PS/OP/Info 89-4

9 Novembre 1989

Integration of Computing for Engineering Needs

Veuillez trouver ci-joint une photocopie des transparents de ma présentation de Mercredi 8 Novembre 1989.

Malhereusement, vous trouverez uniquement les titres des arguments discutés et non un compte rendu de la discussion ou les réponses aux questions soulevées.

A. Pace

Distribution: G. Bachy /LEP, C. Genier /LEP, S. Foffano /LEP, C. Hauviller /LEP, M. Mottier /LEP, M. Mathieu /SPS, R. Cuenot /SPS, R. Maleyran /SPS, M. Bornand /SPS, B. Flockhart /SPS, R. Hanni /ST, K. Neil /ST, P. L. Riboni /PS, A. Poncet /PS, C. Mantke /PS, G. Shering /PS, D. Jacobs /DD, R. Messerli /DD, B. Henningsen /DD, R. Cailliau /MIS, F. Ovett /MIS, J. Boillot /PS, M. Boutheon /PS, R. Billinge /PS.

Item 125. Ethernet interruption: what never do ??? 08-Nov-1989

Ethernet interruption this afternoon : what you never should do !

This afternoon Ethernet interruption was not expected.

In fact, somebody took his PC for a demonstration but he
also took the Ethernet cable (the special twin-coax)
connected to the white box where it's clearly indicated
'Ethernet'.
When you take out this cable, you cut the 'cordon ombilical',
the other users connected to can not anymore access the
network; unfortunately in this case, this 'cordon' was the
same for SRV1_PS !

If you move your PC, please, ask me another twin-coax
cable or call me if you really want to take yours.

