

OPERATION MANUAL

MODEL CBM-510/CBM-520

DOT MATRIX PRINTERS

Japan CBM Corporation

TRADEMARKS

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DISCLAIMER

Every effort has been made to provide complete and accurate information in this manual. However, Japan CBM Corporation makes no representations or warranties with respect to the contents of this manual and reserves the right to make changes to this manual without notice as improvements are made to the product.

Japan CBM Corporation strives to produce the highest quality product possible. Toward that end, we welcome comments on our printers and our manual. If you find areas needing clarification, omissions, or errors in this manual, please notify us.

RECEPTION INTERFERENCE NOTICE

This equipment generates and uses radio frequency energy which may cause interference to radio and television reception. It has been type-tested and found to comply with the limits from a Class B computing device in accordance with the specifications in FCC Rules Part 15, Subpart J, which are designed to provide reasonable protection against such interference in residential installation. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause interference to radio or television reception, take the following corrective measures:

1. Reorient the receiving antenna.
2. Relocate the printer further away from the antenna.
3. Plug the printer into a different outlet so that the printer and receiver are on different branch circuits.

CARE OF YOUR PRINTER

1. Be sure the power to the printer is turned off before you replace the ribbon or attempt to remove any object which may have dropped into the printer.
2. Be certain that each connection is made properly. In particular, check the polarity. If connectors are reversed, the internal elements may be damaged.
3. The system displays the FAULT signal when the motor locks. When this happens, identify the cause and correct it. (See Chapter 7 for details.) Restore the normal status before you restart the print operation.
4. Avoid long wiring of signal lines or connecting to noisy apparatus. If long wiring is unavoidable, consider effective preventative measures, such as using a shield line or twisted pair line for each signal.
5. When you mount the printer, avoid high-heat environments. This includes avoiding heat-producing parts of other equipment. Keep the printer in a properly ventilated room. Excessive heat, cold, or humidity will damage the unit.
6. Keep printer away from excessive vibration and dust.

7. Do not put anything on top of the printer.
8. Place the printer on a flat, stable surface.
9. Do not touch the print head during operation.
10. Do not operate the printer without paper or ribbon.
11. Be careful not to drop foreign objects (clips, pins, etc.) into the printer mechanism.
12. When the printed characters become faint, replace the ribbon.
13. Since the system occasionally sets the ribbon to red when the power switch is turned ON, be sure to advance the paper by at least one line before you use the printer.

TABLE OF CONTENTS

RECEPTION INTERFERENCE NOTICE	iii
CARE OF YOUR PRINTER	iv
CHAPTER 1. OVERVIEW	1
SECTION 1.1 Introduction	1
SECTION 1.2 Features	2
CHAPTER 2. CLASSIFICATION OF CBM-510/520 SERIES PRINTERS	3
CHAPTER 3. MODEL SCHEMATICS	4
SECTION 3.1 Model CBM-510 Schematics	4
SECTION 3.2 Model CBM-520 Schematics	7
CHAPTER 4. SPECIFICATIONS	10
SECTION 4.1 Printing Specifications	10
SECTION 4.2 General Specifications	12
SECTION 4.3 Configuration	
SECTION 4.3.1 Centronics Interface	13
SECTION 4.3.2 Serial Interface	14
SECTION 4.4 Functional Specifications	
SECTION 4.4.1 Character Type	15
SECTION 4.4.2 Graphic Type	15

SECTION 4.5	Function Codes	
SECTION 4.5.1	Character Type	17
SECTION 4.5.2	Graphic Type	18
SECTION 4.6	Character Codes List	20
SECTION 4.6.1	Japan Model	
SECTION 4.6.1.1	Character Type	20
SECTION 4.6.1.2	Graphic Type	21
SECTION 4.6.2	US Model	
SECTION 4.6.2.1	Character Type	22
SECTION 4.6.2.2	Graphic Type	23
CHAPTER 5.	FUNCTIONAL OPERATIONS	24
SECTION 5.1	Test Printing	24
SECTION 5.2	Manual Mode	
SECTION 5.2.1	Paper Feeding	24
SECTION 5.2.2	Reset	24
SECTION 5.3	On-line Mode	
SECTION 5.3.1	Writing Data into the Print Buffer	25
SECTION 5.3.2	Printing Data from the Print Buffer	25
SECTION 5.3.3	Paper Feeding	26

CHAPTER 6. SET-UP FUNCTIONS	27
SECTION 6.1 Centronics Interface	
SECTION 6.1.1 Character Type	27
SECTION 6.1.2 Graphic Type	27
SECTION 6.2 Serial Interface	
SECTION 6.2.1 Character Type	30
SECTION 6.2.2 Graphic Type	32
SECTION 6.3 How to Change the PCB Setting	
SECTION 6.3.1 CBM-510 Series	35
SECTION 6.3.2 CBM-520 Series	36
CHAPTER 7. INTERFACES	37
SECTION 7.1 Centronics Interface	
SECTION 7.1.1 Signal Level Circuit	37
SECTION 7.1.2 Explanation of Signals	39
SECTION 7.1.3 List of Input Connector Signals	
SECTION 7.1.3.1 CBM-510 Series	40
SECTION 7.1.3.2 CBM-520 Series	42
SECTION 7.1.4 Time Chart	
SECTION 7.1.4.1 Data Input and Printing	43
SECTION 7.1.4.2 FAULT and RESET	44
SECTION 7.1.4.3 Test Printing and Paper Feeding	45

SECTION 7.2	Serial Interface	46
SECTION 7.2.1	Signal Level and Circuit	
SECTION 7.2.1.1	RS-232C	46
SECTION 7.2.1.2	TTL Level	47
SECTION 7.2.1.3	20 mA Current Loop	48
SECTION 7.2.2	Explanation of Signals	49
SECTION 7.2.3	List of Input Connector Signals	
SECTION 7.2.3.1	CBM-510 Series	50
SECTION 7.2.3.2	CBM-520 Series	52
SECTION 7.2.4	Time Chart	
SECTION 7.2.4.1	Data Input (RS-232C)	53
SECTION 7.2.4.2	Test Printing/Manual Paper Feed	54
CHAPTER 8.	COMMANDS AND DATA	55
SECTION 8.1	Character Type	
SECTION 8.1.1	Command Type	55
SECTION 8.1.2	Explanation of Commands	56
SECTION 8.1.3	Data Format	59
SECTION 8.1.4	Character List (Japan Model)	60
SECTION 8.1.5	Character List (US Model)	61
SECTION 8.1.6	Data Transmission/Printing (Right Home)	62

SECTION 8.2	Graphic Type	
SECTION 8.2.1	Command Types	66
SECTION 8.2.2	Explanation of Commands	68
SECTION 8.2.3	Data Format	77
SECTION 8.2.4	Data Transmission/Printing (Left Home)	77
CHAPTER 9.	OPERATIONAL FLOW CHART	81
SECTION 9.1	Centronics Interface	
SECTION 9.1.1	Partial Columns	81
SECTION 9.1.2	Full Columns	83
SECTION 9.1.3	1 to 31 Lines Paper Feeding	85
SECTION 9.1.4	Error Checks	
SECTION 9.1.4.1	Software Check	86
SECTION 9.1.4.2	Interruption Check	87
SECTION 9.2	Serial Interface	88
SECTION 9.2.1	Example of Interfacing	
SECTION 9.2.1.1	Right Figure Configuration	88
SECTION 9.2.1.2	F/F Set (Data to 8251)	90
SECTION 9.2.2	Operational Flow Chart	
SECTION 9.2.2.1	Partial Columns	91
SECTION 9.2.2.2	Full Columns	93
SECTION 9.2.2.3	1 to 31 Lines Paper Feeding	96
SECTION 9.2.2.4	Error Checks	97

CHAPTER 10. MAINTENANCE	98
SECTION 10.1 Cleaning	98
SECTION 10.2 Changing the Paper and Ribbon	99
SECTION 10.2.1 CBM-510 Series	100
SECTION 10.2.2 CBM-520 Series	100
SECTION 10.3 Changing Fuses	101
SECTION 10.3.1 CBM-510 Series	101
SECTION 10.3.2 CBM-520 Series	102
SECTION 10.4 Standard Accessories	102
SECTION 10.4.1 CBM-510 Series	102
SECTION 10.4.2 CBM-520 Series	102

CHAPTER 1

OVERVIEW

This manual explains how to operate and maintain Citizen CBM-510/520 Series dot matrix printers. We have made every effort to ensure that the latest information has been included; however, this manual is subject to change without notice.

1.1 Introduction

Citizen CBM-510/520 Series dot matrix printers were developed to be used as terminals for various instruments and personal computers. The ultra-compact printers are available as desktop or panel mount models, with Centronics or Serial Type One (RS-232C, TTL level, 20 mA current loop) interfaces.

1.2 Features

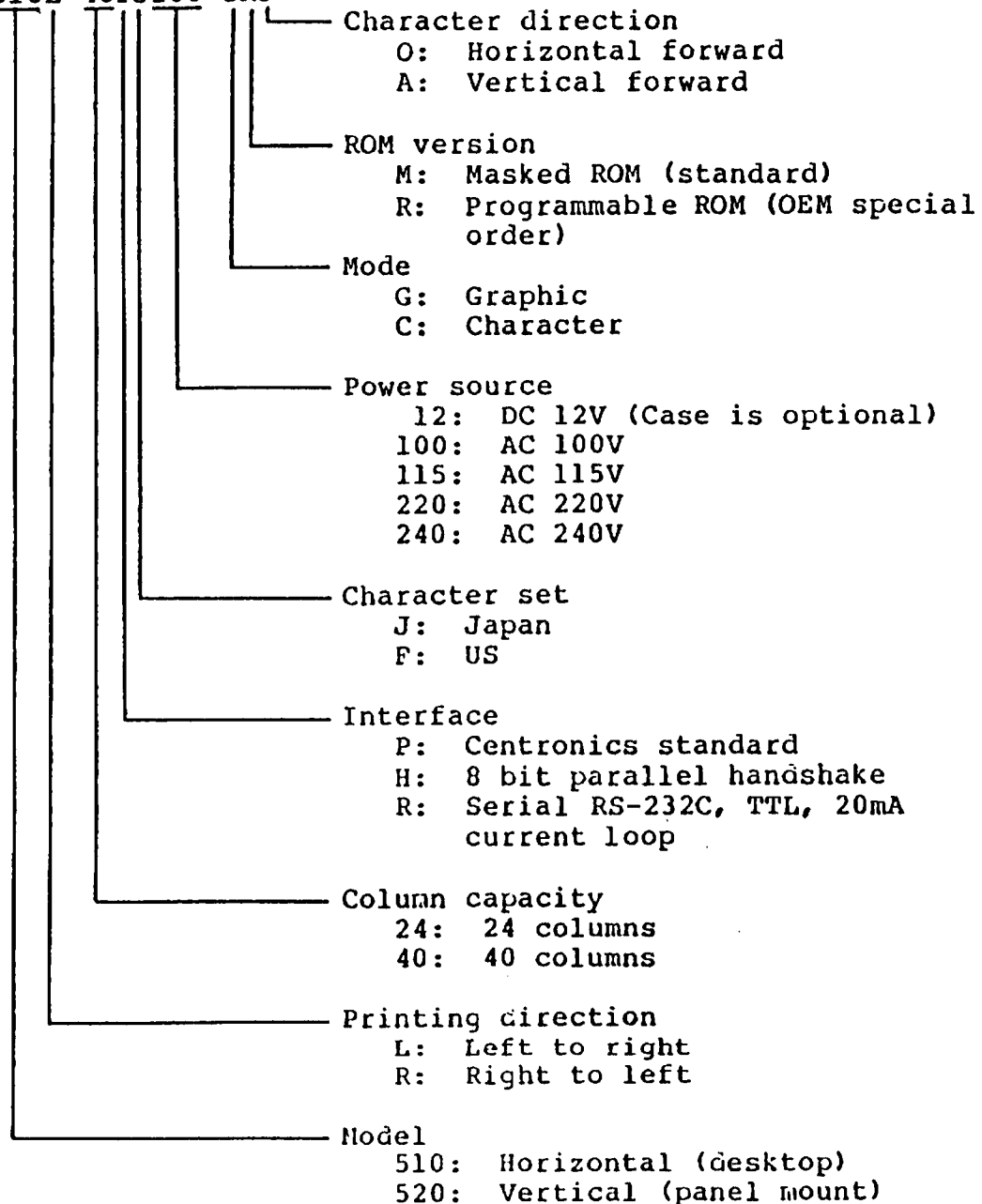
1. The CBM-510/520 Series printers provide 160 characters for the US model, 183 characters for the Japan model (JIS characters plus instrument symbols), and 191 characters for graphics.
2. The printer's intermittent drive system reduces noise and power usage.
3. You may print enlarged, inverted, or red characters.
4. For improved functionality, the printer has a one-character input buffer and a one-line print buffer, as well as the BUFFER FULL AUTOMATIC PRINT FUNCTION.
5. The CBM-510/520 Series printers are small and lightweight.
6. The printers have Centronics and RS-232C interfaces.
7. The 1:1 aspect ratio enables you to print the graphics of your choice.

CHAPTER 2

CLASSIFICATION OF CBM-510/520 SERIES PRINTERS

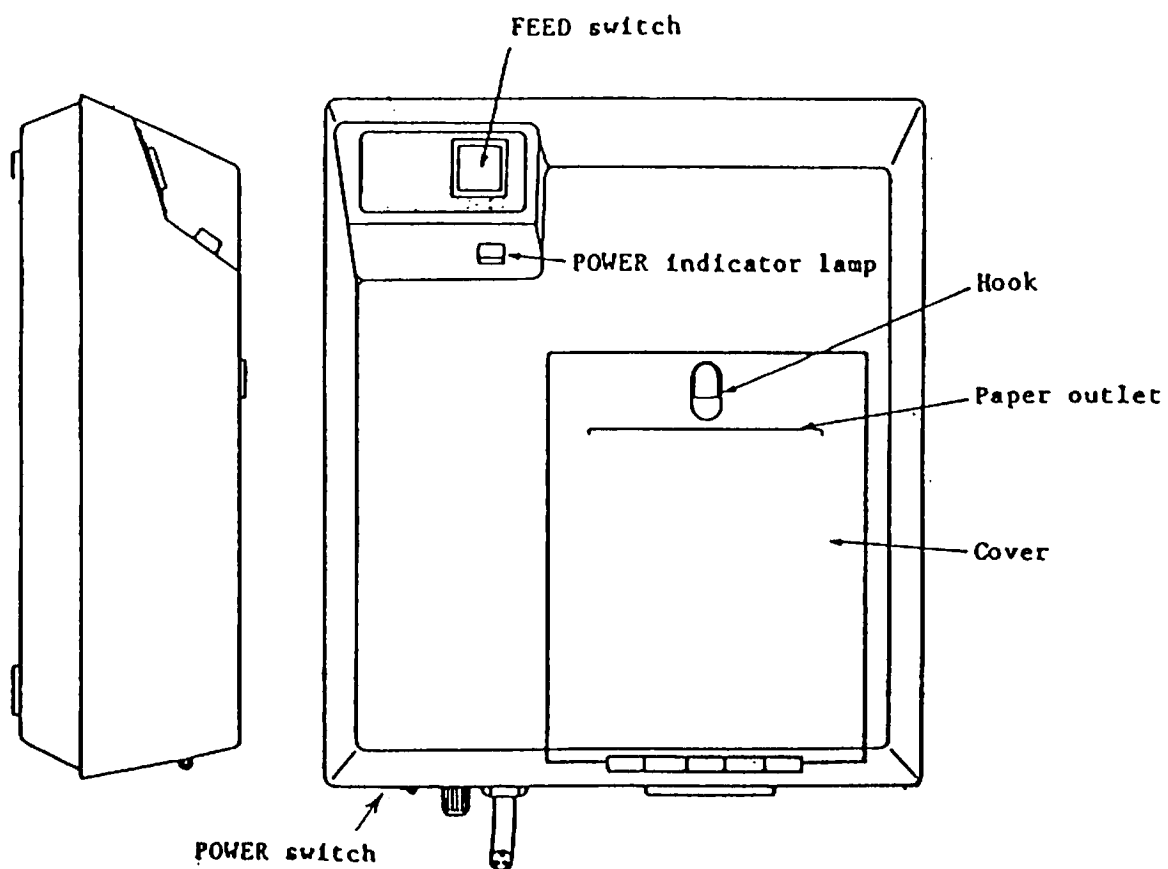
CBM-500 series machines are classified according to the following identification system:

