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EDITORIAL

Report on the Future Publishing Policy of the CERN Computer Newsletter, Prepared Especially for the Celebration of the 100th Issue*

In late 1974 it was decided to form a committee of intelligent Computer Newsletter readers in order to propose a future Newsletter policy to be published in the 100th issue. The committee was to "provide an analysis of past Newsletters and propose a future Newsletter policy with particular reference to the computing situation at CERN" and to "make any other observations and recommendations as judged relevant".

The committee met and coined itself the Centuplet. It decided to form two working parties; one to study the future policy of the Newsletter and another one to take a longer term view.

Recently, the two working parties presented their views to the Centuplet in two reports which unfortunately disagreed fundamentally about which Newsletter policy should be adopted for the medium term future. The two points of view could not be reconciled so it has now been decided to submit the documents to the readership at large to collect further input. Following this a joint committee may be formed in order to re-examine the whole question.

Summary of Working Party 1's Position

After a thorough examination of the first five issues of the Computer Newsletter (February - May 1966) the members of the working party agreed unanimously that the computing situation in CERN is substantially unchanged since 1966. Hence it was recommended that there should not be any change made to the Newsletter publishing policy.

Some clippings from the first five issues which illustrate the point can be found in Appendix I.

Summary of Working Party 2's Position

After a thorough examination of the present computing situation in CERN (and future plans) the members of the working party agreed unanimously that the complexity of providing a computing service today prevents any meaningful comparison with early 1966 when the Newsletter was started. Hence it was recommended that the Newsletter should evolve towards a technical journal specializing in the emerging discipline of "Growth Dynamics of Computer Systems".

A preliminary analysis of this very complex subject can be found in Appendix II.

Conclusions

As mentioned earlier we would like to have comments from the readership on the two reports presented in the appendices. You will also find the horoscope of the first Computer Newsletter on the cover page. This has been established by an (outside) expert in an attempt to predict (rather than define) the future of the Newsletter. It was found sufficiently decorative to be included in this commemorative issue.

***************

In a more serious vein, the Computer Newsletter editor asked me on this solemn occasion to give his best wishes to our faithful subscribers and ask for more readership contributions to the Newsletter than we have had recently. Letters, articles, constructive suggestions and criticism is all very welcome. As can be seen from the above (and the two subsequent appendices) even contributions which are not 100% technical may be accepted.

Tor Bloch

* It was originally hoped to publish this article on April 1st but because of the Easter holiday it was delayed!
APPENDIX I

Quotes from the first five Computer Newsletters (February - May 1966), selected for the occasion of the 100th issue in May 1975.

On Large Computers, Mass Storage, etc.

"... solution is to consider a medium-to-large IBM 360 series, CDC 6400, etc. which acting as a stand-alone computer can solve the short-term problem and also fit into a long-term development pattern which involves the provision of mass core storage, remote consoles, etc., thus assisting in the natural development of the laboratories facilities."

"As part of a review of our computer plans to be made in the light of ..., four working parties have been set up."

On Removing Old Facilities

"... 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."

On Increasing Data Rates

"In a matter of months however it seems likely that the "information explosion" will really hit CERN in a big way and it may well be that physicists will have to reserve in advance large blocks of 6600 real time or else their experiments simply cannot be carried out. The new factor which will radically alter the situation is the advent of the wire spark chamber experiment connected on-line to a small computer. Several such experiments are foreseen for the end of 1966 and onwards. In these experiments the small computer will either write information directly on to ½" magnetic tapes or will transmit information directly into the central memory of the 6600. One such experiment that is planned (and remember always this is one in several) would require 1600 reels of ½" tape, (CERN has 3000 altogether at present) costing 300,000 Frs., or alternatively access to the 6600 for up to 24 hours a day for several weeks (with 100% reliability of course). Clearly the first alternative of writing to tape should be avoided if at all possible, for by the time there are ten experiments one needs a new barrack for tape storage, a team of librarians, and the problem of later analysis time is still not overcome."

Philosophical Comments

"... the system has a poor record for consistent reading of tape labels."

"The use of consoles is probably the most significant trend in modern large scale computing in that it allows a user to debug and run his job at his own speed rather than being governed by overall turn-around times."

"Software takes ever-increasing man-years to develop as hardware gets more sophisticated and so is delivered late, without having been fully debugged."

Less Philosophical Comments

"The present computer operation staff consists of 19 operators, four of whom are shift leaders, a senior operator, an assistant computer manager and a computer manager."
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. It is therefore clear that the operating staff of the computers is insufficient to meet the exceptional demands."

