Folder FD 6500
(Machine Code: B889)
SERVICE MANUAL

March 2007
Subject to change

Conventions and Trademarks

Conventions

Symbol	What it means
	Screw
	Connector
	E-ring
	C-ring
	Clamp
(F)	Front
(R)	Rear

Notations for Standard Paper Sizes

Notation	Paper Size (W x L)	
	Architecture	Engineering
A	9 x 12 in.	8.5 x 11 in.
B	12 x 18 in.	11 x 17 in.
C	18 x 24 in.	17 x 22 in.
D	24 x 36 in.	34 x 22 in.
E	36 x 48 in.	34 x 44 in.

Warnings, Cautions, Notes

In this manual, the following important symbols and notations are used.

⚠WARNING

- A Warning indicates a potentially hazardous situation. Failure to obey a Warning could result in death or serious injury.

⚠CAUTION

- A Caution indicates a potentially hazardous situation. Failure to obey a Caution could result in minor or moderate injury or damage to the machine or other property.

Important

- **Obey these guidelines to avoid problems such as misfeeds, damage to originals, loss of valuable data and to prevent damage to the machine**

Note

- This information provides tips and advice about how to best service the machine.

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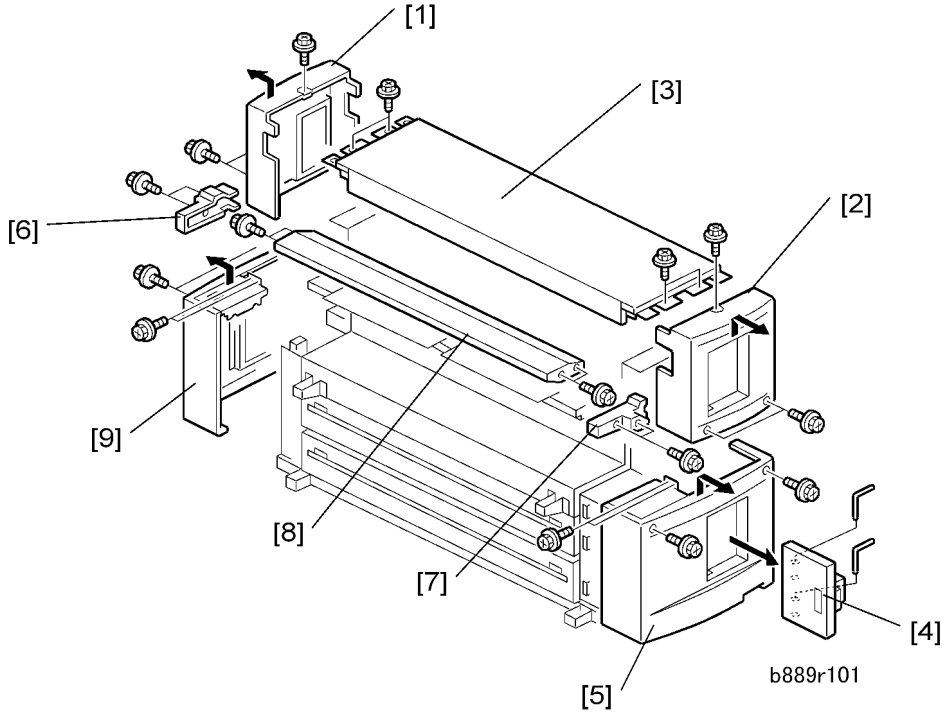
1. Replacement and Adjustment

Common Procedures

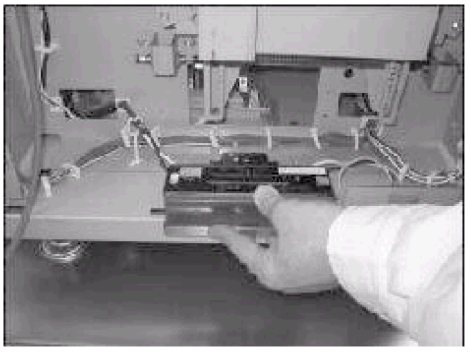
Covers



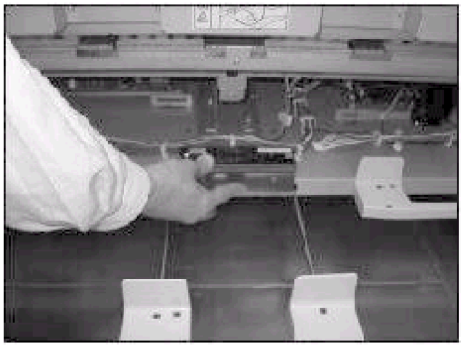
Remove:

- [1] Left Upper Cover [1] (x3)
- [2] Right Upper Cover (x3)
- [3] Top Cover (x4)
- [4] N7 Door (L-pin x2)
- [5] Right Lower Cover (x4)
- [6] Paper Entrance Left Cover (x2)
- [7] Paper Entrance Right Cover (x2)
- [8] Paper Entrance Cover (x4)
- [9] Left Lower Cover (x4)

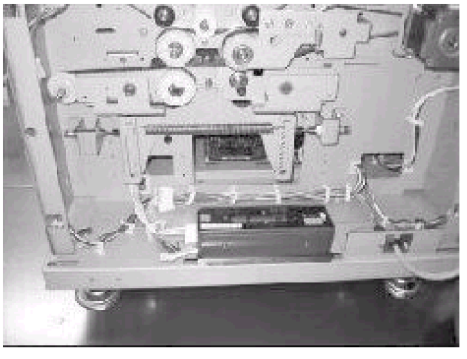
Leveling the Folder Unit



Folder Unit: Right Side



Folder Unit: Rear Side



Folder Unit: Left Side

b286i916

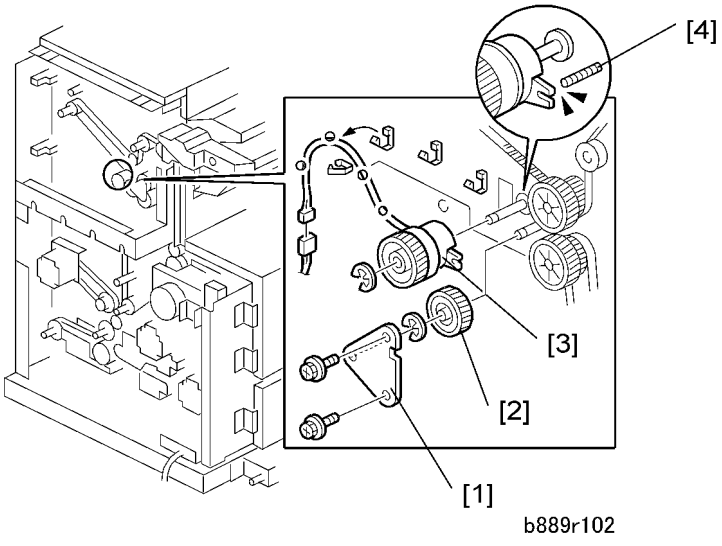
1. Remove:
    - Right bottom cover
    - Rear cover 2 (bottom cover)
    - Left bottom cover

    Important

    - **The folder unit should be level within ±0.15 mm on the right, left, and rear sides.**
    - **Level the sides of the folder unit in this order: right, rear, left.**
2. Set a level on the side (with cover removed) as shown above.
3. Use a wrench to adjust the nuts on each foot, to raise or lower the folder unit at each corner.

Clutches

Vertical Transport Clutch

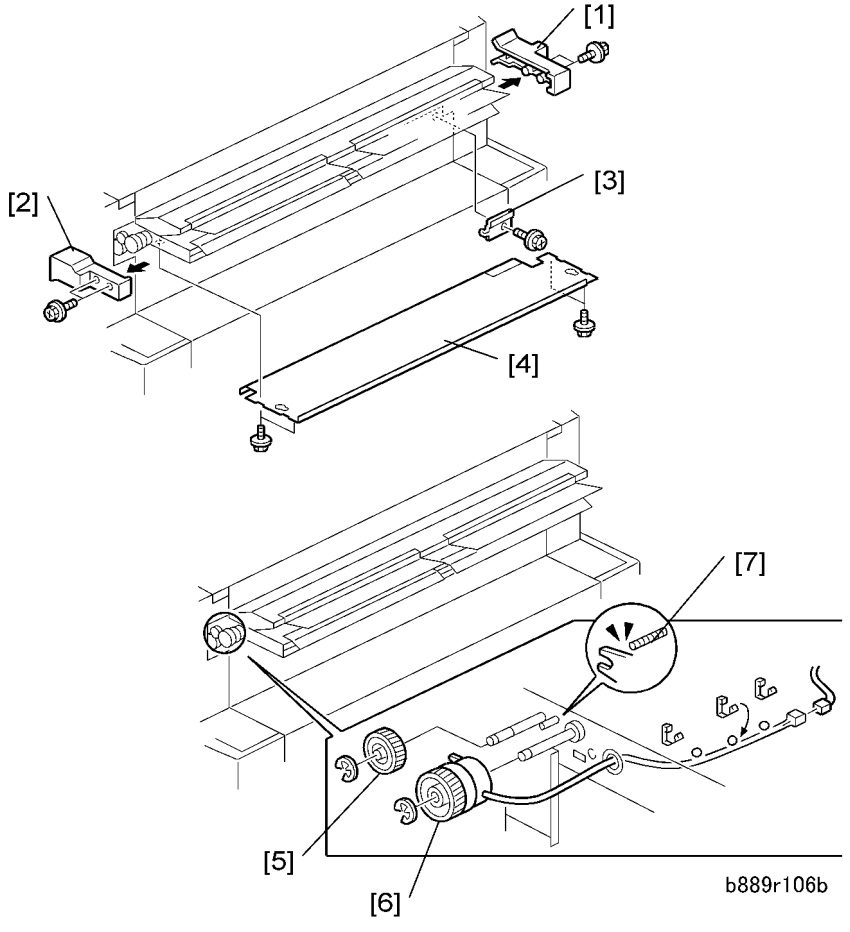


1. Remove:
    - Left upper cover (x3) (see p.5 "Covers")
    - [1] Bracket (x2)
    - [2] Gear (x1)
    - [3] Vertical transport clutch (x1, x4, x1)

Reinstallation

- Make sure that the clutch arm and pin [4] are engaged properly before reattaching the vertical transport clutch.

Paper Entrance Clutch



1. Disconnect the folder unit.
2. Pull the folder unit away from the main machine.
3. Remove:
    - [1] End cover (x2)
    - [2] End cover (x2)
    - [3] Lock plate (x1)
    - [4] Guide plate (x4)
    - [5] Gear (x1)
    - [6] Paper entrance clutch (x1, x3, x1)

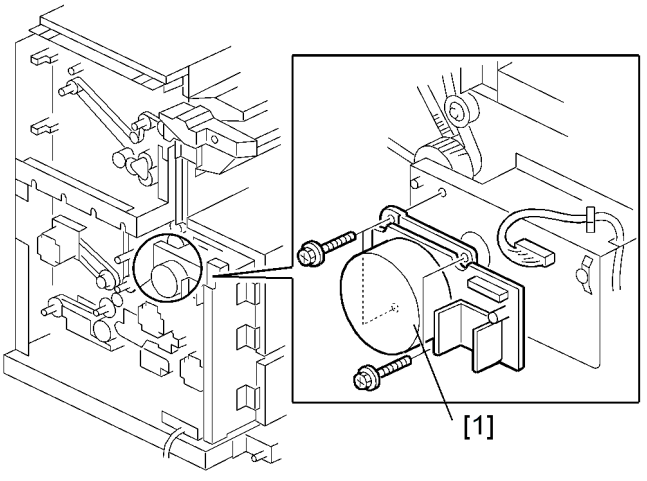
Reinstallation

- Make sure that the clutch arm and pin [7] are engaged properly before reattaching the clutch.

