



DPU-20
THERMAL PRINTER
OPERATION MANUAL

Thank you for buying the DPU-20 thermal printer.

The DPU-20 prints data input by the parallel Centronics method on thermal paper.

Please read this manual carefully before using your printer.
And please keep this manual in a safe place.

This OPERATION MANUAL applies to below.

- DPU-20-20CF
- DPU-20-24CF

Note :

1. It is strictly prohibited to copy all or part of this manual without permission.
2. The information here is subject to change without notice.
3. Please contact Seiko Instruments Inc. (SII) if there are technical inaccuracies or typographical errors.
4. SII is not responsible for influence of defects in operation even if those are related to Note 3.

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1 PRECAUTIONS

- Install the printer in the range from 0° (horizontal) to 90° (vertical) .
- Do not install the printer in the following places:
 - Hot or cold places
 - Places with strong vibration
 - Humid places
 - Places with oily or iron dust.
- Use only the specified DC power supply. Extremely low or high voltage makes the printer malfunction. Also, protect the power line from excessive noise.
- Do not print without paper. It will cause a malfunction of the printer.
- Do not take the printer apart or attempt to repair it yourself.
- Do not pull the paper from the insertion slot after feeding it through. Doing so may cause a malfunction.
- Cut the end of the thermal paper horizontally and insert it into the insertion slot vertically.
- Use only the 58 mm wide thermal paper rolls specified below.

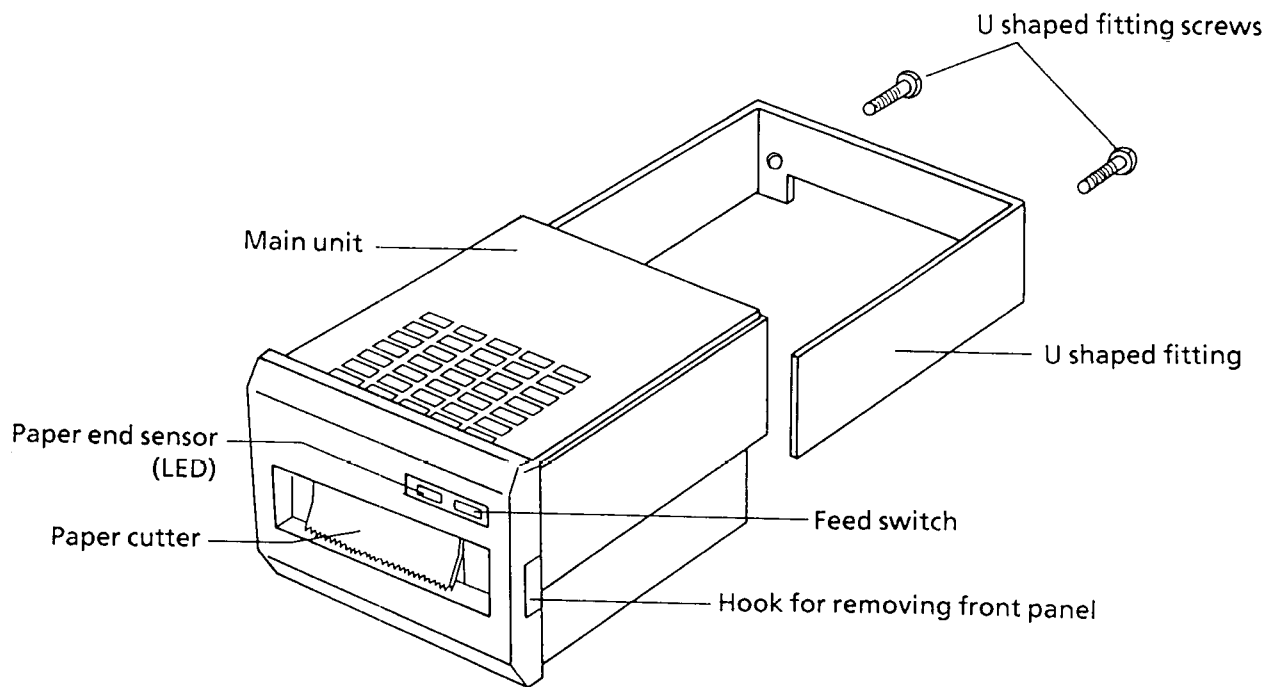
Product No.:	TP058-18C
Width:	58 mm
Outer diameter:	38 mm
Roll length:	18m

2 NOMENCLATURE

The figure below shows the parts of the DPU-20 parts. Once you have opened the carton, check to make sure all the components shown in the figure below are there.

<Components>

- 1 x main unit
- 1 x paper roll (inside unit)
- 1 x U shaped fitting
- 2 x U shaped fitting screw (M3 x 10)



*The paper roll is set inside the unit.
Paper roll: Outer diameter 38 mm Inner diameter 8.7 mm

Figure 2.1

3 CONNECTOR CABLE

The I/O terminal at the rear of the DPU-20 is 4234-0001 LCSC (3M). Use the HIF3BA-34D-2.54R (Hirose) or equivalent connector.

