GENIE

TYMCOM-IX MANUAL

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SECTION 1

INTRODUCTION

GENIE is a truly dynamic problem-solving system for application in the business or scientific domains. GENIE, General Economic and Numeric Interactive Environment, is a package of mathematical methods, data manipulation capabilities, interactive report writer, and an economic data base, which comprise a totally self-contained system.

What does this mean for you?

For the first time, market research analysts, financial analysts, management scientists, or, for that matter, anyone wishing to manipulate a data series or time-oriented series can use this information to manipulate, analyze, forecast, plot, and report entirely within a single system, the GENIE system.

GENIE can be used for:

- Mathematical transformations
- Regression analysis
- Curve fitting
- Time-series analysis
- Statistical analysis
- Report generation
- Forecasting
- Plotting
- Operations research techniques
- Business applications

Being modular in nature, GENIE allows the user to define his own commands to be accessed from GENIE through the user's own FORTRAN or SUPER BASIC programs.

GENIE also contains a built-in editing system and the ability to perform command structures and report structures.

GENIE gives the businessman, the engineer, indeed any Tymshare user, the ability to perform complex data analysis through the application of a small set of simple commands.

Throughout this manual, input typed by the user is underlined. The symbol for a user-typed Carriage Return is ↵. Lowercase letters in an example of a command form represent the actual input. For example, the characters *file name* in a sample command form indicate that the user should type a file name at that point.

Braces in a command form indicate that the user must choose one of the options within the braces.

Control characters are denoted by a superscript c. For example, A^c denotes Control A. The method for typing a control character depends on the type of terminal being used. Consult the literature for your particular terminal or see your Tymshare representative.

Throughout GENIE, Control A and Control Q can be used to delete the previous character typed and the current line, respectively.

SECTION 2

BASIC CONCEPTS

There are several basic concepts that are important for the user to understand to make easy and efficient use of GENIE. These concepts concern the mode of using GENIE and the types of series data that GENIE permits.

ACCESSING GENIE

To access GENIE after logging into the Tymshare system and obtaining the EXECUTIVE dash (–), the user types GENIE followed by a Carriage Return. GENIE responds with the symbol <> to indicate its readiness for the user's commands. After performing each command, GENIE again responds with <>. No series are active immediately after calling GENIE. For example:

```
PLEASE LOG IN:  JIM;;↵

TYMSHARE    4/24/73   15:28

-GENIE↵

<>              GENIE is now awaiting a command.
```

GENIE MODES

There are two modes of use in GENIE, the interactive mode and the command structure mode. In the interactive mode, the user types at the terminal those commands he wishes to perform each time GENIE prints <>.

In the command structure mode, the user creates a command file which can run unattended at the terminal. In this mode, the user has available many of the FORTRAN programming statements, such as DO loops, IF statements, and GOTO statements. See the description of command structures of GENIE.

SERIES DATA TYPES

A series is a name given to a group of numbers. The GENIE system recognizes five data types which can be classed into two forms of organization.

The first organization of data is general data or nontime-oriented data. Thus, a series consisting of general data or nontime-oriented data consists of nothing more than a group of numbers. The numbers 72, 100, 32, and 4 could be considered a general data series of four values or elements, and could be given a name of WEIGHT. Thus, the first element or value of WEIGHT would be 72, the second element 100, and so on. General data series are referred to as X-type series.

The second organization of data is time oriented in one of four ways: monthly, quarterly, semi-annually, or yearly. Thus, a monthly series called SALES, having six data values or elements, would have the first element related to a starting month, with each succeeding element related to a succeeding month. The method of relating a specific element to a starting date uses the technique shown in the following table.

Time-Oriented Series		
	Type	**Referencing Series Elements**
Monthly	M	169 (January 1969) 1170 (November 1970)
Quarterly	Q	169 (First Quarter, 1969) 370 (Third Quarter, 1970)
Semi-annually	S	169 (First Half, 1969) 270 (Second Half, 1970)
Yearly	Y	69 (1969) 70 (1970)

Thus, if the monthly series SALES of six elements started in 1169, then the second element would represent 1269, the third element 170, and so forth.

All series in GENIE, whether they be time-oriented or general, are defined by their type (X, M, Q, S, or Y), start date (SD), and end date (ED).

NOTE: For time-oriented series, the start dates, end dates, and all other elements can be referred to in the format of the above table. For general series, X-type, the start date is equal to 1 and the end date is equal to n, where n is the number of data elements in the series.

All five data types are compatible in that they can be referred to in a command simultaneously on a one-to-one or an element-to-element basis. It is the user's responsibility to provide meaning to this use. For example, if we define that the series SALES1 of N elements and SALES2 of K elements are M-types and the series PRODLV of L elements is X-type, a multiple regression could be run with the following alignment occuring.

PRODLV	**SALES1**	**SALES2**
(1)	(1)	(1)
(2)	(2)	(2)
.	.	.
.	.	.
.	.	(K)
(L)	(N)	

The alignment of series can be altered by using date specifications for elements in the command format.

SECTION 3

GENIE FACTS

This section describes many of the important points about the use of GENIE. The user should read this section before accessing the GENIE system. He will also find it convenient to review this section after experience with GENIE.

GENERAL COMMENTS

- All parameters in most GENIE commands may be either a fixed number or a series name used as a variable. When a series is used as a parameter, the first data value in the series is used.
- Commas are equivalent to Carriage Returns, except where requested, such as in the DATIN and BREAD commands.
- The first four characters of any command are sufficient, except where fewer are indicated.
- Only one type of repetition character is permitted per command.
- Unlike commands are permitted in a command input string at the GENIE executive level with use of the exclamation point (!).
- Utility functions produce X-type series.
- GENIE permits as many as 20 active series with 132 data elements per series. A series becomes active by a READ command or by assignment.
- As many as 131 characters are permitted in each command string.
- GENIE automatically accesses the disk for series names referred to by the user, but not active, except where commands are designed to monitor the status of the working area and/or series.
- Date specifications are legal in all regression and plot routines except GOMPERTZ, CURVE and PLOSCATTER.
- When a dollar sign ($) appears in the following regression routines after the first colon (:), the table of residuals is suppressed at the terminal.

  MULTIPLE
  STEPWISE
  POLYNOMIAL
  CURVE
  GOMPERTZ

  The calculated and extrapolated data is still written to the designated disk file.
- GENIE accepts commands from a Tymshare command file at both the <> and GENIE commands structure level. Commands that may not be included are SIMBUILD, RUNBATCH, RUNSBASIC, and RUNFORTRAN.
- Series names may contain as many as six characters and must be legal Tymshare file names.

DATA BASES

GENIE is designed to interact with and manipulate time-series data. Coupled with the GENIE system are data bases containing time-series information. To access this data, contact your Tymshare representative.

DATE SPECIFICATIONS

In many GENIE commands, segments of referenced series may be used without first using the extraction routine. Two rules must be remembered:

1. The colon (:) is used to separate series in which the start dates are equal. If end dates are specified, they must also be equal.
2. The ampersand (&) is used to indicate that a different start date and/or end date is to be used.

Examples of the above two rules are given below to further enhance their meaning.

<>**MULTIPLE:ASALE:BSALE:CSALE(168:1271)&TIME&NETPFT(1:36)**↵

The series ASALE, BSALE, and CSALE will be used in the multiple regression starting in January 1968 regardless of what the actual start dates of the series are. The last period used will be December 1971. Thus, 48 data pieces have been specified for these independent variables.

The series TIME will be used from its first element to its last element or for 48 periods. TIME might be of any data type. If TIME contains fewer than 48 elements, the length of TIME will become the new number of elements to be used in the regression.

The series NETPFT of X-type will be used from the first to the 36th element as the dependent variable.

<>**LIST:A:B:C**↵

lists at the terminal all series from the first element to the last element of the shortest series regardless of data type.

<>**LIST:A&B&C**↵

is the same as LIST:A:B:C.

GENIE USER LINKS

An interesting and valuable concept of GENIE is that of the user link. The user link allows the user to design his own commands, which can be used to manipulate data and produce output at the terminal or to a disk file. The user link interacts in the same manner as any other GENIE command.

The actual command symbolics must be designed by Tymshare personnel. After this is done, an executable file will be placed in the user's directory where it can be accessed by use of the SIMRUN command.

Examples of some programs which utilize these links are:

- Specialty plot routines with special headings, labels, and grid characteristics
- Reports
- Variance analysis programs, such as PFTV
- Special versions of ECON, the capital investment package
- Other business applications

REPETITION CHARACTERS

Commands may be repeated in the same command input string by use of the ampersand (&). The colon (:) may be used where it is not normally used as part of the command itself or as a series list separator.

Examples

<>**B=EXTR(A:170)&C=EXTR(A:171)**↵

Note that the ampersand is used to separate the two like tasks. If it had not been used, the second task would have been ignored.

<>**TIME:A(12)&B(20)**↵
<>**TIME:A(12):B(20)**↵

Both forms are legal. The colon is not normally part of the TIME command.

It is not legal to mix repetition characters in a command. For example,

<>**TIME:A(10):B(20)&C(30)**↵

is not legal.

UNLIKE COMMANDS

Similar in concept to like commands on a command input string is the ability to enter, at the GENIE executive level only, dissimilar commands on the same command input string.

All commands must be separated by an exclamation point (!). The first command on the string must also be preceded by the exclamation point. Several examples of this feature appear in the text.

GENIE COMPATIBILITY

GENIE is a member of a very powerful family of user-oriented computer programs which comprise the Tymshare Business Information Decision Systems. The ability to utilize data as input to any one of these programs as well as the facility to utilize output from one program as input to another are two very important features of BIDS.

GENIE provides certain commands which allow the user to read both RETRIEVE data files and TYMTAB SAVE files as well as commands to prepare data for use in other programs.

The RETLINK command allows the user to pick out numeric data series from a RETRIEVE file starting with any record for any number of records. The BASE command allows the user to select rows, columns, or individual data elements from TYMTAB SAVE files or other user-created data bases.

The SPECIFY command permits the user to make regular data files compatible with GENIE. The DESPECIFY command removes the required GENIE specifications from the GENIE file so that the data may be used for other purposes.

BUSINESS APPLICATIONS AND SYSTEMS

At present, there are five specialized GENIE business applications systems. In time, this family of programs will grow. These five are:

- Gantt charts
- Gross profit variance analysis
- Capital investment analysis
- Sales mix and cost-volume-profit analysis
- Cost allocation system

Each of these systems is described in detail below.

Gantt Charts

Often, it is desirable to produce visual displays of start dates and end dates as well as percent completion figures of various tasks and jobs being performed by personnel within a company. This type of display provides the planner or manager with an important tool for job and task scheduling. It is also desirable that a method for quick and easy updating of such information be available. GENIE provides this facility with the GANTT command.

The Gantt chart is a visual display tool which performs the above job. The procedure for producing the chart is very simple:

1. The user produces a file in the GENIE editor which contains both chart titles and job descriptions.
2. The user produces a GENIE series which contains data describing the relevant dates and percent completion data for each project.
3. The user executes the GANTT command.

To produce a file containing the title and description information, the user employs the LOAD command. The first three lines of the file must be reserved for the chart title even if left blank. All other lines must contain the job descriptions to be printed on the chart. Each job description may contain as many as 20 characters.

Next, a GENIE series, located either on the disk or in the working area, must be created. Three numbers per project are required to define a bar on the chart for each project:

1. Start date column
2. End date column
3. Percent completion, expressed without percent sign; for example, 20% is expressed as 20

If there are nine projects, tasks, and/or jobs, 27 numbers are needed. The order of insertion into the series is the same as above.

Finally, the GANTT command must be given. The form of the command is:

GANTT:description file/series name

Several questions will be asked which will help to design the chart. A file chart description file called file'GANTT' will be written on the user's directory, which contains the responses to the questions. Thus, the questions will be asked only once unless the file is deleted to allow for changes.

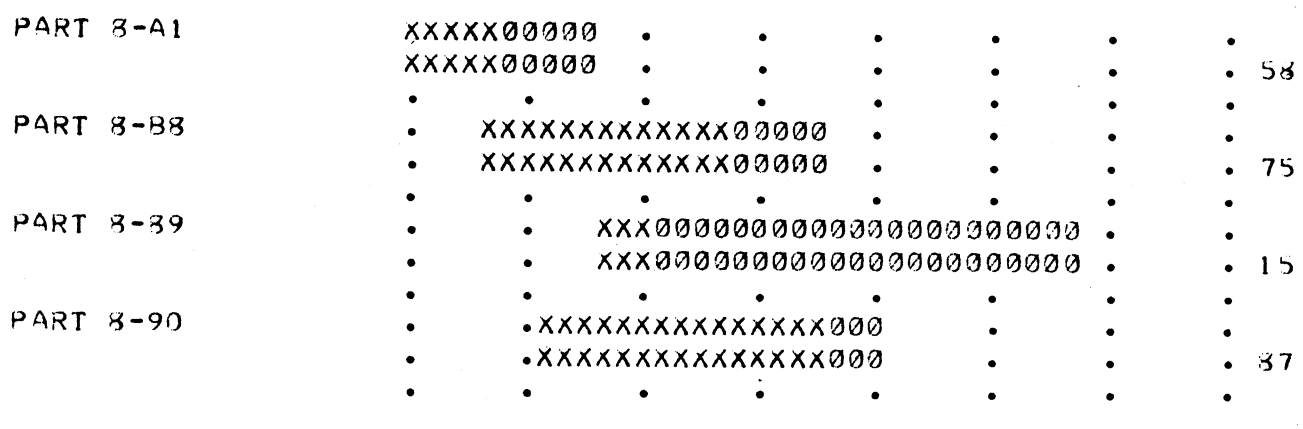
The chart may be printed at the terminal or written on a disk file. If a FILOPEN command is used, the chart will be printed on the designated disk file.

Example

```
<>LØAD:PRØJECT001↵
STRUCTURE CØNTAINS     7     CØMMANDS.

:L↵

 1                          PRØJECT 001
 2                        ASSEMBLY FØR PART 8
 3                             2/2/72
 4 PART 8-A1
 5 PART 8-B8
 6 PART 8-89
 7 PART 8-90

:Q↵

ØLD VERSIØN SAVED TØ PRØJECT001ØLD
SHALL I DELETE IT?YES↵
```

```
<>LIST:P001P8↵

 DATE         P001P8
******* ************
X   1          21.0000
X   2          30.0000
X   3          58.0000
X   4          25.0000
X   5          42.0000
X   6          75.0000
X   7          31.0000
X   8          55.0000
X   9          15.0000
X   10         28.0000
X   11         45.0000
X   12         87.0000


<>GANTT:PRØJECT001/P001P8↵

GRID SYMBØL?•↵

CØMPLETIØN SYMBØL?X↵

INCØMPLETIØN SYMBØL?Ø↵

NUMBER ØF CØLUMNS BETWEEN GRID MARKS?5↵

NUMBER ØF GRID MARK CØLUMNS?8↵

INDICATE LABEL FØR EACH GRID MARK - MAXIMUM 3 CHARACTERS

 1 JAN↵

 2 FEB↵

 3 MAR↵

 4 APR↵

 5 MAY↵

 6 JUN↵

 7 JUL↵

 8 AUG↵
```

PRØJECT 001
ASSEMBLY FØR PART 8
2/2/72

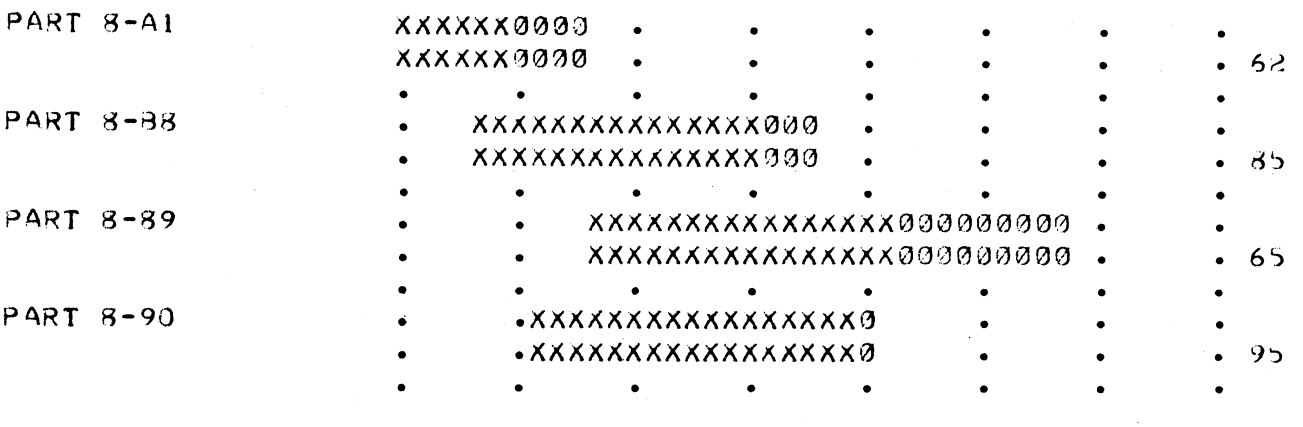


CØMPLETED - X
INCØMPLETE - Ø

<>P001P8(3)=62:P001P8(6)=85:P001P8(9)=65:P001P8(12)=95↵

<>GANTT:PRØJECT001/P001P8↵

PRØJECT 001
ASSEMBLY FØR PART 8
2/2/72



CØMPLETED - X
INCØMPLETE - Ø

Gross Profit Variance Analysis Package

The GENIE Gross Profit Variance Analysis Package is a powerful tool for use by management and administrative personnel. This package may be used to determine the key causes of either losses or gains in profit, as well as variances from standard costs, volumes, and selling prices. With this information, the planner may give feedback to sales and production personnel about the causes of the variances he is investigating.

The package is easy to use and is actually a combination of GENIE and RETRIEVE. To further enhance the system, reports produced by the Gross Profit Variance Analysis Package may be written to disk files, from which key numbers may be taken by use of SUPER FORTRAN or SUPER BASIC programs, all of which may be directly executed from GENIE.

Data

The data contained in the base is relatively straightforward. The fields are defined as follows:

- Product description – Describes the product.
- Department code – Indicates the department, profit center, etc. of which the product is a part.
- Group code – Indicates the group, product line, etc. of which the product is a part.
- Product code – Indicates the particular product.

The code fields may have different interpretations, depending on how the product structure of the company is organized. Regardless of this, the primary function of the department, group, and product codes is to help differentiate among products.

- Standard quantity – This number usually represents a yearly figure.
- Standard selling price per unit
- Standard cost per unit
- Actual or current quantity – This number usually represents current sales and not a yearly figure, although an annualized quantity may be used. A method for comparison of a yearly standard with a current actual not representing a yearly figure is provided.
- Current selling price per unit
- Current cost per unit

Structure

The data base for the GENIE Gross Profit Variance Analysis System is created in Tymshare's data base manipulation package, RETRIEVE. The proper structure of the base is shown on the following page. The names of the individual fields may be different from those indicated, but the other characteristics must be the same.

Field	Type	Width	Name
1	C	25	DES
2	N	4	DEPT
3	N	4	GROUP
4	N	8	PROD
5	N	10,3	STDVOL
6	N	6,2	STDPRI
7	N	6,2	STDCST
8	N	10,3	ACTVOL
9	N	6,2	ACTPRI
10	N	6,2	ACTCST

Seasonal Factor

During execution of the package, the system requests a factor. This number represents the estimated proportion of a full year's sales which the current sales represents. For instance, if the current sales includes all sales through September, then the factor might equal:

$$\frac{9}{12} = .75$$

If the user has previously determined the average seasonality of the product base, the current sales might represent a different proportion of the entire year's sales.

In any event, the effect is to multiply the standard by the factor to reduce it to a common base with the current data or, if the factor is negative, to divide the actual by the absolute value of the factor, thus annualizing the actual.

