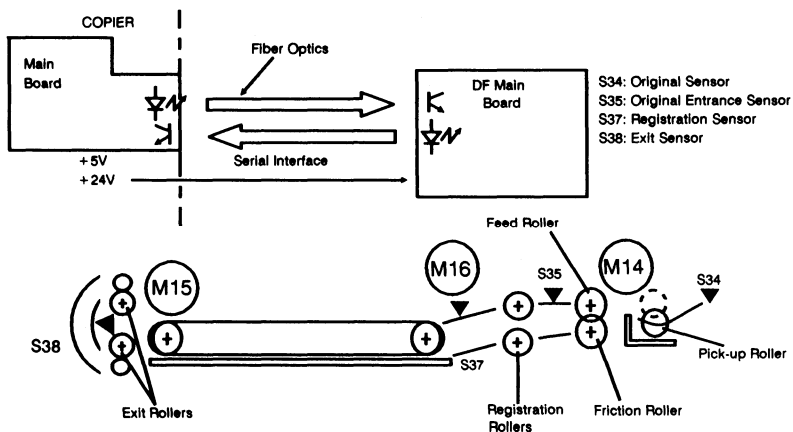


1. SPECIFICATIONS

Original Size:	ADF mode Maximum A3 (11" x 17") Minimum A5 (5½" x 8½") SADF mode Max A3 (11" x 17") Min B6 (5½" x 8½") lengthwise
Original Weight:	Maximum 130 grams (34 lb) Minimum 40 grams (11 lb)
Original Feed Modes:	Automatic Feed (ADF mode) Manual Feed one by one (SADF mode)
Original Capacity:	Maximum 50 sheets (80 gram, 20 lb)
Original Separation:	FFR system
Original Transportation:	One flat belt
Original Stop System:	DC servomotor control system
Copying Speed:	50 cpm continuous copy 25 cpm single copy
Power Source:	+24 volts and +5 volts (from copier)
Power Consumption:	20 Watts
ARDF Dimensions: (W x D x H)	976 x 522 x 104 (millimeters) 38.4 x 20.6 x 4.1 (inches)
ARDF Weight:	12 kg (26.41 lb)

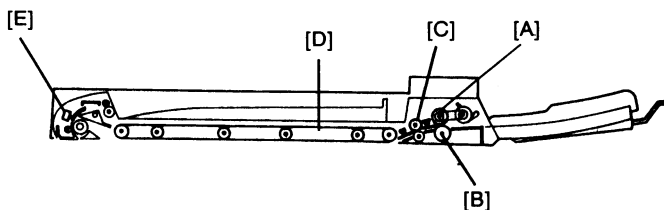
2. BASIC OPERATION

2.1 INTERFACE



The DF has its own CPU which controls all of the DF functions. The DF CPU communicates with the copier through an interface board and serial interface bus. Fiber optics are used for the serial interface bus because they are unaffected by electrical noise.

2.2 SINGLE-SIDED ORIGINAL FEED



- Feed-in -

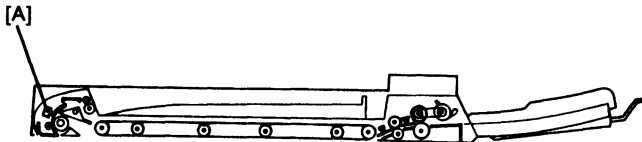
The DF CPU energizes the stopper and pick-up solenoids, and then turns on the feed-in motor. The feed [A] and friction rollers [B] separate and feed an original to the registration rollers [C].

A short time after the original reaches the registration rollers, the DF CPU turns on the belt motor and energizes the registration solenoid. Original skew is corrected by the time lag. The belt [D] then feeds the original to the exposure glass, while the CPU counts the pulses of the belt motor encoder. At the proper time, the CPU stops the belt motor.

- Feed-out -

When the DF CPU receives the feed-out signal from the copier, it turns on the feed-out motor. When the exit sensor [E] is deactuated by the trailing edge of the original, the CPU reduces the speed of the feed-out motor to feed the original out completely. This stacks the originals neatly.

2.3 TWO-SIDED ORIGINAL FEED



- Feed-in -

The operation in this mode is exactly the same as that in the single-sided original feed mode until the registration solenoid turns on. The original is then inverted in order to copy the reverse side of the original first. The reverse side is copied first to stack the copies in the correct order.

- Inversion -

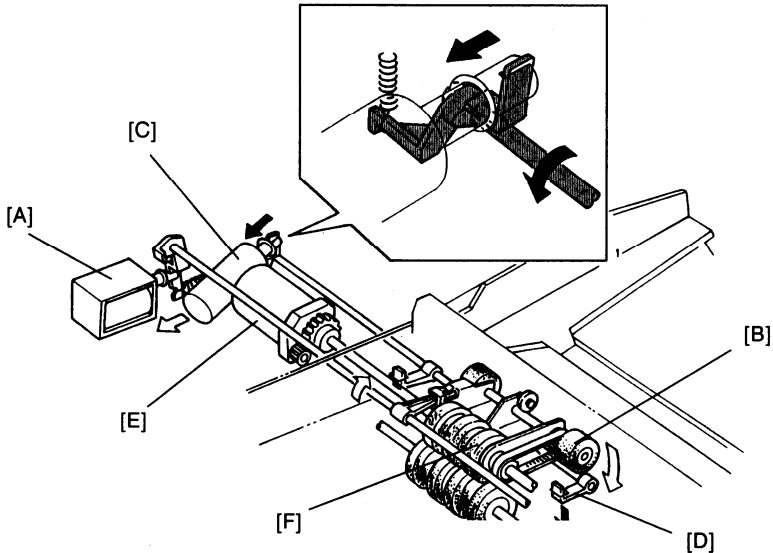
To invert the original, the CPU turns on the belt drive motor, turns on the feed-out motor, and energizes the inverter gate solenoid. The belt drive motor reverses 75 milliseconds after the leading edge of the original passes the exit sensor [A], but the feed-out motor continues driving the original forward.

The belt drive motor turns off 532 pulses after the trailing edge of the original passes the exit sensor. This ensures that the original stops at the correct position.

- Feed-out -

The basic operation in this mode is exactly the same as that in the single-sided original feed mode.

3. FEED-IN UNIT MECHANISM

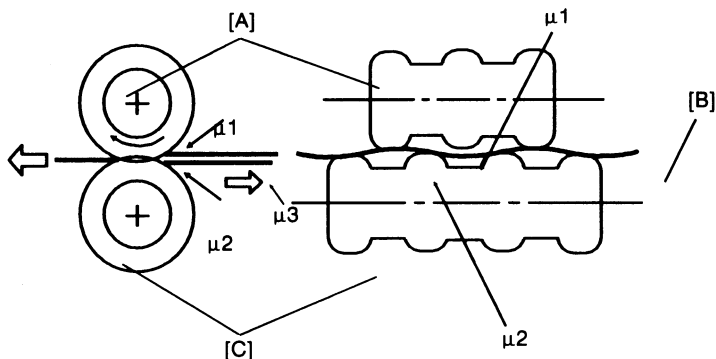


After an original is inserted into the feed-in unit and the Start key is pressed, the DF CPU energizes the pick-up solenoid [A]. This causes the pick-up roller [B] to drop onto the original(s). At the same time, the DF CPU energizes the original stopper solenoid [C] to retract the stopper claws [D].

In ADF mode, the original stopper claws stay underneath the original feed table until all the originals have been fed in. In SADF mode, the stopper claws rise for each original.

The DF CPU turns on the feed-in motor [E] 200 ms after energizing the solenoids. This starts turning the feed rollers [F] and the pick-up rollers.

4. SEPARATION MECHANISM



μ_1 - Coefficient of friction between the feed rollers [A] and the original [B].

