FTP-622DSL4xx SERIES

PRODUCT SPECIFICATION

DOCUMENT CONTROL SECTION

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DESIG	20010420	S.Handa	CHECK	S.Yamaji		APPR	K.Maeda				

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DRW NO.

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Application

This specification concerns the FTP-622DSL4xx series that controls the thermal printer mechanism FTP-622/632MCL10x/35x series. Prior to using this product, refer to the precautions in the Appendix to insure careful handling.

SECTION A
Features

The features of the printer unit using this control board and printer mechanism FTP-622/632MCL series are as follows.

1. Maximum 100mm/second high-speed printing (standard paper, high-speed collective image printing mode, only when SRAM is mounted)
2. RS-232C interface
3. Paper run out, head up, head temperature abnormality, paper near end, head voltage, fuse blow out detection functions are included
4. Various papers can be selected by commands
5. 432dots/line (622MCL), 576dots/line (632MCL) printing with 8lines/mm high resolution.
6. Stable printing quality by temperature detection function
7. Stable printing quality by thermal head driving voltage detection function
8. MCU operation abnormality detection function by watchdog timer is included
9. Fuse blow out detection function for electric circuit to protect for a lot of motor current is included
10. Various bar code commands are supported
11. Character registration function is included (only when Flash ROM is mounted)
12. Automatic starting point detection function by mark detection method is included
13. Two collar printing function is included
14. Paper cut function is included

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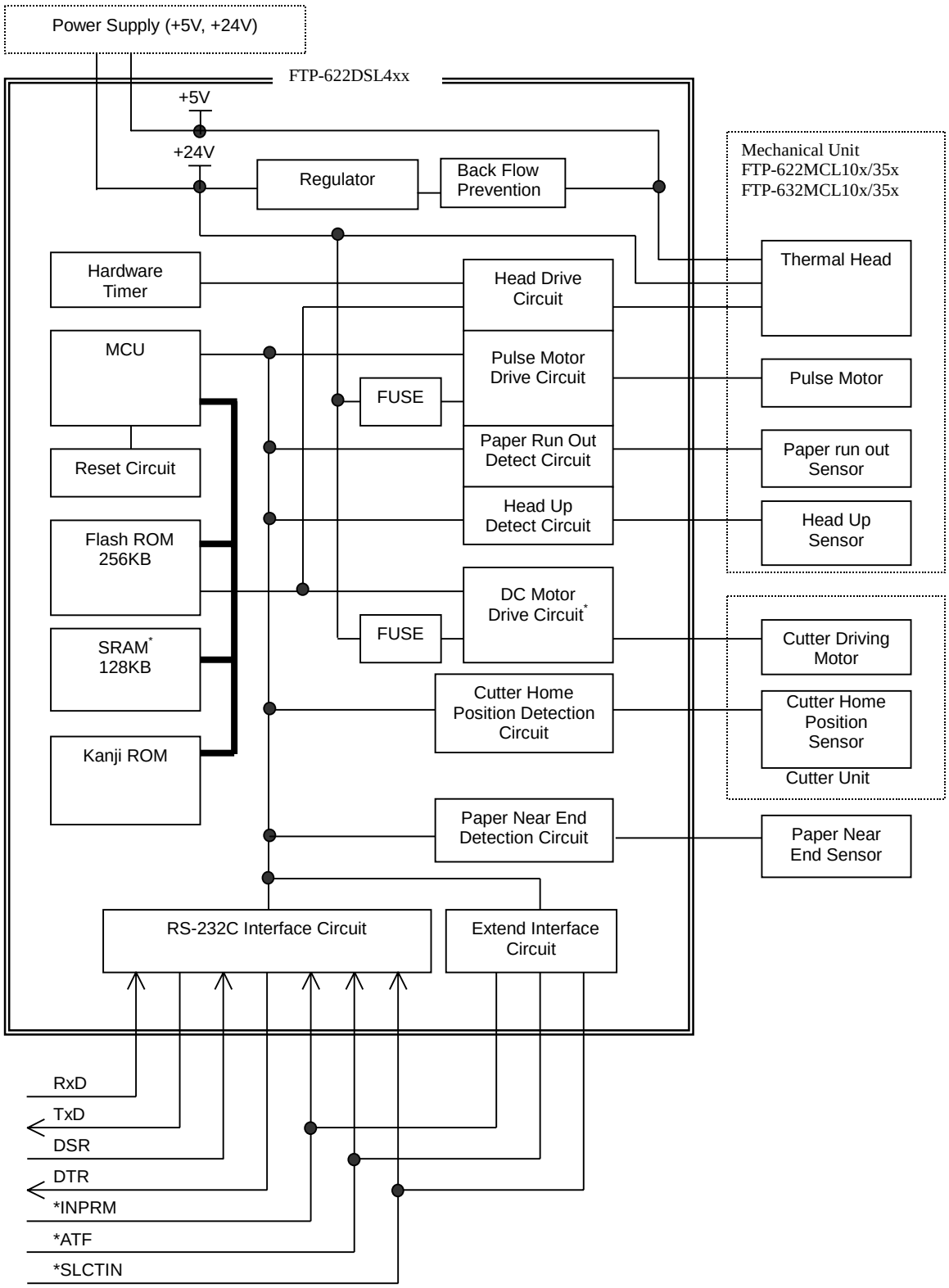
SECTION B
Circuit Configuration

The circuit configuration of the control board is as follows.



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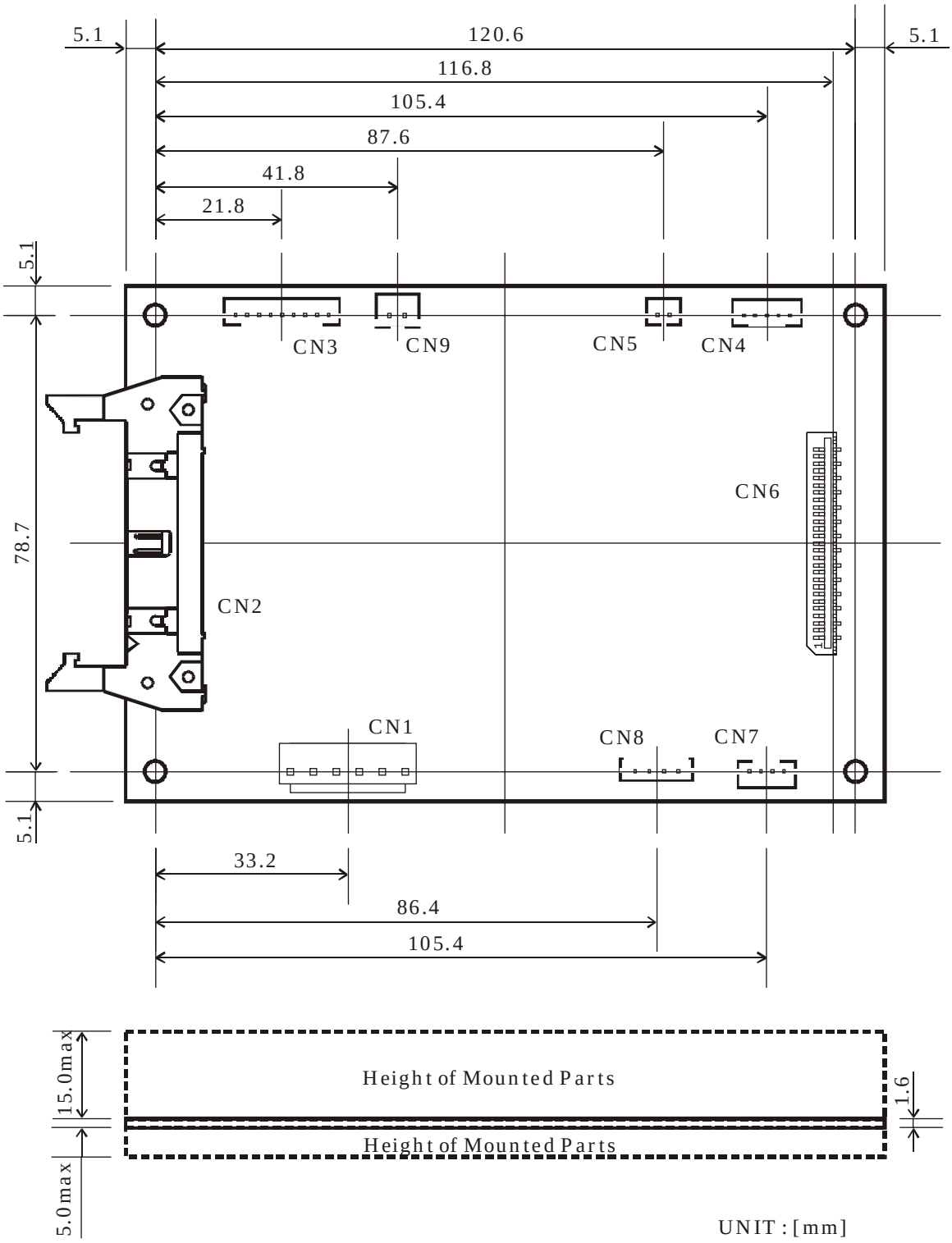
SECTION C
General Specifications

General specifications of a printer unit using this board and a printer mechanism FTP-622/632MCL10x/35x series are the following.

1 Control Board Dimensions Specifications



UNIT : [mm]

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2 Connector Construction

Types and pin configurations of several connectors are following. Data direction is a look from the interface board.

2.1 CN1 (Power supply connector)

(1) Connector Type
B6P - VH: made by JST

(2) Connection Pin Configuration

No.	Signal Name	Data Direction	Explanation
1	+5V	---	Logic power supply pin
2	GND (+5V)	---	Ground pin of logic power supply
3	GND (+VH)	---	Ground pin of head/motor driving power supply
4	GND (+VH)		
5	+VH	---	Head/motor driving power supply
6	+VH		

* The ground pin of logic power supply and the ground pins of head/motor driving power supply are connected in the board.

2.2 CN2 (Extend Interface Circuit)

(1) Connector Type
FCN-605Q030-G/M: made by Fujitsu Takamisawa Component, LTD

(2) Connector Pin Configuration

No.	Signal name	Data direction	No.	Signal name	Data direction
1	NC	---	2	NC	---
3	NC	---	4	NC	---
5	NC	---	6	NC	---
7	NC	---	8	NC	---
9	NC	---	10	NC	---
11	NC	---	12	NC	---
13	NC	---	14	NC	---
15	NC	---	16	NC	---
17	NC	---	18	NC	---
19	NC	---	20	NC	---
21	NC	---	22	NC	---
23	NC	---	24	NC	---
25	*SLCTIN	Input	26	*INPRM	Input
27	NC	---	28	NC	---
29	*ATF	Input	30	GND	---

NC: no connection

Reference to section F “Functional Specification”.

2.3 CN3 (RS-232C Interface Connector)

Reference to section D “Interface Specifications”.

2.4 CN4 (Sensor Connector)

(1) Connector Type
B5B-PH-K-S: made by JST

(2) Connector Pin Configuration

No.	Signal Name	Data Direction	Explanation
1	+5V	---	Logic power supply pin
2	*PES	Input	Paper run out detection signal
3	PESK	---	Cathode side of paper run out sensor
4	+5V	---	Logic power supply pin
5	HUP	Input	Head up detection signal

2.5 CN5 (Paper Near End Sensor Connector)

(1) Connector Type
B2B-PH-K-S: made by JST

(2) Connector Pin Configuration

No.	Signal Name	Data Direction	Explanation
1	+5V	---	Logic power supply pin
2	*NES	Input	Paper near end detection signal

Reference to section D “Interface Specifications”.

2.6 CN6 (Thermal Head Connector)

(1) Connector Type
52045-2810: made by MOLEX

(3) Connector Pin Configuration

No.	Signal Name	Data Direction	Explanation
28	VDH	---	Power supply for thermal head driving
27	VDH		
26	VDH		
25	VDH		
24	HDR	Input	Printing data input signal
23	HCLK	Output	Data communication synchronizing clock signal
22	*LAT	Output	Printing data latch signal
21	*STB2 (N.C) *1)	Output	Head energizing control signal
20	*STB1 (STB1) *1)		
19	TMP	Input	Thermistor input
18	GND (VDH)	---	Ground of power supply for thermal head driving
17	GND (VDH)		
16	GND (VDH)		
15	GND (VDH)		
14	GND (VDH)		
13	GND (VDH)		
12	GND (VDH)		
11	GND (VDH)		
10	GND (VDH)		
9	GND (5VH)	---	Ground of power supply for thermal head control
8	5VH	---	Power supply for thermal head control
7	*STB4 (*STB3) *1)		Head energizing control signal
6	*STB3 (*STB2) *1)		
5	HD	Output	Printing data output signal
4	VDH	---	Power supply for thermal head driving
3	VDH		
2	VDH		
1	VDH		

*1) inside () indicate FTP-622MCL used, and outside () indicate FTP-632MCL used.

2.7 CN7 (Pulse Motor Connector)

(1) Connector Type
B4B-PH-K-S: made by JST

(2) Connector Pin Configuration

No.	Signal Name	Data Direction	Explanation
1	MT/A	Sink/ Source	Pulse motor driving signals
2	MT/*A		
3	MT/B		
4	MT/*B		

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2.8 CN8 (Cutter Unit Connector)

(1) Connector Type
B4B-EH: made by JST

(2) Connector Pin Configuration

No.	Signal Name	Data Direction	Explanation
1	CHP	---	Cutter home position detection signal
2	GND (+5V)	Input	Ground of logic power supply pin
3	MT+	Sink/ Source	Cutter motor driving signals
4	MT-		

2.9 CN9 (Paper Feed Switch Connector)

(1) Connector Type
B2B-XH-A: made by JST

(2) Connector Pin Configuration

No.	Signal Name	Data Direction	Explanation
1	*ATF	Input	Paper feed signal
2	GND (+5V)	---	Ground of logic power supply pin

3 Print Specification

3.1 Printing System

Thermal printing system

3.2 Thermal Head Configuration

Item	Specification	
	FTP-622MCL	FTP-632MCL
Resolution	8dots/mm	
Heating Unit Size	0.125mm (Vertical) x 0.125mm (Horizontal)	
Number of Heating Units	432	576
Effective Printing Area	About 56mm	About 72mm

3.3 Number of Digits of Print Characters

Print Mode	Type		Number of digits	
			FTP-622MCL	FTP-632MCL
Alphanumeric Katakana	Internal half size character	12x24	36	48
	Internal full size character	24x24	18	24
	Registered half size character *1	12x24	36	48
	Registered full size character *1	24x24	18	24
	Internal half size character	8x16	54	72
	Internal full size character	16x16	27	36
	Registered half size character *1	8x16	54	72
	Registered full size character *1	16x16	27	36
Kanji *2	Kanji, non-kanji	24x24	18	24
	Kanji, non-kanji	16x16	27	36

*1: Only when flash-ROM is mounted.
*2: Only when kanji-ROM is mounted.

