

Specifications for Control Board for M-180 Series **BA-180**

February 26. 1996

Rev. C

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REVISION SHEET

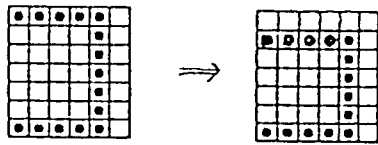
Sheet 1 of 1

Be sure to check the contents before utilizing the specification. This specification has the history shown below.

REVISIONS			DESIGN SECTION			SHEET REV. NO.					
REV	DOCUMENT	DATE	WRT	CHK	APL	SHEET	REV	SHEET	REV	SHEET	REV
	ENACTMENT	Apr. 25. '86	Yoshie	koiwai	shido	1		20		39	
A	Modification	Feb. 20. '89	Yoshie	koiwai	shido	2		21		40	
B	Modification	May. 20. '92	inako	Ito	Endo	3		22		41	
C	Modification	Feb. 26. '96	稻越		猪田	4	B	23		42	C
						5		24		43	B
						6		25			
						7		26			
						8		27	A		
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						12		31			
						13		32			
						14		33			
						15		34			
						16		35			
						17		36			
						18		37			
						19		38			
TITLE BA-180 Specification (STANDARD)			NUMBER OF SHEETS								
			Front Part					Contents	Appendix	Total	
			Cover	Rev. Sheet	Scope	Table of contents	General Features				
			1	1	—	1	1				

REVISION SHEET

Sheet 1 of 1

REV	SHEET	CHANGED CONTENTS	DATE
A	27	(10) Font Table (BA)  [Correction]	'89. 2. 20
B	4 43	2.2 1) Input Connector(CN1) Suitable connector socket...FCN-365J024 ↓ FCN-361J024 fig.2 Circuit diagram CN1 FCN-361P024AG ↓ FCN-365P024AG [Correction]	'92. 5. 20
C	42	fig.1 Exterior Dimensions 18.17 → 16.4 3 → 4 20.05 → 24.14 [Correction]	'96. 2. 26
TITLE BA-180 Specification (STANDARD)			

Summary

This Controller unit, designed to control Model-180, 181, 182, 183, Micro Dot Matrix Printer.
It is characterized by the following features.

1. Except for the printer drive circuit, the controller has C-MOS configuration, which provides the following advantages.
 - a. Wide operating voltage range of 4.0 - 5.75 V DC and low power consumption allows the unit to be battery driven.
 - b. A power down function minimizes power consumption during wait periods.
2. Printer can be controlled and driven using a single power supply.
3. Option of parallel or serial data transfer methods.
4. Direct connection to I/O port of host. unit possible.
5. Print direction switching function.
6. The text mode or bit image mode printing methods can be selected.
7. Printer protect function.
8. Compact size. Exterior dimensions are 80(w) x 88(D) x 19.5(H).

EPSON	TITLE BA-180	SHEET REVISION	NO.	
			NEXT	SHEET

Contents

1. General Specifications...	1
2. Detailed Specifications...	3
2.1 Electric Characteristics...	3
2.2 Interface Specifications...	4
2.3 Explanation of Printer Connector Pins...	14
2.4 Function Selection Using Dip Switches...	15
2.5 Character Set...	16
2.6 Control Functions...	30
2.7 Control commands...	32
Fig. 1 Exterior Dimensions	42
Fig. 2 Circuit diagram	43

EPSON	TITLE	SHEET REVISION	NO.	
	BA-180		NEXT	SHEET

1. General Specifications

1.1 Shape and Dimension: 80(D) x 88(W) x 19.5(H) mm
For further details, see Fig. 1(P.42)

1.2 Data Input Form Selection between Parallel and Serial

- 1) 8 bit parallel 2500 CPS (MAX.)
- 2) Nonsynchronous Serial 4800 BPS or 9600 BPS

1.3 Print Function

1) Flexible printer model Model-180 series
(Model-180,181,182,183)

a. Print Method Impact Dot Matrix

b. Number of columns and print speed

Models	Columns	Print speed (approx.)
Model-180	24	1.7 l/s
Model-181	30	1.3 l/s
Model-182	36	1.1 l/s
Model-183	42	1.0 l/s

2) Types of printing character

JIS mode 128 characters
(5x7 dot matrix)
ASCII mode 31 small letter characters
(5x7 dot matrix)
Graphic mode 36 characters
(6x7 dot matrix)
Download mode 8 characters
(6x7 dot matrix)

3) Line space 3 dots

4) Printing direction Selection between L-type and R-type

1.4 Control function

- 1) Paper feed function
- 2) Self check function
- 3) Buffer-full printing function
- 4) Emergency stop function

EPSON

TITLE

BA-180

SHEET
REVISION

NO.

NEXT

2

SHEET

1

5) Control code

Print command (CR or LF)
 Input Data Cancel command (CAN)
 Enlarged characters
 (10x7 dot matrix)
 International character
 (32 characters)
 Bit Image printing
 Down-load character function
 (8 characters)
 Spacing column
 (0 - 255 dots line spacing)
 Power down function (DC2, DC3)
 Paper feed command

1.5 Operating Voltage Range 4.0 - 5.75 VDC

1.6 Consumption of current (Vcc=5V)

In operating at 6 MHz 6mA (TYP)
 In power down condition
 DC 2 command ---- 2mA (TYP)
 DC 3 command, Emergency stop
 ---- 1mA (TYP)

EPSON	TITLE BA-180	SHEET REVISION	NO.	
			NEXT 3	SHEET 2

2 Detailed Specifications

2.1 Electric Characteristics

1) Absolute Maximum Ratings

Item	Symbol	Condition	Rate	Unit
#1 S.V.	Vcc	Ta=25 °C	Vcc-GND=0 - 6	V
#2 V.I.	Vi	Ta=25 °C	-0.3 -(Vcc-GND)	V
#3 S.T.	Tstg	-----	-25 - +60	°C
#4 S.H.	----	-----	0 - 90	%RH

2) Operating Range

Item	Symbol	Condition	Rate	Unit
#1 S.V.	Vcc	-----	Vcc-GND=4 - 5.75	V
#5 O.T.	TA	-----	0 - 50	°C
#6 O.H.	----	-----	10 - 85 (no condensation)	%RH
#7 F.O.	N	MOS load TTL load	10 1	-- --

- #1 ----- Supply Voltage
- #2 ----- Voltage on all input
- #3 ----- Storage Temperature
- #4 ----- Storage Humidity
- #5 ----- Operating Temperature
- #6 ----- Operating Humidity
- #7 ----- Fun-Out

NOTICE:

If input-voltage exceeds rate voltage, this L.S.I. is caused by lurch-up phenomenon and fatal damage is inflicted to working of system.

EPSON

TITLE

BA-180

SHEET
REVISION

NO.

NEXT

4

SHEET

3

2.2 Interface Specifications

1) Input Connector (CN1)

Suitable connector socket... FCN-361J024 (FUJITSU)

* We recommend that the cable be as short as possible, for signals use the twisted pair type lines and the return wires should be grounded.

2) Arrangement and Functions of Input Connector Pins

Pin No.	Signal Name	Input	Output	Function
A1	DATA 0	○		Parallel transfer Parallel data input terminal "HIGH" data "1" "LOW" data "0"
B1	DATA 1	○		
A2	DATA 2	○		
B2	DATA 3	○		
A3	DATA 4	○		
B3	DATA 5	○		
A4	DATA 6	○		
B4	DATA 7	○		
A5	$\overline{\text{STRB}}$	○		Strobe pulse input Data is accessed at "LOW" level.
B5	BUSY		○	Parallel data reception mode Data input is possible at "LOW" level.
A6	$\overline{\text{ACK}}$		○	Parallel data reception mode When data input is completed "LOW" level pulse is generated.
B6	$\overline{\text{INT}}$	○		Power down release signal input At "LOW" level, power down is released.
A7	$\overline{\text{SLIN}}$	○		On line/off line selector terminal At "LOW" level On-line ... Data transfer is possible. At "HIGH" level Off-line ... Data transfer is impossible.

EPSON

TITLE

BA-180

SHEET
REVISION

B

NO.

NEXT

5

SHEET

4

Pin No.	Signal Name	Input	Output	Function
B7	$\overline{\text{PF}}$	○		Paper feed signal input Effective only when off-line.
A8	$\overline{\text{RESET}}$	○		System reset The LSI is initialized at "LOW" level.
B8	RXD	○		Serial transfer Serial data input terminal
A9	$\overline{\text{DTR}}$		○	Serial data reception mode Data input is possible at "LOW" level.
B9				N.C
AB10	Vcc	○		+ Power supply (4.0 - 5.75 VDC)
AB11,12	GND	○		Ground

- Note: (1) If used when Vcc-GND=5V DC, all input signals will be at TTL level.
(2) A line drawn across the top indicates signals which are active when "LOW".
(3) The $\overline{\text{RESET}}$ pin should be controlled by an open collector.
(4) Please refer to section 3) (P.6) for details regarding the pins.

EPSON

TITLE

BA-180

SHEET
REVISION

NO.

NEXT

6

SHEET

5

3) Explanation of CN1 Connector Signal

a) DATA0 - DATA7

These pins are used for inputting 8bit parallel data.

During parallel data reception, these pins use the STRB pulse to latch data, and the unit is in the on-line mode and a "LOW" level signal is outputted from by the BUSY pin or when the ACK signal has just been output.

