NAME

gex − Graphic EXerciser for Tektronix 4014

SYNOPSIS

gex [−]

DESCRIPT ON

Gex (formerly *llx*) is an interactive graphics program which allows a user to initialize and edit graphical data consisting of lines, arcs, circles, text and library symbols, in two line widths and five line styles.

The graphical data buffer is serial and ranges 0-32K data base units.

The optional ' − ' argument causes a time delay, required by some terminals after erase.

The last file reference is remembered and used as the output file when a null output file name is given. If file name ends with **.tk** 4014 scope code is output, otherwise the graphic data buffer is output. Any **.tk** file can be displayed with the *cat* command.

Long displays and listings can be interrupted with the standard UNIX interrupt key.

Commands are single stroke key depressions which send the current cursor position and the command. When additional typed input is required a prompt message is displayed. When the typed input is multi character it must be terminated with **return** and the standard UNIX character erase (#) and line erase (@) can be used to correct typing errors.

The first *DEFINE* (digitize) produces a *butterfly* on the point, the second produces a *dotted box* around the area defined, and the third is taken as a first. With all *DEFINE* area sub-commands *gex* knows only points, not lines; therefore *DELETE*, *MOVE*, *EDIT*, *COPY*, etc., affect only the points on or within the defined area. For *TEXT* the point is the center of the first character. For *CIRCLE* the point is the center point. For *SYMBOL* the point is the reference point of the symbol.

Inactivity for two minutes will cause *gex* to **Time out!**, this is to relax the scope, **return** brings it back to life again.

Gex Commands:

j JUMP to here. Start a new series of vectors.

v VECTOR Draw a line to here.

t TEXT Place a character string with height *SIZE* and angle *ROTATE* here.

c CIRCLE Draw a circle with radius *SIZE* here.

[SELECT SYMBOL Set library symbol mode.

p PLACE SYMBOL Draw the currently selected symbol at scale *SIZE* and angle *ROTATE* here.

e ERASE SCOPE Clean off scope, does not affect data.

g GRID Set Grid snap increment.

a AVAILABLE BUFF Print buffer space usage.

s SIZE Set mode for *TEXT*, *CIRCLE*, *SYMBOL* and *SCALE*.

r ROTATE Set mode for *TEXT*, *ROTAREA* and *SYMBOL*.

l LINE STYLE Set line width and style for *VECTOR*, *ARC*, *CIRCLE* and *EDIT*.

k KILL TEXT DISP Do not display *TEXT*. See 'C' command.

n NEW DISPLAY Erase scope and redraw picture.

q QUERY Print current status (modes). See 'C' command.

x REF GRID Draw tick marks , at current *GRID* points, on edges of scope.

i INPUT FILE Append data from file to graphic buffer.

O OUTPUT TO FILE Write graphic data buffer to file. Output file names should end with '.g'.

o OUTPUT REPORT Print number of graphic bytes sent to scope.

X BIG X Draw scope diagonals.

. LAST DEFINE Restore last (dd) area.

d DEFINE (digitize) Define a point or area. (*Space bar* can be used here)

- **r** RADIUS aRc (dr) Draw an arc or circle.
- **w** WINDOW (dw ddw) Relocate viewing port.
- **x** MINI GRID (dx) Rotated, *ROTATE* degrees, ruler. (ddx) Point matrix.
- **c** COPY (ddc) Make carbon copy, with respect to second (d) point, of graphic data in area.
- **m** MOVE (ddm) Relocate, with respect to second (d) point, graphic data in area. Stacked points (identical X and Y) can be unstacked with two *DEFINE*s on the point.
- **a** ANGLE (dda) Print angle and distance between points. Distance is given in data base units and scope units.
- **f** FLASH (ddf) Redraw the graphic data in area.
- **D** DELETE (ddD) Remove graphic data from buffer.
- **E** EDIT (ddE) Change to current *SIZE*, *ROTATE*, *LINE STYLE* and *SYMBOL* number. See 'C' command.
- **Q** QUERY (ddQ) Print the buffer values for graphic data in area. See *gdump*(1G) for format description.
- *B* ROTAREA (ddR) Rotate, *ROTATE* degrees about second (d) point, all graphic data in area.
- **G** GRID SNAP (ddG) Snap graphic data in area to current **GRID**. Use with care, can cause coincident points!
- **S** SCALE (ddS) Scale graphic data in area by *SIZE* / **100**, leaving low left point fixed.
- **M** MIRROR Reflect area about midline. *TEXT* and some *SYMBOL*s do not mirror correctly.

w WINDOW Alter viewing port.

e,w,n,s EAST, WEST, NORTH, SOUTH

u,d UP, DOWN Make the picture smaller or larger.

