

# GPLOT V0.87 Command Cheat Sheet

SYSTEM	NAME [FILE [DIMENSIONS]]
DEVICE	NAME [FILE [DIMENSIONS]] - Select output device [W,H,X+Y,I]
CLEAR	[FILE] - Clear drawing / end output file, change output file name.
FILL	Fill screen with colour (device dependent)
OBEY	NAME [PARAMETER=LIST] - Read commands from file (nestable)
HELP	TOPIC - Display help on topic
STATUS	Display status information
MEMTEST	Test dynamic memory. Generate graph plotting test data
GET	NAME - Get an indirect permanent file (ignored if not on NOS)
LOGFILE	NAME - Open a command log file
NUMPOINTS	NUMBER - Set max data points in internal arrays (default 1000)
NSTACK	N - Set evaluator stack size (minimum 4, default 8)
VERSION	[IN] - Version information. Print or put in string register N
WAIT	NAME or user response (enter) on interactive device (eps/sv ignored)
RESET	Reset most state to defaults. Not device or read data.
PREFIX	PATH - Set a prefix to prepend to all filenames, ignored on NOS.
EXIT	Exit GPLOT

DEVICES	NAME [FILE [DIMENSIONS]]
GTKEM	Python/GN/OpenGL based colour graphics terminal
TEK414	Terakron 4010/4014 terminal
EPSCOL	NAME [W,H,X+Y,I] - Encapsulated PostScript file (W,H,X,Y,I INCH)
	default size 5.5x0.5+0.5 inches
SVG	NAME [W,H] - Scalable Vector Graphics file (W,H PIXEL)
	default size 800,800 pixels

COLOURS AND STYLES	NAME [FILE [DIMENSIONS]]
CSGROUP	ALL/GENERAL/TEXT/ANNOT - Colour/style group to set
COLOUR	R G B - Set rgb colour to use, range 0 to 1
WIDTH	WIDTH - Set line width
STYLE	STYLE SOLID/DASH/DOT/DASHDOT [LEN] - Line style, dash len (all groups)

GRAPH PLOTTING	NAME [FILE [DIMENSIONS]]
READ	NAME XCOLD YCOL [YECOL [XECOL]] - Read a data file using columns.
	NAME XCOLD YCOL - Read command input to EOF line
	XCOLD YCOL etc. are column numbers (1 ...) space or comma separated
XYPOINT	Draw xy graph with points
XYLINE	Draw xy graph with lines
XYHISTOGRAM	Draw xy histogram
GRMOVE	X Y - Move to graph coords (X,Y)
GRDRAW	X Y - Draw to graph coords (X,Y)
XYAUTO	Find both axis ranges automatically
XRANGE	XLO XHI - Set X axis range
YRANGE	YLO YHI - Set Y axis range
XYSAME	Keep previous X,Y axis ranges
LINEAR	Use linear X axis
LINEAR	Use linear Y axis
XLOG	Use log X axis
YLOG	Use log Y axis
INTVALUES	NONE/X/Y/BOTH - Try to use integers for axis values, if possible.
GRID	NONE/X/Y/BOTH - Grid array in axis
INTERPOLATE	NONE/CUBIC/QUINTIC N - Interpolate with N intermediate points
ASYMTRY	ASYMTRY error bars (off for X & Y error bars)
HISTSTYLE	ABUT/ABUT+SHADE/LINES/WIDE WIDE+SHADE [WIDTH] - Histogram style
ON/OFF	Turn graph annotation on/off
ANNOTATE	ON/OFF - Turn right edge annotation on/off (drawn only if annotate off)
TITLE	TEXT [FLOWER] - Set title. If lower is yes, below instead of above
XLABEL	TEXT - Set X axis label
YLABEL	TEXT - Set Y axis label
RYLABEL	TEXT - Set right edge Y axis label
GSTYLE	BOXED/AXES/OPEN - Overall graph drawing style.
	(axes must be in range to draw, see ACUT)
ACUT	XO YO - Set point through which axes pass (default: 0,0)
MARKER	NUMBER - Set point marker number
USEKEY	Prepare to create a key (legend) for the graph
ADDEY	Add a key for the current graph/line/points
KEYS	Draw the accumulated keys (after all lines/points)
GRAPHMODE	ON/OFF - Set plot bounds to same aspect ratio as the device.
	... if not ON, the graph appears in a centered, square, subregion
SUBFIGGRID	NX NY [X I] [SHRINK] - Set up gone to draw next graph as a sub-figure.
	... Figures arranged in NX NY grid, this figure at I,J,K,L.