4 INSERTING THE THERMAL PAPER ROLL

- (1) While gently pressing the front panel release latch to remove the front panel and then pull out the printer.
- (2) The outside and inside surfaces of the paper are different. The printing surface is on the outside. Set the paper roll on the shaft. (See Figure 4.1.)

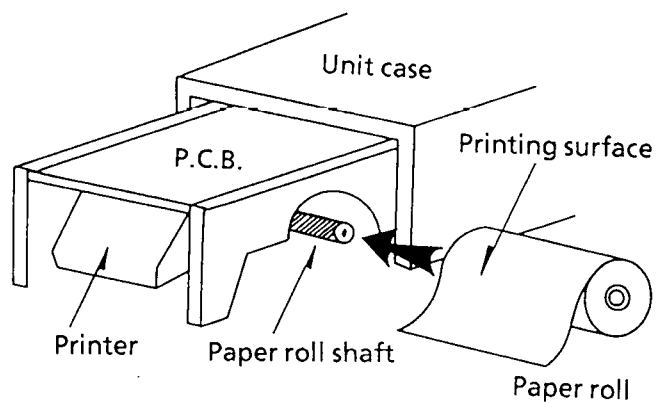


Figure 4.1

- (3) Gently push the paper face down into insertion opening A in Figure 4.2. Keep pressing the feed switch until the paper comes out from the print head.
- (4) When the paper from the print head has come out from the paper cutter, replace the front panel of the unit.

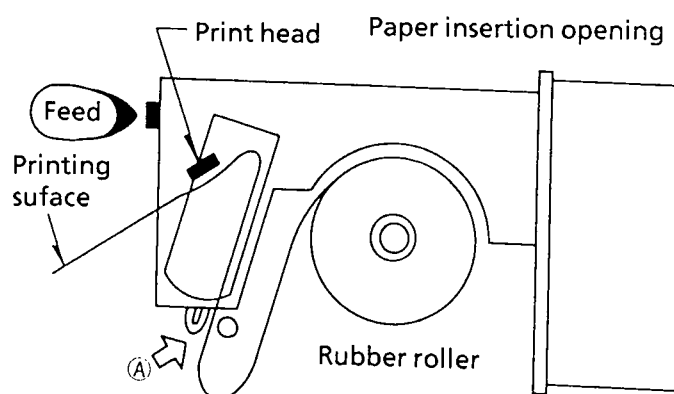


Figure 4.2

Note: If the paper is not advanced by the rollers even when you press the feed switch, push the paper further in through opening A.

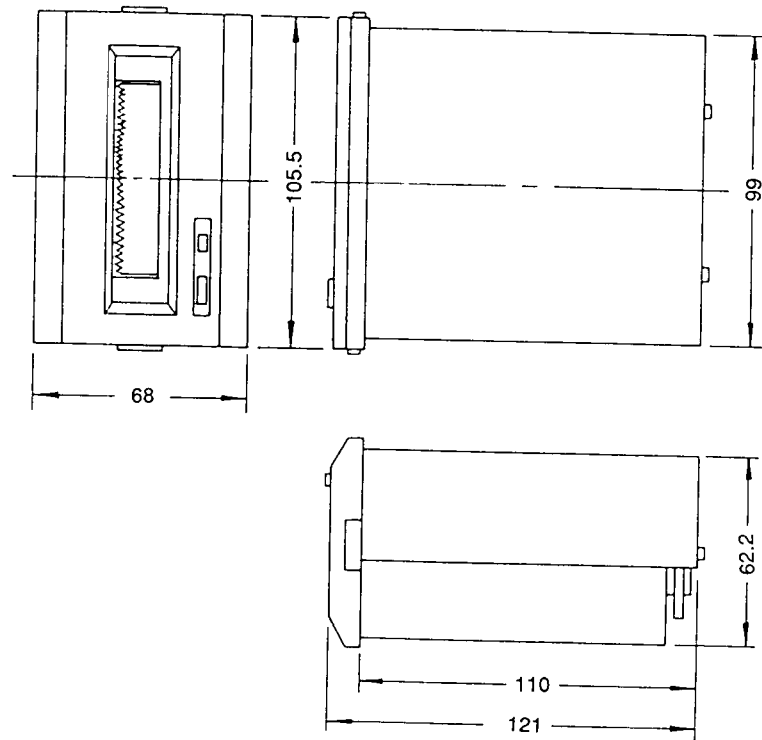
- Cut the edge of the paper roll straight and horizontally. Do not use a paper roll with an edge that is scratched or torn as it may cause a paper jam.
- Insert the edge of the paper roll into the insertion slot vertically. If the paper is inserted at an angle, it may cause a paper jam.