CBM-510L-40PJ100-GRO

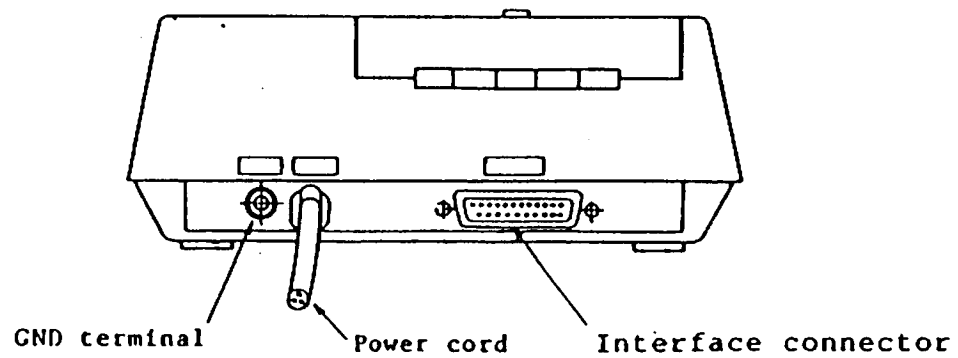
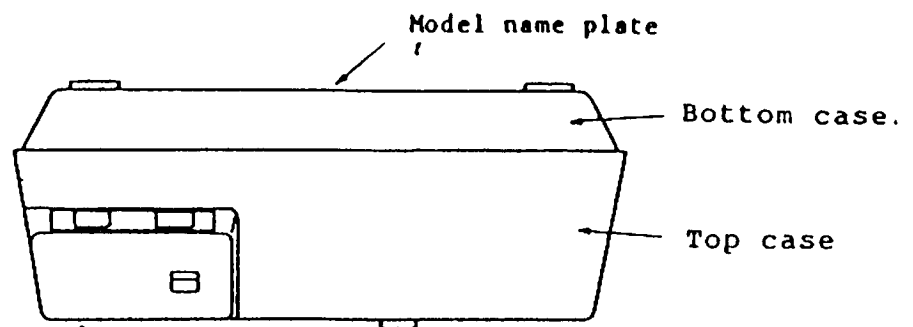


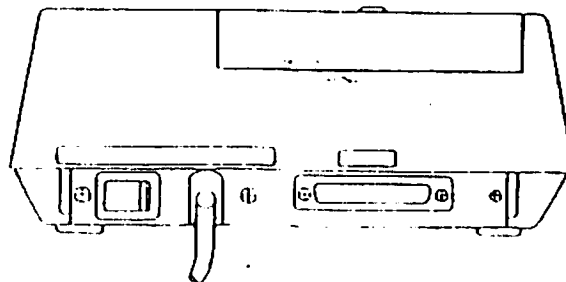
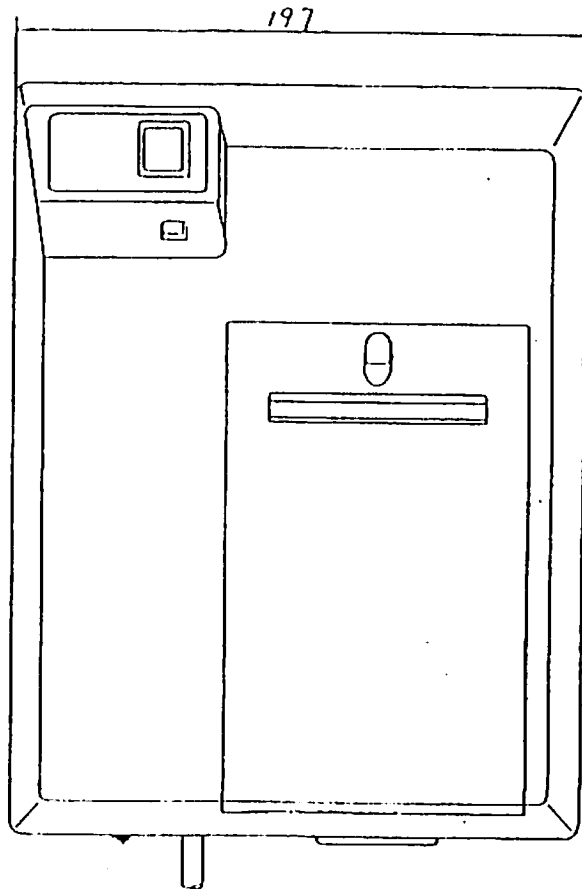
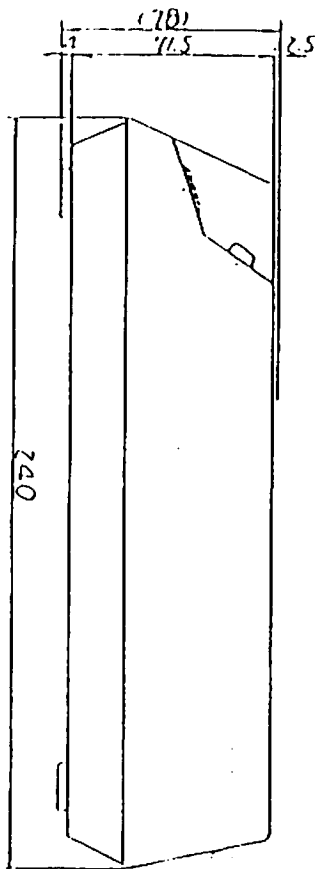
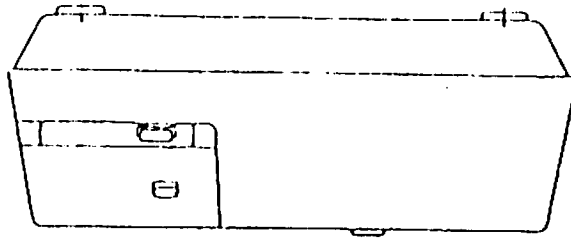
CHAPTER 3
MODEL SCHEMATICS

3.1 Model CBM-510 Schematics

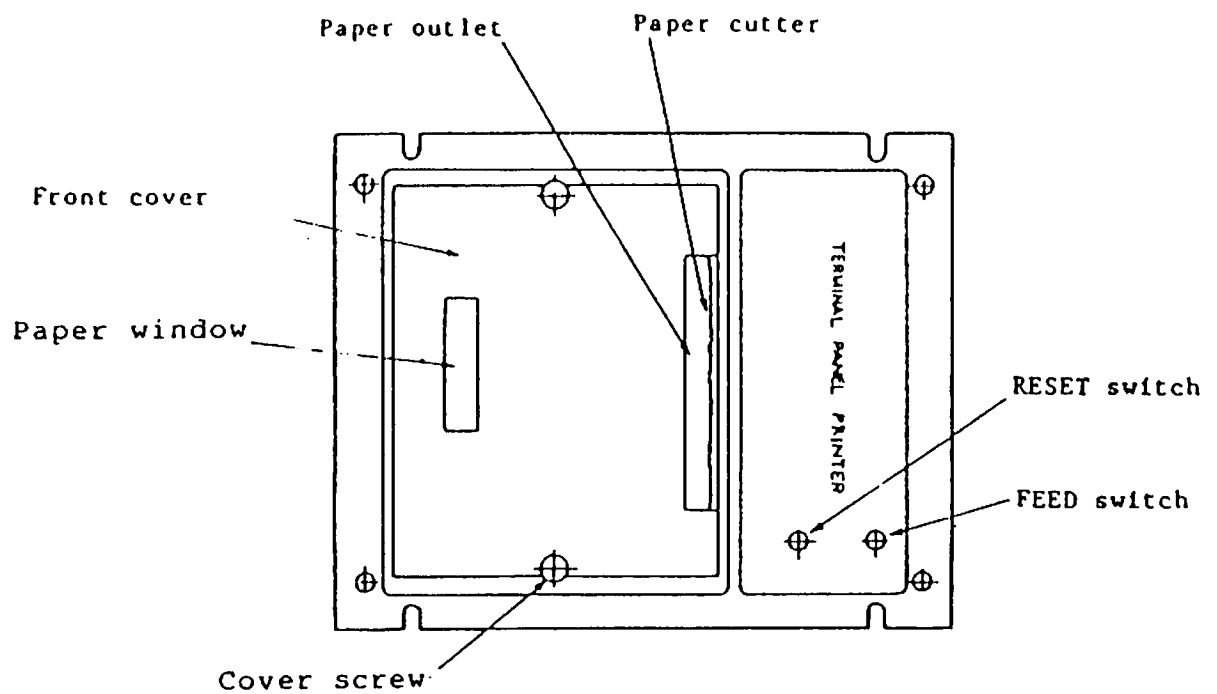


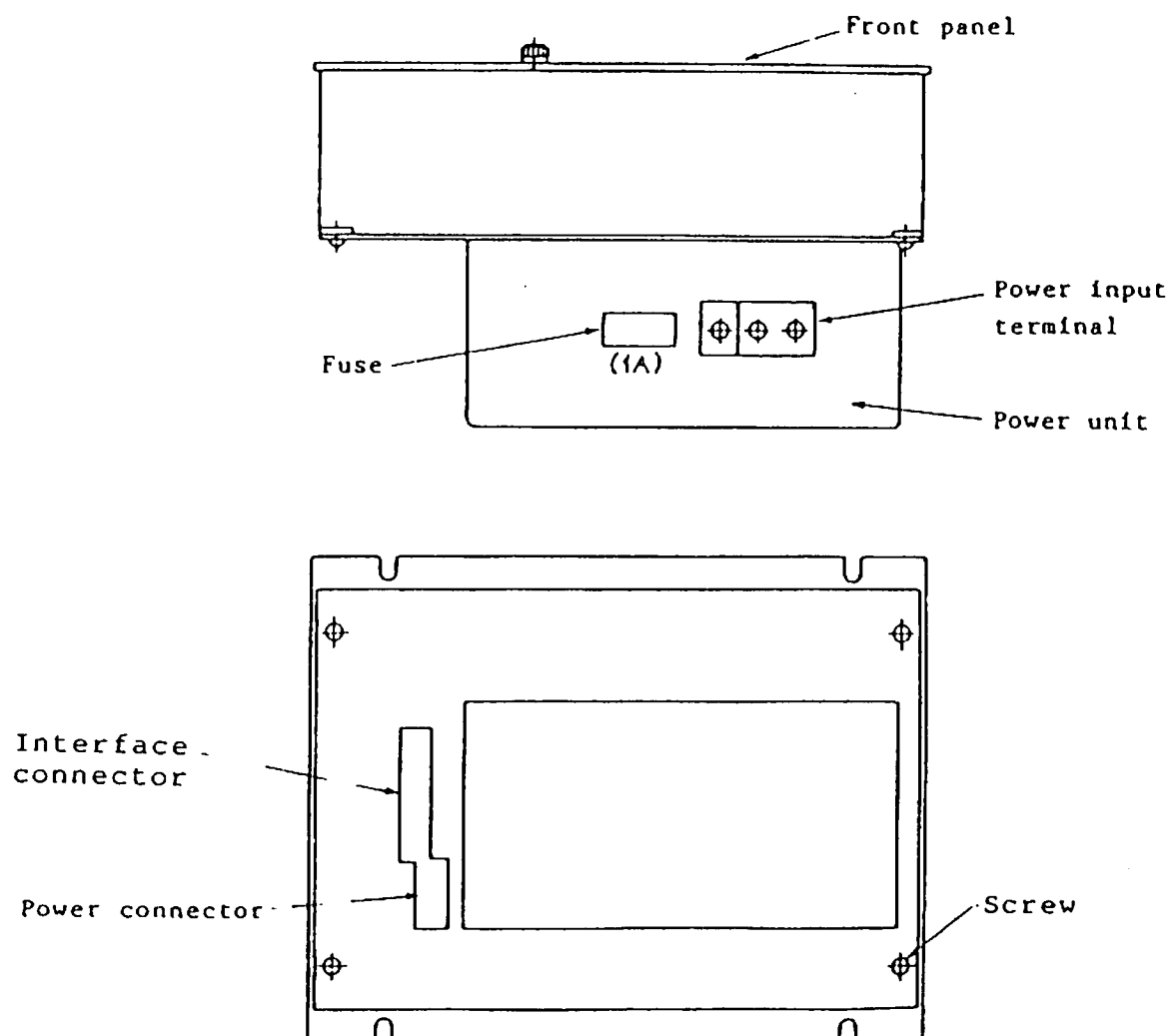
Case color: top, Mancel 7.5Y 9/1, smoked leather tone
bottom, Mancel 2.5Y 5/3, smoked leather tone



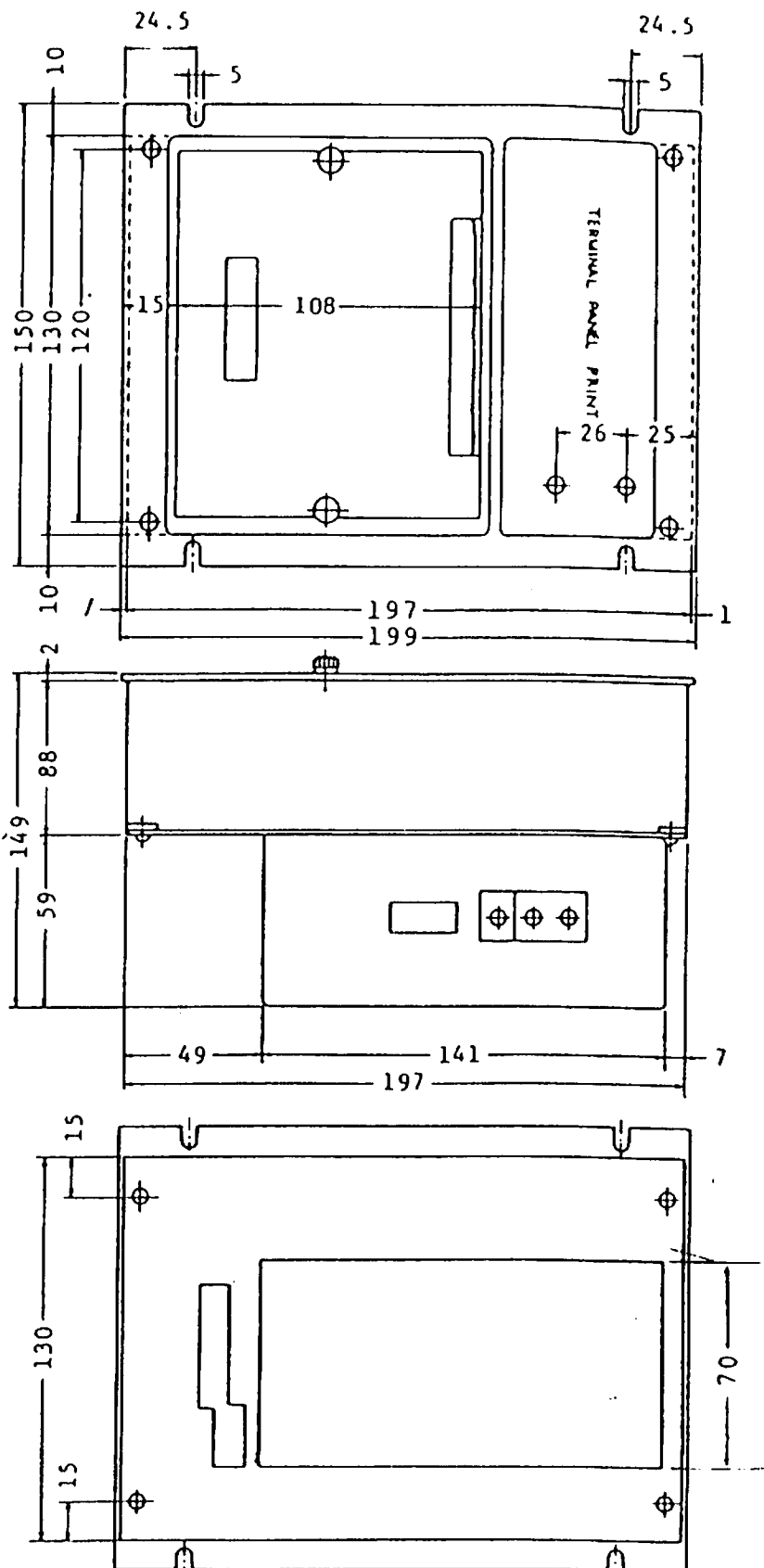


3.2 Model CBM-520 Schematics





Case color: Front panel, Mancel 7.5Y 9/1, smoked leather tone
 Other panels, Mancel 2.5Y 5/3, smoked leather tone



CHAPTER 4

SPECIFICATIONS

4.1 Printing Specifications

Printing system:	Serial impact dot matrix
Font:	5 x 7 dot matrix
Character types:	Alphanumeric and symbols (183 characters for the Japan model, 160 characters for the US model, and 191 characters for graphics)
Character code:	Conforms to JIS C-6220; 8 bit code or 7 bit code
Character size:	
Character type	24 column: 2.75 mm (H) x 1.7 mm (W) (DP-555)
	40 column: 2.75 mm x 1.2 mm (DP-575)
Graphic type	
Text mode	2.75 mm x 1.7 mm (DP-555G) 2.75 mm x 1.25 mm (DP-575G)
Graphic mode	2.75 mm x 1.9 mm (DP-555G, DP-575G)
Character spacing:	
Character type	
24 column	Column pitch 2 mm, line pitch 5.5 mm (DP-555)
40 column	Column pitch 1.5 mm, line pitch 5.5 mm (DP-575)