- **k** KEEP Save current window for *HOME*.
- **h** HOME Restore saved window.
- **a** ALL Display zero to 32K across scope.
- **r** RATIO TRUNCATE Change display *WINDOW* ratio to integer value.
- **z** LIB SYMB ZONE Zoom to given zone. For editing symbol library files.

? MENU Print this list of commands.

H HOLD AUTO DISP Do not automatically redisplay.

C CHANGE Edit, query or kill modes. See **CHANGE** discussion below.

P PLOT Write a plot file. (not implemented)

! UNIX Temporary escape to UNIX.

b BACKUP Start a clean sheet of paper.

y RESTORE Recovery from inadvertant *BACKUP* or *COPY*. Should be issued immediately after the bad *BACKUP* or *COPY*.

^ DONE Terminate program.

CHANGE modes for *EDIT*, *QUERY* and *KILL*

The *gex* initial default for the '**q**' command prints only lines 1 and 2, (default values are shown below), but can be set with the '**C**' command to print any, all or none of the following lines:

L1: SIZE= 70 ROT= 0 LS= 0,0 SYM= 0 KTX= F HOLD= F
L2: GRID= 10,10 X= 17600 Y= 12500 OF= tx.g
L3: EMODES: TR= T TS= T SR= T SS= T SN= T CR= T LS= T
L4: QMODES: L1= T L2= T L3= F L4= F L5= F L6= F L7= F
L5: KMODES: TX= F SY= F SX= F AX= F AC= F
L6: Low= 11300,11300 High= 21530,18970 WR= 10.000
L7: GXY= 100,100 WINC= 400

Line 1 shows the current *SIZE*, *ROTATE*, *LINE STYLE* (width, style), selected *SYMBOL* number, *KILL TEXT* and *HOLD* flags (*True*,*False*).

Line 2 shows the current *GRID* snap increments (x, y), the cursor position (x, y) mapped to 32K, and the remembered output file name.

Line 3 shows the current *EDIT* modes: Text Rotate, Text Size, Symbol Rotate, Symbol Size, Symbol Number, Circle Radius, and Line Style. The 'KEYS' **TR**, **TS**, ... are used by the '*C*' command to change the *True False* state. Only 'KEYS' in the *True* state are edited, thus setting all seven 'KEYS' to *False* completely disables the *EDIT* command. The 'KEY' **AT** sets all 'KEYS' to *True* and the 'KEY' **AF** sets all 'KEYS' to *False*.

Line 4 shows the current 'query' modes for lines 1 thru 7. The 'KEYS' idea is similar to the *EDIT* mode 'KEYS' above.

Line 5 shows the current 'kill' modes: **TeXt**, **SYmbols**, Symbol reference point **X**, Arc reference point **X** and Arc Center point. The 'KEYS' idea is similar to the *EDIT* mode 'KEYS' above.

Line 6 shows the **Low** and **High** points (x, y) of the current *WINDOW* in data base (0 - 32K) units and the *WINDOW* ratio which is computed = (xhigh -xlow) / 1023.

Line 7 shows the internal *GRID* increments (X, Y) and the *WINDOW* increment used for *WINDOW* moves which is computed =

(internalGX + internalGY) * 2.

and attempts to guess and print the current symbol zone.

GRAPHIC DATA FILE FORMAT

The first word of every *gex* graphic data file contains the value 040154 octal, 16492 decimal. The graphic data is in records consisting of the following fields:

RECORD TYPE	DATA FIELDS					
Vector	X	Y	cntl, **0**			
Jump	X	Y	cntl, **1**			
Text	X	Y	cntl, **2**	rotate	size	text
Circle	X	Y	cntl, **3**	radius		
arc	X	Y	cntl, **4**			
Symbol	X	Y	cntl, **5**	rotate	size	symbol

X and *Y* are 15 bit integers, range 0 thru 32767.

The low byte of *cntl* is shown, the high byte contains the line style which is divided into two sub fields, the low 5 bits are the line style and the high 3 bits are the line width. Valid line styles are **0** solid, **1** dotted, **2** dotdashed, **3** shortdashed, **4** longdashed. Valid line widths are **0** normal, **1** bold.

Rotate, *size*, *radius* and *symbol* are full word integers.

Text is a null terminated byte string.