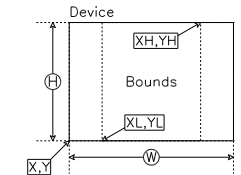
L-SYSTEM	NAME [FILE [DIMENSIONS]]
LSYSTEM	NRULES NITER ANGLE - Generate and draw an L-system.
	... Axiom in STRING 1, rules in STRINGS 2-9
	... Alphabet: F A B C D E M X Y - [ ]
F and D	Draw a unit length line segment the current drawing angle.
M	Move by unit length at the current drawing angle.
+	Turn counter-clockwise by the turning angle.
-	Turn clockwise by the turning angle.
[	Push the current position and angle on to a stack.
]	Pop a position and angle off the stack and make them current.

BASIC DRAWING	NAME [FILE [DIMENSIONS]]
BOUNDS	XL XH YL YH - Set plot bounds (user world coordinate system)
PANE	XL XH YL YH - Set pane (clipping) area.
	... also area in which graph will be plotted.
XL XH YL YH	Set bounds and pane (to be the same)
CANVAS	Stop using any blank area
UNPANE	Stop using any blank area
BLANK	XL XH YL YH - Set blank area
UNBLANK	Stop using any blank area
OUTLINE	PANE/BLANK/BOUNDS/DEVICE - Outline an area
MOVE	X Y - Move to position
DRAW	X Y - Draw to position
PATH	C/O - Draw a closed / open polyline.
	... coordinates from X,Y arrays (see over).
CIRCLE	X Y R - Draw circle, center X,Y, radius R
ARC	X Y R A1 A2 - Draw a circular arc, center X,Y, radius R
	... start angle A1, end angle A2
RECT	X Y W H - Draw a rectangle, bottom left at X,Y, wd W, ht H.
CRECT	X Y W H - Draw a rectangle, center X,Y, width W, height H.
FONT	SET FONTNAME - Font/symbols/markers to use.
	SET: 1 2 3 S M for 3 alphabets, symbol, marker.
LISTFONT	List available fonts
HEIGHT	HEIGHT - Text, symbol or marker height in user bounds units
ANGLE	ANGLE - Text drawing angle wrt X axis (ccw degrees)
SYMMT	TEXT - Draw text (with format control)
WIDTH	WIDTH TEXT - Text horizontally centered on current XPOS,YPOS.
	scaled to WIDTH user units (0 for no scaling, use SYMMT)
MARKER	NUMBER YES - Draw marker at current position

HIGHER DRAWING - TEXT BOXES	NAME [FILE [DIMENSIONS]]
BOXTEXT	TEXT [X Y I] - Draw text in a box with centre or bottom left
	... at X,Y or at the last incremented box position. Box
	... Position increments by specified deltas after each draw.
	... Text is centered vertically and centered or flush left
	... HORIZONTALLY. Text may have up to 5 lines separated by
	BACKSLASHES.
BOXPSIZE	WIDTH HEIGHT BOTLEFT - Set box size. BOTLEFT YES/NO sets.
	MEANING OF BOXTEXT X,Y NO = centre, YES = bottom left.
BOXPHATCH	SPACING ANGLE MODE - Hatch spacing, angle (in spacings), mode:
	NONE/VERT/HORIZ/BOTH
BOXPTEXT	WIDTH/RAZ MODE FLUSHLEFT - Set how text is drawn. MODE: FIX/SCALE.
	WIDTH/RAZ: Fraction of box width for text in SCALE mode.
BOXPBOX	NONE/OUTER/INNER/BOTH - Draw the box outline, inner box around text.
BOXPDELTA	DX DY - Automatic box position step after every box draw.

