S-Class™

DTPL Programmer's Manual ■ ■ ■

right by our customers. ■ ■ ■

datamax·o'neil

Information in this manual is subject to change without notice and does not represent a commitment on the part of Datamax-O'Neil Corporation. No part of this manual may be reproduced or transmitted in any form or by any means, for any purpose other than the purchaser's personal use, without the expressed written permission of Datamax-O'Neil Corporation.

Part Number: 88-2246-01
Revision: B

Contents

Introduction

DTPL Command Sequences

DTPL Status Commands

DTPL File Commands

DTPL Print Commands

DTPL Special Commands

DTPL Downloading Commands

Barcodes

Appendix A

Introduction

1.0   Manual Overview

This manual is designed for users who wish to create their own label production software. Operators without programming experience may prefer to use a label-creation software package.

This manual explains in detail the Datamax-O'Neil Ticket Programming Language (DTPL), how to write programs that will enable Datamax-O'Neil Ticket printers to create ticket formats (designs), and allow the user to control the operation of the printer. Ticket formats that have been created can be printed, stored, and edited.

1.1   Ticket Orientation

Each ticket is made up of a matrix of dot rows and dot columns. The starting position on each ticket is row 0, column 0 (0,0). This is the left top-most corner of a ticket. The end of the ticket is the bottom right-hand corner. Data can be printed anywhere on the ticket by specifying a row and column location.

Characters can be rotated in any of the four directions:
Non-rotated (NR) characters are printed across the ticket from left to right.
Rotated right (RR) characters are printed down the ticket from top to bottom.
Rotated upside down (RU) characters are printed across the ticket from right to left
Rotated left (RL) characters are printed up the ticket from bottom to the top.

1.2   Inverted Characters

An EI (enable inversion) command turns on the inverted mode. All of the following data (except bar codes) will be inverted until a DI (disable inversion) command is sent.

A black border will be added around the characters to improve its readability. Therefore, an inverted character is slightly larger than a normal character. This should be remembered when positioning characters beneath inverted characters with row/column commands.

1.3   Bar Codes

The following highlights some key points on printing barcodes:

➢ All available barcodes (Code 39, Interleaved 2of5, EAN13, EAN8, UPC, USS-Codabar, and Code 128, can be printed via command codes. Barcodes can be printed in either ladder or picket fence orientations. Ladder bar codes can be printed top to bottom (RR) or bottom to top (RL). Picket fence bar codes can be printed left to right (NR) or right to left (RU).

➢ All bar codes should be selected by specifying the starting address, bar code size, orientation and type of bar code. Most bar codes are built using bars 8 dots high and 1 dot wide. The height of the bar can be changed in units of 8 using the bar code size command.

➢ All bar codes can be expanded from their normal bar width of one dot by using the expanded (X) command. This command does not affect the height of the bar code.

➢ A human readable interpretation line can also be selected by sending a BI (bar code interpretation) command.

For more information on bar codes see Section 8.0

1.4   Graphics

Graphics mode allows the user to turn on or off any dot on a ticket. Using this mode you can create your own images, shapes or logos. Each graphic character is one byte of data. Each dot can be positioned by using the same row/column commands.

NOTE: The host to printer interface must be configured for eight bit data length in order to use dot addressable graphics.

DTPL Command Sequences

2.0   Introduction

The printer can accept a wide variety of commands to control the printing of data. A command sequence performs a unique function and many different sequences can be sent for each string to be printed.

A command is distinguished from text by the < > characters. Any data sent between these markers is interpreted as command data. The field data (to be printed on the ticket) is sent with no markers. Every command sequence must be bracketed with the < > characters, (ex. <HW2,2><RC10,30>).

