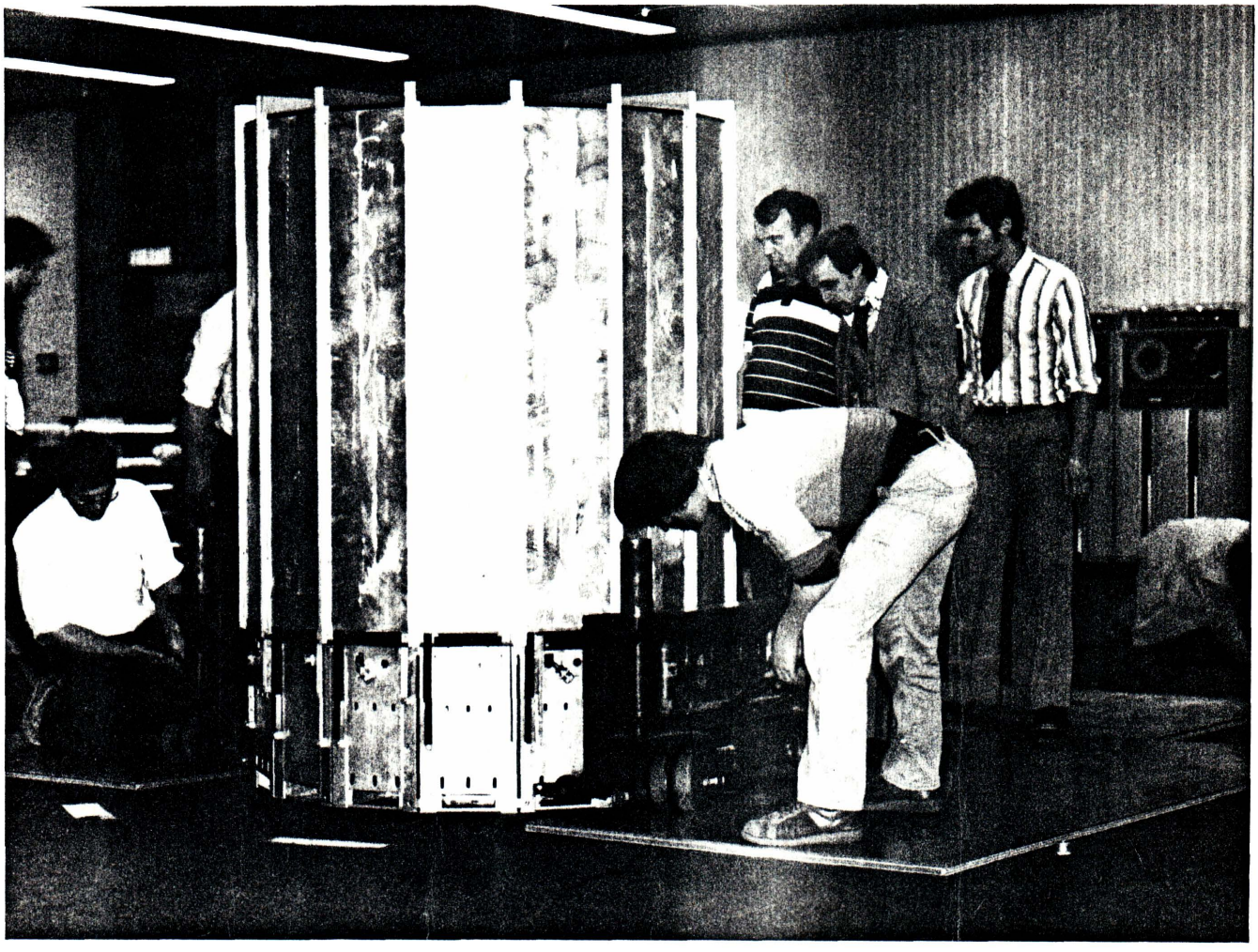
European Centre
for Medium Range Weather Forecasts

COMPUTER NEWSLETTER

Shinfield Park, Reading, Berkshire RG2 9AX, England Reading (0734) 85411 Telex 847908

Number 11 - November 1978

THE CRAY 1 BEING INSTALLED AT SHINFIELD



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In this issue :

* These articles directly concern the computer service, we recommend you read all of them.

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* DIARY

Listed below is a diary of events, as currently know, for the next few weeks. For more, or updated information, contact the person specified.

Monday 13/11 to 8/12 '78	Both machines unavailable 11.00 - 13.00 and 17.00 - 21.00 hours each day, due to link development tests. - Peter Gray
Early December - provisionally 8/9th	Both machines unavailable for two days to enable 2nd provisional acceptance tests to be run. - Rob Brinkhuysen
	Use of User and Project Identifiers becomes mandatory, after 2nd provisional acceptance tests. - Andrew Lea
December to March	Cyber unavailable 3 hours each day, for graphics and communications system development and installation tests. - Peter Gray/ Fritz Königshofer

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Front cover

Installing our CRAY-1 (serial 9) at Shinfield.

This Newsletter is edited and produced by User Support, ECMWF (ext. 355)

The next issue will appear in January 1979.

Christmas Message

Christmas 1978 will mark the end of the interim computing services and the start of the carefully planned permanent services at Shinfield Park.

There really is a marked difference from the situation in late September, when staff were scattered around Bracknell and Didcot, the interim computer systems at Rutherford Laboratories being accessed by terminals. Now we are all comfortably located at Shinfield Park, the computer system has been accepted and the CYBER-CRAY link is close to being operational. During 1979 it is our task to complete the computing facilities with the telecommunication and on-line graphics sub-systems, to put the system to full use, then to prepare the services to the Member States and to the meteorological community at large.

Christmas 1978 is an appropriate moment to reflect upon the fact that all the achievements were made possible by the full dedication and co-operation of everybody involved.

I hope that the dedication and co-operation will continue in 1979, in preparation for a full operational role.

- Rob Brinkhuysen

Successful Acceptance Trials

Much has happened since the September Newsletter, not the least of which is that we are all together now at Shinfield. The two major items for the computer service were the successful passing of the acceptance trials for the two sets of hardware.

