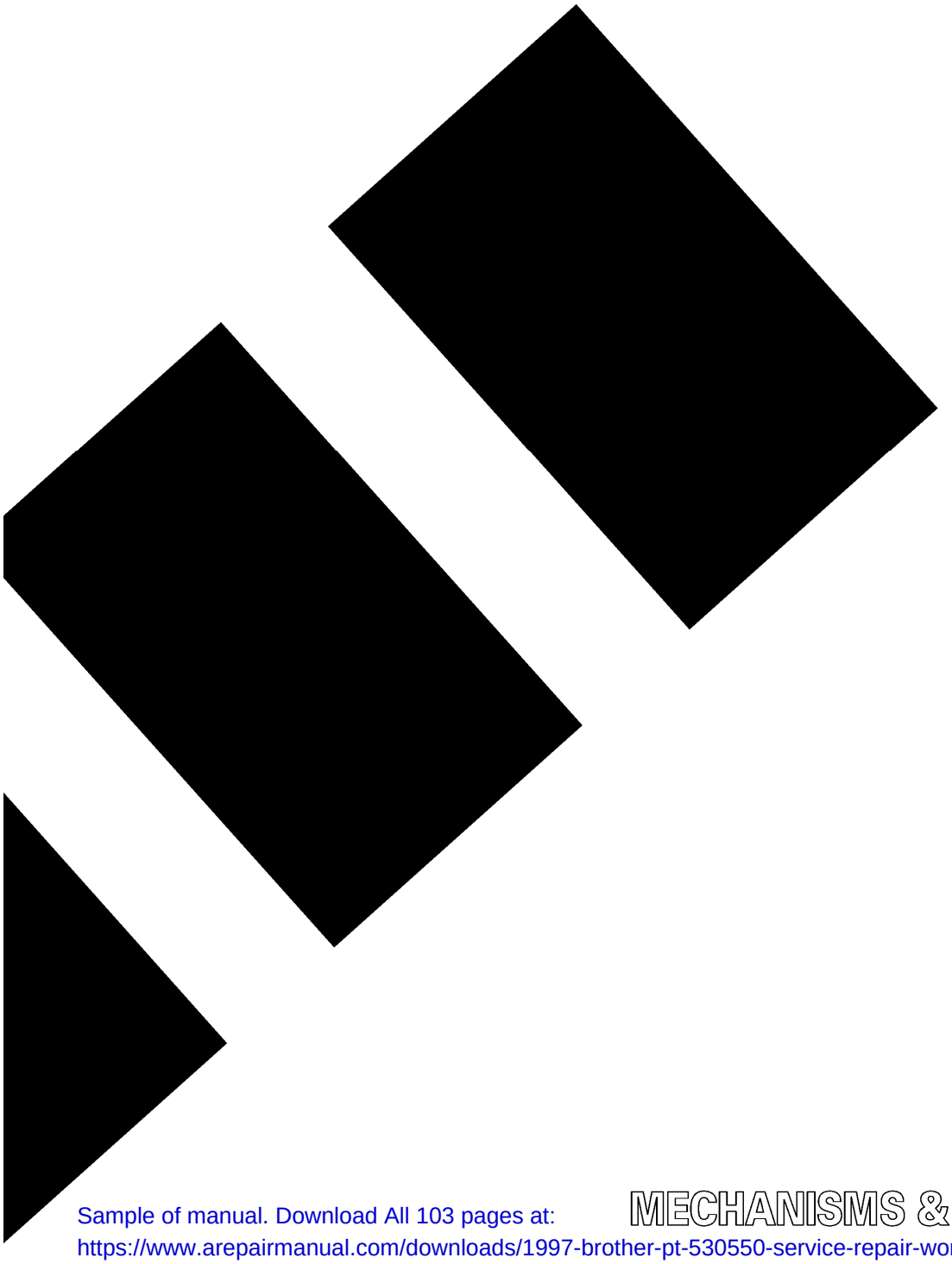
brother®

SERVICE MANUAL

MODEL:PT-530/550



MECHANISMS & ELECTRONICS

brother®

SERVICE MANUAL

MODEL: PT-530/550

PREFACE

This publication is a service manual covering the specifications, theory of operation, disassembly/reassembly procedure, and troubleshooting of the Brother PT-530/550. It is intended for service personnel and other concerned persons to accurately and quickly provide after-sale service for our PT-530/550.

To perform appropriate maintenance so that the machine is always in best condition for the customer, the service personnel must adequately understand and apply this manual.

This manual is made up of four chapters and appendices.

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Chapter I.

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1.1 MECHANICAL SPECIFICATIONS

1.1.1 External Appearance

(Unit: mm)

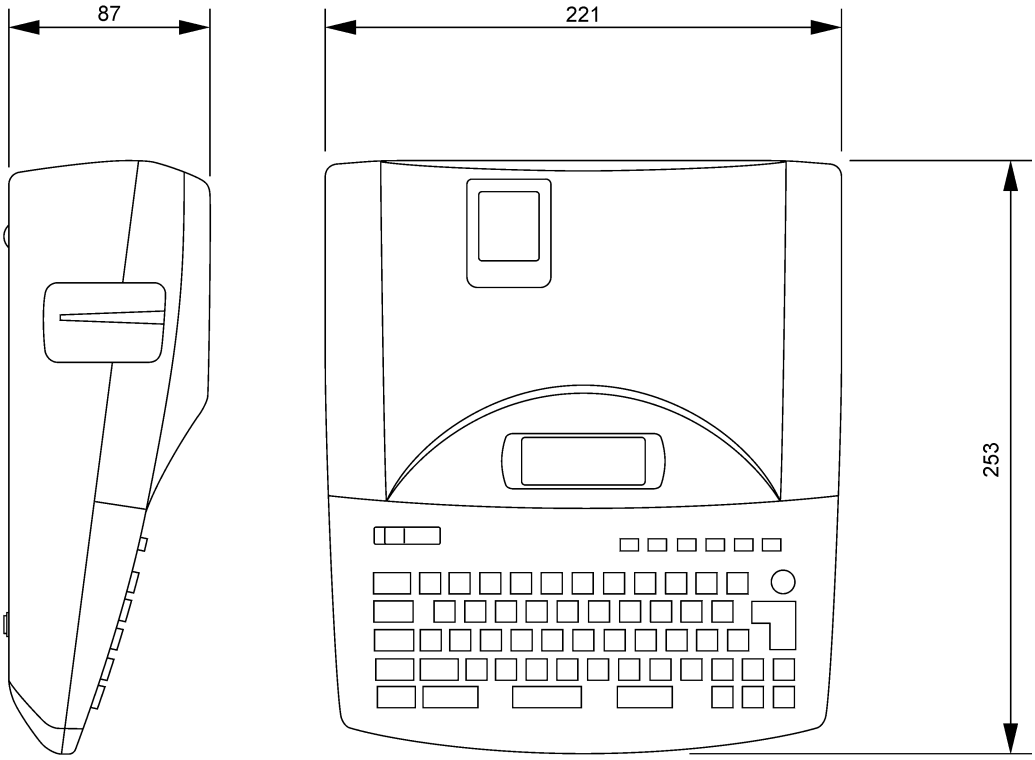


Figure 1.1-1 External Appearance

[1]	Dimensions (W x D x H)		221 x 253 x 87 mm	
[2]	Weight	Machine proper	Approx. 1.2 kg	
			Approx. 1.4 kg	(including batteries and a tape cassette)
		In package	Approx. 3.2 kg	

1.1.2 Keyboard

[1]	Entry system	Rubber keypad
[2]	Number of alphanumeric and symbol keys	39
[3]	Number of function keys	23 (excluding On/Off key)
[4]	Key arrangement	See Figure 1.1-2.

1.1.3 Display

[1] Display type — Liquid crystal display (LCD)

[2] Configuration (See Figure 1.1-2.) — 112 dots wide by 32 dots high

[3] Number of indicators (See Figure 1.1-2.)