Therefore, the data in the data bus must stable before, between and after the STRB pulse.

b) STRB

This is the strobe pulse input pin used for reading parallel data. The unit detects the signal level of this pin when the BUSY signal is "LOW", and the unit is in the on-line mode. In the normal status, the signal is at the "HIGH" level, and data are read after the level becomes "LOW". The pulse width is necessary more than 0.5 μ s.

c) BUSY

This pin is used when parallel data is being received.

The BUSY signal notifies the host computer that the printer is ready to receive data or not when the printer is in the on-line mode. The host unit must output data when it detects a "LOW" level BUSY signal.

d) ACK

Data reading signal in parallel data reception is generated from this terminal.

This signal, having approx. 1.25 μ s pulse width, notifies that the printer has completely read data. The host computer can send other data only after having received this pulse signal. This signal can be considered as a data request signal.

EPSON

TITLE

BA-180

SHEET
REVISION

NO.

NEXT
7

SHEET
6

e) $\overline{\text{INT}}$

Power down mode

This terminal is used for releasing power down mode by DC 2, DC 3 command.

DC 2 power down release

DC 2 power down is released by applying "LOW" level over 5 μs to $\overline{\text{INT}}$ terminal.

DC 3 power down release

DC 3 power down is released by keeping $\overline{\text{INT}}$ terminal "LOW" level till XTAL oscillation gets stabilized.

Power Down Mode is described in the item 2.7 (P.32) in detail.

EPSON

TITLE

BA-180

SHEET
REVISION

NO.

NEXT
8

SHEET
7

f) SLIN

A "LOW" level signal at this pin allows the unit to receive data and set it on-line. On the other hand, a "HIGH" level signal makes data receiving impossible and set it off-line but allows receiving of paper feed (PF) signal.

The following are SLIN pin control restrictions.

- i) After maximum three dots paper feed, on-line is caused by converting SLIN terminal from "HIGH" level to "LOW" level, under paper feed with PF terminal inputted.
- ii) If a "HIGH" level signal is applied to the SLIN pin while in the text mode, all previously input data will be printed and the unit will go off-line.
- iii) If a "HIGH" level signal is applied to the SLIN pin while data is being received, during the bit image mode, normal data will not printed. Therefore, the SLIN pin should not be controlled while bit image data is being received.

However, while being in the following conditions, LSI can read the condition of SLIN terminal.

Soft Sampling, that is, treatment inside LSI is performed in all the following conditions, so it is in the part of time that the terminal condition can be read in effect.

- a) After system reset completion
- b) After power down release
- c) In the middle of data ready
- d) In the middle of paper feed

EPSON

TITLE

BA-180

SHEET
REVISION

NO.

NEXT

9

SHEET

8

g) $\overline{\text{PF}}$

This terminal is used for manual paper feed, and also for self-check control. Signals can be received from this terminal after CPU confirms $\overline{\text{SLIN}}$ terminal "HIGH" level and set it off-line.

But $\overline{\text{PF}}$ terminal can't be controlled in power down.

Paper feed is performed by applying "LOW" level to $\overline{\text{PF}}$ terminal over 50 ms, when $\overline{\text{PF}}$ terminal can be controlled in the off-line mode.

Paper feed with $\overline{\text{PF}}$ terminal inputted is performed in its "LOW" level, but it is difficult to control the number of paper feed lines by $\overline{\text{PF}}$ terminal because of print speed.

Print command method (CR or LF) or paper feed command (ESC+B) should be taken in order to control the number of paper feed lines from the host-computer side.

Self-check is performed by " $\overline{\text{RESET}}$ " in $\overline{\text{PF}}$ terminal "LOW" level.

Self-check stop is performed by " $\overline{\text{RESET}}$ " in $\overline{\text{PF}}$ terminal "HIGH" level.

h) $\overline{\text{RESET}}$

This unit is initialized when this pin has a "LOW" signal.

This pin should be controlled by an open collector and resetting pulse width should be over 5ms.

However, because this pin is combined with the power-on resetting circuit, several hundred to several thousand ms are necessary for resetting. (If a signal from the computer system is used for resetting, we recommend that the C9 power supply capacitor be removed.)

i) $\overline{\text{RXD}}$

This pin is used when inputting serial data. Serial data from the host-computer side can be received from this terminal after $\overline{\text{DTR}}$ terminal is mode "LOW" level keeping in a state of on-line.

EPSON

TITLE

BA-180

SHEET
REVISION

NO.

NEXT

10

SHEET

9

j) DTR

This pin is used when inputting serial data. In the on-line mode, the DTR signal is the signal which notifies the host system that the printer is resdy to receive data. After confirming RDY signal "LOW" level in the host computer side, RXD signal must be made "LOW" level in order to execute data transfer within 200 μ s.

The DTR signal becomes "HIGH" in the following situations.

- i) During or after system resetting
- ii) When a "HIGH" level SLIN signal is received.
- iii) During data read
- iv) During printing operation
- v) During power down mode enabled by the DC2 and DC3 commands and after release.

EPSON

TITLE

BA-180

SHEET
REVISION

NO.

NEXT
11

SHEET
10

- 4) Parallel interface timing
See fig. 2.2-1 (P.12) for "Parallel Interface Timing Chart".
- 5) Serial interface timing
See fig. 2.2-2 (P.13) for "Serial Interface Timing Chart".

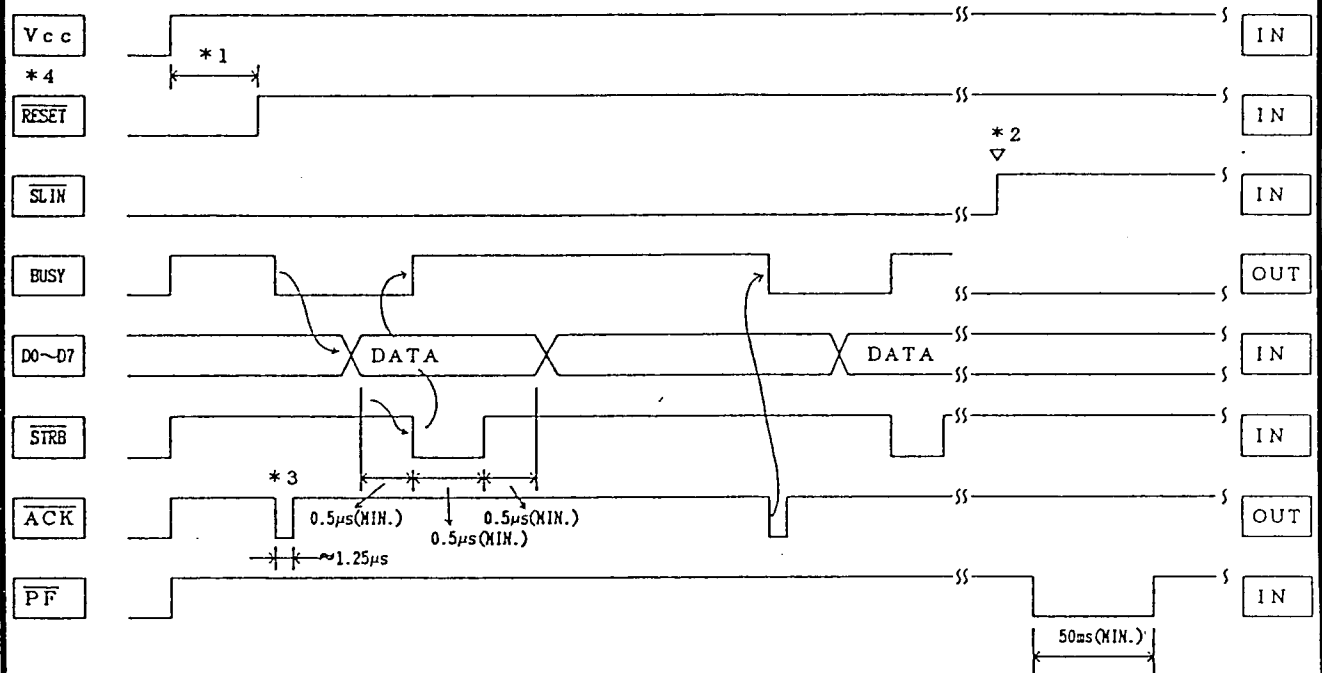
[NOTICE]

Data transfer speed and printing function.

This motor is stopped every one line of printing by printer control. If data transfer of next line is completed before completion of one line of printing, continuous printing that motor doesn't pause is possible.

EPSON	TITLE BA-180	SHEET REVISION	NO.	
			NEXT 12	SHEET 11

Parallel Interface Timing Chart



- *1 Time created by the internal power-on resetting circuit. (approx. 500 - 1500ms)
- *2 After this, paper feed can be performed by the $\overline{PF}$ terminal.
- *3 After LSI reset, one $\overline{ACK}$ signal pulse is outputted.
- *4 This is a signal contained in the circuit which is used for resetting and is not a connector signal.

Fig. 2.2-1

EPSON

TITLE

BA-180

SHEET
REVISION

NO.

