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SERVICE MANUAL

MODEL: LX-200/LX-900/LX-910D



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MECHANISMS & ELECTRONICS

REVISED EDITION May, 2000

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INTRODUCTION

This Service Manual describes the Cool Laminator LX-200/900/910D specifications, operating principles of the mechanisms, disassembly and reassembly procedures, and maintenance and troubleshooting procedures.

This Service Manual is intended for use by trained technicians. It is not intended for use by the user.

The manual is divided into the following chapters.

- Chapter 1. Specifications
- Chapter 2. Mechanism
- Chapter 3. Disassembly Procedures
- Chapter 4. Reassembly Procedures
- Chapter 5. Electronic Controllers
- Chapter 6. Maintenance
- Chapter 7. Troubleshooting
- Appendix Main PCB Circuit Diagram

Chapter 1.
SPECIFICATIONS

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Chapter 1. SPECIFICATIONS

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1.1 Mechanical Specifications

1.1.1 Appearance

- [1] External dimensions (W x D x H) 357 mm x 293 mm x 195 mm
- [2] Mass Approx. 4.6 kg (main unit only)

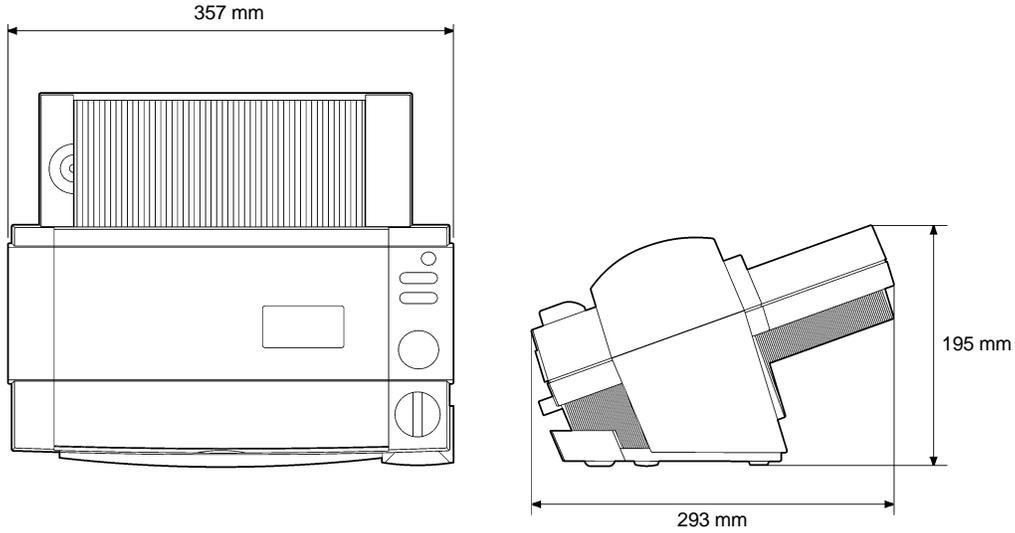


Fig. 1.1-1 Appearance

1.1.2 Operating Panel

- [1] Number of Keys 5 (Power switch, Cut key, Feed key, Start/Stop button, Cutting mode selector)
- [2] Key Arrangement

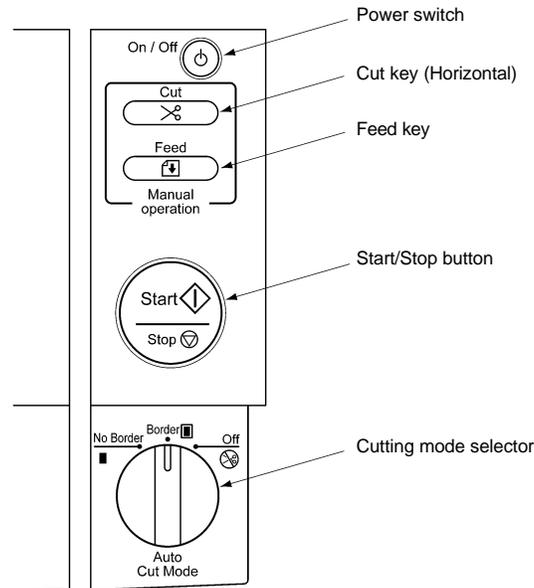


Fig. 1.1-2 Key Arrangement

1.1.3 Indicators

[1] Positions

Start/Stop button LED indicators (red, green, orange)

1.2 Electrical Specifications

1.2.1 Power Supply

[1] Power supply

Commercial power supply (locally available power supply).
Converted to DC by the AC adaptor.

Chapter 2.
MECHANISMS

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Chapter 2. MECHANISMS

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2.1 Mechanical Operating Principles

2.1.1 Description of Mechanisms (Border Mode)

1. When a document is inserted into the paper loading gate, the paper feed rollers feed it to the driving roller.
2. As the document passes between the paper feed rollers, the paper size detector determines its size (length and width).
3. When the document passes between the film cartridges it is sandwiched between the upper and lower films in the compression-feed area, where the films and document are compressed between the driving roller and sub-roller.
4. The compressed document and film is fed to the cutting area, where it is cut to the document size detected by the paper size detector with borders added. It is then transported to the next stage.
5. The laminated document is fed out of the eject gate by the paper eject rollers.

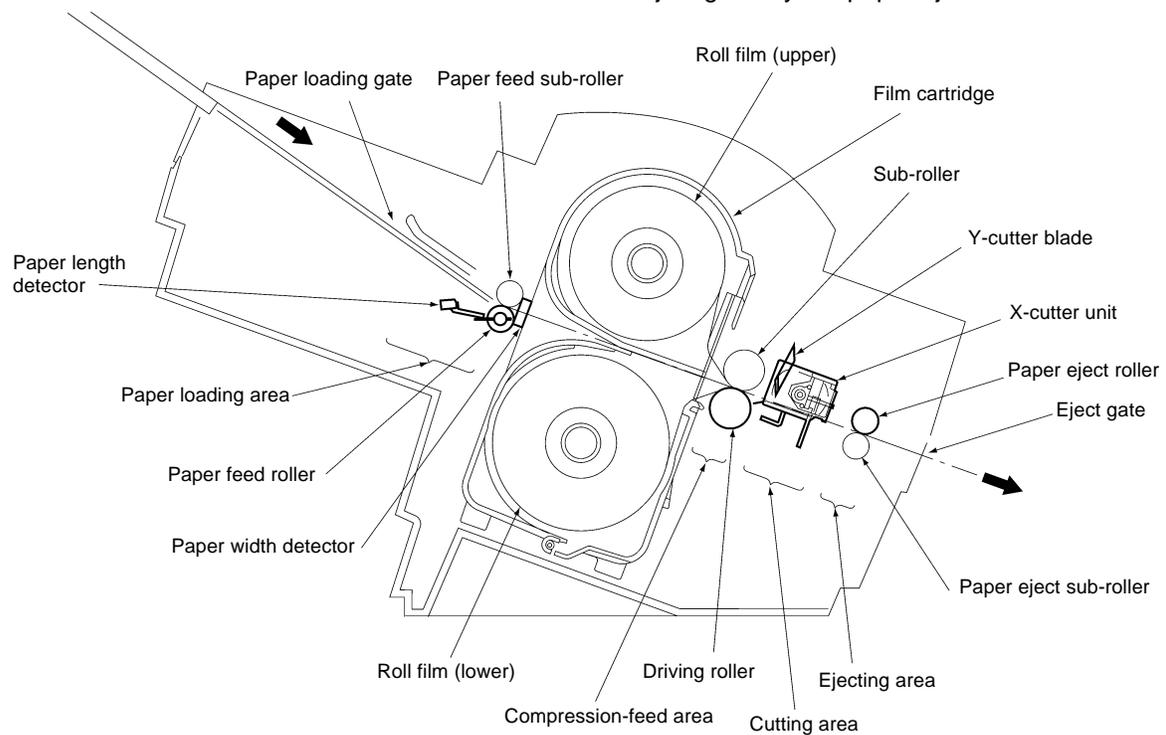


Fig. 2.1-1 Description of Mechanisms

2.1.2 Feed and Compression Mechanisms

The feed and compression mechanism controls the motor drive to feed the document into the film cartridge, compression-feed the films, and eject the laminated document.

