DUPLEX AND LCT UNIT

1. OVERALL MACHINE INFORMATION

1.1 SPECIFICATION

Configuration:

LCT Table or Duplex and LCT Table

Copy Paper Size:

	Duplex	LCT
Maximum	11" x 17"/A3	10" x 14"/B4
Minimum	81/2" x 51/2"/A5 sideways	81/2" x 11"/A4

Copy Paper Weight:

	Duplex	LCT
Paper	17 ~ 28 lb/	17 ~ 28 lb/
Weight	64 ~ 105 g/m²	64 ~ 105 g/m²

Copy Paper Capacity:

	Duplex	LCT
Paper Capacity	50 copies (81/2" x 11"/A4 or smaller)	approximately 1,000 sheets
	30 copies (11" x 17"/A3, 10" x 14"/B4)	

Paper Feeding System: FRR system

Power Source:

DC 24 V and 5 V from the copier

Power Consumption:

	Duplex and LCT	LCT
Maximum	79 W	17 W
Average	43 W	16 W

Dimensions (W x D x H):

Duplex and LCT	LCT
27.6" x 25.8" x 15.7"/700	mm x 655 mm x 400 mm

Weight:

	Duplex and LCT	LCT
Weight	Less than 127 lb/58 kg	Less than 110 lb/50 kg



1.2 MECHANICAL COMPONENT LAYOUT

- 1. Relay Pinch Roller
- 2. Inverter Roller
- 3. Fork Gates
- 4. Duplex Transport Rollers
- 5. Duplex Positioning Roller
- 6. Actuator Roller
- 7. Duplex Pick-up Roller

- 8. Duplex Paper Feed Roller
- 9. Duplex Separation Roller
- 10. LCT Separation Roller
- 11. LCT Paper Feed Roller
- 12. LCT Pick-up Roller
- 13. Return Pinch Roller
- 14. Inver Entrance Gate

1.3 ELECTRICAL COMPONENT DESCRIPTION

SYMBOL	NAME	FUNCTION	INDEX No.
Motors			
M1	Duplex/LCT Motor	Drives all mechanical components in the duplex and LCT units.	12
M2	Tray Motor	Raises and lowers the LCT bottom plate.	4
M3	Jogger Motor	Drives the jogger plates to keep paper evenly stacked on the duplex tray.	21
Magnetic Clu	utches		
MC1	Duplex Drive Clutch	Transmits the drive to the duplex unit	23
MC2	Duplex Paper Feed	Feeds the paper from the duplex tray.	16
MC3	LCT Paper Feed Clutch	Feeds the paper from the LCT.	14
MC4	Relay Clutch	Turns the relay rollers.	17
Solenoids	1	I	
SOL1	Relay Pinch Roller Solenoid	Separates the relay pinch roller from the inverter roller.	29
SOL2	Duplex Entrance Gate Solenoid	Energizes to direct the paper to the duplex unit.	30
SOL3	Lock Solenoid Duplex	Prevents the duplex unit from being pulled out in operation.	13
SOL4	Fork Gate Solenoid	Opens and closes the appropriate fork gates according to the paper size.	27
SOL5	Fork Gate Solenoid 2	Opens and closes the appropriate fork gates according to the paper size.	26
SOL6	Duplex Position Roller Solenoid	Lowers the positioning roller.	20
SOL7	Duplex Pick-up Solenoid	Controls the up-down movement of the duplex pick-up roller.	19
SOL8	Duplex Stopper Solenoid	Stops the paper in the jogger unit.	18
SOL9	LCT Pick-up Solenoid	Controls the up-down movement of the LCT pick-up roller.	28
Switches		<u> </u>	<u> </u>
SW1	Right Lower Door Switch	Cuts the dc power when the right lower door is opened.	6
SW2	Lower Tray Button Switch	Lower the LCT bottom plate.	3
SW3	Upper Limit Switch	Cuts the signal line of the tray up.	2

