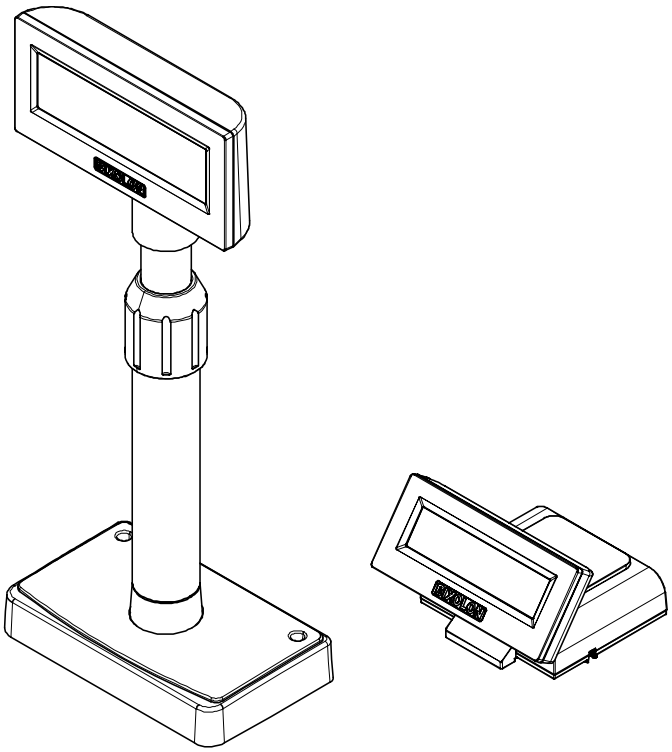
BIXOLON®

Command Manual

BCD-2000/3000

Customer Display
Rev. 1.01



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1. Notice

This Control Commands Manual contains information on the protocol and functions of all control commands that can be used with this Customer Display (BCD-2000/3000).

We at BIXOLON maintain ongoing efforts to enhance and upgrade the functions and quality of all our products. In following, product specifications and/or user manual content may be changed without prior notice.

2. Control Command List

2-1 ESC/POS Emulation Mode

ASCII Command	Function
<BS>	Move cursor left (back space)
<HT>	Move cursor right (horizontal tab)
<LF>	Move cursor down (line feed)
<US><LF>	Move cursor up
<HOM>	Move cursor to home position
<CR>	Move cursor to left-most position
<US><CR>	Move cursor to right-most position
<US> B	Move cursor to bottom position
<US> $ x y	Move cursor to specified position
<CLR>	Clear display screen, and clear string mode
<CAN>	Clear cursor line, and clear string mode
<ESC> @	Initialize display
<ESC> = n	Select peripheral device(s)
<ESC> % n	Select/Cancel user-defined characters
<ESC> & s n m a (p1...pa) * (m-n+1)	Define user-defined characters
<ESC> ? n	Delete user-defined characters
<ESC> s <MD1>	Store user-defined characters into Flash Memory
<ESC> d <MD1>	Reload user-defined characters from Flash Memory
<ESC> R n	Select an international code set
<ESC> t n	Select a character font table
<ESC> W n m x1 y1 x2 y2	Select/Cancel window range
<US><MD1>	Overwrite mode
<US><MD2>	Vertical scroll mode
<US><MD3>	Horizontal scroll mode
<US> E n	Set display screen blink interval
<US> T h m	Set and display counter (set time)
<US> U	Display counter (display time)
<US> r n	Turn reversed character mode on/off
<US> @	Execute self-test
<US> :	Start/End macro definition
<US> ^ n m	Execute and quit defined macro
<US> C n	Set cursor on/off
<US><DC1> n	Set line blinking
<US><DC2> n	Clear line blinking
<ESC> Q A <CR>	Write string character to 1st line
<ESC> Q B <CR>	Write string character to 2nd line
<ESC> Q a <CR>	Write string character to 3rd line(**NOTE-4)
<ESC> Q b <CR>	Write string character to 4th line(**NOTE-4)
<ESC> Q D <CR>	1st line message scroll continuously
<ESC> Q O <CR>	2nd line message scroll continuously
<ESC> Q d <CR>	3rd line message scroll continuously(**NOTE-4)
<ESC> Q o <CR>	4th line message scroll continuously(**NOTE-4)
<ESC> I fn	Image Store / Clear / Display
<GS> I n	Return BCD Information
<STX> <ENQ> P <ETX>	Port Change
<BS> Q A ln d1 d2 d3 d4...dn mn <CR>	Write String Character to n Line and Set position alignment
<BS> w m fn n1 n2 <CR>	Character & Line Position

2-2 CD-5220 (Partner Tech) Emulation Mode

ASCII Command	Function
<BS> or <ESC> [D	Move cursor left (back space)
<HT> or <ESC> [C	Move cursor right (horizontal tab)
<LF> or <ESC> [B	Move cursor down (line feed)
<ESC> [A	Move cursor up
<HOM> or <ESC> [H	Move cursor to home position
<CR> or <ESC> [L	Move cursor to left-most position
<ESC> [R	Move cursor to right-most position
<ESC> [K	Move cursor to bottom position
<ESC> 1 x y	Move cursor to specified position
<CLR>	Clear display screen, and clear string mode
<CAN>	Clear cursor line, and clear string mode
<US> @	Execute self-test
<ESC> @	Initialize display
<ESC> = n	Select peripheral device(s)
<ESC> % n	Select/Cancel user-defined characters
<ESC> & s n m a (p1...pa) * (m-n+1)	Define user-defined characters
<ESC> ? n	Delete user-defined characters
<ESC> s <MD1>	Store user-defined characters into Flash Memory
<ESC> d <MD1>	Reload user-defined characters from Flash Memory
<ESC> f n	Select an international code set
<ESC> c n	Select a character font table
<ESC> W s x1 x2 y	Reset window range at horizontal scroll mode (*Note-1)
<ESC><DC1>	Overwrite mode
<ESC><DC2>	Vertical scroll mode
<ESC><DC3>	Horizontal scroll mode
<ESC> _ n	Set cursor on/off
<ESC> F A d1 d2... dn <CR>	Set the string display mode, write string to 1st line (**NOTE-2)
<ESC> Q B d1 d2... dn <CR>	Set the string display mode, write string to 2nd line (**NOTE-2)
<ESC> F a d1 d2... dn <CR>	Set the string display mode, write string to 3rd line (**NOTE-2,4)
<ESC> Q b d1 d2... dn <CR>	Set the string display mode, write string to 4th line (**NOTE-2,4)
<ESC> F D d1 d2… dn<CR>	1st line message scroll continuously(***NOTE-3)
<ESC> F O d1 d2… dn <CR>	2nd line message scroll continuously(***NOTE-3)
<ESC> F d d1 d2… dn <CR>	3rd line message scroll continuously(***NOTE-3,4)
<ESC> F o d1 d2… dn <CR>	4th line message scroll continuously(***NOTE-3,4)
<ESC> I fn	Image Store / Clear / Display
<GS> I n	Return BCD Information
<STX> <ENQ> P <ETX>	Port Change
<BS> Q A ln d1 d2 d3 d4...dn mn <CR>	Write String Character to n Line and Set position alignment
<BS> w m fn n1 n2 <CR>	Character & Line Position

[* NOTE-1] Detailed description of "<ESC> W s x1 x2 y" command

ASCII Format	**<ESC> W s x1 x2 y**
Dec. Format	27, 87, n, x1, x2, y (n=0 or 1, 1 ≤ x1 ≤ x2 ≤ 20, y=1 or 2)
Hex. Format	[1Bh] [57h] n x1 x2 y [BCD-2000] (n=00h or 01h, 01h ≤ x1 ≤ x2 ≤ 1Eh, 01h ≤ y ≤ 04h) [BCD-2000K] (n=00h or 01h, 01h ≤ x1 ≤ x2 ≤ 14h, y=01h or 02h) [BCD-3000] (n=00h or 01h, 01h ≤ x1 ≤ x2 ≤ 14h, y=01h or 02h)
Description	Selects or cancels a single window on the display screen. * n specifies selection or cancellation. When n=0, a window is canceled. (Values x1, x2, and y are not required.) When n=1, a window is selected. (Values x1, x2, and y are required.) The x1 and x2 set the position of the left column and right column, respectively, of the window. The y sets the upper line or the lower line of the window. This function is valid within the horizontal mode.
ASCII Format	<ESC> W s x1 x2 y

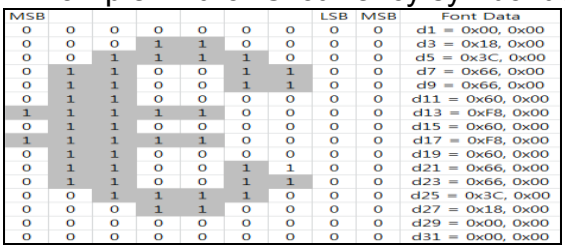
[NOTE-2]**
While using command "<ESC> Q A" or "<ESC> Q B", these two commands can be used with terminal printer : And another commands can not be used except when using command "CLR" or "CAN" to change operating mode.

[*NOTE-3]**
When using command "<ESC> Q D", the upper line message will scroll continuously until a new command is received, it will then clear the upper line and move the cursor to the upper left-end position.