Example

```
<>PFTVARIANCE:GPR0F↵

FACT0R?1↵

C0PY 0F GPR0F SAVED T0 GPR0F0LD

SHALL I RETAIN IT?N0↵

ALL PR0DUCTS,PR0DUCT,T0TAL,GR0UP,DEPARTMENT,EDIT,QUIT(A,P,T,G,D,E,Q)?P↵

DEPARTMENT,GR0UP AND PR0DUCT C0DES?5,14,161↵

R-CLASS GREEN FGH
DEPARTMENT: 5
GR0UP      : 14
PR0DUCT    : 161
```

	VØLUME	PRICE	CØST
ACTUAL	6.000	4.000	2.000
STANDARD	11.000	6.000	4.000
DIFFERENCE	-5.000	-2.000	-2.000
VARIANCE	-10.000	-12.000	12.000

	GSALES	CØST	PRØF	%GS
ACTUAL	24.000	12.000	12.000	50.0
STANDARD	66.000	44.000	22.000	33.3
DIFFERENCE	-42.000	-32.000	-10.000	16.7
VARIANCE			-10.000	

==========

ALL PRØDUCTS,PRØDUCT,TØTAL,GRØUP,DEPARTMENT,EDIT,QUIT(A,P,T,G,D,E,Q)?P2↵

DEPARTMENT,GRØUP AND PRØDUCT CØDES?5,14,161↵
CØDE NØT FØUND IN RECØRD RANGE 2- 2 !

ALL PRØDUCTS,PRØDUCT,TØTAL,GRØUP,DEPARTMENT,EDIT,QUIT(A,P,T,G,D,E,Q)?G↵

GRØUP CØDE?14↵

DEPARTMENT CØDE?5↵

PRINT ALL PRØDUCTS?N↵

PRØDUCT GRØUP CØDE: 14

	VØLUME	PRICE	CØST
ACTUAL	19.000	6.655	2.821
STANDARD	23.000	7.043	3.739
DIFFERENCE	-4.000	-.389	-.918
VARIANCE	-13.217	-13.560	15.900

	GSALES	CØST	PRØF	%GS
ACTUAL	126.440	53.600	72.840	57.6
STANDARD	162.000	86.000	76.000	46.9
DIFFERENCE	-35.560	-32.400	-3.160	10.7
VARIANCE			-3.160	
MIX VARIANCE	7.717			

==========

```
ALL PRØDUCTS,PRØDUCT,TØTAL,GRØUP,DEPARTMENT,EDIT,QUIT(A,P,T,G,D,E,Q)?E↵

DEPARTMENT,GRØUP AND PRØDUCT CØDES?5,14,161↵

STANDARD: VØLUME PRICE CØST      11.000  6.00  4.00
ACTUAL  : VØLUME PRICE CØST       6.000  4.00  2.00

INSERT NEW DATA?11,6,4,12,5.64,4.50↵

R-CLASS GREEN FGH
DEPARTMENT: 5
GRØUP     : 14
PRØDUCT   : 161
```

	VØLUME	PRICE	CØST
ACTUAL	12.000	5.640	4.500
STANDARD	11.000	6.000	4.000
DIFFERENCE	1.000	-.360	.500
VARIANCE	2.000	-4.320	-6.000

	GSALES	CØST	PRØF	%GS
ACTUAL	67.680	54.000	13.680	20.2
STANDARD	66.000	44.000	22.000	33.3
DIFFERENCE	1.680	10.000	-8.320	-13.1
VARIANCE			-8.320	

```
==========================================================================

ALL PRØDUCTS,PRØDUCT,TØTAL,GRØUP,DEPARTMENT,EDIT,QUIT(A,P,T,G,Q,E,Q)?G↵

GRØUP CØDE?14↵

DEPARTMENT CØDE?5↵

PRINT ALL PRØDUCTS?N↵
```

PRØDUCT GRØUP CØDE: 14

	VØLUME	PRICE	CØST
ACTUAL	25.000	6.805	3.824
STANDARD	23.000	7.043	3.739
DIFFERENCE	2.000	-.239	.085
VARIANCE	6.609	-5.880	-2.100

	GSALES	CØST	PRØF	%GS
ACTUAL	170.120	95.600	74.520	43.8
STANDARD	162.000	86.000	76.000	46.9
DIFFERENCE	8.120	9.600	-1.480	-3.1
VARIANCE			-1.480	
MIX VARIANCE	-.109			

==========

ALL PRØDUCTS,PRØDUCT,TØTAL,GRØUP,DEPARTMENT,EDIT,QUIT(A,P,T,G,D,E,Q)?D↵

DEPARTMENT CØDE?7↵

PRINT ALL PRØDUCTS?N↵

DEPARTMENT CØDE: 7

	VØLUME	PRICE	CØST
ACTUAL	25.000	3.288	1.640
STANDARD	25.400	3.304	1.631
DIFFERENCE	-.400	-.016	.009
VARIANCE	-.669	-2.500	.900

	GSALES	CØST	PRØF	%GS
ACTUAL	82.200	41.000	41.200	50.1
STANDARD	83.920	41.440	42.480	50.6
DIFFERENCE	-1.720	-.440	-1.280	-.5
VARIANCE			-1.280	
MIX VARIANCE	.989			

==========

```
ALL PRØDUCTS,PRØDUCT,TØTAL,GRØUP,DEPARTMENT,EDIT,QUIT(A,P,T,G,D,E,Q)?I↵

TØTAL DIVISIØN

                    VØLUME          PRICE           CØST
                ------------    ------------    ------------
ACTUAL              50.000           5.046           2.732
STANDARD            48.400           5.081           2.633
DIFFERENCE           1.600            -.035            .099
VARIANCE             3.917          -8.380          -1.200

                    GSALES          CØST            PRØF            %GS
                ------------    ------------    ------------        -----
ACTUAL             252.320         136.600         115.720         45.9
STANDARD           245.920         127.440         118.480         48.2
DIFFERENCE           6.400           9.160          -2.760         -2.3
VARIANCE                                            -2.760
MIX VARIANCE         2.903

================================================================================


ALL PRØDUCTS,PRØDUCT,TØTAL,GRØUP,DEPARTMENT,EDIT,QUIT(A,P,T,G,D,E,Q)?Q↵

<>
```

Capital Investment Analysis

Among the many business applications and uses of GENIE is the Capital Investment Analysis program, which allows the user to determine the following information about his investment possibilities:

- Annual rate of return
- Continuous rate of return
- Tableau of cash flows: net and cumulative
- Tableau of discounted cash flows: net and cumulative
- Present value of flows at any percent discount
- Produces a contribution to profit statement for up to 13 years

As with all other GENIE packages and commands, a major advantage of the system is the ability to interactively change specific values of the data involved in the production of the above information and to see the results immediately.

Seven active GENIE series or GENIE disk files are required to run the system. These must contain the following information for no more than 13 years:

1. Volume of product to be sold from expenditure
2. Selling price per unit of volume
3. Fixed manufacturing costs associated with expenditure
4. Period costs incurred
5. Amortization of intangibles
6. Net increase in working capital
7. Increase in fixed assets

With the above information as well as additional data requested by the system, the entire operation is complete. GENIE asks the user for the names of the series containing all data only once, unless the file containing this information is deleted prior to the issuance of the ECON command. The form of the ECON command is:

ECON:file name

All output is written to the terminal unless the FILOPEN command is used, in which case the output is directed to a disk file where it can be listed later or interrogated by a SUPER FORTRAN or SUPER BASIC program for additional investigation.

Example

```
<>ECØN:PRØJA001↵
HØW MANY YEARS (MAX=15)?6↵
INITIAL YEAR IS?1972↵
LIST SERIES NAME CØNTAINING APPRØPRIATE DATA!
VØLUME VØL↵
SELLING PRICE SP↵
FIXED MFG COSTS FMC↵
PERIØD CØSTS PC↵
AMØRT ØF INTANGIBLES A0I↵
INCR IN WØRKING CAP INWC↵
INCR IN FIXED ASSETS INFA↵
RETURNS,ALLØWANCES,& DISCØUNTS IS A % ØF GRØSS SALES.
INDICATE % FØR EACH YEAR?.04,.04,.04,.04,.04,.04↵
VARIABLE CØST ØF SALES IS ALSØ A % ØF GRØSS SALES.
```

INDICATE % FØR EACH YEAR?.35,.35,.3,.3,.3,.3↵

ANY CHANGES IN % ?NØ↵

INITIAL CASH FLØW (NEGATIVE IF ØUTFLØW)?-5.08↵

DISCØUNT RATE?7.2↵

PRØJECTED CØNTRIBUTIØN STATEMENT
10/16

	1972	1973	1974	1975	1976
VØLUME	19.80	22.30	33.40	34.70	35.20
SELLING PRICE	1.20	1.30	1.40	1.50	1.60
GRØSS SALES	23.76	28.99	46.76	52.05	56.32
LESS:RET+ALLØW+DISC	.95	1.16	1.87	2.08	2.25
NET SALES	22.81	27.83	44.89	49.97	54.07
LESS:VAR CST SALES	8.32	10.15	14.03	15.62	16.90
GRØSS MARGIN	14.49	17.68	30.86	34.35	37.17
LESS:FIXED MFG CØST	19.70	20.70	21.70	22.70	23.70
GRØSS PRØFIT	-5.21	-3.02	9.16	11.65	13.47
LESS:PERIØD CØSTS	9.70	10.70	11.70	12.70	13.70
CØNTRIBUTIØN TØ PRØF	-14.91	-13.72	-2.54	-1.05	-.23

	1977
VØLUME	50.90
SELLING PRICE	1.70
GRØSS SALES	86.53
LESS:RET+ALLØW+DISC	3.46
NET SALES	83.07
LESS:VAR CST SALES	25.96
GRØSS MARGIN	57.11
LESS:FIXED MFG CØST	24.70
GRØSS PRØFIT	32.41
LESS:PERIØD CØSTS	14.70
CØNTRIBUTIØN TØ PRØF	17.71

```
 ****CASE STUDY CSHFLW ****

DCF RATE ØF RETURN:
ANNUAL     =          -6.6225
CØNTINUØUS=           -6.8519

                    FLØWS                    DISCØUNTED
                ----------------          ----------------
PERIØD           NET   CUMULATIVE           NET   CUMULATIVE
------          -----  ----------          -----  ----------
   0           -5.08        -5.08         -5.08        -5.08
   1          -19.91       -24.99        -21.32       -26.40
   2          -16.72       -41.70        -19.17       -45.57
   3           -3.54       -45.24         -4.35       -49.92
   4             .95       -44.29          1.25       -48.66
   5            4.87       -39.42          6.86       -41.80
   6           27.71       -11.71         41.80          .00

PRESENT VALUE AT    7.20 % DISCØUNT =      -18.6468

<>VØL(1)=22.4 28.9&SP(1)=1.18 1.28↵


<>ECØN:PRØJA001↵

ANY CHANGES IN % ?YES↵

ØLD RAD %
 1       .04
 2       .04
 3       .04
 4       .04
 5       .04
 6       .04

NUMBER,%  TØ STØP TYPE 0,0

WHICH?1,.035↵

WHICH?2,.035↵

WHICH?0,0↵

ØLD VCS %
 1       .35
 2       .35
 3       .30
 4       .30
 5       .30
 6       .30
```

WHICH?1,.30↵

WHICH?2,.30↵

WHICH?3,.25↵

WHICH?4,.25↵

WHICH?5,.25↵

WHICH?6,.25↵

WHICH?0,0↵

INITIAL CASH FLØW (NEGATIVE IF ØUTFLØW)?-6.24↵

DISCØUNT RATE?7.2↵

PRØJECTED CØNTRIBUTIØN STATEMENT
10/16

	1972	1973	1974	1975	1976
VØLUME	22.40	28.90	33.40	34.70	35.20
SELLING PRICE	1.18	1.28	1.40	1.50	1.60
GRØSS SALES	26.43	36.99	46.76	52.05	56.32
LESS:RET+ALLØW+DISC	.93	1.29	1.87	2.08	2.25
NET SALES	25.51	35.70	44.89	49.97	54.07
LESS:VAR CST SALES	7.93	11.10	11.69	13.01	14.08
GRØSS MARGIN	17.58	24.60	33.20	36.96	39.99
LESS:FIXED MFG CØST	19.70	20.70	21.70	22.70	23.70
GRØSS PRØFIT	-2.12	3.90	11.50	14.26	16.29
LESS:PERIØD CØSTS	9.70	10.70	11.70	12.70	13.70
CØNTRIBUTIØN TØ PRØF	-11.82	-6.80	-.20	1.56	2.59

	1977
VØLUME	50.90
SELLING PRICE	1.70
GRØSS SALES	86.53
LESS:RET+ALLØW+DISC	3.46
NET SALES	83.07
LESS:VAR CST SALES	21.63
GRØSS MARGIN	61.44
LESS:FIXED MFG CØST	24.70
GRØSS PRØFIT	36.74
LESS:PERIØD CØSTS	14.70
CØNTRIBUTIØN TØ PRØF	22.04

****CASE STUDY CSHFLW ****

DCF RATE ØF RETURN:
ANNUAL = 5.4801
CØNTINUØUS= 5.3352

	FLØWS		DISCØUNTED	
PERIØD	NET	CUMULATIVE	NET	CUMULATIVE
0	-6.24	-6.24	-6.24	-6.24
1	-16.82	-23.06	-15.95	-22.19
2	-9.80	-32.86	-8.81	-31.00
3	-1.20	-34.06	-1.02	-32.02
4	3.56	-30.51	2.87	-29.15
5	7.69	-22.82	5.89	-23.26
6	32.04	9.22	23.26	.00

PRESENT VALUE AT 7.20 % DISCØUNT = -2.2038

<>

The GENIE Sales Mix and Cost-Volume-Profit Analysis Package

This business applications package, CVPF, is a unique and useful tool for sales management personnel. The ability to interactively alter cost-volume and sales mix relationships to affect contribution margin and thus to determine break-even points as well as required sales for target net profits will be appreciated by those who use this powerful GENIE command.

At least one disk file is required to use CVPF. It must contain the sales numbers for each product to be used in the analysis. A second data file containing variable cost data for each product may also be used, but this is not required. CVPF also allows the user to specify that variable cost is a certain percentage of the sales figure. The form of the command is:

CVPF:sales file:cost file

If the cost file is not specified, the system requests a percentage figure to be used for variable cost. Next, the user is prompted to enter initial values for fixed costs and target net profit. After this, the system produces an analysis report of the initial data.

After this, the system responds with a # and awaits further commands from the user. The command format is as follows:

#x,n

where x is one of the following options:

F – Specify a new fixed cost.

T – Alter the target net profit.

L – List a product's sales and cost data.

C – Change a product's sales and cost data.

% – Change the variable cost percentage of all data.

P – Print an analysis report.

S – Save both cost and sales data to a disk file as it now appears.

Q – Quit.

n is a required parameter for all the above options and is used as follows:

for F – New fixed cost number

T – New target net profit

L – Sequential product number to be listed

C – Sequential product number to be changed

% – Percent to be used (not divided by 100)

P – Nonfunctional

S – Nonfunctional

Q – Nonfunctional

The following examples should provide the user with a sample of the capability of CVPF.

```
-TYPE QQSALES↵

 2000
 2500
 1000
 500

-TYPE QQCØSTS↵

1200 1700 800 200

-GENIE↵

<<CVPF:QQSALES:QQCØSTS↵

THERE ARE  4 PRØDUCTS IN QQSALES

FIXED CØSTS =?1470↵

TARGET NET PRØFIT =?0↵


SALES                          6000.0000
VARIABLE CØST                  3900.0000
CØNTRIBUTIØN MARGIN
BALANCE                        2100.0000


CØNTRIBUTIØN MARGIN
RATIØ                            35.0000%


FIXED CØSTS                    1470.0000
ØPERATING PRØFIT                630.0000


BREAKEVEN SALES                4200.0000
```

#T,588↵

#P,1↵

SALES	6000.0000
VARIABLE CØST	3900.0000
CØNTRIBUTIØN MARGIN BALANCE	2100.0000
CØNTRIBUTIØN MARGIN RATIØ	35.0000%
FIXED CØSTS	1470.0000
ØPERATING PRØFIT	630.0000
BREAKEVEN SALES	4200.0000
REQUIRED PRØFIT	588.0000
REQUIRED SALES	5880.0000

CØNTRIBUTIØN MARGIN VARIANCE FRØM LAST REPØRT 0.0000

#F,1600↵

#P,1↵

SALES	6000.0000
VARIABLE CØST	3900.0000
CØNTRIBUTIØN MARGIN BALANCE	2100.0000
CØNTRIBUTIØN MARGIN RATIØ	35.0000%
FIXED CØSTS	1600.0000
ØPERATING PRØFIT	500.0000
BREAKEVEN SALES	4571.4286
REQUIRED PRØFIT	588.0000
REQUIRED SALES	6251.4286

CØNTRIBUTIØN MARGIN VARIANCE FRØM LAST REPØRT 0.0000

```
#C,1↵

SALES  2000
CØST   1200

1500,900↵

#C,2↵

SALES  2500
CØST   1700

2200,1496↵

#C,3↵

SALES  1000
CØST   800

2000,1600↵

#C,4↵

SALES  500
CØST   200

300,120↵

#P,1↵


SALES                          6000.0000
VARIABLE CØST                  4116.0000
CØNTRIBUTIØN MARGIN
BALANCE                        1884.0000


CØNTRIBUTIØN MARGIN
RATIØ                            31.4000%


FIXED CØSTS                    1600.0000
ØPERATING PRØFIT                284.0000


BREAKEVEN SALES                5095.5414
REQUIRED PRØFIT                 588.0000
REQUIRED SALES                 6968.1529

CØNTRIBUTIØN MARGIN VARIANCE FRØM LAST REPØRT          216.0000

#Q,1↵
```

```
<>CVPF:QQSALES↵

THERE ARE  4 PRØDUCTS IN QQSALES

VARIABLE CØST ØF SALES = WHAT % ØF SALES?38↵

FIXED CØSTS =?1470↵

TARGET NET PRØFIT =?0↵


SALES                          6000.0000
VARIABLE CØST                  2280.0000
CØNTRIBUTIØN MARGIN
BALANCE                        3720.0000


CØNTRIBUTIØN MARGIN
RATIØ                            62.0000%


FIXED CØSTS                    1470.0000
ØPERATING PRØFIT               2250.0000


BREAKEVEN SALES                2370.9677

#Q,1↵


<>
```

An additional facility exists in the CVPF command. It is possible to extract either the standard or actual data from the RETRIEVE data file used in the PFTV command.

The general form of the command is

$\$file:\begin{Bmatrix}S\\A\end{Bmatrix}$

where S indicates that standard information is desired, and A indicates that actual information is desired. The dollar sign ($) *must* appear.

Example

```
<>CVPF:$DAT:S↵

THERE ARE  4 PRODUCTS IN DAT
FIXED COSTS =?1500↵

TARGET NET PROFIT =?750↵


SALES                              5999.2000
VARIABLE COST                      3900.0000
CONTRIBUTION MARGIN
BALANCE                            2099.2000


CONTRIBUTION MARGIN
RATIO                                34.9913%


FIXED COSTS                        1500.0000
OPERATING PROFIT                    599.2000


BREAKEVEN SALES                    4286.7759
REQUIRED PROFIT                     750.0000
REQUIRED SALES                     6430.1639

#Q.1↵
```

The GENIE Interactive Fixed and Variable Cost Allocation System

One task which confronts almost all accounting personnel during both budget preparation and monthly closing is the allocation of costs among the various cost centers, both service and production. Often this procedure becomes quite laborious, involving many repetitions of calculations utilizing alternative allocation schemes until the correct costs are allocated.

The GENIE system allows the user all the flexibility he desires for manipulating the allocations to be made. The example below takes the user though a hypothetical case in which we first make only variable cost allocations and, second, in which some fixed allocations are initially made.