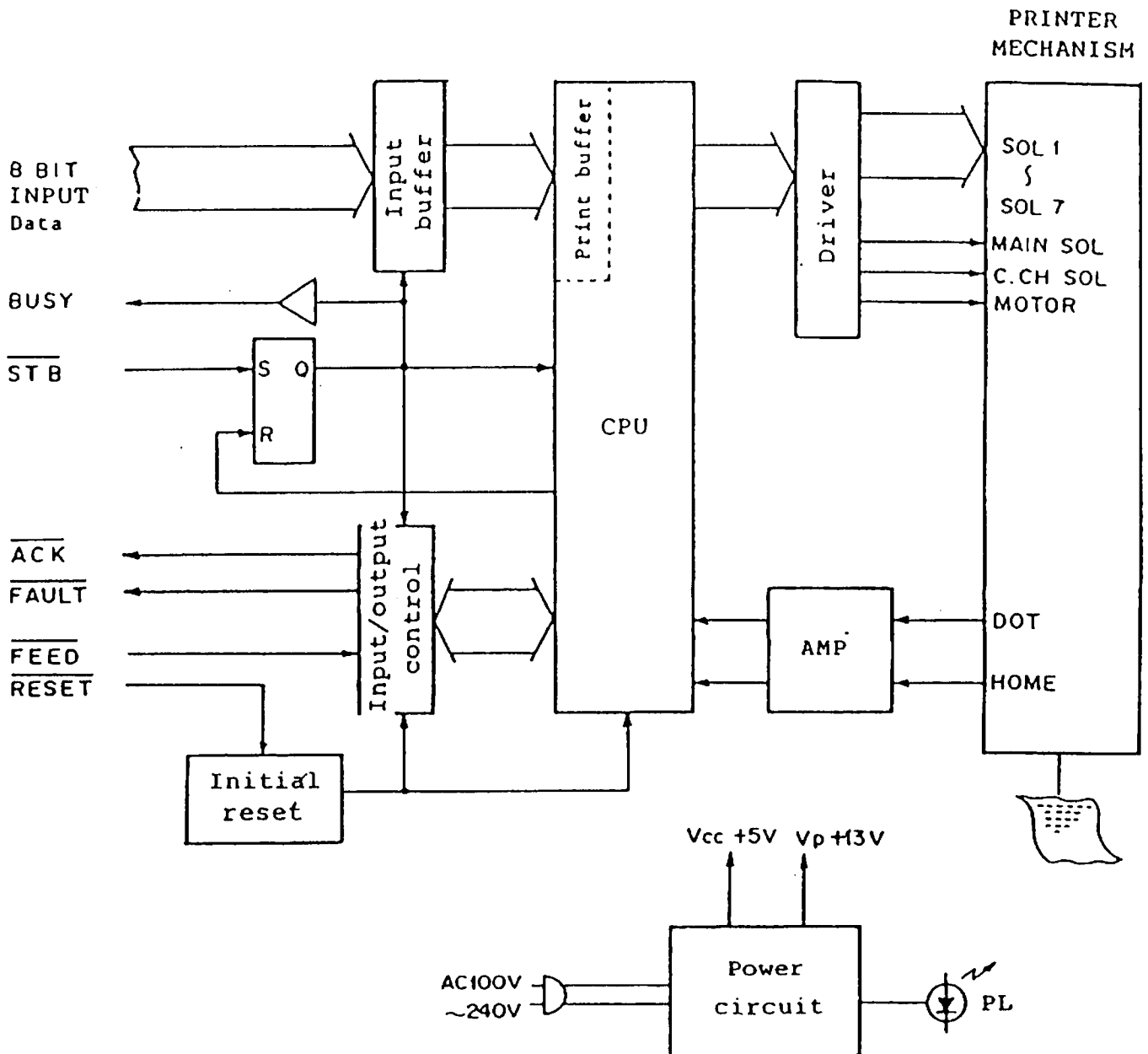
Graphic type	Text mode: 2 mm (DP-555G);
Column pitch	1.5 mm (DP-575G)
	Graphic mode: 2.4 mm (DP-555G, DP-575G)
Line pitch	Text mode: 5.5 mm (DP-555G, DP-575G)
	Graphic mode: 2.75 mm (DP-555G, DP-575G)
Columns:	Variable, 24 column/40 column
Printing direction:	L series: Left to right
Character type	(horizontal)
	R series: Right to left
	(horizontal)
Graphic type	Left to right
Printing speed:	Continuous printing, all columns:
	1.9 lines/sec approx (DP-555)
	1.2 lines/sec approx (DP-575)
	Continuous printing, 5 columns:
	4 lines/sec approx (DP-555)
	4 lines/sec approx (DP-575)
Ribbon:	Two colors (red and black)
	Width: 13 mm
	Spool diameter: 30 or 35 mm
Paper size:	Width: 57.5 mm \pm 0.5 mm; outside diameter: 60 mm maximum (DP-555)
	Width: 69 mm \pm 1 mm; outside diameter: 60 mm maximum (DP-575)
	(High quality plain paper, 60 to 80 μ m thickness, all models)

4.2 General Specifications

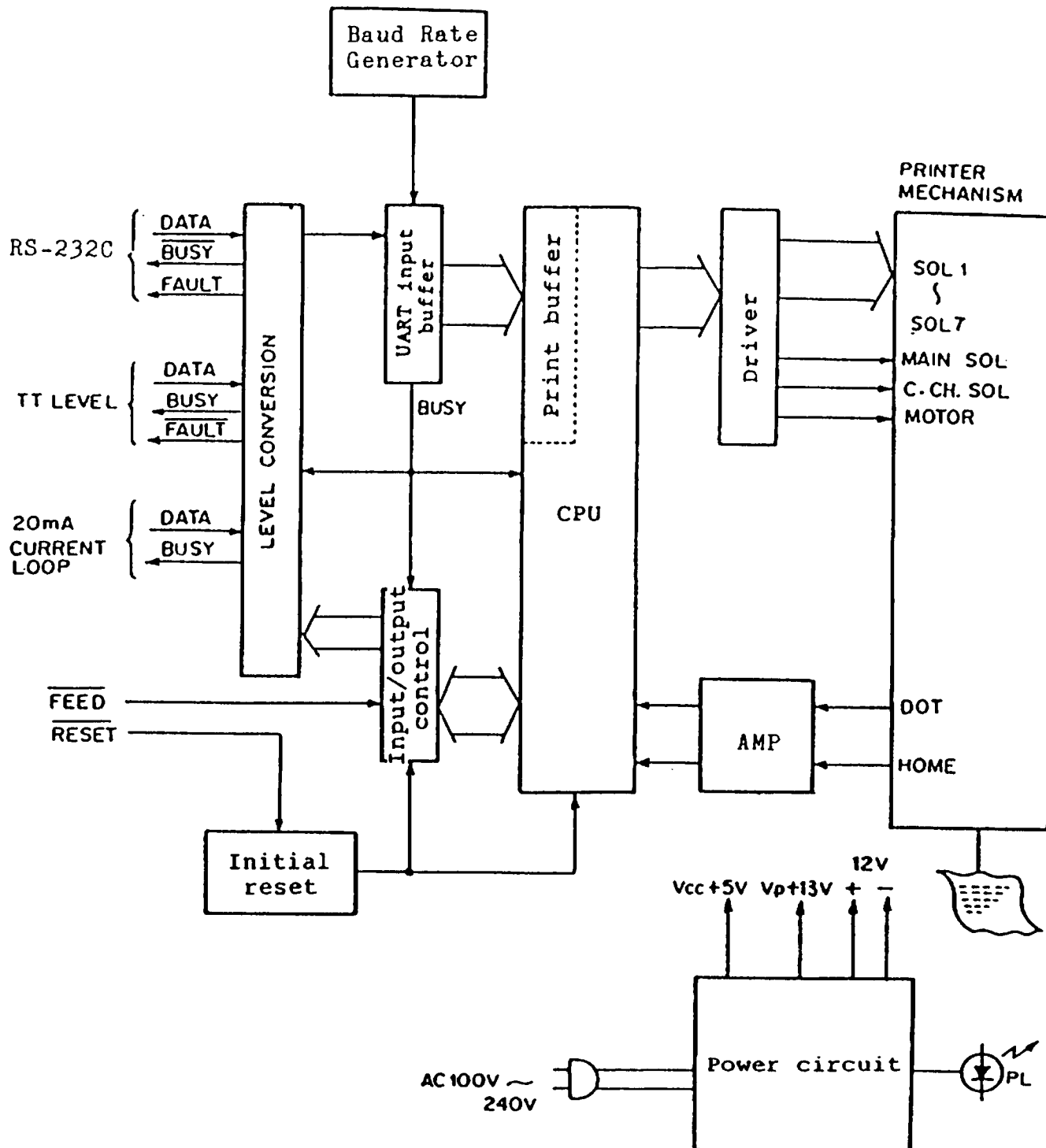
AC power	(1) AC 100V \pm 10% (2) AC 115V \pm 10% (3) AC 220V \pm 10% (4) AC 240V \pm 10% (5) DC 12V (Optional)
Power consumption	Character type: 20W maximum Graphic type: 40W maximum Standby: 7W or less
Operating temperature	5 to 40 degrees Centigrade
Storage temperature	-20 to 70 degrees Centigrade
Humidity	20 to 80% RH (no condensing)
Weight	Approximately 3.0 kg (CBM-510/520 series)
Acoustics	70 dB maximum (approx)
Insulation resistance	AC power source - ground line (FG), 50 M or above measured by a DC 500V megger.
Reliability	Printer: 1,500,000 lines (MCBF) Print head: 36,000,000 characters

4.3 Configuration

4.3.1 CENTRONICS INTERFACE



4.3.2 SERIAL INTERFACE



4.4 Functional Specifications

4.4.1 CHARACTER TYPE

The following character modes are available:

- * Normal characters
- * Red or black characters
- * Enlarged (double width) characters
- * Inverted characters

With the CBM-510/520 Series printers, you can print a combination of normal and enlarged characters in the same line. The data can be printed in a buffer full condition without a print command. Built into the printers are a self-check program for printing functions and a detector for printer mechanism errors.

4.4.2 GRAPHIC TYPE

The Citizen printer enables you to switch between the graphics mode and the character mode quickly and easily.

Internal DIP switches enable you to switch between vertical forward directional characters (Version A) and horizontal

forward directional characters (Version 0). You may also specify or release inverted characters with commands. Use either <LF> or <CR> as a character command.

Both normal and inverted bit images can be printed as image graphics. Since the aspect ratio is 1:1, you may draw any desired graphic image. You may also change printing color from black to red while a line is being printed. You have the option of using horizontal tabs, and you may set the character spacing at either one or two dots.

4.5 Functional Codes

4.5.1 CHARACTER TYPE

Command name	Character	Code	Function
PAPER FEED	FF	(OC)H	The number of columns (1 to 31) to be fed is assigned for the 2nd byte of the command.
PRINT	OR	(OD)H	Assigns printing operation. Assigns carriage returns.
ENLARGED CHARACTER	SO	(OE)H	Assigns to print enlarged characters (double width). The ENLARGED CHARACTER command is released automatically after the line is printed out.
ENLARGED CHARACTER RELEASE	SI	(OF)H	Release the enlarged character command. Assigns normal characters automatically when the ENLARGED CHARACTER RELEASE command entered.
INITIAL SET	DC1	(11)H	Initializes the controller.
INVERTED CHARACTER	DC2	(12)H	Assigns to print inverted characters. This command is released by initial set command
RED CHARACTER	DC3	(13)H	Assigns to print red characters. This command is released automatically after the line is printed.

4.5.2 GRAPHIC TYPE

No.	Command Name	Command	Code
1	HORIZONTAL TAB	HT	(09)H
2	PRINT	LF	(0A)H
3	PAPER FEED	FF + n	(0C)H + n
4	PRINT	CR	(0D)H
5	ENLARGED CHARACTER	SO	(DE)H
6	ENLARGED CHARACTER RELEASE	SI	(OF)H
7	INITIAL SET	DC1	(11)H
8	INVERTED CHARACTER	DC2	(12)H
9	RED CHARACTER	DC3	(13)H
10	ERASE	CAN	(18)H
11	FORWARD DOT IMAGE	ESC + A + n	(1B)H + (41)H + n
12	REVERSE DOT IMAGE	ESC + B + n	(1B)H + (42)H + n
13	PRINT COMMAND (LF) SWITCH-OVER	ESC + C + 1	(1B)H + (43)H + (31)H
14	PRINT COMMAND (LF, CR) SWITCH-OVER	ESC + C + 2	(1B)H + (43)H + (32)H

No.	Command Name	Command	Code
15	RELATIVE HORIZONTAL TAB	ESC + D + n	(1B)H + 44(H) + n
16	2-DOT SPACE	ESC + E	(1B)H + 45(H)
17	2-DOT SPACE RELEASE	ESC + F	(1B)H + 46(H)
18	GRAPHIC MODE	ESC + G	(1B)H + 47(H)
19	INVERTED CHARACTER RELEASE	ESC + H	(1B)H + 48(H)

4.6 Character Codes List

The character codes are factory set. For mass-produced products, you may order special characters as an option. In the following charts, "SP" indicates a blank field.

4.6.1 JAPAN MODEL

4.6.1.1 Character type

[illegible]

4.6.1.2 Graphic type

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4.6.2.2 Graphic type

									0	0	0	0	0	0	1	1	1	1	1	1	1	1	1			
									0	0	0	0	1	1	1	0	0	0	0	1	1	1	1			
									0	0	1	1	0	0	1	1	0	0	1	1	0	0	1			
									0	1	0	1	0	1	0	1	0	1	0	1	0	1	0			
b8	b7	b6	b5	b4	b3	b2	b1		0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F		
									0	0	0	0	0		SP	0	0	P		p		E	U	z	w	
									0	0	0	1	1	DC1	:	1	A	Q	a	q		U	A	Q	C	
									0	0	1	0	2	DC1	-	2	B	R	b	r		T	S	I	L	
									0	0	1	1	3	DC1	!	3	C	S	c	s		Q	a	i	N	
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									0	1	0	1	5		5	E	U	e	u		Σ	.	i	E		
									0	1	1	0	6		6	F	V	f	v		°	TL	T	C		
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									1	0	0	1	9	HT)	9	I	Y	i	y		x	°	°	°	
									1	0	1	0	A	LF	*	A	J	Z	j	z		°	T	°	°	
									1	0	1	1	B	EBC	†	B	K	(k	(±	.	°	°	
									1	1	0	0	C	FF	.	C	L	\	l	l		÷	°	°	°	
									1	1	0	1	D	CR	-	D	-	M)	m	l		π	°	°	°
									1	1	1	0	E	SO	-	E	>	N	^	n		°	°	°	°	
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CHAPTER 5

FUNCTIONAL OPERATIONS

5.1 Test Printing

The system prints alphanumeric and special characters when you turn the power switch ON if you have entered the PAPER FEED or the RESET commands. If the PAPER FEED signal remains ON when the printing is complete, the paper advances again.

5.2 Manual Mode

5.2.1 PAPER FEEDING

If the paper feed switch or the input signal is set to LOW for more than 200 μ S, the system advances the paper. As long as the switch or the signal remains on LOW, the paper continues to advance. The BUSY signal is not activated for manual paper feeding.

5.2.2 RESET

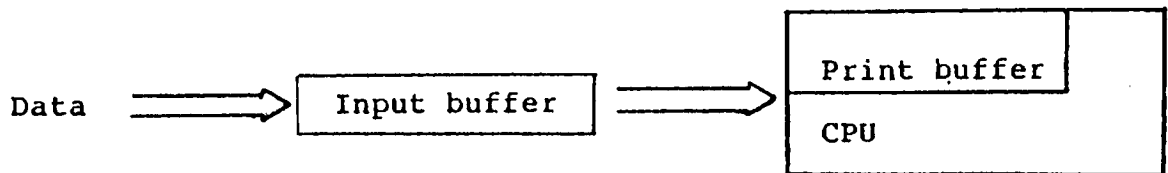
The system RESETs when the reset terminal is set to LOW for more than 50 mS. At that time, the system clears the input buffer, print buffer, and FAULT signal and sets black and normal characters. The INITIAL SET command is stored within the control board.

5.3 On-line Mode

The operations controlled by the system are explained below.

5.3.1 WRITING DATA INTO THE PRINT BUFFER

Data transmitted from the system is stored temporarily in the control unit input buffer, then transferred and stored in the CPU print buffer. A pointer assigns the number of columns to be stored. When data has been written and the PRINT command activated, the printer prints one line and advances the paper by one line.



Schematic View of the Input and Print Buffers

5.3.2 PRINTING DATA FROM THE PRINT BUFFER

Use the PRINT command to print data stored in the print buffer. When the print buffer is full, the system uses the BUFFER FULL AUTOMATIC PRINT FUNCTION to print the data automatically, even if you haven't used the PRINT command.

You may also print red and inverted characters if you have set those commands. The red print setting is valid for only one line, so you must reset that command for each additional line you want. The system uses the PRINT or BUFFER FULL AUTOMATIC PRINT FUNCTION to print the data.

5.3.3 PAPER FEEDING

Enter the PAPER FEED command, then enter the number of lines to be fed as data. The system advances the paper the appropriate number of lines.

CHAPTER 6
SET-UP FUNCTIONS

6.1 Centronics Interface

6.1.1 CHARACTER TYPE

Set DIP Switch S1 according to the specifications shown below.

CAUTION: Switches 1 and 2 must NEVER be set in the ON position at the same time. For shipping, set Switch 1 to ON and Switch 2 to OFF.

Function	1	2	3	Printer	4	5
8 bit data	ON	OFF	OFF	555R	ON	ON
7 bit data	OFF	ON	OFF	555L	OFF	ON
				575R	ON	OFF
				575L	OFF	OFF

OPTION: Set the vertical forward directional character exclusive PCB (standard) as shown below. Switches S1, 2, 4, and 5 are the same as above.

Function	3
Vertical regular position characters	ON
Horizontal regular position characters	OFF

6.1.2 GRAPHIC TYPE

Set DIP Switch S1 according to the specifications shown below.

CAUTION: Switches 1 and 2 must NEVER be set in the ON position at the same time. For shipping, set Switch 1 to ON and Switch 2 to OFF. Set Switch 3 to OFF.

Function	1	2	3	Printer	5
8 bit data	ON	OFF	OFF	555G	ON
7 bit data	OFF	ON	OFF	575G	OFF

Function	4
Vertical regular position characters	ON
Horizontal regular position characters	OFF

6.2 Serial Interface

6.2.1 CHARACTER TYPE

Select the following functions by setting DIP Switch Sl.

