



European Centre
for Medium Range Weather Forecasts

COMPUTER NEWSLETTER

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SPECIAL USER MEETING

When will MANTRAP be available?

When can we expect to be able to use the link and what changes do we have to make?

When can I use a terminal in my room?

To answer questions like these, a meeting has been arranged on Monday 2 October, 1400, Conference Room FH.

Rob Brinkhuysen, Peter Gray and Eric Walton will discuss in some detail plans, consequences and expectations for availability of hardware and software at Shinfield.

PLEASE NOTE

TOWARDS THE END OF OCTOBER, ALL STAFF OF THE CENTRE WILL MOVE TO THE PERMANENT HEADQUARTERS AT SHINFIELD PARK.

THE ADDRESS WILL BE :

EUROPEAN CENTRE FOR MEDIUM RANGE WEATHER FORECASTS,
SHINFIELD PARK,
READING,
BERKSHIRE
RG2 9AX

THE TELEPHONE NUMBER WILL BE :

READING 85411

Front cover photograph by METEOSAT

21 February 1978 at 11.55 GMT

This Newsletter is edited and produced by User Support, Brandon House, (ext. 286)

The next issue will appear in November.

The First GARP Global Experiment

On December 1st this year, one of the largest and most complex scientific undertakings ever attempted will commence its operational phase. It is the first GARP Global Experiment (FGGE). Its purpose, as expressed by the World Meteorological Organisation, one of the sponsors of the experiment, is "to ascertain the attainable limits of weather forecasting and to investigate the mechanisms underlying climatic change". Particularly, the first of these objects is extremely interesting for us at ECMWF, and we will take an active part in the experiment.

The central problem in weather forecasting is that of observation. Without a good picture of what the atmosphere looks like, it is impossible to forecast its future, no matter how complicated the numerical simulations we are able to do. Still, in 1978, after a century of rapid technical developments in the science of meteorology, there are large gaps in the global network of observing stations. The biggest gaps are over the oceans, particularly in the southern hemisphere, but there are also large gaps over some continents (Africa, South America). One reason for these gaps is economic. One single weather ship can cost up to a million pounds a year to operate. Another reason is that the communication difficulties still are enormous in many developing countries.

The main object of the global experiment is to "collect a more complete set of data on the condition of the atmosphere globally than is presently available from existing observational stations". In addition to the basic observing system, the so called World Weather Watch, there will be many other observing systems operating during the FGGE year. A primary goal is obviously to get all conventional data to the collecting centres. In routine operations, a large part, sometimes as much as 50% of all weather observations never reach the users due to inefficient telecommunications. During FGGE a special effort will be made to collect all missing data by mail in delayed mode. Four "area subcentres" (Washington, Bracknell, Moscow and Tokyo) are responsible for these delayed data from their respective sector of the globe.

During the FGGE year there will be five geostationary satellites operating. A geostationary satellite has an orbit along the equator of the earth and its period of revolution is one day. Thus it remains stationary over one spot on the earth's surface. USA will operate two of these satellites, one over the eastern Pacific Ocean and one over Brazil. The European Space Agency, ESA, will operate a satellite "Meteosat" over the Gulf of Guinea. The picture on the cover of this newsletter was taken by "Meteosat". Another geostationary satellite over the Indian Ocean will be operated jointly by ESA and USA. The fifth geostationary satellite is operated by Japan over New Guinea. The most important observations from the geostationary satellites are "cloudwinds", i.e. winds determined from the drift of individual clouds, as determined from a series of pictures. This information is particularly useful over the tropical areas where no simple relationship exists between winds and pressure fields. The geostationary satellites will also serve as data collectors from different types of observing platforms.

Another type of satellite is the polar orbiting satellite. Their orbits are much closer to earth, and they make a full circle around the globe in about 100 minutes. During the course of the day, they will cover all parts of the earth. Polar orbiting satellites are used for satellite soundings, i.e. they determine vertical temperature profiles from the underlying atmosphere through analysis of infrared radiation emitted by the air molecules, particularly CO₂ and H₂O. In addition, sea surface temperatures and pictures of cloud, snow and sea-ice distributions are obtained. Some polar orbiting satellites will also be used for data collection from different observation platforms. Both USA and USSR will operate polar orbiting satellites.

A series of special observing systems will be employed during FGGE. Several nations will operate ships in tropical areas for upper air observations and oceanographic work. Some of these soundings will use a sophisticated wind finding technique based on the OMEGA navigational system, a system for high precision navigation similar to the better known DECCA Navigator.

Dropsondes will be used in tropical ocean areas. They are "radiosondes" equipped with a parachute and dropped from special aircraft. The dropsondes also use the OMEGA system for the wind determination.

An interesting observation system is the constant level balloon. Special balloons with long lifetimes float around in the southern hemisphere at a very high level. Their positions are determined from a polar orbiting satellite which receives radio transmissions from the balloons, giving information about balloon identity, temperature and pressure.

In the southern hemisphere oceans, a large number of free floating buoys will provide wind, temperature and pressure measurements. These buoys will also transmit their data to a satellite which determines their positions and relays the data to a ground station.

About eighty so called jumbo jets will carry windfinding equipment which uses inertial navigation to determine the winddrift of the aircraft, and thus the ambient winds. The data is recorded on a cassette which is subsequently decoded in a delayed mode.

All these different types of data will be gathered and processed at several centres around the world, where they will be merged into one very large database, called the FGGE level II-b dataset. The observations will be archived and available for research by all interested groups. According to the plans, the two centres which collect and handle these datasets, one in Sweden and one in the USSR, will deliver the tapes to the archives, six months after the observations.

What, then, is ECMWF's role in this huge operation? We are, together with the Geophysical Fluid Dynamics Laboratory of NOAA in USA, designated FGGE level III-b centres, which means that we shall analyse the FGGE observations into global analyses for every 12th hour during the year. Global analyses of high resolution horizontally and vertically requires very large computing power, and only ECMWF with its CRAY-1 and GFDL with its Texas Instruments ASC are today able to do this kind of analysis. The ECMWF analyses will have a horizontal resolution of $1.5^{\circ} \times 1.5^{\circ}$, with 15 vertical levels, and we will analyse wind, temperature, surface pressure and humidity. Vertical winds will also be calculated.

