DOCUMENT FEEDER

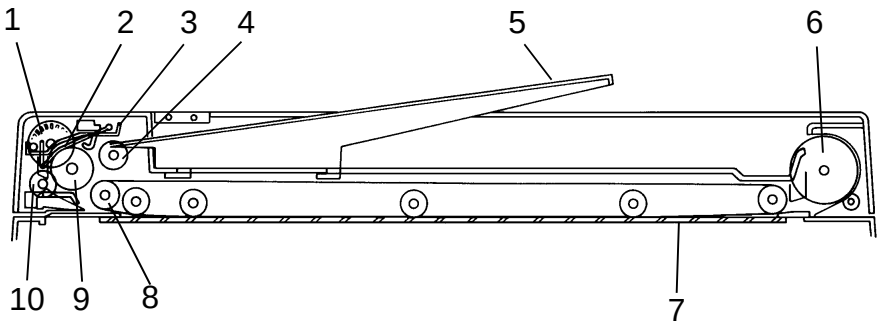
1. SPECIFICATIONS

Original Size:	Maximum: A3 or 11" x 17" Minimum: A5 Lengthwise or 5 1/2" x 8 1/2"
Original Weight:	53 to 105 g/m^2 (14 to 28 lb)
Original Feed:	Automatic Feed - ADF mode
Original Tray Capacity:	30 sheets - 80 g/m^2 (20 lb)
Original Set:	Face up - First sheet on top
Original Transport:	One flat belt
Copying Speed:	13 copies/minute (A4 lengthwise or 8 1/2" x 11" lengthwise)
Power Consumption:	35 W
Dimensions (W x D x H):	590 x 443 x 100 mm (23.3" x 17.5" x 4.0")
Weight:	Approximately 7 kg (15.5 lb)

- Specifications are subject to change without notice.

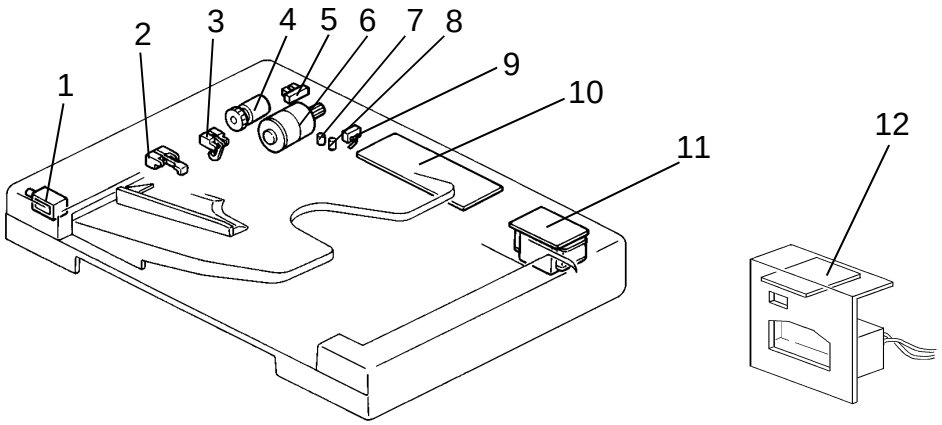
2. COMPONENT LAYOUT

2.1 MECHANICAL COMPONENTS



1. Pulse Generator Disk
2. Friction Belt
3. Pick-up Lever
4. Pick-up Roller
5. Original Table
6. Exit Roller
7. Transport Belt
8. Transport Belt Roller
9. Feed Roller
10. Relay Roller

2.2 ELECTRICAL COMPONENTS

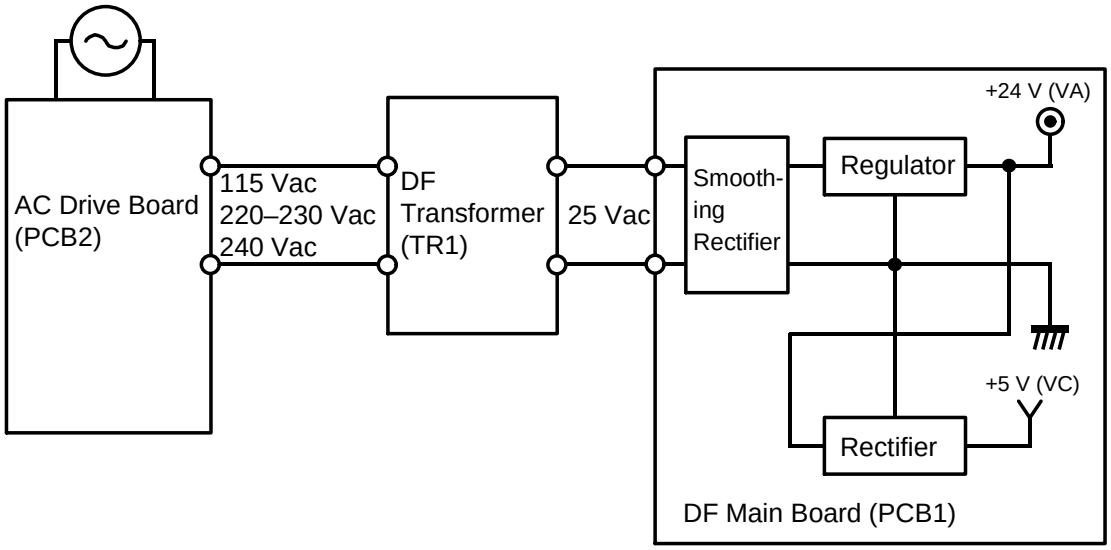


1. Pick-up Solenoid
2. Registration Sensor
3. Original Set Sensor
4. Feed Clutch
5. Pulse Generator Sensor
6. DF Motor
7. Insert Original Indicator
8. Original Misfeed Indicator
9. Lift Switch
10. DF Main Board
11. DF Transformer
12. DF Interface Board

3. ELECTRICAL COMPONENT DESCRIPTIONS

SYMBOL	NAME	FUNCTION	LOCATION
Motor			
M1	DF	Drives all the document feeder components.	6
Solenoid			
SOL1	Pick-up Solenoid	Energizes to press the pick-up lever against the stack of originals in preparation for original feed-in.	1
Clutch			
CL1	Feed Clutch	Turns on to transmit main motor rotation to the feed roller.	4
Switch			
SW1	Lift Switch	Informs the CPU when the DF is lifted and also serves as the misfeed reset switch for the DF.	9
Sensors			
S1	Pulse Generator Sensor	Supplies timing pulse to the DF main board.	5
S2	Original Set Sensor	Informs the copier CPU that originals have been placed and causes the Insert Original indicator to go out.	3
S3	Registration Sensor	Sets original stop timing and checks for original misfeeds.	2
Printed Circuit Board			
PCB1	DF Main Board	Controls all DF functions.	10
PCB2	DF Interface Board	Interfaces between the copier main board and the DF.	12
Transformer			
TR1	DF Transformer	Steps down the wall voltage to 25 volts ac.	11
LEDs			
LED1	Original Misfeed Indicator	Turns on when an original is misdeed.	8
LED2	Insert Original Indicator	Turns off when the originals are inserted into the original table.	7

4. POWER DISTRIBUTION



The document feeder uses two dc power levels: +24 volts, and +5 volts.

When the main switch is turned on, the DF transformer receives the wall outlet ac power through the ac drive board and outputs 25 volts ac to the DF main board. Then, the dc power supply circuit on the DF main board converts the 25 volts ac input to +24 volts and +5 volts.

+24 volts is used by the DF motor, the pick-up solenoid, and the feed clutch. +5 volts is used by other electrical components.

5. BASIC OPERATION

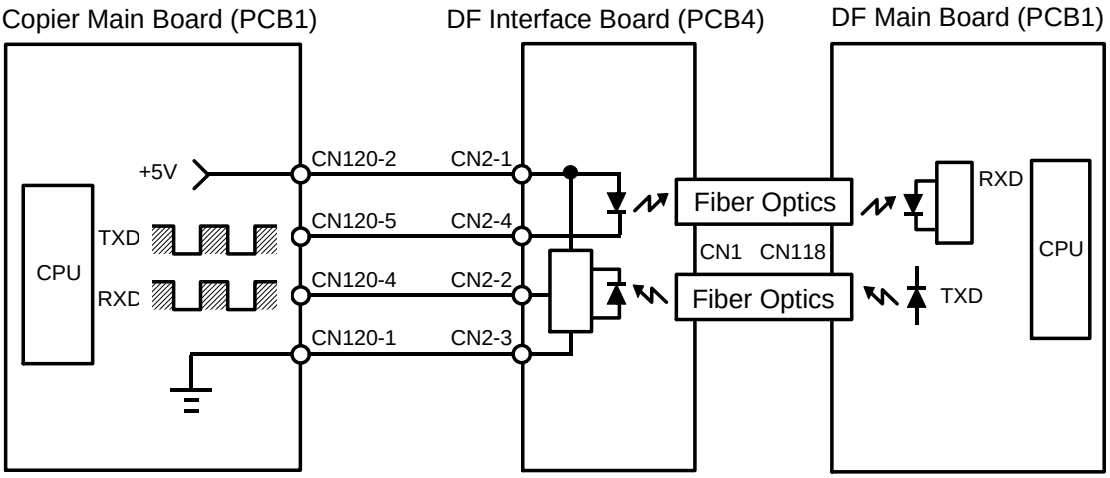
When the main switch is turned on, the DF CPU sends the "DF installed" signal to the copier CPU. Receiving this signal, the copier CPU recognizes that the document feeder is installed and sends the "DF confirmed" signal to the DF CPU.

