

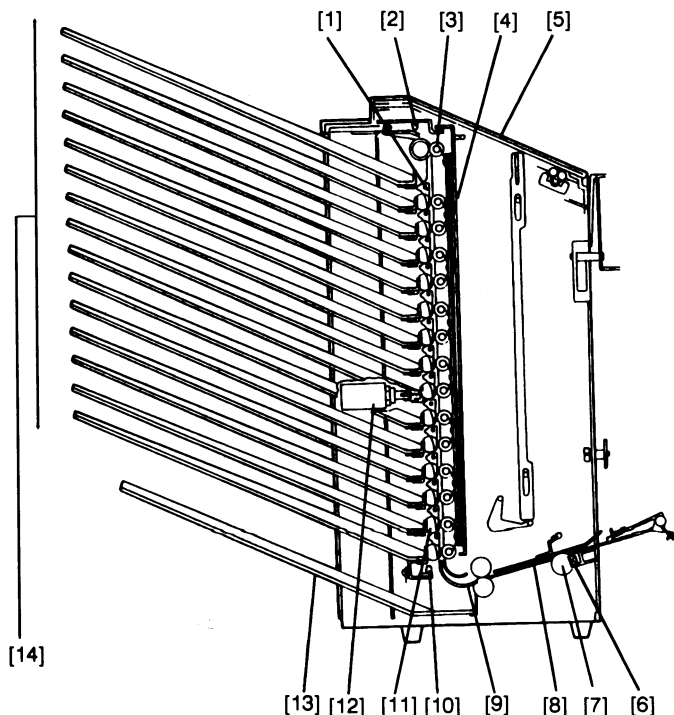
SECTION 14

15 BIN SORTER

1. SPECIFICATIONS

Paper Size for Bins:	Max. 11" x 17" or A3 Min. 8½" x 5½" or A5
Copy Paper Weight:	53 g to 90 g (14 lbs to 24 lbs)
Number of Bins:	15 bins and 1 interrupt bin
Bin Capacity:	Sort---50 sheets/bin Stack---40 sheets/bin
Top Bin Capacity (Clear Mode):	150 sheets
Interrupt Bin Capacity:	100 sheets
Power Source:	100 V/60 Hz (115 V) from copier 100 V/50 Hz (220/240 V) from copier
Power Consumption:	45 W
Dimensions (W x D x H):	499 mm x 535 mm x 600 mm 19.6" x 21.1" x 23.6"
Weight:	23.0 kg (50.7 lbs)

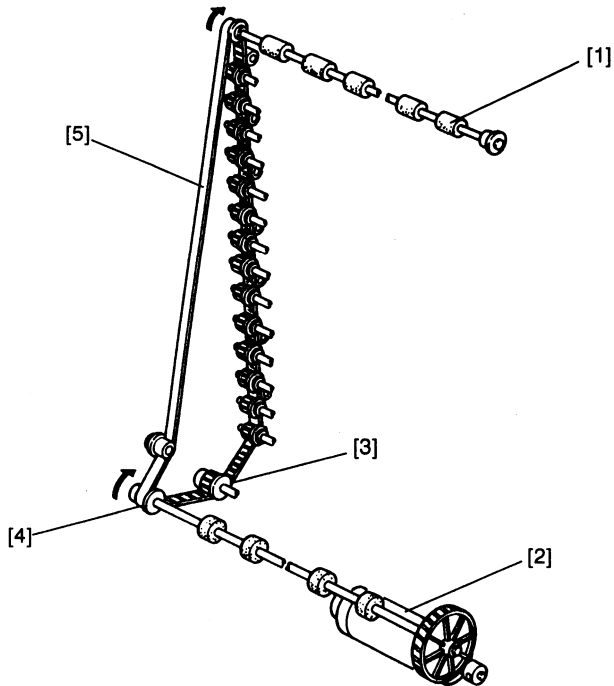
2. MECHANICAL COMPONENT LAYOUT



1. Vertical Drive Rollers
2. Jam Sensor (Photo Tr.)
3. Pressure Rollers
4. Vertical Guide Unit
5. Sorter Cover
6. Inlet Sensor
7. Sponge Roller

8. Relay Guide Plates
9. Turn Gate
10. Jam Sensor (LED)
11. Bin Gates
12. Bin Gate Solenoids
13. Interrupt Bin
14. Standard Bins

3. DRIVE LAYOUT



1. Vertical Drive Rollers (15 rollers)

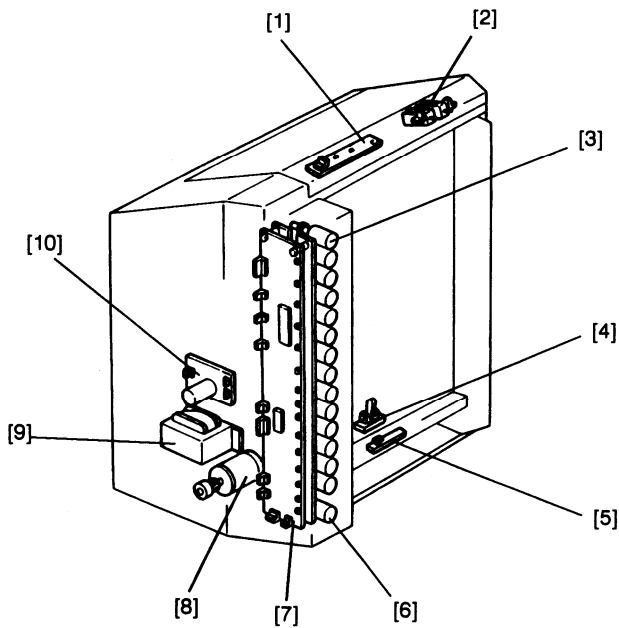
2. Sorter Drive Motor

3. Turn Gate Roller Pulley

4. Sponge Roller Pulley

5. Drive Roller Timing Belt

4. ELECTRICAL COMPONENT LAYOUT



- | | |
|---------------------------------|--------------------------------|
| 1. Jam Sensor (Photo Tr.) | 6. Interrupt Bin Gate Solenoid |
| 2. Sorter Cover Safety Switches | 7. Sorter Main Board |
| 3. Bin Gate Solenoids | 8. Sorter Drive Motor |
| 4. Inlet Sensor | 9. Transformer |
| 5. Jam Sensor (LED) | 10. Power Supply Unit |