Pin No.	Function		Remarks	AT shipping
	ON	OFF		
1	7-bit DATA	8-bit DATA	Selection of DATA bit length	OFF
2				OFF
3	No check is made	Check is made	Parity check	OFF
4	Odd parity	Even parity		OFF
5	1 bit	2 bit	STOP bit length	ON
6	Selection of RS 232C	Note 2		ON
7	Selection of TTL level	Note 2		OFF
8	Selection of 20 mA current loop	Note 2		OFF
9	555R, 575R	555L, 575L	ON for right home position	Note 3
10	555R, 555L	575R, 575L	ON for a 24-column printer	Note 3

Note:

1. If no parity check is made, the data consists of START bit + 8 (7) bits of data + STOP bit.
2. Set only one pin to ON among pins 6, 7, and 8. Set the other two pins to OFF.
3. Set pins 9 and 10 according to the machine installed.

OPTIONAL: Set the vertical forward directional characters exclusive PCB (standard) as shown below. Other functions are the same as above.

Function	2
Vertical forward direction	ON
Horizontal forward direction	OFF

6.2.2 GRAPHIC TYPE

Set DIP Switch S1 to select the following functions:

Pin No.	Function		Remarks	AT shipping
	ON	OFF		
1	7-bit DATA	8-bit DATA	Selection of DATA bit length	OFF
2	_____	Note 3	_____	OFF
3	No check is made	Check is made	Parity check	OFF
4	Odd parity	Even parity	_____	OFF
5	1 bit	2 bit	STOP bit length	ON
6	Selection of RS 232C	Note 2	_____	ON
7	Selection of TTL level	Note 2	_____	OFF
8	Selection of 20 mA current loop	Note 2	_____	OFF
9	Vertical regular pose (A)	Horizontal pose character (O) regular	Characters pose	OFF
10	55SR, 55SL (24-column)	57SR, 57SL (40-column)	ON for a 24-column printer	Note 4

Note:

1. If no parity check is made, the data consists of START bit + 8 (7) bits of data + STOP bit.
2. Set only one pin to ON among pins 6, 7, and 8. Set the other two pins to OFF.
3. Set pin 2 to the OFF position.
4. Pin 10 has been set before shipment according to the printer model.

Select baud rates by setting DIP Switch S2 (character and graphic types).

Pin No.	Function		Remarks	At shipping
	ON	OFF		
1	9600 bps	Note 1, 2	Switching over of baud rates.	OFF
2	4800 bps	Note 1, 2		OFF
3	2400 bps	Note 1, 2		OFF
4	1200 bps	Note 1, 2		ON
5	600 bps	Note 1, 2		OFF
6	300 bps	Note 1, 2		OFF
7	150 bps	Note 1, 2		OFF

Note:

1. You may select only one baud rate (S2).
2. When the printer is connected to the 20 mA current loop, set the baud rate to 1200 bps or below.

6.3 How to Change the PCB Setting

CAUTION: Unplug the machine before you begin this procedure. Failure to do so could result in serious personal injury or damage to the printer mechanisms.

When you change the DIP switch settings, be very careful not to damage the DIP switches, control board, or printer mechanism.

6.3.1 CBM-510 SERIES

1. Open the cover.
2. Verify that the printer mechanism and the print head are in the home position. If not, advance the paper by one line.
3. The DIP switches are located beneath the printer mechanism. Change the setting with a pointed-tip screwdriver, being very careful not to scratch the DIP switches, control board, or printer mechanism.

6.3.2 CBM-520 SERIES

1. Disconnect the board at the back of the printer by removing the four screws.
2. Disconnect the EPC cable from the control board.
3. Remove switch connector CN4 for switches at the front.
4. Change the setting as described above.

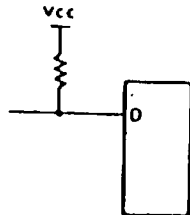
CHAPTER 7

INTERFACES

7.1 Centronics Interface

7.1.1 SIGNAL LEVEL CIRCUIT

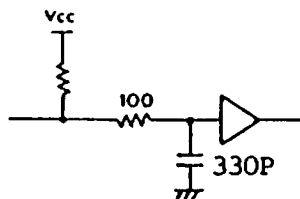
1. DATA



74LS374 or equivalent

0 = L
1 = H

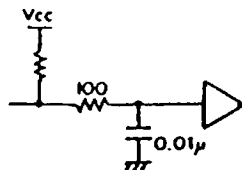
2. STB



74LS367 or equivalent

At publication: STB = L

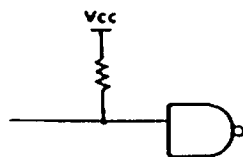
3. FEED



74LS367 or equivalent

FEED = L at paper feeding

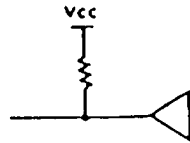
4. RESET



74LS04 or equivalent

RESET = L at resetting

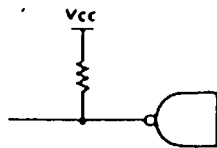
5. FAULT



74LS367 or equivalent

FAULT = L at error occurrence

6. BUSY

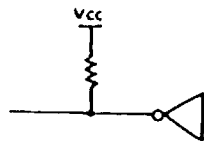


74LS04 or equivalent

BUSY = H during processing

BUSY = L at READY status

7. ACK



74LS00 or equivalent

At responding time:
ACK = L

Resistance with no value is 3.3 k Ω

7.1.2 EXPLANATION OF SIGNALS

1. DATA: 8-bit parallel signal.
2. STB: This signal writes data into the control board.
3. BUSY: This signal shows the input buffer status (see Section 4.3.1). The HIGH status indicates that the CPU has not read the contents of the input buffer. Data or commands are written when this signal is on LOW. The system also produces a BUSY signal when the power switch is turned ON or RESET is activated. If data or a command is written into the input buffer at this time, the BUSY signal remains on until the printing is finished. (See Section 7.1.4, Time Chart)
- (4) ACK: This is a response signal indicating that the CPU has read the contents of the input buffer. It is produced when the BUSY signal changes from HIGH to LOW. However, no change is recognized when the power switch is turned ON or RESET is activated.
- (5) FAULT: This signal is produced when the motor is locked, and it is released when RESET = 0 or the INITIAL SET command (DC1) is used.
- (6) FEED: This signal advances the paper.
- (7) RESET: This signal resets the entire controller.

7.1.3 LIST OF INPUT CONNECTOR SIGNALS

7.1.3.1 CBM-510 Series

Signal Pin No.	Signal Name	Direction	Signal Specification
1	STROBE	Input	H: Normal; L: Reading data; Pulse width: 1 μ S or more
2	DATA 1	Input	8-bit data signal line. The data input is valid within 300 nS before and after the STROBE signal, "L" pulse.
3	DATA 2	Input	
4	DATA 3	Input	
5	DATA 4	Input	
6	DATA 5	Input	
7	DATA 6	Input	
8	DATA 7	Input	
9	DATA 8	Input	
10	ACKNLG	Output	This signals the completion of data entry (2 μ S).
11	BUSY	Output	Data can be input at "L."
12	NC		
13	H Level	Output	Indicates printer power ON.
14	GND		Logic GND level
15	NC		
16	GND		Logic GND level

Signal Pin No.	Signal Name	Direction	Signal Specification
17	CHASSIS GND		Case GND
18	Vcc + 5V	Output	Vcc + 5V up to 100 mA can be available
19	GND		<div> </div> Pair of GND used for twisted pair line
20	GND		
21	GND		
22	GND		
23	GND		
24	GND		
25	GND		
26	GND		
27	GND		
28	GND		
29	GND		
30	GND		
31	RESET	Input	The printer is initialized at "L"
32	FAULT	Output	Indicates the status of printer errors at "L" (mechanism lock).
33	GND		Logic GND level
34	NC		
35	↑		
36	↑		

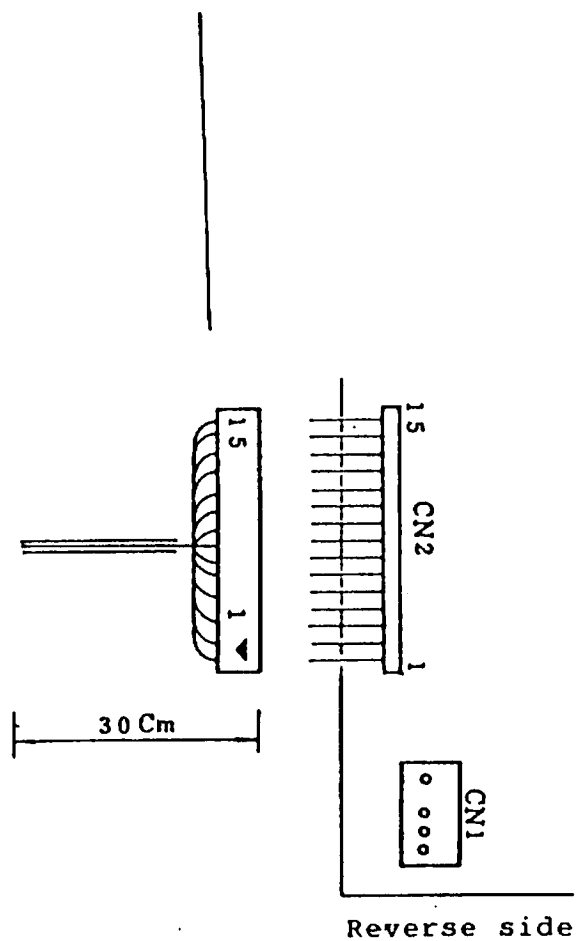
7.1.3.2 CBM-520 Series

Connector used: Molex Co. 5046-15A

Adaptable housing: Molex Co. 5102-15 (Accessory)

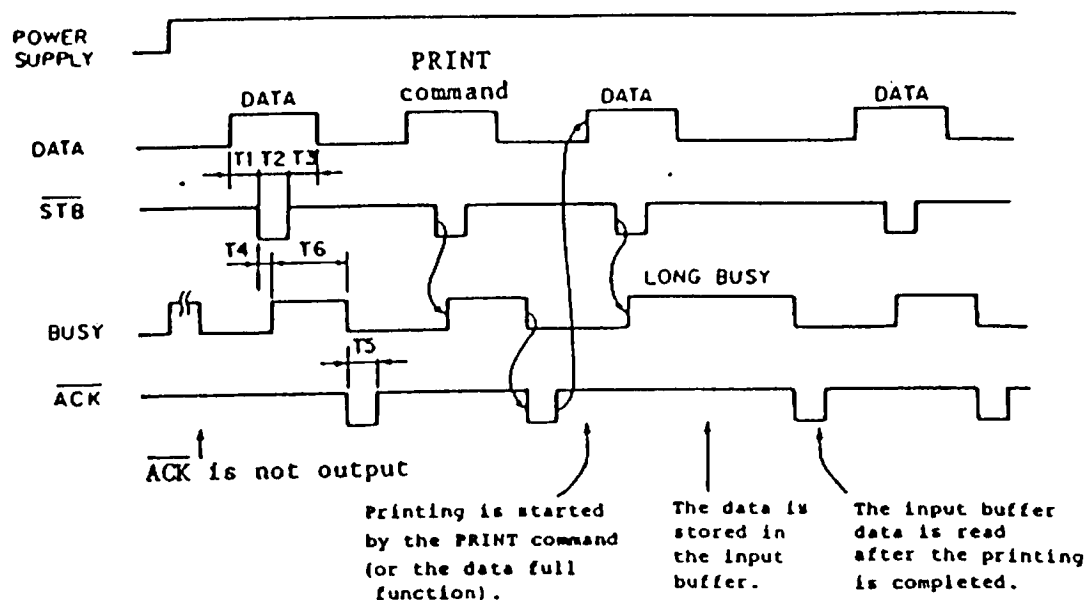
Signal Pin No.	Signal Name
-------------------	-------------

1	STB
2	D1
3	D2
4	D3
5	D4
6	D5
7	D6
8	D7
9	D8
10	ACK
11	BUSY
12	FAULT
13	RESET
14	GND
15	FEED



7.1.4 TIME CHART

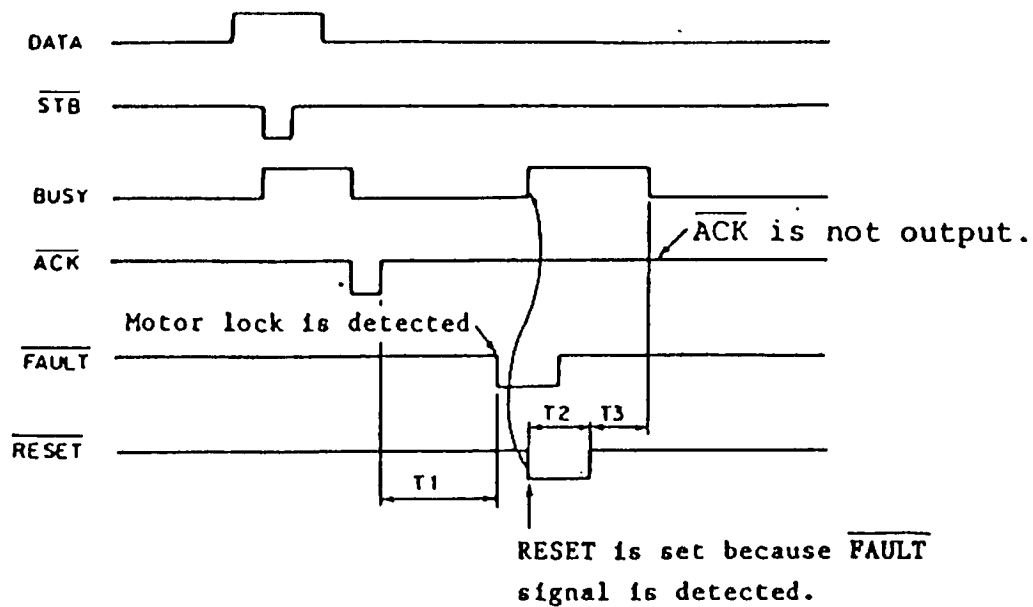
7.1.4.1 Data Input and Printing



T2	500 nS	MIN	
T1, T3	300 nS	MIN	
T4	150 nS	MAX	
T5	2 μ S	TYP	
T6	200 mS	TYP (Only when power is supplied)	
	500 mS	TYP (When data is written into the input buffer during printing with a 24-column printer)	
	850 mS	TYP (When data is written into the input buffer during printing with a 40-column printer)	
5 μ S	MIN (during reading data)		Character type
500 μ S	MAX (during reading data)		
3.75 μ S	MIN (during reading data)		Graphic type
1 mS	MAX (during reading data)		

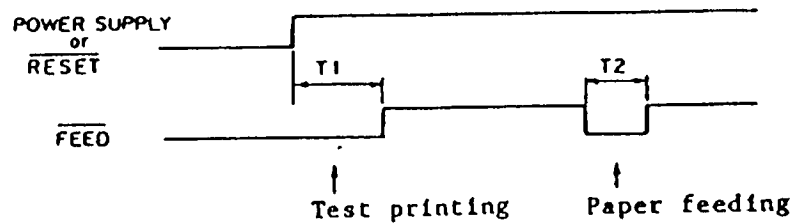
7.1.4.2 FAULT and RESET

PRINT command



T1	320 mS	TYP
T2	50 mS	MIN
T3	200 mS	TYP

7.1.4.3 Test Printing and Paper Feeding



Test printing condition:

T1 500 mS MIN 7 S MAX (When neither printing
nor paper feeding is done)

Paper feeding condition:

T2 200 μ S MIN

7.2 SERIAL INTERFACE

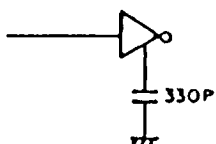
7.2.1 SIGNAL LEVEL AND CIRCUIT

(H = 1)

(L = 0)

7.2.1.1 RS-232C

1. DATA

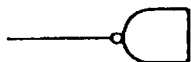


SN75189A or equivalent

MARK -8V STOP bit (H)

SPACE +8V START bit (L)

2. BUSY

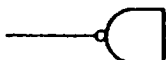


SN75188 or equivalent

MARK -8V at BUSY (H)

SPACE +8V at READY (L)

3. FAULT



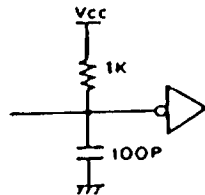
SN75188 or equivalent

MARK -8V at normal
status (H)

SPACE +8V at error
occurrence (L)

7.2.1.2 TTL Level

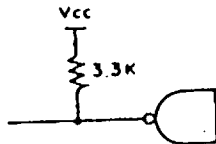
1. DATA



SN74LS14 or equivalent

STOP bit (L)
START bit (H)

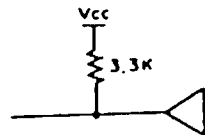
2. BUSY



SN74LS00 or equivalent

(H) at BUSY
(L) at READY

3. FAULT

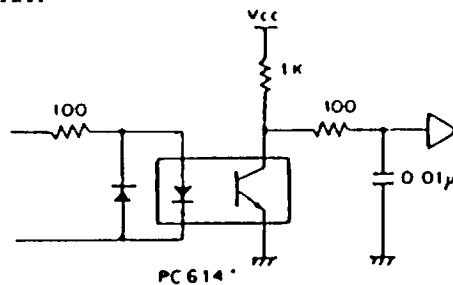


SN74LS125 or equivalent

(H) at normal status
(L) at error occurrence

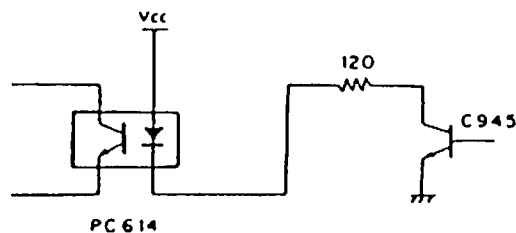
7.2.1.3 20 mA current loop

1. DATA



MARK current (H)
SPACE non-current (L)

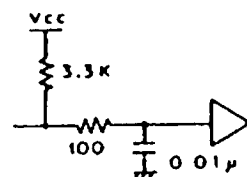
2. BUSY



CURRENT at READY (H)
NON-CURRENT at BUSY (L)

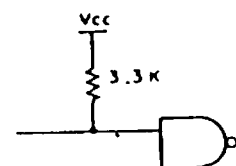
7.2.1.4 FEED.RESET (Manual Signal)

1. FEED



SN74LS125 or equivalent
Send FEED to GND at
paper feeding

2. RESET



SN74LS00 or equivalent
Send RESET to GND at
resetting

7.2.2 EXPLANATION OF SIGNALS

1. DATA: This is a 1-bit serial signal. When a framing error, overrun error, or parity error occurs, the data is ignored.
2. BUSY: This signal shows the UART status (see the schematic). The CPU has not read the contents of the UART when this signal is BUSY. When it is READY, you can enter data or commands. If you enter data or commands when the signal is BUSY, an overrun error occurs and the data is ignored. One character could be written into the UART even during printing.

