

ESC/POS command FUNCTIONS

List of commands

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Kanji command list (when the Japanese, Simplified Chinese, Traditional Chinese, or Korean model is used)

Command	Name	page
FS !	Set print mode(s) for Kanji characters	75
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FS .	Cancel Kanji character mode	77

Character Code Tables

Page 0 (PC437: USA, Standard Europe) (International Character Set: U.S.A.)

HEX	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
HEX BIN	0000	0001	0010	0011	0100	0101	0110	0111	1000	1001	1010	1011	1100	1101	1110	1111
0	0000	NUL	DLE	SP	0	@	P	,	80	96	112	128	144	160	176	192
1	0001		XON	!	1	A	Q	a	97	81	97	113	129	145	161	177
2	0010		"	2	B	R	b	r	114	98	114	130	146	162	178	194
3	0011		#	3	C	S	c	s	115	99	115	131	147	163	179	195
4	0100	EOT		4	D	T	d	t	116	100	116	132	148	164	180	196
5	0101	ENQ		5	E	U	e	u	117	101	117	133	149	165	181	197
6	0110		&	6	F	V	f	v	118	102	118	134	150	166	182	198
7	0111		,	7	G	W	g	w	119	103	119	135	151	167	183	199
8	1000		(	8	H	X	h	x	120	104	120	136	152	168	184	200
9	1001	HT	)	9	I	Y	i	y	121	105	121	137	153	169	185	201
A	1010	LF	*	:	J	Z	j	z	122	106	122	138	154	170	186	202
B	1011		ESC	;	K	[	k	l	123	107	123	139	155	171	187	203
C	1100	FF	,	<	L	\	l	l	124	108	124	140	156	172	188	204
D	1101	CR	-	=	M	]	m	~	125	109	125	141	157	173	189	205
E	1110		.	>	N	^	n	~	126	110	126	142	158	174	190	206
F	1111		/	?	O	_	o	SP	127	111	127	143	159	175	191	207

(注) 文字コード表は、あくまで文字の形状を示したものであり、実際の印字パターンそのものを表すものではない。

Page 1 (Katakana)

	HEX	8	9	A	B	C	D	E	F
HEX	BIN	1000	1001	1010	1011	1100	1101	1110	1111
0	0000	一 128	上 144	SP 160	一 176	タ 192	ミ 208	ニ 224	× 240
1	0001	一 129	下 145	・ 161	ア 177	チ 193	ム 209	ト 225	月 241
2	0010	一 130	下 146	「 162	イ 178	ツ 194	メ 210	キ 226	年 242
3	0011	一 131	ト 147	」 163	ウ 179	テ 195	モ 211	コ 227	月 243
4	0100	一 132	一 148	、 164	エ 180	ト 196	ヤ 212	▲ 228	日 244
5	0101	一 133	一 149	・ 165	オ 181	ナ 197	ユ 213	▲ 229	時 245
6	0110	一 134	一 150	ヲ 166	カ 182	ニ 198	ヨ 214	▲ 230	分 246
7	0111	一 135	一 151	ア 167	キ 183	ヌ 199	ラ 215	▲ 231	秒 247
8	1000	一 136	「 152	イ 168	ク 184	ネ 200	リ 216	♠ 232	千 248
9	1001	一 137	「 153	ウ 169	ケ 185	ノ 201	ル 217	♥ 233	市 249
A	1010	一 138	「 154	エ 170	コ 186	ハ 202	レ 218	♦ 234	区 250
B	1011	一 139	「 155	オ 171	サ 187	ヒ 203	ロ 219	♣ 235	町 251
C	1100	一 140	「 156	ヤ 172	シ 188	フ 204	ワ 220	● 236	村 252
D	1101	一 141	「 157	ユ 173	ス 189	ヘ 205	ン 221	○ 237	人 253
E	1110	一 142	「 158	ヨ 174	セ 190	ホ 206	・ 222	/ 238	※ 254
F	1111	一 143	「 159	ツ 175	ソ 191	マ 207	° 223	\ 239	SP 255

Page 2 (PC850: Multilingual)

	HEX	8	9	A	B	C	D	E	F
HEX	BIN	1000	1001	1010	1011	1100	1101	1110	1111
0	0000	Ç 128	É 144	á 160	176	Ł 192	Š 208	Ó 224	— 240
1	0001	ü 129	æ 145	í 161	177	ł 193	Đ 209	β 225	± 241
2	0010	é 130	Æ 146	ó 162	178	Ṭ 194	Ê 210	Ô 226	— 242
3	0011	â 131	ô 147	ú 163	ı 179	ţ 195	Ë 211	Ò 227	¼ 243
4	0100	ä 132	ö 148	ñ 164	† 180	— 196	È 212	Õ 228	¶ 244
5	0101	à 133	ò 149	Ñ 165	À 181	† 197	ı 213	Ö 229	§ 245
6	0110	ã 134	û 150	ä 166	Â 182	ă 198	Î 214	µ 230	÷ 246
7	0111	ç 135	ù 151	ö 167	Á 183	Ă 199	İ 215	þ 231	ˆ 247
8	1000	ê 136	ÿ 152	¿ 168	© 184	Ł 200	Ï 216	ð 232	° 248
9	1001	ë 137	ÿ 153	® 169	ƒ 185	ŕ 201	Ĳ 217	Ú 233	˚ 249
A	1010	è 138	Ù 154	ˆ 170	ı 186	Ł 202	ŕ 218	Û 234	˙ 250
B	1011	ï 139	ø 155	½ 171	ŕ 187	Ŧ 203	■ 219	Ü 235	¹ 251
C	1100	î 140	£ 156	‡ 172	Ŷ 188	† 204	■ 220	Ý 236	³ 252
D	1101	ì 141	Ø 157	ı 173	Φ 189	— 205	ı 221	Ÿ 237	² 253
E	1110	Ĭ 142	× 158	« 174	¥ 190	† 206	İ 222	238	■ 254
F	1111	À 143	f 159	» 175	ŕ 191	Ŧ 207	■ 223	239	SP 255

Page 3 (PC860: Portuguese)

	HEX	8	9	A	B	C	D	E	F
HEX	BIN	1000	1001	1010	1011	1100	1101	1110	1111
0	0000	Ç 128	É 144	á 160	176	192	208	α 224	≡ 240
1	0001	ü 129	À 145	í 161	177	193	209	β 225	± 241
2	0010	é 130	È 146	ó 162	178	194	210	Γ 226	≥ 242
3	0011	â 131	ô 147	ú 163	179	195	211	π 227	≤ 243
4	0100	ã 132	õ 148	ñ 164	180	196	212	Σ 228	ƒ 244
5	0101	à 133	ò 149	Ñ 165	181	197	213	σ 229	Ƶ 245
6	0110	Á 134	Û 150	ä 166	182	198	214	μ 230	÷ 246
7	0111	ç 135	ù 151	ó 167	183	199	215	τ 231	≈ 247
8	1000	ê 136	Î 152	ô 168	184	200	216	Φ 232	° 248
9	1001	Ê 137	Ï 153	ò 169	185	201	217	Θ 233	• 249
A	1010	è 138	Û 154	170	186	202	218	Ω 234	• 250
B	1011	í 139	Φ 155	½ 171	187	203	219	δ 235	√ 251
C	1100	Ô 140	£ 156	¼ 172	188	204	220	∞ 236	n 252
D	1101	ì 141	Û 157	í 173	189	205	221	∅ 237	² 253
E	1110	Ã 142	Þ 158	« 174	190	206	222	€ 238	■ 254
F	1111	Ä 143	Ó 159	» 175	191	207	223	∩ 239	SP 255

Page 4 (PC863: Canadian-French)

	HEX	8	9	A	B	C	D	E	F
HEX	BIN	1000	1001	1010	1011	1100	1101	1110	1111
0	0000	Ç 128	É 144	Ì 160	Í 176	Ì 192	± 208	α 224	≡ 240
1	0001	ü 129	È 145	í 161	Î 177	± 193	± 209	β 225	± 241
2	0010	é 130	Ê 146	ó 162	Ï 178	± 194	± 210	Γ 226	≥ 242
3	0011	â 131	ô 147	ú 163	Î 179	± 195	± 211	π 227	≤ 243
4	0100	À 132	Ë 148	ñ 164	Ï 180	± 196	± 212	Σ 228	ƒ 244
5	0101	à 133	Ï 149	ñ 165	Ï 181	± 197	± 213	σ 229	ƒ 245
6	0110	ı 134	û 150	ñ 166	Ï 182	± 198	± 214	μ 230	÷ 246
7	0111	ç 135	ù 151	ñ 167	Ï 183	± 199	± 215	τ 231	≈ 247
8	1000	ê 136	ı 152	ñ 168	Ï 184	± 200	± 216	φ 232	° 248
9	1001	ë 137	ô 153	ñ 169	Ï 185	± 201	± 217	θ 233	• 249
A	1010	è 138	Û 154	ñ 170	Ï 186	± 202	± 218	Ω 234	• 250
B	1011	ï 139	φ 155	½ 171	ñ 187	± 203	± 219	δ 235	√ 251
C	1100	î 140	£ 156	¼ 172	ñ 188	± 204	± 220	∞ 236	n 252
D	1101	— 141	Û 157	¾ 173	ñ 189	± 205	± 221	ø 237	z 253
E	1110	Λ 142	Û 158	« 174	ñ 190	± 206	± 222	€ 238	■ 254
F	1111	§ 143	f 159	» 175	ñ 191	± 207	± 223	∩ 239	SP 255

Page 5 (PC865: Nordic)

	HEX	8	9	A	B	C	D	E	F
HEX	BIN	1000	1001	1010	1011	1100	1101	1110	1111
0	0000	Ç 128	É 144	Á 160	176	Ł 192	Š 208	α 224	≡ 240
1	0001	Ü 129	æ 145	Í 161	177	± 193	ŧ 209	β 225	± 241
2	0010	é 130	Æ 146	ó 162	178	ŧ 194	ŧ 210	Γ 226	≥ 242
3	0011	â 131	ô 147	ú 163	ı 179	ı 195	Ł 211	π 227	≤ 243
4	0100	ä 132	ö 148	ñ 164	ı 180	— 196	Ł 212	Σ 228	ƒ 244
5	0101	à 133	ò 149	Ñ 165	ı 181	† 197	ŕ 213	σ 229	Ƶ 245
6	0110	â 134	û 150	ä 166	ı 182	ı 198	ŕ 214	μ 230	÷ 246
7	0111	ç 135	ù 151	o 167	ı 183	ı 199	† 215	τ 231	≈ 247
8	1000	ê 136	ÿ 152	ó 168	ı 184	Ł 200	† 216	Φ 232	° 248
9	1001	ë 137	Ö 153	ŕ 169	ı 185	ŕ 201	ſ 217	θ 233	• 249
A	1010	è 138	Ü 154	ı 170	ı 186	± 202	ŕ 218	Ω 234	• 250
B	1011	ï 139	ø 155	½ 171	ı 187	ŧ 203	■ 219	δ 235	√ 251
C	1100	î 140	£ 156	† 172	ı 188	ı 204	■ 220	∞ 236	n 252
D	1101	ï 141	ø 157	ı 173	ı 189	— 205	ı 221	ø 237	² 253
E	1110	Ä 142	ƒ 158	« 174	ı 190	† 206	ı 222	€ 238	■ 254
F	1111	Å 143	f 159	ı 175	ı 191	± 207	■ 223	∩ 239	SP 255

Page 16 (WPC1252)

	HEX	8	9	A	B	C	D	E	F
HEX	BIN	1000	1001	1010	1011	1100	1101	1110	1111
0	0000	€ 128	SP 144	SP 160	° 176	À 192	Đ 208	à 224	ò 240
1	0001	SP 129	' 145	í 161	± 177	Á 193	Ñ 209	á 225	ñ 241
2	0010	, 130	' 146	¢ 162	· 178	Â 194	Ò 210	â 226	ó 242
3	0011	f 131	" 147	£ 163	· 179	Ã 195	Ó 211	ã 227	ô 243
4	0100	" 132	" 148	¤ 164	' 180	Ä 196	Ô 212	ä 228	õ 244
5	0101	... 133	· 149	¥ 165	µ 181	Å 197	Õ 213	å 229	ö 245
6	0110	† 134	- 150	¡ 166	¶ 182	Æ 198	Ö 214	æ 230	ø 246
7	0111	‡ 135	- 151	§ 167	· 183	Ç 199	× 215	ç 231	+ 247
8	1000	ˆ 136	- 152	¨ 168	· 184	È 200	Ø 216	è 232	˚ 248
9	1001	‰ 137	™ 153	© 169	ˆ 185	É 201	Ù 217	é 233	ù 249
A	1010	Š 138	š 154	ª 170	ˆ 186	Ê 202	Ú 218	ê 234	ú 250
B	1011	‘ 139	’ 155	« 171	» 187	Ë 203	Û 219	ë 235	û 251
C	1100	Œ 140	œ 156	¬ 172	¼ 188	Ì 204	Ü 220	ì 236	ü 252
D	1101	SP 141	SP 157	· 173	½ 189	Í 205	Ý 221	í 237	ý 253
E	1110	Ž 142	ž 158	® 174	¾ 190	Î 206	Þ 222	î 238	þ 254
F	1111	SP 143	Ÿ 159	— 175	¿ 191	Ï 207	ß 223	ï 239	ÿ 255

Page 17 (PC866: Cyrillic#2)

	HEX	8	9	A	B	C	D	E	F
HEX	BIN	1000	1001	1010	1011	1100	1101	1110	1111
0	0000	А 128	Р 144	а 160	176	192	208	Р 224	Ё 240
1	0001	Б 129	С 145	б 161	177	193	209	с 225	ё 241
2	0010	В 130	Т 146	в 162	178	194	210	т 226	€ 242
3	0011	Г 131	У 147	г 163	179	195	211	у 227	€ 243
4	0100	Д 132	Ф 148	д 164	180	196	212	ф 228	Ї 244
5	0101	Е 133	Х 149	е 165	181	197	213	х 229	ї 245
6	0110	Ж 134	Ц 150	ж 166	182	198	214	ц 230	Ў 246
7	0111	З 135	Ч 151	з 167	183	199	215	ч 231	ў 247
8	1000	И 136	Ш 152	и 168	184	200	216	ш 232	° 248
9	1001	Й 137	Щ 153	й 169	185	201	217	щ 233	° 249
A	1010	К 138	Ъ 154	к 170	186	202	218	ъ 234	° 250
B	1011	Л 139	Ы 155	л 171	187	203	219	ы 235	✓ 251
C	1100	М 140	Ь 156	м 172	188	204	220	ь 236	№ 252
D	1101	Н 141	Э 157	н 173	189	205	221	э 237	□ 253
E	1110	О 142	Ю 158	о 174	190	206	222	ю 238	■ 254
F	1111	П 143	Я 159	п 175	191	207	223	я 239	SP 255

Page 18 (PC852: Latin2)

	HEX	8	9	A	B	C	D	E	F
HEX	BIN	1000	1001	1010	1011	1100	1101	1110	1111
0	0000	Ç 128	É 144	á 160	⌘ 176	⌘ 192	đ 208	Ó 224	- 240
1	0001	ü 129	Ĺ 145	í 161	⌘ 177	⌘ 193	Đ 209	β 225	" 241
2	0010	é 130	í 146	ó 162	⌘ 178	⌘ 194	Ď 210	Ô 226	˘ 242
3	0011	â 131	ô 147	ú 163	⌘ 179	⌘ 195	Ě 211	Ň 227	˘ 243
4	0100	ä 132	ö 148	Ä 164	⌘ 180	⌘ 196	ď 212	ń 228	˘ 244
5	0101	ù 133	Ľ 149	ą 165	Á 181	⌘ 197	Ň 213	ň 229	§ 245
6	0110	ć 134	Ī 150	Ž 166	Â 182	Å 198	İ 214	Š 230	÷ 246
7	0111	ç 135	Š 151	ž 167	Ě 183	ā 199	İ 215	š 231	˙ 247
8	1000	ł 136	ś 152	Ę 168	Ş 184	⌘ 200	ě 216	Ř 232	° 248
9	1001	ē 137	Ö 153	ę 169	⌘ 185	⌘ 201	⌘ 217	Ú 233	- 249
A	1010	ő 138	Ü 154	⌘ 170	⌘ 186	⌘ 202	⌘ 218	ı 234	˙ 250
B	1011	õ 139	Ť 155	ž 171	⌘ 187	⌘ 203	⌘ 219	Ů 235	û 251
C	1100	î 140	ť 156	Č 172	⌘ 188	⌘ 204	⌘ 220	ý 236	Ř 252
D	1101	Ž 141	Ľ 157	š 173	Ž 189	⌘ 205	Ť 221	Ý 237	ř 253
E	1110	Ä 142	× 158	« 174	ž 190	⌘ 206	Ú 222	ı 238	■ 254
F	1111	Ć 143	č 159	» 175	⌘ 191	⌘ 207	⌘ 223	˘ 239	SP 255

