# SORTER

# (Machine Code: A511)

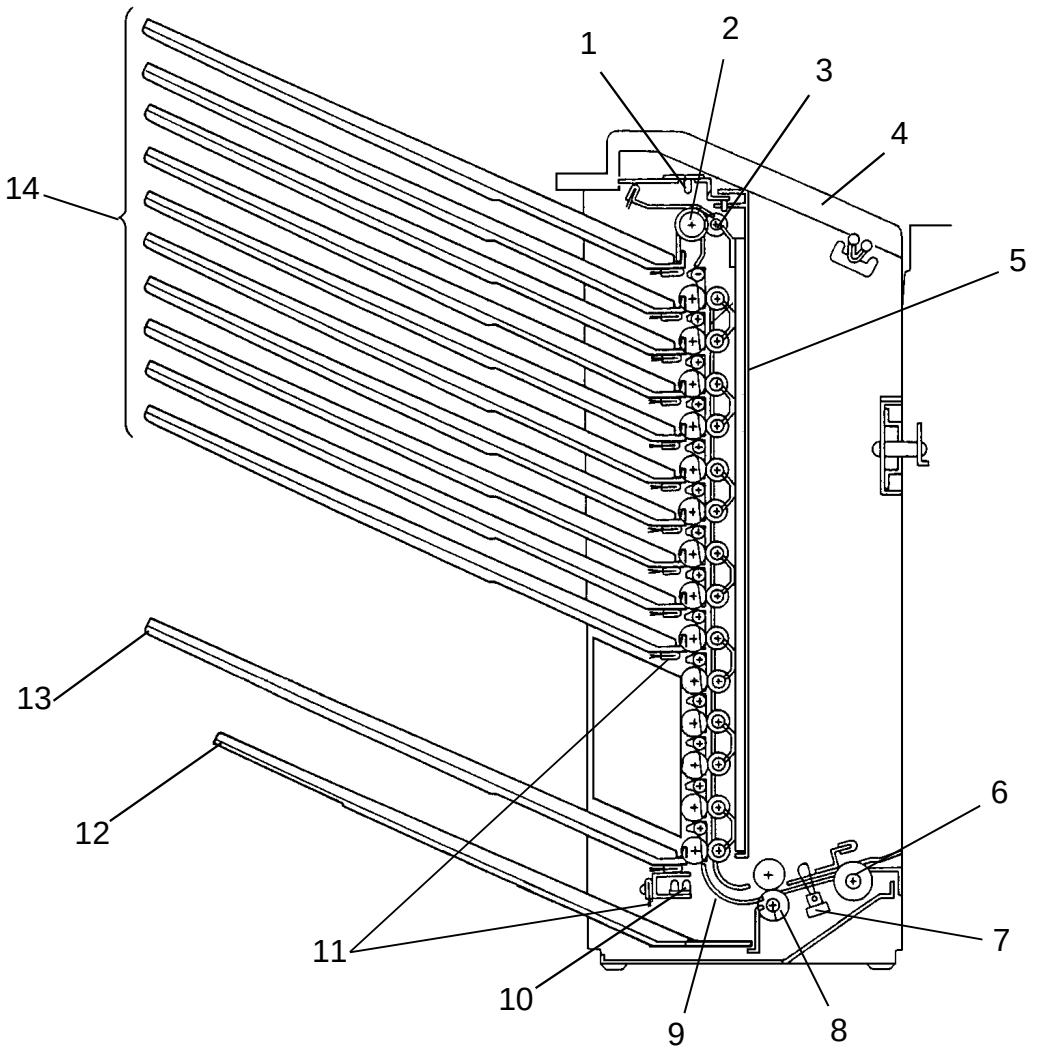
# 1. OVERALL MACHINE INFORMATION

## 1.1 SPECIFICATIONS

| | |
|---|---|
| Paper Size for Bins: | Maximum: A3 (lengthwise) or<br>11" x 17" (lengthwise)<br>Minimum: A5 (sideways) or<br>5 1/2" x 8 1/2" (sideways and lengthwise) |
| Copy Paper Weight: | 52 - 90 g/m$^2$ or 14 - 24 lb |
| Number of Bins: | 10 bins + print bin + interrupt bin (total 12 bins) |
| Bin Capacity: | Sort mode: 50 sheets/bin (A4 or 8 1/2" x 11")<br>Stack mode: 40 sheets/bin (A4 or 8 1/2" x 11") |
| Top Bin Capacity: | 150 sheets (A4 or 8 1/2" x 11") |
| Print Bin Capacity: | 500 sheets (A4 or 8 1/2" x 11")<br>150 sheets (other size) |
| Interrupt Bin Capacity: | 100 sheets (A4 or 8 1/2" x 11") |
| Power Source: | DC 24V from the copier |
| Power Consumption: | 90W (MAX), 30W (Average) |
| Dimensions (W x D x H): | 499 x 535 x 600 mm<br>19.6" x 21.1" x 23.6" |
| Weight: | Approximately 22 Kg or 49 lb |
| Interface Requirement: | A sorter adapter (850 g) is needed. |

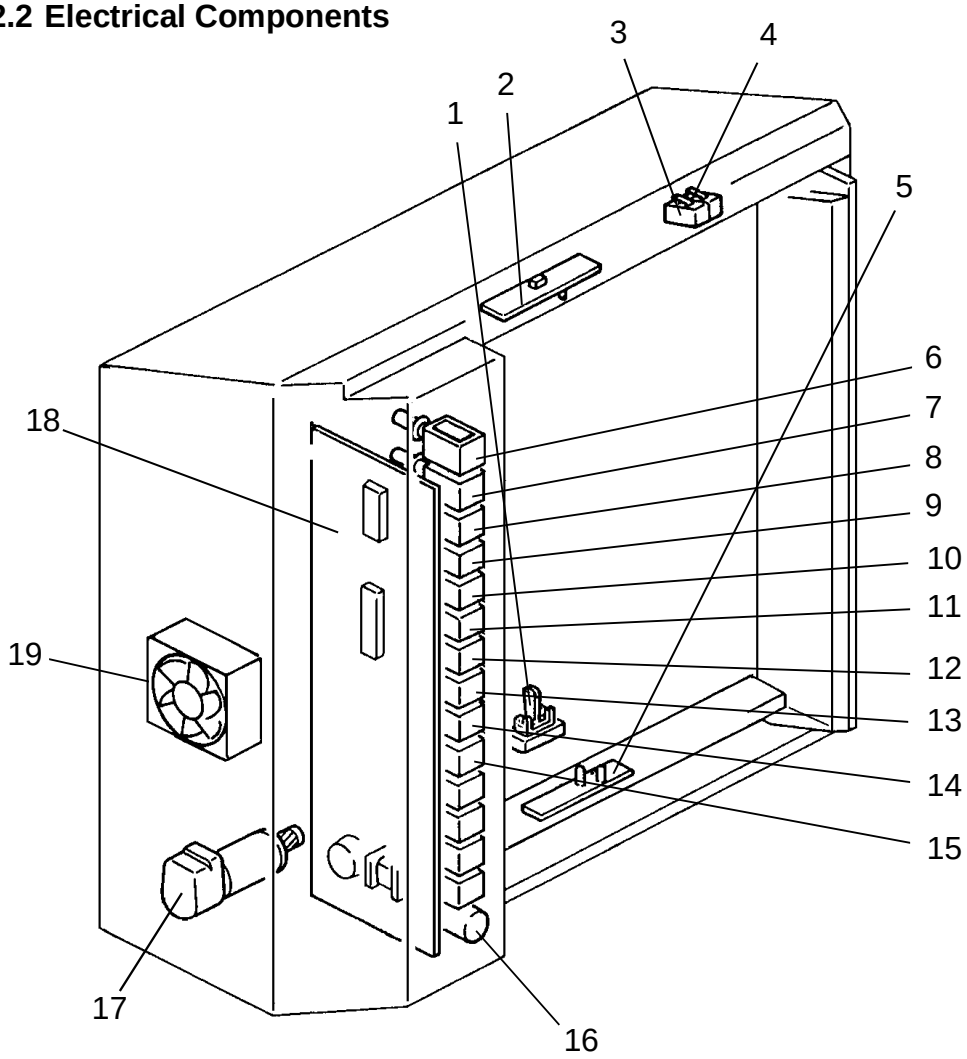
# 1.2 COMPONENT LAYOUT

## 1.2.1 Mechanical Components




1. Entry Sensor Photo Transistor
2. Vertical Drive Rollers
3. Pressure Rollers
4. Sorter Cover
5. Vertical Guide Unit
6. Sponge Roller
7. Inlet Sensor
8. Turn Gate Roller
9. Turn Gate
10. Entry Sensor LED
11. Discharge Brush
12. Interrupt Bin
13. Printer Bin
14. Standard Bins

