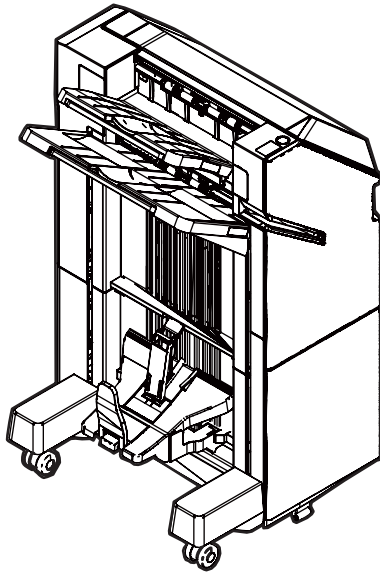


SERVICE MANUAL



DIGITAL MULTIFUNCTIONAL SYSTEM OPTION FINISHER SADDLE FINISHER PUNCH UNIT

MX-FN30 MX-FN31 MODEL MX-PN16B

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Parts marked with "△" are important for maintaining the safety of the set. Be sure to replace these parts with specified ones for maintaining the safety and performance of the set.

[1] SPECIFICATIONS

1. Finisher/Saddle Finisher

Model name		MX-FN30 (3K Finisher)	MX-FN31 (3K Saddle Finisher)
Description		Finisher	Saddle Stitch Finisher
Type		Floor stand type	
Transportation standard		Center standard	
Loading method		Moving offset tray	Moving offset tray and saddle stitch exit tray
Mode		Non-staple, Staple	Non-staple, Staple, Saddle stitch / bi-folding (single sheet output)
Top tray		Yes	Yes
Power consumption		Approx. 140 W	Approx. 140 W
Power Supply		Supplied from the main unit	
Dimension (WxDxH mm)		When folding exit tray: 533 x 623 x 986 mm, 21 x 24_5/8 x 38_7/8 inch	
Foot print dimension (WxD mm)		With tray extended: 635 x 623 x 1049 mm, 25 x 24_58 x 41_3/8 inch	
Weight		Approx. 31 kg, 68.4 lbs	Approx. 54 kg, 119.1 lbs
Stacker section			
Ejectable paper sizes/weight		Refer to the section the attached list "1"	
Paper sizes/weight allowed for offset			
Offset volume		30mm	
Stacking performance	Non-offset	Deviation in X direction : 30mm or less Deviation in Y direction : 50mm or less (Offset tray and Non-staple mode)	
	Offset	Side slip in a job : 30mm or less(Non-staple) Between jobs : 15mm or more	
Alignment on staple mode		Max. displacement value : 2.5 mm	
Paper detection		No	
Output Capacity	Offset tray	Non-stapled: 3,000 sheets or 423 mm or less (A4, 8.5x11) 1,500 sheets or 216 mm or less (A3, 11x17)	
		Both of Stapled: 200 bundles or 3000 sheets or 423 mm or less. (A4, 8.5x11) 100 bundles or 1500 sheets or 216 mm or less. (A3, 11x17) Refer to the section the attached list "2"	
		Staple less stapled: 100 bundles (A4, 8.5x11) 50 bundles (A3, 11x17) Staple less stapled is limited only by bundles.	
Height when mixed	Mixed size (non-staple included)	1500 sheets or 216 mm or less (If there are some of paper on tray when MFP is switched on :750 sheets or 216 mm or less)	
	Staple included)	100 bundles or 1500 sheets or 216 mm or less. (If there are some of paper on tray when MFP is switched on :750 sheets or 216 mm or less)	
Staple section			
Stitching position		1-point at front (Slant), 1-point at rear (Slant), 2-point stitching	
Size/weight allowed for stitching		Refer to the section the attached list "1"	
Number of sheets to be stitched		65 sheets (A4, 8.5x11, 90g/m ²) Stapling a mixture of types/sizes :30 sheets Max. : 300g/m ² (2 sheets) + 90g/m ² (63 sheets) Mixed (same width) staple is possible.	
Stapling method		Dedicated staple cardrige (5,000 staples), Model name: MX-SC11	
Detection of no staple		Yes	
Staple less Staple section			
Stitching position		1-point at rear (Slant)	
Size/weight allowed for stitching		Refer to the section the attached list "1"	
Number of sheets to be stitched		Max. 5 sheets (Guaranty for strength: 5 sheets for 64g/m ² and under, 4 sheets for 65 - 81.4g/m ² , 3 sheets for 81.5 - 105g/m ²)	
Manual staple section			
Stitching position		1-point at rear (Slant)	
Size/weight allowed for stitching		Refer to the section the attached list "1"	
Number of sheets to be stitched		Thickness of paper : 9 mm and under (Approx. 65 sheets for 80 g/m ²)	
Stapling method		Common use with Staple section	
Detection of no staple		Common use with Staple section	
Saddle Stitch section			
Stitching method		—	
Folding position		2-point center stitch and bi-folding Center folding (Adjustment function is available)	
Paper size/weight allowed for saddle stitch		— Refer to the section the attached list "1"	
Number of paper to be stitched		— Max. 20 sheets (256g/m ² 1 sheet + 80g/m ² 19 sheets)	
Loading number		— 1 - 5 sheets : 25 bundles 6 - 10 sheets : 15 bundles 11 - 20 sheets : 10 bundles	
Stapling method		— Staple Cartridge (2000 staples) Model name: MX-SC12	
Detection of no staple		— Yes	
Detection of paper		— Yes	

2. Punch Unit

Model name	MX-PN16B
Description	Punch module (2/3-hole)*1
Punch Type	Any one of the module above can be installed.
Punchable paper size/weight	Refer to the section the attached list "1"
	Plain paper (55-105g/m ²), Heavy Paper (106-300g/m ²) (16 lb. bond-140 lb. index), not guaranteed over 129g/m ²
Paper weight	55-300g/m ²
Power source	Supplied from main unit
Dimensions (WxDxH mm)	Included in MX-FN30/31
Weight	Approx. 2.5 kg, Apporox. 5.6 lbs

*1: Auto switching 2/3 holes

*2: Manual switching 2/4 holes

The attached list "1": Ejectable Paper size/weight (For Finisher/Punch module)

		3K Finisher / 3K Saddle Stitch Finisher							
		Finisher tray				Top tray	Saddle tray		
		Ejectable paper	Offset	Number of sheets to be stitched	Staple less staple	Ejectable paper	Folding	Saddle Stitch	
Paper type	Thin paper 55-59g/m ² 13-16lb. bond	Yes	Yes	-	-	Yes*3	-	-	
	Plain paper 1 60-89g/m ² 16-24 lbs bond *2	Yes	Yes	Yes	5 sheets	Yes*3	3 sheets	20 sheets*8	
	Plain paper 2 90-105g/m ² 24-28 lbs bond *2	Yes	Yes	Yes	5 sheets	Yes*3	3 sheets	20 sheets*8	
	Recycled paper	Yes	Yes	Yes	5 sheets	Yes*3	3 sheets	20 sheets	
	Color paper	Yes	Yes	Yes	5 sheets	Yes*3	3 sheets	20 sheets	
	Letter head	Yes	Yes	Yes	5 sheets	Yes*3	3 sheets*7	-	
	Pre printed	Yes	Yes	Yes	5 sheets	Yes*3	3 sheets*7	-	
	Pre punched	Yes	Yes	Yes	5 sheets	Yes*3	3 sheets*7	-	
	Heavy paper 1 106-176g/m ² 28lbs bond-65lbs Cover	Yes	Yes	Yes*12	-	Yes*3	1 sheet	Yes*11	
	Heavy paper 2 177-220g/m ² 65 lbs Cover-80 lbs Cover	Yes	Yes	Yes*12	-	Yes*3	1 sheet	Yes*11	
	Heavy paper 3 221-256 g/m ² 80lbs Cover-140lbs index	Yes	Yes	Yes*12	-	Yes*3	-	Yes*11	
	Heavy paper 4 257-300 g/m ² 140lbs index-110lbs Cover	Yes	Yes*5	Yes*5 *12	-	-	-	-	
	Embossed paper	-	-	-	-	-	-	-	
	Envelope	-	-	-	-	-	-	-	
	Index paper	Yes*5	Yes*5	Yes*5 *12	-	Yes*3	-	-	
	OHP filme	-	-	-	-	Yes*3	-	-	
	Lable	-	-	-	-	Yes*3	-	-	
Glossy paper	Yes	Yes	Yes*12	-	Yes*3	1 sheet*7	Yes*11		
User section 1~9 *13	Yes	Yes	Yes*6	Yes*6	Yes*3	Yes*7	Yes*6		
Paper size	12x18' (A3W)	305x457	Yes	-	-	Yes*3	3 sheets	20 sheets*9	
	Ledger (11' x 17')	279x432	Yes	Yes	30 sheets	5 sheets	Yes*3	3 sheets	20 sheets*9
	Legal (8.5'x14')	216x356	Yes	Yes	30 sheets	-	Yes*3	3 sheets	20 sheets*9
	Asian Legal (8.5x13.5)	216x343	Yes	Yes	30 sheets	-	Yes*3	-	-
	Mexican Legal (8.5'x13.4')	216x340	Yes	Yes	30 sheets	-	Yes*3	-	-
	Foolscap (8.5'x13')	216x330	Yes	Yes	30 sheets	-	Yes*3	-	-
	Letter (8.5'x11')	279x216	Yes	Yes	65 sheets	5 sheets	Yes*3	-	-
	Letter R (8.5'x11'R)	216x279	Yes	Yes	30 sheets	-	Yes*3	3 sheets	20 sheets*9
	Invoice (5.5'x8.5') *1	216x140	-	-	-	-	-	-	-
	Invoice R (5.5'x8.5'R)	140x216	Yes	-	-	-	Yes*3	-	-
	Executive R (7.25'x10.5'R)	184x266	Yes	-	-	-	Yes*3	-	-
	9x12 (A4W)	305x229	Yes	-	-	-	Yes*3	-	-
	A3	297x420	Yes	Yes	30 sheets	5 sheets	Yes*3	3 sheets	20 sheets*9
	B4	257x364	Yes	Yes	30 sheets	-	Yes*3	3 sheets	20 sheets*9
	A4	297x210	Yes	Yes	65 sheets	5 sheets	Yes*3	-	-
	A4-R	210x297	Yes	Yes	30 sheets	-	Yes*3	3 sheets	20 sheets*9
	B5	257x182	Yes	Yes	65 sheets	-	Yes*3	-	-
	B5-R	182x257	Yes	-	-	-	Yes*3	-	-
	A5 *1	210x148	-	-	-	-	-	-	-
	A5-R	148x210	Yes	-	-	-	Yes*3	-	-
SRA3	320x450	Yes	-	-	-	Yes*3	-	-	
SRA4	320x225	Yes	-	-	-	Yes*3	-	-	
8K	270x390	Yes	Yes	30 sheets	5 sheets	Yes*3	3 sheets	20 sheets*9	
16K	270x195	Yes	Yes	65 sheets	5 sheets	Yes*3	-	-	
16K-R	195x270	Yes	-	-	-	Yes*3	3 sheets	20 sheets*9	

			3K Finisher / 3K Saddle Stitch Finisher						
			Finisher tray				Top tray	Saddle tray	
			Ejectable paper	Offset	Number of sheets to be stitched	Staple less staple	Ejectable paper	Folding	Saddle Stitch
Paper size	Custom-Custom size		Yes*3	Yes*5	-	-	Yes*3	Yes*4	Yes*4
	Custom range	Min X (Sub)	158mm	182mm	-	-	158mm	270mm	270mm
		Max X (Sub)	470mm	432mm	-	-	470mm	457mm	457mm
		Min Y (Main)	100mm	210mm	-	-	100mm	195mm	195mm
		Max Y (Main)	320mm	297mm	-	-	320mm	305mm	305mm
	Custom-size unknown		Yes *3	-	-	-	Yes*3	-	-
Long paper	Width: 90~305 Length: 458~1,300	-	-	-	-	-	-	-	

*1: Invoice and A5 are special size handling

*2: Plain paper1: 60~89g/m² (16-24 lbs bond), Plain paper2: 90~105g/m² (24-28 lbs bond)

*3: not guarantee the alignment

*4: limited for custom-size paper which has the longer X (sub scanning direction) than Y (main scanning direction).

*5: Operation is permitted, but performance is not guaranteed.

*6: Correspond to paper type setting

*7: available for print only outside of fold.

*8: 90g/m² or less

*9: 80g/m²

*11: Heavy paper mode (First page + Normal paper only available)

Staple capacity: 256g/m² (cover)x1-sheet + 55-81.4g/m²x20-sheet, 256g/m² (cover)x1-sheet + 81.4g/m² x 10-sheet

*12: Heavy paper mode (First page + Last page (total 2pages) + Normal paper only available)

*13: Depending on paper property setting.

		Punch module for 3K Finisher / 3K Saddle Stitch Finisher		
		2/3 holes		
Paper type	Thin paper		Yes	
	Plain paper 1 60-89g/m ² 16-24 lbs bond *2		Yes	
	Plain paper 2 90-105g/m ² 24-28 lbs bond *2		Yes	
	Recycled paper		Yes	
	Color paper		Yes	
	Letter head		Yes	
	Pre printed		Yes	
	Pre punched		-	
	Heavy paper 1 106-176g/m ² 28lbs bond-65lbs Cover		Yes	
	Heavy paper 2 177-220g/m ² 65 lbs Cover-80 lbs Cover		Yes	
	Heavy paper 3 221-256 g/m ² 80lbs Cover-140lbs index		Yes	
	Heavy paper 4 257-300 g/m ² 140lbs index-110lbs Cover		Yes	
	Embossed paper		-	
	Envelope		-	
	Index paper		Yes*3	
	OHP film		-	
	label		-	
Glossy paper		Yes		
User setting 1-9		Yes		
Paper size	12x18' (A3W)	305x457	-	
	Ledger (11'x17')	279x432	Yes (3 holes)	
	Legal (8.5'x14')	216x356	Yes (2 holes)	
	Asian Legal (8.5x13.5)	216x343	Yes (2 holes)	
	Mexican Legal (8.5'x13.4')	216x340	Yes (2 holes)	
	Foolscap (8.5'x13')	216x330	Yes (2 holes)	
	Letter (8.5'x11')	279x216	Yes (3 holes)	
	Letter R (8.5'x11'R)	216x279	Yes (2 holes)	
	Invoice (5.5'x8.5')*1	216x140	-	
	Invoice R (5.5'x8.5'R)	140x216	-	
	Executive R (7.25'x10.5'R)	184x266	-	
	9x12 (A4W)	305x229	-	
	A3	297x420	Yes (3 holes)	
	B4	257x364	-	
	A4	297x210	Yes (3 holes)	
	A4-R	210x297	Yes (2 holes)	
	B5	257x182	-	
	B5-R	182x257	-	
	A5 *1	210x148	-	
	A5-R	148x210	-	
	SRA3	320x450	-	
	SRA4	320x225	-	
	8K	270x390	-	
	16K	270x195	-	
	16K-R	195x270	-	
	Custom-Custom size		-	
	Custom range	Min X (Sub)		-
		Max X (Sub)		-
		Min Y (Main)		-
		Max Y (Main)		-
	Custom-size unknown		-	
	Long paper	Width:90~305		-
		Length:458~1,300		-

*1: Invoice and A5 are special size handling.

*2: Plain paper 1: 60~89g/m² (16-24 lbs bond), Plain paper 2: 90~105g/m² (24-28 lbs bond)

*3: Operation is permitted, but performance is not guaranteed.

The attached list “2”: Loading number per size (Finisher)

Model		3K/3K Saddle Finisher tray MX-FN30/MX-FN31						
		Finisher tray				Top tray	Saddle tray	
Function/Mode		Non staple*1	Offset*1	Staple*1	Staple less Staple		Saddle Stitch	
Paper size	Plain paper (60-80g/m ²)	SRA3	1500	-	-	-	125	-
		12x18(A3W)	1500	-	-	-	125	10 bundles of 20 pages
		SRA4	1500	-	-	-	125	-
		9x12(A4W)	1500	-	-	-	125	-
		A3	1500	1500	100 bundles or 1500 pages	100 bundles	125	10 bundles of 20 pages
		B4	1500	1500	100 bundles or 1500 pages	-	125	10 bundles of 20 pages
		A4	3000	3000	200 bundles or 3000 pages	200 bundles	250	-
		A4R	1500	1500	100 bundles or 1500 pages	-	125	10 bundles of 20 pages
		B5	3000	3000	200 bundles or 3000 pages	-	250	-
		B5R	1500	-	-	-	125	-
		A5R	1500	-	-	-	250	-
		11x17	1500	1500	100 bundles or 1500 pages	100 bundles	125	10 bundles of 20 pages
		8.5x14	1500	1500	100 bundles or 1500 pages	-	125	10 bundles of 20 pages
		8.5x13.5 (216x343)	1500	1500	100 bundles or 1500 pages	-	125	10 bundles of 20 pages
		8.5x13.4 (216x340)	1500	1500	100 bundles or 1500 pages	-	125	10 bundles of 20 pages
		8.5x13 (216x330)	1500	1500	100 bundles or 1500 pages	-	125	10 bundles of 20 pages
		8.5x11	3000	3000	200 bundles or 3000 pages	200 bundles	250	-
		8.5x11R	1500	1500	100 bundles or 1500 pages	-	125	10 bundles of 20 pages
		7.25x10.5R	1500	-	-	-	125	-
		5.5x8.5R	1500	-	-	-	250	-
	8K	1500	1500	100 bundles or 1500 pages	100 bundles	125	10 bundles of 20 pages	
	16K	3000	3000	200 bundles or 3000 pages	200 bundles	250	-	
	16KR	1500	-	-	-	125	10 bundles of 20 pages	
Custom - size unknown	1500	-	-	-	50	-		
Long paper		1	-	-	-	1	-	
Thin paper		1500	1500	-	-	125	-	
Heavy paper		*2	*2	Cover paper /Back cover paper only available	-	20 *5	Cover paper only available*5	
Glossy paper	A4/.8.5x11	*3	*3	Cover paper /Back cover paper only available	-	20	Cover paper only available	
Tab paper	A4/.8.5x11	100	-	-	-	20	-	
Label	A4/.8.5x11	100	-	-	-	20	-	
Transparency	A4/.8.5x11	100	-	-	-	20	-	

*1: Paper ejection capacity is 3000 sheets or height of paper ejection capacity is 432mm and unde.

Paper ejection capacity is 1500 sheets or height of paper ejection capacity is 216mm and unde.

*2: Depend on paper size.

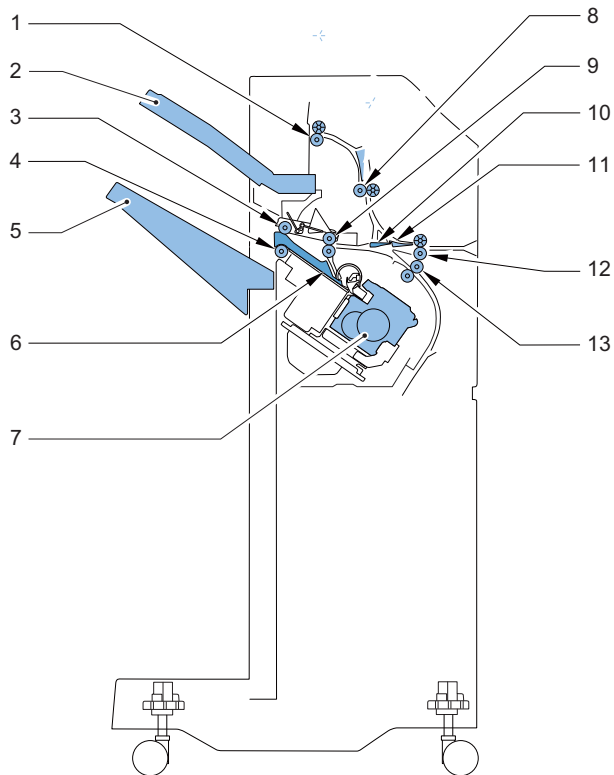
*3: Depend on paper size. A4/Letter/B5/16K: 1500 sheets, other: 750 sheets.

*5: Only 106~256g/m².

[2] INTERNAL STRUCTURES

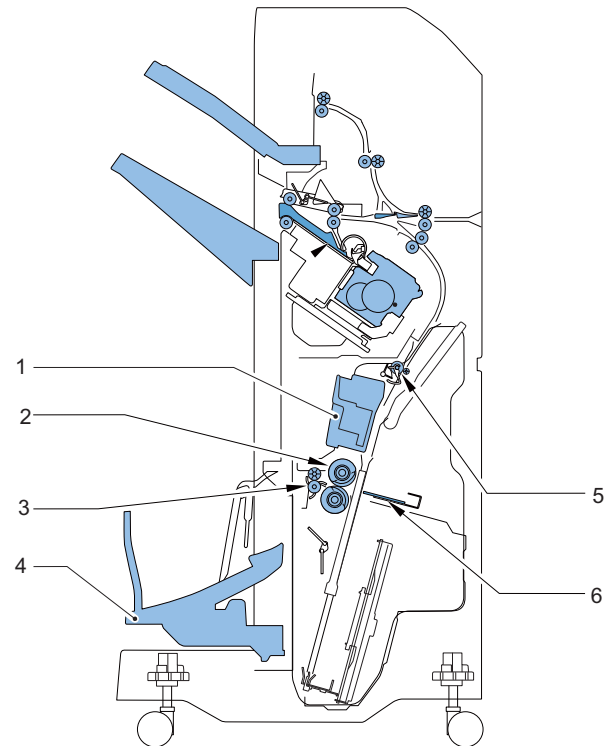
1. Internal structure

A. Finisher section



No.	Parts name
1	Escape Delivery Roller
2	Escape Tray
3	Upper Stack Delivery Roller
4	Lower Stack Delivery Roller
5	Stack Tray
6	Alignment Plate
7	Stapler Unit
8	Escape Feed Roller
9	Pre-Processing Roller
10	Buffer/Saddle Inlet Flapper
11	Escape Inlet Flapper
12	Inlet Roller
13	Buffer/Saddle Inlet Roller

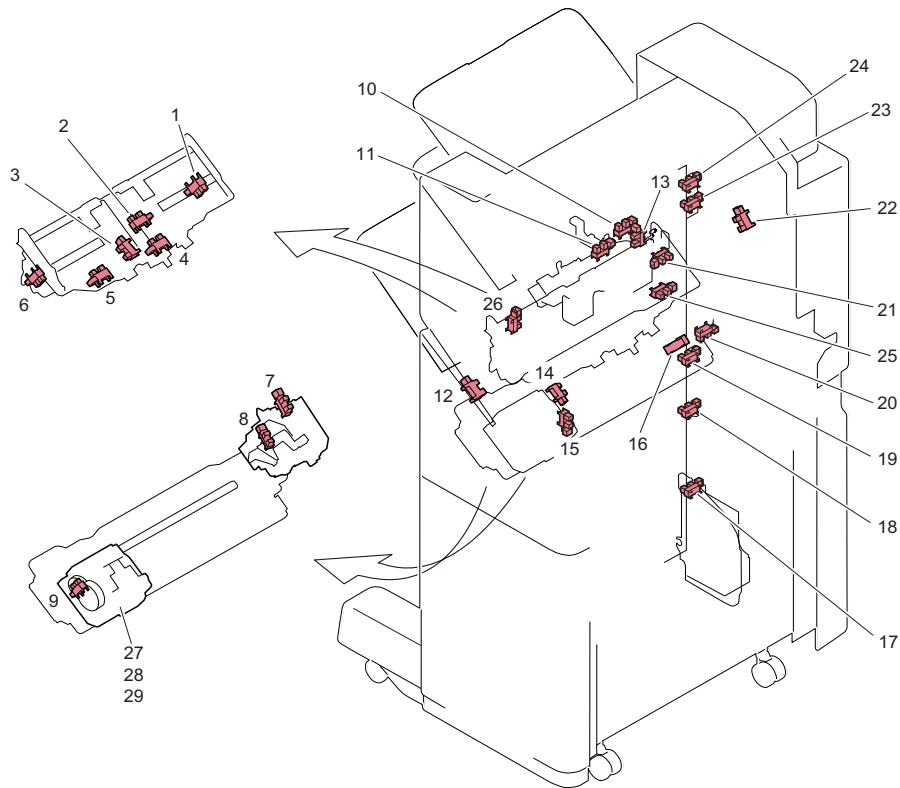
B. Saddle stitch finisher section



No.	Parts name
1	Stitcher Unit
2	Paper Folding Roller
3	Saddle Delivery Roller
4	Saddle Delivery Tray
5	Saddle Feed Roller
6	Paper Pushing Plate

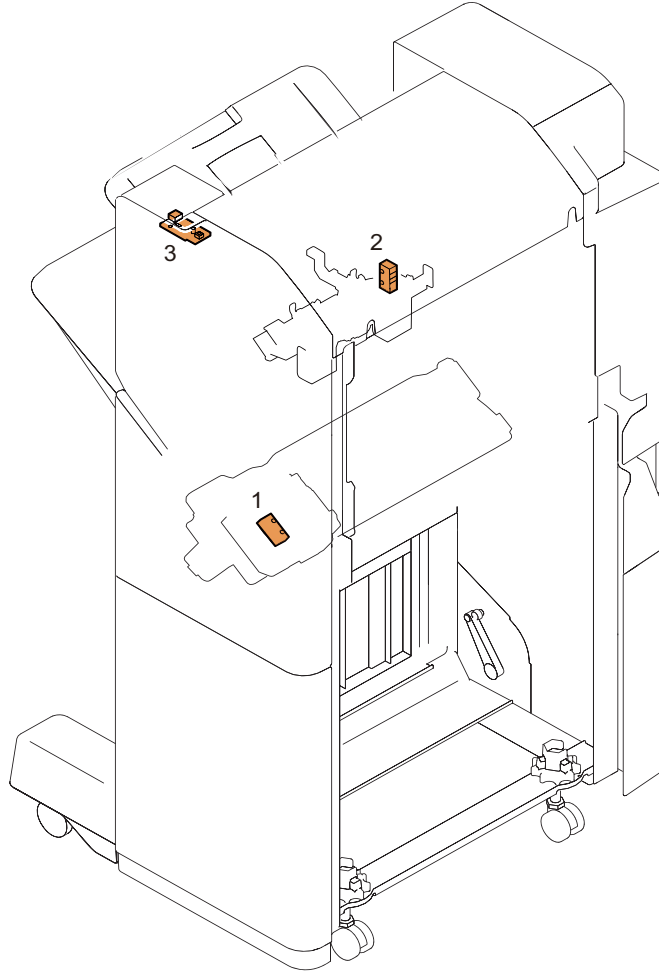
2. Finisher section

A. Sensor



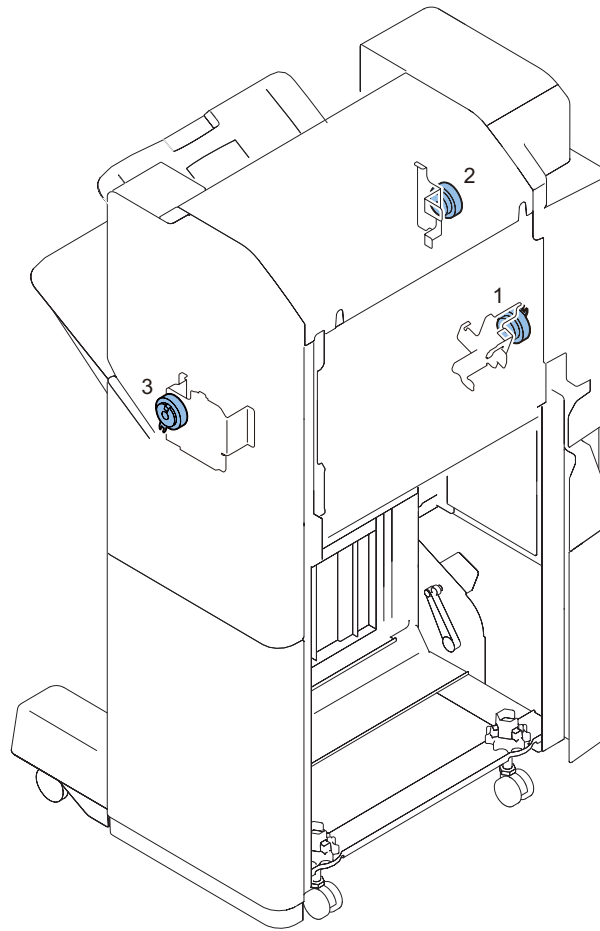
No.	Display item	Name
1	PS116 FNHPJR	Rear edge alignment plate home position sensor
2	PS114 FNDPOPT	Process tray paper surface sensor
3	PS123 FNHPAR	Rear edge assist home position sensor
4	PS118 FNHPTR	Rear edge tongue home position sensor
5	PS117 FNHPTF	Front edge tongue home position sensor
6	PS115 FNHPJF	Front edge alignment plate home position sensor
7	PS130 FNMCSLS	Staple-free stapling motor clock sensor
8	PS129 FNHPCSLs	Staple-free stapling clinch home position sensor
9	PS124 FNHPMSS	Staple shift home position sensor
10	PS111 FNEE	Escape paper exit sensor
11	PS113 FNDFET	Escape tray full detection sensor
12	PS128 FNDPMS	Manual staple paper detection sensor
13	PS119 FNHPS	Oscillation home position sensor
14	PS121 FNHPGKS	Take-up knurling lift home position sensor
15	PS104 FNDOCFD	Front door open/close detection sensor
16	PS103 FNB	Buffer sensor
17	PS109 FNFMTSS	Load tray lower limit (Small coated paper full) sensor
18	PS108 FNFMTLS	Load tray middle (Large coated paper full) sensor
19	PS107 FNFMTLC	Load tray full (Large coated paper full) sensor
20	PS101 FNE	Entry port sensor
21	PS122 FNHPFR	Rear edge falling home position sensor
22	PS105 FNHPFECE	Escape/saddle transport switch flapper home position sensor
23	PS106 FNHPMT	Load tray home position sensor
24	PS110 FNULMT	Load tray upper limit sensor
25	PS102 FNTBP	Preprocessing timing sensor
26	PS120 FNHPP	Paddle home position sensor
27	PS125 FNHPDSS	Staple drive home position sensor
28	PS126 FNDOHS	Staple cuing detection sensor
29	PS127 FNDES	Staple empty detection sensor

B. Micro switch



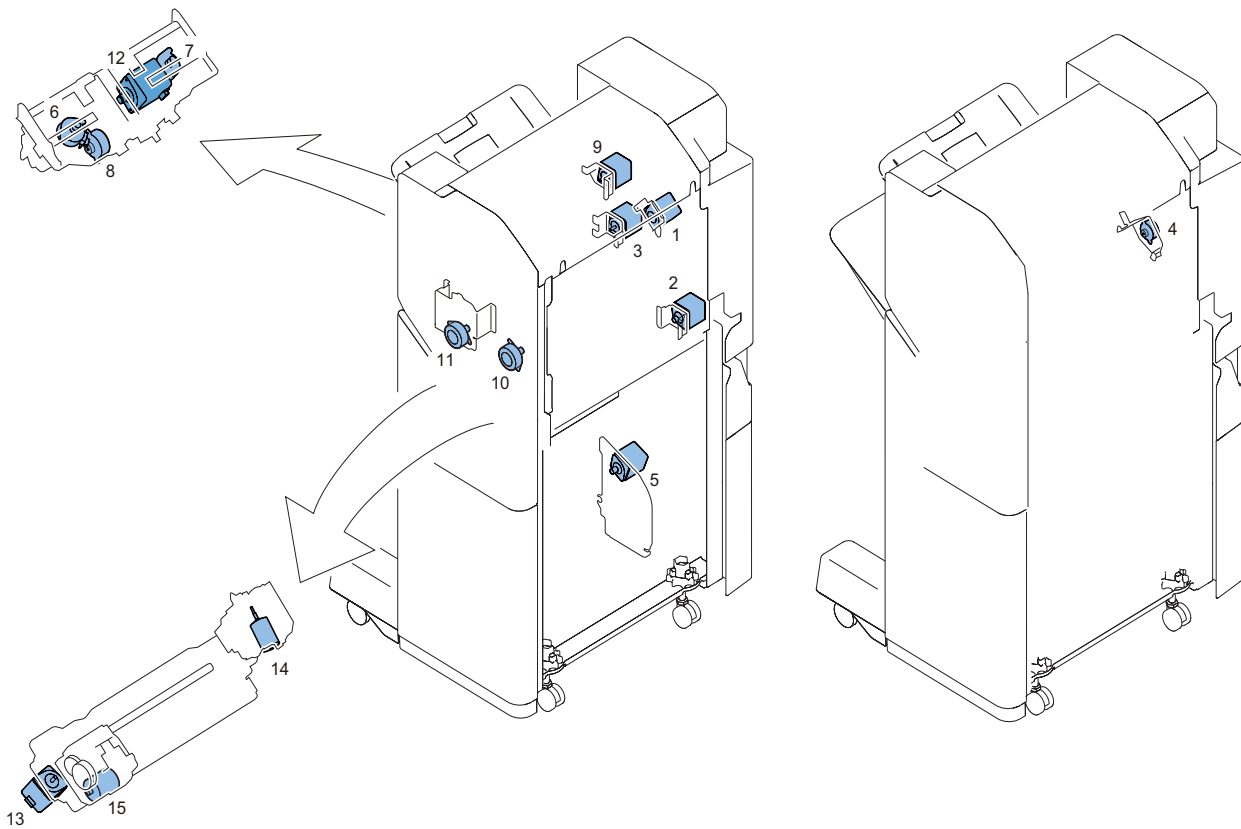
No.	Display item	Name
1	SW101 FNOCFD	Front door open/close switch
2	SW102 FNSSS	Staple safety switch
3	SW103 FNAMS	Manual staple operation SW

C. Clutch



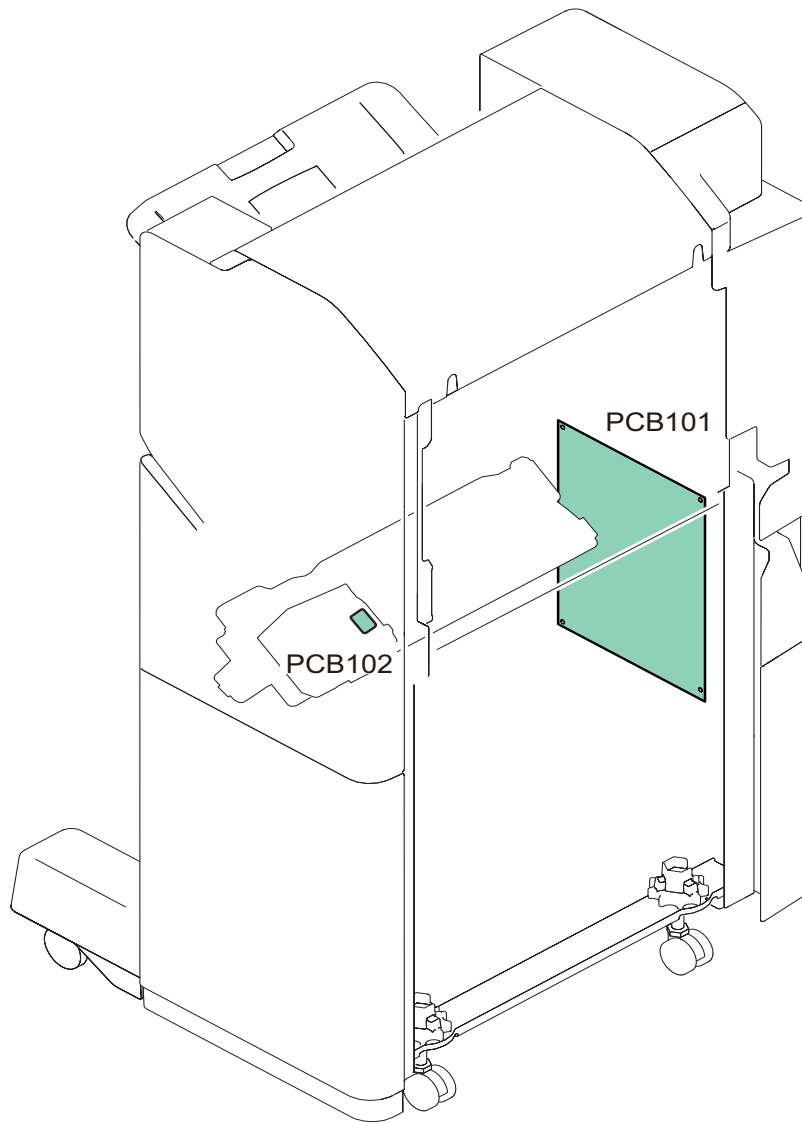
No.	Display item	Name
1	CL101 FNCEDCE	Escape transport drive switch clutch
2	CL102 FNCDRUS	Oscillation lower roller drive clutch
3	CL103 FNCDP	Paddle drive clutch

D. Motor



No.	Display item	Name
1	M101 FNMEC	Entry port transport motor
2	M102 FNMB	Buffer motor
3	M103 FNME	Discharge motor
4	M104 FNMFCES	Escape/Saddle transport switch flapper motor
5	M105 FNMGMT	Load paper tray lift motor
6	M107 FNMJF	Front alignment motor
7	M108 FNMJR	Rear alignment motor
8	M109 FNMDT	Tongue drive motor
9	M110 FNMS	Oscillation motor
10	M111 FNMGRS	Take-up switch roller lift motor
11	M112 FNMFR	Rear edge falling motor
12	M113 FNMAR	Rear edge assist motor
13	M114 FNMMS	Staple horizontal shift motor
14	M116 FNMSLS	Staple free staple motor
15	M115 FNMS	Staple motor

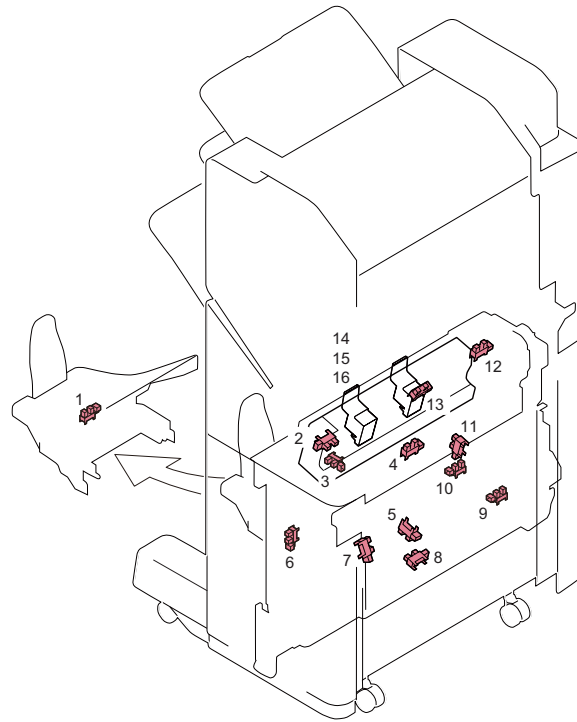
E. PWB



Display item	Name
PCB101	Finisher Controller PWB
PCB102	Stapler unit relay PWB

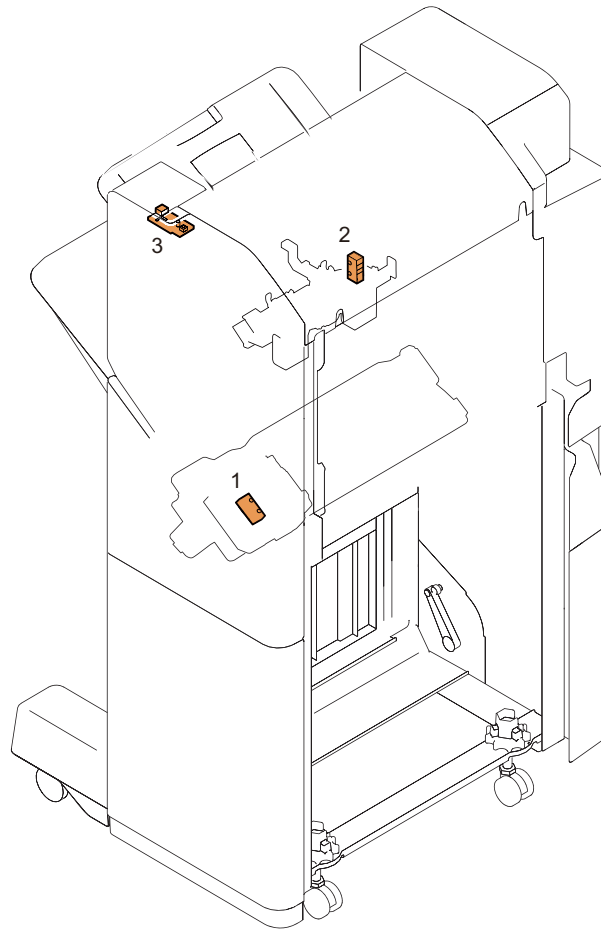
3. Saddle stitch finisher section

A. Sensor



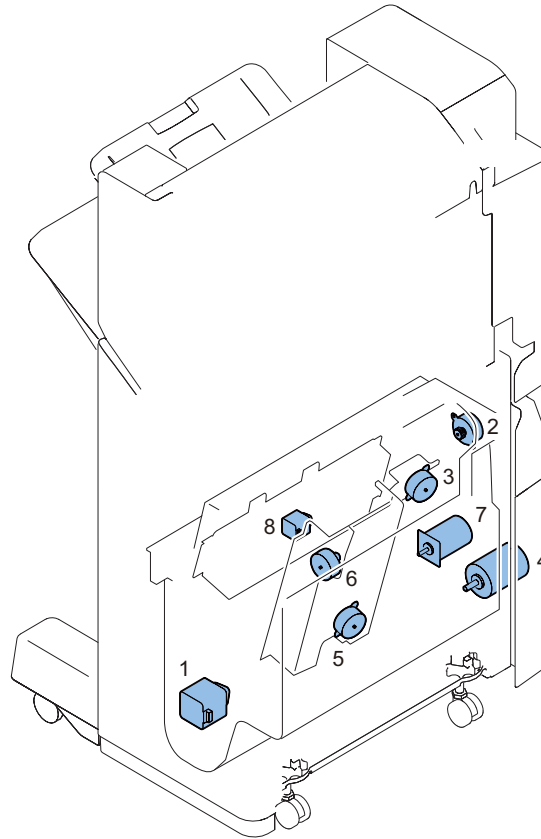
No.	Display item	Name
1	PS216 FSEPB	Saddle folding bundle load paper empty sensor
2	PS203 FSEB	Saddle folding bundle paper exit sensor
3	PS204 FSDU	Saddle detection sensor
4	PS202 FSPV	Saddle vertical path sensor
5	PS209 FSHPG	Saddle gripper home position sensor
6	PS206 FSHPH	Saddle paddle home position sensor
7	PS208 FSHPT	Saddle pushing home position sensor
8	PS210 FSHPSR	Saddle rear edge stopper home position sensor
9	PS212 FSMCF	Saddle folding motor clock sensor
10	PS211 FSMCE	Saddle paper exit motor clock sensor
11	PS207 FSHPJ	Saddle alignment plate home position sensor
12	PS205 FSHPEL	Saddle switch lever home position sensor
13	PS201 FSE	Saddle entry port sensor
14	PS213 FSESRS	Saddle staple rear staple empty sensor
15	PS214 FSESFS	Saddle staple front staple empty sensor
16	PS215 FSHPDSS	Saddle staple drive home position sensor

B. Micro switch



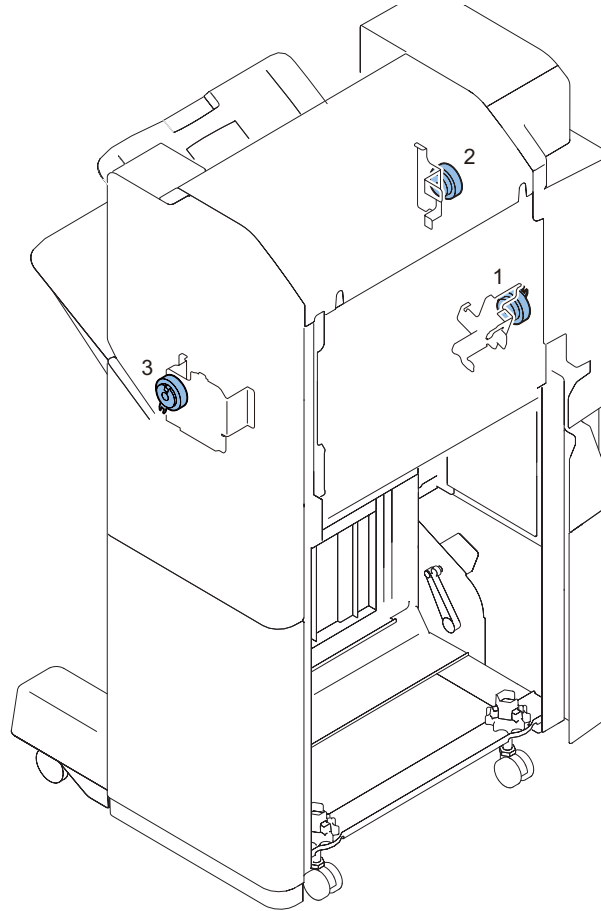
No.	Display item	Name
1	SW101 FNOCFD	Front door open/close switch
2	SW102 FNSSS	Staple safety switch
3	SW103 FNAMS	Manual staple operation SW

C. Motor



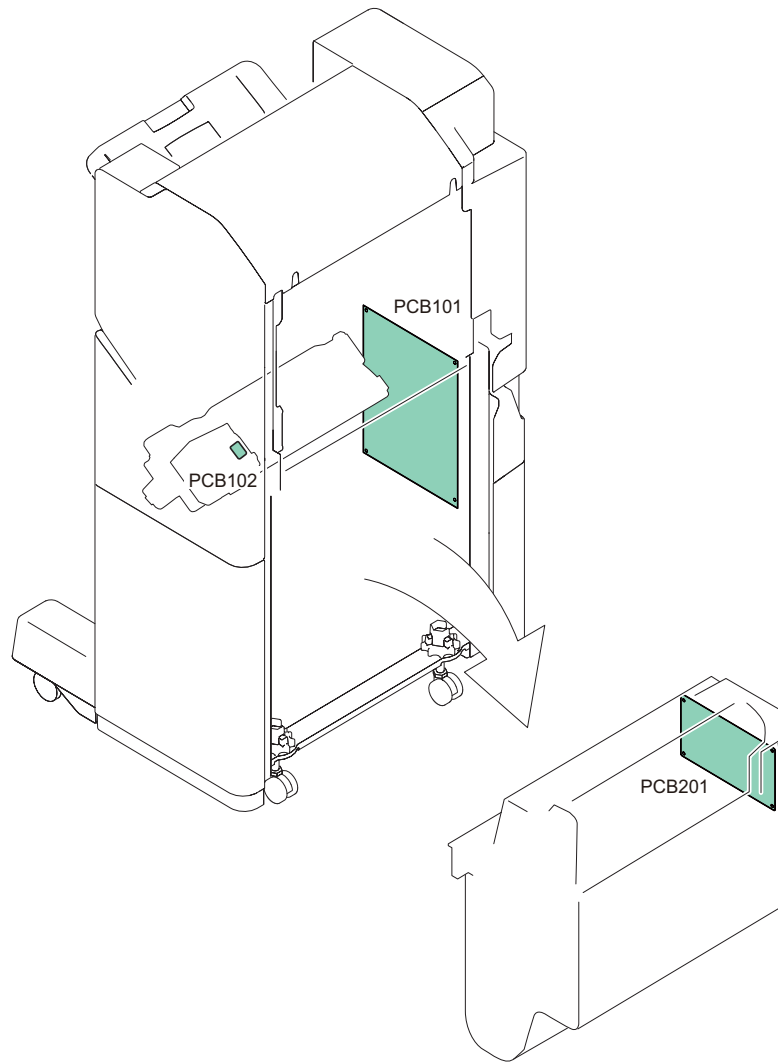
No.	Display item	Name
1	M201 FSMC	Saddle transport motor
2	M202 FSMGLE	Saddle switch lever drive motor
3	M203 FSMJ	Saddle alignment motor
4	M204 FSMF	Saddle folding motor
5	M205 FSMG	Saddle gripper motor
6	M206 FSMRS	Saddle rear edge stopper motor
7	M207 FSME	Saddle discharge motor
8	M208 FSMS	Saddle staple motor

D. Clutch



No.	Display item	Name
1	CL101 FNCEDCE	Escape transport drive switch clutch
2	CL102 FNCDRUS	Oscillation lower roller drive clutch
3	CL103 FNCDP	Paddle drive clutch

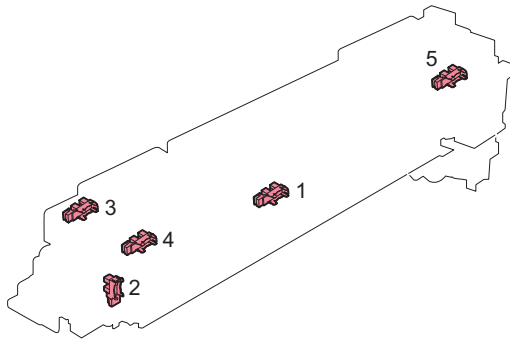
E. PWB



Display item	Name
PCB101	Finisher Controller PWB
PCB102	Stapler unit relay PWB
PCB103	Saddle Sticher Controller PWB

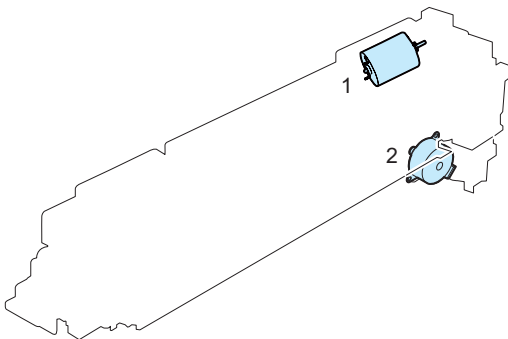
F. Punch unit

(1) Sensor



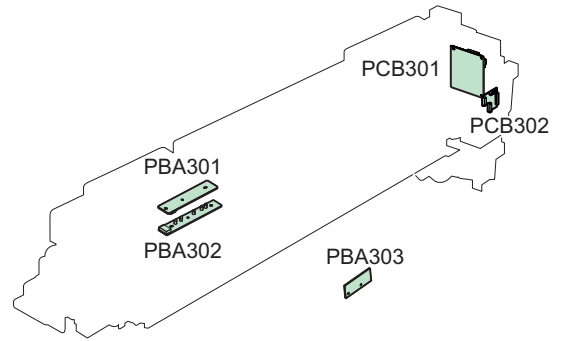
No.	Display item	Name	
1	PS301	-	Punch entrance sensor
2	PS302	FCHPR	Punch horizontal registration home position sensor
3	PS303	FCHPP	Punch hole home position sensor
4	PS304	-	Punch hole home position sensor
5	PS305	FCEP	Punch hole encoder sensor

(2) Motor



No.	Display item	Name	
1	M301	FCP	Punch hole motor
2	M302	FCMR	Punch horizontal registration motor

(3) PWB



No.	Display item	Name
PCB301	-	Punch controller PWB
PCB302	-	Punch connecting PWB
PBA301	FC1DR	Punch horizontal registration detection sensor 1
	FC2DR	Punch horizontal registration detection sensor 2
	FC3DR	Punch horizontal registration detection sensor 3
	FC4DR	Punch horizontal registration detection sensor 4
	FC5DR	Punch horizontal registration detection sensor 5
PBA302	-	Punch horizontal registration detection sensor
PBA303	FCDFWP	Punch dust full detection sensor

[3] ADJUSTMENTS AND SETTINGS

1. Basic adjustments

A. Adjustment, Operation and Inspection, and Functional Setting Items in Service Mode

In service mode, the finisher can perform the following adjustment, operation and inspection, and functional setting items.