Page 19 (PC858)

HEX	HEX	8	9	A	B	C	D	E	F
HEX	BIN	1000	1001	1010	1011	1100	1101	1110	1111
0	0000	Ç 128	É 144	á 160	176	Ł 192	Š 208	Ó 224	— 240
1	0001	ü 129	æ 145	í 161	177	± 193	Đ 209	ß 225	± 241
2	0010	é 130	Æ 146	ó 162	178	τ 194	Ê 210	Ô 226	— 242
3	0011	â 131	ô 147	ú 163	ı 179	† 195	Ë 211	Ò 227	¾ 243
4	0100	ä 132	ö 148	ñ 164	† 180	— 196	È 212	õ 228	¶ 244
5	0101	à 133	ò 149	Ñ 165	À 181	÷ 197	€ 213	Ö 229	§ 245
6	0110	á 134	û 150	ä 166	Á 182	ä 198	í 214	µ 230	÷ 246
7	0111	ç 135	ù 151	ó 167	À 183	Ä 199	î 215	þ 231	˙ 247
8	1000	ê 136	ÿ 152	¿ 168	© 184	Ł 200	Ï 216	ƒ 232	° 248
9	1001	ë 137	ÿ 153	® 169	† 185	ŕ 201	ſ 217	Ů 233	˚ 249
A	1010	è 138	Ù 154	ˆ 170	ı 186	Ł 202	ŕ 218	Ů 234	˙ 250
B	1011	ï 139	ø 155	½ 171	ŕ 187	ŕ 203	219	Ů 235	¹ 251
C	1100	î 140	£ 156	¼ 172	ſ 188	† 204	220	Ÿ 236	³ 252
D	1101	ì 141	Ø 157	ı 173	¢ 189	— 205	ı 221	Ÿ 237	² 253
E	1110	Ä 142	× 158	« 174	¥ 190	÷ 206	İ 222	— 238	■ 254
F	1111	Å 143	ƒ 159	» 175	ŕ 191	¤ 207	223	’ 239	SP 255

Page 255 (Space Page)

	HEX	8	9	A	B	C	D	E	F
HEX	BIN	1000	1001	1010	1011	1100	1101	1110	1111
0	0000	SP 128	SP 144	SP 160	SP 176	SP 192	SP 208	SP 224	SP 240
1	0001	SP 129	SP 145	SP 161	SP 177	SP 193	SP 209	SP 225	SP 241
2	0010	SP 130	SP 146	SP 162	SP 178	SP 194	SP 210	SP 226	SP 242
3	0011	SP 131	SP 147	SP 163	SP 179	SP 195	SP 211	SP 227	SP 243
4	0100	SP 132	SP 148	SP 164	SP 180	SP 196	SP 212	SP 228	SP 244
5	0101	SP 133	SP 149	SP 165	SP 181	SP 197	SP 213	SP 229	SP 245
6	0110	SP 134	SP 150	SP 166	SP 182	SP 198	SP 214	SP 230	SP 246
7	0111	SP 135	SP 151	SP 167	SP 183	SP 199	SP 215	SP 231	SP 247
8	1000	SP 136	SP 152	SP 168	SP 184	SP 200	SP 216	SP 232	SP 248
9	1001	SP 137	SP 153	SP 169	SP 185	SP 201	SP 217	SP 233	SP 249
A	1010	SP 138	SP 154	SP 170	SP 186	SP 202	SP 218	SP 234	SP 250
B	1011	SP 139	SP 155	SP 171	SP 187	SP 203	SP 219	SP 235	SP 251
C	1100	SP 140	SP 156	SP 172	SP 188	SP 204	SP 220	SP 236	SP 252
D	1101	SP 141	SP 157	SP 173	SP 189	SP 205	SP 221	SP 237	SP 253
E	1110	SP 142	SP 158	SP 174	SP 190	SP 206	SP 222	SP 238	SP 254
F	1111	SP 143	SP 159	SP 175	SP 191	SP 207	SP 223	SP 239	SP 255

International Character Set

Country	ASCII code (Hex)											
	23	24	40	5B	5C	5D	5E	60	7B	7C	7D	7E
U.S.A	#	\$	@	[	\	]	^	`	{		}	~
France	#	\$	à	°	ç	§	^	`	é	ù	è	¨
Germany	#	\$	§	Ä	Ö	Ü	^	`	ä	ö	ü	ß
U.K.	£	\$	@	[	\	]	^	`	{		}	~
Denmark I	#	\$	@	Æ	Ø	Å	^	`	æ	ø	å	~
Sweden	#	¤	É	Ä	Ö	Å	Ü	é	ä	ö	å	ü
Italy	#	\$	@	°	\	é	^	ù	à	ò	è	ì
Spain I	Pt	\$	@	¡	Ñ	¿	^	`	¨	ñ	}	~
Japan	#	\$	@	[	¥	]	^	`	{		}	~
Norway	#	¤	É	Æ	Ø	Å	Ü	é	æ	ø	å	ü
Denmark II	#	\$	É	Æ	Ø	Å	Ü	é	æ	ø	å	ü
Spain II	#	\$	á	¡	Ñ	¿	é	`	í	ñ	ó	ú
Latin America	#	\$	á	¡	Ñ	¿	é	ü	í	ñ	ó	ú
Korea	#	\$	@	[	W	]	^	`	{		}	~

COMMANDS

Command Notation

[Name] The name of the command.

[Format] The code sequence.

[Range] Gives the allowable ranges for the arguments.

[Description] Describes the command's function.

[Details] Describes the usage of the command in detail.

[Notes] Provides important information on setting and using the printer command, if necessary.

[Default] Gives the default values, if any, for the command parameters.

[Reference] Lists related commands.

[Example] Gives examples of how to use the command.

Hex indicates the hexadecimal equivalents.

Decimal indicates the decimal equivalents.

[*k*] indicates the contents of the [] should be repeated *k* times.

Explanation of Terms

.(1) Receive buffer The receive buffer is a buffer that stores, as is, the data received from the host (the reception data). The reception data is stored in the receive buffer temporarily, and is then processed sequentially.

.(2) Print buffer

The print buffer is a buffer that stores the image data to be printed.

.(3) Print buffer full This is the state where the print buffer is full. If new print data is input while the print buffer is full, the data in the print buffer is printed out and a line feed is executed. This is the same operation as the **LF** operation.

.(4) Start of line

The start of line state satisfies the following condition:

- . • There is no print data (including spaces and portions of data skipped due to bit image data) currently in the print buffer.
- . • There is no print data (including portions of data skipped due to **HT**)
- . • The print position is not specified by the **ESC \$** or **ESC ** command.

(5) Printable area The maximum range within which printing is possible under the printer specifications. The printable area for this printer is as follows:

The length of the horizontal direction in standard mode:
approximately 72.2 mm {512/180"}

The length of the horizontal direction in page mode:
approximately 72.2 mm {512/180"}

The length of the vertical direction in page mode: approximately 117.3 mm {1662/360"}

(6) Printing area Printing range is set by the command. It must be printing area $\leq$ printable area.

(7) Ignore The state in which all codes, including parameters, are read in and discarded, and

nothing happens.

(8) Inch A unit of length. One inch is 25.4 mm.

(9) MSB Most Significant Bit

(10) LSB Least Significant Bit

(11) Base line Standard position when character data is stored in the print buffer. Normal character in standard mode and page mode:

Control Commands

HT

[Name] Horizontal tab

[Format] ASCII HT Hex 09

Decimal 9

[Description] Moves the print position to the next horizontal tab position.

[Details]

- This command is ignored unless the next horizontal tab position has been set.
- If the next horizontal tab position exceeds the printing area, the printer sets the printing position to [Printing area width + 1].
- If this command is received when the printing position is at [printing area width + 1], the printer executes print buffer-full printing of the current line and horizontal tab processing from the beginning of the next line.
- The default setting of the horizontal tab position for the paper roll is font A (12 × 24) every 8th character (9th, 17th, 25th, ... column).

LF

[Name] Print and line feed

[Format] ASCII LF

Hex 0A

Decimal 10

[Description] Prints the data in the print buffer and feeds one line based on the current line spacing.

[Details] This command sets the print position to the beginning of the line.

[Reference] **ESC 2**, **ESC 3**

FF

[Name] Print and return to standard mode in page mode

[Format] ASCII FF

Hex 0C

Decimal 12

[Description] Prints the data in the print buffer collectively and returns to standard mode.

[Details]

- The buffer data is deleted after being printed.
- The printer does not execute paper cutting.
- This command sets the print position to the beginning of the line.
- This command is enabled only in page mode.

[Reference] **ESC FF**, **ESC L**, **ESC S**

CR

[Name] Print and carriage return

[Format] ASCII CR

Hex 0D

Decimal 13

[Description] When automatic line feed is enabled, this command functions the same as **LF**; when automatic line feed is disabled, this command is ignored.

[Details]

- Sets the print starting position to the beginning of the line.
- The automatic line feed is ignored with a serial interface model.
- This command is set according to the DIP switch 1-1 setting with a parallel interface model.

[Reference] **LF**

CAN

[Name] Cancel print data in page mode

[Format] ASCII CAN

Hex 18

Decimal 24

[Description] In page mode, deletes all the print data in the current printable area.

[Details]

- This command is enabled only in page mode.
- If data that existed in the previously specified printing area also exists in the currently specified printing area, it is deleted.

[Reference] **ESC L**

DLE EOT n

[Name] Real-time status transmission

[Format] ASCII DLE EOT n

Hex 10 04 n

Decimal 16 4 n

[Range] $1 \leq n \leq 4$

[Description] Transmits the selected printer status specified by n in real-time, according to the following parameters:

$n = 1$: Transmit printer status

$n = 2$: Transmit offline status

$n = 3$: Transmit error status

$n = 4$: Transmit paper roll sensor status

[Details]

- The printer transmits the current status. Each status is represented by one-byte data.
- The printer transmits the status without confirming whether the host computer can receive data.
- The printer executes this command upon receiving it.
- This command is executed even when the printer is offline, the receive buffer is full, or there is an error status with a serial interface model.
- With a parallel interface model, this command can not be executed when the printer is busy. This command is executed even when the printer is offline or there is an error status when DIP switch 2-1 is on with a parallel interface model.
- When Auto Status Back (ASB) is enabled using the **GS a** command, the status transmitted by the **DLE EOT** command and the ASB status must be differentiated. (Refer to Appendix G, *TRANSMISSION STATUS IDENTIFICATION*)
- Even though the printer is not selected using **ESC =** (select peripheral device), this command is effective.

[Notes]

- The status is transmitted whenever the data sequence of $\langle 10 \rangle H \langle 04 \rangle H \langle n \rangle$ ($1 \leq n \leq 4$) is received. Example: In **ESC * m nL nH d1...dk**, $d1 = \langle 10 \rangle H$, $d2 = \langle 04 \rangle H$, $d3 = \langle 01 \rangle H$
- This command should not be used within the data sequence of another command that consists of 2 or more bytes. Example: If you attempt to transmit **ESC 3 n** to the printer, but DTR (DSR for the host computer) goes to MARK before n is transmitted and then **DLE EOT 3** interrupts before n is received, the code $\langle 10 \rangle H$ for **DLE EOT 3** is processed as the code for **ESC 3** $\langle 10 \rangle H$.

n = 1: Printer status

Bit	Off/On	Hex	Decimal	Function
0	Off	00	0	Not used. Fixed to Off.
1	On	02	2	Not used. Fixed to On.
2	Off	00	0	Drawer open/close signal is LOW (connector pin 3).
	On	04	4	Drawer open/close signal is HIGH (connector pin 3).
3	Off	00	0	Online.
	On	08	8	Offline.
4	On	10	16	Not used. Fixed to On.
5,6	-	-	-	Undefined.
7	Off	00	0	Not used. Fixed to Off.

n = 2: Offline status

Bit	Off/On	Hex	Decimal	Function
0	Off	00	0	Not used. Fixed to Off.
1	On	02	2	Not used. Fixed to On.
2	Off	00	0	Cover is closed.
	On	04	4	Cover is open.
3	Off	00	0	Paper is not being fed by using the FEED button.
	On	08	8	Paper is being fed by the FEED button.
4	On	10	16	Not used. Fixed to On.
5	Off	00	0	No paper-end stop.
	On	20	32	Printing is being stopped.
6	Off	00	0	No error.
	On	40	64	Error occurs.
7	Off	00	0	Not used. Fixed to Off.

Bit 5: Becomes on when the paper end sensor detects paper end and printing stops.

n = 3: Error status

Bit	Off/On	Hex	Decimal	Function
0	Off	00	0	Not used. Fixed to Off.
1	On	02	2	Not used. Fixed to On.
2	-	-	-	Undefined
3	Off	00	0	No autocutter error.
	On	08	8	Autocutter error occurs.
4	On	10	16	Not used. Fixed to On.
5	Off	00	0	No unrecoverable error.
	On	20	32	Unrecoverable error occurs.
6	Off	00	0	No auto-recoverable error.
	On	40	64	Auto recoverable error occurs.
7	Off	00	0	Not used. Fixed to Off.

- Bit 3: If these errors occur due to paper jams or the like, it is possible to recover by correcting the cause of the error and executing **DLE ENQ n** ($1 \leq n \leq 2$). If an error due to a circuit failure (e.g. wire break) occurs, it is impossible to recover.
- Bit 6: When printing is stopped due to high print head temperature until the print head temperature drops sufficiently or when the paper roll cover is open during printing, bit 6 is On.

$n = 4$: Continuous paper sensor status

Bit	Off/On	Hex	Decimal	Function
0	Off	00	0	Not used. Fixed to Off.
1	On	02	2	Not used. Fixed to On.
2, 3	Off	00	0	Paper roll near-end sensor: paper adequate.
	On	0C	12	Paper near-end is detected by the paper roll near-end sensor.
4	On	10	16	Not used. Fixed to On.
5, 6	Off	00	0	Paper roll sensor: Paper present.
	On	60	96	Paper roll end detected by paper roll sensor.
7	Off	00	0	Not used. Fixed to Off.

[Reference] **DLE ENQ**, **GS a**, **GS r**, Appendix G

DLE ENQ n

[Name] Real-time request to printer

[Format] ASCII DLE ENQ n

Hex 10 05 n

Decimal 16 5 n

[Range] $1 \leq n \leq 2$

[Description] Responds to a request from the host computer. n specifies the requests as follows:

n	Request
1	Recover from an error and restart printing from the line where the error occurred
2	Recover from an error aft clearing the receive and print buffers

[Details]

- When the printer is disabled with **ESC** = (Select peripheral device), this command is effective.
- This command is effective only when an autocutter error occurs.
- The printer starts processing data upon receiving this command.
- This command is executed even when the printer is offline, the receive buffer is full, or there is an error status with a serial interface model.
- With a parallel interface model, this command can not be executed when the printer is busy. This command is executed even when the printer is offline or there is an error status when DIP switch 2-1 is on with a parallel interface model.
- **DLE ENQ 2** enables the printer to recover from an error after clearing the data in the receive buffer and the print buffer. The printer retains the settings (by **ESC !**, **ESC 3**, etc.) that were in effect when the error occurred. The printer can be initialized completely by using this command and **ESC @**. This command is enabled only for errors that have the possibility of recovery, except for print head temperature error.