3.4 Type of Print Characters and Character Configuration

Print Mode	Type		Number of Characters
Alphanumeric Katakana	Internal half size character	12x24	159
	Internal full size character	24x24	159
	Internal half size character	8x16	159
	Internal full size character	16x16	159
Registered Characters *1	Registered half size character	12x24	224
	Registered full size character	24x24	224
	Registered half size character	8x16	224
	Registered full size character	16x16	224
International, Special	Internal half size character	12x24	195
	Internal full size character	24x24	195
	Internal half size character	8x16	195
	Internal full size character	16x16	195
Kanji *2	Kanji, non-kanji	24x24	About 6800
	Kanji, non-kanji	16x16	About 6800

*1: Only when flash-ROM is mounted.
*2: Only when kanji-ROM is mounted.

3.5 Print Mode

(1) Character Space

Print Mode	Type		Character Space (Number of dots)
Alphanumeric Katakana	Internal half size character	12x24	12
	Internal full size character	24x24	24
	Internal half size character	8x16	8
	Internal full size character	16x16	16
Registered Characters *1	Registered half size character	12x24	12
	Registered full size character	24x24	24
	Registered half size character	8x16	8
	Registered full size character	16x16	16
Kanji *2	Kanji, non-kanji	24x24	24
	Kanji, non-kanji	16x16	16

*1: Only when flash-ROM is mounted.
*2: Only when kanji-ROM is mounted.

(2) Line Feed

Print Mode	Type		Line Feed (Number of dots)
Alphanumeric Katakana	Internal half size character	12x24	24 ~ 255
	Internal full size character	24x24	24 ~ 255
	Internal half size character	8x16	16 ~ 255
	Internal full size character	16x16	16 ~ 255
Registered Characters *1	Registered half size character	12x24	24 ~ 255
	Registered full size character	24x24	24 ~ 255
	Registered half size character	8x16	16 ~ 255
	Registered full size character	16x16	16 ~ 255
Kanji *2	Kanji, non-kanji	24x24	24 ~ 255
	Kanji, non-kanji	16x16	16 ~ 255

*1: Only when flash-ROM is mounted.
*2: Only when kanji-ROM is mounted.

(3) Print Character Type

Print Mode	Type of Print Character
Alphanumeric Katakana	Internal half size character (12x24), Registered half size character (24x24) *1 Internal full size character (24x24), Registered half size character (8x16) *1 Internal half size character (8x16), Registered full size character (24x24) *1 Internal full size character (16x16), Registered full size character (16x16) *1
Kanji *2	Non-kanji, kanji JIS Lever 1, Level 2 (conforms to JIS C6226-1983)

*1: Only when flash-ROM is mounted.
*2: Only when kanji-ROM is mounted.

(4) Extended Mode

Print Mode	Type of Print Character
Alphanumeric Katakana Kanji *2 Non-Kanji *2	Horizontal double size, reverse order, black and white reversal, vertical double size, x4 size
Image *1	Reverse order, black and white reversal

*1: Only when flash-ROM is mounted.
*2: Only when kanji-ROM is mounted.

(5) Image Mode

	FTP-622MCL	FTP-632MCL
Max. Number of dots/line	432	576

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3.6 Printing Speed

Max 100mm/sec

3.7 Printing Density

OD Value: 0.8 or more (density of solid black print area under standard print condition)

	FTP-622MCL	FTP-632MCL
Max. Number of dots/line	Specified paper	
Measuring Instrument	Sakura Densitometer PDA 65	

Discoloration of printing caused by paper is not included in this specification.

4 Paper Feed Specification

Paper Feed System	Friction feed
Line Feed Space	About 1/8 inch (when power is turned ON), n/203 inch programmable
Line Feed Speed	About 40 mm / sec (By * ATF signals)

5 Paper Specification

	FTP-622MCL	FTP-632MCL
Specified Paper	Sensitive paper: TF50KS-E4 (Nippon Paper) Standard paper: TF60KS-E (Japan Paper), PD150R (Oji Paper) Medium-term storage paper: TF60KS-F1 (Nippon Paper), PD170R (Oji Paper), P220VBB-1 (Mitsubishi Paper), FH65BC-3H (Oji Paper) Long-term storage paper: PD160R-N (Oji Paper), HA220AA (Mitsubishi Paper), AFP-235 (Mitsubishi Paper)	
Paper Width	58 +0 (-1) mm: MCL001 60 +0 (-1) mm: MCL002	80 +0(-1) mm: MCL001 85 +0(-1) mm: MCL002
Paper Type	Thermo-sensitive roll paper (thermo-sensitive side is on outside)	

6 Functional Specification

(1) Self test print function	
(2) Paper feed function	By *ATF signal
(3) Paper run out detection function	By internal sensor of printer mechanism
(4) Paper near end detection function	By external mechanical switch
(5) Head up detection function	By internal mechanical switch of printer mechanism
(6) Thermal head temperature detection function	By internal thermistor of printer mechanism
(7) Fuse blow out detection function	
(8) Voltage detection function	
(9) Internal RAM abnormality detect function	
(10) Cutter abnormality detect function	
(11) Mark detection function	By GS < command
(12) MCU operation abnormality detect function	By watchdog timer
(13) Bar code print function	
(14) Motor power saving function	
(15) Two color printing function	By GS E command

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7 Power Consumption

7.1 Driving Head

Voltage: 24.0V ± 5%
Current: See the following table

Printing rate \ Speed / Model	High Speed Image Print Mode*1 100mm/sec		High Speed Print Mode 80mm/sec		Medium Speed Print Mode 50mm/sec		Low Speed Print Mode 30mm/sec	
12.5%	622MCL	0.55	(0.86)	0.34	(0.57)	0.24	(0.57)	0.19	(0.29)
	632MCL	0.76	(1.15)	0.44	(0.57)	0.33	(0.57)	0.25	(0.29)
25.0%	622MCL	1.11	(1.72)	0.68	(1.15)	0.48	(1.15)	0.38	(0.57)
	632MCL	1.53	(2.29)	0.89	(1.15)	0.66	(1.15)	0.51	(0.57)
50.0%	622MCL	1.85	(3.44)	1.35	(2.29)	0.96	(2.29)	0.77	(1.15)
	632MCL	2.51	(4.58)	1.77	(2.29)	1.32	(2.29)	1.01	(1.15)
100.0%	622MCL	2.74	(6.87)	2.70	(4.58)	1.92	(4.58)	1.53	(2.29)
	632MCL	3.61	(9.16)	3.54	(4.58)	2.63	(4.58)	2.02	(2.29)

Values inside () indicate peak values, and values outside () indicate mean values.

- Conditions

  Voltage: 24.0 V
  Head resistance: 1455Ω (1500Ω - 3%)
  Ambient temperature: 25°C
  Paper: Standard paper (equivalent to PD150R)
  Printing density: Applied dots are assumed to be evenly distributed.

- The average current increases by about 40% at the low temperature(At the time of 5℃ in head substrate temperature) for the print density correction.

7.2 Driving Motor (feeding paper and driving cutter)

Voltage: 24 V ± 5 %
Current: 1.0 A (max)

NOTE)
The motors for feeding paper and the cutter are not driven at the same time. Therefore this current value includes the current for the motor to drive the cutter.

7.3 Driving Logic

Voltage: 5.0V ± 5%
Current: 0.5A (max)

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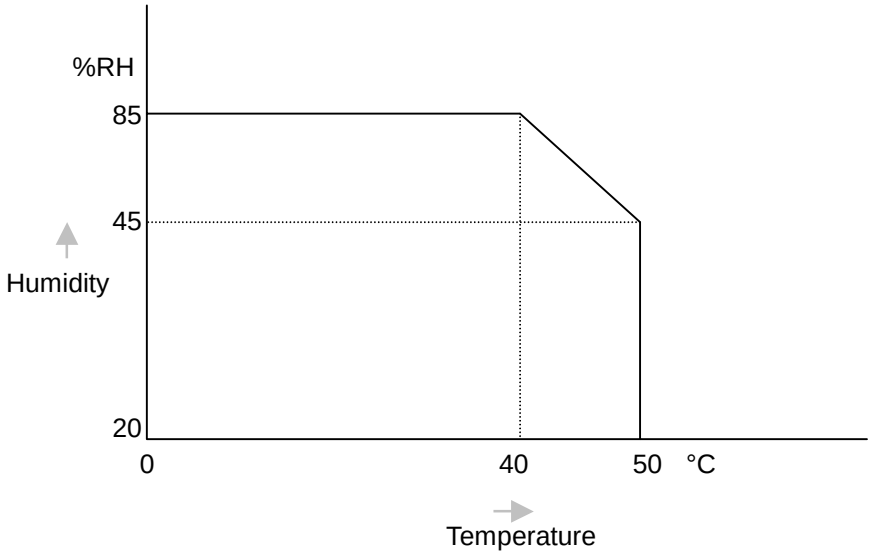
8 Operating Environment

During Operation	Operating Temperature	0 ~ 50°C *1
	Operating Humidity	20 ~ 85% RH (no condensation)
During Stopping	Storage Temperature	-20 ~ 60°C
	Storage Humidity	5 ~ 90%RH (no condensation) excluding thermo sensitive paper

*1: The temperature range that guarantees print quality is 5 ~ 40°C.

Note 1)
When printing is continued under high temperature conditions, the printer may enter off-line status automatically because of the temperature rise of the head, and stop printing (head temperature abnormality). When the head temperature drops to normal, the printer automatically returns to on-line status and continues printing.

Note 2)
Relation between temperature and humidity in printing is as follows.



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SECTION D
Interface Specifications

1 Serial Interface Specification

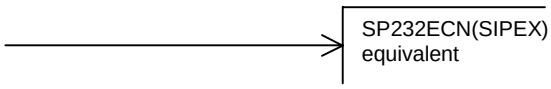
1.1 General Specification

(1) System: Serial interface
(2) Data receiving speed: 19200,9600,4800,1200bps (selected by dip switch)
(3) Synchronous system: Start-Stop synchronous system, full duplex communication
(4) Handshake: by DTR/DSR signal or XON/XOFF (selected by dip switch)
(5) Input/Output level: RS-232C level

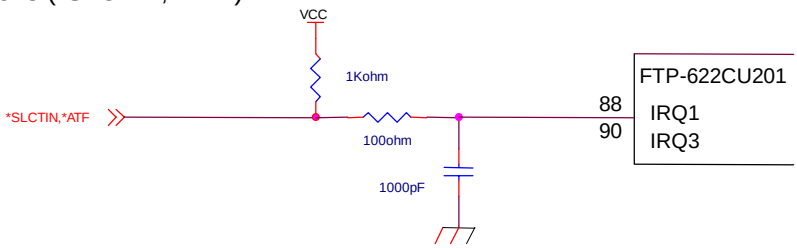
1.2 Electrical Characteristics of Input/Output signals

(1) Signal level (for Output)
Space (logic=0): +3V ~ +12V
Mark (logic=1): -3V ~ -12V

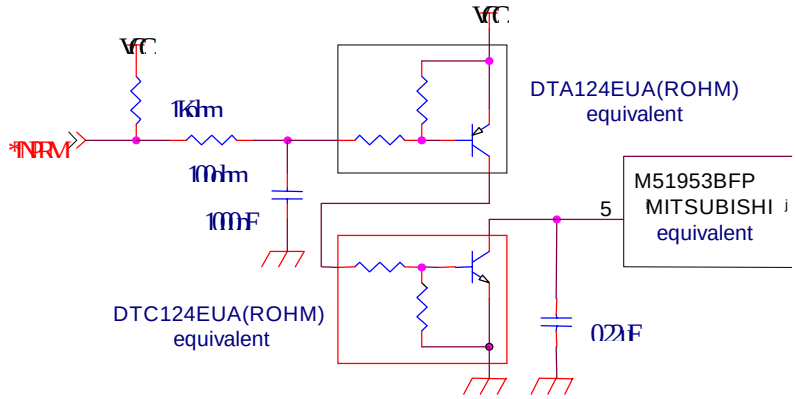
(2) Input conditions (RD,DSR)



(3) Input conditions (*SLCTIN, *ATF)

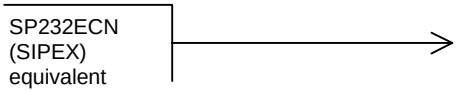


(4) Input condition (*INPRM)



Note
For the input characteristics of FTP-622CU201, see the data books of the H8/3048 series from Hitachi, Ltd.

(5) Output Conditions (TD, DTR)



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1.3 Communication Format

(1) XON / XOFF control: Communication is controlled by what remains in the receive buffer. (XOFF is sent when what remains is 10 bytes or less, then XON code is sent when what remains becomes 20 bytes or more.) This is invalid when DSR / DTR is selected by dipswitch.

(2) Receive buffer length: 45 bytes / 4096 bytes (selected by dip switch)

(3) Receive error processing: When a receive error occurs (ex. parity, overrun) this data is ignored and printing restarts from the next data.

1.4 Pin Configuration of Input/Output Signals

(1) Connector number: CN3

(2) Connector type: B9B-PH-K-S (made by JST)

(3) Connector Pin Configuration

No.	Signal Name	Direction	Function
1	FG	---	Frame ground
2	RD	Input	Receive data
3	TD	Output	Transmission data
4	DTR	Output	Data terminal ready
5	GND	---	Signal ground
6	DSR	Input	Data set ready
7	*SLCTIN	Input	Detection setting invalid signal
8	*INPRM	Input	Initialize request signal
9	*ATF	Input	Paper feed request signal

NOTE1)
Input/Output directions indicate directions from printer.
NOTE2)
For the connector of the other side, use an PHR-9 (made by JST) equivalent product.

