



# European Centre for Medium Range Weather Forecasts

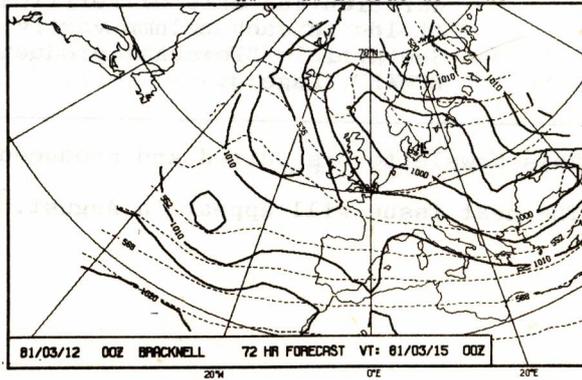
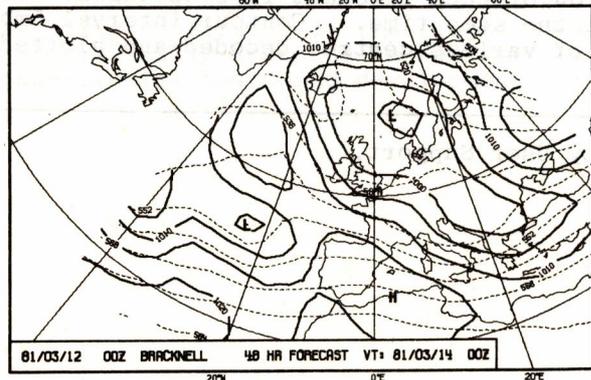
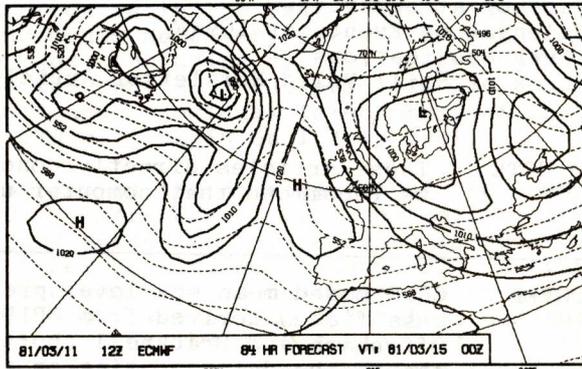
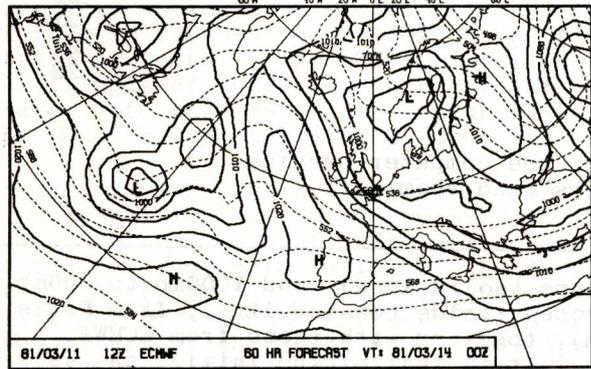
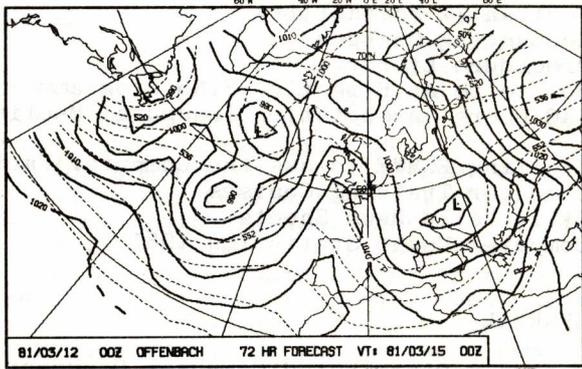
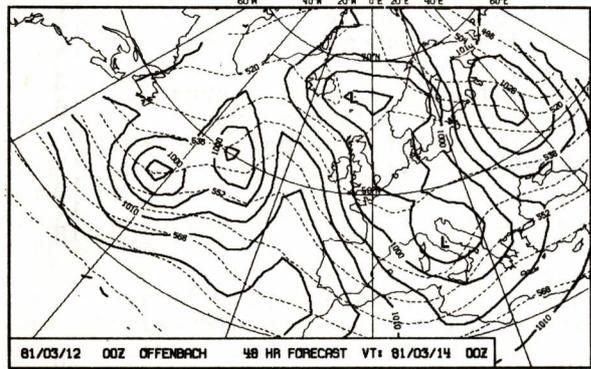
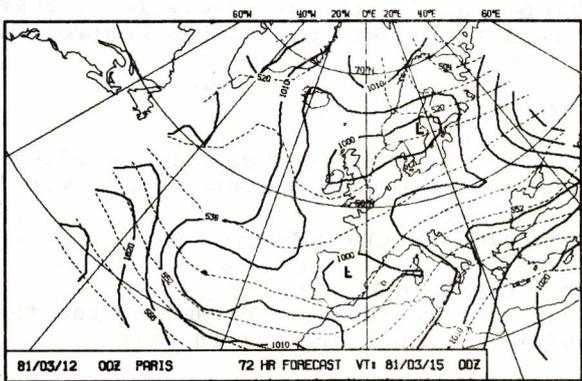
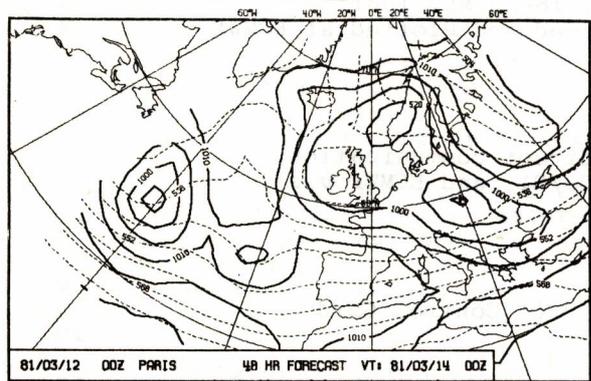
## ECMWF NEWSLETTER

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**NOT TO BE  
TAKEN AWAY**

Number 9 - June 1981



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\* NOTE: These articles directly concern the computer service, we recommend that computer users read them all.

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COVER: GRID coded mean sea level pressure (solid line), and 1000mb to 500mb thickness fields derived from GRID coded fields (dashed line), from Paris (top), Offenbach and Bracknell (bottom), together with those from ECMWF. In each chart, the date and time on the left is that of the initial analysis. The duration and date of verification of each forecast is also shown. The fields in each column verify at the same time. Contour interval 5mb, 80m. See article "Forecast products of various centres decoded and plotted at ECMWF", Page 3.

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This Newsletter is edited and produced by User Support.

The next issue will appear in August.

PROGRESS IN 1981 IN THE OPERATIONS DEPARTMENT AT ECMWF

Perhaps the most important aspect to be noted first is that the routine production of the medium-range forecasts has been continued in a reliable way. So far in 1981, the production of not one forecast has been lost, although it must be admitted that there was a delay of 14 or 15 hours on one occasion in March, with shorter delays of 2-3 hours on several other occasions. As anticipated in my article looking forward to 1981 in the February Newsletter ("Operational Forecasting at ECMWF in 1981"), a number of changes have been made to the forecasting system (i.e. the introduction of corrected humidity analyses, and the more accurate representation of topography and coastlines). Following these changes, additional forecast parameters have been made available for dissemination to Member States including model output wind at 10m and predicted cloud either in the form of a cloudiness parameter, or possibly in a digitally coded form of the "pseudo-satellite" pictures. It is expected that precipitation predictions can also soon be distributed to Member States.

Concerning the quality of the Centre's forecasts, it is encouraging to report that at the recent "Annual Meeting of Forecasters" held at the Centre on 18-19 May, it was concluded that there was "evidence for an improvement in the quality of the Centre's products" over the past year, and that they continue to be regarded "as good or better" than any other forecasts available operationally. A fuller report on the Forecaster's Meeting appears elsewhere in this Newsletter.