When originals are placed on the original table, the Insert Original indicator turns off and the DF CPU sends the "original set" signal to the copier CPU to inform that the originals have been set.

When the Start key is pressed, the copier CPU sends the "feed-in" signal to the document feeder. On receipt of this signal, the DF CPU energizes the DF motor, the pick-up solenoid, and the feed clutch to feed in the bottom sheet of the original stack onto the exposure glass. The pick-up solenoid, and the feed clutch remain energized until the original’s leading edge reaches the registration sensor. The DF motor turns off shortly after the original’s trailing edge passes the registration sensor. Then, the DF motor pauses and reverses for a moment to align the edge of the original with the scale.

The scanner starts, and the start timing does not depend on the progress of the original through the DF. When the scanner reaches the return position, the copier CPU sends the "original change" signal to the DF CPU in order to exchange the current original with the next original.

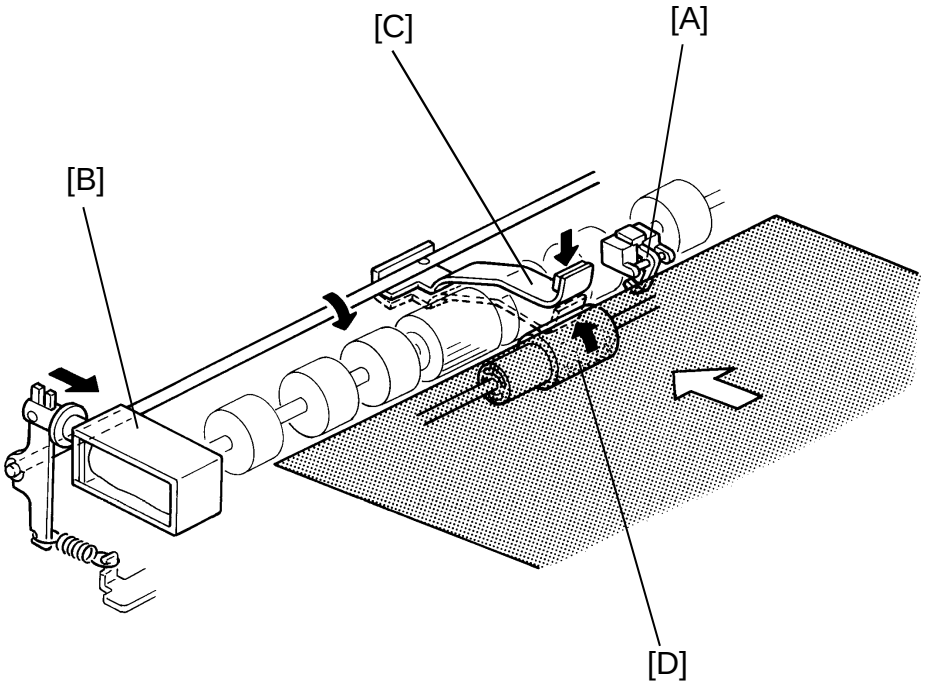
6. INTERFACE CIRCUIT



The copier CPU and the DF CPU communicate via the interface board using fiber optics. The interface board changes the optical signals to electrical signals (and vice versa).

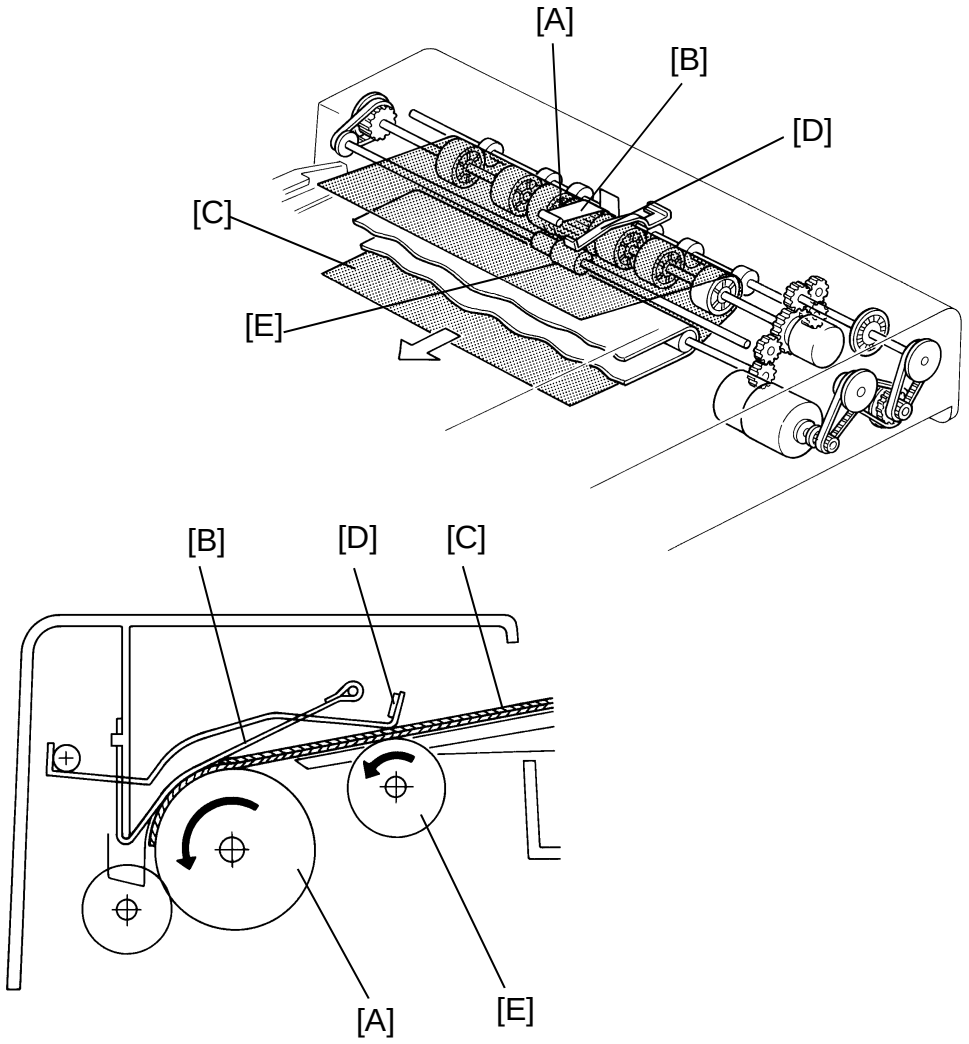
7. ORIGINAL FEED

7.1 ORIGINAL PICK-UP MECHANISM



After setting the originals on the original table, the originals contact the feeler [A] of the original set sensor and cause the feeler to move out of the sensor. The DF CPU then sends the original set signal to the copier CPU to inform it that the document feeder will be used. When the Start key is pressed, the pick-up solenoid [B] is energized. The original stack is then pressed between the pick-up lever [C] and pick-up roller [D]. The rotation of the pick-up roller advances the bottom original.

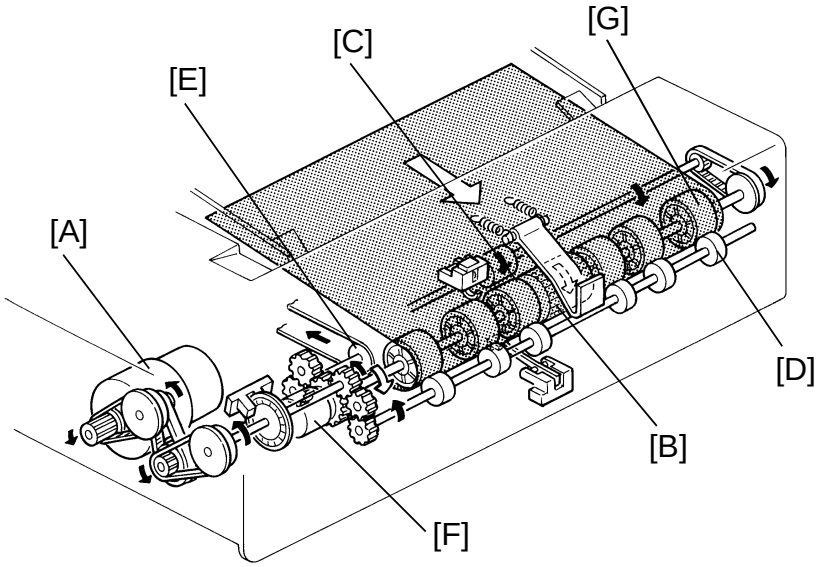
7.2 ORIGINAL SEPARATION MECHANISM



The feed roller [A] and the friction belt [B] are used to feed in and separate the originals [C]. Only the bottom original is fed because the friction belt prevents any other originals from feeding.

