TOSHIBA

TOSHIBA Barcode Printer

# B-SV4T SERIES

## Printer Manual

Document No. **EO18-33019**

Original **Jun., 2007**

(Revised )

This manual includes the contents of the Product Descrption, Maintenance Manual, and Circuit Description.

PRINTED IN JAPAN

TOSHIBA TEC CORPORATION

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***CAUTION!***

1. *This manual may not be copied in whole or in part without prior written permission of TOSHIBA TEC.*
2. *The contents of this manual may be changed without notification.*
3. *Please refer to your local Authorised Service representative with regard to any queries you may have in this manual.*

# 1. FUNDAMENTAL OF THE SYSTEM

## 1.1 Overview

### 1.1.1 Front View

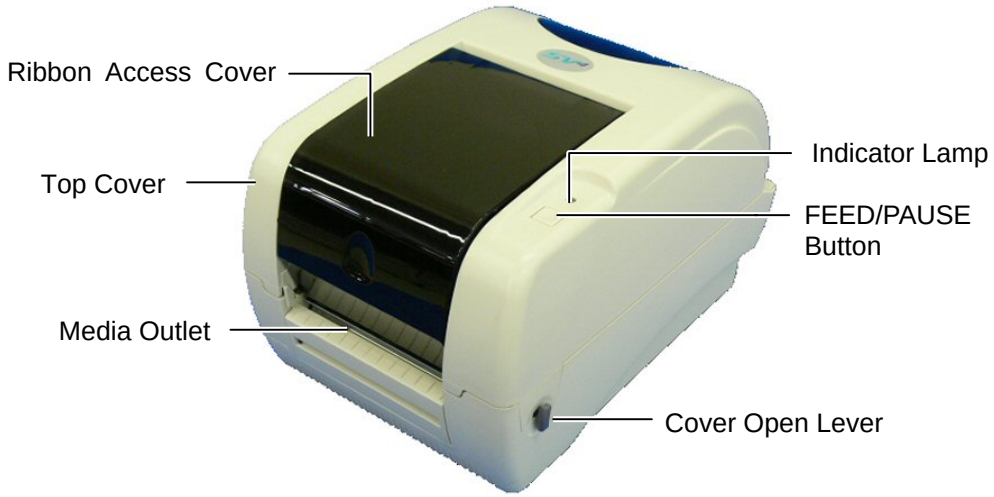



Fig. 1-1 Front View

### 1.1.2 Rear View

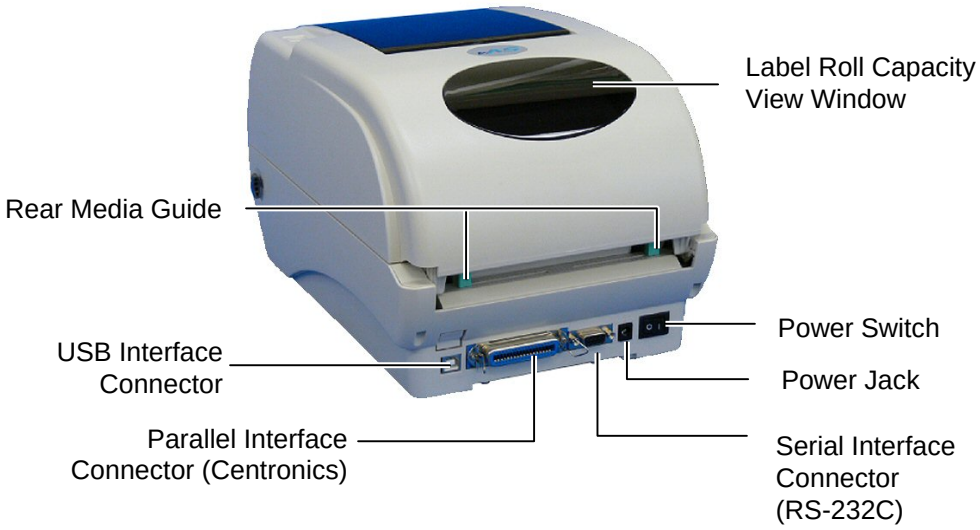



Fig. 1-2 Rear View

### 1.1.3 Interior View

| ***WARNING!*** |
| --- |
| *Do not touch the print head or around it just after printing. You may get burned as the print head becomes very hot during printing.* |

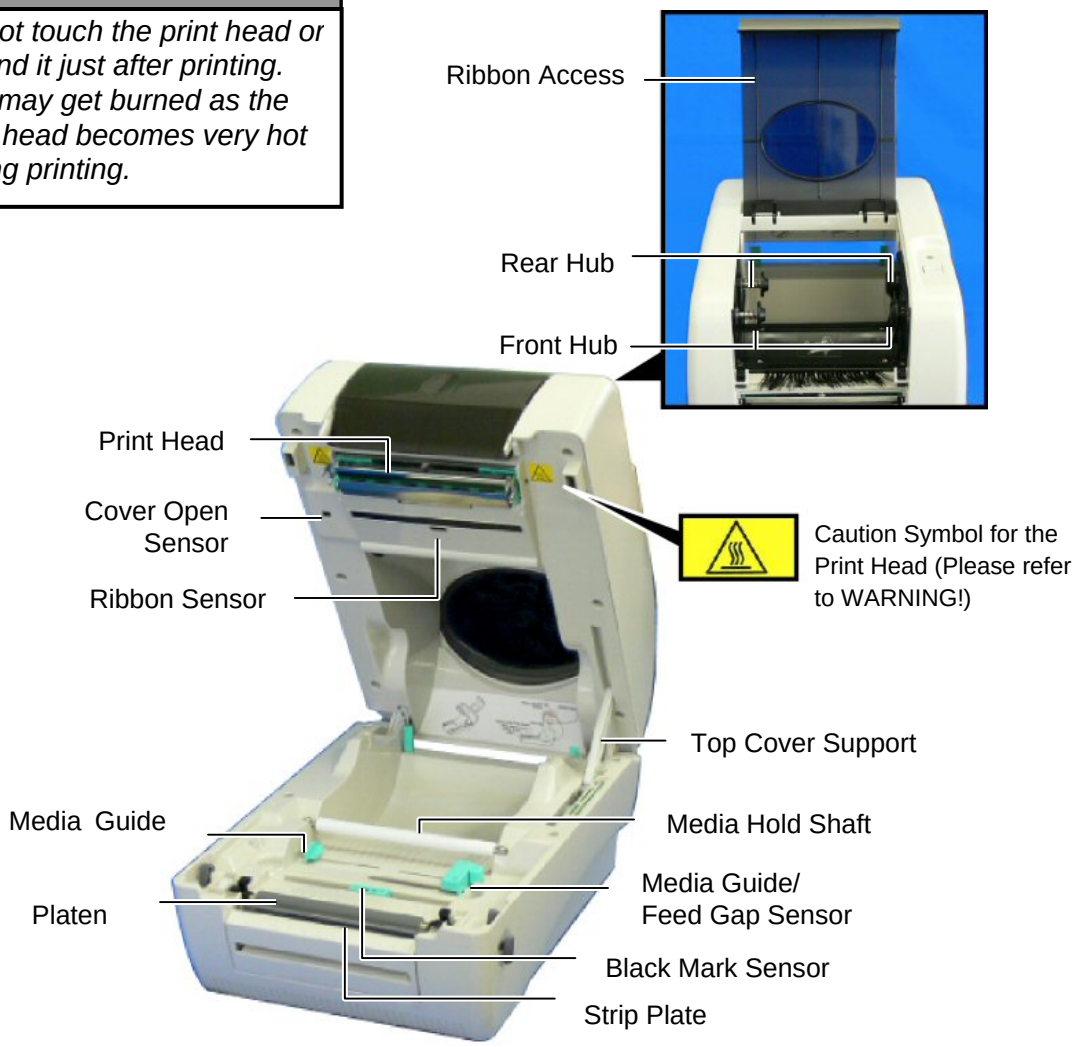



Fig.2 Interior View

## 1.2 Indications in Model No.

**B – S V 4 T– G S 10–QM**

- Destination code
  - QM: Worldwide
- Interface
  - 10: USB, RS-232C, Centronics
- Printer type
  - S: Standard
  - C: Cutter
- Resolution
  - G: 8 dots/mm
- Print method
  - T: Thermal direct or Thermal transfer
- Print width
  - 4: 4 inches

# 1.3 Specification

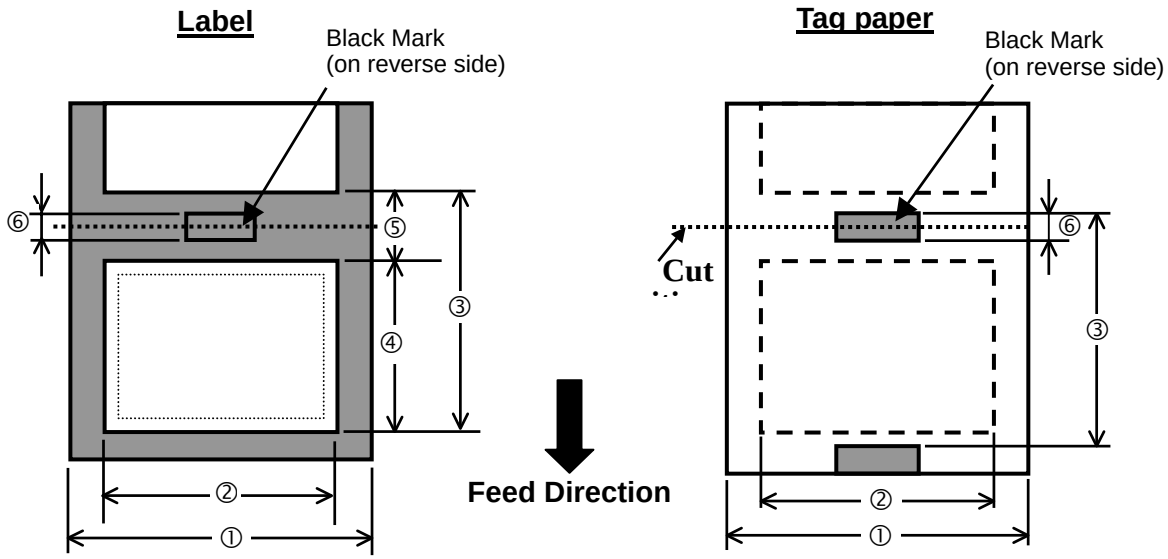
## 1.3.1 Printer

| Item | B-SV4T |
|---|---|
| ***Mechanism*** | |
| Resolution | 203 dpi. |
| Max. Print Width<br>Max. Print Length<br>Ribbon Capacity | 108 mm.<br>609.6 mm ( 24" ).<br>300 meter with 1" core. (Max. Outside diameter: 67 mm) |
| Printing Speed<br>*Strip function* | 2, 3, 4 and 5 ips selectable.<br>2, 3 ips selectable |
| Printing Method | Direct thermal and thermal transfer printing. |
| ***Enclosure***<br>Structure<br>Dimension<br>Operation Panel | <br>Double-walled plastic.<br>Standard Model: 314mm(L) x 213mm(W) x 188mm(H)<br>One push switch, and one indicator LED (Green, Orange, Red colors). |
| ***Hardware***<br>Sensor<br><br><br><br><br>Memory<br><br>Interface<br><br><br>Power | <br>Transmissive sensor (offset 6 mm from liner edge).<br>Reflective sensor (position adjustable).<br>Head open sensor.<br>Ribbon sensor<br>1M byte Flash memory<br>2M bytes DRAM<br>RS-232C (max baud rate, 57600 bps).<br>USB: V1.1.<br>Centronics SPP mode.<br>AC input: 100-240V universal auto switching power supply.<br>DC output: 24V 3.75A. |
| ***Firmware***<br>Font Type<br>Rotation<br>Barcode Format<br><br><br><br>Command Set | <br>8 alpha-numeric bitmap fonts, and 1 true type font.<br>0, 90,180 and 270 degrees.<br>Code 39, Code 93, Code 128UCC, Code128 subsets A.B.C, Codabar, Interleave 2 of 5, EAN-8, EAN-13, EAN-128, UPC-A, UPC-E, EAN and UPC2(5) digits add-on, MSI, PLESSEY, POSTNET, PDF-417, Maxicode, DataMatrix., Reduced Space Symbology (RSS)<br>TPCL |
| ***Environment*** | |
| Operation | Temperature: 5°C ~ 40°C.<br>Relative Humidity: 25% ~ 85% (Non Condensing). |
| Storage | Temperature: -40°C~ 60°C.<br>Relative Humidity: 10% ~ 90% (Non Condensing). |

# 1.4 Supply Specification

## 1.4.1 Media

This direct thermal printer is specifically designed for thermal media. The table below shows the size and shape of the media that can be used on this printer.




Unit: mm (inch)

| Item \ Issue mode | | Batch mode | Strip mode | Cut mode |
|---|---|---|---|---|
| ① Width including backing paper | | 20 to 112 (0.8 to 4.4) | | |
| ② Media width | | 17 to 109 (0.7 to 4.3) | | |
| ③ Media pitch | Label | 12 to 609.6<br>(0.5 to 24.0) | 27.4 to 154.4<br>(1.1 to 6.1) | 27.4 to 609.6<br>(1.1 to 24.0) |
| | Tag | 10 to 609.6<br>(0.4 to 24.0) | ----- | 25.4 to 609.6<br>(1.1 to 24.0) |
| ④ Media length | | 10 to 607.6<br>(0.4 to 23.9) | 25.4 to 152.4<br>(1.1 to 6.0) | 25.4 to 607.6<br>(1.1 to 23.9) |
| ⑤ Gap length | | Min. 2 (0.08) | | Min. 6 (0.2) |
| ⑥ Black mark length | | Min. 2 (0.08) | | |
| Thickness | | 0.06 to 0.19 (0.002 to 0.007) | | |
| Max. outer roll diameter | | Ø127 (5)<br>Ø214 (8.4): When the optional External Media Roll Hanger is used. | | |
| Roll direction | | Outside | | |
| Inner core diameter | | 25.4, 38.1, or 76.2 (1, 1.5, or 3) (See NOTE 2.) | | |

***Note***

*(1). To ensure print quality and print head life use only TOSHIBA TEC approved media.*
*(2). When using a media roll of 76.2-mm (3") inner core diameter, the 3"-Diameter Media Shaft included in the optional External Media Roll Hanger is required.*
*(3). The width and thickness quoted above are said of the label plus its backing paper.*
*(4). Likewise, the approval of label entails that of its backing paper.*
*(5). In the strip mode, the minimum pitch is 27.4 mm.*
*(6). In the cutter mode, it is required the paper be wound outside. Otherwise, paper jam tends to result.*
*(7). In the cutter mode, the paper thickness is **0.19 mm** at maximum, and the paper weight is **150 g/m$^2$** at maximum.*
*(8).Paper shape is as shown in Fig. (1)*
*(9).Tag is **0.19 mm** in thickness, and is less than **150g/m$^2$** in weight.*

## Label Detection

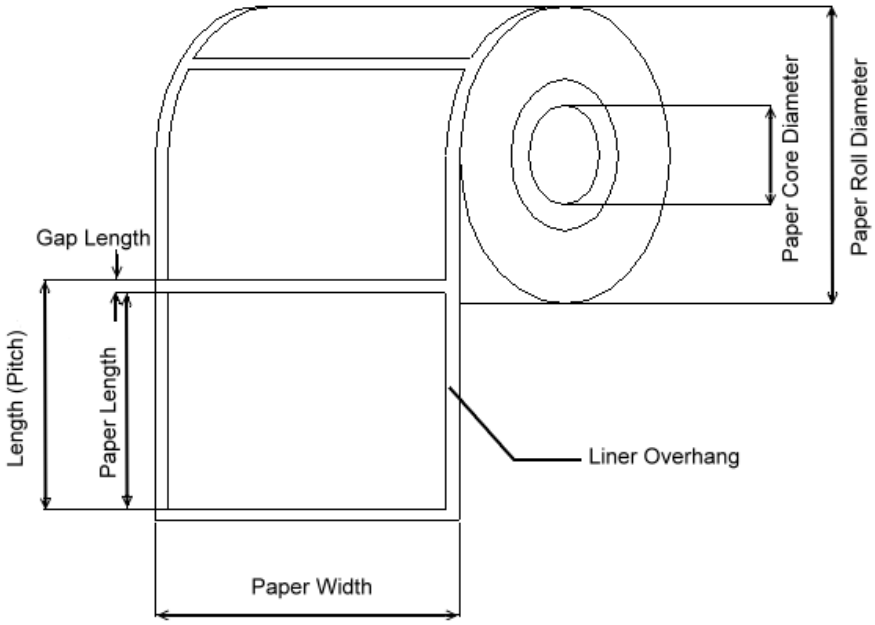



**Figure (1) Regular Label (Die-Cut)**

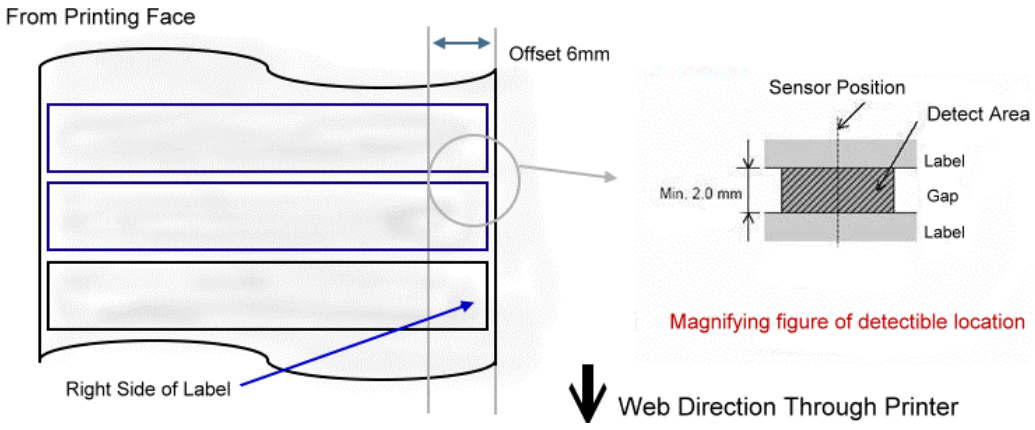



**Figure (2) Transmissive sensor detection**

In B-SV4T, transmissive sensor is located in the right side of label guide, which detects at 6 mm from the liner edge of media，the detectible range, at least, offset 6 mm. Regarding the label, the detectible function only can be used at this way. The minimun lengh of gap is 2 mm and the the detectible range is 8 mm.

## Black Mark Detection

The reflective sensor is full range moveable for detecting the black mark and nutchf. The scope of black mark length detection is min. 2.0 mm, max. 3.81 mm and min. black mark width 8mm.

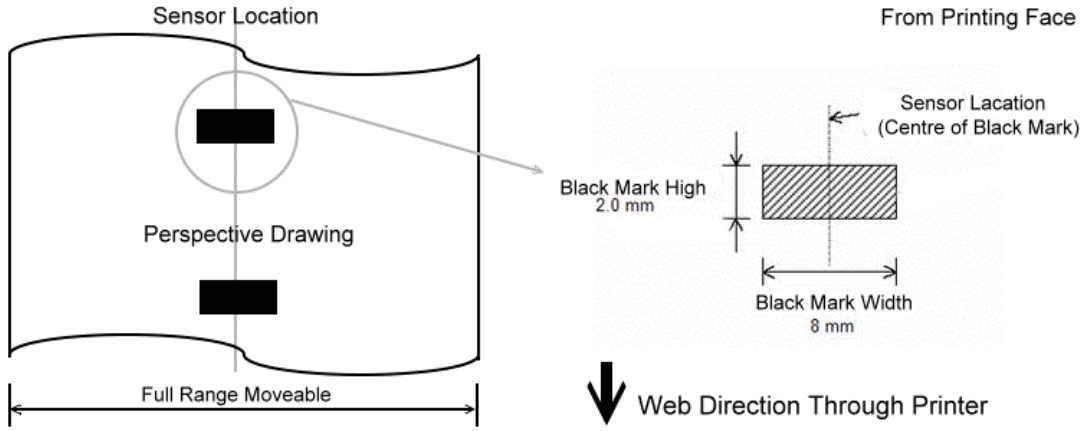



**Figure (3) Black Mark Detection**

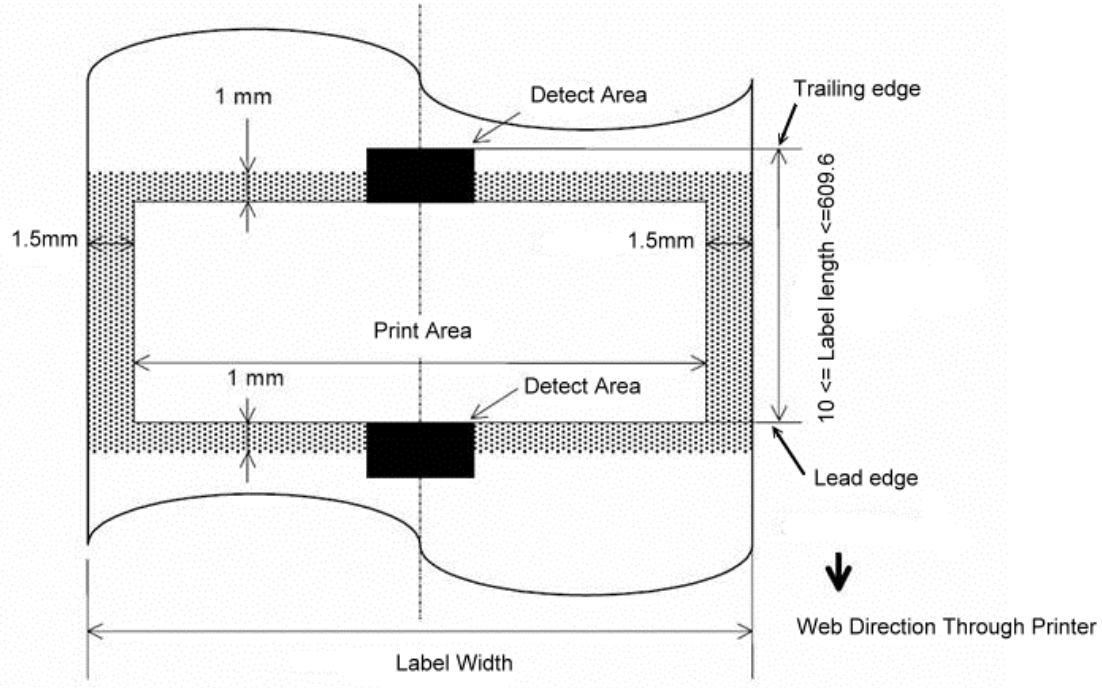



**Figure (4)**

***NOTE***

*(1). Leading edge of black mark is congruent with trailing edge of butt label or tag.*

*(2). The mark-offset error from the trailing edge is +/- 0.76mm (+/- 0.030").*

*(3). Attached hole maybe used as a black mark sensor. Oval / Rectangular attached hole is recommended.*

## Rectangular Aperture Detection

If the rectangular aperture located at the center of label/tag, please use the reflective sensor. Inside of the up–cover has a Black Mark, this is aimed for aperture or transparent label/tag.