When no compression-feed is applied while feeding a document into the film cartridge or ejecting a laminated document, the LF motor rotates clockwise and the motor drive is transmitted via gears to the paper feed roller and paper eject roller.

At this time, the planet gear (A) is free from the drive gear (A), such that the drive is not transmitted to the driving roller.

During compression-feeding of the films, LF motor rotates counterclockwise to move the planet gear (A) against the drive gear (A), such that the drive from the LF motor is transmitted to the driving roller.

Also, planet gear (B) moves against the drive gear (B) and planet gear (C) moves against the drive gear (C), such that the LF motor drive continues to be transmitted to the paper feed roller and paper eject roller, without changing the direction of roller rotation.

- Operation when Feeding Document into the Film Cartridge or when Ejecting a Laminated Document
 1. When the LF motor rotates clockwise (as indicated by the arrow in the diagram), the drive is transmitted via a series of gears to drive the paper feed roller and paper eject roller in the directions indicated by the arrows. At this time, planet gear (A) is free, such that no drive is transmitted to drive gear (A) and the driving roller does not rotate.
 2. The document is fed into the film cartridge when the paper feed roller rotates in the direction indicated by the arrow.
 3. The laminated document is ejected from the eject gate when the paper eject roller rotates in the direction indicated by the arrow.

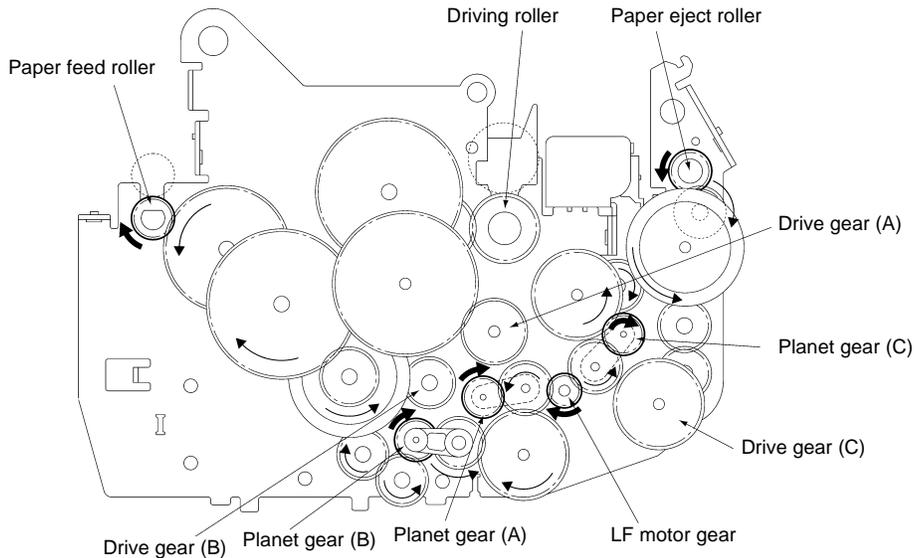


Fig. 2.1-2 Operation when Feeding Document into the Film Cartridge or when Ejecting a Laminated Document

- Operation During Film Compression-Feed
 1. When the leading edge of the document enters the compression-feed area, LF motor starts to rotate counterclockwise, as indicated by the arrow.
 2. Planet gear (A), which had been free, moves to engage with drive gear (A). The drive from the LF motor is then transmitted to the various gears, as shown in the diagram, and the driving roller rotates as indicated by the arrow. Also, planet gear (B) moves against the drive gear (B) and planet gear (C) moves against the drive gear (C), such that the LF motor drive continues to be transmitted to the paper feed roller and paper eject roller, without changing the direction of roller rotation.
 3. The rotation of the driving roller is transmitted to the sub-roller. These rollers feed the films and press them against the document. At this time, the rotations of the paper feed roller and paper eject roller continue uninterrupted.
 4. When the trailing edge of the document leaves the compression-feed area and the X-cutters finish cutting the film, the LF motor reverses to rotate counterclockwise. Planet gear (A) again becomes free such that the driving roller rotation stops and feeding of the films also stops.

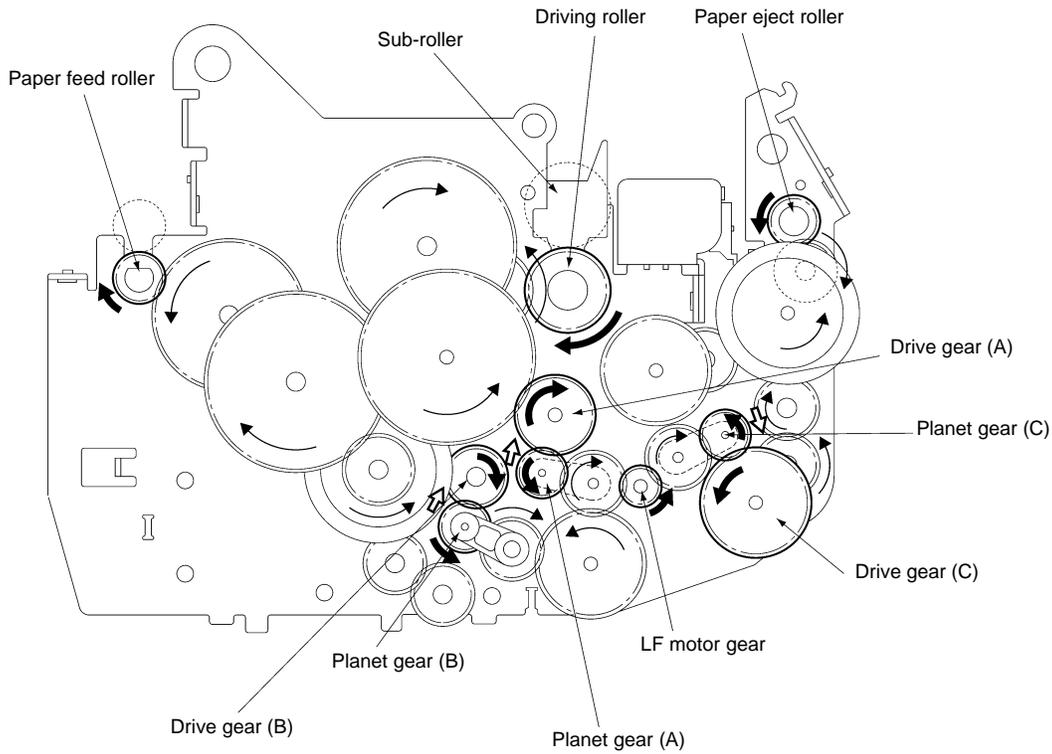


Fig. 2.1-3 Operation During Film Compression-Feed

2.1.3 Cutter Mechanism (Border Mode)

The cutter mechanism cuts the laminated document to the size of the document plus an added border. Both edges of the films are cut to suit the width of the document and the leading edge and trailing edge are cut according to the document length.

- Y-Cutter Vertical Drive Operation

1. The TC motor rotates clockwise from its reference position to drive the cam clockwise via a series of gears. The cam rotates the Y-diversion lever clockwise about its pivot. (All rotations indicated by arrows.)

