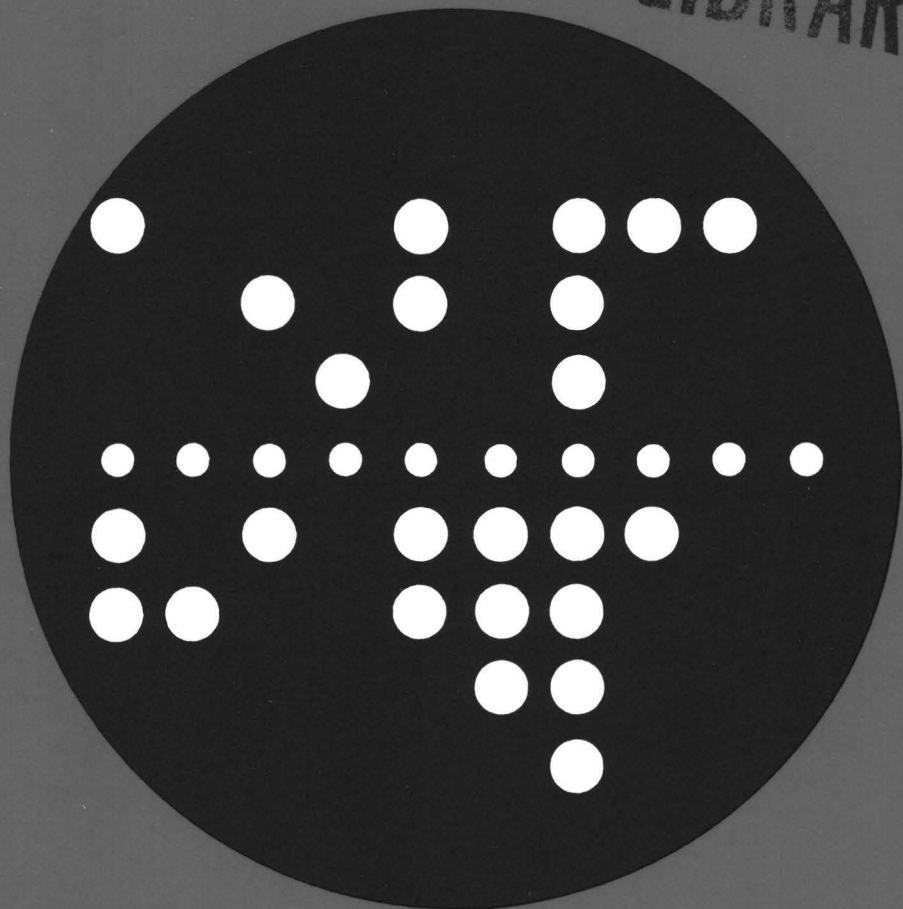# COMPUTING CENTRE NEWSLETTER

February 1981 - N. **48**

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.

The Editorial Board is composed as follows:

              J. Pire.   Responsible Editor.

              M. Dowell.   Technical Editor.

Administration and contact address:

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

ACTIVITE DU CENTRE DE CALCUL EN 1980

J. Pire

I. Le matériel du Centre de Calcul

L'année 1980 a été marquée par l'installation, fin août, de
l'unité centrale AMDAHL 470/V7A en substitution de l'unité
centrale IBM 370/165 qui était en service depuis 1972.

Les modifications des unités périphériques ont dû être re-
portées à 1981 et l'installation du nouveau matériel s'éche-
lonnera de janvier à juin.

Le nombre de terminaux connectés dépasse la centaine et une
trentaine de terminaux attendent que les lignes télépho-
niques et les nouvelles unités de contrôle soient dispo-
nibles pour être connectés. Nous espérons pouvoir donner
satisfaction aux utilisateurs dans le courant du prochain
printemps.