5. ELECTRICAL COMPONENT DESCRIPTIONS

NAME	FUNCTION
Sorter Drive Motor	Drives all the sorter's rollers.
Bin Gate Solenoids	Open and close the appropriate bin gates.
Interrupt Bin Gate Solenoid	Opens and closes the interrupt bin gate.
Sorter Cover Safety Switches	Cut dc 5-volt and motor dc lines.
Inlet Sensor Misfeed detector	
Jam Sensor (PT)	Misfeed detector (light receiving element)
Jam Sensor (LED)	Misfeed detector (light emitting element)
Sorter Main Board	Controls all sorter functions.
Power Supply Unit	Rectifies ac 23-volt input and outputs dc voltages.
Transformer	Steps down the copier's ac 100-volt to ac 23-volt.

6. BASIC OPERATION

-Introduction-

Sorter operation begins when the Start key is depressed. At that time, the sorter drive motor turns on and the rollers start turning.

The sorter has two paper transport speeds. When paper first enters the sorter, it is transported at the "slow speed" of 325 mm/s. This is slightly faster than the copier transport speed. When the trailing edge of the paper passes the exit sensor of the copier, the sorter shifts to the "high speed" of 675 mm/s. The high speed not only decreases copy delivery time, but also improves delivery to the bins, preventing jams at the bin entrance due to paper pile up.

After the trailing edge of the copy passes the jam sensor, the sorter motor turns off at the same time as the copier main motor.

-Clear Mode-

The copies pass from the copier 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 third bin, and so on). The appropriate bin gate solenoid turns on when the trailing edge of the previous sheet passes the jam sensor and turns off when the trailing edge of the paper passes the jam sensor.

If 16 or more is entered while in sort mode, the guidance display will indicate that the maximum copy entry is 15 and the Quantity Entered counter will display 15.

When the sorter bin capacity is set to "limit" by using service program mode #76, copying will stop at the maximum bin capacity for sort mode (50 sheets/bin) and the guidance display will indicate that the sorter is full.

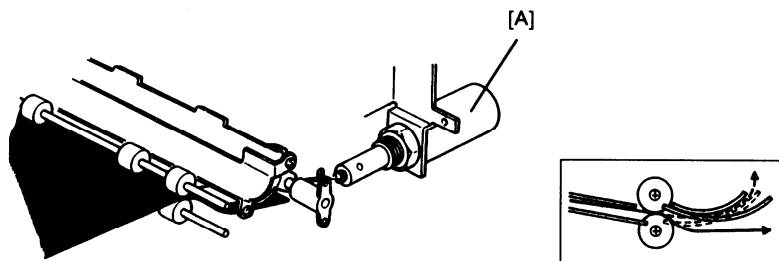
-Stack Mode-

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 depressed again, the entire second run is directed to the second bin. Similarly, the third run goes to the third bin and 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 15 bins. Upon completion of the copy run to the 15th bin, copying will stop and the guidance display will indicate that the sorter is full.

When the sorter bin capacity is set to "limit" by using service program mode #76, the guidance display will indicate that the maximum copy entry is 40 and the Quantity Entered counter will display 40 if the operator enters a number greater than 40 (the maximum bin capacity for stack mode).

-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.

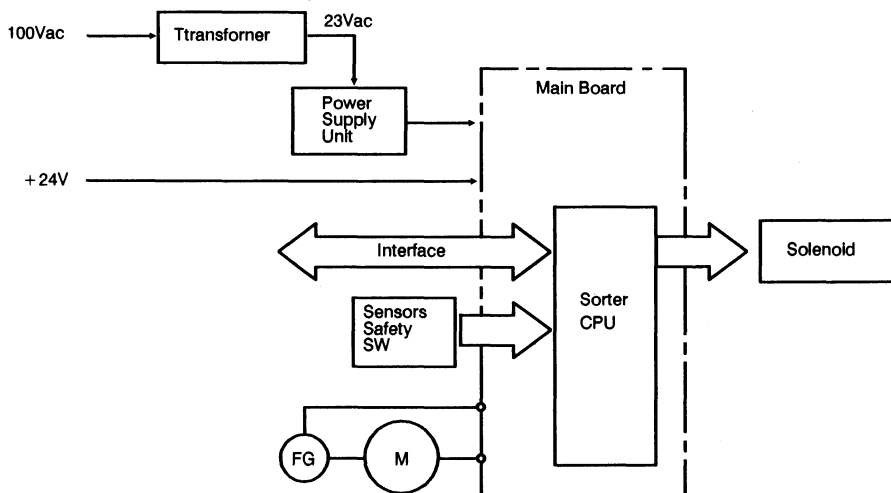
Then, the operator depresses the Start key to make interrupt copies. As each of the interrupt copies enters the sorter, the sorter CPU energizes the interrupt solenoid [A] and the copies are directed to the interrupt bin.

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's Quantity Completed counter so that it displays only the number of copies actually in the top 15 bins. After removing the misfed paper, the misfeed condition is automatically cleared when the sorter cover is opened and closed.

-Control-

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

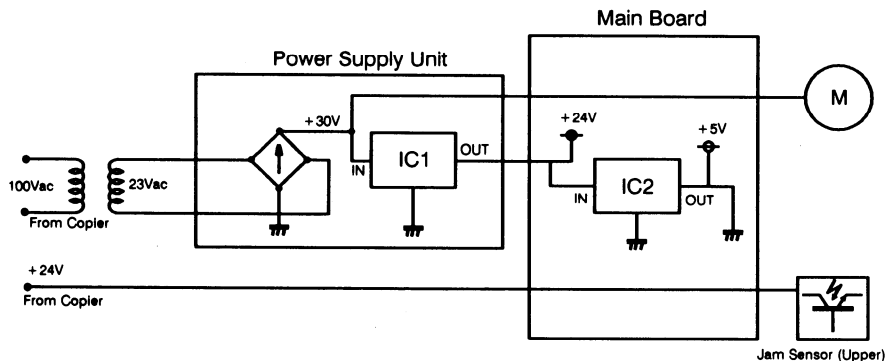
The sorter supplies 100 Vac to the transformer. The transformer changes this 100 Vac to 23 Vac and it is then supplied to the dc power supply unit. The copier also supplies +24 V to the jam sensor through the main board.