[*NOTE-4]**
BCD-2000 Only

2-3 PD6000 (Logic Controls) Emulation Mode

ASCII Command	Hex. Code	Function
<DC2>	12h	Vertical scroll mode
<DC1>	11h	Normal display mode
<EOT> n	04h n	Brightness control (n=FFh, 60h, 40h, 20h)
<BS>	08h	Back space
<HT>	09h	Horizontal tab
<LF>	0Ah	Line feed
<CR>	0Dh	Carriage return
<DLE> n	10h n	Display position (00h ≤ n ≤ 27h)
<DC3>	13h	Cursor on
<DC4>	14h	Cursor off
<US>	1Fh	Reset
<ETX> n p1...p5	03h n p1...p5	Define user font (20h ≤ n ≤ FFh, p1...p5 pattern data)
<ENQ> d1...dn <CR>	05h d1...dn 0Dh	Message scroll (up to 40 characters)
<SOH>	01h	Data to peripheral : All data following this command will be sent to the peripheral until a “Data to display” command is received.
! # <STX>	21h 23h 02h	Data to display : All data following this command will be sent to the customer display until a “Data to peripheral” command is received.
<ESC> I fn	[1Bh] [49h]....	Image Store / Clear / Display
<GS> I n	[1Dh] [49h] n	Return BCD Information
<STX> <ENQ> P <ETX>	[02h] [05h] [50h] 03h]	Port Change
<US> @	[1Fh] [40h]	Execute self-test
<ESC> @	[1Bh] [40h]	Initialize display
<BS> Q A ln d1 d2 d3 d4...dn mn <CR>	08h 51h 41h ln d1 d2 d3 d4...dn mn 0Dh	Write String Character to n Line and Set position alignment
<BS> w m fn n1 n2 <CR>	[[08h] [77h] m fn n1 n2 [0Dh]	Character & Line Position - Read Command: <BS> w m fn <CR>
<BS> <CLR>	[08h] [0Ch]	Clear display screen, and clear string mode
<ESC> u H s d1 d2...d16 <CR>	1Bh 75h 48h 73h d1 d2...d16 0Dh	<BCD-2000> Define user-defined character - s : character code (20h ≤ n ≤ FFh) - d1~d16 : font data (00h ≤ d1~d16 ≤ FFh) - Example : Euro “€” currency symbol design MSB LSB Font Data 0 0 0 0 0 0 0 0 d1 = 0x00 0 0 0 1 1 0 0 0 d2 = 0x18 0 0 1 1 1 1 0 0 d3 = 0x3C 0 1 1 0 0 1 1 0 d4 = 0x66 0 1 1 0 0 1 1 0 d5 = 0x66 0 1 1 0 0 0 0 0 d6 = 0x60 1 1 1 1 1 0 0 0 d7 = 0xF8 0 1 1 0 0 0 0 0 d8 = 0x60 1 1 1 1 1 0 0 0 d9 = 0xF8 0 1 1 0 0 0 0 0 d10 = 0x60 0 1 1 0 0 1 1 0 d11 = 0x66 0 1 1 0 0 1 1 0 d12 = 0x66 0 0 1 1 1 1 0 0 d13 = 0x3C 0 0 0 1 1 0 0 0 d14 = 0x18 0 0 0 0 0 0 0 0 d15 = 0x00 0 0 0 0 0 0 0 0 d16 = 0x00 0 : Don’t care
<ESC> u H s d1	1Bh 75h 48h 73h d1	<BCD-2000K>

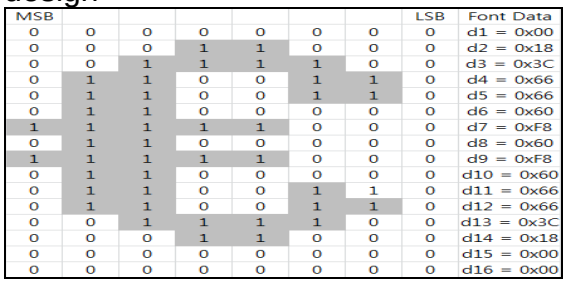
d2...d32 <CR>	d2...d32 0Dh	Define user-defined character - s : character code (20h ≤ n ≤ FFh) - d1~d32 : font data (00h ≤ d1~d32 ≤ FFh) - Example : Euro “€” currency symbol design  0 : Don’t care

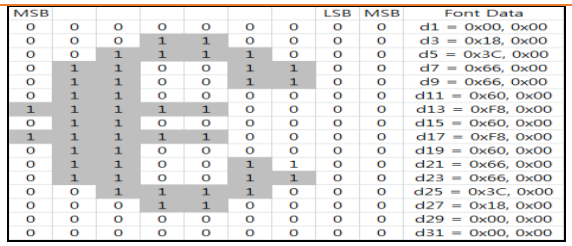
MSB							LSB	MSB	Font Data
0	0	0	0	0	0	0	0	0	d1 = 0x00, 0x00
0	0	0	1	1	0	0	0	0	d3 = 0x18, 0x00
0	0	1	1	1	1	0	0	0	d5 = 0x3C, 0x00
0	1	1	0	0	1	1	0	0	d7 = 0x66, 0x00
0	1	1	0	0	1	1	0	0	d9 = 0x66, 0x00
0	1	1	0	0	0	0	0	0	d11 = 0x60, 0x00
1	1	1	1	1	0	0	0	0	d13 = 0xF8, 0x00
0	1	1	0	0	0	0	0	0	d15 = 0x60, 0x00
1	1	1	1	1	0	0	0	0	d17 = 0xF8, 0x00
0	1	1	0	0	0	0	0	0	d19 = 0x60, 0x00
0	1	1	0	0	1	1	0	0	d21 = 0x66, 0x00
0	1	1	0	0	1	1	0	0	d23 = 0x66, 0x00
0	0	1	1	1	1	0	0	0	d25 = 0x3C, 0x00
0	0	0	1	1	0	0	0	0	d27 = 0x18, 0x00
0	0	0	0	0	0	0	0	0	d29 = 0x00, 0x00
0	0	0	0	0	0	0	0	0	d31 = 0x00, 0x00

2-4 UTC Standard Emulation Mode

ASCII Command	Hex. Code	Function
<EOT> n	04h n	Display dimming (n=20h : 20%, 40h : 40%, 60h : 60%, FFh : 100%)
<BS>	08h	Back space
<HT>	09h	Horizontal tab
<LF>	0Ah	Line feed
<CR>	0Dh	Carriage return
<DLE> n	10h n	Display position (00h ≤ n ≤ 27h, n=00h : home position, 27h : right end of lower line)
<DC1>	11h	Overwrite display mode
<DC2>	12h	Vertical scroll mode
<DC3>	13h	Cursor on
<DC4>	14h	Cursor off
<CAN>	18h	Clear to end of line
<EM>	19h	Clear to end of display
<SUB> n	1Ah n	Select international code set (30h ≤ n ≤ 3Fh) 30h: USA, 31h: Germany, 32h: France 33h: Japan etc: USA
<ESC> d	1Bh 64h	Change to UTC enhanced mode
<FS>	1Ch	Flashing text start
<GS>	1Dh	Flashing text stop
<RS>	1Eh	Clear display and cursor home
<US>	1Fh	Reset
<ESC> I fn	1Bh 49h....	Image Store / Clear / Display
<GS> I n	1Dh 49h n	Return BCD Information
<STX> <ENQ> P <ETX>	02h 05h 50h 03h	Port Change
<US> @	1Fh 40h	Execute self-test
<ESC> @	1Bh 40h	Initialize display
<BS> Q A ln d1 d2 d3 d4...dn mn <CR>	08h 51h 41h ln d1 d2 d3 d4...dn mn 0Dh	Write String Character to n Line and Set position alignment
<BS> w m fn n1 n2 <CR>	08h 77h m fn n1 n2 0Dh	Character & Line Position

2-5 UTC Enhance Emulation Mode

ASCII Command	Hex. Code	Function
<SI>	0Fh	Flashing text start
<SO>	0Eh	Flashing text stop
<ESC> u A d1 d2...dn <CR>	1Bh 75h 41h d1 d2...dn 0Dh	Upper line display(1st line) (1 ≤ n ≤ 20, 20h ≤ dn ≤ FFh) - Clear upper line : <ESC> u A <CR>
<ESC> u B d1 d2...dn <CR>	1Bh 75h 42h d1 d2...dn 0Dh	Bottom line display(2nd line) (1 ≤ n ≤ 20, 20h ≤ dn ≤ FFh) - Clear bottom line : <ESC> u B <CR>
<ESC> u a d1 d2...dn <CR>	1Bh 75h 61h d1 d2...dn 0Dh	Bottom line display(3rd line) (1 ≤ n ≤ 20, 20h ≤ dn ≤ FFh) - Clear bottom line : <ESC> u a <CR>
<ESC> u b d1 d2...dn <CR>	1Bh 75h 62h d1 d2...dn 0Dh	Bottom line display(4th line) (1 ≤ n ≤ 20, 20h ≤ dn ≤ FFh) - Clear bottom line : <ESC> u b <CR>
<ESC> u D d1 d2...dn <CR>	1Bh 75h 44h d1 d2...dn 0Dh	Upper line message scroll continuously (1 ≤ n ≤ 40)
<ESC> u E hh:mm <CR>	1Bh 75h 45h hh:mm 0Dh	Display time (hh, mm = 0~9) - Display previously set time : <ESC> u E <CR>
<ESC> u F d1 d2...dn <CR>	1Bh 75h 46h d1 d2...dn 0Dh	Upper line message scroll one time (1 ≤ n ≤40)
<ESC> u G <CR>	1Bh 75h 47h 0Dh	(Dummy) ~~Display menu buttons until next power up~~
<ESC> u H s d1 d2...d16 <CR>	1Bh 75h 48h 73h d1 d2...d16 0Dh	<BCD-2000> Define user-defined character - s : character code (20h ≤ n ≤ FFh) - d1~d16 : font data (00h ≤ d1~d16 ≤ FFh) - Example : Euro “€” currency symbol design  0 : Don’t care
<ESC> u H s d1 d2...d32 <CR>	1Bh 75h 48h 73h d1 d2...d32 0Dh	<BCD-2000K> Define user-defined character - s : character code (20h ≤ n ≤ FFh) - d1~d32 : font data (00h ≤ d1~d32 ≤ FFh) - Example : Euro “€” currency symbol design