Original feed starts when the pick-up lever [D] presses the original stack and the rotation of the pick-up roller [E] advances the bottom original of the stack. The feed roller moves the original past the friction belt because the driving force of the feed roller is greater than the resistance of the friction belt. The friction belt prevents multiple feeds because the resistance of the friction belt is greater than the friction between original sheets.

7.3 ORIGINAL FEED-IN MECHANISM



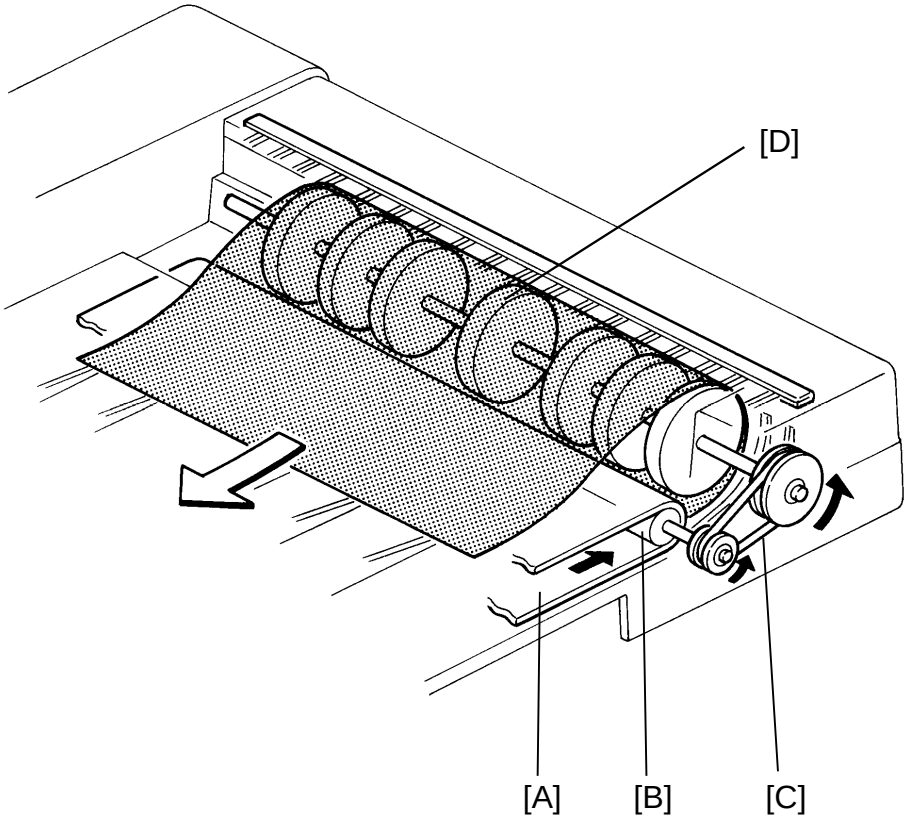
The DF motor [A] drives the feed roller [B], the pick-up roller [C], the relay rollers [D], and the transport belt roller [E] via timing belts and a gear train. The feed roller and the pick-up roller are controlled by the feed clutch [F], but the relay rollers and the transport roller are directly driven by the DF motor. The idler rollers [G] on the feed roller shaft are free from the shaft.

When the Start key is pressed, the DF motor is energized and the relay rollers and transport belt roller start turning. 100 milliseconds after the DF motor starts turning, the pick-up solenoid and the feed clutch is energized. The pick-up and feed rollers then start turning and carry the original between the relay rollers and the idler rollers. The pick-up solenoid and the feed clutch are de-energized when the original's leading edge passes through the registration sensor.

The DF motor remains energized to deliver the original to the exposure glass until a certain number of pulses (10 to 25 pulses) after the original's trailing edge passes through the registration sensor. Then, the DF motor pauses and reverses for 15 pulses to align the edge of the original with the scale.

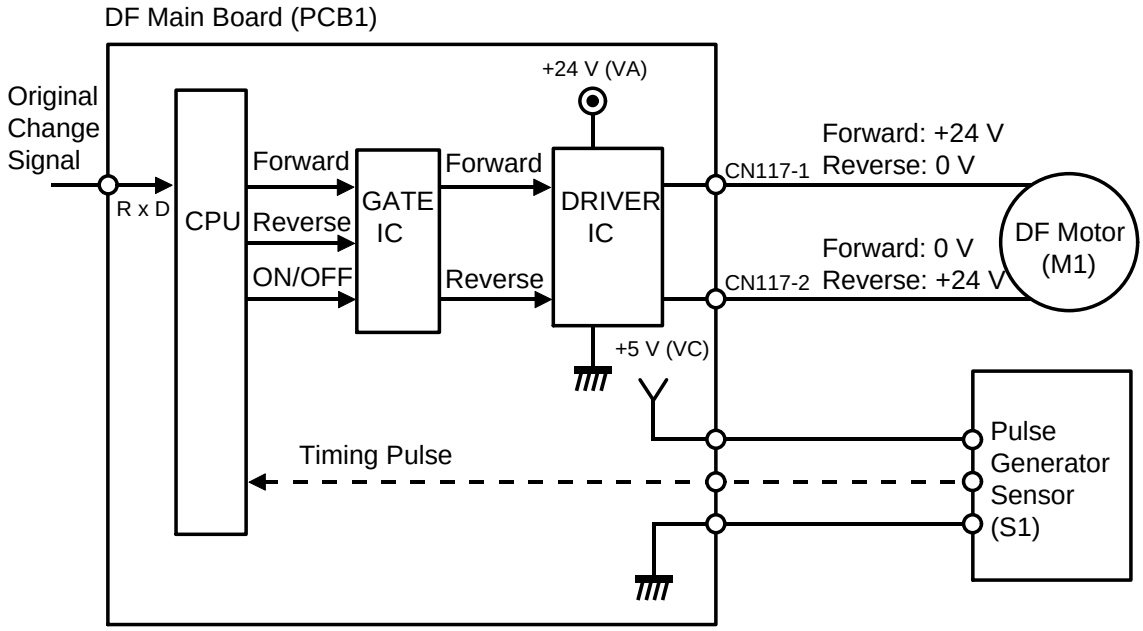
To feed the second original, the DF motor starts rotating when the scanner reaches the return position. (The copier CPU sends the original change signal to the DF CPU.) At this time, the transport belt starts carrying the first original on the exposure glass to the exit roller. The timing for when the pick-up solenoid and the feed clutch are energized for the second original depends on the length of the first original detected by the registration sensor.

7.4 ORIGINAL FEED-OUT MECHANISM



The exit rollers are driven by the DF motor through a gear train, the transport belt roller, the transport belt [A], the transport belt idler roller [B], and the exit roller drive belt [C]. When the DF CPU receives the original change signal from the copier CPU, the DF motor starts turning. Simultaneously, the transport belt carries the original to the exit rollers [D] and the exit rollers take over the original feed-out.

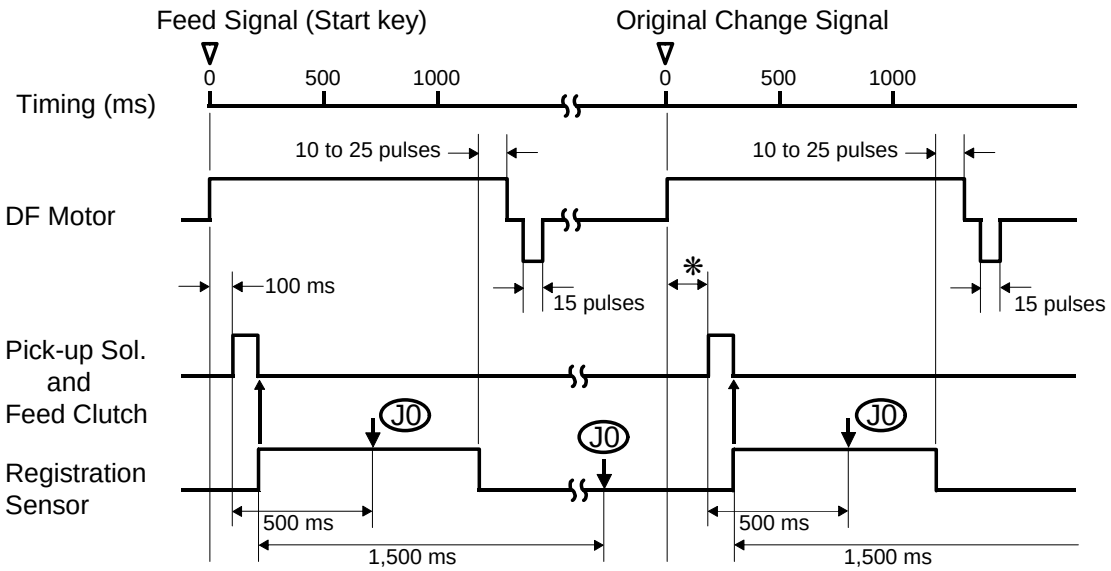
7.5 DF MOTOR CIRCUIT



A 24 volt dc motor is used as the DF motor. When the CPU receives the feed signal from the copier, the CPU outputs the ON signal and the Forward signal to the gate IC. On receipt of the forward signal from the gate IC, the driver IC outputs 24 volts to CN117-1 and 0 volts to CN117-2. This causes the DF motor to start turning in the forward direction.