The First Provisional Acceptance Trial for the Control Data Cyber 175-300 system was delayed one week from the originally scheduled dates. It then started on Sunday 5 November, lasted 48 hours, and proceeded very smoothly. The trial was successfully completed on 7 November, during which the availability was 98.6%.

The Provisional Acceptance Test of the Cray-1 was equally impressive. The machine (serial no. 9) arrived on site on 24 October, was installed and powered up within 7 days. The 48 hour acceptance test was successfully completed on 10 November, the availability being 95%, well over the required 90%. The downtime was mainly attributable to a disk problem.

Both systems went into user service as soon as possible after these acceptance trials and, as users must be aware, are now run 24 hours per day, 7 days a week. At this stage, some 5 hours a day are set aside for further link development and checkout. These activities are scheduled to culminate in the Second Provisional Acceptance Test for the Cyber, in early December, when the link hardware and software to the Cray should be fully operational.

The Computer Division wishes to congratulate both manufacturers for the speedy installation of their equipment, and for passing these acceptance trials so efficiently at their first attempt. We hope this bodes well for the future!

Also, the Computer Division would like to thank all those users who assisted during the Cyber acceptance trial by manning keyboard terminals. Last, but by no means least, both Systems and Operations Sections are to be thanked for the tremendous effort that has gone on for sometime now to prepare for and execute these trials.

- Andrew Lea

The Operational Handling of Numerical Products from the Cray

The operational handling of numerical products from the Cray, called the post-processing, will form the fifth logical step in the meteorological operational suite: data acquisition, pre-processing, analysis, forecast, post-processing and dissemination. In the post-processing, results are received from the Analysis and Forecast and the data transformed into the forms required for dissemination to Member States. Another part of post-processing will be the provision of a regular series of VDU displays and plotted charts of the results, for a meteorological analyst who will be present during the running of the operational suite to monitor the progress, and to verify that meteorological consistency is maintained. There will also the facility to call up additional displays and charts of any of the forecast or analysis products. All this is shown schematically on the next page.

Products disseminated to Member States will be defined by the requirements of the countries themselves. They will be formed from grid-point fields by the post-processing and accumulated in a Dissemination Database (DDB), ready for subsequent transmission through the telecommunications network. Analysis and forecast results will be stored in databases during the operational run, and will be accessible to batch users locally and eventually to remote users, via the telecommunications links. The last stage of the post-processing will be the addition of results from the data-bases to a long-term ECMWF archive.

If 1200Z on the day of an operational run is considered as H+0, every six hours of model time from H-24 up to H+240 results will be passed from the Analysis or Forecast suites running on the Cray-1, via the link to the Cyber (i.e. H-24 to H+0 analyses; H+6 to H+240 forecasts). At each of these times, a post-processing step (PPS) will run in the Cyber under the control of the Supervisor-Monitor-Scheduler master program (SMS) handling the operational run. From about 2000Z onwards, a new PPS will start every ten to fifteen minutes.

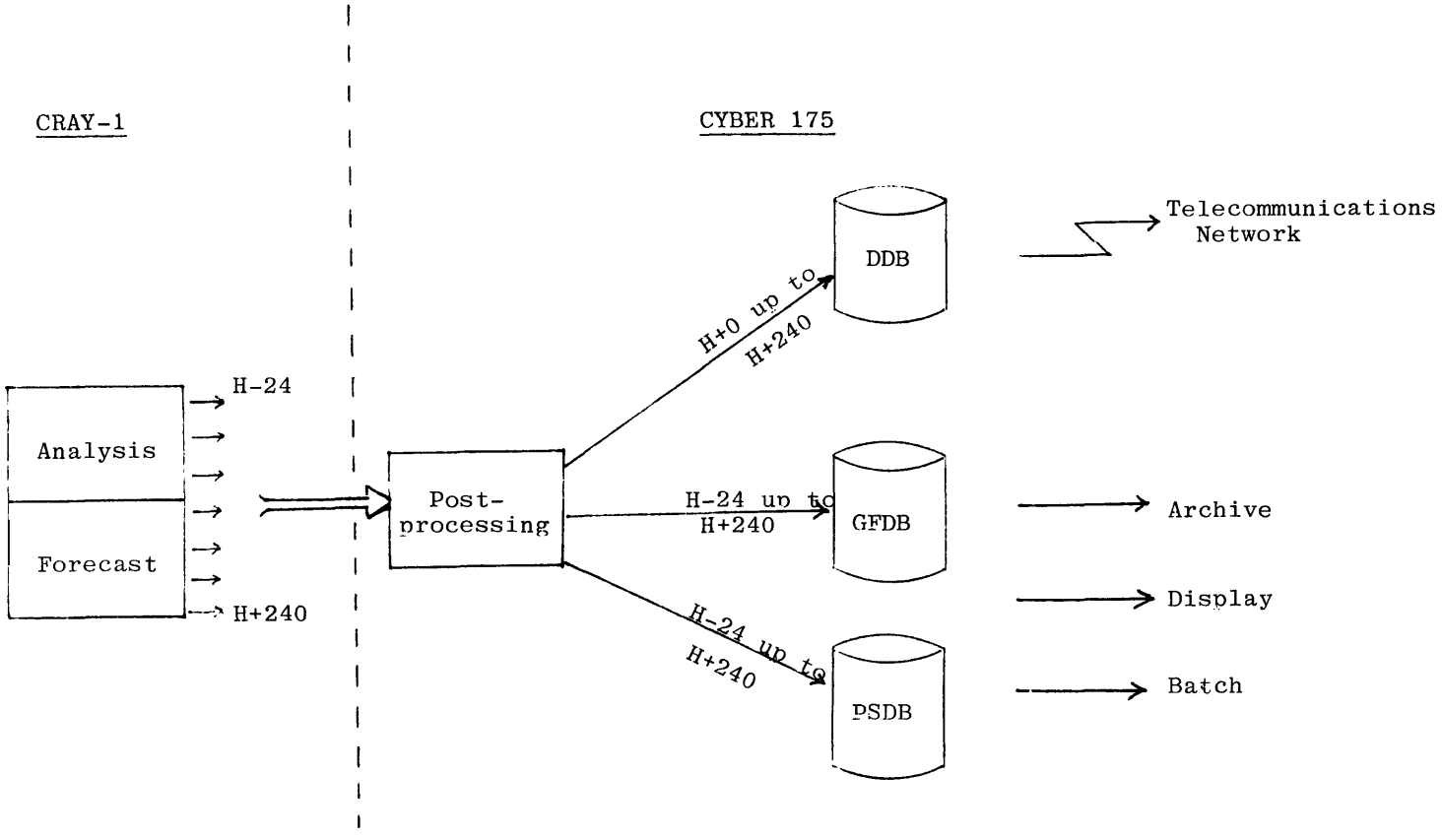
Each results file sent over the link will contain one particular type of data, thus:

