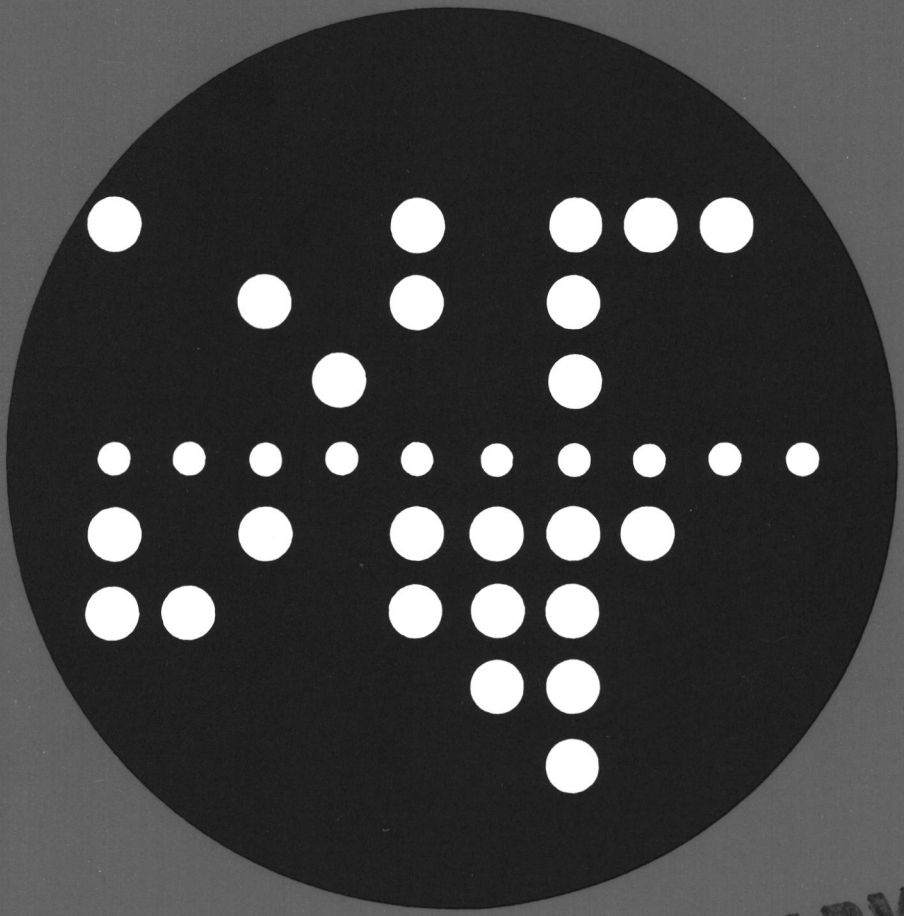
COMPUTING CENTRE NEWSLETTER

June 1980 - N. **42**



Commission of the European Communities

JOINT
RESEARCH
CENTRE

Ispra Establishment

CONTENTS

EDITORIAL NOTE.

The Computing Centre Newsletter is published monthly except for August and December.

It describes developments, modifications and specific topics in relation to the use of the computing installations of the Joint Research Centre, Ispra Establishment.

The aim of the Newsletter is to provide information of importance to the users of the computing installations, in a form which is both interesting and readable.

The Newsletter also includes articles which are of intellectual and educational value in order to keep the users informed of new advances in computer science topics.

Administration and contact address:

Ms. A. Cambon (tel. 730)
Support to Computing
Building 36
J.R.C. Ispra Establishment
21020-ISPRA (Varese)

IMSL LIBRARY-NEW EDITION

M. Dowell

The "Edition 7" release of the IMSL library of mathematical and statistical subroutines is now available on the central computer system. This release is a considerable update of the previous (Edition 6) library which is at present in use.
Additions have been made to the library including thirty-eight basic linear algebra codes (chapter V) as well as several routines to make the library easier to use. The documentation has been substantially improved with a worked example for every routine. Subroutine names and argument lists have been further standardized across all hardware types to aid those who need programs to be portable between different machine ranges.