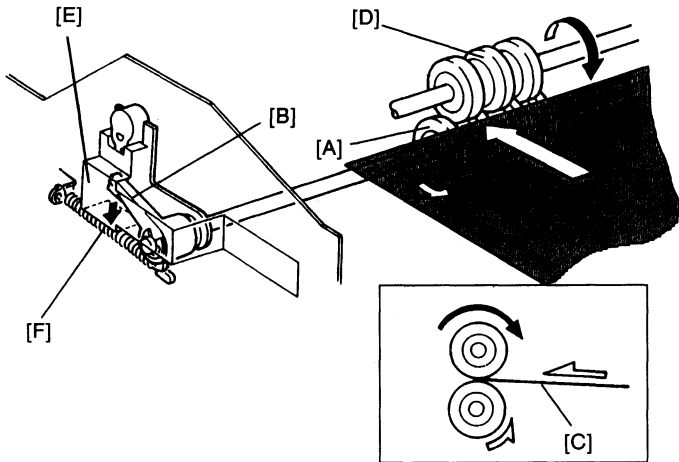
μ_2 - Coefficient of friction between the friction rollers [C] and the original.

μ_3 - Coefficient of friction between originals.

This model uses an FFR (Feed and Friction Roller) original feed system with three sets of rollers (feed, friction and pick-up rollers). The feed and friction rollers have grooves in them which interlock with one another. The rollers interlock to decrease damage to the originals (particularly pencil written originals) from direct roller-to-roller pressure.

The pick-up roller sometimes sends more than one original to the feed and friction rollers. When this happens, the friction rollers strip the extra original from the top original. m_1 is greater than m_3 and m_2 is greater than m_3 . Therefore, the top original will slide past the friction rollers while lower originals stop.

5. MISFEED PREVENTION

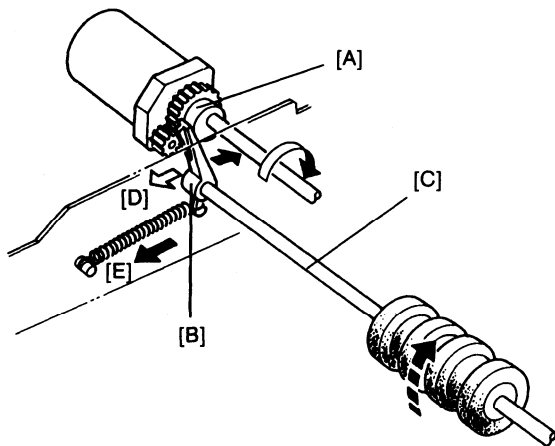


The front side of the friction roller [A] is attached to the misfeed prevention lever [B] via a one-way clutch.

When the leading edge of an original [C] first contacts the feed [D] and friction rollers, the friction roller is stationary. As the leading edge is fed between these rollers, the friction roller rotates counterclockwise a few degrees to help feed thick originals. After the friction roller has rotated a few degrees, the misfeed prevention lever contacts the stopper plate [E] and the friction roller stops rotating. At this point, the separation mechanism will eliminate double feed.

When the trailing edge of the original passes the friction roller, the spring [F] returns the lever to its original position without rotating the friction roller shaft.

6. WEAR PREVENTION

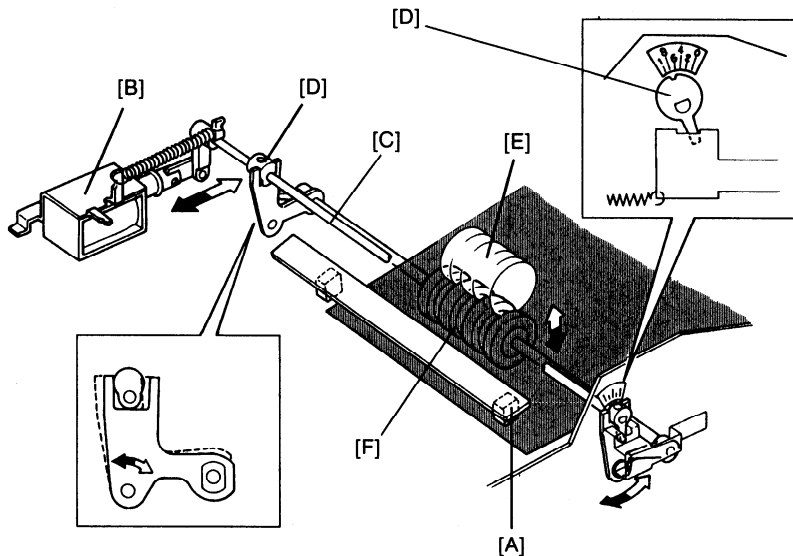


The rear side of the feed roller shaft drive gear has an eccentric cam [A]. This cam contacts the wear prevention lever [B] which is attached via a one-way clutch to the friction roller shaft [C]. This lever is free to rotate in the direction of the white arrow [D].

As the feed roller drive gear rotates, the high point of the cam pushes back the wear prevention lever in the direction of arrow [D]. As the cam rotates to the low point, a spring returns the wear prevention lever to its original position (black arrow [E]). When the wear prevention lever returns, it rotates the friction roller shaft through the one-way clutch.

Every time the feed roller shaft rotates once, the friction roller shaft rotates a few degrees. This prevents the friction roller from wearing unevenly or too quickly.

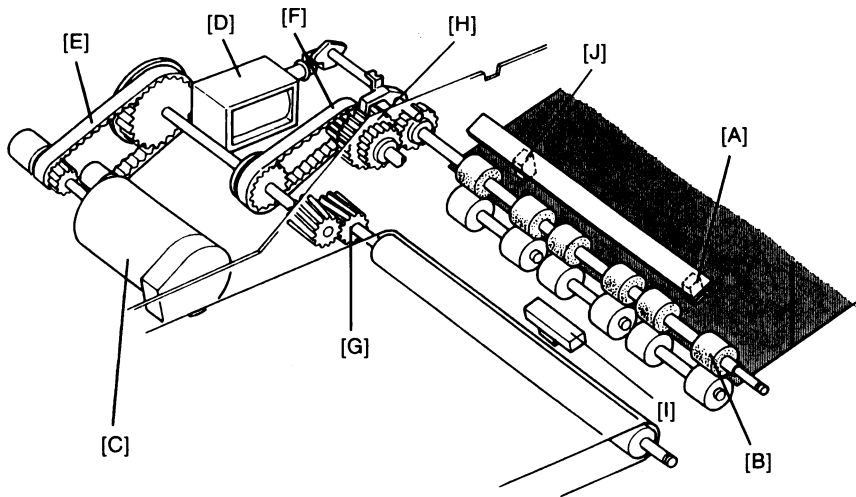
7. FRICTION ROLLER RELEASE MECHANISM



In the ADF mode, when the original activates the original entrance sensor [A], the DF CPU energizes the roller release solenoid [B]. This action rotates the roller release cam shaft [C], which has an eccentric cam [D] on each end, to decrease the overlap of the feed [E] and friction rollers [F]. This prevents smearing of the originals due to the friction roller. The overlap is 0.9 mm when the solenoid is off, and 0.4 mm when it is on.

In the SADF mode, it is not necessary to separate the originals, so the DF CPU energizes the roller release solenoid and releases the friction roller before feeding the original.

8. REGISTRATION



NOTE: In the following discussion, ADF timing is in parentheses.

The DF CPU stops the feed-in motor 25 milliseconds after the leading edge of the original activates the original entrance sensor [A]. The forward momentum of the original causes it to align against the registration roller [B] (skew correction).

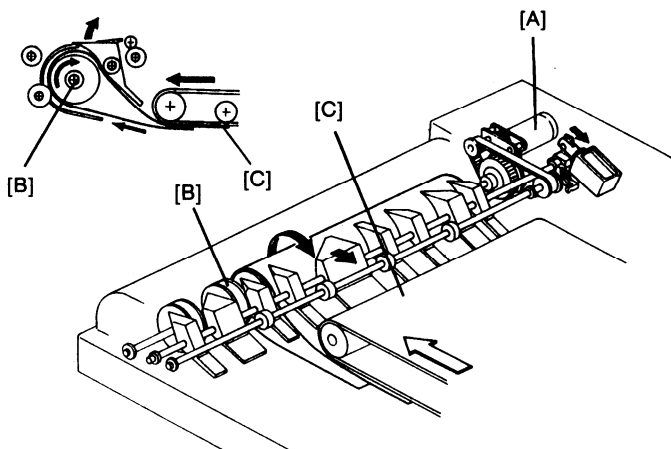
After a further 30 milliseconds, the DF CPU energizes the belt drive motor [C] and the registration solenoid [D]. Rotation of the belt drive motor is transmitted via the timing belts [E and F], belt drive gear [G], registration clutch [H], and registration roller gear.