		 0 : Don't care
<ESC> u l d1 d2...dn <CR>	1Bh 75h 49h d1 d2...dn 0Dh	Two line display (1 ≤ n ≤ 40) - Clear display : <ESC> u l <CR>
<ESC> u 1 n <CR>	1Bh 75h 6Ch n 0Dh	Select international code set (30h ≤ n ≤ 3Fh)
<ESC><SI><CR>	1Bh 0Fh 0Dh	Change to UTC standard mode
<ESC> I fn	1Bh 49h....	Image Store / Clear / Display
<GS> I n	1Dh 49h n	Return BCD Information
<STX> <ENQ> P <ETX>	02h 05h 50h 03h	Port Change
<US> @	1Fh 40h	Execute self-test
<ESC> @	1Bh 40h	Initialize display
<BS> Q A ln d1 d2 d3 d4...dn mn<CR>	08h 51h 41h ln d1 d2 d3 d4...dn mn 0Dh	Write String Character to n Line and Set position alignment
<BS> w m fn n1 n2 <CR>	08h 77h m fn n1 n2 0Dh	Character & Line Position

3. Control Command Descriptions

Setting Items	Setting Contents
Command emulation mode	BIXOLON's Customer Display Standard
Display mode	Overwrite mode
Cursor position	Home position (the upper left corner of the window)
Cursor Display	Cursor On(*)
Display screen	Clear
Window	Not defined
Character code table	PC-437 (*)
International character set	U.S.A (*)
User-defined characters	Not defined
Macro definition	Not defined
Reserved characters	Canceled
Display blinking	Canceled
Peripheral device selection	Display (*)
Set-up time	00:00

(*) Set by the memory switch

3-1 Back Space (Move Cursor Left)

ASCII Format	<BS>	<ESC> [D
Dec. Format	8	27, 91, 68
Hex. Format	[08h]	[1Bh] [5Bh] [44h]
Description	Moves the cursor one character position to the left. When the cursor is at the left end of a line, the operation of this command depends on the display mode, as follows : 1) Overwrite mode : When the cursor is at the left end of the lower line, it is moved to the right end of the upper line. When it is at the left end of the upper line, it is moved to the right end of the lower line. 2) Vertical scroll mode : When the cursor is at the left end of the lower line, it is moved to the right end of the upper line. When it is at the left end of the upper line, the display on the upper line is scrolled to the lower line and the upper line is cleared. At this time, the cursor moved to the right end of the upper line. 3) Horizontal scroll mode : All characters on the current line are scrolled on character to the right. The cursor is not moved, but the character area at the left end is cleared. * When a window is defined, the cursor is moved only within the current window.	

3-2 Horizontal Tab (Move Cursor Right)

ASCII Format	<HT>	<ESC> [C
Dec. Format	9	27, 91, 67
Hex. Format	[09h]	[1Bh] [5Bh] [43h]
Description	Moves the cursor to the right. When the cursor is at the right end of a line, the operation of this command depends on the display mode, as follows : 1) Overwrite mode : When the cursor is at the right end of the upper line, it is moved to the left end of the lower line. When it is at the right end of the lower line, it is moved to the left end of the upper line. 2) Vertical scroll mode : When the cursor is at the right end of the upper line, it is moved to the left end of the lower line. When it is at the right end of the lower line, the display on the lower line is scrolled to the upper line and the lower line is cleared. At this time, the cursor moved to the left end of the lower line. 3) Horizontal scroll mode : All characters on the current line are scrolled on character to the left. The cursor is not moved, but the character area at the left end is cleared. * When a window is defined, the cursor is moved only within the current window.	

3-3 Move Cursor Downward (Line Feed)

ASCII Format	<LF>	<ESC> [B
Dec. Format	10	27, 91, 66
Hex. Format	[0Ah]	[1Bh] [5Bh] [42h]
Description	Moves the cursor down one line. When the cursor is on the lower line, the operation of this command depends on the display mode, as follows : 1) Overwrite mode : The cursor is moved to the same column on the upper line. 2) Vertical scroll mode : The characters displayed on the lower line are scrolled to the upper line and the lower line is cleared. The cursor remains at the same position. 3) Horizontal scroll mode : The cursor is not moved. * When a window is defined, the cursor is moved only within the current window.	

3-4 Move Cursor Up

ASCII Format	<US><LF>	<ESC> [A
Dec. Format	31, 10	27, 91, 65
Hex. Format	[1Fh] [0Ah]	[1Bh] [5Bh] [41h]
Description	Moves the cursor down one line. When the cursor is on the lower line, the operation of this command depends on the display mode, as follows : 1) Overwrite mode : The cursor is moved to the same column on the upper line. 2) Vertical scroll mode : The characters displayed on the lower line are scrolled to the upper line and the lower line is cleared. The cursor remains at the same position. 3) Horizontal scroll mode : The cursor is not moved. * When a window is defined, the cursor is moved only within the current window.	

3-5 Cursor Home (Move Cursor to Home Position)

ASCII Format	<HOM>	<ESC> [H
Dec. Format	11	27, 91, 72
Hex. Format	[0Bh]	[1Bh] [5Bh] [48h]
Description	Moves the cursor to the left-most position on the upper line (home position). Home position indicates the fist column of the upper line. * When a window is defined, the home position is the upper left corner of the window.	

3-6 Carriage Return (Move Cursor to Left-most Position)

ASCII Format	<CR>	<ESC> [L	ASCII Format
Dec. Format	13	11, 91, 76	Dec. Format
Hex. Format	[0Dh]	[1Bh] [5Bh] [4Ch]	Hex. Format
Description	Moves the cursor to the left-most position on the current line. * The cursor is moved only within the current window.		

3-7 Move Cursor to Right-most Position

ASCII Format	<US><CR>	<ESC> [R	ASCII Format
Dec. Format	31, 13	11, 91, 82	Dec. Format
Hex. Format	[1Fh] [0Dh]	[1Bh] [5Bh] [52h]	Hex. Format
Description	Moves the cursor to the right-most position on the current line. * The cursor is moved only within the current window.		

3-8 Move Cursor to Bottom Position

ASCII Format	<US> B	<ESC> [K
Dec. Format	31, 65	11, 91, 75
Hex. Format	[1Fh] [42h]	[1Bh] [5Bh] [4Bh]
Description	Moves the cursor to the bottom position. The bottom position indicates the 20th column of the lower line. * When a window is defined, the bottom position is the lower right corner of the window.	

3-9 Move Cursor to Specified Position

ASCII Format	<US> $ x y	<ESC> 1 x y
Dec. Format	31, 36, x, y	31, 108, x, y
Hex. Format	[1Fh] [24h] x y	[1Bh] [6Ch] x y
Description	Moves the cursor to the nth column on the mth line. If a value exceeding the range is specified for x (column) and/or y (line), this command is ignored and the cursor does not move. [BCD-2000] rage : 1 ≤ x ≤ 30, 1 ≤ y ≤ 4 [BCD-2000K] rage : 1 ≤ x ≤ 20, 1 ≤ y ≤ 2 [BCD-3000] rage : 1 ≤ x ≤ 20, y = 1 or 2	

3-10 Clear Display Screen and Clear String Mode

ASCII Format	<CLR>
Dec. Format	12
Hex. Format	[0Ch]
Description	Clear all the displayed characters. After the command is executed, the cursor moves to the home position. * When a window is defined, the cursor is moved only within the current window.

3-11 Clear Cursor Line and Clear String Mode

ASCII Format	<CAN>
Dec. Format	24
Hex. Format	[18h]
Description	Clears the line containing the cursor. After the command is executed, the cursor moves to the left-most position on the current line. * When a window is defined, the home position is the upper left current of the window.

3-12 Initialize Display

ASCII Format	<ESC> @
Dec. Format	27, 64
Hex. Format	[1Bh] [40h]
Description	Reset the various display settings to their initial values. The software settings are reset to their power-on values. The jumper switches are not checked again. The data in the receive buffer is not cleared. After initializing the display, the display screen is cleared and the cursor moves to the home position.

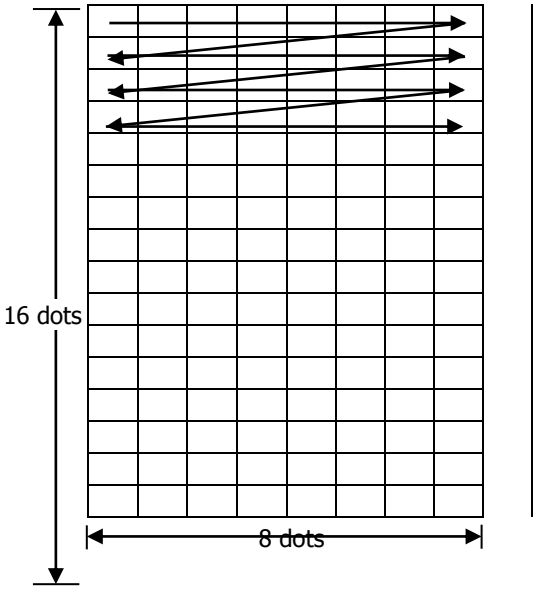
3-13 Select Peripheral Device(s)

ASCII Format	<ESC> = n
Dec. Format	27, 61, n
Hex. Format	[1Bh] [3Dh] n
Description	Select peripheral device(s). If n = 03h, <GS> I, <US> (E command is disabled. For BCD 2000 pass through, <GS> I, <US> (E command is disabled. (To enable it, switch the J2 pin on the B/D from #1-2 -> #2-3, #4-5 -> #5-6.) [BCD-2000] * n=01h, enable printer, disable display. * n=02h, disable printer, enable display. * n=03h, enable printer, enable display. [BCD-3000] * n=20h, enable display. * n=30h, disable display.