HIGHER DRAWING - DECORATED LINES & LABELS	NAME [FILE [DIMENSIONS]]
LINE	LINESPEC - Draw a decorated polyline defined by LINESPEC
	LINESPEC is a sequence of POINTSPECS separated by ) characters.
	POINTSPECS are (type)(x)(y)(A) where x and y are bounds coords.
	(type) is P for a plain, uncoloured, location. A for an
	arrow with automatically determined direction, or S for a skip
	(a shape to skip over to existing line), the colour A
	(is very short) arbitrary text to place in the label in the middle
	of the line segment the POINTSPECS starts.
ARROWPARM	Example: LINE A 3.5 1.6 P 3.5 2.1 RT A 2.6 2.1
	TYPE SIZE SHARPNESS BARBEDNESS - Arrow parameters. TYPE:
	OPEN/CLOSED/BARBED - Size of bounds and mid-line annotations.
SKIPSACLE ANNOTSCALE	SKIPSACLE ANNOTSCALE - Scale of skips and mid-line annotations.
GLABEL	GX GY LENGTH ANGLE TEXT - Draw a label with an arrow and boxed text.
	GX GY are arrow coordinates to which line to which line to
	LENGTH is the length of the arrow line in bounds units, ANGLE
	is the angle of the line wrt +X in degrees. TEXT is the
	text to appear in the label box
ALABEL	X Y LENGTH ANGLE TEXT - As GLABEL, but X,Y in bounds coords.

EVALUATOR (see over for operators)	NAME [FILE [DIMENSIONS]]
ERANGE	BASE START STOP NEXLEM - Set range of values in X/Y
	... stack register. BASE 1 linear, else log base.
EVAL	RPN [ARG] - Execute a procedure/evaluate a function using an RPN
	NOTATION: ARG 1,2, etc. refer to reg registers using @
ITEVAL	START END STEP RPN - Iterated evaluation over start to end by step.
ZDEVAL	RPN - As EVAL, but preserve both X and Y data (see over).
PROC	RPN - Store RPN code string in proc register N. Use EVAL @N
LOADPROC	N NAME - Load a named procedure from GPLEPROC file into proc reg N
STRING	N TEXT - Set contents of string register N
STORE	N - Store real number X in memory register N
RCL	N - Display contents of memory register N
ZEROREAL	V - Set value for divide-by-zero traps. Default 1e-9, 0=no trap.
BOUNDING	Best estimate bounding box instead of drawing with M & D operators.
EXIT	Exit bounding box mode and return to drawing with M & D operators.
BBEND	[SCALE] - Set bounds to match bounding box found with BBSTART/BBEND.



TEXT STRING MARKUP CODES	NAME [FILE [DIMENSIONS]]
..U	Go to upper case
..L	Start/end lower case
..B	Backspace
..+2	Select a font set
..+3	Start/end superscript (2 levels)
..+4	Start/end subscript (2 levels)
..+5	Reset sub/superscript level to 0
..+6	Sub/super fully below/above last ch
..+7	Construct a fraction
..+8	Output symbol with code nn
..+9	Output marker with code nn
..+10	Output alphabetic with code nn
..+11	Start/end underlining

COMMAND LINE OPTIONS	NAME [FILE [DIMENSIONS]]
GPLOT KEY=VAL	To run on NOS
UGPLOT KEY=VAL	To run on Unix-like systems.
OBEY=FILE	Name of obey file to run.
PARAM=STRING	Parameters for obey file in dbl args
GET=YES or NO	Auto GET files on NOS
SAVE=YES or NO	Auto SAVE files on NOS
DEBU=YES or NO	Show expanded parameters
QUITE=YES or NO	Show expanded command
SLIDE=YES or NO	Adjust graph layout for larger text

PLNOTES MARKDOWN INTEGRATION	NAME [FILE [DIMENSIONS]]
GPLOT COMMAND	... etc.
GPLOT COMMAND	... no DEVICE or CLEAR
	(blank line ends GPLOT commands)
Use:	MODE=EXEC,BUILD,PLNOTES,ARG=ANOTE.
	... to create ANOTE.HTML

# GPlot V0.87 Evaluator Cheat Sheet

OPERANDS		
(DIGITS)	(-- C1)	SET TOS ARRAY TO A LITERAL CONSTANT.
SWAP or S	(A1 A2 -- A2 A1)	SET TOS TO X MAX ARRAY.
PI	(-- C1)	SET TOS TO PI.
E	(-- C1)	SET TOS TO E.
IDX	(-- A1)	SET TOS TO ITERATION NUMBER FROM (EVAL. 1 IF IN EVAL.
TWPI	(-- C1)	SET TOS TO THE ARRAY ELEMENT INDEX.
PI/2	(-- C1)	SET TOS TO 2 * PI.
	(-- C1)	SET TOS TO PI / 2