"The standard of tidiness in the equipment room is appalling. It is difficult to understand what method of working some programmers use at an 026 punch. An unfamiliar visitor might assume that this method of working involves a process which results in several hundred punched and unpunched cards of assorted colours being shuffled and spread out at random on the punch tables and surrounding floor. By the end of the weekend when the room has not been cleaned for two evenings the scene is quite spectacular. A unique product of the age of automation."

Usage Statistics

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

<table>
<thead>
<tr>
<th>Category</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hardware development</td>
<td>6%</td>
</tr>
<tr>
<td>Interim Sipro production</td>
<td>36%</td>
</tr>
<tr>
<td>System development, debugging, etc.</td>
<td>30%</td>
</tr>
<tr>
<td>Scheduled maintenance</td>
<td>18%</td>
</tr>
<tr>
<td>Unscheduled maintenance, i.e. down time</td>
<td>10%</td>
</tr>
</tbody>
</table>

(100% = 24 hrs/day for 7 days/week = 168 hrs)"

On this final quote which shows that, after all, a lot of progress has been made, the working party concluded their report.
APPENDIX II

An introduction to the Growth Dynamics of Computer Systems with Suggested Avenues for Future Research

1. Introduction

In order to describe the development of large, interconnected computer systems in a quantitative way, two measures are used:

i) The complexity index (IC) defined as the number of computer-computer links in a system divided by the number of computers.

ii) The overhead quotient (QO) defined as the sum of the number of front-ends and minicomputers in the system divided by the number of worker computers.

Applying these two measures (IC and QO) to the development of the CERN Central Computer System since 1965, one can see how the complexity and overheads have increased monotonically and substantially. The mechanisms behind this growth are analysed and an upper bound for complexity is conjectured for practical systems. It is not at this moment believed that there exists a similar upper bound for overheads.

A brief look into the future suggests that the development in the direction of increased complexity and overheads is not completely stopped yet.

Finally, avenues for future research are suggested.

2. Brief Overview of History

(In the graphic representation chosen we have

\[=\] worker computer

\[
\square
\] front-end

\[
\triangle\square
\] minicomputers

Detailed information on computer brands, function, etc. has been left out for clarity.)

1966

\[
\square
\]

\begin{align*}
\text{IC} &= 0 \\
\text{QO} &= 0
\end{align*}

1970

\[
\begin{array}{c}
\square \\
\square \\
\end{array}
\]

\begin{align*}
\text{IC} &= 0.67 \\
\text{QO} &= 0.5
\end{align*}

1973

\[
\begin{array}{c}
\square \\
\square \\
\end{array}
\]

\[
\begin{array}{c}
\triangle \\
\square
\end{array}
\]

\begin{align*}
\text{IC} &= 0.88 \\
\text{QO} &= 1.67
\end{align*}
3. Mechanisms of Growth

One can distinguish two complementary driving forces in this inexorable development towards higher and higher complexity and overhead:

a) System capacity and/or facilities are augmented by functional separation - certain functions are "subcontracted" to front-ends and minicomputers.

b) Following the above "architectural-conceptual" expansion phase a period of consolidation leads to the doubling up of certain computers in the system.

The functional separation (a) increases IC and QO moderately but the consolidation mechanism (b) causes the most severe increases of complexity as can be seen from a simple example: the doubling up of a system of one worker computer with one front-end:

\[ IC = 0.5 \quad QO = 1 \]

\[ IC = 1.5 \quad QO = 1 \]

For an unchanged QO we get a tripling of complexity (IC).

4. The Future (Limits to Growth)

Assuming that one or two more worker computers are acquired within the next few years and that a packet switching network with both remote and host computer concentrators is developed then the situation would present itself approximately as follows:

\[ IC = 1.92^* \]

\[ QO = 5.5^* \]

* The IC and QO have been calculated assuming that communication line connections are equivalent to computer-computer links. Subsequent research may disprove this assumption.
5. **Avenues for Future Research**

Calculate upper bounds on IC and Q0 using practical quantities such as mean time between failure, repair times, frequency of software changes, number of channels and preventive maintenance requirements. (Note that the theoretical limit

\[ IC \leq \frac{n(n-1)}{2} \]

where \( n \) is the number of computers in the system, is largely valueless for large systems.)