[Notes]

- The status is also transmitted whenever the data sequence of $\langle 10 \rangle \text{H} \langle 05 \rangle \text{H} \langle n \rangle$ ($1 \leq n \leq 2$) is received. Example: In **ESC * m nL nH dk**, $d1 = \langle 10 \rangle \text{H}$, $d2 = \langle 05 \rangle \text{H}$, $d3 = \langle 01 \rangle \text{H}$
- This command should not be contained within another command that consists of two or more bytes. Example: If you attempt to transmit **ESC 3 n** to the printer, but DTR (DSR for the host computer) goes to MARK before n is transmitted, and **DLE ENQ 2** interrupts before n is received, the code $\langle 10 \rangle \text{H}$ for **DLE ENQ 2** is processed as the code for **ESC 3** $\langle 10 \rangle \text{H}$.

[Reference] **DLE EOT**

DLE DC4 n m t

[Name] Generate pulse at real-time

[Format]	ASCII	DLE	DC4	n	m	t
	Hex	10	14	n	m	t
	Decimal	16	20	n	m	t

[Range] $n = 1$
 $m = 0, 1$
 $1 \leq t \leq 8$

[Description] Outputs the pulse specified by t to connector pin m as follows:

m	Connector pin
0	Drawer kick-out connector pin 2.
1	Drawer kick-out connector pin 5.

[Details]

- When the printer is in an error status when this command is processed, this command is ignored.
- When the pulse is output to the connector pin specified while **ESC p** or **DEL DC4** is executed while this command is processed, this command is ignored.
- The printer executes this command upon receiving it.
- With a serial interface model, this command is executed even when the printer is offline, the receive buffer is full, or there is an error status.
- With a parallel interface model, this command cannot be executed when the printer is busy. This command is executed even when the printer is offline or there is an error status when DIP switch 2-1 is on.
- This command is effective even when the printer is disabled with **ESC =** (Select peripheral device).

[Notes]

- If print data includes the same character strings as this command, the printer performs the same operation specified by this command. The user must consider this.
- This command should not be used within the data sequence of another command that consists of 2 or more bytes.

[Reference] **ESC p**

ESC FF

[Name] Print data in page mode

[Format] ASCII ESC FF

Hex 1B 0C

Decimal 27 12

[Description] In page mode, prints all buffered data in the printing area collectively.

[Details]

- This command is enabled only in page mode.
- After printing, the printer does not clear the buffered data, setting values for **ESC T** and the position for buffering character data.

[Reference] **FF**, **ESC L**, **ESC S**

ESC SP *n*

[Name] Set right-side character spacing

[Format] ASCII ESC SP *n*
 Hex 1B 20 *n*
 Decimal 27 32 *n*

[Range] $0 \leq n \leq 255$

[Description] Sets the character spacing for the right side of the character to [*n* × horizontal or vertical motion units].

[Details]

- The right-side character spacing for double-width mode is twice the normal value. When characters are enlarged, the right-side character spacing is *n* times normal value.
- This command does not affect the setting of Kanji characters.
- This command sets values independently in each mode (standard and page modes).
- The horizontal and vertical motion unit are specified by **GS P**. Changing the horizontal or vertical motion unit does not affect the current right-side spacing.
- The **GS P** command can change the horizontal (and vertical) motion unit. However, the value cannot be less than the minimum horizontal movement amount, and it must be in even units of the minimum horizontal movement amount.
- In standard mode, the horizontal motion unit is used.
- In page mode, the horizontal or vertical motion unit differs in page mode, depending on starting position of the printable area as follows:
 - . When the starting position is set to the upper left or lower right of the printable area using **ESC T**, the horizontal motion unit (x) is used.
 - . When the starting position is set to the upper right or lower left of the printable area using **ESC T**, the vertical motion unit (y) is used.
- The maximum right-side spacing is 35.983 mm {255/180"}. Any setting exceeding the maximum is converted to the maximum automatically.

[Default] *n* = 0

[Reference] **GS P**

ESC ! *n*

[Name] Select print mode(s)

[Format]	ASCII	ESC	!	<i>n</i>
	Hex	1B	21	<i>n</i>
	Decimal	27	33	<i>n</i>

[Range] $0 \leq n \leq 255$

[Description] Selects print mode(s) using *n* as follows:

Bit	Off/On	Hex	Decimal	Function
0	Off	00	0	Character font A (12 × 24).
	On	01	1	Character font B (9 × 17).
1	-		-	Undefined.
2	-		-	Undefined.
3	Off	00	0	Emphasized mode not selected.
	On	08	8	Emphasized mode selected.
4	Off	00	0	Double-height mode not selected.
	On	10	16	Double-height mode selected.
5	Off	00	0	Double-width mode not selected.
	On	20	32	Double-width mode selected.
6	-		-	Undefined.
7	Off	00	0	Underline mode not selected.
	On	80	128	Underline mode selected.

[Details]

- When both double-height and double-width modes are selected, quadruple size characters are printed.
- The printer can underline all characters, but can not underline the space set by **HT** or 90° clockwise rotated characters.
- The thickness of the underline is that selected by **ESC -**, regardless of the character size.
- When some characters in a line are double or more height, all the characters on the line are aligned at the baseline.
- **ESC E** can also turn on or off emphasized mode. However, the setting of the last received command is effective.
- **ESC -** can also turn on or off underline mode. However, the setting of the last received command is effective.
- **GS !** can also select character size. However, the setting of the last received command is effective.
- Emphasized mode is effective for alphanumeric and Kanji. All print modes except emphasized mode is effective only for alphanumeric.

[Default] *n* = 0

[Reference] **ESC -**, **ESC E**, **GS !**

ESC \$ *nL nH*

[Name] Set absolute print position

[Format] ASCII ESC \$ *nL nH*
 Hex 1B 24 *nL nH*
 Decimal 27 36 *nL nH*

[Range] $0 \leq nL \leq 255$ $0 \leq nH \leq 255$

[Description] Sets the distance from the beginning of the line to the position at which subsequent characters are to be printed.

- The distance from the beginning of the line to the print position is $[(nL + nH \times 256) \times (\text{vertical or horizontal motion unit})]$.

[Details]

- Settings outside the specified printable area are ignored.
- The horizontal and vertical motion unit are specified by **GS P**.
- The **GS P** command can change the horizontal (and vertical) motion unit. However, the value cannot be less than the minimum horizontal movement amount, and it must be in even units of the minimum horizontal movement amount.
- In standard mode, the horizontal motion unit (x) is used.
- In page mode, horizontal or vertical motion unit differs depending on the starting position of the printable area as follows: 1 When the starting position is set to the upper left or lower right of the printable area using **ESC T**, the horizontal motion unit (x) is used. 2 When the starting position is set to the upper right or lower left of the printable area using **ESC T**, the vertical motion unit (y) is used.

[Reference] **ESC **, **GS \$**, **GS **, **GS P**

ESC * *m nL nH d1...dk*

[Name] Select bit-image mode

[Format] ASCII ESC * *m* *nL* *nH* *d1...dk*
 Hex 1B 2A *m* *nL* *nH* *d1...dk*
 Decimal 27 42 *m* *nL* *nH* *d1...dk*

[Range] *m* = 0, 1, 32, 33
 $0 \leq nL \leq 255$
 $0 \leq nH \leq 3$
 $0 \leq d \leq 255$

[Description] Selects a bit-image mode using *m* for the number of dots specified by *nL* and *nH*, as follows:

<i>m</i>	Mode	Vertical Direction		Horizontal Direction	
		Number of Dots	Dot Density	Dot Density	Number of Data (K)
0	8-dot single-density	8	68 dpi	102 dpi	$nL + nH \times 256$
1	8-dot double-density	8	68 dpi	203 dpi	$nL + nH \times 256$
32	24-dot single-density	24	203 dpi	102 dpi	$(nL + nH \times 256) \times 3$
33	24-dot double-density	24	203 dpi	203 dpi	$(nL + nH \times 256) \times 3$

[dpi: dots per 25.4 mm {1"}]

[Details]

- If the values of *m* is out of the specified range, *nL* and data following are processed as normal data.
- The *nL* and *nH* indicate the number of dots of the bit image in the horizontal direction. The number of dots is calculated by $nL + nH \times 256$.
- If the bit-image data input exceeds the number of dots to be printed on a line, the excess data is ignored.
- *d* indicates the bit-image data. Set a corresponding bit to 1 to print a dot or to 0 to not print a dot.
- If the width of the printing area set by **GS L** and **GS W** less than the width required by the data sent with the **ESC *** command, the following will be performed on the line in question (but the printing cannot exceed the maximum printable area):
 - . The width of the printing area is extended to the right to accommodate the amount of data.
 - . If step does not provide sufficient width for the data, the left margin is reduced to accommodate the data.
- After printing a bit image, the printer returns to normal data processing mode.
- This command is not affected by print modes (emphasized, double-strike, underline, character size or white/black reverse printing), except upside-down printing mode.
- Refer to Figure 3.12.3 for the bit image development position in page mode.
- The relationship between the image data and the dots to be printed is as follows:
- When 8-dot bit image is selected:

ESC - n

[Name] Turn underline mode on/off

[Format] ASCII ESC - n

Hex 1B 2D n

Decimal 27 45 n

[Range] $0 \leq n \leq 2, 48 \leq n \leq 50$

[Description] Turns underline mode on or off, based on the following values of n :

n	Function
0, 48	Turns off underline mode
1, 49	Turns on underline mode (1-dot thick)
2, 50	Turns on underline mode (2-dots thick)

[Details]

- The printer can underline all characters (including right-side character spacing), but cannot underline the space set by **HT**.
- The printer cannot underline 90° clockwise rotated characters and white/black inverted characters.
- When underline mode is turned off by setting the value of n to 0 or 48, the following data is not underlined, and the underline thickness set before the mode is turned off does not change. The default underline thickness is 1 dot.
- Changing the character size does not affect the current underline thickness.
- Underline mode can also be turned on or off by using **ESC !**. Note, however, that the last received command is effective.
- This command does not affect Kanji printing.

[Default] $n = 0$

[Reference] **ESC !**

ESC 2

[Name] Select default line spacing

[Format]	ASCII	ESC	2
	Hex	1B	32
	Decimal	27	50

[Description] Selects approximately 4.23 mm {1/6"} spacing.

[Details]

- The line spacing can be set independently in standard mode and in page mode.

[Reference] **ESC 3**

ESC 3 *n*

[Name] Set line spacing

[Format]	ASCII	ESC	3	<i>n</i>
	Hex	1B	33	<i>n</i>
	Decimal	27	51	<i>n</i>

[Range] $0 \leq n \leq 255$

[Description] Sets the line spacing to [*n* × vertical or horizontal motion unit].

[Details]

- The line spacing can be set independently in standard mode and in page mode.
- The horizontal and vertical motion unit are specified by **GS P**. Changing the horizontal or vertical motion unit does not affect the current line spacing.
- The **GS P** command can change the horizontal (and vertical) motion unit. However, the value cannot be less than the minimum vertical movement amount, and it must be in even units of the minimum vertical movement amount.
- In standard mode, the vertical motion unit (*y*) is used.
- In page mode, this command functions as follows, depending on the starting position of the printable area:
 - . When the starting position is set to the upper left or lower right of the printable area using **ESC T**, the vertical motion unit (*y*) is used.
 - . When the starting position is set to the upper right or lower left of the printable area using **ESC T**, the horizontal motion unit (*x*) is used.
- The maximum paper feed amount is 1016 mm {40"}. Even if a paper feed amount of more than 1016 mm {40"} is set, the printer feeds the paper only 1016 mm {40"}.

[Default] Line spacing equivalent to approximately 4.23mm {1/6"}.

[Reference] **ESC 2**, **GS P**

ESC = *n*

[Name] Set peripheral device

[Format] ASCII ESC = *n*
 Hex 1B 3D *n*
 Decimal 27 61 *n*

[Range] $1 \leq n \leq 255$

[Description] Selects device to which host computer sends data, using *n* as follows:

Bit	Off/On	Hex	Decimal	Function
0	Off	00	0	Printer disabled.
	On	01	1	Printer enabled
1-7	-		-	Undefined.

[Details]

- When the printer is disabled, it ignores all data except for error-recovery commands (**DLE EOT**, **DLE ENQ**, **DLE DC4**) until it is enabled by this command.

[Default] *n*=1

ESC @

[Name] Initialize printer

[Format] ASCII ESC @
 Hex 1B 40
 Decimal 27 64

[Description] Clears the data in the print buffer and resets the printer mode to the mode that was in effect when the power was turned on.

[Details]

- The DIP switch settings are not checked again.
- The data in the receive buffer is not cleared.
- The macro definition is not cleared.
- The NV bit image data is not cleared.
- The data of the NV user memory is not cleared.

ESC E *n*

[Name] Turn emphasized mode on/off

[Format] ASCII ESC E *n*

Hex 1B 45 *n*

Decimal 27 69 *n*

[Range] $0 \leq n \leq 255$

[Description] Turns emphasized mode on or off.

When the LSB of *n* is 0, emphasized mode is turned off.

When the LSB of *n* is 1, emphasized mode is turned on.

[Details]

- Only the least significant bit of *n* is enabled.
- This command and **ESC !** turn on and off emphasized mode in the same way. Be careful when this command is used with **ESC !**.

[Default] *n* = 0

[Reference] **ESC !**

ESC G *n*

[Name] Turn on/off double-strike mode

[Format] ASCII ESC G *n*

Hex 1B 47 *n*

Decimal 27 71 *n*

[Range] $0 \leq n \leq 255$

[Description] Turns double-strike mode on or off.

- When the LSB of *n* is 0, double-strike mode is turned off.
- When the LSB of *n* is 1, double-strike mode is turned on.

[Details]

- Only the lowest bit of *n* is enabled.
- Printer output is the same in double-strike mode and in emphasized mode.

[Default] *n* = 0

[Reference] **ESC E**

ESC J *n*

[Name] Print and feed paper

[Format] ASCII ESC J *n*

Hex 1B 4A *n*

Decimal 27 74 *n*

[Range] $0 \leq n \leq 255$

[Description] Prints the data in the print buffer and feeds the paper [*n* × vertical or horizontal motion unit].

[Details]

- After printing is completed, this command sets the print starting position to the beginning of the line.
- The paper feed amount set by this command does not affect the values set by **ESC 2** or **ESC .3**.
- The horizontal and vertical motion unit are specified by **GS P**.
- The **GS P** command can change the vertical (and horizontal) motion unit. However, the value cannot be less than the minimum vertical movement amount, and it must be in even units of the minimum vertical movement amount.
- In standard mode, the printer uses the vertical motion unit (*y*).
- In page mode, this command functions as follows, depending on the starting position of the printable area:
 - . When the starting position is set to the upper left or lower right of the printable area using **ESC T**, the vertical motion unit (*y*) is used.
 - . When the starting position is set to the upper right or lower left of the print able area using **ESC T**, the horizontal motion unit (*x*) is used.
- The maximum line spacing is 1016mm {40"}. When the setting value exceeds the maximum, it is converted to the maximum automatically.

[Reference] **GS P**

ESC L

[Name] Select page mode

[Format] ASCII ESC L

Hex 1B 4C

Decimal 27 76

[Description] Switches from standard mode to page mode.

[Details]

- This command is enabled only when processed at the beginning of a line in standard mode.
- This command has no effect in page mode.
- After printing by **FF** is completed or by using **ESC S**, the printer returns to standard mode.
- This command sets the position where data is buffered to the position specified by **ESC T** within the printing area defined by **ESC W**.
- This command switches the settings for the following commands (in which the values can be set independently in standard mode and page mode) to those for page mode:
 - . Set right-side character spacing: **ESC SP**, **FS S**
 - . Select default line spacing: **ESC 2**, **ESC 3**
- Only valve settings is possible for the following commands in page mode; these commands are not executed.
 - . Turn 90° clockwise rotation mode on/off: **ESC V**
 - . Select justification: **ESC a**
 - . Turn upside-down printing mode on/off: **ESC {**
 - . Set left margin: **GS L**
 - . Set printable area width: **GS W**
- The following command is ignored in page mode:
 - Execute test print: **GS (A**
- The following command is not available in page mode:
 - Print NV bit image: **FS p**
 - Define NV bit image: **FS q**
 - Write to NV user memory: **FS g 1**
 - Print raster bit image: **GS v 0**

• The printer returns to standard mode when power is turned on, the printer is reset, or **ESC @** is used.

[Reference] **FF**, **CAN**, **ESC FF**, **ESC S**, **ESC T**, **ESC W**, **GS \$**, **GS **

ESC M *n*

[Name] Select character font

[Format] ASCII ESC M *n*

Hex 1B 4D *n*

Decimal 27 77 *n*

[Range] $n = 0, 1, 48, 49$

[Description] Selects character fonts.

