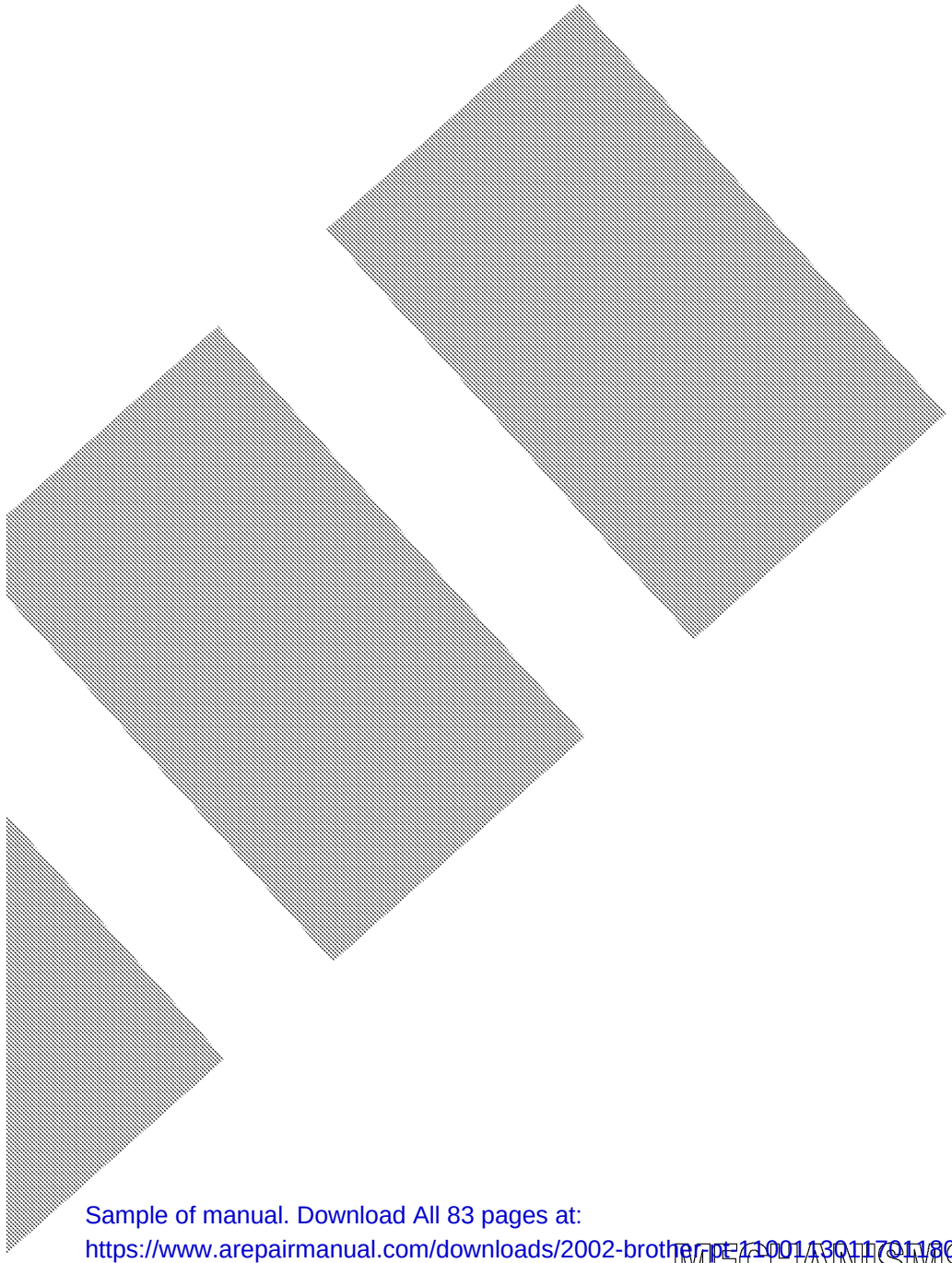
brother®

P-touch
SERVICE MANUAL

MODEL: PT-1100/1130/1170/1180/11Q
PT-1250/1160
ST-1150(Heavy Duty Labeler™)



REVISED 1

MECHANISMS & ELECTRONICS

brother®

SERVICE MANUAL

MODEL: PT-1100/1130/1170/1180/11Q
PT-1250/1160
ST-1150(Heavy Duty Labeler™)

PREFACE

This publication is a service manual covering the specifications, theory of operation, disassembly/reassembly procedure, and troubleshooting of the Brother PT-1100/1130 /1170/1180/11Q, PT-1250/1160 and ST-1150.
It is intended for service personnel and other concerned persons to accurately and quickly provide after-sale service for our PT-1100/1130/1170/1180/11Q, PT-1250/1160 and ST-1150.
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 three chapters and appendices.

CHAPTER I

SPECIFICATIONS

CONTENTS

CHAPTER I SPECIFICATIONS

1.1 MECHANICAL SPECIFICATIONS

1.1.1 External Appearance

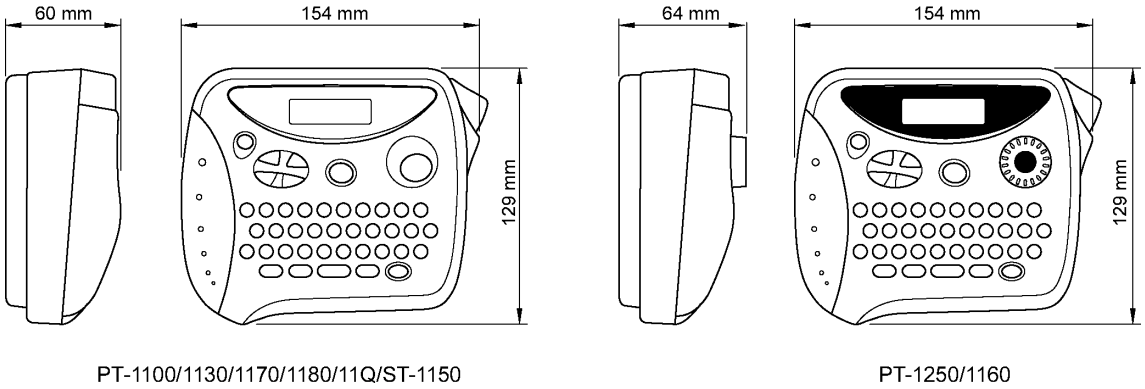


Fig. 1.1-1 External Appearance

(1) Dimensions (W x D x H)
154 x 129 x 60 mm
(PT-1100/1130/1170/1180/11Q/ST-1150)
154 x 129 x 64 mm (PT-1250/1160)

(2) Weight

Machine proper only
Approx. 400 g

In package

Packaging	Weight (g)
Carton with One Unit	670g
Clamshell	650g
Carrying Case	1300g

(including the machine, packing materials and packaged standard components)

1.1.2 Keyboard

(1) Entry system
Rubber 41 key (PT-1100/1130/1170/1180/11Q/ST-1150)
Rubber 40 key and tact switch (PT-1250/1160)

(2) Number of alphanumeric and symbol keys
30

(3) Number of function keys
11 (PT-1100/1130/1170/1180/11Q/ST-1150)
10 (PT-1250/1160)
(including On/Off key, L/R pointing keys must be counted as one.)

(4) Key arrangement
See Fig. 1.1-2.

1.1.3 Display

(1)	Display type	Liquid crystal display (LCD)
(2)	Number of columns	8 columns x 1 row (See Fig. 1.1-2.)
(3)	Number of indicators	10 (See Fig. 1.1-2.)
(4)	Character size	5 dots wide by 7 dots high
(5)	Field-of-view angle adjustment	Fixed by a resistor

1.1.4 Printing Mechanism

(1)	Print method	Thermal transfer onto plastic tapes (laminate tape and non-laminated tape) (Fixed print head and tape feeding mechanism)
(2)	Print speed	10 mm/second (Typical)
(3)	Print head	
	Type	Thermal print head
	Heat generator	Consists of 64 heating elements vertically aligned
	Size of heating element	0.195 mm wide by 0.141 mm high

(4) Character size

	Ratio	Width x height	
Standard (Small) size	(1)	2.26 x 2.96 mm	16 x 21 dot
Double width	(W2)	4.37 x 2.96 mm	31 x 21 dot
Double height	(H2)	2.26 x 5.92 mm	16 x 42 dot
Double width and double height	(4)	4.37 x 5.92 mm	31 x 42 dot
Quadruple width and double height	(8)	8.74 x 5.92 mm	62 x 42 dot

This part explains the dot size of "H" character as an example in the table above, because the character size is different by the width of the tape and the character.

