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User Note 20

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Title:

GENSTAT version 4.04 on EMAS 2900 and EMAS-3

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Software Support Category: See Note 15

Synopsis

This User Note provides details of how to access Genstat on both EMAS 2900 and EMAS-3. It also provides details of how to access the macro library, secondary backing stores and the Genstat worked examples.

Keywords

Analysis of variance, canonical correlation, data description, frequency tables, function optimisation, Genstat4.04, graphical output, multivariate analysis, regression, time series analysis

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1. Documentation

Copies of manual updates may be obtained at a cost of £4. Users are warned that the process of updating a manual is likely to take at least 5 hours to complete. An already updated manual may be purchased at a cost of £14. Documentation may be obtained from:

The Genstat Co-ordinator,
Nag Central Office,
Mayfield House,
256 Banbury Road,
OXFORD,
OX2 7DE.

A version 4.04 of the Genstat manual will be available at each of the Advisory sites during Advisory hours only.

2. Calling Genstat

2.1 EMAS 2900

As with all packages mounted by the Program Library Unit, users should issue the EMAS command:

```
OPTION SEARCHDIR=PLULIB.PACKDIR
```

This needs only to be issued once and existing users of Genstat need not enter it.

To access the package the user should set up a control file containing the instructions which tell Genstat how the analysis is to be performed. The package is then accessed by issuing the EMAS command:

```
GENSTAT PARAMETER=REPLY
```

where the possible PARAMETERS and their REPLY are given in Table 2.1 opposite. Parameters need only be entered if required, but should be separated by commas.

2.2 EMAS-3

As with all packages mounted by the Program Library Unit users should issue the command:

```
SEARCHDIR PLULIB:PACKDIR
```

This needs only be issued once. To access the package the user should set up a control file containing the instructions which tell Genstat how the analysis is to be performed. The package is then accessed by issuing the EMAS command:

```
GENSTAT PARAMETER=REPLY
```

where the possible PARAMETERS and their REPLY are given in Table 2.2 opposite. Parameters need only be entered if required, but should be separated by commas.

Table 2.1

Parameters for Genstat on EMAS 2900

Parameter Name	Default	Reply
CONTROL	Console	The file name for control file containing instructions for the Genstat program.
DATA	Console	File name of secondary data file defined from within Genstat as `'INPUT' 2.`
LISTING	Console	File name or device code for output. This may be directed to a printer by typing .LPnn where nn should be replaced by the local printer number.
SYNTAX	No	Either YES or NO indicating whether or not the syntax checker only is required.
INTERACTIVE	No	Either YES or NO indicating whether or not Genstat is required to be interactive.
PLOTTER	.GP23	Graphical output, filename or device.

Table 2.2

Parameters for Genstat on EMAS-3

Parameter Name	Default	Reply
CONTROL	Console	The file name for the control file containing instructions for the Genstat program.
LISTING	Console	File name or device code for output. This may be directed to a printer by typing .LPnn where nn should be replaced by the local printer number.
DATA	Console	File name of secondary data file defined from within Genstat as `'INPUT' 2.`
OUTPUT2	Console	File name or device for secondary output channel defined from within Genstat as `'OUTPUT' 2.`
PLOTTER		At the time of writing, this facility does not exist in Genstat on EMAS-3.

3. The Genstat 4.04 Macro Library

The standard Genstat macro library for 4.04 is in the file PLULB4.G404MACLIB on EMAS 2900 or PLULIB:GENSTAT.MACROLIB on EMAS-3. Macro users should assign this file to any unit number between 10 and 16 corresponding to a FILE command in the Genstat control cards. See Section 6 for details of defining files on EMAS-3.

4. The Genstat Worked Examples

The originators of Genstat provide a comprehensive set of examples which cover all aspects of data analysis for which the package can be used. The output from the examples is held in a partitioned file and may be listed to a line printer by an EMAS command of the form:

```
LIST PLULB4.GEN404EXAMP_MEMBER,.LPnn        on EMAS 2900
```

or

```
LIST PLULIB:GEN404EXAMP_MEMBER,.LPnn        on EMAS-3
```

Table 4.1 contains a list of all members of the partitioned file and their contents. nn is the printer number required for output.