## 1.2.2 Electrical Components

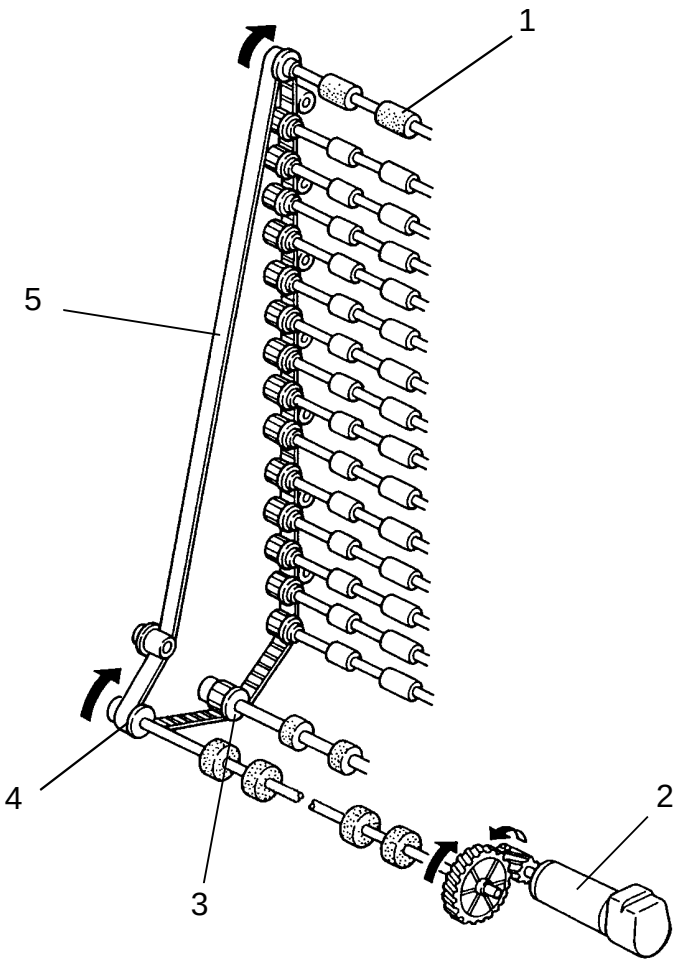



1. Inlet Sensor
2. Entry Sensor Photo Transistor
3. Sorter Cover Safety Switch 1
4. Sorter Cover Safety Switch 2
5. Entry Sensor LED
6. 2nd Bin Solenoid
7. 3rd Bin Solenoid
8. 4th Bin Solenoid
9. 5th Bin Solenoid
10. 6th Bin Solenoid
11. 7th Bin Solenoid
12. 8th Bin Solenoid
13. 9th Bin Solenoid
14. 10th Bin Solenoid
15. Printer Bin Solenoid
16. Interrupt Bin Solenoid
17. Sorter Motor
18. Sorter Main Board
19. Exhaust Fan (A109 copier only)

# 1.3 ELECTRICAL COMPONENT DESCRIPTIONS

| Symbol | Name | Function | Index No. |
|---|---|---|---|
| **Motors** | | | |
| M1 | Sorter Motor | Drives all the sorter rollers. | 17 |
| M2 | Exhaust Fan **(A109 copier only)** | Flow the air out from the copier fusing exhaust fan. | 19 |
| | | | |
| **Solenoids** | | | |
| SOL1 | 2nd Bin Solenoid | Open and close the 2nd bin gate. | 6 |
| SOL2 | 3rd Bin Solenoid | Open and close the 3rd bin gate. | 7 |
| SOL3 | 4th Bin Solenoid | Open and close the 4th bin gate. | 8 |
| SOL4 | 5th Bin Solenoid | Open and close the 5th bin gate. | 9 |
| SOL5 | 6th Bin Solenoid | Open and close the 6th bin gate. | 10 |
| SOL6 | 7th Bin Solenoid | Open and close the 7th bin gate. | 11 |
| SOL7 | 8th Bin Solenoid | Open and close the 8th bin gate. | 12 |
| SOL8 | 9th Bin Solenoid | Open and close the 9th bin gate. | 13 |
| SOL9 | 10th Bin Solenoid | Open and close the 10th bin gate. | 14 |
| SOL10 | Printer Bin Solenoid | Open and close the printer bin gate. | 15 |
| SOL11 | Interrupt Bin Solenoid | Open and close the interrupt bin gate. | 16 |
| | | | |
| **Switches** | | | |
| SW1 | Sorter Cover Safety Switch 1 | Detects when the sorter cover is opened. | 3 |
| SW2 | Sorter Cover Safety Switch 2 | Cut the +24 volts power line. | 4 |
| | | | |
| **Sensors** | | | |
| S1 | Entry Sensor | Detects misfeeds and when the copy paper exits. | 2 and 5 |
| S2 | Inlet Sensor | Detects misfeeds and when the copy paper enters. | 1 |
| | | | |
| **Printed Circuit Boards** | | | |
| PCB 1 | Sorter Main Board | Controls all sorter functions. | 18 |

## 1.4 DRIVE LAYOUT




1. Vertical Drive Rollers (10 Rollers)
2. Sorter Motor
3. Turn Gate Roller Pulley
4. Sponge Roller Pulley
5. Timing Belt

## 1.5 BASIC OPERATION

**- Introduction -**

Sorter operation begins when the copier main motor turns on. At that time, the sorter motor turns on and the rollers start turning.

The sorter has two paper transport speeds. When the sorter motor turns on, it rotates at slow speed of 220 mm/s. This is the slightly faster than the copier's transport speed. When the trailing edge of the paper passes the copier exit sensor, the sorter shifts to high speed which is about 550 mm/s. When the trailing edge of the paper passes the jam sensor, the sorter shifts again to slow speed.

When the copier main motor turns off, the sorter motor also turns off.

**- Clear Mode -**

The copies pass from the copier's exit through the relay guide plates to the turn gate. The turn gate directs the paper to the vertical guide unit. The vertical drive rollers then move the paper up until it reaches the turn guide. The turn guide directs the paper to the first bin. During transport of the copies in this mode, none of the bin gates are used.

**- Sort Mode -**

When in sort mode, the first sheet is placed in the first bin in the same way as when in clear mode.

The second and subsequent copies follow the same path but are directed to the bins in order from top to bottom (second copy to second bin, third to the third bin, and so on). The appropriate bin gate solenoid turns on when the leading edge of the paper activates the inlet sensor and turns off when the trailing edge of the paper passes the jam sensor.

If 11 or more is entered while in sort mode, the message display will indicate "Maximum number of sets is 10.", the Copy Quantity indicator will display 10. (The Start key remains green.)

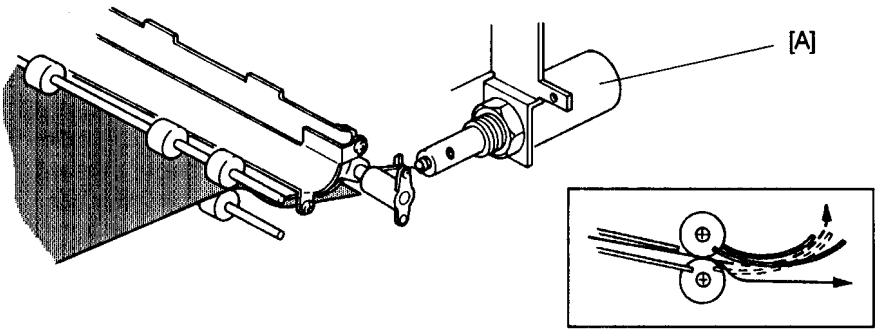
**- Stack Mode -**

When in stack mode, all sheets of the first copy run go to the top bin just as in clear mode. When the Start key is pressed again, the entire second run is directed to the second bin. Similarly, the third run goes to the third bin, the fourth run to the fourth bin.

