



# FORUM

## 195 COMPUTER NEWSLETTER

NEWSLETTER OF SRC's CENTRAL COMPUTING FACILITY

NO. 10 DECEMBER 1980

### 1. INTRODUCTION

In the past, FORUM has been used to pass on the questions and answers which have arisen at the Group Representatives meetings. However, there have been a number of suggestions concerning the need for a Newsletter which would be issued rather more frequently and would contain information on a variety of topics: current state, future proposals, aspects of the service, letters from readers, etc. We are therefore going to experiment by bringing FORUM out more frequently, with the extra shorter editions containing this sort of information.

We serve a population of some 1400 and communication with such a large number poses problems. At the moment we attempt to solve these by appointing Group Representatives whose job it is to act as a filter for information. **If you do not know who your representative is, please ask us.** They meet twice a year, when they have the opportunity to hear our latest plans and raise questions on them and on the service being provided (it is these meetings that are reported in detail in FORUM). We also hold monthly meetings with the users who are based at Chilton, thus giving us more information without the added problems of venue and transport. News bulletins are issued from time to time, containing transitory information (such as shutdown times), mainly by sending computer printout to workstations where the Workstation Representative is expected to display such bulletins prominently. These, together with the new extra FORUMs, form the basis of the communication between us and you (apart from the Program Advisory Office, of course!). We would like to hear from you if you do not consider this adequate or if you have any suggestions for improvement in any part of the service we offer.

Please address all such letters to:

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The division is going through a period of change. The major batch work is done by our two 195s, but, although they are still very powerful machines, they are getting on in years. It is essential that we move to more up to date hardware and software, while minimising the effects of the change. The inclusion of the 3032, with its ability to run the IBM VM operating system, allows us to start on this transition and work is proceeding to provide you with access to the CMS timesharing system. In the meantime, unfortunately, the change has meant that ELECTRIC response has suffered. Various experiments are being tried to alleviate this but they may well have little effect. Please bear with us since CMS offers many more facilities and should be available in the New Year. The main stumbling block to this service is likely to be financial, over which we have little control (!), but we will try to keep you informed of events. When this has been successfully completed we can turn our attention to the replacement of the 195s so that we can continue to provide the power that you have come to expect.

### 2. CENTRAL COMPUTING HARDWARE

The Central Computing Complex at the Rutherford and Appleton Laboratories consists of the following configuration:

- 1 - a four megabyte IBM 3032 acting as a front-end computer,
- 2 - two 360/195 computers, each with 2 megabytes.

Intersystem communication between the IBM 3032 and the two 360/195's is by means of channel-to-channel adapters.

Each computer has access to all tape drives of which there are 14 covering densities 556/800 bpi 7-track and 800/1600/6250 bpi 9-track.

The disc capacity is 8604 megabytes, most of which is accessible by all the computers. Some space is reserved for system datasets and user filestore. The discs are attached to the machines by multiple paths to minimise contention and maximise throughput.

The physical composition of the backing store is 24 demountable spindles and 12 non demountable ones. A fixed head file is attached to the 3032 as a paging device. Its capacity is 11 megabytes.

All unit record equipment such as the 4 central line-printers, 2 card readers, the 4 VDU screen controllers and 3 communication controllers are attached to the three computers via a T-bar switch. This T-bar switch allows the Operations staff to move equipment between machines easily. For example, engineers require unit record equipment for maintenance purposes.

The communication controllers interface the triple system to the 'network' which consists of a complex of asynchronous and synchronous connections. It is a complete topic in its own right and will be covered in the next issue of FORUM.

The 3032 configuration will support between 30 to 40 concurrent users on CMS in addition to the current ELECTRIC service, front-end role and VNET, a virtual machine for interfacing to the network. In order to increase the population to 100 concurrent users on CMS further hardware is necessary to offer an adequate service. The equipment required is two fixed head files or equivalent solid state devices and another four megabytes of main store bringing it up to eight megabytes. The accompanying diagram gives a block schematic of the system as of 1 October 1980.