Within 10 to 25 pulses after the original's trailing edge passes through the registration sensor, the CPU stops sending the ON signal and the Forward signal. The DF motor stops turning. Then the CPU outputs the ON signal and the reverse signal for 15 pulses. Then the driver IC outputs 0 volts to CN117-1 and +24 volts to CN117-2 to reverse the DF motor.

7.6 ORIGINAL FEED AND MISFEED DETECTION TIMING



✻: The timing depends on the length of the first original.

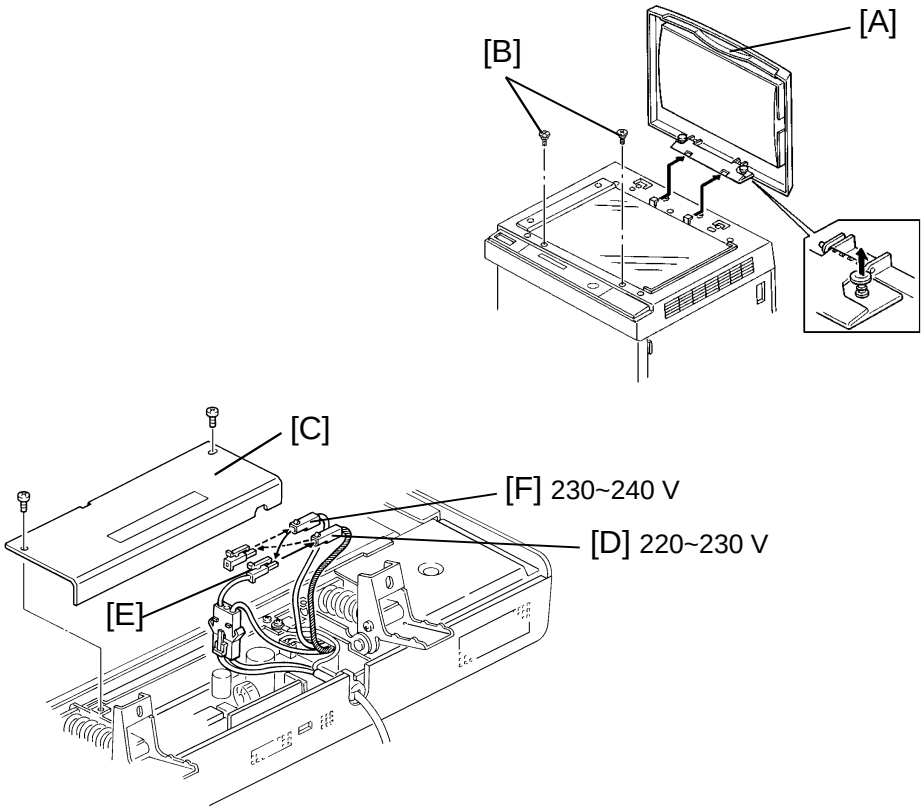
The above chart shows the original feed timing for the original size of A4 lengthwise or 8.5" x 11" and the detection timing.

The registration sensor is used for a misfeed detection. If the DF CPU detects that a misfeed exists, the DF CPU lights the Original Misfeed indicator and sends the original misfeed signal to the copier CPU. Then the copier CPU lights the check paper path and the Misfeed Location Number (JO) on the operation panel. When the main switch is turned on, the DF CPU checks the registration sensor output for initial original misfeed. During the original feed-in, the DF CPU performs two kinds of original misfeed detection:

1. Whether the registration sensor is actuated within 500 milliseconds after the pick-up solenoid and the feed clutch turn on.
2. Whether the original has passed through the registration sensor 1,500 milliseconds after the registration sensor has been actuated.

8. INSTALLATION PROCEDURE

NOTE: This procedure is for the machine code A152 copier.

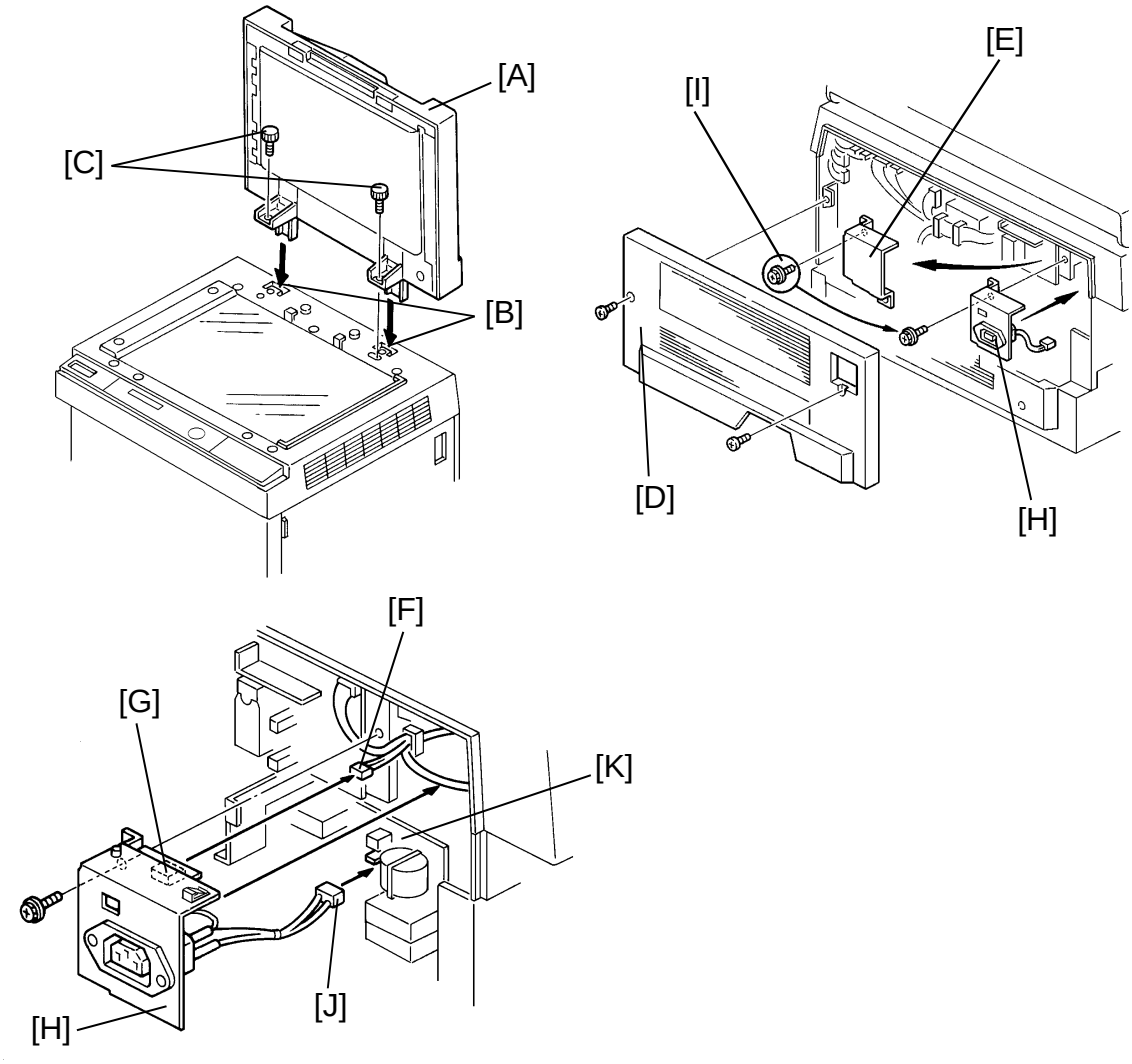


CAUTION: When installing the DF, make sure that the copier is unplugged.

1. Remove the platen cover [A] from the copier.
2. Replace the 2 screws with the 2 stud screws [B].
3. Remove the strips of tape from the DF.