Problem Definition

The management of company XYZ desires to computerize its allocation scheme so as to provide the company with a quick and accurate tool for budget planning. There are presently two service departments which allocate all their direct expenses, and four production departments which also might allocate. Management suggests that the service departments allocate

their expenses based upon personnel and that the production departments allocate based upon available square footage. The allocation basis is determined as follows:

Service Department 1

Allocates To	Number of People
Service department 1	2
Production department 1	2
Production department 2	4
Production department 3	0
Production department 4	3
	11

Service Department 2

Allocates To	Number of People
Production department 1	5
Production department 2	0
Production department 3	8
Production department 4	3
	16

Total available square footage = 3000

Production Department 1

Allocates To	Square Feet
Production department 2	130
Production department 3	215
Production department 4	500

Production Department 2

Allocates To	Square Feet
Production department 4	750

Production Department 3

Allocates To	Square Feet
Production department 4	500

The direct expenses, incurred in thousands of dollars, are as follows:

Service department 1	256.2
Service department 2	453.4
Production department 1	800.5
Production department 2	352
Production department 3	220
Production department 4	550

Data Set-up for Use in GENIE

Two data files must be established in order to run the system. The first data file contains the allocation basis data matrix, and the other contains the direct expense information. A third, the fixed allocation data file, is optional. The allocation basis matrix is an N by N+1 matrix, where N equals the number of cost centers involved in the allocation procedure. The matrix for our example is defined as follows:

Department	1	2	3	4	5	6	Total Available
1	0	2	2	4	0	3	11
2	0	0	5	0	8	3	16
3	0	0	0	130	215	500	3000
4	0	0	0	0	0	750	3000
5	0	0	0	0	0	500	3000
6	0	0	0	0	0	0	3000

The direct expenses data file simply contains N data values corresponding to the numbers listed above.

It is important to note that there is a naming restriction on the file containing the direct expense data. This file must have slashes around its name, and within the slashes, the extension DIR must be appended to the basis matrix name. Thus, if the basis matrix file is called BAS, the direct expenses data file must be called /BAS.DIR/. If a fixed expenses data file is also included, that file should be called /BAS.FIX/.

The basis matrix file appears as follows:

```
-COPY BAS TØ TEL⏎

0 2 2 4 0 3 11
0 0 5 0 8 3 16
0 0 0 130 215 500 3000
0 0 0 0 0 750 3000
0 0 0 0 0 500 3000
0 0 0 0 0 0 3000

-
```

The direct expenses file appears as follows:

```
-TYPE /BAS.DIR/⏎

256.2 453.4 800.5 352 220 550

-
```

After these files have been created, it is possible to execute the system.

There are two commands in the allocation system:

ALLPERCENT:basis matrix file:n

and

ALLOCATE:basis matrix file:n

where n is the number of cost centers.

ALLPERCENT instructs GENIE to generate a disk file containing percentage allocation figures to be used by the ALLOCATE command during processing. The ALLPERCENT command need be used only once, unless a change in the basis numbers is desired. A file called /%basis matrix file name/ is generated, containing these numbers. This file may also be directly edited if desired.

The system is run as follows:

```
-GENIE↵


<>ALLP:BAS:6↵

<>ALLØ:BAS:6↵

CØST CENTER 1 SUMMARY
DIRECT EXPENSES                          256.20
    PLUS FIXED ALLØCATIØN IN               0.00
    PLUS VARIA ALLØCATIØN IN               0.00
                                    --------------
  ****ALLØCATABLE EXPENSES                256.20
  ****UNALLØCATED EXPENSES                 -.00
                                    ==============

  VARIABLE
ALLØCATIØNS TØ        AMØUNT
--------------        ------
           2              46.58
           3              46.58
           4              93.16
           6              69.87
                    -------------
                         256.20
                    =============
```

```
CØST CENTER 2 SUMMARY
DIRECT EXPENSES                          453.40
    PLUS FIXED ALLØCATIØN IN               0.00
    PLUS VARIA ALLØCATIØN IN              46.58
                                    -------------
  ****ALLØCATABLE EXPENSES               499.98
  ****UNALLØCATED EXPENSES                 .00
                                    =============

  VARIABLE
ALLØCATIØNS TØ          AMØUNT
--------------          ------
           3              156.24
           5              249.99
           6               93.75
                    -------------
                          499.98
                    =============


CØST CENTER 3 SUMMARY
DIRECT EXPENSES                          800.50
    PLUS FIXED ALLØCATIØN IN               0.00
    PLUS VARIA ALLØCATIØN IN             202.83
                                    -------------
  ****ALLØCATABLE EXPENSES              1003.33
  ****UNALLØCATED EXPENSES               720.72
                                    =============

  VARIABLE
ALLØCATIØNS TØ          AMØUNT
--------------          ------
           4               43.48
           5               71.91
           6              167.22
                    -------------
                          282.60
                    =============
```

```
C0ST CENTER 4 SUMMARY
DIRECT EXPENSES                          352.00
    PLUS FIXED ALL0CATI0N IN               0.00
    PLUS VARIA ALL0CATI0N IN             136.64
                                    --------------
  ****ALL0CATABLE EXPENSES               488.64
  ****UNALL0CATED EXPENSES               366.48
                                    ==============

  VARIABLE
ALL0CATI0NS T0          AM0UNT
--------------          ------
           6               122.16
                    -------------
                           122.16
                    =============
```

```
C0ST CENTER 5 SUMMARY
DIRECT EXPENSES                          220.00
    PLUS FIXED ALL0CATI0N IN               0.00
    PLUS VARIA ALL0CATI0N IN             321.90
                                    --------------
  ****ALL0CATABLE EXPENSES               541.90
  ****UNALL0CATED EXPENSES               451.58
                                    ==============

  VARIABLE
ALL0CATI0NS T0          AM0UNT
--------------          ------
           6                90.32
                    -------------
                            90.32
                    =============
```

```
C0ST CENTER 6 SUMMARY
DIRECT EXPENSES                          550.00
    PLUS FIXED ALL0CATI0N IN               0.00
    PLUS VARIA ALL0CATI0N IN             543.32
                                    --------------
  ****ALL0CATABLE EXPENSES              1093.32
  ****UNALL0CATED EXPENSES              1093.32
                                    ==============

  VARIABLE
ALL0CATI0NS T0          AM0UNT
--------------          ------
                    -------------
                             0.00
                    =============
```

In an alternative situation, management decides that certain costs will be allocated in a fixed amount from certain cost centers, as follows:

From	To	Amount
1	2	50
2	6	38
3	6	100

It is also decided that the percentage allocations as previously defined will not change, although this is simple to do if it is so desired.

The file /BAS.FIX/ appears as follows:

```
-TYPE /BAS.FIX/↵

1 2 50
2 6 38
3 6 100

-GENIE↵

<>ALLOCATE:BAS:6↵

FIXED ALLOCATION SUMMARY

     FROM        TO         AMOUNT
     ----        ----       ------
        1          2          50.00
        2          6          38.00
        3          6         100.00

COST CENTER 1 SUMMARY
DIRECT EXPENSES                              256.20
     PLUS FIXED ALLOCATION IN                  0.00
     PLUS VARIA ALLOCATION IN                  0.00
     LESS FIXED ALLOCATION OUT                50.00
                                        --------------
   ****ALLOCATABLE EXPENSES                   206.20
   ****UNALLOCATED EXPENSES                     .00
                                        ==============

  VARIABLE
ALLOCATIONS TO          AMOUNT
--------------          ------
             2              37.49
             3              37.49
             4              74.98
             6              56.24
                    -------------
                          206.20
                    =============
```

```
CØST CENTER 2 SUMMARY
DIRECT EXPENSES                              453.40
    PLUS FIXED ALLØCATIØN IN                  50.00
    PLUS VARIA ALLØCATIØN IN                  37.49
    LESS FIXED ALLØCATIØN ØUT                 38.00
                                          ----------
  ****ALLØCATABLE EXPENSES                   502.89
  ****UNALLØCATED EXPENSES                      .00
                                          ==========

  VARIABLE
ALLØCATIØNS TØ        AMØUNT
--------------        ------
           3             157.15
           5             251.45
           6              94.29
                    ----------
                         502.89
                    ==========
CØST CENTER 3 SUMMARY
DIRECT EXPENSES                              800.50
    PLUS FIXED ALLØCATIØN IN                  0.00
    PLUS VARIA ALLØCATIØN IN                194.64
    LESS FIXED ALLØCATIØN ØUT               100.00
                                          ----------
  ****ALLØCATABLE EXPENSES                   895.14
  ****UNALLØCATED EXPENSES                   643.01
                                          ==========

  VARIABLE
ALLØCATIØNS TØ        AMØUNT
--------------        ------
           4              38.79
           5              64.15
           6             149.19
                    ----------
                         252.13
                    ==========
CØST CENTER 4 SUMMARY
DIRECT EXPENSES                              352.00
    PLUS FIXED ALLØCATIØN IN                  0.00
    PLUS VARIA ALLØCATIØN IN                113.77
    LESS FIXED ALLØCATIØN ØUT                 0.00
                                          ----------
  ****ALLØCATABLE EXPENSES                   465.77
  ****UNALLØCATED EXPENSES                   349.33
                                          ==========

  VARIABLE
ALLØCATIØNS TØ        AMØUNT
--------------        ------
           6             116.44
                    ----------
                         116.44
                    ==========
```

```
CØST CENTER 5 SUMMARY
DIRECT EXPENSES                          220.00
    PLUS FIXED ALLØCATIØN IN               0.00
    PLUS VARIA ALLØCATIØN IN             315.60
    LESS FIXED ALLØCATIØN ØUT              0.00
                                      ----------
  ****ALLØCATABLE EXPENSES               535.60
  ****UNALLØCATED EXPENSES               446.33
                                      ==========

  VARIABLE
ALLØCATIØNS TØ        AMØUNT
--------------        ------
           6              89.27
                  ------------
                         89.27
                  ============
```

```
CØST CENTER 6 SUMMARY
DIRECT EXPENSES                          550.00
    PLUS FIXED ALLØCATIØN IN             138.00
    PLUS VARIA ALLØCATIØN IN             505.43
    LESS FIXED ALLØCATIØN ØUT              0.00
                                      ----------
  ****ALLØCATABLE EXPENSES              1193.43
  ****UNALLØCATED EXPENSES              1193.43
                                      ==========

  VARIABLE
ALLØCATIØNS TØ        AMØUNT
--------------        ------
                  ------------
                          0.00
                  ============
```

SECTION 4

GENIE COMMANDS

ACORRELATION

Use: Autocorrelation statistical analysis

Command form: **ACORRELATION:series(n:m:j:k)**

Explanation: ACORRELATION instructs GENIE to perform an autocorrelation on the indicated series and any of the k difference series for j lags. The variables n and m are start and end date parameters, respectively. All five parameters are required.

A difference series may be described as follows:

$$s_{d1} = s_{t0} - s_{t1}$$
$$s_{d2} = s_{t0} - s_{t2}$$
$$\vdots$$

where s is a series, s_d is a difference of s, and s_t refers to time.

Lags refer to time shifts. Thus, comparisons of the series shifted in time are made.

Example

```
<>PRINT:VØLUME↵

****SERIES:     VØLUME    FØR     42    PERIØDS ****

TYPE=M
SD=  167
ED=  670

 222    247    358    371    376    533    435    525    381    379    393    313
 322    490    577    526    605    570    563    573    633    379    596    635
 357    550    625    663    772    829    887    819    672    608    445    396
 485    554    541    684    728    607
```

```
<>ACØRRELATIØN:VØLUME(168:670:4:2)↵

    ØRIGINAL SERIES (MEAN=   .58970E+03 )

 1- 4         .59    .32    .21   -.25
STD. ERR.     .18    .24    .25    .26

    DIFFERENCE  1  (MEAN= -.10387E+02 )

 1- 4         .01   -.14    .13   -.18
STD. ERR.     .19    .19    .19    .19

    DIFFERENCE  2  (MEAN= -.52500E+01 )

 1- 4        -.43   -.15    .23   -.03
STD. ERR.     .19    .22    .23    .23
```

ADJUST

Use: Series adjustment and alignment

Command form: ADJUST:series$\left(\left\{\begin{matrix}+\\-\end{matrix}\right\}\text{n}:\left\{\begin{matrix}\text{B}\\\text{E}\end{matrix}\right\}\right)$

Explanation: ADJUST instructs GENIE to perform a realignment of the indicated series, with n indicating the number of data elements to be affected. The plus sign (+) and the minus sign (–) suggest that these data elements are to be either added to or truncated from the B (beginning) or E (end) of the series.

Example

```
<>LIST:A:B↵

  DATE          A             B
******* ************ ************
X   1        11.0000       20.0000
X   2        12.0000       40.0000
X   3        13.0000       60.0000
X   4        14.0000       80.0000
```

```
<>ADJUST:A(-2:B)&B(2:E)↵
```

```
<>FAST:A:B↵

        A
************
       13.0000
       14.0000
```

Series A was truncated two data points at the beginning, and series B was lengthened two data points at the end.

```
        B
************
       20.0000
       40.0000
       60.0000
       80.0000
        0.0000
        0.0000

<>
```

ASGN

Use: Data assignment

Command form: ASGN:series(n)x

Explanation: ASGN instructs GENIE to assign the value indicated by x for n elements to the series specified. The command first erases all existing data values if it is already active, then assigns the new data from the first to the n^{th} element.

Example

```
<>ASGN:XXX(4)1.448↵

<>LIST:XXX↵

 DATE          XXX
******* ************
X   1          1.4480
X   2          1.4480
X   3          1.4480
X   4          1.4480

<>N(1)=3&M(1)=2.88↵
```

```
<>ASGN:YYY(N)M↵

<>LIST:YYY↵

 DATE         YYY
******* ************
X   1          2.8800
X   2          2.8800
X   3          2.8800


<>
```

CLEAR

Use: Restarting GENIE

Command form: CLEAR:

Explanation: CLEAR instructs GENIE to erase all series presently active in the working area. The effect is to restart GENIE.

Example

```
<>STATUS:↵
 NAME    TYPE   START DATE   END DATE   LENGTH
******   ****  **********   ********   ******
XXX        X          1          4        4
YYY        X          1          3        3
A          X          1          5        5
VØLUME     M        167        670       42


<>CLEAR:↵

**** ALL CLEARED! ****


<>STATUS:↵

 NØ ACTIVE SERIES!!!!
```

CMRN

Use: Changing file name

Command form: **CMRN:old name:new name**

Explanation: CMRN instructs GENIE to copy the contents of the commands or report structure old name to a file called new name and then to delete old name.

Example

```
<>CMRN:TEST:XYZ↵
```

The commands structure or report structure, TEST, is now called XYZ.

COMMANDS STRUCTURES

The GENIE commands structure is a user-created file of pre-stored GENIE commands and programming statements which may be executed without returning to the terminal. Commands structures are very powerful in that they may be started at almost any line in the file and are conversational in nature; that is, the program may be interrupted at any point during execution to display and/or alter data values as well as to make programming changes, and then may be restarted at any point in the file.

The following information is discussed in this section:

- Creation of commands structures
- Execution of commands structures
- DO statements
- IF statements
- GOTO statements
- Variability
- Variable names and commands
- Linking structures

Creating a Commands Structure

A commands structure may be created with either of two commands: the LOAD command and the COPY command. The LOAD command provides the user with the ability not only to create a commands structure but also to edit it during creation. See the section discussing the GENIE editing system.

The COPY command may also be used, but none of the editing features are available except Control A and Control Q.

Execution of a Commands Structure

A commands structure may be started by using the RUNCOMMANDS command. It is important to note that a command file should not be activated in the middle of a DO loop.

DO Statement

The general form of a DO statement is:

DO:n%series

DO statements are recognized only in a commands structure. The command instructs GENIE to perform all command lines in the file between the DO statement and the n^{th} line which is not executed and should be some type of null statement, such as NULL, DUMMY, CONTINUE, or a blank line.

The loop is iterated l times, where l is equal to the length of the indicated series. The i^{th} element of the series may be substituted anywhere within the range of the DO loop on the i^{th} iteration by using a percent sign (%). For example, if we have the following commands structure,

```
A(1)=1 2 3 4
DO:4%A
A(%)=B(%)/%
4CONTINUE
END
```

the DO loop is iterated four times, and the result of the third command line is:

```
ITERATION 1:  A(1)=B(1)/1
ITERATION 2:  A(2)=B(2)/2
ITERATION 3:  A(3)=B(3)/3
ITERATION 4:  A(4)=B(4)/4
```

Nested DO loops are not permitted.

IF Statement

The general form of an IF statement is:

IF/x op y/ command

where x and y may be a real or integer number, a subscripted series name, or a nonsubscripted series name. op may be .GT. (greater than), .LT. (less than), .EQ. (equal to), .NE. (not equal to), .GE. (greater than or equal to), or .LE. (less than or equal to). The command may be any GENIE command except DO.

The IF command may be used at the GENIE executive level. The IF statement is a Boolean logical comparison command. Comparisons are made element to element. If an entire series is referred to, all element comparisons must be satisfied if the indicated command is to be executed. Unless all comparisons are satisfied, execution is passed to the next command line in the file.

GOTO Statement

The general form of a GOTO statement is:

GOTO n

GOTO instructs GENIE to transfer control to line n in the commands structure. The variable may be a numeric value or a nonsubscripted series name. Blanks should not be used.

Variability

All commands in GENIE have dynamic parameters; that is, all parameters may be numeric or they may be a series name from which values are used as parameters. The commands structure goes a step further: The commands themselves are dynamic; it is possible to have entire commands, segments of commands, parameters, series names, and so forth.

Variable Commands

Variable commands are inserted into a commands structure by using the following:

#(k)

where k is a numeric value or a nonsubscripted series name.

The # refers to a reserved file located on the user's directory, called COMMANDSBANK. The value of k indicates the line from which the variable string is to be satisfied or defined. As many #(k) references as desired may be used.

The file COMMANDSBANK may be created in any of three ways:

- LOAD command
- COPY command
- Direct insert

The LOAD and COPY commands may be used to create the required file. The method of doing so is described in their command definitions in this manual.

The direct insert method allows the user to interactively create and/or overwrite lines on COMMANDSBANK during execution of a commands structure. The command to do this is:

n#(l)=string1 string2 string3 ...

where l must be greater than or equal to 1. Each string must be separated by a blank. The l indicates which line in COMMANDSBANK the insert is to begin. For example, if we have

N#(1)=LIST:#(4) (1270) VOL

then the command #(1)#(2)#(3) would be interpreted as:

LIST:VOL(1270)

See the commands file example /#SHOW/.

#n performs the same insert as n#.

Linking Structures

The RUNCOMMANDS command may be used in a commands structure to start execution of another commands structure. The asterisk (*) option may be used to enter the second structure at the point inside it. To return to the original structure, another RUNCOMMANDS command must be used. As many commands structures as desired may be linked together.

Variable names may also be created within DO loops by using the percent sign (%). For example:

```
A(1)=1 2
DO:4%A
A%=%
4CONTINUE
```

This commands structure creates two vector series names: A1=1 and A2=2.

NOTE: If noninteger values are used to name series, for example, A1.34, any attempt to write such a series to the disk will cause a fatal error to GENIE, and all previous work will be lost.