■ Adjustment items SIM 3-10 3K Finisher / 3K Saddle Finisher

Item	Display	Content	Setting range	Default value
A	ALIGNMENT	Alignment position adjustment	50 - 150	100
B	FRONT ADJUST	Front alignment position adjustment	50 - 150	100
C	REAR ADJUST	Rear alignment position adjustment	50 - 150	100
D	ALIGNMENT CENTER	Alignment position center adjustment	50 - 150	100
E	STAPLE FRONT	Stapling position adjustment (one position in front)	70 - 130	100
F	STAPLE REAR	Stapling position adjustment (one position at the rear)	70 - 130	100
G	STAPLE BOTH	Stapling position adjustment (staple pitch of two positions binding)	70 - 130	100
H	MANUAL STAPLE POSITION	Manual stapling position adjustment	80 - 130	100
I	STAPLELESS STAPLE POSITION	Staple-free stapling position adjustment	80 - 115	100
J	BUFFER SHIFT(1-2)	Buffer paper shift quantity adjustment (1-2 sheets)	40 - 160	100
K	BUFFER SHIFT(2-3)	Buffer paper shift quantity adjustment (2-3 sheets)	40 - 160	100
L	PUNCH X	Punch hole position adjustment (X : Sub scanning direction)	80 - 120	100
M	PUNCH Y	Punch hole position adjustment (Y : Main scanning direction)	97 - 115	100
N	EJECTING ROLLER	Paper exit roller height adjustment	70 - 130	100
O	KNURLING ROLLER	Take-up knurling height adjustment	0 - 150	100
P	KNURLING ROLLER RETREAT	Take-up knurling evacuation height adjustment	0 - 200	100
Q	STAPLELESS STAPLE PRESSURE	Staple-free stapling welding pressure adjustment (Motor rotation)	85 - 115	100
R	DELIVERY SPEED(NON-SORT)	Paper exit speed adjustment (Non-sort)	90 - 110	100
S	DELIVERY SPEED(ESCAPE)	Paper exit speed adjustment (Escape)	90 - 110	100
T	EJECTING SPEED(SHIFT)	Bundle paper eject speed adjustment (Shift bundle ejection)	95 - 105	100
U	EJECTING SPEED(STAPLE)	Bundle paper eject speed adjustment (Staple bundle ejection)	95 - 105	100
V	MANUAL STAPLE TIME	Manual staple time out setting	1 - 5	2
W	MANUAL STAPLE PULLOUT TIME	Manual staple pull out time out setting	0 - 10	0
X	STITCHING UNIT *	Saddle folding position adjustment	80 - 120	100
Y	STITCHING UNIT THIN *	Saddle staple position adjustment (Thin paper)	80 - 120	100
Z	FOLDING UNIT *	Saddle folding position adjustment	80 - 120	100
AA	FOLDING UNIT THIN *	Saddle folding position adjustment (Thin paper)	80 - 120	100
AB	SADDLE ALIGNMENT *	Saddle alignment width adjustment	80 - 120	100
AC	STITCHING AND FOLDING *	Saddle staple folding position adjustment	30 - 70	50
AD	SADDLE FOLDING(A4-R/8.5×11R) *	Saddle folding position adjustment A4-R/8.5 x11R	30 - 70	50
AE	SADDLE FOLDING(B4/8.5×14) *	Saddle folding position adjustment B4/8.5 x 14	30 - 70	50
AF	SADDLE FOLDING(A3/11×17) *	Saddle folding position adjustment A3/11 x 17	30 - 70	50
AG	SADDLE FOLDING(12×18) *	Saddle folding position adjustment 12 x 18	30 - 70	50
AH	SADDLE FOLDING(CUSTOM) *	Saddle folding position adjustment Custom size	30 - 70	50

* This is displayed only when MX-FN31 is connected.

2. Adjustments when replacing parts

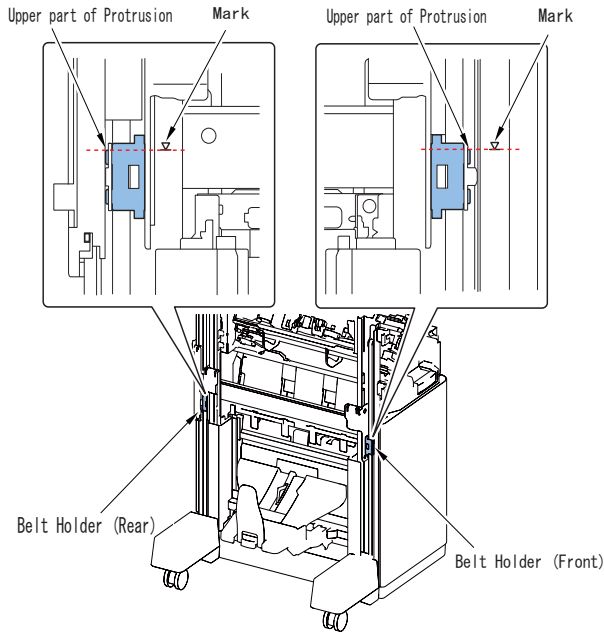
A. Phase Alignment When Installing the Stack Tray Drive Belt

If you remove or replace the stack tray drive belt, align the phase of the belt installation position.

1) Phase adjustment procedure

1. Align the top surface of the protrusions of the belt holder (front and rear) attached to the stack tray drive belt to the marks on the support plate, and fix them in place.

- Clearance: ± 2.5 mm or less

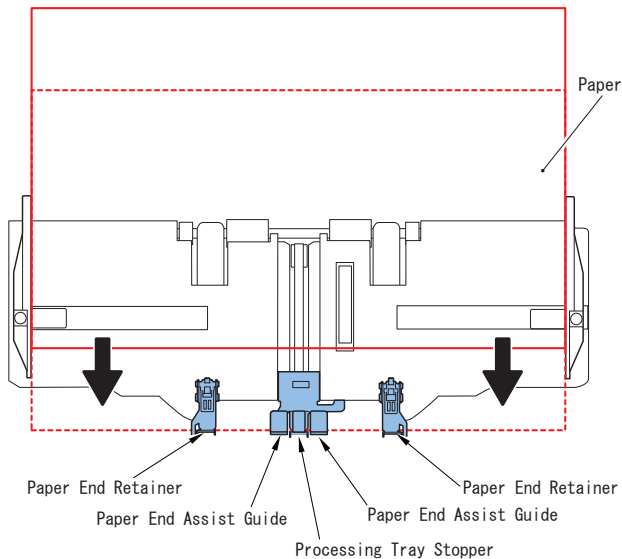


B. Alignment Plate Right-Angle Adjustment

When you remove or replace the alignment plate of the processing tray unit or when alignment errors occur, adjust the right-angle of the alignment plate.

1) Adjustment procedure

1. Place paper in the processing tray unit, and push it against the processing tray stopper and the paper end assist guide and the paper end retainer.

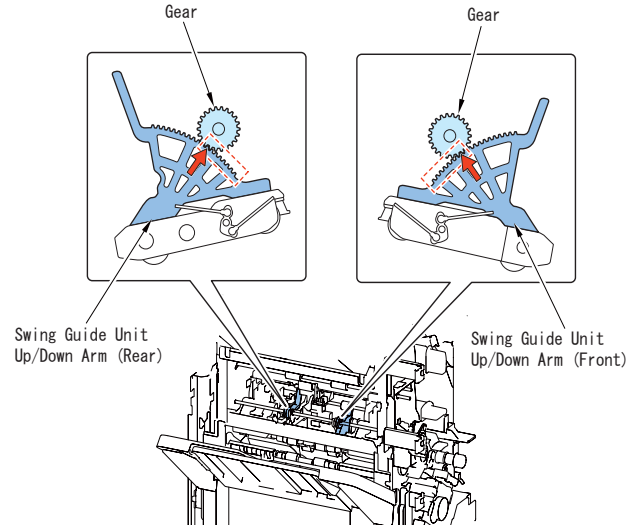


C. Phase Alignment When Installing the Swing Unit

If you remove or replace the swing unit, align the phase of the swing unit installation position, and fix them in place.

1) Phase adjustment procedure

1. Align the swing unit lifting arm (front and rear) to the gear phase, and fix them in place.



D. Adjusting the Stapler Unit Installation Position

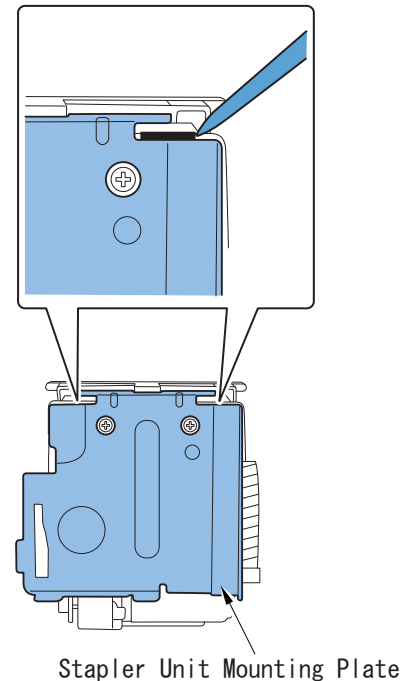
If the staple position from the edge of the paper needs to be adjusted such as when the stapler unit is replaced, perform the adjustment.

1) Adjustment procedure

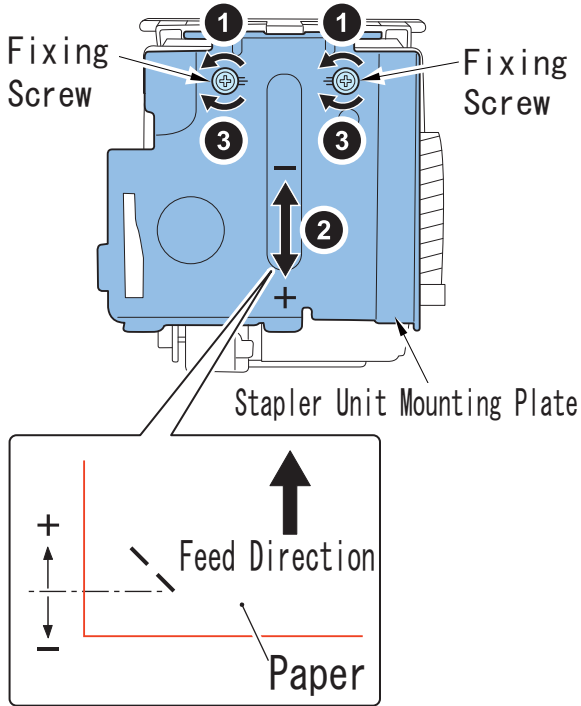
1. Mark the installation position of the stapler unit support plate.

NOTE:

If returning its installation position to the original position, fix the stapler unit support plate by matching to the mark.



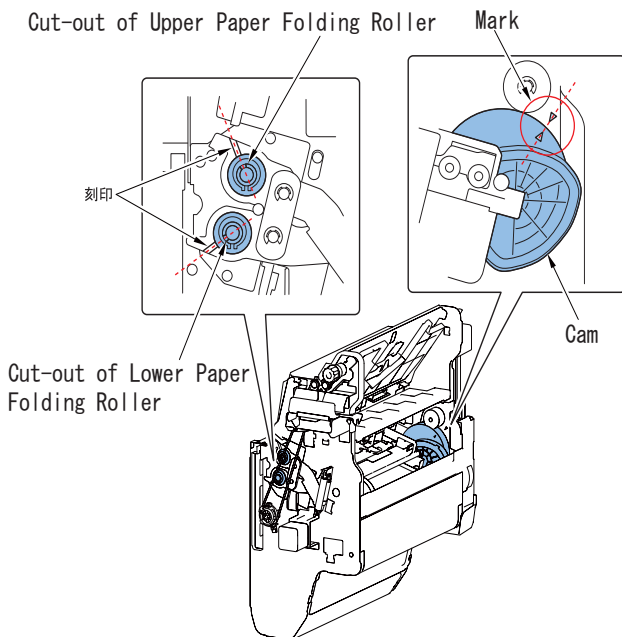
2. Loosen the two screws of the stapler unit support plate, adjust the stapler installation position by referring to the scale, and then tighten the screws.



E. Phase Alignment When Installing the Paper Folding Roller

If you remove or replace the paper folding roller, align the phase of the paper folding roller installation position.

- 1) Phase adjustment procedure
 1. With the shaft notches of the paper folding roller (upper and lower) aligned to the support plate grooves, align the cam mark to the support plate mark, and fix them in place.

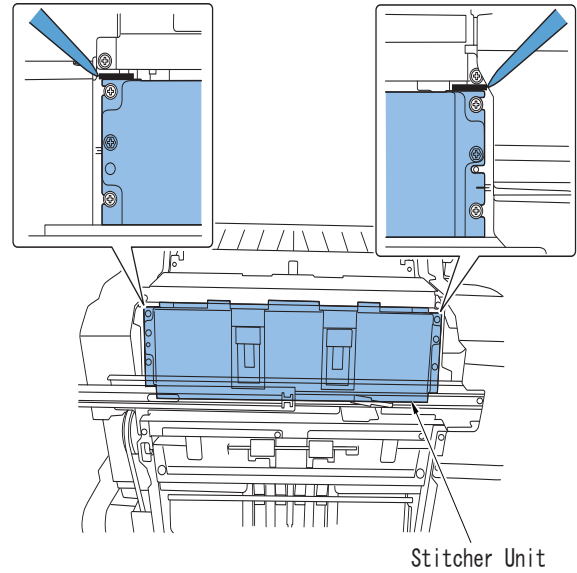


F. Adjusting the Stitcher Unit Installation Position

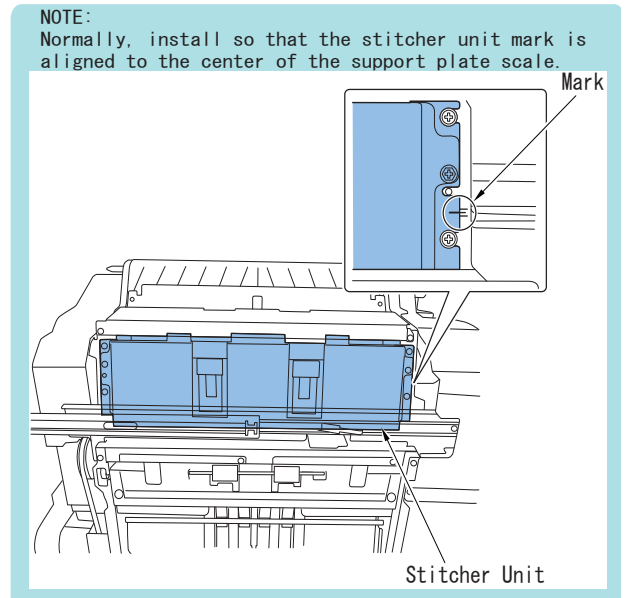
If you remove or replace the stitcher unit and the stitch positions of the front and rear sides become misaligned, perform adjustment.

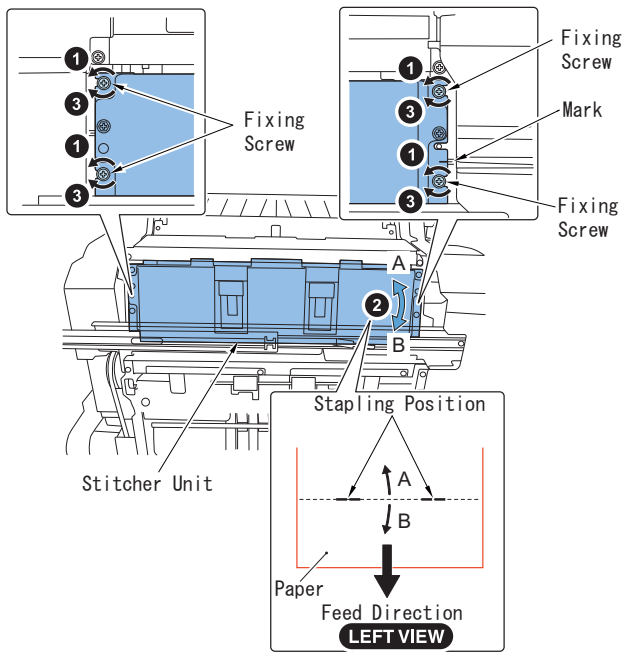
- 1) Adjustment procedure
 1. Mark the installation position of the stitcher unit.

NOTE:
If returning its installation position to the original position, fix the stitcher unit by matching to the mark.

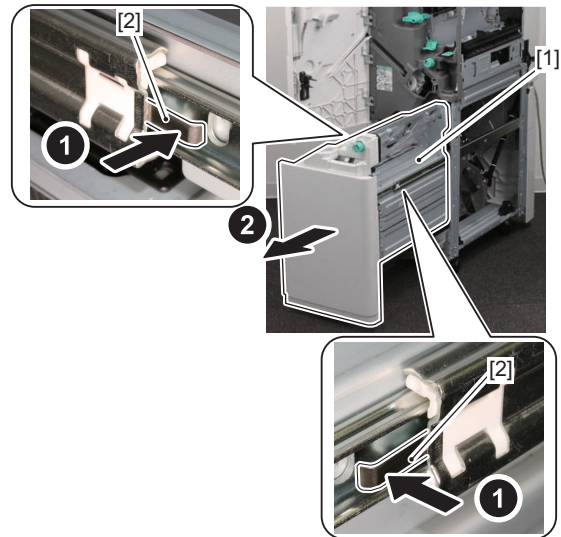


2. Loosen the four screws of the stitcher unit, adjust the installation position by referring to the scale, and then tighten the screws.

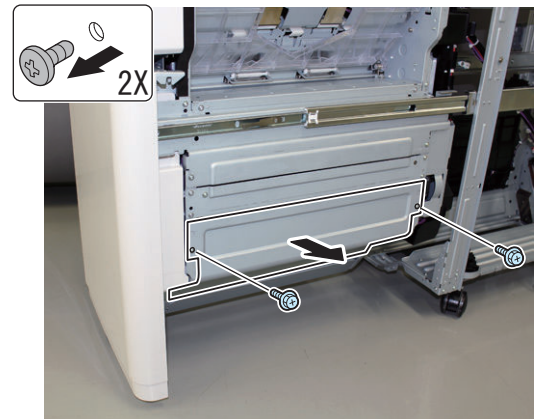




2. Push the plate spring (left/right) [2] and then pull the saddle stitcher unit [1] to the service position.



3. Remove the 2 screws, and then remove the lower right saddle cover.

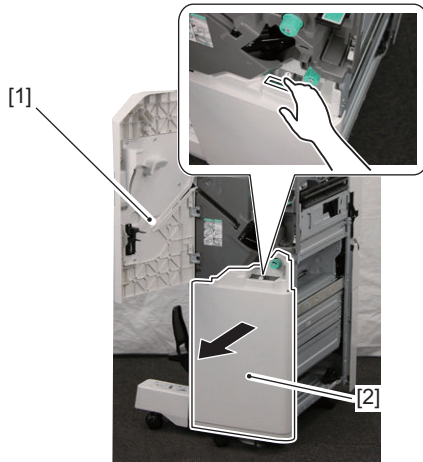


G. Adjusting the Saddle Paper End Stopper Installation Angle

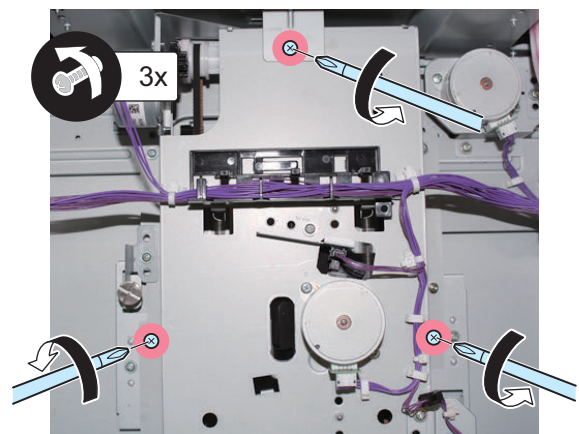
If the fold position of the paper stack delivered from the saddle stitcher unit is skewed, perform adjustment.

1) Adjustment procedure

1. Open the front cover [1], and then pull out the saddle stitcher unit [2] until it stops.



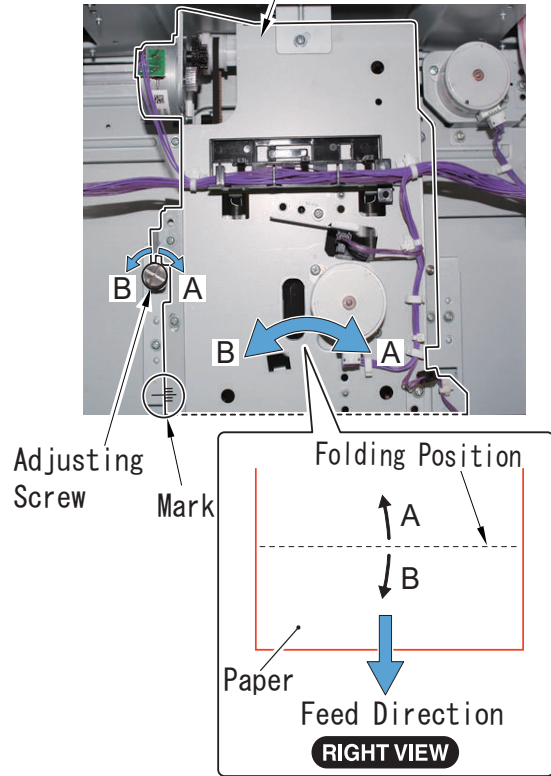
4. Loosen the 3 screws.



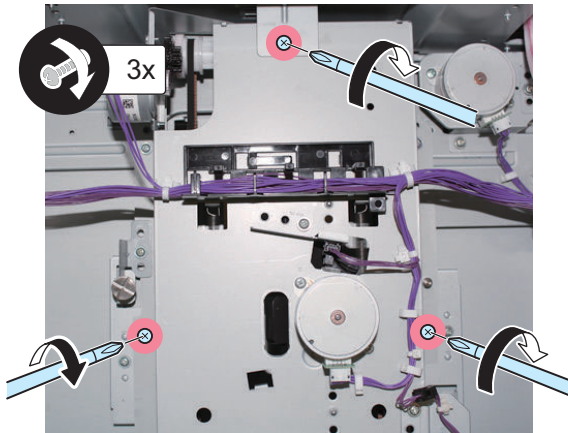
5. Turn the adjusting screw by referring the mark to adjust the saddle paper end stopper installation angle.

- The change amount of the adjusting screw: about 0.8 mm/turn

Mounting Unit of Saddle Paper End Stopper Unit

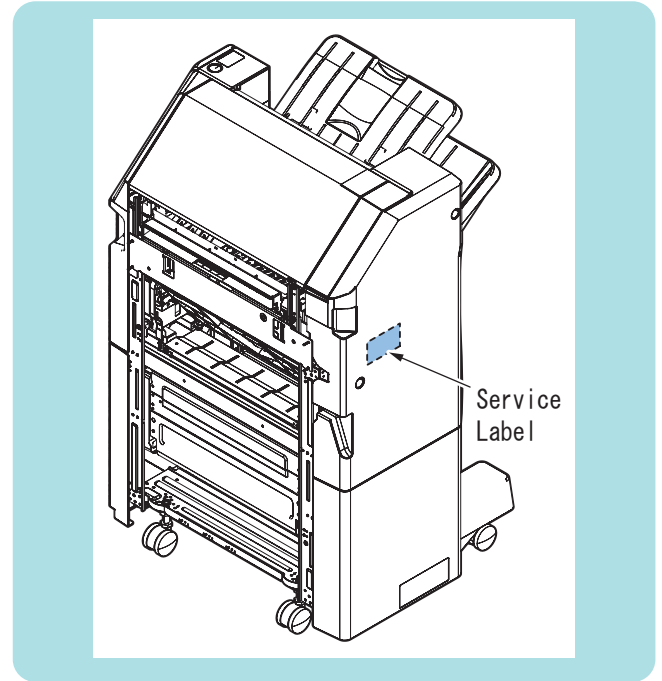


6. After finishing the adjustment, tighten the 3 screws that loosened in the step 4.



H. Handling Finisher Controller PWB Replacements

Enter the adjustment values and setting values listed on the service label.



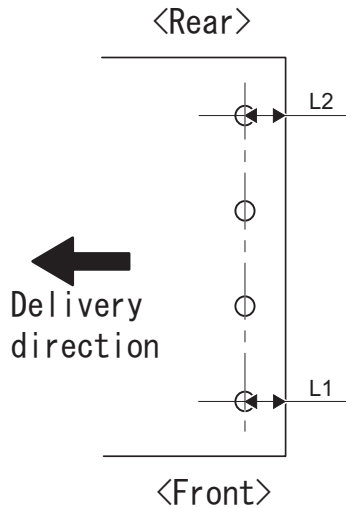
3. Punch module

A. Punch Skew Adjustment

When the punch hole position is skewed, adjust the punch hole position.

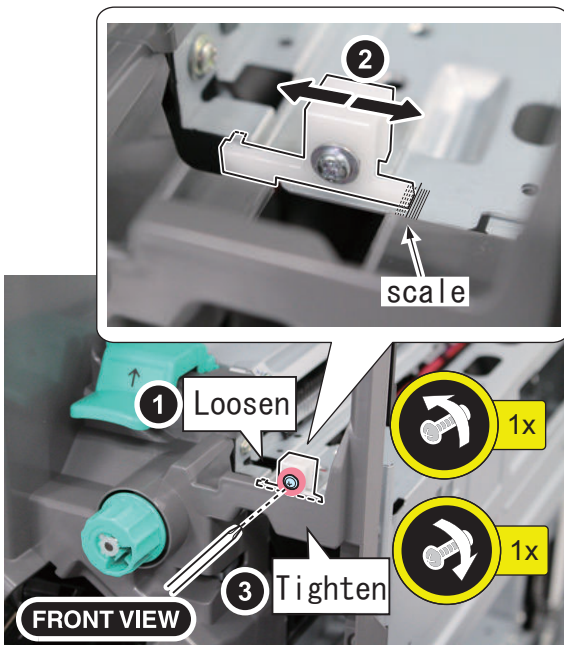
• Adjustment procedure

- 1) Make a print by the punch mode and check the skew amount of the punch hole position.



- 2) Open the front cover of the finisher and then lift the puncher unit. Loosen the screw fixing the guide and then adjust the position of the punch unit positioning guide by referring the scale. After finishing the adjustment, tighten the screw.

- When $L1 > L2$: Shift the guide to the right
- When $L1 < L2$: Shift the guide to the left



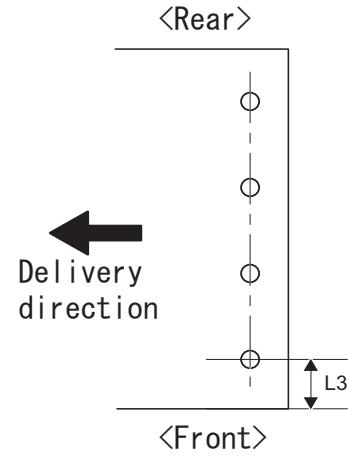
- 3) Lower the puncher unit and then close the front cover of the finisher.
- 4) Make a print by the punch mode and check whether the punch hole is skewed. When the punch hole position is skew, adjust by repeating from the step 2 again.

B. Punch Horizontal Registration Adjustment

When the horizontal registration position of the punch hole is not the standard, adjust the punch horizontal registration position.

• Adjustment procedure

- 1) Make a print by the punch mode and check the horizontal registration position of the punch hole.



<Standard>

• 2/3 Hole Puncher Unit

2 holes: $L3=73 \pm 1.5\text{mm}$ (LGL/LTRR)

3 holes: $L3=31.5 \pm 1.5\text{mm}$ (11"×17"/LTR) /

$40.5 \pm 1.5\text{mm}$ (A3/A4)

- 2) Enter the following service mode to adjust the horizontal registration position of the punch hole.

SIM 3-10 M: PUNCH Y Punch hole position adjustment (Y:Main scanning direction)

When the setting value is changed by 1, the punch position L3 shifts by 0.1mm.

+ : L3 becomes larger (The punch hole shifts toward rear.)

- : L3 becomes smaller (The punch hole shifts toward front)

- 3) Make a print by the punch mode and check the horizontal registration position of the punch hole.

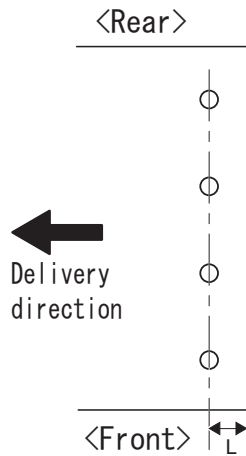
When the punch horizontal registration position is not the standard, adjust by repeating from the step 2 again.

C. Punch Feed Direction Position Adjustment

When the punch hole position in the feed direction is not the standard, adjust the punch feed direction position.

- Adjustment procedure

- 1) When the punch hole position in the feed direction is not the standard, adjust the punch feed direction position.



<Standard>

$L=12 \pm 1.5\text{mm}$

- 2) Enter the following service mode to adjust the feed direction position of the punch hole.

SIM 3-10 L: PUNCH X Punch hole position adjustment (X:Sub scanning direction)

When the setting value is changed by 1, the punch position L shifts by 0.1mm.

+ : L becomes larger (The punch hole shifts toward delivery direction.)

- : L becomes smaller (The punch hole shifts toward inlet direction.)

- 3) Make a print by the punch mode and check the feed direction position of the punch hole. When the punch feed direction position is not the standard, adjust by repeating from the step 2 again.

[4] MAINTENANCE

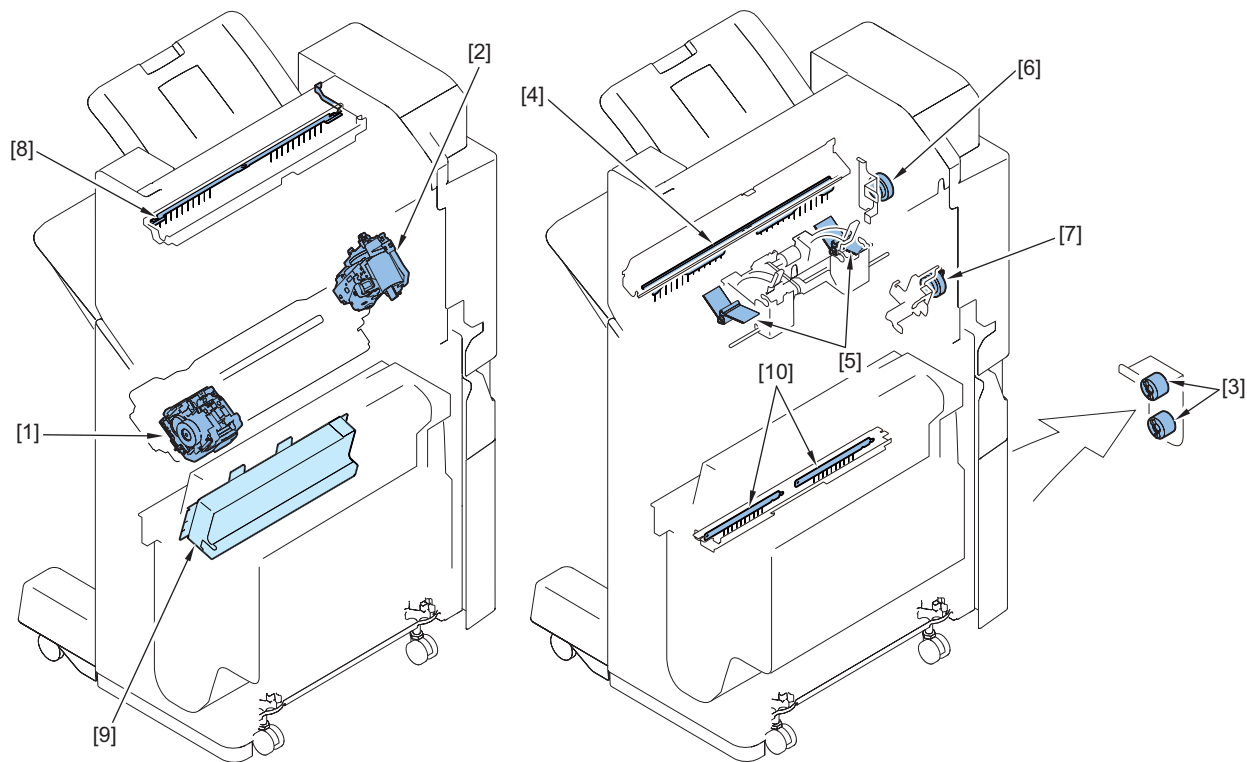
1. Maintenance list

■Periodically Replaced Parts

There are no parts that need to be periodically replaced on the finisher.

■Consumable Parts

Consumable Parts



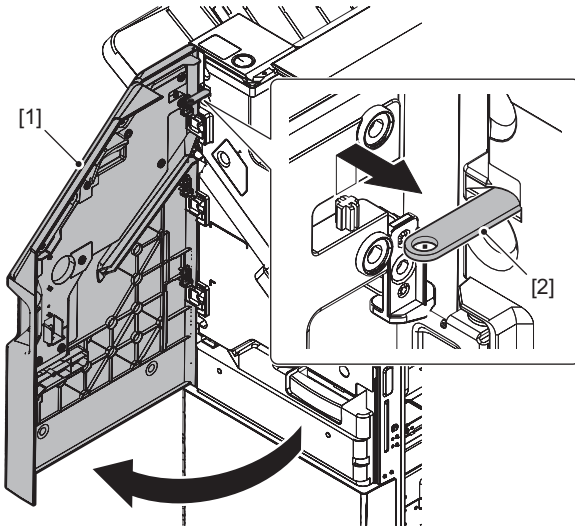
No.	Category	Part Name	Q'ty	Interval	
1	Finisher Unit	Staple Unit	1	500,000 times	
2		Staple-Free Binding Unit	1	20,000 times	
3		Stack Tray Torque Limiter	2	200,000 times	
4		Static Eliminator (Stack Tray Unit)	1	1,000,000 sheets	
5		Paddle Unit	4	1,000,000 times	
6		Oscillation lower roller drive clutch	1	1,000,000 times	CL102
7		Escape transport drive switch clutch	1	1,000,000 times	CL101
8		Static Eliminator (Escape Delivery Unit)	1	1,000,000 sheets	
9	Saddle Stitcher Unit	Stitcher Unit	1	100,000 times	
10		Static Eliminator (Saddle Delivery Unit)	2	1,000,000 sheets	

2. Disassembly and assembly

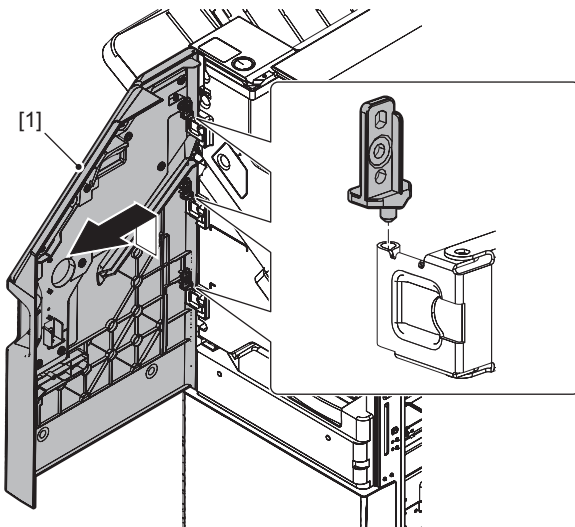
A. External Covers

(1) Removal of the front cover

- 1) Open the front cover [1], and remove the link [2].

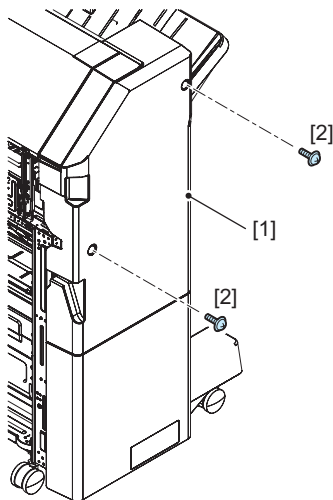


- 2) Remove the front cover [1].

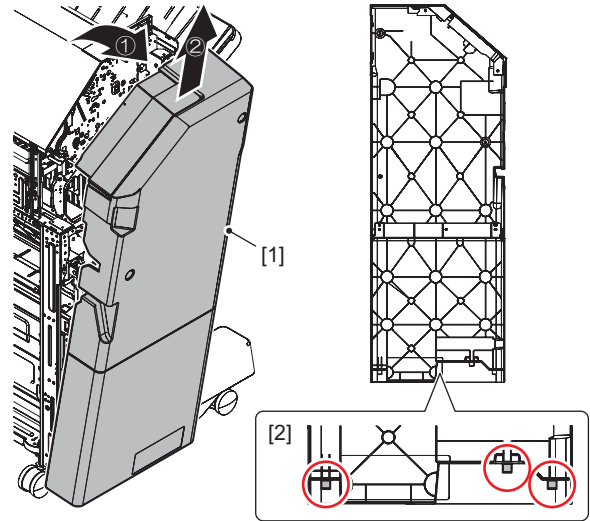


(2) Removing the Rear Cover

- 1) Remove the two screws [2].

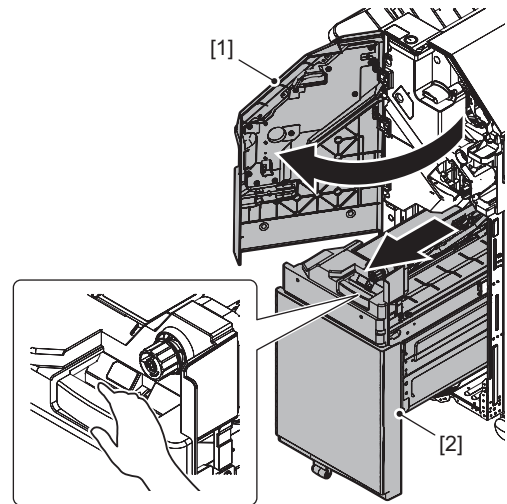


- 2) Lift the rear cover [1], remove the hook [2] and remove from the main unit.

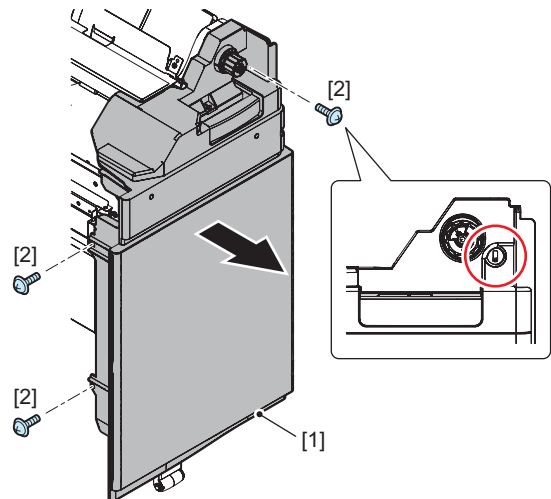


(3) Removal of the front lower cover (FN 31)

- 1) Open the front cover [1] and pull out the saddle unit [2].

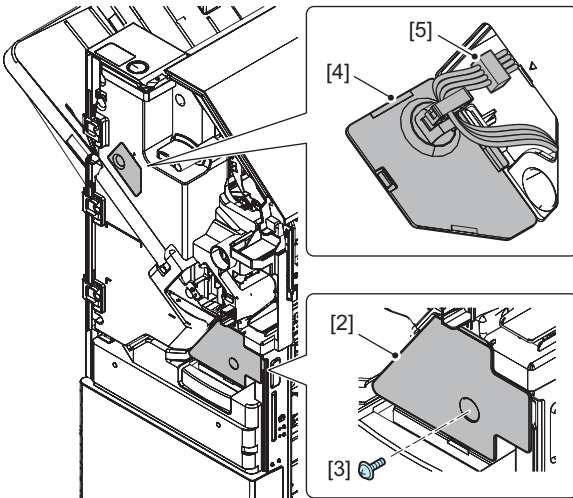


- 2) Remove screws [2] and remove the front lower cover [1].

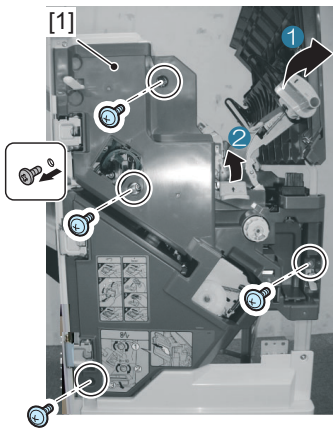


(4) Removal of the front inside cover

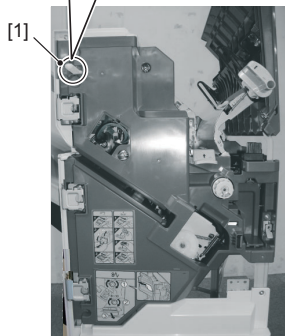
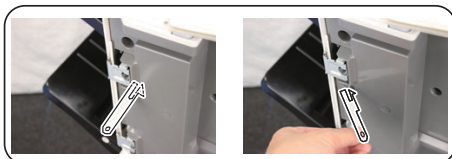
- 1) Remove the front cover.
- 2) Remove a screw [3] and remove covers [2].
Note: This step is required only for MX-FN30.
- 3) Remove a plate [4] and remove the connector [5].



- 4) Move the guides ① and ② .
Remove four screws and remove front inside cover [1].



Note: The link [1]. can be removed easily. Make sure it won't fall off.

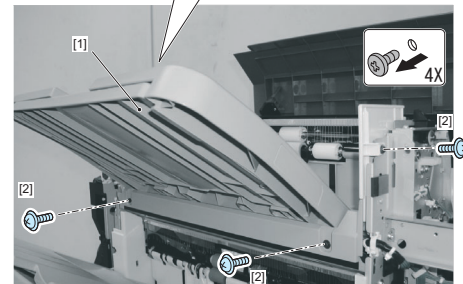
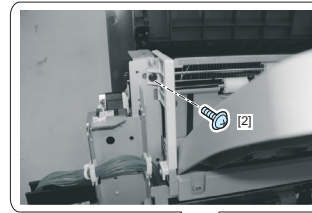


Note: Remove the punch module if installed.

B. Major units

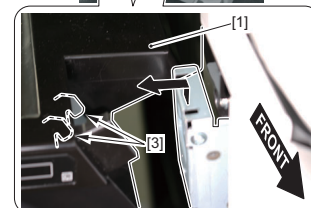
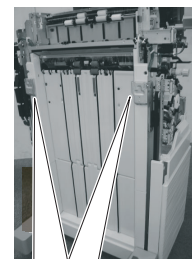
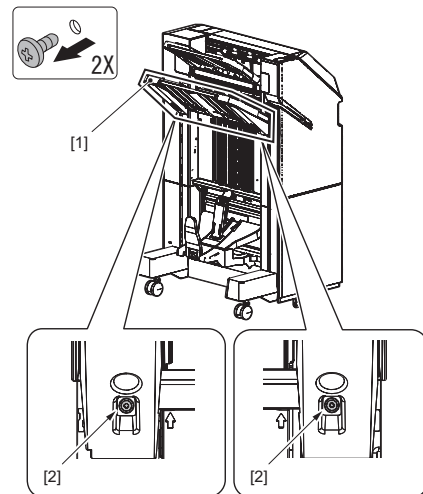
(1) Removal of the escape tray

- 1) Remove the front cover.
- 2) Remove the front inside cover.
- 3) Remove the rear cover.
- 4) Remove the escape tray [1].
Remove four screws and remove the escape tray [1].



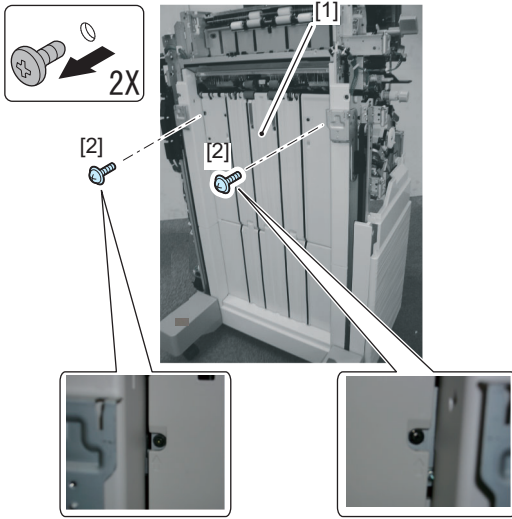
(2) Removal of the height tray

- 1) Remove two screws [2] and remove the height tray [1].
• Hooks [3] x4



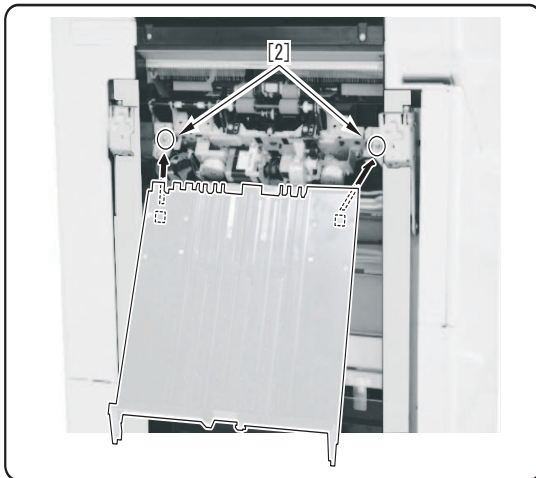
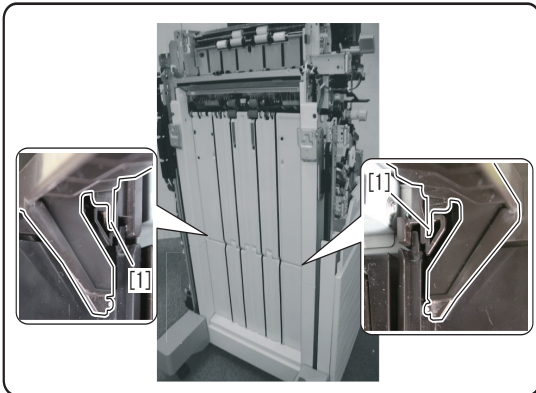
(3) Removal of the grate-shaped lower guide

- 1) Remove the height tray.
- 2) Remove two screws [2] and remove the grate-shaped lower guide [1].



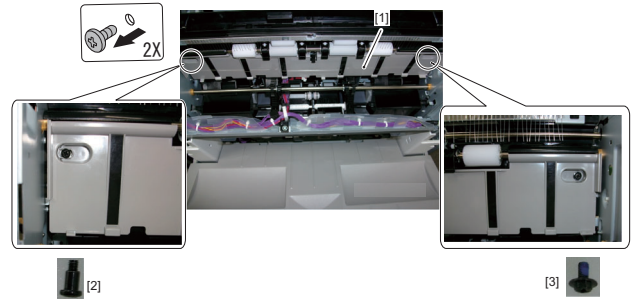
CAUTION:

Hook on the pawls [1] and hook on the hole to the shoulder screw as shown in the photo during the assembly.

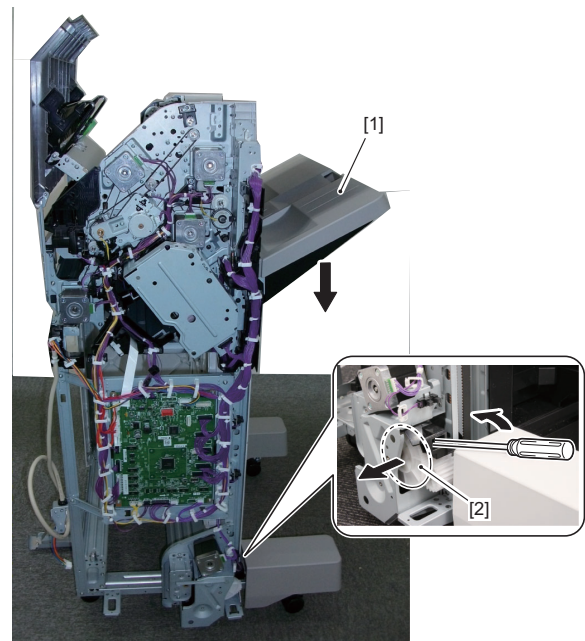


(4) Removal of the swing unit

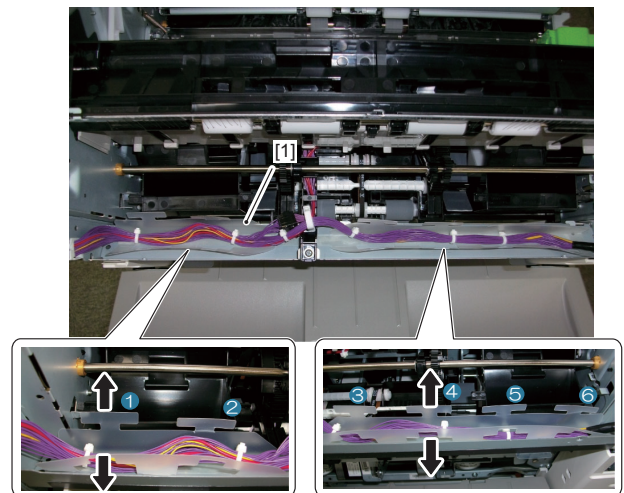
- 1) Remove the front cover.
- 2) Remove the front inside cover.
- 3) Remove the rear cover.
- 4) Remove the escape tray [1].
- 5) Remove the grate-shaped guide [1].
 - Two screws [2]: Shoulder screw [2] and TP screw



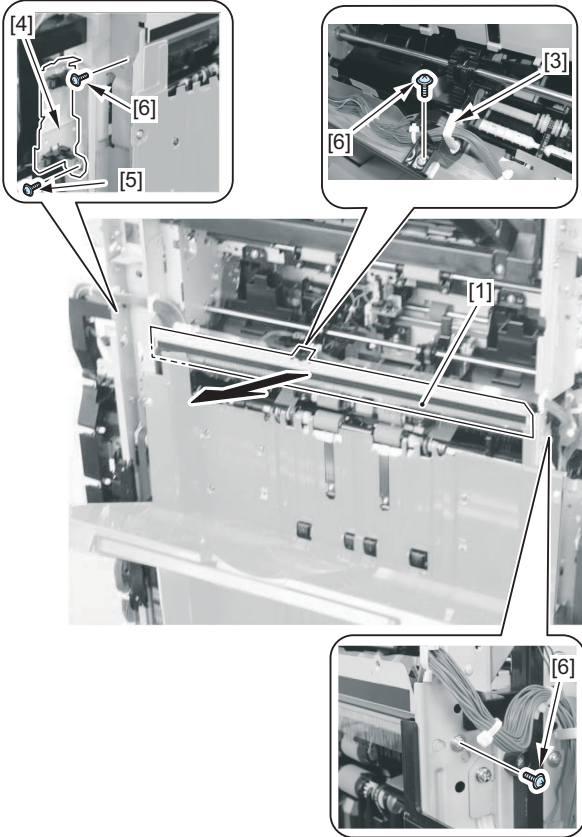
- 6) Move a gear and lower the height tray by 10 cm.



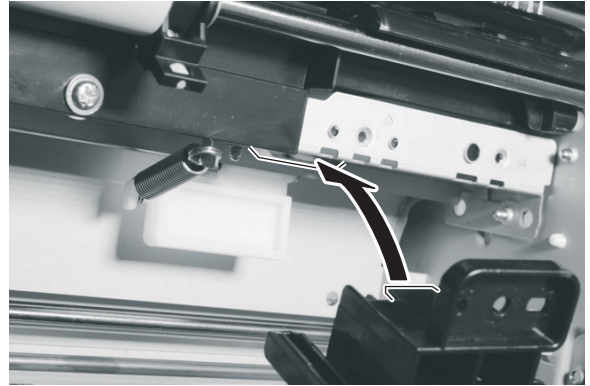
- 7) Loosen six mylars [1] which secure harnesses.



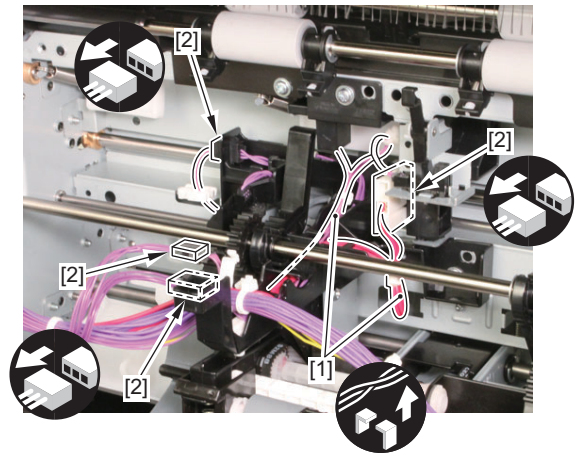
- 8) Remove the harness from the wire saddle [3]. Remove a screw [5] and remove the Center support plate [4]. Remove three screws [6] and remove the tray stay [1].