Table 4.1

Genstat Examples
The members and their contents

Member Name	Contents
ANOVA	Analysis of variance
AVCCOX	All examples in Cochran and Cox's book
CALC	Use of derived variates and calculations
GLM	General linear models
INOUT	Input and output of variates
LANG	Use of the Genstat language
MACRO1	Use of macros
MACRO2	" " "
MACRO3	" " "
MACROC	" " "
MATOPS	Matrix operations
MLTVAR	Multivariate techniques
OPTIM	Optimisation or non-linear regression
REGRES	Linear regression
STORE	Use of backing store
TABLOP	Formation and use of tables
TIMES	Time series analysis

5. Input-Output Channels

Two input channels can be used without a DEFINE statement by using the control word DATA in the Genstat call (see Section 2 above). Further secondary input and output channels are available with the use of the EMAS define command. The input channel numbers with their unit numbers are given in Table 5.1 for EMAS 2900 and Table 5.2 for EMAS-3.

Table 5.1

Primary and Secondary Input and Output Channels on EMAS 2900

'INPUT' n	Channel	'OUTPUT' n	Channel
1	5	1	6
2	7	2	8
3	21	3	22
4	23	4	24

Table 5.2

Primary and Secondary Input and Output Channels on EMAS-3

'INPUT' n	Channel	'OUTPUT' n	Channel
1	5	1	6
2	7	2	8
3	1	3	2
4	3	4	4

Thus, to input on Genstat channel 4 the call to Genstat would be preceded by

```
DEFINE 23,filename                    on EMAS 2900
```

or

```
VDEFINE DDNAME=FT03F001,DSNAME=(filename,2048),RECFM=VBS,DISP=OLD
                                      on EMAS-3
```

and the Genstat code would contain

```
'INPUT' 4
```

which would point Genstat to the file called FILENAME.

6. Using Backing Store Files

6.1 The Genstat Instructions

Saving the variables DATA(1...5) in a file called filename as described in Section 6.2 below.

```
'PUT' DATANAME $ DATA(1...5)

'SAVE/FILE=2' DATANAME
```

where FILE=2 points to the file FILENAME

Accessing variables DATA(1...5)

```
'FETCH/FILE=2' DATA(1...5)

'GET' DATANAME $ DATA(1...5)
```

where FILE=2 points to the filename as described in Section 6.2 below.

6.2 Linking the Genstat Instructions to EMAS 2900

The number following FILE= in the SAVE and FETCH commands above relates not to the channel number but to the nth channel. Thus if FILE=3 is defined then it points to the third channel in the range 10-16 which would be channel 12. Before calling Genstat, an EMAS DEFINE command of the following form is required:

```
DEFINE n,name,V5000
```

where:

n is the channel number related to the FILE= number.

name is the filename

V5000 is obligatory and defines the record length of the EMAS file. Failure to insert this will result in the EMAS failure message:

```
RECORD WRONG LENGTH
```

6.3 Linking the Genstat Instructions to EMAS-3

The number following FILE= in the SAVE and FETCH commands above relate not to the channel number but to the nth channel. Thus if FILE=3 is defined then it points to the third channel in the range 10-16 which would be channel 12. Before calling Genstat, an EMAS DEFINE command of the following form is required:

```
VDEFINE DDNAME=FTnnF001,DSNAME=(name,size,E5996),RECFM=VBS(5996,6000),DISP=NEW
                                                                        OLD
```

where:

nn is the channel number, related to the FILE=number

name is the filename

size is the size of the file in Kbyte

DISP=NEW implies you choose OLD if the file already exists and NEW if it does not.
DISP=OLD

7. Using Graph Plotter Graphics

This facility is only available on EMAS 2900 at the moment. It allows users to use a graph plotter with coloured ink, where this facility is available on the requested plotter. Four colours are available on the Hewlett-Packard plotters and have the following codes:

1 Black
2 Blue
3 Green
4 Red

Control of colour is via the heading command which controls whether points and/or lines are required.
Thus,

```
'HEADING' HLINE = ''L2P3''

'GRAPH/DEVI=1' SAVE, DATA; X $ HLINE
```

will plot SAVE against X as a line in blue (colour 2) with DATA against X on the same axes as a point plot in green (colour 3). The axes will by default be black. Further

options allow the printing of a key on each graph.