With the continuing development of the telecommunications network, more Member States are receiving more products from the Centre. Medium speed lines to France and Ireland have become operational allowing dissemination of an increased range of products to France, and products to be transmitted operationally for the first time to Ireland. As I also reported in my article in February, still wider dissemination of the Centre's products can be expected as the Centre will soon distribute some of its products to non-Member States via the WMO Global Telecommunications System. In connection with arranging for this distribution, the WMO has undertaken a survey of all its Members concerning their requirements for ECMWF products; 40 replies have been received by the WMO. The products offered by the Centre for distribution covered the northern hemisphere, tropical belt, and southern hemisphere; requests were received for data from all these areas and all available verifying times. For many of the areas and verifying times there were a considerable number of requests (as many as 17 or 18 for some northern hemisphere products), but the requirements for southern hemisphere data were significantly lower. In practice, the Centre initially expects to distribute forecasts as far as five days ahead for the northern hemisphere, two days for the tropical belt and four days for the southern hemisphere. The WMO survey also showed that distribution of the products in the FM47-V GRID code form was preferred to the GRAF code form. The arrangements necessary for distribution of the Centre's products or the GTS continue to be made, including establishing the full list and catalogue of bulletins to be prepared by the Centre. The products will be injected onto the GTS at the Bracknell and Offenbach Regional Telecommunication Hubs. It is hoped transmission of products on the GTS will begin on 1 July 1981.

Otherwise in the Centre, there is steady progress in the development of the computing and technical facilities as approved in 1980. Extra Cray-1 disc controllers and discs, doubling the available on-line space, are scheduled for delivery in July. Planning for the installation of the second Cyber is also well advanced. A Cyber Model 730E proved to be the most cost-effective choice, and benchmark tests have shown it to be somewhere between 35 and 50% of the power of the Cyber 175, depending on the nature of the workload. Installation is expected in October. At the telecommunications level, additional hardware is being purchased to complete the duplication of the essential elements of the system, and thus result in increased reliability. Finally in the graphics area, the Aydin colour display terminal was provisionally accepted in February, a link established to the Cyber; and a series of experimental tests and developments in displaying meteorological data are under way.

Daniel Söderman  
Head, Operations Dept.

THE SECOND MEETING OF FORECASTERS, ECMWF, 18-19 MAY 1981

Fourteen delegates from twelve Member States of ECMWF attended the Second Meeting of Forecasters at ECMWF. A stimulating and mutually informative exchange of views took place.

The meeting was opened by the Director of ECMWF Mr. J. Labrousse. Dr. M. Capaldo of Italy was elected chairman.

Following this, during the first day of the meeting, papers were presented by the delegates on the use and evaluation of ECMWF products in the various Member States. Since the last Forecasters Meeting, the communications network linking the Centre and Member States has developed substantially with the establishment of several further medium speed lines. Thus many more Member States are now receiving the products regularly on an operational basis and some are receiving a wider range of products. It emerged from the presentations that ECMWF products have become essential and integral parts of the routine operational forecasting system in the majority of the Member States. The various presentations gave examples of the use of ECMWF forecasts in many areas such as ship routing, marine and agricultural forecasting and general forecasting for the media and for the public.

The meeting considered the quality of the Centre's products as revealed by the presentations, and concluded that there was evidence for improvement in the quality of the Centre's products since the last Forecasters Meeting, held in June 1980. Although delegates' presentations showed that the forecast quality as far as four days was very good, some concern was voiced at the quality of the six and seven days forecasts, which, with present techniques, are found to be operationally usable less than 50% of the time. During the second day, general discussions on a number of other related topics took place. In particular, it was noted by several of the delegates that variability in forecast quality is associated with different synoptic situations. Based on Member States experience, the forecasts perform better in situations of meridional flow (such as blocks) while phase errors occur in the forecasts in cases of high zonal index. It was noted that known systematic errors of the model, including southerly displacement of the jet stream over Europe and low phase speed of zonal waves in more northerly latitudes, are of some concern operationally and the meeting recommended that the Centre should give high priority to their correction.

A lot of interest was expressed in the availability of derived parameters, including model-predicted cloudiness, 10 metre wind, precipitation and 2 metre temperature. The Centre was encouraged to continue the development of such products.

The meeting considered the general question of verification of Centre products, both objective and subjective. It was concluded that the continuation of subjective evaluation should be encouraged, but that it should be optional for each Member State. The meeting recommended that the Centre should continue to produce and publish objective verification statistics. Comparison of ECMWF forecasts with those from other major forecasting centres should be continued.

The official report of the meeting will be available shortly.

- R. Newson

\* \* \* \* \*

FORECAST PRODUCTS OF VARIOUS CENTRES DECODED AND PLOTTED AT ECMWF

For decades, forecast products have been exchanged between forecast centres by means of facsimile chart transmission, whereby a copy of a plotted chart is produced by a facsimile machine at the receiving centre. The disadvantages of this method of exchanging forecast information include:

- Lack of uniformity. Each forecast centre has its own format of chart design, including variations in scales, areas, contour values and intervals.
- Time required. It can take up to 20 minutes of valuable time on a transmission line to transmit a single chart.
- Lack of flexibility. The receiving centre cannot process the received information further.

In recent years, however, forecast (and analysis) information has increasingly become available on the Meteorological Global Telecommunications System of the WMO in digital form, i.e. in the form of GRID code messages. Any forecast centre is free to decode and plot these data for any required area covered by the GRID bulletin in any suitable scale, choosing its own contour values and intervals in plotting the charts. The transmission time required for a chart covering e.g. one-quarter of the Northern Hemisphere is measured in seconds rather than in minutes, and the receiving centre is free to process the received data as it requires.

The European Centre for Medium Range Weather Forecasts currently makes use operationally of GRID code products from two World Meteorological Centres (WMC Washington and WMC Moscow) and three major European centres (RMC Bracknell, RMC Offenbach and NMC Paris).

A selection from a typical set of maps produced daily at ECMWF from GRID code messages is shown on the cover and in Figures 1 and 2. The cover picture shows regional area sea level pressure and 1000mb to 500 mb thickness forecast fields for 48 and 72 hour forecasts from NMC Paris, RMC Offenbach and RMC Bracknell, and 60 and 84 hour forecasts from ECMWF valid at the same time. Note that in this figure, and also in Figures 1 and 2, all the products in a vertical column are valid at the same time. In each chart, the date and time on the left is that of the initial analysis from which the forecast was run.

Figure 1 shows Northern Hemisphere 500 mb height forecast fields for 48 and 72 hour forecasts from WMC Washington and WMC Moscow, and corresponding ECMWF forecasts. Note how easy it is to compare and contrast the forecasts when they are plotted in the same format with the same scale, contour interval etc.

Figure 2 shows difference fields between ECMWF and WMC Washington forecast, obtained by subtracting the lower charts in the columns on the figure.

Because of operational constraints, these maps are normally produced in the early hours of the morning upon completion of the daily ECMWF forecast run based on 12Z data. Thus, the ECMWF forecasts shown in the figures are 12 hours shorter for the hemispheric fields and 12 hours longer for the regional fields, than the products from other centres.

The GRID data received by ECMWF are used mainly for the real-time and delayed monitoring of the performance of the ECMWF operational suite. This means that all the GRID products are normally converted into maps, as shown in the figures, for inspection by meteorologists. The convenience of having the possibility of depicting products from different centres, all in exactly the same format, is clearly shown by the figures.

Some additional advantages of receiving the products in digital form are also identified by studying the figures i.e.:

- (i) possibility of conversion from 1000 mb height to sea level pressure (cover);
- (ii) possibility of depicting 1000 mb to 500 mb thickness when having access to the original height fields (cover);
- (iii) enhanced possibility of studying differences between products from two centres by computing difference fields (Fig. 2).

Naturally, many other possibilities of manipulating digital fields can be envisaged.

At a recent meeting of the Region VI Working Group on Coordination of Requirements for Data in GRID code form, it was decided that for regional products, the data would have a standard resolution of 2.5 x 2.5 degrees, and individual bulletins would cover standard areas with the two basic options being defined as follows:

- (i) 25-75°N and 67.5°W-22.5°W, 22.5°W-22.5°E, 22.5°E-67.5°E.
- (ii) 25-75°N and 90-45°W, 45°W-0°, 0°-45°E, 45-90°E.

One or several of the sectors of either option could be used by regional and national centres in RA VI for distribution of their regional analyses and forecasts.

