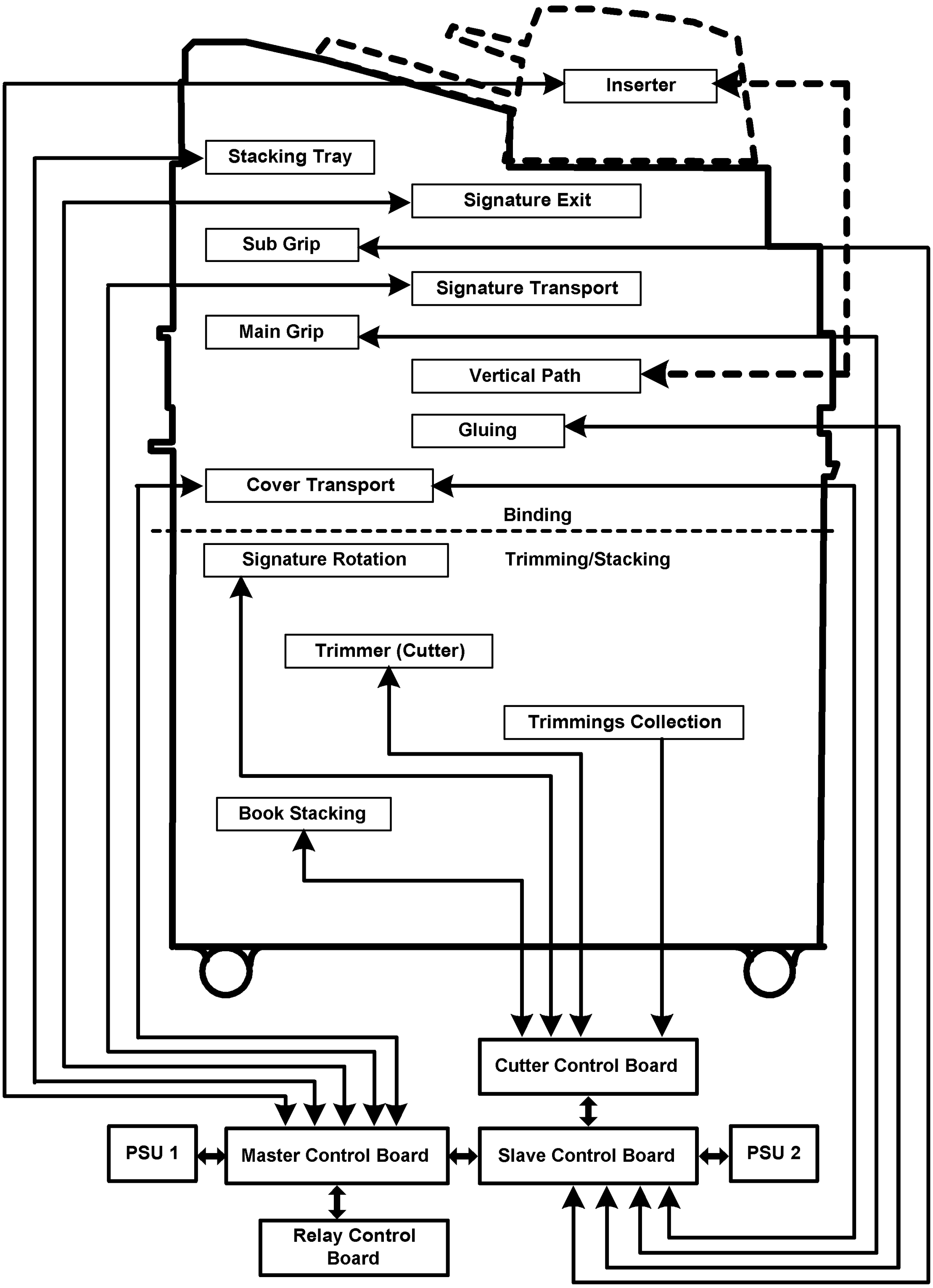
25.1.2 PERFECT BINDER

Paper Positioning	Center aligned	
Delivery	Face-down	
Signature Thickness	10 to 200 sheets (64 to 80 g/m^2) 10 to 150 sheets (81 to 105 g/m^2) Max. thickness: Up to 23 mm (0.9 in.)	
Paper Size	Signature	Width: 182 to 228.6 mm Length: 257 to 320 mm
	Cover	Width: 257 to 330.2 mm Length: 364 to 487.7 mm
Paper Thickness	Signature	64 to 163 g/m^2
	Cover	90 to 300 g/m^2
Finished Size	Width	139.7 mm to 216 mm
	Length	201 to 297 mm
Trimming Range	Top	6 to 28 mm
	Bottom	6 to 28 mm
	Fore Edge	6 to 50 mm

Recommended Cover/Signature Size Ratios	**Target**	**Signature**	**Cover**
	A4	SRA4	13"x19.2" 13"x19" 13"x18" SRA3
	B5	A4	A3
	A5	B5	B4
	LT	9"x12"	13"x19.2" 13"x19"
Trimming Modes	3 cuts: Bottom, top, fore edge 1 cut: Fore edge (Limit: 297 mm) No cuts		
Downstream Delivery	Straight-through, no binding		
	Size	Width: 98.4 to 330.2 mm Length: 139.7 to 487.7 mm	
	Paper Weight	52 to 300 g/m^2	
Book Output Tray	Max.: 23 mm (80g/m^2) Book door locked during operation		
Warm-up Time	Less than 440 sec. (6.3 min.)		
Glue Capacity	Glue vat 380 g (continuous pellet supply) Approximately A4 to B5 100 books		

Trimmings Box Capacity	More than 15 books Approx. A4 to B5 of 100 sheets each, 80 g/m^2
Size (w x d x h)	1090 x 791 x 1387 mm (43 x 31 x 53.5 in.)
Weight	350 kg (770 lb)
Power Supply	EU: 220 to 240V 50/60 Hz NA: 208 60 Hz
Power Consumption	Less than 623 W (with inserter)

25.2 OVERVIEW



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The bookbinder is divided into two parts: the binding unit (top half) and trimming/stacking unit (bottom half). In the binding unit paper sent from the host machine is stacked and aligned (jogged) to form the signature, and then the signature is glued on one edge and joined with the cover. In the trimming unit the book is trimmed, stacked, and output.

The binding unit is comprised of eight distinct units:

- Vertical Transport
- Signature Transport
- Signature Exit
- Stacking Tray
- Sub Grip
- Main Grip
- Gluing
- Cover Transport

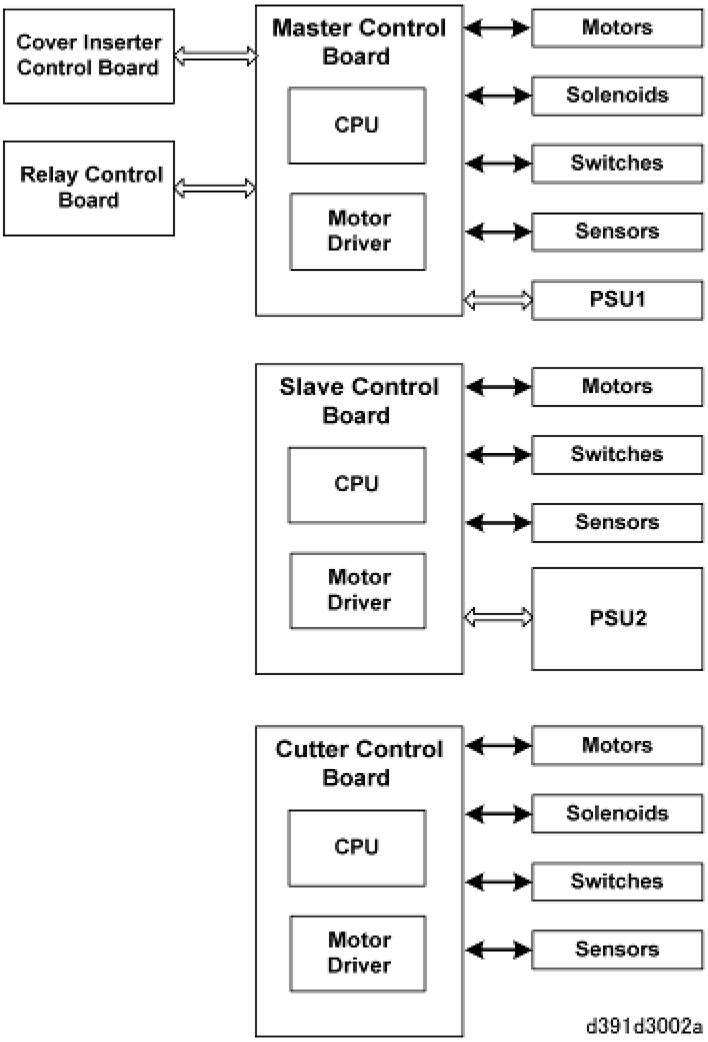
The trimming unit/stacking unit is comprised of four units:

- Signature rotation
- Trimmer (cutter)
- Trimmings collection
- Book stacking

The inserter installed on top of the bookbinder feeds covers through the vertical feed path to the bookbinder below.

25.3 GENERAL BOARD LAYOUT

The master control, slave control, and cutter control boards control the operation of the bookbinder. Each board contains a 16-bit PCU that controls the operations assigned to each board. An optional control board can be connected to the master control board for communication with and control of connected devices.

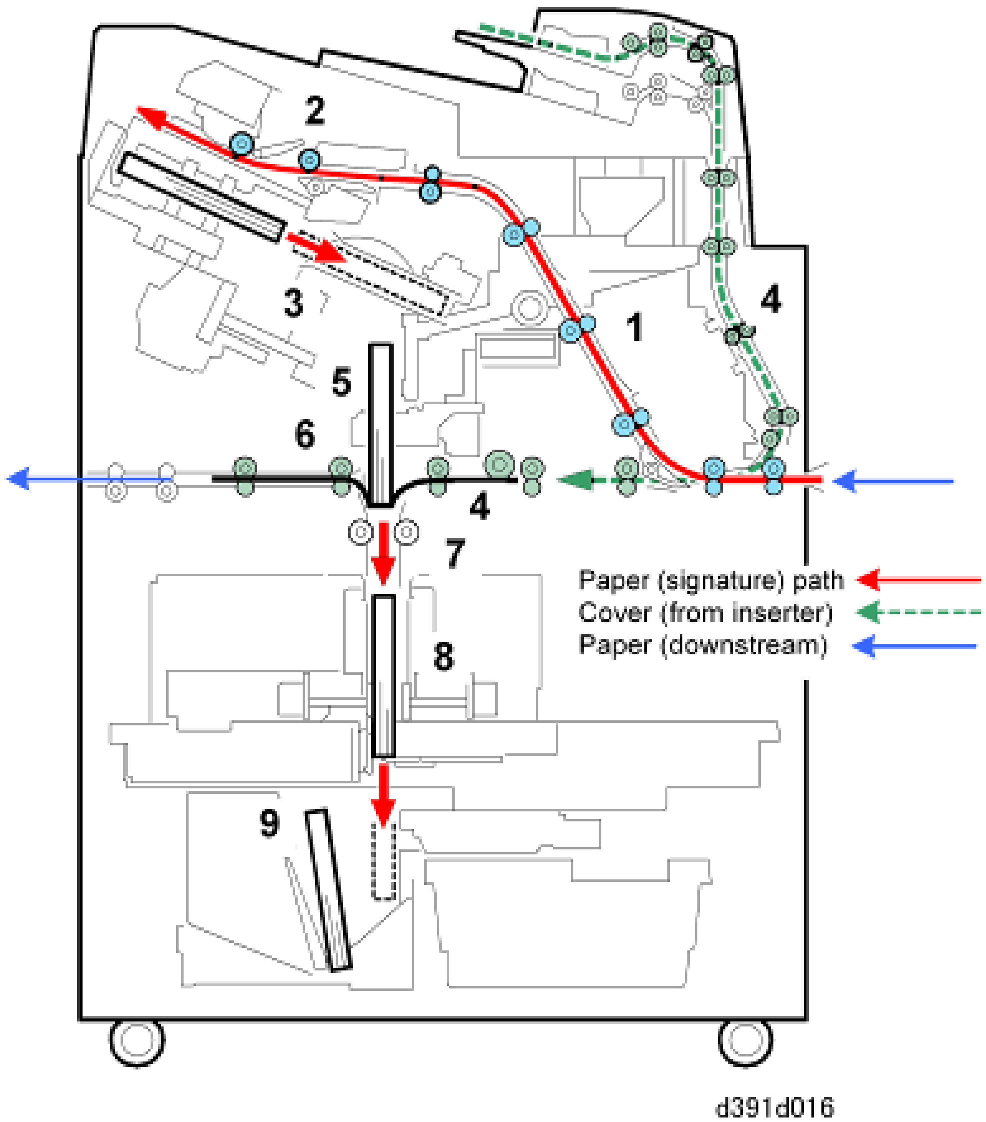


Every control board shares these common points in their configurations:

- The CPU of each board has a built-in ROM that contains the firmware for the control of operation sequences.
- The boards control and drive motors using commands sent from the host machine.
- The board circuits are also to communicate a steady stream of information from the bookbinder to the host machine.

25.4 BASIC OPERATION

In response to the commands from the host machine the bookbinder feeds paper from the host machine to assemble a signature in the stacking tray, feeds a cover from the cover inserter, then assembles the cover and signature by gluing them together. Without commands for creation of a bound book, the bookbinder feeds paper straight through the horizontal transport path for downstream delivery. Once the commands are received for binding sheets into a book, the operational control passes to the master control board, slave control board, and cutter control board.



1	The entrance junction gate directs paper from the host machine to the signature path transport rollers.
2	As each sheet arrives on the stacking tray, the sides and trailing/leading edges are jogged by side fences and positioning rollers to form the signature (stack).
3	After the last sheet is fed, the aligned signature (stack) is clamped in the sub grip and passed to the main grip that positions the signature for gluing.
4	One cover sheet feeds from the inserter mounted on top of the bookbinder and comes to rest below the signature.
5	Glue is applied to the spine of the signature.
6	The glued spine of the signature is set in the center of the cover below and then pushed down so the halves of the cover wrap up around the signature to form the book.
7	The book (cover and signature now glued together) is moved to the trimming unit.
8	The book is rotated three times for trimming on the bottom, top, and fore edge.
9	The trimmed book is sent to the book stacking tray.

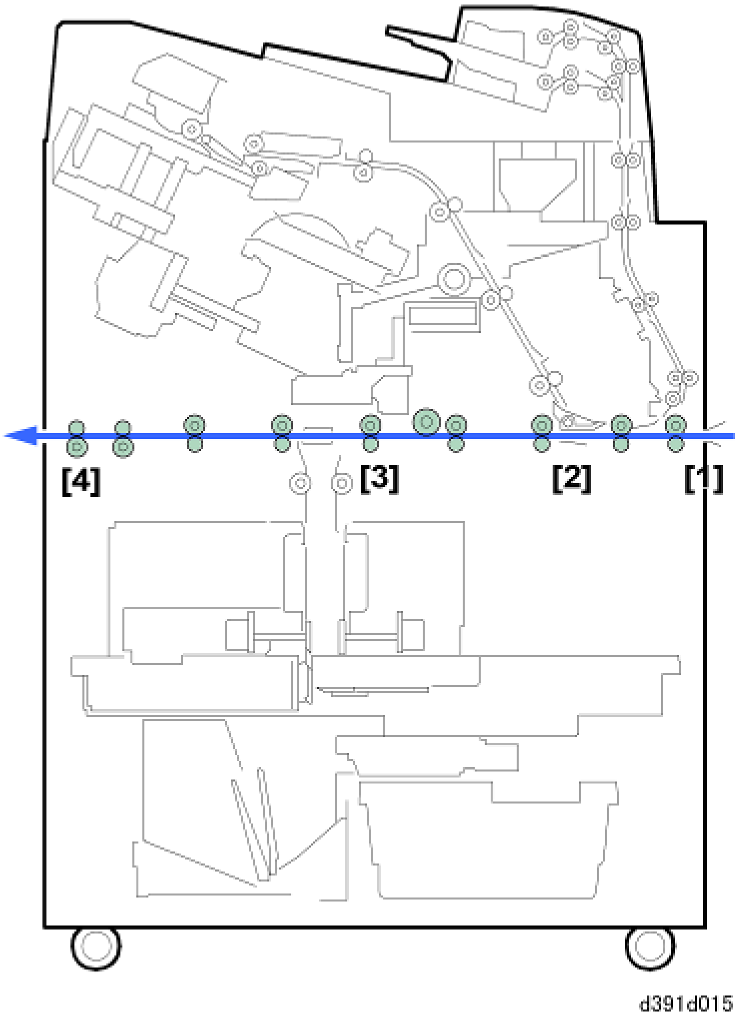
25.5

25.6 EXIT PATHS

The path that paper follows through the bookbinder depends on whether bookbinding is selected for the job.

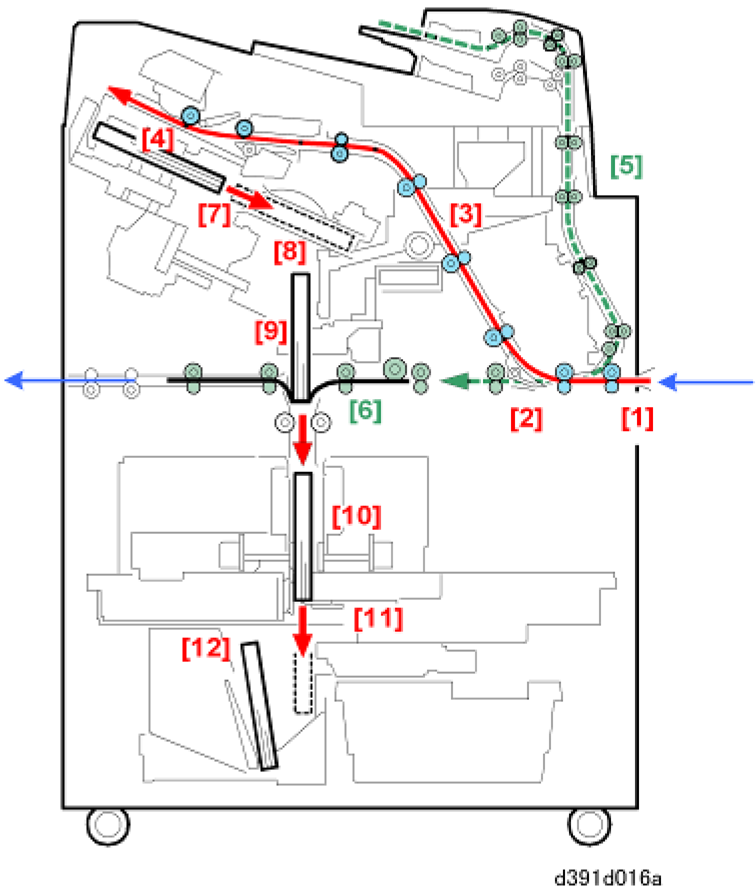
- **Downstream Delivery**. Paper enters the bookbinder passes straight through the bookbinder on the horizontal paper path and exits the bookbinder.
- **Bookbinding Delivery**. Paper enters the bookbinder, enters the signature paper path to the stacking tray and then down to the gluing unit where it is bound to a cover fed from the inserter unit, trimmed and then goes to the book stacking tray.

25.6.1 DOWNSTREAM DELIVERY EXIT



Paper from the host machine enters the bookbinder at the entrance rollers [1]. The entrance junction gate solenoid at [2] remains OFF so the entrance junction gate remains UP so paper can pass through the horizontal transport rollers [3]. The paper exits the bookbinder at [4].

25.6.2 BOOKBINDING DELIVERY EXIT



Paper sent from the host machine enters the bookbinder at the entrance rollers [1]. The entrance junction gate solenoid turns ON and lowers the entrance junction gate [2] to guide paper to the signature path [3]. As each sheet arrives on the stacking tray [4], the sides and trailing/leading edges are jogged by side fences and positioning rollers to align the signature (stack) for binding.

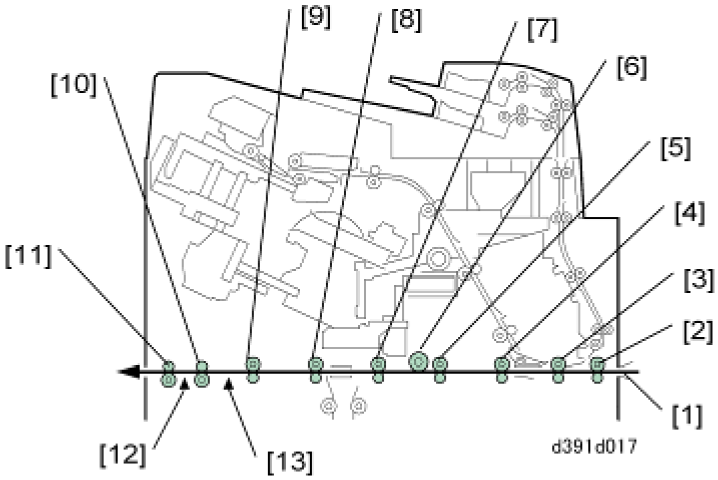
One cover sheet feeds from the inserter mounted on top of the bookbinder through the vertical transport path [5] and comes to rest below the signature and on top of the cover registration unit [6].

After the last sheet is fed to the stacking tray, the aligned signature (stack) is clamped in the sub grip [7] and passed to the main grip [8] that positions the signature for gluing in the gluing unit [9]. The main grip holds the signature as it is glued and then pushes the glued edge into center of the cover below. The sides of the cover fold up around the signature as it is lowered to form the book at [10].

Next, the book descends to the trimming unit [11] where the top, bottom, and fore edges of the book are trimmed.

Finally, the trimmed book is lowered into the book tray buffer and output to the stacking tray [12].

25.7 DOWNSTREAM DELIVERY



[1]	Paper
[2]	Entrance Roller
[3]	Signature Transport Roller 1
[4]	Horizontal Transport Roller 1
[5]	Horizontal Transport Roller 2
[6]	Buffer Roller
[7]	Horizontal Transport Roller 3
[8]	Horizontal Transport Roller 4
[9]	Horizontal Transport Roller 5
[10]	Exit Roller 1
[11]	Exit Roller 2
[12]	Horizontal Exit Sensor (S25)
[13]	Cover Path Sensor 2 (S26)

The paper [1] sent from the host machine is fed by the entrance roller [2] to the horizontal transport rollers. Next, the paper feeds through the horizontal transport rollers. The sensors in the horizontal transport path monitor the passing of each sheet in the paper path.

The following motors switch on just before the sheet arrives at the entrance roller:

- Entrance motor (M10). Drives the entrance roller [2] and signature transport roller [3].
- Cover motor (right) (M12). Drives transport roller 2 [5], transport roller 3 [7], and buffer roller [6].
- Cover motor (left) (M13). Drives transport roller 4 [8] and transport roller 5 [9].
- Exit motor (M14). Drives exit roller [10] and exit roller [11]

The rotation of the entrance roller feeds the paper into the horizontal feed path on top of the cove registration unit. The entrance roller and all other rollers rotate at the same speed as the exit roller of the host machine until the paper exits the bookbinder.

25.8 BLANK PAPER HANDLING

There is a recovery function to handle blank paper sent to the bookbinder by the host machine, depending on whether the feed is set for downstream delivery or book binding.

25.8.1 DOWNSTREAM DELIVERY MODE WITH BLANK PAPER

When blank paper is fed to the entrance roller in the downstream delivery mode, the entrance junction gate remains up so the paper goes into the horizontal transport path. The blank paper passes straight through the horizontal transport rollers and exits the bookbinder.

25.8.2 BOOKBINDING MODE WITH BLANK PAPER

When blank paper is fed to the entrance roller in the bookbinding mode, the entrance roller and signature transport roller 1 feed the paper past the lowered entrance junction gate. The entrance junction gate guides the paper into the signature transport unit. When the signature path sensor 1 (S18) detects the leading edge of the paper, the master control board stops paper feed and the host machine issues a paper jam error. After the paper jam is issued, however, the blank paper is sent to the stacking tray where processing continues.

25.9 AUTOMATIC EXIT

The bookbinder enters automatic exit mode when one of the following events occurs:

- If the bookbinder is switched off during bookbinding.
- When one or both front doors are opened
- When a paper jam occurs
- When any type of error occurs

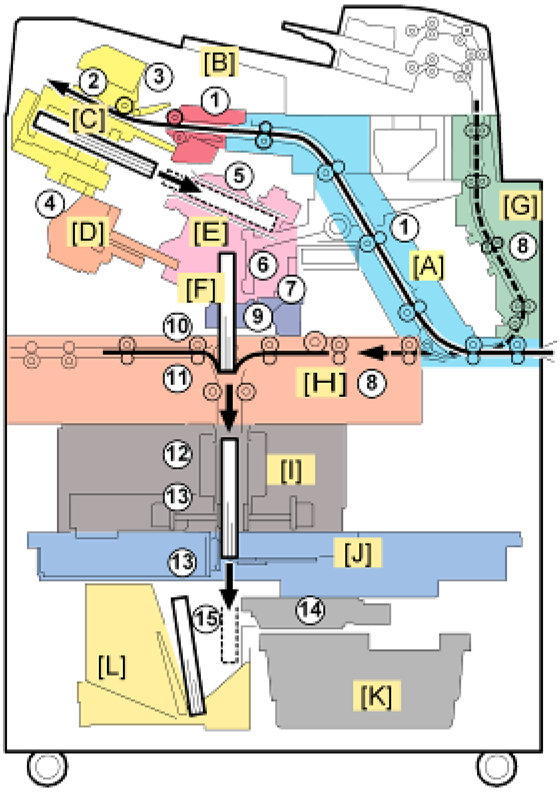
The bookbinding operation stops with the signature gripped in the sub grip or main grip unit.

When the bookbinder is turned on again, or after the front doors are closed, if the master control board, slave control board or cutter control board detect a signature in the sub grip, main grip, or trimming unit, the bookbinder enters the automatic exit mode.

However, even if a signature is detected in the sub grip unit before the signature is passed to the main grip unit, the bookbinder does not enter automatic exit mode to allow removal of the signature from the sub grip manually. In all other cases, if one of the control boards determines whether the signature can be removed manually, the bookbinder does not enter automatic exit mode.

25.10 BOOK BINDING

25.10.1 OVERVIEW



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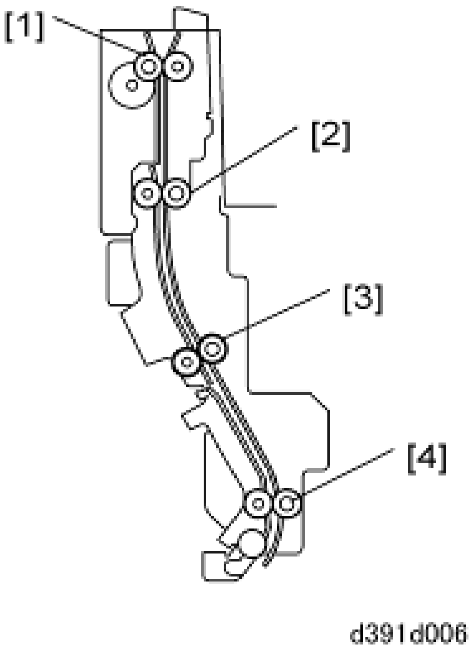
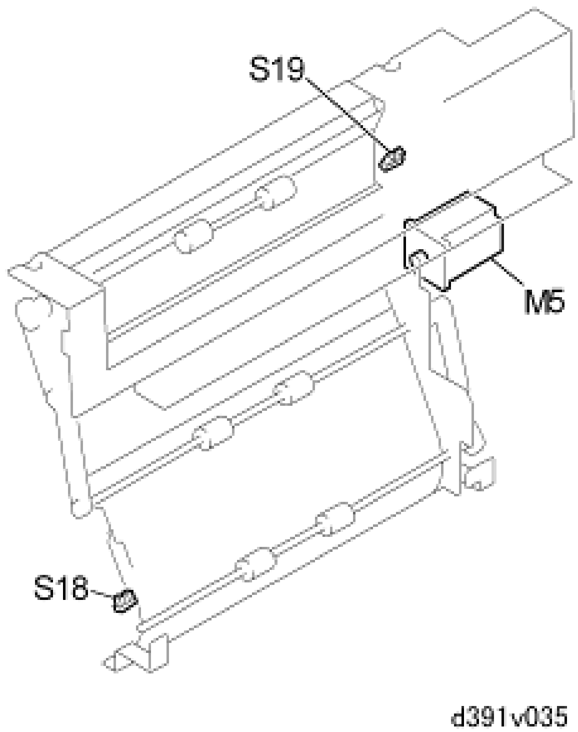
After paper sent from the host machine is aligned for binding in the stacking tray, the stack (signature) is aligned for gluing. Glue is applied to the spine of the signature and then the signature is joined with the cover. Next, the bound signature and cover (the book) is trimmed on its three open edges in the trimming unit.
Here is a summary of the bookbinding operation flow.

①	Paper sent from the host machine passes through the signature path [A] and out the signature path exit [B].
②	The paper is stacked and aligned (jogged) on the stacking tray [C] so all the edges are even.
③	As each sheet enters the stacking tray, its sides are aligned by the front and rear jogger fence and a positioning roller pulls the sheet to the right to align the trailing edge.
④	After the last sheet feeds the sub grip unit [D] with the aligned stack (signature) firmly clamped lowers away from the bottom of the stacking tray and passes the signature to the main grip unit [E].
⑤	The main grip unit rotates the signature clockwise until it is vertical with its spine pointing down and then lowers it to the spine alignment plate.
⑥	The grip unit drops the spine of the signature once onto the spine alignment plate to align the edges of the sheets in the spine so they are even.
⑦	The main grip unit once again clamps the signature and

	raises to the gluing unit [F]
⑧	One cover sheet feeds from the inserter down through the vertical path [G] and stops on top the cover transport unit [H]. Here the cover registration operation positions the cover to be joined with the signature.
⑨	The gluing unit [F] applies glue to the signature spine.
⑩	The main grip unit lowers the signature and pushes it into the center of the cover below supported by the cover fold plate.
⑪	Once the cover and signature are joined at the spine, the grip unit releases the signature, rises to a higher position, and then clamps the signature again. The cover fold plate retracts and the grip unit pushes the signature and cover down through the gap created by the retracted cover fold plate. As the grip unit pushes the signature and cover through the gap, the sides of the cover fold up around the front and back side of the signature.
⑫	The grip unit lowers the joined signature and cover (the book) to the book rotation unit [I] where the book is firmly clamped between two opposing plates, released and then clamped again to the book is positioned for the first cut.
⑬	In the trimming unit [J] the cutting blade (moving right to left) trims the bottom edge and retracts. The book is rotated 180°, the blade cuts the top edge, the book is rotated 90° and the blade cuts the fore edge.
⑭	The trimmer unit expels the trimmings from the cutting mechanism and they fall into the trimmings collection box [K].
⑮	Finally, the finished book is lowered to the book stacking tray [L].

25.11 COVER TRANSPORT: VERTICAL PATH



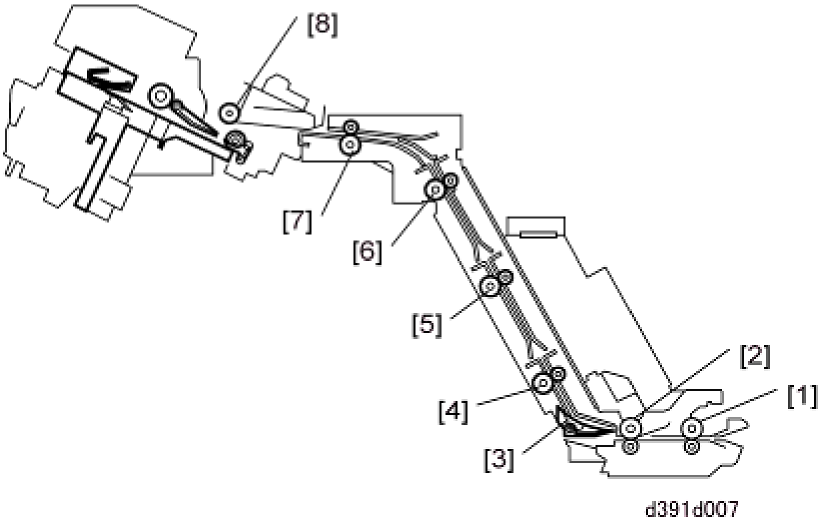


[1]	Vertical Transport Roller 1
[2]	Vertical Transport Roller 2
[3]	Vertical Transport Roller 3
[4]	Vertical Transport Roller 4
M5	Vertical Transport Motor (M5 (INS))
S18	Vertical Transport Sensor 1 (S19 (INS))
S19	Vertical Transport Sensor 2 (S18 (INS))

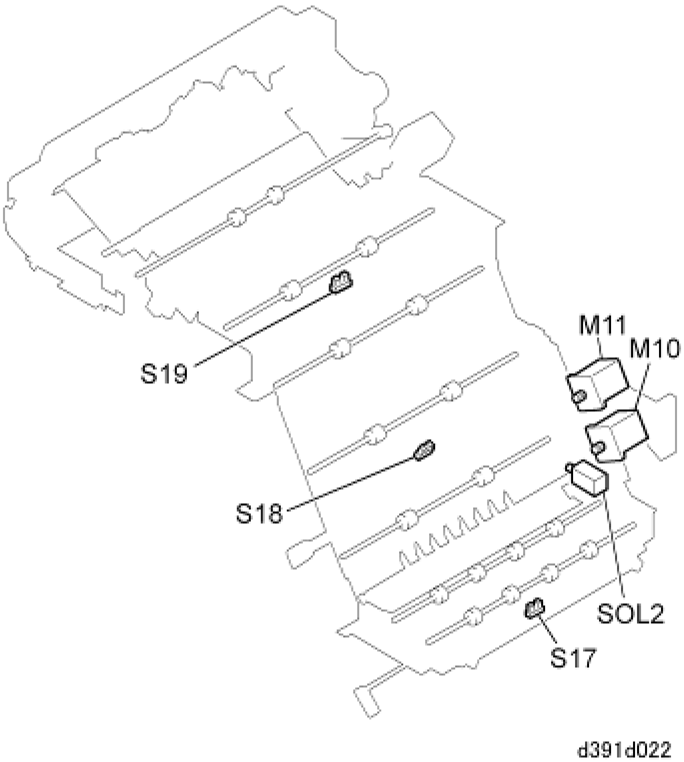
The vertical path rollers feed paper from the inserter as far as the signature transport roller 1. Covers fed from the inserter enter the vertical path at vertical transport roller [1]. The inserter control board (connected to the master control board) controls the operation of the vertical transport motor (M5 (INS)) that drives all the transport rollers in the vertical path. Vertical transport sensors 1 and 2 (S19/S18 (INS)) detect the leading and trailing edges of each cover and signal a jam if a cover stops or fails to arrive at the prescribed time.

25.12 PAPER/SIGNATURE TRANSPORT

25.12.1 SIGNATURE PATH TRANSPORT OPERATION



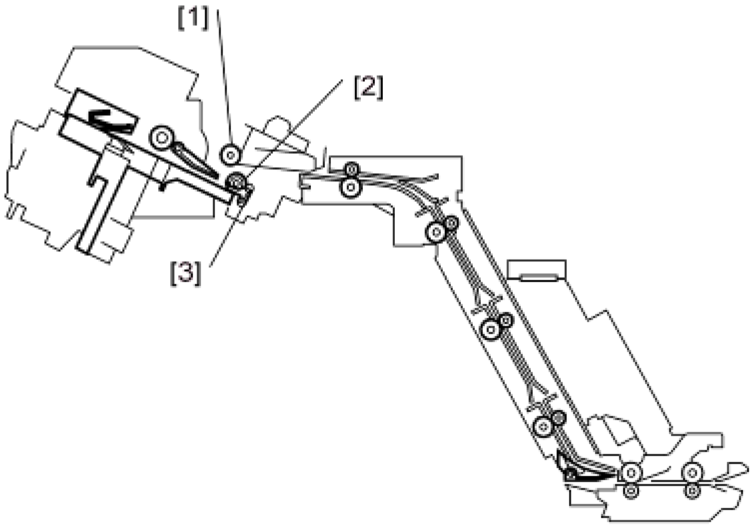
[1]	Entrance Roller
[2]	Signature Transport Roller 1
[3]	Entrance Junction Gate
[4]	Signature Transport Roller 2
[5]	Signature Transport Roller 3
[6]	Signature Transport Roller 4
[7]	Signature Transport Roller 5
[8]	Signature Exit Roller



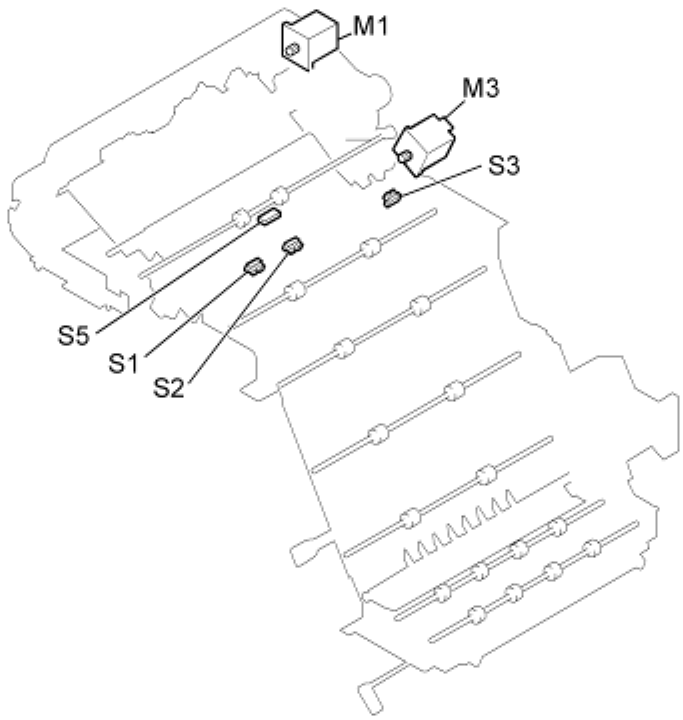
M10	Entrance Motor
M11	Signature Transport Motor
SOL2	Entrance JG Solenoid
S17	Entrance Sensor
S18	Signature Path Sensor 1
S19	Signature Path Sensor 2

The signature path rollers transport paper from the host machine to the stacking tray. The master control board controls the operation of the entrance motor (M10) and signature transport motor (M11). These motors are switched on just before the leading edge of the first sheet arrives at the entrance roller and rotate at the same speed as the host machine exit rollers. When the motors switch on the entrance junction gate solenoid turns on and lowers the exit junction gate which guides the paper into the signature transport path.
The entrance sensor (S17), signature path sensor 1 (S18), and signature path sensor (S19) detect the leading and trailing edges of each sheet and signal a jam if a sheet stops or fails to arrive at the sensor position at the prescribed time.

25.12.2 SIGNATURE PATH EXIT



[1]	Signature Exit Roller
[2]	Stacking Roller
[3]	TE Press Lever



M1	Stacking Roller Motor
M3	TE Press Lever Motor
S1	Paper Detection Sensor (Front)
S2	Paper Detection Sensor (Rear)
S3	TE Press Lever HP Sensor
S5	Timing Sensor

The signature path exit unit (located at the top of the signature path unit):

- Feeds paper onto the stacking tray
- Depresses the stacked trailing edges of the stack
- Detects the height of the stack in the stacking tray.

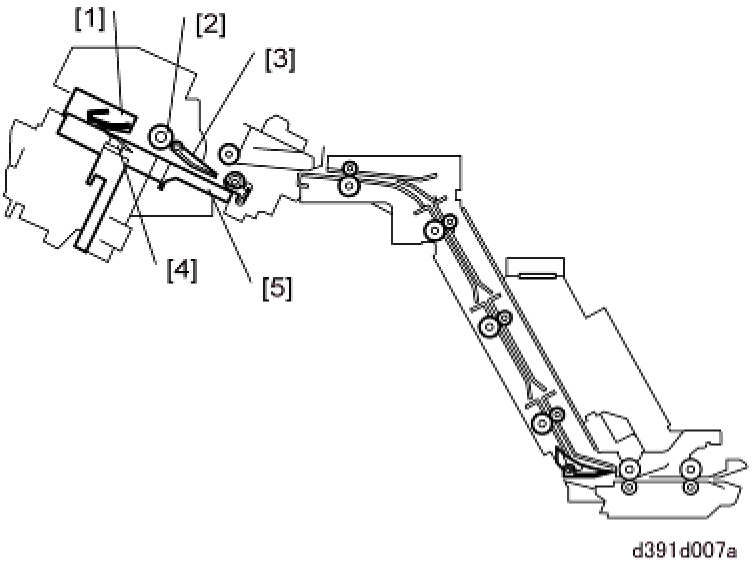
The master control board controls the operation of the stacking roller motor (M1). This motor is switched on just before the leading edge of the first sheet arrives at the entrance roller and rotates at the same speed as the host machine exit rollers. The stacking roller motor (M1) drives the signature exit roller and stacking roller.

The timing sensor (S5) detects the leading and trailing edge of each sheet and signals a jam if the paper stops or fails to arrive within the prescribed time.

Also, when the timing sensor (S5) detects the trailing edge of the sheet, the TE press lever motor (M2) turns on and lowers the TE press lever which presses down the trailing edge of the sheet as soon as it enters the stacking tray. Next, the TE press lever motor (M2) reverses and is then switched off by the TE press lever HP sensor (S3) when the lever returns to its home position.

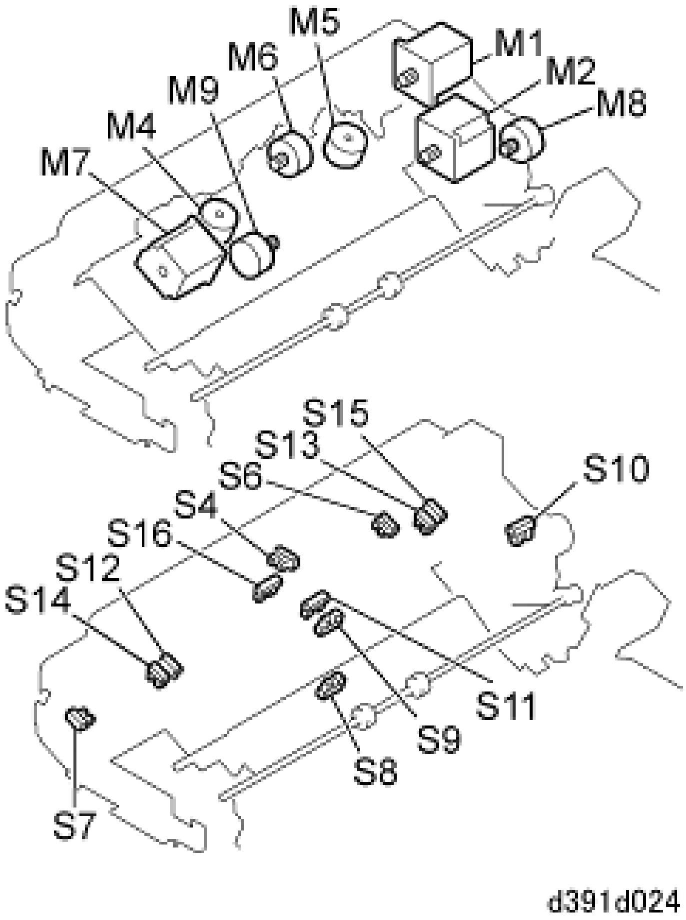
The signal from the paper detection sensors (front/rear) (S1/S2) lower the stacking tray. These sensors (mounted on the TE press lever) control the operation of the TE press lever motor (M3).

25.12.3 STACKING TRAY OPERATION

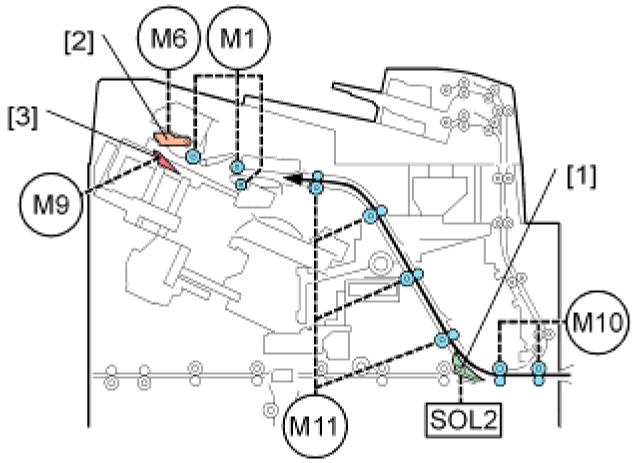


[1]	Jog Fences
[2]	Switchback Rollers
[3]	Switchback Flapper
[4]	Stacking Tray Guide
[5]	Trailing Edge Guide

The stacking tray stacks and aligns (jogs) the front side, rear side, and trailing edge of each sheet as it arrives in the tray. After the last sheet has been fed and its edges aligned, this forms the signature to be bound to the cover.



M1	Stacking Roller Motor
M2	Stacking Tray Lift Motor
M4	Jog Motor (Front)
M5	Jog Motor (Rear)
M6	Stacking Weight Motor
M7	Switchback Roller Lift Motor
M8	Switchback Flapper Motor
M9	Stacking Tray Motor
S4	Top Cover Sensor
S6	Stacking Tray Overflow Sensor
S7	Stacking Tray Lower Limit Sensor
S8	Tray Empty Sensor
S9	Stacking Tray HP Sensor
S10	Switchback Flapper HP Sensor
S11	Switchback Roller HP Sensor
S12	Jog Fence HP Sensor (Front: Small)
S13	Jog Fence HP Sensor (Rear: Small)
S14	Jog Fence HP Sensor (Front: Large)
S15	Jog Fence HP Sensor (Rear: Large)
S16	Stacking Weight HP Sensor



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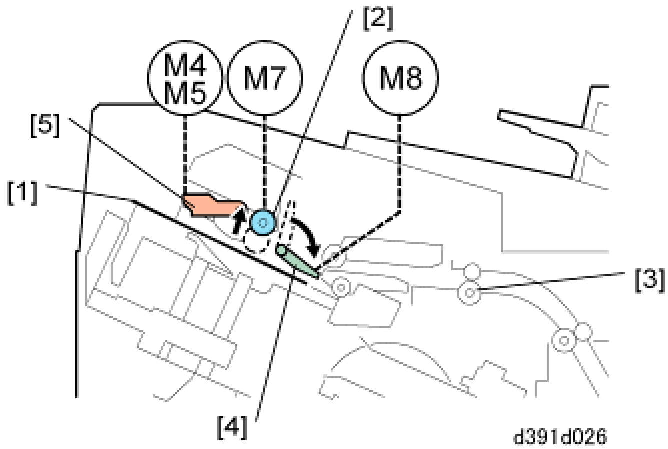
At the start of a job and before the leading edge of the first sheet of paper enters the bookbinder, the following motors turn on and start rotating at the same speed of the host machine exit rollers: entrance motor (M10), signature transport motor (M11), stacking roller motor (M1).

At the same time the entrance junction gate solenoid (SOL2) turns on and lowers the entrance junction gate [1] to guide paper into the signature path. The stacking weight motor (M6) and stacking tray motor (M9) also turn on and move the stacking weight [2] and stacking tray guide [3] to the correct positions for the job paper size.