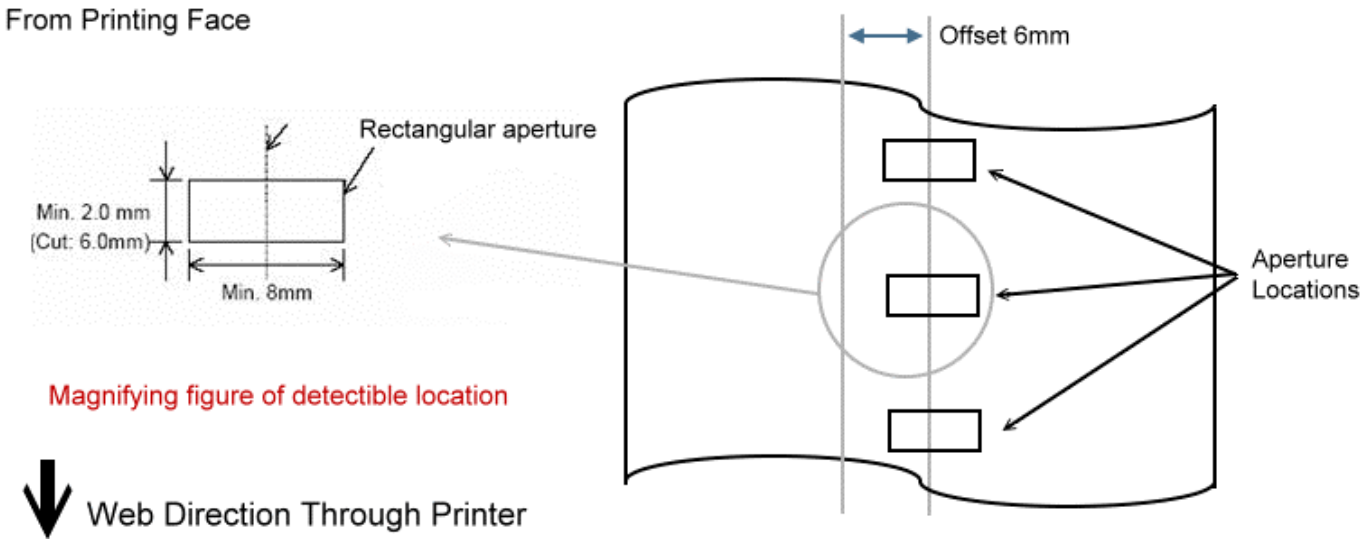



**Figure (5)**

## 1.4.2 Ribbon Sizes and Shapes Specifications

Please make sure that the ribbon being used is approved by TOSHIBA TEC. The warranty does not apply to any problem caused by using non-approved ribbons.

For information regarding TOSHIBA TEC approved ribbon, please contact a TOSHIBA TEC service representative.

| | |
|---|---|
| Type | Spool type |
| Width | 40 mm to 110 mm |
| Length | Depends on its thickness and outside diameter of core. |
| Max. outside diameter | ∅67 mm |
| Outside diameter of core | 25.7 ±0.3 mm |
| Roll direction | Outside |
| End tape | Polyester film (transparent) or silver film (opaque)<br>250 ±5 mm long |

***NOTICE:***

*1.Ribbon sensor is reflective sensor, Transparent film or light reflection (silver film) is recommended in the end of ribbon.*

*2. 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.

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

**L = Ribbon length**

**D = Max. roll diameter**

**d = Ribbon core outside diameter**

**t = Ribbon thickness**

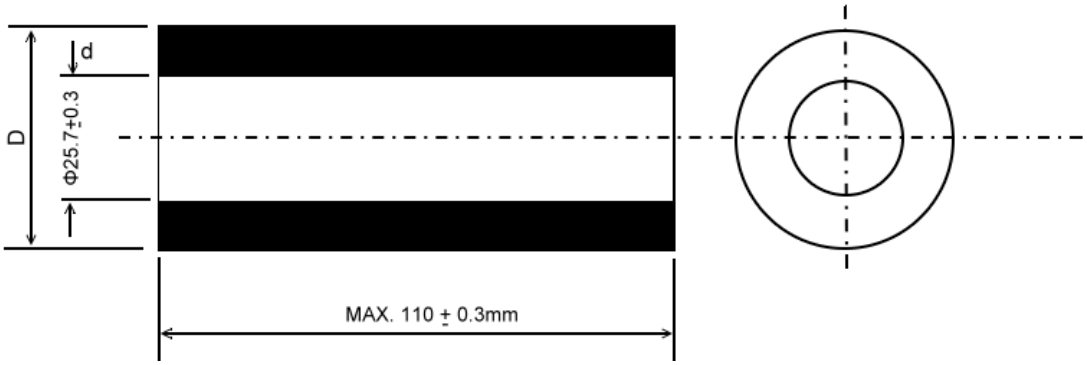



**Figure (7)**

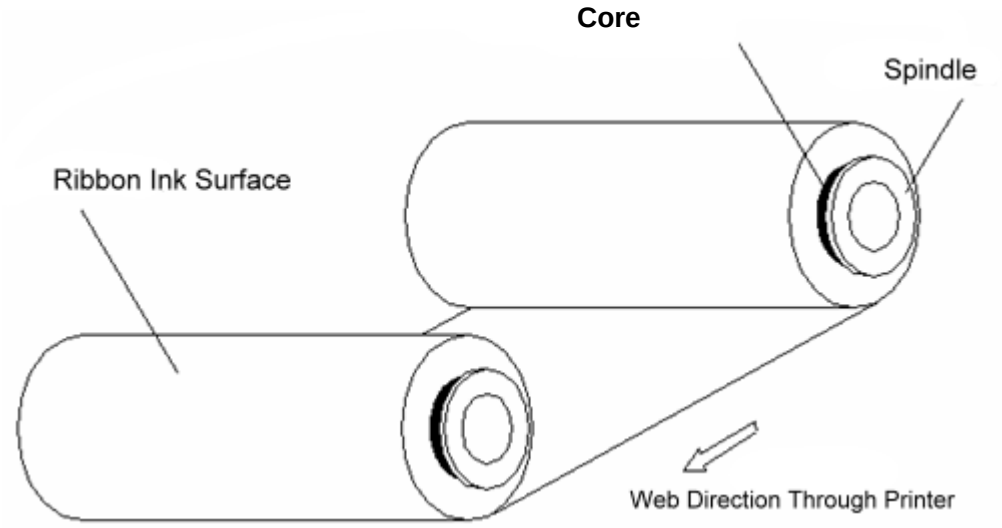



**Figure (8)**

## Approved Ribbons

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

| Ribbon model name | Brand |
|---|---|
| TR45 | Fuji-Copian |
| DW-350 | DNP |
| AWR-470 * | ARMOR |
| B-110A | RICOH |
| B-110C | RICOH |
| TR4085 | Sony Chemical |
| TR4065 * | Sony Chemical |
| TR4070 | Sony Chemical |

**NOTE**

*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 5 inch per sec.*

# 2. ELECTRONICS

## 2.1 Circuit Description

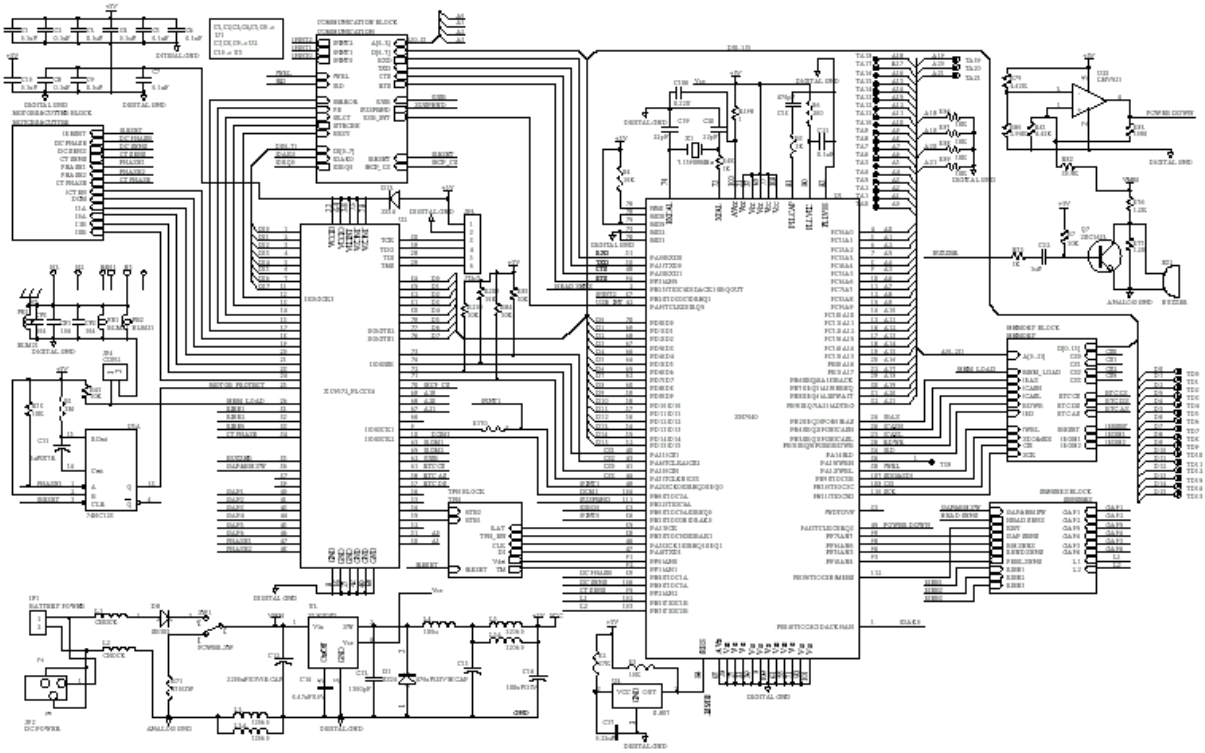


**Fig. 3 Circuit Diagram**

The main PCB ass'y of printer includes 10 system blocks:

1. MCU.
2. Memory System.
3. Decoder System.
4. Print Head System.
5. Motor System.
6. Power System.
7. Communication Interface System.
8. USB System.
9. Sensor System.
10. Cutter System.

The following figure shows the PCB system areas:

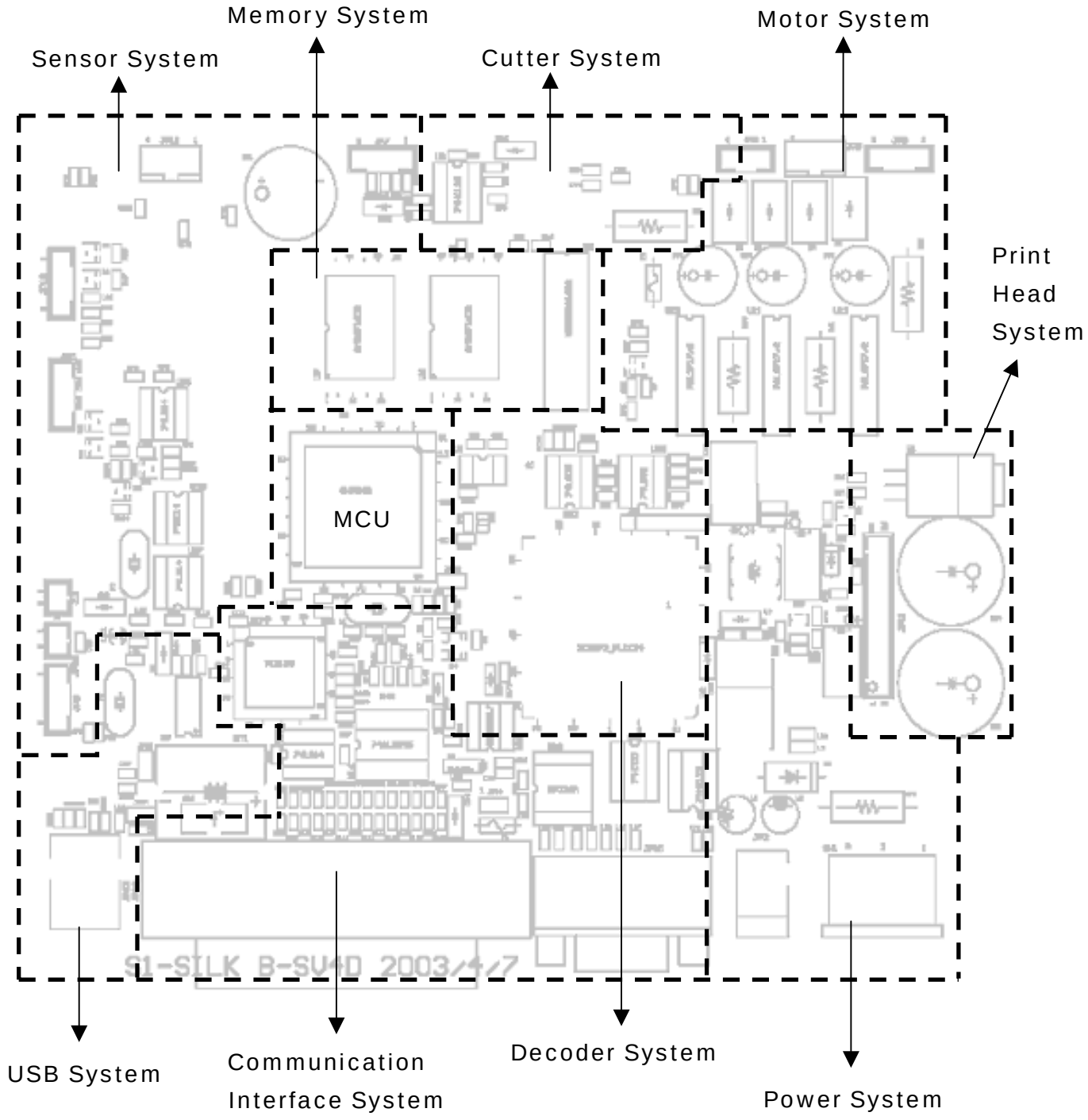



**Fig. 4 PCB System Areas Diagram**

## 2.2 MCU Circuit and MCU PIN Description

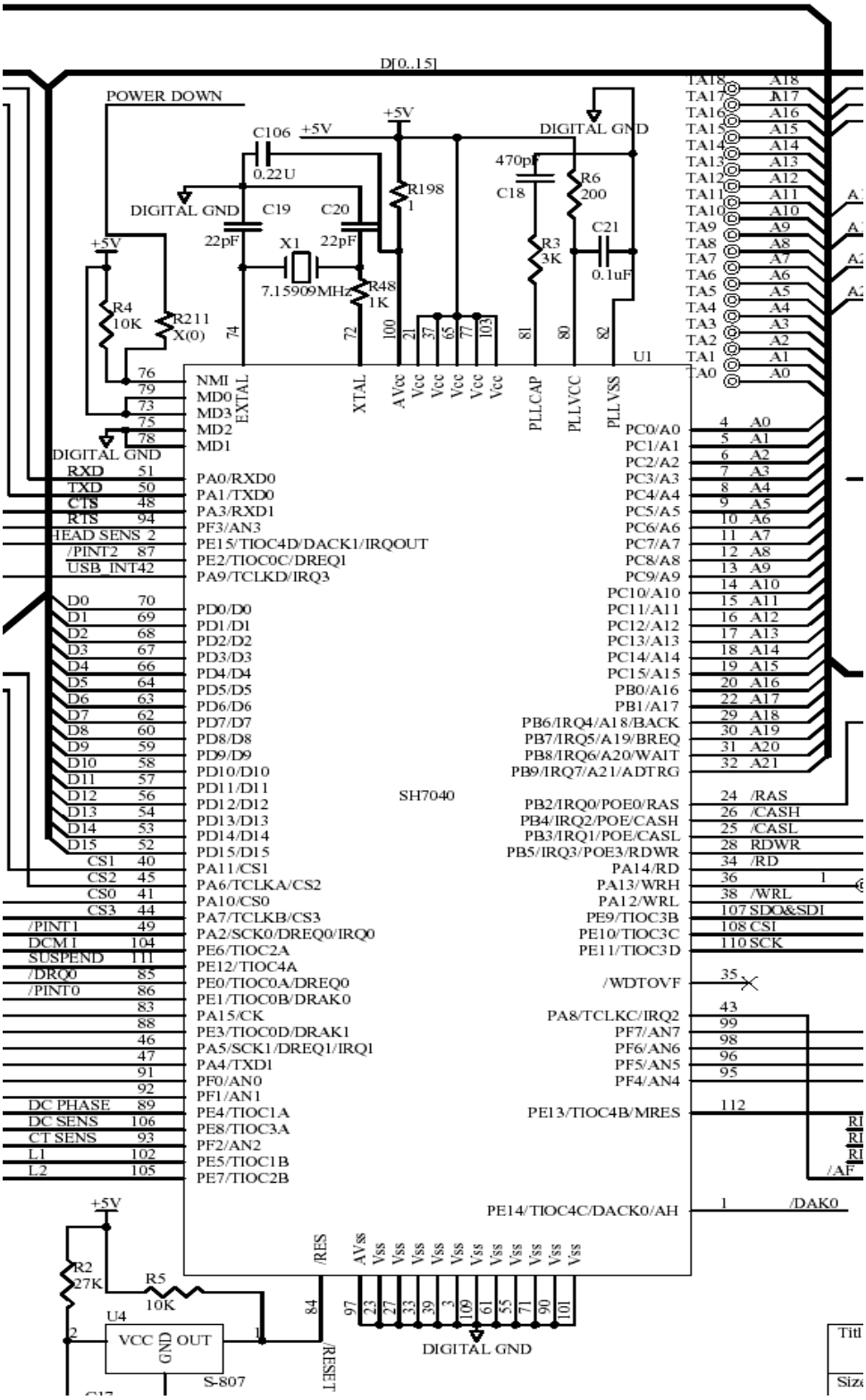



**Fig. 5 MCU PIN Description Diagram**

## 2.2.1 MCU PIN Description:

| Classification | Symbol | I/O | Name | Function |
|---|---|---|---|---|
| Power supply | $V_{CC}$ | I | Supply | Connects to power supply.<br>Connect all $V_{CC}$ pins to the system supply. No operation will occur if there are any open pins. |
| | $V_{SS}$ | I | Ground | Connects to ground.<br>Connect all $V_{SS}$ pins to the system ground. No operation will occur if there are any open pins. |
| | $V_{PP}$ | I | Program supply | Connects to the power supply ($V_{CC}$) during normal operation.<br>When in PROM mode, apply 12.5 V. |
| Clock | PLLVCC | I | PLL supply | On-chip PLL oscillator supply. |
| | PLLVSS | I | PLL ground | On-chip PLL oscillator ground. |
| | PLLCAP | I | PLL capacitance | On-chip PLL oscillator external capacitance connection pin. |
| | EXTAL | I | External clock | Connect a crystal oscillator. Also, an external clock can be input to the EXTAL pin. |
| | XTAL | I | Crystal | Connect a crystal oscillator. |
| | CK | O | System clock | Supplies the system clock to peripheral devices. |
| System control | $\overline{RES}$ | I | Power-on reset | Power-on reset when low |
| | $\overline{MRES}$ | I | Manual reset | Manual reset when low |
| | $\overline{WDTOVF}$ | O | Watchdog timer overflow | Overflow output signal from WDT |
| | $\overline{BREQ}$ | I | Bus request | Goes low when external device requests bus right release |
| | $\overline{BACK}$ | O | Bus request acknowledge | Indicates that bus right has been released to external device. The device that output the $\overline{BREQ}$ signal receives the $\overline{BACK}$ signal, notifying the device that it has obtained the bus right. |