1.5 Description of Signals

Signal Name	Function
RD	1) Serial data input signal. Data signal to be transferred from host to printer. 2) "Space" indicates no data (= 0), "Mark" indicates that data exists (= 1). 3) The data format is as follows. Start | b0 | b1 | b2 | b3 | b4 | b5 | b6 | b7 | Parity | Stop Note *1) Length of stop bit is 1 bit fixed. Note *2) With/without parity and odd/even can be selected by dipswitch. Note *3) Data length setting (7 bits / 8 bits) can be selected by dipswitch. 4) Start bit is "Space" and stop bit is "Mark". 5) Communication speed setting (1200, 4800, 9600, 19200 bps) can be selected by dipswitch.
TD	1) Serial data output signal. Data signal to be transferred from printer to host. 2) When XON/XOFF control is selected by dipswitch, XOFF code (13H) is sent in data receive disabled status. XON code (11H) is sent to host when printer returns to data receive enable status. 3) Other functions are the same as RD.
DTR	1) Output signal to indicate that printer is in data receive enable status. 2) "Space" indicates data receive enable status, "Mark" indicates data receive disable status. 3) If data is sent from host when this signal is "Mark", an error occurs and data is ignored. 4) "Mark" is output during initialization, receive buffer full status and when an abnormality is detected. When XON / XOFF control is set by dipswitch, "Mark" is output only during initialization.
DSR	1) Input signal to indicate that printer is in data transmission enable status. 2) When this signal is "Space", printer judges the status as data transmission enable, and sends data to host. When this signal is "Mark", printer does not send data. 3) When XON/XOFF control is set by dipswitch, printer ignores this signal and sends data.
*ATF	1) Paper feed request signal 2) Normally "High". Paper is fed in "Low" status. 3) When paper is fed by this signal, the internal processing time is not constant. Use the line feed command for a more accurate paper feed. 4) When paper is fed by this signal, when XON/XOFF control is set by dipswitch signal XOFF code is sent, when DTR/DSR control is set DTR becomes “Mark”. 5) When paper is fed by receiving this signal, the position on the page does not change. If paper is fed by the new page command after paper is fed by this signal, the page start position deviates. 6) If this signal in "Low" status is initialized by the *INPRM signal or the power supply is turned on, the test function mode is set.
*SLCTIN	1) Signal that makes the detection functions of initial setting invalid 2) If power is turned ON or if initialization by the *INPRM signal is executed when this signal is "Low", paper run out detection, paper near end, head up detection, head temperature abnormality detection, head driving voltage abnormality detection and paper feed by *ATF signal become invalid.

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Signal Name	Function
*INPRM	1) Signal to initialize printer 2) Normally "High". A hardware reset is executed when "Low" changes to "High". 3) This signal sets the printer status as follows. (1) Print buffer — Clear (2) Line feed pitch — 26dot line (3) Print character type — 12x24 dots half size character (4) Double width specification — Clear (5) Double height specification — Clear (6) Character code — Set to Japanese characters (7) International character setting — Japan (8) Mark detection to start point setting — About 2 mm (9) Paper run out detection setting — Valid *1 (10) Head up detection setting — Valid *1 (11) Temperature abnormality detection setting — Valid *1 (12) Voltage abnormality detection setting — Valid *1 (13) Kanji print mode specification — Clear (14) Print quality setting — Standard paper (15) x4 size print mode specification — Clear (16) Kanji code setting — JIS code (17) Printing speed setting — High-speed mode (18) Receive code buffer — Clear (19) Horizontal tab setting — Every 8 characters (20) Black and white reversal printing — Clear (21) Reverse order printing — Clear (22) Near end detection setting — Invalid (23) Paper feed — Valid (24) Paper type — Continuous paper (25) External registration character — Resisted (26) Page length setting — 44 lines, about 143 mm (27) 90° character rotation — Clear (28) Paper auto-feed amount setting — 10mm (29) Auto status transmission — Clear (30) Motor off-time setting — One excitation time = 0.5 sec, Excitation holding time = 1.0 sec *1: This can be set to invalid by the *SLCTIN signal. 4) If the *ATF signal in "Low" status is initialized by this signal, the test function mode is set. 5) Only initialization is executed without printing data in the buffer. 6) During initialization, DTR outputs “Mark”. After initialization end if an error does not occur, when XON/XOFF control is set by dipswitch signal XON code is sent, when DTR/DSR control is set DTR becomes “Space”. After initialization end if an error occurs, when XON/XOFF control is set by dipswitch XOFF code is sent, when DTR/DSR control is set DTR keeps “Mark”.

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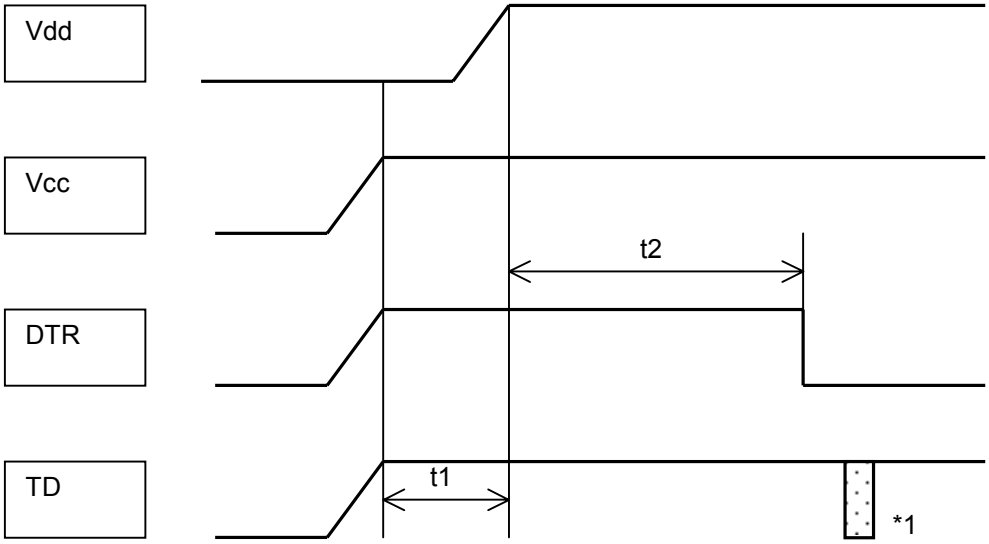
SECTION E
Timing Chart

1 RS-232C Serial Interface

1.1 When power is turned on (no error)



(1) Power supply sequence time: 0msec ≤ t1
(2) Initialization time t2 ≤ 1.2 sec

NOTE 1)
To set paper run out, head up, head voltage abnormality and head temperature abnormality detections to invalid at the initial setting, set the *SLCTIN signal to “Low” level before turning power on.

NOTE 2)
*1: When XON/XOFF control is selected by dipswitch setting, XON code is send.

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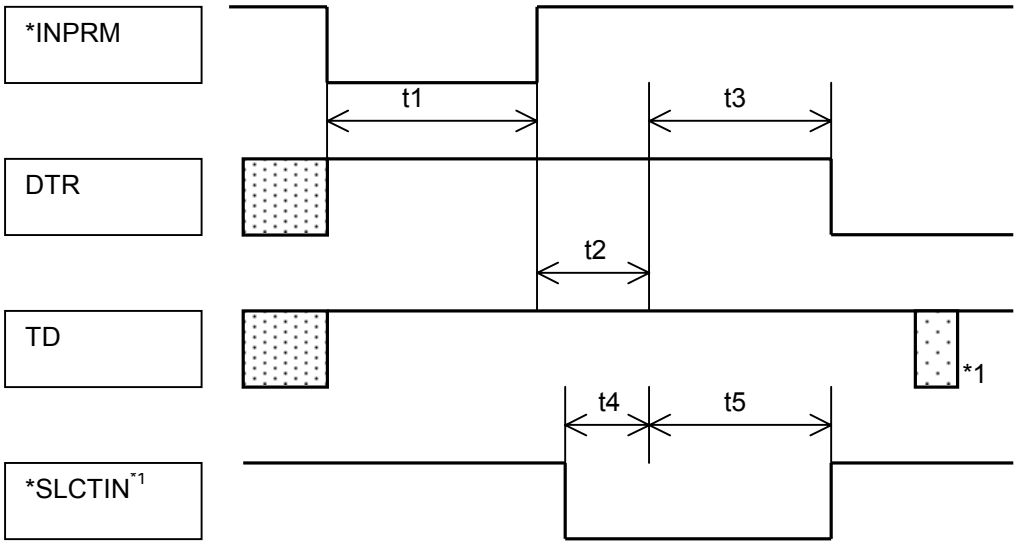
1.2 *INPRM Reset Timing (no error)



(1) *INPRM = “L” time: t1 ≥ 10usec
(2) Initialization transition time: t2 ≤ 90msec
(3) Initialization time: t3 ≤ 1.2sec
(4) *SLCTIN setup time: t4 ≥ 0msec
(5) *SLCTIN hold time: t5 ≥ t3

NOTE 1)
To set paper run out, head up, head voltage abnormality and head temperature abnormality detections to invalid at the initial setting, set the *SLCTIN signal to “Low” level before turning power on.

NOTE 2)
*1: When XON/XOFF control is selected by dipswitch setting, XON code is send.

NOTE 3)
The shaded area in the above figure indicates arbitrary status.

SECTION F
Functional Specification

1 Test Print Function

Test Print Function	1) The self-test print function is selected when power is turned ON or if initialization by the *INPRM signal is executed while the *ATF signal is "Low". 2) The mode automatically changes as follows. ┌ → (a) → (b) → (c) → (d) → (e) → (f) → (g) → (h) → (i) → (j) → (k) ┐ (a) 50% checkered printing (2 lines) (b) 25% checkered printing (3 lines) (c) Printer setting status printing (d) Japanese character set (12x24) (1 set) (e) Overseas character set (12x24) (1 set) (f) International characters (12x24) (8 lines) (g) Japanese character set (8x16) (1 set) (h) Overseas character set (8x16) (1 set) (i) International characters (8x16) (8 lines) (j) Kanji JIS levels 1, 2 *1 (24x24) (k) Paper cut execution *2 3) If an error occurs during test printing, printing stops (except when paper is at near end). When error is cleared, printing restarts after one line feed. 4) To clear test printing, shut power OFF or execute initialization by the *INPRM signal when *ATF is set to "High".

*1: Printed only when Kanji ROM is mounted
*2: Only when cutter is mounted and selected

2 Detection Function

Detection Function	Function
Paper Run Out Detection	1) During printing or feeding paper, a paper run out is detected when the sensor continuously detects a black level for about 6mm. If "XON/XOFF" flow is selected, "XOFF" code is transmitted. If "DTR/DSR" flow is selected, "DTR" signal goes to "mark" state. 2) When the printer detects a paper run out during printing, and if currently printing data exists, the printer automatically enters off-line (BUSY) status after printing one line. 3) Set the paper. If an error has not occurred, one line is fed and printing restarts from the next line. If "XON/XOFF" flow is selected, "XON" code is transmitted. If "DTR/DSR" flow is selected, "DTR" signal goes to "space" state. 4) When paper run out detection invalid mode is set by the detection function setting command or the *SLCTIN pin, paper run out is not detected. 5) When paper run out status is detected in paper run out detection valid mode, paper cannot be fed by command, but can be fed by the *ATF signal. 6) When paper run out is detected, driving of the motor is turned OFF. 7) When the connector for detection is in open status, it is judged as a paper run out.

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Detection Function	Function
Head Up Detection	1) When the printer detects head up during printing, the printer stops driving the head and the motor in one line unit, and the printer automatically enters off-line (BUSY) status. If "XON/XOFF" flow is selected, "XOFF" code is transmitted. If "DTR/DSR" flow is selected, "DTR" signal goes to "mark" state. 2) Move the head down. If an error has not occurred, one line is fed and printing restarts from the next dot line. At this time printing continuity is not guaranteed. If "XON/XOFF" flow is selected, "XON" code is transmitted. If "DTR/DSR" flow is selected, "DTR" signal goes to "space" state. 3) When the head up detection invalid mode is set by the detection function setting command or by the *SLCTIN pin, head up is not detected. 4) When head up status is detected in head up detection valid mode, paper cannot be fed by command, but can be fed by the *ATF signal. 5) When head up is detected, driving the motor is turned OFF.
Thermal Head Temperature Abnormality Detection	1) Temperature is detected by the thermistor inside the thermal head to protect the head from heating. 2) When abnormal temperature (high temperature) is detected, the printer stands by in busy status until the temperature drops to the specified temperature. 3) When the temperature abnormality detection invalid mode is set by the detection function setting command or by the *SLCTIN pin, abnormal temperature is not detected. 4) When temperature abnormality is detected in temperature abnormality detection valid mode, paper cannot be fed by command. 5) When the temperature of the thermal head returns to printing enable status and an error has not occurred, the printer immediately returns to normal status.
Fuse Blow Out Detection	1) When a fuse blow out for motor protection is detected, the printer automatically enters off-line (BUSY) status. If "XON/XOFF" flow is selected, "XOFF" code is transmitted. If "DTR/DSR" flow is selected, "DTR" signal goes to "mark" state. 2) Shut the power OFF and exchange the fuse. 3) In fuse blow out status, data cannot be received and paper cannot be fed by the *ATF signal.
Paper Near End Detection	1) When the near end detection signal (*NES) becomes about 1.5V or less, it is judged as paper near end. In this status, data receiving and printing are executed continuously. 2) When the connector for detection is in open status, it is judged as paper near end. 3) When power is turned ON and at initialization, this function is invalid, and can be valid by the detection function setting command.
Cutter Abnormality Detection	1) When cutting does not end within four seconds, a hardware abnormality is detected as a cutter defect, and the printer automatically enters off-line status. If "XON/XOFF" flow is selected, "XOFF" code is transmitted. If "DTR/DSR" flow is selected, "DTR" signal goes to "mark" state. 2) The printer returns by turning power on again or by hardware reset processing. 3) When the cutter blade is not in the home position at initialization, the printer automatically positions the cutter. 4) If the paper cut command is received when the cutter is not connected, a hardware abnormality occurs after about four seconds.

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Detection Function	Function
Voltage Abnormality Detection	1) Printing head drive voltage is detected, when this voltage is abnormality, the printer automatically enters off-line status. 2) When power-supply voltage returns within the above-mentioned range and an error has not occurred, the printer immediately returns to normal status. 3) When the voltage abnormality detection invalid mode is set by the detection function setting command or by the *SLCTIN pin, abnormal voltage is not detected.
Mark Detection Function	1) Mark is detected by the paper run out detection sensor. 2) The shape of the mark is as follows. (Directly contact Fujitsu for details on dimensions.) Mark  5mm±0.5mm 3) When paper run out or head down status is detected at initialization, the sensor may be on the mark. Feed paper for a maximum of 8 mm and stop the printer avoiding the mark position. If paper run out status is not cleared, it is judged as paper run out status and the printer stops. 4) If a mark is not detected on the page when mark detection is executed, mark undetected status is reported. 5) Mark undetected status is held until the next data (command) is received or until a high priority error occurs.
MCU Operation Abnormality Detection	1) The watchdog timer to prevent printer damage caused by a malfunction detects MCU operation abnormality. 2) If MCU runaway activates the watchdog timer, it is detected as a hardware abnormality.

