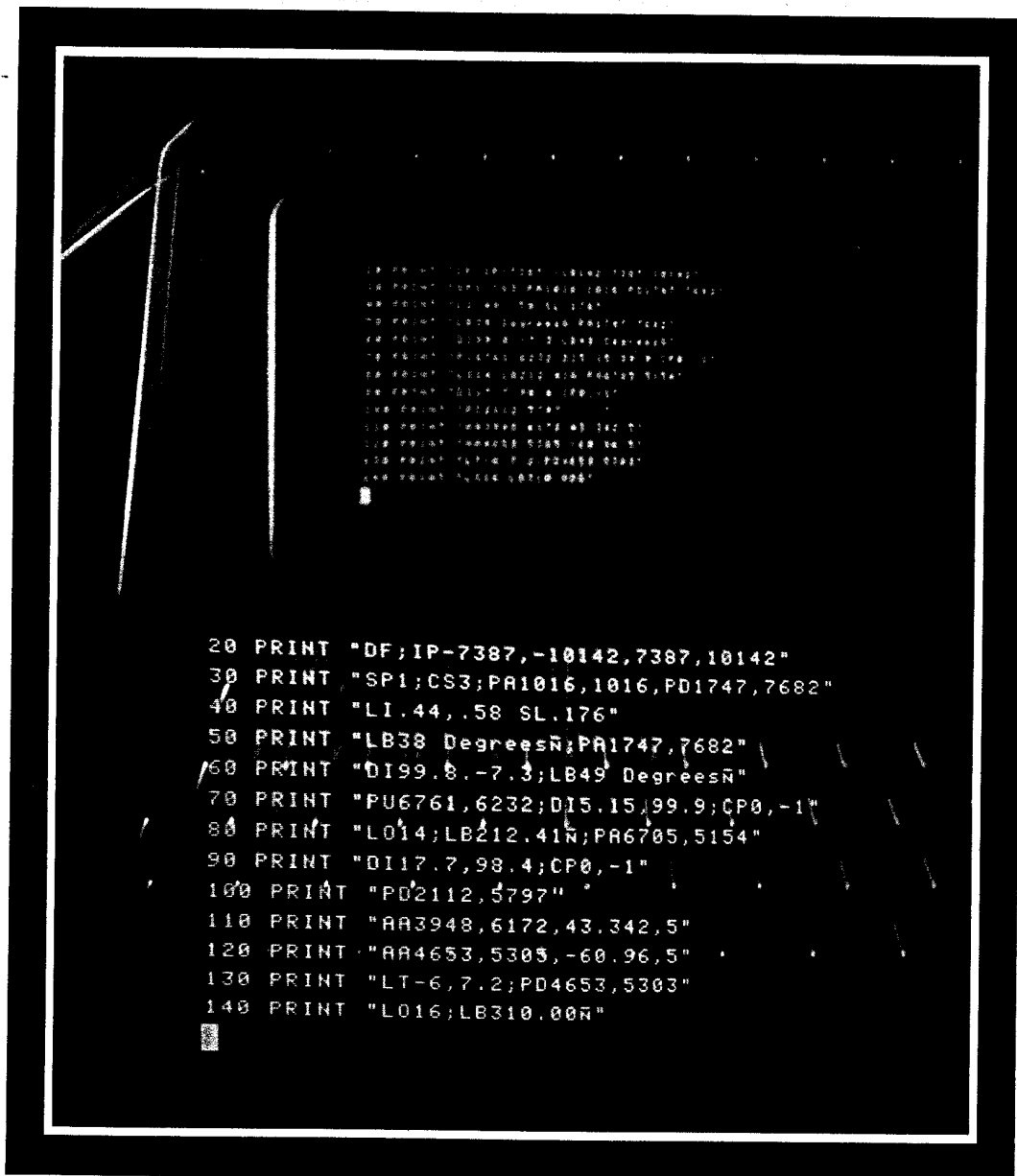


HP-GL Programmer's Reference Manual



HP-GL Programmer's Reference Manual

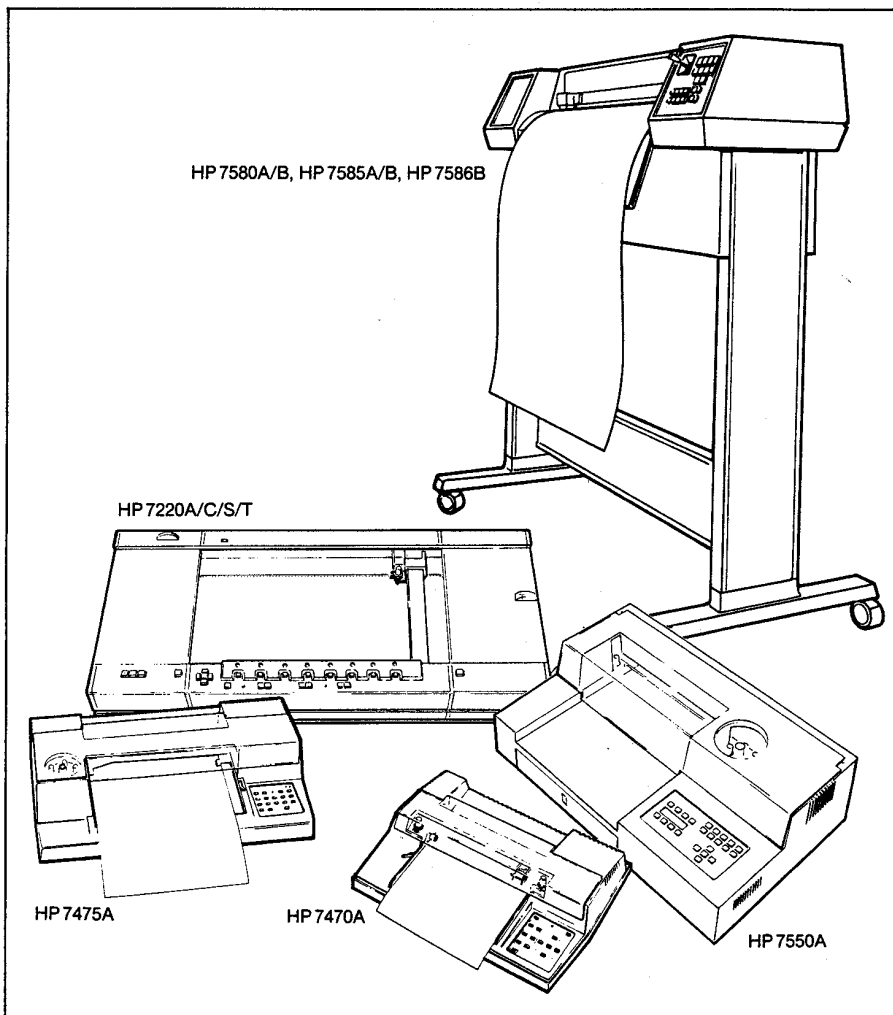


Table of Contents

Introduction	1
The Plotter Coordinate System	3
Power-up Initialization	13
HP-GL Syntax	15
HP-GL Instructions	18
Plotter ASCII Code Definitions in Character Sets	29

List of Tables

Plotter Manuals	1
Plotting Areas and Default P1,P2 Locations	8
Power-up Default Conditions	13
HP-GL Separators and Terminators	16
Parameter Formats and Ranges	17
HP-GL Instruction Set	19
Plotter Reaction to ASCII Control Characters	29
Character Sets	35
Fixed-Space Vector Font	37
Variable-Space Arc Font	40
Fixed-Space Arc Font	43

Introduction

This manual provides information to aid in the design of hardware, firmware, or software for use with the HP family of HP-GL plotters. Its goal is to show the similarities and differences between all plotter models and to provide the information needed to define the HP-GL instruction subset and general syntax that is compatible with any given combination of these plotters.

Before using the manual, please note the following items.

- Plotter models currently in production are shown in **boldface** type throughout this manual to differentiate them from obsolete models. Prior knowledge of HP-GL is assumed.
- Descriptions of the HP 7090 pertain only to its HP-GL plotting functions. The HP 7090 performs as a digital plotter and as an analog-to-digital measuring instrument.
- The term HP 758X denotes the following HP plotter models in any series: 7580, 7585, or 7586. HP 758XA denotes the 7580A and 7585A; HP 758XB denotes the 7580B, 7585B, and 7586B.
- Words typed in **SMALL BOLDFACE TYPE** are switches found on the plotter. **BOLD CONDENSED** type denotes a single ASCII character which should be sent to the plotter.

Following is a list of pertinent manuals recommended for use in conjunction with this manual. They should be used as memory refreshers and to determine characteristics such as front-panel operation and parameter ranges of device-control instructions.

HP Plotter	Manual Title	Part Number
7090A	Interfacing and Programming Manual	07090-90001
7090A	Operator's Manual	07090-90002
7220A,S	Operating and Programming Manual	07220-90002
7220C,T	Operating and Programming Manual	07220-90003
7225A/17601A	Operating and Programming Manual	17601-90000
7225B/17601A	Operating and Programming Manual	17601-90006
7225A,B/17603A	Operating and Programming Manual	17603-90002
7225A/17604A	Operating and Programming Manual	17604-90000
7240A	Operating and Programming Manual	07240-90000

Plotter Manuals

*Plotter Manuals
(Continued)*

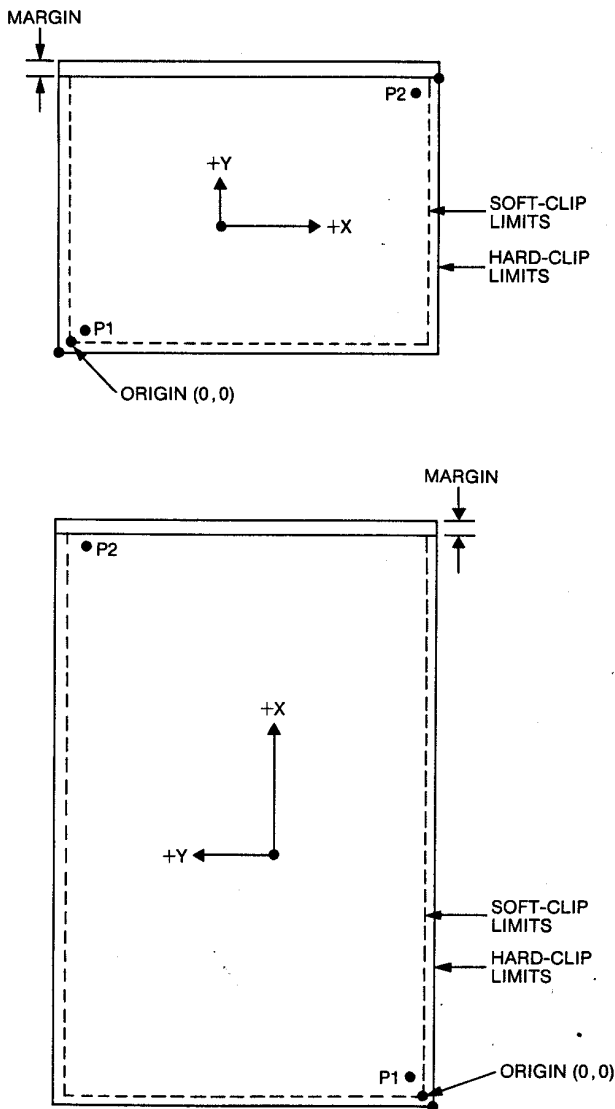
HP Plotter	Manual Title	Part Number
7245A	Operating and Programming Manual	07245-90001
7245B	Operating and Programming Manual	07245-90010
7470A	Interfacing and Programming Manual	07470-90001
7470A	Operator's Manual	07470-90002
7475A	Interfacing and Programming Manual	07475-90001
7475A	Operation and Interconnection Manual	07475-90002
7550A	Interfacing and Programming Manual	07550-90001
7550A	Operation and Interconnection Manual	07550-90002
7580A/7585A	Interfacing and Programming Manual	07580-90014
7580A/7585A	Operator's Manual	07580-90013
*7580B/7585B	Interfacing and Programming Manual	07580-90024
*7580B/7585B	Operator's Manual	07580-90023
**7580B/ 7585B/7586B	Interfacing and Programming Manual	07580-90034
**7580B/ 7585B/7586B	Operator's Manual	07580-90033
9872A	Interfacing and Programming Manual	09872-90003
9872B,S	Operating and Programming Manual	09872-90008
9872C,T	Operating and Programming Manual	09872-90011

*For HP 7580B and 7585B plotters with serial prefix numbers 2309, 2331, 2334, and 2335.
 **For HP 7580B, 7585B, and 7586B plotters with serial prefix numbers 2402 and above.