5 GENERAL SPECIFICATIONS

5.1 Printer Specifications

	DPU-20-20CF	DPU-20-24CF
Printing system	Thermal serial dot	
Printing direction	Left to right in relation to the paper feed	
Printing timing	Taco generator synchronous system	
Home position detection system	Mechanical switch	
Printing speed (normal temperature, 5.0 V)	Approx. 0.9 lines/s	Approx. 0.8 lines/s
Number of columns	20 (2-dot space)	24 (2-dot space)
Character dimensions (W x D)	2.4 mm x 1.6 mm	2.4 mm x 1.4 mm
Character matrix	7 x 5 dot matrix	
Input character code	JIS 8-bit code (See Section 12, Data Code Table.)	
Data input system	8-bit parallel (conforms to Centronics) Handshaking with the $\overline{\text{STROBE}}$, $\overline{\text{READY/BUSY}}$, and $\overline{\text{ACK}}$ lines (See Section 6.3, Data Timing.)	
Service life	500,000 lines (5.0 V rated energy, normal temperature, printing "8")	
Operating voltage	DC + 5V \pm 5%	
Current consumption	Operation: 3.0 A max. Standby: 50 mA max.	
Operating temperature	0 °C to + 50 °C	
Storage temperature	- 40 °C to + 60 °C	
Thermal paper	Width: 58^{+0}_{-1} mm, Thickness: 60 $\mu\text{m} \pm 5 \mu\text{m}$	

5.2 Dimensions



Unit: mm

Note: Rectangular mounting hole:
 $99.3^{+0.5}_{-0}$ mm x $62.7^{+0.5}_{-0}$ mm

6 INTERFACE SPECIFICATION

6.1 Basic Specifications

- (1) The unit is initialized after power on or the input of a reset ($\overline{\text{RESET}}$), and one blank line is fed to remove any slack in the paper roll.
- (2) Eight-bit data from the host is input by $\overline{\text{STROBE}}$, $\overline{\text{READY}}/\text{BUSY}$, and $\overline{\text{ACK}}$ handshaking.
- (3) Eight-bit data is stored in the built-in data memory. When one line of data or a CR or LF code has been input, a line is printed.
- (4) Characters are printed through the conversion of the input data code to dot patterns by the built-in character generator.

6.2 I/O Signals

(1) $\overline{\text{STROBE}}$ input ($\overline{\text{STROBE}}$)

$\overline{\text{STROBE}}$ input is the data read command signal. Data is latched when the signal goes low. The printer starts data input processing when this signal is received.

(2) Data 0 to 7 input (DATA)

Data 0 to 7 is an 8-bit parallel data input signal. It is high when data is 1, and low when data is 0.

(3) $\overline{\text{READY}}/\text{BUSY}$ output ($\overline{\text{READY}}/\text{BUSY}$)

$\overline{\text{READY}}/\text{BUSY}$ checks whether data can be received. When the signal is low, data can be input.

Note: Even if the edge end of the paper does not reach to the print head completely when inserting the paper, $\overline{\text{READY}}/\text{BUSY}$ output will be $\overline{\text{READY}}$ after turning off the $\overline{\text{FEED}}$ signal. Handshake after completing the paper feed.

(4) $\overline{\text{ACK}}$ output

$\overline{\text{ACK}}$ output is a signal to confirm the completion of data input. After outputting the $\overline{\text{ACK}}$ signal, the printer is available to receive the next data.

(5) Paper end signal detection (PE)

When only approximately 27 mm (7 lines) of paper is left on the roll, the PE terminal goes high and an LED on the front panel lights up. The BUSY signal also goes high.

Note: If data is input when the paper is inserted and the end of the paper does not reach the print head and the LED is OFF, the input data will not be printed.

(6) Paper feed ($\overline{\text{FEED}}$)

The feed switch is on the front panel of the main unit. When inserting the paper, hold the feed switch down to feed the paper. The signal is ignored, however, if one or more characters are received or if printing is in progress.

The I/O connector also has a $\overline{\text{FEED}}$ pin, enabling control from the host. When the print head is at the home position, one line of paper is fed after confirmation of the "L" signal. Paper is continuously fed while the feed switch is on. The signal must be low for more than 100 μs to feed one line.

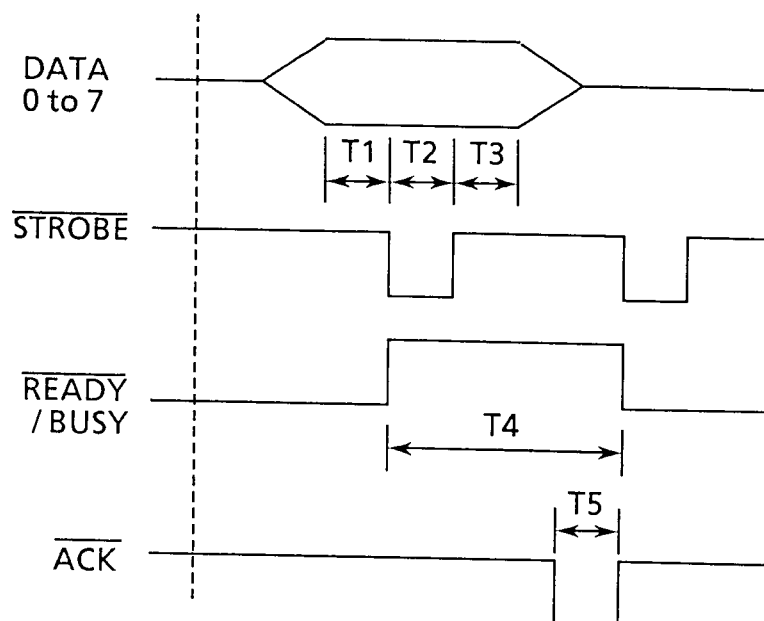
(7) Error signal output ($\overline{\text{ERROR}}$)

