

CITIZEN

User's Manual

Line Thermal Printer

Model : iDP-3210

Rev.	Issued	

Japan CBM Corporation
Information Systems Div.

1996.08.02(10-DCL)15

Declaration of Conformity

Manufacturer's Name : Japan CBM Corporation
 Manufacturer's Address : 1-1-7, Okubo, Shinjuku-ku, Tokyo
 169, Japan

Declare the Product

Product Name Thermal Printer
 Model Number (s) iDP3210
 (iDP3210R, iDP3210P)
 (S.NO.9690001 -)

Conform to the following Standards

LVD	: EN60950	:1992+A1+A2:1993
EMC	: EN55022	:1994 Class A
	: EN61000-3-2	:1995
	: EN50082-1	:1992
	: IEC801-2	:1991 4KV CD, 8KV AD
	: IEC801-3	:1984 3V/m, 27MHz-500MHz
	: IEC801-4	:1988 0.5KV Signal Line 1KV AC mains

Supplementary Information

"The product complies with the requirements of the Low Voltage Directive 73/23/EEC, 93/68/EEC and the EMC Directive 89/336EEC, 92/31/EEC, 93/68EEC"

Place Tokyo, Japan

Signature

Date Sept.1996



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Warning

This is a Class A products. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

This declaration is applied only for 230V model.

IMPORTANT SAFETY INSTRUCTIONS

- Read all of these instructions and save them for later reference.
- Follow all warnings and instructions marked on the product.
- Unplug this product from the wall outlet before cleaning. Do not use liquid or aerosol cleaners. Use a damp cloth for cleaning.
- Do not use this product near water.
- Do not place this product on an unstable cart, stand or table. The product may fall, causing serious damage to the product.
- Slots and openings on the cabinet and the back or bottom are provided for ventilation. To ensure reliable operation of the product and to protect it from overheating, do not block or cover these openings. The openings should never be blocked by placing the product on a bed, sofa, rug or other similar surface. This product should never be placed near or over a radiator or heat register. This product should not be placed in a built-in installation unless proper ventilation is provided.
- This product should be operated from the type of power source indicated on the marking label. If you're not sure of the type of power available, consult your dealer or local power company.
- Do not allow anything to rest on the power cord. Do not locate this product where the cord will be walked on.
- In an extension cord is used with this product, make sure that the total of the ampere ratings on the products plugged into the extension cord do not exceed the extension cord ampere rating. Also, make sure that the total of all products plugged into the wall outlet does not exceed 15 amperes.
- Never push objects of any kind into this product through cabinet slots as they may touch dangerous voltage points or short out parts that could result in a risk of fire or electric shock. Never spill liquid of any kind on the product.
- Except as explained elsewhere in this manual, don't attempt to service this product yourself. Opening and removing those covers that are marked "Do Not Remove" may expose you to dangerous voltage points or other risks. Refer all servicing on those compartments to service personnel.
- Unplug this product from the wall outlet and refer servicing to qualified service personnel under the following conditions:
 - A. When the power cord or plug is damaged or frayed
 - B. If liquid has been spilled into the product.
 - C. If the product has been exposed to rain or water.
 - D. If the product does not operate normally when the operating instructions are followed. Adjust only those controls that are covered by the operating instructions since improper adjustment of other controls may result in damage and will often require extensive work by a qualified technician to restore the product to normal operation.
 - E. If the product has been dropped the cabinet has been damaged.
 - F. If the product exhibits a distinct change in performance, indicating a need for service.

IMPORTANT: This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the instruction manual, may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference, in which case the user at his own expense will be required to take whatever measures may be necessary to correct the interference.

CAUTION: Use shielded cable for this equipment.

For Uses in Canada

This digital apparatus does not exceed the class A limits for radio noise emissions from digital, apparatus, as set out in the radio interface regulations of the Canadian department of communications.

<Cautions>

1. Before using the equipment, be sure to read this User's manual thoroughly.
Please keep this manual handy to refer to when needed.
2. Portions of the contents of this User's manual may be changed without prior notice.
3. The reproduction of parts or all of the contents of this User's manual without permission is strictly forbidden.
4. Absolutely do not carry out maintenance, disassembly, or repair of parts that are not specified in this User's manual.
5. Note that losses which may be attributed to the user's wrong operation method or operating environment will be outside the responsibility of this company.
6. Do not carry out operations other than those explained in this User's manual, since doing so may become a cause of accidents or breakdowns.
7. Because data is basically transient, long-period and permanent storage of data will not be possible.
Please note in advance that this company will not be responsible in any way for losses or lost profits caused through the clearing of the data due to breakdowns, repairs, investigations, etc.
8. If any questionable points, mistakes, omitted explanations, etc. are found in the contents of this manual, please contact this company.
9. Please note that notwithstanding the conditions in above 8, this company will not be responsible for the consequences of results obtained through operation of this equipment.

! This symbol represents an illustration shown to attract user's attention.

! This symbol represents an illustration shown the information like method etc...

! WARNING

- Do not subject this equipment to excessive force or shocks such as by treading on it, dropping it or hitting it.
- Do not install this equipment in locations with poor ventilation, and do not use the equipment in such way that the ventilation port is obstructed.
- Do not use this equipment in locations such as laboratories in which chemical reaction takes place, or in locations in which the air includes salt or toxic gases.
- Do not use this equipment at voltages other than the specified voltage or at frequencies other than at the specified frequencies.
- Do not insert or remove the power cables or interface cable by pulling on the cable, and do not carry the main unit in such way as to subject the cables to force.
- Do not drop or insert foreign objects like paper clips or split pins, etc. into the equipment. In case of dropping those foreign objects into the equipment, remove power supply plug and contact your sales shop.
- Do not arrange the power cable so that many plugs are using same power outlet.
- Do not use the equipment in the situation where there is any breakage on the power supply cable or electrical contact is not proper.
- Do not spill drinks such as tea, coffee or juice, or spray anti-mosquito preparations, etc onto the equipment.
- In case of spilling drinks like water, switch off the power, remove power supply cable and contact your sales shop.
- Do not attempt to disassemble or modify this equipment, since these actions will cause fire or electric shock.
- Please keep the poly bag which this equipment is packed in away from children or throw it away to prevent children from putting it on, putting on it may cause suffocation to them.

Precautions for installation

- Do not install or store this printer near fire, water, a heater, in the direct sunshine in the locations such as high-temperature, high humidity, oily and dusty. This may cause fire and abnormality.
- Do not use this printer in locations such as laboratories in which chemical reactions take place, or in locations in which the air includes salt or toxic gases. This may cause a fire or electric shock.
- Make sure to install this printer on the vertical mounting panel with no vibration.
- Do not use this printer in the locations have environment to cause a trouble in operations.
- Do not put anything on the printer unit. This may cause a breakage.
- To fix this printer, make sure to use enclosed rack mounting bracket and screws.
Do not fasten the screws excessively. This may cause abnormality and breakage.
- Do not use this printer near radio or television, and do not use same outlet as the one used for radio and television. This may cause a trouble with receiving an electric wave.
- Do not use voltage or power supply other than specified in this manual. This may cause breakage and a fire.
- Make sure that capacity of the power supply connected to this printer is enough before using this printer.
- Absolutely do not connect the earth with gas pipe. This may a possibility of explosion.
- Make sure to remove the power plug from power outlet in case of connect or disconnect the earth.
- Make sure to connect or disconnect the cable holding the main body of connectors after switching off the both power of this equipment and the equipment which this equipment is connected to.
- Certainly connect the connector cables. Especially, if the polarity is connected in reverse way, his may cause the damage to the internal parts or to the equipment which this equipment is connected to.
- To avoid data transmission error due to noise, make sure not to use too many extension power supply cables , or not to connect the other equipment creates much noise with this single line.
- For the model with a drawer kick-out connector, Do not connect an equipment with its solenoid specified other than the specified in this manual. This may cause breakage.
- Use this equipment in a place close to a plug socket which is easily accessible for cutting off power.
- For transport, remove the roll paper from the printer.

Caution for Handling

Do not carry out the following operation, since they may damage the printer.

- Do not carry out blank printing in the condition where there is no recording paper, this may damage the print head.
- Do not drop any foreign subjects like paper clips, or splits pins, etc. into the printer unit.
- Do not spill any drinks or chemical liquid onto the printer units.
- Do not subject this equipment to excessive force shocks such as by standing on it, dropping it or hitting it.
- Do not operate the operation panel using sharp objects such as the top of a pen etc.
- Do not use sheets of paper by adhering them together with plastic tape, etc..
- Do not pull the paper in printer forcibly by hand in condition that the platen roller unit is positioned properly.

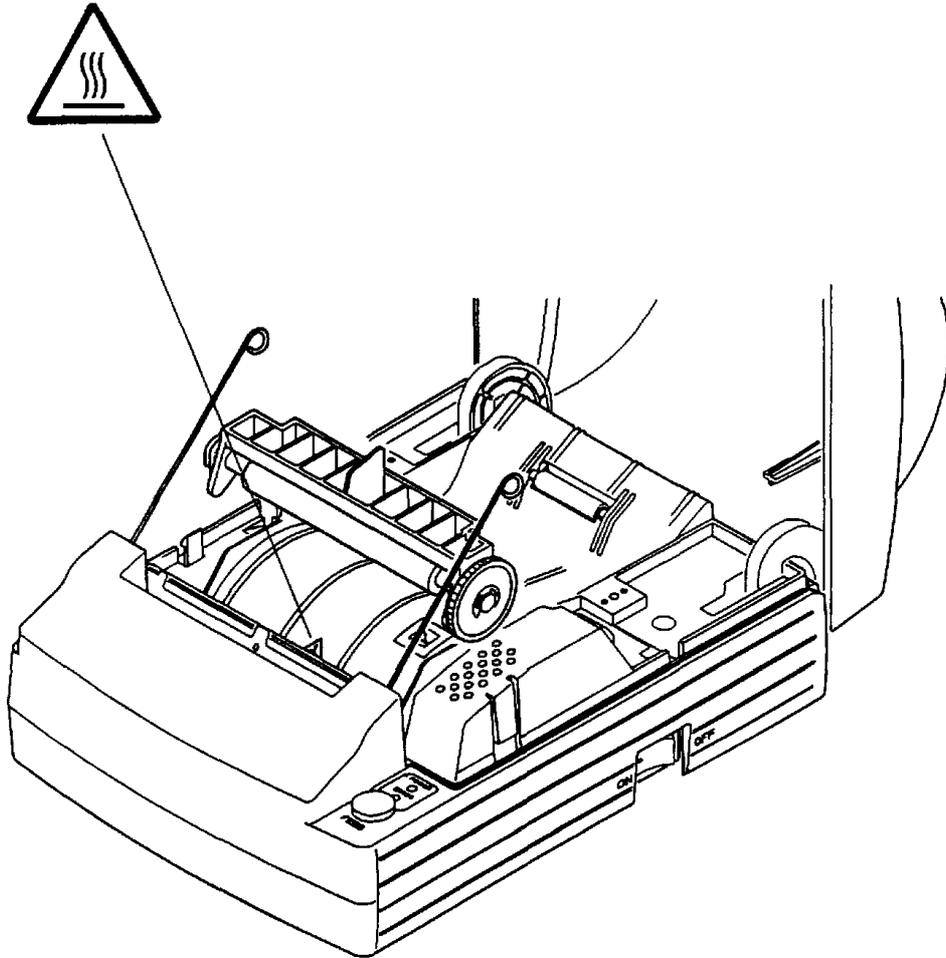
To avoid injury and prevent damage from occurring.

- Do not touch the printing portion of print head.
- During operation, do not touch moving parts such as gears, or the electrical parts inside the printer units.
- Take care not to injure yourself or other objects from the edge of the sheet metal.
- If an abnormality occurs during use, immediately stop using the printer and remove the power cable from the power source outlet.
- If a breakage occurs, do not attempt to disassemble the equipment. Be sure to leave the repair of this equipment to Service personnel.



This Caution label is attached in the following position.
Make sure to use this equipment properly reading the cautions for handling carefully.

This label indicates the danger of burn due to the heat of print head.



Ordinary Maintenance

- Make sure to maintain the equipment after switching OFF the power .
- When cleaning the platen of printer mechanism, wipe out the dirty portion by a cotton pud dipped into ethyl alcohol.
- When cleaning the surface of the main unit case, use soft cloth. In case the dirty portion can not be cleared out by the soft cloth, use wet cloth squeezed tightly.
- Absolutely do not use thinners, trichlene, benzine or ketone group solvents, or chemical-impregnated cleaning cloths.
- In case the print head becomes dirty because of paper dust, clean it by using a soft brush.

Cautions : Do not conduct the maintenance right after printing,
since print head and motor are so hot.

- Head Cleaning
 - (1) Referring to "4. Operation 4.6 Removing of Paper Jam", remove the platen roller unit.
 - (2) Apply ethyl alcohol on a cotton pud and use this to wipe off dust on the surface of a heating unit.
 - (3) Mount the platen roller unit.

Cautions : Do not touch the surface of a heating unit of the print head by naked hands or metal objects.
Do not carry out these procedures right after printing due to the heat of head motor.

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1. OUTLINE

This printer, a small-sized line thermal printer, has been developed to be applicable to various data communication terminals, POS terminals, kitchen printers, etc..

Since the printer is equipped with abundant functions, it can be used widely in various applications.

Read this manual thoroughly before you start using the printer.