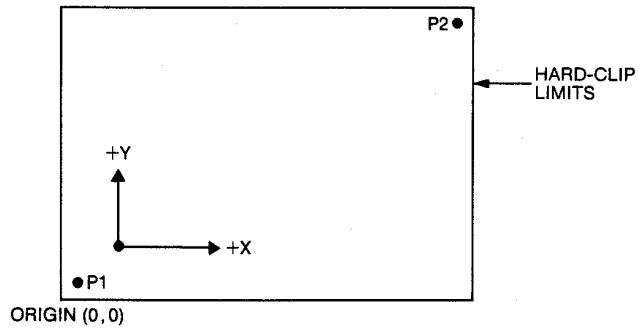
The Plotter Coordinate System

The plotting surface of all HP plotters is a Cartesian coordinate system that is scaled in plotter units. The plotter unit is the smallest possible addressable move and is 0.025 mm (approximately 0.001 in.) in length. The orientation of the X- and Y-axes, the locations of the origin point, and the default location of scaling points P1 and P2 are shown in the following diagrams. The paper is shown as though you were facing the front of the plotter and looking down on it. Default coordinate values for P1 and P2 and the plotter-unit range within the mechanical (hard-clip) limits of each plotter are included in the table entitled Plotting Areas and Default P1,P2 Locations.

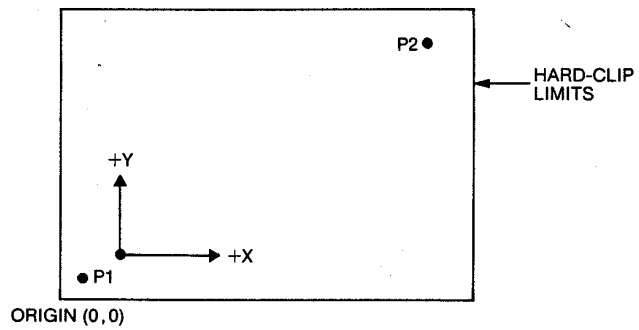
HP 7090A

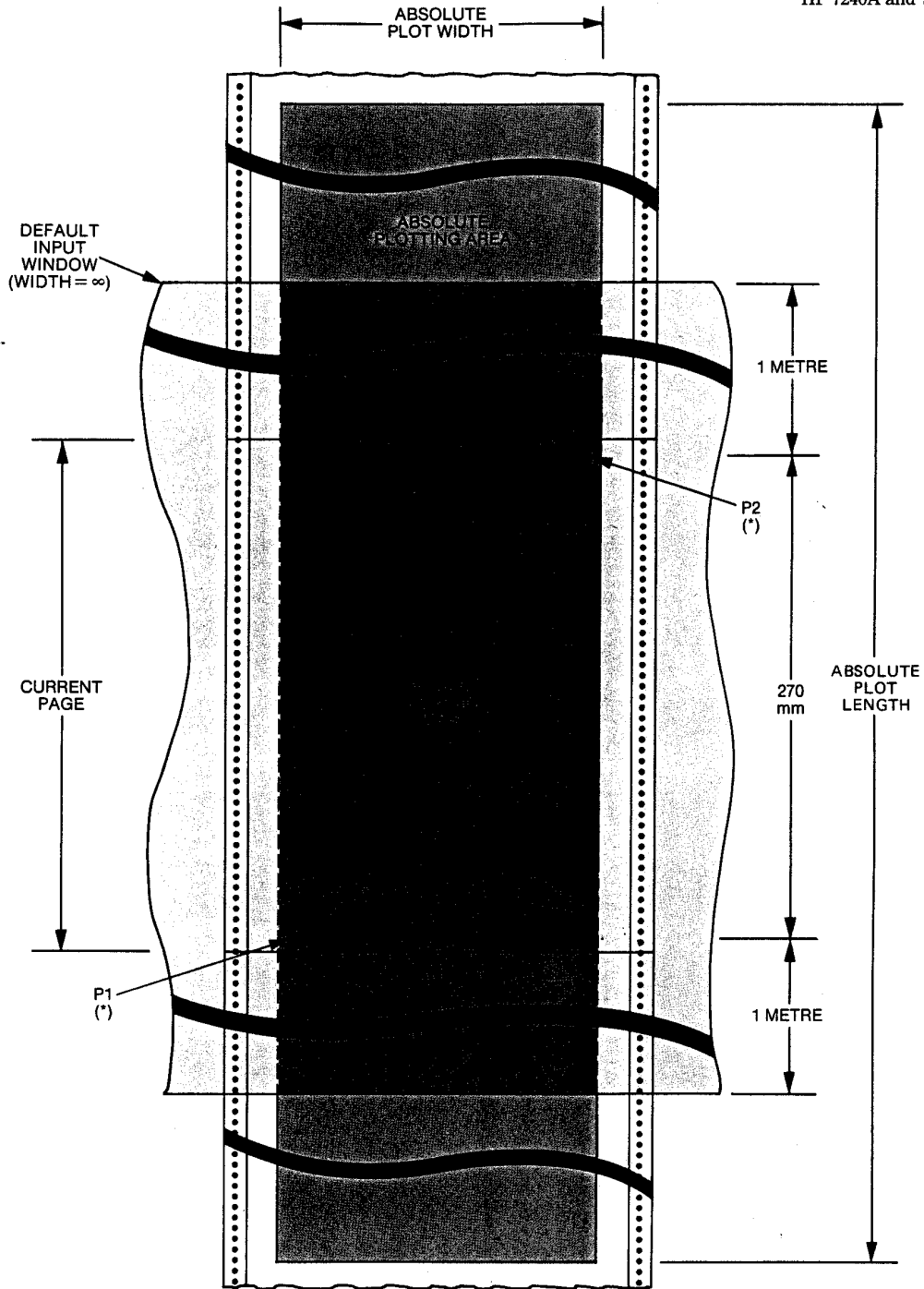


HP 7220A,C,S,T and
9872A,B,C,S,T



HP 7225A,B (17601A,
17603A, and 17604A)



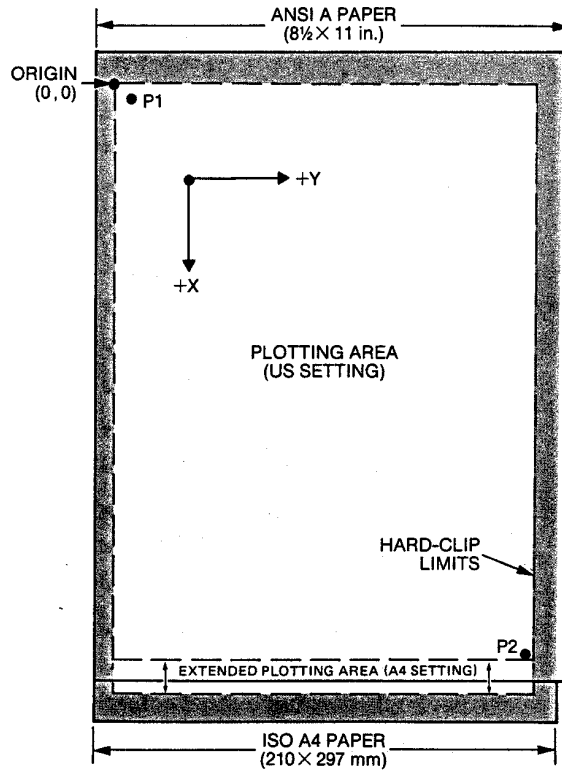


ABSOLUTE PLOT LENGTH = 200000 PLOTTER UNITS (9872 MODE)
= 5000 mm (SCALED MODE)

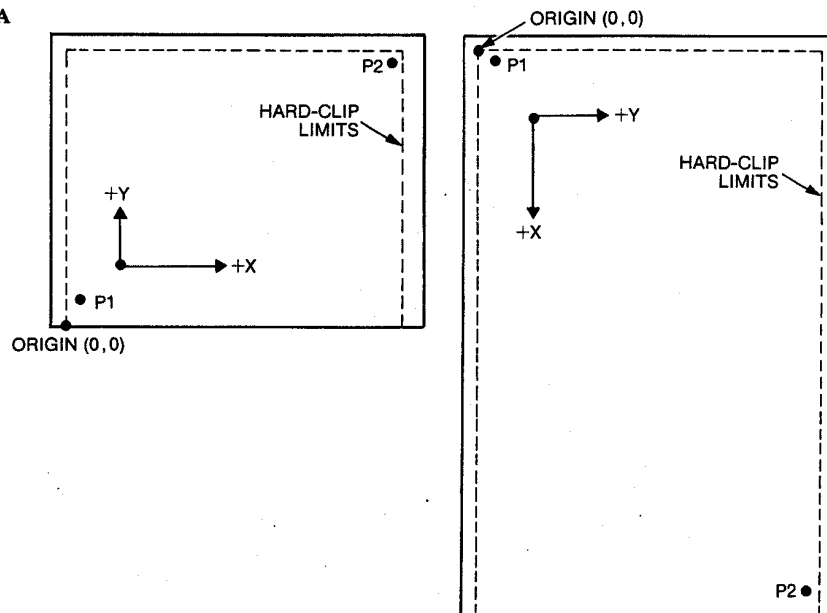
ABSOLUTE PLOT WIDTH = 7544 PLOTTER UNITS (9872 MODE)
= 188.6 mm (SCALED MODE)