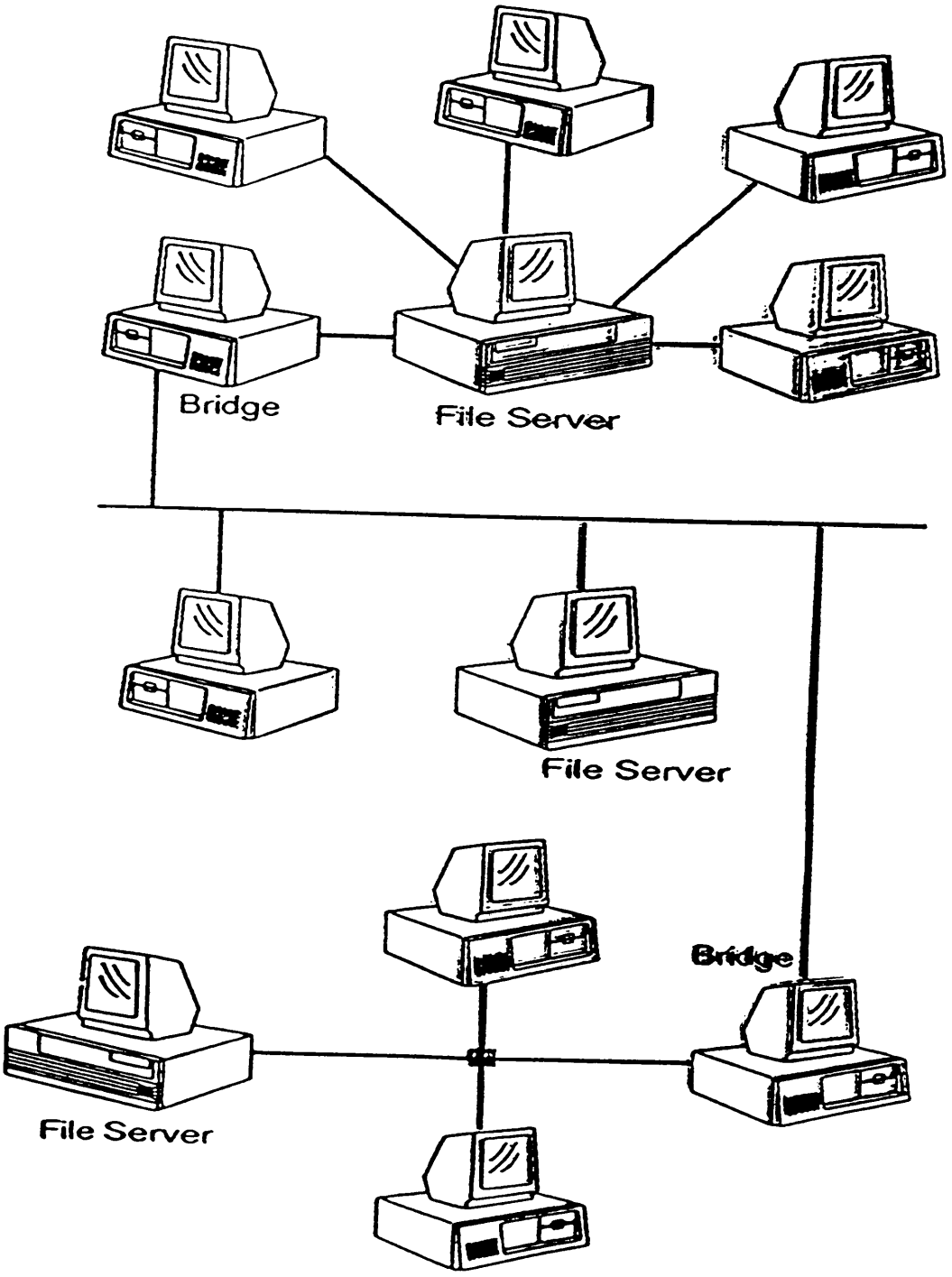
Dehavay C. (13)3184

Editor: Claude Dehavay

Please note how necessary are good specialists able to find the faulty office (10/2-019),
which could have been ANYWHERE in the Division, within 15 minutes.

Integration of Computing for Engineering Needs using MS-DOS (or OS/2) based Local Area Network

Alberto Pace CERN PS/OP



Agenda

- Analysis of Needs and answers in the DOS Environment
- Necessary Investments (H/W and S/W)
- System Management and Manpower Required
- The PS Network and an on-line demonstration

Requirements

- Homogeneous Interface
- Easy to use
- Good response time
- Integrated
  - A Workstation should be an *access point* to a set of tools (applications) which allow to accomplish at least 95% of the common tasks. The information must be accessible, uniformly represented and structured.

Needs Analysis

- Word Processing (WP) and Desk Top Publishing (DTP)
- Drawing and Drafting for DTP
- Spreadsheet, Management and Presentation Graphics
- Computer Aided Design (CAD) and Computer Aided Manufacturing (CAM)
- Computed Aided Engineering (CAE) and Finite Element Method Analysis (FEM)
- Databases
- Programming
- Communications

Answers (MS-DOS Area)

- Word Processing and Desk Top Publishing
  - IBM SGML or Microsoft Word or Microsoft Write
  - Aldus PageMaker or Samna Ami Professional
- Drawing and Drafting for DTP
  - Microsoft Paint or ZSoft PC Paintbrush (Bitmapped)
  - Micrografix Designer or Micrografix Draw (Vectorized)
  - CPI Image-In for scanning images
- Spreadsheet and Management
  - Microsoft Excel
  - Microsoft Project or SuperProject Expert
- Computer Aided Design (CAD) and Manufacturing (CAM)
  - Autodesk Autocad
  - PCad
  - (CadKey)
- Computed Aided Engineering (CAE) and Finite Element Method Analysis (FEM)
  - MathCad
  - Mathematica for Symbolic Computations
  - Ansys PC/Linear WITH a graphic terminal emulation to connect to hosts with Ansys Full.

Answers (continued ...)

- Databases
  - SQL-Graph and SQL-Net to access any Oracle Databases
- Programming
  - Microsoft programming Family (Basic, C, Pascal, Fortran, Assembler)
  - Borland Programming Family (Basic, C, Pascal)
  - Microsoft Windows Development Kit
- Communications (using TCP/IP)
  - Terminal Emulations Programs for DEC VT-220 and IBM 3270 Terminals
  - Color Graphic Terminal Emulation Programs for Tektronix 4105 Terminals (indispensable for FEM calculations)
  - File Transfer
  - Remote Shells
  - (Mail)

User Interface

- Microsoft Windows is recommended.

Investments

- Cost per Workstation: 12 - 15 KSF
- Cost per Server (with full set of printers): 30 - 35 KSF

Example

- Cost of a Network with 2 Servers and 50 Workstations built from **Scratch**: 670 KSF

Workstation Hardware

- Recommended Workstation: Olivetti M 380/C, M380/XP1
  - Intel 80386, 16 or 20 MHh, 32 bit bus Microprocessor
  - Intel 80387 Mathematical Co-Processor (optional)
  - Hard Disk 62 MBytes
  - 4 Mbytes of RAM Memory
  - Color Monitor with VGA compatible Graphic Adapter
  - US or SF Keyboard
  - Ethernet Communication Board
  - Mouse
- Workstation Price (October 1989): **8663 CHF**