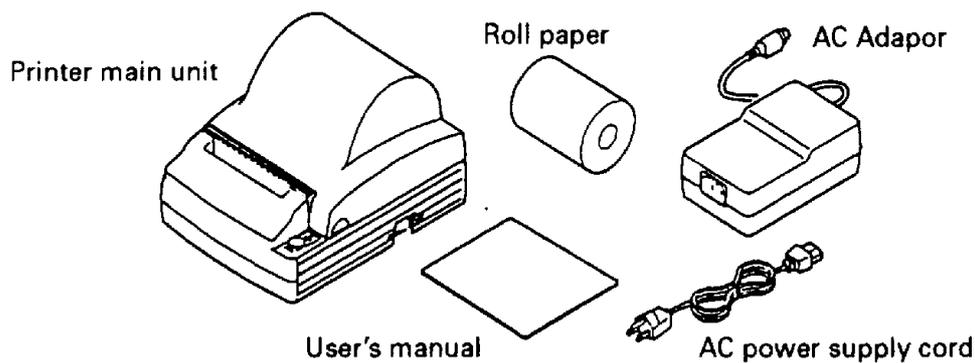
1.1 Features

- (1) Light weight and small foot print.
- (2) Easy paper setting due to auto loading function.
- (3) Easy maintenance and cleaning of print head due to the removable platen design.
- (4) High speed printing and quiet printing due to Line thermal printing .
- (5) High reliability due to long life of printer head and simple design.
- (6) Input buffer incorporated.
- (7) Bar code printing is available. (Exclusive command)
- (8) Drawer kick-out interface incorporated.
- (9) Equipped with an auto cutter.

1.2 Unpacking

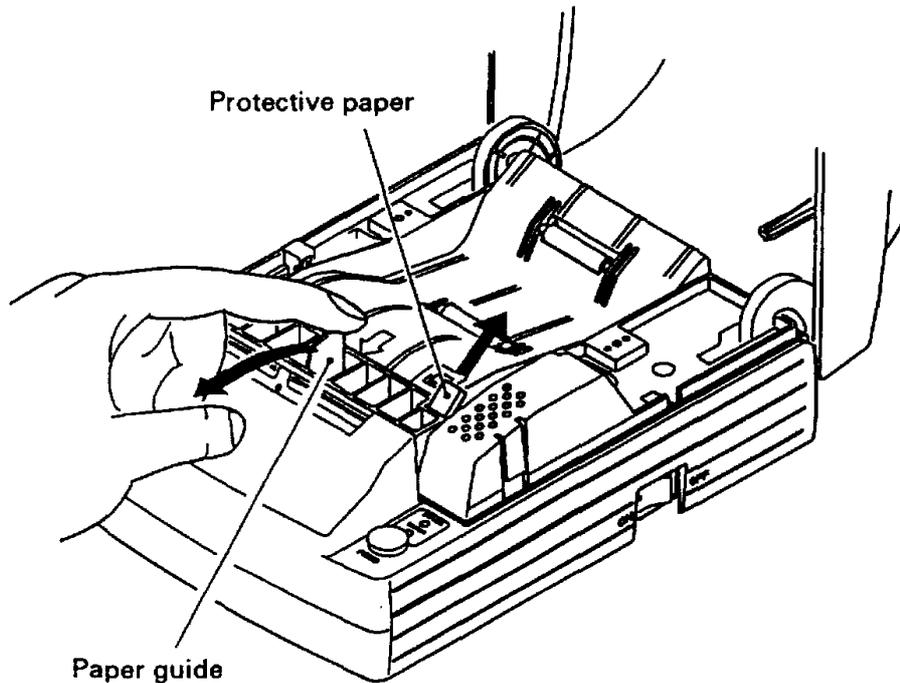
- (1) Upon unpacking the printer, make sure that the following parts are contained in this package.

Printer main unit	x 1
Sample paper roll	x 1
AC Adapter	x 1
AC power supply cord	x 1
User's Manual	x 1



(2) When using the printer, remove the protective paper of the thermal head in the following manner:

- 1) Open the printer cover.
- 2) Holding the paper guide of the platen roller section, pull it in the arrowed direction.
- 3) Pull out the protective paper in the arrowed direction.
- 4) In case the printer is not used for a long time period of time, set the protective paper to keep platen roller away from thermal head.



Caution : Install this printer on a flat and stable table.

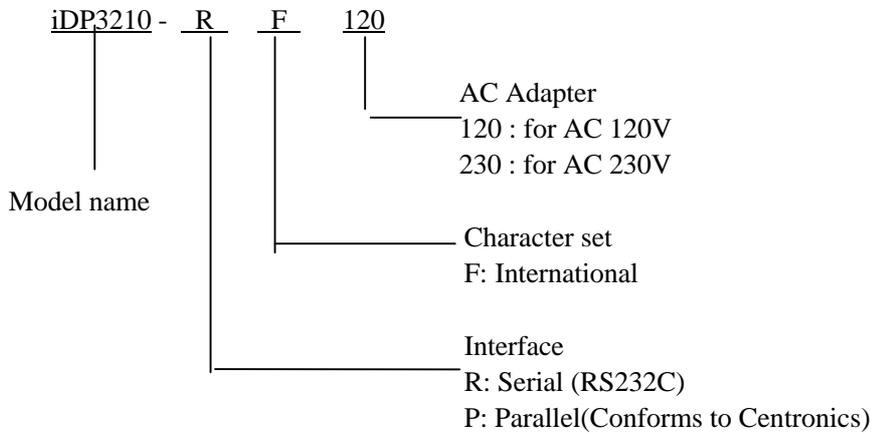
Do not install this printer near to a heater or in direct sunlight.

Do not use this printer in locations with high temperature, high humidity or heavy dirt.

In case of the occurrence of dew condensation, do not switch the power ON until it goes out

2. BASIC SPECIFICATIONS

2.1 Model Classification



*Model name of exclusive AC Adapter and AC power supply cord

30AD-U (120V 3 pin cord)
30AD-E (230V class 1 cord)

2.2 Basic Specifications

Item	Description	
Printing system	Line thermal dot printing system	
Print width	73.92 mm/448 dots	
Dot pitch	Horizontal 0.165mm (approx. 6 dots/mm) Vertical 0.163mm (1/156 inch)	
Printing speed	73.3mm/sec. (Max. Print density = Standard) (450 dot line/sec)	
No. of printing columns	44 columns (10 x 16 dots) or 42 columns (10 x 16 dots) (can be selected by dip switch.)	
Character size	1.485mm x 2.61mm (9 x 16 dots)	
Character type	Alphanumeric, International characters	
Bar code type	UPC-A/E, JAN(EAN) 13 columns/18 columns, ITF CODE 39, CODE 128, CODABAR	
Line pitch	1/6 inch (approx. 4.23mm) (can be selected by Command) Min. 1/156 inch (approx. 0.163mm)	
Paper	Thermal roll paper 80 mm x Ø83 mm (MAX)(See Paper Spec..)	
Interface	Serial (RS-232C), Parallel (Conforms to Centronics.)	
Input buffer	4K byte	
Power supply voltage	DC 24 ± 7%	
Power consumption	100W	
Spec. of AC Adapter	Rated input : AC100V - 240V, 50/60HZ, 120VA Rated output : DC24V, 1.8A	
	Model	30AD-U(For 120) 30AD-E(For 230V)
Weight	Main unit : 1.3 kg, AC Adapter : 0.45 kg	
External dimensions (main body)	152(W) x 201(D) x 123(H)	
Operating temperature/humidity	5 - 40°C, 35 - 85%RH (free of dew condensation)	
Storage temperature/humidity	- 20 - 60°C, 10 - 90%RH (free of dew condensation)	
Reliability	Print head's life : Pulse resistance 50 million pulses Wear resistance 100 Km (Printing ratio 12.5%, normal temperature, normal humidity, recommended paper) Auto cutter's life : 500,000 cut (Normal temperature, normal humidity, recommended paper)	
Safety / EMI Standard	120V Model : UL-C-UK, FCC Class A 230V Model : TUV, GS, CE, Marking	

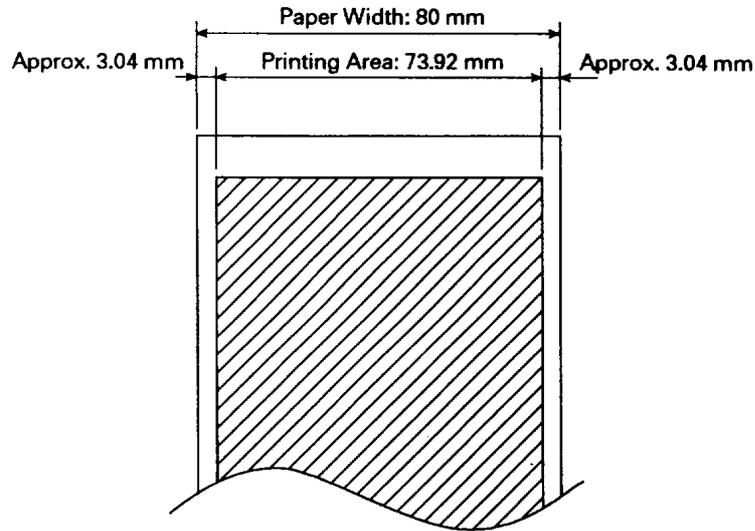
2.3 Printing Paper Specifications

2.3.1 Recommended Paper

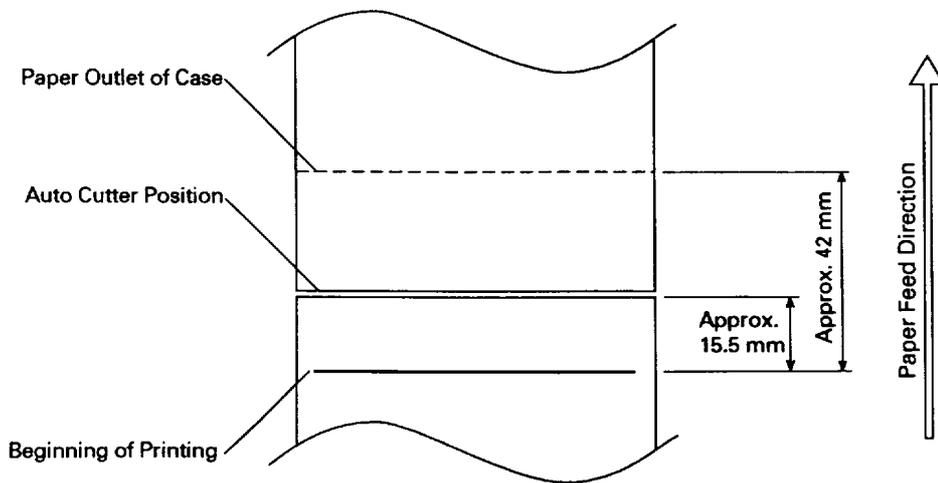
Type	: Thermal paper
Paper width	: 80 plus 0/minus 1 mm
Paper thickness	: 65 ± 5 micro m
Roll diameter	: $\varnothing 83$ mm or less
Printed surface	: Outside of the roll (surface)
Recommended paper	: TF50KS-E2C by Nippon paper Mil. or other equivalent
Core	: $\varnothing 12$ mm (inner diameter), $\varnothing 18$ mm (outer diameter)

- Caution :
1. Print quality may vary if you use paper other than specified.
 2. In such case, change print density by dip switch setting. (See "5 Dip Switch Setting")
 3. Do not paste the paper to the core.
 4. Chemicals or oil may change the color of paper, or printed characters may be vanished.
 5. Change of paper color starts from approx. 70°C. Pay attention to heat, humidity and sun light.

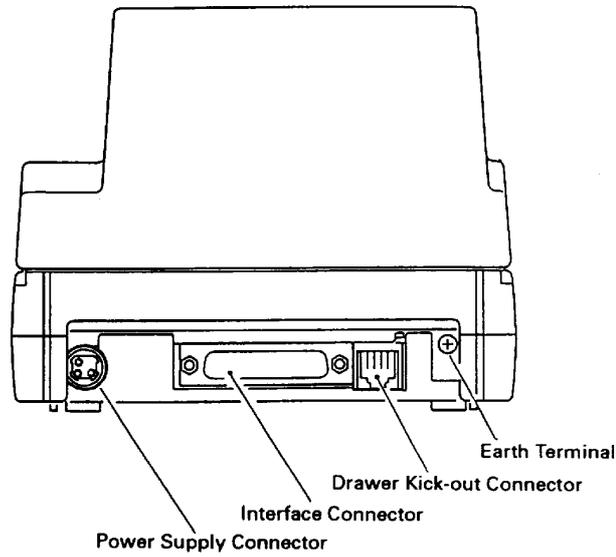
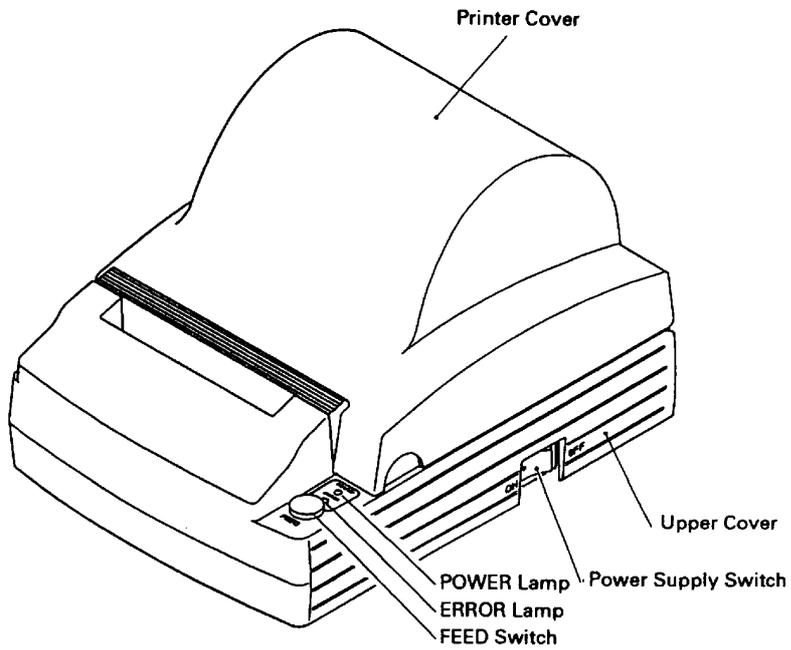
2.3.2 Printing position



2.3.3 Head and Cutter Layout



3 OUTER APPEARANCE AND COMPONENTS



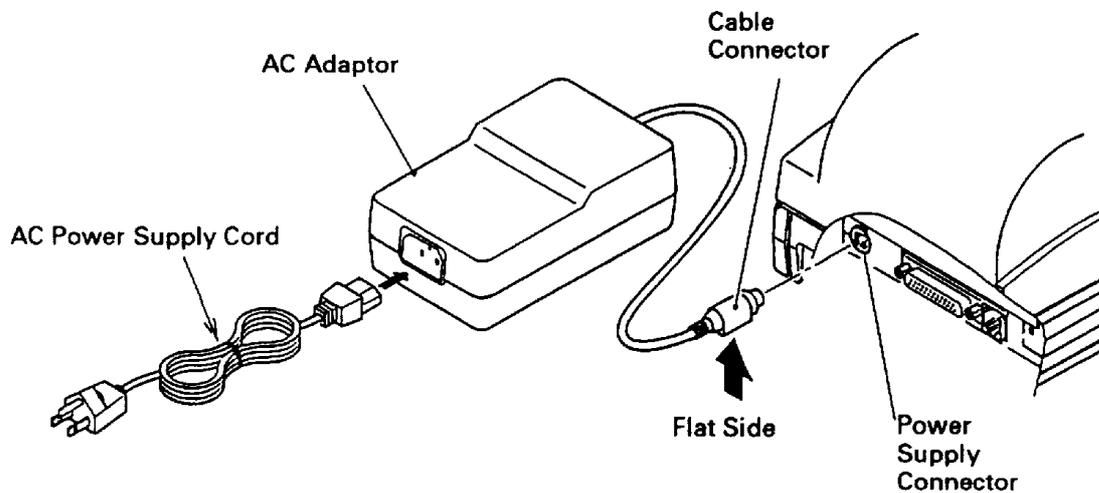
4. OPERATION

4.1 Connecting AC Adapter

- (1) Turn off the power switch.
- (2) Holding the AC Adapter cable connector with its arrowed side facing downward, put it into the power connector on the rear side of the printer.
- (3) Connecting the AC power cord to the AC Adapter, put the AC plug of the cord into the plug socket.