SYMBOL	NAME	FUNCTION INDEX No.	
Sensors	•		
S1	Inverter Entrance Sensor	Detects misfeed.	33
S2	Inverter Exit Sensor	Detects misfeed.	32
S3	Left Lower Door Safety Sensor	Informs the CPU when the left lower door is closed.	31
S4	Duplex Unit Sensor	Informs the CPU when the duplex unit is set.	24
S5	Jogger Home Position Sensor	Informs the CPU when the jogger plates are at home position.	22
S6	Tray Lower Limit Sensor	Informs the CPU when the LCT bottom plate reaches the lower limit position.	11
S7	Tray Upper Limit Sensor	Informs the CPU when the LCT bottom plate reaches the upper limit position.	10
S8	Upper Relay Sensor	Detects misfeed.	9
S9	Lower Relay Sensor	Detects misfeed.	8
S10	Duplex Entrance Sensor	Detects misfeed.	15
S11	LCT Paper End Sensor	Informs the CPU that there is no paper in the LCT.	7
S12	Duplex Paper Sensor	Detects whether or not paper is in the duplex tray.	5
S13	Paper Size Sensor	Detects the paper size.	1
PCBs	1		
PCB1	Tray DC Drive Board	Controls all electrical components in the duplex and LCT unit.	25

2. DETAILED SECTION DESCRIPTIONS

2.1 DUPLEX

2.1.1 Paper Inversion



In the duplex mode, paper passes through the copier inverter unit and then goes into the duplex inverter section.

When the paper reaches the fusing exit sensor, the relay pinch roller solenoid [A] is de-energized. The relay pinch roller [B] is pressed against the inverter roller [C]. The paper is sent to the lower section.

When the paper passes the copier inverter entrance sensor, the duplex entrance gate solenoid [D] is energized.

The return pinch roller [E] feeds the paper back and the duplex entrance gate [F] directs the paper to the duplex unit.

2.1.2 Duplex Transport



After the copy is reversed in the inverter unit, it comes to the duplex transport section. The duplex transport unit [A] carries the copy from the inverter unit to the appropriate gate in the fork gate unit [B]. The CPU opens the gate corresponding to the copy paper size. The copy paper passes through the gate and is transported to the jogger unit [C].

2.1.3 Fork Gate Mechanism





NOTE: Numbers circled within solenoid indicate sequence of solenoid operation.

The fork gate unit has four gates [A] through which copy paper passes to the duplex tray. Two solenoids [B, C], working together, create any of five separate states for the fork gates. (See the figure.)

	Sol. 1 [B]	Sol. 2 [C]	Paper Size
[D]	OFF	OFF	11" x 17"/A3
[E]	ON	OFF	81/2" x 14"/B4
[F]	OFF	ON	81/2" x 11"/A4 (L)
[G]	$OFF \Rightarrow ON$	ON	11" x 81/2"/A4
[H]	ON	$OFF \Rightarrow ON$	81/2" x 51/2"/A5



Black arrows indicate initial movement.

2.1.4 Drive Mechanism



When the duplex unit is set, the duplex drive gear [A] engages with the duplex gear [B]. The rotation of the duplex/LCT motor is transmitted to the duplex unit through the duplex drive clutch [C].

The duplex paper feed clutch gear then turns through the idle gear. The duplex paper feed clutch [D] controls the transmission of the rotation to the duplex paper feed [E], reverse [F], and pick-up rollers[G].

This drive is also transmitted to the duplex entrance roller gear [H] through gears and timing belts. All duplex transport rollers [I] are turning.

Drive is then transmitted back to the LCT via the duplex inverter drive gear [J], and turns the inverter rollers.

2.1.5 Duplex Stacking



Paper is stacked in the duplex tray, which consists of the duplex delivery tray [A] and the jogger unit [B].

The duplex delivery tray transports paper from the fork gate unit to the jogger unit. The duplex delivery tray is ribbed to achieve precise stacking of paper in the duplex tray.

The jogger unit consists of a drive motor [C], jogger fences [D], duplex settlers [E], a positioning roller [F], and duplex stoppers [G]. All these components work together to achieve proper stacking of paper in the duplex tray.

When the Start key is pressed, the CPU reads the cassette paper size coding and the jogger fences are positioned 15 mm from either side of the copy paper. As paper enters the duplex tray, it is positioned under the duplex settlers. The positioning roller (made of sponge) rotates and pushes the paper up against the duplex stoppers to correct paper skew. The positioning roller is then lifted, and the jogger fences move inwards to square the stack every time a sheet enters the duplex tray.