The analyses will be made using the data assimilation system developed by the research department for our own operational analyses. This is "a multi-variate, 4-dimensional statistical interpolation scheme", using the Centre's high resolution gridpoint model and non-linear normal mode initialisation. In short, we interpolate the deviations from a first guess field of the randomly distributed observations to regularly spaced gridpoints. The interpolation makes use of the statistical properties of meteorological fields to obtain the best possible fit. The analysed gridpoint values are then used for a short forecast, which thus provides a new first guess field for the next analysis. In order to eliminate unwanted noise from the analysed fields, they are "filtered" with the non-linear normal mode procedure developed at the Centre.

According to the plans, we will start receiving level II-b data by July next year, and we hope to analyse them as they arrive. To do this, we will need about two CRAY-1 hours each day. A special FGGE operations room will be set up in a section of the library at the third floor in Shinfield Park where VDU terminals and wall space for chart display are most important features. The finished analyses will be sent to central archives to be used by the scientific community.

At present, the ECMWF FGGE section consists of two persons, but from the beginning of next year, three or four seconded scientists will arrive. They will participate actively in the day-to-day operations, but there will also be opportunity for them to work with basic scientific problems, such as the data-impact, answering the question "which observing systems used during FGGE give the best information at the best price?" Such studies will be extremely important as a basis for decisions on the future weather observing system over the globe.

NOS/BE SYSTEM UPGRADE NEWS

Test Sessions

Test sessions to enable users to try out NOS/BE Release 4 have been available since the beginning of September. For the remainder of the month, that is until the Cyber is switched off at Rutherford, the test sessions will continue on a daily basis.

Monday to Friday 15.30 - 18.00

Jobs may be queued for the test session in the Cyber by specifying STNEW on the job-card. These jobs will be executed only during the NOS 1.3 test sessions.

During these sessions the following service will be available:

- Only jobs entered from a terminal during the session, or jobs entered prior to the session with STNEW will be executed;
- Intercom will be up and running;
- BIG jobs will be run, however, STBIG should not be specified if STNEW has been specified;
- PAK jobs will be run, however, STPAK should not be specified if STNEW has been specified;
- The maximum time limit of jobs run during the session should be 2000₈ seconds;
- MANTRAP will not be available. Neither will the MNF compiler.

The following libraries are automatically available in a recompiled form during the sessions:-

ECMWF, ID=EWP3
P3OBJLIB, ID=EWP3
VARIANLIB, ID=EWPLOT
NEWCONTLIB, ID=EWPLO.
NAGLIB.

Jobs may be entered during a test session for execution under the operational system by specifying STOLD, STPAK or STBIG.

System Changes

The following notes provide additional information to that given by the article in the July Newsletter. They are grouped into:-

- those that require (or may require) action on user's part;
- those features that contain enhancements which are either additional or are thought not likely to affect existing user's jobs adversely.

1. Where changes may be Required

1.1 Magnetic Tapes

When the Cyber 175 is moved to Shinfield, the existing 669 magnetic tape decks will be replaced by new 679 tape decks. With the introduction of support for tape drives at a density of 6250 bpi (GE) the job card now has 3 additional parameters that specify the density and number of tapes at each density required. There are two different models of tape drive which either use the densities 800 (HD) and 1600 (PE) bpi or 1600 and 6250 (GE) bpi. Clearly, the only density common to both types of drive is 1600 bpi (PE). In order to ensure proper tape management three additional parameters have been introduced (HD, PE and GE) which specify both the density (or densities) required and the maximum number of tapes required at each density at any one time. The NT parameter will not be necessary and should not be used. (In fact it will indicate the number of tape drives required - but at the system default density). However, note that until the Cyber is upgraded and installed at Shinfield, no 6250 bpi drives are available. Hence, DO NOT USE THE 'GE' PARAMETER during the test sessions.

.../...

EXAMPLE : A job requiring 3 drives, with 2 at 1600 and 1 at 800 would have on the job card, e.g. EWJG1,PE2,HD1.

1.2 FORTRAN 4.7 and FCL (Fortran Common Library)

- (i) Compiled versions of routines created prior to level 446 of FTN need recompilation.
- (ii) Programs that use "over-indexing" of blank common to dynamically alter their field length must be recompiled, using the STATIC parameter on the FTN control card. (This is only a temporary solution as CDC do not undertake to support this parameter in the long term.)
One case where problems could arise in conjunction with the "Static" parameter is with the following attribute - multiple overlay program which has one type of I/O (e.g. Binary) in a higher level overlay, of which no usage is made in overlay below it and any one (or two) overlays resident below at the same time contain the opposite mode I/O (e.g. Coded). Not all such cases fail, but if they do a Record Manager error is produced. This can be overcome by forcing a dummy reference to the I/O used in the higher overlay into the lower level. If you have such a problem you should contact User Support.
- (iii) ENCODE will blank fill the destination field before encoding begins. This will cause problems for those programs that rely on part of the contents of the original output area being maintained.
- (iv) The FTN/SORT interface cannot be used in conjunction with the STATIC parameter on the FTN card, because the SORT routines automatically use the Common Memory Manager (CMM). Also, programs using the sort interface must be recompiled in order to avoid mode 1 errors.
- (v) A user may experience problems with a statement sequence like the following:

```
WRITE(BINFILE)A
  :
  :
  ENDFILE BINFILE
  :
  :
  ENDFILE BINFILE
```

The second ENDFILE forces a change of BINFILE to Z-type records. No error occurs if a binary write is used but if the following occurs:

```
BACKSPACE BINFILE
BACKSPACE BINFILE
```

the mode is not reset and any subsequent binary writes would be processed in coded mode.

Other changes affecting FTN users were described in the article in the July Newsletter on Record Manager, already referred to above.

1.3 INTERCOM 5

INTERCOM 5 will be installed at Shinfield. The following differences to Intercom 4 are important:

- (i) 2 blanks instead of 1 are now needed to specify a blank line.
- (ii) To turn a page the user must enter a blank, instead of any character.
- (iii) The SEND key or its equivalent must be used to signify that an inactive terminal is now active. Previously, no action was needed.
- (iv) A level 17 EOR (End of Record) is now interpreted as an end of record. Previously, it was treated as end of information.

