TEC

TEC Bar Code Printer

B-443

Service Manual

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TOSHIBA TEC CORPORATION

B-443 Bar Code Printer
Service Manual

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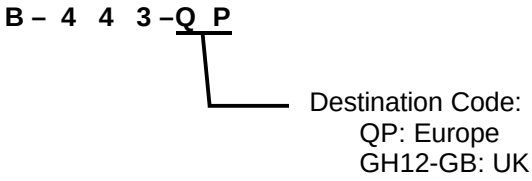
1. FUNDAMENTALS ABOUT THE SYSTEM

1.1 Features of the B-443

1. B-443 bar code printer prints bar codes, characters, logos, on various types of labels and tickets by direct thermal or thermal transfer printing.
2 B-443 adopts a "BASIC-like" high level programming language to help users programme the desired label forms with ease.
3. B-443 bar code printer can be connected to personal computer or optional LCD keyboard to execute the programs downloaded in the printer' s memory. The printer is equipped with the following standard devices: black mark sensor, peel off module and real time clock
4. B-443 bar code printer provides a selection of optional features, including cutter module, memory module, portable LCD keyboard, etc.
5. User friendly label design package software is bundled with B-443.

1.2 Model Naming Syntax



1.3 Overview

1.3.1 Front View

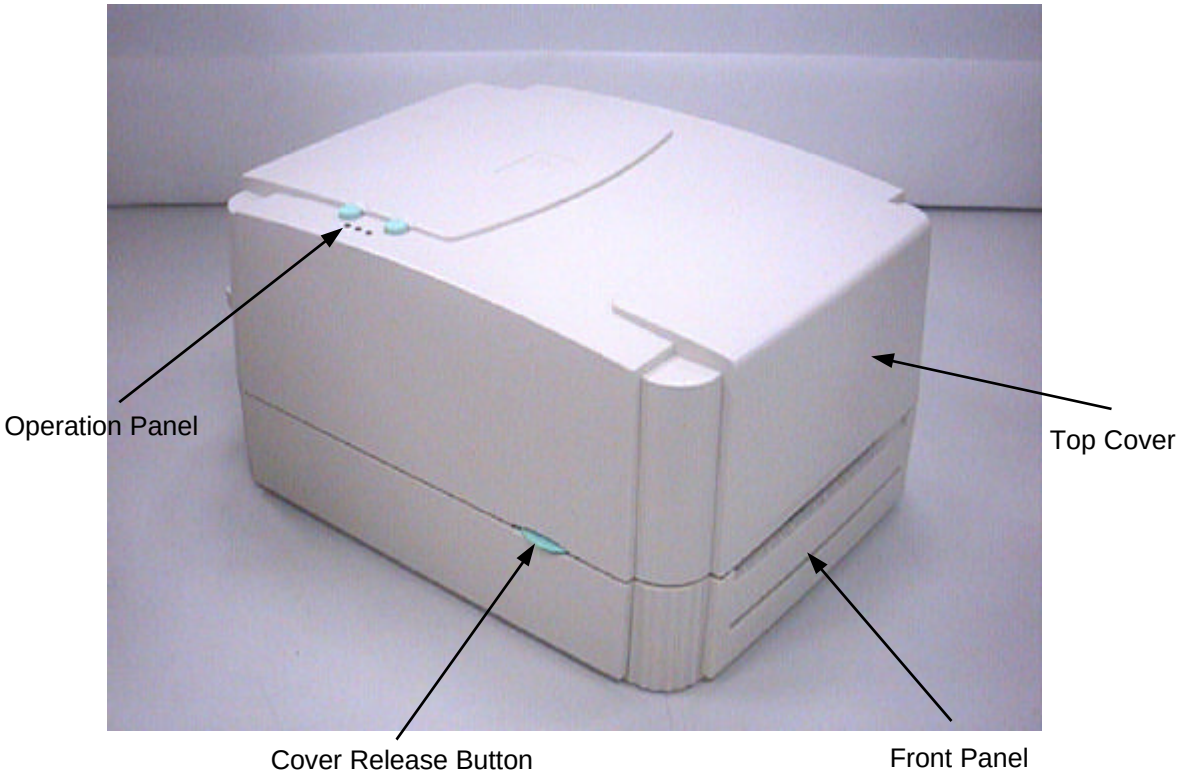


Fig. 1.1 Front View of B-443

1.3.2 Rear View

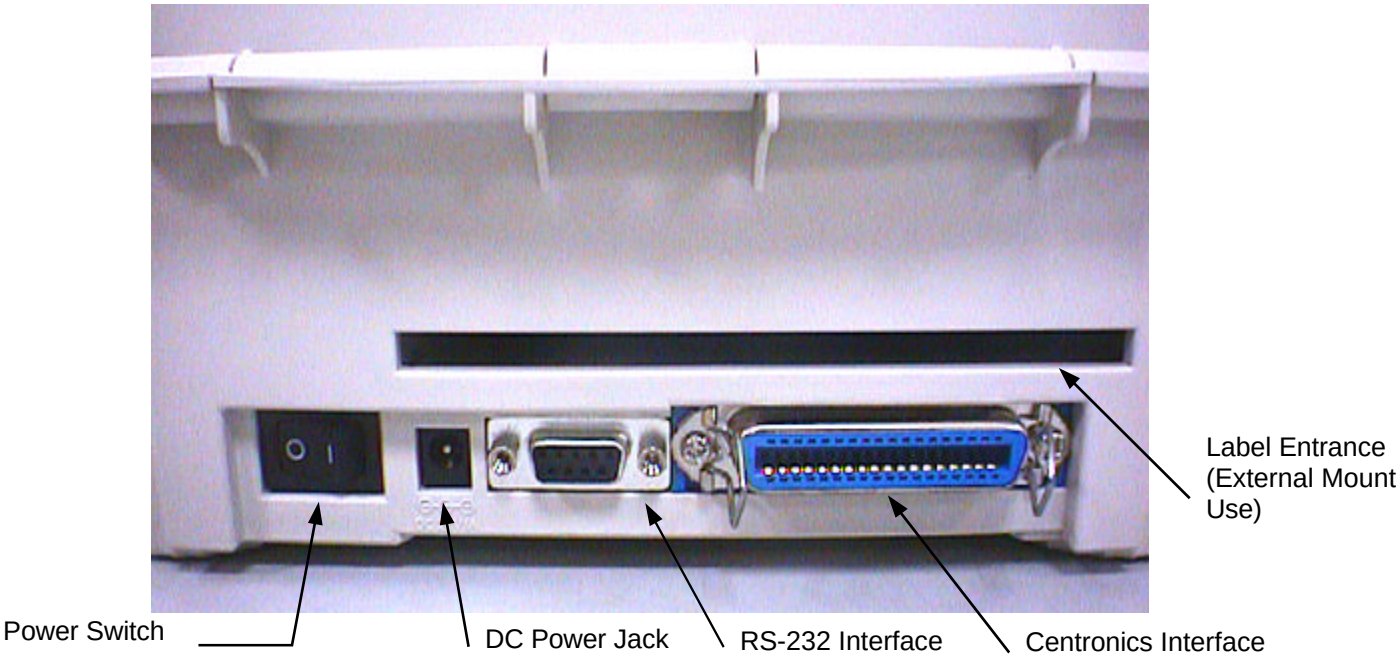


Fig. 1.2 Rear view of B-443

1.4 Basic Specifications

- Thermal transfer and direct thermal printing
- High dot density printing (203 dots/inch)
- Selectable print speeds at 1.5", 2.0" or 3.0" per second
- Supports parallel and serial interface
- Maximum media width up to 4.4" (114 mm)
- Adjustable label edge guide
- International character sets
- Print area is 4.09"W x 90"L (without any file downloaded in the printer memory)
- User selectable bar code ratios and heights
- Prints on labels or tickets
- Equipped with black mark sensor
- Equipped with Real Time Clock
- Comes with self-peeling function
- Buzzer provided to warn of possible errors
- Label stock and thermal transfer ribbon easy to install
- Internal label print counter
- Self test and hex dump mode
- Downloadable fonts from label design software

Electronics/Communication Specifications

- Electrical

CPU: MITSUBISHI M37720S1BFP

TPH: ROHM 4" KF-2004-GC17B

Stepping Motor: Mitsumi

DC Motor: DC24V

Memory:

-- DRAM: MOSEL 2 Mb.

-- Flash: ATMEL 1 Mb

Adapter 100~240VAC ± 10%, 50~60Hz

Regulations: CE, TÜV-GS

- Communications Interface:

Serial port: RS-232C (DB-9) at 2400, 4800, 9600 or 19200 baud rate

-- Word Length: 7 or 8 data bits, 1 or 2 stop bits, selectable parity

-- Handshaking: XON/XOFF and DSR/DTR

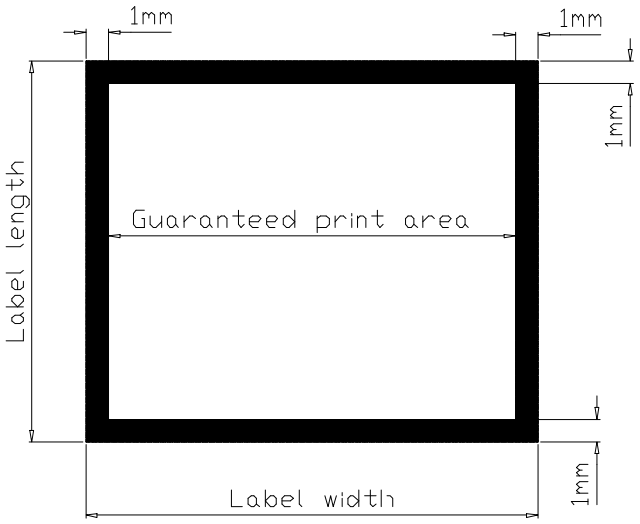
Parallel port: Standard parallel interface

Input Buffer: 60KB

- RS-232 Interface Pin Configuration:

Host Function	9 Pin	25 Pin		9 Pin	Printer Function
				1	+5V
RxD	2	3	←	2	TxD
TxD	3	2	→	3	RxD
DTR	4	20	→	4	DSR
GND	5	7		5	GND
DSR	6	6	→	6	RDY
RTS	7	4	←	7	N/C
CTS	8	5	←	8	RDY
				9	+5V

1.5 Effective Print Area



Label/Ticket Length	12mm~2286mm
Effective Print Length	10mm~2284mm
Label/Ticket Width	25mm~103mm
Effective Print Width	23mm~101mm
No Print Area	1mm

1.6 Available Bar Codes

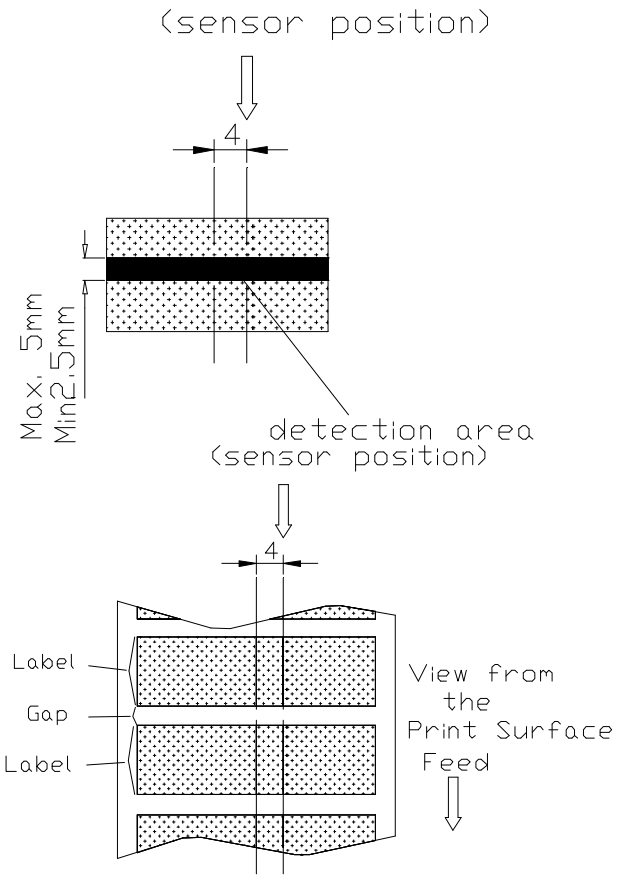
- Code 39
- Code 93
- Code 128 UCC
- Code 128, Subsets A, B, and C
- Codabar
- Interleaved 2 of 5
- EAN-8, EAN-13, EAN-128
- UPC-A, UPC-E
- EAN and UPC with 2 or 5 digits add-on
- UPC Shipping container code
- Postnet
- Maxicode
- PDF-417
- DataMatrix

1.7 Various Sensors

(1) Feed Gap Sensor
The feed gap sensor detects label gap to locate the starting print position of the next label. The sensor is mounted 4 mm off the center line of the main mechanism.

.

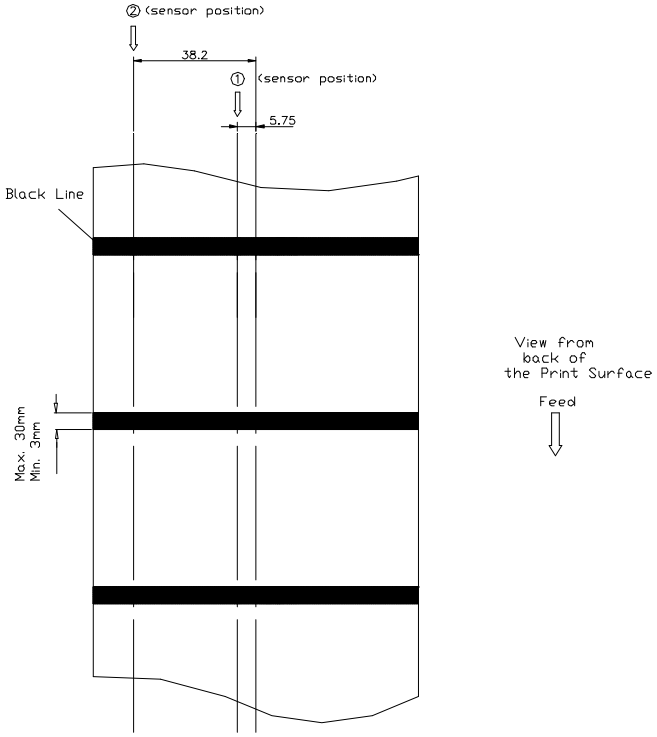
■ In case of Label



(2) Black Mark Sensor
The black mark sensor locates the position of label by emitting infrared rays onto the black mark at the back of the ticket. The sensor is mounted 5.75 mm off the center line of the ticket roll width on the mechanism.

■ In case of Ticket

The default sensor position is (1) as shown in the figure below. To change to the (2) position, the customer should notify the manufacturer in advance. There can be only one position for the sensor. Once the sensor position is agreed upon, it can not be changed afterwards.



(3) Ribbon End Sensor
The sensor detects the end portion of the ribbon. The ribbon end must be transparent.

(4) Label End Sensor
The sensor detects the end portion of the label.

(5) Peel off Sensor
The sensor detects the backing paper of a label.

(6) Ribbon encoder
The encoder is used to detect if the ribbon is broken.

2. SUPPLY SPECIFICATIONS

2.1 Types of Paper

Two types of media are available for B-443: label and ticket.

In B-443, there are two types of sensors for paper: gap sensor and black mark sensor.

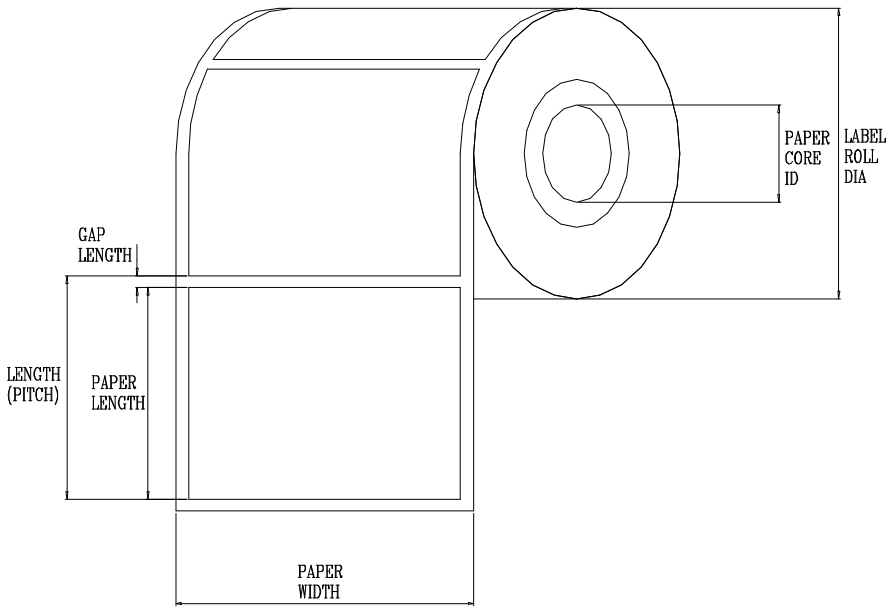
Label and ticket can be further classified into direct thermal type or thermal transfer type.

2.2 Specifications

Items	Label
Paper Width	Max.114mm
	Min. 25mm
Length (Pitch)	12 ~ 2286mm
Thickness	0.20 mm
Max. Roll Diameter (1" core)	Inner roll diameter. Max 4.3" (110mm) External roll diameter. Max 8.4" (214mm)
Roll Up Method	Print surface wound outside as standard
Paper Core ID.	ϕ25.7 $\pm$ 0.3mm

Note:

(1). The width and thickness quoted above are said of the label plus its backing paper.
(2). Likewise, the approval of label entails that of its backing paper.
(3). In the peel off mode, the minimum pitch is 35mm.
(4). In the cutter mode, it is required the paper be wound outside. Otherwise, paper jam tends to result.
(5). In the cutter mode, the paper thickness is 0.2 mm at maximum, and the paper weight is 100 g/m^2 at maximum.
(6). Paper shape is as shown on next page.
(7) Tag is 0.2mm in thickness, and is less than 240g/m^2 in weight.



2.3 Approved labels

- Plain paper
- Ricoh 130LAB thermal label
- Flexcon 31800 PVC label
- Flexcon 22830 Polyester label.

2.4 Ribbon Sizes and Shapes

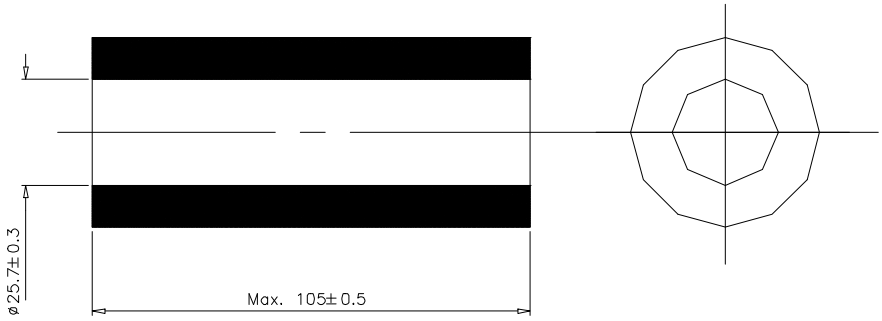
Item	Specifications
Ribbon shape	Spool type
Ribbon width	Max. 110mm
	Min. 40mm
Ribbon winding width	Max. 110mm
	Min. 40mm
Leading tape	Polyester film, 335±5mm long
End tape	Polyester film (transparent), 250±5mm long
Max. ribbon OD.	ϕ67mm
Winding method	Ink surface to be wound outside

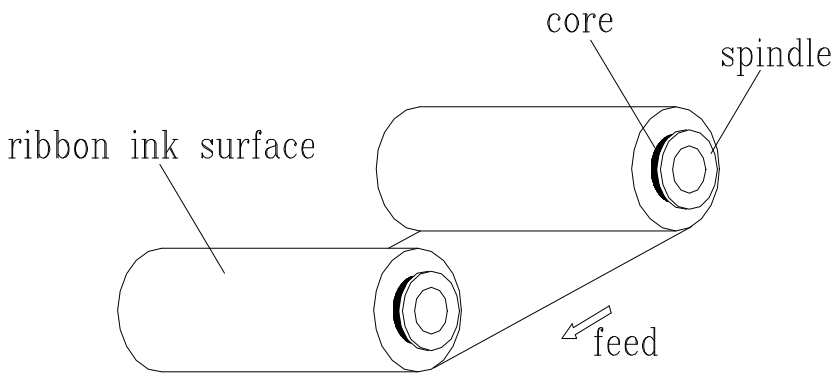
Note: The maximum length of ribbon depends on its thickness and core outside diameter.

The formula below defines the correlation between ribbon roll length and ribbon core diameter.

$$L = \frac{(D^2 - d^2) \times p}{4t}$$ where ,

L = Ribbon length
D = Max. roll diameter
d = Ribbon core outside diameter
t = Ribbon thickness





2.5 Approved Ribbons

The following ribbons appoved should be used.
The manufacturer ink name of the ribbon must not be revealed, and handled carefully.

Item Code	Manufacturer Ink Name	e
BR-30**A4N *1	AWR-470	ARMOR
BR-30**R1	B-110A	RICOH
BR-30**R2	B-110C	RICOH
BR-30**S2N	TR4085	Sony Chemical
BR-30**S4P *2	TR4065	Sony Chemical
BR-30**S3S	TR4070	Sony Chamical

The asterisk (*) in the above table indicates a number corresponding to the ribbon width.
*1:This cannot be used when a serial bar code is printed, and print density should be lower at 40 degree.
*2:This cannot be used when a serial bar code is printed at 3 inch per sec.

Note: The ribbon end must be transparent for B-443.