3 Protective Function

Protective Function	Function
Power Supply Disconnection Sequence Protection	1) This function prevents burning of the head caused by the reverse order disconnection of the logic power supply and power supply for the head. 2) Supply power to logic from the head driving power supply using a three-terminal regulator. 3) MCU detects the head power supply voltage and fuse voltage at initialization, and stops initialization until these values reach the specified values.
Motor Protection	1) Insert a rush resistant fuse (capacity 1.0A) to prevent motor smoking caused by an operation abnormality. 2) Motor current is shut OFF about ten seconds after the motor stops.
Hardware Timer	1) Limit the applied pulse width of the head by a hardware timer to prevent head burning by fixing the logic of the thermal head enable pin.

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SECTION G
Command Specification

Each command is explained using the following conventions:

[Name] Command name

[Function] Function of command

[Code] Control code represented in hexadecimal or decimal notation.
$[X]_{16}$ Hexadecimal notation
$[X]_{10}$ Decimal notation

[Explanation] Explanation of command function

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(1) HT

[Name] Horizontal tab

[Function]

The HT command moves the printing position to the next horizontal tab position.

[Code] $[09]_{16}$
$[09]_{10}$

[Explanation]

(1) If the next horizontal tab position is not set, the HT command is ignored.

(2) If the next horizontal tab position is outside the printing area, the printing position is shifted to the proper position by adding 1 to the printing area width.

(3) If an HT command is received when the print head is located at the position to which the printing has been newly shifted by adding 1 to the printing area width, buffer-full printing is executed. Then, the horizontal tab operation is executed from the head of the next line.

(4) The horizontal tab position is set with *ESC D*.

(5) If characters are received when the print head is located at the position to which the printing has been shifted by adding 1 to the printing area width, buffer-full printing is executed. Then, the print head moves to the leftmost column on the next line, and the received characters are processed. When a line feed command such as *LF* is received, data is printed and a line is fed. The print head then moves to the leftmost column on the next line.

(6) In backward printing, the tab indicates a position from the rightmost column.

(2) LF

[Name] Line feed

[Function]

The LF command prints the data already contained in the print buffer, then sets the next-data receive position at the leftmost column on the next line.

[Code] $[0A]_{16}$
$[10]_{10}$

[Explanation]

(1) The *LF* command prints the data already contained in the print buffer, then sets the next-data receive position at the leftmost column on the next line.

(2) In the initial state, the line spacing is set to approx. 1/8 inch.

(3) When there is no data in the print buffer, only a line feed operation is executed.

(4) When different-height character typefaces are to be printed on the same line, these character typefaces are arranged so that their bottom ends are aligned at the same level.

(5) If line spacing during printing/line-feeding is shorter than the character height, a length equal to the character height feeds the paper.

(3) FF

[Name] Forms feed (new page)

[Function]

The FF command prints the data already contained in the print buffer, then sets the next-data receive position at the leftmost column on the next page.

[Code] $[0C]_{16}$
$[12]_{10}$

[Explanation]

(1) The *FF* command feeds paper by the specified page length.

(2) In the initial state, the page length is set to approx. 143 mm. (44 lines).

(3) When cut-sheet printing is selected, the *FF* command executes the following operations:
- When the page length is set to 0 (page length cancellation) by using *ESC C*, the paper is ejected.
- Paper ejection is checked using the paper-out sensor. When the detection is invalid, the paper ejection is checked.
- The maximum paper ejection length is approx. 1m. If the paper-out state is not detected within the span of the 1-meter ejection, the paper ejection terminates.

(4) When label printing is selected, the *FF* command executes the following operations:
- The data contained in the print buffer is printed, and a search is made for the head of the next label.
- The beginning of a line is set as the next printing position.
- A label is selected with *ESC c1*.

(4) ESC EM + n

[Name] Setting the amount of the feeding at automatic paper feed

[Function]

The amount of the feeding at automatic paper feeding is set.

[Code] $[1B]_{16}$ $[19]_{16}$ [n]
$[27]_{10}$ $[25]_{10}$ [n]

[Explanation]

(1) The amount of feeding is set by this command.

(2) The set amount of feeding is n dot line.

(3) The range of n is $0 \leq n \leq 255$. The automatic paper feed function becomes invalid for n=0.

(4) An initial value is about 10mm.

(5) ESC RS

[Name] Black-white reversed printing specification

[Function]

The ESC RS command specifies black-white reversed printing.

[Code] $[1B]_{16}$ $[1E]_{16}$
$[27]_{10}$ $[30]_{10}$

[Explanation]

(1) The *ESC RS* command specifies black-white reversed printing.

(2) The *ESC RS* command can be specified in units expressed in characters. One line can contain both normal printed characters and reverse printed characters.

(3) The *ESC RS* command can be used in all character modes.

(4) The *ESC RS* command can also be used in bit image printing.

(5) The line-spacing area is not appeared in reverse format.

(6) When a printing start command (*LF* or *FF*) is received in reverse mode, some of the print image is not appear in reverse format. This reverse suppression continues from the reverse mode specified character to the rightmost column (in forward printing mode) or to the leftmost column (in backward printing mode).

(7) The print image of the characters skipped with a *HT* command is not appear in reverse format.

(6) ESC US

[Name] Black-white reversed printing cancellation

[Function]

The ESC US command cancels black-white revered printing.

[Code] $[1B]_{16}$ $[1F]_{16}$
$[27]_{10}$ $[31]_{10}$

[Explanation]

(1) The *ESC US* command cancels the reverse printing mode.

(2) The *ESC US* command does not start character printing.

(7) ESC ! + n

[Name] Printing mode specification

[Function]

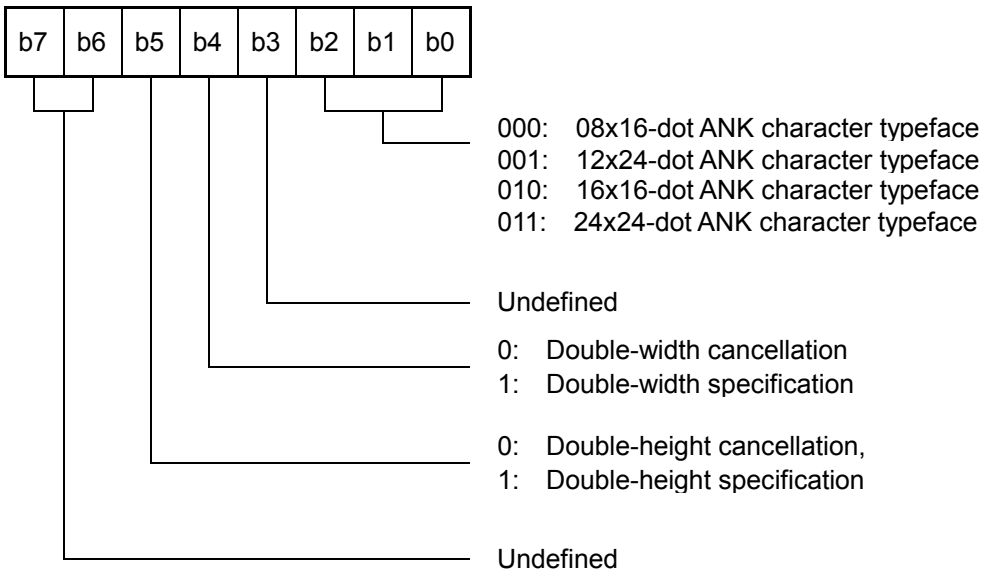
The ESC ! + n command specifies printing mode.

[Code] $[1B]_{16}$ $[21]_{16}$ [n]
$[27]_{10}$ $[33]_{10}$ [n]

[Explanation]

(1) The *ESC !+n* command specifies printing mode.

(2) The following figure shows the relationship between the bits of parameter n and printing mode:



(3) When both the double width and double height are specified, characters with the double height and width character typeface are printed.

(4) When one line contains different-height character typefaces, the character typefaces are arranged so that their bottom ends are aligned at the same level.

(8) ESC % + n

[Name] External registration character specification/cancellation

[Function]

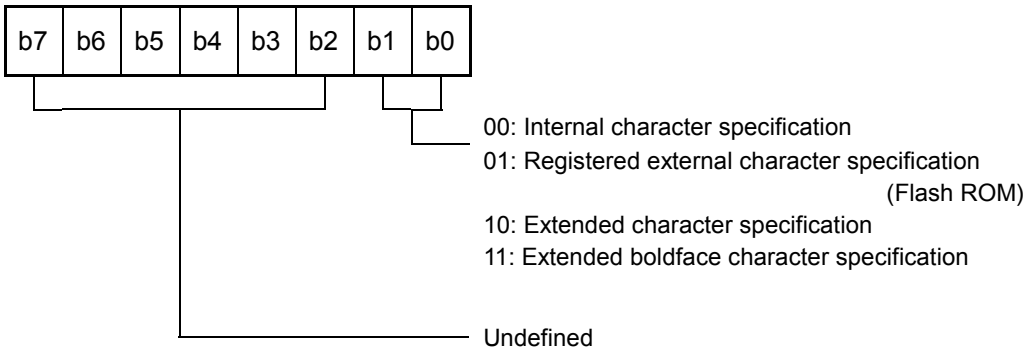
The ESC % + n command specifies or cancels registered external characters.

[Code] $[1B]_{16}$ $[25]_{16}$ [n]
$[27]_{10}$ $[37]_{10}$ [n]

[Explanation]

(1) The *ESC %+n* command selects an internal character set (system-defined font) or a registered external character set (user-defined font).

(2) The following figure shows the relationship between the bits of parameter n and the character set to be selected:



(3) One of the following character sets is selected with the character type selected with the *ESC !* command:

No.	*ESC !* Specification	Registered External Character Specification	Extended Character Specification	Extended Boldface Character Specification
1	08 x 16 ANK	08 x 16 registered	08 x 16 extended	08 x 16 boldface
2	12 x 24 ANK	12 x 24 registered	12 x 24 extended	12 x 24 boldface
3	16 x 16 ANK	16 x 16 registered	16 x 16 extended	Undefined
4	24 x 24 ANK	24 x 24 registered	24 x 24 extended	Undefined

(4) If an undefined external character code is received when the registered character-printing mode is set, the corresponding internal character is printed.

(5) Printing of extended character and extended boldface character is effective only when kanji ROM mounted.

(6) Registration of Registered external character is effective only when flash ROM mounted.

(9) ESC & + y + c_1 + c_2 + x + d_1 to d_n

[Name] External registration character definition

[Function]

The ESC & + y + c_1 + c_2 + x + d_1 to d_n command defines external characters to be registered.

[Code] $[1B]_{16}$ $[26]_{16}$ [y] $[c_1]$ $[c_2]$ [x] $[d_1]$ to $[d_n]$
$[27]_{10}$ $[38]_{10}$ [y] $[c_1]$ $[c_2]$ [x] $[d_1]$ to $[d_n]$

[Explanation]

(1) This *ESC* command defines external characters to be registered.

(2) Parameter y specifies a dummy code. A NUL code must be specified.

(3) Parameter x specifies a dummy code. A NUL code must be specified.

(4) Parameter d specifies the data to be defined.

(5) Parameter c_1 and c_2 specify the areas to be defined. The values of parameter c_1 and c_2 values must satisfy the following conditions:
$[20]_{16} \leq c_1 \leq c_2 \leq [FF]_{16}$

(6) To define one character, parameter c_1 and c_2 must be specified so that the c_1 value is equal to the c_2 value. To define two or more characters, the data block of d_1 to d_n must be specified the same number of times as the number of characters to be defined.

(7) If "$c_2 < c_1$" is detected, a parameter error is assumed and the external characters are not registered.

(8) The length of the data required to define one external character to be registered depends on the character type specified with the *ESC !* command (see the following table):

Character type specified with *ESC !*	Data length
08 x 16 ANK	16 bytes
12 x 24 ANK	48 bytes
16 x 16 ANK	32 bytes
24 x 24 ANK	72 bytes

(9) The *ESC & + y + c_1 + c_2 + x + d_1 to d_n* command cannot be used when Flash ROM is not installed.