3-14 Select/Cancel User-defined Characters

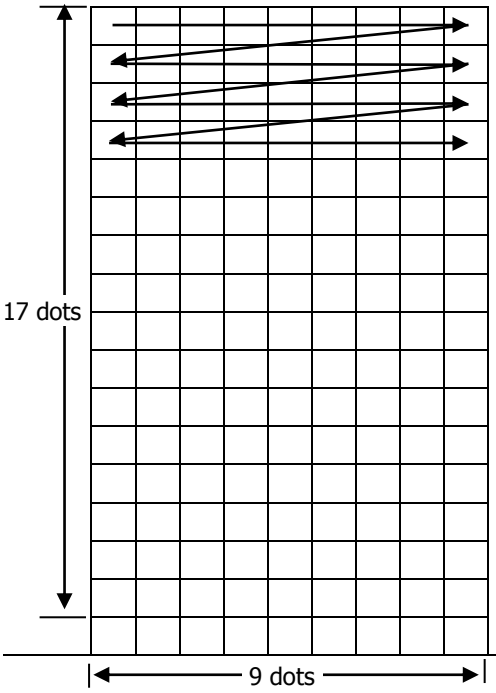
ASCII Format	<ESC> % n
Dec. Format	27, 37, n
Hex. Format	[1Bh] [25h] n
Description	Selects or cancels the user-defined character set. (n=0 or 1, default n=0) When n is 1, the user-defined character set is selected. When the user-defined character set is not defined using the “<ESC> &” command, the internal character set is displayed. When n is 0, the user-defined character set is canceled. (The internal character set is selected.) In this case, this command has no effect on the user-defined characters that have already been defined using the “<ESC> &” command. This command has no effect on the characters already displayed.

3-15 Define User-defined Characters

ASCII Format	**<ESC> & s n m [a (p1...pa)] * (m-n+1)**
Dec. Format	27, 38, s n m [a (p1...pa)] * (m-n+1), s=1, 32 ≤ n ≤ m ≤ 255, 0 ≤ p1...pa ≤ 255
Hex. Format	[1Bh] [26h] s n m [a (p1...pa)] * (m-n+1), s=01h, 20h ≤ n ≤ m ≤ FFh, 00h ≤ p1...pa ≤ FFh
Description	Defines user-defined characters. * s denotes the number of bytes in the vertical direction. (s=1) * n specifies the beginning character code for the definition, and m specifies the final character code. When only one character is defined, use n=m. * 224 characters can be defined between character codes 20h (32) and FFh (255) in the character code table. * a denotes the number of dots in the horizontal direction. When a < 5, the remaining dots on the right side of the user-defined characters are padded with spaces. * p1...pa is the dot data to be defined for the characters. This indicates the dot pattern for a dot in the horizontal direction from the left side. * The number of data items to be defined is s * a. When 8 bits are specified for the communication word length, the most significant bit is ignored. * Once the user-defined characters are defined, they remain effective until they are redefined, "<ESC> @" is executed, or the power is turned off. * When only the user-defined characters are defined and the user-defined character set is not selected using the "<ESC> %" command, the user-defined characters are not displayed.
Example1 [BCD-2000/ BCD-3000]	To define the character "€" at character code 20h (32) :  MSB LSB 0 0 0 0 0 0 0 0 0 0 0 1 1 0 0 0 0 0 1 1 1 1 0 0 0 1 1 0 0 1 1 0 0 1 1 0 0 1 1 0 0 1 1 0 0 0 0 0 1 1 1 1 1 0 0 0 0 1 1 0 0 0 0 0 1 1 1 1 1 0 0 0 0 1 1 0 0 0 0 0 0 1 1 0 0 1 1 0 0 1 1 0 0 1 1 0 0 0 1 1 1 1 0 0 0 0 0 1 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 the user-defined character definition is executed as shown below : [1Bh] [26h] [01h] : define user-defined character [20h] [20h] [10h] : code from 20h to 20h, each character will be composed by 16 bytes [00h] [18h] [3Ch] [66h] [66h] [60h] [F8h] [60h] [F8h] [60h] [66h] [66h] [3Ch] [18h] [00h] [00h] : right side of above define example

Example2
[BCD-2000K]

To define the character “€” at character code 20h (32) :



MSB						LSB		MSB
0	0	0	1	1	1	0	0	0
0	0	1	1	1	1	1	0	0
0	1	1	0	0	1	1	0	0
0	1	1	0	0	1	1	0	0
0	1	1	0	0	0	0	0	0
1	1	1	1	1	1	0	0	0
1	1	1	1	1	0	0	0	0
0	1	1	0	0	0	0	0	0
0	1	1	0	0	0	0	0	0
1	1	1	1	1	1	0	0	0
1	1	1	1	1	0	0	0	0
0	1	1	0	0	0	0	0	0
0	1	1	0	0	1	1	0	0
0	1	1	0	0	1	1	0	0
0	0	1	1	1	1	1	0	0
0	0	0	1	1	1	0	0	0
0	0	0	0	0	0	0	0	0

the user-defined character definition is executed as shown below :
[1Bh] [26h] [01h] : define user-defined character
[20h] [20h] [10h] : code from 20h to 20h, each character will be composed by 34 bytes
[1Ch] [00h] [3Eh] [00h] [66h] [00h] [66h] [00h] [60h] [00h]
[FCh] [00h] [F8h] [00h] [60h] [00h] [60h] [00h] [FCh] [00h]
[F8h] [00h] [60h] [00h] [66h] [00h] [66h] [00h] [3Fh] [00h]
[1Ch] [00h] [00h] [00h]
: right side of above define example

3-16 Delete User-defined Characters

ASCII Format	<ESC> ? n
Dec. Format	27, 63, n
Hex. Format	[1Bh] [3Fh] n
Description	Cancels user-defined characters. (20h ≤ n ≤ FFh) This command cancels the pattern defined for the character code specified by n. If specified code is transmitted after the pattern is canceled by this command, the internal character is displayed. If the specified character code is not defined, this command is ignored. This command has no effect on characters already displayed.

3-17 Store User-defined Characters into Flash Memory

ASCII Format	<ESC> s <MD1>
Dec. Format	27, 115, 1
Hex. Format	[1Bh] [73h] [01h]
Description	Current using character data, including user-defined characters, is stored into flash memory.

3-18 Restore User-defined Characters from Flash Memory

ASCII Format	<ESC> d <MD1>
Dec. Format	27, 100, 1
Hex. Format	[1Bh] [64h] [01h]
Description	Character font table is reloaded from flash memory, and the user-defined characters will be selected.

3-19 Select an International Code set

ASCII Format	<ESC> R n	<ESC> f n
Dec. Format	27, 82, n	27, 102, n
Hex. Format	[1Bh] [52h] n	[1Bh] [66h] n
Description	Set international code set. After setting international code set, the user-defined characters are subject to be deleted.	

3-20 Select a Character Font Table

ASCII Format	<ESC> t n	<ESC> c n
Dec. Format	27, 116, n	27, 99, n
Hex. Format	[1Bh] [74h] n	[1Bh] [63h] n

Description

Select character font table.

[BCD-2000/BCD-3000]

Code Page	Hex	Dec
Page 0 437 (USA, Standard Europe)	00h	0
Page 17 866 (Cyrillic #2)	11h	17
Page 18 852 (Latin 2)	12h	18
Page 20 Farsi	14h	20
Page 27 864 (Arabic)	1Bh	27
Page 31 857 (Turkish)	1Fh	31

[BCD-2000K]

Code Page	Hex	Dec
Page 0 437 (USA, Standard Europe)	00h	0
Page 1 Katakana	01h	1
Page 2 850 (Multilingual)	02h	2
Page 3 860 (Portuguese)	03h	3
Page 4 863 (Canadian-French)	04h	4
Page 5 865 (Nordic)	05h	5
Page 14 1250 (Czech)	0Eh	14
Page 15 1251 (Cyrillic)	0Fh	15
Page 16 1252 (Latin I)	10h	16
Page 17 866 (Cyrillic #2)	11h	17
Page 18 852 (Latin 2)	12h	18
Page 19 858 (Euro)	13h	19
Page 20 Farsi	14h	20
Page 21 862 (Hebrew DOS code)	15h	21
Page 25 1254 (Turkish)	19h	25
Page 26 1257 (Baltic)	1Ah	26
Page 27 864 (Arabic)	1Bh	27
Page 28 775 (Baltic)	1Ch	28
Page 29 737 (Greek)	1Dh	29
Page 30 1253 (Greek)	1Eh	30
Page 31 857 (Turkish)	1Fh	31
Page 32 Hebrew Oldcode	20h	32
Page 33 1255 (Hebrew New code)	21h	33
Page 36 855 (Cyrillic)	24h	36
Page 38 928 (Greek)	26h	38
Page 40 1256 (Arabic)	28h	40
Page 41 1258 (Vietnam)	29h	41
Page 49 TCVN-3	31h	49
Page 50 TCVN-3(Capital)	32h	50
Page 51 VISCII	33h	51