When the paper jams or an other error occurs during printing or paper feed, all output to the printing mechanism goes OFF. Data can not be received if the Error signal output changes to low and the $\overline{\text{READY/BUSY}}$ output changes to low. To clear the error, turned the reset signal must be to low or the power turned off, then on again (power on reset).

(8) Reset ($\overline{\text{RESET}}$)

The reset signal initializes the printer the same way as a power-on reset. When the signal is low, all input data is cleared, and one line of paper is fed. The signal can be received when the printer is at the home position and when there is an error. Reset is not effective during printing. (The I/O connector has a RESET terminal.)

6.3 Data Timing



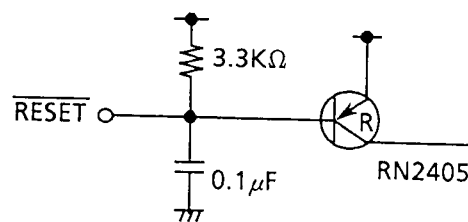
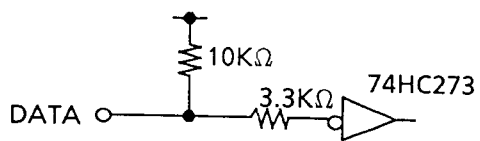
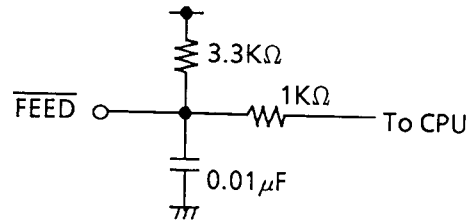
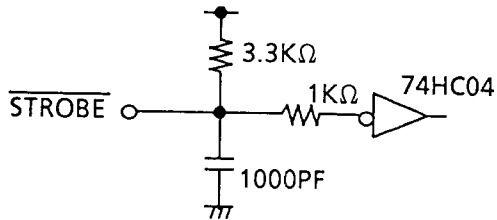
T1, T3	0.5 μ s min.
T2	0.5 μ s min.
T4	219 to 1009 μ s min.
T5	6 μ s TYP.

Note: In the DPU-20 series, the printer is ready to receive data again as soon as it has printed one line of data. When this happens, the data must be input from the host within the specified time.

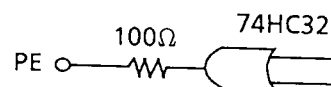
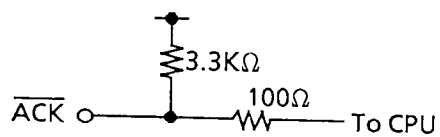
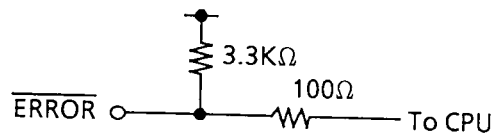
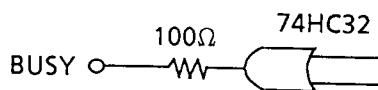
To send from the host computer, ready all the data first, then send it line by line within 165 ms on the DPU-20-20CF, and 210 ms on the DPU-20-24CF.

6.4 Electrical Conditions

(1) Input signal conditions



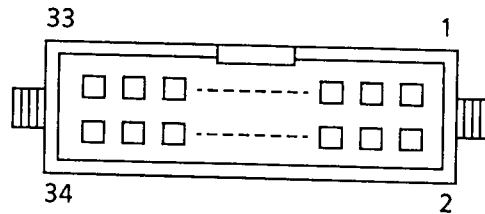
(2) Output signal conditions



6.5 Connector Pins

DPU-20: 4234-0001 LCSC (3M)

Connector: HIF3BA-34D-2.54R (Hirose) or equivalent



Note: Connectors are not supplied with the unit.

($\overline{\text{XXX}}$ is active low.)