Define the set \( C \) of all configurations \( c_i \) which can provide an adequate computing service. Define the distance between two elements \( c_i \) and \( c_j \) in \( C \) as the time \( t_{ij} \) it takes to switch from configuration \( c_i \) to configuration \( c_j \) (i.e., the time to pass from one "working" system to a back-up configuration). Using the space \( C \) thus created one should be able to make studies of effective up-time in redundant multicomputer systems...

6. **Incentives for Future Research**

A free lifetime subscription to the Computer Newsletter is offered as a reward to authors of accepted original articles in the field of "Growth Dynamics of Computer Systems". Please submit such articles to the Editor of the Computer Newsletter.
INTERCOM STATISTICS

Is INTERCOM becoming more popular with computer users? What is the terminal usage?

Two previous notes in Computer Newsletter Number 95 and 96 have tried to answer these questions by means of graphs and tables.

You will find below some graphs and tables of the statistics for the first three months of 1975. There is no doubt that the tendency of the last months of 1974 is confirmed. The total number of INTERCOM users is increasing in spite of the fact that less and less INTERCOM work is done on the 6500. It clearly means that fast and quiet 6400 terminals are becoming more and more popular.

Terminal Usage

The figures given below concern the first three months of 1975 (6/1 to 27/3)
- the 6400 was available for a total of 1327 hours.
- 199 different users used INTERCOM.
- 8839 INTERCOM sessions were recorded.
- 14 T4012 terminals were used for 2261 hours of real time.
- 7 T4023 terminals were used for 843 hours of real time.
- all terminals were used for a total of 3923 real time hours.
- 80.85 CPU hours were used by INTERCOM users.

6 public registered names and passwords were made available to users in March. In less than one month 213 INTERCOM sessions were recorded under these names.

The following table shows the distribution of terminals by type and cluster, and their monthly utilisation as a percentage of connected time over available 6400 time.

<table>
<thead>
<tr>
<th>Location</th>
<th>T4012</th>
<th>T4023</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number</td>
<td>Jan %</td>
</tr>
<tr>
<td>Bldg. 513 DD</td>
<td>3</td>
<td>9.3</td>
</tr>
<tr>
<td>Bldg. 31 DD</td>
<td>2</td>
<td>6.9</td>
</tr>
<tr>
<td>Bldg. 3 OC RIOS</td>
<td>3</td>
<td>7.5</td>
</tr>
<tr>
<td>Bldg. 13 TC</td>
<td>2</td>
<td>6.9</td>
</tr>
<tr>
<td>Bldg. 4 TH</td>
<td>1</td>
<td>16.8</td>
</tr>
<tr>
<td>Bldg. 112 ISR</td>
<td>1</td>
<td>9.3</td>
</tr>
<tr>
<td>Bldg. 1 MSC</td>
<td>1</td>
<td>12.5</td>
</tr>
<tr>
<td>Lab. II SPS</td>
<td>1</td>
<td>0.5</td>
</tr>
<tr>
<td>Totals</td>
<td>14</td>
<td>8.68</td>
</tr>
</tbody>
</table>

Three DTC-300 terminals (Data Terminals and Communications) have been installed on the site, one in building 31, 2-007, one in building 513, R-046, one in building 4, 2-063. The DTC-300 terminal contains a micro-processor and a fast, high-quality print mechanism. It can be used for many word processing applications, and also for plotting. A plot file interpreter will be made available for this device. For more information please phone C. Vandoni, 3355 or 8-952.

P. Benassi
C. Vandoni
INTERCOM Workload

CPU Time Per Week
Solid Line 6400, Broken Line 6500.

Sessions Per Week
Solid Line 6400, Broken Line 6500.

Number of Users Per Week
Solid Line 6400, Broken Line 6500.
DEVIATIONS FROM SUPERMUX SCHEDULE

The 6400 will normally be available for the SUPERMUX service as shown in the 'Central Computer Schedule' of 4 April 1975. However, the present policy is that this machine backs up both the 6500 and the 6600.

In the event of the 6500 not being available for batch-processing, the 6400 will front-end the 7600 and the SUPERMUX service will be suspended.

FOCUS is the only facility at CERN providing the experimental areas with a data link service. For this reason FOCUS users must have available online a 6000 machine with the CERNSCOPE operating system at all times during PS/ISR runs. In the event of a failure of the 6600 which normally runs CERNSCOPE, the 6400 will be taken for this purpose and SUPERMUX will again be unavailable.

Both these interruptions to the SUPERMUX service will by their nature be at very short notice, sufficient only for users to terminate their current activity.