| Classification | Symbol | I/O | Name | Function |
|---|---|---|---|---|
| Operating mode control | MD0–MD3 | I | Mode set | Determines the operating mode. Do not change input value during operation. |
| | FWP | I | Flash memory write protect | Protects flash memory from being written or deleted. |
| Interrupts | NMI | I | Non-maskable interrupt | Non-maskable interrupt request pin. Enables selection of whether to accept on the rising or falling edge. |
| | $\overline{\text{IRQ0}}$–$\overline{\text{IRQ7}}$ | I | Interrupt requests 0–7 | Maskable interrupt request pins. Allows selection of level input and edge input. |
| | $\overline{\text{IRQOUT}}$ | O | Interrupt request output | Indicates that interrupt cause has occurred. Enables notification of interrupt generation also during bus release. |
| Address bus | A0–A21 | O | Address bus | Outputs addresses. |
| Data bus | D0–D15 (QFP-112)<br>D0–D31 (QFP-144) | I/O | Data bus | 16-bit (QFP-112 pin and TQFP-120 pin versions) or 32-bit (QFP-144 pin version) bidirectional data bus. |
| Bus control | $\overline{\text{CS0}}$–$\overline{\text{CS3}}$ | O | Chip selects 0–3 | Chip select signals for external memory or devices. |
| | $\overline{\text{RD}}$ | O | Read | Indicates reading from an external device. |
| | $\overline{\text{WRH}}$ | O | Upper write | Indicates writing the upper 8 bits (15–8) of external data. |
| | $\overline{\text{WRL}}$ | O | Lower write | Indicates writing the lower 8 bits (7–0) of external data. |
| | $\overline{\text{WAIT}}$ | I | Wait | Input causes insertion of wait cycles into the bus cycle during external space access. |
| | $\overline{\text{RAS}}$ | O | Row address strobe | Timing signal for DRAM row address strobe. |
| | $\overline{\text{CASH}}$ | O | Upper column address strobe | Timing signal for DRAM column address strobe.<br>Output when the upper 8 bits of data are accessed. |

| Classification | Symbol | I/O | Name | Function |
|---|---|---|---|---|
| Bus control (cont) | $\overline{\text{CASL}}$ | O | Lower column address strobe | Timing signal for DRAM column address strobe.<br>Output when the lower 8 bits of data are accessed. |
| | RDWR | O | DRAM read/write | DRAM write strobe signal. |
| | $\overline{\text{AH}}$ | O | Address hold | Address hold timing signal for devices using an address/data multiplex bus. |
| | $\overline{\text{WRHH}}$ (QFP-144) | O | HH write | Indicates the writing of bits 31 to 24 of external data. |
| | $\overline{\text{WRHL}}$ (QFP-144) | O | HL write | Indicates the writing of bits 23 to 16 of external data. |
| | $\overline{\text{CASHH}}$ (QFP-144) | O | HH column address strobe | Timing signal for DRAM column address strobe. Output when bits 31 to 24 of data are accessed. |
| | $\overline{\text{CASHL}}$ (QFP-144) | O | HL column address strobe | Timing signal for DRAM column address strobe. Output when bits 23 to 16 of data are accessed. |
| Bus control multifunction timer/pulse unit | TCLKA<br>TCLKB<br>TCLKC<br>TCLKD | I | MTU timer clock input | Input pins for external clocks to the MTU counter. |
| | TIOC0A<br>TIOC0B<br>TIOC0C<br>TIOC0D | I/O | MTU input capture/ output compare (channel 0) | Channel 0 input capture input/output compare output/PWM output pins. |
| | TIOC1A<br>TIOC1B | I/O | MTU input capture/output compare (channel 1) | Channel 1 input capture input/output compare output/PWM output pins. |
| | TIOC2A<br>TIOC2B | I/O | MTU input capture/output compare (channel 2) | Channel 2 input capture input/output compare output/PWM output pins. |

| Classification | Symbol | I/O | Name | Function |
|---|---|---|---|---|
| Bus control multifunction timer/pulse unit (cont) | TIOC3A<br>TIOC3B<br>TIOC3C<br>TIOC3D | I/O | MTU input capture/output compare (channel 3) | Channel 3 input capture input/output compare output/PWM output pins. |
| | TIOC4A<br>TIOC4B<br>TIOC4C<br>TIOC4D | I/O | MTU input capture/output compare (channel 4) | Channel 4 input capture input/output compare output/PWM output pins. |
| Direct memory access controller (DMAC) | $\overline{\text{DREQ0}}$–$\overline{\text{DREQ1}}$ | I | DMA transfer request (channels 0, 1) | Input pin for external requests for DMA transfer. |
| | DRAK0–DRAK1 | O | DREQ request acknowledgment (channels 0, 1) | Output the input sampling acknowledgment of external DMA transfer requests. |
| | DACK0–DACK1 | O | DMA transfer strobe (channels 0, 1) | Output a strobe to the external I/O of external DMA transfer requests. |
| Serial communication interface (SCI) | TxD0–TxD1 | O | Transmit data (channels 0, 1) | SCI0, SCI1 transmit data output pins. (TxD1 is used for data transfer during boot mode of F-ZTAT) |
| | RxD0–RxD1 | I | Receive data (channels 0, 1) | SCI0, SCI1 receive data input pins. (RxD1 is used for data transfer during boot mode of F-ZTAT) |
| | SCK0–SCK1 | I/O | Serial clock (channels 0, 1) | SCI0, SCI1 clock input/output pins. |
| A/D Converter | $AV_{CC}$ | I | Analog supply | Analog supply; connected to $V_{CC}$. |
| | $AV_{SS}$ | I | Analog ground | Analog supply; connected to $V_{SS}$. |
| | AVref (QFP-144 only) | I | Analog reference supply | Analog reference supply input pin. (Connected to $AV_{CC}$ internally in QFP-112 and TQFP-120.) |
| | AN0–AN7 | I | Analog input | Analog signal input pins. |
| | $\overline{\text{ADTRG}}$ | I | A/D conversion trigger input | External trigger input for A/D conversion start. |

| Classification | Symbol | I/O | Name | Function |
|---|---|---|---|---|
| I/O ports | $\overline{POE0}$–$\overline{POE3}$ | I | Port output enable | Input pin for port pin drive control when general use ports are established as output. |
| | PA0–PA15 (QFP-112)<br>PA0–PA23 (QFP-144) | I/O | General purpose port | General purpose input/output port pins.<br>Each bit can be designated for input/output. |
| | PB0–PB9 | I/O | General purpose port | General purpose input/output port pins.<br>Each bit can be designated for input/output. |
| | PC0–PC15 | I/O | General purpose port | General purpose input/output port pins.<br>Each bit can be designated for input/output. |
| | PD0–PD15 (QFP-112)<br>PD0–PD31 (QFP-144) | I/O | General purpose port | General purpose input/output port pins.<br>Each bit can be designated for input/output. |
| | PE0–PE15 | I/O | General purpose port | General purpose input/output port pins.<br>Each bit can be designated for input/output. |
| | PF0–PF7 | I | General purpose port | General purpose input port pins. |

Usage Notes

1. Unused input pins should be pulled up or pulled down.
2. The $\overline{WDTOVF}$ pin should be pulled down in the SH7044/SH7045 F-ZTAT version. However, if it is necessary to pull this pin down, a resistance of 100 k or higher should be used.

## 2.3 Reset Circuit

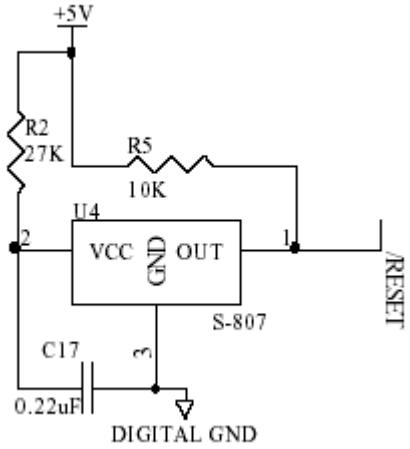



**Fig. 6 Reset Circuit Diagram**

S-80845 IC voltage detector can detect the voltage while RC is charging and output the system reset signal of **low** when the driving voltage is lower than 4.5Vdc (Typical).

## 2.4 Memory Circuit

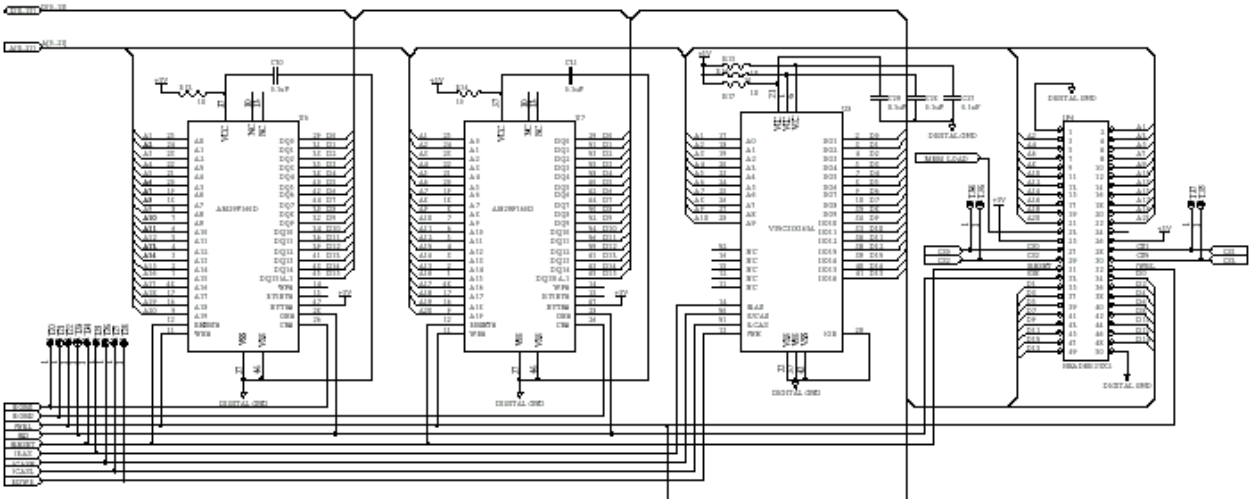


**Fig. 7 Memory Circuit Diagram**

There are 2MB DRAM and 2MB flash ROM built on main PCB ass'y. It uses U6&U7 type 1M Byte Flash ROM and U8 type 2M Byte DRAM. MCU R/W pin becomes **high** when reading Flash ROM or DRAM, and becomes **low** when writing. JP6 is memory module connector, which can expand to 8MB.

## 2.5 Decoder Circuit

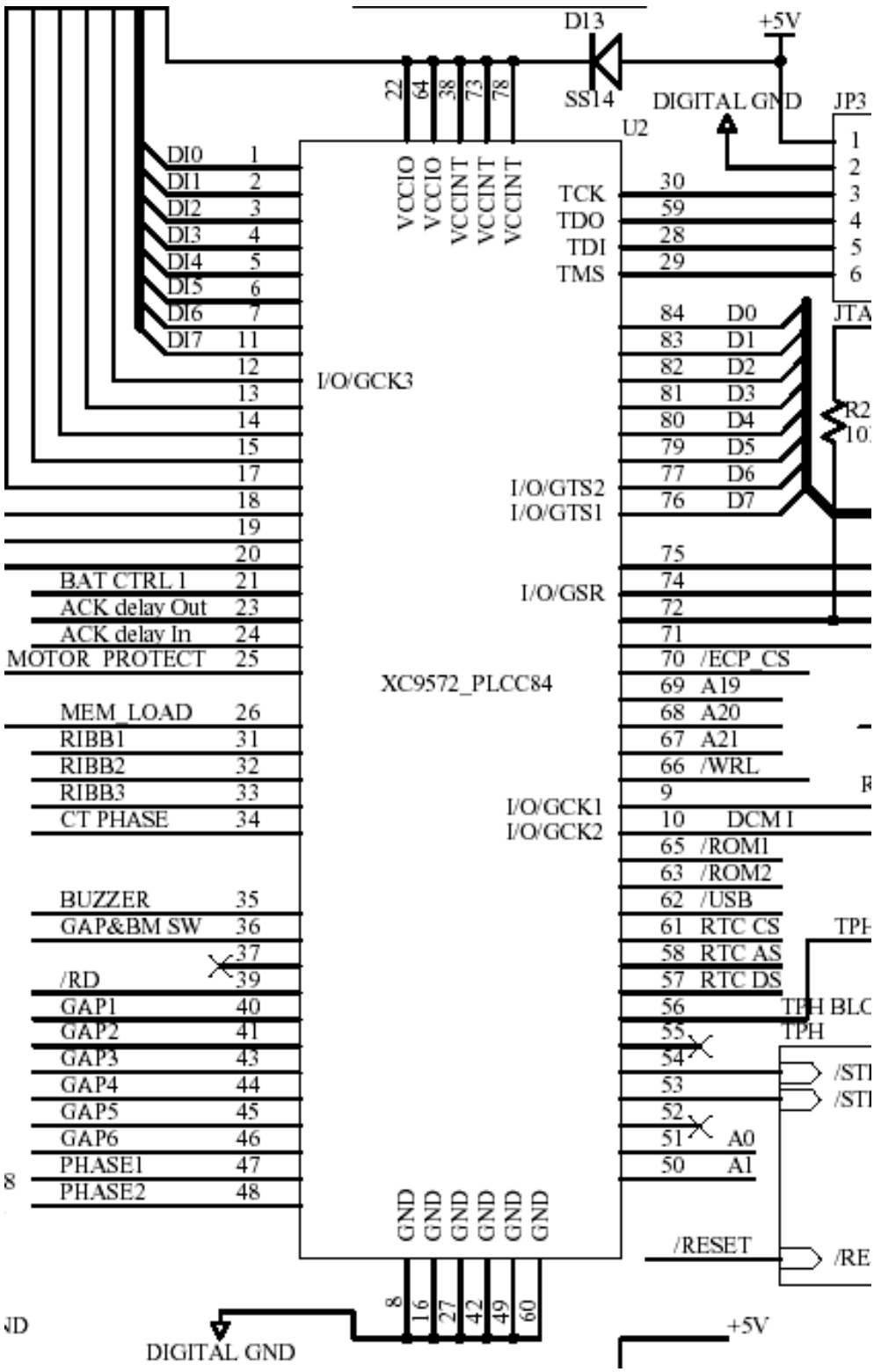
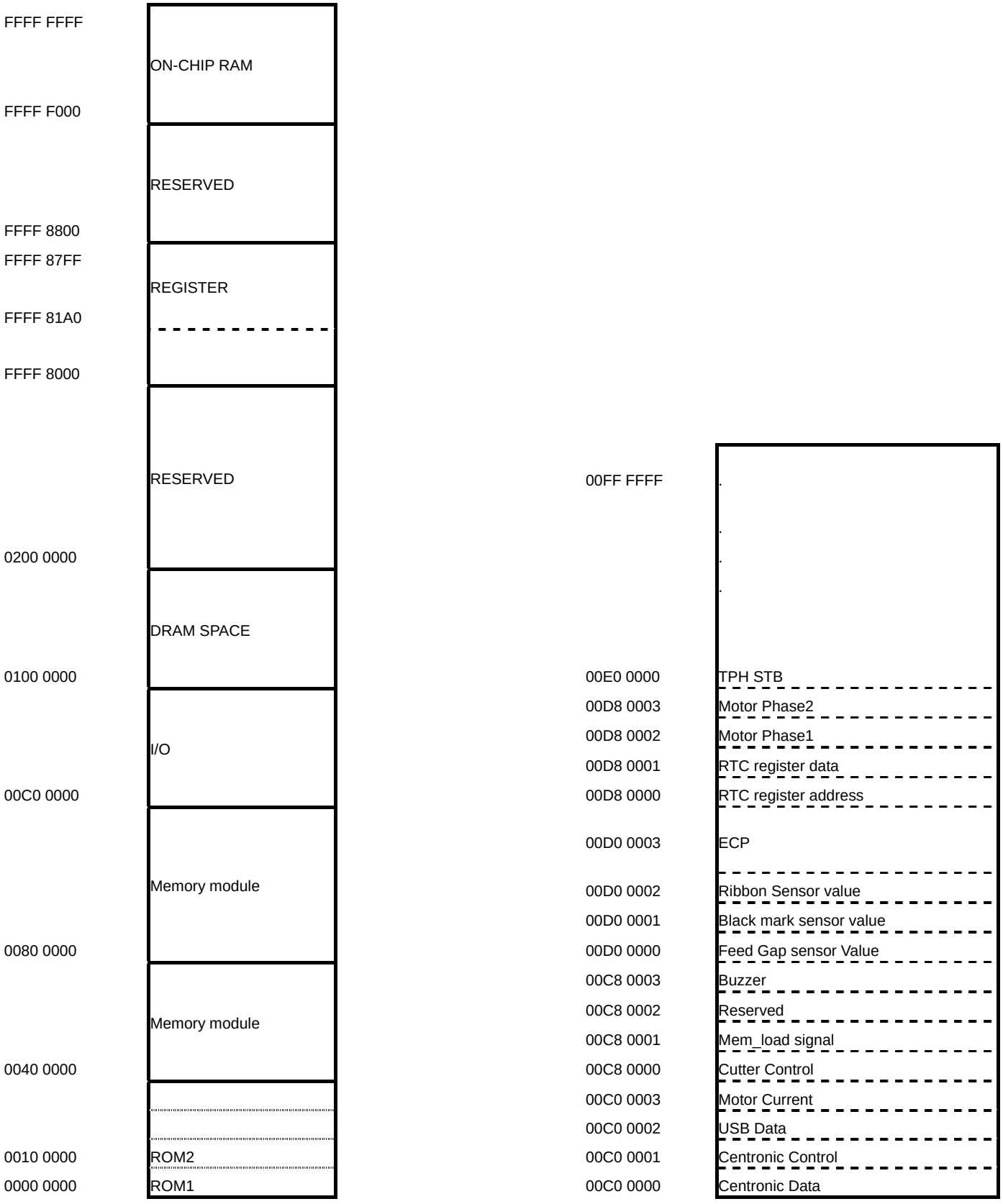



**Fig. 8 Decode Circuit Diagram**

# 2.6 Memory Map



## 2.7 Print Head Circuit

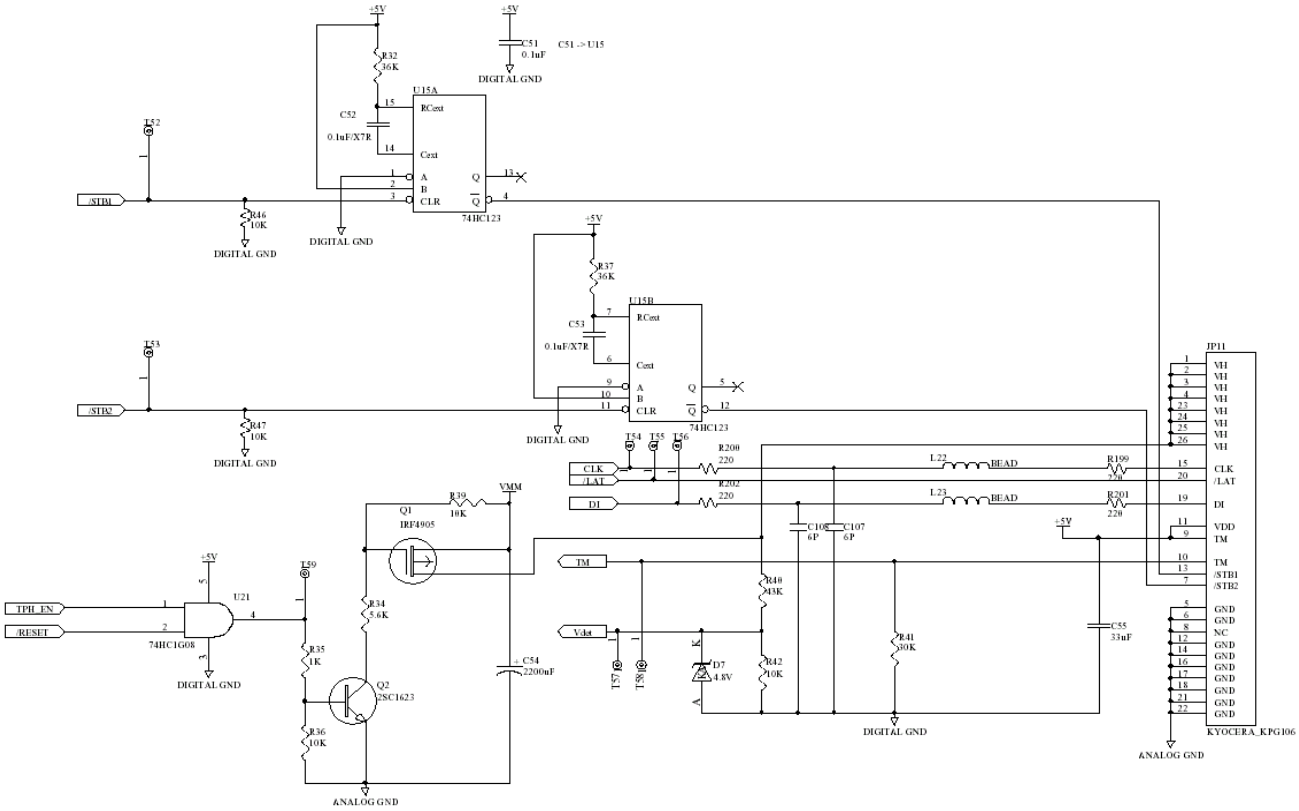



**Fig. 9 Print Head Circuit Diagram**

**CLK** and **LAT** connect to thermal head control clock and data latch respectively.
**TPH_EN** signal controls the DC24V voltage of the thermal head. When TPH_EN is **high**, the thermal head will be separated from 24V ($V_{DD}$). U21 controls protecting print head. It is used to make sure the power of print head is off when switch off the printer.
Q1 and Q2 are used to limit current of print head.
Both /STB1 and /STB2 determine whether to heat the thermal head or not. The RC charging time of U15 and 74HC123 limit the heating time of print head to avoid burning the print head.
**DI** signal sends printer data to the print head.
**TM** signal is the temperature/voltage sensor for thermal head.
The Vdet feeds back the voltage and compensates the heat time for voltage accuracy when printing.