La configuration du matériel au 31 décembre 1980 était la
suivante:

Unité centrale   AMDAHL 470/V7A
dotée de 8 Mb de mémoire centrale
32 K de mémoire cache
12 canaux
1 console principale
2 consoles secondaires (terminaux IBM 3270)
1 station d'interrogation (Hazeltine 1500)

Unités périphériques

unités à disques à têtes de lecture fixes	1 unité IBM 2705/mod. 2 capacité 11,5 Mb
unités à disques à têtes mobiles	4 unités ITEL 7330/mod. 10 capacité unitaire 100 Mb
	19 unités ITEL 7330/mod. 11 capacité unitaire 200 Mb

unités à bandes magnétiques	7 unités MEMOREX 4617 à 9 pistes
	1 unité MEMOREX 4625 à 7 pistes
unité à bandes perforées	1 lecteur IBM 3671
unités à cartes perforées	2 lecteurs/perforateurs IBM 2540
imprimantes	3 imprimantes IBM 1403

unité de contrôle de ligne de télécommunication:

MEMOREX 1380

dotée de   16 entrées pour terminaux IBM 2741
            44 entrées asynchrones
            32 entrées BSC

Périphériques off-line

1 unité BENSON 400
1 unité GOULD 5200

Terminaux

Stations RJE	12
OLIVETTI TCV 275	26
OLIVETTI PR 1220 et PR 1350	5
TEKTRONIX (4014-4015-4051)	7
Hazeltine (1500-1520)	21
IBM 2741	16
IBM MC72T	4
IBM 3276/2 - 3278/2	3
IBM 3275	1
IBM 3277/2	10
TELEPR VT 5600	3
HP (2647A - 2621A)	3
WANG 2200	2

Note: Un SOLAR 16/65 connecté à EURONET sert de front et permet l'accès à l'ordinateur central. Il est connecté par 2 lignes BSC. Une des connexions simule un cluster de video, l'autre une station RJE.

II. Utilisation de l'ordinateur

Comme chaque année, nous fournissons ci-dessous les valeurs de quelques paramètres et leurs variations par rapport à l'année précédente.

A) Utilisation en mode BATCH

		variation
1) Heures CPU	$1679^{(1)}$	$+ 81^{(1)}$
2) I/O Disques	235.6×10^6	$+ 3.2 \times 10^6$
3) I/O Bandes	42.2×10^6	$- 5.6 \times 10^6$
4) Travaux présentés	84.4×10^3	$- 0.9 \times 10^3$
5) Lignes imprimées	278.2×10^6	$- 0.1 \times 10^6$
6) Cartes lues	13.7×10^6	$- 2.9 \times 10^6$
7) Cartes perforées	2.4×10^6	$+ 0.9 \times 10^6$

Par JOB en moyenne

a) Lignes imprimées	3.29×10^3
b) Cartes lues	162
c) Cartes perforées	28
d) Temps CPU (heures)	$19.9 \times 10^{-3(1)}$
e) I/O Disques	2.79×10^3
f) I/O Bandes	500

Les valeurs indiquées sont celles directement relevées.

B) Utilisation T.S.O.

LOGON	43.001	$+ 9.904^{(2)}$	$+30\%^{(2)}$
Heures C.P.U.	$216.00^{(2)}$	$+ 36.0^{(2)}$	$+20\%$
I/O Disques	34.5×10^6	$+ 7.3 \times 10^6$	$+27\%$
Messages envoyés à TSO	2958×10^3	$+ 1060 \times 10^3$	$+56\%$
Messages reçus de TSO	18.500×10^3	$+ 8.431 \times 10^3$	$+84\%$
Heures de connexion	29.974	$+ 9.162$	$+44\%$

---

(1) Si nous tenons compte d'un coefficient 2 entre la rapidité d'exécution de l'unité centrale AMDAHL et celle de l'unité centrale IBM, les valeurs sont respectivement 2160 h, 562 h et 25.5×10^{-3} h.

(2) Si on tient compte du rapport 2 de rapidité entre les unités centrales, ces valeurs deviennent 285.6, 105.6 et 58%.

Si on tient compte de la vitesse de calcul disponible au cours des 4 derniers mois, l'utilisation de l'ordinateur a été notablement plus grande qu'au cours des années précédentes.

Cette demande accrue a très probablement deux raisons:

   a) la facilité d'accès à l'ordinateur,
   b) l'exécution de très gros programmes requérant de très longs temps de calcul dépassant parfois 1 heure de C.P.U. par passage (même sur la nouvelle unité centrale).

L'utilisation toujours croissante de TSO conduit à une légère diminution du nombre des travaux soumis en batch qui, de plus en plus, est utilisé pour les travaux scientifiques de longue durée, les petits travaux étant exécutés directement sous T.S.O.

Les nombres de cartes lues, perforées et lignes imprimées méritent aussi un commentaire.