1.1.5 Tape Cassette

(1)	Cassette	Cartridge type (TZ-cassette)
(2)	Types of tape cassettes	
	Laminated tape cassette	Laminated tape, ink ribbon, and adhesive base tape
	Non-laminated tape cassette	Non-laminated tape and ink ribbon
	Cloth tape cassette	Cloth tape and ink ribbon

(3) Tape size

	Width	Length
Laminated tape	6, 9, 12 mm	8 m
Non-laminated tape	6, 9, 12 mm	8 m
Cloth tape	12 mm	4 m

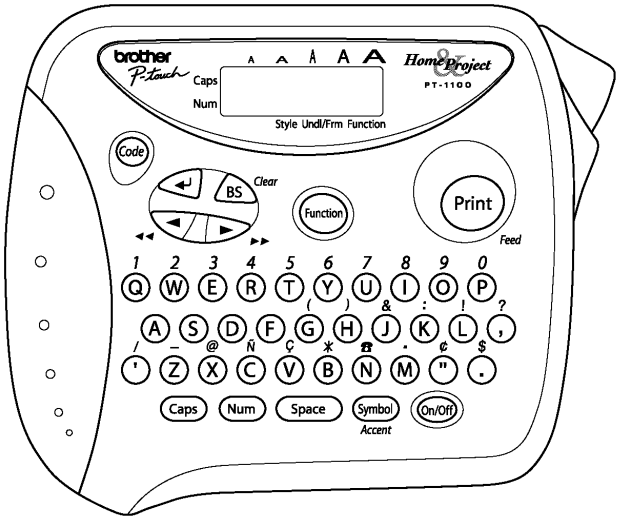
(4) Tape cassette packed with the machine

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

1.1.6 Tape Cutter

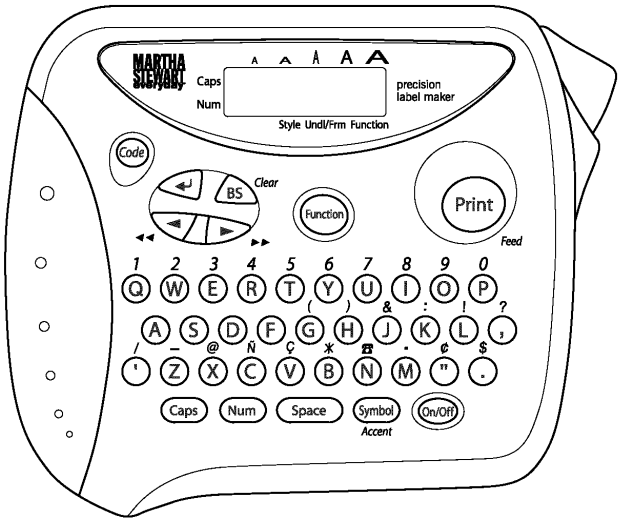
(1)	Tape cutting	Manual cutting with the cutter lever
(2)	Cutter unit	Replaceable by the customer

PT-1100 U.S.A.



PT-1100 AUSTRALIA

PT-1130 U.S.A.



ST-1150 U.S.A./CANADA

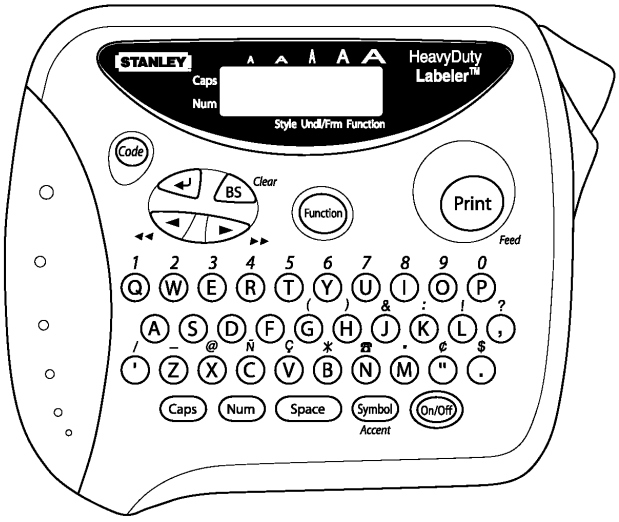
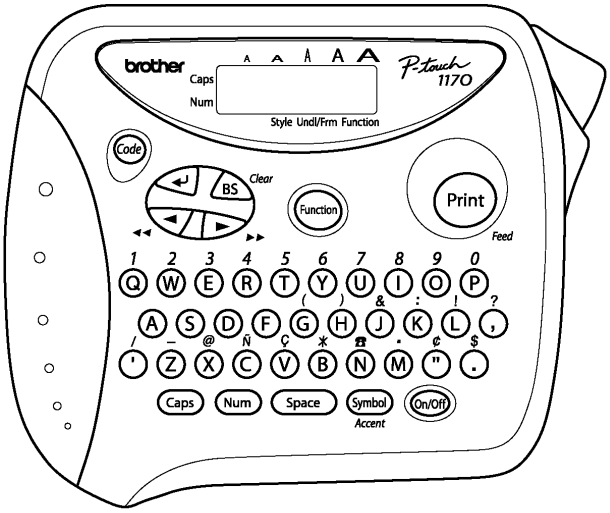
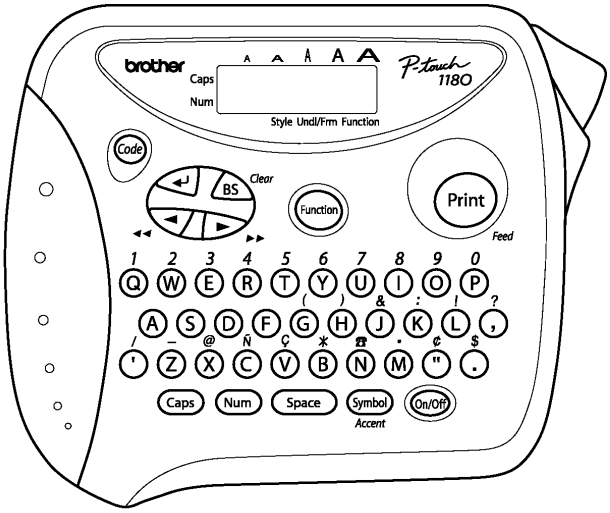


Fig. 1.1-2 Key Arrangement (1)

PT-1170 U.S.A.



PT-1180 U.S.A./CANADA



PT-11Q U.S.A.

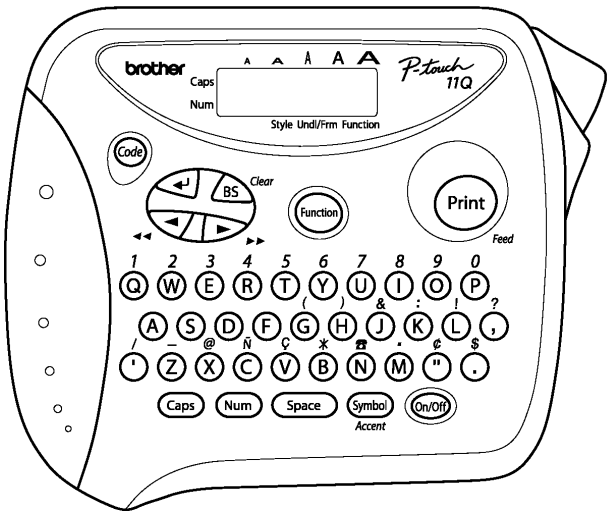
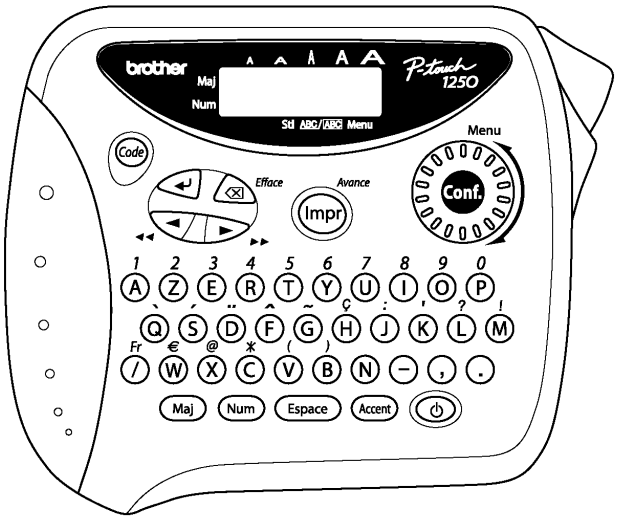


Fig. 1.1-2 Key Arrangement (2)

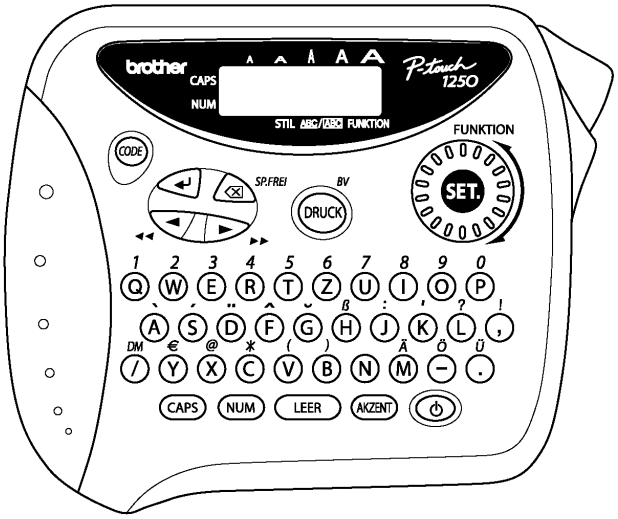
PT-1250 FRENCH



PT-1250 BELGIUM

PT-1250 CANADA

PT-1250 GERMAN



PT-1250 U.K.

PT-1160 U.S.A.

