Z-Folding Unit ZF4000
(Machine Code: B660)

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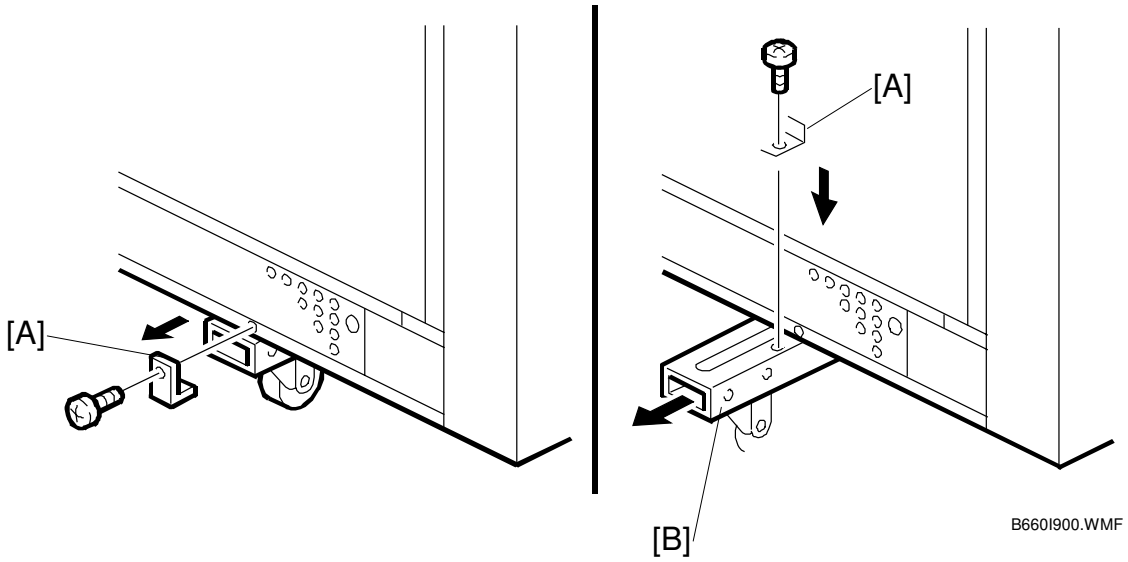
1. REPLACEMENT AND ADJUSTMENT

1.1 BEFORE YOU BEGIN



1. Disengage the Z-folding unit from the machine.
2. Disengage the Z-folding unit from the finisher (or cover sheet feeder).
3. At the bottom on the sides of the Z-folding unit:
   - Remove the lock bracket [A] (☞ x 1).
   - Pull out the foot extension [B].
   - Re-attach the bracket [A] to lock the foot in the open position (☞ x 1).

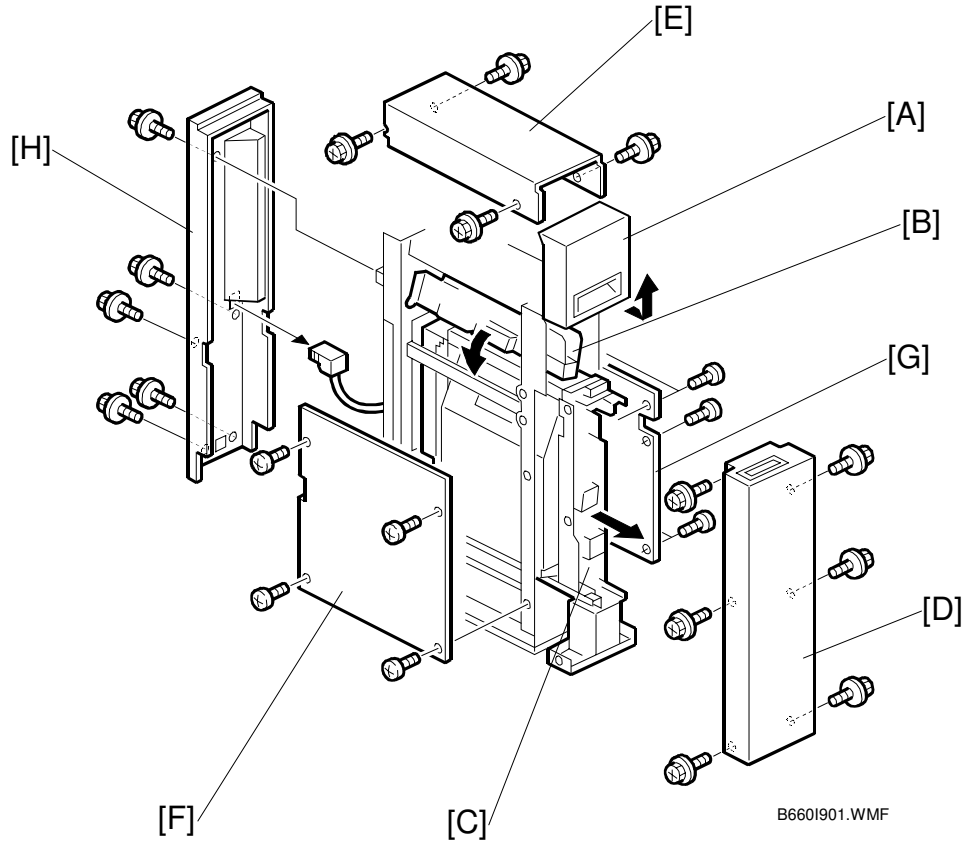
Reinstallation

Do this procedure in the opposite sequence to retract and lock the extensions below the Z-folding unit.

⚠CAUTION

The Z-folding unit is not stable, with or without the feet extended. Do your work carefully; do not tilt the unit.

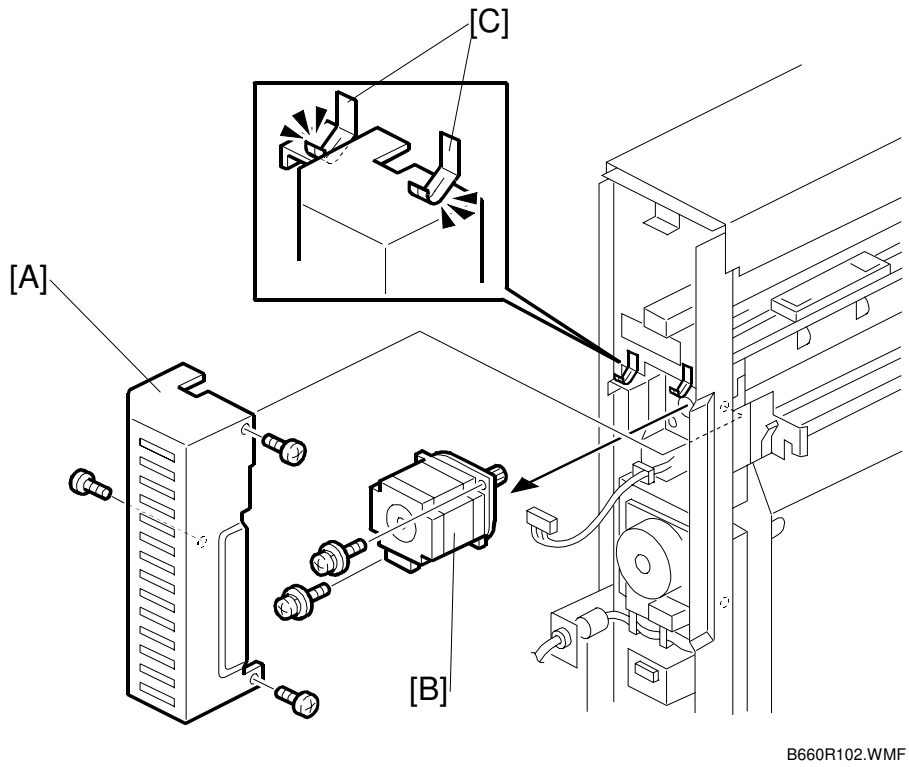
1.2 COVERS



- Open the front door [A].
- Lift the horizontal transport plate [B] to the left until it locks on the left side.
- Pull out the Z-fold mechanism [C].

[D] Front cover (☞ x 6)
[E] Top cover (☞ x 4)
[F] Left cover (☞ x 4)
[G] Right cover (☞ x 5)
[H] Rear cover (☞ x 6)

1.3 FEED MOTOR



B660R102.WMF

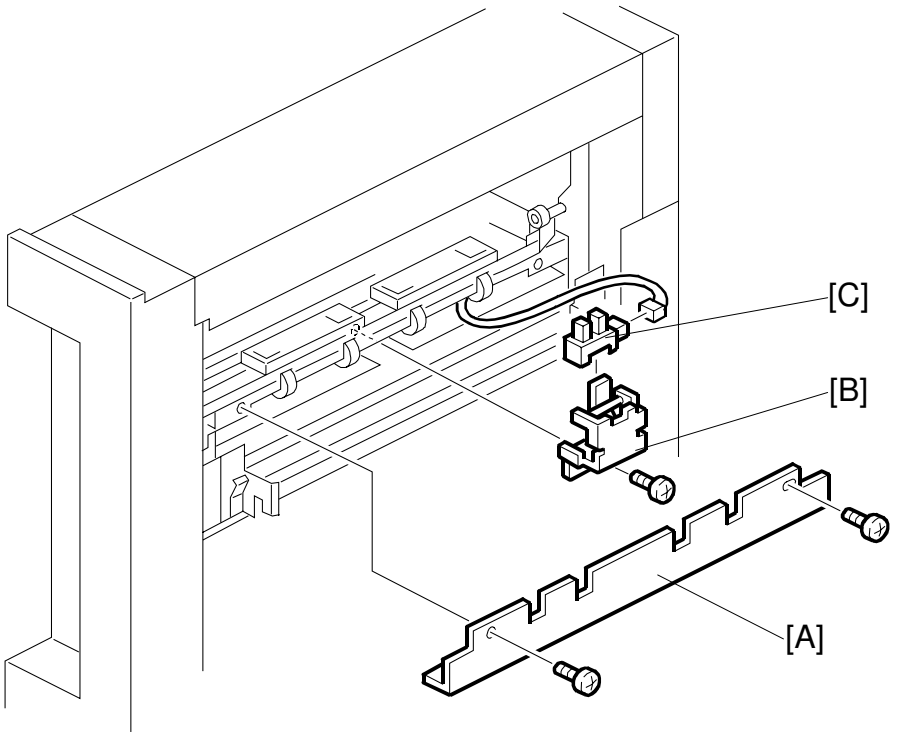
1. Pull the Z-folding mechanism out of the unit, but not fully.
2. Remove: (☛1.2)
   - Left cover
   - Right cover
   - Rear cover

[A]: Motor cover (🔩 x 3)
[B]: Feed Motor (🔩 x 2, 🔌 x 1, timing belt x 1)

Reinstallation

- Confirm that the motor cover is below the leaf springs at [C].