The DF CPU starts counting the belt motor pulses when the leading edge of the original activates the registration sensor [I]. When the pulse count reaches 1,844 pulses, the original is at the proper position. The DF CPU then stops the belt drive motor.

In Auto P.S. or Auto R/E mode the ADF automatically determines the original size. The original size is measured by a combination of the original width sensor [J] and the registration sensor. The registration sensor measures the length of the original by counting pulses as the original passes under it.

The registration sensor is also a jam detector.

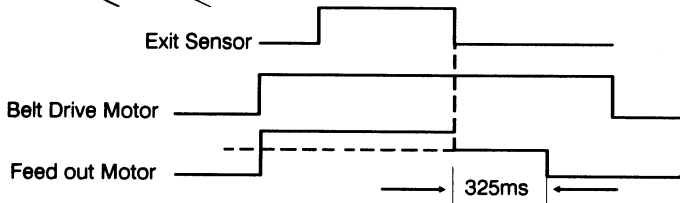
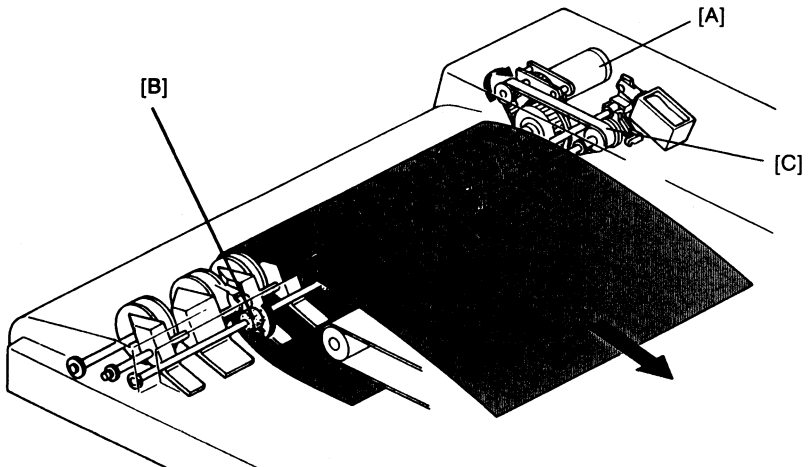
9. INVERTER MECHANISM



In the two-sided original mode, the belt drive motor reverses 75 milliseconds after the leading edge of the original passes the exit sensor; however, the feed-out motor [A] continues to turn forward. Since the friction between the turn roller [B] and the original is greater than the friction between the DF belt [C] and the original, the original continues to move forward through the inverter mechanism.

The belt drive motor and the feed-out motor turn off 532 pulses after the trailing edge of the original passes the exit sensor. This aligns the trailing edge of the original with the original scale.

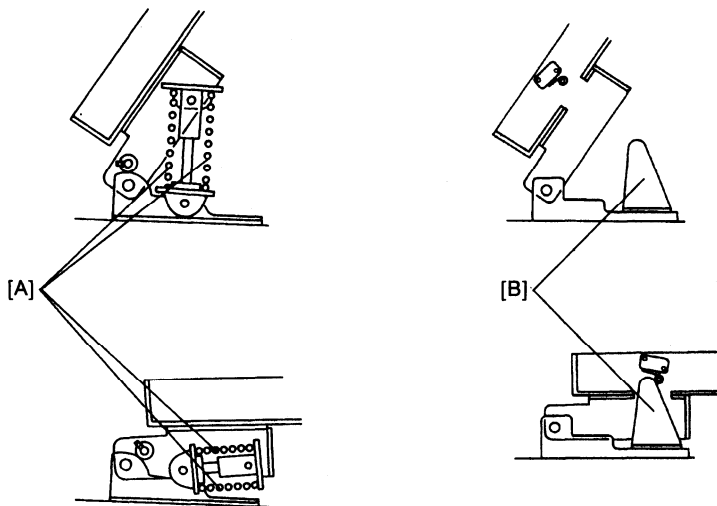
10. FEED-OUT MECHANISM



When the DF CPU receives the feed-out signal, it energizes the belt drive and feed-out [A] motors. The feed-out motor drives the exit rollers [B] through the timing belt [C].

The DF CPU slows down the feed-out motor when the trailing edge of the original passes the exit sensor. The feed-out motor continues to turn at this slower speed to feed the original to the original stacker. This slow-down exit function produces a neat stack of originals.

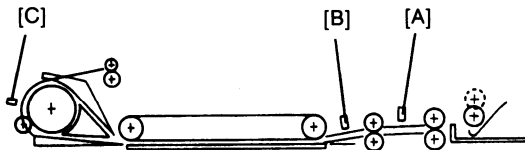
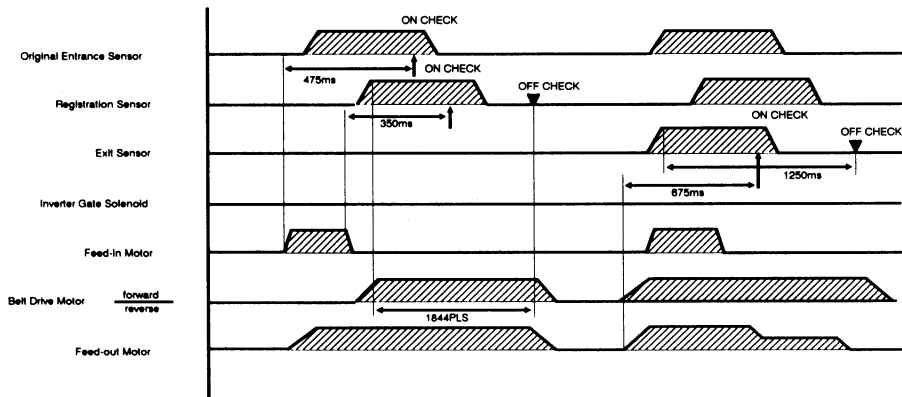
11. LIFT MECHANISM



The lift spring [A] resists the weight of the belt unit, making it easier to lift the belt unit.

When the belt unit is lifted, the detent arm [6] turns on the lift switch. At the same time, the DF CPU sends a signal to the copier CPU. This signal enables the copier to operate without the document feeder. While the lift switch is on, the DF modes are prohibited.

12. MISFEED CHECK



During single-sided mode, three sensors check for misfeeds: the original entrance sensor [A], registration sensor [B], and exit sensor [C]. After the feed-in motor turns on, the original activates the original entrance sensor. The DF CPU checks to see if the original entrance sensor has been activated (original entrance sensor ON check) 475 ms after the feed-in motor turns on. Then, 350 ms after the original entrance sensor is activated, the DF CPU checks to see if the registration sensor has been activated (registration sensor ON check).

The OFF check is carried out when the belt drive motor turns off. The DF CPU checks to see if the registration sensor has been deactivated (registration sensor OFF check). There is no off check for the original entrance sensor.

The ON check for the exit sensor is performed 675 milliseconds after the feed-out and belt drive motors are re-energized. The OFF check for the exit sensor is performed 1,250 ms after the exit sensor is activated.

During two-sided original mode, three sensors detect misfeeds. The ON checks for the original entrance sensor and the registration sensor are the same as when in single-sided mode.