- Daniel Söderman

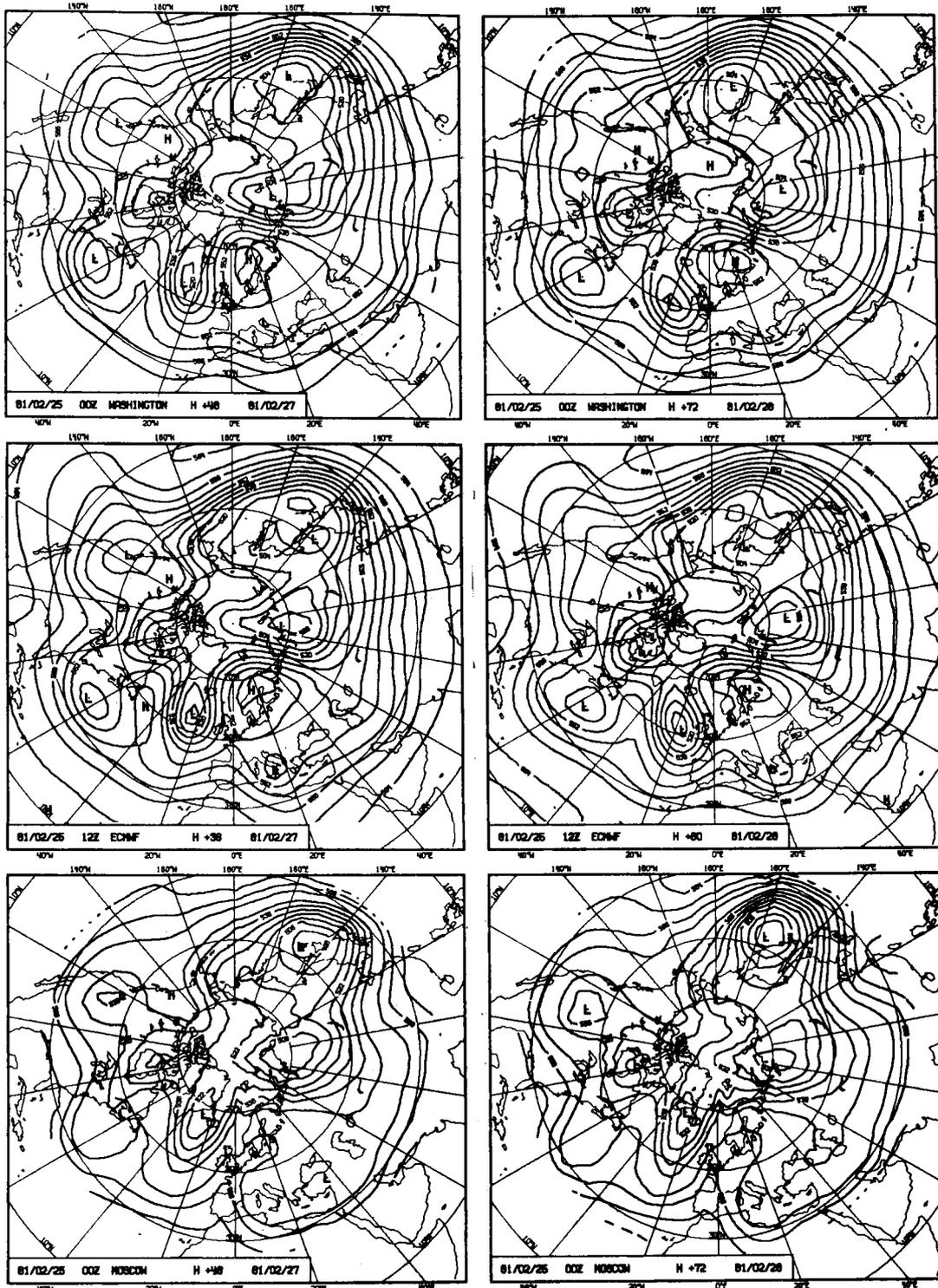


Fig. 1. GRID coded 500mb geopotential analyses and forecasts from WMC Washington (top) and WMC Moscow (bottom), together with ECMWF analyses and forecasts. In each chart, the date and time on the left is that of the initial analysis. The duration and date of verification of each forecast is also shown. The fields in each column verify at the same time. Contour interval 80m.

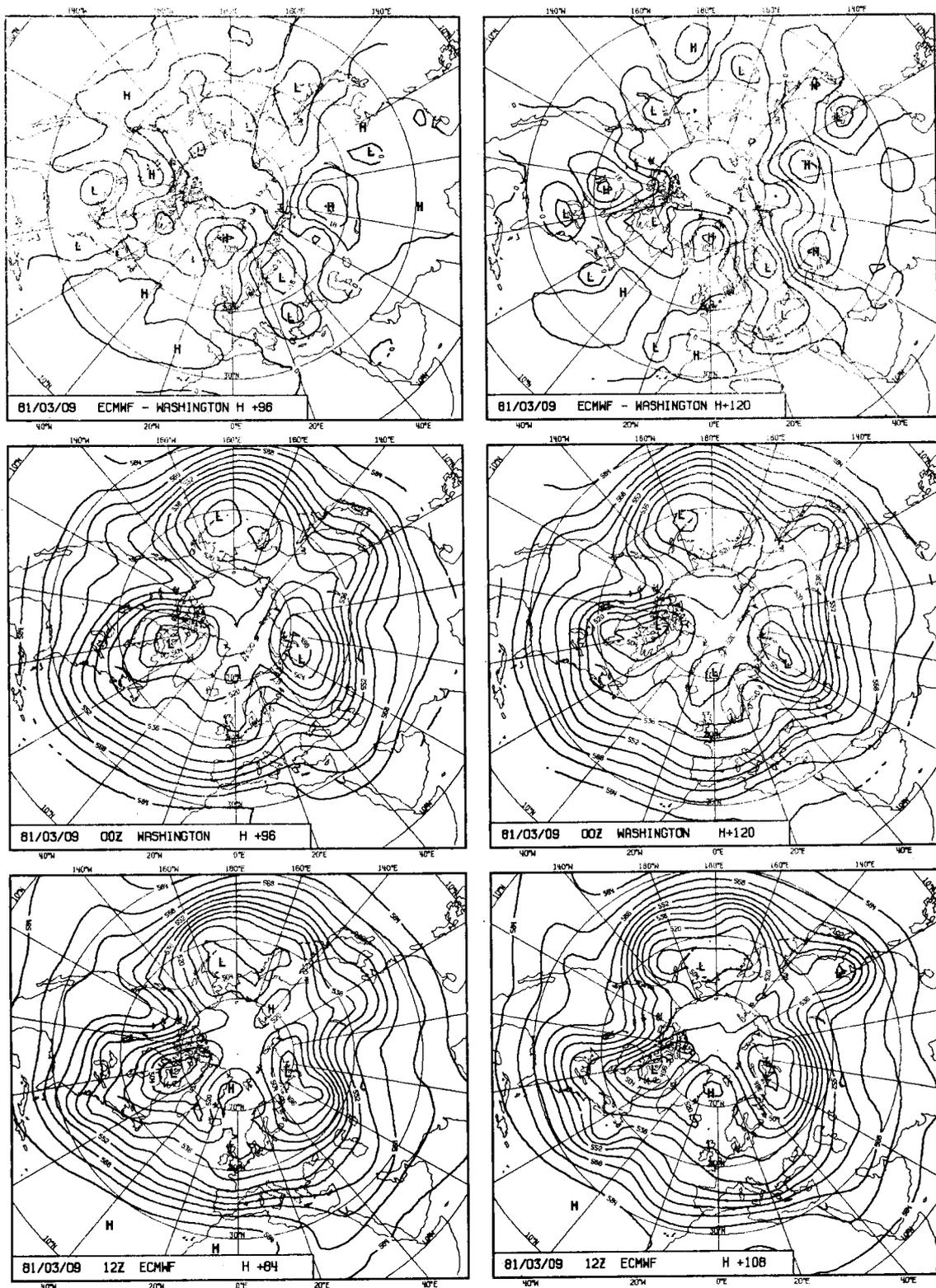


Fig. 2. Difference fields (top figures) obtained by subtracting WMC Washington grid coded 500 mb height fields (centre figures) from the corresponding ECMWF fields valid at the same times (bottom figures). Contour interval 80m.

A SYSTEM AT SMHI IN SWEDEN WHICH ALLOWS DIRECT  
COMMUNICATION BETWEEN THE MAIN COMPUTER, A UNIVAC

1100/21, AND ECMWF VIA A RC 3600

Background

In June 1978 we installed a RC 3600 as a RJ-terminal to our Univac 1100.

In January 1980 the RC 3600 was upgraded and connected to ECMWF as a RJ-terminal and for transmission of DD-files from ECMWF to Sweden. At first, we had to enter with different programs, NTR for communication with Univac and NTS for communication with ECMWF.

During the first 2 months we had to use a cardreader for RJ to ECMWF.

In March 1980 we introduced special software in the Univac that made it possible to prepare jobs for ECMWF from Univac demand terminals.

These jobs were stored on a file in the Univac disc system and the operators had to copy that file to magnetic tape, move the tape to an RC 3600 tape unit for transmission to ECMWF.

Present Status

In January 1981 we extended the memory in RC 3600 from 64 to 128 k bytes and installed new communication software. This software, developed by SIA, is a combination of NTR and NTS and allows direct communication between Univac 1100 and ECMWF.

RC 3600 is now an RJ-terminal both to the Univac and to ECMWF with integrated communication software. We can enter the Univac by cards and ECMWF either by cards or tape. The format of the first card indicates whether it is a job for the Univac or for ECMWF.

At the same time, the RC 3600 is a communication-computer between the Univac and ECMWF.