<i>n</i>	Function
0, 48	Character font A (12 × 24) selected.
1, 49	Character font B (9 × 17) selected.

[Details]

- The **ESC !** command can also select the character fonts. However, the setting of the last received command is effective.

[Reference] **ESC !**

ESC R *n*

[Name] Select an international character set

[Format] ASCII ESC R *n*

Hex 1B 52 *n*

Decimal 27 82 *n*

[Range] $0 \leq n \leq 13$

[Description] Selects an international character set *n* from the following table:

<i>n</i>	Character set
0	U.S.A.
1	France
2	Germany
3	U.K.
4	Denmark I
5	Sweden
6	Italy
7	Spain I
8	Japan
9	Norway
10	Denmark II
11	Spain II
12	Latin America
13	Korea

[Default] $n = 0$

[Reference] 3.2.12 *International Character Set*

ESC S

[Name] Select standard mode

[Format] ASCII ESC S

Hex 1B 53

Decimal 27 83

[Description] Switches from page mode to standard mode.

[Details]

- This command is effective only in page mode.
- Data buffered in page mode are cleared.
- This command sets the print position to the beginning of the line.
- The printing area set by **ESC W** are initialized.
- This command switches the settings for the following commands (in which the values can be set independently in standard mode and page mode) to those for standard mode:
 - . Set right-side character spacing: **ESC SP, FS S**
 - . Select default line spacing: **ESC 2, ESC 3**
- The following commands are enabled only to set in standard mode.
 - . Set printing area in page mode: **ESC W**
 - . Select print direction in page mode: **ESC T**
- The following commands are ignored in standard mode.
 - . Set absolute vertical print position in page mode: **GS \$**
 - . Set relative vertical print position in page mode: **GS **
- Standard mode is selected automatically when power is turned on, the printer is reset, or command **ESC @** is used.

[Reference] **FF**, **ESC FF**, **ESC L**

ESC T *n*

[Name] Select print direction in page mode

[Format] ASCII ESC T *n*
 Hex 1B 54 *n*
 Decimal 27 84 *n*

[Range] $0 \leq n \leq 3$
 $48 \leq n \leq 51$

[Description] Selects the print direction and starting position in page mode. *n* specifies the print direction and starting position as follows:

<i>n</i>	Print Direction	Starting Position
0, 48	Left to right	Upper left (A in the figure)
1, 49	Bottom to top	Lower left (B in the figure)

[Details]

- When the command is input in standard mode, the printer executes only internal flag operation. This command does not affect printing in standard mode.
- This command sets the position where data is buffered within the printing area set by **ESC W**.
- Parameters for horizontal or vertical motion units (x or y) differ as follows, depending on the starting position of the printing area:
 - . If the starting position is the upper left or lower right of the printing area, data is buffered in the direction perpendicular to the paper feed direction:
 - . Commands using horizontal motion units: **ESC SP**, **ESC \$**, **ESC ** Commands using vertical motion units: **ESC 3**, **ESC J**, **GS \$**, **GS **
 - . If the starting position is the upper right or lower left of the printing area, data is buffered in the paper feed direction: Commands using horizontal motion units: **ESC 3**, **ESC J**, **GS \$**, **GS ** Commands using vertical motion units: **ESC SP**, **ESC \$**, **ESC **

[Default] *n* = 0

[Reference] **ESC \$**, **ESC L**, **ESC W**, **ESC **, **GS \$**, **GS P**, **GS **

ESC V *n*

[Name] Turn 90° clockwise rotation mode on/off

[Format]	ASCII	ESC	V	<i>n</i>
	Hex	1B	56	<i>n</i>
	Decimal	27	86	<i>n</i>

[Range] $0 \leq n \leq 1$, $48 \leq n \leq 49$

[Description] Turns 90° clockwise rotation mode on/off *n* is used as follows:

<i>n</i>	Function
0, 48	Turns off 90° clockwise rotation mode
1, 49	Turns on 90° clockwise rotation mode

[Details]

- This command affects printing in standard mode. However, the setting is always effective.
- When underline mode is turned on, the printer does not underline 90° clockwise-rotated.
- Double-width and double-height commands in 90° rotation mode enlarge characters in the opposite directions from double-height and double-width commands in normal mode.

[Default] *n* = 0

[Reference] ESC !, ESC *

ESC \ *nL nH*

[Name] Set relative print position

[Format] ASCII ESC \ *nL nH*
 Hex 1B 5C *nL nH*
 Decimal 27 92 *nL nH*

[Range] $0 \leq nL \leq 255$ $0 \leq nH \leq 255$

[Description] Sets the print starting position based on the current position by using the horizontal or vertical motion unit.

- This command sets the distance from the current position to $[(nL + nH \times 256) \times \text{horizontal or vertical motion unit}]$

[Details]

- Any setting that exceeds the printable area is ignored.
- When pitch *N* is specified to the right: $nL + nH \times 256 = N$ When pitch *N* is specified to the left (the negative direction), use the complement of 65536. When pitch *N* is specified to the left: $nL + nH \times 256 = 65536 - N$
- The print starting position moves from the current position to $[N \times \text{horizontal or vertical motion unit}]$
- The horizontal and vertical motion unit are specified by **GS P**.
- The **GS P** command can change the horizontal (and vertical) motion unit. However, the value cannot be less than the minimum horizontal movement amount, and it must be in even units of the minimum horizontal movement amount.
- In standard mode, the horizontal motion unit is used.
- In page mode, the horizontal or vertical motion unit differs as follows, depending on the starting point of the printing area:
 - When the starting position is set to the upper left or lower right of the printable area using **ESC T**, the horizontal motion unit (x) is used.
 - When the starting position is set to the upper right or lower left of the printable area using **ESC T**, the vertical motion unit (y) is used.

[Reference] **ESC \$**, **GS P**

ESC a *n*

[Name] Select justification

[Format] ASCII ESC a *n*
 Hex 1B 61 *n*
 Decimal 27 97 *n*

[Range] $0 \leq n \leq 2, 48 \leq n \leq 50$

[Description] Aligns all the data in one line to the specified position *n* selects the justification as follows:

<i>n</i>	Justification
0, 48	Left justification
1, 49	Centering
2, 50	Right justification

[Details]

- The command is enabled only when processed at the beginning of the line in standard mode.
- If this command is input in page mode, the printer performs only internal flag operations.
- This command has no effect in page mode.
- This command executes justification in the printing area.
- This command justifies the space area according to **HT**, **ESC \$** or **ESC **.

[Default] *n* = 0

ESC c 3 n

[Name] Select paper sensor(s) to output paper end signals

[Format]	ASCII	ESC	c	3	n
	Hex	1B	63	33	n
	Decimal	27	99	51	n

[Range] $0 \leq n \leq 255$

[Description] Selects the paper sensor(s) to output paper end signals

- Each bit of n is used as follows:

Bit	Off/On	Hex	Decimal	Function
0	Off	00	0	Paper roll near-end sensor disabled
	On	01	1	Paper roll near-end sensor enabled
1	Off	00	0	Paper roll near-end sensor disabled
	On	02	2	Paper roll near-end sensor enabled
2	Off	00	0	Paper roll end sensor disabled
	On	04	4	Paper roll end sensor enabled
3	Off	00	0	Paper roll end sensor disabled
	On	08	8	Paper roll end sensor enabled
4-7	-		-	Undefined

[Details]

- It is possible to select multiple sensors to output signals. Then, if any of the sensors detects a paper end, the paper end signal is output.
- The command is available only with a parallel interface and is ignored with a serial interface.
- Sensor is switched when executing this command. The paper end signal switching be delayed depending on the receive buffer state.
- If either bit 0 or bit 1 is on, the paper roll near-end sensor is selected as the paper sensor outputting paper-end signals
- If either bit 2 or bit 3 is on, the paper roll end sensor is selected as the paper sensor outputting paper-end signals.
- When all the sensors are disabled, the paper end signal always outputs a paper present status.

[Default] $n = 15$

ESC c 4 n

[Name] Select paper sensor(s) to stop printing

[Format]	ASCII	ESC	c	4	n
	Hex	1B	63	34	n
	Decimal	27	99	52	n

[Range] $0 \leq n \leq 255$

[Description] Selects the paper sensor(s) used to stop printing when a paper-end is detected, using *n* as follows:

Bit	Off/On	Hex	Decimal	Function
0	Off	00	0	Paper roll near end sensor disabled.
	On	01	1	Paper roll near end sensor enabled.
1	Off	00	0	Paper roll near end sensor disabled.
	On	02	2	Paper roll near end sensor enabled.
2-7	-		-	Undefined.

[Details]

- When a paper sensor is enabled with this command, printing is stopped only when the corresponding paper is selected for printing.
- When a paper-end is detected by the paper roll sensor, the printer goes offline after printing stops.
- When either bit 0 or 1 is on, the printer selects the paper roll near-end sensor for the paper sensor to stop printing.

[Default] *n* = 0

ESC c 5 *n*

[Name] Enable/disable panel buttons

[Format] ASCII ESC c 5 *n*

Hex 1B 63 35 *n*

Decimal 27 99 53 *n*

[Range] $0 \leq n \leq 255$

[Description] Enables or disables the panel buttons.

- When the LSB of *n* is 0, the panel buttons are enabled.
- When the LSB of *n* is 1, the panel buttons are disabled.

[Details]

- Only the lowest bit of *n* is valid.
- When the panel buttons are disabled, none of them are usable when the printer cover is closed.
- In this printer, the panel buttons are the FEED button.
- In the macro ready mode, the FEED button are enabled regardless of the settings of this command; however, the paper cannot be fed by using these buttons.

[Default] *n* = 0

ESC d *n*

[Name] Print and feed *n* lines

[Format] ASCII ESC d *n*

Hex 1B 64 *n*

Decimal 27 100 *n*

[Range] $0 \leq n \leq 255$

[Description] Prints the data in the print buffer and feeds *n* lines.

[Details]

- This command sets the print starting position to the beginning of the line.
- This command does not affect the line spacing set by **ESC 2** or **ESC 3**.
- The maximum paper feed amount is 1016 mm {40"}. If the paper feed amount (*n* × line spacing) of more than 1016 mm {40"} is specified, the printer feeds the paper only 1016 mm {40"}.

[Reference] **ESC 2**, **ESC 3**

ESC p m t1 t2

[Name] Generate pulse

[Format] ASCII ESC p m t1 t2
 Hex 1B 70 m t1 t2
 Decimal 27 112 m t1 t2

[Range] m = 0, 1, 48, 49

0 ≤ t1 ≤ 200, 0 ≤ t2 ≤ 200

[Description] Outputs the pulse specified by t1 and t2 to connector pin m as follows:

M	Connector pin
0, 48	Drawer kick-out connector pin 2.
1, 49	Drawer kick-out connector pin 5.

[Details]

- The pulse ON time is [t1 × 2 ms] and the OFF time is [t2 × 2 ms].
- If t2 < t1, the OFF time is [t1 × 2 ms]

[Reference] **DLE DC4**

ESC t n

[Name] Select character code table

[Format]	ASCII	ESC	t	n
	Hex	1B	74	n
	Decimal	27	116	n

[Range] $0 \leq n \leq 5$, $16 \leq n \leq 26$, $n = 255$

[Description] Selects a page n from the character code table.

n	Page
0	PC437 [U.S.A., Standard Europe]
1	Katakana
2	PC850 [Multilingual]
3	PC860 [Portuguese]
4	PC863 [Canadian-French]
5	PC865 [Nordic]
16	WPC1252
17	PC866 [Cyrillic #2]
18	PC852 [Latin2]
19	PC858
20 (*1)	Thai character code 42
21 (*1)	Thai character code 11
22 (*1)	Thai character code 13
23 (*1)	Thai character code 14
24 (*1)	Thai character code 16
25 (*1)	Thai character code 17
26 (*1)	Thai character code 18
255	Space page

(*1): ($20 \leq n \leq 26$) is supported only by a Thai model.

[Default] $n = 0$ For Thai model: $n = 20$

ESC { *n*

[Name] Turns on/off upside-down printing mode

[Format] ASCII ESC { *n*

Hex 1B 7B *n*

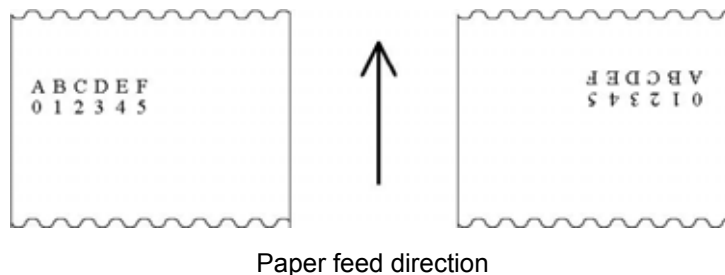
Decimal 27 123 *n*

[Range] $0 \leq n \leq 255$

[Description] Turns upside-down printing mode on or off.

- When the LSB of *n* is 0, upside-down printing mode is turned off.
- When the LSB of *n* is 1, upside-down printing mode is turned on. [Details] • Only the lowest bit of *n* is valid.
- This command is enabled only when processed at the beginning of a line in standard mode.
- When this command is input in page mode, the printer performs only internal flag operations.
- This command does not affect printing in page mode.
- In upside-down printing mode, the printer rotates the line to be printed by 180° and then prints it. [Default] *n* = 0

[Example] When upside-down printing When upside-down printing mode is selected mode is not selected



FS g 1 m a1 a2 a3 a4 nL nH d1...dk

[Name] Write to NV user memory

[Format] ASCII FS g 1 m a1 a2 a3 a4 nL nH d1...dk

Hex 1C 67 31 m a1 a2 a3 a4 nL nH d1...dk

Decimal 28 103 49 m a1 a2 a3 a4 nL nH d1...dk

[Range] $m = 0$ $0 \leq (a1 + (a2 \times 256) + (a3 \times 65536) + (a4 \times 16777216)) \leq 1023$ $1 \leq (nL + (nH \times 256)) \leq 1024$ $32 \leq d \leq 255$ $k = (nL + (nH \times 256))$

[Description] Writes data to NV user memory.

- *m* is always set to 0.
- *a1*, *a2*, *a3*, and *a4* specify the data stored starting address to $(a1 + (a2 \times 256) \times (a3 \times 65536) + (a4 \times 16777216))$.
- *nL*, *nH* select the number of stored data bytes $(nL + (nH \times 256))$.
- *d* specifies the stored data.

[Details]

- NV user memory means the memory area which is used for storing character font data in non-volatile memory.
- This command is available only when processed at the beginning of a line in standard mode.
- This command is ignored in page mode.
- When this command is received during macro definition, the printer ends macro definition and begins executing this command.
- If the values of the argument (*m*), the stored starting address (*a1*, *a2*, *a3*, *a4*), and the number of the stored data (*nL*, *nH*) are out of the specified range, or if the stored starting address (*a1*, *a2*, *a3*, *a4*) + the number of the stored data (*nL*, *nH*) ≥ 1024 , this command is ignored and data following are processed as normal data.
- If the value of the stored data *d* is out of range, the execution of this command is ended, and data following are processed as normal data. In this case, the data which are stored in the NV memory still remain.
- Writing data to the NV memory overwrites previous data. Therefore, previous data is deleted.
- If an error occurs during writing data to the NV memory, "Memory or Gate array R/W error" appears.
- Data which are stored in the NV user memory can be read by **FS g 2**.
- Once data is stored in the NV user memory, it is not erased by executing **ESC @**, **FS q**, reset, or power off.

[Notes]

- Frequent write command execution by **FS g 1** may damage the NV memory. Therefore, it is recommended to write the NV memory 10 times or less a day.
- While processing this command, the printer is BUSY when writing the data to the NV user memory and stops receiving data. Therefore it is prohibited to transmit data including the real-time commands during the execution of this command.

[Reference] **FS g 2**

FS g 2 m a1 a2 a3 a4 nL nH

[Name] Read from NV user memory

[Format] ASCII FS g 2 m a1 a2 a3 a4 nL nH

Hex 1C 67 32 m a1 a2 a3 a4 nL nH

Decimal 28 103 50 m a1 a2 a3 a4 nL nH

[Range] $m = 0 \leq (a1 + (a2 \times 256) + (a3 \times 65536) + (a4 \times 16777216)) \leq 1023$ $1 \leq (nL + (nH \times 256)) \leq 80$

[Description] Transmits data from NV user memory.