## 2.8 Stepping Motor Drive / Protection Circuit

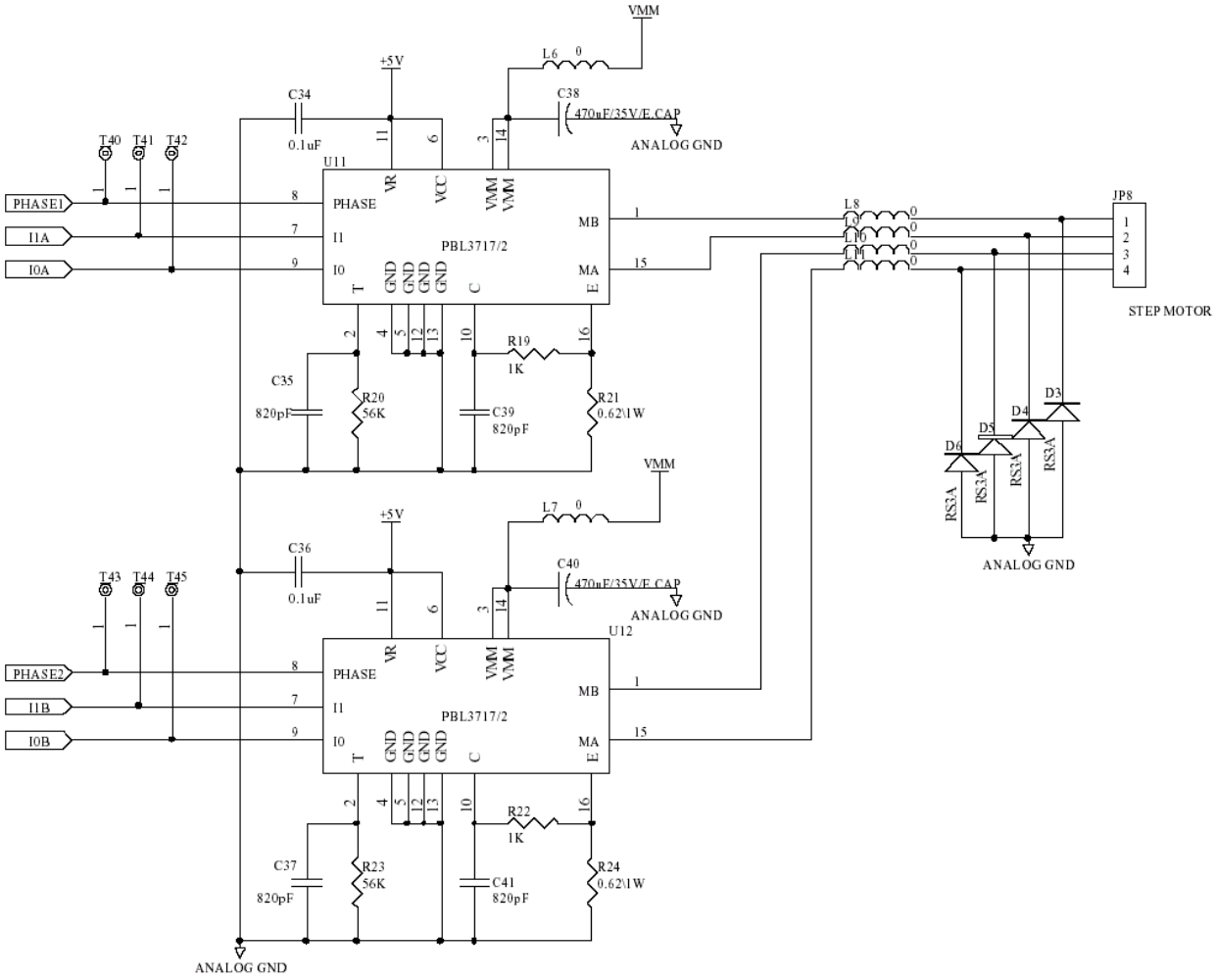



**Fig. 10 Stepping Motor Drive/ Protection Circuit Diagram**

Connector, **JP8**, sends the pattern as shown in table1. The status of I0 & I1 determines the stepping motor power level. The power level pattern is shown in table2. The motor port is a protection pin. When it is at **low** level, the power of the motor system will be closed. Power will be **on** again until **motor pin** is the pulse of **high** level. Phase1 and phase2 determine the pattern of stepping motor drive circuit. For example, the sequence of phase 1/ phase 2 in full step mode is 0/0 → 0/1 → 1/1 → 1/0.

**Table 1 Stepping Motor Pattern**

| Pin on / Step / JP12 | 1 | 2 | 3 | 4 | Phase |
|---|---|---|---|---|---|
| **1** | on | on | | on | A |
| **2** | | on | on | | /A |
| **3** | on | | on | on | /B |
| **4** | | on | on | | B |

**Table 2 Stepping motor power pattern**

| **Motor Current** | Current percentage | I0 | I1 |
|---|---|---|---|
| **High Level** | 100% | L | L |
| **Medium Level** | 60% | H | L |
| **Low Level** | 20% | L | H |
| **Zero Current** | 0% | H | H |

## 2.9 Power Circuit

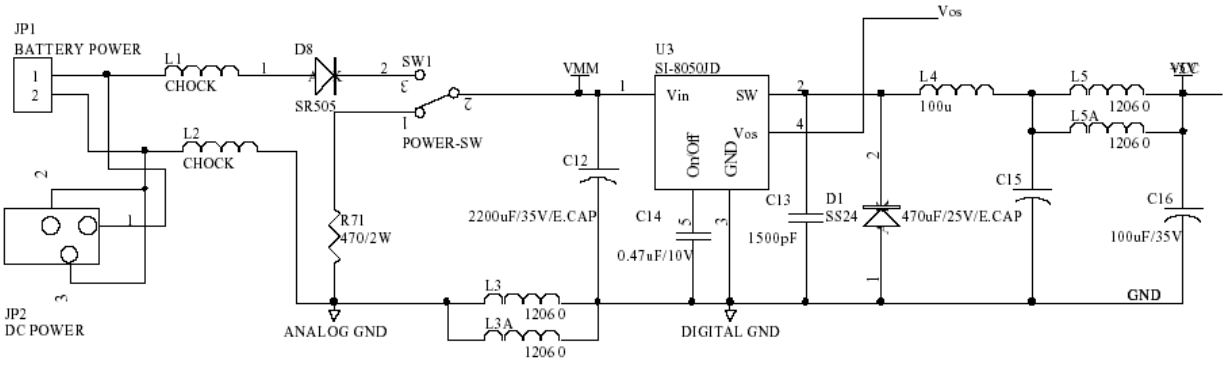



**Fig. 11 Power Circuit Diagram**

The U3 SI-8050JD converts 24Vdc to 5Vdc. the limit current protest is 1.6A.

## 2.10 Parallel Interface Circuit

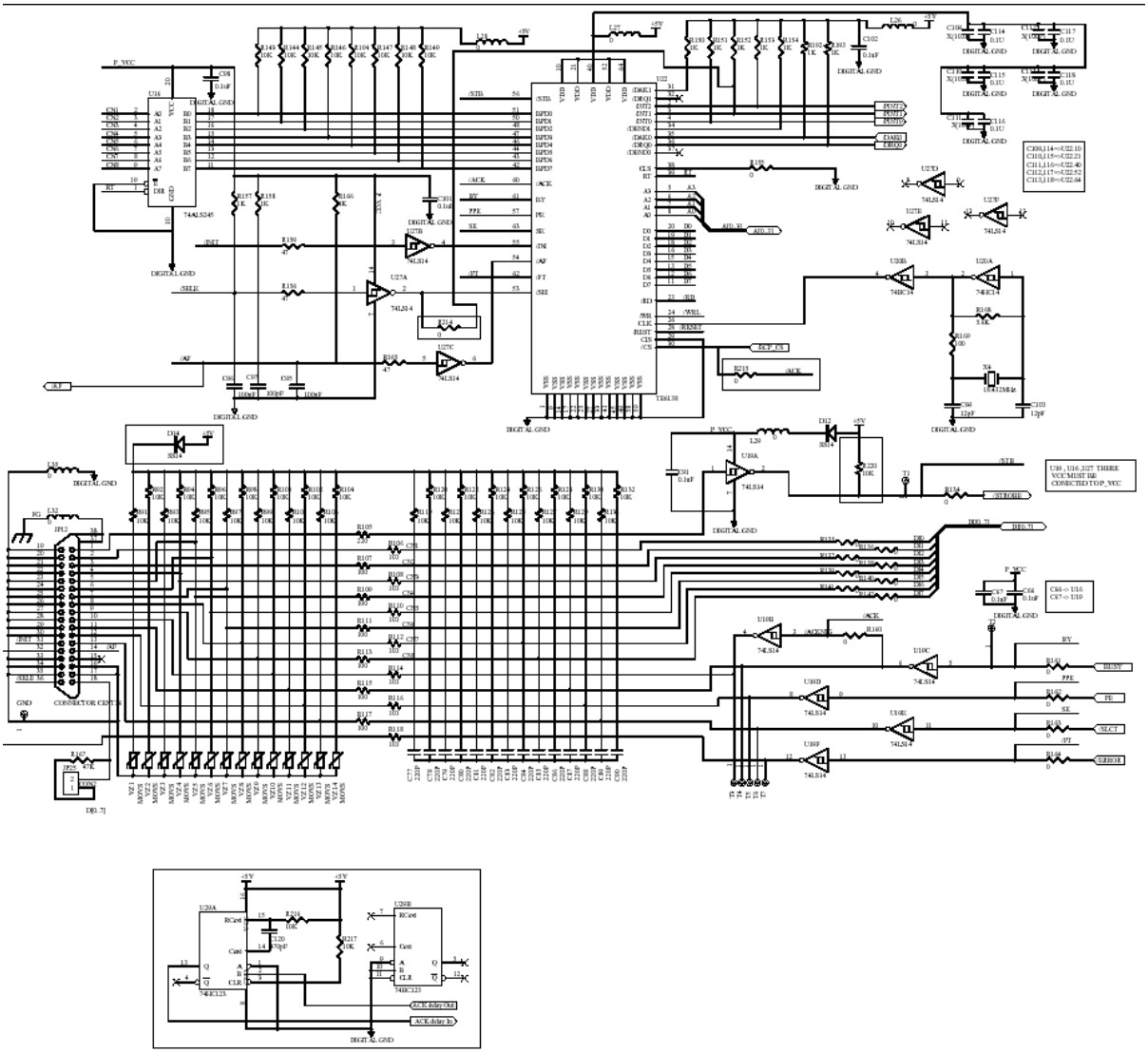


**Fig. 12 Parallel Interface Circuit Diagram**

The Centronic interface supports one-way transmission, SPP mode or ECP mode. The parallel interface circuit is used with the externally connected personal computer parallel interface through the printer cable. When PC's strobe signal comes in, the printer responds **busy** status until it reads the data from parallel interface. Printer will respond **error** signal to PC when it is in error status.

The pin assignments for **nibble mode** parallel interface connector is as following:

**Table 3. Pin Assignments For nibble mode Parallel Interface Connector**

| Pin | SPP Mode | Nibble Mode | In/Out | Function |
|---|---|---|---|---|
| 1 | Strobe | HostClk | In | A **low** on this line indicates that there are valid data at the host. When this pin is de-asserted, the +ve clock edge should be used to shift the data into the device. |
| 2-9 | Data 0-7 | Data 0-7 | In | Data Bus. Single-directional. |
| 10 | Ack | PtrClk | Out | A **low** on this line indicates that there are valid data at the Device. When this pin is de-asserted, the +ve clock edge should be used to shift the data into the host. |
| 11 | Busy | PtrBusy | Out | When in reverse direction, a **high** indicates data, while a **low** indicates a command cycle. In forward direction, it functions as PtrBusy. |
| 12 | Paper Out / End | AckDataReq | Out | When **low**, device acknowledges reverse request. |
| 13 | Select | X-Flag | Out | Extensibility flag |
| 14 | Auto Linefeed | HostBusy | In | When in forward direction, a **high** indicates data, while a **low** indicates a command cycle. In reverse direction, it functions as HostBusy. |
| 15 | No Defined | NC | N/A | |
| 16-17 | Ground | Ground | GND | Ground |
| 18 | Logic High | High / Vcc | Out | |
| 19-30 | Ground | Ground | GND | Ground |
| 31 | Initialize | nInit | In | A **low** indicates data in reverse direction |
| 32 | Error / Fault | nDataAvail | Out | A **low** set by the device indicates that the reverse data is available |
| 33-35 | Ground | Ground | GND | Ground |
| 36 | Select Printer | 1284 Active | In | A **high** indicates that host is in 1284 transfer mode. Taken low to terminate. |

## 2.11 Serial Interface Circuit

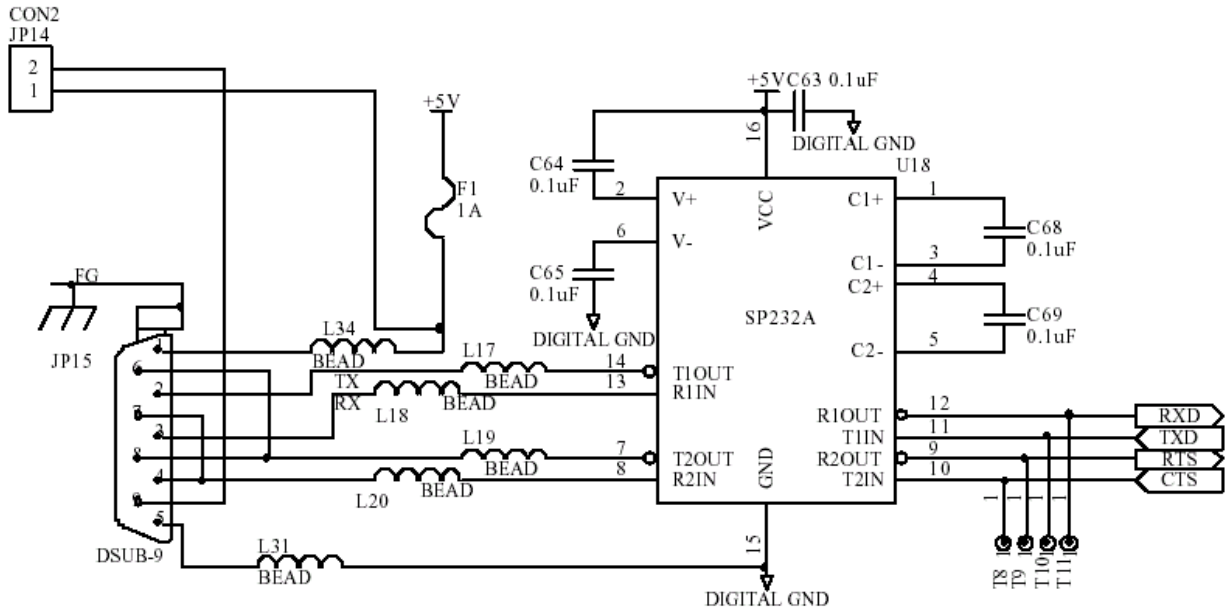



**Fig. 13 Serial Interface Circuit Diagram**

RS-232 is an asynchronous transfer interface, which used with externally connected personal computer and keyboard unit. JP15 connects to PC serial interface through the RS-232 cable. RxD is a data receive pin of MCU. **CTS** is **clear to send** of MCU, which sends a signal from the external device. TxD is a data output pin of MCU. **RTS** is the **request to send** signal, which sends signal to the external device.

## 2.12 USB Circuit

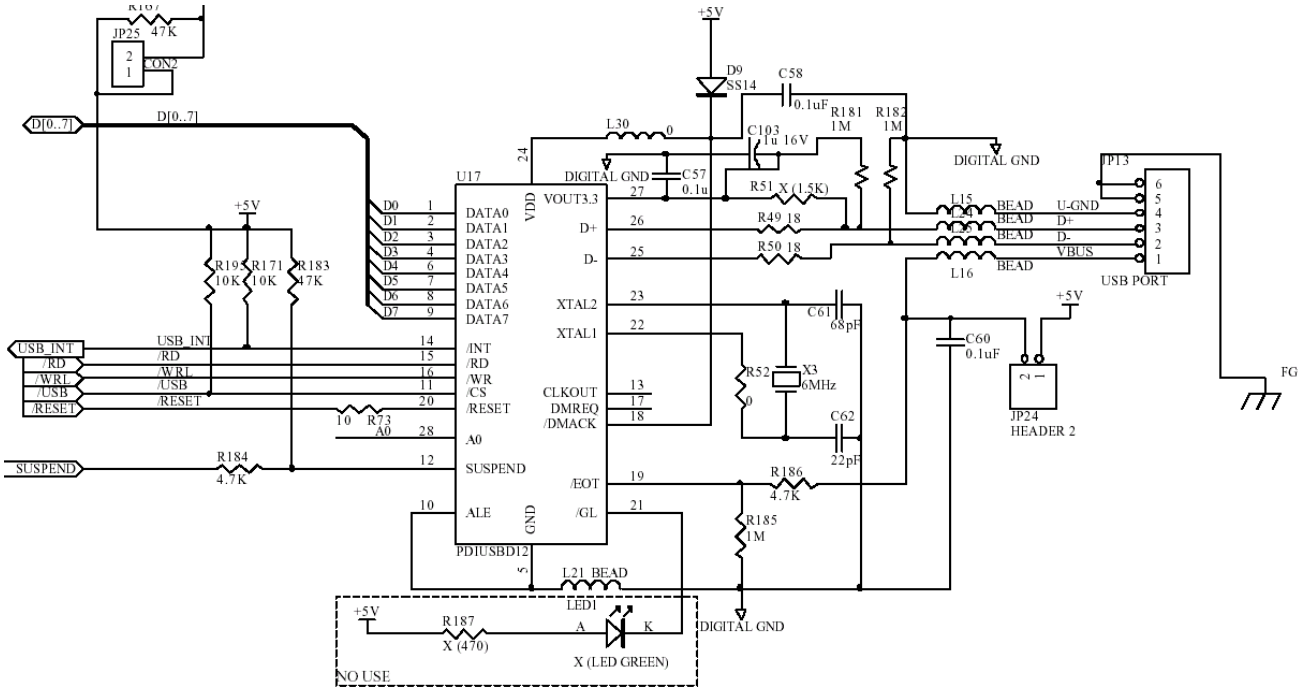



**Fig. 14 USB Circuit Diagram**

## 2.12.1 USB PIN Function

The standard USB 1.1. PIN function is as following:

Table 1: Pin description

| Symbol | Pin | Type[1] | Description |
|---|---|---|---|
| DATA <0> | 1 | IO2 | Bit 0 of bidirectional data. Slew-rate controlled. |
| DATA <1> | 2 | IO2 | Bit 1 of bidirectional data. Slew-rate controlled. |
| DATA <2> | 3 | IO2 | Bit 2 of bidirectional data. Slew-rate controlled. |
| DATA <3> | 4 | IO2 | Bit 3 of bidirectional data. Slew-rate controlled. |
| GND | 5 | P | Ground. |
| DATA <4> | 6 | IO2 | Bit 4 of bidirectional data. Slew-rate controlled. |
| DATA <5> | 7 | IO2 | Bit 5 of bidirectional data. Slew-rate controlled. |
| DATA <6> | 8 | IO2 | Bit 6 of bidirectional data. Slew-rate controlled. |
| DATA <7> | 9 | IO2 | Bit 7 of bidirectional data. Slew-rate controlled. |
| ALE | 10 | I | Address Latch Enable. The falling edge is used to close the latch of the address information in a multiplexed address/ data bus. Permanently tied LOW for separate address/ data bus configuration. |
| CS_N | 11 | I | Chip Select (Active LOW). |
| SUSPEND | 12 | I,OD4 | Device is in Suspend state. |
| CLKOUT | 13 | O2 | Programmable Output Clock (slew-rate controlled). |
| INT_N | 14 | OD4 | Interrupt (Active LOW). |
| RD_N | 15 | I | Read Strobe (Active LOW). |
| WR_N | 16 | I | Write Strobe (Active LOW). |
| DMREQ | 17 | O4 | DMA Request. |
| DMACK_N | 18 | I | DMA Acknowledge (Active LOW). |
| EOT_N | 19 | I | End of DMA Transfer (Active LOW). Double up as $V_{BUS}$ sensing. EOT_N is only valid when asserted together with DMACK_N and either RD_N or WR_N. |
| RESET_N | 20 | I | Reset (Active LOW and asynchronous). Built-in Power-on reset circuit present on chip, so pin can be tied HIGH to $V_{CC}$. |
| GL_N | 21 | OD8 | GoodLink LED indicator (Active LOW) |
| XTAL1 | 22 | I | Crystal Connection 1 (6 MHz). |
| XTAL2 | 23 | O | Crystal Connection 2 (6 MHz). If external clock signal, instead of crystal, is connected to XTAL1, then XTAL2 should be floated. |
| $V_{CC}$ | 24 | P | Voltage supply (4.0 – 5.5 V).<br>To operate the IC at 3.3 V, supply 3.3 V to both $V_{CC}$ and $V_{OUT3.3}$ pins. |
| D– | 25 | A | USB D– data line. |
| D+ | 26 | A | USB D+ data line. |

Table 1: Pin description...*continued*

| Symbol | Pin | Type[1] | Description |
|---|---|---|---|
| $V_{OUT3.3}$ | 27 | P | 3.3 V regulated output. To operate the IC at 3.3 V, supply a 3.3 V to both $V_{CC}$ and $V_{OUT3.3}$ pins. |
| A0 | 28 | I | Address bit. A0 = 1 selects command instruction; A0 = 0 selects the data phase. This bit is a don't care in a multiplexed address and data bus configuration and should be tied HIGH. |

[1] O2 : Output with 2 mA drive
OD4: Output Open Drain with 4 mA drive
OD8: Output Open Drain with 8 mA drive
IO2: Input and Output with 2 mA drive
O4 : Output with 4 mA drive.

