Model TR-ALE

Machine Code: C686

SERVICE MANUAL

April 2007

Subject to change

TABLE OF CONTENTS

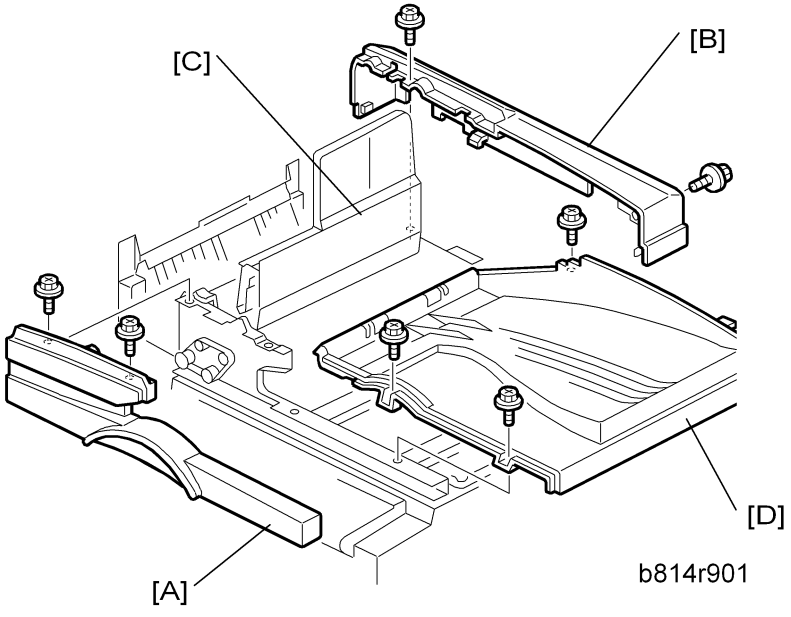
1. Replacement and Adjustment

2. Detailed Section Descriptions

1. Replacement and Adjustment

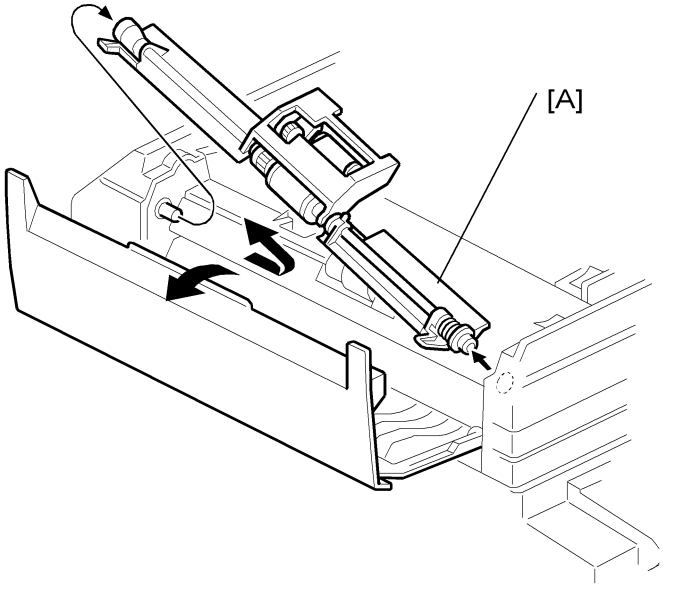
Replacement and Adjustment

DF Exit Table and Cover



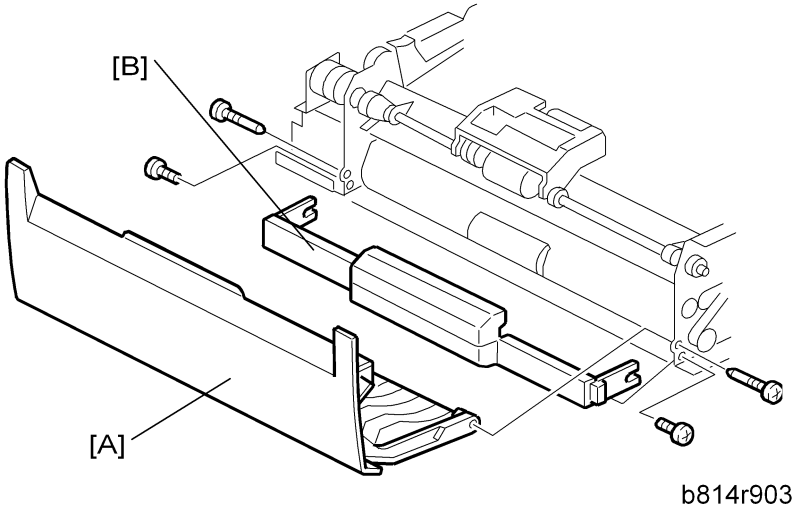
1. Open the left cover.
2. [A] Front cover (x 2)
3. [B] Rear cover (x 2). Take care not to break the 3 hooks.
4. [C] Open the reverse table
5. [D] Original exit table (x 3)

Original Feed Unit



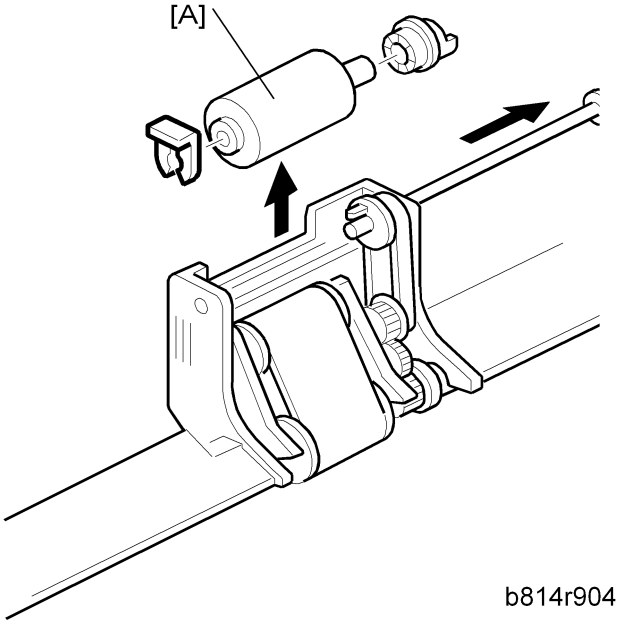
1. Open the left cover.
2. [A] Original feed unit

Left Cover



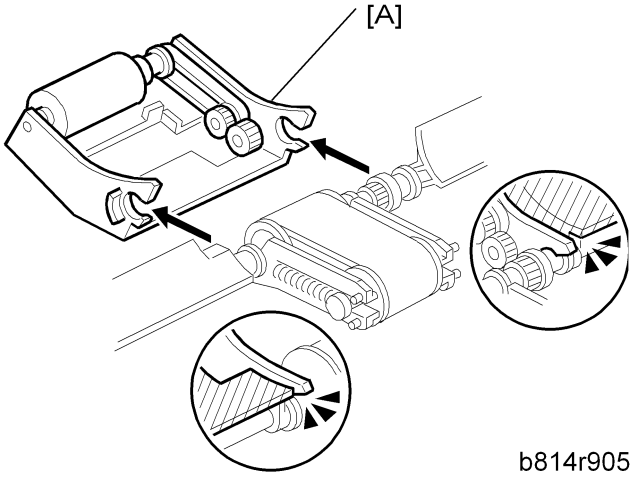
1. Front and rear covers (☛ 'DF Exit Table and Cover')
2. [A] Left cover (🔩 x 2)
3. [B] Lower left stay unit (🔩 x 2)