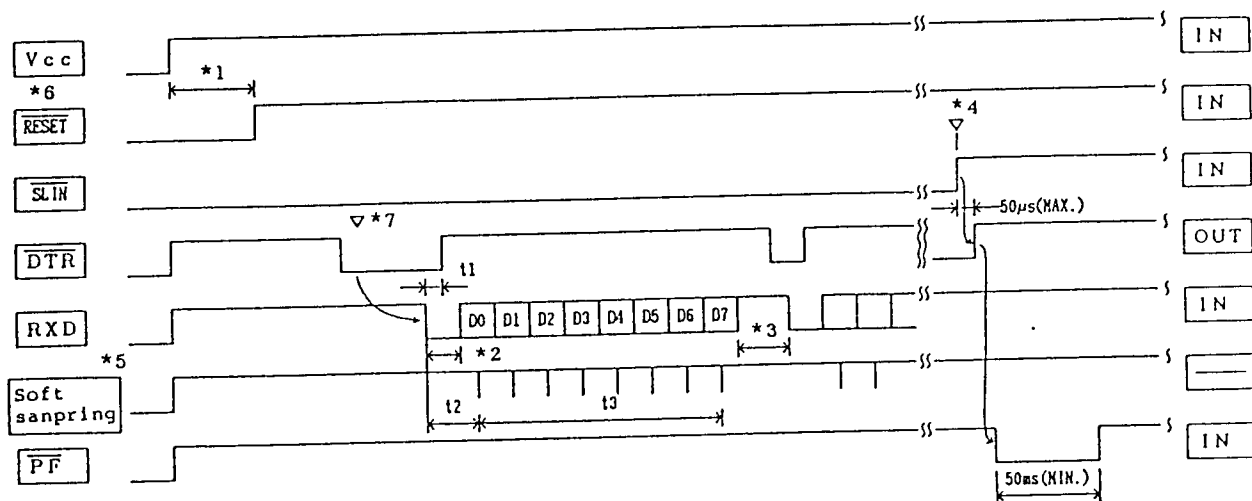
NEXT

13

SHEET

12

Serial Interface Timing Chart



- *1 Time created by the internal power-on resetting circuit. (approx. 500 - 1500ms)
- *2 Start bit is 1 bit.
- *3 Stop bit is more than 1 bit.
- *4 After this, paper feed can be performed by the PF terminal.
- *5 This is used for processing done in the controller and does not appear as a signal outside the controller.
- *6 This is a signal contained in the circuit which is used for resetting and is not a connector signal.
- *7 On printer's control, as RDY signal often generates without relation between RXD signal when data transfer is performed, it is necessary RXD signal are made "LOW" level within 200 μ s after confirming RDY signal "LOW" level.

Transmission speed	t1	t2	t3
4800 BPS	177-239 μ s	250-375 μ s	1167-1750 μ s
9600 BPS	39- 71 μ s	125-187 μ s	583- 875 μ s

Fig. 2.2-2

EPSON	TITLE BA-180	SHEET REVISION	NO.	
			NEXT 14	SHEET 13

2.3 Explanation of Printer Connector Pins (CN2)
2.54mm Pitch 15 Hole

*1 Hole No.	Name	Printer Connector Name
1	PTRG1	Fast feed trigger magnet
2	PTRG2	Fast feed trigger magnet
3	RSW1	Reset detector
4	RSW2	Reset detector
5	MOTOR(+)	Motor(+)
6	MOTOR(-)	Motor(-)
7	HEAD B	Printer solenoid (B)
8	HEAD C	Printer solenoid (C)
9	HEAD D	Printer solenoid (D)
10	HEAD E	Printer solenoid (E)
11	HEAD F	Printer solenoid (F)
12	HEAD COM.	Common printer solenoid
13	HEAD A	Printer solenoid (A)
14	TG1	Timing detector
15	TG2	Timing detector

*1 The printer connector pins and the length of the cable used should be kept to the minimum required and watch for noise (static) occurring at holes No. 3, 4, 14 and 15. For further details on printer specifications see the Printer Specifications Manual.

Suitable connector... Model No. 5143-15CPB (Molex)
or HBRB15S-1J (Burndy)

EPSON

TITLE

BA-180

SHEET
REVISION

NO.

NEXT

15

SHEET

14

2.4 Selecting Functions Using Dip Switches (DIP SW)

The functions in Table 2.4-1 are selected according to dip switch number.

Terminal	Function	OFF	ON
S1	Selection of data transfer method	Parallel	Serial
S2	Selection of the printer method	L-TYPE	R-TYPE
S3	At parallel translation, selection between CR or LF	CR	LF
	At serial translation, selection of baud rate.	9600BPS	4800BPS

Table 2.4-1 Selection of function

- *1 Dip switches must be set before system initializing. If set after system initialization operation cannot be guaranteed.
- *2 Refer to section 2.6 (P.30) for details on printing direction.

EPSON

TITLE

BA-180

SHEET
REVISION

NO.

NEXT

16

SHEET

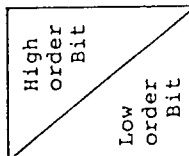
15

2.5 Character Set

(1) Japan

*1	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	NUL	SP	0	@	P	.	p	—	⌵	SP	—	タ	ミ	円	
1	0001		!	1	A	Q	a	q	—	T	,	ア	チ	ム	年	
2	0010		"	2	B	R	b	r	—	⌵	⌵	イ	ツ	メ	月	
3	0011		#	3	C	S	c	s	—	ト	J	ウ	テ	モ	日	
4	0100		\$	4	D	T	d	t	—	—	,	エ	ト	ヤ		
5	0101		%	5	E	U	e	u	—	—	.	オ	ナ	コ		
6	0110		&	6	F	V	f	v	—	⌵	ヲ	カ	ニ	ヨ		
7	0111		'	7	G	W	g	w	—	⌵	フ	キ	ス	ラ		
8	1000		(	8	H	X	h	x	—	⌵	イ	ク	ネ	リ		
9	1001		)	9	I	Y	i	y	—	⌵	ウ	ケ	ノ	ル		
A	1010	LF	*	:	J	Z	j	z	—	⌵	エ	コ	ハ	レ		
B	1011	ESC	+	:	K	[	k	⌵	⌵	⌵	オ	サ	ヒ	ロ		
C	1100		,	<	L	\	l	⌵	⌵	⌵	ヤ	シ	フ	ワ		
D	1101	CR	—	=	M	]	m	⌵	⌵	⌵	ユ	ス	ヘ	ン		
E	1110	SO	.	>	N	^	n	—	⌵	⌵	ヨ	セ	ホ	。		
F	1111		/	?	O	_	o	⌵	⌵	⌵	ヅ	ゾ	ヅ	。		

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EPSON

TITLE

BA-180

SHEET
REVISION

NO.

NEXT

17

SHEET

16

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*1	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	NUL	SP	0	16	32	48	64	80	96	112	128	144	160	176	192
1	0001	1	17	33	49	65	81	97	113	129	145	161	177	193	209	225
2	0010	DC2	•	34	50	66	82	98	114	130	146	162	178	194	210	226
3	0011	DC3	#	35	51	67	83	99	115	131	147	163	179	195	211	227
4	0100	DC4	\$	36	52	68	84	100	116	132	148	164	180	196	212	228
5	0101	%	37	53	69	85	101	117	133	149	165	181	197	213	229	245
6	0110	&	38	54	70	86	102	118	134	150	166	182	198	214	230	246
7	0111	'	39	55	71	87	103	119	135	151	167	183	199	215	231	247
8	1000	CAN	(	40	56	72	88	104	120	136	152	168	184	200	216	232
9	1001	)	41	57	73	89	105	121	137	153	169	185	201	217	233	249
A	1010	*	42	58	74	90	106	122	138	154	170	186	202	218	234	250
B	1011	ESC	+	43	59	75	91	107	123	139	155	171	187	203	219	235
C	1100	,	44	60	76	92	108	124	140	156	172	188	204	220	236	252
D	1101	=	45	61	77	93	109	125	141	157	173	189	205	221	237	253
E	1110	>	46	62	78	94	110	126	142	158	174	190	206	222	238	254
F	1111	/	47	63	79	95	111	127	143	159	175	191	207	223	239	255

EPSON

TITLE

BA-180

SHEET
REVISION

NO.

NEXT

18

SHEET

17

(3) England

*1		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	NUL	SP	16	32	48	64	80	96	112	128	144	160	176	192	208	224
1	0001		1	17	33	49	65	81	97	113	129	145	161	177	193	209	225
2	0010		DC2	18	34	50	66	82	98	114	130	146	162	178	194	210	226
3	0011		DC3	19	35	51	67	83	99	115	131	147	163	179	195	211	227
4	0100		DC4	20	36	52	68	84	100	116	132	148	164	180	196	212	228
5	0101		%	21	37	53	69	85	101	117	133	149	165	181	197	213	229
6	0110		&	22	38	54	70	86	102	118	134	150	166	182	198	214	230
7	0111		,	23	39	55	71	87	103	119	135	151	167	183	199	215	231
8	1000		CAN	24	40	56	72	88	104	120	136	152	168	184	200	216	232
9	1001		)	25	41	57	73	89	105	121	137	153	169	185	201	217	233
A	1010	LF	*	26	42	58	74	90	106	122	138	154	170	186	202	218	234
B	1011	ESC	+	27	43	59	75	91	107	123	139	155	171	187	203	219	235
C	1100		.	28	44	60	76	92	108	124	140	156	172	188	204	220	236
D	1101	CR	-	29	45	61	77	93	109	125	141	157	173	189	205	221	237
E	1110	SO	>	30	46	62	78	94	110	126	142	158	174	190	206	222	238
F	1111		/	31	47	63	79	95	111	127	143	159	175	191	207	223	239

EPSON

TITLE

BA-180

SHEET
REVISION

NO.