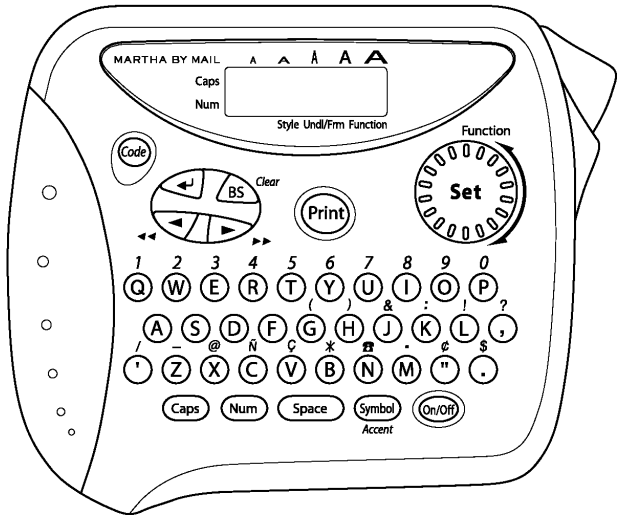


Fig. 1.1-2 Key Arrangement (3)

1.2 ELECTRONICS SPECIFICATIONS

1.2.1 Character Generator

(1)	Internal characters	U.K./ FRA/ BEL (PT-1250) GER (PT-1250) U.S.A./ CAN./AUS. (PT-1100/1130/1170/1180/11Q/ST-1150,and PT-1160/1250 for CAN.)	205 213 176
(2)	Internal font	HELSINKI	
(3)	Print buffer capacity	55 characters	
(4)	Phrase memory capacity	300 characters	

1.2.2 Power Supply

(1)	Power supply	Driven by 6 batteries Optional AC adapter (7VDC, 1.2A) available * For PT-1180, the power supply is batteries only. The optional AC adapter is not available.
(2)	Battery type	6 alkaline batteries (AM4/ LR03)
(3)	Service life of batteries	Will last through one tape cassette, and then some. (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) Battery indication

1) If the voltage level of the VAD rises over approx. 10.8V, the CPU immediately shuts down the power.
2) If it drops even more below approx. 5.3V, the CPU displays the message to warn you of a low battery after completion of printing.
3) If it drops even more below approx. 5.0V, the CPU interrupts the printing and displays the message to warn you of a very low battery.
4) If it drops below approx. 4.8V, the CPU immediately shuts down the power.

* Displays different for each country when the battery is weak or when the battery became empty are indicated below.
* Displays of specification for U.S.A. and for Canada can be switched.

		UK/BELGIUM	FRENCH	GERMAN	U.S.A./AUSTRALIA	CANADA
Battery week	5.3V	BATTERY	B:V	BATTERIE	BATTERY	PILE!
Battery empty	5.0V	BATTERY •	B:V • • • • •	BATTERIE	BATTERY •	PILE! • • •

The underline of eight (8) characters length is drawn for display when the Battery Empty.

1.3 SPECIAL KEY

1.3.1 Format

Push the “Code” key + “BS(⌫)” key + “On/Off (⏻)” key, when the power is off.

1.3.2 Demonstration Print

Push “Code” key + “D” key. (PT-1100/1130/1170/1180/11Q/ST-1150, and PT-1160/1250 for CAN.)
Push “Code” key + “D” key+ “On/Off (⏻)” key. (PT-1250 not only for CAN.)
(It is effective when there is not any data in the text.)

CHAPTER II

MECHANISMS

CONTENTS

CHAPTER II MECHANISM

2.1 THEORY OF OPERATION

2.1.1 Print Mechanism

(1) Structure of Thermal Head

This machine uses thermal transfer printing. The thermal print head has a heat generator consisting of 64 heating elements which are vertically aligned as shown in Fig. 2.1-1. Each heating element is 0.195 mm wide by 0.141 mm high.

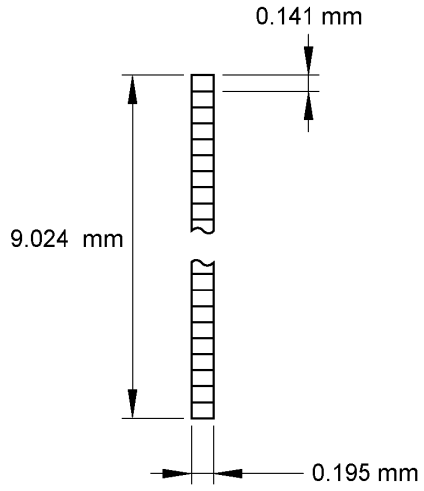


Fig. 2.1-1 Heat Generator of Thermal Head

(2) Printing process

When the cylindrical rubber platen roller is pressed against the thermal print head with the tape* and ink ribbon sandwiched inbetween, the CPU applies electric power to the selected ones of those 64 heating elements.

* Laminated tape when using laminated tape cassettes.
Non-laminated tape when using non-laminated cassettes.

[For tape cassette 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 on the tape. The tape is advanced and the next heating cycle is repeated, thus froming a character on the tape.

(3) Character Formation

While the drive motor (DC motor) feeds the tape and ink ribbon by 0.141 mm for approx 14.0 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 Platen Roller, (Tape Feed) Sub Roller Setting & Retracting Mechanism

This mechanism consists of the holder cam (cassette cover ASSY) and the roller holder ASSY.

The roller holder ASSY supports the platen roller and the sub roller so that :

- the platen roller can move perpendicularly to the thermal head and rotate freely and
- the sub roller can move perpendicularly to the tape feed roller and rotate freely.

By closing the cassette cover ASSY, the holder cam of cassette cover ASSY pushes the roller holder ASSY toward thermal head side by pushing A face of the roller holder ASSY.

The platen roller is pressed perpendicularly against the thermal head with the tape and ink ribbon (only the tape when using non-laminated thermal film tape cassettes) sandwiched inbetween under a uniform load by the roller holder springs (upper and lower). Also, the (tape feed) sub roller is pressed perpendicularly against the tape feed roller built in the tape cassette with the tape (the laminate tape and adhesive base tape when using laminated tape cassettes) sandwiched inbetween by the roller holder springs (upper and lower) and at the same time the (tape feed) sub roller gear becomes engaged with the tape idle gear.

Opening the cassette cover ASSY, (the holder cam of the cassette cover ASSY is released from the roller holder ASSY), retracts the roller holder ASSY from the thermal head, providing you with enough space to replace the tape cassette.

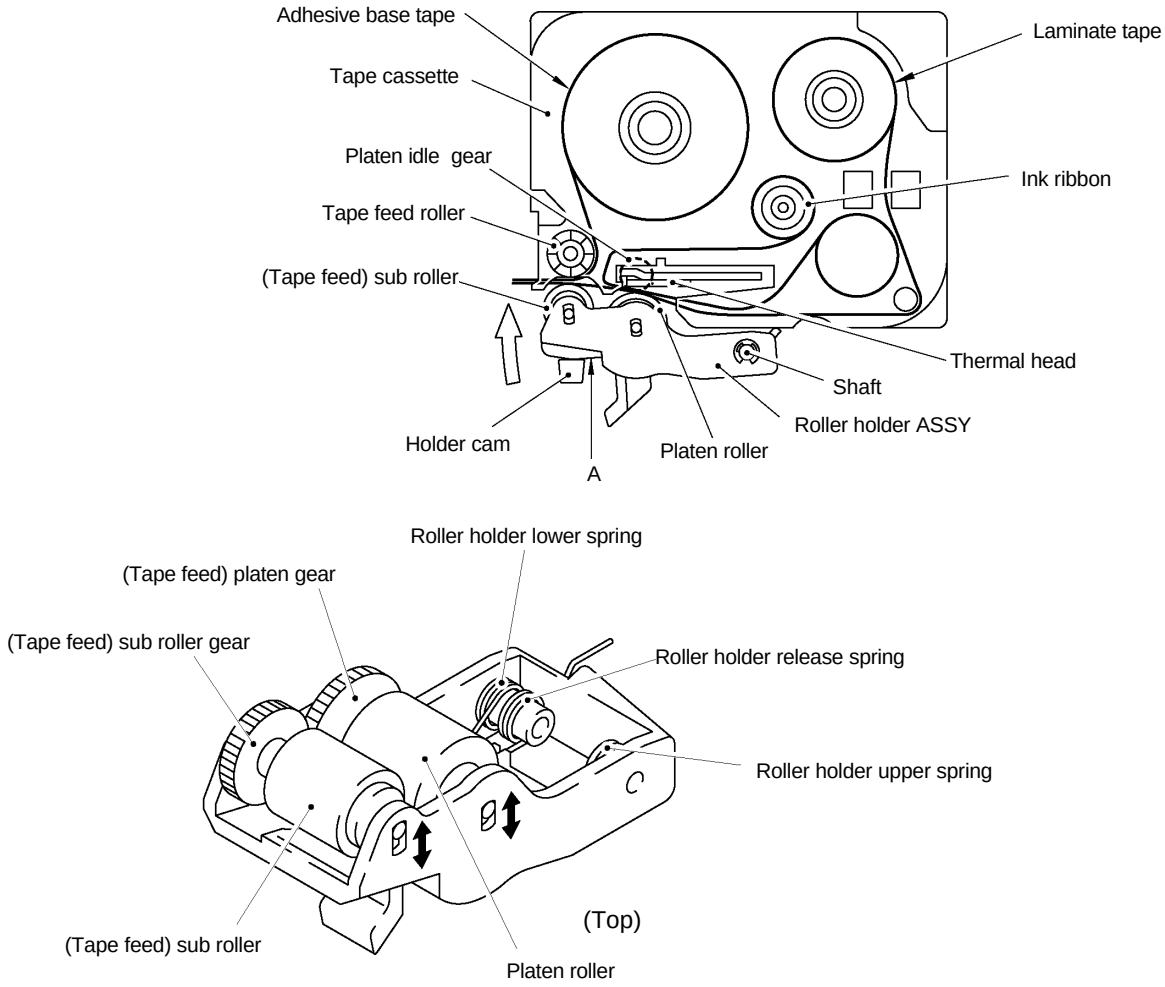


Fig. 2.1-2 Platen and (Tape Feed) Sub Roller Setting & Retracting Mechanism

2.1.3 Tape & Ribbon Feed Mechanism

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

(1) Tape Feeding

As the tape feed motor (DC motor) rotates, the rotation is transmitted via the gear train to the platen idle gear (which rotates both the platen gear) and the tape idle gear (which rotates the tape feed sub roller).

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.