### 3. CENTRAL COMPUTING SOFTWARE

As described elsewhere, these computers consist of two IBM 360/195's and one IBM 3032, the latter acting as a front-end machine for the two former. Summarily one may say that in the 195's the operating system is MVT supported by HASP, in the 3032 it is VM under which may be run several CMS virtual machines, a VM development virtual machine, a front-end development machine and a front-end machine which runs HASP, MAST, ELECTRIC, DKNCP and a small batch stream. The hardware connections between the three machines are managed by software written by R&AL Computing

Division Staff, who also wrote MAST, ELECTRIC and DKNCP and made many alterations to MVT and HASP. The following paragraphs amplify this summary.

MVT allows up to 15 user jobs to run concurrently in one machine, but as the 195's have only 2 Megabytes of main memory each and are not paging machines, the actual number will usually be less than 15. HASP manages the queueing and scheduling of jobs, places their input data on disk storage for reading at run time, places their output results on disk for later printing and distributes central processor time between the concurrent jobs. MVT allows user jobs to connect to their proper data-sets whether private or shared, specially mounted for the job or permanently on-line. It also provides timer services, traps many kinds of execution-time errors and keeps a log of its actions. The 195's have very fast arithmetic processors, although for suitable applications they can be outdone by modern vector machines, but they cannot run the more modern operating systems and their limited main memories entail careful overlay planning for large jobs.

The 3032 software is much more interesting. VM means 'Virtual Machines' whereas the V in MVT merely means 'variable' (number of tasks). Virtual memory (which the Atlas computer had) means that not all of a large program need be in real main memory all the time; by automatic means ( a combination of hardware and system software), not by pre-planned overlaying, currently relevant parts are held in main memory, the rest being kept in fast backing store such as drum or disk and brought in as required. The Virtual Machines concept goes beyond this, being capable of presenting each user not merely with the impression that a very large main memory is at his disposal for the time being, but an entire machine into which he can load an individual operating system, and to which an input/output system with dedicated peripherals is apparently attached. Few users will want all that of course and CMS offers to each user a standard operating system within which files may be edited and jobs created, launched and executed. The system software group uses the VM facility to develop new versions of the operating system, even of the super-system VM itself, at the same time as ordinary production work is going on.

The rather special virtual machine FEM provides the interface between the whole complex and the outside world. ELECTRIC provides (via the MAST message-switching program) facilities for



file-editing and job-creation. DKNCP links the machine to the public telecommunications network, HASP (in addition to the tasks described above for the 195's) at present manages communication with many of the remote workstations that are connected to the central computers, but developments currently under way will transfer that responsibility to the more modern VNET system (V for virtual again: HASP was designed for non-paging machines). Thus the 3032 serves to provide continuity between the older and less functional but still very fast machines and the more usable machines of later technology.

#### 4. VNET

We are now approaching the final stages of the main VNET development and by the time this is published we should have the first version of the production software. We are now planning the schedule for transferring the workstations from HASP to VNET. Initially we shall run for a period with only a few workstations on VNET and they will all be on the Rutherford site. This will enable us to sort out the problems which are shown up by the operational environment and to assess the performance of the system. The transfer of the remaining workstations cannot begin until about April because we shall require the additional 2 Mb of main store on the 3032 to ensure we do not ruin CMS response. Workstations will be moved to VNET a few at a time in case we run into unforeseen problems as the workload builds up and to enable us to provide adequate education in the use of the new system. The order in which the workstations will be transferred is not yet decided. Obviously the transfer period will last several months since there are nearly 100 workstations involved.

Access to CMS from workstations will be possible in the near future. However, the introduction of new users to CMS will also occur in stages so that the load on the system doesn't outstrip the resources available.

The functions available at workstations will be essentially the same as they are now with the addition of access to CMS. Because the workstations are controlled by a different program there will inevitably be some differences in the way these functions are performed. Details of these differences will be provided at a later date.

#### 5. ELECTRIC/CMS STATUS

All development work on user facilities in ELECTRIC has ceased and changes to the ELECTRIC program are restricted to the correction of bugs and performance improvements. In the area of performance, a four week experiment was initiated on 6th October with the maximum number of users reduced from 60 to 55. At the same time the login queue was increased from 12 to 15. Monitoring statistics from this period indicated that there was some improvement in response during peak periods. More work was run but not to the extent we had hoped. Consequently a further reduction to 50 users was tried for four weeks in November. Unfortunately there was hardly any improvement in response but users experienced considerable difficulty in logging-in. As a result of this last experiment it is clear that other system overheads are having a major effect on ELECTRIC response and efforts are being made to reduce these as much as possible. In the meantime the number of user slots has been set at 55 with a login queue of 15.