Workstation Software

- DOS Operating System and Microsoft Windows Interface:
  - Included in the Workstation Price
- Software Application:
  - Prices vary from 100 to 1000 CHF per license.
- Examples

- Write, Paint:	Free
- C, Basic, Pascal	150 CHF
- Terminal Emulation	Free
- Graphic Terminal Emulation	1000 CHF or Network Lic.
- Excel	700 CHF
- Word	700 CHF
- Autocad	1000 CHF
- Ami	160 CHF

Server H/W and S/W

- Hardware: Olivetti M380/XP5, Price 14000 CHF
  - Intel 80386, 32 Bit, 20 MHz Microprocessor
  - 4 Mb RAM Memory
  - 300 or 600 MBytes Hard Disk
  - Monocrome Monitor
  - Etherlink Adapter
- Software: Novell Netware SFT, Price 6000 CHF

Network Printers

- PCL/Laserjet Emulation
  - Olivetti PG 208 M with 2.5 MBytes of Memory: 4500 CHF
- PostScript
  - QMS-PS 810 from Norsk Data: 8000 CHF
  - Apple LaserWriter II/NTX: 6000 CHF
- Color Outputs and Plotters
  - HP7550 Automatic A3/A4 Plotters: 5500 CHF
  - HP Paintjet Color Printer: 1500 CHF
  - Larger Format Plotter with Pen or Electrostatic can be added

Management & Manpower

- General Recommendations
  - Cfr. the Green Book *Computing at CERN in the 1990s.*
  - Cfr. the *MIS Reference Book.*
  - However, among all the possibilities listed as guidelines, a subset must be chosen to allow uniformization and integration between different applications.
- A Workstation in Everyone's Desk
  - Make a plan of investments to reach this goal within two or three years.
  - *Everyone* means Staff of categories 1, 2, 5 and 6. Members of category 3 must also have access to the system.
- Centralized Purchase
  - Purchases must be approved by the Project Leader before being sent to the Management Information System Section (MIS). This will allow the Project Leader to have an uniform Network. Allowed Hardware *must* be a subset of what MIS offers.
- No Software in the local Disks
  - Reduce the user support to the *Official recommended Network* software. Users will soon realize that it is counterproductive to use local programs.

- Training and User Support policy
  - Organize in-house courses for beginners.
  - Organize courses on the *Officially recommended Applications*
  - User Support on the particular application should come from the Management Information System Section (MIS Technical Training).
- Receive Guidelines for the future from MIS
  - Software inquiries, Upgrades, Offers, Tenders and system support *should* come from MIS.
- Heterogeneous versus Homogeneous Network
  - Keep to the minimum the mixture of different kind of hardware. Management problems already arise when using different types of compatible accessories (Monochrome, CGA, EGA, VGA graphic adapter boards, SF or US Keyboard, Amount of available memory, etc).
  - Avoid totally mixing differents operating system as long as this is possible (MS-DOS with Macintosh or with UNIX or with VAX/VMS). If this is not possible, the system management staff has at least to be tripled.
- No in-house developments !!!!
  - The software development is no longer an easy job. The management staff should not develop any application. Only software to overcome *structural* and *necessary* incompatibilities has to be written.
  - Leave the users write their own applications if they need them. Try to uniform the language used (C) to provide them to build and share libraries.
- Include the Staff Cost in the Project Cost

Staff Required

- Staff hierarchy and personal responsabilities must be clear
- Super-Specialists with large views are necessary.

- Project Leader
  - Purchasing
  - High Level System Management
  - Advices Users on system configurations
  - Users Support (Which Application Should I Use ?)
- Two Engineers
  - Users Support
    (How can I use this Application ? How can I print ?)
  - Organize Users Training
  - Organize Users Group Meeting
  - Documentation
- One Technician
  - Installation
  - Repair