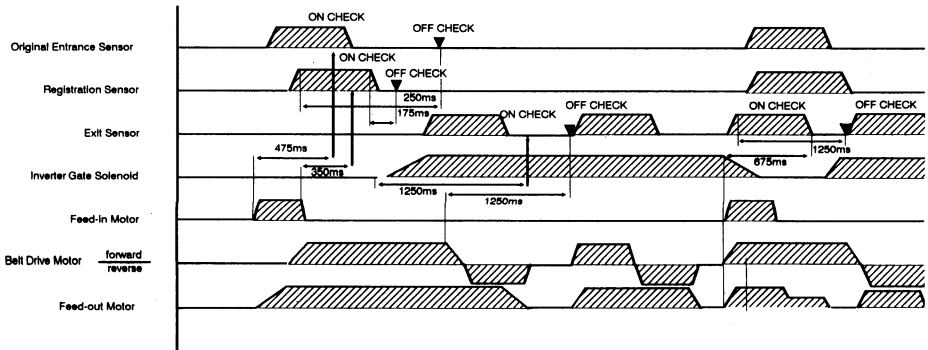
The DF CPU checks if the original entrance sensor has been deactivated 1,250 milliseconds after the registration sensor is activated (original sensor OFF check).

The DF CPU checks if the registration sensor has been deactivated 175 milliseconds after the original entrance sensor is deactivated.

When the original is inverted for the first time, the ON check for the exit sensor is 1,250 milliseconds after the inverter gate solenoid turns on. The OFF check for the exit sensor is 1,250 milliseconds after the belt drive motor reverses.

When the original is fed out, the OFF check and ON check for the exit sensor are the same as in the single-sided mode.

When a misfeed is detected, the DF CPU stops the DF and sends a misfeed signal to the copier. The misfeed condition is cancelled by deactivating the lift switch.



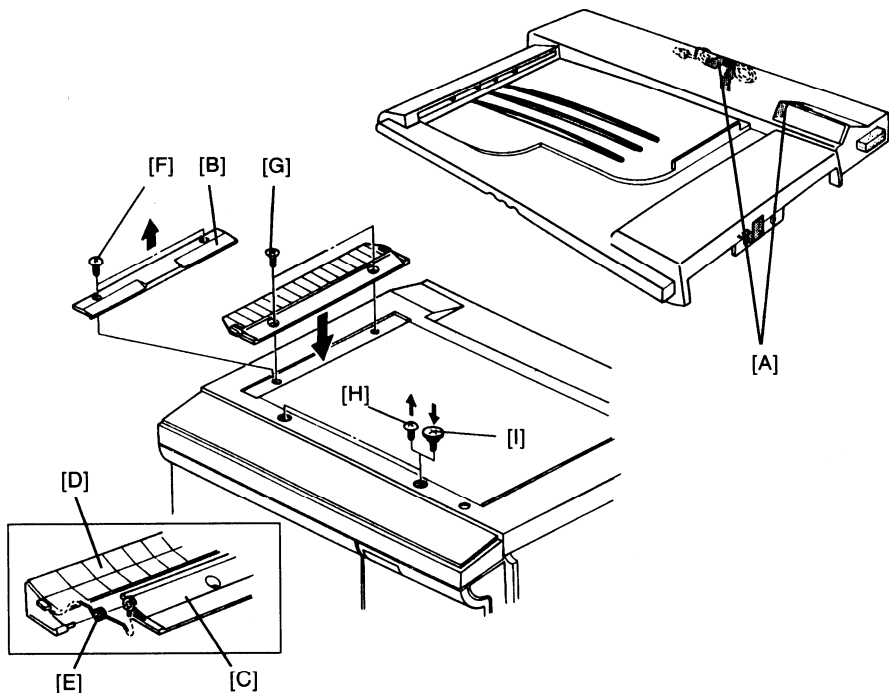
13. INSTALLATION (FT5540/5550/5570. FT5580/5590/6620)

13.1 Accessory Check

Check the quantity and condition of the accessories in the box according to the following list:

1. Original Exit Guide	1
2. Flip Scale	1
3. Flip Scale Spring	1
4. Original Table	1
5. Original Table Cover	1
6. Nylon Harness Bushing	1
7. Harness Bracket	1
8. Nylon Clamp N7	1
9. Lift Switch Actuator Plate	1
10. Test Chart A4	1
11. Toothed Washer	1
12. Ground Screw M4 x 8	1
13. Flathead Shoulder Screw M4 x 8 (Magnet Catch)	2
14. Flathead screw M4 x 6	2
15. Pan Head Screw M4 x 6	8
16. Pan Head Screw with Washer M4 x 10	2
17. Pan Head Screw M4 x 10	3
18. Flathead Screw M4 x 12	1
19. Tapping Screw M4 x 8	1
20. Multiple Language Decal (220/240V Only)	1
21. NECR	1
22. Envelope - NECR (115V Only)	1
23. ARDF Fixing Plate (Not used for this installation)	1
24. Pan Head Screw M5 x 8 (Not used for this installation)	4

13.2 Installation Procedure



1. Remove all the external strips of tape [A].
2. Turn off the main switch of the copier, and exchange the following parts:

Remove

Left Scale [B]

Pan Head Screw - M4 x 6 [F]

Pan Head Screw - M4 x 8 [H]

Install

Exit Guide [C]

Flip Scale [D]

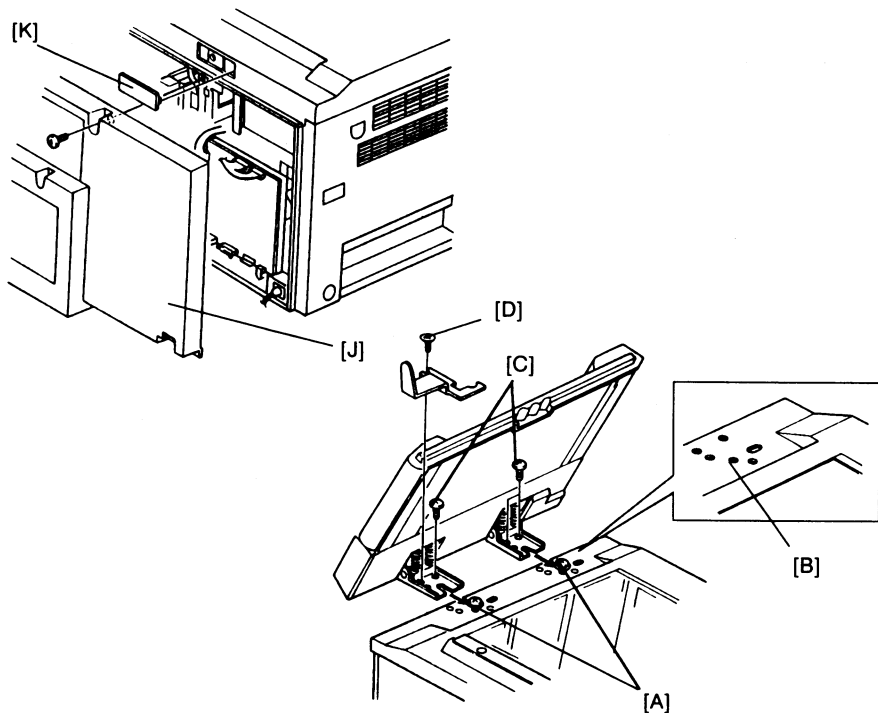
Flip Scale Spring [E]

2 Flathead Screw - M4 x 6 [G]

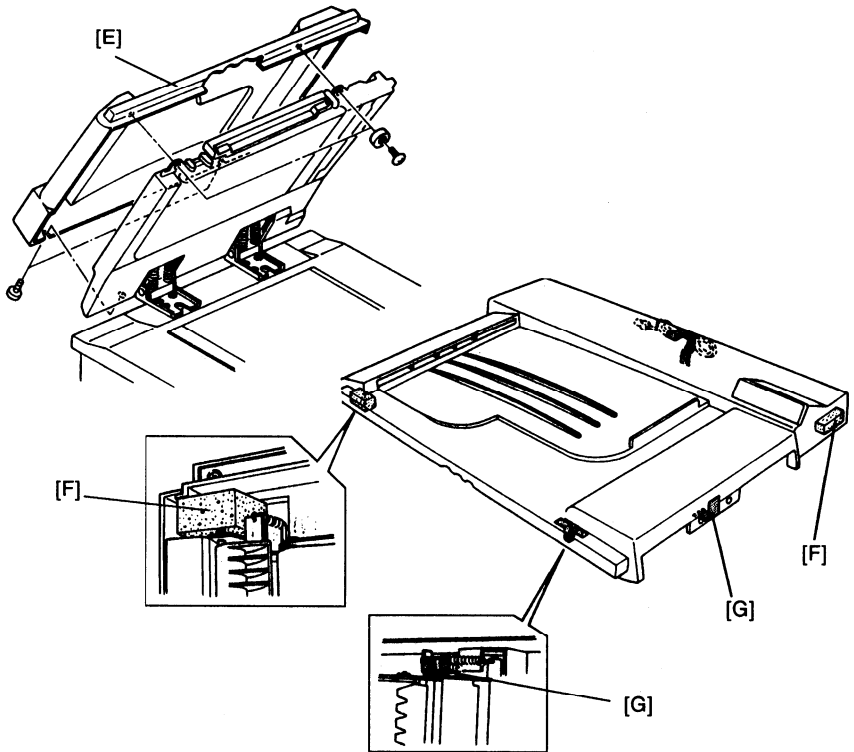
2 Flathead

Screw - M4 x 8 [I]