- arrays of mainly surface data on the model grid;
- arrays of spectral coefficients for upper-air data (T80 for analysis, T40 for forecasts);
- arrays of upper-air data at points of a regular latitude-longitude grid, probably $1\frac{1}{2}^{o}$ x $1\frac{1}{2}^{o}$.

In addition, the files from the Analysis will contain some working files and statistics which have to be saved. At each timestep, each type of data will be handled in a separate sub-step, and these sub-steps and the post-processing steps themselves will run independently and in parallel with each other. Data storage and recovery procedures developed for the post-processing will work on the basis of sub-step units, so that file losses or program restarts will be confined to single sub-steps.

The total volume of data handled in packed form in the 45 post-processing steps will be about 436 megabytes which will be stored in a Global Fields Database (GFDB). In addition to the latest run, results from 14 previous operational runs will be held in the GFDB. A good proportion of the latest run will be online, but the majority of the GFDB will be held offline on magnetic tapes. The results will be accessible on the basis of fields defined by time, standard pressure level and physical parameter. Retrieval of fields will be carried out by an Access Routine which will make the structure of the databases and their online/offline status transparent to a user. A second database, the Polar Stereographic Database (PSDB), will accumulate a selection of fields in a similar way, but with values at points of a northern or southern hemisphere polar stereographic projection. The PSDB will have a lifetime of about 24 hours, and will be used to provide displays of fields, and in the formation of products disseminated in polar stereographic form. The PSDB fields will also be accessible via the database Access Routine.

The Dissemination Database (DDB) will be interrogated every few minutes by a program routing files for transmission to Member States. The program will write files to the telecommunications system through INTERCOM. The DDB will be recreated at each operational run; however, until recreation it will retain products even after they have been routed.



- John Chambers

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* MANTRAP News

Alex Riley, from the University of Leicester, one of the co-authors of MANTRAP, has now provided expert assistance in bringing MANTRAP up to level 473. This work is complete and the package is now available in permanent files. It will be put on the system and made the default compiler during December.

Any problems with MANTRAP should be reported to User Support.

- Peter Gray

Plotting News

The new Versatec plotter and the LSP online controller will be delivered to ECMWF early in December. Following delivery, hardware and software development must take place before provisional acceptance (expected on 26 January 1979) and entry into service (expected mid-February). Prior to that we must continue to use the existing Varian equipment.

The plotter and controller successfully passed a pre-delivery test on 30 November 1978, when the sub-system was demonstrated producing test plots off line from the Cyber.

- Peter Gray

Computing Matters before Council (21/22 Nov. 78)

At its last meeting,Council approved the following matters relating to the computer service.

Allocating resources

At least 25% of the available CPU time of the Cray-1 will be made available directly to Member States. This time will be apportioned as follows once demand exceeds allocation:

i) 10% will be allocated to special projects
ii) 35% of the remainder to be allocated to Member States equally, and 65% proportionally according to financial contributions to the Centre's budget.

The Cyber permanent file space bid for by Member States has not exceeded the available space, therefore all bids can be met at this stage.

By 1 July of each year, every Member State will be required to submit bids for computer resources required for the following year, plus estimates for the subsequent two years.

Training Courses

Proposals for computer related training courses for Member States' users put forward by the Centre have been approved. Details of these courses will be circulated later.

Mainframes

Currently on rental, the two mainframes (Cray-1 and Cyber 175) will now be purchased via a 5 year lease agreement.

Telecommunications

Council has approved various detailed technical aspects connected with the network, for example concerning procedures for using both low (up to 110 baud) and medium (up to 4800 baud) lines. Also the Council has approved a revised schedule for the implementation of the telecommunications network (see table 1).

The Director of ECMWF has been given authority to conclude an agreement with SIA Ltd, for the acquisition, in a joint venture with Denmark, the Federal Republic of Germany and Sweden, of the software necessary to link terminals provided by A/S Regnecentralen to the Centre's network.