The following commands structure illustrates the use of the logical IF statements in GENIE. If all cases in the comparison are satisfied, the operation indicated is performed; otherwise, the next statement in the structure is executed.

```
<>LOAD:XYZ↵
STRUCTURE CONTAINS     6     COMMANDS.
:L↵
 1 A(1)=1 2 3 4 5 6 7 8:B(1)=2 4 6 8 10 12 14 16
 2 *&&     ASSIGNMENTS MADE!
 3 IF/B.EQ.A/*&&     IF STATEMENT IN ERROR!
 4 *&&     O.K. PAST FIRST IF STATEMENT
 5 IF/B.NE.A/*&&     IF STATEMENT COMPARISON O.K.
 6 END

:Q↵

OLD VERSION SAVED TO XYZOLD
SHALL I DELETE IT?Y↵


<>RUNCOMMANDS:XYZ↵

   ASSIGNMENTS MADE!

    O.K. PAST FIRST IF STATEMENT

    IF STATEMENT COMPARISON O.K.

<>
```

The following commands structure illustrates the use of a DO loop and the use of variable name assignments as programming functions.

```
<>LOAD:ABC↵
STRUCTURE CONTAIN    7     COMMANDS.

:L↵

 1 A(1)=1 2
 2 DO:5%A
 3 *&&ITERATION %
 4 A%=%+4.484
 5 5CONTINUE
 6 PRINT:A1:A2
 7 END

:Q↵

OLD VERSION SAVED TO ABCOLD
SHALL I DELETE IT?Y↵


<>RUNCOMMANDS:ABC↵


ITERATION 1


ITERATION 2

****SERIES:     A1     FOR     1     PERIODS ****

TYPE=X
SD=      1
ED=      1

 5.484

****SERIES:     A2     FOR     1     PERIODS ****

TYPE=X
SD=      1
ED=      1

 6.484
```

```
<>LOAD:/#SHOW/⊃
STRUCTURE CONTAINS     4     COMMANDS.

:L⊃

 1 KOUNT(1)=2 3 4 9 8
 2 DO:#(10)#(11)
 3 #(%)
 4 CONTINUE

:Q⊃

OLD VERSION SAVED TO /#SHOW/OLD
SHALL I DELETE IT?YES⊃


<>LOAD:COMMANDSBANK⊃
STRUCTURE CONTAINS     11     COMMANDS.

:L⊃

 1 VOL
 2 A(1)=1
 3 B(1)=5
 4 LIST:#(A)#(B)
 5 (167:1267)
 6 B(1)=7
 7 (167:667)
 8 END
 9 PLOT:#(A)#(7)
 10 4
 11 %KOUNT

:Q⊃

OLD VERSION SAVED TO COMMANDSBANKOLD
SHALL I DELETE IT?YES⊃
```

```
<> !ONECHO !RUNCOMMANDS:/#SHOW/ ↵
 1      KOUNT(1)=2 3 4 9 8
 2      DO:4%KOUNT
 3      A(1)=1
 3      B(1)=5
 3      LIST:VOL(167:1267)

 DATE          VOL
******* ************
JAN   67       198.0000
FEB   67       223.0000
MAR   67       334.0000
APR   67       347.0000
MAY   67       352.0000
JUN   67       509.0000
JUL   67       411.0000
AUG   67       501.0000
SEP   67       357.0000
OCT   67       355.0000
NOV   67       369.0000
DEC   67       289.0000


 3      PLOT:VOL(167:667)
* * * * * * * * * * * * ARITHMETIC PLOT * * * * * * * * * * * *


1= VOL
        198.        250.        302.        354.        405.        457.        509.
           II.........I.........I.........I.........I.........I.........I.........I
 JAN   67 I1          .           .           .           .           .           .
 FEB   67 I     1     .           .           .           .           .           .
 MAR   67 I           .           .      1    .           .           .           .
 APR   67 I           .           .           1.          .           .           .
 MAY   67 I           .           .           1.          .           .           .
 JUN   67 I           .           .           .           .           .           1
           II.........I.........I.........I.........I.........I.........I.........I
          198.        250.        302.        354.        405.        457.        509.
  3      END


<>
```

On the following pages, the listing of the commands file PREDICTION is presented. This listing is a good example of the many interesting features GENIE allows the user to program. A sample run of the file is also shown.

The listing of the file ECON is presented to further display the programming features of GENIE.

```
<>LØAD:PREDICTIØN↵
STRUCTURE CØNTAINS     41    CØMMANDS.

:L↵

 1 *&&**** MØNTHLY FØRECAST ****&&INSERT SERIES NAME AND FACTØR SERIE
SNAME.&
 2 TERMINAL
 3 ØNECHØ
 4 PRINT:#(1)
 5 DESEASØN:#(1)
 6 A=LEN(#(1))&B=A/12
 7 INGR:B
 8 NUM=-B*12+A+1
 9 TIME:C(B)
 10 DØ:12%C
 11 MRGX:#(2)$#(2)
 12 CØNTINUE
 13 DESEAS=#(1)/#(2)*100&A=A+1&B=A
 14 TIME:TIME(A)
 15 ØFFECHØ
 16 *&WRITE ØUTPUT TØ GENDAT FØR CURVE.&FØR MULT REG (X:Y)=(3:7)&FØR C
URVE (X:Y)=(4:7)&FØR PØLY REG (X:Y:Z)=(5:6:ØRDER)&
 17 TERMINAL
 18 ØNECHØ
 19 N#(3)=MULT CURV PØLY /Z
 20 #(X):TIME:DESEAS#(Y)
 21 Y=SDAT(#(1))
 22 XTØ:GENDAT(M:Y)
 23 A=EDAT(GENDAT)
 24 PREDIC=GENDAT(B)*#(2)(NUM)/100
 25 ØFFECHØ
 26 *&&NØTE:GENDAT=DESEASØNALIZED FØRECAST&     PREDIC=ACTUAL FØRECAST
&
 27 ØNECHØ
 28 LIST:GENDAT(A)&PREDIC
 29 ØFFECHØ
 30 *&&DØ YØU WANT PLØTTING? X=(34:36) FØR (YES:NØ)&
 31 TERMINAL
 32 ØNECHØ
 33 GØTØX
 34 #(1)(A)=PREDIC
 35 PLØT:#(1)(169)&#(2)/#(1):DESEAS(168)&#(2)
 36 ØFFECHØ
 37 *&ANØTHER SERIES? X=(1:0)  FØR  (YES:NØ)&
 38 TERMINAL
 39 ØNECHØ
 40 IF/X.EQ.1/GØTØ1
 41 END

:Q↵

ØLD VERSIØN SAVED TØ PREDICTIØNØLD
SHALL I DELETE IT?YES↵
```

```
<>RUNCØMMANDS:PREDICTIØN

**** MØNTHLY FØRECAST ****

INSERT SERIES NAME AND FACTØR SERIESNAME.


<!>N#(1)=VØLUME VØLFAC
 4     PRINT:VØLUME

****SERIES:     VØLUME    FØR     42    PERIØDS ****

TYPE=M
SD=  167
ED=  670

 198    223    334    347    352    509    411    501    357    355    369    289
 298    466    553    502    581    546    539    549    609    355    572    611
 333    526    601    639    748    805    863    795    648    584    421    372
 461    530    517    660    704    583
 5     DESEASØN:VØLUME

SEASØNAL FACTØRS WRITTEN TØ 'VØLFAC'

JAN =   70.129316
FEB =   92.127395
MAR =   107.25192
APR =   111.44436
MAY =   119.11012
JUN =   123.86969
JUL =   114.77128
AUG =   117.17455
SEP =   99.867309
ØCT =   80.003438
NØV =   87.182781
DEC =   77.067841


DESEASØNALIZED DATA WRITTEN TØ 'VØLDES'

 6     A=LEN(VØLUME)&B=A/12
 7     INGR:B
 8     NUM=-B*12+A+1
 9     TIME:C(B)
 10    DØ:12%C
 11    MRGX:VØLFAC$VØLFAC
 11    MRGX:VØLFAC$VØLFAC
 11    MRGX:VØLFAC$VØLFAC
 13    DESEAS=VØLUME/VØLFAC*100&A=A+1&B=A
 14    TIME:TIME(A)

WRITE ØUTPUT TØ GENDAT FØR CURVE.
FØR MULT REG (X:Y)=(3:7)
FØR CURVE (X:Y)=(4:7)
FØR PØLY REG (X:Y:Z)=(5:6:ØRDER)
```

```
<!>X=4&Y=7
 20    CURV:TIME:DESEAS

CURVE DETAILS FOR?1
NUMBER     CURVE FORM                          A            B
******     **********                       ******       ******
  1        Y=A+B*X                          333.798      7.84719

CURVE      UNEXPLAINED      EXPLAINED       TOTAL          COEFFICIENT OF
NUMBER     VARIATION        VARIATION       VARIATION      DETERMINATION
  1         337119.          379970.         717089.         .529878

**** CURVE   1     ****
DETAILS? YES
OUTPUT TO GENDAT
   DATE     X-ACT      Y-ACT      Y-CALC     DIFF       % DIFF

 1           1.000      282.3      341.6     -59.31     -21.01
 2           2.000      242.1      349.5     -107.4     -44.39
 3           3.000      311.4      357.3     -45.92     -14.75
 4           4.000      311.4      365.2     -53.82     -17.29
 5           5.000      295.5      373.0     -77.51     -26.23
 6           6.000      410.9      380.9      30.03      7.309
 7           7.000      358.1      388.7     -30.63     -8.552
 8           8.000      427.6      396.6      30.99      7.248
 9           9.000      357.5      404.4     -46.95     -13.13
 10          10.00      443.7      412.3      31.46      7.090
 11          11.00      423.2      420.1      3.131      .7398
 12          12.00      375.0      428.0     -52.97     -14.13
 13          13.00      424.9      435.8     -10.88     -2.561
 14          14.00      505.8      443.7      62.16      12.29
 15          15.00      515.6      451.5      64.10      12.43
 16          16.00      450.4      459.4     -8.905     -1.977
 17          17.00      487.8      467.2      20.58      4.220
 18          18.00      440.8      475.0     -34.26     -7.773
 19          19.00      469.6      482.9     -13.27     -2.825
 20          20.00      468.5      490.7     -22.21     -4.740
 21          21.00      609.8      498.6      111.2      18.24
 22          22.00      443.7      506.4     -62.71     -14.13
 23          23.00      656.1      514.3      141.8      21.61
 24          24.00      792.8      522.1      270.7      34.14
 25          25.00      474.8      530.0     -55.14     -11.61
```

```
 26          26.00       570.9       537.3       33.12       5.801
 27          27.00       560.4       545.7       14.69       2.622
 28          28.00       573.4       553.5       19.86       3.464
 29          29.00       628.0       561.4       66.62       10.61
 30          30.00       649.9       569.2       80.66       12.41
 31          31.00       751.9       577.1       174.9       23.26
 32          32.00       678.5       584.9       93.57       13.79
 33          33.00       648.9       592.8       56.11       8.647
 34          34.00       730.0       600.6       129.4       17.72
 35          35.00       482.9       608.5      -125.6      -26.00
 36          36.00       482.7       616.3      -133.6      -27.68
 37          37.00       657.4       624.1       33.21       5.052
 38          38.00       575.3       632.0      -56.70      -9.856
 39          39.00       482.0       639.8      -157.8      -32.73
 40          40.00       592.2       647.7      -55.46      -9.365
 41          41.00       591.0       655.5      -64.48      -10.91
 42          42.00       470.7       663.4      -192.7      -40.95
EXTRAPOLATED DATA FOR     1     PERIODS
 43          43.00                   671.2


 23    A=EDAT(GENDAT)
 24    PREDIC=GENDAT(B)*VOLFAC(NUM)/100

NOTE:GENDAT=DESEASONALIZED FORECAST

 28    LIST:GENDAT(A)&PREDIC

 DATE         GENDAT          PREDIC
******* ************ ************
JUL  70      671.2277      770.3766



DO YOU WANT PLOTTING? X=(34:36) FOR (YES:NO)
```

```
<!>X=34↵
 33    GØTØX
 34    VØLUME(A)=PREDIC
 35    PLØT:VØLUME(169)&VØLFAC/VØLUME:DESEAS(168)&VØLFAC
* * * * * * * * * * * * ARITHMETIC PLØT * * * * * * * * * * * *


1= VØLUME
2= VØLFAC
        70.1        202.        334.        467.        599.        731.        863.
          II.........I.........I.........I.........I.........I.........I.........I
JAN   69 I2          .         1.          .          .          .          .          .
FEB   69 I 2         .          .          .    1     .          .          .          .
MAR   69 I  2        .          .          .          1          .          .          .
APR   69 I   2       .          .          .          .    1     .          .          .
MAY   69 I   2       .          .          .          .          .1         .          .
JUN   69 I    2      .          .          .          .          .     1    .          .
JUL   69 I   2       .          .          .          .          .          .          1
AUG   69 I   2       .          .          .          .          .    1     .          .
SEP   69 I  2        .          .          .          .    1     .          .          .
ØCT   69 I2          .          .          .          1          .          .          .
NØV   69 I 2         .          .     1    .          .          .          .          .
DEC   69 I2          .          . 1        .          .          .          .          .
JAN   70 I2          .          .          1.         .          .          .          .
FEB   70 I 2         .          .          .    1     .          .          .          .
MAR   70 I  2        .          .          .  1       .          .          .          .
APR   70 I   2       .          .          .          .    1     .          .          .
MAY   70 I   2       .          .          .          .          1          .          .
JUN   70 I    2      .          .          .          1          .          .          .
JUL   70 I   2       .          .          .          .          .  1       .          .
AUG   70 I   2       .          .          .          .          .          .          .
SEP   70 I  2        .          .          .          .          .          .          .
ØCT   70 I2          .          .          .          .          .          .          .
NØV   70 I 2         .          .          .          .          .          .          .
DEC   70 I                                                                           .
**** ESCAPED AT CØMMAND=     35
```

The demonstration was ended here by an Alt Mode/Escape.

```
<>LØAD:ECØN⊃
STRUCTURE CØNTAINS     30    CØMMANDS.

:L⊃

 1 GS=VØL*SP&RAD=.015*GS&VCS=.7*GS&NS=GS-RAD&GM=NS-VCS&GP=GM-FMC&CTP=
GP-PC&CF=CTP+AMØRT+WC-FA
 2 *&&WHAT IS THE INITIAL FLØW FØR THIS PRØJECT? TYPE  IF=
 3 TERMINAL
 4 CØLS(1)=10&CF(71)=IF
 5 ERASE:IF
 6 *&INPUT DISCØUNT RATE  DR=?
 7 TERMINAL
 8 REPØRT:CØNTRIBSTMT*10.1
 9 DCF:CF/DR
 10 ERASE:DR
 11 *&&DØ YØU WANT TØ CHANGE ANY VALUES X=(30:14)=(NØ:YES)
 12 TERMINAL
 13 GØTØX
 14 *&&DØ YØU WISH TØ SEE ANY ØF THE PRESENT SERIES IN GREATER DETAIL
X=(0:1)=(NØ:YES)
 15 TERMINAL
 16 IF/X.EQ.0/GØT024
 17 *&USE AN N # STATEMENT TØ INSERT THE SERIES TØ BE PRINTED.&# (1) S
HØULD BE THE NUMBER ØF SERIES TØ BE VIEWED.&
 18 TERMINAL
 19 TIME:X(#(1))
 20 X=X+1
 21 DØ:23%X
 22 PRINT:#(%)
 23 CØNTINUE
 24 TIME:X(132):Y(1)
 25 *&&TØ TERMINATE ALTERATIØN PHASE TYPE Y=999
 26 DØ:29%X
 27 TERMINAL
 28 IF/Y.EQ.999/GØTØ1
 29 DUMMY
 30

:Q⊃

ØLD VERSIØN SAVED TØ ECØNØLD
SHALL I DELETE IT?YES⊃


<>
```

COMPOUND

Use: Data generation — Compound growth

Command form: **COMPOUND:series/#periods/rate/base date element**

Explanation: COMPOUND generates data values, starting at the indicated date for the specified number of periods at the compound growth rate as indicated. The rate is specified without a percent sign; for example, to specify a rate of 10%, the user enters 10 only.

Example

```
<>A(1)=10 14 18 25↵

<>COMPOUND:A/4/10/4↵

<>PRINT:A↵

****SERIES:     A      FOR     8     PERIODS ****

TYPE=X
SD=      1
ED=      8

 10      14      18      25      27.5      30.25      33.275      36.6025

<>
```

COPY

Use: Creation of disk files

Command form: **COPY:file name list**

Explanation: The COPY command instructs GENIE to open a disk file for output, allowing for creation of GENIE compatible data files, command structures, report structures, and noncompatible GENIE data files.

When GENIE responds with a colon (:), information may be entered. To inform GENIE that the input is finished and the user wishes to save what has been created, the user types SAVE and a Carriage Return.

The QUIT command terminates input and deletes what has already been created.

Example

```
<>COPY:XXX:YYY↵
GENIE DATA FILE?YES↵

TYPE, START DATE, END DATE?M,170,1270↵

:1676 1234 1143 1457 1789 1888↵

:2000 2200 2498 2200 1965 1765↵

:SAVE↵
 O.K.
 GENIE DATA FILE?NO
COMMANDS STRUCTURE, REPORT STRUCTURE, OR DATA FILE(CS,RS,DF)?CS↵

:*&THIS IS A DEMONSTRATION COMMANDS STRUCTURE!&&↵

:Z=SIN(A)+AVG(A)-2.45*N3(4)↵

:PRINT:Z↵

:END↵

:SAVE↵
O.K.
```

CORRELATION

Use: Statistical correlation analysis

Command form: **CORRELATION**:series list

Explanation: CORRELATION calculates the correlation coefficients among the variables listed and prints these values at the terminal.

Example

```
<>TIME:TIME(6)↵

<>PRICE(1)=1.23 2.43 4.55 4.05 5.01 5.55↵

<>VOLUME(1)=1000 976 908 950 888 850↵
```

```
<>CORRELATION:TIME:PRICE:VOLUME↵
TIME   .VS.   TIME   :        1
PRICE  .VS.   TIME   :      .93356639
PRICE  .VS.   PRICE  :        1
VOLUME .VS.   TIME   :     -.91692673
VOLUME .VS.   PRICE  :      -.95166593
VOLUME .VS.   VOLUME :        1

<>
```

CREATE

Use: Creation, adjustment, and alteration of a series

Command form: series(n)=a b c d e

Explanation: The CREATE command allows the user to create a new X-type series in the working area by referring directly to the new name and the individual elements, or to change values of existing elements, or to add new elements to a series that already exists. The variable n is an element reference if the series is of X-type or a date reference if it is a time series.

The values which follow the equal sign (=) can be numeric, a series name, or a series element.

Only one blank should follow the data elements. Any additional blanks will be assumed to be zeros.

Example

```
<>A(1)=1 2 3 4↵

<>FAST:A↵

       A
************
        1.0000
        2.0000
        3.0000
        4.0000


<>A(-2)=56 67↵
```

```
<>FAST:A↵

       A
*************
       56.0000
       67.0000
        1.0000
        2.0000
        3.0000
        4.0000


<>A(8)=6↵

<>FAST:A↵

       A
*************
       56.0000
       67.0000
        1.0000
        2.0000
        3.0000
        4.0000
        0.0000
        6.0000

<>A(3)=-4 -8:N(1)=5 8:A(N)=A(2)↵

<>FAST:A↵

       A
*************
       56.0000
       67.0000
       -4.0000
       -8.0000
       67.0000
        4.0000
        0.0000
        6.0000
```

```
<>FAST:VOLUME(167:667)↵

       VOLUME
************
      198.0000
      223.0000
      334.0000
      347.0000
      352.0000
      509.0000



<>VOLUME(1166)=150↵

<>FAST:VOLUME(1166:267)↵

       VOLUME
************
      150.0000
        0.0000
      198.0000
      223.0000



<>VOLUME(1266)=VOLUME(167)↵

<>FAST:VOLUME(1166:267)↵

       VOLUME
************
      150.0000
      198.0000
      198.0000
      223.0000
```

DATA INPUT FROM DISK

Although GENIE is designed to automatically read data files which are GENIE compatible and which reside on the disk, there are times when only segments of series are desired. This may be done with either of two commands.

NOTE: Automatic disk read brings an entire series into the working area even when only a portion is referred to in a date specification.

READ and EREAD Commands

The READ command instructs GENIE to read from the disk the series listed or the segments of series listed. The form of the command is:

READ:series(start date:end date)increment

The EREAD command instructs GENIE to perform the same task as the READ command, except that element references must be used at all times even if a series is not of X-type. The form of the EREAD command is:

EREAD:series(start element:end element)increment

Note that both commands allow for an incremental selection of data. The resultant active series is always of X-type.

Example

```
<>VØL=VØLUME↵

<>WRITE:VØL↵

<>!CLEAR:!READ:VØLUME(168:468)!EREAD:VØL(13:16)!LIST:VØL:VØLUME↵

**** ALL CLEARED! ****


 DATE          VØL              VØLUME
******* ************ ************
JAN   68      298.0000      298.0000
FEB   68      466.0000      466.0000
MAR   68      553.0000      553.0000
APR   68      502.0000      502.0000


<>
```

DATIN and BREAD Commands

Use: Data base manipulation

Command forms: **DATIN:file name**
BREAD:file name

Explanation: Both commands instruct GENIE to allow for input from a non-GENIE data file when more than one series is stored in columnar fashion. For example, the data file

X=1,2,3,4
Y=1,4,6,16
Z=1,4,16,64

then appears as follows:

1 1 1
2 4 4
3 6 16
4 16 64

The routine prompts the user while, simultaneously, a file called FILE'BRD' is written on the directory. This allows the identical input as specified by the user's responses to the questions without duplicating the responses.