1.4 Cyber Loader

- (i) A DMP control card within a load sequence causes an error.
- (ii) Capsule generation load sequence does not search the library SYSLIB by default.
- (iii) The new preset option DEBUG, described in section 2.1 will be the default and may cause current jobs to fail with a mode 4 error, if they try and use unset values.

1.5 8-bit Subroutines

It is necessary to use a File card with the parameter RT=S, and also to use, within the load sequence:

```
LDSET(LIB=BIT8LIB).
```

.../...

1.6 COMPASS Program

- (i) As the FIT/FET areas have been restructured into one table, it follows that programs using CRM (an amalgam of BAM and AAM) must be reassembled to use the new File Table format.
- (ii) Programs doing their own memory management must be modified or statically load BAM.
- (iii) There are some changes to the terminal definition field returned by the call to PP routine RWE (INTERCOM).
- (iv) GETP and PUTP macros are eliminated for WA files.

1.7 Extended AAM (Advanced Access Methods)

Maximum block size is reduced to 8190 words.
 Maximum record size is reduced to 8187 words.
 Duplicate primary keys are not allowed.
 MIP block size is specified in the FIT.

2. New Features, Additions, Enhancements2.1 CYBER LOADER

- (i) The new option on the LDSET card (PRESET=DEBUG) should make debugging of programs easier. It presets core to a pattern that is a negative indefinite pattern, so any program using undefined values will fail with a mode 4 error.
- (ii) A fast overlay loader is introduced (FOL). This can be used to load higher level (non 0,0) overlays for an overlay structure which has been built for fast overlay loading by the Cyber loader. This is done by building an overlay directory in order to minimise the number of disc accesses.

2.2 INTERCOM 5

An output file is now generated in the case of job card errors. Previously, this was not produced.

2.3 Cyber Record Manager(i) A Quick Review of Known Facts

CRM 1.5 (Cyber Record Manager) has been rewritten as Basic Access Methods (BAM) and Advanced Access Methods (AAM).

There are capsules instead of overlays. Capsules can be loaded at any address.

The load map shrinks drastically: with BAM/AAM a typical small Fortran program has 2/3 of a page load map.

A controlling routine gets capsules out of a BAM/AAM library. The Fast Dynamic Loader (FDL) is used by the control routine to satisfy externals from the library.

The OPENM capsule is loaded when the first file is opened; it stays loaded until some function is executed. The block and record type capsules for GET and PUT macros are loaded when needed and remain in memory until all files with that block and record type are closed. The REWIND/SKIP macros are loaded as needed and released as soon as any other capsule is needed. The Common Memory Manager (CMM) provides all space allocation (code, buffers, etc.).

The first call to a processing macro that requires a buffer (GET,PUT, etc.) causes a buffer (as calculated at OPENM/SETFIT time) to be allocated unless the buffer was supplied by the user.

The CLOSEM capsule not only closes the file as the user requests, but also releases the buffer space (for AAM always, for BAM only if an appropriate calling parameter has been chosen) and unloads any capsules no longer needed for processing.

Because of encapsulation, it would be a good practice to run, e.g. the Indexed Sequential (IS) portion of a job and then CLOSE it, OPEN the Direct Access (DA) portion then CLOSE and so on.

The File Information Table (FIT) and the File Environment Table have been combined in one Table (FIT extension = FET).

Some Record Type (RT) - Block Type (BT) combinations are no longer supported, i.e.: RT=W on E and K blocks, and K blocking for disc resident files. The presently available FORM should be used to convert such file structure/residence to C blocks or to S device (tape) residence. It is very unlikely that this case applies to any of the ECMWF users.

.../...

Processing of FILE control statements at OPEN time does not require the insertion of an LDSET(FILE=) control statement. LDSET(FILE=) statements are ignored and FILES cards are always processed. A FILE control statement without any parameters will de-activate all previous FILE cards. An error post processor utility (CRMEP) allows one to select or ignore error information which will reside on file ZZZZZEG in binary format.

(ii) Basic Access Methods

The BAM file manager handles SQ (sequential) and WA (word addressable) files. The following changes affect SQ and WA file processing, in addition to the general changes previously mentioned.

Macro Changes for SQ and WA

Changes in the macro expansions require recompilation but not recoding of user COMPASS routines.

The sequential PUT macro now returns the length of the record written to the RL field in the FIT.

The FILE macro creates the FET/FIT combined table; the user defined FET is ignored.

The CLOSEM macro accepts three new values for the cf parameter, i.e.

RET	Close, return
DET	Close, no rewind, release buffer, remove file from list of active files.
DIS	Disconnect the terminal file.

Connect Option

A Connect Flag (CNF) field in the FIT can be set to YES via the CNF parameter of the FILE macro/control statement: the related file is thus made into a terminal file.

Static Loading

For the applications requiring static loading two parameters (USE and OMIT) are added to the FILE control statement, to describe which CRM functions are to be performed on that file.

A new loader LDSET option (STAT) has been defined to signal the loader that static loading is desired. Static loading is a short term aid for conversion. Static loading example:

```
To write records:
FILE(TAPE1,FO=SQ,RT=Z,BT=C,
     USE=PUT/OPENM/CLOSEM/ENDFILE)
LDSET(STAT=TAPE1)
```

```
To read records in the same job run:
FILE(TAPE1,OMIT=PUT,USE=GET)
LDSET(STAT=TAPE1)
```

Block Changes for SQ Files

For BT=K, backspacing is no longer supported. For BT=C, the Maximum Block Length (MBL) is forced to the nearest multiple of PRU (Physical Record Unit : 64 words on disc, 512 words on tape) size using as base value the user-supplied MBL value. Default value is zero, which makes the file an unblocked file (greater central processor efficiency at the expense of parity error processing).

Record Changes for SQ Files

For RT=Z, the size no longer needs to be a multiple of 10 characters.

.../...

The REPLACE Macro for SQ Files

The REPLACE macro can now be used with SQ files, but on mass storage only. It is limited to files with BT=C and RT=F or W. The new record must be exactly the same length as the replaced record.

Changes to WA Files

The PUTP and GETP macros have been removed for WA files. The circular buffer is not needed to process records when all records in a WA file are multiples of PRU size and all records begin on PRU boundaries ($WA=n*100_8 + 1$). The circular buffer suppress (SBF) field in the FIT can be set to YES to suppress CRM's allocation of this buffer.