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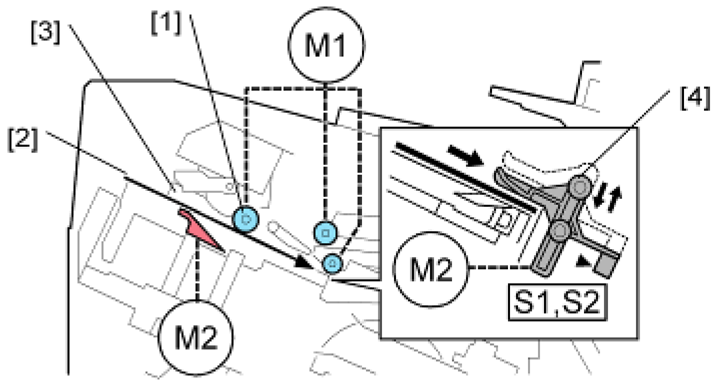
After the leading edge of the paper [1] is detected by the timing sensor (S5) and after the paper has traveled the prescribed distance, the switchback roller lift motor (M7) turns on. This lowers the switchback roller [2] to the transport position and the paper feeds into the nip of the switchback roller.

After the trailing edge of the paper has fed 10 mm past signature transport roller 5 [3] the line speed is increased to 1100 mm/s.

After the leading edge of the paper is detected by the timing sensor (S5) and the paper has traveled the prescribed distance, it stops at the switchback position. After the paper stops the switchback flapper motor (M8) turns on and moves the switchback flapper [4].

The switchback roller lift motor (M7) turns on and retracts the switchback roller from the paper to release it for jogging. First, the jog motor (rear) (M5) turns on and moves the rear jog fence [5] to the start position for the paper size where it will remain during jogging. Next, the jog motor (front) (M4) moves the front jog fence to the start position for the paper size. The front fence pushes the paper against the stationary rear fence during jogging.



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After the side fences have jogged and aligned the sides of the stack, the switchback roller lift motor (M7) turns on and lowers the switchback roller [1] until it contacts the paper [2]. Next, the jog motor (front) (M4) and jog motor (rear) (M5) reverse and retract the front and rear jog fences [3] to their home positions.

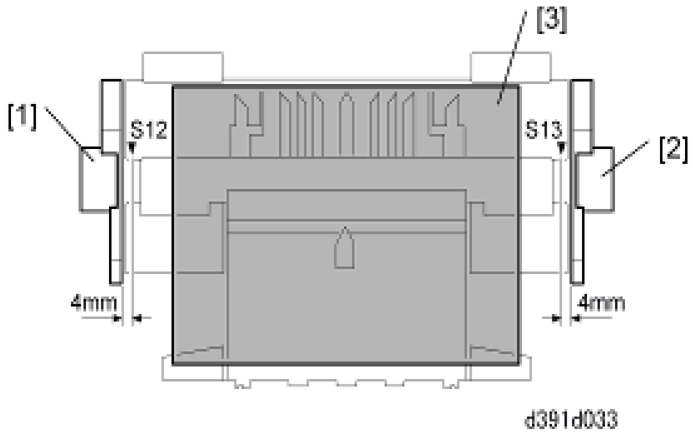
The stacking roller motor (M1) turns on and drives the switchback roller which feeds the paper at 700 mm/s in the reverse (switchback) direction. At this time the TE press lever motor (M3) raises and opens the TE press lever [4]. As soon as the sheet has fed in the switchback direction for the prescribed time, the motor reverses, and then lowers and clamps the trailing edge of the sheet. The signal from the paper detection sensors (front/rear) (S1/S2) lower the stacking tray. These sensors (mounted on the TE press lever) control the operation of the stacking tray lift motor (M2).

After the TE press lever has clamped the trailing edges of the sheets in the stack, the switchback flapper motor (M8) turns on and returns the switchback flapper to its home position to receive the next sheet. At the same time the switchback roller lift motor (M7) turns on, raises the switchback roller, and returns it to its home position to receive the next sheet. After the switchback roller has been raised, the stacking roller motor (M1) resumes its rotation at the same speed of the host machine exit rollers.

The size of the paper selected for the job determines:

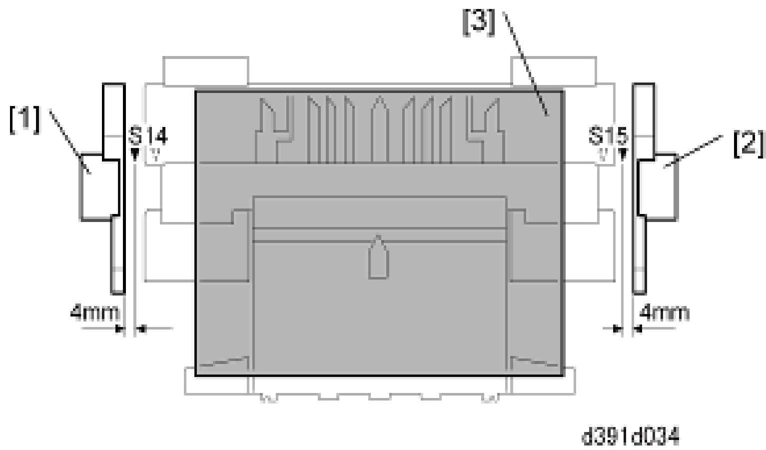
- Standby positions of the side fences
- Which sensor pair is used to detect the home positions of the fences

Paper Up to 298 mm Wide



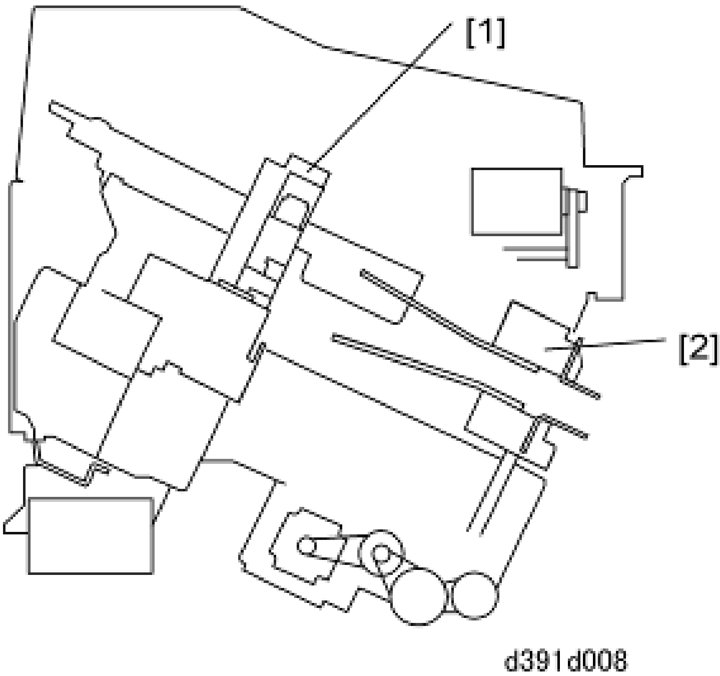
[1]	Front Jog Fence
[2]	Rear Jog Fence
[3]	Paper
S12	Jog Fence HP Sensor: Front: Small
S13	Jog Fence HP Sensor: Rear: Small

Paper Wider Than 298 mm

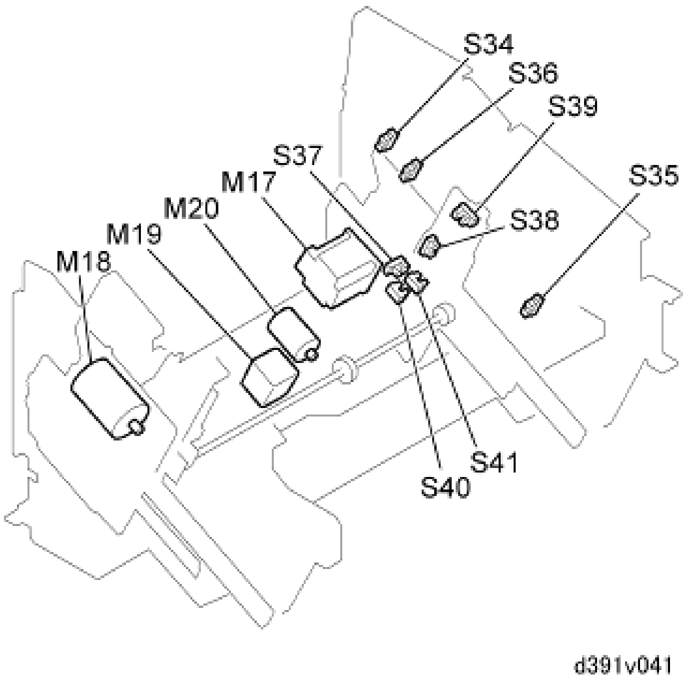


[1]	Front Jog Fence
[2]	Rear Jog Fence
[3]	Paper
S14	Jog Fence HP Sensor: Front: Large
S15	Jog Fence HP Sensor: Rear: Large

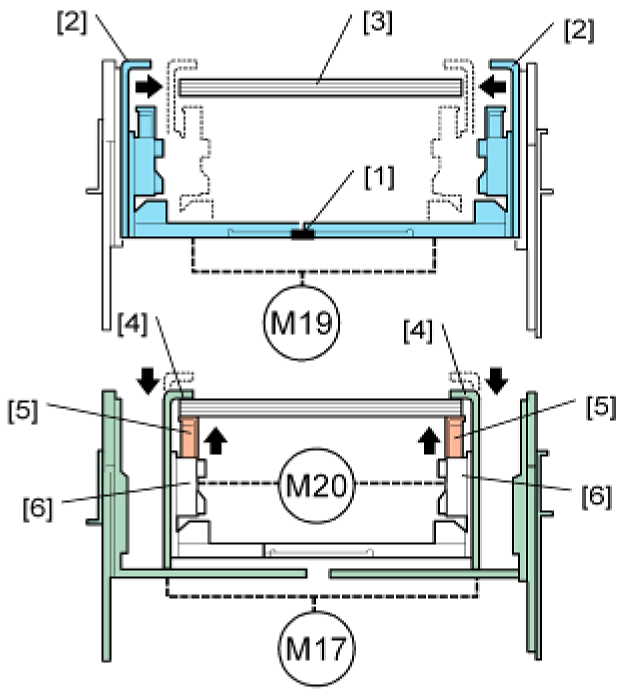
25.12.4 SUB GRIP OPERATION



The sub grip unit [1] takes the aligned stack (signature) from the stacking tray unit and passes it to the main grip [2].



M17	Sub Grip Lift Motor
M18	Signature Move Motor
M19	Sub Grip Size Motor
M20	Sub Grip Motor
S34	Signature HP Sensor
S35	Signature Main Grip Position Sensor
S36	Main Grip Rotate Enable Sensor
S37	Sub Grip HP Sensor
S38	Size HP Sensor
S39	Sub Grip Signature Sensor
S40	Sub Grip Open Sensor
S41	Sub Grip Close Sensor



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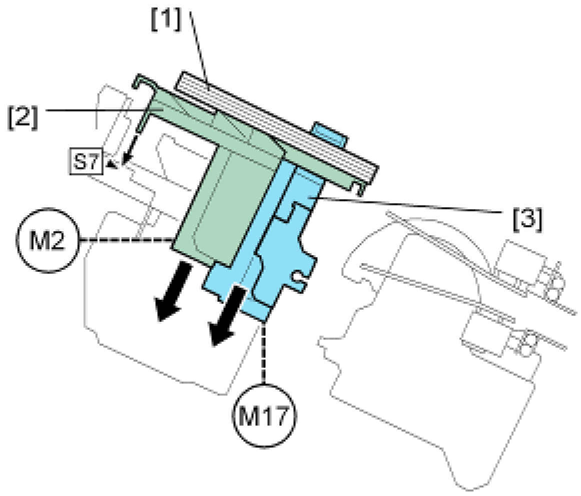
After all the sheets have been stacked and aligned in the stacking tray to form the signature, the sub grip size motor (M19) turns on and rotates the size move gear [1] (a pinion) which starts driving both sides of the sub gripper [2] toward the edges of the signature [3].

After the front and rear sub gripper plates close onto the sides of the signature in the sub grip unit, the sub grip unit lift motor (M17) turns on, lowers the sub grip unit 10 mm, and then reverses and moves the signature up to the arms [4] at the top of the front and back of the sub gripper plates [5]. Next, the sub grip motor (M20) turns on and raises the front and rear bottom plates [6] of the sub gripper until the signature is firmly clamped.



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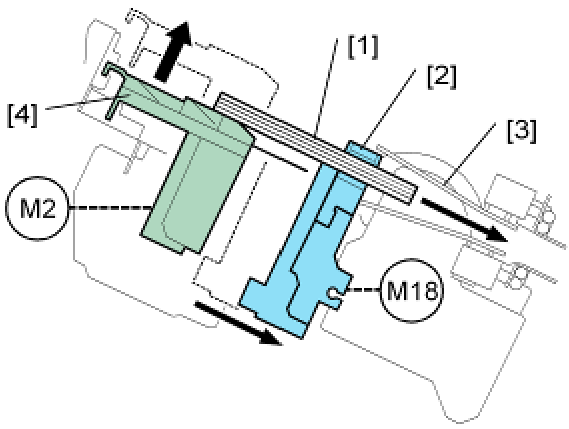
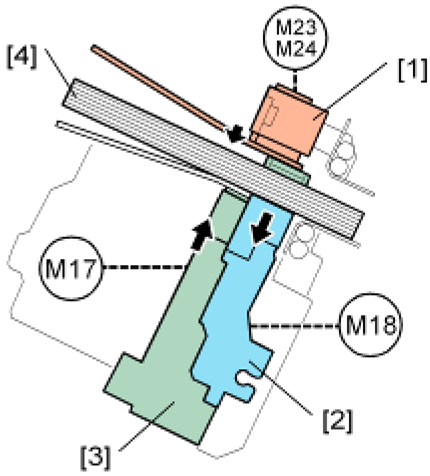
With the signature [1] firmly clamped, the stacking tray lift motor (M2) and sub grip lift motor (M17) switch on and lower both the stacking tray [2] and sub grip unit [3] as far as the stacking tray lower limit sensor (S7) and then stop.

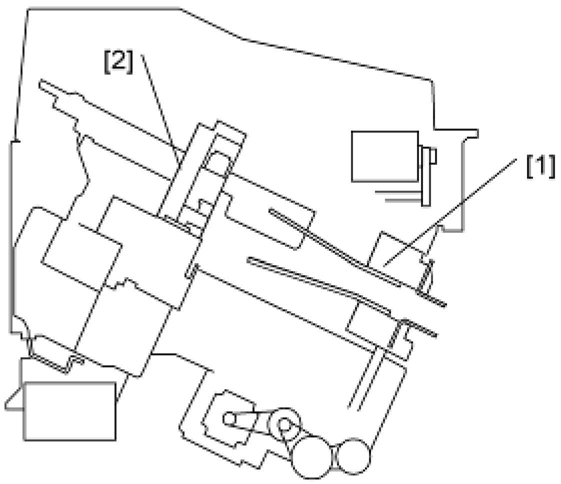


The signature move motor (M18) turns on and moves the signature [1] from the sub grip unit [2] to the main grip [3] transfer point. Next, the stacking tray lift motor (M2) turns on and raises the end of stacking tray at [4]. This action tilts the signature so it slides into the main grip unit.



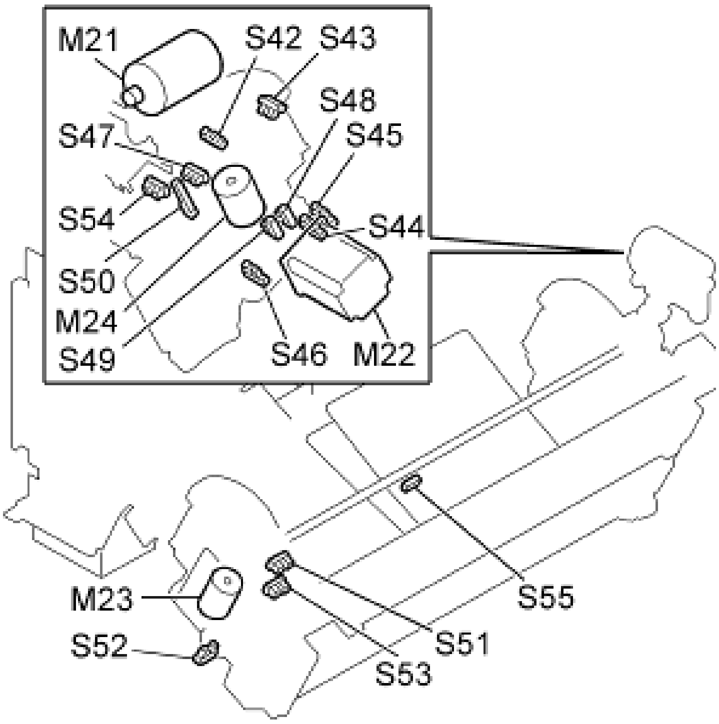
The grip motor: front (M24) and grip motor: rear (M23) switch on and close the main gripper [1] to clamp the signature tightly at the spine. Next, the sub grip motor (M20) turns on and opens the sub gripper [2] to release the signature in the sub grip unit. After the signature is released by the sub grip unit [3], the sub grip lift motor (M17) turns on and raises the sub grip unit about 5 mm away from the signature [4], then returns the sub grip unit to its home position.

25.12.5 MAIN GRIP OPERATION

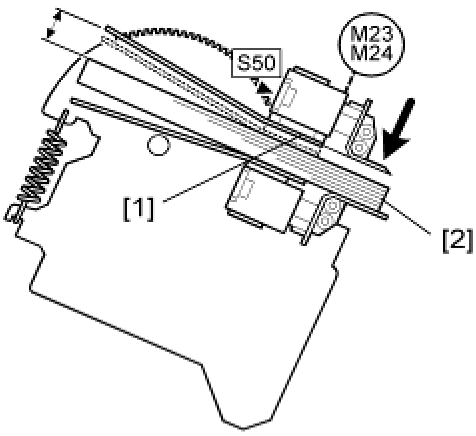


The main grip unit [1] receives the signature from the sub grip unit [2], tamps the spine of the signature to align it for gluing, lowers the signature onto the gluing unit for the application of glue to the spine, and then passes the signature to the trimming unit.

[1]	Mini-Gripper
[2]	Main Gripper



M21	Grip Unit Rotation Motor
M22	Main Grip Lift Motor
M23	Gripper Motor: Rear
M23	Gripper Motor: Rear
M24	Grip Motor: Front
S42	Rotate-to-Binding Position Sensor
S43	Main Grip Rotate HP Sensor
S44	Main Grip HP Sensor
S45	Main Grip HP Sensor: H
S46	Main Grip Encoder: Rear
S47	Main Grip Open Sensor: Rear
S48	Main Grip Press Sensor 1
S49	Main Grip Press Sensor 2
S50	Signature Thickness Sensor
S51	Main Grip Open Sensor: Front
S52	Main Grip Encoder: Front
S53	Main Grip Close Sensor: Front
S54	Main Grip Close Sensor: Rear
S55	Main Grip Signature Sensor



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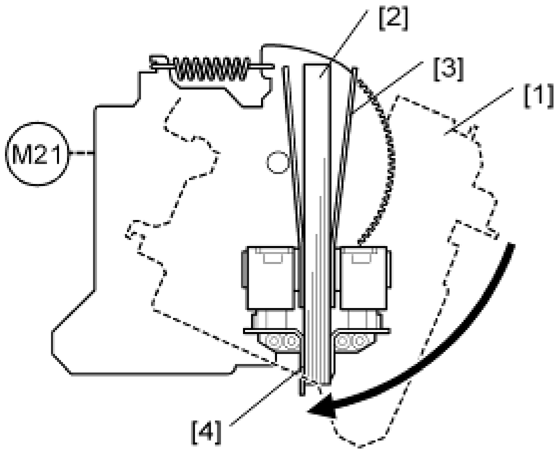
The gripper motor: front (M24) the gripper motor: rear (M23) switch on and close the main grip [1], securely clamping the signature [2] passed from the sub grip to the main grip. At this time the signature thickness sensor (S50) measures the thickness of the signature.



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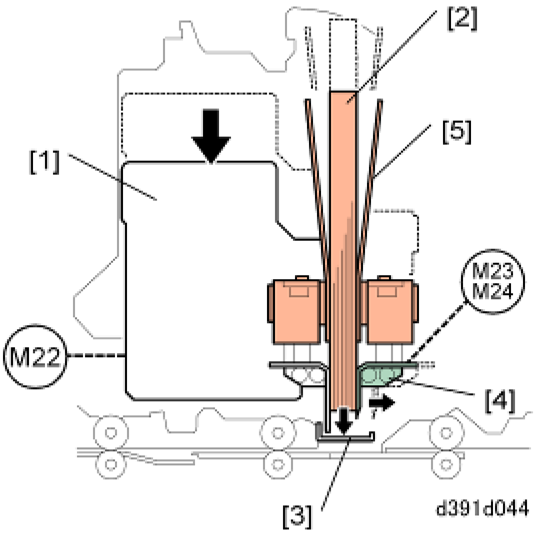
The grip unit rotation motor (M21) turns on and rotates the main grip unit [1] with the signature [2] clamped by the mini-gripper [3] and main gripper [4].



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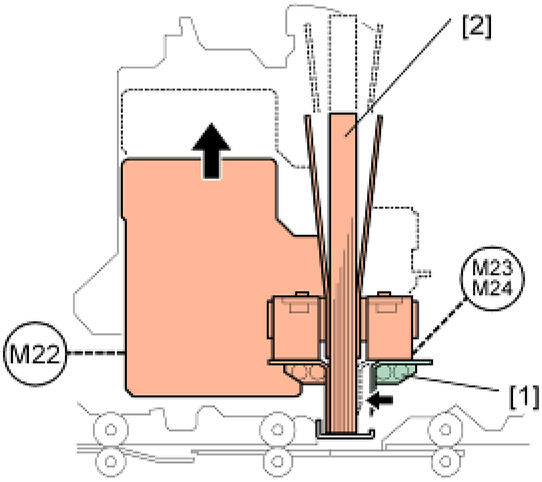
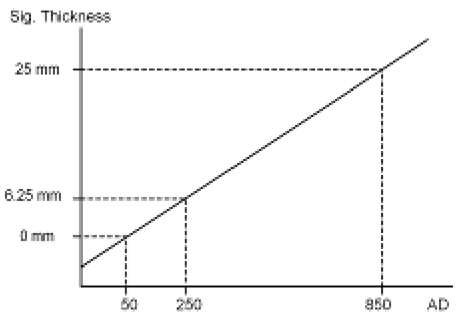
The main grip lift motor (M22) turns on and lowers the main grip unit [1] and signature [2] as far as the signature guide plate [3].

The gripper motor: front (M24) and gripper motor: rear (M23) switch on and open the main gripper [4] 3 mm. At this time the signature is held only by the mini-gripper [5] while the signature and mini-gripper are lowered together onto the signature guide plate. This tamps the spine of the signature so it will be aligned properly for gluing.



d391d046

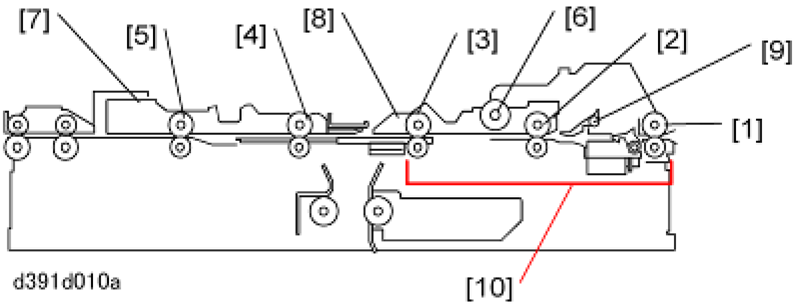
The gripper motor: front (M24) and gripper motor: rear (M23) switch on, close the main gripper [1], and clamp the signature [2]. The main grip lift motor (M22) turns on raises the grip unit and signature to the gluing position



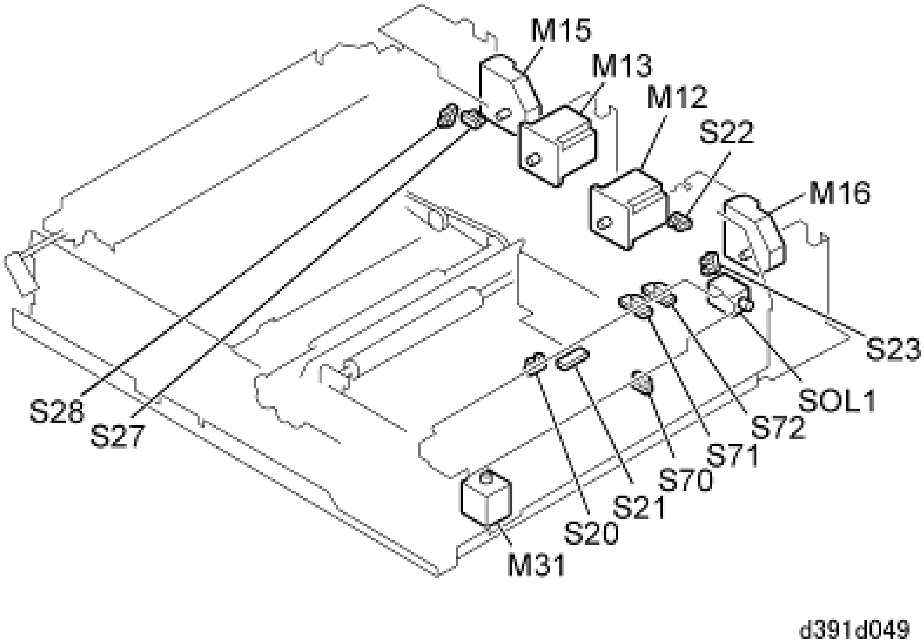
d391d3033c

The signature thickness sensor (S50) measures the thickness of the signature the first time the grip unit closes onto the signature. A corresponding AD value is stored in EEPROM for mm readings from 0 to 25 mm as shown above.

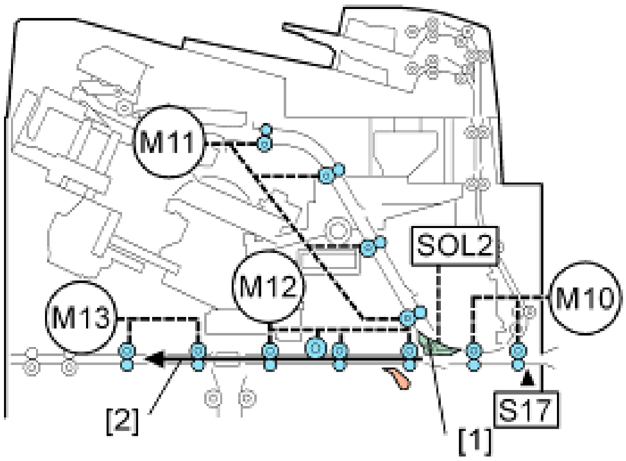
25.13 COVER TRANSPORT AND REGISTRATION



[1]	Horizontal Transport Roller 1
[2]	Horizontal Transport Roller 2
[3]	Horizontal Transport Roller 3
[4]	Horizontal Transport Roller 4
[5]	Horizontal Transport Roller 5
[6]	Buffer Roller
[7]	Cover Transport Guide: Right
[8]	Cover Transport Guide: Left
[9]	Cover Gripper
[10]	Cover Registration Unit



M12	Cover Motor: Right
M13	Cover Motor: Left
M15	Cover Guide Motor: Left
M31	Cover Guide Motor: Right
M31	Cover Horizontal Registration Motor
SOL1	Cover Grip Solenoid
S20	Cover Path Sensor 1
S21	Cover Registration Sensor
S22	Cover Guide HP Sensor: Right
S23	Cover Guide Open Sensor: Right
S27	Cover Guide HP Sensor: Left
S28	Cover Guide Open Sensor: Left
S70	Registration Unit HP Sensor (S70)
S71	Cover Horizontal Registration Sensor : Small
S72	Cover Horizontal Registration Sensor: Large



d391d050

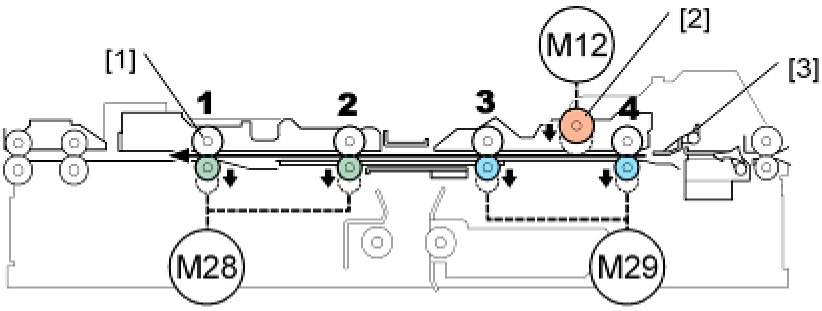
Before paper from the host machine arrives at the entrance of the bookbinder the following motors turn on and start rotating at the same speed as the host machine exit rollers:

- Entrance motor (M10)
- Signature transport motor (M11)
- Cover motor: right (M12)
- Cover motor: left (M13)

The entrance JG solenoid (SOL2) remains off and the entrance junction gate [1] remains open so the cover sent from the inserter above enters the cover transport path.

If the cover is fed from the host machine, when the entrance sensor (S17) detects the leading edge of the cover the rotation speed of cover motors (M12) and (M13) slow to 196.35 mm/s.

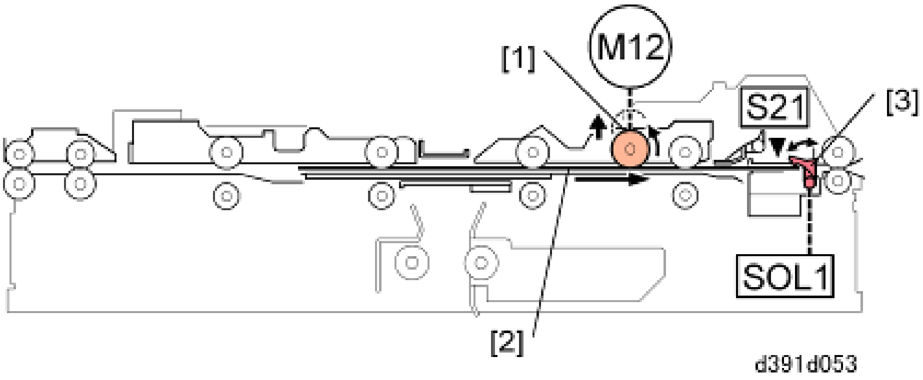
After the trailing edge of the cover passes cover registration sensor (S21) the sheet [2] continues to feed briefly for the prescribed time then the motors stop and the sheet stops.



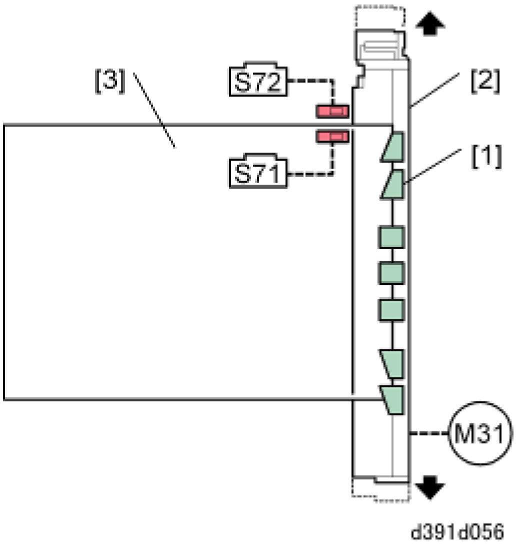
d391d051

The spine fold motor: right (M29) turns on and lowers the transport rollers 3, 4 to release the trailing edge of the cover from the roller nip. The cover motor: right (M12) reverses and lowers the buffer roller [2] to close its nip on the cover.

The spine fold motor: left (M28) turns on and lowers the transport rollers 1, 2 on the left side of the cover, releasing the cover from the nip. The cover grip solenoid (SOL1) energizes and opens the cover gripper [3].



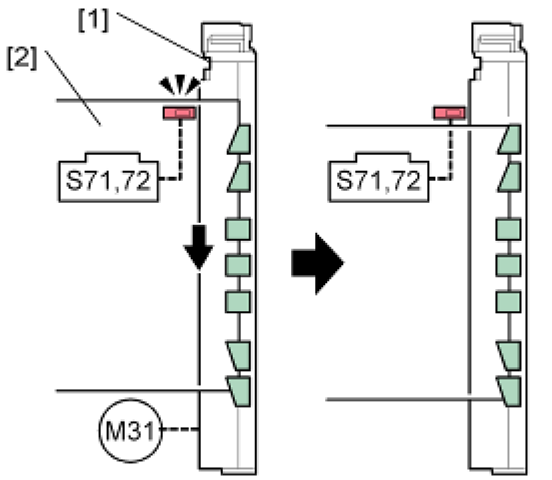
The cover motor: right (M12) reverses and rotates the buffer roller [1] at 500 mm/s and feeds the cover [2] toward the switchback position. The cover is fed to a position at a prescribed distance away from the cover registration sensor (S21) then the motor stops. This is the cover vertical position ("vertical" means "direction of paper feed"). After the cover is aligned at the cover vertical position the gripper solenoid (SOL1) turns off and lowers the cover gripper [3] which clamps the trailing edge of the cover. After the trailing edge of the cover is clamped, the cover motor: right (M12) rotates forward and retracts the buffer roller from the cover.



[1]	Cover Gripper
[2]	Cover Registration Unit
[3]	Cover

The cover horizontal registration motor (M31) turns on and positions the cover at the horizontal position as shown by the arrow. The size of the cover determines which sensor is used to position the cover:

- Cover registration sensor (S) (S71). Used for small paper sizes up to 297 mm wide.
- Cover registration sensor (L) (S72). Used for large paper sizes over 297 mm wide.



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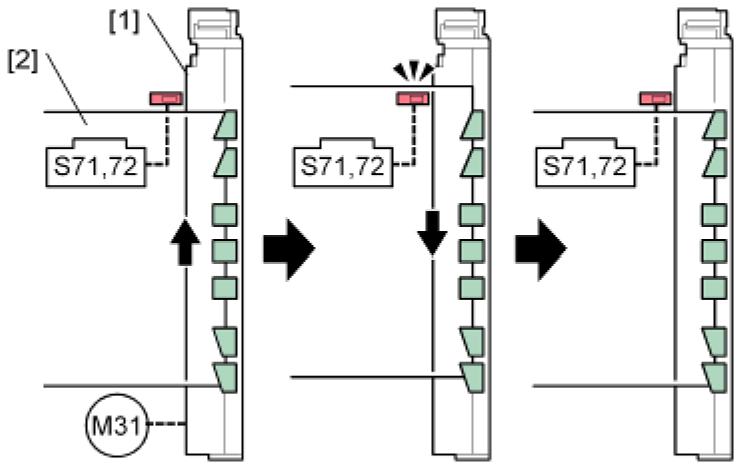
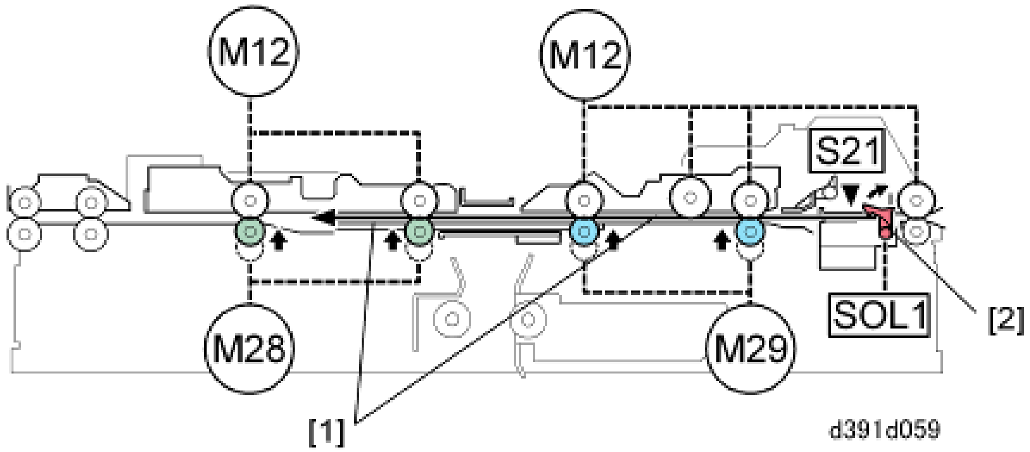
If the cover registration sensor (S71: Small) or (S72: Large) in the cover registration unit [1] is ON, the cover horizontal registration motor (M31) turns on and moves the cover [2] the prescribed distance away from the sensor after the sensor turns off.



d391d058

If the cover registration sensor (S71: Small) or (S72: Large) in the cover registration unit [1] is OFF:

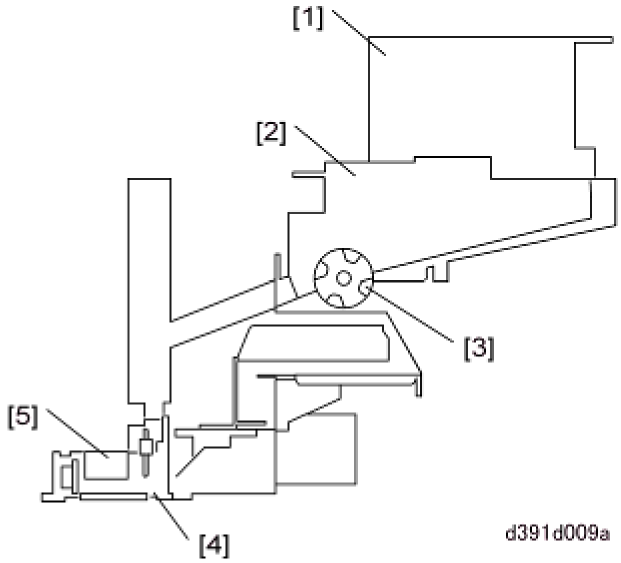
- The cover horizontal registration motor (M31) turns on and moves the cover registration unit [1] and cover [2] until the sensor turns on, continues to move the cover the prescribed distance and then turns off.
- Next, the cover horizontal registration motor (M31) reverses and moves the cover the prescribed distance away from the sensor after the sensor turns off.



The spine fold motor: right (M29) on the right turns on, raises the two transport rollers on the right, and clamps the cover [1] in the roller nips.
The spine fold motor: left (M28) turns on, raises the two transport rollers on the left and clamps the cover in the roller nips.
The cover grip solenoid (SOL1) energizes and opens the cover gripper [2] .
The cover motor: left (M13) and cover motor: right (M12) start rotating at 50 mm/s and feed the cover to the left. After the cover passes the cover registration sensor (S21) the motor and rollers continue to feed the cover a prescribed distance. (The distance is prescribed according to the signature thickness reading performed by the signature thickness sensor (S50)). Finally, the cover grip solenoid (SOL1) turns off and closes the gripper .

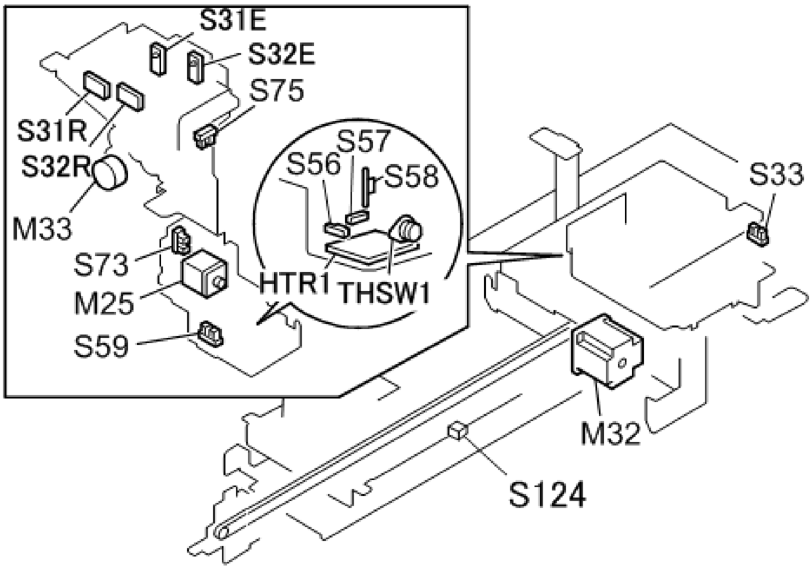
25.14 GLUING

25.14.1 GLUING UNIT OPERATION

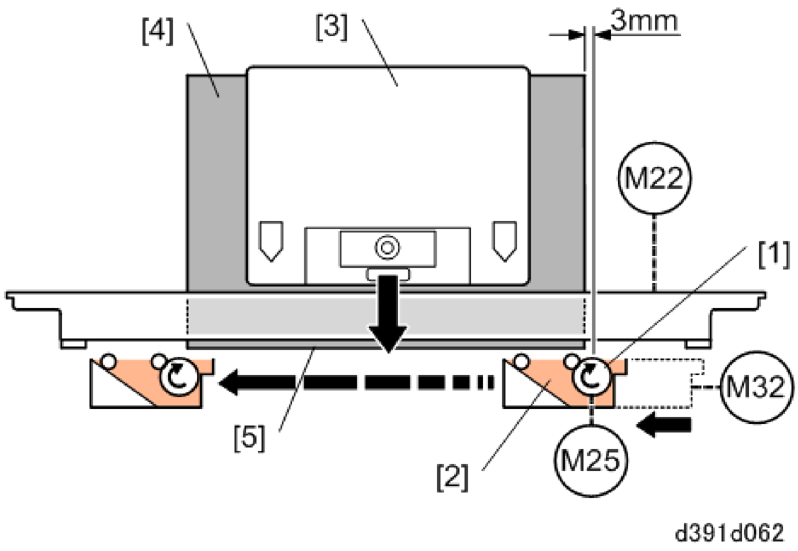


The gluing unit applies glue to the spine of the signature that will be joined with the cover to form the book.

[1]	Glue Hopper
[2]	Glue Dispenser
[3]	Glue Feeder
[4]	Gluing Unit
[5]	Glue Vat



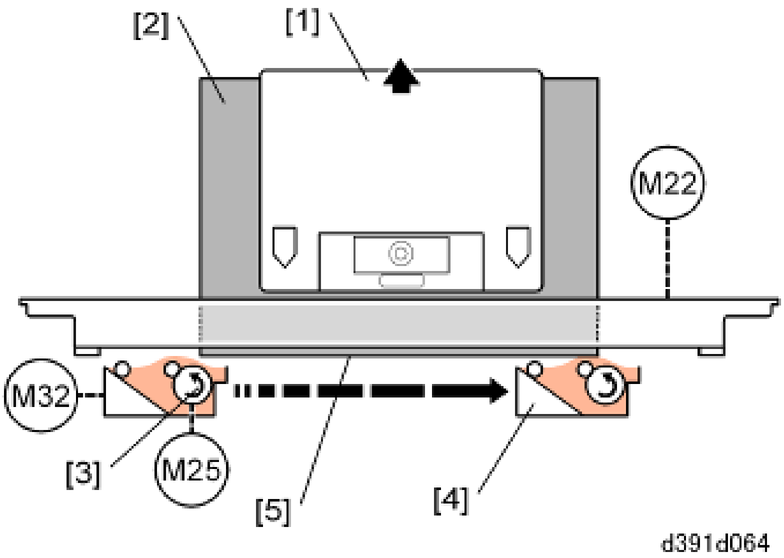
M32	Glue Vat Motor
M33	Glue Supply Motor
S31	Glue Vat Empty Sensor (S31E/S31R)
S32	Glue Vat Empty Sensor (S32E/S32R)
S33	Glue Supply Cover Sensor
S56	Glue Temperature Thermistor
S57	Glue Abnormal Temperature Thermistor
S58	Glue Level Thermistor
S59	Glue Vat Roller Rotation Sensor
S73	Glue Vat HP Sensor: Rear
S75	Glue Roller HP Sensor
S124	Machine Temperature Sensor
TS1	Thermostat
H1	Glue Heater



[1]	Glue Vat Roller
[2]	Glue Vat
[3]	Main Gripper Unit
[4]	Signature
[5]	Signature Spine

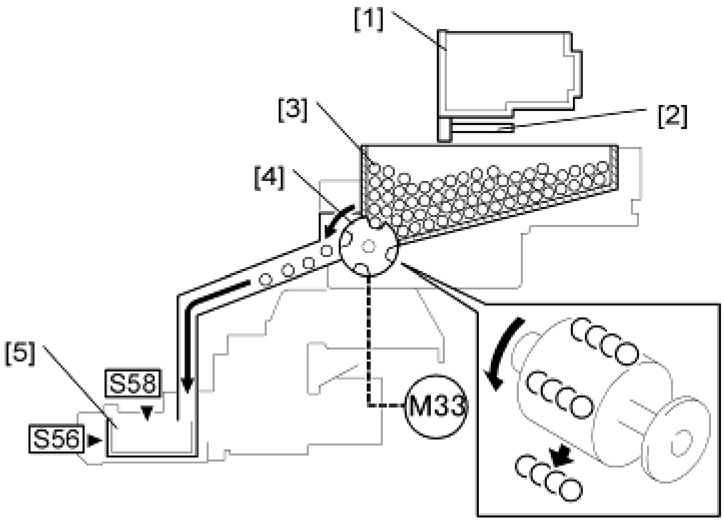
Once the glue has been heated long enough to melt it and has reached the optimum temperature for application, the glue vat roller motor (M25) turns on and rotates the glue vat roller [1] to start stirring the glue. The glue vat motor (M32) turns on moves the glue vat [2] to within 5 mm the signature spine where the glue will be applied. The main grip lift motor (M22) turns on and lowers the main grip unit [3] and signature [4] to the glue application position. (The illustration above is a view of the right side of the grip unit in the direction of paper feed.)

The glue vat motor (M32) turns on. As the motor drives the glue vat from the rear to the front along the length of the signature spine [5], the glue roller applies glue to the spine.



The main grip lift motor (M22) turns on, raises the main grip unit [1] and signature [2] slightly higher. Also, the glue vat roller motor (M25) turns on and reverses the rotation of the glue vat roller [3].
The glue vat move motor (M32) turns on and moves glue vat [4] from the front to the rear. As the vat moves from front to rear the glue applicator plate applies another layer of glue the signature spine [5].

25.14.2 GLUE SUPPLY



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[1]	Glue Hopper
[2]	Shutter
[3]	Glue Bin (holds the glue pellets)
[4]	Glue Feeder
[5]	Glue Vat (holds after it has melted)

The operator pours glue pellets into the glue hopper [1].
When the operator closes the hopper, the shutter [2] opens the dry glue pellets fall down into the bin [3] where they are stored.
During the operation of the bookbinder, the glue temperature thermistor (S56) monitors the temperature of the glue in the vat, and the glue level thermistor (S58) measures the level of the glue in the vat. Both readings are relayed continuously to the slave control board.
After the temperature of the glue already in the glue vat has been raised to the correct level, and immediately after each application of glue to a signature spine, if the surface level of the glue is so low that it cannot be detected by the glue level thermistor (S58):

- The slave control board first confirms that the glue vat is at its home position at the rear of the machine
- The slave control board turns on the glue supply motor (M33).
- The glue supply motor (M33) rotates the glue feeder [4] to pellets from the glue bin to the glue vat [5].
- Each movement of the glue feeder (90° rotation) feeds four 0.22 g pellets to the glue vat.
- The feeder rotates three times (270°) to feed a total of 12 pellets.