3-21 Select/Cancel Window Range

ASCII Format	<ESC> W n m x1 y1 x2 y2
Dec. Format	27, 87, n, m, x1, y1, x2, y2
Hex. Format	[1Bh] [57h] n m x1 y1 x2 y2 [BCD-2000] (1 ≤ n ≤ 4, m=0, 1, 48 or 49, 1 ≤ x1 ≤ x2 ≤ 30, 1 ≤ y1 ≤ y2 ≤ 4) [BCD-2000K] (1 ≤ n ≤ 4, m=0, 1, 48 or 49, 1 ≤ x1 ≤ x2 ≤ 20, 1 ≤ y1 ≤ y2 ≤ 2) [BCD-3000] (1 ≤ n ≤ 4, m=0, 1, 48 or 49, 1 ≤ x1 ≤ x2 ≤ 20, 1 ≤ y1 ≤ y2 ≤ 2)
Description	Selects or cancels a single window on the display screen. * n specifies the window number to be selected or canceled. (01h ≤ n ≤ 04h) * m specifies selection or cancellation. When m=1 or 49 (31h), a window is selected. (Values x1, y1, x2, and y2 are required) When m=0 or 48 (32h), a window is canceled. (Values x1, y1, x2, and y2 are not required) Regardless of n value, it cancels the entire window selected. * x1 and y1 set the positions of the upper left column and line of the window, respectively. Up to four windows can be selected simultaneously on the display screen. However, the window ranges cannot overlap. If a value outside the display screen or overlapping another window is set, this command is ignored. To cancel a window, arguments for the window range (x1, y1, x2, and y2) must not be transmitted.

3-22 Overwrite Mode

ASCII Format	<US><MD1>	<ESC><DC1>
Dec. Format	31, 1	27, 17
Hex. Format	[1Fh] [01h]	[1Bh] [11h]
Description	Selects overwrite mode as the screen display mode. In overwrite mode, entering a character code moves the cursor to the left end of the lower line when the cursor is at the right end of the upper line, and to the left end of the upper line when the cursor is at the right end of the lower line. This mode is selected when the power is turned on. Selecting overwrite mode cancels horizontal or vertical scroll mode. Except when the cursor is at the right end, entering a character code moves the cursor one character to the right after displaying the character.	

3-23 Vertical Scroll Mode

ASCII Format	<US><MD2>	<ESC><DC2>
Dec. Format	31, 2	27, 18
Hex. Format	[1Fh] [02h]	[1Bh] [12h]
Description	Selects vertical scroll mode as the screen display mode. In vertical scroll mode, entering a character code moves the cursor to the left end of the lower line when the cursor is at the right end of the upper line, scrolls the characters displayed on the lower line to the upper line, and clears the lower line when the cursor is at the right end of the lower line. At this time, the cursor is moved to the left end of the lower line. Selecting vertical scroll mode cancels overwrite or horizontal scroll mode. Except when the cursor is at the right end, entering a character code moves the cursor one character to the right after displaying the character.	

3-24 Horizontal Scroll Mode

ASCII Format	<US><MD3>	<ESC><DC3>
Dec. Format	31, 3	
Hex. Format	[1Fh] [03h]	[1Bh] [13h]
Description	Selects horizontal scroll mode as the screen display mode. In horizontal scroll mode, entering a character code scrolls all displayed characters (including commas and periods) one character to the left, then displays the new character at the right end (when the cursor is at the right end of either line). Selecting horizontal scroll mode cancels overwrite or vertical scroll mode. Except when the cursor is at the right end, entering a character code moves the cursor one character to the right after displaying the character.	

3-25 Set Display Screen Blink Interval

ASCII Format	<US> E n
Dec. Format	31, 69, n
Hex. Format	[1Fh] [45h] n
Description	Sets or cancels the blink interval of the display screen. (10 ≤ n ≤ 255) n specifies the blink interval. [(n*50ms.) ON / (n*50ms.) OFF] is repeated. When n=10, the display is kept on (cancels blinking). When n=255, the display is turned off but the contents of the display are maintained.

3-26 Set and Display Counter (Set Time)

ASCII Format	<US> T h m
Dec. Format	31, 84, h m
Hex. Format	[1Fh] [54h] h m
Description	The counter time is set and displayed at the right side of the bottom line. * h is hours, and m is minutes. (0 ≤ h ≤ 23, 0 ≤ m ≤ 59) When this command is entered, the screen is cleared and the time is displayed in 24-mode at the right side of the bottom line. The time counter start from the transmitted code h:m:00. After the time is displayed, the cursor moves to the home position. The counter display disappears when any of the following occurs : 1) The cursor moves to the bottom line. 2) Display characters move to the bottom line. 3) the <CLR> command is received. Even if the time counter is cleared, it continues to be updated in the display.

3-27 Display Counter (Display Time)

ASCII Format	<US> U
Dec. Format	31, 85
Hex. Format	[1Fh] [55h]
Description	Displays the time counter at the right side of the bottom line. If the time has already been set using the “<US> T h m” command, the elapsed time is displayed in real time in the format “hours : minutes : seconds”. If the time has not yet been set, the elapsed time (from when the counter was initialized by turning on the power or from the “<ESC> @” command) is displayed in real time in the format “hours : minutes : seconds”. After the counter is displayed, the cursor moves to the home position. The counter display is cleared when any of the following occurs : 1) The cursor moves to the bottom line. 2) Display characters move to the bottom line. 3) the <CLR> command is received. Even if the time counter is cleared, it continues to be updated in the display.
Example	1) Counter display just before receiving “<US> T h m” : HAVE A NICE DAY!! SUB-TOTAL $32.95 [Example] Display Before Setting the Counter 2) “<US> T h m” (1Fh 54h 17 35) is received : _ 17:35:00 [Example] Counter Setting Indication Above screen “HAVE A NICE DAY!! / SUB-TOTAL $32.95” is cleared, and the input time is displayed at the right side of the lower line ; counting begins from “17:35:00” seconds. At this time, the cursor moves to the home position indicated by “_”. 3) Display data “Welcome to E-SHOP!” is received : Welcome to E-SHOP! _ 17:35:00 [Example] Indication When the Cursor Does Not Move Counter display in the bottom line has no effect on data displayed in the top line. 4) <LF> (0Ah) is received : Welcome to E-SHOP! _ [Example] Indication When the Cursor Moves Moving the cursor to the bottom line clears the time display, but counting continues internally. (Above example shows assumed overwrite mode.)

3-28 Turn Reversed Character Mode On/Off

ASCII Format	<US> r n
Dec. Format	31, 114, n
Hex. Format	[1Fh] [72h] n
Description	Selects or cancels reverse display of the characters received after this command. * n=00h or 30h, reverse characters are canceled. * n=01h or 31h, reverse characters are selected.

3-29 Execute Self-test

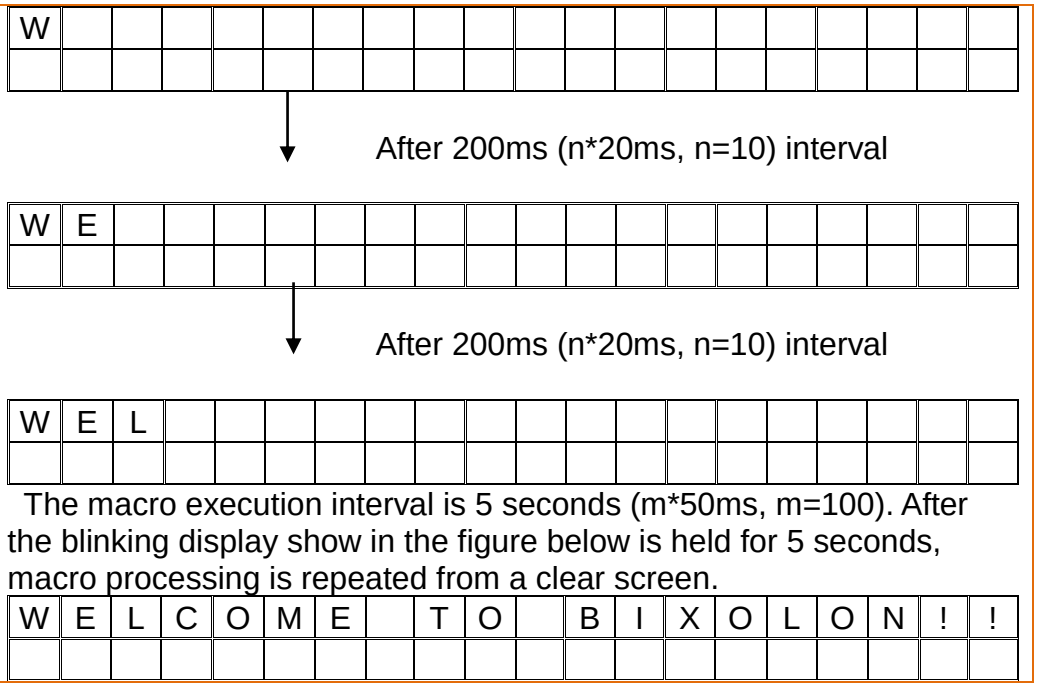
ASCII Format	<US> @
Dec. Format	31, 64
Hex. Format	[1Fh] [40h]
Description	A series of self-test is displayed. All set values except those listed below are initialized : 1) User-defined character definitions 2) Macro definitions 3) Time counter value After completion of the self-test, the screen is cleared and the display position is moved to the home position.