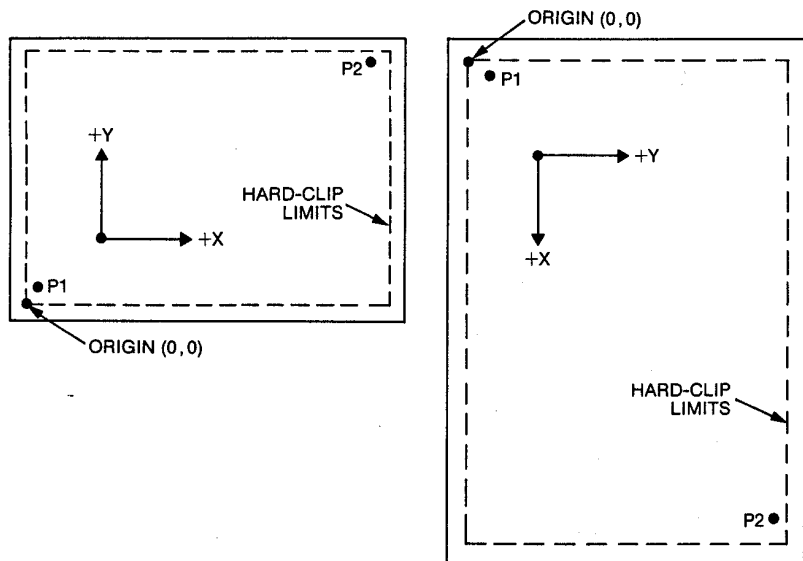
*MODE DEPENDENT

HP 7470A

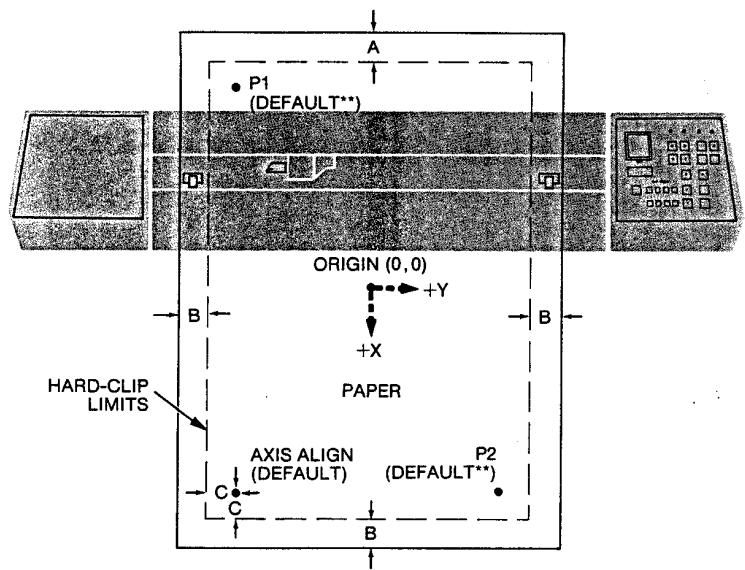


HP 7475A





HP 7550A



HP 758X

NORMAL	EXPAND
A = 39 mm	29 mm
B = 15 mm	5 mm
C = 15 mm	15 mm

*TYPICAL FOR P1, P2, AND
AXIS ALIGN

**DEPENDENT ON PAPER SIZE

Plotting Areas and Default P1,P2 Locations

HP Plotter	Optional Switch Settings and/or Paper Type/Size	Default Scaling Points		Plotting Range		Maximum Plotting Area (X by Y)
		P1 _x ,P1 _y	P2 _x ,P2 _y	X-axis	Y-axis	
7090A	ANSI (A-size)	160, 447	10 210, 7682	0 to 11 036	0 to 8087	275.9 × 202.18 mm (10.82 × 7.93 in.)
	ANSI (B-size)	865, 160	16 140, 10 210	0 to 16 735	0 to 11 036	418.38 × 275.9 mm (16.40 × 10.82 in.)
	ISO (A4-size)	514, 348	10 564, 7583	0 to 11 722	0 to 7885	293.05 × 197.13 mm (11.49 × 7.73 in.)
	ISO (A3-size)	325, 514	15 600, 10 564	0 to 16 287	0 to 11 722	407.18 × 293.05 mm (15.96 × 11.49 in.)
7220A,C,S,T and 9872A,B,C,S,T	Sheet paper	520, 380	15 720, 10 380	0 to 16 000	0 to 11 400	400 × 285 mm (15.75 × 11.2 in.)
7220S,T and 9872S,T	ENGLISH (sprocketed roll paper)	520, 1020	15 760, 11 180	0 to 16 000	0 to 11 400	400 × 285 mm (15.75 × 11.2 in.)
	METRIC (sprocketed roll paper)	520, 1140	15 720, 11 140	0 to 16 000	0 to 11 400	400 × 285 mm (15.75 × 11.2 in.)
7225A,B/ 17601A,17603A, 17604A	A-size	328, 279	10 328, 7479	0 to 11 420	0 to 8140	285 × 203 mm (11.2 × 8 in.)
7240A and 7245A,B	9872 mode (plotter units) (sprocketed roll paper)	200, 200	7400, 11 000	0 to 7544	-39 800 to +51 000 (default window)	English Page 188.6 × 279 mm (7.4 × 11 in.) Metric Page 188.6 × 298.5 mm (7.4 × 11.75 in.)
	SCALED mode (millimetres) (sprocketed roll paper)	0, 0	180, 270	0 to 188.6	-1000 to +1270 (default window)	Long Axis Plots 188.6 mm × 5 m (7.4 in. × 16.4 ft) with full paper return or 188.6 mm × 61 m (7.4 in. × 200 ft) without full paper return

7470A	US (A-size)	250, 279	10 250, 7479	0 to 10 300	0 to 7650	257 × 191 mm (10.2 × 7.5 in.)
	A4 (A4-size)	250, 279	10 250, 7479	0 to 10 900	0 to 7650	272 × 191 mm (10.7 × 7.5 in.)
7475A	US/A4 (A-size)	250, 596	10 250, 7796	0 to 10 365	0 to 7962	257.8 × 198.1 mm (10.15 × 7.8 in.)
	US/A3 (B-size)	522, 259	15 722, 10 259	0 to 16 640	0 to 10 365	413.9 × 257.8 mm (16.3 × 10.15 in.)
	MET/A4 (A4-size)	603, 521	10 603, 7721	0 to 11 040	0 to 7721	274.6 × 192.1 mm (10.81 × 7.56 in.)
	MET/A3 (A3-size)	170, 602	15 370, 10 602	0 to 16 158	0 to 11 040	401.9 × 274.6 mm (15.82 × 10.81 in.)
7550A	A-size	80, 320	10 080, 7520	0 to 10 170	0 to 7840	254.25 × 196 mm (9.97 × 7.68 in.)
	B-size	620 80	15 820, 10 080	0 to 16 450	0 to 10 170	411.25 × 254.25 mm (16.12 × 9.97 in.)
	A4-size	430, 200	10 430, 7400	0 to 10 870	0 to 7600	271.75 × 190 mm (10.65 × 7.45 in.)
	A3-size	380, 430	15 580, 10 430	0 to 15 970	0 to 10 870	399.25 × 271.75 mm (15.65 × 10.65 in.)
7580A,B NOTE: P1, P2 coordinate values for all 758X plotters are approxi- mate. ■	NORMAL (A-size)*	-2790, -4500	2790, 4500	±3390	±5100	169.5 × 255 mm (6.68 × 10.05 in.)
	NORMAL (B-size)	-7100, -4500	7100, 4500	±7700	±5100	385 × 255 mm (15.17 × 10.05 in.)
	NORMAL (C-size)	-9640, -7530	9640, 7530	±10 240	±8130	512 × 406.5 mm (20.17 × 16.02 in.)
	NORMAL (D-size)	-15 710, -10 060	15 710, 10 060	±16 310	±10 660	815.5 × 533 mm (32.13 × 21 in.)
	NORMAL (A4-size)*	-2700, -4830	2700, 4830	±3300	±5430	165 × 271.5 mm (6.5 × 10.7 in.)
	NORMAL (A3-size)	-6780, -4830	6780, 4830	±7380	±5430	369 × 271.5 mm (13.54 × 10.7 in.)

*A and A4-sizes are loaded with the longer axis horizontal. All other sizes have long axis vertical.

Plotting Areas and Default P1,P2 Locations (Continued)

HP Plotter	Optional Switch Settings and/or Paper Type/Size	Default Scaling Points		Plotting Range		Maximum Plotting Area (X by Y)
		P1 _x ,P1 _y	P2 _x ,P2 _y	X-axis	Y-axis	
7580A,B NOTE: P1,P2 coordinate values for all 758X plotters are approximate. ■	NORMAL (A2-size)	-10 280, -7260	10 280, 7260	±10 880	±7860	544 × 393 mm (21.43 × 15.48 in.)
	NORMAL (A1-size)	-15 120, 10 760	15 120, 10 760	±15 720	±11 360	786 × 568 mm (30.97 × 22.38 in.)
	EXPAND (A-size)*	-3190, -4900	3190, 4900	±3790	±5500	189.5 × 275 mm (7.47 × 10.84 in.)
	EXPAND (B-size)	-7500, -4900	7500, 4900	±8100	±5500	405 × 275 mm (15.96 × 10.84 in.)
	EXPAND (C-size)	-10 040, -7930	10 040, 7930	±10 640	±8530	532 × 426.5 mm (20.96 × 16.8 in.)
	EXPAND (D-size)	-16 110, -10 460	16 110, 10 460	±16 710	±11 060	835.5 × 553 mm (32.92 × 21.79 in.)
	EXPAND (A4-size)*	-3090, -5230	3090, 5230	±3690	±5830	184.5 × 291.5 mm (7.27 × 11.49 in.)
	EXPAND (A3-size)	-7180, -5240	7180, 5240	±7780	±5840	389 × 292 mm (15.33 × 11.5 in.)
	EXPAND (A2-size)	-10 680, -7660	10 680, 7660	±11 280	±8260	564 × 413 mm (22.22 × 16.27 in.)
	EXPAND (A1-size)	-15 520, -11 160	15 520, 11 160	±16 120	±11 760	806 × 588 mm (31.76 × 23.17 in.)
7585A,B and 7586B NOTE: P1,P2 coordinate values for all 758X plotters are approximate. ■	NORMAL (A-size)**	-2790, -4500	2790, 4500	±3390	±5100	169.5 × 255 mm (6.68 × 10.05 in.)
	NORMAL (B-size)	-7100, -4500	7100, 4500	±7700	±5100	385 × 255 mm (15.17 × 10.05 in.)
	NORMAL (C-size)**	-7090, -10 075	7090, 10 075	±7690	±10 675	384.5 × 533.75 mm (15.15 × 21.03 in.)
	NORMAL (D-size)	-15 710, -10 060	15 710, 10 060	±16 310	±10 660	815.5 × 533 mm (32.13 × 21 in.)

NORMAL (E-size)	-20 840, -16 180	20 840, 16 180	±21 440	±16 780	1072 × 839 mm (42.24 × 33.06 in.)
NORMAL (A4-size)**	-2700, -4830	2700, 4830	±3300	±5430	165 × 271.5 mm (6.5 × 10.7 in.)
NORMAL (A3 size)	-6780, -4830	6780, 4830	±7380	±5430	369 × 271.5 mm (13.54 × 10.7 in.)
NORMAL (A2-size)**	-6875, -10 785	6875, 10 785	±7475	±11 385	373.75 × 569.25 mm (14.73 × 22.43 in.)
NORMAL (A1-size)	-15 120, -10 760	15 120, 10 760	±15 720	±11 360	786 × 568 mm (30.97 × 22.38 in.)
NORMAL (A0-size)	-22 190, -15 740	22 190, 15 740	±22 790	±16 340	1139.5 × 817 mm (44.9 × 32.19 in.)
EXPAND (A-size)**	-3190, -4900	3190, 4900	±3790	±5500	189.5 × 275 mm (7.47 × 10.84 in.)
EXPAND (B-size)	-7500, -4900	7500, 4900	±8100	±5500	405 × 275 mm (15.96 × 10.84 in.)
EXPAND (C-size)**	-7485, -10 480	7485, 10 480	±8085	±11 080	404.25 × 554 mm (15.93 × 21.83 in.)
EXPAND (D-size)	-16 110, -10 460	16 110, 10 460	±16 710	±11 060	835.5 × 553 mm (32.92 × 21.79 in.)
EXPAND (E-size)	-21 250, -16 580	21 250, 16 580	±21 850	±17 180	1092.5 × 859 mm (43.05 × 33.84 in.)
EXPAND (A4-size)**	-3090, -5230	3090, 5230	±3690	±5830	184.5 × 291.5 mm (7.27 × 11.49 in.)
EXPAND (A3-size)	-7180, -5240	7180, 5240	±7780	±5840	389 × 292 mm (15.33 × 11.5 in.)
EXPAND (A2-size)**	-7270, -11 180	7270, 11 180	±7870	±11 780	393.5 × 589 mm (15.5 × 23.21 in.)
EXPAND (A1-size)	-15 520, -11 160	15 520, 11 160	±16 120	±11 760	806 × 588 mm (31.76 × 23.17 in.)
EXPAND (A0-size)	-22 590, -16 145	22 590, 16 145	±23 190	±16 745	1159.5 × 837.25 mm (45.68 × 32.99 in.)

*A and A4-sizes are loaded with the longer axis horizontal. All other sizes have long axis vertical.

**A, C, A4, and A2-sizes are loaded with the longer axis horizontal. All other sizes have long axis vertical.

Plotting Areas and Default P1,P2 Locations (Continued)

HP Plotter	Optional Switch Settings and/or Paper Type/Size	Default Scaling Points		Plotting Range		Maximum Plotting Area (X by Y)
		P1 _x ,P1 _y	P2 _x ,P2 _y	X-axis	Y-axis	
***7586B (Roll Paper)	NORMAL 914.14 mm/36 in.	-23 184, -17 052	23 184, 17 052	±23 784	±17 652	1189.2 × 882.6 mm (46.6 × 34.6 in.)
	NORMAL 609.6 mm/24 in.	-17 088, -11 000	17 088, 11 000	±17 688	±11 600	884.4 × 580 mm (34.7 × 22.7 in.)
	NORMAL 279.4 mm/11 in.	-7436, -4653	7436, 4653	±8036	±5253	401.8 × 262.25 mm (15.75 × 10.3 in.)

***Applies to roll paper on the 7586B. Limits listed are for a single frame on a multi-frame plot. The X-axis default scaling points are fixed; Y-axis scaling points are approximate. Since the paper is continuous in the X-direction, the plotter uses the width of the paper to determine the scaling points for one frame.

Power-up Initialization

Upon application of power, each plotter performs an initialization cycle to set certain plotting conditions to predefined default values. These default values differ from plotter to plotter, and some functions are not implemented on all plotters. The functions established by each plotter are shown in the following Power-up Default Conditions table.