25.14.3 GLUE TEMPERATURE CONTROL

The slave control board controls the temperature of the glue in the glue vat.
The glue temperature thermistor (S56) constantly monitors the temperature of the glue in the glue vat and relays its readings to the slave control board. The slave control board uses these readings to control the operation of the glue heater and glue vat roller motor (M25).
The slave control board sends the command to the heater to raise the temperature of the glue to 153°C at the beginning of a binding job, or when the bookbinder leaves the energy save mode. The operation depends on the temperature reading.
If the glue temperature is above 120°C:

- The slave control board turns on the heater and sets the target temperature for 152°C
- When the glue temperature thermistor (S56) detects a glue temperature of 150°C±5°C, the slave control board turns on the glue vat roller motor (M25) which starts rotating the glue vat roller at 82.5 mm/s
- The glue vat roller motor (M25) continues to rotate the glue vat roller for 90 sec. to stir the glue and then turns off.
- The heater remains on to maintain the target temperature.

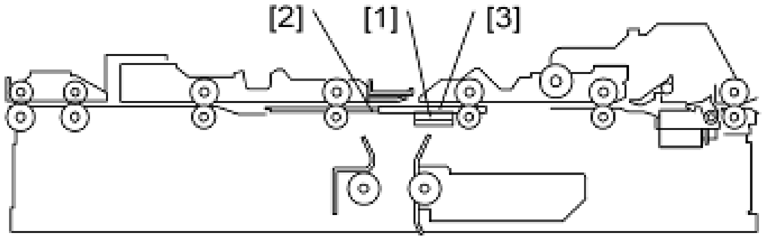
If the glue temperature is between 100°C and 120°C:

- The slave board turns on the heater and sets the target temperature for 152°C.
- When the glue temperature thermistor (S56) detects a glue temperature of 150°C±5°C, the slave control board turns on the glue vat roller motor (M25) which starts rotating the glue vat roller at 82.5 mm/s
- The glue vat roller motor (M25) continues to rotate the glue vat roller for 180 sec. to stir the glue and then turns off.
- The heater remains on to maintain the target temperature.

If the glue temperature is below 100°C:

- The slave control board turns on the heater and sets the target temperature for 173°C.
- As soon as the glue temperature thermistor (S56) detects the glue temperature over 120°C, after 285 sec. the target temperature is reset for 152°C.
- At the same time, when the glue temperature thermistor (S56) detects a glue temperature of 120°C, the slave control board turns on the glue vat roller motor (M25) which starts rotating the glue vat roller at 200 mm/s
- The glue vat roller motor (M25) continues to rotate the glue vat roller for 20 sec. at 200 mm/s to stir the glue and then slows to 82.5 mm/s
- The glue vat roller motor (M25) continues to rotate the glue vat roller for 30 sec. at 82.5 mm/s and then turns off.
- The heater remains on to maintain the target temperature.

25.14.4 JOINING THE SIGNATURE AND COVER



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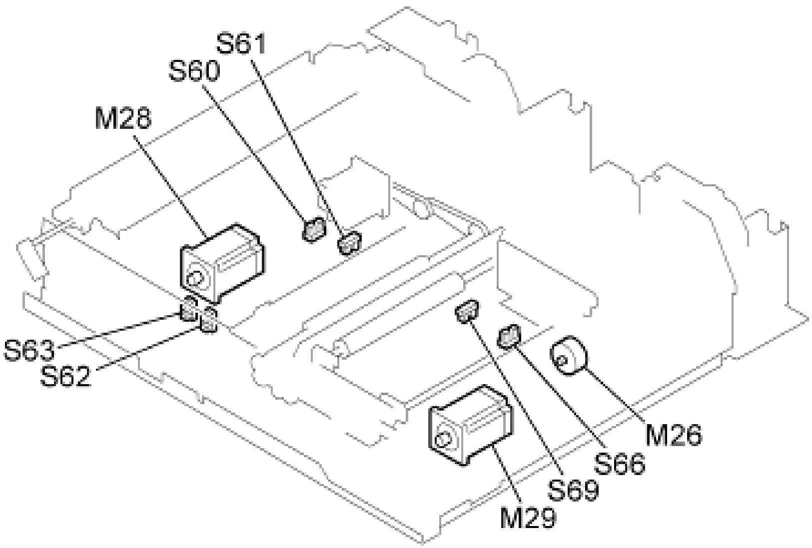
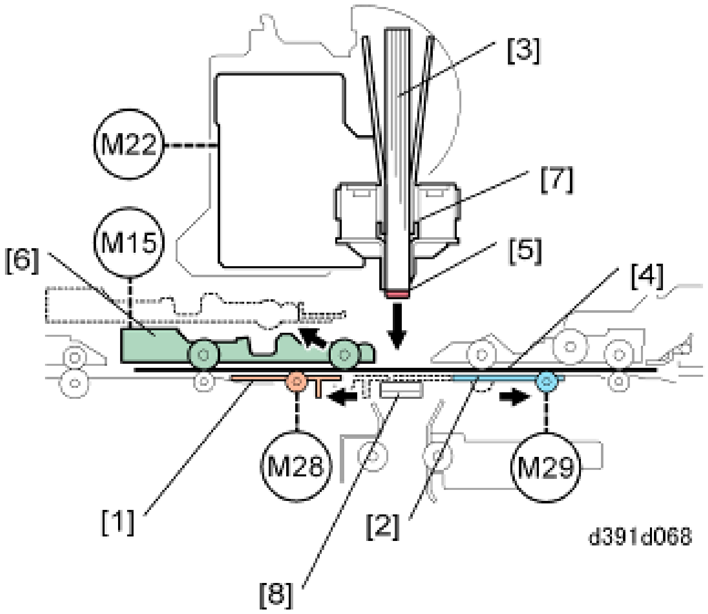
[1]	Spine Plate
[2]	Left Spine Fold Plate
[3]	Right Spine Fold Plate



d391d067

M26	Spine Plate Motor
M28	Spine Fold Motor: Left
M29	Spine Fold Motor: Right
S60	Spine Fold HP Sensor: Left
S61	Spine Fold Close Sensor: Left
S62	Spine Plate Open Sensor
S63	Spine Plate Closed Sensor
S66	Spine Fold HP Sensor: Right
S69	Spine Fold Closed Sensor: Right



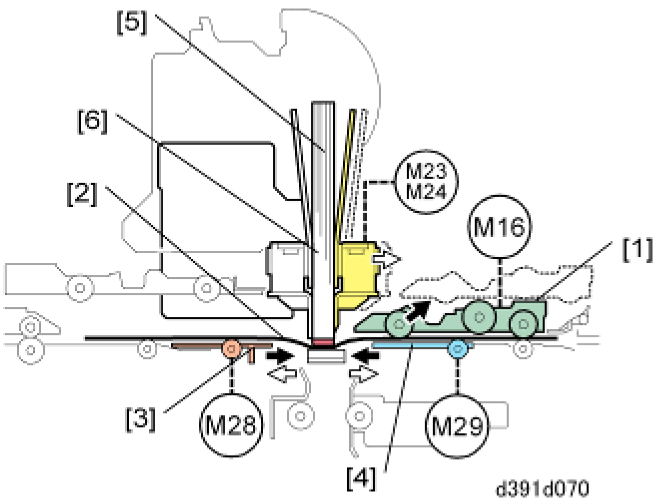
[1]	Spine Fold Plate: Left
[2]	Spine Fold Plate: Right
[3]	Signature
[4]	Cover
[5]	Glued Spine
[6]	Left Cover Transport Guide
[7]	Main Grip Unit
[8]	Spine Plate

The spine fold motor: left (M28) and spine fold motor: right (M29) switch on and move the left spine fold plate [1] and right spine fold plate [2] to their home positions from the spine fold close positions. The motors run long enough to separate the plates so the gap between them is large enough for the signature [3] to pass between them and stop. The run time is prescribed based on the signature thickness measured by the signature thickness sensor (S50).

The cover [4] is on the cover transport unit with the glued spine [5] of the signature above.

The cover guide motor: left (M15) turns on, opens the left cover transport guide [6] and releases the cover from the nips of the transport rollers.

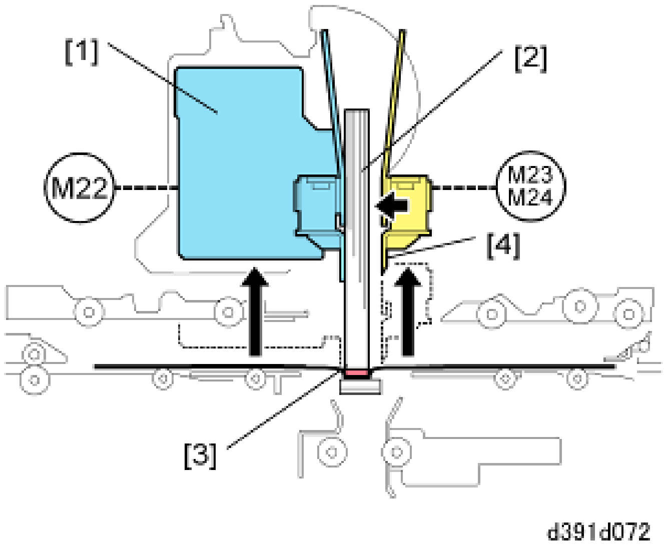
The main grip lift motor (M22) turns on, lowers the main grip unit [7] holding the signature , and presses the glued spine onto the center of the cover supported by the spine plate [8].



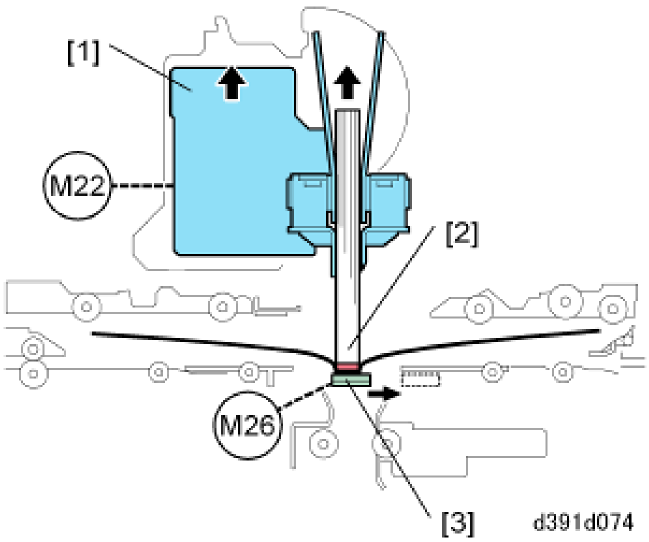
[1]	Cover Transport Guide: Right
[2]	Cover
[3]	Spine Fold Plate: Left
[4]	Spine Fold Plate: Right
[5]	Signature
[6]	Main Gripper

The cover guide motor: right (M16) turns on, opens the right cover transport guide [1] , and releases the cover [2] from the nips of the transfer rollers. The spine fold motor: left (M28) and spine fold motor: right (M29) turn on and close the left and right spine fold plates [3], [4] which clamp the signature [5] near its glued spine.

After holding the signature clamped at its spine glued to the cover for the prescribed time the spine fold motor: left (M28) and spine fold motor: right (M29) turn on. The left spine fold motor moves the left fold plate to its home position. The right spine fold motor remains on for the prescribed time and as it retracts the right fold plate, the grip motor: front (M24) and grip motor: rear (M23) turn on together and open the main gripper [6] 14 mm.

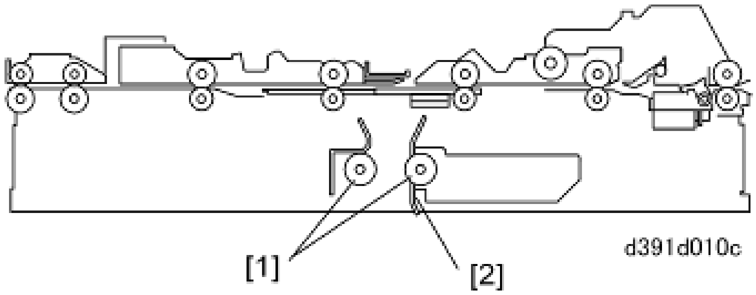


The main grip lift motor (M22) turns on and raises the main grip unit [1] where it can grip the signature [2] at a higher point, then the motor stops. The joined signature and cover [3] do not move.
After the main gripper [4] moves to the higher grip position, the grip motor: front (M24) and grip motor: rear (M23) turn on and clamp the signature again.

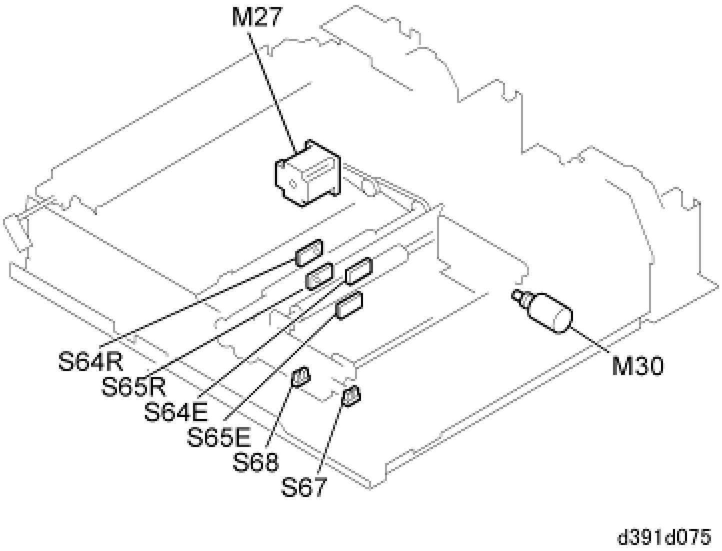


The main grip lift motor (M22) turns on, lifts the main grip unit [1], pulls the joined signature and cover [2] away from the spine plate [3], then stops a short distance away from the plate. The spine plate motor (M26) retracts the spine plate to the right.

25.14.5 SIGNATURE TRANSPORT

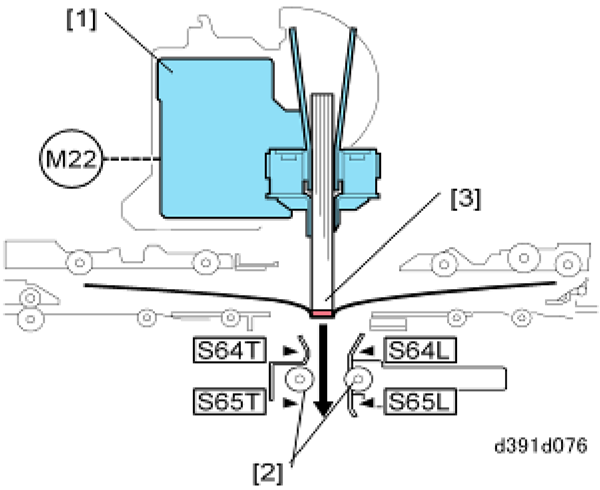


[1]	Signature Exit Roller
[2]	Signature Path Guide



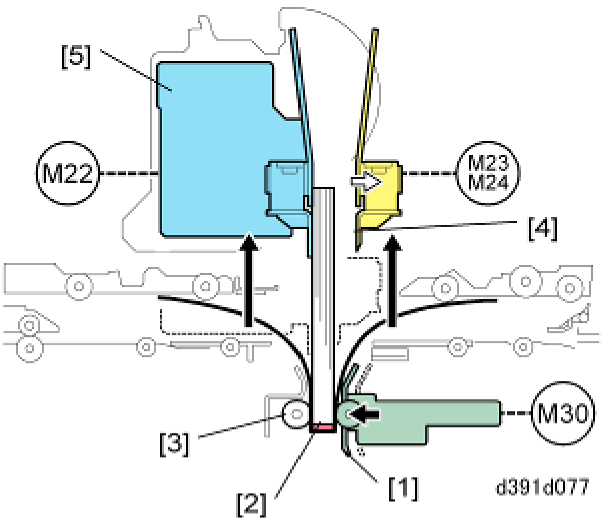
M27	Signature Exit Roller Motor
M30	Signature Path Exit Motor
S64	Book Exit Sensors (S64E: Emitter/S64R: Receptor)
S65	Leading Edge Sensors (S65E: Emitter/S65R: Receptor)
S67	Signature Exit Path HP Sensor
S68	Signature Exit Path Press Sensor

Now the cover is ready to be folded up around the joined signature to complete the formation of the book and the book is passed to the trimming unit.

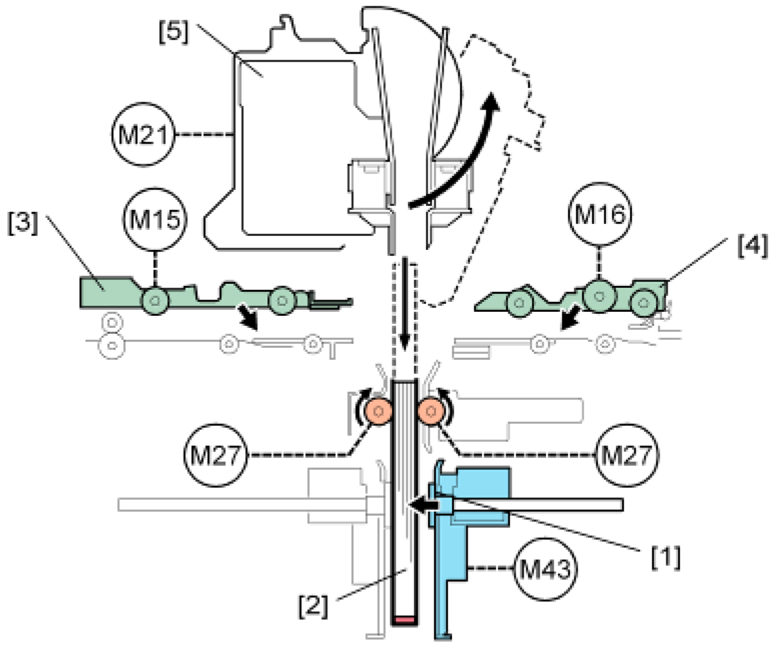


The main grip lift motor (M22) turns on and lowers the main grip unit [1] as far as the signature exit rollers [2]. Two sensor pairs in the signature transport path detect the presence of the joined cover and signature [3] as it is lowered:

- Book Exit Sensors (S64E: Emitter/S64R: Receptor). Detects the leading edge of the signature to confirm that it passes within the prescribed time.
- Leading Edge Sensors (S65E: Emitter/S65R: Receptor). Detects the leading edge of the book, stops the grip lift motor (M22), turns on the signature path exit motor (M30).



The signature path exit motor (M30) turns on, pushes the signature exit guide [1] to the left and lamps the signature and cover [2] in the nip of the signature exit rollers [3]. After the signature is firmly clamped in the nip of the signature exit rollers the grip motor: front (M24) and grip motor: rear (M23) turn on and retract the main gripper [4] away from the sides of the signature. The main grip lift motor (M22) turns on, raises the main grip unit [5] to its home position and stops.



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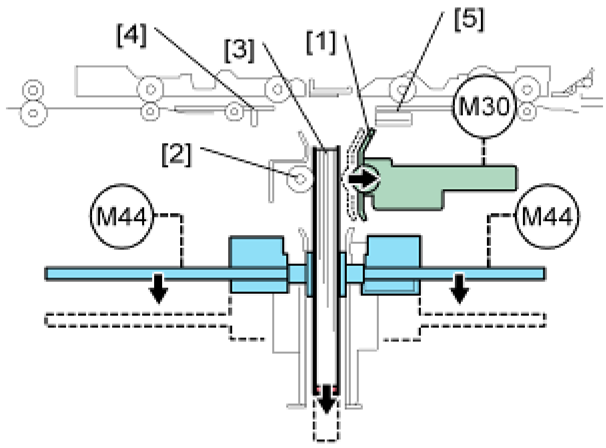
The signature exit roller motor (M27) rotates long enough to lower the signature to reach the point where the signature can be passed to the trimming unit and stops. The book grip motor (M43) turns on, pushes the right book rotation plate [1] to the left and clamps the book [2] between the left and right rotation plates. (The left rotation plate is stationary). At the same time cover guide motors (M15: Left/M16: Right) turn on and close the left and right cover transport guides [3], [4]. Next, the grip unit rotation motor (M21) turns on and rotates the main grip [5] counter-clockwise to its home position.



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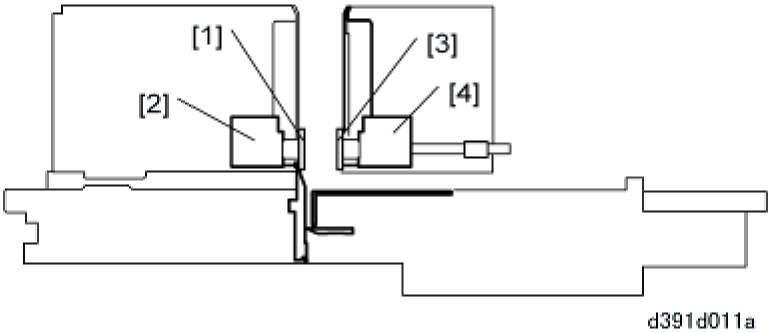
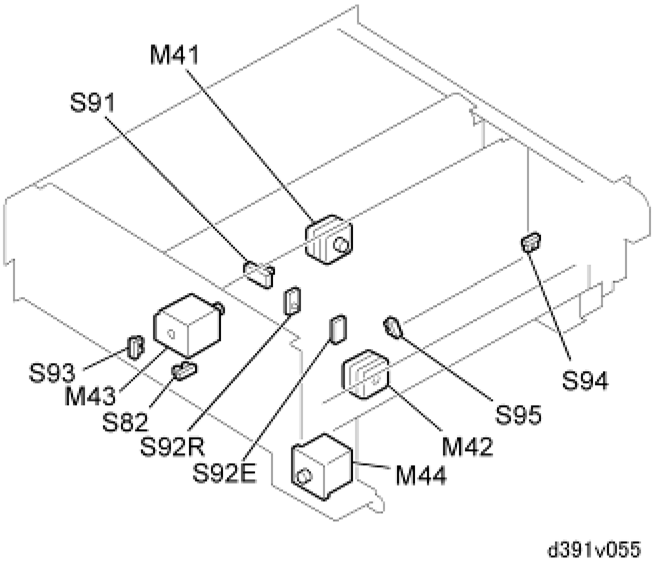
After the signature has been clamped in the trimming unit the signature path exit motor (M30) switches on and retracts the signature exit guide [1] which opens the nip of the signature exit rollers [2] and releases the signature [3].
After the signature rollers have opened, the slide motor (M44) turns on and lowers the signature (clamped between the rotation plates) into the trimming unit to align the signature for trimming. The spine plate motor (M26) turns on and moves the spine plate to its home position. At the same time the left and right spine fold motors (M28, M29) turn on and close the left and right spine fold plates [4] and [5].

25.15 TRIMMING UNIT

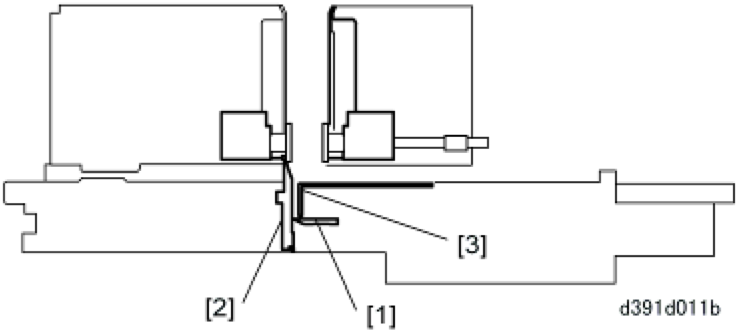
The trimming unit receives the bound book and trims the three edges of the book (top, bottom, fore edge). The trimming unit trims the bottom edge first, rotates the book and trims the top edge, then rotates the book again to trim the fore edge.



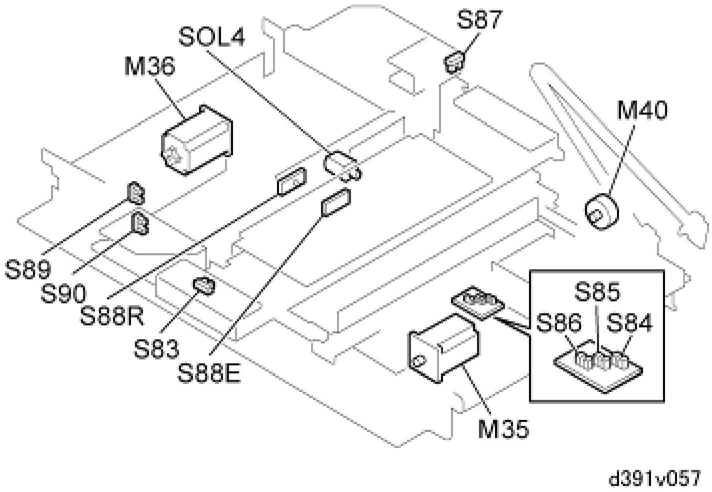
[1]	Book Rotation Plate: Left
[2]	Book Rotation Motor
[3]	Book Rotation Plate: Right
[4]	Book Rotation Motor 2



M41	Book Rotation Motor 2
M42	Book Rotation Motor 1
M43	Book Grip Motor
M44	Slide Motor
S82	Slide HP Sensor
S95	Book Rotation HP Sensor 1
S92	Trim Unit Entrance Sensors (S92R, S92E)
S93	Grip HP Sensor
S94	Grip End Sensor
S91	Book Rotation HP Sensor 2

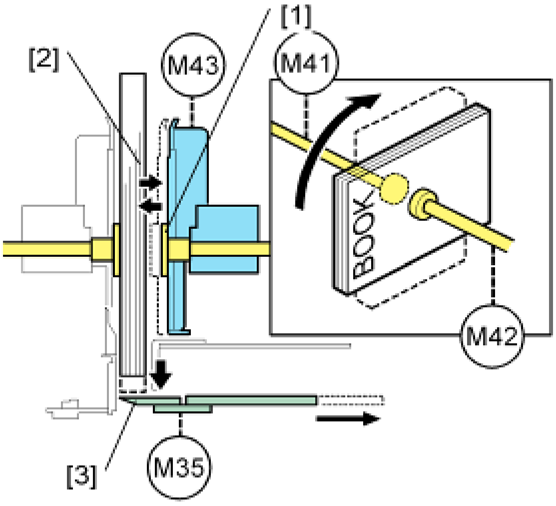


[1]	Blade
[2]	Blade Cradle
[3]	Edge Press Plate



M35	Cutter Motor
M36	Edge Press Plate Motor
M40	Blade Cradle Motor
SOL4	Trimmings Plunger Solenoid
S83	Blade Cradle HP Sensor
S84	Blade Sensor 1
S85	Blade Sensor 2
S86	Trimmer Limit Sensor
S87	Press End Sensor
S88	Book Registration Sensors (S88R/S88E)
S89	Press Limit Sensor
S90	Edge Press Plate HP Sensor

25.15.1 TRIMMING THE BOOK



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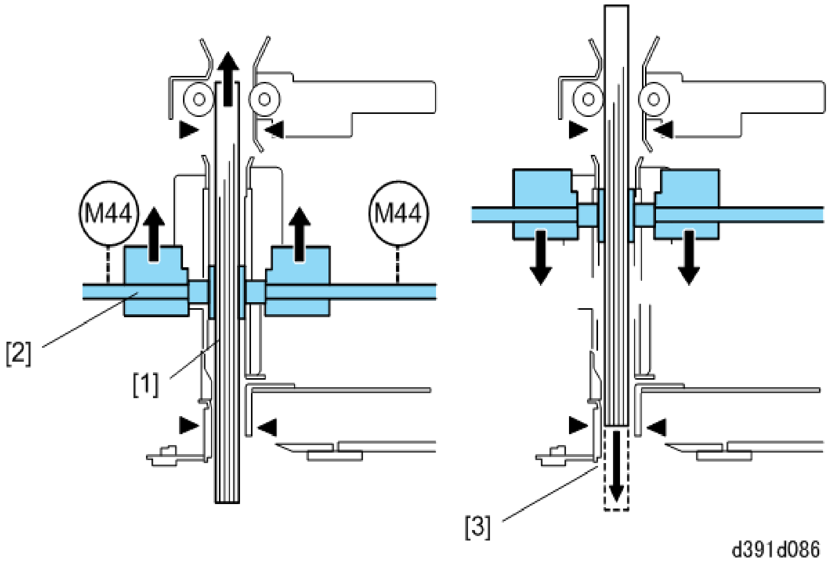
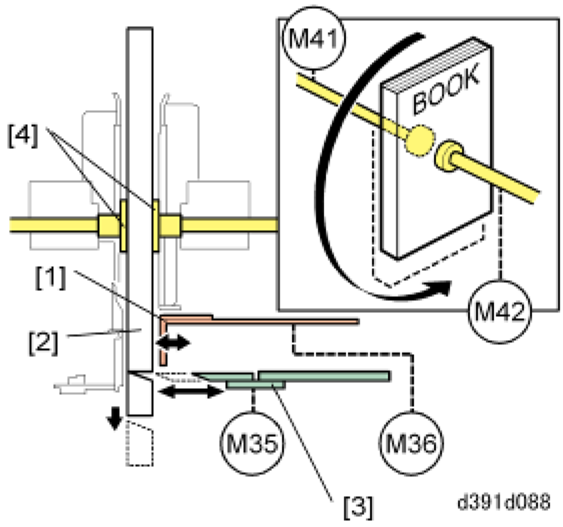
The book grip motor (M43) turns on, retracts the right rotation plate [1] and releases the book [2]. The book falls on top of the blade [3] so the spine of the book is perfectly horizontal against the top of the blade. The book grip motor (M43) turns on again and pushes the right rotation plate against the right side of the book.
With the book firmly clamped by the rotation plates, cutter motor (M35) turns on and retracts the blade. The Book Rotation Motor 1 (M42) and Book Rotation Motor 2 (M41) turn on and rotate the book clockwise 90 degrees (rear to front).

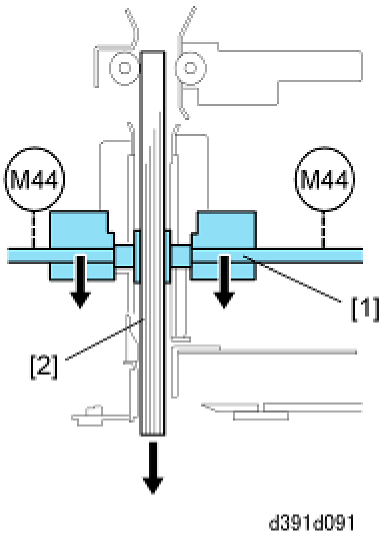


d391d086

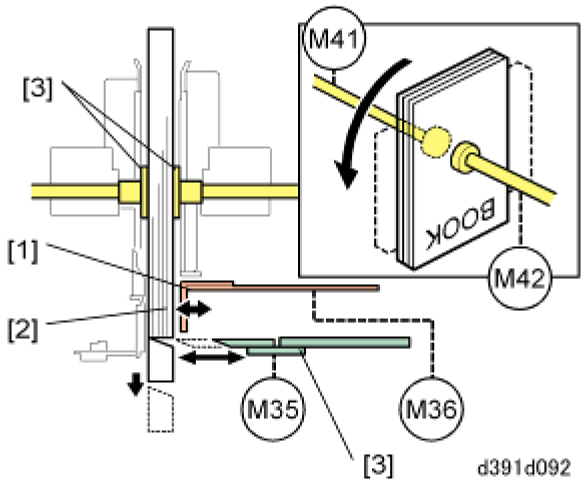
The rotated book [1] clamped in the grip unit [2] is raised or lowered by the slide motor (M44) to the trimming position [3].



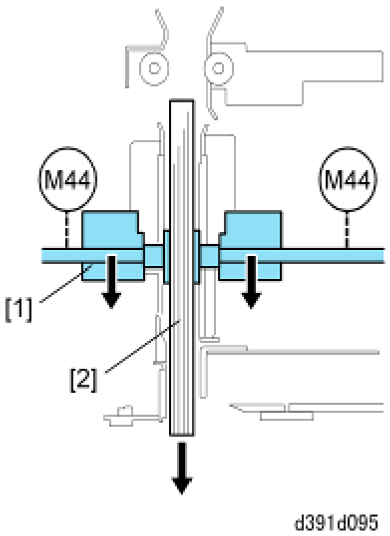
The edge press plate motor (M36) turns on and pushes the edge press plate [1] against the book [2] to compress the edge of the book to be trimmed.
The cutter motor (M35) turns on and pushes the blade [3] against the edge of the book to perform the first cut on the bottom edge
The edge press plate motor (M36) turns on and retracts the edge press plate which releases the book edge. Book rotation motors 1 and 2 (M42, M41) both switch on and turn the book rotation plates [4] and the book counter-clockwise 180 degrees (front to rear).



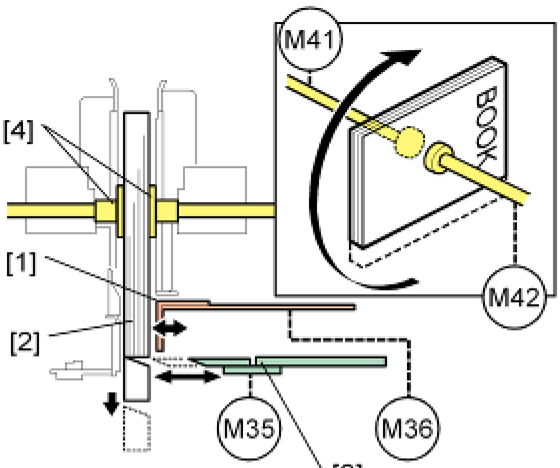
The slide motor (M44) turns on and raises or lowers the book rotation grip unit [1] and the book [2] until the bottom edge of the book is at the cutting position.



The edge press plate motor (M36) turns on and pushes the edge press plate [1] against the book [2] to compress the edge of the book.
The cutter motor (M35) turns on and pushes the blade [3] against the edge of the book to perform the second cut on the bottom edge.
The edge press plate motor (M36) turns on and retracts the edge press plate which releases the book edge . Book rotation motors 1 and 2 (M42, M41) both switch on and turn the book rotation plates [4] and the book counter-clockwise 90 degrees (front to rear).



The slide motor (M44) turns on and raises or lowers the book rotation grip unit [1] and the book [2] until the bottom edge of the book is at the cutting position.

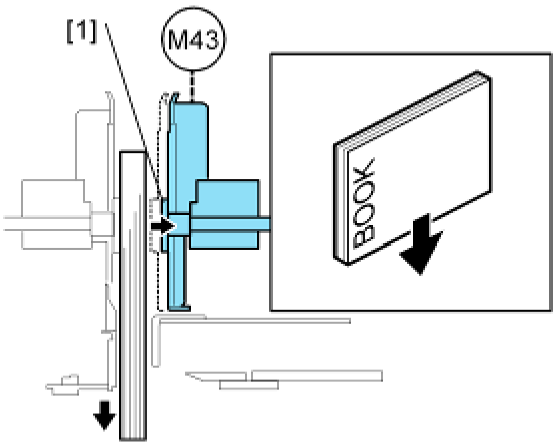


d391d096

The edge press plate motor (M36) turns on and pushes the edge press plate [1] against the book [2] to compress the edge of the book.
The cutter motor (M35) turns on and pushes the blade [3] against the edge of the book to perform the third cut on the fore edge.
If more than 35 mm needs to be trimmed from the fore edge, the edge is trimmed twice in order to reduce the size of the trimmings for collection and disposal.

- The first cut is done at the mid-point of the area to be removed.
- The blade and edge press plate are retracted.
- The edge press plate is pushed against the book edge then the blade does the final cut.

The cutter motor (M35) turns on and retracts the blade .
The edge press plate motor (M36) turns on and retracts the edge press plate to release the book edge. Book rotation motors 1 and 2 (M42, M41) both switch on and turn the book rotation plates [4] and the book clockwise 180 degrees (rear to front).



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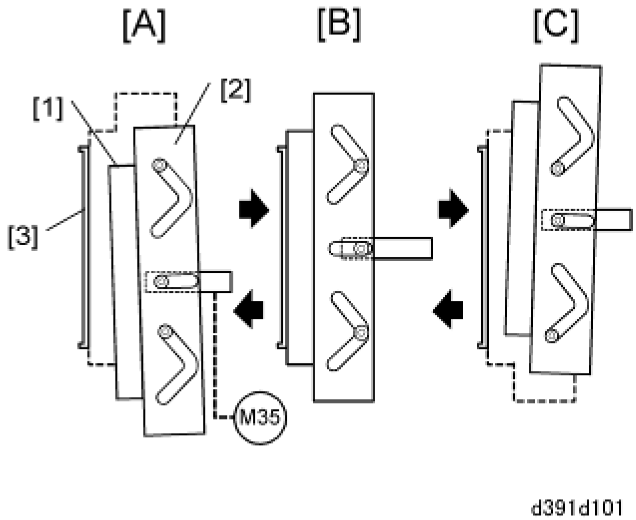
The book grip motor (M43) turns on and releases the right book rotation plate [1]. The book falls into the book stacking tray.

25.15.2 BLADE OPERATION



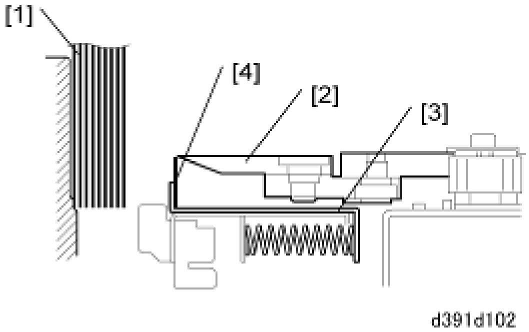
[A]	Retracted toward front before cutting
[B]	Cutting
[C]	Retracts to rear after cutting

The blade [1] is attached to a base plate [2] connected to the cutter motor (M35). After each cut against the blade cradle [3] the cutter motor alternately retracts the base plate and blade to the front or rear. As the blade starts the cut at a slight angle and is pulled away to either the front or rear, this creates a slight rocking motion of the blade along the line of the cut so the blade can cut more efficiently and be pulled away smoothly from the cut edges.
Blade sensor 1 (S84) and blade sensor 2 (S85) (both mounted on the cutter area sensor board) constantly monitor the position of the blade as it cuts. The combination of the states of these sensors (ON/OFF) tell the cutter control board where the blade is at all times during the cutting cycle.

Blade Sn 1 (S84)	Blade Sn 2 (S85)	Blade Position
OFF	OFF	Positioned for cutting stroke front to rear
		Retracting to front
OFF	ON	Retracted at front
ON	OFF	Retracting to rear
		Positioned for cutting stroke rear to front
ON	ON	Retracted to rear

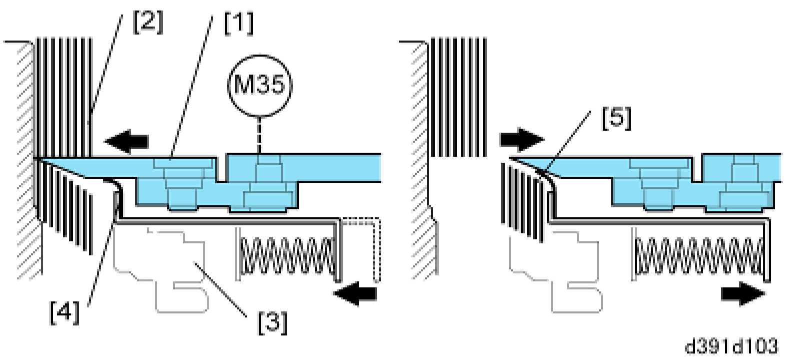
25.15.3 TRIMMINGS COLLECTION AND DISPOSAL

Normally, the trimmings should smoothly fall away from the blade after an edge is trimmed. However, trimmings can frequently stick to the blade after the first and second cuts at the top and bottom of the book. There may be an especially strong tendency for trimmings to adhere to the blade where it cuts into the glue on the end of the spine. To prevent this problem the trimming unit is provided with a trimmings catcher mechanism.



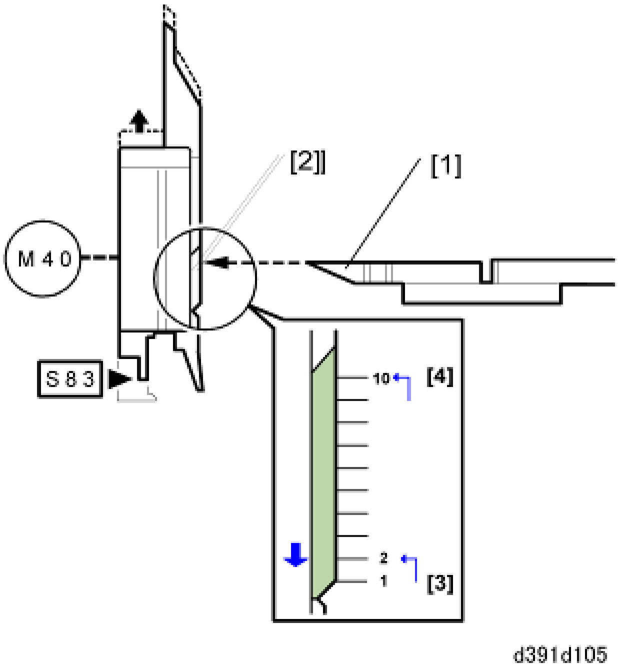
The drawing above shows the trimming catcher mechanism at the standby position.

[1]	Signature
[2]	Blade
[3]	Trimmings Catcher
[4]	Trimmings Seat



The cutter motor (M35) turns on and drives the blade [1] against the edge of the book [2] to perform the cut. The trimmings catcher [3] and the trimmings seat [4] move with the blade when it performs the cut.
After the cut is done the cutter motor (M35) retracts the blade and trimmings catcher mechanism. The trimmings [5] are held in the trimmings seat as the blade is pulled away.

25.15.4 BLADE CRADLE OPERATION



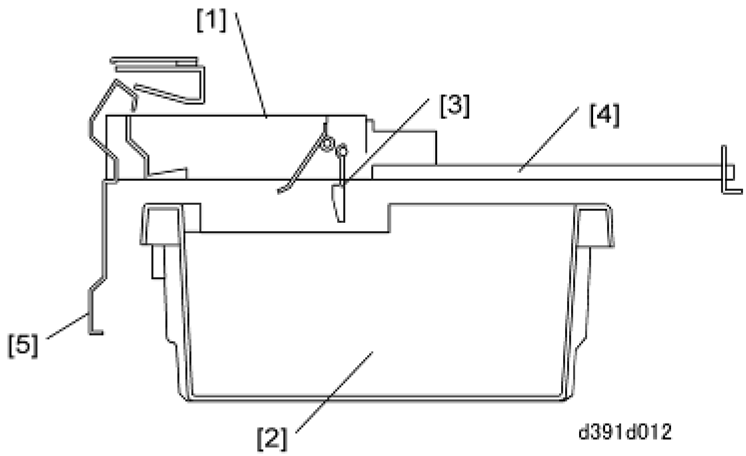
Cutting is performed by pushing the blade [1] against the blade cradle [2] with the edge of the book between the blade and cradle.
After every 550 cuts the blade cradle is lowered 1 mm to change the position where the blade repeatedly impacts the blade cradle. This reduces wear on the blade cradle and extends its service life. The blade does not move. The blade cradle motor (M40) lowers the blade cradle to change the cutting position.

- The blade starts cutting at the first position [3]
- After 550 cuts the blade cradle motor (M40) lowers the blade cradle to the next higher position.
- There are 10 cutting positions.
- After the last cut at the last position [4], the cutter control board issues a warning on the host machine that the blade cradle must be replaced.
- The service life of the blade cradle is 5,550 cuts (550 cuts at each of the 10 positions.)

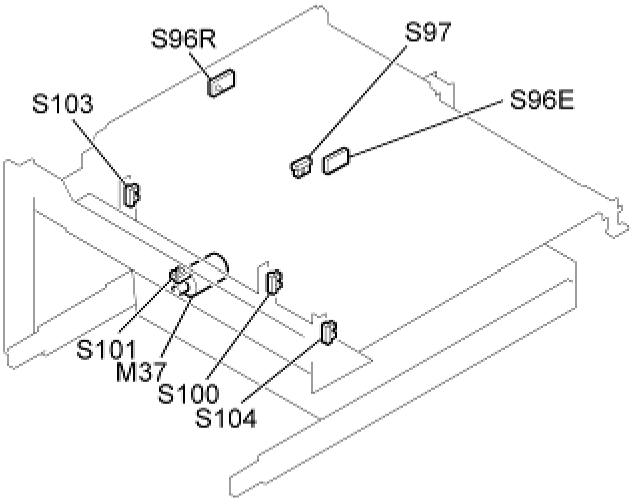
25.15.5 HANDLING TRIMMINGS

Trimmings are dumped into the trimmings box which can be easily removed by the operator and emptied. The frequency at which trimmings are sent to the trimmings box from depends on the size of the job.

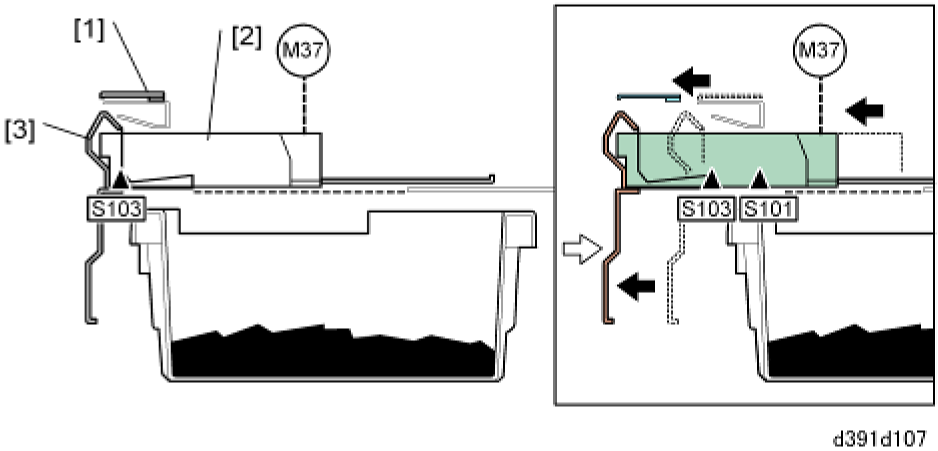
- During a run of 10 to 99 books where trimming is done on three edges (top, bottom, fore edge) trimmings are sent to the trimmings box after the third cut.
- During a run of 100 to 200 books where trimming is done on three edges (top, bottom, fore edge) trimmings are sent to the trimmings box after the second cut and after the third cut.