NEXT

19

SHEET

18

(4) France

*1	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	NUL	SP	O	48	64	80	96	P	112	128	144	160	176	192	208	224
1	0001	I	1	49	65	81	97	Q	113	129	145	161	177	193	209	225
2	0010	DC2	2	50	66	82	98	R	114	130	146	162	178	194	210	226
3	0011	DC3	3	51	67	83	99	S	115	131	147	163	179	195	211	227
4	0100	DC4	4	52	68	84	100	T	116	132	148	164	180	196	212	228
5	0101	%	5	53	69	85	101	U	117	133	149	165	181	197	213	229
6	0110	&	6	54	70	86	102	V	118	134	150	166	182	198	214	230
7	0111	.	7	55	71	87	103	W	119	135	151	167	183	199	215	231
8	1000	CAN	8	56	72	88	104	X	120	136	152	168	184	200	216	232
9	1001	)	9	57	73	89	105	Y	121	137	153	169	185	201	217	233
A	1010	*	:	58	74	90	106	Z	122	138	154	170	186	202	218	234
B	1011	ESC	+	59	75	91	107	.	123	139	155	171	187	203	219	235
C	1100	.	<	60	76	92	108	^	124	140	156	172	188	204	220	236
D	1101	-	=	61	77	93	109	~	125	141	157	173	189	205	221	237
E	1110	.	>	62	78	94	110	^	126	142	158	174	190	206	222	238
F	1111	/	?	63	79	95	111	o	127	143	159	175	191	207	223	239

EPSON

TITLE

BA-180

SHEET
REVISION

NO.

NEXT

20

SHEET

19

(5) Germany

*1		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	NUL	SP	0	16	32	48	64	80	96	112	128	144	160	176	192	208
1	0001		I	1	17	33	49	65	81	97	113	129	145	161	177	193	209
2	0010		DC2	•	18	34	50	66	82	98	114	130	146	162	178	194	210
3	0011		DC3	#	19	35	51	67	83	99	115	131	147	163	179	195	211
4	0100		DC4	\$	20	36	52	68	84	100	116	132	148	164	180	196	212
5	0101		%	5	21	37	53	69	85	101	117	133	149	165	181	197	213
6	0110		&	6	22	38	54	70	86	102	118	134	150	166	182	198	214
7	0111		,	7	23	39	55	71	87	103	119	135	151	167	183	199	215
8	1000		CAN	(	24	40	56	72	88	104	120	136	152	168	184	200	216
9	1001		)	9	25	41	57	73	89	105	121	137	153	169	185	201	217
A	1010	LF	*	:	26	42	58	74	90	106	122	138	154	170	186	202	218
B	1011		ESC	+	27	43	59	75	91	107	123	139	155	171	187	203	219
C	1100		•	<	28	44	60	76	92	108	124	140	156	172	188	204	220
D	1101	CR	-	=	29	45	61	77	93	109	125	141	157	173	189	205	221
E	1110	SO	•	>	30	46	62	78	94	110	126	142	158	174	190	206	222
F	1111		/	?	31	47	63	79	95	111	127	143	159	175	191	207	223

EPSON

TITLE

BA-180

SHEET
REVISION

NO.

NEXT

21

SHEET

20

(6) Denmark

*1	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	NUL	SP	0	1	@	P	.	p	-	-	1	176	192	208	224	240
1	0	16	32	48	A	Q	a	q	-	T	144	160	176	192	208	224
2	1	17	33	49	B	R	b	r	-	T	145	161	177	193	209	225
3	2	18	34	50	C	S	c	s	-	T	146	162	178	194	210	226
4	3	19	35	51	D	T	d	t	-	-	147	163	179	195	211	227
5	4	20	36	52	E	U	e	u	-	-	148	164	180	196	212	228
6	5	21	37	53	F	V	f	v	-	-	149	165	181	197	213	229
7	6	22	38	54	G	W	g	w	-	-	150	166	182	198	214	230
8	7	23	39	55	H	X	h	x	-	-	151	167	183	199	215	231
9	8	24	40	56	I	Y	i	y	-	-	152	168	184	200	216	232
A	9	25	41	57	J	Z	j	z	-	-	153	169	185	201	217	233
B	10	26	42	58	K	Æ	k	æ	-	-	154	170	186	202	218	234
C	11	27	43	59	L	Ø	l	ø	-	-	155	171	187	203	219	235
D	12	28	44	60	M	Å	m	å	-	-	156	172	188	204	220	236
E	13	29	45	61	N	ˆ	n	ˆ	-	-	157	173	189	205	221	237
F	14	30	46	62	O	ˆ	o	ˆ	-	-	158	174	190	206	222	238
	15	31	47	63					+	-	159	175	191	207	223	239

EPSON

TITLE

BA-180

SHEET
REVISION

NO.

NEXT

22

SHEET

21

(7) Sweden

*1	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	0000	NUL	0	0000	0001	0010	0100	0101	0110	0111	1000	1001	1010	1011	1100	1111
1	0001		1	0001	0010	0100	0101	0110	0111	1000	1001	1010	1011	1100	1101	1110
2	0010		2	0010	0011	0100	0101	0110	0111	1000	1001	1010	1011	1100	1101	1110
3	0011		3	0011	0012	0100	0101	0110	0111	1000	1001	1010	1011	1100	1101	1110
4	0100		4	0100	0101	0110	0111	0112	0113	1000	1001	1010	1011	1100	1101	1110
5	0101		5	0101	0102	0110	0111	0112	0113	1000	1001	1010	1011	1100	1101	1110
6	0110		6	0110	0111	0112	0113	0114	0115	1000	1001	1010	1011	1100	1101	1110
7	0111		7	0111	0112	0113	0114	0115	0116	1000	1001	1010	1011	1100	1101	1110
8	1000		8	1000	1001	1010	1011	1012	1013	1100	1101	1110	1111	1112	1113	1114
9	1001		9	1001	1002	1010	1011	1012	1013	1100	1101	1110	1111	1112	1113	1114
A	1010		A	1010	1011	1012	1013	1014	1015	1100	1101	1110	1111	1112	1113	1114
B	1011		B	1011	1012	1013	1014	1015	1016	1100	1101	1110	1111	1112	1113	1114
C	1100		C	1100	1101	1110	1111	1112	1113	1114	1115	1116	1117	1118	1119	1120
D	1101		D	1101	1102	1110	1111	1112	1113	1114	1115	1116	1117	1118	1119	1120
E	1110		E	1110	1111	1112	1113	1114	1115	1116	1117	1118	1119	1120	1121	1122
F	1111		F	1111	1112	1113	1114	1115	1116	1117	1118	1119	1120	1121	1122	1123

EPSON

TITLE

BA-180

SHEET
REVISION

NO.

NEXT

23

SHEET

22

(8) Italy

*1		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	NUL		SP	0	@	P	ù	p	—	⊥						
1	0001			!	1	A	Q	a	q	—	⊥						
2	0010		DC2	•	2	B	R	b	r	—	⊥						
3	0011		DC3	#	3	C	S	c	s	—	⊥						
4	0100		DC4	\$	4	D	T	d	t	—	⊥						
5	0101			%	5	E	U	e	u	—	⊥						
6	0110			&	6	F	V	f	v	—	⊥						
7	0111			'	7	G	W	g	w	—	⊥						
8	1000		CAN	(	8	H	X	h	x	—	⊥						
9	1001			)	9	I	Y	i	y	—	⊥						
A	1010	LF		*	:	J	Z	j	z	—	⊥						
B	1011		ESC	+	:	K	•	k	•	—	⊥						
C	1100			,	<	L	/	l	δ	—	⊥						
D	1101	CR		—	=	M	€	m	€	—	⊥						
E	1110	SO		•	>	N	^	n	^	—	⊥						
F	1111			/	?	O	—	o	o	—	⊥						

EPSON

TITLE

BA-180

SHEET
REVISION

NO.

NEXT

24

SHEET

23

(9) Spain

*1	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	NUL	SP	0	1	2	3	4	5	6	7	8	9	A	B	C	D
1	0001	1	32	48	64	80	96	p	—	—	144	160	176	192	208	224
2	0010	DC2	33	49	65	81	97	q	—	—	145	161	177	193	209	225
3	0011	DC3	34	50	66	82	98	r	—	—	146	162	178	194	210	226
4	0100	DC4	35	51	67	83	99	s	—	—	147	163	179	195	211	227
5	0101	DC4	36	52	68	84	100	t	—	—	148	164	180	196	212	228
6	0110	%	37	53	69	85	101	u	—	—	149	165	181	197	213	229
7	0111	&	38	54	70	86	102	v	—	—	150	166	182	198	214	230
8	1000	CAN	39	55	71	87	103	w	—	—	151	167	183	199	215	231
9	1001	(	40	56	72	88	104	x	—	—	152	168	184	200	216	232
A	1010	)	41	57	73	89	105	y	—	—	153	169	185	201	217	233
B	1011	*	42	58	74	90	106	z	—	—	154	170	186	202	218	234
C	1100	ESC	43	59	75	91	107	—	—	—	155	171	187	203	219	235
D	1101	+	44	60	76	92	108	—	—	—	156	172	188	204	220	236
E	1110	—	45	61	77	93	109	—	—	—	157	173	189	205	221	237
F	1111	—	46	62	78	94	110	—	—	—	158	174	190	206	222	238
		—	47	63	79	95	111	—	—	—	159	175	191	207	223	239

EPSON

TITLE

BA-180

SHEET
REVISION

NO.