When the Y-diversion lever reaches its maximum displacement position with the cam at approximately its 180° rotated position, rotation of the TC motor pauses.

2. When the Y-diversion lever reaches its maximum displacement position, its movement lowers the two Y-cutter blades from the standby position to the cutting position, where they start cutting the edges of the laminated film.
3. When the Y-axis cutters reach the trailing edge cutting position, the TC motor starts rotating again and stops when it reaches its reference position. This rotation returns the cam and Y-diversion lever to their original positions and the cutters move to their standby positions.

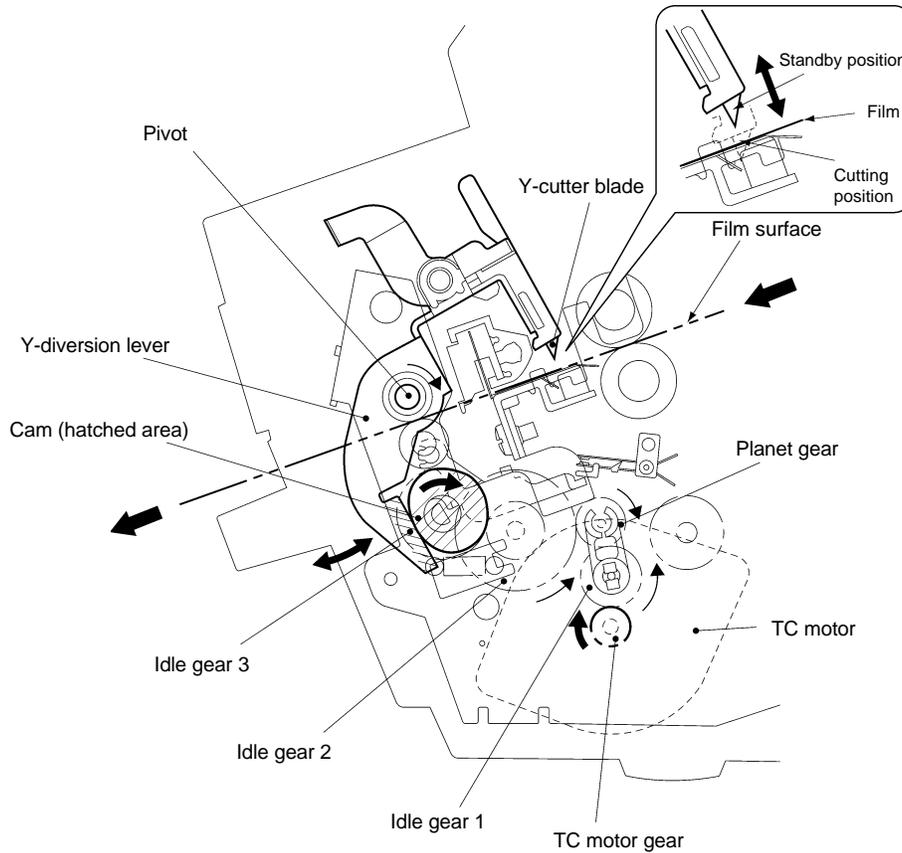


Fig. 2.1-4 Y-Cutter Vertical Drive Operation

- Cutting Leading and Trailing Edges (X-cutter Mechanism)
 1. All the rollers which feed the document stop when the cut position at the leading edge of the document reaches the cutting position of the rotary cutter and fixed-blade cutter.
 2. The DC motor rotates to drive the carriage in the X-cutter assembly via the spiral mechanism (not illustrated).
 3. As the carriage makes a reciprocal movement, the rotary cutter attached to the carriage moves against the fixed cutter to cut the compressed leading edge of the document.
 4. The rotation of the rollers which feed the document restarts when the cutting of the leading edge is complete. Then, when the cut position at the trailing edge of the document reaches the cutting position of the rotary cutter and fixed-blade cutter, the feed rollers stop again.
 5. The document trailing edge is cut in the same way as the leading edge, by a reciprocal movement of the rotary cutter attached to the carriage.
 6. The rotation of the rollers restarts to feed the laminated document from the eject gate after the cutting of the trailing edge is complete.

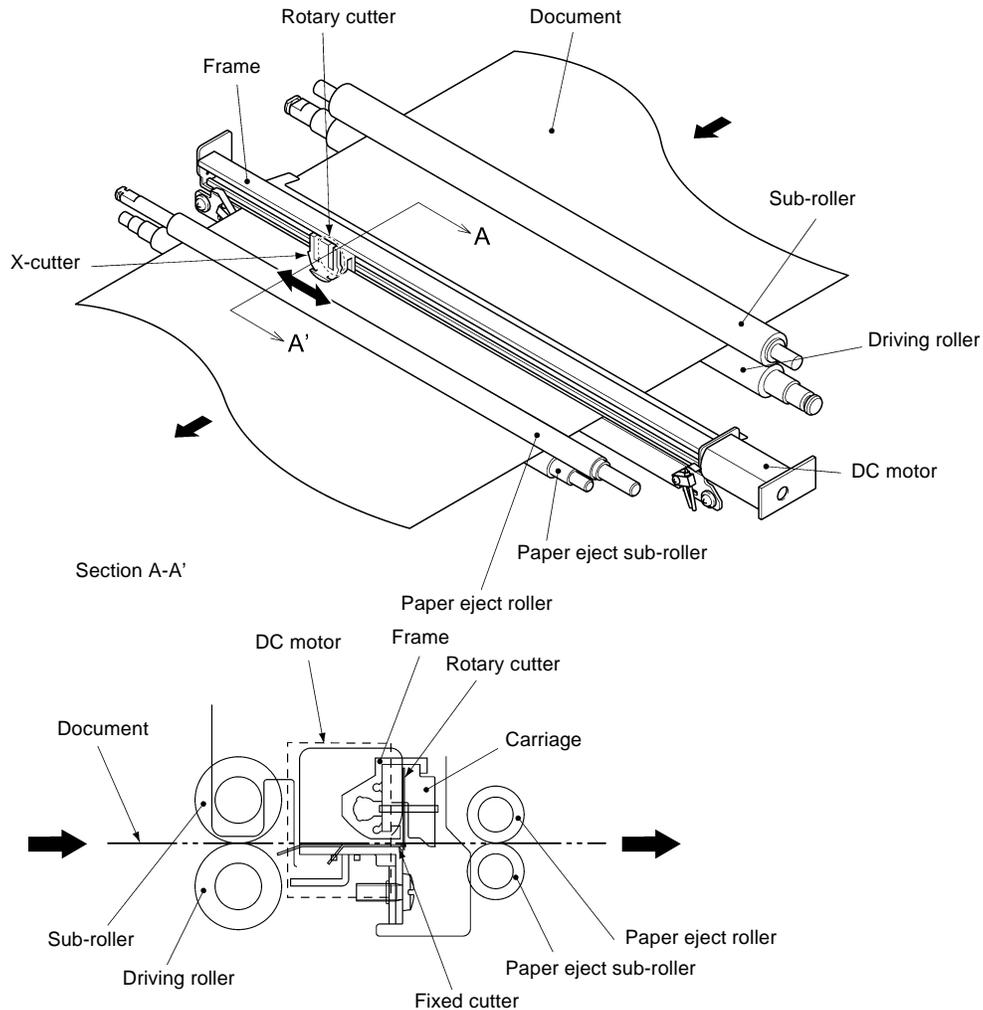


Fig. 2.1-5 Cutting Leading and Trailing Edges (X-cutter Mechanism)

2.1.4 Paper Size Detector Mechanism

- Paper Length Detection

1. When the leading edge of the document passes between the paper feed rollers, it rotates the paper sensor crank about the pivot to turn on the paper sensor which detects the document leading edge.
2. When the trailing edge of the document passes out of the paper feed rollers, the paper sensor crank reverts to its original position to turn off the paper sensor to detect the document trailing edge.