PT-550	USA version:	23
	European versions:	24
PT-530	USA version:	20

[4] Display system — WYSIWYG (What you see is what you get)

1.1.4 Printing Mechanism

[1] Print method — Thermal transfer onto plastic tapes (laminate tape and non-laminated tape) or special tapes (instant lettering tape, non-laminated thermal film tape, iron-on transfer tape, and porous-stamp tape)

(Fixed print head and tape feeding mechanism)

[2] Print speed (max.) — 73 dots (10.3 mm) per second

[3] Print head

Type	Thermal print head
Heat generator	Consists of 128 heating elements vertically aligned
Size of heating element	0.195 mm wide by 0.141 mm high

[4] Character size (dots)

Height

Point size	6	9	12	18	24	36	48
No. of heating elements to be used	15	21	28	44	58	88	120

Width

- N (Narrow)
- M (Medium)
- W (Wide)

1.1.5 Tape Cassette

[1] Cassette — Cartridge type

[2] Types of tape cassettes

- Laminated tape cassette — Laminate tape, ink ribbon, and adhesive base tape
- Non-laminated tape cassette — Non-laminated tape and ink ribbon
- Non-laminated tape cassette, refill-type (YS-18) — - Non-laminated tape refill
- Ink ribbon refill
- Instant lettering tape cassette — Instant lettering tape and ink ribbon
- Non-laminated thermal film tape cassette — Non-laminated thermal film tape
- Iron-on transfer tape cassette — Iron-on transfer tape and ink ribbon
- Stamp tape cassette — Porous-stamp tape and base paper

[3] Tape size

		Width	Length
Laminate tape		6, 9, 12, 18, 24, 36 mm	8 m (5 m for fluorescent coating tapes)
Non-laminated tape		6, 9, 12, 18, 24 mm	8 m
Instant lettering tape		18 mm	8 m
Non-laminated thermal film tape		12, 18 mm	8 m
Iron-on transfer tape		18 mm	5 m
Refill type	Non-laminated tape refill	18 mm	8 m
	Ink ribbon refill	18 mm	8 m
Porous-stamp tape		18, 24 mm	8 m

[4] Tape cassette packed with the machine

Laminated tape cassette containing a 12-mm-wide black ink ribbon, laminate tape, and adhesive base tape

1.1.6 Tape Cutter

[1]	Tape cutting	Automatic cutter
[2]	Cutter unit	Not user-replaceable

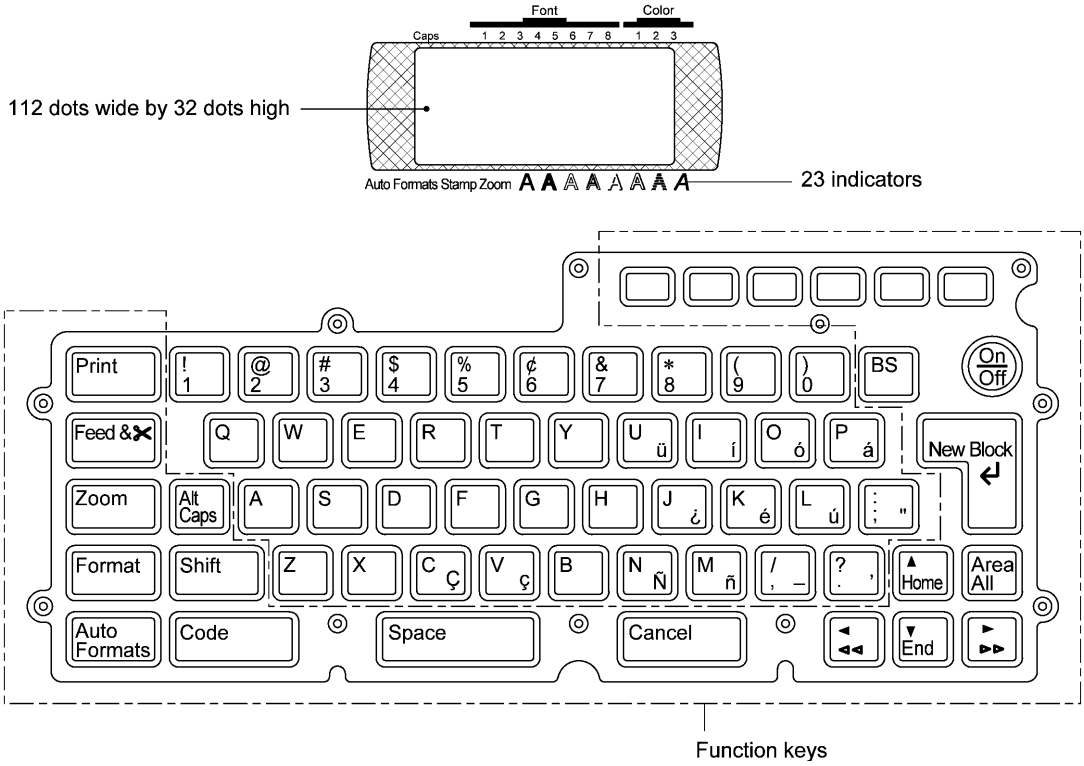
1.1.7 Lettering Stick

Mounted on the bottom of the machine

1.1.8 PC Interface (not provided on the PT-550/530 USA versions.)

[1]	Interface cable	Serial interface (RS-232C) cable for IBM AT/AT or clones
[2]	Interface programs	Editor and device driver for Windows version 3.1 and Windows 95 (which are provided in a floppy disk)

■ PT-550 USA



UK

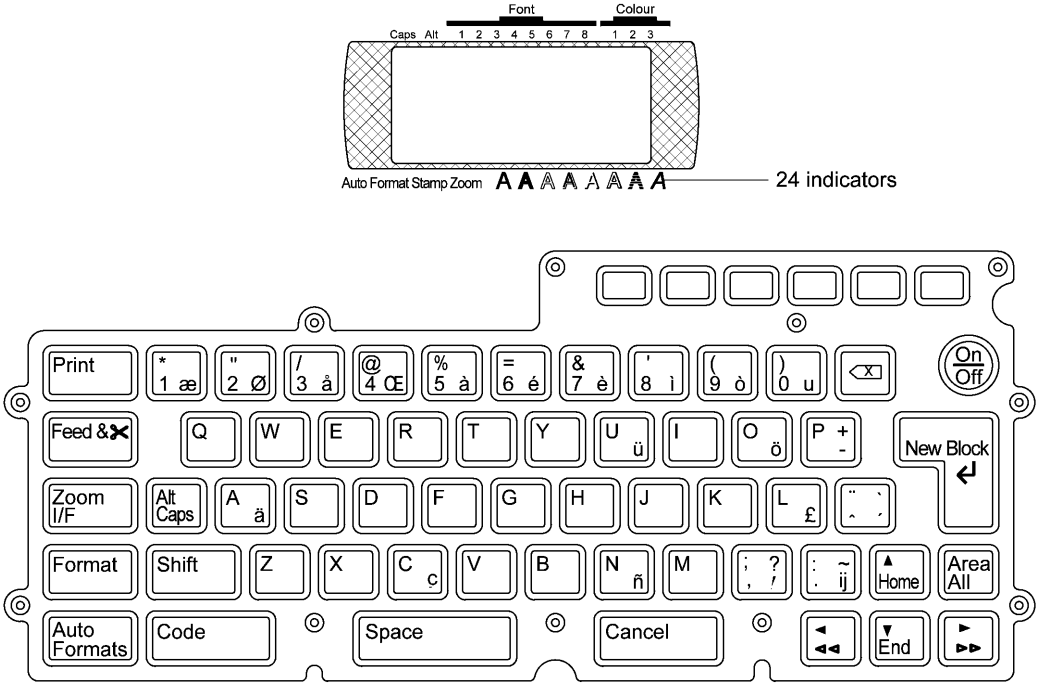
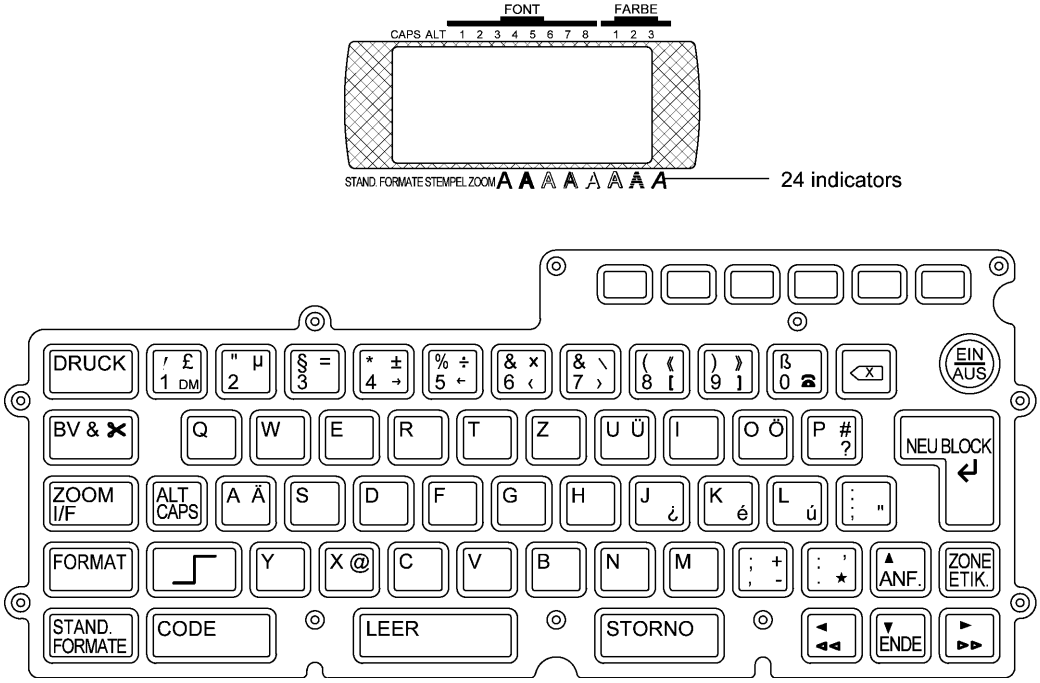


Figure 1.1-2 Key Arrangement (1)