Pick-Up Roller

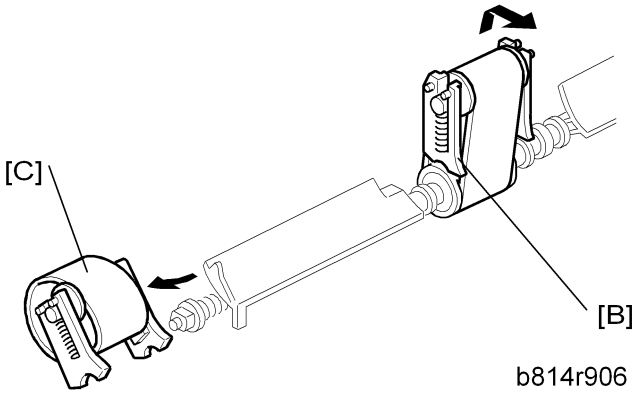


1. Original feed unit (☛ 'Original Feed Unit')
2. [A] Pick-up roller (⟲ x 1)

Feed Belt

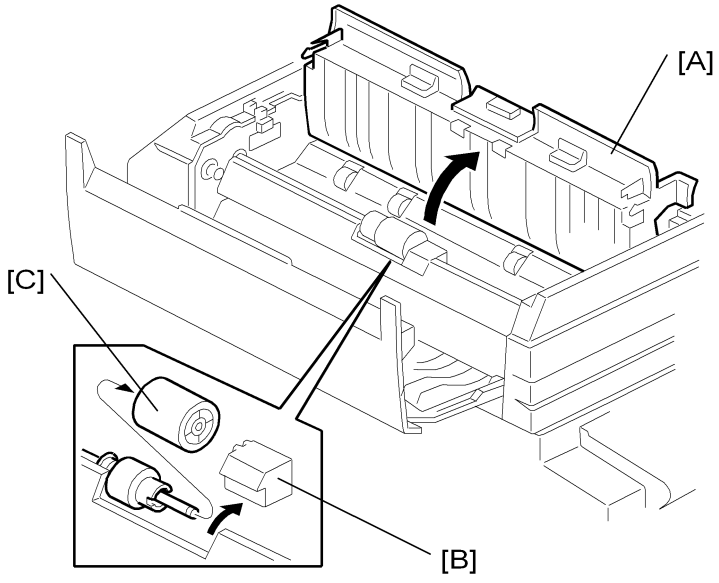


1. Original feed unit (☛ 'Original Feed Unit')
2. [A] Paper feed guide



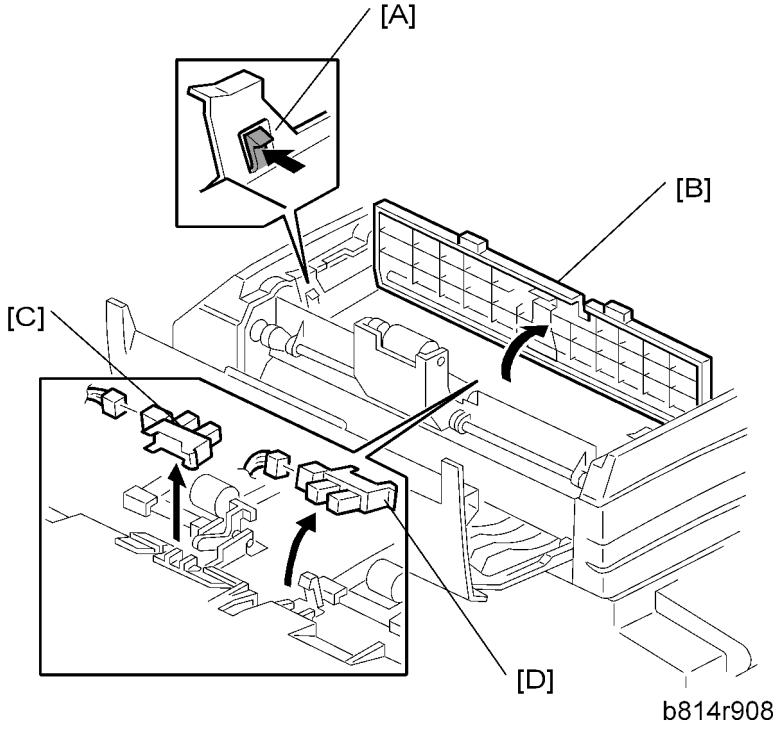
3. [B] Belt holders
4. [C] Feed belt

Separation Roller



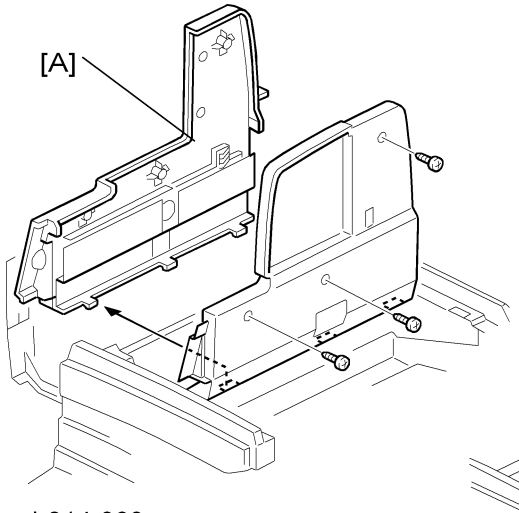
1. Lift the original feed guide [A].
2. [B] Separation roller cover
3. [C] Separation roller

Original Set/Original Reverse Sensors



1. Open the left cover.
2. While pushing the left and right pawls [A], open the original feed guide plate [B].
3. [C] Original set sensor (x 1)
4. [D] Original reverse sensor (x 1)

Original L/W Sensors, Trailing Edge Sensor



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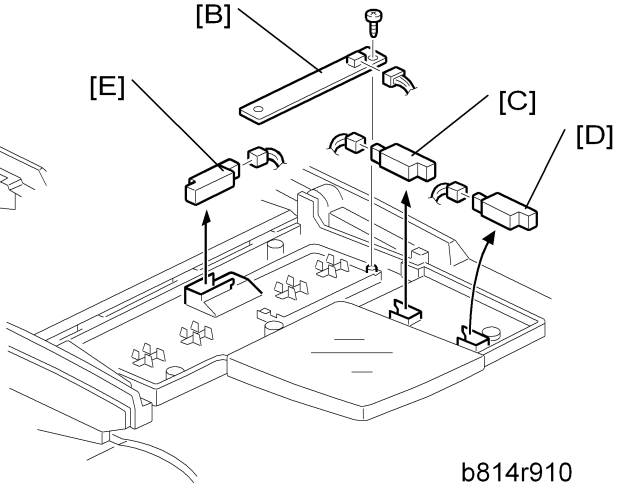

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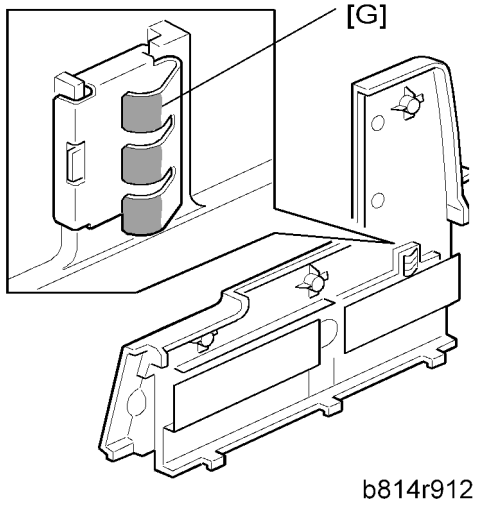
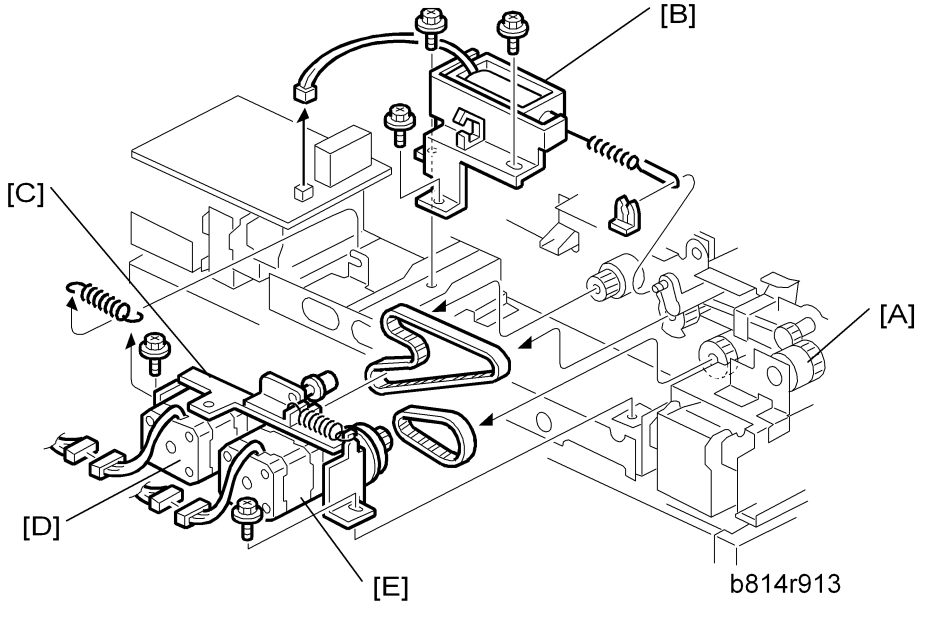
1. Open the original table.
2. [A] Upper part of the table (x 3)
3. [B] Width sensor board (x 1)
4. [C] Length sensor-1 (x 1)
5. [D] Length sensor-2 (x 1)
6. [E] Trailing edge sensor (x 1)



Note

- To ensure proper detection of paper size, after wiping off the sensor board and terminal plate with a dry cloth (or cloth with alcohol), apply silicone grease (KS-660) to the terminal plate [G].

Feed Clutch, Pick-Up Sol, Transport Motor, Feed Motor



Exterior

1. Rear cover (☛ 'DF Exit Table and Cover')

DF Feed Clutch

1. [A] DF feed clutch (C x 1, x 1)

Pick-up Solenoid

1. [B] Pick-up solenoid (x 3, x 1, x 1)

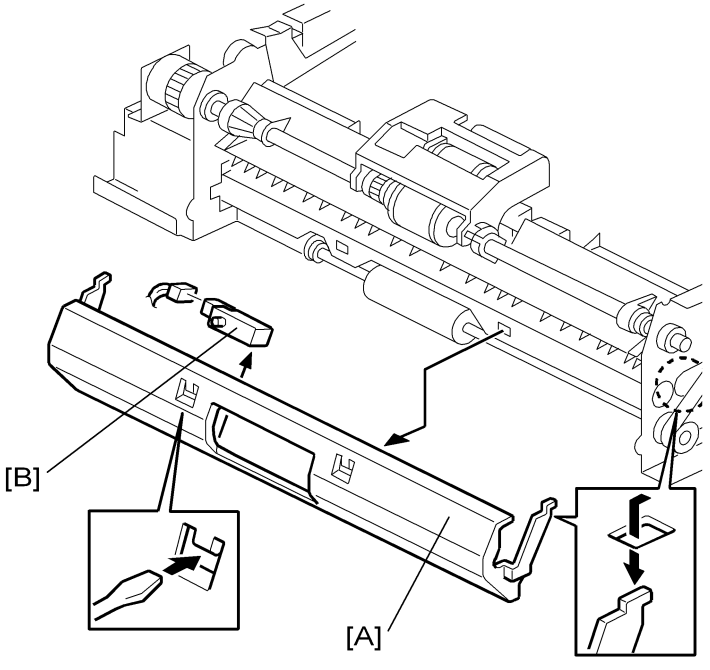
Transport Motor

1. [C] Bracket (x 2)
2. [E] Transport motor (x 2, x 1)

DF Feed Motor

1. [C] Bracket (x 2)
2. [D] DF feed motor (x 2, x 1)

Registration Sensor



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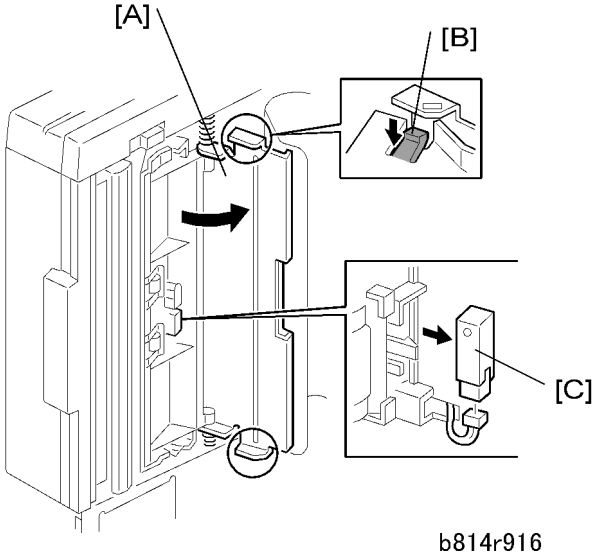
1. Front and rear covers (☛ 'DF Exit Table and Cover')
2. Left cover and lower left stay unit (☛ 'Left Cover')
3. [A] Transport guide plate
4. [B] Registration sensor (☞ x 1)

Stamp Solenoid and Original Exit Sensor



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1. Front cover, Rear cover, Original exit table (☛ 'DF Exit Table and Cover')
2. Open the exit guide plate [A]. Next, detach the unit by inserting a screwdriver or other tool into one of the small openings [B] on either side of the guide plate holder and pushing firmly.
3. [C] Original exit sensor (✍ x 1)