If the mode is not changed, the sorter will continue in this way, sending all copies from a single run to one bin and dropping down one bin each run until there are copies in all 10 bins. Upon completion of the copy run to the 10th bin, copying will stop and the guidance display will indicate "Sorter bins are full. Remove the copies." (The Start key remains green.) The operator can copy 11th or more originals continuously when pressing the start key again. These copies run to the top bin and drop down one bin each run, as described above.

If on any single copy run, the operator enters a number greater than 40 (the maximum bin capacity for stack mode), the 41st copy will automatically drop down to the next bin.

**- Interrupt Mode -**




If the Interrupt key is depressed during a multicopy run, the sorter continues to place copies in the correct bins until that copy run is finished. Which bin the copies go to depends on the mode: sort, stack or clear mode.

Then, the operator presses the Start key to make interrupt copies.
Only when the operator selects OHP/thick paper to be fed from the by-pass feed table, the interrupt copies enter the sorter and the sorter CPU energizes the interrupt bin solenoid [A] and the copies are directed to the interrupt bin. All other copies taken by the interrupt mode are fed to the 1st bin.

When the interrupt mode is canceled, the previous settings and modes are returned to resume the previous copy run that was interrupted.

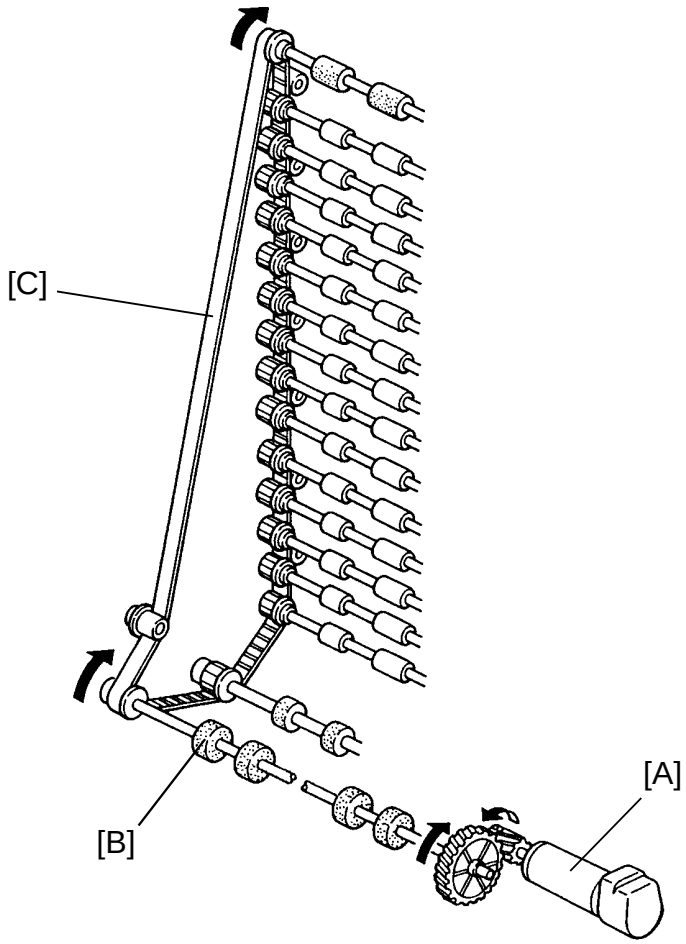
**- Sorter Misfeed -**

The sorter CPU starts the misfeed timing count when the inlet sensor turns on. If the copy is not fed into the bin within a specified period (different for each bin) the sorter CPU will send a misfeed signal to the copier. The copier will then light the Sorter Misfeed indicator and stop operation. (Any copies in the paper path at the time will be finished first.)

The sorter CPU directs any copies that are being processed in the copier at the time of a sorter misfeed to the interrupt bin. It also corrects the copier Copy Counter indicator so that it displays only the number of copies actually in the top 10 bins. After removing the misfed paper, the misfeed condition is automatically cleared when the sorter cover is opened and closed.

# 2. DETAILED SECTION DESCRIPTIONS

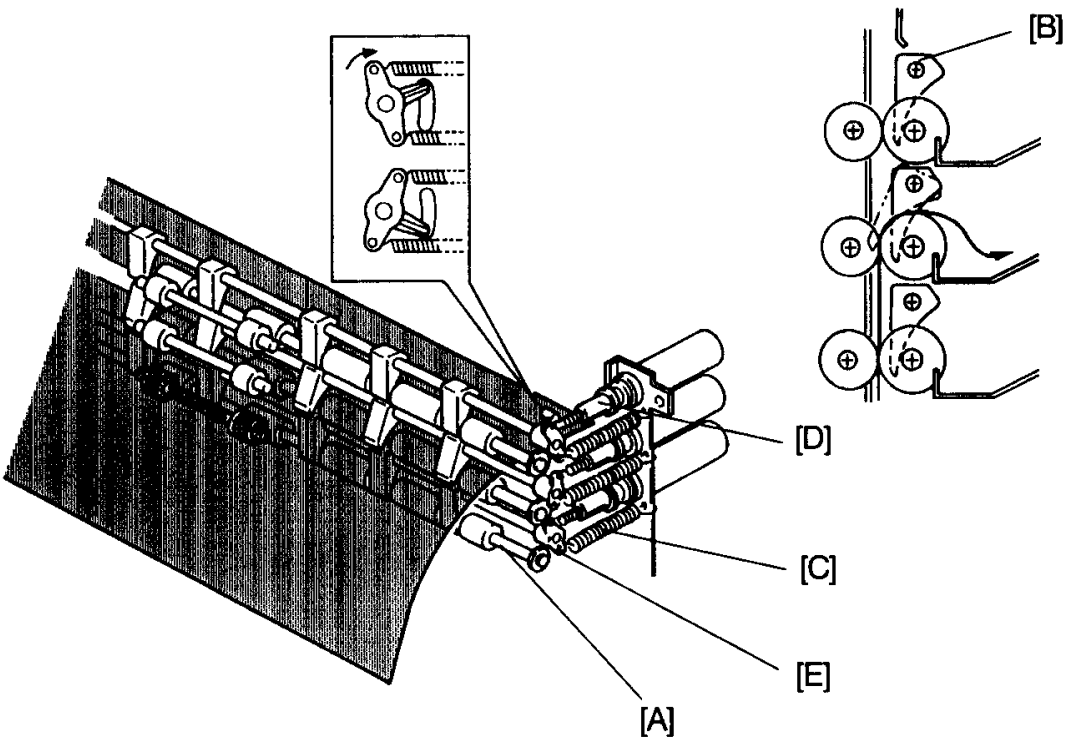
## 2.1 DRIVE MECHANISM




The sorter motor [A] is a servo motor and it is controlled by the sorter CPU. The sorter CPU also controls the motor rotation speeds: slow and high.

The sorter motor drives the sponge roller [B] and the other rollers through a timing belt [C].