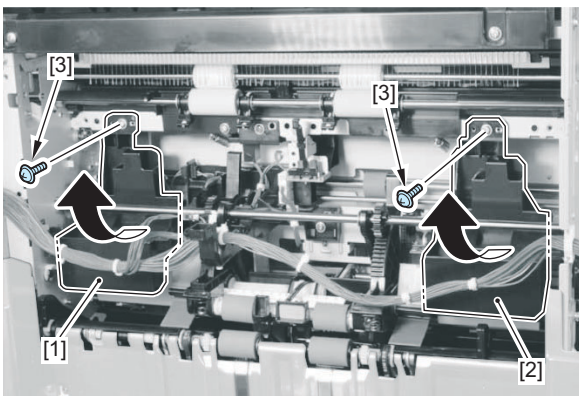
CAUTION:
Make sure to insert the guide into the opening securely for attachment.



- 10) Wire a batch of harnesses and remove four connectors [2].

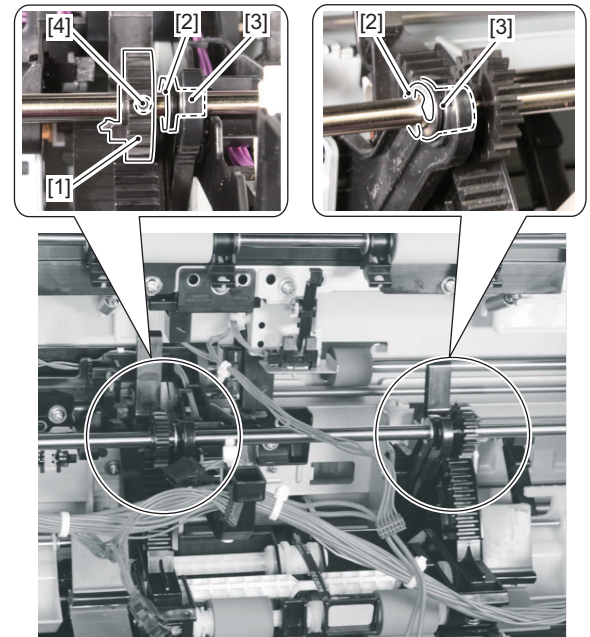
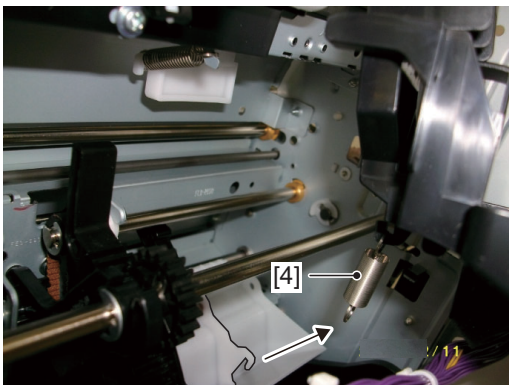


- 9) Remove the guides [1] and [2].
• Screws [3]: One for each, Springs [4]: One for each

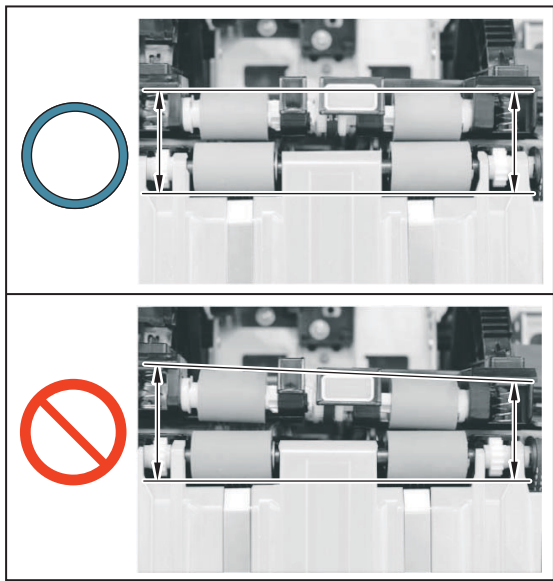


- 11) Remove the gear [1], E-ring [2], bearing [3], and parallel pin [4].

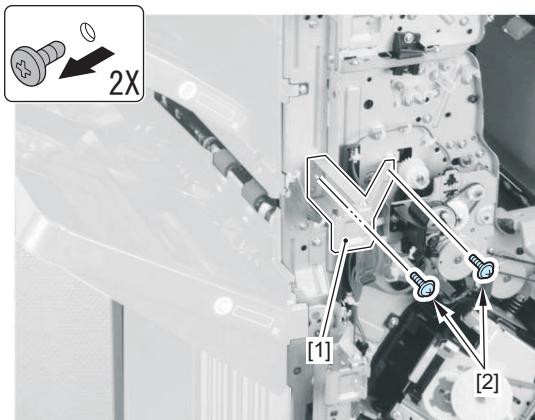
CAUTION:
Make sure to remove the spring [4].



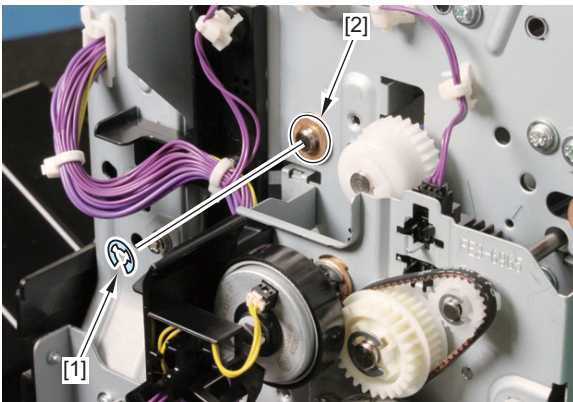
CAUTION:
Confirm the alignment (height on left and right side) of swing gear for assembly.



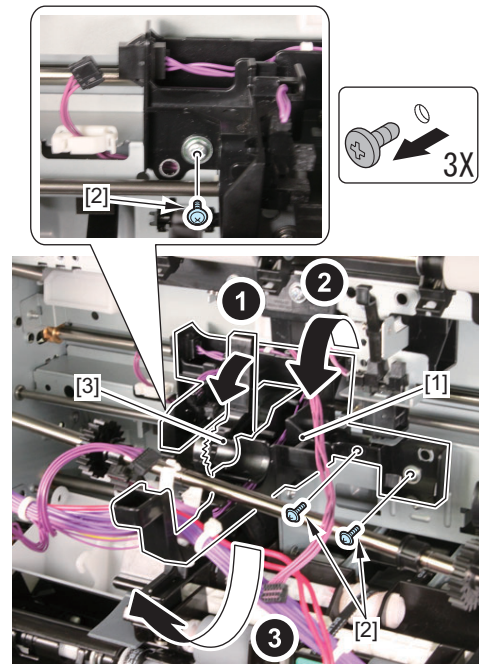
12) Remove two screws [2] and remove the front cover support plate [1].



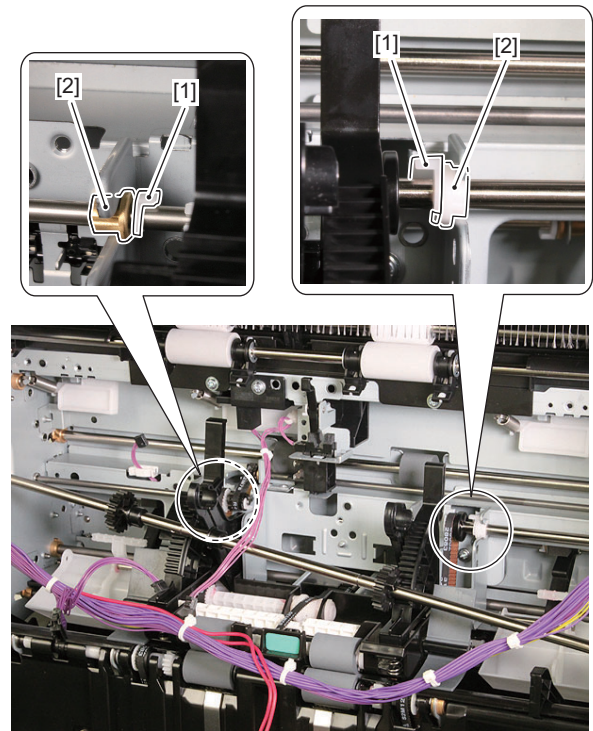
13) Remove the E-ring [1] and the bearing [2].



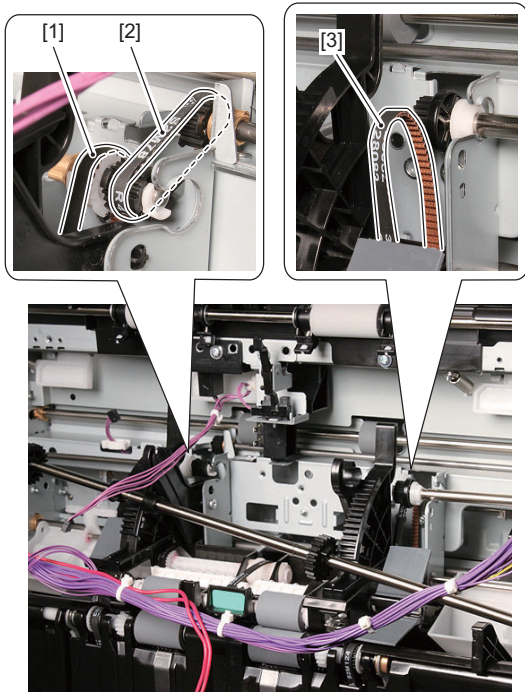
14) Move the pressure rack [3] and remove the cable guide [1]. Screw [2] x3



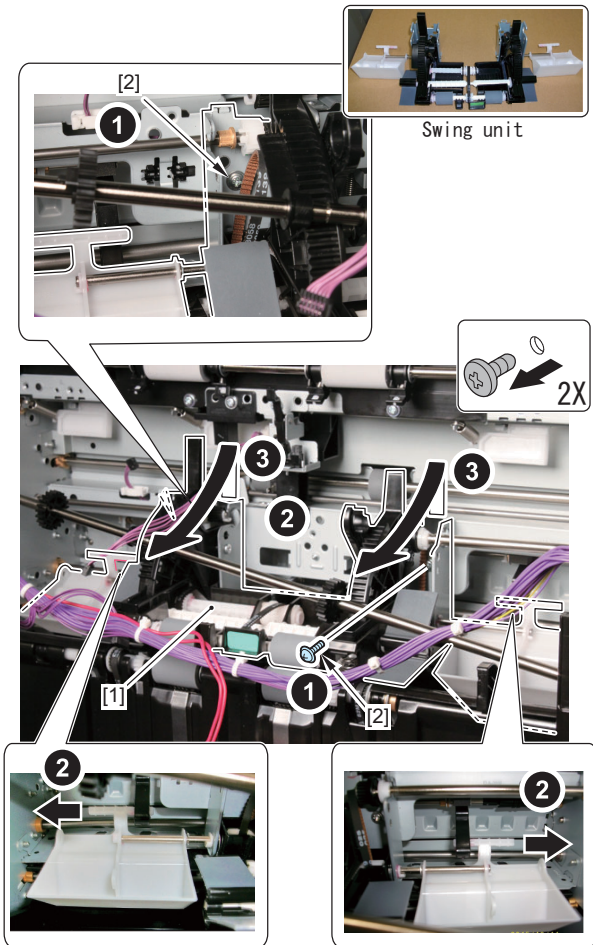
15) Remove the ring [1] and the bearing [2].



16) Remove belts [1], [2], and [3].



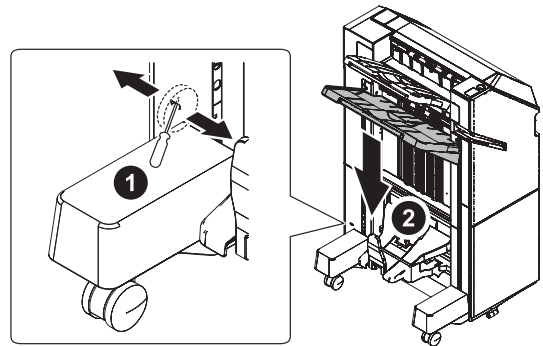
17) Remove the swing unit as shown in the steps ①, ② and ③ below.



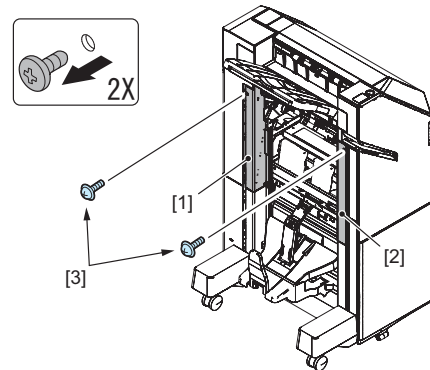
CAUTION:
Adjust the height on left and right side for assembly.

(5) Removal of the processing tray

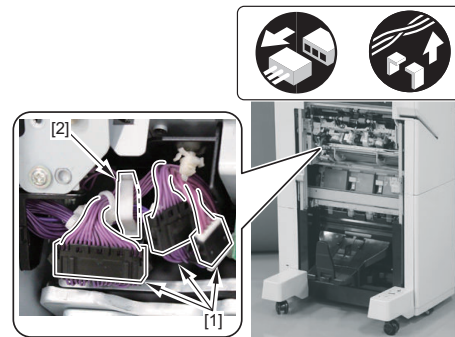
1) Move the gear and lower the height tray.



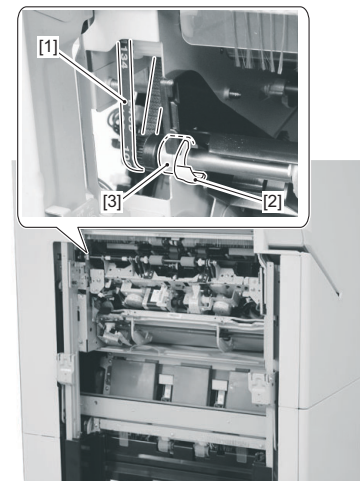
- 2) Remove the height tray.
- 3) Remove the grate-shaped lower guide.
- 4) Remove the side cover [1] and [2].
Screws [3]: One for each



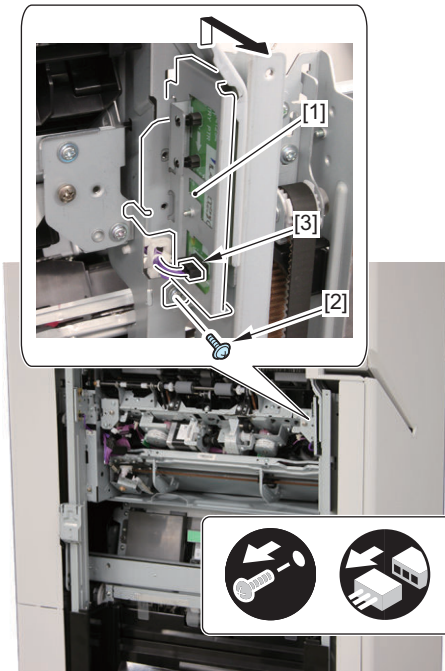
5) Remove the connector [1] and remove the harnesses out of the wire clamp [2].



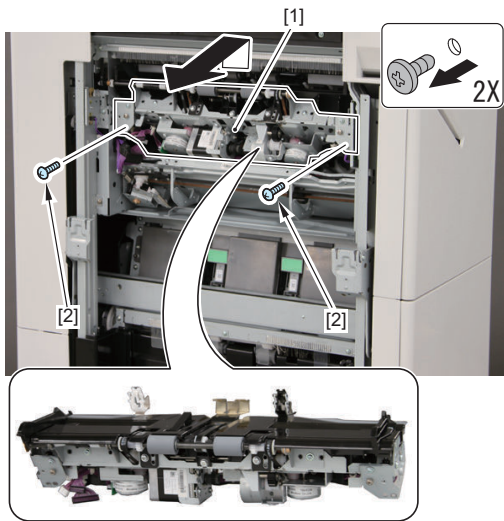
6) Remove the belt [1], ring [2] and the bearing [3].



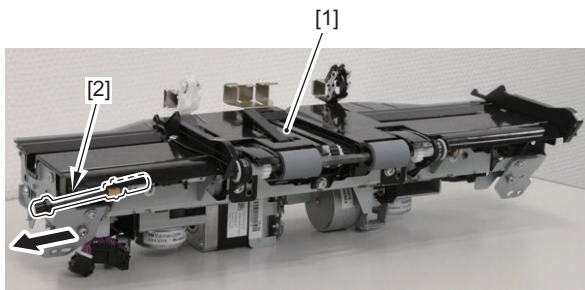
- 7) Remove the area sensor unit [1].
Screw [2] x1, Connector [3]: One for each



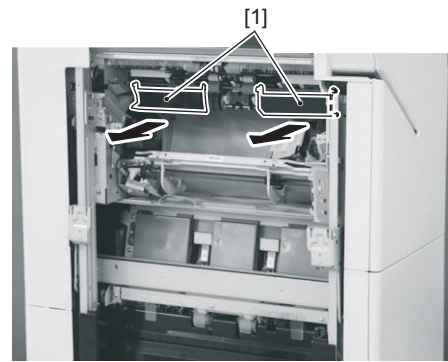
- 8) Remove the processing tray [1]. Screw [2] x2



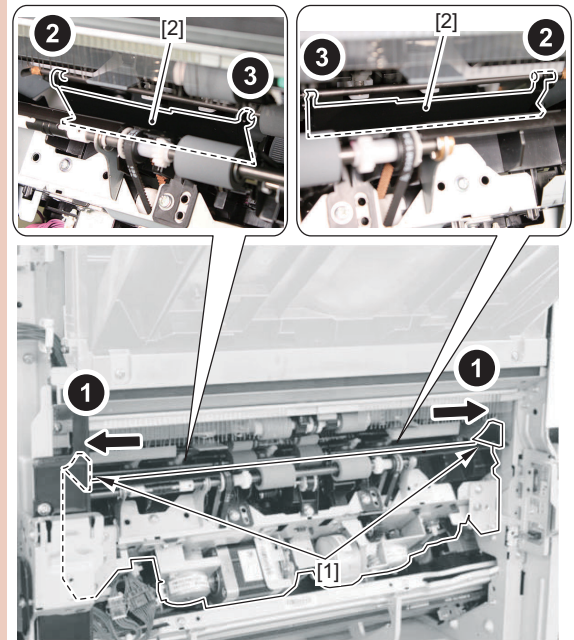
CAUTION:
When replacing the processing tray, make sure to remove the coupling As [2] from the removed tray [1] and attach to new processing tray.



- 9) Remove the paper guide [1] and remove the harnesses out of the wire clamp [2].

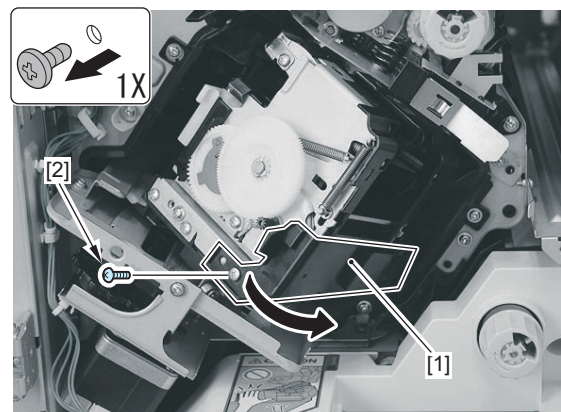


CAUTION:
When attaching the paper guide [2], attach processing tray before paper guide. Otherwise, the paper guide interfere with the processing tray that the processing tray cannot be attached.
Widen the alignment plate [1] for attachment of the paper guide [2].

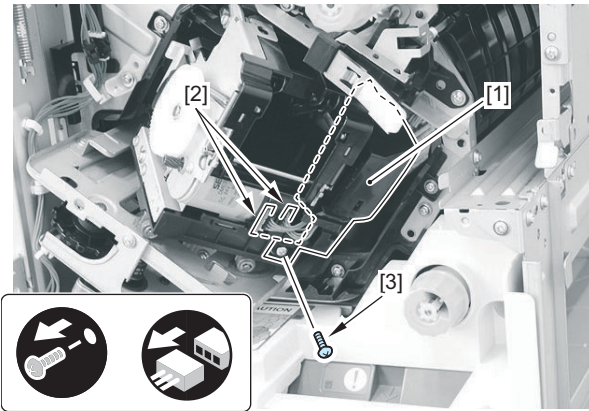


(6) Removal of the stapler unit

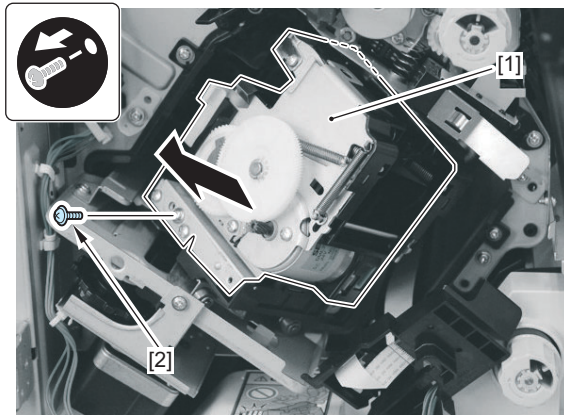
- 1) Remove the front cover.
- 2) Remove the front inside cover.
- 3) Remove the lower cover [1]. Screw [2] x1



- 4) Remove the flexible cover.
Screw [3] x1, Connector [2] x2

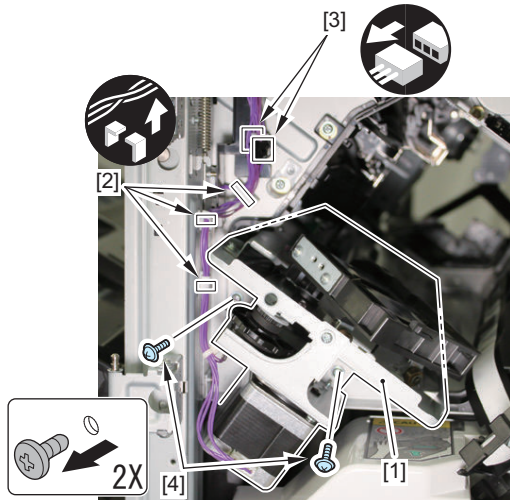


- 5) Remove the stapler unit [1].

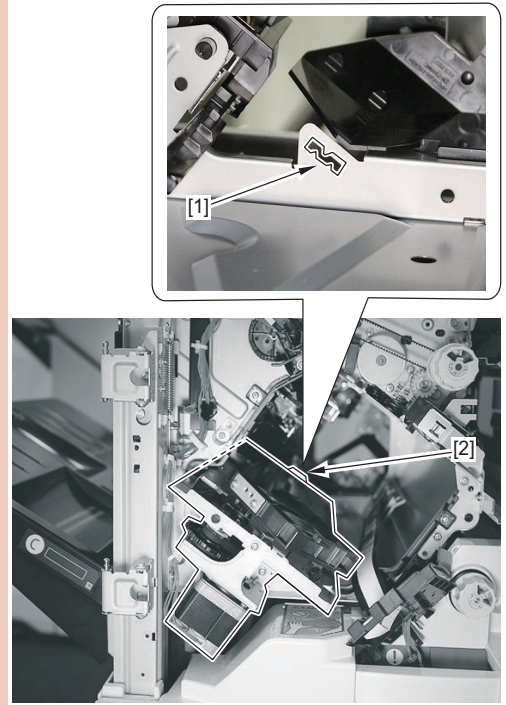


(7) Removal of the staple drive unit

- 1) Remove the stapler unit.
2) Remove staple drive unit.
Wire saddle [2] x3, Connector [3] x2, Screw [4] x2

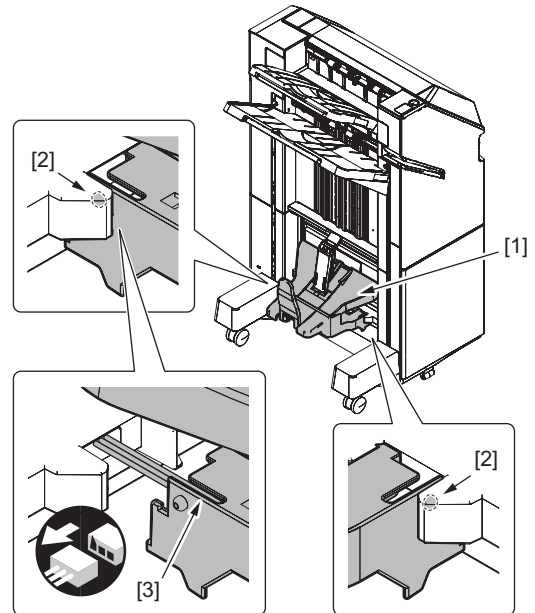


CAUTION:
Make sure to insert the protruding portion [2] into the opening [1].



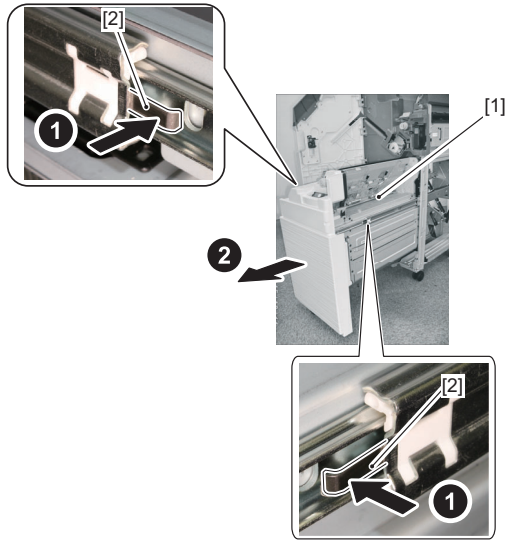
(8) Removal of the saddle exit paper tray

- 1) Remove the saddle exit paper tray [1].
Boss [2] x2, Connector [3] x1

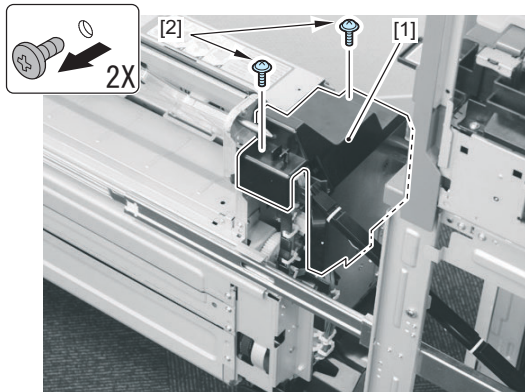


(9) Removal of the saddle unit

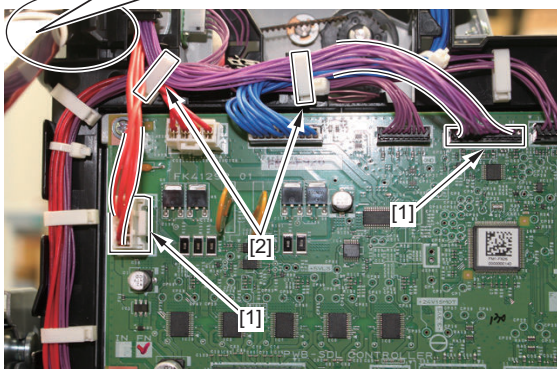
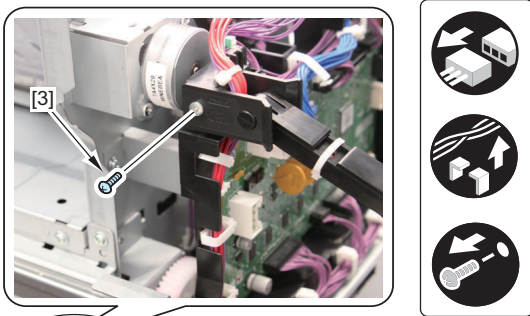
- 1) Remove the front lower cover.
- 2) Push the leaf spring [2] and pull the saddle unit [1] to service position.



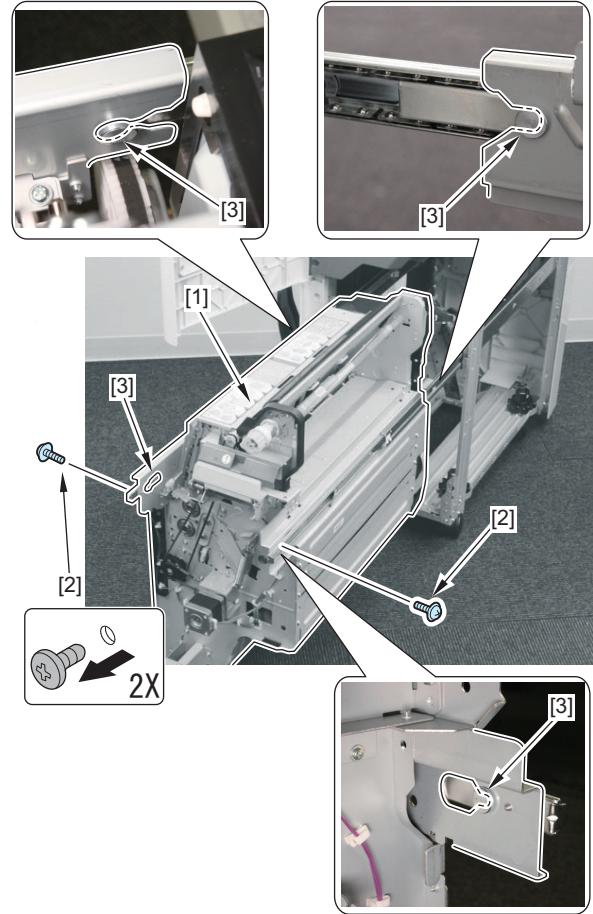
- 3) Remove the saddle PWB cover [1].



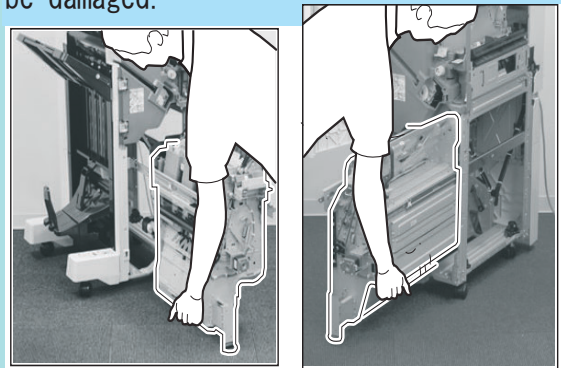
- 4) Remove the harness.
Connector [1] x2, Wire saddle [2] x2, Screw [3] x1



- 5) Remove the saddle unit [1].
Screw [2] x2, Hook [3] x4

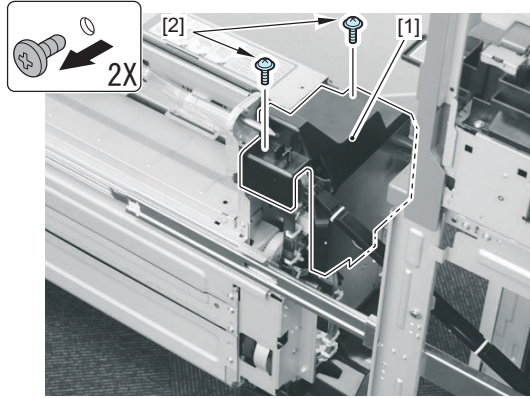


Note:
Hold the locations shown in the photos below while removing the saddle unit. Otherwise, the area you are holding may be damaged.

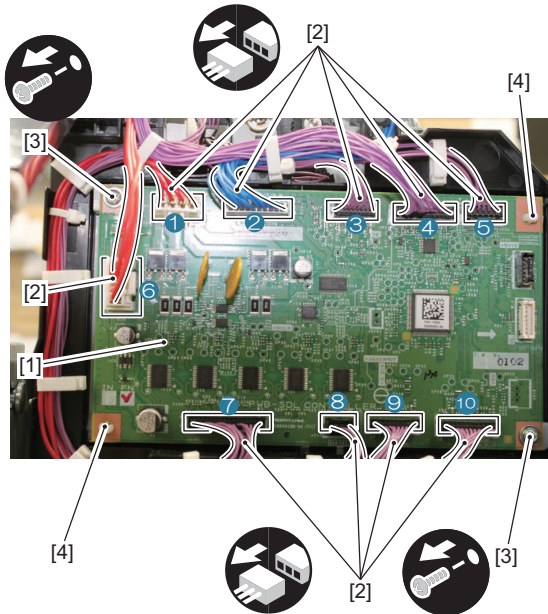


(10) Removal of the thrust unit

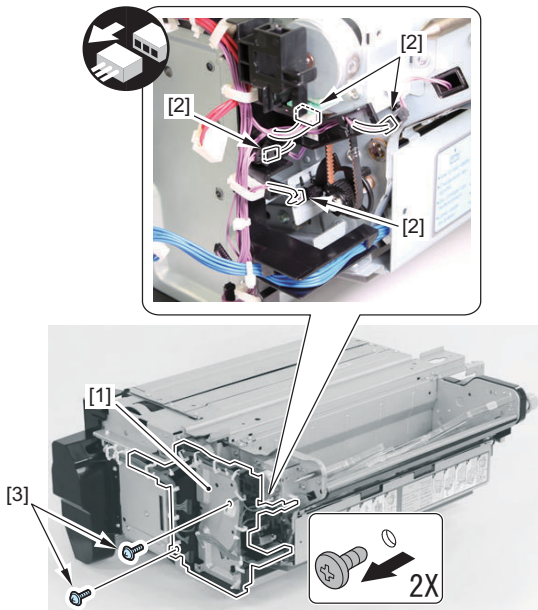
- 1) Remove the saddle unit.
- 2) Remove the saddle PWB cover [1]. Screw [2] x2



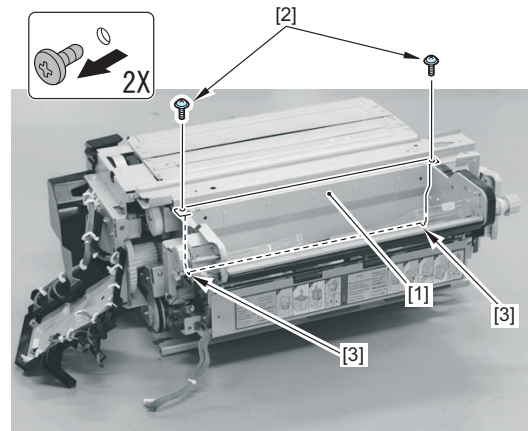
- 3) Remove the saddle PWB [1].
Connector [2] x10, Screw [3] x2, PWB support [4] x2



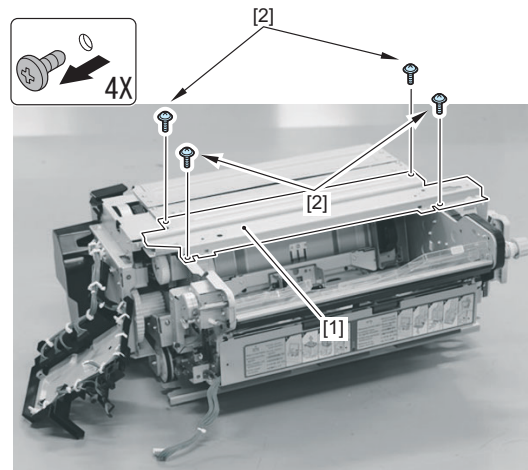
- 4) Remove the PWB holder [1].
Connectors [2] x4, Screw [3] x2



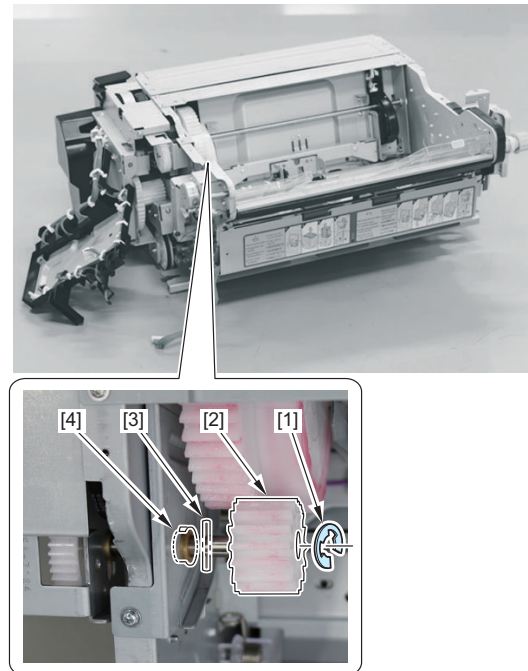
- 5) Remove the saddle upper guide [1].
Screw [2] x2, Opening [3] x2



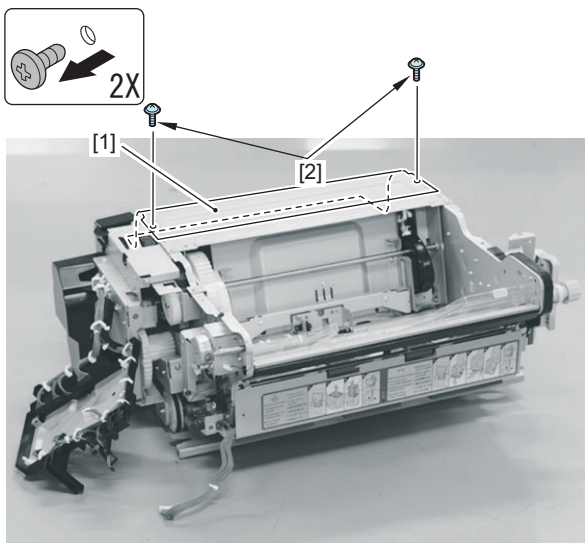
- 6) Remove the rail stay [1].
Screws [2] x4



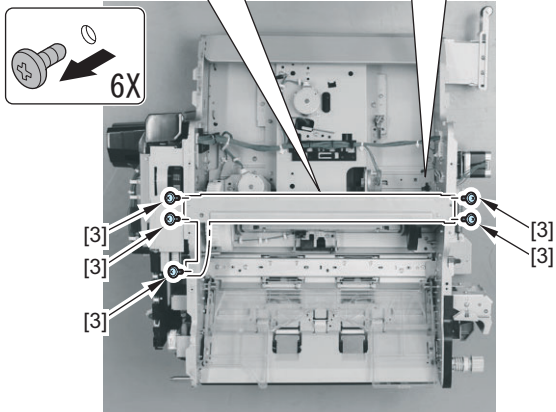
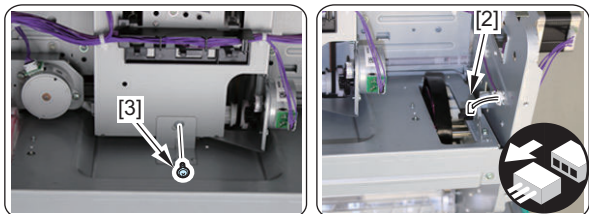
- 7) Remove the drive shaft As.
E-ring [1] x1, Gear [2] x1,
Parallel pin [3] x1, Bearing [4] x1



- 8) Remove the saddle lower guide [1].
Screw [2] x2



- 9) Remove the thrust unit [1].
Connector [2] x2, Screw [3] x6.



CAUTION:
Adjustment after replacing the thrust unit
Execute same position adjustment done after
attachment of paper folding roller.

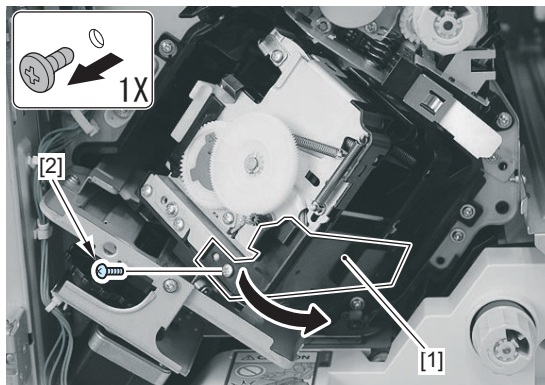
C. Periodic/consumable parts, cleaning positions

(1) Removal of the discharge brush (on escape exit paper section)

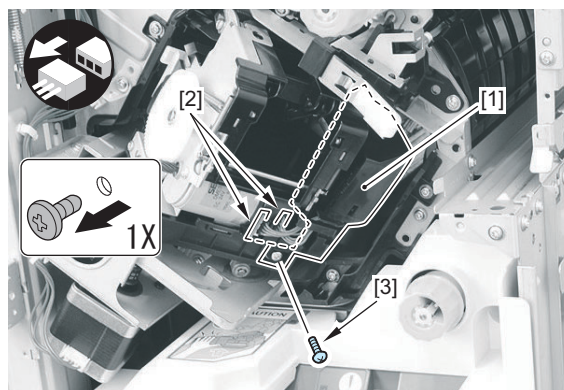
- 1) Remove the front cover.
- 2) Remove the front inside cover.
- 3) Remove the rear cover.
- 4) Remove the escape tray.
- 5) Remove the upper cover.
- 6) Remove the discharge brush [1]. Screw [2] x2

(2) Removal of the stapler unit

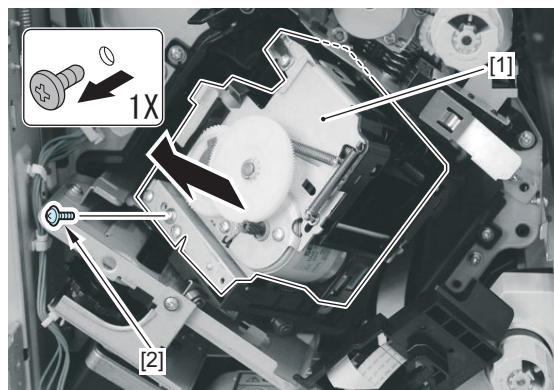
- 1) Remove the front cover.
- 2) Remove the front inside cover.
- 3) Remove the lower cover. Screw [2] x1



- 4) Remove the flexible cover [1].
Screw [3] x1, Connectors [2] x2

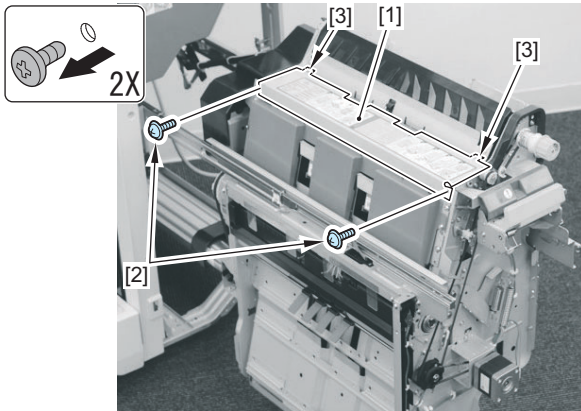


- 5) Remove the stapler unit [1].
Screw [2] x1



(3) Removal of the saddle sticher unit

- 1) Remove the front lower cover.
- 2) Pull out the saddle unit [2] to service position.
- 3) Remove the top panel [1].
Screw [2] x2, Opening [3] x2

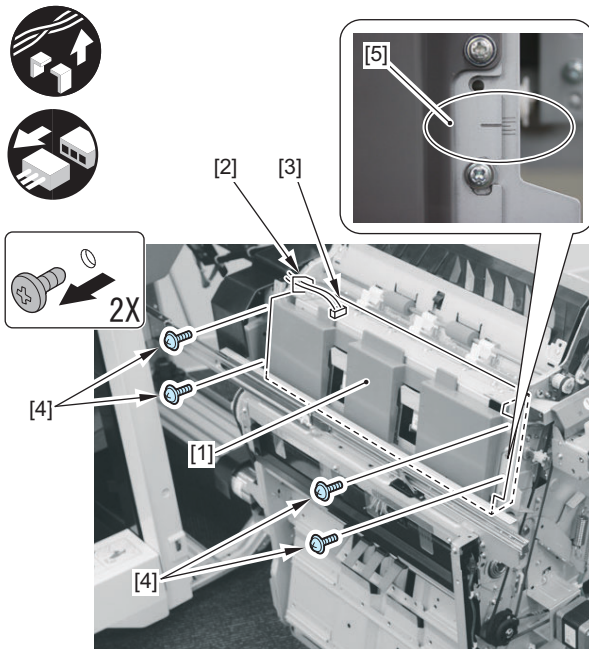


- 4) Remove the saddle sticher unit [1].

Note:

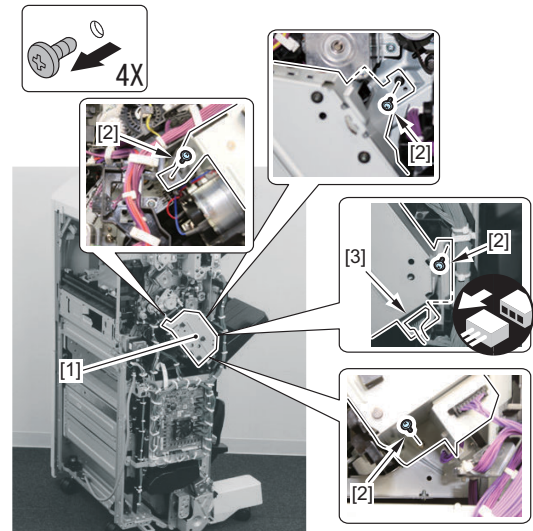
Confirm the scale marking [5] before removing the saddle sticher unit.

Wire saddle [2] x1, Connector [3] x1, Screw [4] x4

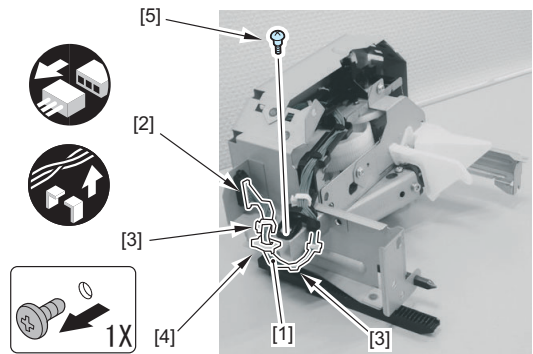


(4) Removal of the staple-free binding unit

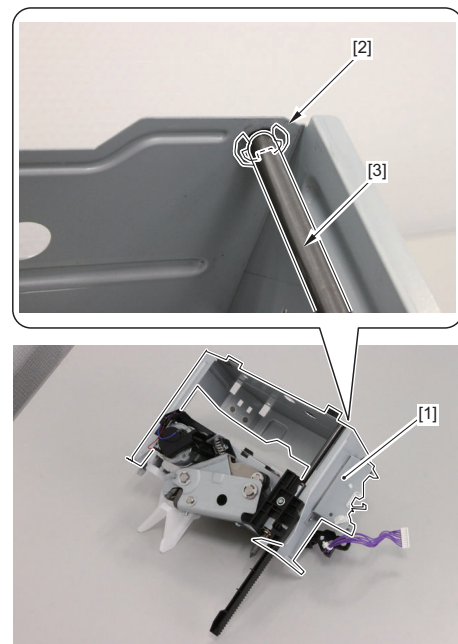
- 1) Remove the rear cover.
- 2) Remove the staple-free binding unit [1].
Screw [2] x4, Connector [3] x1.



- 3) Wire the harness [1].
Connector [2] x1, Wire saddle [3] x2,
Edge saddle [4] x1, Screw [5] x1.

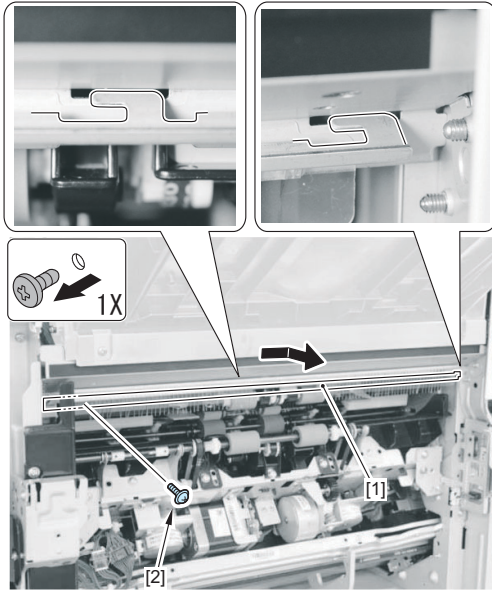


- 4) Remove the support plate on staple-free binding unit.
E-ring [2] x1, Shaft [3] x1.

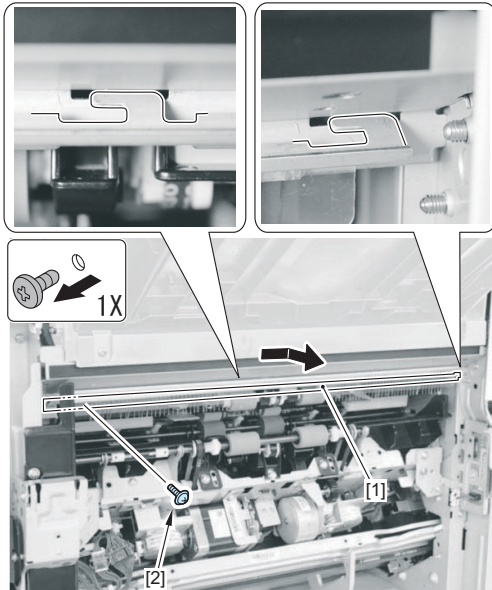


(5) Removal of the discharge brush (on height tray section)

- 1) Remove the height tray.
- 2) Remove the grate-shaped lower guide.
- 3) Remove the side cover (right) [1]. Screw [2] x1

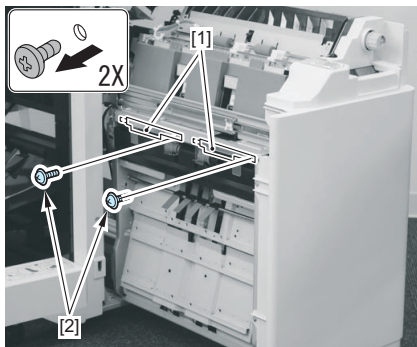


- 4) Remove the discharge brush [1]. Screw [2] x1



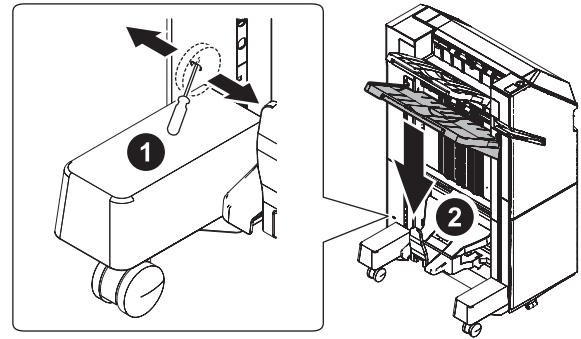
(6) Removal of the discharge brush (on saddle exit paper section)

- 1) Open front cover [1] and pull out the saddle unit [2].
- 2) Remove the discharge brush [1].

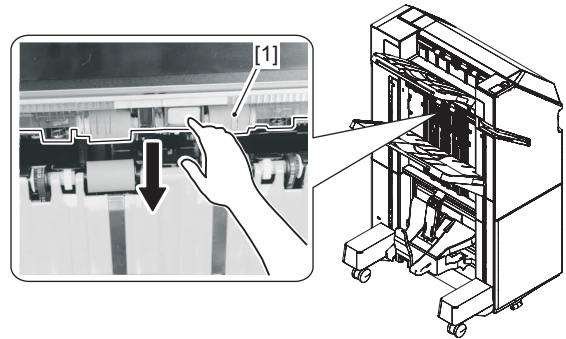


(7) Removal of the paddle unit

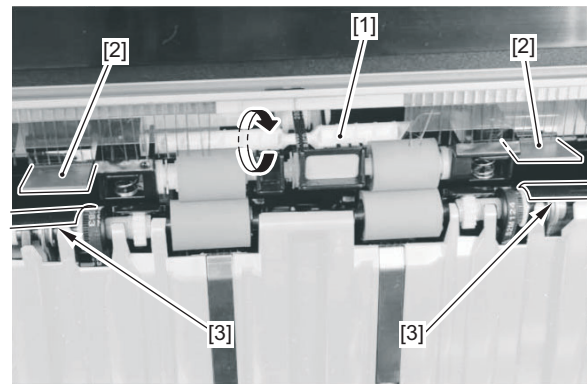
- 1) Lower the height tray.



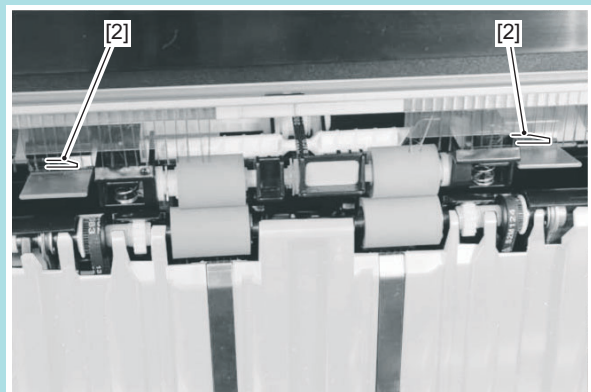
- 2) Lower the swing unit [1].