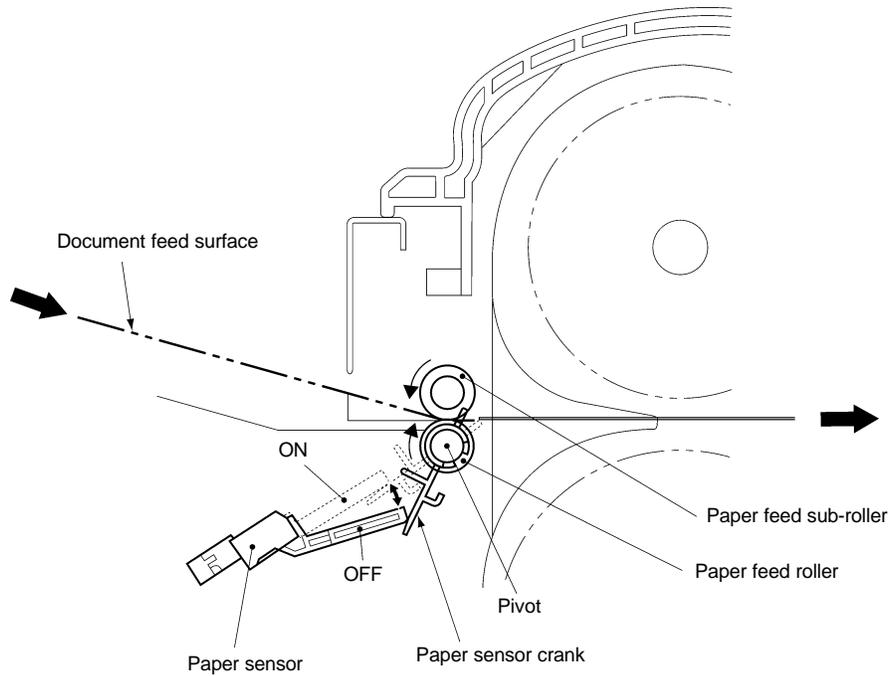
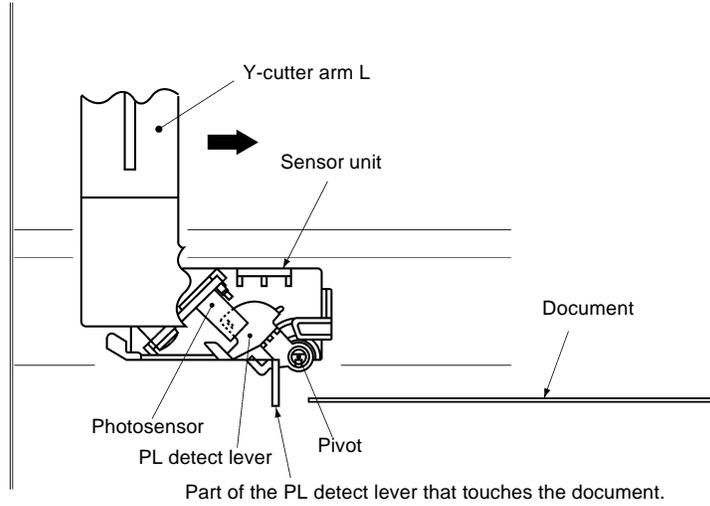


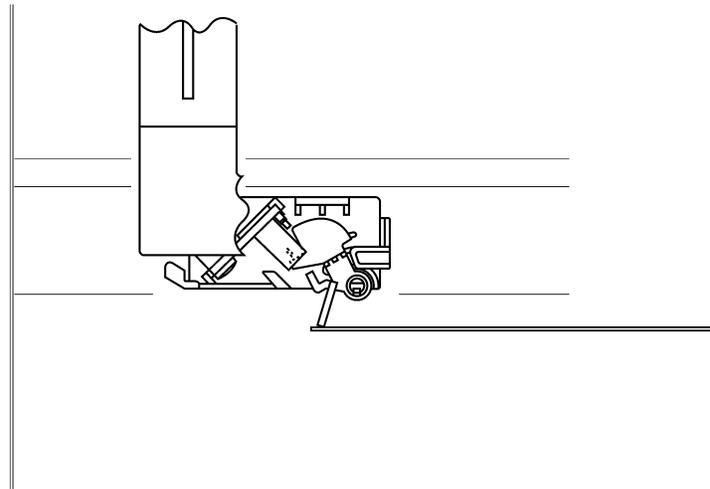
Fig. 2.1-6 Paper Length Detection

- Paper Width Detection

1. The Y-cutter arm L (sensor unit) moves in the direction of the arrow. When the PL detect lever touches the document, it rotates about the pivot to switch off the photosensor.
2. When the photosensor turns off, the Y-cutter arm L movement stops and this position is detected as the document width.



* Photosensor ON status



* Photosensor OFF status

Fig. 2.1-7 Paper Width Detection

2.1.5 Trimming Mechanism

1. When a corner of the laminated document is inserted over the T-cutter plate, the sensor lever operates a leaf switch that detects the document.
2. When the document is detected, the motor gear of TC motor rotates in the direction of the arrow (counterclockwise) from its reference position to drive the T-cam gear in the direction indicated by the arrow (clockwise) via a series of gears.
3. Rotation of the T-cam gear forces the T-cam roller to make a vertical movement, such that T-lever1 moves vertically, rotating around its pivot.
4. As T-lever 1 moves vertically, the T-cutter mounted on the end of T-lever 1 moves up and down, trimming the corner of the laminated document into a rounded radius.