[1]	Trimmings Buffer
[2]	Trimmings Box
[3]	Trimmings Box Full Actuator
[4]	Trimmings Sub Hopper
[5]	Book Press Plate



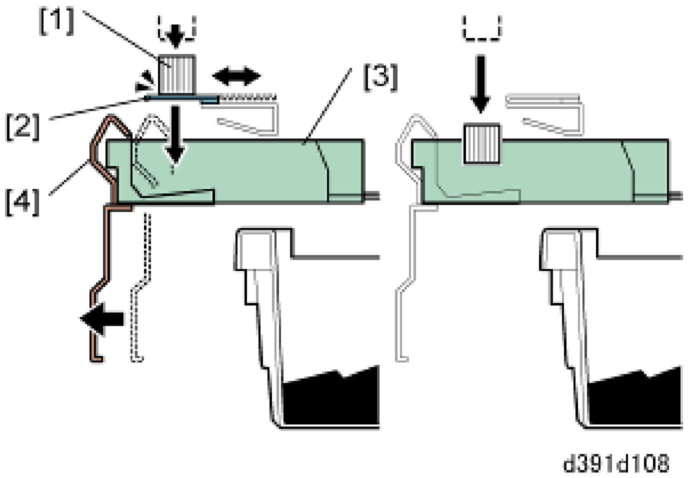
M37	Trimmings Buffer Motor
S96	Trimmings Buffer Full Sensors (S96R, S96E)
S97	Trimmings Box Full Sensor
S100	Trimmings Buffer HP Sensor: Left
S101	Trimmings Buffer Clock Sensor
S103	Trimmings Buffer HP Sensor: Right
S104	Book Press Plate Sensor



First Cut

The trimmings sub buffer [1] is linked to the trimmings buffer [2] and moves together with the down stroke of the book press plate [3].

- The trimmings buffer motor (M37) turns on at the start of the trimming operation and moves the trimmings sub buffer to the left to catch the strips trimmed form the signature by the blade.
- The trimmings buffer moves to the left until the trimmings buffer HP sensor: left (S103) goes ON then the amount of movement to the left is controlled by a flag in the trimmings buffer clock sensor (S101).



The trimmings [1] taken from the third cut (fore edge) fall onto the trimmings sub buffer [2].

- The trimmings fall onto the sub buffer after the first and second cuts (top then bottom edge).
- One end of the top and bottom edge trimmings may have a small amount of glue that could interfere with the retrieval of the longer trimmings after the third cut (fore edge) which is usually longer than the top and bottom trimmings.
- For this reason the trimmings are always dropped onto the sub buffer after the first and second cuts.

The trimmings buffer motor (M37) turns on and moves the trimmings buffer [3] slightly to the left by a prescribed distance and stops. The trimmings sub buffer disengages from the hook that links it to the book press plate [4] and returns to its home position, allowing the trimmings to fall into the trimmings buffer .

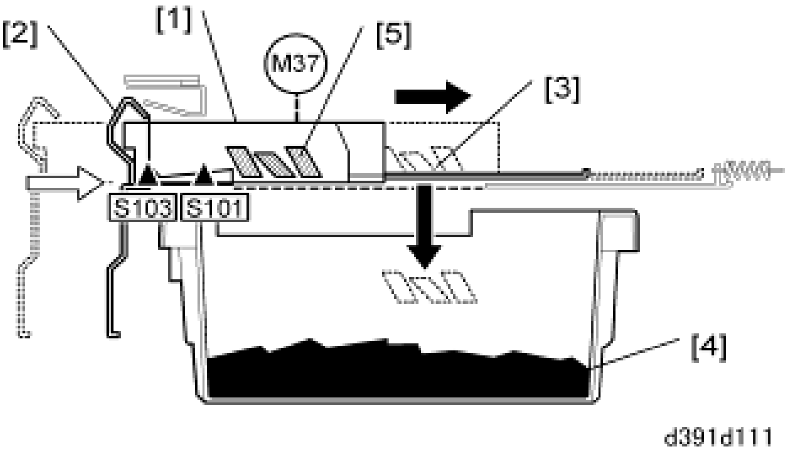
2nd Cut

This operation cycle for the 2nd cut is the same as 1st cut.

3rd Cut

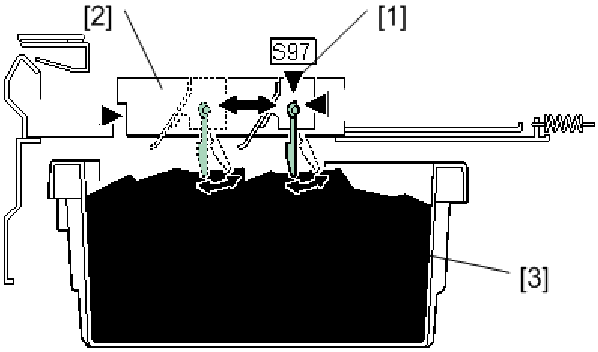
The sub buffer operation (used for the 1st and 2nd cuts) is not used for the third cut on the fore edge. The trimmings are allowed to fall directly into the trimmings buffer.

After 3rd Cut



The trimmings buffer motor (M37) turns on and moves the trimmings buffer [1] to the top of the trimmings box on the right.
The trimmings buffer moves to the right until the trimmings buffer HP sensor: left (S103) goes ON then the amount of movement to the right is controlled by a rotation flag in the trimmings buffer clock sensor (S101).
First, the trimmings buffer and book press plate [2] stop at the home position with the dump port [3] of the book press plate over the trimmings box [4]. Next, the trimmings buffer moves over the dump port so the trimmings [5] can fall into the trimmings box below.

Trimmings Box Full Detection



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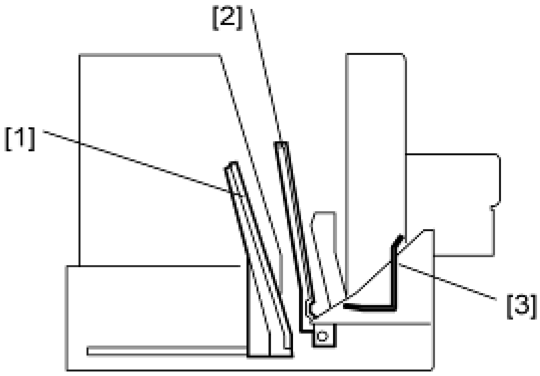
The unit is provided with a trimmings box full sensor (S97) and actuator [1] mounted on the trimmings buffer [2] to detect when the trimmings box [3] is full.

- When the pile of trimmings in the trimmings box below rises high enough to push the actuator up and activate the sensor twice, this signals that the box is full.
- Once the unit has finished trimming the book presently clamped in the grip unit, the sensor will signal the trimming control board that the box is full.
- Operation halts and the machine will display a message to alert the operator that the box must be emptied.

The capacity of the trimmings box is limited to the amount of trimmings generated by trimming the edges of about 15 books (B5 to A4 size) of 100 pages each (about 1,500 strips).

25.15.6 STACKING TRIMMED BOOKS

The trimmed books are sent to the book stacking unit where the books are delivered to the output tray for removal from the bookbinder by the operator.



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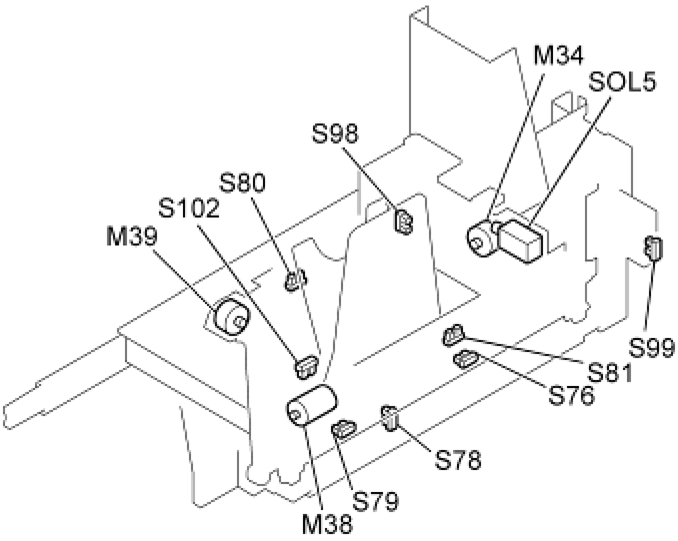
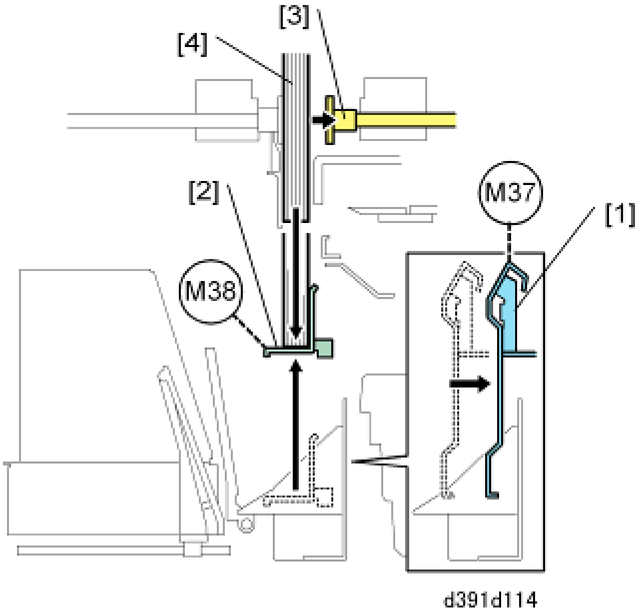
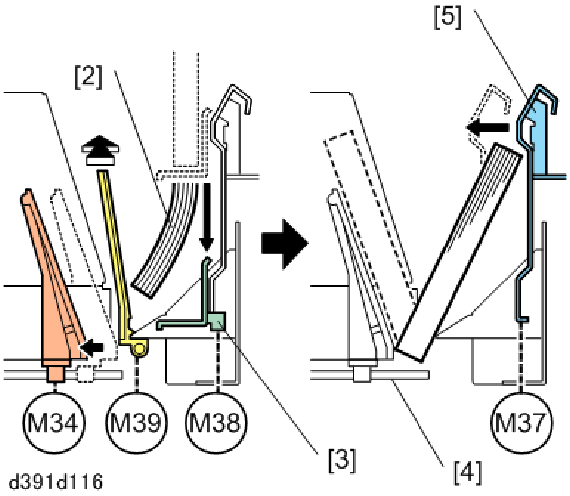
[1]	Book Lift Tray
[2]	Book Buffer Tray
[3]	Book Output Tray



M34	Book Output Belt Motor
M38	Book Lift Tray Motor
M39	Book Buffer Tray Motor
SOL5	Book Door Lock Solenoid
S76	Book Arrival Sensor
S78	Book Buffer Tray HP Sensor
S79	Book Lift Tray HP Sensor
S80	Book Collection Tray HP Sensor
S81	Stacking Tray Book Sensor
S98	Book Door Sensor
S99	Trimmings Box Sensor
S102	Book Lift Tray Lock Sensor

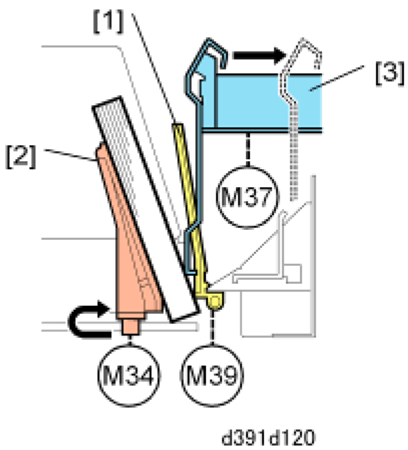


The trimmings buffer motor (M37) turns on and retracts the book press plate [1] in the transport path.
The operations described below are done while the next book is being trimmed.
The book tray lift motor (M38) turns on and raises the book lift tray. [2] The right book rotation plate [3] holding the book [4] in the trimming unit above retracts and releases the book. The book falls into the book lift tray.
The book door lock solenoid (SOL5) (not shown above) keeps the book delivery door locked while the book lift tray is operating.



The output belt motor (M34) moves the book buffer tray [1] to the rear the prescribed distance.

- With the book [2] fallen onto the book lift tray [3], the book lift tray motor (M38) switches on, and then lowers the book lift tray the prescribed distance.
- Next, the book buffer tray motor (M39) switches on, moves the book buffer tray to the rear, and then the book lift tray motor (M38) lowers the book lift tray the prescribed distance where the book is ready to pass to the output tray [4].
- The trimmings buffer motor (M37) turns on, and then pushes the press plate [5] against the book and pushes the book out onto the book output tray.



The book buffer tray motor (M39) turns on and returns the book buffer tray [1] to its home position at the front.

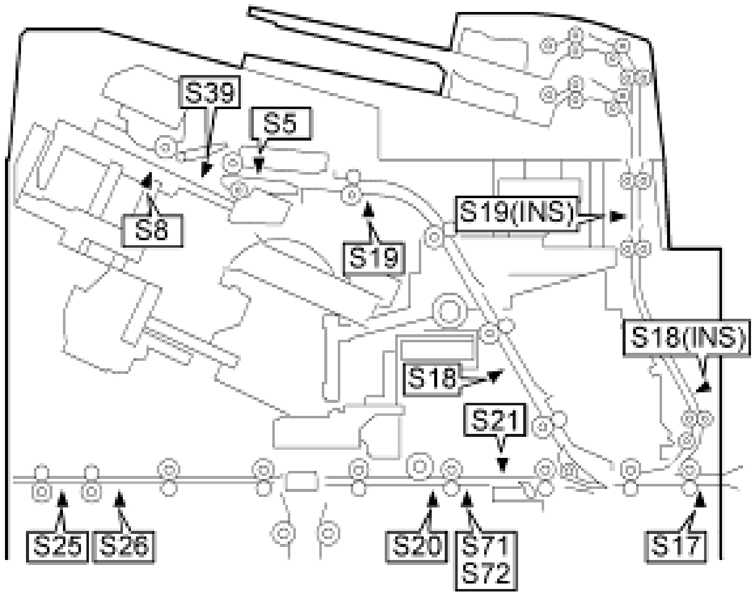
- Next, the book output belt motor (34) switches on and moves the book output tray [2] to the stacking position.
- If the book on the tray is thicker than 31 pages, the book output belt motor (M34) 10 mm to the left and then 10 mm to the right to align the book on the output tray.
- The trimmings buffer motor (M37) turns on and returns the trimmings buffer [3] to its home position.

25.16 JAM DETECTION

25.16.1 OVERVIEW

The shown and listed below are used to monitor the transport of paper and covers through the bookbinder. They confirm that the paper and covers feed smoothly and detect jams when they occur.

- Each sensor confirms that the leading and trailing edges of each sheet as it passes the sensor location.
- The sensor signals a jam if the leading or trailing edge fails to arrive at its location at the correct time.
- If a jam occurs the jam signal is sent to the CPU on the master control board, slave control board, or cutter control board.
- The board CPU shuts down the operation of the bookbinder and relays the jam signal to the host machine which issues the jam alert on the host machine LCD.
- The operator must then open the doors, remove the jam, and then close the doors so the machines can resume operation.



S18 (INS)	Vertical Transport Sensor 1
S19 (INS)	Vertical Transport Sensor 2
S5	Timing Sensor
S8	Tray Empty Sensor
S17	Entrance Sensor
S18	Signature Path Sensor 1
S19	Signature Path Sensor 2
S20	Cover Path Sensor 1
S21	Cover Registration Sensor
S25	Horizontal Exit Sensor
S26	Cover Path Sensor 2
S39	Sub Grip Signature Sensor
S71	Cover Horizontal Sensor (Small)
S72	Cover Horizontal Sensor (Large)

25.17 JAMS

25.17.1 LAG JAMS (PAPER LATE JAM)

A late jam occurs when the sensor does not detect the leading edge (LE) or trailing edge (TE) within the prescribed time because the paper failed to arrive.

NOTE
In the descriptions below the first line shows the jam code followed by the sensor number and sensor name.

1011: S17 Entrance Sensor
Failed to detect the LE within the prescribed time after host machine sent the paper exit signal.
1012: S18 Signature Path Sensor 1
Failed to detect the LE within the prescribed time after entrance sensor (S17) detected the paper.
1013: S19 Signature Path Sensor 2
Failed to detect the LE within the prescribed time after signature path sensor 1 (S18) detected the paper.
1014: S5 Timing Sensor
Failed to detect the LE with the prescribed time after signature path sensor 2 (S19) detected the paper.
1015: S8 Tray Empty Sensor
Failed to detect the LE within the prescribed time after timing sensor (S5) detected the paper.
1016: S39 Sub Grip Signature Sensor
Failed to detect signature LE while the signature was being sent from the sub grip unit to the main grip unit.
1017: S20 Cover Path Sensor 1
Failed to detect the LE within the prescribed time after entrance sensor (S17) detected the paper.
1018: S26 Cover Path Sensor 2
Failed to detect the LE within the prescribed time after cover path sensor 1 (S20) detected the paper.
1019: S25 Horizontal Exit Sensor
Failed to detect the LE within the prescribed time after cover path sensor 2 (S26) detected the paper.
101A: S21 Cover Registration Sensor
Failed to detect the LE within the prescribed time after entrance sensor (S17) detected the paper.
101B: S21 Cover Registration Sensor
Failed to detect the TE of the cover entering the cover registration unit within the prescribed time after switchback.
101C: S71 Cover Horizontal Sensor (Small)
Failed to detect side edge of the cover during horizontal registration of a small cover because it did not arrive within the prescribed time.
101D: S72 Cover Horizontal Sensor (Large)
Failed to detect side of the cover during horizontal registration of a small cover because it did not arrive within the prescribed time.

1068: S19 (INS) Vertical Transport Sensor 1
Failed to detect the LE within the prescribed time after the inserter transport (S14 (INS)) detected the paper.
106A: S18 (INS) Vertical Transport Sensor 2
Failed to detect the LE within the prescribed time after vertical transport sensor1 (S19 (INS)) detected the paper.

25.17.2 LATE JAMS (PAPER LAG JAM)

A lag jam occurs when the sensor does not detect the trailing edge (TE) within the prescribed time because the paper has stopped.

NOTE
In the descriptions below the first line shows the jam code followed by the sensor number and sensor name.

1121: S17 Entrance Sensor
Detected LE but failed to detect the TE within the prescribed time.
1122: S18 Signature Path Sensor 1
Detected LE but failed to detect TE within the prescribed time.
1123: S19 Signature Path Sensor 2
Detected LE but failed to detect TE within the prescribed time.
1124: S5 Timing Sensor
Detected LE but failed to detect TE within the prescribed time.
1125: S8 Tray Empty Sensor
Failed to detect signature TE within the prescribed time while the signature was being sent from the sub grip unit to the main grip unit.
1127: S20 Cover Path Sensor 1
Detected cover LE but failed to detect TE within the prescribed time.
1128: S26 Cover Path Sensor 2
Detected cover LE but failed to detect TE within the prescribed time.
1129: S25 Horizontal Exit Sensor
Detected cover LE but failed to detect TE within the prescribed time.
112A: S21 Cover Registration Sensor
Detected cover LE when the cover arrived in the cover registration unit but failed to detect TE within the prescribed time
112B: S21 Cover Registration Sensor
Failed to detect the TE of the cover leaving the cover registration unit within the prescribed time after switchback.
112C: S71 Cover Horizontal Sensor (Small)
Failed to detect side edge of the cover during horizontal registration of a small cover because it did not leave within the prescribed time.
112D: S72 Cover Horizontal Sensor (Large)
Failed to detect side of the cover during horizontal registration of a small cover because it did not leave within the prescribed time.
1169: S19 (INS) Vertical Transport Sensor 1
Detected the cover LE but failed to detect TE within the prescribed time.
116B: S18 (INS) Vertical Transport Sensor 2
Detected the cover LE but failed to detect TE within the prescribed time.

25.17.3 OTHER JAMS

NOTE
In the descriptions below the first line shows the jam code followed by the sensor number.

1200: Entrance Sensor S17
Detected LE of a sheet of paper sent from the host machine, but S17 detected the TE of the next sheet before S17 signaled the host machine that it had successfully fed the first sheet (detected the TE of the first sheet).
1300: S5, S8, S17, S18, S19, S20, S21, S25, S26
One or more of these sensors detected a sheet of paper in the paper path when the bookbinder was turned on:

- Timing Sensor (S5)
- Tray Empty Sensor (S8)
- Entrance Sensor (S17)
- Signature Path Sensor 1 (S18)
- Signature Path Sensor 2 (S19)
- Cover Path Sensor 1 (S20)
- Cover Registration Sensor (S21)
- Horizontal Exit Sensor (S25)
- Cover Path Sensor 2 (S26)

1400: S4, MSW1, MSW2
One of the following occurred:

- The top cover sensor (S4) detected top cover open during paper exit while downstream delivery was in progress.
- The right front door microswitch (MSW2) or left door microswitch (MSW1) detected that the right front door or left front door (or both) was open.

1700: S5, S8, S17, S18, S19, S20, S21, S25, S26
After opening and closing covers and doors to check for paper remaining the paper path, one or more of the following sensors detected paper still in the paper path of the bookbinder after the covers and doors were closed:

- Timing Sensor (S5)
- Tray Empty Sensor (S8)
- Entrance Sensor (S17)
- Signature Path Sensor 1 (S18)
- Signature Path Sensor 2 (S19)
- Cover Path Sensor 1 (S20)
- Cover Registration Sensor (S21)
- Horizontal Exit Sensor (S25)
- Cover Path Sensor 2 (S26)

1FA0: Stacking Tray Overflow Sensor S6
One of the following occurred:

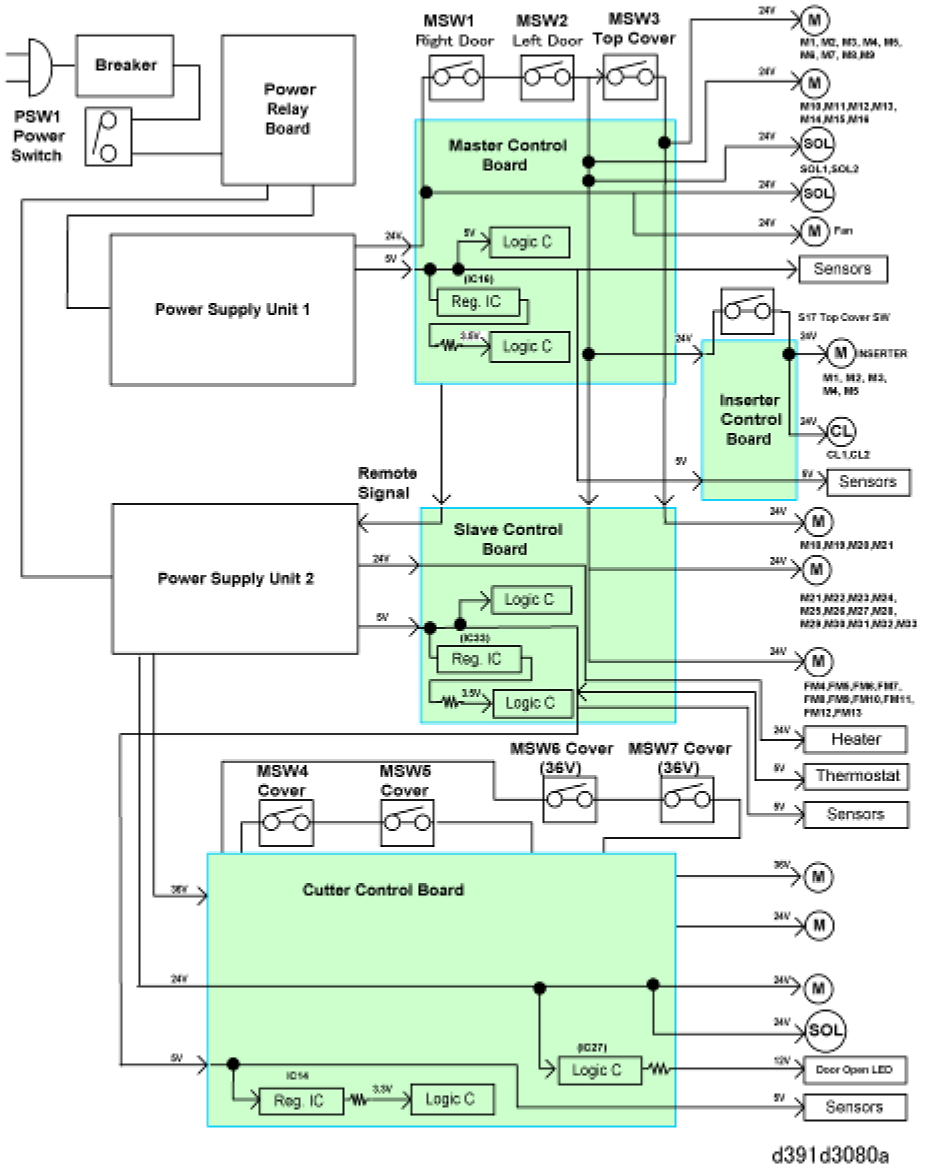
- Detected paper overflow on the stacking tray while sheets being stacked and jogged on the stacking tray
- The bookbinder received a command to stack over 200 sheets in the stacking tray

1FA1: Job Specification Error
The bookbinder received a command to stack fewer than 9 sheets of paper in the stacking tray.
1FA2: Book Jam 1
The book jammed in the trimming unit because the width of the third cut on the fore edge was wider than 40 mm (1.6").

1FA3: Signature Jam 2
The book jammed in the trimming unit at the first or second cut because the length specified for the finished book (measured top to bottom of the book) was over 216 mm (8.5").
1FA4: ---
The signature jammed in the gluing unit because the cover was shorter than the spine where the spine and cover were joined.
1FA5: S5, S21
The paper stopped in the paper path because the timing sensor (S5) or cover registration sensor (S21) sensor detected that the size of the paper in the paper path did not match the paper size specified for the book binding job.
1FA6: ---
Blank paper stopped in the paper path because a blank paper discard command was received.

25.18 POWER SUPPLY

25.18.1 OVERVIEW



The bookbinder is driven by two DC power units, power supply units 1 and 2.

Power Supply Components

Name	Function
Power Supply Unit 1	Supplies DC power to the master control board, inserter control board: DC 5V, 24V
Power Supply Unit 2	Supplies DC power to the slave control board, cutter control board
Power Switch	Turns power supply units 1, 2 on/off
Microswitch	Turns the DC 24V, 36V circuits on/off
Breaker Switch	Trips the breaker and cuts power supply to the bookbinder if a power overload occurs

25.19 ELECTRICAL CIRCUIT PROTECTION FEATURES

The DC 24V and DC 36V electrical circuits of all the motors and solenoids connected to the main control board, slave control board, and cutter control board are provided with fuses or other devices to protect these circuits from power overload.
The motor drive boards (small PCBs near the motors) are also equipped with protective devices.
The boards themselves are also protected with fuses at their 24VDC/36VDC power supply points.
If a short or other problem occurs in power supply units 1 or 2 (due to current or power overload), the affected power unit will shut down immediately in order to protect the board circuits. Fuses on boards blow and cut the AC power supply to the bookbinder as soon as such a problem occurs. When a current or voltage overload occurs, the machine must be turned off immediately and turned on again only after the problem has been corrected.

25.20 ENERGY SAVE MODE

The bookbinder features energy save modes to conserve energy when the binder remains on but idle. The bookbinder enters the energy save mode when one of the following occurs:

38. When the Energy Save button on the bookbinder (right front corner) is pressed to set the machine in energy save mode manually
39. After the machine remains idle for the specified time
40. When the host machine is turned off

When the bookbinder in the energy save mode, full operation can be restored by one of the following events:

- Pressing the energy save button
- Starting a book binding job on the host machine
- Switching on the host machine (after switching off the host machine sent the bookbinder into the energy save mode)

Here are some more details about these energy save modes.

1. Idle time to trigger energy save mode automatically

The bookbinder enters the energy save mode automatically after it has remained idle for a specified time. The gluing unit heater shuts down, glue temperature control stops, and the glue hardens quickly.
After the bookbinder has entered the energy save mode automatically, it can be restored to full operation by pressing the energy save button or by starting a book binding job on the host machine.
The length of the idle time that triggers the energy save mode must be set on the operation panel of the host machine. The default time is "0", so the bookbinder cannot enter energy save mode automatically until the idle time trigger has been entered. The idle time setting can be selected from a range of 1 to 240 minutes.

2. Host machine turned off

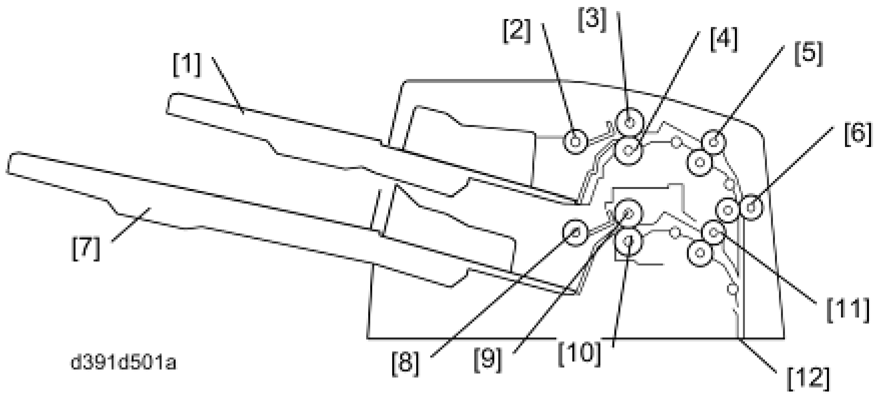
As soon as the host machine notifies the bookbinder that the host machine has been turned off, the bookbinder shuts down. If a job is in progress on the bookbinder, the bookbinder will not shut down until the operation has finished. All power to the bookbinder (with the exception of the CPU on the master control board) turns off and the bookbinder enters the energy save mode. Full power and full operation is restored to the bookbinder when the host machine is turned on again.

26. COVER INTERPOSER TRAY TYPE S1 (D738)

26.1 OVERVIEW

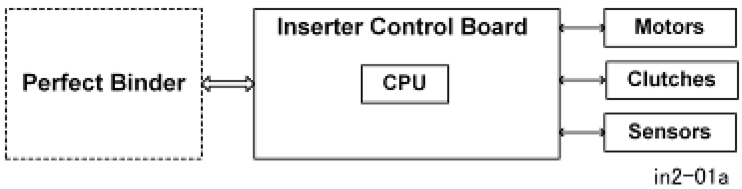
The Cover Interposer Tray Type S1 (hereafter "inserter") is mounted on top of the bookbinder and feeds the book covers that the bookbinder binds to signatures.

26.1.1 CROSS SECTION



[1]	Tray A	[7]	Tray B
[2]	Tray A Pickup Roller	[8]	Tray B Pickup Roller
[3]	Tray A Feed Roller	[9]	Tray B Feed Roller
[4]	Tray A Separation Roller	[10]	Tray B Separation Roller
[5]	Tray A Registration Roller	[11]	Tray B Registration Roller
[6]	Transport Roller 1	[12]	Vertical Transport Path

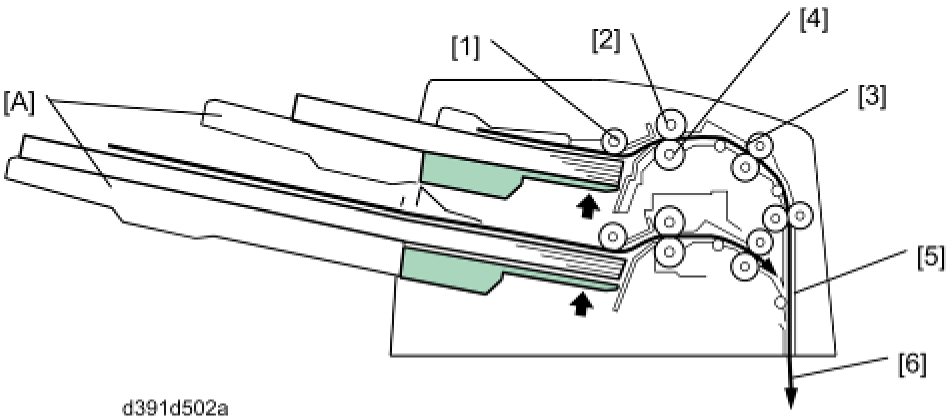
26.2 BASIC ELECTRICAL LAYOUT



The inserter control board and its CPU (IC7) control the operation of the inserter unit. The CPU reads and interprets the input signals from the bookbinder and the inserter sensors. The CPU uses this information to run the inserter motors and clutches according to pre-set timings. The inserter is supplied with DC 24V power from the bookbinder. The inserter control board communicates with the sensors through serial connectors and harnesses.

26.3 BASIC OPERATION

The inserter supplies the covers to bind the signatures that are stacked and aligned in the book binder using printed paper sent from the host machine where the paper is stacked and jogged (aligned) before binding to the cover. The inserter control board operates the inserter in response to instructions received from the bookbinder.

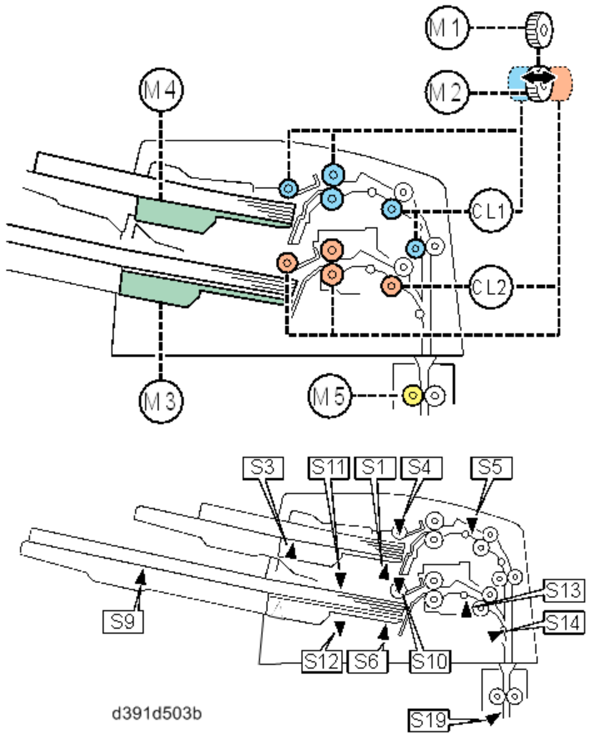


When the inserter receives the instructions for a bookbinding job, the cover feed operation starts at whichever tray [A] was requested for the job on the operation panel of the host machine. The selected tray is raised and then slightly lowered away from the pickup roller [1].

When the inserter receives the command to send the paper:

- The pickup roller [1] feeds paper from the tray.
- The feed roller [2] feeds paper to the registration roller [3] where it stops briefly against the roller to correct skew.
- If more than one sheet feeds at the feed roller, the torque limiter of the separation roller [4] will trigger and reverse feed the bottom sheet back to the tray. (This is the standard FRR mechanism.)
- The registration roller then feeds the sheet to the standby position [5] where it stops.
- When the bookbinder requests the cover for the binding operation, the vertical transport roller 1 [6] feeds the paper to the bookbinder below.

26.4 MOTORS AND SENSORS



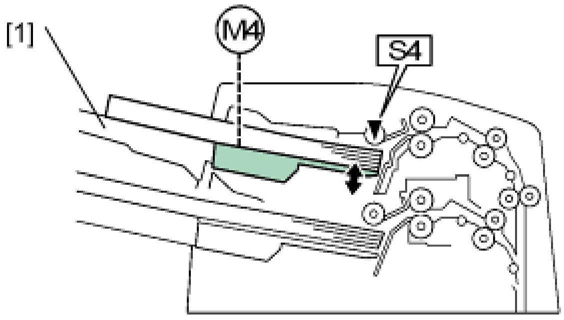
S1 (INS)	Paper Set Sensor: Tray A	S14 (INS)	Inserter Transport Sensor
S3 (INS)	Paper Out Sensor: Tray A	S19 (INS)	Vertical Transport Sensor 1
S4 (INS)	Paper Feed Sensor: Tray A	M1 (INS)	Tray Feed Motor
S5 (INS)	Registration Sensor: Tray A	M2 (INS)	Drive Switch Motor
S6 (INS)	Paper Set Sensor: Tray B	M3 (INS)	Lift Motor: Tray B
S10 (INS)	Paper Feed Sensor: Tray B	M5 (INS)	Vertical Transport Motor
S11 (INS)	Lower Limit Sensor: Tray A	CL1 (INS)	Registration Clutch: Tray A
S12 (INS)	Lower Limit Sensor: Tray B	CL2 (INS)	Registration Clutch: Tray
S13 (INS)	Registration Sensor: Tray B		

26.5 PAPER FEED AND TRANSPORT

The section describes what happens during paper feed from Tray A (essentially the same as what happens with Tray B).

- Lift to pre-feed position
- Feed drive selection
- Paper pickup and feed
- Skew correction at the registration roller
- Transport 1: Feed to standby position
- Transport 2: Feed into vertical path
- Next cover feed

26.5.1 LIFT TO PRE-FEED POSITION



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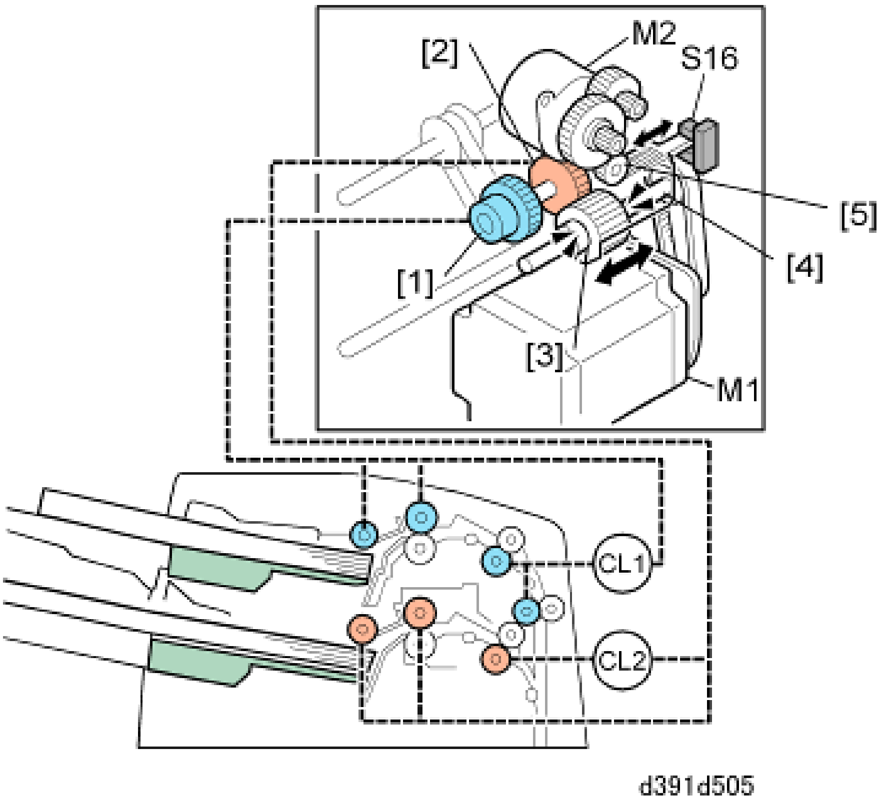
With paper loaded in the tray when the inserter receives a job start command from the bookbinder, the lift motor (M4 (INS)) for Tray A [1] turns on and raises the top tray until paper feed sensor (S4 (INS)) for Tray A detects the top of the paper stack and signals to stop the motor. Next, lift motor (M4 (INS)) reverses for a very brief time to lower the tray a short distance and then stops with the tray up and below the paper feed position.

This function keeps the tray at the proper feed position so the paper can be easily changed if the paper requested for the next job is different from the paper being used in the current job.

26.5.2 DRIVE SELECTION



Drive gear [1] drives the rollers for Tray A, and drive gear [2] drives the rollers for Tray B. One tray feed motor (M1 (INS)) engages the drive gear of whichever tray is selected for the job.

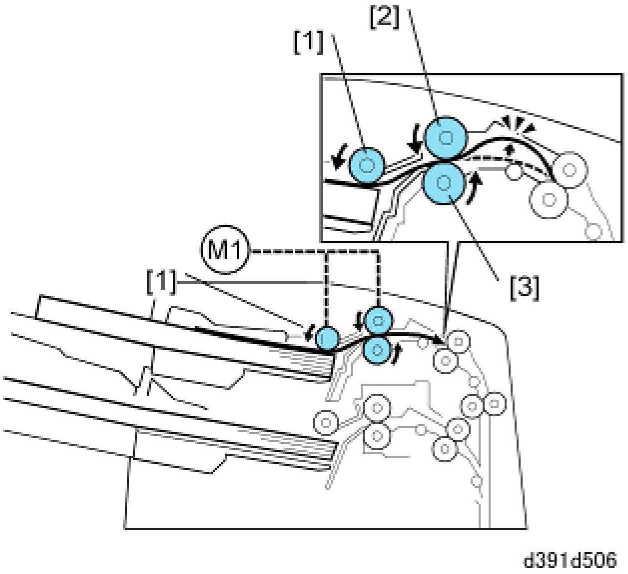
The switching gear [3] of the tray feed motor (M1 (INS)) is mounted on a rack [4] that is moved forward and back by pinion gear [5] driven by drive switch motor (M2 (INS)). The drive switch sensor (S16 (INS)) detects the position of the rack and the switching gear.

- When the rack is to the rear, the actuator on the rack enters the gap of the sensor and switches the sensor ON. The inserter knows that the switching gear is positioned to rotate the drive gear of Tray B.
- When the rack is to the front, the actuator on the rack leaves the gap of the sensor and switches the sensor OFF. The inserter knows the switching gear is positioned to rotate the drive gear of Tray A.

When the inserter receives the command to start feeding paper, it checks the status of the drive switch sensor (S16 (INS)):

- If the switching gear is positioned at the tray requested for the job, tray feed motor (M1 (INS)) turns on and rotates the drive gear of the tray to start feeding paper,
- If the switching gear is not positioned at the tray requested for the job, the drive switch motor (M2 (INS)) turns on (forward or reverse) to move the rack to the drive gear of the tray requested for the job.

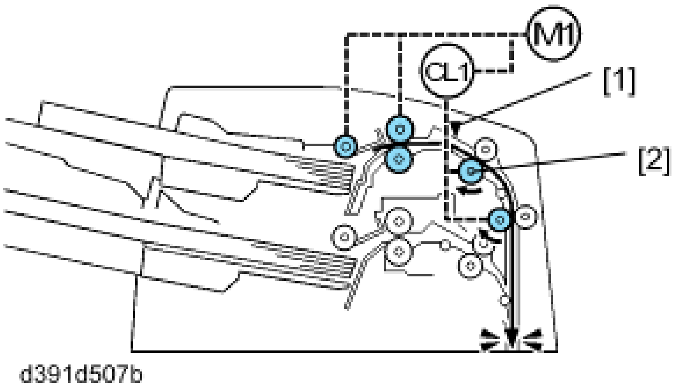
26.5.3 PAPER PICKUP AND FEED



The tray lift motor (M4) turns on and lifts Tray A until the paper feed sensor (S4 (INS)) detects the top of the paper stack and stops the motor with the pickup roller [1] resting on top of the stack.

The feed mechanism is the standard FRR design. The tray feed motor (M1 (INS)) turns on and rotates both the pickup roller [1] and the feed roller [2]. The pickup roller pulls out the paper tray and the feed roller feeds it out of the tray. The separation roller [3] is equipped with a torque limiter to prevent double-feeding.

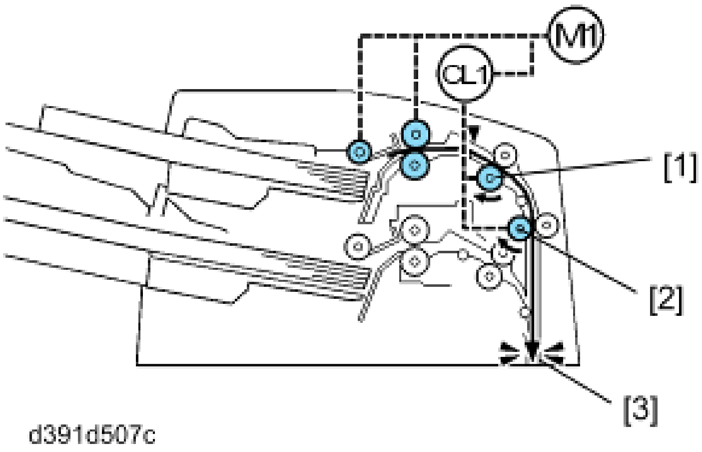
26.5.4 SKEW CORRECTION AT THE REGISTRATION ROLLER



The registration sensor (S5 (INS)) [1] goes ON just as the paper reaches the registration roller [2] and switches the tray feed motor off. This brief pause in paper feed causes the paper to buckle slightly against the registration roller and corrects skew. .

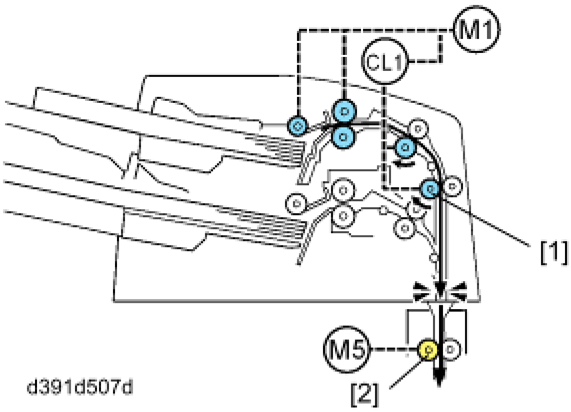
The normal pause for skew correction may not be long enough to correct skew of thick paper or coated paper. When either type of paper is selected for the job, the registration clutch (CL1 (INS)) is switched on to keep the registration roller disengaged slightly longer than normal to allow more time for the paper to buckle against the registration roller and correct skew.

26.5.5 TRANSPORT 1: FEED TO STANDBY POSITION



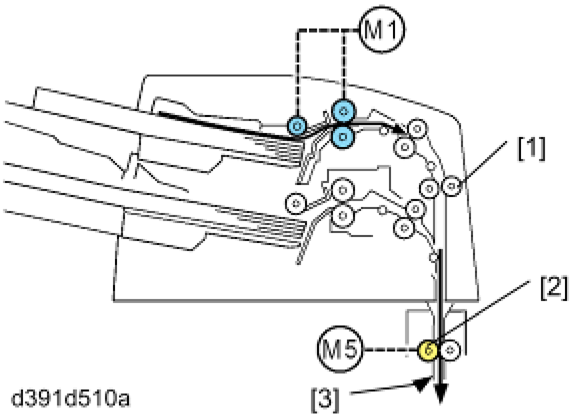
The tray feed motor (M1 (INS)) turns on again and starts rotating the registration roller [1] and transport roller [2] that feed the paper to the standby position [3]. The tray feed motor (M1 (INS)) stops when the paper reaches the standby position (about 105 mm in front of the bookbinder entrance).

26.5.6 TRANSPORT 2: FEED INTO VERTICAL PATH



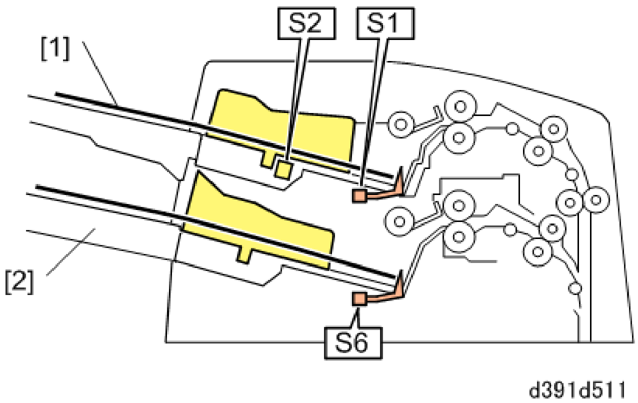
The paper remains at the standby position until the bookbinder requests the cover. Once the bookbinder issues the request for the cover, the tray feed motor (M1 (INS)) and vertical transport motor (M5 (INS)) turn on and feed the paper through transport rollers [1] and delivery rollers [2].