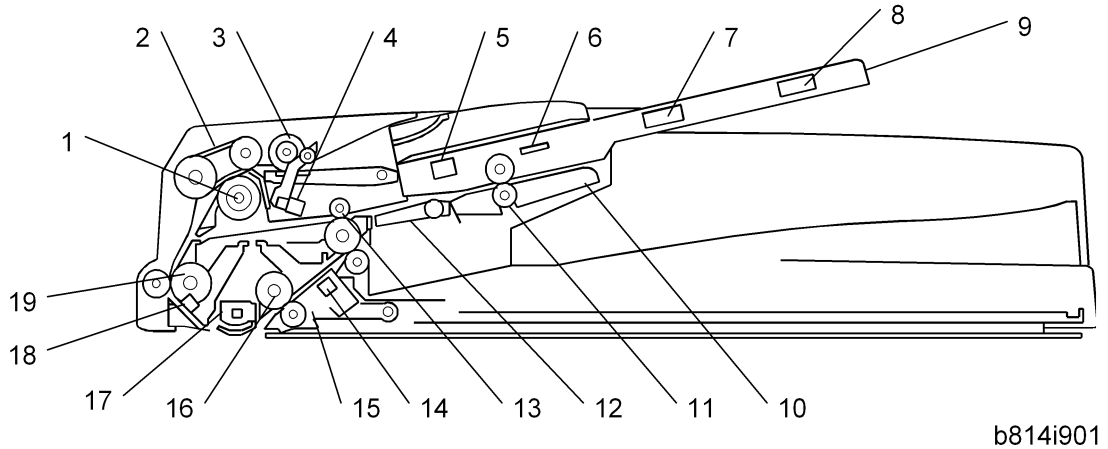
2. Detailed Section Descriptions

Overall Machine Information

Specifications

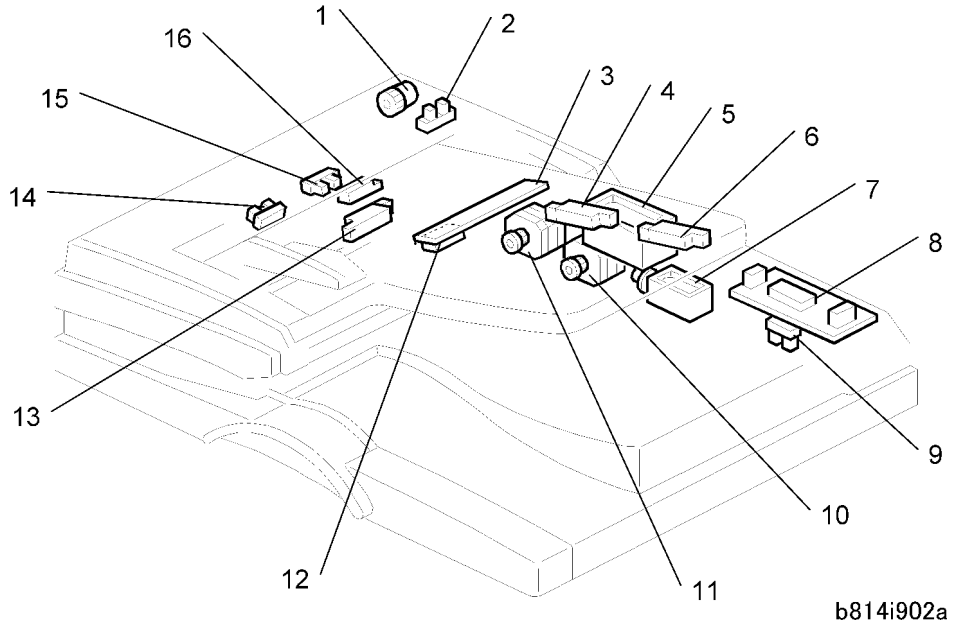
Index	Specifications
Original Size	Standard Size A3 to A5, DLT to HLT Non-standard Size (Single-sided Mode only) Max. width 297 mm Min. width 148 mm Max. length 864 mm Min. length 210 mm
Original Weight	52.3 ~ 105 g/m^2 (14 ~ 28 lb) 52.3 ~ 128 g/m^2 (14 ~ 34 lb)
Table Capacity	50 sheets (80 g/m^2, 22 lbs)
Original Standard Position	Center
Separation	FRR
Original Transport	Roller transport
Original Feed Order	From the top original
Reproduction Range	50 ~ 200 %
Power Source	24 & 5 VDC from the copier
Power Consumption	50 W
Dimensions (W × D × H)	550 mm × 470 mm × 130 mm
Weight	10 kg or less

Mechanical Component Layout



1. Separation Roller	11. Reverse Roller
2. Paper Feed Belt	12. Junction Gate
3. Pick-up Roller	13. Exit Roller
4. Original Set Sensor	14. Original Exit Sensor
5. Original Trailing Edge Sensor	15. Stamp
6. Original Width Sensor Board	16. 2nd Transport Roller
7. Original Length Sensor 1	17. Original Exposure Guide
8. Original Length Sensor 2	18. Registration Sensor
9. Original Table	19. 1st Transport Roller
10. Reverse Table	

Electrical Component Layout



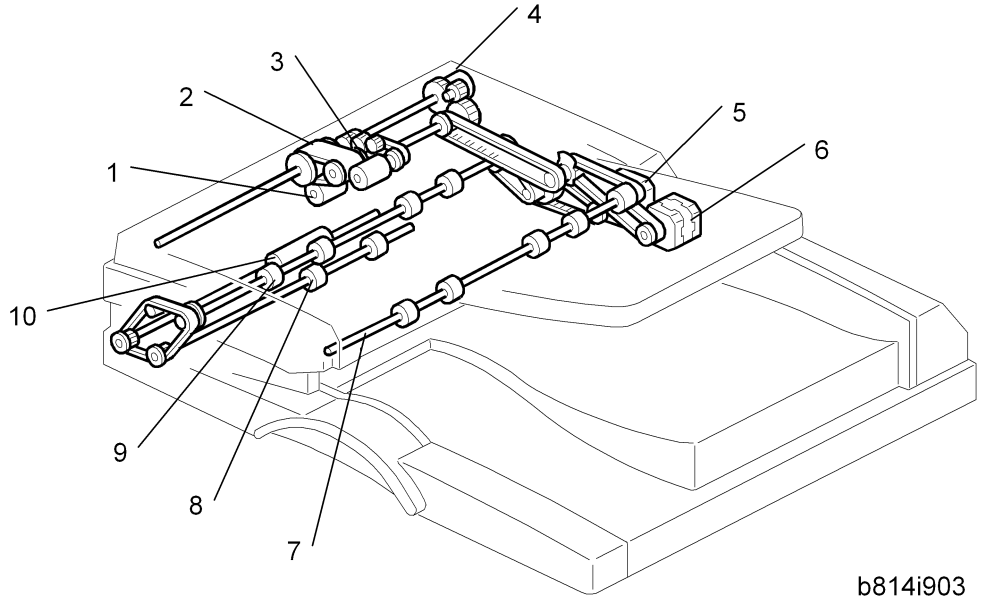
1. DF Feed Clutch	9. DF Position Sensor
2. Feed Cover Sensor	10. DF Feed Motor
3. Original Width Sensor Board	11. DF Transport Motor
4. Original Length Sensor 1	12. Original Exit Sensor
5. DF Pick-up Solenoid	13. Original Trailing Edge Sensor
6. Original Length Sensor 2	14. Original Set Sensor
7. Junction Gate Solenoid	15. Original Reverse Sensor
8. DF Drive PCB	16. Registration Sensor

Electrical Component Description

Symbol	Name	Function	Index No
Motors			
M1	DF Feed	Drives the paper feed mechanism, and drives the inversion mechanism in duplex mode.	10

Symbol	Name	Function	Index No
M2	DF Transport	Drives the transport and exit rollers	11
Sensors			
S1	DF Position	Informs the CPU of the DF when the DF is opened and closed (for platen mode).	9
S2	Registration	Detects the leading edge of the original to determine when to turn off the DF transport motor and expose the original, and checks for original misfeeds.	16
S3	Feed Cover Sensor	Detects whether the feed-in cover is open or not.	2
S4	Original Width	Detects the original width.	3
S5	Original Length 1	Detects the original length.	4
S6	Original Length 2	Detects the original length.	6
S7	Original Set	Detects the original is on the feed table.	14
S8	Original Trailing Edge	stop copy paper feed and to turn off the transport motor, and checks for original misfeeds.	13
S9	Original Exit	Informs the CPU when scanning the original has finished.	12
S10	Original Reverse	Detects the original in the paper path for inverting.	15
Solenoids			
SOL1	DF Pick-up	Controls the up-down movement of the original table.	5
SOL2	Junction Gate	Controls the junction gate for reading the back side of the original in duplex mode.	7
Clutches			
MC1	DF Feed	Transfers transport motor drive to the pick-up roller and feed belt.	1
PCBs			
PCB1	DF Drive	Interfaces the sensor signals with the copier, and transfers the magnetic clutch, solenoid, and motor drive signals from the copier.	8

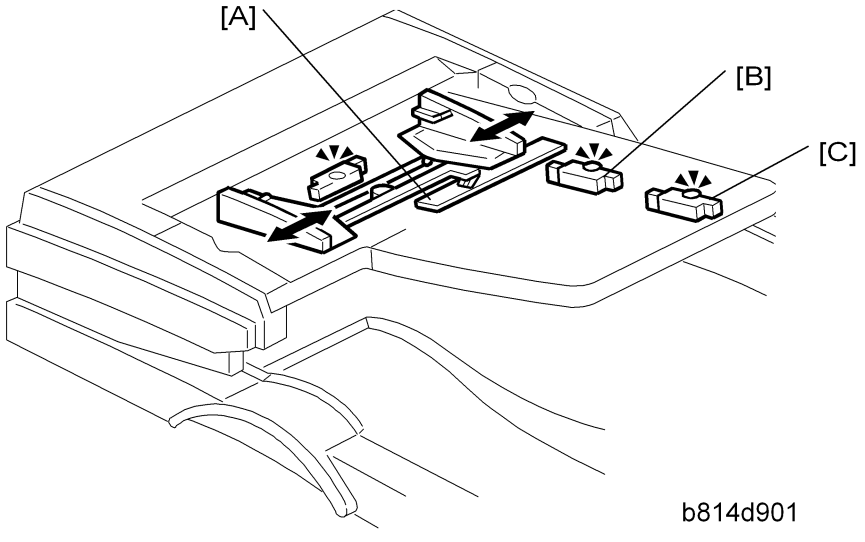
Drive Layout



1. Separation Roller	6. DF Feed Motor
2. Original Feed Belt	7. Reverse Table Roller
3. Pick-up Roller	8. 2nd Transport Roller
4. DF Feed Clutch	9. Exit Roller
5. DF Transport Motor	10. 1st Transport Roller

Detailed Section Descriptions

Original Size Detection



The original size detection mechanism consists of the original width sensor board [A] and two original length sensors-1 [B] and -2 [C]. Based on the combined output of the length sensors and the width sensor board, the machine can detect the size of the original. This integrated detection mechanism is detailed in the table on the next page.

Note that the width sensor's terminal plate is attached to the original guide, so the widths of the originals must all be the same.