If you have any observations or questions concerning the above arrangements, please contact Martin Sheehan of Operations, the Computer Coordinator or your CUAC representative.

Martin Sheehan
<table>
<thead>
<tr>
<th>Week Starting</th>
<th>Monday</th>
<th>Tuesday</th>
<th>Wednesday</th>
<th>Thursday</th>
<th>Friday</th>
<th>Saturday</th>
</tr>
</thead>
<tbody>
<tr>
<td>5-1975</td>
<td>00:00-07:45</td>
<td>08:15-24:00</td>
<td>00:00-07:45</td>
<td>08:15-24:00</td>
<td>00:00-24:00</td>
<td>00:00-24:00</td>
</tr>
<tr>
<td>12-5-1975</td>
<td>00:00-07:45</td>
<td>08:15-24:00</td>
<td>00:00-07:45</td>
<td>08:15-24:00</td>
<td>00:00-24:00</td>
<td>00:00-24:00</td>
</tr>
<tr>
<td>19-5-1975</td>
<td>00:00-07:45</td>
<td>08:15-24:00</td>
<td>00:00-07:45</td>
<td>08:15-24:00</td>
<td>00:00-24:00</td>
<td>00:00-24:00</td>
</tr>
<tr>
<td>26-5-1975</td>
<td>00:00-07:45</td>
<td>08:15-24:00</td>
<td>00:00-07:45</td>
<td>08:15-24:00</td>
<td>00:00-24:00</td>
<td>00:00-24:00</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Week Starting</th>
<th>Monday</th>
<th>Tuesday</th>
<th>Wednesday</th>
<th>Thursday</th>
<th>Friday</th>
<th>Saturday</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-1975</td>
<td>00:00-07:45</td>
<td>08:15-24:00</td>
<td>00:00-07:45</td>
<td>08:15-24:00</td>
<td>00:00-24:00</td>
<td>00:00-24:00</td>
</tr>
</tbody>
</table>

*Running in 310e - RUG 0 down - HPP/RESCUE cancelled.*

Please see Computer Newsletter Number 97 for the general rules applied in FOCUS production running.

Note: Tuesday 13 5 DD Maintenance Cancelled.

L. Gourdiole
7600/6500/6400 MAGNETIC TAPE STATISTICS

This report covers magnetic tape statistics on the 7600/6500/6400 CDC Scope system for the period 1.1.1975 to 31.3.1975. Comparisons are being made with equivalent figures obtained during the last six months of last year as 66X tape drives were introduced in the computer centre (see Computer Newsletter 97, 5.3.1975).

Magnetic Tape Drive Performance

Very encouraging figures were obtained during this first quarter of 1975. Although front-end tape accounting (except mounting figures) is not available as such, 7600 tape performance analysis shows considerable improvements towards target error rates (in read mode) set up at the time of 66X introduction in mid 1974. The 9 track target figure was in fact met for open shop and performance has been constantly at a very acceptable level.

Error rates for 7 track processing has gone down by a factor of roughly 2.5, despite rather poor and alarming performance in the first weeks of the period.

As far as closed shop is concerned, here also an improvement factor of over 2 was achieved against last years figures. This is very positive as the service is now being introduced and the 0.1% target figure (no black-listing at all) is in sight.

On the more negative side of this period, a totally unacceptable number of tapes were snapped or damaged by 66X tape drives between mid-January and February (23 in 4 weeks). A specialist from the manufacturer flew in urgently to CERN to look at our tape drives and install the latest field modifications. Tape damaging, although still not at the target level of 1 in 10000 has consequently dropped by a factor of three. More improvements are expected however as soon as all 66X drives in the computer room have gone through these different modifications.

All the Facts and Figures

Here are all mounting and error rate figures covering this first quarter of 1975, keeping in mind the following target read error rates* set up a year ago:

OPEN SHOP:  7 track read : \( \leq 2\% \)
            9 track read : \( \leq 1\% \)

CLOSED SHOP: 9 track read : \( \leq 0.1\% \) all tapes

1. 7600/6500/6400 Mounts

Total number of mounts : 37901

6000 only statistics being only available as of early this year, no comparisons can be made at this stage with last year as far as overall tape mounting is concerned.