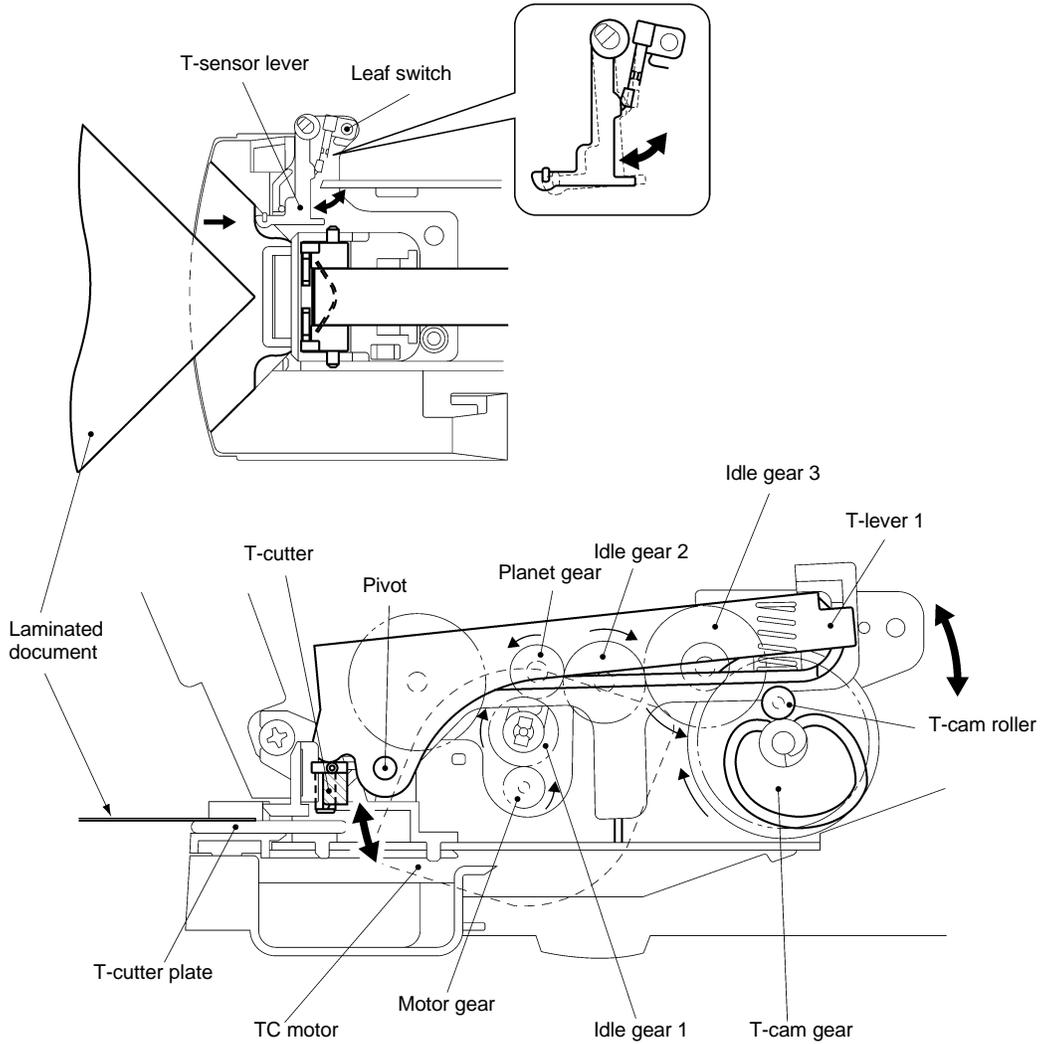


Fig. 2.1-8 Trimming Mechanism

Chapter 3.

DISASSEMBLY PROCEDURES

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3.1 Safety Precautions

When conducting disassembly operations, place the unit on a grounded anti-static sheet. LSI and other electronic components are sensitive to static electricity and may be damaged if touched while charged.

Before transporting a circuit board, wrap it in a conducting sheet such as aluminum foil.

When using a soldering iron or other heat-producing tool, ensure that heat does not damage wires, circuit boards, or plastic parts such as covers.

Take care not to lose small screws or washers removed when replacing parts.

3.2 Removing the Film Cartridge

1. Open the top cover and move the Y-cutter arm L as far as possible to the left.
2. Push the lock lever R in the direction indicated by the arrow to unlock the roller holder assy.

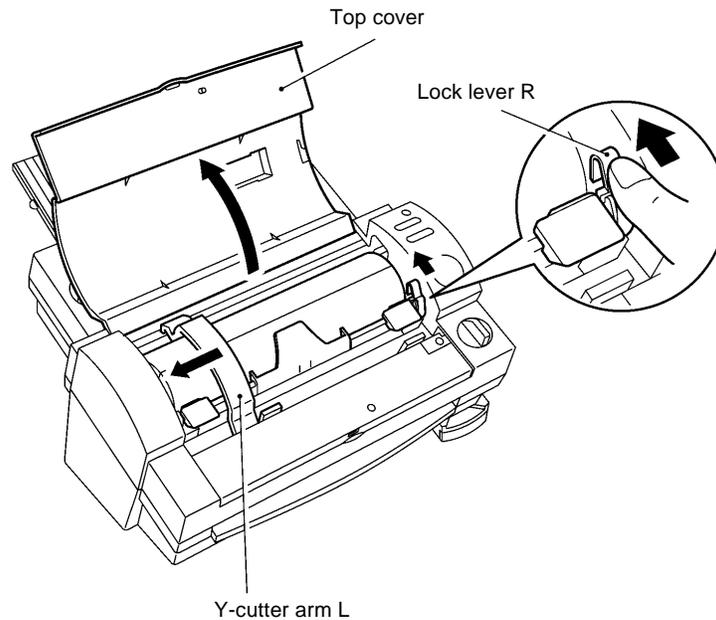


Fig. 3.2-1 Removing the Film Cartridge 1

3. Lift up the roller holder assy and pull out the film cartridge.

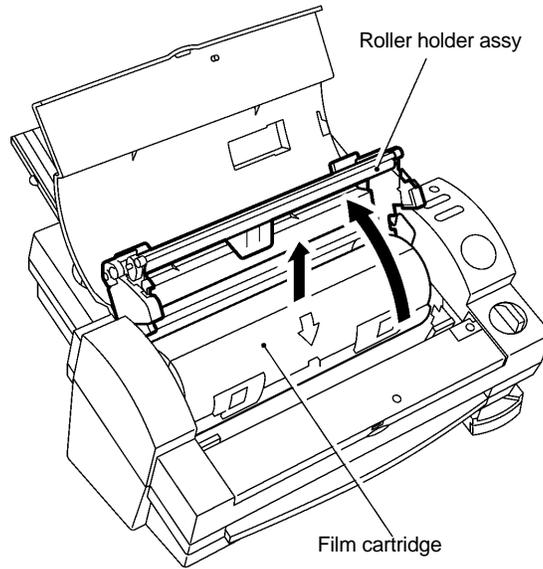


Fig. 3.2-2 Removing the Film Cartridge 2

3.3 Covers

3.3.1 Removing the Trimmer Upper Cover

1. Pull out the T-cutter plate and the trimmer bottom cover.

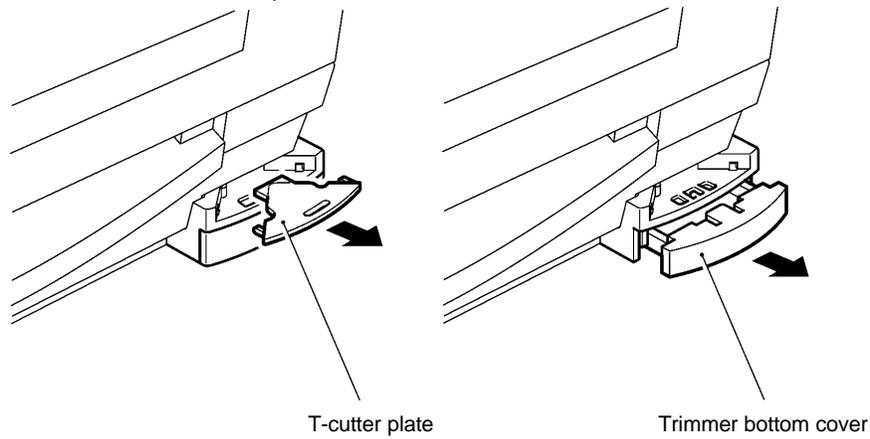


Fig. 3.3-1 Removing the Trimmer Cover 1

2. Set the unit on its side with the trimmer cover uppermost. Remove the two trimmer cover screws. Remove the trimmer upper cover.

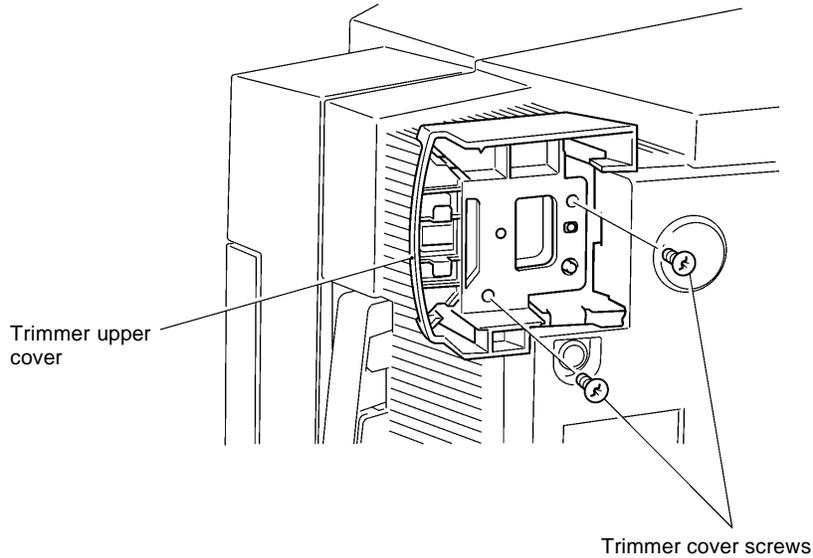


Fig. 3.3-2 Removing the Trimmer Upper Cover 2

3.3.2 Removing the Top Cover

Open the top cover. Lift the top cover shafts out of the shaft recesses in the body cover and remove the cover.