Germany



France

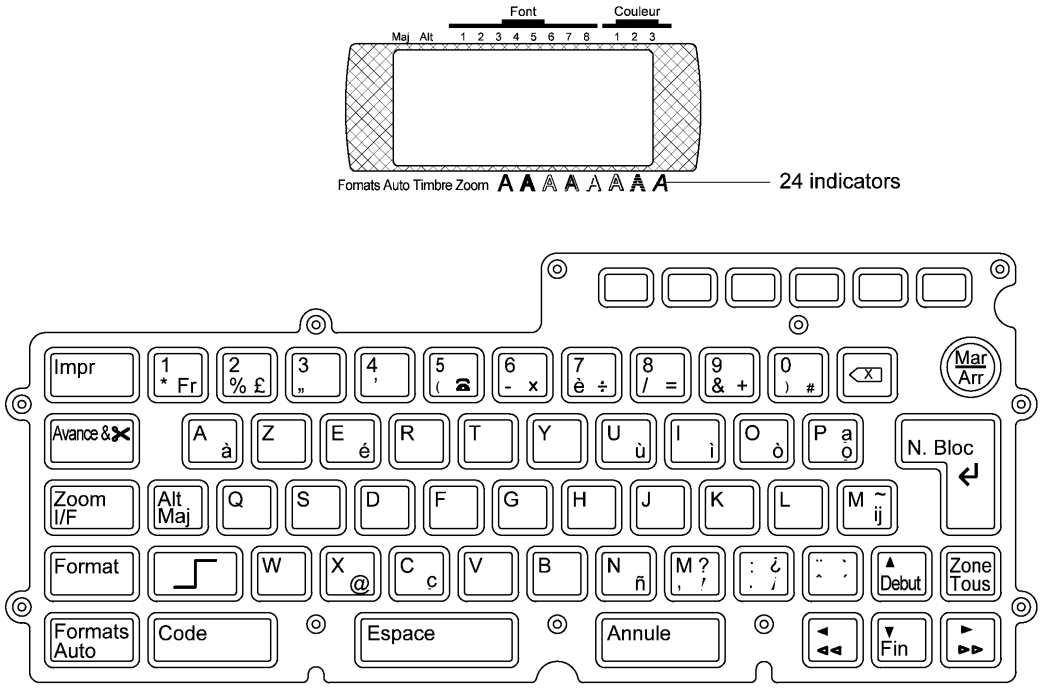
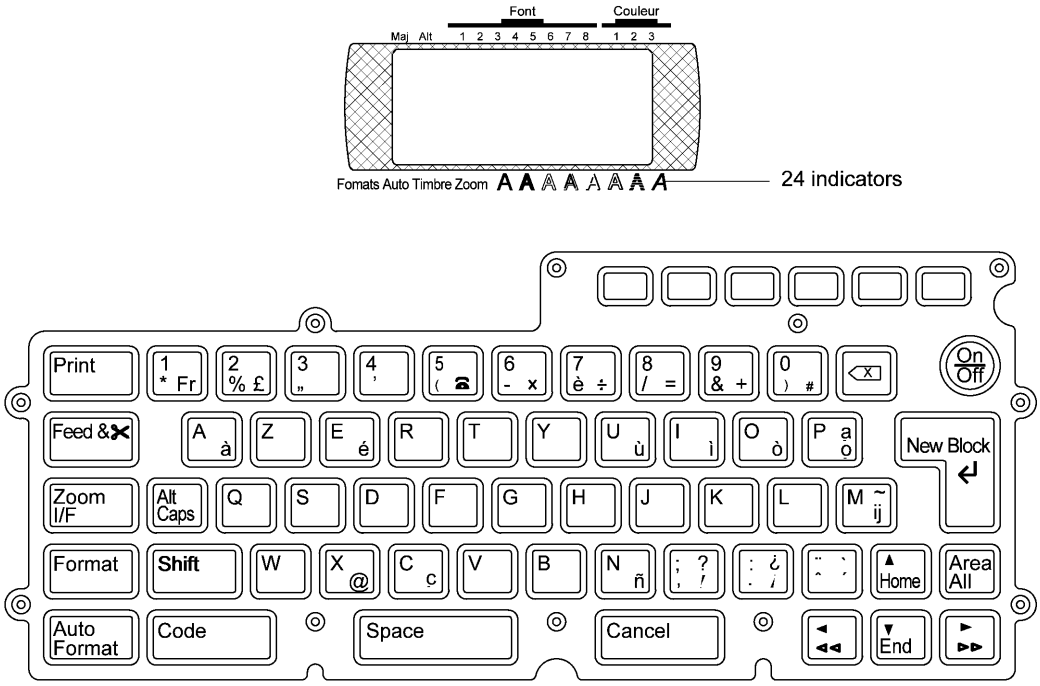


Figure 1.1-2 Key Arrangement (2)

Belgium



■ PT-530 USA

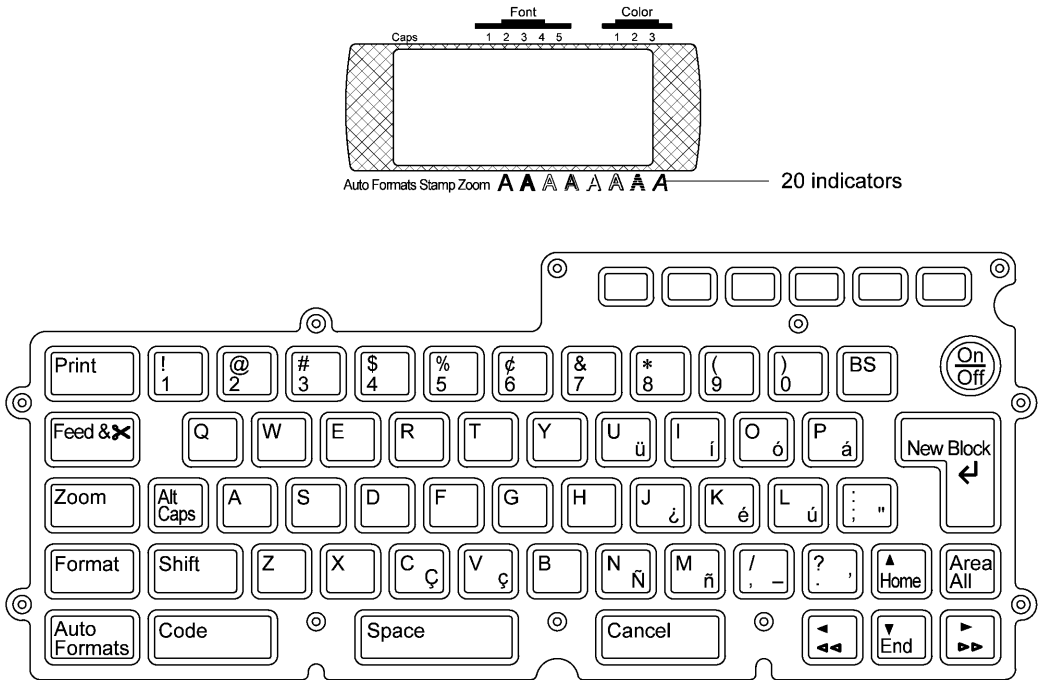


Figure 1.1-2 Key Arrangement (3)

1.2 ELECTRONICS SPECIFICATIONS

1.2.1 Character Generator

[1]	Internal characters	PT-550/530	USA version	: 398 (including symbols)
		PT-550	European versions	: 452 (including symbols)
[2]	Internal fonts	PT-550	USA version	: 8
			European versions	: 8
		PT-530	USA version	: 5

1.2.2 Power Supply

[1]	Power supply	Driven by 8 batteries Optional AC line adapter (9.5 VDC, 1.3A) available
[2]	Battery type	8 alkaline batteries (“AA” SIZE LR6/AM3)
[3]	Service life of batteries	Will last through one 24-mm wide tape cassette, and then some. (by the DEMO print, at room temperature and normal humidity)
[4]	Automatic power off	Yes If the machine remains unused for approx. 5 minutes, it automatically powers itself off.
[5]	Low battery indication	When the voltage level drops below the specified level, the [BATTERIES WEAK] or [REPLACE BATTERIES!] message appears on the LCD.

Chapter II.

MECHANISMS

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2.1 THEORY OF OPERATION

2.1.1 Print Mechanism

■ Structure of Thermal Head

The machine uses thermal transfer printing. The thermal print head has a heat generator consisting of 128 heating elements which are vertically aligned as shown in Figure 2.1-1. Each heating element is 0.195 mm wide by 0.141 mm high.

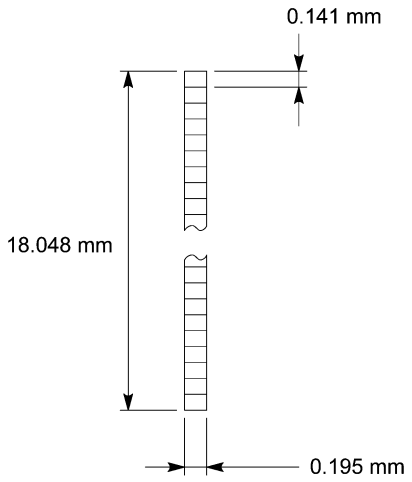

Figure 2.1-1 Heat Generator of Thermal Head

■ Printing Process

When the cylindrical rubber platen is pressed against the thermal print head with the tape and ink ribbon (the tape only when using non-laminated thermal film tape cassettes) sandwiched inbetween, the CPU applies electric power to the selected ones of those 128 heating elements.