26.5.7 NEXT COVER FEED



Once the sheet in the feed path has fed 20 mm past transport rollers 1 [1], the tray feed motor (M1 (INS)) stops and then reverses to start feeding the next sheet. If another sheet is not available, the tray is lowered. When vertical transport sensor 1 (S19 (INS)) detects the passage of the trailing edge feeding into the vertical transport roller 1 [2] this signals the vertical transport motor (M5 (INS)) to turn off.

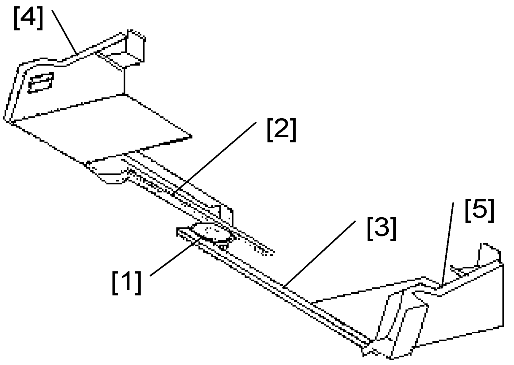
26.6 PAPER DETECTION



Tray A [1] and Tray B [2] are both provided with one paper set sensor (S1 (INS) for Tray A, S6 (INS) for Tray B) to detect the presence of paper on the trays.
When paper is loaded in Tray A, for example, the paper presses down a lever into a photosensor which turns it on and signals the presence of paper loaded in the tray. When this occurs S1 (INS) issues 1_EMPS and S6 (INS) issues 2_EMPS to the inserter control board. This tells the inserter control board that paper is loaded in one or both trays and lights the paper loaded display.

26.6.1 PAPER SIZE DETECTION

The inserter can detect only the width of the paper loaded in the tray. Neither tray is long enough to measure the paper length in the direction of paper feed.



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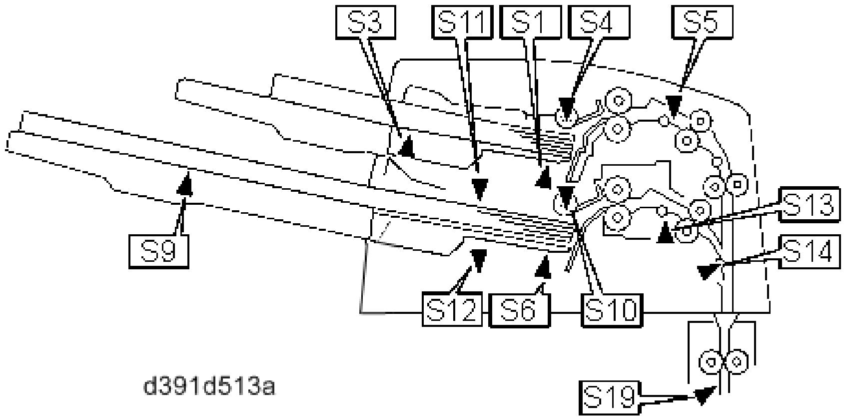
A pinion gear [1] engaging two opposing racks [2] and [3], one attached to each side fence [4] and [5], ensures that both fences move exactly the same distance from the center of the tray when the operator sets the fences for the paper loaded in the tray. Each tray has a paper width sensor (S2 (INS). The sensor detects the position of the side fence rack in front of it. The sensor reads this analog value and sends it to the inserter control board which uses the signal to identify the paper size.

26.6.2 JAM DETECTION



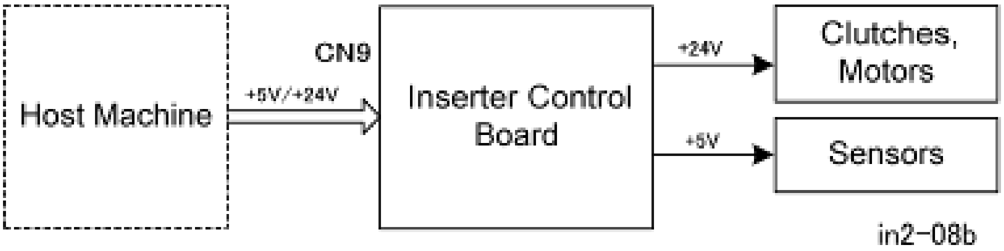
The sensors shown above and listed below are used to detect the presence of paper in the inserter paper path and signal a jam when one occurs.

S1	Paper Set Sensor: Tray A (S1 (INS))
S3	Paper Out Sensor: Tray A (S3 (INS))
S4	Paper Feed Sensor: Tray A (S4 (INS))
S5	Registration Sensor: Tray A (S5 (INS))
S6	Paper Set Sensor: Tray B (S6 (INS))
S10	Paper Feed Sensor: Tray B (S10 (INS))
S13	Registration Sensor: Tray B (S13 (INS))
S14	Inserter Transport Sensor (S4 (INS))
S19	Vertical Transport Sensor 1 (S19 (INS))

The two sensors S18 (INS) and 19 (INS) are in the bookbinder but they are controlled by the inserter control board.
Each sensor uses pulse counts to detect the leading and trailing edge of sheet of paper as it passes. If the leading or trailing edge fails to appear or leave within the prescribed time (these time intervals are checked against the prescribed time intervals stored in the CPU), this signals a paper jam.

- A jam alert shuts down operation of the inserter, the bookbinder, and the host copier.
- Once the jam is removed all covers of the inserter must be closed in order to resume operation.
- After all the covers are closed the inserter control board checks each sensor again for any remaining paper.

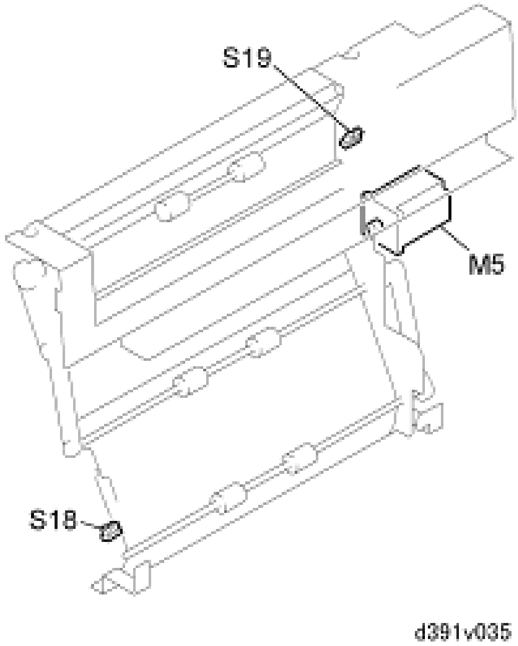
26.6.3 POWER SUPPLY



The bookbinder supplies power to the inserter (DC +5V, +24V). The DC +24V power is supplied to the clutches and motors. The DC +5V power goes to the sensors. Opening any cover of the inserter cuts the power supply, closing the cover restores the power supply.

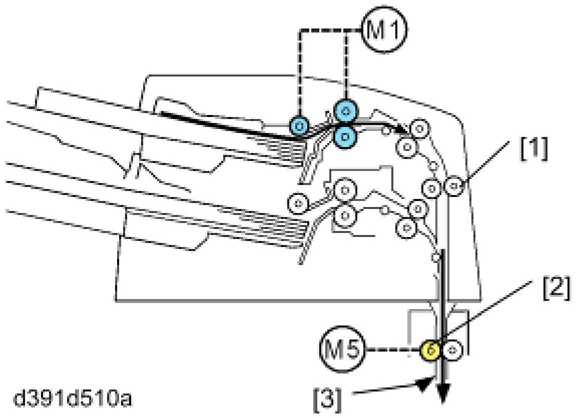
26.7 MOTOR, SENSOR LOCATIONS

26.7.1 INSERTER VERTICAL PATH MOTOR AND SENSORS (INSERTER)



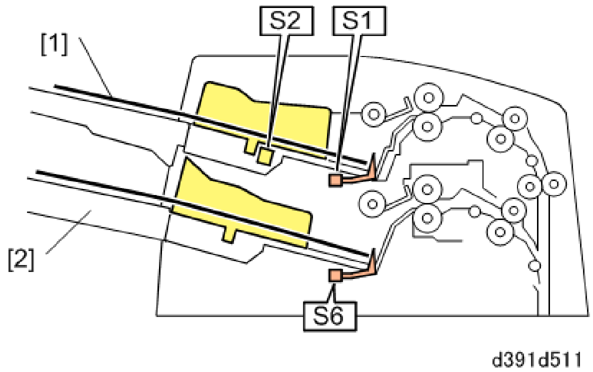
M5 (INS)	Vertical Transport Motor
	Drives all the rollers in the vertical feed path of the perfect binder.
S18 (INS)	Vertical Transport Sensor 2
	Detects the leading and trailing edge of every sheet that passes through the second transport roller (delivery roller) past the registration roller and signals a jam if either edge fails to pass within the prescribed time.
S19 (INS)	Vertical Transport Sensor 1
	The first sensor in the vertical transport path that feeds covers from the inserter to the perfect binder. Detects the leading and trailing edge of each sheet of paper in the path to the stacking tray to monitor timing and trigger jam alerts if the paper stops or fails to arrive. Located in the perfect binder, this sensor is controlled by the inserter.

26.7.2 NEXT COVER FEED



Once the sheet in the feed path has fed 20 mm past the transport rollers [1], tray feed motor M1 (INS) stops and then reverses to start feeding the next sheet. If another sheet is not available, the tray is lowered. When vertical transport sensor 1 S19 (INS) detects the passage of the trailing edge feeding into the nip of vertical transport roller 1 [2] this signals the vertical transport motor M5 (INS) to turn off.

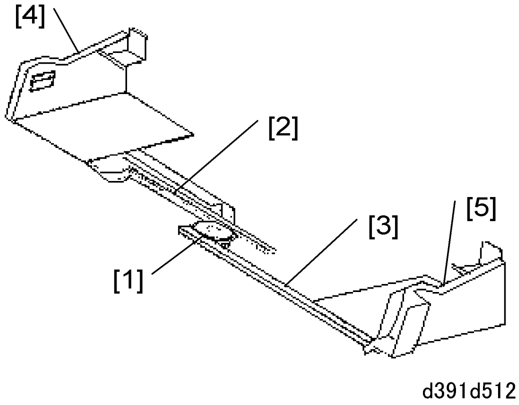
Paper Detection



Tray A [1] and Tray B [2] are both provided with one paper set sensor (S1 (INS) for Tray A, and S6 (INS) for Tray B) to detect the presence of paper on the trays. When paper is loaded in Tray A, for example, the paper presses down a lever into a photo-sensor which turns it on and signals the presence of paper loaded in the tray. When this occurs S1 (INS) issues 1_EMPS and S6 (INS) issues 2_EMPS to the inserter control board. This tells the inserter board that paper is loaded in one or both trays. This lights the paper loaded display.

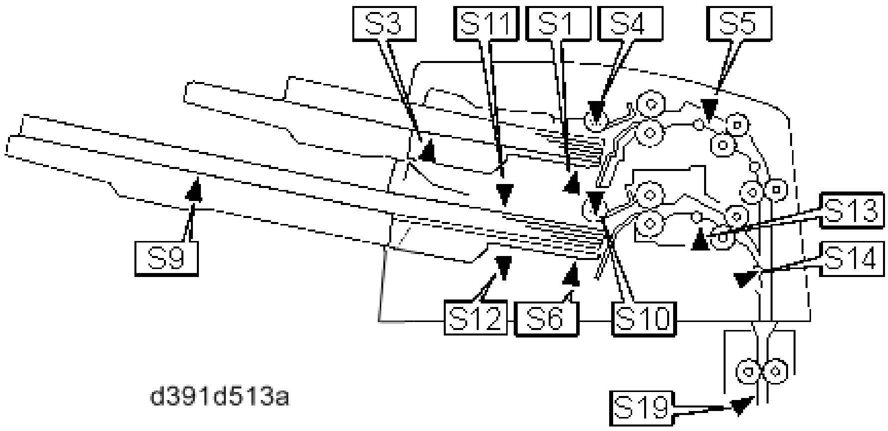
26.7.3 PAPER SIZE DETECTION

The inserter can detect only the width of paper loaded in the tray. Neither tray is long enough to measure the paper length in the direction of paper feed.



A pinion gear [1] engages two opposing racks [2] and [3], one attached to each side fence [4] and [5]. This ensures that both fences move exactly the same distance from the center of the tray when the operator sets the fences for the paper loaded in the tray.
The tray has a paper width sensor S2 (INS). This sensor detects the position of the side fence rack in front of it. The sensor reads this analog value and sends it to the inserter control board which uses the signal to identify the paper size.

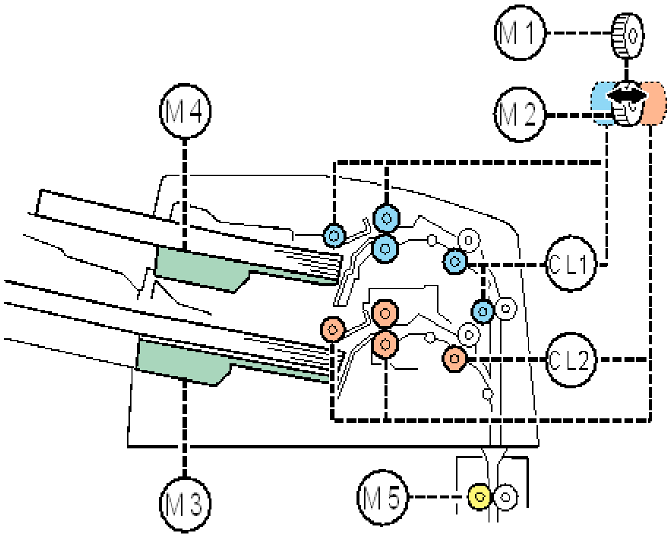
Jam Detection

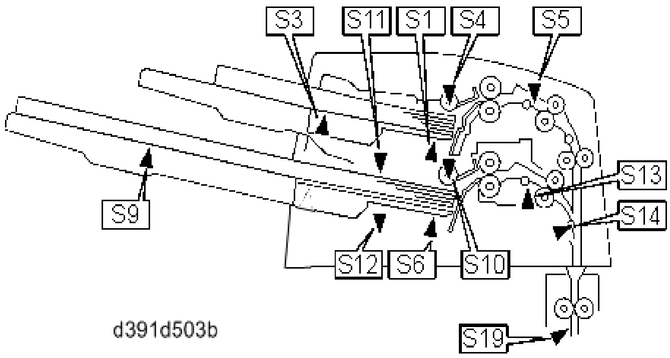


The sensors shown above and listed below are used to detect the presence of paper in the inserter paper path and signal a jam when one occurs

S1	Paper Set Sensor Tray A (S1 (INS))

26.7.4 INSERTER MOTORS AND SENSORS





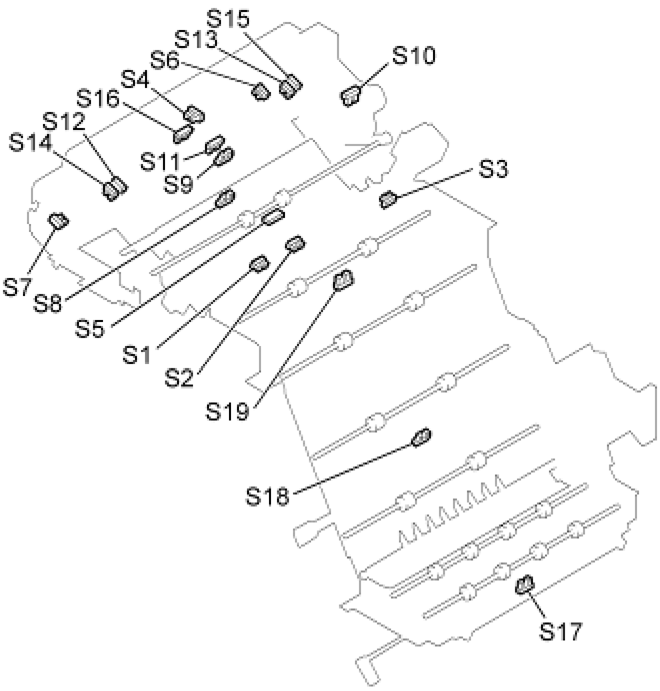
S1 (INS)	Paper Set Sensor: Tray A
	Detects paper on Tray A and signals that Tray A is ready to feed paper.
S2 (INS)	Paper Width Sensor Tray A
	Detects the position of the rear side fence. This signals the width of the paper loaded in Tray A.
S3 (INS)	Paper Out Sensor: Tray A
	Detects when the last sheet feeds from the Tray A and signals that the tray is empty.
S4 (INS)	Paper Feed Sensor: Tray A
	Detects the leading and trailing edge of every sheet that passes through the Tray A feed roller and signals a jam if either edge fails to pass within the prescribed time.
S5 (INS)	Registration Sensor: Tray A
	Detects the leading and trailing edge of every sheet that passes through the Tray A registration roller and signals a jam if either edge fails to pass within the prescribed time.
S6 (INS)	Paper Set Sensor: Tray B
	Detects paper on Tray A and signals that Tray B is ready to feed paper.

S7 (INS)	Paper Width Sensor Tray B
	Detects the position of the rear side fence. This signals the width of the paper loaded in Tray B.
S10 (INS)	Paper Feed Sensor: Tray B
	Detects the leading and trailing edge of every sheet that passes through the Tray B feed roller and signals a jam if either edge fails to pass within the prescribed time.
S11 (INS)	Lower Limit Sensor: Tray A
	Stops the tray lift motor to stop Tray A at its home position.
S12 (INS)	Lower Limit Sensor: Tray B
	Stops the tray lift motor to stop Tray B at its home position.
S13 (INS)	Registration Sensor: Tray B
	Detects the leading and trailing edge of every sheet that passes through the Tray B registration roller and signals a jam if either edge fails to pass within the prescribed time.
S14 (INS)	Inserter Transport Sensor
	Detects the leading and trailing edge of every sheet that passes through the first transport roller past the registration roller and signals a jam if either edge fails to pass within the prescribed time.
S19 (INS)	Vertical Transport Sensor 1
	Detects the leading and trailing edge of each sheet of paper in the path to the vertical transport path and triggers jam alerts if the paper stops or fails to arrive.
M1 (INS)	Tray Feed Motor
	Drives the rollers in Tray A or Tray B, whichever tray is selected for the jog. The drive gear of the motor is mounted on a rack is moved forward to engage the Tray A drive roller or moved to the rear to engage the Tray B drive roller.
M2 (INS)	Drive Switch Motor
	Rotates the pinion gear that moves the rack with the main drive gear of the tray feed motor to the rear or to the front to engage the drive roller of Tray B or Tray A.
M3 (INS)	Lift Motor: Tray A
	Lifts Tray A to the feed position and lowers the tray when the job is finished.
M4 (INS)	Lift Motor: Tray B
	Lifts Tray B to the feed position and lowers the tray when the job is finished.

M5 (INS)	Vertical Transport Motor
	Drives the delivery roller, the last roller in the paper feed path of the inserter.
CL1 (INS)	Registration Clutch: Tray A
	Energizes and disengages the registration roller in the Tray A paper path when a sheet of thick paper or coated paper reaches the registration roller. This allows a little more time for the thick or coated paper to buckle against the roller to correct skew. Operates only for thick or coated paper fed from Tray A.
CL2 (INS)	Registration Clutch: Tray
	Energizes and disengages the registration roller in the Tray B paper path when a sheet of thick paper or coated paper reaches the registration roller. This allows a little more time for the thick or coated paper to buckle against the roller to correct skew. Operates only for thick or coated paper fed from Tray B.

26.8 BOOKBINDER

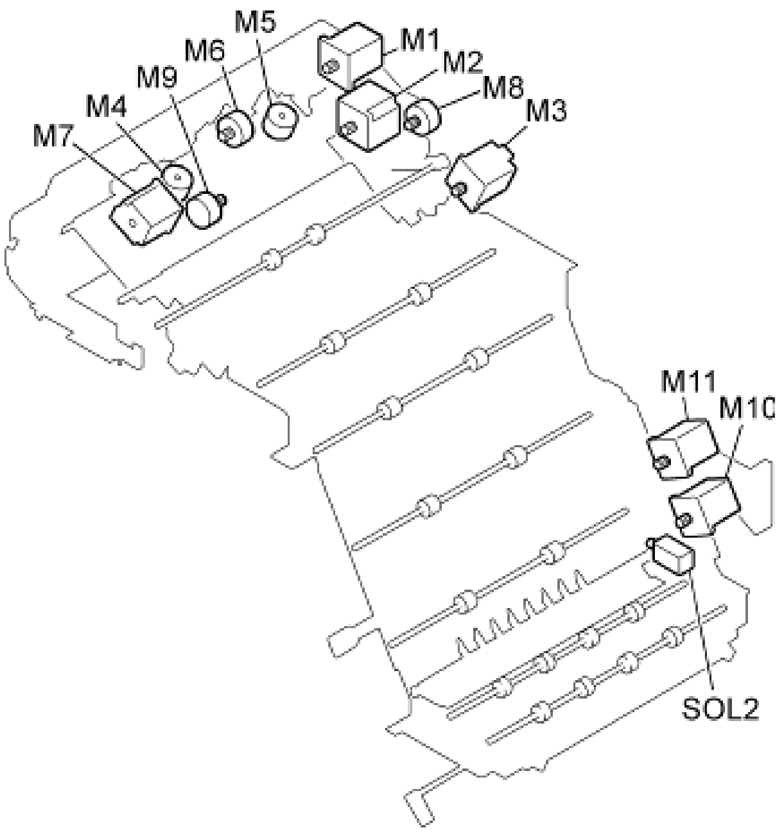
26.8.1 SIGNATURE OUTPUT, TRANSPORT, STACKING TRAY SENSORS



S1	Paper Detection Sensor (Front)
	Detects the sheet of paper.
S2	Paper Detection Sensor (Rear)
	Detects the sheet of paper.
S3	TE Press Lever HP Sensor
	Detects the home position of the TE press lever that compresses the trailing edge of the stack in the stacking tray.
S4	Top Cover Sensor
	Detects when the top cover of the bookbinder is opened and closed.
S5	Timing Sensor
	Detects the leading and trailing edge of each sheet of paper as it enters the stacking tray. When it detects the trailing edge, this turns on the TE press lever motor which lowers the press lever onto the trailing edge of the stack.
S6	Stacking Tray Overflow Sensor
	Detects when the number of sheets on the stacking tray has exceeded the capacity of the tray.
S7	Stacking Tray Lower Limit Sensor
	Detects when the sub grip unit is at its lowest position where it can pass the signature to the main grip unit.

S8	Tray Empty Sensor
	Detects when the stacking tray is empty.
S9	Stacking Tray HP Sensor
	Detects the home position sensor for the stacking tray guide.
S10	Switchback Flapper HP Sensor
	Detects the home position of the switchback flapper.
S11	Switchback Roller HP Sensor
	Detects the home position of the switchback roller which moves up and down as it reverse feeds each sheet in the stacking tray to align its trailing edge against the right side of the tray.
S12	Jog Fence HP Sensor (Front: Small)
	Detects the home position of the front jog fence (small size paper).
S13	Jog Fence HP Sensor (Rear: Small)
	Detects the home position of the rear jog fence (small size paper).
S14	Jog Fence HP Sensor (Front: Large)
	Detects the home position of the front jog fence (large size paper).
S15	Jog Fence HP Sensor (Rear: Large)
	Detects the home position of the rear jog fence (large size paper).
S16	Stacking Weight HP Sensor
	Detects the home position of the stacking weight.
S17	Entrance sensor
	Detects the leading and trailing edge of each sheet of paper as it enters the perfect binder from the host machine.
S18	Signature Path Sensor 1
	Detects the leading and trailing edge of each sheet of paper in the path to the stacking tray and triggers jam alerts if the paper stops or fails to arrive.
S19	Signature Path Sensor 2
	Detects the leading and trailing edge of each sheet of paper in the path to the stacking tray and trigger jam alerts if the paper stops or fails to arrive.

26.8.2 SIGNATURE PATH MOTORS AND SOLENOID



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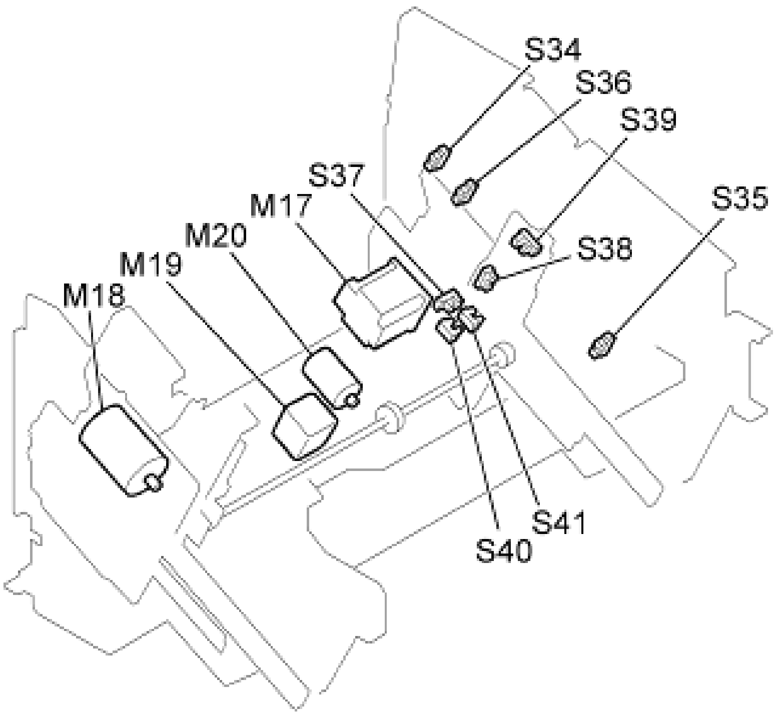
SOL2	Entrance JG Solenoid
	Operates the junction gate behind the entrance roller. When the gate is down, paper feeds up to the stacking tray. When the solenoid energizes the JG opens and allows paper to pass straight through the perfect binder.
M1	Stacking Roller Motor
	Drives the signature exit roller and stacking roller that feed each sheet out of the signature path into the stacking tray.
M2	Stacking Tray Lift Motor
	Lowers the stacking tray to where the signature is delivered to the sub grip unit. Raises the stacking roller after the signature is passed to the sub grip unit.
M3	TE Press Lever Motor
	Raises and lowers the press lever that presses down on the trailing edge of the signature in the stacking tray.
M4	Jogger Motor (Front)
	Moves the front jogging fence forward or backward once and stops at the base position for jogging the edge of each sheet against the front fence.

M5	Jogger Motor (Rear)
	Moves the rear jogging fence forward and backward to align the sides of each sheet with the edges of the signature stack.
M6	Stacking Weight Motor
	At the beginning of a job moves the stacking weight to the proper position for the paper size selected for the job.
M7	Switchback Roller Lift Motor
	Lowers the rotating switchback roller in the stacking tray onto each sheet as it enters the stacking tray. This pushes the trailing edge of each sheet against the right side of the stacking tray to align the spine for binding.
M8	Switchback Flapper Motor
	Raises and lowers the switchback flapper that presses down the trailing edge of each sheet as it enters the stacking tray.
M9	Stacking Tray Motor
	Moves the stacking tray guide to the proper position for the selected paper size.
M10	Entrance Motor
	Drives the entrance roller and transport roller 1 at the entrance of the perfect binder.
M11	Signature Transport Motor
	Drives the four transport rollers in the signature path that feeds paper from the entrance roller to the stacking tray.

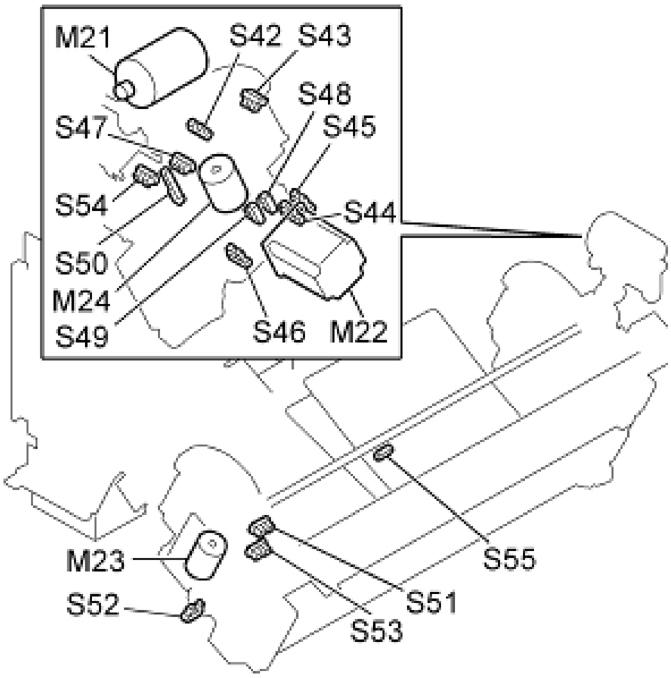
26.8.3 SUB GRIP MOTORS AND SENSORS



S34	Signature HP Sensor
	Detects when the main grip unit is at its lowest position (tilted ccw to the left) where it can receive the signature from the sub grip on the left.
S35	Signature Main Grip Position Sensor
	Detects when the main grip unit is at its home position.
S36	Main Grip Rotate Enable Sensor
	Detects when the main grip unit can be rotated clockwise to bring the signature to the vertical.
S37	Sub Grip HP Sensor
	Detects when the sub grip unit is at the home position (up and under the stacking tray).
S38	Sub Grip Size HP Sensor
	Detects when the sub grip unit is at the correct home position for the width of the selected paper size.
S39	Sub Grip Signature Sensor
	Detects the signature in the sub grip unit.
S40	Sub Grip Open Sensor
	Detects when the sub grip unit is open.

S41	Sub Grip Close Sensor
	Detects when the sub grip unit is closed.
M17	Sub Grip Lift Motor
	Lowers the sub grip unit to where the signature is passed to the main grip. Raises the sub grip unit to its home position below the stacking tray after the signature is passed to the main grip unit.
M18	Signature Move Motor
	Moves the sub grip unit and signature down and to the right so the signature can be passed to the main grip unit.
M19	Sub Grip Size Motor
	Rotates the gear that drives both sides of the sub gripper to the sizes of the signature in the sub grip unit to clamp the signature before the sub grip unit and signature are lowered toward the main grip unit.
M20	Sub Grip Motor
	Raises the front and rear plates of the sub gripper to clamp the signature in the sub grip unit. Opens the plates to release the signature from the sub grip unit to the main grip unit.

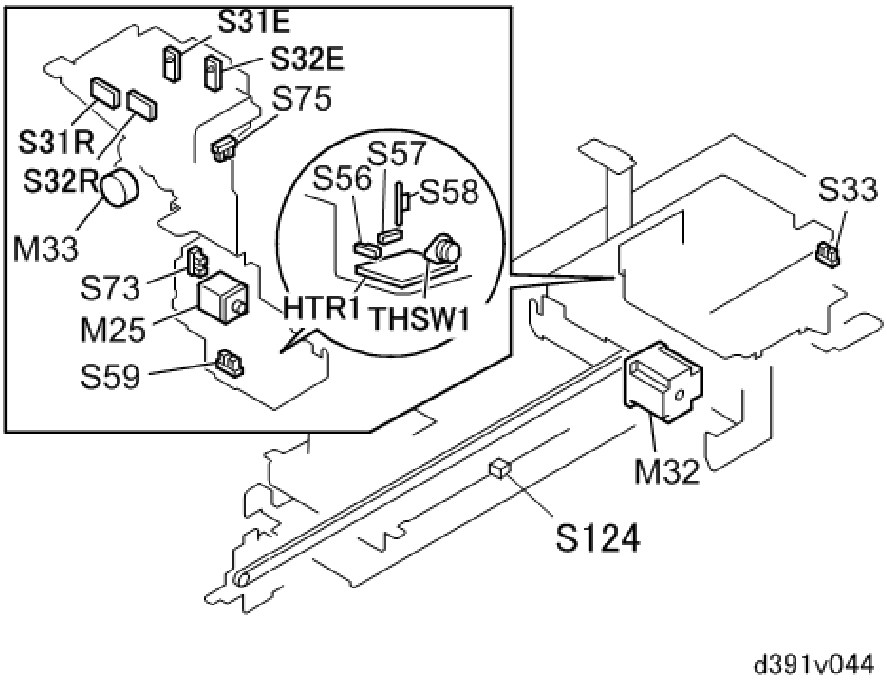
26.8.4 MAIN GRIP MOTORS AND SENSORS



S42	Rotate-to-Binding Position Sensor
	Detects when the main grip unit has rotated to the binding position.
S43	Main Grip Rotate HP Sensor
	Detects when the main grip unit is at the home position.
S44	Main Grip HP Sensor: Low
	Detects when the main grip unit can be rotated.
S45	Main Grip HP Sensor: High
	Detects when the signature is positioned for binding to the cover.
S46	Main Grip Encoder: Rear
	Detects the rotation position of the rear main grip motor (M24) which clamps the rear part of the signature spine in the main grip of the grip unit.
S47	Main Grip Open Sensor: Rear
	Detects when the main gripper is completely open.
S48	Main Grip Press Sensor 1
	Detects the press position of the main gripper during signature alignment.
S49	Main Grip Press Sensor 2
	Detects the press position of the main gripper when the main unit is ready to press the signature into the center of the cover.

S50	Signature Thickness Sensor
	Detects the thickness of the signature as soon as the signature has passed from the sub grip unit to the main grip unit.
S51	Main Grip Open Sensor: Front
	Detects when the main gripper is completely open.
S52	Main Grip Encoder: Front
	Detects rotation of the front main gripper motor (M23).
S53	Main Grip Close Sensor: Front
	Detects when the main grip has closed fully onto the front part of the signature spine.
S54	Main Grip Close Sensor: Rear
	Detects when the main grip has closed fully onto the rear part of the signature spine.
S55	Main Grip Signature Sensor
	Detects when the main grip has released the book into the trimming unit.
M21	Grip Unit Rotation Motor
	Rotates the main grip unit clockwise to the vertical after it receives the signature from the sub grip unit. Rotates the main grip unit counter-clockwise to its home position after the main grip releases the signature.
M22	Main Grip Lift Motor
	Raises and lowers the main grip unit with the signature when gluing the spine, joining the signature and spine, and passing the book to the trimming unit.
M23	Grip Motor: Rear
	Opens and closes the rear half of the main gripper that grips the spine of the signature in the main grip unit.
M24	Grip Motor: Front
	Opens and closes the front half of the main gripper that grips the spine of the signature in the main grip unit.

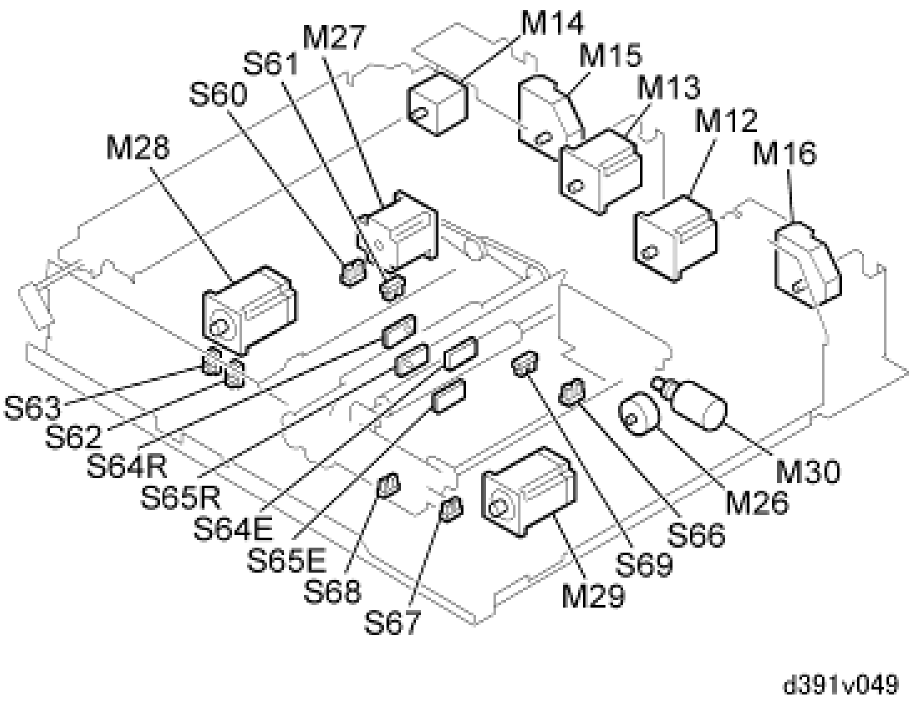
26.8.5 GLUING UNIT MOTORS, SENSORS, HEATER, THERMOSTAT



S31E	Glue Vat Empty Sensor: Emitter
	Detects presence of glue in the vat (the emitter sensor of an Emitter/Receptor pair).
S31R	Glue Vat Empty Sensor: Receptor
	Detects presence of glue in the vat (the receptor sensor of an Emitter/Receptor pair).
S32E	Glue Vat Full Sensor: Emitter
	Detects when the glue vat is full (the emitter sensor of an Emitter/Receptor pair).
S32R	Glue Vat Full Sensor: Receptor
	Detects when the glue vat is full (the receptor sensor of an Emitter/Receptor pair).
S33	Glue Supply Cover Sensor
	Detects when the glue supply unit is opened or closed.
S56	Glue Temperature Thermistor
	Reads the temperature of the glue in the vat (this sensor is inside the glue unit).
S57	Glue Abnormal Temperature Thermistor
	Reads the temperature of the glue in the vat (this sensor is inside the glue unit). If temperature exceeds upper range, triggers an alert and cuts off power to the bookbinder.
S58	Glue Level Thermistor
	Monitors the amount of glue in the vat (this sensor is inside the glue unit).

S59	Glue Vat Roller Rotation Sensor
	Detects rotation of the glue roller to confirm that the motor and roller are operating.
S73	Glue Vat HP Sensor
	Detects when the glue vat is at the home position at the rear.
S75	Glue Roller HP Sensor
	Detects the home position of the glue applicator roller.
S124	Machine Temperature Sensor
	Monitors temperature inside the machine.
M32	Glue Vat Motor
	Drives the gluing unit from front to back, and then back to front below the spine of the signature as the unit applies glue from the glue vat.
M33	Glue Supply Motor
	Drives the rotary feeder that feeds glue pellets (four at a time) from the glue bin to the gluing unit.
M25	Glue Vat Roller Motor
	Rotates the glue vat roller in the gluing unit to stir the glue after it has melted. This rotation coats the glue applicators that apply glue to the spine of the signature above.
HTR1	Glue Heater
	Mounted inside the gluing unit, melts the glue in the gluing unit before the glue is applied to the spine.
THSW1	Thermostat
	Switches off the power supply if it detects abnormally high temperature around the glue unit (this thermostat is inside the glue unit.

26.8.6 COVER TRANSPORT MOTORS AND SENSORS

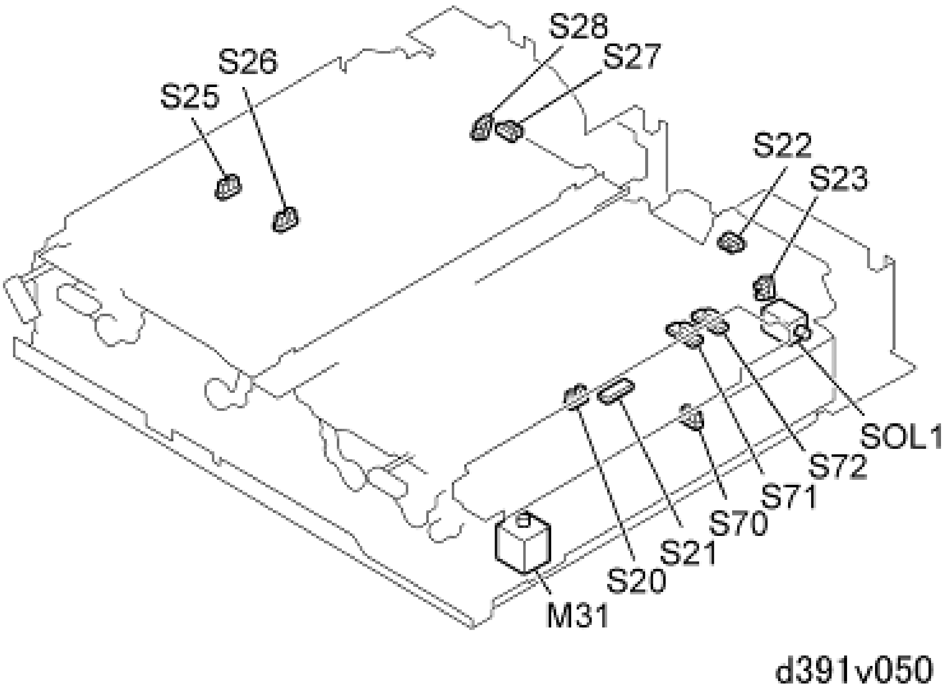


S60	Spine Plate HP Sensor: Left
	Detects the home position of the left spine fold plate.
S61	Spine Fold Close Sensor: Left
	Detects when the left spine fold plate is at its closed position.
S62	Spine Plate Open Sensor
	Detects when the spine plate is open.
S63	Spine Plate Close Sensor
	Detects when the spine plate is closed.
S64E	Book Exit Sensor: Emitter
	Detects the leading edge of the book during binding and release of the book to the trimming unit (the emitter of an Emitter/Receptor pair).
S64R	Book Exit Sensor: Receptor
	Detects the leading edge of the book during binding and release of the book to the trimming unit (the receptor of an Emitter/Receptor pair).
S65E	Leading Edge Sensor: Emitter
	Detects the leading edge of the book during binding and release of the book to the trimming unit (the emitter of an Emitter/Receptor pair).

S65R	Leading Edge Sensor: Receptor
	Detects the leading edge of the book during binding and release of the book to the trimming unit (the receptor of an Emitter/Receptor pair).
S66	Spine Plate HP Sensor: Right
	Detects the home position of the right spine fold plate.
S67	Signature Exit Path HP Sensor
	Detects the home position of the right signature exit roller in the signature path.
S68	Signature Path Exit Press Sensor
	Detects application of pressure at the nip of the right signature exit roller in the signature exit path.
S69	Spine Fold Close Sensor: Right
	Detects when the right spine fold plate is at its closed position.
M12	Cover Motor: Right
	Drives s horizontal transport rollers transport roller 2, 3, and the buffer roller to feed a cover into the cover registration unit. Reverses to reverse rotation of the buffer roller to jog the trailing edge of the cover against the right side of the cover registration unit.
M13	Cover Motor: Left
	Drives horizontal transport rollers 4 and 5.
M14	Exit Motor
	Drives the two exit rollers in the horizontal paper path feed paper out of the perfect binder for downstream delivery.
M15	Cover Guide Motor: Left
	Opens and closes the left cover transport guide releases the cover from the nips horizontal transport rollers 4 and 5.
M16	Cover Guide Motor: Right
	Opens and closes the left cover transport guide releases the cover from the nips horizontal transport rollers 1, 2, and 3.
M26	Spine Plate Motor
	Retracts the spine plate to the right to open the well through which the main grip unit pushes the joined signature and cover so the sides of the cover can fold up around the sides of the signature.
M27	Signature Exit Roller Motor
	Drives the signature exit roller that feeds the bound signature to the trimming unit below.

M28	Spine Fold Motor: Left
	Performs two functions: 1) Raises and lowers transport rollers 4, 5 when the cover is aligned in the cover registration unit, and 2) Pushes the spine fold plate against the left side of the signature after the signature is pushed down on the cover against the spine plate.
M29	Spine Fold Motor: Right
	Performs two functions: 1) Raises and lowers transport rollers 2, 3 when the cover is aligned in the cover registration unit, and 2) Pushes the spine fold plate against the right side of the signature after the signature is pushed down on the cover against the spine plate.
M30	Signature Exit Path Motor
	Projects and retracts the signature exit guide which closes and opens the nip of the signature exit rollers above the trimming unit.

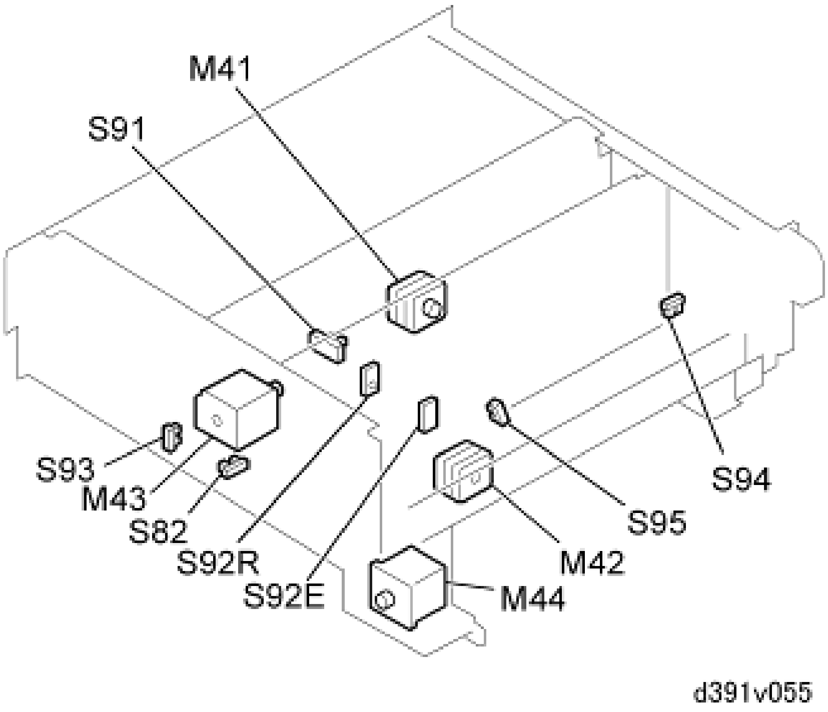
26.8.7 COVER TRANSPORT UNIT SOLENOID, MOTORS, SENSORS



M31	Cover Horizontal Registration Motor
	Moves the cover in the cover registration unit to the front or back to position the cover for binding to the signature.
S20	Cover Path: Sensor 1
	Detects the cover in the paper path during transport and spine folding.
S21	Cover Registration Sensor
	Detects the cover only during cover gripping.
S22	Cover Guide HP Sensor: Right
	Detects home position of the path guide on the right edge of the cover in the cover transport path.
S23	Cover Guide Open Sensor: Right
	Detects when the right cover guide is opened and closed.
S25	Horizontal Path Exit Sensor
	Detects the leading and trailing edge of each sheet as it exits the bookbinder during straight-through feeding.
S26	Cover Path: Sensor 2
	Detects the cover in the paper path during exit and spine folding.
S27	Cover Guide HP Sensor: Left
	Detects home position of the path guide on the left edge of the cover in the cover transport path.
S28	Cover Guide Open Sensor: Left
	Detects when the left cover guide is open and closed.