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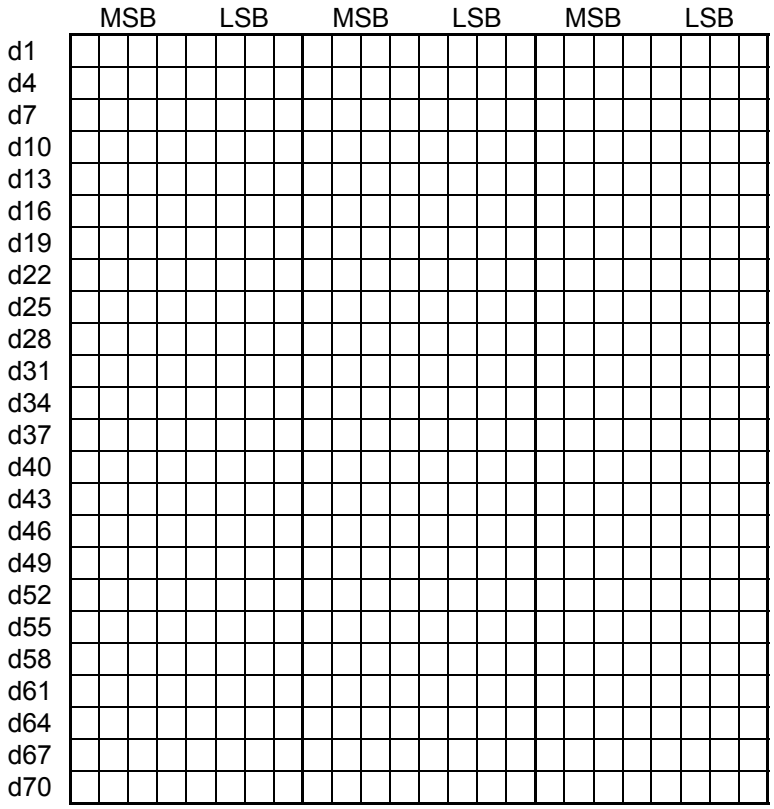
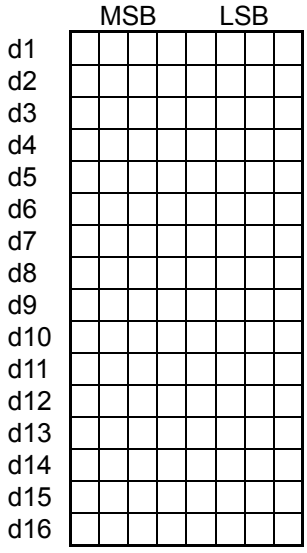
(10)The character-typeface definition data must use the following formats:



[24×24]



[8×16]

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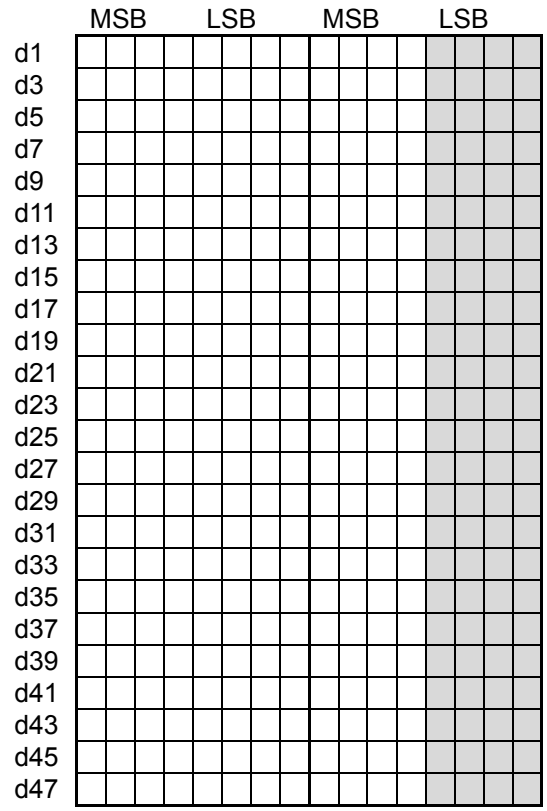
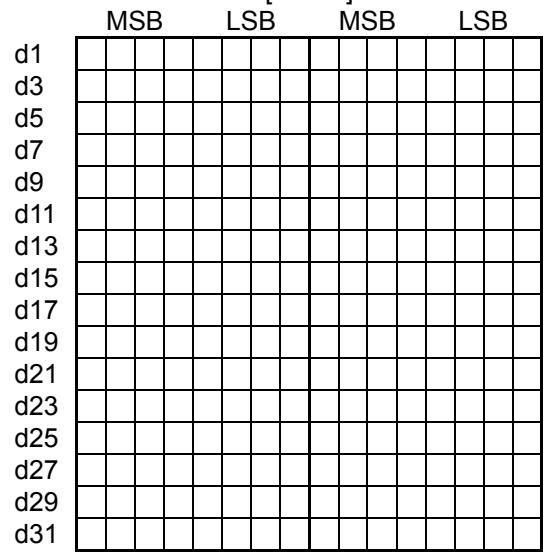


[12×24]



[16×16]

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*(10) ESC * + m + n_1 + n_2 + d_1 to d_n*

[Name] Bit image printing

[Function]

The ESC * + m + n_1 + n_2 + d_1 to d_n command specifies and prints a bit image.

[Code] $[1B]_{16}$ $[2A]_{16}$ [m] [n_1] [n_2] [d_1] to [d_n]
$[27]_{10}$ $[42]_{10}$ [m] [n_1] [n_2] [d_1] to [d_n]

[Explanation]

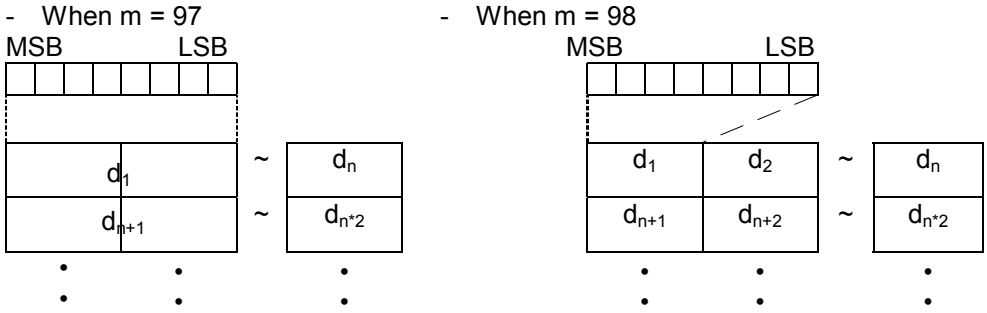
(1) This *ESC* command specifies and prints a bit image.

(2) The relationship between parameter m and image print modes is as follows:

m	Mode	Number of print dots		Number of dots
		Vertical direction	Horizontal Direction	
97	Single density	1	16	(n_2*256+n_1)*print-width/2
98	Double density	1	8	(n_2*256+n_1)*print-width

(3) Parameter n_1 and n_2 specify the number of lines to be printed. Without regard to the specified mode, conditions $0 \le n_1 \le 255$ and $0 \le n_2 \le 3$ must be satisfied. If condition $n_1 = n_2 = 0$ is satisfied, a parameter error is assumed and this *ESC* command becomes invalid. Data overflowing from the specified printing area is ignored.

(4) The following figure shows the relationship between bit image data and print data:



(5) Parameter n_1 and n_2 specify the number of dots in the vertical direction of the bit image to be printed. That is, the number of dots is "256 x n_2 + n_1." Therefore, the number of dots to be transferred is "(256 x n_2 + n_1) x print-head-width."

(6) The print width is as follows:

Printer	Print width (bytes)
FTP-622MCL	54
FTP-632MCL	72

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(11) ESC 2

[Name] 1/6-inch line pitch setting

[Function]

The ESC 2 command sets the single line pitch to 1/6 inch.

[Code] $[1B]_{16}$ $[32]_{16}$
$[27]_{10}$ $[50]_{10}$

[Explanation]

(1) The *ESC 2* command sets single line pitch to 1/6 inch.

(2) When line pitch is set using the *ESC 2* command, the line spacing set with the *ESC A* command is invalidated.

(12) ESC 3 + n

[Name] Line pitch setting

[Function]

The ESC 3 + n command sets single line pitch.

[Code] $[1B]_{16}$ $[33]_{16}$ [n]
$[27]_{10}$ $[51]_{10}$ [n]

[Explanation]

(1) The *ESC 3 + n* command sets single line pitch to n dot lines.

(2) When line pitch is set using the *ESC 3+n* command, the line pitch previously set with the *ESC A* command is invalidated.

(3) In line feed with printing, paper is fed by at least the height of the character currently specified. In line feed without printing, paper is fed only by the specified line spacing. For example, when line spacing of 10 dot lines is specified for a character of which height is 24 dot lines, paper is fed by 24 dot lines (in line feed with printing) or 10 dot lines (in line feed without printing).

(13) ESC ? + n

[Name] External registration character deletion

[Function]

The ESC ? + n command deletes an external registration character specified with parameter n

[Code] $[1B]_{16}$ $[3F]_{16}$ [n]
$[27]_{10}$ $[63]_{10}$ [n]

[Explanation]

(1) Parameter n specifies the deleted character code.

(2) When the value of parameter n must satisfy the following condition:
$[20]_{16} \leq n \leq [FF]_{16}$

(3) After deletion, the corresponding internal character is printed.

(4) The code definition pattern of the character type specified with the *ESC !* command is deleted.

(5) If an unregistered character code is specified with the *ESC ?+n* command, the *ESC ?+n* command is ignored.

(14) ESC @

[Name] Printer resetting

[Function]

The ESC @ command initializes the printer.

[Code] $[1B]_{16}$ $[40]_{16}$
$[27]_{10}$ $[64]_{10}$

[Explanation]

(1) The *ESC* @ command initializes the printer.

(2) The *ESC* @ command prints the data contained in the print buffer, and initializes various setup items.

(3) When the *ESC* @ command is executed, various setup items are set as follows:

1)	Print buffer	Clear
2)	Line feed pitch	26dot line
3)	Print character type	12x24 dots half size character
4)	Double width specification	Clear
5)	Double height specification	Clear
6)	Character code	Set to Japanese characters
7)	International character setting	Japan
8)	Mark detection to start point setting	About 2 mm
9)	Paper run out detection setting	Valid *1
10)	Head up detection setting	Valid *1
11)	Temperature abnormality detection setting	Valid *1
12)	Voltage abnormality detection setting	Valid *1
13)	Kanji print mode specification	Clear
14)	Print quality setting	Standard paper
15)	x4 size print mode specification	Clear
16)	Kanji code setting	JIS code
17)	Printing speed setting	High-speed mode
18)	Receive code buffer	Clear
19)	Horizontal tab setting	Every 8 characters
20)	Black and white reversal printing	Clear
21)	Reverse order printing	Clear
22)	Near end detection setting	Invalid
23)	Paper feed	Valid
24)	Paper type	Continuous paper
25)	External registration character	Resisted
26)	Page length setting	44 lines, about 143 mm
27)	90° character rotation	Clear
28)	Paper auto-feed amount setting	10mm
29)	Auto status transmission	Clear
30)	Motor off-time setting	One excitation time = 0.5 sec Excitation holding time = 1.0 sec

*1: This can be set to invalid by the *SLCTIN signal.

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(15) ESC A + n

[Name] Line spacing setting

[Function]

The ESC A + n command sets the line spacing to "n" dot lines.

[Code] $[1B]_{16}$ $[41]_{16}$ [n]
$[27]_{10}$ $[65]_{10}$ [n]

[Explanation]

(1) The *ESC A + n* command sets the line spacing to "n" dot lines.

(2) Condition 0 ≤ n ≤ 255 must be satisfied. However, when "n + character-height" is 256 dot lines or more, the line spacing is n + character-height - 256.

(3) If the *ESC A + n* command is set two or more times for the same line, the last set line spacing is valid.

(4) When line pitch is set with the *ESC 3* or *ESC 2* command, the line spacing set with the *ESC A + n* is invalidated.

(16) ESC C + n

[Name] Page length setting

[Function]

The ESC C + n command sets the page length to "n" lines.

[Code] $[1B]_{16}$ $[43]_{16}$ [n]
$[27]_{10}$ $[67]_{10}$ [n]

[Explanation]

(1) The *ESC C + n* command sets the page length to "n" lines.

(2) Condition 0 ≤ n ≤ 63 must be satisfied.

(3) When parameter n specifies 0, the page length is reset. If a *FF* command is received when the cut sheet mode is specified and the page length is reset, the paper is ejected.

(4) If the value of parameter n is incorrect, the page length setting is invalidated and the previous page length is validated.

(5) Even if the line spacing is changed after the page length is set, the page length is not changed.

(6) The line pitch is set as follows:
- When the line spacing is set with *ESC A* command, the line pitch is set with "character-height + line spacing".
- When the line pitch is set with *ESC 2* or *ESC 3* command, the line pitch is set with the line pitch to be set.

(17) ESC D +d_1 to d_n + NUL

[Name] Horizontal tab position setting

[Function]

The ESC D + d_1 to d_n + NUL command sets the horizontal tab position.

[Code] $[1B]_{16}$ $[44]_{16}$ $[d_1]$ to $[d_n]$ $[00]_{16}$
$[27]_{16}$ $[68]_{16}$ $[d_1]$ to $[d_n]$ $[00]_{10}$

[Explanation]

(1) Condition $1 \leq d \leq 255$ must be satisfied.

(2) Condition $1 \leq n \leq 32$ must be satisfied.

(3) The horizontal tab position is set to the position that is "d x ANK-character-width" distant from the head of the line in the printing area. When character-width is satisfied to double-width, the horizontal tab position is applied double- character width.

(4) Even if the character width is changed after the horizontal tab position is set, the set horizontal tab position is not changed.

(5) When the horizontal tab is set with the *ESC D+d_1 to d_n + NUL* command, the horizontal tab position already set is canceled.

(6) When horizontal position d=8 is set, executing a *HT* command moves the next print position to column 9.

(7) Up to 32 horizontal tab positions can be set. If more than 32 horizontal tab positions are set, the data at the excessive tab positions is handled as ordinary data.

(8) The "d" values must be entered in ascending order, and must end with NUL. If the "d_n" value is equal to or smaller than the "d_{n-1}" value, processing this *ESC* command is terminated when the d_n value is received. The subsequent data is handled as ordinary data.

(9) All horizontal tab positions can be canceled with the *ESC D NUL* command.

(10) When the power to the printer is turned on or the printer is reset, the horizontal tab positions are set for intervals of 8characters selected in the initial state.

(18) ESC J + n

[Name] Forward paper feed

[Function]

The ESC J + n command feeds paper in the forward direction.

[Code] $[1B]_{16}$ $[4A]_{16}$ [n]
$[27]_{10}$ $[74]_{10}$ [n]

[Explanation]

(1) The *ESC J + n* command feeds paper in the forward direction by "n" dot lines.

(2) Condition $0 \leq n \leq 255$ must be satisfied.

(3) When there is data in the print buffer, the data in the print buffer is printed after which paper is fed in the forward direction.

(4) When parameter n specifies 0, the data contained in the buffer is printed but paper is not fed.

(19) ESC K + n

[Name] Backward paper feed

[Function]

The ESC K + n command feeds paper in the backward direction.

[Code] $[1B]_{16}$ $[4B]_{16}$ [n]
$[27]_{10}$ $[75]_{10}$ [n]

[Explanation]

(1) The *ESC K + n* command feeds paper in the backward direction by "n" dot lines. Condition $0 \leq n \leq 255$ must be satisfied.

(2) When there is data in the print buffer, the data in the print buffer is printed after which paper is fed in the backward direction.

(3) When parameter n specifies 0, the data contained in the buffer is printed but paper is not fed.

(4) If paper back-feed is executed, paper jam may be occurred. If use this command, it is necessary to confirm application with printer.

(5) If paper back-feed executed, the upper part of character is smashed by gear's back-rush. When the print is execute after back-feeding, feed the paper forward with amount more than back-rush, prevent smash of character.

(6) When this command is executed, the paper must not come off from the rubber roller.