Power-up Default Conditions

Function	Condition	Equivalent Instruction	Exceptions
Plotting mode	Absolute	PA;	1
Pen state	Up(off)	PU;	None
Automatic pen functions	On	AP;	2
Pen velocity	Machine dependent	VS;	3
Adaptive pen velocity	Off	VN;	4
Scaling points (P1,P2)	Machine dependent	IP;	5
Scaling	User-unit scaling off	SC;	6
Input window	Mechanical limits	IW;	7,8
Chord angle/tolerance	5 degrees	CT;	9
Symbol mode	Off	SM;	None
Digitize clear	On	DC;	10
Tick length	tp and $tn = 0.5\%$ of $|P2_x - P1_x|$ for Y-tick and 0.5% of $|P2_y - P1_y|$ for X-tick	TL;	11
Line type and pattern length	Solid line; 4% of distance from P1 to P2	LT;	None
Mask value	223, 0, 0	IM;	12
Label origin	Current pen position	—	None
Label direction	Horizontal	DR1, 0	13
Character size	Relative: width = 0.75% of $|P2_x - P1_x|$ height = 1.5% of $|P2_y - P1_y|$	SR;	11, 14
Character slant	0 degrees	SL0;	None
Extra space	No extra space	ES0, 0;	15
Select character set	Standard	SS;	None
Standard set	Set 0	CS0;	None
Alternate set	Set 0	CA0;	None
Character chord	5 degrees	CC;	15
Label buffer	Cleared	BL ETX	15
Label terminator	ETX (decimal code 3)	DT;	16

¹Applicable only to 7090, 7470, 7475, 7550, 7580, 7585, and 7586.

²Not implemented on 7090, 7225, 7240, 7245, 7470, and 7475.

³Velocity = 75 cm/s on 7090; 25 cm/s on 7225 (17601, 17603, 17604); 24 cm/s on 7240 and 7245; 36 cm/s on 7220 and 9872; and 38.1 cm/s on 7470 and 7475. On 7550, 7580, 7585, and 7586, default speeds for fiber-tip, roller-ball, and drafting pen carousels are 50, 60, and 15 cm/s, respectively. Transparency pen carousels on the 7550 default at 10 cm/s.

⁴Applicable only to 7220 and 9872.

⁵Refer to table of Plotting Areas and Default P1,P2 Locations.

⁶On 7240 and 7245, scaling is implemented only when 9872/SCALED switch is set to SCALED (moves default to millimetres).

⁷On 7090, limits are *soft-clip* limits that depend on setting of ISO/ANSI switch and front-panel toggle. On 7470, mechanical limits depend on setting of US/A4 switch. On 7475, mechanical limits depend on settings of the US/MET and A4/A3 switches. On 7550, mechanical limits depend on paper size. On 7580, 7585, and 7586, mechanical limits depend on paper size and position of EXPAND/NORMAL switch. Refer to table of Plotting Areas and Default P1,P2 Locations.

⁸On 7240 and 7245, input window is: X1,Y1 = - infinity, - 39 800
X2,Y2 = + infinity, 51 000

⁹Not implemented on 7090, 7225 (17601,17603), 9872, or 7470 with HP-IB or HP-IL.

¹⁰Not implemented on 7090.

¹¹On 7090, 7470, and 7475, algebraic P1,P2 distances are used.

¹²On 7240 and 7245, IM; defaults to 255 and 255,0,0, respectively. Note also that only the first mask value is applicable for plotters with an RS-232-C interface.

¹³On 7580, 7585, and 7586, label direction is relative (DR1,0) in EMULATE or absolute (DI12,0) in NORMAL.

¹⁴On 7580, 7585, and 7586, character size defaults to relative in EMULATE or absolute in NORMAL. In either case, characters are 0.285 cm wide by 0.375 cm high.

¹⁵Applicable only to 7550, 7580, 7585, and 7586.

¹⁶DT instruction not implemented on 7225 (17601) and 9872.

Power-up Default Conditions (Continued)

Function	Condition	Equivalent Instruction	Exceptions
Fill type, spacing, and angle	<ul style="list-style-type: none"> • Type 1, solid bidirectional fill • 1% of distance between P1 and P2 • 0 degrees 	FT ;	17
Pen Thickness	0.3 mm (fill spacing for solid fill)	PT ;	17
Rotation	0 degrees (default orientation)	RO ;	18
User-defined fill type	Solid bidirectional fill	UF ;	19
Character selection mode	HP 7-bit mode	CM ;	19
Polygon mode	Polygon buffer cleared	PM 0 ; PM 2	19
Downloadable character buffer	Cleared	DL ;	19

¹⁷Applicable only to 7475, 7550, 7580B, and 7585B (serial prefix number 2402 and higher), and 7586.

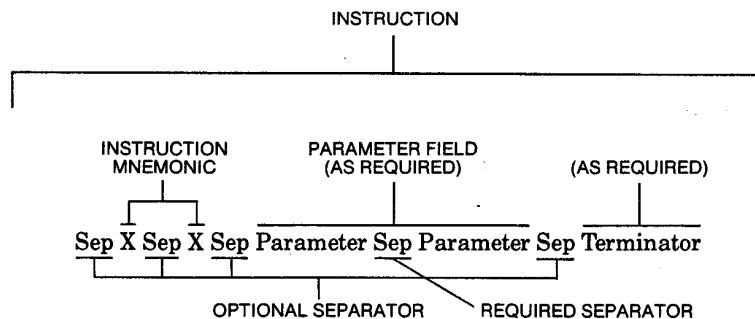
¹⁸Applicable only to 7090, 7475, 7550, 7580, 7585, and 7586.

¹⁹Applicable only to 7550, 7580B, and 7585B (serial prefix number 2402 and higher), and 7586.

HP-GL Syntax

In all cases, an HP-GL instruction is a two-letter mnemonic, which may be upper- or lowercase. The mnemonic suggests the instruction's function; for instance, PA is the mnemonic for the plot absolute instruction and LB is the mnemonic for the label instruction. An HP-GL instruction is defined as a mnemonic followed by its parameter field, if any, and a terminator.

If multiple parameters follow the mnemonic, they must be delimited from each other by a required separator. Optional separators may also be used before, after, and between the mnemonic and before the terminator as shown below. Separators and terminators that are recognized by each plotter are listed in the table entitled HP-GL Separators and Terminators.



Each parameter in the parameter field must comply with one of three format types; integer, decimal, or character. The parameter format type as well as the numerical ranges of integers and decimals varies from plotter to plotter. Numerical ranges for each plotter are listed in the table entitled Parameter Formats and Ranges. Parameter format types required by each HP-GL instruction are given in the definition column of the table entitled HP-GL Instruction Set.

HP-GL Separators and Terminators

HP Plotter	Required Parameter Separator	Optional Separators	Required Terminator ¹		
			HP-IB	RS-232-C	HP-IL
7090A	One or more commas and/or spaces, or a + or - sign which may be preceded by commas or spaces	Zero or more commas and/or spaces	; or LF or the next mnemonic	—	—
7220A,C,S,T	One or more commas and/or spaces	Zero or more commas and/or spaces	—	; only	—
7225A,B/17601A	One comma	Spaces are ignored	; or LF	—	—
7225A,B/17603A 7225A,B/17604A	One or more commas and/or spaces	Zero or more commas and/or spaces	—	; only	—
7240A	One comma	Spaces are ignored	—	; only	—
7245A,B	One comma	Spaces are ignored	; or LF	—	—
7470A	One or more commas and/or spaces, or a + or - sign which may be preceded by commas or spaces	Zero or more commas and/or spaces	; or LF or any numeric or nonalphabetic characters such as \$ or #, or the next mnemonic	; or non-numeric or nonalphabetic characters such as \$ or #, or the next mnemonic	; or LF or any nonnumeric or nonalphabetic characters such as \$ or #, or the next mnemonic
7475A	One or more commas and/or spaces, or a + or - sign which may be preceded by commas or spaces	Zero or more commas and/or spaces	; or LF or the next mnemonic	; or the next mnemonic	—
7550A	One or more commas and/or spaces	Zero or more commas and/or spaces	; or LF or the next mnemonic	; or the next mnemonic	—
7580A,B/ 7585A,B/7586B	One or more commas and/or spaces	Zero or more commas and/or spaces	; or LF or the next mnemonic	; or the next mnemonic	—
9872A,B,C,S,T	One comma	Spaces are ignored	; or LF	—	—

¹In all cases, the control character ETX (ASCII decimal equivalent 3) is the default terminator for HP-GL instructions LB and BL. (The terminator may be redefined by the DT instruction on some plotters.)

The format table below is for summary purposes only. Refer to specific HP-GL instructions for exact parameter ranges.

Parameter Formats and Ranges

HP Plotter	Integer (i)		Decimal (d)	
	Not Scaled	Scaled*	Not Scaled	Scaled*
7090A	-32 768 to +32 767 (Decimal fraction truncated)	-32 768 to +32 767 (Decimal fraction truncated)	-128.0000 to +127.9999 (Decimal fraction optional)	-128.0000 to +127.9999 Decimal fraction optional)
7220A,C,S,T	±32 767 (Decimal fraction truncated)	±16 383 (Decimal fraction truncated)	±127.999 (Decimal fraction optional)	±127.999 (Decimal fraction optional)
7225A,B/ 17601A	±32 767 (Decimal produces an error)	±32 767 (Decimal produces an error)	±127.999 (Decimal fraction optional)	±127.999 (Decimal fraction optional)
7225A,B/ 17603A	±32 767 (Decimal produces an error)	±32 767 (Decimal produces an error)	±127.999 (Decimal fraction optional)	±127.999 (Decimal fraction optional)
7225A,B/ 17604A	±32 767 (Decimal fraction truncated)	±32 767 (Decimal fraction truncated)	±127.999 (Decimal fraction optional)	±127.999 (Decimal fraction optional)
7240A 7245A,B	±1 × 10 ⁺⁹⁹ (Decimal fraction optional)	±1 × 10 ⁺⁹⁹ (Decimal fraction optional)	±1 × 10 ⁺⁹⁹ (Decimal fraction optional)	±1 × 10 ⁺⁹⁹ (Decimal fraction optional)
7470A/ 7475A	-32 768 to +32 767 (Decimal fraction discarded; integer portion unchanged if number is positive, but is increased to next more negative integer if number is negative)	-32 768.0000 to +32 767.9999 (Decimal fraction optional)	-128.0000 to +127.999 (Decimal fraction optional)	-32 768.0000 to +32 767.9999 (Decimal fraction optional)
7550A	-2 ²³ to +2 ²³ - 1 (Decimal fraction rounded)	-2 ²³ to +2 ²³ - 1 (Decimal fraction rounded)	-2 ²³ to +2 ²³ - 1 (Decimal fraction optional)	-2 ²³ to +2 ²³ - 1 (Decimal fraction optional)
7580A,B/ 7585A,B/ 7586B	-2 ²⁶ to +2 ²⁶ - 1 (Decimal fraction rounded)	-2 ²⁶ to +2 ²⁶ - 1 (Decimal fraction rounded)	-2 ²⁶ to +2 ²⁶ - 1 (Decimal fraction optional)	-2 ²⁶ to +2 ²⁶ - 1 (Decimal fraction optional)
9872A,B,C,S,T	±32 767 (Decimal produces an error)	±16 383 (Decimal produces an error)	±127.999 (Decimal fraction optional)	±127.999 (Decimal fraction optional)

*A scaled format is used only when user-unit scaling is active. This format applies to all HP-GL instruction parameters that are interpreted as user units.

HP-GL Instructions

Below is a list of HP-GL instructions common to the **7470A**, **7475A**, **7550A**, and **758XB** plotters.

CA	IN	OO	SL
CP	IP	OP	SM
CS	IW	OS	SP
DC	LB	OW	SR
DF	LT	PA	SS
DI	OA	PD	TL
DP	OC	PR	UC
DR	OD	PU	VS
DT	OE	SA	XT
EC	OF	SC	YT
IM	OI	SI	

The table beginning on the following page contains a comprehensive review of HP-GL. The table is divided into four sections that pertain to the interfacing capability of each plotter.

Plotters listed in the first section of the table can function on either the HP-IB or RS-232-C interface. The **7470A**, **7475A**, and **758XA** have a single interface that is specified as an option (001 for RS-232-C and 002 for HP-IB). The **7550A** and **758XB** have dual interface capability.