S70	Registration Unit HP Sensor
	Detects when the cover registration unit is at the home position.
S71	Cover Horizontal Registration Sensor (S)
	Detects the rear edge of a small size cover (up to 297 mm) during cover registration in the cover registration unit.
S72	Cover Horizontal Registration Sensor (L)
	Detects the rear edge of a small size cover (larger than 297 mm) during cover registration in the cover registration unit.
SOL1	Cover Grip Solenoid
	Opens and closes to control operation of the cover gripper in the cover registration unit. The cover gripper clamps the cover so the cover registration guide can move the cover front/rear to position the cover for binding to the signature.

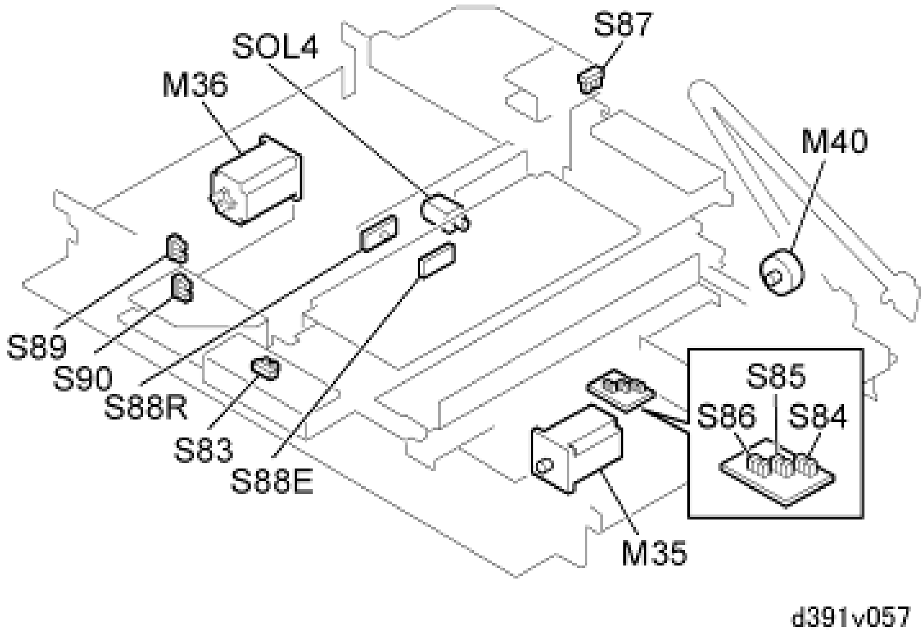
26.8.8 SIGNATURE ROTATION UNIT MOTORS AND SENSORS



S82	Slide HP Sensor
	Detects the home position of the book rotation grip unit. The book rotation grip unit is raised and lowered by the slide motor (M44) when the book is being trimmed.
S91	Book Rotation HP Sensor 2
	Detects the stop position of the book rotation plates that rotate the book three times for trimming.
S92E	Trim Unit Entrance Sensor: Emitter
	Detects a book at the entrance of the trimmer unit. (The emitter of an Emitter/Receptor pair.)
S92R	Trim Unit Entrance Sensor: Receptor
	Detects a book at the entrance of the trimmer unit. (The receptor of an Emitter/Receptor pair.)
S93	Grip HP Sensor
	Detects the home position of the gripper in the main grip unit.
S94	Grip End Sensor
	Detects when the signature grip operation in the main grip unit has ended.
S95	Book Rotation HP Sensor 1
	Detects the position of rotate motor rotation motor 1 (M42) after it has been rotated to rotate the book for trimming

M41	Book Rotation Motor 2
	After the right book rotation plate is pushed against the right side of the book to clamp it for rotation, rotates the left book rotation plate and the book so the book can be trimmed at the bottom, top, and fore edges.
M42	Book Rotation Motor 1
	After the right book rotation plate is pushed against the right side of the book to clamp it for rotation, rotates the right book rotation plate and the book so the book can be trimmed at the bottom, top, and fore edges.
M43	Book Grip Motor
	Projects and retracts the right book rotation plate to clamp and release the book between the left and right book rotation plates.
M44	Slide Motor
	Lowers the book (clamped between the left and right rotation plates) into the trimming unit and positions each edge for trimming.

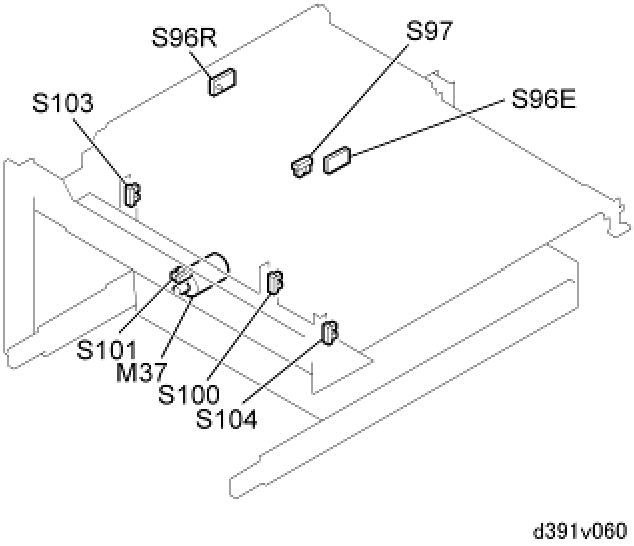
26.8.9 TRIMMING UNIT MOTOR, SENSORS, AND SOLENOID



M35	Cutter Motor
	Pushes the cutting blade against the edges of the signature to trim away the bottom, top, and fore edges, then retracts the blade away so the trimmings can be retrieved.
M36	Edge Press Plate Motor
	Pushes the edge press plate against the edge of the book to compress before the blade does the cut. Retracts the edge press plate so the book can be rotated for the next cut.
M40	Blade Cradle Motor
	Raises and lowers the blade cradle to switch the cutting position. The bottom and top cuts are done high on the cradle, and the fore edge cut is done low on the cradle.
S83	Blade Cradle HP Sensor
	Detects the home position of the blade cradle. The blade pushes against the blade cradle during cutting. The blade cradle is raised and lowered to change the cutting position.
S84	Blade Sensor 1
	Detects the left/right positions of the cutter blade and the cutter end (cutter area sensor is inside the base plate) as the blade moves slightly from one side to the other during cutting.

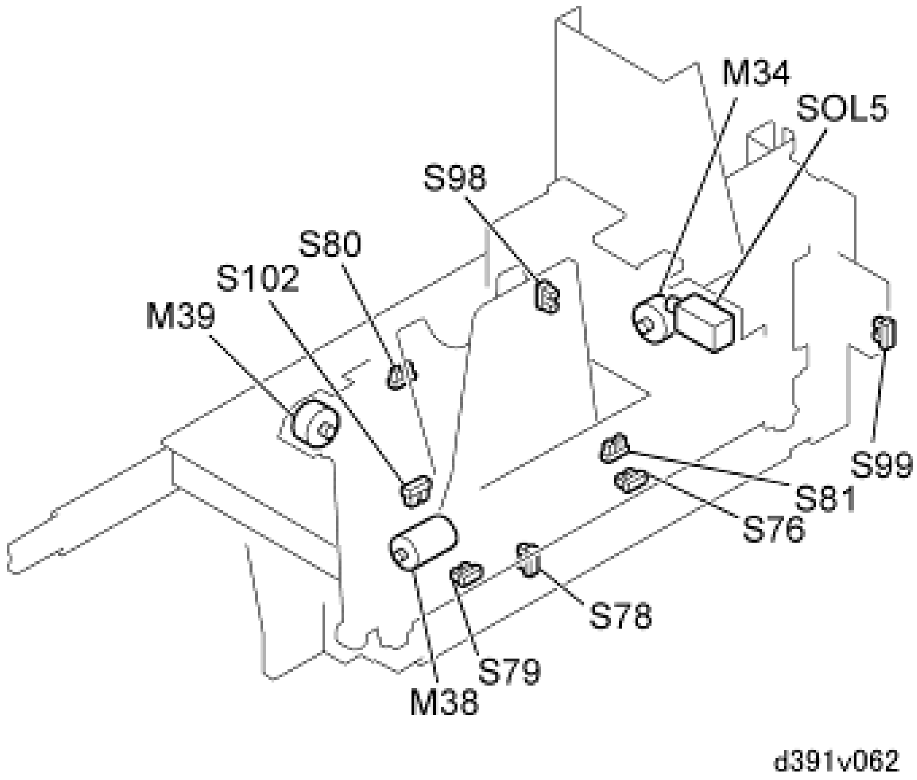
S85	Blade Sensor 2
	Detects the left/right positions of the cutter blade and the cutter end (cutter area sensor is inside the base plate) as the blade moves slightly from one side to the other during cutting.
S86	Trimmer Limit Sensor
	Detects any abnormal amount of movement in the trimming blade (cutter area inside base plate).
S87	Press End Sensor
	Detects completion of pressing of the edge press plate against the edge of the book. The edge press plate compresses the edge before it is cut.
S88E	Book Registration Sensor: Emitter
	Stops the slide motor that is raising the book rotation grip unit that is raising the book for cutting. (The emitter sensor of an Emitter/Receptor sensor pair).
S88R	Book Registration Sensor: Receptor
	Stops the slide motor that is raising the book rotation grip unit that is raising the book for cutting. (The receptor sensor of an Emitter/Receptor sensor pair).
S89	Press Limit Sensor
	Detects any abnormal amount of movement of the edge press plate when presses against the edge of the book before cutting.
S90	Edge Press Plate HP Sensor
	Detects the home position (right) of the edge press plate. The edge press plate pushed to the left to cut and then retracted by the edge press plate motor (M36).
SOL4	Trimmings Plunger Solenoid
	Pushes and retracts the trimmings plunger that grabs the paper strips under the blade which has cut them from the edges of the book.

26.8.10 TRIMMINGS COLLECTION UNIT MOTOR AND SENSORS



M37	Trimmings Buffer Motor
	Moves the trimmings buffer to the left and right. (1) Moves it to the left to gather the trimmed strips from the cutter, moves it to the right to dump the strips into the trimmings box below. (2) Also moves it left to push the book press plate against the side of the book to nudge it from the lift tray onto the book buffer tray then moves it right to its home position.
S096E	Trimmings Buffer Full Sensor: Emitter
	Detects when the trimmings buffer is full of trimmed paper strips. (The emitter of an Emitter/Receptor pair.)
S096R	Trimmings Buffer Full Sensor: Receptor
	Detects when the trimmings buffer is full of trimmed paper strips. (The receptor of an Emitter/Receptor pair.)
S97	Trimmings Box Full Sensor
	Detects when the trimmings box is full of paper strips trimmed from the edges of the books.
S100	Trimmings Buffer HP Sensor: Right
	Detects the home position of the trimmings buffer on the right.
S101	Trimmings Buffer Clock Sensor
	Detects rotation of the trimmings buffer motor (M37) which moves the trimmings buffer left and right across the top of the trimmings box.
S103	Trimmings Buffer HP Sensor (Left
	Detects the home position (left) of the trimmings buffer above the trimmings box.
S104	Book Press Plate Sensor
	Detects the position of the book press plate. The book press plate presses against the side of the book when the trimmed strips are collected from under the blade.

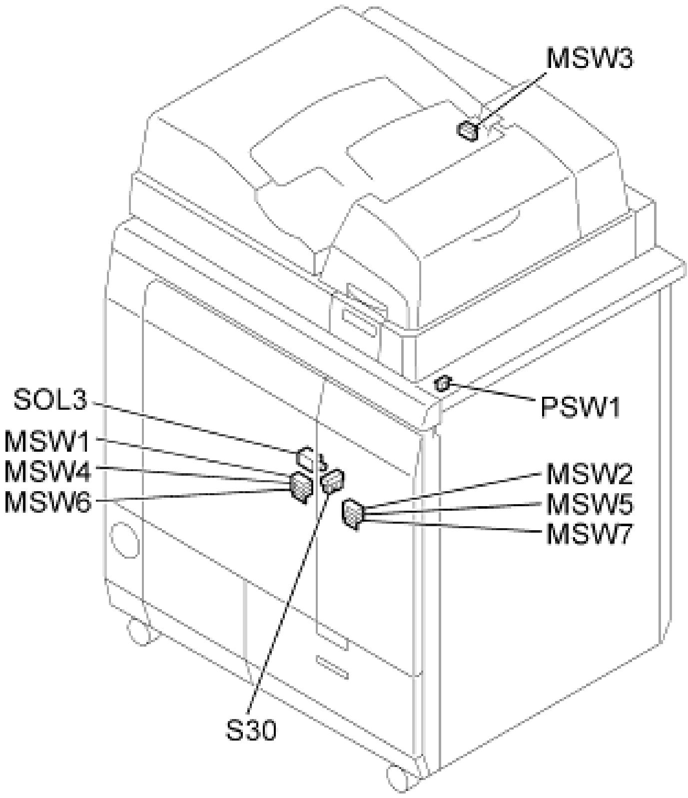
26.8.11 BOOK STACKER UNIT MOTOR, SENSORS, AND SOLENOID



M34	Book Output Belt Motor
	Moves the book output tray to the positioned prescribed for the thickness of the book.
M38	Book Lift Tray Motor
	Raises and the book lift tray to receive the book from the trimming unit above then lowers the book into the book buffer.
M39	Book Buffer Tray Motor
	Retracts the book buffer tray to the rear so the book falls from the book buffer onto the output tray. Pushes the book buffer tray to the front to receive the next book from the book lift tray.
S76	Book Arrival Sensor
	Detects the arrival of the bound book in the book buffer below the trimming unit.
S78	Book Buffer Tray HP Sensor
	Detects the home position (forward) of the book collection buffer tray. The book buffer tray retracts to the rear to allow the book to fall onto the output tray.
S79	Book Lift Tray HP Sensor
	Detects the home position (down) of the book lift tray. The book lift tray is raised to receive the book from the trimming unit above and lower it into the book buffer.

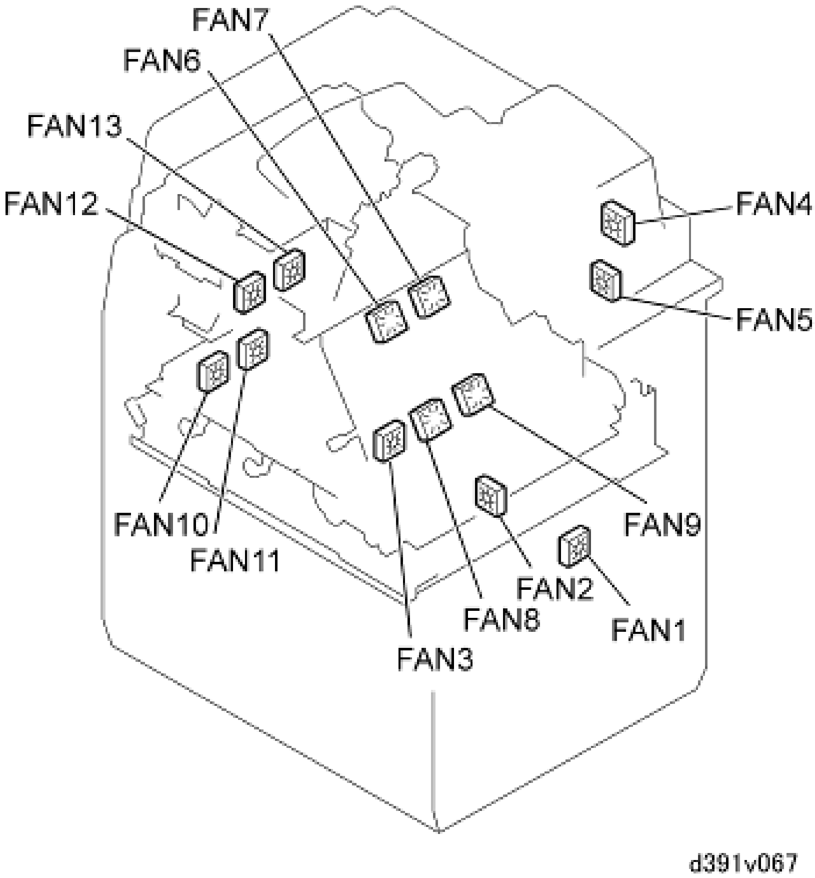
S80	Book Tray HP Sensor
	Detects the home position of the book output tray.
S81	Book Output Tray Sensor
	Detects the presence of a book on the book output tray.
S98	Book Door Sensor
	Detects when the door of the book stacker unit is opened or closed.
S99	Trimmings Box Sensor
	Detects the presence or absence of the trimmings box. Triggers an alert if the box is not installed.
S102	Book Lift Tray Lock Sensor
	Detects rotation of the book lift tray motor (M38) which raises and lowers the book lift tray that lowers the book from the trimming unit to the book buffer.
SOL5	Book Stacker Lock Solenoid
	Operates the lock of the book door. Energizes and locks the book door while the machine is operating. This is a safety feature.

26.8.12 OTHER SWITCHES, SENSORS, AND SOLENOIDS



MSW1	Left Front Door Switch: Upper
	Detects when the left front door is open and closed
MSW2	Right Front Door Switch (Upper)
	Detects when the right front door is open and closed
MSW3	Top Cover Switch
	Detects when the top cover is open and closed
MSW4	Left Front Door Switch: Center
	Detects when the left front door is open and closed
MSW5	Right Front Door Switch: Center
	Detects when the right front door is open and closed
MSW6	Left Front Door Switch (36V)
	Detects when the left front door is open and closed
MSW7	Right Front Door Switch (36V)
	Detects when the right front door is open and closed
PSW1	Glue Heater Button
	Starts heating the glue.
S30	Right Front Door Sensor
	Detects when the right front door is opened and closed.
SOL3	Right Front Door Solenoid
	Operates the lock of the right front door. Energizes and locks the right front door while the machine is operating. This is a safety feature.

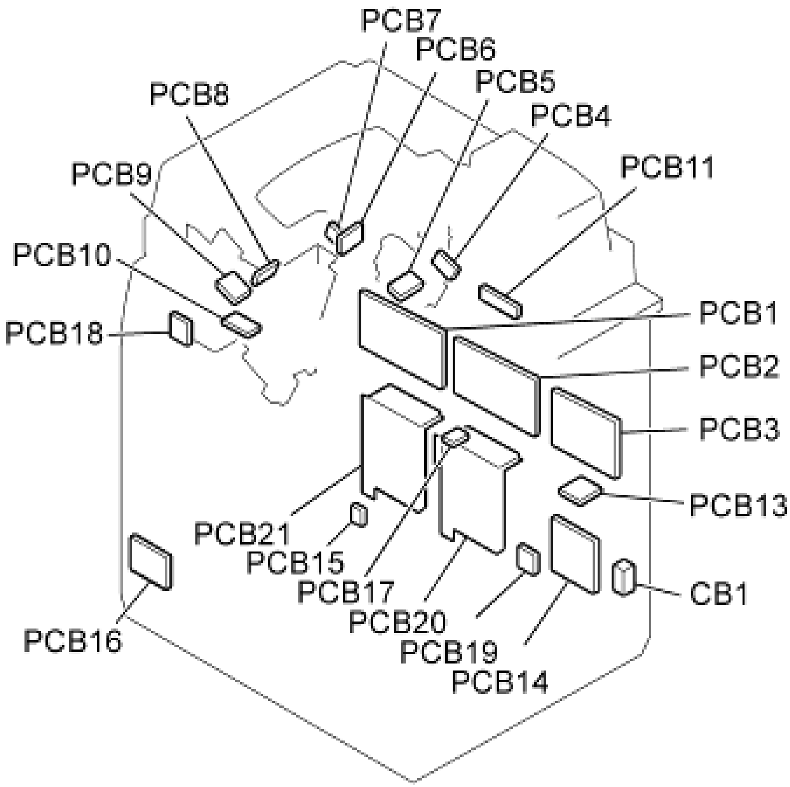
26.8.13 FAN MOTORS



FM01	Power Supply Fan: Right
	Cools power supply unit 1.
FM02	Power Supply Fan: Center
	Cools both power supply units 1, 2.
FM03	Power Supply Fan: Left
	Cools power supply unit 2.
FM04	Glue Supply Fan :Upper
	Cools the area around the top of the gluing unit.
FM05	Glue Supply Fan :Lower
	Cools the area round the bottom of the gluing unit.
FM06	Signature Fan 2 :Front
	Mounted beside FM07 cools the area around the trailing edge of the signature clamped in the main grip.
FM07	Signature Fan 2 :Rear
	Mounted beside FM06 cools the area around the trailing edge of the signature clamped in the main grip.
FM08	Signature Fan 1 :Front
	Mounted beside FM09 cools the area around the leading edge of the signature clamped in the main grip.

FM09	Signature Fan 1 :Rear
	Mounted beside FM08 cools the area around the leading edge of the signature clamped in the main grip.
FM10	Spine Plate Fan :Lower Front
	Mounted beside FM11 cools the area around the spine plate where the signature is pressed onto the cover.
FM11	Spine Plate Fan :Lower Rear
	Mounted beside FM10 cools the area around the spine plate where the signature is pressed onto the cover.
FM12	Spine Plate Fan :Upper Front
	Mounted beside FM13 cools the area around the spine plate where the signature is pressed onto the cover.
FM13	Spine Plate Fan :Upper Rear
	Mounted beside FM12 cools the area around the spine plate where the signature is pressed onto the cover.

26.8.14 PCBS



CB1	Breaker Switch
	Trips a switch that cuts of the power supply to perfect binder if a power surge/drop occurs on the power supply line.
PCB1	Master Control Board
	Controls cover, paper, and signature transport, paper stacking and jogging, and interfaces with the inserter, relay unit, and slave control board. Draws power from PSU1
PCB2	Slave Control Board
	Controls sub grip, main grip, gluing unit, cover feed in the cover registration unit, and interfaces with the master, cutter, and inserter control boards. Draws power directly from PSU2.
PCB3	Cutter Control Board
	Controls signature rotation for trimming, trimming, trimmings collection, and book stacking.
PCB4	Main Grip Relay Board 1
PCB5	Main Grip Relay Board 2
PCB6	Main Grip Relay Board 3
PCB7	Sub Grip Relay Board 1
PCB8	Sub Grip Relay Board 2

PCB9	Sub Grip Relay Board 3		
PCB10	Sub Grip Relay Board 4		
PCB11	Glue Applicator Relay Board		
	Interfaces between the gluing unit and the slave control board.		
PCB12	Relay Board (Optional Control Board)		
	--- Not present, not used with this machine ---		
	--- Not Used ---		
PCB13	Transceiver Board (Optional Control Board)		
	--- Not present, not used with this machine ---		
PCB14	Relay Board		
	Interfaces between the relay unit and master control board.		
PCB15	Front Cover LED		
	Controls the small LED on the right front door. When this LED is OFF the doors can be opened. When ON the doors cannot be opened.		
PCB16	Full LED Board		
	Controls operation of the stacker door button and binding status lamp. (The lamp encircles the button.)		
	Stacker Button	OFF	Standby, nothing on tray
		FLASH	Stacking, cannot press and open door
		ON	Book on tray, press button to open door and remove book.
	Binding Status Lamp	OFF	No binding in progress
		ON	Binding in progress
PCB17	Glue Heater Button/LED		
	Press this button to start heating the glue before a job starts.		
	ON	Ready	
	FLASH	Glue heating, please wait until ON	
	OFF	Not ready. Max. wait time after job start: 6 min.	

PCB18	Service Board
	Located on the rear, upper left corner of the machine, the service board is used to set and release the modes: 1) Normal Operation, 2) Maintenance Mode, 3) Low Power Mode. Important settings can be read from the flashing sequences of the LEDs and settings can be done with the push-switches on the service board. Settings done with the service board are stored in the EEPROM.
PCB19	Power Supply Relay Board
	Supplies power to the relay unit.
PCB20	Power Supply Unit 1
	Supplies power to the master control board.
PCB21	Power Supply Unit 2
	Supplies power to the slave control board.

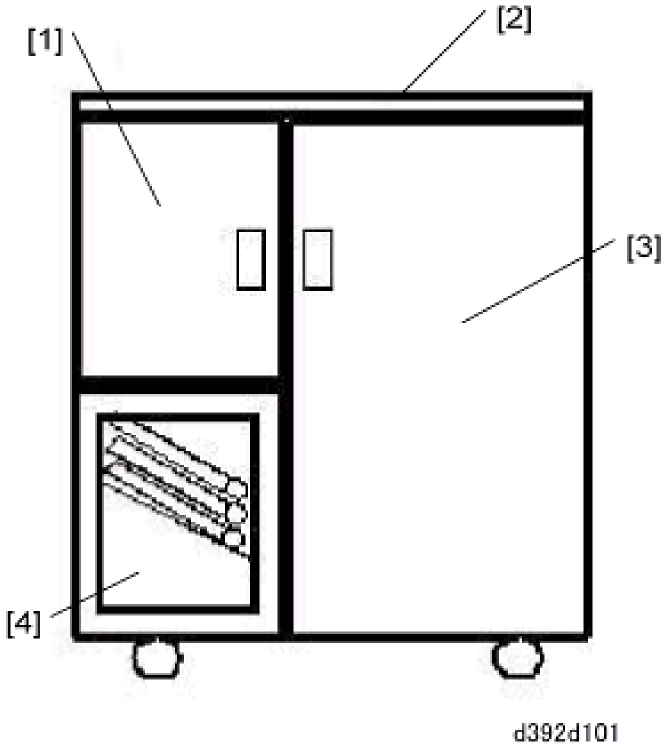
27. RING BINDER RB5020 (D737)

27.1 SPECIFICATIONS

Configuration	Console		
Paper Transport	Centered in paper path		
Operation Modes	Punching + ring binding Punching only Straight-through (downstream delivery)		
Signature Thickness	2 to 100 sheets		
Paper Size	Punching, binding	A4 LEF, LT LEF, Tab Sheets for each size	
	Straight-through (no punching)		
	Unfolded	A6 to A3 SEF, DLT, HLT, 12"x18", 13"x19", 12.6"x19.2", 13"x19.2", Tab sheets (A4, LT, LG)	
	Z-Folded	A3, B4, A4 SEF, DLT, LG, LT SEF 12"x18" (from upstream Z-Folder unit).	
Paper Weight	64 to 216 g/m^2		
Ring Sizes	2 (50-sheet, 100-sheet)		
Punching	EU: A4 LEF: 23 holes NA: LT LEF: 21 holes		
Ring Supply	Cartridge feed: capacity: 80 rings max.		
Output Tray Capacity	11 documents (100-ring bound, A4 SEF)		
	Thickness	Ring	On Tray
	2 to 10	50	25
	11 to 50	50, 100	16
	51 to 100	100	11
Punching Only	Up to 100 sheets		
Size	870 x 730 x 1010 mm (34.3 x 28.7 x 38.8 in.)		
Weight	140 kg (308 lb)		
Power Consumption	Less than 400 W		
DIP SW Settings	All OFF		

27.2 IMPORTANT PARTS

27.2.1 EXTERNAL VIEW

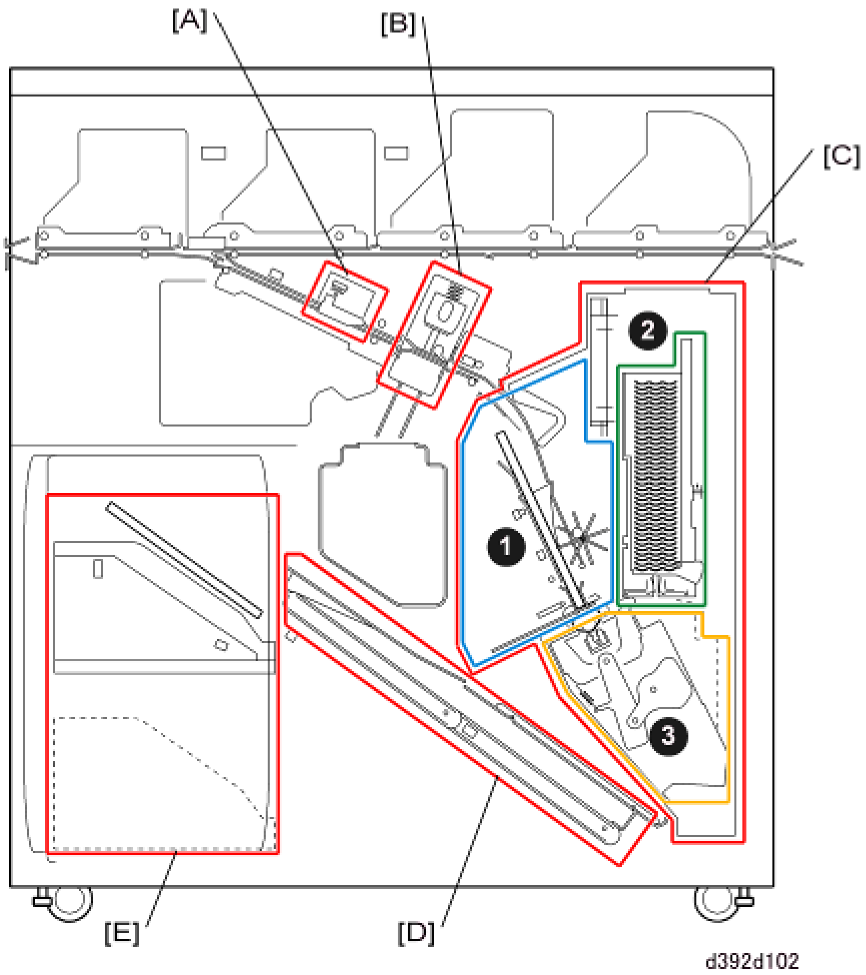


[1] Left Door
[2] Top Cover
[3] Right Door
[4] Output Tray

Note

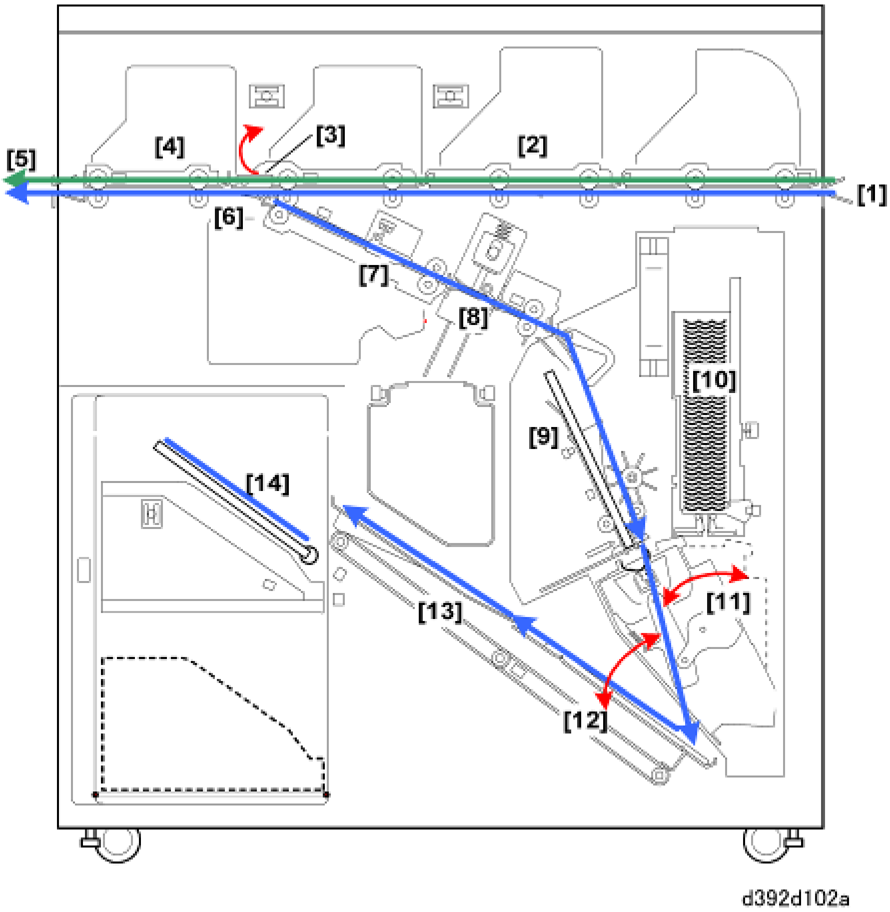
The open area below the output tray [4] must remain free of obstacles.
This must not be used as a storage area for paper or other supplies

27.2.2 CROSS SECTION



[A]	Pre-Punch Jogger Unit
[B]	Punch Unit
[C]	Binder Unit
①	Pre-Bind Jogger Unit
②	Ring Supply Unit (with Ring Cartridge)
③	Clamp Unit
[D]	Output Belt Unit
[E]	Stacker Unit

27.3 PAPER TRANSPORT



Downstream delivery

Paper enters the finisher at the entrance [1]. The transport rollers [2] feed the paper through the finisher and past the switchback junction gate [3], which remains up. The exit rollers [4] feed the paper out of the finisher at [5].

Ring binding

Paper enters the finisher at the entrance [1]. The transport rollers [2] feed the paper through the finisher and past the switch back junction gate [3] which remains open. The exit rollers [4] feed the paper partially out of the finisher at [5] and stop.

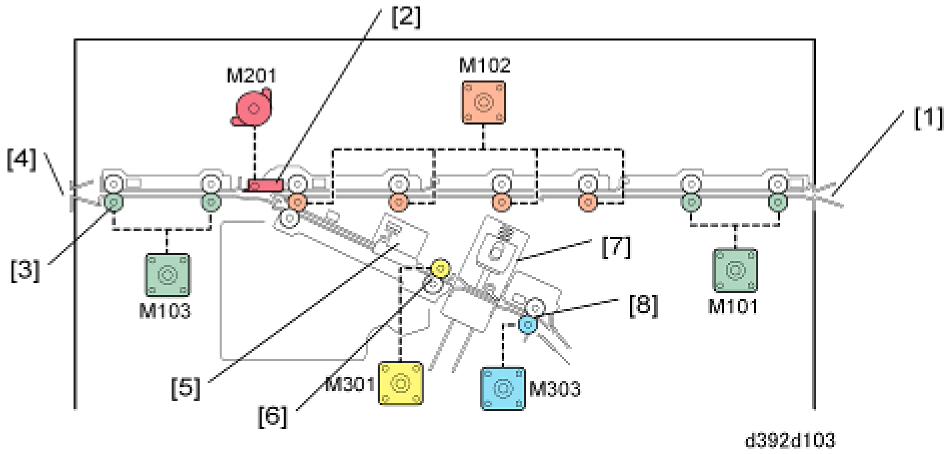
The switchback junction gate [3] lowers. The exit rollers [4] reverse and feed the paper toward the lowered junction gate. At [6], the junction gate feeds the paper down to the pre-punch jogger [7], where the paper is aligned for punching.

The punch unit [8] punches the paper and feeds the paper to the pre-bind jogger [9], where the sheets are stacked, aligned, and clamped for ring binding.

The ring supply unit and ring cartridge [10] holds the rings. The clamp unit [11] takes one ring from the ring cartridge and swings left to the pre-bind jogger (this is holding the clamped stack) and closes the rings around the spine of the stack.

Output belt 1 [12] raises and catches the bound stack and then lowers back to the same level as output belt 2 [13]. Output belt 1 and 2 then feed the document to the stacking unit [14].

27.4 PAPER FEED AND SWITCHBACK

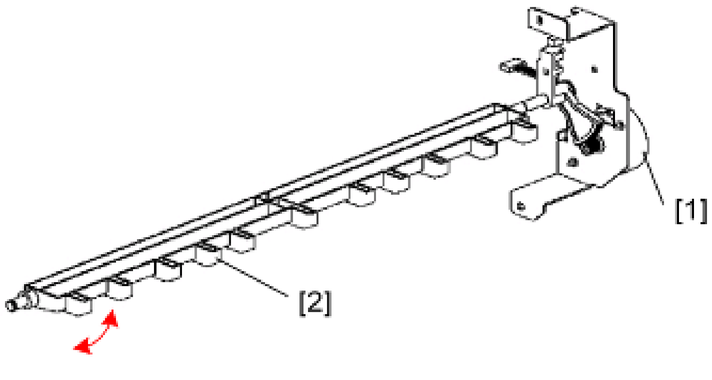


[1] Entrance
[2] Switchback Junction Gate
[3] Exit rollers
[4] Exit
[5] Pre-Punch Jogger Side Fences
[6] Pre-Punch Jogger Rollers
[7] Punch Unit
[8] Punch Unit Runout Rollers

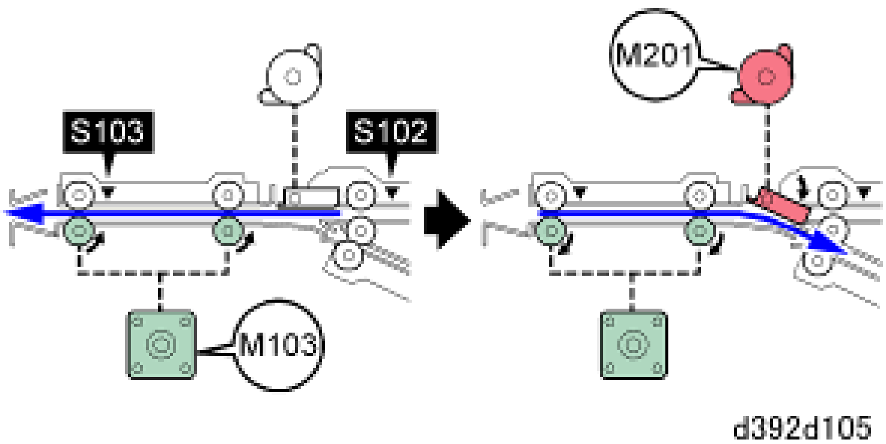
M101	Entrance Motor	Drives the entrance roller and 1st transport roller at the entrance of the ring binder.
M102	Transport Motor	With its long timing belt, drives transport rollers 2, 3, 4, and 5 in the horizontal paper path.
M201	Path JG Motor	Operates the path junction gate near transport roller 4 in the horizontal path. A spring normally keeps the junction gate open so that paper can pass straight through the finisher for downstream delivery. Closes the junction gate after paper has passed. The exit motor reverses and feeds the paper past the closed junction gate into the binding path below.
M103	Exit Motor	Drives the 6th transport roller and exit roller in the horizontal paper path for downstream delivery (the paper passes straight through with no punching or binding). For ring binding, this motor reverses and feeds the paper past the closed switchback junction gate to the binding path below.
M301	Jog Roller Motor	Operates the jog roller that feeds the paper into the pre-punch jogger unit.
M303	Punch Unit Runout Motor	Rotates the punch runout roller that feeds the punched sheet out of the punch unit to the pre-bind jogger.

27.5 PRE-PUNCH JOGGING AND PUNCHING

27.5.1 SWITCHBACK

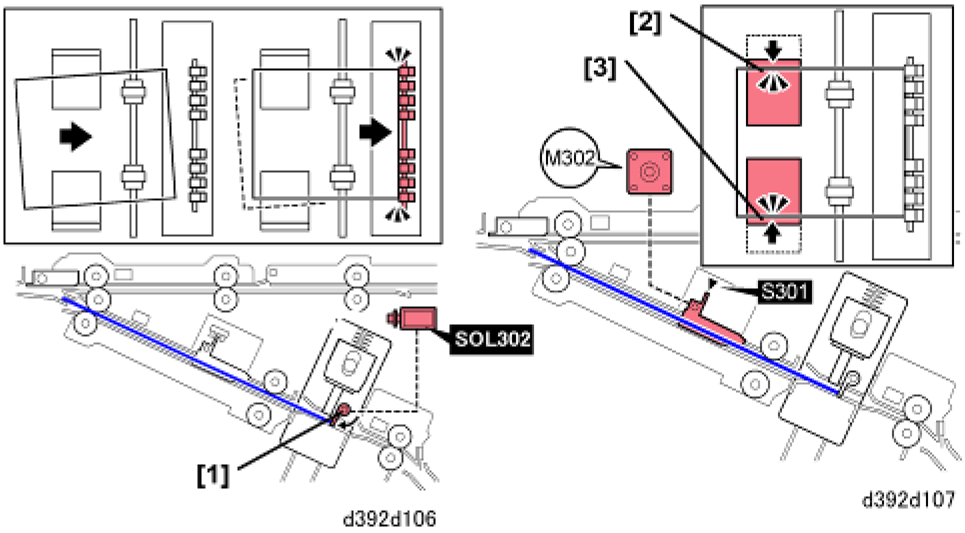


The path junction gate motor (M201) [1] raises and lowers the switchback junction gate [2]



M201	Path JG Motor	Operates the path junction gate near transport roller 4 in the horizontal path. A spring normally keeps the junction gate open so that paper can pass straight through the finisher for downstream delivery. At the start of a binding job, rotates the junction gate which closes the horizontal path. This changes the direction of the paper (switchback) and feeds it to the punch unit below.
S103	Exit Sensor	Detects the leading and trailing edge of each sheet at the exit roller. Detects a jam if the paper fails to arrive (late jam) or stops (lag jam).
S102	Transport Sensor	Detects the leading and trailing edge of each sheet at transport roller 5 by the junction gate. Detects a jam if the paper fails to arrive (late jam) or stops (lag jam).
M103	Exit Motor	Drives the 6th transport roller and exit roller in the horizontal paper path for downstream delivery (the paper passes straight through with no punching or binding).

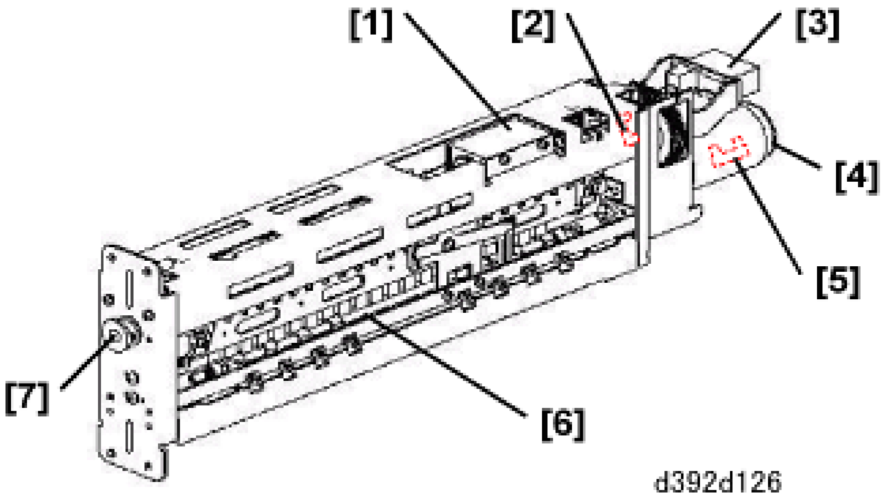
27.6 PRE-PUNCH JOGGING



[1]	Stopper
[2]	Front Side Fence
[3]	Rear Side Fence

M302	Side Jogger Motor	Drives the front and rear fence to center each sheet of paper so that it is aligned for punching. Sheets are aligned and punched one at a time.
SOL302	Top Fence SOL	Opens and closes the stopper inside the punch unit that improves the accuracy of hole punching on the leading edge of each sheet.
S301	Pre-Punch Jogger HP Sensor	Detects the home position of the front and rear jogger fences in the pre-punch jogger unit.

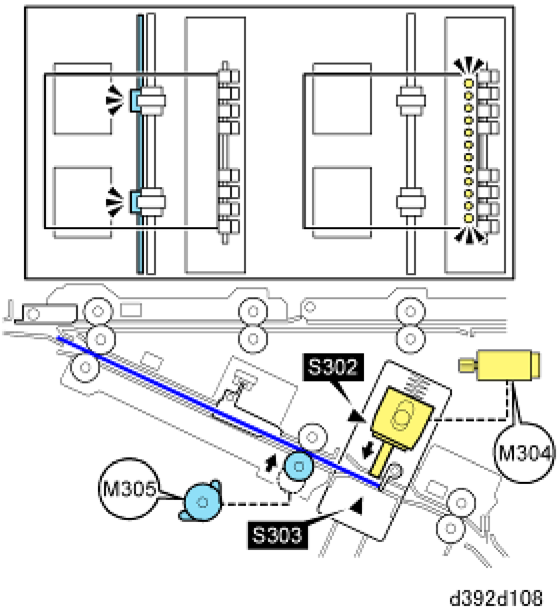
27.7 PAPER PUNCHING



[1]	Top fence solenoid (SOL302) opens and closes the stopper [6].
[2]	Punch HP Sensor (S302) detects the starting point for punching.
[3]	Drawer Connector
[4]	Punch motor (M304)
[5]	Punch encoder sensor (S303) controls speed, stop control for operation based on load changes for thick paper, thin paper.
[6]	Stopper stops the paper at the punching position.
[7]	Knob used to pull the punch unit out of the finisher.

There are two separate punch units, one for A4 paper and one for LT paper.
- The A4 punch unit punches 23 holes.
- The LT punch unit punches 21 holes.

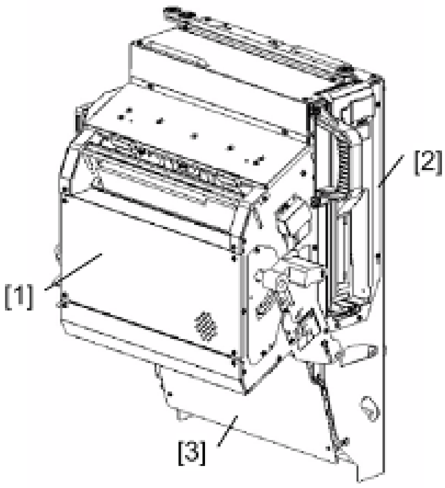
The correct type of punch unit must be installed for A4/LT punching. The job will not execute if the paper size (A4 or LT) does not match the punch unit. The system always recognizes which type of punch is installed (based on the punch circuitry.)



M305	Jog Roller Lift Motor	Opens the nip of the rubber rollers by raising the idle rollers in the pre-punch jogger unit so that the paper can be freed for horizontal alignment (perpendicular to the direction of paper feed) by the front and rear fence in the pre-punch jogging unit.
S303	Punch Encoder Sensor	Controls the start and stop timing of the punching operation by counting rotations of the punch motor (M304).
S302	Punch HP Sensor	Detects the home position of the punch unit. Signals an error if the punch unit is not installed or not installed properly.
M304	Punch Motor	Drives the punch unit that punches holes in the paper. There are two types of punches: 1) A4 23 hole-, 2) LT 21-hole. The punch unit must be replaced to switch between A4/LT punching.