(iii) Initial/Extended Advanced Access Methods

AAM supports four file organisations : initial IS (Indexed Sequential), extended IS, Direct Access (DA), and Actual Key (AK). Initial AAM consists of capsules to process IS, AK and DA files and a Multiple-Index Processor (MIP). The AAM utilities, IXGEN, SISTAT, ESTMATE, KYAN and CREATE are modified. Initial AAM represents a first stage improvement of the existing Advanced Access Methods. Extended AAM consists of a new IS processor and a new MIP as well as the following utilities:

MIPGEN - An Extended MIP index file creation utility.
 FLSTAT - A utility to print file statistics for both Extended IS and Extended MIP index files.
 FLBLOK - A utility to aid in calculation of block and buffer sizes.
 MIPDIS - A utility which disassociates and re-associates data and index files.

FORM 1.1 must be used for AAM file conversion between Initial AAM and Extended AAM file structures.

Conclusions

A detailed description of the announced changes for AAM file processing would only be confusing.

A set of ECMWF test jobs has already been run under NOS/BE Release 4 with positive results for IS, AK, DA and WA file organisations.

The only change introduced affects IS file users. To create Extended IS files they must specify the ORG and NEW parameters in a FILE call/control statement.

The question is : why should the Extended IS be a better choice than the Initial IS? And, if this is the case, why then don't we get the Extended IS by default?

These questions will only find an answer when the new system becomes available. For the time being, IS users are reminded that, if they create Extended IS files, as CDC recommends, the SISTAT utility must be replaced by the FLSTAT utility.

All BAM/AAM users must discontinue their error chasing from file ZZZZZEF. Set fields EFC and/or DFC in your FIT instead and use the CRMEP utility, as described in the the BAM/AAM manuals.

- Luigi Bertuzzi
 - John Greenaway

The Cyber-Cray Link SoftwareIntroduction

The link between back-end (CRAY-1) and front-end (CYBER 175) of the ECMWF computer system is provided by special purpose hardware and software.

The hardware is supplied by Cray Research and couples between I/O channels on the two machines.

The software on the back-end is supplied by the standard Cray-1 Operating System (COS) which contains a "station call processor" capable of handling transmissions governed by a Cray defined protocol.

The software on the front-end machine must be compatible with the Cray protocol. Since ECMWF is the first site to link a CDC machine operating under the standard NOS/BE system to a Cray-1, special development has been necessary to provide this facility. This development is being carried out by CDC (Minneapolis) under a special contract.

Running on the Cyber 175, the station software logically links the operating systems of the 2 computers. It executes at a number of control points under the NOS/BE operating system and provides the following general features:

- a) remote and local batch job access to the Cray-1;
- b) capability to transfer files and magnetic tapes between systems at speeds up to 6 million bits/second (MBS);
- c) limited operator display of CRAY-OS status from the front-end.

Job Transmission

The station is designed to transmit job files between the Cyber and the Cray-1. Control statements for NOS/BE and COS differ to the extent that it is not possible for the same job to run on either system. Therefore, it is the user's responsibility to ensure that the job is properly defined for the mainframe in which it is to run.

Jobs destined for the Cray are first entered into the NOS/BE input queue with the destination computer designated via the "ST" parameter on the job card. Those who have run jobs on the Cray at Rutherford will recognise that this is the same technique used by the QCRAVIN mechanism to transmit jobs.

Each job must commence with a valid NOS/BE job card followed by a valid ACCOUNT statement. The station uses parameters from these statements to build a COS job card and then converts the entire job from NOS/BE 6-bit display code to COS 8-bit ASCII before sending the resultant job to the Cray-1. Output files from the job are automatically returned to the Cyber and disposed according to standard NOS/BE procedures.

The following job card parameters may be used in the generation of a Cray job statement:

Jobname, print limit, field length, time limit, priority.

Ex: EWDD1,STCRA,CM3200,P7,T400. SAMPLE JOB CARD.

It is also possible to send a job to NOS/BE by execution of the DISPOSE control statement on the Cray-1. The resultant file on NOS/BE is entered into the job input queue for subsequent execution. In this case, the first control statement must be a valid NOS/BE job card. The only conversion performed by the station is ASCII to display code for the entire file.

.../...

File Staging

The Cray station provides the capability to stage files between machines; i.e. all transfers are initiated by jobs executing in the Cray-1. The COS control statements ACQUIRE and DISPOSE provide the transfer mechanism and allow for the definition of file sets on removable volumes or in non-default sets. Additionally, tape files may be staged, subsequent to identification by ACQUIRE or DISPOSE parameters.

Upon completion of staging, a message is placed in the dayfile of the Cray job which initiated the transfer.

Files may be transferred in any one of several different modes:

- | <u>Cyber</u> | ↔ | <u>Cray</u> |
|------------------------------------|---|------------------------|
| a) 64 character set (Display code) | ↔ | ASCII |
| b) 96 character set | ← | ASCII (from Cray only) |
| c) bit string | ↔ | transparent |
| d) W type binary (I blocking) | ↔ | blocked binary |
-
- a) Transfers coded files with appropriate conversion by the station so that the data may be processed by an FTN or CFT program utilising formatted I/O.
 - b) ASCII files on the Cray-1 may be transferred to NOS/BE, retaining upper and lower print characters. This conversion is not available on files staged to the Cray-1.
 - c) When a transparent binary file is transferred to/from NOS/BE, no data conversion takes place and the file is transmitted bit for bit. This capability is valuable, for example, to retain on NOS/BE a back-up copy of a COS file. Because no conversion takes place in the station, this mode is particularly efficient. The NOS/BE copy of the file will not normally be processed on the Cyber.
 - d) Transfers binary files so that the data may be processed by an FTN or CFT program utilising unformatted I/O. Note, however, that the only conversion provided by the station is between NOS/BE W type records and COS blocked format. It is the user's responsibility to ensure that data is in the appropriate form; i.e. integer, floating point or character conversion may be necessary. Utilities to perform these conversions are at present being prepared and are outlined in this Newsletter on page 10.

Apart from the automatic handling of Cray-1 \$OUT, \$PUNCH and \$PLOT files, it is possible for the user to direct a file to be printed, punched or plotted by NOS/BE. However, there are no immediate plans to implement a graphics package on the Cray-1.