LIBRARY FILES

When *gex* starts it attempts to open **./lib.g**, if it exists it is used as the source for symbols. If **./lib.g** is not found an attempt is made to open **/usr/lib/gexlib.g**, if this fails *gex* runs without a symbol library. When no library exists or a selected symbol does not exist, a dot is displayed at symbol references. It is recommended that user libraries be kept in a directory unique to each library along with the subordinate graphic files.

Each symbol in a *gex* symbol library is selected via a number in the range 0 thru 4095. This number identifies a particular symbol zone within the 0 thru 32K range of *gex*. The range of each symbol zone is 512 X 512. Since the low left corner of each *WINDOW* is snapped to the current *GRID* the perimeter of the symbol zone, as it appears on the scope, may be part of the adjacent symbol zone. The reference point for each symbol is the first data point of that symbol.

If a picture is worth 1000 words, try this:
(You do what's in quotes)

1. "**chdir**"" to a clean (empty) directory
2. "**gex**" start *gex*
3. "**w**" window, "**z**" zone, "**1000**"
4. draw some stuff (this will be symbol 1000)
5. "**w**" window, "**z** zone, "**2000**
6. draw some more stuff (this will be symbol 2000)
7. "**w**" window, "**a** all
8. notice the tiny versions of the two new symbols!
9. "O" output, "**lib.g**
10. "^" quit
11. "**gex**" restart *gex*
12. "**[**" select symbol, "**1000**
13. "**position cursor, p**" place symbol
14. repeat 13 a couple times
15. "**[**" select symbol, "**2000**
16. "**position cursor, p**" place symbol

17. repeat 16 a couple times
18. got the picture ? if not call for help!

FILES

tx.g	Default output file
/usr/bin/gexmenu	The ? command
lib.g	Symbol library
/usr/lib/gexlib.g	Default library

SEE ALSO

atgex(1G), gcon(1G), gdump(1G), gsplit(1G), hatch(1G), tkdump(1G)

DIAGNOSTICS

Buffer full EXPECT blowup soon
Graphic buffer about to overflow.

Can't create ____
Write permission in directory or file system.

Cannot OPEN _____
Probably name was mistyped or file does not exist.

DATA is on file -- tx.g
Buffer not empty on exit.

DEFINE two points first
This command requires two points.

DELTA ZERO
Cursor was not moved to establish a delta for **COPY** or **MOVE**.

File Format ERROR
Not a *gex* type file.

GRID TOO SMALL
The current **GRID** is too small to display.

INVALID data CH=NNN
Bad data transfer to cpu.

LIMIT
Can't move **WINDOW** any more.

NO CHANGE
Nothing has been added to buffer (y **RESTORE**).

NOTHING FOUND / CHANGED
Nothing was found or what was found did not change.

Not ENOUGH SPACE IN BUFFER
Not enough space to do the file **INPUT** or **COPY**.

POINT OUT OF BOUNDS
SCALE command aborted because a point would go out.

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BUGS

Buffer size restriction should be eliminated.

GEX Menu

j = JUMP
v = VECTOR
t = TEXT
c = CIRCLE
l = SELECT SYMBOL
p = PLACE SYMBOL
e = ERASE SCOPE
g = GRID SET
a = AVAILABLE BUFF
s = SIZE
r = ROTATE
l = LINE STYLE
k = KILL TEXT DISP
n = NEW DISPLAY
q = QUERY
x = REF GRID
i = INPUT FILE
O = OUTPUT TO FILE
o = OUTPUT REPORT
X = BIG X
. = LAST DEFINE
d = DEFINE (digitize)
dr = RADIUS aRc (dr)
dw = WINDOW (dw ddw)
dx = MINI GRID (dx ddx)
dc = COPY (ddc)
dm = MOVE (ddm)
da = ANGLE (dda)
df = FLASH (ddf)
dD = DELETE (ddD)
dE = EDIT (ddE)
dQ = QUERY (ddQ)
dR = ROTAREA (ddR)
dG = GRID SNAP (ddG)
dS = SCALE (ddS)
dM = MIRROR (ddM)
w = WINDOW
we = EAST
ww = WEST
wn = NORTH
ws = SOUTH
wu = UP
wd = DOWN
wk = KEEP
wh = HOME
wa = ALL
wr = RATIO TRUNCATE
wz = SYMBOL ZONE
? = MENU
H = HOLD AUTO DISP
C = CHANGE E, q or k modes
! = UNIX
b = BACKUP
y = RESTORE
^ = DONE