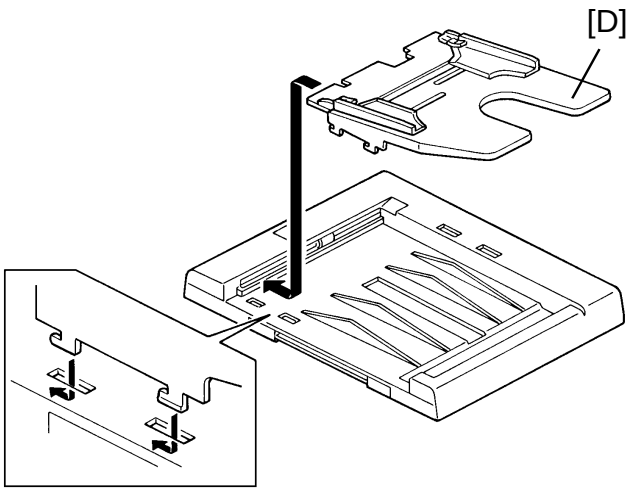
CAUTION: This procedure (step 3) must be done only in 240 volt areas

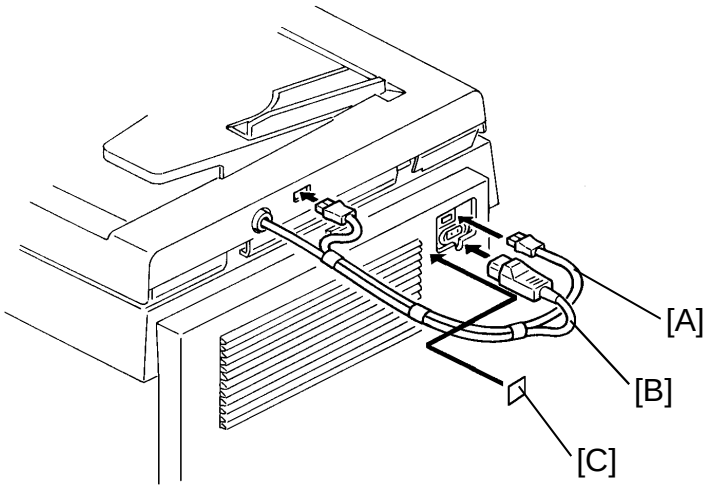
4. Perform the conversion from 220~230 V to 240 V as follows:
   1) Remove the main board cover [C] (2 screws).
   2) Disconnect the connector for 220~230 V [D] (Black Wire) from the ac harness connector [E] and reconnect the connector for 240 V [F] (White Wire) to the ac harness connector.
   3) Reinstall the cover.



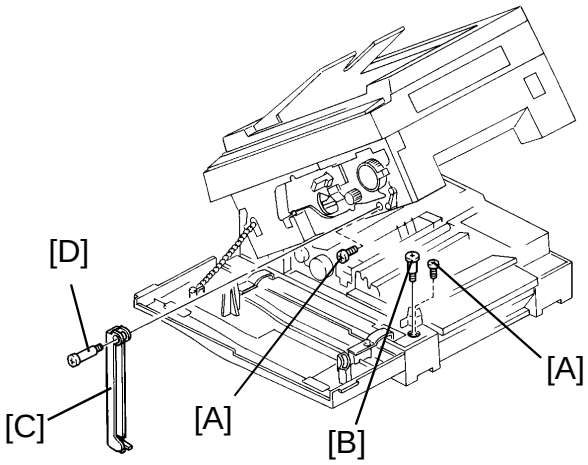
5. Insert the DF [A] into the holes [B] in the copier upper cover.
6. Secure the DF to the copier (2 thumb screws [C]).
7. Remove the upper rear cover [D] (2 screws).
8. Remove the ADF bracket [E] (1 screw and 1 clamp).
9. Locate the 4P connector [F] and connect it to the ADF interface board [G], then fix the ADF interface unit [H] to the copier (1 screw) while securing the harnesses through the wire clamp.

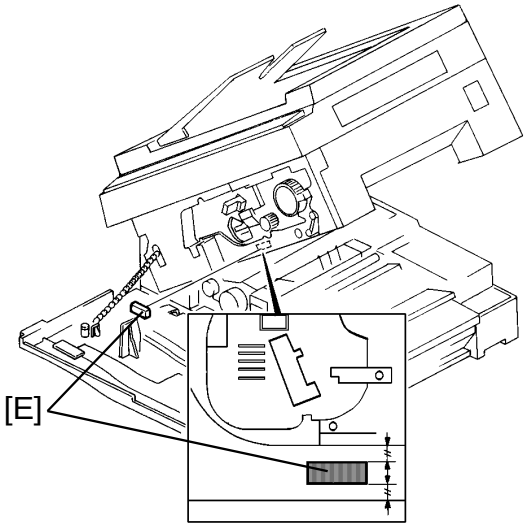
   NOTE: Use the screw that secured the ADF bracket [I].
10. Plug in the connector [J] (3P/Black) to CN418 on the ac drive board [K].

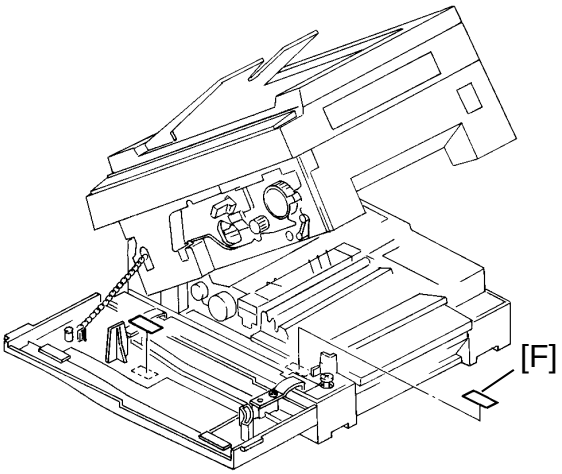




11. Reinstall the upper rear cover.
12. Plug the optics fiber cable [A] into the DF and the copier.
13. Plug the power supply cord [B] of the DF into the outlet in the copier rear cover.
14. Attach the voltage reference decal [C].
15. Install the original table [D].





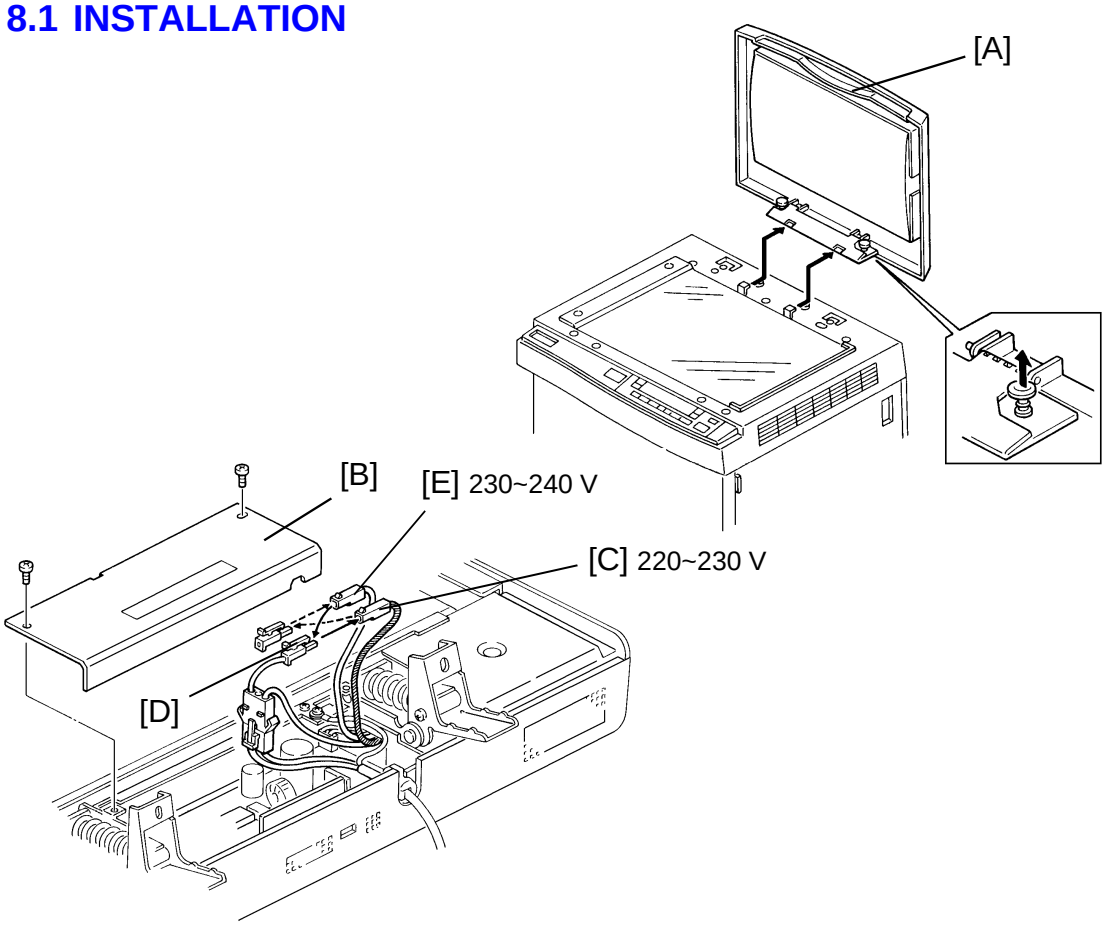


16. Open the front cover.
17. Lift the upper unit.
18. Remove 2 screws [A].
19. Tighten the shorter stepped screw [B].
20. Install the upper unit stand [C]
    (1 longer stepped screw [D]).
21. Attach the magnet [E].
22. Attach the decal [F].
23. Close the upper unit and the front cover.
24. Check the operation of the DF.
25. Instruct key operators how to use the upper unit stand.