Status Facilities

Interactive users operating under Intercom on the Cyber can display status information about Cray jobs. The status command allows for the display of jobs in different Cray queues; e.g. input, print, punch, plot, execute, files awaiting transmission, etc. A more detailed status of individual jobs is also available.

Dataset status requests can be used to test whether a permanent file exists on the Cray system.

Cray-Cyber Data Conversion

A data conversion utility is currently being written and will be available on the linked system at Shinfield.

This will accept and produce Cray blocked binary datasets. Such datasets can be obtained on the Cray from the Cyber by using the ACQUIRE control card with the parameter DF=BB. Such datasets can also be sent back to the Cyber by using DISPOSE.

Some examples of data formats that can be converted are:

- a) Real Numbers
- b) Integers
- c) Logicals
- d) Characters

These can be converted on a word, record or file basis.

It will be available as a stand alone utility or as a Fortran callable subroutine.

Full details and syntax will be published closer to the release of this product.

- Gary Harding

Fortran 77 and Fortran 82

As you may know, ANSI have published a new Fortran standard known as Fortran 77. This contains many new features, some of which have been established in current Fortran compilers for some time. Some of the more important additions are itemised below. CDC hope to have a compiler up to the new standard some time next year, and will provide a conversion program to assist in converting current FTN4 programs.

The ANSI Committee responsible for the standard X3J3, have not stopped and are now looking ahead to the next standard revision time in 1982/1983. There is an International meeting being held in London at the end of November under the auspices of the BSI and ISO to present suggestions to the X3J3 Committee. If you have any ideas on what Fortran should look like in the 80's, or even if Fortran should change at all, you are invited to contact me, and I will pass on your suggestions to the Committee.

If you have any other questions about Fortran 77, or CDC's new compiler, I will be pleased to attempt to answer them.

Major Differences between Fortran IV and Fortran 77

- Character data type
- Block IF statement
- General use of mixed mode expressions
- Improved I/O control
- Real variable for DO control
- Expressions allowed in more places.

- Gary Harding, ext. 292

LIBRARIES1. CRAYLIB

Additional mathematical routines have now been obtained from CRI and incorporated into CRAYLIB. They are all coded in assembler and are highly vectorised. The total contents of CRAYLIB are now as follows:

MXM	Matrix multiply
MINV	Matrix inversion
CFFT2	} Fast Fourier Transform
RCFFT2	
CRFFT2	
SNRM2	$\sqrt{(x_1^2 + x_2^2 + \dots + x_n^2)}$
SROT	} Modified Givens rotation
SROTG	
SROTMG	
SROTM	
ISAMAX	Finds element of vector having largest absolute value
SASUM	Sums the absolute values of the elements of a vector
SDOT	Scalar product
SSCAL	Scales a vector by a scalar
SSWAP	Interchanges 2 vectors
SCOPY	Copies a vector

The routines may be obtained by means of the control card:

```
LDR(LIB=CRAYLIB:$FTLIB)
```

The only documentation available to date is for CFFT2.

2. The NCAR Software Support Library

Much of the NCAR library has now been implemented on the CRAY-1. So far, we have little experience of this library in the Centre, but it is quite possible that it contains routines which are currently unavailable from other sources, e.g. NAG.

Packages exist under the following general headings:

```
Solution of nonlinear systems
Determination of roots of polynomials
Interpolation
Approximation
Smoothing
Solution of linear systems
Eigenvalue / eigenvector analysis
Numerical integration
Solution of ordinary and partial differential equations
FFT
Statistical analysis
Random number generation
```

A manual is available in the User Support office as well as output from test programs. The library may be accessed by means of:

```
LDR(....,LIB=NCARLIB:$FTLIB,....)
```

3. Intercom Procedure Library

New users of Intercom on the Cyber quickly realise that a number of very common operations require several commands to be typed. An example is the examination of job output, held under user's terminal identifier in the NOS/BE output queue. The following commands are necessary before any output is obtained:

```
BATCH,filename,LOCAL
PAGE,filename
+
```

It is possible to ease the burden of typing by implementing CCL procedures. These can be made to execute a number of Intercom commands at the expense of one input line.

Several ECMWF computer users have designed and implemented their own procedure libraries. In the interests of efficiency, it is obviously a good idea to supply and maintain a central procedure library, and hopefully stop the proliferation of private versions.

As input to the design of such a facility we ask that all who currently use Intercom procedures supply us with documentation or listings.

We should be pleased to hear from anyone who wishes to contribute ideas.

4. Selection of Widely Used Routines for ECMWFLIB

The Program Library Group are currently engaged in an effort to rationalise program libraries on the Cyber. The aim is to build one central ECMWFLIB which will contain utilities and packages of general interest. In order to establish the initial contents of this library, the contents of P3OBJLIB are being examined. Routines which are widely used will be incorporated into the new library. The list given below has been circulated to most Section Heads with a request to indicate which are used in order for us to put together an initial ECMWFLIB.

PSTMAP	PRINT1
TRANSF	PRINT2
GRIDFG	CONVRT
JTRANS	CONVAR
FILM	GPINIT,GPGRFX,GPAXES, etc.
BCLIN1	LNDSEA
OMEG1	GPGRFP
RUNGK	EXVOLA
FORCE	

Manufacturers' Manuals

1. Changes to Cray and CDC Manuals

Early in September, the following changes were made to the Personal and Office sets of manuals. If you did not receive these updates please contact me (Dave Dent).

Cray Personal Set

CFT Reference Manual (2240009, Rev. C), change packet C-01

Cray Office Set

OS Version 1.0 Reference Manual (2240011, Rev. E)

- this manual replaces the External Reference Specification manual issued previously.

CAL Assembler Version 1 Reference Manual (2240000, Rev. F) plus change packet 01.

CDC Personal Set

FTN Reference Manual (60497800, Rev. C), change packet D.

CDC Office Set

Fortran Common Library Mathematical Routines Reference Manual (60498200, Rev. E.)

Please note that these CDC manuals apply to the test system of NOS/BE Release 4 only.

The CDC reference sets located in Fitzwilliam House, John Scott House and Brandon House have been expanded to include the following manuals relevant to the NOS/BE test system.