Les valeurs indiquées ci-dessus sont fournies à titre de comparaison avec les années précédentes; mais nous devons noter que de plus en plus les travaux batch sont introduits par T.S.O. ou par R.J.E. (voir table I), tandis que l'impression des listes est encore en grande partie exécutée localement (95%). En ce qui concerne les cartes perforées, 40% seulement (soit environ 0.16×10^6) sont réellement perforées, le 60% sont destinées à des stations R.J.E. et servent au transfert de fichiers mais ne sont pas réellement perforées.

Table I: Pourcentage du nombre total de Job entrés par TSO et RJE au cours des derniers mois.

	Sept.	Oct.	Nov.	Déc.
TSO	47	51	51	56
RJE	6	6	8	12
Tot.	53	57	59	68

Au cours des premiers mois de nombreuses heures supplémentaires ont dû être effectuées pour faire face aux demandes de travail et parer aux difficultés d'exploitation dues au manque de fiabilité du matériel (notamment la mémoire centrale). Depuis septembre, la charge quoique continuant à augmenter a été facilement absorbée.

Les ennuis rencontrés ont été dus aux unités périphériques (principalement les unités à disques) et à un orage qui, en octobre, a endommagé un très grand nombre de modems (près de 100) et a par conséquent provoqué de sérieux ennuis aux utilisateurs de T.S.O. Des mesures de protection ont été appliquées de façon à éviter la répétition d'une telle catastrophe.

Améliorations espérées en 1981

Les améliorations espérées au cours de 1981 et déjà programmées porteront sur

1) la capacité et la fiabilité des unités à disques,

2) la fiabilité des unités à bandes magnétiques,

3) le nombre des points d'entrée des unités de contrôle de communication,

4) le nombre de lignes de télécommunication arrivant au Centre de Calcul.

La réalisation effective et surtout les dates de mise en service de ces améliorations dépendent de travaux d'infrastructure dont la réalisation ne dépend pas exclusivement du Centre de Calcul.

Du point de vue logiciel, le système MVS est à l'étude et sera installé, puis testé selon un planning qui dépend de la disponibilité du personnel. Les problèmes de conversion éventuels seront traités lorsqu'ils deviendront d'actualité. De toute façon, le système actuel sera maintenu aussi longtemps qu'il sera nécessaire pour garantir une solution correcte à ces problèmes.

IMSL EDITION 8

M. Dowell

The JRC Ispra Central Computing Service has recently received a new version (Editon 8) of the IMSL Library. The Library now consists of 495 subroutines covering the general fields of mathematics and statistics. This reflects forty-one new routines and four deleted routines. The deleted routines are in the chapter concerned with random deviate generation, and are:

      GGAMS - replaced by GGAMR
      GGAMT - replaced by GGAMR
      GGBIR - replaced by GGBM
      GGMLT - replaced by GGMTN

The new library will be available (using the existing data set names) from Monday 4th May 1981.
People who are currently making use of the 4 routines listed above should either modify their programs to use the new (better) routines or take personal copies of these subroutines before the 4th May 1981.
Anyone requiring advice regarding these points should contact Mr. Martyn Dowell (ext. 701, room 1886 [building A36]).

Highlights of Edition 8

Exploratory Data Analysis

Four new routines implementing some of the techniques of exploratory data analysis have been added to the Library. Two of these routines are in Chapter B. One routine does median polish of a two-way table; the other produces "letter value" summaries. A new routine in Chapter U produces stem and leaf plots. Another new routine in Chapter U yields boxplots of one to several samples on a single set of axes. The otuput from this latter routine allows easy comparison of the samples and also provides clear indication of the dispersion characteristics of each sample.

Categorized Data Analysis

Abilities for log linear model analysis have been provided in a new routine that does iterative proportional fitting. Another new routine computes exact probabilities for two-way tables. This latter routine supplements the existing routine CTRBYC.

Differential Equations

A subroutine which solves differential equation systems with
two-point boundary conditions has been added. This routine
utilizes a multiple shooting technique, using IMSL initial value
routine DVERK to solve the differential equations each "shot".
Another new routine calculates double integrals, using DCADRE to
calculate each simple integral.

Eigensystem Analysis

A code to find eigenvalues and eigenvectors of band symmetric
matrices is included in Edition 8. The existing routines for
real symmetric and complex Hermitian matrices have also been
extended to allow input in full storage mode.