Summary of IMSL changes for Edition 7

New Subroutines

* A differential equation solver - variable order Adams predictor corrector or Gear method (DGEAR)

* Solution of linear least squares problems (LLSQDF)

* Single value decomposition of a bidiagonal (LSVDB) and real (LSVDF) matrix

* Non-central chi-squared portability distribution function (MDCHN)

* Linear discriminant analysis method by Fisher for reducing the number of variables (ODFISH)

* Multivariate normal linear discriminant analysis among several known groups (ODNORM)

* Information routines (U series)

* Vector and matrix manipulation (V series)

* Minimum of a function of N variables using a conjugate gradient method (ZXCGR)

* One-dimensional unimodal function minimization using the Golden section search method (ZXGSN)

Modified and Replaced Subroutines

A number of subroutines have either been modified or replaced by new more efficient versions. A copy of the IMSL document giving details of these changes is available for reference in the Computing Support Library.

Manual Changes

The new IMSL Edition 7 manual is now held in 3 binders.
This manual has been subject to considerable changes and now is sectioned into the relevant chapters and contains a KWIC (keyword in context) index to assist the user in locating a subroutine by key words. A copy of this manual is available for reference in the Computing Support Library.

Availability of Edition 7 Library

The policy on the availability of the IMSL libraries (single and double precision) is being changed for Edition 7. Previously it has been the policy to mount a limited subset of the IMSL libraries on permanent online volume. Now all of the Edition 7 libraries (single & double precision versions) will be permanently available.

Use of the IMSL Library on the IBM 370/165

The IMSL library is available in load module form. There are two load module libraries, one using single precision and the other double precision. Normally the source of the library will not be generally available (or necessary) for the user.

IMSL Single Precision Library

The load module library is stored in the data set SYS1.LIBMASXS which is on disk COPICB.
This may be early accessed by users of the standard FORTRAN G1 procedures in a manner as follows:

```
//     EXEC     FTG1CG,PRN=MASXS,ULB=DISK,VLB=COPICB
```

Users of the equivalent FORTRAN HE procedures may also include these parameters. Uses of more complicated job control language features must include the necessary job control statements to cause the library to be scanned.

IMSL Double Precision Library

The load module library is stored in the data set SYS1.LIBMASXD which is on disk COPICB.
This may be easily accessed by users of the standard FORTRAN G1 procedures in a manner as follow:

```
//     EXEC     FTG1CG,PRN=MASXD,ULB=DISK,VLB=COPICB
```

Users of the equivalent FORTRAN HE procedures may also include these parameters.
Users of more complicated job control language features must include the necessary job control statements to cause the libraries to be scanned.

People who are at Present using IMSL

At present the IMSL libraries (Edition 6) are available from data sets SYS1.LIBMASTS & SYS1.LIBMASTD (both on COPICB). For a short period time those libraries will remain available as well as the new Edition 7 libraries. This will allow users time to change to the new libraries and verify compatibility. People who are using routines from the present MASTS & MASTD libraries which are not available in Edition 7 must either convert to the newer (more efficient) routine or take a personal copy of the old routine from the load module library.

From the 1st September 1980 the old libraries (MASTS & MASTD) will no longer be available.

Note

Unlike the NAG library (see Newsletter n. 38 and errata corrige in Newsletter n. 41), the naming convention is the same for single and double precision versions of subroutines in the IMSL libraries. Therefore, in general it is not possible to use different subroutine from both the single and double precision libraries in the same program.

Example of Use of the IMSL Library

The example in Annex 1 shows the use of the IMSL single precision library using the IMSL subroutine ZX3LP which is an "easy-to-use" linear programming subroutine which uses the revised Simplex algorithm [1].

The problem is to maximise $x_1 + 3x_2 = S$

Subject to the constaints:

$$x_1 \leq 1$$

$$x_2 \leq 1$$

$$x_1 + x_2 \leq 1.5$$

$$x_1 + x_2 \geqslant 0.5$$

$$x_1 \geqslant 0 \quad x_2 \geqslant 0$$

Results of Example

```
ZX3LP EXAMPLE PROGRAM RESULTS
VALUE OF OBJECTIVE FUNCTION=     3.500
SOLUTION VECTOR=      0.500      1.000
```