2.6 Detail test data

(1). SONY TR-4085, Plain paper, Static Electricity Max. 0.4 KV
Speed 1.5, Density 2~11
Speed 2.0, Density 4~12
Speed 3.0, Density 4~15

(2). FujiCopian FBR TTM-84, Plain paper, Static Electricity Max. 0.5 KV
Speed 1.5, Density 0~4
Speed 2.0, Density 4~7
Speed 3.0, Density 7~15

(3). RICOH B-110A, Plain paper, Static Electricity Max. 0.6 KV
Speed 1.5, Density 2~15
Speed 2.0, Density 4~15
Speed 3.0, Density 7~15

(4). SONY TR-4070, Flexcon 31800 PVC label, Static Electricity Max.0.6 KV
Speed 1.5, Density 8~15
Speed 2.0, Density 9~15
Speed 3.0, Density N/A

(5). RICOH B-110C Flexcon 31800 PVC label, Static Electricity Max.0.9 KV
Speed 1.5, Density 6~15
Speed 2.0, Density 7~15
Speed 3.0, Density N/A

(6). SONY TR-4070, Flexcon 22830 (SPS-007) Polyester label, Static Electricity Max.0.6 KV
Speed 1.5, Density 10~15
Speed 2.0, Density 13~15
Speed 3.0, Density N/A

(7). RICOH B-110C Flexcon 22830 (SPS-007) Polyester label, Static Electricity Max.0.9 KV
Speed 1.5, Density 9~15
Speed 2.0, Density 11~15
Speed 3.0, Density N/A

(8). RICOH 130LAB thermal paper
Speed 1.5, Density 8~15
Speed 2.0, Density 10~15
Speed 3.0, Density 13~15

3. ELECTRONICS

3.1 Circuit Description

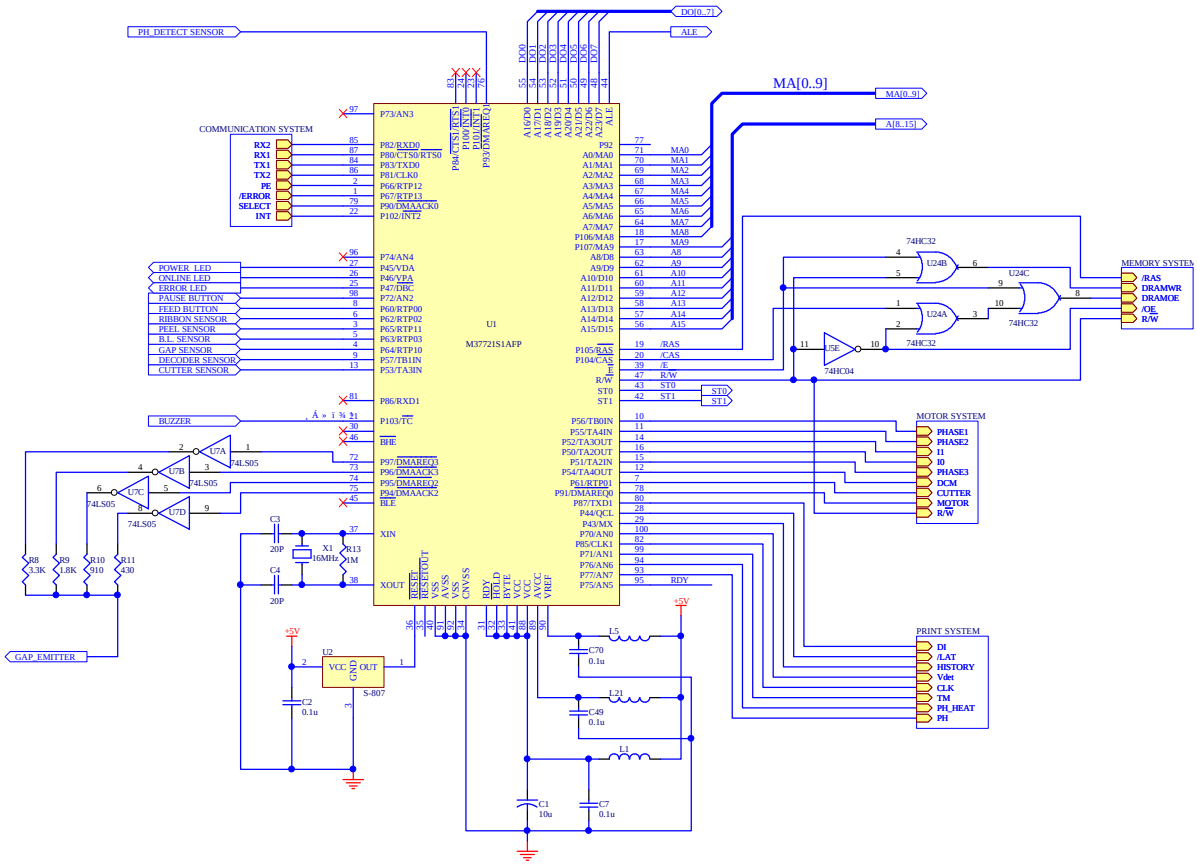


Fig. 3.1 MCU Circuit Diagram

The above is the MCU circuit diagram.

The main board of B-443 consists of five system blocks:
A. Memory System (decoder & memory block)
B. Motor System (stepping motor, DC motor and cutter block)
C. Print head System
D. Communication System (serial & parallel port block)
E. Power System

The figure below shows the PCB system area.

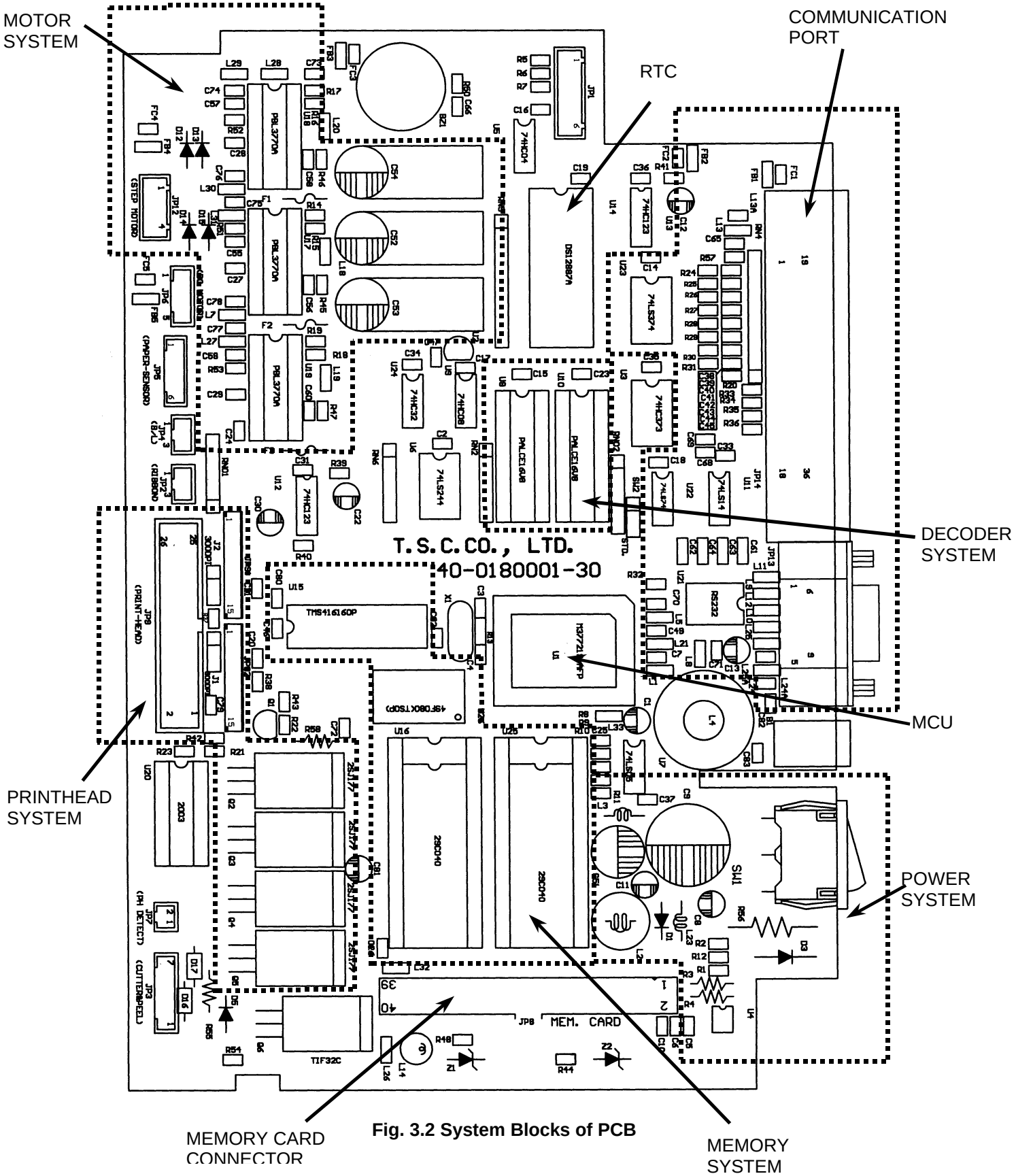


Fig. 3.2 System Blocks of PCB

3.2 MCU Pin Description

Pin	Name	Input/Output	Function
Vcc, Vss	Power supply		Supply 5V±10% to Vcc and 0V to Vss.
CNVss	CNVss input	Input	This pin controls the processor mode. Connected to Vss for single-chip mode, to Vcc for external ROM types.
/RESET	Reset input	Input	To enter the reset state, this pin must be kept at "L" condition, and maintained so for the required time.
X_{IN}	Clock input	Input	These are I/O pins of internal clock generating circuit. Connect a ceramic or quartz crystal resonator between X_{IN} and X_{OUT}. When an external clock is used, the clock source should be connected to the X_{IN} pin, and the X_{OUT} pin should be left open.
X_{OUT}	Clock output	Output	
/E	Enable output	Output	Data/instruction read and data write are performed when output from this pin is "L".
BYTE	Bus width selection input	Input	In memory expansion mode or microprocessor mode, this pin determines whether the external data bus is of 8-bit width or 16-bit width. The width is 16 bits for "L" signal input and 8 bits for "H" signal input.
/HOLD	/HOLD input pin	Input	This is an input pin for the /HOLD request signal.
/RDY	/RDY input pin	Input	This is an input pin for the /RDY signal.
φ1	Clock φ1 output	Output	This is the φ1 output pin, which is equal to the clock X_{IN} pin divided by 2.
ST0, ST1	Status signal output pin	Output	The bus use status output is generated in 2-bit code STO ST1 Refresh 0 0 Hold 0 1 DMA 1 0 CPU 1 1
AVcc, AVss	Analog supply input		Power supply for the A-D converter. Connect AV_{CC} and AV_{SS} to V_{SS} externally.
V_{REF}	Reference voltage input	Input	This is reference voltage input pin for the A-D converter.
A0/MA0~ A7/MA7	Address low-order/DRAM address	Output	This is an output pin for the 8 low-order bits of addresses. When the DRAM is to be accessed, the row and column addresses are generated by means of time division multiplexing.

A8/D8~ A15/D15	Address medium-order/ data high-order	I/O	When the BYTE pin is set to "L" in memory expansion mode or microprocessor mode and external data bus is 16-bit width, high-order data (D15~D8) is input or output when /E output is "L" and an address (A15~A8) is output when /E output is "H". If the BYTE pin is "H" that is an external data bus is 8-bit width, only address (A15~A8) is output.
A16/D0~ A23/D7	Address high-order/data low-order	I/O	In memory expansion mode or microprocessor mode low-order data (D7~D0) is input or output when /E output is "L" and an address (A23~A16) is output when /E output is "H".
R/W, /BHE ALE, /BHE	Memory Control signal output	Output	These are R/W, /BHE, ALE, and /BLE output pins.
$P4_0$~$P4_7$	I/O port P4	I/O	This port is provided 5-bit I/O. As it has an I/O register, it is possible to perform programming to determine whether each bit serves as an input pin or an output pin.
$P5_0$~$P5_7$	I/O port P5	I/O	This port is used for 8-bit I/O. It has basically the same function as port P4. In addition, it provides timer A2, timer A3, timer A4 with I/O pins and TimeB0, and TimeB1 with input pins.
$P6_0$~$P6_7$	I/O port P6	I/O	This port is used for 8-bit I/O. It has basically the same function as port P4. In addition, pins P60 through P63 and pins P64 through P67 are capable of functioning as a 4-bit real-time output, respectively.
$P7_0$~$P7_7$	I/O port P7	I/O	This port is used for 8-bit I/O. It has basically the same function as port P4. In addition, it provides input pins for analog inputs AN0 through AN7. Pin P77 is also used for A-D conversion start trigger input.
$P8_0$~$P8_7$	I/O port P8	I/O	This port is used for 8-bit I/O. It has basically the same function as port P4. In addition, it provides RxD, TxD, CLK, /CTS//RTS terminals for UART 0 and UART 1.
$P9_0$~$P9_7$	I/O port P9	I/O	This is an 8-bit I/O port. It has basically the same function as port P4. In addition, it provides DMA request input pin and DMA acknowledge signal output pin.
$P10_0$~$P10_7$	I/O port P10	I/O	This is an 8-bit I/O port. It has basically the same function as port P4. In addition, it provides the /INT0, /INT1, /INT2 input pins, /TC I/O pins, and /RAS, /CAS, MA8, MA9 output pin.

3.3 Reset Circuit

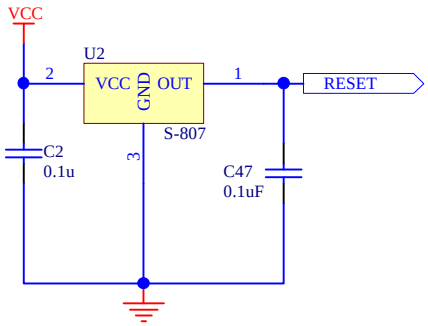


Fig. 3.3 Reset Circuit

This is the reset circuit .The 80746ALO IC outputs the system reset signal of "LOW" when the driving voltage is lower than 4.6V (Typical).

3.4 Memory System

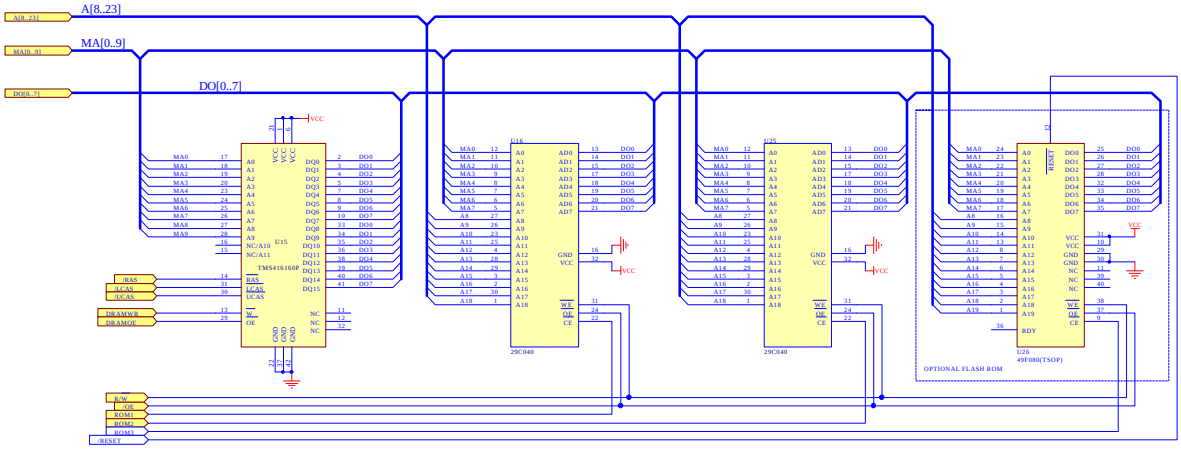
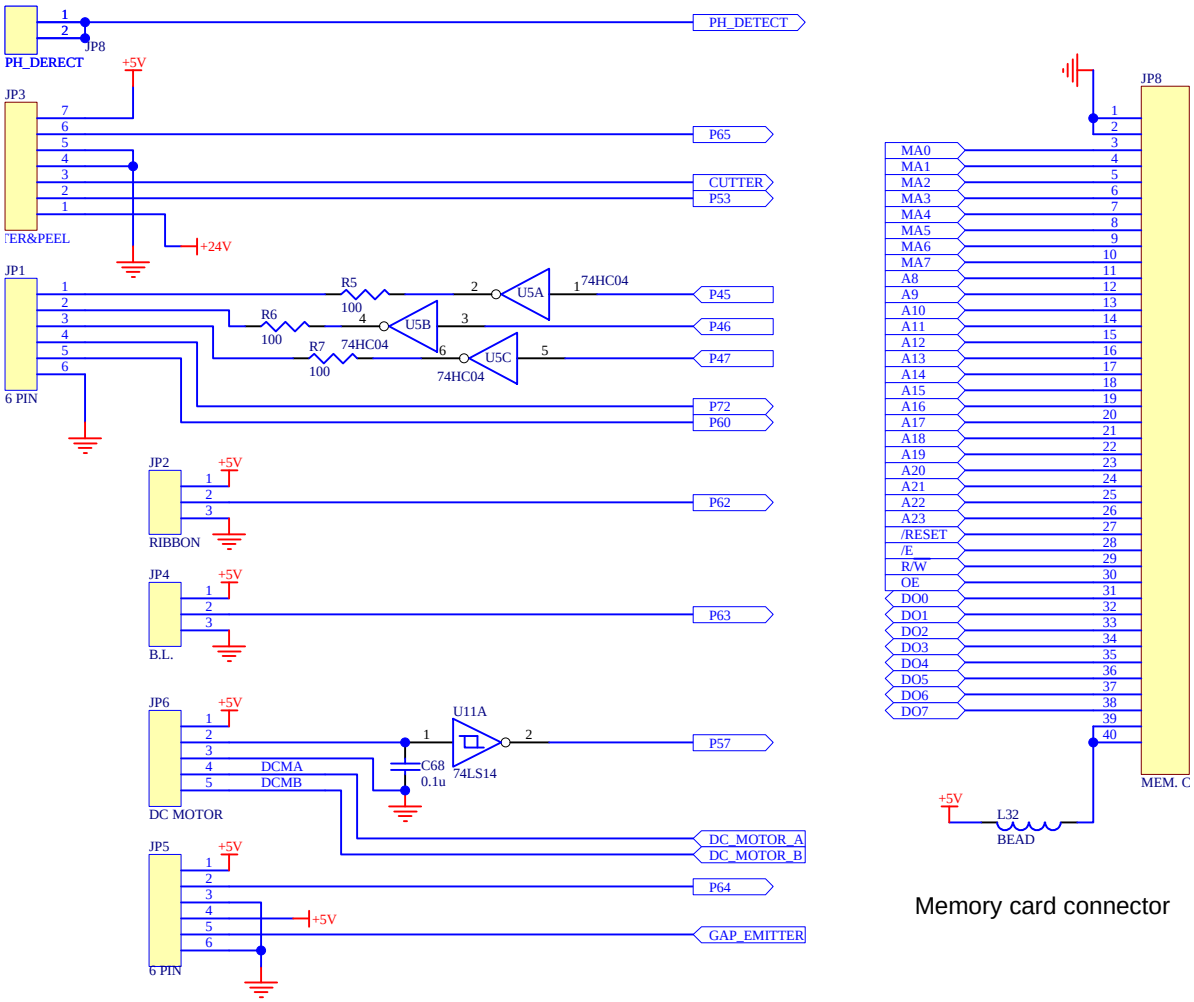


Fig. 3.4 FLASH ROMS and DRAM Diagram

This is the memory circuit. The U16&U17 type 512K Byte FLASH ROM,U26 type 1M Byte FLASH ROM and U15 type 2M Byte DRAM are used. The MCU R/W pin becomes "H" when reading Flash ROM or DRAM, and "L" when writing.

3.5 Connector Circuit Diagram



Memory card connector

Fig. 3.5 Connector Circuit Diagram

P45~P47 are output pins from MCU, which control the Power-on, Feed and Error LEDs respectively. The LED lights on when the signal is “low”, goes out when the signal is “on”.

P72: the detect pin of push button.(normally at ‘ high’ level)
P60: the detect pin of feed button. (normally at ‘ high’ level)
P65: the detect pin of the peel-off sensor. (normally at ‘ high’ level)
P62: the detect pin of the ribbon sensor. (normally at ‘ high’ level)
P63: the detect pin of the black mark sensor. (normally at ‘ high’ level)
P64: the detect pin of the gap sensor and print head micro sensor. (normally at ‘ high’ level)

P57: the detect pin of the decoder sensor. (normally at ‘ high’ level)

P53: the detect pin of the cutter sensor (check if the cutter is in right position, normally at ‘ high” level)

JP8: the connector which connects the external memory module.

CUTTER: the control pin of the CUTTER system.

DC_MOTOR_A: the control pin of the DC MOTOR system.

DC_MOTOR_B: the control pin of the DC MOTOR system.

GAP_EMITTER: the control pin of the GAP EMITTER system

PH_DETECT: the detect pin of the print head open detect sensor

3.6 Real-Time Clock Circuit

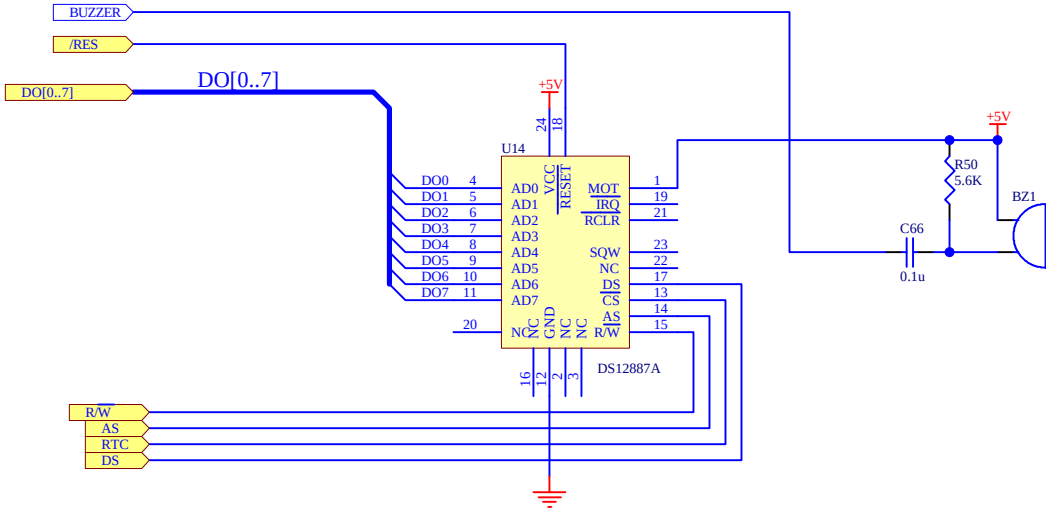


Fig. 3.6 Real-Time Clock Circuit

This is a real-time clock circuit. MCU will read the date/time and write the data when the signal of RTC is low. AS is the address strobe signal. DS is the data strobe signal. R/W decides whether MCU is in read mode or write mode. When R/W is at ‘ HIGH’ level, MCU reads data or time from RTC. When R/W is at ‘ LOW’ level, MCU writes data to RTC.