Command	Format	Description
ASCII Graphics Command	<g#>ASCII high byte1,ASCII low byte1 ... byte#	Sets the printer to use ASCII characters instead of straight decimal representations of the data.
Bar Code Expanded Command	<X2>	Expands the width of a bar code by 'X' dots. 9 is the largest expansion allowed.
Bar Code Interpretation Command	<BI>	Allows the bar code interpretation (human readable code) to be printed underneath the bar code. The command is only active for the bar code immediately after it.
Bar Code Ratio Adjust Command	<AXB#>string	Expands interleaved 2of5 and 3of9 barcodes from 2:1 to 3:1 ratio.
Bar Code Select Command	<AB#>string or <aB#>string	Selects the bar code type and size: A= U for UPC and EAN8 A= E for EAN-13 A= N (for three of nine) A= F (for interleaved two of five) A= C (for USS-CODABAR) A= O (for CODE 128) B= P (for picket-fence) B= L (for ladder) # = unit size of bar code
Boxsize Command	<BSx,y>	Sets the size of frame which printed characters should be printed. x=Width and y=Height
Clear Buffer Command	<CB>	This command will clear the printer's buffer.
Delete Permanent Length Command	<dpl>	This command re-enables the automatic ticket measuring function of the printer after power up. This command clears the current printing length and ticket length and recalibrates new values.

Font Size Command	<Fx>	This command sets the font size. The defaults is F3. x= 1 for Font1 characters (5x7) 2 for Font2 characters (8x16) 3 for OCRB (17x31) 4 for OCRA (5x9) 6 for large OCRB (30x52) 7 for OCRA (15x29) 8 for Courier (20x40)(20x33) 9 for small OCRB (13x20) 10 for Prestige (25x41) 11 for Script (25x49) 12 for Orator (46x91) 13 for Courier (20x40)(20x42)
Graphics Command	<G>byte1,byte2,byte3,byte4,byte5,byte6,byte7 or <G#>byte1,byte2...byte#	Sets the printer to Graphics Mode and sends graphic data to the printer.
Height/Width Command	<HWx,y>	Multiplies the normal character height by x=Width and y=Height
Printing Length Command	<PL#>	Changes the normal printing length to a user defined unit length. Each unit equals .0098" or 2 dots
Permanent Printing Length Command	<pl#>	Changes the normal printing length to a user defined unit length. Each unit equals .0098" or 2 dots and saves the value in the printer's Flash memory.
Permanent Ticket Length Command	<tl#>	This command should only be used if the ticket length is greater than the printing length. This value is stored in the printer's Flash memory.
Repeat Command	<RE#>	Allows the printing of any number (up to 9999) tickets without re-transmitting the data.
Rotation Command	<NR> No rotation <RR> Rotate right (+90) <RU> Rotate upside down (+180) <RL> Rotate left (+270 or - 90)	This command sets the rotation mode for all the following text data.
Row/Column Command	<RCx,y>	This command positions the character at the row (x) and column (y).

DTPL Status Commands

3.0   Introduction

The status-enabled function must be set to activate these commands.

Command	Format	Description
ASCII Status	<S6> or <s6>	This command should be used when the host can not handle non-ASCII characters. All status information, including the xon/xoff, will have 30h added to them to convert them to an ASCII value.
Clear Permanent Status Commands	<cs>	This command clears all permanent status commands from the Flash memory.
Delayed Status Request	<S3> or <s3>	The printer will return an ack (6) status byte after printing the last ticket in a run instead of after each ticket.
Delete Parking Ticket Command	<dpt>	Deletes the permanent parking ticket command <pt> and returns the printer to the normal mode of operation.
Diagnostic Mode Command	<DM>	Sets the printer to diagnostic mode.
Disable Inverted Print Mode Command	<DI>	Disables inverted print mode.
Disable Shading	<DS>	Stops the shading of the data.
Disable Test Ticket Acknowledge Command	<dta>	Returns the printer to the normal test ticket mode in which no ack character is sent.
Download Space Available Status	<S7>	Returns the amount of available space left in the download memory area of the printer as an 8 digit hexadecimal count.
Draw Box Command	<BXx,y>	Draws a box "x" dot rows tall and "y" dot columns wide.
Draw Horizontal Line Command	<HXx>	Draws a horizontal line (one dot wide) "x" dots long.
Draw Vertical Line Command	<VXx>	Draws a vertical line (one dot wide) "x" dots long.
Enable Inverted Print Mode Command	<EI>	Enables inverted print mode (white on black printing).
Enable Shading	<ES>	Shade of all the following data until disabled
Enable Test Ticket Acknowledge Command	<ta>	The printer will return an ack character (5) after each test ticket printed.
Expanded Character Mode Disable Command	<xd>	Sets the printer to the normal default status.
Expanded Character Mode Enable Command	<xe>	Enables the printer to print all values over 127 provided that they have modified the font data to have valid bitmaps for those values.
Line Thickness Command	<LT#>	This command is used in conjunction with the line and box drawing commands. It allows the user to change the thickness of the lines being drawn from their normal default thickness of one dot.
Load Ticket Count Command	<TC1234567>	Allows the user to pre-load the printer's seven digit ticket count. It must contain all seven digits –a count of 5 would be sent as <TC0000005>.