Example

```
<>!CLEAR:!COPY:TESTBASE↵

**** ALL CLEARED! ****

GENIE DATA FILE?NO↵
COMMANDS STRUCTURE,REPORT STRUCTURE, OR DATA FILE(CS,RS,DF)?DF↵

:1 1 1↵

:2 4 4↵

:3 6 16↵

:4 16 64↵

:SAVE↵
O.K.
```

```
<>BREAD:TESTBASE↵
HØW MANY SERIES ARE STØRED IN TESTBASE ?
3↵
HØW MANY SERIES WILL BE INPUTTED ?
3↵
 1:
SERIES NUMBER AND NAME? 1,XXX↵
TYPE ?
X↵
START AND END DATES ?
1,4↵
 2:
SERIES NUMBER AND NAME? 2,YYY↵
TYPE ?
M↵
START AND END DATES ?
170,470↵
 3:
SERIES NUMBER AND NAME? 3,ZZZ↵
TYPE ?
Y↵
START AND END DATES ?
70,73↵

FILE TESTBASE'BRD' WRITTEN ØN YØUR DIRECTØRY FØR
AUTØMATIC READ ØF TESTBASE


<>!STATUS:!CLEAR:!STATUS:!DATIN:TESTBASE!STATUS:↵
 NAME    TYPE   START DATE   END DATE   LENGTH
******   ****   **********   ********   ******
XXX        X           1          4        4
YYY        M         170        470        4
ZZZ        Y          70         73        4


**** ALL CLEARED! ****


 NØ ACTIVE SERIES!!!!
 NAME    TYPE   START DATE   END DATE   LENGTH
******   ****   **********   ********   ******
XXX        X           1          4        4
YYY        M         170        470        4
ZZZ        Y          70         73        4


<>
```

RETLINK Command – RETRIEVE Compatibility

Use: RETRIEVE compatibility

Command form: **RETLINK:file name**

Explanation: RETLINK allows the user to select numeric data from a RETRIEVE data file. A file called FILE'RETL' is created after responding to the questions. This allows the user to execute RETLINK without answering the questions more than once.

Data may be selected from as many records as desired, starting at any record. No repetition is permitted.

NOTE: All series created by RETLINK are written to disk files.

Example

```
-TYPE RECØRD↵

AUG    26LAWYER EXPENSE                -23.13
FEB  2   MEALS                         -3.85
FEB  2   MILEAGE                       -6.75
FEB  2   TØLLS                         -1.00
FEB  5   MEALS                         -1.25
FEB  5   MILEAGE                       -6.75
FEB  5   TØLLS                         -1.00
FEB  10  MEALS                         -3.75
FEB  10  MILEAGE                       -6.75

-GENIE↵

<>RETLINK:RECØRD↵
NUMBER ØF SERIES TØ BE CREATED?1↵
HØW MANY CHARACTERS PER RECØRD IN THE FILE?45↵
SERIES NAME,START RECØRD,# RECØRDS,START CHARACTER,# CHARACTERS
 1
CØST,2,4,35,10↵

<>LIST:CØST↵

 DATE        CØST
******* ************
X  1          -3.8500
X  2          -6.7500
X  3          -1.0000
X  4          -1.2500
```

```
<>CLEAR:↵

**** ALL CLEARED! ****


<>RETLINK:RECØRD↵

<>LIST:CØST↵

 DATE        CØST
******* ************
X   1          -3.3500
X   2          -6.7500
X   3          -1.0000
X   4          -1.2500
```

BASE Command — TYMTAB Compatibility

Use: Data input from a data base and/or a TYMTAB SAVE file

Command form: **BASE:information file:data file**

Explanation: The BASE command instructs GENIE to take data from the indicated data file and read this data into active GENIE series names. The data file may be a TYMTAB SAVE file if a dollar sign ($) appears after the first colon (:) in the command input string. All series created are X-type. The XTO command may be used to change the type and date specifications. The information file contains the specifications which instruct GENIE how to read the data file and by what names the GENIE series will be referred to. The form of the information file is as follows:

The first two pieces of information are the number of rows and columns of data.

The remaining information is of the following form:

row-column designation,series name,location

Row-column designations are:

- rn
- cm
- rncm

where r = row
c = column
n = row number
m = column number

The series name is the name by which the user refers to the selected data.

Location refers to the:

- Start column if a row is selected
- Start row if a column is selected
- Location in the series if a single data value is selected

Example

```
-TYPE MØDEL↵

5,8
R1,RØW1,1
C1,CØL1,2
R4,RØW4,3
R1C1,RØWCØL,1
R2C1,RØWCØL,2
R3C1,RØWCØL,3
R3C1,RØWCØL,4

-TYPE DATAF↵

1 2 3 4 5 6 7 8
10 20 30 40 50 60 70 80
100 200 300 400 500 600 700 800
1000 2000 3000 4000 5000 6000 7000 8000
10000 20000 30000 40000 50000 60000 70000 80000


-GENIE↵


<>!BASE:MØDEL:DATAF!PRINT:RØW1:CØL1:RØW4:RØWCØL↵

****SERIES:    RØW1  FØR    8    PERIØDS ****

TYPE=X
SD=    1
ED=    8

 1     2     3     4     5     6     7     8

****SERIES:    CØL1  FØR    4    PERIØDS ****

TYPE=X
SD=    1
ED=    4

 10    100   1000    10000

****SERIES:    RØW4  FØR    6    PERIØDS ****

TYPE=X
SD=    1
ED=    6

 3000     4000     5000     6000     7000     8000
```

```
****SERIES:     RØWCØL    FØR      4     PERIØDS ****

TYPE=X
SD=       1
ED=       4

 1        10       100      100
```

DATA TYPE CONVERSION

Use: Data type conversion

Command forms:
XTO:series name(type:start date)
MTO:series name(type)
QTO:series name(type)
STO:series name
TOX:series name

Explanation: The above commands instruct GENIE to convert a series from one type to another. QTO converts an X-type series. MTO converts an M-type series to any type except X. QTO converts a quarterly series to any type except X and M.

Repetition characters:
& for all
: for all except XTO

Example

A series of X-type is converted to all other types and then finally back to X-type.

```
<>S(1)=1 2 3 4 5 6 7 8 9↵

<>XTO:S(M:170)↵


<>LIST:S↵

  DATE         S
******* ************
JAN  70        1.0000
FEB  70        2.0000
MAR  70        3.0000
APR  70        4.0000
MAY  70        5.0000
JUN  70        6.0000
JUL  70        7.0000
AUG  70        8.0000
SEP  70        9.0000
```

The series S has been converted element for element to monthly data.

```
<>MTO:S(Q)↵

<>LIST:S↵

 DATE          S
******* ************
Q 1   70        6.0000
Q 2   70       15.0000
Q 3   70       24.0000
```

The series has now been converted to quarterly data, with the proper months being summed into the proper quarters.

```
<>QTO:S(S)↵

<>LIST:S↵

 DATE          S
******* ************
S 1   70       21.0000
S 2   70       24.0000
```

The series has now been converted to semi-annual data.

```
<>STO:S↵

<>LIST:S↵

 DATE          S
******* ************
 1970          45.0000
```

The series now has been converted to annual data.

```
<>TOX:S↵

<>LIST:S↵

 DATE          S
******* ************
X   1          45.0000
```

The series has been converted to an X-type series equal in length with the series given in the TOX command.

```
<>
```

FREE FORM OUTPUT TO DISK FILE

Use: File output – Data

Command form: DATOUT:data string

Explanation: DATOUT instructs GENIE to write whatever has been typed in the data string. As many DATOUT commands as desired may be used so long as a file is opened. Also see the FILOPEN command.

Example

```
<>FILOPEN: WAST↵

<>DATOUT: 1.266 PRODUCT A↵

<>DATOUT: 4.449 PRODUCT B↵

<>FILCLOSE:↵

<>Q↵
**** GOOD DAY MASTER! ****

-TYPE WAST↵
1.266 PRODUCT A
4.449 PRODUCT B

-
```

DOCUMENTING GENIE SESSIONS

The user can document a terminal session in two ways. The command

DATE:

instructs GENIE to print at the terminal the date and the time. The command

*string

instructs GENIE to print the designated string at the terminal. An ampersand (&) may be used as a Carriage Return-Line Feed. A comment string may contain as many as 131 characters.

Example

```
<>DATE:↵
********      10/11   16:42      ********
```

DELETE

Use: Deletion of disk files

Command form: DELETE:file list

Explanation: DELETE deletes all the specified files from the user's directory.

Example

```
<>READ:ORA↵
```

The disk series ORA was read from the disk.

```
<>ERASE:ORA↵
```

The series ORA is now erased from the working area.

```
<>DELETE:ORA↵
```

The disk file ORA is now deleted.

```
<>READ:ORA↵
**** FILE   ORA   NOT IN FILE DIRECTORY ! ****

<>
```

DCF

Use: Discounted cash flow and present value

Command form: DCF:series$\left\{\begin{matrix}(Y)\\(N)\end{matrix}\right\}$/discount rate

Explanation: DCF instructs GENIE to perform a discounted cash flow and present value analysis on the series mentioned. If N is specified, the schedule of flows is not printed. If neither Y nor N is specified, Y is assumed. GENIE requests a discount rate if none is specified.

NOTE: Ten percent must appear as 10, not as .10 or 10%.

Example

```
<>C123(1)=-3500 -1445 500 1250 3500 500 4500 1000 987↵

<>DCF:C123/6↵

 ****CASE STUDY C123   ****

DCF RATE OF RETURN:
ANNUAL     =          21.5215
CONTINUOUS=           19.4921

                    FLOWS                    DISCOUNTED
              ------------------       ------------------
PERIOD          NET    CUMULATIVE          NET    CUMULATIVE
------        -----    ----------        -----    ----------
   0       -3500.00      -3500.00     -3500.00      -3500.00
   1       -1445.00      -4945.00     -1189.09      -4689.09
   2         500.00      -4445.00       338.58      -4350.51
   3        1250.00      -3195.00       696.55      -3653.96
   4        3500.00        305.00      1604.93      -2049.04
   5         500.00        805.00       188.67      -1860.37
   6        4500.00       5305.00      1397.31       -463.06
   7        1000.00       6305.00       255.52       -207.53
   8         987.00       7292.00       207.53           .00

PRESENT VALUE AT    6.00 % DISCOUNT =     4233.9072

<>DCF:C123(N)/8↵

 ****CASE STUDY C123   ****

DCF RATE OF RETURN:
ANNUAL     =          21.5215
CONTINUOUS=           19.4921

PRESENT VALUE AT    8.00 % DISCOUNT =     3448.3919

<>DCF:C1234(N)/21.5215↵
'C1234'  NOT ACTIVE,NOT IN FILE DIRECTORY,OR NOT GENIE COMPATIBLE!
```

```
<>DCF:C123(N)/21.5215↵

 ****CASE STUDY C123   ****

DCF RATE OF RETURN:
ANNUAL     =          21.5215
CONTINUOUS=           19.4921

PRESENT VALUE AT  21.52 % DISCOUNT =          .0940
```

DESEASONALIZATION OF DATA

Use: Deseasonalization of time series data

Command forms: **DESE:monthly series(start date:end date)**
DESQ:quarterly series(start date:end date)

Explanation: DESE instructs GENIE to find the 12 monthly seasonal factors for the series specified. DESQ instructs GENIE to find the four quarterly seasonal factors for the series indicated. The link relative method is used. All factors are written to the disk automatically, starting with January or the first quarter.

NOTE: The deseasonalized series is also written to the disk.

Repetition character: &

Example

```
<>DESEASONALIZE:VOLUME↵

SEASONAL FACTORS WRITTEN TO 'VOLFAC'

JAN =   70.129316
FEB =   92.127395
MAR =   107.25192
APR =   111.44436
MAY =   119.11012
JUN =   123.86969
JUL =   114.77128
AUG =   117.17455
SEP =   99.867309
OCT =   80.003438
NOV =   87.182781
DEC =   77.067841

DESEASONALIZED DATA WRITTEN TO 'VOLDES'
```

Seasonal factors located on VOLFAC.

```
<>MTO:VOLUME(Q)↵
```
Convert to quarterly data.

```
<>MVOL=VOLUME↵
```
Assign to different name.

```
<>DESQ:MVOL↵
```
Execute quarterly deseasonalization.

```
SEASONAL FACTORS WRITTEN TO 'MVOFAC'

Q1 =  87.112818
Q2 =  115.67742
Q3 =  114.39566
Q4 =  82.814103
```
Seasonal factors located on MVOFAC.

```
DESEASONALIZED DATA WRITTEN TO 'MVODES'


<>
```

DESPECIFY

Use: Removal of GENIE specifications

Command form: **DESPECIFY:**

Explanation: DESPECIFY removes type, start date, and end date specifications from a disk file.

GENIE prompts the user by asking for the file names and whether more tasks are desired.

Example

```
<>DESPECIFY:↵
DISK FILE NAME?VOLUME↵
ANOTHER FILE?NO↵


<>READ:VOLUME↵

**** FILE   VOLUME   NOT GENIE COMPATIBLE ! ****


<>
```

DUMP AND RESTORE

Often the circumstance may arise where a terminal session of GENIE may need to be terminated, but the present contents of the working area may need to be saved and then reused at a later date. Two commands are available for this purpose: DUMP and RESTORE.

The form of the DUMP command is:

DUMP:file name

The DUMP command writes the current contents of the working area to a binary file of the specified name.

The form of the RESTORE command is:

RESTORE:file name

The RESTORE command clears the present contents of the working area and constructs it as pictured in the DUMP file of the specified name.

Example

```
<>STATUS:↵
 NAME    TYPE   START DATE   END DATE   LENGTH
******   ****   **********   ********   ******
VOLUME    M         167         670        42
A         X           1           5         5
B         Q         171         172         5

<>DUMP:DUMPFILE↵

<>CLEAR:↵

**** ALL CLEARED! ****

<>STATUS:↵

 NO ACTIVE SERIES!!!!

<>RESTORE:DUMPFILE↵

GENIE RESTORED AS OF     10/11   17:22
```

```
<>STATUS:↵
 NAME    TYPE   START DATE   END DATE   LENGTH
******   ****   **********   ********   ******
VOLUME    M         167         670        42
A         X           1           5         5
B         Q         171         172         5


<>
```

ERASE

Use: Erasing series from GENIE

Command form: ERASE:series list

Explanation: ERASE deactivates all series listed in the command.

Example

```
<>WRKA:↵

**** ACTIVE SERIES     3
**** INACTIVE SERIES      17


<>ERASE:VOLUME↵

<>WRKA:↵

**** ACTIVE SERIES     2          VOLUME has been erased from the working area.
**** INACTIVE SERIES      18


<>
```

EXTRACT

Use: Extraction of subseries

Command form: $series_2$=EXTR($series_1$:start date:n)increment

Explanation: EXTR creates subseries (new or old). $Series_2$ is created from $series_1$, starting with the specified start date for n elements. The increment is defaulted as 1, and n is defaulted as the length or the last element of the series.

The values of n can be greater than the length of the series, but, again, the last element is taken as n.

Example

```
<>PRINT:VOLUME↵

****SERIES:     VOLUME    FOR     42    PERIODS ****

TYPE=M
SD=   167
ED=   670

 222    247    358    371    376    533    435    525    381    379    393    313
 322    490    577    526    605    570    563    573    633    379    596    635
 357    550    625    663    772    829    887    819    672    608    445    396
 485    554    541    684    728    607

<>A=EXTR(VOLUME:667:4)&B=EXTR(VOLUME:667:-4)&C=EXTR(VOLUME:667:4)2↵

<>FAST:A:B:C↵

       A
*************
     533.0000
     435.0000
     525.0000          Series A: 667–967
     381.0000


       B
*************
     533.0000
     376.0000
     371.0000          Series B: 667–367
     358.0000


       C
*************
     533.0000
     525.0000          Series C: 667 and 867


<>
```

```
<>S(1)=1 2 3 4 5 6 7 8 9 10↵

<>A=EXTR(S:4:4)&B=EXTR(S:1)2&C=EXTR(S:-2:-4)&D=EXTR(S:-5:3)↵

<>PRINT:A:B:C:D↵
****SERIES:     A      FOR     4     PERIODS ****

TYPE=X
SD=     1
ED=     4

 4      5      6      7

****SERIES:     B      FOR     5     PERIODS ****

TYPE=X
SD=     1
ED=     5

 1      3      5      7      9

****SERIES:     C      FOR     4     PERIODS ****

TYPE=X
SD=     1
ED=     4

 9      8      7      6

****SERIES:     D      FOR     4     PERIODS ****

TYPE=X
SD=     1
ED=     4

 6      7      8      9


<>
```

DISK FILE OUTPUT

At any time during a GENIE session, it may be desirable to direct output normally printed at the terminal to a disk file. This is probably most advantageous when output is quite voluminous and the user wishes to utilize the high-speed printer. Two commands exist to provide this facility: One command, FILOPEN, opens the file, and the other, FILCLOSE, closes it.

Opening a File for Output

The FILOPEN command enables the user to direct output to a disk file once the command has been given during the following instances:

- All reports generated from the GENIE report generator. (See the section on the report generator.)
- When using the DATOUT command.
- During execution of any of the GENIE plot routines.
- During execution of any of the GENIE business applications packages.

The form of the FILOPEN command is:

FILOPEN:file name

Note that only one file at a time may be opened.

WARNING: Do not have a file open during execution of the GOMPERTZ command.

Closing an Output File

The FILCLOSE command closes the output file opened with the FILOPEN command. The form of the FILCLOSE command is:

FILCLOSE:

GROWTH

Use: Growth analysis

Command form: **GROWTH:series(start date:end date)**

Explanation: GROWTH instructs GENIE to perform an exponential growth analysis on the series named. The regression equation is used to extrapolate for four periods, and is of the form:

$$y = a\, e^{bx}$$

Example

```
<> GROWTH:VOLUME(769:670)↵

GROWTH ANALYSIS FOR      VOLUME

  AVERAGE PERIOD RATE =     -1.675456    %
  CONTINUOUS RATE     =     -1.6896505   %
  THE DOUBLE LIFE     =     -41.023109    PERIODS

   PERIOD          ESTIMATE          ACTUAL
*********        ********          ******
    -11          661.4130        887.0000
    -10          650.3313        819.0000
     -9          639.4353        672.0000
     -8          628.7218        608.0000
     -7          618.1878        445.0000
     -6          607.8304        396.0000
     -5          597.6465        485.0000
     -4          587.6331        554.0000
     -3          577.7876        541.0000
     -2          568.1070        684.0000
     -1          558.5887        728.0000
      0          549.2297        607.0000
      1          540.0276
      2          530.9797
      3          522.0834
      4          513.3361


<>
```

INTO

Use: Series alteration and insertion

Command form: INTO:series$_1$(start element:number of elements)series$_2$(start element)

Explanation: INTO inserts the specified number of elements from series$_1$, starting at the specified element, into series$_2$, starting at the specified element for the same number of elements.

Example

```
<>A(1)=1 2 3 4 5 6:B(1)=10 20 30 40↵

<>INTO:A(1:3)C(1)&B(1:4)C(4)&A(4:3)C(8)↵

<>FAST:C↵

     C
************
         1.0000
         2.0000
         3.0000
        10.0000
        20.0000
        30.0000
        40.0000
         4.0000
         5.0000
         6.0000

<>
```

Series C is created by placing various components of series A and B into specified locations of C.

LET

Use: Series list – Short form

Command forms: **LET:/./ = series list**
LET:/../ = series list
LET:/.../ = series list
LET:/..../ = series list

Explanation: The command allows the user to use /./, /../, and so forth, instead of the entire list.

Example

```
<>LET:/./=LIST:VOLUME(167:467)↵

<>/./↵

 DATE         VOLUME
******* ************
JAN  67       222.0000
FEB  67       247.0000
MAR  67       358.0000
APR  67       371.0000


<>LET:/./=LIST↵

<>LET:/../=VOLUME(167:467)↵

<>/./:/../↵
'/../'   NOT ACTIVE,NOT IN FILE DIRECTORY,OR NOT GENIE COMPATIBLE!
```

Only one special series list is permitted in a command.

```
<>LIST:/../↵

 DATE         VOLUME
******* ************
JAN  67       222.0000
FEB  67       247.0000
MAR  67       358.0000
APR  67       371.0000


<>
```

GENIE EDITOR SYSTEM

The GENIE Editor system is a comprehensive editing system designed to aid the GENIE user in creating commands and report structures. Many of the options are quite similar in function to the Tymshare EDITOR language.