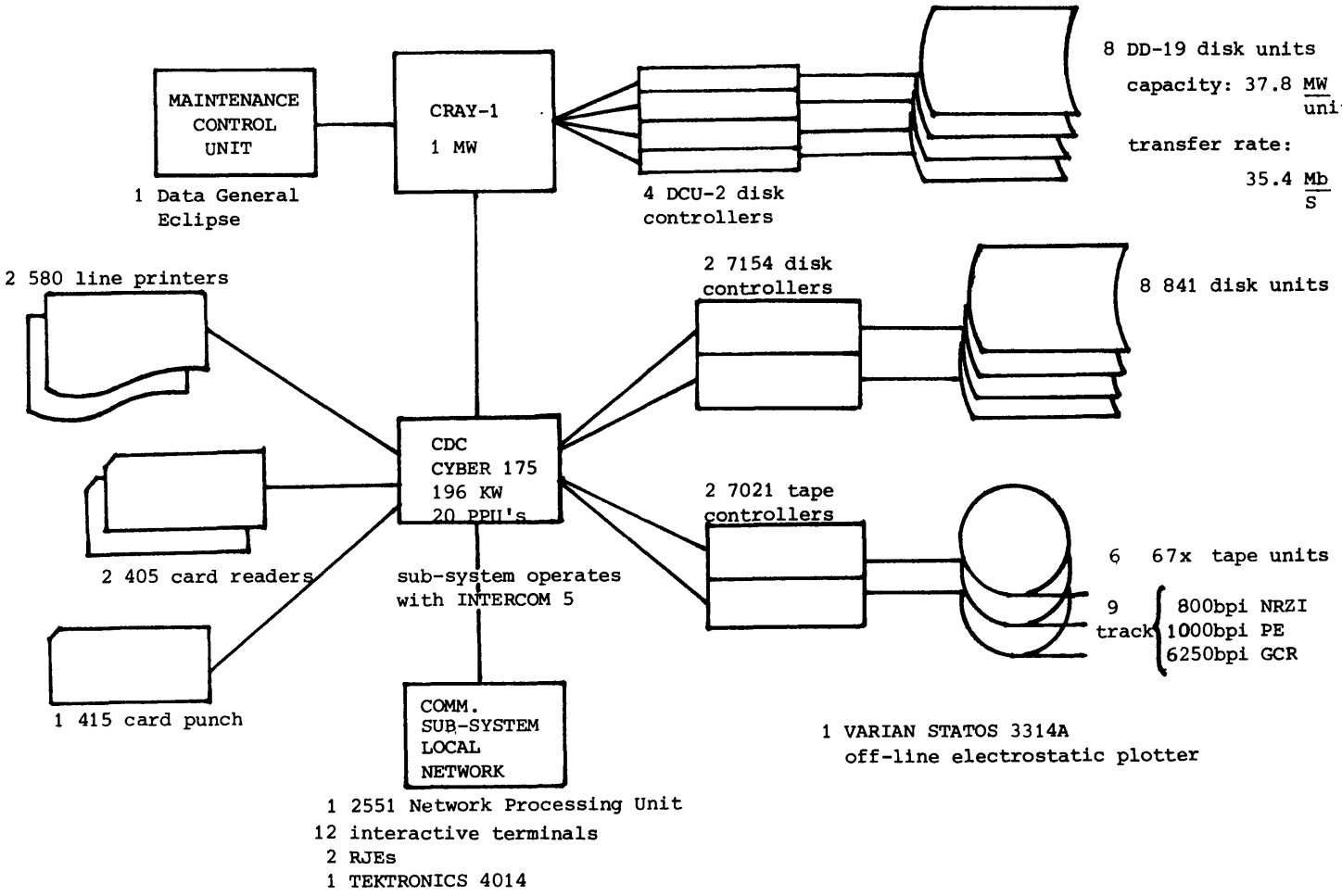
Table 1

Updated implementation schedule for ECMWF telecommunications network as approved by Council, 21/22.11.78

Member State	Council approved date for medium speed lines	Low speed line (1 July 79) required
United Kingdom	January 1979	No
Germany F.R.	April 1979	No
France	April 1979	No
Sweden	April 1979	No
Finland	October 1979	No
Denmark	November 1979	No
Ireland	July 1980	No
Italy	July 1980	Yes
Greece	September 1980	Yes
Spain	December 1980	Yes
Yugoslavia	December 1980	Yes
Belgium	July 1981	No
Austria	July 1981	No
Portugal	July 1981	Yes
Netherlands	October 1981	Yes
Turkey	November 1981	Yes
Switzerland	January 1984	No

- Andrew Lea

* PRESENT CONFIGURATION OF COMPUTER SYSTEM OF ECMWF



Hardware differences between the Cray-1 at Rutherford (Serial 1) and the Cray-1 at Shinfield (Serial 9) are as follows:

	Serial 1	Serial 9
Memory	½ M words	1 M words
parity	1 parity bit for 64 data bits	automatic correction of single bit parity errors (SECDED) 8 parity bits for 64 data bits
timing	10 clock periods to read or write	11 clock periods to read or write
floating point interruptions (overflow, divide check) during a vector operation	none	yes, at end of vector operation
I/O-channel to controller, parity checking	none	4 parity bits for 16 data bits
Disks	4	8
Disk controllers	2	4

- Dave Dent

* System Development Plans for the Cyber

Between now and Easter 1979, we shall be installing, developing and accepting new equipment on the Cyber. Unfortunately, this means that a good deal of development time will have to be reserved throughout most of this period. We shall try to limit this development time to the evenings as far as possible.

The principal development activities will be:

Cray/Cyber link development:	until 8 December the Cyber will be unavailable from 11.00 to 13.00 and from 17.00 to 21.00. It is hoped that the 2 hour mid-day period can soon be re-scheduled to the evening.
Plotter installation and support development:	from mid-December until end of January, the Cyber will be unavailable from 17.00 to 20.00.
NFEP Communications System installation and acceptance:	from mid-February until the end of March, the Cyber will be unavailable between 17.00 and 20.00.

Over weekends, there will be longer periods when the Cyber will also be reserved for development. Details are not yet known.

Note that these days and times are only approximate, and are liable to alter as circumstances change.

- Tony Stanford

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* User and Project Identifiers

Now that the ECMWF computer service is based at Shinfield, we propose to introduce both user and project identification.

Users will be identified by 3 character user identifiers. Such identifiers will be used where there is a need to identify individuals. An example is jobname, to provide easy recognition of who owns a particular job and where the output should go.

Projects will be identified by project identifiers. These will be 3 to 8 characters long, the first 2 characters identifying the country originating the project. For this purpose, the Centre is treated as being a country, all Centre projects will begin EC..... Project identifiers will be used to allocate resources when required (e.g. PF space), and to account for usage.

These user and project identifiers have been mostly assigned already, if you are unaware of what yours will be, ask your Section Head. They can be used now, e.g. on jobname. However, after second acceptance they will become necessary, in particular, INTERCOM login will be only by these user and project identifiers. The date of changeover will probably be Monday 11 December, this will be confirmed later.

- Andrew Lea

CONGRATULATIONS!

to Richard Friedman, and his wife Anita, on the birth of their daughter, Nora, on 3rd November;

also to Dave Dent, and his wife Pat, on the birth of their daughter, Elizabeth, on 17th November.

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* NOS/BE 473 PROBLEM HARVEST

Listed below are some of the major problems which have been discovered to date.

SEGLOADER - Specifying PL=ANY VALUE on the LGO card causes both the keyword and the parameter to be taken as file name replacement for the corresponding file on the program card. The problem will not be fixed until our system upgrades to level 477 or beyond. To avoid program failures print limits should be declared on the FTN card during compilation.

