G L F R C M O D E L I N G G R O U P S O F T W A R E

SCT

A USER'S MANUAL

by

JACQUES REGNIERE and IRENE KWAIN

Great Lakes Forest Research Center

Canadian Forestry Service

P. O. Box 490

Sault Ste Marie, Ontario

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INTRODUCTION

SCT is a fully interactive graphics program which was designed to produce scatter diagrams, including the results of regression analysis. Data sets processed by SCT consist of the X AND Y COORDINATES of one or more GROUPS of points, with the options of representing PRECISION INTERVALS on the Y coordinates, and PREDICTED values derived through regression analysis or some other means.

SCT responds to a series of COMMANDS which it reads from the screen of a GRAPHIC TERMINAL. Graphs can be built gradually, and can be displayed (using the GRAph command) at any time during a session.

Once a graph has been prepared to a user's satisfaction, it is possible to save the graph on disk for later reproduction or for further development.

SCT has some built-in error detection capabilities, particularly with respect to the SYNTAX and LOGIC of commands issued by the user. The error message appearing on the screen, however, is general and does not spell-out errors. Rather, it suggests consultation of the HELP facility which explains command syntax and usage.

A note on the notation used in this manual to describe command syntax: only the capitalized portion of words is needed in commands, and arguments between [ ] are optional (can be omitted). Thus, only the first 3 letters of commands are needed, and litteral arguments can be abbreviated to just the first letter.

1.0 DATA PREPARATION AND ENTRY

1.1 The Structure of SCT Data Sets

SCT handles data which basically consist of 2 or more columns of values, representing the X and Y coordinates of individual points. Optionally, SCT accepts information in up to 3 additional columns: one containing a GROUPING INDEX (when more than one group of points is to be plotted), one containing the precision INTERVAL associated with the Y coordinate, and one containing a PREDICTED value (for regression problems).

TABLE 1

STRUCTURE OF THE GENERALIZED SCT DATA SET

OBSERVATION	COORDINATES X	COORDINATES Y	PRECISION INTERVAL	PREDICTED VALUE	GROUPING INDEX
1	X_{11}	Y_{11}	I_{11}	P_{11}	1
2	X_{21}	Y_{21}	I_{21}	P_{21}	1
⋮	⋮	⋮	⋮	⋮	⋮
N_1	X_{N1}	Y_{N1}	I_{N1}	P_{N1}	1
1	X_{12}	Y_{12}	I_{12}	P_{12}	2
2	X_{22}	Y_{22}	I_{22}	P_{22}	2
⋮	⋮	⋮	⋮	⋮	⋮
N_2	X_{N2}	Y_{N2}	I_{N2}	P_{N2}	2
.	.	.	.	.	.
.	.	.	.	.	.
.	.	.	.	.	.
N_R	X_{NR}	Y_{NR}	I_{NR}	P_{NR}	R

A generalized data set is shown in Table 1. Note that each of the 3 additional columns is optional (not necessary) and that their order can be changed. The only requirement

is that the X and Y values should be in the first and second columns, respectively.

Thus, data sets suitable for processing by SCT consist of one or more (say, r) GROUPS of X-Y coordinates (optionally accompanied by their group-index, precision interval, and predicted value). Each group is, in turn, composed of a certain number (Ni, i=1 to r) of X-Y coordinates (or observations) (Table 1).

As an example for the remainder of this manual, we use a hypothetical data set consisting of the average growth rate of an insect, measured at various temperatures (OBSERVATIONS), on 3 food substrates (GROUPS). Accompanying these data are:

1. the standard error of the mean for each point and
2. the growth rate predicted by a non-linear equation (Table 2).

TABLE 2

HYPOTHETICAL DATA SET SUITABLE FOR SCT

SUBSTRATE INDEX	TEMPERATURE DEGREES C	GROWTH RATE		
		MEAN	ST. ERROR	PREDICTED
1	5.	0.0057	0.0014	0.0113
	10.	0.0287	0.0050	0.0248
	15.	0.0499	0.0081	0.0484
	20.	0.0777	0.0118	0.0792
	25.	0.1095	0.0162	0.1072
	30.	0.1241	0.0183	0.1254
	35.	0.1010	0.0197	0.0945
2	12.	0.0520	0.0052	0.0463
	18.	0.0960	0.0096	0.0936
	22.	0.1264	0.0126	0.1285
	28.	0.1684	0.0160	0.1679
3	12.	0.0286	0.0029	0.0278
	18.	0.0527	0.0052	0.0561
	22.	0.0846	0.0084	0.0770
	28.	0.0939	0.0093	0.1007

1.2 Preparation of Data Sets for SCT

SCT reads data sets from files stored on disk on the PDP-11/70. These files can be prepared in several ways, including the use of MINITAB, by punched CARDS, or through the PDS file EDITOR.

These data files must reflect the structure illustrated in Table 1. Using our example the file SCTDEMO.DAT was stored on disk (Table 3).

TABLE 3

HYPOTHETICAL DATA SET IN TABLE 2.
PREPARED FOR PROCESSING BY SCT

5.	0.0057	0.0014	0.0114	1.
10.	0.0287	0.0050	0.0248	1.
15.	0.0500	0.0081	0.0484	1.
20.	0.0777	0.0119	0.0793	1.
25.	0.1096	0.0163	0.1073	1.
30.	0.1242	0.0183	0.1254	1.
35.	0.1011	0.0197	0.0945	1.
12.	0.0520	0.0052	0.0464	2.
18.	0.0885	0.0097	0.0838	2.
22.	0.1264	0.0120	0.1285	2.
28.	0.1605	0.0160	0.1679	2.
12.	0.0288	0.0029	0.0278	3.
18.	0.0527	0.0053	0.0562	3.
22.	0.0848	0.0085	0.0771	3.
28.	0.0940	0.0094	0.1007	3.