8. Example on EMAS-3

Assume that an editor has been used to create a file named GD2 with the following contents:

```
'REFERENCE' EXAMPLE
''
      THIS EXAMPLE ILLUSTRATES THE USE OF THE CALCULATE STATEMENT

      GRAIN IS HARVESTED FROM 20 PLOTS CONSISTING OF 12 ROWS, 7
      INCHES APART AND 55 FEET LONG. WEIGHTS OF GRAIN ARE RECORDED IN KILOS
      AND INCLUDE THE WEIGHT OF THE SACK = 0.6 KILOS. 50 GM. SAMPLES OF
      GRAIN ARE TAKEN FROM EACH PLOT, DRIED AND WEIGHED. THE RESULTS ARE
      FINALLY EXPRESSED AS WEIGHTS (AT 85% DRY MATTER) IN TONNES/HECTARE.
''
'VARIATE' GR,DMIN50,GRAIN $20
'SCALAR' CONV
'READ/P' GR,DMIN50
''
CALCULATE FACTOR FOR CONVERTING KILOS/PLOT TO TONNES/HECTARE
''
'CALCULATE' CONV = 10000/(12*7*0.0254*55*0.3048*1000)
''
CONVERT RECORDED WEIGHTS IN KILOS TO WEIGHTS (AT 85% DRY MATTER)
IN TONNES/HECTARE
''
'CALCULATE' GRAIN = CONV*(GR-0.6)*DMIN50*2/85
'PRINT/P' GR,DMIN50,GRAIN $ 10.2
'RUN'
18.3 44.3
15.6 44.2
16.9 44.3
15.9 44.2
14.4 44.2
16.0 30.0
17.6 44.2
16.7 44.2
14.0 44.2
15.2 44.2
13.4 44.0
17.8 44.1
16.3 44.2
14.3 44.2
14.0 44.3
17.6 44.1
14.3 44.2
17.6 44.0
14.9 44.0
17.0 44.2
'EOD'
'CLOSE'
'STOP'
```

Then Genstat may be used thus:

```
Command:genstat control=gd2,listing=example

AMDAHL 470 V/7 EMAS/VSS SS 4.02X GENSTAT 4.04B (PLU release 1 12/02/86)
Entered at 09.43.44 on 20/06/86

Program returns.  RC= 0

End of GENSTAT run: Completed
CPU = 1secs, PT = 1283, Cost = 35p
```

And the results contained in file named EXAMPLE may be listed to a line printer:

```
Command:list example,.lpl5
```

and will appear like this:

```
GENSTAT V    RELEASE 4.04B
COPYRIGHT 1984 LAWES AGRICULTURAL TRUST (ROTHAMSTED EXPERIMENTAL STATION)

   1  'REFERENCE' EXAMPLE
  -2  ''
  -3        THIS EXAMPLE ILLUSTRATES THE USE OF THE CALCULATE STATEMENT
  -4        GRAIN IS HARVESTED FROM 20 PLOTS CONSISTING OF 12 ROWS, 7
  -5        INCHES APART AND 55 FEET LONG. WEIGHTS OF GRAIN ARE RECORDED IN KILOS
  -7        AND INCLUDE THE WEIGHT OF THE SACK = 0.6 KILOS. 50 GM. SAMPLES OF
  -8        GRAIN ARE TAKEN FROM EACH PLOT, DRIED AND WEIGHED. THE RESULTS ARE
  -9        FINALLY EXPRESSED AS WEIGHTS (AT 85% DRY MATTER) IN TONNES/HECTARE.
  10  ''
  11  'VARIATE' GR,DMIN50,GRAIN $20
  12  'SCALAR' CONV
  13  'READ/P' GR,DMIN50
 -14  ''
 -15  CALCULATE FACTOR FOR CONVERTING KILOS/PLOT TO TONNES/HECTARE
  16  ''
  17  'CALCULATE' CONV = 10000/(12*7*0.0254*55*0.3048*1000)
 -18  ''
 -19  CONVERT RECORDED WEIGHTS IN KILOS TO WEIGHTS (AT 85% DRY MATTER)
 -20  IN TONNES/HECTARE
  21  ''
  22  'CALCULATE' GRAIN = CONV*(GR-0.6)*DMIN50*2/85
  23  'PRINT/P' GR,DMIN50,GRAIN $ 10.2
  24  'RUN'

    IDENTIFIER    MINIMUM      MEAN    MAXIMUM      VALUES  MISSING
            GR      13.40     15.89      18.30          20        0
        DMIN50      30.00     43.46      44.30          20        0 SKEW


       GR    DMIN50     GRAIN
    18.30     44.30      5.16
    15.60     44.20      4.36
    16.90     44.30      4.75
    15.90     44.20      4.45
    14.40     44.20      4.01
    16.00     30.00      3.04
    17.60     44.20      4.94
    16.70     44.20      4.68
    14.00     44.20      3.90
    15.20     44.20      4.25
    13.40     44.00      3.70
    17.80     44.10      4.99
    16.30     44.20      4.57
    14.30     44.20      3.98
    14.00     44.30      3.91
    17.60     44.10      4.93
    14.30     44.20      3.98
    17.60     44.00      4.92
    14.90     44.00      4.14
    17.00     44.20      4.77


  46  'CLOSE'

******** END OF EXAMPLE2.  MAXIMUM OF 972 DATA UNITS USED AT LINE 24 (15028 LEF
```