Jobs for ECMWF are generally prepared from the Univac demand terminals. At present we have 10 demand terminals in different offices within the institute and one in the Meteorological Institute at the University of Stockholm (MISU). There are automatic controls of USER IDENTIFIER and PROJECT IDENTIFIER for CYBER/CRAY jobs in our Univac system.

When jobs are prepared they are directly transmitted from the Univac to ECMWF.

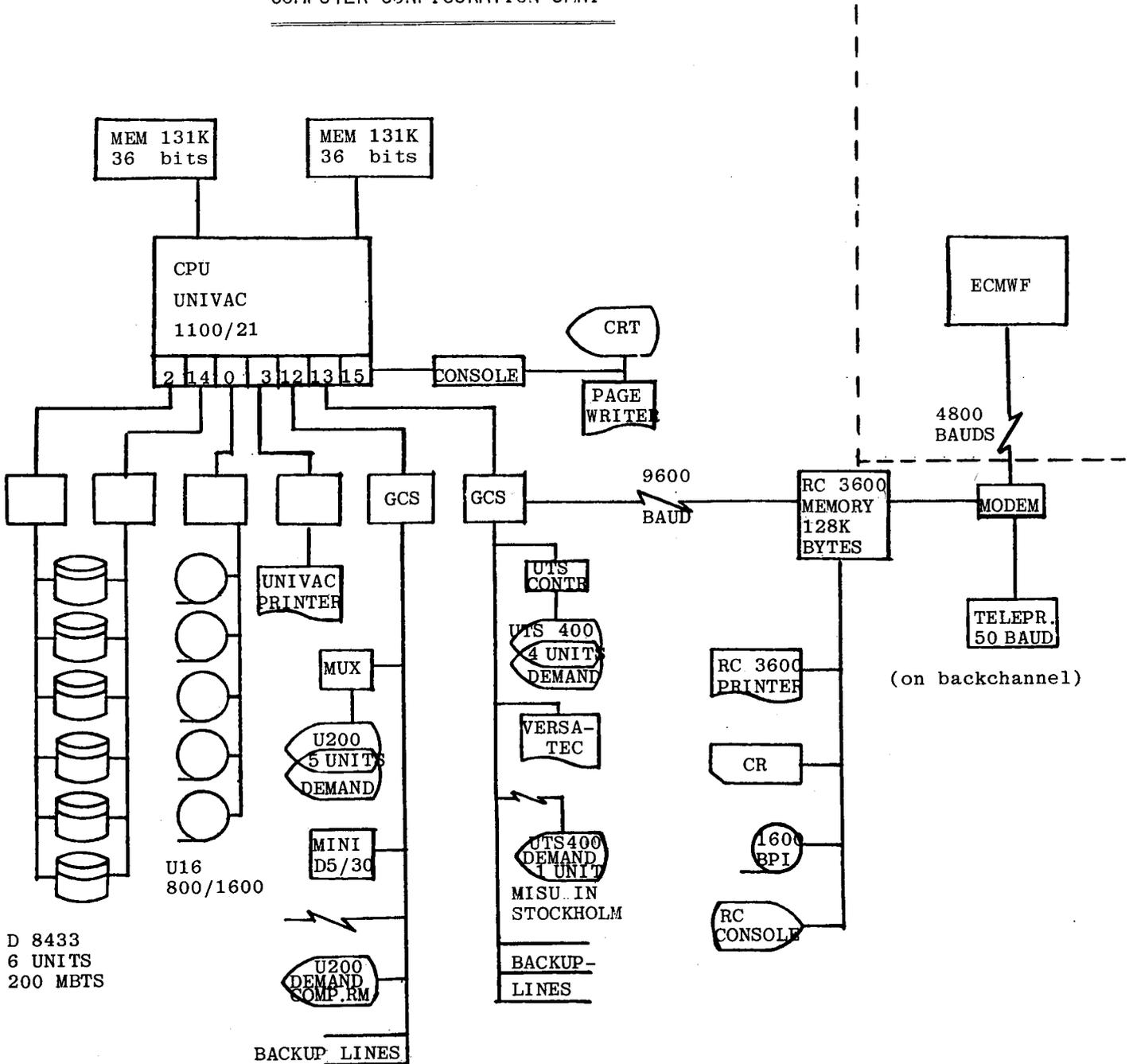
The results from ECMWF are transmitted to the Univac. If there are less than 25 pages the printouts are directed to the RC 3600 printer, if more, to the Univac printer.

As MISU in Stockholm has no printer their results are stored in a special file in the Univac disc system and they can inspect the results on their Univac UTS 400 display. They can also order printouts of results. Such printouts are delivered by mail to MISU.

The new system is very convenient and time-saving. The communication software is stable and as a rule the only operator intervention needed is to handle the printouts.

- Arne Lindblad,  
Swedish Meteorological &  
Hydrological Institute.

COMPUTER CONFIGURATION SMHI



TELECOMMUNICATIONS NEWSThe State of the ECMWF Network (ECNET)

The topography of the ECMWF's medium-speed lines network currently covers Denmark, Germany, Ireland, France, Sweden and the UK.

Soon, Finland will join our Medium-speed community, shortly followed by The Netherlands, Austria and Portugal.

The telegraphic lines of our low-speed network will slowly cease existence as medium-speed links become operational. At the end of this year, only Spain, Greece, Italy, Yugoslavia, and Turkey will still be serviced via this medium.

Recent Upgrades in our Telecommunication Subsystem

The move towards a full duplication of our NFEP (Network Front-End Processor) is now about to be completed.

The completion of the Provisional Acceptance of additional HDLC controllers (medium speed lines access) and TMX hardware (low-speed lines access) has left the back-up system identical to the NFEP system as far as the network is concerned.

The upgrade of the Mass Storage connected to the back-up system is still outstanding due to a damaged disc drive unit. Soon, a replacement of this unit will raise the back-up hardware into a full replica of the NFEP hardware

Switching from one system to the other is now an easy task; indeed, as both telecommunication systems are simultaneously accessible through Intercom, the dissemination of products can be routed to a given system by submitting a job via the supervisory system. Switching the complete network between the back-up system and the NFEP system is now achieved via a manually operated switch at our network Control Centre.

AN EXAMPLE OF WEEKLY NFEP TERMINAL STATISTICS From 11/5/81 to 17/5/81

Country	Activity			Total Data (KCHR)		Data Rate (CH/SEC)		Line-Quality (0-100)
	On-Line	Data-In	Data-Out	Input	Output	Input	Output	
Belgium	.0	.0	.0	.0	.0	.0	.0	0
Denmark	.3	.0	.2	.0	232.1	.0	205.4	100
F.R. Germany	99.7	72.1	7.4	28738.5	15402.0	65.9	342.6	98
Ireland	12.9	.0	7.6	.0	9146.1	.0	200.3	100
Spain	100.0	.0	16.2	.0	1436.5	.0	14.7	100
France	23.7	.1	4.8	84.5	8140.2	173.6	279.2	100
Greece	100.0	.0	26.1	.0	2080.7	.0	13.2	100
Italy	100.0	.0	16.1	.0	1270.0	.0	13.1	100
Yugoslavia	100.0	.0	6.8	.0	252.7	.0	6.2	100
Netherlands	100.0	.0	21.2	.0	1681.9	.0	13.2	100
Austria	.0	.0	.0	.0	.0	.0	.0	0
Portugal	100.0	.0	19.4	.0	726.7	.0	6.2	100
Test *	.0	.0	.0	.0	.0	.0	.0	0
Finland	.0	.0	.0	.0	.0	.0	.0	0
Sweden	100.0	.1	6.3	191.0	11481.2	323.7	301.5	100
Turkey	100.0	.0	10.5	.0	394.3	.0	6.2	100
United Kingdom	98.7	79.0	10.6	27071.0	6448.2	56.7	101.0	100

\* Used for medium speed lines in test mode.

REMARKS:

- 1) On-line activity is the percentage of time a terminal is connected on link-level, i.e. HDLC for medium speed lines. A low speed line is regarded as 100% on-line if data has been transmitted, otherwise the value is 0%.
- 2) Data-in activity is the percentage of on-line time a terminal has transmitted data to the NFEP.
- 3) Data-out activity is the percentage of on-line time a terminal has received data from the NFEP.
- 4) Data-rate gives the average transmission speed in characters per second for an input or output file, respectively,
- 5) Line-quality gives an indication of the quality of a medium speed line as seen by the modem. The maximum value is 100. A lower value does not necessarily mean that transmission errors have occurred. The value for low speed lines is 100 if data has been transmitted and 0 if no data was transmitted.

CRAY USER GROUP

Geerd Hoffmann and Peter Gray attended the 7th meeting of the Cray User Group in Boulder, Colorado on April 20th to 23rd. The meeting was well supported by both Cray customers and Cray Research, with 102 attendees.