1.4 UPPER EXIT SENSOR



B660R103.WMF

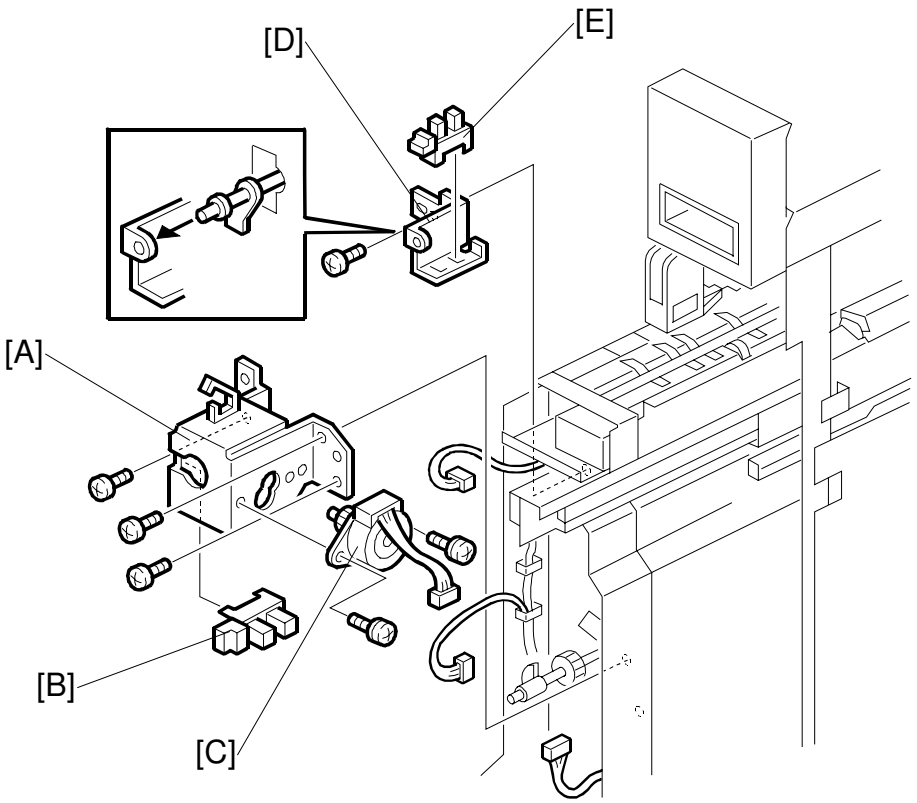
Left cover (☛1.2)

[A]: Bracket (🔩 x 2)

[B]: Upper exit sensor unit (🔩 x 1, 🔌 x 1, ✋ x 1)

[C]: Upper exit sensor

1.5 UPPER STOPPER MOTOR/HP SENSOR, FEED SENSOR

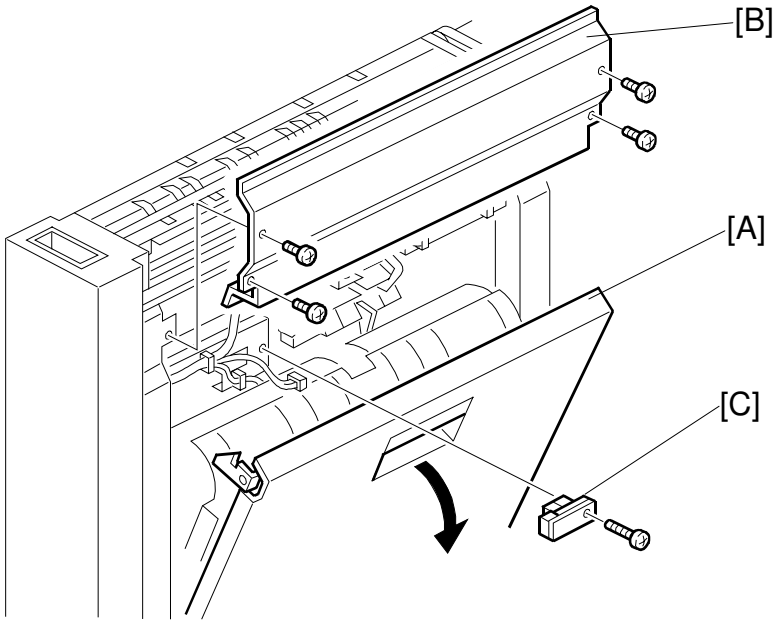


B660R104.WMF

Front cover (☛1.2)

[A]: Upper stopper motor unit (🔩 x 3, 🔩 x 2, 🔩 x 2)
[B]: Upper stopper motor HP sensor
[C]: Upper stopper motor (🔩 x 2)
[D]: Feed sensor unit (🔩 x 1, 🔩 x 1)
[E]: Feed sensor

1.6 FOLD TIMING SENSOR

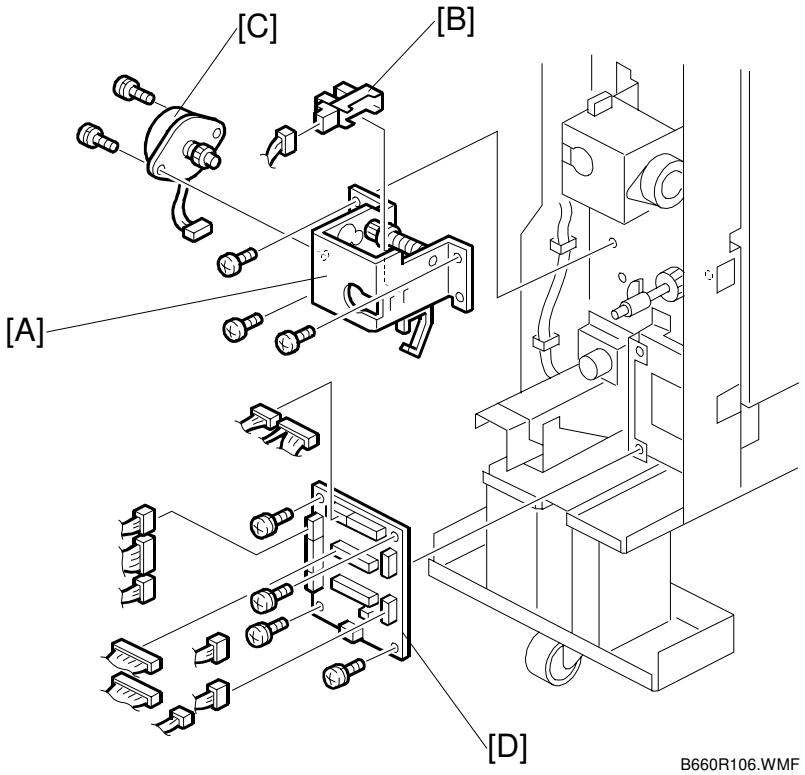


B660R105.WMF

Pull the Z-fold mechanism out of the unit.

[A]: Open the right vertical transport unit cover.
[B]: Plate (x 4)
[C]: Fold timing sensor (x 1, x 1)