The system also produces a BUSY signal when the power switch is turned ON or RESET is activated.

3. FAULT (TTL)/FAULT (RS-232C): This signal is produced when the motor is locked, and it is released when RESET = 0 or the INITIAL SET command (DC1) is used.
4. FEED: This signal, when set to LOW, advances the paper.
5. RESET: This signal resets the entire controller.

7.2.3 LIST OF INPUT CONNECTOR SIGNALS

7.2.3.1 CBM-510 Series

Connector Number	Signal Name	Terminal	Signal Direction	Host Modem
1	Protective ground (FG)		↔	
2	NC			
3	Reception data (RS-232C)		←	
4	NC			
5	NC			
6	NC			
7	Signal ground or common fly-back line (GND)		↔	
8	NC			
9	FAULT (TTL)		→	
10	NC			
11	NC			
12	FAULT (RS-232C)		→	
13	BUSY (20 mA current loop)		←	
14	BUSY return (20 mA current loop)		→	

Connector Number	Signal Name	Terminal	Signal Direction	Host Modem
15	NC			
16	DATA return (20 mA current loop)		—————→	
17	NC			
18	DATA (20 mA current loop)		←————	
19	BUSY (TTL)		—————→	
20	Data Terminal READY - BUSY (RS-232C)		—————→	
21	DATA (TTL)		←————	
22	NC			
23	RESET		←————	
24	NC			
25	NC			

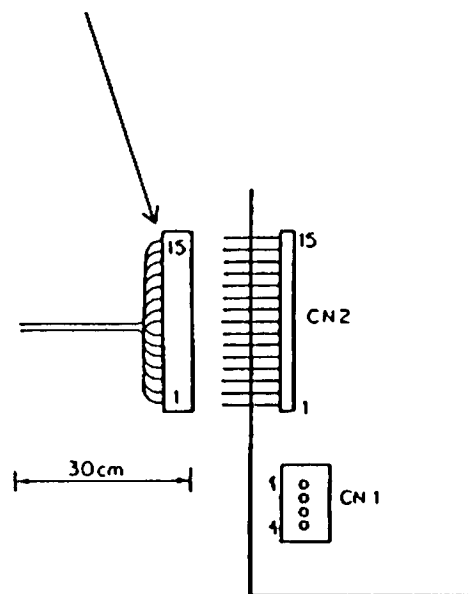
Adaptable connector
D Subconnector
D-25-2778
(Yamaich Denki)

7.2.3.2 CBM-520 Series

Connector used: Molex Co. 5046-15A

Adaptable housing: Molex Co. 5102-15 (Accessory)

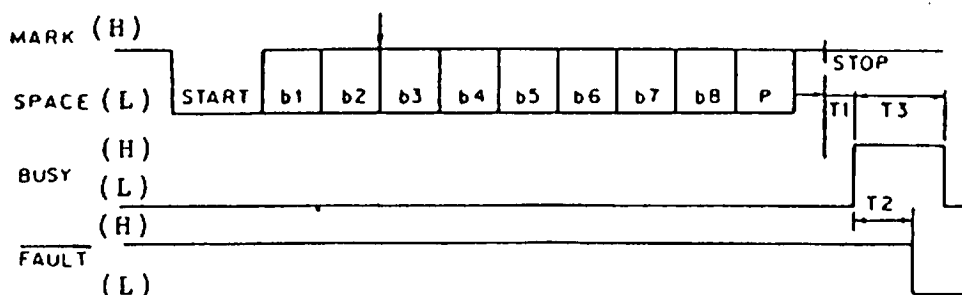
Terminal No.	Signal Name
1	FAULT (TTL)
2	-12V (RS-232C) 30 mA *
3	BUSY (RS-232C)
4	+12V (RS-232C) 30 mA *
5	FAULT (RS-232C)
6	DATA (RS-232C)
7	BUSY (20 mA current loop)
8	BUSY return (20 mA current loop)
9	DATA return (20 mA current loop)
10	DATA (20 mA current loop)
11	BUSY (TTL)
12	DATA (TTL)
13	GND
14	RESET
15	FEED



* For CBM-520, $\pm 12V$ is supplied to this terminal.

7.2.4 TIME CHART (START/STOP SYNC SYSTEM)

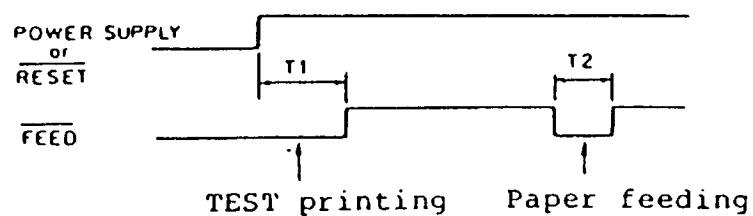
7.2.4.1 Data input (for RS-232C) (H = 1) (L = 0)



(When a machine error occurs:)

P		Parity bit. If no parity check is made by setting DIP switches, P is not required.
T1	12 μ S	MAX (Delay beginning at the center of the first STOP bit)
T2	320 mS	TYP
T3	42.5 μ S	MIN (for each character)
	500 mS	TYP (When data is written into the UART during printing with a 24-column printer)
	850 mS	TYP (When data is written into the UART during printing with a 40-column printer)
	200 mS	TYP (When the power switch is turned ON or when RESET is activated)

7.2.4.2 Test Printing and Manual Paper Feeding



Test printing condition:

T1 500 mS MIN 7 S MAX

Paper feeding condition:

T2 200 μ S MIN (When neither printing nor paper
feeding is done)

CHAPTER 8
COMMANDS AND DATA

8.1 Character Type

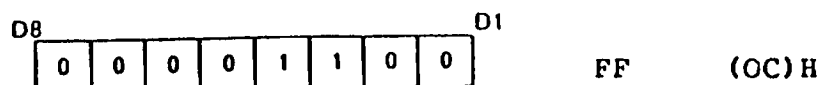
8.1.1 COMMAND TYPE

Command Name	Character	Code
1. PAPER FEED	FF	(0C)H
2. PRINT	CR	(0D)H
3. ENLARGED CHARACTER	SO	(0E)H
4. ENLARGED CHARACTER Release	SI	(0F)H
5. INITIAL SET	DC1	(11)H
6. INVERTED PRINT	DC2	(12)H
7. RED CHARACTER	DC3	(13)H

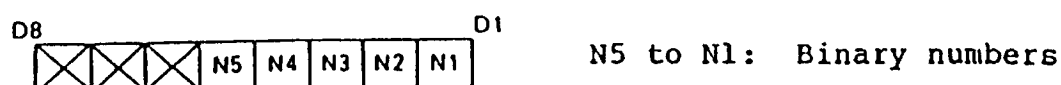
8.1.2 EXPLANATION OF COMMANDS

1. PAPER FEED:

1st byte

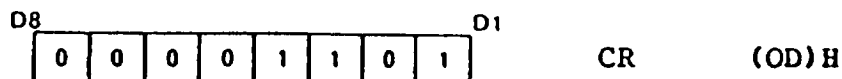


2nd byte



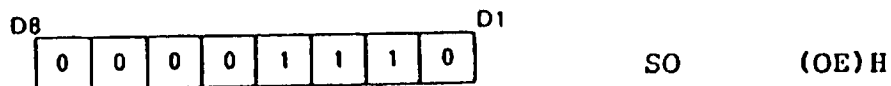
When you write the number of lines (2nd byte) to be fed continuously into the PAPER FEED command (1st byte), the system advances the paper by the number of lines assigned. You can assign 1 to 31 lines with the PAPER FEED command. If you assign 0, the paper will not advance. When you use this command, the system prints the data stored in the internal print buffer and advances the paper.

2. PRINT:



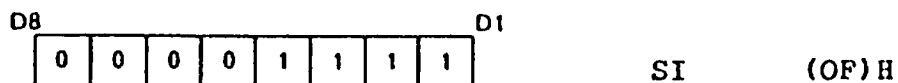
When you execute this command after the print data is sent out, the system prints the data and advances the paper one line. The paper advances one line even if there is no data.

3. ENLARGED CHARACTER:



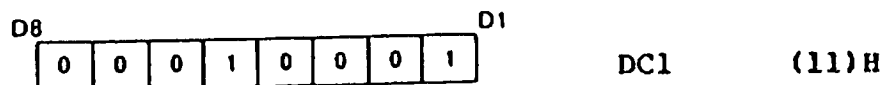
When you enter this command, the succeeding data is enlarged double the width of normal characters for printing. This enlarged printing continues until you enter the ENLARGED CHARACTER RELEASE command or until the line has been printed. Since the enlarged characters require double the space of normal characters, be careful not to exceed the limit of the columns.

4. ENLARGED CHARACTER RELEASE:



This command releases the EXPANDED CHARACTER command set by <SO>. The system prints data entered following this command normally.

5. INITIAL SET:



This command initializes the controller, which then enters the following status and clears the internal print buffer:

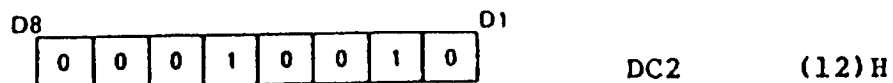
Normal character

Regular character

FAULT output clear

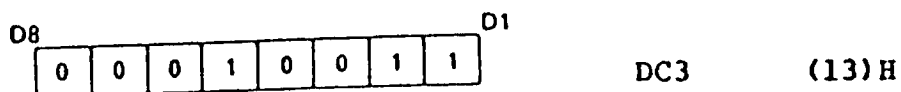
BUFFER FULL PRINT FUNCTION clear

6. INVERTED CHARACTER:



Use the INVERTED CHARACTER command to print one line of inverted characters. This command remains in effect until you turn it off by entering the INITIAL SET command.

7. RED CHARACTER:



When you implement this command, the system prints a single line in red. Since the system releases this command after printing the line, you must re-enter the command for each line of red print desired.

8.1.3 DATA FORMAT



The system stores the b8 to b1 data in the print buffer through the input buffer. Codes in blank fields are ignored. The next section shows the correspondence between characters and codes.

8.1.4 CHARACTER LIST (JAPAN MODEL)

For mass-produced products, you may order special characters as an option. In the following charts, "SP" indicates a blank field.

[illegible]

8.1.5 CHARACTER LIST (US MODEL)

[illegible]

8.1.6 DATA TRANSMISSION AND PRINTING (RIGHT HOME POSITION)

This section contains examples of data transmission and printing operations. For these examples, we used a 24-digit printer with right home position one.

1. BUFFER FULL AUTOMATIC PRINT FUNCTION; enlarged print used for selected characters (HIJKLMN):

ABCDEFGH <SO> HIJKLMN <SI> OPQ

2. To print enlarged characters over two lines:

<SO> ABCDEFG <CR> <SO> HIJK <SI> LMNOPQ <CR>

NOTE: Since the enlarged characters require double the space of normal characters, be careful not to exceed the column limit.

3. To print inverted characters:

<DC2> ABCDEFG <CR> ... <DC1>

When you enter <DC2>, the system prints all succeeding inverted. You cannot invert a portion of a line. This command remains in effect until you enter the INITIAL SET command or the manual RESET. In this example, <DC1> released the command.

4. To print characters in red ink:

<DC3> ABCDEFG <CR>

When you enter the <DC3> command, the system prints all the succeeding characters in the line with red ink. This command is released automatically when a new line is fed. Since this command is executed one line at a time, the system cannot print selected characters in red.

5. You may print selected characters, advance the paper by a predetermined number of lines, then continue printing.

ABCD <CR> <FF> <03> EFGH <CR>

<03> coding: x x x N5 N4 N3 N2 N1

6. You may print a line of red inverted characters and expand selected characters (HKJKMN). This uses the BUFFER FULL AUTOMATIC PRINT FUNCTION.

<DC2> <DC3> ABCDEFG <SO> HIJKMN <SI> OPQ

Example of printing:

ABCDEFGHIJKLMNO — 1

ABCDEFG
HIJKLMNO — 2

93303H — 3

Red characters — ABCDEF — 4

Three lines
paper feeding { ABC
EFGH } — 5

Red character — 0304721 I H93303H — 6

7. In the next example, the system ignores the last character.

ABC <SO> DEFGHIJKLMN

↑ Automatic printing
starts

Print:

Enlarged characters

↑
ABCDEFGHIJKLM

↖
(One normal character space is blanked)

When you change characters from normal to enlarged, one dot-space is required for the space between characters. When you change from enlarged to normal, two dot-spaces are required.

You must enter all commands except <DC1>, <SO>, and <SI> at the beginning of the line, before you enter data.

8.2 Graphic Type

8.2.1 COMMAND TYPES

No.	Command Name	Command	Code
1	HORIZONTAL TAB	HT	(09)H
2	PRINT	LF	(0A)H
3	PAPER FEED	FF + n	(0C)H
4	PRINT	CR	(0D)H
5	ENLARGED CHARACTER	SO	(DE)H
6	ENLARGED CHARACTER RELEASE	SI	(OF)H
7	INITIAL SET	DC1	(11)H
8	INVERTED CHARACTER	DC2	(12)H
9	RED CHARACTER	DC3	(13)H
10	ERASE	CAN	(18)H
11	FORWARD DOT IMAGE	ESC + A + n	(1B)H + (41)H + n
12	REVERSE DOT IMAGE	ESC + B + n	(1B)H + (42)H + n
13	PRINT COMMAND (LF) SWITCH-OVER	ESC + C + 1	(1B)H + (43)H + (31)H
14	PRINT COMMAND (LF, CR) SWITCH-OVER	ESC + C + 2	(1B)H + (43)H + (32)H

No.	Command Name	Command	Code
15	RELATIVE HORIZONTAL TAB	ESC + D + n	(1B)H + 44(H) + n
16	2-DOT SPACE	ESC + E	(1B)H + 45(H)
17	2-DOT SPACE RELEASE	ESC + F	(1B)H + 46(H)
18	GRAPHIC MODE	ESC + G	(1B)H + 47(H)
19	INVERTED CHARACTER RELEASE	ESC + H	(1B)H + 48(H)

8.2.2 EXPLANATION OF COMMANDS

1. HORIZONTAL TAB HT (09)H

Set tab positions by entering <ESC><D><n>. You may then tab to that location by entering the tab code. The system ignores this command in the GRAPHIC mode.

The system default sets the tabs at every 8 characters.

2. PRINT LF (0A)H

If you enter this command with data and the <LF> code, the system prints the data and advances the paper by one line. If you enter this command with the <LF> code and no data, the system advances the paper without printing anything.

3. PAPER FEEDING FF +n (0C)H + n

You may instruct the system to feed the paper from 1 to 31 lines with this command. If you assign 0 lines, the paper does not advance.

The 2nd byte is read as follows:

x x x B4 B3 B2 B1 B0

The upper 3 bits are ignored. When you implement this command, the system clears the data stored in the print buffer.

4. PRINT COMMAND <CR> (OD)H

This is the initial print code. However, if you enter the PRINT COMMAND SWITCH-OVER, <ESC><C><1>, the system ignores the <CR> code. If you enter the INITIAL SET command <DC1> or the PRINT COMMAND SWITCH-OVER <ESC><C><2>, the system uses the <CR> code for printing.

5. ENLARGED CHARACTER <SO> (OE)H

When you enter this command, the system prints all succeeding data double the width of normal characters.

6. ENLARGED CHARACTER RELEASE <SI> (OF)H

Use this command to release the ENLARGED CHARACTER command set by <SO>. All succeeding data is printed normally.

7. INITIAL SET <DC1> (11)H

This command initializes the controller. The controller assumes the following status:

- * Clears input buffer and internal print buffer
- * Normal characters
- * Black characters
- * Regular-position characters
- * Clears FAULT output
- * Prints with <CR> and ignores <LF>

- * Tabs are set every 8 characters
- * 1-dot space
- * CHARACTER MODE

8. INVERTED CHARACTER <DC2> (12)H

Use this command to assign inverted characters (in relation to the SET-UP status). When you implement this command, the system prints all succeeding data upside-down. This command remains in effect until you enter the INITIAL SET command or the INVERTED CHARACTER RELEASE command <ESC><H>. Enter this command as the first character of the line.

