

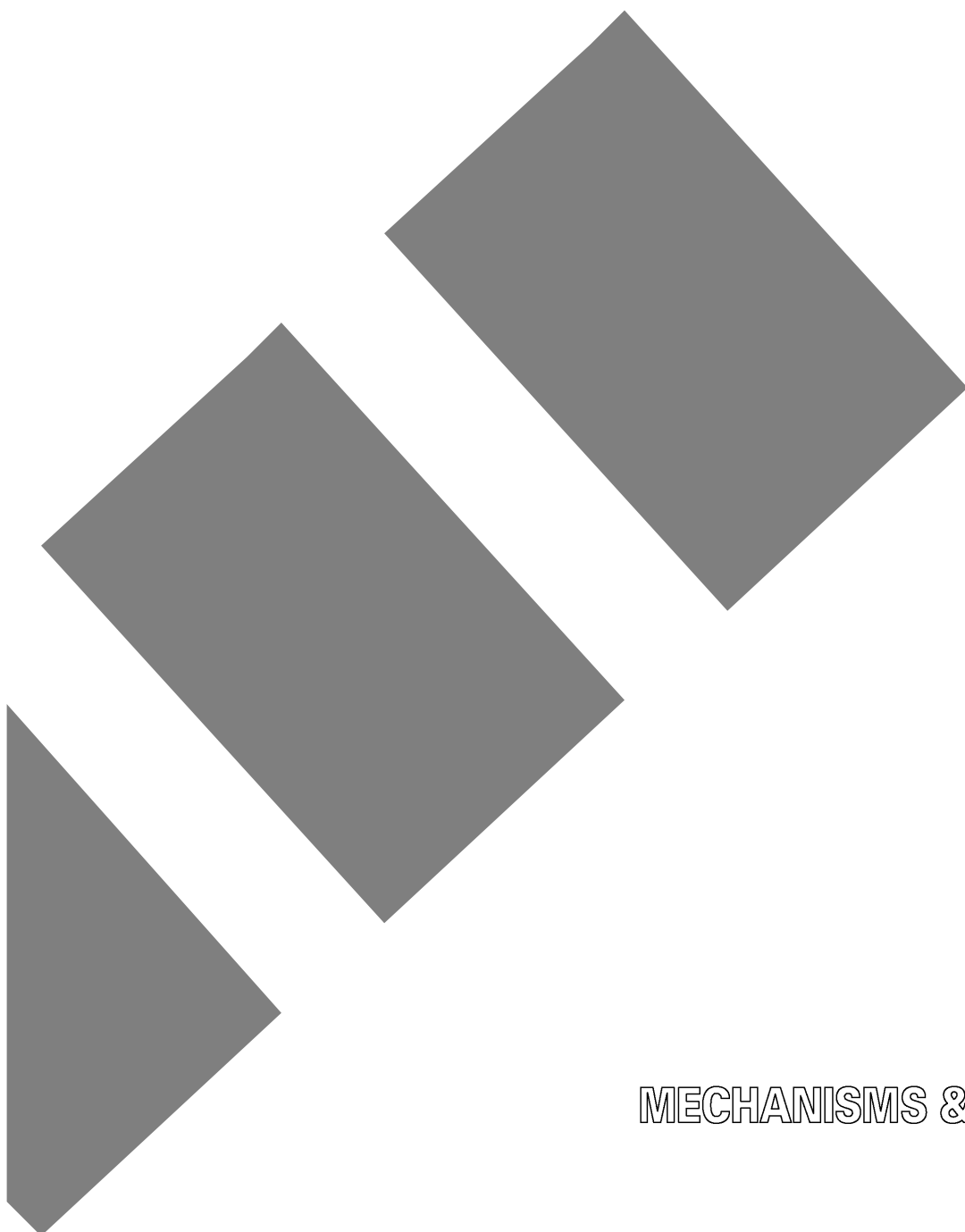


SERVICE MANUAL

MODEL: P-touch 65

P-touch HOME&HOBBY

P-touch One



MECHANISMS & ELECTRONICS



SERVICE MANUAL

MODEL:P-touch 65

P-touch HOME&HOBBY

P-touch One

© Copyright Brother 2000

All rights reserved.

No part of this publication may be reproduced in any form or by any means without permission in writing from the publisher.

Specifications are subject to change without notice.

PREFACE

This publication is a service manual covering the specifications, theory of operation, disassembly/reassembly procedure, and troubleshooting of the Brother P-touch 65/P-touch HOME&HOBBY/P-touch One. It is intended for service personnel and other concerned persons to accurately and quickly provide after-sale service for our P-touch 65/P-touch HOME&HOBBY/P-touch One.

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.

CHAPTER I	SPECIFICATIONS
CHAPTER II	MECHANISMS
CHAPTER III	ELECTRONICS
CHAPTER IV	TROUBLESHOOTING
APPENDICES	CIRCUIT DIAGRAMS

Chapter I.

SPECIFICATIONS

CONTENTS

CHAPTER I. SPECIFICATIONS

1.1	MECHANICAL SPECIFICATIONS	I-1
1.1.1	External Appearance.....	I-1
1.1.2	Keyboard.....	I-1
1.1.3	Display.....	I-1
1.1.4	Printing Mechanism	I-2
1.1.5	Tape Cassette	I-2
1.1.6	Tape Cutter	I-2
1.2	ELECTRONICS SPECIFICATIONS	I-4
1.2.1	Character Generator	I-4
1.2.2	Power Supply	I-4

1.1 MECHANICAL SPECIFICATIONS

1.1.1 External Appearance

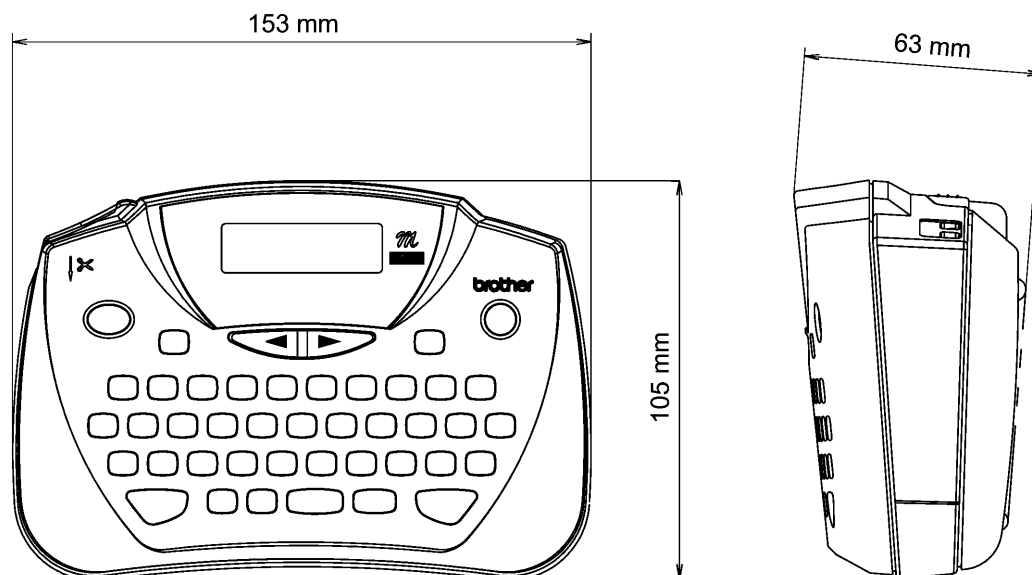


Figure 1.1-1 External Appearance

- | | | |
|-----|------------------------|---|
| (1) | Dimensions (W x D x H) | 153 mm x 105 mm x 63 mm |
| (2) | Weight | |
| | Machine proper | Approx. 310 g |
| | In package | 410 g or less (including dry cells and a tape cassette) |

1.1.2 Keyboard

- | | | |
|-----|--|---------------------------|
| (1) | Entry system | Rubber key pad |
| (2) | Number of alphanumeric and symbol keys | 31 |
| (3) | Number of function keys | 12 (including On/Off key) |
| (4) | Key arrangement | See Figure 1.1-2. |

1.1.3 Display

- | | | |
|-----|--------------------------------|---|
| (1) | Display type | Liquid crystal display (LCD) |
| (2) | Number of columns | 8 columns x 1 rows
(See Figure 1.1-2.) |
| (3) | Number of indicators | 11 (See Figure 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 system	Direct thermal printing (Fixed print head and tape feeding mechanism)
(2)	Print speed	7.5 mm/second (Typical)
(3)	Print head	
	Type	Thermal print head
	Heat generator	Consists of 64 heating elements vertically aligned
	Size of heating element	0.136 mm wide by 0.106 mm high
(4)	Character size (dots)	Height x Width
	Standard (Small) size (1)	32 x 20
	Double width (W2)	32 x 40
	Double height (H2)	64 x 20
	Large size (4)	64 x 40

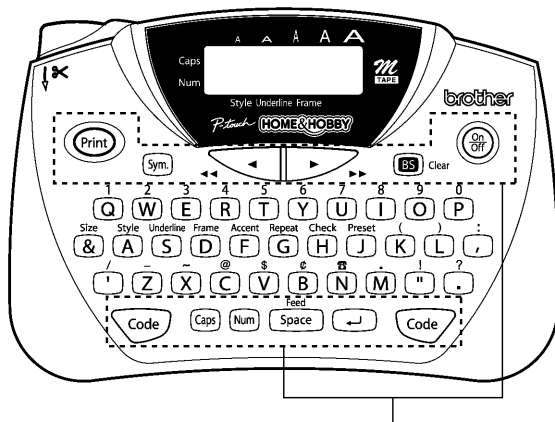
1.1.5 Tape Cassette

(1)	Cassette	Cartridge type
(2)	Tape type	Direct thermal print tape (Metal deposit layer on substrate)
(3)	Tape size	Width: 9, 12 mm Length: 8 m
(4)	Tape cassette packed with the machine	Character color: Black Tape color: White Tape width: 12 mm or 9 mm (EU) Tape length: 4 m

1.1.6 Tape Cutter

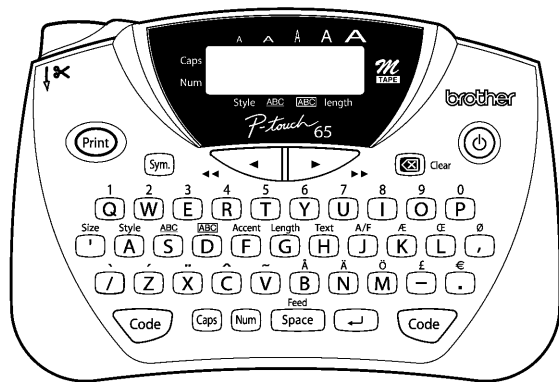
(1)	Tape cutting	Manual cutting with the cutter lever
(2)	Cutter unit	User-replaceable

U.S. version (incl. Canada and Brazil)

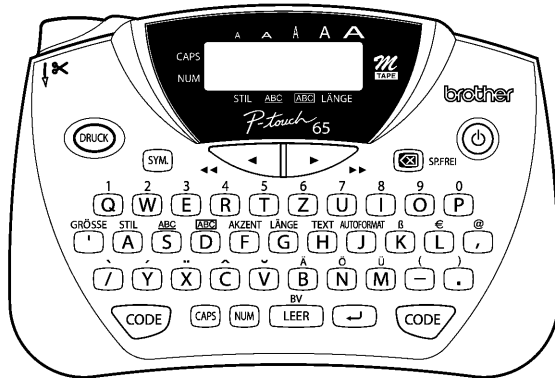


Function keys

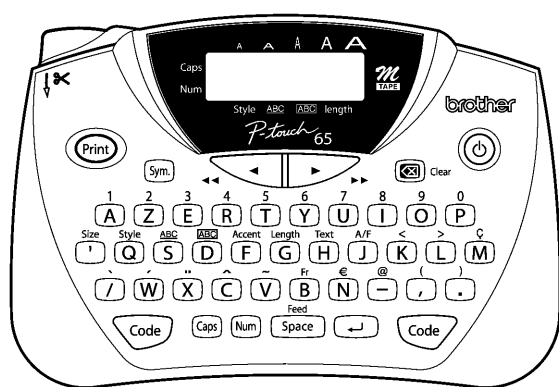
U.K. version



German version



Belgium version



French version



Australian version

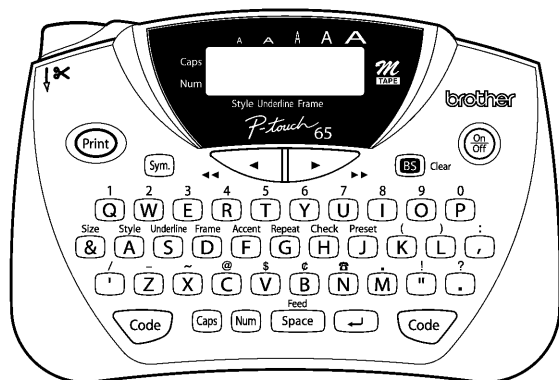


Figure 1.1-2 Key Arrangement

1.2 ELECTRONICS SPECIFICATIONS

1.2.1 Character Generator

(1)	Internal characters	U.K./French/Belgium	180
		German	188
		U.S./Canada	178
(2)	Internal fonts	HELSINKI	
(3)	Print buffer capacity	55 characters	
(4)	Phrase memory capacity	None	

1.2.2 Power Supply

(1)	Power supply	Driven by 6 dry cells Optional AC line adapter (7 VDC, 1.2A) available (Europe only)
(2)	Battery type	Alkaline dry cells (AM3/LR6)
(3)	Service life of batteries	Will last through one tape cassette, and then some (at room temperature and normal humidity).
(4)	Automatic powering-off	Yes (If the machine remains unused for approx. 5 minutes, it automatically powers itself off.)
(5)	Low battery indication	1) If the voltage level drops below approx. 5.7V, the CPU displays the "BATTERY" message to warn you of low battery after completion of printing. 2) If it drops further below approx. 5.2V, the CPU immediately shuts down the power. 3) Adapters with an output of 10.8 V or greater are designated as "high-voltage" adapters and cannot be used for this machine. If this machine detects any high-voltage adapter plugged in, it will power itself off.

Chapter II.

MECHANISMS

CONTENTS

CHAPTER II. MECHANISMS

2.1	THEORY OF OPERATION	II-1
2.1.1	Print Mechanism.....	II-1
2.1.2	Platen Setting & Retracting Mechanism	II-2
2.1.3	Tape Feed Mechanism.....	II-3
2.1.4	Tape Cutter Mechanism	II-4
2.1.5	Cutter Safety Lock Mechanism.....	II-5
2.2	DISASSEMBLY & REASSEMBLY.....	II-6
2.2.1	Disassembly Procedure.....	II-7
[1]	Removing the Cassette Cover, Dry Cells, Tape Cassette, and Cutter Unit.....	II-7
[2]	Removing the Chassis ASSY.....	II-8
[3]	Removing the Sub PCB*, Main PCB, and Rubber Key Pad	II-11
[4]	Taking out the - and + Terminal ASSYs 65, +/- Terminals P1 and P3, and Battery Terminals P2	II-12
[5]	Unsoldering the + and - Terminal ASSYs 65 and Sub PCB Leads* from the Main PCB.....	II-14
2.2.2	Reassembly Procedure	II-15
[1]	Soldering the Sub PCB Leads* and + and - Terminal ASSYs 65 onto the Main PCB.....	II-15
[2]	Setting the Battery Terminals P2, +/- Terminals P3 and P1, and + and - Terminal ASSYs 65	II-16
[3]	Installing the Rubber Key Pad, Main PCB, and Sub PCB*	II-17
[4]	Installing the Chassis ASSY.....	II-18
[5]	Setting the Cutter Unit, Tape Cassette, Dry Cells, and Cassette Cover	II-21
[6]	Demonstration Print and Final Check	II-22

2.1 THEORY OF OPERATION

2.1.1 Print Mechanism

n Structure of Thermal Head

This machine uses direct thermal printing. The thermal print head has a heat generator consisting of 64 heating elements which are vertically aligned as shown in Figure 2.1-1. Each heating element is 0.136 mm wide by 0.106 mm high.

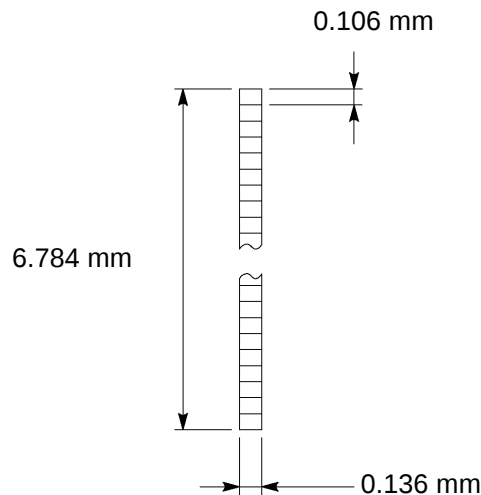


Figure 2.1-1 Heat Generator of Thermal Head

n Printing Process

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

The selected heating element(s) generates heat that dissolves the metal deposit layer of the thermal tape so as to reveal the substrate layer, producing a dot on the tape. The tape is advanced and the next heating cycle is repeated, thus forming a character on the tape.

n Character Formation

While the drive motor (DC motor) feeds the tape by 0.106 mm for 13.8 ms, the thermal head generates heat once. The feed amount of 0.106 mm is smaller than the width (0.136 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 Setting & Retracting Mechanism

This mechanism consists of the roller holder ASSY and the roller holder setting lever (wedged lever) provided on the inside of the cassette cover.

The roller holder ASSY supports the platen so that the platen can move perpendicularly to the thermal head and rotate freely.

Closing the cassette cover fits its roller holder setting lever into the slot between the roller holder ASSY and the chassis's bent section. 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.

The platen is pressed perpendicularly against the thermal head with the tape sandwiched inbetween under a uniform load by the platen spring. At the same time, the platen gear becomes engaged with the drive gear of the gear train on the chassis (see Figure 2.1-3).

Opening the cassette cover pulls out its roller holder setting lever so that the roller holder spring retracts the roller holder ASSY from the thermal head, providing you with enough space to replace the tape cassette.

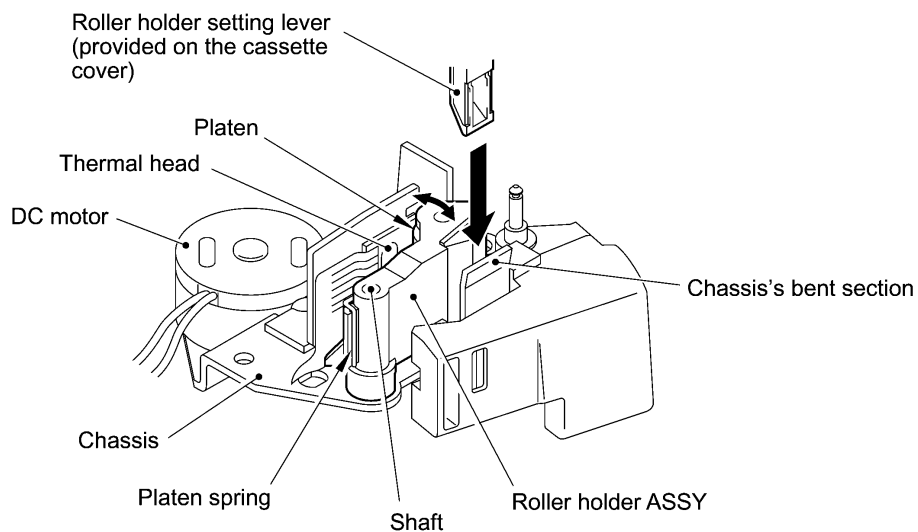
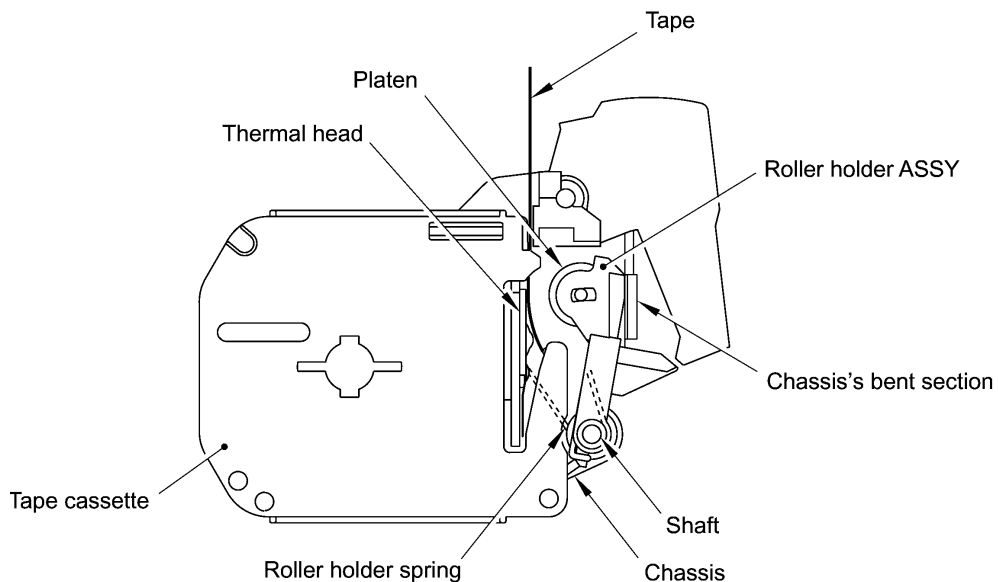


Figure 2.1-2 Platen Setting & Retracting Mechanism

2.1.3 Tape Feed Mechanism

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

When you load a tape cassette and close the cassette cover, the platen and the thermal head sandwich the tape inbetween and the platen gear becomes engaged with the gear train, as described in Subsection 2.1.2.