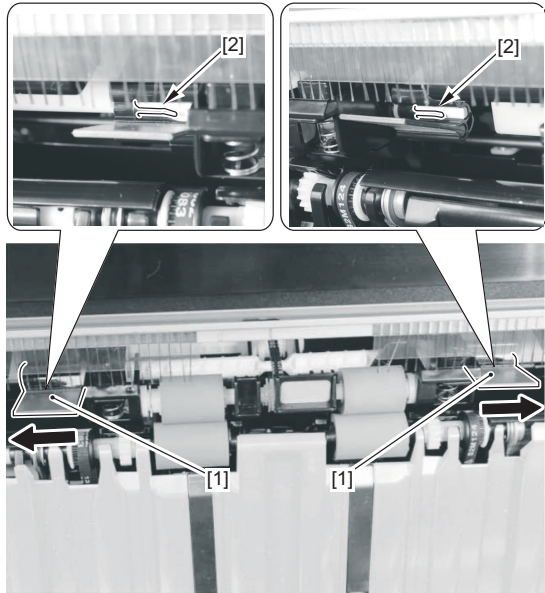
- 3) Rotate the paddle shaft [1] until the paddles [2] touches the guide [3].



Note:
Rotate the paddle shaft further by 180 degrees if the pawls [2] cannot be seen.

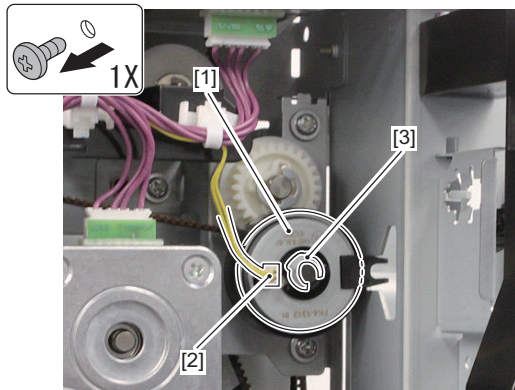


- 4) Remove the paddle [1].
Pawl [2]: One for each section



(8) Removal of the clutch on the delivery lower roller

- 1) Remove the rear cover.
- 2) Remove the clutch [1].
Connector [2] x1, Ring [3] x1.

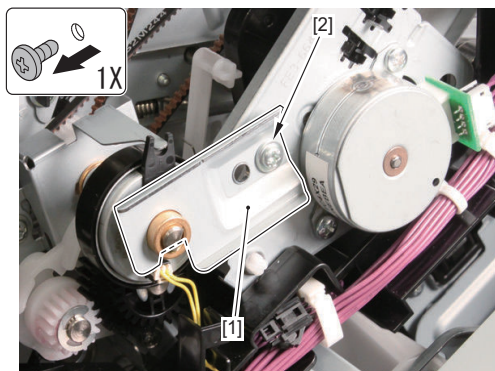


(9) Removal of the Escape transport drive switch clutch

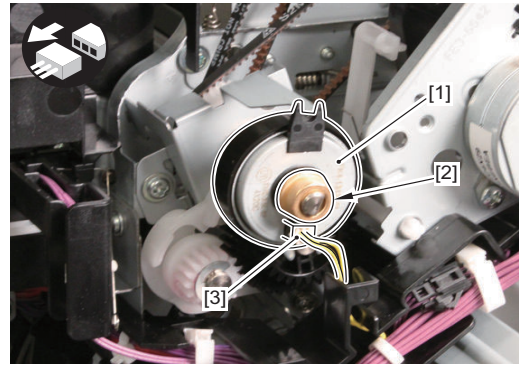
- 1) Remove the rear cover.
- 2) Remove the puncher unit.

Note: Make sure to follow the Installation manual and remove the puncher unit properly.

- 3) Remove the support plate [1]. Screw [2] x1

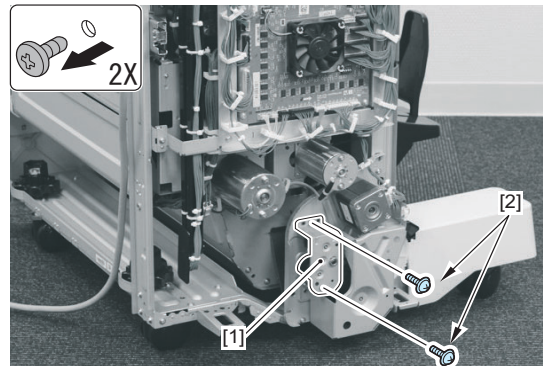


- 4) Remove the Escape transport drive switch clutch [1].
Bearing [2] x1, Connector [3] x1

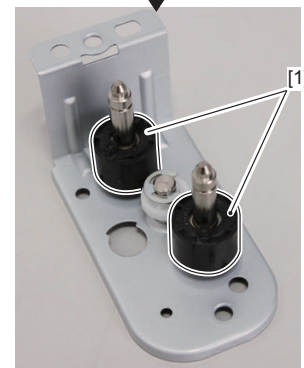
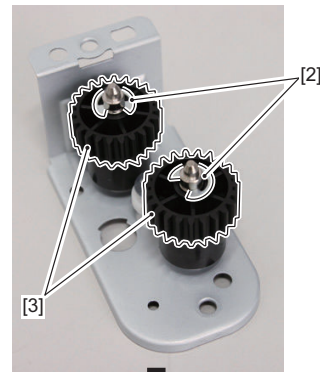


(10) Removal of the torque limiter on the height tray

- 1) Remove the torque limiter unit [1]. Screws [2] x2



- 2) Remove the torque limiter [1].
E-ring [2]: One on each, Gear [3]: One on each

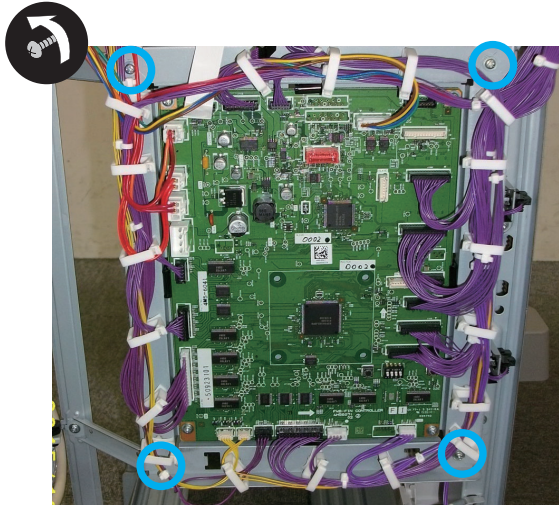


Note:
Parallel pin will remain after removing the torque limiter.
Keep it in a safe place.

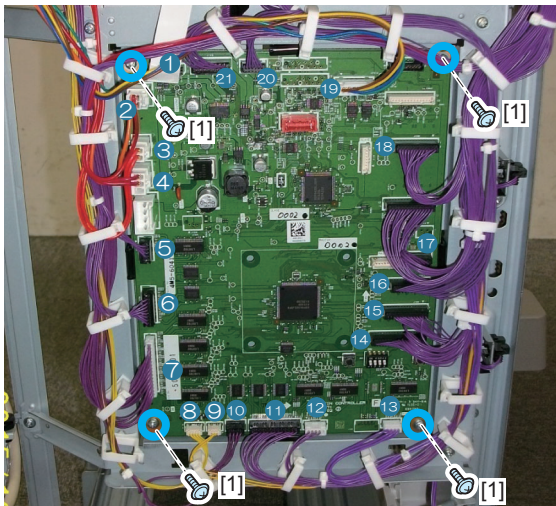
D. PWB

(1) Removal of the finisher controller PWB

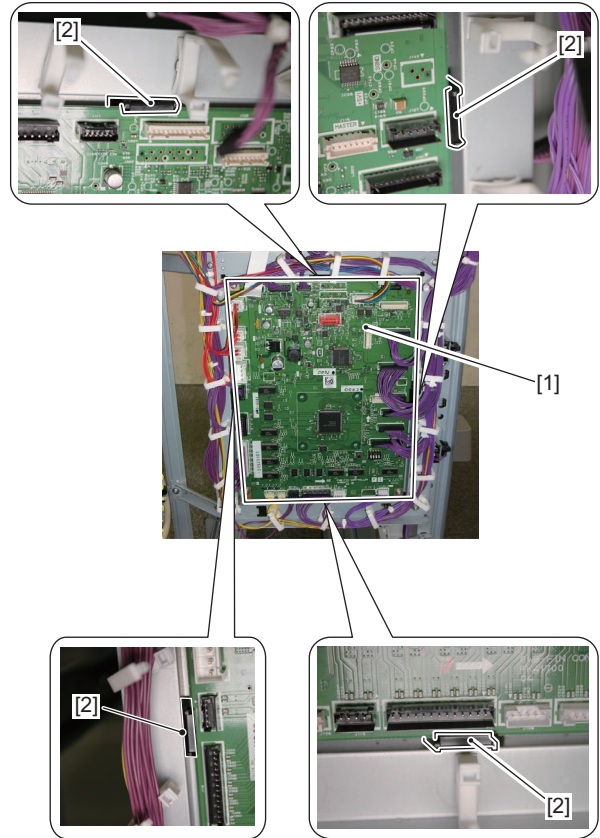
- 1) Remove the rear cover.
- 2) Loosen the screw of PWB stay. Screw x4



- 3) Remove the connector, harness, and screw.
Connector x21, Harness x1, Screw [1] x4



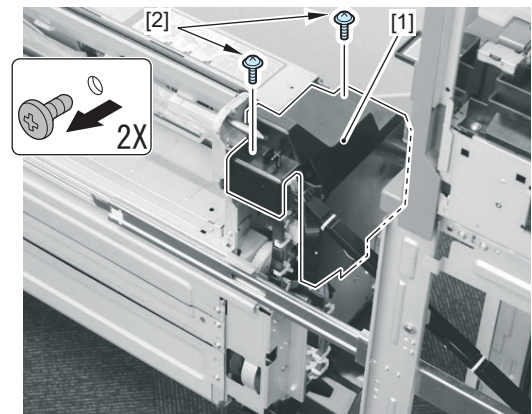
- 4) Remove the PWB [1]. Pawl [2] x4



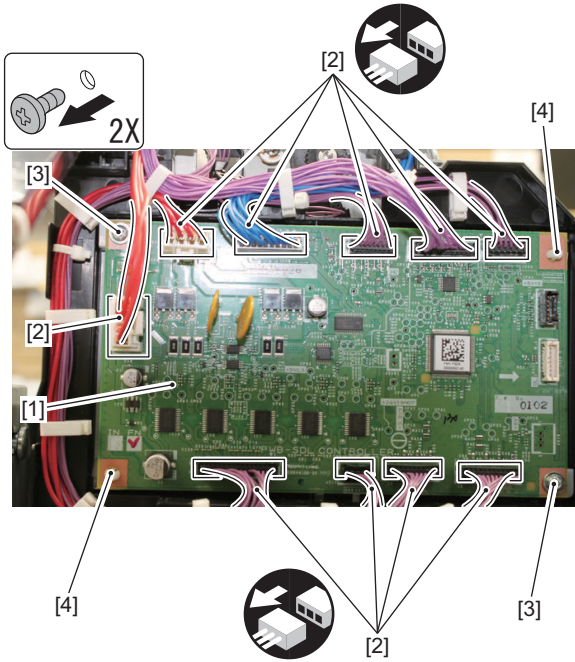
- 5) Enter the adjustment values and setting values listed on the service label.

(2) Removal of the saddle stitcher controller

- 1) Pull out the saddle unit. (Service position)
- 2) Remove the PWB cover [1]. Screw [2] x2



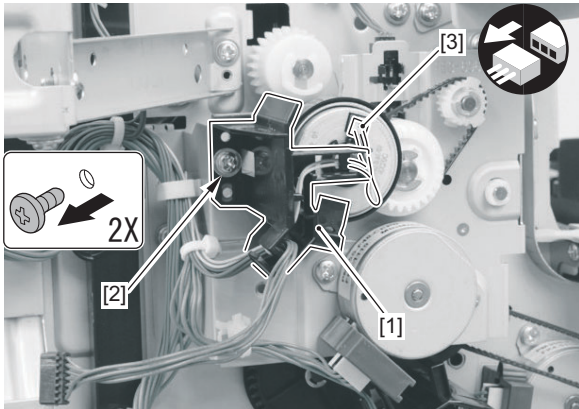
- 3) Remove the PWB [1].
Connector [2] x10, Screw [3] x2, PWB support x2



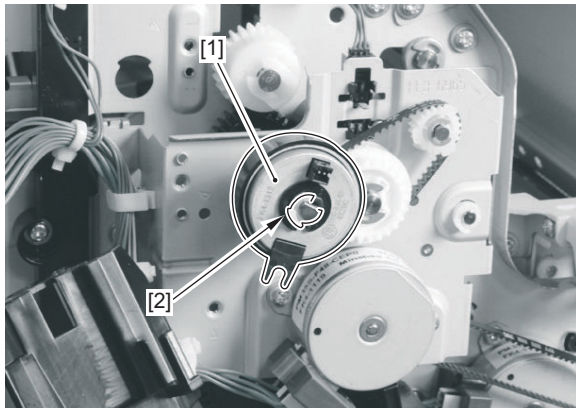
E. Clutch

(1) Removal of Paddle drive clutch

- 1) Remove the front cover.
- 2) Remove the front inside cover
- 3) Remove the harness guide [1].
Screw [2] x1, Connector [3] x 1



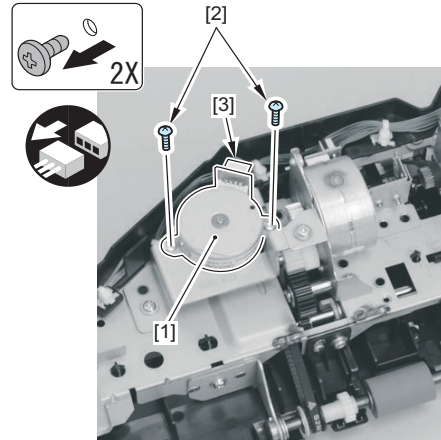
- 4) Remove the clutch [1].
Ring [2] x1 Ring [2] x1



F. Motor

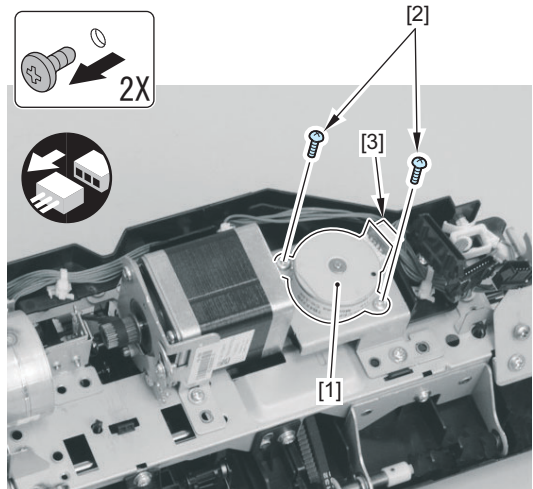
(1) Removal of Front alignment motor

- 1) Remove the processing tray unit.
- 2) Remove the motor [1].
Screw[2] x 2, Connector[3] x1



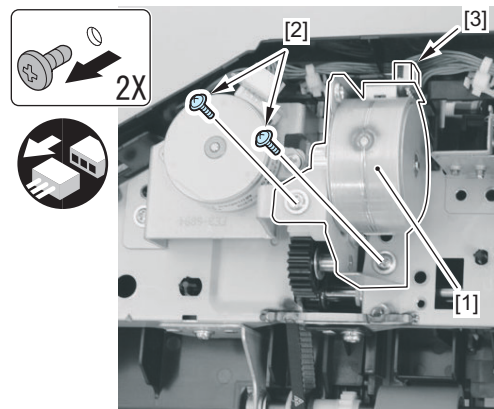
(2) Removal of Rear alignment motor

- 1) Remove the processing tray unit.
- 2) Remove the motor [1].
Screw[2] x 2, Connector[3] x1

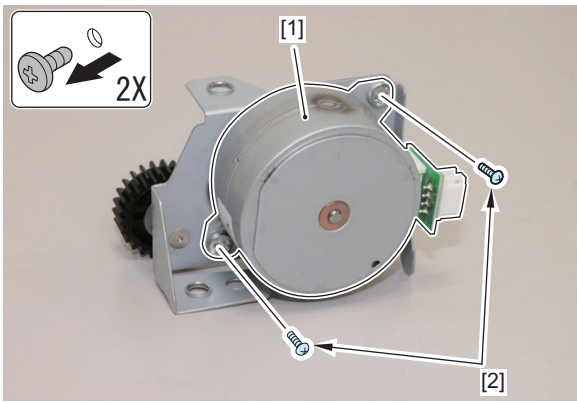


(3) Removal of Tongue drive motor

- 1) Remove the processing tray unit.
- 2) Remove the motor unit [1].
Screw[2] x 2, Connector[3] x1

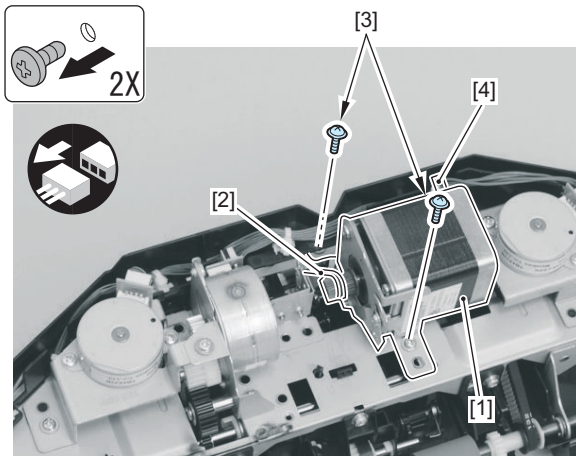


- 3) Remove the motor [1].



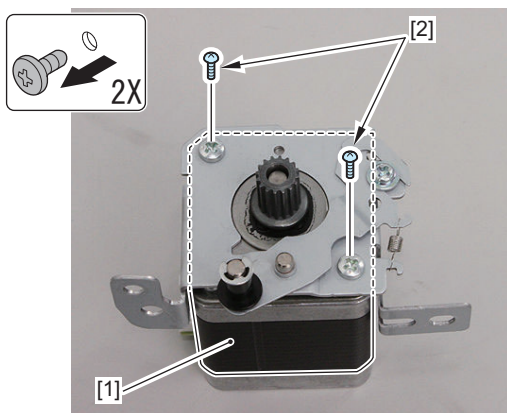
(4) Removal of Rear edge assist motor

- 1) Remove the dispose tray unit.
- 2) Remove the motor unit [1].
Belt [2] x1, Screw[3] x 2, Connector[4] x1



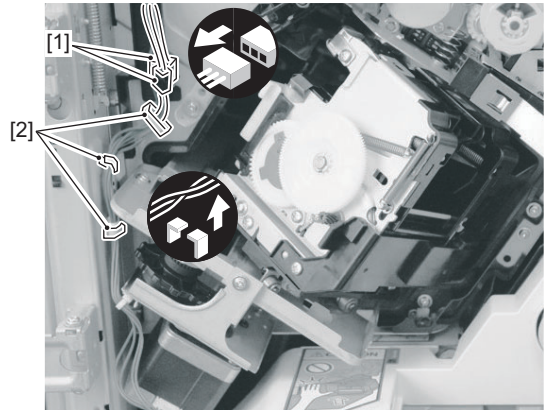
Note:
When installing the belt, be sure to set the tensioner.

- 3) Remove the motor [1]. Screw [2] x2

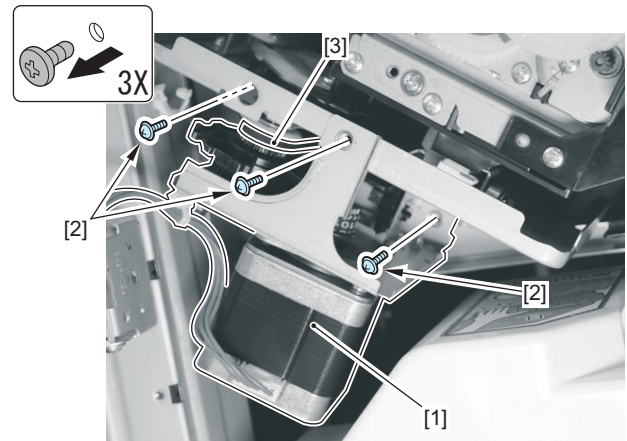


(5) Removal of Staple horizontal shift motor

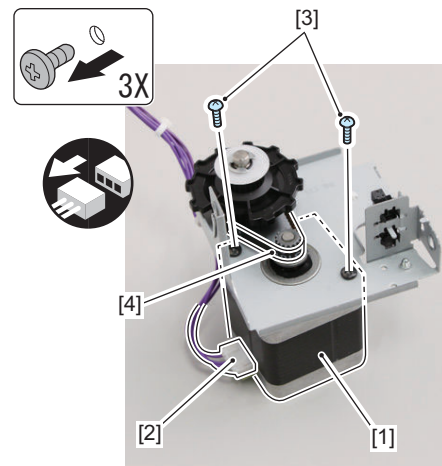
- 1) Remove the front cover.
- 2) Remove the front inside cover.
- 3) Fix the harness [1].
Connector [1] x2, Wire saddle [2] x 3



- 4) Remove the motor unit [1].
Screw [2] x3, Belt [3] x1

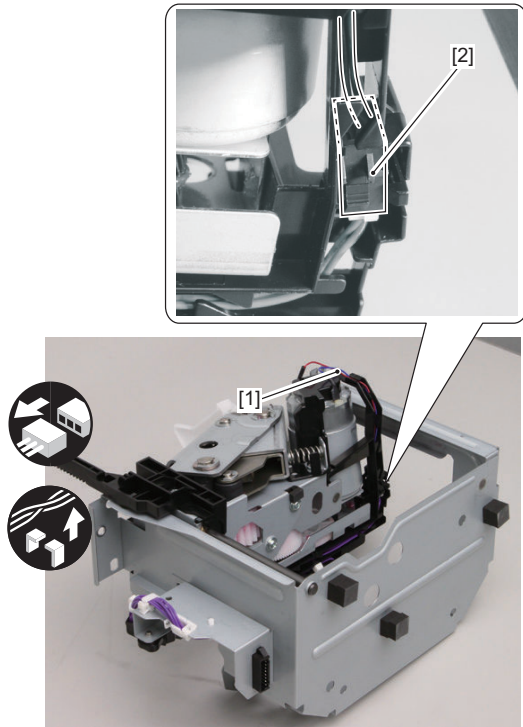


- 5) Remove the motor [1].
Connector [2] x1, Screw [3] x2, Belt [4] x1

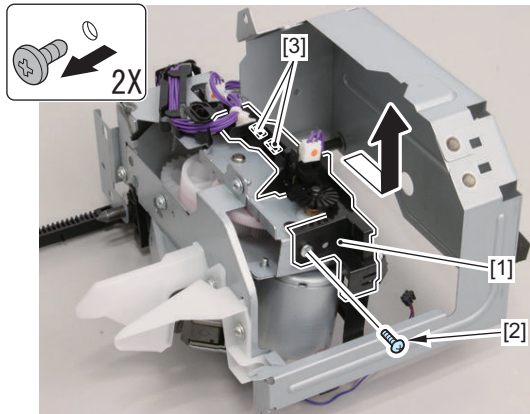


(6) Removal of Staple free staple motor

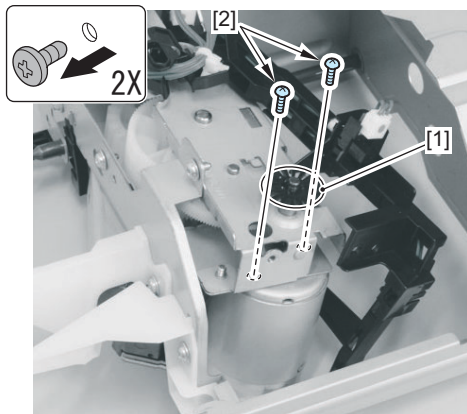
- 1) Remove the staple-free binding unit.



- 2) Remove the harness guide [1].
Screw [2] x1, Pawl [3] x2

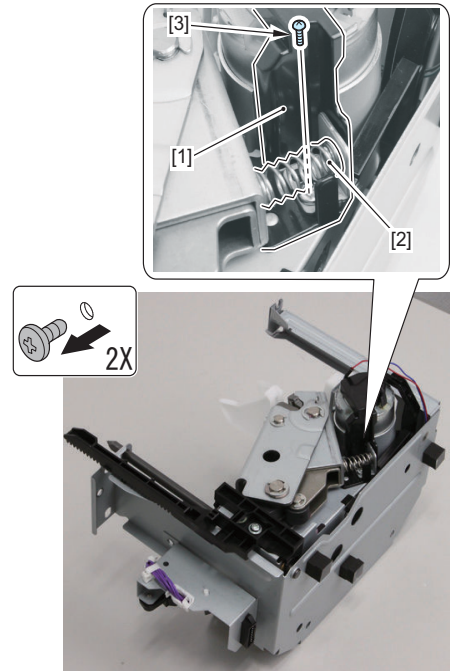


- 3) Remove the harness guide [1].
Screw [2] x1, Pawl [3] x2



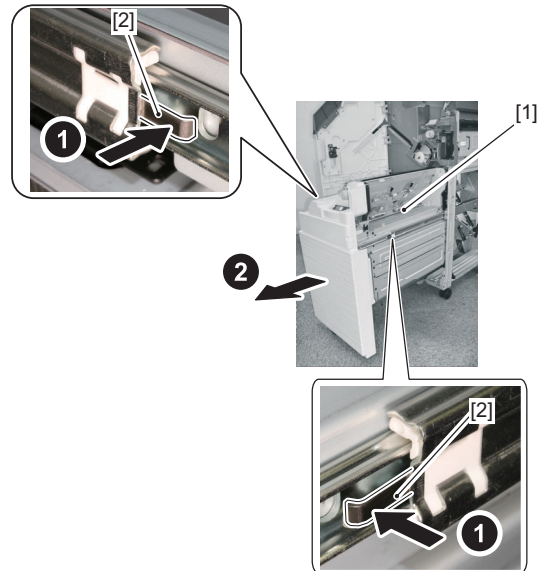
- 4) Remove the motor.

Motor cover [1] x1, Spring [2] x1, Screw [3] x1

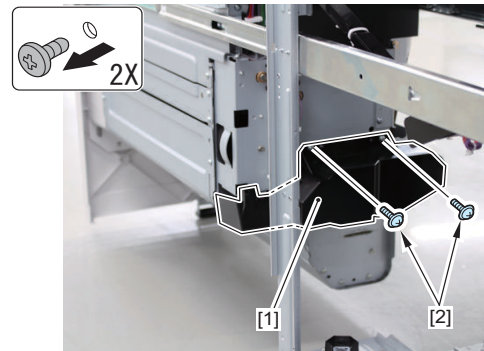


(7) Removal of Saddle folding motor

- 1) Push the leaf spring [2], and pull out the saddle unit [1] to the service position.

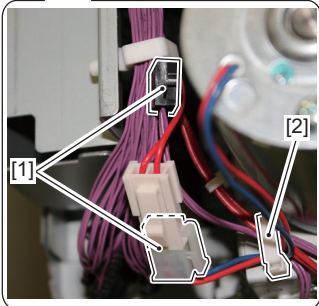
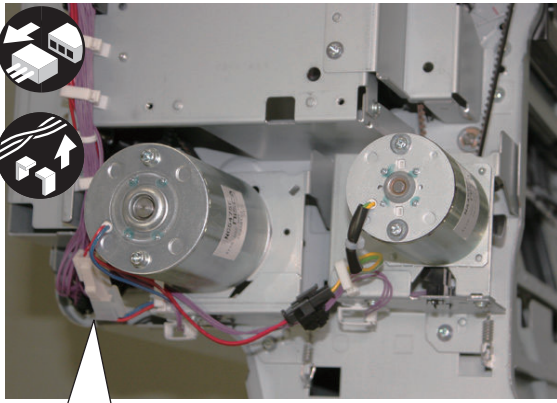


- 2) Remove the motor cover [1]. Screw [2] x2



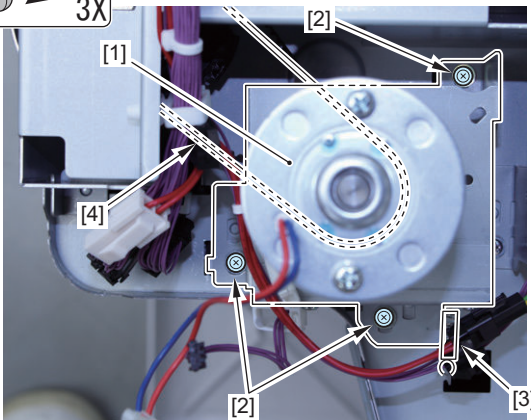
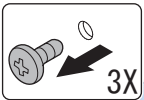
3) Fix the harness.

Connector [1] x2, Wire saddle [2] x1



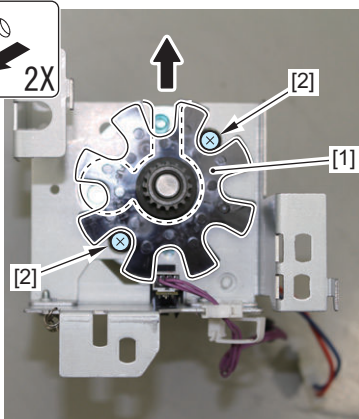
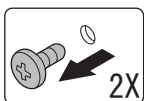
4) Remove the motor unit [1]

Screw [2] x3, Spring [3] x1, Belt [4] x1



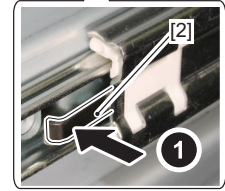
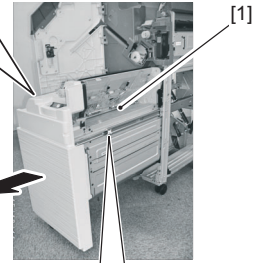
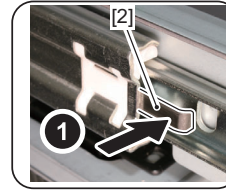
5) Remove the motor unit [1].

Screw [2] x2

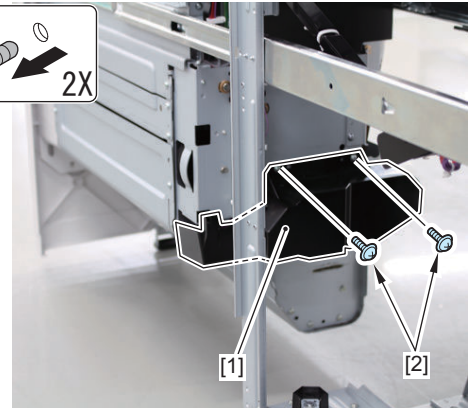
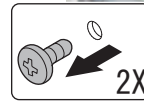


(8) Removal of Saddle discharge motor

1) Push the leaf spring [2], and pull out the saddle unit [1] to the service position.

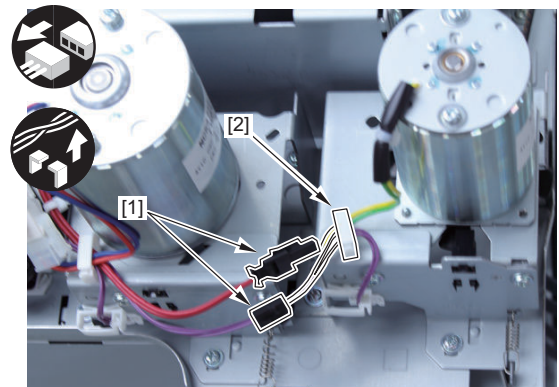


2) Remove the motor cover [1]. Screw [2] x2

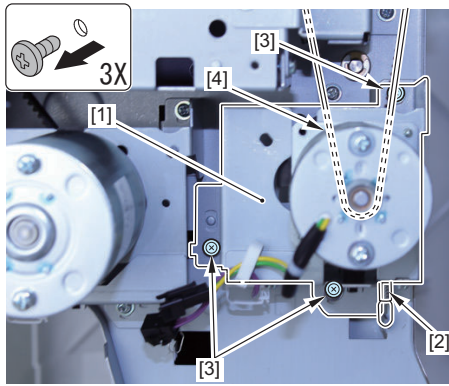


3) Fix the harness.

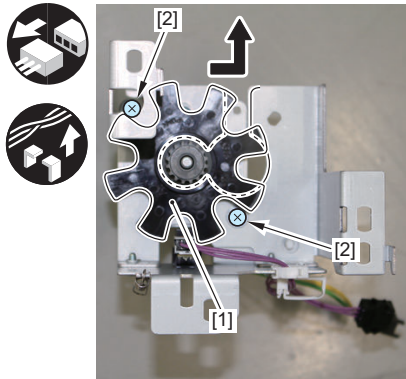
Connector [1] x2, Wire saddle [2] x1



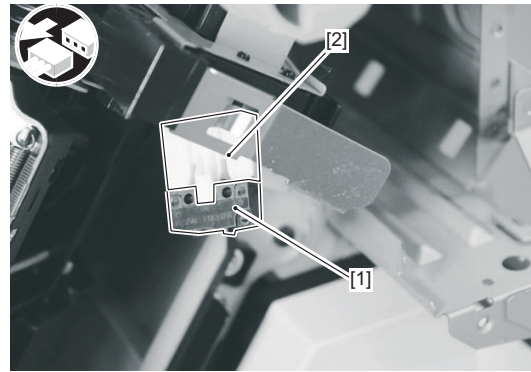
- 4) Remove the motor unit [1]
Spring [2] x1, Screw [3] x3, Belt [4] x1



- 5) Remove the motor unit [1]. Screw [2] x2

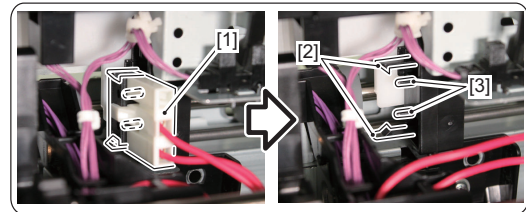


- 5) Remove the switch [1]. Connector I [2] x1



(2) Removal of swing guide safety switch.

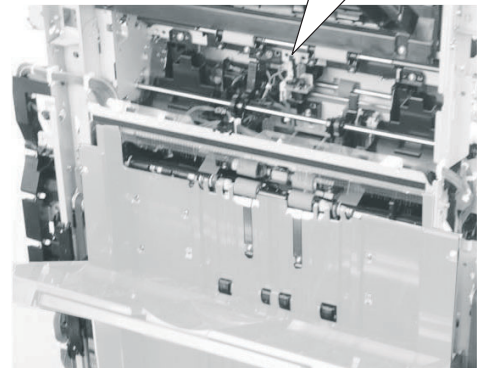
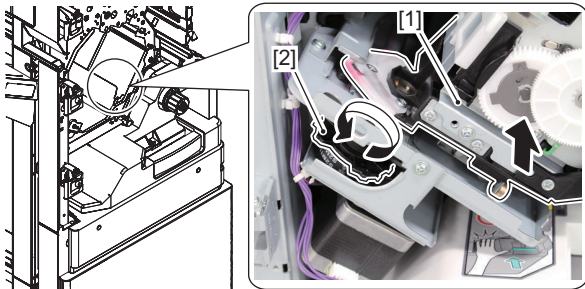
- 1) Remove the front cover.
 - 2) Remove the front inside cover.
 - 3) Remove the rear cover.
 - 4) Remove the escape tray.
 - 5) Remove the switch As [1].
- Pawl [2] x2, Boss [3] x2



G. Switch

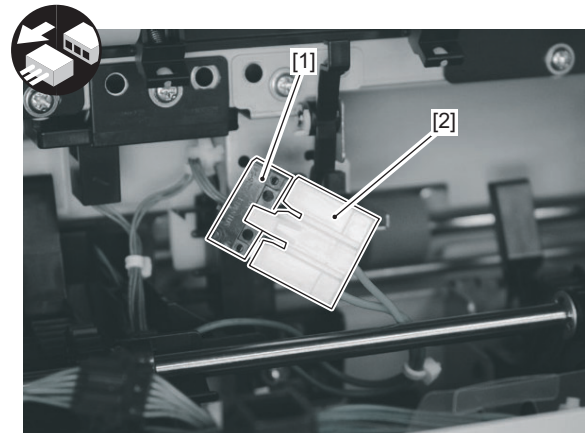
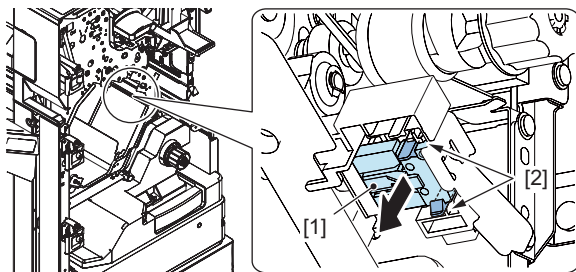
(1) Removal of front cover switch

- 1) Remove the front cover.
- 2) Remove the front inside cover.
- 3) Turn the dial [2], and move the stapler unit [1] approx. 10cm.



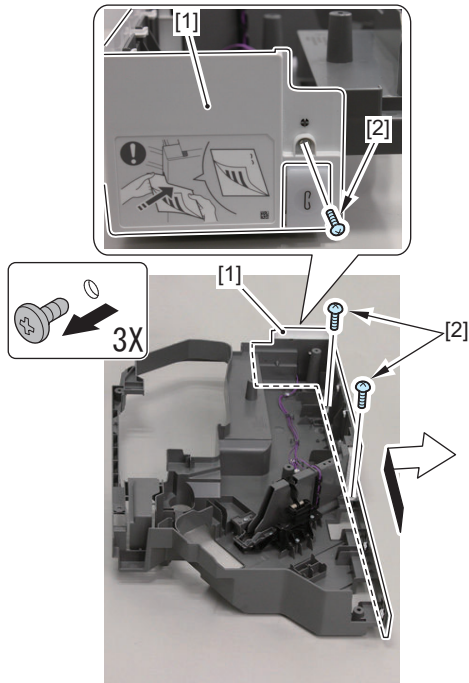
- 6) Remove the switch [1]. Connector [2] x1

- 4) Remove the switch As [1]. Pawl [2] x2

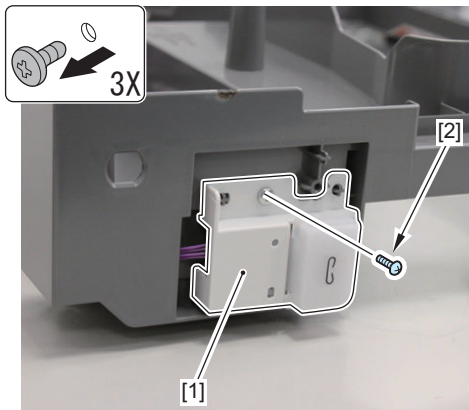


(3) Removal of manual staple switch

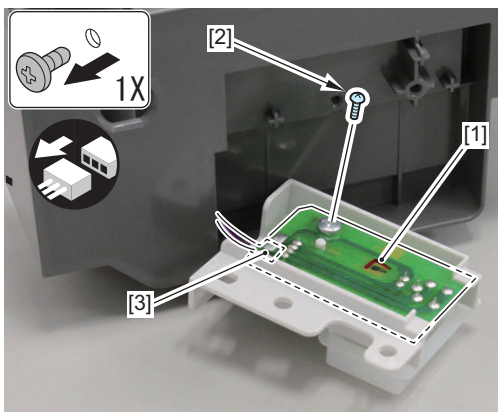
- 1) Remove the front cover.
- 2) Remove the front inside cover.
- 3) Disassemble the front cover [1]. Screw [2] x3



- 4) Remove the switch holder. Screw [2] x1



- 5) Remove the switch [1]. Connector [2] x1

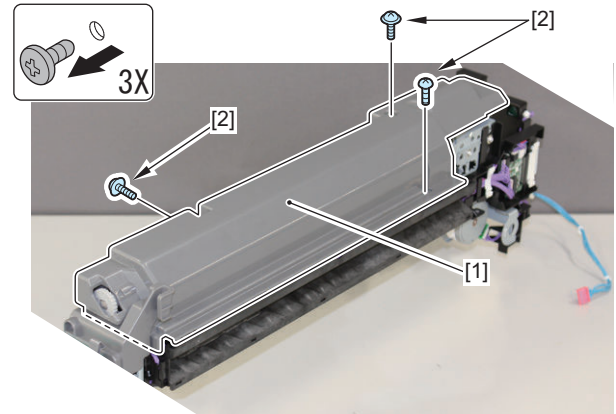


3. Punch module

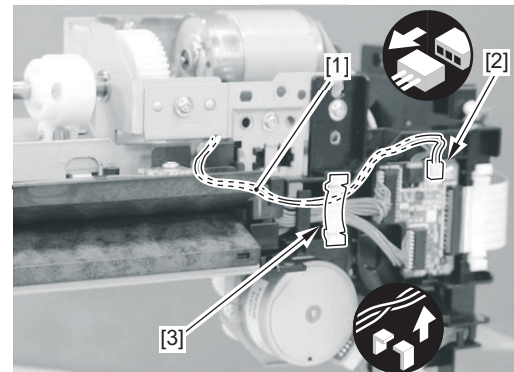
A. Motor

(1) Removal of the Punch hole motor

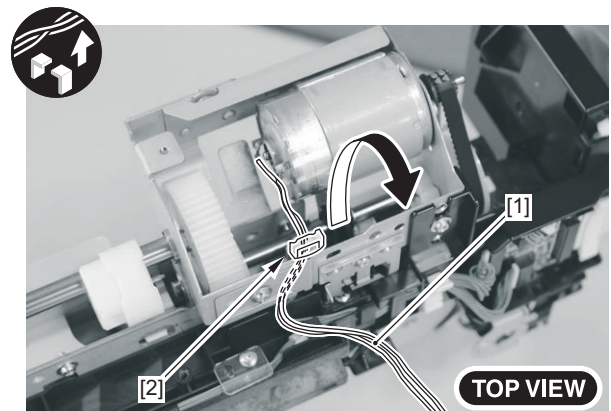
- 1) Remove the punch cover. Screw [2] x3



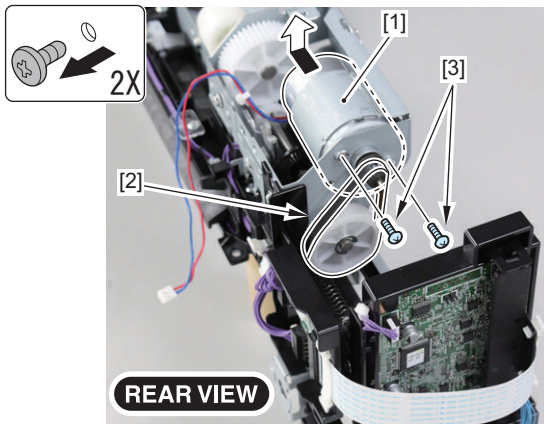
- 2) Remove the harness [1].
Connector [2] x1, Harness holder [3] x1



- 3) Remove the harness [1]. Edge saddle [2] x1

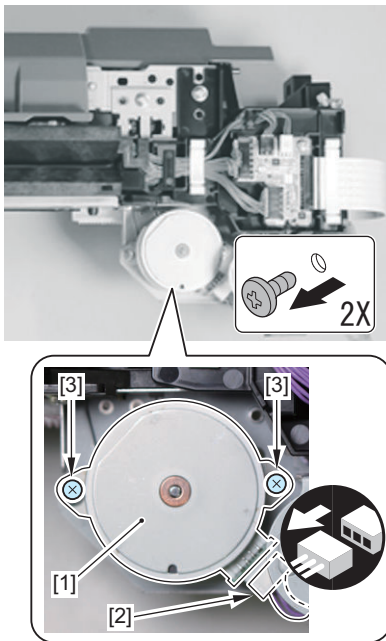


- 4) Remove the motor [1]. Belt [2] x1, Screw [3] x2

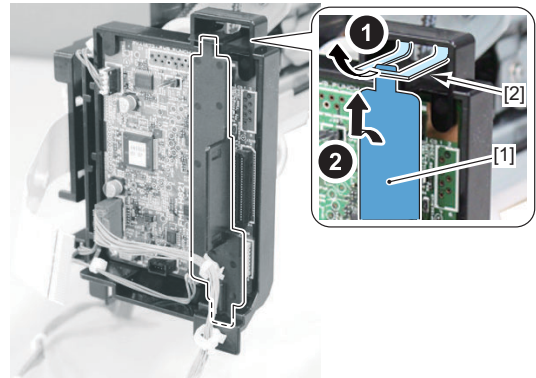


(2) Removal of Punch horizontal registration motor

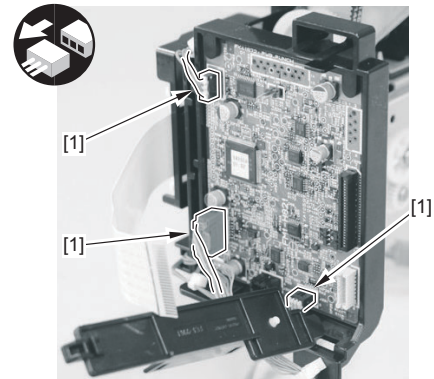
- 1) Remove the motor [1].
Connector [2] x1, Screw [3] x2



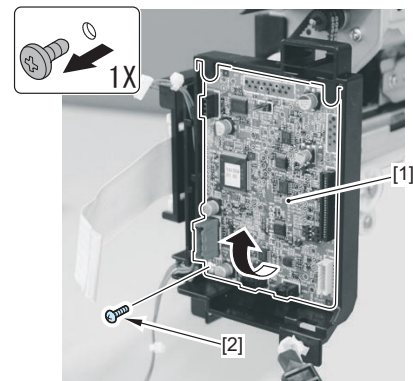
- 2) Remove the harness guide [1].
Pawl [2] x1