(20) ESC R + n

[Name] International character specification

[Function]

The *ESC R + n* command specifies printing using a specified set of international characters.

[Code] $[1B]_{16}$ $[52]_{16}$ [n]
$[27]_{10}$ $[82]_{10}$ [n]

[Explanation]

(1) The *ESC R + n* command enables a set of international characters (specified with parameter n) to be printed.

(2) The relationship between international characters and parameter n is as shown below.

(3) In the initial state, the domestic character set and character set "Japan" are set.

(4) If the value of parameter n is invalid, this *ESC* command is invalidated. The previous setting is validated.

n	Code / Country	23	24	40	5B	5C	5D	5E	60	7B	7C	7D	7E
0	USA	#	$	@	[	\	]	^	`	{	¦	}	~
1	FRENCH	#	$	à	°	Ç	§	^	`	é	ù	è	¨
2	GERMAN	#	$	§	Ä	Ö	Ü	^	`	ä	ö	ü	ß
3	UK	£	$	@	[	\	]	^	`	{	¦	}	~
4	DENMARK	#	$	@	Æ	Ø	Å	^	`	æ	ø	å	~
5	SWEDEN	#	¤	É	Ä	Ö	Å	Ü	é	ä	ö	å	ü
6	ITALY	#	$	@	°	\	é	^	ù	à	ò	è	ì
7	SPAIN	Pt	$	@	¡	Ñ	¿	^	`	¨	ñ	}	~
8	JAPAN	#	$	@	[	\	]	^	`	{	|	}	¯
9	NORWAY	#	¤	É	Æ	Ø	Å	Ü	é	æ	ø	å	ü
10	DENMARK2	#	$	É	Æ	Ø	Å	Ü	é	æ	ø	å	ü
11	SPAIN2	#	$	á	¡	ñ	¿	é	`	í	ñ	ó	ú
12	RATIN AMERICA	#	$	á	¡	ñ	¿	é	Ü	í	ñ	ó	ú
13	JAPAN2	#	$	@	[	\	]	^	`	{	¦	}	~

(Each code value is represented in hexadecimal notation.)

n = $[41]_{16}$ Domestic character set ANK
n = $[42]_{16}$ Foreign character set ANK

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(21) ESC V + n

[Name] Right rotation 90°

[Function]

The character is rotated right by 90°.

[Code] $[1B]_{16}$ $[56]_{16}$ [n]
$[27]_{10}$ $[86]_{10}$ [n]

[Explanation]

(1) 90° rotation is specified by n and release is set.

n	Set content
0	Rotation release of 90°
1	Rotation specification of 90°

(2) It is effective to all character kind.

(3) It is invalid concerning the barcode, the image, and the registration image.

(4) A standard print and the rotation print of 90° can exist together in the same line because an automatic changing is not done by this command.

(5) Character font becomes equal to 270° rotation (90° in left rotation) when 90° rotation is specified at upside-down printing.

(6) The direction of the expansion must not rotate with the character when you rotate the length double size and the double width character right by 90°.

(22) ESC X + n + m

[Name] Setting the turning time of the motor excitation

[Function]

The turning off time of the motor excitation current is set.

[Code] $[1B]_{16}$ $[58]_{16}$ [n] [m]
$[27]_{10}$ $[88]_{10}$ [n] [m]

[Explanation]

(1) The off time of motor exciting after feeding or print stopping is set.

(2) n sets one excitation time after the motor stops in 0.5 seconds.

(3) m sets time from the motor stop to turning off in 0.5 seconds.

(4) The time that can be set range is as follows.
$0 \leq m \leq n \leq 20$

(5) An initial value is m=10 and n=20.

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(23) ESC c + 1 + n

[Name] Internal processing setting

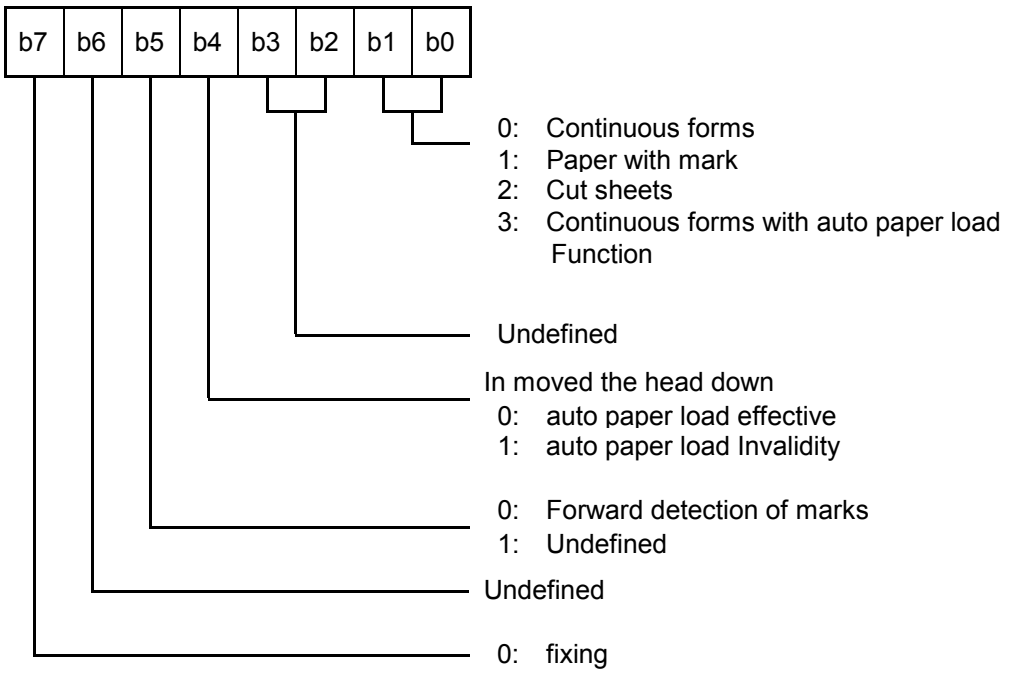
[Function]

The ESC c + 1 + n command sets internal processing.

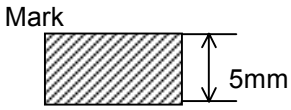
[Code] $[1B]_{16}$ $[63]_{16}$ $[31]_{16}$ [n]
$[27]_{10}$ $[99]_{10}$ $[49]_{10}$ [n]

[Explanation]

(1) The bits of parameter n specify internal processing as follows:



(2) A mark is a black bar with a height of 5 mm.



(3) When the printer is initialized, parameter n is cleared to 0.

(4) If this *ESC* command is issued when there is data in the print buffer, the data in the buffer is printed after which the internal processing is set.

(5) When the specified paper type is a paper with mark, marks are automatically detected when forms are inserted. When the specified paper type is cut sheets, cut sheets are automatically fed when they are set.

(6) If the paper type is changed from "cut sheets" to "other than cut sheets," the existing forms are automatically ejected.

(7) When the specified paper type is continuous form with auto paper load, continuous forms with auto paper load are automatically fed when they are set.

(24) ESC d + n

[Name] n-line feed

[Function]

The ESC d + n command prints the data and feeds a line, then feeds the paper by "n" lines.

[Code] $[1B]_{16}$ $[64]_{16}$ [n]
$[27]_{10}$ $[100]_{10}$ [n]

[Explanation]

(1) The *ESC d + n* command feeds paper by a line count specified with parameter n.

(2) Condition $0 \leq n \leq 255$ must be satisfied.

(3) After "n" lines are fed, the data receive position is set at the left edge on the line.

(4) When there is data in the print buffer, the data contained in the buffer is printed after which paper is fed by "n" lines.

(25) ESC e + n

[Name] Backward n-line feed

[Function]

The ESC e + n command prints the data and feeds a line, then feeds the paper in the backward direction by "n" lines.

[Code] $[1B]_{16}$ $[65]_{16}$ [n]
$[27]_{10}$ $[101]_{10}$ [n]

[Explanation]

(1) The *ESC e + n* command feeds paper in the backward direction by the line count specified with parameter n.

(2) Condition 0 ≤ n ≤ 255 must be satisfied.

(3) After "n" lines are fed, the data receive position is set at the left edge on the line.

(4) When the value of parameter n is 0, the data contained in the buffer is printed but the paper is not fed.

(5) If paper back-feed is executed, paper jam may be occurred. If use this command, it is necessary to confirm application with printer.

(6) If paper back-feed executed, the upper part of character is smashed by gear's back-rush. When the print is execute after back-feeding, feed the paper forward with amount more than back-rush, prevent smash of character.

(7) When this command is executed, the paper must not come off from the rubber roller.

(26) ESC s + n

[Name] Printing speed setting

[Function]

The ESC s + n command sets printing speed.

[Code] $[1B]_{16}$ $[73]_{16}$ [n]
$[27]_{10}$ $[115]_{10}$ [n]

[Explanation]

(1) The *ESC s + n* command sets printing speed.

(2) When there is data in the print buffer, the data contained in the print buffer is printed after which the printing speed is set.

(3) When the same printing speed as the current printing speed is specified with this *ESC* command, no change occurs.

(4) The relationship between parameter n and the specified printing speed is as follows:

n	Function mode
$[60]_{16}$	High-speed printing
$[61]_{16}$	Medium-speed printing
$[62]_{16}$	Medium-speed printing
$[63]_{16}$	Low-speed printing

(5) If a parameter value not listed in the above table is set, the newly set printing speed is invalidated. The previous printing speed is validated.

(6) When two-color paper is used, it is necessary to be set the medium-speed printing mode.

(27) ESC t + n

[Name] Character code table selection

[Function]

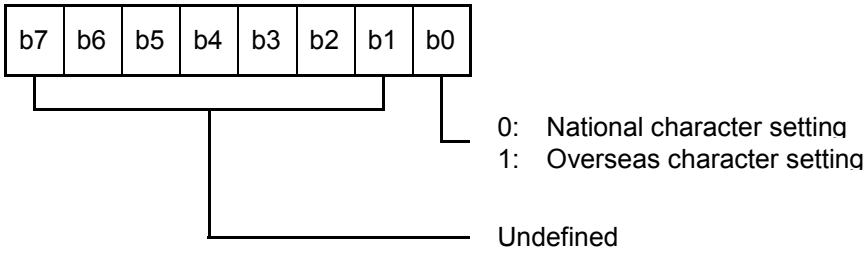
The ESC t + n command selects page n from the character code table.

[Code] $[1B]_{16}$ $[74]_{16}$ [n]
$[27]_{10}$ $[116]_{10}$ [n]

[Explanation]

(1) The *ESC t + n* command selects page n from the character code table.

(2) The bits of parameter n specify the following information:



(3) The *ESC t + n* command has the same effect as that acquired by specifying $[41]_{16}$ or $[42]_{16}$ in the parameter of the *ESC R* command. Therefore, when both the *ESC t + n* command and the *ESC R* command are specified, the last of these *ESC* commands specified is validated.

(4) The initial value of parameter n is 0.

(5) See Section H, "List of Character Codes."

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(28) ESC { + n

[Name] Upside-down printing setting/cancellation

[Function]

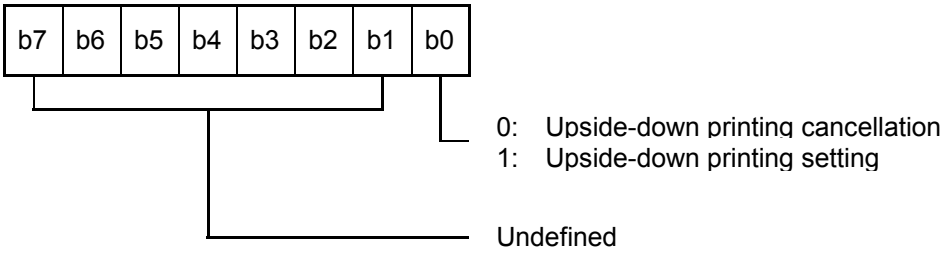
The ESC { + n command sets or cancels upside-down printing.

[Code] $[1B]_{16}$ $[7B]_{16}$ [n]
$[27]_{10}$ $[123]_{10}$ [n]

[Explanation]

(1) Parameter n sets or cancels upside-down printing.

(2) The bits of parameter n specify the following information:



(3) The *ESC { + n* command can be used in all character modes.

(4) The *ESC { +n* command can also be used in bit image printing.

(5) The character base line is at the bottom of the character typeface. Print character typefaces are arranged so that their bottom ends are aligned at the same level.

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SHEET 53

(29) FS ! + n

[Name] Kanji printing mode collective specification

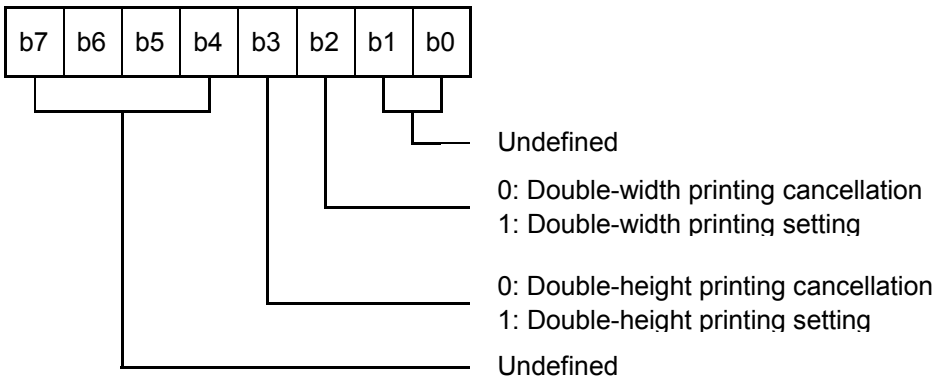
[Function]

The FS ! + n command specifies kanji printing modes collectively.

[Code] $[1C]_{16}$ $[21]_{16}$ [n]
$[28]_{10}$ $[33]_{10}$ [n]

[Explanation]

(1) The bits of parameter n specify the following information:



(2) When both the double-width printing and double-height printing are specified, double height and width printing is executed.

(3) When one line contains character typefaces with different heights, the character typefaces are arranged so that their base line or bottom ends are aligned at the same level.

(4) When a character typeface is to be extended horizontally, the left edge of the character typeface is fixed and the right edge is extended to the right.

(5) When printing mode is specified with this command and other commands, only the command processed last is validated. For example, the printing mode set with the *FS W* command is invalidated by the *FS ! + n* command.

(6) This command is valid when the kanji ROM is mounted.