(1/2)

Pin no.	Signal	I/O	Description
1	$\overline{\text{STROBE}}$	input	Tells the printer to read data. The data is latched to the falling edge of the signal. The pulse width must be $0.5 \mu\text{s}$ or more.
3 5 7 9 11 13 15 17	DATA 0 DATA 1 DATA 2 DATA 3 DATA 4 DATA 5 DATA 6 DATA 7	input	8-bit parallel data signal. High when data is 1 and low when data is 0.
19	$\overline{\text{ACK}}$	output	Data input end signal
21	$\overline{\text{READY}} / \text{BUSY}$	output	Shows whether data can be received or not. Data can be received when the signal is low.
23	PE	output	Paper end signal
25	$\overline{\text{ERROR}}$	output	Error signal
27	Vcc	input	DC + 5.0 V operating power supply

(2/2)

Pin no.	Signal	I/O	Description
29 31	GND	input	Power supply GND
33	Vp	input	DC + 5.0 V power supply for printer
2 4 6 8 10 12 14 16 18	Return GND		GND
20	NC		Not used
22	NC		Not used
24	$\overline{\text{FEED}}$	input	Paper feed signal
26	$\overline{\text{RESET}}$	input	Initialize signal
28	Vp	input	DC + 5.0 V power supply for printer
30 32	GND	input	Power supply GND
34	Vp	input	DC + 5.0 V power supply for printer

Note: All pins for power supply (pin No. 27 to 34) must be connected.

7 POWER SPECIFICATIONS

Operating voltage: + 5.0 VDC \pm 5 %

Current consumption:

Operation: 3.0 A max. (momentary current during printing)

Standby: 50 mA max.

To handle the maximum momentary current of 3.0 A during printing. (Always connect four pins for each (VP, Vcc, and GND) .)

When using the same power supply as the host system, ensure that the system is free from momentary drops in voltage and power surges.

(1) Conditions for internal circuit power on reset

The voltage level is checked when the power is turned on, and the circuit is initialized under the conditions shown below.

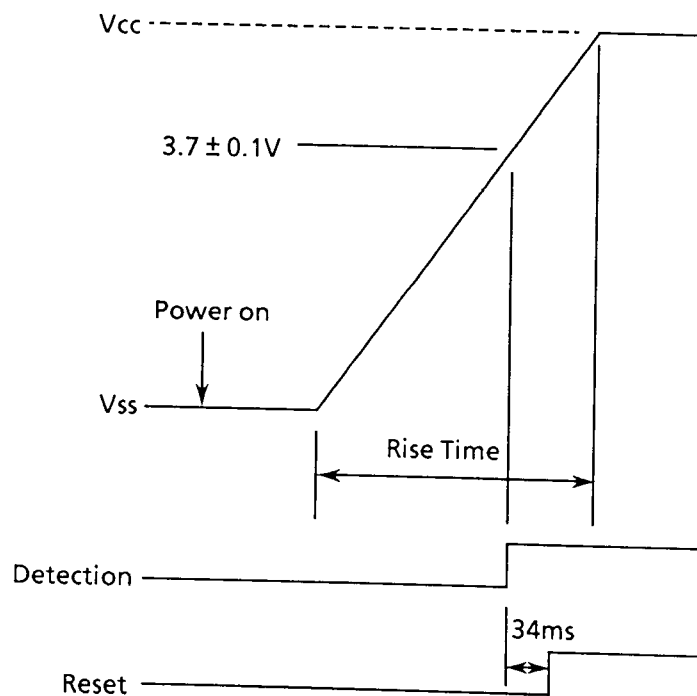
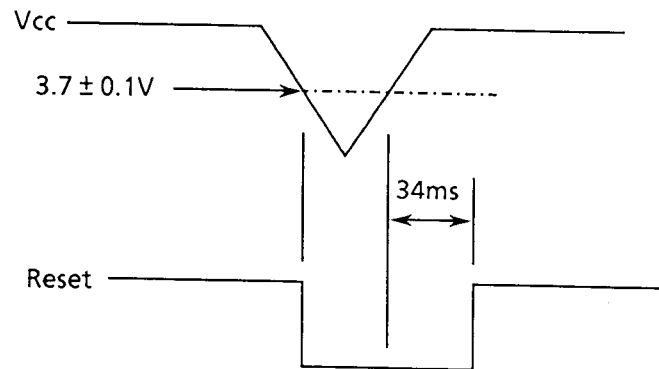


Fig. 7.1 Time cycle

(2) Reset conditions after abnormal drops in voltage during operation

When there are abnormal drops in voltage as shown below, the circuit is reset the same manner as a power-on reset.



8 PRINT FUNCTIONS

8.1 Test Print

When the power is turned on while the feed switch is on, one line is fed, and test printing starts. All printable characters are printed once, then a zigzag (0FEH) pattern is printed for 10 lines.

Note: The upright/inverted print switch can change between upright or inverted printing of the test printing.