3-30 Start/End Macro Definition

ASCII Format	<US> :
Dec. Format	31, 58
Hex. Format	[1Fh] [3Ah]
Description	Starts or ends a macro definition. Up to 80 bytes can be defined for macro processing (one byte per character). Macro definition processing starts with the first “<US> :” command and end with the second “<US> :” command. Receipt of either of the two types of data shown below is regarded as a macro definition error. Macro definition processing is stopped, and any following data is processed as normal data. At this time, the macro remains undefined. 1) The “<US> ^” command is received during a macro processing definition. 2) A macro processing definition exceeds 80 bytes (except for the “<US> :” command). To delete a macro definition, send a “<US> :” command just after “<US> :”.

3-31 Execute and Quit Defined Macro

ASCII Format	<US> ^ n m
Dec. Format	31, 94, n m
Hex. Format	[1Fh] [5Eh] n m
Description	Executes the process defined as a macro. (00h ≤ n ≤ FFh, 00h ≤ m ≤ FFh) n specifies the time interval for displaying characters in units of [n*20msec] when a macro is executed. This specifies the time interval before displaying each successive character but does not affect the processing speed of command codes. m specifies the interval of execution. Where macro processing is repeated, it starts over from the beginning after the completion state of the previous macro processing is held for [m*50msec]. If data is received from the host during macro processing, the macro processing is terminated. After macro processing is finished, the current window is cleared and the cursor is moved to the home position in the current window. Display settings at the completion of macro processing remain valid. After macro processing is finished, the screen is cleared and the cursor is moved to the home position. Display settings in place at the completion of macro processing remain valid. If macro is undefined, this command is invalid and the display content is not affected. If “<ESC> = n”, “<ESC> @”, and “<US> @” are defined in the macro, these commands are ignored when executing the macro commands. Even if the printer is selected (by a peripheral device selection command) when macro processing is started, data is not transmitted to the printer during macro processing.
Example	1) Star Macro.....<.US> : .....1Fh, 3Ah 2) Clear Display…….. <CLR>.....0Ch 3) Set Blink (interval=0, blink off)……..<US> E 0……1Fh, 45h, 00h 4) Displayed Character.....WELCOME TO BIXOLON!! 5) Set Blink (interval=10*50ms=0.5s) ...<US> E 10……..1Fh, 45h, 0Ah 6) End Macro.....<US> : ……..1Fh, 3Ah 7) Execute Macro (n=10, =100)……. <US> ^ 10 100 …..1Fh, 5Eh, 0Ah,64h * 1) is the starting command and 6) is the ending command of a macro definition. * Total 27-byte data from 2) to 5) is stored in the macro definition range. When the display receives the macro execution command, the defined data is in processed order. * 2) is a screen clear command. * 3) and 5) are blinking commands. * Macro execution is started by #7). The time interval for displaying the characters is 200ms (n*20ms, n=10). When 100ms has passed after the character “W” has been displayed, the next character, “E” is displayed.



The macro execution interval is 5 seconds (m*50ms, m=100). After the blinking display show in the figure below is held for 5 seconds, macro processing is repeated from a clear screen.

3-32 Set Cursor On/Off

ASCII Format	<US> C n	<ESC> _ n
Dec. Format	31, 67, n	29, 95, n
Hex. Format	[1Fh] [43h] n	[1Bh] [5Fh] n
Description	Set cursor ON or OFF (n=0 or 1). When n=00h, cursor is turned off. When n=01h, cursor is turned on.	

3-33 Set Line Blinking

ASCII Format	<US><DC1> n
Dec. Format	31, 17, n
Hex. Format	[1Fh] [11h] n
Description	[BCD-2000] Set line blinking (n=31h or 32h or 33h or 34h). When n=31h, 1st line blinking. When n=32h, 2nd line blinking. When n=33h, 3rd line blinking. When n=34h, 4th line blinking. [BCD-2000K] Set line blinking (n=31h or 32h). When n=31h, 1st line blinking. When n=32h, 2nd line blinking. [BCD-3000] Set line blinking (n=31h or 32h). When n=31h, Upper line blinking. When n=32h, Lower line blinking.

3-34 Clear Line Blinking

ASCII Format	<US><DC2> n
Dec. Format	31, 18, n
Hex. Format	[1Fh] [12h] n
Description	[BCD-2000] Clear line blinking (n=31h or 32h or 33h or 34h). When n=31h, Clear 1st line blinking. When n=32h, Clear 2nd line blinking. When n=33h, Clear 3rd line blinking. When n=34h, Clear 4th line blinking. [BCD-2000K] Clear line blinking (n=31h or 32h). When n=31h, Clear 1st line blinking. When n=32h, Clear 2nd line blinking. [BCD-3000] Clear line blinking (n=31h or 32h). When n=31h, Clear upper line blinking. When n=32h, Clear lower line blinking.

3-35 Write String Character to 1st Line

ASCII Format	<ESC> Q A d1 d2 d3 d4...dn <CR>	<ESC> F A d1 d2 d3 d4...dn <CR>	ASCII Format
Dec. Format	27, 81, 65, d1, d2, d3, d4,...dn, 13	27, 70, 65, d1, d2, d3, d4,...dn, 13	Dec. Format
Hex. Format	[1Bh] [51h] [41h] d1 d2 d3 d4...dn [0Dh]	[1Bh] [46h] [41h] d1 d2 d3 d4...dn [0Dh]	Hex. Format
Description	Set the string display mode, write to upper line d1 d2 d3 d4...dn. The string display mode will be cancelled and revert back to the last mode after receiving either “<CLR>” or “<CAN>”. [BCD-2000] 1 ≤ n ≤ 30, 20h ≤ dn ≤ FFh [BCD-2000K] 1 ≤ n ≤ 20, 20h ≤ dn ≤ FFh [BCD-3000] 1 ≤ n ≤ 20, 20h ≤ dn ≤ FFh		

3-36 Write String Character to 2nd Line

ASCII Format	<ESC> Q B d1 d2 d3 d4...dn <CR>	<ESC> Q B d1 d2 d3 d4...dn <CR>	ASCII Format
Dec. Format	27, 81, 66, d1, d2, d3, d4,...dn, 13	27, 70, 66, d1, d2, d3, d4,...dn, 13	Dec. Format
Hex. Format	[1Bh] [51h] [42h] d1 d2 d3 d4...dn [0Dh]	[1Bh] [46h] [42h] d1 d2 d3 d4...dn [0Dh]	Hex. Format
Description	Set the string display mode, write to lower line d1 d2 d3 d4...dn. The string display mode will be cancelled and revert back to the last mode after receiving either “<CLR>” or “<CAN>”. [BCD-2000] 1 ≤ n ≤ 30, 20h ≤ dn ≤ FFh [BCD-2000K] 1 ≤ n ≤ 20, 20h ≤ dn ≤ FFh [BCD-3000] 1 ≤ n ≤ 20, 20h ≤ dn ≤ FFh		

3-37 Write String Character to 3rd Line

ASCII Format	<ESC> Q a d1 d2 d3 d4...dn <CR>	<ESC> F a d1 d2 d3 d4...dn <CR>	ASCII Format
Dec. Format	27, 81, 97, d1, d2, d3, d4,...dn, 13	27, 70, 97, d1, d2, d3, d4,...dn, 13	Dec. Format
Hex. Format	[1Bh] [51h] [61h] d1 d2 d3 d4...dn [0Dh]	[1Bh] [46h] [61h] d1 d2 d3 d4...dn [0Dh]	Hex. Format
Description	Set the string display mode, write to upper line d1 d2 d3 d4...dn. The string display mode will be cancelled and revert back to the last mode after receiving either “<CLR>” or “<CAN>”. The command is for BCD-2000 only. [BCD-2000] 1 ≤ n ≤ 30, 20h ≤ dn ≤ FFh [BCD-2000K] Not Support		

3-38 Write String Character to 4th Line

ASCII Format	<ESC> Q b d1 d2 d3 d4...dn <CR>	<ESC> Q b d1 d2 d3 d4...dn <CR>	ASCII Format
Dec. Format	27, 81, 98, d1, d2, d3, d4,...dn, 13	27, 70, 98, d1, d2, d3, d4,...dn, 13	Dec. Format
Hex. Format	[1Bh] [51h] [62h] d1 d2 d3 d4...dn [0Dh]	[1Bh] [46h] [62h] d1 d2 d3 d4...dn [0Dh]	Hex. Format
Description	Set the string display mode, write to lower line d1 d2 d3 d4...dn. The string display mode will be cancelled and revert back to the last mode after receiving either “<CLR>” or “<CAN>”. The command is for BCD-2000 only. [BCD-2000] 1 ≤ n ≤ 30, 20h ≤ dn ≤ FFh [BCD-2000K] Not Support		

3-39 1st Line Message Scroll Continuously

ASCII Format	<ESC> Q D d1 d2 d3 d4...dn <CR>	<ESC> F D d1 d2 d3 d4...dn <CR>	ASCII Format
Dec. Format	27, 81, 68, d1, d2, d3, d4,...dn, 13	27, 70, 68, d1, d2, d3, d4,...dn, 13	Dec. Format
Hex. Format	[1Bh] [51h] [44h] d1 d2 d3 d4...dn [0Dh]	[1Bh] [46h] [44h] d1 d2 d3 d4...dn [0Dh]	Hex. Format
Description	The upper line message will scroll continuously in the horizontal direction until a new command is received. (from the right end to the left end). If there is any incoming data while scrolling, it should stop scrolling. The string display mode will be cancelled and revert back to the last mode after receiving either “<CLR>” or “<CAN>”. [BCD-2000] 1 ≤ n ≤ 80, 20h ≤ dn ≤ FFh [BCD-3000] 1 ≤ n ≤ 40, 20h ≤ dn ≤ FFh		