Command	Format	Description
No Status	<S5> or <s5>	Disables the transmission of all status information, except for x-on/off information.
Parking Ticket Command	<PT> or <pt>	Reverses the ticket to the print position after the last ticket in a group has been printed.
Partial ASCII Status	<S8> or <s8>	All status information, except for a valid xon/xoff, will have 30h added to them to convert them to an ASCII value.
Pcx File Being Sent Command	<pcx>	Notifies the printer that a PCX image file is being sent to the printer.
Print Downloadable Font Command	<SF#>	Use this font command to specify the desired font.
Print Downloadable Logo Command	<LD#>	The Printer prints one of its customer-downloaded logos on the ticket.
Print Intensity	<lve#>	Adjusts the print intensity at a given speed setting. The # value may range from –5 to +5.
Print Resident Logo Command	<LO#>	Causes the Printer to print any one of its factory pre-loaded logos on the ticket.
Print Ticket Count Command	<PC>	Prints the total amount of tickets printed on that printer.
Prom Type And Ticket Count Status Request	<S2>	The printer will respond with a seven-digit ticket count followed by the software level of the printer.
Purge Printer Of Remaining Tickets Command	<PP>	In this mode, when the printer runs out of tickets it will purge all remaining ticket information. It will also reset the ticket count to zero.
Scale Down Command	<SD#>	Fonts will be divided by the # indicated in the scale down command.
Shade Pattern #	<PA#>	The number sent is the pattern that you want to shade with. Pattern # 0 - white 13 - light medium fine dot pattern 1 - very light course dot pattern 14 - medium fine dot pattern 2 - light course dot pattern 15 - dark - medium fine dot pattern 3 - light - medium course dot pattern 16 - dark fine dot pattern 4 - medium course dot pattern 17 - open 5 - dark - medium course dot pattern 18 - open 6 - dark course dot pattern 19 - black 7 - open 20 - vertical lines 8 - open 21 - horizontal lines 9 - black 22 - forward diagonal lines 10 - white 23 - backward diagonal lines 11 - very light fine dot pattern 24 - square grid 12 - light fine dot pattern 25 - diagonal grid
Shade Pattern In Background	<PAB>	Sets the shading to occur in the background.
Shade Pattern In Foreground	<PAF>	Sets the shading to occur in the foreground.
Starting Point Command	<SP#,#>	Assigns the starting location of the logo.
Status Request	<S1>	Instructs the printer to respond with a one byte status message.
Test Button Disabled Command	<td>	Disables the test button on the printer.
Test Button Enabled Command	<te>	Enables the test button on the printer.

DTPL File Commands

4.0   Introduction

The printer supports three modes of file storage:

Resident: Files are stored in EPROM memory by the printer.
Permanent: Files are stored in Flash memory by the user.
Temporary: Files are stored in RAM.

All files downloaded to the printer are initially stored as permanent files. The storage mode can be changed with one of the following DTPL commands:

Default Permanent file - <pf>
Default Temporary file - <tf>
Permanent file - <PF>
Temporary file - <TF>

The lower case storage mode commands change the printer's default mode, while the upper case commands modify the printer's file storage mode until modified by the next storage mode command.

RESIDENT FILES

Resident fonts are printed with the <F#> command and resident logos are printed with the <LO#> command. Resident fonts can't be removed. Resident files are usually only factory installed.

PERMANENT AND TEMPORARY FILES

The printer automatically assigns a sequential ID# to all permanent and temporary files unless the files are preceded with a valid <ID#> command. The first two soft fonts loaded would be referenced as <SF1> and <SF2>, respectively. The first two logos loaded would be referenced as <LD1> and <LD2>, respectively. Permanent files are stored in flash and therefore will be saved if the printer is turned off. Temporary files are stored in ram and will be lost if the printer is turned off.