## 2.2 BIN GATE OPERATION

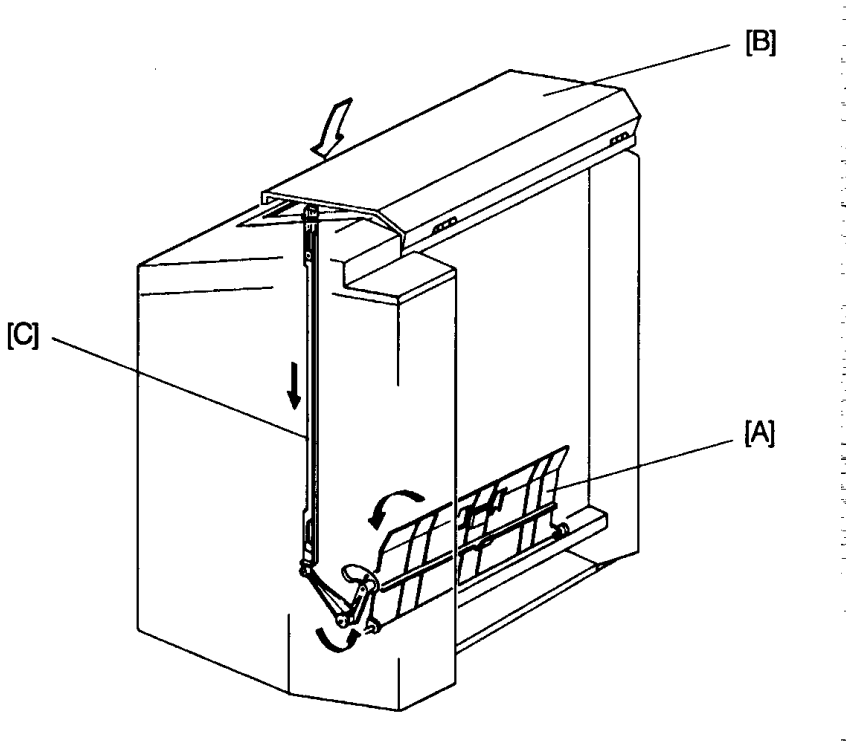



Each bin gate shaft [A] is individually controlled by a solenoid. Normally, the bin gates [B] are held out of the paper path by the return spring [C].

To feed paper into a bin, the sorter CPU energizes the appropriate solenoid. The solenoid plunger [D] then rotates the bin gate lever [E] and opens the gate out into the paper path. The curved inner face of the gate directs the paper into the bin.

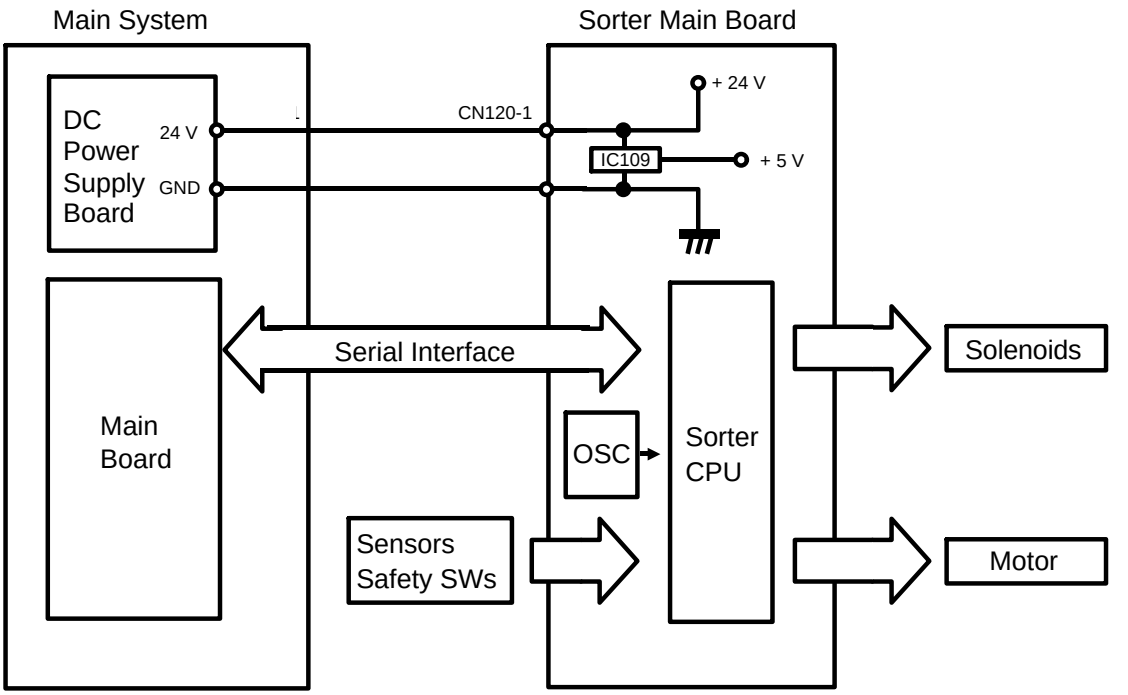
After the paper passes into the bin, the solenoid turns off and the return spring pulls the bin gate lever back to the closed position.

## 2.3 RELAY GUIDE PLATE RESET MECHANISM




This mechanism prevents the relay guide plate [A] from being left up after misfed paper has been removed from the sorter. When the operator closes the sorter cover [B], the reset lever [C] is pushed down, returning the relay guide plate to the horizontal position.

## 2.4 ELECTRICAL CONTROL

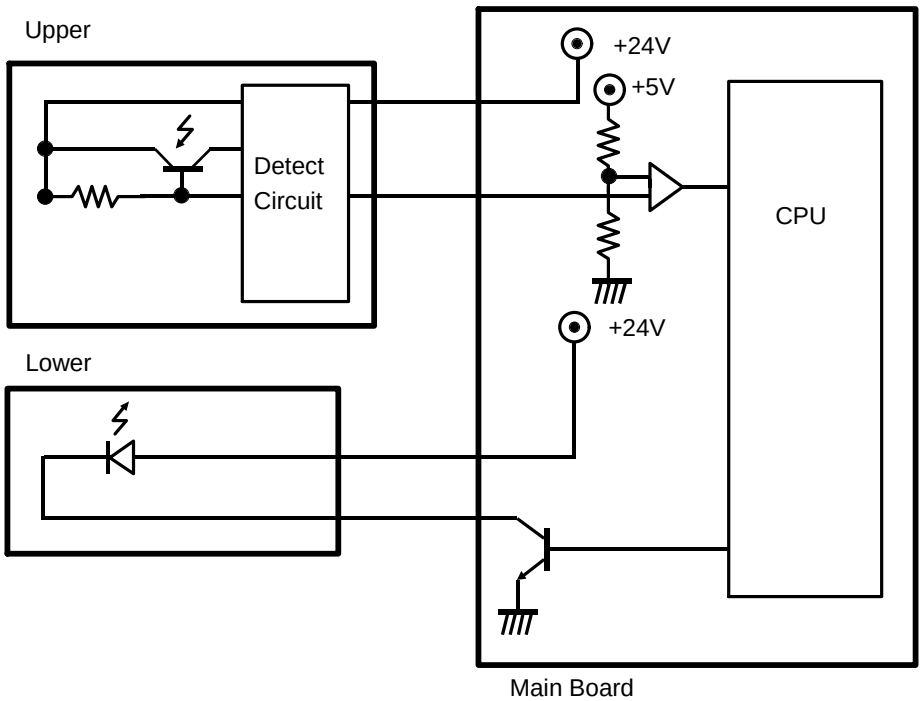



24 V is supplied from the copier, the sorter main board generates a 5 V supply from the 24 V input.

The sorter has its own CPU which controls all the functions of the sorter. The sorter CPU communicates with the copier through a serial interface bus.

Signals from the sensors and the safety switch are sent to the copier main PCB. The copier main PCB sends the command signals for activation of the motor and the solenoids to the sorter CPU.

