HP DRAFTMASTER PLOTTER POCKET GUIDE

How To Use This Guide

This pocket guide is divided into two sections. The first section lists each HP-GL instruction in alphabetic order of the instruction's mnemonic. Also included are tables of default conditions, HP-GL errors, and device-control errors. If you know what the instruction does, but don't know the mnemonic, the index on the following pages groups the HP-GL instructions according to function. Refer to this index to find the instruction you need as well as its page number.

The second section of this guide lists each device-control instruction in alphabetic order of the escape sequence.

Syntax and parameter ranges are provided for each HP-GL and device-control instruction. The format notation 'current units' indicates that the format is integer if scaling is off and real if scaling is on. The semicolon is included as the terminator for all HP-GL instructions. (However, a semicolon or the next mnemonic are each valid terminators. In an HP-IB configuration, a line feed character is also a valid terminator.) The terminator sent by the plotter at the end of an output response is **CR LF** in an HP-IB configuration and **CR**, or as set by an ESC.M instruction, in an RS-232-C/CCITT V.24 configuration.

HP-GL Instruction Summary

AA, Arc Absolute

USE: Draws an arc, using absolute coordinates, that starts at the current pen location and uses the specified center point.

SYNTAX: AA *X,Y,arc angle(,chord tolerance)*;

Parameter	Format	Range	Default
X,Y coordinates	current units	−8 388 608 to 8 388 607	none
arc angle	real	−360 to 360 degrees**	none
chord tolerance chord angle*	real	0.36 to 180 degrees**	5 degrees
chord deviation	current units	−8 388 608 to 8 388 607	5 degrees†

*Chord angle is the default interpretation of chord tolerance.

**Practical range; allowable range is −8 388 608 to 8 388 607.

†If no deviation distance is specified, the chord tolerance defaults to a chord *angle* of 5 degrees.

AF, Advance Full Page

USE: Advances roll paper one full page length and establishes the origin at the center of the new page.

SYNTAX: AF;

AH, Advance Half Page

USE: Advances roll paper one half page length and establishes the origin at the center of the new page.

SYNTAX: AH;

AP, Automatic Pen Operations

USE: Controls automatic pen operations such as returning a pen to the carousel if it has been in the holder without drawing for a certain time.

SYNTAX: AP; or AP n;

Parameter	Format	Range	Default
n	integer	0 to 255	95

AR, Arc Relative

USE: Draws an arc, using relative coordinates, that starts at the current pen location and uses the specified center point.

SYNTAX: AR *X,Y,arc angle(,chord tolerance)*;

Parameter	Format	Range	Default
X,Y coordinates	current units	−8 388 608 to 8 388 607	none
arc angle	real	−360 to 360 degrees**	none
chord tolerance chord angle*	real	0.36 to 180 degrees**	5 degrees
chord deviation	current units	−8 388 608 to 8 388 607	5 degrees†

*Chord angle is the default interpretation of chord tolerance.

**Practical range; allowable range is −8388608 to 8388607.

†If no deviation distance is specified, the chord tolerance defaults to a chord *angle* of 5 degrees.

AS, Acceleration Select

USE: Sets pen acceleration for one or all pens. The default acceleration is suitable for all recommended pen and media combinations. Slowing the acceleration may improve line quality if you are using heavier than recommended media.

SYNTAX: AS *pen acceleration (,pen number)*; or AS;

Parameter	Format	Range	Default
pen acceleration	integer	1 to 4 g's	4
pen number	integer	1 to 8	all pens

BL, Buffer Label

USE: Stores a label in the label buffer. You can then use the output length (OL) instruction to determine its space requirement prior to drawing it. Or, you can use the plot buffer (PB) instruction to repeatedly plot this label.

SYNTAX: BL *c...c* CHR$(3) or BL CHR$(3)

Parameter	Format	Range	Default
c...c	label	1 to 150 ASCII characters	none

CA, Designate Alternate Character Set

USE: Designates a character set as the alternate character set to be used in labeling instructions. Use this instruction to provide an additional character set that you can easily access in a program.

SYNTAX: CA *set*; or CA;

Parameter	Format	Range	Default
set	integer	−1, 0−59, 60, 70, 80, 99, 100 & 101*	0

*The Kanji character set (sets 100 and 101) are available as an option.

CC, Character Chord Angle

USE: Sets the chord angle that determines the smoothness of characters drawn when you select one of the arc-font character sets for labeling.

SYNTAX: CC *chord angle*; or CC;

Parameter	Format	Range	Default
chord angle	real	0.36 to 45 degrees*	5

*Practical range; allowable range is −8 388 608 to 8 388 607.

CI, Circle

USE: Draws a circle using the specified radius and chord tolerance. If you want a filled circle, refer to the WG or PM instruction.

SYNTAX: CI *radius(,chord tolerance)*;

Parameter	Format	Range	Default
radius	current units	−8 388 608 to 8 388 607	none
chord tolerance chord angle*	real	0.36 to 180 degrees**	5 degrees
chord deviation	current units	−8 388 608 to 8 388 607	5 degrees†

*Chord angle is the default interpretation of chord tolerance.

**Practical range; allowable range is −8 388 608 to 8 388 607.

†If no deviation distance is specified, the chord tolerance defaults to a chord *angle* of 5 degrees.

CM, Character Selection Mode

USE: Specifies mode of character set selection and usage. Use this instruction to select the alternate HP 8-bit, ISO 7-bit, or ISO 8-bit character modes.

SYNTAX: CM *switch mode(,fallback mode)*; or CM;

Parameter	Format	Range	Default
switch mode	integer	0 to 3	0
fallback mode	integer	0 or 1	0

CP, Character Plot

USE: Moves the pen the specified number of character plot cells from the current pen location (e.g., to indent or center a label).

SYNTAX: CP *spaces, lines*; or CP;

Parameter	Format	Range	Default
spaces	real	−8 388 608 to 8 388 607 CP cells	none
lines	real	−8 388 608 to 8 388 607 CP cells	none

CS, Designate Standard Character Set

USE: Designates a character set as the standard character set for labeling instructions. Use this instruction to change the default ANSI ASCII English set to one with characters appropriate to your application. This instruction is particularly useful if you plot most of your labels in a language other than English.

SYNTAX: CS *set*; or CS;

Parameter	Format	Range	Default
set	integer	−1, 0−59, 60, 70, 80, 99, 100 & 101*	0

*The Kanji character set (sets 100 and 101) are available as an option.

CT, Chord Tolerance

USE: Determines whether the chord tolerance parameter of the CI, AA, AR, EW, and WG instructions is interpreted as a chord angle in degrees or as a deviation distance in current units.

SYNTAX: CT *n*; or CT;

Parameter	Format	Range	Default
n	integer	0 or 1	0 (degrees)

CV, Curved Line Generator

USE: Collects vectors (line segments) in the vector buffer so that they can be plotted as a group. This allows the plotter to plot in a continuous motion, rather than stopping and starting at each vector endpoint. As a result, curves appear smoother.