Input signals from the sensors and the safety switches are sent to the sorter CPU directly. The sorter CPU operates the bin solenoids and the sorter drive motor.

This sorter uses a dc motor. The motor speed is fixed by using a frequency generator (FG). The dc motor operates at high and low paper transport speeds.

7. FUNCTIONAL AND ELECTRICAL DESCRIPTION

7.1 Power Supply

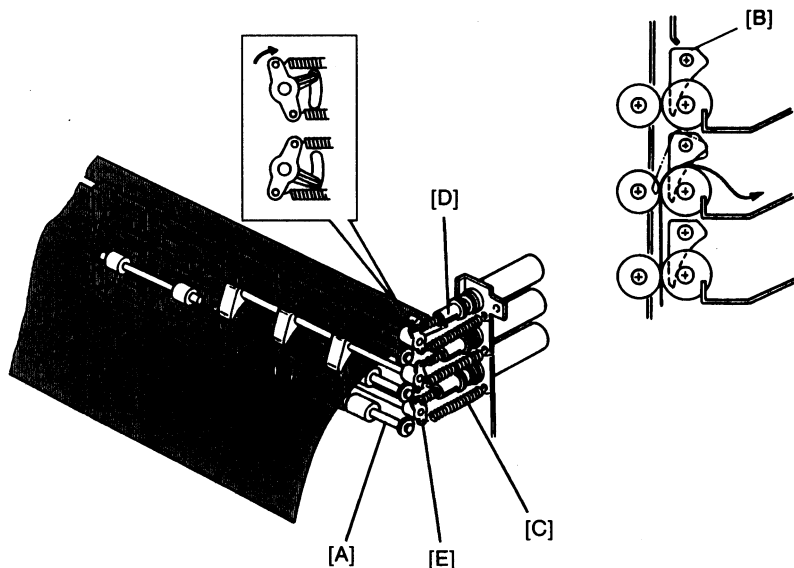


When the copier's main power switch is turned on, the copier supplies 100 Vac to the sorter's inner transformer. The transformer drops it to 23 Vac. This 23 Vac is changed to +24 V (Vs) through the rectifier and the voltage regulator IC (IC1) in the sorter power supply unit. And also, 23 Vac is changed to +30 V (Vm) through the rectifier only. +24 V (Vs) is dropped to +5 V by IC2 in the sorter main board.

+24 V is then supplied to the solenoids and jam sensor (LED), +30 V (Vm) is supplied to the dc motor, and +5 V is supplied to the CPU, the other ICs, and the inlet sensor.

+24 V (Va) is supplied from the copier to the sorter main board. +24 V (Va) is supplied only to the upper jam sensor in order to prevent the sensor from misoperating because of a change of voltage.

7.2 Bin Gate Operation

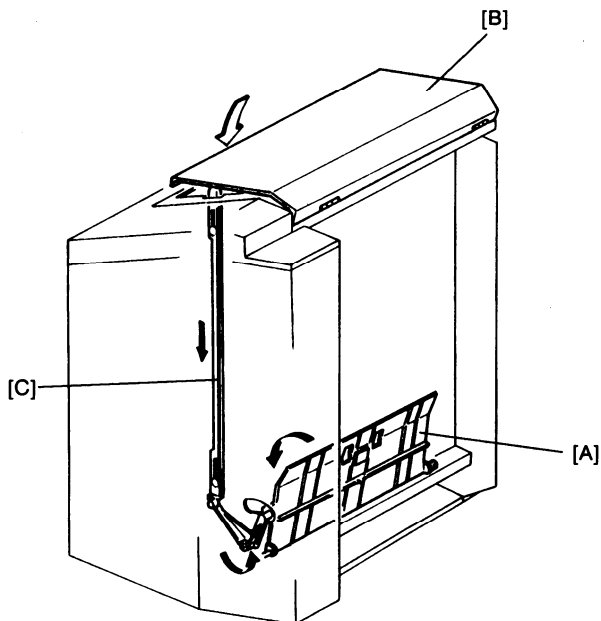


Each bin gate shaft [A] is individually controlled by a solenoid. Normally, the bin gates [B] are held out of the paper path by the return spring [C].

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.

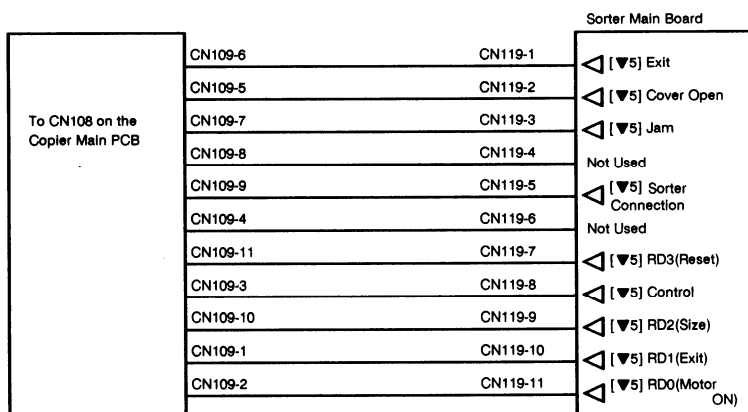
After the paper passes into the bin, the solenoid turns off and the return spring pulls the bin gate lever back to the closed position.

7.3 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.

7.4 Interface with the Copier



The above interface is used for communication between the copier and the sorter. There are 5 lines to send data to the copier, and there are 6 lines to send data to the sorter.