# 2.13 Sensor Circuit

## 2.13.1 Feed Gap and Black Mark Sensor

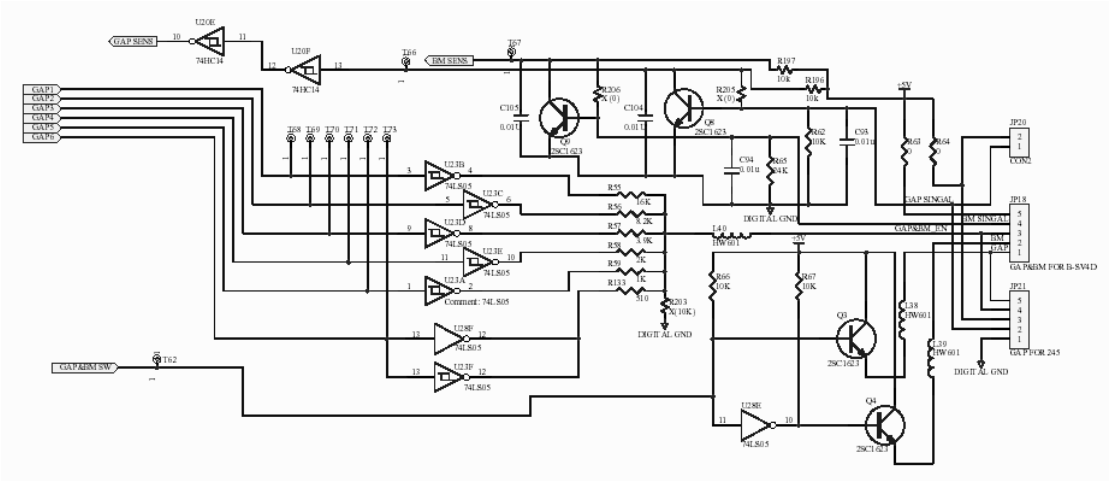



**Fig. 15 Feed Gap / Black Mark Sensor Circuit Diagram**

1. The feed gap sensor is a penetrable sensor with 64 levels.
2. Black mark sensor is a reflecting sensor with 64 levels.
3. The feed gap sensor activates when feed gap and black mark **SW** signal is **high**. The black mark sensor activates when **GAP& BM_SW** signal is **low**.

## 2.13.2 Head Open Micro Switch

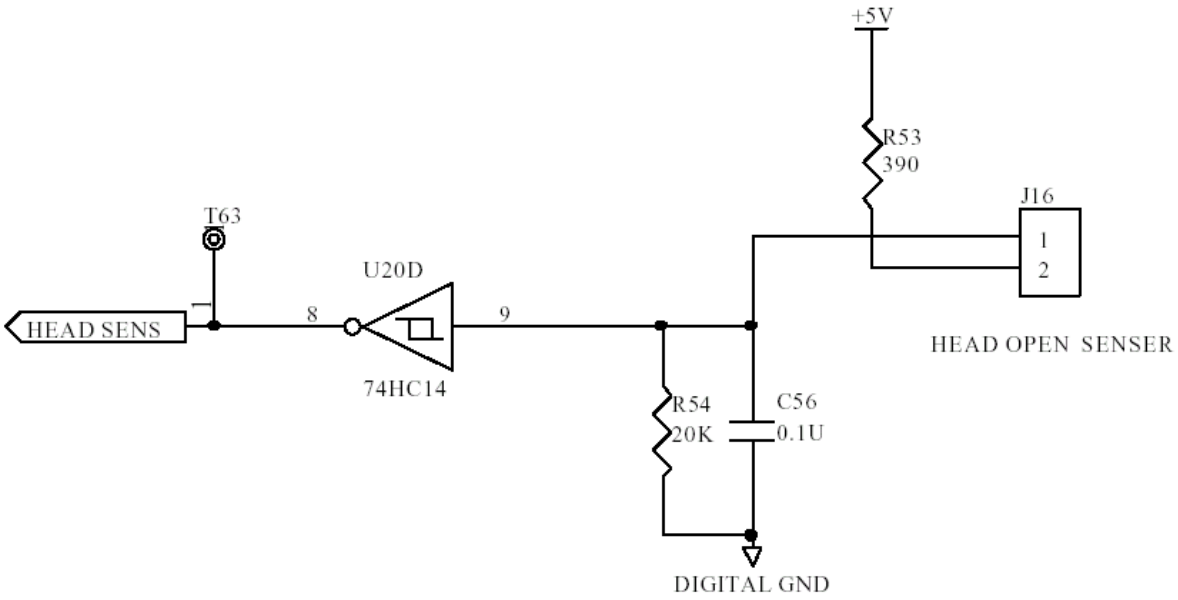



**Fig. 16 Head Open Micro Switch Circuit Diagram**

The Head Open Micro Switch is a micro-switch. The voltage is **low** when the print head opens; otherwise, it is **high**.

## 2.13.3 Strip Sensor

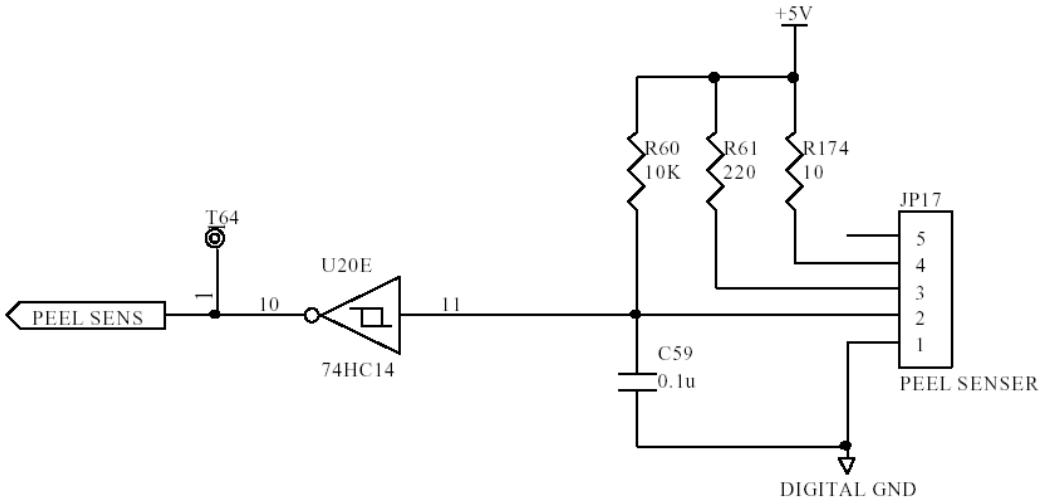



**Fig. 17 Strip Sensor Circuit Diagram**

This is a reflecting sensor. The strip sensor signal voltage is **high** when the paper is detected; otherwise, it is **low**.

## 2.13.4 Ribbon Sensor

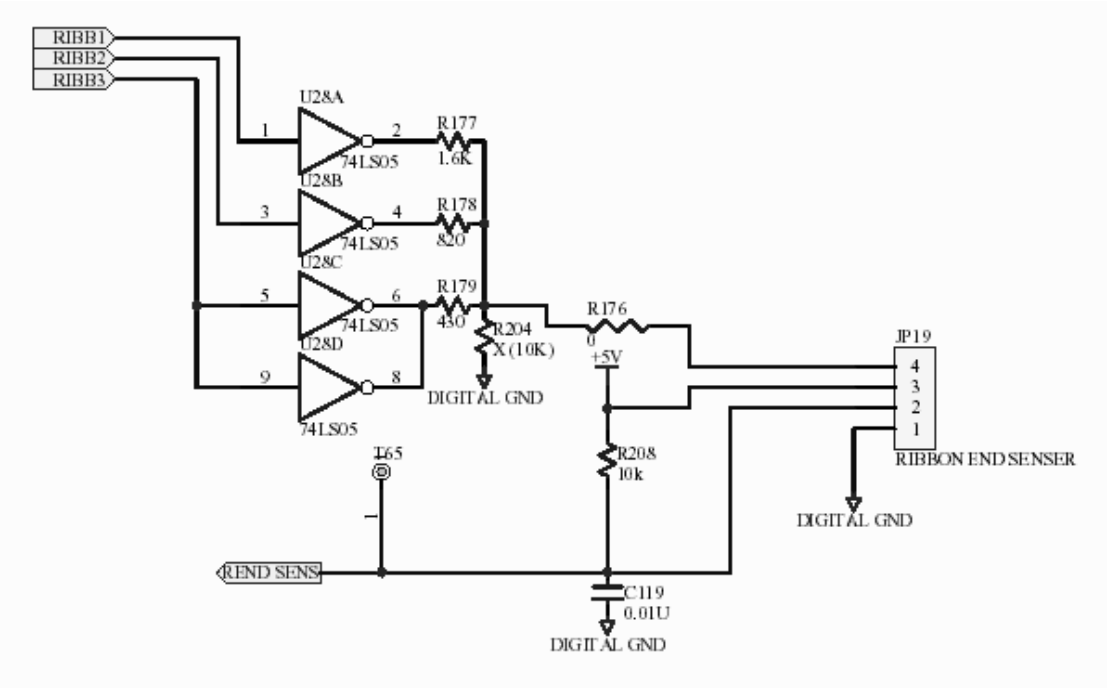



**Fig. 18 Ribbon Sensor Circuit Diagram**

This ribbon sensor is a reflecting sensor. The RIBB1~3 can be changed by command or auto-calibration. The **REND** signal voltage is **high** when the ribbon is detected; otherwise, it is **low**.

## 2.14 Cutter Drive / Protection Circuit

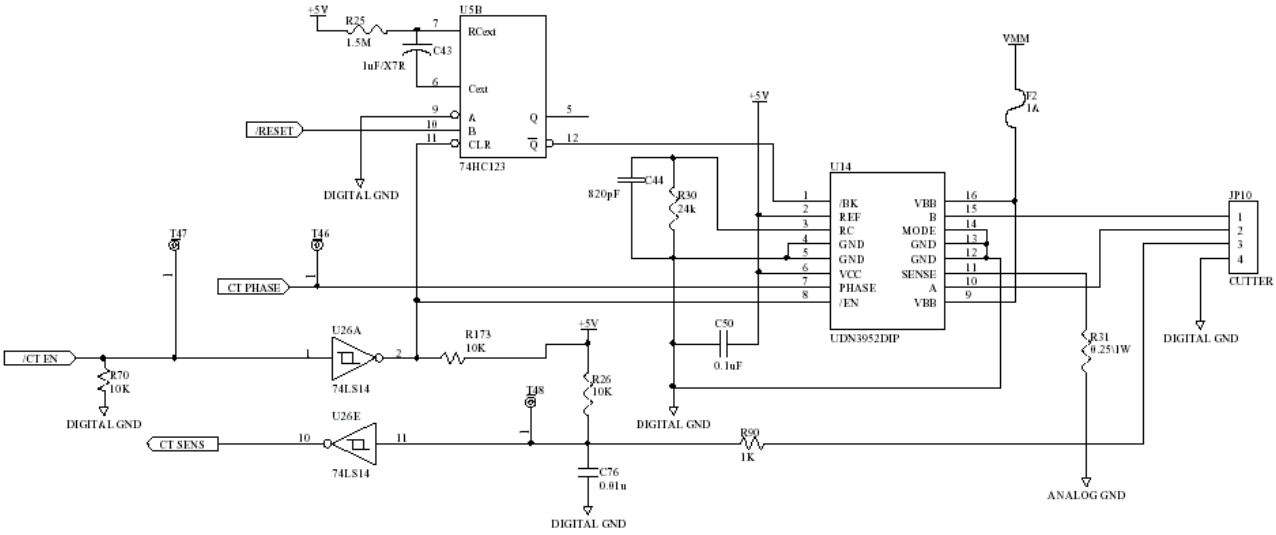



**Fig. 19 Cutter Drive / Protection Circuit Diagram**

**RESET** signal is **high** when the printer is turned on. The cutter is activated when **CTEN** signal is **low**. **CTPhase** signal controls the rotated direction. **U15B 74HC123** controls the breaking of the DC motor of the cutter. The sensor of the cutter sends **high - low** signal to MCU through the **CTSENS** pin that detects action of a cutter.

## 2.15 DC Motor Driver / Encoder Circuit

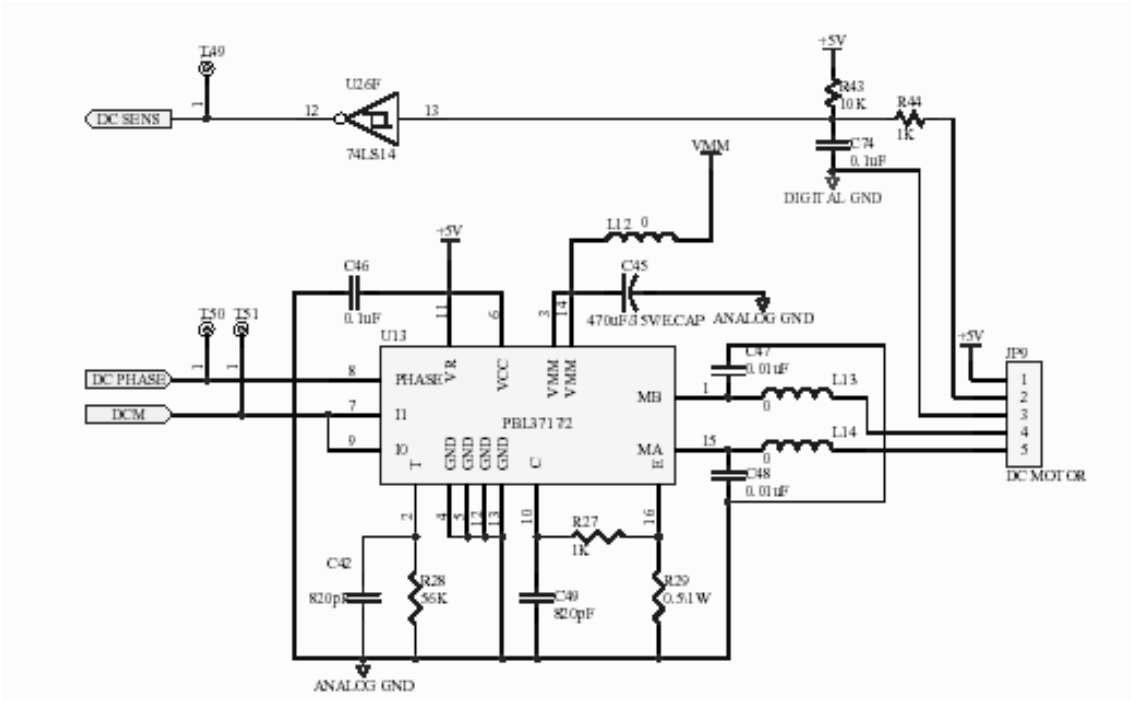



**Fig. 20 DC Motor Drive/ Encoder Circuit Diagram**

**DCM** signal is used to switch on/off the motor driver, The **DC PHASE** signal is to control the direction of the rotate the encoder circuit, which is used to detect the rotary rate. **DC SENS** signal voltage is **high** when the hole of the gear is detected; otherwise, it is **low**.

# 3. REPLACING THE IMPORTANT PARTS

***WARNING!***

1. *Turn off the power switch and disconnect the DC plug of the AC Adapter and the cables before replacing any parts.*
2. *Follow all manual instructions. Failure to do so could create safety hazards such as fire or electrocution.*

***CAUTION!***

1. *To protect the connector pins or component from static discharge, do not touch them with bear hand.*
2. *Use electrostatic free form and the original carton for transportation.*
3. *Keep your work environment static free to avoid damage to the printer.*
4. *Do not remove any connectors from the printer within 10 sec. after unplugging the power cord.*

***NOTES:***

1. *Manual instructions must be followed when installing option kits or adding cables to avoid system failures and to insure proper performance and operation.*
2. *Failure to follow manual instructions or any unauthorized modifications, substitution or change to this product will void the limited product warranty.*

## ■ Lubrication

***CAUTION!***

1. *Lubrication: During parts replacement*
2. *Kinds of oil: FLOIL G-488: 1kg can (part No.: 19454906001)*

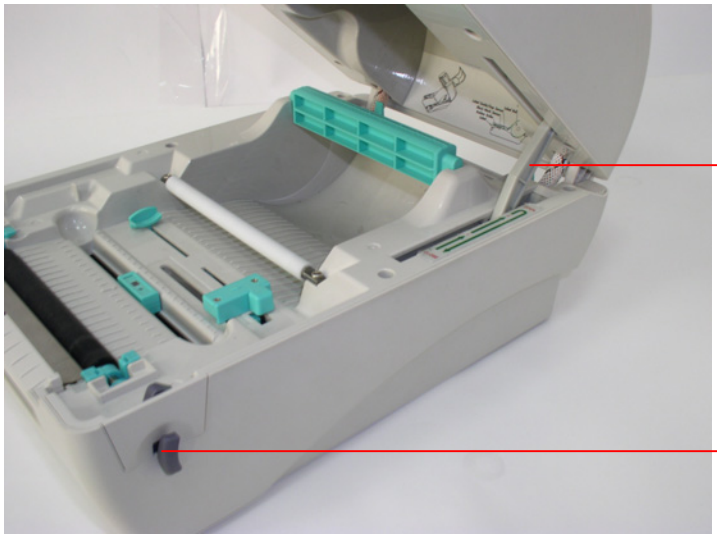
Any machine is generally in its best condition when delivered; therefore, it is necessary to try to keep this condition. Unexpected failure occurs due to lack of oil, debris, or dust. To keep its best condition, periodically clean the machine and apply proper kinds of oil to each part in which lubrication is needed. Although the frequency of lubrication varies according to how much the machine is used, at least it is necessary to lubricate before the machine becomes dry. It is also necessary to wipe off excessive oil as it collects dirt.

## 3.1 Replacing the Top Cover Ass'y

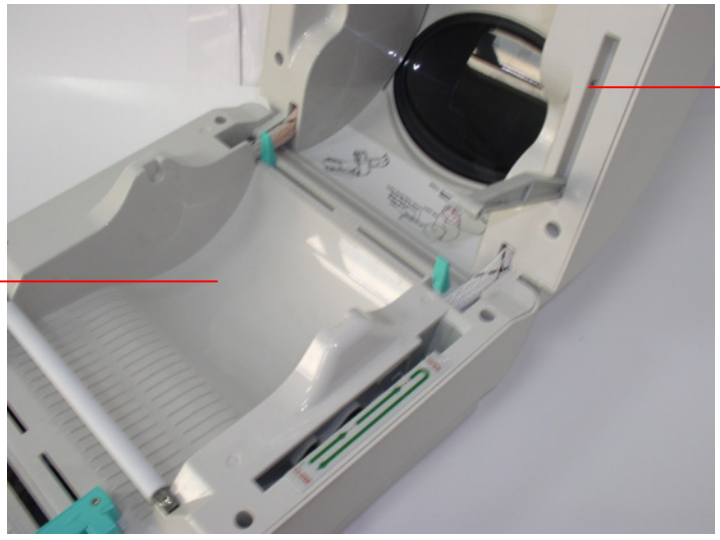
***CAUTION!***

1. *NEVER touch the element when handling the Print Head.*
2. *NEVER touch the connector pins to avoid a breakdown of the Print Head by static electricity.*

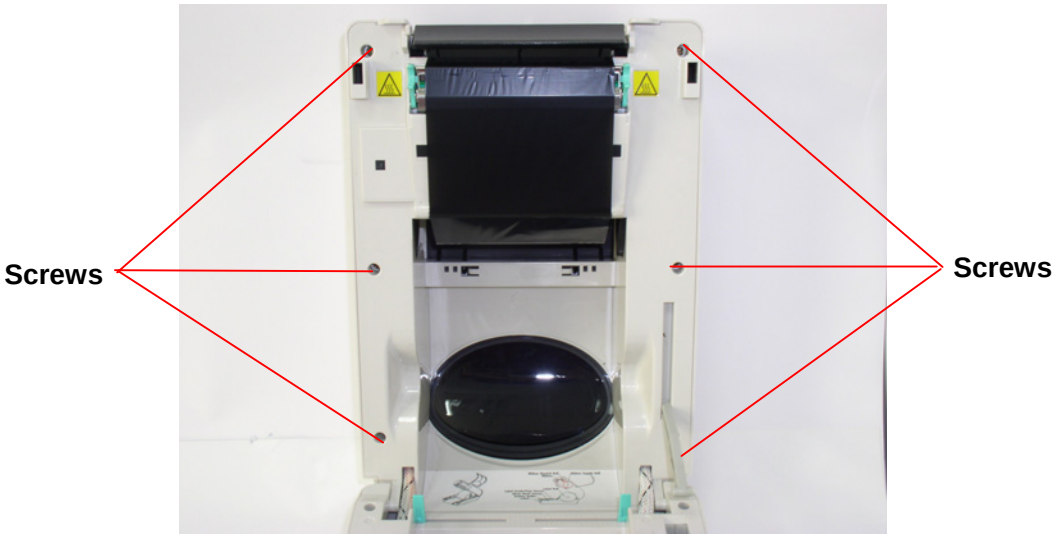
1. Open the printer **top cover** by pushing forward the **top cover open levers to the paper outlet direction**. The **top cover support** will hold the printer top cover.




2. Open the top cover to the ultimate angle. Push the top cover support to the communication port direction to separate the lower inner cover and top cover.



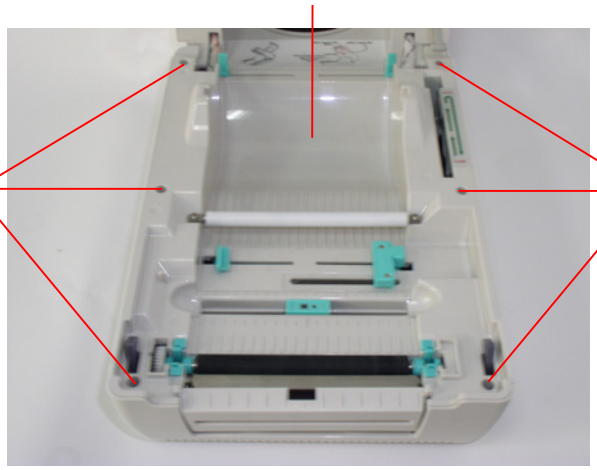
3. Remove the 6 screws in the **top inner cover**.