As the DC motor rotates, the rotation is transmitted via the gear train to the platen gear. Accordingly, the sandwiched tape will be advanced.

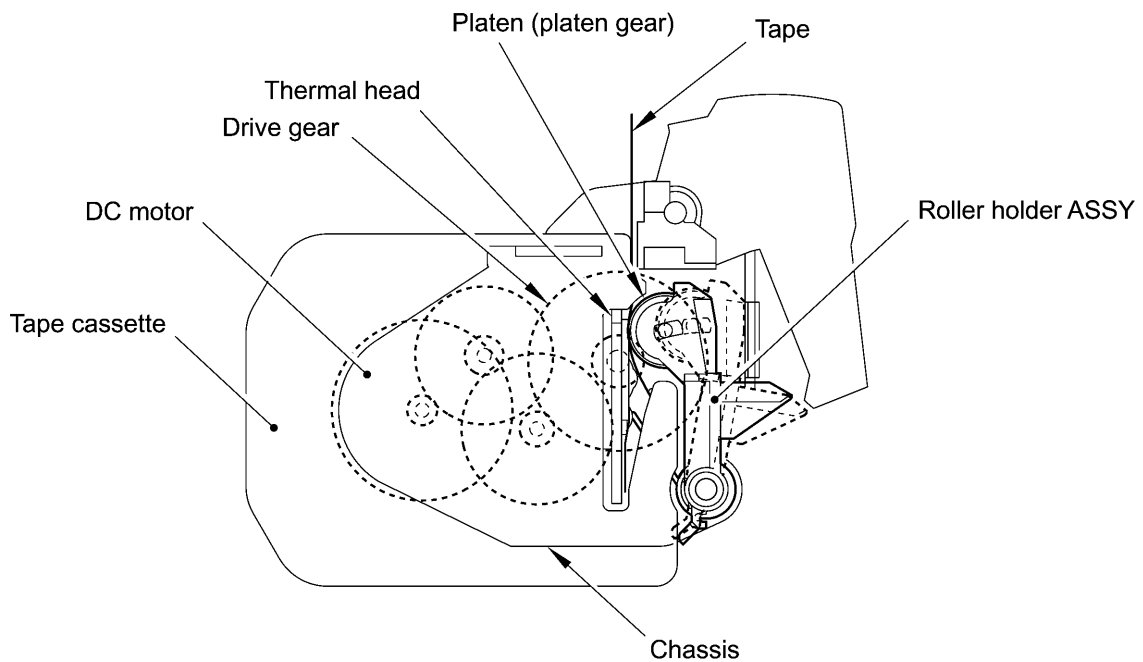


Figure 2.1-3 Tape Feed Mechanism

2.1.4 Tape Cutter Mechanism

The cutter mechanism consists of a cutter lever and a cutter unit in which a blade is retracted by a spring.

Pressing the cutter lever pushes out the blade from the cutter unit to press the printed tape against the cutter board of the tape cassette, cutting the printed tape coming through the cutter unit and the cutter board.

When the cassette cover is opened and no tape cassette is loaded, the cutter safety mechanism works to lock the cutter lever as described in Subsection 2.1.5.

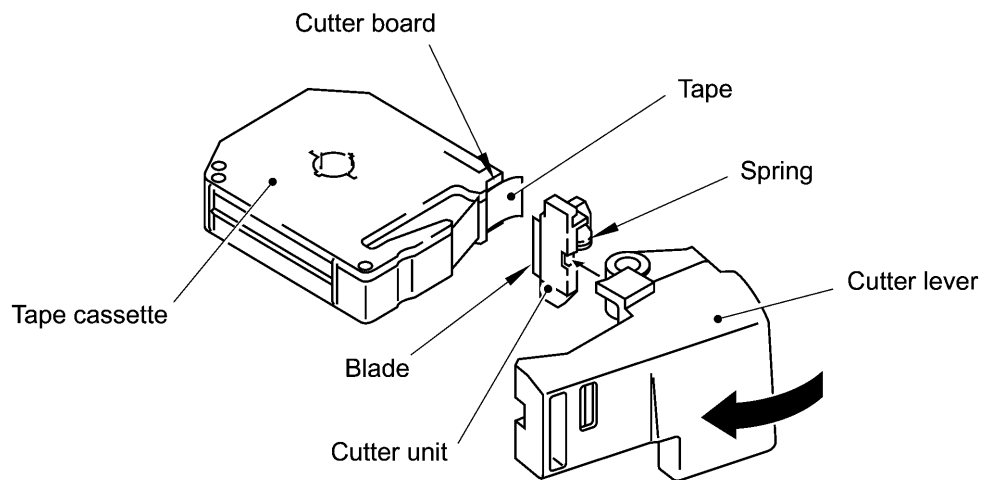


Figure 2.1-4 Tape Cutter Mechanism

2.1.5 Cutter Safety Lock Mechanism

When the cassette cover is opened and no tape cassette is loaded, the roller holder ASSY is retracted from the thermal head with the roller holder 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 unit for safety, as shown below.

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

Closing the cassette cover 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 head so that the cutter lever stopper does not interfere with the cutter lever.

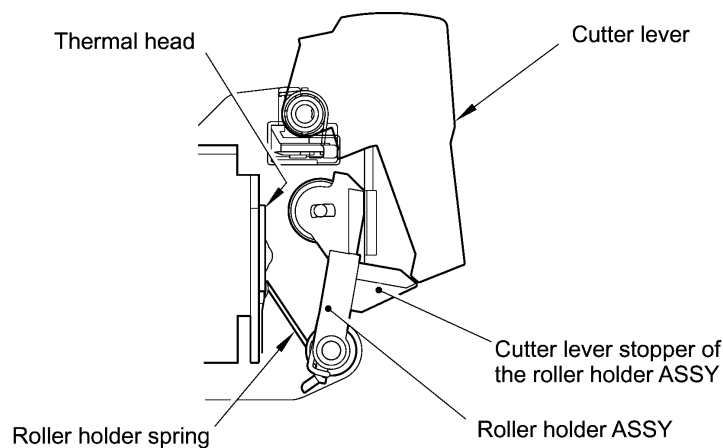


Figure 2.1-5 Cutter Safety Lock Mechanism

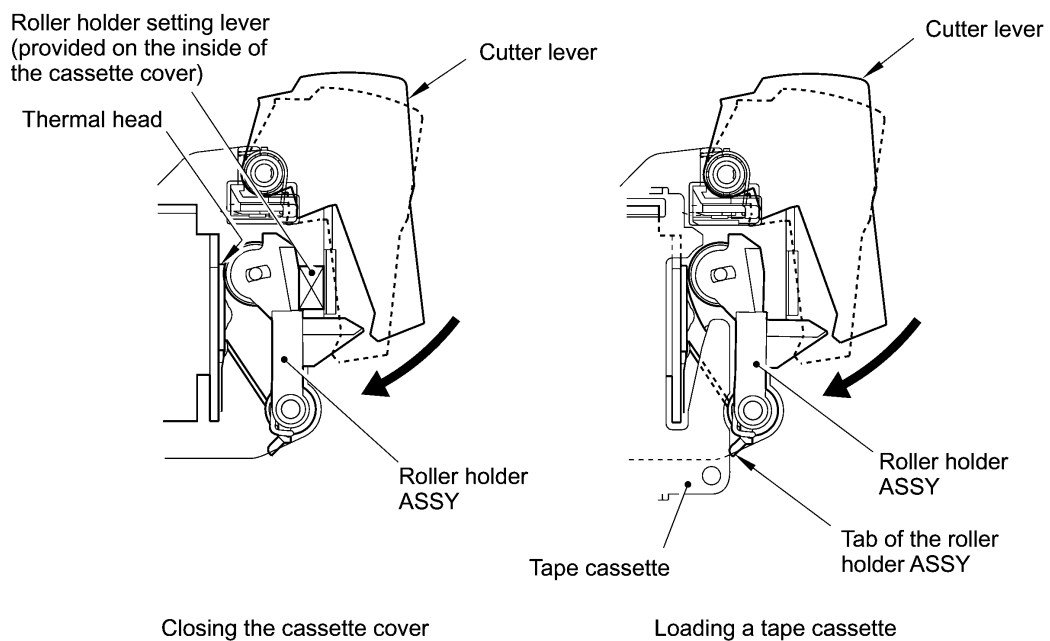


Figure 2.1-6 Releasing the Cutter Safety Lock Mechanism

2.2 DISASSEMBLY & REASSEMBLY

n Safety Precautions

- (1) You should carry out disassembly & reassembly jobs on an anti-static sheet grounded correctly. Otherwise, the LSI and other electronic devices will 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.

n Tightening Torque List

Location	Screw type	Q'ty	Tightening torque
Bottom cover	Taptite, bind B M2.6 x 8	4	0.39 ±0.10 N•m (4 ±1 kgf•cm)
Chassis ASSY	Taptite, bind B M2.6 x 4	3	0.196 ±0.049 N•m (2 ±0.5 kgf•cm)
Chassis ASSY (for motor)	Screw, pan M1.7 x 2.5	2	0.10 to 0.196 N•m (1 to 2 kgf•cm)
Thermal head ASSY	Screw, cup M2.6 x 4	1	0.49 ±0.196 N•m (5 ±2 kgf•cm)
Sub PCB*	Taptite, bind B M2.6 x 4	2	0.196 ±0.049 N•m (2 ±0.5 kgf•cm)
Main PCB	Taptite, bind B M2.6 x 4	2	0.196 ±0.049 N•m (2 ±0.5 kgf•cm)

*Provided on the European version

2.2.1 Disassembly Procedure

[1] Removing the Cassette Cover, Dry Cells, Tape Cassette, and Cutter Unit

- (1) Turn the machine upside down.
- (2) Press section "A" of the cassette cover to release the latch, and then remove the cassette cover.

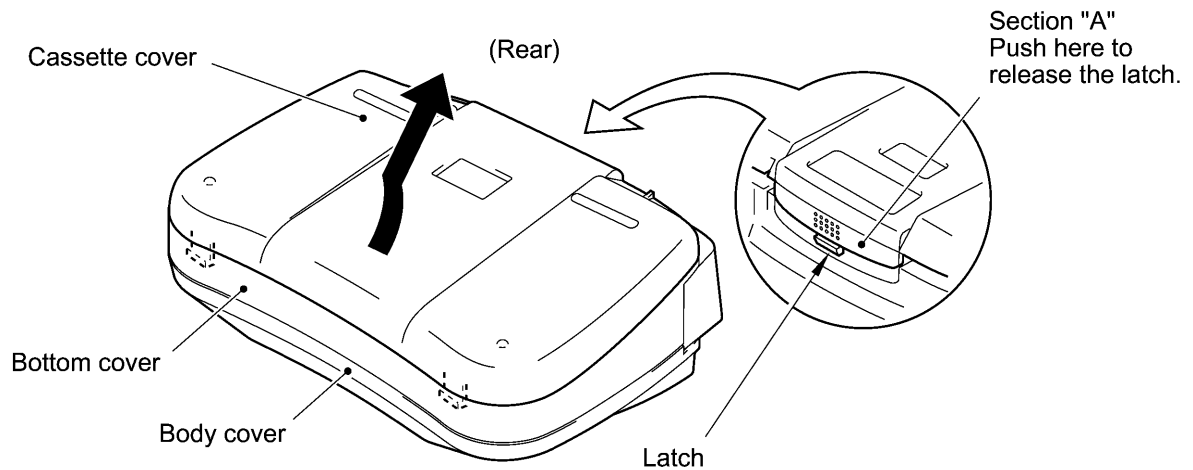


Figure 2.2-1 Removing the Cassette Cover

- (3) Remove the six dry cells, tape cassette, and cutter unit. For easier removal of the tape cassette, lift up the front edge and then take it out.

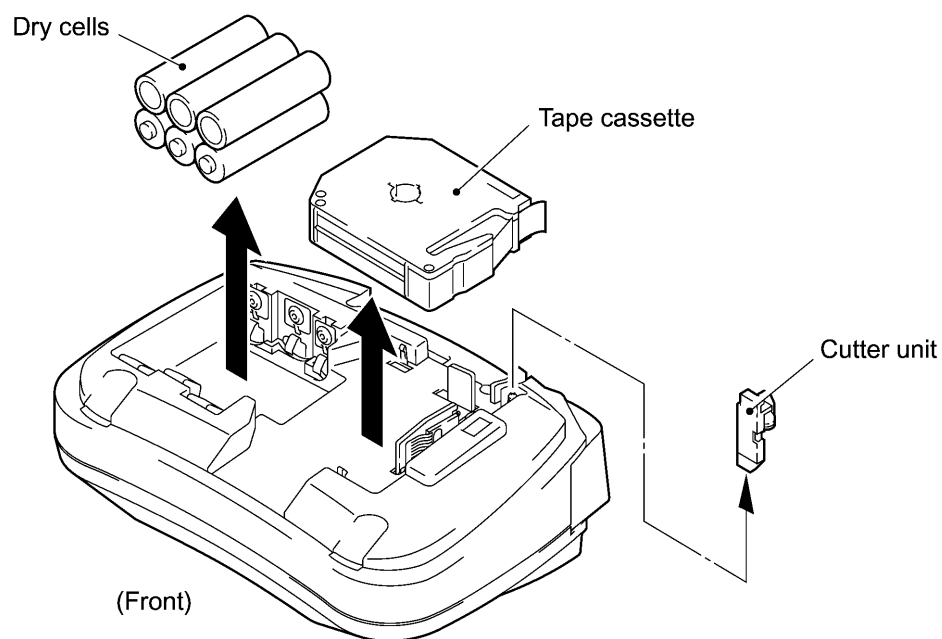


Figure 2.2-2 Removing the Dry Cells, Tape Cassette and Cutter Unit

[2] Removing the Chassis ASSY

- (1) Remove the four screws from the bottom cover.

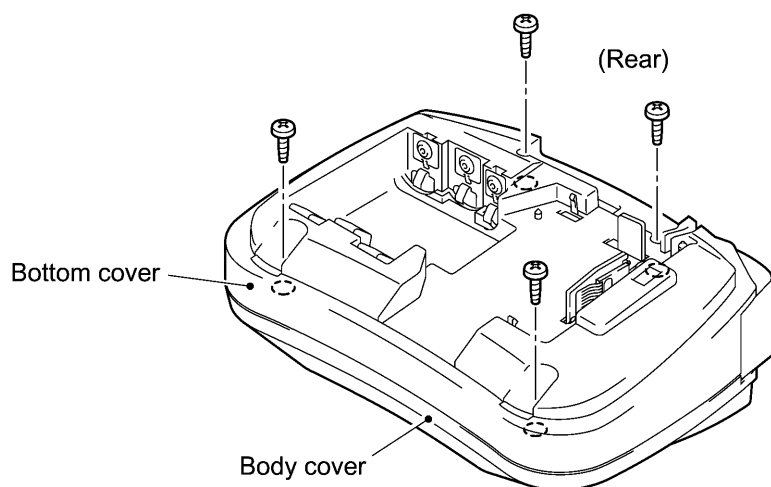


Figure 2.2-3 Unscrewing the Bottom Cover

- (2) Slightly open the bottom cover and disconnect the head flat cable from the main PCB.

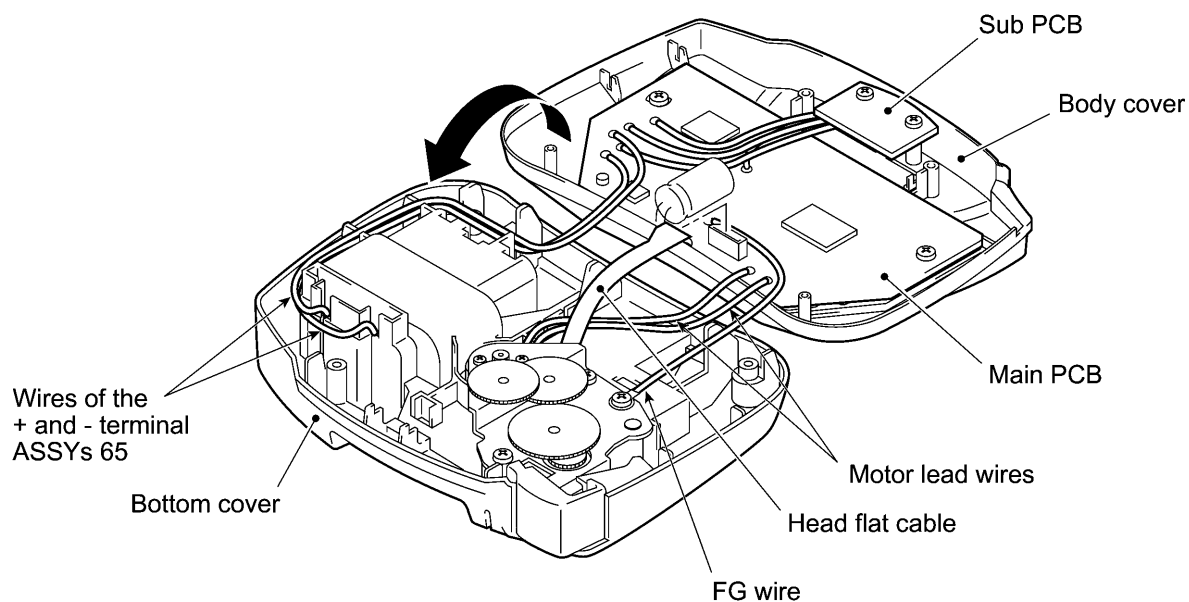


Figure 2.2-4 Disconnecting the Head Flat Cable

- (3) Remove the three screws from the chassis ASSY. The FG wire also comes off.
- (4) Unsolder the motor lead wires from the main PCB.