References

[1] Hadley, G.
Linear Programming, Addison-Wesley, Reading, Massachusetts, 1962

Annex 1

Listing of Example Job

```
//          JOB (YOUR JOB CARD)
$       CLASS 2
//      EXEC  FTG1CG,PRN=MASXS,ULB=DISK,VLB=COPICB
//CMP.SYSIN  DD  *
C       ZX3LP EXAMPLE PROGRAM
C
        INTEGER  IA,N,M1,M2,IW(16),IER
        REAL     A(6,2),B(6),C(2),RW(52),PSOL(4),DSOL(6),S
C       N=NUMBER OF UNKNOWNS
        N=2
C       M1=NUMBER OF INEQUALITY CONSTRAINTS
        M1=4
C       M2=NUMBER OF EQUALITY CONSTRAINTS
        M2=0
C       IA=FIRST DIMENSION OF A
        IA=6
C       SET UP MATRIX OF CONSTRAINTS
        A(1,1)=1.0
        A(1,2)=0.0
        A(2,1)=0.0
        A(2,2)=1.0
        A(3,1)=1.0
        A(3,2)=1.0
        A(4,1)=-1.0
        A(4,2)=-1.0
C       VECTOR OF RIGHT-HAND SIDES OF CONSTRAINT EQUATIONS
        B(1)=1.0
        B(2)=1.0
        B(3)=1.5
        B(4)=-0.5
C       COEFFICIENTS OF OBJECTIVE FUNCTIONS
        C(1)=1.0
        C(2)=3.0
        CALL ZX3LP (A,IA,B,C,N,M1,M2,S,PSOL,DSOL,RW,IW,IER)
C       CHECK IF ERROR (IER#0)
        IF(IER.NE.0)WRITE(6,1000)IER
        IF(IER.NE.0)GOTO 20
C       WRITE RESULTS
        WRITE(6,1001)S,PSOL(1),PSOL(2)
20      STOP
100     FORMAT(I4/F8.2/2F8.2/4F8.2)
1000    FORMAT(' ERROR IN ZX3LP : IER= ',I5)
1001    FORMAT(' ZX3LP EXAMPLE PROGRAM RESULTS'/
       1        ' VALUE OF OBJECTIVE FUNCTION=',F8.3/
       2        ' SOLUTION VECTOR=',2F10.3)
        END
/*
```

TSO CHANGES

M. Dowell

(This article gives a summary of the TSO changes which were described by C. Daolio in the "TSO Information Meeting" held on 10th March 1980 and also gives further information regarding subsequent changes).

Introduction

The System Group of the Computing Centre have recently completed a task which has resulted in a number of corrections and enhancements to the TSO system. Some of these features have already been described in Newsletter no. 36, November 1979 and will, therefore, not be described here.

The more general changes may be summarized as follows:

* For many commands modifications to correct existing "bugs" have been performed.

* Both the online HELP information and the batch HELP information (obtained by using the LSTHELP command procedure) have been updated to correct minor errors and to include information about enhanced features.

Other more specific changes are itemised in the following sections:

1. Changes of Command Procedures to Commands

Some command procedures have been replaced by TSO commands. This enables them to be executed more efficiently and also in certain cases avoids unecessary requestion of information from the users which may be obtained internally.
The commands procedures which have now be replaced by the equivalent commands are:
CANCEL, SUBMIT, STATUS, FREESPA, RESIN

2. LOGON Procedure

A new LOGON procedure TOTLOG has been included. This procedure is equivalent to the union of all of the existing LOGON procedure. It is particularly useful, for example, if you wish to perform an assembler compilation, COBOL compilation and FORTRAN compilation in the same TSO session.

3. EDIT enhancements

* A new data set type USER (associated with record format U) has been included. This is particularly useful for users involved in "black art" of load module modification.
* DSP, CANCEL, STATUS, SUBMIT, LISTUP may now be used as subcommands of EDIT
* EDIT may now be used for larger data sets (up to 10000 records). This has been made possible by increasing the size of the work data set used by EDIT.

4. QED

Another editing system is now available for TSO users. The system is named QED and may be invoked by typing the QED command with various parameters.
The system was obtained from Triangle University Computer Centre in the U.S.A.
It is upwards compatible with EDIT (i.e. all EDIT facilities are available in QED and also many enhancements).