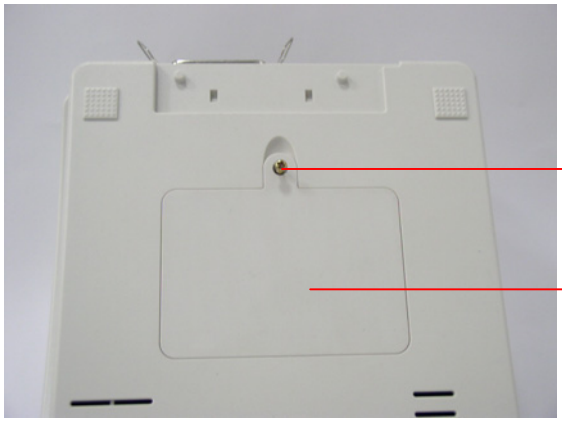



4. Disconnect the harness from the Feed button PCB. Replace the top cover ass'y.
5. Reassemble parts in reverse procedures.

## 3.2 Replacing the Lower Inner Cover

1. Refer to 3.1 to remove the top cover ass'y.
2. Remove the 6 screws on lower inner cover. Turn the printer upside down, remove the 2 screws of **hinge holder**, and 1 screw of memory module cover.

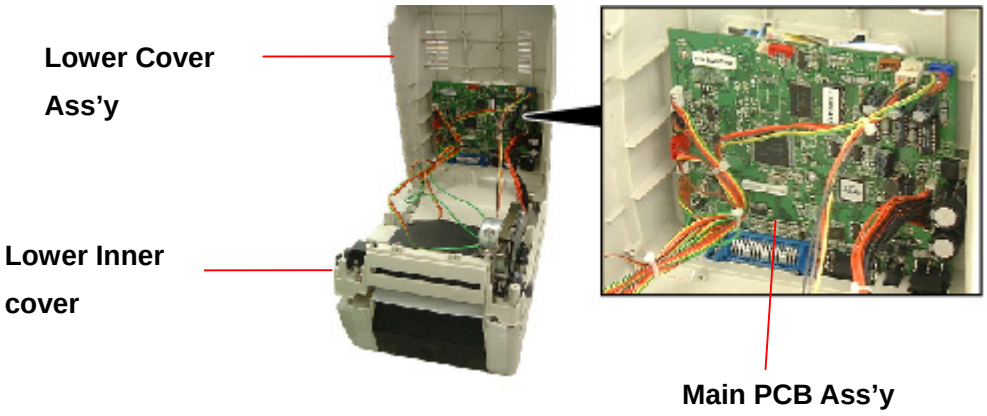




3. Disconnect all harnesses from Main PCB ass'y. Lift up the lower inner cover.
4. Replace the lower inner cover.
5. Reassemble in reverse procedures.

## 3.3 Replacing the Lower Cover Ass'y

1. Refer to 3.1 to open the top cover ass'y.
2. Refer to 3.2 to remove the 6 screws of lower inner cover. Turn the printer upside down, remove the 2 screws of hinge holder, and 1 screw of memory module cover.
3. Disconnect all harnesses from Main PCB ass'y. Lift up the lower inner cover.
4. Replace the lower cover ass'y.




5. Reassemble in reverse procedures.

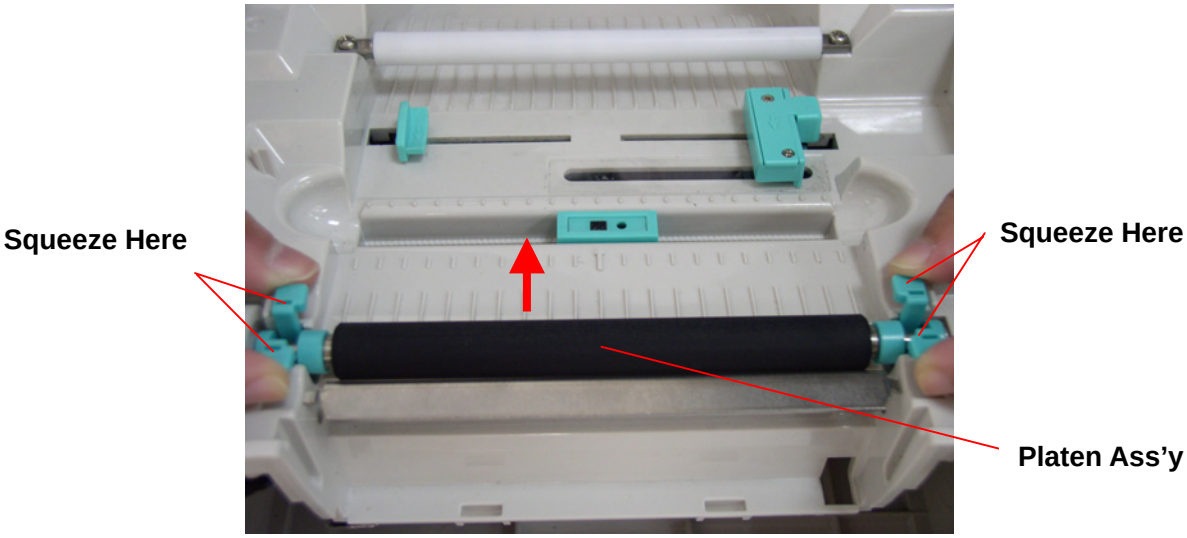
## 3.4 Replacing the Main PCB Ass'y

1. Please refer to 3.2, 3.3 for disassembling the lower cover ass'y and lower inner cover.
2. Disconnect all harnesses from the main PCB ass'y.
3. Remove 4 screws on the **main PCB ass'y**.

4. Replace the main PCB ass'y .
5. Reassemble parts in reverse procedures.

## 3.5 Replacing the Platen Ass'y

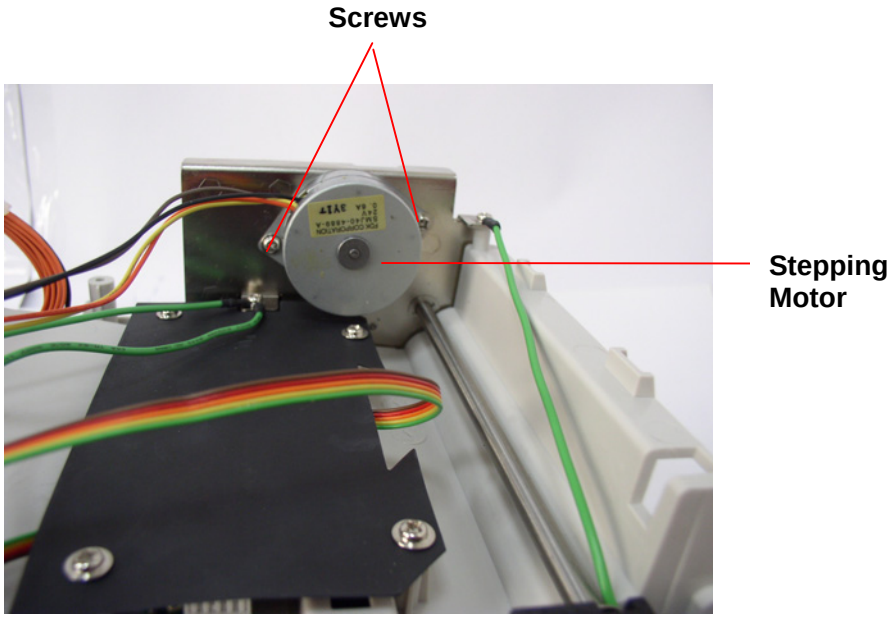
1. Squeeze two sides of **platen ass'y** and take it out.



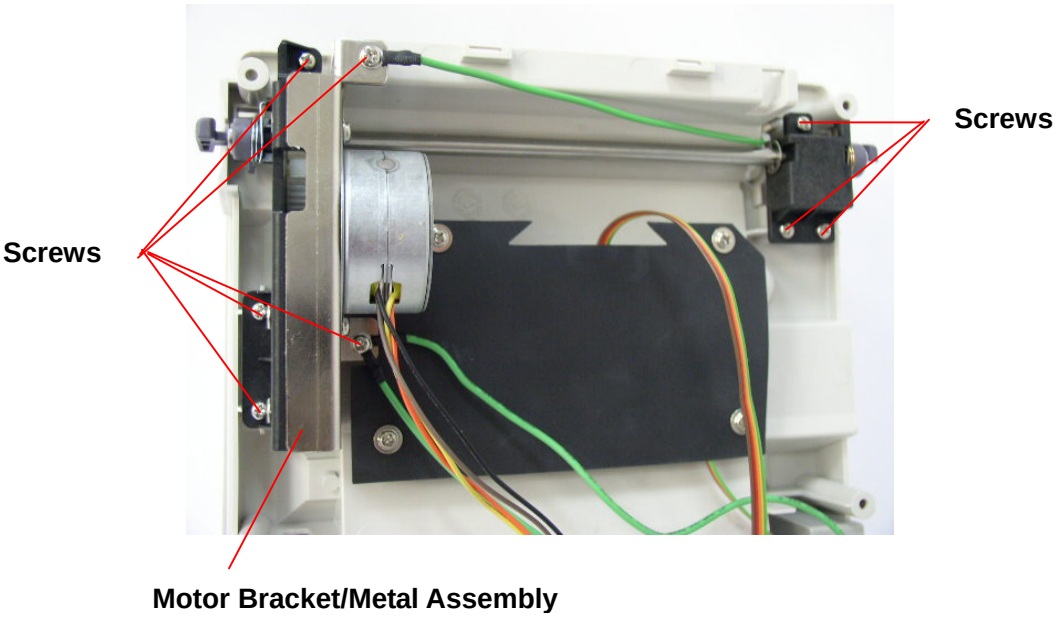

2. Replace a platen ass'y.
3. Reassemble it in reverse procedures.

## 3.6 Replacing the Stepping Motor Bracket / Metal Assembly and Stepping Motor

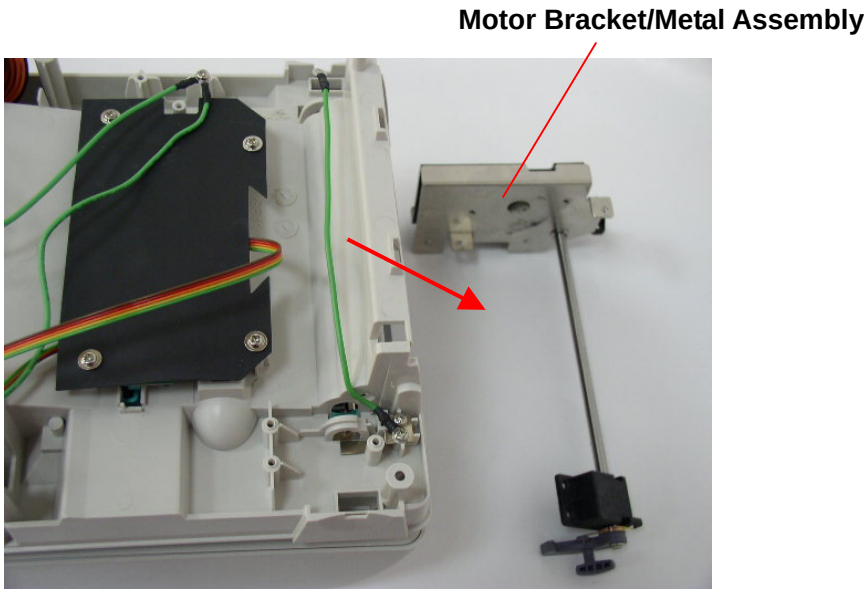
1. Please refer to 3.1 for disassembling the lower cover ass'y and lower inner cover.
2. Disconnect all harnesses from the main PCB ass'y .
3. Turn the lower inner cover upside down.
4. Remove 2 screws that fixed the stepping motor on the bracket.
5. Remove the stepping motor.




6. Remove 8 screws of the stepping **motor bracket / metal assembly**.



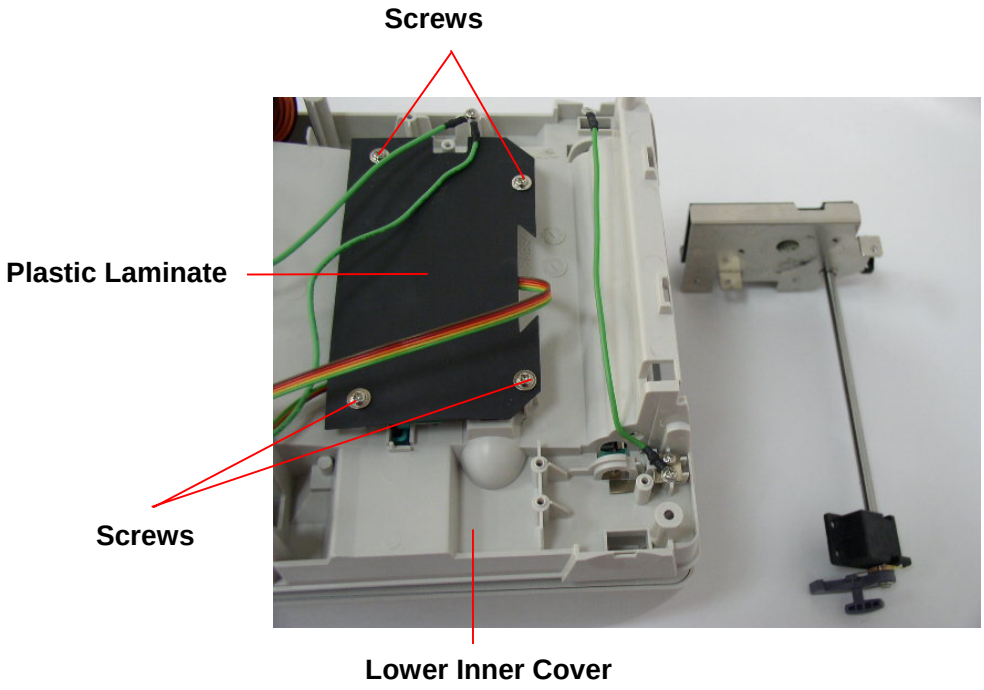
7. Remove the **motor bracket/metal assembly**.



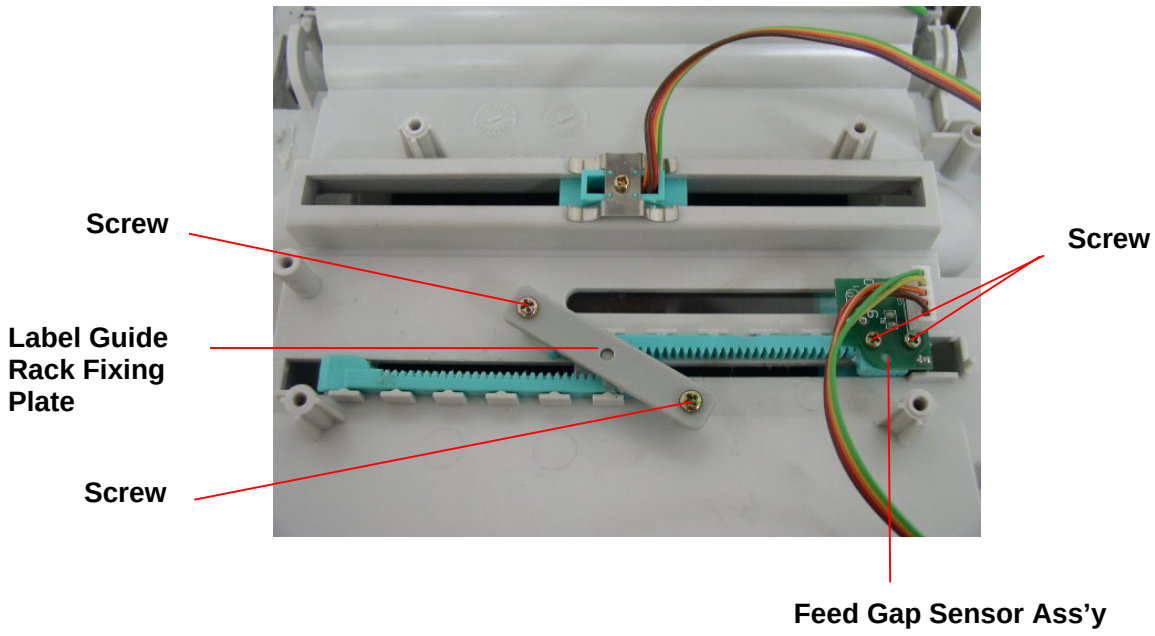

8. Reassemble parts in reverse procedures.

## 3.7 Replacing the Feed Gap Sensor Ass'y and Label Guide

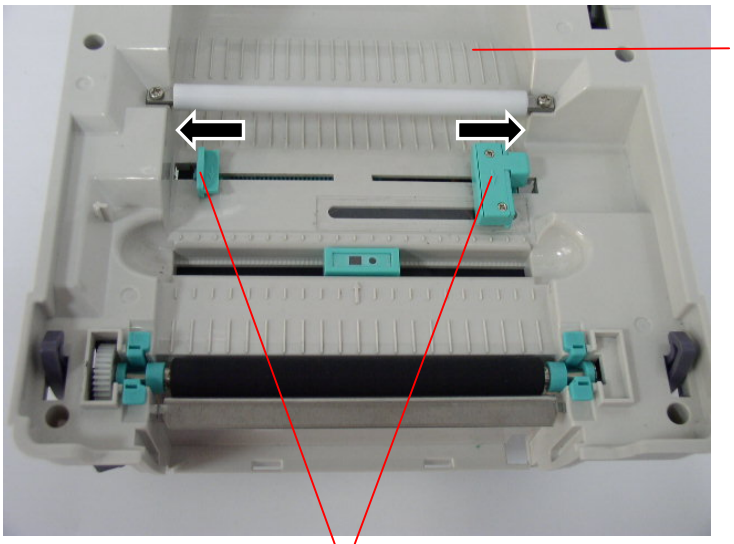
1. Please refer to 3.1 for disassembling the lower cover ass'y and lower inner cover.
2. Disconnect all harnesses from the main PCB ass'y .
3. Turn the lower inner cover upside down.
4. Screws off 4 screws and remove the **plastic laminate**.




5. Screws off 2 screws from a Label Guide Rack Fixing Plate and 2 from a gap sensor PCB then remove the **feed gap sensor ass'y**.



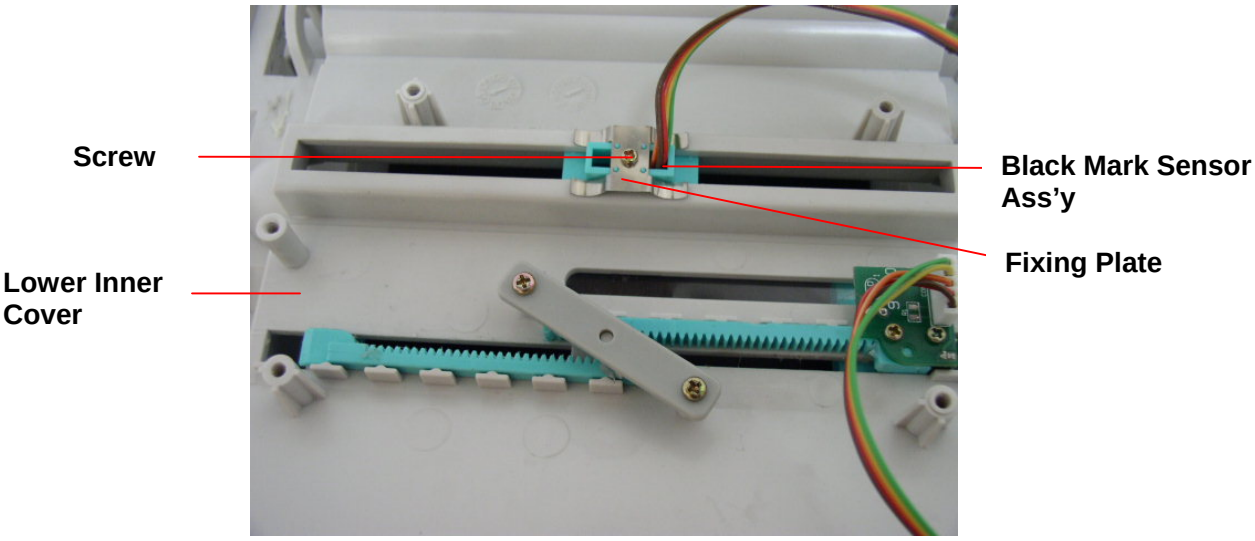
6. Turn over the lower inner cover.
7. Move the **right side and left side label guides** to the end of each side. Rotates 90 degrees and pull them out**.**



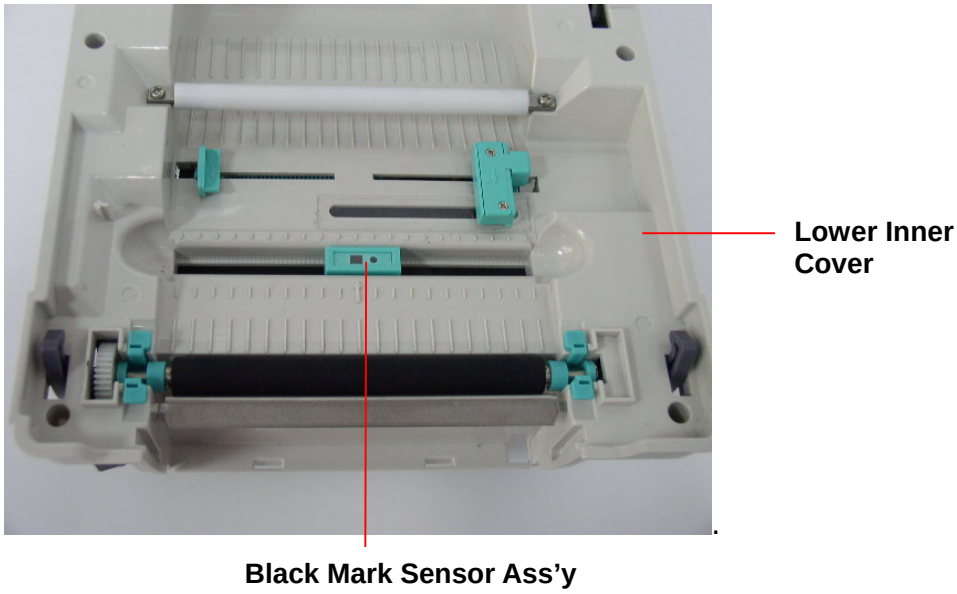

8. Reassemble parts in reverse procedures.
9. After exchanging the feed gap sensor ass'y, do the calibration based on Section 2.9.1Media sensor in the Owner's Manual as a reference.