8. INSTALLATION PROCEDURE

NOTE: This procedure is for machine code A077/A078 copiers.

8.1 INSTALLATION

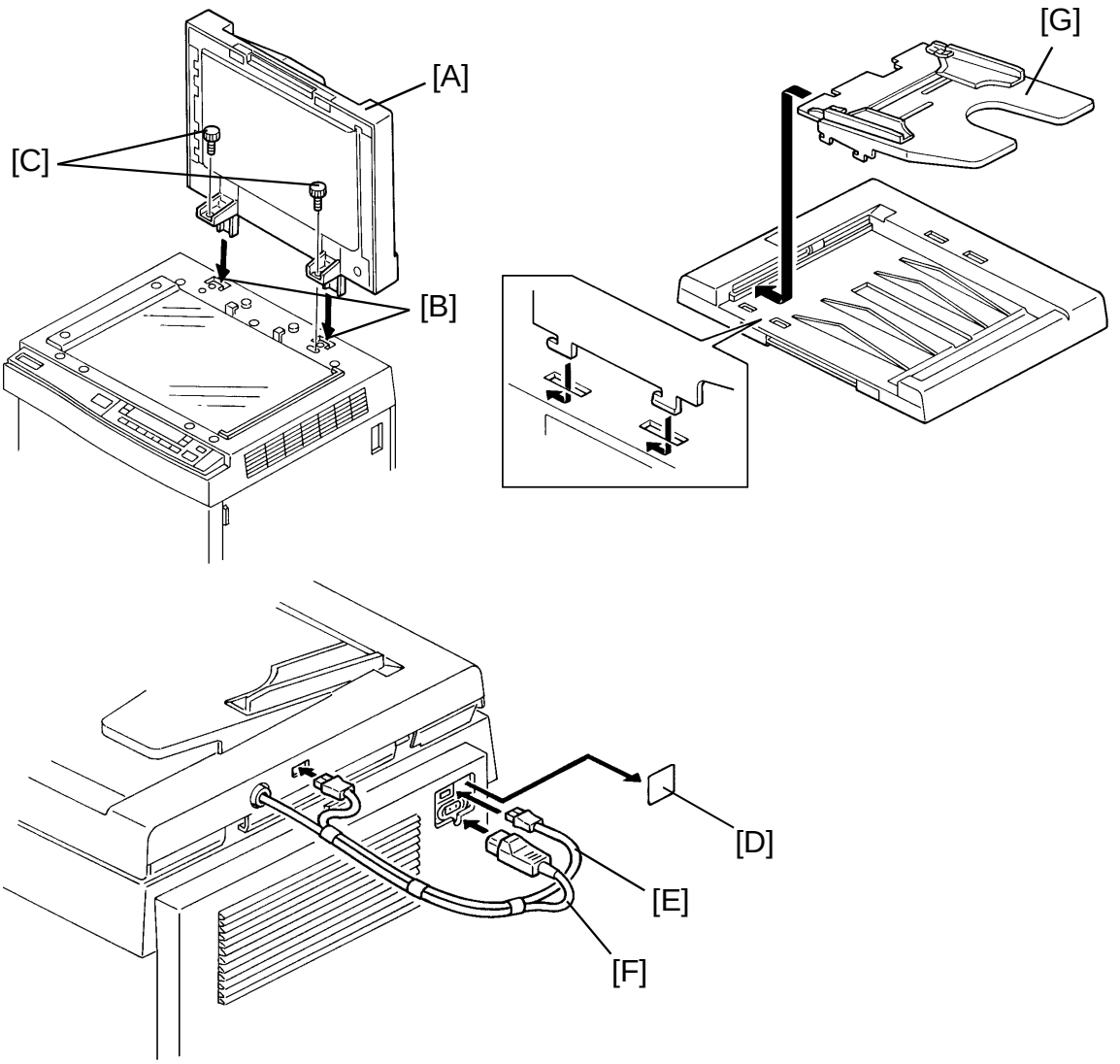


CAUTION: When installing the DF, make sure that the copier is unplugged.

1. Remove the platen cover [A] from the copier.
2. Remove the strips of tape from the DF.

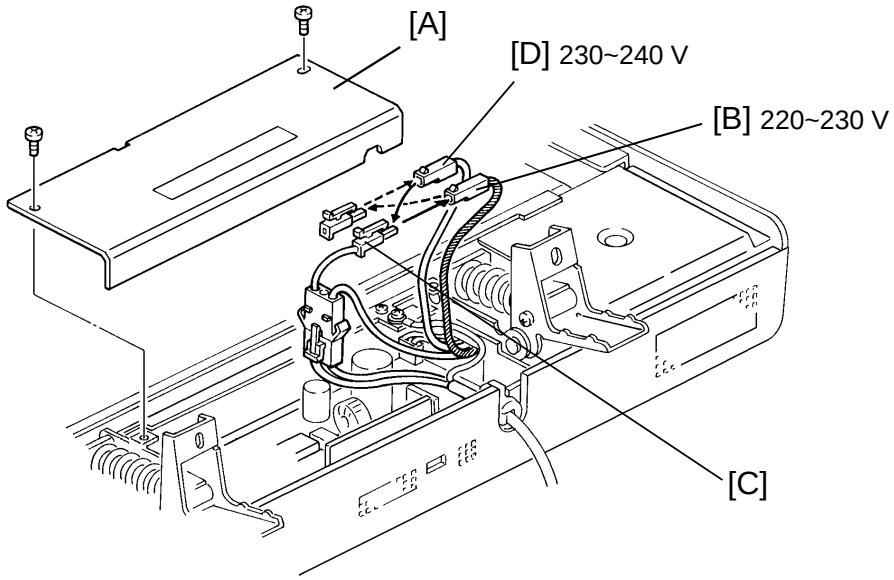
CAUTION: This procedure (step 3) must be done only in 240 volts areas.

3. Perform the conversion from 220~230 V to 240 V as follows:
   1) Remove the main board cover [B] (2 screws).
   2) Disconnect the connector for 220~230 V [C] (Black Wire) from ac harness connector [D] and reconnect the connector for 240 V [E] (White Wire) to the ac harness connector.
   3) Reinstall the cover.



4. Insert the DF [A] into the holes [B] of the copier upper cover.
5. Secure the DF to the copier (2 thumb screws [C]).
6. Remove the seal [D] from the outlet of the copier.
7. Plug in the optics fiber cable [E] to the DF and the copier as shown.
8. Plug in the power supply cord [F] of the DF to the outlet of the copier rear cover as shown.
9. Install the original table [G] as shown.
10. Check the operation of the DF.

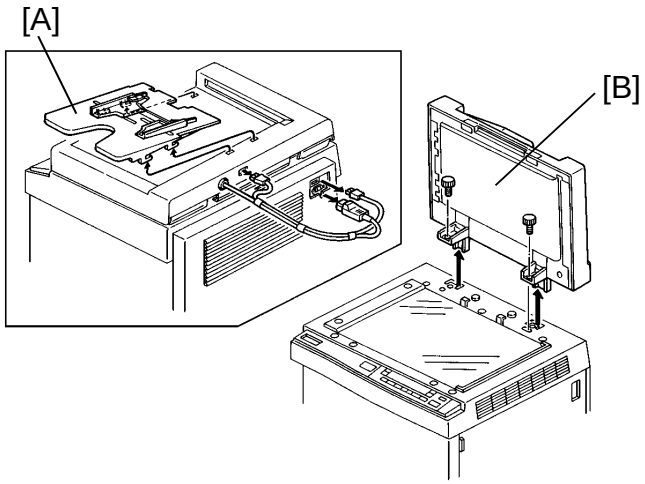
8.2 220 ~ 230 V/240 V CONVERSION

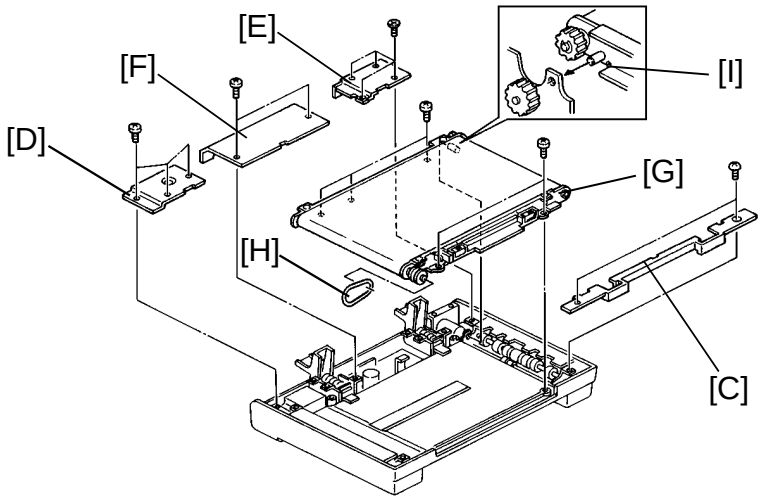


1. Remove the main board cover [A] (2 screws).
2. Disconnect the connector for 220~230 V [B] (Black Wire) from ac harness connector [C] and reconnect the connector for 240 V [D] (White Wire) to the ac harness connector.
3. Reinstall the cover.