We recommend that users should use QED when possible because:

1) It has more sophisticated features making many tasks much easier
2) It runs faster (because it uses no work data set but packs all of the data set to be edited into store).
3) It is more secure, because it is not possible to exit from a QED session by causing multiple attention interruption. It is only possible to exit from QED via a normal END subcommand.
4) All TSO commands, except COMPRESS, LOGOFF, LOGON, TEST TIME, and all commands procedures, are available under QED command without exiting from the QED session.

However, because of the use of store for holding a copy of the data set to be edited, it is not possible to edit very large data sets (>4000 records of 80 characters).

Full QED information will be available via the HELP and LSTHELP facilities. Also, there is a TUCC manual entitled "TUCC TSO Editor QED" available for reference and purchase, from the Computing Support Library.

5. Libraries for the LINK & LOADGO command

Some of the libraries invoked by using the keyword parameters have been changed. (e.g. the COBLIB keyword parameter now uses the 'SYS1.ANVLIB' library).

6. Compiler macros and User Libraries

The compile/link/go macros (e.g. FG1CLG, PL1CLG) have all been modified to allow for the inclusion of a user library. This has been provided in a way similar to the mechanism available on the batch system.
Two keyword parameters PRN(xxx) and VLB(xxxx) may be given to indicate the final part of the library name (xxxx) (where the full name is SYS1.LIBxxxx) [which resides on disk specified by VLB] to be included.

7. ASM Assembler Macro

It is now possible to request that the standard macros library (SYS1.MACLIB) be scanned by using the parameter MACLIB. Also for the assembler the user may specify his own macro library by using the LIB(xxxx) parameter. If both LIB(xxxx) and MACLIB are specified then the standard macro library will be concatenated to the user specified library.

8. SUBMIT

The SUBMIT command (see section 1) has been enhanced to include extra parameter options. These are as follows:

'SFX' - specifies the suffix character that will be appended to userid identification to form the job-name. This job-name will be in effect in any case, even if the job card is present on the data set. Default 'Z'.

'ACCT' - specifies the accounting number. (Eight numeric char.) If the job card is not present the valid ACCTN number given by the user or the default value (userid ACCTN) will be considered.

Example: SUBMIT TEST.CNTL SFX(A) ACT(99998888)

9. DELETE Command

For this command it is no longer possible to use the alias D. This has been withdrawn because of the number of disastrous problems which have occurred because of mistyping. However, the D alias for the subcommand (DELETE) of EDIT and QED, is still available.

10. CREA/CREARES

Minor errors concerning default allocations for size and increment have been corrected. For CREARES there is now an automatic default of 6 months reservation for the proper user if no other information (for user or reservation period) is specified.
The use of the VTOC expiration date has been withdrawn for CREA and CREARES.

11. COBCLG

A procedure for compile/link/go of COBOL program has been provided which has facilities equivalent to those provided for other languages.

12. ASM

The ASM TSO prompter enables the test compilation and execution of assembler programs (using the Assembler F compiler). This may be achieved by using the ASM command or the RUN subcommand of EDIT for an assembler data set.
In each case it is necessary to use the GENLOG logon procedure and not ASHLOG.

13. COMMENT

The COMMENT command procedure is used to insert comments in command procedures written by the users (CLIST data set type).
This is useful to provide explanatory information in the text of a command procedure.

CPU BOUND AND INPUT/OUTPUT BOUND JOBS

M. Dowell

The "$ CLASS" HASP control command may be used to define the maximum amount of main storage required by the job. This and other HASP control cards must follow the JOB card and preceed any $OC cards and/or job control cards. Full details of all of the HASP control cards and their various functions may be found in Installation Notes: Section INFO.

The full format of the "$ CLASS" card is as follows:

col 1	$	
col 2-6	blank	
col 7-11	CLASS	
col 12	blank	
col 13	x	(where x is replaced by the identification of the class in which the job should be run)

The class of the job is defined by the maximum amount of main storage it requires.
The class is either a letter in the range A-I or a number in the range 1-9.
The significance of this identification is as follows:

Class	Maximum main storage
1/A	100K
2/B	200K
3/C	300K
4/D	400K
5/E	600K
6/F	800K
7/G	1000K
8/H	1200K
9/I	1400K

Note

If a "$ CLASS" card is not included then "$ CLASS A" is assumed.