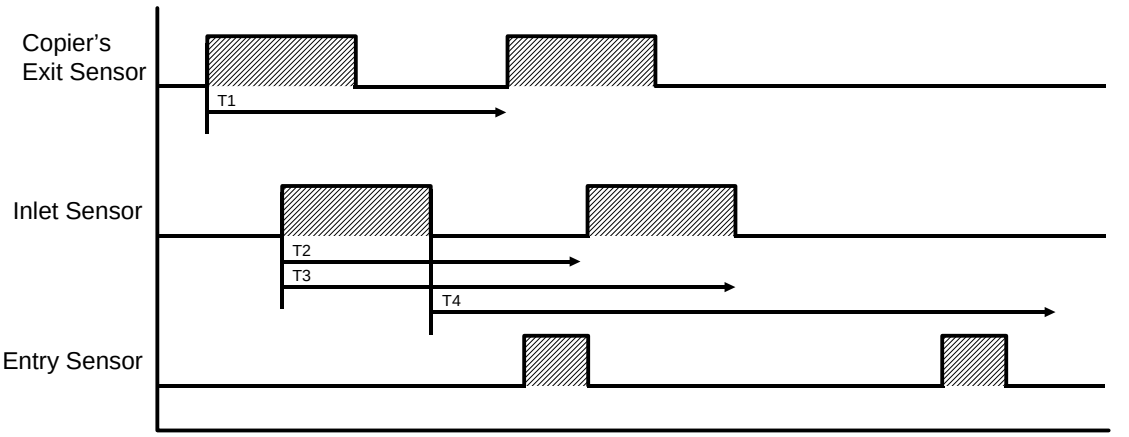
## 2.5 JAM AND BIN COPY SENSORS




There is a jam sensor on the upper sensor board which detects sorter misfeeds. A LED on the lower sensor board is turned on by a pulse signal which is supplied from the sorter CPU.

When there is paper between either board, this pulse light does not activate the phototransistor on the upper board. In this case, the sorter CPU determines that the vertical drive roller is misfeeding a copy. This pulse signal detection system has an advantage over a photointerruptor system because there is no interference from external light.

## 2.6 MISFEED SENSING




The three components indicated in the above timing chart are involved in jam detection. There are four jam detection tests, as follows.

T1: The inlet sensor is checked 80 pulses (0.36s) after the copier's exit sensor is turned ON. If the inlet sensor is not on, there is a jam is the copier's exit area.

T2: y pulses (see the table below) after the inlet sensor is turned ON, the inlet sensor turns OFF. If the inlet sensor is not OFF, there is a jam in the sorter entrance area.

T3: z pulses (see the table below) after the inlet sensor is turned ON, the entry sensor turns ON. If the entry sensor is not ON, there is a jam in the vertical transport area.

T4: z pulses after the inlet sensor is turned OFF, the entry sensor turns OFF. If the entry sensor is not OFF, there is a jam in the sorter exit area.

| Paper Size | 5 1/2 x 8 1/2 | 8 1/2 x 11 | 8 1/2 x 14 | 11 x 17 | 8 1/2 x 5 1/2 | 11 x 8 1/2 |
|---|---|---|---|---|---|---|
| y pulse | 380 | 484 | 620 | 752 | 240 | 376 |

| Paper Size | A3 | B4 | A4(L) | A4(S) | B5L | B5(S) | A5(L) | A5(S) |
|---|---|---|---|---|---|---|---|---|
| y pulse | 732 | 532 | 516 | 364 | 448 | 316 | 364 | 256 |

| Bin No. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | Print | Interrupt |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| z pulse | 992 | 904 | 860 | 816 | 772 | 724 | 680 | 632 | 588 | 544 | 360 | 316 |

# 3. INSTALLATION

## 3.1 ACCESSORY CHECK

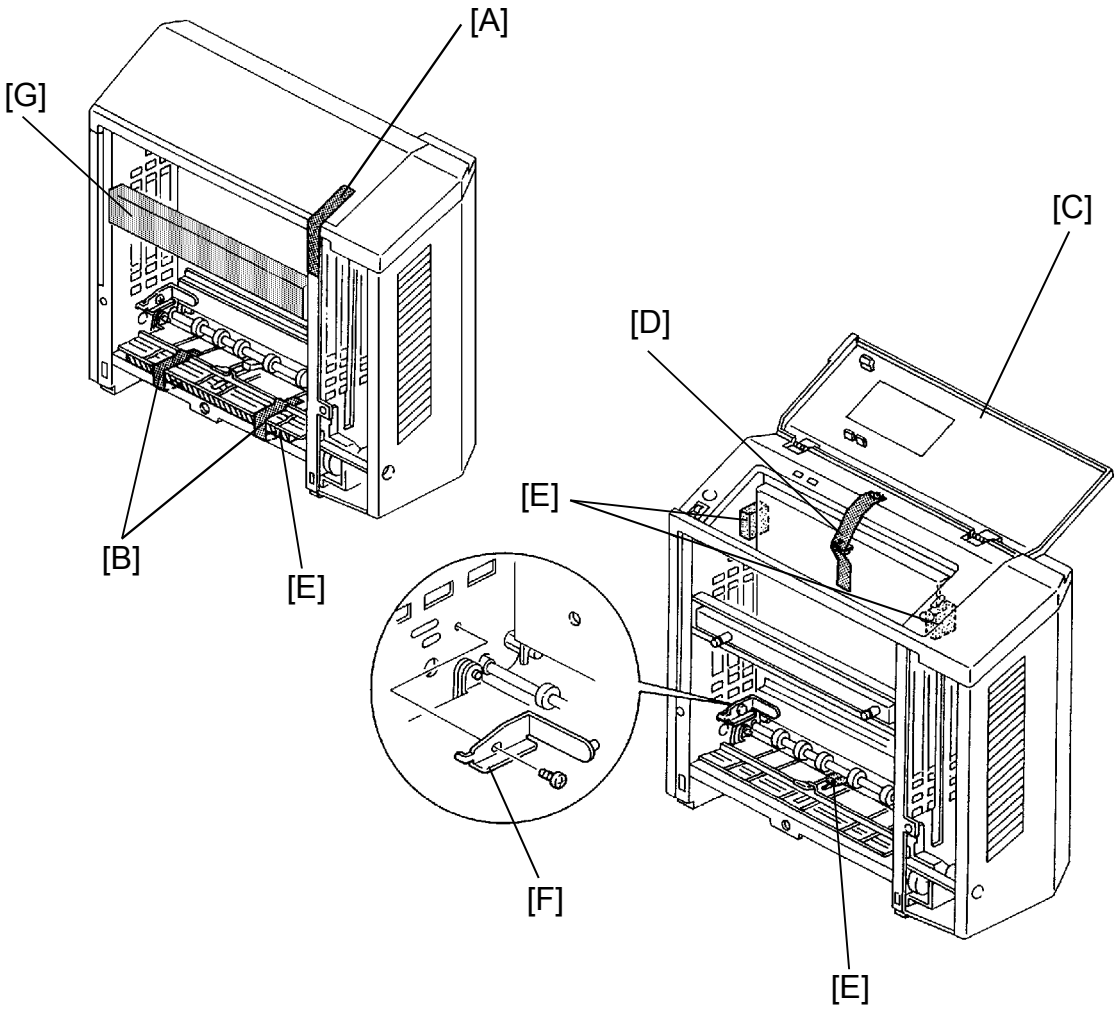
Check the accessories according to the following list:

| Description | Q'ty |
|---|---|
| 1. Installation Procedure | 1 |
| 2. NECR | 1 |
| 3. Envelope for NECR | 1 |
| 4. Stud | 2 |
| 5. Knob Screw | 2 |
| 6. Sorter Bin | 11 |
| 7. Interrupt Bin | 1 |
| 8. Bin Cover | 1 |
| 9. Grounding Screw | 1 |

**Sorter Adapter**

| Description | Q'ty |
|---|---|
| 1. Fan Motor Assembly | 1 |
| 2. Air Outlet Plate | 1 |
| 3. Harness Clamp | 2 |
| 4. Relay Harness | 1 |
| 5. Edge Saddle | 2 |
| 6. Guide Plate Assembly | 2 |
| 7. Philips Pan Head Screw -M4 x 6 | 9 |

