TEC

TEC Thermal Printer

B-450 SERIES

Product Description

Document No. **EO10-33003A**

Original   **Dec., 1998**

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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 Authorized Service representative with regard to any queries you may have in this manual.*

1. OUTLINE OF THE SYSTEM

1.1 FEATURES OF THE B-450 SERIES

1) Various bar codes, characters and graphic data can be printed using either thermal transfer or thermal direct methods. (HS model supports the thermal transfer method only.)
   This printer can also print writable characters and logos at designated coordinates by using a graphic command.
   It not only includes a variety of bar codes, characters and graphic data, but also comes with the new genaration data code symbol and two-dimensional codes (Data Matrix, PDF417, Maxicode, QR Code and Micro PDF) which are replacing bar codes.

2) Since the B-450 accommodates several interfaces such as the RS-232C, Centronics (QP only) and External I/O, it is very versatile.

3) A 16-bit CPU and a Gate Arrey equipped with several peripheral LSIs realizes high system performance.

4) A high dot density of 11.8 dots/mm (300 dpi) (TS model) or 23.6 dots/mm (600 dpi) (HS model) produces a clear print and the head history control system optimizes applied pulse signal to the head.

5) The TS model can print data with the size of up to 114.0 mm (W) by 999.0 mm (H) at the maximum print speed of 101.6 mm/sec. The HS model prints data with the size of up to 110.0 mm (W) by 999.0 mm (H) at the maximum speed of 50.8 mm/sec.

6) No adjustment of paper thickness or printing pressure is necessary.

7) Optional devices such as a cutter module, strip module and keyboard module are available.

NOTE: *Every size is written in millimeter (mm) in this manual. To obtain the size in inch, divide by 25.4*

Data Matrix is a trade mark of International Data Matrix, Inc.
PDF417 is a trade mark of Symbol technologies, Inc.
QR Code is a trade mark of DENSO CORPORATION.
Maxi Code is a trade mark of united Parcel Service of America, Inc.

1.2 DESCRIPTION OF MODEL NUMBER

B - 4 5 2 - T S 1 0 - Q Q - P A C

Special Code
US: North America Block
PAC: with a start up kit
No description: without a start up kit

Destination Code
QP: European Version
QQ: Canada, Mexico, etc.
US: North America Block

Specification
10: without Centronics interface
11,12: with Centronics interface

Issue mode
S: Batch

Resolution
T: 11.8 dots/mm (300 dpi)
H: 23.6 dots/mm (600 dpi)
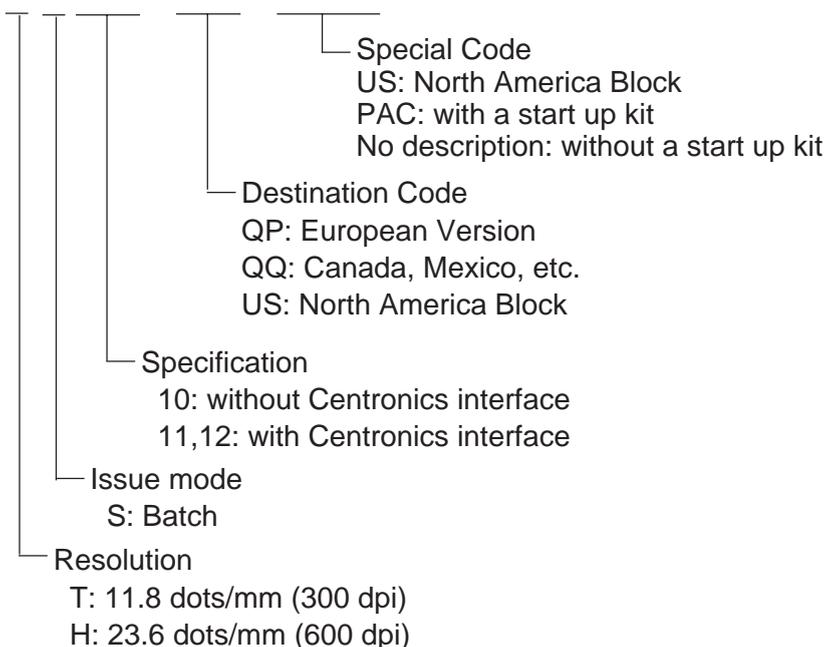
1.3 APPEARANCE AND DIMENSIONS (APPROXIMATE)

1.3.1 Front View/Rear View

[TS model]

<u>Front View</u>   <u>Rear View</u>

Operation Panel

Top Cover

Paper Guide

DIP Switch

Parallel Interface Connector (Centronics)

Paper Guide Lock Lever

Optional Keyboard Connector

Paper Outlet

Power Switch
O : OFF
I : ON

Supply Holder

AC Power Inlet

Serial Interface Connector (RS-232C)

Fig. 1-1

[HS model]

<u>Front View</u>   <u>Rear View</u>

Operation Panel

Top Cover

Supply Cover

Parallel Interface Connector (Centronics)