- 3) Remove the connector [1].
Connector [1] x3



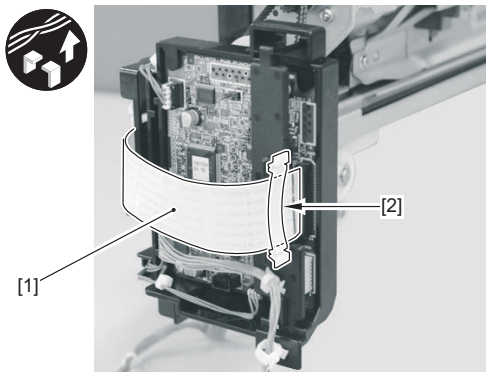
- 4) Remove the PWB [1].
Screw [2] x1



B. PWB

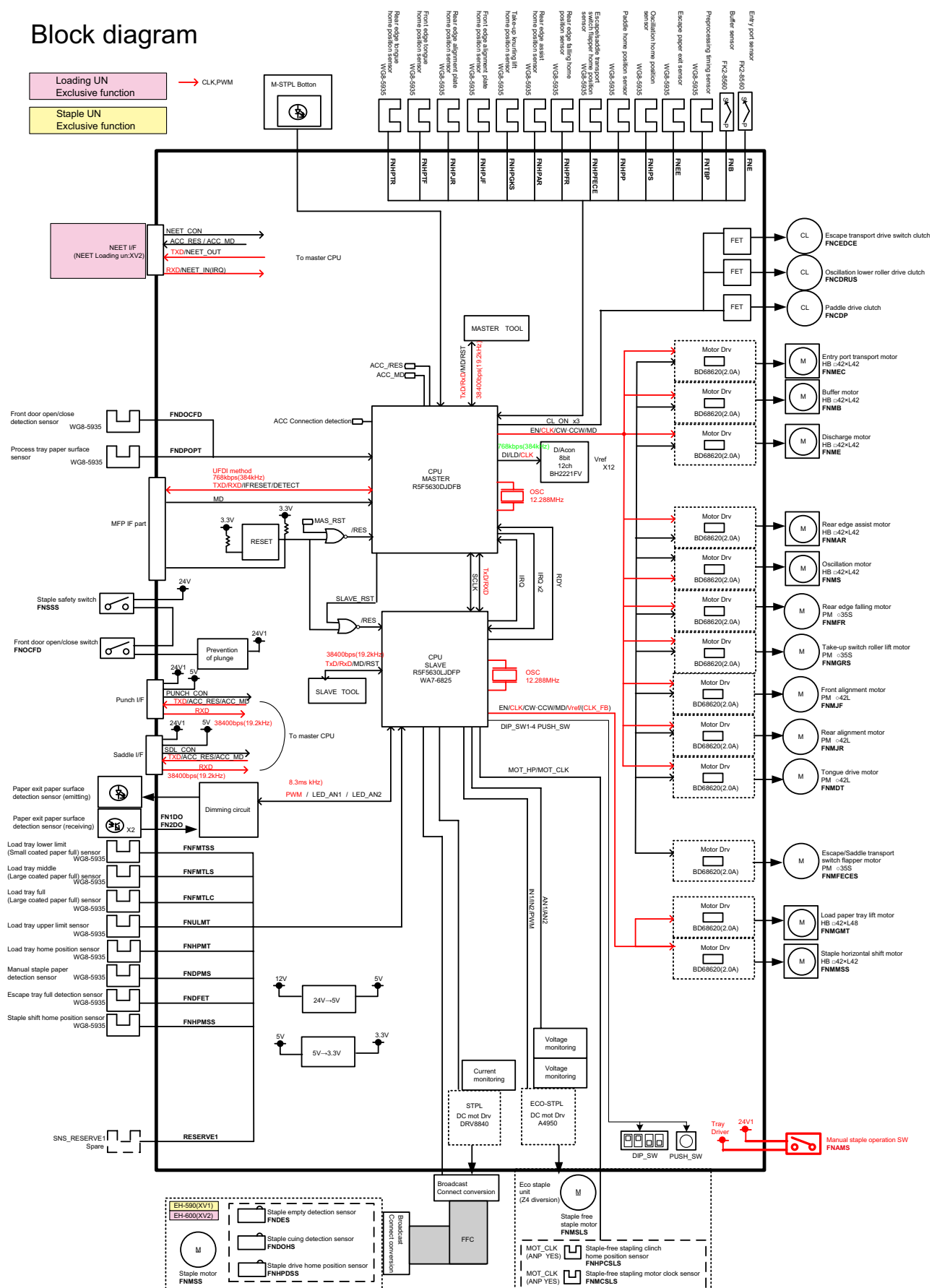
(1) Removable of puncher controller PWB

- 1) Remove the flat cable [1].
Flat cable [1] x1, Harness holder [2] x1



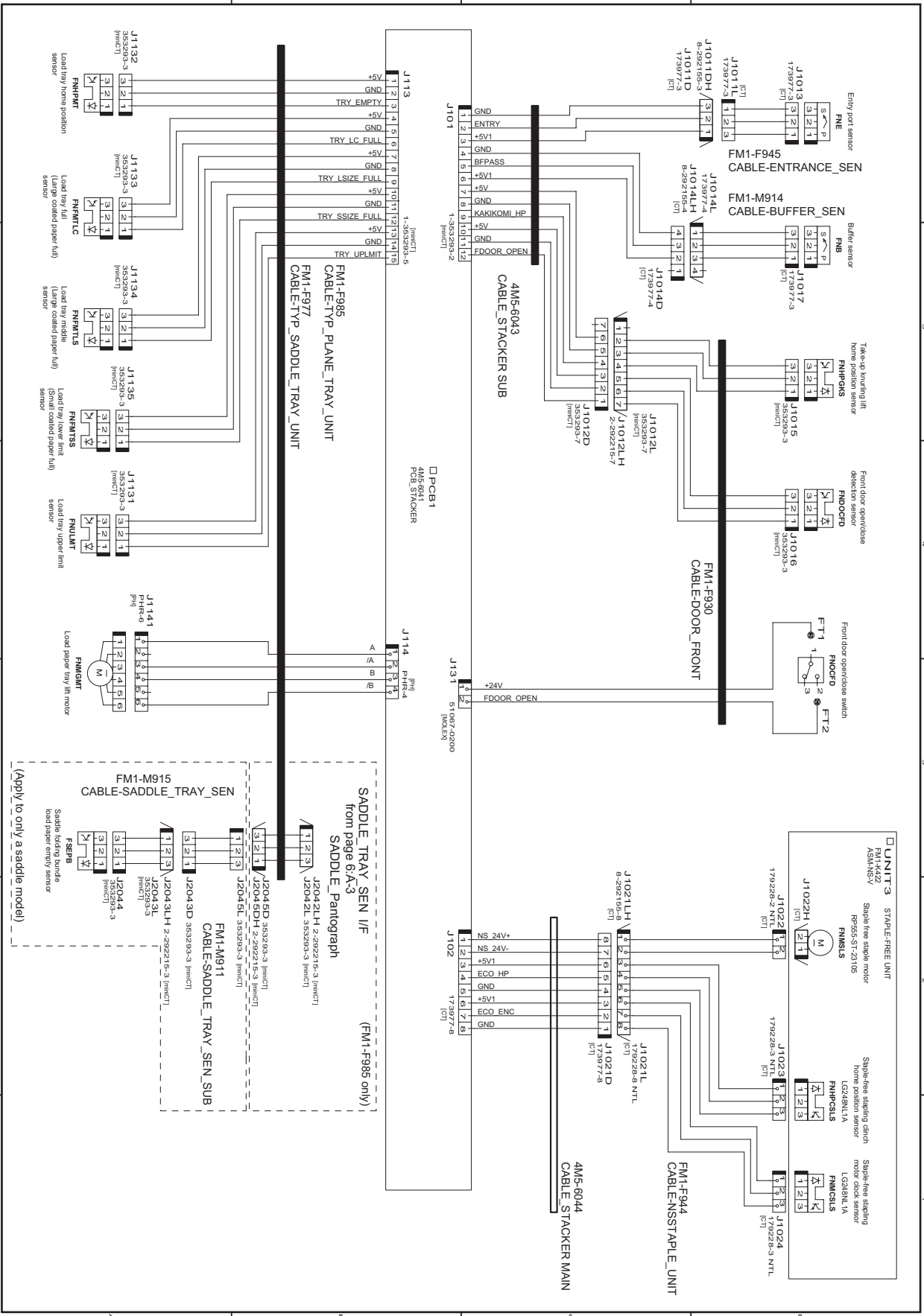
[5] ELECTRICAL SECTION

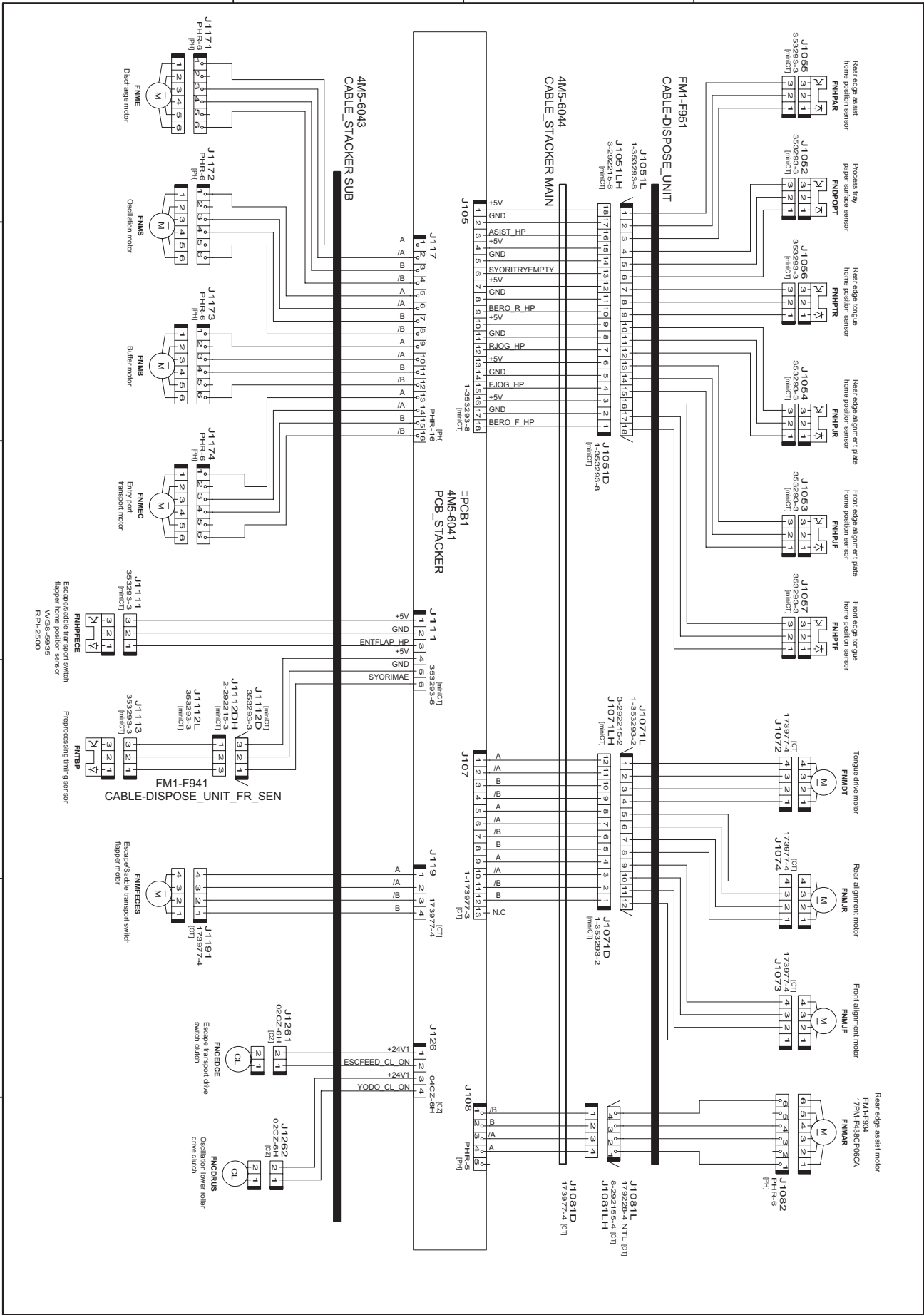
1. Block diagram

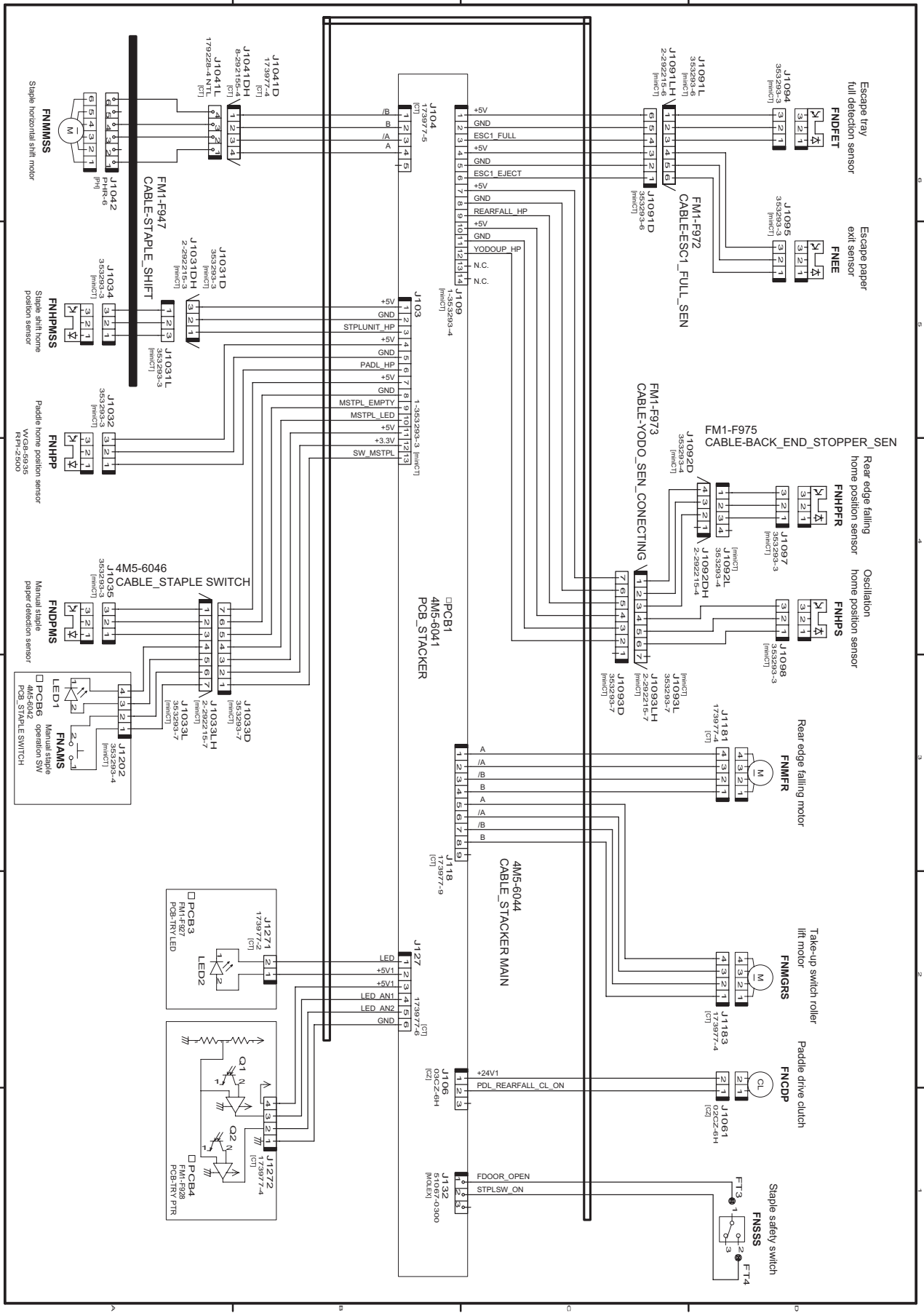


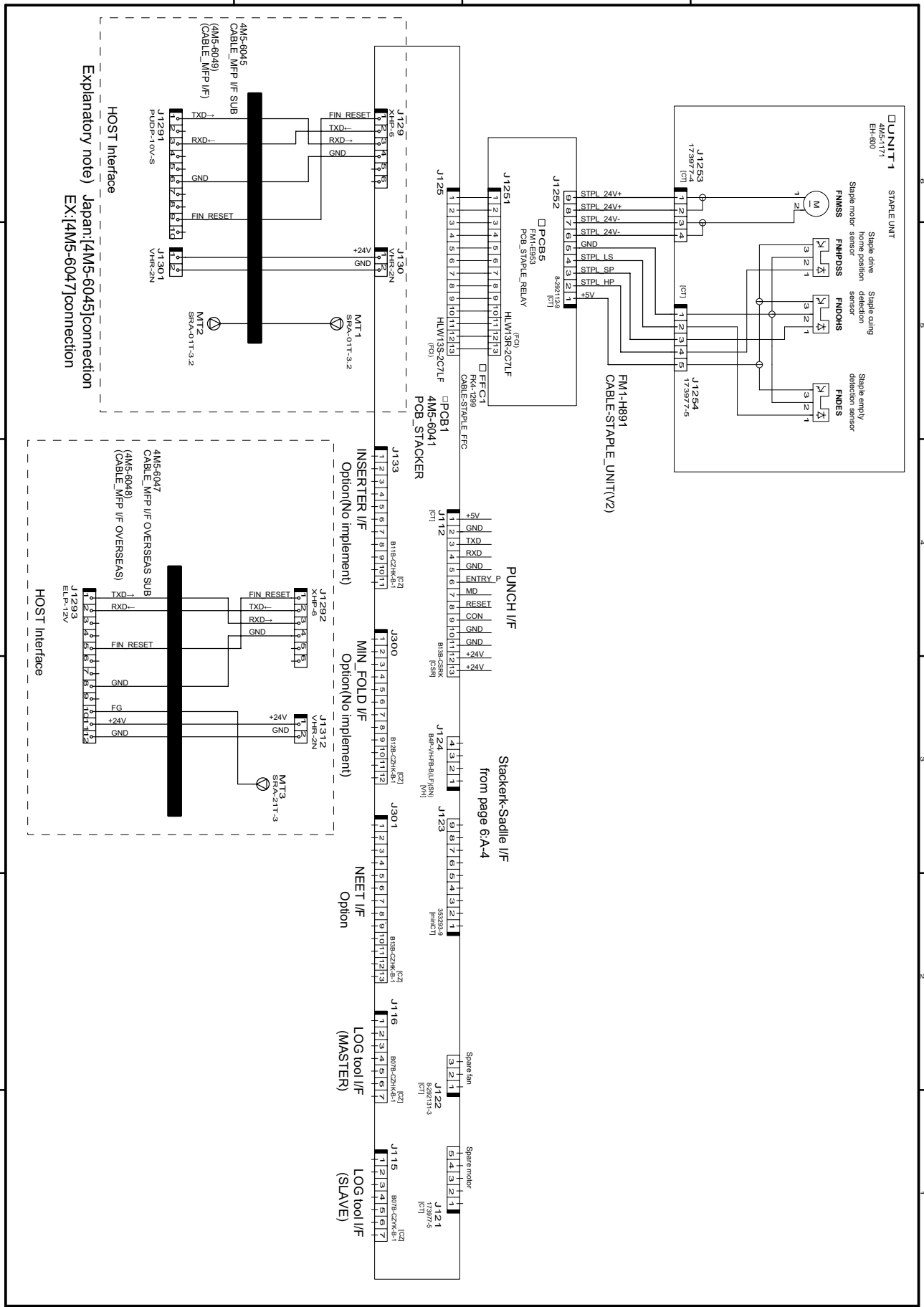
2. Actual wiring chart

A. Finisher unit

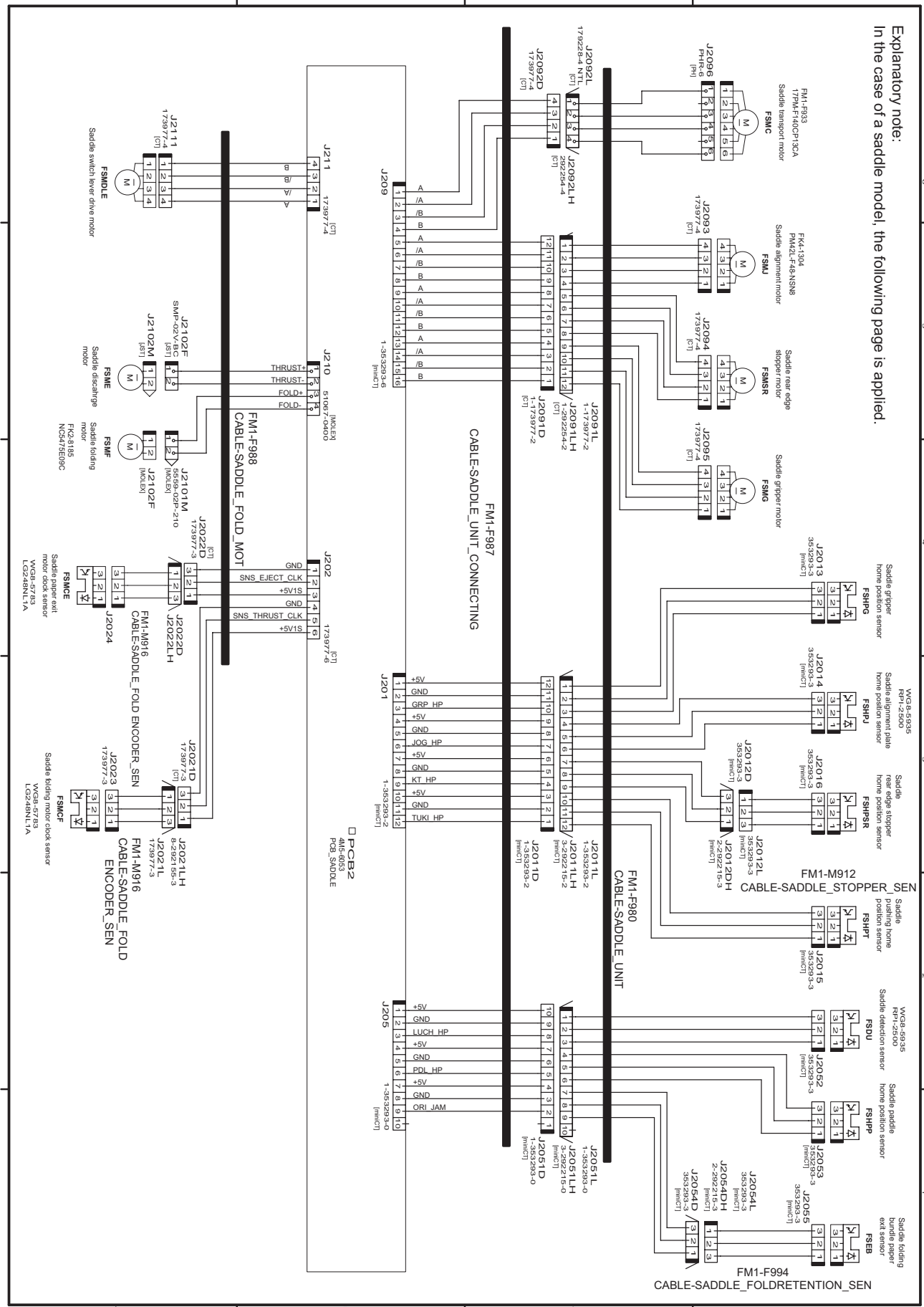


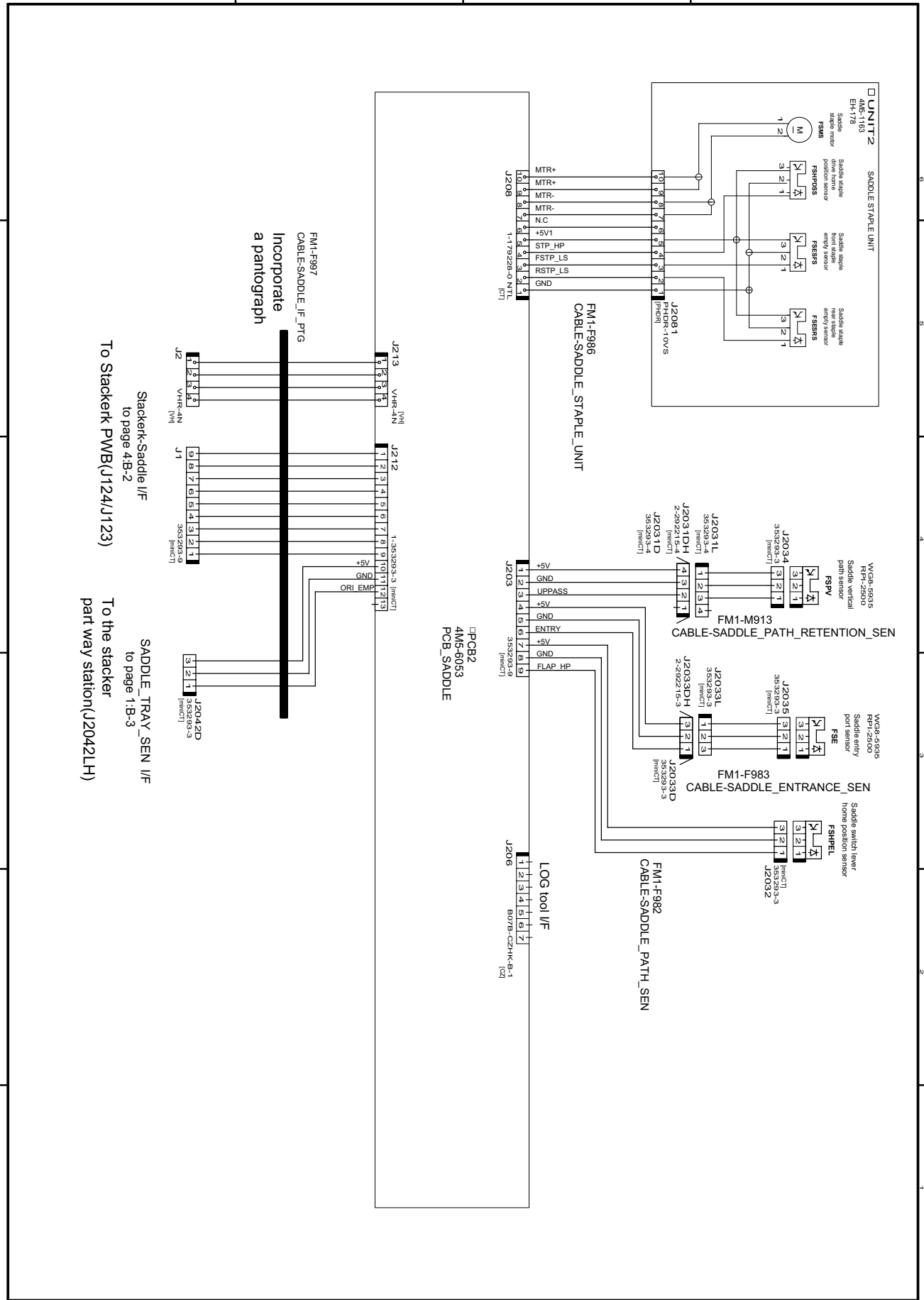




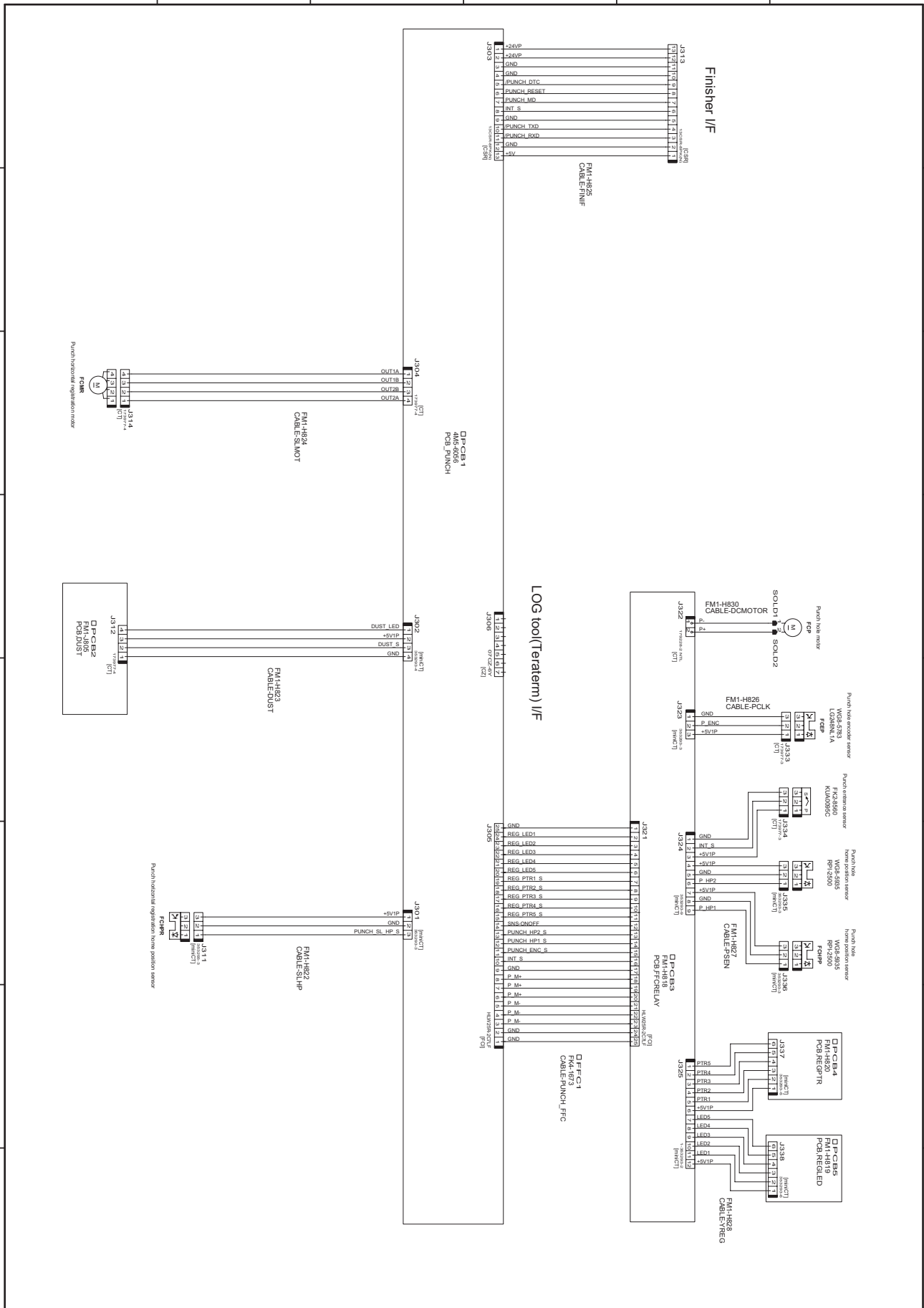


Explanatory note:
In the case of a saddle model, the following page is applied.





B. Punch unit



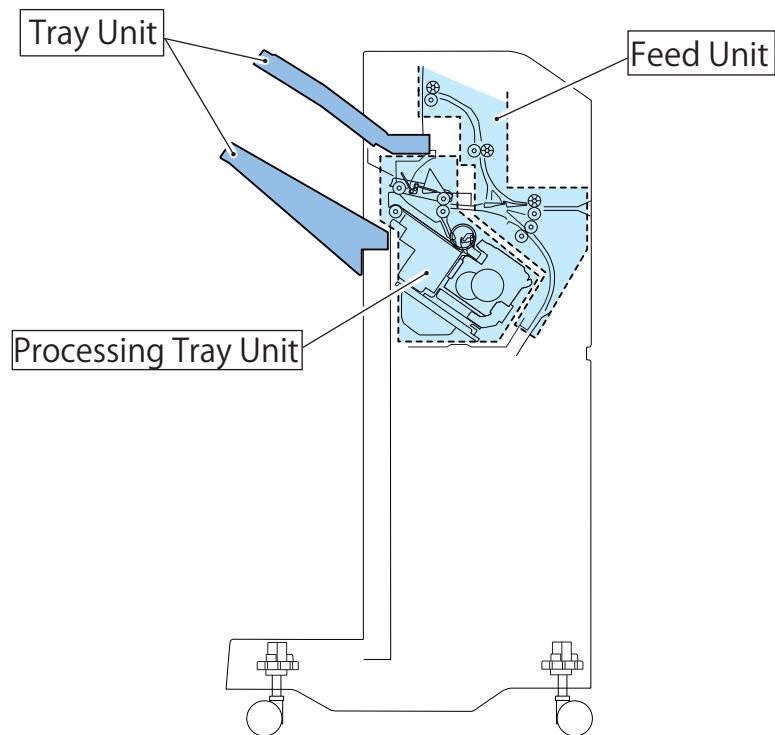
[6] Technical Explanation 3K Finisher

1. Basic Configuration

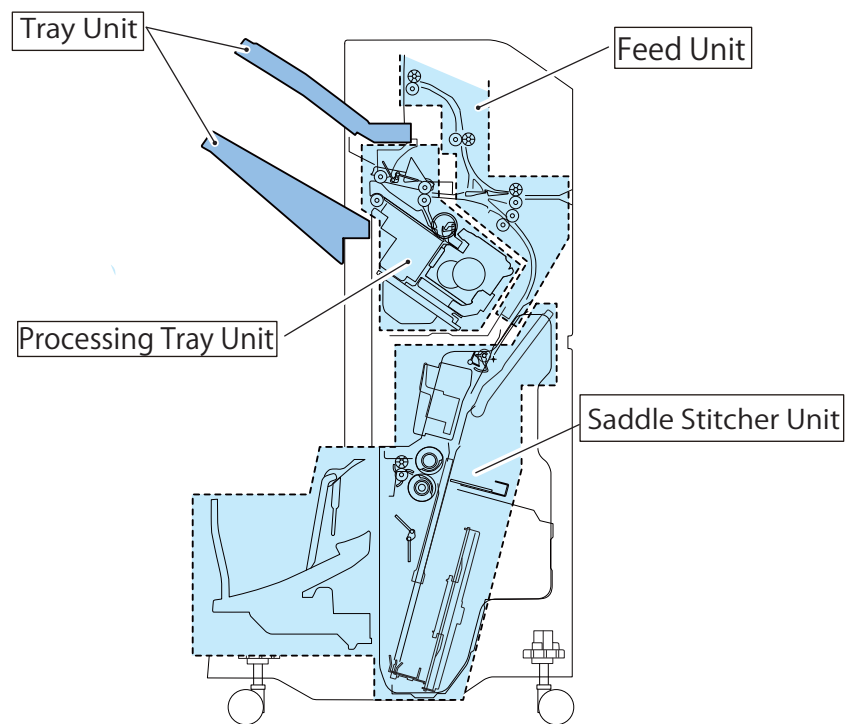
A. Functional Configuration

The components of this finisher are organized into 4 major blocks: feed unit, processing tray unit (stapler unit), tray unit, and saddle stitcher unit.

- Staple Finisher



- Saddle Stitch Finisher



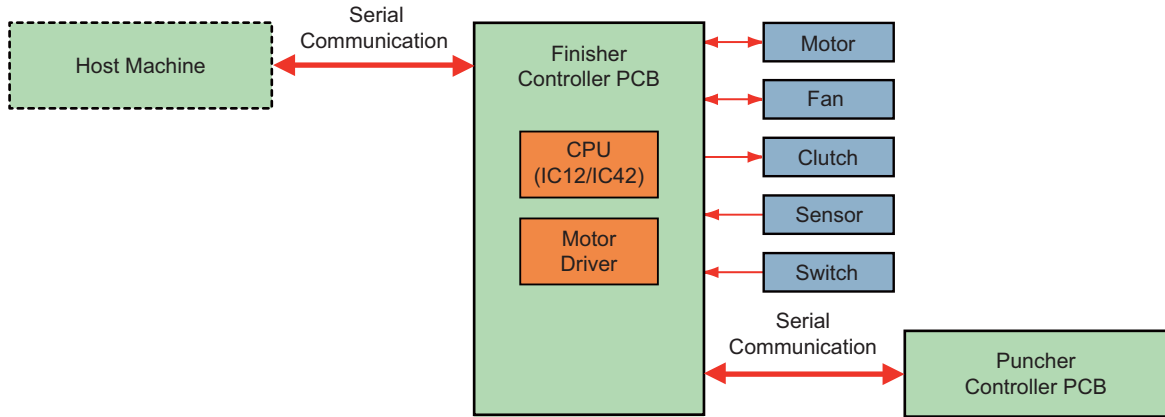
B. Overview of Electrical Circuitry

The finisher's operation sequence is controlled by the finisher controller PWB.

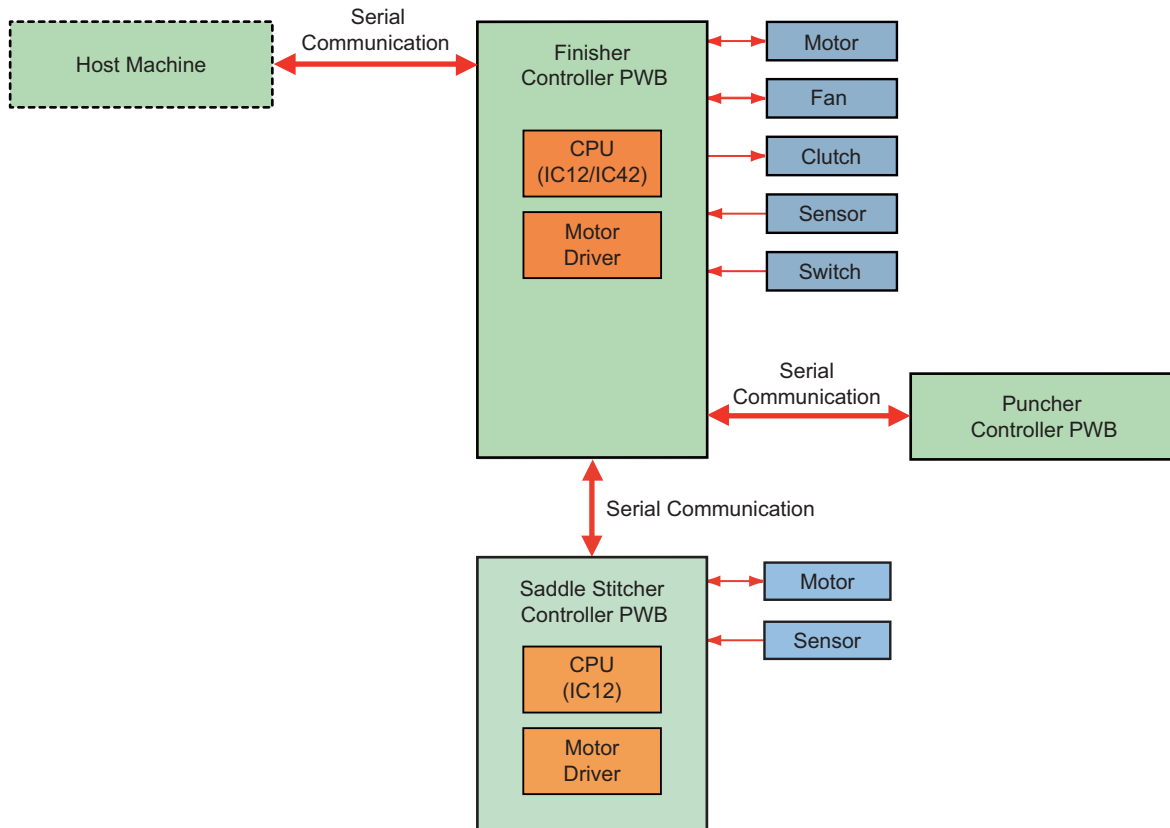
The finisher controller PWB has a 32-bit CPU (IC12/IC42) that performs sequence control. It also communicates to its host, saddle stitche controller PWB, and the optional puncher unit. Communication between the host and the paper folding inserter unit that is installed in the upstream of the finisher is performed through the finisher controller PWB. The CPU on the finisher controller PWB contains a ROM for storing the operating sequence program.

The finisher controller PWB receives various commands through the communication cable from its host to drive the motors, clutches, and fan. It also sends sensor and switch information to its host through the communication cable.

- Staple Finisher



- Saddle Stitch Finisher



2. Controls

A. Controls

	Item
Basic Operation	Outline
Feeding Unit	Outline
	Basic Operation
	Feed Switch Operation
	Buffer Operation
Stack/Escapes Tray Unit	Outline
	Stack Tray Up and Down Movement
	Stack Tray Delivery Paper Surface Detection, Paper Full
	Escape Tray Paper Full Detection
Processing Tray Unit	Outline
	Stacking Operation
	Alignment/Shifting Operation
	Staple Operation
	Staple-free Binding Operation
	Stack Delivery Operation
Saddle Stitcher Unit	Outline
	Configuration
	Basic Operation
	Stacking Operation
	Paper Stack Feed Operation
	Stitch Operation
	Paper Folding/Delivery Operation
Controller Unit	Outline
	Finisher Controller PWB
	Saddle Stitcher Controller PWB
Jam Detection	Outline
	Jams
Power Supply	Power Supply Route
	Protective Functions
Service Tasks	Upgrading

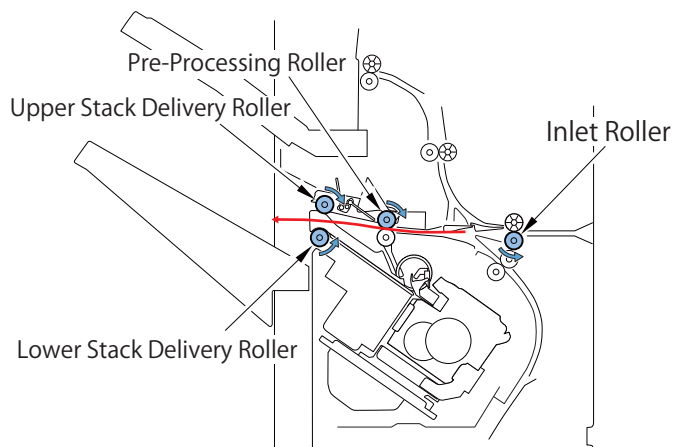
3. Basic Operation

A. Outline

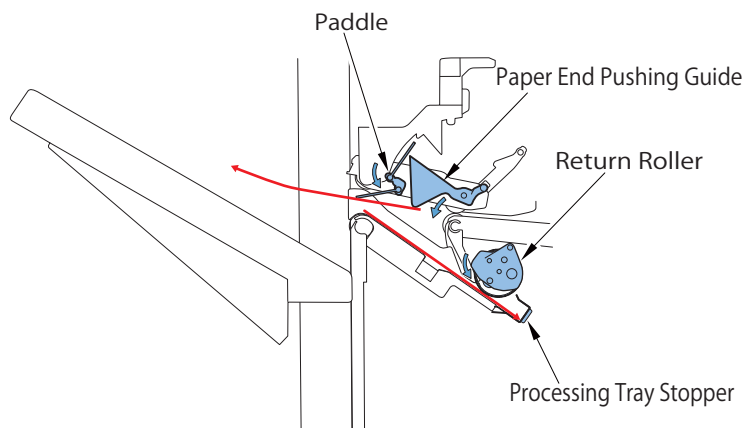
Basic operations of this finisher are described below.

■During stack tray delivery

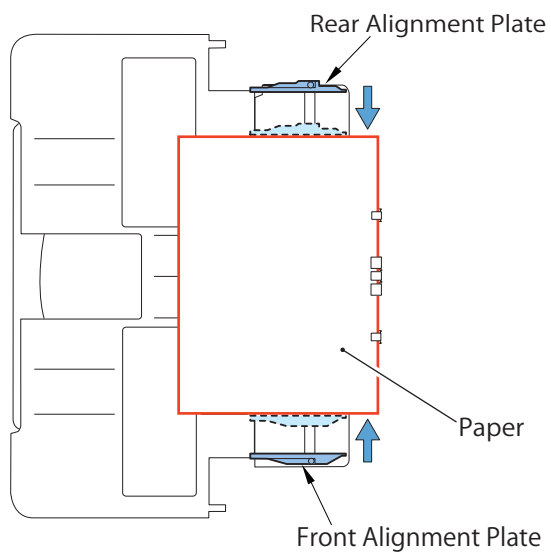
- 1) The paper delivered from the host machine is fed by the inlet roller, pre-processing roller and stack delivery roller.



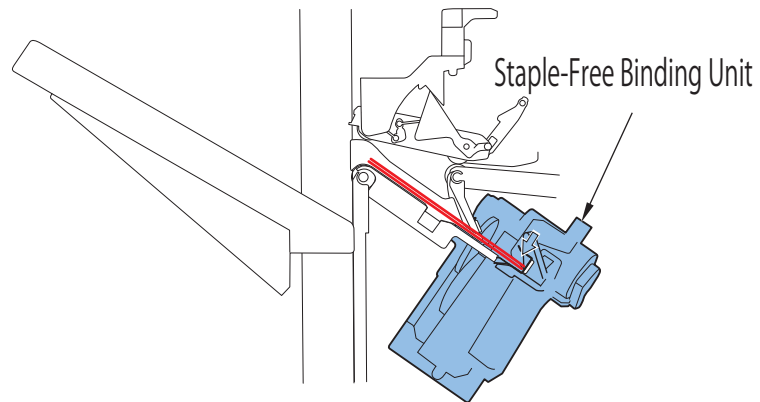
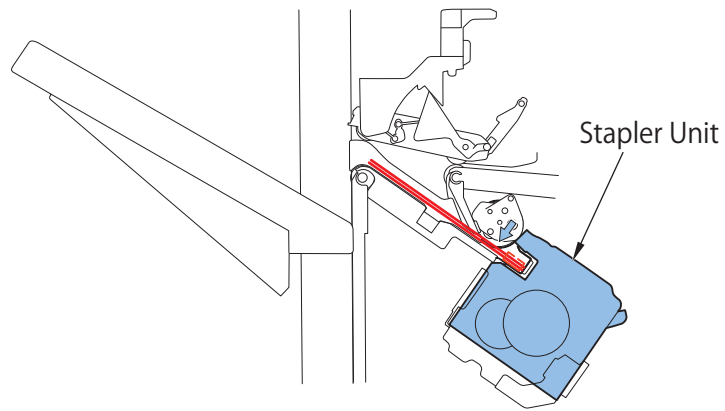
- 2) The paper delivered by the pre-processing roller is stacked on the processing tray by the paper end pushing guide and paddle. The return roller and processing tray stopper align paper in the feed direction.



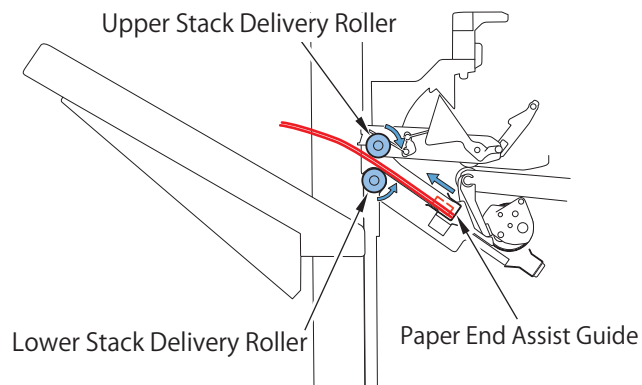
- 3) The alignment plates are used to align paper in the width direction.



- 4) The operations described in steps 1 to 3 are repeated for each sheet to stack the sheets on the processing tray.
- 5) The stacked sheets are stapled and binded (only in staple mode or staple-free binding mode).

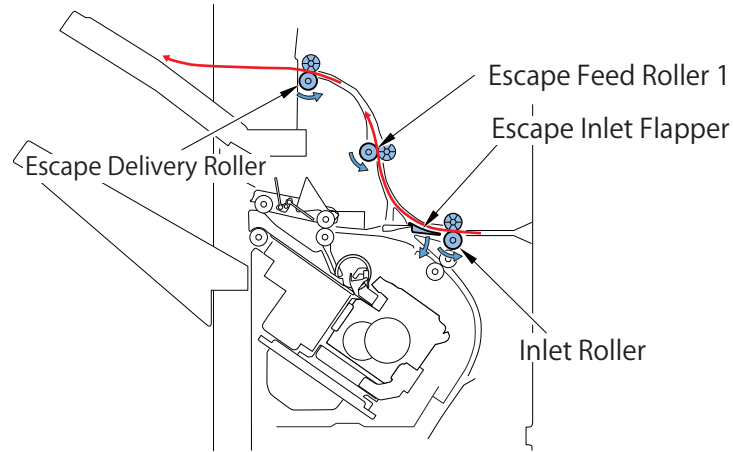


- 6) After being shifted, the paper stack on the processing tray that has been stacked by the paper end assist guide and stack delivery roller are delivered to the stack tray.



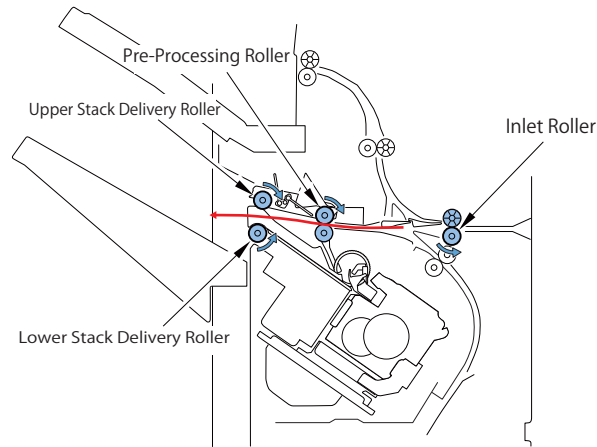
■During escape tray delivery

- 1) The paper delivered from the host machine is fed by the inlet roller, escape inlet flapper, escape feed roller 1, and the escape delivery roller.

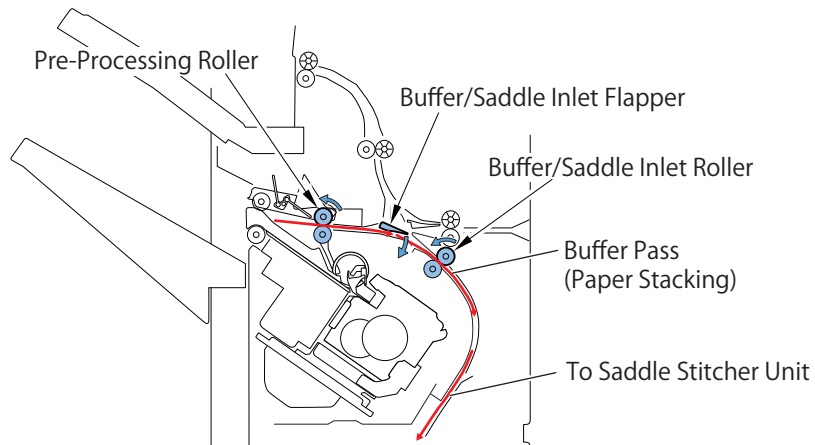


■During saddle stitcher unit and buffer path unit feeding

- 1) The paper delivered from the host machine is fed by the inlet roller, pre-processing roller, and stack delivery roller.

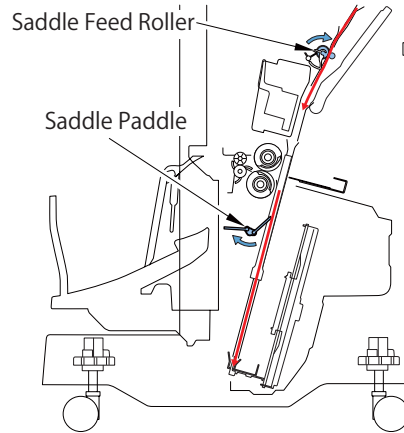


- 2) The paper is switched back and fed to the saddle stitcher unit and buffer path unit by the buffer/saddle inlet flapper and buffer/saddle inlet roller.

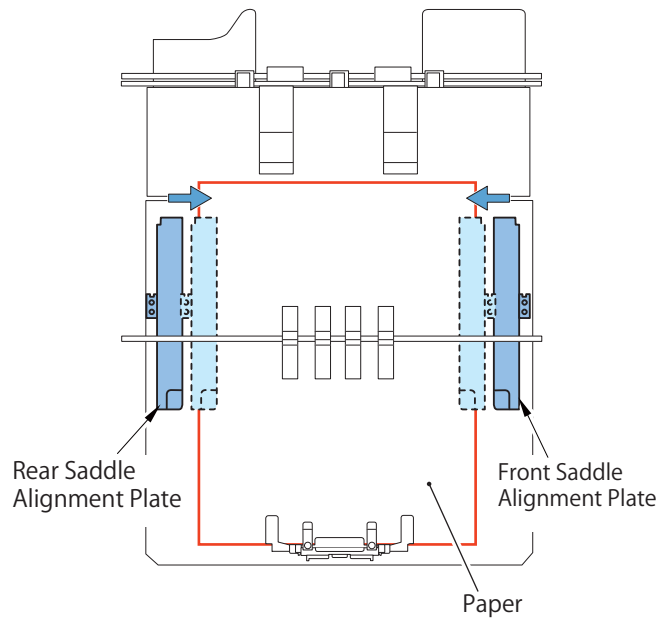


■During saddle delivery tray delivery

- 1) The paper fed to the saddle stitcher unit is then stacked on the saddle processing tray by the saddle feed roller and saddle paddle.

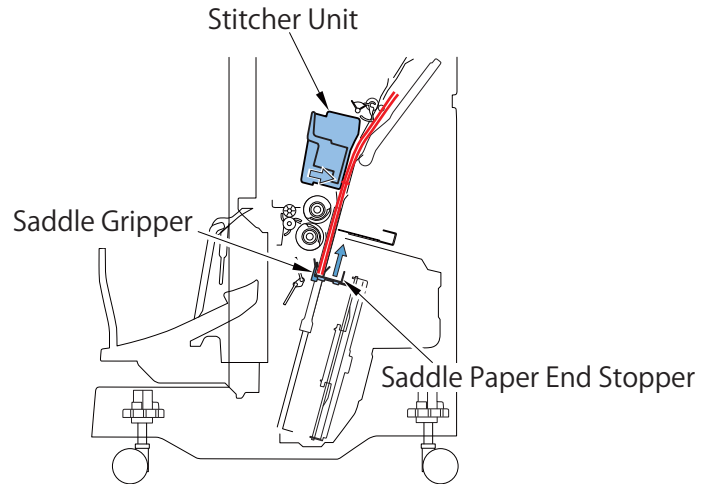


- 2) The saddle alignment plates are used to align paper in the width direction.

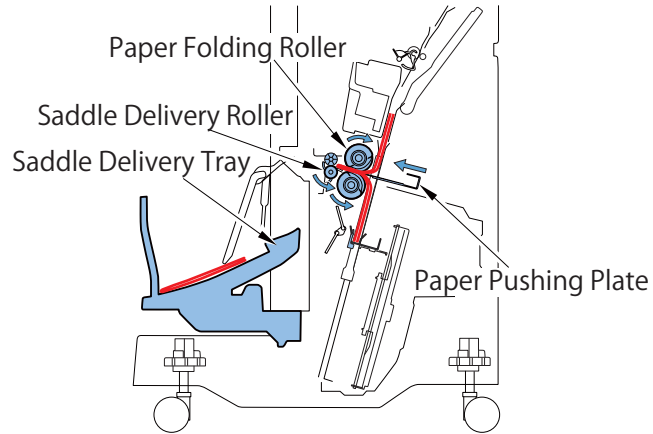


- 3) The operations described in steps 1 and 2 are repeated for each sheet to stack the sheets on the saddle processing tray.

- 4) The paper is stitched (only in booklet mode).



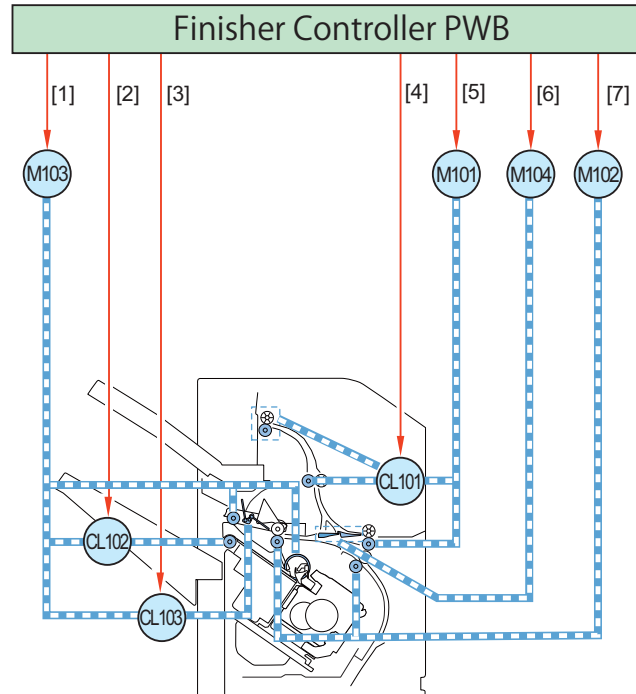
- 5) After the paper is folded by the paper pushing plate and paper folding roller, it is delivered on to the saddle delivery tray by the saddle delivery roller.



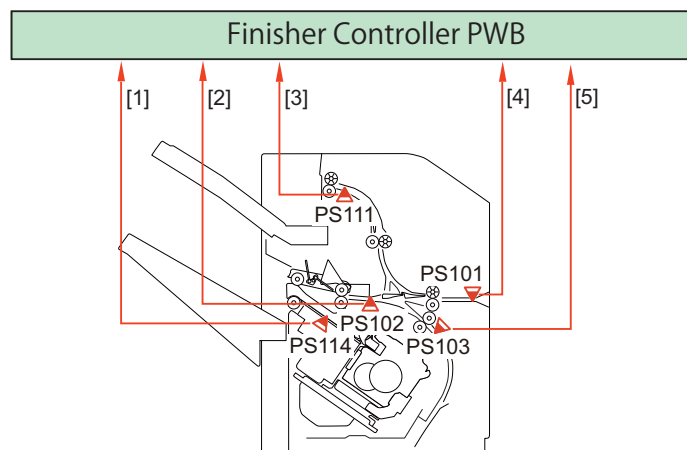
4. Feeding Unit

A. Outline

The feeding unit feeds the paper received from the host machine to the stack tray, escape tray, or the saddle stitcher unit according to the instructions from the finisher controller PWB. Seven sensors are provided along the paper feed path to detect the paper feed state and jam.