- *m* is always set to 0.
- *a1*, *a2*, *a3*, and *a4* specify the data stored starting address to $(a1 + (a2 \times 256) \times (a3 \times 65536) + (a4 \times 16777216))$.
- *nL*, *nH* select the number of stored data bytes $(nL + (nH \times 256))$.

[Details]

- NV user memory means the memory area which is used for storing character font data in non-volatile memory.
- If the values of the argument (*m*), the stored starting address (*a1*, *a2*, *a3*, *a4*) and the number of the stored data (*nL*, *nH*) are out of the specified range, or if the stored starting address (*a1*, *a2*, *a3*, *a4*) + the number of the stored data (*nL*, *nH*) ≥ 1024 , this command is ignored and data following are processed as normal data.
- After the data is ready to be transmitted, the printer executes the following process.
 - . Executes READY to BUSY. If it is already BUSY, the printer executes nothing.
 - . Transmits [Header + Data + NUL].
 - . Executes BUSY to READY. If it is already BUSY from any other cause, the printer executes nothing.
- The contents of [Header + Data + NUL] are as follows:
 Header: Hexadecimal = 5FH / Decimal = 95 (1 byte)
 Data: Data stored in NV user memory $((nL + (nH \times 256))$ bytes)
 NUL: Hexadecimal = 00H / Decimal = 0 (1 byte)
- When DTR/DSR control is selected, the printer transmits data consecutively after confirming whether the host computer is ready to receive data. When the host is not ready to receive data, the printer waits until the host is ready.
- When XON/XOFF control is selected, the printer transmits all data consecutively without confirming whether the host computer is ready to receive data. The data transmission must be consecutive, except for the XOFF code.
- With the parallel interface mode, the data buffer capacity (which is the memory area to store all transmitted data except ASB status) is 99 bytes. Data which exceeds 99 bytes are ignored.
- Data which is stored in the NV user memory can be written by **FS g 1**.

[Notes]

- The printer transmits all data collectively without confirming whether the host is ready to receive data. To receive all data result correctly, (the capacity of the transmitted data + 2) bytes or more space is required in the receive buffer.
- During data transmission, the printer ignores real-time commands. Also, the printer does not transmit ASB even when the ABS is enabled. Therefore, the user cannot confirm changes in the printer status during these periods.

[Reference] **FS g 1**

FS p n m

[Name] Print NV bit image

[Format] ASCII FS p n m
Hex 1C 70 n m
Decimal 28 112 n m

[Range] $1 \leq n \leq 255$
 $0 \leq m \leq 3, 48 \leq m \leq 51$

[Description] Prints a NV bit image n using the mode specified by m .

m	Mode	Vertical Dot Density	Horizontal Dot Density
0, 48	Normal	203 dpi	203 dpi
1, 49	Double-width	2030 dpi	102 dpi
2, 50	Double-height	102 dpi	102 dpi
3, 51	Quadruple	102 dpi	102 dpi

[dpi: dots per 25.4 mm {1"}]

- n is the number of the NV bit image (defined using the **FS q** command).
- m specifies the bit image mode.

[Details]

- NV bit image means a bit image which is defined in a non-volatile memory by **FS q** and printed by **FS p**.
- This command is not effective when the specified NV bit image has not been defined.
- In standard mode, this command is effective only when there is no data in the print buffer.
- In page mode, this command is not effective.
- This command is not affected by print modes (emphasized, double-strike, underline, character size, white/black reverse printing, or 90° rotated characters, etc.), except upside-down printing mode.
- If the printing area width set by **GS L** and **GS W** for the NV bit image is less than one vertical line, the following processing is performed only on the line in question. However, in NV bit image mode, one vertical line means 1 dot in normal mode ($m=0, 48$) and in double-height mode ($m=2, 50$), and it means 2 dots in double-width mode ($m=1, 49$) and in quadruple mode ($m=3, 51$).
 - The printing area width is extended to the right in NV bit image mode up to one line vertically. In this case, printing does not exceed the printable area.
 - If the printing area width cannot be extended by one line vertically, the left margin is reduced to accommodate one line vertically.
- If the downloaded bit-image to be printed exceeds one line, the excess data is not printed.
- This command feeds dots (for the height n of the NV bit-image) in normal and double-width modes, and (for the height $n \times 2$ of the NV bit-image) in double-height and quadruple modes, regardless of the line spacing specified by **ESC 2** or **ESC 3**.
- After printing the bit image, this command sets the print position to the beginning of the line and processes the data that follows as normal data.

[References] **ESC ***, **FS q**, **GS l**, **GS v 0**

FS q n [xL xH yL yH d1...dk]1...[xL xH yL yH d1...dk]n

[Name] Define NV bit image

[Format] ASCII FS q n [xL xH yL yH d1...dk]1...[xL xH yL yH d1...dk]n
 Hex 1C 71 n [xL xH yL yH d1...dk]1...[xL xH yL yH d1...dk]n
 Decimal 28 113 n [xL xH yL yH d1...dk]1...[xL xH yL yH d1...dk]n

[Range] $1 \leq n \leq 255$ $0 \leq xL \leq 255$ $0 \leq xH \leq 3$ (when $1 \leq (xL + xH \times 256) \leq 1023$) $0 \leq yL \leq 255$
 $0 \leq yH \leq 1$ (when $1 \leq (yL + yH \times 256) \leq 288$) $0 \leq d \leq 255$ $k = (xL + xH \times 256) \times (yL + yH \times 256) \times 8$ Total defined data area = 2M bits (256K bytes)

[Description] Define the NV bit image specified by *n*.

- *n* specifies the number of the defined NV bit image.
- *xL*, *xH* specifies $(xL + xH \times 256) \times 8$ dots in the horizontal direction for the NV bit image you are defining.
- *yL*, *yH* specifies $(yL + yH \times 256) \times 8$ dots in the vertical direction for the NV bit image you are defining.

[Details]

- This command cancels all NV bit images that have already been defined by this command. The printer can not redefine only one of several data definitions previously defined. In this case, all data needs to be sent again.
- From the beginning of the processing of this command till the finish of hardware reset, mechanical operations (including initializing the position of the printer head when the cover is open, paper feeding by using the FEED button, etc.) cannot be performed.
- During processing this command, the printer is in BUSY when writing the data to the NV user memory and stops receiving data. Therefore it is prohibited to transmit the data including the real-time commands during the execution of this command.
- NV bit image means a bit image which is defined in a non-volatile memory by **FS q** and printed by **FS p**.
- In standard mode, this command is effective only when processed at the beginning of the line.
- In page mode, this command is not effective.
- This command is effective when 7 bytes <FS~ yH> is processed as a normal value.
- When the amount of data exceeds the capacity left in the range defined by *xL*, *xH*, *yL*, *yH*, the printer processes *xL*, *xH*, *yL*, *yH* out of the defined range.
- In the first group of NV bit images, when any of the parameters *xL*, *xH*, *yL*, *yH* is out of the definition range, this command is disabled.
- In groups of NV bit images other than the first one, when the printer processes *xL*, *xH*, *yL*, *yH* out of the defined range, it stops processing this command and starts writing into the NV images. At this time, NV bit images that haven't been defined are disabled (undefined), but any NV bit images before that are enabled.
- The *d* indicates the definition data. In data (*d*) a 1 bit specifies a dot to be printed and a 0 bit specifies a dot not to be printed.
- This command defines *n* as the number of a NV bit image. Numbers rise in order from NV bit image 01H. Therefore, the first data group [xL xH yL yH d1...dk] is NV bit image 01H, and the last data group [xL xH yL yH d1...dk] is NV bit image *n*. The total agrees with the number of NV bit images specified by command **FS p**.
- A definition data of a NV bit image consists of [xL xH yL yH d1...dk]. Therefore, when only one NV bit image is defined *n*=1, the printer processes a data group [xL xH yL yH d1...dk] once. The printer uses ([data: $(xL + xH \times 256) \times (yL + yH \times 256) \times 8$] + [header :4]) bytes of NV memory.

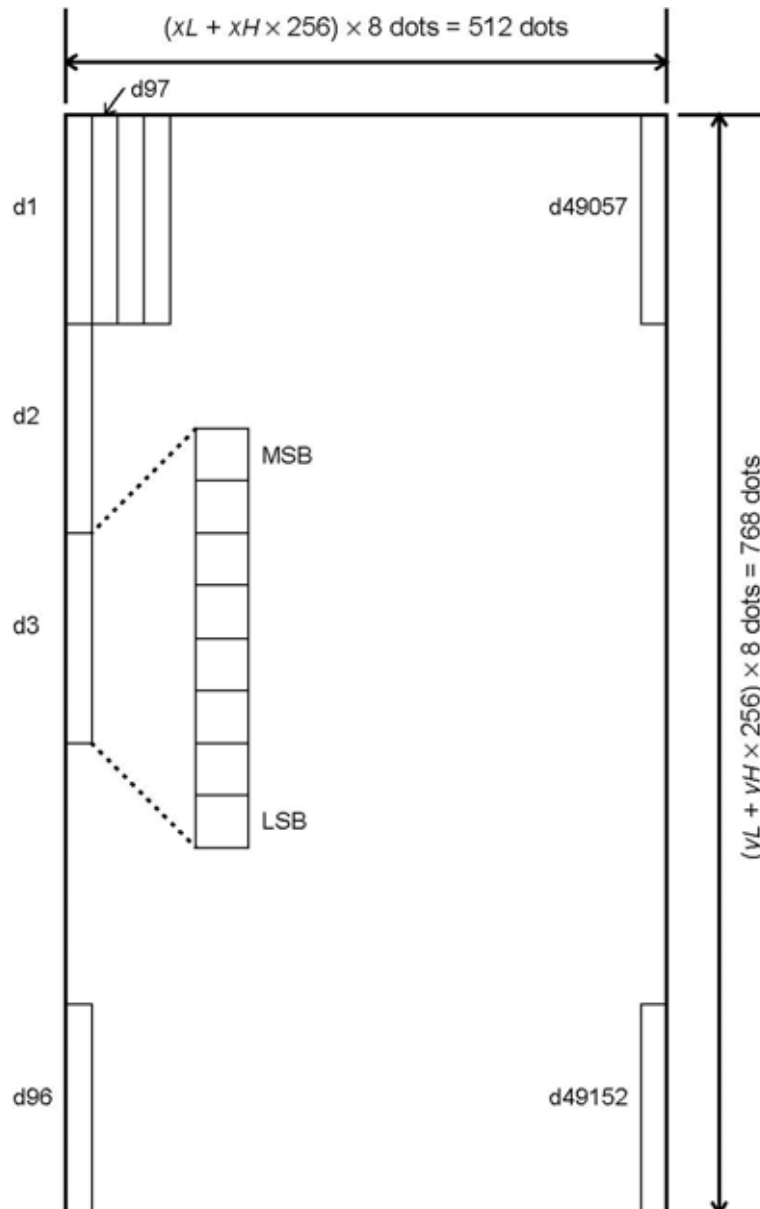
- The definition area in this printer is a maximum of 2M bits (256K bytes). This command can define several NV bit images, but cannot define a bit image data whose total capacity [bit image data + header] exceeds 2M bytes (256K bytes).
- The printer is busy immediately before writing into NV memory, regardless of the setting of DIP switch 2-1.
- The printer does not transmit ASB status and perform status detection during processing of this command even when ASB is specified.
- When this command is received during macro definition, the printer ends macro definition, and begins performing this command.
- Once a NV bit image is defined, it is not erased by performing **ESC @**, reset, and power off.
- This command performs only definition of a NV bit image and does not perform printing. Printing of the NV bit image is performed by the **FS p** command.

[Notes]

- Frequent write command execution may cause damage the NV memory. Therefore, it is recommended to write the NV memory 10 times or less a day.
- The printer performs a hardware reset after the procedure to place the image into the NV memory. Therefore, user-defined characters, downloaded bit images, and macros should be defined only after completing this command. The printer clears the receive and print buffers and resets the mode to the mode that was in effect at power on. At this time, DIP switch settings are checked again.

[Reference] **FS p**

[Example] When $x_L = 64$, $x_H = 0$, $y_L = 96$, $y_H = 0$



GS ! *n*

[Name] Select character size

[Format]	ASCII	GS	!	<i>n</i>
	Hex	1D	21	<i>n</i>
	Decimal	29	33	<i>n</i>

[Range] $0 \leq n \leq 255$

($1 \leq$ vertical number of times ≤ 8 , $1 \leq$ horizontal number of times ≤ 8)

[Description] Selects the character height using bits 0 to 2 and selects the character width using bits 4 to 7, as follows:

Bit	Off/On	Hex	Decimal	Function
0	Character height selection. See Table 2.			
1				
2				
3				
4	Character width selection. See Table 1.			
5				
6				
7				

Table 1 Character Width Selection

Hex	Decimal	Width
00	0	1 (normal)
10	16	2 (double-width)
20	32	3
30	48	4
40	64	5
50	80	6
60	96	7
70	112	8

Table 2 Character Height Selection

Hex	Decimal	Height
00	0	1 (normal)
01	1	2 (double-height)
02	2	3
03	3	4
04	4	5
05	5	6
06	6	7
07	7	8

[Details]

- This command is all characters (alphanumeric and Kanji) effective except for HRI characters.
- If *n* is outside of the defined range, this command is ignored.
- In standard mode, the vertical direction is the paper feed direction, and the horizontal direction is perpendicular to the paper feed direction. However, when character orientation changes in 90° clockwise-rotation mode, the relationship between vertical and horizontal directions is reversed.
- In page mode, vertical and horizontal directions are based on the character orientation.
- When characters are enlarged with different sizes on one line, all the characters on the line are aligned at the baseline.
- The **ESC !** command can also turn double-width and double-height modes on or off. However, the setting of the last received command is effective.

[Default] *n* = 0 [Reference] **ESC !**

GS \$ *nL nH*

[Name] Set absolute vertical print position in page mode

[Format] ASCII GS \$ *nL nH*

Hex 1D 24 *nL nH*

Decimal 29 36 *nL nH* [Range] $0 \leq nL \leq 255$, $0 \leq nH \leq 255$

[Description] • Sets the absolute vertical print starting position for buffer character data in page mode.

- This command sets the absolute print position to $[(nL + nH \times 256) \times (\text{vertical or horizontal motion unit})]$.

[Details]

- This command is effective only in page mode.
- If the $[(nL + nH \times 256) \times (\text{vertical or horizontal motion unit})]$ exceeds the specified printing area, this command is ignored.
- The horizontal starting buffer position does not move.
- The reference starting position is that specified by **ESC T**.
- This command operates as follows, depending on the starting position of the printing area specified by **ESC T**:
 - When the starting position is set to the upper left or lower right, this command sets the absolute position in the vertical direction.
 - When the starting position is set to the upper right or lower left, this command sets the absolute position in the horizontal direction.
- The horizontal and vertical motion unit are specified by **GS P**.
- The **GS P** command can change the horizontal and vertical motion unit. However, the value cannot be less than the minimum horizontal movement amount, and it must be in even units of the minimum horizontal movement amount.

[Reference] **ESC \$**, **ESC T**, **ESC W**, **ESC **, **GS P**, **GS **

GS *x y d1...d(x × y × 8)

[Name] Define downloaded bit image

[Format] ASCII GS * x y d1...d(x × y × 8)

Hex 1D 2A x y d1...d(x × y × 8)

Decimal 29 42 x y d1...d(x × y × 8)

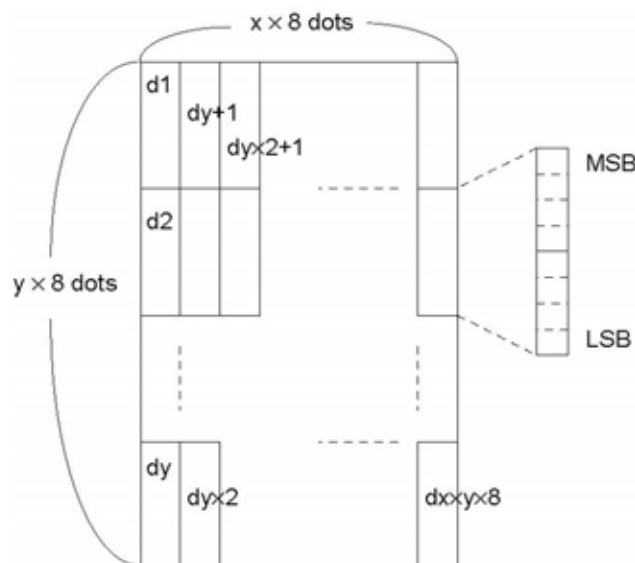
[Range] $1 \leq x \leq 255$ $1 \leq y \leq 48$ $x \times y \leq 1536$ $0 \leq d \leq 255$

[Description] Defines a downloaded bit image using the number of dots specified by x and y

- x specifies the number of dots in the horizontal direction.
- y specifies the number of dots in the vertical direction.

