CERN COMPUTER NEWSLETTER

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Introduction

As computing becomes a more and more widespread and complex activity in the laboratory, the need will increase for a means to have a wider general circulation of background information about different aspects of computing activities than is possible with the present system of Computer Notices. I therefore make no apology for introducing yet another circular which will find its way on to CERN desks. Rather I would express the hope that this newsletter will prove to be a useful source of general information on computer use and performance, programming developments and the requirements of different kinds of computer users, as well as on future plans for computers, programming and computer uses in the laboratory. The newsletter will be edited by the Computer Manager and any comments, criticism or suggestion for topics to be included should be addressed to him.

G.R. Macleod

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Recent usage statistics

Recently the weekly average division of time between different uses of the 6600 has been approximately as follows:

- Hardware development: 6%
- Interim Sipros production: 36% (100% = 24 hrs/day for 7 days/week)
- System development, debugging etc: 30%
- Scheduled maintenance: 18% (168 hrs)
- Unscheduled maintenance i.e. down time: 10%

System development time (mostly Sipros development) has included approximately two hours per day of production work. The figure of 10% down time refers to the total down time, and obscures the fact that although the machine may be apparently processing CERN's workload there can still be various items of peripheral equipment malfunctioning and suspected intermittent faults in the main frame. Hardware development time is at present occupied by on-line tests of HPD 1.

Suspected machine errors - Programming Enquiry Office

This office exists to meet two principle needs. Firstly to answer general programming inquiries and secondly to receive and examine evidence on all suspected machine errors. This latter work is most important especially whilst there are suspected intermittent machine faults. Such errors often manifest themselves as stops for no apparent reason, necessitating a machine dead start. The programmer's output is returned with, say, a scribbled message "stop with P = ". If you receive such output and you do not understand the reason for the stop, do not just throw away the output and re-submit the job. Take your evidence and discuss it with the Enquiry Office. These intermittent faults can never be tracked down unless evidence is patiently accumulated.

Progress on Final Sipros

Two hours of CERN production work have been carried out daily for the last 4 weeks under the multiprogramming version of Sipros. Three major problems have appeared as a result of this work; one is solved and the other two are still causing headaches. In the first runs it became apparent there were circumstances in which a job could try to exchange jump with itself. (The exchange jump process is required when a halt is reached in a certain job, when for example I/O is required, and the control processor gets on with executing another job whilst a peripheral processor deals with the I/O.) This bug in the system has now been eliminated. There remains the embarrassing fact that the system has a poor record for consistent reading of tape labels, and there has been a recent series of unexplained stops with the P counter set to zero. Until these problems have been overcome there
can be no extension to the time given over to production under Final Sipros.

Tests of flying spot digitiser running on line simultaneously with other jobs are now proceeding.

What is wrong with the card punch?

For some time now the card punch has been producing binary cards with checksum errors. It appears the cause is a simple design deficiency of the punch. The punch mechanism consists of a solenoid which when activated pulls the punch head down against the resistance of a spring. When certain bit patterns have to be punched a solenoid field can interact sufficiently with a neighbouring punch head as well as its own, to cause the neighbouring head to punch in error. As a temporary measure the CDC maintenance engineers at CERN have been adjusting the spring tensions, and many hours of valuable maintenance time has been devoted to this problem alone. There is unfortunately nothing further that can be done until the CDC official modification is received which is expected during February. In the meantime it is still worthwhile trying to get binary cards. The average error rate is usually around 1 card in 1000 which means that the majority of binary decks are still punched without errors.

The 415 card punch has a read station after the punch station at which it is possible to read the holes just punched and send this information back to a programmable controller for checking. Unfortunately such a controller is not yet installed on the CERN 6600. An IBM punch is available at CERN which could be substituted temporarily for the CDC 415. However the IBM machine punches at a rate of only 100 cards/min (compared with 250/min for the 415), it does not have a usable read station, and it does not have the feature whereby the first card (programmer's name) of each new deck is offset to enable the operators to separate the jobs easily. All in all changing the punch now would not seem to offer any real improvement. It is impossible to link up the punch on the 14G1 with the 6600.

CDC 3400 COMPUTER

The CDC 3400 computer was installed at CERN during the October overhaul as a means of providing some additional on-site computing facilities. It has proved to be a useful additional facility and further it has shown itself to be exceedingly reliable. The 3400 has been installed and maintained by Control Data at no charge to CERN; the duration of its stay at CERN has so far been reviewed with Control Data each fortnight. In order to keep a machine of this type CERN has now sent a letter of intent to CDC to rent a 3000 series computer on site after the 6600 computer is running reliably with SIPROS.

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Policy

The original intention for the 1401 computer was to use it principally for paper tape to magnetic tape conversion and Calcomp plottings until this work could be transferred to the 6600. Due to the delays that have occurred in the development of Sipsos and with it the attachment of the plotter and paper tape reader it has so far been impossible to make the changeover and the work has remained on the 1401. The immediate future of the machine is that CERN will continue to rent it and there is no question of any decision being taken to remove it unless equivalent proven facilities are available on the other computers.