9. REPLACEMENT AND ADJUSTMENT

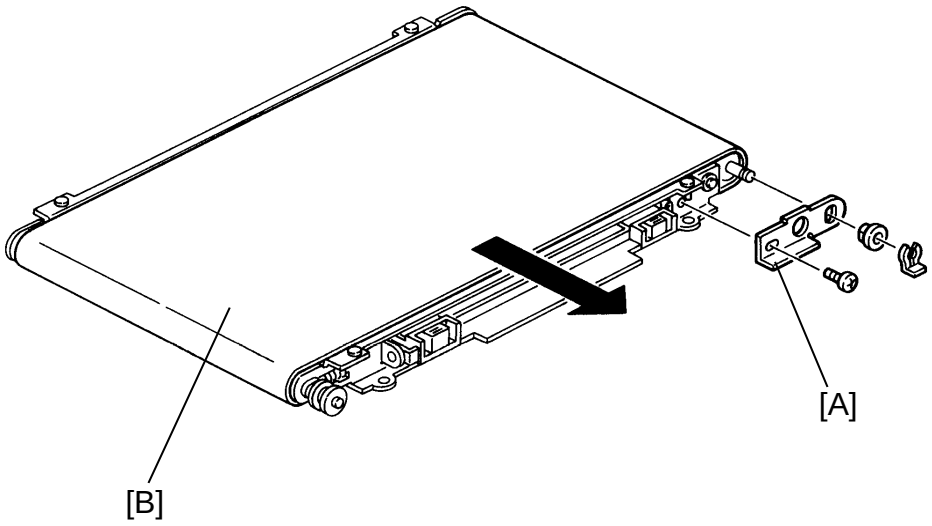
9.1 TRANSPORT BELT REPLACEMENT





1. Turn off the main switch.
2. Remove the original table [A].
3. Remove the DF [B] from the copier (2 knob screws, 1 power supply cord and 1 optics harness).
4. Remove the grip guide [C] (2 screws).
5. Remove the transformer cover [D] (3 screws), DF motor cover [E] (4 screws) and main board cover [F] (2 screws).
6. Remove the transport belt assembly [G] (5 screws and 1 drive belt [H]).

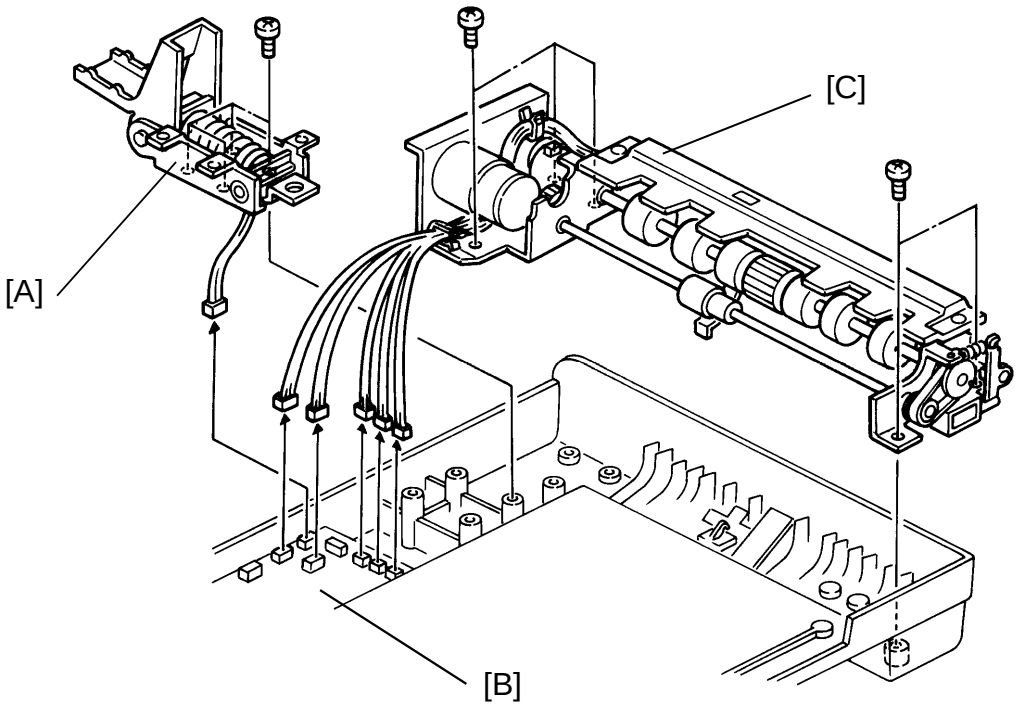
NOTE: When installing the transport belt assembly, make sure that the positioning pin [I] fits into the DF frame.



7. Remove the transport roller holder [A] (1 screw, 1 snap ring and 1 bushing).
8. Pull out the transport belt [B].

NOTE: After reinstalling the transport belt, make sure that the bushings of the transport rollers set correctly and the transport belt turns smoothly.

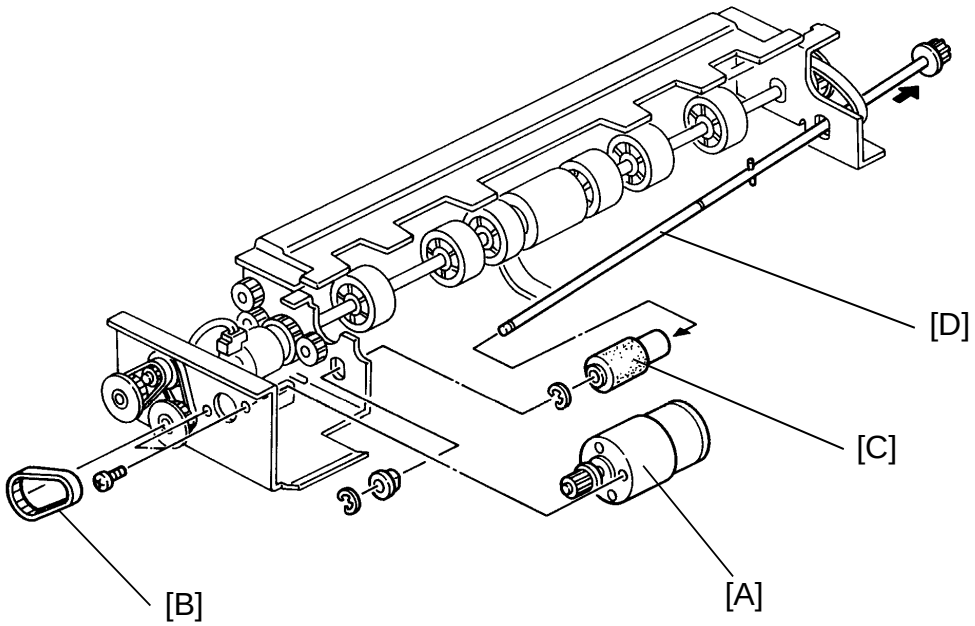
9.2 FEED-IN UNIT REMOVAL



1. Turn off the main switch.
2. Remove the transport belt assembly. (See Transport Belt Replacement.)
3. Remove the left hinge bracket [A] (4 screws and 1 connector).
4. Disconnect five connectors from the main board [B] (CN111, CN113, CN115, CN116 and CN117).
5. Remove the feed-in unit [C] (5 screws).