3.7 Decode Circuit

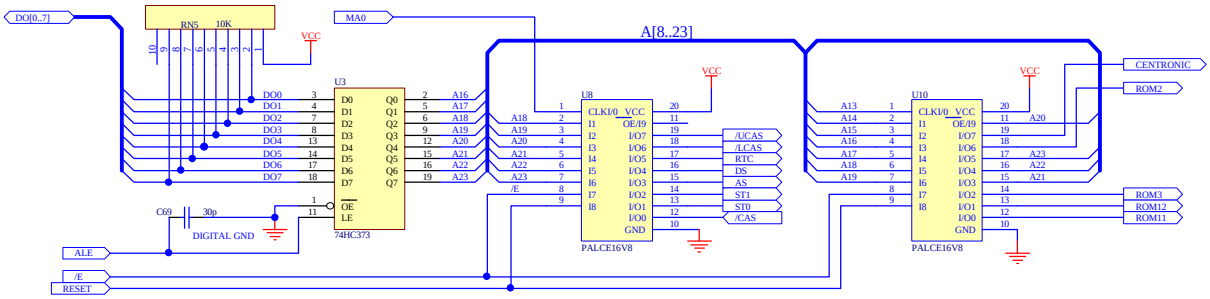


Fig. 3.7 Decode Circuit

This is the decode circuit which calculates memory map. U3 is used to latch addresses from DO0 to DO7. The main function of U8 and U10 are to decode the address and memory control signal .The memory map of B-443 is as shown in Figure 1.2.

The pin function description is as follows:

AS: The address strobe control signal of RTC.

DS: The data strobe control signal of RTC.

/CAS: The DRAM column address control pin of MCU.

/LCAS: The bank 0 column address control pin of DRAM.

/UCAS: The bank 1 column address control pin of DRAM.

RTC: The chip select pin of RTC.

CENTRONIC: Enable MCU to read data from parallel port.

ROM11: The chip select pin of U16 when system is in normal mode.

ROM12: The chip select pin of U16 when system is in BIOS update mode.

ROM2: The chip select pin of U25.

ROM3: The chip select pin of U26.

ST0: Status signal output pin of MCU.

ST1: Status signal output pin of MCU.

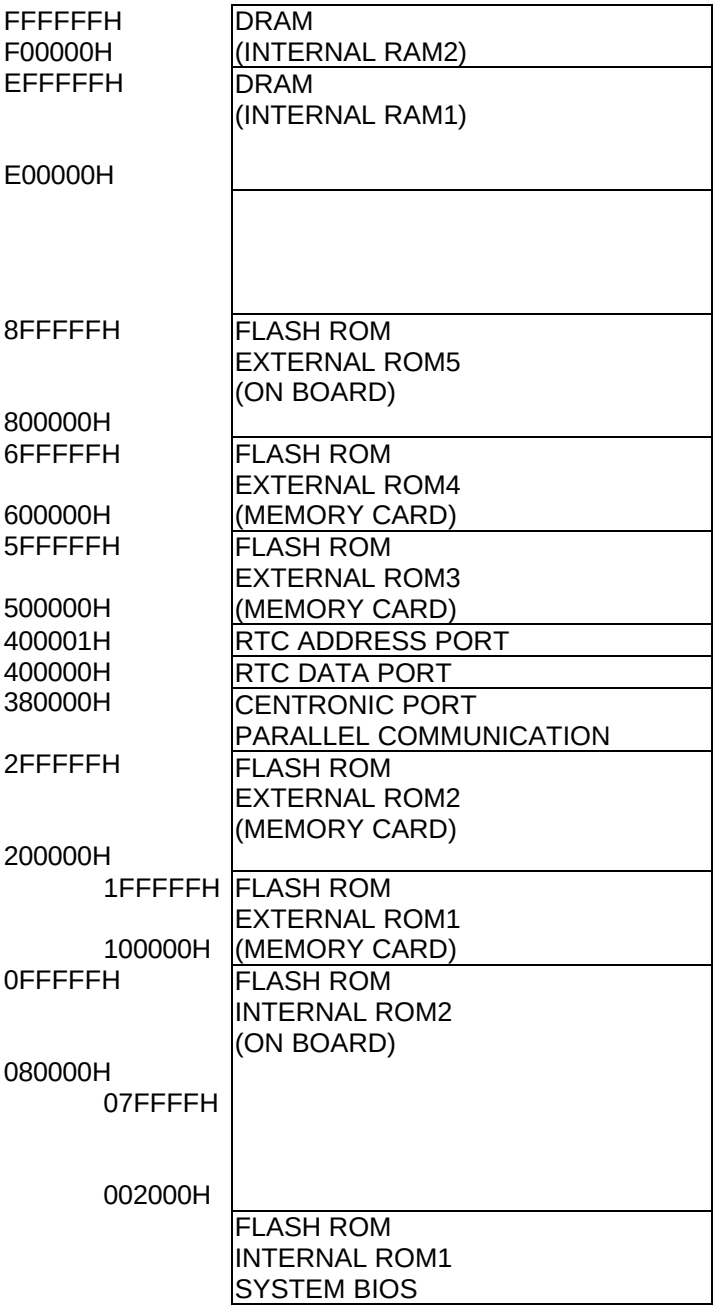


Fig. 3.8 The Memory Map of B-443

3.8 Thermal Head Drive/ Protection and History Control Circuit

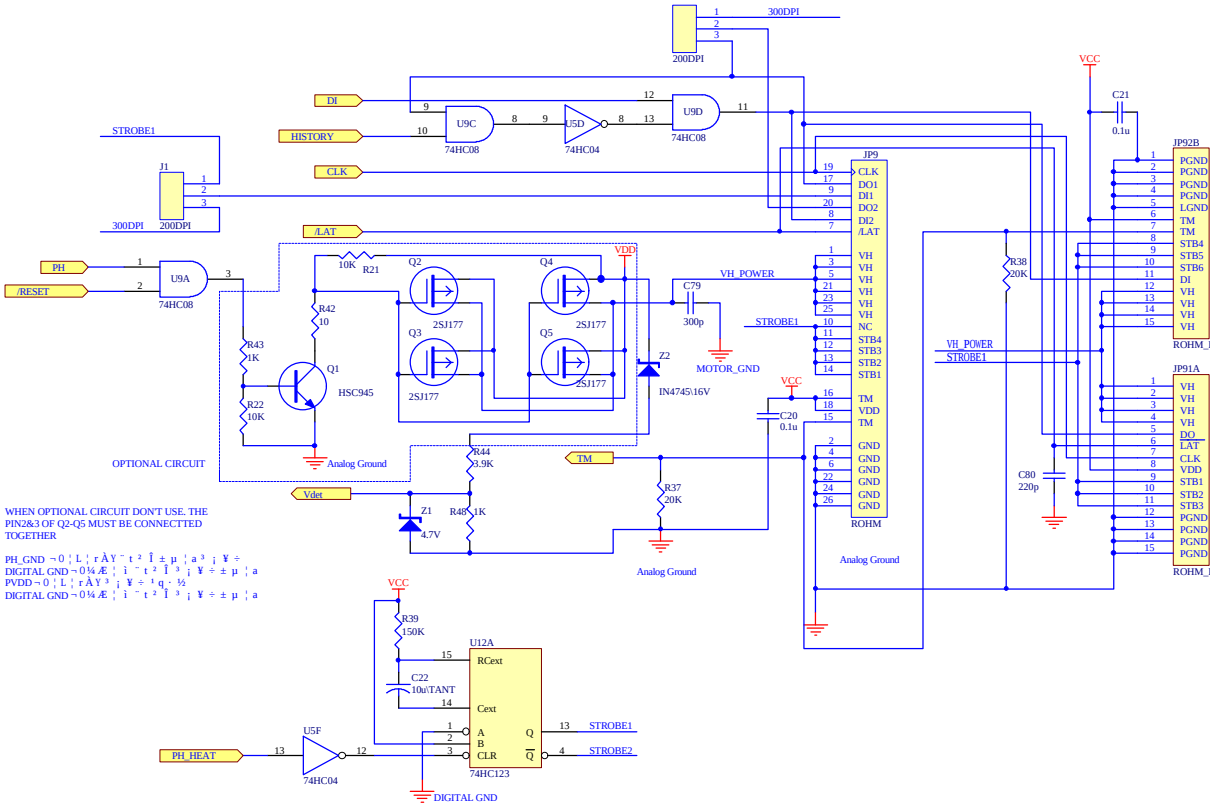


Fig. 3.9 Thermal Head Drive/ Protection and History Control Circuit

This is the thermal head drive/protection and history control circuit. CLK and /LAT are connected to thermal head control clock and data latch respectively. PH controls the DC24V voltage of the thermal head. When PH is "LOW", the thermal head will be separated from 24V (V_{DD}). PH_HEAT determines whether to heat the thermal head or not. HISTORY determines whether the history control is available or not. DI sends the printer data to the print head. TM is the temperature/voltage sensor for thermal head. Vdet feeds back the voltage and compensates the heat time for voltage accuracy when printing.

3.9 24V/5V Converter Circuit

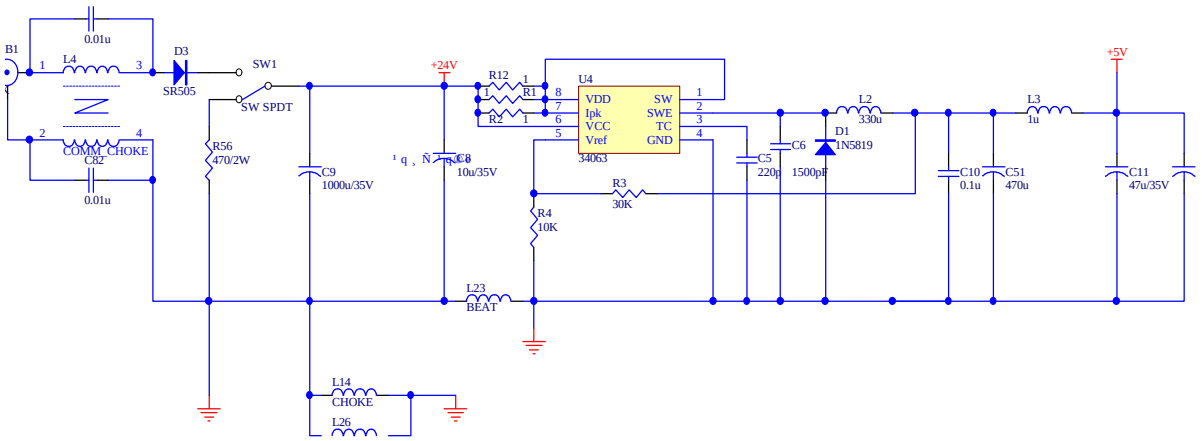


Fig. 3.10 24V/5V Converter Circuit

Figure 3.10 is the DC-TO-DC (DC24V to DC 5V) converter circuit, which is a boost system circuit structure. U4 is the DC-TO-DC converter IC, which converts voltage by using PWM control mode. The output voltage is dependent on R3 and R4, and its value is derived by the following formula:

$$|V_{out}| = 1.25\left(1 + \frac{R2}{R1}\right)$$

3.10 Stepping Motor And DC Motor Driver/ Protection Circuit

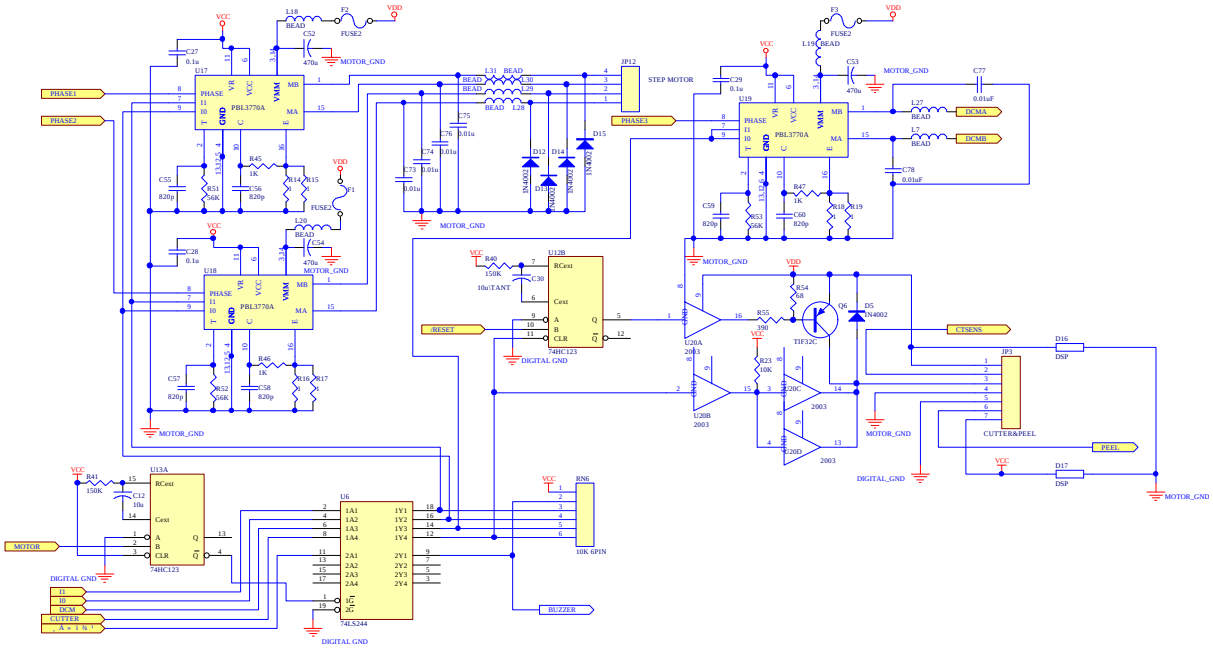


Fig. 3.11 Stepping Motor And DC Motor Driver/ Protection Circuit

This is the Stepping Motor and DC Motor Drive/ Protection Circuit. Connector JP12 sends the pattern as shown in table1. The status of I0 & I1 determines the stepping motor power level, the power level pattern is as shown in table2. Motor port is the protection pin. When it is at ' LOW' level, the power of the motor system will be closed. Power will be ON again when MOTOR pin is the pulse of ' HIGH' level. PHASE1 and PHASE2 determine the pattern of stepping motor drive circuit. For example, the sequence of PHASE1/PHASE2 in full step mode is 0/0 -> 0/1 -> 1/1 -> 1/0.

Pin on JP12 / Step	1	2	3	4	PHASE
1	ON	ON		ON	A
2		ON	ON		/A
3	ON		ON	ON	/B
4		ON	ON		B

Table1 Stepping Motor Pattern

MOTOR CURRENT		I0	I1
HIGH LEVEL	100%	L	L
MEDIUM LEVEL	60%	H	L
LOW LEVEL	20%	L	H
ZERO CURRENT	0%	H	H

Table2 Stepping motor power pattern

The power of DC motor is on when DCM pin is at ' LOW' level. PHASE3 determines the DC motor rotation direction (forward or backward).

3.11 Communication (Serial & Parallel Port) Circuit

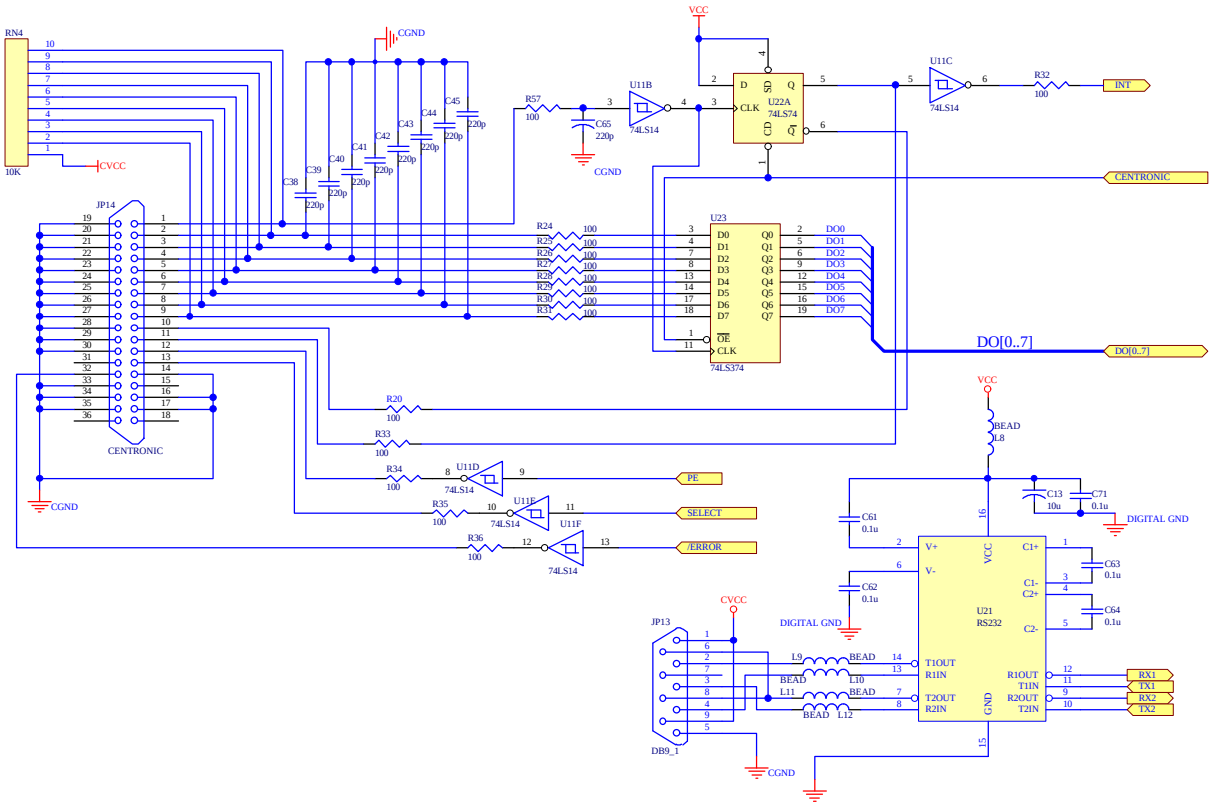


Fig. 3.12 RS-232 (Serial Port) Circuit

The RS-232 Circuit is for use with the externally connected personal computer and keyboard unit. JP13 connects to PC serial port through the RS-232 cable. RxD is the data receive pin of MCU. CTS is the Clear To Send of MCU, which sends the signal from the external device. TxD is the data output pin of MCU. RTS is the Request To Send signal which MCU sends to the external device.

The parallel port circuit is for use with the external personal computer parallel port connected through the printer cable. When PC's strobe signal comes in, the printer responds the 'busy status' until it reads the data from parallel port. Printer will respond the 'error signal' to PC when it is in error status.

3.12 Cutter Drive Circuit

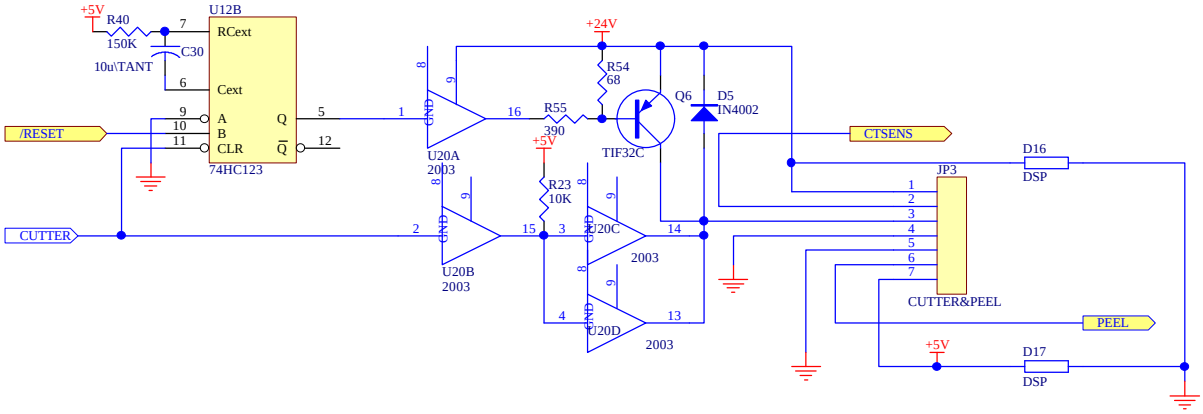


Fig. 3.13 Cutter Drive Circuit

This is the cutter drive circuit. The RESET signal is 1 when the printer is turned on. CUTTER controls the activation of the cutter. The cutter is activated when CUTTER signal is “low”. The sensor of cutter sends the “Hi-Low” signal to MCU through CTSENS pin that detects the action of cutter.

3.13 Mainboard Replacement

1. Turn off the printer power.
2. Remove the power cord and RS-232 and/or parallel port cable.
3. Open the top cover of the printer.
4. Remove the printer front panel.