27.8 BINDER UNIT

27.8.1 OVERVIEW



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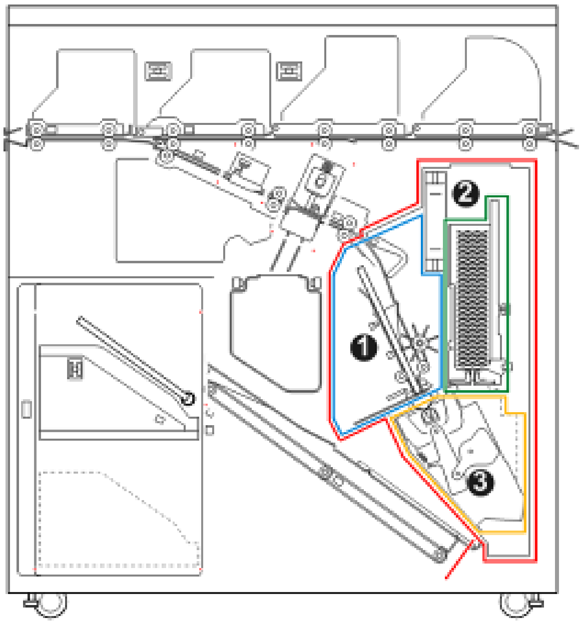


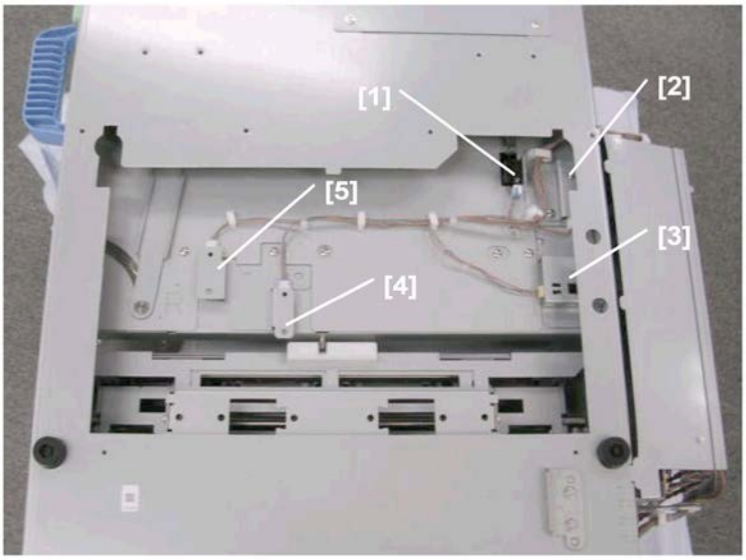
d392d139

Three units comprise the binder unit.

[1]	Pre-bind jogger unit	Jogs and stacks each punched sheet so that the document is aligned for ring binding.
[2]	Ring supply unit	Holds the ring cartridge that feeds a single ring to the clamp unit below.
[3]	Clamp unit	Takes a ring from the bottom of the ring cartridge and swings right to insert the ring into the holes in the stack in the pre-bind jog unit.

27.9 RING SUPPLY UNIT

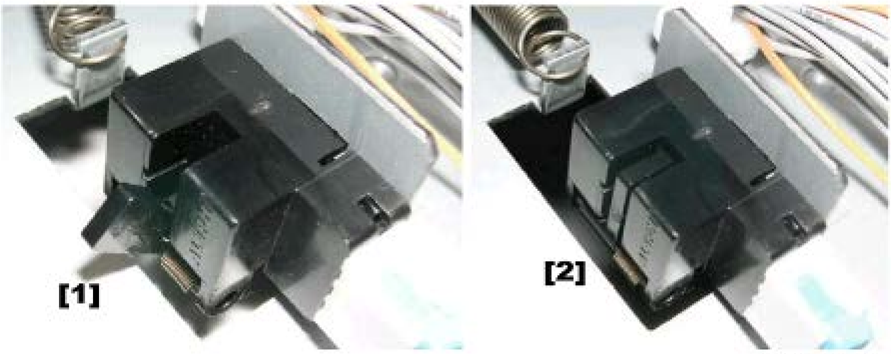
27.9.1 LOCATIONS OF COMPONENTS



d392d140

[1] Cartridge Detection Sensor (S801)
[2] Ring Cartridge Type Sensor (S805)
[3] Ring Near-End Sensor (S803)
[4] Rings Reversed Sensor (S802)
[5] 500/100 Ring Detect Sensor (S804)

[1] Ring Cartridge Detection: Cartridge Detection Sensor (S801)
Detects the presence of the ring cartridge. Triggers an alert if the ring cartridge is not installed or installed incorrectly.



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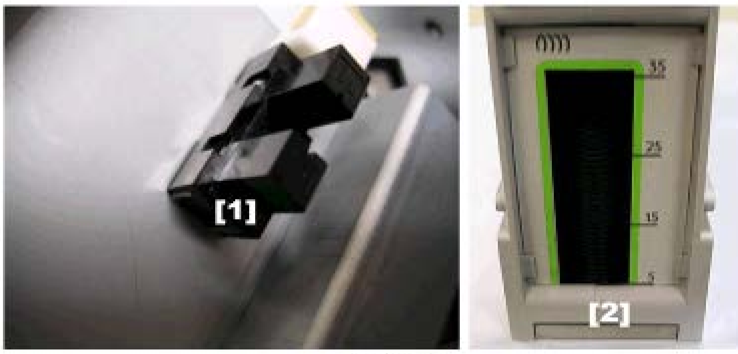
Pushing the ring cartridge into the binder unit pushes the actuator arm [1] out of the gap of the interrupt sensor, and the cartridge is ready to feed rings. Pulling out the ring cartridge releases the actuator arm [2], turns on the sensor, and signals that the ring cartridge is not installed.

[2] Ring Type Detection: Ring Cartridge Type Sensor (S805)
This sensor detects which type of ring cartridge is installed (A4 or LT).

d392d902

The ring cartridge type sensor (S805) [1] is a photo-sensor. The LT cartridge has an open knockout [2]. The A4 cartridge has a cover. The sensor detects the cartridge type by the absence (shown above) or presence of the cover.

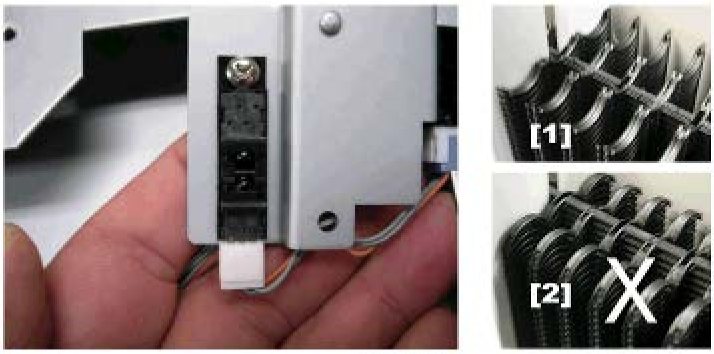
[3] Ring Supply Level Detection: Ring Near-End Sensor (S803)
This interrupt sensor detects when approximately 5 rings remain in the ring cartridge.



d392d903

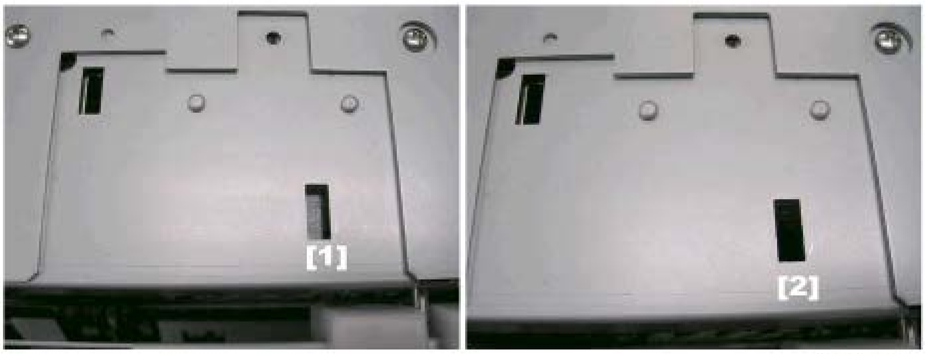
An actuator attached to a descending weight on top of the ring stack turns this sensor [1] on when it reaches the bottom of the ring stack. A graduated scale [2] attached to the front of the ring cartridge at installation also allows the operator to see the number of rings remaining in the ring cartridge.

[4] Ring Loading Detection: Rings Reversed Sensor (S802)
This photo-sensor detects when rings have been loaded incorrectly.



d392d904

Rings must be loaded in the cartridge with the open side facing up [1] not down [2].



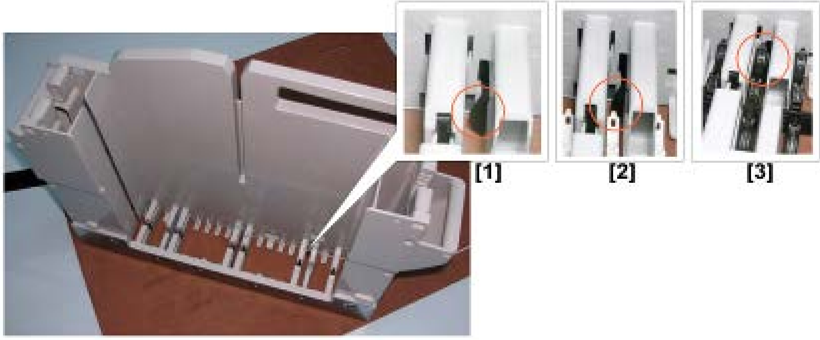
d392d905

When the rings are loaded correctly, this pushes a cover into the window [1]. When the rings are loaded incorrectly, the cover does not appear on the window [2]. The sensor determines whether the rings are loaded correctly based on the presence or absence of the cover.

[5] Ring Size Detection: 500/100 Ring Detect Sensor (S804)
This photo-sensor detects the ring size. There are only two ring sizes: 50-sheet, and 100-sheet.

d392d906

An actuator opens and closes a window on the right side of the ring cartridge.



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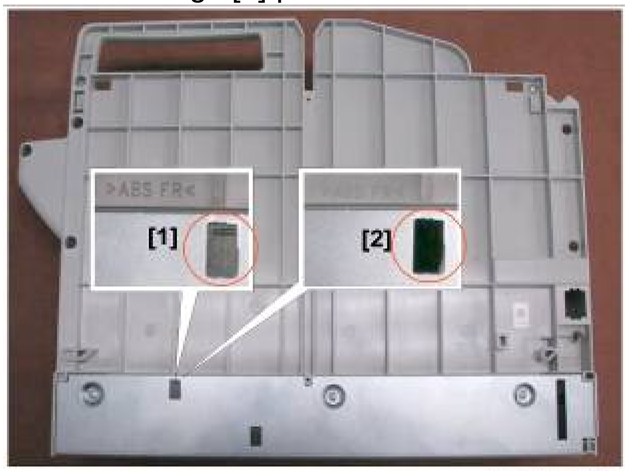
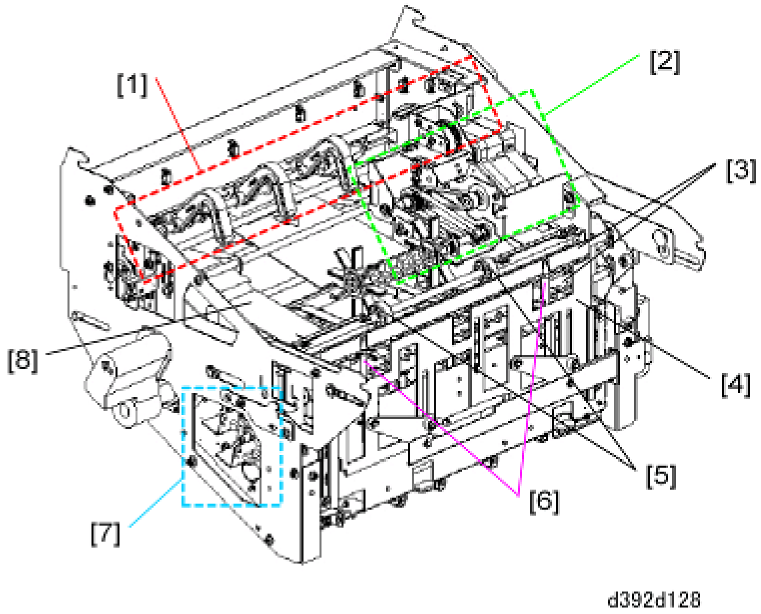
The actuator [1] remains up when 50-sheet rings [2] are installed. The wider 100-sheet rings [3] push the actuator down.



d392d909

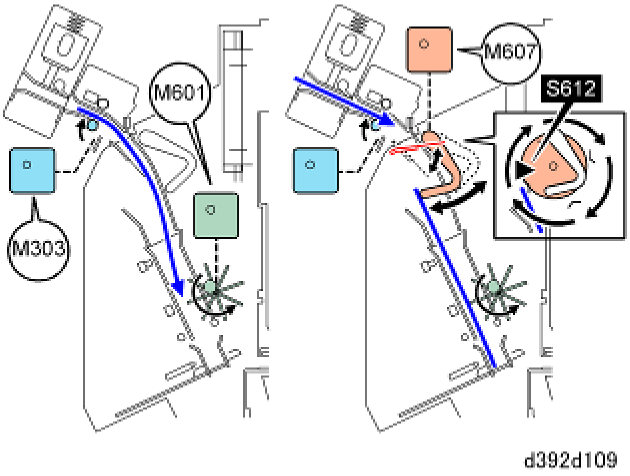
The cover on the right side of the cartridge remains closed [1] when the 50-sheet size rings are installed. The cover opens [2] when the 100-sheet size rings depress the actuator. The sensor detects whether the cover is open (50-sheet rings) or closed (100-sheet rings).

27.10 PRE-BIND JOGGER

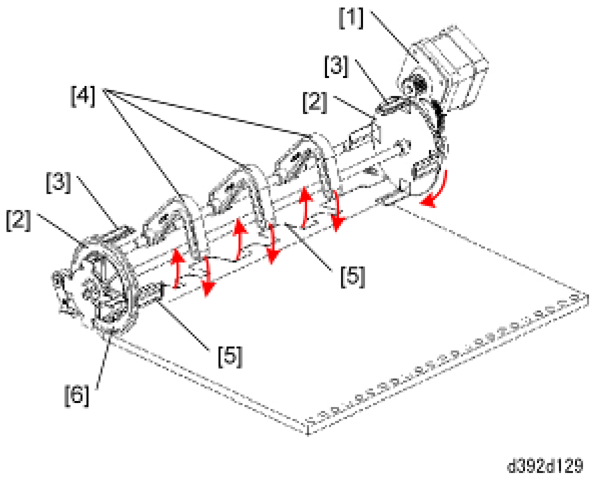


[1]	Stack Tamper Mechanism	Presses down each sheet as it enters the pre-bind jogger so that the following sheet can feed smoothly.
[2]	Paddle Roller Mechanism	Feeds each sheet into the unit until the leading edge hits the top edge of the shutter and stops.
[3]	Clamp Mechanism	Clamps the punched leading edge of the stack and holds it while the rings are inserted and closed.
[4]	Shutter Mechanism	Raises and stops the punched leading edge of each sheet when the stack is formed for ring binding.
[5]	Stack Runout Mechanism	Feeds the stack out of the pre-bind jogger unit after the rings have been inserted and closed.
[6]	Alignment Pin Mechanism	Inserts two pins in the last holes on either end of the leading edge to make sure that the holes are aligned correctly for ring binding.
[7]	Stack Thickness Detection Mechanism	Determines the thickness of the stack (the thickness determines how far the paddle roller must be raised).
[8]	Jogger Mechanism	Jogs the top and bottom edges of the stack between the front fence and rear fence.

27.10.1 STACK TAMPER MECHANISM



M303	Punch Unit Runout Motor	Rotates the punch runout roller that feeds the punched sheet out of the punch unit to the pre-bind jogger.
M601	Paddle Roller Motor	Drives the paddle roller in the pre-bind jogger that pushes the leading edge of each sheet against the raised shutter to align the stack. The motor drives the roller at a speed that is slightly faster than the line speed.
M607	Stack Tamper Motor	Drives the cam that operates the tamper arms, posts, and mylar sheet that press down the trailing edge of each sheet as it enters the pre-bind jogger unit so that the path is clear for the next sheet.
S612	Stack Tamper HP Sensor	Detects the actuator of the tamper fence and stops the stack tamper motor (S607). The allowed arc of rotation is 90 degrees.



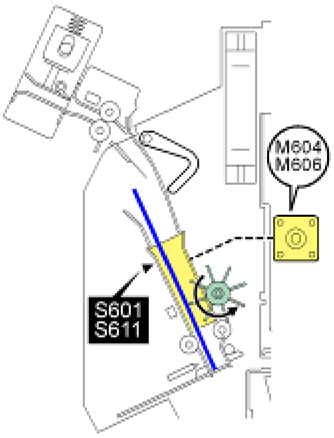
[1] Stack Tamper Motor (M607)
[2] Tamper Wheels
[3] Tamper Posts
[4] Tamper Arms
[5] Tamper Plate (mylar)
[6] Stack Tamper HP Sensor (S612)

The stack tamper motor [1] (M607) drives the tamper wheels [2], posts [3], arms [4], and mylar tamper plate [5] that press down on the top and ends of the trailing edge to keep the paper feed path open for the next sheet approaching.

After the sheet enters the binder unit, the arms rotate down 90 degrees to press down the trailing edge of the paper. The stop position of the tamper fence is controlled by the stack tamper HP sensor [6] (S612).

The mylar tamper plate is linked to the rotation of the stack tamper arms so that the tamper arms, tamper plate, and posts of the tamper fence press down on the trailing edge of the sheet at the same time after the sheet has passed over the mylar tamper plate (a cam controls this mechanism).

27.10.2 PRE-BIND JOGGER MECHANISM



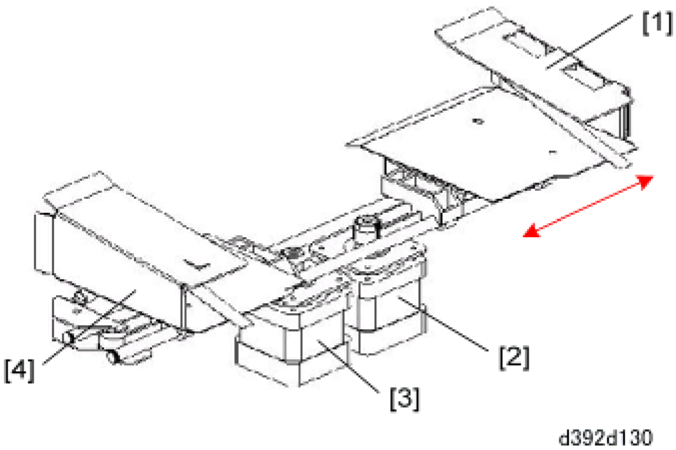
d392d110

Fence 1 (Front Fence)

M604	Jog Fence Motor 1	Operates Side Fence 1, the front jogger fence in the pre-bind jogger unit. At the start of every job, moves the front fence to the position for the selected paper size and stops. The rear fence jogs the paper against the stationary front fence.
S601	Side Fence 1 HP Sensor	Detects the home position of the front side fence of the pre-bind jogger. The home or default position is for A4-size paper. (The front fence moves between two positions: A4 and LT.)

Fence 2 (Rear Fence)

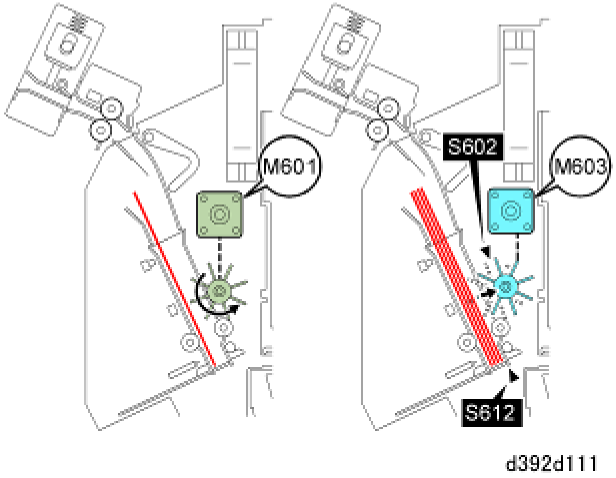
M606	Jog Fence Motor 2	Operates Side Fence 2, the rear jogger fence in the pre-bind jogger unit. At the start of every job, moves the front fence to the start position for the selected paper size and waits. As each sheet is fed, the motor pushes the rear side fence forward and then retracts it. This jogs the edge of each sheet against the stationary front fence.
S611	Side Fence 2 HP Sensor 2	Detects the home position of side fence 2 (rear fence) in the pre-bind jogger unit.



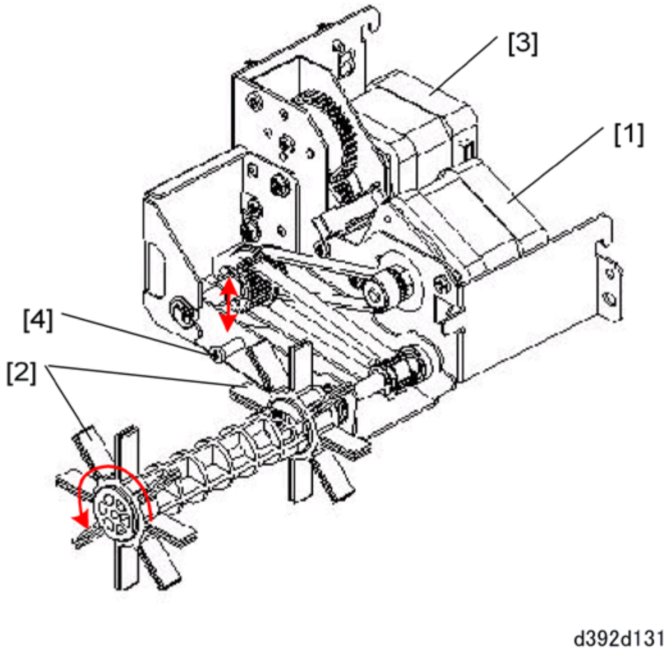
[1] Side Fence Motor 1 (M604)
[2] Side Fence 1 (Front)
[3] Side Fence Motor 2 (M606)
[4] Side Fence 2 (Rear)

Side fence motor 1 (M604) [1] moves side fence 1 [2] via a timing belt to the position for the selected paper size (A4 or LT) and stops. Side fence 1 HP sensor controls the operation of side fence motor 1 (M604).
Side fence motor 2 (M606) [3] moves side fence 2 [4] (the rear fence) to the front and back to jog each sheet against side fence 1 which remains stationary. The side fence 2 HP sensor (S611) controls the operation of side fence motor 2 to make sure that side fence 2 moves the prescribed distance for the selected paper size.

27.10.3 PADDLE ROLLER MECHANISM



M601	Paddle Roller Motor	Drives the paddle roller in the pre-bind jogger that pushes the leading edge of each sheet against the raised shutter to align the stack. The motor drives the roller at a speed that is slightly faster than the line speed.
M603	Paddle Roller Lift Motor	Raises and lowers the paddle roller. Raises the paddle roller to the proper height for the stack. The readings of the stack thickness sensor (S607) are used to determine when and how far the paddle roller is raised by the motor. At the end of the job, lowers the paddle roller as far as the paddle roller HP sensor (S601).
S602	Paddle Roller HP Sensor	Detects the descending paddle roller and switches off the paddle roller motor (M601) so that the roller stops at its home position.
S612	Stack Tamper HP Sensor	Detects the actuator of the tamper fence and stops the stack tamper motor (S607). The allowed arc of rotation is 90 degrees.



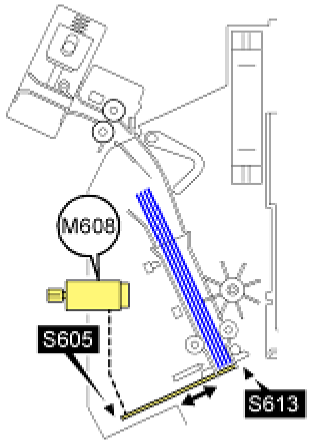
[1] Paddle Roller Motor (M601)
[2] Paddle Rollers
[3] Paddle Roller Lift Motor (M603)
[4] Lift Pin

The paddle roller motor (M601) [1] drives the paddle rollers [2]. The rotation of the paddle rollers pulls each sheet into the pre-bind jogger and pushes the leading edge against the shutter. The operation of the paddle mechanism ensures that the paper that has entered the jogging unit feeds as far as the raised shutter and stops at its leading edge.

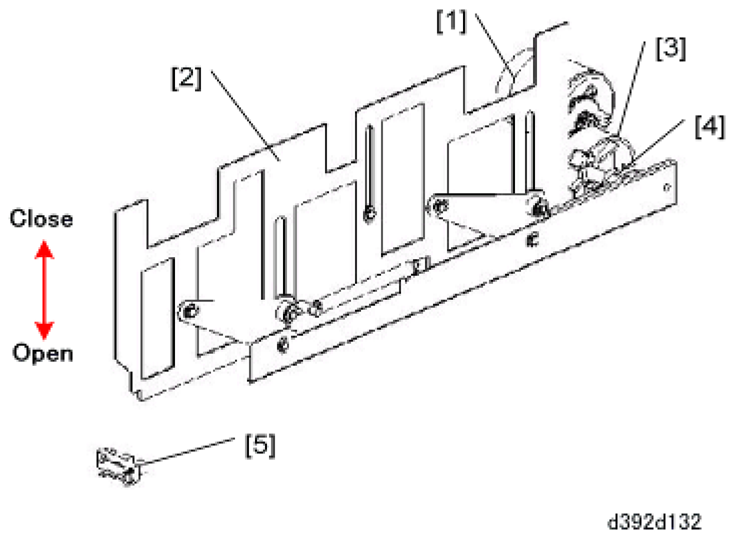
The paddle roller, comprised of soft rubber strips, is rotated at a speed slightly faster than the line speed to rake the paper into the pre-bind jogger.

The height of the paddle roller is controlled by the paddle roller lift motor (M603) and the paddle roller HP sensor (S602). The paddle roller is raised to the correct height for the thickness of the stack and then remains at a prescribed distance away from the surface of the stack. The height of the paddle roller is controlled by the thickness of the stack detected by the stack thickness sensor (S607).

27.10.4 SHUTTER MECHANISM



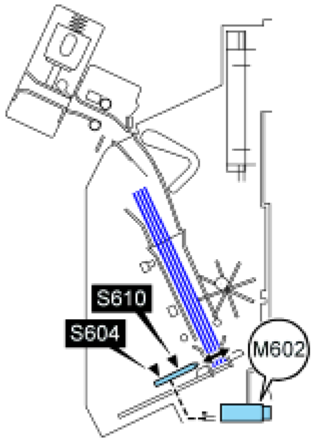
M608	Shutter Motor	Raises and lowers the shutter. Raises the shutter to provide a fence to stop the leading edge of each sheet as it enters the pre-bind jogger. Lowers the shutter so the assembled stack can be clamped for binding.
S605	Shutter HP Sensor 1	Detects the actuator of the shutter when it is lowered, signals that the shutter has returned to its home position, and switches off the shutter motor (M608).
S613	Shutter HP 2 Sensor	Detects the stop positions of the shutter and shuts off the shutter motor (M608). There are two stop positions. The shutter is raised and stopped so that the leading edge of the stack in the pre-bind jogger can be aligned against the shutter, and then lowered and stopped so that the punched leading edge can be bound with the rings.



[1] Shutter Motor (M608)
[2] Shutter
[3] Shutter Drive Gear
[4] Shutter Cam
[5] Shutter HP Sensor 1 (S605)

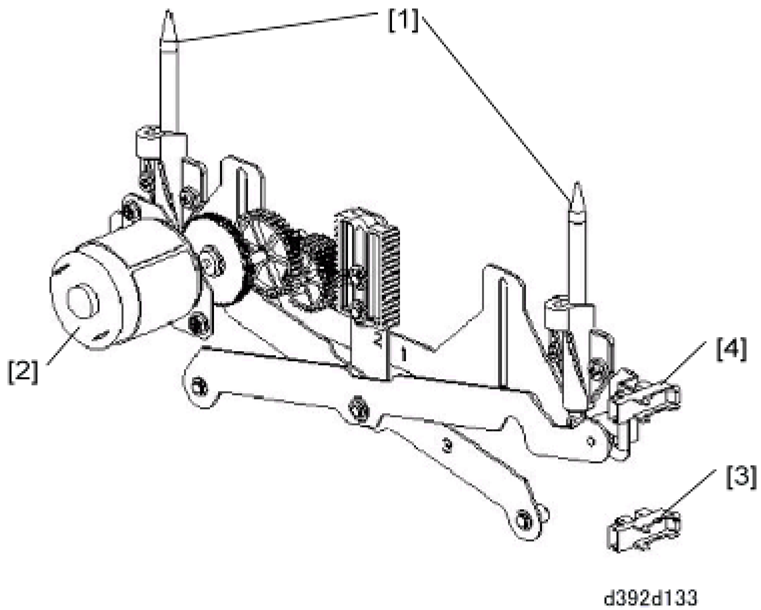
While the sides of the stack in the binder unit are being jogged, the shutter motor (M608) [1] closes the shutter [2] so that the leading edge of the stack will hit it and be aligned for binding.
The motor will open the shutter again for ring binding and book output. The shutter is closed and opened by the rotating shutter driver gear [3] and shutter cam [4] driven by the shutter motor (M608).
Shutter HP sensor 1 (S605) [5] detects the open/closed positions of the shutter, and shutter HP sensor 2 (S613) (not shown above) detects the stop position for the motor through a slit in the shutter drive gear.

27.10.5 ALIGNMENT PIN MECHANISM



d392d113

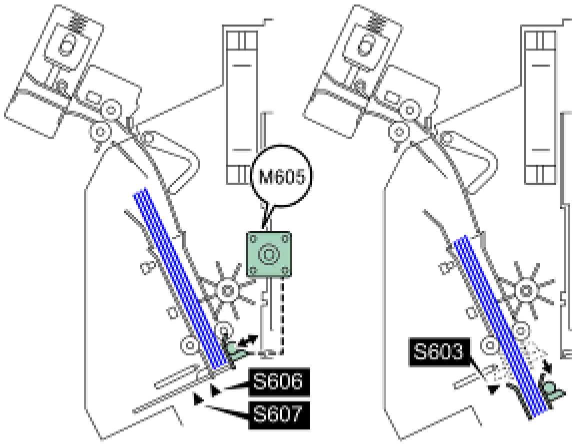
M602	Alignment Pin Motor	Raises and lowers the alignment pins. Raises the pins until they pass through the holes on either end of the spine. This is the last alignment adjustment done before ring binding.
S610	Alignment Pin Up Sensor	Detects when the two alignment pins in the binder unit are at the full up position and inserted successfully into the two holes on either end of the stack.
S604	Alignment Pin HP Sensor	Detects the actuator of the alignment pin linkage, signals that the linkage has returned to its home position, and switches off the alignment pin motor (M602).



[1] Alignment Pins
[2] Alignment Pin Motor (M602)
[3] Alignment Pin HP Sensor (S604)
[4] Alignment Pin Up Sensor (S610)

The two alignment pins [1] are inserted into the holes at either end of the punched edge to make sure that the spine is aligned correctly so that the rings can be inserted into the punched holes.
The alignment pins are projected and retracted by a scissors lift (rack and pinion) driven by the alignment pin motor (M602) [2].
Other than during the pin alignment operation, the pins remain retracted to their home positions detected by the alignment pin HP sensor (S604) [3].
During the pin alignment, the pins (driven by the alignment pin motor) project up and pass through the punch holes, and when the pins reach the punched holes, the alignment pin up sensor (S610) [4] detects the pins at their highest point and reverses the motor to retract the pins to the home position.

27.10.6 STACK THICKNESS DETECTION

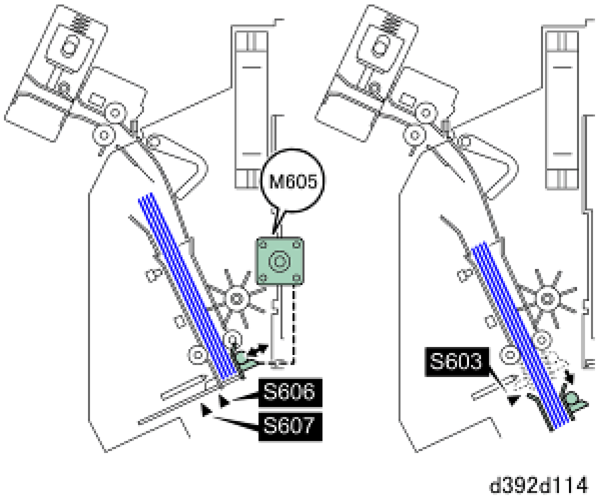


d392d114

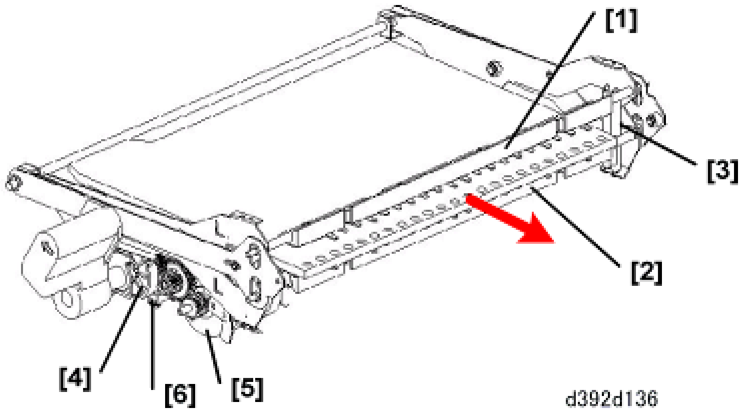
S606	50-Sheet Detect Sensor	Detects when the stack is thicker than 5.5 mm. If the job is set for binding a 50-sheet document with the smaller 50-sheet rings, the job will stop if this sensor detects that the stack is thicker than 5.5 mm. The 5.5 mm thickness is the limit for a 50-sheet ring binding job.
S607	Stack Thickness Sensor	Measures the thickness of the stack through a cutout in the upper arm plate. This reading is used to adjust the height of the paddle roller when the stack is jogged in the pre-bind jogger.

If the thickness of the stack in the jogger unit measured by the stack thickness sensor (S607) is more than 5.5 mm for a 50-sheet job or more than 11 mm for a 100-stack job, this will cause an overflow error.
The stack thickness sensor (S607) measures the stack through a cutout in the clamp upper arm plate. This reading is also used to adjust the height of the paddle roller.

27.10.7 PRE-BIND UNIT CLAMPER



M605	Clamp Motor	Rotates the cam that opens and closes the clamp that clinches the punched spine of the stack after it has been jogged in the pre-bind jogger. The spine remains clamped until the rings have been inserted and closed.
S603	Clamp HP Sensor	Controls the operation of the clamp lift cam that opens the arms of the clamp in the pre-bind jogger. The jaws of the clamp (powered by large springs) close on the punched spine and do not release it until the rings have been inserted into the holes and closed.



[1] Upper Guide Clamp
[2] Lower Guide Clamp
[3] Clamp Spring
[4] Clamp Lift Cam
[5] Clamp Motor (M605)
[6] Clamp HP Sensor (S603)

The guide clamps [1] and [2] clinch the spine of the document before binding. The opposing upper and lower clamps are held closed by large springs [3].

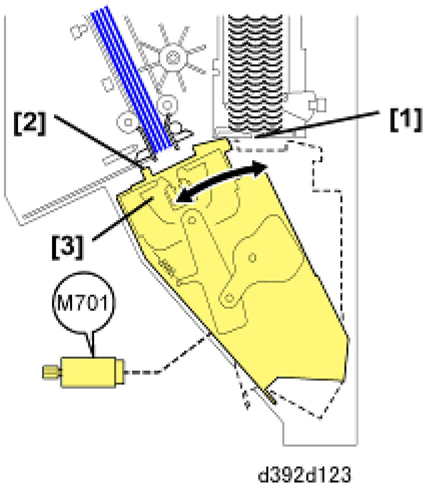
The rotation of the clamp lift cam [4] driven by the clamp motor (M605) [5] against a bearing attached to the clamp upper arm raises the clamp upper guide.

The rotation position of the clamp lift cam is controlled by the clamp HP sensor (S603) [6]. The clamp upper guide normally remains retracted and separated from the bearing of the clamp upper arm.

During ring binding, the stack is clinched only at the spine by the upper and lower guide clamps and pulled in the direction of the arrow for ring binding by the clamp binder motor (M701).

27.11 RING BINDING

27.11.1 RING LOADING, CLAMP UNIT SWING MECHANISM

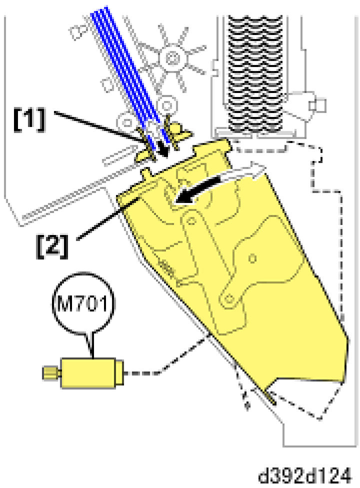


M701: Clamp Binder Motor

The clamp binder motor (M701) performs these operations:

- Drives the linkage and gear that raises the ring clamper to the bottom of the ring supply unit [1] to clinch one ring strip and pull it away from the bottom of the ring stack.
- Drives the gear> cam> linkage that swings the top of the ring binder (holding the ring strip) toward the bottom of the pre-bind jogger [2] (where the clamped spine of the stack is exposed and waiting for the rings to be inserted and closed).
- Rotates the cam> gear> linkage that pulls the closer [3] down to close the rings into the holes and around the spine of the document.

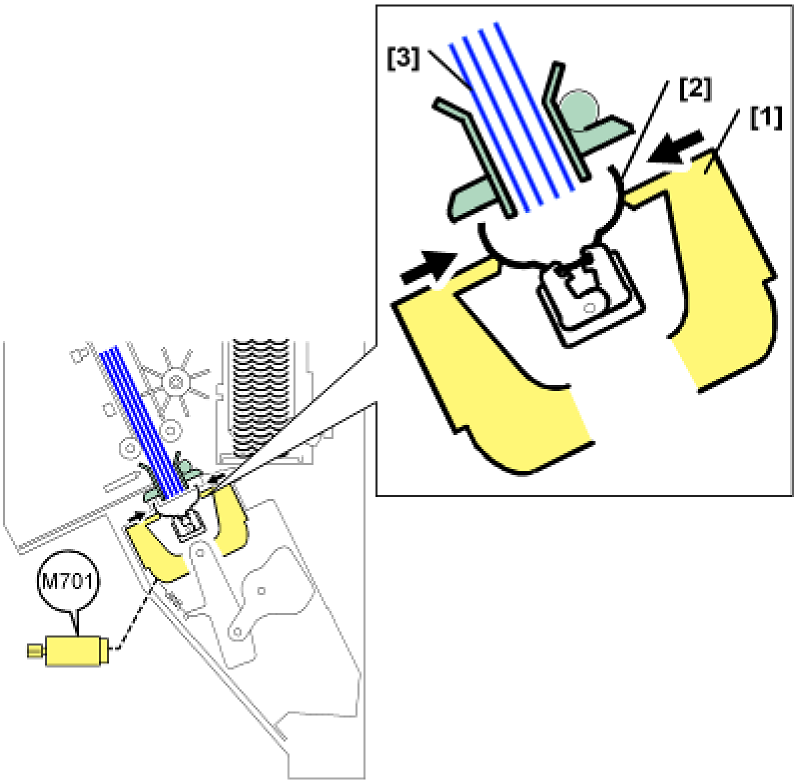
27.11.2 LOWERING THE PUNCHED STACK FOR BINDING



M701: Clamp Binder Motor

The clamp binder motor (M701) rotates a cam via a gear, and this pulls down a link that pulls the pre-bind jogger [1] into the clamp unit [2]. This lowers the clamped spine of the document, to prepare for the closing of the rings through the punched holes.

27.11.3 BINDING MECHANISM



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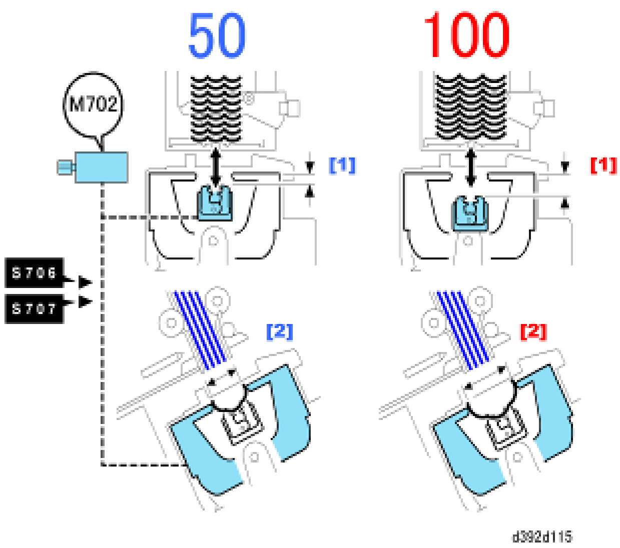
The clamp binder motor (M701) turns a gear that moves an intricate arrangement of cams and linkages. This mechanism closes the plates of the closer [1] just below the curvature of the ring [2]. This forces the ring to close through the holes of the spine [3] clamped in the clamper unit of the pre-bind jogger. The continued rotation of the motor, cams, and linkages retracts the plates of the closer, retracts the clamper of the pre-jog binder, and swings the clamp unit back to the right to fetch the next ring.

27.11.4 SIZE SWITCHING MECHANISM



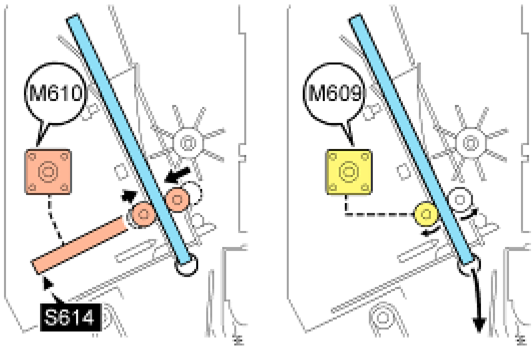
S707	Ring Switch Timing Sensor	Confirms that the cam (driven by the 50/100 clamp adjust motor (M702) has reached the stop position and switches off the motor at the correct pitch setting for the ring size. Issues an error if the closer does not return to its home position with the prescribed time
S706	Ring Switch HP Sensor	Confirms that the cams (driven by the 50/100 clamp adjust motor (M702) have returned to home position after they have adjusted the depth and pitch for closing and locking the rings. Issues an error if the cams do not return to the home position within the prescribed time.
M702	50/100 Clamp Adjust Motor	Operates the switching cams (1 and 2) that adjust the pitch and depth for the size of the rings so they will be closed properly.

In order for this mechanism to work with both large and small rings, the linkage depth [1] and the binding pitch [2] must be adjusted for the size of the ring (50 or 100-sheet size).

The 50/100 clamp adjust motor (M702) drives a gear and switching cams 1 and 2 above the same shaft. Switching cam 1 switches the binding pitch and switching cam 2 switches the linkage depth.

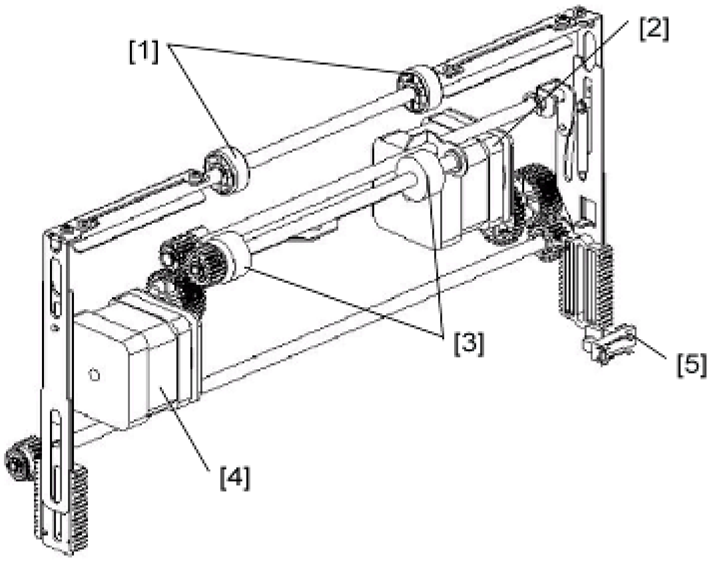
27.12 OUTPUT AND STACKING

27.12.1 BINDER UNIT OUTPUT



d392d117

M610	Runout Press Roller Motor	Raises and lowers the press roller to adjust it to the thickness of the book before the runout roller motor turns on and starts rotating the roller to feed the bound document out of the binder unit.
M609	Runout Roller Motor	Rotates the runout press roller that feeds the bound book out of the binder unit.
S614	Runout Roller HP Sensor	Controls operation of the runout press roller motor (M610) that raises the runout roller in the pre-bind jogger unit. The roller is lowered to close the nip so that the bound stack can be fed out of the binder unit. The home position is up (nip released).



[1]	Runout Press Roller
[2]	Runout Roller Motor (M610)
[3]	Runout Roller
[4]	Runout Roller Motor (M609)
[5]	Runout Roller HP Sensor (S614)

The runout mechanism:

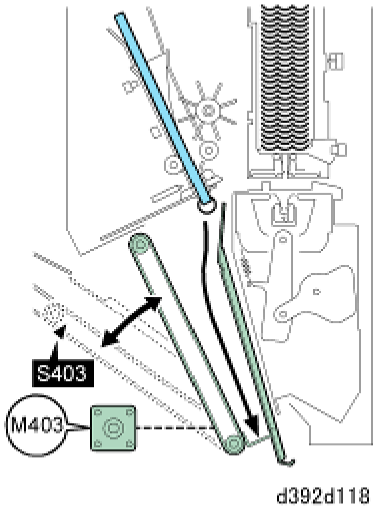
- Delivers stacks that have been only punched with no binding
- Stacks documents that have been both punched and bound with rings

When a punched or bound stacked is sent out of the binder unit, the runout press roller [1] (driven by the runout roller roller motor (M610) [2]) lowers in the direction of the arrow, clinches the stack, then the runout roller [3] (driven by the output roller motor (M609) [4]) starts rotating and feeds the stack out of the finisher.

The runout press roller HP sensor (S614) [5] detects the descending press roller, turns off the runout press roller motor (M610) and stops the roller at its clinch position.

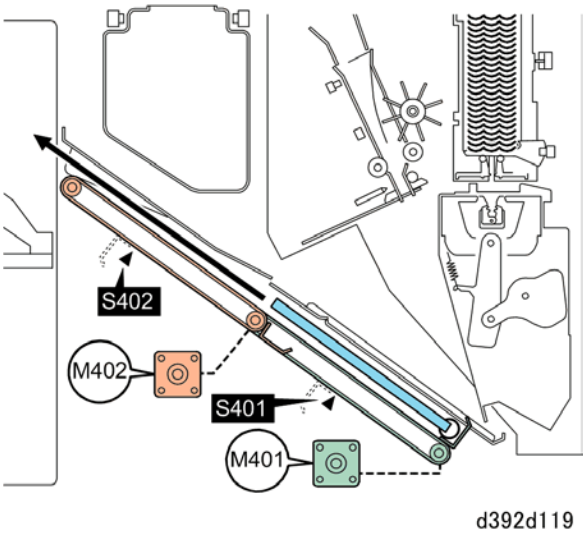
While the runout press roller is descending and the runout roller is about 1 mm away from the surface of the travel guide at the upper part, the stacks feeds out of the binder unit.