1.2.1 File Format -

SCT reads files in a LIST-DIRECTED format, this means that no specific format is required, except that all values must be separated by at least one blank, or a comma.

1.2.2 Size of Data Sets -

SCT will process files containing up to 250 OBSERVATIONS, in up to 8 GROUPS. Whenever the total number of observations exceeds 250, SCT will not process the excess

values.

1.2.3 Missing Values -

SCT handles missing values of the Y-coordinates (2nd column). These missing values MUST be entered in the data file by giving them a value BELOW the minimum Y-coordinate in a data set (e.g. missing values at or below -1). Once this missing value code has been given to SCT by using the MISsing command, any value at or below this code will be considered missing.

One use of missing values in SCT is in producing graphs which show regression lines OUTSIDE the range of the data (extrapolation) or to define additional data points to allow smooth drawing of non-linear equations. For example, our hypothetical data set can be expanded with missing data to extrapolate the results on substrates 2 and 3 (Table 4).

TABLE 4

HYPOTHETICAL DATA SET OF TABLE 2.
EXPANDED TO PRODUCE EXTRAPOLATED
PREDICTED VALUES (GROUPS 2 AND 3)

5.	0.0057	0.0014	0.0114	1.		
10.	0.0287	0.0050	0.0248	1.		
15.	0.0500	0.0081	0.0484	1.		
20.	0.0777	0.0119	0.0793	1.		
25.	0.1086	0.0163	0.1073	1.		
30.	0.1242	0.0183	0.1254	1.		
35.	0.1011	0.0197	0.0945	1.		
12.	0.0520	0.0052	0.0464	2.		
18.	0.0865	0.0097	0.0936	2.		
22.	0.1284	0.0126	0.1285	2.		
28.	0.1805	0.0180	0.1879	2.		
12.	0.0286	0.0029	0.0278	3.		
18.	0.0527	0.0053	0.0562	3.		
22.	0.0840	0.0085	0.0771	3.		
28.	0.0940	0.0094	0.1007	3.		
5.	-1.0000	0.0000	0.0160	2.	———	E
8.	-1.0000	0.0000	0.0258	2.		X P
32.	-1.0000	0.0000	0.1818	2.		P O
35.	-1.0000	0.0000	0.1329	2.		A R
5.	-1.0000	0.0000	0.0098	3.		N T
8.	-1.0000	0.0000	0.0155	3.		D I
32.	-1.0000	0.0000	0.1089	3.		E O
35.	-1.0000	0.0000	0.0797	3.	———	D N

Other uses of the missing data include drawing special lines (as additional groups) on the graph. For example, adding a fourth group in our hypothetical data set could allow drawing a vertical line at, say 20 degrees C:

```
.       .       .       .       .
.       .       .       .       .
.       .       .       .       .
20      -1      0       0       4
20      -1      0       1       4
```

2.0 THE SCT COMMANDS

The following sections describe the various SCT commands, their syntax and usage. We divide SCT commands into 5 groups:

1. data definition commands
2. graph structure commands
3. data presentation commands
4. lettering commands
5. program control commands.

2.1 Data Definition Commands

2.1.1 The File Command -

SYNTAX: FILe FILENAME [Pred] [Intervals] [Group]
where
FILENAME is a valid IAS file specification.

The FILe command is issued to define the name of the disk file (FILENAME) where the data are stored, and the NATURE and ORDER of optional columns to be read from this file (besides the essential X and Y coordinates in the first 2 columns).

The FILENAME parameter may be any valid IAS file specification, including other than default disk drive, account number, or version number. For example, DR0;[11,54]SCTDEMO.DAT;1 is a valid file specification. So is SCTDEMO.DAT if you logged into account [11,54].

When the input file has been successfully found and opened, SCT reads it to the end or until a maximum of 250 observations is reached, whichever comes first. If an error is made in the file specification, a severe error will occur and SCT will be aborted.

Upon successful completion of a FILe command, SCT prints the number of observations read on the terminal screen.

The presence of additional columns in the input file is indicated by the appropriate keywords in the FILe command. For example, issuing

SCT> FIL SCTDEMO.DAT
will result in SCT reading ONLY X-Y coordinates from the input file.

Similarly

SCT> FIL SCTDEMO.DAT P I G
will result in SCT reading 5 columns in the input file: X-Y coordinates, predicted values, precision intervals and group indices IN THAT ORDER. Changing the ORDER of the keywords will change the order in which these values are read by SCT. Obviously the keyword-order must correspond to the order of a file's columns. Even if a file contains more than one group of observations, it is not necessary to have a grouping index column in the input file. Grouping can be done through SCT using the GROup command described below.

ERROR MESSAGE: None

2.1.2 The GROup Command -

SYNTAX: GROup R
where
R is the number of groups to be defined (1 < R < 8)

The GROup command is used when the input file contains several groups of points, but no grouping-index column. This command can be used when the input file is sorted BY GROUPS rather than in some other order (such as X, for example)

Immediately after a GROup command has been issued, SCT will prompt for the CUT-POINTS of each successive group in the input file. These cut-points refer to the observation (or line) number in the file, rather than to the values of some variable in it. Thus, the group cut-points in our example (Table 3) would be : 7 (for group 1), 11 (for group 2), and 15 (for group 3).