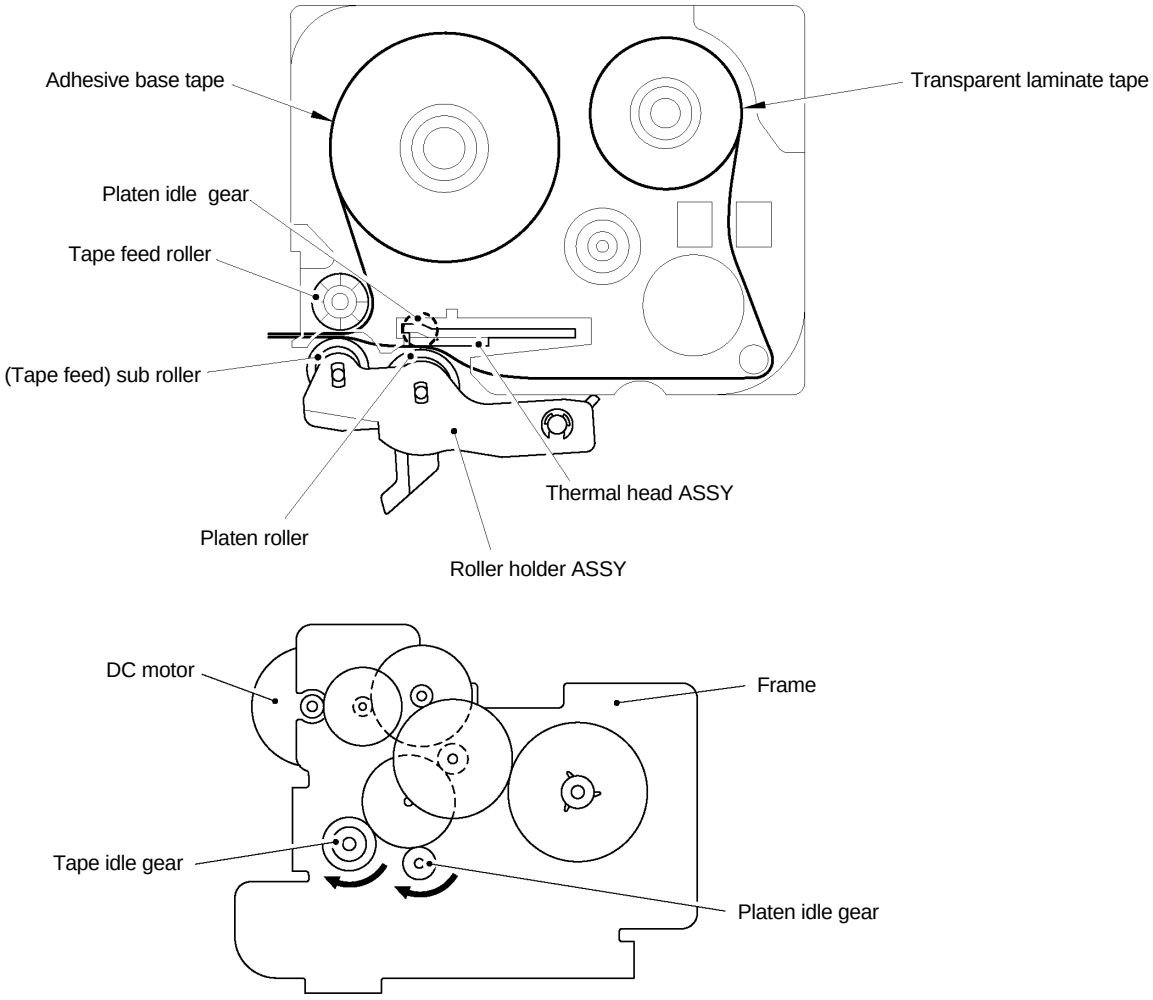


Fig. 2.1-3 Tape Feeding Mechanism

(2) 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.

(3) Ink Ribbon Feeding

As the DC 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 roller and the ribbon drive cam, the feed amount of the ribbon drive cam is slightly greater than that of the platen idle gear. The difference between the tape feed speeds at the platen roller 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.

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

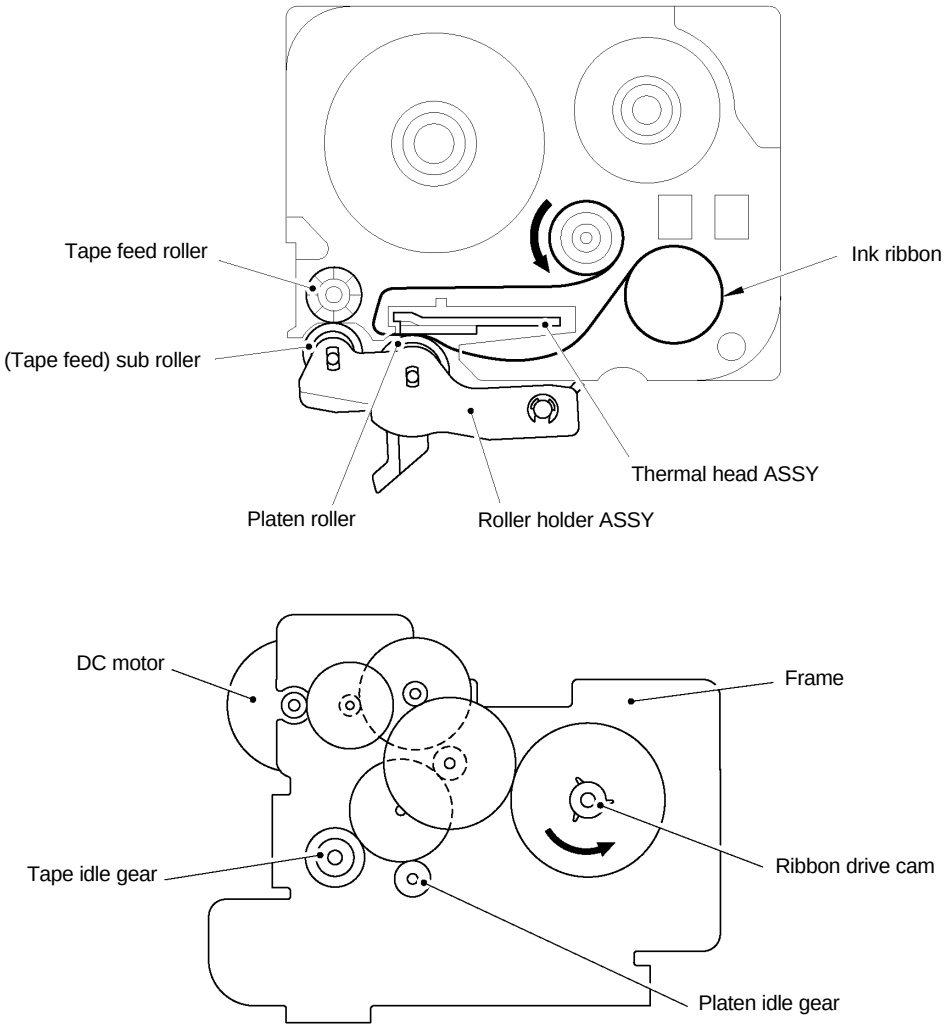


Fig. 2.1-4 Ribbon Feeding Mechanism

2.1.4 Tape Cutter Mechanism

The tape cut unit consists from the cutter case ASSY and the board.

Tape that finished printing is fed out from the tape cassette and stops at a point passed between the cutter case ASSY and the board.

When the cutter lever is pushed at this point, then, the cutter case ASSY (cutter blade) is operated to cut tape.

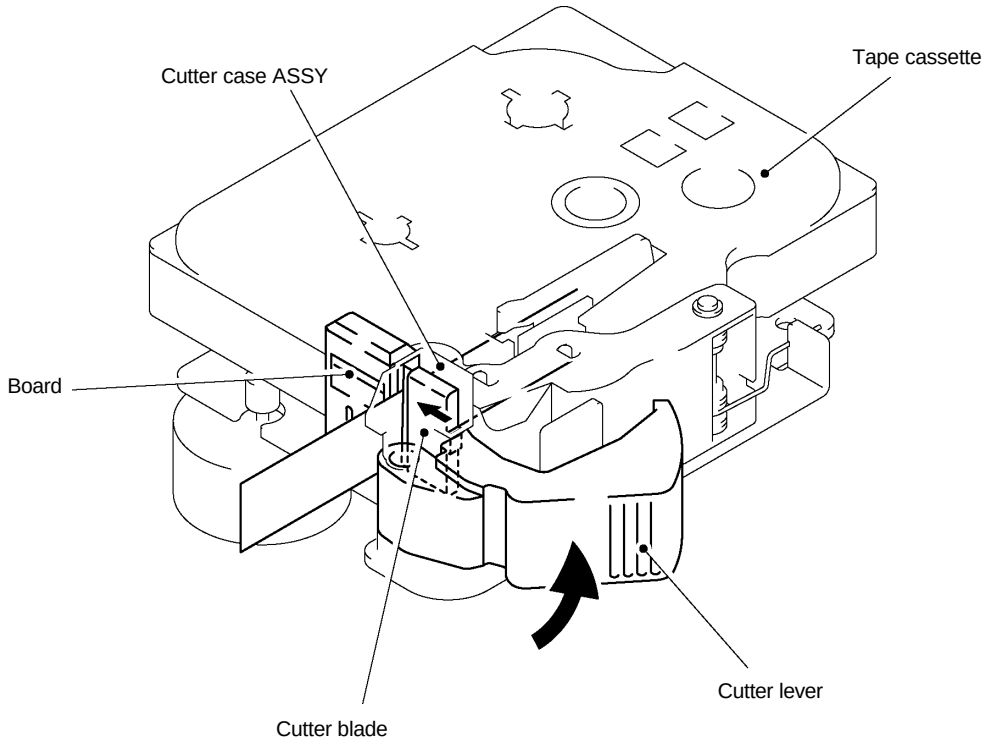


Fig. 2.1-5 Tape Cutter Mechanism

2.1.5 Cutter Safety Lock Mechanism

When the cassette cover ASSY is opened and no tape cassette is loaded, the roller holder ASSY is retracted from the thermal head with the roller holder release spring (as described in Subsection 2.1.2). In this retracted position, the cutter lever stopper of the roller holder ASSY blocks the end of the cutter lever, preventing the cutter blade from coming out of the cutter case ASSY for safety, as shown below.