NEXT

25

SHEET

24

(10) Font Table

(20)	(21)	(22)	(23)	(24)	(25)	(26)	(27)
(28)	(29)	(2A)	(2B)	(2C)	(2D)	(2E)	(2F)
(30)	(31)	(32)	(33)	(34)	(35)	(36)	(37)
(38)	(39)	(3A)	(3B)	(3C)	(3D)	(3E)	(3F)
(40)	(41)	(42)	(43)	(44)	(45)	(46)	(47)
(48)	(49)	(4A)	(4B)	(4C)	(4D)	(4E)	(4F)
(50)	(51)	(52)	(53)	(54)	(55)	(56)	(57)
(58)	(59)	(5A)	(5B)	(5C)	(5D)	(5E)	(5F)

EPSON

TITLE

BA-180

SHEET
REVISION

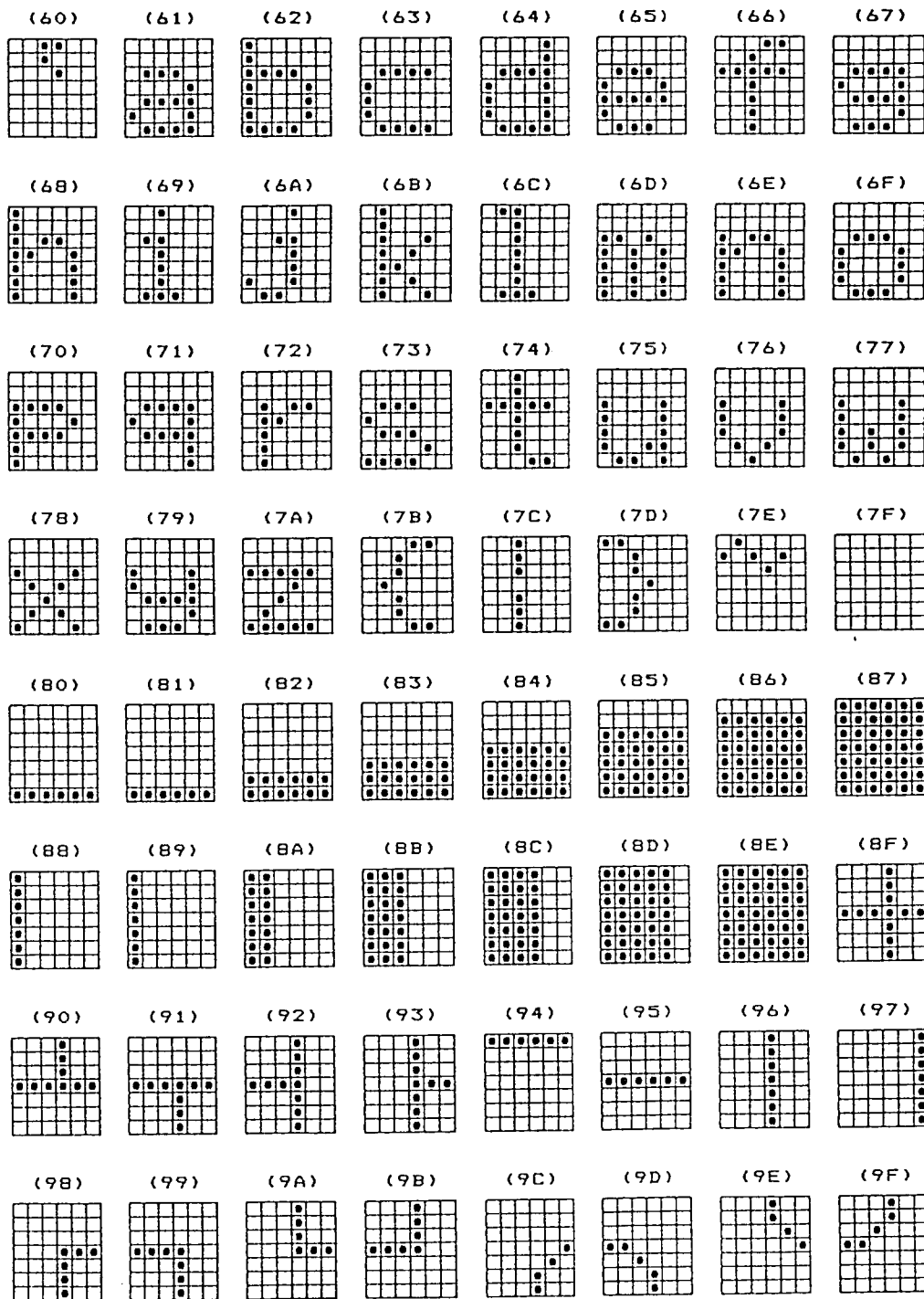
NO.

NEXT

26

SHEET

25



EPSON

TITLE

BA-180

SHEET
REVISION

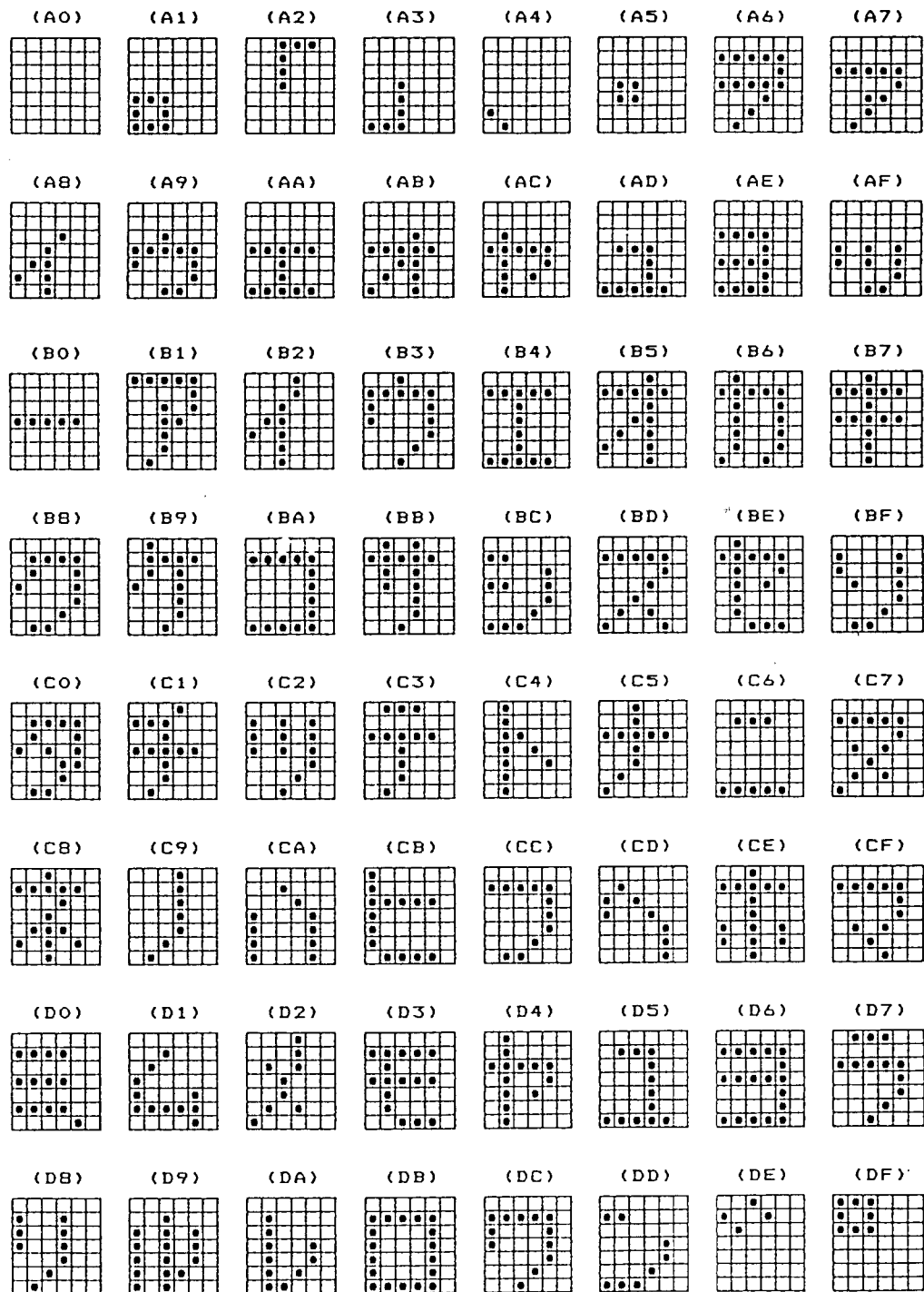
NO.

NEXT

27

SHEET

26



EPSON

TITLE

BA-180

SHEET
REVISION

A

NO.