Transforms

New routines include an inverse Laplace transform code and a
subroutine which calculates fast Fourier transforms of two- and
three-dimensional arrays.

Random Number Generation

Ten new routines have been added to Chapter G in the Library.
GGUO and GGNO are routines to generate order statistics from a
uniform and a normal distribution respectively. Any set of
order statistics from the i-th to the j-th from a given sample
size may be generated. Two other new routines are for
generation of variates from a nonhomogeneous Poisson process
using an efficient thinning method by IMSL Adivsor
P. A. W. Lewis. Another basic uniform generator has been added
to the Library for the user who would prefer an alternate
multiplier. The shuffled generator GGUW has been modified so
the user may call it from any subroutine in the chapter if it is
desired to perform shuffling prior to generation of non uniform
variates. A routine for generation of discrete uniform
deviates, as well as two routines for generation of variates
from general discrete distribution has been provided. One of
the general routines uses a table lookup method and the other
uses the alias method. In addition to the new routines added,
the efficiencies of the current routines for generation of
gamma, beta, and multinomial variates have been substantially
improved.

Interpolation; Approximation; Smoothing

Featured additions are easy-to-use companions to the existing
cubic spline interpolation and smoothing subroutines.
The easy-to-use interpolatory spline routine achieves high
accuracy without requiring user-supplied end conditions, while

the easy-to-use smoothing spline routine uses statistical
considerations to determine the degree of smoothing needed. The
latter subroutine is based on work by Grace Wahba, F. Utreras
Diaz and Paul Merz. Additional one-dimensional approximation
subroutines calculate a cubic spline interpolant with periodic
end conditions and a least squares approximation using
user-supplied basis functions. Two-dimensional advances include
a new code by H. Akima which fits a smooth surface to data given
at irregularly spaced points (x ,y) and modificatations to all
the bicubic spline routines so that they use C. de Boor's
"not-a-knot" boundary conditions rather than the less accurate
"natural" boundary conditions.

Linear Algebraic Equations

Two new subroutines have been added to Chapter L for Edition 8.
LLBQF computes high accuracy solution to linear least squares
problems. The routine is based on an algorithm developed by Ake
Björck.
LGINF, a subroutine to compute the generalized inverse of a
matrix has also been added to Chapter L.

Probability Density and Distribution Functions

Two new routines in Chapter M allow evaluation of a general
continuous distribution function or its inverse, using a table
of values of the density function. A new routine has been added
to Chapter N for nonparametric estimation of the density
function using the kernel method.

Regression Analysis

Edition 8 allows two useful alternatives to least squares
estimation in regression models. The new routine RLLAV performs
an L_4 or least absolute values fit of a linear model, and a
second new routine RLLMV computes an L_∞ or minimum maximum
deviation fit.

Zeros and Extrema; Linear Programming

A more robust nonlinear equation solver ZSCNT has been added
which should be used instead of ZSYSTM for all new applications.
ZSYSTM will be deleted for Edition 9. A new linear programming
routine; based on R. J. Hanson's work, has been added which may
eventually replace ZX3LP and ZX0LP. This subroutine ZX4LP is
expected to handle large problems with greater reliability.
User comparisons between ZX3LP and ZX4LP are invited.

JRC COMPUTER GRAPHICS

M. Dowell

A new green book entitled "JRC Computer Graphics" is now available for computer users. This green book provides fully comprehensive (and yet simple to use) information for users (or potential users) of the graphics facilities of the JRC-Ispra, Central Computing Service.

The JRC Computer Graphics green book is divided into sections as follows:

1. Introduction
   A general overview with details of the output devices which are available

2. JCL Procedures
   How to gain access to graphics facilities (in batch and TSO)

3. Elaboration of the Intermediate Graphic File
   How the graphic output may be displayed on: Tektronix visual display terminal, the Gould electrostatic plotter and the Benson penplotter

4. Lineprinter Graphics
   How to use very simple subroutines to produce simple descriptive graphs

5. Basic 2D-Routines
   Building blocks for simple graphics drawings

6. Easy Graphics
   Subroutines to allow users to produce complete graphs with minimal effort

7. Easy Graphics, More Difficult

8. 2D Function Graphs, GINOGRAF

9. GINOZONE
   Contour Mapping

10. 3D Computer Graphics
    Use of the GINO-F subroutines for producing two-dimensional representations of three dimensional drawings

People who have not yet obtained a copy of this green book may
do so by completing and returning the appropriate section in the
request form at the end of this Newsletter.