NON-EXISTENT LIBRARY SPECIFIED - Many a load map appears to be plagued by this "non fatal loader error". As previously stated, programs and routines created prior to level 473 should be recompiled.

LOAD MAP MISSING IN SPITE OF "MAP,ON" - Same as above : old user libraries being attached to satisfy externals. Loaded modules were compiled/assembled with MANTRAP. The load map can be retrieved from file ZZZZMP with : REWIND,ZZZZMP.
COPY,ZZZZMP.

RM ERROR 347 - Record Manager capsules cannot be loaded by FDL (Fast Dynamic Loader) if CMM (Common Memory Manager) is not loaded. This happens when a statically loaded program satisfies its externals from an old user library.
IO statements embedded in old modules do not trigger the static loading of the necessary BAM/AAM capsules. If static loading is to co-exist with old libraries, an LDSET control statement with the STAT option and a FILE card with the USE and the OMIT parameters should be introduced for each file affected by RM ERROR 347. See page E-1 of your BAM Reference Manual.

WHY STATIC LOADING? - The temporarily available test version of Mantrap forces static loading for error trace purposes. We are being told that dynamic loading will be restored in our production version of the dump analyser.
- Static loading is also required when internal memory requests via the MEMORY macro are needed. An alternative request for increased field length without loader problems in being studied by means of CMM (Common Memory Manager) facilities.

- Luigi Bertuzzi
- John Greenaway

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* File Manipulation on the Cyber

The REQUEST card must now be used if files are to be made permanent, or if their disposition is to be changed (by DISPOSE or ROUTE), in order that they are stored on the correct device.

Thus, if a new permanent file is to be created a statement of the form

REQUEST(lfn,*PF) or REQUEST,lfn,*PF. (where lfn is the local file name)

must be used before any other reference to the file is made. Similarly, if a file is to be DISPOSE'd or ROUTE'd then a statement of the form

REQUEST(lfn,*Q) or REQUEST,lfn,*Q. (where lfn is the local file name)

must be used.

It is not necessary to use a REQUEST if the Intercom commands STORE or BATCH are to be used, as these automatically send the file to the correct device.

As a result of the fact that FETCH,STORE and BATCH make a copy of any file that they operate on, they should not be used with random files such as EDITLIB libraries, Random Update libraries or other files created in users' programs as Random using routines such as OPENMS, WRITEMS, etc.

...cont.

Neither is it necessary to use REQUEST for reserved filenames such as OUTPUT, PUNCH, etc.

Example Commands to create a permanent file from a deck of cards, using a temporary file called FILE.

```
REQUEST(FILE,*PF)
COPY(INPUT,FILE)
CATALOG(FILE,pfn,ID=id.....)
```

where pfn and id are the permanent file name and user id respectively.

- John Greenaway

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* Use of LOADPF and DUMPF

As some users may be aware, the DUMPF and LOADPF utilities are described in the NOS/BE Reference Manual. However, due to a deficiency in these utilities, if two jobs attempt a dump on the same permanent file set simultaneously, one of the two automatically aborts. As the public permanent file set is dumped and archived by Operations, it is not normally necessary to do this yourself. If your file has recently been created or modified and is complicated or expensive of resources to recreate, you should copy the file onto tape yourself within the job which created the file, (without using DUMPF). This should then avoid the above problem. The archiving of permanent file sets resident on private packs is wholly and exclusively the responsibility of the owner. Consequently, no archiving of these files will be done by operations. Owners of private packs should consult Tony Stanford concerning the use of DUMPF and LOADPF.

Reloading of files(LOADPF) is not as critical as DUMPF, described above. However, it is still not a straightforward procedure as it can mean the loading of multiple tapes (currently running at 3) or a search through an unsorted listing of files of about 40 pages, (in order to reduce the number of tape mounts to one). Clearly, this process is not efficient, but without modification to the Dump utility (an important piece of software), no obvious remedy is available. Consequently, you are asked to take care when deleting your permanent files. If you make a mistake please do not make requests to User Support to reload files of a trivial size, unless they cannot easily be recreated. Please retype the file yourself. However, if you believe this is a lot of work and you do require a file reloaded on the public permanent file set from the archive, bring the following information (as a minimum) to User Support:

Permanent file name	-	PFN
Identifier	-	ID
Cycle	-	CY
Last date modified/ accessed.		

We will attempt to recover it for you but cannot guarantee success, especially if it is an old file.

- John Greenaway

Double Precision Arithmetic on the Cray

The Cray, unlike the Cyber, does not have any hardware provision for performing double precision arithmetic, with the consequence that all double precision arithmetic is done using software simulation routines.

The fact that double precision arithmetic is very slow on the Cray has never been in doubt. However, an example from milestone 3 on the Cray may help you to decide never to use double precision on the Cray. (The normal precision accuracy is usually sufficient anyway).

An FFT routine was taking 20.6 milliseconds per transform. After changing 2 double precision multiplications and 2 DSIN calls to single precision multiplication and SIN calls, the FFT ran in 8 milliseconds, and gave exactly the same results.

- Peter Gray

Hints on Copying Cyber Files and a Proposal

File copying can be handled by the well known COPY utilities or by the less known product FORM.

Due to the limitations of the COPY utilities and to the different organisations and structures made possible by file residence and by file origin, we must distinguish between tape to tape copies and tape to disk/disk to tape copies.

Tape to tape copies can be most easily achieved with the COPY utilities, bearing in mind that whenever the Record Type is other than "S", or whenever the file structure is unknown, then COPYBF should be used. However, do make sure that both tapes have been requested as "Stranger" tapes. This means that both tape request control cards must specify the parameter "S".

A COPYBF from "Stranger" tape to "Stranger" tape is equivalent to a bit by bit copy, which will not alter the file structure at all.

When COPYBF is used in this way the word "FILE" means all the information between the BOI (Beginning of Information) and the first Tape Mark, or all the information between two Tape Marks.

A Tape Mark on a standard internal Cyber tape delimits the End of Information, hence:

```
REQUEST,TAPIN,S,------
REQUEST,TAPOUT,S,-----
COPYBF,TAPIN,TAPOUT.
```

reproduces TAPIN completely.

