European Centre
for Medium Range Weather Forecasts

COMPUTER NEWSLETTER

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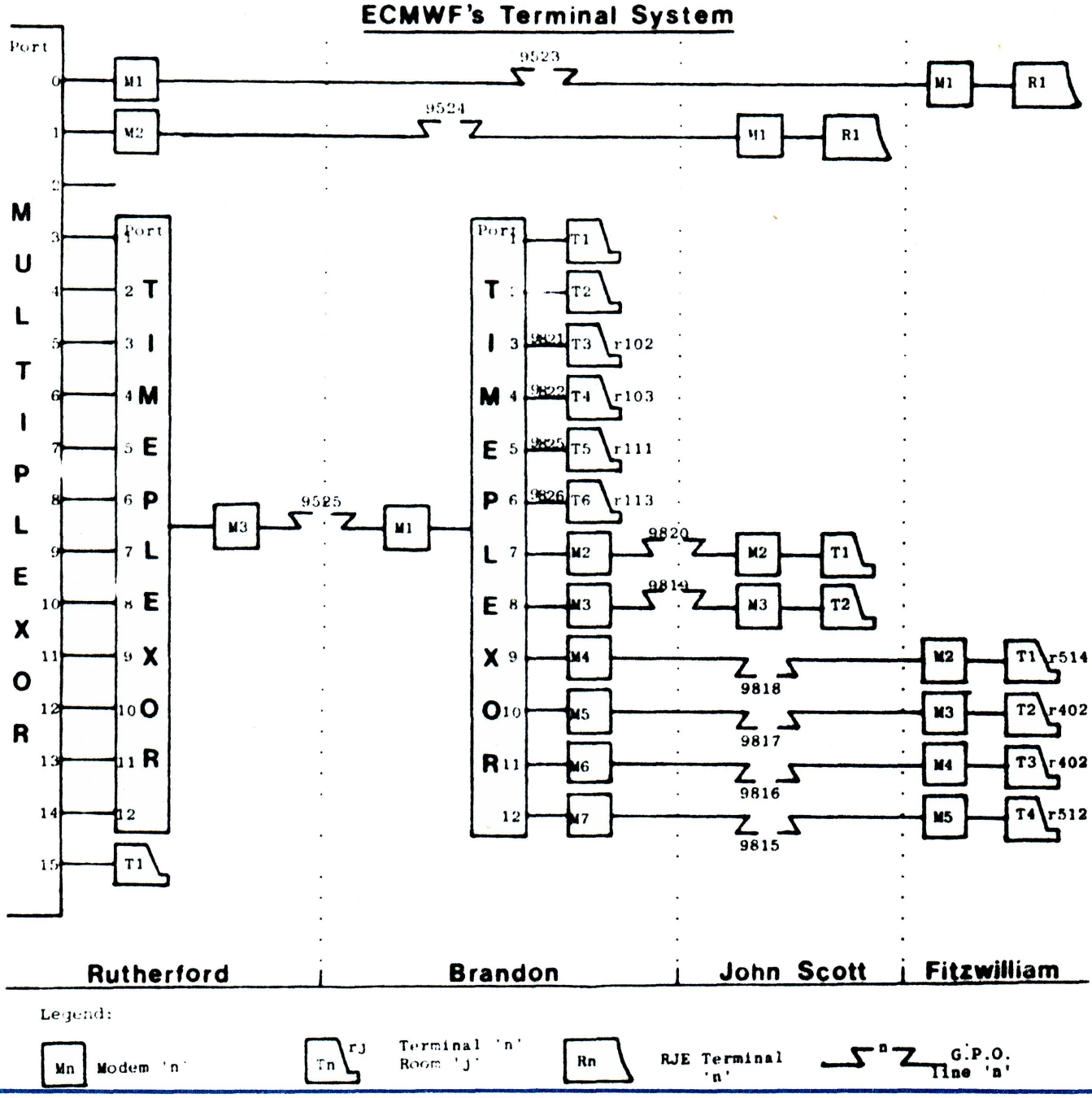
ECMWF's Terminal System



Computer System Status

CYBER 175

The acceptance test for the CYBER 175 was successfully performed during 26 and 27 January. Hardware and software behaved as expected and apart from a few minor problems, the performance was well above the criteria defined for acceptance. A joint effort by Operations and Systems Sections then made it possible to switch from service on the 6600 in Bracknell, to the CYBER 175 at Rutherford, without disturbance.

Recently, CDC announced that now three versions of the CYBER 175 are available, the CYBER 175-100, 175-200, and 175-300; apparently an attempt to bridge the gap which existed between the performance of the CYBER 174 and the CYBER 175.

The system installed at Rutherford is the 175-300, the most powerful of the three versions.