HP-GL Instruction	Definition	HP-IB or RS-232-C						HP-IB						RS-232-C				HP-IL								
		7 4 7 0 A	7 4 7 0 A	7 5 5 0 A	7 5 8 0 A	7 5 8 0 B	7 5 8 0 B	7 0 9 0 A	7 1 2 5 A	1 6 0 1 B	7 2 4 5 A	7 2 4 5 B	9 8 7 2 A	9 8 7 2 C	9 8 7 2 S	9 8 7 2 T	7 2 2 0 A	7 2 2 0 S	7 1 2 6 A	7 1 2 6 A	7 1 2 6 A	7 1 2 6 A	7 2 7 0 A	7 4 7 0 A		
AA X,Y,arc angle,(chord angle)	Arc absolute X,Y,arc angle, chord angle (d)										*													*		
AA X,Y,arc angle,(chord angle)	Arc absolute X,Y,arc angle, chord angle (i)															*	*									
AA X,Y,arc angle,(chord angle)	Arc absolute X,Y (i/d), arc angle (i), chord angle (i)	†	*																							
AA X,Y,arc angle,(chord tolerance)	Arc absolute X,Y (i), arc angle (d), chord tolerance (d)				*	*	*																			
AA X,Y,arc angle,(chord tolerance)	Arc absolute X,Y (d), arc angle (d), chord tolerance (d)				*																					
AF	Advance full page	N	N	*	N	N	*8	N	N	N	N	8	*8	8	*8	8	*8	N	N						N	
AH	Advance half page	N	N	*	N	N	*8	N	N	N	N	8	*8	8	*8	8	*8	N	N							N
AP n	Automatic pen operations (i)	N	N	*	*	*	*	N	N	N	N	*	*	*	*	*	*	N	N	N						N
AR X,Y,arc angle,(chord angle)	Arc relative X,Y,arc angle, chord angle (d)										*														*	
AR X,Y,arc angle,(chord angle)	Arc relative X,Y,arc angle, chord angle (i)															*	*									
AR X,Y,arc angle,(chord angle)	Arc relative X,Y (i/d), arc angle (i), chord angle (i)	†	*																							
AR X,Y,arc angle,(chord tolerance)	Arc relative X,Y (i), arc angle (d), chord tolerance (d)				*	*	*																			

HP-GL Instruction	Definition	HP-IB or RS-232-C						HP-IB						RS-232-C				HP-IL				
		7	7	7	7	7	7	7	1	7	7	9	8	9	8	7	7	7	1	7	1	7
		4	4	5	5	5	5	0	2	6	2	2	8	7	7	2	2	2	7	2	7	7
		7	7	5	8	8	8	9	5	0	4	4	7	2	2	0	0	5	0	5	0	4
		0	5	0	0	5	6	0	A	1	5	5	2	B	S	A	S	A	3	A	4	0
		A	A	A	A	A	B	A	B	A	A	B	A	C	T	C	T	B	A	B	A	A
WG	radius,start angle, sweep angle,(chord tolerance)			*																		
XA	Xoffset,(tick interval (,start point,(end point,(number of minor tick intervals per major tick))))										*										*	
¹ XT	Draw X-axis tick	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	
YA	Yoffset,(tick interval (,start point,(end point,(number of minor tick intervals per major tick))))										*										*	
¹ YT	Draw Y-axis tick	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	

¹Instructions applicable to all plotter models.

²Instructions applicable to all plotter models except 9872A.

Abbreviations

- (i) = Integer
- (d) = Decimal (or Real)
- (i/d) = Integer if not scaled or decimal if scaled.
- (c) = ASCII character

Syntax Notations

- () = All items in parentheses are optional.
- c...c = Any number of labeling characters.
- (,..) = Any number of X,Y coordinate pairs. In the GR instruction, any number of Y-coordinates.

Plotter Applicability

- * = Normal implementation
- N = Instruction recognized, but ignored (NOP).
- Blank = Instruction not recognized (error 1 set).
- † = Implemented only on RS-232-C plotters with serial prefix number 2312A or higher.
- 8 = Error 8 is set if sheet paper is being used, roll paper is not properly loaded, or for the 7220 and 9872, the plotter is a B or C model.
- B = Implemented only on 7580B/7585B plotters with serial prefix number 2402 and higher. On earlier B models, error 1 set.
- NB = NOP'd on 7580B/7585B plotters with serial prefix number 2402 and higher. On earlier B models, error 1 set.
- Y = Implemented only on 758XB plotters with serial prefix numbers 2309, 2331, 2334, 2335. On B models with serial prefix number 2402 and higher, instruction is NOP'd.
- D = Draws a cutline across the border between plots.

Plotter ASCII Code Definitions in Character Sets

The reaction of all plotters to nonprinting ASCII control characters (decimal equivalents 0 through 32 and 127) are listed in the table entitled Plotter Reaction to ASCII Control Characters.

Decimal Value	ASCII Character	Reaction in All Sets
0	NULL	¹ No Operation (NOP)
1	SOH	¹ NOP
2	STX	¹ NOP
3	ETX	End Label Instruction (Default)
4	ETO	¹ NOP
5	ENQ	¹ NOP
6	ACK	¹ NOP
7	BEL	NOP
8	BS	Backspace
9	HT	² NOP
10	LF	Line Feed
11	VT	Inverse Line Feed
12	FF	NOP
13	CR	Carriage Return
14	SO	Select Alternate Character Set
15	SI	Select Standard Character Set
16	DLE	¹ NOP
17	DC1	NOP
18	DC2	NOP
19	DC3	NOP
20	DC4	NOP
21	NAK	¹ NOP
22	SYN	¹ NOP
23	ETB	¹ NOP
24	CAN	¹ NOP
25	EM	¹ NOP
26	SUB	¹ NOP
27	ESC	¹ NOP
28	FS	¹ NOP
29	GS	¹ NOP
30	RS	¹ NOP
31	US	¹ NOP
32	SP	Space
127	DEL	^{1,3} NOP
142	SS2	⁴ Single Shift to Slot G2 (ISO 8-Bit Mode Only)
143	SS3	⁴ Single Shift to Slot G3 (ISO 8-Bit Mode Only)

*Plotter Reaction to
ASCII Control Characters*

¹On all 9872 models, error 4 is generated.

²On 7475A and 7550A plotters, and on 758X plotters with serial prefix number 2402 and higher, decimal 9 generates 1/2 backspace (HT, horizontal tab).

³On 7470A plotters, decimal 127 causes the \perp symbol to be drawn.

⁴Implemented only on 7550A plotters and on 758X plotters with serial prefix number 2402 and higher.

All plotters have the capability of labeling with any of at least five internal character sets. These character sets are designated sets 0 through 4, and each set includes characters that correspond with, or are accessed by, ASCII printing characters (decimal codes 33 through 126). Except for minor cosmetic differences, such as a slash through the numeral zero, these five character sets are identical from plotter to plotter. In addition, each character set has identical upper- and lowercase alphabetic characters and identical numerals. They differ only in certain symbols and punctuation marks that are unique to a particular language.


























At any time, the plotter can label using either the standard character set or the alternate character set. When default conditions are established, all plotters automatically set both the standard and alternate sets to the ANSI ASCII character set (set 0). The standard character set and the symbols which vary from set to set are shown next for each plotter.

NOTE: The plotters will perform an automatic backspace before drawing any of the shaded symbols. Therefore, when an accented letter is required, the letter should be entered first, followed by the accent. □

7090A

CHARACTER SET 0

! " # \$ % & ' () * + , - . / 0 1 2 3 4 5 6 7 8 9 : ; < = > ? @
 A B C D E F G H I J K L M N O P Q R S T U V W X Y Z [\] ^ _ `
 a b c d e f g h i j k l m n o p q r s t u v w x y z { | } ~

Decimal Value	Set 0	Set 1	Set 2	Set 3	Set 4
35	#	#	£	£	¢
39	,	,		,	
91	[	[	[	Ø	[
92	\	f	φ	£	i
93	]	]	]	ø]
94	^	↑		∞	
95	_				
96	`				
123	{	π			
124	|				
125	}	→			
126	~				

CHARACTER SET 0

7220A,C,S,T and 9872A,B,C,S,T

! " # \$ % & ' () * + , - . / 0 1 2 3 4 5 6 7 8 9 : ; < = > ?
 @ A B C D E F G H I J K L M N O P Q R S T U V W X Y Z [\] ^ _
 ` a b c d e f g h i j k l m n o p q r s t u v w x y z { | } ~

Decimal Value	Set 0 Standard ASCII	Set 1 9825 ASCII	Set 2 French/German ASCII	Set 3 Scandinavian ASCII	Set 4 Spanish/Latin American ASCII
35	#	#	£	£	¿
39	.	.		.	
91	[	[	[	Ø	[
92	\	√	ç	Æ	i
93	]	]	]	ø]
94	^	↑		æ	
95	-				
96	,				
123	{	π			
124	|	†			
125	}	-			
126	~				

CHARACTER SET 0

7225A,B (17601A, 17603A, 17604A)

! " # \$ % & ' () * + , - . / 0 1 2 3 4 5 6 7 8 9 : ; < = > ?
 @ A B C D E F G H I J K L M N O P Q R S T U V W X Y Z [\] ^ _
 ` a b c d e f g h i j k l m n o p q r s t u v w x y z { | } ~

Decimal Value	Set 0 Std ASCII	Set 1 9825 ASCII	Set 2 French/German ASCII	Set 3 Scandinavian ASCII	Set 4 Spanish/Latin American ASCII
35	#	#	£	£	¿
39	.	.		.	
91	[	[	[	Ø	[
92	\	√	ç	Æ	i
93	]	]	]	ø]
94	^	↑		æ	
95	-				
96	,				
123	{	π			
124	|	†			
125	}	-			
126	~				

CHARACTER SET 0

! " # \$ % & ' () * + , - . / 0 1 2 3 4 5 6 7 8 9 : ; < = > ?
 @ A B C D E F G H I J K L M N O P Q R S T U V W X Y Z [\] ^ _
 ` a b c d e f g h i j k l m n o p q r s t u v w x y z { | } ~

Decimal Value	Set 0 Std ASCII	Set 1 9825 ASCII	Set 2 French/German ASCII	Set 3 Scandinavian ASCII	Set 4 Spanish/Latin American ASCII
35	#	#	f	f	l
39	,	,	ç	,	ç
91	[	[	[	ø	[
92	\	f	ç	é	i
93	]	]	]	ø]
94	^	↑	↑	ø	↑
95	~	~	~	~	~
96	~	~	~	~	~
123	{	π	π	π	π
124	|	†	†	†	†
125	}	~	~	~	~
126	~	~	~	~	~

The 7240 and 7245 plotters have nine additional internal dot matrix character sets. Below is the standard ASCII dot matrix set (set 20), followed by the symbols in the dot matrix character sets that change from set to set. Automatic backspacing is not performed on these symbols.

CHARACTER SET 20

! " # \$ % & ' () * + , - . / 0 1 2 3 4 5 6 7 8 9 : ; < = > ?
 @ A B C D E F G H I J K L M N O P Q R S T U V W X Y Z [\] ^ _
 ` a b c d e f g h i j k l m n o p q r s t u v w x y z { | } ~ ■

Decimal Value	Set 20 Std ASCII	Set 21 9825 ASCII	Set 22 French ASCII	Set 23 German ASCII	Set 24 Swedish/Finnish ASCII	Set 25 Danish/Norwegian ASCII	Set 26 Spanish ASCII	Set 27 British ASCII
35	#	#	#	£	#	#	#	£
36	\$	\$	\$	£	#	#	#	£
64	@	@	@	£	#	#	#	£
91	[[[£	#	#	#	£
92	\	\	\	£	#	#	#	£
93]]]	£	#	#	#	£
94	^	↑	↑	£	#	#	#	£
96	~	~	~	£	#	#	#	£
123	{	π	π	£	#	#	#	£
124	|	†	†	£	#	#	#	£
125	}	~	~	£	#	#	#	£
126	~	~	~	£	#	#	#	£
127	■	■	■	£	#	#	#	£

The Roman Extension ASCII dot matrix set (set 28) is shown next. The shaded characters highlight the differences between this set and set 20 shown above.