Present work load - future work load

At present the 1401 frequently has long queues of work. The base load work is about 18 hours a day 7 days a week but there are often severe (always upwards) fluctuations on this load. Perhaps 60% of this work however is of a type where the 1401 time requirement could be predicted fairly accurately several weeks or months in advance. More specifically output of paper tape and cards from scanning tables and IEPs, and tape condensing activities for example are generally planned on a production basis with known schedules. Hitherto it has not been the practice to ask for advance notice of 1401 time requirements, but the situation is now being reached where this information would be very useful for long and short term planning. We shall shortly endeavour to contact people whom we know are responsible for a large part of this work to obtain their estimates for the future, but there are quite likely many people unknown to us planning experiments which will involve large amounts of 1401 time. Please contact us. We are particularly interested in long range forecasts because if these imply that the 1401 will be inadequate for this base load work, alternative plans must be made now.

Calcomp plotting

A letter came recently:

To the Computer Manager 2.2.66

I drew your attention last week to the appalling service for those people requiring Calcomp plotting results. Since then the service has if anything got worse. At present I have still not received plotting from a program run last Sunday morning and it is believed now that the results have been lost. This seems to be a recurrent problem.

I should like to know what steps are being taken:

1. to keep track of tapes to be plotted
2. ensure an adequately small delay before plotting tapes after they have been produced on the 6600
3. ensuring a tape is available and ready on unit T24 before the start of the program.

R. Keyser
to which we would like to say sorry; but you will see part of our difficulties from the above and also the section headed "Operators" elsewhere in this letter. Mishandling of tapes is inexcusable, but there is another more likely explanation of the errors which have been occurring recently. Certain people who were producing several hours plotting at a time were recommended to equivalence the plotting unit, logical tape T24 to T23 and use their own allocated tapes to get the output on T23. This method sounds all right, but must not be used. It happens that although the desired output appears on T23 some information is still written on T24 and any subsequent plotting output on T24 will be lost as a result of this isolated bit of information. All plotting output must be on T24 and until further notice T24 must not be equivalenced to any other unit. In addition as T24 is seen by the system as a normal type of tape it is possible for a programmer to rewind it and use it. This must be avoided as it destroys the previous plotting information. As far as future plans for plotting are concerned the following possibilities are open to us and are actively being investigated.

1. continue the present system with minor improvements
2. attach the Calcomp to the 6600
3. buy a separate controller and tape unit for the plotter
4. buy a faster plotter
5. attach the Calcomp to the 6600 with a limit of say 5 mins to give a faster turn round for small amounts of plotting and buy another device for longer plots off-line.

**COMPUTER OPERATORS**

The present computer operation staff consists of 19 operators, four of whom are shift leaders, a senior operator (H. Klein), an assistant computer manager (O.R. Synons) and a computer manager (N. Spoonley). The installed computers are a 6600, 3400 and a 1401, whilst the original planning for the computing facilities, and hence staffing, provided for the sole installation of a 6600. In addition some work is still being off-loaded to Paris for TC Division reducing the demands of this division for time on the 6600. The 6600 at present is being operated with two shifts of operators and each shift consists of five persons. There are allocated with two on the tapes and console, two on the printers, and one on the card reader. The 3400 operates over three shifts and a group of nine operators are used to cover these. This group also operates the 1401. During the week-end the 6600 is operated for two long shifts with a group of four operators and the 3400 for 24 hrs/day with a group of three operators. This means that each operator works at least one week-end in three and often one in two. In addition the demands of the Paris working requires further operators on duty for long hours at the week-ends. The number on each shift at present is a minimum and holiday, illness and HPD running can only be accommodated by working with fewer operators than is desirable.

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It is therefore clear that the operating staff of the computers is insufficient to meet the exceptional demands. The future size of the CERN facilities are now under discussion and the recruitment of additional staff is being pursued with this in mind. The aim is to be able to operate the machines on a continuous basis and to provide the operators necessary for the running of the EPD and Luciole Devices.

6000 SERIES USERS ORGANISATION (VIM)

The third meeting of the VIM organisation was held at CERN on the 20th, 21st January 1966, with several committee meetings held on 19th January. The meeting was attended by representatives of installations already having machines or having one on order. The meeting was concerned primarily with the current state of the hardware and the software. The latter topic, due to recently announced changes in the plans of CDC, included a discussion of the 6800 development. The hardware session involved a statement by P. Zimmer (CDC Vice President for the 6000 Series) on the currently known problems of the hardware and the causes of the recent overhaul. It was appreciated that CDC are making considerable effort to improve the state of the hardware but they are clearly slow in developing techniques for maintenance and fault diagnostics.

The software session devoted itself mainly to a discussion of the new plans which had just been issued by CDC. The main points are given below:

1. The initial version of SIPROS due for release in February 1966 will suffer modifications only until June 1966. From then on it will be maintained (i.e. kept error free) but not improved.

2. A new version SIPROS 4 will be written for issue in July 1967 and this will be based on the use of a disk simulating the effect of an additional large amount of directly addressable extended core store (ECS).

3. SIPROS 5 will be written as the standard software for this machine for issue in November 1968, almost nine months after the first scheduled delivery of the 6800. It will utilise the ECS, being a development of SIPROS 4 and will include an American Standards Association Fortran IV Compiler.

4. An LPEHA operating system will be developed as an extension of the Chippewa System and will be issued in February 1968. This system will probably be associated with an incompatible version of the 6800 i.e. the machine is not compatible with the rest of the 6000 series.
The proposed plans were discussed at length and finally a motion proposed by CERN was adopted asking Control Data to review their schedule in order to have the simple standard software system for the 6600 available with the first machines.