[For tape cassettes except non-laminated thermal film tape cassettes]

If the selected heating element(s) generates heat, the ink on the sandwiched ribbon will be melted and transferred to the tape, producing a dot(s) on the tape. The ink ribbon and the tape are advanced and then the next heating cycle is repeated, thus forming a character on the tape.

[For non-laminated thermal film tape cassettes]

If the selected heating element(s) generates heat, the thermal film tape develops itself to produce a dot(s) on the tape. The tape is advanced and the next heating cycle is repeated, thus forming a character on the tape.

[For stamp tape cassettes]

If the selected heating element(s) generates heat, the porous-stamp tape will be melted so that a pore(s) will be formed in the tape. The tape is advanced and the next heating cycle is repeated, thus forming a character of pores in the tape. The printed stamp tape can be used as the face of a stamp. When the stamp is pressed against the ink-pad, it will absorb ink through the pores.

For laminated tape cassettes, instant lettering tape cassettes, and iron-on transfer tape cassettes, the CPU processes the print data to generate a mirror image so that the printed character can be seen normally when viewed from the other side of the printed face of the tape.

■ Character Formation

While the main motor (stepping motor) feeds the tape and ink ribbon (tape only when using non-laminated thermal film tape cassettes or stamp tape cassettes) by 0.141 mm for 13.8 ms, the thermal head generates heat once. The feed amount of 0.141 mm is smaller than the width (0.195 mm) of the heating elements so that the heat generated at one heating cycle will overlap with the next heating cycle. This forms a character having no gap between adjacent printed dots.

2.1.2 Roller Holder ASSY Setting & Retracting Mechanism

This mechanism consists of the roller release lever, roller release rod, and roller holder ASSY.

The roller holder ASSY incorporates the platen holder and the sub roller holder. These holders support the platen and the tape feed sub roller so that they can move perpendicularly to the thermal head and the tape feed roller, respectively, as well as rotating freely.

Closing the cassette cover pushes down the roller release lever which moves the roller release rod to the left (when viewed from the front of the machine). This pivots the roller holder ASSY around the shaft provided on the chassis so as to press the roller holder ASSY against the thermal head side.

The platen is pressed perpendicularly against the thermal head with the tape and ink ribbon (only the tape when using non-laminated thermal film tape cassettes or stamp tape cassettes) sandwiched inbetween under a uniform load by the platen spring. At the same time, the platen gear becomes engaged with the platen idle gear.

Also, the tape feed sub roller is pressed perpendicularly against the tape feed roller built in the tape cassette with the tape (and base paper when using laminated tape cassettes or stamp tape cassettes) sandwiched inbetween under a uniform load by the sub roller holder springs. At the same time, the sub roller gear becomes engaged with the tape feed gear.

If you open the cassette cover, the roller release lever pops up by pivoting around its center shaft since its bottom end is pulled down by the release lever spring. This retracts the roller holder ASSY from the thermal head, providing you with enough space to replace the tape cassette.

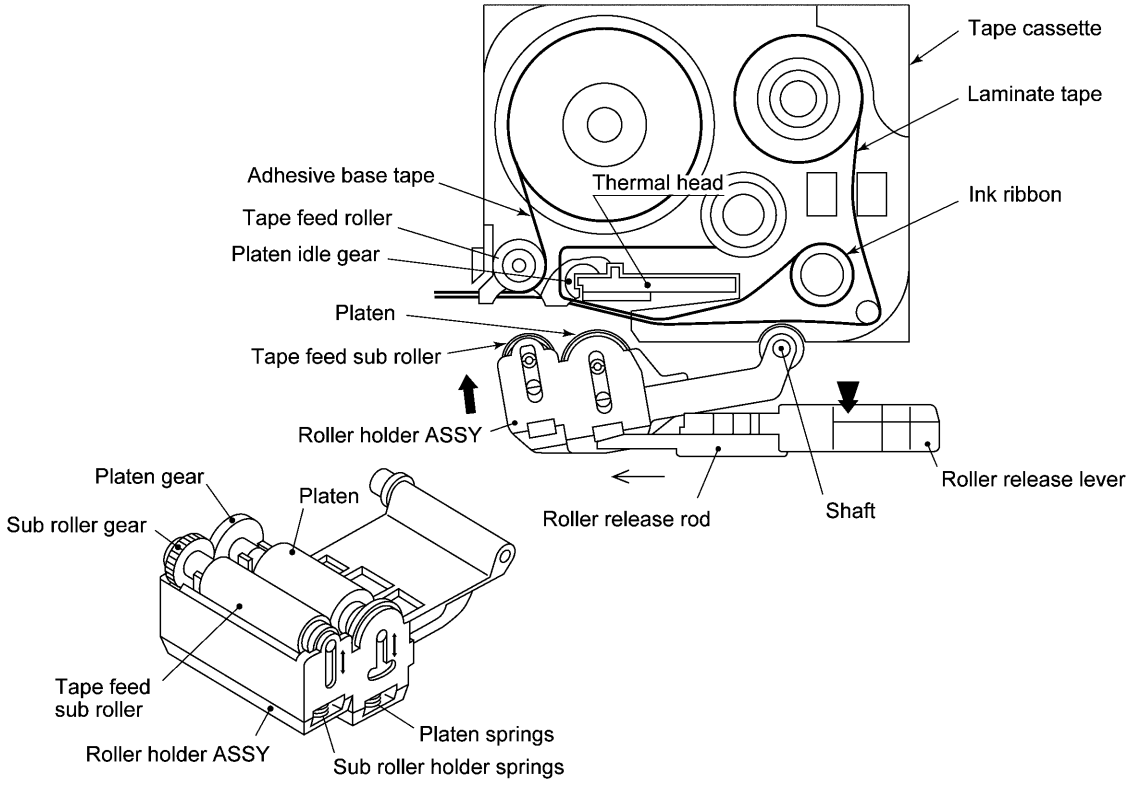

Figure 2.1-2 Roller Holder ASSY Setting & Retracting Mechanism

2.1.3 Regular Tape & Ribbon Feed Mechanism

This mechanism consists of a main motor, gear train, and roller holder ASSY.

■ Regular Tape Feeding

When you load a tape cassette and close the cassette cover, the platen and the thermal head sandwich the tape and ink ribbon (only the tape when using non-laminated thermal file tape cassettes or stamp tape cassettes) inbetween. Also, the tape feed sub roller in the roller holder ASSY and the tape feed roller inside the tape cassette sandwich the tape (and base paper when using laminated tape cassettes or stamp tape cassettes) inbetween, as described in Subsection 2.1.2.

As the main motor (stepping motor) rotates, the rotation is transmitted via the gear train to the platen idle gear (which rotates the platen gear) and the tape feed gear (which rotates the tape feed roller and the tape feed sub roller at the same rotation speed).

Accordingly, the sandwiched tape and ink ribbon will be advanced. (When a laminated tape cassette is mounted, the sandwiched laminate tape, adhesive base tape, and ink ribbon will be advanced together).

The feeding amount of the platen is slightly less than that of the tape feed sub roller.

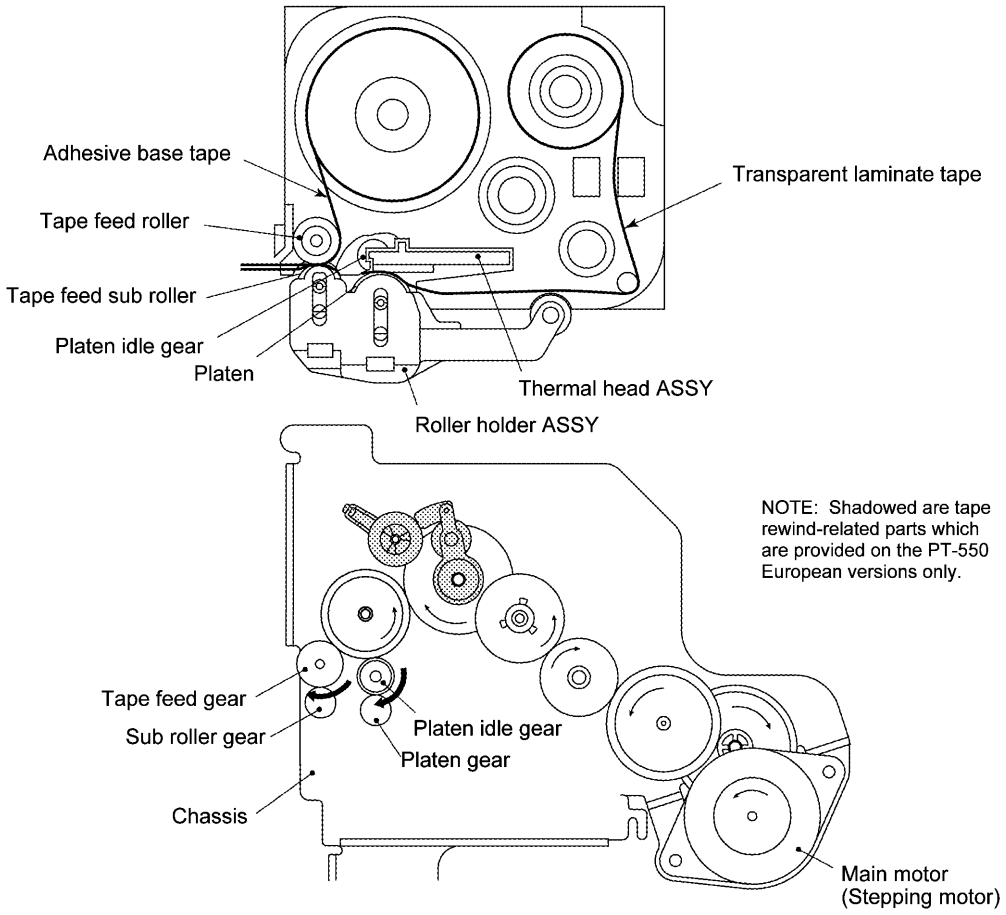

Figure 2.1-3 Tape Feeding Mechanism

■ Adhesive Base Tape Feeding (only for laminated tape cassettes)

A laminated tape cassette contains both a transparent laminate tape roll and a separate adhesive base tape roll.