		NA	EU	Original Length 1	Original Length 2	P1	P2	P3	P4
1	A3 (297 x 420)	✘	❍	ON	ON	-	-	-	ON
2	B4 (257 x 364)	✘	❍	ON	ON	-	-	ON	-
3	A4 SEF (210 x 297)	✘	❍	ON	-	-	ON	-	-
4	A4 LEF (297 x 210)	✘	❍	-	-	-	-	-	ON
5	B5 SEF (182 x 257)	✘	❍	ON	-	ON	-	-	-

		NA	EU	Original Length 1	Original Length 2	P1	P2	P3	P4
6	B5 LEF (257 x 182)	✘	❍	-	-	-	-	ON	-
7	A5 SEF (148 x 210)	✘	❍	-	-	ON	-	-	-
8	A5 LEF (210 x 148)	✘	❍	-	-	-	ON	-	-
9	11" x 17"	●[1]	✘	ON	ON	-	-	-	ON
10	11" x 15"	❍[1]	✘	ON	ON	-	-	-	ON
11	10" x 14"	❍	✘	ON	ON	-	-	ON	-
12	81/2" x 14"	●[2]	✘	ON	ON	-	ON	-	-
13	81/2" x 13"	✘	●[4]	ON	ON	-	ON	-	-
14	8" x 13"	❍[2]	❍[4]	ON	ON	-	ON	-	-
15	81/2" x 11" SEF	●[3]	✘	ON	-	-	ON	-	-
16	11" x 81/2" LEF	❍	✘	-	-	-	-	-	ON
17	8" x 10" SEF	❍[3]	✘	ON	-	-	ON	-	-
18	51/2" x 81/2" SEF	❍	✘	-	-	ON	-	-	-
19	81/2" x 51/2" LEF	❍	✘	-	-	-	ON	-	-

NA: America (North, Middle, South) EU: Europe, Asia, China, Taiwan

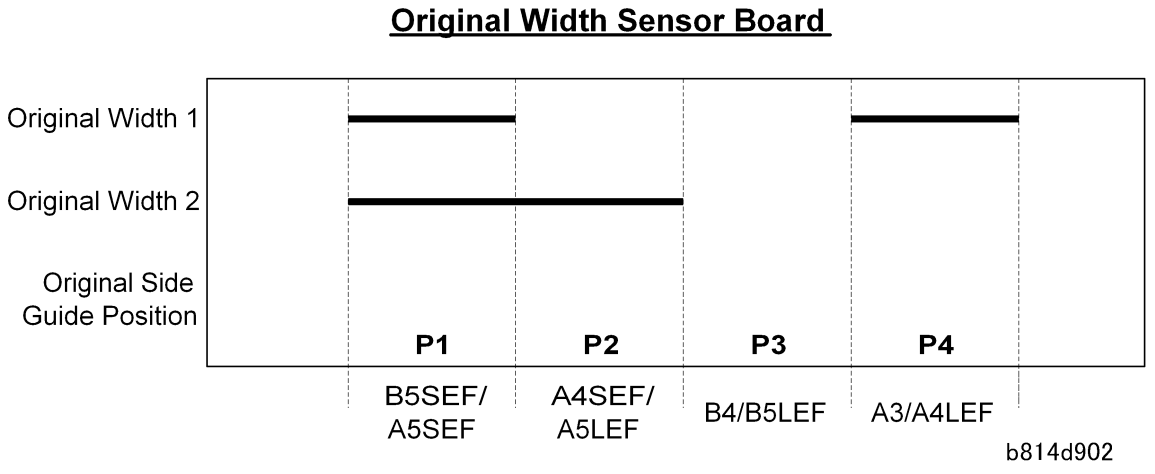
✘: No, ❍: Yes ON: Paper present

❍[1], ●[1]: In NA, original size 11" x 15" is detected as 11" x 17"

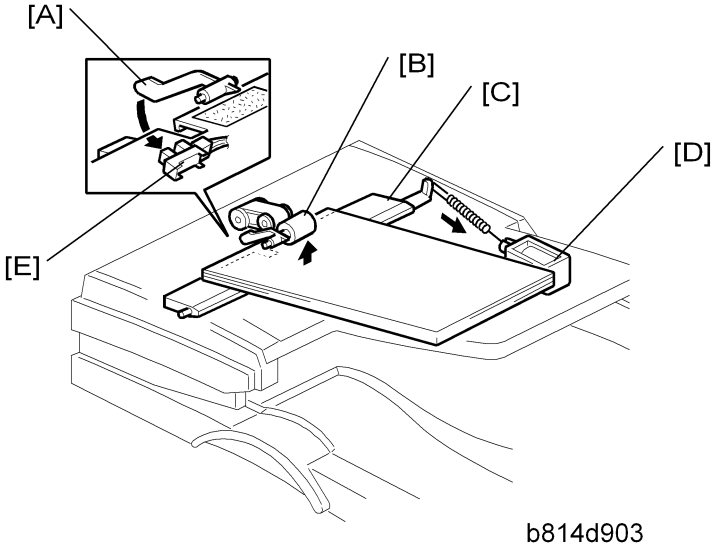
❍[2], ●[2]: In NA, original size 8" x 13" is detected as 8.5" x 14"

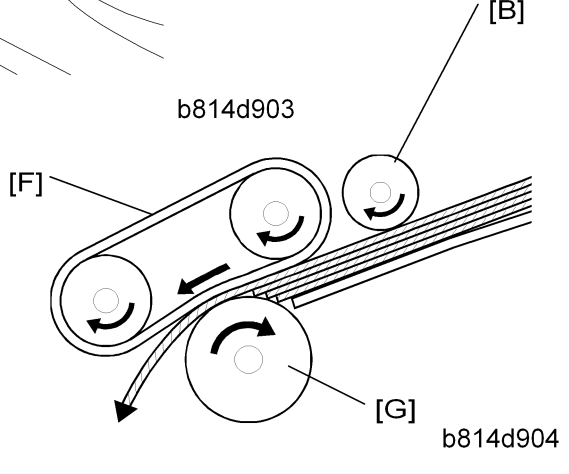
❍[3], ●[3]: In NA, original size 8" x 10" is detected as 8.5" x 11"

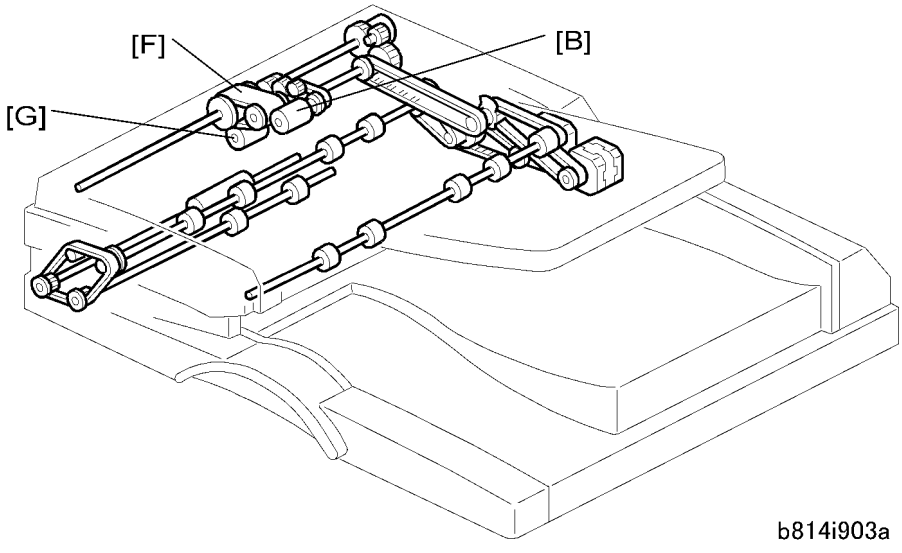
❍[4], ●[4]: In EU, original size 8" x 13" is detected as 8.5" x 13"



Pick-Up and Separation







The original is set with the image facing up. The original pushes actuator [A] and the original set sensor [E] is activated.

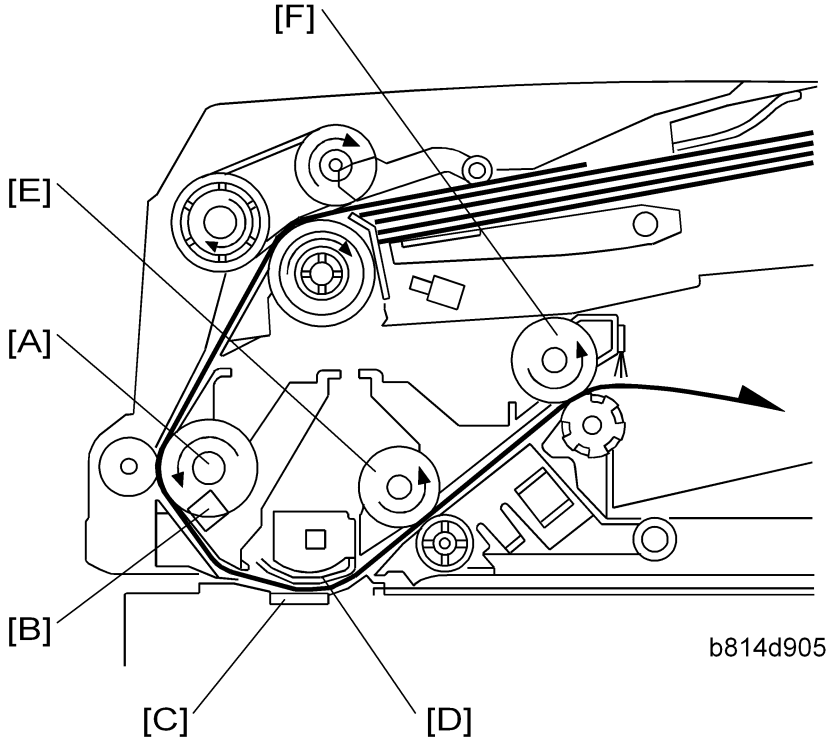
After pressing the start button, the pick-up solenoid [D] is activated and the lift plate [C] lifts the original up until it comes in contact with the pick-up roller [B]. The pick-up roller then feeds the top sheet of paper.

After being fed from the pick-up roller, the topmost sheet is separated from the stack by the separation roller and sent to the first transport roller.

The mechanism is an FRR system, consisting of the original feed belt [F] and separation roller [G].