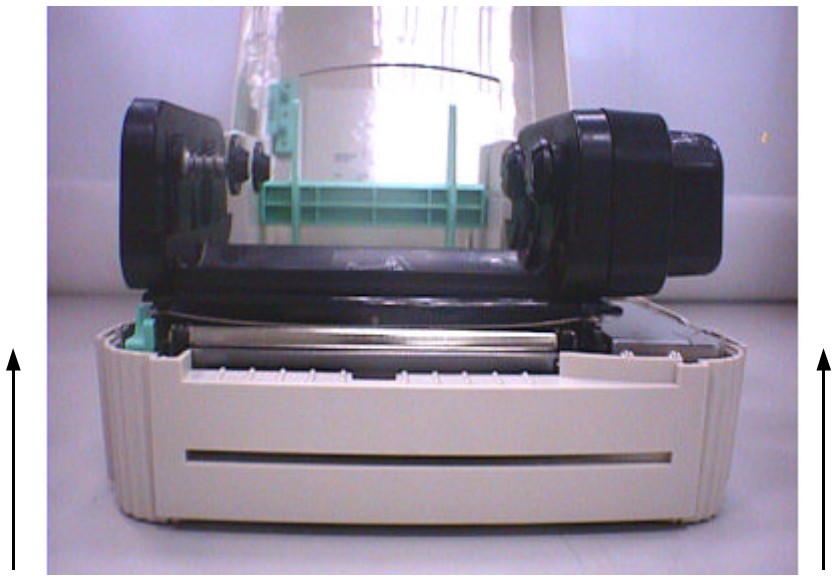


Fig. 3.14 Remove the front cover in the direction of the arrows

5. Remove the two screws and the metal cover.

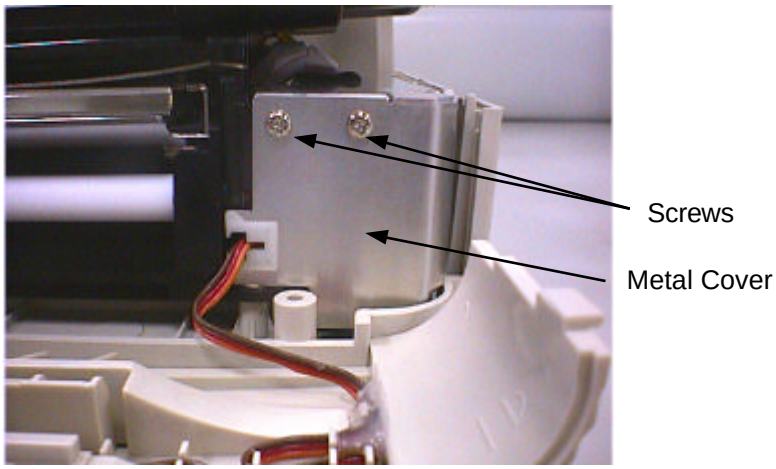


Fig. 3.15 Remove the screws and metal cover

6. Release the cable tie and remove the peel-off sensor connector.

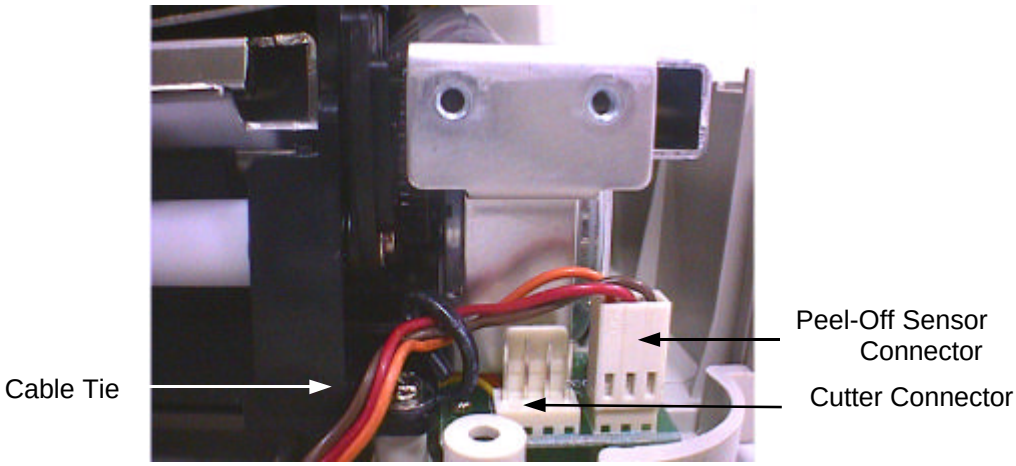


Fig. 3.16 Cable tie and peel-off sensor connector

7. Remove the screws on the lower left and lower right corners of main mechanism.

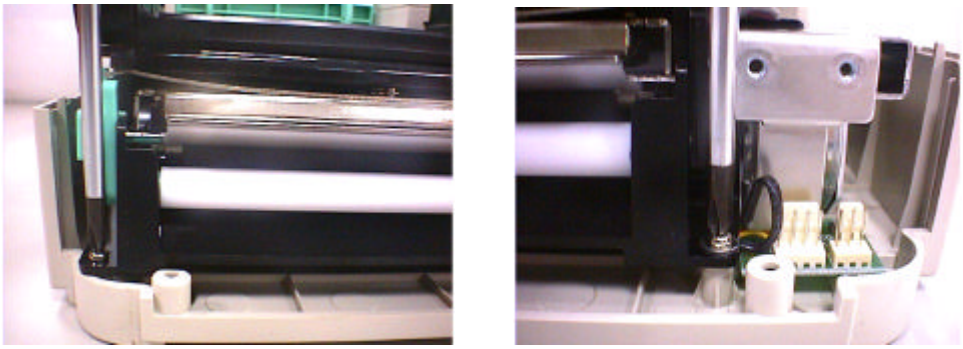


Fig. 3.17 Remove the screws in the lower left, lower right corners of the main mechanism.

8. Remove the four screws of the internal label roll mount.

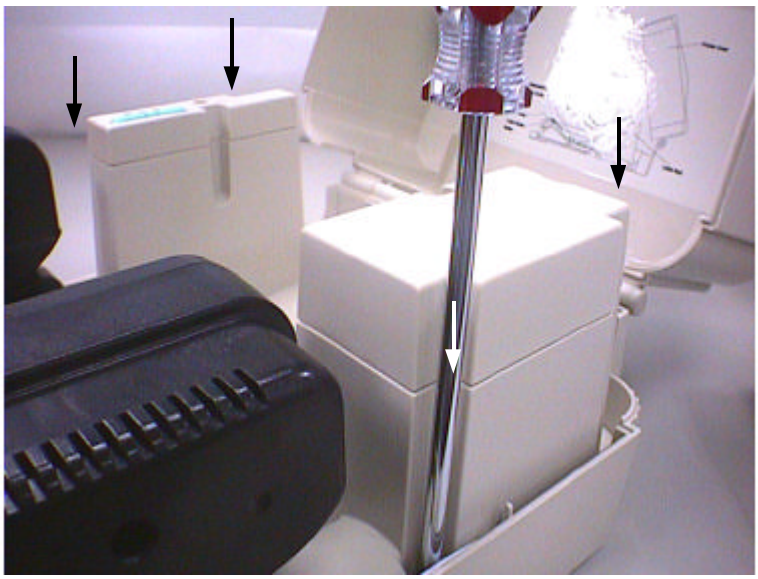


Fig. 3.18 Remove screws of the label roll mount

9. Move the mechanism about 5 mm in the label feed direction.
10. Take out the internal label roll mount and remove the connector.

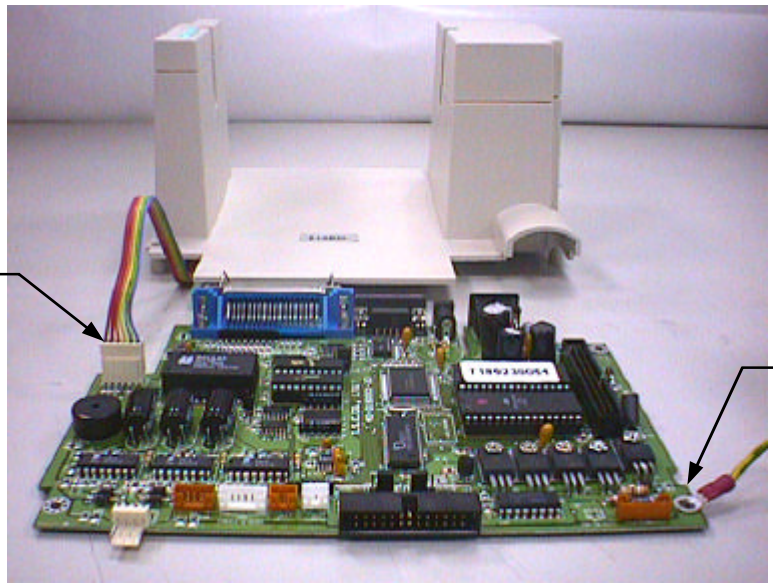


Fig. 3.19 Take out the internal label roll mount and remove the connector

11. Remove the screw of ground wire on the mainboard.
12. Remove all connectors on the mainboard. (JP1, JP2, JP3, JP4, JP5, JP6, JP7, JP11, JP7, JP9, JP12)

Connector	Description
JP1	External button, LED connector
JP2	Ribbon sensor receiver connector
JP3	Cutter and Peel off sensor connector
JP4	Black mark sensor connector
JP5	Gap / ribbon transmit sensor connector
JP6	DC motor and encoder connector
JP7	TPH head up switch connector
JP8	Memory cartridge connector
JP9	TPH connector
JP12	Stepping motor connector

13. Take out the mechanism.
14. Replace the mainboard.
15. Reassemble the mechanism and internal label roll mount in the reverse procedures of the removal.

3.14 Flash memory Replacement

If files can not be stored in the FLASH memory or if the firmware can not be upgraded, the first LED turns ON and OFF incessantly to indicate the Flash memory fails. Please follow the steps below to replace the flash memory.

1. Turn off the printer power.
2. Remove the power cord and RS-232 and/or parallel port cable.
3. Open the top cover of the printer.
4. Remove the printer front panel.
5. Remove the two screws and the metal cover.
6. Release the cable tie and remove the peel-off sensor connector.
7. Remove the screw on the PCB of peel-off and cutter connector.
8. Remove the screws in the lower left, lower right corners of main mechanism.
9. Remove all four screws of the internal label roll mount.
10. Move the mechanism in the label feed direction about 5 mm.
11. Take out the internal label roll mount and remove the connector.
12. Use an IC clamp to remove the FLASH memory.

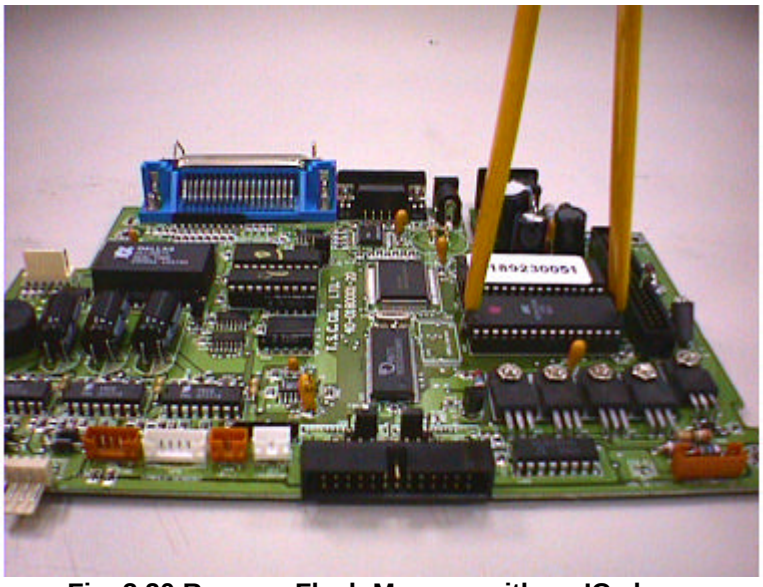


Fig. 3.20 Remove Flash Memory with an IC clamp

Note: The notch of flash memory and mark on the socket must face the same direction.

13. Install the new FLASH memory.
14. Install the FLASH memory cartridge. Copy firmware into the new Flash memory cartridge.
15. Reassemble the mechanism and internal label roll mount in the reverse procedures of the removal.

3.15 Cutter, DC Motor, Stepping Motor Driver IC Replacement

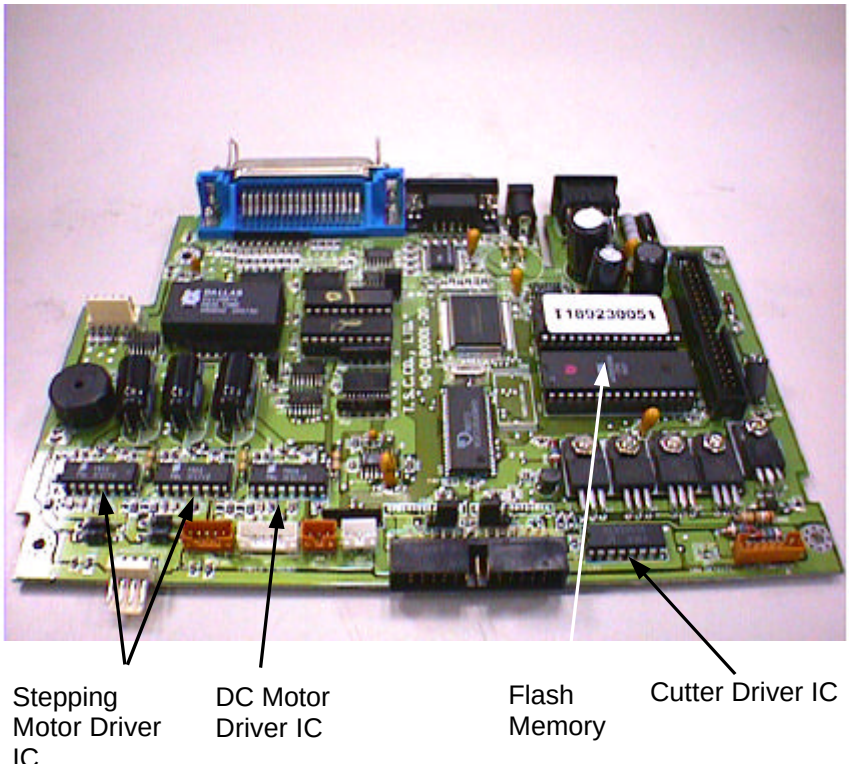


Fig. 3.21 Driver IC Locations

If the DC motor (ribbon rewind spindle) rotates back and forth, please check the DC motor driver IC, make sure it is firmly inserted in the IC socket and is not burned.
If the cutter does not work, please check that the software or program has been switched to the cutter mode. If the cutter still does not function, please check the cutter driver IC, make sure it is firmly inserted in the IC socket and is not burned.
The stepping motor driver IC is burned if the stepping motor makes noises but does not feed labels when the FEED key is pressed. In this case, please replace with a new driver IC.
Use an IC clamp to remove the damaged IC.

4. MECHANISM

4.1 Cutter Installation

1. Turn off the printer power.
2. Open the top cover of the printer.
3. Remove the printer front panel slowly and carefully. (Cf. Fig. 3.14)
4. Remove the two screws and the metal cover. (Cf. Fig. 3.15)
5. Release the cable tie and remove the peel-off sensor connector. (Cf. Fig. 3.16)
6. Remove the peel-off sensor connector. (Cf. Fig. 3.17)
7. Plug in the cutter connector.
8. Insert the right and left side flange of cutter into the slot.

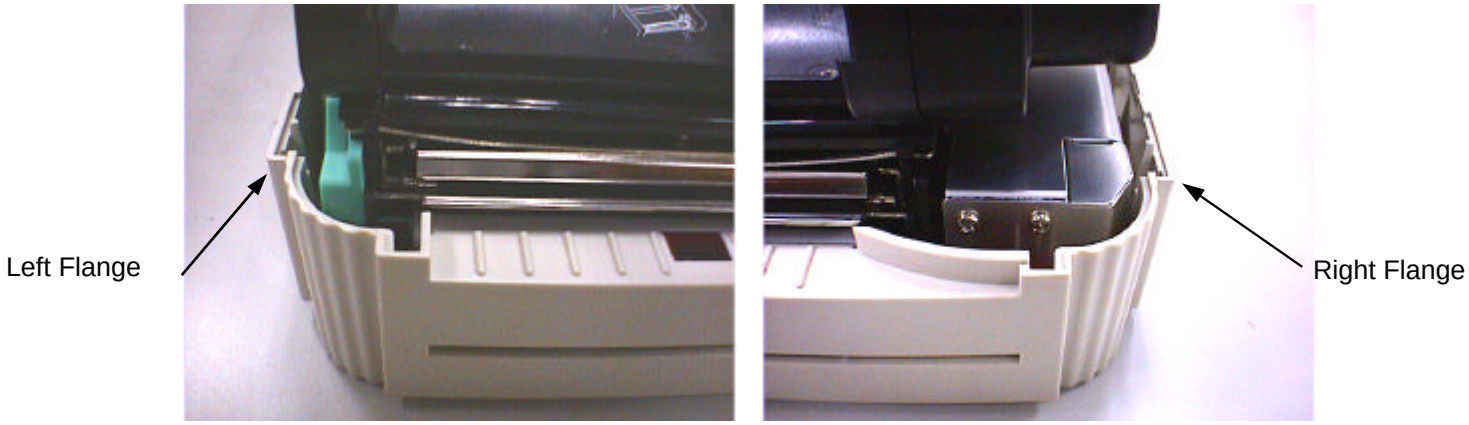


Fig. 4.1 Cutter Installation

9. Fasten the cutter from the bottom of the printer with the provided screw.
10. Make sure no screws or other parts are left in the printer.
11. Reassemble the mechanism and internal label roll mount in the reverse procedures of the removal.

4.2 Print Head Replacement

1. Turn off the printer power.
2. Remove the RS-232 cable and power cord.
3. Open the top cover.
4. Remove the ribbon and label roll.
5. Open the print carriage.
6. Remove the screw at the top front center of the mechanism, as shown.

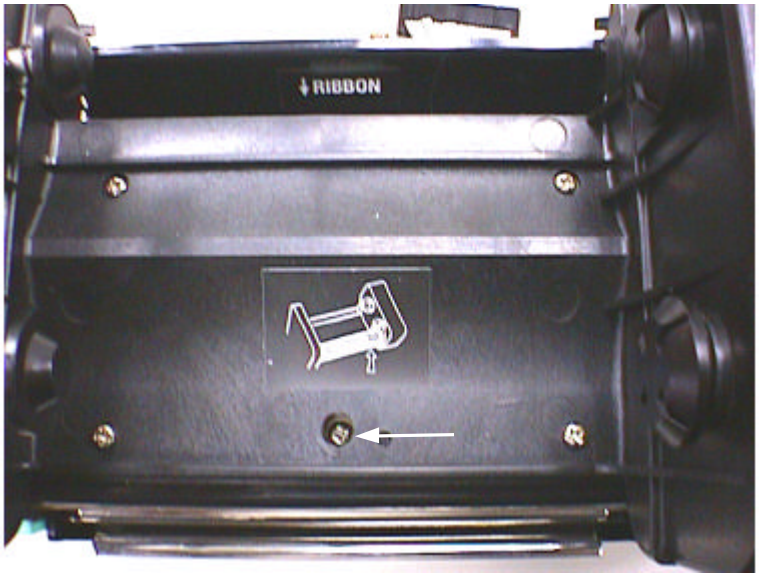


Fig. 4.2 The Print Head Screw

7. Disconnect the print head cable.

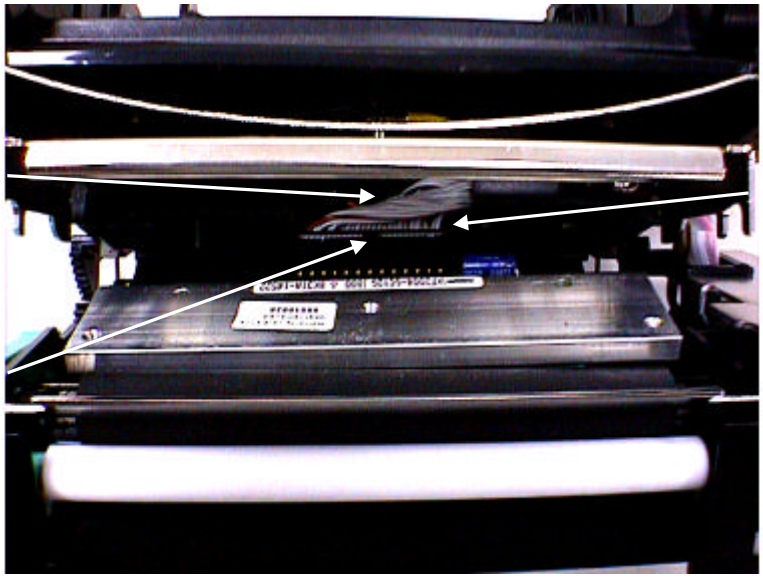


Fig. 4.3 Printhead and the Cable

Note: The key of connector must be positioned upward.
Do not touch the elements of the print head.
Do not disassemble the print head.

8. Tidy up the cable so that it does not protrude or interfere with the ribbon.
9. Reassemble the removed parts in the reverse order of removal.

4.3 DC Motor Replacement

1. Turn off the printer power.
2. Remove the power cord and RS-232 and/or parallel port cable.
3. Open the top cover of the printer.
4. Remove the printer front panel. (Cf. Fig. 3.14)
5. Remove the two screws and the metal cover. (Cf. Fig. 3.15)
6. Release the cable tie and remove the peel-off sensor connector. (Cf. Fig. 3.16)
7. Remove the screw on the PCB of peel-off and cutter connector.
8. Remove the screws in the lower left, lower right corners of the main mechanism.
9. Remove all four screws of the internal label roll mount. (Cf. Fig. 3.18)
10. Move the mechanism in the label feed direction about 5 mm.
11. Take out the internal label roll mount and remove connector JP1. (Cf. Fig. 3.19)
12. Remove the screw of ground wire on the mainboard.
13. Remove all connectors on the mainboard.
14. Take out the mechanism.
15. Remove the cable tie.
16. Remove the three screws on DC motor fixture.