Thus, assuming that file SCTDEMO.DAT did not contain a grouping-index column, and since its observations ARE sorted by group, we could issue the following commands:

EXAMPLE

```
1.  SCT> FIL SCTDEMO.DAT I P
    NUMBER OF OBSERVATIONS READ:  15
2.  SCT> GRO 3
    GROUP 1 CUT-POINT:  7
    GROUP 2 CUT-POINT:  11
    GROUP 3 CUT-POINT:  15
    SCT>

    instead of:
3.  PLT> FIL SCTDEMO.DAT I P G
```

ERROR MESSAGE

SCT will PRINT an error message and will not execute A GROup command if:

1. R > 8
2. a cut-point is larger than the number of observations in the file
3. a cut-point is smaller or equal to a previously defined cut-point.

2.1.3 The MISsing Command -

SYNTAX: MISsing V
where
V is a value AT OR BELOW which a Y-coordinate is to be considered missing.

As described earlier in section 1.2.3, missing values may be very useful when using SCT. Such uses include: curve extrapolation, adding extra points to smooth non-linear regressions, and drawing special lines on a graph.

EXAMPLE

```
SCT> MIS -1
SCT>
```

ERROR MESSAGE: None

2.1.4 The COMmon Command -

SYNTAX: COMmon

The COMmon command instructs SCT that, while there are several groups of points in the input file, the PREDICTED VALUES ALL BELONG TO THE SAME CURVE, and that the grouping only applies to the symbols drawn to represent data points.

Re-issuing the COMmon command restores SCT's distinction of as many lines as there are groups in the file.

EXAMPLE

```
SCT> COM
SCT>
```

ERROR MESSAGE: None

2.2 GRAPH STRUCTURE COMMANDS

The screen of VT-640 and Tektronix 4010 graphic terminals consists of a matrix of phosphorous dots called addressable points, which can be illuminated electronically, in order to produce images. There are 1023 columns of such dots along the horizontal aspect of the screen, each containing a vertical series of 780 dots (thus 1023 x 780 dots on the screen). The graphics software is a series of instructions prepared by the computer to illuminate some of these points. Any point outside the addressable screen cannot be displayed.

The general structure of a SCT graph is illustrated in Figure 1. Most of the aspects of this structure can be modified by a SCT graph-structure command.

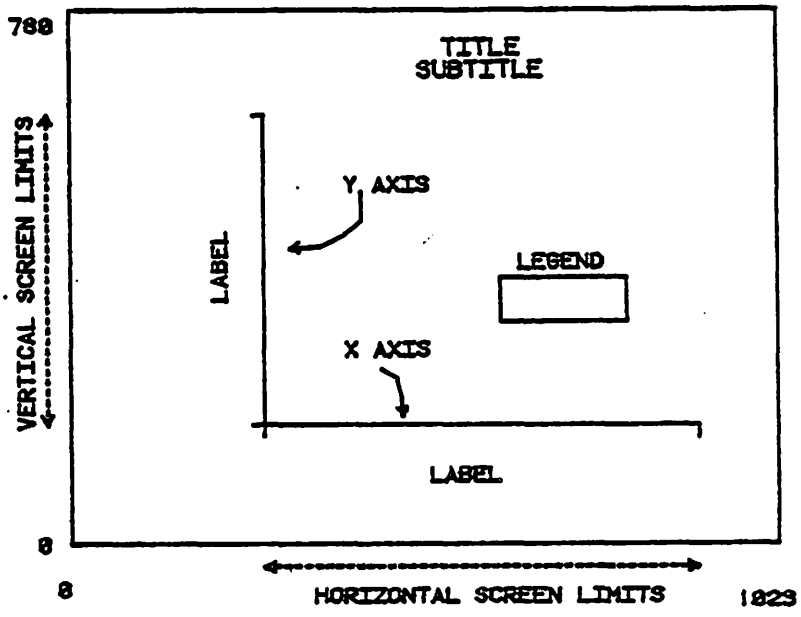


FIGURE 1: STRUCTURE OF THE SCT GRAPH

2.2.1 The SCReen command -

SYNTAX: SCReen [ASPECT MIN MAX]
where

ASPECT is either Horizontal or Vertical (abbreviated if desired) MIN and MAX are VALID screen limits (Figure 1).

The SCReen command controls the POSITION and LENGTH of the axes on the terminal screen. Thus, it can be used to alter the SHAPE, SIZE, and POSITION of the entire graph. The command is useful in :

1. changing the size of the graph with respect to the lettering (which cannot be altered on our terminals).
2. allowing more than one set of axes on a single graph (although these cannot be displayed simultaneously on the screen, they can be on the hard-copy terminals or pen plotter).

By default, the screen limits are set by SCT at [200,850] on the horizontal, and [170,655] on the vertical. These values are thought to produce generally satisfactory results, providing a good height/width ratio between the axes, leaving sufficient space on all sides for lettering.

When altering these limits, it is recommended to leave some empty space below the X-axis and to the left of the Y-axis for tic marks and axis labels. Thus the lower HORIZONTAL limit shoud be >150, and the lower VERTICAL limit >100.

Drawing several GRAPHS on the same page is a rather specialized use requiring some familiarity with the equip-

ment and software. But practise makes good. For example, if a figure is to contain 2 graphs of equal dimensions, one below the other, the vertical screen limits could be set by the following string of commands:

EXAMPLE

1. SCT> SCR V 100 300
   for the LOWER graph

2. SCT> SCR V 450 650
   for the UPPER graph

   The result being 2 rather thin graphs (Figure 2). Omitting the X axis label in the upper graph, and using more of the vertical screen's addressable space would lead to larger graphs.