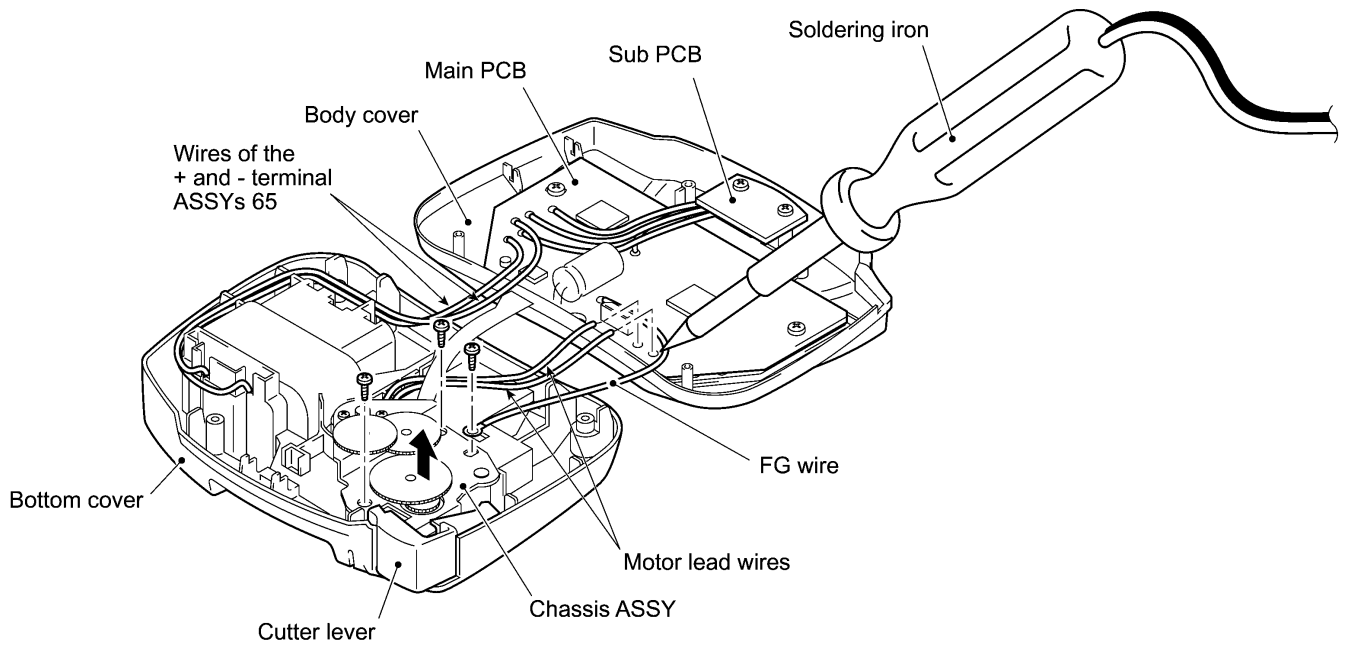


Figure 2.2-5 Unsoldering the Motor Lead Wires and Removing the Chassis ASSY

- (5) Lift the chassis ASSY up and out of the bottom cover. The cutter lever also comes off.

n Disassembling the Chassis 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) Remove the screw from the thermal head ASSY and take off the ASSY.
- (2) Remove the retaining ring from the shaft of the chassis ASSY.
- (3) Pull up the roller holder ASSY together with the spring.
- (4) Remove the two screws from the chassis ASSY and take off the DC motor ASSY.

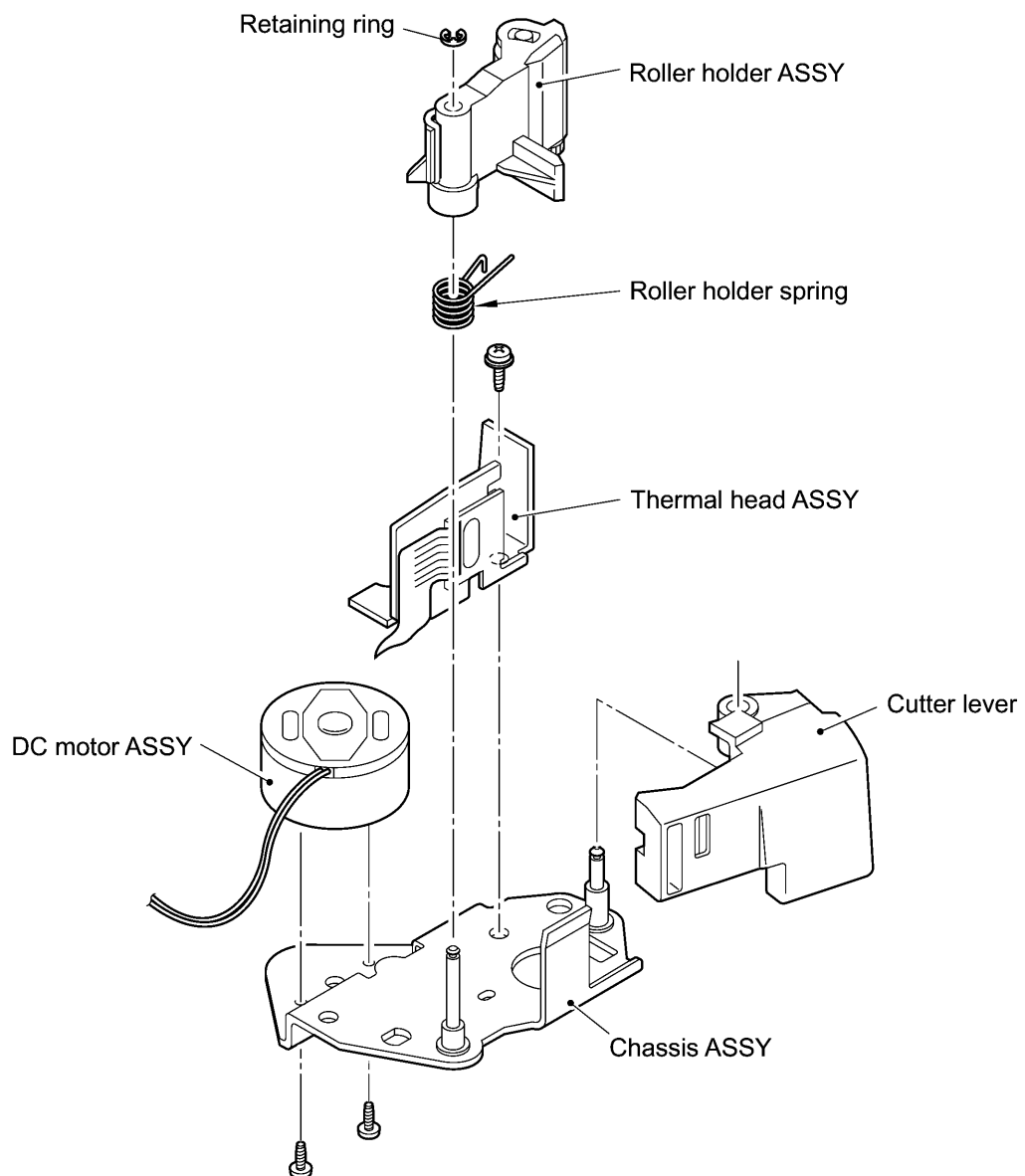


Figure 2.2-6 Disassembling the Chassis ASSY

[3] Removing the Sub PCB*, Main PCB, and Rubber Key Pad

*Provided on the European version.

- (1) European version: Remove the two screws from the sub PCB*.

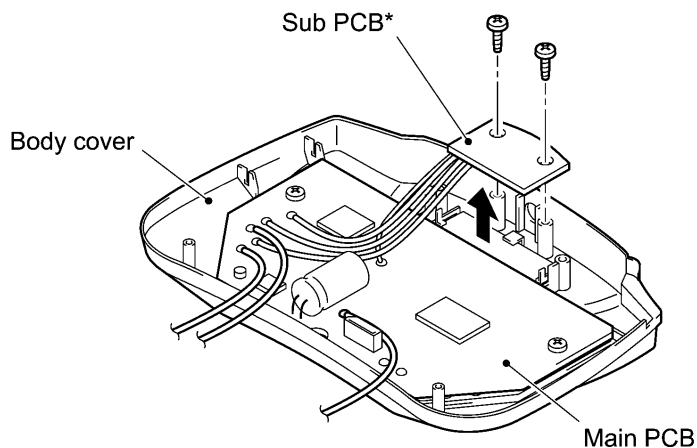


Figure 2.2-7 Taking out the Sub PCB*

- (2) Remove the two screws from the main PCB.
- (3) Slightly slide the main PCB to the front, press the latches provided on the body cover outwards, and then take out the LCD by gently pulling out the main PCB and LCD flat cable.
- (4) Take out the rubber key pad.

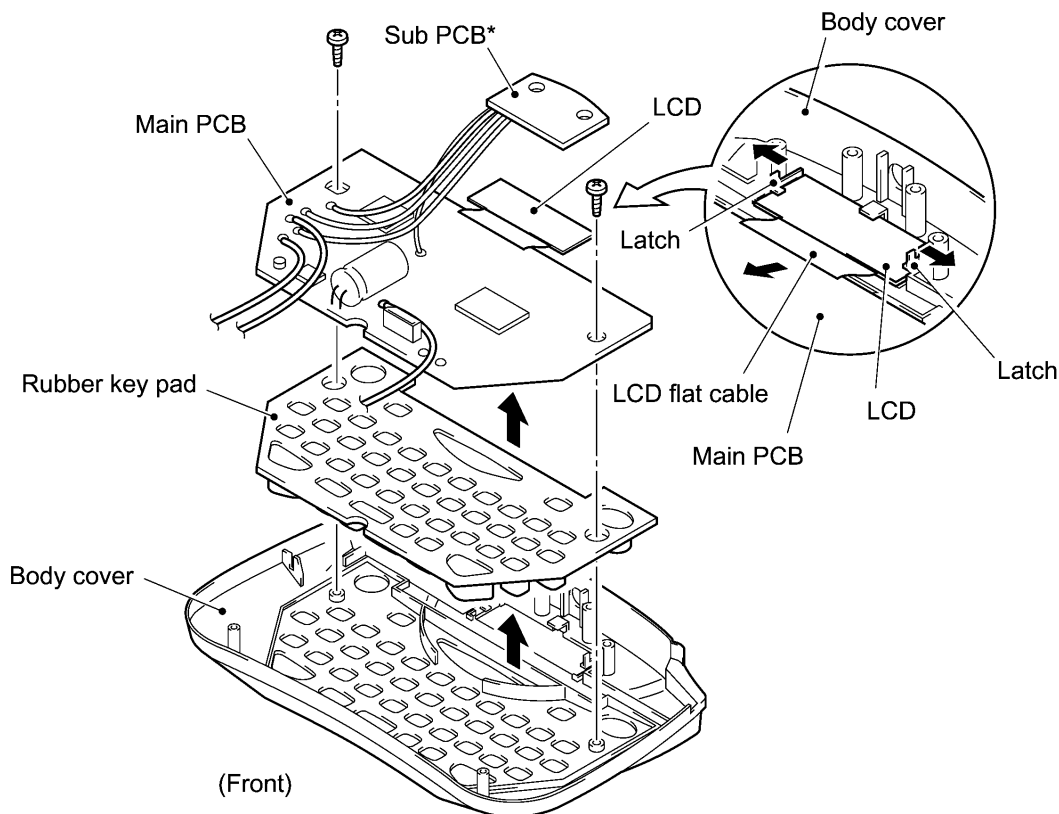


Figure 2.2-8 Taking out the Main PCB and Rubber Key Pad from the Body Cover

[4] Taking out the - and + Terminal ASSYs 65, +/- Terminals P1 and P3, and Battery Terminals P2

- (1) Unlatch the locking pawl of the - terminal ASSY 65 with the tip of the flat screwdriver and from the bottom push the terminal ASSY up and out of the bottom cover.
- (2) In the same manner as in step (1), remove the +/- terminals P1 and P3.
- (3) Turn the bottom cover upside down, unlatch the locking pawl of the + terminal ASSY 65 with the flat screwdriver, and push the terminal out of the bottom cover.

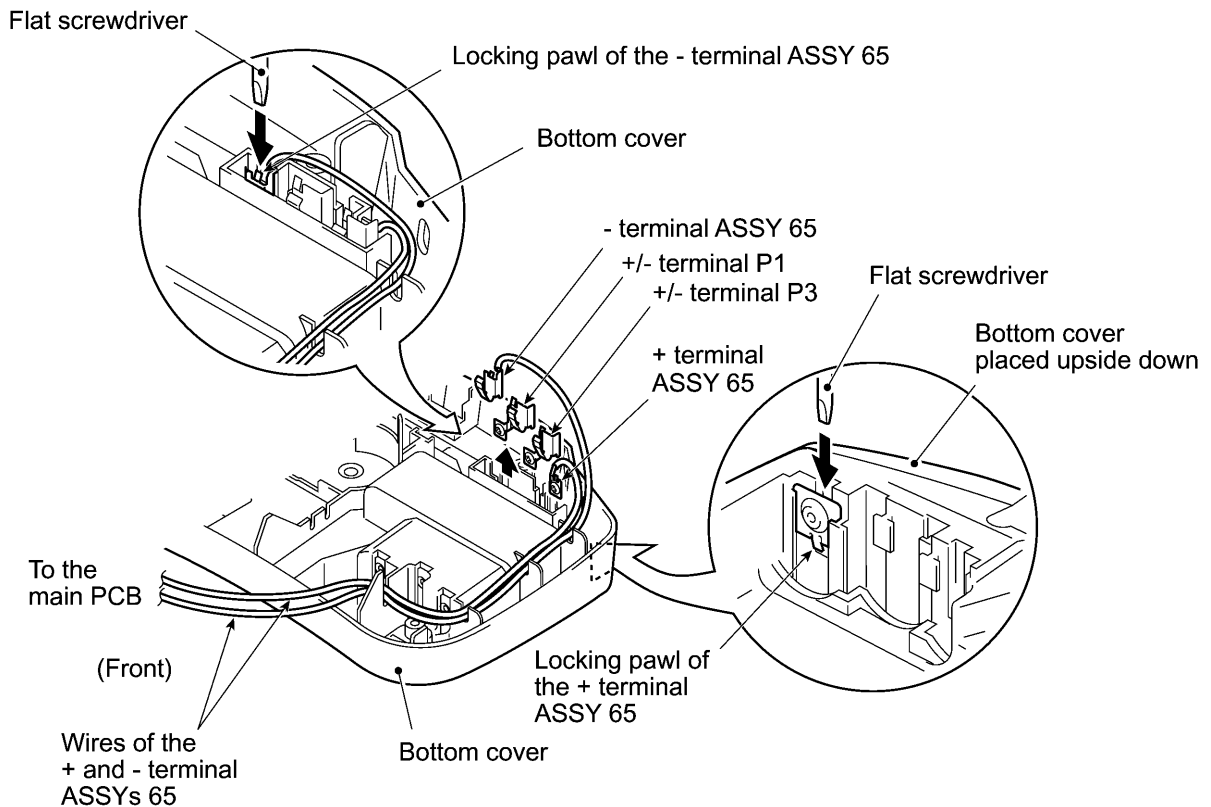


Figure 2.2-9 Taking out the - and + Terminal ASSYs 65 and +/- Terminals P1 and P3

- (4) As shown below, press the locking pawl of each battery terminal P2 with a flat screwdriver and push it out from the bottom cover.

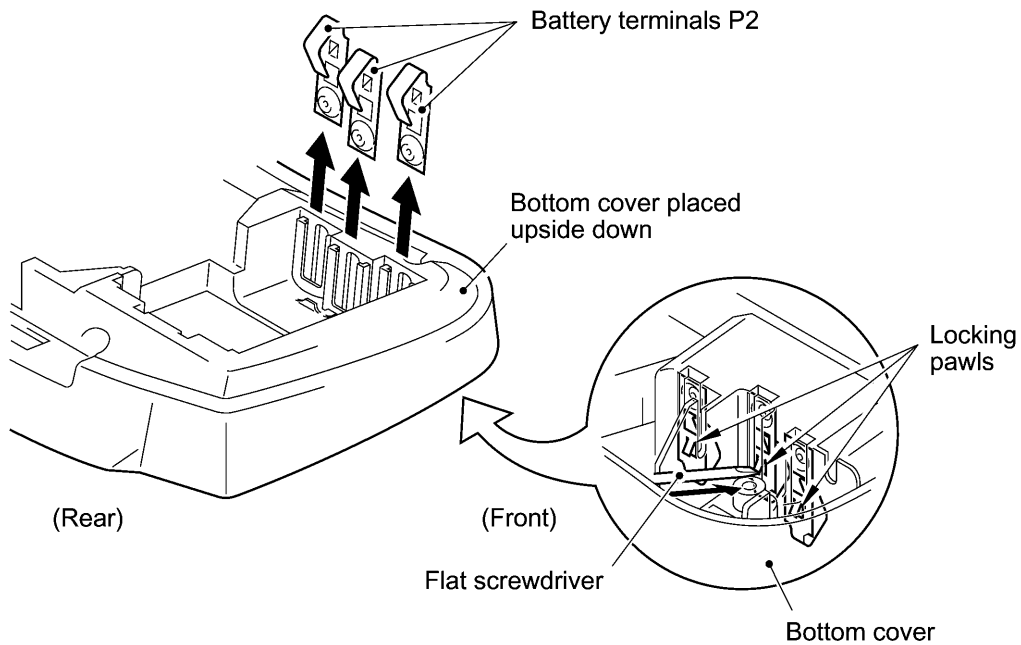


Figure 2.2-10 Taking out the Battery Terminals P2

[5] Unsoldering the + and - Terminal ASSYs 65 and Sub PCB Leads* from the Main PCB

*Provided on the European version.

If it is necessary to separate the + and - terminal ASSY 65 or sub PCB* leads from the main PCB, unsolder them with a soldering iron.

- (1) Unsolder the + and - terminal ASSYs 65 from the main PCB.
- (2) European version: To remove the sub PCB*, unsolder the four lead wires from the main PCB.

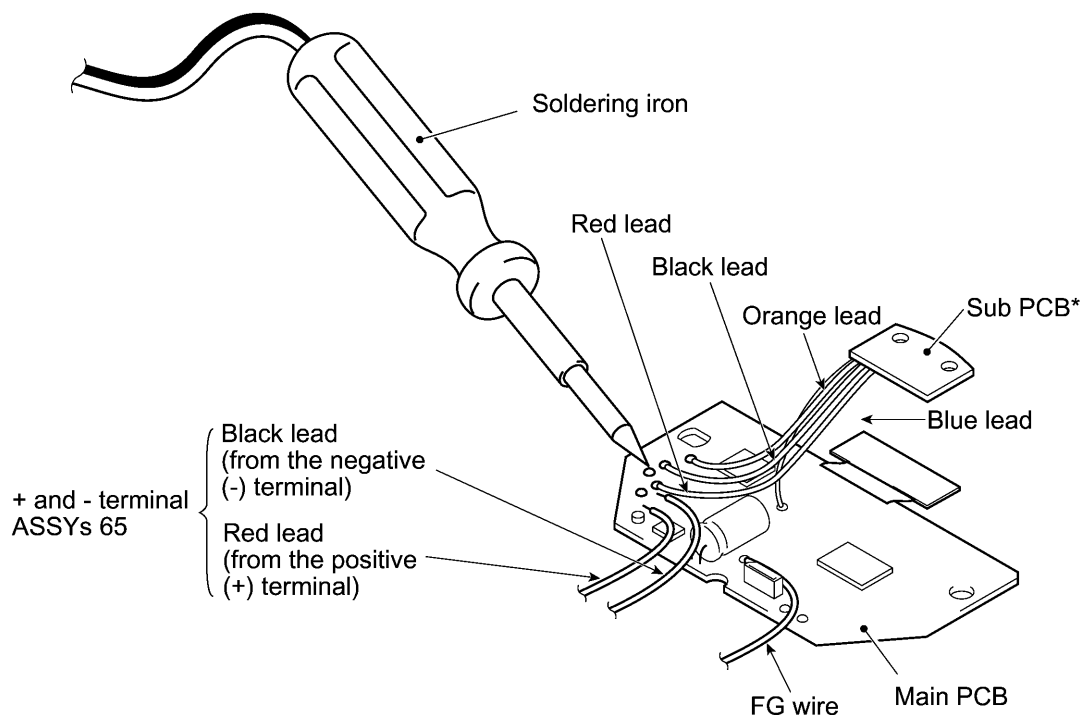


Figure 2.2-11 Unsoldering the + and - Terminal ASSYs 65 and Sub PCB Leads*

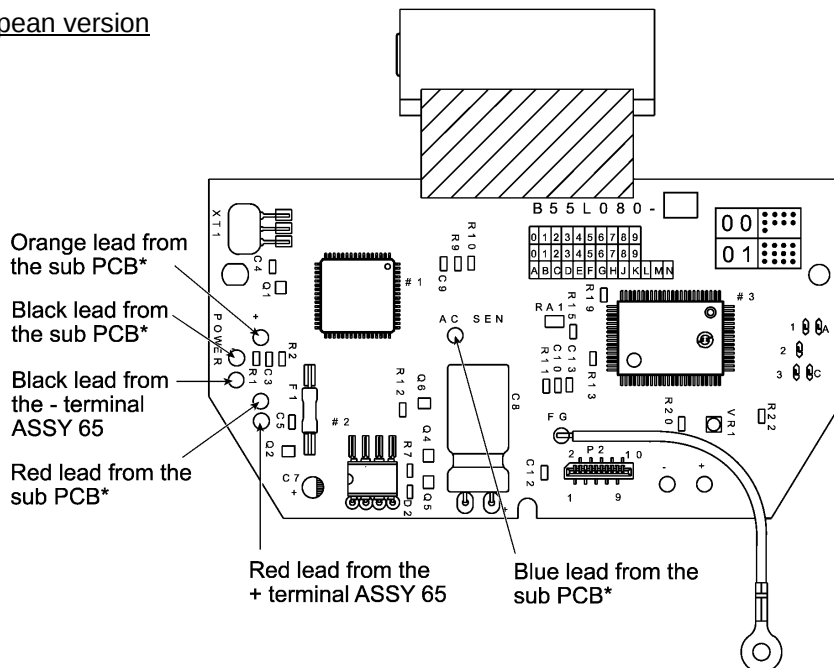
2.2.2 Reassembly Procedure

[1] Soldering the Sub PCB Leads* and the + and - Terminal ASSYs 65 onto the Main PCB

*Provided on the European version.