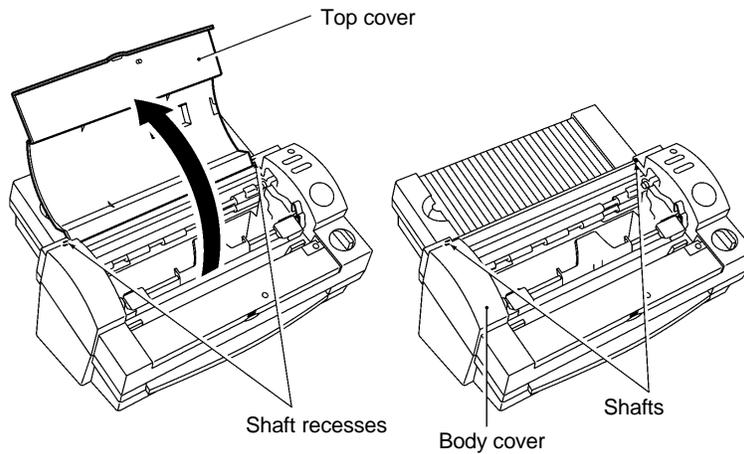


Fig. 3.3-3 Removing the Top Cover

3.3.3 Removing the Sub-tray

1. Open the sub-tray.
2. Flex the center of the sub-tray toward you to release the shafts from the shaft recesses in the body cover. Remove the sub-tray.

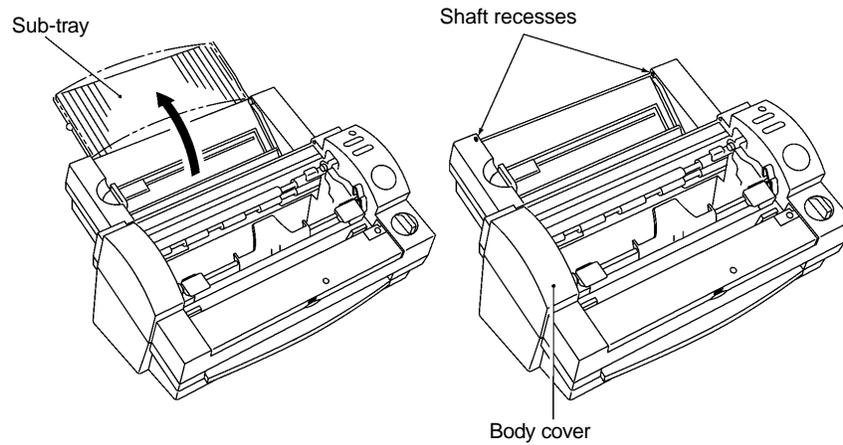


Fig. 3.3-4 Removing the Sub-tray

3.3.4 Removing the Paper Tray and Paper Guide

1. Lift the top of the paper tray in the direction of arrow A, then pull it in the direction of arrow B. Remove the paper tray.

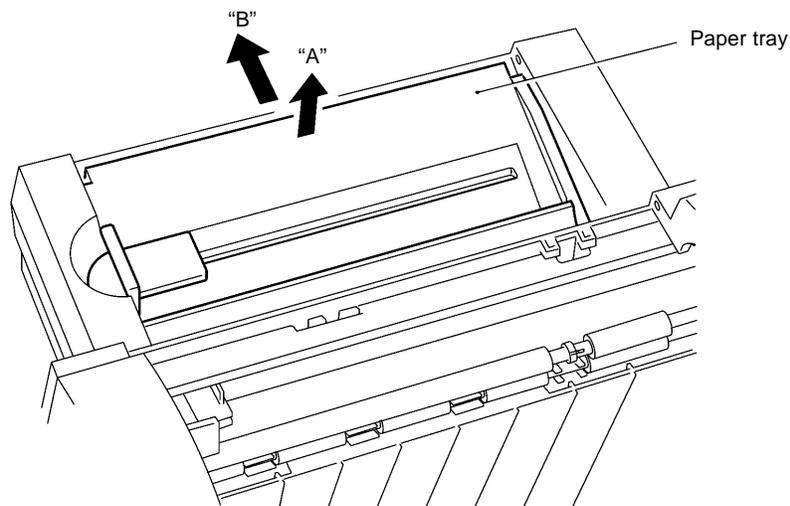


Fig. 3.3-5 Removing the Paper Tray

2. Disengage the paper guide hook (at the rear of the paper tray) from the paper tray. Remove the paper guide.

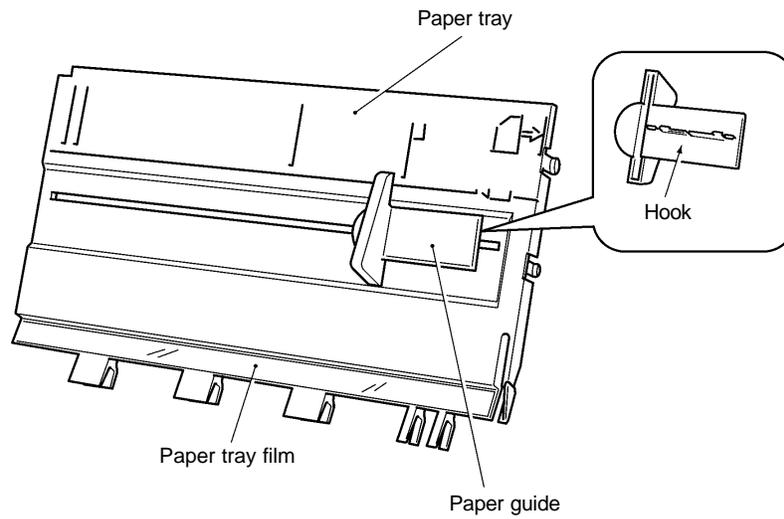


Fig. 3.3-6 Removing the Paper Guide

3.3.5 Removing the Body Cover B

1. Remove the two bottom cover screws A from the bottom of the bottom cover.

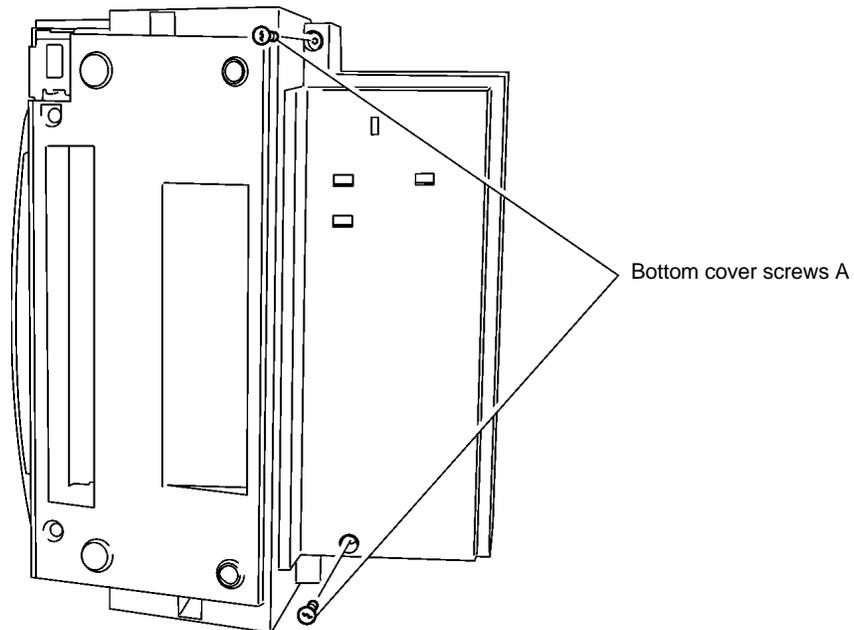


Fig. 3.3-7 Removing the Body Cover B (1)

2. Lift the rear of the bottom cover in the direction of arrow B while pushing it in the direction of arrow A. Release the four hooks at the rear face.
3. Push the body cover in the directions indicated by the arrows C to release the hook at the left and right side.
4. Release the two hooks from the front of the body cover.