SYNTAX: CV *n(,input delay)*; or CV;

Parameter	Format	Range	Default
n	integer	0 or 1	1 (on)
input delay	integer	0 to 8 388 607 msec	100

DC, Digitize Clear

USE: Terminates digitize mode. For example, if you are using an interrupt routine in a digitizing program to branch to another plotting function, use DC to clear the digitize mode immediately after branching.

SYNTAX: DC;

DF, Default

USE: Sets certain plotter functions to predefined default conditions. Use this instruction to return the plotter to a known state while maintaining the current locations of P1 and P2. When you use DF at the beginning of a program, unwanted graphics parameters such as character size, slant, or scaling are not inherited from another program. Refer to the table of default conditions at the end of this pocket guide.

SYNTAX: DF;

DI, Absolute Direction

USE: Specifies the direction in which labels are drawn, independent of P1 and P2 settings. Use this instruction to change labeling direction when you are labeling line charts, schematic drawings, blueprints, and survey boundaries.

SYNTAX: DI *run, rise*; or DI;

Parameter	Format	Range	Default
run (or cos θ)	real	−8 388 608 to 8 388 607	1
rise (or sin θ)	real	−8 388 608 to 8 388 607	0

DL, Define Downloadable Character

USE: Allows you to design characters and store them in a buffer for repeated use by character set −1.

SYNTAX: DL *character number (,pen control), X-coordinate, Y-coordinate (,...,(,pen control(,...,)));* or

DL *character number*; or DL;

Parameter	Format	Range	Default
character number	integer	33 to 126	none
pen control	integer	−128	none
X,Y coordinates	integer	−127 to 127 primitive grid units	none

DP, Digitize Point

USE: Returns the X,Y coordinates of a selected point on a plot to the computer for later use. Use this instruction to input data for a graphics program or to obtain the coordinates of a point or points on a plot.

SYNTAX: DP;

DR, Relative Direction

USE: Specifies the direction in which labels are drawn, relative to the scaling points P1 and P2. *Label direction is adjusted when P1 and P2 change so that labels maintain the same relationship to the plotted data.* Use DI if you want label direction to be independent of P1 and P2.

SYNTAX: DR *run, rise*; or DR;

Parameter	Format	Range	Default
run	real	−8 388 608 to 8 388 607	1% of $P2_X - P1_X$
rise	real	−8 388 608 to 8 388 607	0% of $P2_Y - P1_Y$

DS, Designate Character Set into Slot

USE: Designates up to four character sets to be immediately available for plotting. Used with ISO character sets and modes.

SYNTAX: DS *slot,set*; or DS;

Parameter	Format	Range	Default
slot	integer	0–1 (HP modes) 0–3 (ISO modes)	0
set	integer	−1, 0–59, 60, 70, 80, 99, 100 & 101*	0

*The Kanji character set (sets 100 and 101) are available as an option.

DT, Define Label Terminator

USE: Specifies the ASCII character to be used as the label terminator. Use this instruction to define a new label terminator if your computer cannot use the default label terminator (**ETX**, decimal code 3).

SYNTAX: DT *label terminator*; or DT;

Parameter	Format	Range	Default
label terminator	label	any character except **NULL, ENQ, LF, ESC**, and ; (decimal codes 0, 5, 10, 27, and 59 respectively)	**ETX** (decimal code 3)

DV, Direction Vertical

USE: Specifies vertical mode as the direction for subsequent labels. Use this instruction to 'stack' horizontal characters in a column. A carriage return and line feed place the next 'column' to the left of the previous one. This is especially useful when using the Kanji character set.

SYNTAX: DV *n*; or DV;

Parameter	Format	Range	Default
n	integer	0 or 1	0 horizontal

EA, Edge Rectangle Absolute

USE: Defines and outlines a rectangle using absolute coordinates. Use the EA instruction to create charts that require rectangles; for example, bar charts, flow charts, and organization charts.

SYNTAX: EA *X,Y*;

Parameter	Format	Range	Default
X,Y coordinates	current units	−8 388 608 to 8 388 607	none

EC, Enable Cut Line

USE: Draws a dashed cut line between 'pages' on roll paper to indicate where to cut the paper. Used with AF, AH, and PG instructions.

SYNTAX: EC; or EC *n*;

Parameter	Format	Range	Default
n	integer	−8 388 608 to 8 388 607	none

EP, Edge Polygon

USE: Outlines the polygon currently stored in the polygon buffer. Use this instruction to edge polygons that you defined in polygon mode (PM) and with the rectangle and wedge instructions (RA, RR, and WG).

SYNTAX: EP;

ER, Edge Rectangle Relative

USE: Defines and outlines a rectangle using relative coordinates. Use ER to create charts that require rectangles; for example, bar charts, flow charts, and organization charts.

SYNTAX: ER *X,Y*;

Parameter	Format	Range	Default
X,Y increments	current units	−8 388 608 to 8 388 607	none

ES, Extra Space

USE: Adjusts space between characters and lines of labels without affecting character size.

SYNTAX: ES *spaces (,lines)*; or ES;

Parameter	Format	Range	Default
spaces	real	−0.5 to 1*	0
lines	real	−0.5 to 2*	0

*Practical range; allowable range is −8 388 608 to 8 388 607.

EW, Edge Wedge

USE: Outlines any wedge. Use these instructions to produce sectors of a pie chart.

SYNTAX: EW *radius, start angle, sweep angle (,chord tolerance)*;

Parameter	Format	Range	Default
radius	current units	−8 388 608 to 8 388 607	none
start angle	real	0 to 360 degrees**	none
sweep angle	real	0 to 360 degrees**	none
chord tolerance			
chord angle*	real	0.36 to 50 degrees**	5 degrees
chord deviation	current units	−8 388 608 to 8 388 607	5 degrees†

*Chord angle is the default interpretation of chord tolerance.

**Practical range; allowable range is −8 388 608 to 8 388 607.

†If no deviation distance is specified, the chord tolerance defaults to a chord *angle* of 5 degrees.

FP, Fill Polygon

USE: Fills the polygon currently in the polygon buffer. Use FP to fill polygons defined in polygon mode (PM) and defined with the edge rectangle and wedge instructions (EA, ER, and EW).

SYNTAX: FP;

FR, Advance Frame

USE: Advances paper to the next plot frame and calculates a relative coordinate system for that frame. Use FR to do multi-frame long-axis plotting.

SYNTAX: FR;

FS, Force Select

USE: Sets pen pressure to the paper for one or all pens. Use this instruction to optimize pen life and line quality for each pen and paper combination.

SYNTAX: FS *pen force (,pen number)*;

Parameter	Format	Range	Default
pen force	integer	1 to 8	varies with carousel
pen number	integer	1 to 8	all pens

Carousel Type	Default Pen Force
paper	24
transparency	24
roller ball	51
drafting	30

FT, Fill Type

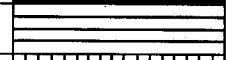
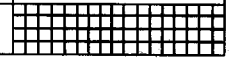
USE: Selects the shading pattern used in polygons (FP), rectangles (RA or RR), or wedges (WG). Use this instruction to enhance plots with solid fill, parallel lines (hatching), cross-hatching, or a fill pattern you designed using the user-defined fill type (UF) instruction.