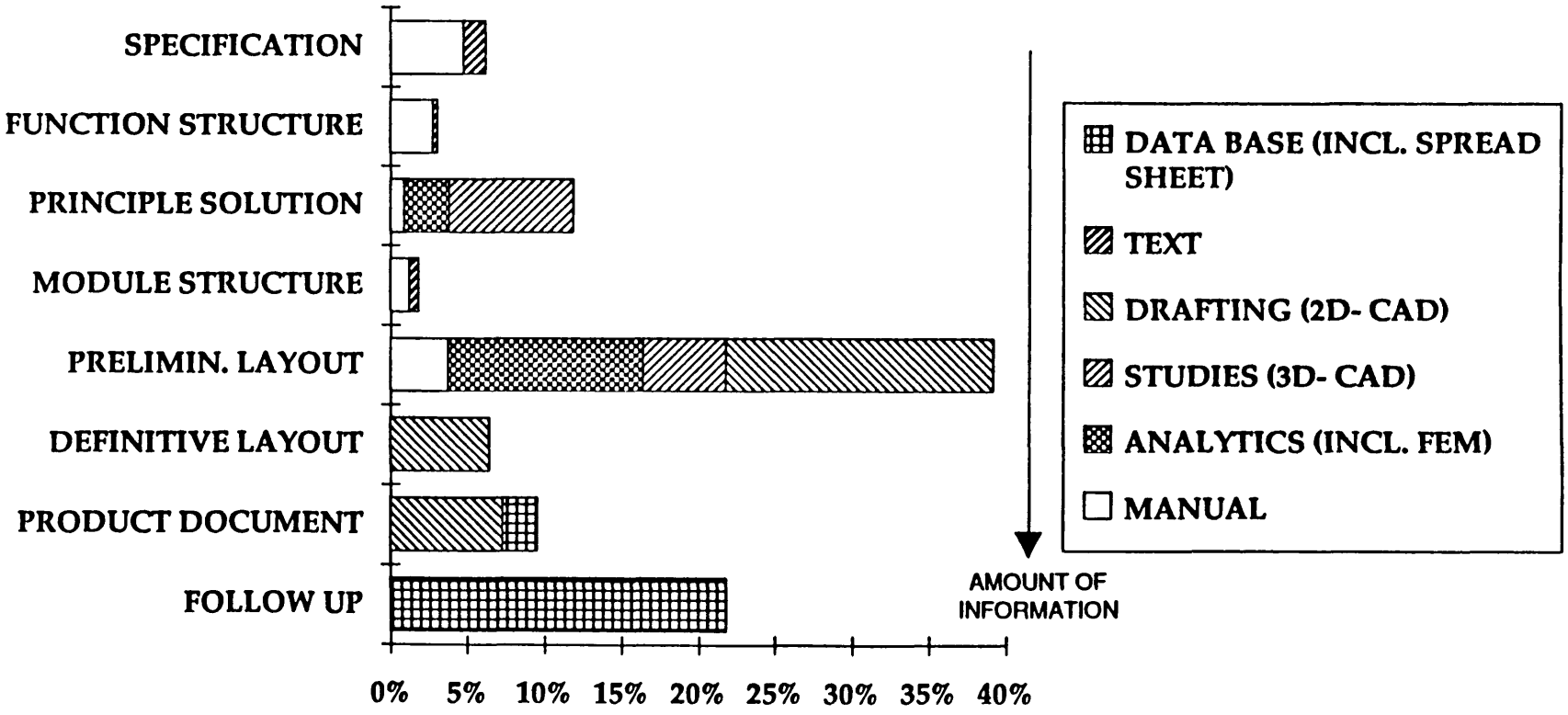
Future

- 80486 Based Workstation
- Operating System/2 (OS/2)

EVALUATION OF COMPUTER USE

PS / ML
GROUP
OCT -89

SPLIT OF THE DESIGN PROCESS



SOURCES: VDI 2221; VDI 2234; BEITZ (ENGINEERING DESIGN); CERN CASE STUDY; QUESTIONNAIRE

The PS Network

- Staff: G. Shering (Project Leader), A. Pace, C. Dehavay.
- 4 Servers. 1.2 GigaBytes of Disks.
- 4 Network PCL Laser Printers distributed geographically.
- 4 Network PostScript Printers distributed geographically.
- 6 Network Plotters distributed geographically, one of them is an A1 Electrostatic completely automatic. Only 1 of the 6 is a manual plotter.
- More than 120 Workstations.
- More than 160 Registered Users, 50 - 60 simultaneously connected.
- Total Investments in two years: about 1 MSF.

ANNEXE 1

Computing for Engineering at CERN in the 1990s

9th December 1988

Contents

ANNEXE 2

Accelerator Computing Requirements in the Nineties

Working Group on Accelerator Computing

Final Version, March 1989

Workstations

There is essential agreement on the trend towards networked workstations, together with local servers, and increasing use of the central services over the network.

