ELLIOTT 900 SERIES SIMULATOR

PLOTTING FACILITIES IN 903 ALGOL.

Overview.

ALGOL provides procedures for drawing vectors, points and
characters as part of the standard library They have "built-
in" declarations in the Translator, as for sin, instring, etc.
However, unlike the standard library routines, they are not
"built-in" to the Interpreter. Therefore programs using them
must always be translated in library mode, i.e., by an entry
at 12.

The facilities are a subset of those in Elliott 4100 ALGOL.

Drawing and Plotting.

Four procedures are available for use in drawing graphs,
pictures and diagrams.

set origin

900 / Hunter ALGOL: set origin(X,Y)

This has two integer parameters called by value, X and Y,
which set the origin to be X pixels in from the left and Y
pixels down from the top of the plotter window. The X-axis is
across the screen with positive direction to the right; the Y
axis positive direction is upwards. The default is 160, 320.

Other models: set origin(E, P)

This has two integer parameters called by value, E and P,
which locates the origin at E of steps from the left margin of
the plotter screen and allows a choice of the axis
orientation, namely (P=0): X across the window or (P=1): X
along the paper. Any value other than 0 or 1 for P is treated
if 0.

An attempt to plot to the left of or above the screen causes a program halt with an appropriate error message.

draw line(E,F)

This draws a line from the current position to the point with coordinates (E,F). E and F are integer parameters called by value.

move pen(E,F)

This moves the current pen position to the point with coordinates (E,F). E and F are integer parameters called by value.

cencharacter(N)

This draws a character centred on the current pen position. In 4100 ALGOL there is a choice of about ten different characters, but here the character is always a small +. The parameter N is an integer called by value for compatibility with 4120 ALGOL and should have the value 1.

Text output

The plotter can be used with ALGOL print statements. It is output device number 5. Before characters can be drawn the procedure way (D, L) must be called. D and L are passed by value. D should have the value zero, and is inserted for compatibility with 4100 ALGOL where characters can be oriented along either the X or Y-axis; here they are always along the X-axis. L determines the character size which comprises (for 900 plotting) 5*L pixels in X and 7*L pixels in Y, so a value of L between 3 and 6 is probably suitable. For all other machine types, L determines the character width in L*2.5 plotter steps (pixels) approximately. In this case useful values of L are in the range 4 to 25.

The character set for output by the Elliott standard library is:

letters A to Z (capitals only)
digits 0 to 9
space
others + - * = and subscript ten (created by the ? character
in 900 telecode)

All other characters, including newline, are output as an
inverted V, rather like ^ only bigger.

Note: an improved plotting library created by Terry Froggatt
also provides \, /, (,), [,], <, >, ` and ' – see
ALG3(TJF).RLB.

As mentioned above, way (D, L) must be called before using
punch(5), e.g.,

way (0, 10);
"print" punch(5), 'ABCDEFG`;

All characters output on the screen are drawn on a grid of
boxes whose size depends on the last call of WAY. The initial
pen position is at the bottom left hand corner of the box. The
final pen position is at the bottom right hand corner ready
for drawing the next character. Right in this context is the
direction of increasing X.

Examples.

There are five plotting examples in the HUNTER directory that
use '900 plotting': CORNU.DAT, MOON.DAT, MOONQUIK.DAT,
NAVIG.DAT, SUNDIAL.DAT. SUNDIAL is the fastest to run: it
produces a graph for correcting local time (as measured by a
sundial) to astronomical time at different times of year.
CORNU plots a Cornu spiral. MOON plots the trajectory of the
Apollo 8 mission, is very slow, MOONQUIK is faster, doing the
same task with pre-computed coordinates. NAVIG plots the
ellipses within which a ship is likely to lie with various
probabilities, given four position lines from star sights.

There is a comprehensive example of '903 plotting' in DEMO10
in the 903ALGOL directory which plots examples of a number of
interesting mathematical curves.