## 3.2 INSTALLATION PROCEDURE




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

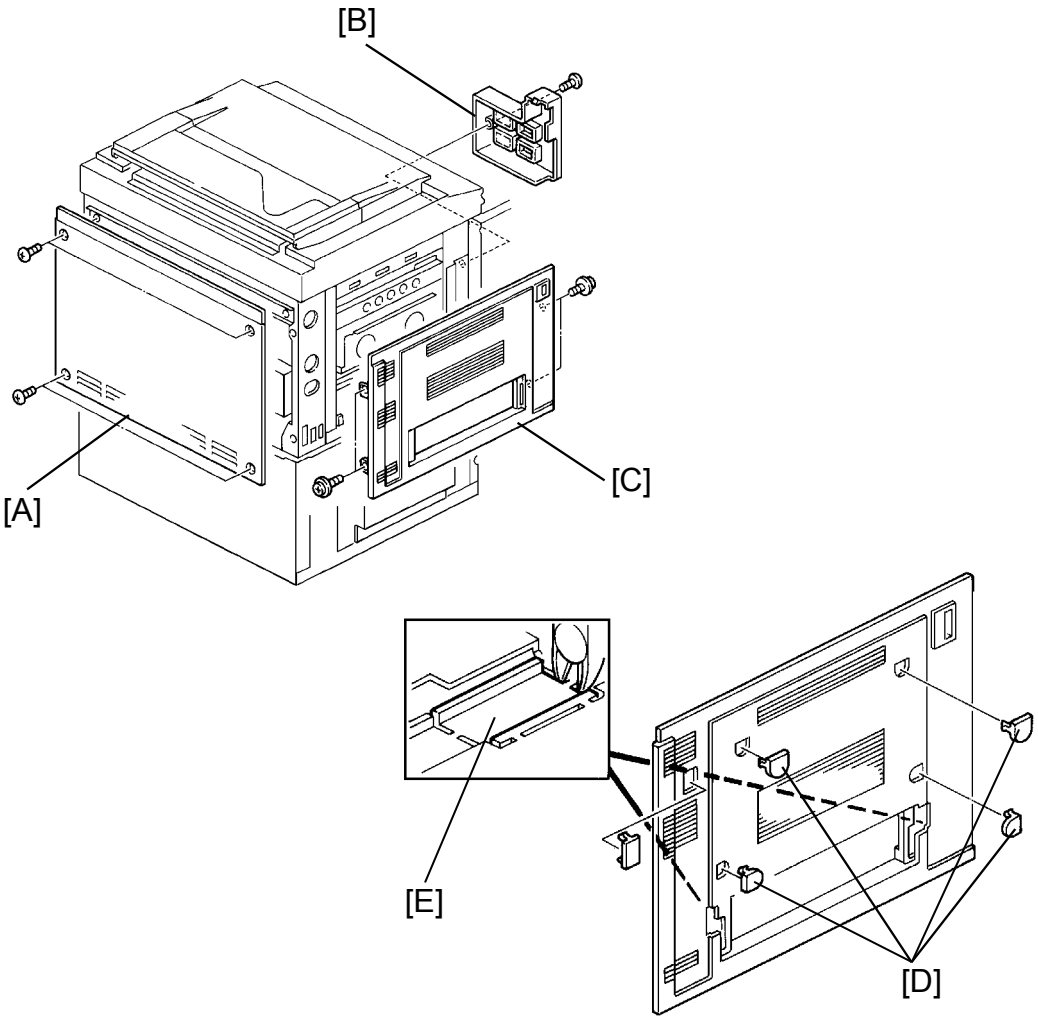
NOTE: To install this sorter to A109 copier, A527 sorter adapter kit (option) is necessary.

1. Remove three pieces of tape:

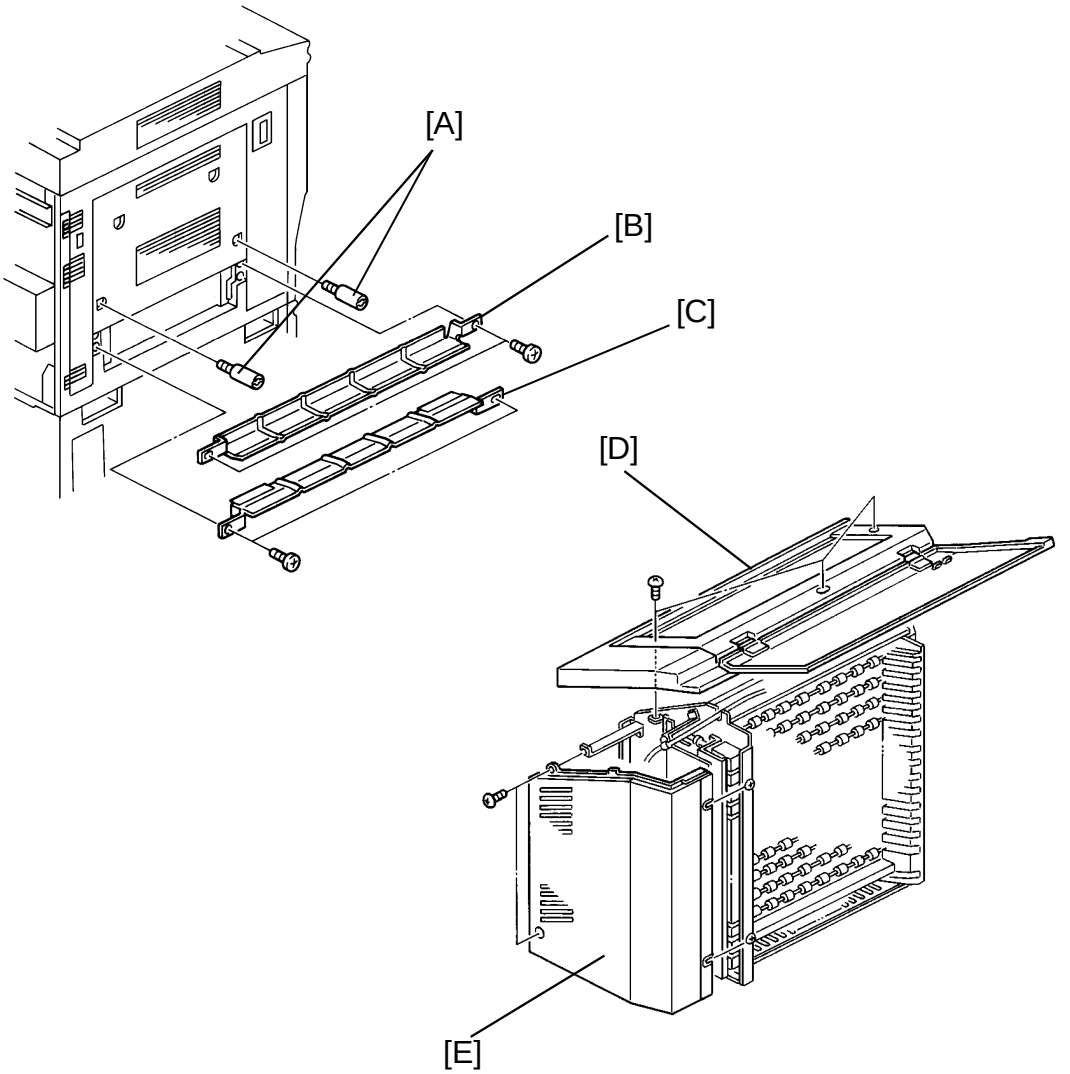
   Sorter Top Cover [A] (1 pc)
   Transport Guide [B] (2 pcs)

2. Open the top cover [C] and remove the following items:

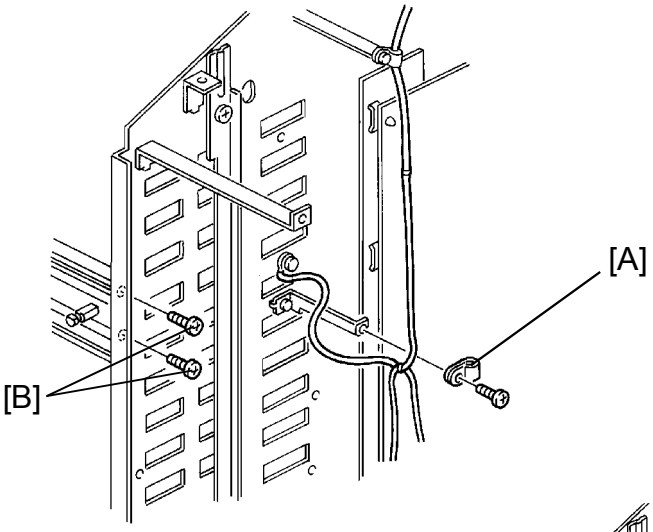
   Tape [D] (1 pc)
   Cushion [E] (4 pcs)
   Fixing Clamp [F] (1 pc) [1 screw]
   Card Board [G] (1 pc)