Closing the cassette cover ASSY or loading a tape cassette release the cutter safety lock mechanism as follows.

Closing the cassette cover ASSY pivots the roller holder ASSY towards the thermal head so that the cutter lever stopper does not interfere with the cutter lever.

When a tape cassette is loaded, its outer edge pushes the tab of the roller holder ASSY to pivot the roller holder ASSY towards the thermal haed so that the cutter lever stopper does not interfere with the cutter lever.

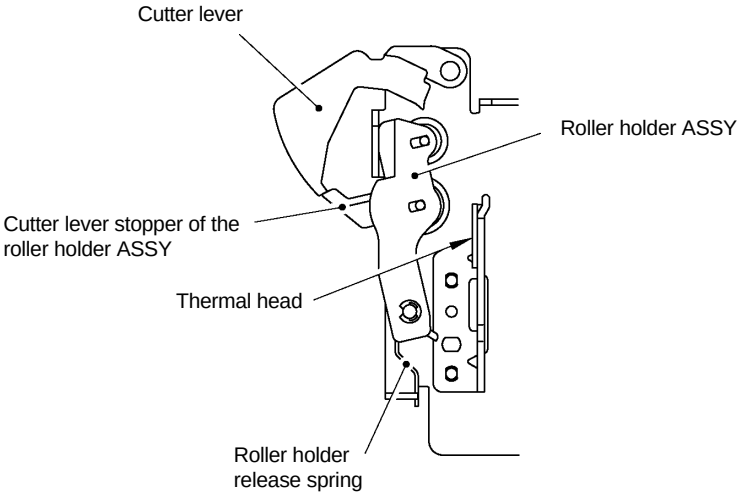


Fig. 2.1-6 Cutter Safety lock Mechanism

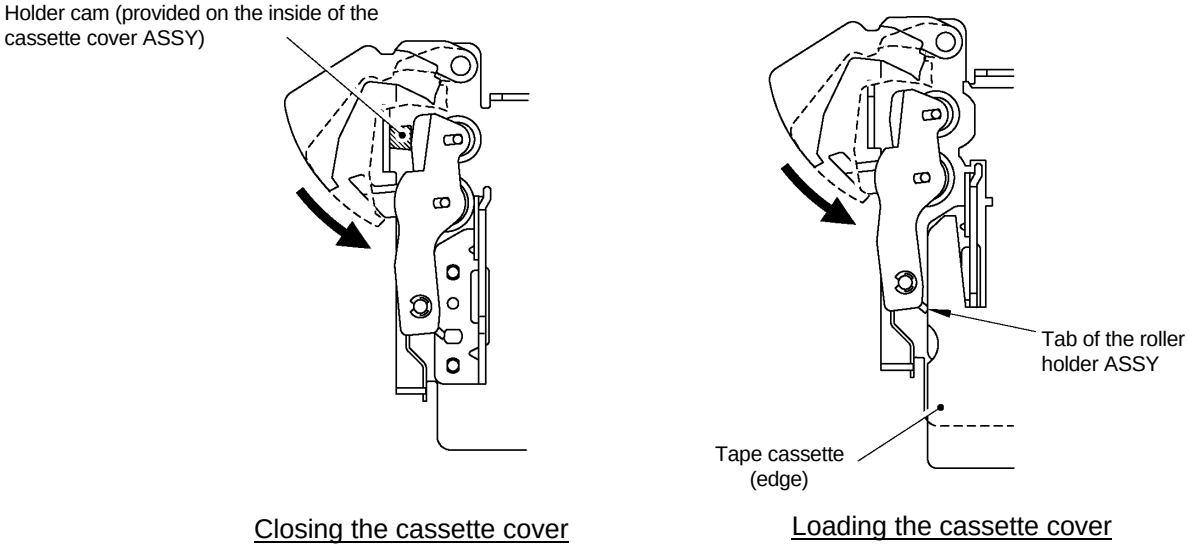


Fig. 2.1-7 Releasing the Cutter Safety Lock Mechanism

2.1.6 Interlock Mechanism of the Roller Holder

(1) When the cassette case ASSY is opened, then the holder cam attached at back side of cassette cover is released from surface A. Following to that, the roller holder ASSY is retracted from the thermal head side with tension of the roller release spring.

(2) When the cassette cover ASSY is closed, then the holder cam located at backside pushes the thermal head at roller holder ASSY by pressing A surface of the roller holder ASSY.

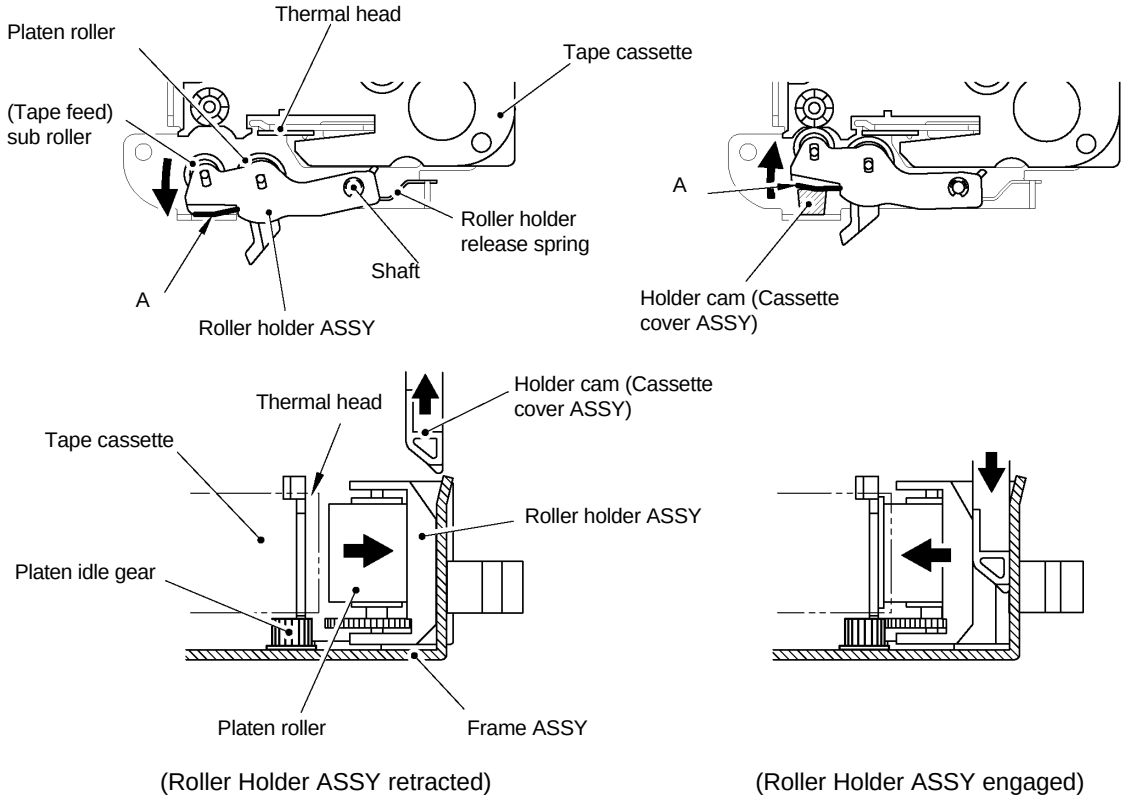


Fig. 2.1-8 Holder Cam (Cassette Cover ASSY) and Roller Holder ASSY

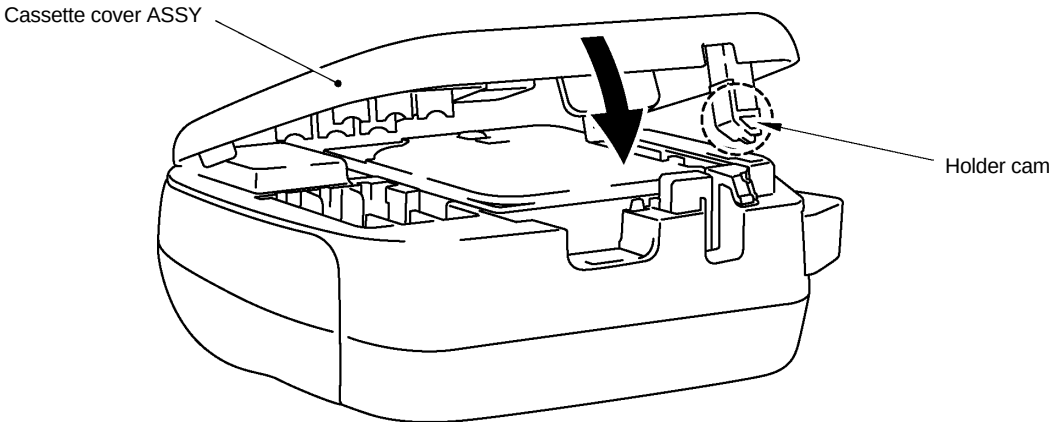


Fig. 2.1-9 Interlock Mechanism of the Roller Holder

2.2 DISASSEMBLY & REASSEMBLY

2.2.1 Disassembly Procedure

[1] Removing the cassette cover ASSY, the tape cassette and the batteries

(1) Turn the machine upside down.