CPU Bound and Input/Output Bound Jobs

The use of a letter or a number for the class code depends on whether the job is CPU bound or Input/Output (I/O) bound.
For jobs which are CPU bound (that is in the execution of the job the operations performed are mainly arithmetic or logical) a number 1-9 should be used.
For jobs which are I/O bound (that is in the execution of the job the operations performed are mainly input/output (disk, tapes, etc.)) a letter A-I should be used.

For example:

1.

```
//JOB1      JOB(your job card)
$      CLASS 2
$OC ----------
--------------
--------------
/*
```

The above is a job which is specififed as CPU bound requiring a maximum of 200K bytes of main storage.

2.

```
//JOB       JOB(your job card)
$      CLASS C
--------------
--------------
--------------
```

The above is a job which is specified as I/O bound requiring a maximum of 300K bytes of main storage.

On the HASP log of every job output details of I/O on CPU usage for the job are given. Also, in this part of the output an indication is given as to whether the job is CPU bound or I/O bound.

The algorithm which gives this output information has recently been enhanced to more exactly ascertain this categorization.

> Users are advised to check their output to see which of the two CLASS systems (A-I or 1-9) they should be using for each particular job.
> By indicating that your job is CPU bound or I/O bound you will assist in the effective scheduling of the computer and therefore the more efficient running of the system.

Statistics of computing installation utilization.
Report of computing installation exploitation
for the month of May 1980.

	YEAR 1979	YEAR 1980
General		
Number of working days	19 d	17 d
Work hours from 8.00 to 24.00 for	16.00h	16.00h
Duration of scheduled maintenance	17.50h	16.59h
Duration of unexpected maintenance	15.08h	14.83h
Total maintenance time	32.58h	31.42h
Total exploitation time	271.42h	265.08h*
CPU time in problem mode	129.09h	163.82h
Batch Processing		
Number of jobs	7116	6011
Number of cards input	1614000	908000
Number of lines printed	23391000	20342000
Number of cards punched	125000	134000
CPU time	111.63h	142.88h
Number of I/O (Disk)	18258000	16533000
Number of I/O (Magnetic tape)	4190000	2745000
T.S.O		
Number of LOGON's	3055	3289
Number of messages sent by terminals	166226	230000
Number of messages received by terminals	857764	1467000
CPU time	15.24h	19.64h
Number of I/O (Disk)	2745000	3008000
Connect time	1847.73h	2412.48h
IMS		
Total time service is available	115.40h	94.15h
CPU time	1.47h	1.30h
Number of I/O (Disk)	365800	229000

* This figure includes 24.50h of overtime.

Utilisation of computer centre by objectives and appropriation accounts for the month of May 1980.

		IBM 370/165 equivalent time in hours
1.20.2	General Services - Administration - Ispra	40.95
1.20.3	General Services - Technical - Ispra	0.14
1.30.3	Central Workshop	0.55
1.30.4	L.M.A.	-
33001	Reactor Safety	175.66
33002	Plutonium Fuel and Actinide Research	6.42
33003	Nuclear Materials	9.40
33004	Safeguards	7.76
33011	Solar Energy	0.01
33012	Hydrogen	0.04
33013	Design Studies on Thermonuclear Fusion	8.36
33021	Environment and Resources	16.61
33030	METRE	1.26
33041	Informatics	30.97
33044	Training	-
33046	Support to the Commission	4.56
33300	ESSOR	36.44
	TOTAL	339.13
1.94.0	Services to External Users	3.62
	TOTAL	342.75