Paper Guide Lock Lever

DIP Switch

Keyboard Connector

Paper Outlet

Power Switch
O : OFF
I : ON

Supply Holder

AC Power Inlet

Expansion I/O Interface Connector

Serial Interface Connector (RS-232C)
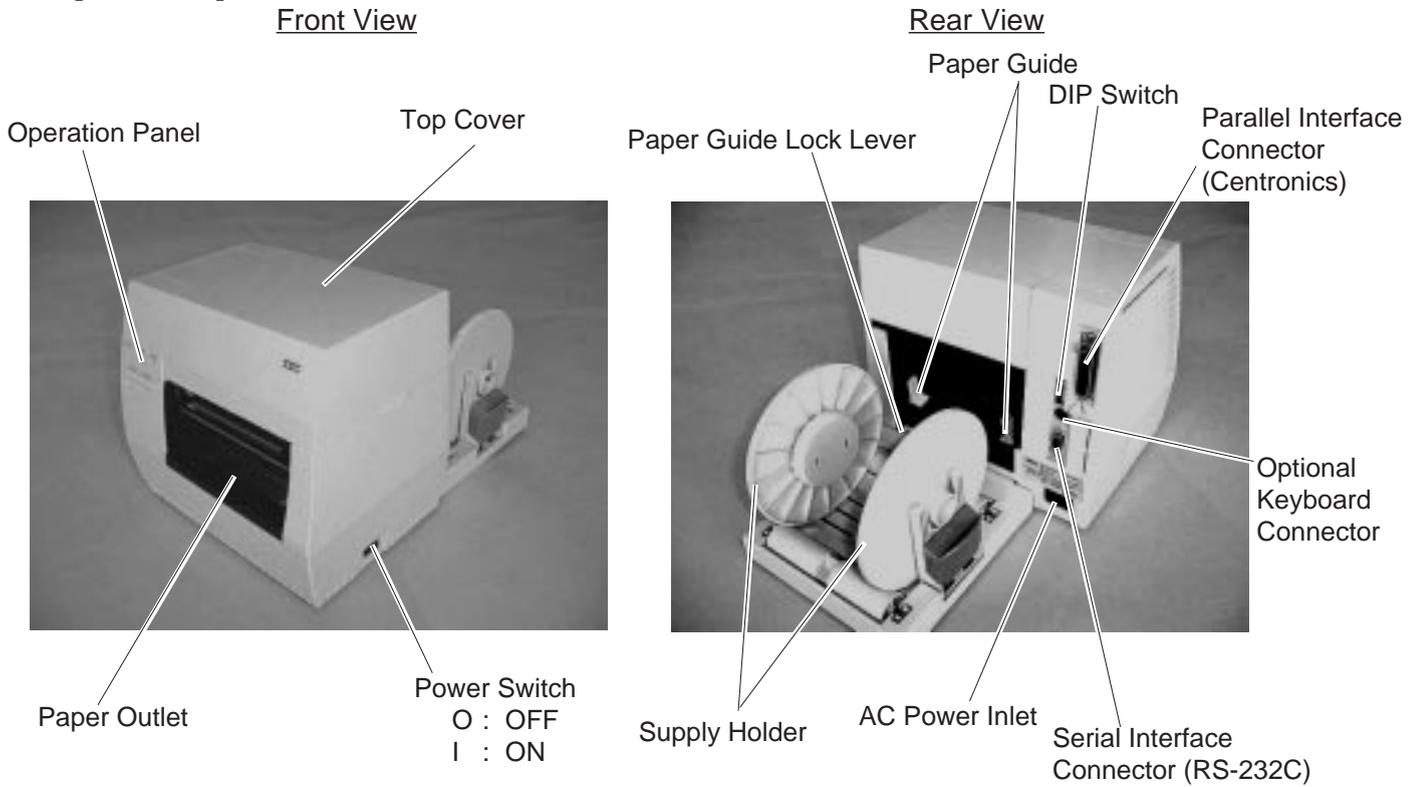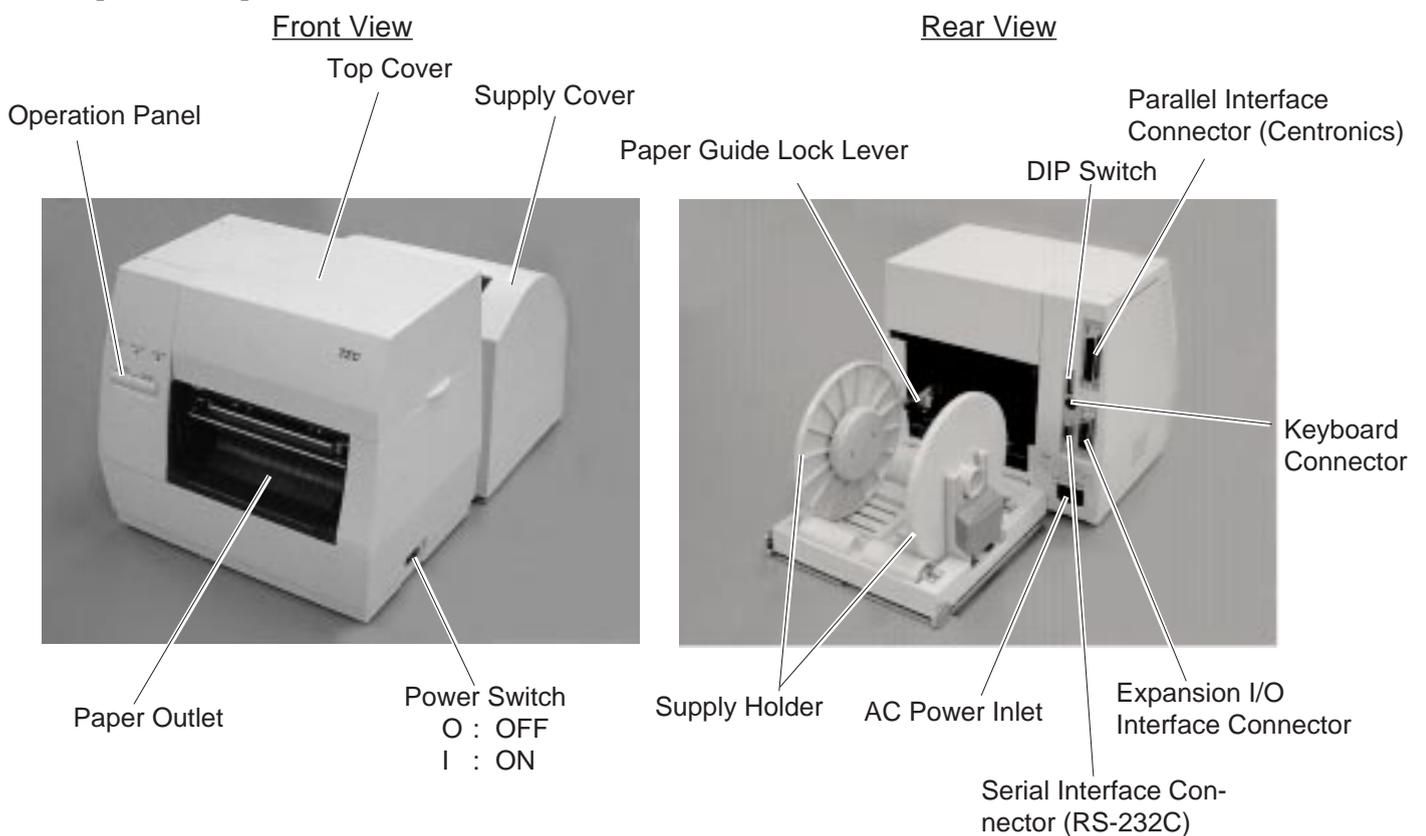
Fig. 1-2

1.3.2 Operation Panel

Fig. 1-3

POWER LED (Green)

Lights when the power is turned on.

ON-LINE LED (Green)

1) Flashes when communicating with a host computer.

2) On while printing.

ERROR LED (Red)

Lights when the printer does not operate correctly.

FEED Button

Feeds paper. Used to select options in the Diag. Test Operation mode and used to fine adjust values in the nagative direction.(Refer to the Maintenance Manual.)

PAUSE Button

Pauses printing.

Resets the printer when paused or when an error occurs.
Used to set the threshold. (Refer to Owner's Manual)
Used as an enter key in the Diag. Test Operation mode.

1.3.3 Dimension (Approximate)

Standard : 268 mm (W) x 198 mm (D) x 244 mm (H)
With supply holder unit : 268 mm (W) x 410 mm (D) x 244 mm (H)

1.3.4 Weight

TS model : Printer: 4.7 kg (without paper and ribbon)
Supply Holder: 1 kg

HS model : Printer: 5.0 kg (without paper and ribbon)
Supply Holder + Supply Cover : 2.5 kg

1.4 BASIC SPECIFICATIONS

1) Printing method .... TS model: Thermal direct printing or thermal transfer printing
                                   HS model: Thermal transfer printing

2) Print head (4 inches)
   [TS model]   **[HS model]**
   ① Total number of dots .... 1248 dots   ① Total number of dots .... 2496 dots
   ② Dot density .... 300 dpi   ② Dot density .... 600 dpi
                              (11.8 dots/mm)   (23.6 dots/mm)
   ③ Effective print width .... 105.7 mm   ③ Effective print width .... 103.6 mm
   ④ Thermal pitch .... 0.085 mm   ④ Thermal pitch .... 0.042 mm

3) Print speed ....TS model: 50.8 mm/sec., 101.6 mm/sec. (selectable)
                                   HS model: 50.8 mm/sec.
   NOTE: *These print speeds are available when printing ratio is less than 15% of the entire label or*
            tag paper.

4) Format size (W) x (L) .... Label: TS model:114.0 x 997.0 max., HS model: 110.0 x 997.0 max.
                                 Tag Paper: 114.0 x 999.0 max. (TS model only)

5) Issuing mode .... Batch printing (standard)
                                    Auto cut (Auto cut mode is only available when an optional cutter is
                                    attached.)
                                    Strip printing (Strip mode is only available when an optional strip module
                                    is attached.)

6) Type of bar code/two dimensional code
   ① JAN8, EAN8, JAN13, EAN13, UPC-A, UPC-B
   ② EAN8, EAN13, UPC-A, UPC-E+2 digit
   ③ EAN8, EAN13, UPC-A, UPC-E+5 digit
   ④ NW-7
   ⑤ CODE39 (STANDARD)
   ⑥ CODE39 (FULL ASCII)
   ⑦ ITF
   ⑧ MSI
   ⑨ CODE93
   ⑩ CODE128
   ⑪ EAN128
   ⑫ Data Matrix
   ⑬ PDF417
   ⑭ QR Code
   ⑮ industrial 2 of 5
   ⑯ Customer Bar Code
   ⑰ POSTNET
   ⑱ RM4SCC (ROYAL MAIL 4STATE CUSTOMERCODE)
   ⑲ KIX CODE
   ⑳ Maxi Code

7) Bar code rotation .... 0°, 90°, 180°, 270°

8) Type of characters
   ① Times Roman medium (12, 15 point)   ⑨ Prestige Elite medium (10.5 point)
   ② Times Roman bold (15, 18, 21 point)   ⑩ Prestige Elite bold (15 point)
   ③ Times Roman Italic (18 point)   ⑪ Courier medium (15 point)
   ④ Helvetica medium (9, 15, 18 point)   ⑫ Courier bold (18 point)
   ⑤ Helvetica bold (18, 21 point)   ⑬ OCR-A,B (12 point)
   ⑥ Helvetica Italic (18 point)   ⑭ Outline font (Helvetica bold/ Times Roman/Pop)
   ⑦ Presentation bold (27 point)   ⑮ Price font 1, 2, 3
   ⑧ Letter Gothic medium (14.3 point)   ⑯ Writable Characters   (10 types)...QQ,
                                                                        (45 types)...QP

9) Character code

   [TS model]

   ① PC-850   ② PC-8   ③ PC-852   ④ PC-857

   [HS model]

   ① PC-850   ② PC-8   ③ PC-852   ④ PC-857   ⑤ PC-851   ⑥ PC-855
   ⑦ PC-1250   ⑧ PC-1251   ⑨ PC-1252   ⑩ PC-1253   ⑪ PC-1254   ⑫ PC-1257
   ⑬ LATIN9   ⑭ ARABIC

10) Character magnification

   ① Regular font: 0.5 ~ 9.5 times (Between 0.5 and 1 times, magnification can be specified in steps of 0.1 time, thereafter, specified in steps of 0.5 times.)
   ② Outline font: 2.0 ~ 85.0 mm (magnified 0.1 mm in each direction)

   NOTE: *When the outline font size is large, the ribbon may wrinkle according to the quality of the ribbon or print tone.*

11) White or black background All types of characters are available

12) Character rotation .... 0°, 90°, 180°, 270°

13) Character strings rotasion .... 0°, 90°, 180°, 270°

14) Type of line

   ① Horizontal line   ② Vertical line   ③ Slant line   ④ Square   ⑤ Rounded Rectangle   ⑥ Circle

15) Line Width .... 1 dot to 12 dots can be specified (in units of 0.1 mm)
   Guaranteed only when a line has more than 3 dots.