9. RED CHARACTER <DC3> (13)H

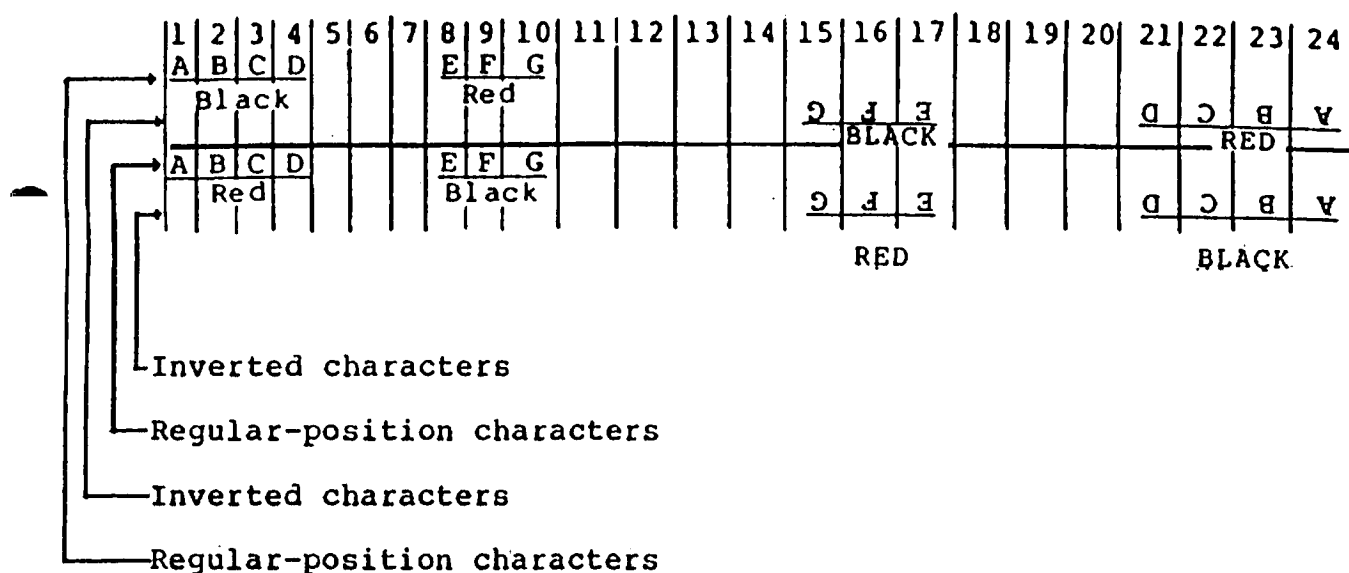
This command instructs the system to print a single line of red characters. Since the system releases this command after printing the line, you must enter the command each time you wish to print a line of red characters.

If you enter this command in the middle of the line, the system inserts three blank characters for the CHARACTER MODE and two blank characters for the GRAPHICS MODE (12 dots usually but 14 dots for 2-dot space). The columns printed in red depend on the printer model and the selection of regular-position characters or inverted characters.

Example:

Input data ABCD <DC3> EFG

24 column printer (CHARACTER MODE)



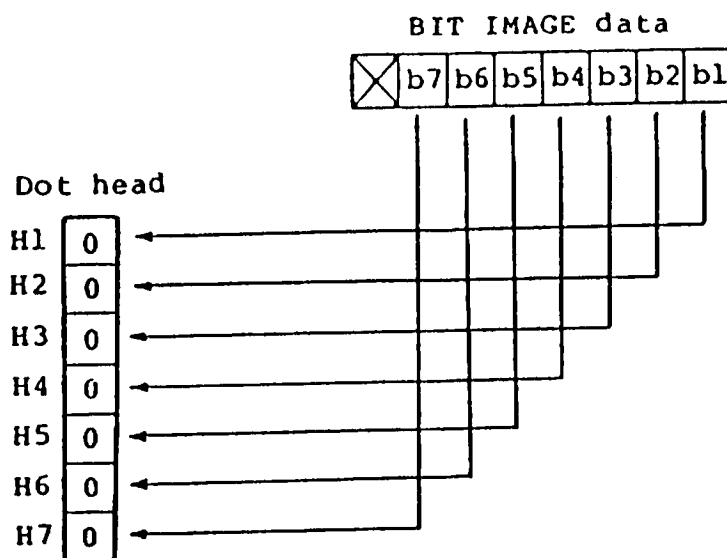
As shown above, if you enter regular position characters for a left home position printer and inverted characters for a right home position, the system prints black characters from the first of the data to <DC3> and red characters after <DC3>. If you enter inverted characters for a left home position printer and regular position characters for a right home position printer, the system prints red characters from the first of the data to <DC3> and black characters after <DC3>.

10. ERASE <CAN> (18)H

Use this command to erase all data stored in the print buffer. After you enter this command, the system sets the black character mode. Other modes, however, are not changed, and the mode set before you entered the ERASE command remains as it is.

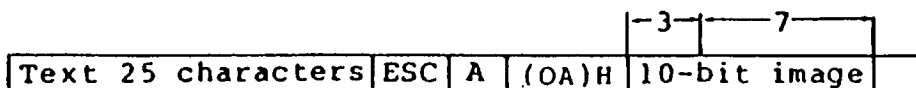
11. REGULAR BIT IMAGE <ESC><A><n> (1B)H + (41)H + n

You may print up to 153 positions for a line with a 40-column printer and up to 126 positions with a 24-column printer. Assign the data number with "n." This command is effective only in the GRAPHIC mode (<ESC><G>). The system returns to the text mode when the bit image printing is complete.



When inverted characters are set, the following correspondence is assumed: b7 -> H1, b6 -> H2, b5 -> H3, b4 -> H4, b3 -> H5, b2 -> H6, and b1 -> H7.

Example of input data for 40 columns:

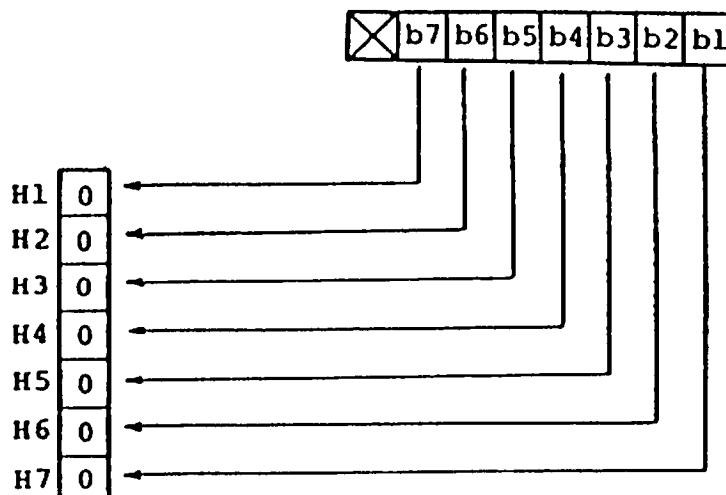


The text 25 characters on the line head contain 150 dot positions (6 x 25). There are still 3 dot positions of the 10 positions that can be printed, but 7 positions are ignored and cleared.

The data following the 10-bit image data is assumed to be text. The system prints automatically after you enter the 10-bit image data.

12. INVERSE BIT IMAGE <ESC><n> (1B)h + (42)H + n

This command assigns the same operation as that of the FORWARD BIT IMAGE, inversely. The array is reversed, and the system assumes the following correspondence: b7 -> H7, b5 -> H6, b4 -> H4, b3 -> H3, b2 -> H2, and b1 -> H1.



13. PRINT COMMAND (LF) SWITCH-OVER

`<ESC><C><1>` (1B)H + (43)H + (31)H

With this command, the `<LF>` code is used as the PRINT command. When you enter this command, the system ignores the `<CR>` code.

14. PRINT COMMAND (LF, CR) SWITCH-OVER

`<ESC><C><2>` (1B)H + (43)H + (32)H

This command uses either the `<LF>` code or the `<CR>` code for printing. For example, if you enter `<text> <LF>`, `<CR>`, the system advances a line with `<LF>` for the text printing, then advances another line with `<CR>`. This command is very useful in the GRAPHIC MODE.

15. RELATIVE HORIZONTAL TAB

`<ESC><D><n>` (1B)H + (44)H + n (n = 2)

Use this command to set a tab every n characters. Implement this command with the `<HT>` command.

For example, entering `<ESC><D><0A>` instructs the system to set tabs in the 11th, 21st, and 31st columns. If n = 1, the TAB setting is made while you input DATA. The system deletes DATA entered prior to `<ESC><D><n>`.

16. 2-DOT SPACE <ESC><E> (1B)H + (45)H

Use this command to assign 2-dot spacing between characters. When you use this command, the system clears the data stored in the print buffer. Therefore, you must enter this command before you enter data.

In the CHARACTER MODE, the following correspondence is assumed:

40 characters -- 34 characters (575G printer)

24 characters -- 20 characters (555G printer)

In the GRAPHIC MODE, the correspondence is

25 characters -- 22 characters (575G printer)

21 characters -- 18 characters (555G printer)

17. 2-DOT SPACE RELEASE <ESC><F> (1B)H + (46)H

Use this command to return the setting to 1-dot space.

18. GRAPHIC MODE <ESC><G> (1B)H + (47)H

You must enter this command before you enter the data. Use this command to implement the GRAPHIC MODE. In this mode, the system leaves no space between lines of text data.

If you want to leave space between lines, you must enter the PRINT command twice. The system then clears data stored in the print buffer.

The print buffer contains 153 dot positions (25 characters + 3 dot positions) for a 40-column printer, and 126 dot positions (21 characters) for a 24-column printer.

```

"0123456789:;<=>?@ABCDEFGHI
JKLMNOPQRSTUVWXYZ[^\_`abcde
fghijklmnopqrsstuvwxyz{|}~
^_`abcde fghijklmnopqrsstuv
wxyz{|}~^_`abcde fghijklmnop
qrsstuvwxyz{|}~^_`abcde fgh
ijklmnopqrsstuvwxyz{|}~^_`
abcde fghijklmnopqrsstuvwxy
z{|}~^_`abcde fghijklmnopqr
stuvwxyz{|}~^_`abcde fghijk
lmnopqrstuvwxyz{|}~^_`abcde
fghijklmnopqrstuvwxyz{|}~^_
`abcde fghijklmnopqrstuvwxyz
{|}~^_`abcde fghijklmnopqrst
uvwxy

```

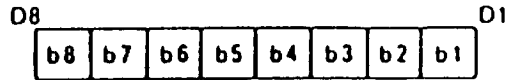
CHARACTER MODE (40 columns)

GRAPHIC MODE (24 columns)

19. INVERTED CHARACTER RELEASE <ESC><H> (1B)H + (48)H

Use this command to return printing from inverted printing to normal. You must enter this command before you enter data.

8.2.3 DATA FORMAT



b8 to b1: binary numbers

The data coded by b8 to b1 is stored in the print buffer via the input buffer. Refer to Sections 4.4 and 4.5 for the correspondence between codes and characters. The system ignores the blank fields in this code.

8.2.4 DATA TRANSMISSION AND PRINTING (LEFT HOME POSITION)

This section contains examples of data transmission and printing operations. For these examples, we used a 24-digit printer with left home position one.

1. BUFFER FULL AUTOMATIC FULL PRINT FUNCTION; enlarged print used for selected characters (<CR> not required):

ABCDEFGH <SO> HIJKLMN <SI> OPQ

2. To print enlarged characters over two lines:

<SO> ABCDEFG <CR> HIJK <SI> LMNOPQ <CR>

Note: Since the enlarged characters require double the space of normal characters, be careful not to exceed the column limit.

3. To print inverted characters:

<DC2> ABCDEFG <CR> ... <ESC><H>

When you enter <DC2>, the system prints all succeeding characters inverted. You cannot invert a portion of a line. This command remains in effect until you enter the INITIAL SET command or the manual RESET. In this example, <ESC><H> released the command.

4. To print red characters:

<DC3> ABCDEFG <CR>

When you enter the <DC3> command, the system prints all succeeding characters in the line with red ink. You cannot print selected characters in red; you must print a complete line. This command is released automatically when a new line is fed.

5. You may print selected characters, advance the paper by a predetermined number of lines, then continue printing.

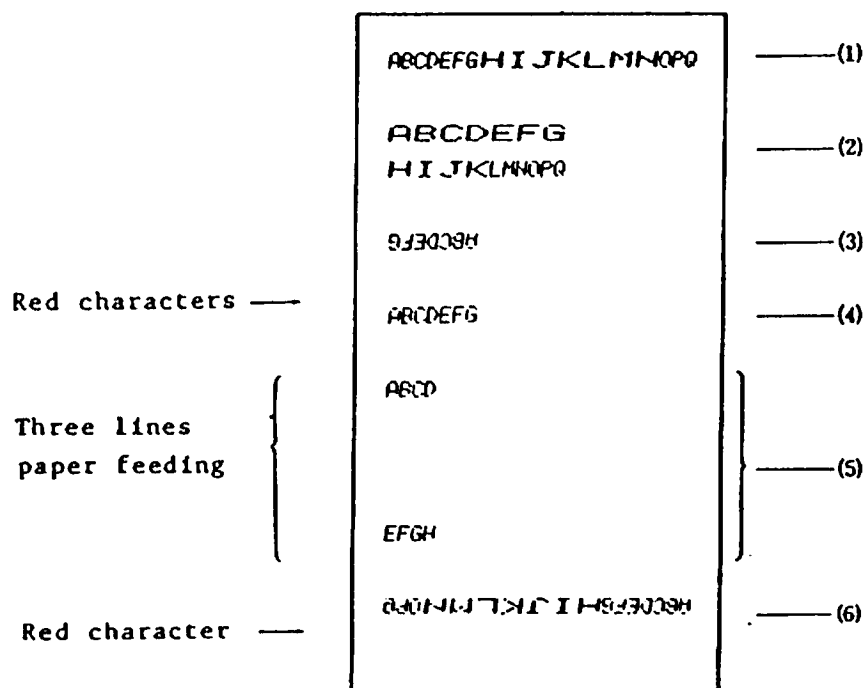
ABCD <CR> <FF> <03> EFGH <CR>

<03> coding: x x x N5 N4 N3 N2 N1

6. You may print a line of red inverted characters and expand selected characters. This uses the BUFFER FULL AUTOMATIC PRINT FUNCTION.

<DC2> <DC3> ABCDEFG <SO> HIJKMN <SI> OPQ

Example of printing:

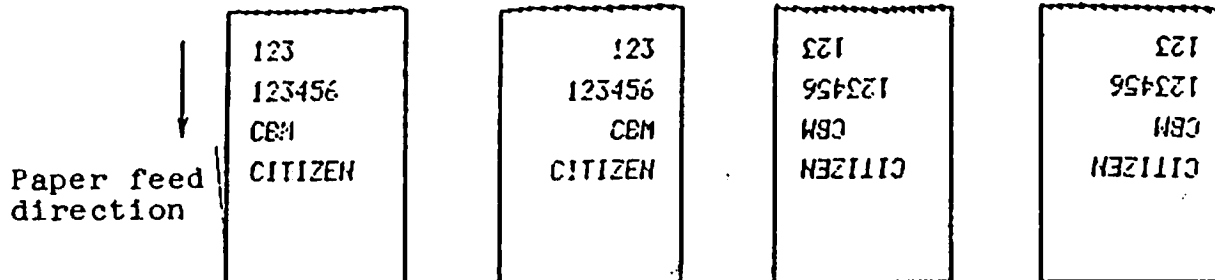


7. Printing example for CBM-520 machine data transmission sequence:

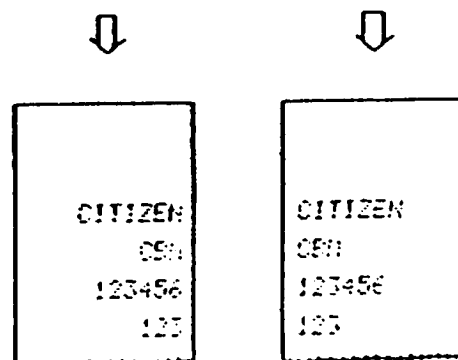
- (1) <CITIZEN> <CR>
- (2) <CBM> <CR>
- (3) <123456> <CR>
- (4) <123> <CR>

Printout sample:

MODEL	CBM-520L-A	520R-A	520L-O	520R-O
Home position	Right	Left	Right	Left
Inverted command or vertical ROM	Yes	Yes	No	No