(2) Open the cassette cover ASSY by applying the force toward “A” direction.

(3) Push the rib “B” on the holder cam assembled on the cassette cover ASSY to the direction of the arrow to remove the holder cam from the cassette cover ASSY.

Caution: *Never draw out the holder cam. The rib “B” on the holder cam may be damaged.*

(4) The cassette cover is removed by applying a force toward “D” direction of the arrow by pushing the “C” section outward.

(5) Remove the tape cassette.

(6) Remove the batteries.

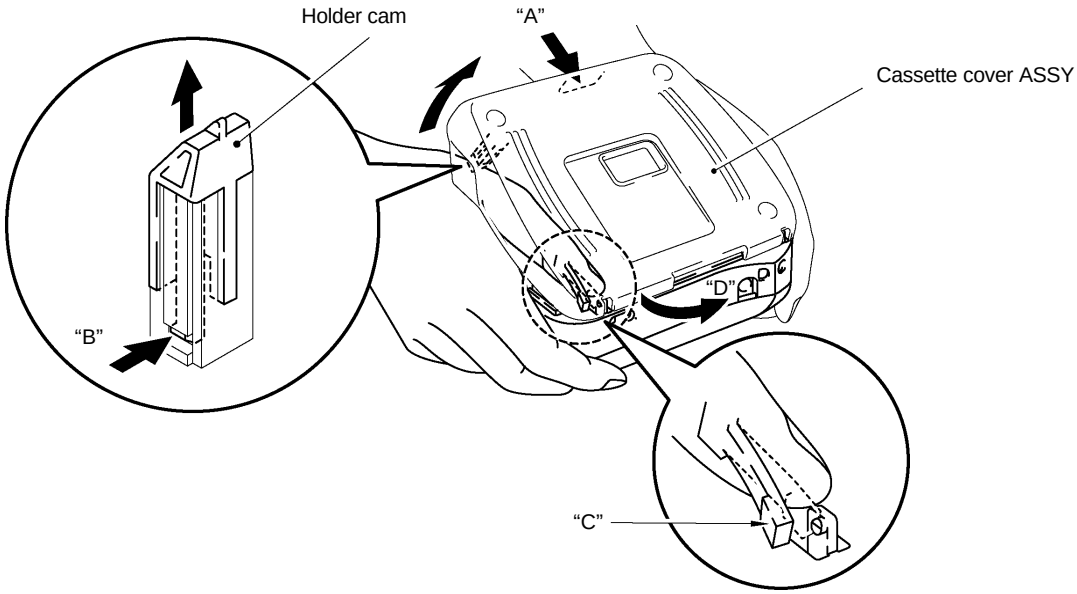


Fig. 2.2-1 Removing the Cassette Cover

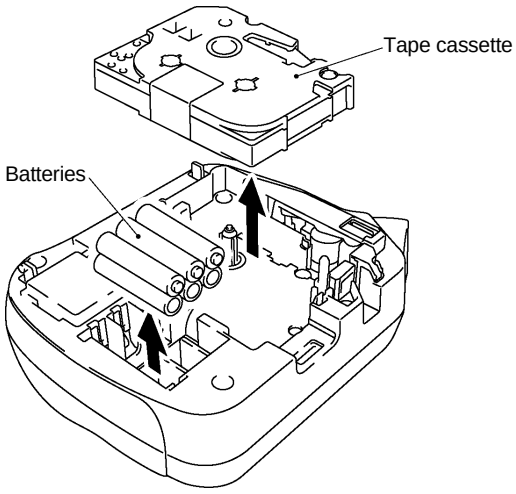


Fig. 2.2-2 Removing the Tape Cassette and Batteries

[2] Removing the bottom cover, the cutter case ASSY and the board

(1) Place the machine upside down.

(2) Pull out the cutter case ASSY and the board from the frame.

(3) Remove the four screws, then the bottom cover and the upper cover are able to be separated.

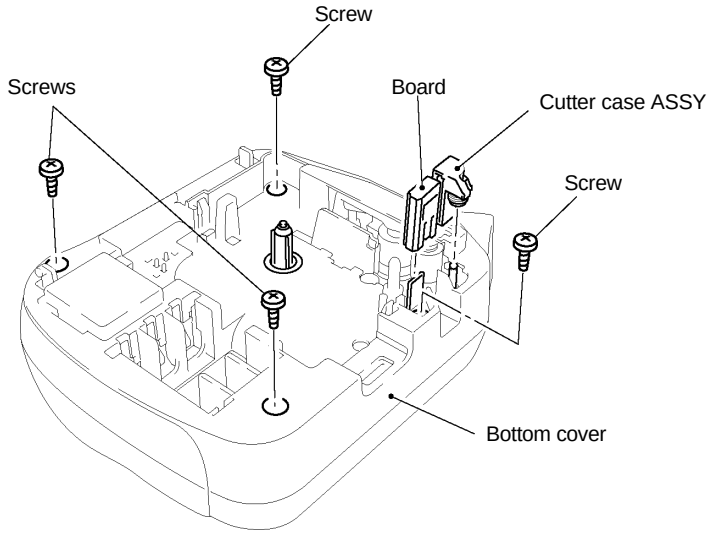


Fig. 2.2-3 Removing the Bottom Cover, Cutter Case ASSY and the Board (1)

(4) Open the upper cover to the left as shown below.

(5) Discharge the condenser (C1) on the sub PCB ASSY with tool like a screwdriver.

(6) Disconnect the thermal head flat cable from the main PCB.

Note: *Discharge without fail before disconnecting the thermal flat cable, otherwise the electronic part such as LSI or others should be damaged.*

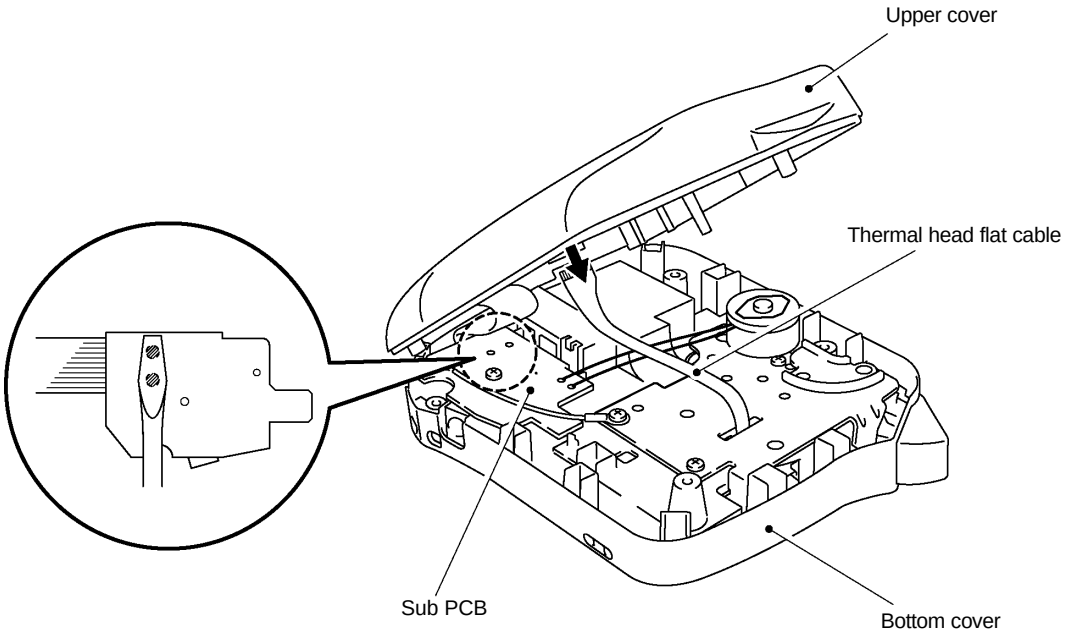


Fig. 2.2-4 Removing the Bottom Cover, Cutter Case ASSY and the Board (2)

[3] Removing the frame ASSY

(1) Remove the two motor harnesses from the sub PCB by melting the solder.

(2) Remove the three screws and remove the frame ASSY from the bottom cover.

Note: *The cutter lever will be disconnected from the cutter lever shaft of the frame Assy at this point.*

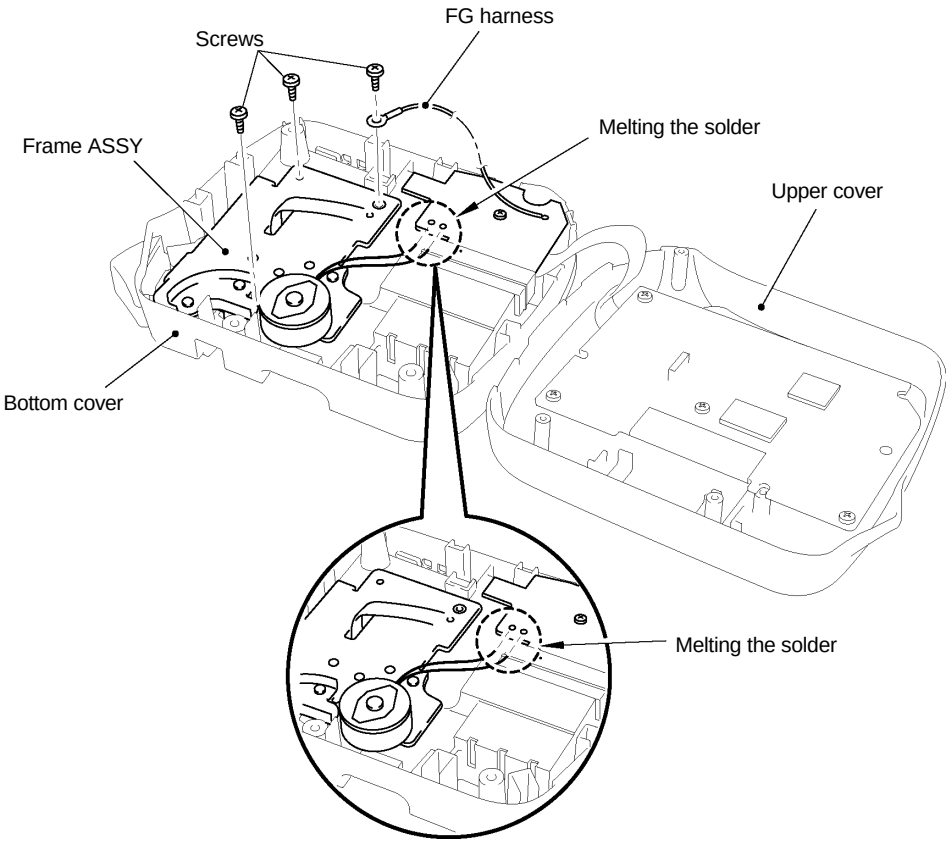


Fig. 2.2-5 Removing the Frame ASSY

■ Disassembling the Frame ASSY

Removing the DC motor ASSY

(1) Remove the two screws from the frame ASSY and take out the motor ASSY.