Terminal Network

Although the spooling system via the batch terminal in Fitzwilliam House could manage with the work load from all the users in Bracknell, it was a definite relief when the new Regnecentralen batch terminal in John Scott House became operational at the end of February.

The interactive terminals became operational at the end of February, as well, when the Racal Milgo timeplexors were installed as the last part in the complicated chain of events to get the network operational.

There are still some problems with the installation of the telephone lines between John Scott House and Brandon House; it is expected that these problems will be solved by the middle of March.

The schematic diagram on the front page of this Newsletter gives the current configuration of the terminal system between Bracknell and Rutherford.

- Rob Brinkhuysen

The Spring Experiments

In order to begin operational trials in mid-1979, three major groups of programs have to be developed and tested. The operational suite will gather the data from the telecommunication system, quality control it, supervise the running of the Analysis Suite and the Forecast Model Suite. Finally, it will disseminate the forecast products. The Analysis Suite performs an optimal (in a statistical sense) interpolation of the data onto the model's grid and assimilates the data to the model taking account of the weather evolution during the previous day. The Model Suite takes the output from the Analysis Suite and actually makes the forecast.

All three systems are under development and it is expected that all will be available by the end of this year.

The Spring Experiments are concerned with an extensive test and inter-comparison of two different model suites. The differences between the models lie mainly in the area of the physical parameterisations. These programs are concerned with the representation in the model of rain, snow, convection, internal turbulence, turbulence at the earth's surface and in the planetary boundary layer, the effects of radiation and its interaction with cloud. One of the model suites will use a set of representations for these processes which is rather simplified, omits several feedback loops which are thought to be important, but has been in extensive use at the Geophysical Fluid Dynamics Laboratory, Princeton, for over fifteen years. It is therefore robust, well tested and its properties rather well known. It has of course been extensively re-coded at the Centre.

The second Model Suite has been developed at the Centre taking account of progress in the subject over the last fifteen years. It is rather more complex than the GFDL suite, has more feedback loops and represents a state of the art model for forecasting purposes. Its overall properties are consequently less well known than those of the GFDL model. This second model has much more vector code than the GFDL model, and so the difference in computer time will not be large, despite the increase in computation.

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In the Spring Experiments we shall make ten-day forecasts (with 15 level, 1.8 degree resolution) for about twenty selected cases with each of the models and analyse the results with several questions in mind. The first question is whether or not there are obvious shortcomings in our numerical formulations which could lead to instability of a forecast. Secondly, we would like to see how well each model does in the earlier part of the forecast when we should get reasonable accuracy in the predictions of both large and medium scale and where the differences between the models should not be too important. Then we shall look at the later parts of the forecasts where the differences in the models should become more important. This is the period where we expect the forecasts to show predictive skill only in the largest scales of motion. We shall therefore try to determine the impact of the model differences on the forecast skill in the large scales. Hopefully, we can demonstrate that the newer treatment offers an improvement in accuracy.

The carrying through of these experiments will demand a great deal of resources in terms of computer time and man-time. Altogether, we will need 600-900 hours of Cray time if everything goes smoothly and no re-runs are required. Thus the task must be spread over several months.

The experiment starts in mid-March 1978 and we hope to have a report with at least preliminary results by August/September 1978, so that the first operational model can be finalised by the end of the year.

- A. Hollingsworth

ECMWF Plotter Plans

ECMWF recently decided to buy an on-line plotting system comprising two Versatec 8122 electrostatic plotters connected to the CYBER 175 through a Logical Signal Processor (LSP).

The LSP is a specialised programmable mini for signal-controlling applications, such as interfacing two or more incompatible pieces of hardware (e.g. computers, peripherals, telephone system, manufacturing machines, etc.). In ECMWF's case the problem is interfacing two plotters to a computer. The instruction set is principally bit-oriented in order to set the input and output signals, 0 or 1. Level changers, purpose built hardware units, will ensure that the electronic signal level is right. Furthermore, word-oriented (16 bits) instructions are available to make a limited degree of normal data processing possible. The instruction time is 125ns, i.e. the LSP is an 8 MIPS computer! This makes it quite obvious that two fast electrostatic plotters (2 inches per sec.) can be driven at full speed. The instruction set works on two sets of one-bit registers, signal registers associated with the signal lines and the data registers used as internal storage. An additional 16-bit X-register is used for loop-counting, addressing and data-store. A hardware stack mechanism provides means for subroutine and interrupt handling. Furthermore, 16-bit word random access scratch pad memory is available to hold buffered data.