Motors

1

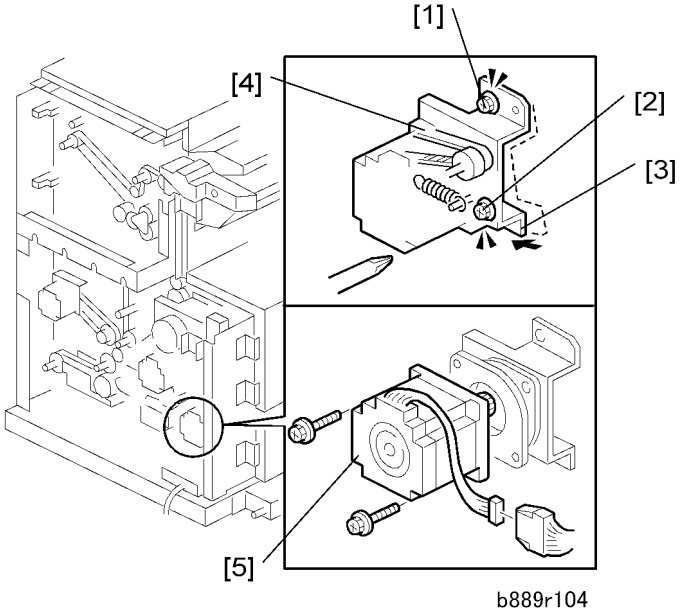
Transport Motor



b889r103

1. Remove:
    - Left upper cover (x2), left lower cover (x2) (see p.5 "Covers")
    - Transport motor [1] (x4, x1)

Fan Fold Motor



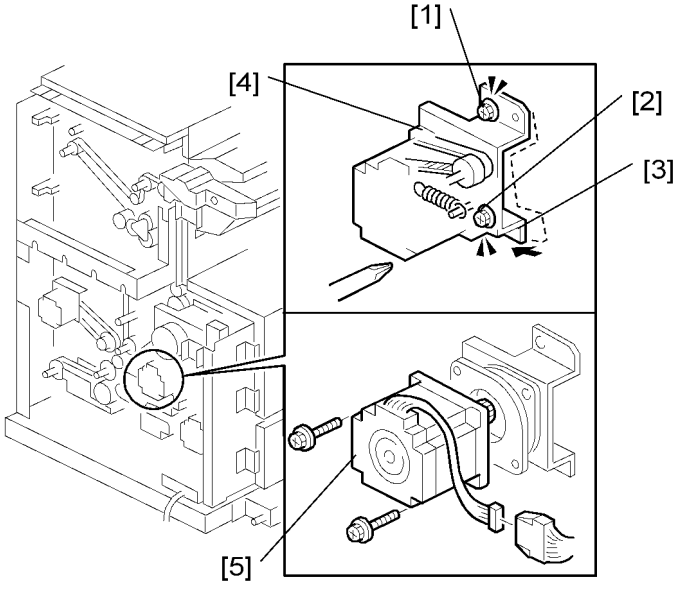
b889r104

1. Remove left upper cover (x2), left lower cover (x2) (see p.5 "Covers")
2. Loosen the base screws [1], [2] (leave them loosely attached).
3. Slide the base [3] to the left to slacken the timing belt [4]. Then unfasten the belt.
4. Remove the fan fold motor [5] (x2, x1)

Reinstallation

- Make sure that the tension is restored to the timing belt when it is reattached.

Fan Fold Plate Motor (F)



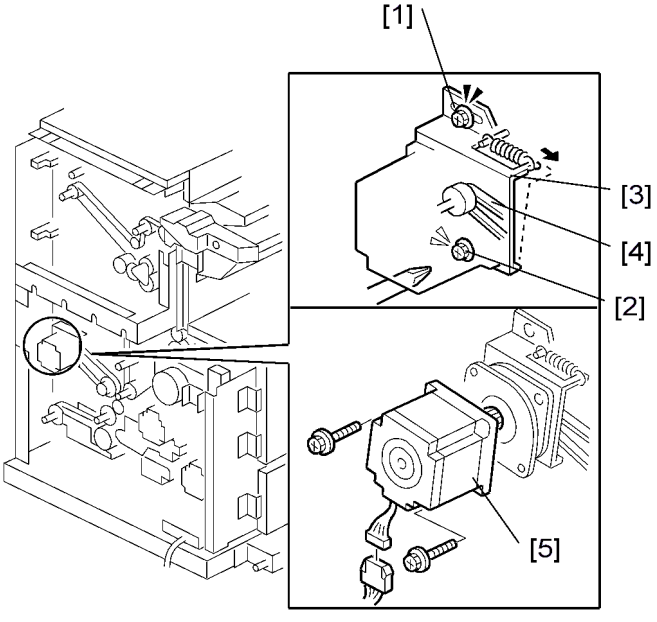
b889r104a

1. Remove left upper cover (x2), left lower cover (x2) (see p.5 "Covers")
2. Loosen the base screws [1], [2] (leave them loosely attached).
3. Slide the base [3] to the left to slacken the timing belt [4]. Then unfasten the belt.
4. Remove the fan fold plate motor [5] (x2, x1)

Reinstallation

- Make sure that the tension is restored to the timing belt when it is reattached.

Fan Fold Plate Motor (R)



b889r105

1. Remove left upper cover (x2), left lower cover (x2) (see p.5 "Covers")
2. Loosen the base screws [1], [2] (leave them loosely attached).
3. Slide the base [3] to the right to slacken the timing belt [4]. Then unfasten the belt.
4. Remove the fan fold plate motor [5] (x2, x1)

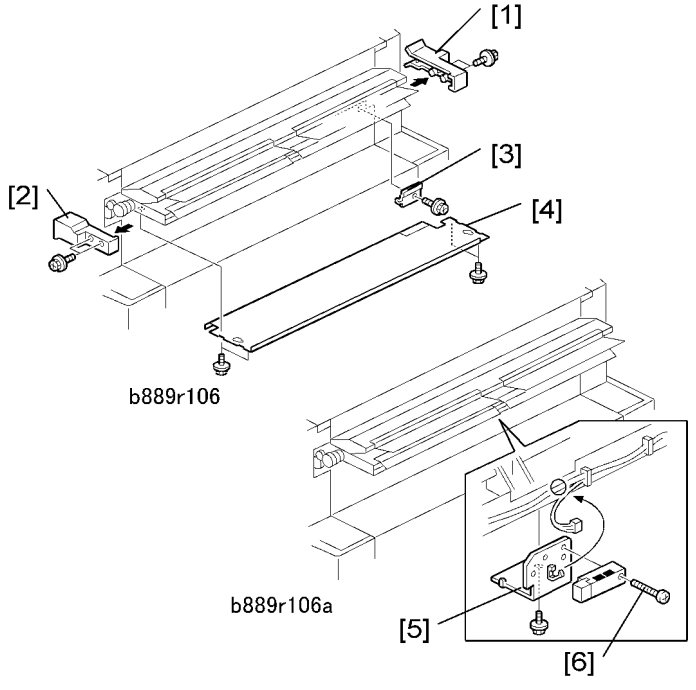
Reinstallation

- Make sure that the tension is restored to the timing belt when it is reattached.

Sensors

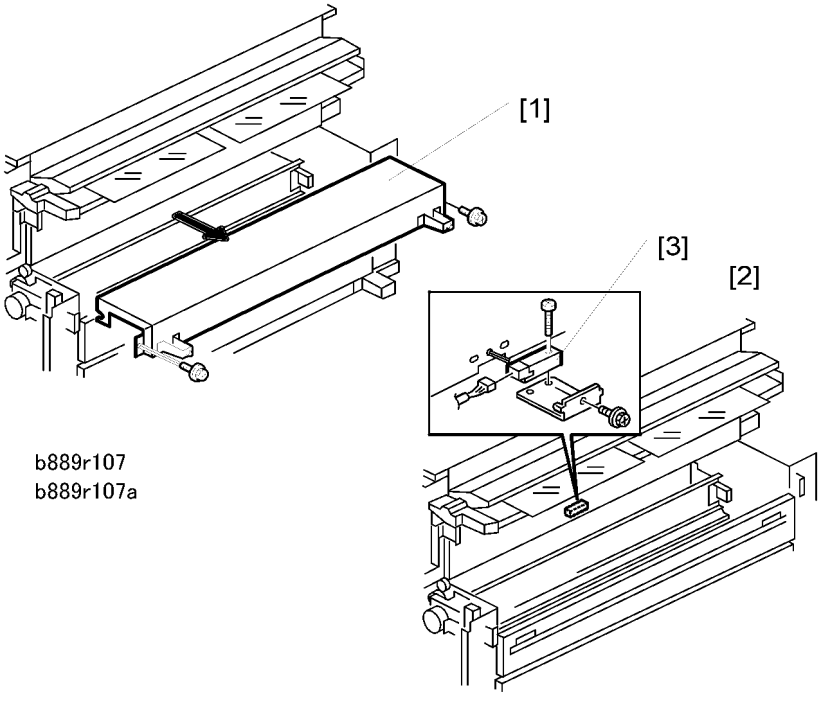
1

Folder Unit Entrance Sensor



1. Disconnect the folder unit.
2. Pull the folder unit away from the main machine.
3. Remove (see p.5 "Covers"):
    - Paper entrance left cover (x2)
    - Paper entrance right cover (x2)
    - Paper entrance cover (x4)
4. Remove:
    - [1] End cover (x2)
    - [2] End cover (x2)
    - [3] Lock plate (x1)
    - [4] Guide plate (x4)
    - [5] Sensor plate (x1, x1)
    - [6] Folder unit entrance sensor (x1, x1)

Relay Sensor 2



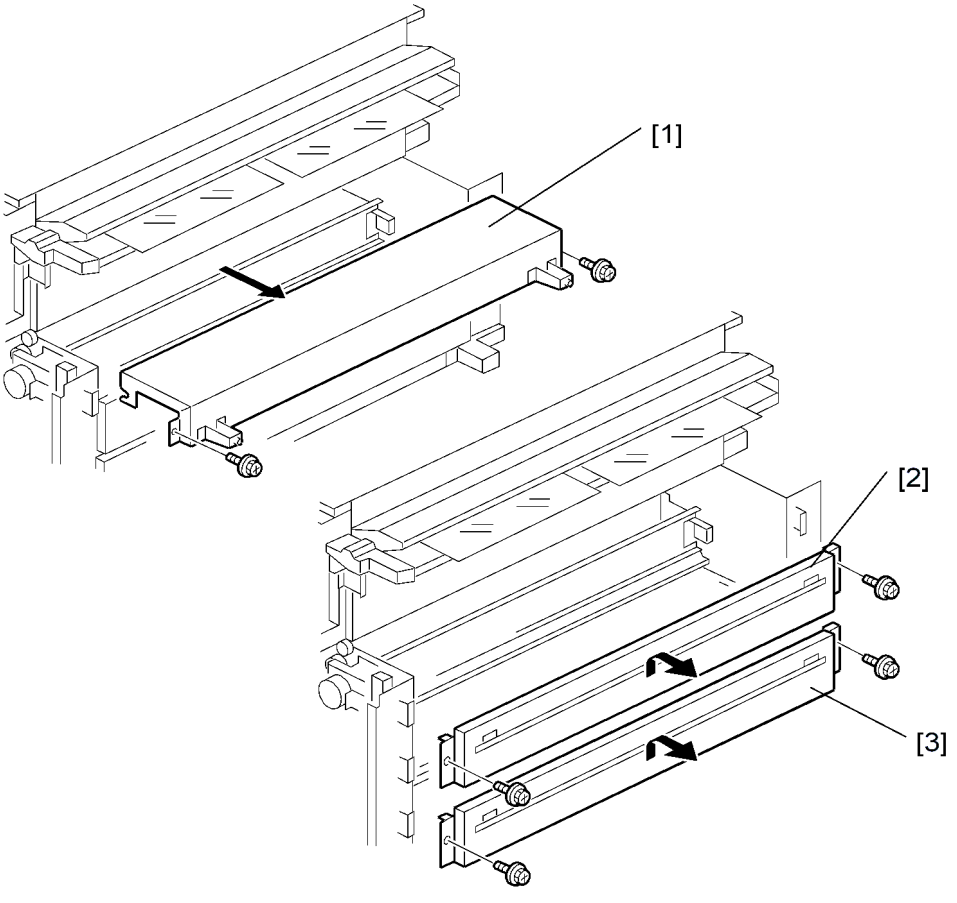
b889r107
b889r107a

1. Disconnect the folder unit.
2. Pull the folder unit away from the main machine.
3. Remove:
    - [1] Front top cover (x2)
    - [2] Sensor bracket (x1)
    - [3] Relay sensor 2 (x1, x1)

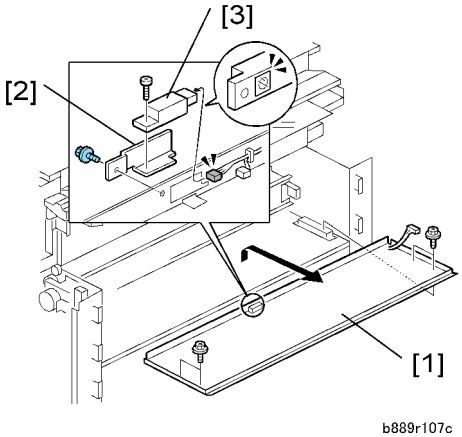
Reinstallation

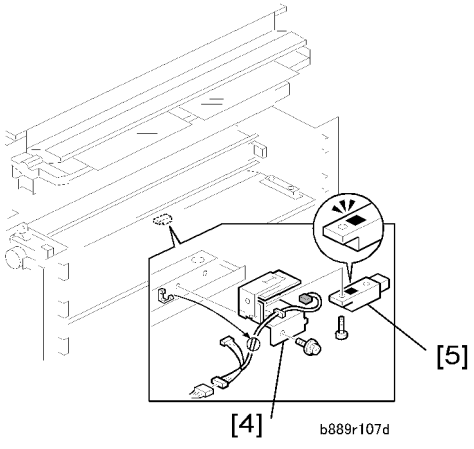
- After replacement, make sure that the machine is level.