2.1.6 Jogger Drive Mechanism



Both the front [A] and rear [B] fences of the jogger unit are attached to the same wire [C]. The jogger drive pulley [D] is mounted on the jogger motor shaft. When the jogger drive pulley turns, both fences move the same distance in opposite directions. The jogger home position sensor [E] informs the CPU when the jogger is at the home position.

In duplex mode, when the Start key is pressed, the jogger fences are driven outward by the stepper motor, and the sensor actuator plate [F] slides through the slot of the jogger home position sensor to the reference home position. After the home position is referenced, the jogger fences move inward and the stop position is determined by the paper size (cassette code).

2.1.7 Duplex Positioning Roller



-- Drive Mechanism --

The duplex positioning roller [A] is driven by the main drive belt. Power is transferred from the main drive belt to the positioning roller through the positioning roller pully [B], the positioning drive shaft [C], the positioning roller pulley [D], and the rubber belt.

-- Up and Down Mechanism --

The positioning roller release spring [E] lifts the positioning roller 7 millimeters (0.29") above the jogger bottom plate and holds it in this position so that it does not interfere with the lateral stacking process. When a sheet is fed into the duplex tray, the positioning roller solenoid [F] energizes, pulling the positioning roller down to fully advance the copy paper up to the duplex stopper.

2.1.8 Duplex Tray Sensors



Duplex Entrance Sensor

When paper enters the duplex tray, the positioning roller bracket [A] is in the low position and the actuator roller [B] is resting on the jogger bottom plate. When the paper passes under the actuator roller, the friction of the paper turns the actuator roller. This rotation moves the entrance actuator [C] up and down, actuating the entrance sensor.

There are several slots in the entrance actuator [C] that activate the sensor [D] successively when the actuator roller rotates. If there are more than two changes (ON - OFF - ON or OFF - ON - OFF) during the checking period, the CPU determines that paper has entered the duplex tray.

Duplex Paper Sensor

When there is copy paper in the duplex tray, the paper actuator [E] is moved up and away from the duplex paper sensor [F], which activates the photointerrupter ($5V \rightarrow 0V$). This informs the CPU that paper is in the duplex tray. When the last sheet of paper has entered the duplex tray, the CPU checks the duplex paper sensor signal and lights the second original instructions in the guidance display.



2.1.9 Duplex Stopper and Pick-up Roller Mechanism

The pick-up roller bracket is lifted up by the rear most duplex stopper [A]. Both the duplex stopper and the pick-up roller [B] are moved by solenoids.

When paper is being fed, the duplex stopper solenoid [C] is energized and the stoppers are lowered. The pick-up roller bracket rotates downward and the pick-up roller drops onto the copy paper. The duplex pick-up solenoid [D] is energized 160 milliseconds after the duplex feed clutch turns on. Paper feed then begins. The pick-up roller stays in contact with the paper during paper feed.

2.2 LCT (Large Capacity Tray)

2.2.1 LCT Drive Mechanism



Drive from a reversible motor [A] is transmitted through a worm gear [B] to the drive pulley [C] shaft. The tray wires have metal hooks on them. These hooks are set to the stays [D] of the bottom plate, so, when the drive pulley turns (clockwise, rear view), the hooks on the wires move the tray upward. The tray goes up until the upper limit sensor [E] is actuated by the top sheet pushing up the pick-up roller [F].

To lower the tray, the pulley turns counterclockwise until the lower limit sensor [G] is actuated by the actuator of the bottom plate [H].

2.2.2 Tray Lock Mechanism



When the tray is set, it is positioned by the lock arm [A]. The roller of the lock arm presses against the lock plate [B]. And the lock lever [C] engages the tray stopper [D] to prevent the tray from being opened or pulled out while the tray is in the up position.

When the tray moves to the down position, the tray bottom plate pushes the lock lever. The tray stopper is disengaged and it is allowing the tray to be pulled out.



When the tray is pulled out, the pick-up release lever [A] is turned and the pick-up roller [B] is then lifted up.

At the front side of the tray, there is the paper end feeler lift-up mechanism [C]. When the tray is pulled out, the paper end release lever [D] turns and the paper end feeler [E] is lifted up.