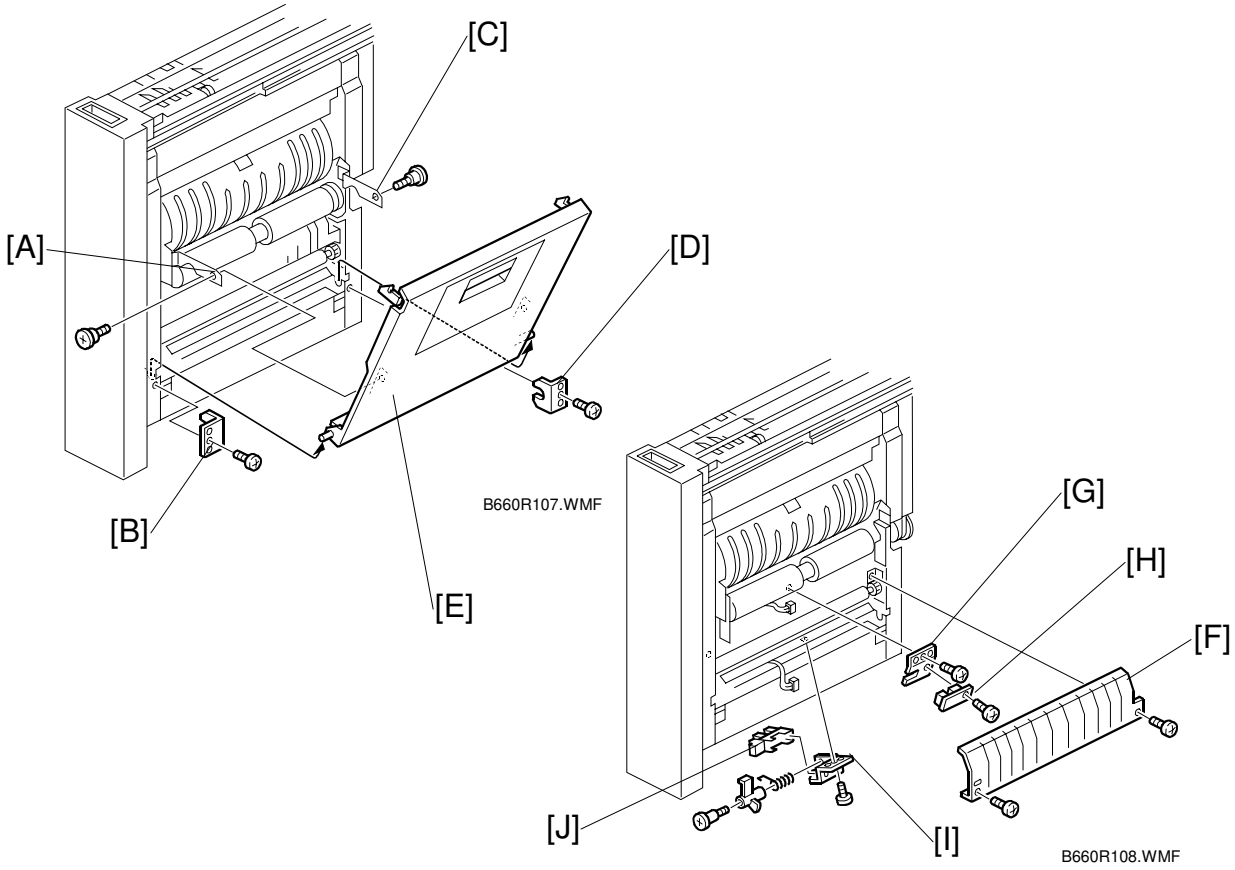
1.7 LOWER STOPPER MOTOR/HP SENSOR, RELAY BOARD



Front cover (☛1.2)

[A]: Lower stopper motor unit (🔩 x 3, 🔩 x 2, 🔩 x 2),
[B]: Lower stopper HP sensor
[C]: Lower stopper motor (🔩 x 2)
[D]: Relay board (🔩 x 4, 🔩 x 3, 🔩 x 10)

1.8 LEADING EDGE SENSOR, LOWER EXIT SENSOR

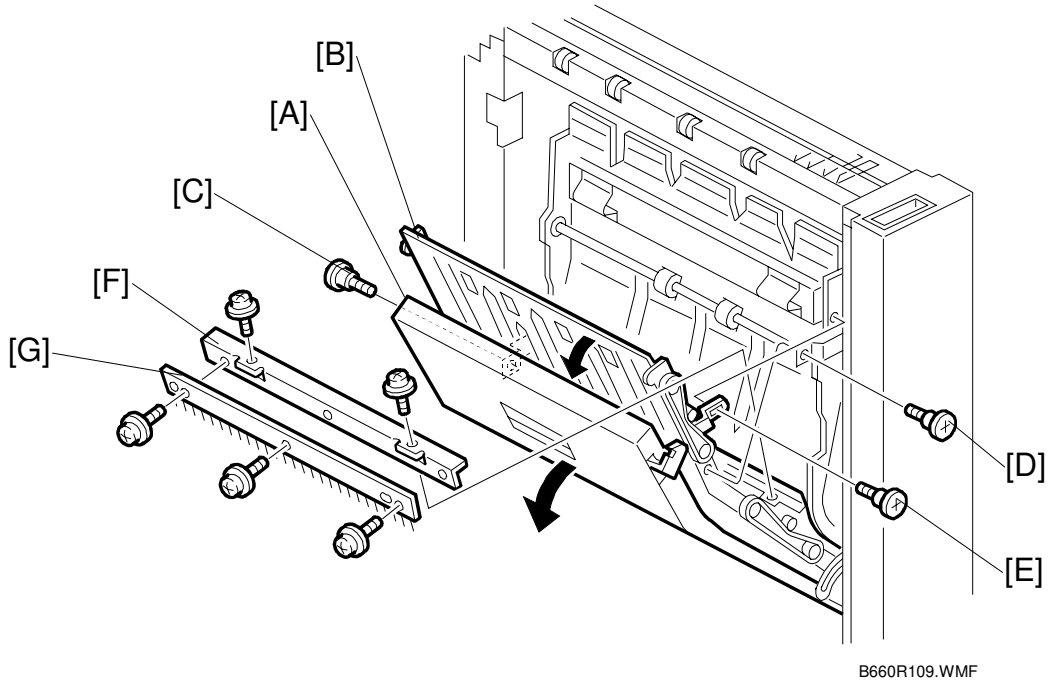


Pull out the Z-folding mechanism.

Open the right vertical transport cover [E].

[A]: Left link arm (☞ x 1)
[B]: Left corner bracket (☞ x 1)
[C]: Right link arm (☞ x 1)
[D]: Right corner bracket (☞ x 1)
[E]: Vertical transport cover.
[F]: Lower fold roller cover (☞ x 2)
[G]: Leading edge sensor unit (☞ x 1, ☞ x 1)
[H]: Leading edge sensor (☞ x 1)
[I]: Lower exit sensor unit (☞ x 1, ☞ x 1)
[J]: Lower exit sensor

1.9 ANTI-STATIC BRUSH

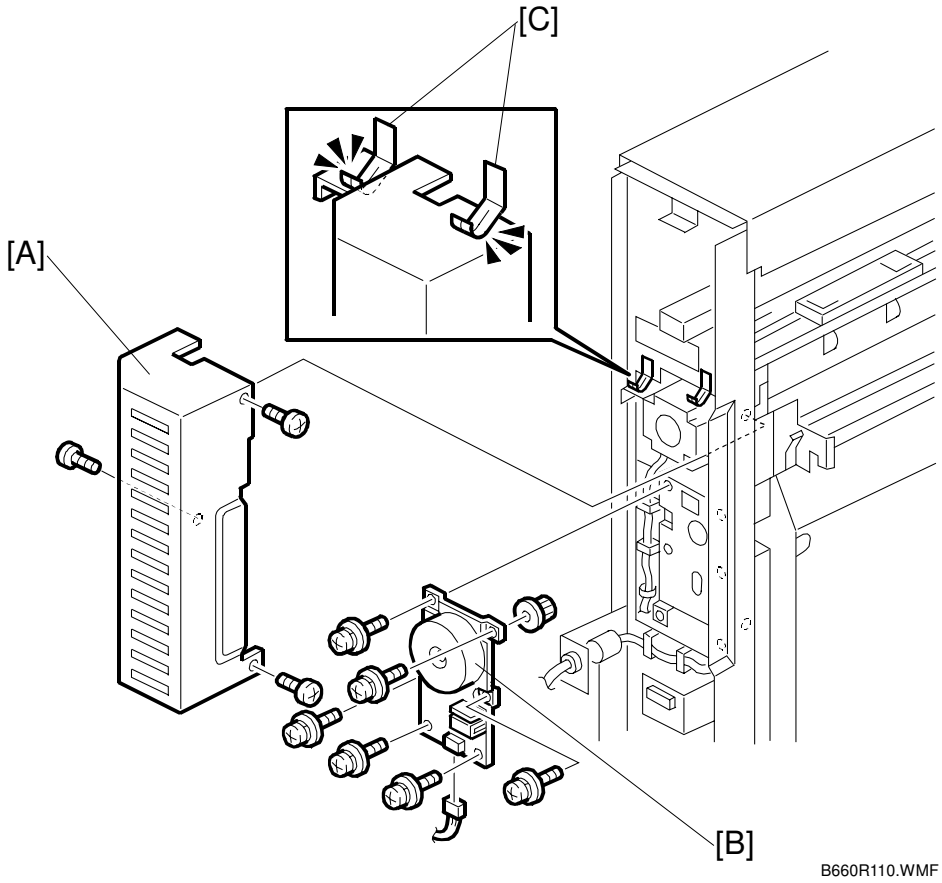


1. Pull out the Z-folding mechanism.
2. Open the left vertical transport cover [A].
3. Open the vertical transport assembly [B].

Remove:

[C] Left link screw
[D] Right link screw
[E] Link screw [E]
[F] Bracket
[G] Anti-static brush

1.10 FOLD ROLLER MOTOR



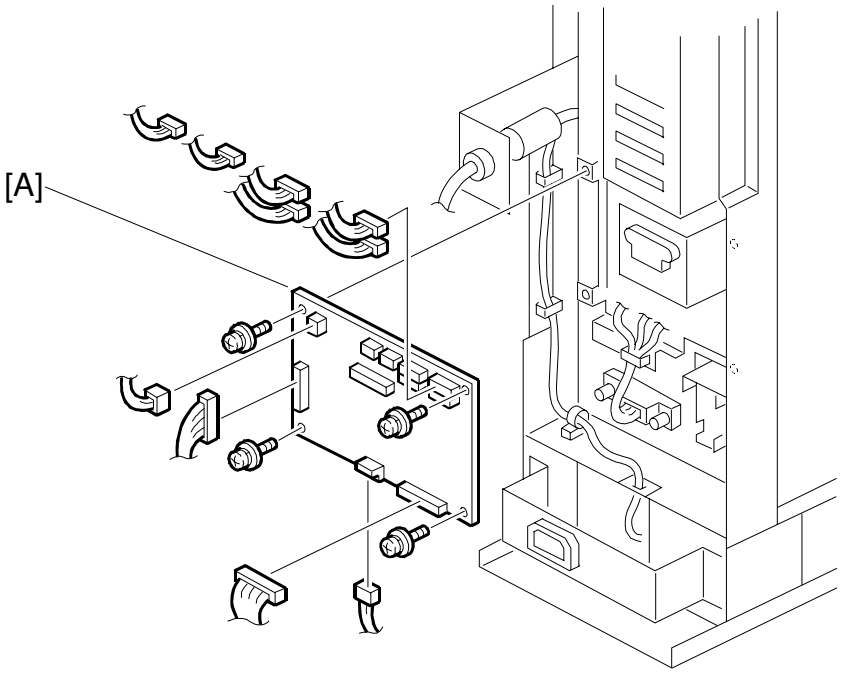
1. Pull the Z-folding mechanism out of the unit, but not fully.
2. Remove: (☛1.2)
   - Left cover
   - Right cover
   - Rear cover

[A]: Motor cover (🔩 x 3)
[B]: Fold roller motor (🔩 x 6, 🔌 x 1, timing belt x 1)

Reinstallation

Make sure that the motor cover is below the leaf springs [C].