The functions of these lines are as follows:

Table 1

Data direction: from sorter to copier		
Connector No.	Name	Function
CN119-1	Exit	Informs the copier when the copy paper is fed out to the sorter bin.
CN119-2	Cover Open	Informs the copier when the sorter upper cover is opened.
CN119-3	Jam	Informs the copier when a jam occurs in the sorter.
CN119-4		Not used
CN119-5	Sorter Connection	Informs the copier when the sorter is connected to the copier.

Table 2

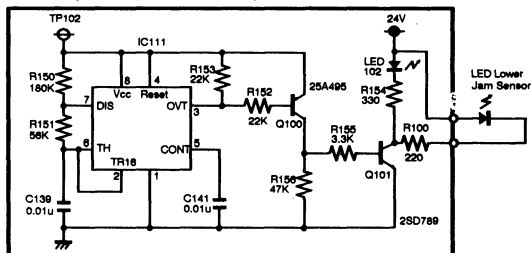
Data direction: from copier to sorter		
Connector	Name	Function
CN119-6		Not used
CN119-7	Reset	Function A: Informs the sorter when SP71 is set to enable the sorter.
CN119-8	* Control	Lets the sorter distinguish between Function A and Function B.
CN119-9	Size	Function A: Informs the sorter of the paper size. (Shorter than 300 mm, or longer than or equal to 300 mm)
CN119-10	Exit	Function A: Informs the sorter when the copier exit sensor is activated.
CN119-11	Motor ON	Function A: Informs the sorter when the copier main motor is ON.
CN119-7 -9 -10 -11	RD3 RD2 RD1 RD0	Function B: Informs the sorter of the appropriate bin number by the combination of the binary states of these 4 signals.

* The control line (CN119-8) switches between HIGH and LOW. When the control line is HIGH, CN119-7, -9, -10, -11 are used for Function A.

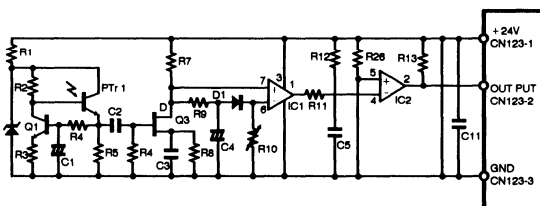
When the control line is LOW, CN119-7, -9, -10, -11 are used for Function B.

7.5 Jam Sensors

Oscillatory Circuit (Sorter Main Board)



Sorter Main Board



The jam sensor detects misfeeds of paper in the sorter.

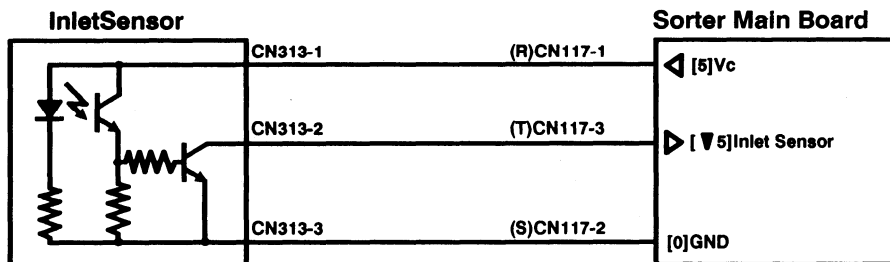
The LED on the lower jam sensor board is turned on by a pulse signal which is supplied by an oscillator.

This pulse signal detection system has an advantage over a photointerruptor system because there is no noise from external light.

When there is no paper between the upper and the lower jam sensors, the LED on the lower jam sensor board activates a phototransistor (PTR1) on the upper jam sensor board. PTR1 turns on Q3, which causes IC1 pin 6 to have a higher voltage than pin 7. IC1 pin 1 then goes LOW. IC2 pin 4 is then lower than pin 5, causing pin 2 of IC2 to output HIGH. This HIGH signal at CN123-2 informs the sorter main board that no paper is present.

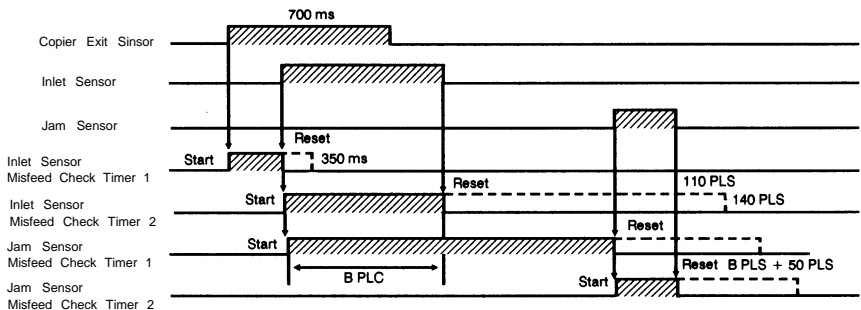
When paper is entering a bin, the phototransistor (PTR1) turns off. This causes the circuit to output a LOW signal to CN123-2. The sorter main board determines that paper is in the bins.

7.6 Inlet Sensor



The inlet sensor is a photointerrupter. When the photointerrupter is not blocked (on), the connected main board pin becomes 0 volts. When the photointerrupter is blocked (off), it sends a high signal to the main board.

7.7 Misfeed Check



The sorter has two sensors which are used to detect misfeeds in the sorter. Also, the exit sensor in the copier is used to check for misfeeds in the sorter. The two sorter sensors each have two misfeed check timers. After each misfeed check timer is set (starts), misfeed check is continuous for the timer period. The timer must be reset within the timer period by the appropriate sensor going either ON or OFF as shown in the following table. If the timer is not reset within the timer period, the sorter CPU determines that there has been a misfeed and it energizes the interrupt solenoid to allow the remaining copies to go to the interrupt pin.