When a transparent laminate tape and an adhesive base tape pass through the contact point (between the tape feed roller and tape feed sub roller), they are then bonded together into a single, printed tape. The ink printed on the laminate tape is, therefore, sealed up with the adhesive base tape.

■ Ink Ribbon Feeding (except for non-laminated thermal film tape cassettes and stamp tape cassettes)

As the main motor rotates, the ribbon drive cam located at the middle of the gear train rotates counterclockwise. When fitted on the ribbon drive cam, the ribbon take-up roll in the tape cassette also rotates to take up the ink ribbon.

To apply proper tension to the ink ribbon between the platen and the ribbon drive cam, the feed amount of the ribbon drive cam is slightly greater than that of the tape feed gear. The difference between the feed speeds at the platen and at the ribbon drive cam is absorbed by the clutch spring which is integrated in the ribbon drive cam and allows the cam to slip.

This way, the ink ribbon is kept tense, which enables the ribbon to clearly separate from the tape at the stabilized angle after printing.

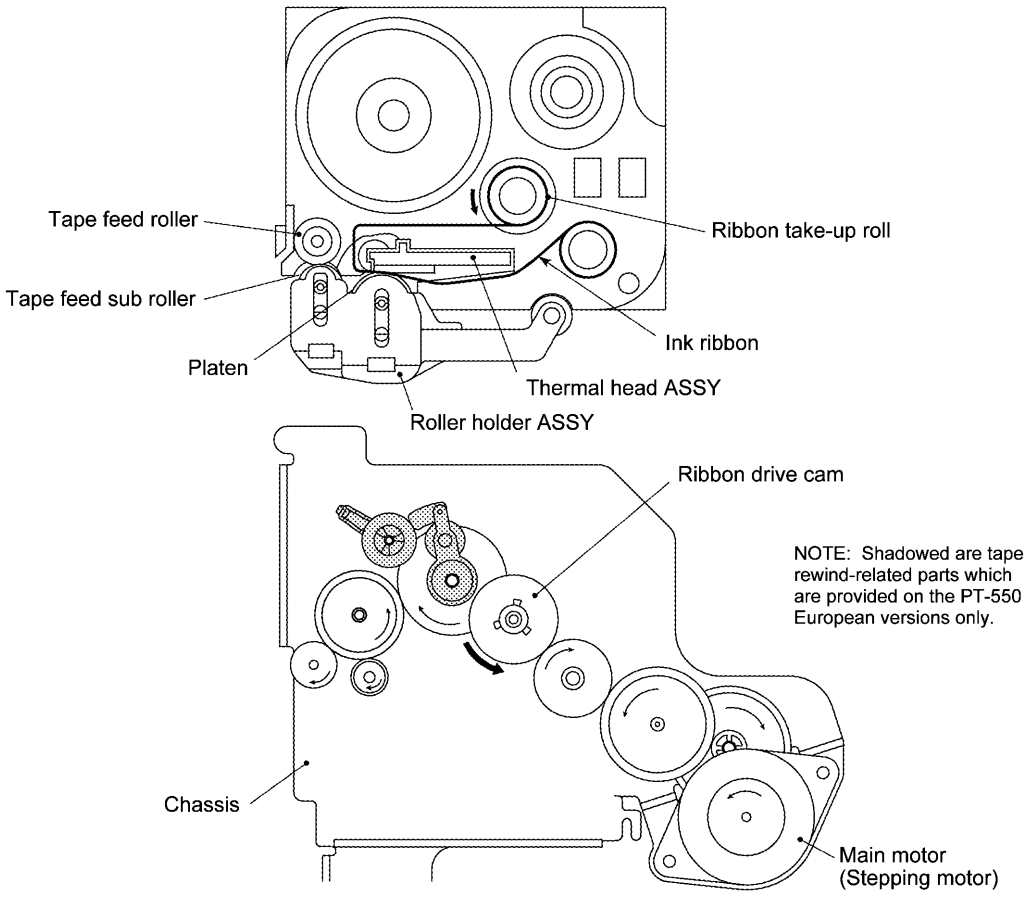

Figure 2.1-4 Ribbon Feeding Mechanism

2.1.4 Color Printing Mechanism (provided on the PT-550 European versions only)

The color printing mechanism allows you to print on a tape with up to three colors. You need to use a refill-type non-laminated tape cassette (YS-18), change the color ribbon and press the New Block switch to rewind the tape for color printing.

The color printing consists of two processes--printing process and tape rewinding process.

Printing process: This process is the same as for the regular printing (described in Subsection 2.1.3) except for the detection of the leading edge of the tape. If the tape leading-edge sensor signals that the leading edge of the tape passes through the light axis, the CPU further rotates the main motor by the specified number of pulses from that detection moment in order to feed the tape to the printing start position. Refer to Figure 2.1-5.

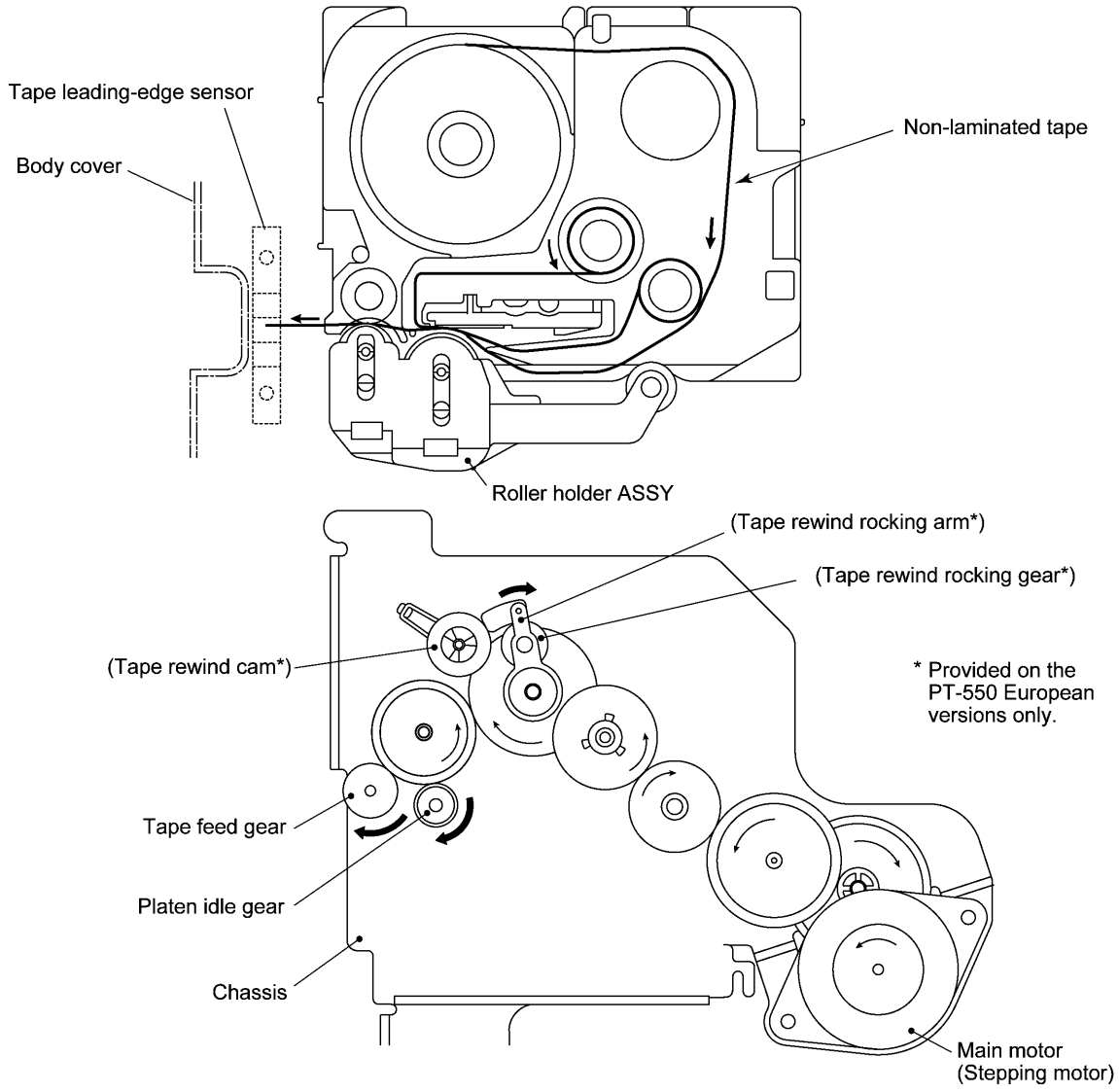

Figure 2.1-5 Printing Process in Color Printing

Tape rewinding process: After completion of the 1st printing sequence, you open the cassette cover, which retracts the roller holder ASSY from the thermal head providing you with enough space to access the ribbon (as described in Subsection 2.1.2). Then you take out the 1st color ribbon. To rewind the tape, you press the New Block switch.