1.11 MAIN CONTROL BOARD



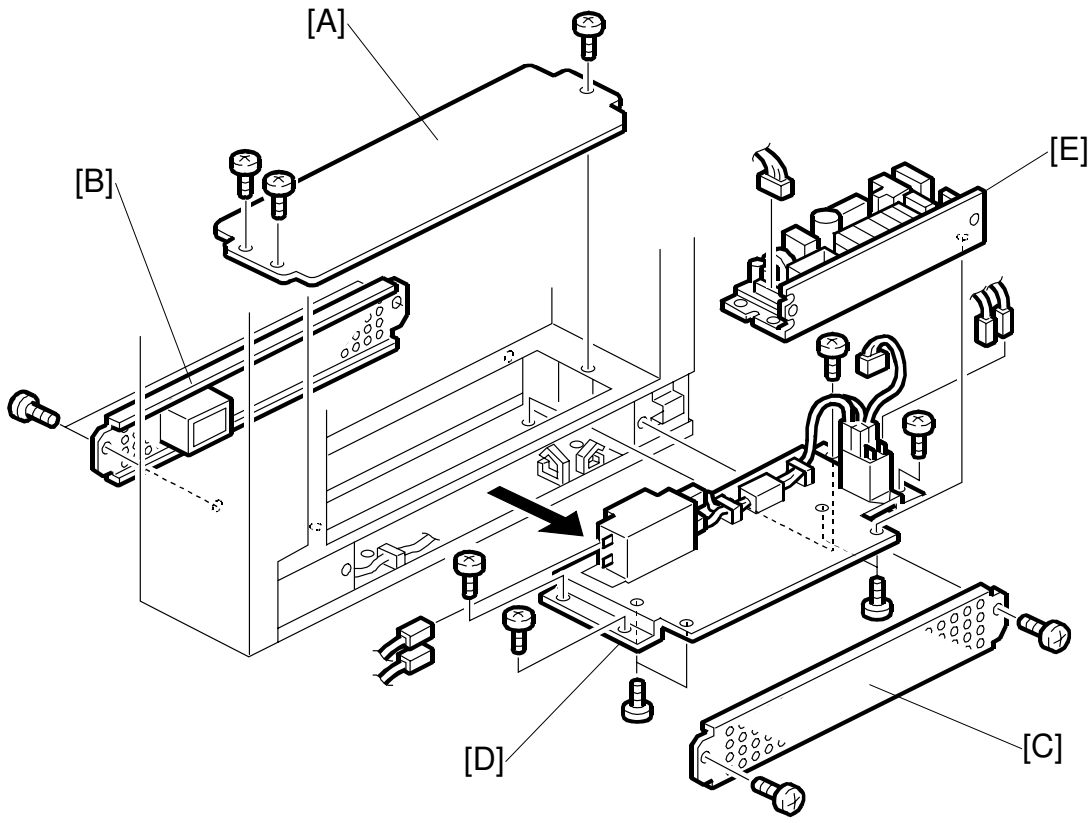
B660R111.WMF

Remove:

- Rear cover. (☛1.2)

[A] Main control board [A] (🔩 x 4, 🖐 x 10)

1.12 PSU



- Open the front door.
- Pull the Z-fold mechanism out of the unit.

Remove:

- Left cover and right cover. (☛1.2)

[A] Base top cover (🔩 x 3).
[B] Base left cover (🔩 x 2).
[C] Base right cover (🔩 x 2).

- Make a mark at the positions of the connectors, then disconnect them.

NOTE: These connectors do not have different colors. To help you connect them again correctly, make marks on them.

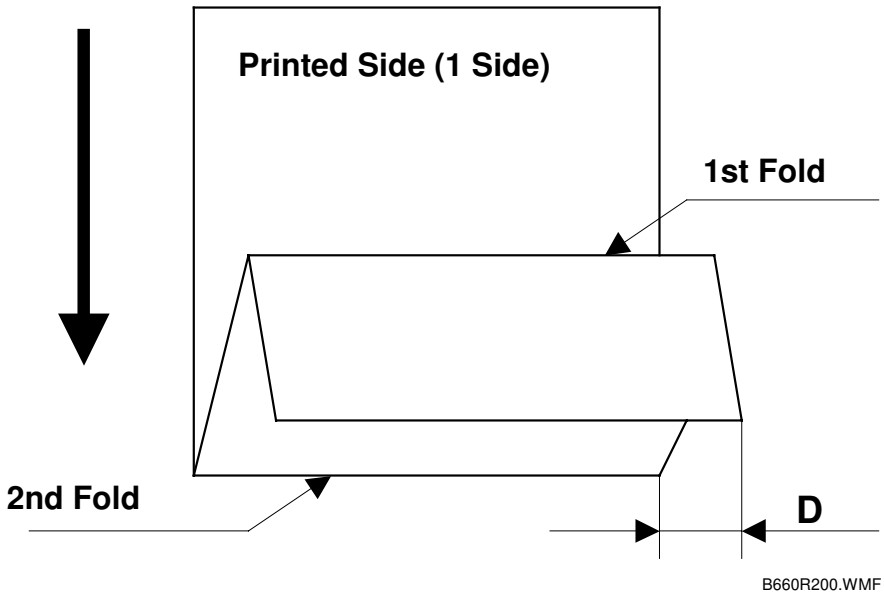
[D] Power supply unit (PSU) (✋ x4, 🔩 x 4).

- Pull the PSU out of the right side of the bottom.

[E] Power supply board (🔩 x 4, ✋ x 1).

1.13 UNEVEN FOLDING ADJUSTMENT

1.13.1 OVERVIEW



This procedure describes how to correct uneven folding (D) in paper folded with the Z-Fold unit. Before doing this procedure, please note the names and positions of the 1st and 2nd Fold.

Section 3.2.2 provides a full description of how Z-folding is done.

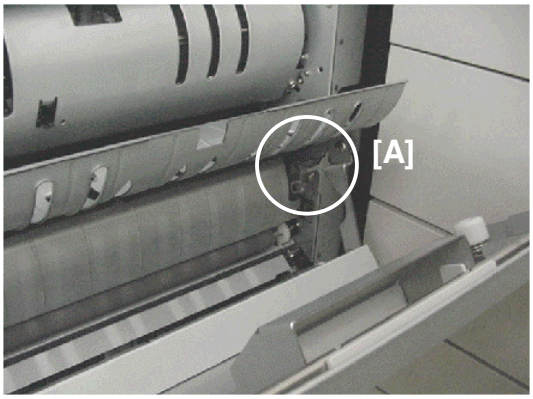
1.13.2 Z-FOLD ADJUSTMENT SCREWS

The adjustment of the 1st fold is done by turning an adjustment screw linked to the paper stopper.

Pull out the Z-fold mechanism.

Open the right cover to see the adjustment screw located at [A].

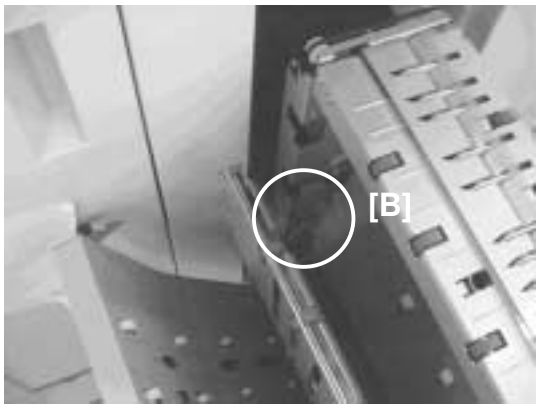
This is the screw used to adjust the 1st fold.



B660R206.BMP

Open the left cover to see the screw located at [B].

This is the screw used to adjust the 2nd fold.