Name	Timer Set	Timer Reset	Timer period
Inlet Sensor Misfeed Check Timer 1 (ON Check)	Copier's exit sensor ON	Inlet sensor ON	350 ms (*1)
Inlet Sensor Misfeed Check Timer 2 (OFF Check)	Inlet sensor ON	Inlet sensor OFF	110 pulses (For paper shorter than 300 mm) 140 pulses (For paper longer than or equal to 300 mm)
Jam Sensor Misfeed Check Timer 1 (ON Check)	Inlet sensor ON	Jam sensor ON	A pulses (*2)
Jam Sensor Misfeed Check Timer 2 (OFF Check)	Jam sensor ON	Jam sensor OFF	B + 50 pulses (*3)

*1 Time control, not pulse control, is used for only this period because the pulse count for the period changes greatly due to the high and low paper transport speeds.

*2 "A pulses" depends on which bin the paper is going to. For the first bin, this period is 202 pulses.

*3. "B pulses" is the length of time that the inlet sensor is ON. This period is uncertain because it depends both on the length of the paper and the amount of paper slippage.

8. INSTALLATION

8.1 Accessory Check

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

Installation Procedure.....	1
NECR	1
Bin	15
Interrupt Bin	1
Stud	2
Grounding Screw.....	1
Toothed Screw	1
Sorter Adapter	1
Screw - M4 x 6	2
Multiple Language Decal (220/240V only)	1
Envelope - NECR (115V only)	1

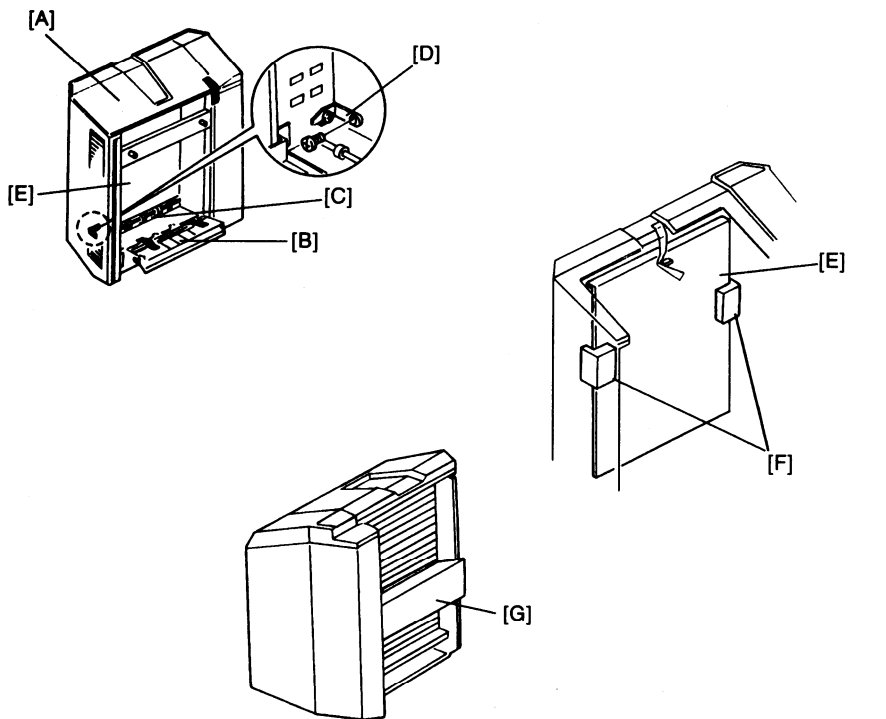
Note: Some older copiers may have incompatible EPROMs. When the sorter cannot be enabled by setting SP71, check the EPROMs on the copier main board and the operation panel board. If the copier uses the following EPROM part numbers, they must be changed.

A007 5103	EPROM-IC 103 on the main board
A007 5145	EPROM-IC 821 on the operation panel board
A007 5146	EPROM-IC 822 on the operation panel board
A007 5147	EPROM-IC 823 on the operation panel board

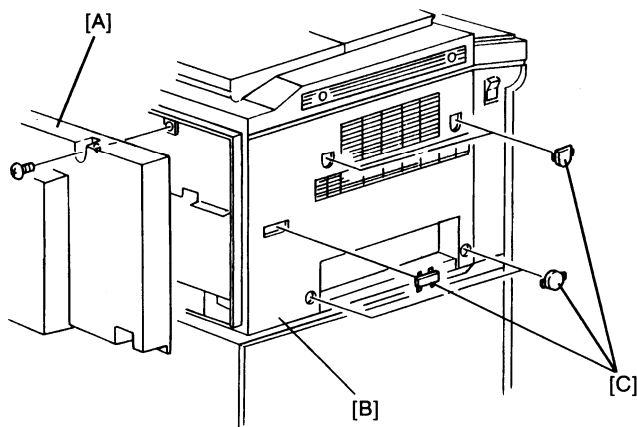
The new EPROMs can be ordered as a set.