Peter Appleton-Jones, Cray's marketing Vice President, opened the meeting with a general status report. Cray's 1980 revenues stood at \$60 and Cray now employs over 800 people. A total of 22 systems were installed by the end of 1980 and 35 will be installed by the end of 1981.

Cray announced enhanced buffer memory availability for the Input Output Processor Subsystem. Buffer memory can now be up to 8 million words and a second fast (850 million bits per second) access to the Cray 1S CPU is now available.

Reports on software status were presented by Cray, including a very welcome change of policy which will result in improved support. COS 1.10 is expected to be released in July 1981 and COS 1.11 early in 1982. (ECMWF currently use COS 1.08). The CFT 1.10 release will give full ANSI 77 support later this year.

Several customer sites presented reports on their experiences (including one from ECMWF on performance measurement work), and on techniques adopted to give improved user services in specific environments, and many useful discussions took place between customers to identify, and sometimes solve, common problems.

- Peter Gray

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\* CRAY JOBCARD 'MEMORY' PARAMETER AND THE 'RFL' CONTROL CARD

In the near future we shall be ignoring the 'CM' or 'M=' parameter which users code on their Cray jobcards. The reason for this is one of efficiency. It is much more efficient to use the RFL control card to increase and decrease a job's memory requirements between job steps, than to set a minimum field length for the whole duration of that job.

For example, consider a job with several steps, one of which requires the whole of memory:

```

XYZ, STCRA, T5000, CM30000.
ACCOUNT(ABC)
ACQUIRE(....etc....)
.
.
CFT(B=BIG)
LDR(DN=BIG) for 100 secs requiring all the memory
CFT(B=SMALL)
LDR(DN=SMALL) for 350 secs requiring 500K
    
```

This job will 'hog' the whole of memory for 450 seconds when it really only needs that amount of memory for 100 seconds. Besides slowing down turnaround for other jobs, it also slows down its own turnaround time.

The job could be made much more efficient by changing the JCL to:

```

XYZ, STCRA, T5000. --- N.B. NO 'CM' PARAMETER
ACCOUNT(ABC)
RFL(M=50) --- N.B.
ACQUIRE(....etc....)
.
.
RFL(M=145) --- N.B.
CFT(B=BIG)
RFL(M) --- N.B. 'M' means "whole of memory"
LDR(DN=BIG)
RFL(M=145) --- N.B.
CFT(B=SMALL)
RFL(M=500) --- N.B.
LDR(DN=SMALL)
RFL(M=50)
.
.
    
```

Just placing these RFL cards at various points in the JCL should improve the turn-around time for this job considerably.

Values to use on the RFL card:

RFL(M=50) for JCL such as ACQUIRE, ACCESS, ASSIGN, COPYx, SKIPx, etc.  
RFL(M=145)for JCL such as BUILD, CFT.

For user program loads consult the end of the load map where you should find a value 'TOTAL FL - xxx' (e.g. TOTAL FL - 467126). Round this up to the nearest thousand (octal) and divide by a thousand (e.g. 470) and use this on the RFL card, RFL(M=470).

CRAY Research are planning to introduce automatic memory management (such as NOS/BE uses) into COS in the future, but this will probably not be available until next year. In the meantime, please make use of the RFL card in the manner described.

Even if you do not specify a 'CM' (or 'M') parameter at present, you could be wasting memory, because COS never does an automatic RFL down.

In the first example, without an explicit 'CM' parameter, the job would occupy the whole of memory when 'LDR(DN=BIG) executed, and this state of affairs would continue until the end of the job.

- Neil Storer

\* \* \* \* \*

\* SOFTWARE PLANS FOR 1981 IN BRIEF

Cray COS

It has been decided that COS 1.09 will not be installed at ECMWF, though quality assurance testing will take place to facilitate an upgrade to COS 1.10 in September or October.

CFT 1.09 is at present undergoing testing prior to installation in the near future. CFT 1.10 is not likely to be installed before the end of 1981.

Cyber NOS/BE

NOS/BE level 530 is in the process of being installed. Later plans include software changes to improve the data transfer rates to the 885 discs (in June), an upgrade to level 538 (in August), and the implementation of code to support shared discs (in September) prior to the installation of the Cyber 730E in the last quarter of 1981.

- Peter Gray

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EDITING AT ECMWF: A NEW FACILITY

A new way of editing, based on the availability of EDIT, a package from the University of Washington's Academic Computer Center, is being tested and documented at ECMWF.

EDIT offers a number of facilities, i.e.

DISPLAY or ASCII (upper and lower case) text handling (useful for document preparation).

Faster response time.

Automatic saving of edited work onto a local file, with the possibility of permanent files, extensions, or "Fileset" member replacement.

No fixed line numbering (EDITOR style), with maximum flexibility for line additions (after any other line) and insertions (before any other line).

Commands may be either 'character string' or 'line' directed.

Character strings of any length (several lines) can be specified in commands using 'ellipsis' notation.

Multiple commands can be typed in and issued as one command.

Multiple commands can be organised and executed as automatic loops of commands, or any last (multiple) command(s) can be repeated by simply typing in a full stop "." command.

Portions of text can be extracted into a buffer and later inserted/added from that buffer (the buffer contents can also be separately saved onto a file).

Text files can be merged into the EDIT work file.

Modifications can be executed by commands using optional 'veto' (request permission for line modification) or 'verify' (display modified text lines) facilities.

Many other options offered by EDIT can only be appreciated after some editing sessions.

In general, EDITOR users need a re-adjustment period, to accept the change from the familiar line-orientated approach, but after a while, EDIT should definitely prove itself preferable to EDITOR.

One important drawback; operating system commands are not recognised by EDIT. A seminar and a bulletin will soon be offered to prospective users.

- Luigi Bertuzzi

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FORTRAN 77 PORTABILITY

Anyone who is planning to program with Fortran 77 features (using the compilers FTN5 or CFT) and who wishes to retain portability between implementations of this language on different computers, may be interested in a new report.

This report highlights those areas likely to cause incompatibilities between implementations and recommends some programming practices to help minimise problems.

A copy of the report entitled 'Fortran 77 Portability' is held in the Advisory Office.

- David Dent

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ACCOUNTING CHANGES

The following changes to the accounting messages generated in the dayfile of batch jobs have recently been implemented: Normally, the box printout giving the state of the account is suppressed. It will reappear if the usage at any priority level on either Cyber or Cray exceeds 90% of the allocation. It will also reappear if permanent file ownership exceeds 110% of the allocation.

Extra parameters may be specified on the ACCOUNT statement to control printing of the account information as follows:

- BOX = NO - do not print box;
- BOX = YES - print box giving total usage;
- BOX = FULL - print box giving usage at each allocated priority level.

e.g. ACCOUNT, ECXX, BOX = YES will generate a 'partial' box.

- David Dent

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PROCEDURE LIBRARY

Version 1.4 of PROCLIB was introduced on 9th April. The principal changes are as follows:

1. MAKFILE, GETFILE, ADDFILE, REPFIL, DELFILE, LOOK

All these procedures interface to FILESETS, and not to UPDATE libraries. If used on an existing UPDATE library, they will fail with the message:

ZMASTER IS NOT A FILESET.

An additional parameter may be used to force these procedures to operate on UPDATE libraries, e.g.

GETFILE,X,MYPL,TYPE=OLD.

Use CONVERT to change an UPDATE library to a FILESET.

2. PROCIN

Now accepts only keyword parameters which are all optional and order independent, e.g.

PROCIN,SUP.  
PROCIN,KEEP,MR=0.  
PROCIN,ID=uid,AC=ac.

As positional parameters are not accepted, the following is no longer valid:

PROCIN,uid,ac.

3. COMPRES

Removes waste space from a FILESET by cataloguing a new cycle.

4. LISTSET

Lists contents of a FILESET assuming that the elements contain coded data.

5. LIB

Allows libraries to be declared at any time during an Intercom session. The previous mechanism of supplying the library at PROCIN time is no longer necessary. Anyone who has executed the following:

PROCIN,LIB=lfm,KEEP.

will have catalogued a file of 27 RB's containing procedures and programs belonging to PROCLIB. To reduce to the normal sized PROCLIB, type:

PROCIN,IGNORE,KEEP.

6. GETDECK

Now REWINDs the destination file so that, if a file already exists with the same name, it is overwritten.

7. AUD

Now allows an online AUDIT of files on a private pack which is already MOUNTed.

The Computer Bulletin B6.5/1 describing the procedure library has been rewritten and distributed internally. Member States will receive their copies with the next parcel of manual updates.

- David Dent

\* \* \* \* \*

HOW TO BE AN EFFECTIVE FTN5 PROGRAMMER

PART 1. From a talk given by Richard R. Ragan, CDC, at a joint ECODEU, VIM Languages Committee, Manchester, September 1980.