- (1) European version: Solder the four lead wires of the sub PCB* to the main PCB according to the wire ID colors as shown below.
- (2) Solder the + and - terminal ASSYs 65 according to the wire ID colors as shown below.

European version



US version

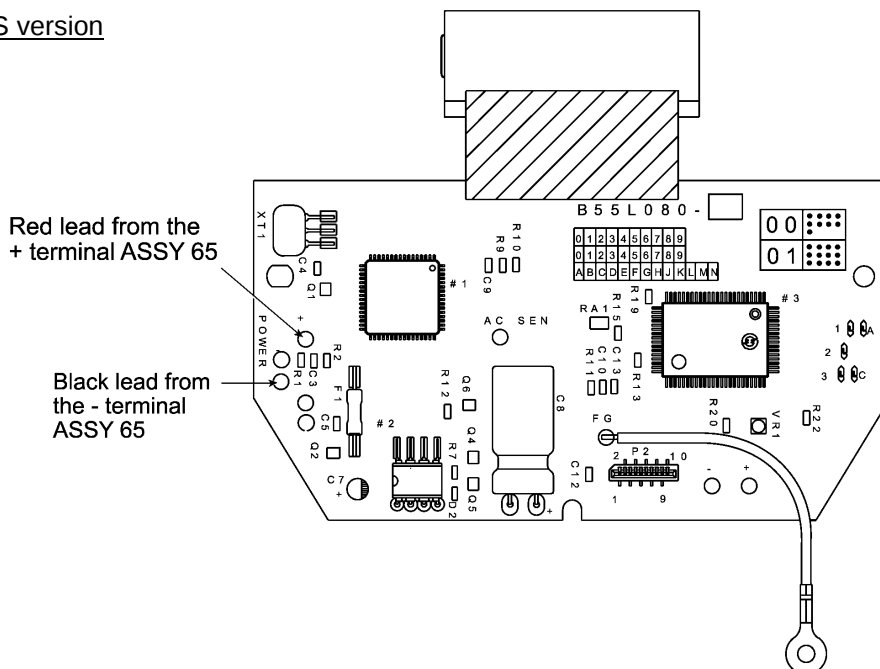


Figure 2.2-12 Soldering the Sub PCB Leads* and the + and - Terminal ASSYs 65

[2] Setting the Battery Terminals P2, +/- Terminals P3 and P1, and + and - Terminal ASSYs 65

- (1) Place the bottom cover upside down.
- (2) Set three battery terminals P2 to the bottom cover until they snap into place, as shown below.

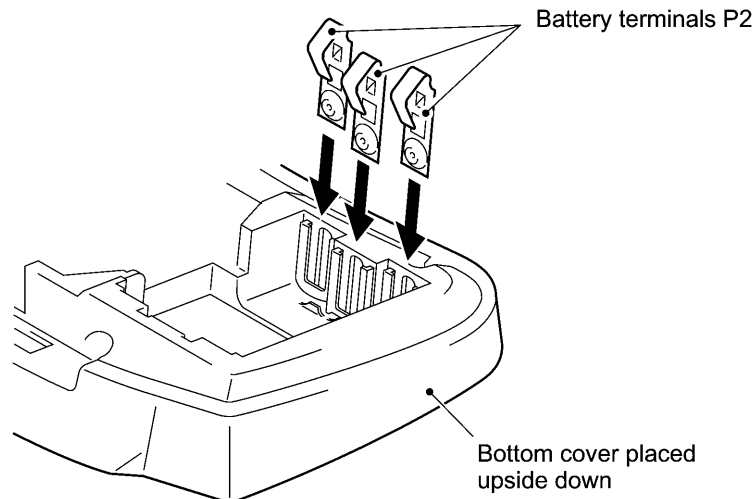


Figure 2.2-13 Setting the Battery Terminals P2

- (3) Turn the bottom cover rightside up.
- (4) Snap the + terminal ASSY 65 into the bottom cover.
- (5) Snap the +/- terminals P3 and P1 into the bottom cover.
- (6) Snap the - terminal ASSY 65 into place.

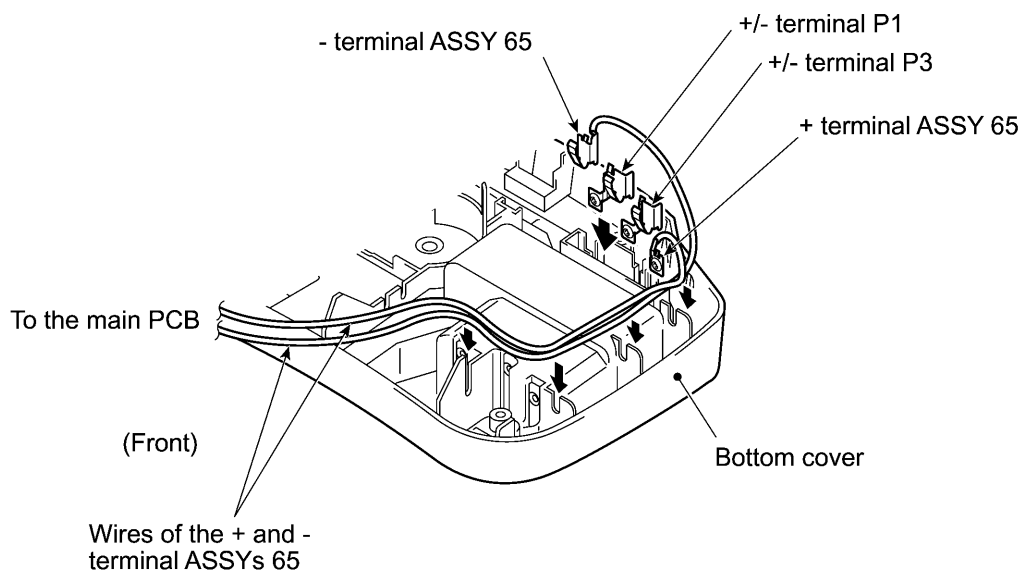


Figure 2.2-14 Setting the +/- Terminals P3 and P1 and the + and - Terminal ASSYs 65

[3] Installing the Rubber Key Pad, Main PCB, and Sub PCB*

*Provided on the European version.

- (1) Place the body cover upside down.
- (2) Put the rubber key pad in the body cover.

NOTE: Before setting the main PCB, check that there is no foreign material or dust on the key contacts of the main PCB.

- (3) While pressing the latches on the body cover outwards, slide the LCD as illustrated below. Make sure that the LCD is fully fitted in the body cover.
- (4) Secure the main PCB to the body cover with two screws.

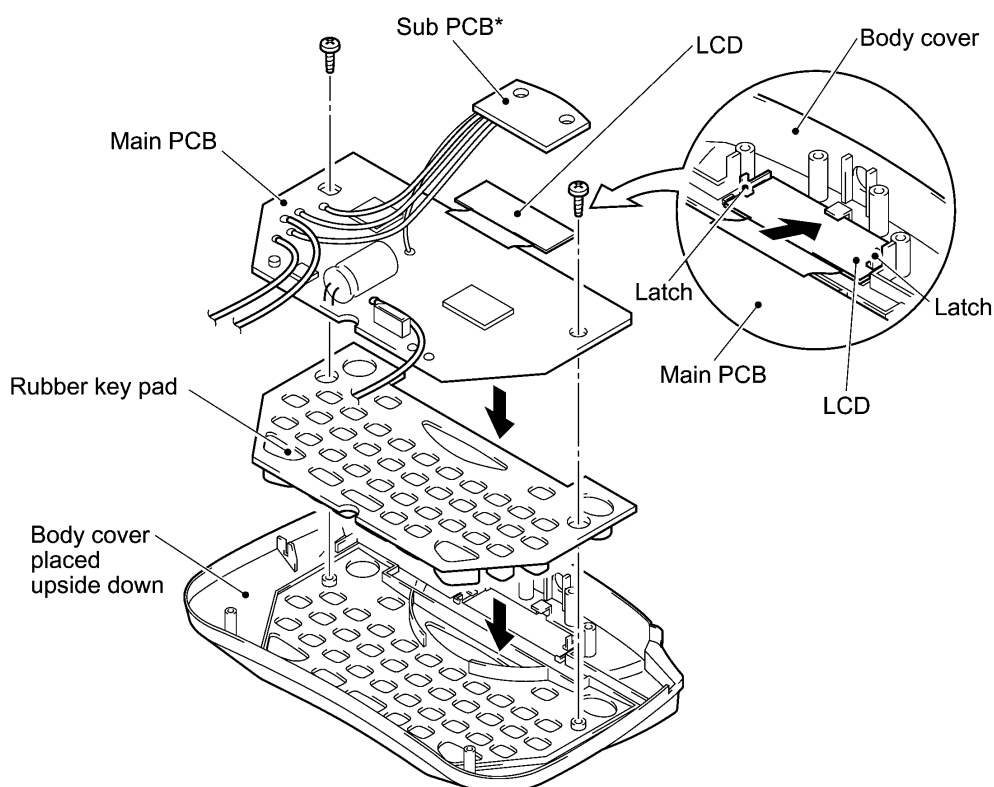


Figure 2.2-15 Reinstalling the Rubber Key Pad and Main PCB

- (5) European version: Secure the sub PCB* with two screws.

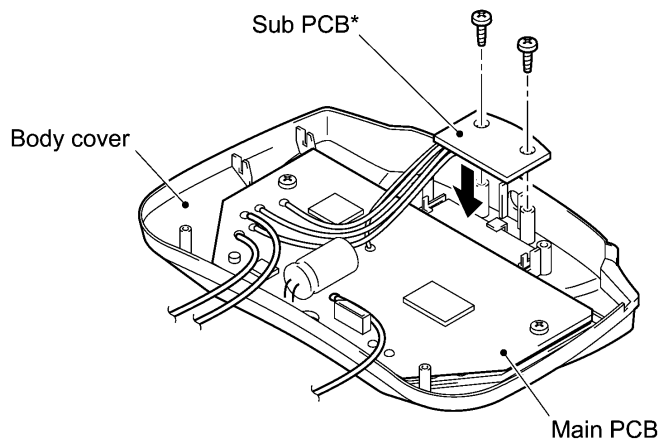


Figure 2.2-16 Securing the Sub PCB*

[4] Installing the Chassis ASSY

- (1) If the chassis ASSY has been disassembled, assemble the components, referring to page II-20.
- (2) As shown in Figure 2.2-20, fit the cutter lever onto the shaft on the chassis ASSY.
- (3) Put the chassis ASSY with the cutter lever back into the bottom cover.
- (4) Secure the chassis ASSY with three screws. One of those screws should also secure the FG wire.

NOTE: Check that the FG wire is secured to the correct position, referring to the illustration given below.

- (5) Solder the motor lead wires to the main PCB as shown below.

NOTE: Check the wire ID colors, then solder the black and red wires to the (+) and (-) points, respectively.

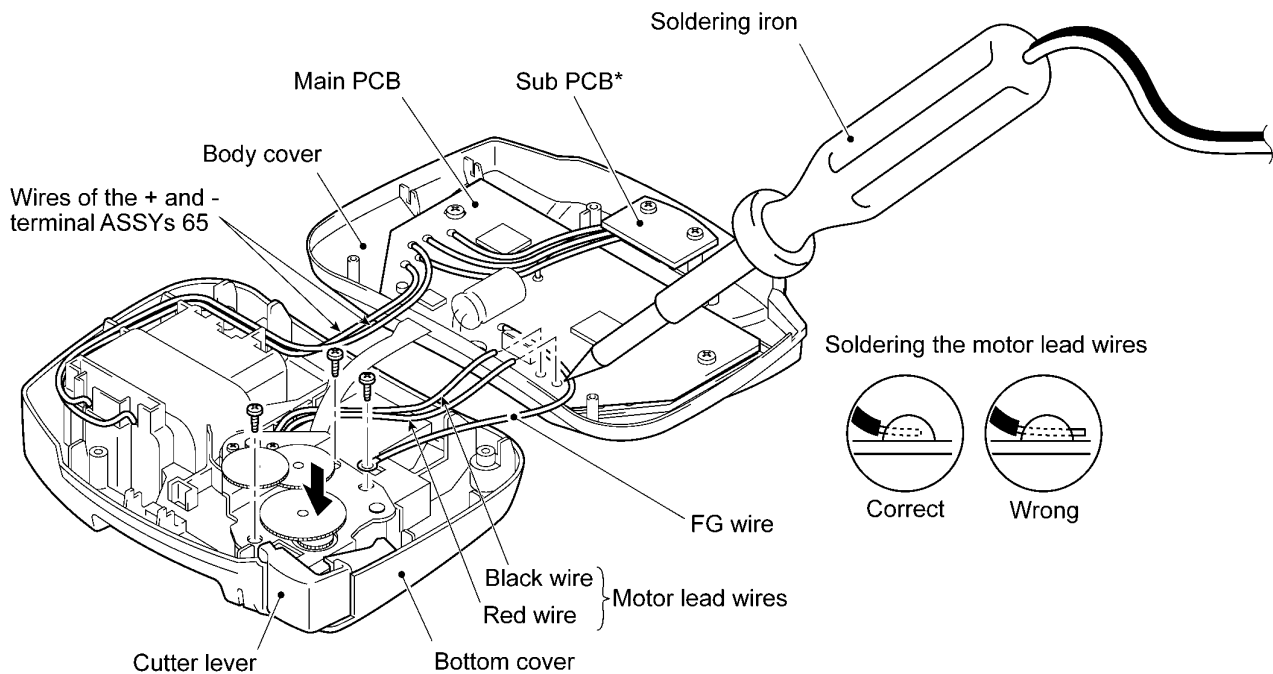


Figure 2.2-17 Installing the Chassis ASSY and Soldering the Motor Lead Wires

- (6) Route the wires of the + and - terminal ASSYs 65 along the four ribs provided on the bottom cover as illustrated below.
- (7) Connect the head flat cable to the main PCB and close the bottom cover.

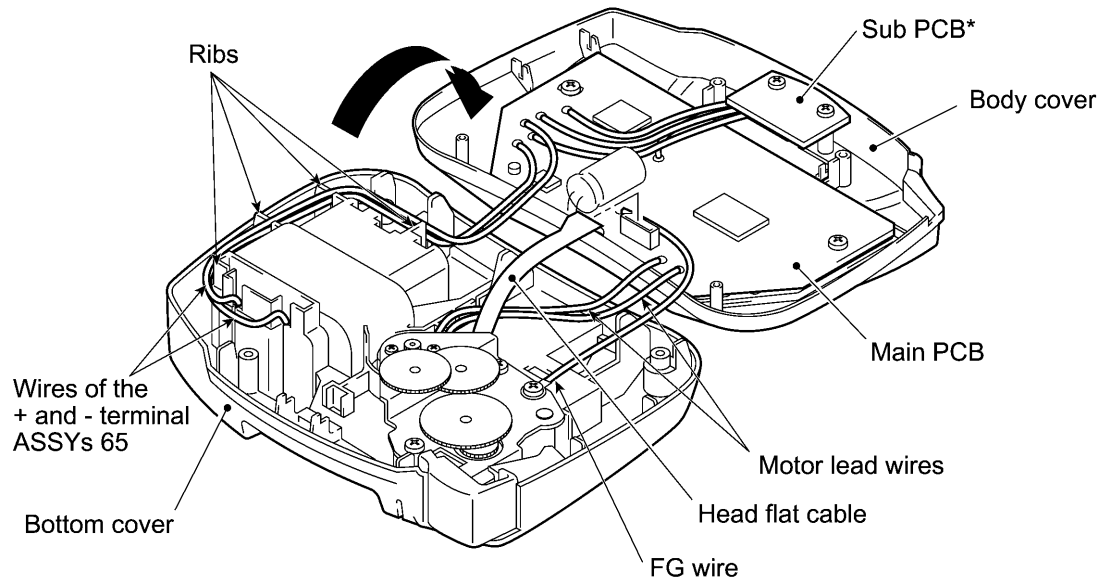


Figure 2.2-18 Routing the + and - Terminal ASSYs 65 and Connecting the Head Flat Cable

- (8) Secure the bottom cover to the body cover with four screws, taking care not to pinch the wires between the body cover and bottom cover.

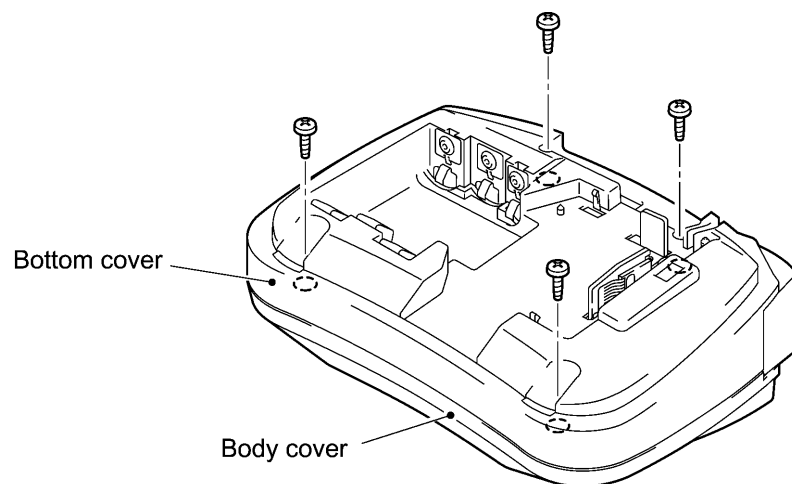


Figure 2.2-19 Securing the Bottom Cover to the Body Cover

n Assembling the Components of the Chassis ASSY

- (1) Secure the DC motor ASSY to the chassis with two screws so that the motor lead wires face as shown below.
- (2) Set the roller holder spring onto the roller holder ASSY so that its straight end is fitted into section "A" on the ASSY, then install them to the chassis and secure the ASSY with the retaining ring.
- (3) As shown below, turn the bent end of the roller holder spring with a flat screwdriver and fit it into an oval hole provided in the chassis. Then secure the thermal head ASSY with a screw.