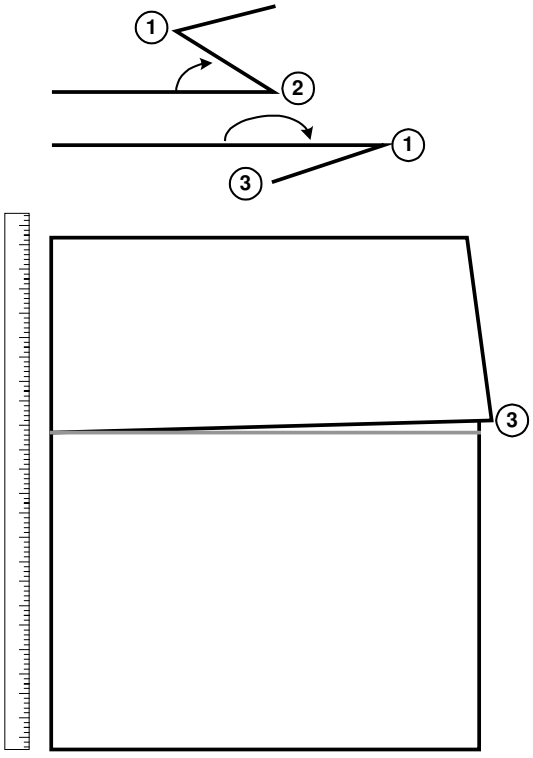
B660R210.BMP

1.13.3 Z-FOLD ADJUSTMENT PROCEDURE

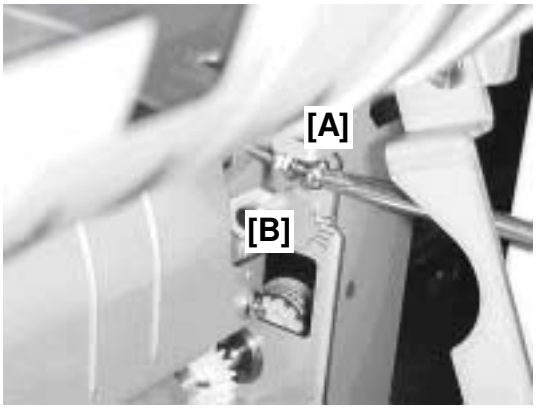
1st Fold Adjustment

1. Print one A3 copy and send it through the Z-fold unit.
2. Open the 2nd fold ❷.
3. Turn the paper over so the edge ❸ is aligned with the crease of the 2nd fold.
4. Open the right door and locate the screw that adjusts the 1st fold (see previous page).
5. Use a plus screwdriver to turn the screw [A] to the left to loosen the nut.
   - If the corner is over the right edge, turn the screw to the right.
   - If the corner is over the left edge, turn the screw to the left.

   NOTE:
   - The illustration above shows the corner over the right edge.
   - You can see the pointer [B] change position on the notches of the adjustment scale as you turn the screw.
6. Close the Z-Fold unit.
7. Do another test print.
8. If the 1st fold is still misaligned, repeat this procedure until the alignment is correct.
9. After the adjustment is completed, use a screw driver to hold the screw in position, then retighten the nut you loosened in Step 2. Do not turn the screw.



B660R215.WMF

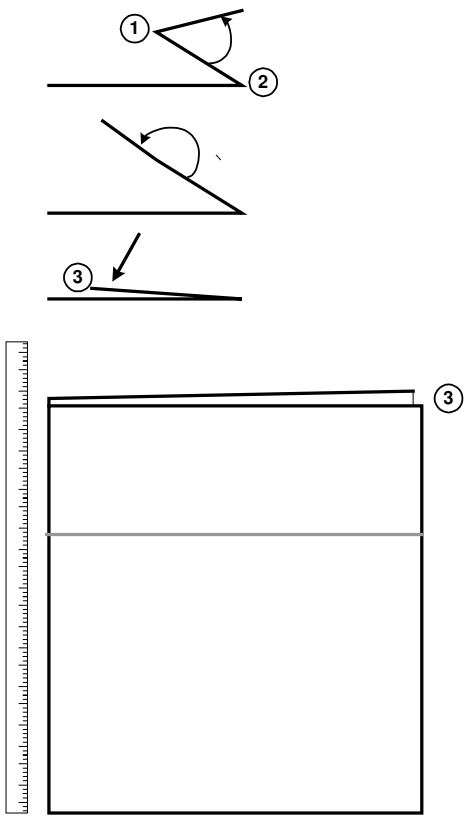


B660R220.BMP

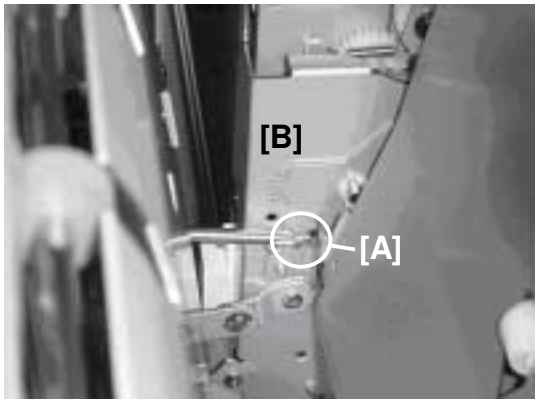
2nd Fold Adjustment

1. Print one A3 copy and send it through the Z-fold unit.
2. Open the folded sheet at the 1st fold ❶ then lay it down flat.
3. Stand the sheet on its end so the edge ❸ is up and the crease of the 1st fold is facing out.
4. Open the left door and locate the screw that adjusts the 2nd fold (see previous page).
5. Use a plus screwdriver to turn the screw [A] to the left to loosen the nut.
   - If the corner is over the right edge, turn the screw to the right.
   - If the corner is over the left edge, turn the screw to the left.

   NOTE:
   - The illustration shows the corner over the right edge.
   - You can see the pointer [B] change position on the notches of the adjustment scale as you turn the screw.
6. Close the Z-Fold unit.
7. Do another test print.
8. If the 1st fold is still misaligned, repeat this procedure until the alignment is correct.
9. After the adjustment is completed, use a screw driver to hold the screw in position, then retighten the nut you loosened in Step 2. Do not turn the screw.



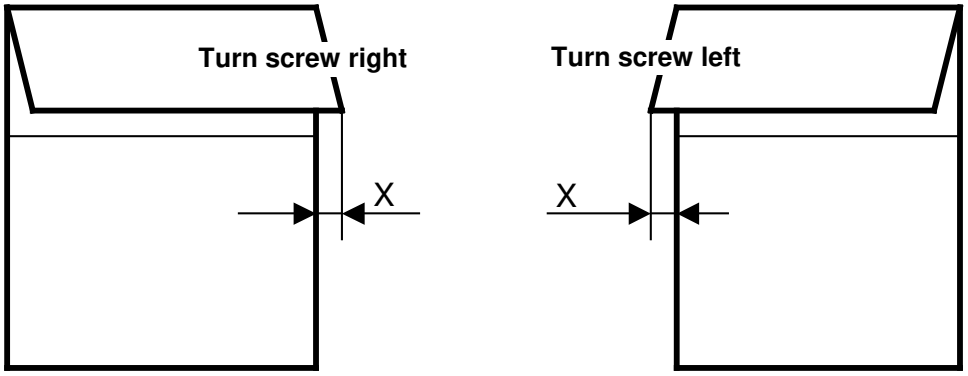
B660R225.WMF



B660R230.BMP

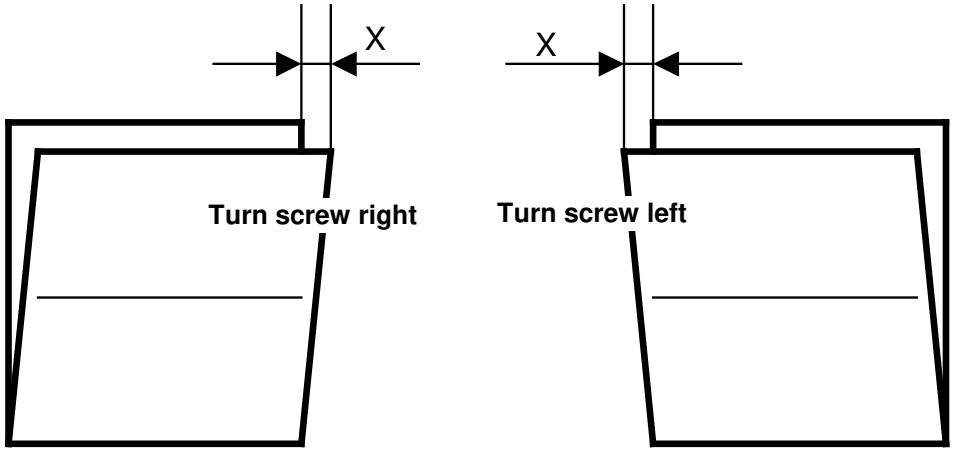
1.13.4 Z-FOLD ADJUSTMENT REFERENCE TABLE

1st Fold Adjustment



B660R235.WMF

2nd Fold Adjustment

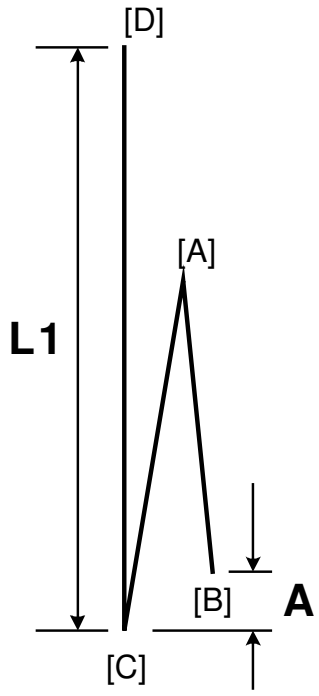


B660R240.WMF

NOTE: A one-notch adjustment on the scale means the alignment is corrected by about 1 mm.

2. SERVICE TABLES

Two SP codes have been added for the Z-folding unit, to adjust the positions of the folds.