* Read error rate: percent of read type mounts showing 1 or more unrecovered parity error.
2. 7600 Mounts and Error Rates

Overall 7600 only tape mounts: 26594 (70% of total)

<table>
<thead>
<tr>
<th>Track</th>
<th>1st quarter 1975 (6.1 - 31.3.75)</th>
<th>last 2 quarters 1974 (3.7 - 31.12.74)</th>
<th>Cumulative (since 66X introduction, 3.7.74)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>RD mounts</td>
<td>W mounts</td>
<td>Total</td>
</tr>
<tr>
<td>7</td>
<td>5378</td>
<td>752</td>
<td>6130</td>
</tr>
<tr>
<td></td>
<td>8300</td>
<td>1287</td>
<td>9587</td>
</tr>
<tr>
<td></td>
<td>13678</td>
<td>2039</td>
<td>15717</td>
</tr>
<tr>
<td></td>
<td>Error rates</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Read*</td>
<td>Write</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>2.16%</td>
<td>0.93%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5.95%</td>
<td>0.54%</td>
<td>4.46%</td>
</tr>
<tr>
<td></td>
<td>0.69%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>RD mounts</td>
<td>W mounts</td>
<td>Total</td>
</tr>
<tr>
<td></td>
<td>15935</td>
<td>4529</td>
<td>20464</td>
</tr>
<tr>
<td></td>
<td>24581</td>
<td>7806</td>
<td>32387</td>
</tr>
<tr>
<td></td>
<td>40516</td>
<td>12335</td>
<td>52891</td>
</tr>
<tr>
<td></td>
<td>Error rates</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Read*</td>
<td>Write</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>0.85%</td>
<td>0.70%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1.47%</td>
<td>0.28%</td>
<td>1.23%</td>
</tr>
<tr>
<td></td>
<td>0.44%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>RD mounts</td>
<td>W mounts</td>
<td>Total</td>
</tr>
<tr>
<td>LOSED</td>
<td>1652</td>
<td>309</td>
<td>1961</td>
</tr>
<tr>
<td>SHO</td>
<td>1969</td>
<td>457</td>
<td>2426</td>
</tr>
<tr>
<td></td>
<td>3621</td>
<td>766</td>
<td>4387</td>
</tr>
<tr>
<td></td>
<td>Error rates</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Read</td>
<td>Write</td>
<td></td>
</tr>
<tr>
<td>SHOP</td>
<td>0.24%</td>
<td>0.97%</td>
<td>0.56%</td>
</tr>
<tr>
<td></td>
<td>0.0%</td>
<td></td>
<td>0.0%</td>
</tr>
<tr>
<td></td>
<td>0.41%</td>
<td></td>
<td>0.39%</td>
</tr>
<tr>
<td>* Black listed tapes excluded.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Conclusions

The graphs on the next page show the history of tape mounting and read error rates throughout this first quarter of 1975. The bad weeks of the start of the period are noticeable, but the trends look acceptable except maybe for 7 track processing. Here performance is very variable although the overall average figures aim at the 2% limit. The following conclusions can be drawn:

- 9 track processing

Despite the hick-ups just following the Christmas shutdown, performance has always stayed below the 1% figure in read mode. Write error rates have increased by a factor of 3 and action is presently taken to correct this degradation.

- 7 track processing

Very variable performance was observed in read mode, although the 2% target is just about met. Here also, write error rates have increased, but by a factor of 2 and action is being taken also to correct the situation immediately.
Closed shop processing (experimental)

This service, in its last phase as an experiment, has shown encouraging improvements in read mode, where the error rate has dropped by a factor of 2.3. The 0.1% should be reached very shortly. The official service is now started in its final form and these figures look very positive. However, write failures have appeared which were not observed during the last semester of 1974. This is certainly the most important facet of this overall write problem with 66X tape drives and it is being approached now with the utmost priority. However, these write error rates are raw as seen by the centre. Users see very few of these as operators clean the tapes and restage on any incident of that sort. Moreover, if restage still fails, a pool tape is mounted to satisfy the post stage request.

If you have any question or comments about the above figures, please contact me at 4935.

J.C. Juvet

CONFERENCES

An "International Conference on Fault Tolerant Computing" will be organised in Paris, June 18-20th 1975. Further information can be obtained from T. Lindelöf, DD (telephone 5010 or 4952).

QUESTIONNAIRE ON USERS' REQUIREMENTS IN NUMERICAL ANALYSIS AND STATISTICS

We are planning to send a questionnaire on users' requirements in numerical analysis and applied statistics to all computer users at CERN. The intention is to discover which branches of numerical analysis and applied statistics are of importance to computer users at CERN. You will receive the questionnaire in May 1975. Should you, for any reason, not receive a copy of this questionnaire you can order one from C. Perlemoine, DD.