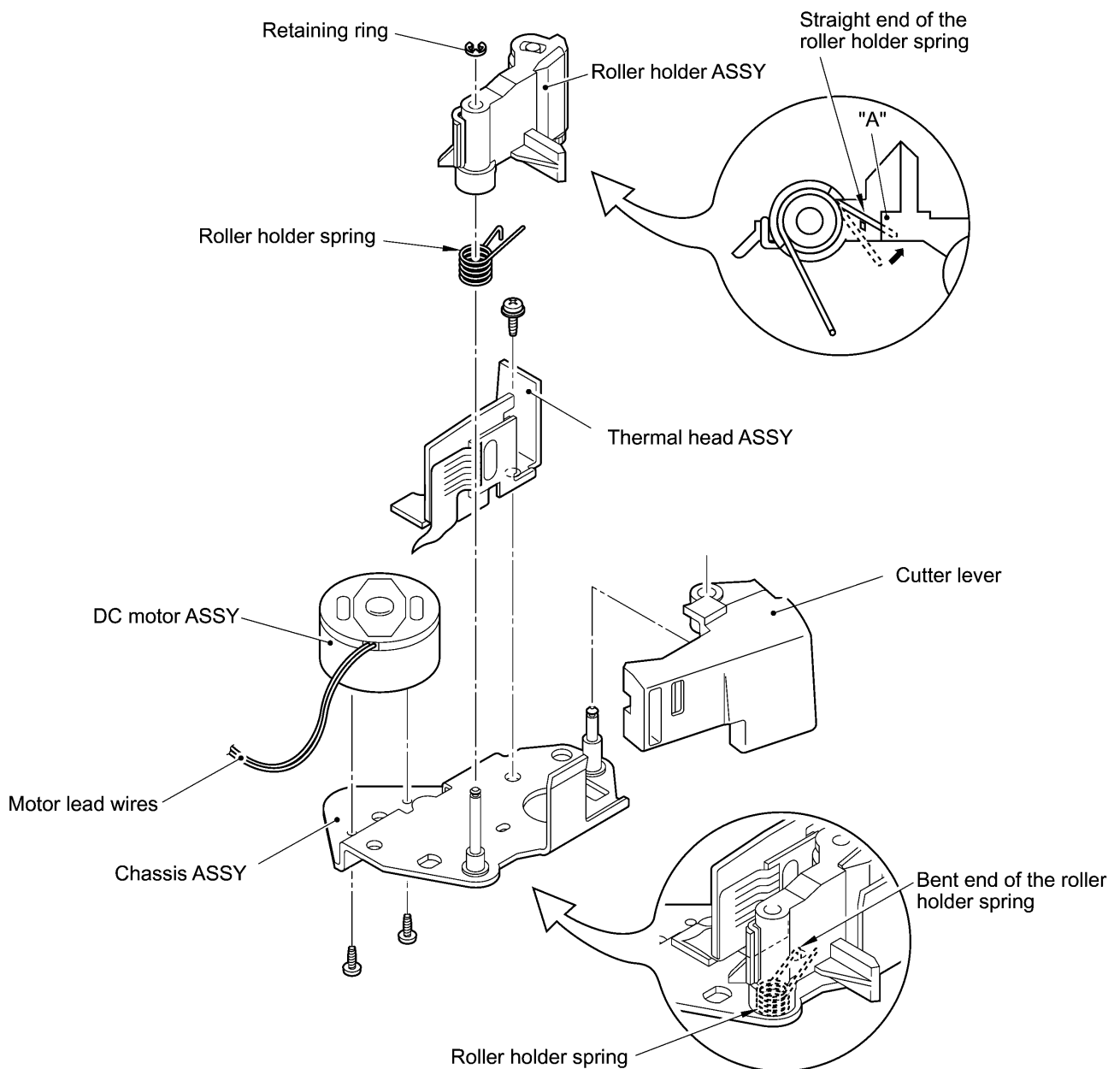


Figure 2.2-20 Assembling the Components of the Chassis ASSY

[5] Setting the Cutter Unit, Tape Cassette, Dry Cells, and Cassette Cover

- (1) Set the cutter unit into place.
- (2) Set a tape cassette.
- (3) Load dry cells.
- (4) Fit hooks "X" of the cassette cover and then snap the cover into place.

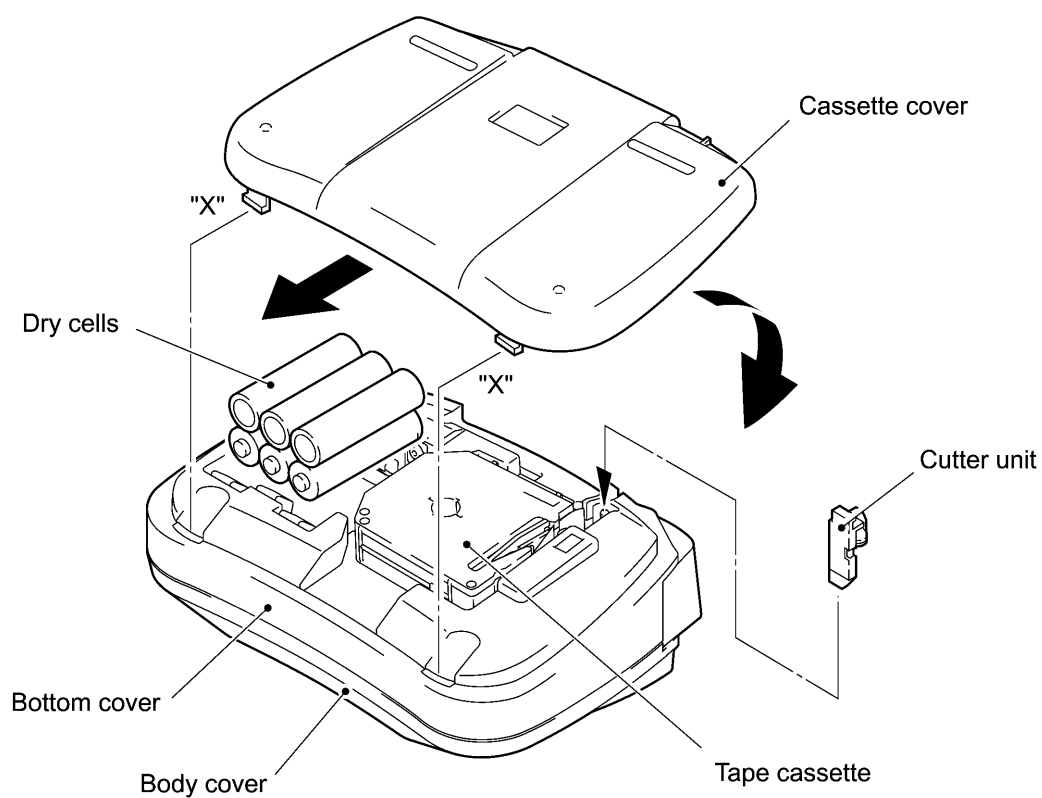


Figure 2.2-21 Setting the Cutter Unit, Tape Cassette, Dry Cells, and Cassette Cover

[6] Demonstration Print and Final Check

- (1) Power on the machine.
- (2) While holding down the Code key, press the  key (BS key in U.S. and Australian versions) to cancel data previously entered.
- (3) Power off the machine.
- (4) While holding down the Code and D keys, press and release the  key (On/Off key in the U.S. and Australian versions), then release the Code and D keys. The demonstration print will start.
- (5) During the demonstration print, check that the machine feeds the tape and prints data correctly. Then, cut the tape.
- (6) Open the cassette cover to check that it retracts the roller holder ASSY from the thermal head. Close the cassette cover to check that it presses the roller holder ASSY against the thermal head.
- (7) Check that pressing the keys causes correct operation.
- (8) Check that the  key (On/Off key in the U.S. and Australian versions) operates correctly.
- (9) Replace the dry cells with new ones, and then power on the machine.
- (10) Check the tape feeding length according to the steps below.
 - 1) While holding down the Code key, press the Space key to feed tape.
 - 2) Push the cutter lever to cut the tape.
 - 3) Enter arbitrary characters.
 - 4) While holding down the Code key, press the H key. After the print preview, the tape length will appear. Make a note of the length.
 - 5) Press the Print key to print.
 - 6) After completion of printing, cut the printed tape.
 - 7) Check that the cut tape is the length recorded in step 4) $\pm 5\%$ long.
 - 8) If the cut tape is out of the specified range, insert the tip of a screwdriver through the hole provided in the bottom cover and rotate the trimmer (VR1) on the main PCB to adjust the tape feeding length.

Rotating the VR1 clockwise will shorten the tape feeding length; rotating it counterclockwise will lengthen it.

If any problem is found, go to the troubleshooting in Chapter IV.

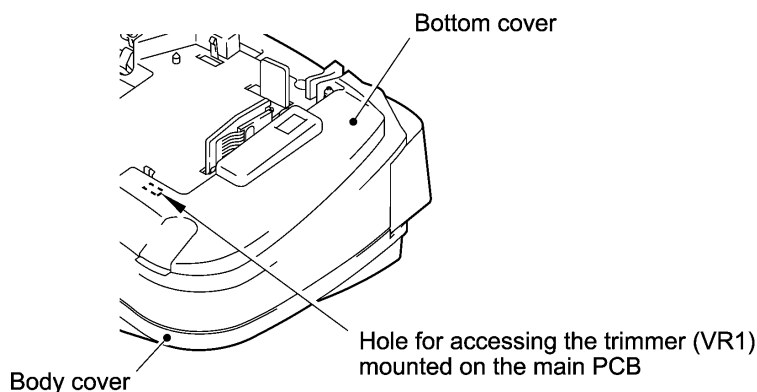


Figure 2.2-22 Adjusting the Trimmer (VR1) on the Main PCB

Chapter III.

ELECTRONICS

CONTENTS

CHAPTER III. ELECTRONICS

3.1	OUTLINE OF CONTROL ELECTRONICS	III-1
3.2	MAIN PCB.....	III-2
3.2.1	Block Diagram	III-2
3.2.2	CPU.....	III-3
3.2.3	LCD Controller.....	III-3
3.2.4	Key Contacts Matrix	III-4
[1]	Key contacts matrix.....	III-4
[2]	Solder points.....	III-6
3.2.5	Power ON/OFF Key and Reset Circuit	III-7
[1]	Power ON/OFF circuit.....	III-7
[2]	Automatic powering-off circuit.....	III-8
3.2.6	Motor Drive Circuit.....	III-9
3.2.7	Thermal Head Drive Circuit	III-10
3.2.8	Voltage Detection Circuit.....	III-12
3.2.9	Oscillation Circuit.....	III-13
3.2.10	Power Supply Circuit	III-14
3.3	SUB PCB	III-15
3.3.1	Sub PCB	III-15

3.1 OUTLINE OF CONTROL ELECTRONICS

Figure 3.1-1 shows a block diagram of the control electronics of this machine. The control electronics consists of a main PCB, LCD, motor, thermal print head assembly, and sub PCB*.

* Provided on the European version.

n Main PCB

This manages all the components including an LCD, motor, key pad, and thermal print head.

n Motor

The DC motor is a power source to advance tape. It operates on 9V (unstabilized).

n Thermal Print Head

This is a thick-film thermal print head which integrates a heat generator (consisting of 64 heating elements vertically aligned) and driver circuitry. When selectively energized by 9V (unstabilized), those heating elements produce characters.

n LCD

The LCD is 8 characters wide by one row and it has also 11 guidance indicators.

n Sub PCB

This allows you to use an AC adapter.

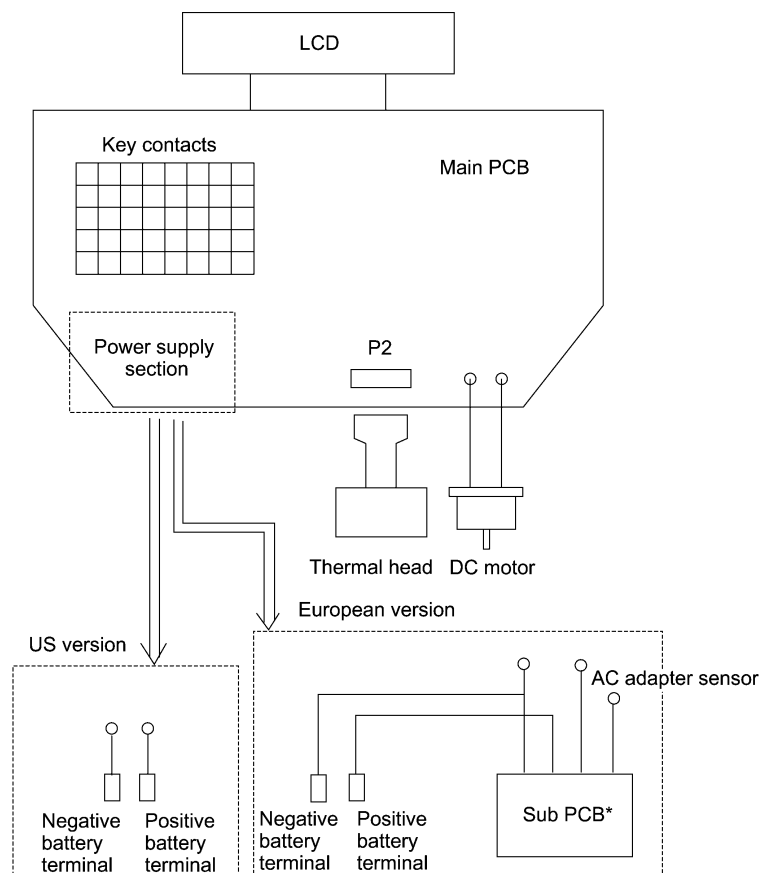


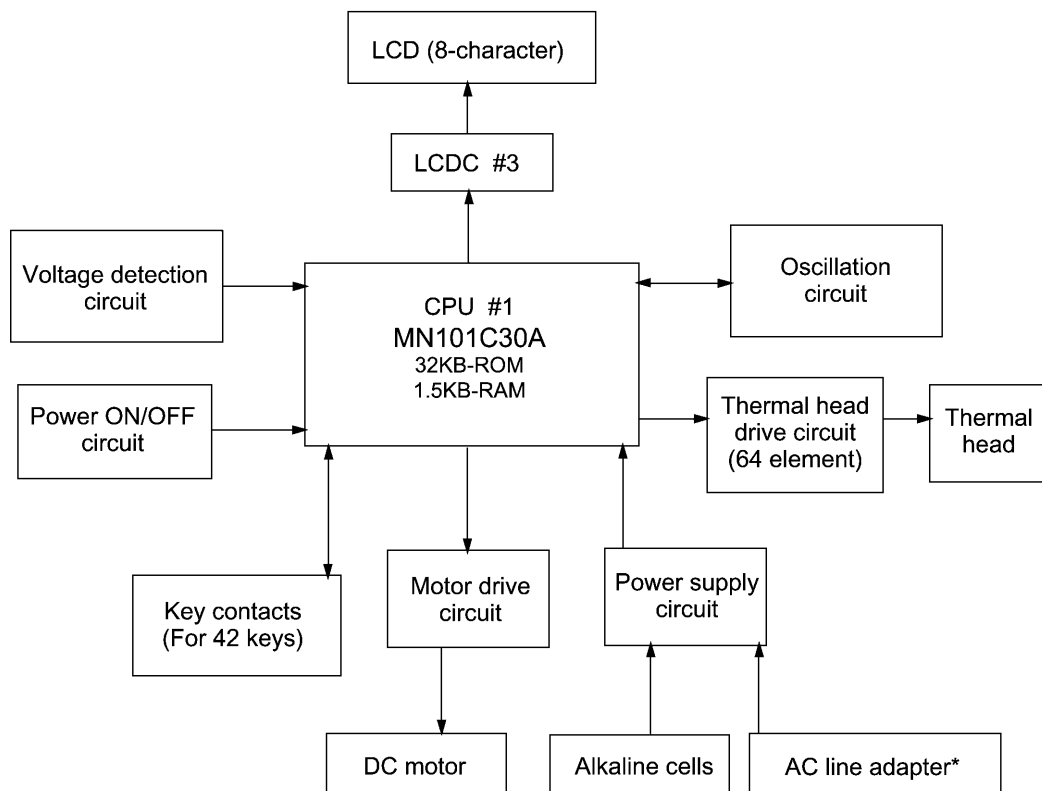
Figure 3.1-1 Configuration of the Electronic Part

3.2 MAIN PCB

3.2.1 Block Diagram

Figure 3.2-1 shows a block diagram of the main PCB. The main PCB consists of the following:

- (1) CPU (including a ROM and RAM)
- (2) LCD controller
- (3) Key contacts matrix and solder points (destination switching circuit)
- (4) Power ON/OFF circuit
- (5) Motor drive circuit
- (6) Thermal head drive circuit
- (7) Voltage detection circuit
- (8) Oscillation circuit
- (9) Power supply circuit



* Provided for the European version.

Figure 3.2-1 Main PCB Block Diagram

3.2.4 Key Contacts Matrix

[1] Key contacts matrix

On the main PCB is a key contacts matrix that is a set of carbon-printed 43 key contact patterns. Each contact pattern has a pair of electrodes.

The rubber key pad is made of high-impedance silicon rubber. As shown in Figure 3.2-3, each key on the rubber key pad consists of a key top, rubber spring, and conductive paint which functions as a switching element.

If a particular key is pressed, the conductive paint of the key short-circuits the paired electrodes carbon-printed on the main PCB.

Figure 3.2-4 shows a key scan timing scheme and scanning pulse outputs. Ports P70 through P75 on the CPU issue a group of key scanning pulses. Every scanning pulse is Low active for 200 μ s and is in high impedance while inactive. Ports P60 through P67 act as input ports which receive key status.

The CPU scans the key contacts matrix every 10 ms. If the CPU reads the same data on an input port two successive times, it interprets the state as the key being pressed; if the CPU reads the same data six successive times, it interprets the state as the key being released. The input mode of this keying system is 2-key roll-over and 3-key lockout.

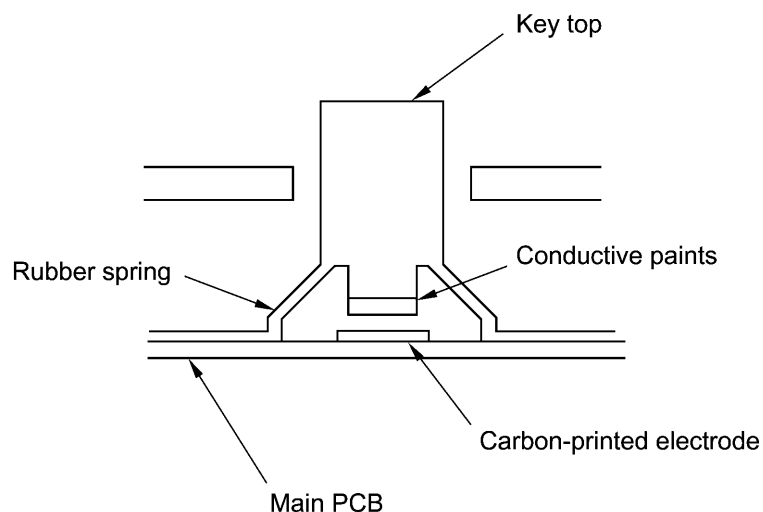


Figure 3.2-3 Detailed Diagram of Keyboard

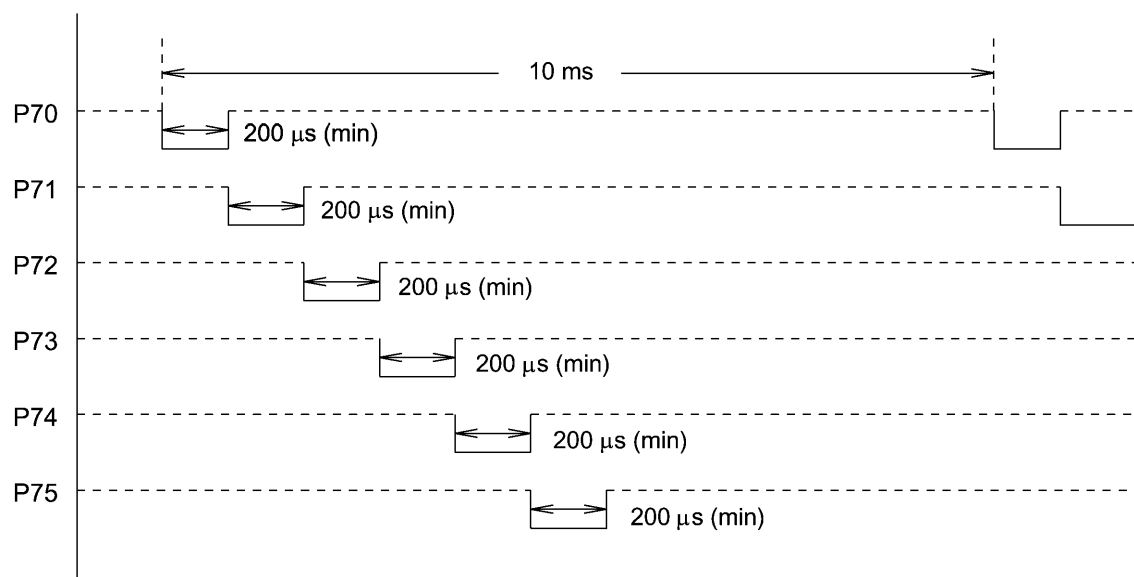


Figure 3.2-4 Key Scan Timing Scheme and Scanning Pulse Outputs

[2] Solder points

Figure 3.2-5 shows a circuit diagram relating to the keyboard and solder points. Solder points 1 through 3 customize the machine for the destination (shipping country) .