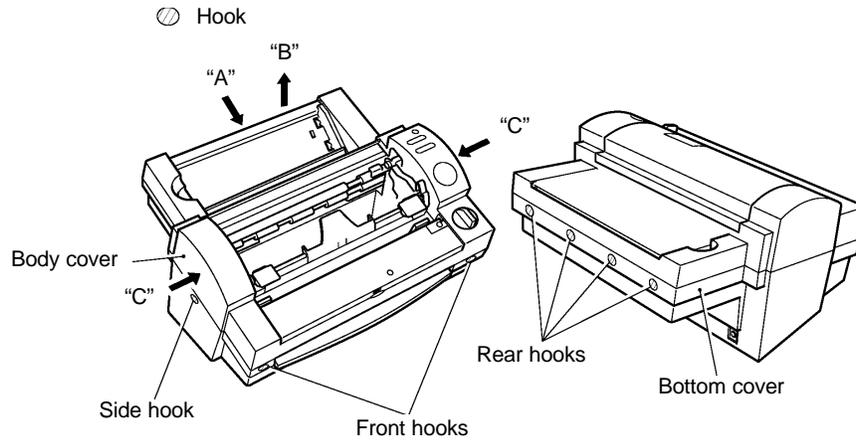


Fig. 3.3-8 Removing the Body Cover (2)

5. Disconnect the switch harness assy (white CN1) from the main PCB and remove the body cover. (The body cover switch PCB is connected to the main PCB of bottom cover via the switch harness assy.)

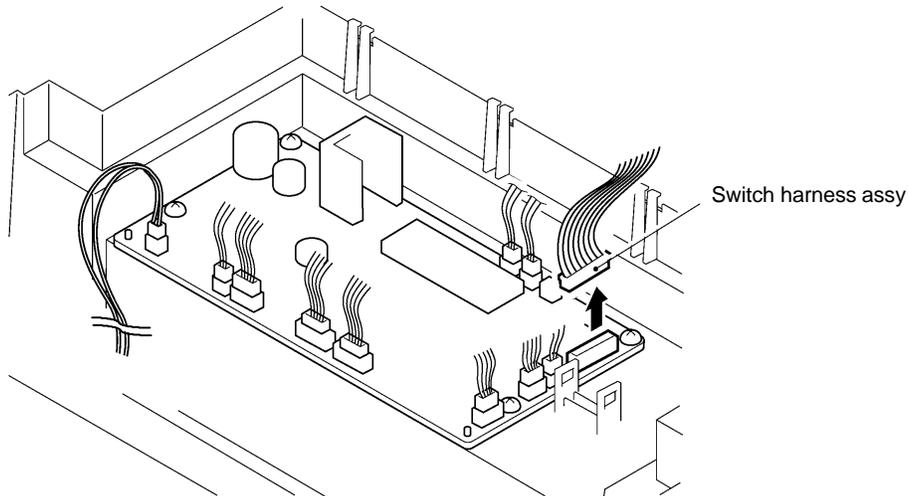


Fig. 3.3-9 Removing the Body Cover (3)

3.3.6 Removing the Front Cover

1. Remove the two front cover screws under the bottom cover.

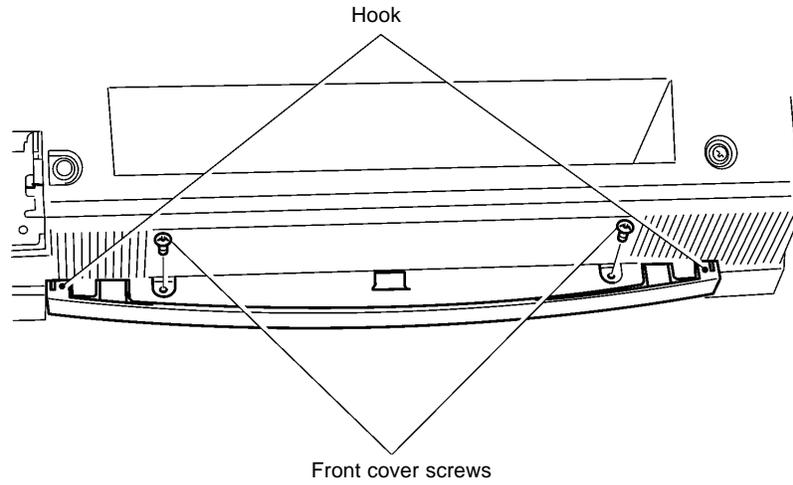


Fig. 3.3-10 Removing the Front Cover (1)

2. While pressing up the two hooks on the front cover from underneath, pull the front cover out to remove it.

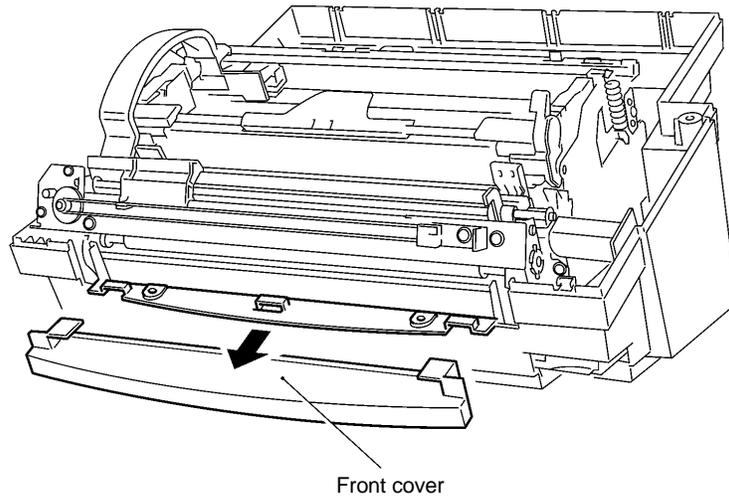


Fig. 3.3-11 Removing the Front Cover (2)

3.3.7 Removing the Cover Switch Assy

1. Disconnect the cover switch assy harness connector (yellow CN4) located under the body cover from the switch PCB.
2. Remove the cover switch screw. Remove the cover switch assy.