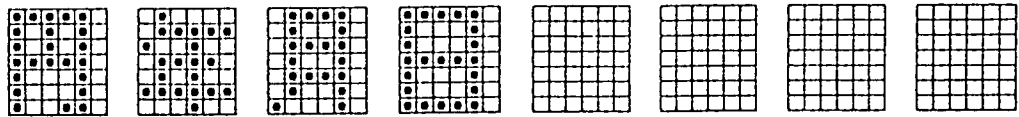
NEXT

28

SHEET

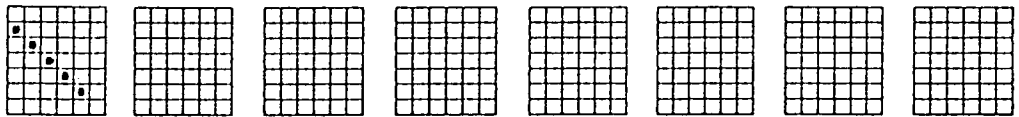
27

(E0) (E1) (E2) (E3) (E4) (E5) (E6) (E7)



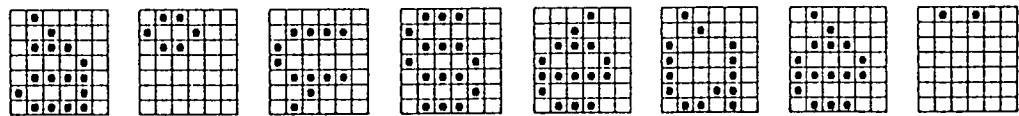
U.S.A

(5C)



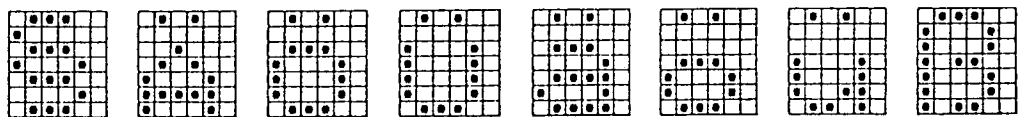
France

(40) (5B) (5C) (5D) (7B) (7C) (7D) (7E)



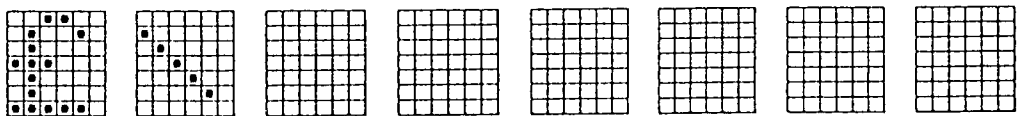
Germany

(40) (5B) (5C) (5D) (7B) (7C) (7D) (7E)



England

(23) (5C) (FA) (FB) (FC) (FD) (FE) (FF)



EPSON

TITLE

BA-180

SHEET
REVISION

NO.

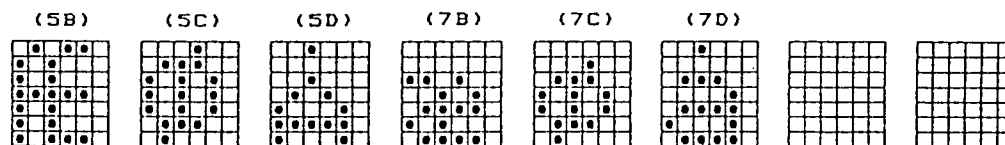
NEXT

29

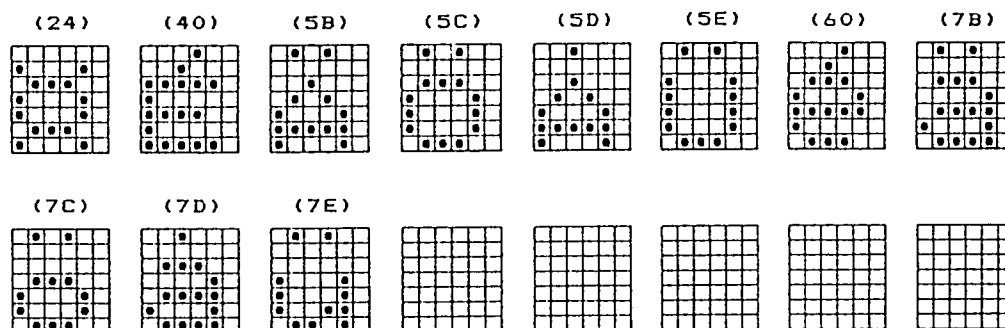
SHEET

28

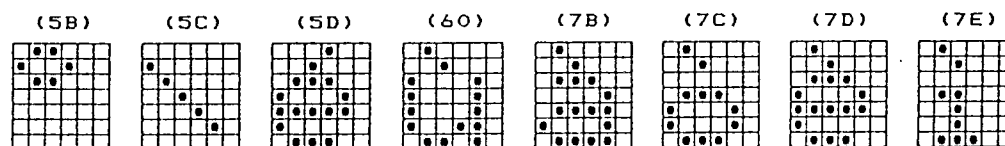
Denmark



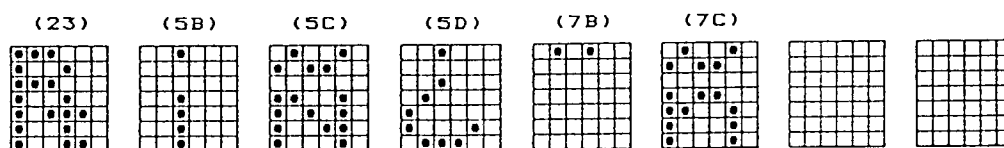
Sweden



Italy



Spain



EPSON

TITLE

BA-180

SHEET
REVISION

NO.

NEXT

30

SHEET

29

2.6 Control functions

1) Paper feed function

In the off-line mode, paper feed is done by sending "LOW" level for more than 50ms to $\overline{\text{PF}}$ terminal.

When $\overline{\text{PF}}$ terminal is kept "LOW" level, paper feed is carried out.

But it is difficult to control paper feed line.

If it is necessary to control paper line feed, use print command (CR or LF) or paper feed command (ESC+B).

2) Self-check function

This unit has a self-check function. If $\overline{\text{PF}}$ terminal is set to "LOW" level and this unit is reset, data in character-set is printed in order of codes.

This self-check function is stopped, if it is reset while keeping $\overline{\text{PF}}$ terminal "HIGH" level.

3) Buffer-full (auto) printing function

If printing data (including space column) of all columns is inputted, data in print-buffer memory is printed and then paper is fed.

4) Emergency stop function

If this unit detects the following unusual conditions while printing, power to head and motor is cut off and this unit changes to power down mode. This emergency stop is cancelled by resetting this unit.

[Unusual condition of printer can be detected by this unit]

a. Motor lock

b. Detection Failure by timing detector

c. Detection Failure by reset detector

5) Selection of printing direction

Printing direction (L-Type or R-Type) is selected by S2 terminal.

In case of L-Type, normal characters are printed toward paper feed direction.

In case of R-Type, inverted characters are printed toward paper feed direction.

Please refer to figure 2.6-1 (P.31)

EPSON

TITLE

BA-180

SHEET
REVISION

NO.

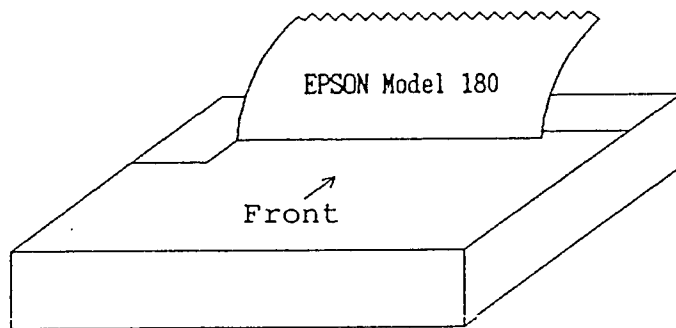
NEXT

31

SHEET

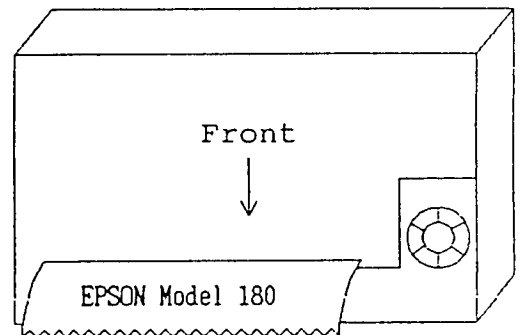
30

Set Method is described in Section 2.4 (P.15)



L Type

print from left side



R Type

inverse print from right side

L Type

R Type



Paper feed
direction

Fig. 2.6-1 Selection of printing direction

EPSON

TITLE

BA-180

SHEET
REVISION

NO.

NEXT

32

SHEET

31

2.7 Control commands

1) Printing command (CR or LF)

If S3 terminal is set either CR code (0DH) or LF code (0AH), parallel transfer is effected.

If selectional code (CR or LF) is inputted, data in print buffer is printed and paper feed is performed when parallel data is inputted.

When serial data is inputted, it is available CR code only.

2) Cancellation command for input data (CAN)

If CAN code (18H) is inputted, all data which are inputted before CAN code (18H) on the same line are cancelled.

3) Enlarged character printing (SO)

Input SO (0EH) code with arbitrary columns, then the following data is printed with double width enlarged characters. The number of columns entered when all the characters of a line are printed as enlarged characters are shown in Table 2.7-1.

This function is released by inputting a print command (CR or LF) or DC4 (14H) code.

Function	Number of columns
Model-180	12 columns
Model-181	15 columns
Model-182	18 columns
Model-183	21 columns

Table 2.7-1 Number of columns enlarged character printing

EPSON	TITLE BA-180	SHEET REVISION	NO.	
			NEXT 33	SHEET 32

4) Power down function

Power down can be performed with DC2 and DC3 codes to reduce this unit current during printer non-control.

When a power down command (DC2 or DC3) is received, the power down mode occurs after all previously received data is printed.