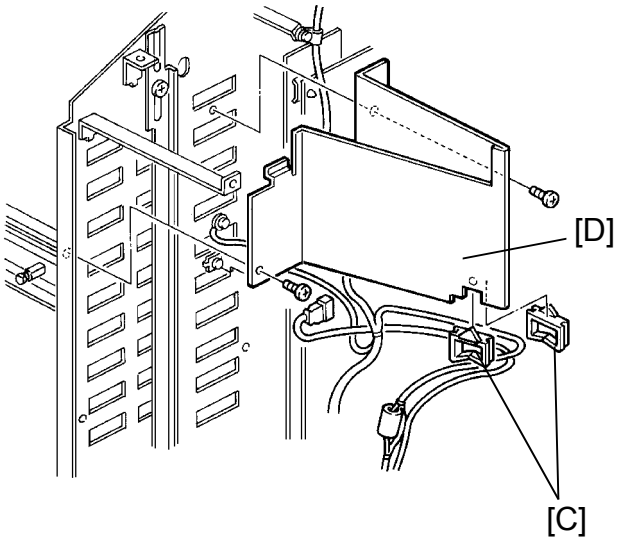



3. Remove the upper rear cover [A] (4 screws).
4. Open the front doors then remove the left inner cover [B] (1 screw).
5. Remove the upper left cover [C].
6. Remove the 5 small caps [D].
7. Remove the 2 portions [E] with cutting pliers as shown.
8. Reinstall the upper left cover [C].

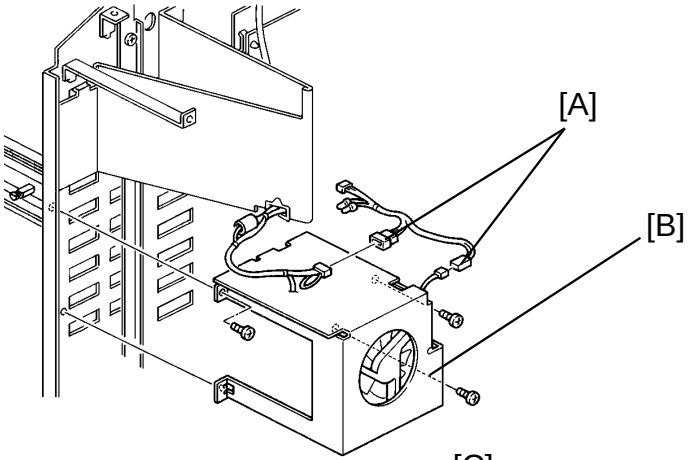


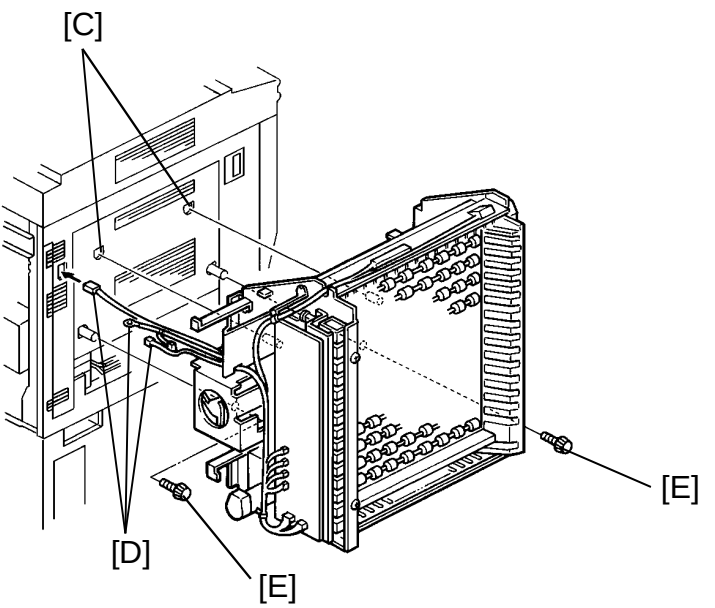

9. Install the studs [A].
10. Install the upper guide plate [B] (2 screws).
11. Install the lower guide plate [C] (2 screws).
12. Remove the sorter top cover [D] (3 screws).
13. Remove the sorter rear cover [E] (4 screws).
14. Remove the sorter front cover (2 screws).



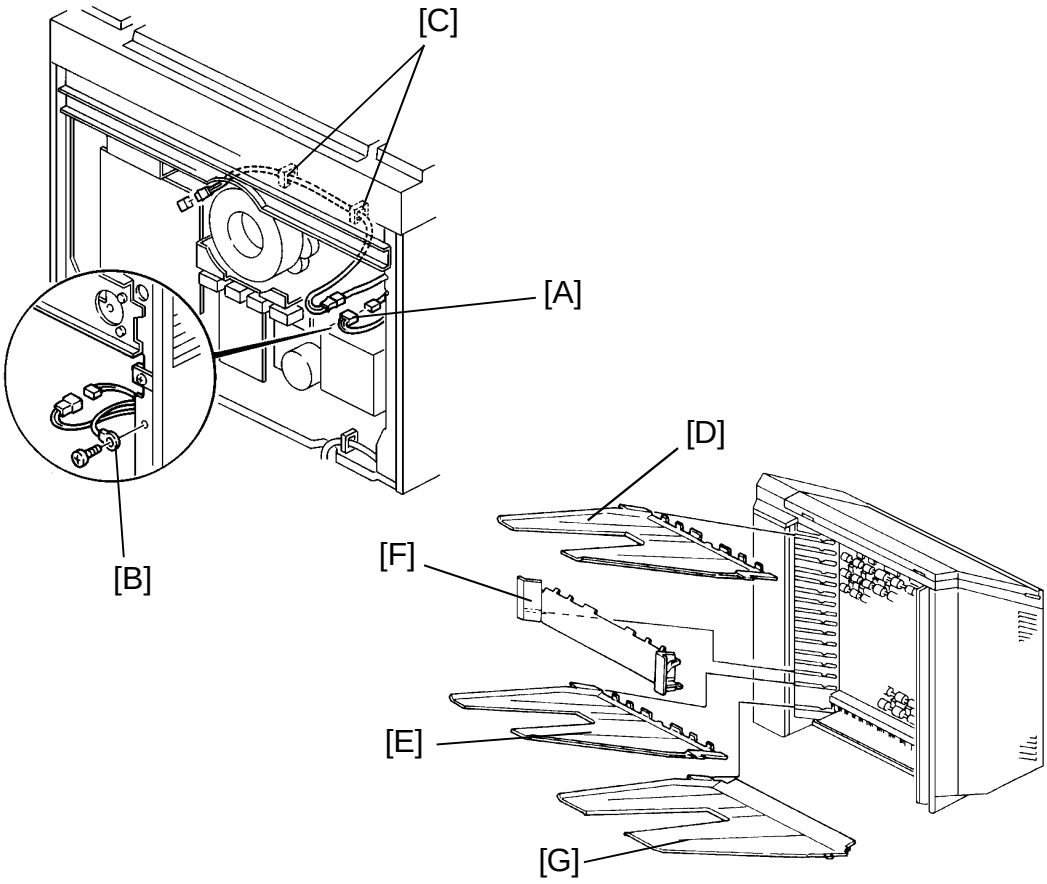




15. Remove the harness clamp [A] (1 screw).
16. Remove the two screws [B].
17. Install the two edge saddles [C] on the air outlet plate [D].
18. Install the plate [D] to the sorter rear frame (2 screws).




19. Connect the connectors [A] of the accessory harness with the connectors from the fan assembly.
20. Install the fan assembly [B] to the sorter rear frame (3 screws and 1 connector).
21. Install the sorter to the main system using holes [C] (Connect the 2 studs of the sorter to the main frame).
22. Insert the sorter harnesses [D] through the hole on the left cover.
23. Fix the sorter to the main frame with two screws (2 knob screws [E]).




24. Remove the protective cover and secure the 4p connector [A].
25. Secure the grounding wire [B]* (1 grounding screw with toothed washer).