[Details]

- The number of dots in the horizontal direction is $x \times 8$, in the vertical direction it is $y \times 8$.
- If $x \times y$ is out of the specified range, this command is disabled.
- The *d* indicates bit-image data. Data (*d*) specifies a bit printed to 1 and not printed to 0.
- The downloaded bit image definition is cleared when:
 - . ESC @ is executed.
 - . ESC & is executed.
 - . FS q is executed.
 - . Printer is reset or the power is turned off.
- The following figure shows the relationship between the downloaded bit image and the printed data.



[Reference] GS /

GS (A *pL pH n m*

[Name] Execute test print

[Format] ASCII GS (A *pL pH n m*

Hex 1D 28 41 *pL pH n m*

Decimal 29 40 65 *pL pH n m*

[Range] ($pL + (pH \times 256) = 2$) ($pL=2, pH=0$) $0 \leq n \leq 2, 48 \leq n \leq 50$ $1 \leq m \leq 3, 49 \leq m \leq 51$

[Description]

- Executes a test print with a specified test pattern on a specified paper.
- *pL* and *pH* specifies the number of the parameter such as *n*, *m* to ($pL + (pH \times 256)$) bytes. *n* specifies the paper to be tested.

<i>N</i>	Paper
0, 48	Basic sheet (paper roll)
1, 49 2, 50	Paper roll

m specifies a test pattern.

<i>m</i>	Test pattern
1, 49	Hexadecimal dump
2, 50	Printer status print
3, 51	Rolling pattern print

[Details]

- This command is enabled only when processed at the beginning of a line in standard mode.
- This command is no effect in page mode.
- When this command is received during macro definition, the printer ends macro definition and begins performing this command.
 - After the test print is finished, the printer resets itself automatically. Therefore, the already-defined data before this command is executed, such as an user-defined characters, downloaded bit image, and macro, becomes undefined, and the receive buffer and print buffer are cleared, and each setting returns to the default value. The printer also re-reads the DIP switch settings.
- The printer cuts the paper at the end of the test print.
- The printer goes BUSY while this command is executed.

GS / m

[Name] Print downloaded bit image

[Format]	ASCII	GS	/	<i>m</i>
	Hex	1D	2F	<i>m</i>
	Decimal	29	47	<i>m</i>

[Range] $0 \leq m \leq 3$, $48 \leq m \leq 51$

[Description] Prints a downloaded bit image using the mode specified by *m*. *m* selects a mode from the table below:

<i>m</i>	Mode	Vertical Dot Density	Horizontal Dot Density
0, 48	Normal	180 dpi	180 dpi
1, 49	Double-width	180 dpi	90 dpi
2, 50	Double-height	90 dpi	180 dpi
3, 51	Quadruple	90 dpi	90 dpi

[dpi: dots per 25.4 mm {1"}]

[Details]

- This command is ignored if a downloaded bit image has not been defined.
- In standard mode, this command is effective only when there is no data in the print buffer.
- This command has no effect in the print modes (emphasized, double-strike, underline, character size, or white/black reverse printing), except for upside-down printing mode.
- If the downloaded bit-image to be printed exceeds the printable area, the excess data is not printed.
- Refer to Figure 3.12.3 for the downloaded bit image development position in page mode.
- If the printing area width set by **GS L** and **GS W** is less than one line in vertical, the following processing is performed only on the line in question:
 - . The printing area width is extended to the right up to one line in vertical. In this case, printing does not exceed the printable area.
 - . If the printing area width cannot be extended by one line in vertical, the left margin is reduced to accommodate one line in vertical.

[Reference] **GS** *

GS B *n*

[Name] Turn white/black reverse printing mode

[Format] ASCII GS B *n*

Hex 1D 42 *n*

Decimal 29 66 *n*

[Range] $0 \leq n \leq 255$

[Description] Turns on or off white/black reverse printing mode.

- When the LSB of *n* is 0, white/black reverse mode is turned off.
- When the LSB of *n* is 1, white/black reverse mode is turned on.

[Details]

- Only the lowest bit of *n* is valid.
- This command is available for built-in characters and user-defined characters.
- When white/black reverse printing mode is on, it also applied to character spacing set by **ESC S**.
- This command does not affect bit image, user-defined bit image, bar code, HRI characters, and spacing skipped by **HT**, **ESC \$**, and **ESC **.
- This command does not affect the space between lines.
- White/black reverse mode has a higher priority than underline mode. Even if underline mode is on, it is disabled (but not canceled) when white/black reverse mode is selected.

[Default] *n* = 0

GS H *n*

[Name] Select printing position for HRI characters

[Format] ASCII GS H *n*

Hex 1D 48 *n*

Decimal 29 72 *n*

[Range] $0 \leq n \leq 3, 48 \leq n \leq 51$

[Description] Selects the printing position of HRI characters when printing a bar code. *n* selects the printing position as follows:

<i>n</i>	Printing position
0, 48	Not printed
1, 49	Above the bar code
2, 50	Below the bar code
3, 51	Both above and below the bar code

[Details]

- HRI indicates Human Readable Interpretation.
- HRI characters are printed using the font specified by **GS f**.

[Default] *n* = 0 [Reference] **GS f**, **GS k**

GS In

[Name] Transmit printer ID

[Format]	ASCII	GS	I	n
	Hex	1D	49	n
	Decimal	29	73	n

[Range] $1 \leq n \leq 3$, $49 \leq n \leq 51$, $65 \leq n \leq 69$

[Description] Transmits the printer ID specified by n as follows:

n	Printer ID	Specification	ID (hexadecimal)
1, 49	Printer model ID	TM-T88I I series	20
2, 50	Type ID	See table below.	
3, 51	ROM version ID	Depends on ROM version.	
65	Firmware version	Depends on Firmware version.	
66	Manufacturer	EPSON	
67	Printer name	TM-T88III	
68	Serial number	Depends on serial number.	
69	Type of model	Japanese model: KANJI JAPANESE Simplified Chinese model: CHINA GB2312 Traditional Chinese model: TAIWAN BIG-5 Thai model: THAI 3 PASS Korean model: KOREA C-5601C	

$n = 2$, Type ID

Bit	Off/On	Hex	Decimal	Function
0	Off	00	0	Two-byte character code not supported.
	On	01	1	Two-byte character code supported.
1	On	02	2	Autocutter equipped.
2	Off	00	0	Not used. Fixed to Off.
3	Off	00	0	Not used. Fixed to Off.
4	Off	00	0	Not used. Fixed to Off.
5	-	-	-	Undefined.
6	-	-	-	Undefined.
7	Off	00	0	Not used. Fixed to Off.

[Details]

- When DTR/DSR control is selected in the serial interface model, the printer transmits the printer ID after confirming that the host is ready to receive data (DSR signal is SPACE). If the host computer is not ready to receive data (DSR signal is MARK), the printer waits until the host is ready.
- When XON/XOFF control is selected in the serial interface model, the printer transmits the printer ID without confirming the condition of the DSR signal.
- The printer ID is transmitted when the data in the receive buffer is developed. Therefore, there may be a time lag between receiving this command and transmitting the status, depending on the receive buffer status.

- When the printer ID transmission is specified with ($1 \leq n \leq 3$) or ($49 \leq n \leq 51$), one byte code is transmitted.
- When Auto Status Back (ASB) is enabled using **GS a**, the printer ID transmitted by **GS T** and the ASB status must be differentiated using the table in Appendix G.
- After the data is ready to be transmitted, the printer executes the following process.
- When the printer ID transmission is specified with ($65 \leq n \leq 68$), the following contents are transmitted:

Header: Hexadecimal = 5FH / Decimal = 95 (1 byte)

Data: Printer information

NUL: Hexadecimal = 00H / Decimal = 0 (1 byte)

- ① Executes READY to BUSY. If it is already BUSY, the printer executes nothing.
- ② Transmits [Header + Data + NUL].
- ③ Executes BUSY to READY. If it is already BUSY from any other cause, the printer executes nothing.

GS P x y

[Name] Set horizontal and vertical motion units

[Format] ASCII GS P x y

Hex 1D 50 x y

Decimal 29 80 x y

[Range] $0 \leq x \leq 255$ $0 \leq y \leq 255$

[Description] Sets the horizontal and vertical motion units to approximately 25.4/x mm { 1/x inches} and approximately 25.4/y mm {1/y inches}, respectively.

When x and y are set to 0, the default setting of each value is used.

[Details]

- The horizontal direction is perpendicular to the paper feed direction and the vertical direction is the paper feed direction.

- In standard mode, the following commands use x or y, regardless of character rotation (upside-down or 90° clockwise rotation):

- Commands using x: **ESC SP, ESC \$, ESC \, FS S, GS L, GS W**

- Commands using y: **ESC 3, ESC J, GS V**

- In page mode, the following command use x or y, depending on character orientation:

When the print starting position is set to the upper left or lower right of the printing area using **ESC T** (data is buffered in the direction perpendicular to the paper feed direction):

Commands using x: **ESC SP, ESC \$, ESC W, ESC \, FS S**
 Commands using y: **ESC 3, ESC J, ESC W, GS \$, GS \, GS V**

When the print starting position is set to the upper right or lower left of the printing area using **ESC T** (data is buffered in the paper feed direction):

Commands using x: **ESC 3, ESC J, ESC W, GS \$, GS **
 Commands using y: **ESC SP, ESC \$, ESC W, ESC \, FS S, GS V**

- The command does not affect the previously specified values.
- The calculated result from combining this command with others is truncated to the minimum value of the mechanical pitch.

[Default] x = 180, y = 360

[Reference] **ESC SP, ESC \$, ESC 3, ESC J, ESC W, ESC \, GS \$, GS L, GS V, GS W, GS **

GS V *m* , GS V *m n*

[Name] Select cut mode and cut paper

[Format]	ASCII	GS	V	<i>m</i>	
	Hex	1D	56	<i>m</i>	
	Decimal	29	86	<i>m</i>	
	ASCII	GS	V	<i>m</i>	<i>n</i>
	Hex	1D	56	<i>m</i>	<i>n</i>
	Decimal	29	86	<i>m</i>	<i>n</i>

[Range] *m* = 1, 49
m = 66, $0 \leq n \leq 255$

[Description] Selects a mode for cutting paper and executes paper cutting.

The value of *m* selects the mode as follows:

<i>m</i>	Print mode
1, 49	Partial cut (one point left uncut)
66	Feeds paper (cutting position + [<i>n</i> × (vertical motion unit)]), and cuts the paper partially (one point left uncut).

[Details]

- This command is effective only processed at the beginning of a line. [Details for]
- Only the partial cut is available; there is no full cut. [Details for]
- When *n* = 0, the printer feeds the paper to the cutting position and cuts it.
- When *n* ≠ 0, the printer feeds the paper to (cutting position + [*n* × vertical motion unit]) and cuts it.
- The horizontal and vertical motion unit are specified by **GS P**.
- The paper feed amount is calculated using the vertical motion unit (y). However, the value cannot be less than the minimum horizontal movement amount, and it must be in even units of the minimum horizontal movement amount.

GS a n

[Name] Enable/Disable Automatic Status Back (ASB)

[Format]	ASCII	GS	a	n
	Hex	1D	61	n
	Decimal	29	97	n

[Range] $0 \leq n \leq 255$ [Description] Enables or disables ASB and specifies the status items to include, using *n* as follows:

Bit	Off/On	Hex	Decimal	Status for ASB
0	Off	00	0	Drawer kick-out connector pin 3 status disabled.
	On	01	1	Drawer kick-out connector pin 3 status enabled.
1	Off	00	0	Online/offline status disabled.
	On	02	2	Online/offline status enabled.
2	Off	00	0	Error status disabled.
	On	04	4	Error status enabled.
3	Off	00	0	Paper roll sensor status disabled.
	On	08	8	Paper roll sensor status enabled.
4-7	-		-	Undefined.

[Details]

- If any of the status items in the table above are enabled, the printer transmits the status when this command is executed. The printer automatically transmits the status whenever the enabled status item changes. The disabled status items may change, in this case, because each status transmission represents the current status.
 - If all status items are disabled, the ASB function is also disabled.
 - If the ASB is enabled as a default, the printer transmits the status when the printer data reception and transmission is possible at the first time from when the printer is turned on.
 - The following four status bytes are transmitted without confirming whether the host is ready to receive data. The four status bytes must be consecutive, except for the XOFF code.
 - Since this command is executed after the data is processed in the receive buffer, there may be a time lag between data reception and status transmission.
 - When the printer is disabled by **ESC =** (Select peripheral device), the four status bytes are transmitted whenever the status changes.
 - When using **DLE EOT**, **GS I**, or **GS r**, the status transmitted by these commands and ASB status must be differentiated, according to the procedure in Appendix G, *Transmission Status Identification*.
- The status to be transmitted are as follows:

First byte (printer information)

Bit	Off/On	Hex	Decimal	Status for ASB
0	Off	00	0	Not used. Fixed to Off.
1	Off	00	0	Not used. Fixed to Off.
2	Off	00	0	Drawer kick-out connector pin 3 is LOW.
	On	04	4	Drawer kick-out connector pin 3 is HIGH.
3	Off	00	0	Online.
	On	08	8	Offline.
4	On	10	16	Not used. Fixed to On.
5	Off	00	0	Cover is closed.
	On	20	32	Cover is open.
6	Off	00	0	Paper is not being fed by using the PAPER FEED button.
	On	40	64	Paper is being fed by using the PAPER FEED button.
7	Off	00	0	Not used. Fixed to Off.

Second byte (printer information)

Bit	Off/On	Hex	Decimal	Status for ASB
0	-		-	Undefined.
1	-		-	Undefined.
2	-		-	Undefined.
3	Off	00	0	No autocutter error.
	On	08	8	Autocutter error occurred.
4	Off	00	0	Not used. Fixed to Off.
5	Off	00	0	No unrecoverable error.
	On	20	32	Unrecoverable error occurred.
6	Off	00	0	No automatically recoverable error.
	On	40	64	Automatically recoverable error occurred.
7	Off	00	0	Not used. Fixed to Off.

- Bit 3: If these errors occur due to paper jams or the like, it is possible to recover by correcting the cause of the error and executing **DLE ENQ n** ($1 \leq n \leq 2$). If an error due to a circuit failure (e.g. wire break) occurs, it is impossible to recover.
- Bit 6: When printing is stopped due to high print head temperature until the print head temperature drops sufficiently or when the paper roll cover is open during printing, bit 6 is On.

Third byte (paper sensor information)

Bit	Off/On	Hex	Decimal	Status for ASB
0, 1	Off	00	0	Paper roll near-end sensor: paper adequate.
	On	03	3	Paper roll near-end sensor: paper near end.
2, 3	Off	00	0	Paper roll end sensor: paper present.
	On	0C	12	Paper roll end sensor: paper not present.
4	Off	00	0	Not used. Fixed to Off.
5, 6	-		-	Undefined.
7	Off	00	0	Not used. Fixed to Off.

Fourth byte (paper sensor information)

Bit	Off/On	Hex	Decimal	Status for ASB
0-3	-		-	Undefined.
4	Off	00	0	Not used. Fixed to Off.
5, 6	-		-	Undefined.
7	Off	00	0	Not used. Fixed to Off.

[Default] $n = 0$ when DIP SW 2-1 is off, $n = 2$ when DIP SW 2-1 is on.

[Reference] **DLE EOT**, **GS r**, Appendix G, *Transmission Status Identification*

GS b n

[Name] Turns smoothing mode on/off

[Format] ASCII GS b n

Hex 1D 62 n

Decimal 29 98 n [Range] $0 \leq n \leq 255$

[Description] Turns smoothing mode on or off.