20	U.S.A./Canada	H	H	H
10	Germany	H	H	H
02	Belgium	H	L	H
01	France	L	H	H
00	England	H	H	H
Spec. No.	Destination	1	2	3
		Solder Points		

H: Solder point opened L: Solder point closed

Solder points A and C are reserved for the future use for the thermal head ranking.

The CPU reads the solder point status once in the powering-on sequence to recognize the customization.

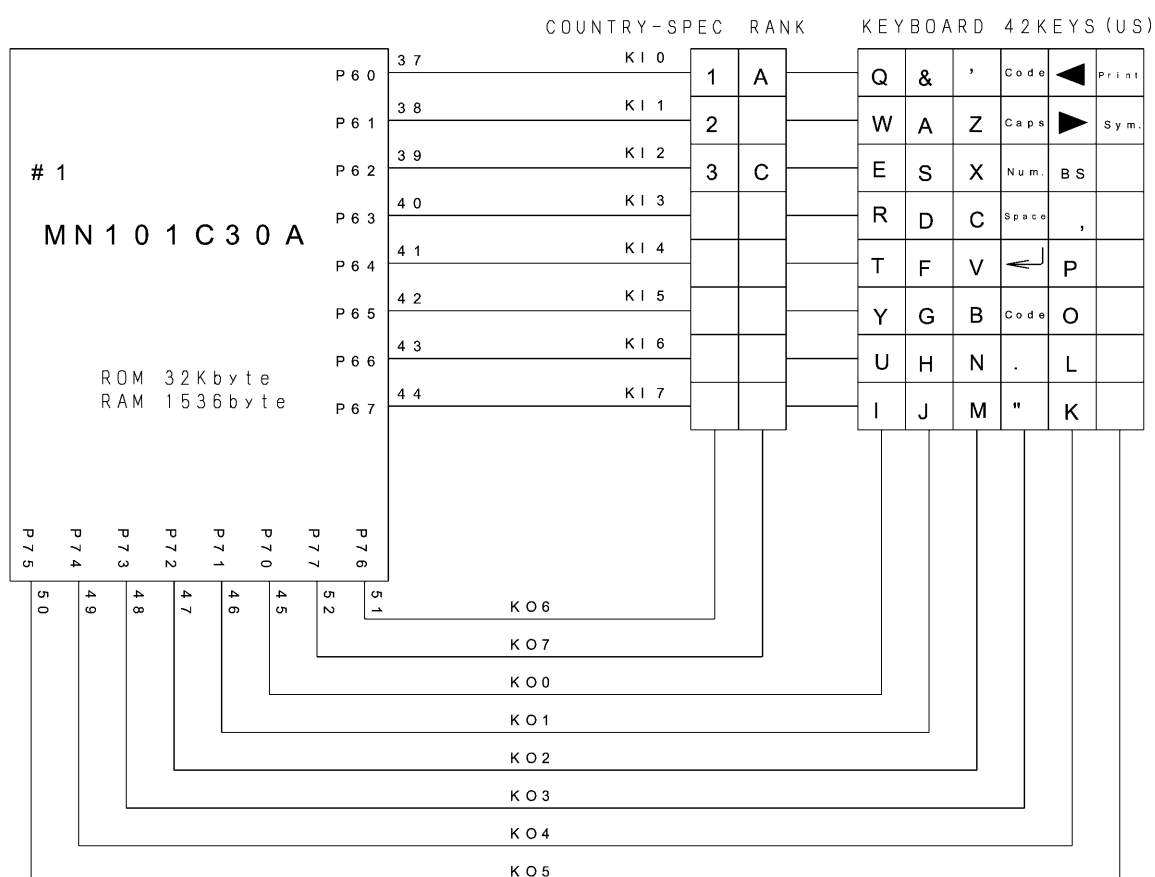


Figure 3.2-5 Keyboard and Solder Points

3.2.5 Power ON/OFF Key and Reset Circuit

[1] Power ON/OFF circuit

Figure 3.2-6 shows a circuit diagram of the power ON/OFF key. The CPU processes the ON/OFF key state in a sequence quite different from other keys although the ON/OFF key is on the same key pad.

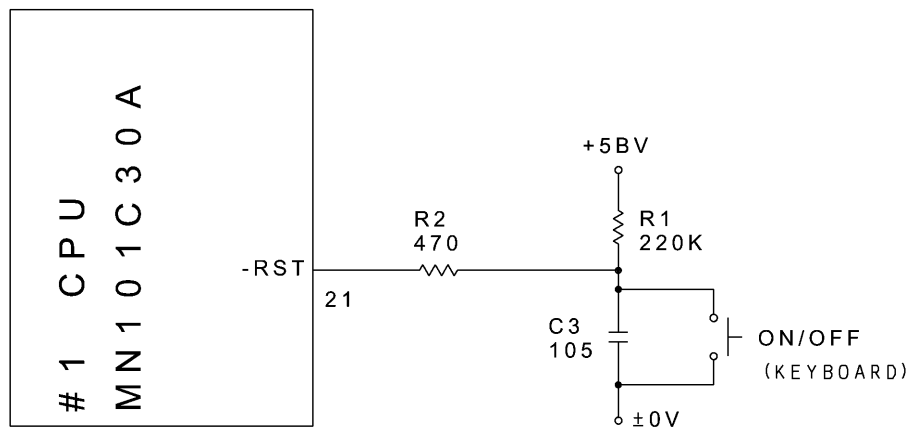
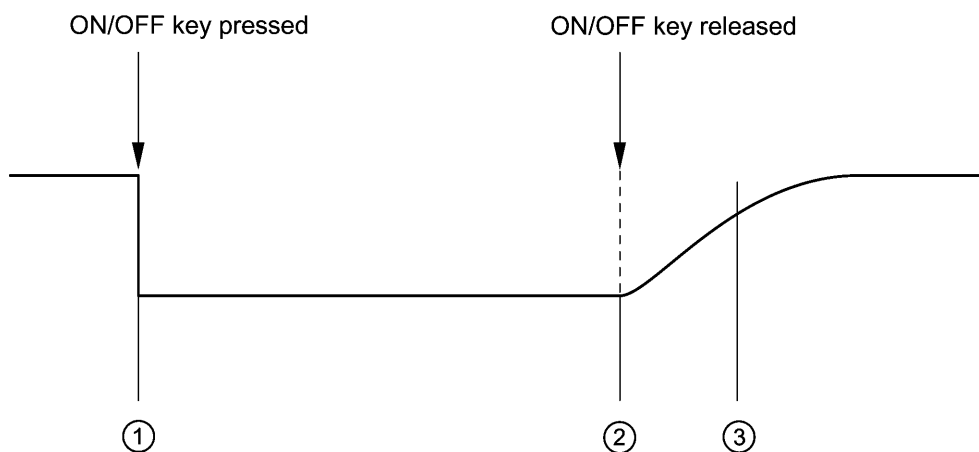


Figure 3.2-6 ON/OFF Key



- - , The ON/OFF key is held down, during which the CPU is inactive.
- , - **f** Reset operation by the reset circuit
- f** In the powering-on sequence: The reset signal is canceled and the program starts.
- f** In the powering-off sequence: The reset signal is canceled and the program stops.

Figure 3.2-7 Powering-on/-off sequence

[2] Automatic powering-off circuit

If you power off the machine with the ON/OFF key or you make no key entry for approx. 5 minutes, the oscillation stops so that the CPU enters the sleep mode.

To cancel the sleep mode and resume the normal operation mode, press the ON/OFF key.

3.2.6 Motor Drive Circuit

Figure 3.2-8 shows the motor drive circuit of the DC motor which feeds tape.

Through P10, the CPU produces a start/stop control signal to the motor drive circuit. Figure 3.2-9 shows the part of motor waveforms.

#2 (BA6220) is an electronic governor IC and controls to keep the rotation speed of the motor constant even if the power source voltage (VBT) varies.

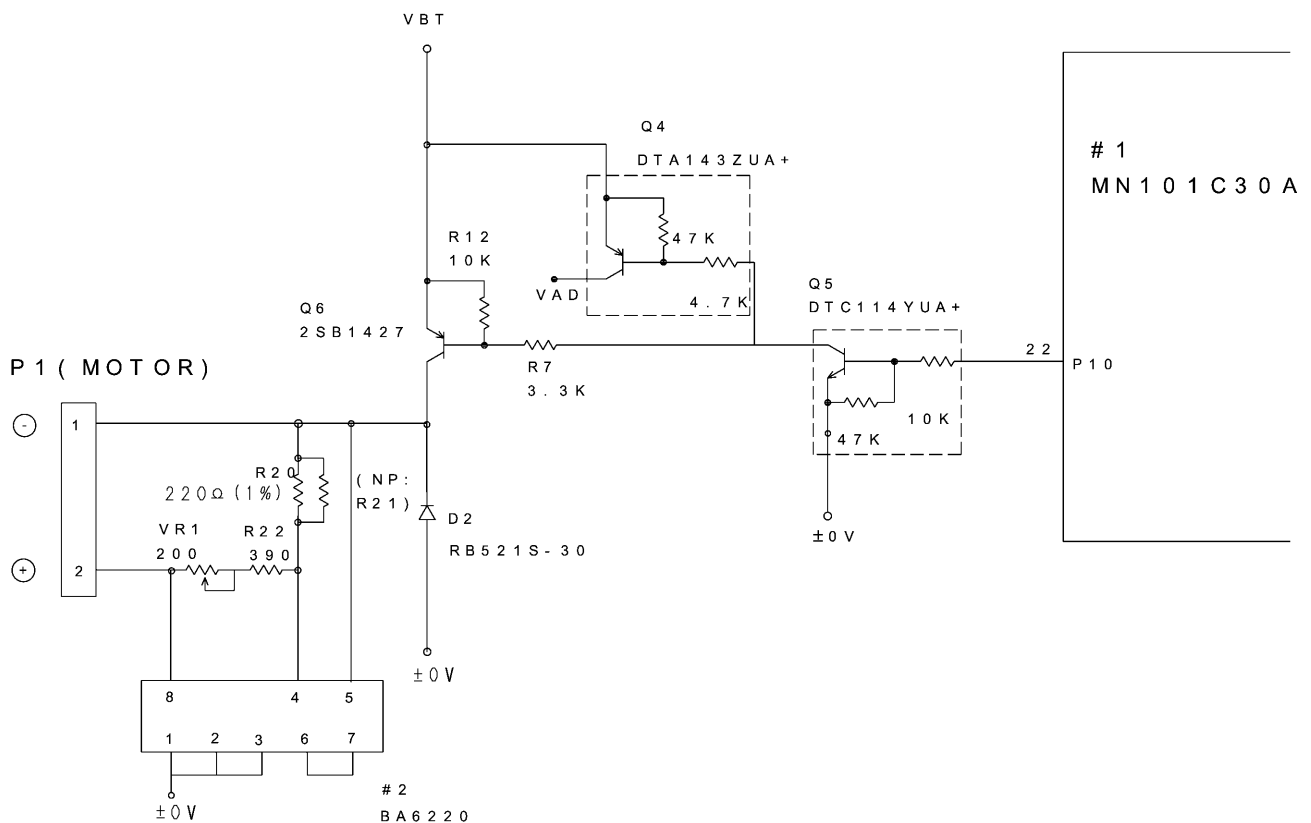


Figure 3.2-8 Motor Drive Circuit

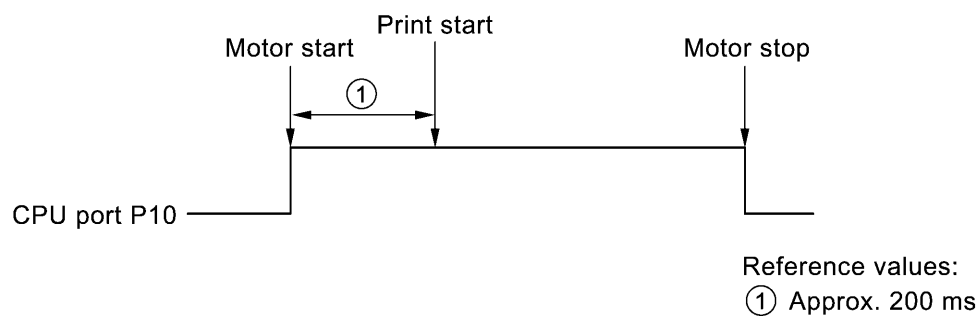


Figure 3.2-9 Part of Motor Waveforms

3.2.7 Thermal Head Drive Circuit

Figure 3.2-10 shows the thermal head drive circuit.

The print head has an integrated heat generator (consisting of 64 heating elements vertically aligned in 240 dpi) and a built-in driver IC.

Synchronizing with the clock on P02, the CPU outputs print data on P00 in the serial form. Upon receipt of P01 signal issued by the CPU, the thermal head control circuit latches the print data and drives the heating elements of the thermal head according to the signal issued from P03. Figure 3.2-11 illustrates a timing chart of the thermal head drive.

Capacitor C10 works as a thermal head overheat protector. It cuts off the P03 signal to shut down invalid drive current if the signal sticks to the low level due to any malfunctions of the programs or the CPU.

Since thermal heads are very sensitive to heat and the head drive source is not stabilized, the CPU determines the ON-time length of the P03 signal while monitoring the head drive source voltage (refer to Subsection 3.2.8).

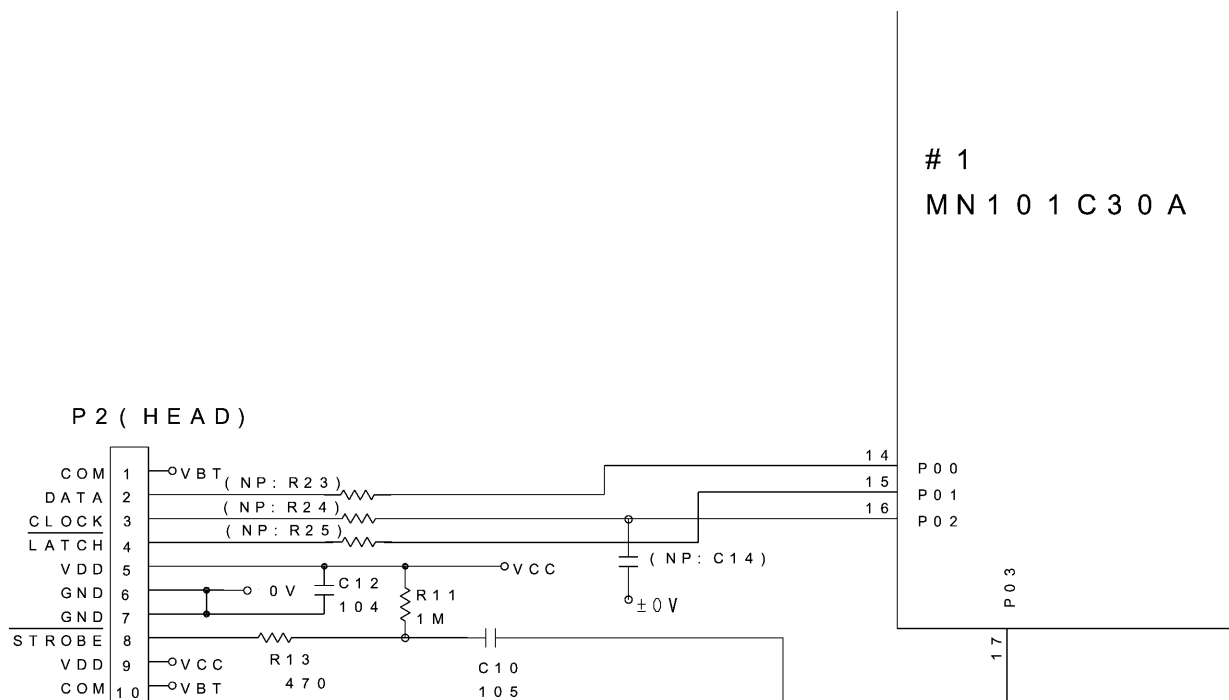


Figure 3.2-10 Thermal Head Drive Circuit

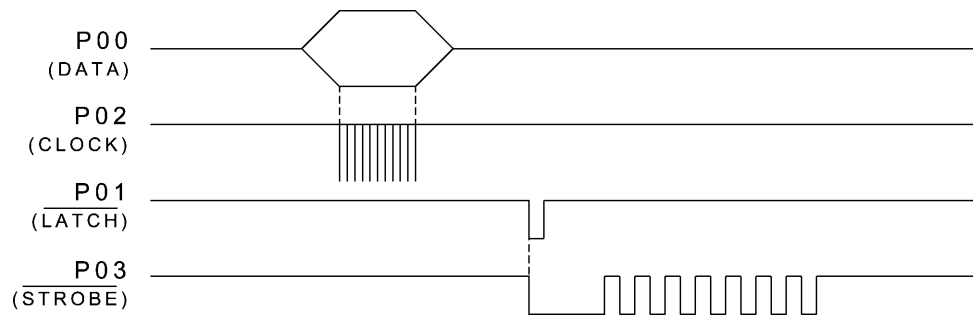


Figure 3.2-11 Timing Chart for Thermal Head Drive

3.2.8 Voltage Detection Circuit

Figure 3.2-12 shows the voltage detection circuit which is composed of a resistor network.

Voltage detection circuit

This circuit, which is composed of divider resistors R9 and R10, steps down the power source VAD fed from dry cells or the AC adapter and feeds the output to the A/D input port PA1 on the CPU. According to the drive source voltage, the CPU determines the optimum head drive power.

During non-printing:

If the voltage level of the VAD drops below approx. 6.8V, the CPU immediately shuts down the power.

• Adapters with an output of 10.8 V or greater are designated as "high-voltage" adapters and cannot be used for this machine. If this machine detects any high-voltage adapter plugged in, it will power itself off.

During printing:

• If it drops even more below approx. 5.7V, the CPU displays the "BATTERY" message to warn you of a low battery after completion of printing.

• If it drops below approx. 5.2V, the CPU immediately shuts down the power.

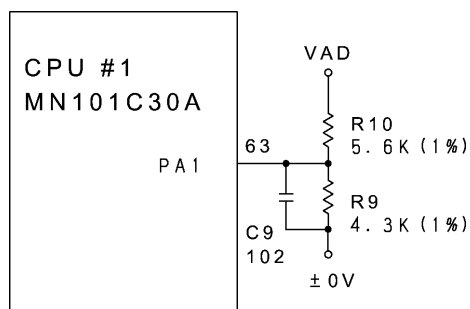


Figure 3.2-12 Voltage Detection Circuit

3.2.9 Oscillation Circuit

Figure 3.2-13 shows the oscillation circuit.

This circuit contains an oscillator and generates 8 MHz frequency which acts as the CPU basic clock. The CPU divides this into half (4 MHz) to synchronize its internal operations.

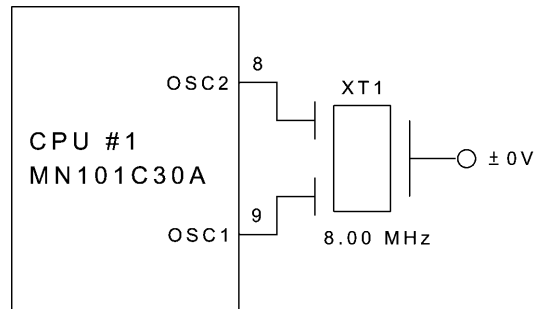


Figure 3.2-13 Oscillation Circuit

3.2.10 Power Supply Circuit

Figure 3.2-14 shows the power supply circuit. The 3-terminal regulator RH5RL50A stabilizes the battery output, producing the +5BV power source ($5 \pm 0.125V$).