! Cautions : Do not use the power supply unit other than the specified.

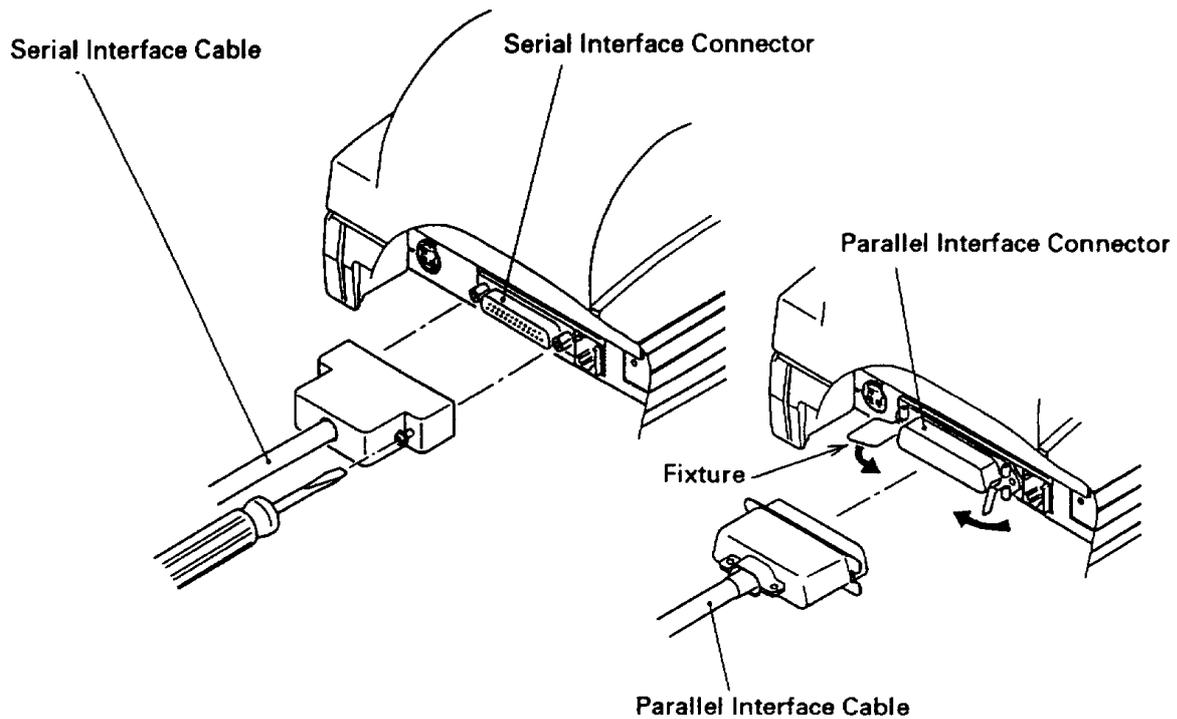
In connecting / removing the cable connector, make sure to do this holding the side of arrow mark.
Make sure to use the power outlet for this power supply unit separated from the one used for the other equipment creates noise.



4.2 Connecting Interface Cable

- (1) Turn OFF the power switch. (Both for the printer and the host side.)
- (2) Confirming the up and down side of the cable terminal, connect it to the interface connector.
- (3) Fix the cable terminal.

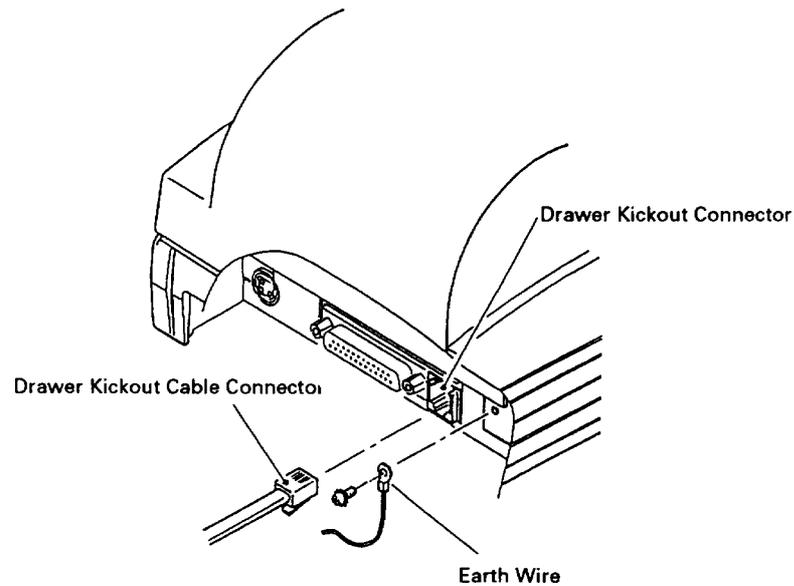
Serial interface:	Tighten screws.
Parallel interface:	Turn to tighten the fixing parts.
- (4) Connect the cable to the host side.



4.3 Connecting Drawer Kickout Connector

- (1) Turn OFF the power switch.
- (2) Confirming the up and down side of the drawer kickout cable connector, put it into the drawer kickout connector on the rear side of the printer.
- (3) Fix, with a screw, the drawer earth wire to the printer earth terminal.

Cautions : Do not connect the drawer (solenoid) other than the specified in this manual.



4.4 Inserting the Paper Roll

Cautions : Do not use a paper roll other than the one specified in this manual.

In case of using a paper roll other than the one specified, there is a case the print quality and reliability may not be guaranteed.

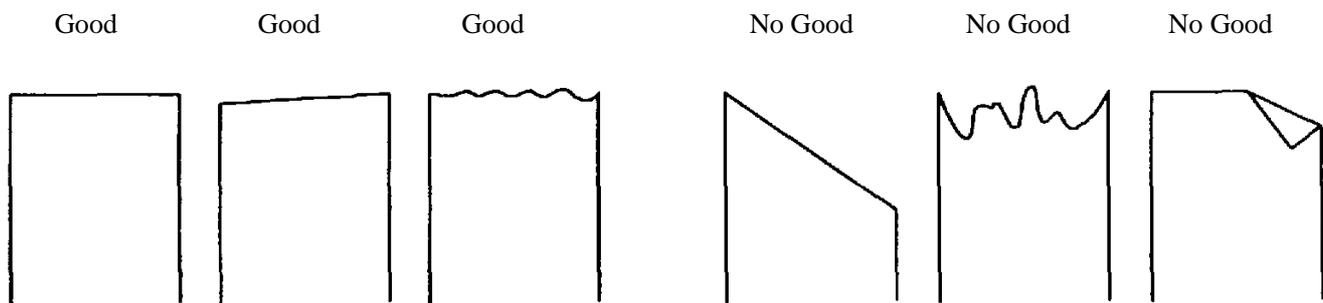
- (1) Holding the projections on both sides of the printer cover, open it until it stops.

Cautions : The printer cover is not detachable. Do not try to further open beyond the stop position.

Do not insert the paper roll with its end fluffed or bent.

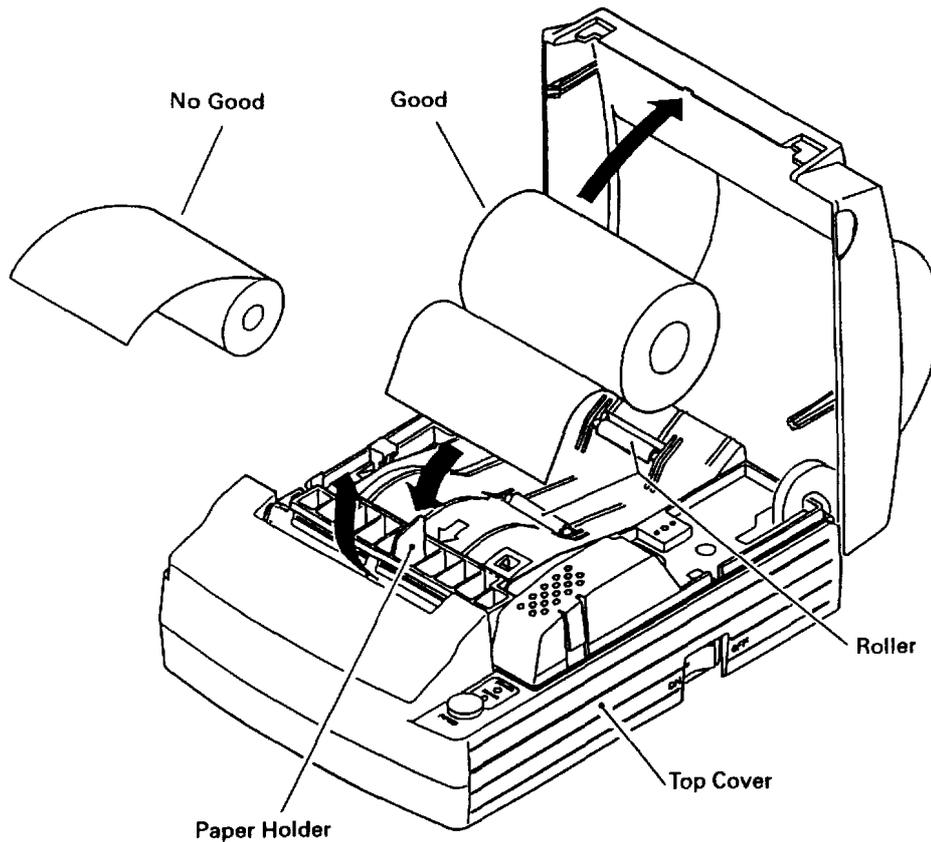
- (2) Cut the end of paper roll approximately at a right angle.

Cautions : Do not insert the paper roll with its end fluffed or bent.



- (3) Confirming winding direction of the paper roll, put it on the roller section of the upper cover.
- (4) Turn ON the power switch.
- (5) Insert the tip of the paper roll straight into the paper inlet (as indicated by an arrow on the case).
- (6) Paper is automatically pulled into the platen roller and comes out of the paper outlet.
As excessive portion of paper is automatically cut off, remove it away.
- (7) With the printer cover closed, printer is ready to print.

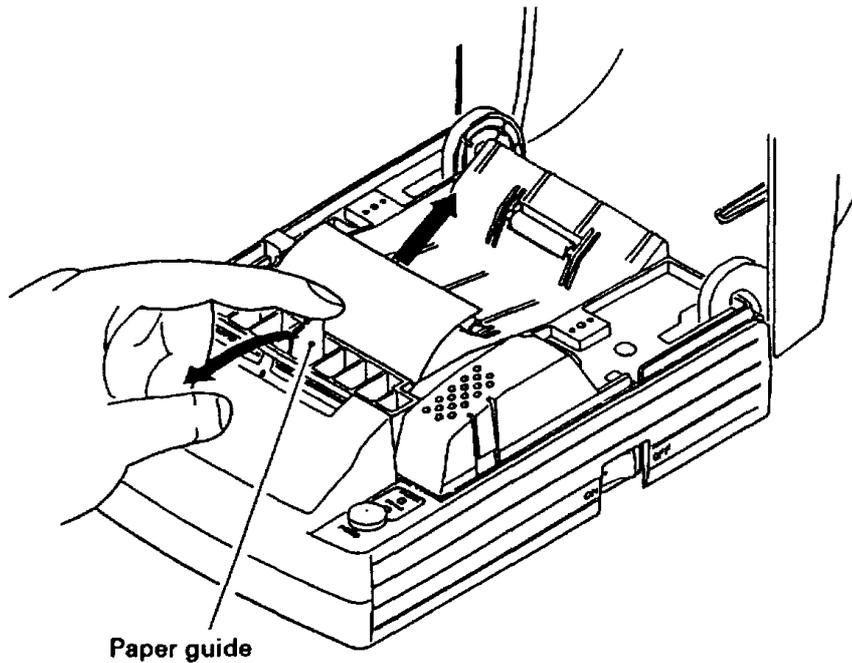
- Cautions :** In case the slack of paper remains, remove the slack by rolling up the roll paper.
In case the paper is tilting, keep pressing FEED switch after closing printer cover.
Then, this tilting is automatically corrected.
Do not open printer cover during printing.
Do not hold the paper coming from the outlet during printing, this may cause a paper jam.
When using auto paper cutter at full cut mode, please remove printed paper which was cut before next printing starts.