16) Mechanism

   ① Batch mechanism
   This is the standard mechanism which let the printer print continuously without winding the label and tag paper. The strip or auto-cut function is available when the optional module is installed.

   ② Auto cut mechanism
   When the cutter module is installed, the backing paper and tag paper are cut individually (stop and cut). Minimum cut length is 25.4 mm (tag paper) or 37.0 mm (label).
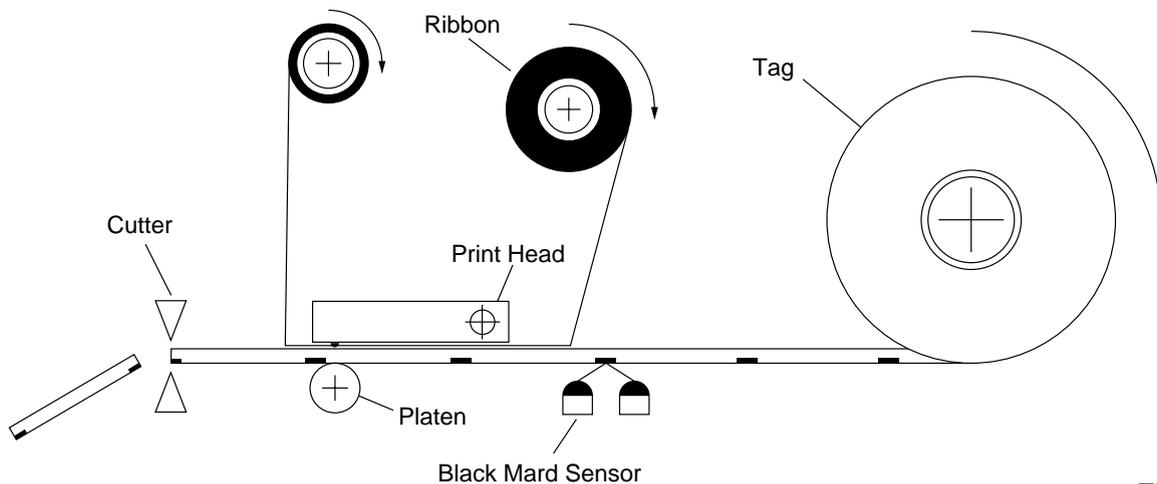

Fig. 1-4

17) Power supply

   QQ model: AC100 ~ 120 V, 60 Hz
   QP model: AC220 ~ 240 V, 50 Hz

18) Current consumption

   [TS model]
   QP model: 0.41 A, 74 W max. (standby: 0.15 A, 23.5 W)
   QQ model: 0.94 A, 47 W max. (standby: 0.30 A, 18 W)

   [HS model]
   QP model: 0.90 A, 150 W max. (standby: 0.12 A, 17 W)
   QQ model: 1.80 A, 140 W max. (standby: 0.22 A, 13.5 W)

19) Rush current .... TS model: QQ model : 13.8 A or less, QP model : 12.5 A or less
   HS model: QQ model : 13.8 A or less, QP model: 12.5 A or less

1.5 ELECTRONICS SPECIFICATIONS

1) CPU .... V55PI (16 MHz), 120 Pin QFP (0.5 mm)

2) Memory

   ① Program: Flash ROM 2 MB
   ② Backup: EE-PROM 128 Bytes
   ③ Image buffer + Work: [TS model] D-RAM 2 MB (Image buffer 1792 KB, Work 256 KB)
                              [HS model] D-RAM 4 MB (Image buffer 3840 KB, Work 256 KB)

> **NOTE:** The 1 MB Flash ROM can be used for the QQ models manufactured before August "99
> (Serial No. 9Nxxxxxx or earlier).

3) Interface

   ① RS-232C interface

      (1) Communication mode: Full-duplex

      (2) Transmission speed: 2400,4800,9600,19200 BPS (selectable)

      (3) Synchronization: start-stop synchronization

      (4) Transmission parameter

        ■ Parity: None, EVEN
        ■ Start bit: 1-bit
        ■ Stop bit: 1-bit
        ■ Word length   8-bit

      (5) Error detection

        ■ Parity check: VRC (Vartical parity check)
        ■ Framing error: This error occurs when no stop bit is found in the frame specified startig
                  with the start bit.
        ■ Overrun error: This error occurs when subsequent data is input before the data input to
                  the UART from the host is read by the printer.

      (6) Data entry code: ASCII, 8-bit code for European characters, 8-bit code for graphic

      (7) Receiving buffer: 5 KB

      (8) Protcol

        ■ XON/XOFF (DC1/DC3) protocol

- When initialized after power on, this printer becomes ready to receive data and sends an XON code (11H). (Trasmission or non-transmission of XON code is selectable by means of the DIP switch.)

- The printer sends an XOFF code (13H) when the blank positions in the receive buffer becomes 800 Bytes or less.

- The printer sends an XON code (11H) when the blank positions in the receive buffer are 2KB or more.

- When there are no blank positions in the receive buffer, the printer discards data received which exceeds the receive buffer capacity, without storing it in the buffer. (After detecting the XOFF code, the host computer must stop transmission before the printer receive buffer becomes full.)

- The ptinter sends an XOFF code (13H) at power off time. (XOFF code send is selectable with Dip switch.)

■ READY/BUSY (DTR) protocol

- When initialized after power on, this printer becomes ready to receive data and converts the DTR signal to "High" level (READY).

- The printer converts the DTR signal to "LOW" level (BUSY) when the blank positions in the receive buffer amount to 800 Bytes or less.

- The printer converts the DTR signal to "High" level (READY) when the blank position in the receive buffer amount to 2KB or more.

- When there are no blank position in the receive buffer, the printer discards data received which exceeds the receive buffer capacity, without storing it in the buffer.

  (After detecting a BUSY signal, the host computer must stop transmission before the printer receive buffer becomes full.)

■ (READY/BUSY (RTS) Protocol

- When initialized after power on, this printer becomes ready to receive data and converts the RTS signal to "High" level (READY).

- The printer converts the RTS signal to "Low" level (BUSY) when the blank positions in the receive buffer amount to 800 bytes or less.

- The printer converts the RTS signal to "High" level (READY) when the blank position in the receive buffer amount to 2KB or more.

- When there are no blank position in the receive buffer, the printer discards data received which exceeds the receive buffer capacity, without storing it in the buffer. (After detecting a BUSY signal, the host computer must stop transmission before the printer receive buffer becomes full.)

- The printer must keep the DTR signal "High" level, and the host must keep the DSR signal "High" level.

■ XON/XOFF (DC1/DC3) protocol + READY/BUSY (DTR) protocol

- When initialized after power on, this printer becomes ready to receive data and converts the DTR signal to "High" level (READY). The printer sends an XON code (11H).

- When the blank positions in the receive buffer are 800 Bytes or less, the printer converts the DTR signal to "LOW" level (BUSY) and sends an XOFF code (13H).

- When the bland positions in the receive buffer are 2KB or more, the printer converts the DTR signal to "High" level (READY) and sends an XON code (11H).

- When there are no blank positions in the receive buffer, the printer discards data received which exceeds the receive buffer capacity, without storing it in the buffer.

  (After detecting the XOFF code or BUSY signal, the host computer must stop transmission before the printer receive buffer becomes full.)

- The printer sends an XOFF code (13H) at power off time.

(9) Pin description

Pin No.	Signal	I/O	Description
2	TD (Transmit Data)	O	Data line from which the printer sends data to the host (send data line). Logic "1" is "Low", and "0" "High". It is LOW (MARK) while no data is being sent.
3	RD (Received Data)	I	Data line from which the printer receives data from the host (receive data line). Logic "1" is "Low", and "0" "High". It is LOW (MARK) while no data is being sent.
4	DSR (Data Set Ready)	I	Input signal from the host. It must be "High" for the printer to receive data.
5	SG (Data Set Ready)	-	Ground line for all data and control signals.
6	DTR (Data Terminal Eeady)	O	Output signal to the host. When controlling the READY/ BUSY (DTR): • Indicates that the printer is ready to receive data. • When the receive buffer is nearly full, it is "Low", and when the buffer is nearly empty, it becomes "High". When controlling the READ/BUSY (RTS): After power is ON, it is always "High".
7	CTS (Clear to Send)	I	Input signal from the host. It must be "High" for the printer to send data.
8	RTS (Request to Send)	O	Output signal to the host. When controlling the READY/BUSY (DTR): • Indicates there is data to send to the host. • After power is ON, it is always "High". When controlling the READY/BUSY (RTS): • When the receive buffer is nearly full, it is "Low", and when the buffer is nearly empty, it becomes "High".