Fan Fold LED (F1), Fan Fold Sensor (F2)



1. Disconnect the folder unit.
2. Pull the folder unit away from the main machine.
3. Remove (See p.5 "Covers")
    - Left upper cover
    - Left lower cover
    - Right upper cover
    - Right lower cover
4. Remove:
    - [1] Front top cover (x2)
    - [2] Front middle cover (x2)
    - [3] Front bottom cover (x2)





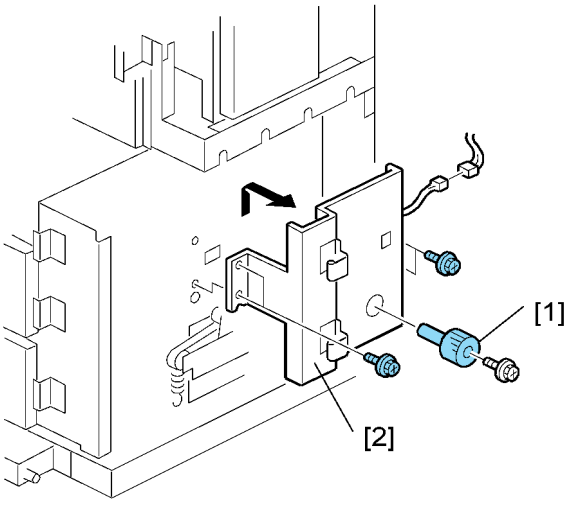
5. Remove:
   - [1] Transport guide plate (x4, x1)
   - [2] Sensor bracket (x1)
   - [3] Fan fold LED (F1) (x1, Gray x1)
   - [4] Sensor bracket (x1, Gray x1, x1)
   - [5] Fan fold sensor [2] (x1)

Reinstallation

- Make sure that the fan fold sensor (F2) is positioned as shown above after it has been reattached.

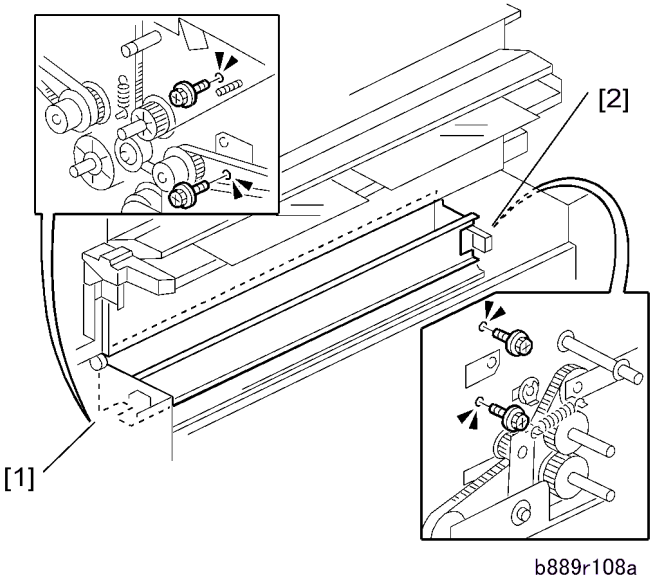
Fan Folder Entrance Sensor

1. Disconnect the folder unit.
2. Pull the folder unit away from the main machine.
3. Remove (see p.5 "Covers"):
   - Right upper cover (x3)
   - N7 Door (L-pin x2)
   - Right Lower Cover (x4)



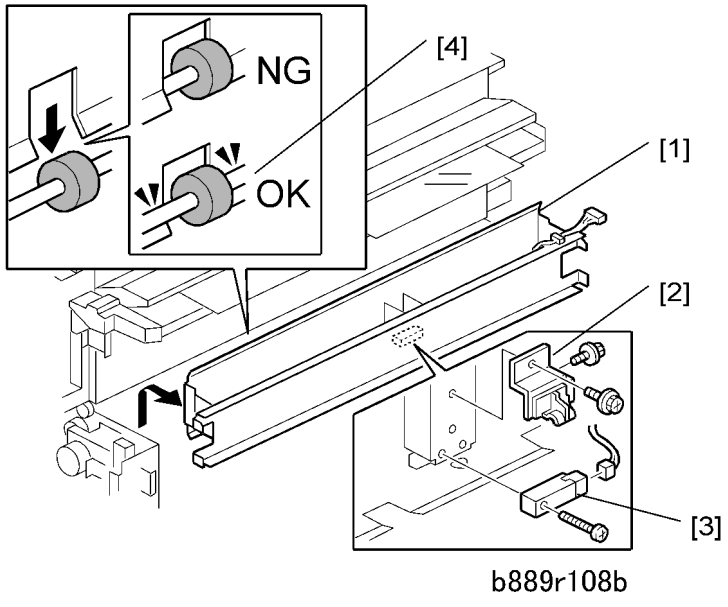
b889r109

4. Remove:
   - [1] Knob (x1)
   - [2] Bracket (x4, x1)



b889r108a

5. Remove the screws on the left [1] and right [2] side of the folder unit (x4)

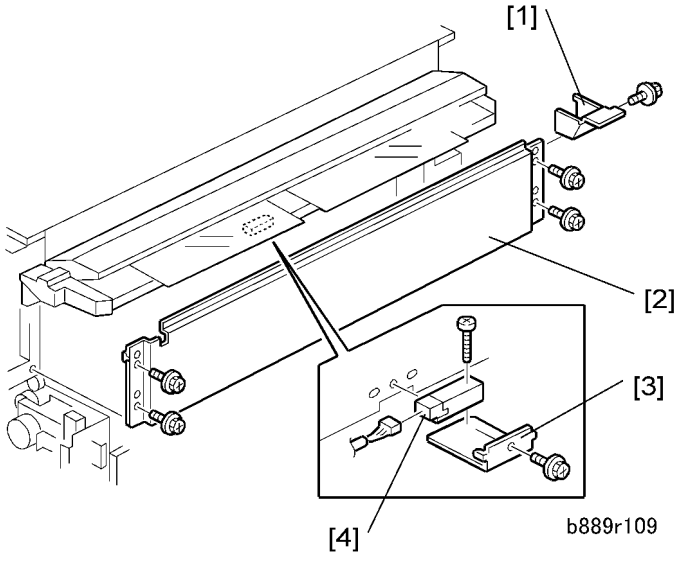


6. Remove:
    - [1] Lower transport guide plate
    - [2] Fan folder entrance sensor cover (x2)
    - [3] Fan folder entrance sensor (x1, x1)

Reinstallation

- Make sure that the transport roller shaft [4] is in front of the cover as shown.
- After replacement, make sure that the machine is level.

Relay Sensor 1

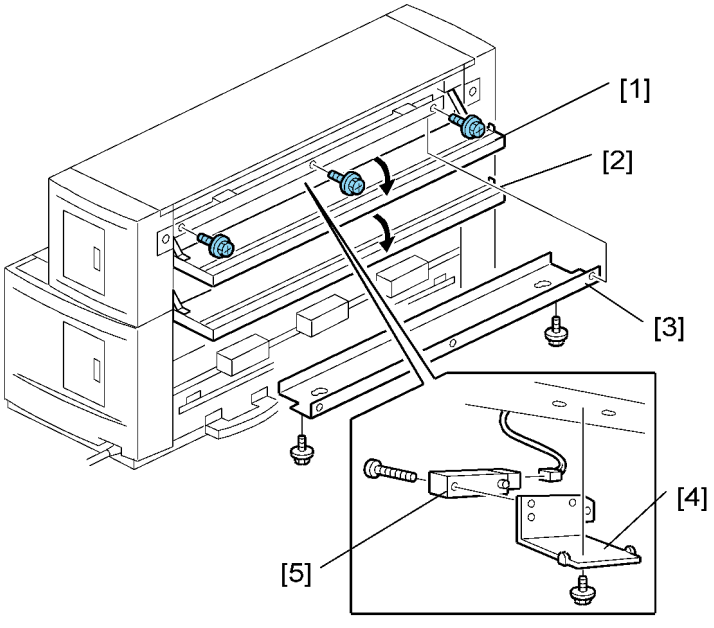


1. Disconnect the folder unit.
2. Pull the folder unit away from the main machine.
3. Remove:
    - [1] Gear cover (x1)
    - [2] Front vertical cover (x4)
    - [3] Sensor bracket (x1, x1)
    - [4] Relay sensor 1 (x1)

Reinstallation

- After replacement, make sure that the machine is level.

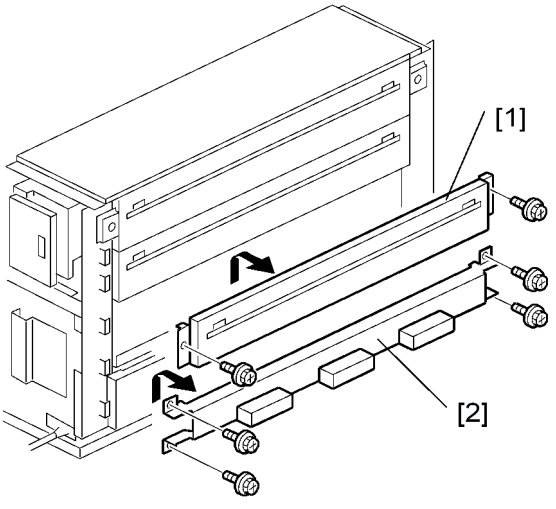
Straight-Through Sensor



b889r110

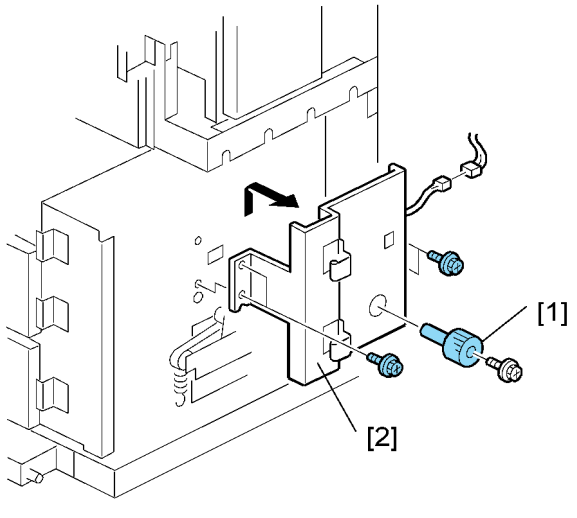
1. Open:
    - [1] Door N3
    - [2] Door N5.
2. Remove:
    - [3] Inner cover (x3 blue, x2 silver)
    - [4] Sensor bracket (x1, x1)
    - [5] Straight-through sensor (x1)

Fan Fold LED (R1), Fan Fold Sensor (R2)



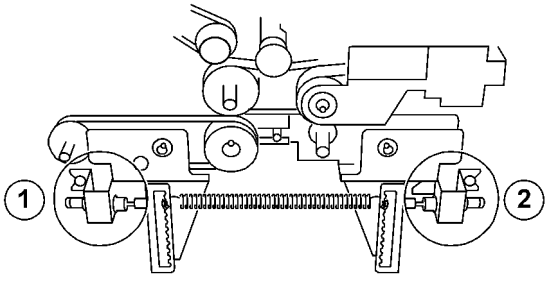
b889r114

1. Remove:
    - [1] Rear cover 1 (x2)
    - [2] Rear copy tray support (x4)



b889r109

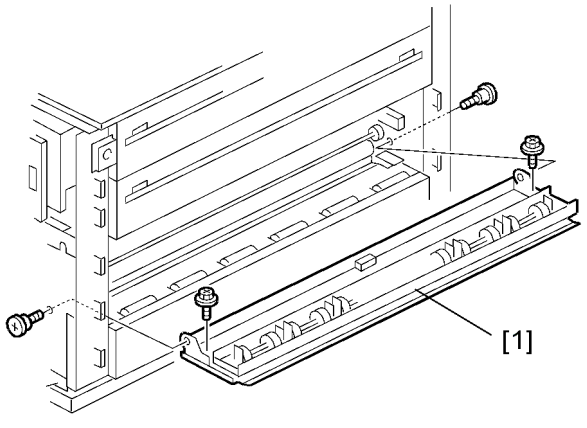
2. Remove:
    - [1] Knob (x1)
    - [2] Bracket (x4, x1)



b889r204

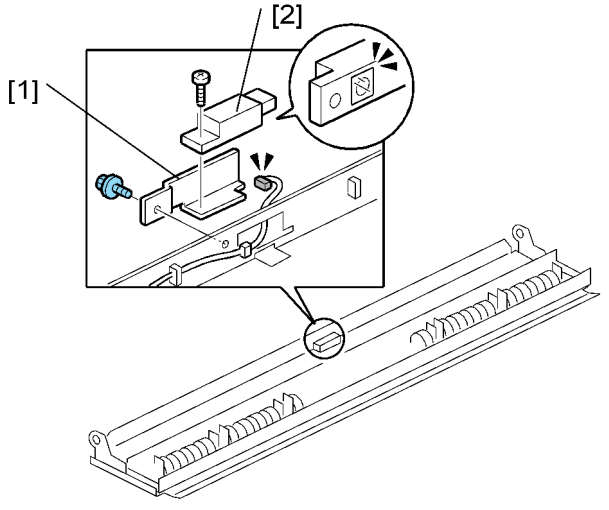
Important

- The settings of knobs ① and ② determine the amount of pressure applied by folding rollers. The knobs are set at the factory and should never be adjusted in the field by the service technician.