4.5 How to Remove Remaining Roll Paper

- (1) Open the printer cover.
- (2) Holding the paper guide, pull it in the arrowed direction. The platen roller is detached from the print head and the remaining paper can be pulled out.

Caution : Be sure to use the paper guide for pulling out paper. (Opposite direction)



4.6 Removing Paper Jam

- (1) Turn Off power switch
- (2) Open the printer cover.
- (3) Cut off the paper roll near the paper inlet.
- (4) Detaching, from the chassis hook, the head springs on both sides by moving them in arrowed direction, lift them up.
- (5) Lift up the paper guide knob and the platen roller unit can be detached.
- (6) Completely remove the roll paper remains inside of the paper course.
- (7) Confirming direction of the platen roller unit, insert it into the inside of bush guide of chassis.
- (8) Lightly pushing the platen roller unit, fit the head springs on both sides on the hook part.

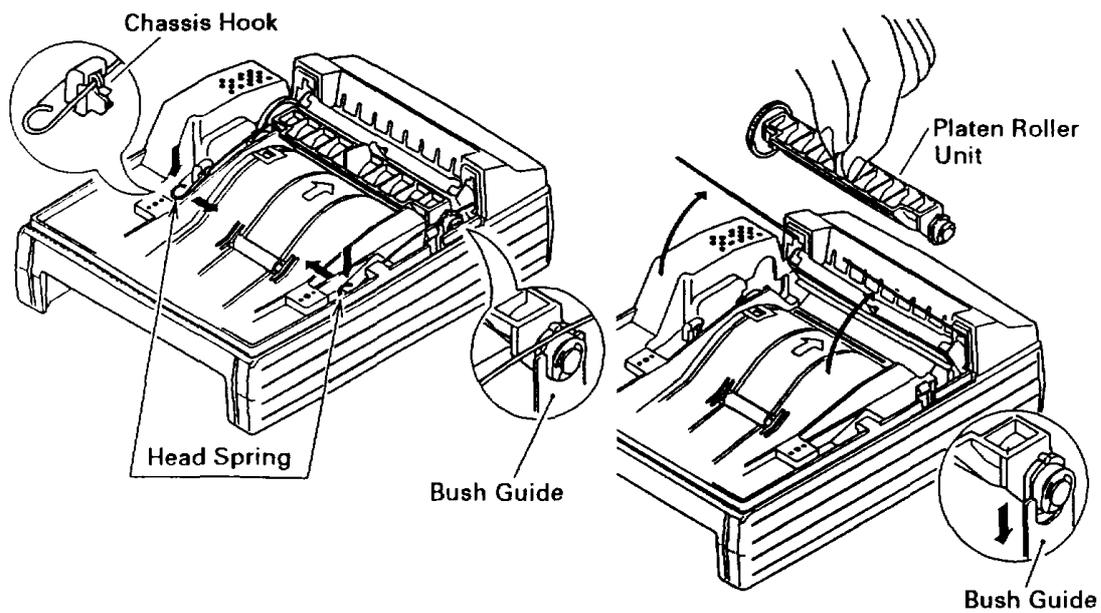
Caution : Since print head and motor are hot, do not carry out this action right after printing.

In case of moving the head springs, do not move it beyond the removable range of the springs.

When removing the remaining paper, do not touch the surface of heating unit of the print head by naked hands or by a metal piece etc.

Except for the necessary case of removing paper jam, do not remove the platen roller unit.

In case of inserting paper roll, make sure to confirm this was inserted correctly.



4.7 Canceling Cutter Lock

- (1) As referring to "4.6 Removing Paper Jam", remove the roll paper remains inside the paper course.
- (2) Press the FEED switch. The auto cutter performs initialization, returning the blade to home position and canceling alarm state.
- (3) If the blade does not return to home position or alarm state is not canceled by Item 2 operation, turn off the power switch and, by turning the emergency knob inside the hole at the bottom of the main unit in the arrowed direction, return the auto cutter blade to home position.
- (4) Fully remove remaining paper on the cutter blade through using tweezers.

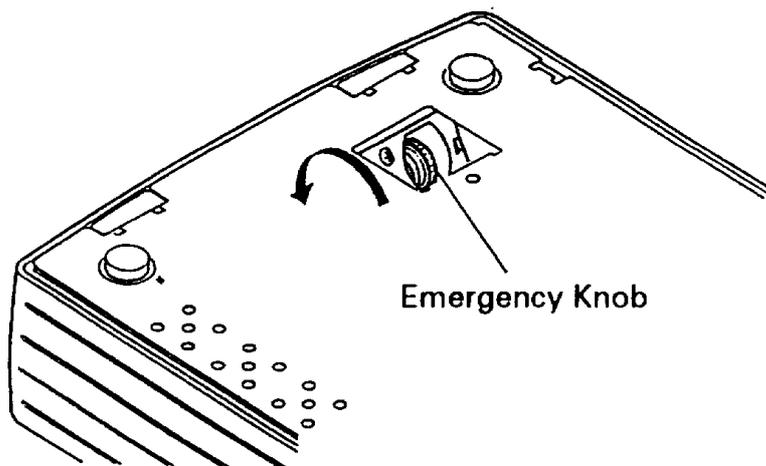
Caution : Since print head and motor are hot, do not carry out this action right after printing.

For removing the remaining paper, do not touch the surface of heating unit of the print head by naked hands or by a metal piece etc.

Paper cutter enable/disable can be selected by dip switch setting.

In case of using this printer at paper cutter disable mode, make sure to confirm the cutter blade is in the home position.

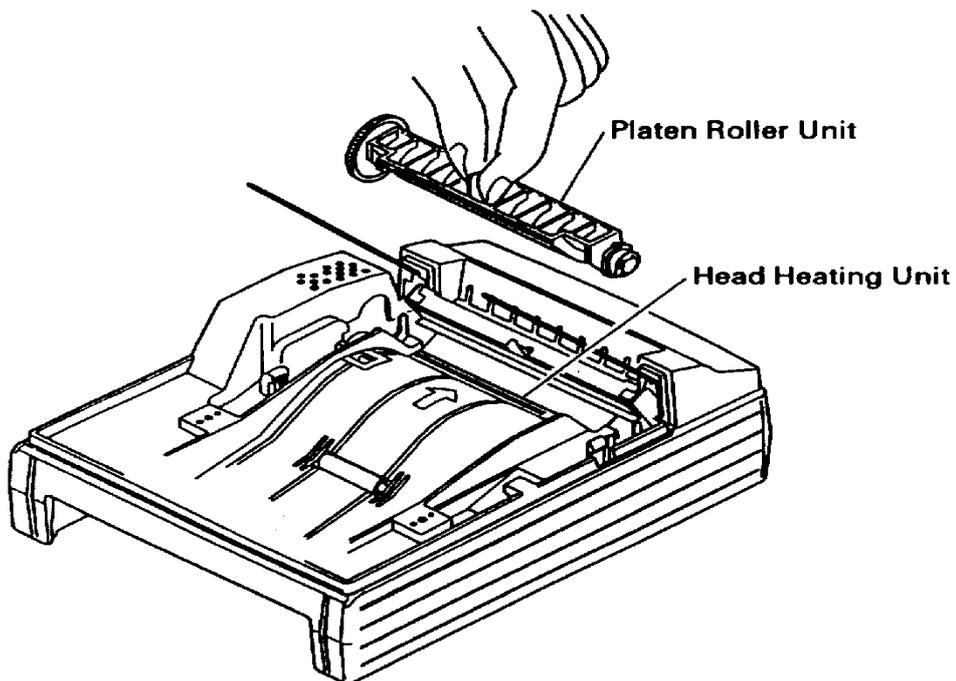
In case the cutter blade is not in the home position, return this blade to the home position by following the above procedure.



4.8 Cleaning Print Head

- (1) As referring to "4.6 Removing Paper Jam", remove the platen roller unit.
- (2) Using a cotton pud containing ethyl alcohol, wipe off dust, etc. on the surface of the surface of the head heating unit.
- (3) Mount the platen roller unit.

Caution : Do not touch the surface of heating unit of the print head by naked hands or by a metal piece etc.
Since print head and motor are hot, do not carry out this action right after printing.



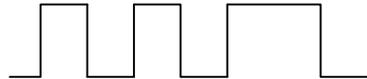
4.9 OPERATION PANEL AND DISPLAY OF ERROR

(1) POWER LAMP (Green)

With power switch is turned ON, this lamp lights up. Further, when "Memory Check Error" has occurred, this lamp lights up, too.

(2) ERROR LAMP (Red)

Error details are indicated by lighting or blinking state as follows.

ERROR DETAIL	DISPLAY PATTERN		RESETTING METHOD
	POWER LED	ERROR LED	
Memory check error	 (Quick blinking)	Illuminated	Not possible
Cover open	Illuminated	Illuminated	Close the cover
Print Head overheat	Illuminated	Illuminated	Automatically recovered when cooled.
Paper near end	Illuminated	Illuminated	Set new paper
Paper end	Illuminated	 (Quick blinking)	Set new paper
Cutter motor lock	Illuminated	 (Quick blinking & slow blinking)	Eliminate paper jam
Macro execution wait	Illuminated	 (slow blinking)	Press FEED switch.

Details of error

- Cover open : When printer cover is opened, printer cover open sensor detects the cover opening and has ERROR LED illuminate, then stops printing operation. But, depending on dip switch setting, paper feed can be performed when printer cover is opened.
- Print Head overheat : To protect print head from excessive heat, in case the temperature of print head goes high(approx. 65°C or over), head temperature sensor works and has ERROR LED illuminate, then stops printing operation. After head temperature is cooled (Approx. 60°C or less), printing operation automatically starts.
- Paper near end : When the remaining of roll paper goes scarce, paper near end sensor located on the side of roller portion of the upper cover works, and has ERROR LED illuminate to show the remaining of roll paper is getting scarce. (See “setting of paper end detector effective for outputting a signal for no paper” and “setting of paper end sensor effective for print stop” in the chapter of print control function.)
- Paper end : When the roll paper runs out completely, the paper sensor located in the paper course near to print head detects the end of print paper and has ERROR LED illuminate, then stops printing operation. (See “setting of paper end sensor effective for outputting a signal for no paper” and “setting of paper end sensor effective for print stop” in the chapter of print control function.)
When the paper is inserted into the paper course near to print head, roll paper is automatically loaded.
- Cutter motor lock : In case that cutter position sensor locates in the auto cutter unit keeps ON or OFF for one second or more during the operation of cutter motor, this sensor detects it as motor lock state.
And then, this stops cutter operation and printing operation.
(See the chapter of 4.5 “cancellation of cutter lock”)

(3) FEED Switch

With this pressed once shortly, paper is fed by one line. With this kept pressed, lines are fed continuously. In case of macro execution wait, this is executed by pressing FEED switch.

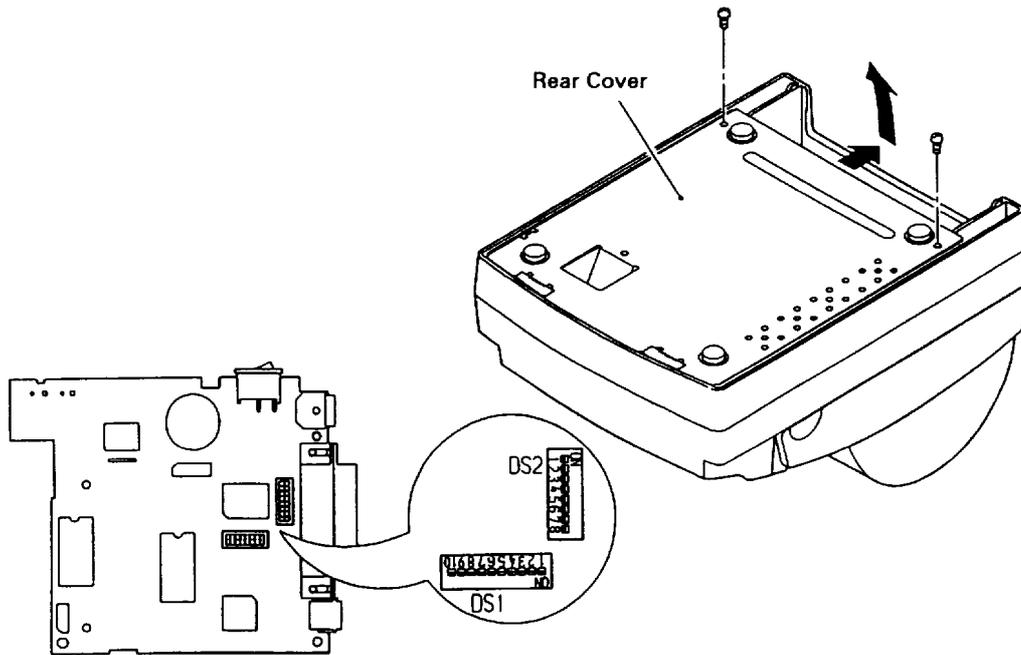
(4) FEED Switch and Power Switch

By turning ON power switch with pressing FEED SWITCH, self printing is performed.

5 Dip Switch Setting

5.1 Location of Dip Switch

- (1) Turn OFF the power switch.
- (2) Remove the rear cover.
(Remove it by taking off two screws at the bottom and turning the cover in the arrowed direction.)



5.2 Dip Switch Setting

DS1	FUNCTION	ON	OFF	FACTORY SETTING
-1	Paper cutter	Enabled	Disabled	ON
-2	Cover open	Disabled	Enabled	OFF
-3	CR switching	LF activate	Ignored	OFF
-4	Unused			OFF
-5	Print columns	44 columns	42 columns	ON
-6	International Characters	See the table below.		OFF
-7	International Characters			OFF
-8	International Characters			OFF
-9	Print density	See the table below		OFF
-10	Print density			ON

DS2	FUNCTION	ON	OFF	FACTORY SETTING
-1	Bit length	7 bits	8 bits	OFF
-2	Parity	Provided	Not provided	OFF
-3	Odd/even	Even	Odd	OFF
-4	DTR/XON-XOFF	XON-XOFF	DTR/DSR	OFF
-5	BAUD RATE	See the table below.		OFF
-6	BAUD RATE			ON
-7	BAUD RATE			ON
-8	Unused	-----		OFF

(Note) DS2 is available only for serial interface.