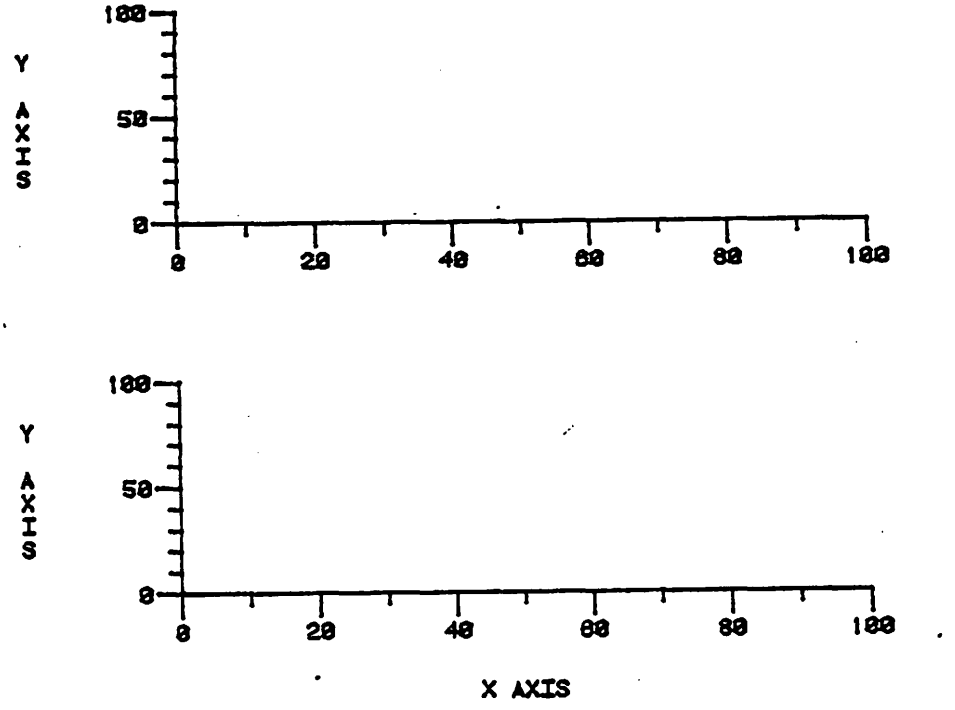


FIGURE 2: USE OF THE SCREEN COMMAND

3. When the parameters of the SCReen command are omitted, SCT prints the current screen limits on the terminal:

```
SCT> SCR
        PRESENT LIMITS          X               Y
                    MIN     200.0000        170.0000
                    MAX     850.0000        655.0000
        SCT>
```

ERROR MESSAGE

SCT will return an error message and will not execute the SCReen command if:

1. the second parameter begins with a character other than H or V, or
2. the MIN or MAX parameter is invalid (too large).

2.2.2 The AXIs Command -

SYNTAX: AXIs [ID MIN MAX]
where

ID is the axis identity (either X or Y), and MIN < MAX are the axis minimum and maximum desired.

This command allows the user to choose the range of values to be displayed on the graph. However SCT is programmed to choose the "best" axis MIN and MAX, taking into CONDISERATION the actual data MIN and MAX, whether real or specified in the AXIs command. This is necessary in order to produce neat tic-mark labels. Thus, specified axis MINS and MAXS may not be obeyed exactly, but SCT will try to accommodate them as much as possible (it will display AT LEAST the range specified or more, never less).

EXAMPLE

1. SCT> AXI X 100 250
   SCT>
2. When the parameters of the AXIs command are omitted, SCT prints the current axis MIN and MAX values:

```
SCT> AXI

PRESENT LIMITS          X              Y
          MIN       100.0000        0.0000
          MAX       250.0000        1.0000
SCT>
```

Data values outside ranges specified by the AXIs command will not be displayed, and curves will be clipped at the axis limits (Figure 3).

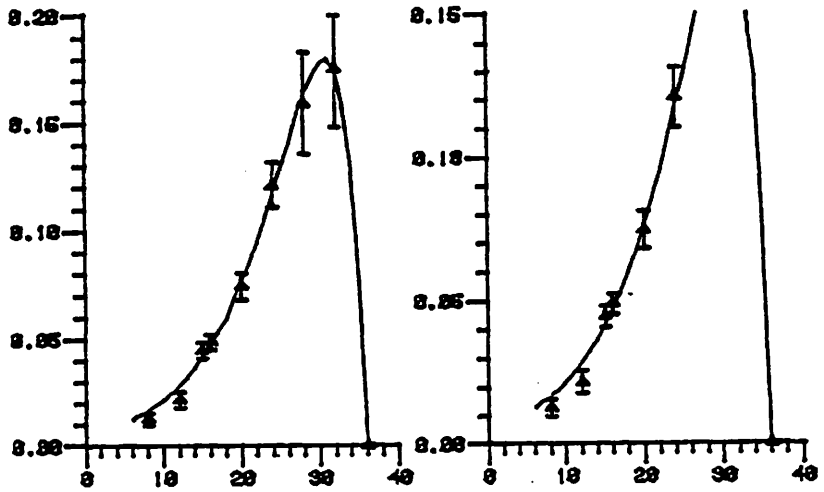


FIGURE 3. USE OF THE AXIS COMMAND (NOTE THE CLIPPING)

ERROR MESSAGE

SCT will return an error message and will not execute the AXIs command if:

1. the ID parameter is not X or Y
2. if MIN greater or equal MAX

2.2.3 The TRAnsform Command -

SYNTAX: TRAnsform AXIS TYPE
where

AXIS is either X, Y, or Both (may be abbreviated) and TYPE is either Logarithmic or Numerical (may be abbreviated).