No.	Signal names	Load sign name	Part name
[1]	Discharge motor drive signal	M103 FNME	Discharge motor
[2]	Oscillation lower roller drive clutch drive signal	CL102 FNCDRUS	Oscillation lower roller drive clutch
[3]	Paddle drive clutch drive signal	CL103 FNCDP	Paddle drive clutch
[4]	Escape transport drive switch clutch drive signal	CL101 FNCEDE	Escape transport drive switch clutch
[5]	Entry port transport motor drive signal	M101 FNMEC	Entry port transport motor
[6]	Escape/Saddle transport switch flapper motor drive signal	M104 FNMFECS	Escape/Saddle transport switch flapper motor
[7]	Buffer motor drive signal	M102 FNMB	Buffer motor



No.	Signal names	Load sign name	Part name
[1]	Process tray paper surface sensor detection signal	PS114 FNDPOPT	Process tray paper surface sensor
[2]	Preprocessing timing sensor detection signal	PS102 FNTBP	Preprocessing timing sensor
[3]	Escape paper exit sensor detection signal	PS111 FNEE	Escape paper exit sensor
[4]	Entry port sensor detection signal	PS101 FNE	Entry port sensor
[5]	Buffer sensor detection signal	PS103 FNB	Buffer sensor

B. Basic Operation

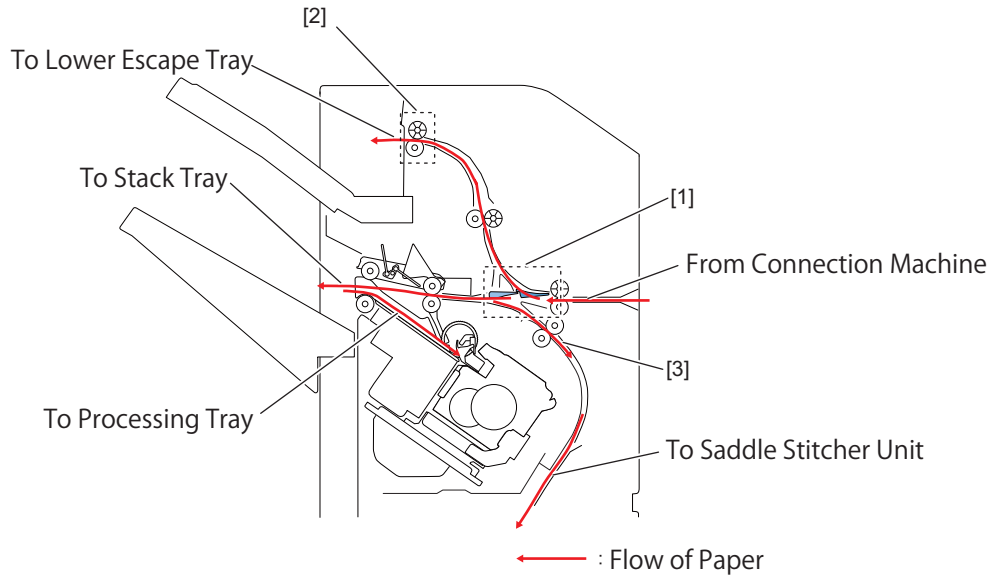
[1] Feed switch operation

Three flappers are used to feed the paper to the stack tray (processing tray), escape tray, or the saddle stitcher unit (buffer path unit).

[2] Shift operation

When paper is stacked in the escape tray, switch the paper position for each job. (only when shift sort mode is selected)

[3] Buffer operation A specified number of sheets are stored in the buffer path unit and fed with the paper received from the host machine to the processing tray unit.

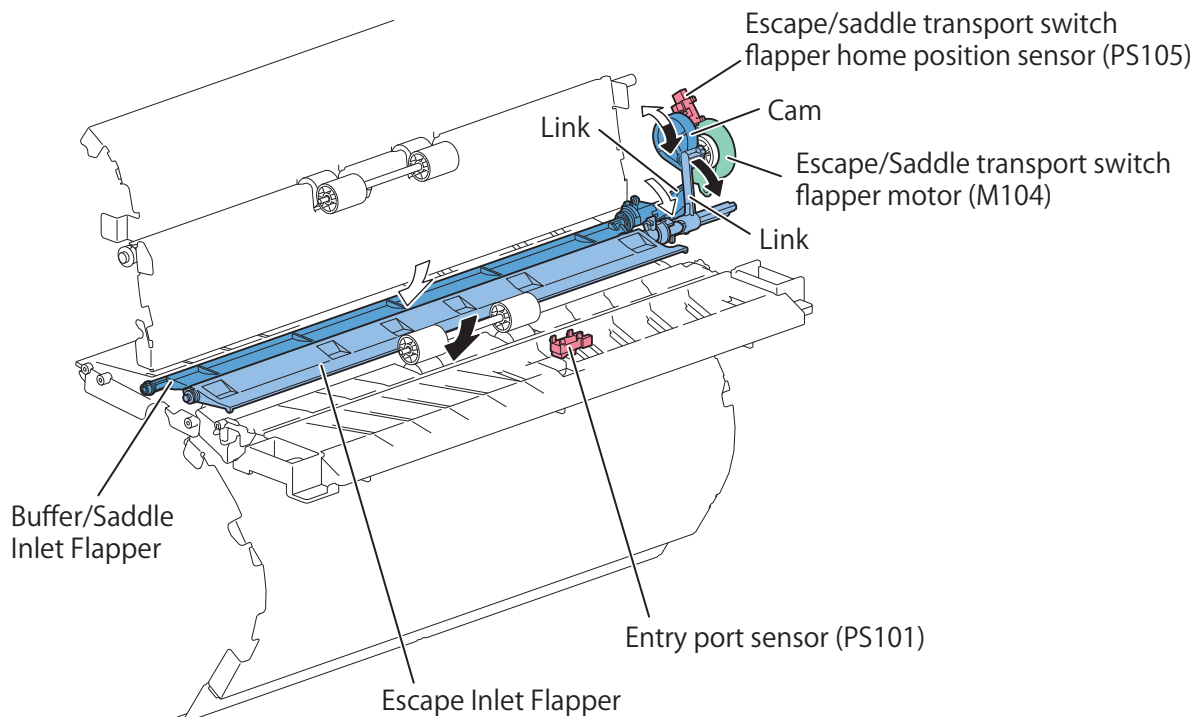


C. Feed switch operation

This equipment feeds the paper received from the host machine to the stack tray (processing tray), lower escape tray, or saddle delivery tray (saddle stitcher unit).

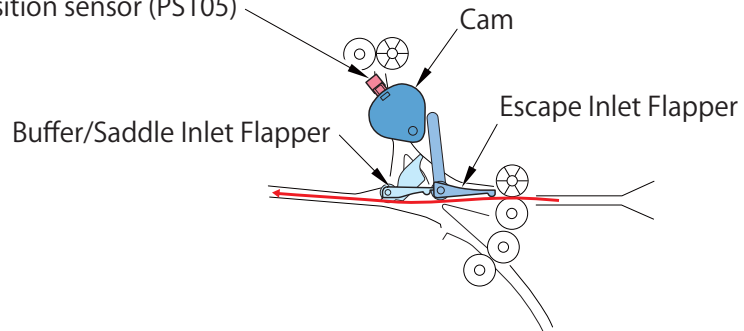
The feed path is switched by two flappers: escape inlet flapper and buffer/saddle inlet flapper.

The home position is detected by the Escape/saddle transport switch flapper home position sensor (PS105). The flapper are driven by the motor: Escape/Saddle transport switch flapper motor (M104).



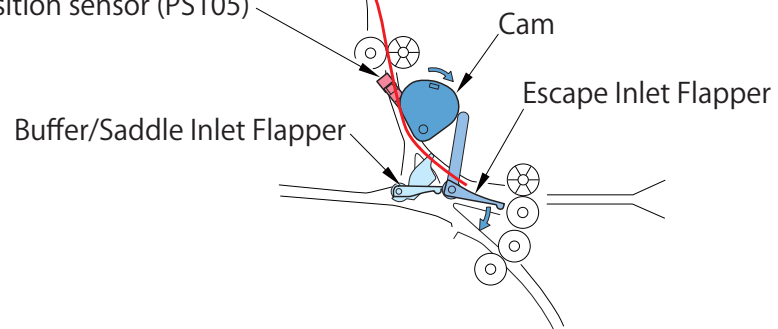
- Paper feed to the stack tray (processing tray)
- Escape Inlet Flapper: OFF
- Buffer/Saddle Inlet Flapper: OFF
- Escape/saddle transport switch flapper home position sensor (PS105): OFF

Escape/saddle transport switch
flapper home position sensor (PS105)



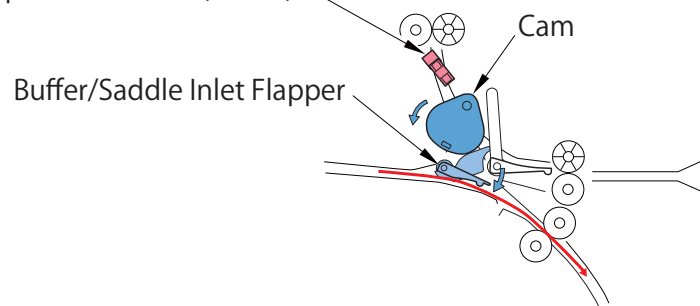
- Paper feed to the escape tray
- Escape Inlet Flapper: ON
- Escape/saddle transport switch flapper home position sensor (PS105): OFF

Escape/saddle transport switch
flapper home position sensor (PS105)



- Paper feed to the saddle delivery tray (saddle stitcher unit)
- Buffer/Saddle Inlet Flapper: ON
- Escape/saddle transport switch flapper home position sensor (PS105): OFF

Escape/saddle transport switch
flapper home position sensor (PS105)



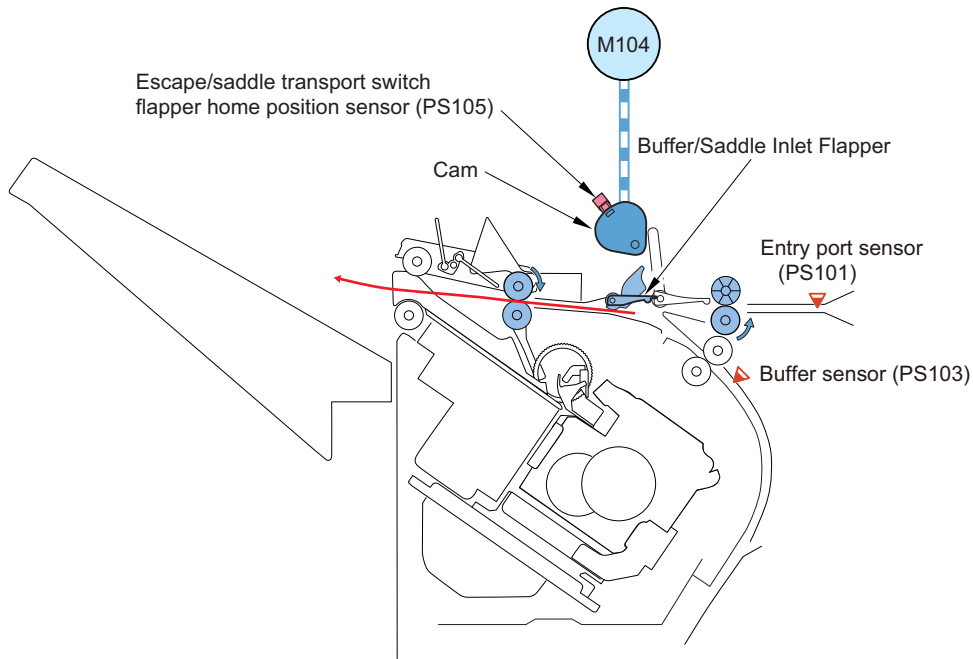
D. Buffer Operation

The paper fed by the host machine while the processing tray unit is performing shift operation or staple operation is stored in the buffer path unit and fed to the processing tray unit as a paper stack. This allows paper to be fed without sacrificing print processing speed. In addition, the buffer operation is not performed at the staple-free binding mode.

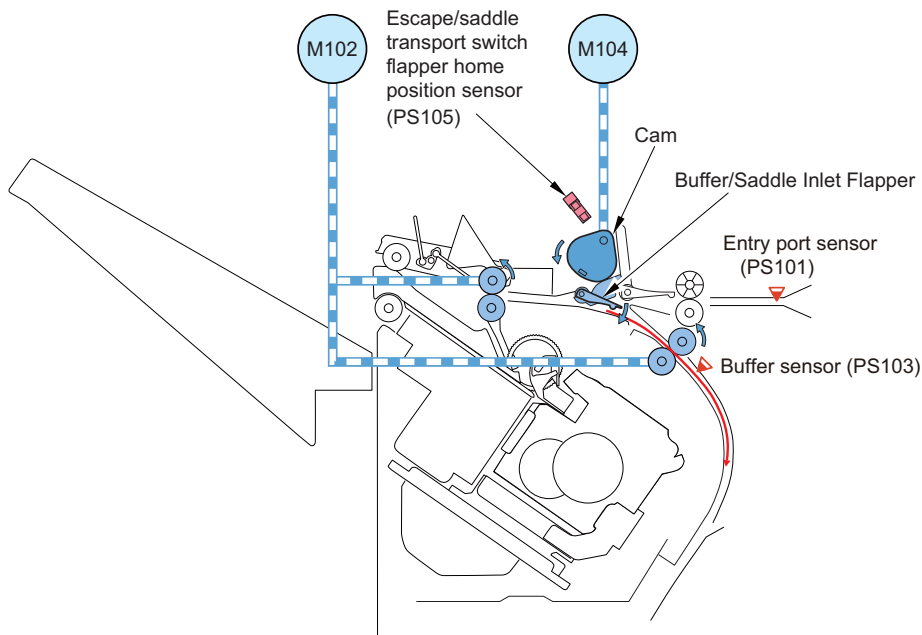
- Paper size applicable for buffer feed operation
- Feed direction: 182 mm to 220 mm
- Cross feed direction: 210 mm to 297 mm
- Number of sheets that can be buffered: 1 to 3 sheets (Up to 2 sheets can be stacked in the buffer. 1 or 2 sheets for 2-sided print)
- Weight of paper that can be buffered: 60 to 105 g/m²
- Buffer paper shift amount: 3.5 ± 1.0 mm

■ Buffer Operation

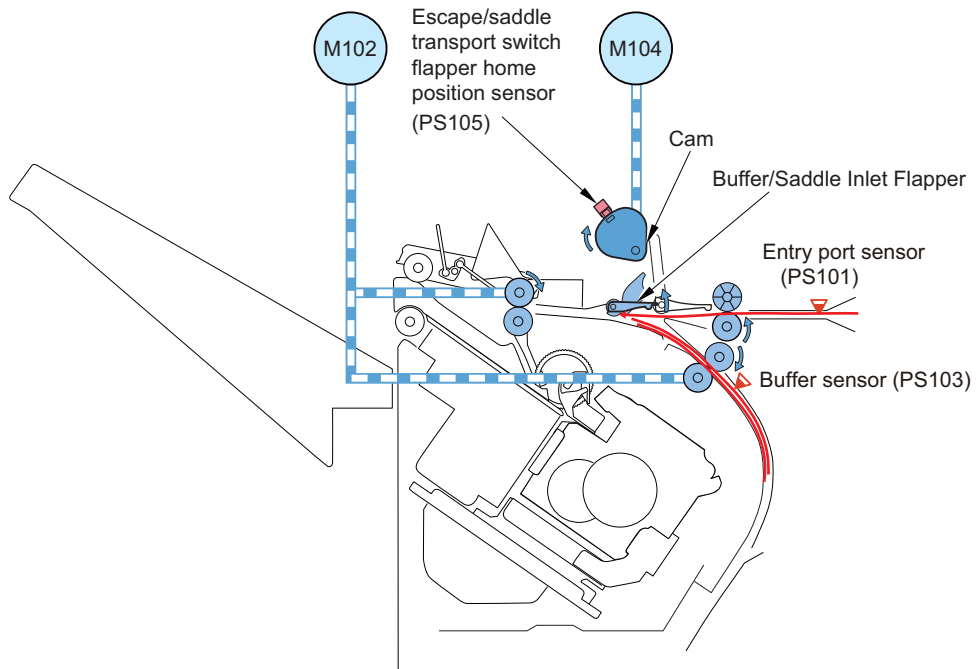
- 1) The trailing edge of the paper fed by the host machine is detected by the Entry port sensor (PS101). The paper is fed for a specified amount where it stops.



- 2) The Escape/Saddle transport switch flapper motor (M104) is driven to switch the buffer/saddle inlet flapper. The Buffer motor (M102) is driven in reverse to feed the paper to the buffer path unit. The paper trailing edge is detected by the Buffer sensor (PS103), and the paper is fed a specified amount where it stops.



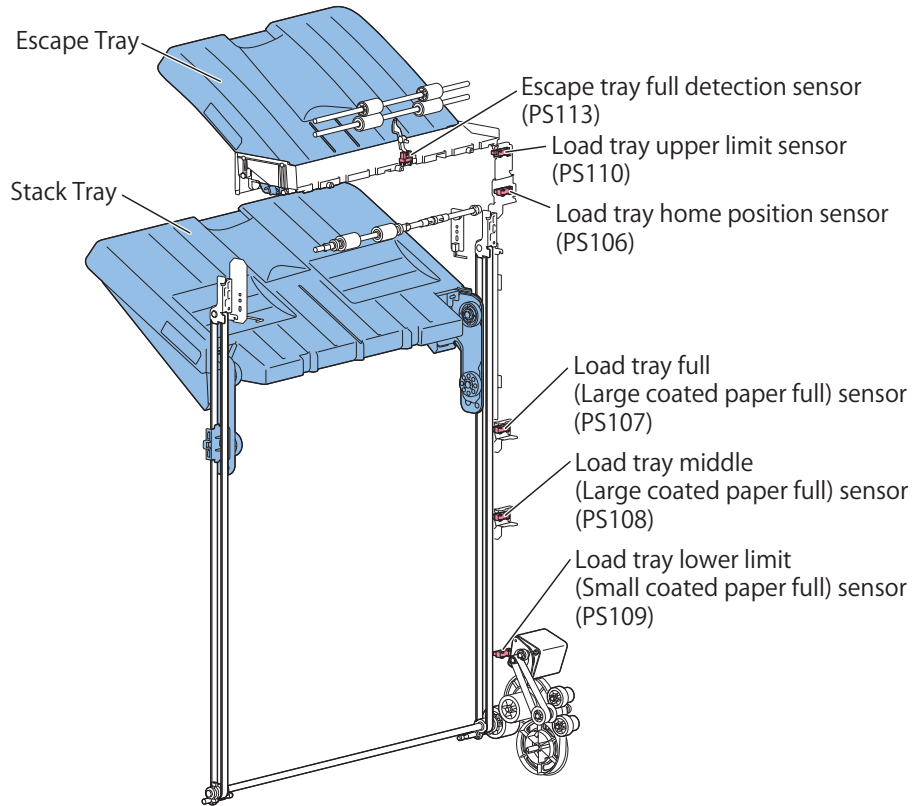
- 3) The Escape/Saddle transport switch flapper motor (M104) is driven to switch the buffer/saddle inlet flapper. The paper stored in the buffer and the paper received from the host machine are placed on top of each other but shifted by a specified amount and fed.
- If one sheet of paper is stored in the buffer, the overlapped sheets are fed to the processing tray unit as they are.
 - If two sheets of paper are stored in the buffer, the operation described in steps 2 and 3 is performed, the two sheets and the paper received from the host machine are placed on top of each other and fed to the processing tray unit.



5. Stack/Escape Tray Unit

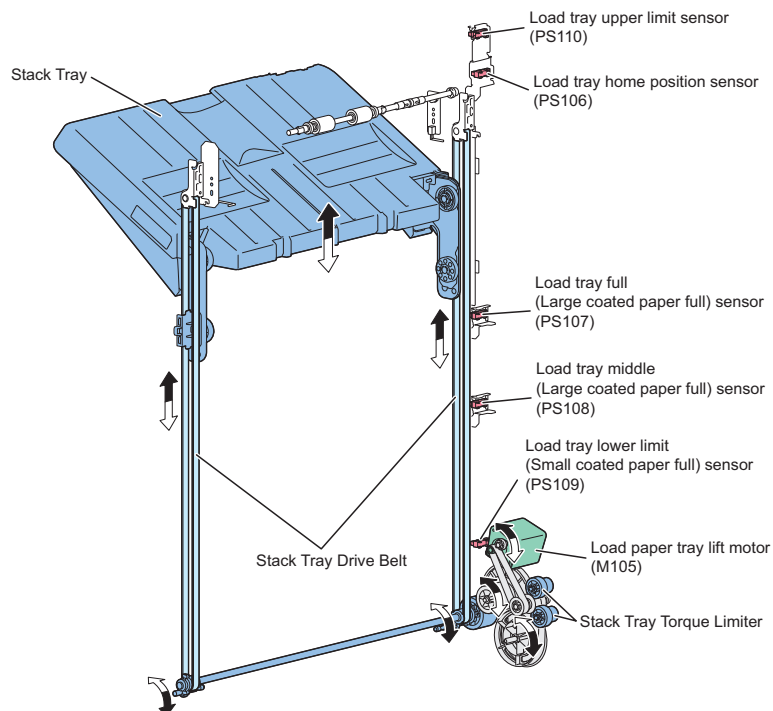
A. Outline

This equipment has a stack tray and a escape tray. The escape tray is fixed in place. The stack tray moves up and down according to the instructions from the finisher controller PCB. The stack/escape tray unit has a sensor for detecting the paper surface of the stack tray unit, four sensors for detecting whether the paper delivered in the tray is full, and two sensors for detecting the position of the stack tray.



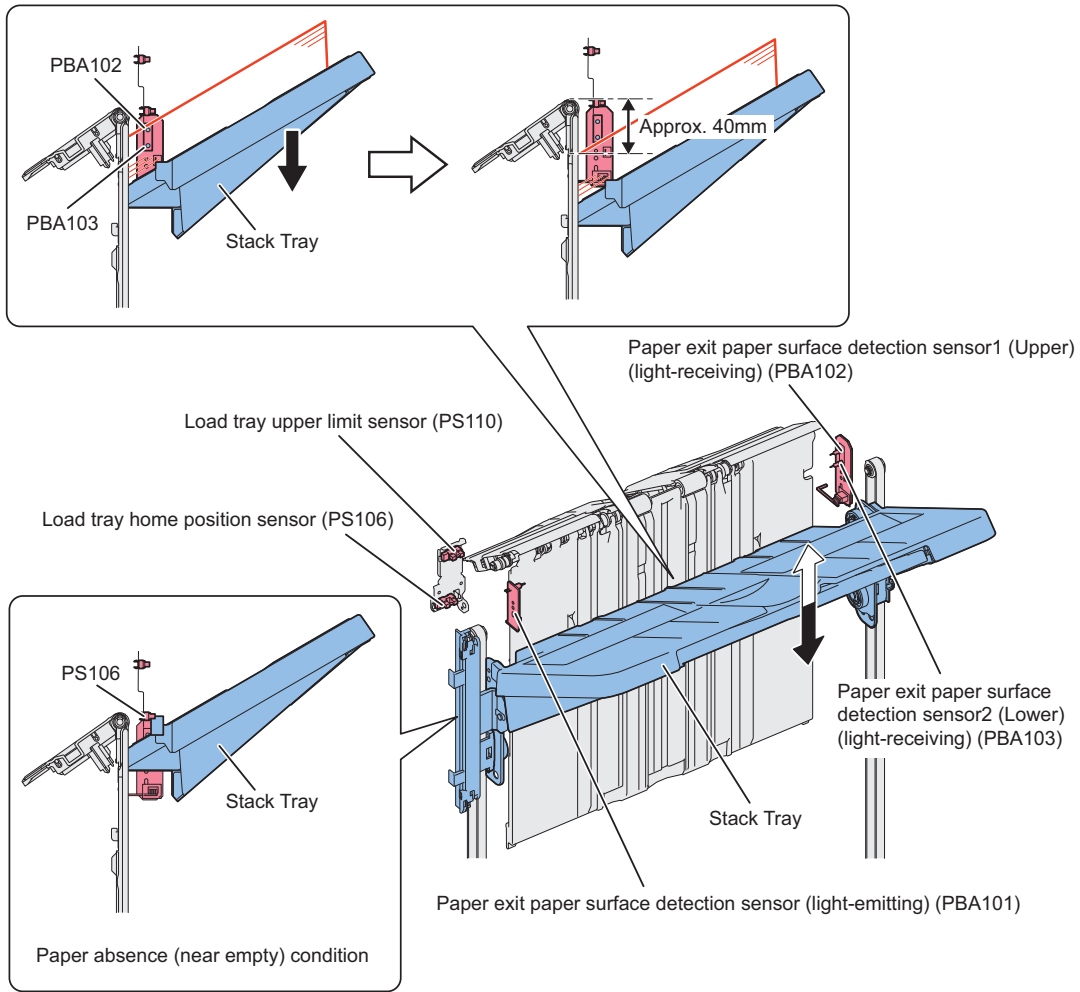
B. Stack Tray Up and Down Movement

The finisher controller PCB drives the Load paper tray lift motor (M105) to move the stack tray up and down via the belt. The Load tray home position sensor (PS106) detects the home position of the stack tray. The Load tray upper limit sensor (PS110) detects the upper limit position of the stack tray.

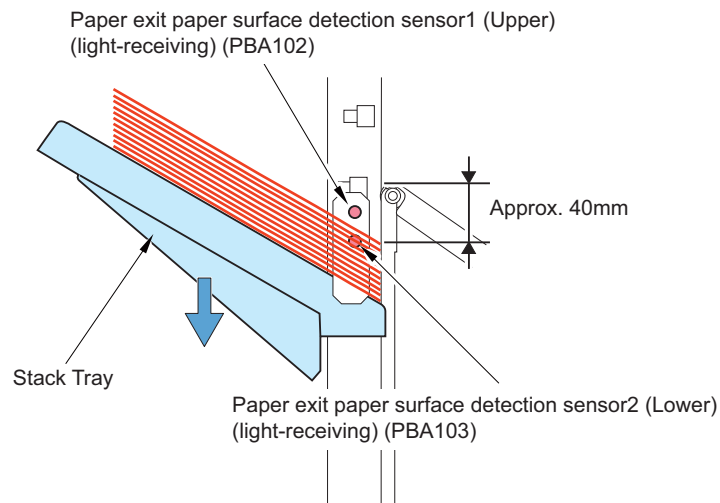


C. Stack Tray Delivery Paper Surface Detection, Paper Full

The surface position of the paper delivered in the stack tray is detected by the Paper exit paper surface detection sensors (PBA101, PBA102(FN1DO), PBA103(FN2DO)). The surface of the paper delivered in the stack tray is detected by using the Paper exit paper surface detection sensor 1 and 2 (upper and lower) (light-receiving) (PBA102, PBA103) to detect the on/off state of the LED light emitted from the Paper exit paper surface detection sensor (light-emitting) (PBA101).

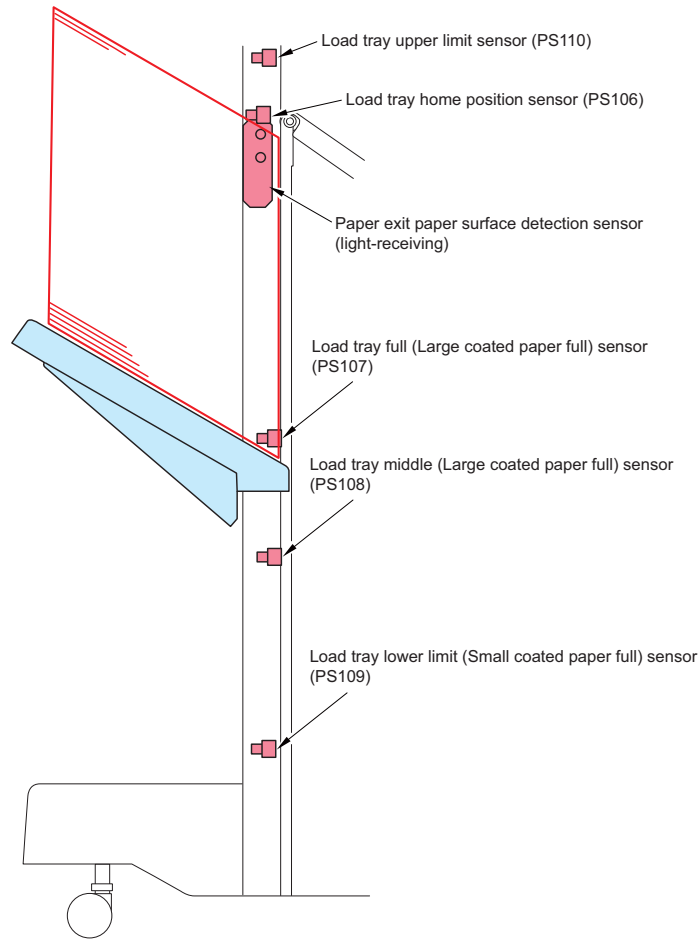


When the paper stacked in the stack tray increases, the LED light from the Paper exit paper surface detection sensor (light-emitting) (PBA101) is blocked. When this happens, the stack tray is lowered so that the paper surface height on the stack tray is appropriately aligned with the paper delivered from the delivery unit (about 40 mm).



If the Load tray full (Large coated paper full) sensor, the Load tray middle (Large coated paper full) sensor and the Load tray lower limit (Small coated paper full) sensor (PS107, PS108, and PS109) are on when the LED light from the Paper exit paper surface detection sensor (light-emitting) (PBA101) is blocked (; the Paper exit paper surface detection sensor detects the paper), this equipment decides that the paper in the delivery tray is full and stops the paper feed operation.

The following illustration shows the condition that the Load tray full (Large coated paper full) sensor (PS107) detected the paper full on the stack tray.

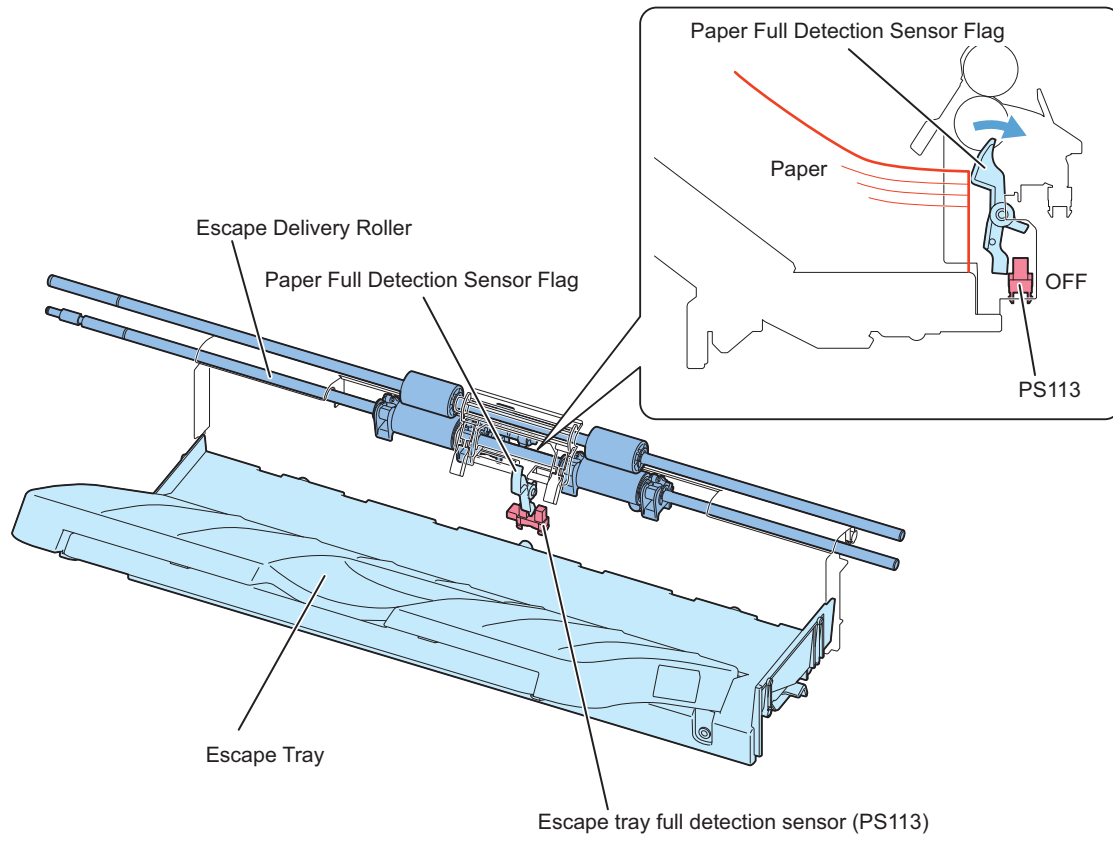


Sensor name	Function
Load tray full (Large coated paper full) sensor (PS107)	Paper full detection of large-size coated paper
Load tray middle (Large coated paper full) sensor (PS108)	Paper full detection of large-size plain paper Paper full detection of small-size coated paper
Load tray lower limit (Small coated paper full) sensor (PS109)	Paper full detection of small-size plain paper

- Small size: feed length 216 mm or less, large size: feed length more than 216 mm

D. Escape Tray Paper Full Detection

Paper full detection on the escape tray is performed using the Escape tray full detection sensor (PS113). When the Escape tray full detection sensor (PS113) is on, it is determined that the paper in the escape tray is full, and paper feed operation is stopped.



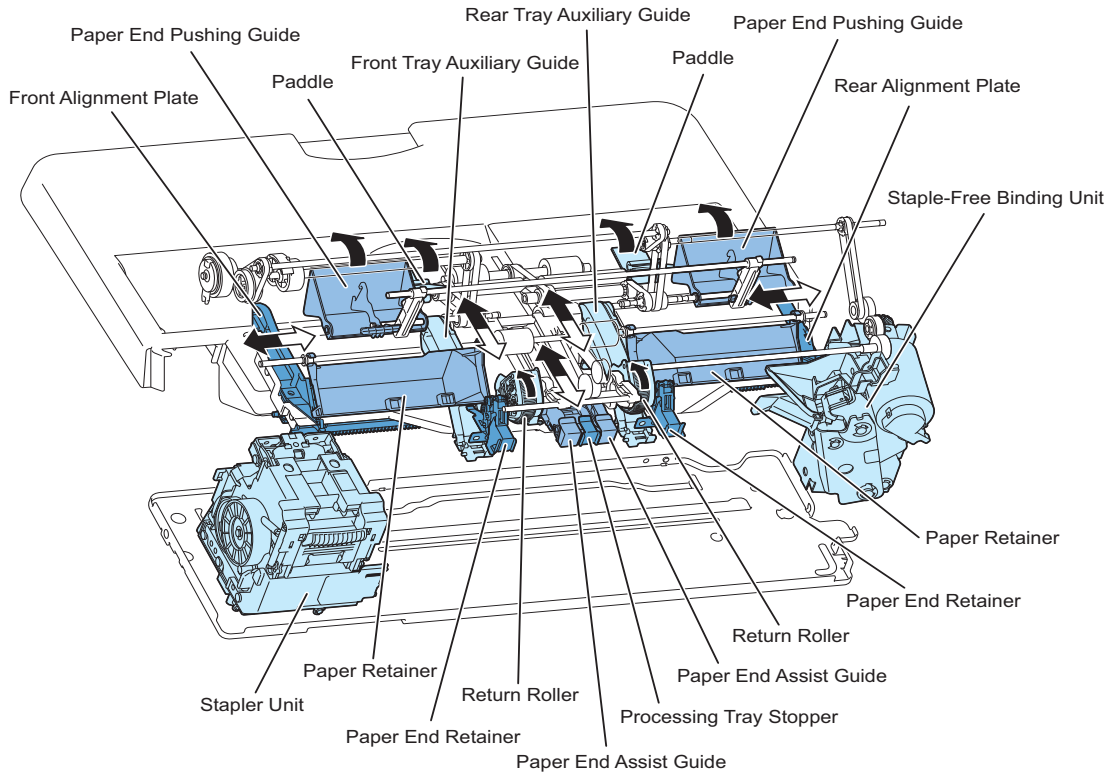
NOTE:

To prevent damage when the tray is raised due to an error in the stack tray unit, the escape tray unit is constructed so that the tray moves to the top.

6. Processing Tray Unit

A. Outline

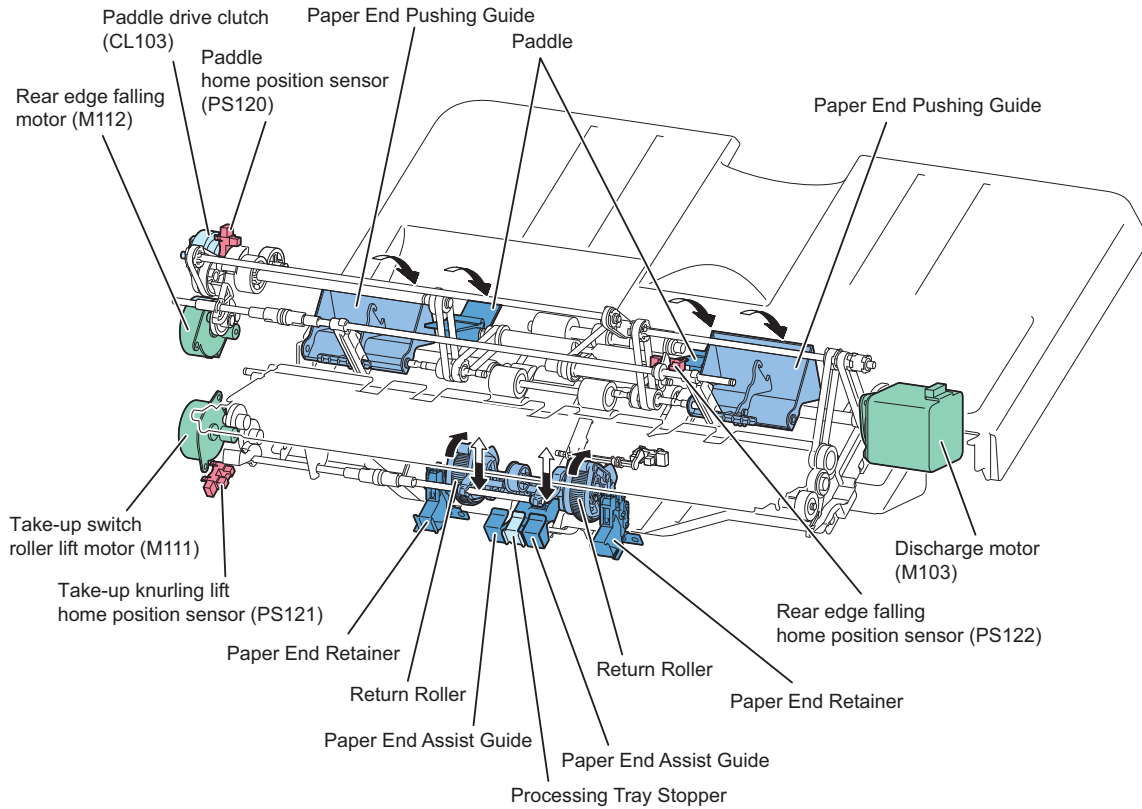
The processing tray unit aligns, shifts, and staples the delivered paper, and then delivers the paper stack onto the stack tray. Note that alignment is not performed in the processing tray unit if shifting, stapling, or staple-free binding is not performed. (However, alignment is performed for 2-sided print of A3 and B4 sheets weighing less than 64 g/m².)



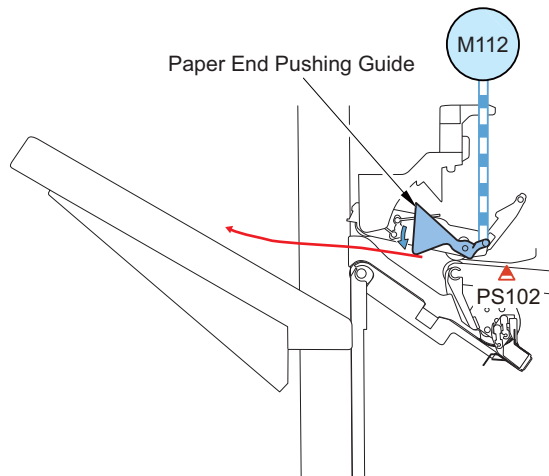
Name	Role
Paddle	Feeds the paper delivered from the pre-processing roller onto the processing tray unit.
Return Roller	Feeds the paper fed onto the processing tray to the stopper.
Processing Tray Stopper	Allows the paper fed to the processing tray to be pressed against itself to align the paper in the feed direction.
Front/Rear Alignment Plate	Aligns the paper fed to the processing tray in the width direction and shifts the paper.
Paper End Assist Guide	Supports the trailing edge of the paper stack fed to the processing tray and delivers the stack by pushing it onto the stack tray.
Paper End Pushing Guide	Pushes down on the trailing edge of the paper delivered from the pre-processing roller and drops the paper trailing edge onto the processing tray.
Stapler Unit	Staples sheets.
Staple-free Binding Unit	Binds sheets without using staples.
Front/Rear Tray Auxiliary Guide	Supports paper stacking when long paper is stacked to prevent alignment errors caused by warped paper.
Paper Retainer	Retains the paper stacked on the processing tray using its own weight.
Paper End Retainer	Prevents bending by holding the paper trailing edge pressed against the processing stopper.

B. Stacking Operation

The paper delivered from the pre-processing roller is stacked on the processing tray and aligned in the feed direction. How paper is delivered from the pre-processing roller and stacked on the processing tray is described below.

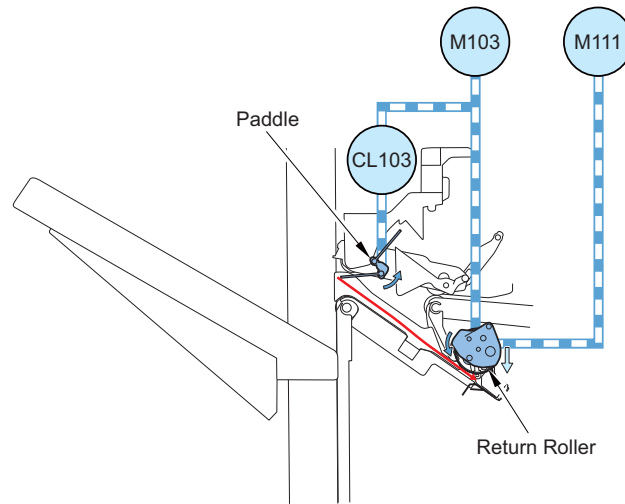


- 1) The trailing edge of the paper received from the host machine is detected by the Preprocessing timing sensor (PS102). After a specified time elapses, the Rear edge falling motor (M112) drives to lower the paper end pushing guide which presses down on the paper trailing edge onto the processing tray.

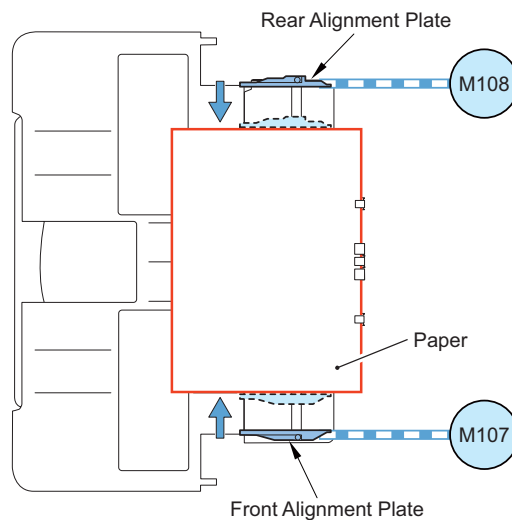
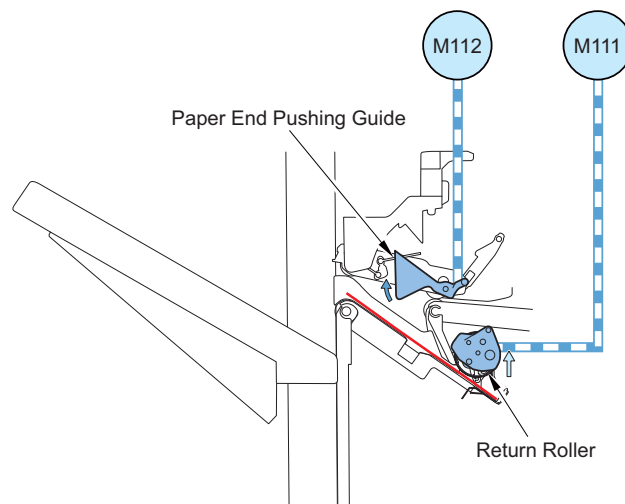


- 2) The Discharge motor (M103) drives, and the Paddle drive clutch (CL103) turns on. The paddle is rotated (once for small size, twice for large size) and pulls in the paper into the processing tray unit. Further, Take-up switch roller lift motor (M111) is driven, and Discharge motor (M103) is used for rotation. The return roller is lowered, and the paper is pressed against the processing tray stopper to align the paper in the feed direction.

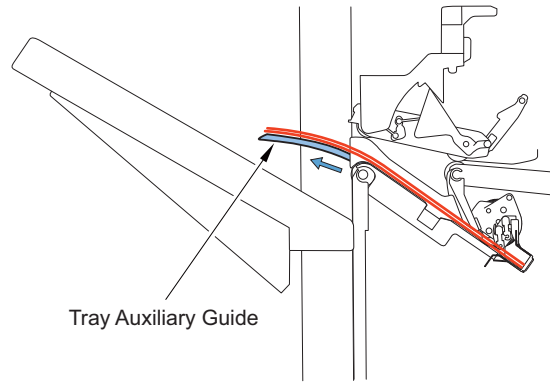
NOTE: The buffered paper stack is pulled into the processing tray unit by the stack delivery roller.



- 3) The Rear edge falling motor (M112) and Take-up switch roller lift motor (M111) are driven to lift the paper end pushing guide and return roller. Then the Front/Rear alignment motors (M107/M108) are driven to move the front/rear alignment plate so that the paper stacked in the processing tray is aligned in the cross feed direction.

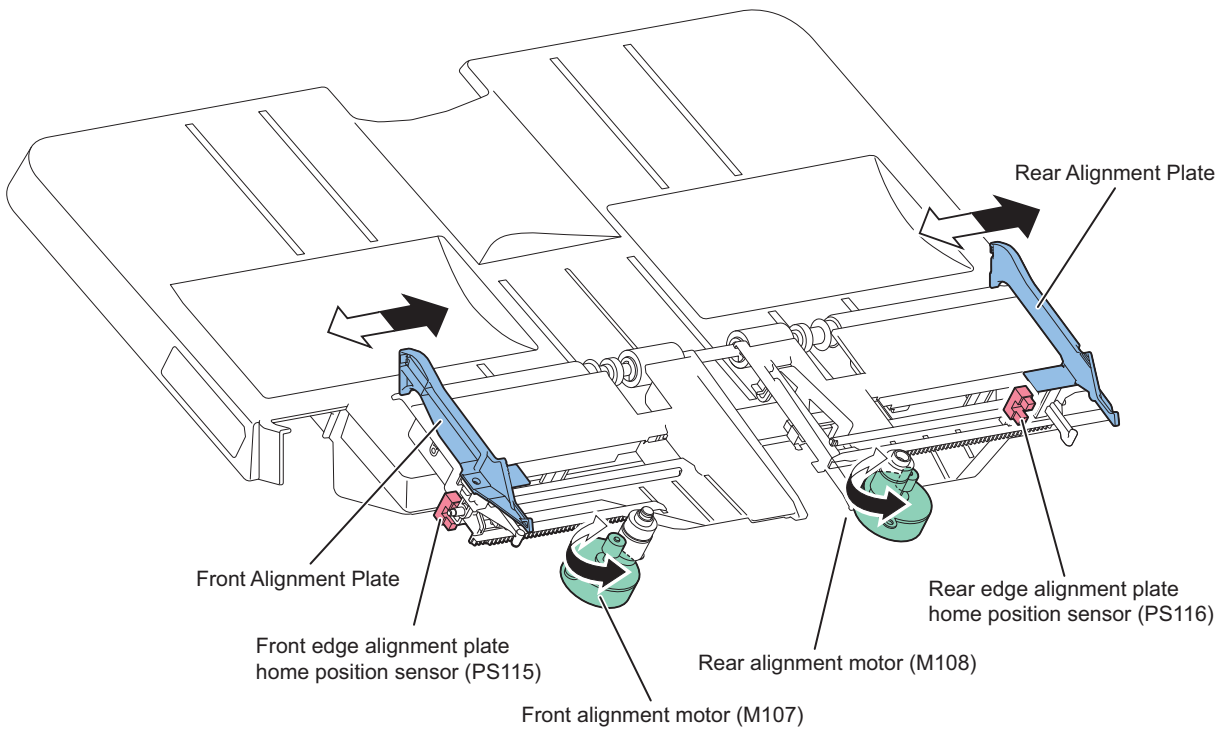


4) Operations described in steps 1 to 3 are repeated for each sheet.



C. Alignment/Shifting Operation

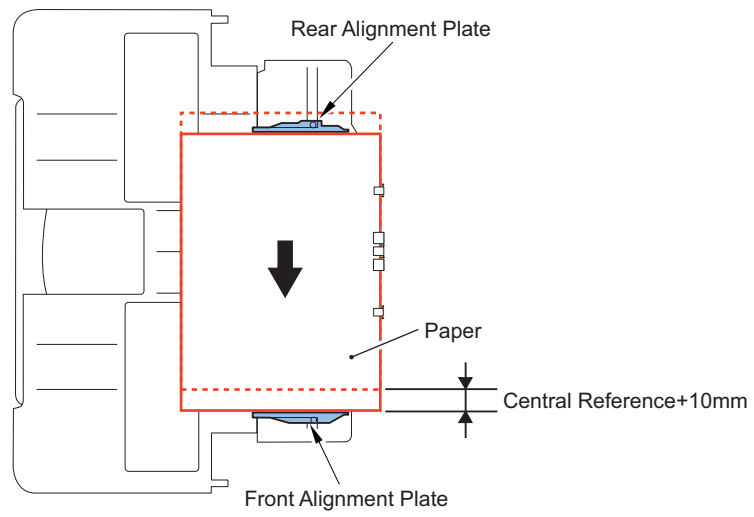
The paper stacked on the processing tray is aligned in the width direction by the front and rear alignment plates. When shift sort is specified, the paper stacked on the processing tray is shifted to the front or rear side. The front alignment plate is driven by the Front alignment motor (M107) and the rear alignment plate by the Rear alignment motor (M108). The home positions of the alignment plates are detected by the Front edge alignment plate home position sensor (PS115) and Rear edge alignment plate home position sensor (PS116).



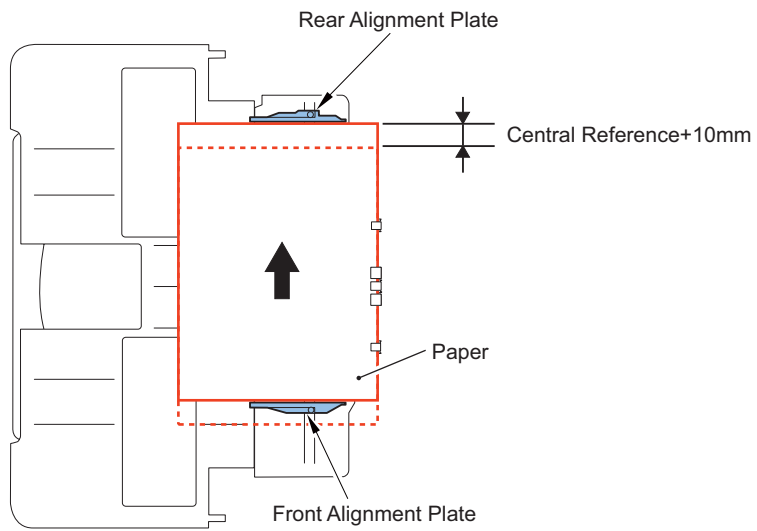
The relationship between operation modes and shift positions is summarized in the following table:

Operation Mode	Paper	Shift position
Shift sort	Paper width: 210 mm to 297 mm Paper length: 182 mm to 432 mm	<ul style="list-style-type: none"> • Front shift position: 10 mm frontward from the center reference position • Rear shift position: 10 mm frontward from the center reference position
	Paper other than above	Center reference
Staple	A3, A4, A4R, B4, B5, 11"×17", LGL, LTR, LTRR, EXEC, 8K, 16K,	Center reference
Staple-free binding	A3, A4, 11"×17", LTR, 8K, 16K	Center reference

- Front shift position



- Rear shift position



D. Staple Operation

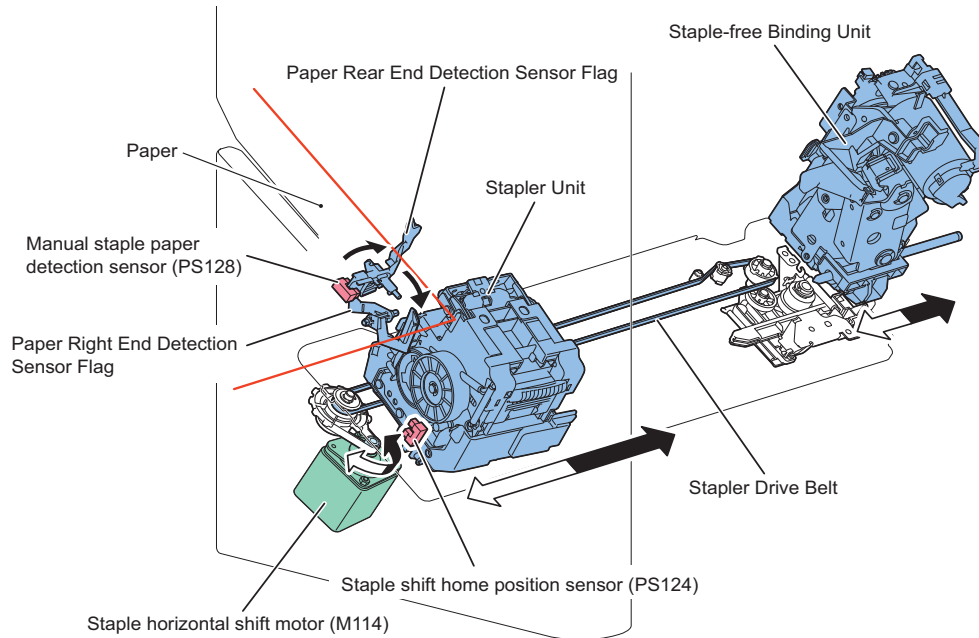
■ Outline

In staple operation, the specified number of sheets of paper (65 sheets max.) is stapled by the stapler unit. The staple position varies depending on the staple mode.