PRINT DENSITY	LIGHT	STANDARD	DARK	DARKER
DS1-9	OFF	ON	OFF	ON
DS1-10	OFF	OFF	ON	ON

INTERNATIONAL	U.S.A.	FRANCE	GERMANY	U.K.	DENMARK 1	SWEDEN	ITALY	JAPAN
DS1-6	OFF	ON	OFF	ON	OFF	ON	OFF	ON
DS1-6	OFF	ON	OFF	ON	OFF	ON	OFF	ON
-7	OFF	OFF	ON	ON	OFF	OFF	ON	ON
-8	OFF	OFF	OFF	OFF	ON	ON	ON	ON

BAUD RATE	150	300	600	1200	2400	4800	9600	19200
DS2-5	OFF	ON	OFF	ON	OFF	ON	OFF	ON
-6	OFF	OFF	ON	ON	OFF	OFF	ON	ON
-7	OFF	OFF	OFF	OFF	ON	ON	ON	ON

6. INTERFACE (Connecting with Peripheral Equipment)

6.1 Parallel Interface

6.1.1 Specifications

Data input method : 8 bit parallel signal (DATA 1 - 8)

Control signals: ACK ,BUSY ,STB ,FAULT ,PE ,RESET

Applicable connector : Printer side 57LE-40360 (Equivalent to amphenol)

Cable side 57-30360 (Equivalent to amphenol)

6.1.2 CONNECTOR'S PIN CONFIGURATION

No.	SIGNAL NAME	No.	SIGNAL NAME
1	STB	19	TWISTED PAIR GND
2	DATA 1	20	TWISTED PAIR GND
3	DATA 2	21	TWISTED PAIR GND
4	DATA 3	22	TWISTED PAIR GND
5	DATA 4	23	TWISTED PAIR GND
6	DATA 5	24	TWISTED PAIR GND
7	DATA 6	25	TWISTED PAIR GND
8	DATA 7	26	TWISTED PAIR GND
9	DATA 8	27	TWISTED PAIR GND
10	ACK	28	TWISTED PAIR GND
11	BUSY	29	TWISTED PAIR GND
12	PE	30	TWISTED PAIR GND
13	+5V DC	31	RESET
14		32	FAULT
15		33	GND
16	GND	34	Drawer switch output
17	FRAME GND	35	+5V DC
18		36	

6.1.3 I/O SIGNALS

(1) Input Signals to the Printer

- DATA : 8-bit parallel signal (positive logic)
- STB : Strobe signal to read 8-bit data (negative logic)
- RESET : Signal to reset the entire printer (negative logic) 1m sec or more

(2) Output Signals from Printer

- ACK : An 8 bit data request signal. Pulse signal output at the end of the BUSY signal. (negative logic)
- BUSY : The signal to indicate BUSY state of the printer. Input new data for "LOW". (positive logic)
- FAULT : The signal which is made "LOW" when the printer is in alarm state. All the control circuits inside the printer are stopped at this time.(negative logic)
- PE : The signal which is output when paper runs out or goes scarce. (positive logic)
- Drawer Switch Output : With the switch open, this signal goes "HIGH". When shorting, this goes "LOW".

(3) Power supply

- +5 V DC : This is 5V pulled up by a 3.3k Ohm resistor.
- GND : This is the common ground for the circuit.

6.1.4 Electrical Characteristics

(1) Input Signal Level

All the input signals are at C-MOS level.

"HIGH" level : 4.0V MIN

"LOW" level : 1.0V MAX

(2) Output Signal Level

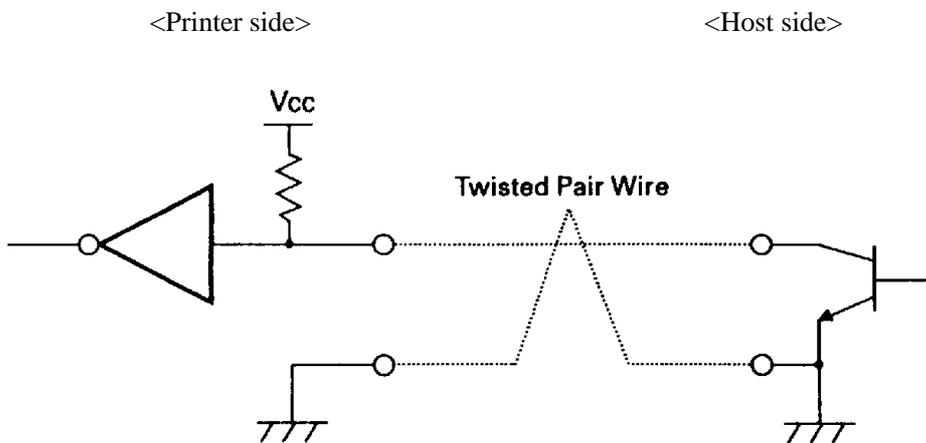
All the output signals are at C-MOS level.

"HIGH" level : 4.5V MIN

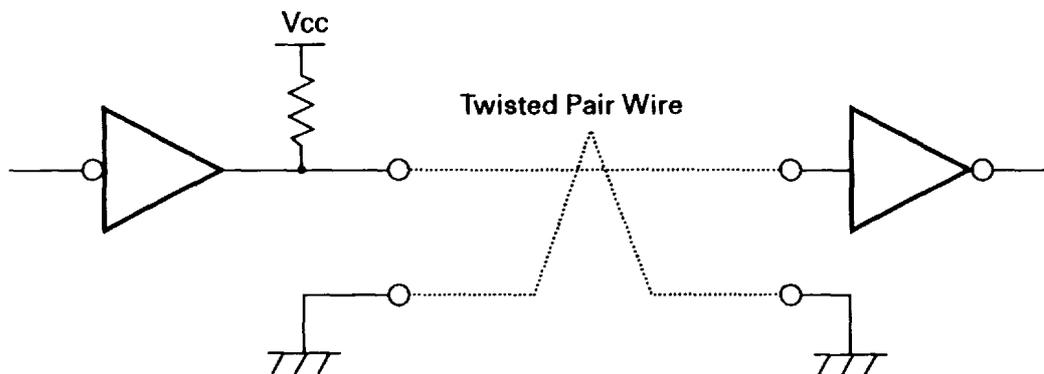
"LOW" level : 0.1V MAX

(3) I/O Conditions

Both input signal of STB and RESET are pulled up by 3.3K Ohm, and all of the other is pulled up by 50K Ohm.

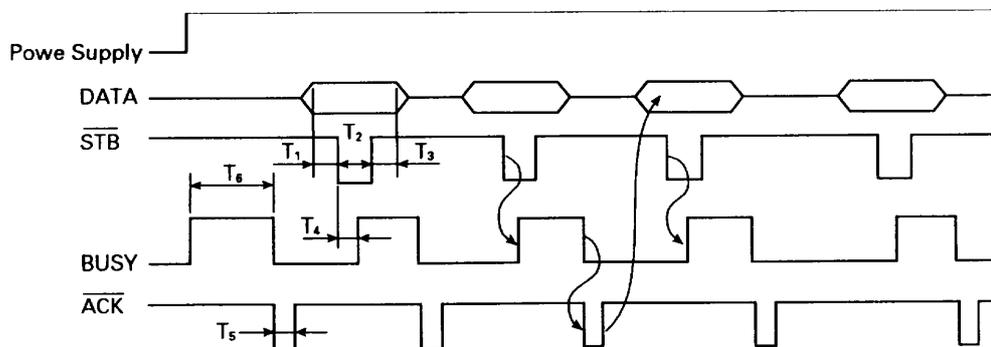


All the output signals are pulled up by 50K Ohm.



6.1.5 TIMING CHART

(1) Data Input and Printing Timing



T1, T2, T3	: 0.5λs	MIN
T4	: 270 ns	MAX
T5	: 2.3λs	TYP
T6	: 500 ms	MIN (On supplying power)

6.1.6 Data Receiving Control

When BUSY signal is "LOW", data from the host can be received. When it being "HIGH", data can not be received.

6.1.7 Buffering

As the buffer of 4K byte can be buffered in input buffer, the host side can be released immediately.

6.2 Serial Interface

6.2.1 Specifications

- (1) Data transfer system: Asynchronous
- (2) Baud rates
150, 300, 600, 1200, 2400, 4800, 9600, 19200 bps (Selectable by user)
- (3) Configuration of one word
 - Start bit : 1 bit
 - Data bit : 7 bits or 8 bits (Selectable by user)
 - Parity bit : Add/even or no parity (Selectable by user)
 - Stop bit : 1 bit or more
- (4) Signal polarity
 - RS-232C
 - Mark = Logic "1" (-3V - -12V)
 - Space = Logic "0" (+3V - +12V)
- (5) Receive data (RD signal)
 - RS-232C
 - Mark = 1
 - Space = 0
- (6) Data receiving control (DTR signal)
 - RS-232C
 - Mark : Data transfer not available
 - Space : Data transfer available
- (7) Data transmission control (TD signal)
 - DC1 code (11H) X-ON : Data reception available
 - DC3 code (13H) X-OFF : Data reception not available

6.2.2 Connector's Pin Configurations

No.	SIGNAL NAME	I/O	FUNCTION
1	FG		Frame Grand
7	GND		Signal GND
3	RD	Input	Receiving data
20	DTR	Output	Printer BUSY signal
2	TD	Output	Transmission data
6	DSR	Input	Data set READY

Applicable connector (D-Sub connectors)

Printer side : 17LE-13250 (Equivalent to DDK)

Cable side : 17JE-23250 (Equivalent to DDK)

Cautions : 1. Signal for RS-232C conforms to EIA RS-232C.

2. In case the receiving data is not being transmitted, keep receiving data in mark state.

6.2.3 I/O SIGNALS

(1) RD

Serial receiving data signal. On occurrence of framing error, overrun error, or parity error, the data is printed as "?".

(2) DTR

When this signal is READY, write data or a command. When they are written in BUSY, overrun error is occurred and data is ignored. Even during printing, data can be loaded in the input buffer. Further, BUSY can take place on supply of power, during test printing, during on-line, or on resetting.

(3) TD

When, while in data reception, the input buffer on the printer side has only 128 bytes .or less left,DC3 (13H) data reception impossible signals are output. When the input buffer has 256 bytes left, DC1 (11H) data reception possible signals are output to the host. When DTR/DSR control having been selected in status information transmission, it is first confirmed that DSR is "space" and data is sent. When DTR/DSR control has not been selected, DSR is ignored and data is transmitted.

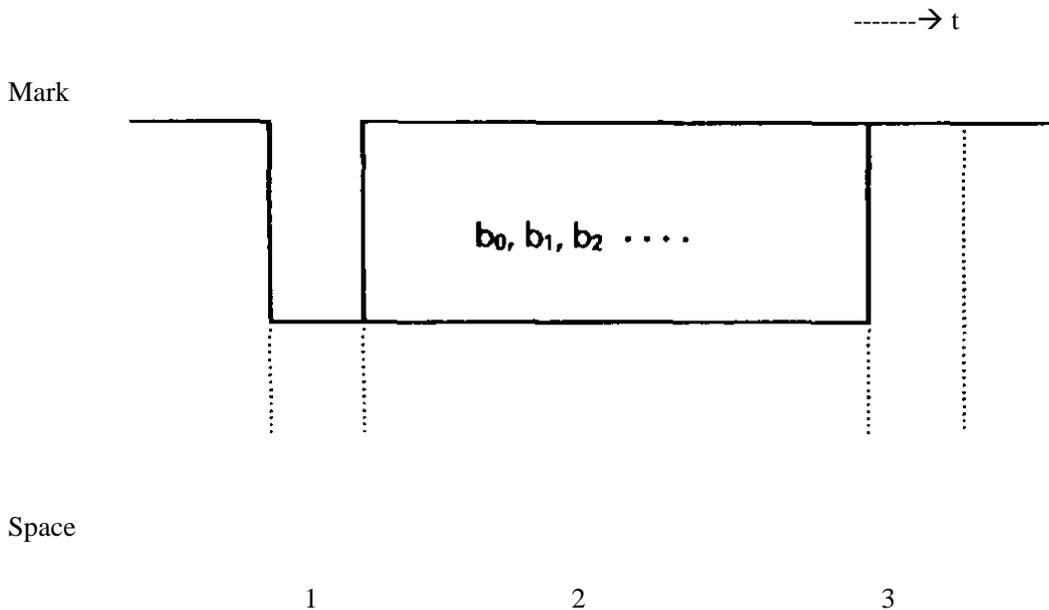
(4) FG

Case GND

(5) GND

Common GND on the circuit.

6.2.4 Data Configuration



1. Start bit
2. Data bit (+ parity bit)
3. Stop bit (1 or more)

(1) Start Bit

In 1/2 bit from the mark-to-space starting edge, state is read once again. When "space" state is confirmed, it is recognized as the start bit. If it is "mark" state, it is not taken as the start bit. Without taking it as an error, detection of a start bit is carried out once again.

(2) Data Bit + Parity Bit

Data bit and parity bit are sampled at 1/2 start bit for time length equal to 1 bit. The state thus sampled is taken as the data for the bit concerned. Bits are named as Bit 0, Bit 1, parity bit counted from the one close to the start bit.

(3) Stop Bit

The stop bit is a mark level of 1 bit or more. With "space" having been detected on detection of a stop bit, framing error takes place.

6.2.5 Error Detection

Parity, framing, and overrun are detected. On detection of any error, the data are stored in the buffer as "?".

(1) Framing Error

With "space" state having been detected on detection of a stop bit, error takes place.
The data are stored in the buffer as "?".

(2) Parity Error

With an error having been detected under specifying parity check, the data is stored in the buffer as "?".

(3) Overrun Error

On detection of an overrun error, the data are stored in the buffer as "?".

6.2.6 Data Receiving Control

When DTR/DSR control having been selected, with BUSY signal at "LOW", data from the host side are received. With the signal at "HIGH", they can not be received.