SYNTAX: FT *type(,spacing(,angle))*; or FT;

Parameter	Format	Range	Default
type	integer	1 to 6	1
spacing	current units	0 to 8 388 607	depends on type
angle	real	0 to 90 degrees*	0

*Practical range; allowable range is −8 388 608 to 8 388 607.

The fill types that come with the plotter (1–4) are as follows:

Type	Fill Type	Pattern
1 or 2	solid	
3	hatch	
4	cross-hatch	

GC, Group Count

USE: Allows you to assign an arbitrary number that will be output by the OG instruction. Use GC with the OG instruction to monitor the successful transfer of data blocks in spooling applications.

SYNTAX: GC *count number*; or GC;

Parameter	Format	Range	Default
count number	integer	−8 388 608 to 8 388 607	0

GM, Graphics Memory

USE: Allocates memory to four of the five buffers in the configurable graphics memory.

SYNTAX: GM *(polygon buffer(,downloadable character buffer(,reserved buffer(,vector buffer(,pen sort buffer)))))*; or GM;

Parameter	Format	Range*	Default
polygon buffer	integer	4 to 25 520 bytes	3072
downloadable character buffer	integer	0 to 25 516 bytes	0
reserved buffer	integer	0**	0
vector buffer	integer	66 to 25 582	3000
pen sort buffer	integer	12 to 25 528	18 504

*The maximum values assume that the I/O buffer (**ESC**. T) is 1024.

**You must enter 0 for this parameter.

GP, Group Pen

USE: Assigns pens of the same type/color to a group in order to extend the effective writing distance beyond the life of one pen.

SYNTAX: GP *(group number(,pen number(,number of pens(,length))))*; or GP;

Parameter	Format	Range	Default
group number	integer	1 to 8	all groups
pen number	integer	1 to 8	group number
number of pens	integer	0 to 8*	1
length	integer	1 to 50 000	100 metres

*Pen number + number of pens must be < 9

IM, Input Mask

USE: Controls which HP-GL errors are reported. If you are using an HP-IB interface, you can also use IM to control the conditions that cause an HP-IB service request or a positive response to a parallel poll.

SYNTAX: IM *E-mask value(,S-mask value(,P-mask value))*; or IM;

Parameter	Format	Range	Default
E-mask value	integer	0 to 255	223
S-mask value	integer	0 to 255	0
P-mask value	integer	0 to 255	0

IN, Initialize

USE: Resets most plotter functions to their default settings. Use this instruction to return the plotter to a known state and to cancel settings that may have been changed by a previous program. Any settings changed from the front panel will not be reset. Refer to the table of default conditions at the end of this pocket guide.

SYNTAX: IN; or IN −1;

IP, Input P1 and P2

USE: Allows you to establish new or default locations for the scaling points P1 and P2. P1 and P2 are used by the scale instruction (SC) to establish user-unit scaling. The IP instruction is often used to ensure that a plot is always the same size, regardless of how P1 and P2 might have been set from the front panel or the size of media loaded in the plotter.

SYNTAX: IP *P1X,P1Y(,P2X,P2Y)*; or IP;

Parameter	Format	Range	Default
X,Y coordinates	integer	−8 388 608 to 8 388 607* plotter units	depends on media size**

*Range for sheet media.

**Refer to the table of plotter unit ranges for various media sizes at the end of this pocket guide.

IV, Invoke Character Slot

USE: Invokes a character set slot into either the right or left half of the in-use code table. Primarily used with ISO modes of character selection.

SYNTAX: IV *(slot(,left))*;

Parameter	Format	Range	Default
slot	integer	0–1 (HP modes) 0–3 (ISO modes)	0
left	integer	0–1	0

IW, Input Window

USE: Defines a rectangular area, or window, that establishes soft-clip limits. Subsequent programmed pen motion will be restricted to this area. Use this instruction when you want to be sure that your plot falls within a specific area.

SYNTAX: IW *X1,Y1,X2,Y2*; or IW;

Parameter	Format	Range	Default
X,Y Coordinates	integer current units*	−8 388 608 to 8 388 607	current hard-clip limits

*Regardless of scaling, the IW parameters must be integer. They will be interpreted as current units.

KY, Define Key

USE: Assigns a predefined function to one of the front-panel function keys. Use this instruction with the WD instruction when designing interactive programs.

SYNTAX: KY *key(,function)*; or KY;

Parameter	Format	Range	Default
key	integer	1 to 4	none
function	integer	1 to 12	none

LB, Label

USE: Plots text using the currently defined character set.

SYNTAX: LB *c...c* CHR$(3)

Parameter	Format	Range	Default
c...c	label	any ASCII character	none

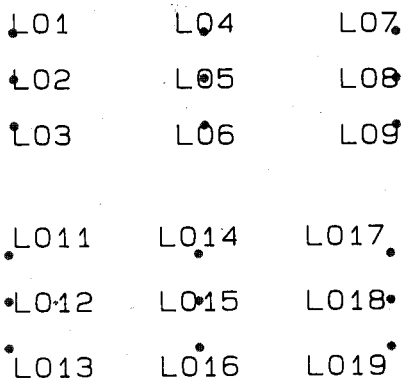
LO, Label Origin

USE: Positions labels relative to current pen location. Use LO to center, left justify, or right justify labels. The label can be drawn above or below the current pen location and can also be offset by an amount equal to ½ the character's width and height.

SYNTAX: LO *position number*; or LO;

Parameter	Format	Range	Default
position number	integer	1 to 9 or 11 to 19	1

The label origins for each position number are shown in the following figure.



LT, Line Type

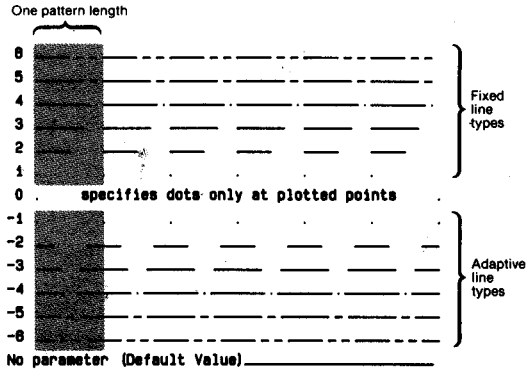
USE: Specifies the line pattern to be used when drawing lines and nonsolid fill types. Use LT to emphasize or de-emphasize other plotted lines and shapes.

SYNTAX: LT *pattern number(,pattern length)*; or LT;

Parameter	Format	Range	Default
pattern number	integer	−6 to +6	no parameter solid line
pattern length	real	0 to 100* percent	4% of the diagonal distance between P1 and P2

*Practical range; allowable range is −8 388 608 to 8 388 607.

The line types for each pattern number are shown in the following figure.



NR, Not Ready

USE: Programmatically simulates pressing VIEW. However, you cannot take the plotter out of the view state with the NR instruction.

SYNTAX: NR;

OA, Output Actual Pen Status

USE: Outputs the current pen location (in plotter units) and up/down position. Use this information to position a label or figure, to determine the parameters of a window, or to determine the pen's current location if you moved it using front-panel cursor buttons.