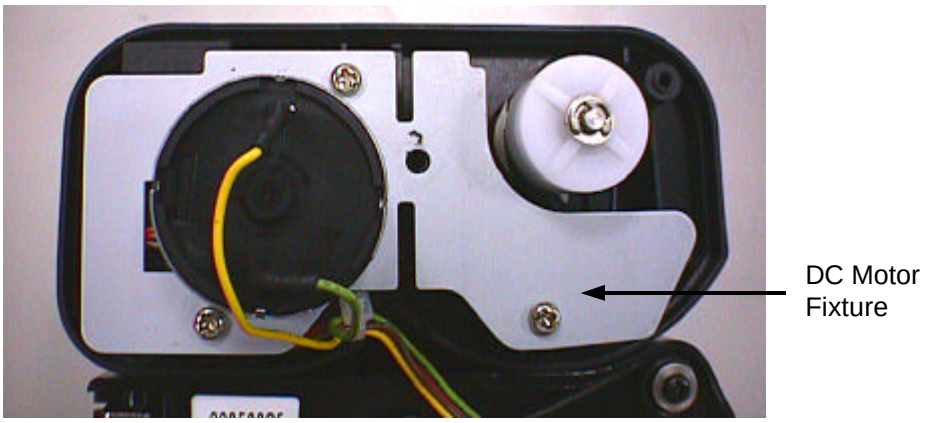


Fig. 4.4 DC Motor Fixture

17. Remove the three screws used to fix DC motor from behind the fixture.
18. Replace the DC motor and motor wires.
19. Reassemble the removed parts in the reverse order of the removal.

4.4 Ribbon Rewind Spindle Encoder Replacement

The encoder is installed on the gear box of DC motor, and is used to detect if the ribbon can be unerringly rewound by the spindle. The encoder is connected to JP6 on the mainboard. Please switch the printer to thermal transfer mode. The multi-meter is used to measure the voltage of Pin2 (+5V). If the voltage changes continuously from 0 to 5 volts DC, the encoder is in condition. Otherwise, please follow the steps below to replace the encoder PCB

1. Follow directions in Section 4.3 to remove DC motor and DC motor fixture.

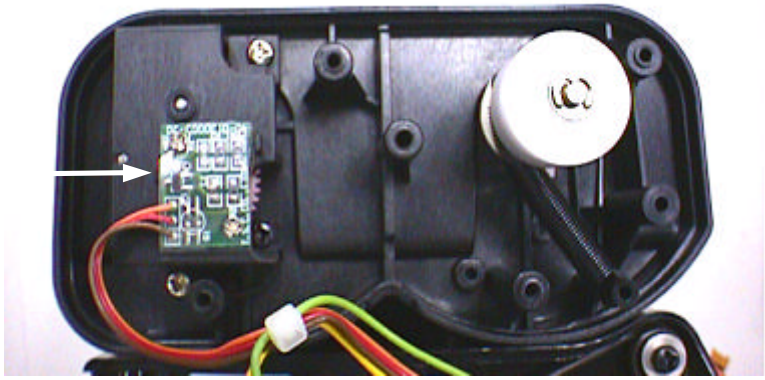


Fig. 4.5 DC Motor Encoder

2. Remove the two flat tap screws and cable tie.
3. Replace the Encoder PCB and Encoder Wires.
4. Reassemble the removed parts in the reverse order of removal.

4.5 Felt Fabric Replacement

Felt Fabric is located in the ribbon supply spindle. It is used to tighten the ribbon to prevent it from getting wrinkled during printing. If the ribbon does not stretch tight when label back feeds during printing, please replace the felt to secure the best printing quality. Follow the steps below to replace the felt fabric.

1. Follow the instructions in Section 4.3 to remove DC motor and DC motor fixture.
2. Remove the E-ring and washer on ribbon supply spindle.

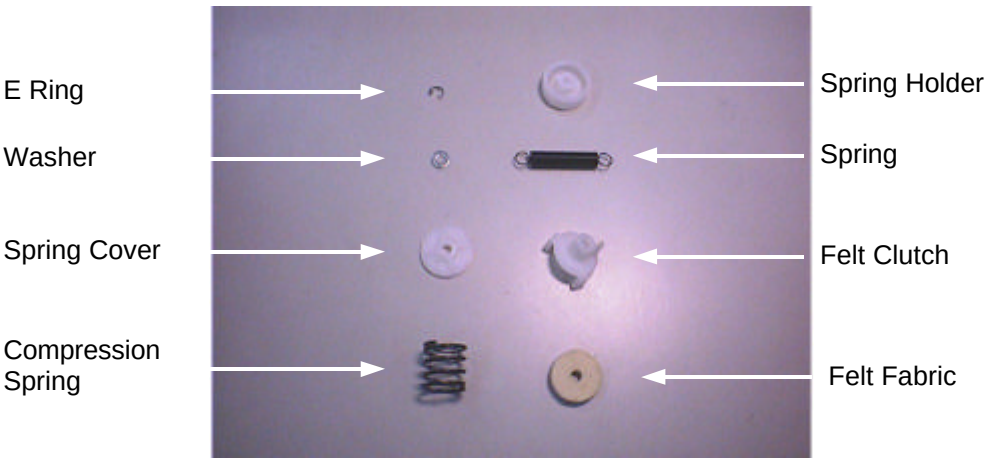


Fig. 4.6 Components of the Ribbon Supply Spindle

3. Remove the spring cover, compression spring and spring holder.
4. Remove the spring, felt clutch and felt fabric.
5. Replace with a new felt.

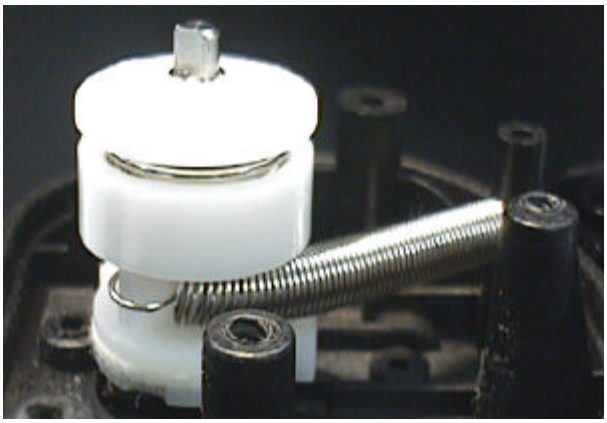


Fig. 4.7 Side View of the Ribbon Supply Spindle Assembly

6. Reassemble the removed parts in the reverse order of removal.

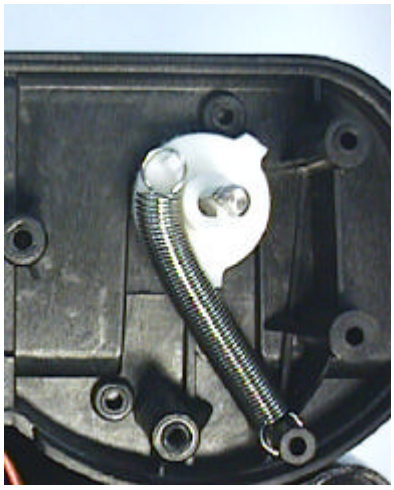


Fig. 4.8 Front View of the Ribbon Supply Spindle

4.6 Stepping Motor Replacement

1. Turn off the printer power.
2. Remove the power cord and RS-232 and/or Parallel port cable.
3. Open the top cover of the printer.
4. Remove the printer front panel. (Cf. Fig. 3.14)
5. Remove the two screws and the metal cover. (Cf. Fig. 3.15)
6. Release the cable tie and remove the peel-off sensor connector. (Cf. Fig. 3.16)
7. Remove the screw on the PCB of peel-off and cutter connector.
8. Remove the screws in the lower left, lower right corners of the main mechanism. (Cf. Fig. 3.17)
9. Remove all four screws of the internal label roll mount. (Cf. Fig. 3.18)
10. Move the mechanism in the label feed direction about 5 mm.
11. Take out the internal label roll mount and remove the connector. (Cf. Fig. 3.19)
12. Remove the screw of ground wire on the mainboard.
13. Remove all the connectors on mainboard. (JP1, JP2, JP3, JP4, JP5, JP6, JP7, JP11, JP7, JP9, JP12)
14. Take out the mechanism.
15. Remove the two screws of the stepping motor.

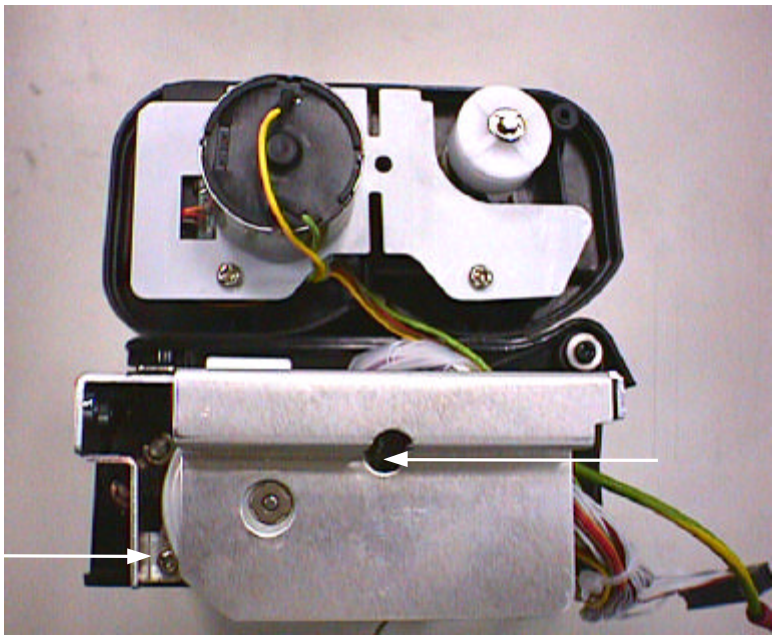


Fig. 4.9 Stepping Motor

16. Replace the stepping motor, stepping motor wires, and reassemble the removed parts in the reverse order of removal.

4.7 Black Mark Sensor / Gap Sensor (Receiver) Replacement

Black mark sensor is reflection type sensor. It is connected to JP4 (3 pin connector). A multi-meter is used to measure the signal of Pin2 to test if there is voltage variation when black mark is detected. Before conducting the test, please invoke the BLINE command first. The printer will switch from gap sensor to black mark sensor. If there is no voltage variation, please follow steps below to replace the black mark sensor / gap sensor (receiver) PCB.

1. Turn off the printer power.
2. Remove the power cord and RS-232 and/or parallel port cable.
3. Open the top cover of the printer.
4. Remove the printer front panel. (Cf. Fig. 3.14)
5. Remove the two screws and the metal cover. (Cf. Fig. 3.15)
6. Release the cable tie and remove the peel-off sensor connector. (Cf. Fig. 3.16)
7. Remove the screw on the PCB of peel-off and cutter connector.
8. Remove the screws in the lower left, lower right corners of the main mechanism. (Cf. Fig. 3.17)
9. Remove all four screws of the internal label roll mount. (Cf. Fig. 3.18)
10. Move the mechanism in the label feed direction about 5 mm.
11. Take out the internal label roll mount and remove the connector. (Cf. Fig. 3.19)
12. Remove the screw of ground wire on the mainboard.
13. Remove all the connectors on mainboard. (JP1, JP2, JP3, JP4, JP5, JP6, JP7, JP11, JP7, JP9, JP12)
14. Take out the mechanism.
15. Remove one flat tap screws and black mark sensor PCB.

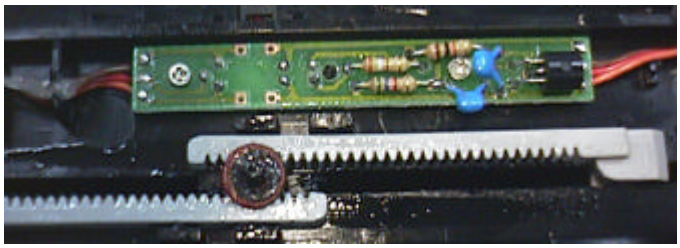


Fig. 4.10 Black Mark Sensor and Gap Receiver Sensor

16. Reassemble the removed parts in the reverse order of removal.

4.8 Ribbon Sensor (Receiver) Replacement

1. Turn off the printer power.
2. Remove the power cord and RS-232 and/or parallel port cable.
3. Open the top cover of the printer.
4. Remove the printer front panel. (Cf. Fig. 3.14)
5. Remove the two screws and the metal cover. (Cf. Fig. 3.15)
6. Release the cable tie and remove the peel-off sensor connector. (Cf. Fig. 3.16)
7. Remove the screw on the PCB of peel-off and cutter connector.
8. Remove the screws in the lower left, lower right corners of the main mechanism. (Cf. Fig. 3.17)
9. Remove all four screws of the internal label roll mount. (Cf. Fig. 3.18)
10. Move the mechanism in the label feed direction about 5 mm.
11. Take out the internal label roll mount and remove the connector. (Cf. Fig. 3.19`)
12. Remove the screw of ground wire on the mainboard.
13. Remove all the connectors on mainboard. (JP1, JP2, JP3, JP4, JP5, JP6, JP7, JP11, JP7, JP9, JP12)
14. Take out the mechanism.
15. Remove the screws, springs and spring bushing on both sides of the mechanism.

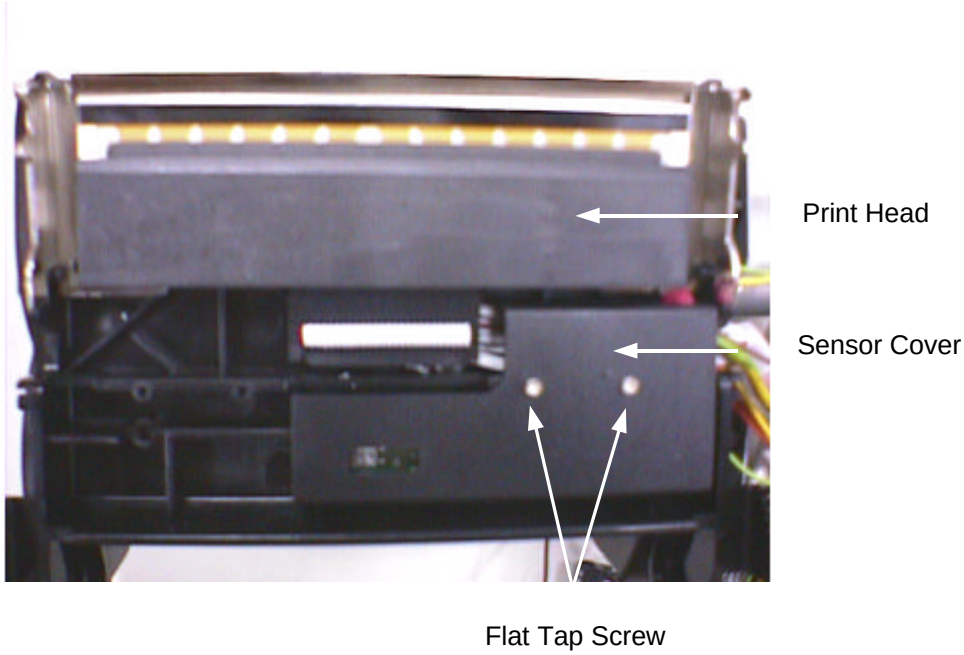


Fig. 4.11 Ribbon Sensor Cover

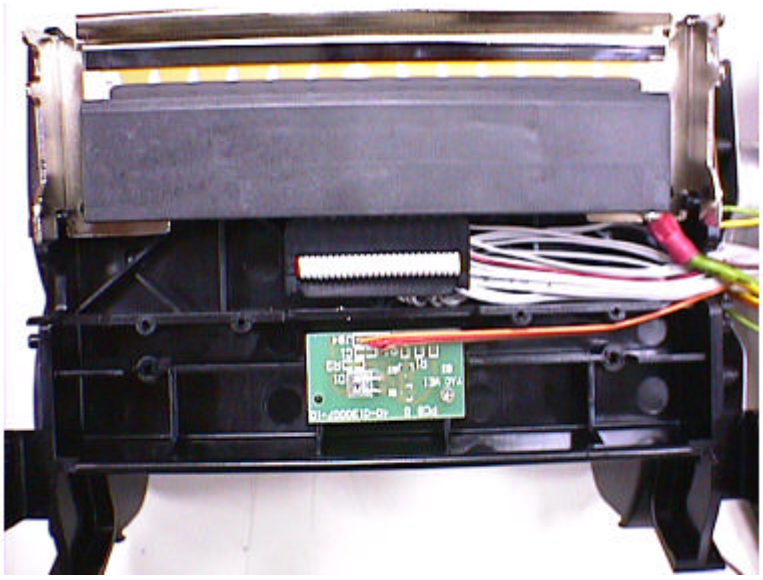


Fig. 4.12 Ribbon Sensor

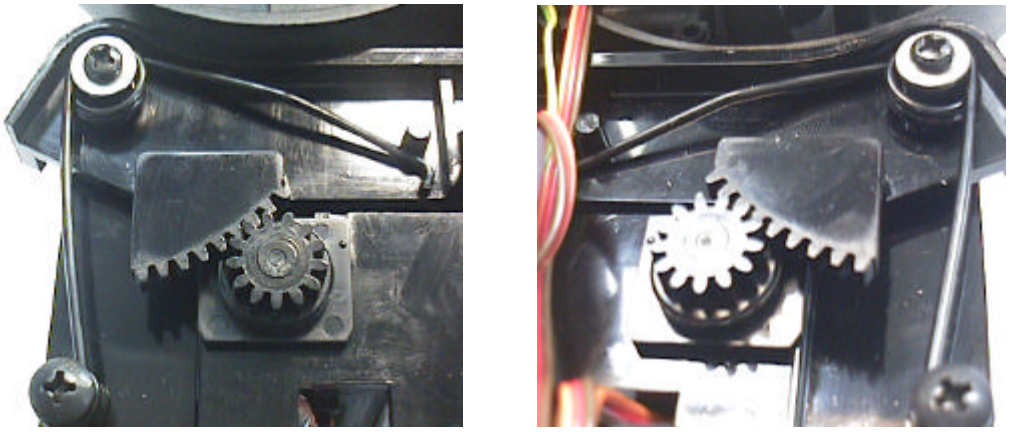


Fig. 4.13 Spring Installation on Left Side and Right Side

Note: The left side spring and the right side spring are different in shape. The right side spring has a straight end, whereas the left side spring has an end that is curved 90 degrees.

16. The main mechanism is divided into upper mechanism and lower mechanism.
17. The ribbon sensor (receiver) is located in the upper mechanism.
18. Remove the screws on the ribbon sensor cover.
19. Replace with a new ribbon sensor PCB.
20. Reassemble the removed parts in the reverse order of removal.

4.9 Ribbon Sensor (Transmitter) / Gap Sensor (Transmitter) Replacement

1. Please follow the steps in Section 4.6 to separate the upper mechanism from the lower mechanism.
2. The ribbon sensor (transmitter) is located in the center of the lower mechanism.

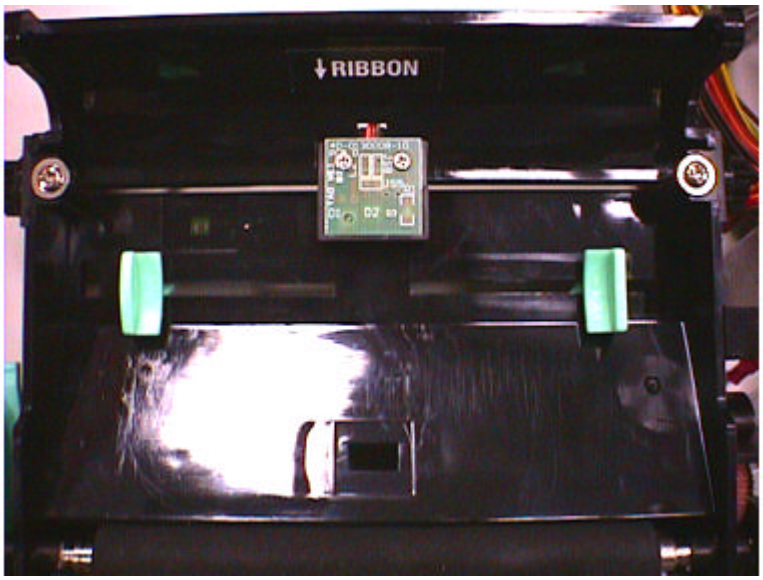


Fig. 4.14 Ribbon Sensor (Transmitter)

3. Remove the two flat tap screws
4. Remove the cable tie and sensor PCB.
5. Replace with a new PCB. Reassemble the removed parts in the reverse order of removal.

4.10 Platen Replacement

1. Turn off the printer power.
2. Remove the power cord and RS-232 and/or parallel port cable.
3. Open the top cover of the printer.
4. Remove the printer front panel. (Cf. Fig. 3.14)
5. Remove the two screws and the metal cover. (Cf. Fig. 3.15)
6. Release the cable tie and remove the peel-off sensor connector. (Cf. Fig. 3.16)
7. Remove the screw on the PCB of peel-off and cutter connector.
8. Remove the screws in the lower left, lower right corners of the main mechanism. (Cf. Fig. 3.17)
9. Remove all four screws of the internal label roll mount. (Cf. Fig. 3.18)
10. Move the mechanism in the label feed direction about 5 mm.
11. Take out the internal label roll mount and remove the connector. (Cf. Fig. 3.19)
12. Remove the screw of ground wire on the mainboard.
13. Remove all the connectors on the mainboard. (JP1, JP2, JP3, JP4, JP5, JP6, JP7, JP11, JP7, JP9, JP12)
14. Take out the mechanism.
15. Remove the two screws, stepping motor and stepping motor cover. (Cf. Fig. 4.9)
16. Remove the E ring and two gears.