(30) FS &

[Name] Kanji printing mode specification

[Function]

The FS & command specifies kanji printing mode.

[Code] $[1C]_{16}$ $[26]_{16}$
$[28]_{10}$ $[38]_{10}$

[Explanation]

(1) The *FS &* command specifies kanji printing mode.

(2) A kanji character must be represented with a 2-byte code conforming to JIS C6226-$_{1983}$. The first byte then the second byte must be sent.

(3) The size of each kanji typeface must be 16x16 dots or 24x24 dots.

(4) As for the size on the kanji typeface, the font size specified by the ESC ! command is applied. When 8x16 dots is set the size of kanji typeface is 16x16 dots, when 12x24 dots is set, the size of kanji typeface is 24x24 dots.

(5) The size of a character typeface must be selected with a printing mode setting command (*FS !* and *ESC !*). (For details, see "Printing Mode Setting Commands.")

(6) Even if an undefined character code is specified for printing, a character may be printed.

(7) This command is valid when kanji ROM is mounted.

*(31) FS * + m + n_1 + n_2 + d_1 to d_n*

[Name] High-speed collective image printings specified

[Function]

This command specified the high-speed collective image printing.

[Code] $[1C]_{16}$ $[2A]_{16}$ [m] [n_1] [n_2] [d_1] to [d_n]
$[28]_{10}$ $[42]_{10}$ [m] [n_1] [n_2] [d_1] to [d_n]

[Explanation]

(1) m specifies the operation mode.

m	Operation	Caption
97	Print	The image data of SRAM is printed in the n_1 + n_2 * 256 dot-line.
98	Download	The image data of the n_1 + n_2 x 256 dot-line is registered to SRAM.
99	Print/download	The image data of the n_1 + n_2 x 256 dot-line is registered to and is printed.

(2) The number of print lines is specified with n_1 + n_2 x 256.

(3) The number of maximum lines is as follows for SRAM (128KB) equipped with this board.

Mechanism model	Number of maximum lines
FTP-622MCL	2427line
FTP-632MCL	1818line

(4) The quantity of image data is (n_1+n_2x256) x print area.

(5) This command is valid when SRAM is mounted.

(32) FS .

[Name] Kanji printing mode cancellation

[Function]

The FS . command cancels kanji printing mode.

[Code] $[1C]_{16}$ $[2E]_{16}$
$[28]_{10}$ $[46]_{10}$

[Explanation]

(1) The *FS* command cancels kanji printing mode.

(2) This command is valid when kanji ROM is mounted.

(33) FS 9 + n

[Name] Detection function enable/disable setting

[Function]

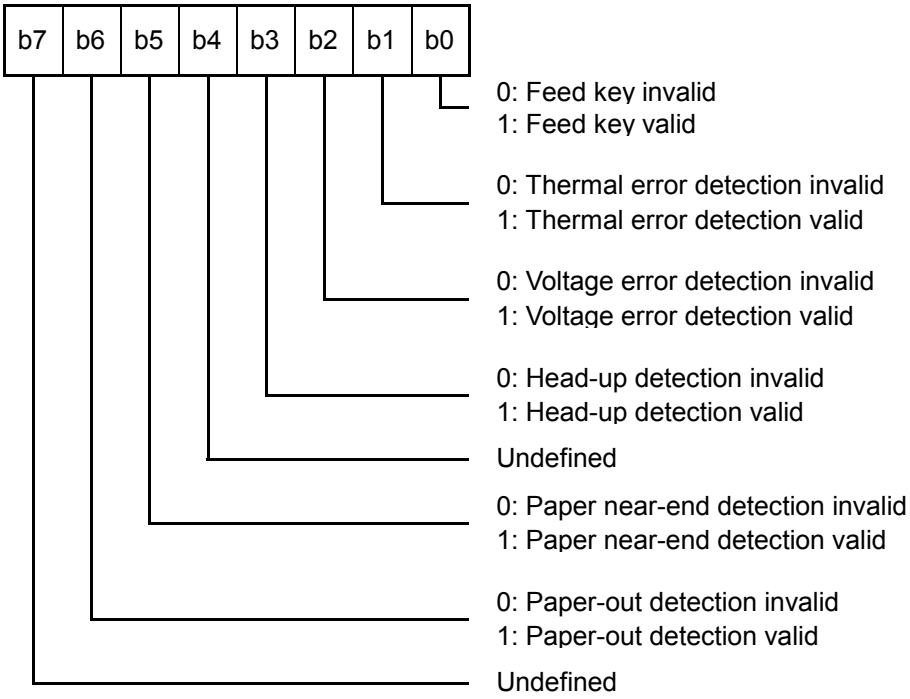
The FS 9 + n command enables or disables various detection functions.

[Code] $[1C]_{16}$ $[39]_{16}$ [n]
$[28]_{10}$ $[57]_{10}$ [n]

[Explanation]

(1) Condition 0 ≤ n ≤ 255 must be satisfied.

(2) The bits of parameter n specify the following information:



(3) In the initial state, all of the detection functions other than the paper near-end detection function are valid.

(34) FS C + n

[Name] Kanji code system selection

[Function]

The FS C + n command selects kanji code system.

[Code] $[1C]_{16}$ $[43]_{16}$ [n]
$[28]_{10}$ $[67]_{10}$ [n]

[Explanation]

(1) Parameter n specifies the kanji code system as follows:

n	Selected system
0, 48	JIS code system
1, 49	Shift JIS code system

(2) In each kanji code system, the following code values are valid:
- JIS code system
  Byte 1: $[21]_{16}$ to $[7E]_{16}$
  Byte 2: $[21]_{16}$ to $[7E]_{16}$

- Shift JIS code system
  Byte 1: $[81]_{16}$ to $[9F]_{16}$ and $[E0]_{16}$ to $[EF]_{16}$
  Byte 2: $[40]_{16}$ to $[7E]_{16}$ and $[80]_{16}$ to $[FC]_{16}$

(3) The initial value of parameter n is 0.

(4) Even if a code value outside the permitted range is specified, the character of a font may print.

(5) When the code outside the range is specified when the shift JIS code system is specified, ANK character which corresponds to code is printed.

(6) This command is valid when kanji ROM is mounted.

(35) FS E + n

[Name] Correction of impressed energy

[Function]

Impressed energy is corrected.

[Code] $[1C]_{16}$ $[45]_{16}$ [n]
$[28]_{10}$ $[69]_{10}$ [n]

[Explanation]

(1) The correction value is set by n. The range of n is shown below.
$0 \leq n \leq 255$

(2) Impressed energy grows by the value of n large.

(3) Please note that the life of the head shortens when the impressed energy is too large. There is danger to which the head is disconnected for $n \geq 128$.

(4) An initial value is n = 57.

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(36) FS W + n

[Name] Kanji double height and width printing specification/cancellation

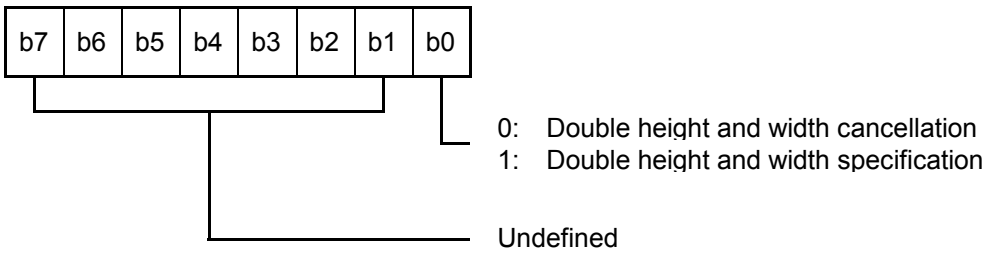
[Function]

The FS W + n command specifies or cancels kanji double height and width printing.

[Code] $[1C]_{16}$ $[57]_{16}$ [n]
$[28]_{10}$ $[87]_{10}$ [n]

[Explanation]

(1) The bits of parameter n specify the following information:



(2) The double height and width size is the same as that acquired when both the double width and double height are specified simultaneously.

(3) When the double height and width mode is canceled with the *FS W + n* command, subsequent characters are printed at ordinary size.

(4) When different-height character typefaces are to be printed on the same line, their base line or bottom ends are aligned at the same level.

(5) When a character typeface is to be extended horizontally, the left edge of the character typeface is fixed and the right edge is extended to the right.

(6) The double height and width mode can also be specified with the *FS !* command by specifying both the double width and double height simultaneously. However, only command executed last is validated. Therefore, when the double height and width mode is specified with an *FS !* command after which the double height and width mode is canceled with an *FS W + n* command, the setting with the *FS !* command is canceled.

(7) This command is valid when kanji ROM is mounted.

(37) GS & + m + x + y_1 + y_2 + d_1 to d_n

[Name] Registration of image data

[Function]

This command is registration of image data.

[Code] $[1D]_{16}$ $[26]_{16}$ [m] [x] [y_1] [y_2] [d_1] to [d_n]
$[29]_{10}$ $[38]_{10}$ [m] [x] [y_1] [y_2] [d_1] to [d_n]

[Explanation]

(1) m specifies the identification number of the registered image. The range of m is 1≤m≤255. When two or more images are registered, it distinguishes by this identification number.

(2) x shows the number of bytes of width.

(3) $y_1 + y_2 \times 256$ shows the number of length dot-lines. The range of y_1 and y_2 is as follows.
$0 \le y_1 \le 255$, $y_2 = 0$

(4) When the number of data is 0, if specified ID has already been registered, that data is deleted. if not, nothing is done.

(5) Because the data is registered on FLASH memory, the image data is not deleted by the power supply cutting.

(6) Header is automatically added to the image data and it is registered. Header is composed of six bytes and controls the identification number and the size etc. of the image data.

(7) The capacity of the image data is 128KB. Please note that the data that exceeds this capacity cannot be registered.

(8) This command is valid when Flash ROM is mounted.

(38) GS ' + m + n

[Name] Print registered image data

[Function]

The registered image data is printed.

[Code] $[1D]_{16}$ $[27]_{16}$ [m] [n]
$[29]_{10}$ $[39]_{10}$ [m] [n]

[Explanation]

(1) m specifies the identification number of the printed registration image. When the identification number of the no registration is specified, it becomes a parameter error.

(2) n specifies the mode of the print.

m	Print mode	Caption
0,48	Normal	The registered image data is printed by the registered size.
1,49	Double width	The registered image data is printed by double width.
2,50	Double height	The registered image data is printed by double height.
3,51	Double width and height	The registered image data is printed by double width and height.

(3) When the image data overflows the printing area, overflow part is disregard.

(4) The bottom of the character and the bottom of image data are arranged and are printed when the character height and image data height is different.

(5) The data for 255dot-line is printed when the height of the printed image data is more than 256dot-line.

(6) This command is valid when Flash ROM is mounted.

(39) GS <

[Name] Mark detection execution

[Function]

The GS < command feeds paper up to the next mark position.

[Code] $[1D]_{16}$ $[3C]_{16}$
$[29]_{10}$ $[60]_{10}$

[Explanation]

(1) The *GS* < command feeds paper up to the next mark position.

(2) After a mark is detected, paper is fed (the head is detected) in accordance with the head detection base; the paper feed then stops.

(3) If no mark is found within the specified page length from the mark-detection-execution starting point, an error is assumed and the page feed stops.

(4) For an explanation of the relationship between mark position and print line position, see the printer mechanism specifications.

(40) GS A + m + n

[Name] After-mark-detection head distance setting

[Function]

The GS A + m + n command sets the head detection distance to be used after mark detection.

[Code] $[1D]_{16}$ $[41]_{16}$ [m] [n]
$[29]_{10}$ $[65]_{10}$ [m] [n]

[Explanation]

(1) The *GS A + m + n* command sets the head detection distance to be used after mark detection.

(2) The value of parameter m is always 0.

(3) Parameter n specifies the head detection distance in dot lines.

(4) Condition 0 ≤ n ≤ 63 must be satisfied. If an "n" value outside this range is specified, a parameter error occurs. The previous head detection distance is not changed.

(5) When the power is turned on or the printer is reset, parameter m is cleared to 0 and parameter n is set to 16.

(41) GS E + n

[Name] Print quality setting

[Function]

The GS E + n command sets print quality in paper units.

[Code] $[1D]_{16}$ $[45]_{16}$ [n]
$[29]_{10}$ $[69]_{10}$ [n]

[Explanation]

(1) The *GS E + n* command sets print quality for each paper and automatic division print mode is set or canceled.

(2) The five low-order bits of parameter n are used to select paper quality. The three high-order bits of parameter n are disregarded.

(3) The relationship between four low-order bits of parameter n and paper quality is as follows:

n	Mode	Paper quality	Applicable paper type	Manufacturer
0	TYPE [1]			
1	TYPE [2]			
2	TYPE [3]		TF50KS-E4	Nippon Paper Mfg. Co., Ltd.
3	TYPE [4]	Standard paper	PD150R, PD160R, PD170R	Oji Paper Mfg. Co., Ltd.
4	TYPE [5]		TF60KS-F1, TF60KJ-R	Nippon Paper Mfg. Co., Ltd.
5	TYPE [6]		TF60KS-E	Nippon Paper Mfg. Co. Ltd.
6	TYPE [7]		HA220AA	Mitsubishi Paper Mills, Ltd.
7	TYPE [8]			
8	TYPE [9]	Long preservation paper	AFP-235	Mitsubishi Paper Mills, Ltd.
9	TYPE [10]			
10	TYPE [11]			
11	TYPE [12]			
12	TYPE [13]			
13	TYPE [14]			
14	TYPE [15]			
15	TYPE [16]			
20	TYPE [17]	Two color paper (Blue/Black)	PB770	Mitsubishi Paper Mills, Ltd.
21	TYPE [18]			
22	TYPE [19]	Two color Paper (Red/Black)	PB670	Mitsubishi Paper Mills, Ltd.
23	TYPE [20]			

(4) The initial value of parameter n is 3.

(5) The relationship between bit of parameter n and color is as follows:

n	Mode	Color
20	TYPE [17]	Blue
21	TYPE [18]	Black
22	TYPE [19]	Red
23	TYPE [20]	Black

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(42) GS V + n + m

[Name] Paper cutting

[Function]

The GS V + n + m command executes cutting the paper

[Code] $[1D]_{16}$ $[56]_{16}$ [n] [m]
$[29]_{10}$ $[86]_{10}$ [n] [m]

[Explanation]

(1) The relationship between parameter n and operation is as follows.

n	Operation	Note
0,48	Full cutting	m is unnecessary
1,49	Partial cutting	
65	Paper feed and full cutting	m is necessary.
66	Paper feed and partial cutting	

(2) Full cutting completely cuts off paper.