(10) Interface circuit

■ Input circuit   ■ Output circuit

RD
CTS
DSR

SN75189 or equivalent

TD
RTS
DTR

SN75188 or equivalent

Fig. 1-5

■ Signal level

Input voltage : "H" .. +3V~ + 15V   Output voltage :   "H" .. +6V ~ +13V
"L" ... −3V~ − 15V   Output voltage :   "L" ... −6V ~ −13V

② Centronics interface

(1) Data input method:____   8-bit parallel (DATA 1~8)_ _____ _____
(2) Control signals: ACK, BUSY, PAUSE, DATA; STB, INPUT; PRIME, FAULT, PE
(3) Data input code: ASCII, JIS 8-bit code for European characters, 8-bit code for graphic
(4) Receiving buffer: 5KB
(5) Input/Output circuit configuration and Input/Output conditions

Type	Signal Name.	Configuration	
Input	DATA 1 to 8	SN74LS245 or equivalent +5V 1K (Uninstalled.)	Logical level (input) "1" = 2 to 5V "0" = 0 to 0.4V
	INPUT PRIME DATA STB	SN74LS14 or equivalent +5V 1K 100P (DATA•STB only)	
Output	BUSY FAULT PAUSE ACK PE	SN7406 or equivalent +5V 1K 100P (ACK only)	Logical level (input) "1" = 2.4 to 5V "0" = 0 to 0.4V Fig. 1-6

4) Sensor/Switch
① Head up switch (micro switch)
The head up switch is located on the lower left side and back end of the printer frame.
This switch detects that the print head is in the print position (head is down) when the print head block is lowered and the arm on the left side of the print head block turns ON the switch.

② Media sensor
[TS model]
This sensor, comprised of the black mark sensor and feed gap sensor, is located in two parts on the back side of the printer, part on the bottom rear of the paper guide base and part on the sensor holder.

[HS model]
This sensor, comprised of the black mark sensor and feed gap sensor, is located in two parts on the front side of the printer, part on the bottom front of the paper guide base and part on the sensor cover. For the HS model, the position of the media sensor can be adjusted in 5 steps in both left and right direction.

■ Black Mark Sensor (Reflective sensor)
This is a fixed sensor which detects black marks at the center of the tag paper.
■ Feed Gap Sensor (Transmissive sensor)
This is a fixed sensor which detects label gaps at the center of the label.
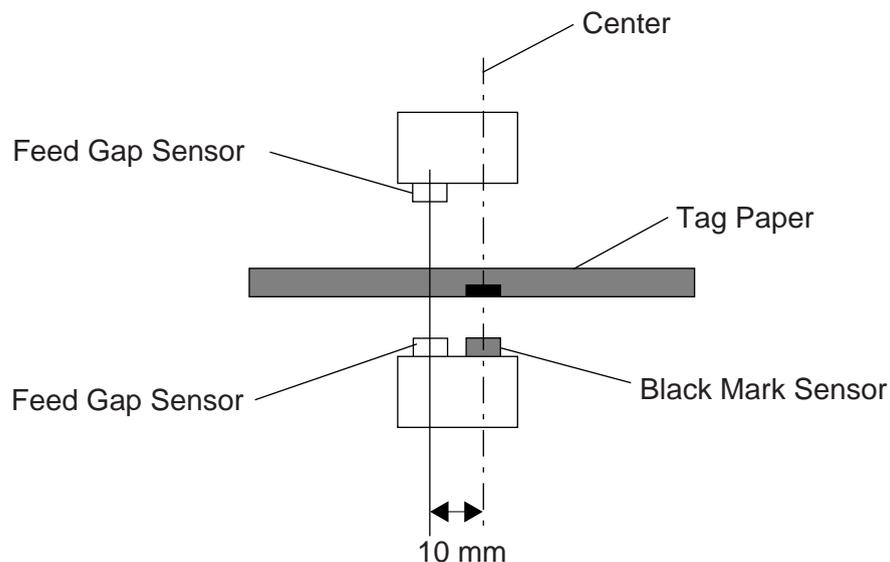

Fig. 1-7

③ Slit sensor (Transmissive sensor)

This sensor detects the rotation count of the ribbon slit gear and the ribbon motors. The ribbon motors torque works to take up slack in the ribbon and is dependent on the detected count.

The slit sensor is a photo coupler combining an LED and a transistor.

The slit sensor (feed) also detects a ribbon end. When the ribbon has been used up, the ribbon slit gear stops and the slit sensor does not turn on and off.
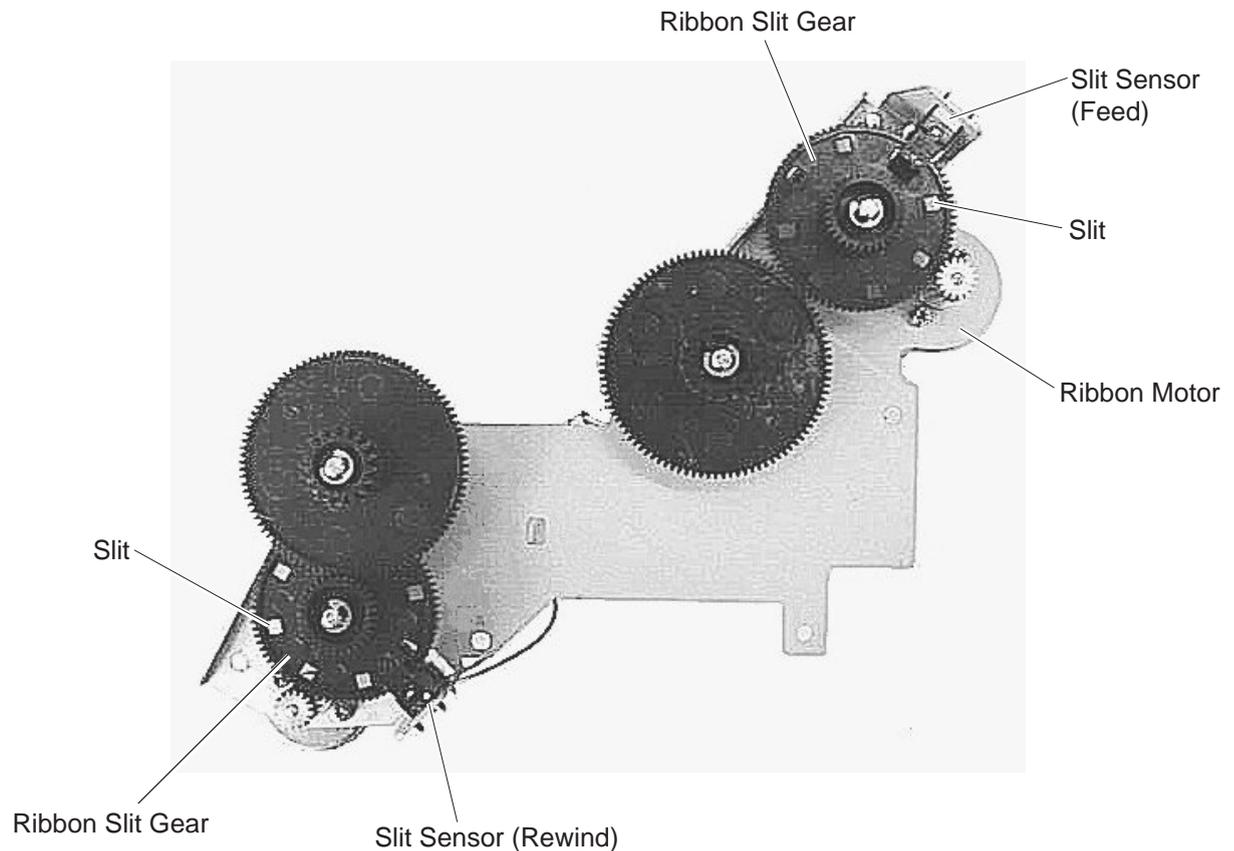

Fig. 1-8

④ Cutter home position switch (micro switch)

A cam positioned at the right side of the cutter turns the micro switch on/off in accordance with the cycle of the cutter motion (half rotation). The micro switch status indicates if the cutter is in the home position.

⑤ Cutter cover open switch (micro switch)

The cutter cover open switch is located on the lower front part of the cutter unit.

This switch detects that the cutter cover is opened when the tab of the cutter cover is released from the actuator arm and the micro switch turns OFF.