STACK MANIPULATION		
SWAP or S	(A1 A2 -- A2 A1)	SWAP OR EXCHANGE TOP 2 STACK ARRAYS.
DUP or &	(A1 -- A1 A1)	Duplicate TOP OF STACK.
C	(AN ... C1 -- AN)	GET STACK LEVEL AT DEPTH C1 INTO TOP OF STACK
POP	(A1 --)	POP TOP OF STACK
CL	(--)	CLEAR STACK
SETX	(A1 -- A1)	OVERWRITE RANGE, GRAPH X VALUES WITH STACK TOP VALUES: X = A1
SETY	(A1 -- A1)	OVERWRITE GRAPH Y VALUES WITH STACK TOP VALUES: Y = A1
XLIN	(C1 C2 C3 --)	X = C1 TO C2 IN C3 LINEAR STEPS
XLOG	(C1 C2 C3 C4 --)	X = C1 to C2 TO C1 to C3 IN C4 STEPS
YLIN	(A1 C2 -- A1 C2)	C2 = A1(C2)
YLOG	(C1 C2 -- C1 C2)	C1 = MOD(C1,C2), C2 = (C1/C2): 1D TO 2D INDEX CONVERT, 0 BASED.
IOU	(C1 C2 -- C1 C2)	C1 = MOD(C1,C2)+1, C2 = (C1/C2)+1: 1D TO 2D INDEX CONV, 1 BASED.
ITU	(C1 C2 -- C1 C2)	

BASIC ARITHMETIC		
+	(A1 A2 -- A1 A2)	ADD ARRAY ELEMENTS: A1 = A1 + A2
-	(A1 A2 -- A1 A2)	SUBTRACT ARRAY ELEMENTS: A1 = A1 - A2
R-	(A1 A2 -- A1 A2)	REVERSE SUBTRACT: A1 = A2 - A1
*	(A1 A2 -- A1 A2)	MULTIPLY ARRAY ELEMENTS: A1 = A1 * A2
**	(A1 A2 -- A1 A2)	EXPONENTIATION: A1 = A1 ** A2
/	(A1 A2 -- A1 A2)	DIVIDE ARRAY ELEMENTS: A1 = A1 / A2
R/	(A1 A2 -- A1 A2)	REVERSE DIVIDE: A1 = A2 / A1
RCIP	(A1 -- A1)	RECIPROCAL A1 = 1.0 / A1
CHS	(A1 -- A1)	A1 = -A1
ABS	(A1 -- A1)	A1 = ABS(A1)

MATH FUNCTIONS		
COS	(A1 -- A1)	A1 = SIN(A1)
SIN	(A1 -- A1)	A1 = COS(A1)
TAN	(A1 -- A1)	A1 = TAN(A1)
ASIN	(A1 -- A1)	A1 = ARCSIN(A1)
ACOS	(A1 -- A1)	A1 = ARCCOS(A1)
ATAN	(A1 -- A1)	A1 = ARCTAN(A1)
SINH	(A1 -- A1)	A1 = SINH(A1), DOMAIN [X] (-742.36
COSH	(A1 -- A1)	A1 = COSH(A1), DOMAIN [X] (-742.36
TANH	(A1 -- A1)	A1 = TANH(A1), DOMAIN [X] (-742.36
SORT	(A1 -- A1)	A1 = SORT(A1)
LOG	(A1 -- A1)	BASE E LOGARITHM: A1 = LN(A1)
LG10	(A1 -- A1)	BASE 10 LOGARITHM: A1 = LOG10(A1)
LOG2	(A1 -- A1)	BASE 2 LOGARITHM: A1 = LOG2(A1)
EXP	(A1 -- A1)	A1 = E ** A1 DOMAIN -675.81 TO 741.66
RAND	(A1 -- A1)	UNIFORMLY DISTRIBUTED RANDOM [0:A1]: A1 = A1 RANDOM
SEED	(C1 --)	SET RANDOM NUMBER SEED TO A1(C1)
GCD	(C1 C2 -- C1)	FIND GREATEST COMMON DIVISOR OF C1, C2

NUMBER RANGE RELATED		
MIN	(A1 A2 -- A1)	A1 = MIN(A1,A2)
MAX	(A1 A2 -- A1)	A1 = MAX(A1,A2)
MOD	(A1 A2 -- A1)	A1 = MOD(A1,A2) OR A1 = A1 % A2
SIGN	(A1 -- A1)	A1 = (A1 > 0) ? 1 : -1

