

HP 7470A GRAPHICS PLOTTER REFERENCE CARD



HEWLETT
PACKARD

Decimal Equivalents

ESC . @	27,46,64
ESC . B	27,46,66
ESC . E	27,46,69
ESC . H	27,46,72
ESC . I	27,46,73
ESC . J	27,46,74
ESC . K	27,46,75
ESC . L	27,46,76
ESC . M	27,46,77
ESC . N	27,46,78
ESC . O	27,46,79
ESC . R	27,46,82
ETX	3
LF	10
CR	13
:	58
;	59

RS-232-C Error Messages

These error numbers are returned by executing an **ESC** . E instruction.

Error Number	Meaning
0	A zero indicates there was no I/O error.
10	Output instruction received while another output instruction is executing. The original output instruction will continue normally while the one in error will be ignored.
11	Invalid byte received following the first two characters (ESC .) in a device control instruction.
12	Invalid byte received while parsing a device control instruction. Parameters are defaulted from the parameter where the invalid byte was received to the end of the instruction.
13	Parameter out of range.
14	Too many parameters received. Additional parameters beyond the proper number are ignored, and the parsing of the instruction ends when a colon (normal exit) or the first byte of another instruction is received (abnormal exit).
15	A framing error, parity error, or overrun error has been detected.
16	The input buffer memory has overflowed. As a result of the overflow, one or more bytes of data have been lost, and therefore, an HP-GL error will probably also occur.

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Device Control Instructions Summary

Plotter On Instruction

ESC . (or ESC . Y

Prepares plotter to accept other instructions. Needed only when γ/ρ switch set to γ .

Plotter Off Instruction

ESC .) or ESC . Z

Deactivates plotter input buffer when γ/ρ switch set to γ .

Set Plotter Configuration

ESC . @ [(<DEC>) ; (<ASC>)] :

Enables or disables hardware handshake or monitor mode. Parameters are:

<DEC> — ignored, and

<ASC> — Data Terminal Ready line control. ASCII decimal equivalent of 4-bit word (0 to 15).

Output Buffer Space

ESC . B

Outputs the number of bytes currently available for data in the buffer. Response is:

<DEC> [TERM] — 0 to 255.

Output Extended Error

ESC . E

Output a decimal code to identify the type of RS-232-C related error that occurred. Response is:

<DEC> [TERM] — 0, no error, or 10-16.

[TERM] = Carriage return character unless changed by ESC . M command.

Set Handshake Mode 1

ESC . H [(<DEC>) ; (<ASC>) ; (<ASC> (; ... <ASC>))] :

Establishes parameters for handshake mode 1 which uses all parameters of ESC . M command when responding to the enquiry character. Parameters are:

<DEC> — Block size or Xoff threshold level,

<ASC> — Enquiry character or omitted, and

<ASC> ... <ASC> — Acknowledgment string of 1 to 10 characters or Xon trigger characters.

Set Handshake Mode 2

ESC . I [(<DEC>) ; (<ASC>) ; (<ASC> (; ... <ASC>))] :

Establishes parameters for handshake mode 2 which uses only turnaround delay parameter of ESC . M when responding to the enquiry character. Parameters are:

<DEC> — Block size or Xoff threshold level,

<ASC> — Enquiry character or omitted, and

<ASC> ... <ASC> — Acknowledgment string of 1 to 10 characters or Xon trigger characters.

Abort Device Control

ESC . J

Aborts any partially decoded or executed device control instructions including outputs.

Abort Graphic Instruction

ESC . K

Aborts any partially decoded or executed HP-GL instruction and discards all instructions in buffer.

Output Buffer Size

ESC . L

Waits until the buffer is empty, then outputs the buffer size in bytes; 255.

Set Output Mode

ESC . M [(<DEC>) ; (<ASC>) ; (<ASC>) ; (<ASC> (; (<ASC>)) ; (<ASC>))] :

Sets parameters for output where:

<DEC> — Turnaround delay, 0-54 612,

<ASC> — Output trigger character, ASCII 0-127,

<ASC> — Echo terminate character, ASCII 0-127,

<ASC> ... <ASC> — 1 or 2 output terminators, ASCII 0-127, 0 terminates string, and

<ASC> — output initiator, ASCII 0-127.

Set Extended Output and Handshake Mode

ESC . N [(<DEC>) ; (<ASC> (; ... <ASC>))] :

Establishes extended parameters for any output command where:

<DEC> — Delay between output characters, 0-54 612

<ASC> ... <ASC> — Immediate response string of 1 to 10 characters or Xoff trigger characters; ASCII 0-127, 0 terminates string.