BASIC ACCESS METHODS
ADVANCED ACCESS METHODS
LOADER
UPDATE
DIAGNOSTIC HANDBOOK

2. Feedback to Manufacturers regarding their Manuals

One or two people have pointed out to me shortcomings in various manuals from the manufacturers. These have included mistakes in the manual, as well as areas where the manual is far from clear or just downright incomprehensible. Both the main manufactures with whom we deal, (Cray and Control Data) welcome reports from installations concerning their documentation. Thus, if you find any such problems in their manuals, please bring them to the attention of myself (Andrew Lea) or any member of User Support.

- Andrew Lea
- Dave Dent



"I can't understand it - you work at ECMWF - yet every time we go out it rains!"

Significant Modifications to the Cray-1 Software in the July Release

(COS 1.0.2)

The following significant changes have been made to COS in the July release:

- Simplified setting of disc FLAWS.
- Most I/O has been speeded up.
- A MODIFY control card has been implemented to change parameters on a permanent file.
- The mass storage display is now accurate.
- An initial version of BUILD is available. (However, it lacks several features. It is not recommended for use).
- UPDATE has been fixed to prevent unmodified common decks from being put on the compile file if in normal mode.
- The job scheduler now uses initial memory priority in calculating CPU priority so that high priority jobs get a larger proportion of CPU time. All priority levels are distinct.
- A limit can now be set on the size of datasets by setting a parameter in the ASSIGN control statements.
- Files can now span more than one disc unit.

The following problems have become apparent during the past few weeks of operational use of COS 1.0.2:

RELEASE

There is a system fault which has the effect of RELEASEing datasets which should only have been closed. Temporarily, avoid the problem by removing all RELEASE control statements. However, execution of a CAL statement may also cause the problem to appear, as CAL releases a work-dataset internally.

.../...

BUFFER IN/OUT A 'BLOCK NUMBER ERROR' can occur when handling large records with small system buffers (e.g. default size of BS=4). The problem will usually go away if BS=22 is coded on the ASSIGN statement.

SSWITCH The utility subroutine SSWITCH as documented in CFT Reference Manual is not available.

BUILD Fails constantly when attempting to create a new library.

SAVE Although in theory it is possible to have 4095 editions of a dataset, in practice part of the dataset catalogue becomes full when a much smaller quantity exists, with the message "DSC FULL". This situation occurred last week, and generated other problems in running jobs on the Cray.

 Please avoid this by restricting multiple editions to a small number.

DISPOSE The use of the control card DISPOSE with DC=IN to initiate a new Cray job from a running job has been found to cause system crashes. It seems that the code for this facility is very deficient and will not be fixed for some time. Therefore, the parameter DC=IN on the Cray DISPOSE control card must not be used until further notice.

- Neil Storer
- Dave Dent

Cyber PF Space Control

1. All users of Cyber permanent files are reminded that each user ID is restricted to a limit of 100 Rbs.
2. If you have a temporary essential need for more than 100 Rbs please contact Graham Holt or the Shift Leader on duty.
3. A new control procedure has been implemented as follows:
 - a) User ID limit of 100 Rbs continues.
 - b) Each day at about 1430 hours, an audit of disc space will be taken. The free disc space will be compared with a predetermined value, if insufficient free space exists, those users exceeding 100 Rbs will be selected in offending order. The selected user ID's will be purged dumped to tape by selecting the files least frequently accessed for purge dumping.
 - c) The dump tapes used will be allocated to the relevant users within the tape library. Only 1 copy of each tape will exist therefore the data is insecure.
 - d) Affected users will be contacted to inform them of the action taken, further a copy of the Purge Dump output will be sent to them.
 - e) To reload files from dump tapes, the user must make a request to Graham Holt or the Shift Leader on duty, giving full information from the Purge Dump output for those files to be reloaded. When the operators have completed the reload, a copy of the PFLOAD output will be sent back to the user as confirmation.
 - f) If any files which are not reloaded need to be retained, these must be copied to user magnetic tapes for security of the data.

- Eric Walton

GRAPHICS

Varian Basic Software

Users who produce graphical output with the Varian Basic Software are warned not to call the routine ENDPLOT. This routine causes the plot tapes to be rewound. The operators will then have difficulty plotting subsequent jobs from that tape. Users of the Contouring Package are not affected. A Computer Bulletin will shortly be available on the Varian Basic Software.

Changes to Graphics under the New System NOS/BE 1.3

The only change users should find with the new system is that the date (plotted with the jobname at the beginning of the plot) will be in the form YY/MM/DD

e.g. 78/08/31

and not 31/08/78 as previously.

- Howard Watkins

Cyber Advanced User Course

The June course given by Neil Storer had to be postponed twice at short notice, due to unforeseen difficulties. When it was eventually held, some who had asked to come on it could not attend it at all because of prior commitments. We regret due to pressure of work, it will not be possible to repeat the entire course but it may be possible to repeat some parts if there is sufficient demand. Will anyone who missed part of the course and would like that part repeated, please contact me.

- Andrew Lea

User Support Staff

John Greenaway joined User Support on 1 August. His role will be to work on the software libraries, initially this will be the NAG library. He has provided below a short biography.

Mrs. Pam Prior joined User Support on 18 September. Pam's work will be to look after documentation, this will include the manufacturers' manuals as well as locally produced material.

- Andrew Lea

John Greenaway - an Introduction

I joined the User Support section officially at the beginning of August, although taking a week's break (to recover!) before commencing my duties on 8 August. Previously I worked at Imperial College Computer Centre for 8 years in a similar role. My experience in the Advisory area should prove useful, although my knowledge has been more closely concerned with the NOS/KRONOS system. This had a very different time-sharing system to INTERCOM, and also a different permanent file system. I have had some knowledge of NOS/BE, but it was of a less detailed nature. So bear with me, if you find my knowledge a little 'rusty' at the beginning, whilst I become Experienced with the new system, i.e. add a BE to my NOS knowledge, and also learn about the Cray.

- John Greenaway

Q and A

Q. When, for example, listing a file at a VDU terminal, I hit the interrupt key, it sometimes scrambles the session, taking up to half an hour of effort to recover. Can something be done to stop "interrupt" having such disastrous effects?

Stefano Tibaldi

A. This is a complex problem caused by an interaction between the design of the terminals, the way the datalink links are configured, and the over sophisticated features available on these VDUs.

When we are at Shinfield, it should be possible for us to program the 2551 communications processor to avoid the problem you now see when you hit the BREAK key, though it will be some time before we can spare the effort to do this.