CONDITIONALS		
ODD	(A1 -- A1)	A1 = 1 WHERE INT(A1) IS ODD ELSE 0
GT	(A1 A2 -- A1 A2 A3)	A3 = (A1 > A2) ? 1 : 0
LT	(A1 A2 -- A1 A2 A3)	A3 = (A1 < A2) ? 1 : 0
LE	(A1 A2 -- A1 A2 A3)	A3 = (A1 <= A2) ? 1 : 0
GE	(A1 A2 -- A1 A2 A3)	A3 = (A1 >= A2) ? 1 : 0
EQ	(A1 A2 -- A1 A2 A3)	A3 = (A1 == A2) ? 1 : 0
NE	(A1 A2 -- A1 A2 A3)	A3 = (A1 != A2) ? 1 : 0
NOT	(A1 -- A1)	A1 = (A1 == 0) ? 1 : 0
SEL	(A1 A2 A3 -- A1 A2 A3)	A3 = (A3 == 0) ? A1 : A2

GRAPHICS		
M	(C1 C2 --)	MOVE TO (C1,C2)
D	(C1 C2 --)	DRAW TO (C1,C2)
C	(C1 C2 C3 --)	DRAW CIRCLE, CENTER C1,C2 RADIUS C3.
A	(C1 C2 C3 C4 C5 --)	DRAW ARC, CENTER C1,C2 RADIUS C3, ANGLES C4 TO C5.
BOX	(C1 C2 C3 C4 --)	DRAW RECTANGLE, BOTTOM LEFT C1,C2, WIDTH C3 HEIGHT C4.
HDSH	(A1 -- A1)	DRAW RELATIVE (0,1) IF A1(1) 0 ELSE MOVE
VDSH	(A1 -- A1)	DRAW RELATIVE (0,1) IF A1(1) 0 ELSE MOVE
PTH0	(A1 A2 --)	DRAW POLYLINE X=A1,Y=A2, OPEN
PTHC	(A1 A2 --)	DRAW POLYLINE X=A1,Y=A2, CLOSED
TVF	(C1 --)	DRAW CONTENTS OF STRING REGISTER C1 AS TEXT.
TS	(C1 --)	DRAW C1 AS TEXT USING FORMAT STRING IN C2.
TM	(C1 --)	DRAW INT(C1) AS TEXT USING FORMAT STRING IN C2.
TC	(C1 --)	DRAW SYMBOL WITH CODE NUMBER C1
TH	(C1 --)	DRAW MARKER WITH CODE NUMBER C1
TA	(C1 --)	DRAW CHARACTER WITH CODE C1 FROM CURRENT ALPHABET
TEC	(C1 --)	SET TEXT/CHARACTER/SYMBOL HEIGHT
TEC	(C1 --)	SET TEXT DRAWING ANGLE IN DEGREES CCW
TEC	(C1 --)	START TEXT CONTINUATION
TEC	(C1 --)	END TEXT CONTINUATION
TEC	(C1 --)	GET THE LENGTH IN BOUNDS AT UNIT HEIGHT OF STRING IN REGISTER C1.
TEC	(C1 --)	ROTATE X=A1,Y=A2 BY C3 RADIANS ABOUT ORIGIN.
TEC	(C1 --)	TRANSLATE X=A1,Y=A2 BY C3,C4
TEC	(C1 --)	SCALE X=A1,Y=A2 BY C3,C4
TEC	(C1 --)	LABEL AT (C1,C2), LEN C3, ANG C4, STRING REG C5

NUMBER TYPE CONVERSIONS		
INT	(A1 -- A1)	TRUNCATION A1 = INT(A1)
FRAC	(A1 -- A1)	FRACTIONAL PART A1 = FRAC(A1)
FLOOR	(A1 -- A1)	A1 = FLOOR(A1)
CEIL	(A1 -- A1)	A1 = CEILING(A1)

SYSTEM		
STO or =	(A1 C2 -- A1)	STORE A1(1) (A.K.A. C1) IN REGISTER C2
RCL or (HASH)	(C1 -- C1)	RECALL CONST VALUE FROM REGISTER INT(C1)
PE	(A1 C2 C3 -- A1)	PRINT TOS ARRAY FIRST AND LAST ELEMENTS
PE	(A1 C2 C3 -- A1)	PRINT ELEMENTS C2 TO C3 OF A1 IN FREE FORMAT
PE	(A1 C2 C3 -- A1)	PRINT C1 (TOS A1) IN FREE FORMAT
PE	(A1 C2 C3 -- A1)	PRINT ALL STACK LEVELS FIRST AND LAST ELEMENTS
PE	(A1 C2 C3 -- A1)	CONVERT RADIANS TO DEGREES
PE	(A1 C2 C3 -- A1)	CONVERT DEGREES TO RADIANS