The <ID#> command is used to assign an ID number to soft fonts and logos.

The delete file command <DF#> is used to delete permanent and temporary files.
<DF#> command format:

1 - delete all permanent and temporary files.
2 - delete all temporary files.
3 - delete all permanent and temporary soft fonts.
4 - delete all temporary soft fonts.
5 - delete all permanent and temporary logo files.
6 - delete all temporary logo files.
7 - delete individual soft font file.
8 - delete individual logo file.

DTPL Print Commands

5.0   Introduction

The following table lists the printer's various print commands.

Command	Format	Description
Print / Cut Ticket	<p>	The printer will cut the ticket after printing if it has a cutter.
Print / No Cut Ticket	<q>	The printer will not cut the ticket after printing even if it has a cutter.
Print Ticket And Eject	<z>	The printer will eject the ticket after the ticket is cut.
Print / Cut (Hold Ticket Image)	<h>	Allows the user to update a number of fields on the ticket without re-transmitting all of the data. When this command is used, the printer will hold the print image in memory. Only text and bar codes can be updated on a 'held' ticket.
Print / No Cut (Hold Ticket Image)	<r>	The ticket is not cut until a normal print command (<p> or FF) is sent.

DTPL Special Commands

6.0 Introduction

The following commands are to be transmitted independently (without the < or > characters).

Command	Format	Description
Normal Print / Cut Command	0CH (FF)	Prints and cuts the ticket.
Print / No Cut	1DH	Causes the printer to print a ticket without cutting.
Load Downloadable Logo	ESC<RC0,0><G#>(BYTE1 - BYTE#)<RC#,#><G#>(BYTES)...ESC	Allows the user to store up to 128K bytes of logos in the Printer's memory. Once stored, the logos can be accessed via a simple command.
Clear Downloadable Storage Area	ESC c	Clears the download logo and font pointers so that new information can be downloaded to the printer at the beginning of memory.

DTPL Downloading Commands

7.0   Downloading Commands

Logos can originate in one of two manners. They can be permanently stored in the printer's memory before leaving the factory (<LO#> command) or the customer can download them directly (<LD#> command). If the printer is in permanent file mode then all logos downloaded by the user will be automatically stored in Flash. They will still be available even after the printer is turned off.

RESIDENT FACTORY LOGOS

To print a factory logo, you could send the following:
<SP60,170><LO1>
The above command will print the first factory loaded logo locating it at row/column position 60,170.

NOTE: Factory logos are a customer-specified option and are not present on most printers.

DOWNLOADABLE LOGOS

The printer is capable of receiving downloaded logo data and recalling it throughout the day. The download logo data must be in either the DTPL image format described below or the PCX format.

DTPL IMAGE FORMAT

This data is comprised mostly of DTPL graphics commands. The downloaded data must be sent in strict accordance with the following rules.

The logo should be drawn such that the left-topmost corner is considered to be position 0,0. To enter download mode, send the following:

ESC
<RC0,0>
<G#>byte 1,byte 2, ... byte #
<RCx,y> or CR
<G#>byte 1,byte 2, ... byte #
.
.
ESC

All download logo data is bracketed by ESC characters. Following the ESC, the printer expects to receive a row/column command (preferably <RC0,0>). The <G#> tells the printer how many bytes of logo data are to follow. The following # bytes should be sent without any commas. The commas are used for clarity in this example.

The above routine should be repeated for each line of logo data. For the remaining lines, a CR should be used in place of the row/column command if the data is to start at the beginning of the next line. If you use carriage returns, the logo can be expanded simply by using the <HW#,#> command. Each carriage return will move the next line down 8 dots. If you use row/column commands to position each line of logo data, you can't expand the logo.

To load additional logos, repeat the above procedure for each logo. The logos will automatically be assigned the next consecutive number unless the <ID#> command is used. The printer will accept a maximum of 128k bytes of downloadable data.

NOTE: The printer's total capacity of downloadable space is for both logos and fonts.