CHARACTER SET 28

! " # \$ % & ' () * + , - . / 0 1 2 3 4 5 6 7 8 9 : ; < = > ?
 @ A B C D E F G A A J O U M O U A Q B C A U P A Y D U E J B
 ` a b c d e f g h i j k l m n o p q r s t u v w x y z { | } ~ ■

CHARACTER SET 0

7470A

! " # \$ % & ' () * + , - . / 0 1 2 3 4 5 6 7 8 9 : ; < = > ? @
 A B C D E F G H I J K L M N O P Q R S T U V W X Y Z [\] ^ _ `
 a b c d e f g h i j k l m n o p q r s t u v w x y z { | } ~ +

Decimal Value	Set 0 Standard ASCII	Set 1 9825 Set	Set 2 French/German	Set 3 Scandinavian	Set 4 Spanish/Latin American
35	#	#	£	£	¿
39	,	,	☒	,	☒
91	[	[	[	Ø	[
92	\	f	ç	Æ	i
93	]	]	]	ø]
94	^	↑	☒	æ	☒
95	~	☒	☒	☒	☒
96	`	☒	☒	☒	☒
123	{	π	☒	☒	☒
124	|	†	☒	☒	☒
125	}	→	☒	☒	☒
126	~	☒	☒	☒	☒

CHARACTER SET 0

! " # \$ % & ' () * + , - . / 0 1 2 3 4 5 6 7 8 9 : ; < = > ? @
 A B C D E F G H I J K L M N O P Q R S T U V W X Y Z [\] ^ _ `
 a b c d e f g h i j k l m n o p q r s t u v w x y z { | } ~ +

Refer to the 7470A chart for the shaded symbols associated with automatic backspacing. These symbols are the same on the 7470A and 7475A plotters.

The 7475A plotter has 19 internal character sets. In addition to the standard five sets, the 7475A plotter also contains the following:

- | | | | |
|--------|---|--------|--------------------------|
| Set 6 | JIS ASCII | Set 33 | ISO German |
| Set 7 | Roman Extensions | Set 34 | ISO French |
| Set 8 | Katakana | Set 35 | ISO British |
| Set 9 | ISO IRV (International Reference Version) | Set 36 | ISO Italian |
| Set 30 | ISO Swedish | Set 37 | ISO Spanish |
| Set 31 | ISO Swedish for Names | Set 38 | ISO Portuguese |
| Set 32 | ISO Norwegian, Version 1 | Set 39 | ISO Norwegian, Version 2 |

Except for minor cosmetic differences, these sets are the same as the corresponding sets pictured in the ASCII Code Definitions in Character Sets table beginning on page 37.

Character sets 0, 10, and 20 from the three respective fonts are shown below. The difference in the total space required to plot the sets emphasizes the difference between fixed-space fonts and variable-space fonts.

Fixed-Space Vector Font

CHARACTER SET 0

! " # \$ % & ' () * + , - . / 0 1 2 3 4 5 6 7 8 9 : ; < = > ? @
A B C D E F G H I J K L M N O P Q R S T U V W X Y Z [\] ^ _ ` `
a b c d e f g h i j k l m n o p q r s t u v w x y z { | } ~

Variable-Space Arc Font

CHARACTER SET 10

! " # \$ % & ' 0 * + , - . / 0 1 2 3 4 5 6 7 8 9 : ; < = > ? @
A B C D E F G H I J K L M N O P Q R S T U V W X Y Z [\] ^ _ ` `
a b c d e f g h i j k l m n o p q r s t u v w x y z { | } ~

Fixed-Space Arc Font
(Implemented only on 758XB
plotters with serial prefix
number 2402 and above.)

CHARACTER SET 20

! " # \$ % & ' () * + , - . / 0 1 2 3 4 5 6 7 8 9 : ; < = > ? @
A B C D E F G H I J K L M N O P Q R S T U V W X Y Z [\] ^ _ ` `
a b c d e f g h i j k l m n o p q r s t u v w x y z { | } ~

The table beginning on the following page shows all the character sets. Each of the shaded symbols is automatically backspaced one character before it is drawn.

The special centered symbols in character sets 5, 15, and 25 (ASCII decimal codes 65 through 79) are designed for use in symbol mode with the SM instruction. When used in a label instruction, spacing will be irregular and may produce undesirable results.

ASCII Code Definitions
in Character Sets —
Fixed-Space Vector Font

DECIMAL VALUE	SET																				
	0	1	2	3	4	5	6	7	8	9	30	31	32	33	34	35	36	37	38	39	99
33	!	!	!	!	!	!	!	À	.	!	!	!	!	!	!	!	!	!	!	!	!
34	"	"	"	"	"	"	"	Â	Γ	"	"	"	"	"	"	"	"	"	"	"	"
35	#	#	£	£	£	#	#	È	∏	#	#	#	#	#	£	£	£	£	#	#	¢
36	\$	\$	\$	\$	\$	\$	\$	Ê	∏	∏	∏	∏	\$	\$	\$	\$	\$	\$	\$	\$	\$
37	%	%	%	%	%	%	%	Ë	·	%	%	%	%	%	%	%	%	%	%	%	%
38	&	&	&	&	&	&	&	Ï	Ɔ	&	&	&	&	&	&	&	&	&	&	&	&
39	'	'	■	'	■	'	'	Ï	Ɔ	'	'	'	'	'	'	'	'	'	'	'	'
40	(	(	(	(	(	(	(	Í	(((((((((((((
41	)	)	)	)	)	)	)	Í)))))))))))))
42	*	*	*	*	*	*	*	ˆ	ı	*	*	*	*	*	*	*	*	*	*	*	*
43	+	+	+	+	+	+	+	ˆ	ı	+	+	+	+	+	+	+	+	+	+	+	+
44	.	.	.	.	.	.	.	ˆ	ı	.	.	.	.	.	.	.	.	.	.	.	.
45	-	-	-	-	-	-	-	Ù	ı	-	-	-	-	-	-	-	-	-	-	-	-
46	.	.	.	.	.	.	.	Û	ı	.	.	.	.	.	.	.	.	.	.	.	.
47	/	/	/	/	/	/	/	£	ı	/	/	/	/	/	/	/	/	/	/	/	/
48	0	0	0	0	0	0	0	-	-	0	0	0	0	0	0	0	0	0	0	0	0
49	1	1	1	1	1	1	1	Ɔ	ı	1	1	1	1	1	1	1	1	1	1	1	1
50	2	2	2	2	2	2	2	ı	ı	2	2	2	2	2	2	2	2	2	2	2	2
51	3	3	3	3	3	3	3	ı	ı	3	3	3	3	3	3	3	3	3	3	3	3
52	4	4	4	4	4	4	4	Ç	ı	4	4	4	4	4	4	4	4	4	4	4	4
53	5	5	5	5	5	5	5	¢	ı	5	5	5	5	5	5	5	5	5	5	5	5
54	6	6	6	6	6	6	6	Ñ	ı	6	6	6	6	6	6	6	6	6	6	6	6
55	7	7	7	7	7	7	7	ñ	ı	7	7	7	7	7	7	7	7	7	7	7	7
56	8	8	8	8	8	8	8	ı	ı	8	8	8	8	8	8	8	8	8	8	8	8
57	9	9	9	9	9	9	9	ı	ı	9	9	9	9	9	9	9	9	9	9	9	9
58	:	:	:	:	:	:	:	∏	ı	:	:	:	:	:	:	:	:	:	:	:	:
59	:	:	:	:	:	:	:	£	ı	:	:	:	:	:	:	:	:	:	:	:	:
60	<	<	<	<	<	<	<	¥	ı	<	<	<	<	<	<	<	<	<	<	<	<
61	=	=	=	=	=	=	=	§	ı	=	=	=	=	=	=	=	=	=	=	=	=
62	>	>	>	>	>	>	>	ı	ı	>	>	>	>	>	>	>	>	>	>	>	>
63	?	?	?	?	?	?	?	ı	ı	?	?	?	?	?	?	?	?	?	?	?	?
64	@	@	@	@	@	@	@	â	ı	@	@	É	@	§	à	@	§	§	§	§	@

ASCII Code Definitions
in Character Sets –
Fixed-Space Vector Font (Continued)

DECIMAL VALUE	SET																				
	0	1	2	3	4	5	6	7	8	9	30	31	32	33	34	35	36	37	38	39	99
65	A	A	A	A	A	▣	A	ê	ƒ	A	A	A	A	A	A	A	A	A	A	A	A
66	B	B	B	B	B	◊	B	ô	Ƴ	B	B	B	B	B	B	B	B	B	B	B	B
67	C	C	C	C	C	△	C	û	Ƶ	C	C	C	C	C	C	C	C	C	C	C	C
68	D	D	D	D	D	+	D	á	†	D	D	D	D	D	D	D	D	D	D	D	D
69	E	E	E	E	E	x	E	é	ƶ	E	E	E	E	E	E	E	E	E	E	E	E
70	F	F	F	F	F	◊	F	ó	∩	F	F	F	F	F	F	F	F	F	F	F	F
71	G	G	G	G	G	†	G	ú	Ʒ	G	G	G	G	G	G	G	G	G	G	G	G
72	H	H	H	H	H	x	H	à	Ʒ	H	H	H	H	H	H	H	H	H	H	H	H
73	I	I	I	I	I	z	I	è	Ʒ	I	I	I	I	I	I	I	I	I	I	I	I
74	J	J	J	J	J	Ƴ	J	ò	∧	J	J	J	J	J	J	J	J	J	J	J	J
75	K	K	K	K	K	x	K	ù	Ƶ	K	K	K	K	K	K	K	K	K	K	K	K
76	L	L	L	L	L	*	L	ä	ƶ	L	L	L	L	L	L	L	L	L	L	L	L
77	M	M	M	M	M	x	M	ë	∧	M	M	M	M	M	M	M	M	M	M	M	M
78	N	N	N	N	N	∩	N	ö	Ʒ	N	N	N	N	N	N	N	N	N	N	N	N
79	O	O	O	O	O	*	O	ü	ƶ	O	O	O	O	O	O	O	O	O	O	O	O
80	P	P	P	P	P	-	P	À	∩	P	P	P	P	P	P	P	P	P	P	P	P
81	Q	Q	Q	Q	Q	∩	Q	î	∩	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q
82	R	R	R	R	R	R	R	Ø	Ƴ	R	R	R	R	R	R	R	R	R	R	R	R
83	S	S	S	S	S	S	S	Æ	Ƶ	S	S	S	S	S	S	S	S	S	S	S	S
84	T	T	T	T	T	T	T	à	ƶ	T	T	T	T	T	T	T	T	T	T	T	T
85	U	U	U	U	U	U	U	í	∩	U	U	U	U	U	U	U	U	U	U	U	U
86	V	V	V	V	V	V	V	ø	∩	V	V	V	V	V	V	V	V	V	V	V	V
87	W	W	W	W	W	W	W	æ	∩	W	W	W	W	W	W	W	W	W	W	W	W
88	X	X	X	X	X	X	X	Ä	∩	X	X	X	X	X	X	X	X	X	X	X	X
89	Y	Y	Y	Y	Y	Y	Y	ÿ	∩	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
90	Z	Z	Z	Z	Z	Z	Z	Ö	∩	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z
91	[	[	[	Ø	[	[	[	Ü	∩	[	Ä	Ä	Æ	Ä	•	[	•	∩	Ä	Ä	[
92	\	√	ç	Æ	∩	\	¥	É	ƶ	\	Ö	Ö	Ø	Ö	ç	\	ç	Ñ	Ç	Ç	Ø
93	]	]	]	ø	]	]	]	ÿ	∩	]	Ä	Ä	Ä	Ü	§	]	é	∩	Ö	Ö]
94	^	↑	■	æ	■	^	^	ß	∩	^	^	Ü	^	^	^	^	^	^	^	^	∩
95	-	■	■	■	■	-	-	ô	•	-	-	-	-	-	-	-	-	-	-	-	-
96	`	■	■	`	`	`	`	Á	∩	`	`	é	`	`	`	`	ü	`	`	`	`