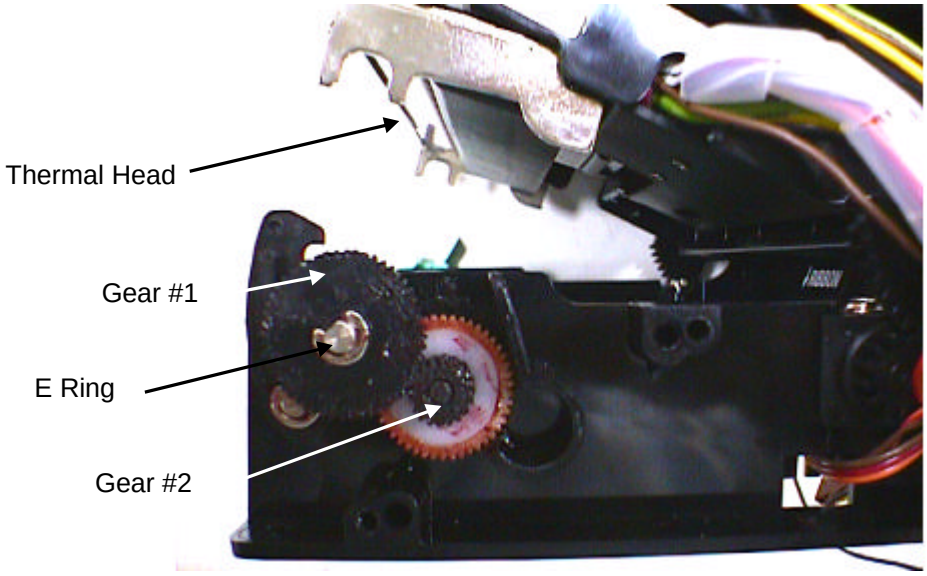


Fig. 4.15 Location of E ring and Gears

17. Remove the E ring and the printer carriage release lever on the left side of the mechanism. (Fig. 4.16)
18. Remove the E ring and the printer carriage release lever arm. (Fig. 4.17)

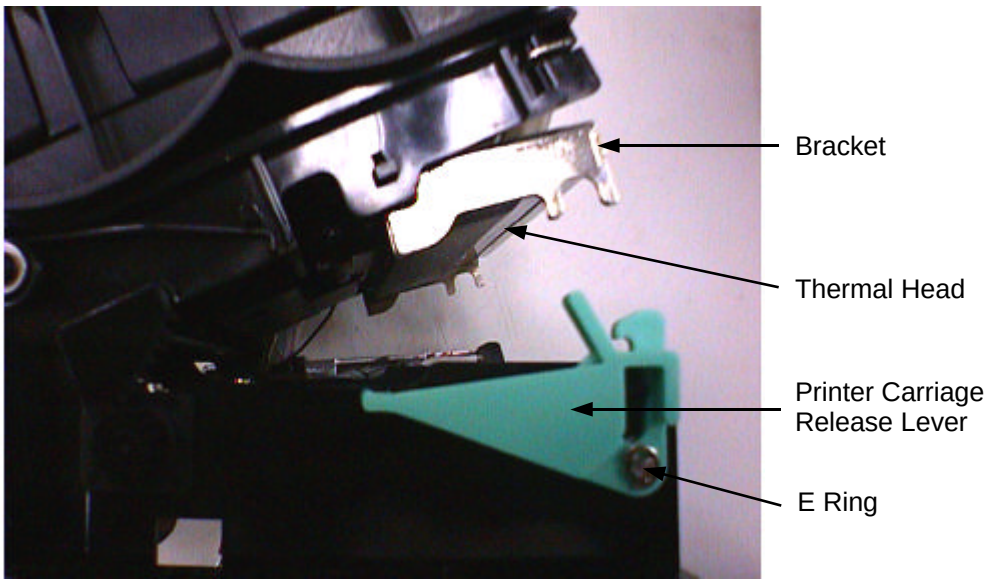


Fig. 4.16 Printer carriage release lever and E ring

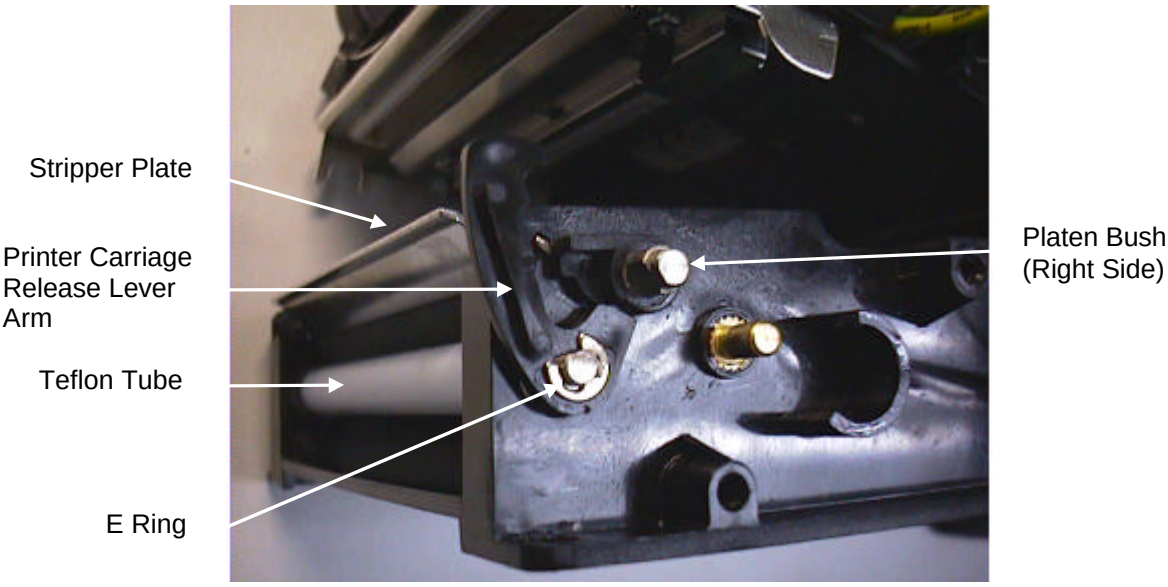


Fig. 4.17 Printer carriage release lever arm and E ring

19. Remove the teflon tube and metal rod. (Fig. 4.18)
20. Remove the E ring, the left side and right side platen bushes. (Fig. 4.19)
21. Remove the stripper plate.

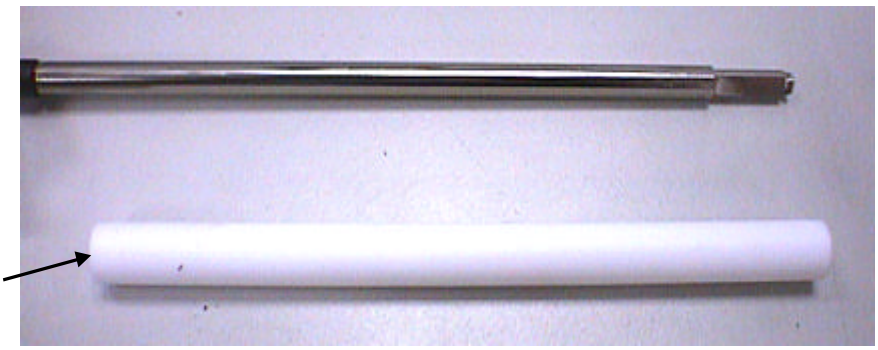


Fig. 4.18 Teflon tube and metal rod

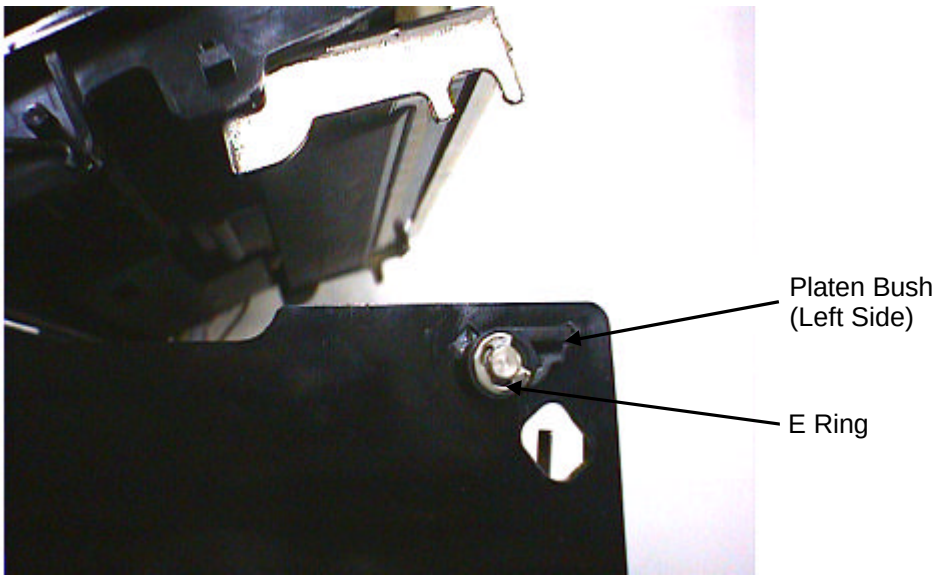
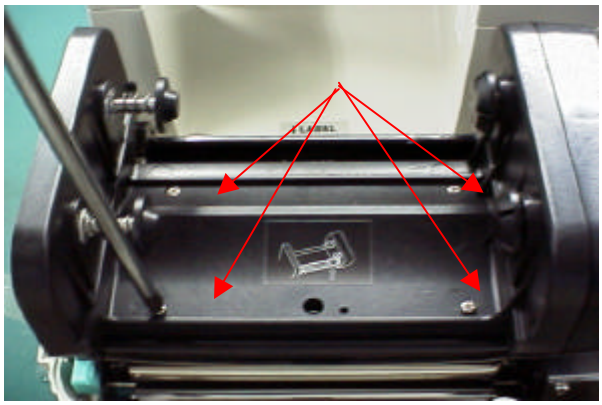


Fig. 4.19 Remove E ring and platen bush

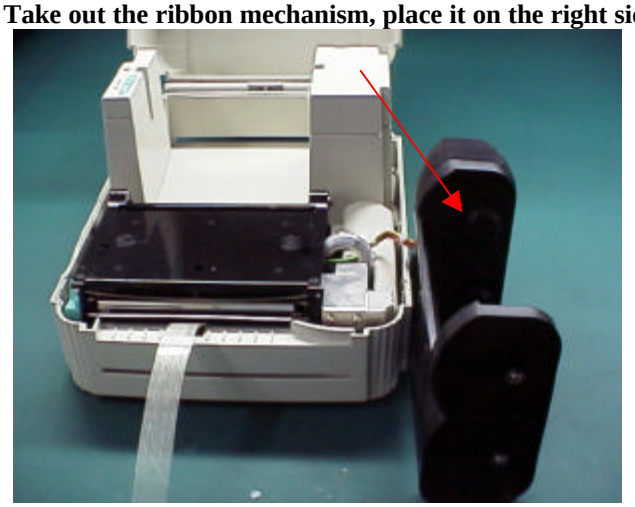
22. Move the platen a bit to the right of the mechanism, take out the platen.
23. Replace the platen and reassemble the removed parts in the reverse order of removal.

4.11 Head-Up Sensor Replacement

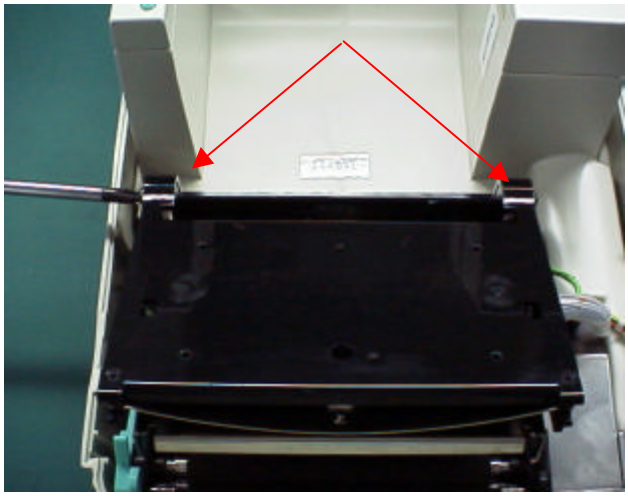
1. Remove the four screws with an electric screwdriver



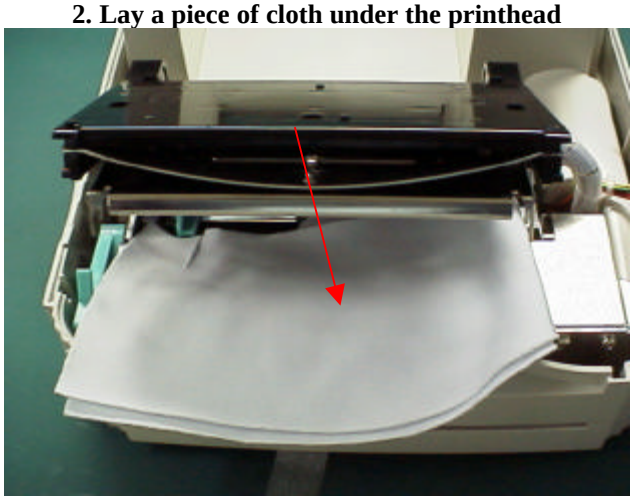
1. Take out the ribbon mechanism, place it on the right side



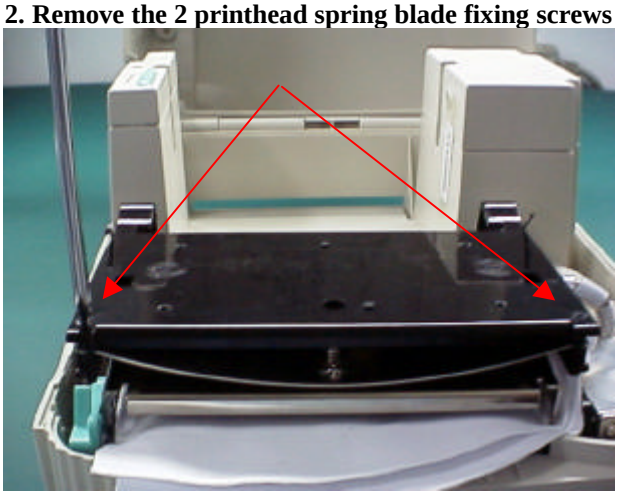
2. Remove the screws on either side with an electric screw driver



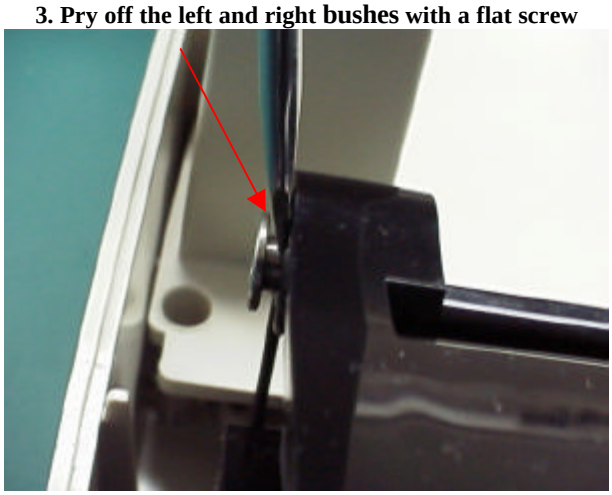
2. Lay a piece of cloth under the printhead



2. Remove the 2 printhead spring blade fixing screws

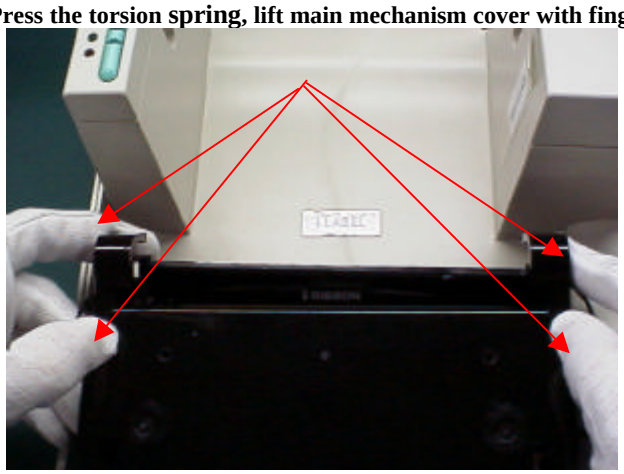


3. Pry off the left and right bushes with a flat screw

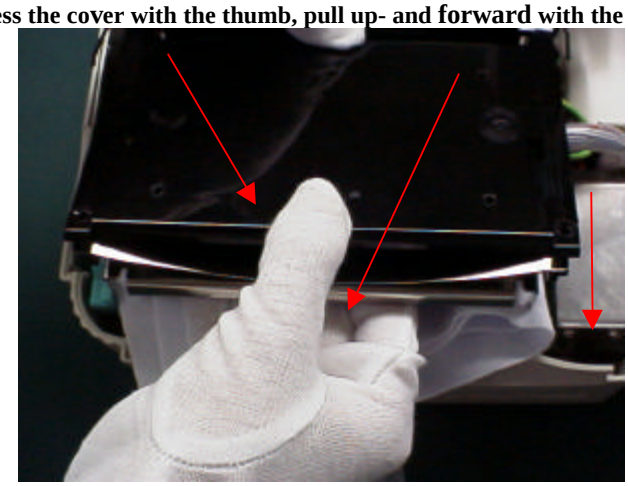


2. Pry off the torsion springs on either side

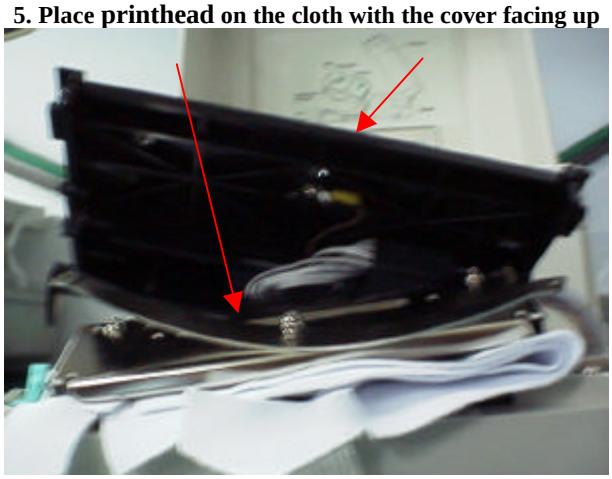
4. Press the torsion spring, lift main mechanism cover with fingers



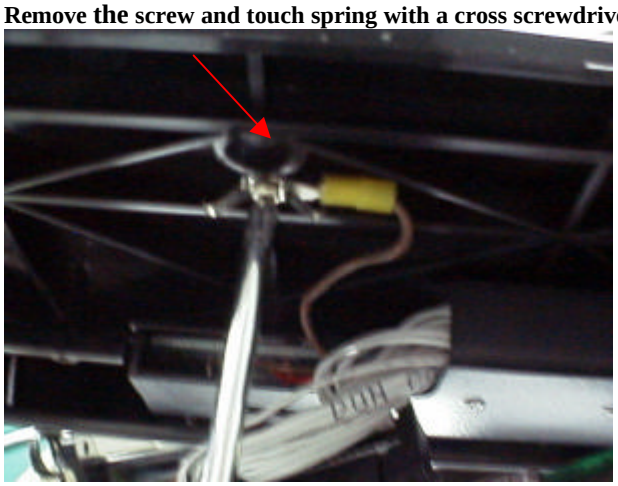
4. Press the cover with the thumb, pull up- and forward with the fingers



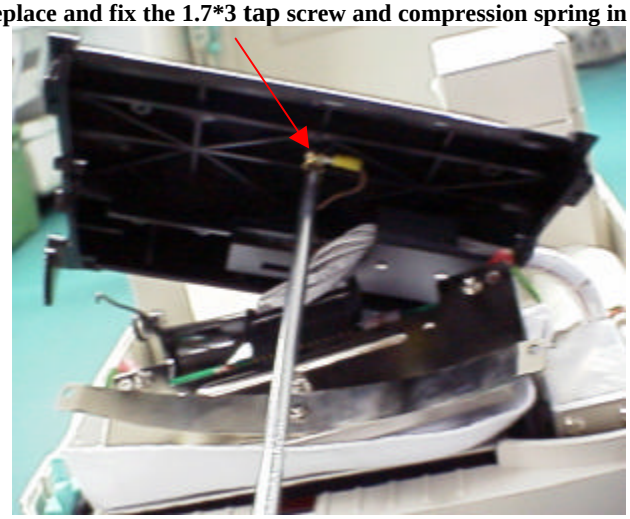
5. Place printhead on the cloth with the cover facing up



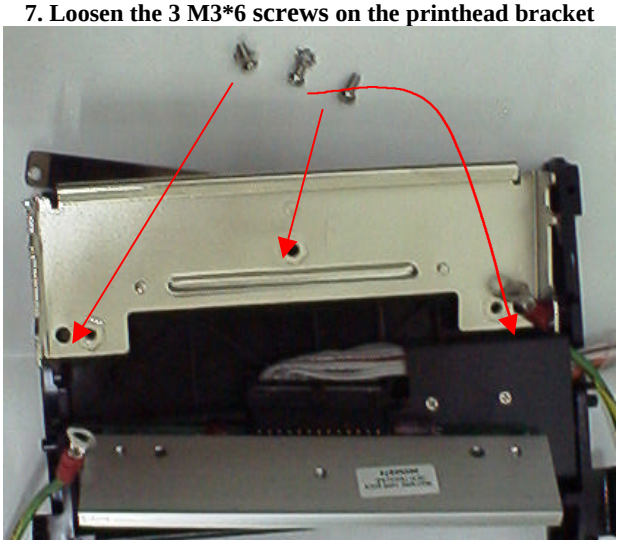
5. Remove the screw and touch spring with a cross screwdriver