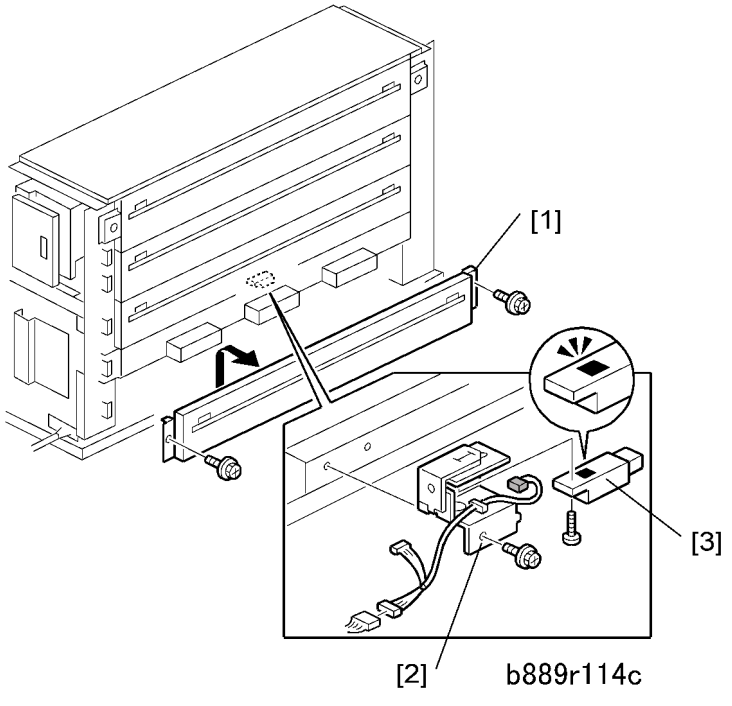


b889r114a

3. Remove the exit guide plate [1] (x1).



4. Remove:
   - LED bracket [1] (x1, Gray x1)
   - Fan fold LED (R1) [2] (x1)

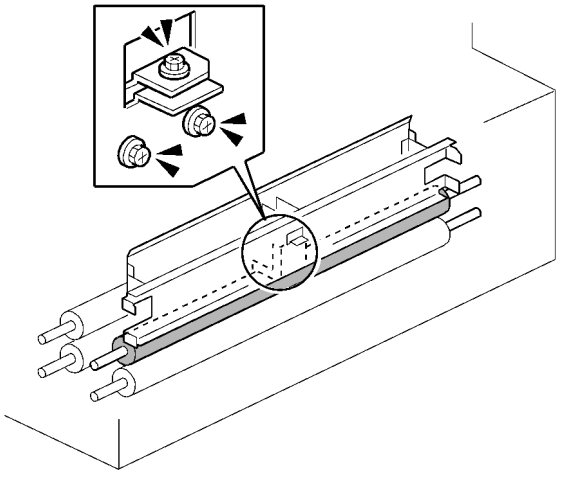


5. Remove:
   - [1] Rear cover 2 (x1)

- [2] Sensor bracket (x1, x1)
- [3] Fan fold sensor (R2) (x1, Gray x1)

Reinstallation

- Make sure that the fan fold sensor (R2) [3] is positioned as shown above after it has been reattached.
- After replacement, make sure that the machine is level.

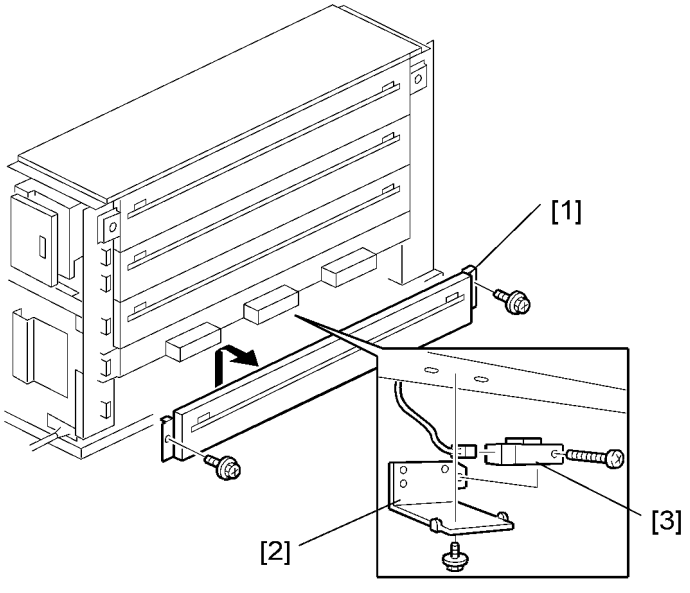


b889r203

Important

- **The three screws shown above determine the amount of folding roller deflection. These screws are adjusted at the factory and should never be adjusted in the field by the service technician.**

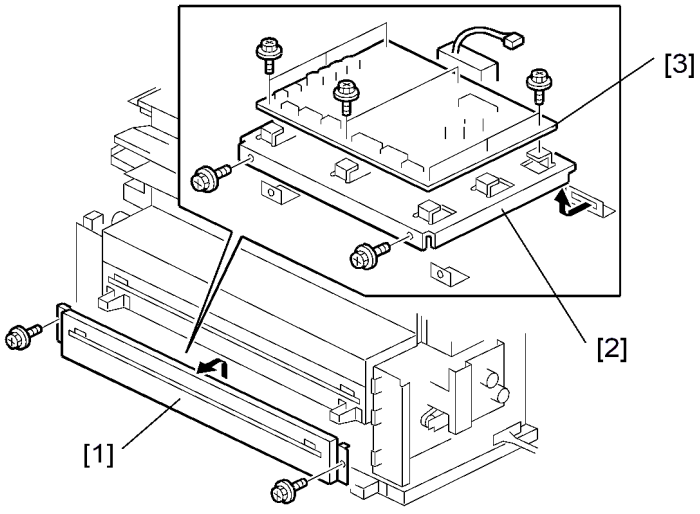
Folder Unit Exit Sensor



1. Remove:
    - [1] Rear cover 2 (x2)
    - [2] Sensor bracket (x1, x1)
    - [3] Folder unit exit sensor (x1)

Boards

MCU



b889r112

1. Disconnect the folder unit.
2. Pull the folder unit away from the main machine.
3. Remove:
    - Front bottom cover [1] (x2)
    - Bracket [2] (x All, x2)
    - MCU [3] (x8)

Reinstallation

- After replacement, make sure that the machine is level.

DIP SW Settings on the MCU

Here is a summary of the MCU DIP switch settings.

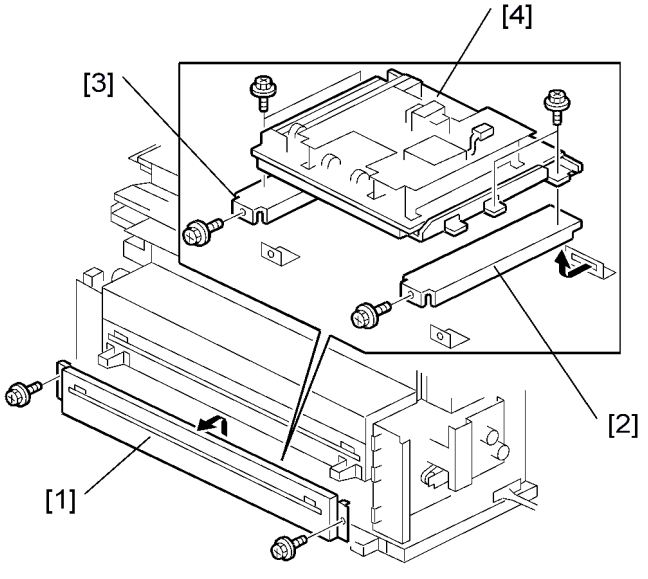
Important

- **Do not change these DIP SW settings. The tables below are provided only for your reference so you can confirm that they are set correctly.**

DIP Switches	Default
SW1	OFF

DIP Switches	Default
Bit 1	OFF
Bit 2	ON
SW2	Force CPU reset
SW3	
Bit 1	ON
Bit 2	ON
Bit 3	OFF
Bit 4	OFF
Bit 5	OFF
Bit 6	OFF
Bit 7	OFF
Bit 8	OFF

PSU



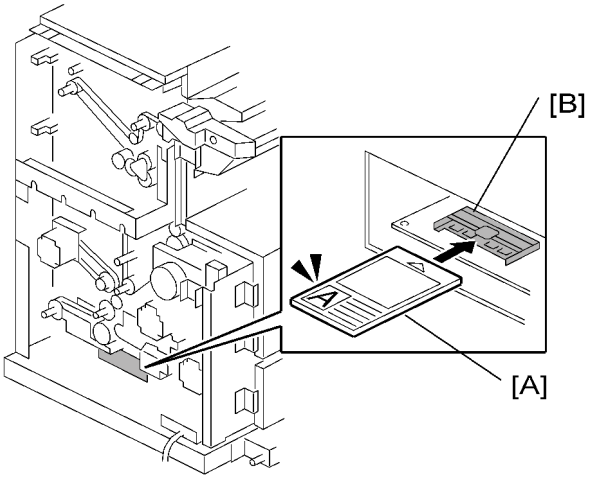
b889r113

1. Disconnect the folder unit.
2. Pull the folder unit away from the main machine.
3. Remove:
    - Front bottom cover [1] (x2)
    - Right bracket [2] (x All, x1)
    - Left bracket [3] (x1)
    - PSU [4] (x4)

Reinstallation

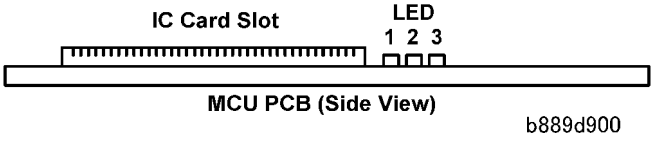
- After replacement, make sure that the machine is level.

Firmware Update



b889r201

1. Prepare an IC card with the new version of the firmware.
2. Switch off the main machine.
3. Switch off the folder unit.
4. Remove: (See p.5 "Covers")
   - Left upper cover
   - Lower left cover
5. Insert the IC card [A] into the PCB slot **CN220** [B] of the MCU board inside the folder unit as shown.
6. Switch on the folder unit to start the firmware update.
7. Watch the LEDs on the PCB.



b889d900

	LED1	LED2	LED3
During installation	Flashes	ON	OFF
Installation completed	Flashes	OFF	OFF

8. When LED2 goes off, switch off the folder unit.
9. Remove the card from the slot.

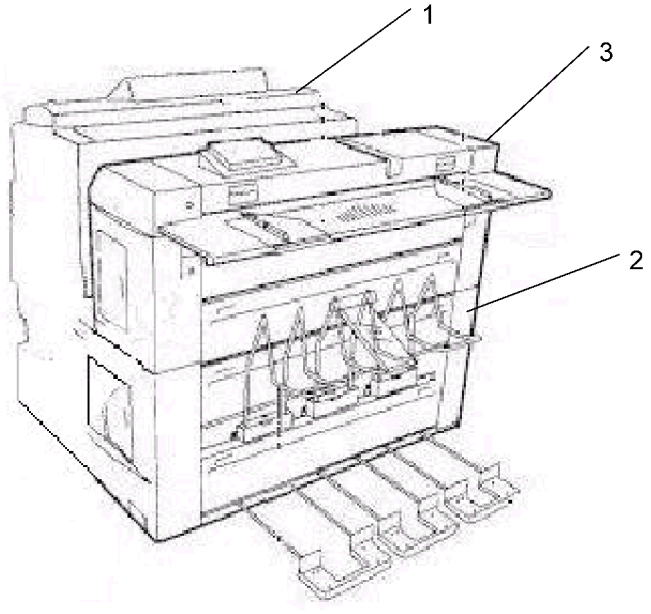
Note

- During normal operation LED1 and LED3 flash. LED2 remains off.

2. Detailed Descriptions

Overview

Important Parts



b889d919

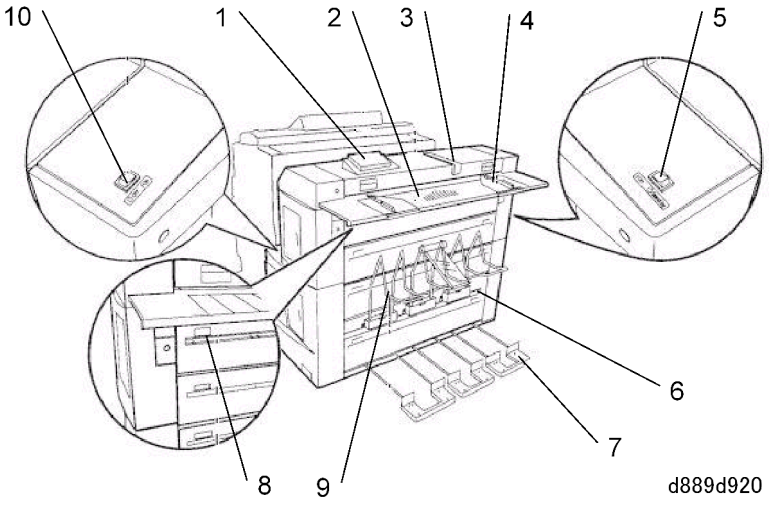
This section is a very brief description of some important points about folder unit operation.