A007 9502 15 bin Sorter ROM kit

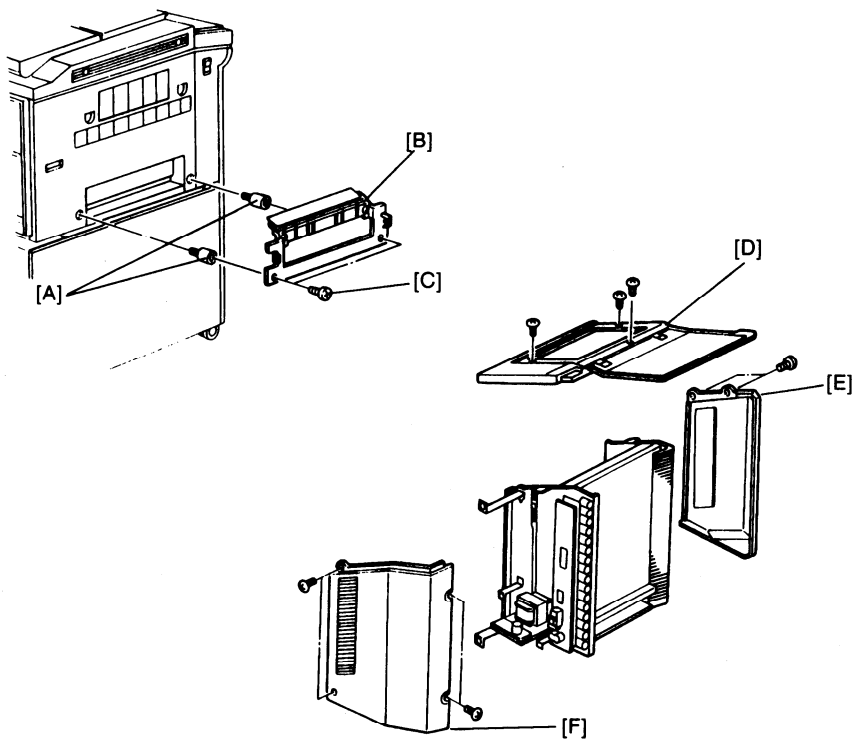
8.2 Installation Procedure



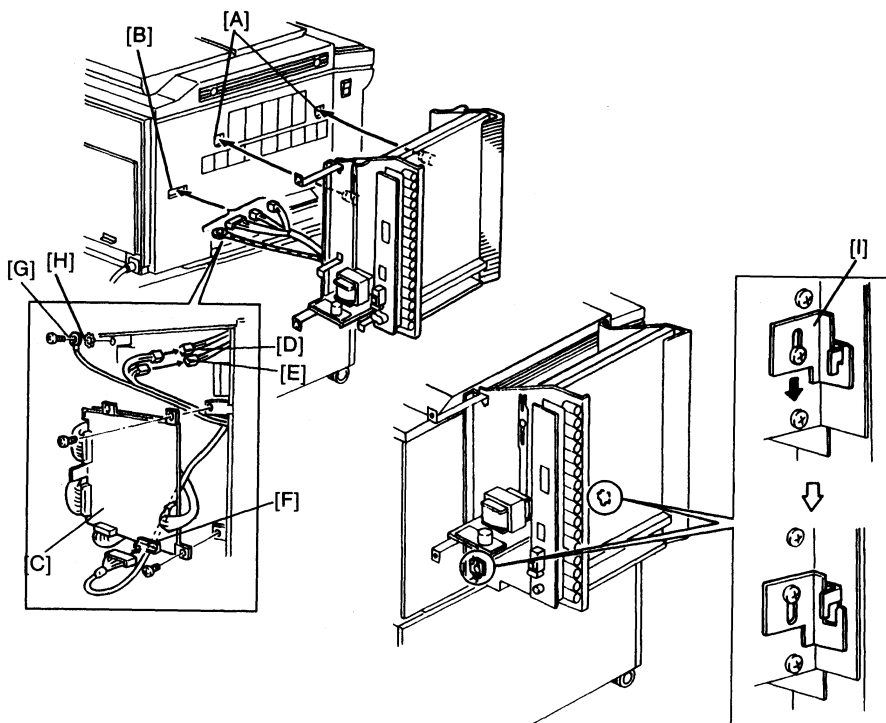
1. Remove the tape holding the upper cover [A].
2. Remove the two strips of tape holding the relay guide plates [B] and take out the cushion block [C].
3. Remove the shipping retainer [D] from the bottom of the vertical guide unit [E] (1 screw).
4. Open the upper cover and remove the tape holding the vertical guide unit [E].
5. Take out the two cushion blocks [F] holding the vertical guide unit and the shipping retainer [G].



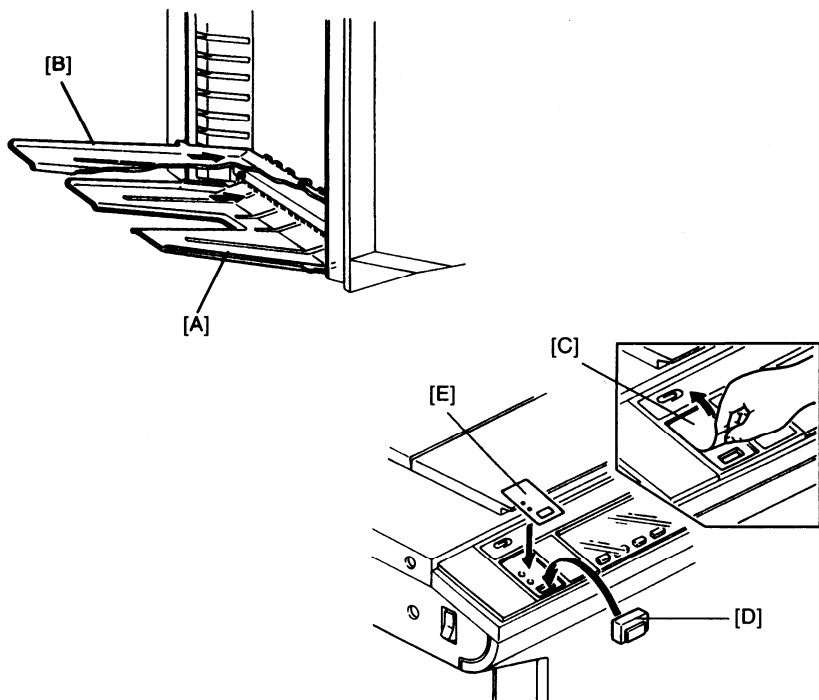
6. Turn off the main switch of the copier.
7. Remove the rear [A] and left covers [B] of the copier (6 screws).
8. Remove the 5 plastic caps [C] from the docking holes.
9. Remount the left cover.



10. Screw in the two mounting studs [A], then install the sorter adapter [B] with two screws [C].
11. Remove the upper cover [D] (3 screws).
12. Remove the front [E] and rear covers [F] of the sorter (6 screws).



13. Mount the sorter on the copier through the docking holes [A].
14. Pass the sorter's harnesses through the rectangular docking hole [B].
15. Remove the main board shielding plate (2 screws) and swing the board [C] to the left (2 screws), then connect the red 2P connector [D] to the red 2P free connector and the white 4P connector [E] to the white 4P free connector.
16. Connect the harness from the sorter to CN108 [F] on the main board. Secure the ground wire [G] as shown (toothed washer [H] is also installed for the European version).
17. Secure the sorter to the sorter adapter by fixing the brackets [I] while lifting them up (1 screw each).
18. Remount the upper, front, and rear covers.