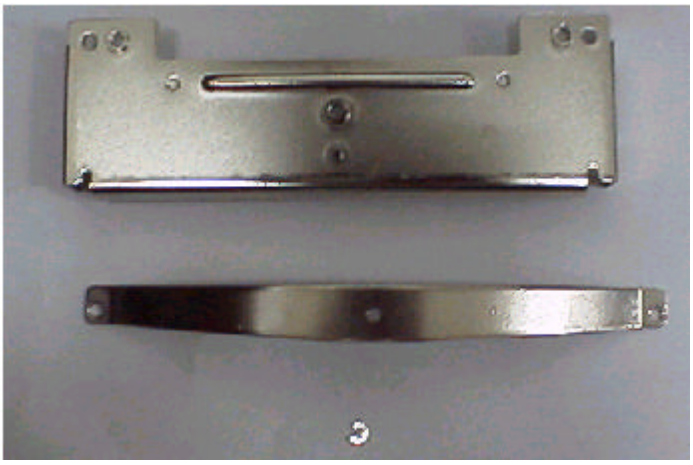
6. Replace and fix the 1.7*3 tap screw and compression spring in place



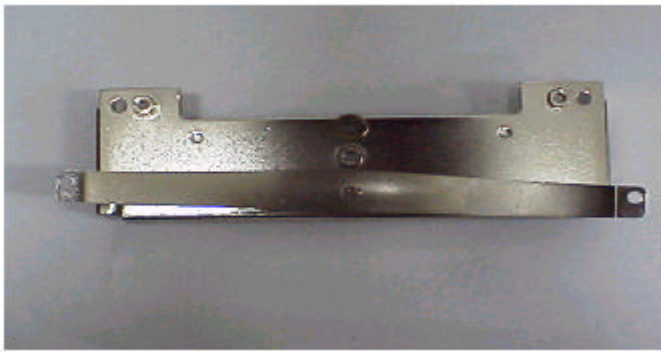
7. Loosen the 3 M3*6 screws on the printhead bracket



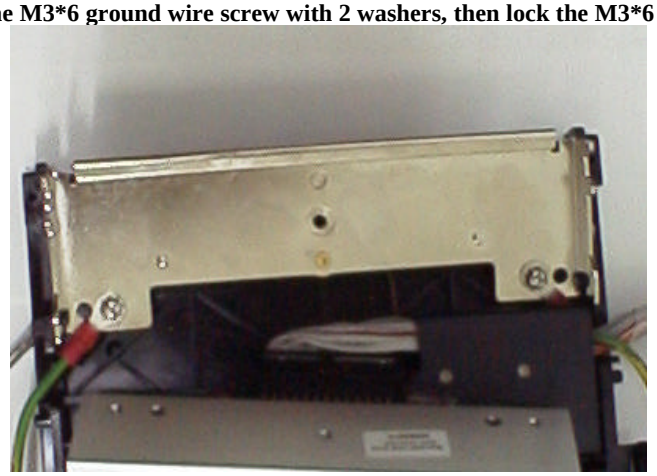
8. Take out the printhead bracket, remove the spring blade



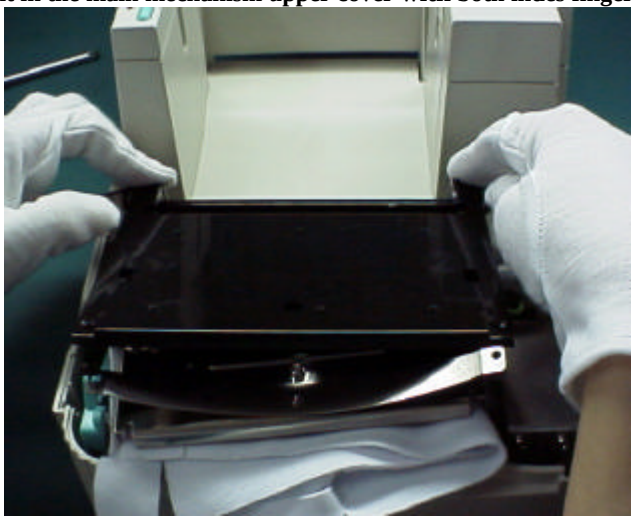
8. Replace the printhead bracket, put back the spring blade



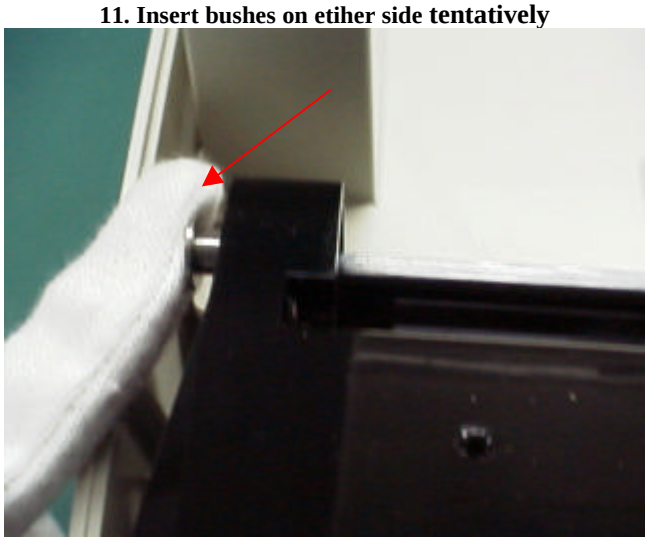
9. Fasten the M3*6 ground wire screw with 2 washers, then lock the M3*6 TPH screw



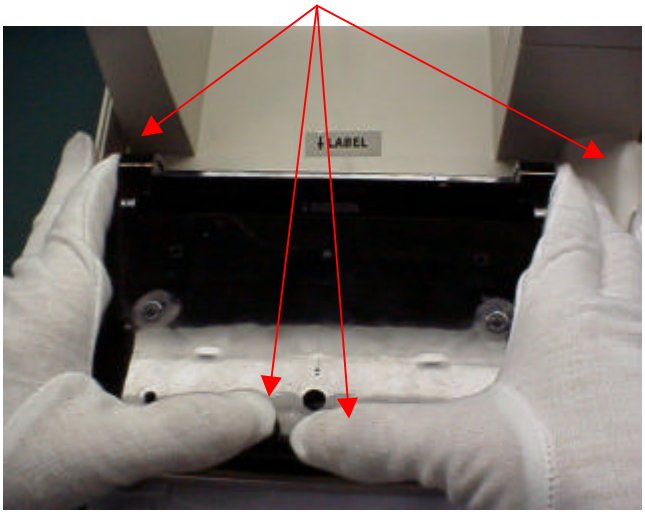
10. Press on one end of the torsion spring with both thumbs, fit in the main mechanism upper cover with both indes fingers



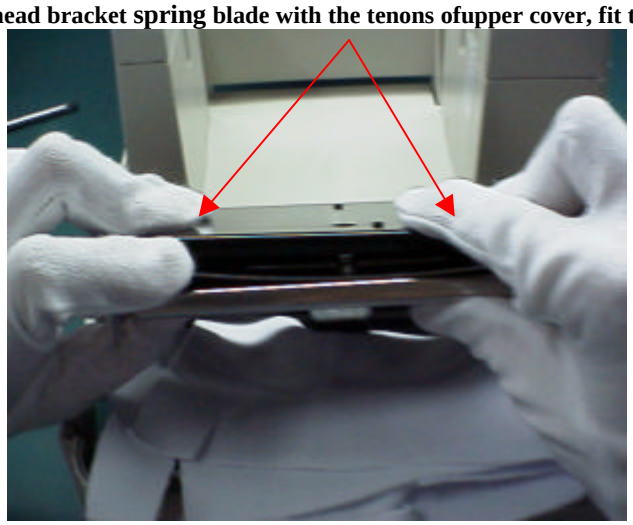
11. Insert bushes on etiher side tentatively



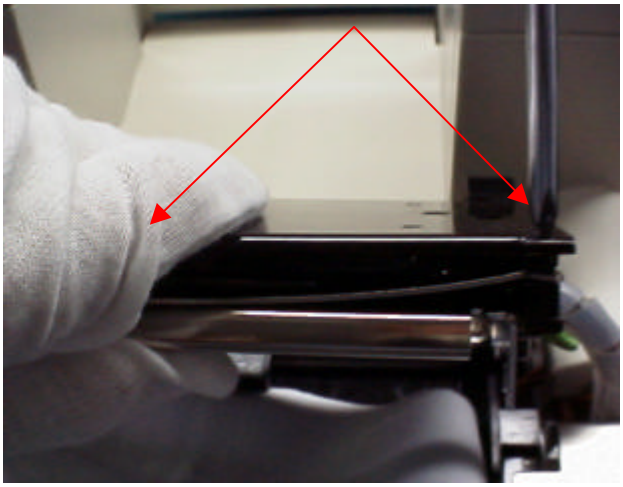
11. Press down with both thumbs, fit in the bushes with both index fingers



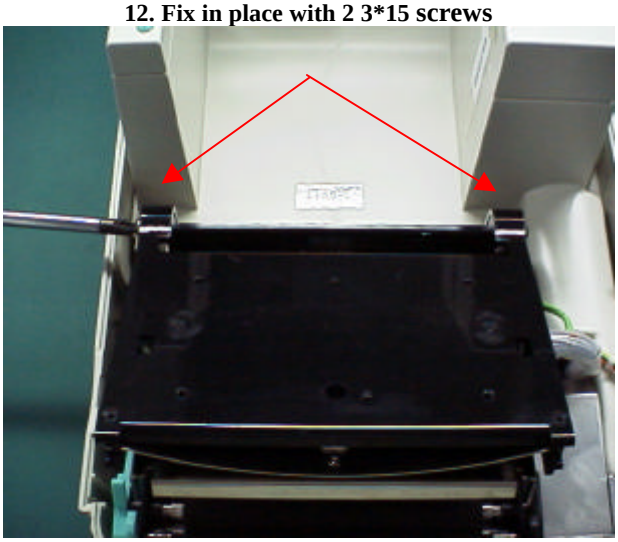
11. Align printhead bracket spring blade with the tenons ofupper cover, fit the two together



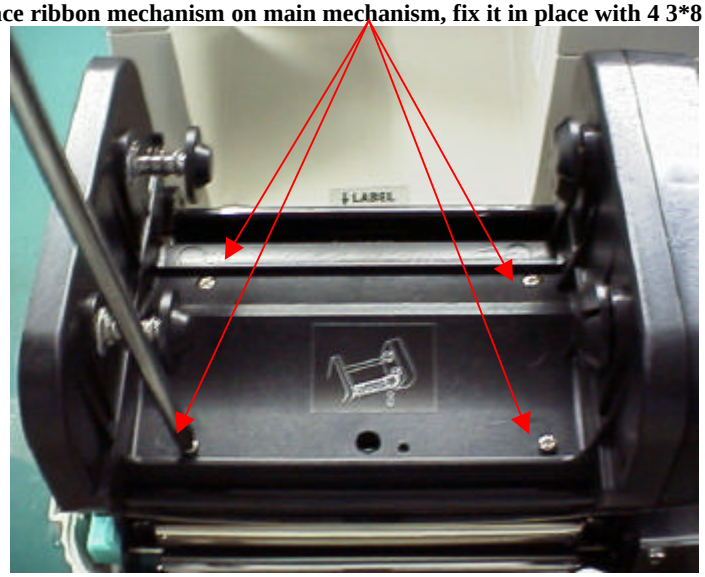
11. Fix the two in place with 2 2.6*12 screws, adjust the height of the screw so that the screw head is level with the screw hole



12. Fix in place with 2 3*15 screws



12. Place ribbon mechanism on main mechanism, fix it in place with 4 3*8 screws

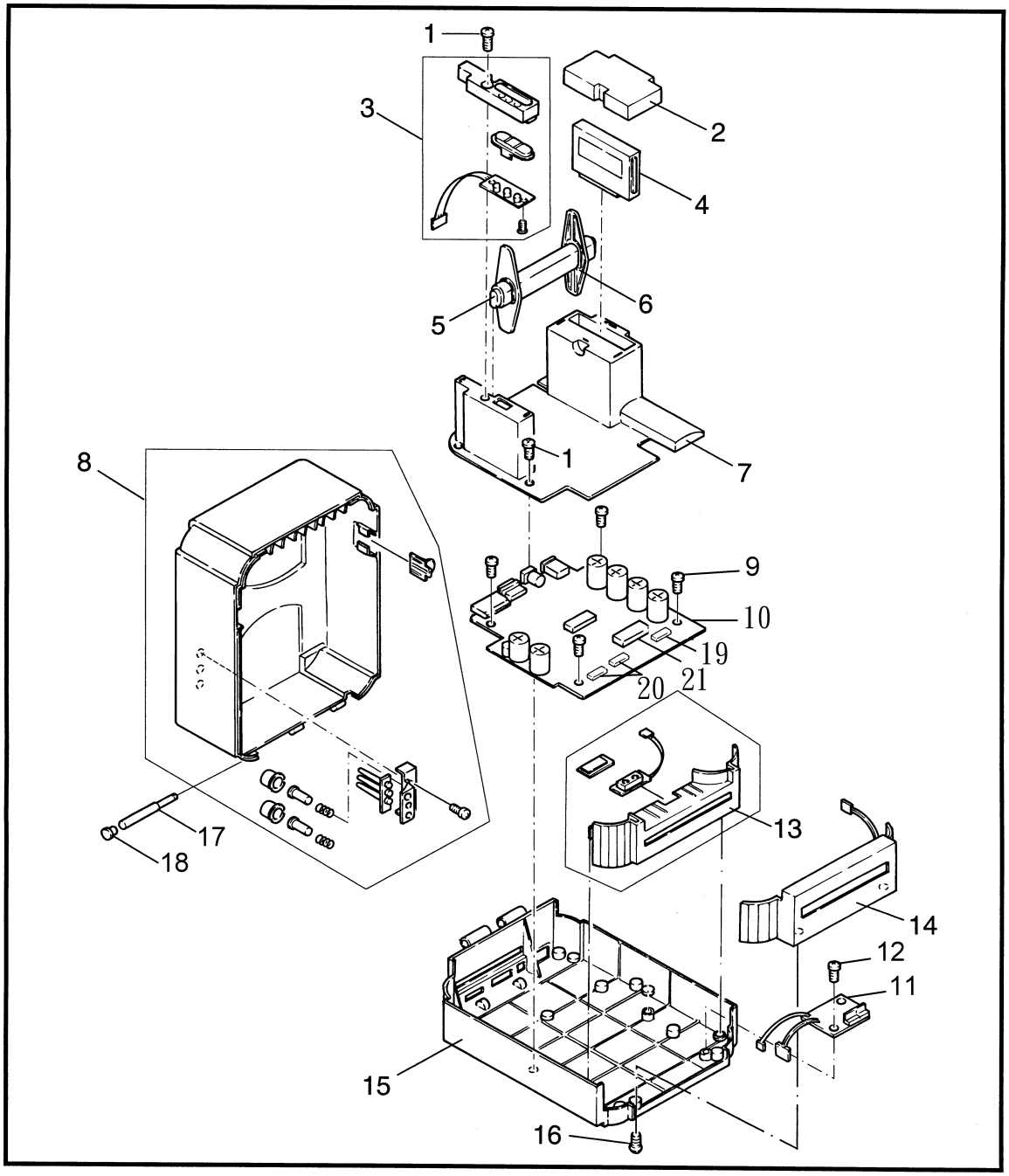


4.12 Parts List

① Cover and Panels

Ref. No.	Part No.	Description	Remarks	List Price
1-1	37-1403008-34	Screw, ϕ3x8		
1-2	30-0130050-00	Memory Module Cover		
1-3	98-0130057-00	Push Botton Box Ass' y		
1-4	98-0181009-00	1 MB Memory Module	Option	
	98-0181010-00	2 MB Memory Module	Option	
	98-0181011-00	3 MB Memory Module	Option	
	98-0181012-00	4 MB Memory Module	Option	
1-5	30-0130059-00	Label Roller (Hub shape: circular)		
	30-0130048-00	Label Roller (Hub shape: quadrangular)		
1-6	30-0130060-00	Label Roller Fixed Tab		
1-7	30-0180043-00	Label Roller Mount		
1-8	98-0180065-00	Upper Cover Ass' y		
1-9	37-1403006-34	Screw, ϕ3x6 Tap4 Round+Ni		
1-10	98-0180071-00	Main PCB-A Ass' y		
1-11	98-0180016-00	PCB-I Ass' y		
1-12	37-1402005-31	Screw, ϕ2x5		
1-13	98-0130055-00	Front Cover Ass' y		
1-14	98-0130069-00	Cutter Module		
1-15	98-0180060-00	Lower Cover Ass' y		
1-16	52-0300021-21	Screw, M3x6 Round + Ni		
1-17	32-0130015-00	Hinge Shaft		
1-18	30-0130041-00	Stopper		
1-19	80-ULN2003-00	Cutter Driver IC		
1-20	80-PBL3717-00	DC Motor, Stepping Motor Driver IC		
1-21	82-029C040-00	Flash Memory		

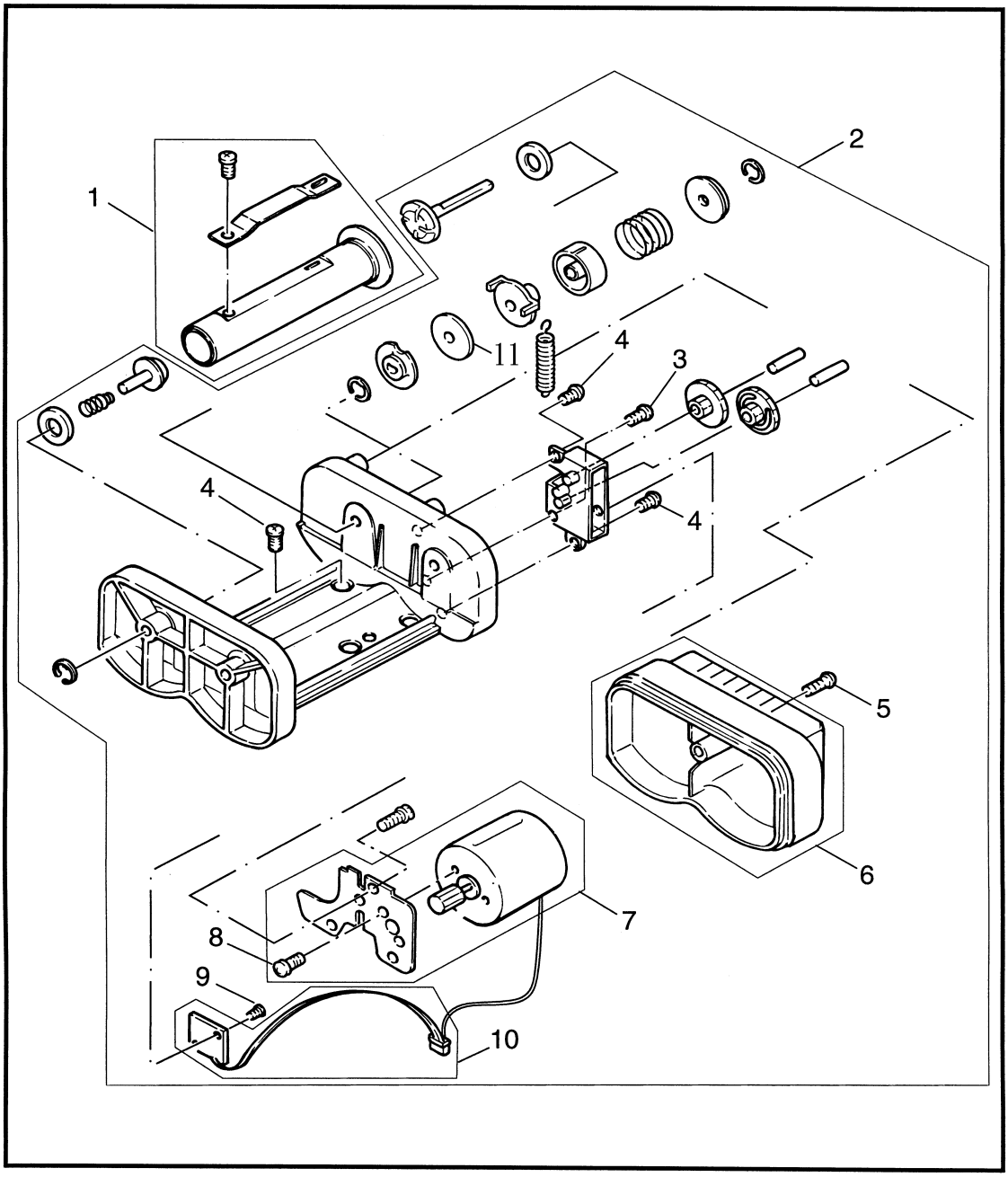
① Cover and Panels



② Ribbon Mechanism Assembly

Ref. No.	Part No.	Description	Remarks	List Price
2-1	98-0130019-10	Ribbon Spindle Ass' y		
2-2	98-0180009-10	Ribbon Mechanism Ass' y		
2-3	37-1403005-32	Screw, ϕ3x5 Tap4 Round + Black		
2-4	37-1403008-34	Screw, ϕ3x8		
2-5	37-1203510-31	Screw, ϕ3.5x10 Tap2 Round + Yellow		
2-6	30-0130014-10	Ribbon Base Side Cover		
2-7	98-0180011-10	DC motor Ass' y		
2-8	37-1502604-34	Screw, M2.6x4 Round + Ni		
2-9	37-1201705-24	Screw, ϕ1.7x5 Tap2 Flat + Ni		
2-10	98-0180015-10	PCB-F Ass' y (ribbon rewind DC motor)		
2-11	36-0180002-00	Felt Fabric		