When DTR/DSR control not having been selected, after X-ON transmission, data is received from the host side. No transmission of data can take place after X-OFF is transmitted.

6.2.7 Buffering

Data transfer to the input buffer include DTR signals and TD signals as the control signals concerned.

(1) DTR signals (See 4.2.3 (2).)

(2) TD signals (See 4.2.3 (3).)

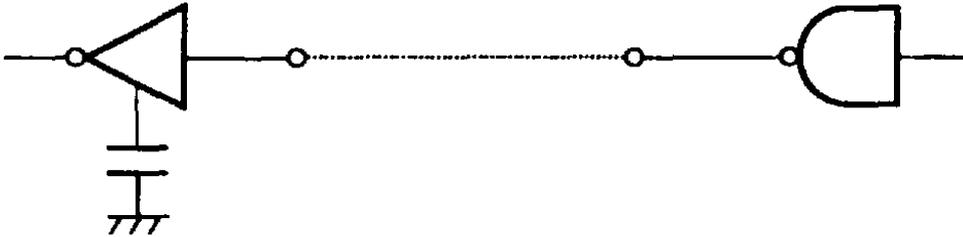
6.2.8 ELECTRICAL CHARACTERISTICS

(1) RS-232C Circuit

Input (RD, DSR)

(Printer Side)

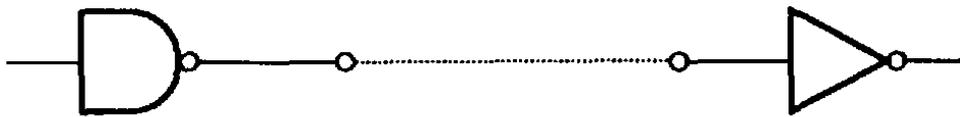
(Host Side)



Equivalent to Max 232

RD Mark = <-8V> : Stop bit
 Space = <+8V>: Start bit

Output (DTR, TD)



Equivalent to Max 232

TD Mark = <-8V> : 1
 Space = <+8V>: 0

7. Drawer Kickout Connector

7.1 Specifications

(1) Drawer-Kick Drive Signal

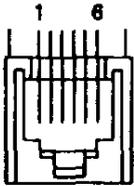
Pulses specified by ESCp are output. Also, SW(+) state, in parallel interface, can be observed by Pin 34 of the interface connector and, in serial interface, by ESC u command.

(2) Electrical Characteristics

- 1) Drive voltage : DC24V
- 2) Drive current : Max. 0.8A (within 510ms)
- 3) SW signal : signal level "L"= 0 - 0.5V
"H"= 3 - 5V

7.2 Connector's Pin Configurations

No.	SIGNAL NAME	FUNCTION
1	FG	Frame ground
2	DRAWER 1	Drawer 1 driving signal
3	DRSW	Drawer SW input
4	VDR	Drawer driving power supply
5	DRAWER 2	Drawer 2 driving signal
6	GND	Common ground on the circuits

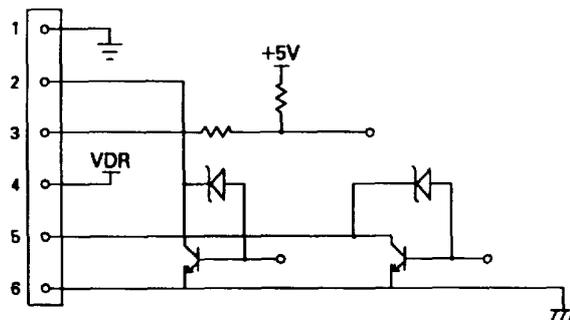


Connector used : TM5RJ3-66 (Hirose) or equivalent
Applicable connector : TM3P-66P (Hirose) or equivalent

Caution

- 1) No output is available during printing.
- 2) Drawer 1 and Drawer 2 can not be driven simultaneously.
- 3) Use a solenoid of 36 Ohm or more for the drawer. Do not exceed 0.8A for output current.
Failure or seizure can take place.
- 4) No connection is available to a telephone line.

7.3 Drive Circuit

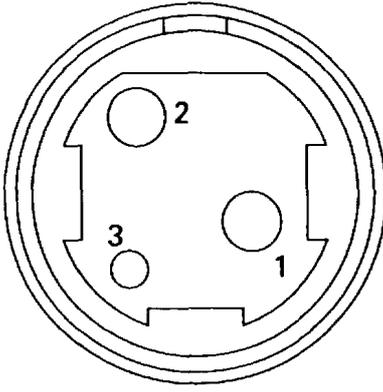


8 POWER SUPPLY CONNECTOR SPECIFICATIONS

This is the connector for power supply from exclusive AC Adapter.

Connector's Pin Configurations

No.	Function
1	+24V
2	GND
3	N.C
SHELL	F.g



Connector used : TCS7960-53-2010 (Hoshiden) or equivalent
Applicable connectors : TCP8927-63-1100 (Hoshiden) or equivalent
TCP8927-53-1100 (Hoshiden) or equivalent

9 PRINT CONTROL FUNCTION

9.1 Command List

	CONTROL CODE	FUNCTION	PAGE
1	HT	Horizontal tab command	
2	CR	Print command	
3	LF	Printing and paper feed	
4	ESC SP	Setting the right space amount of the character	
5	!	Collective specifying printing mode	
6	%	Specifying/canceling download character set	
7	&	Defining download characters	
8	*	Specifying the bit image mode	
9	-	Specifying/canceling underline	
10	2	Specifying 1/6-inch line feed rate	
11	3	Setting line feed rate n/203 inch	
12	@	Initializing the Printer	
13	D	Setting horizontal tab position	
14	E	Specifying/canceling highlighting	
15	G	Specifying/canceling double printing	
16	J	Printing and feeds paper n/203 inch	
17	R	Selecting the international characters	
18	c3	Setting of paper end sensor effective for outputting a signal for no paper(Parallel Mode Only)	
19	c4	Setting of paper end sensor effective for print stop	
20	c5	Enabling/disabling the panel switches	
21	d	Printing and feeding the paper by n lines	
22	p	Generating the specified pulse(Drawer Kickout)	
23	t	Selecting the character code table	
24	v	Transmitting the printer status(Serial Mode Only)	
25	u	Transmitting the status of peripheral equipment(Serial Mode Only)	
26	{	Specifying/canceling the inverted characters	
27	V	Specifying/canceling the 90° - right-turned characters	
28	\$	Specifying the absolute positions	
29	¥	Specifying the relative positions	
30	GS k	Printing the bar code	
31	w	Selecting the horizontal size (scale factor) of bar code	
32	h	Selecting the height of the bar code	
33	H	Selecting the font of HRI character	
34	*	Defining the download bit image	
35	/	Printing the download bit image	
36	:	Starting/ending macro definition	
37	^	Executing the macro	
38	ESC =	Data input control	
39	a	Aligning the characters	
40	i	Full cut	
41	m	Partial cut	

9.2 Command Details

(1) Horizontal Tab Command (HT)

Code : (09)h

Shifts the printing position to the next horizontal tab position. The horizontal tab position is set by ESC D. Initial setting of the horizontal tab position is in 9th, 17th, 25th, 33rd, 41st columns.

(2) Print Command (CR)

Code : [0D]h

1) When DS 1 -3 is OFF:

This command is ignored.

2) When DS 1- 3 is ON:

With data held inside the input buffer, printing and line feed are performed.

Without data inside the input buffer, however, no printing is performed.

(3) Printing and Paper Feed Command (LF)

Code : [0A]h

Prints data inside the internal input buffer and feeds lines based on the line feed amount having been set.

(4) Setting the right space amount of the characters (ESC SP)

Code : [1Bh] + [20h] + n

* {0 ≤ n ≤ 20} Data is described in Hex code.

The rightward space amount is set in dot unit (0.165 mm unit). In the initial value, it is n=0.

The rightward space amount in double wide mode is made double of the set volume.

(5) Specifying Collectively the Print Mode (ESC ! n)

Code: [1Bh] + [21h] + n ≤

* {0 ≤ n ≤ FF} The data is described in Hex code.

Printing mode is assigned. Each n bit indicates the following:

BIT	FUNCTION	VALUE	
		0	1
1	Undefined		
2	Undefined		
3	Undefined		
4	Highlighting	Canceled	Specified
5	Double height	Canceled	Specified
6	Double width	Canceled	Specified
7	Undefined		
8	Underline	Canceled	Specified

- With double height and double width being specified simultaneously, double wide and double high characters are consisted.
- An underline is attached to the full character width, which, however, is not attached to the part having been skipped by the horizontal tab. Neither is it attached to 90°-right-turned characters.
- The underline width is as having been specified by ESC -. The initial value is "1".

(6) Specifying/Canceling Download Character Set (ESC % n)

Code: [1B]h + [25]h + n

* {0 ≤ n ≤ FF} Data is described in Hex code.

Specifying/canceling download characters. Download characters and download bit images cannot be defined simultaneously. Further, only the lowest bit (n0) is valid for n. The lowest bit (n0) indicates the following:

n0= 0: Canceling download character

n0= 1: Specifying download character

(7) Defining Download Character (ESC & s n m a (D1D2 - Dn)

Code: [1B]h + [26]h + s +n +m +a +Dn

* {s = 02}

{20 (Hex) ≤ n ≤ 7E (Hex)}

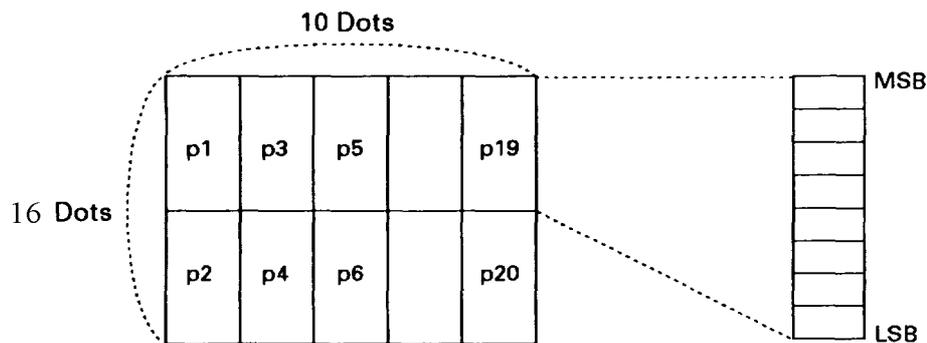
{20 (Hex) ≤ m ≤ 7E (Hex)}

{0 ≤ a ≤ 0A (Hex)}

Defines the font of download characters of alphanumeric characters.

- "s" indicates the number of bytes in vertical direction.
- "n" indicates the start character code and "m" indicates the end character code. To define only one character, set n=m.
- Character codes definable includes 95 ASCII codes in total between <20>H - <7E>H.
- "a" indicates the number of dots in horizontal direction for definition.
- Dn is the data to be defined, which indicate a pattern equal to "a" dot in horizontal direction from the left end. The rest of the pattern on the right side is filled with space.
- Download characters thus defined remain valid until redefinition, ESC @ execution, GS * execution, or power OFF is practiced.

Example



(8) Specifying the Bit Image Mode (ESC * m n1 n2 D1 - Dn)

Code : [1B]h + [2A]h + m + n1 + n2 + Dn

* {m= bit image mode (See the table below.)}

{0 ≤ n1 ≤ FF}

{0 ≤ n2 ≤ 02} Data is described in Hex code.

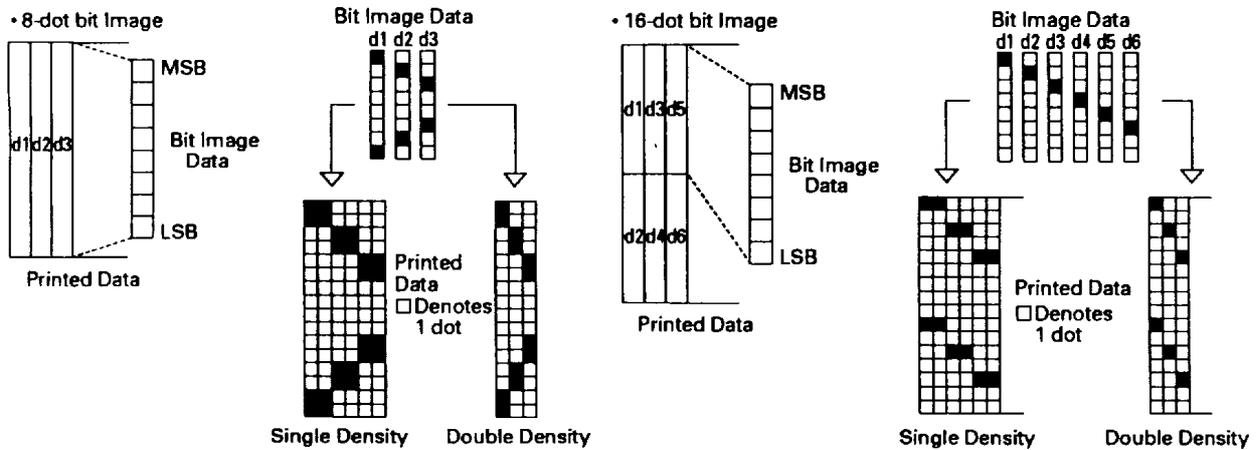
According to the bit image mode assigned in m, prints data in the bit image.

- The no. of dots printed is divided by 256, whose quotient is taken as n2 and residual as n1.
- The total no. of dots printed in the bit image is equal to n1 + (256 x n2).
- When bit image data have been input in excess of 1 dot/line (448 dots) position, the excess data are discarded.
- In the bit image data (Dn), the bits subject to printing are taken as "1" and those not as "0".
- The bit image modes are shown as follows:

m(Hex)	MODE	VERTICAL DIRECTION		HORIZONTAL DIRECTION	
		NO. OF DOTS	DOT DENSITY	DOT DENSITY	MAX. NO OF DOTS
0	8-dot single density	8	78 DPI	77 DPI	224
1	8-dot double density	8	78 DPI	154 DPI	448
32	16-dot single density	16	156 DPI	77 DPI	224
33	16-dot double density	16	156 DPI	154 DPI	448

- When the value set in m (bit image mode) are out of conditions, the data following after n1 is processed as printing data.