3-40 2nd Line Message Scroll Continuously

ASCII Format	<ESC> Q O d1 d2 d3 d4...dn <CR>	<ESC> F O d1 d2 d3 d4...dn <CR>	ASCII Format
Dec. Format	27, 81, 79, d1, d2, d3, d4,...dn, 13	27, 70, 79, d1, d2, d3, d4,...dn, 13	Dec. Format
Hex. Format	[1Bh] [51h] [4Fh] d1 d2 d3 d4...dn [0Dh]	[1Bh] [46h] [4Fh] d1 d2 d3 d4...dn [0Dh]	Hex. Format
Description	The lower line message will scroll continuously in the horizontal direction until a new command is received. The string display mode will be cancelled and revert back to the last mode after receiving either “<CLR>” or “<CAN>”. [BCD-2000] 1 ≤ n ≤ 80, 20h ≤ dn ≤ FFh [BCD-3000] 1 ≤ n ≤ 40, 20h ≤ dn ≤ FFh		

3-41 3rd Line Message Scroll Continuously

ASCII Format	<ESC> Q d d1 d2 d3 d4...dn <CR>	<ESC> F d d1 d2 d3 d4...dn <CR>	ASCII Format
Dec. Format	27, 81, 100, d1, d2, d3, d4,...dn, 13	27, 70, 100, d1, d2, d3, d4,...dn, 13	Dec. Format
Hex. Format	[1Bh] [51h] [64h] d1 d2 d3 d4...dn [0Dh]	[1Bh] [46h] [64h] d1 d2 d3 d4...dn [0Dh]	Hex. Format
Description	The upper line message will scroll continuously in the horizontal direction until a new command is received. The string display mode will be cancelled and revert back to the last mode after receiving either “<CLR>” or “<CAN>”. The command is for BCD-2000 only. [BCD-2000] 1 ≤ n ≤ 80, 20h ≤ dn ≤ FFh [BCD-2000K] Not Support		

3-42 4th Line Message Scroll Continuously

ASCII Format	<ESC> Q o d1 d2 d3 d4...dn <CR>	<ESC> F o d1 d2 d3 d4...dn <CR>	ASCII Format
Dec. Format	27, 81, 111, d1, d2, d3, d4,...dn, 13	27, 70, 111, d1, d2, d3, d4,...dn, 13	Dec. Format
Hex. Format	[1Bh] [51h] [6Fh] d1 d2 d3 d4...dn [0Dh]	[1Bh] [46h] [6Fh] d1 d2 d3 d4...dn [0Dh]	Hex. Format
Description	The lower line message will scroll continuously in the horizontal direction until a new command is received. The string display mode will be cancelled and revert back to the last mode after receiving either “<CLR>” or “<CAN>”. The command is for BCD-2000 only. [BCD-2000] 1 ≤ n ≤ 80, 20h ≤ dn ≤ FFh [BCD-2000K] Not Support		

3-43 Image

3-43-1 Image Store

ASCII Format	**<ESC> I fn n x y d1 d2 d3 d4...dk**
Dec. Format	27, 73, fn, n, x, y, d1, d2, d3, d4,...dk
Hex. Format	[1Bh] [49h] fn n, x y d1 d2 d3 d4...dk
Description	Saves the image to the LCD. The image is saved in a non-volatile memory so it is not removed when the power is turned off. N is the number for the data image to be saved. x, y is the image size. fn=0x00, 0x01 ≤ n ≤ 0x05 [BCD-2000] 1 ≤ x ≤ 30, 1 ≤ y ≤ 64, 00h ≤ dn ≤ FFh [BCD-3000] 1 ≤ x ≤ 20, 1 ≤ y ≤ 32, 00h ≤ dn ≤ FFh
Example	Data Format : MSB to LSB [Bit 7 6 5 4 3 2 1 0] x(20) x 8dot = 160 1 2 3 … 18 19 20 21 22 23 … 28 29 30 31 32 33 … 38 39 40 41 42 43 … k-2 k-1 K y

3-43-2 Image Clear

ASCII Format	**<ESC> I fn n**
Dec. Format	27, 73, fn, n
Hex. Format	[1Bh] [49h] fn n
Description	Delete images in the LCD. N is the number for the image data to be deleted and only images in the selected area are deleted. X1, y1 are image coordinates and x2, y2 are image size. When deleting all the images or individual images, it only clears the selected image data while leaving the image for display. 0x01 ≤ fn ≤ 0x02 [fn=1] 1 ≤ n ≤ 5 delete individual images [fn=2], n=5 delete all 5 images

3-43-3 Image Display

ASCII Format	**<ESC> I fn x y n**
Dec. Format	27, 73, fn, x, y, n
Hex. Format	[1Bh] [49h] fn x y n
Description	Display images in the LCD. fn=0x03, 0x01 ≤ n ≤ 0x05 x, y are image coordinates. If the image exceeds the display area, the image will not be displayed. All the images are cleared by <CLR> or <CAN> command or if data is input after the image displays. In this case, the previous window data is reset and the cursor is positioned at 0,0. If there is any incoming data to be displayed while displaying the image, the image will be cleared and it will display from 0,0 position. The cursor is disabled when displaying the image. [BCD-2000] 0 ≤ x < 240, 0 ≤ y < 64, 00h ≤ dn ≤ FFh [BCD-3000] 0 ≤ x < 160, 0 ≤ y < 32, 00h ≤ dn ≤ FFh

3-44 Return BCD Information

<table>
<tr><td>ASCII Format</td><td><GS> I n</td></tr>
<tr><td>Dec. Format</td><td>29, 73, n</td></tr>
<tr><td>Hex. Format</td><td>[1Dh] [49h] n</td></tr>
<tr><td>Description</td><td>This command transmits the BCD ID or Information.
<table>
<tr><th>Parameter(n)</th><th>Type</th><th>Specification</th></tr>
<tr><td>1</td><td>BCD ID</td><td>0x50</td></tr>
<tr><td>65</td><td>Firmware Version</td><td>V00.00</td></tr>
<tr><td>66</td><td>Manufacture</td><td>BIXOLON</td></tr>
<tr><td>67</td><td>Model Name</td><td>[BCD-2000] : BCD-2000
[BCD-2000K] : BCD-2000K
[BCD-3000] : BCD-3000</td></tr>
<tr><td>69</td><td>Code Page</td><td>Currently enabled code page</td></tr>
<tr><td>70</td><td>Current connection port</td><td>0x53: SERIAL
0x55: USB</td></tr>
</table>
BCD Information(when n=65,66,67,69) consist of [Header ~ NULL] data as shown below:
<table>
<tr><th>Transmitted data</th><th>Hex</th><th>Decimal</th><th>Amount of Data</th></tr>
<tr><td>Header</td><td>5Fh</td><td>0</td><td>1byte</td></tr>
<tr><td>BCD Information</td><td colspan="2">Depends on the model</td><td>0-15bytes</td></tr>
<tr><td>NULL</td><td>00h</td><td>0</td><td>1byte</td></tr>
</table>
The program lead cycle must be at least 300msec.</td></tr>
</table>

3-45 Port Change

ASCII Format	<STX> <ENQ> P <ETX>
Dec. Format	2, 5, 80, 3
Hex. Format	[02h] [05h] [50h] [03h]
Description	The command is in the use of converting connected communication port USB -> SERIAL or SERIAL -> USB The port status and connectivity can be checked by GS I n(46n)

3-46 Write String Character to n Line and Set position alignment

ASCII Format	<BS> Q A ln d1 d2 d3 d4...dn mn <CR>
Dec. Format	08, 81, 65, ln, d1, d2, d3, d4,...dn, mn, 13
Hex. Format	[08h] [51h] [41h] ln d1 d2 d3 d4...dn mn [0Dh]
Description	Set the string display mode, write to line d1 d2 d3 d4...dn. The string display mode will be cancelled and revert back to the last mode after receiving either “<CLR>” or “<CAN>” or “<BS CLR>” 0 ≤ mn ≤ 2 mn: 0 – Alignment: Left alignment(default); 1 – Center alignment; 2 – Right alignment [BCD-2000] 1 ≤ ln ≤ 4 1 ≤ n ≤ 30, 20h ≤ dn ≤ FFh or 1 ≤ n ≤ 20, 20h ≤ dn ≤ FFh [BCD-3000] 1 ≤ ln ≤ 2 1 ≤ n ≤ 20, 20h ≤ dn ≤ FFh In the event of mn=2, it (right alignment) will be calculated symmetrically based on horizontal position coordinates This is standard command regardless of emulation mode By means of ESC @, variables of the command can be reset.