SYNTAX: OA;

Parameter	Response	Format	Range
none	X,Y,Pen status	integer	current hard-clip limits

OC, Output Commanded Pen Status

USE: Outputs the location and up/down position of the last commanded pen move instruction. Use OC to position a label or determine the parameters of an instruction that tried to move the pen beyond the limits of some window. You can also use this instruction when you want to know the pen's location in user units.

SYNTAX: OC;

Parameter	Response	Format	Range
none	X,Y,Pen status	current units	−8 388 608 to 8 388 607

OD, Output Digitized Point and Pen Status

USE: Outputs the X,Y coordinates and up/down pen position associated with the last digitized point. Use this instruction after the DP instruction to return the coordinates of the digitized point to your computer.

SYNTAX: OD;

Parameter	Response	Format	Range
none	X,Y,Pen status	integer current units*	current hard-clip limits

*Regardless of scaling, the OD response will be integer. Interpret the response as current units.

OE, Output Error

USE: Outputs a number corresponding to the type of HP-GL error (if any) received by the plotter after the most recent IN or OE instruction. Use this instruction for debugging programs.

SYNTAX: OE;

Parameter	Response	Format	Range
none	error number	integer	0 to 7

OF, Output Factors

USE: Outputs the number of plotter units per millimetre in each axis. This instruction lets you use the plotter with software that needs to know the size of a plotter unit.

SYNTAX: OF;

Parameter	Response	Format	Range
none	40,40	integer	none

OG, Output Group Count

USE: Outputs the data block number of the current group count and whether the escape function has been activated. Use this instruction at the end of a data block in spooling applications, where it is important to know the current data block number and whether the data block has been transferred.

SYNTAX: OG;

Parameter	Response	Format	Range
none	count number, escape status	integer	−1 or 0

OH, Output Hard-Clip Limits

USE: Outputs the X,Y coordinates of the current hard-clip limits. Use this instruction to determine the plotter unit dimensions of the area in which plotting can occur.

SYNTAX: OH;

Parameter	Response	Format	Range
none	X_{LL},Y_{LL},X_{UR},Y_{UR}	integer	current hard-clip limits

OI, Output Identification

USE: Outputs the plotter's identifying model number. This information is useful in a remote operating configuration (where several plotters are connected to the computer) to determine which plotter model is on-line, or when software needs the plotter's model number.

SYNTAX: OI;

Parameter	Response	Format	Range
none	7595A or 7596A*	character string	none

*If Emulate is ON, the response will be 7585B or 7586B.

OK, Output Key

USE: Outputs a number that indicates which, if any, of the front-panel function keys has been pressed. Use this instruction with the WD instruction when designing interactive programs.

SYNTAX: OK;

Parameter	Response	Format	Range
none	key pressed	integer	0 to 4

OL, Output Label Length

USE: Outputs information about the label contained in the label buffer.

SYNTAX: OL;

Parameter	Response	Format
none	length, characters, line feeds,	real integer integer

OO, Output Options

USE: Outputs eight option parameters indicating the features implemented on the plotter. Some software packages use this feature to determine which plotter capabilities exist.

SYNTAX: OO;

Parameter	Response	Format	Range
none	c,1,0,0,1,1,0,1	integer	c = 0 to 3

OP, Output P1 and P2

USE: Outputs the X,Y coordinates (in plotter units) of the current scaling points P1 and P2. Use this instruction to determine the numeric coordinates of P1 and P2 when they have been set manually, and to help compute the number of plotter units per user unit when scaling is on. This instruction can also be used with the input window (IW) instruction to programmatically set the window to P1 and P2.

SYNTAX: OP;

Parameter	Response	Format	Range
none	$P1_X$,$P1_Y$,$P2_X$,$P2_Y$	integer	−8 388 608 to 8 388 607*

*Except that P2 tracks P1 and may be outside this range.

OS, Output Status

USE: Outputs the decimal value of the status byte. Use this instruction in debugging operations and in digitizing applications.

SYNTAX: OS;

Parameter	Response	Format	Range
none	status number	integer	0 to 255

OT, Output Carousel Type

USE: Outputs information on the type of carousel loaded and the stalls occupied.

SYNTAX: OT;

Parameter	Response	Format	Range
none	type, map	integer integer	−1 to 5 0 to 255

OW, Output Window

USE: Outputs the X,Y coordinates of the lower-left and upper-right corners of the window area in which plotting can occur. This instruction is especially useful when the window area (defined by IW) extends beyond the hard-clip limits.

SYNTAX: OW;

Parameter	Response	Format	Range
none	$X_{LL},Y_{LL},X_{UR},Y_{UR}$	integer	current hard-clip limits

PA, Plot Absolute

USE: Establishes absolute plotting and moves the pen to specified absolute coordinates using the current pen position.

SYNTAX: PA *X,Y(,...)*; or PA;

Parameter	Format	Range	Default
X,Y coordinates	current units	−8 388 608 to 8 388 607	none

PB, Print Buffered Label

USE: Prints the contents of the label buffer.

SYNTAX: PB;

PD, Pen Down

USE: Lowers the pen onto the writing surface for drawing and moves it to the coordinates/increments you specified.

SYNTAX: PD *X,Y(,...)*; or PD;

Parameter	Format	Range	Default
X,Y coordinates/ increments	current units	−8 388 608 to 8 388 607	none

PG, Page Feed

USE: Advances roll paper one page length and establishes the plotter-unit origin at the center of the new page.

SYNTAX: PG *(n)*; or PG;

Parameter	Format	Range	Default
n	integer	−8 388 608 to 8 388 607	none

PM, Polygon Mode

USE: Enters polygon mode for defining shapes such as block letters, logos, surface charts, or any unique or intricate area for subsequent filling and/or edging. Fill polygons using the fill polygon (FP) instruction and/or outline them using the edge polygon (EP) instruction.

SYNTAX: PM *n*; or PM;

Parameter	Format	Range	Default
n	integer	0 to 2	0

PR, Plot Relative

USE: Establishes relative plotting and moves the pen (using the current position) to the specified points, each successive move relative to the last current pen location.

SYNTAX: PR *X,Y(,...)*; or PR;

Parameter	Format	Range	Default
X,Y increments	current units	−8 388 608 to 8 388 607	none

PS, Page Size

USE: Changes the size of the hard clip limits.

SYNTAX: PS *length(,width)*; or PS;

Parameter	Format	Range	Default
length	integer	0 to 8 388 607 plotter units	depends on media size
width	integer	0 to 8 388 607 plotter units	depends on media size

PT, Pen Thickness

USE: Determines the spacing between the parallel lines in solid fill patterns, according to the pen tip thickness.

SYNTAX: PT *pen thickness*; or PT;

Parameter	Format	Range	Default
pen thickness	real	0.1 to 5.0 millimetres	0.3 millimetres

PU, Pen Up

USE: Raises the pen from the plotting surface. Use this instruction to prevent stray lines from being drawn.

SYNTAX: PU *X,Y(,...)*; or PU;

Parameter	Format	Range	Default
X,Y coordinates/ increments	current units	−8 388 608 to 8 388 607	none

RA, Fill Rectangle Absolute

USE: Defines and fills a rectangle using absolute coordinates. Use this instruction to fill rectangular shapes required by bar charts, logos, and other plots. To outline a rectangle using absolute coordinates, use the EA (Edge Rectangle Absolute) instruction.