Upside down of the above sample



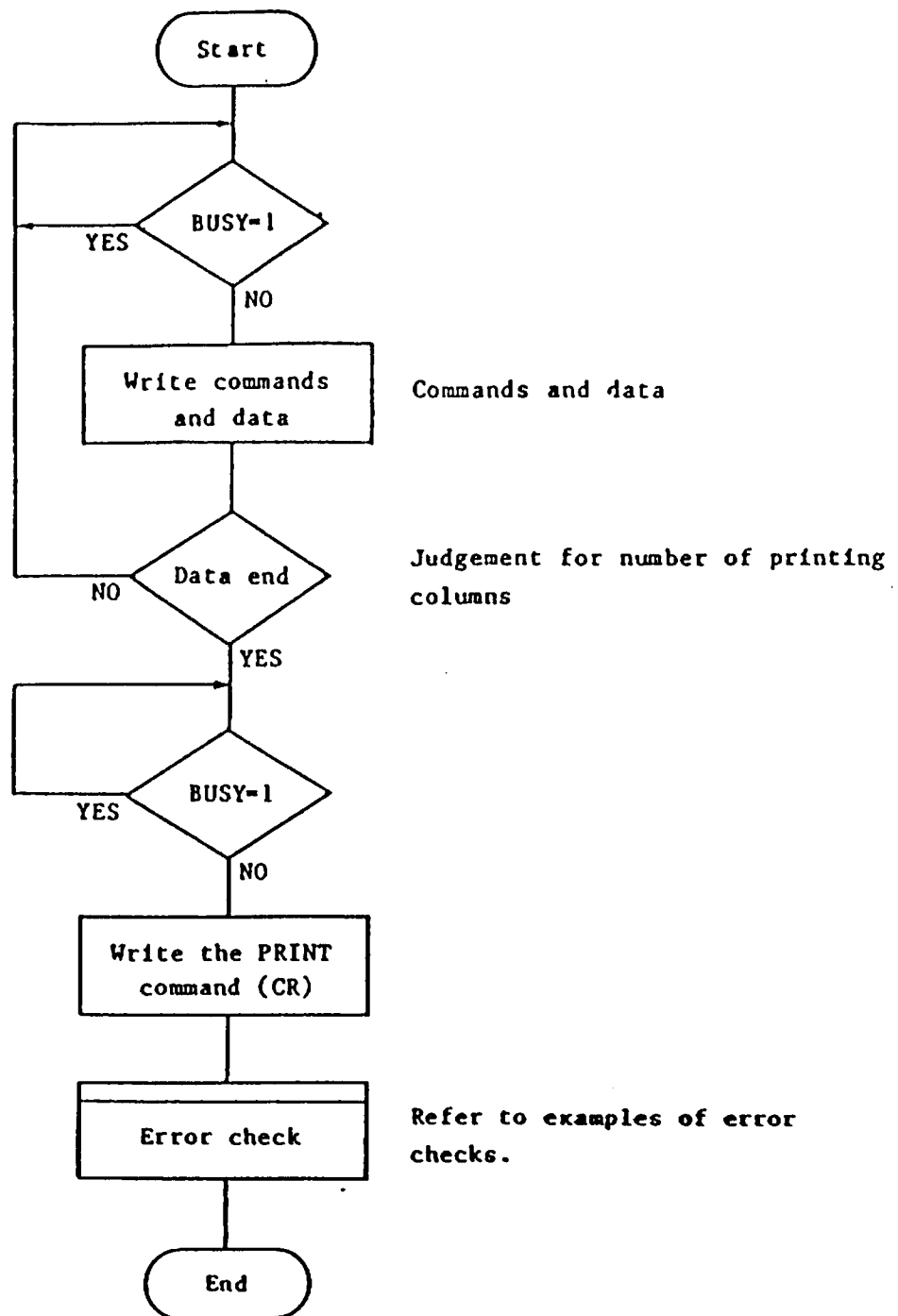
CHAPTER 9

OPERATIONAL FLOW CHART

9.1 Centronics Interface

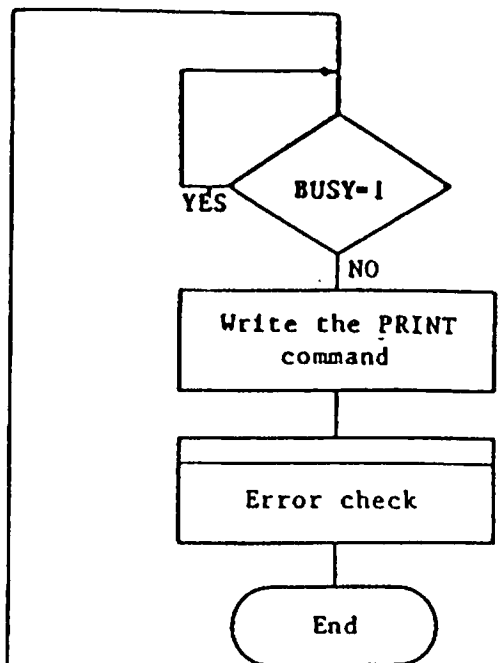
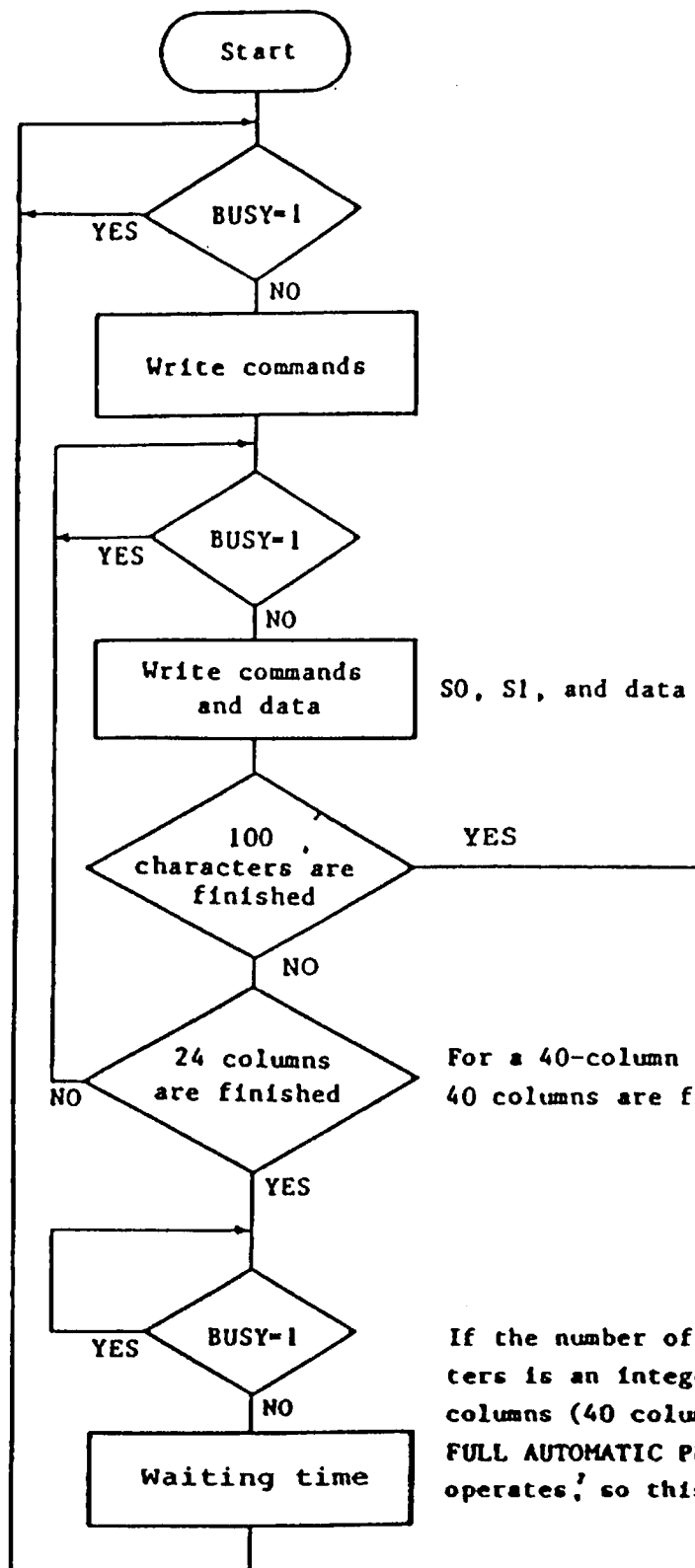
9.1.1 PARTIAL COLUMNS

The flow chart for the Centronics interface using partial columns is shown on the next page.



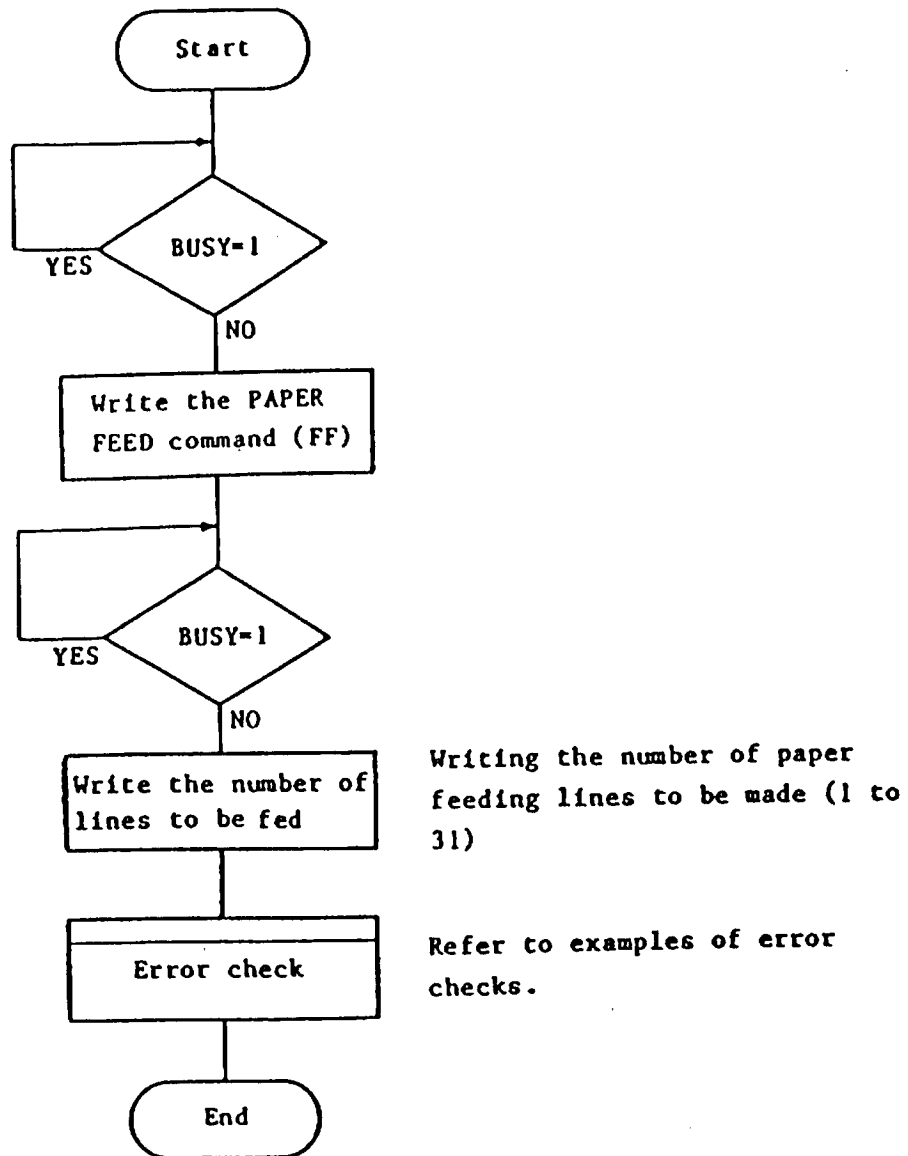
9.1.2 FULL COLUMNS

The flow chart for the Centronics interface using full columns is shown on the next page. We used 100 characters for this example.



* Refer to examples of error checks.

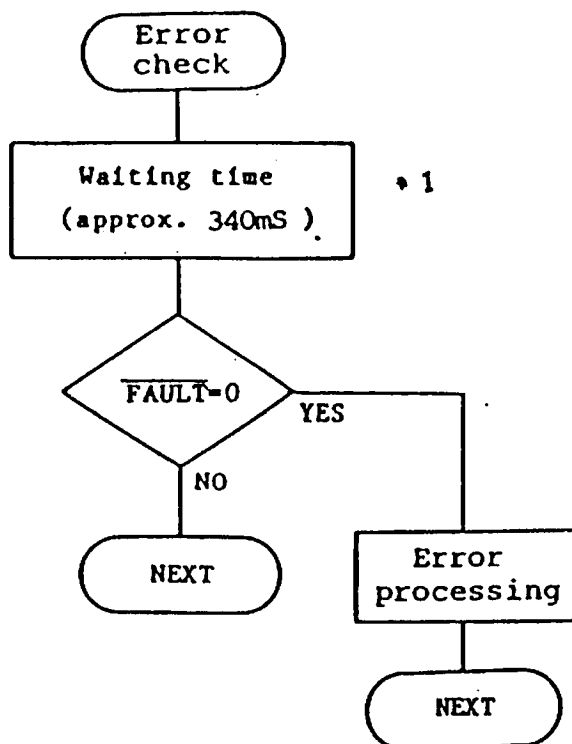
9.1.3 1 TO 31 LINES PAPER FEEDING



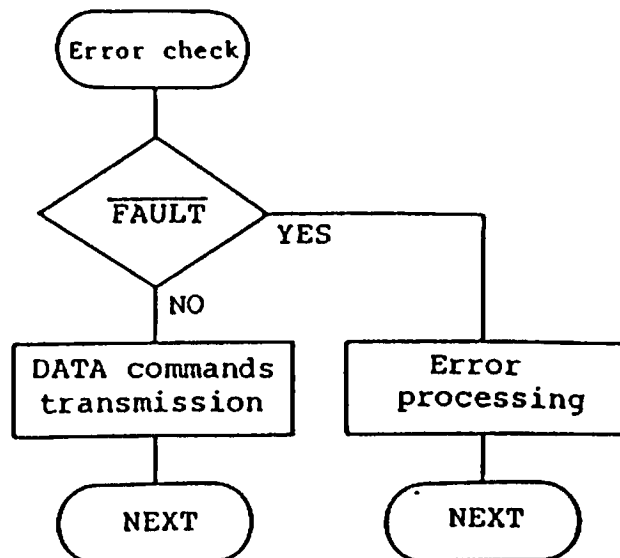
9.1.4 ERROR CHECKS

9.1.4.1 Software Check

EX 1. Error check for the present line

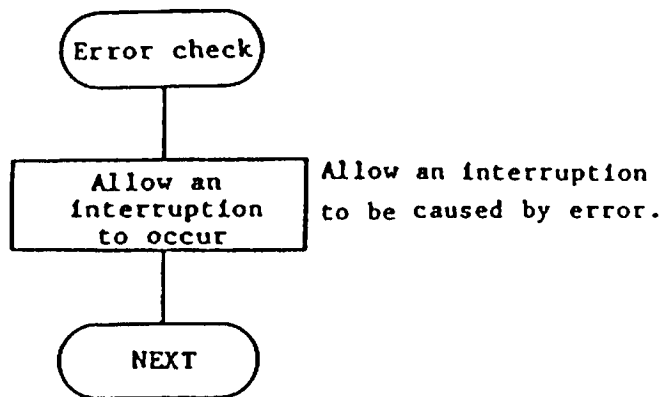


EX 2. Error check for the previous line.

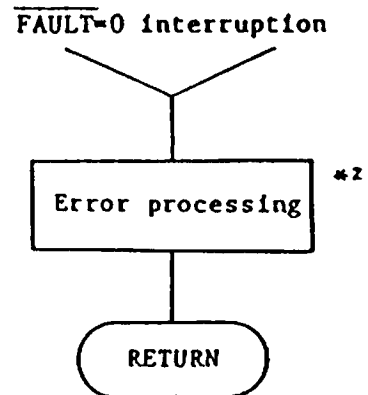


*1 Waiting time from printing start
to motor lock detection
However, 600msec is required as the
waiting time at starting time.

9.1.4.2 Interruption Check



When an interruption is caused by an error:



*2 For example, a buzzer is used to notify the error to external and stop the system.

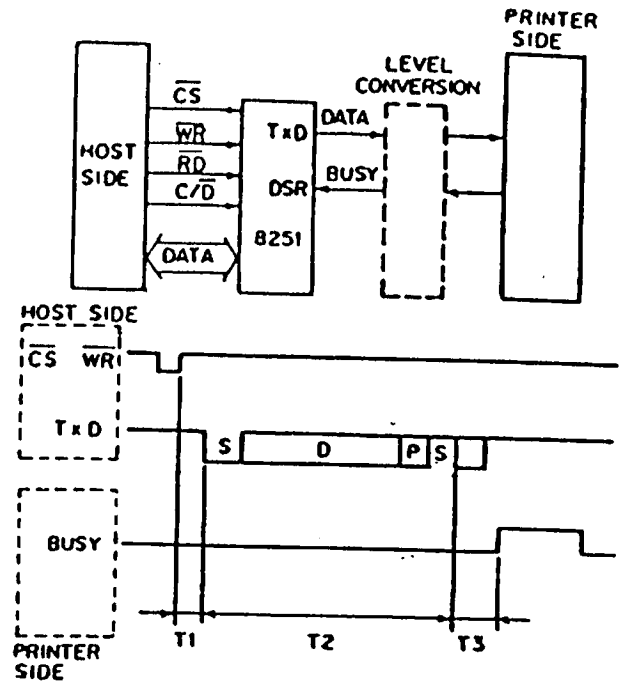
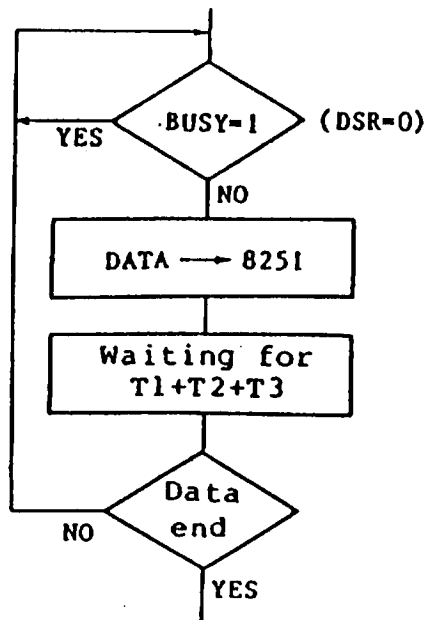
9.2 Serial Interface

9.2.1 EXAMPLE OF INTERFACING

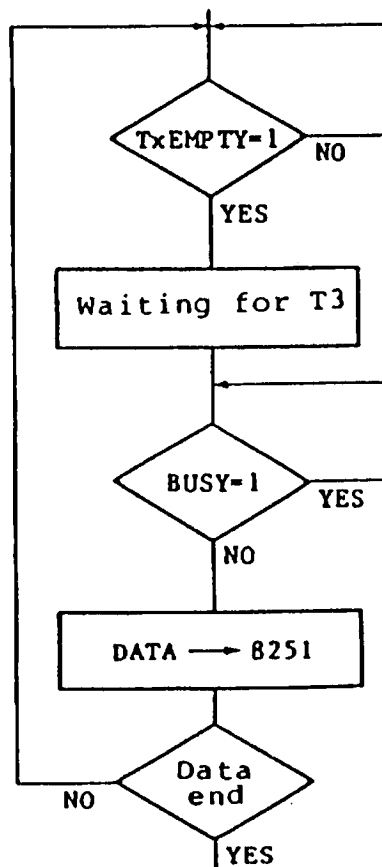
9.2.1.1 Right Figure Configuration

BUSY check is made after $T1 + T2 + T3$ when data is written to 8251.