These prevent the pick-up roller and the paper end feeler from hitting the tray rear frame, when the tray is pulled out.

2.2.3 Paper End Detection



When paper is in the tray, the paper lifts the paper end actuator [A] up. When the paper runs out, the paper end actuator falls through a hole in the bottom plate and other end of the actuator activates the paper end sensor [B]. The Add Paper indicator then lights.

2.2.4 Paper Size Detection



The rear side fence [A] and the front side fence [B] can be moved to change the paper size.

The array of five photointerrupters [C] installed at the front side of the tray detects the paper size.

Each paper size has its own unique combination of notches in the paper size plate [D].

The CPU reads which photointerrupters have been de-activated by the paper size plate to determine which paper size has been set.

Whenever both front and rear side fences are moved for changing paper size, this paper size plate should also be moved to the proper position.

2.2.5 Paper Feed Drive Mechanism

The rotation of the duplex/LCT motor [A] is transmitted to the paper feed drive and the duplex unit drive via gears and a timing belt.

The tray paper feed clutch [B] controls the drive transmission to the paper feed roller [C], reverse roller [D] and pick-up roller [E].

The relay clutch [F] controls the drive transmission to the relay rollers.

3. INSTALLATION

3.1 ACCESSORY CHECK

1. Installation Procedure (115 V version only)	1 pc
2. NECR (115 V version only)	1 pc
3. Envelope for NECR (115 V version only)	1 pc
4. Philips Tapping Screw M4 x 8	1 pc



- 1. Remove the strips of filament tape [A] from the LCT and Duplex Unit.
- 2. Pull out the duplex tray and remove the filament tape [B] and cushion [C].
- 3. Remove the rear cover [D] (3 screws) and rear side covers [E] (2 screws each).
- 4. Remove the shipping retainers [F] (1 screw each).
- 5. Place the copier on the unit by using the lift handles [G]. Make sure the pegs [H] fit into the copier's peg holes.



- 6. Remove the copier's rear lower cover (4 screws) and the base cover bracket [A] (2 screws).
- 7. Connect the 3 connectors to the copier's main PCB [B], and secure the harness in the clamps [C] as shown.
- 8. Secure the ground wire [D] (1 M4 x 8 philips tapping screw).
- 9. Push the lift handles [E] back in the copier and install the rear side covers [F] over the handles.
- 10. Reinstall the rear covers.



NOTE: Step 11 to 14 are for paper size setting change.

- 11. Pull out the LCT and open the top cover [A].
- 12. Position the paper size plate [B] to match the desired paper size (1 screw).
- 13. Position the rear side fence [C] and the front side fence [D] to match the desired paper size (1 screw each).
- 14. Position the end fence [E] to match the desired paper size.
- 15. Load paper and close the top cover.
- 16. Reinstall the LCT and check machine operation.



4. REPLACEMENT AND ADJUSTMENT

4.1 LCT

4.1.1 LCT Removal



NOTE: Push the red button to lower the tray before opening the LCT.

- 1. Pull out the duplex tray [A] and the LCT [B].
- 2. Remove the duplex and LCT unit front right cover [C] (2 screws).
- 3. Remove the unit's left front cover (2 screws) and remove the front left cover [D] (3 screws).
- 4. Set the duplex tray [A] back in.
- 5. Pull the LCT [E] all the way out.
- 6. Remove the LCT [E] (6 screws).

4.1.2 LCT Motor Replacement



- 1. Remove the LCT. (See LCT Removal section.)
- 2. Disconnect the LCT motor connector [A].
- 3. Remove the LCT motor unit [B] (4 screws).
- 4. Remove the LCT motor [C] (4 screws).
- 5. Remove the motor gear [D] (2 Allen screws) and replace the LCT motor.



4.1.3 Paper Size Sensor Replacement

- 2. Remove the front side fence lock [B] (1 screw).
- 3. Remove the LCT front cover [C] (3 screws, 2 connectors).
- 4. Remove the size actuator board lock [D] (1 screw), and remove the size actuator board [E].
- 5. Remove the paper size sensor unit [F] (1 screw).
- 6. Replace the paper size sensor [G] (1 screw).