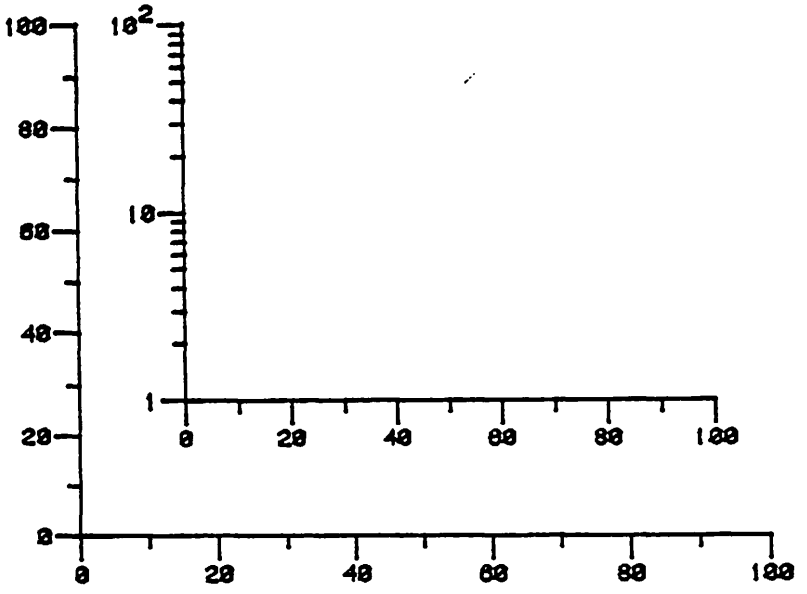
The TRAnsform command is used to get one or both axes

on a logarithmic scale (and to revert to numerical scale). This may seem like a straight forward command. However, the user should keep in mind that the logarithm of zero or any negative value is impossible. Attempting a log transformation on a variable containing such values will cause the computer to send some error messages to the screen during plotting. SCT will not execute a TRAnsform command if the minimum of the axis to be transformed is zero or less. However, if the user has used the AXIs command to change this minimum, SCT will not be able to detect this type of error in advance.

EXAMPLE

```
SCT> TRA Y LOG
SCT>
```
Produces a logarithmic Y axis (Figure 4).

FIGURE 4: USE OF THE TRANSFORM COMMAND



ERROR MESSAGE

SCT will return an error message and will not execute the TRAnsform command if:

1. the AXIS parameter's first character is not X, Y or B
2. the TYPE parameter's first character is not L or N
3. the relevant axis minimum is zero or less.

2.2.4 The GRId Command -

SYNTAX: GRId

This command instructs SCT that a rectangular grid of lines is to appear on the graph. These lines, perpendicular to each axis, are useful in some cases in clarifying widely dispersed clouds of prints, or in cases where values are to be read from the figure.

Re-issuing the GRId command disables this facility.

EXAMPLE

```
SCT> GRI
SCT>
```

ERROR MESSAGE: None

2.3 DATA AND CURVE REPRESENTATION COMMANDS

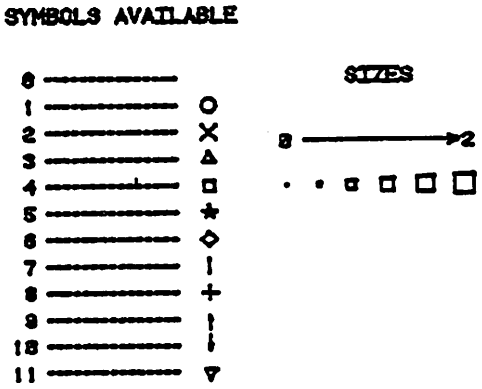
By default, SCT draws circles for all data points and solid lines connecting all predicted values in a data set. The data representation commands modify this.

2.3.1 The SYMbol Command -

SYNTAX: SYMbol ID TYPE
where

ID is a valid group number (between 1 and the number of groups defined), and TYPE is a valid symbol type (Table 5).

TABLE 5



The SYMbol command is used to change the symbol representing data points by group. No symbol is displayed if TYPE is zero, and a symbol type of -1 will disable drawing of the precision intervals as well.

ERROR MESSAGE

SCT will return an error message and will not execute the SYMbol command if ID is larger than the number of groups defined.

2.3.2 The SIZe Command -

SYNTAX: SIZe V
where
V is the desired size (any number > 0.)

The SIZe command is used to modify the size of the symbols used to draw data points. By default, the size is 1. A value V > 1 will reduce it, while V < 1 will increase it. Zero produces a dot for any symbol, while 2 is probably as large as any one would wish (Table 5).

ERROR MESSAGE

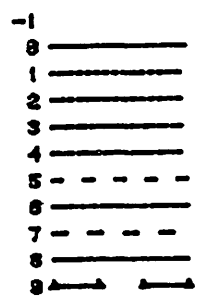
SCT will return an error message and will not execute the SIZe command if V < 0.

2.3.3 The LINe Command -

SYNTAX: LINe ID TYPE
where
ID is a valid group number (between 1 and the number of groups defined), and TYPE is a valid line type (Table 6).