2. SUPPLY SPECIFICATIONS

Infomation regarding the supply specifications contained in Product Description is essential to service engineers. Detail specifications and other information on the paper and ribbon are described in Supply Manual by model. It is issued by and sent from TOSHIBA TEC H.Q (Sales Division) upon release of new model or manual's revision. When purchasing the supplies locally, be sure to refer to the Supply Manual for details, or trouble may occur. Be sure to read carefully and understand the Supply Manual since if also includes the details about notes, precision of the print start position, limitations on printing, etc.

2.1 PAPER
[TS model]

Type \ Item	Label			Tag Paper	
	Batch	On-demand	Auto-cut	Batch	Auto-cut
Width (mm)	25.4 ~ 114.0			25.4 ~ 114.0	
Length (mm)	15.0 ~ 999.0	25.4 ~ 999.0	37.0 ~ 999.0	15.0 ~ 999.0	25.4 ~ 999.0
Thickness (mm)	0.10 ~ 0.17	0.13 ~ 0.17	0.10 ~ 0.17	0.10 ~ 0.17	
Outer roll diameter (mm)	152.4 max.			152.4 max.	
Recommended paper	RICOH: 130LAB, 140LA			I-BEST S	

NOTES:
1. When cutting the label, secure a gap of 6 mm or more and cut in the middle of the gap.
2. The thermal paper used for direct thermal printing must not have the specifications which exceed Na^+ 800 ppm, K^+ 250 ppm and Cl^- 500 ppm.
3. Some ink used on pre-printed labels may contain ingredients which shorten the print head's product life. Do not use labels pre-printed with ink which contain hard sub–stances such as carbonic calcium ($Ca\ CO_3$) and kaolin (Al_2O_3, $2SiO_2$, $2H_2O$).
4. The label should be at least three times as long as the detection gap.
5. Relations between media roll length and core diameter.

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

   L: Paper length   d: Paper core outside diameter
   D: Max. roll diameter   t: Paper thickness
6. Use of paper with a width less than the minimun paper width may shorten the print head life.
7. Use of paper which is narrower than the specified minimum width may shorten the print head life.
8. Only for the tag paper 25.4 mm to 37.0 mm in width, the thickness ranges from 0.10 mm to 0.26 mm.
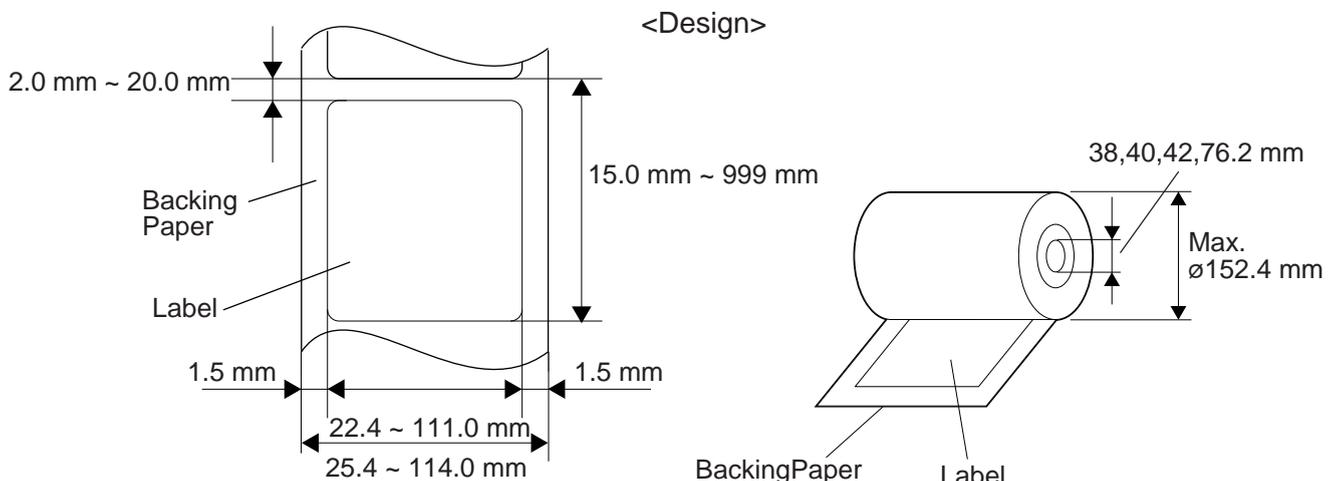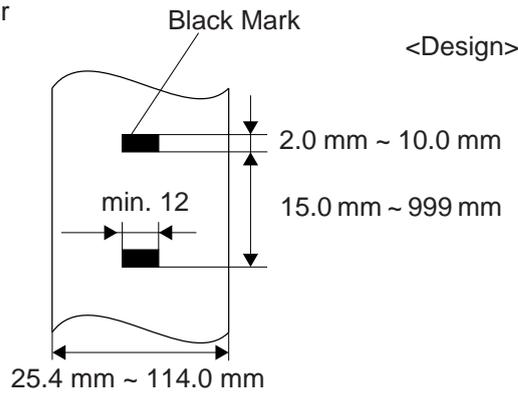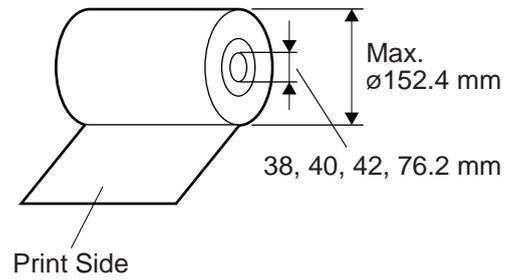
1) Label

Fig. 2-1

Fig. 2-2

2) Tag Paper

<Design>

Black Mark

2.0 mm ~ 10.0 mm

15.0 mm ~ 999 mm

min. 12

25.4 mm ~ 114.0 mm

Fig. 2-3

Max.
ø152.4 mm

38, 40, 42, 76.2 mm

Print Side

Fig. 2-4

<Non Print Area>

2 mm

Printing Area

2 mm

1.5 mm

1.5 mm

Fig. 2-5

Cut Position
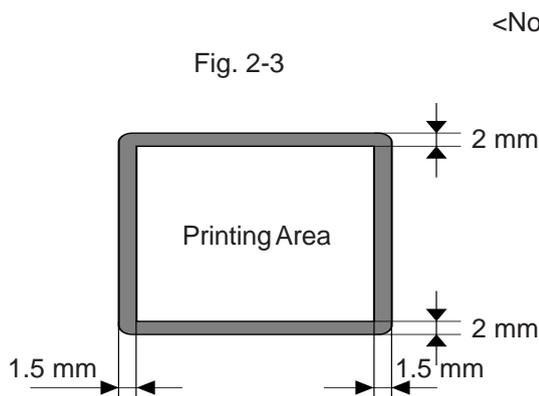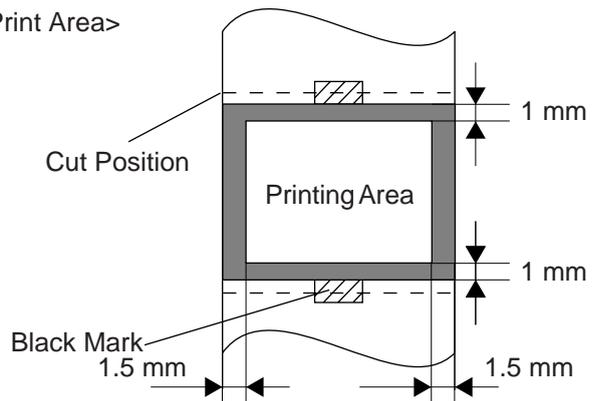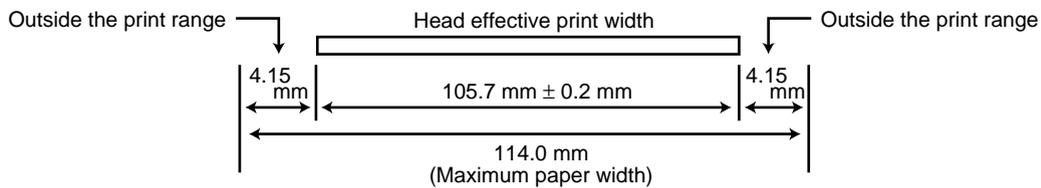
1 mm

Printing Area

1 mm

Black Mark

1.5 mm

1.5 mm

Fig. 2-6

NOTE: *Max. effective print area is 105.7 mm (W) x 981.3 mm (L).*

3) Relationship between the head effective print width and paper.