The form of the command used for commands structures is:

LOAD:file name

The form of the command used for report structures is:

LOAD:file name*

The LOAD command instructs GENIE to load into the Editor a file of the specified name. If an asterisk follows the file name, it is assumed to be a report structure; if no asterisk appears, it is assumed to be a commands structure. When the Editor responds with a colon (:), commands may be given. Prior to the appearance of a colon (:), the number of lines in the file is printed. If the file is a new file, GENIE prints zero lines present.

The general form of a command is:

$:xn_1:n_2$

where x is the command mnemonic, and n_1 and n_2 are the start and end line parameters, respectively. If n_2 is not present, then if n_1 is present, the range of the command is line n_1 only. If n_1 is also not present, the range of the command will be all lines in the file.

The following are available commands:

L – List lines

C – Change subscripts

P – Put lines to a different file

D – Delete lines

I – Insert lines

F – Find strings

S – Substitute strings

A – Append lines

An n+ indicates that line n is to be overwritten with whatever text follows. Q terminates the editing session and permits the user to specify whether an old copy of the original file is to be deleted or saved.

Example

```
<>LOAD: GROH↵
STRUCTURE CONTAINS      0      COMMANDS.

:I 1: 4↵

 1
LINE 1↵
 2
LINE 2↵
 3
LINE 3↵
 4
LINE 4↵
:L↵

 1 LINE 1
 2 LINE 2
 3 LINE 3
 4 LINE 4

:S2: 3↵

NEW STRING?ROW↵
OLD STRING?LINE↵

 2
:L↵

 1 LINE 1
 2 ROW 2
 3 ROW 3
 4 LINE 4

:S1↵

NEW STRING?X(2)↵
OLD STRING?LINE 1↵

 1
:L1↵

 1 X(2)
```

```
:C1↵

(I+N)←(I)↵

 N=4↵

NMBER OF CHANGES=      1
:L1↵

 1 X(6)

:P↵

NEW STRUCTURE NAME?GROH1↵
:I2↵

 2
COLUMN 1
:L1:3↵

 1 X(6)
 2 COLUMN 1
 3 ROW 2

:D2:5↵

:L↵

 1 X(6)

:Q↵

OLD VERSION SAVED TO GROHOLD
SHALL I DELETE IT?YES↵


<>
```

MAKE AND UNMAKE

Use: Reduction and enlargement of storage requirements of commands and report structures.

Command forms: MAKE:structures list
UNMAKE:structures list

Explanation: The UNMAKE and MAKE commands instruct GENIE to unmake a 132 fixed record length file to minimum storage, and to make a reduced file into a 132 fixed record length file compatible for GENIE.

MAXIMUM AND MINIMUM

Use: Maximum or minimum series

Command forms: **MAXIMUM:series list**
MINIMUM:series list

Explanation: MAXIMUM and MINIMUM instruct GENIE to find the maximum and minimum value of each series listed. Element number and date specification is also supplied.

Example

```
<>MAXIMUM:VOLUME:T1(169)&T2(167:1268)↵

SERIES   MAXIMUM VALUE   ELEMENT      RANGE OF TEST
******   **************  *******      **************
VOLUME        863.0000        31        25 -    42
T1             58.3039        31        25 -    42
T2             47.8521        24         1 -    24

<>MAXIMUM:VOLUME:T1:T2↵

SERIES   MAXIMUM VALUE   ELEMENT      RANGE OF TEST
******   **************  *******      **************
VOLUME        863.0000        31         1 -    42
T1             60.5800         4         1 -    42
T2             47.8521        24         1 -    42

<>MINIMUM:VOLUME(169)&T1(467:368)&T2(167:1268)↵

SERIES   MINIMUM VALUE   ELEMENT      RANGE OF TEST
******   **************  *******      **************
VOLUME        333.0000        25        25 -    42
T1             30.1667        12         4 -    15
T2            -47.7210         8         1 -    24

<>MINIMUM:VOLUME&T1&T2↵

SERIES   MINIMUM VALUE   ELEMENT      RANGE OF TEST
******   **************  *******      **************
VOLUME        198.0000         1         1 -    42
T1             25.7059         1         1 -    42
T2            -47.7210         8         1 -    42

<>
```

MONITORING THE WORKING AREA

Several commands exist which help to monitor the status of the working area as well as the status of series. The forms of these commands are:

LDATE:series names
LENGTH:series names
LNAMES:series names
LTYPE:series names
STATUS:series names
WRKA:

If a series name is not specified or if an asterisk is designated, the assumed list of series names is all active series.

Example

```
<>LDATE:↵
VØLUME
TYPE: M
START DATE:  167
END DATE:  670

T2
TYPE: M
START DATE:  167
END DATE:  670


<>LENGTH:↵

**** VØLUME  LENGTH IS   42
**** T2      LENGTH IS   42


<>LNAMES:↵

**** VØLUME
**** T2


<>LTYPE:↵

**** VØLUME  M
**** T2      M
```

```
<>STATUS:↵
 NAME    TYPE   START DATE   END DATE   LENGTH
******   ****   **********   ********   ******
VØLUME     M        167         670        42
T2         M        167         670        42


<>WRKA:↵

**** ACTIVE SERIES     2
**** INACTIVE SERIES      18


<>
```

MRGX

Use: Merging series

Command form: **MRGX:series$_1$\$series$_2$**

Explanation: The MRGX command merges series$_1$ and series$_2$ and calls the result series$_1$. Series$_2$ is merged to the end of series$_1$ with the resultant type specification being the statistical X type.

Example

```
<>A(1)=100 148 168 180 208:B(1)=250 290 340↵

<>MRGX:A$B↵

<>PRINT:A:B↵

****SERIES:     A      FØR     8     PERIØDS ****

TYPE=X
SD=     1
ED=     8

 100    148    168    180    208    250    290    340

****SERIES:     B      FØR     7     PERIØDS ****

TYPE=X
SD=     1
ED=     5

 2      3.333     0      4.667     6      7.333     0


<>
```

ONECHO AND OFFECHO

Use: Terminal print control

Command forms: **ONECHO**
OFFECHO

Explanation: ONECHO and OFFECHO initiate and terminate, respectively, the printing of various commands in a commands structure.

If ONECHO does not appear in a commands structure, output of the commands does not occur, unless ONECHO is stated before a RUNC command.

NOTE: No blanks are permitted.

NEWS

Use: Printing news

Command forms: **NEWS:**
NEWS:OLD

Explanation: NEWS instructs GENIE to print to the terminal the latest GENIE news (new). NEWS:OLD prints all old news, with most recent information first.

SERIES OUTPUT AT THE TERMINAL

Several commands exist which allow the user to print either an entire series, a segment of a series, or groups of series at the terminal. The LIST, FAST, LISW, and PRINT commands perform these tasks.

The LIST command instructs GENIE to print to the terminal all elements of the series listed up to the shortest length series listed. Date specifications for all elements of the first series are included. A maximum of three series across the page are permitted, but more may be included in the list. Date specifications are permitted. The form of the LIST command is:

LIST:series list

The LISW command is the same as the LIST command, except that eight series may be printed across the page on a wide-carriage terminal. The command form is:

LISW:series list

The FAST command instructs GENIE to print to the terminal all series listed in fast format, which does not include date specifications on the printout and only prints one series across the page, although more may be listed. The form of the FAST command is:

FAST:series list

The PRINT command instructs GENIE to print the entire series in free format, including specification data and series length. No date specifications in the command are permitted. The form of the PRINT command is:

PRINT:series list

The LIST, LISW, and FAST commands are printed in F13.4 format. If a data element exceeds this format, it is not printed, and execution is discontinued.

Example

```
<>LIST:A:B:C:D↵

 DATE          A             B             C             D
******* ************ ************ ************ ************
JAN   67      198.0000      19.0385       96.1633      115.2017
FEB   67      223.0000      21.4423      108.3051      129.7474
MAR   67      334.0000      32.1154      162.2148      194.3302


<>A(467)=10000000000000000↵

<>LIST:A↵

 DATE          A
******* ************
JAN   67      198.0000
FEB   67      223.0000
MAR   67      334.0000
APR   67 NUMBER > F12.4 FIELD!
```

```
<>PRINT: A: B: C↵

****SERIES:     A      FOR     4     PERIODS ****

TYPE=M
SD=   167
ED=   170

 198    223    334    1E+16

****SERIES:     B      FOR     3     PERIODS ****

TYPE=M
SD=   167
ED=   367

 19.038462    21.442308    32.115385

****SERIES:     C      FOR     3     PERIODS ****

TYPE=M
SD=   167
ED=   367

 96.163269    108.3051     162.21481


<>FAST: A(267:367)&B: C(267:267)&D↵

       A
************
     223.0000
     334.0000


       B
************
     21.4423


       C
************
     108.3051


       D
************
     115.2017
     129.7474
     194.3302
```

```
<>LI SW: A( 267: 367) &B( 267: 267)↵
```

Only one element is printed because of the date.

```
 DATE         A                B
******* ************ ************
FEB  67      223.0000         21.4423
```

PLOTTING

Various routines are available in GENIE that permit the user to selectively plot series at the terminal.

The PLOSCATTER command

PLOSCATTER:series$_1$:series$_2$

constructs a scatter plot of series$_1$ versus series$_2$. Automatic scaling occurs for both axes. The scale down the page is preset to 30 columns. An ampersand (&) may be used to indicate a new plot.

The PLOTTIME command

PLOTTIME:series list

instructs GENIE to construct an arithmetic plot of the designated series (as many as three are permitted) against time, which is plotted down the page. Thus, all series are plotted versus 1, 2, 3, 4, . . . , n, where n is the length of the longest series listed. The time axis is labeled according to the type specification of the first listed series. Scaling occurs automatically. Date specifications may be used. A slash (/) may be used to indicate that a new plot is desired.

If a dollar sign ($) appears in the command anywhere after the initial colon (:), GENIE requests plot symbols for all referenced series as well as a tie symbol. Otherwise, a 1 is used for the first series, a 2 for the second, and so forth. An asterisk (*) is used for a tie.

The PLTWIDE command,

PLTWIDE:series list

constructs the same plot as described for the PLOTTIME command, except that the output is designed for a wide-carriage terminal. A maximum of nine series may be used.

The HISTOGRAM command

HISTOGRAM:series list

prints a histogram, using the data contained in the series designated in the series list. The first referenced series is used to define the intervals of frequency distribution. The chart may be expanded to fit a wide-carriage terminal by placing a dollar sign ($) after the first colon (:) in the command string. If the number of points in a particular interval is greater than the number of print positions available, the bars are automatically adjusted.

The PLO1 command

PLO1:series list

instructs GENIE to perform a plot identical to the one described for the PLOTTIME command, except that time is on the horizontal axis. Only as many as 40 data points may be plotted. Slightly over 80 print columns are required to print 40 data points.

The PLO2 command

PLO2:series list*n

performs the same plot as described for the PLTWIDE and PLOTTIME commands, except that the horizontal scale is variable. It may be adjusted by use of the n optional parameter. The defaulted value of n is 70, and the maximum value may be 120.

The PLO3 command

PLO3:series list

instructs GENIE to perform the same plot as PLOTTIME, except that the scale numbers are integerized and the points are plotted accordingly.

The PLW3 command

PLW3:series list

instructs GENIE to perform the same plot as PLO3, except that output is designed for a wide-carriage terminal.

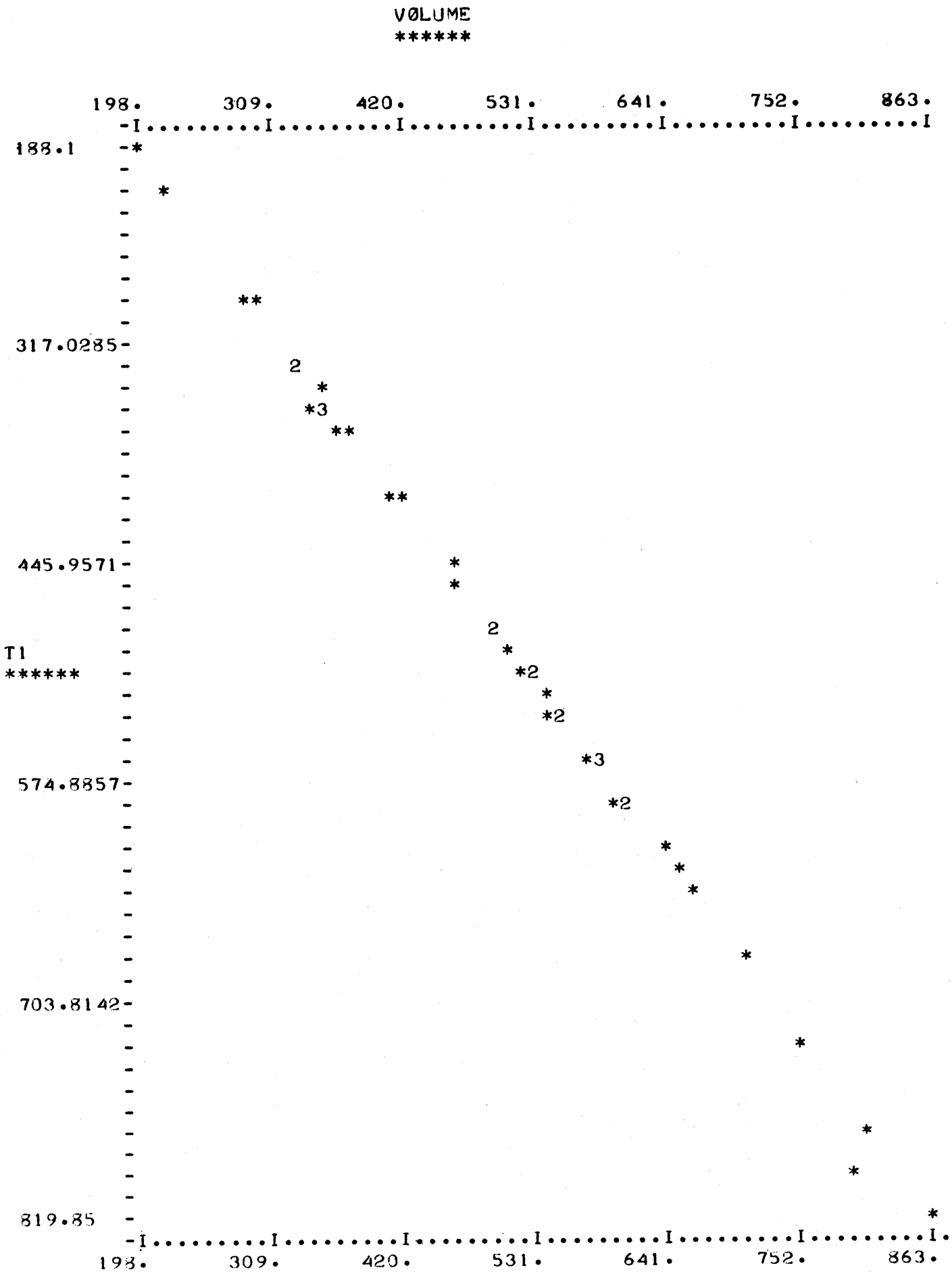
The PLO4 command

PLO4:series list*n

instructs GENIE to perform the same plot as PLO2, except that a separate plot for each series listed is generated, and the numeric value of each plotted point is written on the plot next to the point.

Example

```
<>PLØSCATTER:T1:VØLUME↵

**** NØ. ØF DATA PØINTS      42    ****
```


VØLUME
******
198.
309.
420.
531.
641.
752.
863.
188.1
317.0285
445.9571
574.8857
703.8142
819.85
T1
******

```
<>PLØT:$VØLUME:T1:T2(168)↵
PLØT SYMBØL FØR VØLUME=V↵
PLØT SYMBØL FØR T1    =1↵
PLØT SYMBØL FØR T2    =2↵
PLØT SYMBØL FØR TIE   =T↵
```

* * * * * * * * * * * * ARITHMETIC PLØT * * * * * * * * * * * *

V= VØLUME
1= T1
2= T2

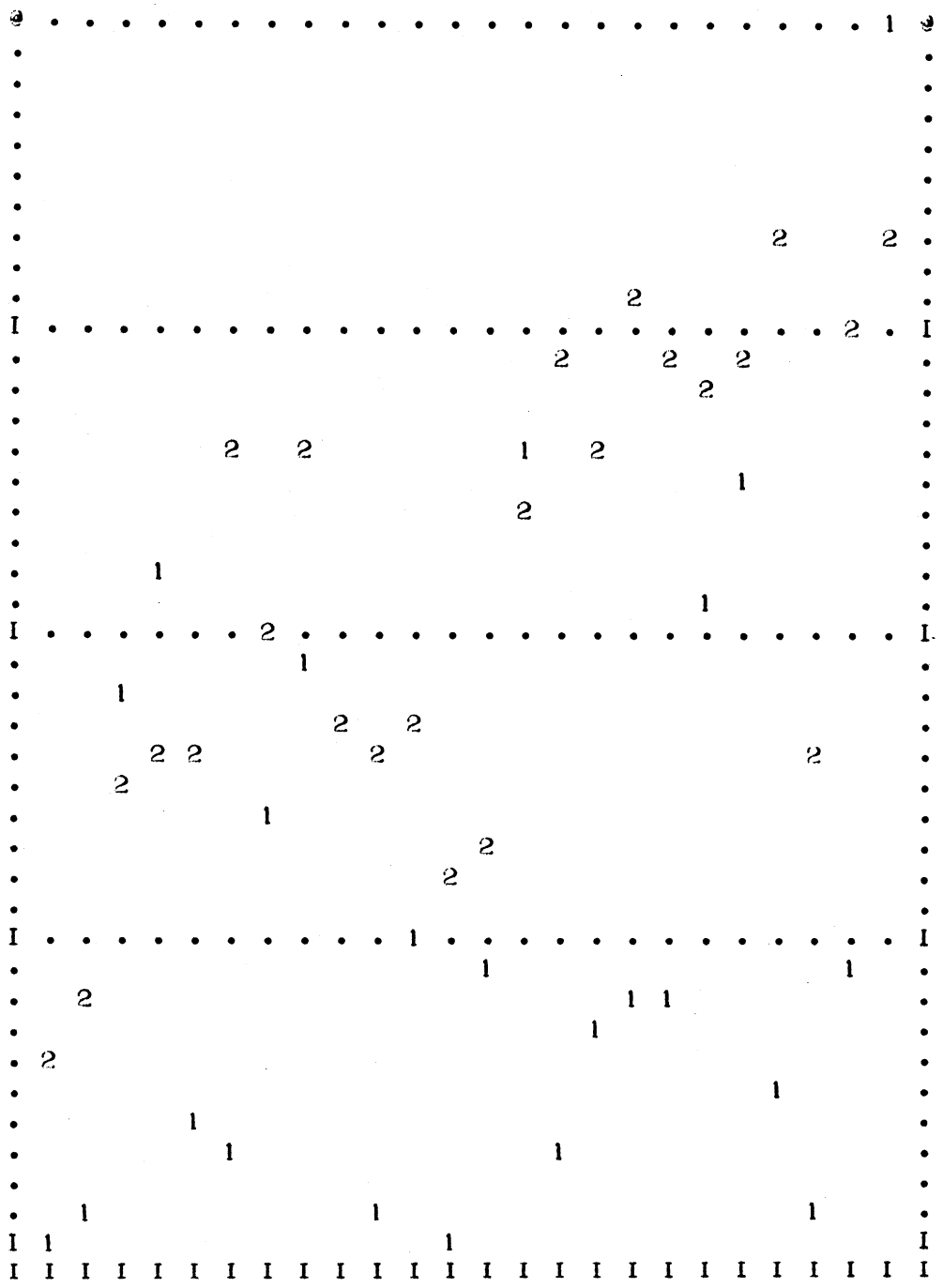
```
      283.       380.       476.       573.       670.       766.       863.
        II.........I.........I.........I.........I.........I.........I.........I
JAN  68 IIV          .  2       .          .          .          .          .
FEB  68 I            .   2 1 V  .          .          .          .          .
MAR  68 I            .   2      .    1 V   .          .          .          .
APR  68 I            .    2     1 V        .          .          .          .
MAY  68 I            .     2    .      1   V          .          .          .
JUN  68 I            .      2   .    1   V  .          .          .          .
JUL  68 I            .       2  .   1   V   .          .          .          .
AUG  68 I            .        2.    1   V   .          .          .          .
SEP  68 I            .        2.          1   V      .          .          .
ØCT  68 I      1 V   .          2          .          .          .          .
NØV  68 I            .          .2    1   V.          .          .          .
DEC  68 I            .          . 2       1   V      .          .          .
JAN  69 I    1 V     .          .  2       .          .          .          .
FEB  69 I            .          . 1 2V     .          .          .          .
MAR  69 I            .          .    2   1. V       .          .          .
APR  69 I            .          .     2    .  1   V   .          .          .
MAY  69 I            .          .      2   .          .    1   V .          .
JUN  69 I            .          .       2  .          .        1.   V       .
JUL  69 I            .          .        2.          .          .     1     V
AUG  69 I            .          .         2          .          . T        .
SEP  69 I            .          .          .2  1   V  .          .          .
ØCT  69 I            .          .       1  .V2        .          .          .
NØV  69 I            . 1 V      .          .  2       .          .          .
DEC  69 I        1 V.           .          .   2      .          .          .
JAN  70 I            .     1 V  .          .    2     .          .          .
FEB  70 I            .          . 1  V     .      2   .          .          .
MAR  70 I            .          .1   V     .       2  .          .          .
APR  70 I            .          .          .    1  V2.          .          .
MAY  70 I            .          .          .        12  V       .          .
JUN  70 I            .          .       1  .V        .2        .          .
        II.........I.........I.........I.........I.........I.........I.........I
      283.       380.       476.       573.       670.       766.       863.
```

<>PLØT:T2:VØLUME(167:1268)↵

1= T2
2= VØLUME

SCALE FACTØR = 15.7

GRID PØINTS = 89.2
246.
402.
559.
716.