When the LSB of n is 0, smoothing mode is turned off. When the LSB of n is 1, smoothing mode is turned on.

[Details]

- Only the lowest bit of n is valid.
- Smoothing mode is available for built-in, user-defined characters.
- Even if smoothing mode is turned on, smoothing is not performed when either of character width or character height is the normal size.

[Default] $n = 0$

[Reference] **ESC !**, **GS !**

GS f n

[Name] Select font for Human Readable Interpretation (HRI) characters

[Format]	ASCII	GS	f	n
	Hex	1D	66	n
	Decimal	29	102	n

[Range] $n = 0, 1, 48, 49$

[Description] Selects a font for the HRI characters used when printing a bar code. n selects a font from the following table:

n	Font
0, 48	Font A (12 × 24)
1, 49	Font B (9 × 17)

[Details]

- HRI indicates Human Readable Interpretation.
- HRI characters are printed at the position specified by **GS H**.

[Default] $n = 0$

[Reference] **GS H**, **GS k**

GS h n

[Name] Select bar code height

[Format]	ASCII	GS	h	n
	Hex	1D	68	n
	Decimal	29	104	n

[Range] $1 \leq n \leq 255$

[Description] Selects the height of the bar code.

n specifies the number of dots in the vertical direction.

[Default] $n = 162$

[Reference] **GS k**

GS k m d1...dk NUL ,GS k m n d1...dn

[Name] Print bar code

[Format] ASCII GS k m d1...dk NUL

Hex 1D 6B m d1...dk 00

Decimal 29 107 m d1...dk 0

ASCII GS k m n d1...dn

Hex 1D 6B mn d1...dn

Decimal 29 107 m n d1...dn

[Range] $0 \leq m \leq 6$ (k and d depends on the bar code system used)

$65 \leq m \leq 73$ (n and d depends on the bar code system used)

[Description] Selects a bar code system and prints the bar code. m selects a bar code system as follows:

m		Bar Code System	Number of Characters	Remarks
A	0	UPC-A	$11 \leq k \leq 12$	$48 \leq d \leq 57$
	1	UPC-E	$11 \leq k \leq 12$	$48 \leq d \leq 57$
	2	JAN13 (EAN13)	$12 \leq k \leq 13$	$48 \leq d \leq 57$
	3	JAN 8 (EAN8)	$7 \leq k \leq 8$	$48 \leq d \leq 57$
	4	CODE39	$1 \leq k$	$48 \leq d \leq 57, 65 \leq d \leq 90, 32, 36, 37, 43, 45, 46, 47$
	5	ITF	$1 \leq k$ (even number)	$48 \leq d \leq 57$
	6	CODABAR	$1 \leq k$	$48 \leq d \leq 57, 65 \leq d \leq 68, 36, 43, 45, 46, 47, 58$
B	65	UPC-A	$11 \leq n \leq 12$	$48 \leq d \leq 57$
	66	UPC-E	$11 \leq n \leq 12$	$48 \leq d \leq 57$
	67	JAN13 (EAN13)	$12 \leq n \leq 13$	$48 \leq d \leq 57$
	68	JAN 8 (EAN8)	$7 \leq n \leq 8$	$48 \leq d \leq 57$
	69	CODE39	$1 \leq n \leq 255$	$48 \leq d \leq 57, 65 \leq d \leq 90, 32, 36, 37, 43, 45, 46, 47$
	70	ITF	$1 \leq n \leq 255$ (even number)	$48 \leq d \leq 57$
	71	CODABAR	$1 \leq n \leq 255$	$48 \leq d \leq 57, 65 \leq d \leq 68, 36, 43, 45, 46, 47, 58$
	73	CODE128	$2 \leq n \leq 255$	$0 \leq d \leq 127$

[Details for A]

- This command ends with a NUL code.
- When the bar code system used is UPC-A or UPC-E, the printer prints the bar code data after receiving 12 bytes bar code data and processes the following data as normal data.
- When the bar code system used is JAN13 (EAN13), the printer prints the bar code after receiving 13 bytes bar code data and processes the following data as normal data.
- When the bar code system used is JAN8 (EAN8), the printer prints the bar code after receiving 8 bytes bar code data and processes the following data as normal data.
- The number of data for ITF bar code must be even numbers. When an odd number of data is input, the printer ignores the last received data.

[Details for B]

- n indicates the number of bar code data, and the printer processes n bytes from the next character data as bar code data.
- If n is outside of the specified range, the printer stops command processing and processes the following data as normal data.

[Details in standard mode]

- If d is outside of the specified range, the printer only feeds paper and processes the following data as normal data.
- If the horizontal size exceeds printing area, the printer only feeds the paper.
- This command feeds as much paper as is required to print the bar code, regardless of the line spacing specified by **ESC 2** or **ESC 3**.
- This command is enabled only when no data exists in the print buffer. When data exists in the print buffer, the printer processes the data following m as normal data.
- After printing bar code, this command sets the print position to the beginning of the line.
- This command is not affected by print modes (emphasized, double-strike, underline, character size, white/black reverse printing, or 90° rotated character, etc.), except for upside-down printing mode.

[Details in page mode]

- This command develops bar code data in the print buffer, but does not print it. After processing bar code data, this command moves the print position to the right side dot of the bar code.
- If d is out of the specified range, the printer stops command processing and processes the following data as normal data. In this case the data buffer position does not change.
- If bar code width exceeds the printing area, the printer does not print the bar code but moves the data buffer position to the left side out of the printing area.
- Refer to Figure 3.12.3 for bar code data buffer position. When CODE93 ($m = 72$) is used:
- The printer prints an HRI character () as start character at the beginning of the HRI character string.
- The printer prints an HRI character () as a stop character at the end of the HRI character string.

- The printer prints HRI characters (■ + an alphabetic character) as a control character (<00>H to <1F>H and <7F>H):

Control character				Control character			
ASCII	Hex	Decimal	HRI character	ASCII	Hex	Decimal	HRI character
NUL	00	0	■ U	DLE	10	16	■ P
SOH	01	1	■ A	DC1	11	17	■ Q
STX	02	2	■ B	DC2	12	18	■ R
ETX	03	3	■ C	DC3	13	19	■ S
EOT	04	4	■ D	DC4	14	20	■ T
ENQ	05	5	■ E	NAK	15	21	■ U
ACK	06	6	■ F	SYN	16	22	■ V
BEL	07	7	■ G	ETB	17	23	■ W
BS	08	8	■ H	CAN	18	24	■ X
HT	09	9	■ I	EM	19	25	■ Y
LF	0A	10	■ J	SUB	1A	26	■ Z
VT	0B	11	■ K	ESC	1B	27	■ A
FF	0C	12	■ L	FS	1C	28	■ B
CR	0D	13	■ M	GS	1D	29	■ C
SO	0E	14	■ N	RS	1E	30	■ D
SI	0F	15	■ O	US	1F	31	■ E
				DEL	7F	127	■ T

[Example] Printing **GS k** 72 7 67 111 100 101 13 57 51



When CODE128 ($m = 73$) is used:

- Refer to Appendix J for the information of the CODE 128 bar code and its code table.
- When using the CODE 128 in this printer, take the following points into account for data transmission:

The top of the bar code data string must be code set selection character (any of CODE A, CODE B or CODE C) which selects the first code set.

Special characters are defined by combining two characters "{" and one character. The ASCII character "{" is defined by transmitting "{" twice consecutively.

Specific character	Transmit data		
	ASCII	Hex	Decimal
SHIFT	{S	7B, 53	123, 83
CODE A	{A	7B, 41	123, 65
CODE B	{B	7B, 42	123, 66
CODE C	{C	7B, 43	123, 67
FNC1	{1	7B, 31	123, 49
FNC2	{2	7B, 32	123, 50
FNC3	{3	7B, 33	123, 51
FNC4	{4	7B, 34	123, 52
"{"	{{	7B, 7B	123, 123

[Example] Example data for printing "No. 123456"

In this example, the printer first prints "No." using CODE B, then prints the following numbers using CODE C.

GS k 73 10 123 66 78 111 46 123 67 12 34 56



- . • If the top of the bar code data is not the code set selection character, the printer stops command processing and processes the following data as normal data.
 - . • If combination of "{" and the following character does not apply any special character, the printer stops command processing and processes the following data as normal data.
 - . • If the printer receives characters that cannot be used in the special code set, the printer stops command processing and processes the following data as normal data.
 - . • The printer does not print HRI characters that correspond to the shift characters or code set selection characters.
 - . • HRI character for the function character is space.
 - . • HRI characters for the control character (<00>H to <1F>H and <7F>H) are space.
- <Others> Be sure to keep spaces on both right and left sides of a bar code. (Spaces are different depending on the types of the bar code.)

[Reference] **GS H**, **GS f**, **GS h**, **GS w**, Appendix C

GS r n

[Name] Transmit status

[Format] ASCII GS r n
Hex 1D 72 n
Decimal 29 114 n

[Range] n = 1, 2, 49, 50

[Description] Transmits the status specified by n as follows:

n	Function
1, 49	Transmits paper sensor status
2, 50	Transmits drawer kick-out connector status

[Details]

- When using a serial interface

When DTR/DSR control is selected, the printer transmits only 1 byte after confirming the host is ready to receive data (DSR signal is SPACE). If the host computer is not ready to receive data (DSR signal is MARK), the printer waits until the host is ready.

When XON/XOFF control is selected, the printer transmits only 1 byte without confirming the condition of the DSR signal.

- This command is executed when the data in the receive buffer is developed. Therefore, there may be a time lag between receiving this command and transmitting the status, depending on the receive buffer status.

• When Auto Status Back (ASB) is enabled using **GS a**, the status transmitted by **GS r** and the ASB status must be differentiated using the table in Appendix G.

- The status types to be transmitted are shown below:

Paper sensor status (n = 1, 49):

Bit	Off/On	Hex	Decimal	Status for ASB
0, 1	Off	00	0	Paper roll near-end sensor: paper adequate.
	On	03	3	Paper roll near-end sensor: paper near end.
2, 3	Off	00	0	Paper roll end sensor: paper adequate.
	On	(0C)	(12)	Paper roll end sensor: paper near end.
4	Off	00	0	Not used. Fixed to Off.
5, 6	-		-	Undefined.
7	Off	00	0	Not used. Fixed to Off.

Bits 2 and 3: When the paper end sensor detects a paper end, the printer goes offline and does not execute this command. Therefore, bits 2 and 3 do not transmit the status of paper end.

Drawer kick-out connector status ($n = 2, 50$):

Bit	Off/On	Hex	Decimal	Function
0	Off	00	0	Drawer kick-out connector pin 3 is LOW.
	On	01	1	Drawer kick-out connector pin 3 is HIGH.
1-3	-		-	Undefined.
4	Off	00	0	Not used. Fixed to Off.
5, 6	-		-	Undefined.
7	Off	00	0	Not used. Fixed to Off.

[Reference] DLE EOT, GS a, Appendix G

GS v 0 m xL xH yL yH d1....dk

[Name] Print raster bit image

[Format]	ASCII	GS	v	0	m	xL	xH	yL	yH	d1...dk
	Hex	1D	76	30	m	xL	xH	yL	yH	d1...dk
	Decimal	29	118	48	m	xL	xH	yL	yH	d1...dk

[Range] $0 \leq m \leq 3$, $48 \leq m \leq 51$

$0 \leq xL \leq 255$

$0 \leq xH \leq 255$

$0 \leq yL \leq 255$

$0 \leq yH \leq 8$

$0 \leq d \leq 255$

$k = (xL + xH \times 256) \times (yL + yH \times 256) (k \neq 0)$

[Description] Selects Raster bit-image mode. The value of *m* selects the mode, as follows:

<i>m</i>	Mode	Vertical Dot Density	Horizontal Dot Density
0, 48	Normal	203 dpi	203 dpi
1, 49	Double-width	203 dpi	102 dpi
2, 50	Double-height	102 dpi	203 dpi
3, 51	Quadruple	102 dpi	102 dpi

[dpi: dots per 25.4 mm {1"}]

- *xL*, *xH*, select the number of data bytes ($xL+xH \times 256$) in the horizontal direction for the bit image.

- *yL*, *yH*, select the number of data bytes ($yL+yH \times 256$) in the vertical direction for the bit image.

[Details]

- In standard mode, this command is effective only when there is no data in the print buffer.

- This command has no effect in all print modes (character size, emphasized, double-strike, upside-down, underline, white/black reverse printing, etc.) for raster bit image.

- If the printing area width set by **GS L** and **GS W** is less than the minimum width, the printing area is extended to the minimum width only on the line in question. The minimum width means 1 dot in normal ($m=0$, 48) and double-height ($m=2$, 50), 2 dots in double-width ($m=1$, 49) and quadruple ($m=3$, 51) modes.

- Data outside the printing area is read in and discarded on a dot-by-dot basis.

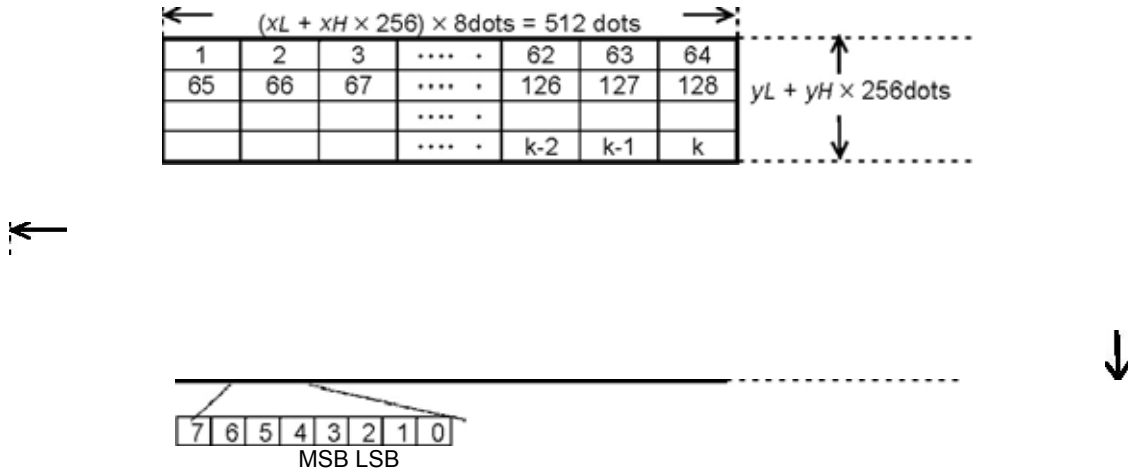
- The position at which subsequent characters are to be printed for raster bit image is specified by **HT** (Horizontal Tab), **ESC \$** (Set absolute print position), **ESC ** (Set relative print position), and **GS L** (Set left margin). If the position at which subsequent characters are to be printed is not a multiple of 8, print speed may decline.

- The **ESC a** (Select justification) setting is also effective on raster bit images.

- When this command is received during macro definition, the printer ends macro definition, and begins performing this command. The definition of this command should be cleared.

- *d* indicates the bit-image data. Set time a bit to 1 prints a dot and setting it to 0 does not print a dot.

[Example] When $xL + xH \times 256 = 64$



GS w n

[Name] Set bar code width

[Format] ASCII GS w n
Hex 1D 77 n
Decimal 29 119 n

[Range] $2 \leq n \leq 6$

[Description] Set the horizontal size of the bar code. n specifies the bar code width as follows:

n	Module Width (mm) for Multi-level Bar Code	Binary-level Bar Code	
		Thin element width (mm)	Thick element width (mm)
2	0.282	0.282	0.706
3	0.423	0.423	1.129
4	0.564	0.564	1.411
5	0.706	0.706	1.834
6	0.847	0.847	2.258

• Multi-level bar codes are as follows: UPC-A, UPC-E, JAN13 (EAN13), JAN8 (EAN8), CODE93, CODE128

• Binary-level bar codes are as follows: CODE39, ITF, CODABAR

[Default] $n = 3$

[Reference] **GS k**

Kanji Control Commands

(for Japanese model, Simplified Chinese model, Traditional Chinese model, and Korean model)

FS ! *n*

[Name] Set print mode(s) for Kanji characters

[Format]	ASCII	FS	!	<i>n</i>
	Hex	1C	21	<i>n</i>
	Decimal	28	33	<i>n</i>

[Range] $0 \leq n \leq 255$

[Description] Sets the print mode for Kanji characters, using *n* as follows:

Bit	Off/On	Hex	Decimal	Function
0	-	-	-	Undefined.
1	-	-	-	Undefined.
2	Off	00	0	Double-width mode is OFF.
	On	04	4	Double-width mode is ON.
3	Off	00	.	Double-height mode is OFF.
	On	08	8	Double-height mode is ON.
4	-	-	-	Undefined.
5	-	-	-	Undefined.
6	-	-	-	Undefined.
7	Off	00	0	Underline mode is OFF.
	On	80	128	Underline mode is ON.