B660S901.WMF

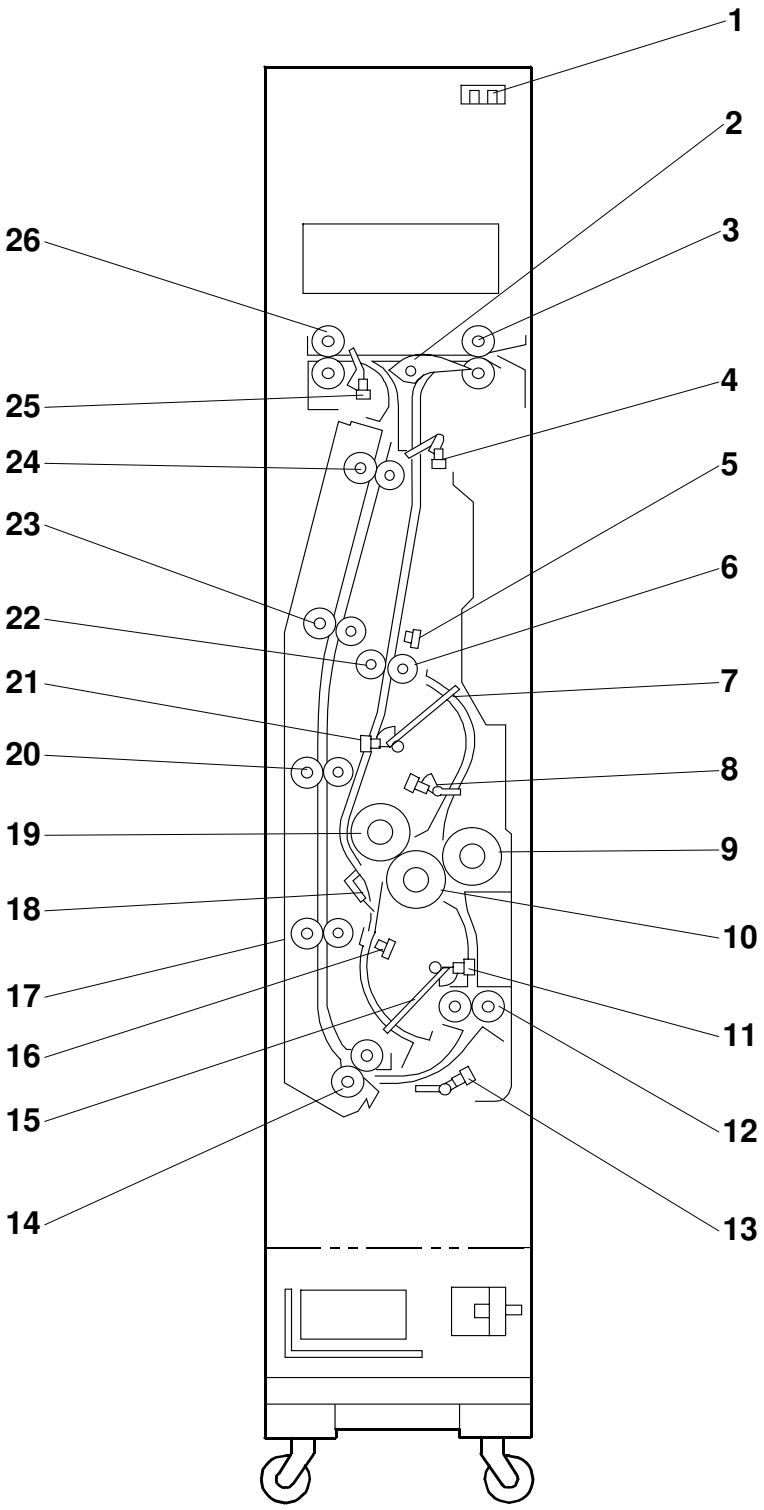
Use these SPs to adjust the locations of the first fold and the second fold.

The illustration shows the position of the sheet while it goes through the lower exit rollers after it has been folded.

SP6301 001 to 008	Fine Adjustment – 1st Fold Position
	[-4 ~ +4/0/ 0.2 mm] Adjusts the position of the first fold [A] to decrease or increase the distance (**A**) between the leading edge [B] and the crease of the 2nd fold [C].
SP6301 009 to 016	Fine Adjustment – 2nd Fold Position
	[-4 ~ +4/0/ 0.2 mm] Adjusts the position of the 2nd fold [C] to decrease or increase the length (**L1**) of the sheet between the trailing edge [D] and the 2nd fold.

3. DETAILS

3.1 OVERVIEW

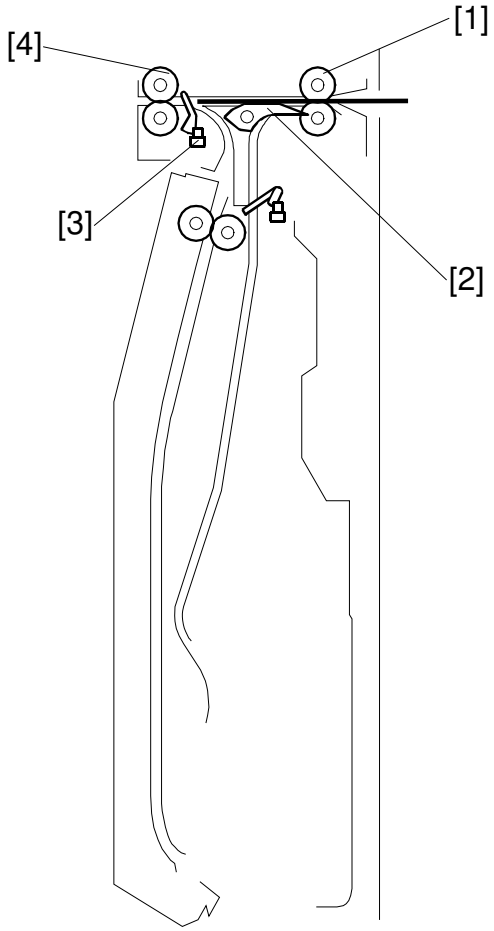


B660D102.WMF

1. Front Door Sensor
2. Junction Gate
3. Feed Rollers
4. Feed Sensor
5. Fold Timing Sensor
6. Pinch Idle Roller
7. Upper Stopper
8. Upper Stopper Path Sensor
9. 3rd Fold Roller
10. 2nd Fold Roller
11. Lower Stopper HP Sensor
12. Lower Exit Rollers
13. Lower Exit Sensor
14. Grip Rollers
15. Lower Stopper
16. Leading Edge Sensor
17. Vertical Feed Rollers – 1
18. Anti-Static Brush
19. 1st Fold Roller
20. Vertical Feed Rollers – 2
21. Upper Stopper HP Sensor
22. Pinch Feed Roller
23. Vertical Feed Rollers – 3
24. Vertical Feed Rollers – 4
25. Upper Exit Sensor
26. Upper Exit Rollers

3.2 Z-FOLDING UNIT PAPER PATH

3.2.1 PAPER PATH WITH NO FOLDING



B660D901.WMF

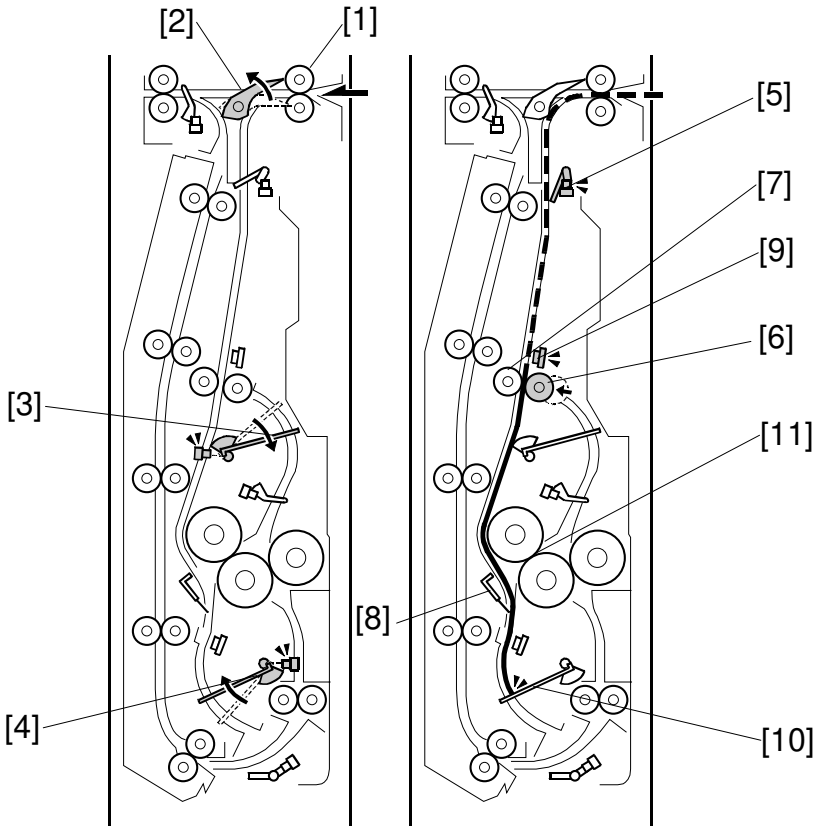
The feed rollers [1] feed the paper from the main machine into the Z-folding unit.

If Z-folding was not used for the job, the sheet feeds above the closed junction gate [2].

The upper exit sensor [3] detects the leading and trailing edge of the unfolded sheet.

The upper exit rollers [4] feed the unfolded sheet out of the Z-folding unit and into the finisher.

3.2.2 PAPER PATH WITH Z-FOLDING



The feed rollers [1] feed the paper from the main machine into the Z-folding unit.

The junction gate solenoid energizes and opens the junction gate [2]. The junction gate sends the sheet down into the Z-folding paper path.