J F M A M J J A S Ø N D J F M A M J J A S Ø N D
A E A P A U U U E C Ø E A E A P A U U U E C Ø E
N B R R Y N L G P T V C N B R R Y N L G P T V C

6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6
7 7 7 7 7 7 7 7 7 7 7 7 8 8 8 8 8 8 8 8 8 8 8 8

```
<>PLØ2:VØLUME:T2(167:1067)*30
```

```
1= VØLUME
2= T2
        89.243    229.162    369.081    509.000

JAN   67 I2        1  .          .          .
FEB   67 I 2         1.          .          .
MAR   67 I           .        1  .2         .
APR   67 I           .          1  .     2   .
MAY   67 I     2     .          1  .         .
JUN   67 I   2       .             .         1
JUL   67 I           .       2     . 1       .
AUG   67 I           .             .2      1.
SEP   67 I         2.            1.          .
ØCT   67 I 2         .          1  .          .

        89.243    229.162    369.081    509.000
```

```
<>PLØ2:VØLUME:T2(167:1067)*40
```

```
1= VØLUME
2= T2
        89.243    194.183    299.122    404.061    509.000

JAN   67 I2          1            .          .          .
FEB   67 I  2        . 1          .          .          .
MAR   67 I           .            .  1    2  .          .
APR   67 I           .            .    1     .    2     .
MAY   67 I       2   .            .      1   .          .
JUN   67 I     2     .            .          .          1
JUL   67 I           .            .2         1          .
AUG   67 I           .            .          2.         1.
SEP   67 I           . 2          .      1   .          .
ØCT   67 I 2         .            .      1   .          .

        89.243    194.183    299.122    404.061    509.000
```

```
<>PLØ3:VØLUME:T2(167:1267)↵
* * * * * * * * * * * * ARITHMETIC PLØT * * * * * * * * * * * *


1= VØLUME
2= T2
        89.0        159.        229.        299.        369.        439.        509.
          II.........I.........I.........I.........I.........I.........I.........I
JAN  67 I2          .     1     .           .           .           .           .
FEB  67 I    2      .           1.          .           .           .           .
MAR  67 I           .           .           .     1     .  2        .           .
APR  67 I           .           .           .        1  .           .2          .
MAY  67 I         2.            .           .          1.           .           .
JUN  67 I       2   .           .           .           .           .           1.
JUL  67 I           .           .           . 2         .     1     .           .
AUG  67 I           .           .           .           .  2        .           1 .
SEP  67 I           .           2 .         .           .     1     .           .
ØCT  67 I  2        .           .           .           1.          .           .
NØV  67 I           .           .     2     .           .1          .           .
DEC  67 I 2         .           .           1 .         .           .           .
          II.........I.........I.........I.........I.........I.........I.........I
        89.0        159.        229.        299.        369.        439.        509.


<>PL04:VØLUME:T1(167:667)$*40↵
PLØT SYMBØL FØR VØLUME=V↵
PLØT SYMBØL FØR T1     =T↵


V= VØLUME
        198.000    275.750    353.500    431.250    509.000

JAN  67 IV 198
FEB  67 I    V 223
MAR  67 I                  V 334
APR  67 I                    V 347
MAY  67 I                    V 352
JUN  67 I                                       V 509

        198.000    275.750    353.500    431.250    509.000


T= T1
         11.831     94.700    177.570    260.439    343.309

JAN  67 IT 15.756561
FEB  67 IT 11.830927
MAR  67 I                                  T 279.4485
APR  67 I                                       T 343.30883
MAY  67 I     T 49.684747
JUN  67 I   T 31.532765

         11.831     94.700    177.570    260.439    343.309
```

```
<>PRINT:SCALE:VØLUME:T2↵

****SERIES:     SCALE     FØR      9     PERIØDS ****

TYPE=X
SO=      1
EO=      9

  1      50     100     150     200     300     400     500     600

****SERIES:     VØLUME    FØR     42     PERIØDS ****

TYPE=M
SO=    167
EO=    670

 194     223     334     347     352     509     411     501     357     355     369     289
 293     466     553     502     531     546     539     549     609     355     572     611
 333     526     601     639     748     805     863     795     648     584     421     372
 461     530     517     660     704     583

****SERIES:     T2      FØR     42     PERIØDS ****

TYPE=M
SO=    167
EO=    670

 39.243439     116.33093     384.4485     448.30883     154.68475     136.53277
 319.34639     394.23232     219.6147     104.9893      260.53564     97.335425
 234.96901     507.33303     149.02358    200.7281      217.37367     219.80684
 421.37549     490.59831     170.25095    104.9893      235.47947     715.51684
 102.06255     408.69021     385.33321    502.73583     326.72677     655.06112
 80.339293     35.027299     534.0154     87.681406     116.19072     462.64295
 440.20315     529.59177     610.85561    278.2058      301.74926     462.03516
```

```
<>HISTØGRAM:SCALE:VØLUME:T2↵

XXXXXXXXXXXXXXXXXXXXXXXXX
                         X
                         X
                         X+
 1.0     <=   X   < 50.  X+
                         X+
                         X    1
                         X
                         X+++
 50.     <=   X   < .10E+03X   +
                         X+++
                         X    3
                         X
                         X+++++++
 .10E+03<=   X   < .15E+03X      +
                         X+++++++
                         X    7
                         X
                         X+++
 .15E+03<=   X   < .20E+03X   +
                         X+++
                         X    3
                         X
                         X++++++++++
 .20E+03<=   X   < .30E+03X          +
                         X++++++++++
                         X   11
                         X
                         X++++++++++++++
 .30E+03<=   X   < .40E+03X              +
                         X++++++++++++++
                         X   15
                         X
                         X++++++++++
 .40E+03<=   X   < .50E+03X           +
                         X++++++++++
                         X   11
                         X
                         X++++++++++++++++++
 .50E+03<=   X   < .60E+03X                  +
                         X++++++++++++++++++
                         X   18
                         X
XXXXXXXXXXXXXXXXXXXXXXXXX
```

REGRESSION ANALYSIS

Regression analysis is one of the primary functions of GENIE. Coupled with the extremely flexible data manipulation capabilities and commands structure scheme, a powerful system for planning and forecasting is available to the user.

Several regression types now exist, and more will be added as time goes on. The following regressions are described in this subsection:

- Multiple
- Stepwise
- Polynomial
- 7 least squares
- Gompertz
- Logistics
- Modified exponential

The MULTIPLE command

MULTIPLE:series list

performs a multiple regression. The last named series in the series list is taken to be the dependent variable. The resultant equation form is:

$$y = A_0 + A_1x_1 + A_2x_2 + \cdots + A_nx_n$$

The STEPWISE command

STEPWISE:series list/limit constant

performs a stepwise regression. The last named series in the series list is taken to be the dependent variable. The limit constant limits the variables to be entered. The default constant is 1.5, and the resultant equation is the same as in the multiple regression.

The POLYNOMIAL command

POLYNOMIAL:series list/n

performs a polynomial regression up to the n^{th} order. Only two series names may be listed. The first is the independent variable and the second is the dependent variable. The resultant equation is:

$$y = A_0 + A_1x + A_2x^2 + A_3x^3 + \cdots + A_nx^n$$

The maximum value of n is 10.

The CURVES command

CURVES:series$_1$:series$_2$

instructs GENIE to perform a least squares curve fit on as many as seven different curve types, listed below. Series$_1$ is the independent variable, x; series$_2$ is the dependent variable, y.

1. $y = Ax + B$
2. $y = 1/(A + Bx)$
3. $y = A(B^x)$
4. $y = A(x^B)$
5. $y = A + B/x$
6. $y = A\,e^{Bx}$
7. $y = x/(Ax + B)$

Automatic extrapolation of y is provided for n periods when the length of x is n elements longer than y. Selective specification of details for any combination of the above seven curves is possible, as well as tables of residuals. To select which curves are to be used, the user responds to the question asked by typing the number of the curves desired, separated by a colon (:). A 0 indicates that all seven curves are desired.

The GOMPERTZ command

GOMPERTZ:series:file$_1$:file$_2$:file$_3$(n)

performs three regressions and forecasts for n periods. File$_1$ will contain the calculated and forecasted values for the Gompertz regression, file$_2$ will contain logistics curve data, and file$_3$ will contain modified exponential curve data. The length of series must be an integer multiple of 3.

Suppression of Table of Residuals

A dollar sign ($) placed anywhere after the first colon (:) in all regression commands will suppress the printout of the table of residuals when output is to the terminal.

Date Specifications

Date specifications may be used to select subseries for regression commands, except in the CURVES and GOMPERTZ commands.

Example

```
<>TIME:TIME(14)↵

<>MULTIPLE:TIME&T1:VØLUME(769)$↵

* * * * * * * * * * * * * * * MULTIPLE  REGRESSIØN * * * * * * * * * * * *

 VAR      MEAN          STANDARD    CØRRE      REGRES      STD.ERR     CØMPUTED
 NØ.                    DEVIAT      X VS Y     CØEFF.    ØF REG.CØE    T VALUE

  1      6.500         3.606       -.3192     -12.91        12.60       -1.025

  2      489.9         202.4        .2152      .1530        .2245        .6818
 DEPENDENT

  3      594.8         147.5

 INTERCEPT                        603.80

 MULTIPLE CØRRELATIØN             .38207

 STD. ERRØR ØF ESTIMATE           150.68

                  ANALYSIS ØF VARIANCE FØR THE REGRESSIØN

SØURCE ØF VARIATIØN      DEGREES      SUM ØF        MEAN       F VALUE
                        ØF FREEDØM    SQUARES      SQUARES
ATTRIBUTE TØ REGRESS        2          34929.       17464.       .7692
DEVIATIØN FRØM REGRE        9          .20434E+06   22705.
      TØTAL                11          .23927E+06

CALCULATED AND EXTRAPØLATED VALUES ØN 'GENDAT'!. READ:GENDAT(1)

DURBIN-WATSØN STATISTIC       .71990791

<>LIST:GENDAT↵

  DATE          GENDAT
******* ************
X   1          720.3435
X   2          622.3561
X   3          661.3220
X   4          604.5852
X   5          563.8942
X   6          604.0024
X   7          587.6534
X   8          588.4193
X   9          587.9417
X   10         524.1164
X   11         514.8050
X   12         558.5608
```

```
<>STEPWISE:TIME&TI:VOLUME(769)$
```

```
* * * * * * * * * * * * STEPWISE REGRESSION * * * * * * * * * * * *
   12 OBSERVATIONS     3 VARIABLES

 VARIABLE       MEAN        STANDARD
   NO.                      DEVIATION
     1         6.50000        3.60555
     2       489.92429      202.41195
     3       594.83333      147.48611


 CORRELATION MATRIX
 1.0000 -.0164 -.3192
 -.0164 1.0000  .2152
 -.3192  .2152 1.0000



**** STEP   1 ****

 VARIABLE ENTERED..... 1
 PROPORTION REDUCED IN THIS STEP.........      .102
 CUMULATIVE SUM OF SQUARES REDUCED.......    24375.448
 CUMULATIVE PROPORTION REDUCED...........      .102       OFF       .239E+06
 FOR  1 VARIABLES ENTERED
   MULTIPLE CORRELATION COEFFICIENT...          .319
       (ADJUSTED FOR D.F...............       .319
   F-VALUE FOR ANALYSIS OF VARIANCE...         1.134
   STANDARD ERROR OF ESTIMATE.........       146.594
       (ADJUSTED FOR D.F...............   146.594



    VARIABLE       REGRESSION      STD.ERROR OF      COMPUTED
     NUMBER        COEFFICIENT      REG.COEFF.       T-VALUE
        1           -13.05594        12.25881         -1.065
   INTERCEPT          679.697



**** STEP   2 ****

 VARIABLE ENTERED..... 2
 PROPORTION REDUCED IN THIS STEP.........      .441E-01
 CUMULATIVE SUM OF SQUARES REDUCED.......    34928.758
 CUMULATIVE PROPORTION REDUCED...........      .146       OFF       .239E+06
 FOR  2 VARIABLES ENTERED
   MULTIPLE CORRELATION COEFFICIENT...          .382
       (ADJUSTED FOR D.F...............       .246
   F-VALUE FOR ANALYSIS OF VARIANCE...          .769
   STANDARD ERROR OF ESTIMATE.........       150.682
       (ADJUSTED FOR D.F...............   158.036
```

VARIABLE NUMBER	REGRESSIØN CØEFFICIENT	STD.ERRØR ØF REG.CØEFF.	CØMPUTED T-VALUE
1	-12.91469	12.60234	-1.025
2	.15305	.22448	.682
INTERCEPT	603.798		

DURBIN-WATSØN STATISTIC .71990791

CALCULATED AND EXTRAPØLATED VALUES WRITTEN TØ 'GENDAT' !!!!

<>TIME:TIME(20)↵

<>PØLYNØMIAL:TIME&VØLUME(968)/3↵
* * * * * * * * * * * * * * PØLYNØMIAL REGRESSIØN * * * * * * * * * * * **
DEGREE,INTERCEPT,CØEFFICIENTS

1 576.56316 .56541353
****
2 420.41404 43.151538 -2.0279107
****
3 350.13519 79.011871 -6.1946406 .13227714
****

SØURCE ØF VARIATIØN DUE TØ REGRESSIØN

DEG ØF FREEDØM	SUM ØF SQ	MEAN SQUARE	F-VALUE	IMP IN SUM SQ
1	212.60	212.60	.89960E-02	212.60
**********				
2	72410.	36205.	1.7427	72198.
**********				
3	80132.	26711.	1.2371	7721.2
**********				

SØURCE ØF VARIATIØN ABØUT REGRESSIØN

DEG ØF FREEDØM	SUM ØF SQ	MEAN SQUARE
18	.42538E+06	23632.
**********		
17	.35318E+06	20775.
**********		
16	.34546E+06	21591.
**********		

CALCULATED AND EXTRAPØLATED DATA WRITTEN ØN GENDAT

DEGREE 3

TABLE ØF RESIDUALS

DATE	X VALUE	Y VALUE	Y ESTIMATE	RESIDUAL	% DE
********	*******	*******	**********	********	******
SEP 68	1.000	609.0	423.1	185.9	30.53
ØCT 68	2.000	355.0	484.4	-129.4	-36.46
NØV 68	3.000	572.0	535.0	37.01	6.470
DEC 68	4.000	611.0	575.5	35.47	5.805
JAN 69	5.000	333.0	606.9	-273.9	-82.24
FEB 69	6.000	526.0	629.8	-103.8	-19.73
MAR 69	7.000	601.0	645.1	-44.05	-7.330
APR 69	8.000	639.0	653.5	-14.50	-2.269
MAY 69	9.000	748.0	655.9	92.09	12.31
JUN 69	10.00	805.0	653.1	151.9	18.87
JUL 69	11.00	863.0	645.8	217.2	25.17
AUG 69	12.00	795.0	634.8	160.2	20.15
SEP 69	13.00	648.0	621.0	26.99	4.165
ØCT 69	14.00	584.0	605.1	-21.12	-3.616
NØV 69	15.00	421.0	588.0	-167.0	-39.66
DEC 69	16.00	372.0	570.3	-198.3	-53.31
JAN 70	17.00	461.0	553.0	-91.96	-19.95
FEB 70	18.00	530.0	536.7	-6.726	-1.269
MAR 70	19.00	517.0	522.4	-5.384	-1.041
APR 70	20.00	660.0	510.7	149.3	22.62

<>GØMPERTZ:VØLUME:X1:X2:X3(4)$↵

GØMPERTZ CURVE FIT TØ LØG(Y)=LØG(C)+LØG(A)*BX
C= 639.88175 LØG (C) 6.4612834
LØG(A) = -.99887625 B= .92004163
STANDARD DEVIATIØN = 115.55417
SSAR= 549660.3660
SSDR= 560816.2180
R2 = .4950

MØDIFIED EXPØNENTIAL FIT TØ Y=C+A*BX
A = -467.9405
B = .9473
C = 694.8218
STANDARD DEVIATIØN = 116.04303
SSAR= 600376.9970
SSDR= 565571.3880
R2 = .5149

LØGISTICS CURVE FIT TØ Y=1/(C+A*B↑X)
1/C= 604.17067 C= 1.6551615E-03
A= 2.5285778E-03 B= .89277584
STANDARD DEVIATIØN = 116.55483
SSAR= 518214.5830
SSDR= 570571.1900
R2 = .4760

```
<>TIME:TIME(45)↵

<>CURVE:TIME:VØLUME$↵

CURVE DETAILS FØR?1:4:6
NUMBER     CURVE FØRM                          A            B
******     **********                        ******       ******
  1        Y=A+B*X                          332.387      8.03517
  4        Y=A*(X**B)                       217.992      .281149
  6        Y=A*EXP(B*X)                     328.082      .176539E-01

CURVE      UNEXPLAINED      EXPLAINED       TØTAL              CØEFFICIENT ØF
NUMBER     VARIATIØN        VARIATIØN       VARIATIØN          DETERMINATIØN
   1        620052.          398392.         .101844E+07        .391177
   4        567099.          455114.         .102221E+07        .445224
   6        671510.          467547.         .113906E+07        .410469

**** CURVE    1     ****
DETAILS? YES
ØUTPUT TØ VØL1
EXTRAPØLATED DATA FØR     3     PERIØDS


**** CURVE    4     ****
DETAILS? YES
ØUTPUT TØ VØL4
EXTRAPØLATED DATA FØR     3     PERIØDS


**** CURVE    6     ****
DETAILS? NØ


<>
```

THE GENIE REPORT GENERATOR

REPORT Command

The REPORT command is used for report generation and report structures. The general command form is:

REPORT:structure name*field specification/start line:end line

The report structure is the name of the disk file which contains the report format. The field specification is an optional parameter which controls the format of the numeric data to be printed. For example, if the field specification is 8.3, the data is printed as XXXX.XXX. If the field specification is 4, the data is printed as XXXX. The default is a six-place integer.

The start line and the end line are optional parameters which indicate which lines of the report are to be printed. For example, /3:30 prints lines 3 through 30, inclusive; /4 prints line 4 through the end of the report; /1 or default prints the entire report.

NOTE: Data is always rounded and is never truncated.

Report Structures

Two types of data are categorized for report structures: literal and numeric. These types, as well as two print control characters, are all of the syntax required to write any report.