4.1.4 Tray Lower Limit Sensor Replacement

- 1. Remove the LCT. (See LCT Removal section.)
- 2. Disconnect the connector [A] on the tray lower limit sensor [B].
- 3. Remove the tray lower limit sensor unit [C] (1 screw).
- 4. Remove the tray lower limit sensor [B] from the bracket.





4.1.5 Lower Tray Button Switch Replacement

- 1. Pull out the LCT [A].
- 2. Remove the front side fence lock [B] (1 screw).
- 3. Remove the LCT front cover [C] (3 screws).
- 4. Free the harness from the clamp [D] and remove the lower tray button switch [E] (2 screws).



4.1.6 LCT Front Wire Replacement

- 1. Remove the LCT. (See LCT Removal section.)
- 2. Remove the front side-fence lock [A] (1 screw).
- 3. Remove the front cover [B] (3 screws, 2 connectors).
- 4. Remove the harness guide bracket [C] (1 screw).
- 5. Free the tray lock brackets [D] from the tray stay [E] as shown in the figure.
- 6. Remove the spring [F].
- 7. Loosen the screw [G] securing the arm bracket [H].
- 8. Remove the wire.

-- Installation --



- 1. Manually rotate the drive pulley [A] so that the slit is vertical.
- 2. Install the wire which has a red mark at the edge on the drive pulley and wrap it 2 times around clockwise.
- 3. Place a small blade screw driver [B] through the pulley and into the hole to secure the pulley as shown in the figure.
- 4. Run the wire over the pulleys in the following order: [C]
 - 13/4 turns over the drive pulley ${\rm l}$
 - 1/2 turn over pulley 2
 - 1/2 turn over pulley ③ (rear)
 - 1/4 turn over pulley ④
 - 1/4 turn over pulley (5)
 - 1/2 turn over pulley 6
 - 1/4 turn over pulley ⑦
 - 1/4 turn over pulley (8)
 - 1/4 turn over pulley (front)



- 5. Remove the small blade screw driver [D] securing the drive pulley.
- 6. Install the end of the wire in the drive pulley and wrap it 3 times around counter clockwise, as shown in the figure [E].
- 7. Reinstall the spring [F] and secure the arm bracket screw [G].
- 8. While lifting the tray manually, hook the tray lock brackets [H] back on.
- 9. Reinstall the unit and check machine operation.



4.1.7 LCT Rear Wire Replacement

-- Removal --

- 1. Remove the LCT motor unit. (See LCT Motor Replacement section.)
- 2. Remove the lower limit sensor. (See Lower Limit Sensor Replacement section.)
- 3. Perform steps 5 to 8 of the LCT Front Wire Replacement section.

-- Installation --

The reinstallation of the rear wire is basically the same as that of the front wire. Make sure of the following points and install the rear wire according to the front wire installation procedure.

- When first installing the red marked edge onto the drive pulley, wrap it around counterclockwise.
- When installing the end of the wire onto the drive pulley, wrap it around clockwiseway.



4.1.8 Paper Feed, Pick Up and Reverse Roller Replacement

- 1. Remove the LCT. (See LCT Removal section.)
- 2. Remove the rollers in the following order.
 - Reverse roller [A] (1 snap ring)
 - Paper feed roller [B] (1 snap ring)
 - Pick up roller [C] (1 snap ring)
 - **NOTE:** When installing the new rollers, make sure not to touch the rubber surface with bare hands.



4.2 DUPLEX TRAY

4.2.1 Duplex Tray Removal



NOTE: Push the red button to lower the tray before opening the LCT.

- 1. Pull out the duplex tray [A] and the LCT [B].
- 2. Remove the duplex and LCT unit front right cover [C] (2 screws).
- 3. Remove the unit's left front cover (2 screws) and remove the front left cover [D] (3 screws).
- 4. Remove both duplex tray lock brackets [E] (3 screws).
- 5. Remove the duplex tray [A].

4.2.2 Jogger Drive Wire Replacement

-- Removal --



- 1. Remove the duplex tray. (See Duplex Tray Removal section.)
- 2. Remove the front wire lock bracket (with cushion) [A] and the rear wire lock bracket [B] (1 screw each).
- 3. Turn over the duplex tray and remove the wire spring [C].
- 4. Remove the jogger drive wire [D].