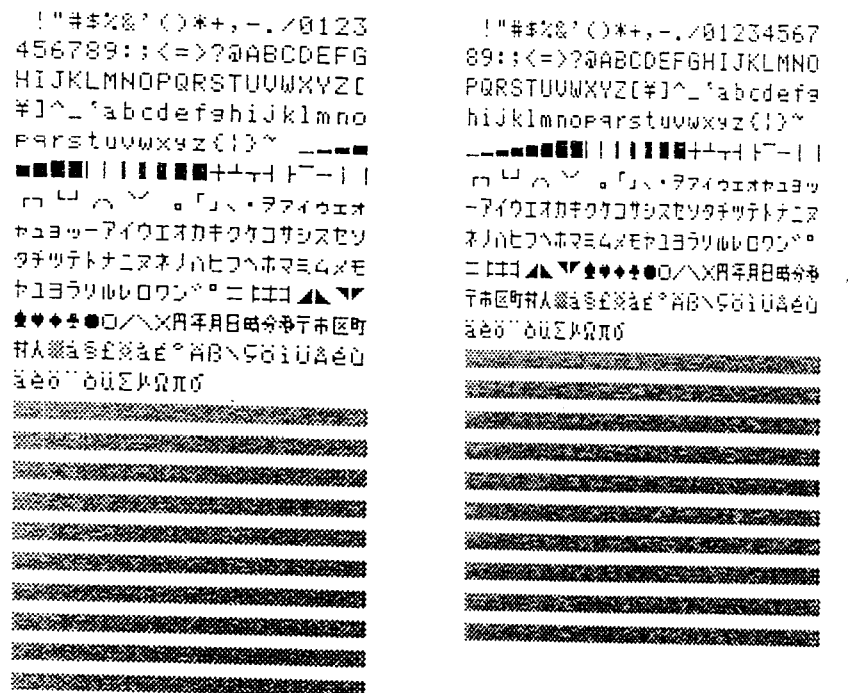
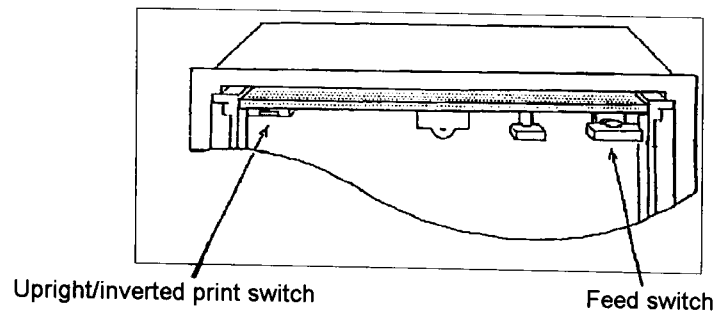


Fig 8.1 Test printing

8.2 Upright and Inverted Printing



Change between upright and inverted printing by sliding the furthest button on the left of the circuit board after turning on the printer. To change the print mode, set the slide switch to the desired position, then turn the power off and then on again or send a reset.

Upright printing: ON (toward right side)
Inverted printing: OFF (toward left side)

Upright printing

[illegible]

Printer

Inverted printing

[illegible]

Printer

9 INPUT DATA CODES

9.1 Character Codes

See the data code table in Section 11 for 8-bit character codes. For example, "A" = 41H, "キ" = B7H is shown. If the code for the blank section of the character code table is input, the command is ignored.

9.2 Control Codes

The following control codes occur at the start of printing.

(1) LF code (0AH)

Data in the print buffer is printed and paper is fed when the <LF> code is input. If no print data is received, only paper is fed.

(2) CR code (0DH)

Data in the print buffer is printed and paper is fed when the <CR> code is input. The <CR> code is ignored when there is no print data preceding it.

Note: For data + <CR> + <LF>, printing is performed for data + <CR>, and if the next data is an <LF>, the <LF> is ignored.

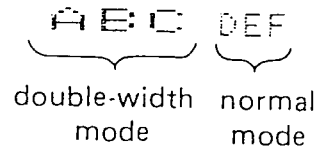
(3) SO code (0EH)

The SO code sets initiates double-width print mode. Data input after the <SO> code is printed twice the normal width. The <SO> code is canceled with the <SI> code.

(4) SI code (0FH)

The SI code cancels the double-width print mode.
For example,

```
LPRINT CHR$ (&H0E); "ABC", CHR$ (&H0F)
; "DEF"; CHR$ (&H0D)
```



(5) CAN code

The CAN code clears all of the data that is stored in the data memory and waits for the next data input. If the <SO>, <SI>, or <ESC> + "S" + n1 + n2 + n3 + n4 existed in the cleared data, the function of that code is also cleared. However, since ESC + "c" and ESC + "R" + n controls flags in the command input, and are not included in the print buffer, even if the CAN code is input, the printer stays in its present status.

(6) ESC code (1BH) + "S" (53H) (**Software graphics**)

Normally these codes print characters. If the data following the specific control codes and specific procedures is received, bit image graphics, and characters and bit image graphics can be printed. For using the software graphics, declare the length of the bit image graphics by specifying the

<ESC> + "S" and value in the following four digits. After printing data, the printer returns to the previous print mode.