The main motor rotates in the reverse direction (clockwise in Figure 2.1-6) and its rotation is transmitted via the gear train. The tape rewind rocking arm rotates counterclockwise so that its rocking gear engages with the tape rewind cam. Fitted over the cam which rotates counterclockwise, the tape rewind spool (in the refill-type non-laminated tape cassette, YS-18) also rotates to rewind the tape into the cassette.

If the leading edge of the rewound tape passes through the tape leading-edge sensor, the CPU further rotates the motor to rewind the tape by the specified number of pulses from that detection moment. This way, the tape rewinding process is completed.

To print with the 2nd color, you load the 2nd color ribbon and close the cassette cover. The same printing process as for the 1st color takes place for the 2nd color printing. After completion of printing, you open the cassette cover, take out the 2nd color ribbon, and rewind the tape. The same tape rewinding operation as described above takes place. To print with the 3rd color, the same processes as above are repeated.

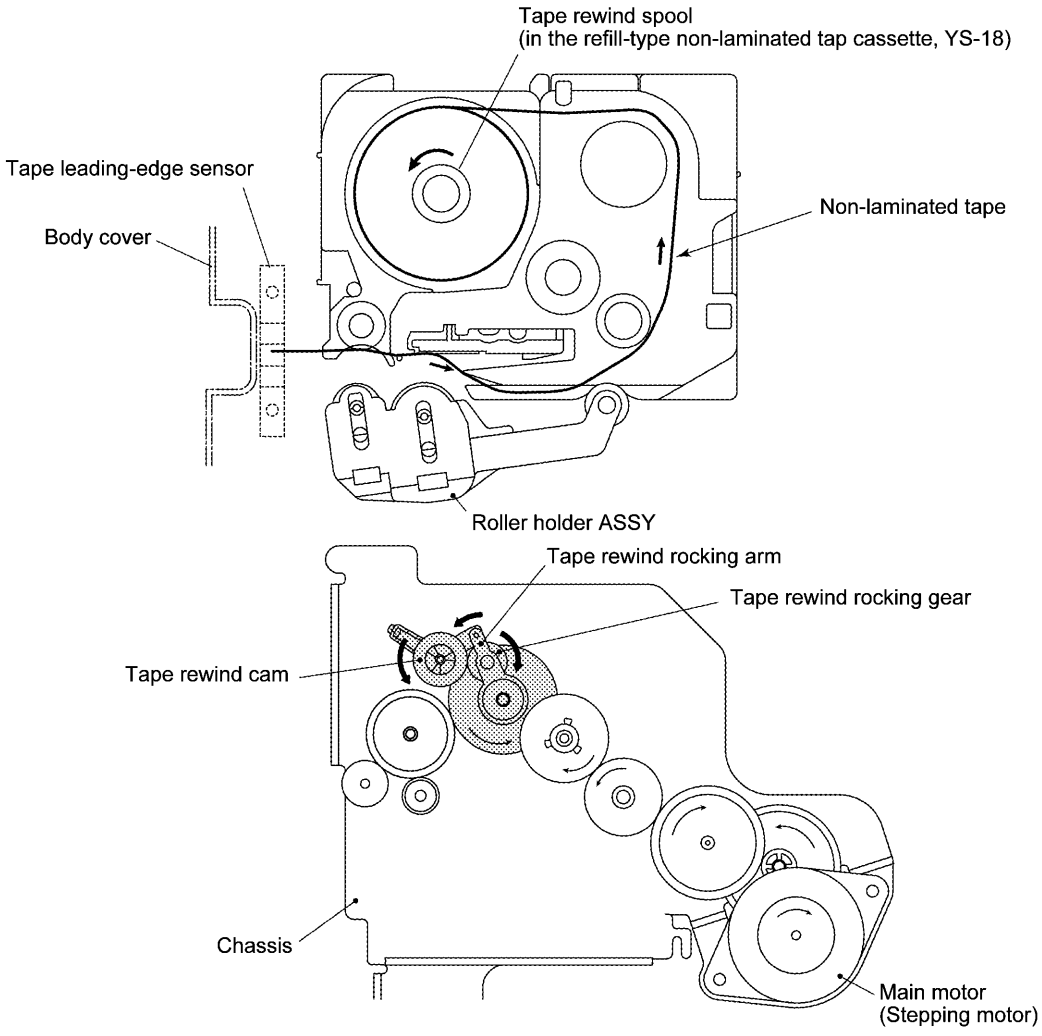

Figure 2.1-6 Tape Rewinding Process in Color Printing

2.1.5 Tape Cutter Mechanism

The tape cutter unit consists of a stationary blade and a movable blade driven by the cutter motor.

Upon completion of printing and tape feeding, the CPU activates the cutter motor (DC motor) whose clockwise rotation is transmitted via the idle gears to the cutter rocking gear.

As the cutter rocking gear rotates counterclockwise, its boss "X" (which is fitted in the opening of the movable blade) actuates the movable blade to pivot it around shaft "Y." Consequently, the cutter cuts the printed tape routing through the movable and stationary blades, just like a scissors.

After that, the CPU keeps the cutter motor on. When the movable blade comes back to the home position, its end "Z" activates the cutter sensor actuator which presses the cutter sensor switch provided on the main PCB. The moment the CPU receives the sensor signal, it stops the cutter motor.

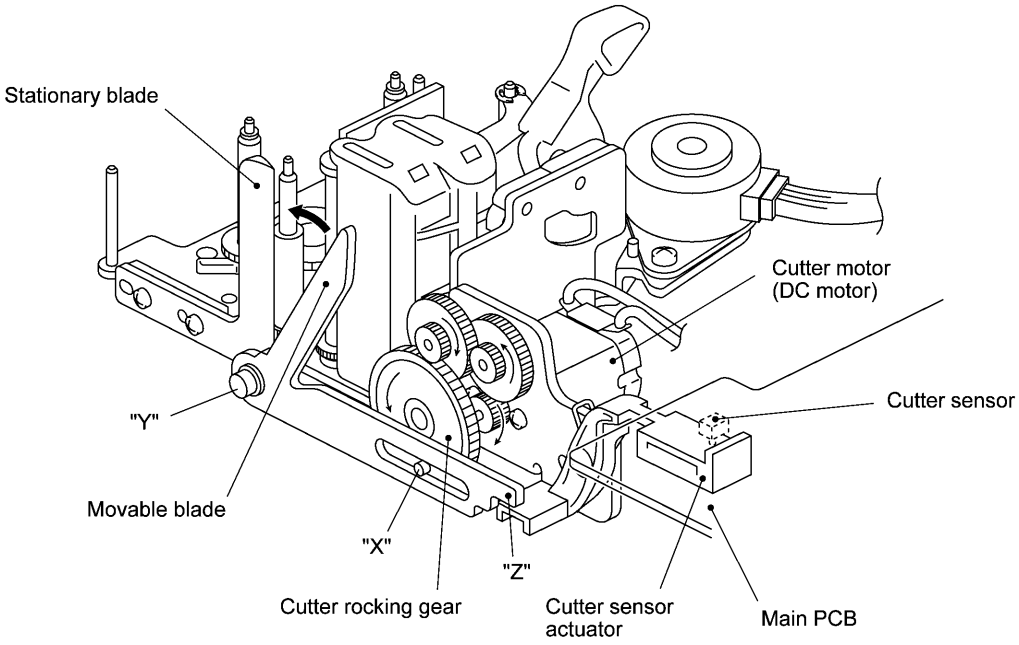

Figure 2.1-7 Tape Cutter Mechanism

2.1.6 Cover Open Switch

Sliding the cover open switch to the left turns the cover lock lever as illustrated below, releasing the cassette cover.