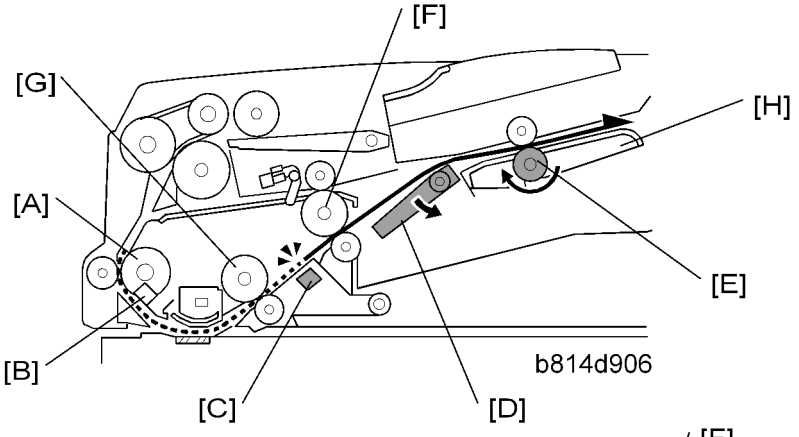
Original Transport and Exit

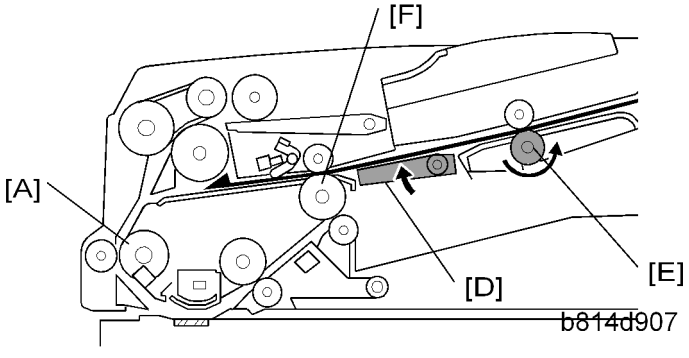
Single-Sided Originals



The DF feed motor feeds the separated original to the first transport roller [A] at maximum speed. When the registration sensor [B] detects the leading edge, the motor stops for a short while. Then the feed and transport motors turn on again, and feed the original through the scanning area at a lower speed (the scanning area contains the original exposure guide [D] and DF exposure glass [C]). After scanning, the original is fed out by the second transport roller [E] and exit roller [F].

Double-Sided Originals

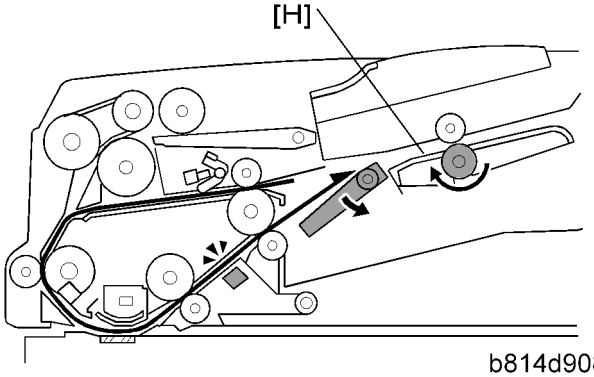




When the registration sensor [B] detects the leading edge of the original, the DF feed motor (which drives the feed roller) and transport motor (which drives the transport roller) both switch off. After a brief interval, the transport motor alone reactivates to drive the first transport roller [A] and second transport roller [G] and the exit roller [F]. The front side of the original is then scanned.

When the original exit sensor [C] detects the leading edge of the original, the junction gate solenoid is activated and the junction gate [D] opens. The original is then transported towards the reverse table [H].

Soon after the trailing edge of the original passes the exit sensor [C], the junction gate solenoid switches off and the junction gate [D] is closed. When the original has been fed onto the reverse table, the DF feed motor switches on in reverse. The original is then fed by the reverse roller [E] and then by the exit roller [F] and first transport roller [A] to the scanning area (where the reverse side will be scanned).



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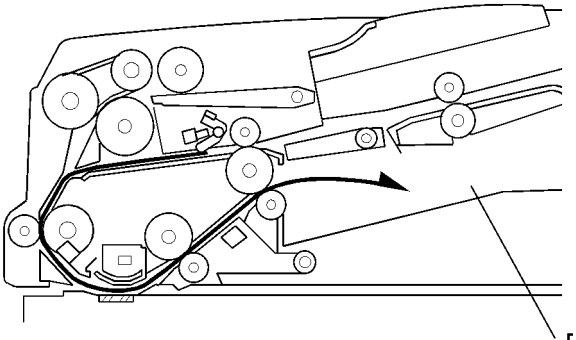

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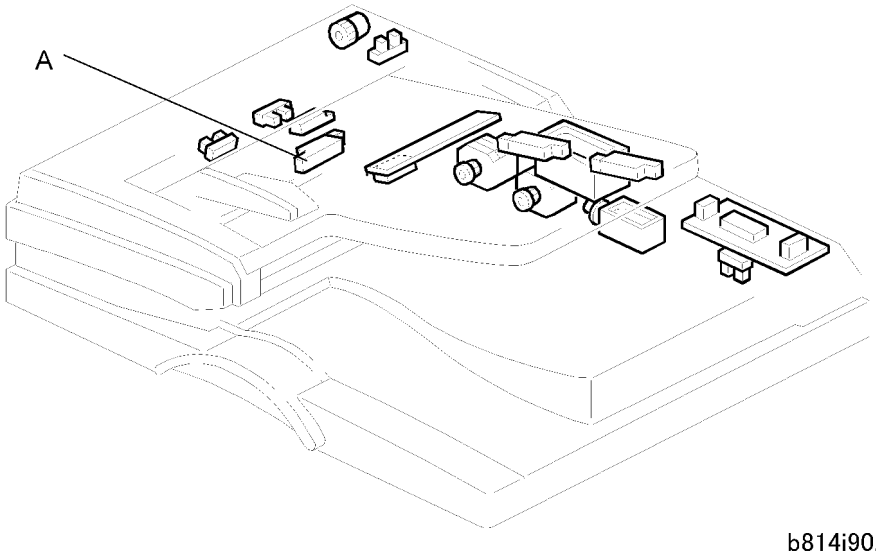
The original is then sent to the reverse table [H] a second time to be turned over. This is done so that the duplex copies will be properly stacked front side down in the exit tray [J] in the correct order.

Original Trailing Edge Sensor



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During one-to-one copying, copy paper is fed to the registration roller in advance (while the original is still being scanned), to increase the copy speed. The trailing edge sensor [A] monitors the stack of originals in the feeder, and detects when the trailing edge of the last page has been fed in. The main CPU then stops the copier from feeding an unwanted extra sheet of copy paper.

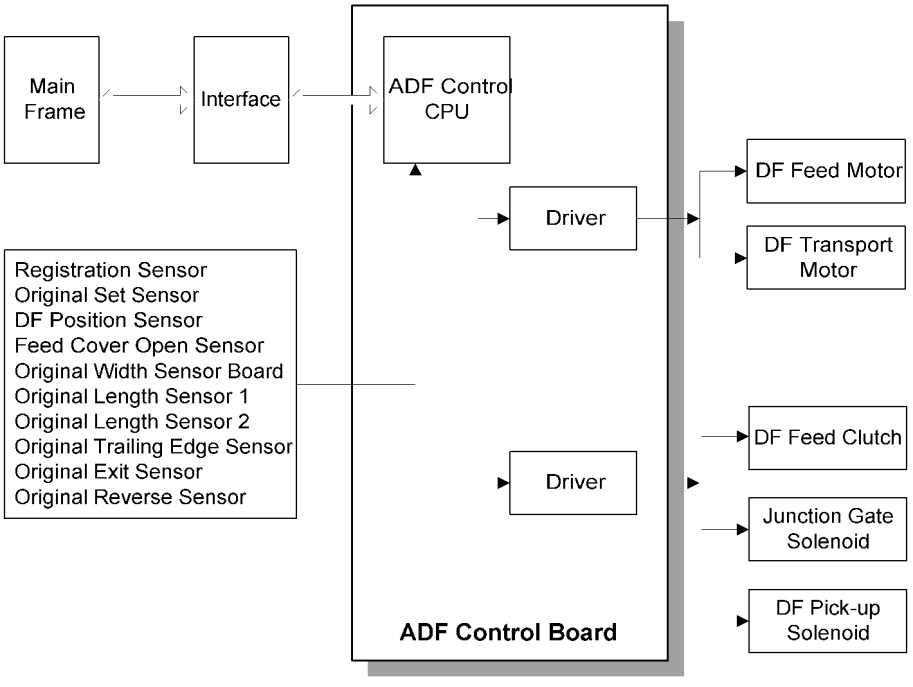
Jam Detection

JAM 1A:	If the registration sensor does not turn on within X1 ms after original feed starts. • X1 = 1,000 ms
JAM 1B:	If the registration sensor does not turn on within 953 ms after the leading edge of the original reaches the original reverse sensor (duplex mode only)
JAM 2:	If the registration sensor does not turn off within X2 ms after receiving the feeding signal from the Mainframe and after turning on. • X2 = (Original length/line speed) +2,000 ms
JAM 3:	If there is no original at the registration sensor when scanning is started, even though the sensor had already turned on.
	The operator may then remove the original from the ADF.

JAM 4:	The current original is stopped after the registration sensor detects its leading edge, but the previous original is still at the scanning position.
JAM 5:	If the original exit sensor does not turn on within X3 ms after receiving relaying signal from the Mainframe and after the registration sensor turns on. • X3 = 140 mm/line speed
JAM 6:	If the original exit sensor does not turn off within X4 ms after the original exit sensor turns on. • X4 = (Original length/line speed) +1,030 ms
JAM 7:	If the original reverse sensor does not turn on within 2,329 ms after the reversing process begins (Duplex mode only).
JAM 8:	If the original stopped at the stamp position is removed.
JAM 9:	If the cover is opened or the ADF is lifted up while the ADF is in operation.
JAM 10:	If the DF gate signal (indicating that the original is now in the correct position for scanning) is not asserted when the original trailing edge passes the DF exposure glass. JAM 10 occurs when the original is pulled out while it is being scanned.

Overall Electrical Circuit

The DF CPU controls the transport motor, DF feed motor, DF feed clutch, junction gate solenoid, stamp solenoid, and pick-up solenoid. The DF CPU also monitors all DF sensors and provides updated status information when prompted at regular intervals by the mainframe, which may then take action based on this information. The DF–mainframe connection is checked automatically just after power is supplied to the mainframe.