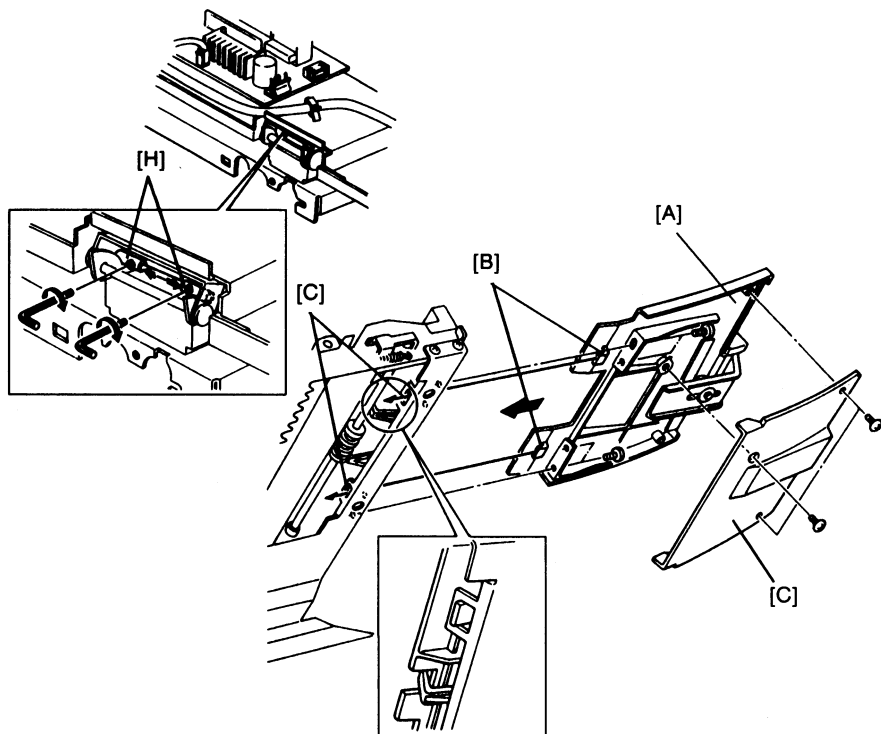
NOTE: If the platen cover has been mounted on the machine, remove the platen cover and the two stud screws.



3. Remove the copier rear cover [J] (2 screws) and the plastic cap [K].
4. Temporarily secure the two screws [A] (pan head screws with washer M4 x 10) in the holes [B] on the upper cover, and install the DF. Then, secure it with the lift switch actuator plate (3 pan head screws - M4 x 10 [C], 1 flat head screw - M4 x 10 [D]).



5. Remove the DF cover [E] (4 screws), and remove the shipping retainers (2 foam pads [F], 2 strips of tape [G]).

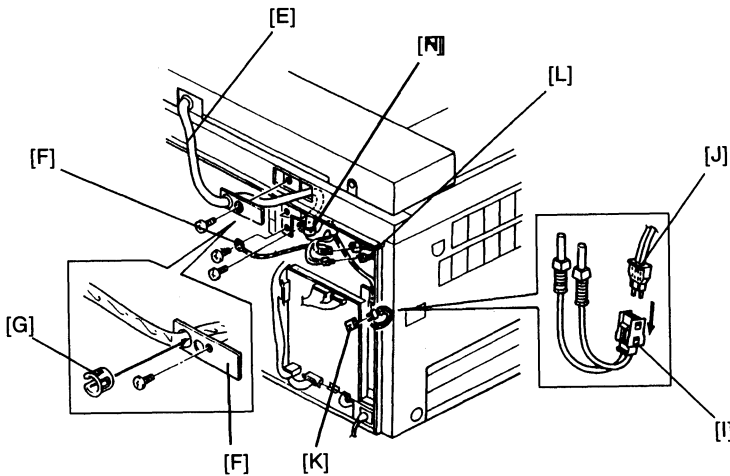


6. Move the DF stoppers [H] to the ends as shown and tighten the Allen screws.

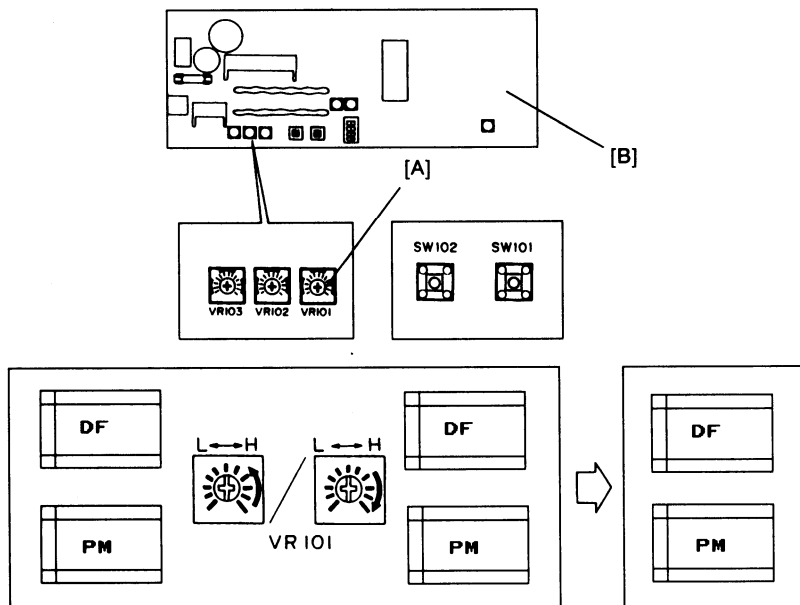
CAUTION: When the DF cover is removed, the DF unit tends to fly up easily.

7. Install the original feed table [A] on the right side of the belt unit (4 pan head screws - M4 x 6). (Be sure to engage the 2 hooks [B] of the original table with the docking holes [C] of the belt unit.)

8. Install the original table cover [D] under the original table (3 pan head screws - M4 x 6).



9. Pass the DF interface harness [E] through the hole in the harness bracket [F], and install the harness bushing [G]. Then, secure the harness bracket to the copier (1 tapping screw - M4 x 8).
10. Remove the fiber optics adapter [I] (not needed for this installation), and connect the optic cable [J] to CN112 [K] on the copier main board.
11. Connect the free connector (4P White [L]).
12. Secure the ground wire [M] (1 ground screw and toothed washer).
13. Secure the harnesses with a clamp [N] (1 pan head screw - M4 x 6), and reinstall the rear cover.