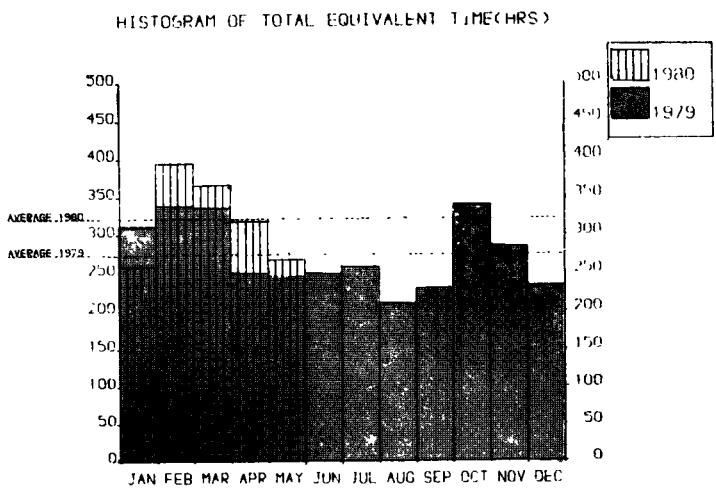
BATCH PROCESSING DISTRIBUTED BY REQUESTED CORE MEMORY SIZE

	100	200	300	400	600	800	1000	1200	1400	>1400
No. of jobs	1603	1549	1244	827	353	39	8	55	16	-
Elapsed time	56	141	172	205	135	17	2	17	15	-
CPU time	2.4	19.7	25.5	40.4	36.1	4.6	0.4	8.2	4.6	-
"Equiv" time	18	39	54	73	49	7	1	9	7	-
"Turn" time	1.2	3.4	4.4	5.3	9.0	10.6	18.4	10.2	12.3	-
I/O (disk)	1766	2590	3916	4355	1841	284	20	72	369	-
I/O (tape)	1148	477	204	815	63	2	1	9	5	-

NOTE.
All times are in hours.
"Equiv" means equivalent.
"Turn" means turn around.
All I/O transfers are measured in 1000's.

PERCENTAGE OF JOBS FINISHED IN LESS THAN

TIME	15mn	30mn	1hr	2hrs	4hrs	8hrs	1day	2day	3day	6day
%year 1979	27	40	54	70	86	95	99	100	100	100
%year 1980	20	34	49	64	80	93	99	100	100	100



Projected total for 1980 = 3859 Hours(using average)

Total for 1979 was = 3292 Hours

REFERENCES TO THE PERSONNEL/FUNCTIONS OF THE COMPUTING CENTRE.

			Room	Tele.
Manager of The Computing Centre		J.Pire		
Responsible for User Registration	Ms.	G.Rambo		
Operations Sector				
Responsible for the Computer Room		A.Binda-Rossetti		
Substituted in case of abscence by:				
Responsible for Peripherals		G.Nocera		
Systems Group				
Responsible for the group		D.König		
Substituted in case of abscence by:		P.A.Moinil		
Responsible for TSC Registration		C.Daolio		
Informatics Support Sector				
Responsible for the Sector	(f.f.)	H.de Wolde	1883	1259
Secretary	Mrs.	G.Hudry	1873	787
Responsible for User Support		H.de Wolde	1883	1259
General Inf./Support Library	Mrs.	A.Cambon	1871	730
Advisory Service/List of Consultants (See Note 1)			1870	730

A.Inzaghi — A.A.Pollicini

H.I. de Wolde

R.Meelhuysen — M.Dowell

NOTE 1. The advisory service is available in the same room as the Computing Support Library (room 1870). Exact details of the advisory service times for a specific week can be found at the head of any output listing (for that week).
Any informatics problem may be raised. However, the service is not designed to help users with problems which are their sole responsibility. For example, debugging of the logic of programs and requests for information which can easily be retrieved from available documentation.
If necessary, other competent personnel from the informatics division may be contacted by the consultant but not directly by the users.
The users should only contact the person who is the consultant for that specific day and only during the specified hours.
Outside the specified hours general information may be requested from Mrs. A. Cambon in the Computing Support Library.

HOW TO OBTAIN COMPUTING CENTRE DOCUMENTATION.

Persons interested in receiving copies of the Computing Centre "green books" or in receiving regularly the "Computing Centre Newsletter" are requested to complete the appropriate part of the following form and send it to :-

Ms. A. Cambon

Support To Computing

Building 36

Tel. 730.

Indicate with a (✓) which options are required.

Please add my name to Newsletter mailing list ( )

Please send me copies of the following "green books":

JRC-TSO Primer ( )

GRAPHIT ( )

Towards a New Programming Style ( )

LIBRARIAN ( )

NAME .....

ADDRESS .....

.....

.....

TELEPHONE .....