Main Frame
Interface
ADF Control CPU
Driver
Driver
DF Feed Motor
DF Transport Motor
DF Feed Clutch
Junction Gate Solenoid
DF Pick-up Solenoid
Registration Sensor
Original Set Sensor
DF Position Sensor
Feed Cover Open Sensor
Original Width Sensor Board
Original Length Sensor 1
Original Length Sensor 2
Original Trailing Edge Sensor
Original Exit Sensor
Original Reverse Sensor
ADF Control Board

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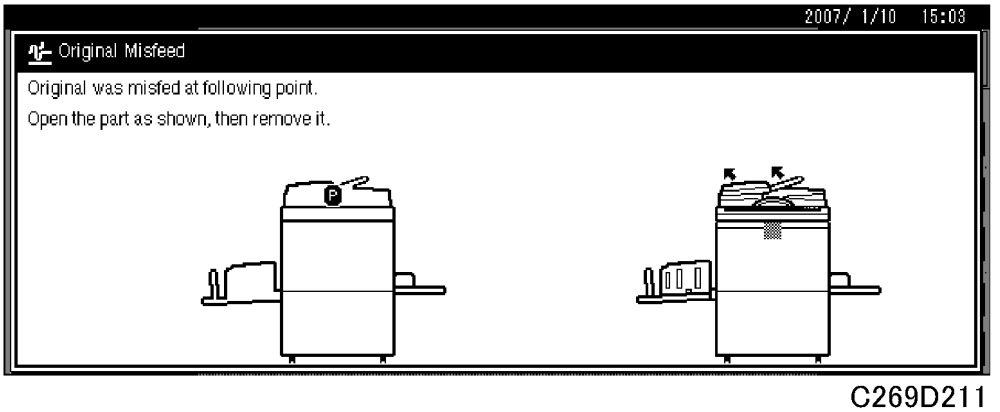
Timing Charts

Original Feed Error Detection in the ADF

2

ARDF Feed in Error (P Jam)



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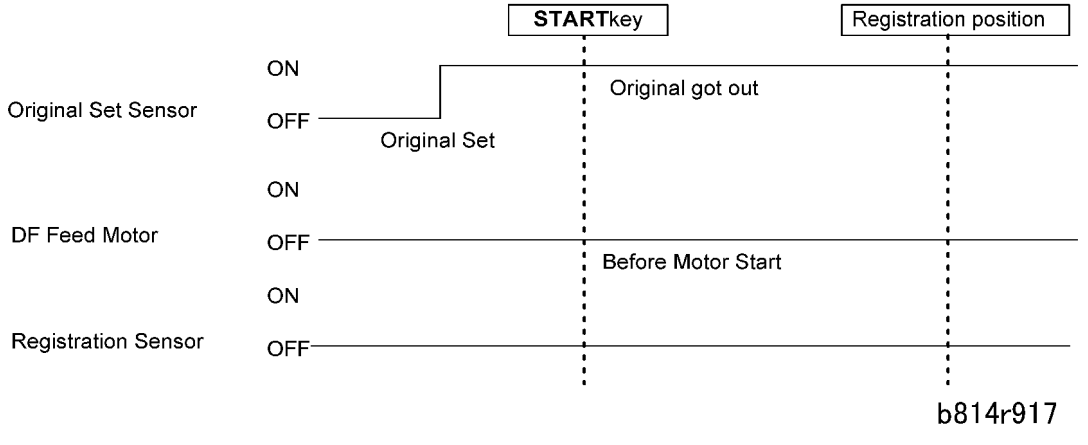
Original transport from Original Set Position to Front Page registration position

1. If the original was out of the machine before the DF feed motor turned on.



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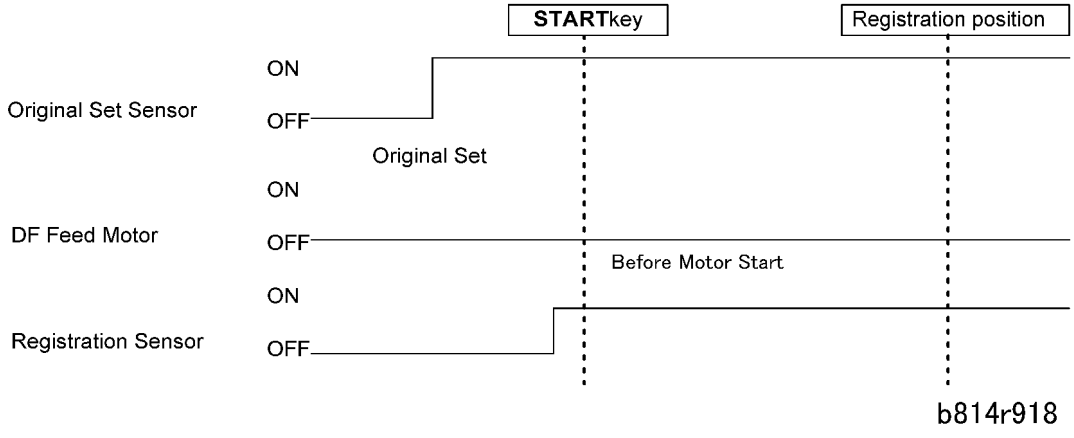
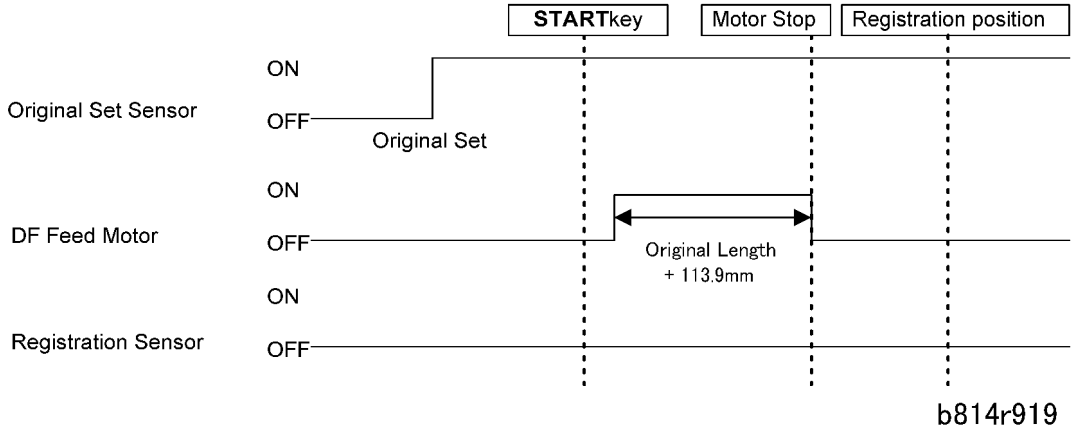
2. If the registration sensor turned on before the DF feed motor turned on.

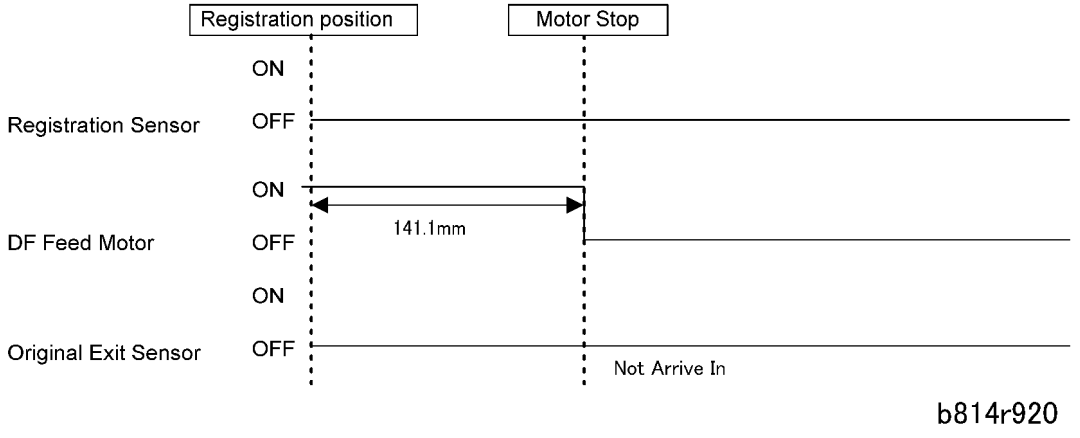


3. If the registration sensor does not turn on when the DF feed motor has fed more than the original length + 113.9 mm.

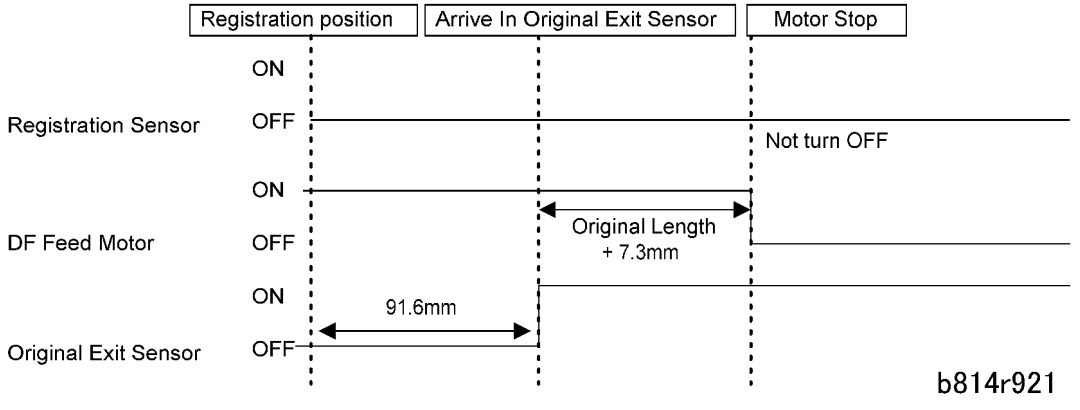


Original transport from Front Page registration position to Switch Back position

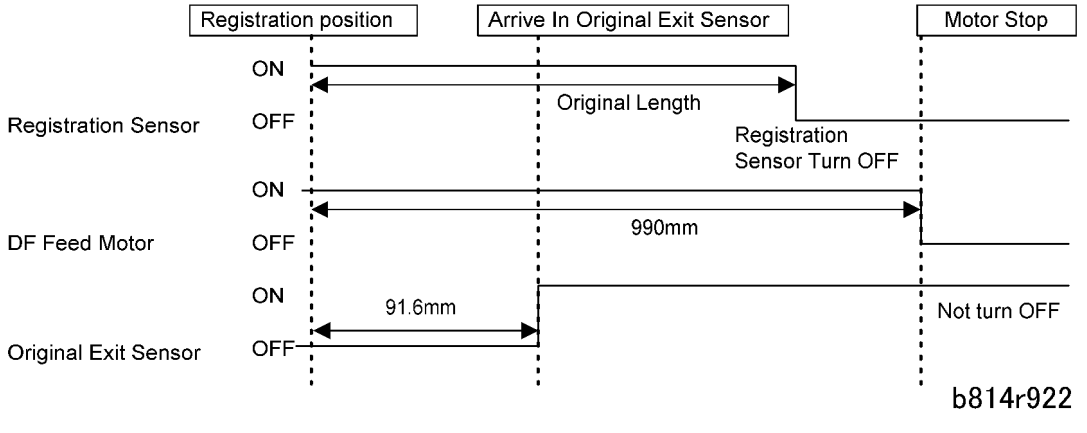
1. If the original exit sensor does not turn on when the DF feed motor has fed more than 141.1mm.



2. If the registration sensor does not turn off when the DF feed motor has fed more than the original length + 7.3 mm after arriving at the original exit sensor.