TABLE 6

LINE TYPES AVAILABLE



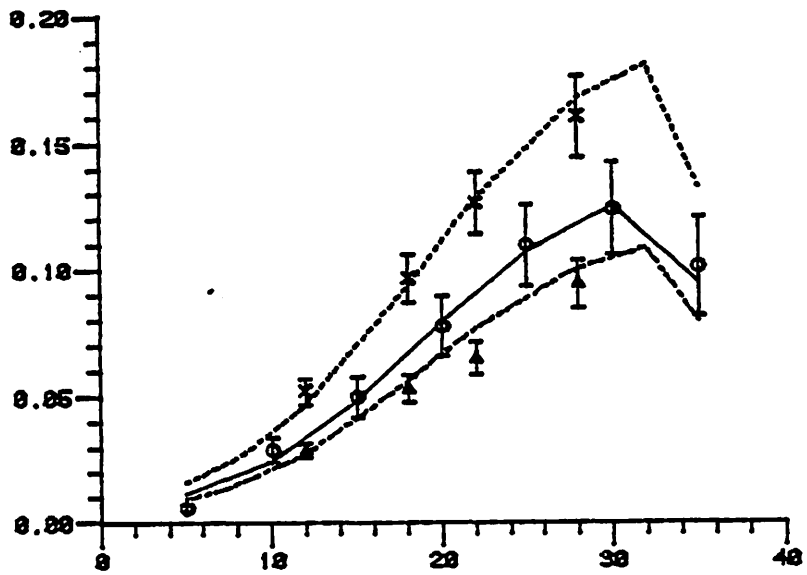
Additional line types may be designed by the user by referring to the Tektronix Terminal Control System Reference Manual p 3-13. The line-types provided here are designed for clarity.

ERROR MESSAGE

SCT will return an error message and will not execute a LINe command if ID is not a valid group number.

In Figure 5, and example of the use of the SYMbol, SIZe and LINe commands is illustrated.

FIGURE 5: USE OF DATA PRESENTATION COMMANDS



2.3.4 The CONnect Command -

SYNTAX: CONnect

This command must be used in cases where there is no column for predicted values in the input file, and the user wants data points CONNECTED to each other as in a PLT graph. The CONnect command can be issued whether predicted values were read-in or not, and in conjunction with the COMmon command, in which case ALL points are connected by a single line.

Re-issuing the CONnect command will disable this facility.

EXAMPLE

```
SCT> CON
SCT>
```

ERROR MESSAGE: None

2.4 LETTERING COMMANDS

The VT-640 and Tektronix 4010 graphic terminals currently in use at GLFRC and FPMI do not have very extensive lettering capabilities, and therefore there is a lack of flexibility in SCT's lettering commands. For example, text cannot be printed at an angle, and there is only one size and font for characters. The modelling Group has developed the lettering capabilities of the Digital Pen Plotter, however, and special requirements such as angled writing, different character sizes, and subscript or superscript lettering can be done on final drafts when necessary (to be avoided whenever possible because of increased work load).

Three types of standard lettering of graphs are offered by SCT:

1. a LEGEND with variable names of up to 15 characters.
2. Axis labels up to a number of characters which can take-up the length of the relevant axis,and
3. two graph-title lines which may cover the length of the X axis of the graph.

2.4.1 The LEGend command -

SYNTAX: LEGend ID [NAME]
or LEGend Function
where

ID is the id number of a group. NAME is any string of up to 15 characters. Alternatively, Function is either Locate or Suppress (may be abbreviated).

The LEGend command is used to identify groups, their associated line and symbol, by name on the graph. When the NAME parameter is omitted, the corresponding group will not be represented in the legend. When NAME is only blanks (one or more), the line and symbol samples for the group will appear in the legend, without a name.

Thus, in its name-definition form, the LEGend command is used to determine which groups will be represented in the legend, and their names.

EXAMPLES

1. SCT> LEG 1 GROUP NUMBER 1
   Will cause SCT give a sample of group 1's line and symbol type, with its name , in the legend.
2. SCT> LEG 2 <space> <space>
   Would provide a sample of group 2's line and symbol, without a name, and
3. SCT> LEG 3 <return>
   Would remove group 3 from the legend (not from the graph) if it was there in the first place.

The legend is positionned INTERACTIVELY on the terminal screen after the other elements of the graph have been drawn, anywhere above the X axis and to the right of the Y axis, provided there is enough space on the screen to do so (as determined by SCT). To enable the legend location facility, issue:

SCT> LEG Loc

The response of SCT to this command is not immediate but will take effect after the next GRAph command. Then, the cross-hair cursor will appear on-screen, and the user may locate the legend.

The legend may be conceptualized as a rectangle of sufficient dimensions to comprise a sample of each curve's line type (length adjustable through the SAMple command below), its symbol type, and its name (as long as the longest name specified by the user, up to 15 characters) (Figure 6). This rectangle obviously has 4 corners, known to SCT as

1. upper left hand corner
2. upper right hand corner
3. lower left hand corner
4. lower right hand corner

(see Figure 6)