Output Extended Status

ESC . O

Outputs the decimal equivalent value of a 16-bit immediate status word. Response is:

<DEC> [TERM] — a value ≤ 40 .

Reset Handshake

ESC . R

Defaults all handshake parameters.

Plotter Default Conditions

Function	Equivalent Instruction	Conditions
Plotting mode	PA;	Absolute
Relative character direction	DR 1, 0;	Horizontal
Line type	LT;	Solid line
Line pattern length	LT n, 4;	4% of the diagonal distance from P1 to P2
Input window	IW;	Mechanical limits of plotter
Relative character size	SR;	Width = 0.75% of (P2 _x - P1 _x) Height = 1.5% of (P2 _y - P1 _y)
Symbol mode	SM;	Off
Tick length	TL .5, .5;	tp = tn = 0.5% of (P2 _x - P1 _x) for Y-tick and 0.5% of (P2 _y - P1 _y) for X-tick
Standard character set	CS0;	Set 0
Alternate character set	CA0;	Set 0
Character set selected	SS;	Standard
Character slant	SL0;	0 degrees
Mask value	IM 223, 0, 0;	223, 0, 0
Digitize clear	DC;	On
Scale	SC;	Off
Pen velocity	VS;	38.1 cm/s (15 in./s) velocity; 2 g acceleration
Label terminator	DT ETX ;	ETX (ASCII decimal equivalent 3)

The carriage-return point is updated to the current pen position.

Additional Conditions Set by IN but not DF

- Pen is raised
- P1 set to 250, 279; P2 set to 10 250, 7479
- All errors cleared
- Setting of paper switch, **US/A4**, read.

HP-GL Error Messages

Error Number	Meaning
0	No HP-GL error for which mask is set has occurred.
1	Instruction not recognized The plotter has received an illegal character sequence.
2	Wrong number of parameters Too many or too few parameters have been sent with an instruction.
3	Bad parameter The parameters sent to the plotter with an instruction are out of range for that instruction or include an illegal character.
4	No used
5	Unknown character set A character set out of the range 0 through 4 has been designated as either the standard or alternate character set.
6	Position overflow Numeric overflow in plotter's character generator.
7	Not used
8	Vector received while pinch wheels raised.

HP-GL Plotter Instructions Summary

Instruction	Definition	Instruction	Definition
*AA x, y, arc angle (, chord angle)	Arc absolute (i)	OI	Output identification (c return)
*AR x, y, arc angle (, chord angle)	Arc relative (i)	OO	Output options (i return)
CA n	Designate alternate set n (i)	OP	Output P1 and P2 (i return)
*CI radius (, chord angle)	Circle (i)	OS	Output status (i return)
CP spaces, lines	Character plot (d)	OW	Output window (i return)
CS n	Designate standard set n (i)	PA x,y(, . . .)	Plot absolute (i; d if scaled)
DC	Digitize clear	PD (x,y(, . . .))	Pen down (i; d if scaled)
DF	Set default values	PR x,y(, . . .)	Plot relative (i; d if scaled)
DI run, rise	Absolute direction (d)	PU (x,y(, . . .))	Pen up (i; d if scaled)
DP	Digitize point	SA	Select alternate character set
DR run, rise	Relative direction (d)	SC X _{min} ,X _{max} ,Y _{min} ,Y _{max}	Scale into user units (i)
DT c	Define label terminator (c)	SI width, height	Absolute character size (d)
IM e(s,(p))	Input e, s, and p masks (i)	SL tan θ	Absolute character slant from vertical (d)
IN	Initialize	SM c	Symbol mode (c)
IP P1 _x ,P1 _y (,P2 _x ,P2 _y)	Input P1 and P2 (i)	SP n	Select pen n (i)
IW X _{lo} ,Y _{lo} ,X _{hi} ,Y _{hi} ,	Input window (i)	SR width, height	Relative character size (d)
LB c . . . c	Label ASCII string (c)	SS	Select standard character set
LT t(,l)	Designate line type (i) and length (d)	TL tp(,tn)	Tick length (d)
OA	Output actual position and pen status (i return)	**UC (pen,)x,y,pen(, . . .)	User defined character (d)
OC	Output commanded position and pen status (d return)	VS v	Select velocity v (d)
OD	Output digitized point and pen status (i return)	XT	X-axis tick
OE	Output error (i return)	YT	Y-axis tick
OF	Output factors (i return)		

*Available only with Option 001.

**Not available with Option 003.

(c) ASCII character

(i) truncates parameter to integer

(d) uses decimal portion of parameter