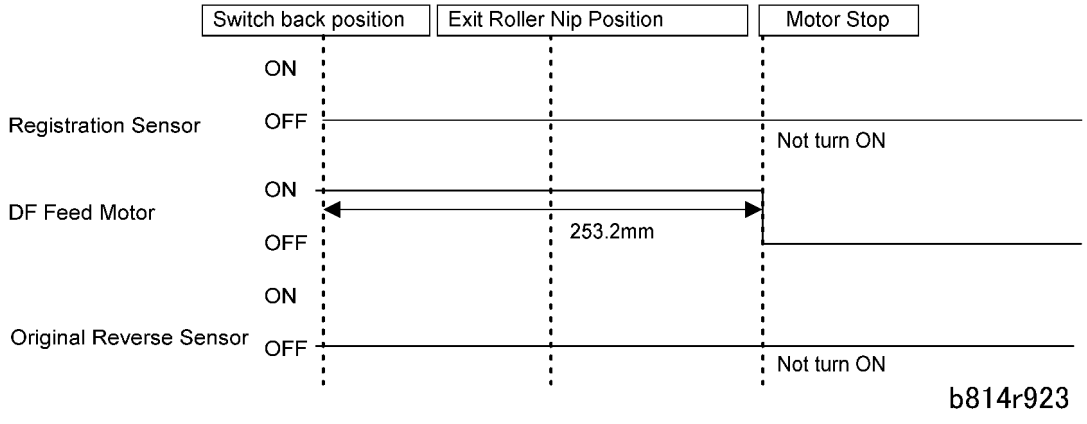


3. If the original exit sensor does not turn off when the DF feed motor has fed more than 990 mm before the original trailing edge got to the original exit sensor.

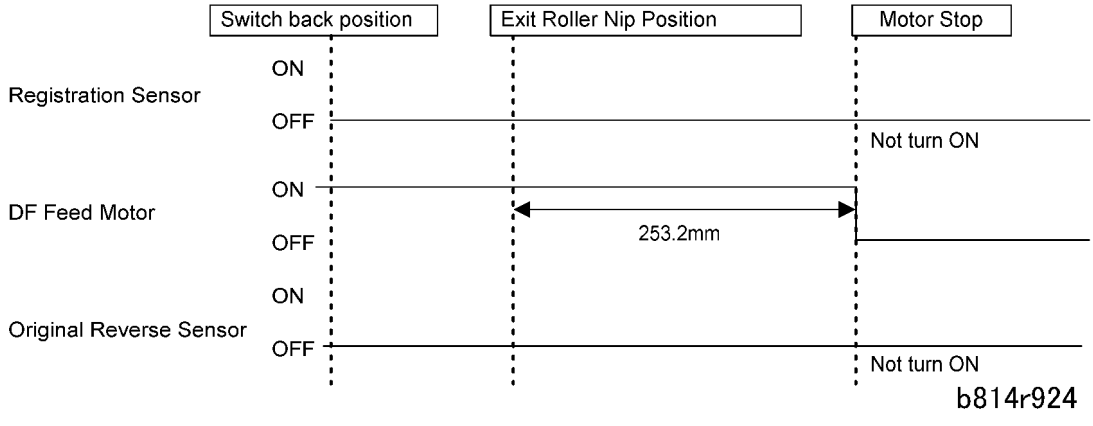


Original transport of Switch Back position to Back Page registration position

1. If the registration sensor or original reverse sensor does not turn on when the DF feed motor has fed more than 253.2 mm from the switch back position.

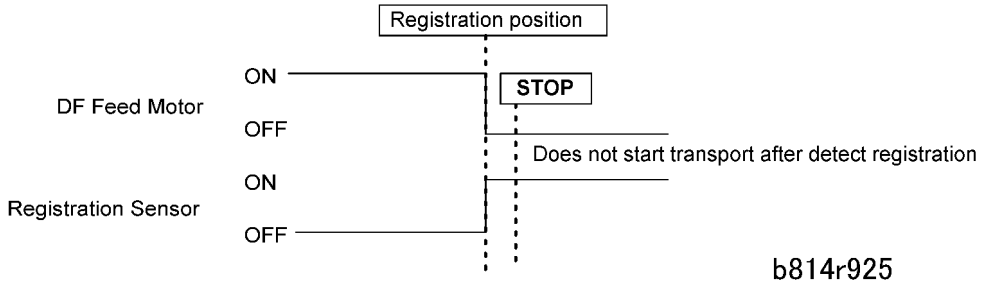


2. If the registration sensor or original reverse sensor does not turn on when the DF feed motor has fed more than 253.2 mm from the exit roller nip position.

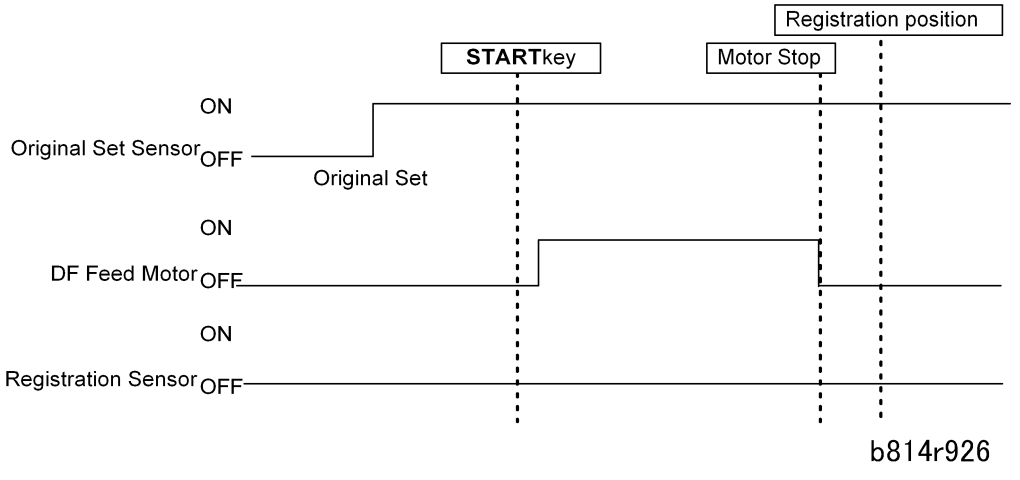


Other Cases

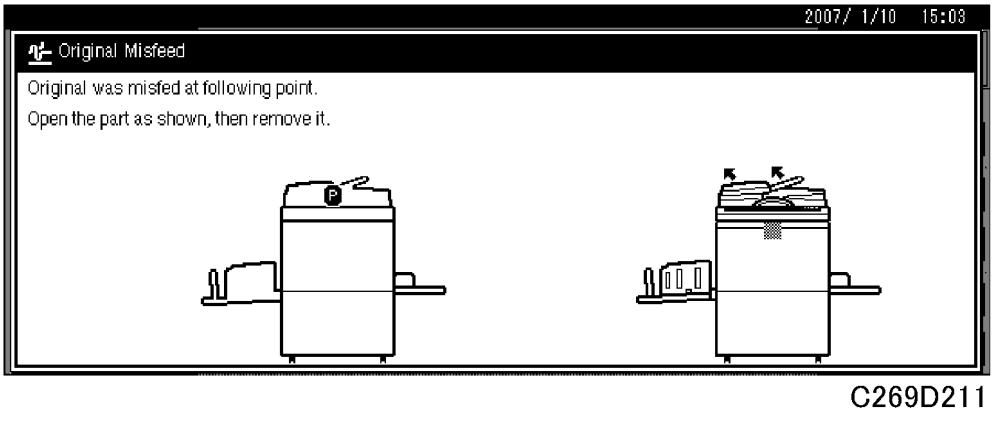
1. If the machine stops before receiving a scan start job signal and after original registration (stop key or shutdown)



2. If the DF feed motor is forced to stop to before original registration (stop key or shutdown)

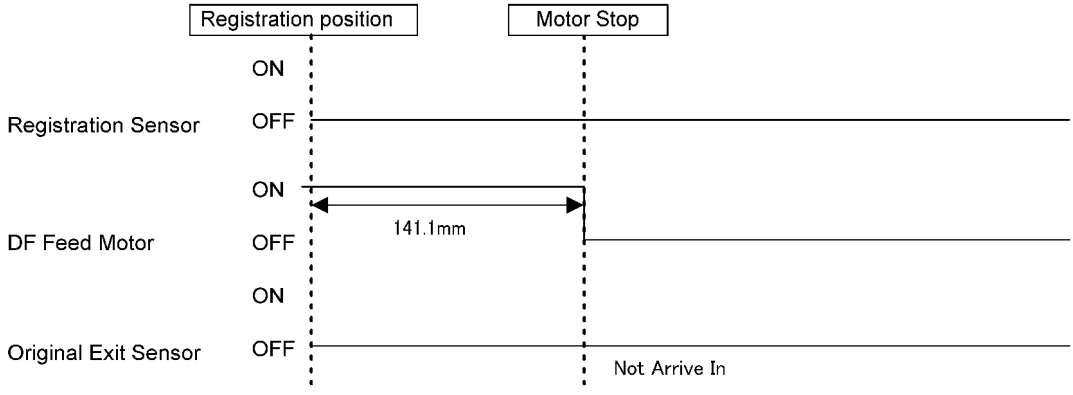


ARDF Feed out Error (P Jam)

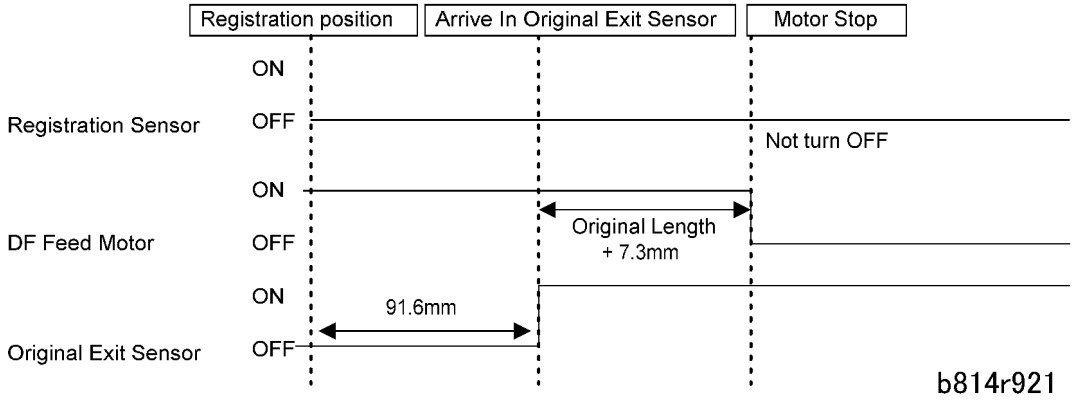


Original transport from registration position to original exit tray

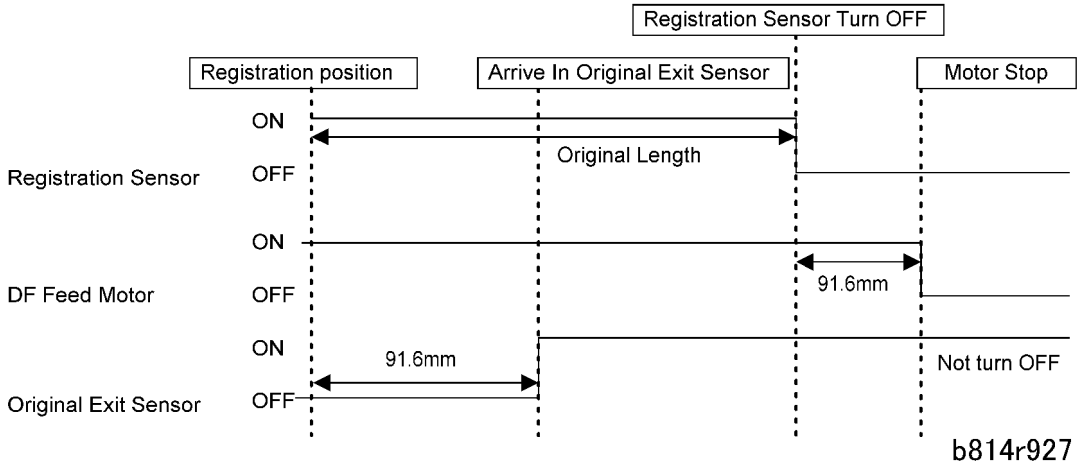
1. If the original exit sensor does not turn on when the DF feed motor has fed more than 141.1mm.