The relation between bit image data and printing dots are shown below.



(9) Specifying/ Canceling Underline (ESC - n)

Code: [1B]h + [2D]h + n

* {0 ≤ n ≤ 02} Data is described in Hex code.

Specifying/canceling an underline.

- An underline is attached to the full character width. It is, however, not attached to the part having been horizontal tab command.
- An underline is not attached to a 90 °- right-turned characters.
- Types of underlines by n value are shown below:

n (Hex)	Type
0	Canceling an underline.
1	Specifying an underline for 1-dot width.
2	Specifying an underline for 2-dot width.

(10) Specifying 1/6 inch line feed rate (ESC 2)

Code : [1B]h + [32]h

The line feed rate per line is specified by 1/6 inch.

(11) Setting line feed rate n/203 inch (ESC 3 n)

Code : [1B]h + [33]h + n

* {0 ≤ n ≤ FF} Data is described in Hex code.

The line feed rate per line is specified by n/156 inch.

- The initial value is n = 26(18H), being 4.23 mm line feed rate.

(12) Initializing Printer (ESC @)

Code : [1B]h + [40]h

Clears data stored in the print buffer and brings various settings to the initial state (Default state).

- Data inside the internal input buffer are not cleared.
- Dip switches are read once again.

(13) Setting Horizontal Tab Position (ESC D n NUL)

Code : [1B]h + [44]h + n [00]h

* {0 ≤ n ≤ FF} Data is described in Hex code.

Specifying a horizontal tab position.

- "n" indicates the no. of columns from the beginning to the horizontal tab position. At this time, n= set position - 1 is to be specified.
- The tab position is set at position where it is "character width x n" from the line beginning. The character width, at this time, includes the rightward space amount. In double wide characters, it is made double of the ordinary case.
- Tab positions can be specified are maximum 24. Specifying exceeding this is ignored.
- ESC D NUL clears all the set tab positions. Following clearing, horizontal tab command is ignored.
- Initial value is specified for each eight characters(9.17.25.33.41) of ANK characters.

(14) Specifying/canceling highlighting (ESC E n)

Code : [1B]h + [45]h + n

* {0 ≤ n ≤ FF} Data is described in Hex code.

Specifying/canceling the highlighted characters.

- "n" is valid only for the lowest bit (n0).
- Control by the lowest bit (n0) is shown as follows:

n0	Type
0	Canceling highlighting.
1	Specifying highlighting.

- This is effective to all characters.
- Dot configuration of a highlighted character includes one extra dot added at its side.

(15) Specifying/canceling Double Printing (ESC G n)

Code : [1B]h + [47]h + n

* {0 ≤ n ≤ FF} Data is described in Hex code.

Specifying/canceling the double printing.

- "n" is valid only for the lowest bit (n0).
- Control by n is shown as follows.

n0	Type
0	Canceling double printing.
1	Specifying double printing.

- The print result of Double printing and highlight character printing is completely same

(16) Printing and feeding paper n/203 inch (ESC J n)

Code : [1B]h + [4A]h + n

* {0 ≤ n ≤ FF} Data is described in Hex code.

Prints data inside the print buffer and feeds paper by n/156 inch.

- Specified volume does not remain.
- The beginning of the line is to be considered as the next printing start position.

(17) Selecting International Characters (ESC R n)

Code : [1B]h + [52]h + n
 * {0 ≤ n ≤ 0A} Data is described in Hex code.

Selecting international characters.

- Depending on the value of n, following character sets are specified.

n(Hex)	CHARACTER SET
0	U.S.A.
1	France
2	Germany
3	U.K.
4	Denmark 1
5	Sweden
6	Italy
7	Spain
8	Japan
9	Norway
A	Denmark 2

- The initial value of n indicates the character set specified by the dip switch. However, setting is available only through use of this command for "Spain ", "Norway", and "Denmark II".

(18) Setting of paper end detector available for output of paper end signal

Code : [1B]h + [63]h + [33]h + n
 * {0 ≤ n ≤ FF} Data is described in Hex code

Specifying the condition of paper end detector to stop printing operation.

- n is valid only for the lowest bit. (n0)
- n bit means the followings.

n0	Condition
0	Paper near end disable (initial value)
1	Paper near end enable

Remarks : This is valid only for parallel interface model.

(19) Setting of paper end detector available for print stop

Code : [1B]h + [63]h + [34]h + n
 * {0 ≤ n ≤ FF} Data is described in Hex code.

Specifying the condition of paper end detector to stop printing operation.

- n is valid only for the lowest bit. (n0)
- n bit means the followings.

n0	Condition
0	Paper near end disable (initial value)
1	Paper near end enable

(20) Enabling/Disabling Panel Switch (ESC c 5 n)

Code : [1B]h + [63]h + [35]h + n
 * {0 ≤ n ≤ FF} Data is described in Hex code.

Selecting the paper feed switch valid/invalid.

- "n" is valid only in the lowest bit (n0).
- "n" bit means the followings.

n0	Condition
0	Paper feed SW valid.
1	Paper feed SW invalid.

- The initial value of n is "0".

(20) Printing and Feeding the paper by n lines (ESC d n)

Code : [1B]h + [64]h + n
 * {0 ≤ n ≤ FF} Data is described in Hex code.

Prints data inside the buffer and feeds paper by n lines.

- Specified line does not remain.
- The beginning of the line is to be considered as the next printing start position.

(21) Generating specified Pulse (ESC p m n1 n2)

Code : [1B]h + [70]h + m + n + n2
 * {m = connector pin No. (See table below.)}
 {0 ≤ n1 ≤ FF}
 {0 ≤ n2 ≤ FF} Data is described in Hex code.

Signals specified by n1, n2 are output to Connector Pin m.

- Bit m (m0) means the followings.

m0	Condition
0	Drawer kick No. 2 pin
1	Drawer kick No. 5 pin

- ON time is considered as n1 x 2ms and OFF time as n2 x 2ms.
- When m is out of the defined range, n1, n2 are discarded, where no signals are output.
- Drive duty of Drawer is shown below:

$$\frac{\text{ON time}}{\text{ON time} + \text{OFF time}} \leq 0.2$$

(Take OFF time as being 4 times or more longer than ON time.)

(22) Selecting Character Code Table (ESC t n)

Code : [1B]h + [74]h + n
 * {0 ≤ n ≤ 1} Data is described in Hex code.

Selecting Page n on the character code table:

- "n" means the followings.

n (Hex)	Condition
0	IBM Character #2
1	Japanese Character

- The initial value of n is specified by dip switch setting. (DS1-5.6.7)
 (Other than Japanese character is specified, IBM #2 is specified.)

(23) Transmitting the printer status (ESC v)

Code : [1B]h + [76]h

Current printer status is transmitted..

- Status sent out consists of 1 byte whose content is as in the table below.
- In DTR/DSR control, after receivable state of the host (DSR signal being in SPACE state) is confirmed, only 1 byte is transmitted. In XON/XOFF control, DSR signal state not being confirmed, only 1 byte is transmitted.
- In DTR/DSR control, when the host is in unreceivable state (DSR signal being in MARK state), it waits until receivable state is created.

BIT	FUNCTION	VALUE	
		0	1
0	Not defined		
1	Not defined		
2	Paper end	With paper	Without paper
3	Not defined		
4	Not used	Fixed to 0	-
5	Not defined		
6	Not defined		
7	Not defined		

Remarks. This command is valid only for serial interface model.

(24) Transmitting the status of Peripheral Equipment (ESC u n)

Code : [1B]h + [75]h + n

* {n = 0}

Current status of connector pin No.3 is transmitted.

- "n" means the followings.

n (Hex)	Condition
0	Drawer Kick Connector No. 3

- Status transmitted consists of 1 byte whose content is as in the table below.
- Any equipment has not been connected to this connector, Bit 0 of n is always "1".
- In DTR/DSR control, after receivable state of the host (DSR signal being in SPACE state) is confirmed, only 1 byte is transmitted. Further, in XON/ XOFF control, DSR signal state not being confirmed, only 1 byte is transmitted.
- In DTR/DSR control, when the host is unreceivable state (DSR signal being in MARK state), it keeps waiting until receivable state is created.

BIT	FUNCTION	VALUE	
		0	1
0	Level of pin No. 3	"L"	"H"
1	Not defined		
2	Not defined		
3	Not defined		
4	Not used	Fixed to 0	-
5	Not defined		
6	Not defined		
7	Not defined		

(Remarks) This command is valid only for serial interface model.

(25) specifying/Canceling Inverted Characters

Code : [1B]h + [7B]h + n

* {0 ≤ n ≤ FF} Data is described in Hex code.

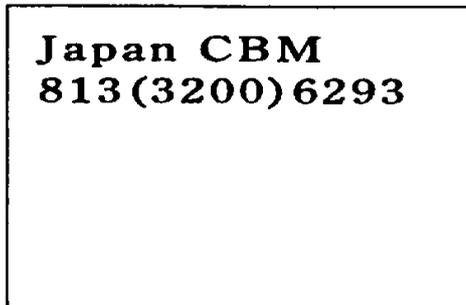
Specifying/canceling inverted characters.

- "n" is valid only for the lowest bit (n0).
- Bit n (n0) means the followings.

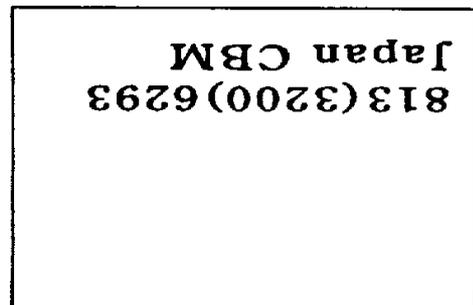
n0	Condition
0	Canceling inverted characters.
1	Specifying inverted characters.

- This is valid only when this is specified at the beginning of a line.
- The printing example is shown below.
- The initial value of n is "0".

When inverted characters
have been canceled:



When inverted characters
have been assigned:



Paper feed direction

(26) Specifying/Canceling 90°-right- turned Characters (ESC V n)

Code : [1B]h + [56]h + n

*{0 ≤ n ≤ 1} Data is described in Hex code.

Specifying/canceling characters 90°-right- turned character.

- No underlines are attached to 90°-right- turned characters .
- "n" means the followings.

n (Hex)	Condition
0	Canceling 90° -right- turned Characters
1	Specifying 90° -right- turned Characters

- The initial value of n is "0".

(27) Specifying Absolute Positions (ESC \$ n1 n2)

Code : [1B]h + [24]h + n1 + n2

* {0 ≤ n1 ≤ FF}

{0 ≤ n2 ≤ 1} Data is described in Hex code.

The printing start position is specified in the number of dots from the beginning of line.

- The number of dots is divided by 256, whose quotient is taken as n2 and the residual as n1. Therefore, the printing start position is equal to n1 + n2 x 256 from the beginning of line..
- Specifying beyond the line end is ignored.

(28) Specifying Relative Positions (ESC ¥ n1 n2)

Code : [1B]h + [5C]h + n1 + n2

* {0 ≤ n1 ≤ FF}

{0 ≤ n2 ≤ FF} Data is described in Hex code.

The printing start position is specified in the number of dots from the current position.

- Rightward direction is taken as plus and leftward direction as minus.
- To specify N dot in minus (left) direction, use a complement of N for assignment.
- N dots = 65536 - N
- The number of dots is divided by 256, whose quotient is taken as n2 and the residual as n1.
- Specifying exceeding the end of line is ignored.

(29) Bar Code Printing (GS k n Dn NUL)

Code : [1D]h + [6B]h + n + Dn + [00]h

* {0 ≤ n ≤ 7} Data are described in Hex code.

Specifying a type of bar code and printing bar codes.

- The beginning of line is considered as the next printing start position.
- Depending on the value of n, the following bar code can be selected.
- Dn indicates a character code to be printed.

n (Hex)	Bar Code System	Maximum Columns
0	UPC-A	-
1	UPC-E	-
2	JAN13 (EAN)	-
3	JAN 8 (EAN)	-
4	CODE 39	15
5	ITF	26
6	CODABAR	19
7	CODE 128	17

*maximum columns in the printer

- Data, when being held in the print buffer, are ignored.
- When the character code Dn cannot be printed, the data following after this is printed as ordinary print data.
- When a bar code whose number of characters to be printed is fixed has been selected, the number of characters have to be always made equal to the number of characters to be printed. When the horizontal direction exceeds one line length, the excess part is not printed.

(30) Selecting Bar Code width (GS w n)

Code : [1d]H + [77]H + N

* {2 ≤ n ≤ 4} Data is described in Hex code.

Selecting bar code width.

- The initial value of this width is "3".

(31) Selecting Bar Code Height (GS h n)

Code : [1d]H + [68]H + N

* {1 ≤ n ≤ FF} Data is described in Hex code.

Selecting bar code height.

- "n" indicates the number of dots in vertical direction.
- The initial value of n is "162".

(32) Selecting Printing Position of HRI Characters (GS H n)

Code : [1d]H + [48]H + N

* {0 ≤ n ≤ 3} Data is described in Hex code.

Selecting printing position of HRI characters for printing bar codes.

- "n" means the followings.

n (Hex)	Printing Position
0	No printing
1	Above the bar code
2	Below the bar code
3	Both above and below the bar code

- The initial value of n is "0".

(33) Defining Download Bit Image (GS * n1 n2 Dn)

Code : [1D]h + [2A]h + n1 + n2 Dn

* {1 ≤ n1 ≤ FF}

{1 ≤ n2 ≤ 48}

{n1 x n2 ≤ 1311} Data is described in Hex code.

Defines downloading bit images of the number of dots specified by n1/n2.

- The numbers of dots are n1 x 8 in horizontal direction and n2 x 8 in vertical direction.
- Dn indicates bit image data.
- The download bit image thus defined remains effective until redefinition, ESC @ execution, ESC &, or power OFF takes place.
- A download character and a download bit image cannot be defined simultaneously. With this command executed, defined content of a download character is cleared.
- Relations between the bit image data and the dot defined are shown below:

(34) Printing Download Bit Image (GS / m)

Code : [1D]h + [2F]h + m

* {0 ≤ m ≤ 3} Data is described in Hex code.