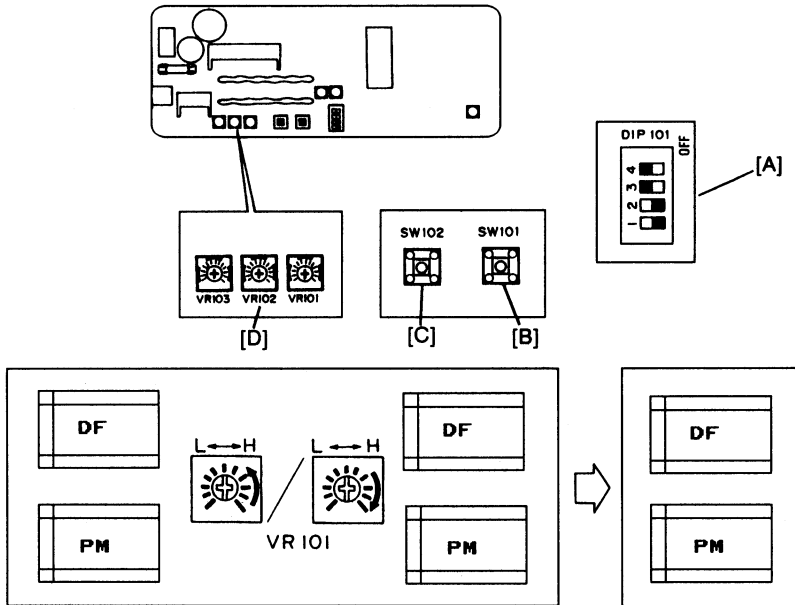
14. Turn on the copier main switch, and set SP 72-1 to enable ARDF operation. (Refer to the copier installation procedure for information on how to access a service program.)

15. Adjust the lead edge registration as follows:

- a) In platen mode, use the flip scale to make a copy of the test chart.
- b) Keep this copy for reference and mark "PM" (Platen Mode) on the reverse side of it.

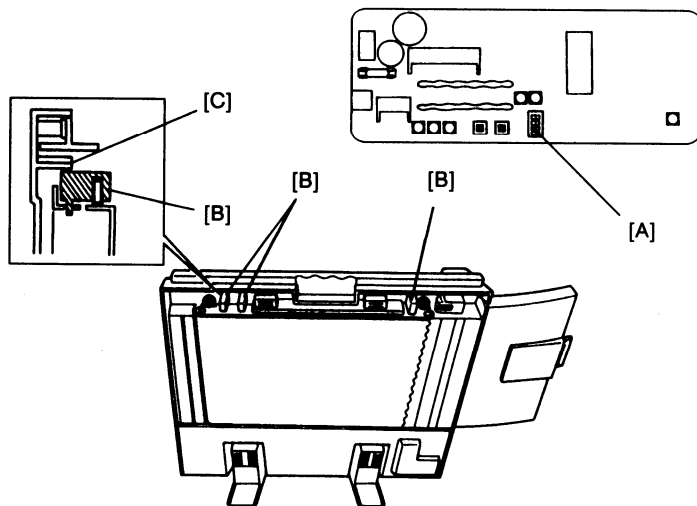
(Front Side Original)

- c) Use the DF to make a copy of the test chart.
- d) Adjust the DF registration against the platen reference mode ("PM") using VR 101 [A] on the DF PCB [B].
 PM > DF: Turn VR 101 counterclockwise
 PM < DF: Turn VR 101 clockwise
- e) Continue to repeat steps "c)" and "d)" until you achieve the same registration as in step "b)".



(Reverse Side Original)

- f) Turn off the copier main switch and set DIP SW 101 [A] on the DF main PCB as follows:
 ON: 101-3, 4
 OFF: 101-1, 2
- g) Turn on the copier main switch, and set the test chart face up and with the leading edge to the right on the feed-in table.)
- h) Press switch 101 [B] on the DF main PCB twice.
- i) Press the Start key to make a copy, then press switch 102 [C] to feed out the test chart.
- j) Adjust the DF registration against the platen reference mode ("PM") by using VR-102 [D] on the DF main PCB.
 PM > DF: Turn VR 102 clockwise
 PM < DF: Turn VR 102 counterclockwise
- k) Continue to repeat steps "i)" and "j)" until you achieve the same registration as in step "b)".



16. Turn off the copier main switch and all the switches of the DIP SW 101 [A] on the DF main PCB.

17. Reinstall all covers.

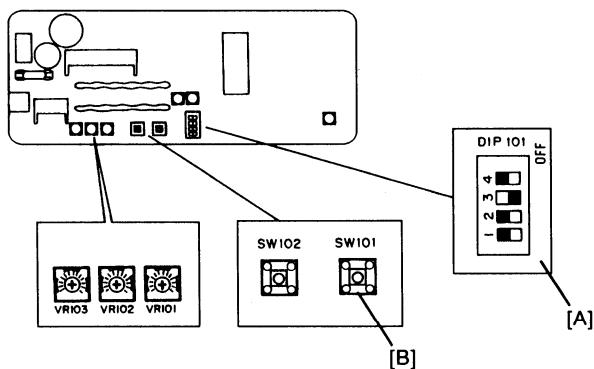
NOTE: When reinstalling the DF cover, ensure that the belt holders [B] do not ride on the ribs [C] of the DF cover.

18. Turn on the copier main switch, and check the operation of the DF and the copier system.

19. Fill out the New Equipment Condition Report.

14. REPLACEMENT AND ADJUSTMENT

14.1 DF Belt Drive Motor Speed Adjustment



NOTE: This adjustment should be done whenever the DF main board is replaced.

ADJUSTMENT STANDARD: $2,600 \pm 30$ rpm

1. Turn off the main switch.
2. Remove the DF cover (4 screws, 2 collars).
3. Lower the DF unit.
4. Turn on DIP SW 101-1, 2, and 4 [A].
5. Turn on the main switch.
 - The belt drive motor will start turning, and the left two digits of the motor speed will be displayed in the original counter.
 - Press SW 101 [B] on the DF main board to display the second two digits of the motor speed.

Example: Motor speed = 2,612 rpm

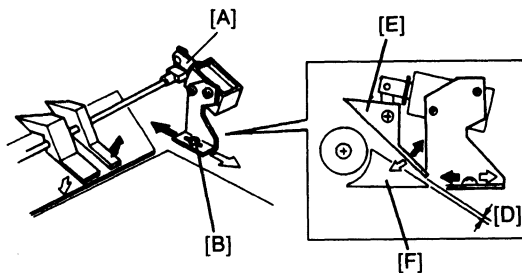
When SW 101 is not pressed, "26" is displayed.

When SW 101 is pressed, "12" is displayed.

6. Adjust the motor speed to 2,600 30 rpm by turning VR 103 on the DF main board.
7. Turn off the main switch, return DIP SW 101 to the normal position, and reassemble. (All switches are off.)

14.2 Inverter Turn Gate Solenoid Adjustment

Adjustment Standard: 1.5 ± 0.5 mm



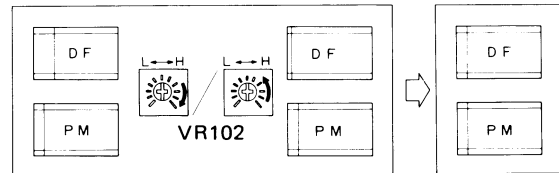
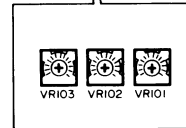
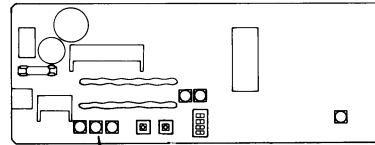
1. Remove the DF upper cover (4 screws).
2. Manually energize the inverter solenoid [A].
3. Loosen the screw [B] and adjust the position of the inverter solenoid to bring the gap [D] between the turn gate [E] and the guide plate [F] within the adjustment standard.
4. Tighten the screw and install the DF upper cover.

3. DF REGISTRATION

1. Turn on the copier main switch and adjust the lead edge registration as follows:

Front Side Original

- a) Make a copy using the test chart in the platen mode with the flip scale.
- b) Keep this copy for reference and mark PM (Platen Mode) on its reverse side.
- c) Make a copy using the test chart with the DF.
- d) Adjust the DF registration against the platen reference mode ("PM") by using VR102 on the ARDF main board [A].
 PM > DF: Turn VR102 counterclockwise
 PM < DF: Turn VR102 clockwise
- e) Continue to repeat steps 'c)' and 'd)' until you achieve the same registration as in step 'b)'.