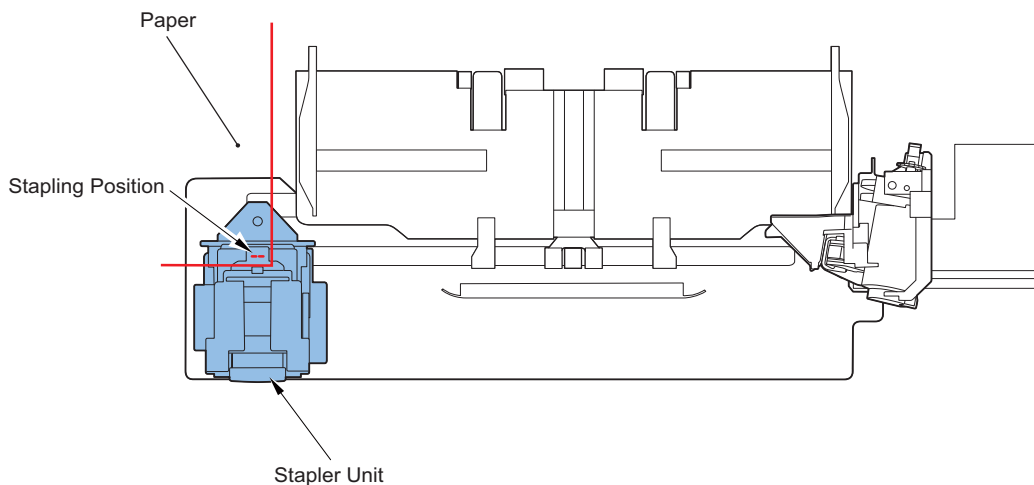
The stapler unit is driven by the Staple horizontal shift motor (M114). The home position is detected by the Staple shift home position sensor (PS124). In addition, if paper is set in the manual staple paper slot and the Manual staple paper detection sensor (PS128) turns on, manual stapling becomes possible (manual staple LED lights). If the manual staple button is pressed or a specified time elapses, stapling is executed. The time from when the paper is set until stapling is executed automatically can be adjusted through <configuration/registration> and service mode. (Range of settings: 1 to 5 seconds, default value: 2 seconds)

Manual stapling cannot be executed if the finisher is in one of the following conditions.

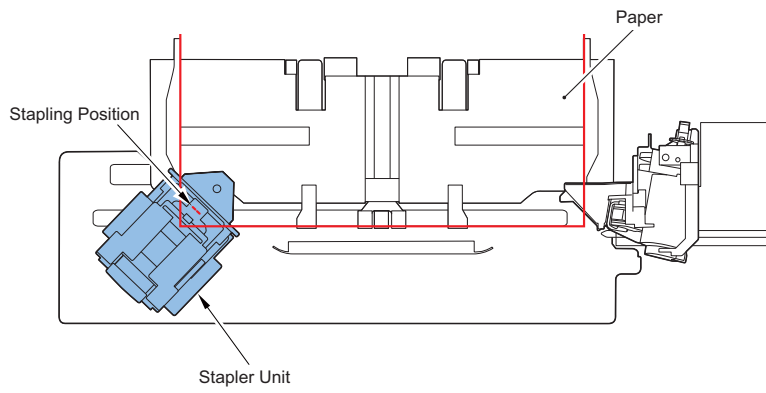
- * During initial operation
- * Front cover is open
- * When a jam occurs
- * When an error occurs
- * When a staple empty alarm occurs
- * When a job is being executed
- * During sleep mode
- * During tray function restriction mode
- * When there is paper in the processing tray
- * When the stapler is not at its home position
- * When paper is detected in the manual stapler unit



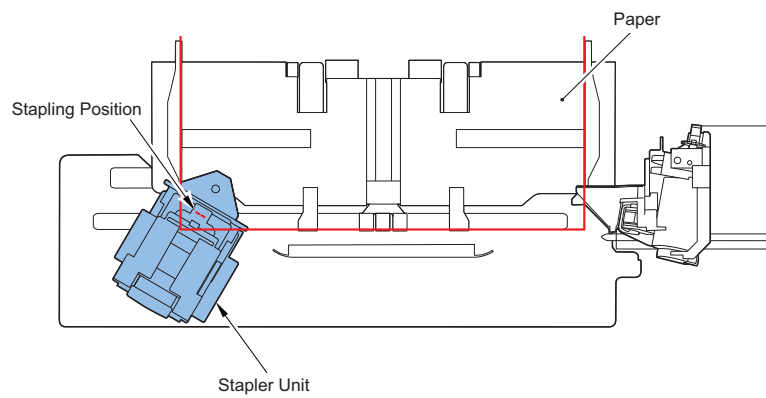
• Manual stapling



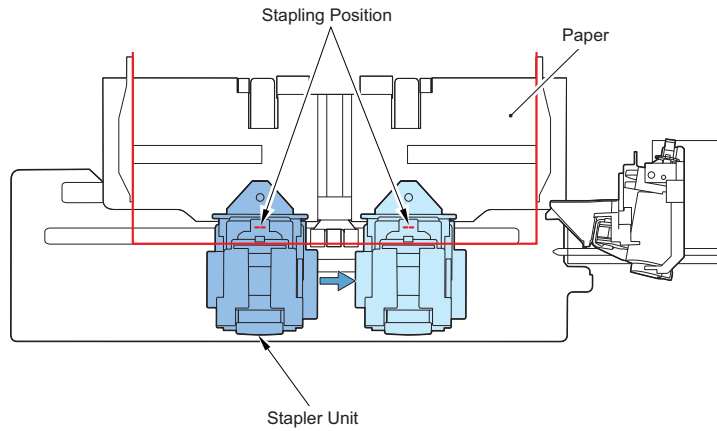
- Front 1-point stapling (45 deg)



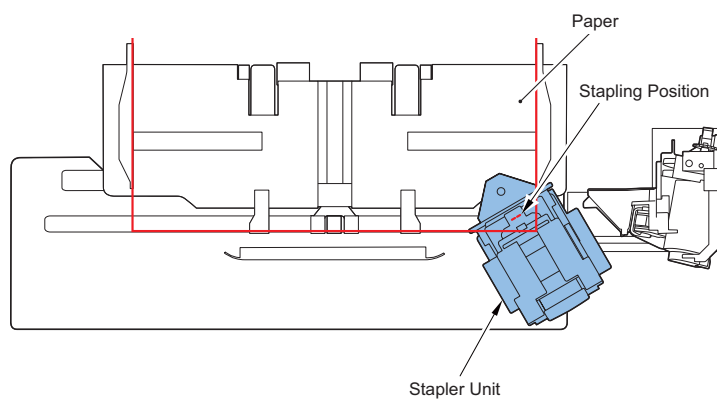
- Front 1-point stapling (30 deg)



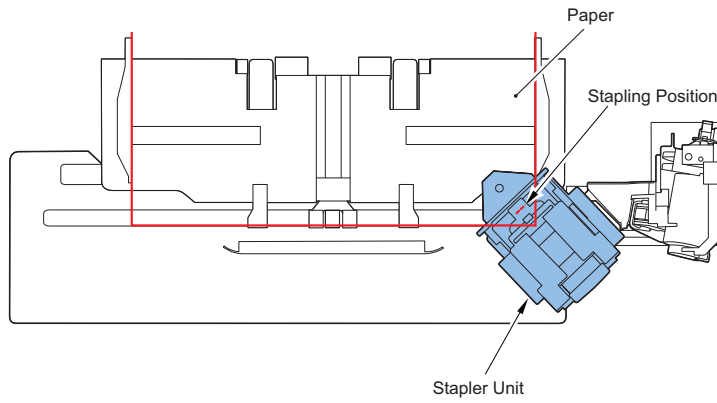
- 2-point stapling



- Rear 1-point stapling (30 deg)



• Rear 1-point stapling (45 deg)

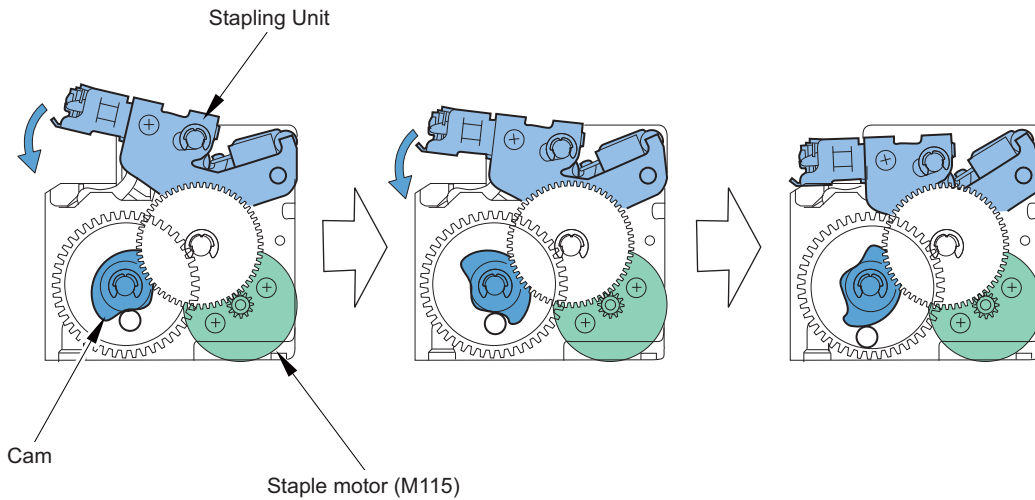


■ Stapler Unit

Stapling occurs when the cam driven by the Staple motor (M115) rotates once.

The cam's home position is detected by the Staple drive home position sensor (PS125).

The presence of the staple cartridge and the presence of the staples in the staple cartridge are detected by the Staple empty detection sensor (PS127). Whether the staple in the staple cartridge is pushed out to the leading edge of the cartridge is detected by the Staple cuing detection sensor (PS126).



• Number of sheets that can be stapled

Item	Specifications			Remarks
	Paper	Small size	Large size	
Number of sheets that can be stapled	52 - 90g/m ²	65 sheets	30 sheets	<ul style="list-style-type: none"> • Paper thickness (small size): 11 mm or less • Paper thickness (large size): 5.5 mm or less Paper size regulations Small size: feed length 216 mm or less Large size: feed length more than 216 mm
	More than 90 to 105g/m ²	50 sheets	25 sheets	
	More than 105 to 256g/m ²	2 sheets	2 sheets	

If a job is in the following condition, stapling is not performed, and the paper is delivered.

- When the number of sheets that can be stapled is exceeded
- When paper whose width is less than 210 mm or more than 297 mm is in use
- When paper whose length is less than 182 mm or more than 432 mm is in use

E. Staple-free Binding Operation

■Outline

Staple-free binding includes an operation that binds the specified number of sheets (5 sheets max.) using the staple-free binding unit. The binding position is one location on the rear side.

In staple-free binding mode, the paper stack center-aligned by the processing tray is shifted to the staple-free binding position by the alignment plate.

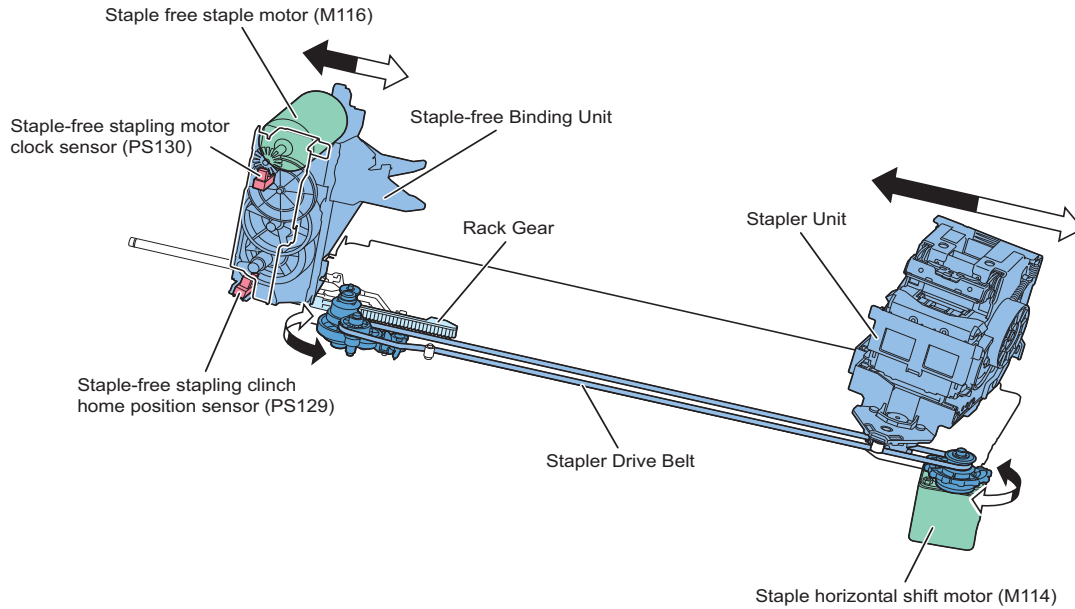
The staple-free binding unit is driven by the Staple free staple motor (M116) to bind the paper stack.

The rotation status of the Staple free staple motor (M116) is detected by the Staple-free stapling motor clock sensor (PS130).

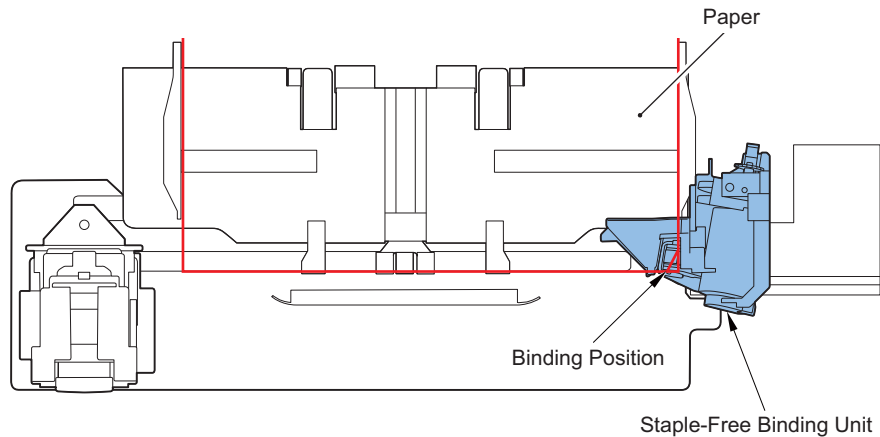
The binding unit's home position is detected by the Staple-free stapling clinch home position sensor (PS129).

Note that the staple-free binding unit is shifted by the Staple horizontal shift motor (M114) to the front or rear in sync with the stapler unit.

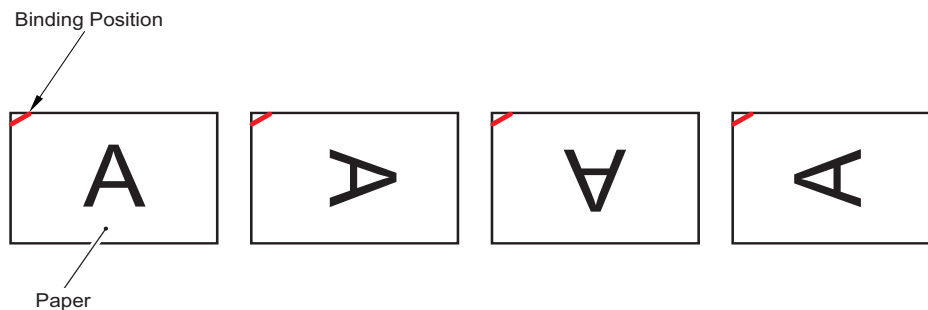
When stapling by the stapler unit is taking place, the staple-free binding unit is stored in the rear.



Because the staple-free binding position is only rear 1-point binding, the binding position for the printing is changed by the combination of the printing image rotation control and face up/down delivery function.

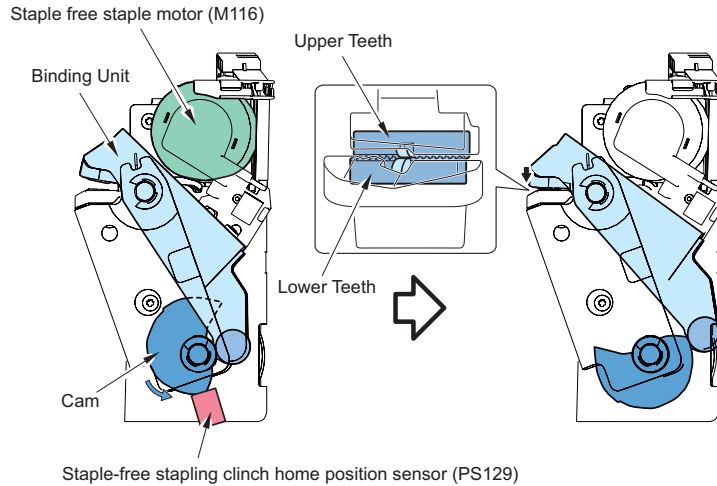


The relations between the direction of the printing and the binding position are described below.



■Staple-Free Binding Unit

When the Staple free staple motor (M116) drives and the cam rotates once, the binding unit pinches the paper. The wave-shaped upper teeth and lower teeth of the binding unit bite the paper to bind it. The cam rotation status is detected by the Staple-free stapling clinch home position sensor (PS129) to detect the home position of the binding unit.



- Number of sheets that can be binded

Item	Specifications	Remarks
Binding capacity	<ul style="list-style-type: none"> • 52 to 64 g/m²: 5 sheets or less • More than 64 to 81.4 g/m²: 4 sheets or less • More than 81.4 to 105 g/m²: 3 sheets or less * However the operation limit is uniformly 5 sheets or less 	<ul style="list-style-type: none"> • Binding a mix of different widths is not possible. • Binding a mix of same width is possible.

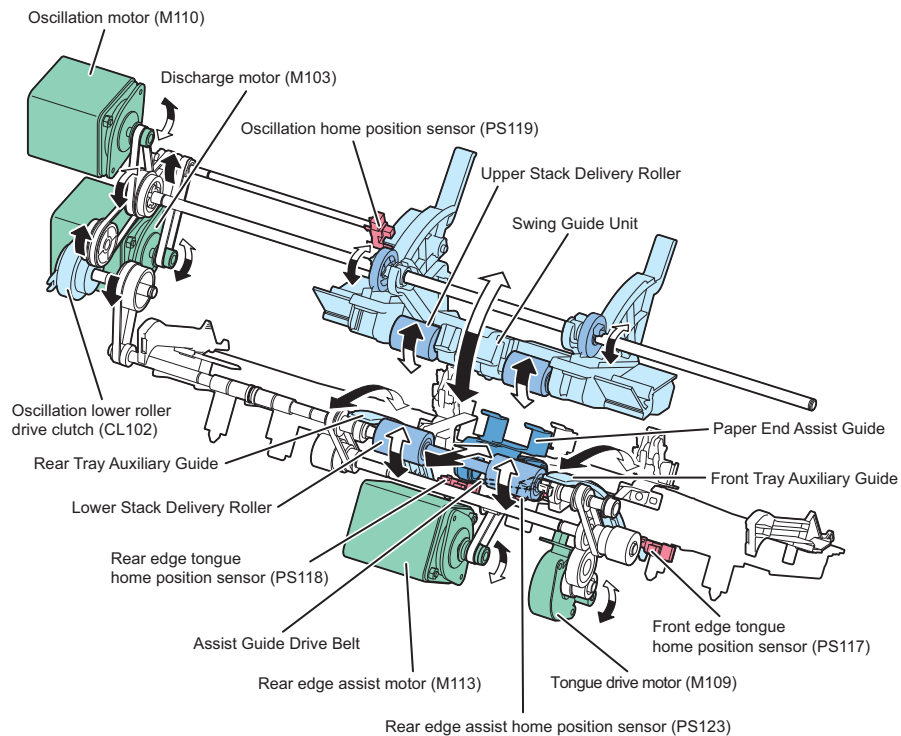
If a job is in the following condition, staple-free binding is not performed, and the paper is delivered.

- When the number of sheets that can be staple-free binded is exceeded
- When paper whose width is less than 270 mm or more than 297 mm is in use
- When paper whose length is less than 195 mm or more than 432 mm is in use

F. Stack delivery

The paper stacked in the processing tray is fed toward the stack tray by the paper end assist guide and delivered to the stack tray by the stack delivery roller. The upper stack delivery roller is used for this purpose. During this process, the swing unit including the upper stack delivery roller is controlled so that it is positioned at the appropriate location according to the thickness and type of the delivered paper stack. The paper end assist guide is driven by the Rear edge assist motor (M113) via the assist guide drive belt. The paper end assist guide's home position is detected by the Rear edge assist home position sensor (PS123).

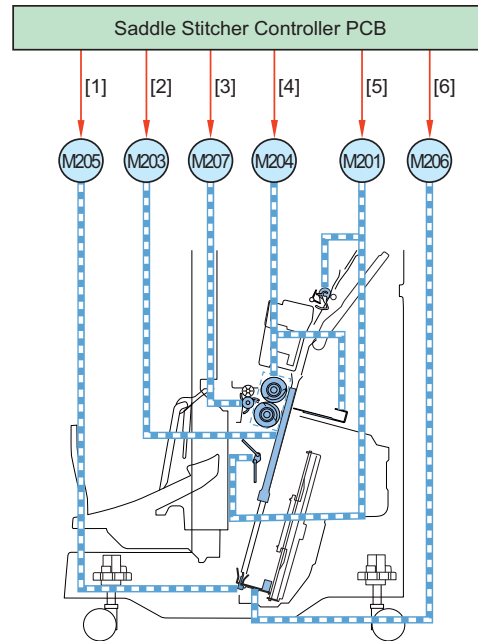
The number of the stack delivery sheet is to 5 sheets at the maximum.



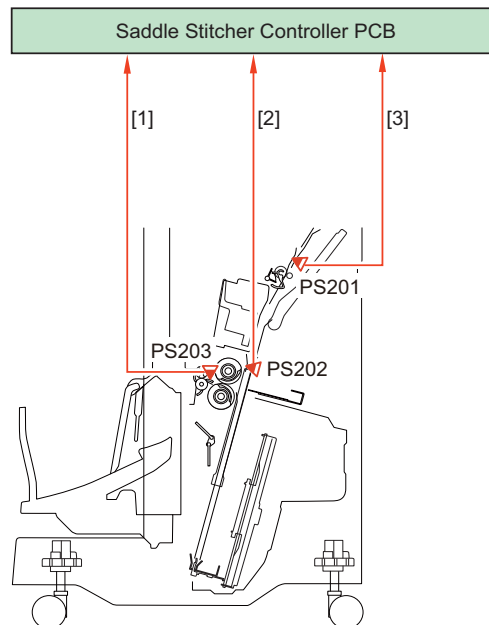
7. Saddle Stitcher Unit

A. Outline

The saddle stitcher unit stitches and folds paper according to the instructions from the saddle stitcher controller PCB and delivers the paper to the saddle delivery tray. Three sensors are provided along the paper feed path to detect the paper feed state and jam.



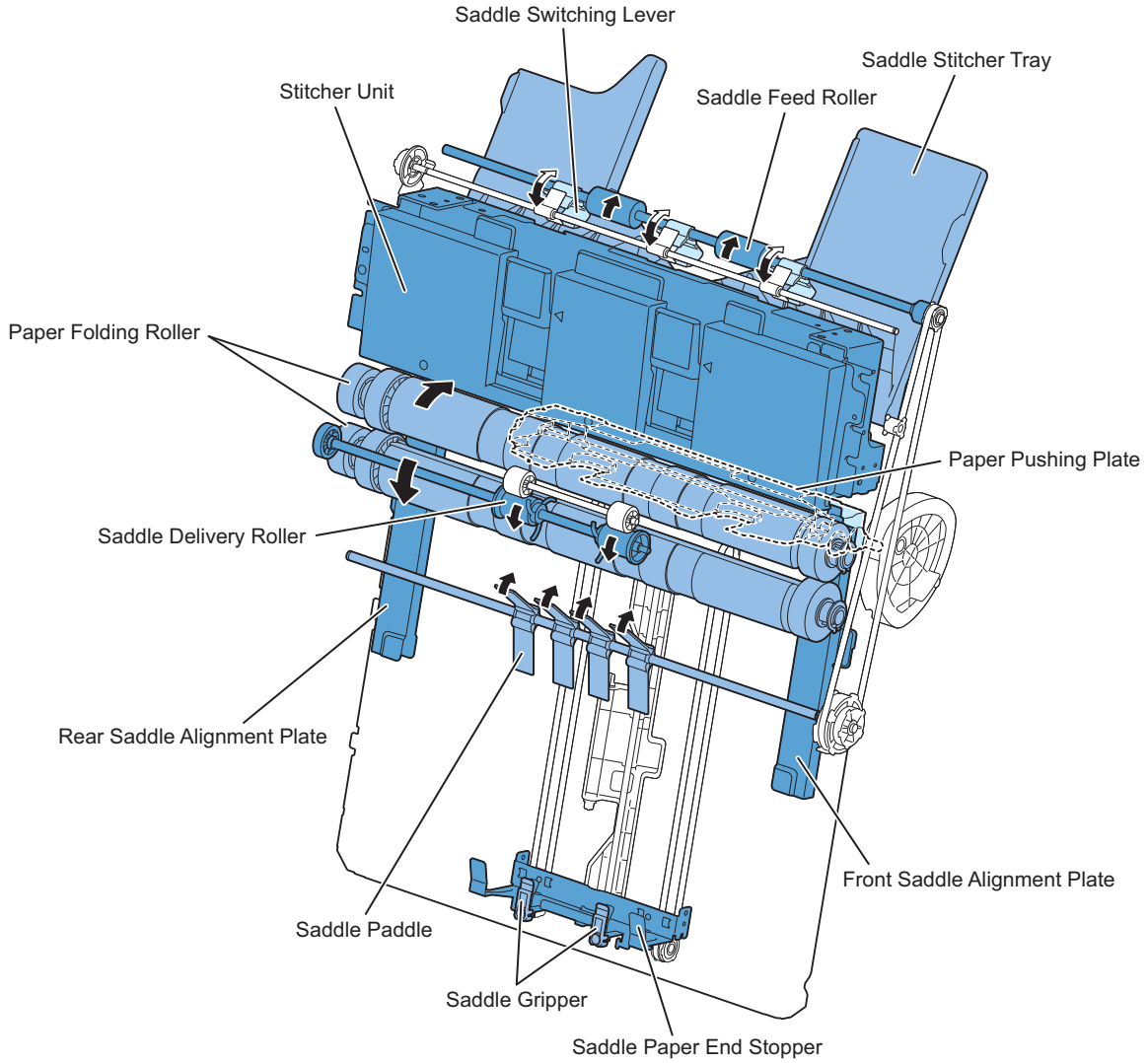
No.	Signals name	Load sign name		Parts name
[1]	Saddle gripper motor drive signal	M205	FSMG	Saddle gripper motor
[2]	Saddle alignment motor drive signal	M203	FSMJ	Saddle alignment motor
[3]	Saddle discharge motor drive signal	M207	FSME	Saddle discharge motor
[4]	Saddle folding motor drive signal	M204	FSMF	Saddle folding motor
[5]	Saddle transport motor drive signal	M201	FSMC	Saddle transport motor
[6]	Saddle rear edge stopper motor drive signal	M206	FMSR	Saddle rear edge stopper motor



No.	Signals name	Load sign name		Parts name
[1]	Saddle folding bundle paper exit sensor detection signal	PS203	FSEB	Saddle folding bundle paper exit sensor
[2]	Saddle vertical path sensor detection signal	PS202	FSPV	Saddle vertical path sensor
[3]	Saddle entry port sensor detection signal	PS201	FSE	Saddle entry port sensor

B. Configuration

The names and roles of the components of the saddle stitcher unit are as follows:



Name	Role
Paper Folding Roller	Folds paper stacks in half by gripping them and feeding them.
Paper Pushing Plate	Pushes the center area of paper stacks to feed them to the paper folding roller unit.
Stitcher Unit	Stitches at two locations at the center of paper stacks.
Saddle Paddle	Feeds the paper fed to the saddle processing tray to the saddle paper end stopper.
Saddle Paper End Stopper	Presses the fed paper against the saddle processing tray, aligns the paper in the feed direction, and feeds the paper stack from the saddle processing tray.
Saddle Alignment Plate	Aligns the paper fed to the saddle processing tray in the cross feed direction.
Saddle Gripper	Holds the paper trailing edge pressed against the saddle paper end stopper and works in conjunction with the saddle paper end stopper to feed the paper stack from the saddle processing tray.
Saddle Switching Lever	Guides the paper stack fed from the saddle processing tray.
Saddle Sticher Tray	Stacks the paper fed to the saddle processing tray.

C. Basic Operation

The saddle stitcher unit uses the following 4 sequences of operation:

[1] Stacking operation

The paper fed from the transport area is stacked in the saddle processing tray and is aligned in the feed direction and cross feed direction.

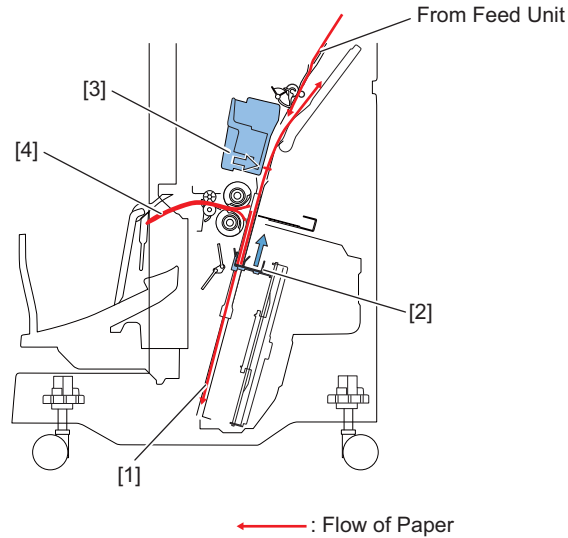
[2] Paper stack feed operation

The paper stack in the saddle processing tray is fed to the stitching position and paper folding position.

[3] Stitch operation

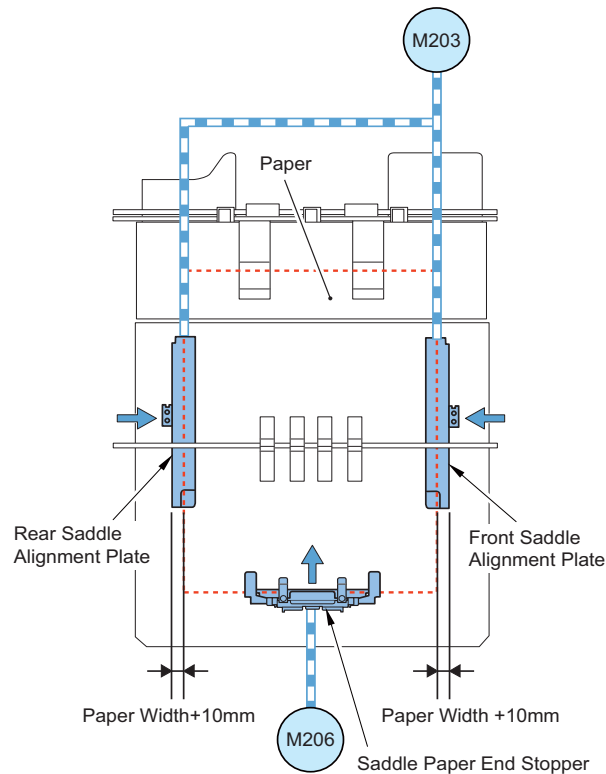
The paper is stitched at two locations at the center. (only in saddle stitch mode)

[4] Paper folding/delivery operation The paper is folded in half at the center and delivered to the saddle delivery tray.

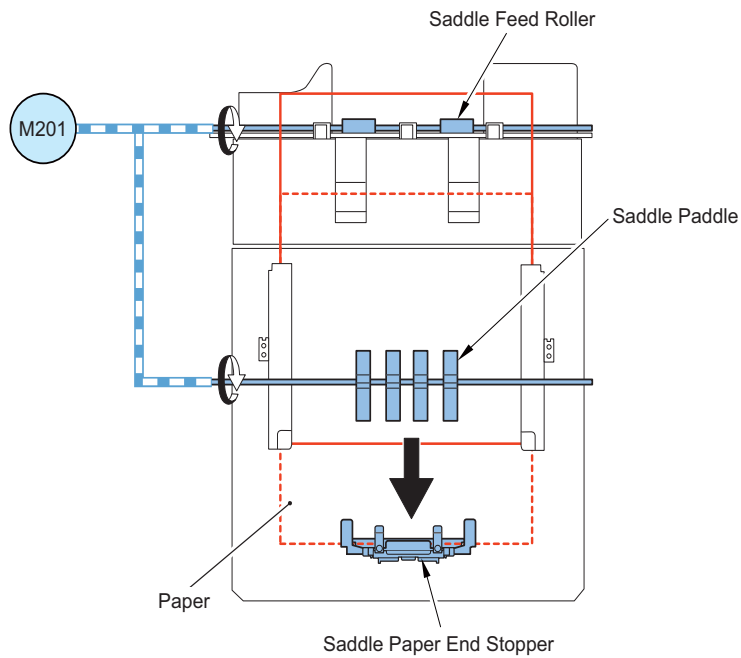


D. Stacking Operation

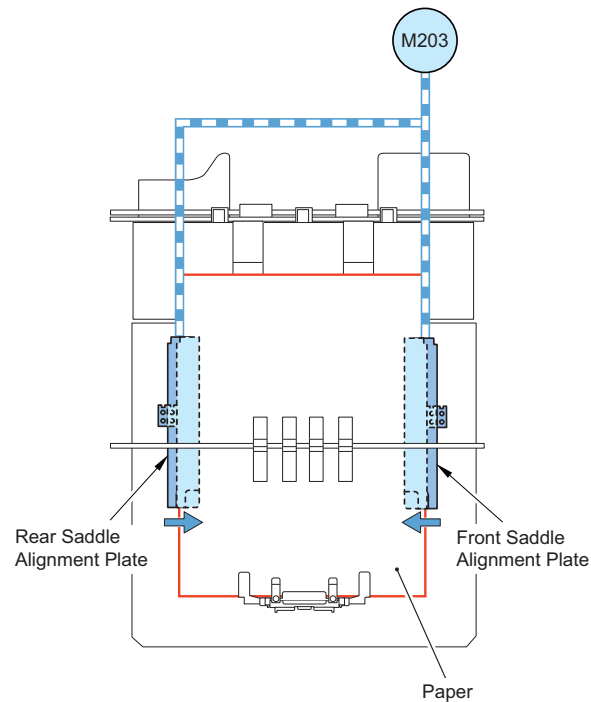
- 1) The saddle stitcher controller PCB drives the Saddle rear edge stopper motor (M206) to move the saddle paper end stopper according to the paper size. Then, it drives the Saddle alignment motor (M203) to move the saddle alignment plate to the paper width +10 mm position.



- 2) The Saddle transport motor (M201) drives to rotate the saddle feed roller and saddle paddle and feeds the paper to the saddle processing tray. During this process, the paper is pressed against the saddle paper end stopper to align the paper in the feed direction.



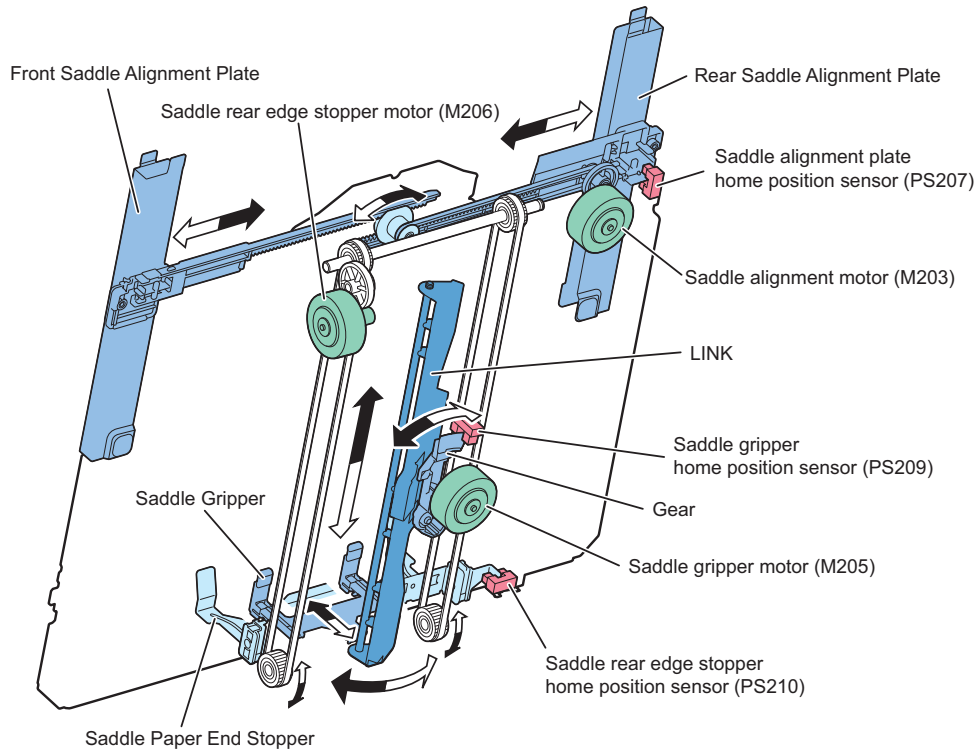
- 3) The Saddle alignment motor (M203) drives to operate the saddle alignment plate. The saddles is processed, and the paper stacked in the tray is aligned in the cross feed direction.



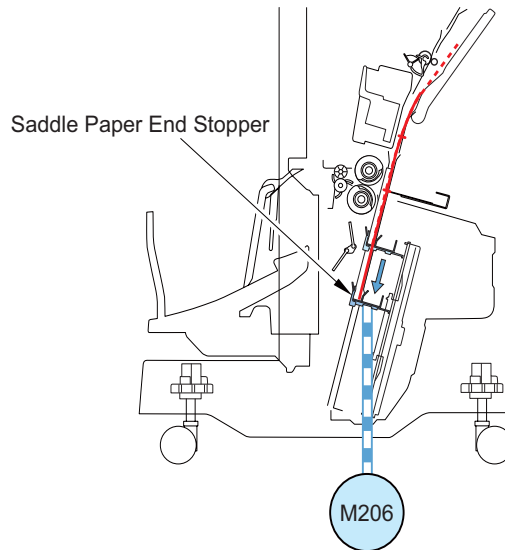
- 4) Operations described in steps (2) to (3) are repeated for each sheet.

E. Paper Stack Feed Operation

- 1) The Saddle gripper motor (M205) drives causing the saddle gripper via the gear and link to grip the trailing edge of the paper stack in the saddle processing tray. Then the Saddle rear edge stopper motor (M206) drives to raise the saddle paper end stopper and feeds the paper stack to the stitching position. (only in booklet mode)

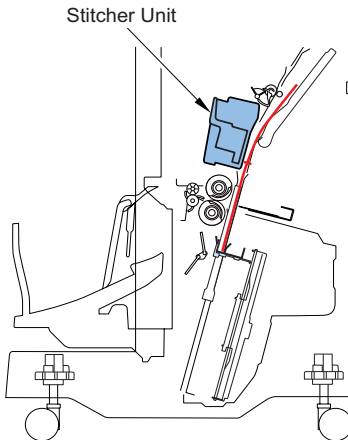


- 2) After stitching is complete, the Saddle rear edge stopper motor (M206) drives to lower the saddle paper end stopper and feeds the paper stack to the paper folding position.



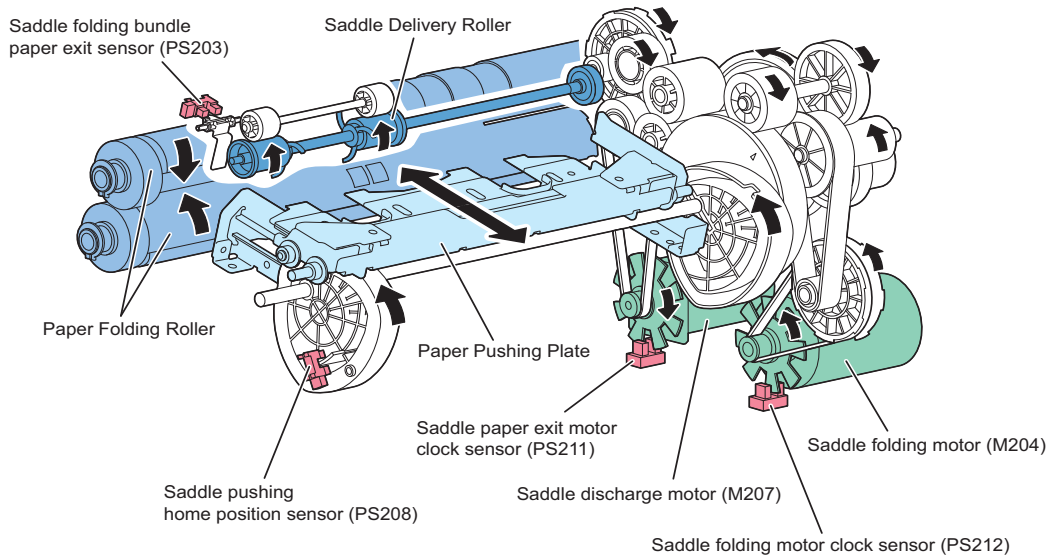
F. Stitch Operation

- 1) After the paper stack in the saddle processing tray is fed to the stitching position, the Saddle staple motor (M208) drives causing the stitcher unit to stitch two locations: front side and rear side.

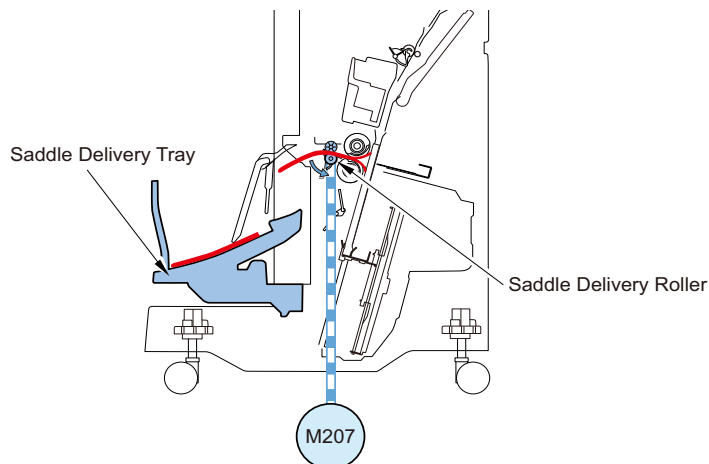


G. Paper Folding/Delivery Operation

- 1) After the paper stack is fed to the paper folding position, the Saddle folding motor (M204) drives causing the paper pushing plate and paper folding roller to operate. The paper pushing plate feeds the center section of the paper stack into the paper folding roller where the paper stack is folded in half.



- 2) The Saddle discharge motor (M207) drives causing the saddle delivery roller to rotate. This delivers the folded paper stack to the saddle delivery tray.

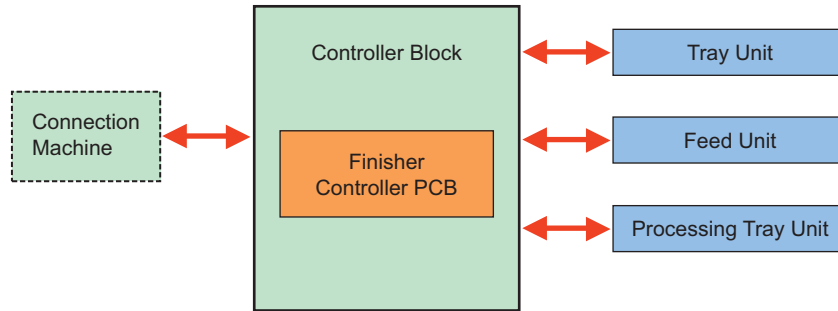


8. Controller Unit

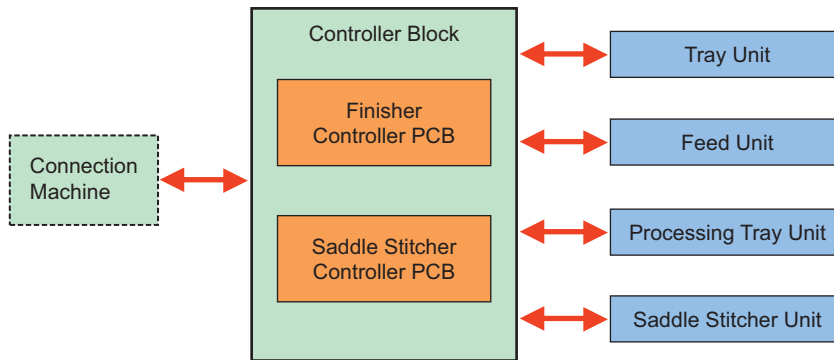
A. Outline

The controller unit controls the entire machine. It controls the stack unit, feeding unit, processing tray unit, and saddle sticher unit. The controller unit consists of two PWBs: finisher controller PWB and saddle sticher controller PWB.

- Staple Finisher



- Booklet Finisher

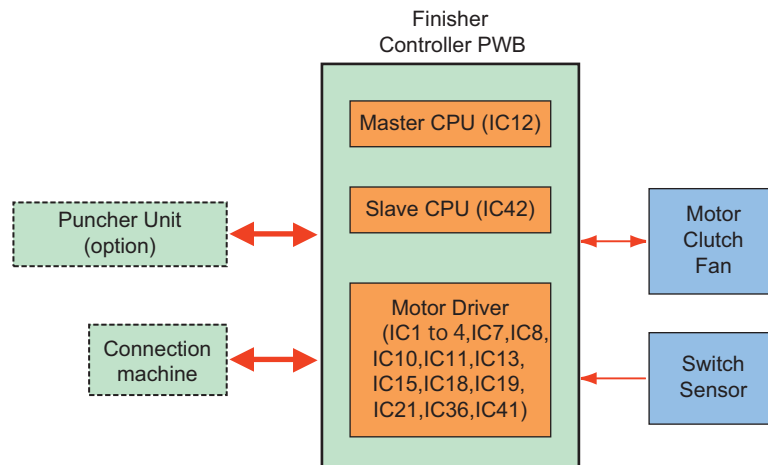


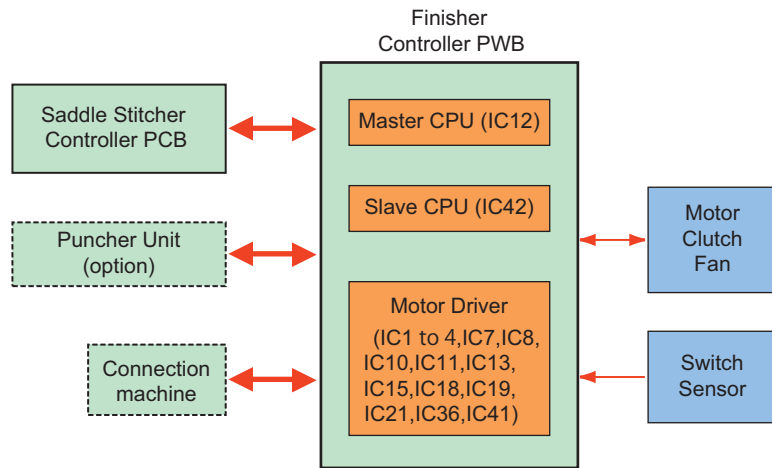
B. Finisher Controller PWB

The finisher controller PWB drives loads (motors, clutches, fan) and notifies the host machine of the states of sensors and switches according to the instructions from the host machine.

This circuit also controls the puncher unit and the saddle sticher controller PWB.

- Staple Finisher



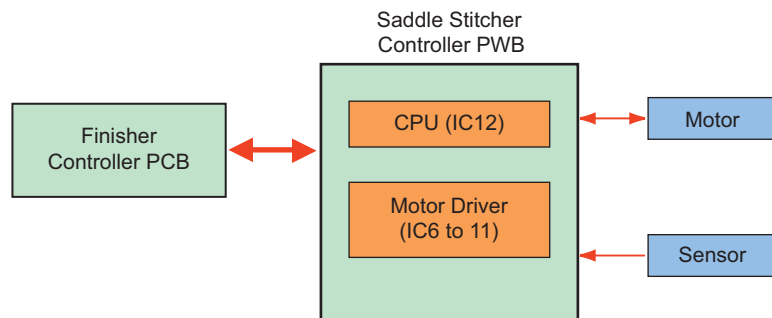


Roles of major ICs mounted on this PCB are summarized below.

Name	Role
Master CPU(IC12)	<ul style="list-style-type: none"> • Controls communications between this equipment and host machine. • Controls communications with the saddle stitcher unit, puncher unit, and other optional units. • Controls communication with the slave CPU • Stores the firmware for operating the finisher • Controls sensors, switches, and motors
Slave CPU(IC42)	<ul style="list-style-type: none"> • Controls communication with the master CPU • Stores the firmware for operating the finisher • Controls sensors, switches, and motors
Motor drivers (IC1 to IC4, IC7, IC8, IC10, IC11, IC13, IC15, IC18, IC19, IC21, IC36, IC41)	<ul style="list-style-type: none"> • Controls the driving of motors

C. Saddle stitcher controller PWB

The saddle stitcher controller PWB drives motors and notifies the host machine of the states of sensors according to the instructions from the finisher controller PWB.



Roles of major ICs mounted on this PCB are summarized below.

Name	Role
CPU (IC12)	<ul style="list-style-type: none"> • Controls communication with the finisher controller • Stores the firmware for operating the finisher • Controls sensors and motors
Motor Driver (IC6 - 11)	<ul style="list-style-type: none"> • Controls the driving of motors

9. Jam Detection

A. JAM code list

Detection of paper jam depends on whether there is a paper around a sensor area at check timing preliminarily stored to finisher controller PWB and saddle stitcher controller PWB.

Once either finisher controller PWB or saddle stitcher controller PWB detects paper jam, the machine pauses the paper transportation and discharging of the paper.

At the same time, the paper jam is notified to the devices being connected.