Literal Data

The form for literal data is:

n*string:

The asterisk (*) instructs GENIE to print all of the indicated string that appears between the asterisk and the colon (:). The n parameter is a repetition factor. The n default is 1. For example:

3*ABC: = ABCABCABC

Numeric Data

The form for numeric data is:

series(n)m:

The n is an integer fixed number which determines the element in the series which will have its value printed. Date specifications are not permitted. The m is a number or nonsubscripted series name which is used as an iteration factor. The default is 1. For example,

A(2)3: = A(2):A(3):A(4):

requests that the values of the indicated series A in the second, third, and fourth data elements be printed.

Print Carriage Control

Each end of a line in a report structure generates a Line Feed and a Carriage Return on the report output except when a @: appears at the end of the line. This causes GENIE to begin executing the report formats on the next line of the structure, but does not cause a Line Feed and/or a Carriage Return.

To hold the command line on the report structure but cause a Line Feed and Carriage Return on the report output, @@: is the designation.

Variable Literal Data

Variable literal data is possible by use of the n# and #n variable functions. A term such as #(4) accesses the fourth line of the COMMANDSBANK file. (See the discussion of commands files to learn about COMMANDSBANK.) One important use of # might be for variable titling; another might be for variable footnoting or subtitling. The # may not be used for numeric data.

Writing Reports to a Disk File

If the FILOPEN command has been given, all reports are written to the designated file. (See the discussion on the FILOPEN command.)

FORM Command

The FORM command

FORM:structure name*field specification/start line:end line

is the same as the REPORT command, except that X's are substituted for numerics. The FORM command allows the user to check the format of the designated report for errors without making calculations.

Example

```
<>LOAD:PRODREP*↵
STRUCTURE CONTAINS     11    COMMANDS.

:L↵

 1 @@:@@:@@:@@
 2 24* :*XYZ MANUFACTURING COMPANY:@@:28* :*PRODUCT REPORT:@@:31* :*F
OR 1972
 3 32* :*M LBS:@@:@@:22* :*MONTH:26* :*YTD:@@:22* :*-----:26* :*---
 4 *PRODUCT    :2*       PLAN     ACTUAL   VARIANCE
 5 *-------    :2*       ----     ------   --------
 6 *CALXON     :SALES(1)COLS
 7 *PRIXON     :SALES(7)COLS
 8 *TRIXON     :SALES(13)COLS
 9 *FLAXON     :SALES(19)COLS
 10 10* :COLS* ---------
 11 *TOTAL      :SALES(25)COLS:@@:10* :COLS* =========:@@:@@

:Q↵

OLD VERSION SAVED TO PRODREPOLD
SHALL I DELETE IT?YES↵
```

```
<> !COLS=6!FORM:PRODREP*10.2↵
```

```
                    XYZ MANUFACTURING COMPANY
                        PRODUCT REPORT
                            FOR 1972
                             M LBS

                          MONTH                              YTD
                          -----                              ---
PRODUCT          PLAN     ACTUAL   VARIANCE      PLAN     ACTUAL   VARIANCE
-------          ----     ------   --------      ----     ------   --------
CALXON    XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
PRIXON    XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
TRIXON    XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
FLAXON    XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
          --------- --------- --------- --------- --------- ---------
TOTAL     XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
          ========= ========= ========= ========= ========= =========
```

```
<>REPORT:PRODREP*10.2↵
```

```
                    XYZ MANUFACTURING COMPANY
                        PRODUCT REPORT
                            FOR 1972
                             M LBS

                          MONTH                              YTD
                          -----                              ---
PRODUCT          PLAN     ACTUAL   VARIANCE      PLAN     ACTUAL   VARIANCE
-------          ----     ------   --------      ----     ------   --------
CALXON          250.00    258.00       8.00   1000.00   1150.00     150.00
PRIXON          333.00    320.00     -13.00   1200.00   1205.00       5.00
TRIXON          508.00    480.00     -28.00   2000.00   1800.00    -200.00
FLAXON         1499.00   1600.00     101.00   3555.00   4000.00     445.00
               --------- --------- --------- --------- --------- ---------
TOTAL          2590.00   2658.00      68.00   7755.00   8155.00     400.00
               ========= ========= ========= ========= ========= =========
```

```
<> !COLS=3!REPORT:PRODREP*10.1
```

```
                    XYZ MANUFACTURING COMPANY
                        PRODUCT REPORT
                           FOR 1972
                           M LBS

                      MONTH                              YTD
                      -----                              ---
PRODUCT          PLAN      ACTUAL    VARIANCE      PLAN      ACTUAL    VARIANCE
-------          ----      ------    --------      ----      ------    --------
CALXON          250.0      258.0         8.0
PRIXON          333.0      320.0       -13.0
TRIXON          508.0      480.0       -28.0
FLAXON         1499.0     1600.0       101.0
               --------- --------- ---------
TOTAL          2590.0     2658.0        68.0
               ========= ========= =========
```

RANGE

Use: Data classification

Command form: RANGE:series list

Explanation: RANGE instructs GENIE to produce a frequency chart over specified intervals. The command is identical to the HISTOGRAM command, except that output is a chart instead of a graph. The first listed series defines the intervals over which the data in the remaining series is to be classified.

Example

```
<>RANGE:SCALE:VOLUME:S
```

```
            RANGE                    FREQUENCY    RELATIVE FREQUENCY
 1.000   <=   X   <  50.00               0              0.000
 50.00   <=   X   <  100.0               1              2.041
 100.0   <=   X   <  150.0               0              0.000
 150.0   <=   X   <  200.0               1              2.041
 200.0   <=   X   <  300.0               3              6.122
 300.0   <=   X   <  400.0               9             18.367
 400.0   <=   X   <  500.0               5             10.204
 500.0   <=   X   <  600.0              14             28.571

TOTAL IN SAMPLE          49
TOTAL IN INTERVALS           33
TOTAL NOT IN INTERVALS           16

<>
```

ACCESSING OTHER SYSTEM LANGUAGES

Use: Executing user-created programs from GENIE

Command forms: **RUNFORTRAN:program name**
RUNSBASIC:program name
RUNBATCH:program name

Explanation: The above commands instruct GENIE to run the program indicated in the designated Tymshare language. After the program finishes executing, control automatically is returned to GENIE.

Example

The following program is used to demonstrate the RUNFORTRAN command.

```
-SFORTRAN↵

>LOAD INSFOR↵
OK.
>LIST↵
  1             DISPLAY""
  2             DISPLAY"IN SUPER FORTRAN"
  3             END
>&↵

-GENIE↵


<>A(1)=1 2 3 4↵


<>LIST:A↵

 DATE         A
******* ************
X   1          1.0000
X   2          2.0000
X   3          3.0000
X   4          4.0000


<>RUNFORTRAN:INSFOR↵


IN SUPER FORTRAN
```

```
<>
GENIE RESTORED AS OF     10/15  11:05


<>LIST:A↵

 DATE         A
******* ************
X   1          1.0000
X   2          2.0000
X   3          3.0000
X   4          4.0000

<>
```

RUNCOMMANDS

Use: Executing a commands structure

Command form: **RUNCOMMANDS:structure name*n**

Explanation: RUNCOMMANDS initiates a commands structure, starting with the n^{th} command line. If the asterisk (*) does not appear, n is assumed to be 1.

SORT

Use: Data manipulation

Command form: **SORT:series$_1$:series$_2$**

Explanation: SORT instructs GENIE to sort series$_1$ in descending order. Series$_2$ will not contain the previous element locations of the old series element order.

Example

```
<> !VOL1=VOLUME!SORT:VOL1:VOLORD!LIST:VOLUME:VOL1:VOLORD↵

 DATE         VOLUME         VOL1          VOLORD
******* ************ ************ ************
JAN   67      222.0000     533.0000       6.0000
FEB   67      247.0000     525.0000       8.0000
MAR   67      358.0000     435.0000       7.0000
APR   67      371.0000     393.0000      11.0000
MAY   67      376.0000     381.0000       9.0000
JUN   67      533.0000     379.0000      10.0000
JUL   67      435.0000     376.0000       5.0000
AUG   67      525.0000     371.0000       4.0000
SEP   67      381.0000     358.0000       3.0000
OCT   67      379.0000     313.0000      12.0000
NOV   67      393.0000     247.0000       2.0000
DEC   67      313.0000     222.0000       1.0000

<>
```

SPECIFY

Use: Insertion of GENIE specifications

Command form: **SPECIFY:**

Explanation: SPECIFY instructs GENIE to insert onto a data file the type, start date, and end date specifications to make the file GENIE compatible. The file is not activated. GENIE prompts the user by asking for the file names and whether more tasks are desired.

Example

```
<>DESPECIFY:↵
DISK FILE NAME?VOLUME↵
ANOTHER FILE?NO↵


<>READ:VOLUME↵
**** FILE   VOLUME   NOT GENIE COMPATIBLE ! ****


<>SPECIFY:↵
DISK FILE NAME?VOLUME↵
TYPE?M↵
START DATE?167↵
END DATE?670↵
ANOTHER FILE?NO↵


<>READ:VOLUME↵


<>
```

GENIE SIMULATOR

The GENIE model simulator is a unique package, combining the broad flexibility of GENIE with the execution speed of a binary FORTRAN model built into GENIE with one command.

The following steps are all that is needed to create a SIM model:

1. Define equations.
2. Create image of GENIE system to be used.
3. Execute SIMBUILD.

Only two steps are required to run a SIM file:

1. Alter any values, if desired.
2. Execute SIMRUN.

Syntax

The equation set which comprises the SIM model can be composed of active GENIE names, FORTRAN built-in functions, constants, and the incremental variable I. These four components may be utilized to create a wide range of models, including recursive models.

As an example, suppose we have the following equation:

A(1)=(VOLUME(0)+SQRT(4.))*LOG10(I+10)

A and VOLUME are the active series names. The subscripts (0) and (1) refer to the time periods t_0 and t_1. Negative subscripts are not permitted. Thus, the 0 subscript also refers to $A_t+1=A_t+B_t-1$ or as $A_t=A_{t-1}+B_{t-2}$. A(0), (A(1), . . . , A(9) are permitted. As many as six active names per line are permitted. B(0) refers to the first element in B. A(1) refers to the second element in A.

SQRT(4.) is actually a constant value equal to 2; however, for the purpose of demonstrating the need to use (4.) rather than (4), it has been used. The syntax requirement here is that any constant term surrounded by parentheses must have a decimal point to distinguish it from an active name subscript. Of course, 2 without parentheses could also have been used.

(I+10) illustrates the I counter available. The model, which is built, is run through a DO loop starting with I=1 and ending with I equal to the length of the largest active series name referred to in the equation set.

SQRT and LOG10 are examples of only two of the many SUPER FORTRAN built-in functions available in GENIE.

Creating a SIM Model

The LOAD command is used to create a file containing the equation set to be modeled. The user should make sure that all equations are correct. Any syntax errors will be detected upon compilation of the SIM model by the SUPER FORTRAN compiler.

After returning to GENIE command level or continuing the flow of a commands structure, the core contents of the variables to be used in the SIM model are to be created. All active series names are to be entered. If the model refers to names of series that do not exist but are to be calculated, dummy images of the names must be created. For instance, in the example equation, A is to be created and VOLUME already exists. The following commands satisfy the image requirements for this single equation:

READ:VOLUME↵
A=1↵

After the image of core is created, the model is ready to build. The correct command is:

SIMBUILD:file name*↵

where the specified file contains the equation set.

Two files are written on the user's directory. The first file is the SIM file, and the second is the SIMRES file. The SIM file is the built model, and the SIMRES file is the file which can restore the proper core image required to run the SIM model.

After both files are created, GENIE takes the SIM file into SUPER FORTRAN for compilation. If any errors exist, an error message is given by the compiler.

If the user is not returned to GENIE command level, he types QUIT in SUPER FORTRAN, and GENIE in the Tymshare EXECUTIVE.

Executing a SIM Model

After control is returned to GENIE, the working area is automatically restored. At this time, the values of any independent variables can be altered. To change the value of a dependent variable would make no sense, since that value would be overwritten. It would also be senseless to change the length of any series without rerunning the SIMBUILD command.

To run the model, the user executes the SIMRUN command:

SIMRUN:file nameSIM ↵

NOTE: Although a SIM model may compile, it may still be subject to run time errors. The most common run time errors are: division by zero, log of a negative number, and square root of a negative number.

If such an error occurs during execution of the SIM model, the user will be left in SUPER FORTRAN. Therefore, the user types QUIT in SUPER FORTRAN, or GENIE in the EXECUTIVE. He changes the appropriate values and gives the SIMRUN command again.

Example

```
<>LOAD:EQUATIONSET↵
STRUCTURE CONTAINS     3     COMMANDS.

:L↵

 1 A(1)=(VOLUME(0)+SQRT(4.))*LOG10(I+19)
 2 B(2)=A(1)*1.2+VOLUME(1)
 3 RATIO(1)=B(2)/VOLUME(0)                    Equations

:Q↵

OLD VERSION SAVED TO EQUATIONSETOLD
SHALL I DELETE IT?YES↵


<>A(1)=0&B(1)=0&RATIO(1)=0↵
                                              Set core image.

<>READ:VOLUME(167:1267)↵


<>SIMBUILD:EQUATIONSET↵                       Execute SIMBUILD.

FILE  EQUATIONSETSIM     WRITTEN ON YOUR DIRECTORY!


TEXT ONLY? OLD FILE
DO NOT INTERRUPT EXECUTION!
```

```
<>
GENIE RESTORED AS OF     10/15   13:49

<>SIMRUN:EQUATIONSETSIM⏎                    Execute SIMRUN.

<>LIST:VOLUME:A:B:RATIO⏎                    List results.

  DATE         VOLUME          A              B              RATIO
******* ************ ************ ************ ************
JAN   67      198.0000       0.0000         0.0000         0.0000
FEB   67      223.0000     260.2060         0.0000         2.7033
MAR   67      334.0000     297.4993       535.2472         3.0987
APR   67      347.0000     451.0540       690.9992         2.6595
MAY   67      352.0000     475.2430       888.2648         2.6579
JUN   67      509.0000     488.5948       922.2916         3.1117
JUL   67      411.0000     714.3473      1095.3137         2.4916
AUG   67      501.0000     584.3840      1268.2168         2.9252
SEP   67      357.0000     719.9760      1202.2608         2.4371
OCT   67      355.0000     519.5297      1220.9712         2.7407
NOV   67      369.0000     522.0761       978.4357         2.8042
DEC   67      289.0000     548.0120       995.4913         2.5654
```

SWITCH

Use: Data manipulation

Command form: SWITCH:series(date$_1$:date$_2$)

Explanation: SWITCH instructs GENIE to interchange the two elements indicated in the command string.

Example

```
<>LIST:VOLUME(167:467)⏎

  DATE         VOLUME
******* ************
JAN   67      198.0000
FEB   67      223.0000
MAR   67      334.0000
APR   67      347.0000

<>!SWITCH:VOLUME(167:467)!LIST:VOLUME(167:467)⏎

  DATE         VOLUME
******* ************
JAN   67      347.0000
FEB   67      223.0000
MAR   67      334.0000
APR   67      198.0000
<>
```

TAPE INPUT OF COMMANDS

GENIE accepts tape input of commands at the <> (command) level. Care must be taken not to overflow the input buffer size limit, as this will cause commands to be lost.

THE TERMINAL COMMAND

The TERMINAL command

TERMINAL

instructs GENIE to transfer control from an executing commands structure to the terminal for one command and then to return control to the structure at the statement following the TERMINAL command. The TERMINAL command is important in utilizing the conversational capabilities of GENIE. Examples are given in the explanation of commands structures.

THE TIME COMMAND

The TIME command

TIME:series(n)

instructs GENIE to create a series of consecutive numbers, where series=1,2,3,4,...,n.

Example

```
<>TIME:A(4):TIME(10)↵

<>PRINT:A:TIME↵
****SERIES:     A      FOR     4     PERIODS ****

TYPE=X
SD=      1
ED=      4

 1       2       3       4

****SERIES:     TIME   FOR     10    PERIODS ****

TYPE=X
SD=      1
ED=     10

 1       2       3       4       5       6       7       8       9       10


<>
```

DATA, STATISTICAL, AND MATHEMATICAL TRANSFORMS

One of the primary functions of GENIE is the ability to manipulate and transform data with one or a series of simple commands. The commands and examples which appear below illustrate this capability.

Data Transformations

TOTAL:series$_2$=series$_1$
series$_2$=TOT(series$_1$)

TOTAL and TOT instruct GENIE to accumulate into a single element series called series$_2$ the sum of all elements in series$_1$. The TOT(series$_1$) form may be used in mathematical transformations.

series$_2$=AVG(series)
series$_2$=MEA(series$_1$)

AVG and MEA instruct GENIE to find the arithmetic mean of a series and place that value into the single element series called series$_2$. The AVG command may be used in mathematical transformations.

EXPONENT:series$_1$(exponent)series$_2$

EXPONENT instructs GENIE to raise the elements of series$_1$ to the indicated exponent and call the resultant series$_2$. The exponent may be a series name. The mathematical transformation

series$_2$=series$_1$↑exponent

has the same function.

series$_2$=STD(series$_1$)

STD instructs GENIE to calculate the standard deviation of series$_1$ and place the resultant number in a single element series, series$_2$.

series$_2$=CUM(series$_1$)

CUM instructs GENIE to create series$_2$ from series$_1$, where the I^{th} element in series$_2$ is the sum of the first I elements of series$_1$.

series$_2$=SDAT(series$_1$)
series$_2$=EDAT(series$_1$)

SDAT and EDAT instruct GENIE to insert the start and end date, respectively, into the single element series called series$_2$. These data transformations may be used in mathematical transformations.

INGR:series list

INGR instructs GENIE to integrate the specified data elements of the indicated series. Date specifications may be used.

Statistical Transformations

$series_2$=MOVE($series_1$:n)

MOVE creates $series_2$, which is an n term moving average of $series_1$. The start date of $series_2$ will be the start date of $series_1$ plus one period.

$series_3$=SMOT($series_1$:$series_2$)n

SMOT instructs GENIE to create $series_3$, which is a smoothed series, from $series_1$ by weighting $series_1$ according to $series_2$. The n is an integer selection variable which, if specified, indicates to GENIE to apply the weights to every n^{th} element in $series_1$.

$series_2$=XSMO($series_1$)

XSMO instructs GENIE to create $series_2$ from $series_1$ by applying exponential weights to $series_1$.

$series_3$=CROSS($series_1$:$series_2$)

CROSS instructs GENIE to create $series_3$, which contains the cross covariances of $series_1$ and $series_2$.

Mathematical Transformations

Mathematical transformations provide the facility to manipulate series as if they were single variables. A reference to a series name utilizes all elements of that series unless a series of shorter length is used. The exception to this statement is a series containing only one element.

The result of a mathematical transformation is either a series or an element within a series, which is a function of a series of mathematical operations upon series, series elements, functional transformations, and scalar values. Operations occur from left to right, and no parentheses are permitted.

Mathematical transformations may contain any combination of the following mathematical operators and functional transformation functions:

Mathematical Operators	
Character	**Description**
*	Multiplication
/	Division
+	Addition
–	Subtraction
↑	Exponentiation

Functional Transforms	
Function	**Description**
SIN(a)	Sine
COS(a)	Cosine
TAN(a)	Tangent
LOG(a)	Natural log
LOG10(a)	Common log
EXP(a)	Exponential e
ABS(a)	Absolute value
SQRT(a)	Square root
LEN(a)	Length of a series
SERIES(n)	A series element
SDAT(a)	Start date of a series
EDAT(a)	End date of a series
AVG(series)	Average value of a series
TOT(series)	Sum total of a series

As many as 14 operators may appear in a transform. The ampersand (&) is used as a repetition character. The colon (:) is not permitted.

WRITE

Use: Output to a disk file

Command forms: **WRITE:series list**
WRITE:series list/composite name

Explanation: WRITE creates a GENIE-compatible data file. The first form shown above saves each series to a separate file, which has the same name as the series. The second form shown takes all the series listed and writes them as a composite series of X-type.

Example

```
<> !X(1)=1 2:Y(1)=3 4!WRITE:X:Y/XY !LIST:XY↵

  DATE         XY
******* ************
X   1          1.0000
X   2          2.0000
X   3          3.0000
X   4          4.0000

<>
```