Example 1:



Example 2:



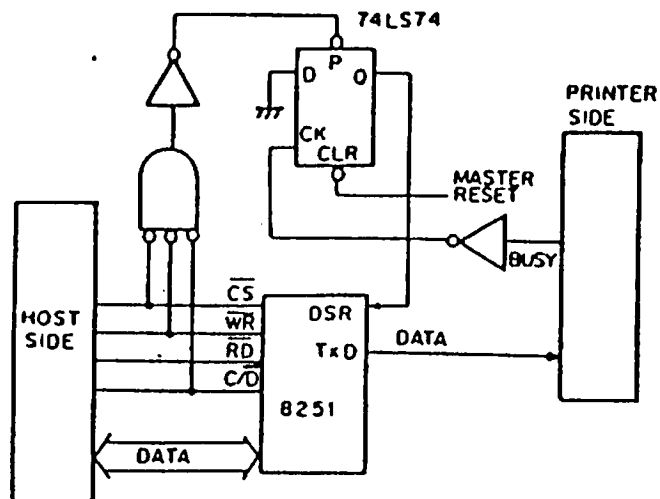
T1: Delay of data transmission from CS and WR

T2: Transmission time

T3: Delay time between the center point of stop bit and BUSY point + $1/\text{baud rate} \times 16$

9.2.1.2 F/F Set (Data to 8251)

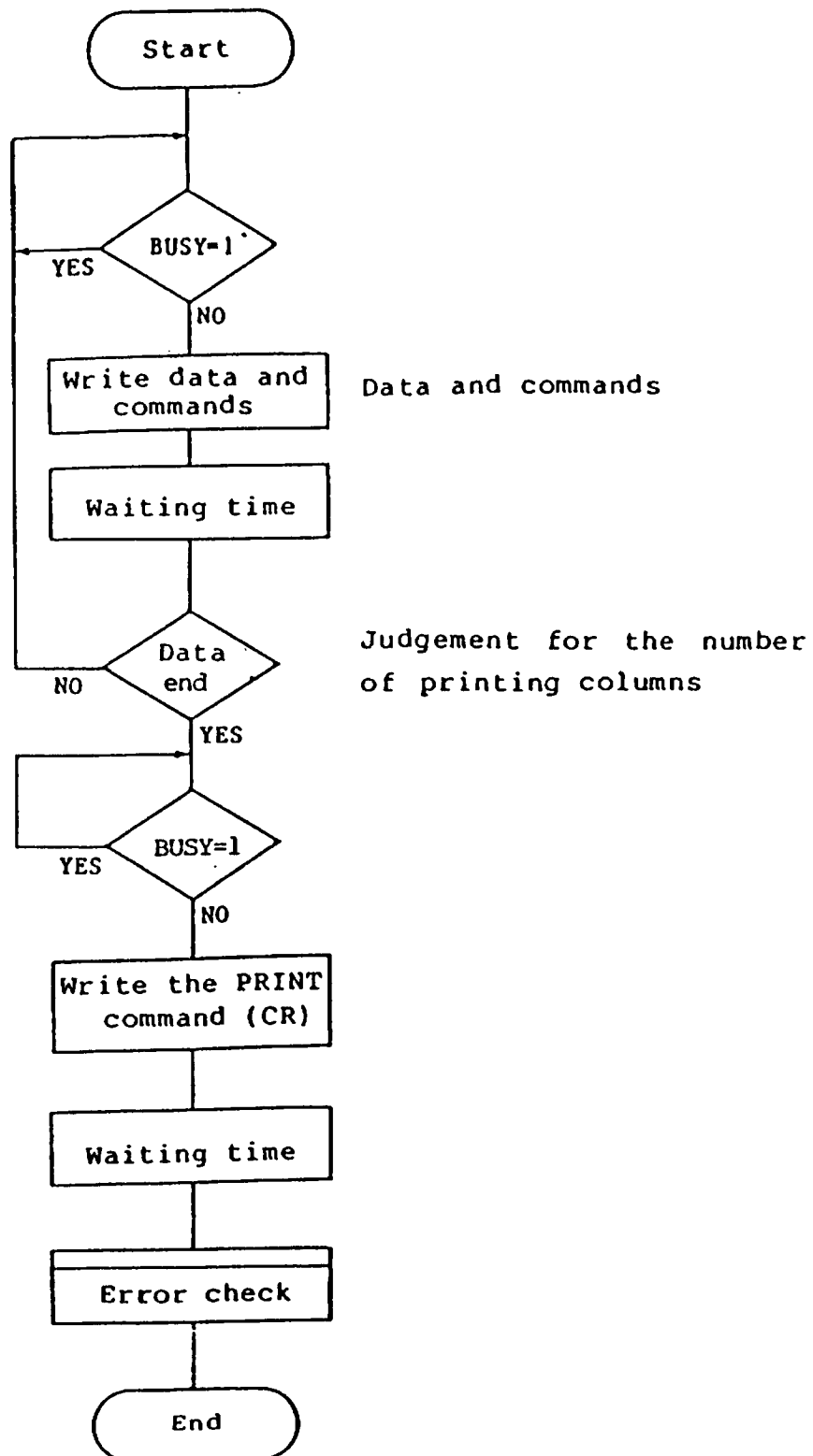
As shown in the figure below, prepare F/F which is set when data is written to 8251 and reset at the trailing edge of BUSY. Use its output as the BUSY within the host computer.



9.2.2 OPERATIONAL FLOW CHART

9.2.2.1 Partial Columns

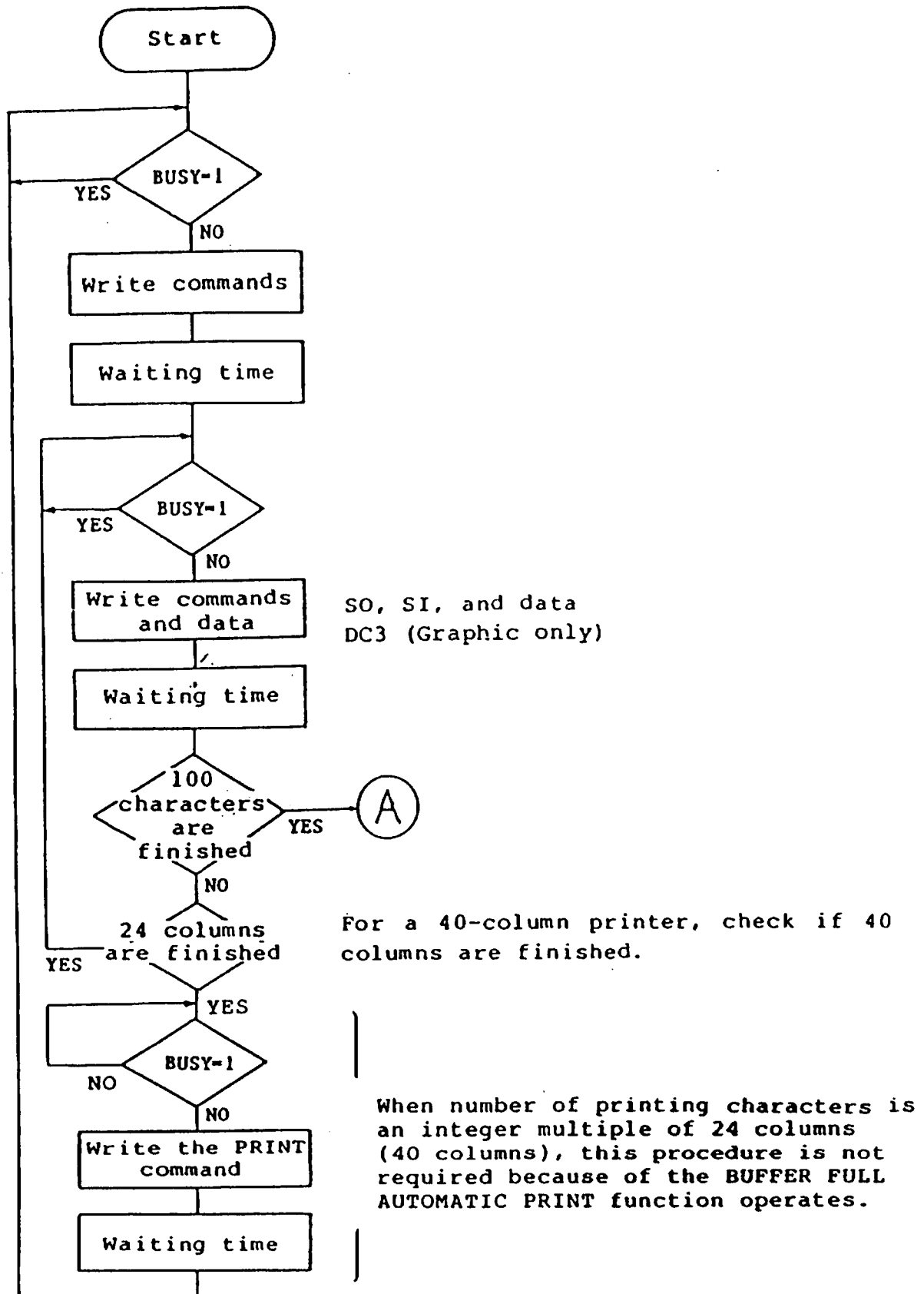
The flow chart for the Serial interface using partial columns is shown on the next page.

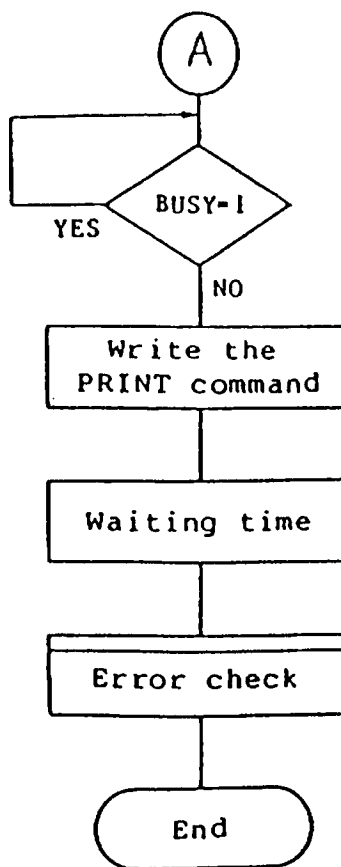


Depending on print time, waiting time may not be required.
Refer to Section 9.1.4 for error check information.

9.2.2.2 Full Columns

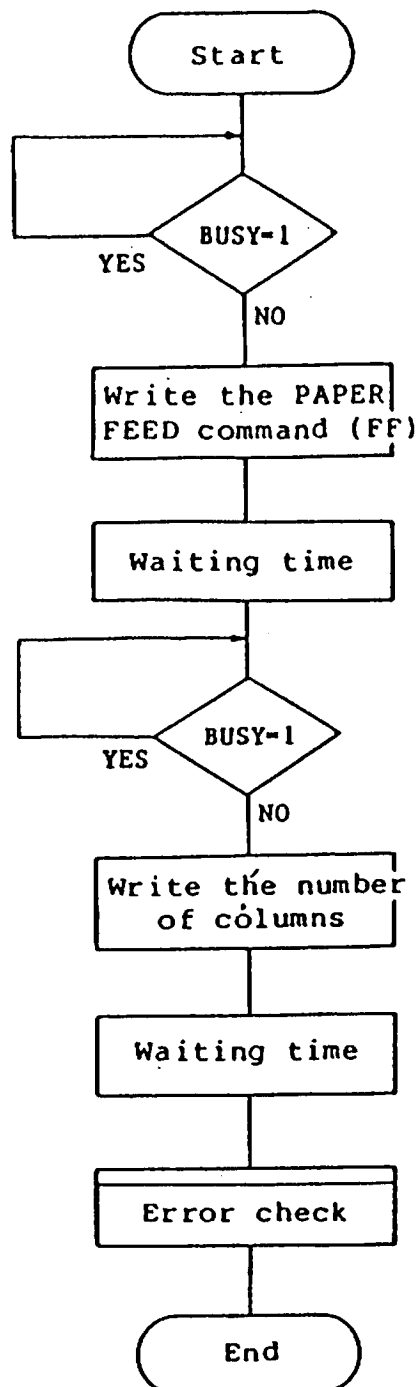
The flow chart for the Serial interface using full columns is shown on the next page. We used 100 characters for this example.





Depending on print time, waiting time may not be required.
Refer to Section 9.1.4 for error check information.

9.2.2.3 1 to 31 Lines Paper Feeding



Depending on print time, waiting time may not be required.

Refer to Section 9.1.4 for error check information.

9.2.2.4 Error Checks

Same as Section 9.1.4

CHAPTER 10

MAINTENANCE

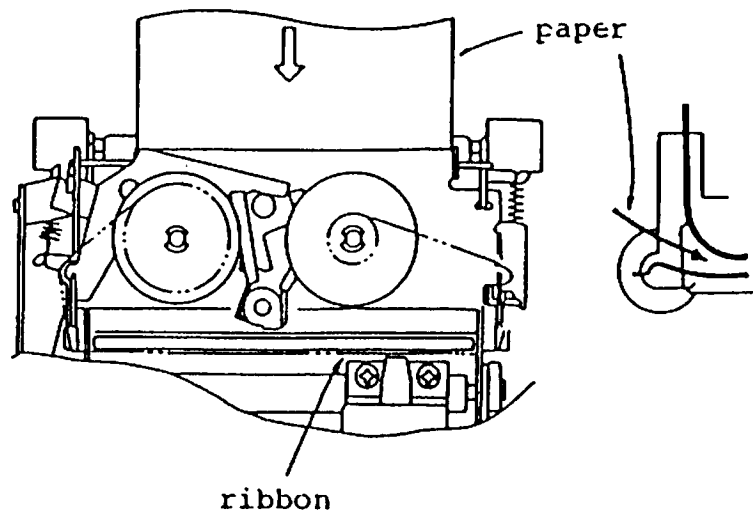
10.1 CLEANING

Keep your printer in good condition by cleaning it periodically.

CAUTION: Unplug the machine before you begin this procedure. Failure to do so could result in serious personal injury or damage to the printer mechanisms.

1. Clean printer case with a cloth dampened slightly with alcohol. Be careful not to wet the electronic parts or machine body.
2. Inside the printer: Remove dust and foreign particles from the printer mechanism and PCB using a soft brush each time you replace parts or when you remove the top cover or case. Be careful not to damage electronic parts and wiring.

10.2 Changing the Paper and Ribbon



Be careful to keep ink away from the machine body when you replace the ribbon. If ink should get on the case, clean with a cloth dampened with alcohol immediately.

10.2.1 CBM-510 SERIES

Hold the hook of the cover and lift it gently. Remove old ribbon; discard. Insert new ribbon as shown in the diagram above.

10.2.2 CBM-520 SERIES

Remove the two screws which hold the front cover in place; remove the cover to replace the ribbon (as shown in the diagram above).

10.3 Changing Fuses

If the printer does not operate or the indicator lamp does not light, check the fuse first. If the fuse is blown, locate the cause and repair it before replacing the fuse. Then follow the instructions below to replace the fuse.

CAUTION: Unplug the machine before you begin this procedure. Failure to do so could result in serious personal injury or damage to the printer mechanisms.

10.3.1 CBM-510 SERIES

1. Remove four screws located at the lower side of the printer case.
2. Open the top case.
3. Replace the fuse with 125V 1A musette type F-7142 (Sato Parts) or equivalent.

10.3.2 CBM-520 SERIES

1. Remove the four screws holding the panel.
2. Remove the mechanism body from the case.
3. Remove the fuse cover of the rear power unit.
4. Replace the fuse with 125V 1A F-7151 (Sato Parts) or equivalent.

10.4 Standard Accessories

10.4.1 CBM-510 SERIES

Name	Quantity
Fuse 1A Musette type	1
Roll paper	
24-column 57 x 60 ϕ	1
40-column 69.5 x 50 ϕ	
Paper shaft	1
Ribbon (red/black)	1
Test print sample	1

10.4.2 CBM-520 SERIES

Name	Quantity
Fuse 1A Musette type	1
Roll paper	
24-column 57 x 60 ø	1
40-column 69.5 x 50 ø	
Paper shaft	1
Ribbon (red/black)	1
Data input cord with housing (30 cm)	1
Test print sample	1