On a "Stranger" internal Cyber tape or on an external non-Cyber tape, a Tape Mark is either a separator between files or the End of Information (in the latter case a number of consecutive Tape Marks ought to be found), hence TAPIN can only be reproduced completely by specifying the number of Files it contains as a third parameter to COPYBF.

If an attempted COPYBF leads to a dayfile message saying "Maximum Device Capacity Exceeded", the tape being copied has blocks longer than 5120 characters and the tape Request should convey this information to the system by using the "L" (for LONG) rather than the "S" parameter.

Different considerations apply to tape to disk/disk to tape copies for two main reasons:

1. a disk cannot be requested as a "Stranger" device;
2. disk residence allows for file organisations which are not supported on tape.

What the COPY utilities can do when a change of file residence is involved will be discussed in a subsequent issue of the Newsletter.

Changes of file residence often imply some kind of file conversion, be it in structure or in organisation, which the COPY utilities do not handle at all.

Depending on what the requirements are, the CDC product "FORM" is a more powerful copying tool.

First of all, the files from which and onto which a copy is to be made, can be described to FORM by means of the FILE control card. FORM can then be called into action with the simple control card:

```
FORM(INP=input-file,OUT=output-file)
```

Secondly, FORM accepts directives through which the user specifies functions to be performed such as:

.../cont.

. IBM/CDC conversion
. file organisation conversion
. copy selectively
. reformat records in terms of data fields
. sequence numbering
. reformat files for printing

It is therefore suggested that all users who have specific file handling requirements submit a short specification of what these are to me.

The subject of file copying will then be covered by addressing specific cases rather than elaborating on the subject in general terms. It is further proposed that some CCL procedures be created to cover the common uses of FORM. Only by getting input from you, the users, can I decide which procedures to propose.

- Luigi Bertuzzi

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* Documentation Changes

ECMWF Bulletins

Bulletins B5.2/1 (Simple Graphics Software) and B5.2/2 (ECMWF Contouring Package) with amendment pages for B2.2/1 (Introduction to Control Statements on the Cray-1) were issued in late September.

Bulletins B1.1/1 (Naming Conventions), B2.7/1 (Cyber-Cray Job Transmission and File Staging) and B6.1/2 (Program Library Documentation Standard) will be distributed shortly.

Manufacturers' Manuals

The following updates to Personal and User Office sets of manuals have recently been distributed:

Personal Set

Cray : CFT Reference Manual change packet C-02 (limited distribution, awaiting further deliveries)

User Office Set

Cray : COS Reference Manual Change Packet E-01.
CAL Assembler V.1 Reference Manual Change Packet F-02
Cyber: Compass Reference Manual Revision Packet D
Cyber Loader Reference Manual Revision Packet F
Basic Access Methods Revision D
Update Revision Packet B
Intercom Version 5 Revision A

In addition, each User Office set should now have been supplied with a copy of the NAG Mini-manual Mark 6.

Please notify me if you did not receive copies of these updates. Should you inadvertently have been issued with any duplicates, the return of one copy would be appreciated.

I have reviewed the User Office situation since the move from Bracknell, and believe I have now supplied all the necessary User Office Manual and Bulletin sets. Please let me know if you feel you have been left out!

- Pam Prior

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* New Software on the Cray-1

The operating system (COS) and compiler (CFT) installed on the new Cray-1 following the acceptance test, are designated as release 1.0.3. The following is an indication of the most important changes:

1. COS

ACQUIRE - a new control statement to assist in front-end communication. ACQUIRE obtains a Cyber resident dataset, stages it to the Cray-1, makes it permanent and accessible to the job making the request. Alternatively, if the dataset is already permanent on Cray-1 mass storage, ACQUIRE allows dataset access to the job making the request (i.e. behaves as ACCESS).
Note that ACQUIRE CANNOT BE USED on our system until the link is operational. Both ACQUIRE and DISPOSE allow the user to specify file residency on Cyber private packs or on tape volumes.

Continuation statements - A consequence of this latter development is a requirement to allow continuation cards for control statements. COS 1.0.3 permits most control statements to be continued across a card image boundary.

MODIFY - has been extended to allow changes to the permanent dataset name (PDN) of an existing dataset.

COMPARE - A utility to compare 2 datasets and list all discrepancies.

AUDIT - has been rewritten and now allows several new parameters. Datasets may be selected for listing by device, size or prefix (i.e. all PDN's commencing with a given character string).

LDR - The library searching algorithm has been changed so that the default library $FTLIB is automatically included in the library list, ex:

```
ACCESS(DN=L,PDN=ECMWFLIB,ID=DUMP00)
LDR(LIB=L,.....)
```

The loader now makes use of a directory record in the library, if present, (created by BUILD).

BUILD - has been improved and is now usable.

Enhanced operator facilities.

2. CFT

Optimising - The compiler now attempts to reschedule the generated code to make better use of the Cray-1 hardware. Improvements in (scalar) code have been observed in the range 0-30%. Redundant memory references in vectorised loops have been suppressed.
The semi-implicit grid point model executed on serial 1 with a CP time reduction of 12%. Note however that the change to serial 9 imposes an overhead of about 3% due to the additional cost of memory accesses under SECDED. (See article on Cray-1 hardware changes).
Further notes on CP time improvements under CFT 1.0.3 are contained in the article on Fast Fourier Transforms (page 13).

FLOWTRACE (a) - A new feature which summarises timing information and provides a subroutine tracing facility. The option is invoked by

```
CFT(ON=F)
```

or by use of the compiler directives

```
CDIR$ FLOW
CDIR$ NOFLOW
```

.../cont.

The following information about each subroutine in the program is listed:

- time spent in subroutine
- percentage of total time spent in subroutine
- number of times the subroutine was called
- average time per call spent in subroutine
- list of first 14 routines which are called by the subroutine
- list of first 14 routines which call the subroutine.

WARNINGS : In the current compiler the cost of the flowtrace computation is included in the subroutine totals. For small subroutines, this can lead to a distorted picture. A PROGRAM statement is ESSENTIAL. The flowtrace will not work properly without one and may in fact generate a lot of unwanted output.