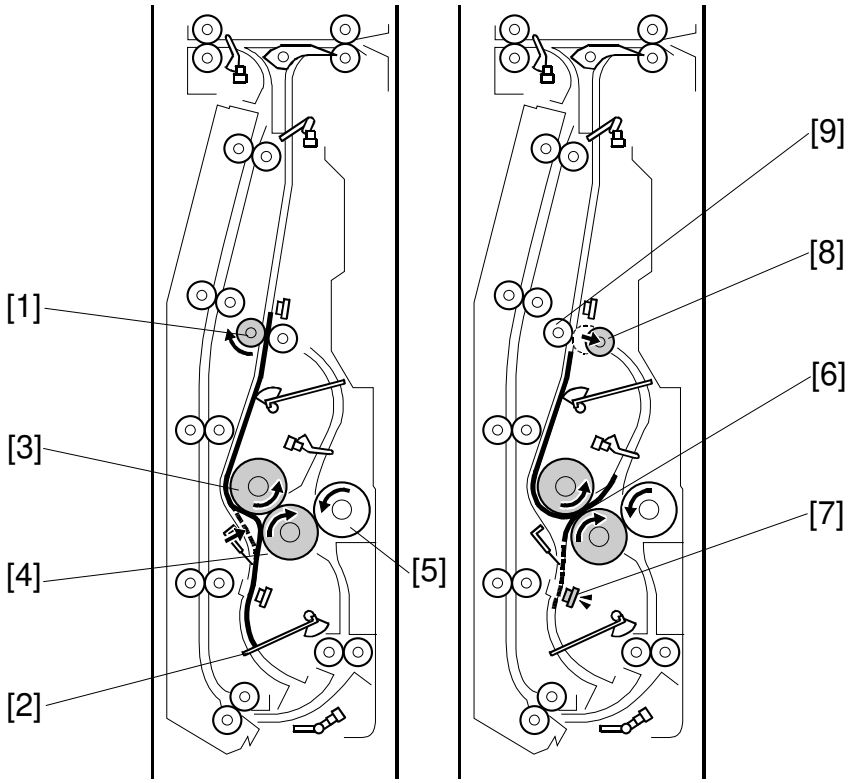
The upper and lower stopper motors move the upper stopper [3] and lower stopper [4] to the positions for the paper size that was used for the job.

The feed sensor [5] detects the leading edge and trailing edge of the sheet. The pinch idle roller solenoid (upper) pulls the pinch idle roller [6] away from the pinch feed roller [7] and the paper can fall between the pinch rollers.

The anti-static brush [8] removes static electricity from the sheet.

When the fold timing sensor [9] detects the trailing edge of the sheet, it energizes the pinch idle roller solenoid (lower). This pushes the pinch idle roller [6] against the opposite pinch feed roller [7].

The lower stopper [10] stops the sheet and buckles it slightly toward the nip [11] of the 1st and 2nd fold rollers.



The pinch feed roller [1] turns and feeds the sheet down against the lower stopper [2]

At the correct time, the fold roller motor switches on and turns the:

- 1st fold roller [3]
- 2nd fold roller [4]
- 3rd fold roller [5]

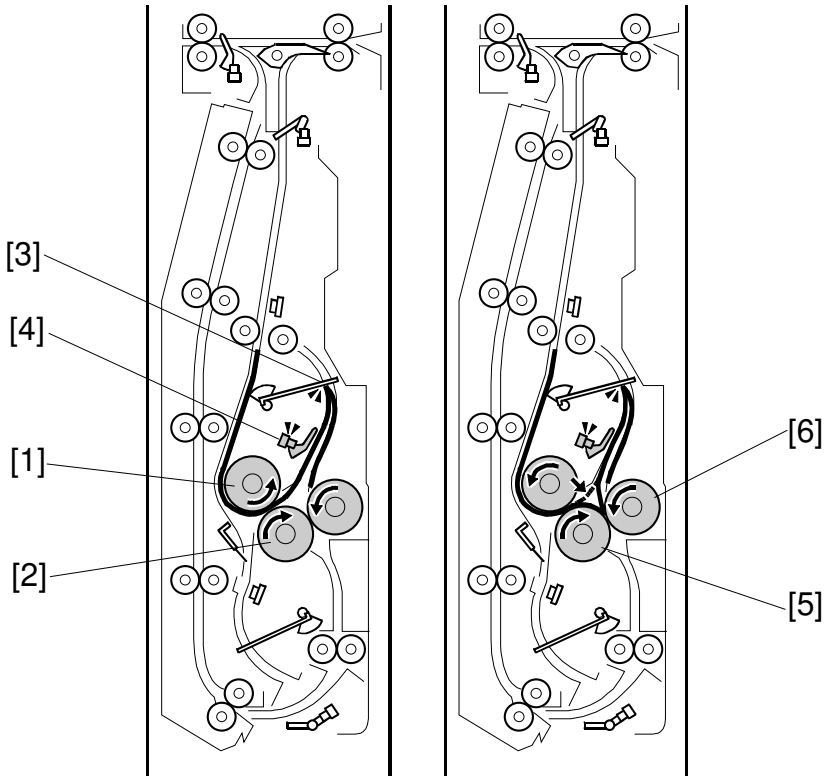
The sheet continues to buckle until it feeds into the nip [6] of the 1st and 2nd fold rollers. These two rollers fold the sheet.

The leading edge sensor [7] detects the leading edge of the sheet:

- When the leading edge goes by while the paper feeds down (to the lower stopper).
- When the leading edge goes by again while the paper feeds up into the nip of the 1st and 2nd fold rollers.

If the leading edge sensor does not detect the leading edge at the correct time, this sensor signals a jam.

At the correct time, the pinch idle roller [8] is pulled away from the pinch feed roller [9] by the pinch idle roller solenoid (upper).



B660D203.WMF

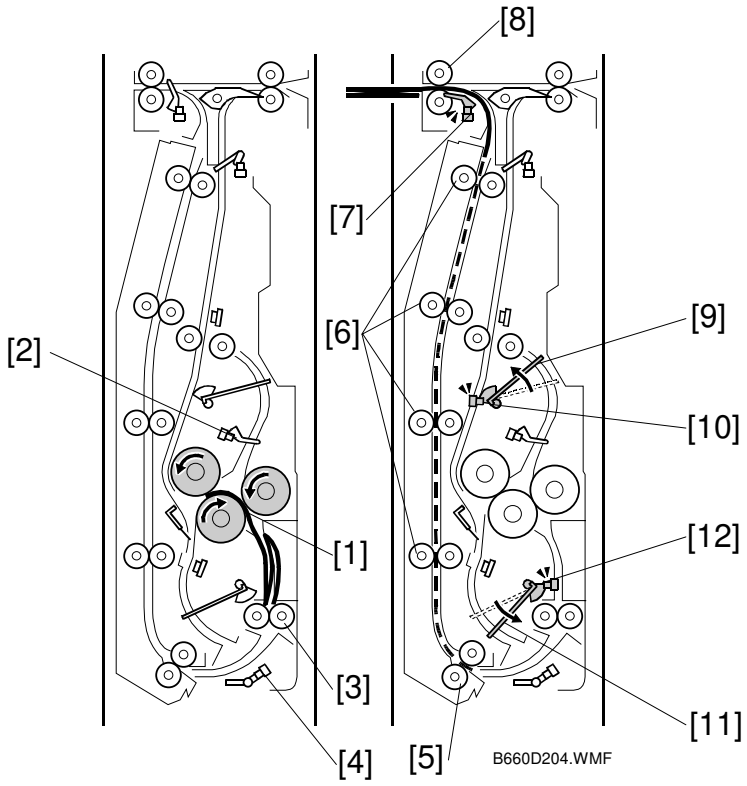
The 1st fold roller [1] and 2nd fold roller [2] continue to turn. This feeds the edge of the 1st fold up until it hits the upper stopper [3].

The sheet lifts the feeler of the upper stopper path sensor [4]. This sensor:

- Detects when the sheet comes to the upper stopper path.
- Detects when the sheet goes out of the upper stopper path.

The upper stopper sensor detects a jam if it does not detect that the sheet comes and goes at the correct times.

When the sheet feeds between the 1st and 2nd fold rollers, this pushes the first fold against the upper stopper. The sheet buckles down into the gap between the 2nd fold roller [5] and 3rd fold roller [6]. The second fold is made when the sheet feeds between the 2nd and 3rd feed rollers.



The 2nd and 3rd fold rollers [1] continue to turn and feed the sheet down.

The feeler of the upper stopper path sensor [2] falls and the sensor detects that the sheet is gone. The fold rollers feed the folded sheet to the lower exit rollers [3].

The lower exit sensor [4] detects the leading edge and trailing edge of the sheet. If the trailing edge is not detected during the correct time interval, the sensor detects a jam.

The grip rollers [5] feed the folded sheet to the four pairs of vertical feed rollers [6].

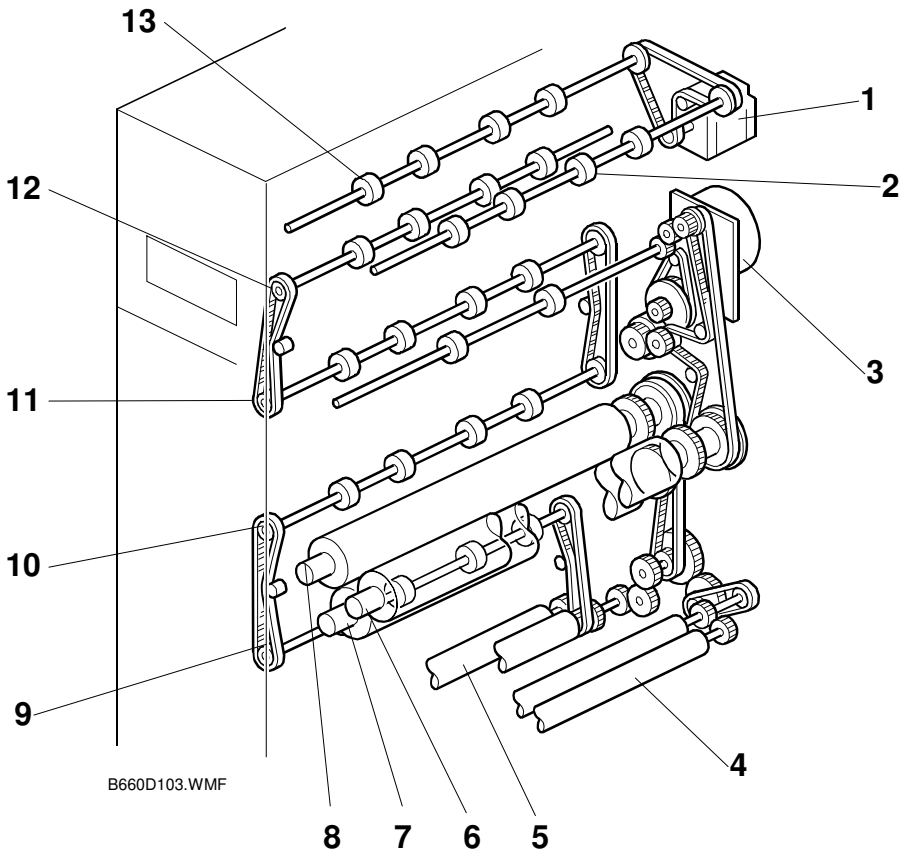
The upper exit sensor [7] detects the leading edge and trailing edge of each folded sheet. If the leading and trailing edge are not detected during the correct time interval, this sensor detects a jam.