3-47 Character & Line Position

<table>
<tr><td>ASCII Format</td><td><BS> w m fn n1 n2 <CR></td></tr>
<tr><td>Dec. Format</td><td>08, 119, m, fn, n1, n2, 13</td></tr>
<tr><td>Hex. Format</td><td>[08h] [77h] m fn n1 n2 [0Dh]</td></tr>
<tr><td>Description</td><td>
m = r, w (r: Read, w: Write)

Define
<table>
<tr><th>fn</th><th>nx</th><th>Function</th></tr>
<tr><td>1</td><td>n1
n2</td><td>Set horizontal row
Max character number</td></tr>
<tr><td>2</td><td>n1
n2</td><td>Horizontal start position of the first character
Vertical start position of the first character</td></tr>
<tr><td>3</td><td>n1
n2</td><td>character space
line space</td></tr>
</table>
Range
<table>
<tr><th>fn</th><th>nx</th><th>BCD-2000</th><th>BCD-2000K</th><th>BCD-3000</th></tr>
<tr><td>1</td><td>n1
n2</td><td>1 ≤ n1 ≤ 4
1 ≤ n2 ≤ 30</td><td>1 ≤ n1 ≤ 4
1 ≤ n2 ≤ 30</td><td>1 ≤ n1 ≤ 2
1 ≤ n2 ≤ 20</td></tr>
<tr><td>2</td><td>n1
n2</td><td>1 ≤ n1 ≤ 230
1 ≤ n2 ≤ 44</td><td>1 ≤ n1 ≤ 230
1 ≤ n2 ≤ 44</td><td>1 ≤ n1 ≤ 150
1 ≤ n2 ≤ 12</td></tr>
<tr><td>3</td><td>n1
n2</td><td>1 ≤ n1 ≤ 230
1 ≤ n2 ≤ 44</td><td>1 ≤ n1 ≤ 230
1 ≤ n2 ≤ 44</td><td>1 ≤ n1 ≤ 150
1 ≤ n2 ≤ 12</td></tr>
<tr><td colspan="2">* Default</td><td>30x4(standard)</td><td>30x2(standard)</td><td>20x2(standard)</td></tr>
</table>
(*) Default value is the number of horizontal characters X lin

The command is;
- Volatile but if nonvolatile needed, refer to MSW4(Display Position Setting)
- To set the position and margin of LCD display
- The data shall be sent after commands transmitted due to automated screen clear.
- standard command regardless of emulation mode
</td></tr>
<tr><td>Example</td><td>
[Read]
[08h][77h][72h] fn [0Dh]

consist of [Header ~ NULL] data as shown below:
<table>
<tr><th>Transmitted data</th><th>Hex</th><th>Decimal</th><th>Amount of Data</th></tr>
<tr><td>Header</td><td>5Fh</td><td>0</td><td>1byte</td></tr>
<tr><td>Response</td><td colspan="2">Setting value</td><td>2bytes</td></tr>
<tr><td>NULL</td><td>00h</td><td>0</td><td>1byte</td></tr>
</table>
The program lead cycle must be at least 300msec
</td></tr>
</table>

3-48 Memory Switch

• The following settings other than the DIP switch can be changed by software.
These settings become effective after the power is turned on or initialization is executed by a command.

1) MSW 1 (BCD Common Setting)

Memory S/W	Function	Default	Content to be set	Range to be set
1	Character code table Selection	n=0	Page 0 is selected	[BCD-2000/BCD-3000] 0,17,18,20,27,31 [BCD-2000K] 0,1,2,3,4,5,14,15,16, 17,18,19,20,21,25, 26,27,28,29,30,31,32, 33,36,38,40,41,49,50,51
2	International character set selection	n=0	U.S.A is selected	0-15
3	Selection of the peripheral devices	n=2	Display is selected	1-3
4	Cursor display	n=1	Cursor On	0, 1
5 ~ 7	Reserved	-	-	
8	Selection	n=0	Sleep mode off	0, 1

2) MSW 2 (BCD-2000 Setting)

Memory S/W	Function	Default	Content to be set	Range to be set
1	Handshaking (BCD-2000)	n=0	DTR/DSR	0: DTR/DSR 1: Xon/Xoff
2	BCD Mode Selection	n=0	BCD-2000	0: BCD-2000 (8x16) 1: BCD-2000K (9x17)
3 ~8	Reserved	-	-	-

3) MSW 3 (BCD-3000 Setting)

Memory S/W	Function	Default	Content to be set	Range to be set
1	Baud rate(bps)	(*)Refer to following Table	9600bps	-
2				
3				
4	Word length	n=0	8bit	0: 8bit 1: 7bit
5	Parity selection	n=0	No	0: No 1: Yes
6	Parity check	n=0	None	0: None(or Odd) 1: Even
7	Handshaking	n=0	DTR/DSR	0: DTR/DSR 1: Xon/Xoff
8	Reserved	-	- selected	-

(*) Refer to following Table

Memory Switch			Baud rate(bps)	Remark
MSW3-3	MSW3-2	MSW3-1		
OFF	OFF	OFF	9600	(Default)
OFF	OFF	ON	4800	-
OFF	ON	OFF	2400	-
OFF	ON	ON	1200	-
ON	OFF	OFF	115200	-
ON	OFF	ON	57600	-
ON	ON	OFF	38400	-
ON	ON	ON	19200	-

Caution or Warning	- Provided that you connect SRP-Q300/302 with BCD-3000, serial communication must be set to 9600bps. (Default: 9600bps)

4) MSW 4 (Display Position Setting)

Memory S/W	Function	Default	Content to be set	Range to be set
1	Set horizontal row	BCD-2000: n = 4 BCD-2000K: n = 2 BCD-3000: n = 2	3-47 Character & Line Position Reference for command	
2	Max character number	BCD-2000: n = 30 BCD-2000K: n = 20 BCD-3000: n = 20		
3	Horizontal start position of the first character	BCD-2000: n = 0 BCD-2000K: n = 11 BCD-3000: n = 0		
4	Vertical start position of the first character	BCD-2000: n = 0 BCD-2000K: n = 12 BCD-3000: n = 0		
5	character space	BCD-2000: n = 0 BCD-2000K: n = 2 BCD-3000: n = 0		
6	line space	BCD-2000: n = 0 BCD-2000K: n = 6 BCD-3000: n = 0		
7~8	Reserved	-	-	-

5) MSW 5 (Emulation Mode Setting)

Memory S/W	Function	Default	Content to be set	Range to be set
1	BCD-2000/2000K/3000 Command Emulation	(*)Refer to following Table	ESC/POS	0~15
2				
3				
4				
5	Reserved	-	-	-
6				
7				
8				

(*)BCD-2000/2000K/3000 Command Emulation

Memory Switch				Emulation	Remark
MSW5-4	MSW5-3	MSW5-2	MSW5-1		
OFF	OFF	OFF	OFF	ESC/POS	Note 1
OFF	OFF	OFF	ON	CD5220	
OFF	OFF	ON	OFF	PD6000	
OFF	OFF	ON	ON	UTC Standard / UTC Enhance	
OFF	ON	OFF	OFF	Reserved	
OFF	ON	OFF	ON		
OFF	ON	ON	OFF		
OFF	ON	ON	ON		
ON	OFF	OFF	OFF		
ON	OFF	OFF	ON		
ON	OFF	ON	OFF		
ON	OFF	ON	ON		
ON	ON	OFF	OFF		
ON	ON	OFF	ON		
ON	ON	ON	OFF		
ON	ON	ON	ON		

Note1: In the event that every MSW5 is off, emulation will be controlled by Dip-Switch.

<table>
<tr><td>ASCII Format</td><td><US> (E n m d1 d2 d3 d4 d5 d6 d7 d8 <CR></td><td>ASCII Format</td><td><US> (E n m d1 d2 d3 d4 d5 d6 d7 d8 <CR></td></tr>
<tr><td>Dec. Format</td><td>31, 40, 69, n, m, d1, d2, d3, d4, d5, d6, d7, d8, 13 (1 ≤ n ≤ 3), (0 ≤ m ≤ 1)</td><td>Dec. Format</td><td>31, 40, 69, n, m, d1, d2, d3, d4, d5, d6, d7, d8, 13 (1 ≤ n ≤ 3), (0 ≤ m ≤ 1)</td></tr>
<tr><td>Hex. Format</td><td>[1Fh] [28h] [45h] n m d1 d2 d3 d4 d5 d6 d7 d8 [0Dh]</td><td>Hex. Format</td><td>[1Fh] [28h] [45h] n m d1 d2 d3 d4 d5 d6 d7 d8 [0Dh]</td></tr>
<tr><td>Description</td><td colspan="3">Set Memory Switch.
* n specifies Memory Switch number.
* m = 0 : Set Memory Switch / m = 1 : Read Memory Switch
To read a memory switch, data(d8 to d1) are must not be transmitted.
Memory Switch setting is changed, must be BCD power is reset.

Read Memory Switch
MSW Information (when m=1) consist of [Header ~ NULL] data as shown below:
<table>
<tr><td>Transmitted data</td><td>Hex</td><td>Decimal</td><td>Amount of Data</td></tr>
<tr><td>Header</td><td>5Fh</td><td>0</td><td>1byte</td></tr>
<tr><td>MSW Information</td><td colspan="2">MSWx-1 ~ MSW x-8</td><td>8bytes</td></tr>
<tr><td>NULL</td><td>00h</td><td>0</td><td>1byte</td></tr>
</table></td></tr>
</table>

Example	Set Memory Switch 1 (Code Page PC-852 Select) : [1Fh] [28h] [45h] [01h] [00h] [12h] [00h] [02h] [01h] [00h] [00h] [00h] [00h] [0Dh] Read Memory Switch 1 ~ 3 : [1Fh] [28h] [45h] [01h] [01h] [0Dh] [1Fh] [46h] [45h] [02h] [01h] [0Dh] [1Fh] [28h] [45h] [03h] [01h] [0Dh]

Revision history

Rev.	Date	Page	Description
1.00	17.05.17	-	New
1.01	28.12.17	4~11 35~40	Add New Emulation