JAM code	JAM content	Conditions to detect paper jam
FNE_N	Entry port sensor time-out JAM	Entry port sensor is not turned on when a paper is transported by the "distance between entrance of the finisher and entrance sensor plus margin (200 mm)" after reception of signal on discharge of a paper from main unit (right before the entrance of lead edge of a paper into finisher)
FNE_S	Entry port sensor remaining JAM	Entry port sensor is not turned off when a paper is transported by 50 mm plus 80 mm from 50 mm before the rear edge of a paper.
FNTBP_N	Preprocessing timing sensor time-out JAM	Preprocessing timing sensor is not turned on when a paper is transported by the "distance to Preprocessing timing sensor plus margin (50 mm)" after lead edge of the paper reached to the entrance paper roller.
FNTBP_S	Preprocessing timing sensor remaining JAM	Preprocessing timing sensor is not turned off when a paper is transported by the "distance to Preprocessing timing sensor plus margin (80 mm)" after trail edge of the paper passing through the entrance paper roller and additionally transported by 15 mm.
FNB_N	Buffer sensor time-out JAM	Buffer sensor is not turned on when a paper is transported by the "distance to Buffer sensor plus margin (50 mm)" after lead edge of the paper reached to the buffer switchback position.
FNB_S	Buffer sensor remaining JAM	Buffer sensor is not turned off after transporting a paper by the "distance to buffer sensor plus margin (80 mm)" after trail edge of the paper reached to the buffer path switchback position.
FNEE_N	The first Escape paper exit sensor time-out JAM	Escape paper exit sensor is not turned on when a paper is transported by the "distance to escape delivery sensor plus margin (50 mm)" after lead edge of the paper reached to the escape middle roller.
FNEE_S	The first Escape paper exit sensor remaining JAM	Escape paper exit sensor is not turned off when a paper is transported by the "distance to escape delivery sensor plus margin (80 mm)" after trail edge of the paper reached to the escape middle roller and additionally transported by 15 mm.
FNSSS	Staple safety switch actuation Jam	First detection of Staple safety switch activation trouble after power-on Same trouble is detected intermittently afterward. *Staple safety switch actuation trouble if detected in a raw.
FNMOTERR	Motor trouble JAM	The following status do not change after 60 seconds: Initialization of machine, preparation for a job, waiting for paper transport, finishing of a job, manual stapling, enforced output of a paper after staple job is canceled by a user before finishing, switching to a cover-open status, switching to a paper jam status
FNDPMS	Manual bundle insert JAM	Sensor is detecting a paper but unable to staple.
FNMAR	Rear edge assist motor JAM	First detection of Rear edge assist motor trouble after power-on Detection of same trouble intermittently afterward. *Rear edge assist motor trouble if detected in a raw.
FNMJF	Front alignment motor JAM	First detection of Front alignment motor trouble after power-on Detection of same trouble intermittently afterward. *Front alignment motor trouble if detected in a raw.
FNMMSS	Staple horizontal shift motor JAM	First detection of Staple horizontal shift motor trouble after power-on Detection of same trouble intermittently afterward. *Staple horizontal shift motor trouble if detected in a raw.
FNMS	Oscillation motor JAM	First detection of Oscillation motor trouble after power-on Detection of same trouble intermittently afterward. *Oscillation motor trouble if detected in a raw.
FNMJR	Rear alignment motor JAM	First detection of Rear alignment motor trouble after power-on Detection of same trouble intermittently afterward. *Rear alignment motor trouble if detected in a raw.
FNMGMT	Load paper tray lift motor Jam	First detection of Load paper tray lift motor trouble after power-on Detection of same trouble intermittently afterward. *Load paper tray lift motor trouble if detected in a raw.
FNMFR	Rear edge falling motor Jam	First detection of paper end pushing guide after power-on Detection of same trouble intermittently afterward. *Rear edge falling motor trouble if detected in a raw.
FNMDT	Tongue drive motor JAM	First detection of Tongue drive motor trouble after power-on Detection of same trouble intermittently afterward. *Tongue drive motor trouble if detected in a raw.
FNMFECES	Escape/Saddle transport switch flapper motor Jam	First detection of Escape/Saddle transport switch flapper motor trouble after power-on Detection of same trouble intermittently afterward. *Escape/Saddle transport switch flapper motor trouble if detected in a raw.
FNCDP	Paddle Jam	First detection of paddle trouble after power-on Detection of same trouble intermittently afterward. *Paddle trouble if detected in a raw.
FNMS	Staple JAM	Failure to detect "home position" at Staple drive home position sensor within 400 msec of Staple drive home position sensor moved out of home position while processing for staple.
FNMSLS	Staple free staple motor JAM	First detection of Staple free staple motor trouble after power-on. Intermittent detection of the same trouble afterward. *Staple free staple motor trouble if detected in a raw.
FSE_N	Saddle entry port sensor time-out JAM	Saddle entry port sensor is not turned on when the paper is transported by the "distance to turn on the Saddle entry port sensor plus margin (100mm)" after the start of the switch back transportation.
FSE_S	Saddle entry port sensor remaining JAM	Saddle entry port sensor is not turned off when the paper is transported by the "paper length plus margin (50mm)" after the detection of the Saddle entry port sensor ON.

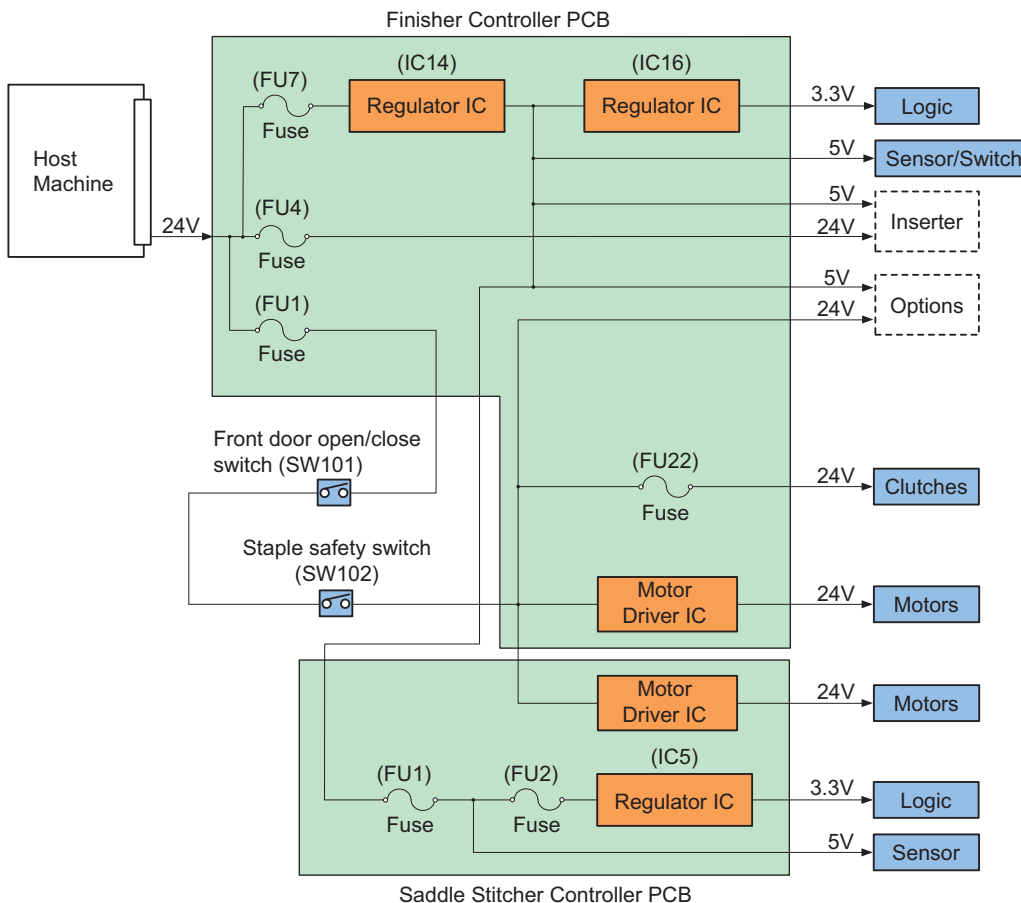
JAM code	JAM content	Conditions to detect paper jam
FSEB_N	Saddle folding bundle paper exit sensor time-out JAM	Saddle folding bundle paper exit sensor is not turned on even after a lapse of 2,000msec since the start of pushing.
FSEB_S	Saddle folding bundle paper exit sensor remaining JAM	Saddle folding bundle paper exit sensor is not turned off when a paper is transported by the "paper length divided by 2 plus margin (100mm)" after the Saddle entry port sensor is turned ON.
FSMS	Saddle staple JAM	Home position sensor is not turned on even after a lapse of 120msec since the start of the clinch operation, and then if the saddle staple returns the home position within 1200msec when rotating the motor backward.
FSMSR	Saddle rear edge stopper motor JAM	First detection of Saddle rear edge stopper motor trouble after power-on. Intermittent detection of the same trouble afterward. *Saddle rear edge stopper motor trouble if detected in a raw.
FSME	Saddle discharge motor JAM	First detection of Saddle discharge motor trouble after power-on. Intermittent detection of the same trouble afterward. *Saddle discharge motor trouble if detected in a raw.
FSMJ	Saddle alignment motor JAM	First detection of Saddle alignment motor trouble after power-on. Intermittent detection of the same trouble afterward. *Saddle alignment motor trouble if detected in a raw.
FSMC	Paddle JAM (Saddle section)	First detection of paddle trouble (saddle section) after power-on. Intermittent detection of the same trouble afterward. *Paddle (Saddle section) trouble if detected in a raw.
FSMF	Saddle folding motor JAM	First detection of Saddle folding motor trouble after power-on. Intermittent detection of the same trouble afterward. *Saddle folding motor trouble if detected in a raw.
FSMDLE	Saddle switch lever drive motor JAM	First detection of Saddle switch lever drive motor trouble after power-on. Intermittent detection of the same trouble afterward. * Saddle switch lever drive motor trouble if detected in a raw.
FSMG	Saddle gripper motor JAM	First detection of Saddle gripper motor trouble after power-on. Intermittent detection of the same trouble afterward. *Saddle gripper motor trouble if detected in a raw.

10. Power Supply

A. Power Supply Route

The 24V and 12V are supplied to the finisher controller PWB when the host machine is turned on. The 24V is converted into 5V and 3.3V by the regulator IC (IC14/IC16) on the finisher controller PWB and is used to drive the motors and clutches and fan and the 5V is used to drive the sensors and switches and the 3.3V is used to drive the logic.

The 24V is shut down when the opening of the front cover or swing guide is detected by the Front door open/close switch (SW101) or Staple safety switch (SW102). The 24V and 5V are supplied to the saddle sticher controller PCB and options. The 24V supplied to the saddle sticher controller PWB is used to drive the motor and 5V is converted into the 3.3V by the regulator IC (IC5) on the saddle sticher controller PWB.



B. Protection Function

The 24V circuits (used to drive the motors and clutches and fan) are provided with the fuses or the motor drivers with an overcurrent protective function to provide protection from the over current.

The power input circuit of each controller PCB is also provided with a fuse which is blown when an excessive current flows.

11. Service Tasks

A. Upgrading

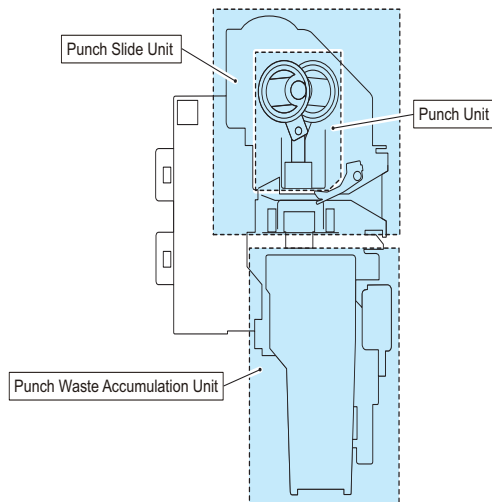
When upgrading the firmware of the finisher controller PCB and the saddle sticher controller PCB, upgrade from the host machine. (Refer to the service manual for the host machine as to the detail.)

[7] Technical Explanation Punch unit

1. Basic Configuration

A. Functional Configuration

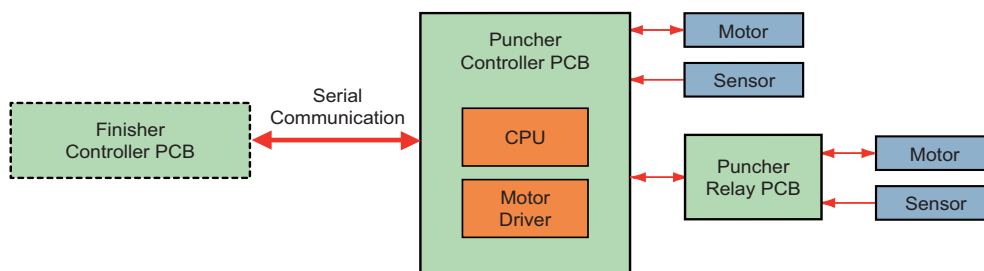
The components of this puncher unit are organized into 3 major blocks: punch unit, punch slide unit and punch waste accumulation unit.



B. Overview of Electrical Circuitry

The operation sequence of the puncher unit is controlled by the puncher controller PWB.

The puncher controller PWB has a 32-bit CPU that performs sequence control. The puncher controller PWB receives various commands from the finisher controller PWB to drive the motors. And it controls the operation of the puncher unit according to the detection states of the sensor.



2. Controls

A. Controls

Item	
Basic Operation	Outline
Feed Drive System	Outline
	Configuration
	Horizontal Registration Control
	Punch Operation
Controller Unit	Punch Waste Full Detection
	Puncher Controller PWB
Jam Detection	Jams
Power Supply	Power Supply Route
	Protection Function
Service Tasks	Upgrading

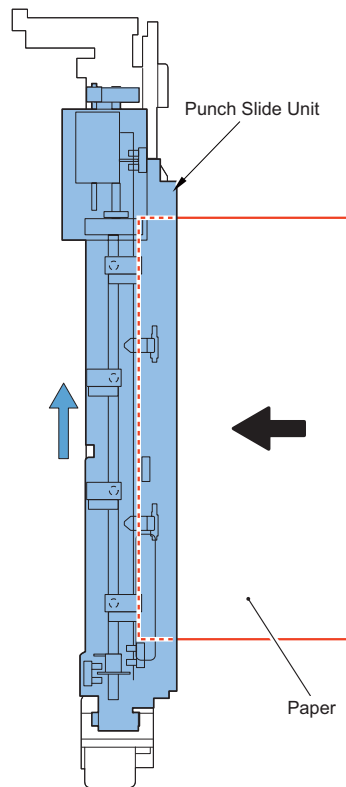
3. Basic Operation

A. Outline

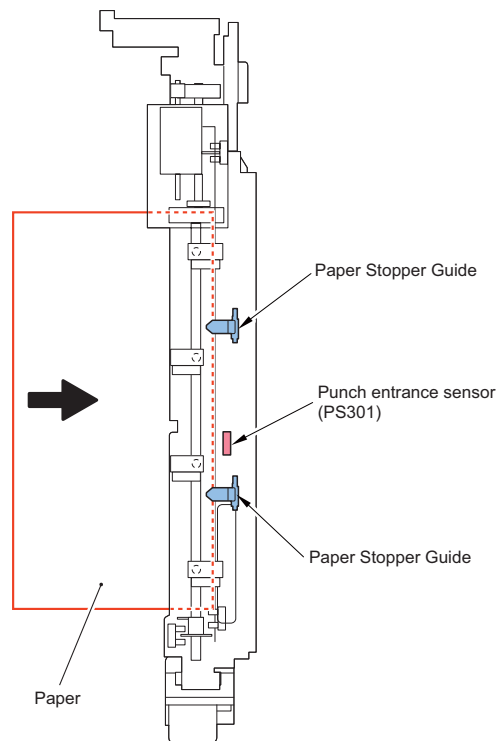
Basic operations of this puncher unit are described below.

■When in precision priority mode (normal mode)

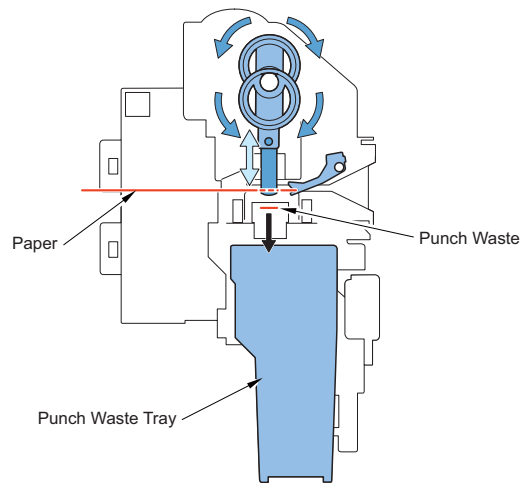
- 1) When paper is fed from the upstream connection machine to the puncher unit, the punch slide unit performs horizontal registration.



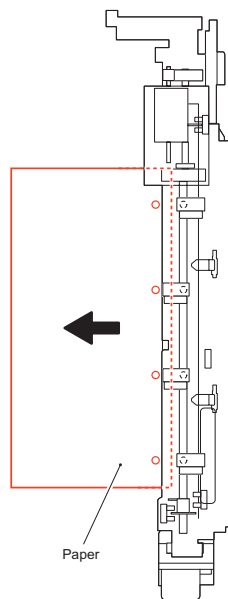
- 2) After the paper is fed from the position where the Punch entrance sensor (PS301) detects the paper trailing edge to a given position, the paper is switched back and fed until it bumps against the paper stopper guide.



3) The paper is punched. The punch waste is ejected into the punch waste tray.

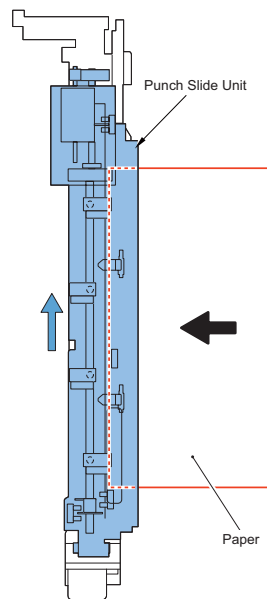


4) The paper is fed to the finisher feeding unit.

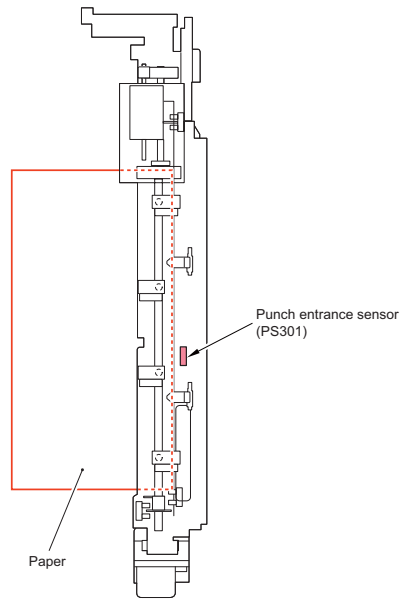


■When in speed priority mode

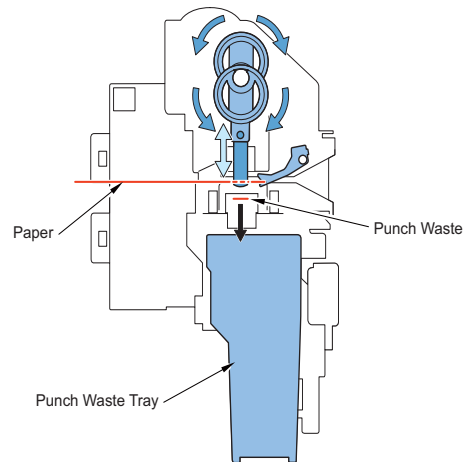
1) When paper is fed from the upstream connection machine to the puncher unit, the punch slide unit performs horizontal registration.



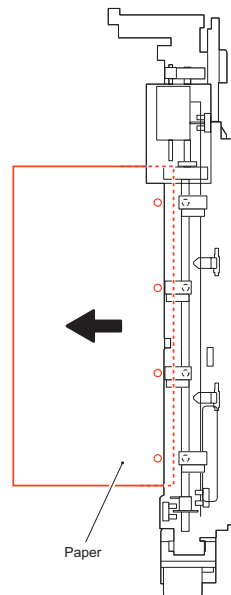
- 2) The paper is fed from the position where the Punch entrance sensor (PS301) detects the paper trailing edge to a given position (punch position) and stops.



- 3) The paper is punched. The punch waste is ejected into the punch waste tray.



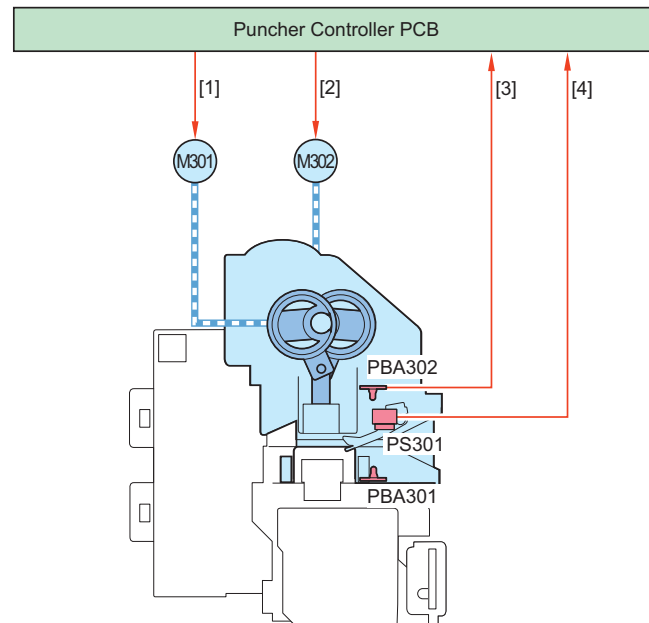
- 4) The paper is fed to the finisher feeding unit.



4. Feeding Unit

A. Outline

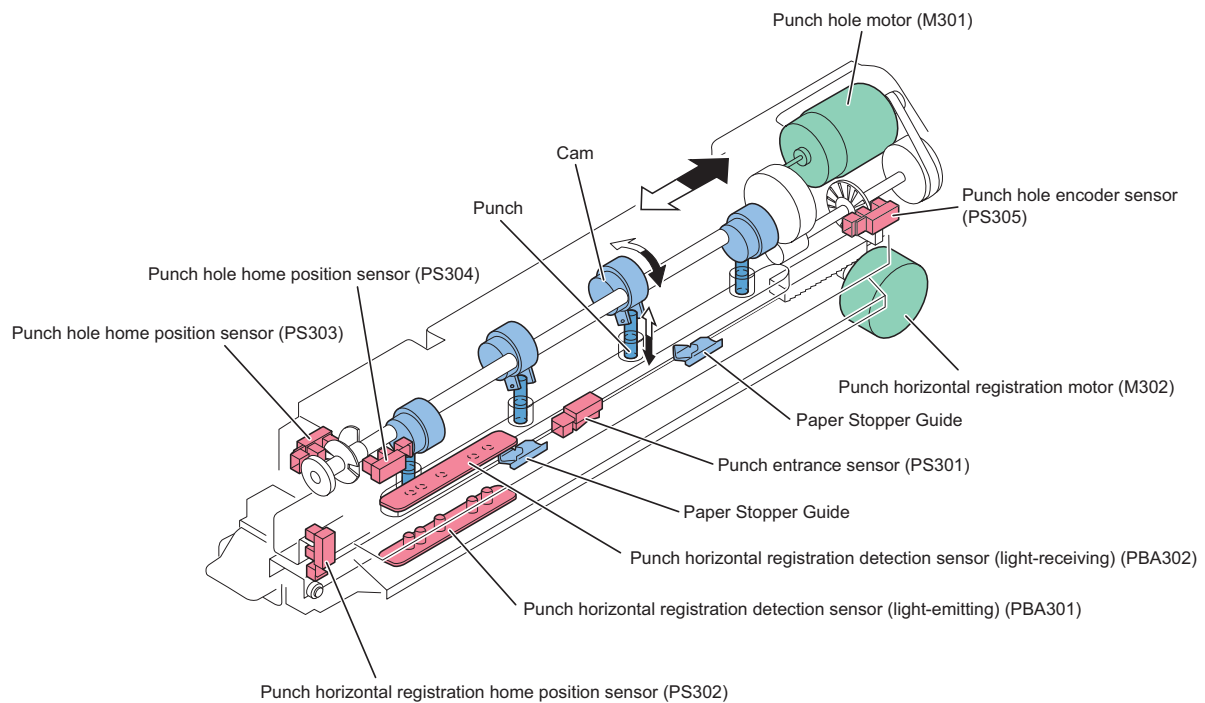
This puncher unit is installed in the feed inlet unit inside the finisher. It punches holes in paper fed from the host machine according to the puncher controller PWB instructions. Paper feeding inside the puncher unit is performed by the delivery roller of the upstream connection machine and the inlet roller of the finisher. In the paper feed path, there are the Punch entrance sensor (PS301) and Punch horizontal registration detection sensor (PBA301/PBA302), which detect the paper feed status and the horizontal registration position, respectively.



No.	Signals name	Load sign name		Parts name
[1]	Punch hole motor drive signal	M301	FCP	Punch hole motor
[2]	Punch horizontal registration motor drive signal	M302	FCMR	Punch horizontal registration motor
[3]	Punch horizontal registration detection sensor detection signal	PBA301	–	Punch horizontal registration detection sensor (light-emitting)
		PBA302	–	Punch horizontal registration detection sensor (light-receiving)
[4]	Punch entrance sensor detection signal	PS301	–	Punch entrance sensor

B. Configuration

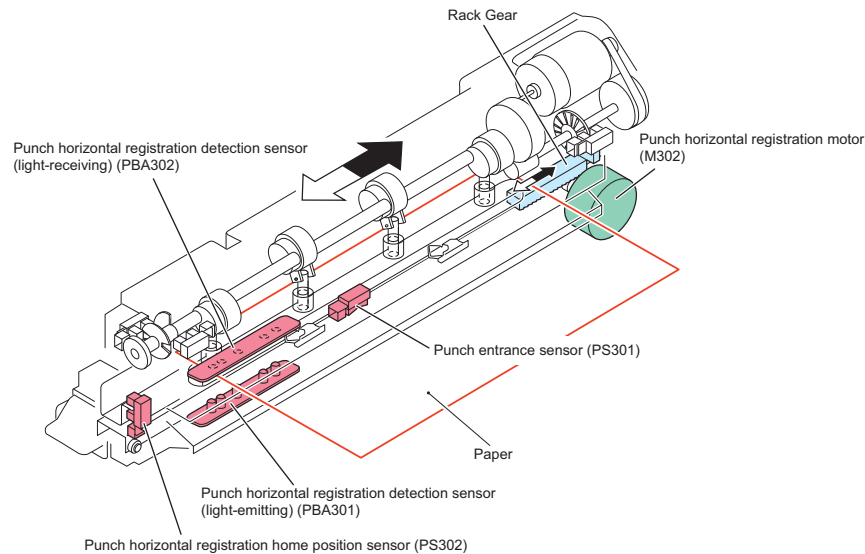
The punch operation of this puncher unit is performed by two mechanical units: punch unit and punch slide unit. They are driven by the Punch hole motor (M301) and Punch horizontal registration motor (M302), respectively.



Name	Role
Punch hole motor (M301)	Drives the punch operation via a belt.
Punch hole encoder sensor PS305)	Detects the rotation of the Punch hole motor (M301) of the DC motor.
Punch	Punches holes in paper.
Cam	Moves the punch up and down
Paper Stopper Guide	Stops the trailing edge of the paper that has been switched back during the punch operation in precision priority mode in order to align the paper in the feed direction.
Punch horizontal registration motor (M302)	Drives the punch slide operation via rack gear.
Punch horizontal registration detection sensor (light-emitting)(PBA301)	Detects the paper edges using detection units at five locations according to the paper size.
Punch horizontal registration detection sensor (light-receiving)(PBA302)	
Punch entrance sensor (PS301)	Detects paper fed from the upstream connection machine.
Punch horizontal registration home position sensor (PS302)	Detects the home position of the punch slide unit.
Punch hole home position sensor (PS303)	Detects the position of punch operation (cam operation) using the combination of the on/off states of two sensors.
Punch hole home position sensor (PS304)	

C. Horizontal Registration Control

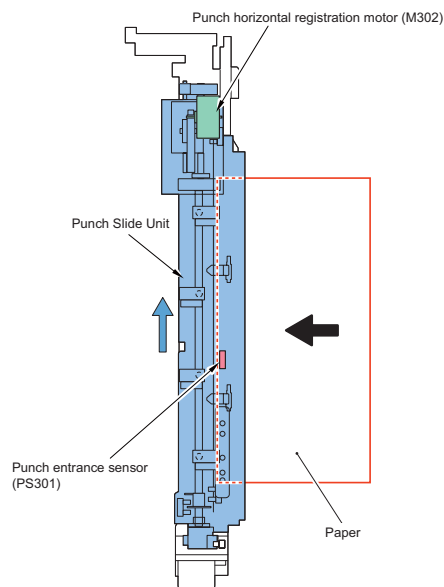
The horizontal registration control during punching is performed by the movement of the punch slide unit in the front and rear directions according to the paper size. The punch slide unit is driven by the Punch horizontal registration motor (M302). The home position is detected by the Punch horizontal registration home position sensor (PS302).



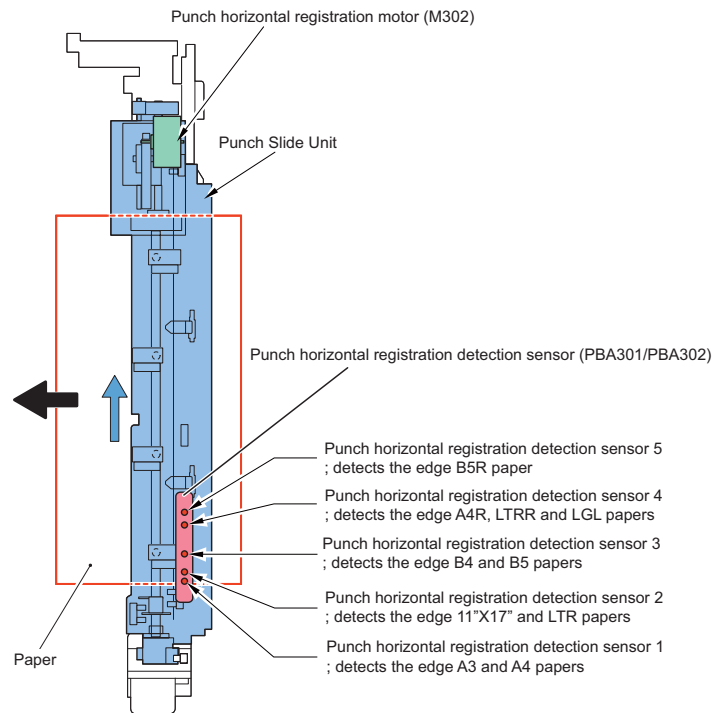
During the horizontal registration control, the punch slide unit detects the paper edges through the Punch horizontal registration detection sensor (PBA301/302) and moves to the appropriate position for the paper size.

How the punch slide unit is driven during the horizontal registration control is described below.

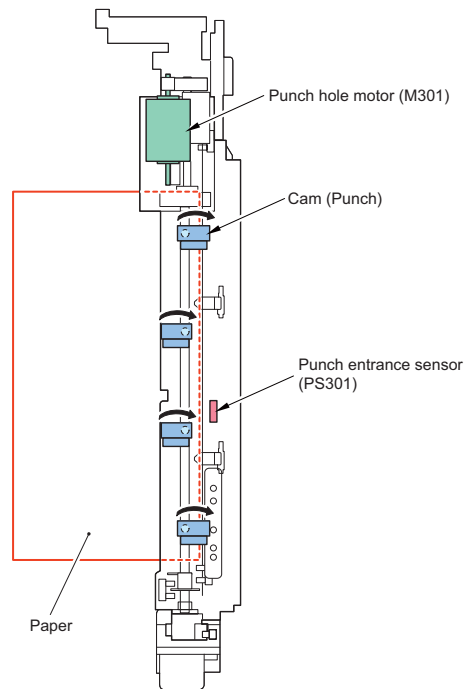
- 1) When the Punch entrance sensor (PS301) detects paper fed from the upstream connection machine, the Punch horizontal registration motor (M302) drives, and the punch slide unit starts moving to the rear.



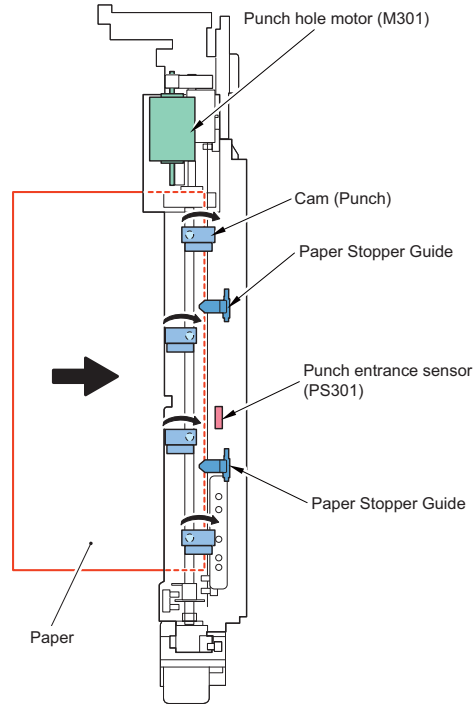
- 2) When the punch horizontal registration sensor on the punch slide unit detects the paper edge (front) at the position according to the paper size information received from the host machine, the punch slide unit stops at the punching position.



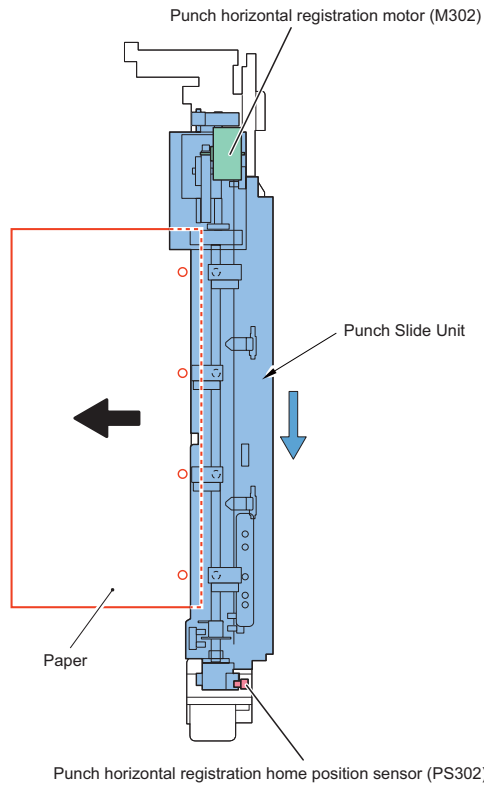
- 3) In speed priority mode, the paper moves by a given amount from where the Punch entrance sensor (PS301) detects the paper edges and stops. Then the Punch hole motor (M301) drives to punch the paper.



- 4) In precision priority mode, the paper moves by a given amount from where the Punch entrance sensor (PS301) detects the trailing edge of the paper and switches back. The paper is fed to the position where it bumps against the paper stopper guide, and the Punch hole motor (M301) drives to punch the paper.



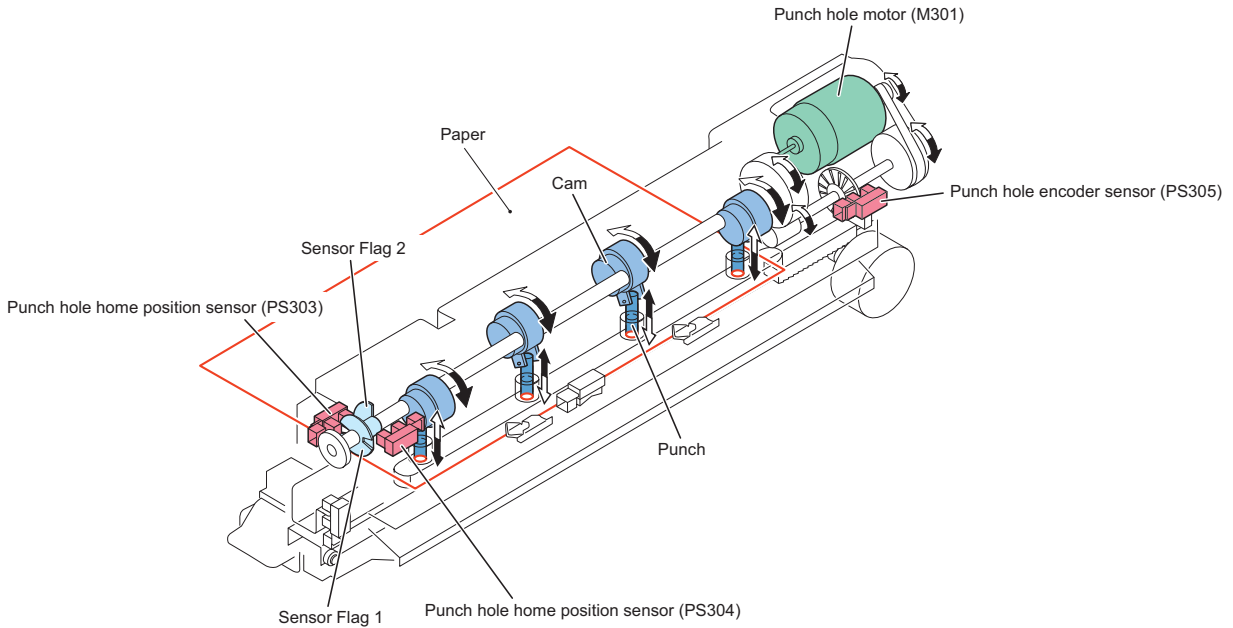
- 5) After punching, the paper is fed to the finisher feeding unit. At the same time, the punch slide unit moves to the home position.



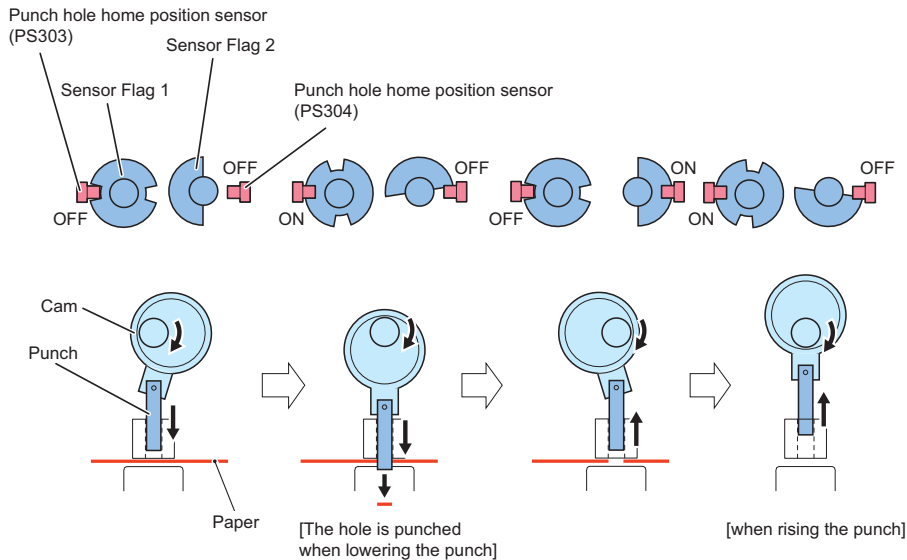
- 6) During punch mode, the operation described in steps 1 to 5 is repeated for every sheet that is fed.

D. Punch Operation

The Punching is an operation performed by a punch to make specific number of holes in paper. The punch is driven by the Punch hole motor (M301) via a cam. Its home position is detected by the Punch hole home position sensor (PS303) and Punch hole home position sensor (PS304). During punching, the Punch hole motor (M301) drives to turn the cam, causing the punch to move up and down to make holes in paper.

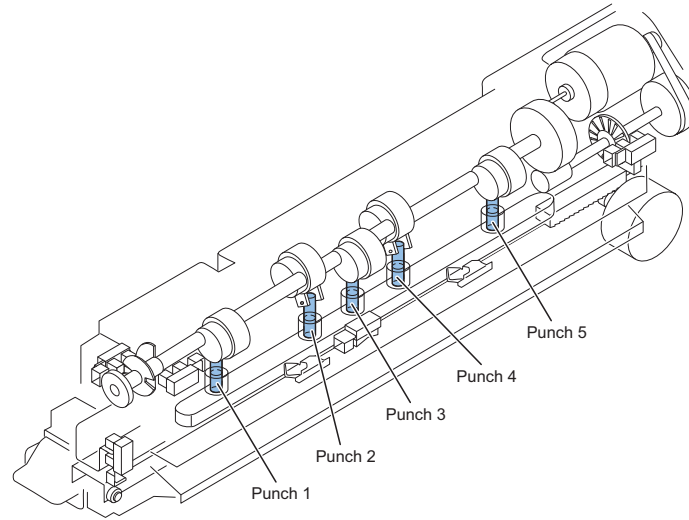


The punch position is detected by the combination of the Punch hole home position sensor (PS303) and Punch hole home position sensor (PS304). The following illustration shows examples of the different combinations of the sensor and cam positions.



The relationship between the sensors and punch position is shown below.

- 2/3 Hole Puncher Unit



Punch hole home position sensor (PS303)	Punch hole home position sensor (PS304)	Punch 1	Punch 2	Punch 3	Punch 4	Number of holes	Punch hole home position sensor (PS303)
OFF	OFF	-	-	-	-	-	-
ON	OFF	Down (Punching)	UP	Down (Punching)	UP	Down (Punching)	3 holes
OFF	ON	-	-	-	-	-	-
ON	OFF	UP	Down (Punching)	UP	Down (Punching)	UP	2 holes

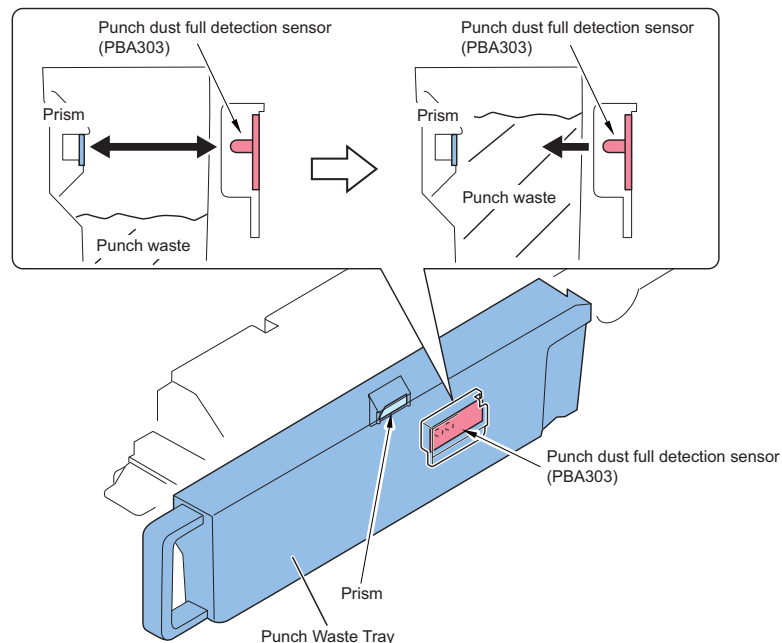
E. Punch Waste Full Detection

Punch waste full detection is performed by the Punch dust full detection sensor (PBA303) at the side of the punch waste tray and the prism inside the punch waste tray. Punch waste full detection is performed by a prism reflecting the LED light from the lightemitting area of the Punch dust full detection sensor (PBA303) and the light-receiving area of the sensor detecting the reflected light.

During punching, punch waste is collected in the punch waste tray. After punching is complete, if the Punch dust full detection sensor (PBA303) cannot receive the LED light, it determines that the punch waste is full.

Punch waste near-full detection and full detection are performed under the following conditions.

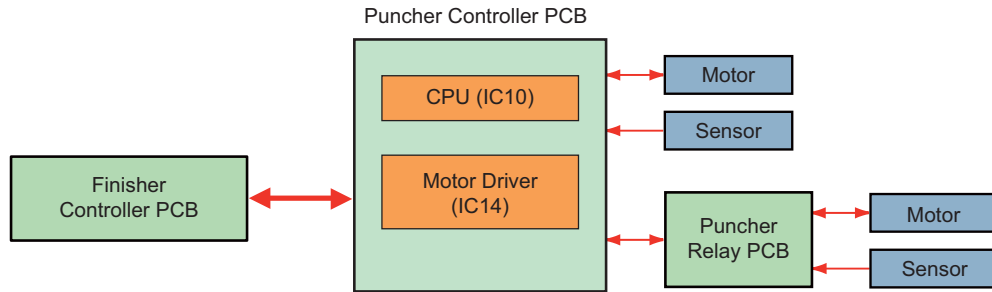
- Near-full detection
 - * If punch waste full is detected consecutively five times during the punch operation after punch waste full is detected
- Full detection (punch waste tray detection)
 - *If punch waste full is detected consecutively 1,000 times during the punch operation after punch waste full is detected
 - *If punch waste full is detected when the finisher front cover is closed
 - *If punch waste full is detected at power-on.



5. Controller Unit

A. Puncher Controller PWB

The puncher controller PWB drives motors and notifies the finisher of the states of sensors according to the instructions from the finisher controller PWB.



Roles of major ICs mounted on this PCB are summarized below.

Name	Role
CPU (IC10)	<ul style="list-style-type: none"> Controls communication with the finisher controller Stores the firmware for operating the puncher unit Controls sensors and motors
Motor driver (IC14)	<ul style="list-style-type: none"> Motor driver (IC14) Controls the punch shift motor (M302)

6. Jam Detection

A. JAM code list

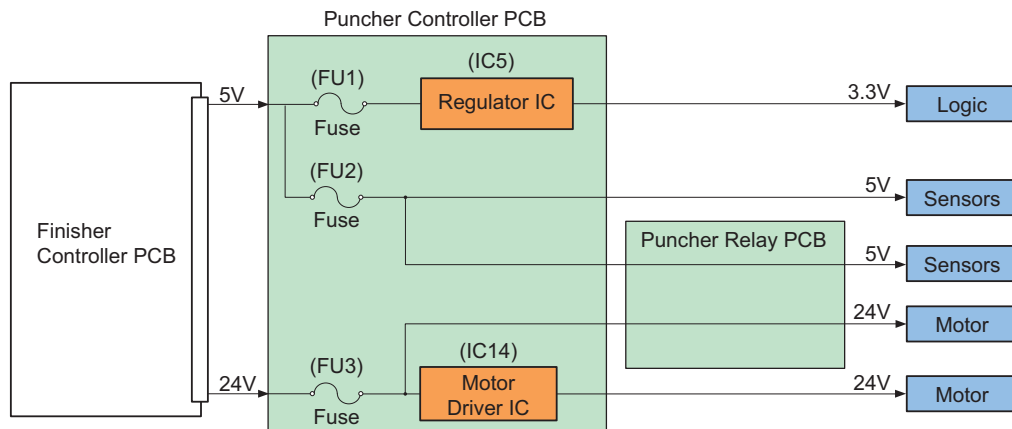
JAM code	JAM content	Conditions to detect paper jam
FCP2	Punched hole JAM	Not return the home position even after a lapse of 205ms during punching operation.
FCP	Punch motor JAM	First detection of punch motor trouble after power-on. Intermittent detection of the same trouble afterward. *Punch motor trouble if detected in a raw.
FCMR	Punch shift motor JAM	First detection of punch shift motor trouble after power-on. Intermittent detection of the same trouble afterward. *Punch shift motor trouble if detected in a raw.

7. Power Supply

A. Power Supply Route

The 24V and 5V are supplied to the puncher controller PCB through the finisher controller PCB when the host machine is turned on.

The 5V is converted into 3.3V by the regulator IC (IC5) on the puncher controller PCB. The 24V is used to drive the motors and the 5V is used to drive the sensors and the 3.3V is used to drive the logic.



B. Protection Function

The power input circuit of the puncher controller PCB is provided with a fuse which is blown when an excessive current flow. And the 24V circuit for driving the motor is provided with the motor driver with an overcurrent protective function to protect from the over current.

8. Service Tasks

A. Upgrading

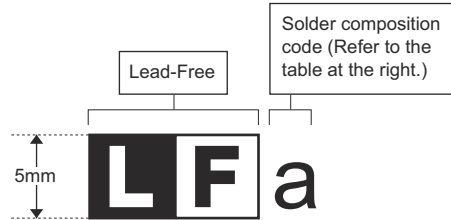
When upgrading the firmware of the puncher controller PCB, upgrade from the host machine.

(Refer to the service manual for the host machine as to the detail.)

LEAD-FREE SOLDER

The PWB's of this model employs lead-free solder. The "LF" marks indicated on the PWB's and the Service Manual mean "Lead-Free" solder. The alphabet following the LF mark shows the kind of lead-free solder.

Example:



<Solder composition code of lead-free solder>

Solder composition	Solder composition code
Sn-Ag-Cu	a
Sn-Ag-Bi Sn-Ag-Bi-Cu	b
Sn-Zn-Bi	z
Sn-In-Ag-Bi	i
Sn-Cu-Ni	n
Sn-Ag-Sb	s
Bi-Sn-Ag-P Bi-Sn-Ag	p

(1) NOTE FOR THE USE OF LEAD-FREE SOLDER THREAD

When repairing a lead-free solder PWB, use lead-free solder thread.

Never use conventional lead solder thread, which may cause a breakdown or an accident.

Since the melting-point of lead-free solder thread is about 40°C higher than that of conventional lead solder thread, the use of the exclusive-use soldering iron is recommended.

(2) NOTE FOR SOLDERING WORK

Since the melting-point of lead-free solder is about 220°C, which is about 40°C higher than that of conventional lead solder, and its soldering capacity is inferior to conventional one, it is apt to keep the soldering iron in contact with the PWB for longer time. This may cause land separation or may exceed the heat-resistive temperature of components. Use enough care to separate the soldering iron from the PWB when completion of soldering is confirmed.

Since lead-free solder includes a greater quantity of tin, the iron tip may corrode easily. Turn ON/OFF the soldering iron power frequently.

If different-kind solder remains on the soldering iron tip, it is melted together with lead-free solder. To avoid this, clean the soldering iron tip after completion of soldering work.

If the soldering iron tip is discolored black during soldering work, clean and file the tip with steel wool or a fine filer.

CAUTION FOR BATTERY REPLACEMENT

- (Danish) ADVARSEL !
Lithiumbatteri – Eksplosionsfare ved fejlagtig håndtering.
Udskiftning må kun ske med batteri
af samme fabrikat og type.
Levér det brugte batteri tilbage til leverandoren.
- (English) Caution !
Danger of explosion if battery is incorrectly replaced.
Replace only with the same or equivalent type
recommended by the manufacturer.
Dispose of used batteries according to manufacturer's instructions.
- (Finnish) VAROITUS
Paristo voi räjähtää, jos se on virheellisesti asennettu.
Vaihda paristo ainoastaan laitevalmistajan suosittelemaan
tyyppiin. Hävitä käytetty paristo valmistajan ohjeiden
mukaisesti.
- (French) ATTENTION
Il y a danger d'explosion s' il y a remplacement incorrect
de la batterie. Remplacer uniquement avec une batterie du
même type ou d'un type équivalent recommandé par
le constructeur.
Mettre au rebut les batteries usagées conformément aux
instructions du fabricant.
- (Swedish) VARNING
Explosionsfara vid felaktigt batteribyte.
Använd samma batterityp eller en ekvivalent
typ som rekommenderas av apparattillverkaren.
Kassera använt batteri enligt fabrikantens
instruktion.
- (German) Achtung
Explosionsgefahr bei Verwendung inkorrekt er Batterien.
Als Ersatzbatterien dürfen nur Batterien vom gleichen Typ oder
vom Hersteller empfohlene Batterien verwendet werden.
Entsorgung der gebrauchten Batterien nur nach den vom
Hersteller angegebenen Anweisungen.

CAUTION FOR BATTERY DISPOSAL

- (For USA, CANADA)
"BATTERY DISPOSAL"
THIS PRODUCT CONTAINS A LITHIUM PRIMARY
(MANGANESE DIOXIDE) MEMORY BACK-UP BATTERY
THAT MUST BE DISPOSED OF PROPERLY. REMOVE THE
BATTERY FROM THE PRODUCT AND CONTACT YOUR
LOCAL ENVIRONMENTAL AGENCIES FOR INFORMATION
ON RECYCLING AND DISPOSAL OPTIONS.
- "TRAITEMENT DES PILES USAGÉES"
CE PRODUIT CONTIENT UNE PILE DE SAUVEGARDE DE
MÉMOIRE LITHIUM PRIMAIRE (DIOXYDE DE MANGANÈSE)
QUI DOIT ÊTRE TRAITÉE CORRECTEMENT. ENLEVEZ LA
PILE DU PRODUIT ET PRENEZ CONTACT AVEC VOTRE
AGENCE ENVIRONNEMENTALE LOCALE POUR DES
INFORMATIONS SUR LES MÉTHODES DE RECYCLAGE ET
DE TRAITEMENT.