CMS is now generally available to all users who have access to the Gandalf PACX. However, it may be necessary to restrict the number of simultaneous users until more main memory is available. With the current hardware we expect to be able to support up to 25 simultaneous users without any serious degradation of performance which gives sub-second response to trivial commands for most of the time.

There are currently 12 PACX ports at 1200 baud and 4 at 300 baud. Approximately 180 users are registered in CMS, most of these on the Rutherford site because of the PACX access restrictions at present.

There have been four introductory CMS courses for users given at the Atlas Centre, the first by IBM and the other three by the Computing Division staff. The last course was held in December.

There have been some problems with errors in the CMS software which handles the filing system but it is believed that the recently installed version 6.11 has completely cured these. A new version of VM including CMS is expected towards the end of the year. Of particular interest to users will be a new editor, XEDIT, and a new EXEC file processor, EXEC2. XEDIT has much improved support for ASCII terminals which most people will be using whilst retaining full-screen editing capabilities. It

is expected that this will become the standard CMS editor at Rutherford. EXEC2 has many improvements over the current EXEC processor, one of which is the removal of the 8 byte token restriction. This should allow easier production and submission of jobs to MVT and may make parts of the PLANT/SUPPLY system obsolete.

Current Rutherford developments of the CMS service include the provision of an incremental dumping system for the CMS filestore and the provision of utilities for copying files directly from ELECTRIC into CMS. The **Introduction to CMS on the RAL Coupled System** is in the process of being updated and a new reference card, including locally written commands, is being produced.

## 6. TURNAROUND GUIDELINES

### Short Jobs

Core Size Requested	P12	P10	P8	P6	P4
0-210k	15m	30m	2h	o/n	w/e
212-350k	-	1h	3h	o/n	w/e
352-560k	-	2h	4h	o/n	w/e
562-1000k	-	o/n	o/n	o/n	w/e
>1000k	-	w/e	w/e	w/e	w/e

### Long Jobs

(request >90 secs CPU)

Priority >6 and core <1000k	w/e
Priority 4	w/e
Any Job core >1000k	w/e

### Notes

- 1) From 1 Nov 80 priority 12 jobs can only be used for jobs requesting <10 sec CPU but there is no core restriction below 1000k. Turnaround guidelines are not yet available for this type of job.
- 2) A large quantity of priority 1 time is issued to each account. It is commonly used for production work whose submission cannot be accommodated within normal weekly rations and yet is an essential part of a scientific programme. Such work may be run when all higher priority work has been completed, chiefly at night and at weekends.
- 3) Certain jobs may be assigned to special classes if they require very large quantities of other resources, for example lines >250k.

## 7. MEETINGS AND COURSES

We hold a number of meetings and courses for users and FORUM is a good place to publicise these.

**January 21:** Group Representatives Meeting.

**January 22/23:** INTRODUCTION TO BATCH COMPUTING.

This is the next in our regular series of courses for those who have only just started using our facilities. It will be the first course to include CMS as a regular part.