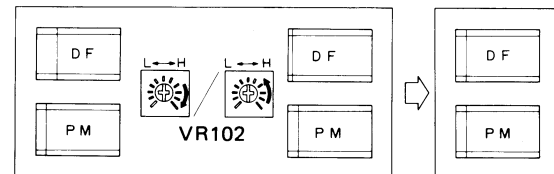
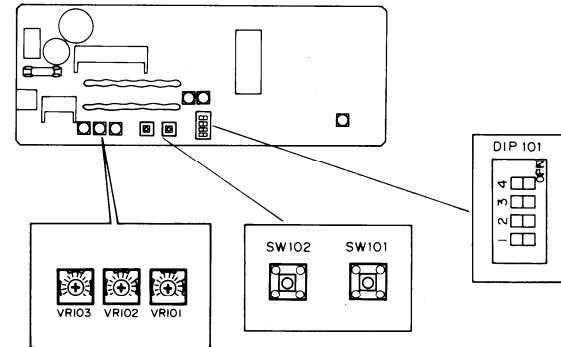


Reverse Side Original

- f) Turn off the copier main switch and set DIP SW 101 as follows:
 ON: 101-3, -4
 OFF: 101-1, -2
- g) Turn on the copier main switch and set the copier test chart on the original table of the ARDF.
- h) Press switch 101 on the ARDF main board twice.
- i) Press the Start key to make a copy; then, press switch 102 to feed out the test chart.
- j) Adjust the DF registration against the platen reference mode ("PM") by using VR-102 on the ARDF main board.

PM > DF: Turn VR 102 clockwise

PM < DF: Turn VR 102 counterclockwise

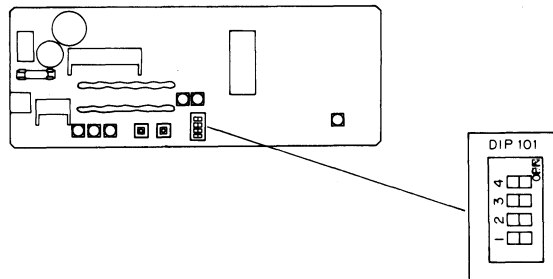


k) Continue to repeat steps 'i)' and 'j)' until you achieve the same registration as in step 'b)'.

2. Turn off the copier main switch and set DIP SW101 as follows:

ON: 101-1, -3

OFF: 101-2, -4



ARDF INSTALLATION (FT5560)

ACCESSORY CHECK

Check the quantity and condition of the accessories in the box according to the following list:

- | | |
|---------------------------------------|----|
| 1. Original Exit Guide | 1 |
| 2. Flathead screw M4 x 6 | 2 |
| 3. Flip Scale | 1 |
| 4. Flip Scale Spring | 1 |
| 5. Original Table | 1 |
| 6. Pan Head Screw M4 x 8 | 11 |
| 7. Original Table Cover | 1 |
| 8. Nylon Harness Bushing | 1 |
| 9. Harness Bracket | 1 |
| 10. Pan Head Screw M4 x 6 | 1 |
| 11. Nylon Clamp N7 | 1 |
| 12. Toothed Washer | 1 |
| 13. Ground Screw | 1 |
| 14. Lift Switch Actuator Plate | 1 |
| 15. Pan Head Screw With Washer M4 x 8 | 2 |

16. Flathead Screw M4 x 8	1
17. Flathead Shoulder Screw M4 x 8 (for magnetic latch)	2
18. Test Chart A4	1
19. NECR	1
20. Envelope - NECR (115V Only)	1
21. Multiple Language Decal (220/240V Only)	1
22. ARDF Fixing Plate	1
23. Pan Head Screw M5 x 8	4

INSTALLATION PROCEDURE

1. Remove all the external strips of tape [A].
2. Turn off the main switch of the copier, and remove the following parts.

Platen cover [B]

Mounting studs (2) [C]

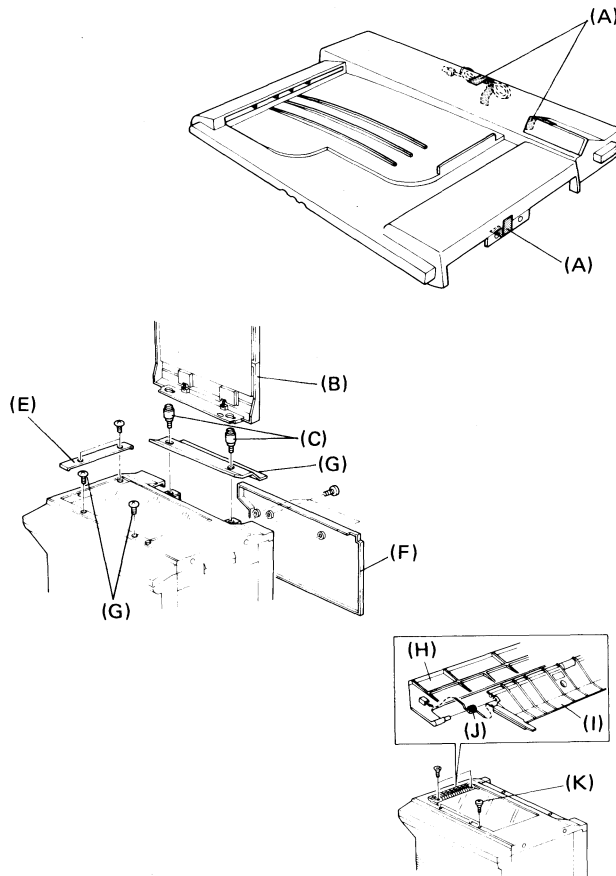
Truss screw [D]

Left scale (2 screws) [E]

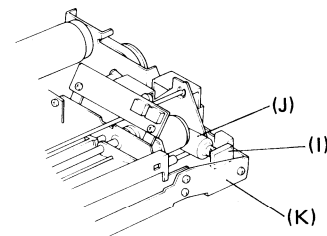
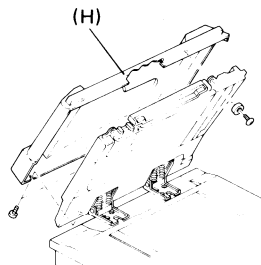
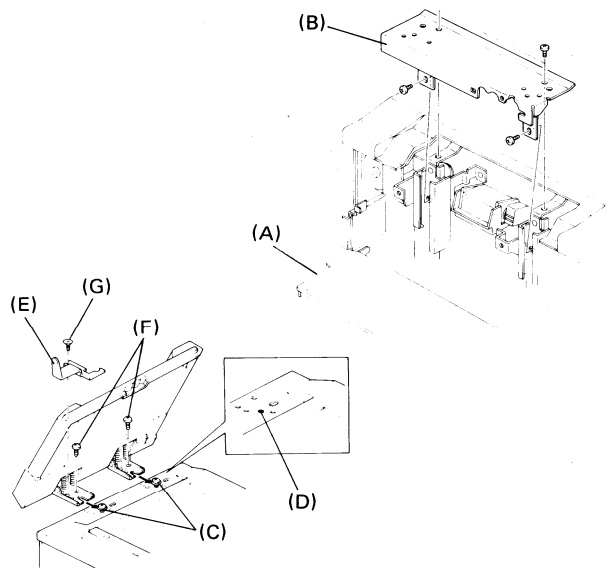
Rear cover (3 screws) [F]

Rear upper cover [G]