Type: <ESC> + "S" + n1 + n2 + n3 + n4 + graphics data

Examples: With 192 bit image data

1BH, 53H, 30H, 31H, 39H, 32H,....

<ESC> S 0 1 9 2 data of 192

- Four digit integer

n1 + n2 + n3 + n4 must be integers of four digits.

If the data is INPUT in an incorrect for mat, the command is ignored and, the pervious status is kept.

Good example	Bad example
0012 0190	00AB ← Data is not integer 024 ← Data is not in four digits

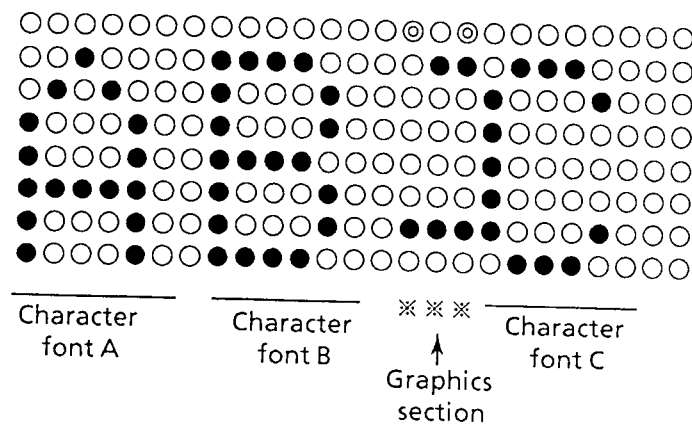
The relationship between bits of the graphics data and dots of the print head is shown below with software graphics printing examples:

Examples:Data

41H,	42H,	1BH,	53H,	30H,	30H,
(A)	(B)	<ESC>	(S)	(0)	(0)
30H,	33H,	41H,	42H,	43H,	43H
(0)	(3)	(A)	(B)	(C)	(C)

Data	Dot
D0	Not used
D1	first
D2	second
D3	Third
D4	fourth
D5	ifth
D6	sixth
D7	seventh

⊙ can not print because dots are unused.



In software graphics , if data from one line overflows it will be printed on the next line. Character codes other than "S" or formats other than $n1 + n2 + n3 + n4$ are invalid, and subsequent graphics data will be printed as character codes.

(7) ESC code (1BH) + "c" (63H)

When ESC "c" is input, F9H to FDH in the table of character codes are changed as shown in the following table. Pressing ESC "c" again resets the mode. Since this change remains in effect on a line basis, 市 and Σ , 区 and μ , and 人 and τ can not be used on the same line. The <CAN> code will not have an effect. Character codes other than "c" are invalid, and data is printed in the previous status.

Code	F9H	FAH	FBH	FCH	FDH
Character at initialization	市	区	町	村	人
ESC + "c"	Σ	μ	Ω	π	τ

(8) ESC code (1BH) + "R"(52H)

ESC R is used to set the character set of different countries. <ESC> + "R" + n (00H to 06H) selects the characters shown in the table below. The selected character remains in effect until a command is input to change it. The <CAN> code will not have an effect. The default setting is JAPAN.

Character codes other than "R" or value other than 00H to 06H is invalid, and the data is printed using the character set of the previous setting country.

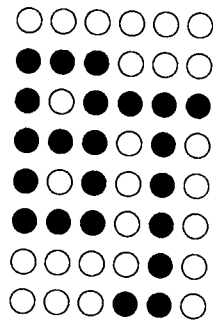
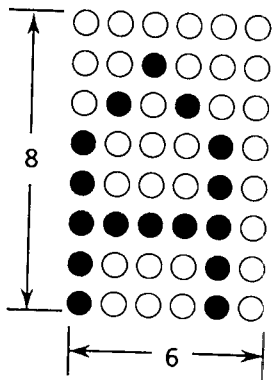
Country name	n	Country name	n	Country name	n	Country name	n
JAPAN	0	GERMANY	2	SWEDEN	4	U.S.A.	6
FRANCE	1	U.K.	3	ITALY	5		

HEX	23H	24H	40H	5BH	5CH	5DH	5EH	60H	7BH	7CH	7DH	7EH
JAPAN	#	\$	@	[	#	]	^	*	C	/	>	~
FRANCE	#	\$	@	>	\$	@	^	*	e	U	e	~
GERMANY	#	\$	@	A	@	U	^	*	a	U	e	~
U.K.	E	\$	@	C	/	]	^	*	a	U	U	B
SWEDEN	#	\$	@	A	@	A	U	e	a	U	a	U
ITALY	#	\$	@	>	/	e	^	*	a	U	e	i
U.S.A.	#	\$	@	[	/	]	^	*	C	/	>	~

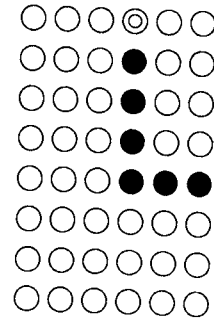
10 CHARACTER FONT

10.1 Normal Size Characters

Normal size characters use an 8 x 6 dot matrix, but since the DPU-20 uses a character printer, the top row does not print.