(3) Partial cutting leaves part of the paper uncut.

(4) When parameter n specifies 65 or 66, the printer cuts the paper after the printer feeds paper by parameter m.

(5) Parameter m shows the number of dot lines, and Condition $0 \leq m \leq 255$ must be satisfied.

(43) GS e + n + m

[Name] Bar code width setting

[Function]

The GS e + n + m command sets the width of a bar code.

[Code] $[1D]_{16}$ $[65]_{16}$ [n] [m]
$[29]_{10}$ $[101]_{10}$ [n] [m]

[Explanation]

(1) Parameter n specifies the width of a narrow bar in dots.

(2) Parameter m specifies the width of a wide bar in dots.

(3) When the code does not consist of wide bars and/or narrow bars, the value of parameter n is set as the minimum width.

(4) The initial value of parameter n is 2. The initial value of parameter m is 6.

(5) The following conditions must be satisfied:
$1 \leq n \leq 255$
$1 \leq m \leq 255$

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(44) GS h + n

[Name] Bar code height setting

[Function]

The GS h + n command sets the height of a bar code.

[Code] $[1D]_{16}$ $[68]_{16}$ [n]
$[29]_{10}$ $[104]_{10}$ [n]

[Explanation]

(1) Condition 1 ≤ n ≤ 255 must be satisfied.

(2) Parameter n specifies the height of a bar code in dots.

(3) The initial value of parameter n is 60.

(45) GS k + m + n + d_1 to d_n

[Name] Bar code printing

[Function]

The GS k + m + n + d_1 to d_n command selects a bar code type and prints a bar code.

[Code] $[1D]_{16}$ $[6B]_{16}$ [m] [n] [d_1] to [d_n]
$[29]_{10}$ $[107]_{10}$ [m] [n] [d_1] to [d_n]

[Explanation]

(1) Parameter m specifies the type of bar codes to be printed (see the following table):

m	Type of bar code	Number of records
65	UPC-A	Fixed (11≦n≦12)
66	Undefined	---
67	JAN(EAN)13	Fixed (12≦n≦13)
68	JAN(EAN)8	Fixed (7≦n≦8)
69	CODE39	Variable
70	ITF	Variable (Even number)
71	CODABAR	Variable

(2) The command configuration, code, definition area, and part of the conditions depend on parameter m.

(3) Parameter d specifies the character to be printed. If parameter d specifies a character code that cannot be printed when the data length is fixed, the corresponding bar code is not printed. If parameter d specifies a character code that cannot be printed when the data length is variable, the bar code prior to this command is printed but the subsequent data is handled as ordinary data.

(4) After a bar code is extended, the printing start position is set to the next dot of the bar code end data.

(5) If the print data exceeds the printing area of which width is one line, the overflowing part of the data is ignored.

(6) If the bar code is higher than the line spacing set with the ESC 2 or ESC 3 command, paper is fed by the bar code height without regard to the specified line spacing.

(7) When NUL is specified at the check digit position or when an odd number of data records is specified in ITF with m=5, the check digit is calculated automatically. The calculation results are added to the bar code. When data other than NUL is specified at the check digit position, the received data is expanded in the bar code without modifications.

(8) When one line contains both a bar code and characters to be printed, the bottom of these characters and the bottom of the bar code are aligned at the same level.

(9) Two or more bar codes cannot be contained on the same line. If this GS command is received when there is a bar code in the print buffer, the data contained in the print buffer is automatically printed, after which the command is accepted.

(10) A code area which is available to be set by each bar codes is shown as below:

A kind of bar codes	Code area
UPC-A, ITF, EAN-13/8	'0' ~ '9'
CODE 39	'0' ~ '9', 'A' ~ 'Z',' ','$','/','+','%'
CODABAR	'0' ~ '9','-','$',':','/','.','+','A' ~ 'D'

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(46) GS w + n

[Name] Bar code width magnification setting

[Function]

The GS w + n command sets the width magnification of a bar code.

[Code] $[1D]_{16}$ $[77]_{16}$ [n]
$[29]_{10}$ $[109]_{10}$ [n]

[Explanation]

(1) Parameter n specifies the horizontal magnification of a bar code.

(2) Condition 1 ≤ n ≤ 255 must be satisfied.

(3) The initial value of parameter n is 1.

(4) Both the widths of a narrow bar and a wide bar is multiplied by n times.

(47) GS a + n

[Name] Setting and cancellation of auto status transmission

[Function]

When the serial communications mode is selected, the target status for the automatic status transmission is selected.

[Code] $[1D]_{16}$ $[61]_{16}$ [n]
$[29]_{10}$ $[97]_{10}$ [n]

[Explanation]

(1) The relation of the target status for n and the transmission is as follows.

Bit	Status	Setting
0	Undefined	---
1	State of online/off-line	0:Invalidity 1:Effective
2	State of error	0:Invalidity 1:Effective
3	Undefined	---
4	State of automatic paper feed	0:Invalidity 1:Effective
5-7	Undefined	---

(2) An initial value becomes n = 0.

(3) Status is transmitted when this command is received or status is changed. At this time, because each status shows a present state, the status transmission of invalidity is not done.

(4) When all status is invalid, the automatic status transmission is not done.

(5) This command is effective only serial interface board.

(6) There is a possibility to cause the delay between reception of command and sending of status.

(7) The following status in four bytes is transmitted without confirming host's state.

The first byte (printer information)

Bit	Status	Caption
0	Unused	0: Fixation
1	Unused	0: Fixation
2	Unused	0: Fixation
3	online/off-line	0: online 1: off-line
4	auto-loading	0: not auto-loading 1: auto-loading
5	Unused	0: Fixation
6	Form sending with FEED key	0: not feed 1:feed
7	Unused	0: Fixation

The second byte (error information)

Bit	Status	Caption
0	Unused	0: Fixation
1	Serial communication error	0:undetection 1:detection
2	Head-up	0:undetection 1:detection
3	The cutter is abnormal	0:undetection 1:detection
4	Mark check failed	0:undetection 1:detection
5	Hard ware error	0:undetection 1:detection
6	Head temperature is abnormal	0:undetection 1:detection
7	Power supply voltage is abnormal	0:undetection 1:detection

Note 1)
Hard ware error is internal RAM is abnormal, head heat reckless driving, fuse blow out.

The third byte (paper detection status)

Bit	Status	Caption
0	Near end	0:undetection 1:detection
1	Unused	0: Fixation
2	Out of paper	0:undetection 1:detection
3-7	Unused	0: Fixation

The fourth byte (parameter) ···· specification parameter (Refer to the FS r command)

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(48) FS r + n

[Name] Parameter transmission

[Function]

A specified parameter replies when the serial communications mode is selected.

[Code] $[1C]_{16}$ $[72]_{16}$ [n]
$[28]_{10}$ $[114]_{10}$ [n]

[Explanation]

(1) This command is effective only serial communications.

(2) The reply parameter is specified by n.

(3) An initial value is n = 0.

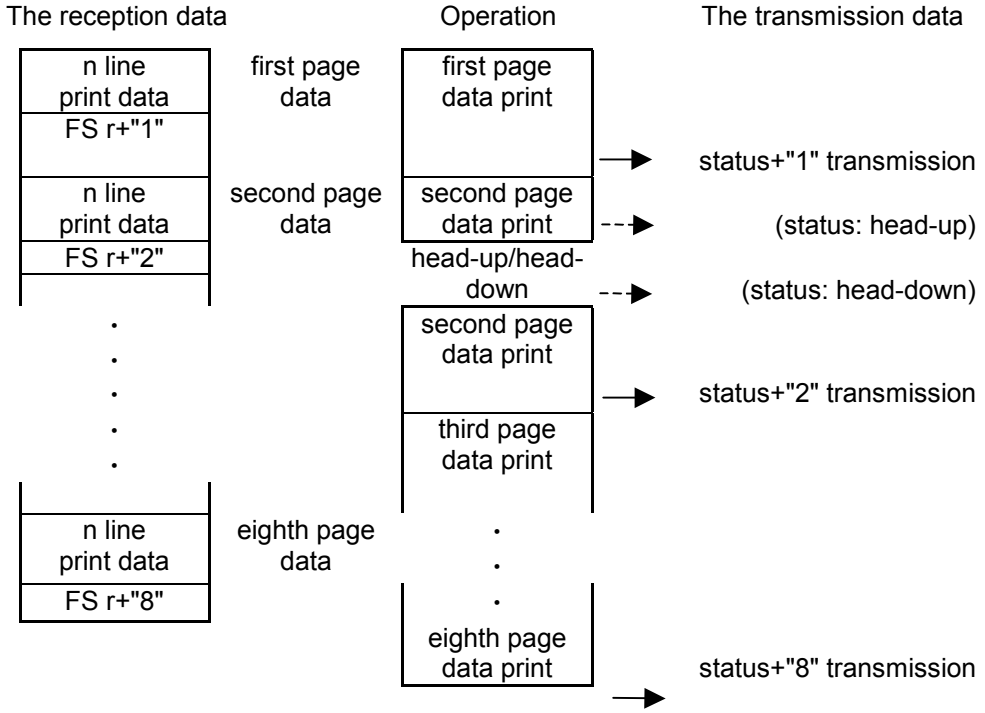
(4) The range of n is 0 ≤ n ≤ 255.

(5) The parameter is transmitted when this command is received. The reply data follows the format of the automatic status transmission and replies parameter n as status in the fourth byte.

The first byte	The second byte	The third byte	The fourth byte
Printer information	Error information	Paper information	Parameter

(6) When the parameter reply is done by this command, the automatic status transmission always reaches the value of a specified parameter.

(7) It can be confirmed that the ending of print by this command.



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SECTION H
List of Character Codes

1 National Character Code

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0			SP	0	@	P	`	p	_	┴	SP	ー	タ	ミ	═	×
1			!	1	A	Q	a	q	▬	┬	。	ア	チ	ム	╞	円
2			"	2	B	R	b	r	▬	┤	「	イ	ツ	メ	╪	年
3			#	3	C	S	c	s	▬	├	」	ウ	テ	モ	╡	月
4			$	4	D	T	d	t	▬	‾	、	エ	ト	ヤ	◢	日
5			%	5	E	U	e	u	■	―	・	オ	ナ	ユ	◣	時
6			&	6	F	V	f	v	■	|	ヲ	カ	ニ	ヨ	◥	分
7			'	7	G	W	g	w	■	|	ァ	キ	ヌ	ラ	◤	秒
8			(	8	H	X	h	x	▌	┌	ィ	ク	ネ	リ	♠	〒
9	HT	EM	)	9	I	Y	i	y	▌	┐	ゥ	ケ	ノ	ル	♥	市
A	LF		*	:	J	Z	j	z	▌	└	ェ	コ	ハ	レ	♦	区
B		ESC	+	;	K	[	k	{	▌	┘	ォ	サ	ヒ	ロ	♣	町
C	FF	FS	,	<	L	¥	l	¦	▌	╭	ャ	シ	フ	ワ	●	村
D		GS	−	=	M	]	m	}	■	╮	ュ	ス	ヘ	ン	○	人
E			.	>	N	^	n	~	■	╰	ョ	セ	ホ	゛	／	▩
F		`	／	?	O	_	o	SP	+	╯	ッ	ソ	マ	゜	＼	SP

(In this table, “SP” indicates a space.)

Note 1)
Each code is represented in hexadecimal notation.

Note 2)
If an undefined code ($[00]_{16}$ to $[1F]_{16}$) or an undefined ESC, FS, or GS sequence listed in this table is received, an abnormal operation may occur. (However, when image print data, character registration data, or command parameters are received, they are handled as ordinary data.)

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2 Overseas Character Codes

Upper / Lower	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0			SP	0	@	P	`	p	Ç	É	á	░	└	╨	α	≡
1			!	1	A	Q	a	q	ü	æ	í	▒	┴	╤	β	±
2			"	2	B	R	b	r	é	Æ	ó	▓	┬	╥	Γ	≥
3			#	3	C	S	c	s	â	ô	ú	│	├	╙	π	≤
4			$	4	D	T	d	t	ä	ö	ñ	┤	─	╘	Σ	⌠
5			%	5	E	U	e	u	à	ò	Ñ	╡	┼	╒	σ	⌡
6			&	6	F	V	f	v	å	û	ª	╢	╞	╓	µ	÷
7			'	7	G	W	g	w	ç	ù	º	╖	╟	╫	τ	≈
8			(	8	H	X	h	x	ê	ÿ	¿	╕	╚	╪	Φ	°
9	HT	EM	)	9	I	Y	i	y	ë	Ö	⌐	╣	╔	┘	Θ	●
A	LF		*	:	J	Z	j	z	è	Ü	¬	║	╩	┌	Ω	•
B		ESC	+	;	K	[	k	{	ï	¢	½	╗	╦	█	δ	√
C	FF	FS	,	<	L	\	l	|	î	£	¼	╝	╠	▄	∞	ⁿ
D		GS	-	=	M	]	m	}	ì	¥	¡	╜	═	▌	ø	²
E		RS	.	>	N	^	n	~	Ä	Pt	«	╛	╬	▐	ε	▪
F		US	/	?	O	_	o	SP	Å	*ƒ*	»	┐	╧	▀	∩	SP

(In this table, “SP” indicates a space.)

Note 1)
Each code is represented in hexadecimal notation.

Note 2)
If an undefined code ($[00]_{16}$ to $[1F]_{16}$) or an undefined ESC, FS, or GS sequence listed in this table is received, an abnormal operation may occur. (However, when image print data, character registration data, or command parameters are received, they are handled as ordinary data.)

SECTION I
Packaging, Stamping and Other Conditions

1 Packaging

This control board is packed in accordance with Fujitsu Takamisawa component standard packaging specification.

2 Stamping

The type, serial number, and revision information is stamped on the Fujitsu Takamisawa Component standard label affixed to this control board.

3 Other condition

(1) Detected errors must be resolved by mutual agreement in accordance with this specification.

(2) To change the contents of this specification, the changes must be reported on and mutually agreed upon in advance.

(3) The model described in this specification is the standard model. Therefore, when functional compatibility is maintained, the items not described in this specification may be changed without prior notice.

(4) If more detailed information is required or ambiguous information is detected, these problems must be resolved by mutual agreement.

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