SYNTAX: RA *X,Y*;

Parameter	Format	Range	Default
X,Y coordinates	current units	−8 388 608 to 8 388 607	none

RO, Rotate Coordinate System

USE: Rotates the plotter's coordinate system 90 degrees about the plotter-unit coordinate origin. This instruction allows you to orient your plot vertically or horizontally.

SYNTAX: RO *n*; or RO;

Parameter	Format	Range	Default
n	integer	0 or 90 degrees	0 degrees

RR, Fill Rectangle Relative

USE: Defines and fills a rectangle using relative coordinates. Use this instruction to fill rectangular shapes required by bar charts, logos, and other plots. To outline a rectangle using relative coordinates, use the edge relative rectangle (ER) instruction.

SYNTAX: RR *X,Y*;

Parameter	Format	Range	Default
X,Y increments	current units	−8 388 608 to 8 388 607	none

SA, Select Alternate Character Set

USE: Selects the alternate character set (already designated by the CA instruction) for subsequent labeling. Use this instruction to shift from the currently selected standard set to the designated alternate set.

SYNTAX: SA;

SC, Scale

USE: Establishes a user-unit coordinate system by mapping user-defined values onto the scaling points P1 and P2. Thus, you can plot in units convenient to your application. In addition, you can use this instruction to establish automatic isotropic scaling or to relocate the origin and set a specific ratio of plotter units to user units.

SYNTAX: SC X_{min}, X_{max}, Y_{min}, Y_{max}(, *type*(, *left*, *bottom*));
or
SC X_{min}, X_{factor}, Y_{min}, Y_{factor}, 2; or SC;

Parameter	Format	Range	Default
X_{min}	real	−8 388 608 to 8 388 607	none
X_{max}	real	−8 388 608 to 8 388 607	none
Y_{min}	real	−8 388 608 to 8 388 607	none
Y_{max}	real	−8 388 608 to 8 388 607	none
type	integer	0 to 2	0
left	real	0 to 100%	50%
bottom	real	0 to 100%	50%
X_{factor}	real	−8 388 608 to 8 388 607*	none
Y_{factor}	real	−8 388 608 to 8 388 607*	none

*Excluding zero (0) and values approaching zero

SG, Select Pen Group

USE: Allows the plotter to select a predesignated group of pens. Use this instruction with the GP instruction to extend the effective writing distance beyond the limits of one pen.

SYNTAX: SG *pen number*;

Parameter	Format	Range	Default
pen number	integer	0 to 8	none

SI, Absolute Character Size

USE: Specifies the size of labeling characters in centimetres. Use this instruction to establish character sizing that is not dependent on the settings of P1 and P2.

SYNTAX: SI *width, height*; or SI;

Parameter	Format	Range	Default
width	real	−110 to 110*	0.285 cm
height	real	−110 to 110*	0.375 cm

*Excluding zero and values approaching zero.
Practical range; allowable range is −8 388 608 to 8 388 607.

SL, Character Slant

USE: Specifies the slant at which the characters in a label are drawn. Use this instruction to create slanted text for emphasis, or to reestablish upright labeling after an SL instruction with parameters has been in effect.

SYNTAX: SL *tangent*; or SL;

Parameter	Format	Range	Default
tangent	real	−3.5 to 3.5* degrees	0 (no slant)

*Practical range; allowable range is −8 388 608 to 8 388 607.

SM, Symbol Mode

USE: Draws the specified symbol at each X,Y coordinate. Use symbol mode to create scattergrams, indicate points on geometric drawings, and differentiate data points on multi-line graphs.

SYNTAX: SM *character (,character*)*; or SM;
*Used only with Kanji characters.

Parameter	Format	Range	Default
character	label	any printing character (decimal codes 33-126)**	none

**Decimal code 59 (the semicolon) is an HP-GL terminator and cannot be used as a symbol *in any character set*. Use it only to cancel symbol mode (*SM;*).

SP, Select Pen

USE: Loads the specified pen into the pen holder or returns the current pen to the carousel. Use the SP instruction to change pen colors or widths during a plot. At the end of every program, use SP to return the pen to the carousel.

SYNTAX: SP *pen number*; or SP;

Parameter	Format	Range	Default
pen number	integer	0 to 8	0

SR, Relative Character Size

USE: Specifies the relative size of characters as a percentage of the distance between P1 and P2. Use this instruction to establish relative character sizes so that if the P1/P2 distance changes, the character sizes adjust to occupy the same relative amount of space.

SYNTAX: SR *width, height*; or SR;

Parameter	Format	Range	Default
width	real	−100 to 100 percent* of $P2_X - P1_X$	0.285 cm
height	real	−100 to 100 percent* of $P2_Y - P2_Y$	0.375 cm

*Practical range; allowable range is −8 388 608 to 8 388 607.

SS, Select Standard Character Set

USE: Selects the standard set (already designated by the CS instruction) for subsequent labeling. Use this instruction to shift from the currently selected alternate set to the designated standard set.

SYNTAX: SS;

TL, Tick Length

USE: Specifies the length of the tick marks produced by the tick instructions (XT and YT). Use this instruction to adjust both the positive and negative portions of tick marks, and to establish a tick length for drawing grids.

SYNTAX: TL *positive tick (,negative tick)*; or TL;

Parameter	Format	Range	Default
positive tick length	real	−100 to 100* percent	0.5% of $\|P2_X - P1_X\|$ and $\|P2_Y - P1_Y\|$
negative tick length	real	−100 to 100* percent	0.5% of $\|P2_X - P1_X\|$ and $\|P2_Y - P1_Y\|$

*Practical range; allowable range is −8 388 608 to 8 388 607.

UC, User-Defined Character

USE: Draws characters of your own design. Use this instruction to create characters or symbols not included in your plotter's character sets; for example, logos.

SYNTAX: UC *(pen control,) X-increment, Y-increment (,...) (,pen control) (,...)*; or UC;

Parameter	Format	Range	Default
pen control	integer	−9999 to −8 388 608 = pen up +9999 to 8 388 607 = pen down	pen up
X,Y increments	integer	−9998 to 9998 primitive grid units	none

UF, User-Defined Fill Type

USE: Defines a fill pattern composed of composed of 'gaps' between parallel lines such as a semilog or candy-stripe effect. All fill instructions (FP, RA, RR, and WG) can use this fill type.

SYNTAX: UF *gap1(,gap2,...gap3)*; or UF;

Parameter	Format	Range	Default
gap	real	0 to 8 388 607	none

VS, Velocity Select

USE: Specifies pen speed in centimetres per second. Use this instruction to optimize pen life and line quality for each pen and media combination. Create a slightly thicker line on any media by slowing the pen speed.

SYNTAX: VS *pen speed(,pen number)*; or VS;

Parameter	Format	Range	Default
pen speed	integer	1 to 60	depends on carousel
pen number	integer	1 to 8	all pens

WD, Write to Display

USE: Causes the specified message to be displayed on the front panel of the plotter and establishes keyboard mode. Use this instruction when designing interactive programs.