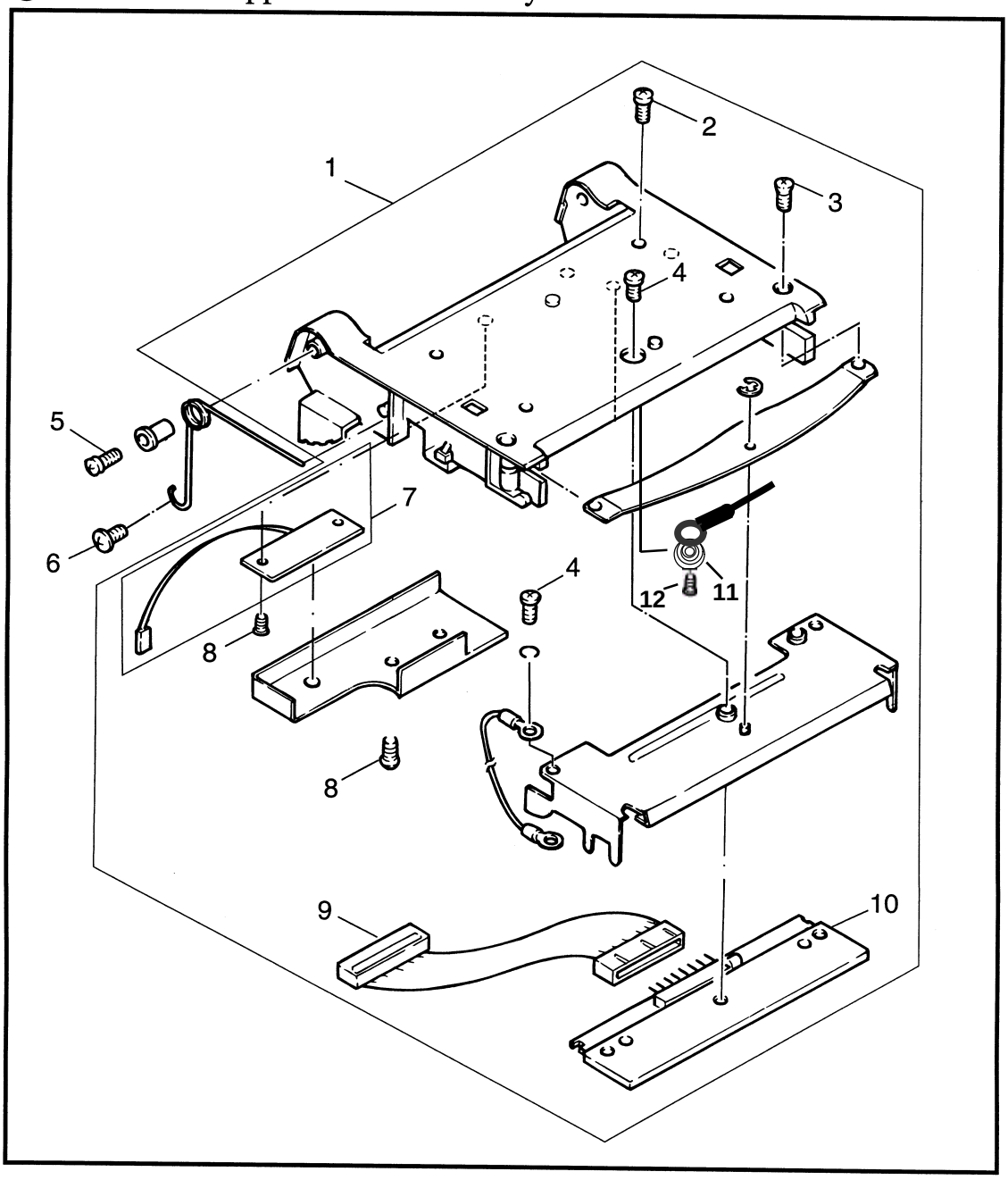
② Ribbon Mechanism Assembly



③ Mechanism Upper Cover Assembly

Ref. No.	Part No.	Description	Remarks	List Price
3-1	98-0180069-00	Mechanism Upper Cover Ass' y		
3-2	37-1403008-34	Screw, ϕ3x8		
3-3	37-1202612-22	Screw, ϕ2.6x12 Tap4		
3-4	37-1503006-34	Screw, M3x6 Round + Ni		
3-5	37-1403015-32	Screw, ϕ3x15 Tap4 Round + Ni		
3-6	37-1403508-52	Screw, ϕ3.5x8		
3-7	98-0180012-00	PCB-G Ass' y (Ribbon sensor)		
3-8	37-1201705-24	Screw, ϕ1.7x5 Tap2 Flat + Ni		
3-9	72-0050003-00	Flat Cable		
3-10	64-0010011-00	Thermal Head		
3-11	32-0130041-20	TPH Head-Up Spring		
3-12	37-1201703-32	Screw, ϕ1.7x3		

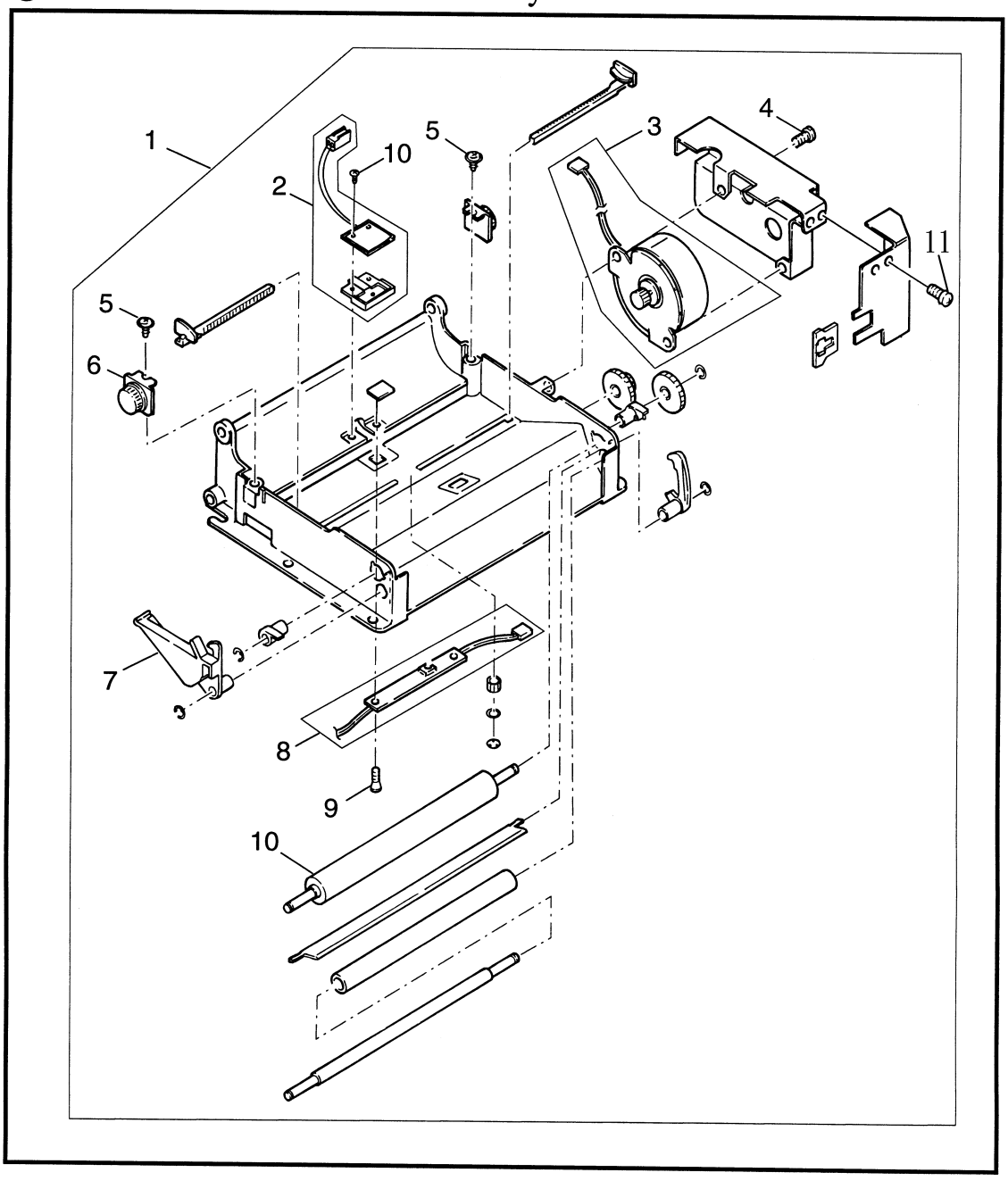
③ Mechanism Upper Cover Assembly



④ Mechanism Lower Cover Assembly

Ref. No.	Part No.	Description	Remarks	List Price
4-1	98-0180070-00	Mechanism Lower Cover Ass' y		
4-2	98-0180013-00	PCB-D Ass' y (Gap/Ribbon Sensor)		
4-3	65-0010005-00	Stepping Motor		
4-4	37-1403008-34	Screw, ϕ3x8		
4-5	37-1403006-74	Screw, ϕ3x6 Tap4 Round/W + Ni		
4-6	36-0130002-00	Damper		
4-7	30-0130053-10	Printer Carriage Release Lever (L)		
4-8	98-0180014-00	PCB-E1 Ass' y		
4-9	37-1201705-24	Screw, ϕ1.7x5 Tap2 Flat + Ni		
4-10	36-0130001-40	Platen		
4-11	37-1503004-14	Screw M3x4		

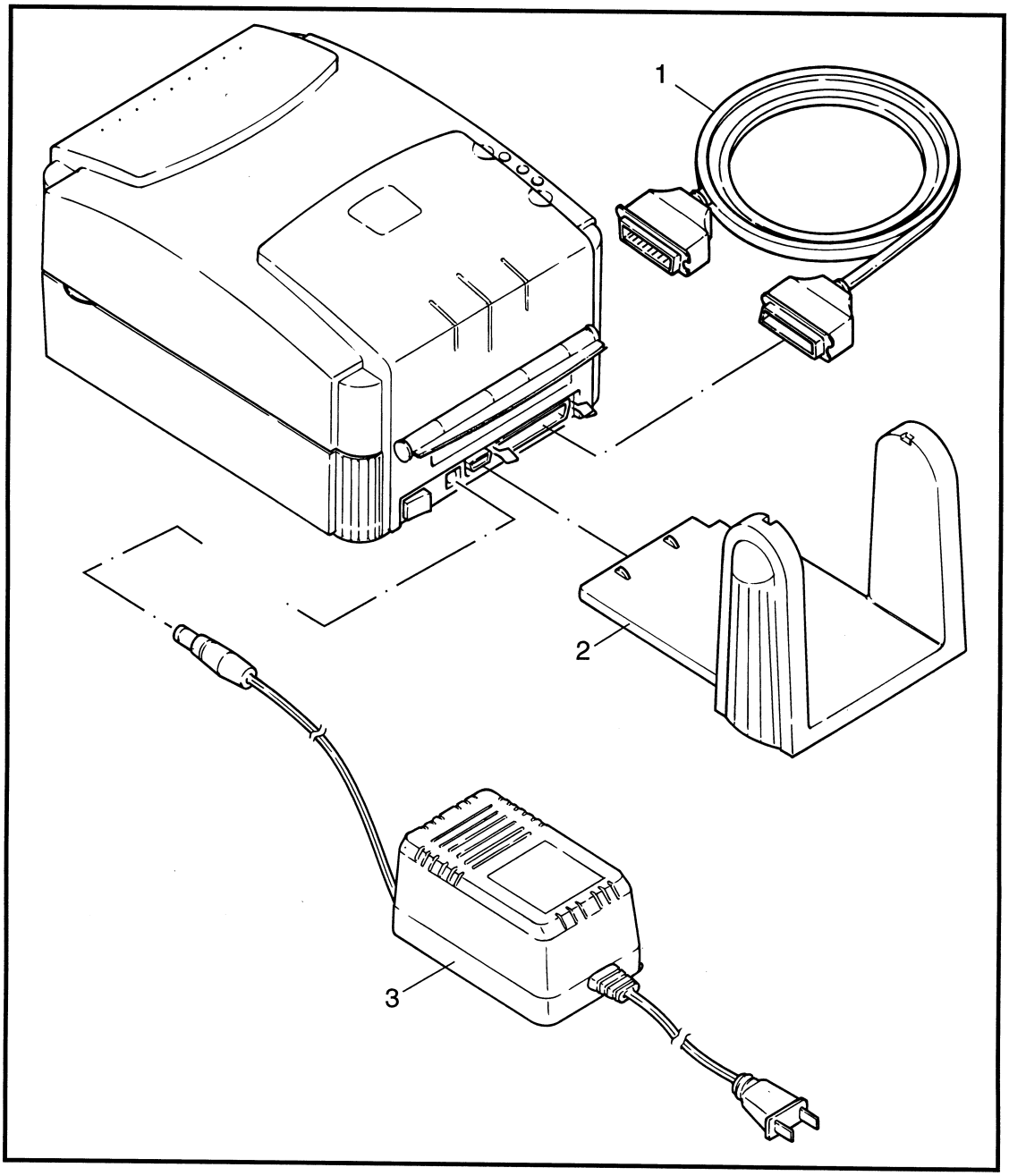
④ Mechanism Lower Cover Assembly



⑤ Accessories

Ref. No.	Part No.	Description	Remarks	List Price
5-1	72-0010001-00	Parallel Port Cable		
5-2	98-0130050-00	External Label Roll Mount Ass' y		
5-3	62-0130003-01	Power Adapter		
5-5	36-0130038-00	Print Head Cleaning Pen	Option	

⑤ Accessories



5. TROUBLE SHOOTING

5.1 Error Messages

Syntax Error:
The command format is incorrect. Check user' s manual to be sure.
The serial port setting is incorrect. Check DIP switch and reset the printer.

Out of Range:
Numeric input is too large to be processed.
The input string is too long to be stored.
The size of the text of bar code exceeds that of the label.

Download Error:
The format of the downloaded file is incorrect.
There is not enough memory to store the file.

Stack Overflow:
Program contains too complex mathematical expressions. Divide into several expressions.
There is too much nested routine.

Memory Error:
Too many variables defined.

RS-232 Error:
The serial port setting is incorrect.

File Not Found:
Cannot open the file specified. Download the file again.

Type Mismatch:
Variable type mismatch.

Gap Not Found:
Cannot detect label edge. Calibrate the backing paper again.

Clock Access Error:
Can not read from/write to the clock.

5.2 Trouble Shooting

Problems	Solutions
1. Ribbon does not advance.	Check the printing mode setting and reset the printer.
2. Poor print quality.	Clean the print head. Adjust the print density setting.
3. Only prints diagonal pattern in the self-test.	Ribbon and paper are incompatible. Use a different type of ribbon.
4. Power indicator light does not illuminate.	Check the connection of serial port cable.
5. On-line indicator light does not to illuminate.	Check the DIP switch setting and reset the printer. Check that power cord is properly connected.
6. Error indicator remains illuminated.	Out of paper or out of ribbon. Check the DIP switch setting Check the paper core, make sure it is installed on the ribbon rewind spindle. Press the FEED key. The error message will be printed out on the print media or sent out through RS-232 port. If there is no problem with direct thermal printing, but error occurs in thermal transfer printing. Please check the encoder of the DC motor.

5.3 Calibrate the Gap Register

1. Install the label.
2. Turn on the printer power while pressing the PAUSE button. The printer will calibrate the transparency of the backing paper and adjust the gap register.

5.4 Self-test

1. Install the label.
2. Turn on the printer power while pressing the FEED button, the printer will:
   (1) Print head checking pattern.
   (2) Calibrate the label length.
   (3) Print internal settings.
   (4) Initiate self-test.
   (5) Enter dump mode.

5.5 Ram Clear

Press the PAUSE and FEED button simultaneously for more than 3 seconds. The printer will clear the memory and reset the printer.
Be sure to calibrate the gap register with blank label before printing.

5.6 Diagnosis Operation Procedure

When the power is turned on without any button pressed, self diagnosis is performed automatically to test the available memory. If any error occurs during this period, the ERR light will flash.

Do the self test and inspect the test pattern to check if the thermal head is available.

5.7 Testing Sensors

A. Checking Ribbon Sensor

Switch the multimeter to the DC gear. Connect the black wire to DC GND, and the red wire to PIN2 of JP2.

1. When ribbon is detected between TX and RX of the ribbon sensor, the measured voltage should be 5 Vdc.
2. When ribbon is not detected between TX and RX of the ribbon sensor, the measured voltage should be 0 Vdc.

The ribbon sensor is normal if the checking complies with the two cases above. Or else, the ribbon sensor is out of order.

B. Checking DC Motor Encoder Sensor

Switch the multimeter to the DC gear. Connect the black wire to DC GND, and the red wire to PIN2 of JP6.

1. When gap of the gear box is detected by the DC motor encoder sensor, the measured voltage should be 5 Vdc.
2. When gap of the gear box is not detected by the DC motor encoder sensor, the measured voltage should be 0 Vdc.

The DC motor encoder sensor is normal if the checking complies with the two cases above. Or else, the DC motor encoder sensor is out of order.

C. Checking Gap Sensor

Do gap calibration first by holding the Pause button and activating the printer power at the same time. If the calibration result is correct, go on and check the gap sensor. Switch the multimeter to the DC gear. Connect the black wire to DC GND, and the red wire to PIN2 of JP5. Load label on the printer.

1. When gap (backing paper only) is detected between TX and RX of the gap sensor, the measured voltage should be 0 Vdc.
2. When gap (backing paper only) is not detected between TX and RX of the gap sensor, the measured voltage should be 5 Vdc.

The gap sensor is normal if the checking complies with the two cases above. Or else, the gap sensor is out of order.

D. Checking Black Line Sensor

Switch the multimeter to the DC gear. Connect the black wire to DC GND, and the red wire to PIN2 of JP4. Load black line label on the printer.

1. When black line is detected by the black line sensor, the measured voltage should be 5 Vdc.
2. When black line is not detected by the black line sensor, the measured voltage should be 0 Vdc.

The black line sensor is normal if the checking complies with the two cases above. Or else, the black line sensor is out of order.

E. Checking Peel Off Sensor

Switch the multimeter to the DC gear. Connect the black wire to DC GND, and the red wire to PIN6 of JP3.

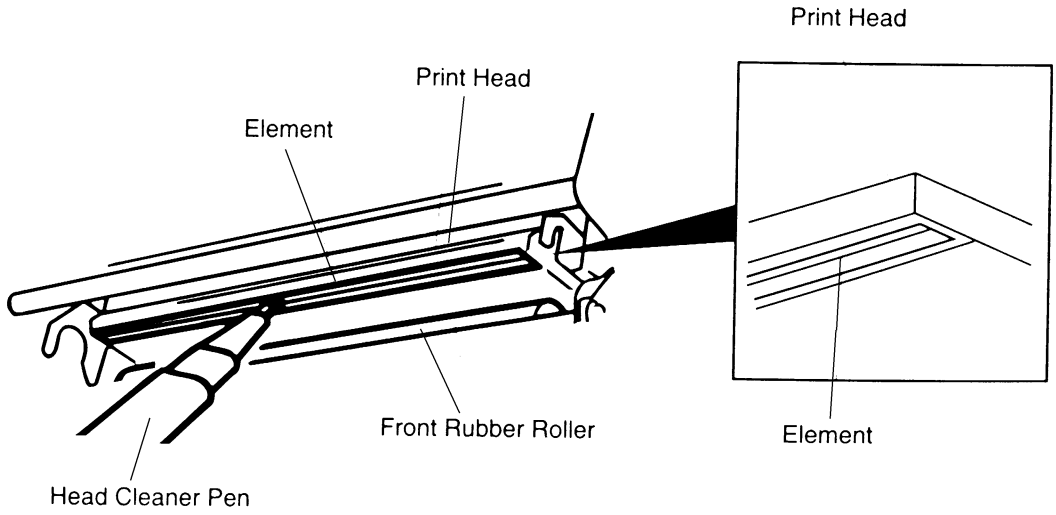
1. When label is detected by the peel off sensor, the measured voltage should be 0 Vdc.
2. When label is not detected by the peel off sensor, the measured voltage should be 5 Vdc.

The peel off sensor is normal if the checking complies with the two cases above. Or else, the peel off sensor is out of order.

5.8 Cleaning the Print Head

The printer should be cleaned regularly to retain high quality and optimum performance. The greater the usage of the printer, the more frequent the cleaning.

1. Turn the power off
2. Open the printer cover.
3. Open the printer carriage by pulling up the release lever to the left of the front rubber roller.
4. Remove the ribbon and label.
5. Clean the print head element with a head cleaner pen.
6. Clean the front rubber roller with a piece of alcohol moistened cloth.



Precaution

This service manual is intended for use by service technicians, and designed as a guide for repair & maintenance. The manual is intended to promote smooth service operations of the product in the market place. It is not intended for any other purpose such as development or product specifications. For questions regarding development or product specifications, please contact directly to the TAIWAN SEMICONDUCTOR.

This manual may be changed or revised without notice. If you find any misprints or omissions, please contact directly to the TAIWAN SEMICONDUCTOR promptly. (Facsimile No. +886-2-2912-2499)

TOSHIBA TEC and TAIWAN SEMICONDUCTOR cannot be held responsible for any trouble which have been caused by misprints or omissions.

Safety Summary

Personal safety in handling or maintaining the equipment is extremely important. Warnings and Cautions necessary for safe handling are included in this manual. All warnings and cautions contained in this manual and written inside or outside of the printer should be read and understood before handling or maintaining the equipment.

Never modify the machine. Except for the addition of options as specifically provided for in the service manual, change or modifications to the machine are not approved. Unauthorized changes or modifications may not comply with your country's safety standards.

Safety Precaution

Electrical equipment is dangerous. Electrical shock from such equipment can cause death. Never operate electrical equipment unless authorized to do so by a responsible authority.
In emergency work on electrical equipment is authorized, be sure that it is performed in strict compliance with approved safety regulations.

The following safety precautions will help to ensure proper use of the printer:

- Turn off the printer before 1) opening the top cover for any reason, 2) attaching/detaching any cable and memory cards, and 3) changing the dip switch setting.
- Disconnect the power cord whenever you are working inside the printer.
- Keep your work environment static free.