The upper exit rollers [8] feed the folded sheet into the finisher.

At the correct time:

- The upper stopper motor lifts the upper stopper [9] until the upper stopper sensor [10] detects that the upper stopper is at its home position. This stops the motor.
- The lower stopper motor lowers the lower stopper [11] until the lower stopper sensor [12] detects that the lower stopper is at its home position. This stops the motor.

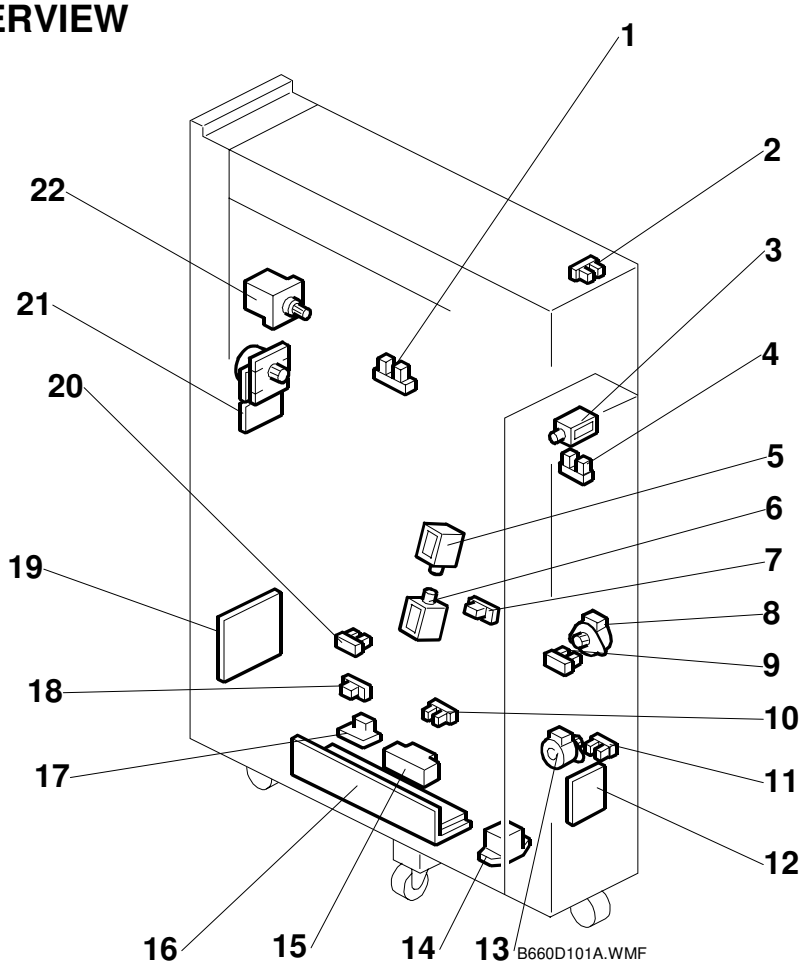
3.3 DRIVE LAYOUT



1. Feed Motor
2. Feed Rollers
3. Fold Roller Motor
4. Lower Exit Rollers
5. Grip Rollers
6. 3rd Fold Roller
7. 2nd Fold Roller
8. 1st Fold Roller
9. Vertical Feed Rollers – 1
10. Vertical Feed Rollers – 2
11. Vertical Feed Rollers – 3
12. Vertical Feed Rollers – 4
13. Upper Exit Rollers

3.4 ELECTRICAL COMPONENTS

3.4.1 OVERVIEW



1. Upper Exit Sensor
2. Front Door Sensor
3. Junction Gate Solenoid
4. Feed Sensor
5. Pinch Idle Roller Solenoid – Upper
6. Pinch Idle Roller Solenoid – Lower
7. Fold Timing Sensor
8. Upper Stopper Motor
9. Upper Stopper HP Sensor
10. Lower Exit Sensor
11. Lower Stopper HP Sensor
12. DC Relay Board
13. Lower Stopper Motor
14. Relay
15. Breaker
16. Power Supply Unit
17. Surge Protector Board
18. Leading Edge Sensor
19. Main Control Board
20. Upper Stopper Path Sensor
21. Fold Roller Motor
22. Feed Motor

3.4.2 ELECTRICAL COMPONENT SUMMARY

Motors		
No.	**Name**	**Description**
M1	Feed Motor	Drives the feed rollers and exit rollers of the Z-folding unit.
M2	Fold Roller Motor	Drives the 1st, 2nd, and 3rd fold rollers.
M3	Lower Stopper Motor	Raises and lowers the lower stopper. It 1) Raises the upper stopper to the proper position for the size of the paper selected for the job, and 2) Lowers the lower stopper until the lower stopper sensor detects that the lower stopper is at its home position where it remains until the start of the next job.
M4	Upper Stopper Motor	Lowers and raises the upper stopper. It 1) Lowers the upper stopper to the proper position for the size of the paper selected for the job, and 2) Raises the upper stopper until the upper stopper sensor detects that the upper stopper is at its home position where it remains until the start of the next job.

PCBs		
No.	**Name**	**Description**
PCB1	Main Control Board	Controls the operation of the Z-folding unit.
PCB2	PSU	Supplies the dc power for the Z-folding unit.
PCB3	Surge Protector Board	AC input and breaker relay board.
PCB4	DC Relay Board	PSU DC output and DC motors and sensor relay board.

Sensors		
No.	**Name**	**Description**
S1	Feed Sensor	Detects the leading edge and trailing edge of the sheet at the top of the paper path before Z-Folding. When the feed sensor detects the leading edge, it energizes the pinch idle roller solenoid. The solenoid pulls the pinch idle roller away from the pinch feed roller so the paper can fall below these opposing rollers.
S2	Fold Timing Sensor	(1) Detects the leading edge of the sheet and energizes the pinch idle roller solenoid (upper) to pull the pinch idle roller away from the pinch feed roller so the sheet falls through the gap between these rollers. (2) Detects the trailing edge of the sheet and energizes the pinch idle roller solenoid (lower) to push the pinch idle roller against the pinch feed roller.
S3	Front Door Sensor	Detects when the top cover of the Z-folding unit is closed and signals an alert that the cover is open. The unit cannot be used until this cover is closed.
S4	Leading Edge Sensor	Mounted above the lower stopper. The leading edge sensor 1) detects the leading edge of the sheet when drops onto the lower stopper, 2) detects the leading edge again when the paper is pulled up into the nip of the 1st and 2nd fold rollers. If the leading edge sensor does not detect the edge at the prescribed times, it will signal an error.
S5	Lower Exit Sensor	Mounted below the lower exit rollers. Detects the leading/trailing edges of the folded sheet as it passes below. If these edges do not pass at the times prescribed for the selected paper size, the sensor will signal a jam alert.
S6	Lower Stopper HP Sensor	Detects the lower stopper when it reaches its home position and turns off the lower stopper motor.
S7	Upper Exit Sensor	1) Detects the leading/trailing edges of each sheet unfolded sheet after it passes over the closed junction gate, 2) Detects the leading/trailing edge of each folded sheet as it leaves the vertical feed path below. If the edges do not go by for the time prescribed for the paper size, the sensor will send a jam alert.
S8	Upper Stopper HP	Detects the upper stopper when it reaches its home position and

Sensors		
No.	**Name**	**Description**
	Sensor	turns off the upper stopper motor.
S9	Upper Stopper Path Sensor	Mounted below the upper stopper. 1) When the feeler of the upper stopper path sensor detects the paper when the crease of the first fold stops at the upper stopper, it delays long enough so the 1st/2nd feed rollers can continue to rotate and buckle the trailing edge of the paper below at the nip of the 2nd/3rd feed rollers, then the sensor switches off the 1st/2nd feed rollers and switches on the 2nd/3rd feed roller pair. The 2nd/3rd feed rollers pull the buckle into the nip and create the 2nd crease. 2) Detects the paper when it leaves the upper stopper path and signals an error if the paper does not leave at the prescribed time.

Solenoids		
No.	**Name**	**Description**
SOL1	Junction Gate Solenoid	Opens and closes the junction gate solenoid. When not energized, the junction gate remains closed and paper passes over the back of the closed junction gate and through the Z-folding unit. When energized it opens the junction gate which guides paper down and into the paper path of the Z-folding unit.
SOL2	Pinch Idle Roller Solenoid (Lower)	Attached to the pinch idle roller, this solenoid pushes the pinch idle roller and closes the gap between the pinch idle/pinch feed rollers when the fold timing sensor at the above the pinch idle roller detects the trailing edge of the sheet so the rollers can pinch and stop the paper in the paper path.
SOL3	Pinch Idle Roller Solenoid (Upper)	Attached to the pinch idle roller, this solenoid pulls the pinch idle roller away from the pinch feed roller when the feed sensor at the top of the Z-fold paper path detects the leading edge of the sheet so the paper can drop between these opposing rollers.

Switches		
No.	**Name**	**Description**
SW1	Breaker	Opens and breaks the power circuit if the Z-folding unit overheats.

Relays		
No.	**Name**	**Description**
RA1	Relay	Switch relay