1. Main Machine (B286/B289)
2. Folder Unit B889 (installed at the back of main machine)
3. Manual Feeder D333 (installed on top of folder unit)

The manual feeder is an option. The manual feeder is used to feed paper directly to the folder unit. This can be done with or without the main machine switched on.

Note

- For more details about how to operate the folder unit, please see the "Folder FD6500A Operating Instructions".



Manual Feeder D333

1. **Operation panel**. Used to set the folder unit online/offline, and select the type of folding.
2. **Paper feed table**. The paper is inserted here for folding when the folder unit is used independently.
3. **Folding guide**. Used as a guide for folding paper manually.
4. **Paper guide**. Adjusts to the width of the paper fed into the folder unit when the folder unit is used independently.

   Folder Unit B889

5. **Power switch**. Switches the folder unit on/off. When the folder unit is used with the main machine, the folder unit must be turned on first so that the folder unit will recognize the main machine.
6. **Folded paper exit**. Folded paper exits here.
7. **Folded paper output tray**. Folded paper from paper exit stacks here.

   Important

   - **The tray capacity is 1 folded copy. Each copy must be removed as soon as it leaves the folder unit when printing and folding more than 1 copy.**
8. **Straight-through**. Paper from the main machine sent straight through the folder unit (no folding) exits here.
9. **Straight-through output tray**. Holds paper from the Straight-through tray. Capacity: 10 sheets.
10. **Heater switch**. Switch on manually when humidity is high to prevent paper from wrinkling. The heater remains on even after the folder unit is switched off.

Folder Operation

Power On/Off

The power on/off sequence is important.

To turn the folder unit on

1. First, switch on the folder unit.
2. Next, switch on the main machine.

Important

- **The folder unit must be turned on first. Otherwise, the folder unit will not recognize the main machine.**

To turn the folder unit off

1. First, switch off the main machine.
2. Next, switch off the folder unit.

Important

- **The main machine must be switched off first. Switching off the folder first will cause an alarm. If this occurs, switch the folder unit on again. Then 1) switch off the main machine, 2) switch off the folder unit.**

Operation Modes

If the Manual Feeder D333 is installed on top of the folder unit, the folder unit and manual feeder can be used with or without the main machine.

Full operation mode

The main machine and folder unit are both powered on and online. Paper feeds from the main machine. At the junction gate:

- If the junction gate remains closed the paper feeds straight through the folder unit, leaves the folder unit from the straight-through exit, and falls into the straight-through output tray.
- If the junction gate opens, the paper feeds to the fan folder unit below for single or multiple fan folding, and is then fed out through the folded paper exit to the folded paper output tray.

System offline mode

The folder unit and manual feeder are used independently while the main machine and folder unit are both powered on. Pressing the [Online/Offline] key on the manual feeder operation panel toggles the folder unit off and on line. The paper is then fed at the paper feed table of the manual feeder.

Independent offline mode

The folder unit and manual feeder are used independently while the main machine is off.

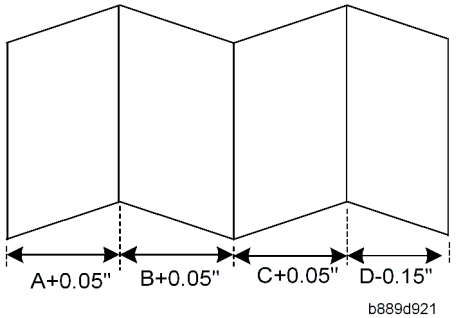
1. The operator makes sure that both the main machine and folder unit are both switched off.
2. The folder unit is powered on.
3. The operator presses [↦] on the folder operation panel for 2 sec. to light the operation panel display.
4. The paper is fed at the paper feed table of the manual feeder.

2

Important Points

- The folder unit can handle plain paper only. Do not try to feed translucent paper or OHP transparencies through the folder unit.
- If the humidity at the work site is extremely high, turn on the heater switch of the folder unit. Otherwise, do not turn this switch on. The heater remains on, even when the folder unit power switch is off.
- Fan folding position adjustment done on the operation panel of the manual feeder is applied to each fold surface. However, there cannot be less than 8.5 inches between folds.
- When a fan fold is adjusted, the last surface will be shorter than the others because the lengths of the others have been increased. For example, if fan folding is increased by +0.05 inches for a job where three folds are done to create four surfaces, +0.5 will be added to the first 3 surfaces but the last surface will be 0.15 shorter.

Surface	Before	After
A	A inch	A + 0.05"
B	B inch	B + 0.05"
C	C inch	C +0 .05"
D	D inch	D - 0.15



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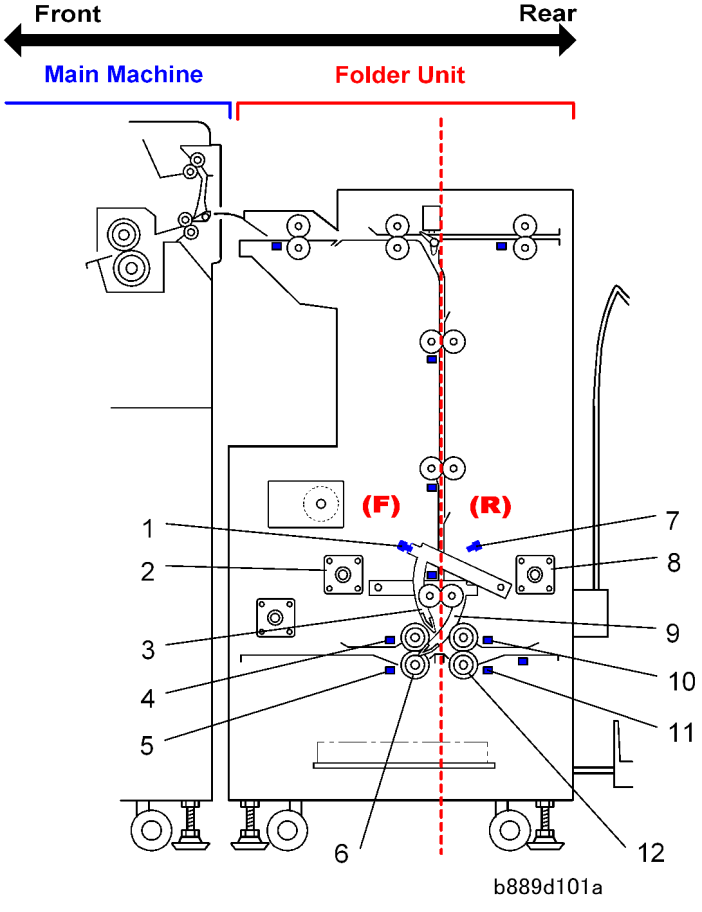
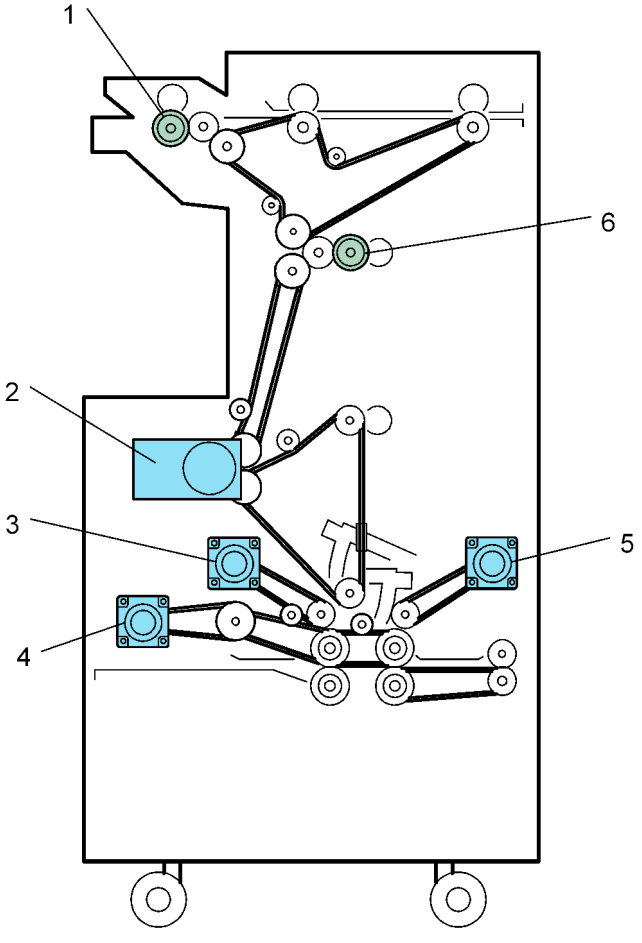
Unit Orientation



In the folder unit there are several sets of opposing parts and components of the same name. The names of these paired parts and components have an "(F)" (Front) or "(R)" (Rear) attached to their names to identify them.

1. Fan Fold Plate HP Sensor (F)
2. Fan Fold Plate Motor (F)
3. Fan Fold Plate (F)
4. Fan Fold LED (F1)
5. Fan Fold Sensor (F2)
6. Fan Fold Rollers (F)
7. Fan Fold Plate HP Sensor (R)
8. Fan Fold Plate Motor (R)
9. Fan Fold Plate (R)
10. Fan Fold LED (R1)
11. Fan Fold Sensor (R2)
12. Fan Fold Rollers (R)

Drive Layout



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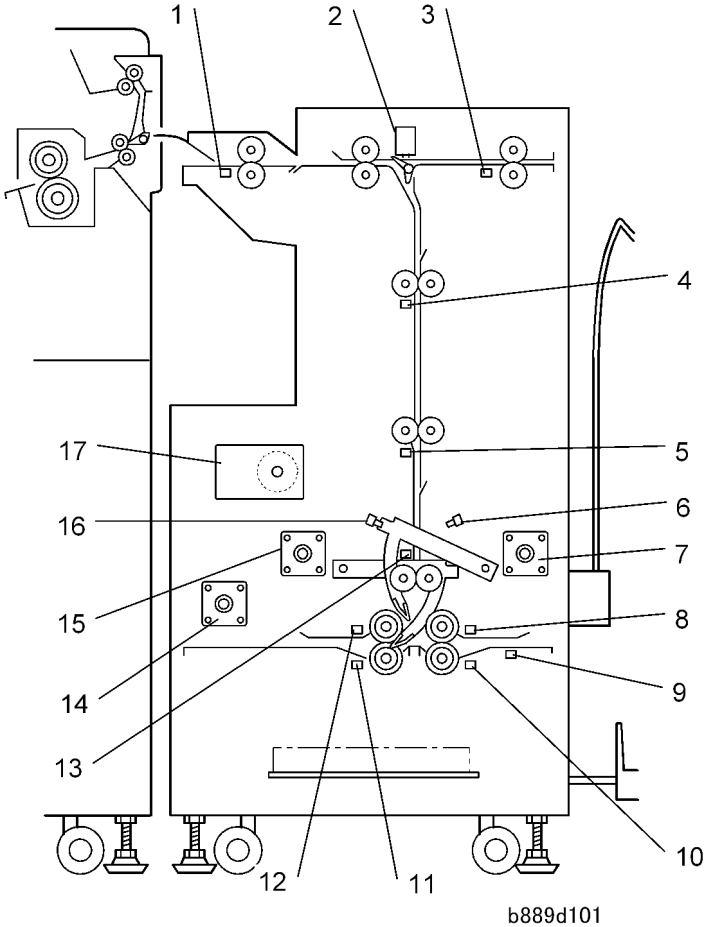
1. Paper Entrance Clutch
2. Transport Motor
3. Fan Fold Plate Motor (F)
4. Fan Fold Motor
5. Fan Fold Plate Motor (R)

6. Vertical Transport Clutch

Electrical Components

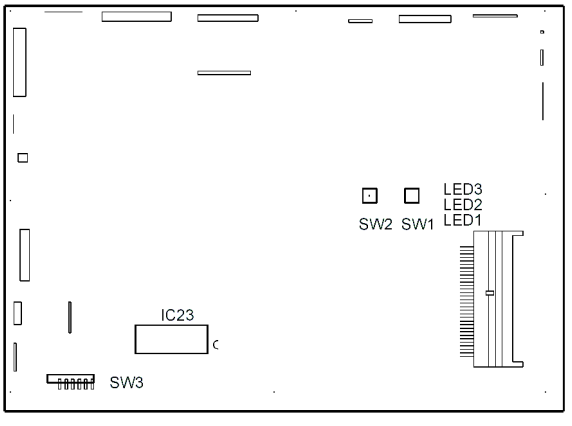
General Layout



1. Folder Entrance Sensor
2. Junction Gate Solenoid
3. Straight-Through Sensor
4. Relay Sensor 1
10. Fan Fold Sensor (R2)
11. Fan Fold Sensor (F2)
12. Fan Fold LED (F1)
13. Fan Folder Entrance Sensor

5. Relay Sensor 2
6. Fan Fold Plate HP Sensor (R)
7. Fan Fold Plate Motor (R)
8. Fan Fold LED (R1)
9. Folder Unit Exit Sensor
14. Fan Fold Motor
15. Fan Fold Plate Motor (F)
16. Fan Fold Plate HP Sensor (F)
17. Transport Motor