F. James
B. Schorr
1975 MAGNETIC TAPE

ERROR RATE STATISTICS
First quarter: 6-1 to 3-1-75
(weeks 2 to 13)
(7600 jobs only)

- Closed shop (no back-listing)
- Open shop

ERROR RATES: % of read mounts with > 1 uncorrected
(READ NODE) read parity error (blade list tape out)

7 TRACK OPEN SHOP

9 TRACK OPEN SHOP

9 TRACK CLOSED SHOP
1975 TAPE MOUNTING STATISTICS

First quarter: 6-1 to 31-3-1975
(wk 2 to 13)

Tape mounts \((\times 10^3)\)

- **Total mounts** (7600/6400/6500, 7+9 tracks)
- **Total 7600 mounts** (7+9 tracks)
- **9 tracks 7600 mounts** (open shop)
- **7 tracks 7600 mounts**
- **Total closed shop mounts** (7600/6400/6500)

Week of Easter shutdown (3.3 days off)
HEPPI, AN INFORMATION RETRIEVAL SYSTEM FOR HIGH-ENERGY PHYSICS

HEPPI is a simple High Energy Physics Published Information retrieval system, available at the CERN central computers.

Its purpose is to help people working in H.E.P. and related fields to obtain lists of books, articles and reports dealing with a specific field of interest, that have been published in the last few years.

HEPPI uses an already existing retrieval language, INFOL2, and can access the information of the CERN library preprints and reports list and of the DESY high energy physics index.

The system is described in the report DD/75/9, available from the Secretariat of the Data Handling Division or at the desk of the main library. The library staff can assist you in using HEPPI, or perform a bibliographic search for you.

AN EXAMPLE

INPUT

FINIS
END OF FILE

INIS
EXTR
REPORT ALL
EXTRACTIONS 1
? EQ CHER
RETRIEVAL CRITERIA 1
INTERROGATION
INFOL 3

HEPPI;DESY75.
FINH;HEPPI;HEPPI;ID=DEC05.
ACCOUNT;PALA22I;DEV;0400FP.

END OF RECORD

PRLD1T6.
### IF YOU NEED HELP ....

**Programming Enquiry Office**
- New Computer Centre (opening hours: 14.00 - 17.30)
  - 9.00 - 12.15
  - 513/1-014
  - 4952 or 8-792
- Old Computer Centre (""
  - 11.00 - 12.30
  - 2/1-061
  - 2377
- TC RIOS (""
  - 15.00 - 17.30
  - 8.45 - 10.30
  - 13/1-026
  - 3533

**Program Library**
- Help with library routines
  - F. James
  - E. Edberg
  - 513/1-017
  - 4959
- Distribution of library material
  - Mme. D. Dupraz
  - 513/1-015
  - 4951

**Documentation Office**
- J.L. Penaud
  - 513/1-019
  - 2371

**Computer Science Library**
- Mme. J. Negles
  - 513/1-024
  - 2379

**Tape Problems**
- Software
  - Mlle. J. Richards
  - 513/1-005
  - 4952 or 4957
- Operations
  - J.C. Juvet
  - 513/R-037
  - 4935

**Tape Allocation, Cleaning, Certification**
- Magnetic Tape Reception in 513
  - 513/Entry Hall
  - 4939

**INTERCOM Problems**
- C. Vandori
  - 31/2-007
  - 3355 or 8-952

**RIOS Problems**
- M. Fleischmann
  - 513/2-010
  - 4920 or 8-521

**Computer Coordinator**
- H. Burmeister
  - 513/1-011
  - bleeper 8-615

**Computer Service Problems**
- Computer Operations Manager
  - J. Ferguson
  - 513/R-037
  - 4935 or 8-637
- Users Support Manager
  - G. Fast
  - 513/2-008
  - 4884 or 8-981
- Systems Manager
  - E. McIntosh
  - 31/1-025
  - 4944

**Computer Reception/Communications Operator**
- 4927

**Microfilm Problems**
- D. Stungo
  - 513/R-007
  - 3106

**Terminal Problems**
- Comm. Operator
  - 513
  - 4927

**GD3 Graphics Problems**
- M. Howie
  - 31/2-006
  - 2993

**FOCUS/FOCUS Data Links**
- M. Gerard
  - 31/1-022
  - 4942 or 8-951
- L. Pope
  - 8-826
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