[Notes]

- When both double-width and double-height modes are set (including right-and left-side character spacing), quadruple-size characters are printed.
- The printer can underline all characters (including right-and left-side character spacing), but cannot underline the space set by **HT** and 90° clockwise-rotated characters.
- The thickness of the underline is that specified by **FS -**, regardless of the character size.
- When some of the characters in a line are double or more height, all the characters on the line are aligned at the baseline.
- It is possible to emphasize the Kanji character using **FS W** or **GS !**, the setting of the last received command is effective.
- It is possible to turn under line mode on or off using **FS -**, and the setting of the last received command is effective.

[Default] *n* = 0

[Reference] **FS W**, **GS !**

FS &

[Name] Select Kanji character mode

[Format] ASCII FS &

Hex 1C 26

Decimal 28 38

[Description] Selects Kanji character mode.

[Notes]

- When the Kanji character code system is SHIFT JIS, the printer performs only internal flag operations. Printing is not affected.

[Notes] For Japanese model:

- This command is effective only when the JIS code system is selected.
- When the Kanji character mode is selected, the printer processes all Kanji code for each two bytes.
- Kanji codes are processed in the order of the first byte and second byte.
- Kanji character mode is not selected when the power is turned on.
- Using **FS C**, the Kanji character code system is selected.

For Simplified Chinese/Traditional Chinese/Korean model:

- When the kanji character mode is selected, the printer checks whether the code is for Kanji or not, then processed the first byte and the second byte if the code is for Kanji.
- Kanji codes are processed in the order of the first byte and second byte.
- Kanji character mode is not selected when the power is turned on.
- Kanji codes are processed in the order of the first byte and second byte.

[Reference] **FS -**, **FS .**, **FS C**

FS .

[Name] Cancel Kanji character mode

[Format] ASCII FS .

Hex 1C 2E

Decimal 28 46

[Description] Cancels nKanji character mode.

[Notes] For Japanese model:

- This command is effective only when the JIS code system is selected.
- When the Kanji character mode is not selected, all character codes are processed one byte at a time as ASCII code.
- Kanji character mode is not selected when the power is turned on. For Simplified Chinese/Traditional Chinese/Korean model:
 - When the Kanji character mode is not selected, all character codes are processed one byte at a time as ASCII code.
 - Kanji character mode is selected when the power is turned on.

[Reference] **FS &**, **FS C**

APPENDIX A: MISCELLANEOUS NOTES

A.1 Notes on Printing and Paper Feeding

- 1) Because the TM-T88III series printer is a line printer, it automatically feeds paper after printing the data.

Therefore, when the line spacing for one line is set to a smaller value than the print data, paper may be fed more than the set amount just to print the data.

For example, when the line spacing for one line is set to 10 dots (10/180 inches) and only paper feeding is executed, paper is fed for 10 dots; however, if bit-image characters are printed, paper is fed for 24 dots. (Refer to Table A.1.)

When only rotated characters are printed on one line, paper feeding is executed as shown in Table A.1.

Table A.1 Paper Feeding Amount		Required Paper Feeding Amount (dots)
Normal Characters	Font A Font B Kanji font	24 × number of times enlarged in vertical 17 × number of times enlarged in vertical 24 × number of times enlarged in vertical
Rotated Characters	Font A Font B Kanji font	12 × number of times enlarged in vertical 9 × number of times enlarged in vertical 24 × number of times enlarged in vertical
Bit image (ESC*)		24

- 2) When the printer goes to the standby (data-waiting) state during printing, it temporarily stops printing and feeding paper. When data is transmitted and printing is executed, paper may shift 1 to 3 dots from the print starting position, which especially affects bit-image printing.

- 3) Interval of autocutting operation in the receipt section For driving the auto cutter of the receipt section, take the interval as a minimum of 10 lines of printing or paper feeding (to prevent small pieces of cut paper from dropping into the auto cutter).

A.2 Notes on Printer Installation

- Connect the external power supply to the power supply connector of the printer. Then plug in the external power supply and turn it on if necessary. Be sure not to connect the external power supply with the wrong polarity. If it is connected incorrectly, the internal circuit fuse of the printer may be blown or the external power supply may be damaged.
- The power supply voltage is within the range of $24\text{ V} \pm 7\%$. If the power supply voltage drops to the outside of the range above during printing, the printer stops printing and waits until the voltage returns to normal and then automatically begins printing again. Therefore, printing speed may slow, the print pitch may not be correct, and some dots in some characters may not be printed.
- Both high and low voltage errors are shown in table 3.7.3. The blinking patterns are shown in the table.
- When either a high or low voltage error occurs, turn off the power as soon as possible.

A.3 Other Notes

1) Printer mechanism handling

- Do not pull the paper out when the cover is closed.
- Because the thermal elements of the print head and driver IC are easy to break, do not touch them with any metal objects.
- Since the areas around the print head become very hot during and just after printing, do not touch them.
- Do not use the cover open button except when necessary.
- Do not touch the surface of the print head because dust and dirt can stick to the surface and damage the elements.
- Thermal paper containing Na^+ , K^+ , and Cl^- ions can harm the print head thermal elements. Therefore, be sure to use only the specified paper.
- Label paper cannot be used.

2) Thermal paper handling

- ① Notes on using thermal paper
 - a) Chemicals and oil on thermal paper may cause discoloration and faded printing. Therefore, pay attention to the following:
 - a) Use water paste, starch paste, polyvinyl paste, or CMC paste when gluing thermal paper.
 - b) Volatile organic solvents such as alcohol, ester, and ketone can cause discoloration.
 - c) Some adhesive tapes may cause discoloration or faded printing.
 - d) If thermal paper touches anything which includes phthalic acid ester plasticizer for a long time, it can reduce the image formation ability of the paper and can cause the printed image to fade. Therefore, when storing thermal paper in a card case or sample notebook, be sure to use only products made from polyethylene, polypropylene, or polyester.
 - e) If thermal paper touches diazo copy paper immediately after copying, the printed surface may be discolored.
 - f) Thermal paper must not be stored with the printed surfaces against each other because the printing may be transferred between the surfaces.
 - g) If the surface of thermal paper is scratched with a hard metal object such as a nail, the paper may become discolored.

- ② Notes on thermal paper storage Since color development begins at 70°C {158°F}, thermal paper should be protected from high temperature, humidity, and light, both before and after printing.
- a) Store paper away from high temperature and humidity. Do not store thermal paper near a heater or in enclosed places exposed to direct sunlight.
 - b) Avoid direct light. Extended exposure to direct light may cause discoloration or faded printing.
- 3) Others
- Because this printer uses plated steel, the cutting edges may be subject to rust. However, this does not affect the printer performance.

APPENDIX B: NOTES ON USING THE DRAWER KICK-OUT

CONNECTOR

1) Drawer kick-out connector use conditions (refer to Section 2.2.3, Drawer kick-out connector)
Because drawer specifications differ depending the manufacturer and the part number, make sure that the specifications of the drawer to be used meet the following conditions before connecting it to the drawer kick-out connector. These conditions also apply to any other devices that use the drawer kick-out connector.

Any devices that do not satisfy all the following conditions must not be used.

[Conditions]

- A load must be provided between drawer kick-out connector pins 4 and 2 or between pins 4 and 5. (Operating the printer with incorrectly installed devices voids the warranty.)
- When the drawer open/close signal is used, a switch must be provided between drawer kick-out connector pins 3 and 6. (Connecting devices other than the drawer open/close switch voids the warranty.)
- The resistance of the load must be 24 Ω or more, or the input current must be 1 A or less. (If a device with a resistance of less than 24 Ω or an input current of over 1 A is used, the resulting overcurrent may damage the printer and the device.)
- Be sure to use drawer kick-out connector pin 4 (24 V power output) to drive the device. Never connect any other power supply to the drawer kick-out connector. (Connecting a power supply other than that specified voids the warranty.)

The peak current is 1 A. When energizing the drawer kick-out drive signal, follow the conditions described in 3) of Section 2.2.3, *Drawer kick-out drive signal*.

APPENDIX C: TRANSMISSION STATUS IDENTIFICATION

Because the specified status bits transmitted from the TM-T88III series printer are fixed, the user can confirm the command to which the status belongs, as shown in the following table. When using Auto Status Back (ASB), however, process the consecutive three-byte code (except for XOFF) as ASB data after confirming the first byte of the ASB. Otherwise, the status transmitted by using the **GS r** and the status of the second and following bytes of the ASB cannot be differentiated.

Table G.1 Transmission Status Identification Command & Function	Status Reply
GS 	<0* * 0* * * * >B
GS r	<0* * 0* * * * >B
XON	<00010001>B
XOFF	<00010011>B
DLE EOT	<0* * 1* * 10>B
ASB (1st byte)	<0* * 1* * 00>B
ASB (2nd to 4th bytes)	<0* * 0* * * * >B

APPENDIX D: CODE128 BAR CODE

J.1 Description of the CODE128 Bar Code

In CODE128 bar code system, it is possible to represent 128 ASCII characters and 2-digit numerals using one bar code character that is defined by combining one of the 103 bar code characters and 3 code sets. Each code set is used for representing the following characters:

- . • Code set A: ASCII characters 00H to 5FH
- . • Code set B: ASCII characters 20H to 7FH
- . • Code set C: 2-digit numeral characters using one character (100 numerals from 00 to 99)

The following special characters are also available in CODE128:

- . • SHIFT characters In code set A, the character just after SHIFT is processed as a character for code set B. In code set B, the character just after SHIFT is processed as the character for code set A. SHIFT characters cannot be used in code set C.
- . • Code set selection character (CODE A, CODE B, CODE C)

This character switches the following code set to code set A, B, or C.

- . • Function character (FNC1, FNC2, FNC3, FNC4) The usage of function characters depends on the application software. In code set C, only FNC1 is available.

J.2 Code Tables

Printable characters in code set A

Character	Transmit Data		Character	Transmit Data		Character	Transmit Data			
	Hex			Decimal			Hex	Decimal	Hex	Decimal
NUL	00	0	(	28	40	P		50		80
SOH	01	1	)	29	41	Q		51		81
STX	02	2	*	2A	42	R		52		82
ETX	03	3	+	2B	43	S		53		83
EOT	04	4	,	2C	44	T		54		84
ENQ	05	5	-	2D	45	U		55		85
ACK	06	6	.	2E	46	V		56		86
BEL	07	7	/	2F	47	W		57		87
BS	08	8	0	30	48	X		58		88
HT	09	9	1	31	49	Y		59		89
LF	0A	10	2	32	50	Z		5A		90
VT	0B	11	3	33	51	[		5B		91
FF	0C	12	4	34	52	\		5C		92
CR	0D	13	5	35	53	]		5D		93
SO	0E	14	6	36	54	^		5E		94
SI	0F	15	7	37	55	—		5F		95
DLE	10	16	8	38	56	FNC1		7B,31		123,49
DC1	11	17	9	39	57	FNC2		7B,32		123,50
DC2	12	18	:	3A	58	FNC3		7B,33		123,51
DC3	13	19	;	3B	59	FNC4		7B,34		123,52
DC4	14	20	<	3C	60	SHIFT		7B,53		123,83
NAK	15	21	=	3D	61	CODE B		7B,42		123,66
SYN	16	22	>	3E	62	CODE C		7B,43		123,67
ETB	17	23	?	3F	63					
CAN	18	24	@	40	64					
EM	19	25	A	41	65					
SUB	1A	26	B	42	66					
ESC	1B	27	C	43	67					
FS	1C	28	D	44	68					
GS	1D	29	E	45	69					
RS	1E	30	F	46	70					
US	1F	31	G	47	71					
SP	20	32	H	48	72					
!	21	33	I	49	73					
"	22	34	J	4A	74					
#	23	35	K	4B	75					
\$	24	36	L	4C	76					
%	25	37	M	4D	77					
&	26	38	N	4E	78					
'	27	39	O	4F	79					

Printable characters in code set B

Character	Transmit Data		Character	Transmit Data		Character	Transmit Data			
	Hex			Decimal			Hex	Decimal	Hex	Decimal
SP	20	32	H	48	72	p		70		112
!	21	33	I	49	73	q		71		113
"	22	34	J	4A	74	r		72		114
#	23	35	K	4B	75	s		73		115
\$	24	36	L	4C	76	t		74		116
%	25	37	M	4D	77	u		75		117
&	26	38	N	4E	78	v		76		118
'	27	39	O	4F	79	w		77		119
(	28	40	P	50	80	x		78		120
)	29	41	Q	51	81	y		79		121
*	2A	42	R	52	82	z		7A		122
+	2B	43	S	53	83	{	7B,7B			123,123
,	2C	44	T	54	84			7C		124
-	2D	45	U	55	85	}		7D		125
.	2E	46	V	56	86	—		7E		126
/	2F	47	W	57	87	DEL		7F		127
0	30	48	X	58	88	FNC1		7B,31		123,49
1	31	49	Y	59	89	FNC2		7B,32		123,50
2	32	50	Z	5A	90	FNC3		7B,33		123,51
3	33	51	[	5B	91	FNC4		7B,34		123,52
4	34	52	\	5C	92	SHIFT		7B,53		123,83
5	35	53	]	5D	93	CODE A		7B,41		123,66
6	36	54	^	5E	94	CODE C		7B,43		123,67
7	37	55	—	5F	95					
8	38	56	`	60	96					
9	39	57	a	61	97					
:	3A	58	b	62	98					
;	3B	59	c	63	99					
<	3C	60	d	64	100					
=	3D	61	e	65	101					
>	3E	62	f	66	102					
?	3F	63	g	67	103					
@	40	64	h	68	104					
A	41	65	i	69	105					
B	42	66	j	6A	106					
C	43	67	k	6B	107					
D	44	68	l	6C	108					
E	45	69	m	6D	109					
F	46	70	n	6E	110					
G	47	71	o	6F	111					

Printable characters in code set C

Character	Transmit Data		Character	Transmit Data		Character	Transmit Data			
	Hex			Decimal			Hex	Decimal	Hex	Decimal
00	00	0	40	28	40	80		50		80
01	01	1	41	29	41	81		51		81
02	02	2	42	2A	42	82		52		82
03	03	3	43	2B	43	83		53		83
04	04	4	44	2C	44	84		54		84
05	05	5	45	2D	45	85		55		85
06	06	6	46	2E	46	86		56		86
07	07	7	47	2F	47	87		57		87
08	08	8	48	30	48	88		58		88
09	09	9	49	31	49	89		59		89
10	0A	10	50	32	50	90		5A		90
11	0B	11	51	33	51	91		5B		91
12	0C	12	52	34	52	92		5C		92
13	0D	13	53	35	53	93		5D		93
14	0E	14	54	36	54	94		5E		94
15	0F	15	55	37	55	95		5F		95
16	10	16	56	38	56	96		60		96
17	11	17	57	39	57	97		61		97
18	12	18	58	3A	58	98		62		98
19	13	19	59	3B	59	99		63		99
20	14	20	60	3C	60	FNC1		7B,31		123,49
21	15	21	61	3D	61	CODE A		7B,41		123,65
22	16	22	62	3E	62	CODE B		7B,42		123,66
23	17	23	63	3F	63					
24	18	24	64	40	64					
25	19	25	65	41	65					
26	1A	26	66	42	66					
27	1B	27	67	43	67					
28	1C	28	68	44	68					
29	1D	29	69	45	69					
30	1E	30	70	46	70					
31	1F	31	71	47	71					
32	20	32	72	48	72					
33	21	33	73	49	73					
34	22	34	74	4A	74					
35	23	35	75	4B	75					
36	24	36	76	4C	76					
37	25	37	77	4D	77					
38	26	38	78	4E	78					
39	27	39	79	4F	79					