MCU



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MCU LEDs

	LED1	LED2	LED3
During installation	Flashes	ON	OFF
Installation completed	Flashes	OFF	OFF
Normal operation	Flashes	OFF	Flashes

MCU DIP SW Settings

Important

- **Do not change these DIP SW settings. The tables below are provided only for your reference so you can confirm that they are set correctly.**

DIP Switches	Default
SW1	OFF

DIP Switches	Default
Bit 1	OFF
Bit 2	ON
SW2	Force CPU reset
SW3	
Bit 1	ON
Bit 2	ON
Bit 3	OFF
Bit 4	OFF
Bit 5	OFF
Bit 6	OFF
Bit 7	OFF
Bit 8	OFF

Description of Electrical Components

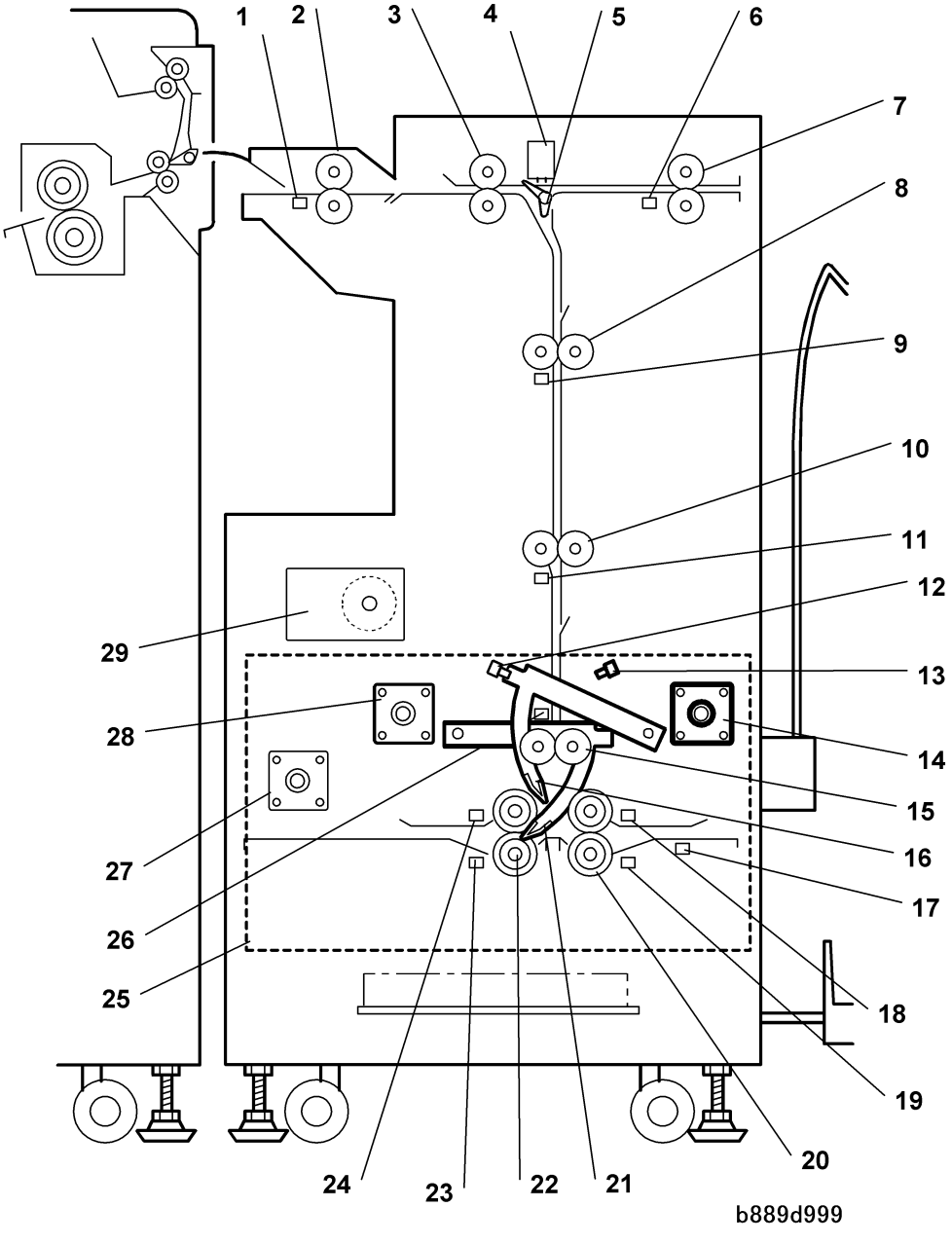
Component		Function
Boards		
PCB1	MCU	The main control unit controls the operation of the folder unit in offline and online mode.
PCB2	PSU	The power supply unit supplies dc power to the folder unit.
Motors		
M1	Fan Fold Motor	Feeds the stack in the fan folder unit to the front and rear when the paper is alternately creased for folding between the front and rear fan fold rollers.
M2	Fan Fold Plate Motor (F)	Raises and lowers the fan fold plate (F) that pushes the paper between the fan fold rollers (R) for folding.

Component		Function
M3	Fan Fold Plate Motor (R)	Raises and lowers the fan fold plate (R) that pushes the paper between the fan fold rollers (F) for folding.
M4	PCB Fan	Mounted on the MCU, this fan cools the main control unit board.
M5	Transport Motor	Drives all the timing belts and paper feed rollers in the folder unit.
Sensors		
S1	Fan Fold Sensor: Emitter (R1)	Located behind the fan fold rollers (R), this LED emits light toward the fan fold sensor (R2) below. When this light beam is broken, the fan fold sensor (R2) detects the paper.
	Fan Fold Sensor: Receptor (R2)	Located behind the fan fold rollers (R), this sensor receives light from the fan fold LED (R1) above. When paper emerges from the fan fold rollers, this interrupts the light beam and starts a pulse count. This pulse count is used to control the timing of the fan fold motor.
S2	Fan Fold Plate HP Sensor (F)	When this sensor detects the top of the fan fold plate (F) as the fan fold plate motor (F) retracts the plate, this switches the fan fold plate motor (F) off.
S3	Fan Fold Plate HP Sensor (R)	When this sensor detects the top of the fan fold plate (R) as the fan fold plate motor (R) retracts the plate, this switches the fan fold plate motor (R) off.
S4	Fan Fold Sensor: Emitter (F1)	Located behind the fan fold rollers (F), this LED emits light toward the fan fold sensor (F2) below. When this light beam is broken, the fan fold sensor (F2) detects the paper.
	Fan Fold Sensor: Receptor (F2)	Located behind the fan fold rollers (F), this sensor receives light from the fan fold LED (F1) above. When paper emerges from the fan fold rollers, this interrupts the light beam and starts a pulse count. This pulse count is used to control the timing of the fan fold motor.
S5	Fan Folder Entrance Sensor	Performs two functions: 1) Detects the leading edge of the paper when it enters the fan folder unit to start the folding cycle, and 2) Detects paper jams at the entrance of the fan folder unit.

Component		Function
S6	Folder Unit Entrance Sensor	Performs two functions: 1) Detects paper when it enters the folder unit and activates the vertical relay clutch, and 2) Detects paper jams at the entrance of the folder unit.
S7	Folder Unit Exit Sensor	This sensor is behind the fan fold rollers (R) and near the exit. It monitors the feed of the folded stack when it leaves the folder unit at the lower exit after folding is finished. Also detects jams at the lower exit.
S8	Relay Sensor 1	Located below transport roller 2, this sensor monitors the timing of paper feed and detects paper jams.
S9	Relay Sensor 2	Located below transport roller 3, this sensor monitors the timing of paper feed to detect paper jams.
S10	Straight-Through Sensor	Located in front of the straight-through exit rollers, this sensor monitors paper feed and detects paper jams.
Solenoids		
SOL1	Junction Gate Solenoid	Remains off (deactivated) so that the junction gate remains open. This directs paper to the fan folder unit below. Switches on (activates) to close the junction gate. This sends the paper straight through the top of the fan folder unit (no folding) so that it exits at the upper exit.
Switches		
SW1	Heater SW	Turns the power for the folder unit anti-condensation heaters on and off.
SW2	Main Power SW	Turns the power for the folder unit on/off. When used online (with the main machine), always switch on the folder unit first, then switch on the main machine.
SW3	N1 Guide MSW	This microswitch detects whether guide N1 at the right upper corner of the folder unit)is open or closed.
SW4	N2 Knob Door SW	This push-switch detects whether door N2 (behind the right upper door) is open or closed.
SW5	N3 Door MSW	This microswitch detects whether door N3 on the back of the folder unit is open or closed.

Component		Function
SW6	N3 Door Push SW	This push-switch detects whether upper door N3 (rear upper) is open or closed.
SW7	N5 Door MSW	This microswitch detects whether door N5 on the back of the folder unit is open or closed.
SW8	N5 Door Push SW	This push-switch detects whether the lower door N5 (rear lower) is open or closed.
SW9	N6 Guide SW (L)	This is the lower push-switch that detects whether guide N6 (behind door N5) is open or closed.
SW10	N6 Guide SW (U)	This is the upper push-switch that detects whether guide N6 (behind door N5) is open or closed.
SW11	N7 Knob Door SW	This push-switch detects whether door N7 (behind the right lower door) is open or closed.
Clutches		
MC1	Paper Entrance Clutch	Switches on when the exit sensor in the main machine detects paper leaving the machine and entering the folder unit. The clutch drives the folder unit entrance roller, so that paper is fed into the folder unit.
MC2	Vertical Transport Clutch	Switches on when the folder unit entrance sensor detects paper entering the folder unit. The clutch drives the transport rollers, so that paper is fed through the folder unit.
Other		
H1	Anti-Condensation Heater 1 (Front Left)	2 heaters (H1, H2) located below the front top cover. These heaters keep the folder free of moisture that could interfere with paper feed. These heaters are not options.
H2	Anti-Condensation Heater 2 (Front Right)	
CB1	Circuit Breaker	Breaks the main power supply to the folder unit if there is an overload or short circuit. Located on the right corner of the folder unit, this switch is set manually. This breaker switch must be at the down position for the machine to operate.

Overall Configuration

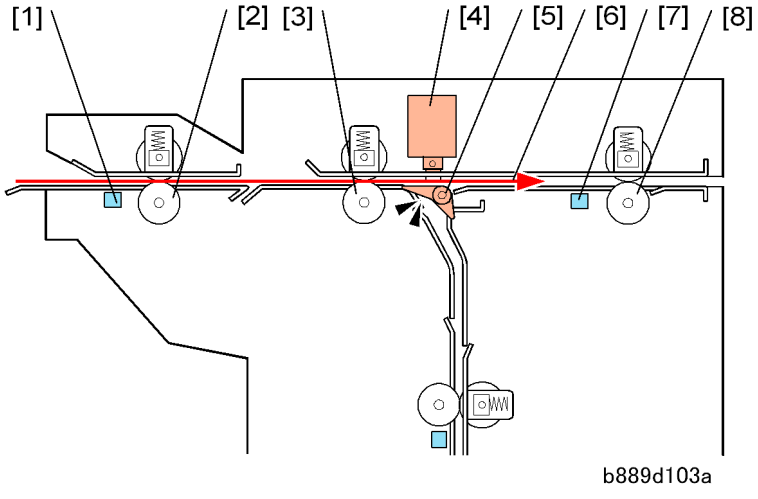


1. Folder Unit Entrance Sensor
16. Fan Fold Plate (F)

2. Entrance Rollers
3. Transport Roller 1
4. Junction Gate Solenoid
5. Junction Gate
6. Straight-Through Sensor
7. Straight-Through Exit Rollers
8. Transport Roller 2
9. Relay Sensor 1
10. Transport Roller 3
11. Relay Sensor 2
12. Fan Fold Plate HP Sensor (F)
13. Fan Fold Plate HP Sensor (R)
14. Fan Fold Plate Motor (R)
15. Transport Roller 4
17. Folder Unit Exit Sensor
18. Fan Fold LED (R1)
19. Fan Fold Sensor (R2)
20. Fan Fold Rollers (R)
21. Fan Fold Plate (R)
22. Fan Fold Rollers (F)
23. Fan Fold Sensor (F2)
24. Fan Fold LED (F1)
25. Fan Folder Unit
26. Fan Folder Entrance Sensor
27. Fan Folder Motor
28. Fan Fold Plate Motor (F)
29. Transport Motor

Folder Unit Operation, Mechanisms

Straight-Through



When the paper enters the folder unit:

- The paper passes over the folder unit entrance sensor [1]
- The entrance roller [2] and transport roller 1 [3] feed the paper toward the junction gate.