During power down, all this unit terminals maintain their status just before power reduction.

a. DC2 (12H)

After DC2 code input, this unit power down mode occurs. At that time, XTAL oscillation continues.

[Power down release]

a-1) $\overline{\text{INT}}$ input

The status just before power down is restored by using more than 5 ms "LOW" level input to the $\overline{\text{INT}}$ terminal to enable printer control and data translation.

a-2) $\overline{\text{RESET}}$ input

Power down is released by applying a more than 5 ms "LOW" level to the $\overline{\text{RESET}}$ terminal to initialize internal unit activation.

b. DC3 (13H)

This unit power down mode occurs with DC3 code input. Since XTAL oscillation ceases at that time, the current consumption is less than that during the DC2 power down mode.

[Power down release]

b-1) $\overline{\text{INT}}$ input

Power down is released by "LOW" level to the $\overline{\text{INT}}$ terminal. However, when the oscillation is not stable, it is necessary to provide "LOW" level to the $\overline{\text{INT}}$ terminal.

After oscillation stabilization, "HIGH" level is made to the $\overline{\text{INT}}$ terminal. Next, the status just before power down is restored to enable printer control and data translation. A timing chart is shown in Fig. 2.7-1 (P.35).

EPSON

TITLE

BA-180

SHEET
REVISION

NO.

NEXT

34

SHEET

33

b-2) RESET input

Power down is released by "LOW" level to the RESET terminal. However, when the oscillation is not stable, it is necessary to provide "LOW" level to the RESET terminal. After oscillation stabilization, "HIGH" level is made to the RESET terminal. Next, the initialization of internal unit activation occurs.

EPSON

TITLE

BA-180

SHEET
REVISION

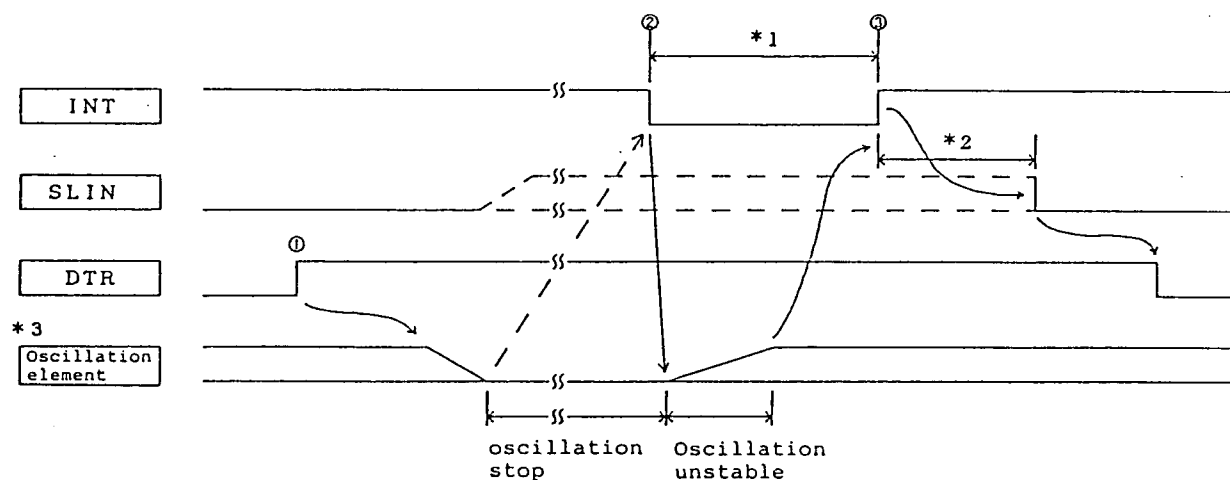
NO.

NEXT

35

SHEET

34



[Power down]

- ① The $\overline{\text{DTR}}$ terminal become "HIGH" when the DC3 command is received. If data is in the buffer at that time, it is printed. After that the oscillating element will stop oscillating.

[Release]

- ② Performed with hardware by making the $\overline{\text{INT}}$ terminal "LOW" to cause clock control circuit operation for oscillation resumption. After oscillation stabilizes. ③ the $\overline{\text{INT}}$ terminal becomes "HIGH".

Note) *1 An oscillation frequency stabilization time period shall be provided. Approximately over 60ms.

*2 Time period when this unit senses the $\overline{\text{SLIN}}$ terminal.

*3 This is used for in-unit processing and does not appear as a signal outside the unit.

Fig. 2.7-1 "DC3" command power down and release

EPSON

TITLE

BA-180

SHEET
REVISION

NO.

NEXT

36

SHEET

35

5) Escape alphabet control commands

The following function settings occur with the input of ESC (1BH) code and the following alphabet code. Also, n after the alphabet code indicates an 8 bit binary value.

"+" is used as a separator for convenience and should not be entered as data.

NOTE) When an Escape Alphabet Command is inputted in the middle of a line, data previously entered is printed, then the previous sequence is terminated.

Therefore, a function set by an Escape Alphabet Command operates during the next line and after.

a. ESC+A+n (Set spacing between lines)

The spacing between lines is set by inputting ESC+A+n code. However, n must be within $1 \leq n \leq 255$.

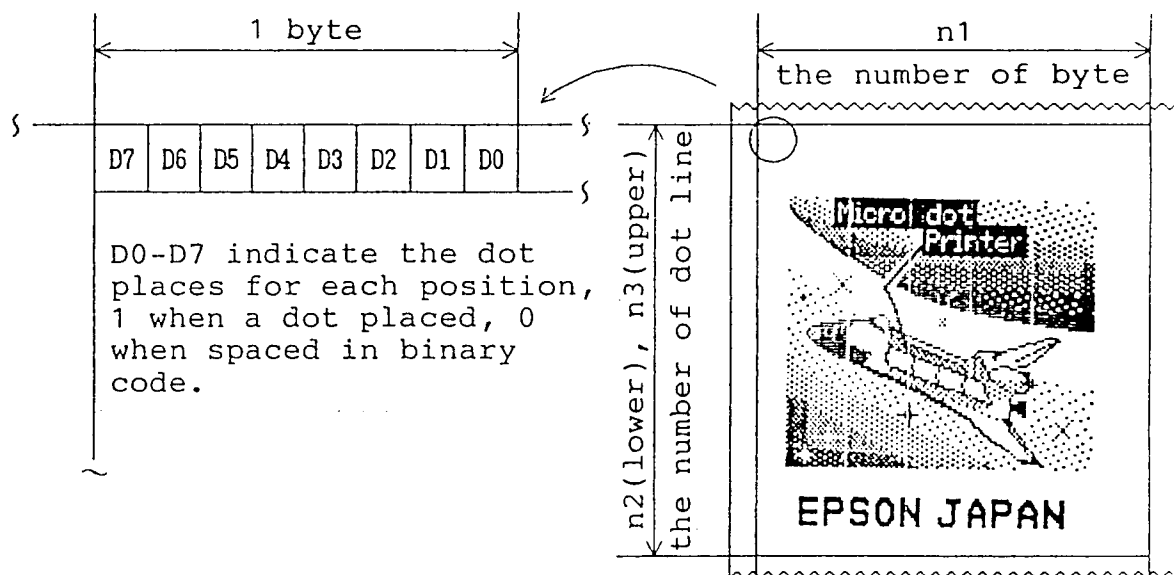
NOTE) When continuous printing is performed, n=0 can be set.

b. ESC+K+n1+n2+n3 (Bit image data translation)

The text mode is converted to a bit image mode by ESC+K+n1+n2+n3 code input. n1, n2 and n3 specify the translation of successive bit image data.

In other words, n1 indicates the number of horizontal bytes while n2 (lower) or n3 (upper) indicates the number of vertical dot lines.

The relation of data and print-out is as follows.



EPSON

TITLE

BA-180

SHEET
REVISION

NO.

NEXT
37

SHEET
36

When bit image data (n1) X (n3 X 256 + n2) is received, the following data is automatically treated as text mode data.

The range specified for n1, n2 and n3 is shown in Table 2.7-2.

When exceeding the range specified, the operation is not able to guarantee.

	n1	n2	n3
Model-180	1-18	0-255	0-1
Model-181	1-23	0-255	0-1
Model-182	1-27	0-255	0-1
Model-183	1-32	0-255	0-1

(out of range when n2=n3=0)

Table 2.7-2 Parameter specification range

Note 1) Bit image printing can only be performed with a parallel interface since the translation speed should be more than 18 bytes/15 ms.

Note 2) Data should be continuously sent for the dot line number specified by n2,n3. When data translation is interrupted, the following print data is not guaranteed.

Note 3) When a new bit image is specified after the translation of bit image data, one dot line space exists at the boundary.

[Example] M-180 1 dot line full dot printing
(Hexadecimal numbers)

1B	.	4B	.	12	.	01	.	00	.	FF	...	FF
↑		↑		↑		↑		↑		└──────────┘		
ESC		K		n1		n2		n3		Total 18 data		

EPSON

TITLE

BA-180

SHEET
REVISION

NO.

NEXT
38

SHEET
37

- c. ESC+R+n (International character set)
The following characters are set for a specified country by ESC+R+n code input.

n	Country
0	U.S.A
1	France
2	Germany
3	England
4	Denmark
5	Sweden
6	Italy
7	Spain
8	Japan

Table 2.7-3

An n other than the specified n is invalid, and the previous n becomes valid.
n = 8 (Japan) occurs when power is applied or RESET occurs.