19. Install the interrupt bin [A]. Then starting from bottom to top, install the other bins [B] as shown.

Note: Make sure that the bins lock in place when they are installed.

20. Peel off the panel cover [C] at the left end of the operation panel.

21. Install the sorter/stack key top [D] (copier accessory) and stick down the sorter/stack key cover [E] (copier accessory).

22. Set SP 71-2 to enable the sorter. (Refer to the copier installation procedure for SP access-ing.)

23. Check the sorter's operation.

9. SERVICE TABLES

1. LEDs

The 3 LEDs on the sorter main board indicate signals as follows:

LED NO.	Lights when sensor below is activated.
LED 100	Jam Sensor Upper (Photo Tr)
LED 101	Inlet Sensor
LED 102	Jam Sensor Lower (LED)

2. Dip Switch

The dip switch on the sorter main board has three functions as follows:

DIP SW				MODE
1	2	3	4	
1	0	0	1	Free Run
1	0	0	0	Paper Transport Test (For paper shorter than 300 mm)
1	1	0	0	Paper Transport Test (For paper shorter than 300 mm)

1: ON 0: OFF

Note: When using the paper transport test mode, SP71 must be set to "0".

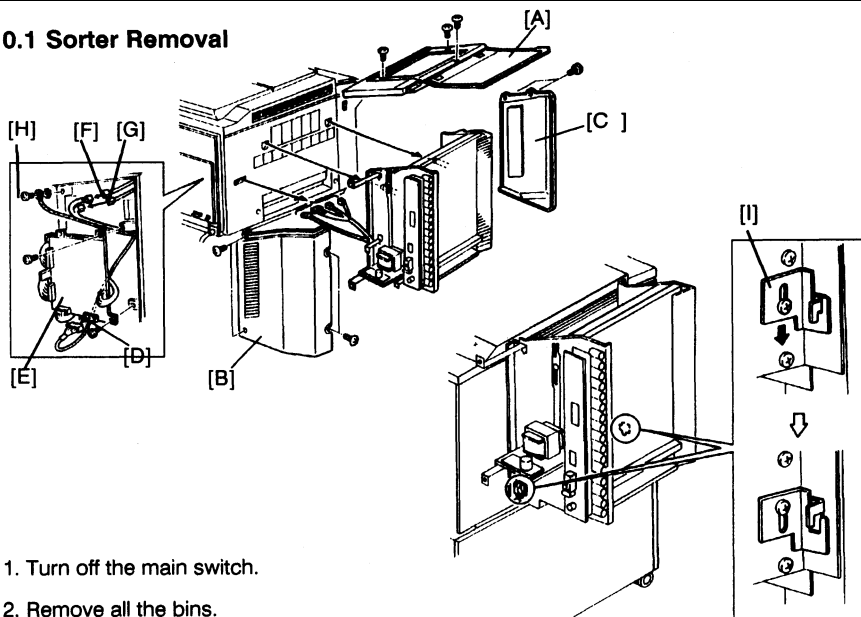
3. Service Program Mode

Three sorter functions can be accessed from the copier by using the SP mode. (Refer to the copier manual's "SERVICE PROGRAM MODE OPERATION" for the SP access procedure.)

Mode No.	Function	Date	Factory Setting	Comments
28: Sort Priority	Sort Mode is automatically selected when more than 1 original is set on the DF table and the entered copy quantity is from 2 to 15.	0: Normal 1: Sort	0	Sorter and DF must be installed on the machine.
71: Sorter/Finisher Operation	Enables sorter or finisher operation.	0: NO 1: S20 2: S15 3: F.H	0	S20 = Midi sorter S15 = 15 bin sorter F.H = Finisher
76: Sorter Bin Capacity	Stops copying at the stack and sort mode bin capacity limit. Indicates the maximum entry number (40) on the guidance display in stack mode and sort modes.	0: No limit 1: Limit	0	Limit = 50 sheets/bin in sort mode Limit = 40 sheets/bin in stack mode.

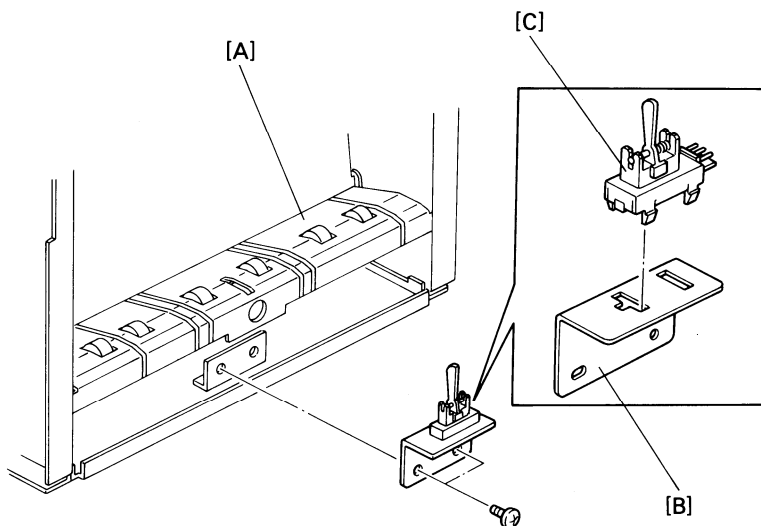
10. REPLACEMENT AND ADJUSTMENT

10.1 Sorter Removal



1. Turn off the main switch.
2. Remove all the bins.
3. Remove the rear cover of the copier (4 screws).
4. Open the sorter cover and remove the upper cover [A] of the sorter (3 screws).
5. Remove the front [B] and rear covers [C] of the sorter (6 screws).
6. Remove the copier main board shielding plate (2 screws).
7. Disconnect the sorter harness from CN108 [D] on the copier main board [E].
8. Swing the copier main board to the left (2 screws) and disconnect the red 2P connector [F] and the white 4P connector [G].
9. Remove the ground wire [H] from the copier (1 screw).
10. Loosen the screws (front and rear, one each) securing the fixing brackets [I], and slide the brackets down.
11. Remove the sorter from the copier.