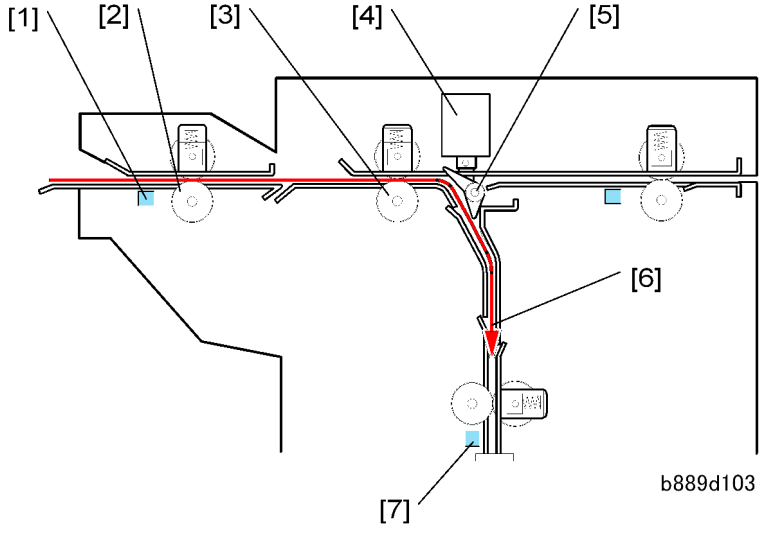
When no folding is selected for the job:

- The junction gate solenoid [4] switches on and closes the junction gate [5].
- The paper [6] passes over the closed junction gate.

The paper passes the straight-through sensor [7], then the straight-through exit roller [8] feeds the paper out of the folder unit.

Fan Folding

Paper Feed



When the paper enters the folder unit:

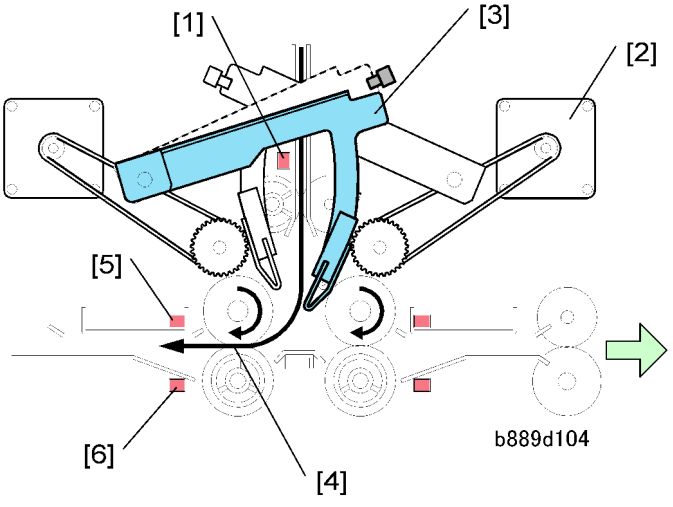
- The paper passes over the folder unit entrance sensor [1]
- The entrance roller [2] and transport roller 1 [3] feed the paper toward the junction gate.

When folding is selected for the job:

- The junction gate [4] solenoid remains off and the junction gate [5] remains open.
- The open junction gate guides the paper [6] toward relay sensor 1 [7].

The paper passes relay sensor 1 and continues to the fan folder unit below.

Paper Folding

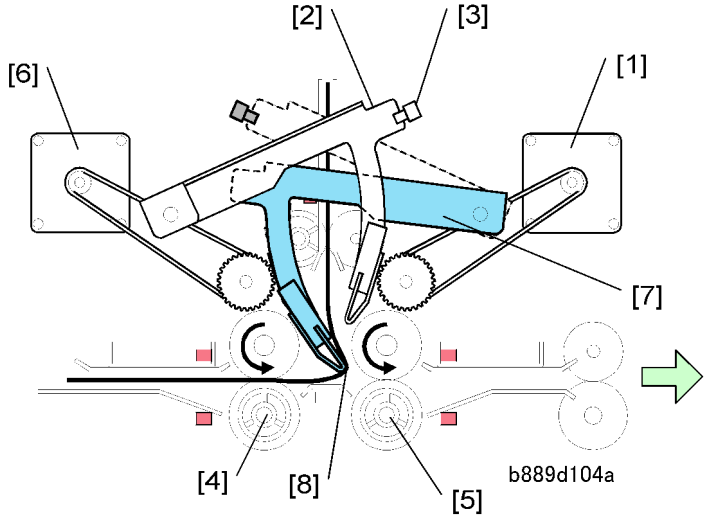


The leading edge of the paper passes the fan folder entrance sensor [1].

The fan fold plate motor (R) [2] switches on and lowers the fan fold plate (R) [3].

The plate guides the leading edge of the paper into the fan fold rollers (F) [4], driven by the fan fold motor.

The fan fold LED (F1) [5] and fan fold sensor (F2) [6] behind the fan fold rollers (F) [4] detect the leading edge of the paper when it comes out from between the rollers. This starts a pulse count.

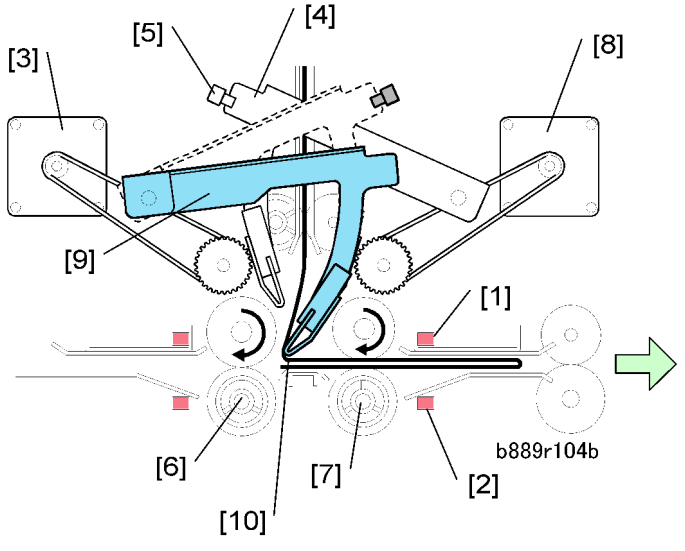


The fan fold motor feeds the paper the prescribed distance, measured by the pulse count started by the fan fold LED (F1) and fan fold sensor (F2).

Then:

- The fan fold plate motor (R) [1] reverses and raises the fan fold plate (R) [2]
- The fan fold plate motor (R) switches off when the fan fold plate HP sensor (R) [3] detects the edge of the fan fold plate (R).
- The fan fold motor reverses and drives both sets of fan fold rollers [4], [5] to feed the paper to the rear.

Next, the fan fold plate motor (F) [6] switches on and lowers the fan fold plate (F) [7]. The edge of the plate pushes the paper [8] between the fan fold rollers (R) [5] and the rollers crease the paper. This forms the first fold.



The fan fold LED (R1) [1] and fan fold sensor (R2) [2] pair behind the fan fold rollers (R) detect the edge of the crease when it comes out from between the rollers. This starts a pulse count.

The fan fold motor feeds the paper the prescribed distance, measured by the pulse count started by the fan fold LED (R1) and fan fold sensor (R2) pair:

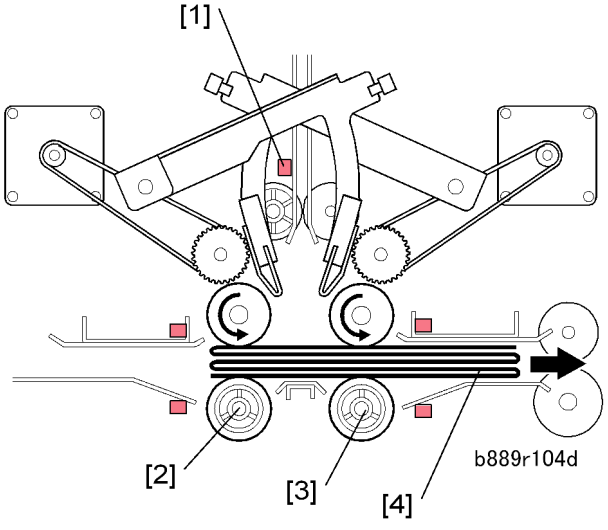
- The fan fold plate motor (F) [3] reverses and raises the fan fold plate (F) [4]
- The fan fold plate motor (F) switches off when the fan fold plate HP sensor [5] detects the edge of the fan fold plate.
- The fan fold motor reverses and drives both sets of fan fold rollers [6], [7] to feed the paper to the front.

Next, the fan fold plate motor (R) [8] switches on and lowers the fan fold plate (R) [9]. The edge of the plate pushes the paper [10] between the fan fold rollers (F) [6] and the rollers crease the paper. This forms the second fold.

This cycle repeats until all the folds are completed:

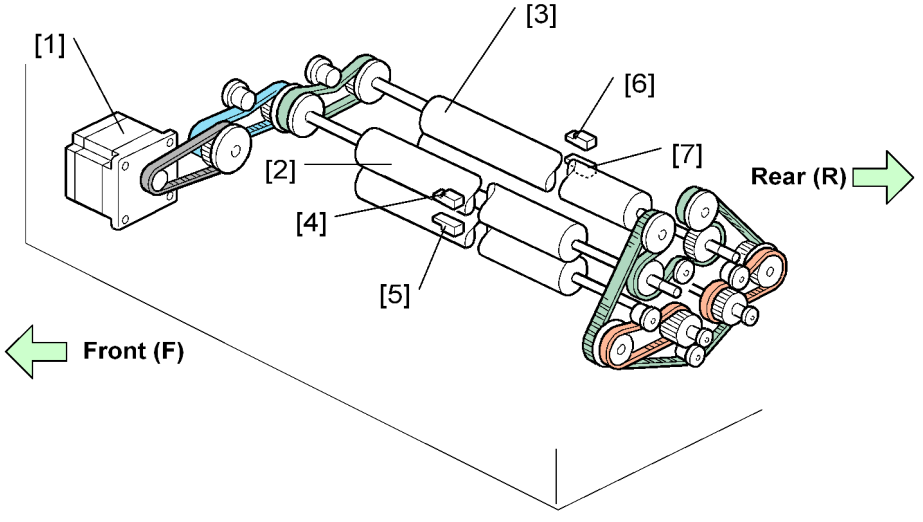
- The fold plate motors continue to alternate the raising and lowering of the fold plates to push the paper into the front and back fan fold rollers that form the creases of the folds.

- The fan fold motor switches the direction of rotation of the fan fold rollers, so that the stack feeds forward and back after each section is folded.
- The LED and sensor pairs detect the edges and start the pulse count that the folder unit uses to time the rotation of the fan folder motor. The time of rotation determines how far the paper is fed in each direction.



After the trailing edge of the paper passes the fan folder entrance sensor [1], the fan fold rollers [2], [3] feed the stack [4] out of the folder unit.

Drive Mechanism



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One fan fold motor [1] with a series of three timing belts drives the front fan fold roller [2] and rear fan fold roller [3].

The fan fold LED (F1) [4] is mounted above the fan fold sensor (F2) [5]. The sensor receives light from the LED above. When the light beam is interrupted by the paper coming out from between the rollers, paper is detected.

The fan fold LED (R1) [6] is mounted above the fan fold sensor (R2) [7]. The sensor receives light from the LED above. When the light beam is interrupted by the paper coming out from between the rollers, paper is detected.

After either sensor pair detects a paper edge, this starts a pulse count that the fan fold motor (a stepper motor) uses to measure the time that it should allow the paper to feed. The length of time that the paper is allowed to feed in either direction determines the length of the folded surface.

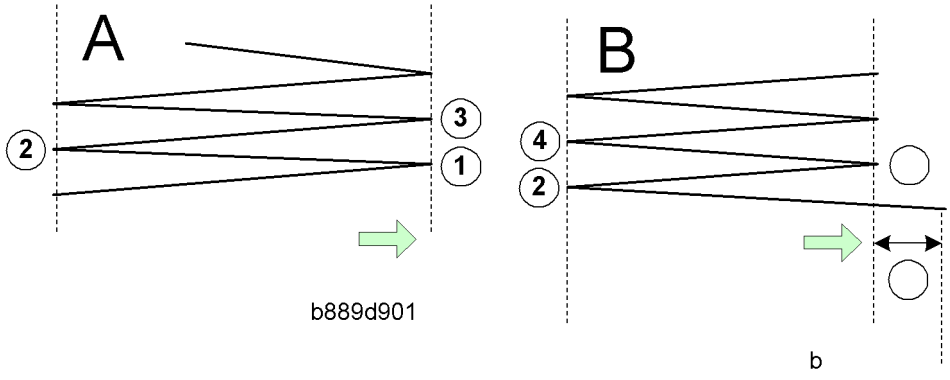
- Allowing the paper to feed a longer time creates a longer folded surface.
- Allowing the paper to feed a shorter time creates a shorter folded surface.

More about Folding

There are two types of folding:

- **Long folding**. The folded copy looks like an accordion with the edges of the folded surfaces aligned.
- **File folding**. The same as long folding but the leading edge of the bottom sheet protrudes from the bottom of the stack. This margin can be used to fasten the leading edge into a flat binder, or it can be punched for filing in a ring binder.

Long Folds and File Folds



The first example [A] is a long fold. The second example [B] is a file fold. The colored arrows show the direction of paper feed when viewed from the right side of the folder unit.

Important

- **For the sake of convention, the folds on the right sides of the stacks shown above are called "peak folds" and those on the left are "valley folds".**

In Stack [A], fold ① is a peak fold, fold ② is a valley fold, ③ is a peak fold, and so on.