## 3.8 Replacing the Black Mark Sensor Ass'y

1. Please refer to 3.1 for disassembling the lower cover ass'y and lower inner cover.
2. Disconnect all harnesses from the main PCB ass'y .
3. Turn the lower inner cover upside down. Remove 4 screws and remove the **plastic laminate**.
4. Remove 1 screw from the **black mark sensor ass'y**.




5. Turn over the lower inner cover.
6. Replace the **black mark sensor ass'y**



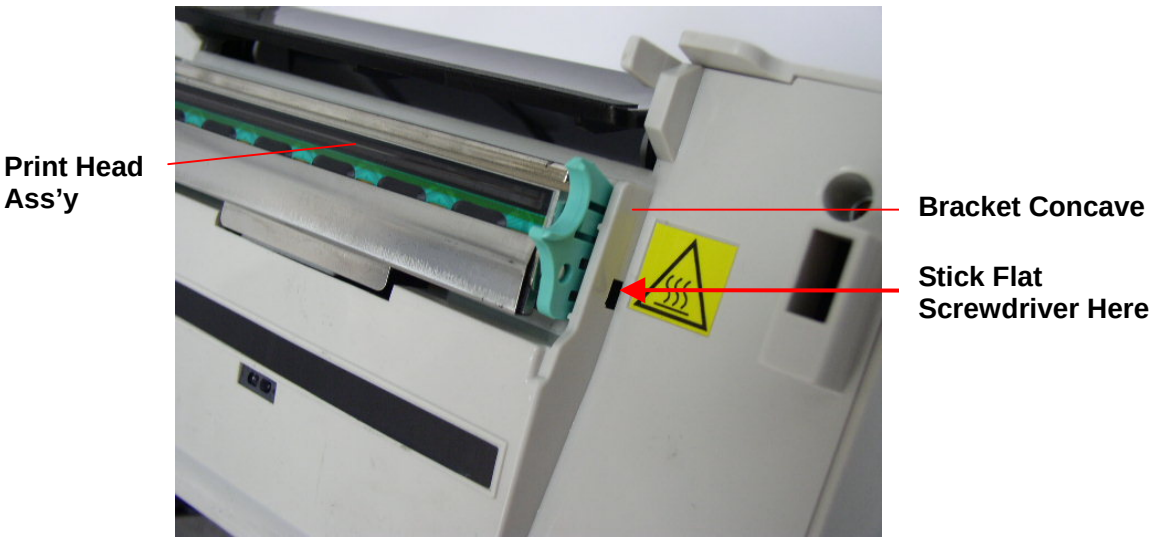

7. Reassemble parts in reverse procedures.
8. After exchanging the black mark sensor ass'y, do the calibration based on Section 2.9.1Media sensor in the Owner's Manual as a reference

## 3.9 Replacing the Print Head Ass'y

***CAUTION!***

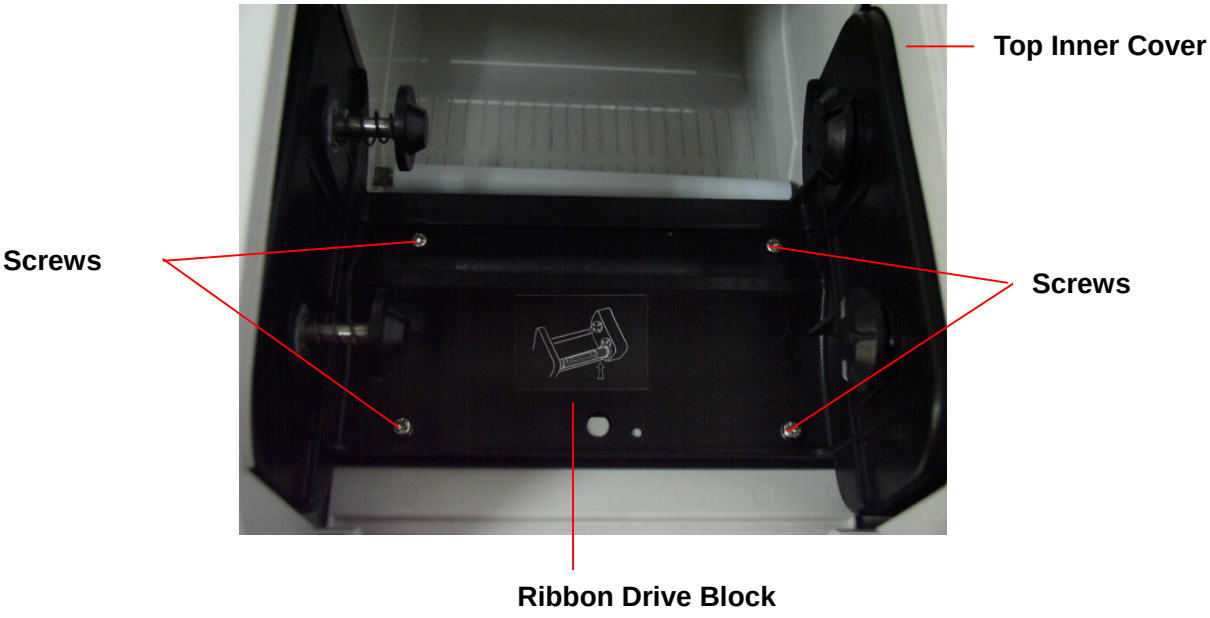
1. *NEVER touch the element when handling the Print Head Ass'y.*
2. *NEVER touch the connector pins to avoid a breakdown of the Print Head by static electricity.*

1. Press right concave of the print head **bracket** and use a flat screwdriver to stick right side of the printer head bracket then pick up the print head ass'y.
2. Disconnect print head harnesses.
3. Reassemble parts in reverse procedures.

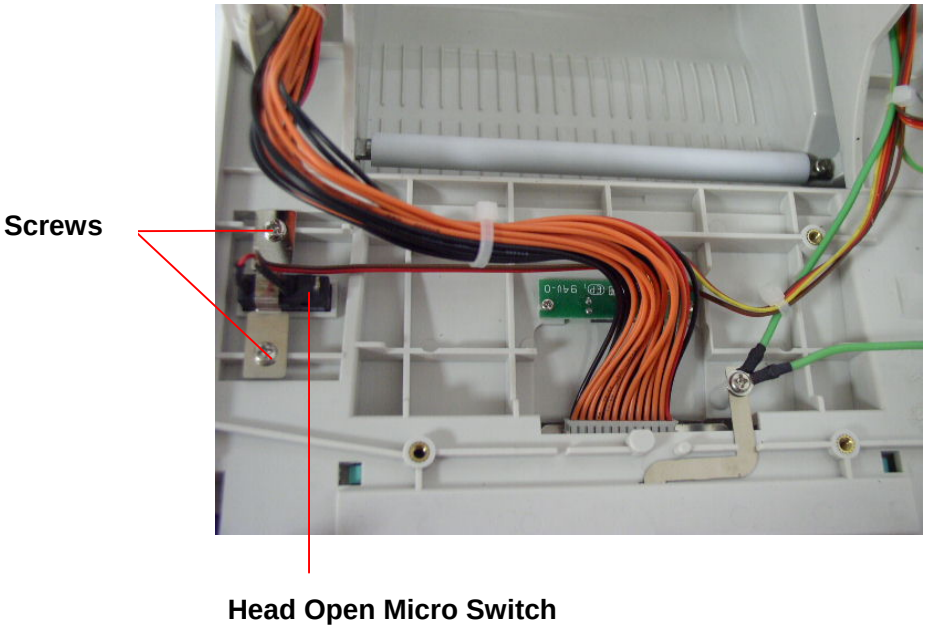


## 3.10 Replacing the Head Open Micro Switch

1. Please refer to 3.1 for disassembling the top cover ass'y and top inner cover.
2. Disconnect **ribbon drive block** by screwing off 4 screws at top inner cover.



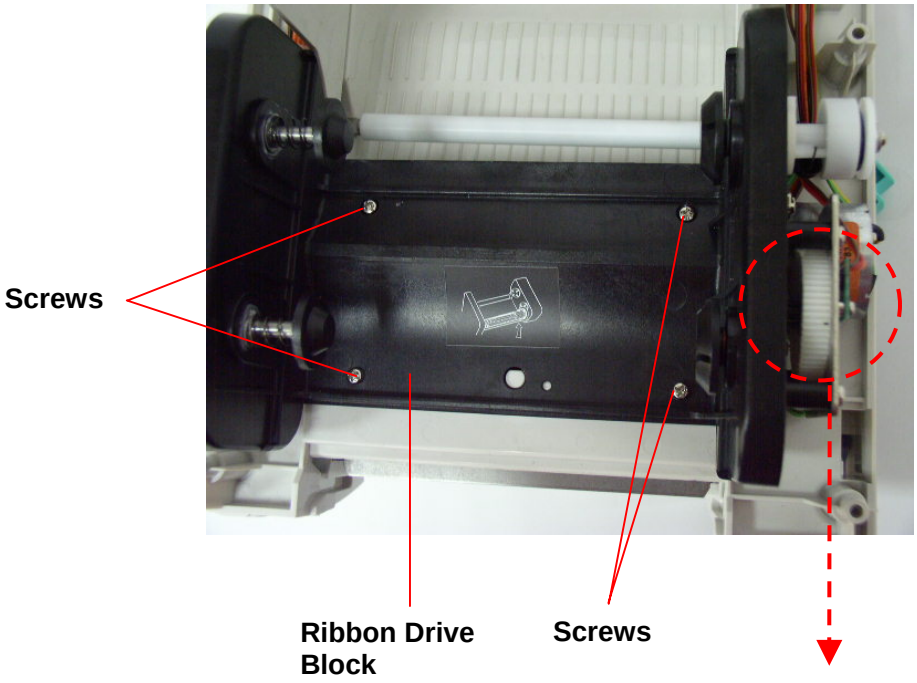

3. Remove 2 screws and remove the **head open micro switch**.

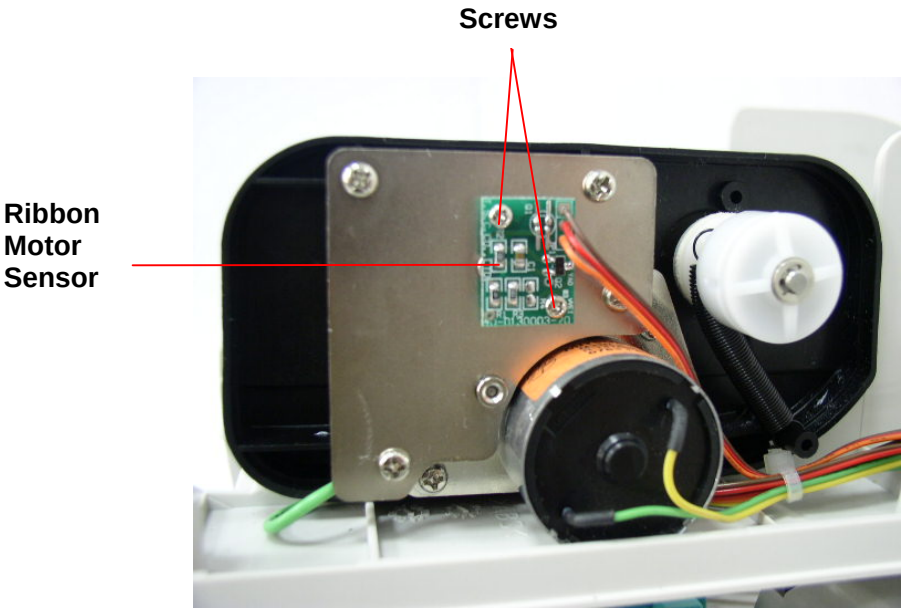



4. Reassemble parts in reverse procedures.

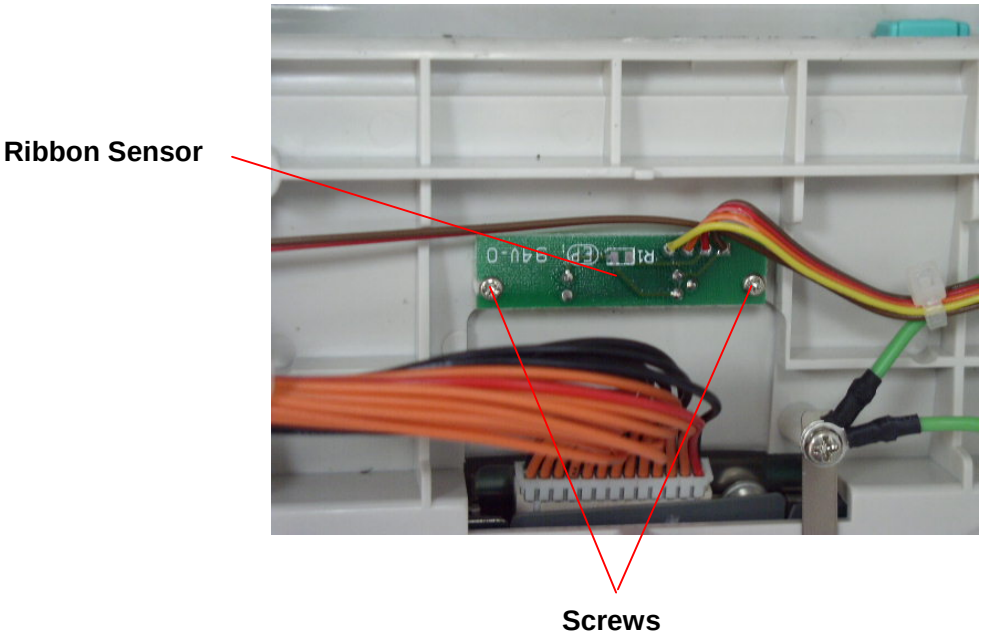
## 3.11 Replacing the Ribbon Motor and Ribbon Sensor

1. Please refer to 3.1 for disassembling the top cover ass'y and top inner cover.
2. Disconnect **ribbon drive block** by screwing off 4 screws at top inner cover.
3. Screw off 2 screws at side of the ribbon mount.
4. Replace the **ribbon motor sensor.**



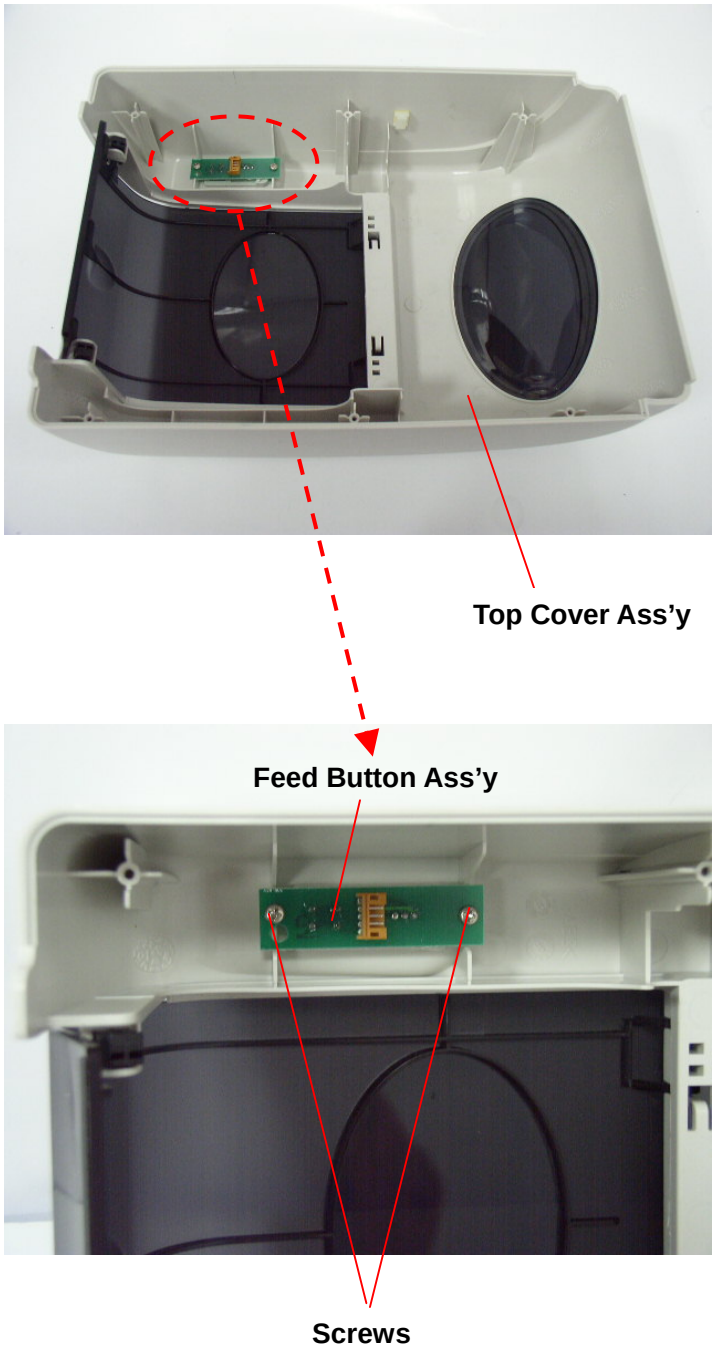
5. Screw off 2 screws from the top inner cover.
6. Replace the **ribbon sensor**.




7. Reassemble parts in reverse procedures.

## 3.12 Replacing the Feed Button Ass'y

1. Please refer to 3.1 for disassembling the top cover ass'y and top inner cover.
2. Turn the top cover upside down.
3. Remove 2 screws on **feed button Ass'y** and remove feed button PCB.