Perhaps the next set of VDUs purchased will not include the sophisticated features which cause us all these problems. We do not see these problems on our other terminals (DECWRITER, SILENT 700, CDC or TEKTRONIX) which lack these features.

I am surprised that it can take you 30 minutes to recover from a problem. I would like to see how this occurs.

Peter Gray

Q. I have heard that at Shinfield when we login to INTERCOM, we will get a different (two character) id every time. If this is true it will have a fairly disastrous effect on terminals users, especially when it comes to output routing, etc.

Andrew Lorenc

A. The above was first thought to be the case, but is now known to be not true. At Shinfield, as now, you will have the same id everytime you login, also irrespective of which terminal you login from. What may be true is that the id you have at Shinfield may be different from that which you have now.

Peter Gray

Q. It would be very valuable to have the ability to write procedures on the Cray (as one can write CCL procedures on the Cyber).

Chris Clarke

A. There is no such facility at the moment. The Centre has put it on a "wish-list", which is going before the Cray User Group in September, to be forwarded to Cray Research Inc.

Dave Dent

Possible Vacancies within the Computer Division

A possible series of vacancies will arise within the Computer Division of the Centre as of 1 January 1979. Applications are invited now, the closing date for all posts being 10 November 1978. Application forms can be obtained from the Centre or from the meteorological offices of the member countries. In any enquiry please quote the post number.

For all posts, the following holds:

LOCATION: ECMWF Headquarters at Shinfield, Near Reading, Berkshire, UK.

STARTING DATE: 1 January 1979

QUALIFICATIONS: In addition to any specific qualifications attached to the particular post, fluency is required in one of the working languages of the Centre, and a good knowledge of at least one of the others. The working languages of the Centre are English, French and German.

REMUNERATION: Depending on the grade, as follows:

A2/3	£649.68	to	£1084.18	per month
B5	£404.43	to	£537.17	per month
B4	£354.65	to	£470.80	per month
B3	£309.03	to	£410.13	per month

plus, where applicable, household allowance (6% of basic salary), children's allowance (£38.06 per child), education allowance and, for non-UK residents, expatriation allowance (16 - 20% of basic salary).

All remunerations are net of tax.

POST: Deputy Head of Computer Operations Section

POST NO.: C101

GRADE: A2/3

FUNCTION: The Deputy Head of Computer Operations will assist the Head of the Section in managing the day-to-day computer operations. He will be responsible for the work schedules and operating procedures, for the training of operators and the stock control of consumables and spares. He will be involved in the planning of equipment changes, the liaison with manufacturers' maintenance engineers. He will take part in the analysis and control of computer room activities and utilisation and performance of the computer system.

QUALIFICATIONS: Candidates must have at least five years experience in the organisational aspects of a large scale scientific computing environment. University education or equivalent experience and knowledge in the principles, capabilities and operating techniques of modern data processing equipment. Experience with meteorological applications would be considered an advantage.

POST: Telecommunications Engineer

POST NO.: C103

GRADE: A2/3

FUNCTION: The engineer will report to the Head of Computer Operations Section. He will be responsible for all data transmission hardware, circuits and terminal equipment, within the Centre's Headquarters, for an external private network of medium- and low-speed connections to 17 countries, also for in-house terminal circuits.
He has to ensure that installation, operation, maintenance and repair of data transmission facilities, including PTT services, modems, test equipment, network processor interfaces, terminals and internal data circuits are properly carried out. He will have to train and assist computer operators in the area of data transmission operation.
He will be involved in development of new data transmission facilities and technical specification and evaluation of new equipment and maintenance contracts.

QUALIFICATIONS: A university education or equivalent. Sound experience over a number of years in installation and maintenance of advanced data transmission systems is essential. First hand knowledge of telecommunications techniques and the operation of a large computer installation is most desirable.

POST: Shift Leader

POST NO.: C10X

GRADE: B5

FUNCTION: The Shift Leader will report to the Head of Computer Operations and be fully responsible for all duties of a shift team operating the computer systems. He will participate in all standard Computer Room activities and will be responsible for the implementation of installation standards and procedures; he will also be expected to contribute by assisting the Head of Computer Operations. He will be responsible for organisation of work so as to ensure optimum use of the systems, for reporting on all operational aspects and will carry out other duties as may be necessary for the smooth running of Computer Operations.

QUALIFICATIONS: Candidates must have at least 3 years operating experience in a large scale scientific computing environment and experience in a supervisory capacity, and be able to demonstrate their ability. CDC experience would be an advantage. The post calls for a good standard of achievement in secondary education. The possession of a Higher National Certificate, or equivalent, in computer related subjects, would be considered an advantage. Applicants must be prepared to work a shift system including weekends and public holidays.

POST: Console Operators

POST NO.: C119 - C125

GRADE: B4

FUNCTION : The Console Operator reports to a Shift Leader and is responsible for controlling the computer systems via central consoles.
The successful candidates will assist the Shift Leader in providing a computer service for local batch work and supporting remote batch stations and terminals.
Additionally, the Console Operator will perform the operation of off-line equipment, the control of input and output batch workloads, performing maintenance procedures on peripherals, reporting faults and monitoring performance of all equipment and carrying out any other tasks which are essential to the smooth running of Computer Operations.

QUALIFICATIONS: Candidates must have at least 2 years' operating experience in a large scale scientific computing environment and be able to demonstrate their knowledge. CDC experience is an advantage but not essential. The posts call for a good standard of achievement in secondary education. The possession of Higher National Certificate, or equivalent, in computer related subjects, would be considered an advantage. Applicants must be prepared to work a shift system including weekends and public holidays.

POST: Computer Operators

POST NO.: C126 - C130

GRADE: B3

FUNCTION: The Computer Operator reports to a Shift Leader and is responsible for the operation and daily maintenance of peripheral equipment and the handling of computer input and output. Reception duties will involve direct contact with the computer users.
Additionally, there will be tasks concerning the operation of off-line equipment and the tape library and tape certifiers/cleaners.
Some operators will work in a full shift system, including weekends and public holidays.

QUALIFICATIONS: Candidates must have at least 18 months' experience as Computer Operator or Computer Receptionist, preferably in a large scientific installation. CDC experience would be an advantage but not essential. Candidates must be able to communicate with staff on all levels.