Important

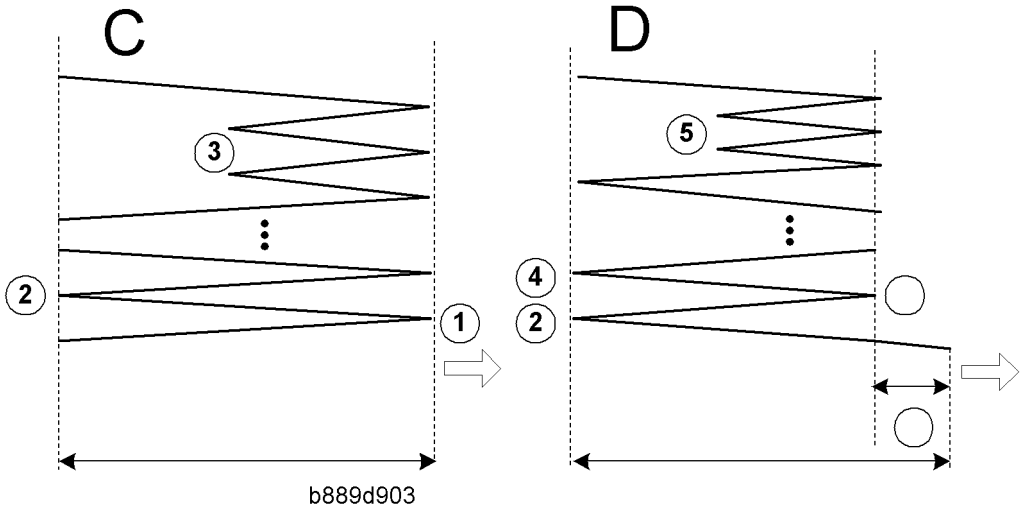
- **In a "long fold" like Stack [A], the first fold is always a peak fold.**

In Stack [B], ① is the leading edge fed wider than other sections of the stack, ② is a valley fold, ③ is a peak fold, ④ is a valley fold, and so on.

Important

- **In a "file fold" like Stack [B], the first fold is always a valley fold (done after creating the longer bottom sheet with the protruding leading edge). To create this difference in length, the fan fold motor feeds the leading edge to the rear slightly farther (about 40 mm) than the other folded sections above.**

Adjusted Folds



As shown in Stack [A] above, the top flap is slightly shorter than the other folds below which are of uniform size. If this is not desirable, the folding job can be set to calculate how much paper is needed for the last fold to ensure that the top flap is the same length as the other folds below, with folded surfaces of shorter length hidden within the stack. The folds of the paper remaining before the final full-length fold are "adjusted" to create shorter sections that will be covered by the top flap, so that the stack has a neat and uniform appearance.

These adjusted folds can be done for either long folds or file folds as shown above.

Stack [C] is a long fold (the first fold ① is a peak fold). The folds are adjusted at ③ so that the last flap is the same size as the other sections of the stack and long enough to cover the shorter adjusted folds below.

Stack [D] is a file fold (the first fold is a valley fold). The folds are adjusted at ⑤ so that the last flap is the same size as the other sections of the stack and long enough to cover the short adjusted folds below.

Fold Length Selection and Adjustment

Long Folding

In long folding, all sections are folded at the same length. The lengths of the selections can be selected on the operation panel: 140 mm, 170 mm, 210 mm, or 297 mm.

File Folding

The first fold is done to create a bottom section 210 mm long; all other sections are done at 170 mm. This leaves a wider margin (40 mm) on the bottom section that can be used for binding. The sections in file folding are limited to this 170 mm length.

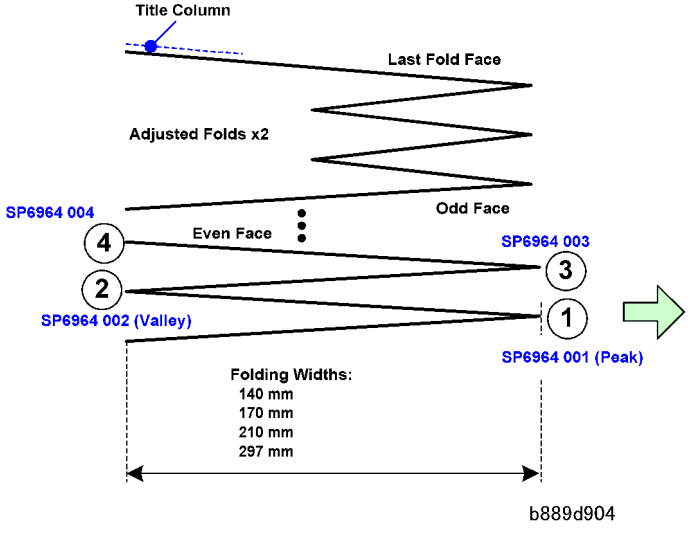
These are the codes used to select the type of fold jobs on the operation panel.

Code	Folded Section Size	Type
1	Metric: 140 mm Inch: 8.5 inches	Long folding only
2	Metric: 170 mm Inch: 9 inches	
3	Metric: 210 mm Inch: 11 inches	
4	Metric: 297 mm Inch: 12 inches	
5	Metric: 210 mm Inch: 8.5 inches	With file folding

Fold Adjustments with SP Codes

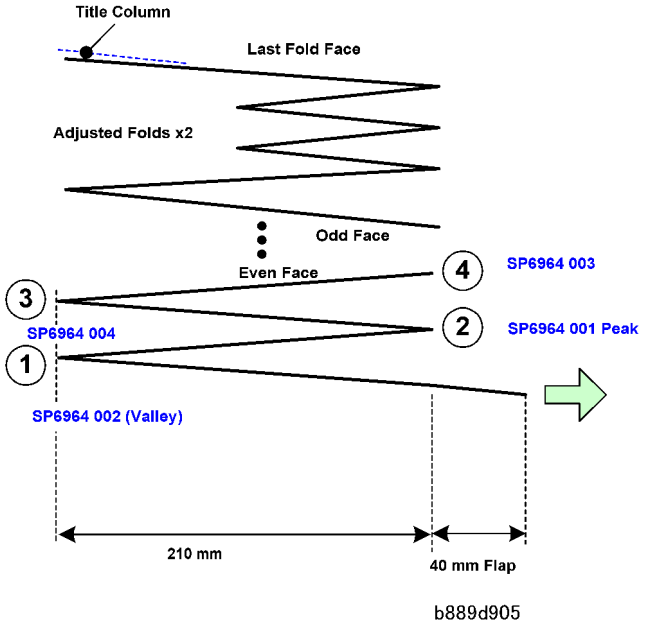
Here is a summary of the adjustments on fan folding that can be done with the SP codes.

Long Folding (With Adjusted Folds)



In long fan folding, the first fold is a peak fold. SP6964 001 applies to the first peak fold. SP6964 002 applies to the first valley fold, and so on.

File Folding (With Adjusted Folds)



In file fan folding, the first fold is a valley fold. SP6964 002 applies to the first valley fold. SP6964 001 applies to the first peak fold, and so on.

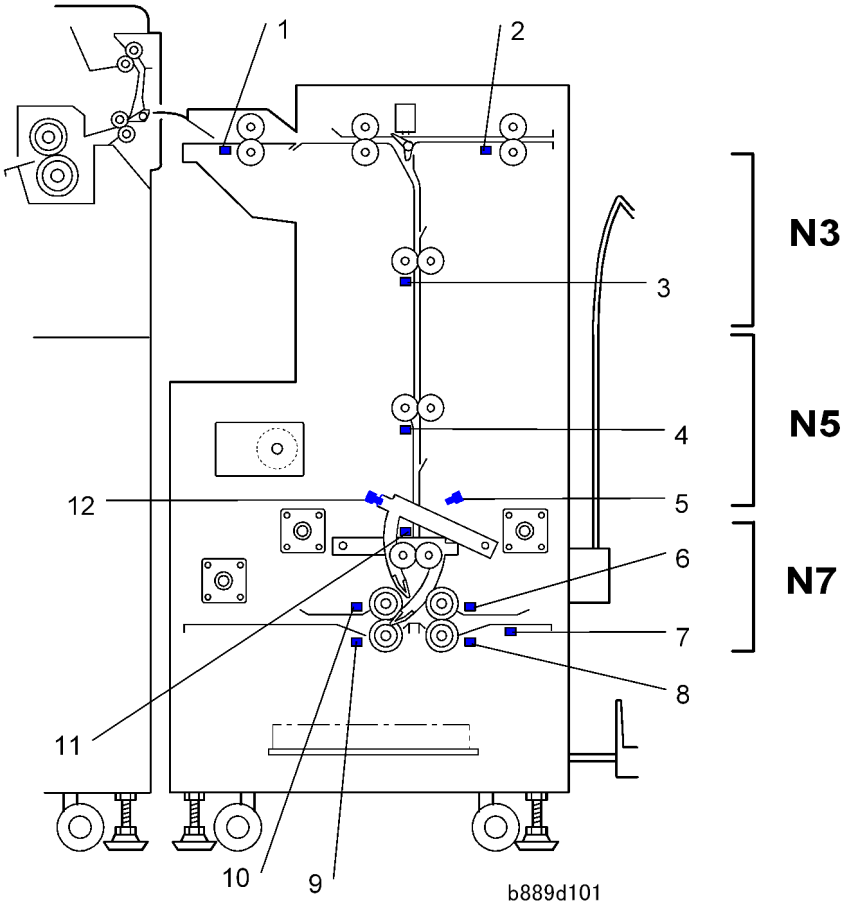
SP 6964 (Fold Length) Adjustments

This is a summary of how SP adjustments affect fan folding. For more details about these SP adjustments, see "Service Tables" in the service manual for the main machine.

No.	Name	Fold Type	Target Size	Target Section
1	1st Fold Peak	All other than A3 SEF)	All sizes other than A3 SEF	1st section
2	1st Fold Valley			
3	2nd Fold Peak	Std (other than Std file), Long folding without adjusted pages	All sizes	2nd section
4	2nd Fold Valley			
21	Margin 7th Fold	Std file (A0 SEF)	A0 SEF	Section before last flap adjusted
22	Margin 5th Fold	Std file (A1, A2 SEF)	A1 SEF, A2 SEF	
23	Margin 3rd Fold	Std file (A3 SEF)	A3 SEF	

No.	Name	Fold Type	Target Size	Target Section
41	Long Print: 1st Fold Peak: After 2nd Fold	Long fold with adjusted pages	All sizes	2nd section
44	Margin Fold: 1st Fold Valley: After 2nd Fold	File fold with adjusted pages	All sizes	
42	1st Fold Valley: After 2nd Fold	Long fold and file fold with adjusted pages	All sizes	3rd section
43	Margin 1st Fold Peak: After 2nd Fold			4th section
31	Fixed Width Fold	Long fold and file fold, both without adjusted pages	All sizes	Last section
32	Final Fold	Long fold with adjusted pages	All sizes	
51	Margin File	File fold with adjusted pages	All sizes	

Jam Detection



No	Sensor Name	Type	What Happened
1	Folder Unit Entrance Sensor	Late	Paper leading edge did not arrive to switch sensor ON within 30 mm of feed time.
		Lag	Paper trailing edge did not arrive to switch sensor OFF within 30 mm of feed time.
2	Straight-through	Late	Paper leading edge did not arrive to switch sensor ON within 30 mm of feed time.
		Lag	Paper trailing edge did not arrive to switch sensor OFF within 30 mm of feed time.

No	Sensor Name	Type	What Happened
3	Relay Sensor 1	Late	Paper leading edge did not arrive to switch sensor ON within 30 mm of feed time.
		Lag	Paper trailing edge did not arrive to switch sensor OFF within 30 mm of feed time.
4	Relay Sensor 2	Late	Paper leading edge did not arrive to switch sensor ON within 30 mm of feed time.
		Lag	Paper trailing edge did not arrive to switch sensor OFF within 30 mm of feed time.
5	Fan Fold Plate HP Sensor (R)	---	Does not perform jam detection.
6	Fan fold (R1)	Late	Paper leading edge did not arrive to switch sensor ON within 30 mm of feed time.
		Lag	"R1", "R2" (8) work together Paper trailing edge did not arrive to switch sensor OFF within 30 mm of feed time.
7	Folder unit exit	Late	Paper leading edge did not arrive to switch sensor ON within 30 mm of feed time.
		Lag	Paper trailing edge did not arrive to switch sensor OFF within 30 mm of feed time.
8	Fan fold (R2)	---	Paired with "6" above. "R1" is the LED emitter, R2 is the receptor.
9	Fan fold (F2)	Late	Paired with "10" below. "F1" is the LED emitter, R2 is the receptor.
10	Fan fold (F1)	Late	"F1", "F2" (9) work together. Paper leading edge did not arrive to switch sensor ON within 30 mm of feed time.
		Lag	Paper trailing edge did not arrive to switch sensor OFF within 30 mm of feed time.
11	Folder entrance	Late	Paper leading edge did not arrive to switch sensor ON within 30 mm of feed time.
		Lag	Paper trailing edge did not arrive to switch sensor OFF within 30 mm of feed time.

No	Sensor Name	Type	What Happened
12	Fan Fold Plate HP Sensor (F)	---	Does not perform jam detection.