Following the introduction of this new green books the following
are now obsolete:

* The green book - GRAPHIT (December 1978)

. * The following Newsletter articles:

    July 1980, N. 43
    Printer Plots

    May 1980, N. 41
    Easy Graphics

    January 1980, N. 37
    Note to the Users of the GRAPHIT-Tektronix System

    July 1979, N. 33
    3D Plots with Hidden Lines Removal

    May 1979, N. 31
    GRAPHIT-Tektronix

    March 1979, N. 29
    Graphics: On-line Scanning of the Intermediate File

    October 1977, N. 15
    GINO-F - A graphic package

    February 1977, N. 8
    The Graphics Facilities at the Computer Centre

DOCUMENTS AVAILABLE

The Computing Support Library informs users that the following
manuals are available for distribution:

```
ADABAS  Introduction                                       6.5
ADABAS-ADACOM Reference Manual                            10.0
ADABAS-ADAMINT Reference Manual                           22.0
ADABAS-ADASCRIPT Reference Manual                          9.0
ADABAS-ADAWRITER Reference Manual                         18.0
ADABAS-Application Programmer Guide                        3.5
ADABAS-Reference Manual                                   30.0
ADABAS-Utilities Manual                                   45.0
NATURAL                                                   55.0

GINO-F                                                    25.0
Ginozone                                                   7.5
Ginograf                                                   7.5

PLOT-10 Tektronix User Manual                             13.0
PLOT-10 Tektronix Review Routines                          7.5
Tektronix 4015 and 4015-1 Terminals                       15.0

LIBRARIAN TSO User Reference Manual                        3.0
LIBRARIAN User Reference Manual                            7.0

PASCAL 8000                                                8.0
PASCAL (book)                                             11.0
```

Order forms for the manuals are available at the office of Mrs.
Cambon (building 36 - tel. 730).
Please remember that the Computing Support Library only accepts
request with the budget number signed by the programme manager
(activity sheet holder), to assure payment.

```
STATISTICS OF COMPUTING INSTALLATION UTILIZATION
REPORT OF COMPUTING INSTALLATION EXPLOITATION
FOR THE MONTH OF     JANUARY  1981.
```

	YEAR 1980	YEAR 1981
General		
Number of working days	21 d	19 d
Work hours from 8.00 to 24.00 for	16.00h	16.00h
Duration of scheduled maintenance	23.67h	13.84h
Duration of unexpected maintenance	48.17h	2.84h**
Total maintenance time	71.84h	16.68h
Total exploitation time	269.66h	287.32h
CPU time in problem mode	139.01h	285.50h*

Batch Processing		
Number of jobs	6308	7086
Number of cards input	1046900	650000
Number of lines printed	21468000	23374000
Number of cards punched	104000	42600
CPU time	121.41h	238.75h*
Number of I/O (Disk)	18339000	22069000
Number of I/O (Magnetic tape)	2692000	3391000

T.S.O		
Number of LOGON's	2814	4348
Number of messages sent by terminals	169000	292330
Number of messages received by terminals	988000	1927000
CPU time	15.55h	43.66h*
Number of I/O (Disk)	2204000	4265000
Connect time	1946.79h	2960.63h

IMS		
Total time service is available	190.22h	125.90h
CPU time	2.05h	3.09h*
Number of I/O (Disk)	515000	555200

* Real CPU has been multiplied by a factor of 2 to indicate the
   increased throughput of the AMDAHL.

** Covering all the configuration.

UTILIZATION OF COMPUTING CENTRE BY OBJECTIVES & APPROPRIATION
ACCOUNTS FOR THE MONTH OF JANUARY 1981.