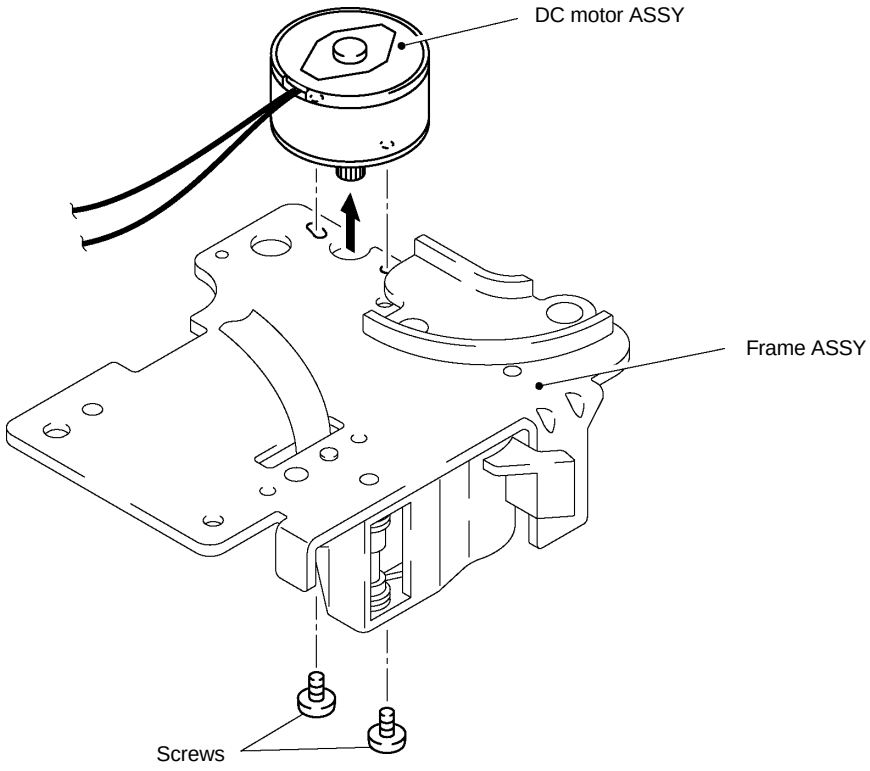


Fig. 2.2-6 Removing the DC Motor ASSY

Removing the roller holder ASSY and thermal head ASSY

When handling the thermal head ASSY, do not touch the thermal head by hand. Otherwise, it may be damaged due to the electricity charged in your body.

(1) After taking off the retaining ring, remove the roller holder ASSY and the roller holder return spring from the frame ASSY.

(2) Remove a screw which secures the thermal head ASSY to the frame ASSY, then take out the thermal head ASSY.

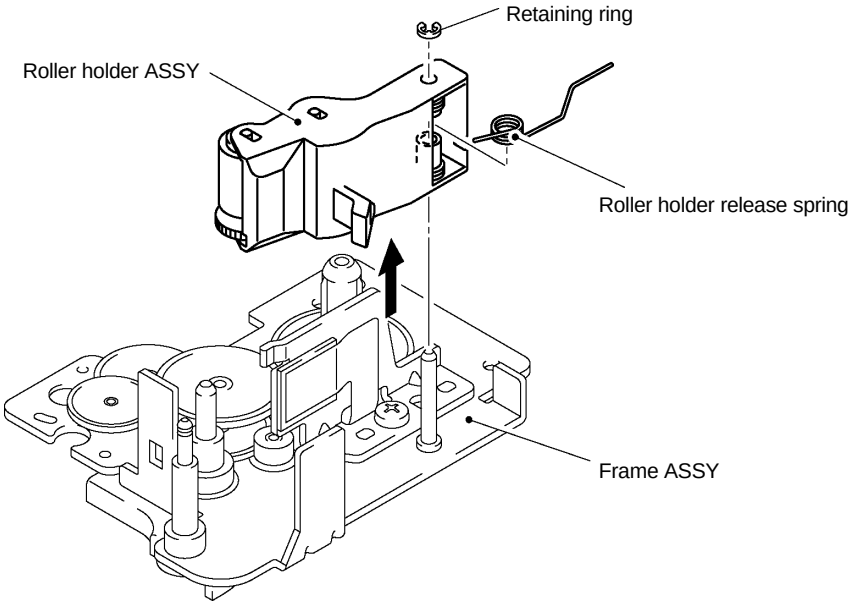


Fig. 2.2-7 Removing the Roller Holder ASSY

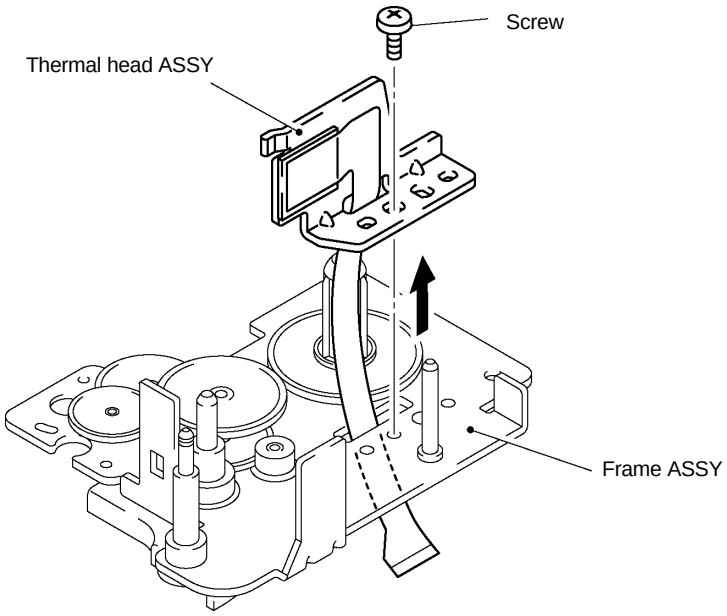


Fig. 2.2-8 Removing the Thermal Head

[4] Removing the terminal press cover

(1) Remove the terminal press cover by releasing the hooks from the grooves of the bottom cover.

You can remove the terminal press cover by releasing the two hooks from the back side of the bottom cover by using tool like a flat screwdriver.

(2) Remove the battery terminal (-) from the terminal press cover.

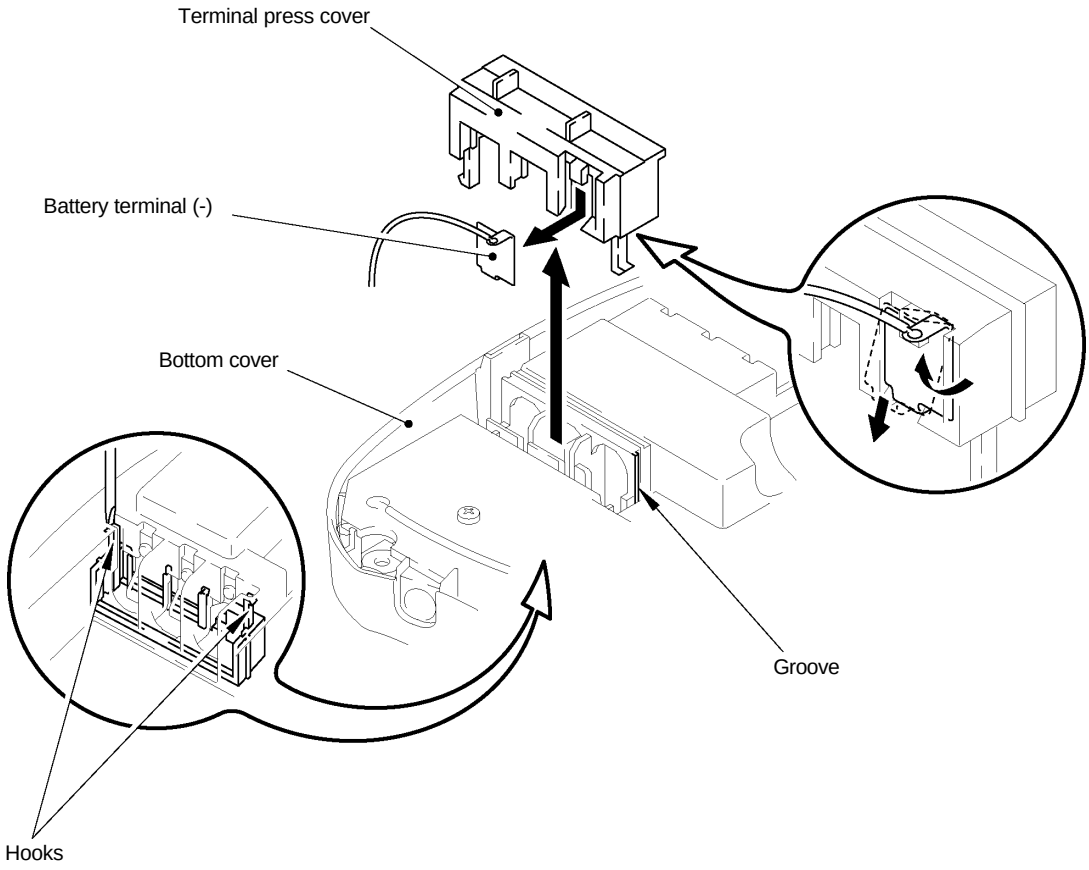


Fig. 2.2-9 Removing the Terminal Press Cover

[5] Removing the battery terminals

(1) Remove the battery terminal B (+,-) from the bottom cover.