PRINT DOWNLOADED LOGOS

To print a downloaded logo #2 starting at row/column position 50,120 send:
<SP50,120><LD2>

DOWNLOADING IN ASCII FORMAT

Downloading of logos can be done in ASCII format just like ASCII graphics. It follows all of the above rules except that a small g is used instead of a capital G and the bytes of data are represented as ASCII characters not decimal.

DOWNLOADING PCX SUPPLEMENT

PCX files are a commonly found format used by image and paint programs. These files can be downloaded directly as is to the printer as long as they are preceded with a small DTPL string. The only restriction on the PCX file is that it must be saved in the 1-bit format. This is the normal format for non-color images. The PCX file can be downloaded to the printer for use later on as a logo or it can be sent as a PCX graphics file to be printed immediately. To print the PCX file immediately, send the following command string:

<SP#,#><pcx><G#>pcx bytes.

The pcx must be in lowercase letters. The <SP#,#> command positions the image. If no starting point is sent, the image will start at point 0,0. The # in the G command is equal to the number of bytes in the entire PCX file.

After the <G#> you must send the actual PCX file. There must not be any extra characters sent! For example, if the PCX file contained 3500 bytes you would send a <G3500> command followed by the 3500 bytes.

To download the PCX file for use later on as a logo, follow the same procedure as above but send an esc character (27d) both before and after the PCX data stream. esc<pcx><G#>pcx bytes esc.

This image can then be printed using the normal logo printing commands like <SP20,20><LD1><p>. All PCX images can be rotated, multiplied and scaled just like any DTPL font.

PCX VS DTPL IMAGE FORMAT

The printer handles both 1-bit PCX files and DTPL image files. PCX files take up less room in memory than the corresponding DTPL image. Therefore, more logos can fit in memory if they are in PCX format than in the DTPL format. However, since the PCX files are saved in compressed form they must be decompressed and converted to the DTPL Image format by the printer before the image is printed. Because of this internal converting, it takes a little longer to print a PCX image. For most images, the difference in printing speed is insignificant.

DTPL TEXT LOGO (MACRO) SUPPLEMENT

The printer can store a string of DTPL commands (a macro) in memory as if they were a downloaded logo image. These commands could then be used later on to print a ticket by using a print logo command.

However, instead of printing a logo image it will print a ticket according to the DTPL commands previously sent. This is a handy feature when most of the tickets have the same format and only a few lines are different. It is also useful in cutting down the communication time needed to print each ticket. In order for the DTPL commands to be stored in memory and not be acted on immediately, you must bracket the DTPL string with esc(27d) characters. The bracketed DTPL string is then considered an DTPL logo.

Barcodes

8.0   Barcodes

UPC

UPC (version A) is a numeric only code which contains a left hand border character, 6 left hand characters, a center character, 6 right hand characters and a right border character. The letter U is used to select UPC bar code. The border and center characters are defined as follows:

Left Border J
Center K
Right Border L

A typical data stream for printing UPC ladder bar code is as follows:

"<RC0,70><X2><UL5>J501234K567890L"

The following data will generate a 5 unit wide (40 dots) expanded bar code. The bar code will represent the numbers 501234 and 567890 separated by the guard markers. It will start in row 0 and column 70 and build down and towards the left. There will be no interpretation printed.

A typical data stream for printing UPC picket fence bar code with interpretation is as follows

"<RC0,70><X2><BI><UP5>J501234K567890L"

EAN8 - This code is really an 8 digit UPC code. A typical EAN8 ladder code follows:

"<RC0,70><X2><UL5>J1234K5678L"

The same bar code printed in the opposite direction would be as follows:

"<RL><RC200,70><X2><uL5>J1234K5678L"

I 2 OF 5

Interleaved 2 of 5 bar code is a numeric only bar code. All I 2 of 5 bar codes must contain an even number of characters and are bracketed by a stop and start character. The character is the colon (:). The letter F is used to select interleaved two of five bar code. Note: this bar code can be printed in either a 2:1 or 3:1 wide to narrow ratio. The following are 2:1 ratio commands (the default value).

A typical picket fence bar code would be sent as follows:

"<RC0,10><X2><FP3>:123456:"

The above prints a 3 unit high (24 dots) bar code starting at row 0 column 10. The bar code will extend down and to the right from the initial row and column position.

A typical ladder orientation bar code with interpretation and a default width of 4 would be sent as follows.