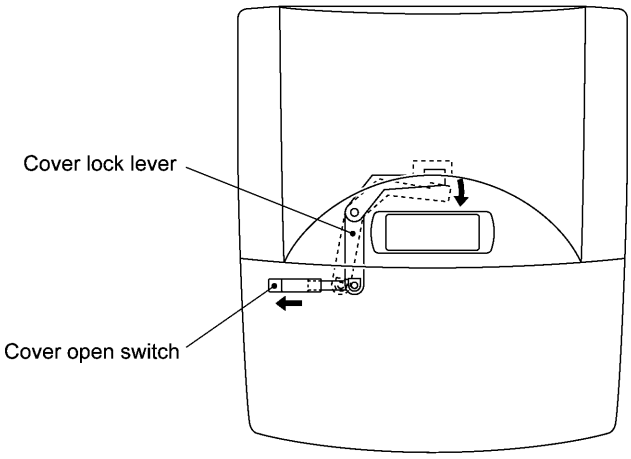

Figure 2.1-8 Cover Open Switch

2.1.7 Cassette Cover Sensor

The cassette cover sensor (photosensor PH1) is provided on the main PCB. Closing the cassette cover puts its sensor tab in the photosensor, signaling that the cassette cover is closed.

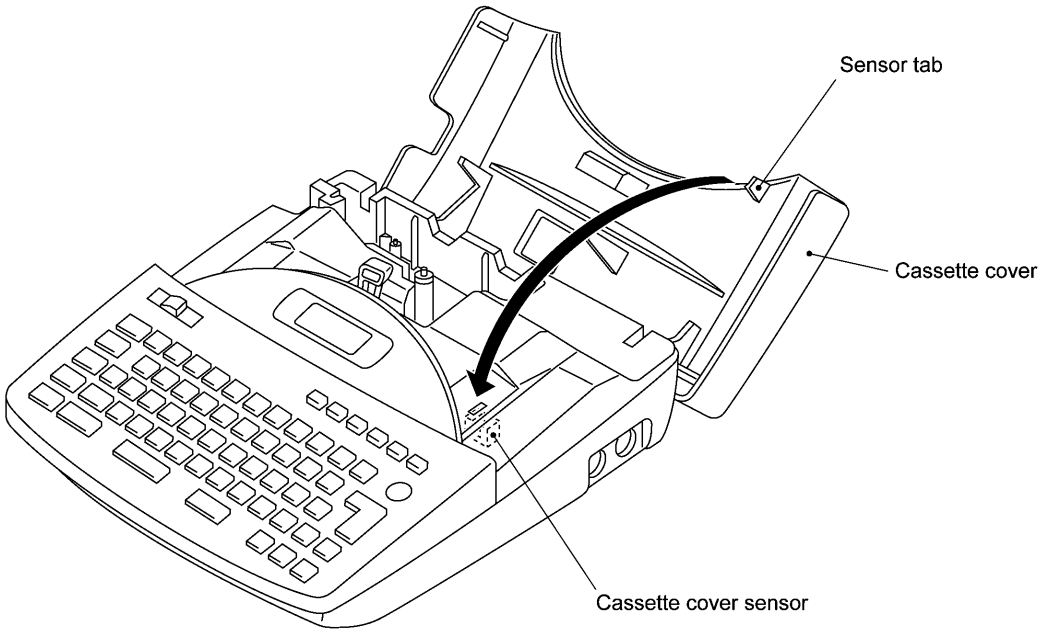

Figure 2.1-9 Cassette Cover Sensor

2.2 DISASSEMBLY & REASSEMBLY

■ Safety Precautions

(1) The disassembly or reassembly work should be carried out on a grounded antistatic sheet. Otherwise, the LSIs and electronic parts may be damaged due to the electricity charged in your body.

(2) When transporting PCBs, be sure to wrap them in conductive sheets such as aluminum foil.

(3) When using soldering irons and other heat-generating tools, take care not to damage the resin parts such as wires, PCBs, and covers.

(4) Be careful not to lose screws, washers, or other parts removed for parts replacement.

(5) Tighten screws to the torque values listed below.

■ Tightening Torque List

Location	Screw type	Q'ty	Tightening torque N•cm (kgf•cm)
Bottom cover	Taptite, bind 3 x 8	4	38.2 (4)
Power supply PCB	Taptite, bind 2.6 x 6	2	29.4 (3)
Cutter unit	Screw, bind 3 x 5	2	58.8 (6)
Cutter motor	Screw, pan cup 2.6 x 3.5	2	39.2 (4)
Thermal head ASSY	Screw, bind 3 x 5	2	58.8 (6)
Main motor ASSY	Screw, cup 2.6 x 3.5	2	39.2 (4)
Chassis ASSY	Taptite, bind 3 x 8	3	39.2 (4)
Main PCB	Taptite, bind 2.6 x 6	3	29.4 (3)
Leading-edge sensor PCB	Taptite, pan cup 2.6 x 8	2	29.4 (3)
LCD support	Taptite, bind 2.6 x 6	2	29.4 (3)

2.2.1 Disassembly Procedure

[1] Removing the Tape Cassette and Cassette Cover

(1) Slide the cover open switch to the left and open the cassette cover fully.

(2) Pull the tape cassette up and out of the machine.

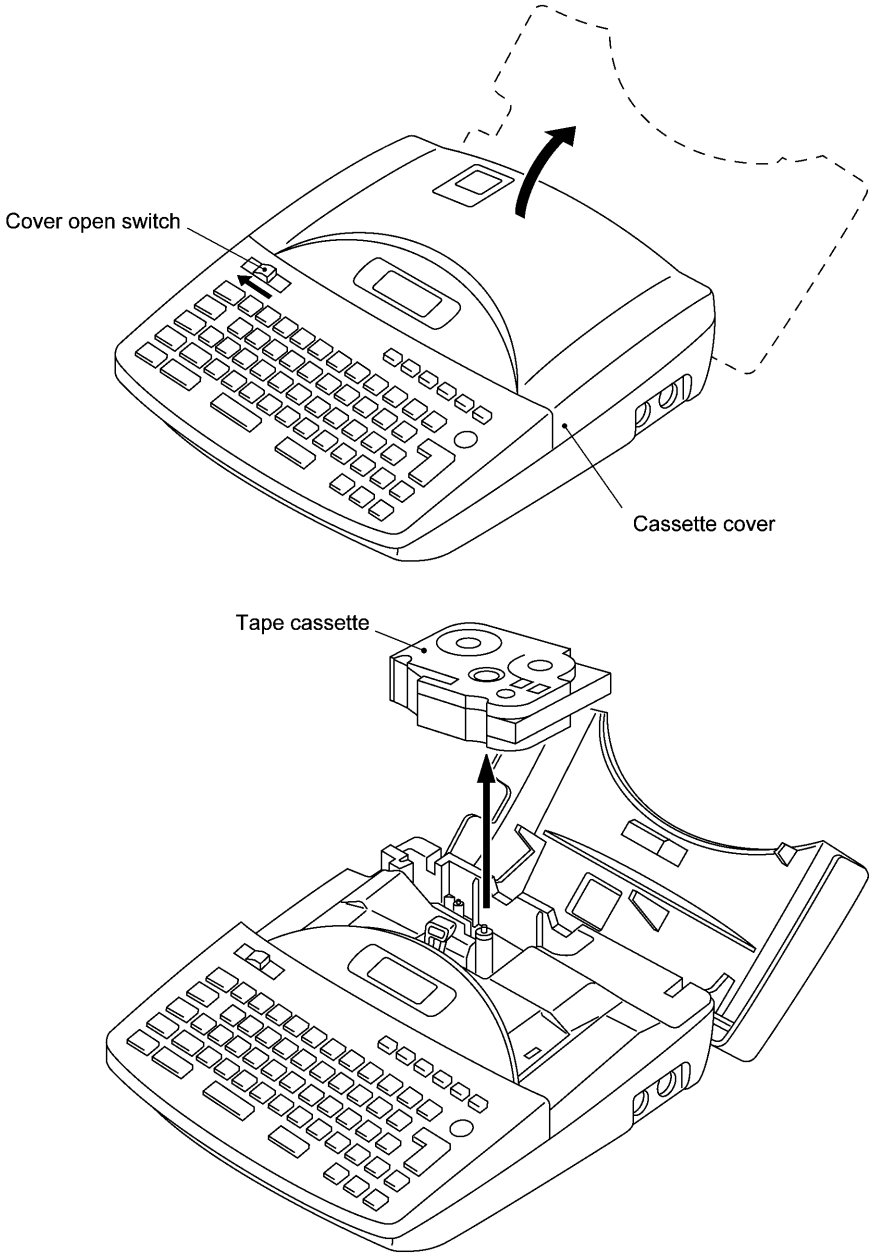

Figure 2.2-1 Removing the Tape Cassette

(3) Push the hinges of the cassette cover outwards and take off the cassette cover.