    **NOTE*:** For all models other than those intended for North America, the green wire is intended as a functional earth ans should be connected as shown.
26. Install two wire clamps [C].
27. Connect the fiber optics connector to the CN515 of the main control board.
28. Insert the 10 sorter bins [D].
29. Insert the print tray [E] in the 15th slot, then insert and push the bin cover [F] firmly in the 14th slot.

    **NOTE:** The print tray is interchangeable with the sorter bins.
30. Insert the interrupt bin [G].
31. Install all covers on the copier and the sorter.
32. Check the machine operation.

# 4. SERVICE TABLES

## 4.1 TEST POINT

| NUMBER | FUNCTION |
|---|---|
| TP100 | Factory Use |
| TP101 | 24 V |
| TP102 | 5 V |
| TP103 | 0 V (GND) |

## 4.2 LEDs

| NUMBER | FUNCTION |
|---|---|
| LED100 | Lights when the inlet sensor is activated. |
| LED101 | Lights when the entry sensor is activated. |
| LED102 | Lights when the sorter motor speed is corrected in speed adjustment |

## 4.3 DIP SWITCH

| DPS100 | | | | FUNCTION |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | |
| 1 | 0 | 0 | 1 | Free run without paper. |
| 1 | 0 | 0 | 0 | Free run with paper. (Paper feeding check) |
| 1 | 0 | 0 | 0 | |
| 0 | 1 | 0 | 0 | Adjusts the motor speed in High Speed mode by VR101. |
| 0 | 1 | 0 | 1 | Adjust the motor speed in Slow Speed mode by VR100. |

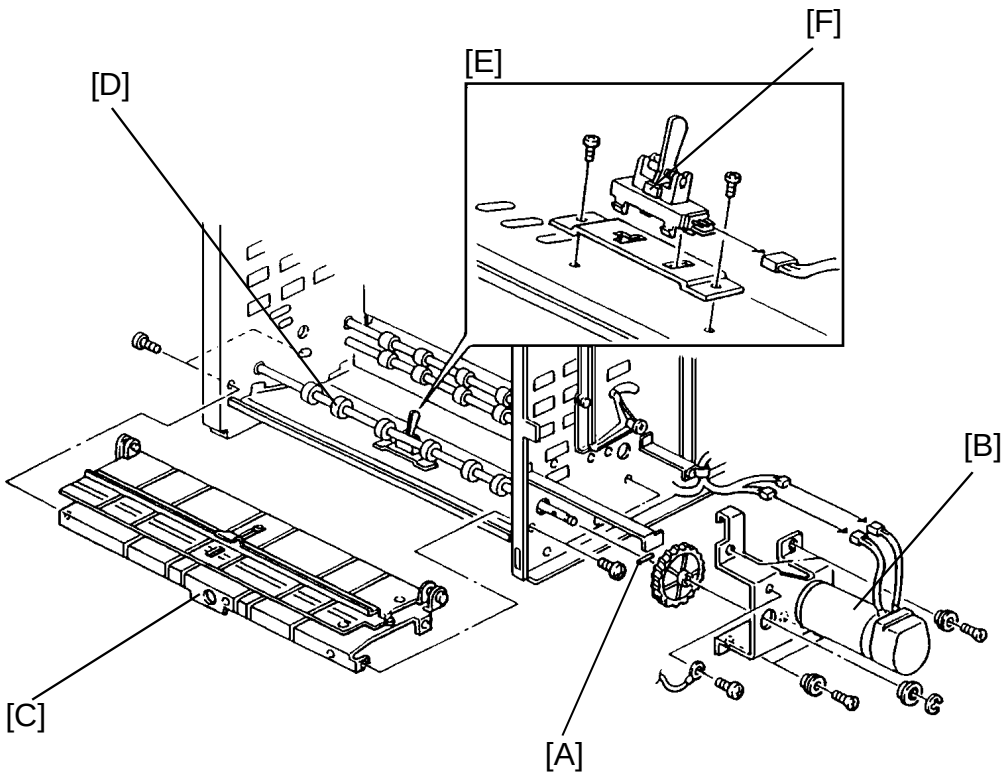
**NOTE:** DIP switches should all be OFF in normal mode.

## 4.4 VARIABLE RESISTORS

| NUMBER | FUNCTION |
|---|---|
| VR100 | Adjusts slow speed of the motor. |
| VR101 | Adjusts high speed of the motor. |

# 5. REPLACEMENT AND ADJUSTMENT

## 5.1 SORTER MOTOR, SPONGE ROLLER, AND INLET SENSOR REPLACEMENT

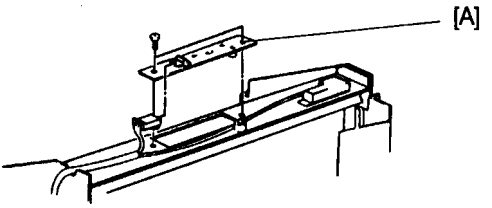



**NOTE:** Be careful not to lose the positioning pin [A].

1. Remove all sorter bins, then remove the sorter from the copier. (See the Sorter Removal section.)
2. Remove the sorter motor [B] (4 screws, E-ring, ground-wire).
3. Remove the inlet guide board unit [C] (4 screws).
4. Remove the roller drive pulley (1 allen-screw) and replace the sponge roller [D].
5. Remove the inlet sensor with the bracket on [E] (2 screws).
6. Pull out the harness and replace the sensor [F].

## 5.2 JAM SENSOR REPLACEMENT

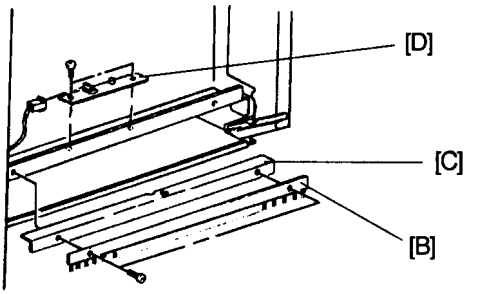
- Entry Sensor Photo-transistor -




1. Turn off the main switch and unplug the machine.
2. Open the sorter cover and remove the upper cover (3 screws).
3. Disconnect the harness from the upper jam sensor board [A].
4. Remove the entry sensor board (2 screws).

**CAUTION: Do not touch the variable resistor mounted on the sensor board; it is factory adjusted.**

- Entry Sensor LED -



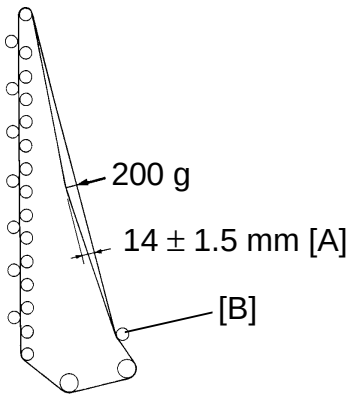

1. Turn off the main switch and unplug the machine.
2. Remove all sorter bins.
3. Remove the antistatic brush [B] and the sensor cover [C] (2 screws).
4. Disconnect the harness from the lower sensor board [D].
5. Remove the entry sensor board (2 screws).

## 5.3 VERTICAL DRIVE ROLLER TIMING BELT ADJUSTMENT

Standard: 14 ± 1.5 mm reflection at 200 g

Measurement: Take the measurement at the center, between the pulley and the belt tightner roller [A].

Part to adjust: Belt tightner bracket [B] (1 screw)




## 5.4 SORTER MOTOR SPEED ADJUSTMENT

**CAUTION: - Always perform the high motor speed adjustment first.**
**- Make sure to check the low motor speed after adjusting the high motor speed.**
**- LED102 takes sometime before responding to the adjustment. Wait 2 to 3 seconds after adjusting the VR, then check LED102.**

1. Remove the sorter upper cover (3 screws).
2. Remove the sorter rear cover (4 screws).
3. Turn on DPS100-2, 4 on the sorter main PCB. By using VR100, adjust the high motor speed so that LED 102 lights on.
4. Turn on DPS100-2 on the sorter main PCB. By using VR101, adjust the low motor speed so that LED102 lights on.