SYNTAX: WD *c...c* CHR$(3) or WD CHR$(3)

Parameter	Format	Range	Default
c...c (up to 32 characters)	label	any character except **NULL**, **ETX**, **ENQ**, **ESC**, and **DEL** (decimal codes 0, 3, 5, 27, and 127 respectively)	none

WG, Fill Wedge

USE: Defines and fills any wedge. Use this instruction to produce sectors of a pie chart.

SYNTAX: WG *radius,start angle,sweep angle(,chord tolerance)*;

Parameter	Format	Range	Default
radius	current units	−8 388 608 to 8 388 607	none
start angle	real	0 to 360 degrees*	none
sweep angle	real	0 to 360 degrees*	none
chord tolerance chord angle* chord deviation	 real current units	 0.36 to 50 degrees** −8 388 608 to 8 388 607	 5 degrees 5 degrees†

*Chord angle is the default interpretation of chord tolerance.

**Practical range; allowable range is −8 388 608 to 8 388 607.

†If no deviation distance is specified, the chord tolerance defaults to a chord *angle* of 5 degrees.

XT, X-Tick

USE: Draws a vertical (parallel to the Y-axis) tick at the current pen location. Use this instruction to draw vertical tick marks on axes, and with the tick length (TL) instruction to draw grid lines or lines centered on or starting with the current pen location.

SYNTAX: XT;

YT, Y-Tick

USE: Draws a horizontal (parallel to the X-axis) tick at the current pen location. Use this instruction to draw horizontal tick marks on axes, and with the tick length (TL) instruction to draw grid lines or lines centered on or starting with the current pen location.

SYNTAX: YT;

Device-Control Instruction Summary

ESC . A, Output Identification

USE: Outputs the plotter's model number and firmware revision level.

SYNTAX: **ESC** . A

Parameter	Response	Format	Range
none	model number	character string	7595A or 7596A*
	firmware revision level*	integer	1 to 32 767

*If Emulate is on, the response will be 7585B or 7586B and no firmware revision level is returned.

ESC . B, Output Buffer Space

USE: Outputs the plotter's currently available logical I/O buffer space.

SYNTAX: **ESC** . B

Parameter	Response	Format	Range
none	available logical I/O buffer space	integer	2 to 25 518 bytes

ESC . E, Output Extended Error

USE: Outputs the error number for any I/O error related to device-control instructions and clears the error message from the front-panel display. Use this instruction when debugging a program to determine which errors have occurred (if any). Additionally, if you are using the RS-232-C interface, you can use ESC . E with ESC . @ to do block I/O error checking. Refer to the table at the end of this pocket guide for a list of the error numbers and their messages.

SYNTAX: **ESC** . E

Parameter	Response	Format	Range
none	error number	integer	0, 10 to 18

ESC . H, Set Handshake Mode 1

USE: Configures the plotter for enquire/acknowledge handshake when the computer requires the parameters of ESC . M and ESC . N be used during the handshaking sequence.

SYNTAX: **ESC** . H *(data block size); (enquiry character); (acknowledgment string)*: or **ESC** . H :

Parameter	Format	Range	Default
data block size	integer	0 to 25 518 bytes*	80 bytes
enquiry character	ASCII value	0 to 26, 28 to 31**	0 (no character)
acknowledgment string	ASCII value	0 to 126	0 (no character)

*Practical range; allowable range is 0 to 65 535.

**Practical range; printable characters (ASCII codes 32 to 126) can be used but should be avoided as they are required to send the HP-GL instructions.

ESC . I, Set Handshake Mode 2

USE: Configures the plotter for either the Xon-Xoff or enquire/acknowledge handshakes when the computer does not expect the parameters of the ESC . M and ESC . N instructions to be used during the handshaking sequence. This is often true when the handshake protocol is part of the computer's operating system.

SYNTAX: Depends on the handshake being configured.

Xon-Xoff: **ESC** . I *(Xoff threshold level); (omitted); (Xon trigger character(s))*:

Parameter	Format	Range	Default
Xoff threshold level	integer	0 to logical I/O buffer size −1*	80 bytes
omitted	integer	0**	none
Xon trigger character(s)	ASCII value	0 to 126 one to ten decimal codes	0 (no character)

*Practical range; actual range is 0 to 65 535; however any value greater than the logical buffer size is changed to one byte less than the logical I/O buffer size.

**You can designate the omitted parameter by entering a 0 or by putting the semicolon without a parameter.

Enquire/Acknowledge: **ESC** . I *(data block size); (enquiry character); (acknowledgment string)*:

Parameter	Format	Range	Default
data block size	integer	0 to 25 518 bytes *	80 bytes
enquiry character	ASCII value	0 to 26, 28 to 126** decimal code	0 (no character)
acknowledgment string	ASCII value	0 to 126 one to ten decimal codes	0 (no character)

*Practical range; allowable range is 0 to 65 535.

**Practical range; printable characters (ASCII codes 32 to 126) can be used but should be avoided as they are required to send the HP-GL instructions.

ESC . J, Abort Device-Control

USE: Aborts any device-control instruction that may be partially decoded or executed. Use this instruction in an initialization sequence when you first access the plotter.

SYNTAX: **ESC** . J

ESC . K, Abort Graphics

USE: Aborts any partially decoded HP-GL instruction and discards remaining instructions in the I/O, pen sort, bidirectional, and vector buffers. Use this instruction as part of an initialization sequence when starting a new program or to terminate plotting of HP-GL instructions in the buffer.

SYNTAX: **ESC** . K

ESC . L, Output Buffer Size When Empty

USE: Outputs the size (in bytes) of the logical I/O buffer. The response is not transmitted by the plotter until the buffer is empty.

SYNTAX: **ESC** . L

Parameter	Response	Format	Range
none	available logical I/O buffer space	integer	2 to 25 518 bytes

ESC . M, Set Output Mode

USE: Establishes parameters for the plotter's communication format. Use the instruction to establish a turnaround delay, an output trigger character, an echo terminator, and an output initiator character. Also use it to change the output terminator from its default value, ASCII decimal code 13 (carriage return).

SYNTAX: **ESC** . M *turnaround delay);(output trigger);(echo terminator);(output terminator);(output initiator)*:

Parameter	Format	Range	Default
turnaround delay	integer	0 to 9999 msecs	0
output trigger	ASCII value	0–4, 6–26, 28–126 decimal code	0 (no character)
echo terminator	ASCII value	0–4, 6–26, 28–126 decimal code	0 (no character)
output terminator	ASCII value	0–4, 6–26, 28–126 one or two decimal codes	13 (carriage return)
output initiator	ASCII value	0 to 126 decimal code	0 (no character)

ESC . N, Set Extended Output and Handshake Mode

USE: Establishes parameters for the plotter's communication format. Use this instruction to specify an intercharacter delay in all handshake modes and either the immediate response string for the enquire/acknowledge handshake or the Xoff trigger character(s) for the Xon-Xoff handshake.