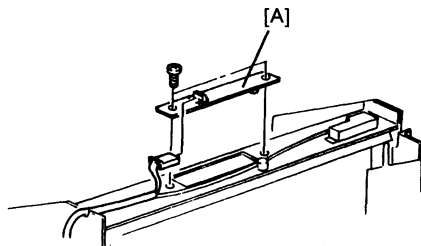
2. INLET SENSOR REPLACEMENT



1. Turn off the main switch.
2. Remove the sorter from the copier. (See Sorter Removal.)
3. Disconnect the harness from the inlet sensor board installed under the lower relay guide plate [A].
4. Remove the inlet sensor bracket [B] with the inlet sensor [C] (2 screws).
5. Remove the inlet sensor from the bracket.

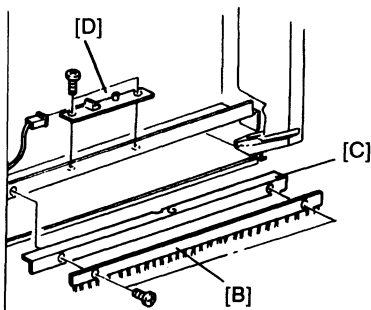
10.3 Jam Sensor Replacement

*Upper Jam Sensor (Photo-transistor)



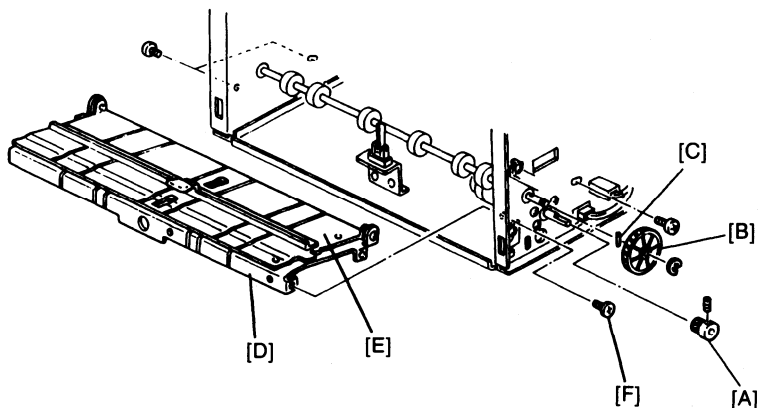
1. Turn off the main switch.
2. Open the sorter cover and remove the upper cover (3 screws).
3. Disconnect the harness from the upper jam sensor board [A].
4. Remove the upper jam sensor board (2 screws).

*Lower Jam Sensor (LED)



1. Turn off the main switch.
2. Remove the interrupt bin and the 15th bin.
3. Remove the antistatic brush [B] and the sensor cover [C] (2 screws).
4. Disconnect the harness from the lower jam sensor board [D].
5. Remove the lower jam sensor board (2 screws).

10.4 Sponge Roller Replacement



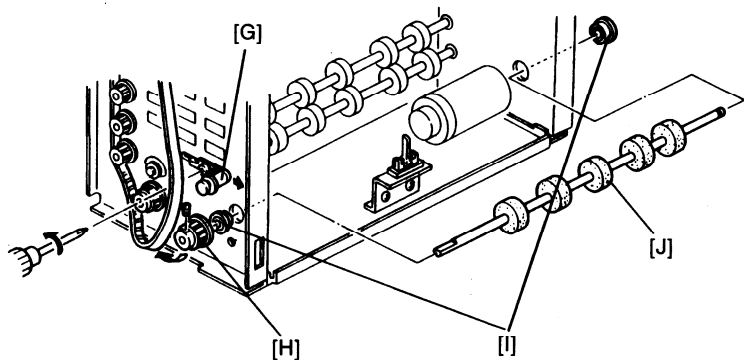
1. Turn off the main switch.
2. Remove the sorter from the copier. (See Sorter Removal.)
3. From the sorter rear side, remove the motor drive pulley (1 Allen screw); then, remove the gear [B] of the sponge roller shaft (1 E-ring) and the parallel pin [C].

Note: Be sure not to lower the parallel pin.

4. Remove the lower guide plate [D] with the upper guide plate [E] (2 screws each from the front and rear sides).

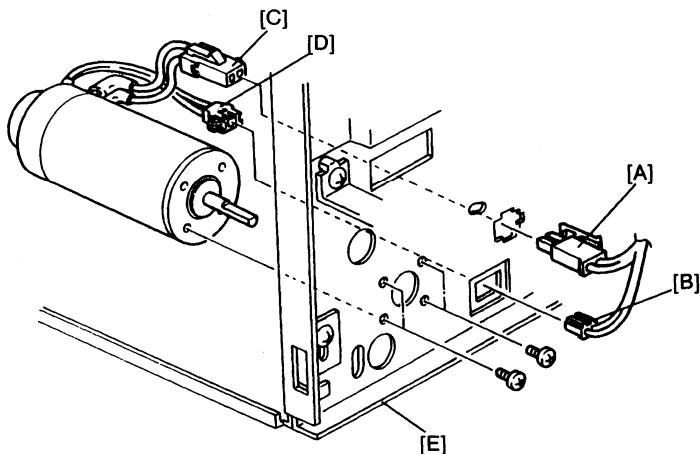
Note:

- Be sure not to damage the inlet sensor when removing the guide plate.
- One of the rear side screws is a flat head screw [F].



5. From the sorter front side, release the belt tightener bracket [G] (1 screw).
6. Remove the sponge roller drive pulley [H] (1 Allen screw).
7. Remove the roller bearings [I] from the front and the rear of the roller shaft.
8. Replace the sponge roller [J].

10.5 DC Motor Replacement



1. Turn off the main switch.
2. Remove the lower guide plate with the upper guide plate. (See Sponge Roller Replacement steps 1 to 4.)
3. Disconnect the main board motor harness [A] and FG harness [B], then remove the motor harness [C] and FG harness [D] from the rear side plate [E].
4. Remove the dc motor from the rear side plate (4 screws).