One goal of the FORTRAN standards committee in defining FORTRAN 77 was to introduce more modern facilities into the language. The challenge was to do so and not alter the basic language to the extent that it would be completely foreign to FORTRAN users. One of the consequences of this evolutionary approach is that you can find the old language features side-by-side with the new in FORTRAN 77. This is good, because old programs should mostly work. It is bad because it doesn't force people to use the new and better ways to do things, if they are not inclined to do so.

This talk attempts to help overcome this inertia of staying with old features, by showing what is new and how to use it effectively.

The addition of the Block IF statement provides a major structured programming construct to the FORTRAN user. Where you used to write:

```
OLD(FTN4)  IF(.NOT.(I .LT. 10)) GO TO 200
           PRINT *, I
           I = I + 10
           200 I = I - 10
```

```
NEW(FTN5)  IF (I .LT. 10) THEN
           PRINT *, I
           I = I + 10
           ENDIF
           I = I - 10
```

This eliminates extra labels and GO TO's and lets you more easily understand the condition being tested.

In many cases, you wish to execute one set of statements if a condition is true, and another set if it is false. To do this, you use the ELSE statement with the block IF.

```
IF(X .GE. 0)THEN
  Y = SQRT(X)
ELSE
  PRINT *, 'SORT OF NEGATIVE VALUE', X
ENDIF
```

Sometimes more complicated conditions are involved. This can be handled using the concepts we have just seen. For example,

```
IF(AGE .GT. 65)THEN
  SALARY=WAGES*.70
ELSE
  IF(AGE.GT.60)THEN
    SALARY = WAGES*.6
  ELSE
    IF(AGE.LT.18)THEN
      SALARY=WAGES*.52
    ELSE
      SALARY = WAGES
    ENDIF
  ENDIF
ENDIF
```

But there is a better way to do this. It is an interesting psychological fact that people have trouble handling nesting depths greater than three. If we use IF and ELSE as we just did, the nesting depth increases for each condition. For cases where the conditions are all mutually exclusive alternatives, the ELSE IF statement is a better choice.

```
IF(AGE.GT.65)THEN
  SALARY=WAGES*.7
ELSE IF(AGE.GT.60)THEN
  SALARY=WAGES*.6
ELSE IF(AGE.LT.18)THEN
  SALARY=WAGES*.52
ELSE
  SALARY=WAGES
ENDIF
```

Note that the nesting depth never exceeds one. A note of efficiency with respect to the use of the IF and ELSE IF -- order the tests such that the most likely condition is tested first, the second most likely second, etc.

You will also note that I indented the statements within a BLOCK IF structure in all of my examples. This is a highly recommended practice because it makes it easier to determine which statements are executed under control of which conditions.

Another major feature of the FORTRAN 77 language is the character data type. It allows much simpler character handling for the user than the old Hollerith character strings. In addition, it is not dependent on the number of characters per word, so character handling programs are portable.

To use CHARACTER data objects, you need only declare them with a CHARACTER type statement.

```
CHARACTER CARD*80, LINE*136, C(5,5)*8
CHARACTER *72 INLINE, LASTLN
```

The statement specifies objects to be of type character and gives their length. The first line above defines a variable CARD that will hold eighty characters, a variable LINE that will hold one hundred and thirty six characters and a five by five array C each of whose elements will hold eight characters. The second line defines two variables of length seventy two. Note that the length declaration can be factored out if many items of the same length are to be declared.

Since FORTRAN 77 character data is fixed length in nature, the use of substrings to manipulate data is more useful than employing the concatenation operator. Substrings allow the reference or definition of part of a character entity.

```
CHARACTER LINE*80
DO 10 I=1,LEN(LINE)
IF(LINE(I:I),EQ.'=')THEN
  LINE(I:I)='+ '
ENDIF
10 CONTINUE
```

Note that the above program checks each character position of LINE for an equal sign and replaces each one found by a plus. By using the LEN function to define the upper limit of the DO loop, we insure that the program will work even if the size of LINE is changed.

When you write a subroutine or function that uses character data, you should always declare the character dummy arguments (or the function name if it is a character function) to have a length of (\*). This means that the actual length will be that used in the current reference to the routine. Consider the general utility of the following routine that squeezes out blanks from the first argument and puts the result into the second argument:

```
SUBROUTINE SQUEEZ(A,B,J)
INTEGER J
CHARACTER A*80, B*80
J = 0
DO 10 I=1,LEN(A)
  IF(A(I:I).NE.' ')THEN
    J=J+1
    B(J:J) = A(I:I)
  ENDIF
10 CONTINUE
END
```

The major problem with this routine is that it only works for eighty character lines. A more general version is:

```
SUBROUTINE SQUEEZ(A,B,J)
INTEGER J
CHARACTER A*(*), B*(*)
J=0
DO 10 I=1, LEN(A)
  IF(A(I:I) .NE. ' ') THEN
    J=J+1
    IF(J .LE. LEN(B))THEN
      B(J:J)=A(I:I)
    ELSE
      STOP 'SQUEEZ ERROR'
    ENDIF
  ENDIF
10 CONTINUE
END
```

The new version of the routine will work for any length strings. In the CDC FTN5 implementation, it is also more efficient if character dummy arguments are declared with a length of (\*) instead of a constant length.

FORTTRAN 77 has a built in function called INDEX which locates the first occurrence of one string within another string. It returns the starting character position if the string is found and zero if it is not. There are some obvious uses in scanning a string. A not so obvious use is to determine if a character belongs to a set of characters.

```
CHARACTER LINE*80
IF(INDEX('+*/AEIOU',LINE(I:I)).NE. 0)THEN
```

This tests whether the  $i^{\text{th}}$  character of LINE is an arithmetic operator or a vowel.

The default collating sequence of CDC FTN5 is the ASCII collating sequence. There is a library subroutine which permits the user to redefine the collating sequence. Any characters that are not specified will all collate equal to the lowest character in the collating sequence. I recently put this to good use in a program where I wanted to scan off English words. My definition of a word was string of alphabetic characters, possibly containing an apostrophe, delimited by all other characters. I simplified my delimiter testing by redefining the collating sequence.

```
CHARACTER LINE*80
CALL CSOWN('ABCDEFGHIJKLMNOPQRSTUVWXYZ''')
```

```

      .
      .
      .
*   TEST FOR DELIMITER.
    IF (LINE(I:I) .NE. ' ')THEN
```

Since all special characters (except apostrophe) now compare equal to blank, my delimiter test is very easy and efficient.

In spite of all the wonders of the new CHARACTER data type, we all know that a lot of routines will still expect Hollerith data. How can you convert between the two data types?

```

      BOOLEAN H
      CHARACTER*10 X
*   CONVERT CHARACTER TO BOOLEAN.
      READ(X, '(A10)')H
*   CONVERT BOOLEAN TO CHARACTER
      WRITE(X, '(A10)') H
```

This employs the new FORTRAN 77 feature of internal I/O. It is like ENCODE/DECODE but you can remember which does which more easily. The internal READ above reads from character variable X instead of an input line. X is read under an A10 into H just as if it had been read from a card. The reverse is happening on the WRITE where the destination is the variable X. There is one other unusual thing in the above example. The format statement body is placed directly into the I/O statement. This can be extremely handy for simple formats. A word of warning is in order though: FTN5 does not validate such inline formats at compile time, so if you want to be completely safe, you should use a FORMAT statement.

Part 2 of this talk will appear in the August issue of the Newsletter.

\* \* \* \* \*

NAG USERS' ASSOCIATION INAUGURAL MEETING

This meeting was held at Oxford between 8-10 April. Jan Haseler and myself attended on behalf of the Centre. Routines and libraries which may be of interest to us, when they become available, include the following:

- (a) Routines for Time-Series Analysis
- (b) The Finite Element Library
- (c) The NAG Graphical Supplement
- (d) The Toolpack project - This being a joint project, aimed at making available a set of tools for "Numerical Software Engineering" e.g. The PFORT Verifier which checks for Fortran Program Portability.

Except for the first of these, all are likely to involve additional expenditure in order to obtain them, hence we need to know what demand there is, before we consider obtaining any of them.

Further information is available on the above in the Advisory Office.

- John Greenaway

\* \* \* \* \*

VISITING ECMWF TO USE THE COMPUTER FACILITIES

All Member State visitors intending to come to the Centre to use the computer facilities are reminded of the value of informing User Support beforehand of an intended visit. This is to help the Centre coordinate such visits to avoid too many visitors coming at any one time, otherwise, for example, lack of office space can be a serious problem. It is also to help the visitor get the best from his visit, especially the first time visitor, who may be unfamiliar with the Centre's equipment.