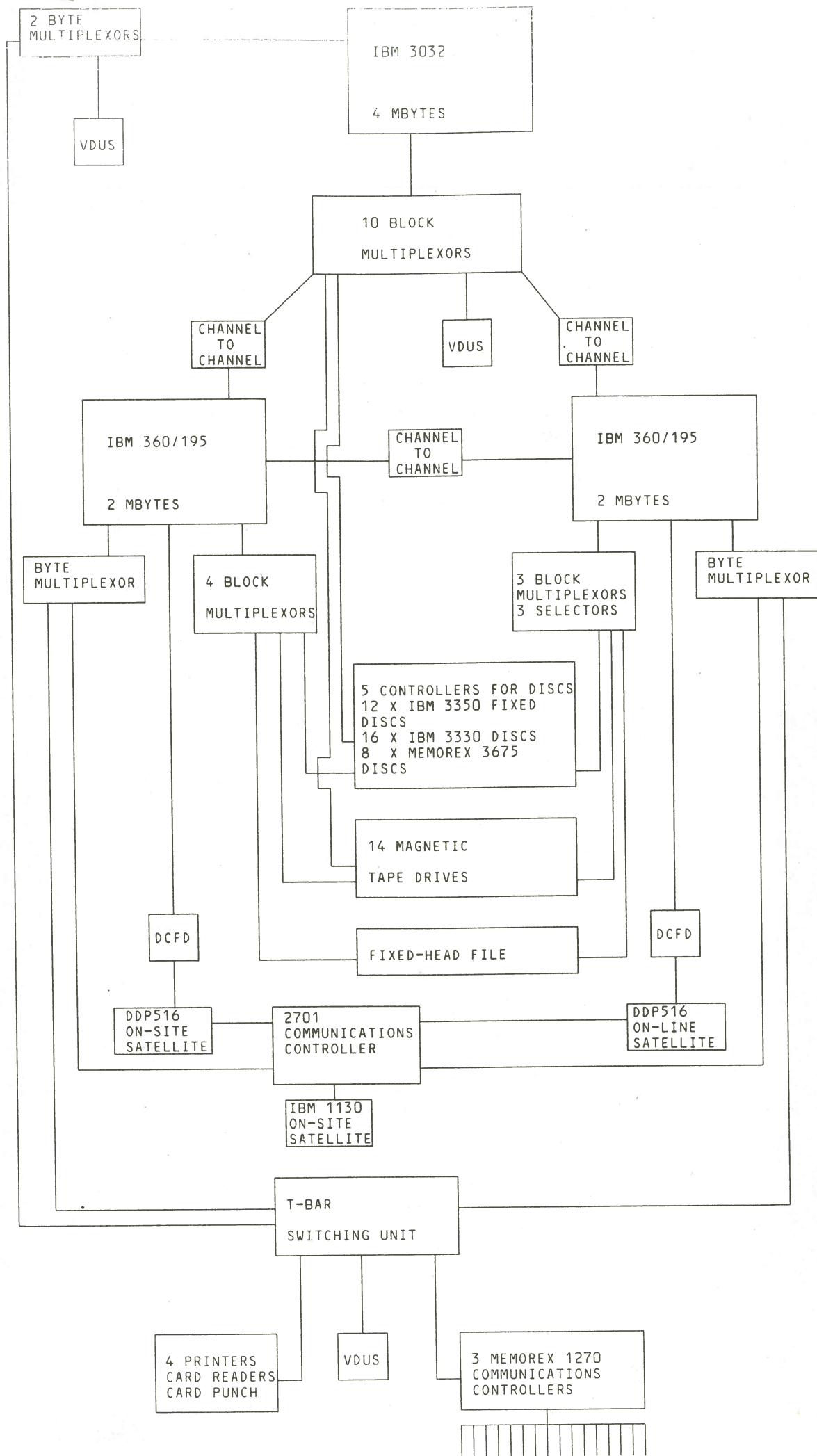
Courses to convert existing ELECTRIC users to CMS have been held on site, the last being held in December. Courses for external users will be held in the New Year as workstations are converted to allow access to CMS.

**February 9:** Joint Rutherford and Daresbury Laboratories Computer Advisory Committee meeting.

This newsletter is published by:

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2 BYTE  
MULTIPLEXORS

IBM 3032  
4 MBYTES

VDUS

10 BLOCK  
MULTIPLEXORS

CHANNEL  
TO  
CHANNEL

VDUS

CHANNEL  
TO  
CHANNEL

IBM 360/195  
2 MBYTES

IBM 360/195  
2 MBYTES

CHANNEL  
TO  
CHANNEL

BYTE  
MULTIPLEXOR

4 BLOCK  
MULTIPLEXORS

3 BLOCK  
MULTIPLEXORS  
3 SELECTORS

BYTE  
MULTIPLEXOR

5 CONTROLLERS FOR DISCS  
12 X IBM 3350 FIXED  
DISCS  
16 X IBM 3330 DISCS  
8 X MEMOREX 3675  
DISCS

14 MAGNETIC  
TAPE DRIVES

FIXED-HEAD FILE

DCFD

DCFD

DDP516  
ON-SITE  
SATELLITE

2701  
COMMUNICATIONS  
CONTROLLER

DDP516  
ON-LINE  
SATELLITE

IBM 1130  
ON-SITE  
SATELLITE

T-BAR  
SWITCHING UNIT

4 PRINTERS  
CARD READERS  
CARD PUNCH

VDUS

3 MEMOREX 1270  
COMMUNICATIONS  
CONTROLLERS



REMOTE LINKS