27.12.2 OUTPUT BELTS



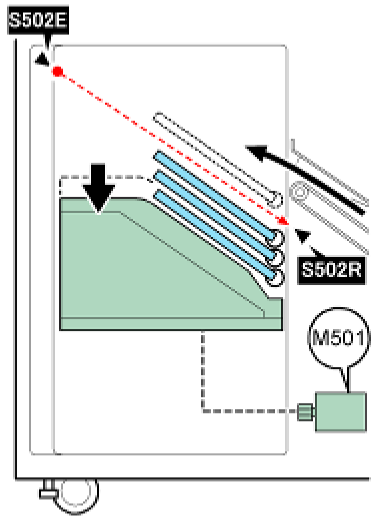
M403	Output Belt Rotation Motor	Rotates the output belt 1 assembly. Rotates the assembly cw to the vertical so it can receive the bound book from the binder unit, and then rotates it ccw to the horizontal to feed the book to output belt 2.
S403	Output Belt Rotation HP Sensor	After the output belt rotation motor (M403) rotates output belt 1 cw to the vertical, it reverses and rotates the book and belt ccw to the horizontal. The sensor detects when the belt reaches the horizontal and stops the output belt rotation motor (M403).

Cw: clockwise, ccw: counterclockwise



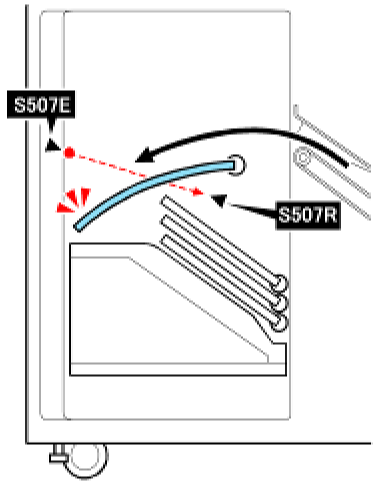
M402	Output Belt 2 Motor	Drives the belt of output belt 2 which relays the book from output belt 1 to the book output tray.
M401	Output Belt 1 Motor	Drives the belt of output belt 1 which receives the bound book from the binder unit
S401	Output Belt 1 HP Sensor	Detects the home position of the pawls mounted on output belt 1. The pawls hook and push the book onto output belt 2. With the pawls at their home positions, the belt is ready to move the next book received from the binder unit.
S402	Output Belt 2 HP Sensor	Detects the home position of the pawls mounted on output belt 2. The pawls hook and push the book onto the output stacking tray. With the pawls at their home positions the belt is ready to move the next book from output belt 1.

27.12.3 STACKER UNIT



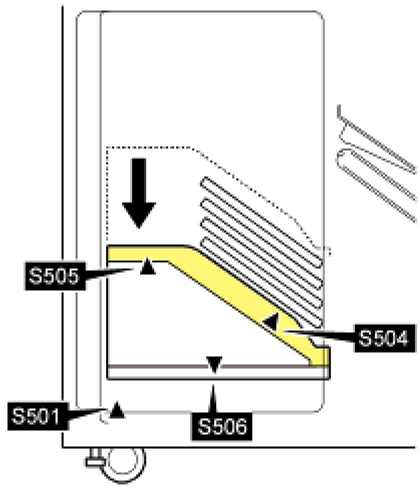
d392d120

M501	Stacker Motor	Raises and lowers the stacking tray where the bound books are output from output belt 2.
S502E	Stack Height Sensor	Detects the top of the document stack on the on the stacker tray and signals when the stacker tray is full. This is the emitter sensor of an Emitter/Receptor pair.
S502R	Stack Height Sensor	Detects the top of the document stack on the on the stacker tray and signals when the stacker tray is full. This is the receptor sensor of an Emitter/Receptor pair.



d392d121

S507E	Book Position Sensor	Checks the position of the bound book to detect book skew or falling. The emitter of an Emitter/Receptor pair.
S507R	Book Position Sensor	Checks the position of the bound book to detect book skew or falling. The receptor of an Emitter/Receptor pair.

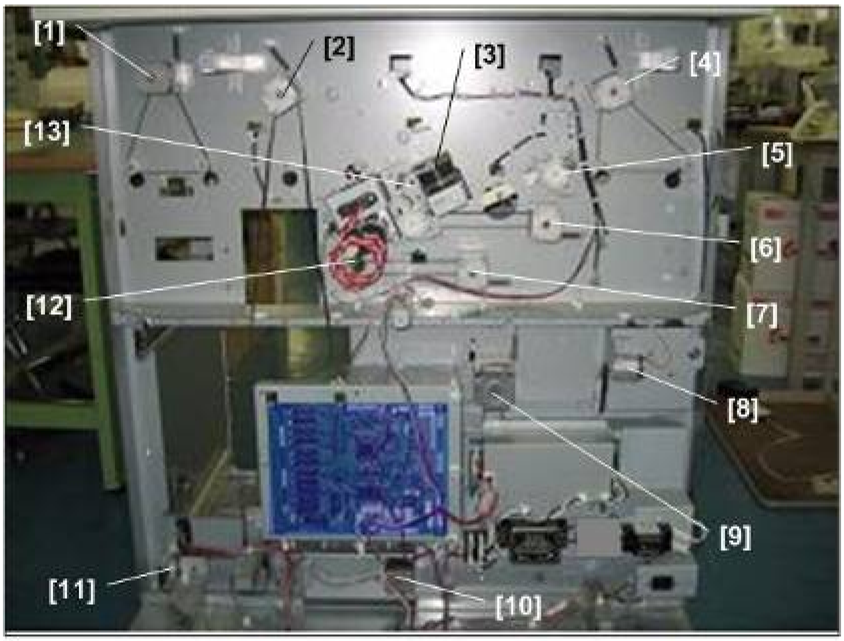


d392d122

S505	Tray Detect Sensor	Detects whether the stacker tray is pulled out or pushed in. Signals an alert after a job starts if the tray is pulled out.
S504	Stacker Detect Sensor	Detects a document on the stacker tray at power on.
S501	Stacker HP Sensor	Detects the home position of the stacker tray and stops the stacker motor (M501). The stacker tray is at its home position when it is completely down.
S506	Obstacle Detection Microswitch	The bay on the left side of the finisher remains open with a large space exposed under the output tray. This space must always remain open. If something like a stack of magazines or newspapers is placed under the tray accidentally, the spring loaded bottom of the tray will trigger this switch and stop the tray when it contacts the top of the obstacle.

27.13 MOTOR, SENSOR LOCATIONS

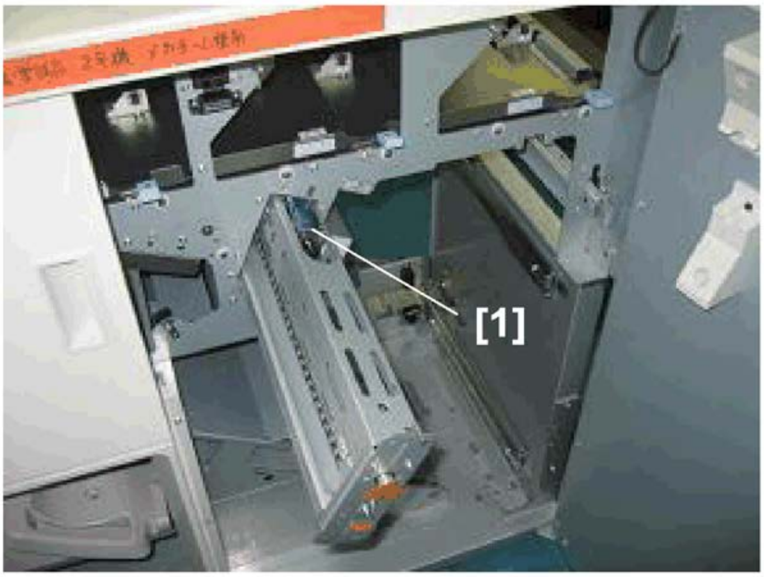
27.13.1 MAIN BOARD MOTORS, SOLENOID



d392v101

[1]	M101	Entrance Motor	Drives the entrance roller and 1st transport roller at the entrance of the ring binder.
[2]	M102	Transport Motor	Drives transport rollers 2, 3, 4, and 5 in the horizontal paper path.
[3]	M302	Side Jogger Motor	Drives the front and rear fence to the rear and forward that centers each sheet of paper so it is aligned for punching.
[4]	M103	Exit Motor	Drives the 6th transport roller and exit roller in the horizontal paper path for downstream delivery (the paper passes straight through with no punching or binding).
[5]	M201	Path JG Motor	Operates the path junction gate near the transport roller 4 in the horizontal path.
[6]	M301	Jog Roller Motor	Operates the side fence that jogs the stack below the punch to align it for punching.
[7]	M303	Punch Unit Runout Motor	Rotates the punch runout roller that feeds the punched sheet out of the punch unit to the pre-bind jogger.
[8]	M501	Stacker Motor	Raises and lowers the stacking tray where the bound books are output from output belt 2.
[9]	M402	Output Belt 2 Motor	Drives the belt of output belt 2 which relays the book from output belt 1 to the book output tray.

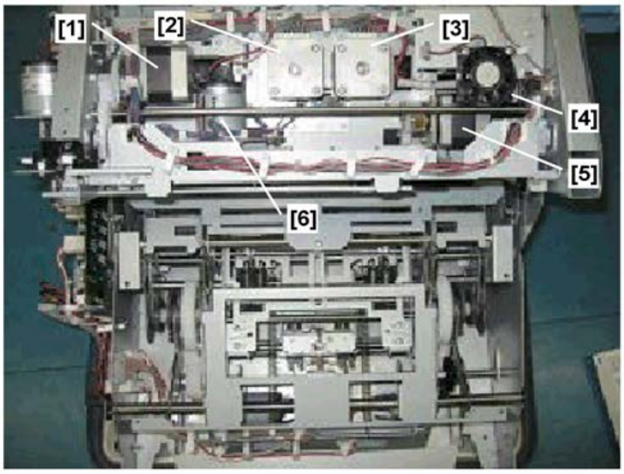
[10]	M403	Output Belt Rotation Motor	Rotates the output belt 1 assembly.
[11]	M401	Output Belt 1 Motor	Drives the belt of output belt 1 which receives the bound book from the binder unit.
[12]	M304	Punch Motor	Drives the punch unit that punches holes in the paper.
[13]	M305	Jog Roller Lift Motor	Opens the nip of the rubber rollers by raising the idle rollers in the pre-punch jogger unit so the paper can be freed for horizontal alignment (perpendicular to the direction of paper feed) by the front and rear fence in the pre-punch jogging unit.



d392v102

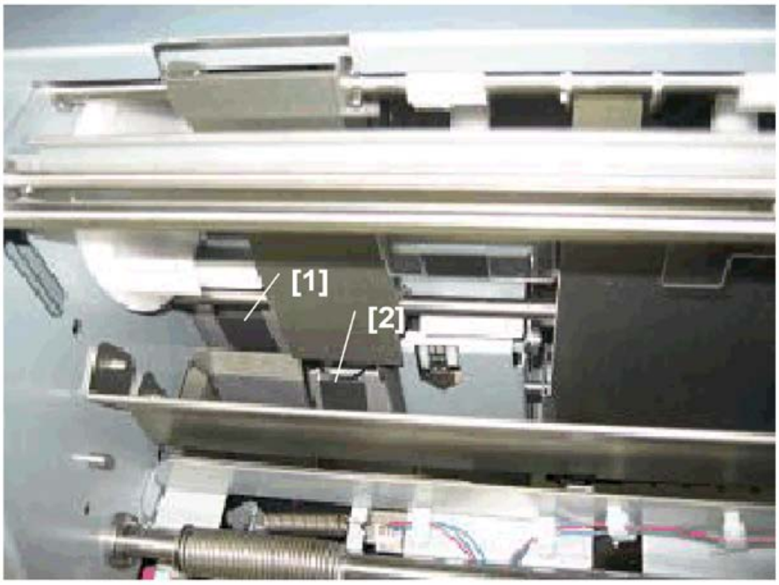
[1]	SOL302	Top Fence SOL	Opens and closes the stopper inside the punch unit that improves the accuracy of hole punching on the leading edge of each sheet.

27.13.2 BINDER UNIT CONTROL BOARD MOTORS



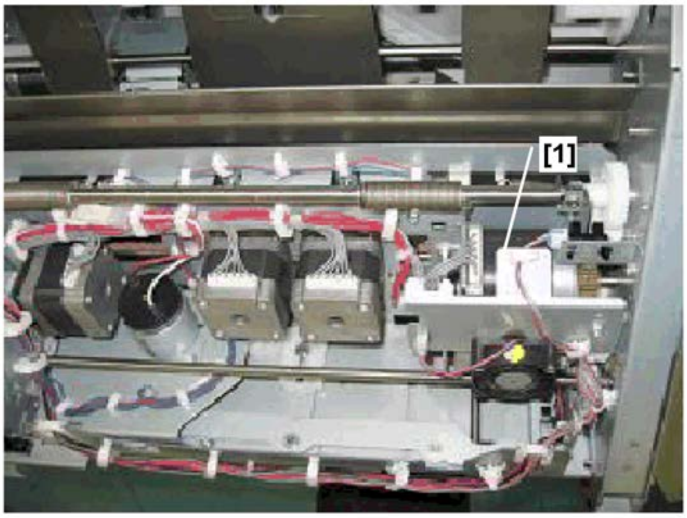
d392v103

[1]	M610	Runout Press Roller Motor	Raises and lowers the press roller to adjust it to the thickness of the book before the runout roller motor turns on to start rotating the roller to feed the roller out of the binder unit.
[2]	M606	Jog Fence Motor 2	Operates Side Fence 2, the rear jogger fence in the pre-bind jogger unit.
[3]	M604	Jog Fence Motor 1	Operates Side Fence 1, the front jogger fence in the pre-bind jogger unit.
[4]	M611	Fan Motor	Cools the area around the motors in the binder unit.
[5]	M609	Runout Roller Motor	Rotates the runout press roller that feeds the bound book out of the binder unit.
[6]	M602	Alignment Pin Motor	Raises and lowers the alignment pins.



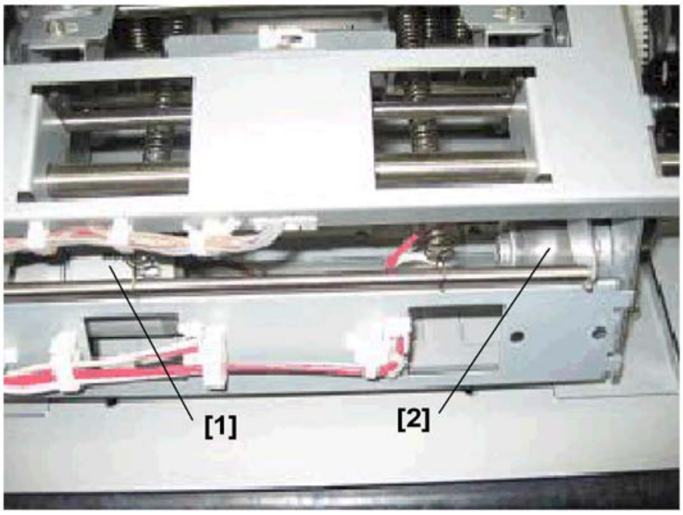
d392v104

[1]	M603	Paddle Roller Lift Motor	Raises and lowers the paddle roller.
[2]	M601	Paddle Roller Motor	Drives the paddle roller in the pre-bind jogger that pushes the leading edge of each sheet against the raised shutter to align the stack.



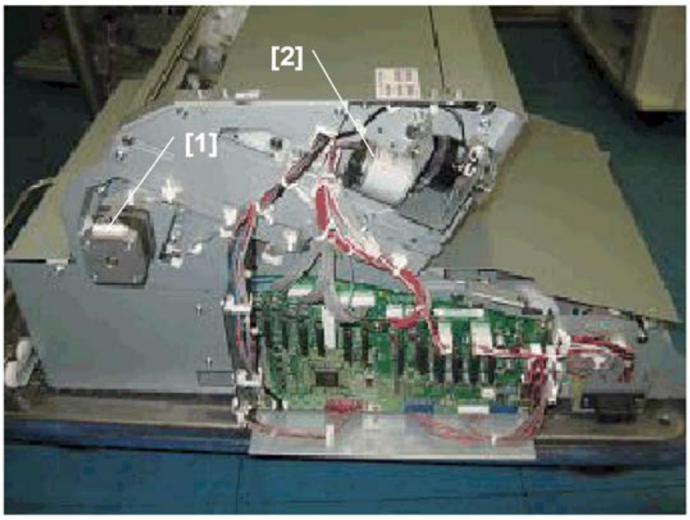
d392v105

[1]	M605	Clamp Motor	Rotates the cam which opens and closes the clamp that clinches the punched spine of the stack after it has been jogged in the pre-bind jogger.



d392v106

[1]	M701	Clamp Binder Motor	(1) Drives the linkage and gear that raises the ring clamper to the bottom of the ring supply unit to pull and clamp one ring strip from the bottom of the ring stack. (2) Drives the gear> cam> linkage that swings the top of the ring binder (holding the ring strip) toward the bottom of the pre-bind jogger (where the clamped spine of the stack is exposed and waiting for the rings to be inserted and closed). (3) Rotates the cam> gear> linkage that pulls the closer down to close the rings.
[2]	M702	50/100 Clamp Adjust Motor	Operates the switching cams (1 and 2) that adjust the pitch and depth for the size of the rings so they will be closed properly.

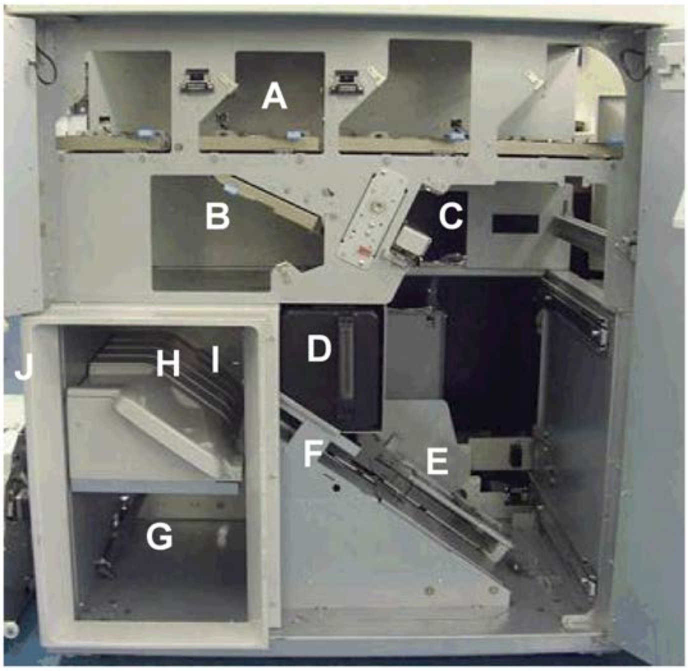


d392v107

[1]	M607	Stack Tamper Motor	Drives the cam that operates the tamper arms, posts, and mylar sheet that press down the trailing edge of each sheet as it enters the pre-bind jogger unit so the path is clear for the next sheet.
[2]	M608	Shutter Motor	Raises and lowers the shutter.

27.14 MAIN BOARD SENSORS

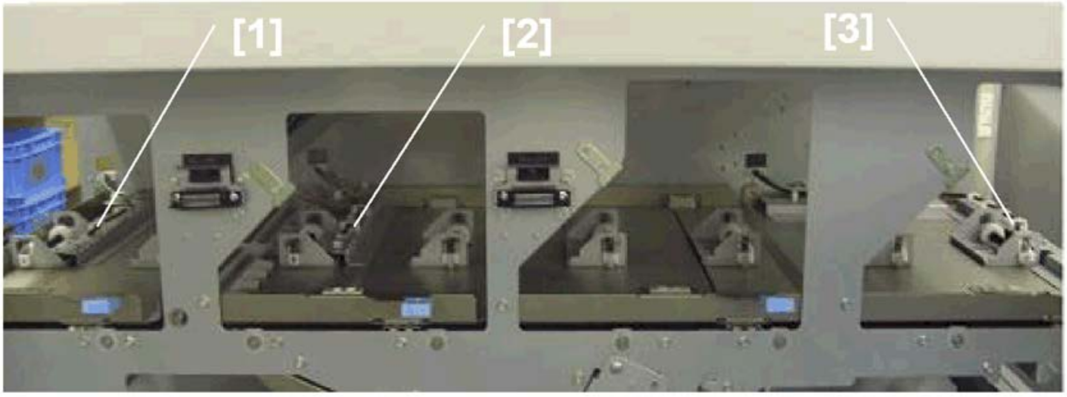
27.14.1 FRONT VIEW



d392v108

A Horizontal Paper Path
B Pre-Punch
C Post-Punch
D Punchout Box
E Output Belt 1
F Output Belt 2
G Stacker Well
H Output Tray
I Stacker Top
J Stacker Side

27.14.2 A: PAPER TRANSPORT



d392v109

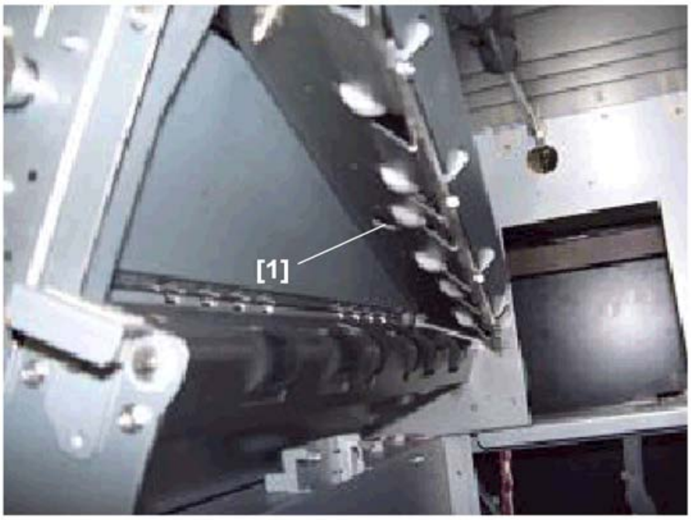
[1]	S103	Exit Sensor	Detects the leading and trailing edge of each sheet at the exit roller. Detects a jam if the paper fails to arrive (late jam) or stops (lag jam).
[2]	S102	Transport Sensor	Detects the leading and trailing edge of each sheet at the transport roller 5 at the junction gate. Detects a jam if the paper fails to arrive (late jam) or stops (lag jam).
[3]	S101	Entrance Sensor	Detects the leading and trailing edge of each sheet at the entrance roller. Detects a jam if the paper fails to arrive (late jam) or stops (lag jam).

27.14.3 B: PRE-PUNCHING

d392v110

[1]	S201	Punch Reference Sensor	After the paper has passed the switchback junction roller, this sensor triggers the operation of the pre-punch jogging unit to center and align the sheet for punching.

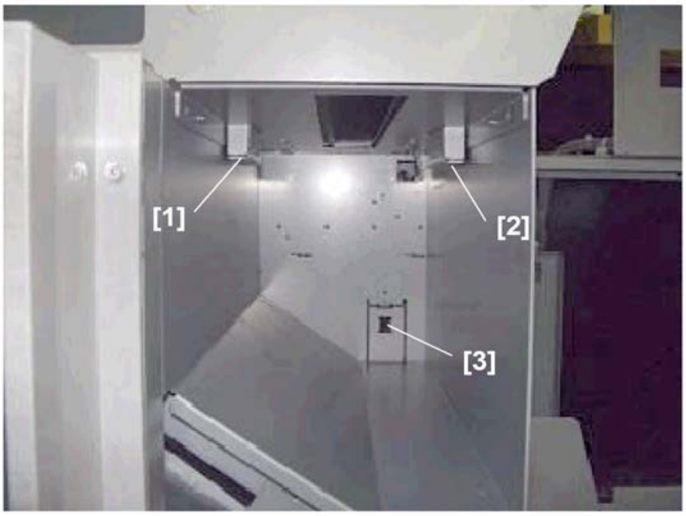
27.14.4 C: POST-PUNCHING



d392v111

[1]	S202	Punch Reference Sensor	Located immediately downstream of the punch unit, confirms that the paper has exited the punch unit after punching, then after successful exit triggers the jogging operation of the pre-bind jogger. Signals an error if either the leading or trailing edge of the sheet fails to arrive at the prescribed time.

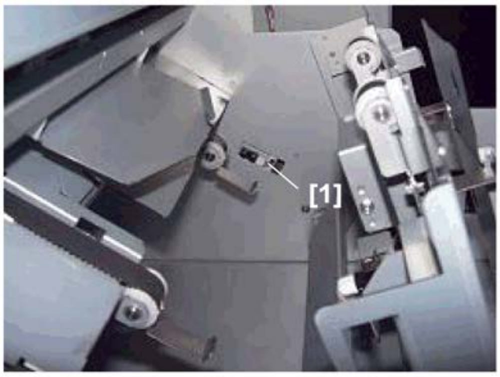
27.14.5 D: PUNCHOUT BOX

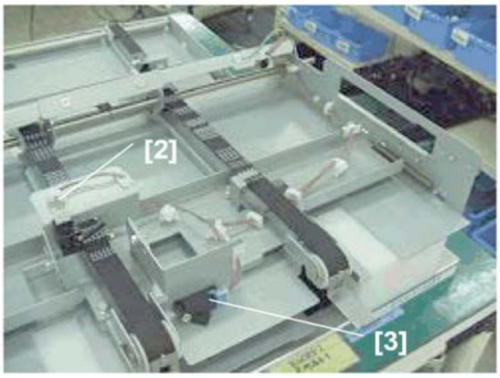


d392v112

[1]	S307R	Full Sensor	Detects when the chad box is full. The receptor of an Emitter/Receptor pair.
[2]	S307E	Full Sensor	Detects when the chad box is full. The emitter of an Emitter/Receptor pair.
[3]	S308	Chad Box Sensor	Detects the presence of the chad box. Triggers an error if the box is not installed or is installed improperly.

27.14.6 E: OUTPUT BELT 1





d392v113

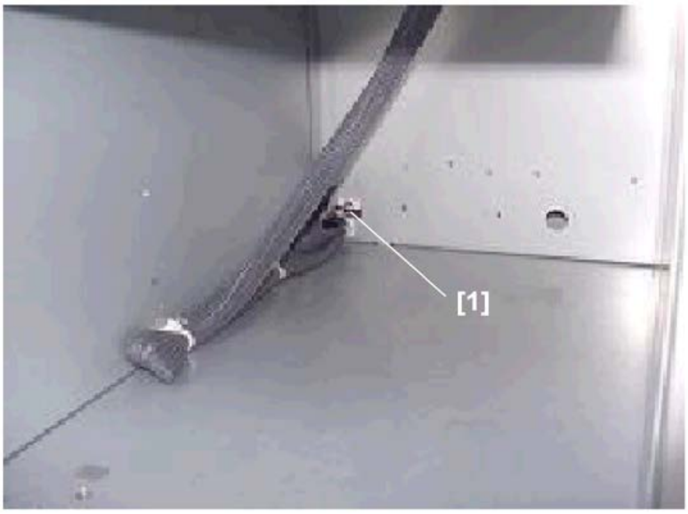
[1]	S403	Output Belt Rotation HP Sensor	Detects when the belt reaches the horizontal and stops the output belt rotation motor (M403).
[2]	S401	Output Belt 1 HP Sensor	Detects the home position of the pawls mounted on output belt 1.
[3]	S404	Output Unit Entrance Sensor	Checks the leading/trailing edge timing of the stacks (ring-bound or punched-only) fed from the pre-bind jogger unit.

27.14.7 F: OUTPUT BELT 2

d392v114

[1]	S402	Output Belt 2 HP Sensor	Detects the home position of the pawls mounted on output belt 2.

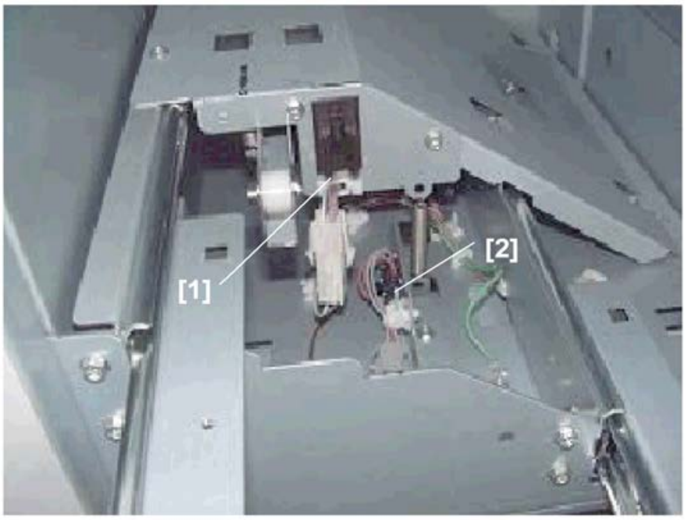
27.14.8 G: STACKER WELL



d392v115

[1]	S501	Stacker HP Sensor	Detects the home position of the stacker tray and stops the stacker motor (M501).

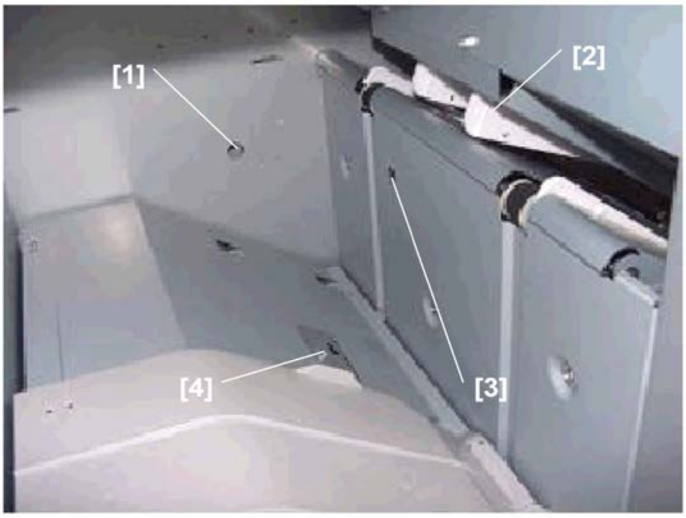
27.14.9 H: TRAY: INSIDE VIEW



d392v116

[1]	S505	Tray Detect Sensor	Detects whether the stacker tray is pulled out or pushed in. Signals an alert after a job starts if the tray is pulled out.
[2]	S506	Obstacle Detect Microswitch	Detects an obstacle below the output tray and stops the operation.

27.14.10 I: STACKER: TOP



d392v117

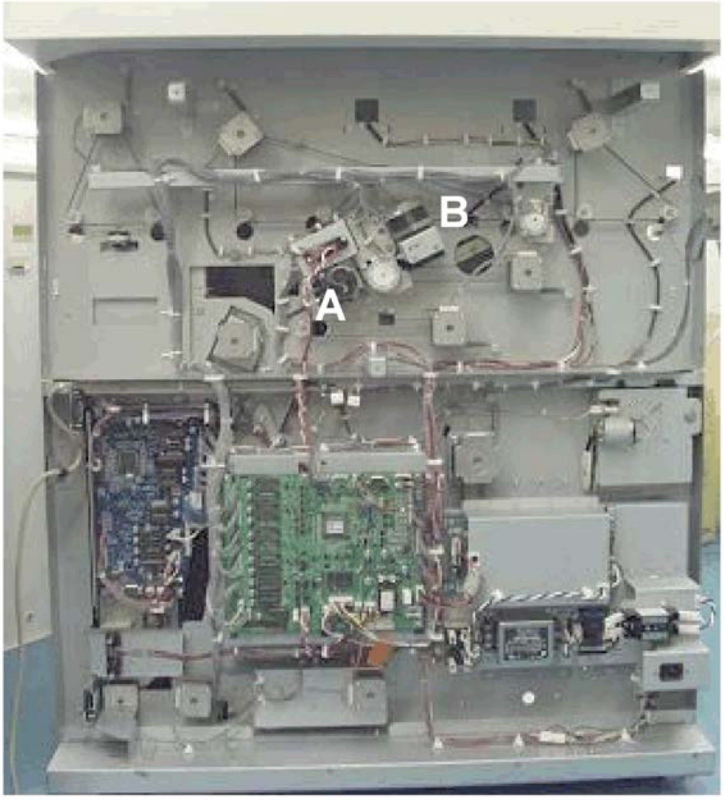
[1]	S507R	Book Position Sensor	Checks the position of the bound book to detect book skew or falling. The receptor of an Emitter/Receptor pair.
[2]	S405	Book Pass Sensor	Checks the leading/trailing edge timing of the stack output to the stacking tray by the pawl of output belt 2. Signals an error if the leading/trailing edges fail to arrive or leave at the prescribed time.
[3]	S502R	Stack Height Sensor	Detects the top of the document stack on the on the stacker tray and signals when the stacker tray if full. This is the receptor sensor of an Emitter/Receptor pair.
[4]	S504	Stacker Detect Sensor	Detects a document on the stacker tray at power on.

27.14.11 J: STACKER: SIDE

d392v118

[1]	S502E	Stack Height Sensor	Detects the top of the document stack on the on the stacker tray and signals when the stacker tray if full. This is the emitter sensor of an Emitter/Receptor pair.
[2]	S507E	Book Position Sensor	Checks the position of the bound book to detect book skew or falling. The emitter of an Emitter/Receptor pair.

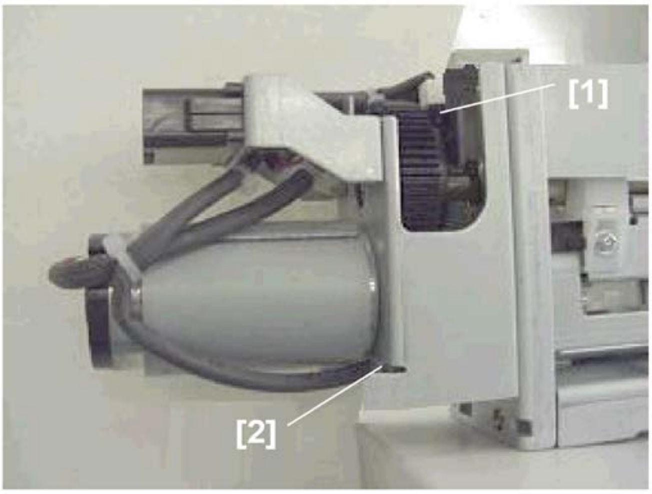
27.15 AROUND PUNCH UNIT, PRE-PUNCH JOGGER



d392v119

A Punch Unit
B Pre-Punch Jogger Unit

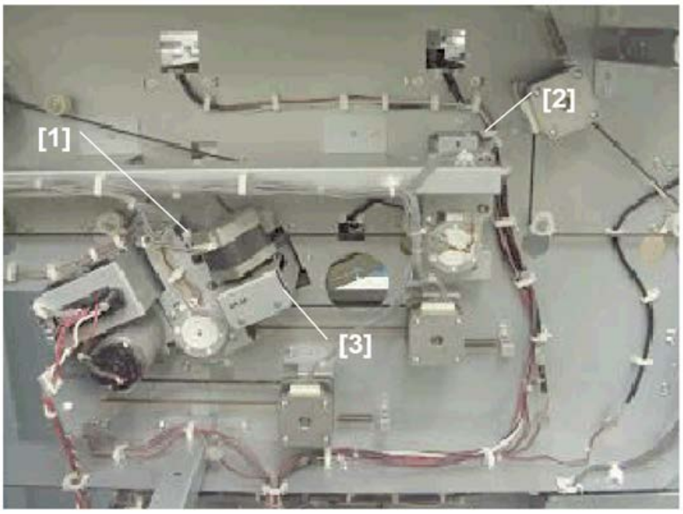
27.15.1 A: PUNCH UNIT



d392v126

[1]	S302	Punch HP Sensor	Detects the home position of the punch unit. Signals an error if the punch unit is neither installed nor installed properly.
[2]	S303	Punch Encoder Sensor	Controls the start and stop timing of the punching operation by counting rotations of the punch motor (M304).

27.15.2 B: PRE-PUNCH JOGGER UNIT

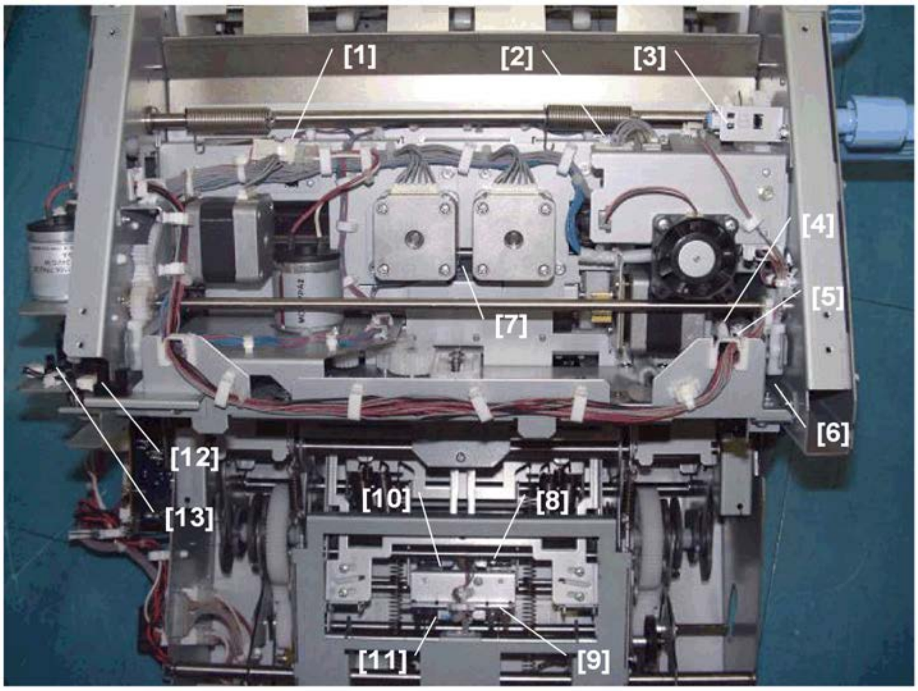


d392v121

[1]	S309	Jog Roller Lift HP Sensor	Detects the home position of the idle rollers raised and lowered by the jog roller lift motor (M305) in the pre-punch jogger unit during pre-punch jogging.
[2]	S203	Path JG HP Sensor	Detects the actuator of the switchback junction gate after it returns to its home position and switches off the path junction gate motor (M201).
[3]	S301	Pre-Punch Jogger HP Sensor	Detects the home position of the front and rear jogger fences in the pre-punch jogger unit.

27.16 SUB BOARD SENSORS

27.16.1 PAPER JOGGING UNIT (FRONT), BINDER UNIT

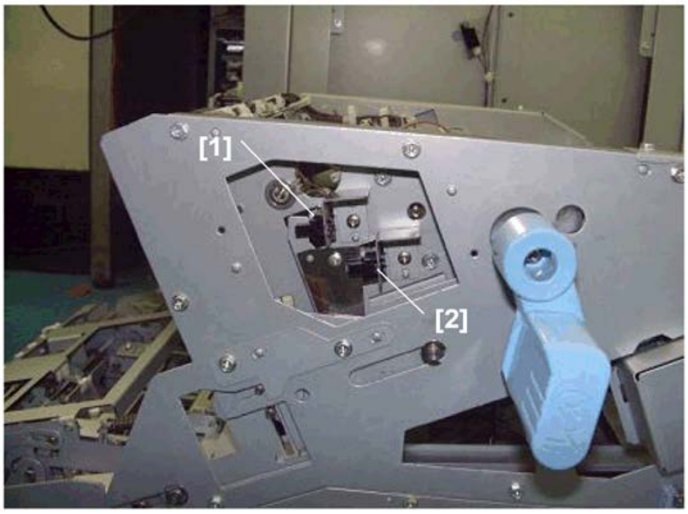


d392v122

[1]	S611	Side Fence 2 HP Sensor 2	Detects the home position of side fence 2 (rear fence) in the pre-bind jogger unit.
[2]	S601	Side Fence 1 HP Sensor	Detects the home position of the front side fence of the pre-bind jogger.
[3]	S603	Clamp HP Sensor	Controls the operation of the clamp lift cam that opens the arms of the clamp in the pre-bind jogger.
[4]	S610	Alignment Pin Up Sensor	Detects when the two alignment pins in the binder unit are at the full up position and inserted successfully into the two wholes on either end of the stack.
[5]	S604	Alignment Pin HP Sensor	Detects the actuator of the alignment pin linkage, signals that the linkage has returned to its home position, and switches off the alignment pin motor (M602).
[6]	S605	Shutter HP Sensor 1	Detects the actuator of the as it is lowered, signals that the shutter has returned to its home position, and switches off the shutter motor (M608).
[7]	S609	Paper LE Detect Sensor	Detects the arrival of each sheet in the pre-bind jogger under. Also signals an alert if it detects paper remaining in the pre-bind jogger unit at power on.

[8]	S702	Bind Timing Sensor	Monitors the operation timing of the clamp unit during the binding cycle: 1). Separation, when the closer retrieves 1 ring from the ring cartridge above, 2) Swinging the clamp unit left to the pre-bind jogger holding the punched edge of the stack, 3) Closing, retracts the closer to close and lock the rings through the punched holes, 4) Swinging the clamp unit right to the home position below the ring supply unit. Issues an error if the clamp unit does not return to its home position within the prescribed time.
[9]	S707	Ring Switch Timing Sensor	Confirms that the cam (driven by the 50/100 clamp adjust motor (M702) has reached the stop position and switched off the motor at the pitch setting for the ring size. Issues an error if the closer does not return to its home position with the prescribed time
[10]	S701	Binder HP Sensor	Detects the home position of the clamp unit. Issues an error if the clamp unit does not return to its home position under the ring supply unit within the prescribed time.
[11]	S706	Ring Switch HP Sensor	Confirms that the cams (driven by the 50/100 clamp adjust motor (M702) have returned to its home position after they have adjusted the depth and pitch for closing and locking the rings.
[12]	S614	Runout Roller HP Sensor	Controls operation of the runout roller motor (M609) that raises the runout roller in the pre-bind jogger unit.
[13]	S613	Shutter HP 2 Sensor	Detects the stop positions of the shutter and shuts off the shutter motor (M608).

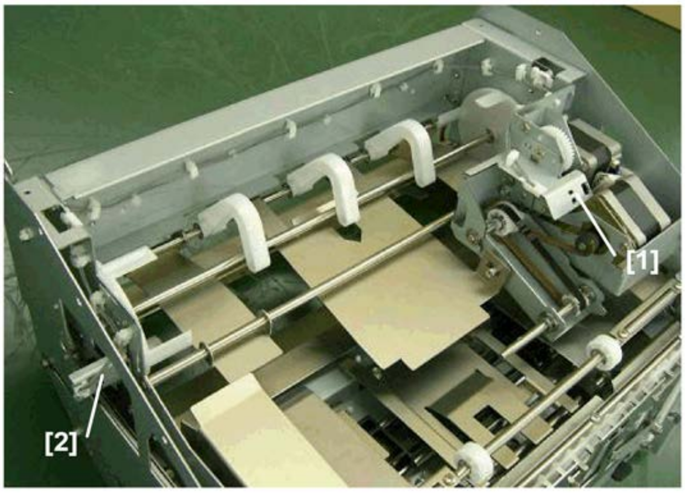
27.16.2 PAPER JOGGING UNIT: SIDE VIEW



d392v123

[1]	S606	50-Sheet Detect Sensor	Detects when the signature is thicker than 5.5 mm.
[2]	S607	Stack Thickness Sensor	Measures the thickness of the stack through a cutout in the upper arm plate.

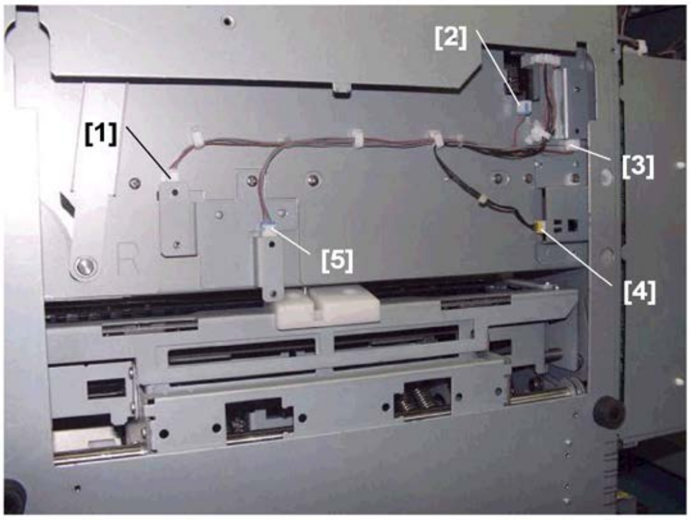
27.16.3 PAPER JOGGING UNIT: INSIDE VIEW



d392v124

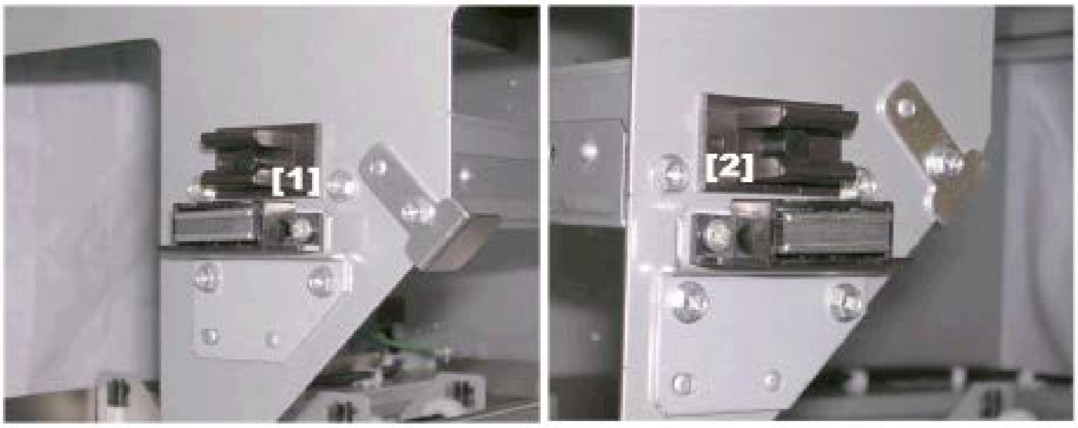
[1]	S602	Paddle Roller HP Sensor	Detects the descending paddle roller and switches off the paddle roller motor (M601) so the roller stops at its home position.
[2]	S612	Stack Tamper HP Sensor	Detects the actuator of the tamper fence and stops the stack tamper motor (S607).

27.16.4 CARTRIDGE UNIT: INSIDE VIEW



[1]	S804	50/100 Ring Detect Sensor	There are only two ring sizes: 50/100. The notations refer to the approximate number of sheets in the stack (50 sheets, 100 sheets).
[2]	S801	Cartridge Detect Sensor	Detects the presence of the ring cartridge. Triggers an alert if the ring cartridge is not installed or installed incorrectly.
[3]	S805	Ring Cartridge Type Sensor	This sensor detects which type of ring cartridge is installed (A4 ring cartridge or LT ring cartridge).
[4]	S803	Ring Near-End Sensor	The actuator attached to the descending weight on top of the ring stack turns this sensor on when it reaches the bottom of the stack when there are only 5 rings remaining.
[5]	S802	Rings Reversed Sensor	Detects when rings have been loaded incorrectly.

27.17 SWITCHES



d392v906

[1]	SW1	Left Door Switch	Detects when left door opened/closed/
[2]	SW2	Right Door Switch	Detects when right door opened/closed.