SYNTAX: **ESC** . N *(intercharacter delay); (handshake dependent parameter)*:

Parameter	Format	Range	Default
interchacter delay	integer	0 to 9999 msecs	0
handhake dependent parameter Xon-Xoff: Xoff trigger characters(s)	ASCII value	0 to 126 up to ten decimal codes	0 (no character)
Enquire/Acknowledge: immediate response string	ASCII value	0 to 126 up to ten decimal codes	0 (no character)

ESC . O, Output Extended Status

USE: Outputs the plotter's extended status. Use this instruction to obtain information about the current operating status of the plotter.

SYNTAX: **ESC** . O

Parameter	Response	Format	Range
none	operating status	integer	0 to 4095

ESC . P, Set Handshake Mode

USE: Sets one of three standard handshakes.

SYNTAX: **ESC** . P *handshake*:

Parameter	Format	Range	Default
handshake	integer	0 (none) 1 (Xon-Xoff) 2 (ENQ-ACK) 3 (hardwire)	0

ESC . Q, Set Monitor Mode

USE: Enables or disables either monitor mode 1 (parse) or monitor mode 2 (receive). Use this instruction as a debugging aid in program development. This instruction is valid only when you have set **Monitor Mode: ON** from the front panel and you are using an RS-232-C interface (refer to the User's Guide for more information).

SYNTAX: **ESC** . Q *n*:

Parameter	Format	Range	Default
n	integer	0, 1, or 2	0

ESC.R, Reset

USE: Resets certain I/O conditions to power-up default states. Use this instruction to establish known conditions when starting a new plot.

SYNTAX: **ESC**.R

ESC.S, Output Configurable Memory Size

USE: Outputs the total memory size of user-definable RAM (0), or the memory space available in one of its five buffers: the physical I/O buffer (1), polygon buffer (2), downloadable character buffer (3), vector buffer (5), and pen sort buffer (6). Use this instruction to determine how much memory is currently allocated to each buffer or to confirm the allocation performed by GM, ESC.T, or ESC.R.

SYNTAX: **ESC**.S *n*:

Parameter	Format	Range	Default
n	integer	0 to 6*	0 (total memory)

*Parameter 4 is an unused buffer.

Parameter	Response	Format	Range
n	memory size	integer	0 to 25600

ESC.T, Allocate Configurable Memory

USE: Allocates memory in user-definable RAM, which consists of five buffers: the physical I/O buffer, polygon buffer, downloadable character buffer, vector buffer, and pen sort buffer. Use this instruction to change the sizes of these buffers as needed.

SYNTAX: **ESC**.T *(physical I/O buffer);(polygon buffer);(downloadable character buffer);0;(vector buffer);(pen sort buffer)*:

Parameter	Format	Range	Default
physical I/O buffer size	integer	2 to 25518 bytes	1024
polygon buffer	integer	4 to 25520 bytes	3072
downloadable character buffer	integer	0 to 25516 bytes	0
reserved			0
vector buffer	integer	66 to 25582 bytes	3000
pen sort buffer	integer	12 to 25528 bytes	18504

ESC.U, End Flush Mode

USE: Ends the flush mode begun when the **ESCAPE** function key defined by the KY instruction is pressed.

SYNTAX: **ESC**.U

ESC.Y or ESC.(, Plotter On

USE: Enables the plotter to accept data and interpret it as HP-GL or device-control instructions. Use this instruction in Eavesdrop Mode (RS-232-C interface only) to establish programmed-on operation.

SYNTAX: **ESC**.Y or **ESC**.(

ESC.Z or ESC.), Plotter Off

USE: Disables the plotter so that it accepts only a plotter-on instruction. Use this instruction in **Eavesdrop Mode** (RS-232-C interface only) to establish programmed-off operation.

SYNTAX: **ESC**.) or **ESC**.Z

ESC.@, Set Plotter Configuration

USE: *For RS-232-C users*, this instruction sets an effective logical I/O buffer size and controls hardwire handshake, communications protocol, monitor modes 1 and 2, and block I/O error checking.

For HP-IB users, sets an effective logical I/O buffer size. Use the instruction to enlarge the logical I/O buffer.

SYNTAX: **ESC**.@ *(logical I/O buffer size);(I/O conditions)*:

Parameter	Format	Range	Default
logical I/O buffer size	integer	0 to 25518 bytes*	1024 bytes
I/O conditions	integer	0 to 31**	3

*Practical range; actual range is 0 to 65535.

**Practical range; actual range is 0 to 127.

The Default (DF) Instruction Establishes the following conditions.

Function	Equivalent Instruction	Default Condition
Label Buffer	BL CHR$(3)	Cleared.
Alternate Character Set	CA0;	Character set 0.
Character Chord Angle	CC;	Chord angle of 5.
Character Selection Mode	CM;	HP 7-bit mode.
Standard Character Set	CS0;	Character set 0.
Chord Tolerance	CT;	Chord angle of 5.
Digitize Clear	DC;	Clear DP instruction and return to current display.
Downloadable Character Buffer	DL;	Cleared.
Direction Absolute	DI1.0	Horizontal characters.
Label Terminator	DT;	CHR$(3)/decimal code 3/ **ETX**.
Direction Vertical	DV;	Horizontal characters.
Extra Space	ES0.0;	No extra space.
Fill Type	FT;	—Type 1, solid bidirectional fill. —Spacing determined by PT Instruction. —0 degrees angle.
Input Mask	IM;	Recognizes all defined errors.
Input Window	IW;	Set to hard-clip limits.
Label Origin	L01;	Standard labeling starting at current location.
Line Type	LT;	Solid line.

(Table continues)

Function	Equivalent Instruction	Default Condition
Plotting Mode	PA ;	Absolute plotting.
Polygon Mode	PM0 ; PM2 ;	Polygon buffer cleared.
Page Size	PS ;	Uses normal hard-clip limits.
Pen Thickness	PT ;	0.3 mm
Scaling	SC ;	User-unit scaling is off.
Character Size Absolute	SI ;	Size as follows: —Width = 0.285 cm —Height = 0.375 cm
Character Slant	SL ;	No slant.
Symbol Mode	SM ;	Off.
Select Standard Set	SS ;	Standard set selected.
Tick Length	TL ;	tp=tn=0.5% of $\|P2_X - P1_X\|$ for X-tick and 0.5% of $\|P2_Y - P1_Y\|$ for X-tick
User-Defined Fill	UF ;	Solid bidirectional fill.

The Initialize (IN) instruction establishes all of the above conditions plus these *additional* conditions.

- raises the pen (*PU;*)
- cancels programmatic 90-degree rotation (*RO;*)
- sets P1, P2, and the axis-align point to the X,Y coordinate values set when the hard-clip limits were established (*IP;*)
- turns on automatic pen operation (*AP;*)
- sets default pen speed, force, and acceleration values for the carousel installed in the plotter (*VS; FS; AS;*)
- clears any HP-GL error condition
- clears the display and removes any function key definitions established by the KY and WD instructions (*KY; WD CHR$(3)*)
- sets the group count to 0 (*GC;*)

Changing any of the following front-panel settings from their defaults establishes a partial initialization.

P1 P2 Speed

Force Rotate

Group Sort

If the user changes any of these front-panel settings, none of them will be restored to their default values by (*IN;*). You can override these settings by implementing the individual instructions for those settings you don't want under user control.