-- Installation --





5. Set the new wire in the following way:

- Hook the wire which is not marked red to the spring
- Secure the other end of the spring to the bracket
- 1/2 turn over the pulley
- 11/2 turns over the jogger motor pulley
- Remove the spring from the bracket and hook the end of the wire (marked red) to the spring.
- Reinstall the 2 wire brackets [A] [B] to secure the wire.



4.2.3 Paper Feed, Pick Up and Reverse Roller Replacement

- 1. Pull out the duplex tray.
- 2. Remove the pick up [A] paper feed [B], and reverse rollers [C] (1 snap ring each).
 - **NOTE:** When installing the new rollers, make sure not to touch the rubber surface with bare hands.



4.2.4 Position Roller Belt Replacement



- 1. Pull out the duplex tray.
- 2. Remove the snap ring [A] on the position roller [B].
- 3. While holding the position roller belt [C], remove the position roller [B].
 - **NOTE:** When installing the new position roller, make sure not to touch the roller surface with bare hands.



4.2.5 Duplex Paper Sensor Replacement

- 1. Pull out the duplex tray.
- 2. Disconnect the paper end sensor connector [A].
- 3. Remove the duplex paper sensor unit [B] (1 screw).
- 4. Replace the duplex paper sensor [C] (1 screw).

4.2.6 Entrance Sensor and Actuator Roller Replacement

- 1. Pull out the duplex tray.
- 2. Disconnect the entrance sensor connector [D].
- 3. Replace the entrance sensor [E] (1 screw).



4.2.7 Jogger Home Position Sensor Replacement

- 1. Remove the duplex tray. (See Duplex Tray Removal section.)
- 2. Replace the jogger home position sensor [A] (1 screw, 1 connector).

4.3 DUPLEX AND LCT UNIT

4.3.1 Duplex Tray Set Sensor Replacement



- 1. Remove the Duplex and LCT Unit rear cover [A] (3 screws).
- 2. Disconnect the connector [B] on the duplex tray set sensor.
- 3. Remove the duplex tray set sensor unit [C] (1 screw).
- 4. Replace the duplex tray set sensor [D] (1 screw).

4.3.2 DC Drive Board Replacement



- 1. Turn off the main and anti-condensation switches.
- 2. Remove the duplex and LCT unit rear cover [A] (3 screws).
- 3. Replace the DC drive board [B] (8 connectors, 4 clamps).



4.3.3 Right Lower Doors Switch Replacement

- 1. Pull out the duplex tray [A] and the LCT [B].
- 2. Remove the front right cover [C] (2 screws).
- 3. Remove the right lower door switch unit [D] (1 screws, 3 connectors).
- 4. Replace the right lower door switch [E] (2 screws).



4.3.4 Duplex and LCT Motor Replacement



- 1. Pull out the duplex tray and the LCT.
- 2. Turn off the main and anti-condensation switches.
- 3. Remove the duplex and LCT unit rear cover [A] (3 screws).
- 4. Remove the duplex and LCT motor [B] (3 screws, 1 connector). **NOTE:** When installing, make sure the drive belt is positioned properly.

4.3.5 Upper Relay Sensor Replacement

- 1. Remove the duplex and LCT unit right upper cover [A] and right rear cover [B] (2 screws each).
- 2. Disconnect the connector of the upper relay sensor [C] and free the harness from the metal clamps.
- 3. Remove the upper relay sensor unit [D] (1 screw).
- 4. Replace the upper relay sensor [E].

4.3.6 Lower Relay Sensor Replacement

- 1. Open the duplex and LCT unit right door [A].
- 2. Remove the units right rear cover [G] (2 screws).
- 3. Disconnect the connector of the lower relay sensor [C] and free the harnesses from the metal clamps.
- 4. Remove the lower relay sensor unit [D] (1 screw).
- 5. Replace the lower relay sensor [E].

4.3.7 Left Lower Door Sensor Replacement (A306 only)

- 1. Open the duplex and LCT unit left door [A].
- 2. Remove the duplex and LCT unit left rear cover [B] (2 screws).
- 3. Remove the left lower door sensor unit [C] (1 screw).
- 4. Replace the left lower door sensor [D] (1 connector).