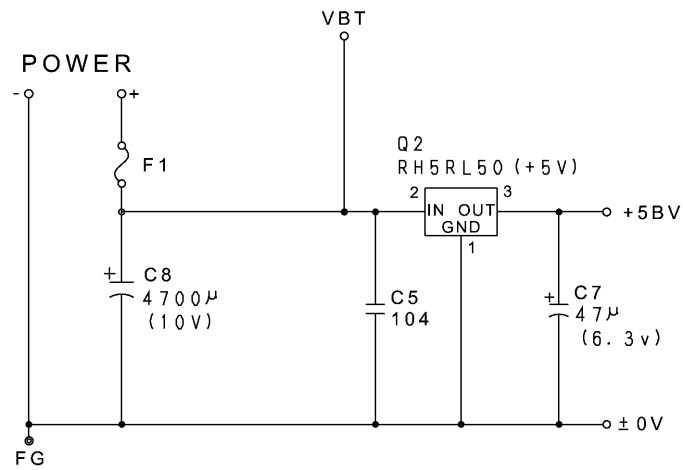


Figure 3.2-14 Power Supply Circuit

3.3 SUB PCB

3.3.1 Sub PCB

The sub PCB is provided for the European version and allows you to connect an AC adapter.

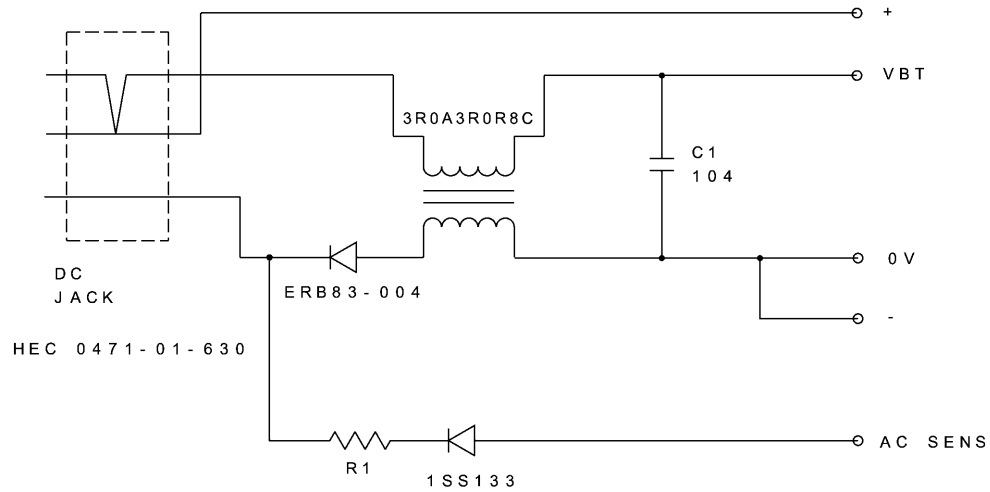


Figure 3.3-1 Sub PCB Circuit

Chapter IV.

TROUBLESHOOTING

CONTENTS

CHAPTER IV TROUBLESHOOTING

4.1 TROUBLESHOOTING	IV-1
4.1.1 Precautions	IV-1
4.1.2 After Repairing	IV-1
4.1.3 Troubleshooting Flows	IV-2
[1] Tape feeding failure	IV-2
[2] Printing failure	IV-5
[3] Powering failure (Nothing appears on the LCD.)	IV-8
[4] No key entry possible.....	IV-10
[5] Abnormal LCD indication	IV-11

4.1 TROUBLESHOOTING

This section gives the service personnel some of the troubleshooting procedures to be followed if an error or malfunction occurs with this machine. It is impossible to anticipate all of the possible troubles which may occur in future and determine the troubleshooting procedures, so this chapter covers some sample troubles. However, those samples will help service personnel pinpoint and repair other defective elements if he/she analyzes and examines them well.

4.1.1 Precautions

Be sure to observe the following precautions to prevent the secondary problems from happening during troubleshooting:

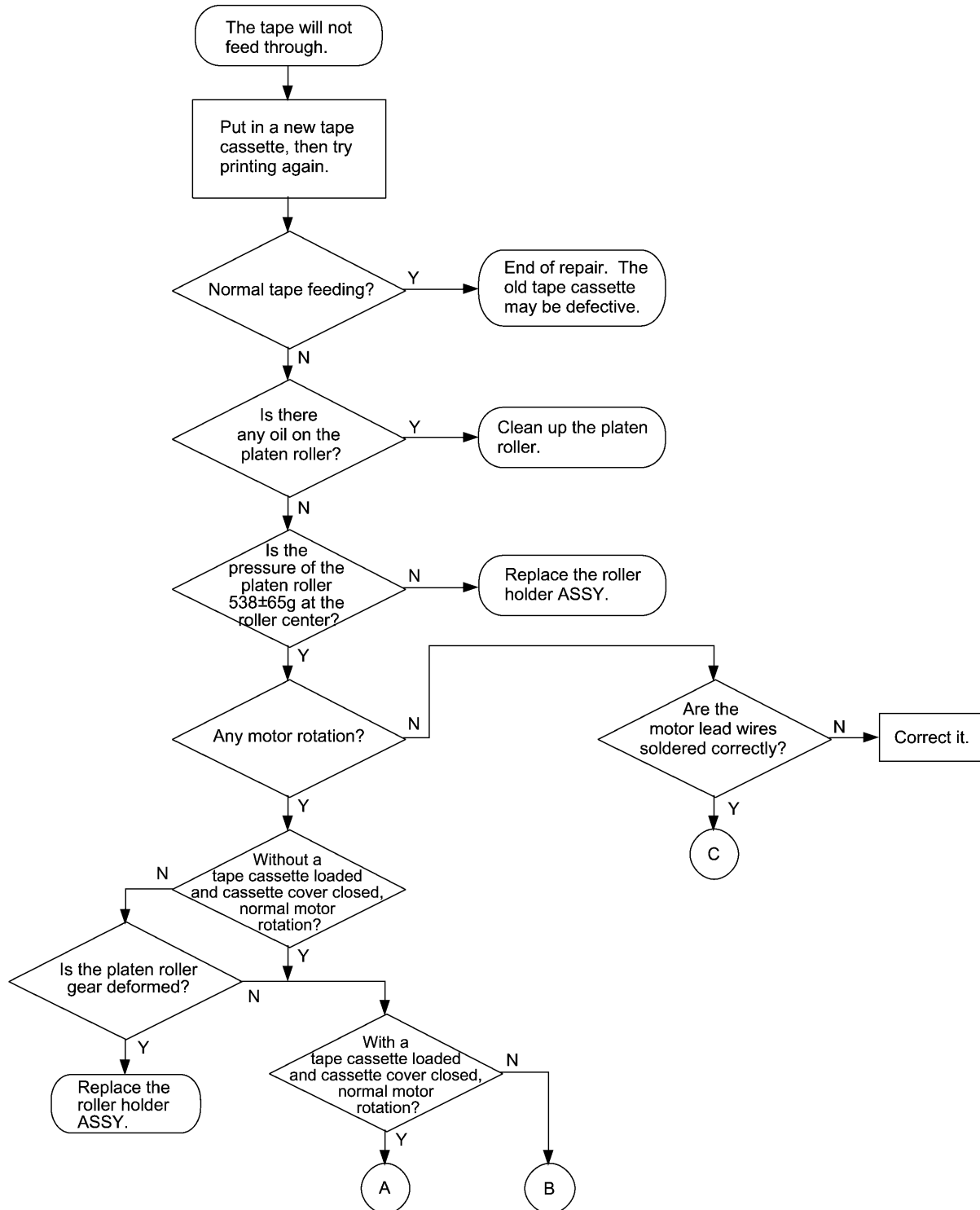
- (1) Get a good idea of what the trouble is. Whenever more than one trouble source is found, plan the most reasonable repairing procedure after reviewing the relationship between them.
- (2) When supplying power to this machine having problems with either a set of batteries or the AC line adapter, make sure that its output voltage level is 8 to 10V under no load.
- (3) When using a circuit tester for testing the conductivity, remove all of the batteries (and disconnect the AC line adapter) from this machine.
- (4) To repair an error which occurred in the thermal print head and its related sections, disconnect the thermal head cable until repairs are finished.

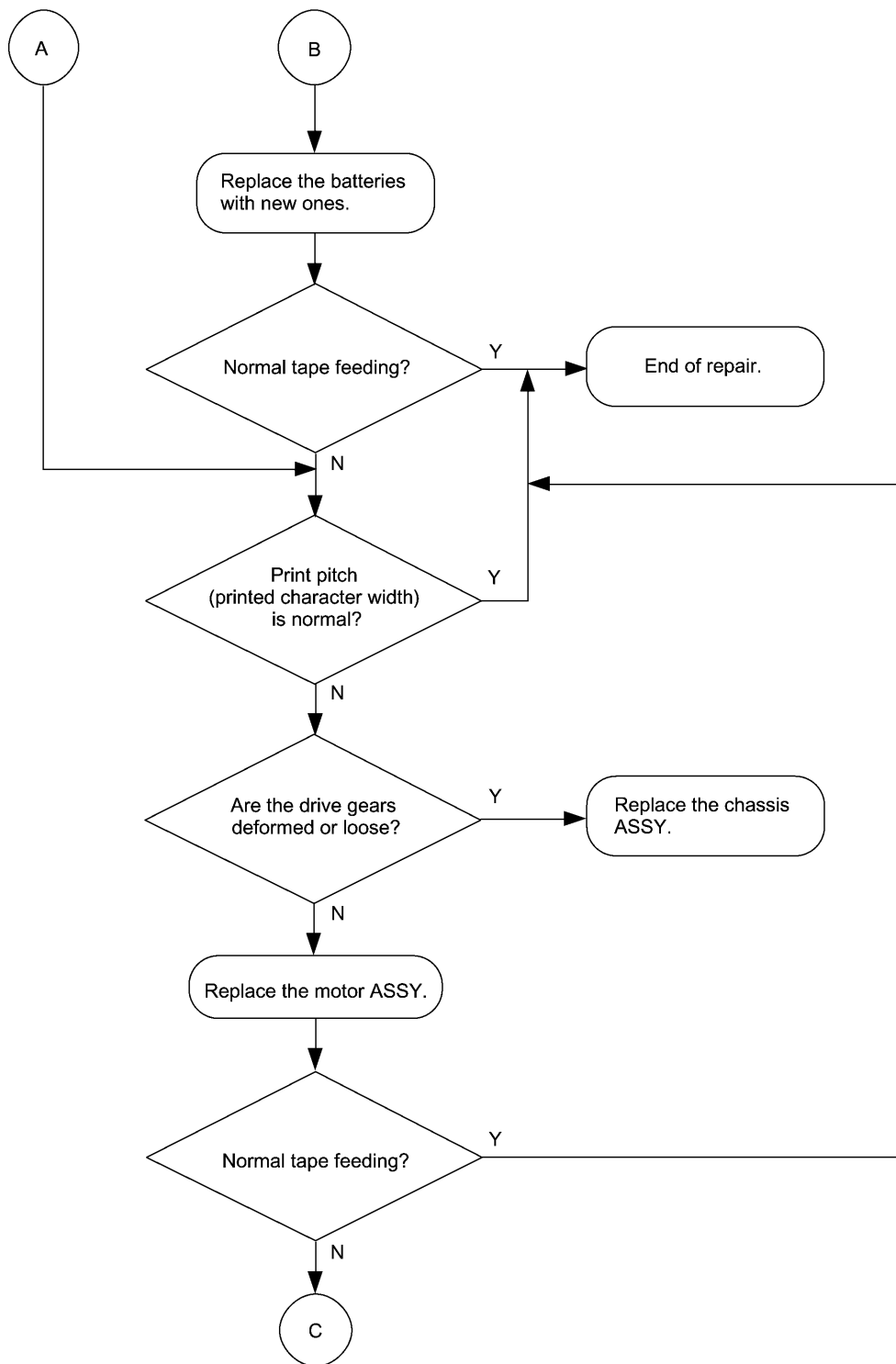
4.1.2 After Repairing

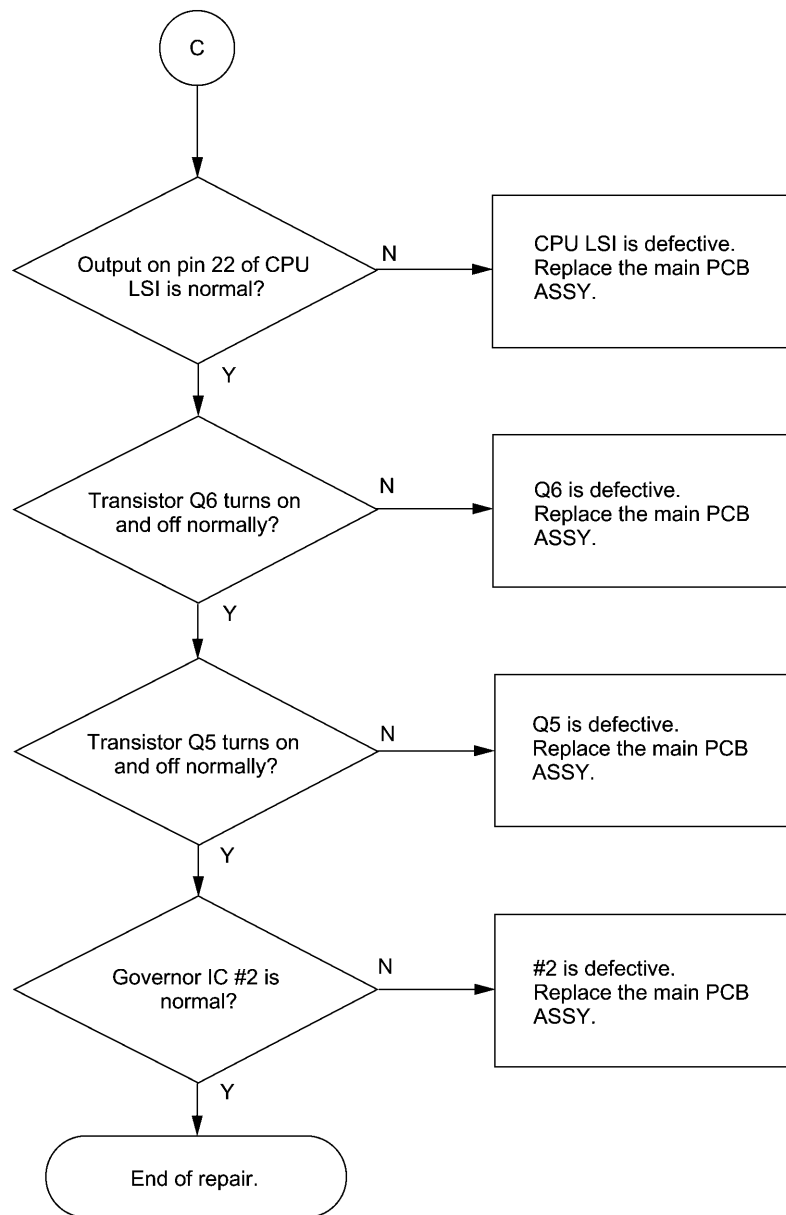
After repairing the defective section, be sure to check again to see if the repaired section works correctly. Also make a note of the troubleshooting procedure so that it will be handy should problems occur in the future.