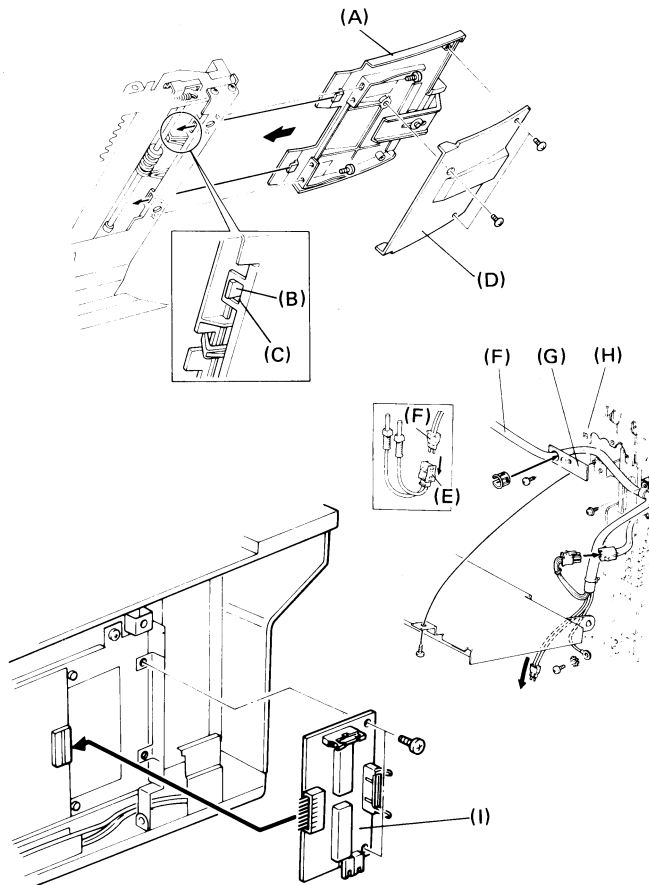
3. Mount the flip scale [H] on the original exit guide [I] (2 screws). Ensure that the flip-scale spring [J] is set correctly.
4. Secure the 2 flathead shoulder screws [K] as shown in the figure.



5. Lower the PCB plate [A] (2 screws).
6. Insert the ARDF fixing plate [B] into the DF mounting plate (4 screws - M5 x 8).
7. Temporarily secure the two screws [C] (pan head screws with washer M4 x 8) to the holes [D] on the ARDF fixing plate, and install the ARDF. Then, secure it with the lift switch actuator plate [E]. (3 pan head screws - M4 x 8 [F], 1 flat head screw - M4 x 8 [G])
8. Remove the ARDF cover [H] (4 screws), and remove the shipping cushion [I] from between the stopper solenoid [J] and the ARDF side plate [K].



9. Install the original feed table [A] on the right side of the belt unit (4 pan head screws - M4 x 8). (Be sure to engage the 2 hooks [B] of the original table with the docking holes [C] of the belt unit.)
10. Install the original table cover [D] under the original table (3 pan head screws - M4 x 8).
11. Remove the fiber optics adapter [E] from the ARDF interface harness [F].
12. Pass the ARDF interface harness through the hole in the harness bracket [G]. Then, secure the harness bracket to the ARDF fixing plate [H] (1 pan head screw - M4 x 6).
13. Install the interface board [I] (2 screws and 1 connector). (This is not necessary if a sorter or a duplex unit has already been installed on the system.)



14. Pass the fiber optics harness [A] from behind the PCB plate [B], being careful not to damage it. Connect the fiber optics adapter [C] to the fiber optics harness and connect the fiber optics harness to the interface board as follows:

CN806 -- Brown

CN807 -- Black

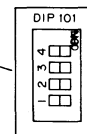
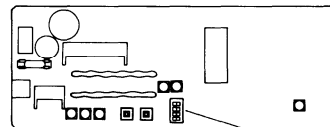
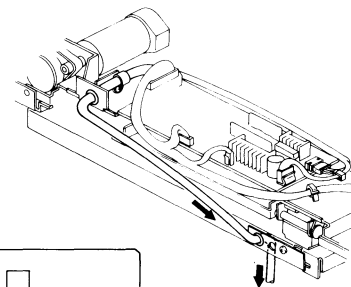
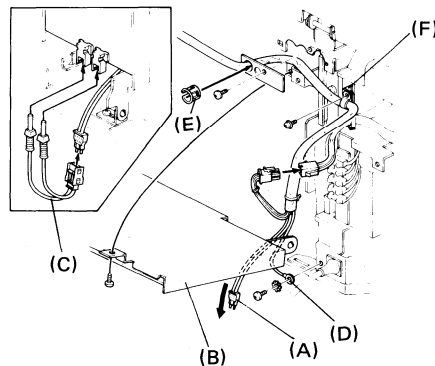
15. Connect the ARDF harness to the copier's ac 4p connector.

16. Secure the ground wire [D] to the copier frame (1 ground screw and washer).

17. Install the nylon harness bushing [E] in the harness bracket. Ensure that there is no slack between the harness hole and the harness bracket.

18. Secure the harnesses with a clamp [F] (1 pan head screw - M4 x 8).

19. Raise and secure the copier PCB plate.



20. Set DIP SW 101-3 on the ARDF main board.
21. Turn on the copier main switch and adjust the lead edge registration as follows:

- a) Make a copy using the test chart in the platen mode with the flip scale.

Front Side Original

- b) Keep this copy for reference and mark PM (Platen Mode) on its reverse side.

- c) Make a copy using the test chart with the DF.

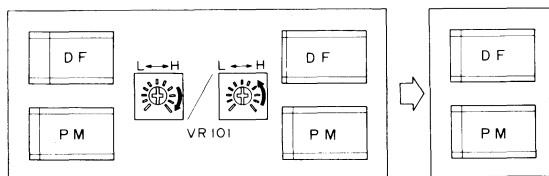
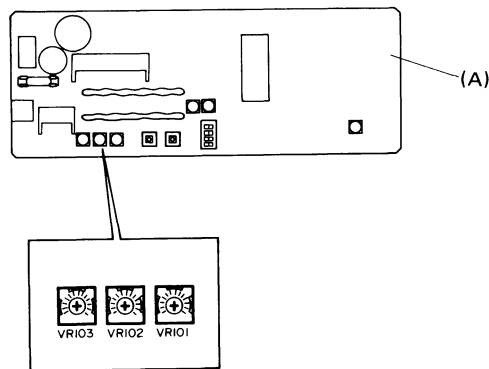
- d) Adjust the DF registration against the platen reference mode ("PM") by using VR101 on the ARDF main board [A].

PM > DF: Turn VR101

counterclockwise

PM < DF: Turn VR101 clockwise

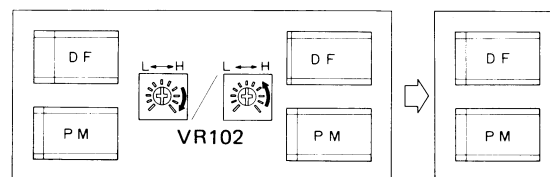
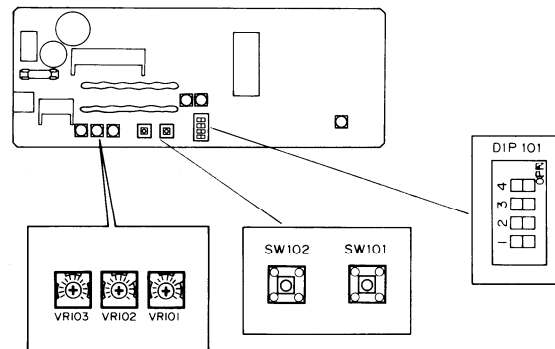
- e) Continue to repeat steps 'c)' and 'd)' until you achieve the same registration as in step 'b)'.



Reverse Side Original

- f) Turn off the copier main switch and set DIP SW 101 as follows:
 ON: 101-3, -4
 OFF: 101-1, -2
- g) Turn on the copier main switch and set the copier test chart on the original table of the ARDF.
- h) Press switch 101 on the ARDF main board twice.
- i) Press the Start key to make a copy; then, press switch 102 to feed out the test chart.
- j) Adjust the DF registration against the platen reference mode ("PM") by using VR-102 on the ARDF main board.

PM > DF: Turn VR102 clockwise
 PM < DF: Turn VR102 counterclockwise



k) Continue to repeat steps 'i)' and 'j)' until you achieve the same registration as in step 'b)'.

22. Turn off the copier main switch and set DIP SW101 as follows:

ON: 101-1, -3

OFF: 101-2, -4

23. Move the ARDF stoppers [A] to the ends as shown and tighten the allen screws.

24. Reinstall the copier and ARDF covers.

▶ When reinstalling the ARDF cover, make sure that the belt holders [B] do not ride on the ribs [C] of the ARDF cover.

25. Check the operation of the ARDF and copier system.

26. Fill out the New Equipment Condition Report.