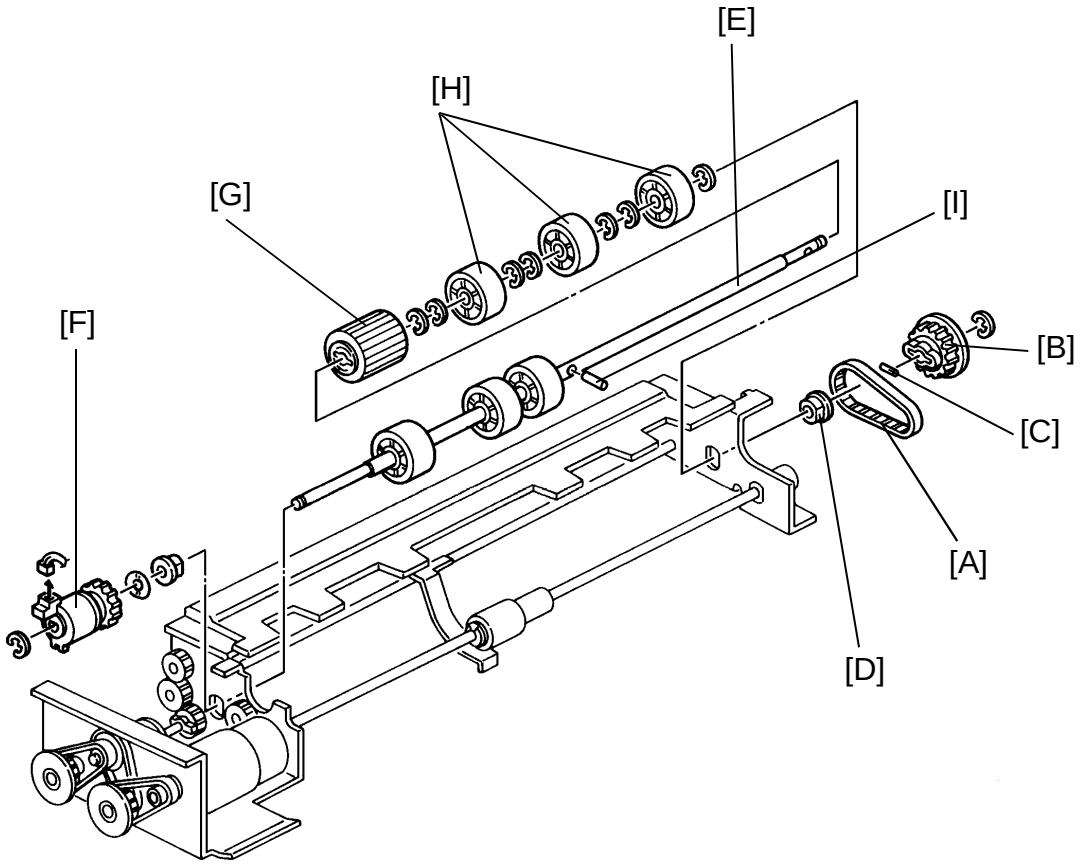
NOTE: When reinstalling the feed-in unit, the harness must be positioned underneath the right hinge bracket.

9.3 PICK-UP ROLLER REPLACEMENT



1. Turn off the main switch.
2. Remove the feed-in unit. (See Feed-in Unit Removal.)
3. Remove the DF motor [A] (2 screws and 1 timing belt [B]).
4. Remove the pick-up roller [C] (2 E-rings and 1 bushing) from the shaft [D].

9.4 FEED ROLLER REPLACEMENT

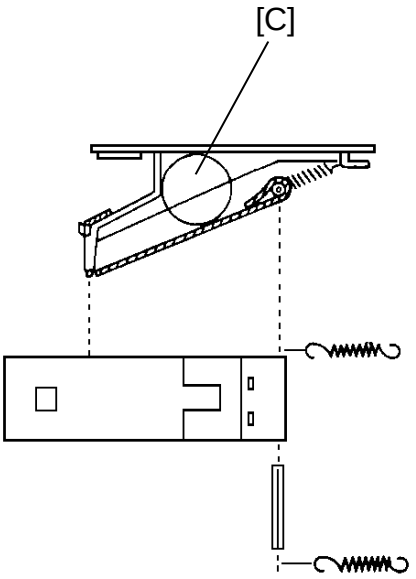


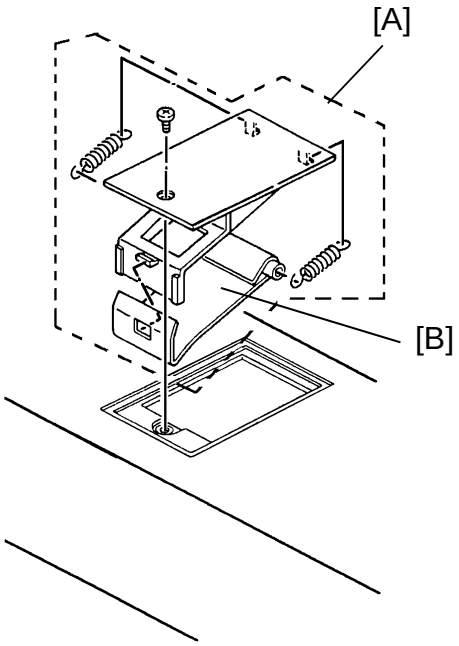
1. Turn off the main switch.
2. Remove the feed-in unit. (See Feed-in Unit Removal.)
3. Remove the feed roller timing belt [A], feed roller gear [B] (1 E-ring and 1 spring pin [C]) and 1 bushing [D].

   NOTE: Be careful not to lose the spring pin.
4. Slide the feed roller shaft [E] towards the front and remove the feed clutch [F] (1 E-ring and 1 connector).
5. Take out the feed roller shaft (1 spacer and 1 bushing ----- from the rear side).
6. Remove the feed roller [G] from the shaft (3 idler rollers [H], 7 E-rings and 1 spring pin [I]).

   NOTE: Be careful not to lose the spring pin.

9.5 FRICTION BELT REPLACEMENT

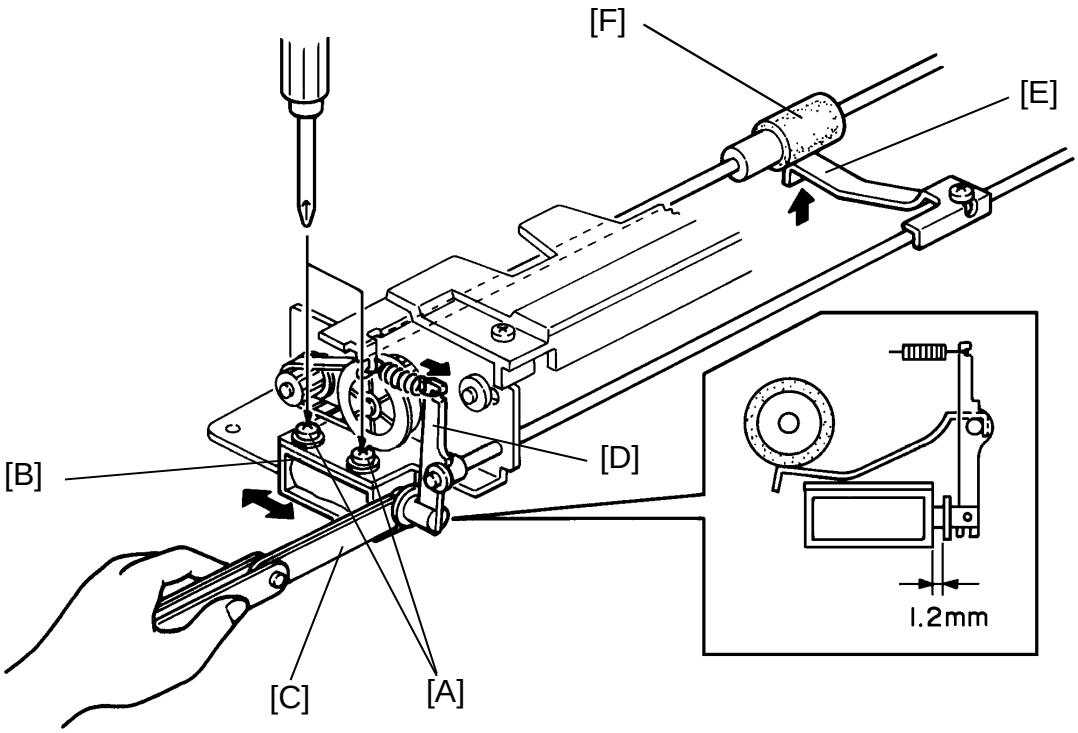




1. Turn off the main switch.
2. Remove the friction belt assembly [A] (1 screw).
3. Remove the friction belt [B] (2 springs, 1 pin).

NOTE: When installing the friction belt assembly, make sure the feed roller [C] is set in the correct position. (See the illustration.)

9.6 PICK-UP SOLENOID ADJUSTMENT



1. Turn off the main switch.
2. Remove the feed-in unit. (See Feed-in Unit Removal.)
3. Loosen two screws [A] securing the pick-up solenoid [B].
4. Place a 1.2 mm thickness gauge [C] between the plunger and the solenoid.
5. Turn the solenoid lever [D] clockwise until the plunger touches the thickness gauge. Just at this point, tighten two screws.
6. Make sure that the pick-up lever [E] is touching the pick-up roller [F] when the plunger is pushed. If not, repeat steps 3 to 5.
7. Reassemble the DF.
8. Turn on the main switch and check the original feed-in operation.