"<RC0,70><FL>:123456:"

An expanded (doubled) version of the above bar code would be as follows:

"<RC0,70><FL><X2>:123456:"

A 3:1 ratio of the above expanded (doubled) version would be as follows:

"<RC0,70><FXL><X2>:123456:"

EAN13

EAN13 is a numeric only bar code. All EAN13 codes must contain a variable parity bit followed by a front guard character (J), 6 left-hand characters, a center pattern (K), 6 right-hand characters and an ending guard pattern (L). The first (parity) bit determines the parity of the left-hand characters. The last bit in the right-hand side is the check-digit. The firmware automatically recalculates this value after transmission. The letter E is used to select EAN13 bar code.

A typical EAN13 ladder bar code sequence would look like the following:

"<RC0,70><EL5><BI>9J014561K780128L"

The above command line would generate a 5 unit wide bar code starting on row 0,column 70. The BI command causes the interpretation to be printed with the bar code.

A typical expanded EAN13 picket fence bar code with no interpretation would be as follows:

"<RC0,10><X2><EP3>9J014561K780128L"

CODE 39

Code 39 is an alphanumeric bar code. All code 39 data must be bracketed by an asterisk (*) on both sides. The letter N is used to select three of nine bar code. Note: this bar code can be printed in either a 2:1 or 3:1 wide to narrow ratio. The following are 2:1 ratio commands (the default value).

A typical ladder code 39 bar code would be sent as follows:

"<RC0,70><NL3>*CODE39*"

This would result in a 3 unit wide bar code starting on row 0, column 70. No interpretation is printed.

A typical picket fence code 39 would be as follows:

"<RC0,10><NP5><BI>*CODE39*"

This code starts at row 0, column 10. The interpretation is included.

To print the above bar code in a 3:1 ratio you would send the following:

"<RC0,10><NXP5><BI>*CODE39*"

USS-CODABAR

USS-CODABAR is a numeric bar code with 6 special characters (-$:/.+) and 4 start/stop characters (A,B,C,D). A start and stop character must bracket the data sent. The letter C is used to select USS-CODABAR bar code.

A typical data stream for a picket fence codabar bar code with interpretation starting at row 0,column 110 is as follows:

"<RC0,110><CP><BI>A123456B"

A expanded ladder version of the above would be as follows:

"<RC0,110><X2><CL><BI>A123456B"

CODE 128

Code 128 is an alphanumeric bar code. All code 128 data must be bracketed by a caret (^) on both sides. The letter O is used to select one twenty eight bar code. Shift characters and check digits are automatically calculated by the Printer.

A typical ladder code 128 bar code would be sent as follows:

"<RC0,70><OL3>^CODE128^"

This would result in a 3 unit wide bar code starting on row 0, column 70. No interpretation is printed.

A typical expanded picket fence code 128 would be as follows:

"<RC0,10><X2><OP5><BI>^CODE128^"

This code starts at row 0, column 10. The interpretation is included.