Such a case occurred recently, when a visitor very unfortunately wasted most of his time trying to handle an incompatible tape format, the tape containing the program and data he wished to use at the Centre. A call to User Support beforehand could have resulted in sufficient information being given to him to make the tape transfer a very simple one.

As is mentioned in section 3.8 of the Introductory Guide (ECMWF Computer Bulletin B1.0/1), please contact User Support, preferably in writing to the usual Centre address, as far in advance of the intended visit dates as possible. Within User Support, general coordination of visits is handled by Pam Prior.

- Andrew Lea

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COMPUTER TRAINING COURSES

The Centre is offering another series of training courses for Member States personnel and ECMWF staff. Information has been sent to the Member States and nominations to attend are now invited. Nominations from ECMWF staff will shortly be invited via Section Heads.

In summary, the courses being offered are:

<u>Course B</u>	<u>BASIC USAGE</u>	<u>21-25 September</u>
-----------------	--------------------	------------------------

This is intended for anyone who will be actually programming the Cray-1, to give them sufficient experience to run simple work. It will also introduce them to some of the Cyber facilities they may need to complement their Cray activity. Prior knowledge of another computing system, plus a knowledge of Fortran, is required. An optional 5th day (25 Sept) is devoted to explaining how to use ECMWF's meteorological database and archive system.

Course CCRAY USER COURSE28th September to 2 October

An in-depth course for those who will make heavy use of the Cray-1 and its many unique facilities. Intending participants will be expected to know how to run simple jobs on the Cray-1.

Course DCYBER USER COURSE5 - 9 October

Again, an in-depth course, this time for those who will make detailed use of the Cyber 175 in conjunction with the Cray-1. Among other things, it will cover Cyber file handling (including private tapes and discs), and program preparation facilities (UPDATE, debugging, etc.). Intending participants will be expected to know the basics of a Cyber NOS/BE system.

- Luigi Bertuzzi

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STILL VALID NEWS SHEETS

Below is a list of News Sheets that still contain some valid information which has not been incorporated into the Bulletin set (up to News Sheet 113). All other News Sheets are redundant and can be thrown away.

<u>No.</u>	<u>Still Valid Article</u>
15	Private packs on the Cyber (MOUNT/DISMOUNT)
16	Checkpointing and program termination
19	CRAY UPDATE (temporary datasets used)
47	Libraries on the Cray-1
53	Writing 6250 bpi tapes (EEC parameter)
54	Things not to do to the Station
56	DISP
65	Data security on Cyber and Cray
66	New Cray Audit
67	Attention Cyber BUFFER IN users
71	Packs command
73	Minimum Cyber field length
77	ACCOUNT of an executing job
89	Minimum field length for Cray jobs
93	Final validation Stranger tapes
98	Cray symmetric multiply (rounding factors)
101	Allocations and priority groups 1981
106	Gandalf PACXIV upgrade
108	SUBMIT
109	NOS/BE and products at level 530
111	TEMP
112	Validator dayfile messages

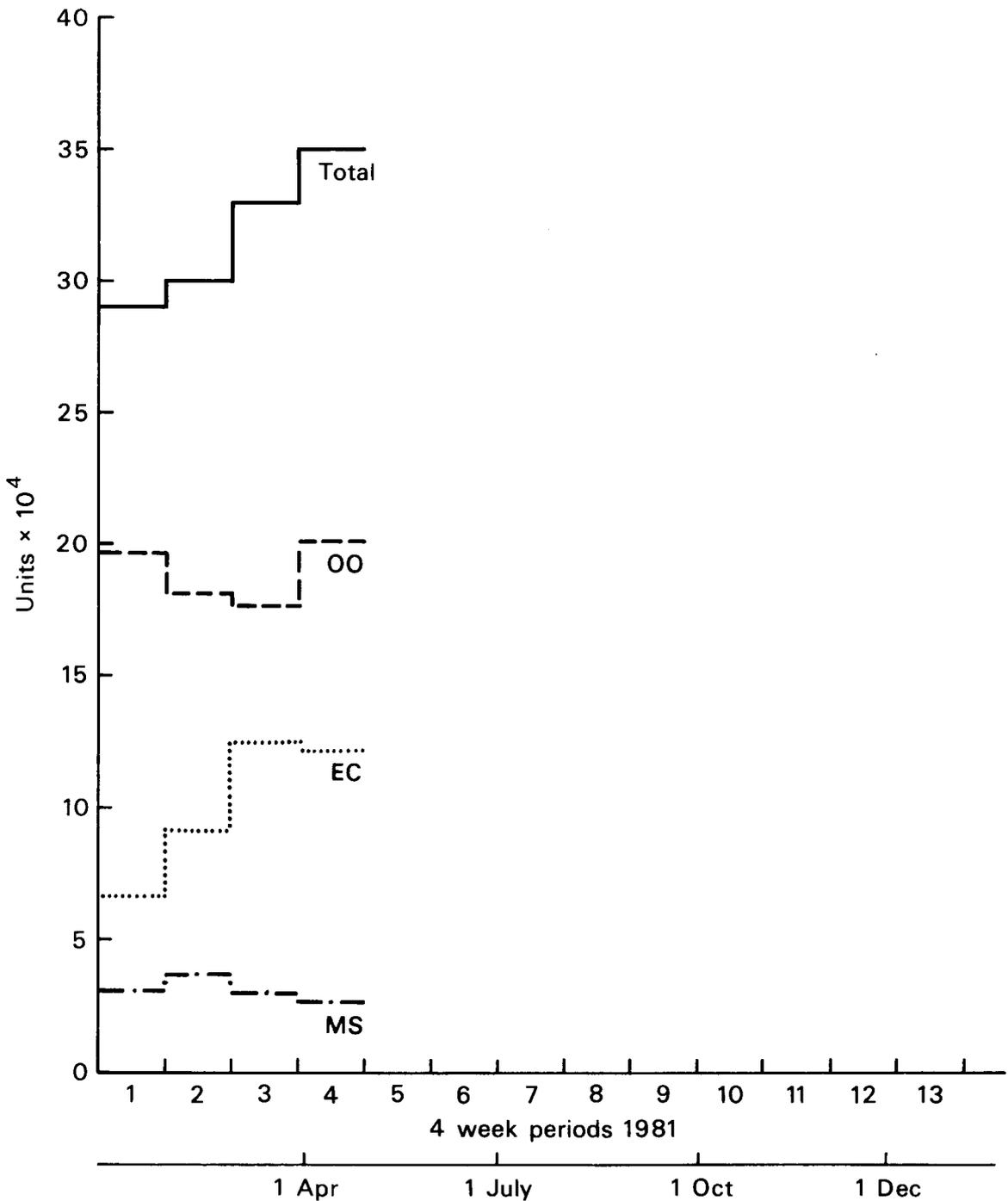
The News Sheets which can be thrown away since this list was last published are numbers 86, 110, 113.