(b) - As an additional option, FLOWTRACE can also print a line for every CALL or RETURN statement executed, listing the following:

routine name
calling routine name
job time
time the routine is entered
time spent in the routine
time the routine returns

Because this option can generate a large volume of output, it must be explicitly requested as follows:

CALL SETPLIMQ(KOUNT) where KOUNT specifies the number of trace lines printed.

Improved messages - CFT-produced messages have been organised into 5 levels of severity:

1. COMMENT - programming inefficiencies
2. NOTE - non ANSI 66
3. CAUTION - possible user error
4. WARNING - probable user error
5. ERROR - fatal error.

By default, level 3,4, and 5 messages are printed. A control statement parameter may be used to modify this,
ex. CFT(E=1)

3. SPECIAL ROUTINES

The mathematical routines currently available in CRAYLIB have been organised into a Cray-1 library called $SCILIB. The contents are the same as listed previously for CRAYLIB (see Newsletter No. 10, page 11), with a few additions.

Contact User Support for details.

4. PROBLEMS IN CFT 1.0.3

User Support know of at least 2 code sequences which were handled correctly by CFT 1.0.2 (at Rutherford) but which no longer work under CFT 1.0.3. Consequently, CFT 1.0.2 is currently available for use by including:

```
ACCESS(DN=CFT,PDN=CFTOLD)
CFT(---)
```

Please tell us about any problems you experience and about any timing changes (improvements?) provided by the new compiler.

- Dave Dent

Fast Fourier Transforms on Cray-1

Some Further Improvements

Subsequent to the original article describing FFT's on the Cray-1 (Newsletter No.8, May 1978, page 1) further work has been carried out in an attempt to improve the execution rate. As observed previously, the most efficient method is to perform many FFT's simultaneously, i.e. the parallel approach. A Fortran package which makes use of this technique has been available for some time. Significant improvements on this package have now been achieved by recoding the key routine in assembler (CAL).

A simple test problem of 64 simultaneous complex transforms of length 60 is used to compare performance in each of the key sections of the program. Results are given below, $\theta=0$ indicates no phase factors; $\theta>0$ implies that multiplications by phase factors are included. All figures are Megaflops/second.

factor	phase angle θ	CAL	CFT 1.0.2	CFT 1.0.3	CAL/CFT 1.0.3
2	0	36	21	25	1.4
2	>0	84	37	44	1.9
3	0	74	41	45	1.6
3	>0	106	49	55	1.9
4	0	62	34	37	1.7
4	>0	91	45	49	1.9
5	0	91	45	47	1.9
5	>0	104	48	49	2.1

The Fortran package has been tested under 2 compilers. The later compiler (CFT 1.0.3) includes instruction rescheduling and suppression of redundant scalar memory references. Improvements vary from 2% to 19%.

Comparing the assembler version with the last Fortran version indicates that improvement factors of between 1½ and 2 have been achieved.

- Clive Temperton
- Dave Dent

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* Advisory Office

An Advisory Office has now opened in the Computer Block adjacent to the user area (room 037). Advisors are available for consultation at the following hours, Monday - Friday:

09.00 - 12.00 14.00 - 17.00

'PHONE EXTENSION 308/309

These hours are only provisional at this stage, and will be adjusted in light of experience. A review will be undertaken at the end of the year.

NOTE that this office will close for Christmas at 17.00 hours (or earlier if the Centre closes earlier) on Friday 22 December and re-open at 09.00 hours on Tuesday 2 January.

- User Support

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* The NAG Library - Mark 6

CYBER - The latest release of NAG (Mark 6) is now available on the Cyber as a test library. It can be used as follows:

```
ATTACH(NAGLIB,NAGMK6,ID=NAG,MR=1)
FTN                 - Compilation of user's (calling) program
LIBRARY(NAGLIB)     - Specify that NAG Library is to be searched
LGO.                - Execute and load program and required NAG routines
```

The Mark 6 release sees the addition of 64 new routines and the deletion of some older routines. The new routines are in the following areas:

- new surface fitting routines
- substantial expansion of the optimisation chapter
- new suite of random number generation routines.

Please try the new library and report any problems. After a suitable period Mark 6 will become the default version, if no major problems are found.

CRAY - The same routines are being implemented on the Cray and the process of testing has only just resumed. Currently their accuracy cannot be guaranteed, however, as the machine constants have been upgraded there is a better chance that they are an improvement on the old library. So, if you have an urgent need for one of the NAG routines, please try the new library, which is accessed as follows:

```
ACCESS(DN=NAGLIB,PDN=NAGMK6,ID=NAG)
LDR(LIB=NAGLIB....)
```

As always, please report any problems you encounter to User Support.

- John Greenaway
- Dave Dent

Gary's Night Out on the Files

During the afternoon of Thursday 28 September, the last full Cray/Cyber working day at Rutherford, the motor on the main printer burnt out. Exhaustive enquiries revealed that there were no spares in the UK and no replacement could be obtained before noon on Friday, the very time of scheduled system shutdown prior to removal to Shinfield! Output and input queues were predicably long at this last opportunity to work for 1 month, - about 100 jobs in each.

So...the story of the marathon commences... Alex van Tricht took a taxi to Bracknell at 7pm and kept the RJE printers in both John Scott and Fitzwilliam House running from 8.30pm until 2am, reloading approximately 3 boxes during that time. At 2am Gray Harding, having already worked a normal day and spent the evening at Rutherford, volunteered to take over and spent the rest of the night and early morning running between Fitzwilliam House and John Scott House until, having reloaded approximately 3 boxes, the output queues were empty by 7am.

So for all those of you who saw Gary staggering around bleary-eyed on that Friday morning, and assumed he'd had a night out on the tiles, take heed of this article, which is intended to restore his reputation!

- User Support

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* Public Libraries on the Two Computers

Some of our library users may be a little confused as to the residence of the libraries on our two machines (I know that I sometimes forget where each file is!), so for handy reference, a list of public libraries with their corresponding ID's is appended.

However, this list will change when further rationalisation of libraries takes place, so it should not be regarded as final, but merely as a statement of the current situation.