Prints download bit images in a mode specified by m.

- Modes can be selected by m are shown table for selection with m are shown below.

m	MODE NAME	DOT DENSITY IN VERTICAL DIRECTION	DOT DENSITY IN HORIZONTAL DIRECTION
0	Normal mode	156 DPI	154 DPI
1	Double wide mode	156 DPI	77 DPI
2	double high mode	78 DPI	154 DPI
3	Double wide/double high mode	78 DPI	77 DPI

- When data exist inside the print buffer, this command is ignored.
- When a download bit image has not been defined, this command is ignored.
- A portion of a download bit image exceeding one line length is not printed.
- A download character and a download bit image cannot be defined simultaneously.

(35) Starting / Ending Macro Definition (GS :)

Code : [1D]h + [3A]h

Specifying starting / ending macro definition. Maximum content available for macro definition is 2048 bytes. A portion exceeding 2048 bytes is not defined.

- Even with ESC @ (initialization of the printer) having been executed, defined content is not cleared. Therefore, it is possible to include ESC @ into the content of macro definition.
- Normal printing operation is carried out even while in macro definition

(37) Macro Execution (GS^ n1 n2 n3)

Code : [1D]h + [5E]h + n1 + n2 + n3

* {0 ≤ n1 ≤ FF}

{0 ≤ n2 ≤ FF}

{0 ≤ n3 ≤ 1} Data is described in Hex code.

Executing contents defined in macro.

- "n1 - n3" indicate as follows:
 - n1 : The number of times of macro execution
 - n2 : Waiting time on macro execution
Waiting time of n2 x 100 msec is given for every execution.
 - n3 : Macro execution mode

n3	Mode
0	Continuous execution
1	Execution by the paper feed SW

Continuous execution : The Macro is executed n1 times continuously at the time intervals specified by n2.

Execution by FEED SW : After waiting for lapse of time specified by n2, the ERROR LED flickers and the paper feed switch is waited to be pressed. When it is pressed, the macro is executed once. This action is repeated n1 times.

- When this command is received while in macro definition, suspension of macro definition is indicated. At this time, the defined content is cleared.
- No execution takes place when macro is held undefined or n1=0.
- While in macro execution with n3=1, paper feed with the FEED SW is not available.

(38) Data Input Control (ESC = n)

Code : [1B]h + [3D]h + n

* {0 ≤ n ≤ FF} Data is described in Hex code.

Selecting equipment in which data input from the host is effective.

- Each bit of n indicates as follows:

BIT	EQUIPMENT	VALUE	
		0	1
0	Printer	Invalid	Valid
1	Not defined		
2	Not defined		
3	Not defined		
4	Not defined		
5	Not defined		
6	Not defined		
7	Not defined		

- When the printer has not been selected, this printer abandons all received data until it is selected by this command.
- Even when the printer has not been selected, it can become BUSY state through printer operation.
- The initial value of n is "1".

(39) Aligning the characters (ESC a n)

Code : [1b]h + [61]h + n

* {0 ≤ n ≤ 2} Data is described in Hex code.

All the printed data within one line are aligned in the specified position.

- Depending on n value, positional alignment is carried out as in the table below:

n (Hex)	POSITION
0	Left end alignment
1	Centering
2	Right end alignment

- This is valid only when n is inputted at the beginning of line.
- The initial value of n is "0".

(40) Full Cut (ESC i)

Code : [1B]h + [69]h

Full cutting of paper is performed.

- This is valid only when n is inputted at the beginning of line.

(41) Partial Cut (ESC m)

Code : [1B]h + [6D]h

Partial cutting of paper is carried out.

- This is valid only when n is inputted at the beginning of line.

10 CHARACTER CODE TABLE

10.1 International (IBM Character #2)

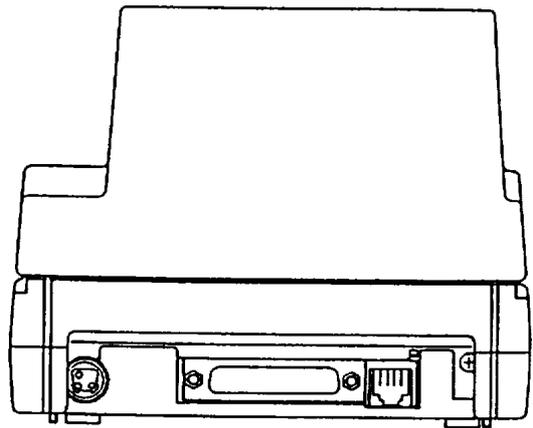
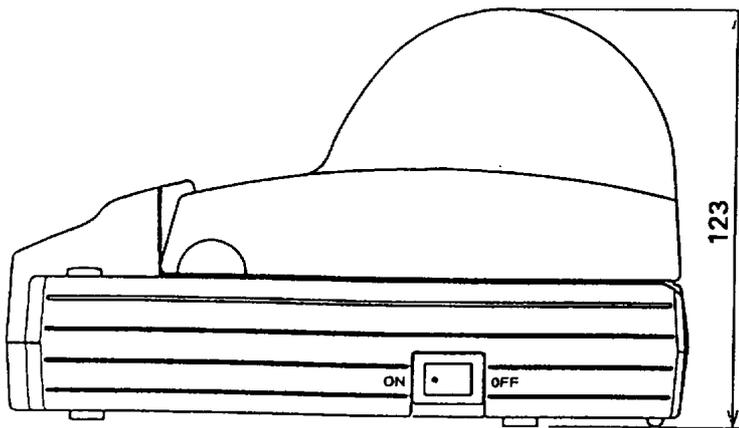
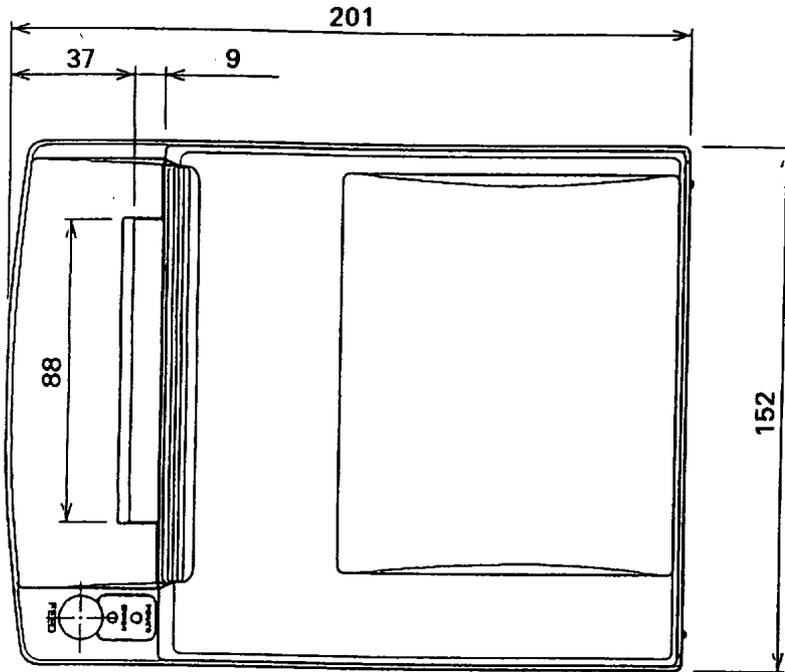
	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	sol		SP	0	@	P	,	p	ç	é	á	☒	L	┘	α	≡
1		! ex	!	1	A	Q	a	q	ú	z	í	☒	┘	┘	β	±
2			·	2	B	R	b	r	é	æ	ó	☒	┘	┘	Γ	≅
3			#	3	C	S	c	s	á	ó	ú	|	┘	┘	π	≈
4			\$	4	D	T	d	t	á	ó	ú	┘	┘	┘	Σ	ƒ
5			%	5	E	U	e	u	á	ó	Ñ	┘	┘	┘	σ	γ
6			&	6	F	V	f	v	á	ú	í	┘	┘	┘	μ	÷
7			'	7	G	W	g	w	ç	ú	↳	┘	┘	┘	τ	≈
8			(	8	H	X	h	x	é	ÿ	¿	┘	┘	┘	Φ	·
9	HT		)	9	I	Y	i	y	é	ó	┘	┘	┘	┘	θ	·
A	LP		*	:	J	Z	j	z	é	ó	┘	|	┘	┘	Ω	·
B		esc	+	:	K	[	k	{	í	ç	↳	┘	┘	┘	δ	√
C		PS	,	<	L	\	l	|	í	ç	↳	┘	┘	┘	∞	·
D		GS	-	=	M	]	m	}	í	ç	|	┘	┘	┘	φ	²
E			.	>	N	·	n	~	λ	R	<	┘	┘	┘	ε	■
F			/	?	O	_	o	SP	λ	f	>	┘	┘	┘	∩	SP

10.2 International Character Code Table

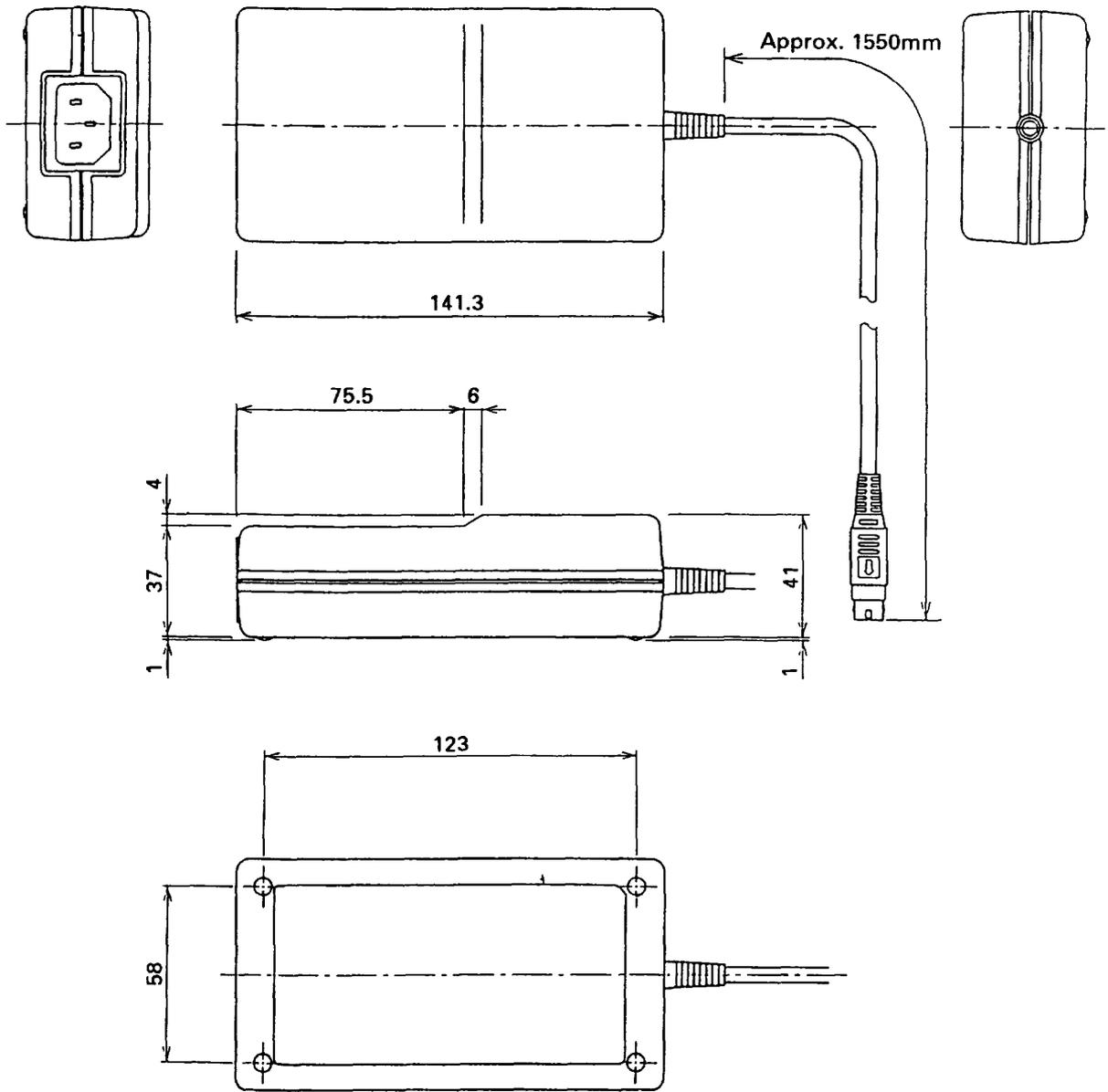
	Country	23	24	40	5B	5C	5D	5E	60	7B	7C	7D	7E
0	U. S. A.	#	\$	@	[	\	\]	^	`	(	|	)	~
1	France	#	\$	a	·	ç	š	ˆ	˘	é	ù	è	ˆ
2	Germany	#	\$	š	λ	ó	ú	ˆ	˘	a	o	q	ß
3	U. K.	£	\$	@	[	\	\]	ˆ	˘	(	|	)	~
4	Denmark I	#	\$	@	Æ	Ø	λ	ˆ	˘	æ	ø	á	~
5	Sweden	#	¤	é	λ	ó	λ	ó	é	a	o	a	q
6	Italy	#	\$	@	·	\	é	ˆ	ù	a	ó	è	ì
7	Spain	R	\$	@	i	ñ	¿	ˆ	˘	ˆ	n)	~
8	Japan	#	\$	@	[	¥	]	ˆ	˘	(	|	)	~
9	Norway	#	¤	é	Æ	Ø	λ	ó	é	æ	ø	á	q
10	Denmark II	#	\$	é	Æ	Ø	λ	ó	é	æ	ø	á	q

Appendix 1 Outline Drawing

1.1 Outline Drawing of Printer (Model : iDP-3210)



1.2 Outer Drawing of AC Adapter (Model : 30AD)



Appendix 2 Block Diagram