HP-GL Errors	
Error Number	**Displayed Message**
1	unrecognized command
2	wrong # parameters
3	bad parameter
5	unknown character set
6	position overflow
7	buffer overflow

Device-Control Errors	
Error Number	**Displayed Message**
10	bad output request
11	bad byte after ESC .
12	bad byte in I/O control
13	bad parameter
14	too many parameters
15	bad transmission
16	buffer overflow
17	transmit underrun
18	indeterminate error

The values in the following tables are based on exact media size. Because many factors (such as, "Squareness" of the media) contribute to these values, you should consider them approximations.

Normal Plot Size
(Expand: OFF)

Paper Size	Default Scaling Points P1	Default Scaling Points P2	Hard-Clip Plotting Range		Maximum Plotting Area (X and Y)
	$P1_X,P1_Y$	$P2_X,P2_Y$	X-axis	Y-axis	
A (horizontal)	−4348,−2598	4348,2598	±4948	±3198	247.4 × 159.9 mm (9.74 × 6.3 in.)
A (vertical)	−3868,−3078	3868,3078	±4468	±3678	223.4 × 183.9 mm (8.8 × 7.24 in.)
B (vertical)	−6916,−4348	6916,4348	±7516	±4948	375.8 × 247.9 mm (14.8 × 9.74 in.)
C (horizontal)	−9936,−6916	9936,6916	±10 536	±7516	526.8 × 375.8 mm (20.74 × 14.8 in.)
D (horizontal)	−16 032,−9456	16 032,9456	±16 632	±10 056	831.6 × 502.8 mm (32.74 × 19.8 in.)
D (vertical)	−15 552,−9936	15 552,9936	±16 152	±10 536	807.6 × 526.8 mm (31.8 × 20.74 in.)

(Continued)

Normal Plot Size
(Expand: OFF)

Paper Size	Default Scaling Points P1	Default Scaling Points P2	Hard-Clip Plotting Range		Maximum Plotting Area (X and Y)
	$P1_X,P1_Y$	$P2_X,P2_Y$	X-axis	Y-axis	
E (vertical)	−20 632,−16 032	20 632,16 032	±21 232	±16 632	1061.6 × 833.1 mm (41.8 × 32.8 in.)
A4 (horizontal)	−4700,−2480	4700,2480	±5300	±3080	265 × 154 mm (10.43 × 6.06 in.)
A4 (vertical)	−4220,−2960	4220,2960	±4820	±3560	241 × 178 mm (9.49 × 7.01 in.)
A3 (vertical)	−6680,−4700	6680,4700	±7280	±5300	364 × 265 mm (14.33 × 10.43 in.)
A2 (horizontal)	−10 640,−6680	10 640,6680	±11 240	±7280	562 × 364 mm (22.13 × 14.33 in.)
A1 (horizontal)	−15 580,−10 160	16 180,10 160	±16 180	±10 760	809 × 538 mm (31.85 × 21.18 in.)

A1 (vertical)	−15 100,−10 640	15 100,10 640	±15 700	±11 240	785 × 562 mm (30.91 × 22.13 in.)
A0 (vertical)	−22 060,−15 580	22 060,15 580	±22 660	±16 180	1133 × 809 mm (44.61 × 31.85 in.)
Architectural C (horizontal)	−10 952,−7424	10 952,7424	±11 552	±8024	577.6 × 401.2 mm (22.74 × 15.8 in.)
Architectural D (vertical)	−16 568,−10 952	16 568,10 952	±17 168	±11 552	858.4 × 577.6 mm (33.8 × 22.74 in.)
Architectural D (horizontal)	−17 048,−10 472	17 048,10 472	±17 648	±11 072	882.4 × 553.6 mm (34.74 × 21.8 in.)
Architectural E (vertical)	−22 664,−17 048	22 664,17 048	±23 264	±17 648	1163.2 × 882.4 mm (45.8 × 34.74 in.)

Expanded Plot Size
(Expand: ON)

Paper Size	Default Scaling Points P1	Default Scaling Points P2	Hard-Clip Plotting Range		Maximum Plotting Area (X and Y)
	$P1_X,P1_Y$	$P2_X,P2_Y$	X-axis	Y-axis	
A (horizontal)	−4788,−3038	4788,3038	±5388	±3638	269.4 × 181.9 mm (10.61 × 7.16 in.)
A (vertical)	−4308,−3518	4308,3518	±4908	±4118	245.4 × 205.9 mm (9.66 × 8.11 in.)
B (vertical)	−7356,−4788	7356,4788	±7956	±5388	397.8 × 269.4 mm (15.66 × 10.61 in.)
C (horizontal)	−10 376,−7356	10 376,7356	±10 976	±7956	548.8 × 397.8 mm (21.61 × 15.66 in.)
D (horizontal)	−16 472,−9896	16 472,9896	±17 072	±10 496	853.6 × 524.8 mm (33.61 × 20.66 in.)
D (vertical)	−15 992,−10 376	15 992,10 376	±16 592	±10 976	829.6 × 548.8 mm (32.66 × 21.61 in.)

E (vertical)	−21 072,−16 472	21 072,16 472	±21 672	±17 072	1083.6 × 853.6 mm (42.66 × 33.61 in.)
A4 (horizontal)	−5140,−2920	5140,2920	±5740	±3520	287 × 176 mm (11.3 × 6.93 in.)
A4 (vertical)	−4660,−3400	4660,3400	±5260	±4000	263 × 200 mm (10.35 × 7.87 in.)
A3 (vertical)	−7120,−5140	7120,5140	±7720	±5740	386 × 287 mm (15.2 × 11.3 in.)
A2 (horizontal)	−11 080,−7120	11 080,7120	±11 680	±7720	584 × 386 mm (23 × 15.2 in.)
A1 (horizontal)	−16 020,−10 600	16 020,10 600	±16 620	±11 200	831 × 560 mm (32.72 × 22.05 in.)
A1 (vertical)	−15 540,−11 080	15 540,11 080	±16 140	±11 680	807 × 584 mm (31.77 × 22.3 in.)
A0 (vertical)	−22 500,−16 020	22 500,16 020	±23 100	±16 620	1155 × 831 mm (45.47 × 32.72 in.)

(Continued)

Expanded Plot Size

(Expand: ON)

Paper Size	Default Scaling Points P1	Default Scaling Points P2	Hard-Clip Plotting Range		Maximum Plotting Area (X and Y)
	$P1_X,P1_Y$	$P2_X,P2_Y$	X-axis	Y-axis	
Architectural C (horizontal)	−11 392,−7864	11 392,7864	±11 992	±8464	599.6 × 423.2 mm (23.61 × 16.66 in.)
Architectural D (horizontal)	−17 488,−10 912	17 488,10 912	±18 088	±11 512	904.4 × 575.6 mm (35.61 × 22.66 in.)
Architectural D (vertical)	−17 008,−11 392	17 008,11 392	±17 608	±11 992	880.4 × 599.6 mm (34.66 × 22.03 in.)
Architectural E (vertical)	−23 104,−17 488	23 104,17 488	±23 704	±18 088	1185.2 × 904.4 mm (46.66 × 36.61 in.)