                                              AMDAHL 470/V7A
                                        equivalent time in hours

33001	Reactor Safety	285.16
33002	Plutonium Fuel and Actinide Research	-
33003	Safety of Nuclear Materials	3.69
33004	Fissile Materials Control and Management	20.28
33005	Super-SARA Test Programme SSTP	34.71
33011	Solar Energy	1.70
33012	Hydrogen Production, Energy Storage and Transport	0.59
33013	Thermonuclear Fusion Technology	54.72
33014	High Temperature Materials	1.33
33021	Protection of the Environment	19.16
33022	Remote Sensing from Space	1.43
33041	Informatics	24.93
33043	Support to the Community Bureau of References	2.49
33044	Training and Fducation	-
33046	Provision of Scientific and Technical Services	5.42
1.20.1 1.20.2	General Administration - JRC General Services - Administration - Ispra	79.41
1.20.3	General Services - Technical - Ispra	2.37
1.30.3	Central Workshop Ispra	1.24
1.40.2	ESSOR	0.52
	TOTAL	539.15
1.94.0	Services to External Users	8.16
	TOTAL	547.31

BATCH PROCESSING DISTRIBUTED BY REQUESTED CORE MEMORY SIZE

	100 k	200 k	300 k	400 k	600 k	800 k	1000 k	1200 k	1400 k	>1400 k
No. of jobs	2015	1646	1261	1026	465	143	93	44	–	22
Elapsed time	57	149	163	198	185	74	32	46	–	9
CPU time	3.2	27.6	40.8	34.0	74.0	26.0	9.7	13.7	–	5.0
"Equiv" time	16	54	64	84	88	33	14	19	–	8
"Turn" time	0.5	1.3	1.6	2.5	3.1	2.4	1.5	2.6	–	6.3
I/O (disk)	1210	3616	3165	6734	1858	942	628	823	–	366
I/O (tape)	1586	338	202	882	230	9	58	7	–	35

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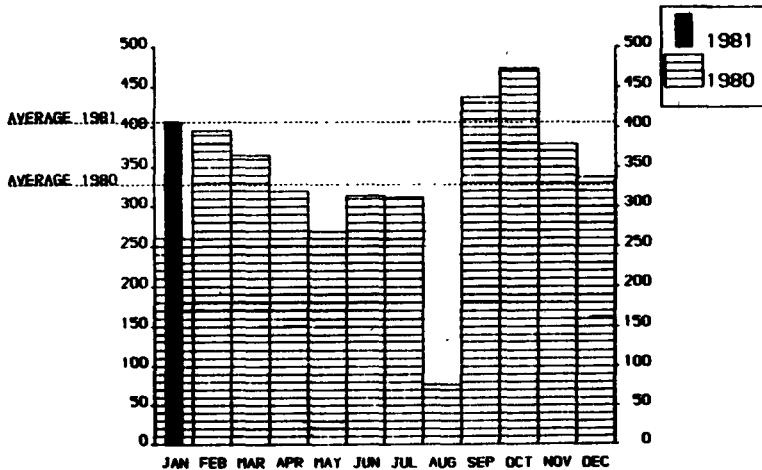All times are in hours.
"Equiv" means equivalent.
"Turn" means turn around.
All I/O transfers are measured in 1000's.

PERCENTAGE OF JOBS FINISHED IN LESS THAN:

TIME	15mn	30mn	1hr	2hrs	4hrs	8hrs	1day	2day	3day	6day
%year 1980	26	39	52	63	78	90	98	99	100	100
%year 1981	35	49	63	75	89	97	99	100	100	100

HISTOGRAM OF TOTAL EQUIVALENT TIME(HRS)

Projected total for 1981 = 4877 Hours(using average)

Total for 1980 was = 3936 Hours

REFERENCES TO THE PERSONNEL/FUNCTIONS OF THE COMPUTING CENTRE

Manager of The Computing Centre   J.Pire

 Responsible for User Registration   Ms. G.Rambs

Operations Sector
 Responsible for the Computer Room   A.Binda-Rossetti
 Substituted in case of abscence by:

 Responsible for Peripherals   G.Nocera

Systems Software Sector
 Responsible for the sector   D.König
 Substituted in case of abscence by: P.A.Moinil

 Responsible for TSO Registration   C.Daolio

			Room	Tele.
Informatics Support Sector				
Responsible for the Sector	(f.f.)	H.de Wolde	1883	787
Secretary	Mrs.	G.Hudry	1873	787
Responsible for User Support		M.Dowell	1886	701
General Inf./Support Library	Mrs.	A.Cambon	1871	730
Advisory Service/List of Consultants(See Note 1)			1870	730

A.Inzaghi   H.I. de Wolde
              A.A.Pollicini
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   ( )

JRC Computer Graphics   ( )

Towards a New Programming Style   ( )

LIBRARIAN   ( )

       NAME   ....

       ADDRESS   ....

       ....

       ....

       TELEPHONE   ....