Outside the print range

Head effective print width

Outside the print range

4.15 mm

105.7 mm ± 0.2 mm

4.15 mm

114.0 mm
(Maximum paper width)

[HS model]

Type / Item	Label Batch	On-demand	Auto-cut
Width (mm)	25.4 - 110.0		
Pitch (mm)	7.0 - 999.0	25.4 - 999.0	37.0 - 999.0
Length (mm)	5.0 - 997.0	23.4 - 997.0	31.0 - 993.0
Thickness (mm)	0.10 - 0.17	0.13 - 0.17	0.10 - 0.17
Shape	Roll paper wound inside.		
Outer roll diameter	152.4 mm max.		
Paper core (mm)	Inner diameter ø38, 40, 42, 76.2 ± 0.3		
Recommended paper	LINTEC: FR1510-50 SILVER PET LINTEC: FR1412-50 WHITE PET		

NOTES:

1. The thickness of the backing paper should be 56μm or more.

2. The label should be at least three times as long as the detection gap.

3. The max. paper width includes the backing paper width.

4. Use Glassine paper 7K, 8K, or equivalent type for the backing paper. (Transparency rate should exceed 22%.)

5. Relations between media roll length and core diameter. The unit of measure should be unified.

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

   L: Paper length d: Paper core outside diameter
   D: Max. roll diameter t: Paper thickness

6. When using the cutter, be sure to cut the gap between labels. Perforated labels should be tested before use.

7. When cutting the label, secure a gap of 6 mm or more and cut in the middle of the gap.

8. Fanfold paper cannot be used.

9. How to fix the label stock to the paper core

   Remove the labels from the backing paper for the minimum of 400 mm long and fix the backing paper edge to the paper core as shown below. Failure to do this may cause a void print because the powder on the paper core surface may be attached to the label which contacts with the paper core.
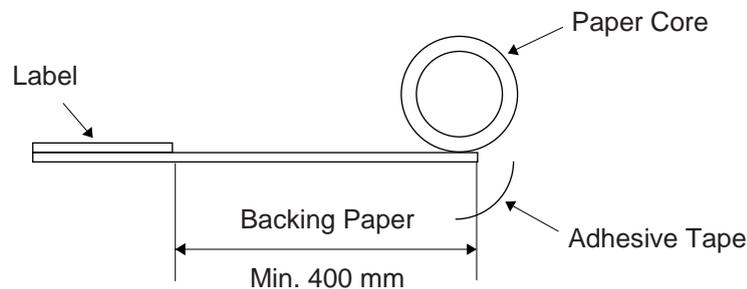

Fig. 2-7

2.2 RIBBON

No.	Item		Specification
1	Shape		Spool type
2	Width		60, 90, 110
3	Max. length		TS model: 300 m, HS model: 270 m
4	Max. OD		Ø65 mm
5	Back treatment		Coated
6	Core	Material	Cardboard
		Shape	See Fig. 2-8.
7	Leader tape		Polyester film (opaque), 260±5 mm long
8	Winding method		The ink side is outside of ribbon winding.

<Core Shape>

4 + 1.0,-0 mm

25.8 ± 0.2 mm

118+0, -0.5 mm   4 + 0.2,-0 mm
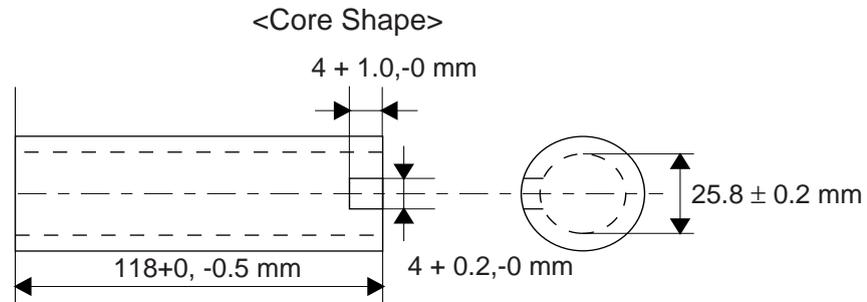
Fig. 2-8

NOTE: *When purchasing ribbon locally, they must meet the above size. There may be TOSHIBA TEC-approved ribbons which do not fall within the above size, however, they have no functional problem.*
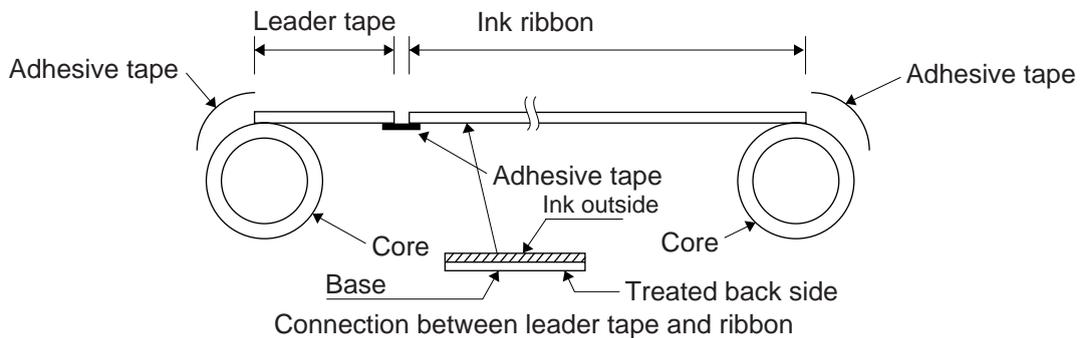

Leader tape   Ink ribbon

Adhesive tape

Adhesive tape

Core

Adhesive tape

Ink outside

Core

Base

Treated back side

Connection between leader tape and ribbon

Fig. 2-9

2.3 CARE AND HANDLING OF THE PAPER AND RIBBON

CAUTION:

Be sure to read carefully and understand the Supply Manual. Use only paper and ribbon which meet specified requirements. Use of non-specified paper and ribbon may shorten the head life and result in problems with bar code readability or print quality. All paper and ribbon should be handled with care to avoid any damage to the paper, ribbon or printer. Read the following guideline carefully.

- Do not store the paper and ribbon for longer than the manufactures recommended shelf life.
- Store paper rolls on the flat end, do not store them on the curved sides as this might flatten that side causing erratic paper advance and poor print quality.
- Store the paper in plastic bags and always reseal after opening. Unprotected paper can get dirty and the extra abrasion from the dust and dirt particles will shorten the print head life.
- Store the paper and ribbon in a cool, dry place. Avoid areas where they would be exposed to direct sunlight, high temperature, high humidity, dust or gas.
- The thermal paper used for direct thermal printing must not have the specifications which exceed Na^+ 800 ppm, K^+ 250 ppm and CL-500 ppm.
- Some ink used on pre-printed labels may contain ingredients which shorten the print head's product life. Do not use labels pre-printed with ink which contain hard substances such as carbonic calsium ($CaCO_3$) and kaolin (Al_2O_3, $2SiO_2$, $2H_2O$).
- Avoid using paper containing SiO_2 or talc which wears the print head protection layer.

For further information please contact your local distributor or your paper and ribbon manufacturer.

3. OPTIONAL KIT

Option Name	Type	Use
Cutter module	B-7204-QM	This cutter module uses a rotary cutter. It cuts backing paper of labels and tag paper automatically in "stop and cut" mode.
Strip module	B-7904-H-QM	This strip module strips the label from the backing paper with the take-up block and strip block. When the rewinder guide plate is attached, the tag paper and label with backing paper are wound.
Programmable Keyboard module	KB-80-QM	This module is an external intelligent keyboard unit.
Expansion I/O interface board (TS model only)	B-7704-IO-QM	Installing this board in the printer allows a connection with an external device with the exclusive interface, such as the Keyboard module.
Centronics interface board (TS-QQ model only)	B-7704-C-QM	Installing this board in the printer allows a connection with a PC by the Centronics parallel interface.
LAN I/F Board (TS model only)	B-7704-LAN-QM	This board enables the printer to be used in a LAN network by using the command language.

NOTE: *To purchase the OPTIONAL KIT, please contact your authorized TOSHIBA TEC representative or TOSHIBA TEC Head Quarter.*

3.1 CUTTER MODULE: B-7204-QM

This compact cutter module uses a built-in rotary cutter. The specification is provided below:

  ① Cutting method .... Rotary cut
  ② Cut mode .... Stop cut
  ③ Cut width .... 25.4 ~ 114.0 mm
  ④ Cut length .... Tag paper:25.4 ~ 999.0 mm, Label:37.0 ~ 999.0 mm
  ⑤ Thickness .... 100.0 ~ 170.0 μm
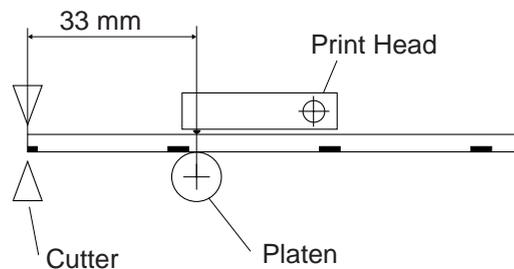 ⑥ Home position switch .... Micro switch

Fig. 3-1

3.2 STRIP MODULE: B-7904-H-QM

This strip module strips labels from the backing paper one by one using an exclusive DC motor which turns the strip roller to feed the backing paper. No backing paper take-up is provided.