- Andrew Lea

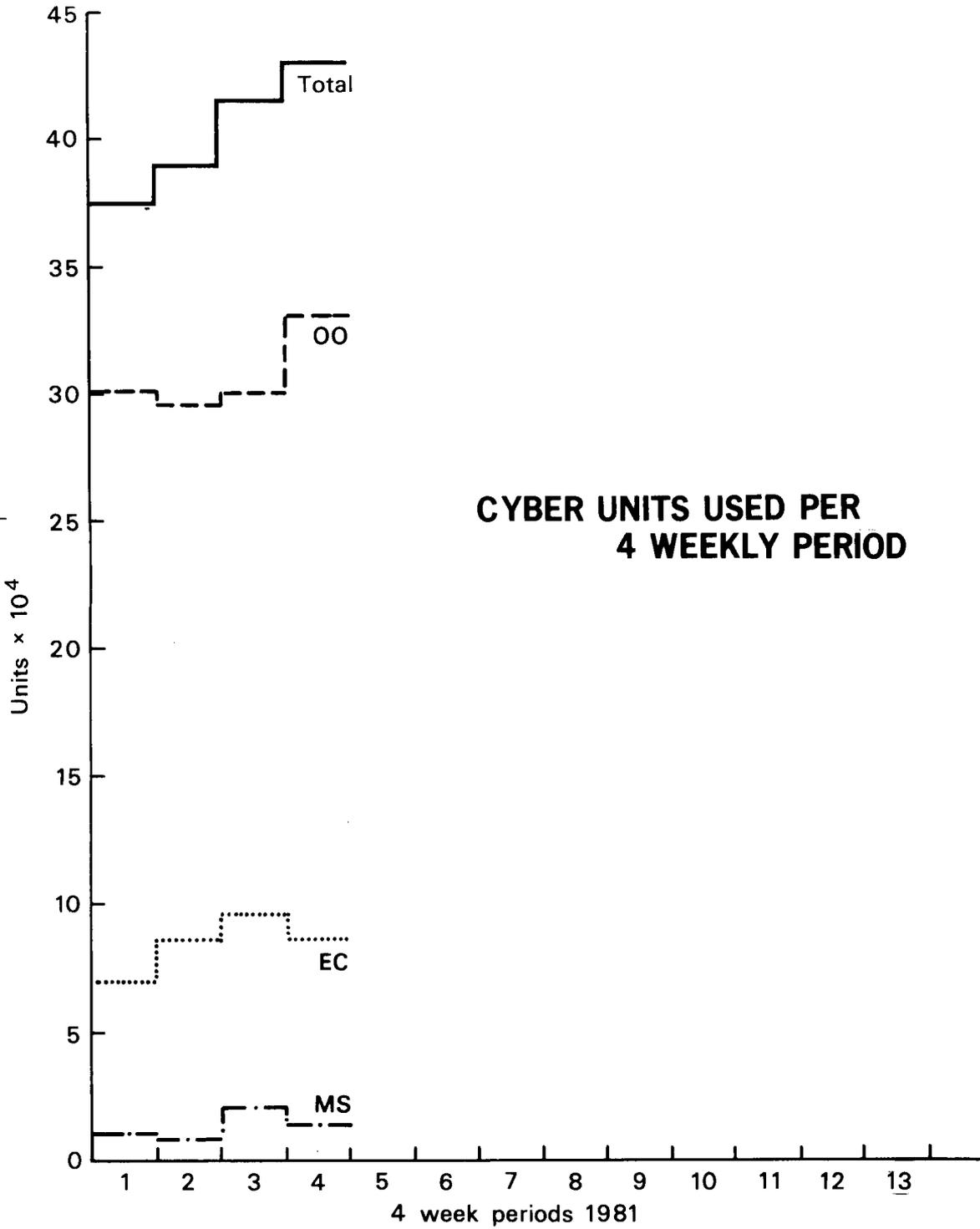
COMPUTER USAGE STATISTICS 1981

- Total = total usage less those jobs classed as systems overheads
- OO = operational suite running
- EC = Centre users
- MS = Member State users, including Special projects

**CRAY UNITS USED PER 4 WEEKLY PERIOD**



**CYBER UNITS USED PER  
4 WEEKLY PERIOD**



RECENTLY DISTRIBUTED COMPUTER DOCUMENTATION

New ECMWF Computer Bulletins

- B. 1.6/1 Working limits, defaults and installation parameters.
- B. 4.4/1 An introduction to Loaders.
- B. 4.9/2 FORTRAN optimisation for the Cyber 175-3000
- B. 8.1/3 Fileset - A Cyber file compaction package.

Alphabetic Bulletin index.

Revisions to Existent Bulletins

- B. 0.1/1 (1) ECMWF Computer Division management and personnel list.
- B. 2.2/1 (4) Introduction to control statements on the Cray 1
- B. 2.7/1 (4) Cyber-Cray Job transmission and file staging.
- B. 4.9/3 (1) TIMING: A Fortran package to identify the time consuming parts of a program.
- B. 5.2/3 (2) Contouring Package user's guide.

Revision of the "Current Contents" page.

Cyber

Cyber Record Manager Advanced Access Methods User's Guide Revision A.  
 NOS/BE Reference Manual - Update packet J.  
 NOS/BE Diagnostic Handbook - Revision K.

Cray

- Cray 1 Library Reference Manual Revision D
- Cray 1 Library Reference Manual Update packet D-01
- Cray 1 OS Reference Manual Revision I
- Cray 1 Updage Reference Manual Update packet B-01
- CAL Assembler Reference Manual Update Packet G-04

- Pam Prior

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VACANCY AT ECMWF

POST: SENIOR SCIENTIST (R501)

FUNCTION: This post is in the Modelling Division and the work to be carried out involves:

- (i) Research and development in the field of numerical weather prediction, with particular emphasis on the development of integration techniques for global models of the atmosphere.
- (ii) Synoptic studies and the evaluation of the operational and research forecasting systems in use at the Centre.

QUALIFICATIONS: A University education (Ph.D. or equivalent, or several years post-graduate experience) in meteorology, mathematics or physics. Candidates for this post are expected to have made personally a significant contribution in the fields of dynamical and/or numerical meteorology.

Fluency in one of the working languages of the Centre\* and a good knowledge of at least one of the others is also required.

STARTING DATE: 1st September 1981.

\* The working languages of the Centre are: English  
 French  
 German

\* \* \* \* \*

CALENDAR OF EVENTS AT ECMWF

1 - 12 June	Training course A2: application to ECMWF model of material in course A1.
9 - 12 June	Technical Advisory Committee (3rd Session).
15 - 26 June	Training course B: operational aspects of the ECMWF forecasting system
4 - 19 September	ECMWF seminar. Topic this year: "Problems and prospects in medium and long-range weather forecasting".
21 - 25 September	Computer training course B: Basic computer usage.
28 Sept - 2 Oct.	Computer training course C: Use of Cray-1
5 - 9 October	Computer training course D: Use of Cyber.
12 - 16 October *	Member States Computing Representatives' meeting (2nd Session).
19 - 23 October *	Graphics seminar
19 - 20 November	Council (14th Session)

\* tentative dates only; courses /meetings to be confirmed.

\* \* \* \* \*

ECMWF PUBLICATIONS

Technical Report No. 24:	On the average errors of an ensemble of forecasts.
Technical Memorandum No. 23:	The vectorisation of the vertical interpolation.
Technical Memorandum No. 27:	An evaluation of the GKS Proposal for Standards in Graphics with respect to the GSPC Core Proposal.
Technical Memorandum No. 28:	Preliminary assessment of long range integrations performed with the ECMWF global model.
Technical Memorandum No. 29:	Cyclone Tracks and Positions in ECMWF Forecasts and Analysis for September and October 1980.
Technical Memorandum No. 31:	On relation between index cycles of the atmosphere circulation and spatial spectrum of the kinetic energy in the model of the general circulation of the atmosphere.
Workshop:	On Radiation and Cloud-Radiation Interaction in Numerical Modelling, 15 - 17 October 1980.
Global Atmospheric Research Programme :	The Global Weather Experiment. Daily Global Analysis Part 1 : December 1978 to February 1979.
ECMWF Forecast Report No. 11:	November 1980.
ECMWF Forecast Charts :	Up to 30 April 1981.
ECMWF Verification Charts :	Up to 30 April 1981.

INDEX OF STILL VALID NEWSLETTER ARTICLES

This is an index of the major articles published in the ECMWF Newsletter plus those in the original ECMWF Technical Newsletter series. As one goes back in time, some points in these articles may have been superseded. When in doubt, contact the author or User Support.

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\* T indicates the original Technical Newsletter series

USEFUL NAMES AND 'PHONE NUMBERS WITHIN ECMWF

		<u>Room*</u>	<u>Ext**</u>
Head of Operations Department	- Daniel Söderman	OB 010A	373
ADVISORY OFFICE - Open 9-12, 14-17 daily		CB 037	308/309
	Other methods of quick contact:		
	- telex (No. 847908)		
	- COMFILE (see Bulletin B1.5/1)		
Computer Division Head	- Geerd Hoffmann	OB 009A	340/342
COMPUTER OPERATIONS			
Console	- Shift Leaders	CB Hall	334
Reception Counter	}	CB Hall	332
Terminal Queries			
Tape Requests			
Operations Section Head	- Eric Walton	OB 002	349/351
Deputy Operations Section Head	- Graham Holt	CB 033	476
DOCUMENTATION	- Pam Prior	OB 016	355
Libraries (ECMWF, NAG, CERN, etc.)	- John Greenaway	OB 017	354
METEOROLOGICAL DIVISION			
Division Head	- Roger Newson	OB 008	343
Applications Section Head	- Joel Martellet	OB 011	360
Operations Section Head	- Austin Woods	OB 107	406
Meteorological Analysts	- Ove Åkesson	OB 106	380
	- Veli Akyildiz	OB 104A	379
	- Horst Böttger	OB 104A	378
	- Rauno Nieminen	OB 104A	378
	- Herbert Pümpel	OB 106	380
Meteorological Operations Room		CB Hall	328/443
REGISTRATION (User and Project Identifiers, INTERCOM)	- Pam Prior	OB 016	355
Research Department Computer Co-ordinator	- Rex Gibson	OB 126	384
Systems Software Section Head	- Peter Gray	CB 133	323
TELECOMMUNICATIONS			
Fault Reporting	- Pierre-Pascal Regnault	CB 028	397/375
Section Head	- Fritz Königshofer	CB 130	310
User Support Section Head	- Andrew Lea	OB 003	348

\* CB - Computer Block  
OB - Office Block

\*\* The ECMWF telephone number is READING (0734) 85411, international +44 734 85411