(2) After disengaging the hook of the battery terminal (+) by tool like a flat screwdriver, remove the battery terminal (+) from the bottom cover.

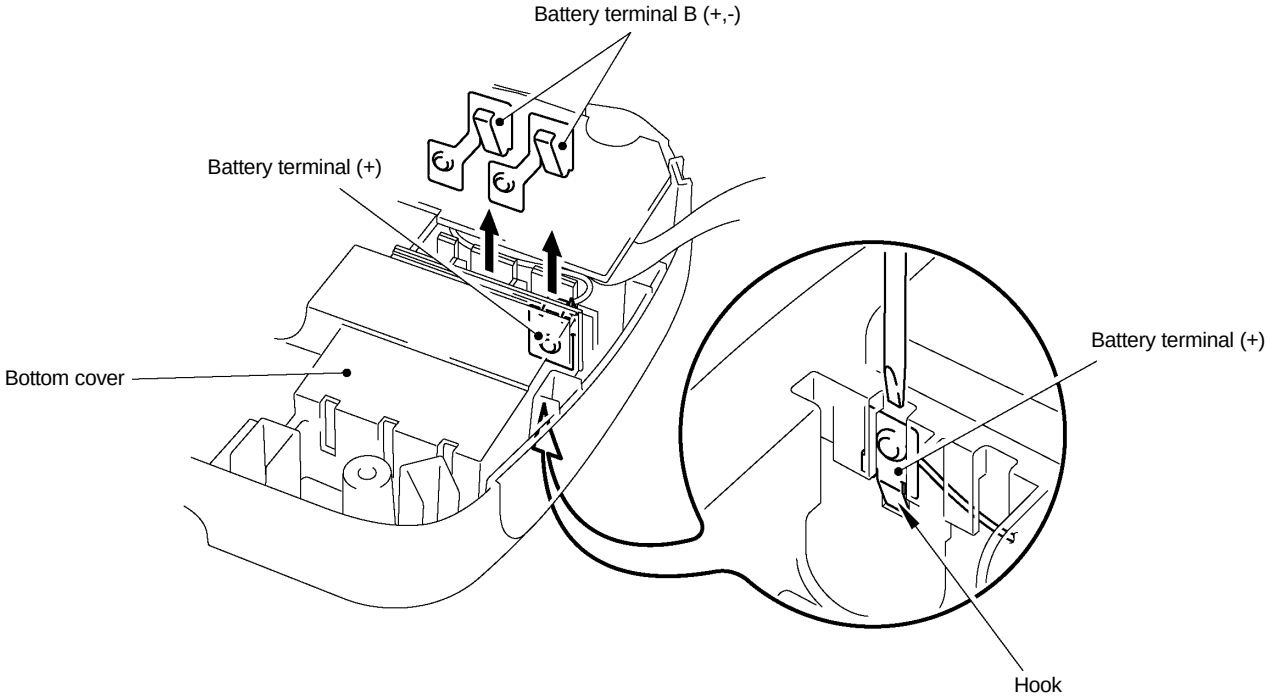


Fig. 2.2-10 Removing the Battery Terminals (1)

(3) Place the bottom cover upside down. After disengaging the hooks in “A” section of the battery terminal A (+,-) by using tool like a flat screwdriver, remove the battery terminal A (+,-) from the bottom cover.

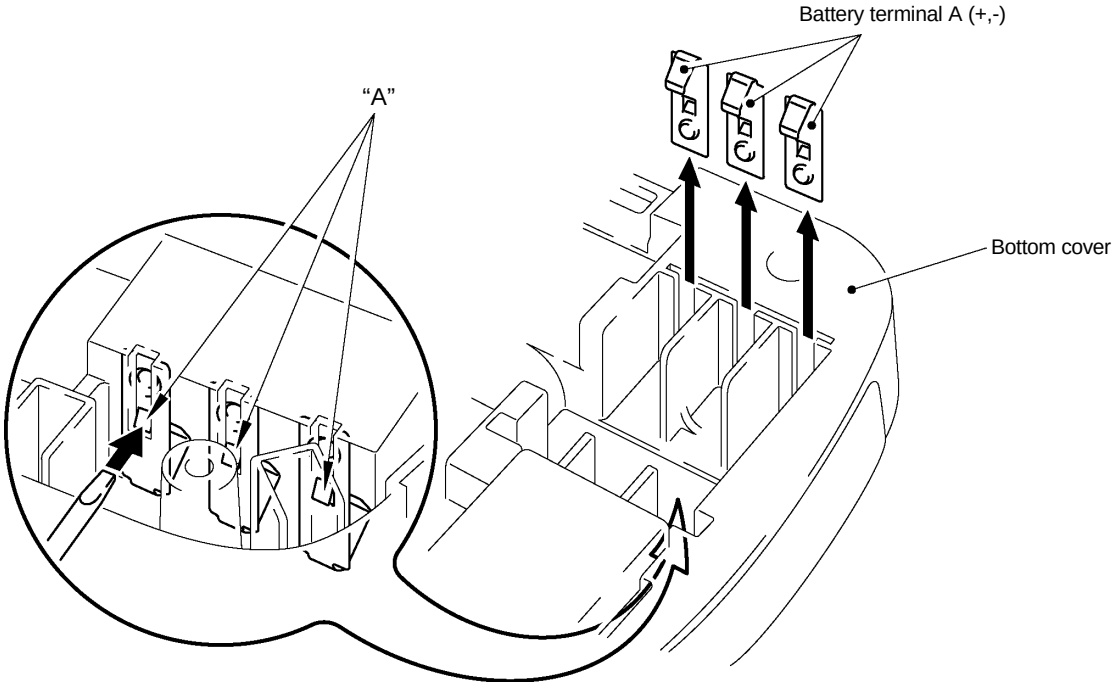


Fig. 2.2-11 Removing the Battery Terminals (2)

[6] Removing the Sub PCB

(1) After removing the battery terminal (+), the battery terminal (-), take off a screw and remove the sub PCB.

Note: *The AC jack is not provided on the sub PCB for PT-1180. Therefore the form of the bottom cover is slightly different from the figure below.*

(2) The relay harness soldered to the sub PCB is removed.

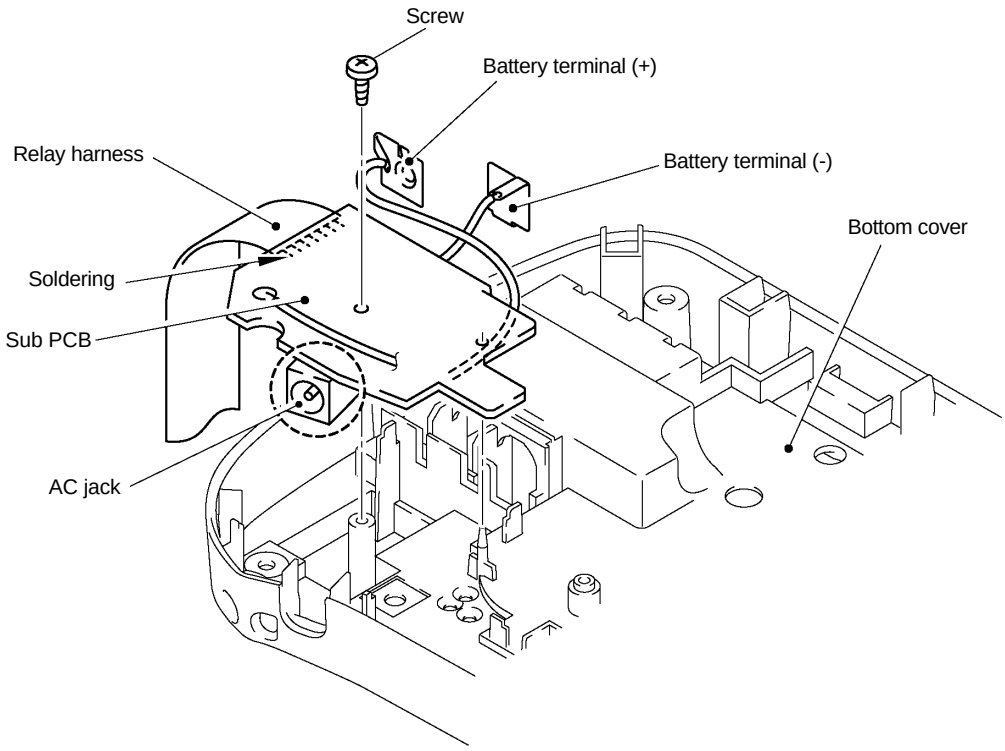


Fig. 2.2-12 Removing the Sub PCB