*ASCII Code Definitions
in Character Sets —
Fixed-Space Vector Font (Continued)*

DECIMAL VALUE	SET																				
	0	1	2	3	4	5	6	7	8	9	30	31	32	33	34	35	36	37	38	39	99
97	a	a	a	a	a	∩	a	Ã		a	a	a	a	a	a	a	a	a	a	a	a
98	b	b	b	b	b	⊃	b	ã		b	b	b	b	b	b	b	b	b	b	b	b
99	c	c	c	c	c	∩	c	Ð		c	c	c	c	c	c	c	c	c	c	c	c
100	d	d	d	d	d	U	d	đ		d	d	d	d	d	d	d	d	d	d	d	d
101	e	e	e	e	e	—	e	Í		e	e	e	e	e	e	e	e	e	e	e	e
102	f	f	f	f	f	≡	f	ì		f	f	f	f	f	f	f	f	f	f	f	f
103	g	g	g	g	g	≡	g	Ó		g	g	g	g	g	g	g	g	g	g	g	g
104	h	h	h	h	h	≈	h	Ò		h	h	h	h	h	h	h	h	h	h	h	h
105	i	i	i	i	i	~	i	Ï		i	i	i	i	i	i	i	i	i	i	i	i
106	j	j	j	j	j	≡	j	ö		j	j	j	j	j	j	j	j	j	j	j	j
107	k	k	k	k	k	≥	k	Š		k	k	k	k	k	k	k	k	k	k	k	k
108	l	l	l	l	l	#	l	š		l	l	l	l	l	l	l	l	l	l	l	l
109	m	m	m	m	m	Δ	m	Ú		m	m	m	m	m	m	m	m	m	m	m	m
110	n	n	n	n	n	Π	n	ÿ		n	n	n	n	n	n	n	n	n	n	n	n
111	o	o	o	o	o	Σ	o	ÿ		o	o	o	o	o	o	o	o	o	o	o	o
112	p	p	p	p	p	±	p	þ		p	p	p	p	p	p	p	p	p	p	p	p
113	q	q	q	q	q	±	q	þ		q	q	q	q	q	q	q	q	q	q	q	q
114	r	r	r	r	r	—	r			r	r	r	r	r	r	r	r	r	r	r	r
115	s	s	s	s	s	↑	s			s	s	s	s	s	s	s	s	s	s	s	s
116	t	t	t	t	t	—	t			t	t	t	t	t	t	t	t	t	t	t	t
117	u	u	u	u	u	↓	u			u	u	u	u	u	u	u	u	u	u	u	u
118	v	v	v	v	v	∫	v	—		v	v	v	v	v	v	v	v	v	v	v	v
119	w	w	w	w	w	÷	w	¼		w	w	w	w	w	w	w	w	w	w	w	w
120	x	x	x	x	x	*	x	½		x	x	x	x	x	x	x	x	x	x	x	x
121	y	y	y	y	y	∇	y	¾		y	y	y	y	y	y	y	y	y	y	y	y
122	z	z	z	z	z	·	z	¾		z	z	z	z	z	z	z	z	z	z	z	z
123	{	π	■	■	■	{	{	<		{	ä	ä	æ	ä	é	{	à	·	ã	ã	μ
124	|	†	■	■	■	|	|	□		|	ö	ö	ø	ö	ù	|	ò	ñ	ç	ç	°
125	}	—	■	■	■	}	}	>		}	á	á	á	ü	è	}	è	ç	ö	ö	∞
126	~	■	■	■	■	~	~	±		—	—	ü	—	ß	—	—	ì	~	·	·	~

ASCII Code Definitions
in Character Sets —
Variable-Space Arc Font

DECIMAL VALUE	SET																			
	10	11	12	13	14	15	16	17	18	19	40	41	42	43	44	45	46	47	48	49
33	!	!	!	!	!	!	!	À	.	!	!	!	!	!	!	!	!	!	!	!
34	"	"	"	"	"	"	"	Â	Γ	"	"	"	"	"	"	"	"	"	"	"
35	#	#	£	£	¿	#	#	È	∟	#	#	#	#	#	£	£	£	£	#	\$
36	\$	\$	\$	\$	\$	\$	\$	Ê	,	∩	∩	∩	\$	\$	\$	\$	\$	\$	\$	\$
37	%	%	%	%	%	%	%	Ë	·	%	%	%	%	%	%	%	%	%	%	%
38	&	&	&	&	&	&	&	Ï	Ɔ	&	&	&	&	&	&	&	&	&	&	&
39	'	'	■	'	■	'	'	ÿ	Ɔ	'	'	'	'	'	'	'	'	'	'	'
40	(	(	(	(	(	(	(	ı	((((((((((((
41)))))))	˘))))))))))))
42	*	*	*	*	*	*	*	ˆ	ı	*	*	*	*	*	*	*	*	*	*	*
43	+	+	+	+	+	+	+	˙	ı	+	+	+	+	+	+	+	+	+	+	+
44	,	,	,	,	,	,	,	˜	ı	,	,	,	,	,	,	,	,	,	,	,
45	-	-	-	-	-	-	-	Ù	ı	-	-	-	-	-	-	-	-	-	-	-
46	.	.	.	.	.	.	.	Û	ı	.	.	.	.	.	.	.	.	.	.	.
47	/	/	/	/	/	/	/	£	ı	/	/	/	/	/	/	/	/	/	/	/
48	0	0	0	0	0	0	0	—	-	0	0	0	0	0	0	0	0	0	0	0
49	1	1	1	1	1	1	1	Ɔ	ı	1	1	1	1	1	1	1	1	1	1	1
50	2	2	2	2	2	2	2	ı	ı	2	2	2	2	2	2	2	2	2	2	2
51	3	3	3	3	3	3	3	˘	ı	3	3	3	3	3	3	3	3	3	3	3
52	4	4	4	4	4	4	4	Ç	ı	4	4	4	4	4	4	4	4	4	4	4
53	5	5	5	5	5	5	5	ç	ı	5	5	5	5	5	5	5	5	5	5	5
54	6	6	6	6	6	6	6	Ñ	ı	6	6	6	6	6	6	6	6	6	6	6
55	7	7	7	7	7	7	7	ñ	ı	7	7	7	7	7	7	7	7	7	7	7
56	8	8	8	8	8	8	8	ı	ı	8	8	8	8	8	8	8	8	8	8	8
57	9	9	9	9	9	9	9	¿	ı	9	9	9	9	9	9	9	9	9	9	9
58	:	:	:	:	:	:	:	∩	ı	:	:	:	:	:	:	:	:	:	:	:
59	;	;	;	;	;	;	;	£	ı	;	;	;	;	;	;	;	;	;	;	;
60	<	<	<	<	<	<	<	¥	ı	<	<	<	<	<	<	<	<	<	<	<
61	=	=	=	=	=	=	=	§	ı	=	=	=	=	=	=	=	=	=	=	=
62	>	>	>	>	>	>	>	Ɔ	ı	>	>	>	>	>	>	>	>	>	>	>
63	?	?	?	?	?	?	?	ç	ı	?	?	?	?	?	?	?	?	?	?	?
64	@	@	@	@	@	@	@	â	ı	@	@	É	@	§	à	@	§	§	§	@

ASCII Code Definitions
in Character Sets —
Variable-Space Arc Font (Continued)

DECIMAL VALUE	SET																			
	10	11	12	13	14	15	16	17	18	19	40	41	42	43	44	45	46	47	48	49
65	A	A	A	A	A	□	A	ê	ƒ	A	A	A	A	A	A	A	A	A	A	A
66	B	B	B	B	B	○	B	ô	Ƶ	B	B	B	B	B	B	B	B	B	B	B
67	C	C	C	C	C	△	C	û	ƚ	C	C	C	C	C	C	C	C	C	C	C
68	D	D	D	D	D	+	D	á	†	D	D	D	D	D	D	D	D	D	D	D
69	E	E	E	E	E	×	E	é	‡	E	E	E	E	E	E	E	E	E	E	E
70	F	F	F	F	F	◊	F	ó	∩	F	F	F	F	F	F	F	F	F	F	F
71	G	G	G	G	G	‡	G	ú	×	G	G	G	G	G	G	G	G	G	G	G
72	H	H	H	H	H	×	H	à	‡	H	H	H	H	H	H	H	H	H	H	H
73	I	I	I	I	I	z	I	è	∩	I	I	I	I	I	I	I	I	I	I	I
74	J	J	J	J	J	γ	J	ò	∧	J	J	J	J	J	J	J	J	J	J	J
75	K	K	K	K	K	×	K	ù	‡	K	K	K	K	K	K	K	K	K	K	K
76	L	L	L	L	L	*	L	ä	∩	L	L	L	L	L	L	L	L	L	L	L
77	M	M	M	M	M	Σ	M	ë	∧	M	M	M	M	M	M	M	M	M	M	M
78	N	N	N	N	N	∩	N	ö	‡	N	N	N	N	N	N	N	N	N	N	N
79	O	O	O	O	O	*	O	ü	∩	O	O	O	O	O	O	O	O	O	O	O
80	P	P	P	P	P	-	P	Á	∩	P	P	P	P	P	P	P	P	P	P	P
81	Q	Q	Q	Q	Q	∩	Q	î	∩	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q
82	R	R	R	R	R	R	R	Ø	×	R	R	R	R	R	R	R	R	R	R	R
83	S	S	S	S	S	S	S	Æ	∩	S	S	S	S	S	S	S	S	S	S	S
84	T	T	T	T	T	T	T	à	‡	T	T	T	T	T	T	T	T	T	T	T
85	U	U	U	U	U	U	U	í	∩	U	U	U	U	U	U	U	U	U	U	U
86	V	V	V	V	V	V	V	ø	∩	V	V	V	V	V	V	V	V	V	V	V
87	W	W	W	W	W	W	W	æ	∩	W	W	W	W	W	W	W	W	W	W	W
88	X	X	X	X	X	X	X	Ä	∩	X	X	X	X	X	X	X	X	X	X	X
89	Y	Y	Y	Y	Y	Y	Y	ÿ	∩	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
90	Z	Z	Z	Z	Z	Z	Z	Ö	∩	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z
91	[	[	[	Ø	[	[	[	Ü	∩	[	Ä	Ä	Æ	Ä	·	[	·	∩	Ä	Æ
92	\	√	ç	Æ	∩	\	¥	É	∩	\	Ö	Ö	Ø	Ö	ç	\	ç	Ñ	Ç	Ø
93	]	]	]	ø	]	]	]	ÿ	∩	]	Ä	Ä	Ä	Ü	§	]	é	∩	Ö	Ä
94	^	↑	■	æ	■	^	^	B	·	^	^	Ü	^	^	^	^	^	^	^	^
95	—	—	—	—	—	—	—	Ô	·	—	—	—	—	—	—	—	—	—	—	—
96	·	·	·	·	·	·	·	Á	·	·	é	·	·	·	·	·	·	·	·	·

ASCII Code Definitions
in Character Sets —
Variable-Space Arc Font (Continued)

DECIMAL VALUE	SET																			
	10	11	12	13	14	15	16	17	18	19	40	41	42	43	44	45	46	47	48	49
97	a	a	a	a	a	∩	a	Ã	a	a	a	a	a	a	a	a	a	a	a	a
98	b	b	b	b	b	∩	b	ã	b	b	b	b	b	b	b	b	b	b	b	b
99	c	c	c	c	c	C	c	Ð	c	c	c	c	c	c	c	c	c	c	c	c
100	d	d	d	d	d	U	d	đ	d	d	d	d	d	d	d	d	d	d	d	d
101	e	e	e	e	e	—	e	í	e	e	e	e	e	e	e	e	e	e	e	e
102	f	f	f	f	f	≡	f	ì	f	f	f	f	f	f	f	f	f	f	f	f
103	g	g	g	g	g	≅	g	Ó	g	g	g	g	g	g	g	g	g	g	g	g
104	h	h	h	h	h	≈	h	Ò	h	h	h	h	h	h	h	h	h	h	h	h
105	i	i	i	i	i	~	i	Ï	i	i	i	i	i	i	i	i	i	i	i	i
106	j	j	j	j	j	≤	j	ø	j	j	j	j	j	j	j	j	j	j	j	j
107	k	k	k	k	k	≥	k	Š	k	k	k	k	k	k	k	k	k	k	k	k
108	l	l	l	l	l	≠	l	š	l	l	l	l	l	l	l	l	l	l	l	l
109	m	m	m	m	m	Δ	m	Ú	m	m	m	m	m	m	m	m	m	m	m	m
110	n	n	n	n	n	Π	n	ÿ	n	n	n	n	n	n	n	n	n	n	n	n
111	o	o	o	o	o	Σ	o	ÿ	o	o	o	o	o	o	o	o	o	o	o	o
112	p	p	p	p	p	±	p	þ	p	p	p	p	p	p	p	p	p	p	p	p
113	q	q	q	q	q	∓	q	þ	q	q	q	q	q	q	q	q	q	q	q	q
114	r	r	r	r	r	→	r		r	r	r	r	r	r	r	r	r	r	r	r
115	s	s	s	s	s	↑	s		s	s	s	s	s	s	s	s	s	s	s	s
116	t	t	t	t	t	←	t		t	t	t	t	t	t	t	t	t	t	t	t
117	u	u	u	u	u	↓	u		u	u	u	u	u	u	u	u	u	u	u	u
118	v	v	v	v	v	∫	v	—	v	v	v	v	v	v	v	v	v	v	v	v
119	w	w	w	w	w	÷	w	¼	w	w	w	w	w	w	w	w	w	w	w	w
120	x	x	x	x	x	*	x	½	x	x	x	x	x	x	x	x	x	x	x	x
121	y	y	y	y	y	∇	y	¾	y	y	y	y	y	y	y	y	y	y	y	y
122	z	z	z	z	z	·	z	¾	z	z	z	z	z	z	z	z	z	z	z	z
123	{	π	■	■	■	{	{	«	{	ä	ä	æ	ä	é	{	à	·	ã	æ	
124	|	†	■	■	■	|	|	□	|	ö	ö	ø	ö	ù	|	ò	ñ	ç	ø	
125	}	→	■	■	■	}	}	»	}	á	á	á	ü	è	}	è	ç	õ	á	
126	~	■	■	■	■	~	~	±	—	—	ü	—	ß	·	—	ì	~	·	~	