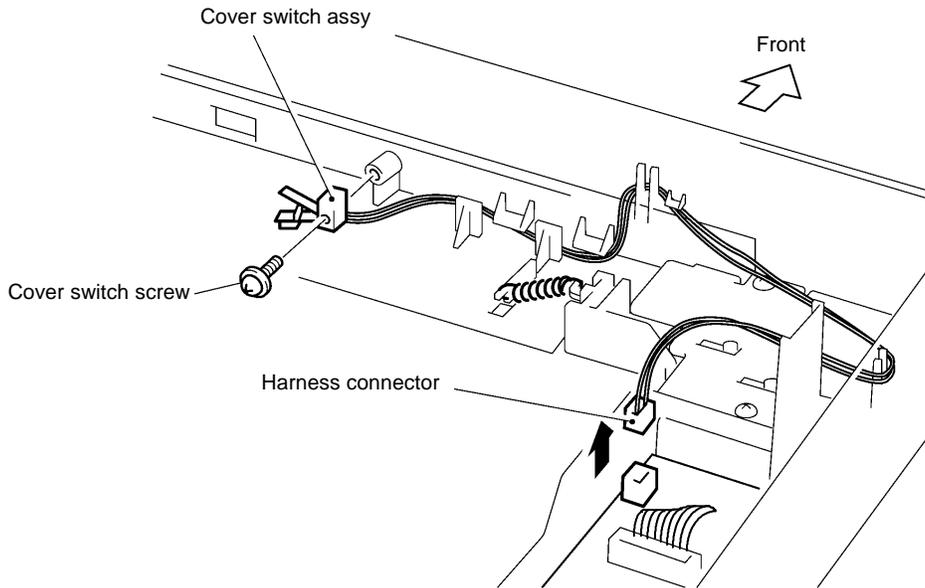


Fig. 3.3-12 Removing the Cover Switch Assy

3.3.8 Removing the Dial Switch Holder Assy B

1. Disconnect the leaf switch R Assy (red CN2) and leaf switch L Assy (white CN3) harness connectors from the switch PCB.
2. Remove the dial lock arm and the dial lock arm spring that is hooked on the body cover.
3. Remove the switch harness Assy from switch PCB.
4. Remove the two dial holder screws. Remove the Dial Switch Holder Assy B.

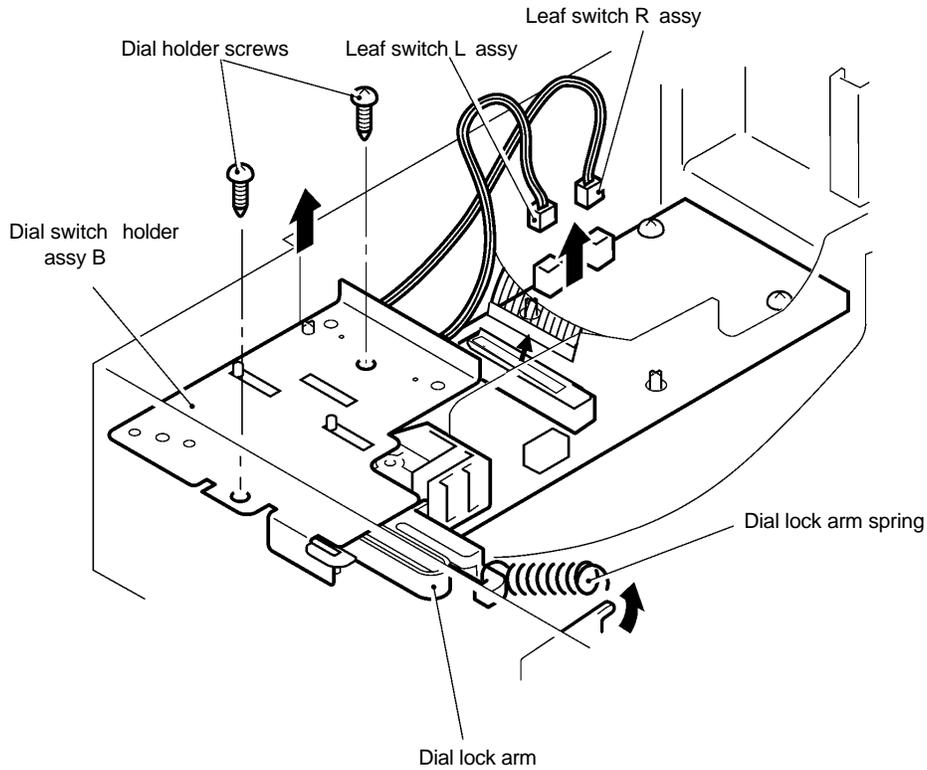


Fig. 3.3-13 Removing the Dial Switch Holder Assy B

3.3.9 Disassembling the Dial Switch Holder Assy B

1. Pull the plate spring in the direction of the arrow. Remove dial switch B.
2. Remove the two leaf switch R/L screws. Remove the leaf switch R Assy (red CN2) and the leaf switch L Assy (white CN3).

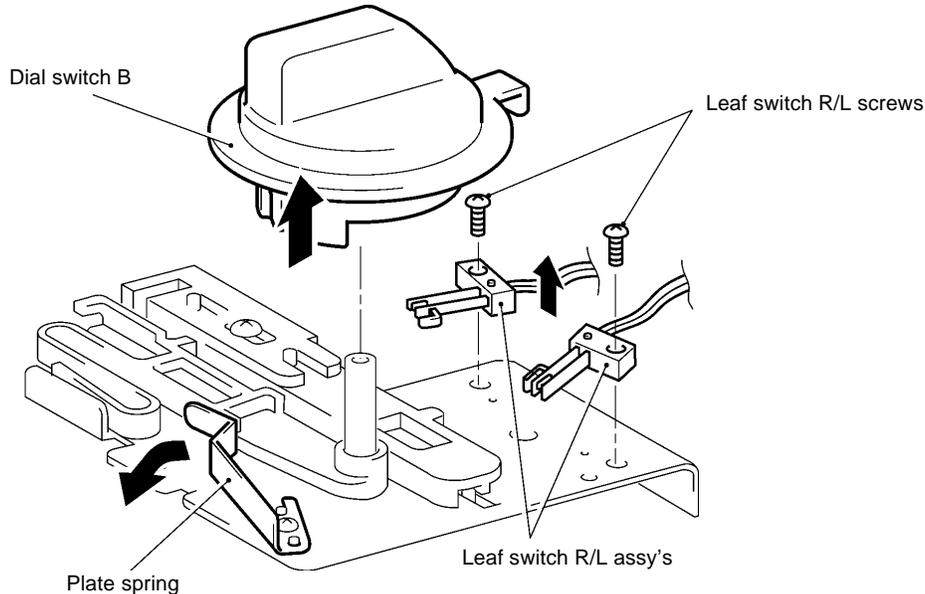


Fig. 3.3-14 Disassembling the Dial Switch Holder Assy B (1)

3. Remove the slide plate spring screw. Remove the plate spring.
4. Lift the slide plate 1B diagonally upward. Disengage slide plate 1B from the hook and remove it.

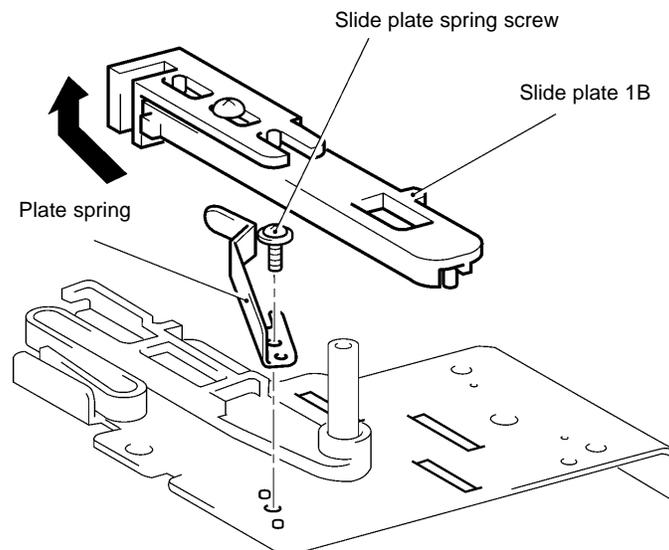


Fig. 3.3-15 Disassembling the Dial Switch Holder Assy B (2)