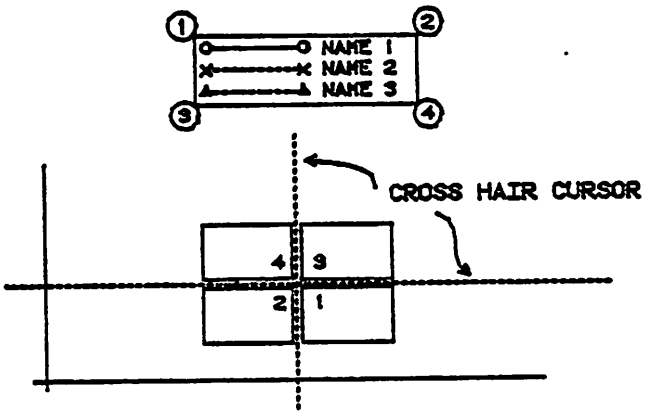


FIGURE 6: LOCATING THE LEGEND INTERACTIVELY

When the cross-hair cursor appears on the screen, SCT is expecting the user to enter one of the following characters, followed by carriage-return:

1 : upper left hand corner of the legend here

2 : upper right hand corner of the legend here

3 : lower left hand corner of the legend here

4 : lower right hand corner of the legend here

D : draw legend in LAST position successfully tested

S : suppress legend-locating

The cross-hair cursor can be moved by the "arrow keys" on the VT-640 terminal, or by the directional wheels on the Tektronix 4010. If the legend can fit on the screen at the location specified, a dot will appear on the screen at the location entered (it may be necessary to move the VT-640 cursor to see this dot). Nothing happens otherwise. The cross-hair cursor reappears for another trial OR to either draw the legend ("D") or suppress it ("S"). When "D" is pressed, SCT draws the legend in the last position successfully tested for space (Figure 6).

It is possible to determine the approximate dimensions of the legend to assist in locating it properly, by trying to locate corner 2 (upper right- hand) near the origin of the axes, since SCT does not allow the legend to overlap the axes. Then, one may be better able to find a location where the legend will not overwrite other elements of the graph.

Finally, to disable legend drawing at any time, issue:

SCT> LEG Suppress

ERROR MESSAGE

SCT will return an error message and will not execute the LEGend command if the first argument is not a valid group number, "L" or "S".

2.4.2 The SAMple Command -

SYNTAX: SAMple [LENGTH]
where

LENGTH is the length of the line samples (in screen units) to appear on the legend.

By default, length = 70. Any realistic length (from 0 to, say, 300 units) may be specified. If the length parameter is omitted, SCT will print the present line-sample length.

ERROR MESSAGE

Unless a typing error occurs, SCT will accept any length value.

2.4.3 The LABel Command -

SYNTAX: LABel

This command instructs SCT that axis labels are to be entered. SCT will immediately prompt the user for axis labels. If no label is desired on one of the axes, press return without entering any characters at the appropriate prompt.

Old labels are erased automatically once a LABel command is issued. The labels are centered automatically, and will be truncated if too long to be printed along the axis.

EXAMPLE

```
SCT> LAB
X-axis label:  Label of The X axis
Y-axis label:  Label of The Y axis
```

ERROR MESSAGE: None

2.4.4 The TITles Command -

SYNTAX: TITles

This command operates similarly to the LABels command.

Here again old titles are erased when TITles is issued. Pressing return without entering characters skips the relevant title-line (there are 2). Title lines are positioned automatically above the Y-axis, and centered.

EXAMPLE

```
SCT> TIT
Line 1 of title:  title line
Line 2 of title:  subtitle
```

ERROR MESSAGE: None

An example of SCT's lettering is illustrated in Figure 7.

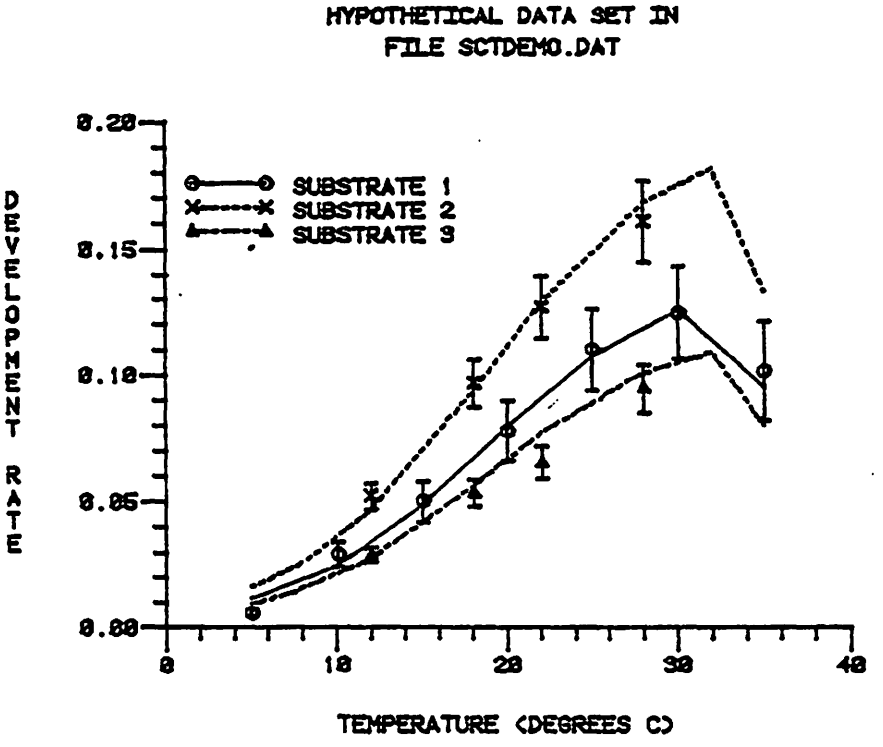


FIGURE 7: USE OF SCT LETTERING COMMANDS

2.5 PROGRAM CONTROL COMMANDS

The following commands do not act on the graph but give instructions to SCT as to what to do.