- d. ESC+&+A1+A2 (Download character registration data transmission)

An arbitrary 6 x 7 dot matrix pattern can be registered in LSI by the input of ESC+&+A1+A2 code and the following pattern data.

Up to 8 characters can be registered at an arbitrary address in the 20H - FFH address area. However, when new pattern data is registered at the same address, the previously registered data is cleared and the new data is valid. Also, when an attempt is made to register more than 8 characters, all previously registered download character registration data is cleared.

[Address setting]

The address setting is in accord with the character code that can be accessed after registration, the same as for other fixed characters. When a fixed character is defined at a set address, the previously fixed character becomes invalid.

A1 indicates the registration start address while A2 indicates the registration end address. Therefore, the number of registered characters set by A1 and A2 can be registered continuously by A1-A2 with up to 8 characters.

EPSON

TITLE

BA-180

SHEET
REVISION

NO.

NEXT

39

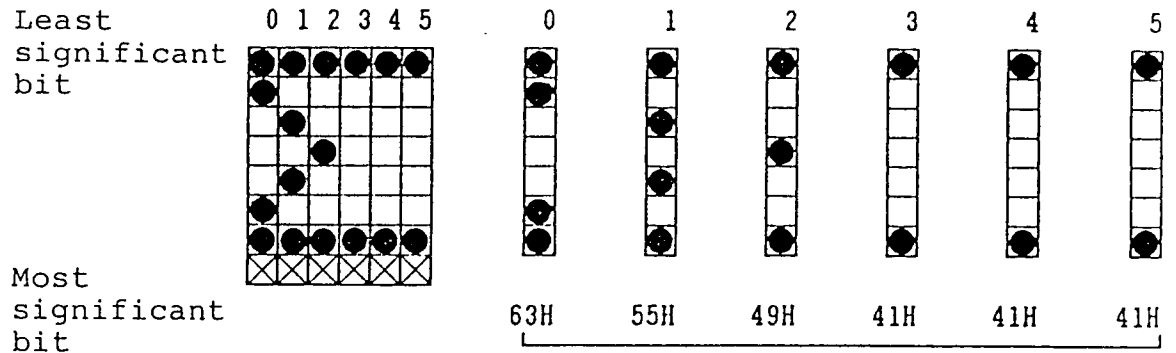
SHEET

38

[Pattern data configuration]

Registered pattern data consists of 6 byte per one character. In other words, the 6x7 dot matrix pattern is divided by 6 vertically, and all 6 byte data is sent with each 6 byte data as 1 byte data.

<Example> During pattern data translation:



Pattern data (6 byte)

(Most significant bits are ignored.)

[Data translation system]

d-1) 1 character registration

Select the address (character code) to be defined from 20H to FFH as A1. In one download character registration, the registration start address is in accord with the registration end address. In other words, A1 = A2.

<Example> A full 6x7 dot matrix pattern is registered at address 41H (Code for fixed character "A") (Hexadecimal number).

1B . 26 . 41 . 41 . FF . FF . FF . FF . FF . FF
 ↑ ↑ ↑ ↑ └──────────────────┘
 ESC & A1 A2 Pattern data (6 byte)

When character code 41H is specified, full dot printing of a 6x7 dot matrix is performed by the following control code (Character "A" cannot be accessed).

EPSON

TITLE

BA-180

SHEET
REVISION

NO.

NEXT

40

SHEET

39

d-2) Plural character registration

Up to 8 characters can be registered by repeating one character registration.

When plural characters are defined for continuously addressed (character codes), the pattern data (A2-A1+1) is continuously registered for the number of characters with A1 as the registration start address and A2 as the registration end address.

Note) $A1 < A2$, $A2 - A1 \leq 7$

<Example> Full 6x7 dot matrix patterns are registered respectively in addressed E4H - E6H (Hexadecimal numbers).

1B	.	26	.	E4	.	E6	.	FF...FF	.	FF...FF	.	FF...FF
↑		↑		↑		↑		└───┘		└───┘		└───┘
ESC		&		A1		A2		E4 data		E5 data		E6 data
								(6 byte)		(6 byte)		(6 byte)
Total 6 x 3 = 18 byte												

e. ESC+B+n (Paper feed command)

When ESC+B+n is input, paper is fed by n-dot line.
n should be $1 \leq n \leq 255$.

f. ESC+P+n (Printer model selection command)

When ESC+P+n is input, the model of the printer can be selected. Table 2.7-3 shows the value of n and the selectable printer.

n	Printer
0	Model-180
1	Model-181
2	Model-182
3	Model-183

(Table 2.7-3)

When n of more than 4 is input, the input is invalid and the last input value is set.

At power on or RESET, n=0 (Model-180) is selected.

EPSON

TITLE

BA-180

SHEET
REVISION

NO.

NEXT

41

SHEET

40

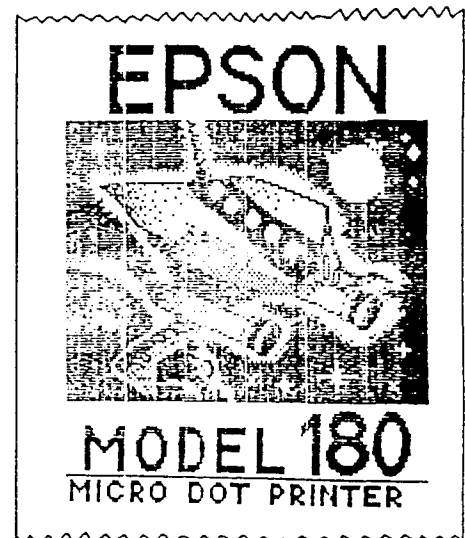
Printing Sample

1) Text mode

```
"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMN
PQRSTUVWXYZ[^\_`abcdefg
hijklmnopqrstuvwxyz{|}~
_____|||###+++++---||
□□△○。「」・ヲイウエオカクサシセソタチツテトナニホヘトフヘホマミムモヤヨラリルロワヅ〰
月年月日
@[^]{}~
あゝふせえいね”
$A0U300B
@[^]{}~
```

[illegible]

2) Bit image mode



EPSON

TITLE

BA-180

SHEET	REVISION
-------	----------

NO.

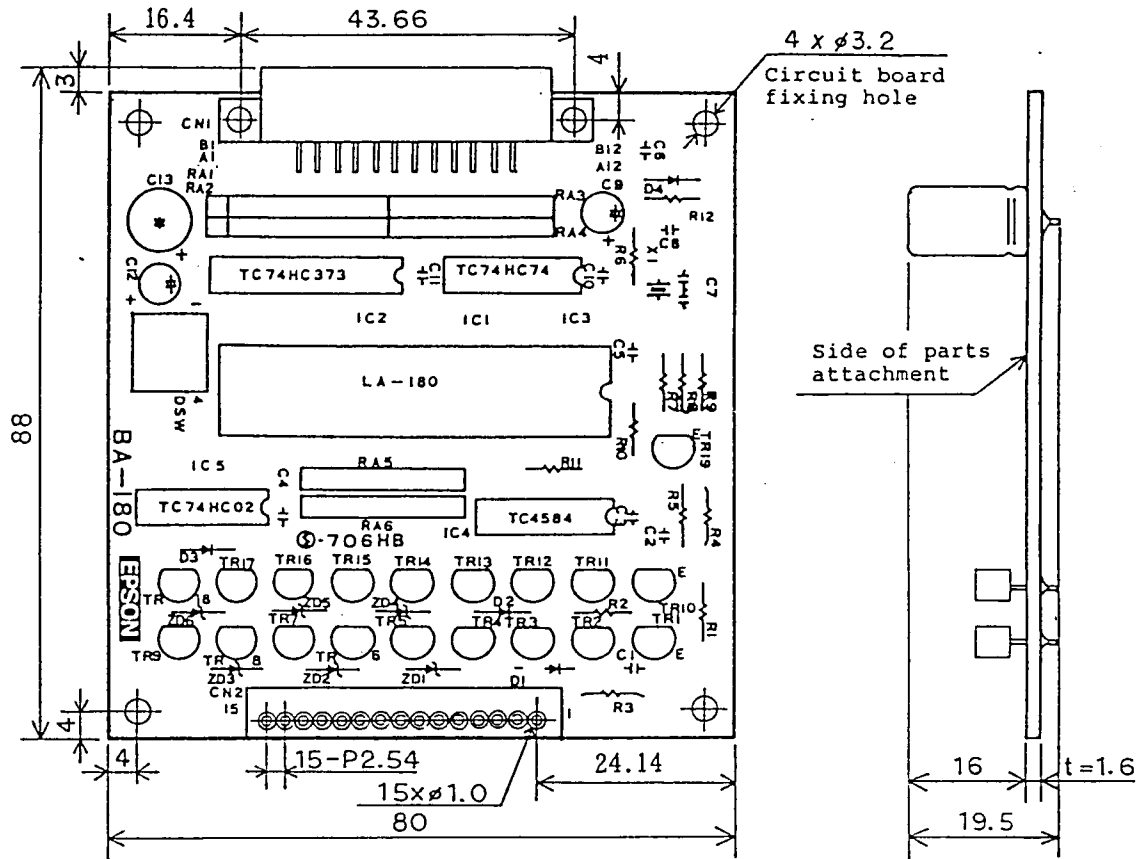
NEXT

42

SHEET

41

Fig. 1 Exterior Dimensions



Unit;mm

EPSON

TITLE

BA-180

SHEET
REVISION

C

NO.

NEXT

43

SHEET

42