DIARY

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

Daily NOS/BE 1.3 test sessions every evening between 1530 and 1800.
Peter Gray

Friday 29/9/78 Cyber service ceases at Rutherford for approximately 1 month.
1100 Rob Brinkhuysen

However, there is a possibility that the Cyber will be available for a limited one shift service during the latter part of October (without RJE facilities).

Interim Cray service continues at Rutherford but access is via the Eclipse card reader/line printer only.

Rob Brinkhuysen

Wednesday 1/11/78 Cyber service resumes at Shinfield.

Rob Brinkhuysen

Until the start of the Cray service at Shinfield, the interim Cray service at Rutherford continues (3 shift cover); operator cover for the Cyber is planned during office hours (day shift). The Cyber will be available to the users during the other hours, except the test sessions, but without operator cover (no tape or private pack jobs).

Monday 13/11/78 Cray (1 Mword) service opens at Shinfield. Service on $\frac{1}{2}$ Mword Cray at Rutherford ceases.

Rob Brinkhuysen

Monday 13/11 to Both machines unavailable for 5 hours each day, due to link
late November 78 development tests.

Peter Gray

Mid November Full operator cover (4 shifts covering 7 days a week).

Eric Walton

Late November Both machines unavailable for two days to enable 2nd provisional acceptance tests to be run.

Rob Brinkhuysen

December to mid- Cyber unavailable 2 hours each day, for graphics and communications
February system development and installation tests.

Peter Gray / Fritz Königshofer

Dataset Backup at Shinfield

Prior to the second provisional acceptance tests, the link between Cyber and Cray will not be available. Hence, the Cray will be accessed in the same way as at present, via the utilities QCRAVIN and QCRAVOUT.

When the link software is fully operational, it is planned to treat the Cray mass storage as a cache memory. This means that datasets catalogued on the Cray will remain there for only a short time, as there will be a regular PURGE. It will be the user's responsibility to transfer files for permanent storage to the Cyber. After a suitable initial period, the present backup protection provided by the DUMP ID scheme will be discontinued, leaving sufficient time for those files to be transferred to the Cyber before the catalogue is purged.

- Peter Gray

Previous 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. 286).

	<u>Newsletter</u>		
	<u>No.</u>	<u>Date</u>	<u>Page</u>
<u>CRAY-1</u>			
Back-up of permanent files via the Eclipse	9	July 78	7
Bug list for users to inspect	7	April 78	7
Computer configuration	5	Jan. 78	1
Dataset identification convention	9	July 78	10
Fast Fourier Transforms	8	May 78	1
I/O transfer rate tests	9	July 78	4
Libraries - CRAY	10	Sept. 78	11
- NAG	8	May 78	8
- NCAR	10	Sept. 78	11
Service Schedule	6	March 78	3
Software - July release of COS/CFT,etc	8	May 78	7
	and 10	Sept. 78	14
Transfer of CB files to the Cyber (DSOUT)	7	April 78	6
UPDATE - advice for users	5	Jan. 78	5
 <u>CYBER 175</u>			
Computer configuration	5	Jan. 78	1
Disk packs (844-41, double density)	8	May 78	5
Fortran - Ill conditioning in programs	4	Nov. 77	4
- MNF compiler for debugging	1	Aug. 77	1
Libraries - CERN	9	July 78	14
- NAG	8	May 78	8
Job Scheduling	7	April 78	3
NOS/BE Release 4 upgrade	10	Sept. 78	3
Permanent file space control	10	Sept. 78	15
Record Manager changes under NOS/BE (release 4)	9	July 78	8
Routing printed output	7	April 78	5
Service Schedule	6	March 78	3
Terminals - Newbury VDU problems	8	May 78	4

.../...

GENERAL

Cyber-Cray link software	10	Sept. 78	8
Documentation - Computer Bulletins	6	March 78	3
- Computer Manuals	8	May 78	6
- News Sheets	4	Nov. 77	2
Fortran 77 and Fortran 82	10	Sept. 78	10
Fortran 77 in more detail	2	Sept. 77	4
Graphics - Tektronix 4014 plans	9	July 78	3
- Versatec plotter plans	6	March 78	2
- Versatec software plans	9	July 78	3
Shinfield moves - Oct. to Dec. 78	8	May 78	2
- updated plans	9	July 78	8
Telecommunications project	8	May 78	4
Transport schedule to Rutherford	6	March 78	3

METEOROLOGY

First GARP Global Experiment (FGGE)	10	Sept. 78	1
Operational forecast suite	7	April 78	1
Spectral model	9	July 78	1
Spring Experiments (1973)	6	March 78	1

This Month's Laws

Gilb's Laws of Unreliability

- 1) Computers are unreliable, but humans are even more unreliable.
Corollary : At the source of every error which is blamed on the computer, you will find at least two human errors, including the error of blaming it on the computer.
- 2) Any system which depends on human reliability is unreliable.
- 3) The only difference between the fool and the criminal who attacks a system is that the fool attacks unpredictably and on a broader front.
- 7) Undetectable errors are infinite in variety, in contrast to detectable errors which by definition are limited.
- 9) Investment in reliability will increase until it exceeds the probable cost of errors, or until someone insists on getting some useful work done.

USEFUL NAMES AND PHONE NUMBERS

		<u>Room</u>	<u>Ext.</u>
ADVISORY - Cray	David Dent	BH102	286
- Cyber 175	Luigi Bertuzzi, John Greenaway	BH103	284
Computer Division Head	Rob Brinkhuysen	FH509	210
Computer Terminal Rooms	- Brandon House	BH107	296
	- Fitzwilliam House	FH401/2	225/229
	- John Scott House	JS Central Room	256
Disk Space and Permanent File Problems		As for ADVISORY	
DOCUMENTATION	David Dent, Pam Prior	BH102	286
INTERCOM - registering new users	- Jean-Luc Pepin	BH111	294
OPERATIONS -	Computer Room Rutherford		(0235) 838099 or
	Graham Holt		(0235) 21900, x229
	Eric Walton	RL2-40	(0235) 83288
Research Dept. Computer Co-ordinator	- Rex Gibson	FH411	248
Tape Requests	Pauline Litchfield	As for OPERATIONS	
Terminal Problems		As for ADVISORY	
User Support Section Head	- Andrew Lea	BH101	289