Cray Libraries

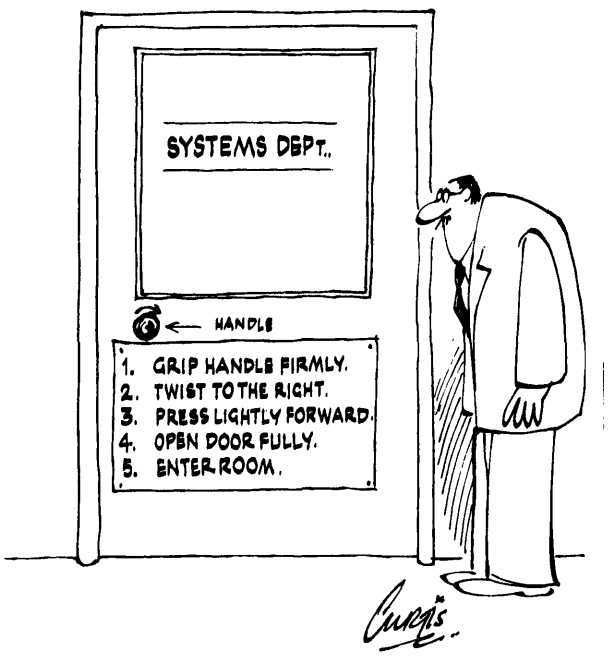
NAME	RESIDENCE*	ID	DESCRIPTION
NAGLIB	PD	DUMP00	Old (temporary) version of NAG library (MK.5)
NAGMK6	PD	NAG	New (MK.6) NAG library, implemented on Cray
NCARLIB	PD	-	NCAR library, only implemented on Cray
ECMWFLIB	PD	DUMP00	Library of ECMWF routines, mostly taken from P3 library on Cyber
$SCILIB	System	-	Replaces current Cray library, CRAYLIB.

Cyber Libraries

NAME	RESIDENCE*	ID	DESCRIPTION
NAGLIB	System	-	Current NAG (MK.5) library
NAGMK6	PF	NAG	New NAG (MK.6) library
ECMWF	PF	EWP3	ECMWF library - many of routines taken from P3 library
VARIANLIB	PF	EWPLOT	Varian Basic Software
NEWCONTLIB	PF	EWPLOT	New Contouring Package
CERNLIB	PF	-	CERN library
P3OBJLIB	PF	EWP3	Library, used by different groups.

* PD indicates a Cray permanent dataset
System indicates a system file on either machine
PF indicates a Cyber permanent file

- John Greenaway
- Dave Dent



User Support Staff

Mrs. Pam Prior joined User Support on 18 September. Pam's initial responsibility is to look after documentation, this includes manufacturers' manuals as well as locally produced material. She has provided below a short summary of her previous experience.

Pam is in office 016 (ground floor, office block), on extension 355.

- Andrew Lea

Having taken a degree in German and French, I joined H.M. Customs and Excise, where I worked in systems analysis and design on the Customs Project Team. The purpose of the project was to computerise the processing of documentation concerned with importations. The system went live in May. My work entailed a good deal of user liaison, but was very different from the situation here, in that those users were non-technical and to some extent initially resistant to the system. The system was based on ICL equipment, so I am looking forward to learning more about the Cray and the Cyber.

- Pam Prior

Vacancies

There are the following vacancies in our new Headquarters at Shinfield, near Reading. Remuneration is commensurate with those of International Organisations. For further information contact the Personnel Section.

Computer Operators

Operators are required to work in a 4-shift cycle, including weekends and public holidays, under the supervision of a Shift Leader. A minimum of 2 years' operating experience on a large scale computer system is required. Experience with CDC systems would be an advantage.

Computer Receptionists

Duties involve working with computer peripherals and off-line equipment, distribution of computer output and tape library duties. 18 months' experience is required either as a computer operator or computer receptionist.

Systems Analysts

A Systems Analyst in the Computer Systems section to be involved in design, implementation, maintenance and procedures of the software of the computer complex.

A Systems Analyst in the User Support section to be involved in the liaison with the local and remote users, program libraries, documentation, accounting, training and advice.

A University education or equivalent if required, followed by at least four years relevant experience.

This Month's Laws

Finagle's Rules

Ever since the first scientific experiment, man has been plagued by the increasing antagonism of nature. It seems only right that nature should be logical and neat, but experience has shown that this is not the case. A further series of rules has been formulated, designed to help man accept the pigheadedness of nature:

Rule 1 : To study a subject best, understand it thoroughly before you start.
Rule 2 : Always keep a record of data. It indicates you've been working.
Rule 3 : Always draw your curves, then plot the reading.
Rule 4 : In case of doubt, make it sound convincing.
Rule 5 : Experiments should be reproducible. They should all fail in the same way.
Rule 6 : Do not believe in miracles. Rely on them.

INDEX of still valid Newsletter Articles

Listed below are the major articles published in all Newsletters to date, which are still valid. However, as one goes back in time some points in these articles may no longer be accurate. When in doubt, contact the author, or User Support (ext. 347 or 355)

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GENERAL

METEOROLOGY

USEFUL NAMES AND PHONE NUMBERS

		Room*	Ext.
ADVISORY OFFICE Open 9-12, 14-17 daily		CB 037	308/309
Computer Division Head	- Rob Brinkhuysen	OB 009A	340/341
Disk Space and Permanent File Problems		AS FOR ADVISORY	
DOCUMENTATION	- Pam Prior	OB 016	355
	- Dave Dent	OB 004	347
INTERCOM - registering new users			
	- Jean-Luc Pepin	CB 132	326
Libraries (ECMWF, NAG, CERN, etc)			
	- John Greenaway	OB 017	354
OPERATIONS	- Console/Shift Leader	Computer Hall	334
	- Graham Holt	CB 024	306
	- Eric Walton	OB 002	349/351
Registration (User & Project Identifiers)			
	- Pam Prior	OB 016	355
Research Department Computer Co-ordinator			
	- Rex Gibson	OB 126	384
Tape Requests	- Pauline Litchfield	Computer Hall	335/334
User Support Section Head	- Andrew Lea	OB 003	348

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* CB - Computer Block
OB - Office Block