   ① Print speed: TS model: Max.4 ips, HS model: Max. 2 ips
   ② Available minimum label length: 25.4 mm
   ③ Available minimum label width: 25.4 mm

3.3 KEYBOARD MODULE: KB-80-QM

This keyboard is equipped with 16 digits x 2 lines LCD and 28 key switches.

Built-in basic interpreter allows.

   ① Display
      16 digits x 2 lines LCD
   ② Key switch
      Numeric and function keys
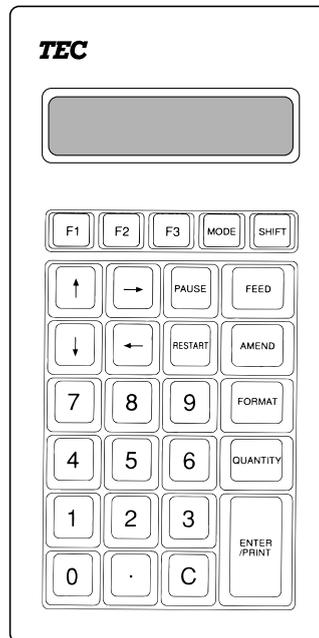
Fig. 3-2

   ③ Interface
     (1) RS232C: 2 channels
        Channel 1: 8-pin-DIN connector (with approx. 1 m cable)
        Channel 2: 9-pin DSUB connector
     (2) Pin Description

To printer (8-pin DIN)

Pin No.	Signal	I/O
1	GND	
2	GND	
3	RXD	Input
4	TXD	Output
5	$\overline{\text{CTS}}$	Input
6	$\overline{\text{RTS}}$	Output
7	+5V	Input
8	+5V	Input

Shield to frame ground

To PC 9-pin DSUB female (Locking screw: Inch)

Pin No.	Signal	I/O
1	-	
2	TXD	Output
3	RXD	Input
4	-	
5	GND	
6	-	
7	$\overline{\text{CTS}}$	Input
8	$\overline{\text{RTS}}$	Output
9	-	

5 V

0 ohm
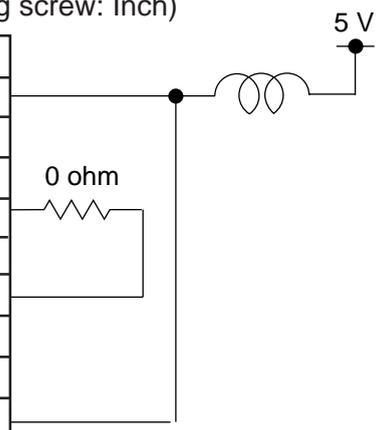
④ Power supply
5V (Supplied through the DIN connector) 5V±5%
⑤ Memory
(1) Flash memory: 8 M bit
(2) SRAM: 32 K byte
⑥ Buzzer: Installed.

3.4 EXPANSION I/O INTERFACE BOARD: B-7704-IO-QM (TS MODEL ONLY)

This interface board is used to connect the printer to external devices, such as a labeler.
The input/output signals from the connected external devices can control label feeding or printing and indicates the printer state.

① Pin description: (FCN-685J0024 connector or equivalent)

Pin No.	Signal	I/O
1	IN0	Input
2	IN1	Input
3	IN2	Input
4	IN3	Input
5	IN4	Input
6	IN5	Input
7	OUT0	Output
8	OUT1	Output
9	OUT2	Output
10	OUT3	Output
11	OUT4	Output
12	OUT5	Output

Pin No.	Signal	I/O
13	OUT6	Input
14	N. C	-
15	COM1	-
16	N. C	-
17	N. C	-
18	N. C	-
19	N. C	-
20	N. C	-
21	COM2	-
22	N. C	-
23	N. C	-
24	N. C	-

NOTE: *Controller side connector: FCN-781P024-G/P Connector or equivalent*
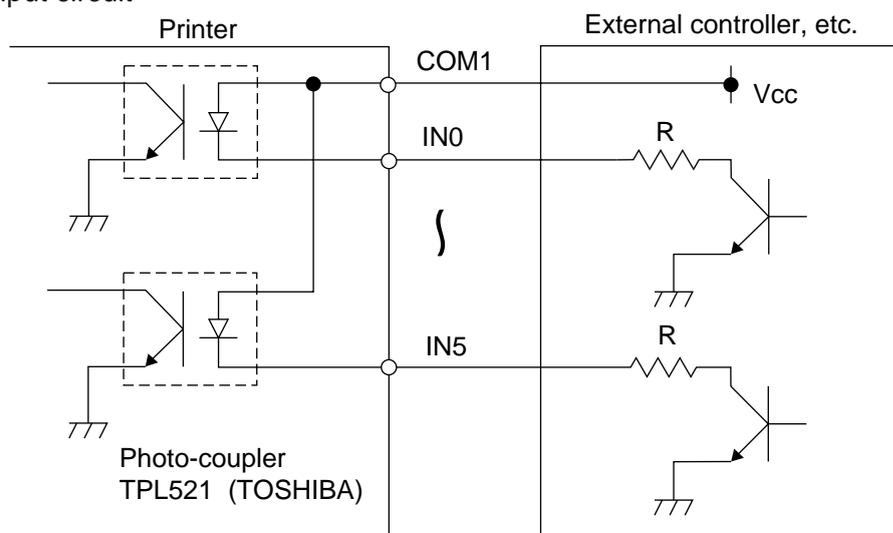
② Input circuit

Fig. 3-3

There are six input circuits, and each input is a current loop using a photo-coupler.
The anode of the photo-coupler is connected to common pin COM1 in each of the five circuits. Each cathode is independent. The voltage of Vcc is 24 V (max.) while the diode operating current is 16 mA.
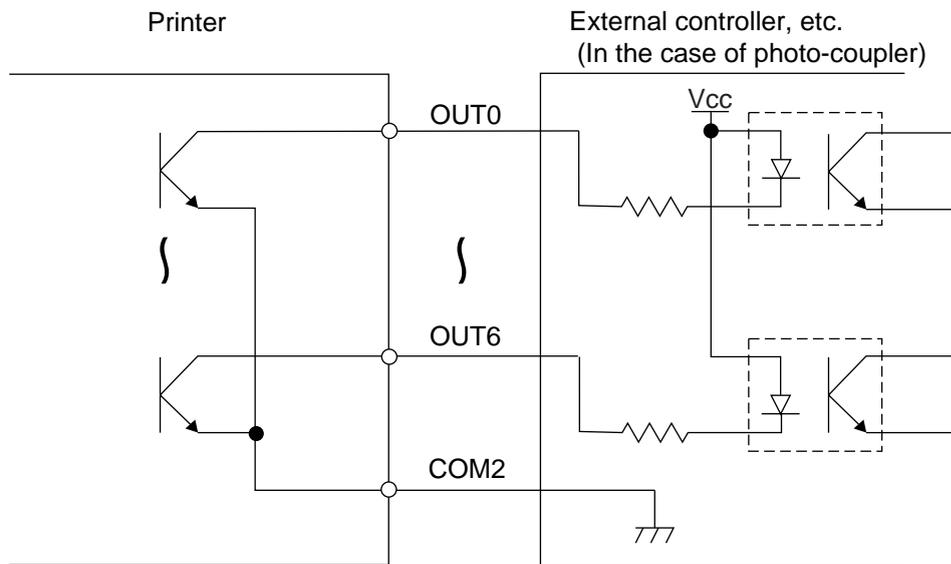
③ Output circuit

Fig. 3-4

There are seven output circuits, and each output is an open collector. The voltage of Vcc is 24V (max.) while the operating current is 150 mA.
For other details, please refer to the Expansion I/O specification.

④ Signal description

[Input]
IN0:   Feed .... Feeds a label.
IN1:   Print .... Prints a label.
IN2:   Pause .... Pauses printing.
IN3:   Not used.
IN4:   Not used.
IN5:   Not used.

[Output]
OUT0:   Feeding .... The printer is feeding labels.
OUT1:   Printing .... The printer is printing labels.
OUT2:   Pausing .... The printer is pausing.
OUT3:   Error state .... The printer is in error state.
OUT4:   Not used. .... Always OFF.
OUT5:   POWER ON .... The printer power is ON.
OUT6:   Not used. .... Always OFF.