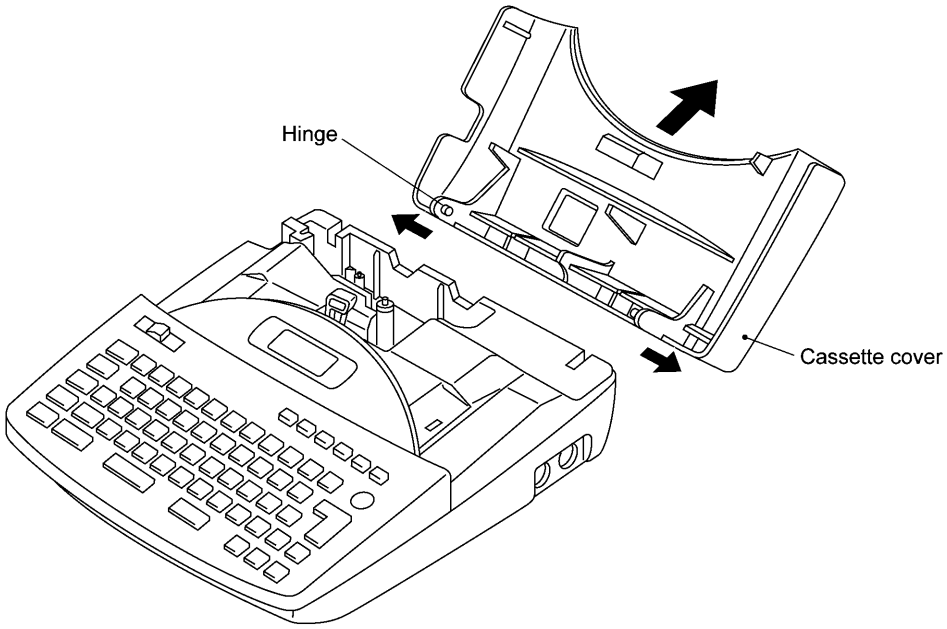

Figure 2.2-2 Removing the Cassette Cover

[2] Removing the Lettering Stick

(1) Turn the machine upside down.

(2) Pull out the lettering stick.

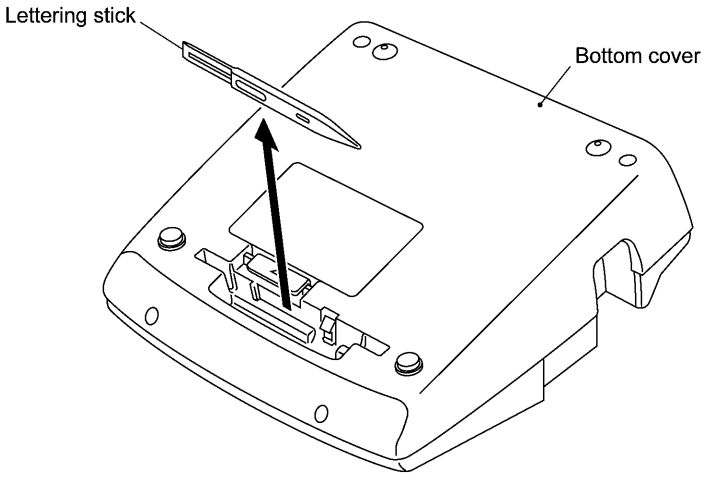

Figure 2.2-3 Removing the Lettering Stick

[3] Removing the Battery Lid and Batteries

(1) Press section "A" of the battery lid and remove it.

(2) Take out batteries.

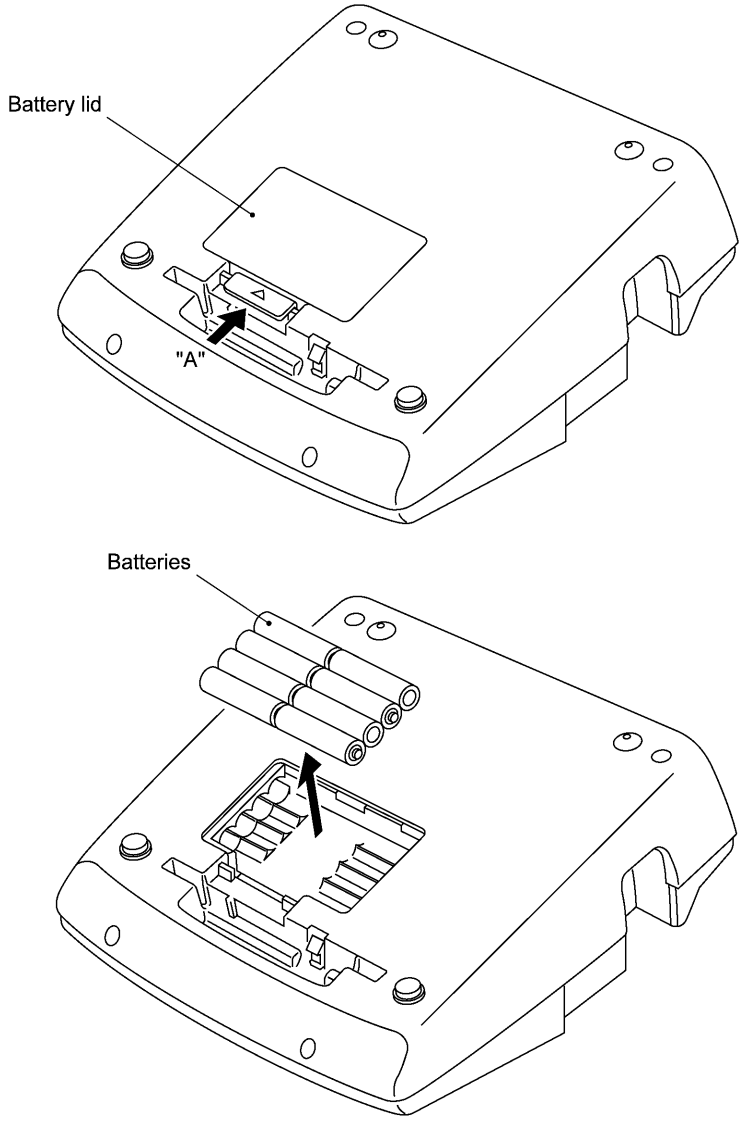

Figure 2.2-4 Removing the Battery Lid and Batteries

[4] Removing the Bottom Cover

(1) Turn the machine upside down.
(2) Remove four screws from the bottom cover.
(3) Apply your fingers to the rear end of the body cover and pull up the body cover.

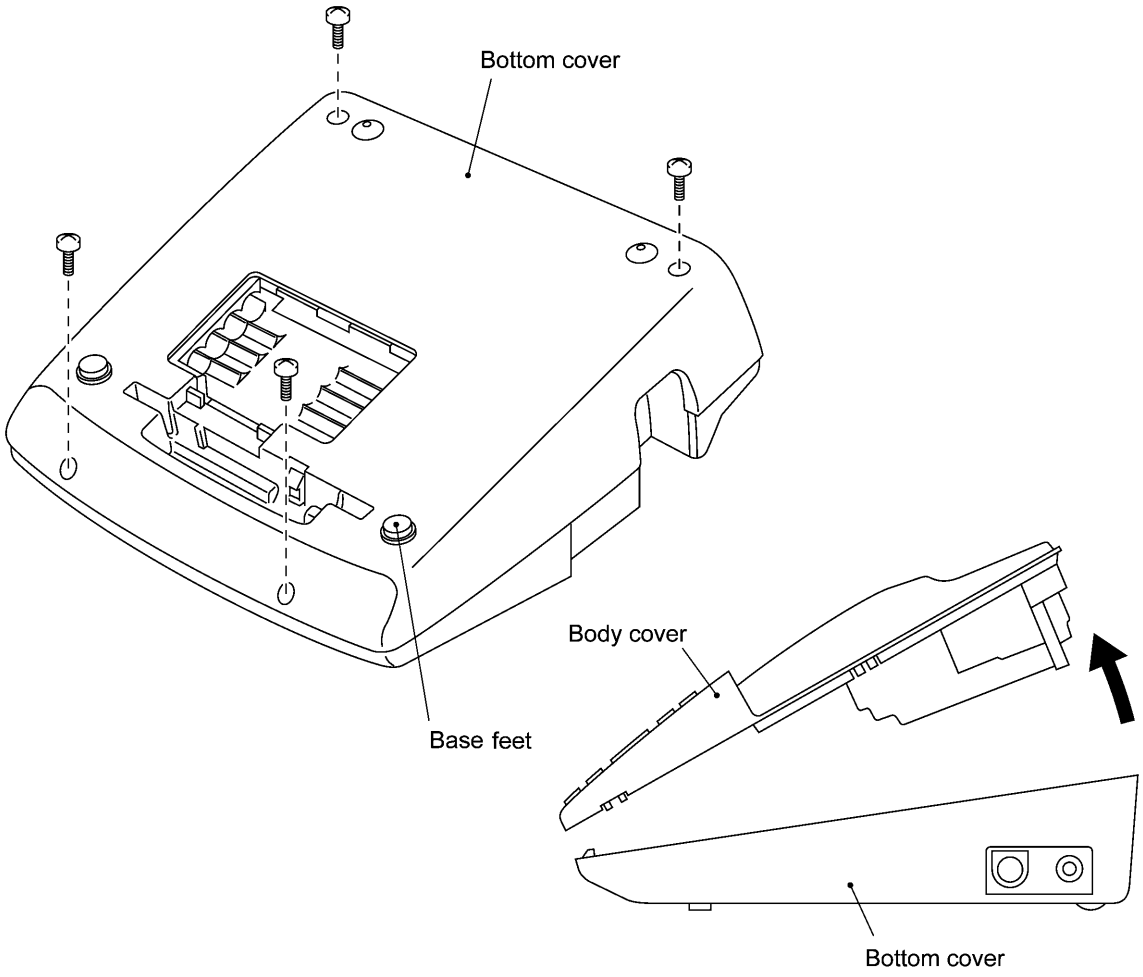

Figure 2.2-5 Removing the Body Cover (1)