2. If the registration sensor does not turn off when the DF feed motor has fed more than the original length + 7.3mm after arriving at the original exit sensor.

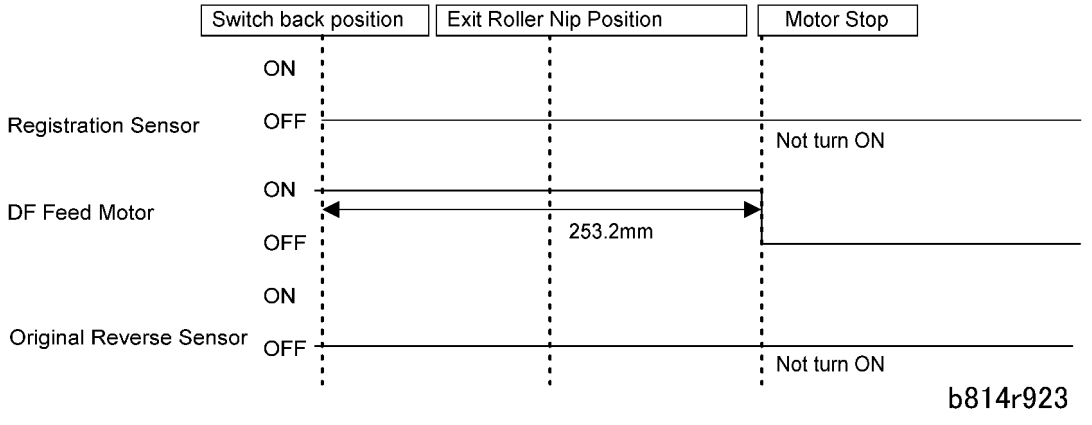


3. If the original exit sensor does not turn off when the DF feed motor has fed more than 91.6 mm after the registration sensor turned off before the original trailing edge got to the original exit sensor.

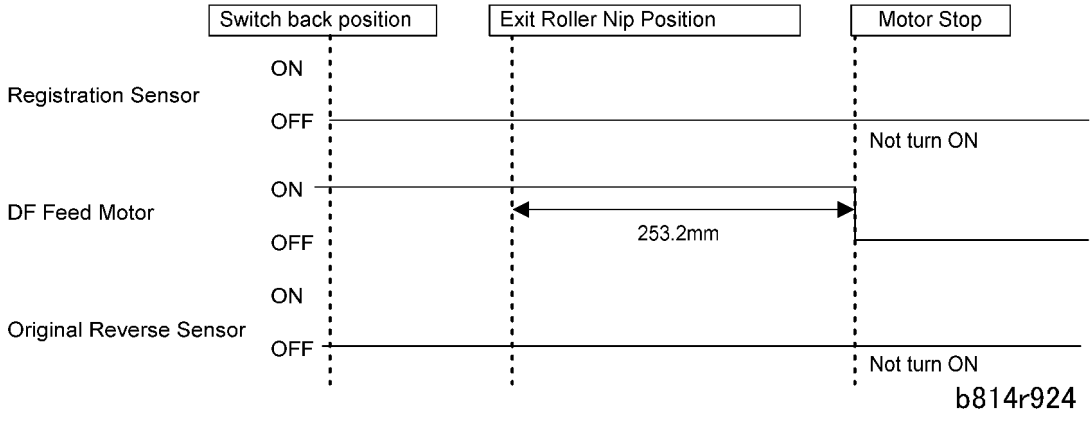


Original transport of Registration position to Switch Back position

1. If the registration sensor or original reverse sensor does not turn on when the DF feed motor has fed more than 253.2mm from the switch back position.

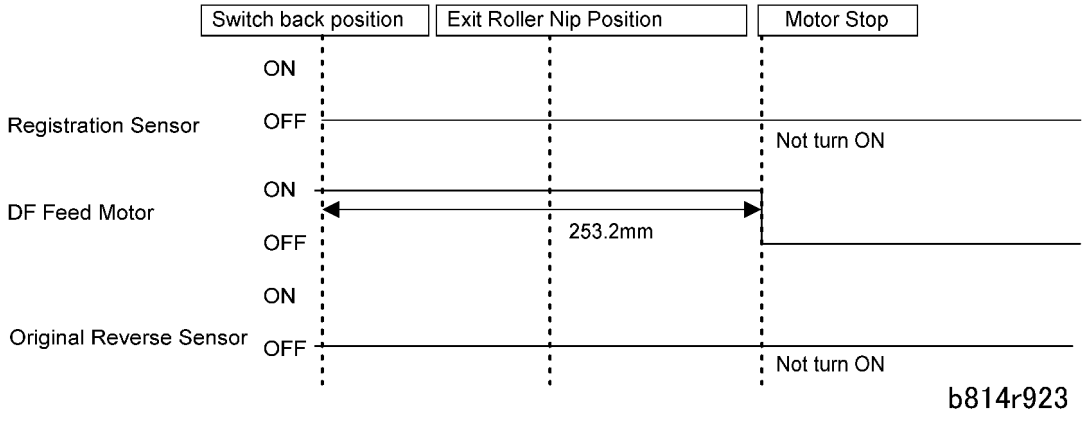


2. If the registration sensor or original reverse sensor does not turn on when the DF feed motor has fed more than 253.2mm from the exit roller nip position.

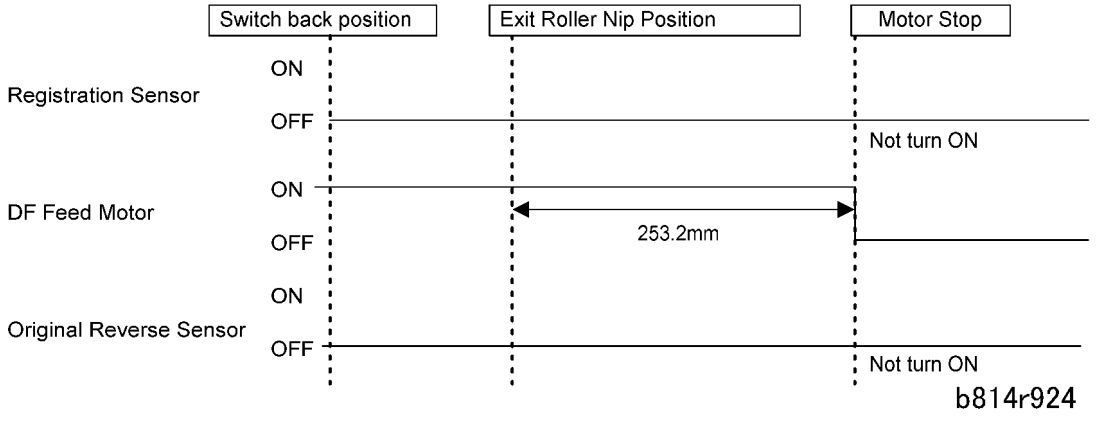


Original transport of Switch Back position to Registration position

1. If the registration sensor or original reverse sensor does not turn on when the DF feed motor has fed more than 253.2mm from the switch back position.

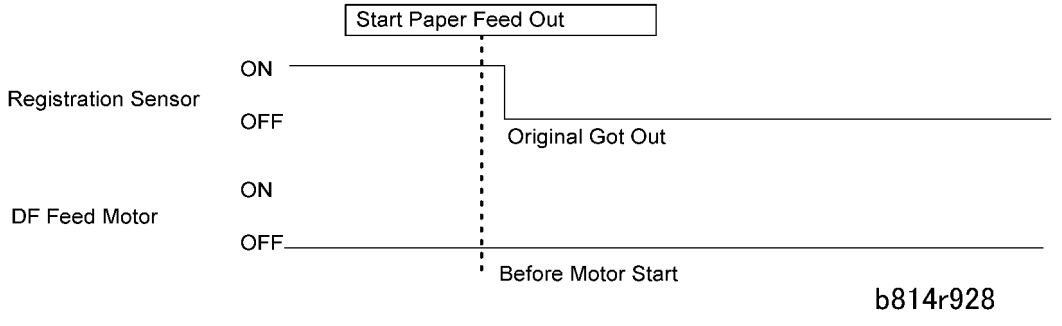


2. If the registration sensor or original reverse sensor does not turn on when the DF feed motor has fed more than 253.2mm from the exit roller nip position.

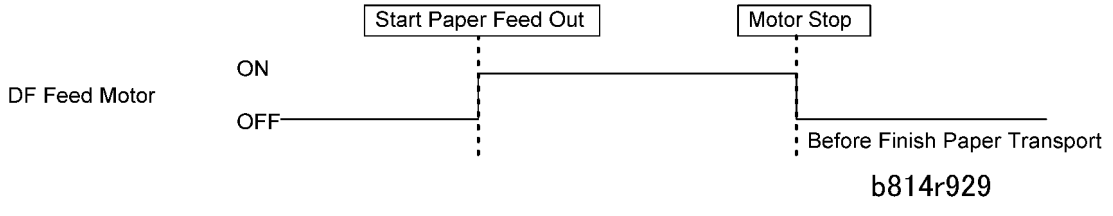


Other Cases

1. If the original starts to feed out from the registration position but the original fed out before the DF feed motor started.



2. If the DF feed motor was forced to stop before finishing original feed out to the original exit tray (stop key or shutdown)



3. If the DF jam sensor is on when the DF cover is closed.

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