Appendix A

ASCII Control Chart

	Char	Dec	Hex	Char	Dec	Hex	Char	Dec	Hex	Char	Dec	Hex
Ctrl @	NUL	0	00		32	20	@	64	40	`	96	60
Ctrl A	SOH	1	01	!	33	21	A	65	41	a	97	61
Ctrl B	STX	2	02	"	34	22	B	66	42	b	98	62
Ctrl C	EXT	3	03	#	35	23	C	67	43	c	99	63
Ctrl D	EOT	4	04	$	36	24	D	68	44	d	100	64
Ctrl E	ENQ	5	05	%	37	25	E	69	45	e	101	65
Ctrl F	ACK	6	06	&	38	26	F	70	46	f	102	66
Ctrl G	BEL	7	07	Ô	39	27	G	71	47	g	103	67
Ctrl H	BS	8	08	(	40	28	H	72	48	h	104	68
Ctrl I	HT	9	09	)	41	29	I	73	49	i	105	69
Ctrl J	LF	10	0A	*	42	2A	J	74	4A	j	106	6A
Ctrl K	VT	11	0B	+	43	2B	K	75	4B	k	107	6B
Ctrl L	FF	12	0C	,	44	2C	L	76	4C	l	108	6C
Ctrl M	CR	13	0D	-	45	2D	M	77	4D	m	109	6D
Ctrl N	SO	14	0E	.	46	2E	N	78	4E	n	110	6E
Ctrl O	SI	15	0F	/	47	2F	O	79	4F	o	111	6F
Ctrl P	DLE	16	10	0	48	30	P	80	50	p	112	70
Ctrl Q	DC1	17	11	1	49	31	Q	81	51	q	113	71
Ctrl R	DC2	18	12	2	50	32	R	82	52	r	114	72
Ctrl S	DC3	19	13	3	51	33	S	83	53	s	115	73
Ctrl T	DC4	20	14	4	52	34	T	84	54	t	116	74
Ctrl U	NAK	21	15	5	53	35	U	85	55	u	117	75
Ctrl V	SYN	22	16	6	54	36	V	86	56	v	118	76
Ctrl W	ETB	23	17	7	55	37	W	87	57	w	119	77
Ctrl X	CAN	24	18	8	56	38	X	88	58	x	120	78
Ctrl Y	EM	25	19	9	57	39	Y	89	59	y	121	79
Ctrl Z	SUB	26	1A	:	58	3A	Z	90	5A	z	122	7A
Ctrl [	ESC	27	1B	;	59	3B	[	91	5B	{	123	7B
Ctrl \	FS	28	1C	<	60	3C	\	92	5C	|	124	7C
Ctrl]	GS	29	1D	=	61	3D	]	93	5D	}	125	7D
Ctrl ^	RS	30	1E	>	62	3E	^	94	5E	~	126	7E
Ctrl _	US	31	1F	?	63	3F	_	95	5F		127	7F

(Continued next page)

ASCII Control Chart   (concluded)

Char	Dec	Hex	Char	Dec	Hex	Char	Dec	Hex	Char	Dec	Hex
Ç	128	80	á	160	A0		192	C0	Ó	224	E0
ü	129	81	í	161	A1		193	C1	ß	225	E1
é	130	82	ó	162	A2		194	C2	Ô	226	E2
â	131	83	ú	163	A3		195	C3	Ò	227	E3
ä	132	84	ñ	164	A4		196	C4	õ	228	E4
à	133	85	Ñ	165	A5		197	C5	Õ	229	E5
å	134	86	ª	166	A6	ã	198	C6	µ	230	E6
ç	135	87	°	167	A7	Ã	199	C7	þ	231	E7
ê	136	88	¿	168	A8		200	C8	Þ	232	E8
ë	137	89	®	169	A9		201	C9	Ú	233	E9
è	138	8A		170	AA		202	CA	Û	234	EA
ï	139	8B	1/2	171	AB		203	CB	Ù	235	EB
î	140	8C	1/4	172	AC		204	CC	ý	236	EC
ì	141	8D	¡	173	AD		205	CD	Ý	237	ED
Ä	142	8E		174	AE		206	CE		238	EE
Å	143	8F	¯	175	AF		207	CF		239	EF
É	144	90		176	B0	ð	208	D0		240	F0
æ	145	91		177	B1	Đ	209	D1	±	241	F1
Æ	146	92	²	178	B2	Ê	210	D2		242	F2
ô	147	93	³	179	B3	Ë	211	D3	3/4	243	F3
ö	148	94	´	180	B4	È	212	D4		244	F4
ò	149	95	Á	181	B5		213	D5		245	F5
û	150	96	Â	182	B6	Í	214	D6	÷	246	F6
ù	151	97	À	183	B7	Î	215	D7	¸	247	F7
ÿ	152	98	©	184	B8	Ï	216	D8	°	248	F8
Ö	153	99	¹	185	B9		217	D9	¨	249	F9
Ü	154	9A		186	BA		218	DA	·	250	FA
ø	155	9B	»	187	BB		219	DB		251	FB
£	156	9C		188	BC		220	DC		252	FC
Ø	157	9D	¢	189	BD		221	DD		253	FD
x	158	9E	¥	190	BE	Ì	222	DE		254	FE
ƒ	159	9F		191	BF		223	DF	€	255	FF

☑**Notes:** For the hardware handshake XON/XOFF commands:
  XON = Ctrl Q (DC1)
  XOFF = Ctrl S (DC3)