3.5 CENTRONICS INTERFACE BOARD: B-7704-C-QM (TS MODEL ONLY)

The B-7704-C-QM optional Centronics interface board has been developed for establishing the communication between printer and PC via the Centronics interface.
    ① Kind: Centronics Interface
    ② Data Input: 8 bit Parallel
    ③ Control Signal: ACK, BUSY, PAUSE, DATA•STB, FAULT, PE, INPUT•PRIME
    ④ Data Input Code: ASCII Code, European Character Set 8 bit Code, Graphic 8 bit Code, JIS 8
                           Code, Shift JIS Kanji Code, JIS Kanji Code

3.6 LAN I/F BOARD: B-7704-LAN-QM (TS MODEL ONLY)

Installing this LAN I/F board into the printer can connect the printer and the host by means of Local Area Network and 10BASE-T.

(1) Connection

```
┌──────────────┐  ← Centronics I/F    ┌──────────────┐   TCP/IP    ┌─ Comm Assist-TEP1
│              │                      │              │ ←─────────→ │  Bar Code Printer Server
│ B-452 Printer│ ←──────────────────→ │B-7704-LAN-QM │             └─
│              │    RS-232C I/F        │              │
└──────────────┘                      └──────────────┘
      ↕
RS-232C  I/F
DIN
┌──────────────┐
│  KB-80-QM    │
│  Keyboard    │
└──────────────┘
```
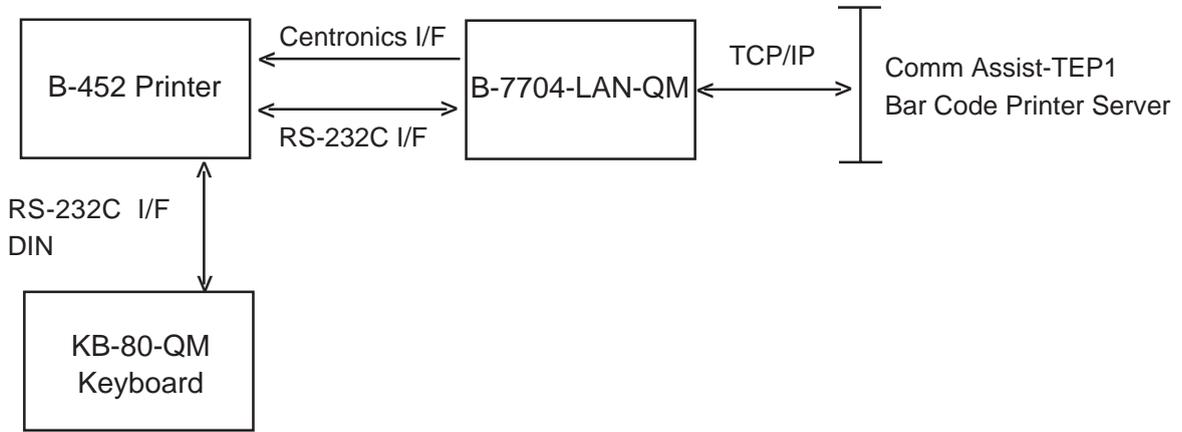
(2) Protocol

   1) Specifications

LAN Hardware	Standard	Ethernet V2.0 (10BASET)
	Transmission modulation method	Base band method
	Media access	CSMA/CD (Bus structure)
LAN Protocol	Protocol	TCP/IP
	Physical Layer	Ethernet V2.0 (Conforming to IEEE802.3)

   2) Communication Session

   Control Session: TELNET Server
                        240 seconds is set as the inactivity timer.
   Data Session: TCP Port for Centronics I/F Output (1 session)
                        TCP Port for RS-232C I/F Output (1 session)
                        LPR server (1 session)

(3) B-7704-LAN-QM Initial Setting before shipment

Item	Parameter	TELNET Setting
Operation Mode	Socket Mode	Impossible
Data format for socket communication	Transparent Clear the receive buffer at communication.	Impossible
My IP Address	190.238.254.254	Possible
Sub Net Address	0.0.0.0 (Not Used)	Possible
Gateway IP Address	0.0.0.0 (Not Used)	Possible
TCP Port No. for communication by RS-232C I/F	1111	Possible
TCP Port No. for communication by Centronics I/F	2222	Possible
Client Connection	Enable (Used)	Impossible
Server IP Address	0.0.0.0 (Not Used)	Possible
TCP Port no. of server	0 (Not Used)	Possible
Connection retry count	10 times	Possible
Connection Trigger	Connected by the receive data. Disconnected by the timer.	Possible
Disconnection Timer value	90 seconds	Possible
Receive Control Timer	60 seconds	Impossible
RS-232C I/F Protocol	Baud Rate: 38400 bps Data Length: 8 bits Parity: EVEN Stop Bit: 1 bit Protocol: XON/XOFF without Flow Control	Possible
ER Signal	ON status by turning the printer power ON	Impossible
Password for the management TELNET	None	Impossible

NOTES:　1.　*In the TELNET setting, select applicable items from the menu and enter each setting value. Then selecting* **[Save changes to EE_PROM restart CommAssist]** *in* **[5) Exit]** *performs EE_PROM writing and restarting the printer.*

　　　　　2.　*The RS-232C I/F Protocol of the B-7704-LAN-QM should be the same as that of the printer.*

(4) Printer Interface (RS-232C Interface)
1) Communication mode: Full-duplex
2) Synchronization method: Start-stop synchronization
3) Transmission speed: 2400 to 19200 bps
Selectable by the printer DIP switch setting
Initial setting from the printer is 9600 bps.
4) Start bit: 1-bit
5) Data length: 8-bits
6) Parity: NONE/EVEN
Selectable by the printer DIP switch setting
Initial setting from the RS-232C is NONE.
7) Stop bit: 1-bit
8) Flow control: XON/XOFF with/without flow control
Initial setting from the RS-232C is XON/XOFF without flow control.
9) Data entry code: ASCII code, Shift JIS code

NOTE: *At the B-7704-H-QM initial setting mode, the printer's transmission speed and parity should be set to 9600 bps and NONE with the DIP switch, respectively.*

10) Connector Pin and Signal Description

B-452 Printer		Direction of signal	B-7704-LAN-QM		Description
Pin No.	Signal Name		Pin No.	Signal Name	
1	GND	-	1	GND	-
2	GND	-	9	GND	-
3	RD	←	3	TD	Data line from which the printer receives data from the B-7704-LAN-QM.
4	TD	→	2	RD	Data line from which the printer sends data to the B-7704-LAN-QM.
5	CTS	←	5	RTS	Imput signal from the B-7704-LAN-QM. (It is always "High".)
6	RTS	→	4	CTS	Output signal to the B-7704-LAN-QM (After power is ON, it is always "High".)
7	+5V	←	6	+5V	-
8	+5V	→	None	-	-

(5) Printer Interface (Centronics Interface)
It is a parallel output port for the data received from the Ethernet. Signals SELECTIN and INIT should not be used. For signals PE, SELECT, ERROR, their states are only indicated by the TELNET. They should not have any effect on data transmission.
The data received from the Ethernet is output to the Centronics via the 16-KB ring buffer.

(6) LED Function

LED	Function
ON-LINE LED (STATUS LED 1)	ON (Green):　　　Operating Mode ON (Orange):　　　Diagnostic RAM Test (Power ON) Blink (Orange):　　RARP output, Loop Back Test (Power ON) Blink (Red):　　　System Error (Synchronizes with the ERROR LED) ON (Orange) → OFF: Returns to the factory default setting.
ERROR LED (STATUS LED 2)	OFF:　　　　　　　　Operating Mode (Wait status) or while initializing ON (Green):　　　　　Data Receive Blinks once (Red):　　External Ethernet Loop Back Error Blinks twice (Red):　　NV-RAM Error Blinks three times (Red):RAM Error Blinks four times (Red):　Internal Ethernet Loop Back Error Continuous blink (Red):　System Error (Synchronizes with the ON-LINE LED)

(7) Dip Switch Function
　　　CPU reads the status of Dip switch when the power is turned ON.

Dip Switch (ON/OFF)				Function	Remarks
1	2	3	4		
OFF	**OFF**	**OFF**	**OFF**	**Operating Mode**	**Factory default setting**
OFF	OFF	OFF	ON	C-F1 Mode	Not used.
ON	ON	ON	ON	The factory default setting is written into the ROM.	Initial Mode (Not used.)

(8) Jumper Pin Function

No.	Function	Initial
JP1	SG/FG Short 　　Available:　Short 　　None:　　　Open	None:　　　Open
JP2	Centronics Interface Logic Select 　　Available:　Original logic 　　Non:　　　Reverse	None:　　　Reverse
JP3	P-ROM/F-ROM Select 　　Pins 1-2:　F-ROM 　　Pins 2-3:　P-ROM	Pins 1-2:　　F-ROM
JP4	S-RAM Size Select 　　Pins 1-2:　1M Byte 　　Pins 2-3:　256K Byte	Pins 2-3:　　256K Byte