4.1.3 Troubleshooting Flows

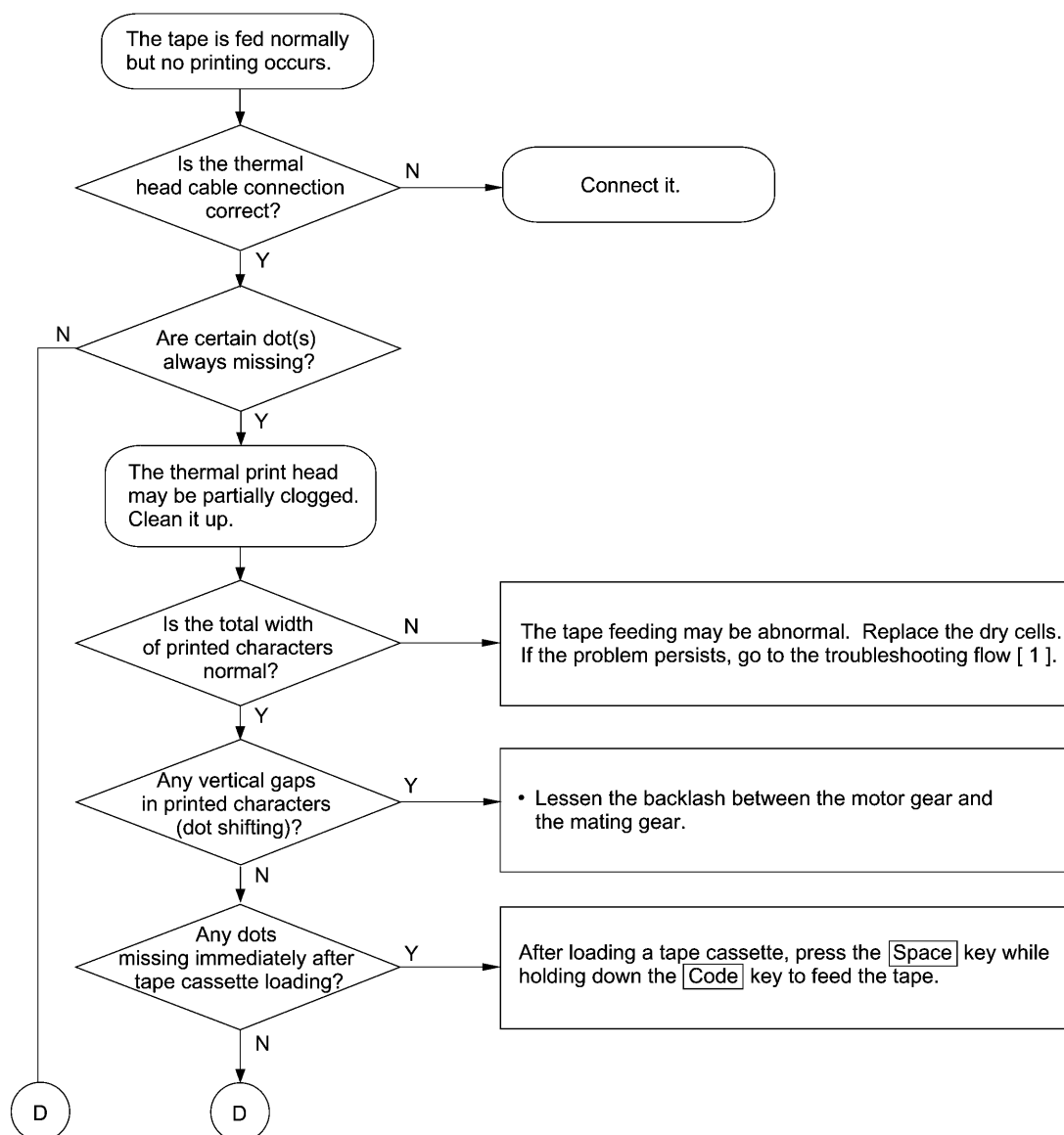
[1] Tape feeding failure

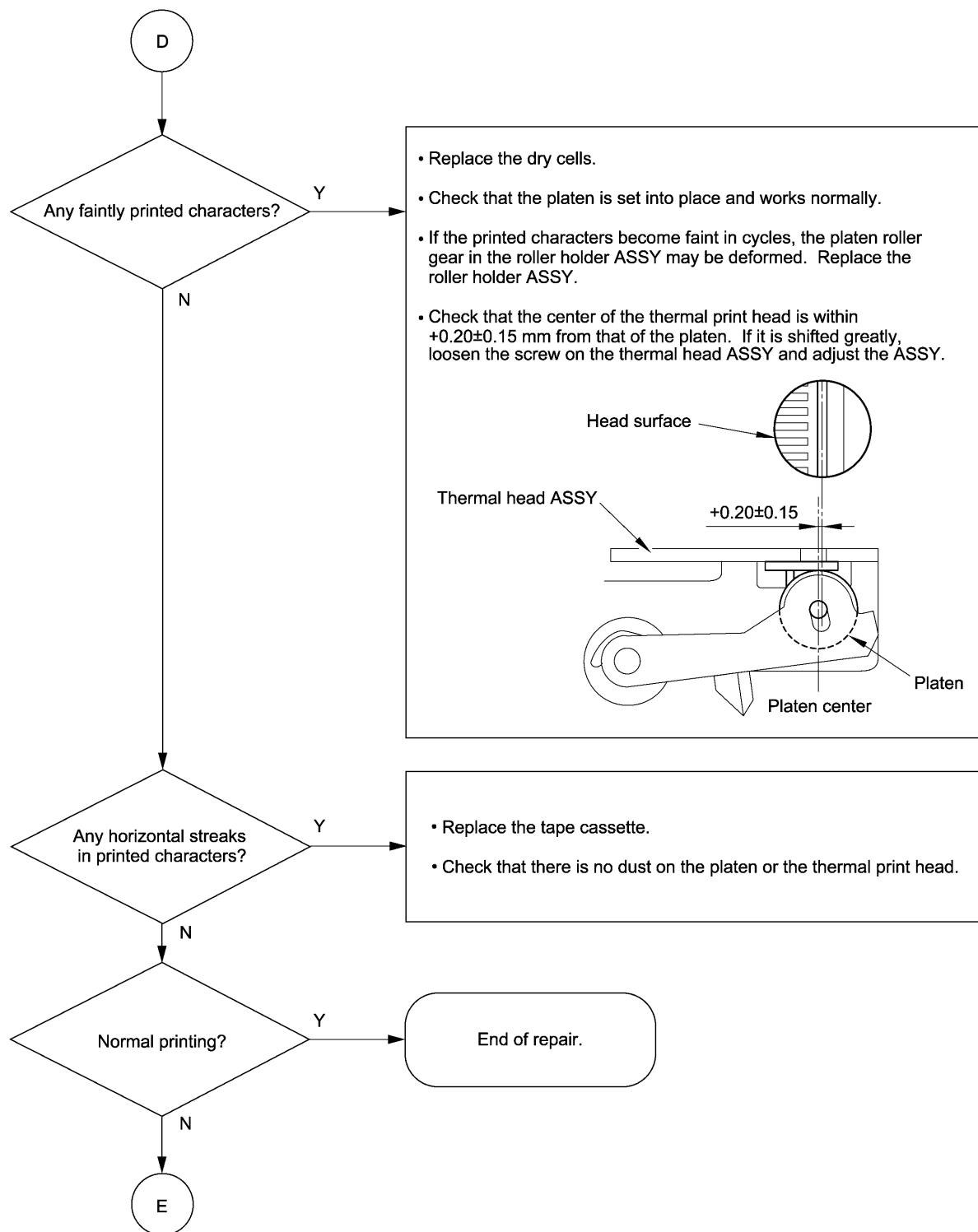


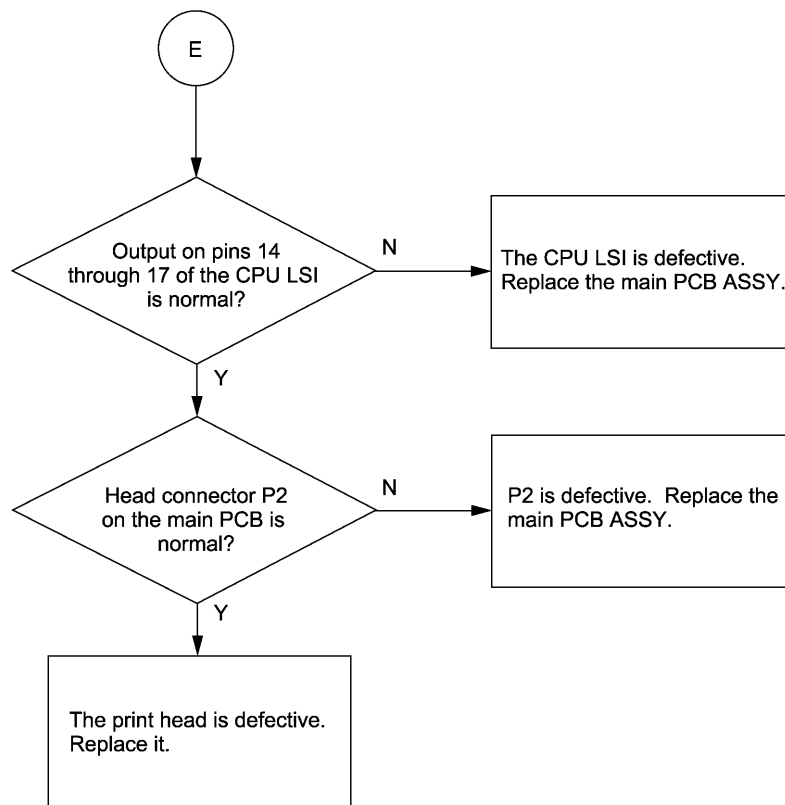




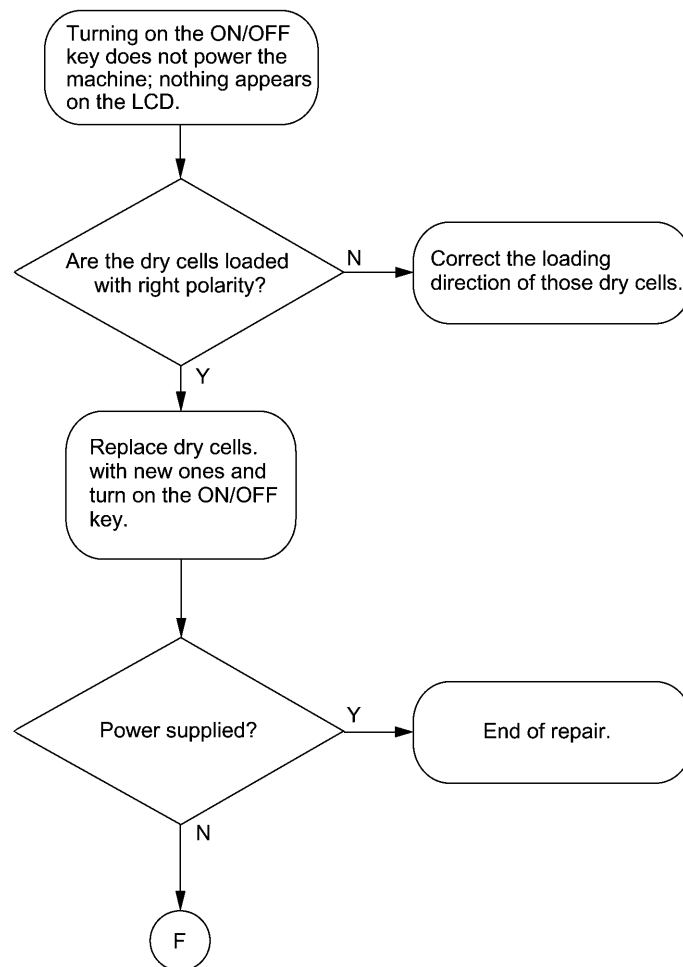
[2] Printing failure

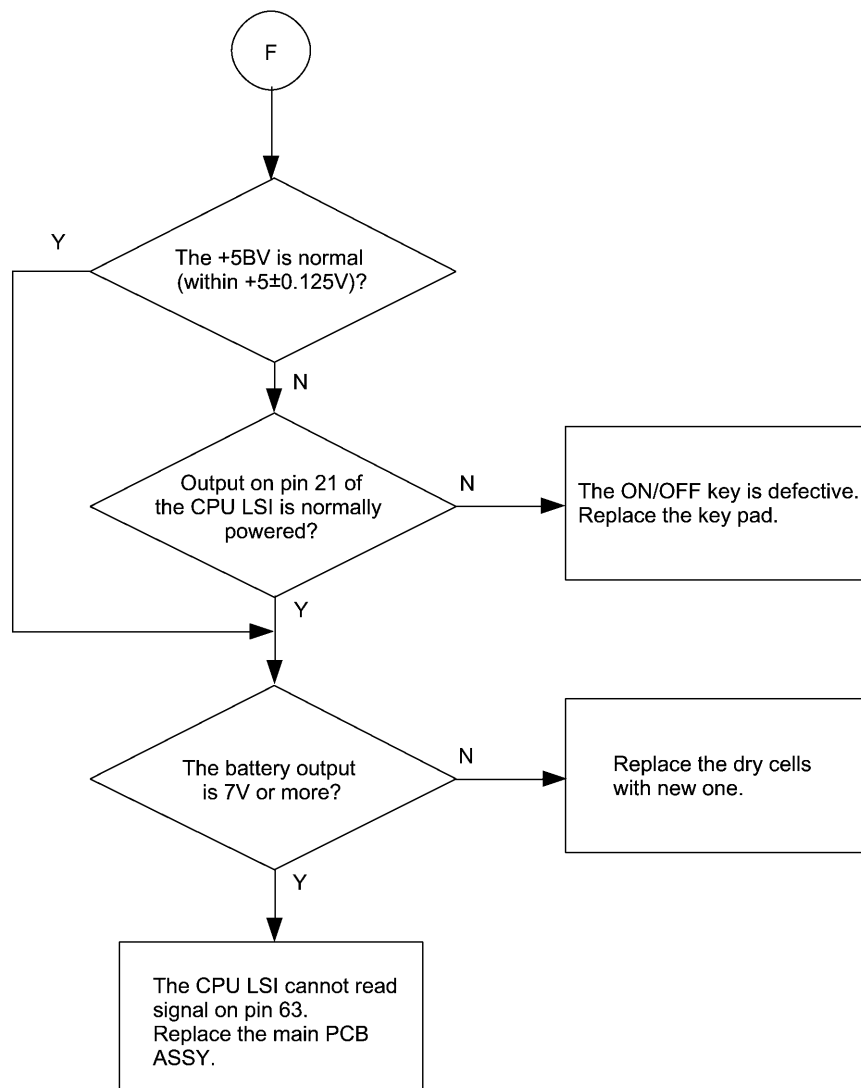




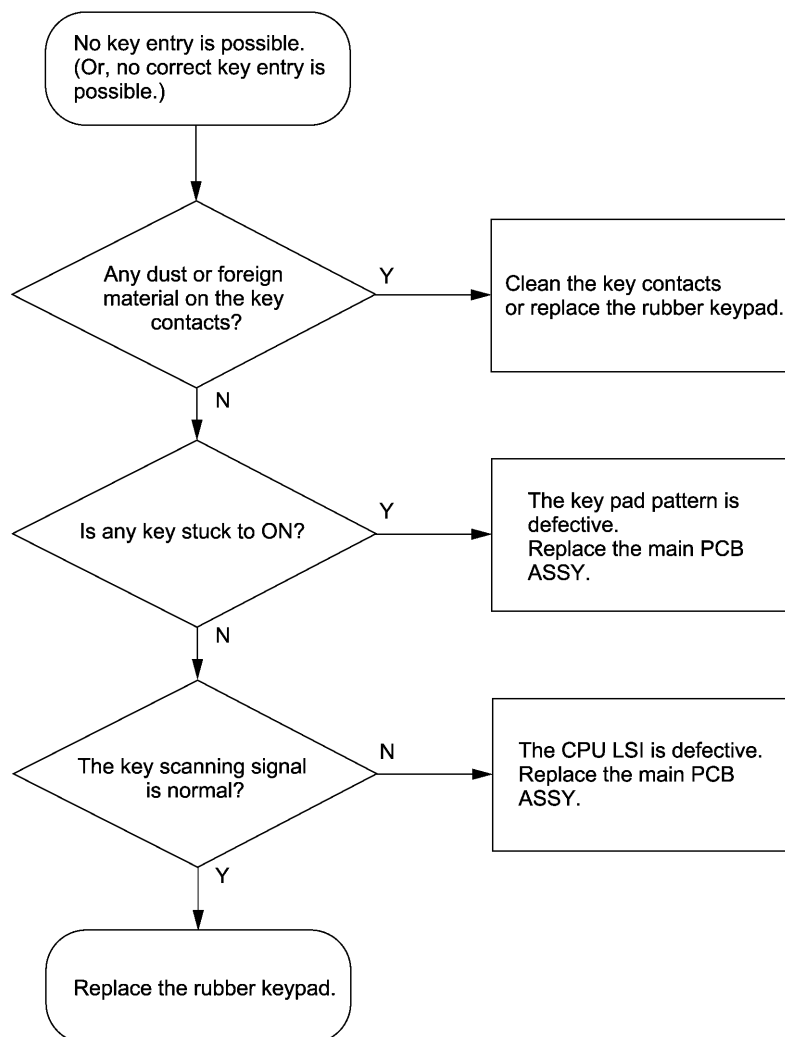


[3] Powering failure (Nothing appears on the LCD.)

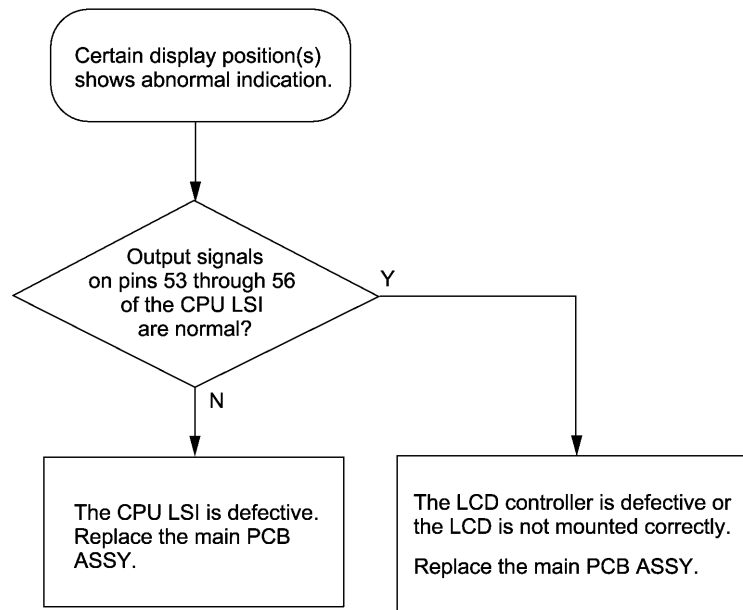




[4] No key entry possible



[5] Abnormal LCD indication



APPENDICES

Circuit Diagrams

A: Main PCB

B: Sub PCB (for P-touch 65 and P-touch One only)

The diagram illustrates the main PCB circuit for the LA3765000, featuring a power supply section, a microcontroller (MN101C30A), memory (ROM 32Kbyte, RAM 1536byte), an LCD (UTS-G535AY), and a keyboard. The circuit is designed for multiple languages, including US, European (UK, FR, GE, BE), and others.

Power Supply: The power supply section includes a battery connection (POWER +, POWER -) and a sub-PCB section (SUB PCB) with a ±0V, VBT, and AC SEN input. The power supply is regulated by a 5.6K (1%) resistor (R10) and a 4.3K (1%) resistor (R9), with a 10V output. The power supply is connected to the microcontroller (MN101C30A) and the LCD.

Microcontroller (MN101C30A): The microcontroller is the central component, with various pins connected to the power supply, memory, LCD, and keyboard. The microcontroller is labeled #1 and has a ROM of 32Kbyte and RAM of 1536byte.

Memory: The memory section includes a ROM (32Kbyte) and RAM (1536byte), connected to the microcontroller.

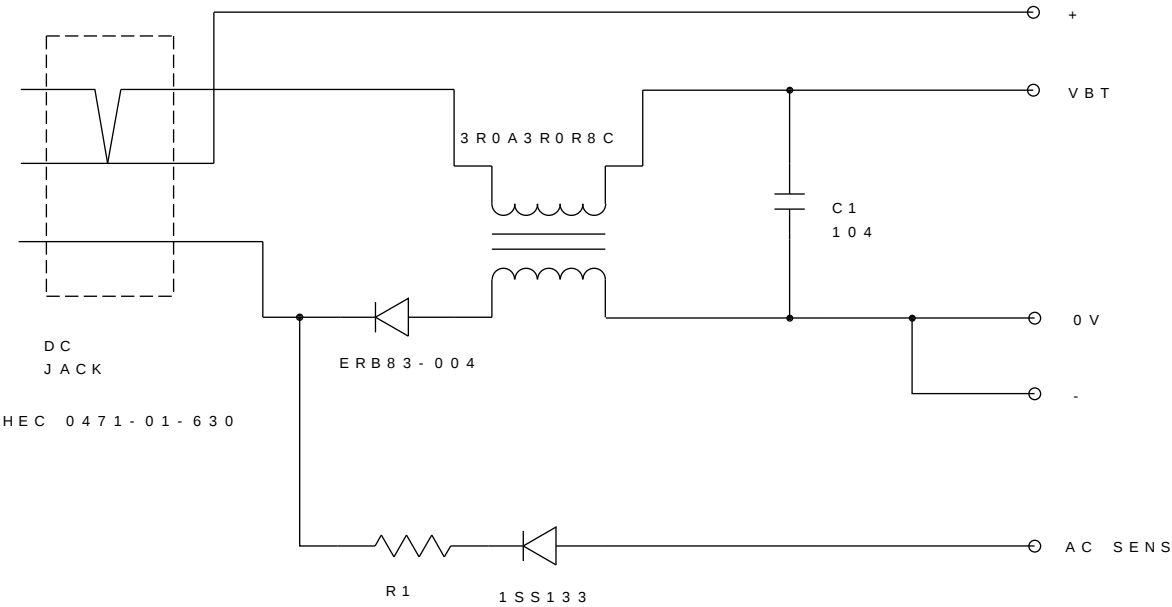
LCD (UTS-G535AY): The LCD is connected to the microcontroller via a 3-pin connector (COM1, COM2, COM3) and a 4-pin connector (COM4, COM5, COM6, COM7). The LCD is labeled #3 and has a 91K±2% (82K) resistor (R19) connected to its COM1 pin.

Keyboard: The keyboard is connected to the microcontroller via a 17-pin connector (K10, K11, K12, K13, K14, K15, K16, K17). The keyboard is labeled #2 and has a 220Ω resistor (R20) connected to its K10 pin.

Language Selection: The diagram includes language selection tables for US, UK, BE, GE, and FR. These tables map the keyboard keys to the microcontroller pins (K10, K11, K12, K13, K14, K15, K16, K17).

Other Components: The circuit includes various passive components such as resistors (R1, R2, R3, R4, R5, R6, R7, R8, R9, R10, R11, R12, R13, R14, R15, R16, R17, R18, R19, R20, R21, R22, R23, R24, R25, R26, R27, R28, R29, R30, R31, R32, R33, R34, R35, R36, R37, R38, R39, R40, R41, R42, R43, R44, R45, R46, R47, R48, R49, R50, R51, R52, R53, R54, R55, R56, R57, R58, R59, R60, R61, R62, R63, R64, R65, R66, R67, R68, R69, R70, R71, R72, R73, R74, R75, R76, R77, R78, R79, R80, R81, R82, R83, R84, R85, R86, R87, R88, R89, R90, R91, R92, R93, R94, R95, R96, R97, R98, R99, R100), capacitors (C1, C2, C3, C4, C5, C6, C7, C8, C9, C10, C11, C12, C13, C14, C15, C16, C17, C18, C19, C20, C21, C22, C23, C24, C25, C26, C27, C28, C29, C30, C31, C32, C33, C34, C35, C36, C37, C38, C39, C40, C41, C42, C43, C44, C45, C46, C47, C48, C49, C50, C51, C52, C53, C54, C55, C56, C57, C58, C59, C60, C61, C62, C63, C64, C65, C66, C67, C68, C69, C70, C71, C72, C73, C74, C75, C76, C77, C78, C79, C80, C81, C82, C83, C84, C85, C86, C87, C88, C89, C90, C91, C92, C93, C94, C95, C96, C97, C98, C99, C100), and transistors (Q1, Q2, Q3, Q4, Q5, Q6, Q7, Q8, Q9, Q10, Q11, Q12, Q13, Q14, Q15, Q16, Q17, Q18, Q19, Q20, Q21, Q22, Q23, Q24, Q25, Q26, Q27, Q28, Q29, Q30, Q31, Q32, Q33, Q34, Q35, Q36, Q37, Q38, Q39, Q40, Q41, Q42, Q43, Q44, Q45, Q46, Q47, Q48, Q49, Q50, Q51, Q52, Q53, Q54, Q55, Q56, Q57, Q58, Q59, Q60, Q61, Q62, Q63, Q64, Q65, Q66, Q67, Q68, Q69, Q70, Q71, Q72, Q73, Q74, Q75, Q76, Q77, Q78, Q79, Q80, Q81, Q82, Q83, Q84, Q85, Q86, Q87, Q88, Q89, Q90, Q91, Q92, Q93, Q94, Q95, Q96, Q97, Q98, Q99, Q100).

Appendix B. Sub PCB



NAME	SUB PCB CIRCUIT DIAGRAM PT65
CODE	LA3766000

brother®

May, 2000
8V2008BE0
Printed in Japan