2.5.1 The GRAph Command -

SYNTAX: GRAph

The command instructs SCT to produce the graph on the terminal screen. It can be issued repeatedly at any stage to display the graph as it is developed.

Once the graph has been drawn, the user must press return to pursue. The screen will be cleared following a return.

ERROR MESSAGE: None

2.5.2 The PENplot Command -

SYNTAX: PENplot

This command is used to produce copies of the graph on the Digital pen plotter ONLY. DO NOT issue this command if you are not working the Textronix 4010, or if the pen plotter has not been properly prepared. Otherwise, the graphic terminal may be disabled and the current SCT session will be lost. Before issuing the PENplot command, make sure that

1. the pen plotter is "ON"
2. the margins have been set

3. paper is positioned on the plotter
4. the "load" and "local" keys are disabled, and
5. the pen cap has been removed.

Execution of the Penplot command is immediate and cannot be interrupted. Press return AT THE END of the graph to pursue.

ERROR MESSAGE: None

2.5.3 The SAVe Command -

SYNTAX: SAVe FILENAME
where
FILENAME is a valid IAS file specification.

This command creates a file containing all the parameters needed to reproduce the graph in its present form at some later time (during the same or another SCT session). Whenever a user is satisfied with a graph, and wishes to obtain a copy from the pen plotter, he should save his graph under an appropriate name, for later retrieval. We suggest using file type SCT for simplicity.

EXAMPLE

```
SCT> SAV JUNK.SCT
```

ERROR MESSAGE: None

2.5.4 The RETrieve Command -

SYNTAX: RETrieve FILENAME
where
FILENAME is a valid IAS file specification.

This command reads from file "filename" the parameters needed to produce a previously saved graph. Only files created by the SCT SAVe command can be retrieved. Immediately following the RETrieve command, SCT will read the original data file and the usual message reporting the number of observation read will be displayed.

EXAMPLE

```
SCT> RET JUNK.SCT
NUMBER OF OVSERVATIONS READ:  10
```

ERROR MESSAGE

SCT will return an error message and will not execute the RETrieve command if the specified file was not created by a SCT SAVe.

2.5.5 The HELp Command -

SYNTAX: HELp [COMmand]
where

COMmand is any valid SCT command (may be abbreviated to 3 letters).

This facility provides a summary of the information in this manual, command-by-command, as a refresher. If COMmand is not a valid SCT command, the HELp command will not be executed. If the COMmand parameter is omitted, the HELp facility will list the SCT commands available (Table 7). The HELp facility is a subprogram of SCT, and the prompt HELP> will appear at the end of a HELp printout, awaiting another COMmand parameter. To exit the HELp facility, simply press return.

TABLE 7

THE HELP FACILITY IN SCT

SCT COMMANDS AVAILABLE:

COMMAND	DESCRIPTIONS
FILE	DEFINE INPUT FILE
GROUP	DEFINE DATA POINT GROUPS (UP TO 8)
TRANSFORM	LOG/NUMERICAL AXES
LINE	SELECT A LINE TYPE FOR CURVE
SYMBOL	SELECT A SYMBOL FOR THE VALUES OF A Y-VARIABLE
SIZE	SIZE OF SYMBOLS
LEGEND	NAME Y-VARIABLES,ENABLE THE LEGEND POSITIONING FACILITY
SAMPLE	CHANGE THE LENGTH OF LINE-SAMPLE IN LEGEND
LABELS	X, Y AXIS TITLES
TITLES	GRAPH TITLE LINES (2)
SCREEN	CHANGE SIZE & SCREEN LOCATION OF GRAPH
AXIS	ADJUST AXIS MIN & MAX
HELP	BRIEF DESCRIPTION OF COMMAND SYNTAX USE
GRID	TO DRAW A SQUARE GRID ON GRAPH
MISSING	MISSING VALUES IN X OR Y
COMMON	SINGLE REGRESSION EQUATIONS FOR ALL GROUPS
CONNECT	CONNECTING OBSERVED VALUES WITH LINES
GRAPH	TO DO THE GRAPH ON EVERY TERMINAL EXCEPT PENPLOTTER
PENPLOT	OUTPUT TO PENPLOTTER
SAVE	SAVE THE PLOTTING PARAMETERS FOR LATER USE
RETRIEVE	RETRIEVE SAVED PLOTTING PARAMETERS
BYE	TERMINATES PROGRAM EXECUTION

ENTER A COMMAND, OR <RETURN> TO GET OUT
HELP>

ERROR MESSAGE: None

2.5.6 The BYE Command -

SYNTAX: BYE

This command terminates SCT and returns control to PDS.

3.0 COMMAND SYNTAX SUMMARY

FILe FILENAME [P] [I] [G]	
GROup R	1 < R < 8
MISsing V	
COMmon	
SCReen [ASPECT MIN MAX]	ASPECT = H or V
AXIs [ID MIN MAX]	ID = X or Y, MIN < MAX
TRAnsform AXIS TYPE	AXIS = X, Y, or B
	TYPE = L or N
GRId	
SYMbol ID TYPE	1 < ID < of groups
SIZe V	
LINe ID TYPE	1 < ID < of groups
CONnect	
LEGend ID [NAME]	1 < ID < of groups
LEGend FUNCTION	FUNCTION = L or S
SAMple [LENGTH]	
LABel	
GRAph	
PENplot	
SAVe FILENAME	
RETrieve FILENAME	
CLEar	
HELp [COMmand]	
BYE	