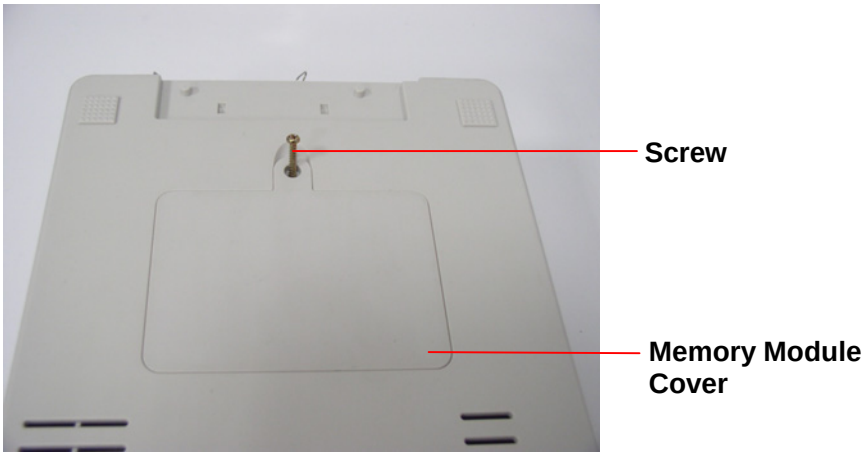



4. Reassemble parts in reverse procedures.

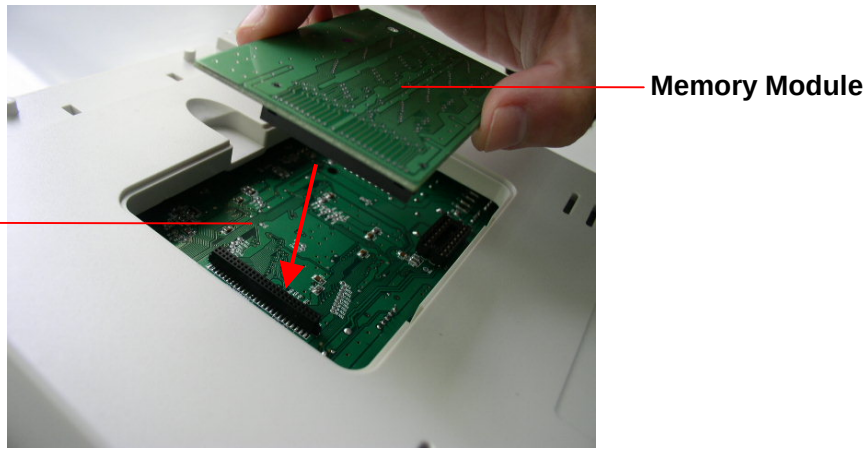
# 4. INSTALLATION PROCEDURE FOR OPTIONAL EQUIPMENT

## 4.1 Set Up Memory Module (Option: B-SV704-E1M/E2M/E3M/E4M/E6M/E8M-QM-R)

1. Turn the printer upside down.
2. Screw off 1 screw and open the **memory module cover**.



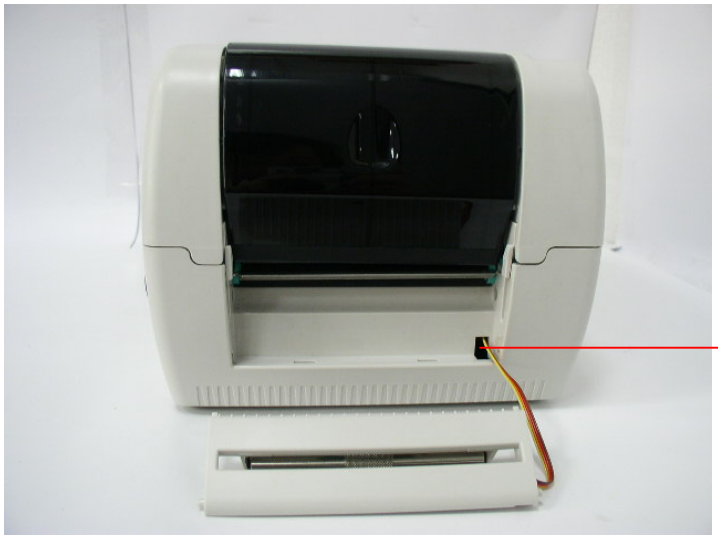

3. Plug in a memory module, pin to pin, on main PCB ass'y.




4. Revert the memory module cover.
5. Reassemble parts in reverse procedures.

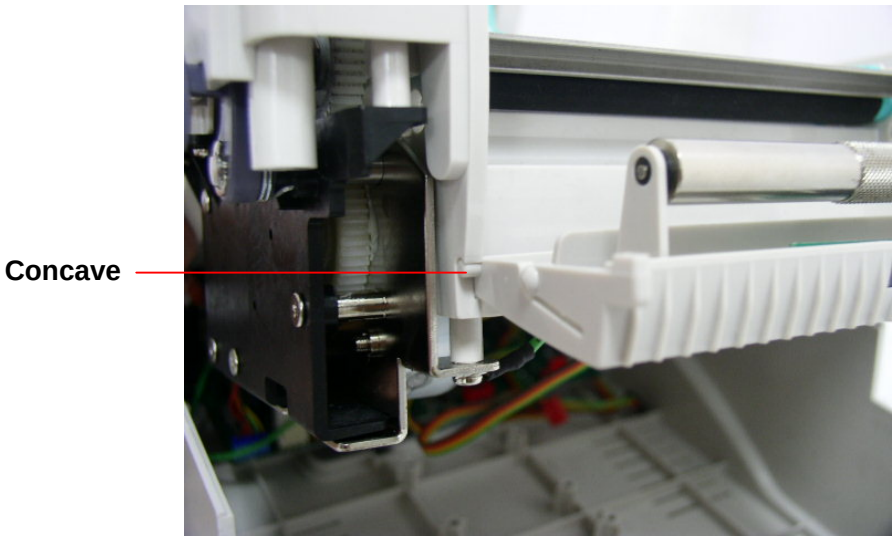
## 4.2 Install the Strip Module (Option: B-SV404-H-QM-R)

1. Open the top cover ass'y.
2. Remove two screws for hinge support and one screw for memory module cover in lower cover ass'y.
3. Remove 6 screws on the lower inner cover.
4. Hold the lower cover ass'y and lift up the top cover open levers to separate the lower inner cover and the lower cover ass'y. (Please refer to section 3.1 )
5. Connect the harness of strip module through the slot of lower inner cover.

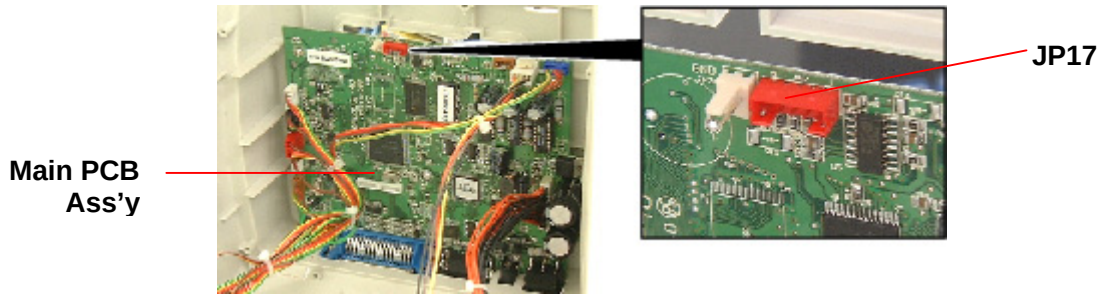



6. Lift up the lower inner cover to gently push strip panel into the two concaves of lower cover front side.

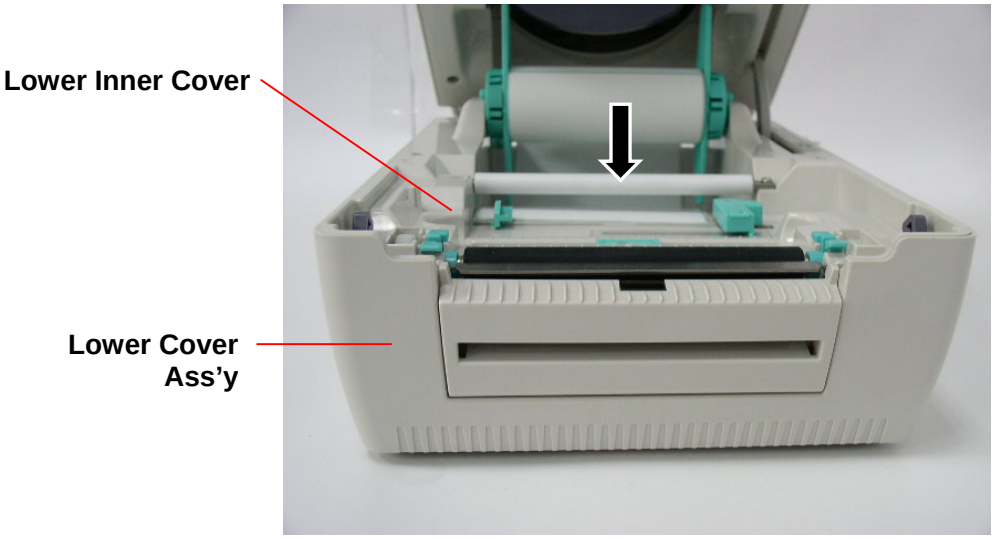
   ***Note :*** *Must lift up the lower inner cover first, then, the strip module could be installed into the concave of lower inner cover.*



7. Connect the harness of strip module at JP17 on the main PCB ass'y .




8. Put down the lower inner cover onto lower cover ass'y.




9. Push strip module to lock to the lower inner cover.

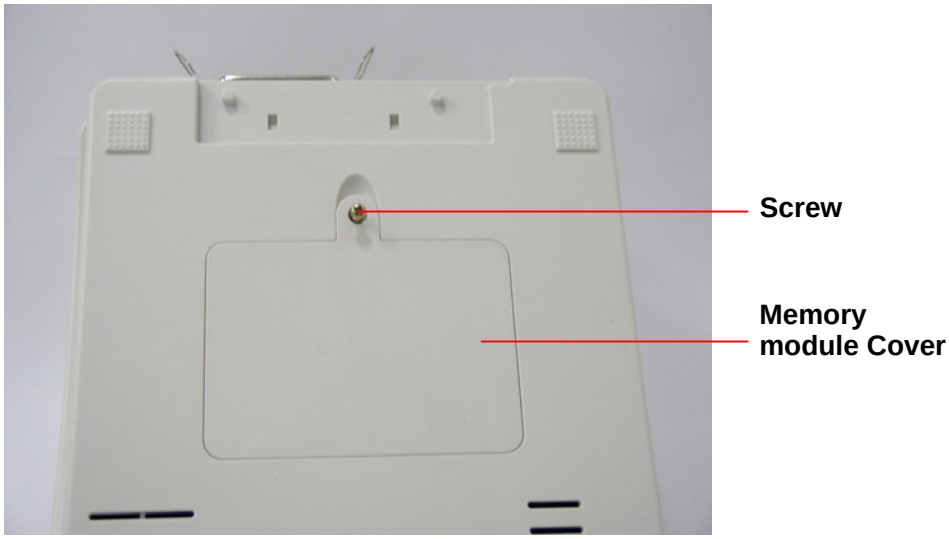

10. Reassemble parts in reverse procedures.

## 4.3 Install the Cutter Module (Option: B-SV204-QM-R)

| *WARNING!* |
| --- |
| *1. Be sure to turn OFF the power before removing the Cutter Cover.*<br>*2. Care must be taken not to injure your fingers by the cutter blade.* |

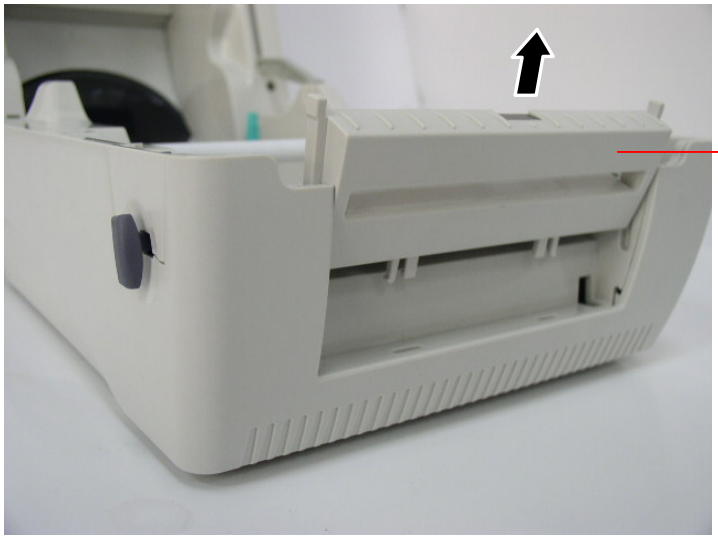
1. Upside down the printer to remove two screws of **hinge holder** in the lower cover ass'y.


2. Remove the screw that fixes the **memory module cover**.



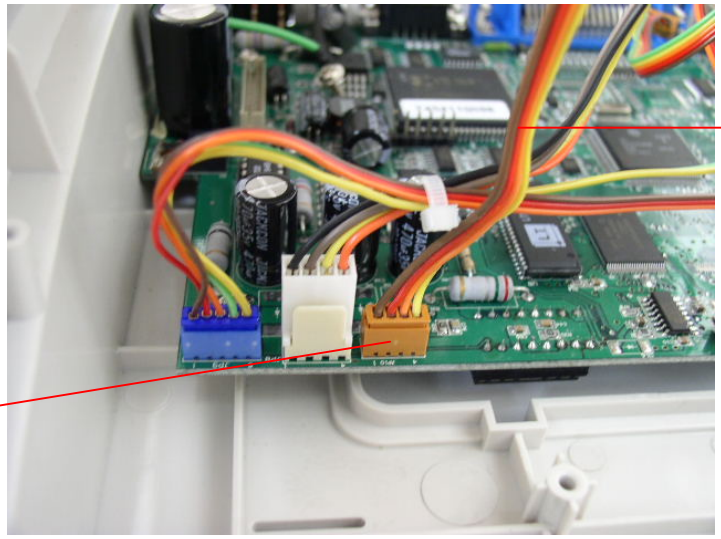
3. Plug in the Cutter Driver IC A3952SB at U14 socket on the main PCB ass'y .

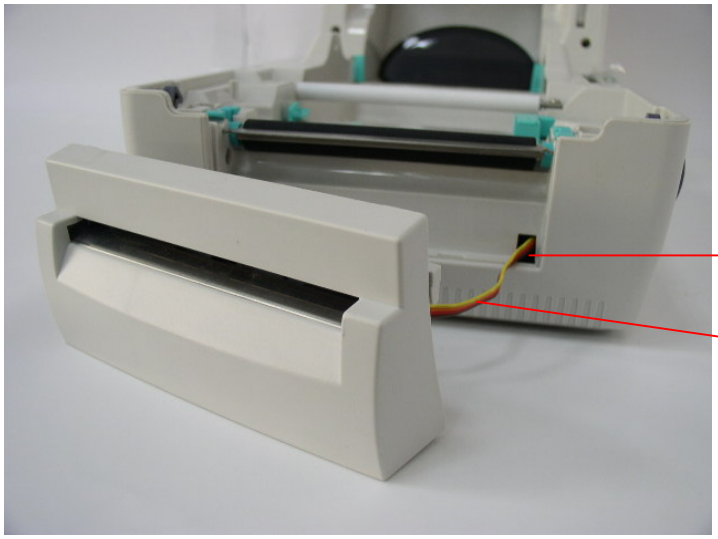

4. Open the printer **top cover ass'y** by pushing the **top cover open levers to the paper outlet direction**. The **top cover support** will hold the printer **top cover ass'y**.
5. Open the top cover ass'y to the ultimate open angle. Push the top cover support to the communication port direction to disconnect the lower inner cover and top cover support.
6. Pull up the front cover from the lower cover ass'y.



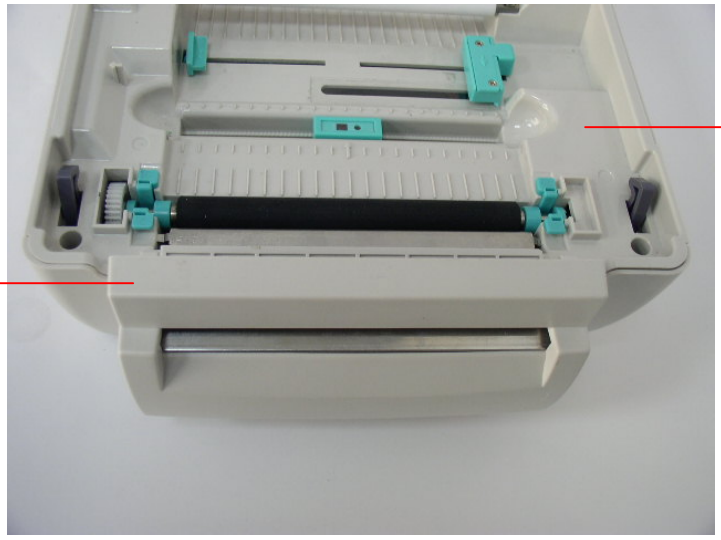

7. Remove the 6 screws in **lower inner cover**.
8. Lift up the lower inner cover from the **lower cover ass'y**.

9. Install the 4 pin connector of the cutter onto JP10 on the main PCB ass'y . Pull the wire of the 4-pin connector through the slot of lower inner cover front side. Then, put back the lower inner cover.



10. Gently push cutter module into the two slots of lower inner cover front side, then push cutter to lock into the lower inner cover.




11. Assemble the memory module cover.
12. Reassemble parts in reverse procedures.

# 5. TROUBLESHOOTING

This section lists the common problems that you may encounter when operating the printer. Also, it provides solutions.

1. ***The printer is not receiving power.***
   - Turn the power switch on.
   - Check power connection from both the socket to the power supply and the power supply to the printer.

2. ***The printer is on and ready to use.***
   - No action necessary.

3. ***The printer is paused.***
   - Press the feed button to resume printing.

4. ***The LED is on red blinking.***

   If the LED is on red blinking, which means that either label or ribbon runs out.

   *Label runs out:*

   - Load a roll of label and follow the instructions as following and then press the feed button to resume printing.

     1. Insert a paper roller into a paper roll
     2. Open the printer's top cover by releasing the green cover lock tabs located on each side of the printer and lifting the top cover. A support bar at the rear of the printer will hold the printer top cover open.
     3. Place a roll of paper onto the center of the paper roll mount.
     4. Feed the paper, printing side face up, through the Teflon bar and the paper guide and pass over the platen.
     5. Adjust the green center-biased paper guides in or out so they are slightly touch the edges of the label backing.
     6. To close the printer top cover, lift the cover slightly and pull the support bar forward toward the front of the printer. Close the printer top cover slowly and make sure the cover locks latch securely.

*Ribbon runs out:*

- Load a roll of ribbon and follow the instructions as following and then press the feed button to resume printing.

1. Push down on the ribbon access cover to unlock and open the cover
2. Place a paper core on a ribbon rewind spindle.
3. Mount the ribbon rewind paper core on the front hubs.
4. Install a ribbon on the ribbon supply spindle.
5. Mount the ribbon supply spindle on the rear hubs.
6. Attach the ribbon leader to the ribbon rewind paper core.
7. Rotate the ribbon rewind paper core until the ribbon leader is thoroughly, firmly encompassed by the black section of the ribbon.
8. Close the ribbon access cover.

*Ribbon sensor or ribbon rewind encoder error*

- Remove the ribbon, close the ribbon mechanism then turn off/on the printer power. The printer will be switched to thermal direct mode automatically.

If the printer LED is still on red blink, please check the following:

A. Is a paper core installed on the ribbon rewind spindle?
B. Is ribbon installed correct along the ribbon path?
C. Is the ribbon too transparent?
D. Is the rib of the ribbon spindle is broken?
E. Is the ribbon gear broken or worn?
F. Turn off printer power. Rewind the ribbon spindle by hand. Does the spindle rewind smoothly by hand? If the ribbon spindle doesn't rewind smoothly, please replace the ribbon mechanism.
G. Is the DC motor broken?
H. Is the ribbon sensor broken?
Measure the current of pin2 of JP19. If the ribbon detects the ribbon, it should be 5V DC; otherwise, it should be 0V DC.
I. Is the DC motor encoder sensor broken?
Measure the current of pin2 of JP9. When sensor detects the gap of encoder, it is 5V DC; otherwise it should be 0V DC.
Check if there is any black lubricant oil filled between gaps, which may cause error.
J. Check the DC motor driver IC (U13) on the main PCB ass'y . If it can function
all right, please replace the main PCB ass'y.

*Paper sensor error*

Please check the following items:

A. Is label installed correctly? Please refer to previous **4. *The LED is on red blinking*** – *Label runs out to* load a roll of label and then press the feed button to resume printing.

B. Is there any label stuck on the label sensor? Is there any pre-printed logo on the label? Please initialize to reset the system.

*Main PCB ass'y, feed gap sensor or black mark sensor failure.*

- Measure the current of pin3 of Q8. It is 5V DC when the label is detected and 0V DC for gap. If the voltage is not correct as above mentioned, the U23 ,CPU (U1) or feed gap sensor may be broken. Please change the feed gap sensor receiver first because the receiver sensor failure rate is higher than the transmitter sensor.

5. ***The printer setting runs error*.**

*Printer setting runs error:*

Refer to the chapter of **Initialization** in Interface Specification to reset the system.

6. ***Continuous feeding labels***

- The printer setting may go wrong. Please do the "Initialization" and "Feed Gap and Black Mark Sensor Calibration". (Refer to Interface Specification).

7. ***No print on the label***

- Is the label or ribbon loaded correctly? Refer to No, 4 Label runs out and Ribbon runs out to load the paper or to load the ribbon.
- Does the ribbon run out?
- Is the thermal head connector connected?
- Is the thermal head broken? Check it by printer self-test printout.
- Is main PCB U21, U15, Q1 broken?

8. ***Printer does not print.***

*Printed by enclosed BarTender software*

- This may be driver conflict problem. Please remove all the drivers in the printer folder and then re-install the driver for your printer.

*Printed by printer command.*

- This problem is caused by incorrect syntax commands. B-SV4T printer will ignore incorrect syntax commands. Please set the printer to the dump mode and make sure the printed command is identical to the commands sent from the application software.

- The printer serial port setting is not correspondent to the PC's setting
  Please do the configuration by TPCL commands.

9. ***Poor print quality***
   - The head maybe dirty. Clean the thermal print head.
   - Adjust the print density setting***.***
   - Ribbon and paper media are not compatible.

10. ***Stepping motor does not feed label***
    - Does stepping motor function normally?
    - Are U11, and U12 (3717 driver IC) of main PCB ass'y broken?

11. ***No 5V DC on main PCB ass'y.***
    - Is switching power broken?
    - Is main PCB ass'y U3 broken? Please replace a new main PCB ass'y .

12. ***Cutter functions abnormally.***
    *Cutter is not activated*
    Cutter is broken or the main PCB ass'y is broken. If it still has problem after a new cutter replaced, the U14 (driver IC) or U5 IC on the main PCB ass'y may be broken.

13. ***Black mark can't be detected properly***
    - Please check the position of the black mark. Is the width of black mark too thin to be detected? The suggested black mark width is 12 mm.
    - Does the sensor function properly?
      Measure the current of pin3 of Q9. It is 5VDC when the black mark is detected; otherwise it should be 0V DC. If the voltage is correct as above mentioned and the black mark still can't be detected, CPU may have some problem.

# 6. MAINTENANCE

| ***WARNING!*** |
|---|
| 1. *Be sure to disconnect the power cord before performing maintenance. Failure to do this may cause an electric shock.*<br>2. *To avoid injury, be careful not to pinch your fingers while opening or closing the top cover and print head block.*<br>3. *The print head becomes hot immediately after printing. Allow it to cool before performing any maintenance.*<br>4. *Do not pour water directly onto the printer.* |

This section presents the clean tools and methods to maintain your printer.

Use one or more of the following supplies that meets your needs:

- Cleaning pens
- Cleaning swabs
- Lint-free cloth.

The cleaning process is described as following

| Printer Part | Method |
|---|---|
| *Printer Head | ■ Let the print head to cool for one minute<br>■ Use a cleaning pen to swab the print elements |
| Platen Roller | ■ Rotate the platen roller and wipe it thoroughly with 70% **ethanol and a cleaning swab, or lint-free cloth. |
| Exterior | ■ Wipe it with water-dampened cloth |
| Interior | ■ Brush or air blow |

***** Do not touch printer head by hand. If you touch it carelessly, please use ethanol to clean it.

******It's industry alcohol. Please do not use regular alcohol, which may damage the printer head.

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