ASCII Code Definitions
in Character Sets —
Fixed-Space Arc Font

DECIMAL VALUE	SET																			
	20	21	22	23	24	25	26	27	28	29	50	51	52	53	54	55	56	57	58	59
33	!	!	!	!	!	!	!	À	.	!	!	!	!	!	!	!	!	!	!	!
34	"	"	"	"	"	"	"	Â	ƒ	"	"	"	"	"	"	"	"	"	"	"
35	#	#	£	£	¢	#	#	È	ƒ	#	#	#	#	#	£	£	£	£	#	\$
36	\$	\$	\$	\$	\$	\$	\$	É	,	¤	¤	¤	¤	\$	\$	\$	\$	\$	\$	\$
37	%	%	%	%	%	%	%	Ê	•	%	%	%	%	%	%	%	%	%	%	%
38	&	&	&	&	&	&	&	Ë	ƒ	&	&	&	&	&	&	&	&	&	&	&
39	'	'	■	'	■	'	'	Ï	ƒ	'	'	'	'	'	'	'	'	'	'	'
40	(	(	(	(	(	(	(	Í	ƒ	(((((((((((
41	)	)	)	)	)	)	)	Î	ƒ)))))))))))
42	*	*	*	*	*	*	*	Ï	ƒ	*	*	*	*	*	*	*	*	*	*	*
43	+	+	+	+	+	+	+	Ï	ƒ	+	+	+	+	+	+	+	+	+	+	+
44	,	,	,	,	,	,	,	Ï	ƒ	,	,	,	,	,	,	,	,	,	,	,
45	-	-	-	-	-	-	-	Ï	ƒ	-	-	-	-	-	-	-	-	-	-	-
46	.	.	.	.	.	.	.	Ï	ƒ	.	.	.	.	.	.	.	.	.	.	.
47	/	/	/	/	/	/	/	Ï	ƒ	/	/	/	/	/	/	/	/	/	/	/
48	0	0	0	0	0	0	0	Ï	ƒ	0	0	0	0	0	0	0	0	0	0	0
49	1	1	1	1	1	1	1	Ï	ƒ	1	1	1	1	1	1	1	1	1	1	1
50	2	2	2	2	2	2	2	Ï	ƒ	2	2	2	2	2	2	2	2	2	2	2
51	3	3	3	3	3	3	3	Ï	ƒ	3	3	3	3	3	3	3	3	3	3	3
52	4	4	4	4	4	4	4	Ï	ƒ	4	4	4	4	4	4	4	4	4	4	4
53	5	5	5	5	5	5	5	Ï	ƒ	5	5	5	5	5	5	5	5	5	5	5
54	6	6	6	6	6	6	6	Ï	ƒ	6	6	6	6	6	6	6	6	6	6	6
55	7	7	7	7	7	7	7	Ï	ƒ	7	7	7	7	7	7	7	7	7	7	7
56	8	8	8	8	8	8	8	Ï	ƒ	8	8	8	8	8	8	8	8	8	8	8
57	9	9	9	9	9	9	9	Ï	ƒ	9	9	9	9	9	9	9	9	9	9	9
58	:	:	:	:	:	:	:	Ï	ƒ	:	:	:	:	:	:	:	:	:	:	:
59	;	;	;	;	;	;	;	Ï	ƒ	;	;	;	;	;	;	;	;	;	;	;
60	<	<	<	<	<	<	<	Ï	ƒ	<	<	<	<	<	<	<	<	<	<	<
61	=	=	=	=	=	=	=	Ï	ƒ	=	=	=	=	=	=	=	=	=	=	=
62	>	>	>	>	>	>	>	Ï	ƒ	>	>	>	>	>	>	>	>	>	>	>
63	?	?	?	?	?	?	?	Ï	ƒ	?	?	?	?	?	?	?	?	?	?	?
64	@	@	@	@	@	@	@	Ï	ƒ	@	@	É	@	\$	ð	@	\$	\$	\$	@

ASCII Code Definitions
in Character Sets —
Fixed-Space Arc Font (Continued)

DECIMAL VALUE	SET																			
	20	21	22	23	24	25	26	27	28	29	50	51	52	53	54	55	56	57	58	59
65	A	A	A	A	A	▣	A	ê	ƒ	A	A	A	A	A	A	A	A	A	A	A
66	B	B	B	B	B	◊	B	ô	ツ	B	B	B	B	B	B	B	B	B	B	B
67	C	C	C	C	C	△	C	û	ƒ	C	C	C	C	C	C	C	C	C	C	C
68	D	D	D	D	D	+	D	á	†	D	D	D	D	D	D	D	D	D	D	D
69	E	E	E	E	E	x	E	é	†	E	E	E	E	E	E	E	E	E	E	E
70	F	F	F	F	F	◊	F	ó	二	F	F	F	F	F	F	F	F	F	F	F
71	G	G	G	G	G	+	G	ú	ƒ	G	G	G	G	G	G	G	G	G	G	G
72	H	H	H	H	H	x	H	à	‡	H	H	H	H	H	H	H	H	H	H	H
73	I	I	I	I	I	z	I	è	ノ	I	I	I	I	I	I	I	I	I	I	I
74	J	J	J	J	J	γ	J	ò	∧	J	J	J	J	J	J	J	J	J	J	J
75	K	K	K	K	K	x	K	ù	‡	K	K	K	K	K	K	K	K	K	K	K
76	L	L	L	L	L	*	L	ä	ノ	L	L	L	L	L	L	L	L	L	L	L
77	M	M	M	M	M	z	M	ë	∧	M	M	M	M	M	M	M	M	M	M	M
78	N	N	N	N	N	|	N	ö	‡	N	N	N	N	N	N	N	N	N	N	N
79	O	O	O	O	O	*	O	ü	γ	O	O	O	O	O	O	O	O	O	O	O
80	P	P	P	P	P	-	P	À	≡	P	P	P	P	P	P	P	P	P	P	P
81	Q	Q	Q	Q	Q	|	Q	î	∠	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q
82	R	R	R	R	R	R	R	ø	×	R	R	R	R	R	R	R	R	R	R	R
83	S	S	S	S	S	S	S	Æ	ƒ	S	S	S	S	S	S	S	S	S	S	S
84	T	T	T	T	T	T	T	à	‡	T	T	T	T	T	T	T	T	T	T	T
85	U	U	U	U	U	U	U	í	∩	U	U	U	U	U	U	U	U	U	U	U
86	V	V	V	V	V	V	V	ø	∩	V	V	V	V	V	V	V	V	V	V	V
87	W	W	W	W	W	W	W	æ	∩	W	W	W	W	W	W	W	W	W	W	W
88	X	X	X	X	X	X	X	Ä	∩	X	X	X	X	X	X	X	X	X	X	X
89	Y	Y	Y	Y	Y	Y	Y	ÿ	∩	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
90	Z	Z	Z	Z	Z	Z	Z	Ö	∩	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z
91	[	[	[	Ø	[	[	[	Ü	∩	[	Ä	Ä	Æ	Ä	°	[	°	|	Ä	Æ
92	\	√	ç	Æ	|	\	¥	É	∩	\	Ö	Ö	Ø	Ö	ç	\	ç	Ñ	Ç	Ø
93	]	]	]	ø	]	]	]	ÿ	∩	]	Ä	Ä	Ä	Ü	§	]	é	¿	Ö	Ä
94	^	↑	■	■	■	■	^	^	β	"	^	^	Ü	^	^	^	^	^	^	^
95	-	■	■	■	■	-	-	ô	°	-	-	-	-	-	-	-	-	-	-	-
96	'	■	■	'	'	'	'	Á	'	'	é	'	'	'	'	'	'	'	'	'

ASCII Code Definitions
in Character Sets —
Fixed-Space Arc Font (Continued)

DECIMAL VALUE	SET																			
	20	21	22	23	24	25	26	27	28	29	50	51	52	53	54	55	56	57	58	59
97	a	a	a	a	a	∩	a	Ã	a	a	a	a	a	a	a	a	a	a	a	a
98	b	b	b	b	b	∩	b	ã	b	b	b	b	b	b	b	b	b	b	b	b
99	c	c	c	c	c	∩	c	ð	c	c	c	c	c	c	c	c	c	c	c	c
100	d	d	d	d	d	∩	d	đ	d	d	d	d	d	d	d	d	d	d	d	d
101	e	e	e	e	e	∩	e	í	e	e	e	e	e	e	e	e	e	e	e	e
102	f	f	f	f	f	≡	f	ì	f	f	f	f	f	f	f	f	f	f	f	f
103	g	g	g	g	g	≡	g	ó	g	g	g	g	g	g	g	g	g	g	g	g
104	h	h	h	h	h	≈	h	ò	h	h	h	h	h	h	h	h	h	h	h	h
105	i	i	i	i	i	~	i	ï	i	i	i	i	i	i	i	i	i	i	i	i
106	J	J	J	J	J	≤	J	õ	J	J	J	J	J	J	J	J	J	J	J	J
107	k	k	k	k	k	≥	k	š	k	k	k	k	k	k	k	k	k	k	k	k
108	l	l	l	l	l	#	l	š	l	l	l	l	l	l	l	l	l	l	l	l
109	m	m	m	m	m	Δ	m	ú	m	m	m	m	m	m	m	m	m	m	m	m
110	n	n	n	n	n	∏	n	ÿ	n	n	n	n	n	n	n	n	n	n	n	n
111	o	o	o	o	o	Σ	o	ÿ	o	o	o	o	o	o	o	o	o	o	o	o
112	p	p	p	p	p	±	p	þ	p	p	p	p	p	p	p	p	p	p	p	p
113	q	q	q	q	q	∓	q	þ	q	q	q	q	q	q	q	q	q	q	q	q
114	r	r	r	r	r	→	r		r	r	r	r	r	r	r	r	r	r	r	r
115	s	s	s	s	s	↑	s		s	s	s	s	s	s	s	s	s	s	s	s
116	t	t	t	t	t	←	t		t	t	t	t	t	t	t	t	t	t	t	t
117	u	u	u	u	u	↓	u		u	u	u	u	u	u	u	u	u	u	u	u
118	v	v	v	v	v	∫	v	-	v	v	v	v	v	v	v	v	v	v	v	v
119	w	w	w	w	w	÷	w	¼	w	w	w	w	w	w	w	w	w	w	w	w
120	x	x	x	x	x	*	x	½	x	x	x	x	x	x	x	x	x	x	x	x
121	y	y	y	y	y	∇	y	à	y	y	y	y	y	y	y	y	y	y	y	y
122	z	z	z	z	z	°	z	ò	z	z	z	z	z	z	z	z	z	z	z	z
123	{	π				{	{	«	{	ä	ä	æ	ä	é	{	à	°	ã	æ	
124	|	†				|	|	□	|	ö	ö	ø	ö	ù	|	ò	ñ	ç	ø	
125	}	→				}	}	»	}	ä	ä	ä	ü	è	}	è	ç	õ	ä	
126	~					~	~	±	-	-	ü	-	ß	°	-	ì	~	°	~	