The project of implementing this on-line system is tripartite. Sintrom Electronics, Reading, will supply the Versatec plotters. Systems Reliability Ltd. (SRL), Luton, will supply the LSP and the LSP software for receiving raster data and outputting to the right plotter. ECMWF is committed to supply the CYBER PP-driver software necessary to communicate with the LSP. Only one Versatec plotter is to be installed initially, the second is expected to be available in mid-1979. The one-plotter system is planned to be ready for acceptance trials in mid-December 1978. Users will not be affected at all. In fact, a more efficient service is envisaged by this approach.

- K. Petersen

Computer Bulletins

The first set of ECMWF Computer Bulletins have just been issued and distributed and additional Bulletins are in preparation. Distribution is currently one set per office and includes a blue ECMWF binder to hold them.

Issued to date

B7.1/1: PRINTxx - Control Cards to Examine Files

B7.4/1: MANTRAP User's Guide

In preparation

B2.2/1: Introduction to Control Statements on the CRAY-1.

B7.2/1: CRAY-1 Job Submission and File Transfer via the CYBER-175.

B3.1/1: Use of the Newbury 7005 VDU.

The Computer Bulletins will form a permanent set of locally written or adapted documents, guides, etc., intended to supplement the manuals offered by the computer manufacturers.

- User Support

Handling $OUT Datasets on Cray

The $OUT dataset is opened for write only at the start of a Cray job. This disables the use of such utilities as COPYD, COPYF etc., in association with data produced on $OUT, as well as inhibiting the use of $OUT as an input data set to a FORTRAN program. A simple way around this problem is to code:

```
RELEASE(DN=$OUT)
ASSIGN(DN=$OUT)
```

Records written to $OUT are often variable in length, but usually of a maximum length of about 128 characters. Such records can be read using:

```
BUFFER IN(KDV,Ø)(ALINE(1),ALINE(16))
```

If ALINE has dimension 16, the line read with the above statement can be written to $OUT using

```
WRITE(6)ALINE
```

Since $OUT cannot be used for input and output at the same time, a $OUT dataset to be input to a FORTRAN program would first be copied, e.g.:

```
JOB(JN=ANAME,M=300,T=2Ø)
RELEASE(DN=$OUT)
ASSIGN(DN=$OUT)
(job step producing $OUT dataset)
---------
REWIND(DN=$OUT)
COPYF(I=$OUT,O=FTØ9,NF)
RELEASE(DN=$OUT)
ASSIGN(DN=$OUT)
CFT.
LDR.
```

In the example, $OUT is released, and re-opened with an ASSIGN. A job step produces output on $OUT which is then copied to FTØ9. $OUT is released and re-assigned to destroy the data it contained, and a FORTRAN program processes the old $OUT data on FTØ9. The printed output from the job will be that produced by the CFT compiler and the FORTRAN program.

- Rex Gibson

New Computer Service Schedule

Commencing on 6 March a three shift system went into operation. The weekly operator schedule starts on Monday mornings and ends at 2300 on Friday evenings. Until such time as it is possible to extend to a 7 day service, (possibly in May), the arrangements for running weekend jobs remain as at present.

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The following is the service schedule:

CRAY	0900 - 1400	batch service
	1400 - 1700	bookable dedicated session
	1700 - 1800	housekeeping
	1800 - 0500	batch service
	0500 - 0900	preventative maintenance (Tuesday and Friday)
CDC	0900 - 0600	batch service
	0600 - 0700	housekeeping
	0700 - 0900	preventative maintenance (Tuesday, Wednesday and Friday)

The transport arrangements will be as follows:

Bracknell	Rutherford	Rutherford	Bracknell
		0700	0815
0830	0945	0945	1100
1245	1400	1400	1515
1545	1700	1700	1815
2215	2330	2330	0045

The early morning and late evening runs may be arranged by taxi, which means that there is a limit of three passengers for these trips. Transport will start and finish at John Scott House.

- Rob Brinkhuysen

Q & A

Q: How many words can fit on a tape? On an 844 disk pack?

A About 4,910,000 64-bit words will fit on a 9-track 1600 BPI tape assuming 512 words per physical block.
About 14,000,000 words (about 105 Mbytes) will fit on a 6250 BPI tape.
An 844 disk pack will hold about 18,350,000 words. The NOS/BE system limits jobs to how much disk space they can occupy at one time. The default is about 6,290,000 words. This corresponds to a setting of LIMIT,3000. (See NOS/BE Reference Manual, page 4-55). Using LIMIT,11000. would set the disk limit for a job to about 18,000,000 or 1 full 844 disk pack.

Q: What maximum field length can be specified currently for a CRAY job?

A: The maximum FL is 1,600,000B and corresponds to a jobcard of EWJOB,CM1600,STCRA.
Note also that when the CM parameter is not specified on the job card, a default of 145,000B is used:

EWJOB,STCRA. equals EWJOB,CM145,STCRA.

Note especially - the default will change to 200,000B with the next system (i.e. CM200)

- User Support