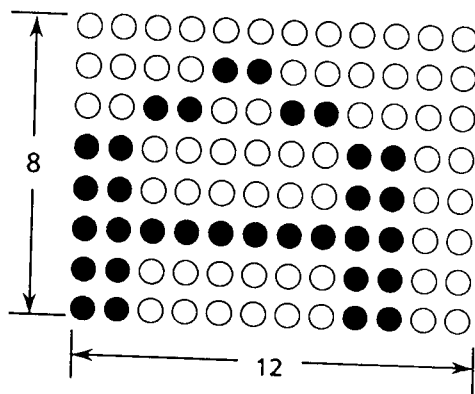
Example



©dose not print

10.2 Double-width Characters

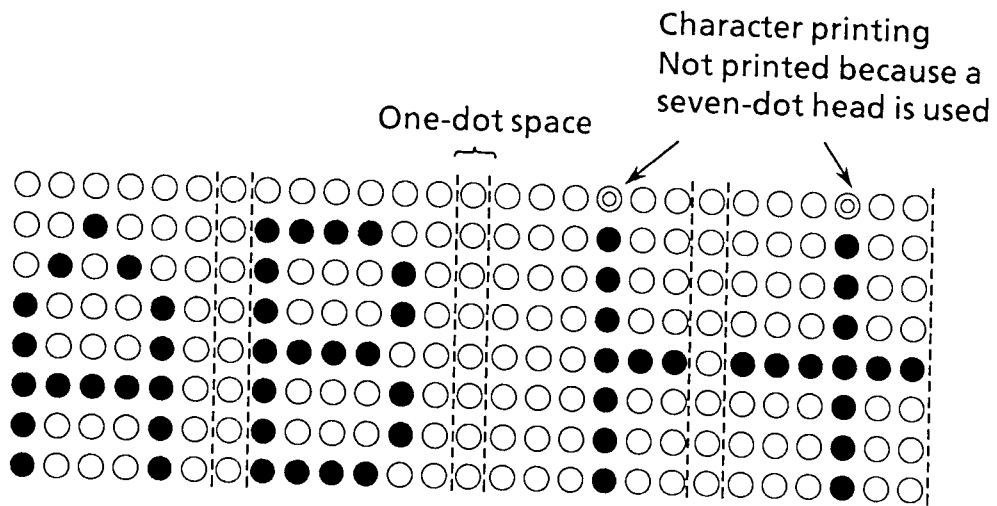
Double-width characters use an 8 x 12 dot matrix. Each dot of the character pattern is printed twice, doubling the size of the character. As with normal size characters, the top row does not print.



Example

10.3 Space between Characters

The DPU-20 prints a one-dot space between characters.



Print example

11 DATA CODE TABLE

The table below shows the 8-bit codes for all characters and control codes.

Undefined codes are ignored. Codes enclosed by heavy lines are control codes.

Higher bit Lower bit		0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
		0000	0001	0010	0011	0100	0101	0110	0111	1000	1001	1010	1011	1100	1101	1110	1111
0	0000			SP	␣	@	P	,	p	—	—	SP	—	タ	ニ	=	×
1	0001			!	1	A	Q	a	q	—	T	。	ア	チ	ム	＝	円
2	0010			"	2	B	R	b	r	—	—	「	イ	ツ	メ	≡	年
3	0011			#	3	C	S	c	s	—	—	」	ウ	テ	モ	≡	月
4	0100			\$	4	D	T	d	t	—	—	、	エ	ト	ヤ	▲	日
5	0101			%	5	E	U	e	u	—	—	・	オ	ナ	ユ	▲	時
6	0110			&	6	F	V	f	v	—	—	ヲ	カ	ニ	ヨ	▲	分
7	0111			'	7	G	W	g	w	—	—	ア	キ	ヌ	ラ	▲	秒
8	1000		CAN	(	8	H	X	h	x	—	—	イ	ク	ネ	リ	▲	千
9	1001			)	9	I	Y	i	y	—	—	ウ	ケ	ノ	ル	▲	市
A	1010	LF		*	:	J	Z	j	z	—	—	エ	コ	ハ	レ	▲	区
B	1011			+	;	K	[	k	{	—	—	オ	サ	ヒ	ロ	▲	町
C	1100			,	<	L	\	l	|	—	—	ヤ	シ	フ	ワ	●	村
D	1101	CR		-	=	M	]	m	}	—	—	ユ	ス	ヘ	ン	○	人
E	1110	SO		.	>	N	^	n	~	—	—	ヨ	セ	ホ	ニ	／	衆
F	1111	SI		/	?	O	_	o	SP	+	—	ッ	ソ	マ	。	／	衆

Undefined codes are ignored. Codes enclosed by heavy lines

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 are control codes

Undefined codes are ignored. Codes enclosed by heavy lines are control codes. are control codes.