It is agreed that a "workstation on every desk" is a reasonable aim. In the Accelerator divisions it is estimated that 1000 general purpose office workstations will be in use in the Nineties. In addition there will be a number of special purpose workstations, Vax Station or Apollo. Approximately, 30 will be used for mechanical design, 40 for controls (20 in PS controls, 20 in SPS/LEP controls), 20 for accelerator design and modelling, and 10 for database design. An attempt is being made to minimise the use of special purpose workstations, so a total of 100 seems reasonable.

The accelerator divisions make extensive use of a wide range of industrial software, and so tend to prefer the IBM compatible office workstations for which there is the widest range of software and add on cards. There are, of course, other reasons such as history, European element. The PS, SPS, and ST have a policy on this matter, but in LEP both the IBM and Macintosh streams are present. It was agreed that divisions should have a policy in this area, and an adequate mechanism for implementing the policy. The advantages in concentrating on a single type of workstation include better support from the limited manpower available, better network facilities, easier communication, and a better spread of knowledge from other users.

For office workstation application software a two level approach is recommended. The "high" level should be the best package for the specialist application (often, unfortunately, the most expensive). The "low" level should be a popular package running on the office workstation. Examples are found in many areas. In mechanical design it could be Euclid and AutoCad, in electrical design Daisy and PCAD, in word processing NORTEXT and a popular PC package, in databases ORACLE and Symphony or EXCEL, in software engineering Teamwork and PCSA. At the popular level there is a danger of diversification due to the individualism of divisions and groups. This might be controlled by recommendations from the appropriate Technical Boards, by selective training and support, and by providing interchange between the approved high and low end systems. Interchange is made easier if the low end system is the same as the high end, eg. Euclid or Oracle on a PC. This may not be the

Chapter 2

Main Conclusions

Networked workstations will become the generalised computing tools, with about 1000 general purpose office workstations and 100 special purpose workstations in the accelerator divisions.

Local and special purpose servers and networking support will continue to be supplied from within the accelerator divisions, but the accelerator divisions will increasingly rely on DD for central network support, for the main computing facilities, for the accelerator database engine, and for backup facilities. For all this they will expect as good support as the research divisions.

It is agreed that CERN should remain a multi-vendor site as a whole. The accelerator divisions, however, retain the right to opt for a single line, either as a group or each division separately. Support for open systems such as UNIX, and products that will run on a variety of support engines, should be continued and even given preference.

The accelerator divisions have a substantial commitment to IBM compatible office workstations (PCs), mainly of European manufacture. Network facilities and interconnections are being set up to capitalise on their use. DD support for the supply and networking of this line should continue, and all CERN-wide facilities made available on such networks. Coordination should be provided for the choice of software to be used, and its relationship with other CERN software options.

(ONISS ....)

Increased manpower will be required in the accelerator divisions for computing other than the control systems. In particular up to 15 people will be required for local informatics and networking support, working in liason with the central support services.

EUROPEAN ORGANIZATION FOR NUCLEAR RESEARCH
ORGANISATION EUROPEENNE POUR LA RECHERCHE NUCLEAIRE

PS/ML/Note 88-14
Geneva, May 16th, 1988

Report of the Committee for Administrative Computing Support in Engineering

(Comité pour l' Aide Informatique Administrative à l' Ingenierie, CAIAI)

R. Hanni/ST, M. Moller/SPS, M. Mottier/LEP, A. Pace/PS (editor and chairman)

0. Introduction

The Committee for Administrative Computing Support in Engineering (CAIAI) was created on the 11th of February 1988 by the COMIMECA with an original mandate to establish an inventory of the different needs and coordinate the efforts between the different divisional groups responsible for mechanical engineering studies.

Since that date, a detailed mandate was elaborated, and four different areas have been examined. In those, the task has been:

- Study and appraisal of the different existing methods
- Proposal of a uniform methodology, when possible
- Otherwise, specify a system which would introduce this uniformity

The topics that have been investigated are: Design Offices and Workshops Management, Numerical Control Applications, Bureautique, and the Euclid Oracle Interface, that are all non CAD activities.

1. Design Offices and Workshops Management

The existing methods used for design offices and workshops management are very different and they accomplish different tasks. There are systems which run on mainframes and others which run on PCs. Some systems are used to create a database of the different activities and other systems are used to ensure efficient planning and work loading. This is why a proposal for achieving uniformity cannot be implemented immediately.

However in this particular field much hardware (such as old PCs and index lines) is under-dimensioned and will be replaced soon. This could be a good occasion for a complete specification which would accomplish all requirements. Should this recommendation be accepted CERN-wide, a successive harmonization of the different management procedures would be greatly facilitated. A proposed specification follows.

Hardware

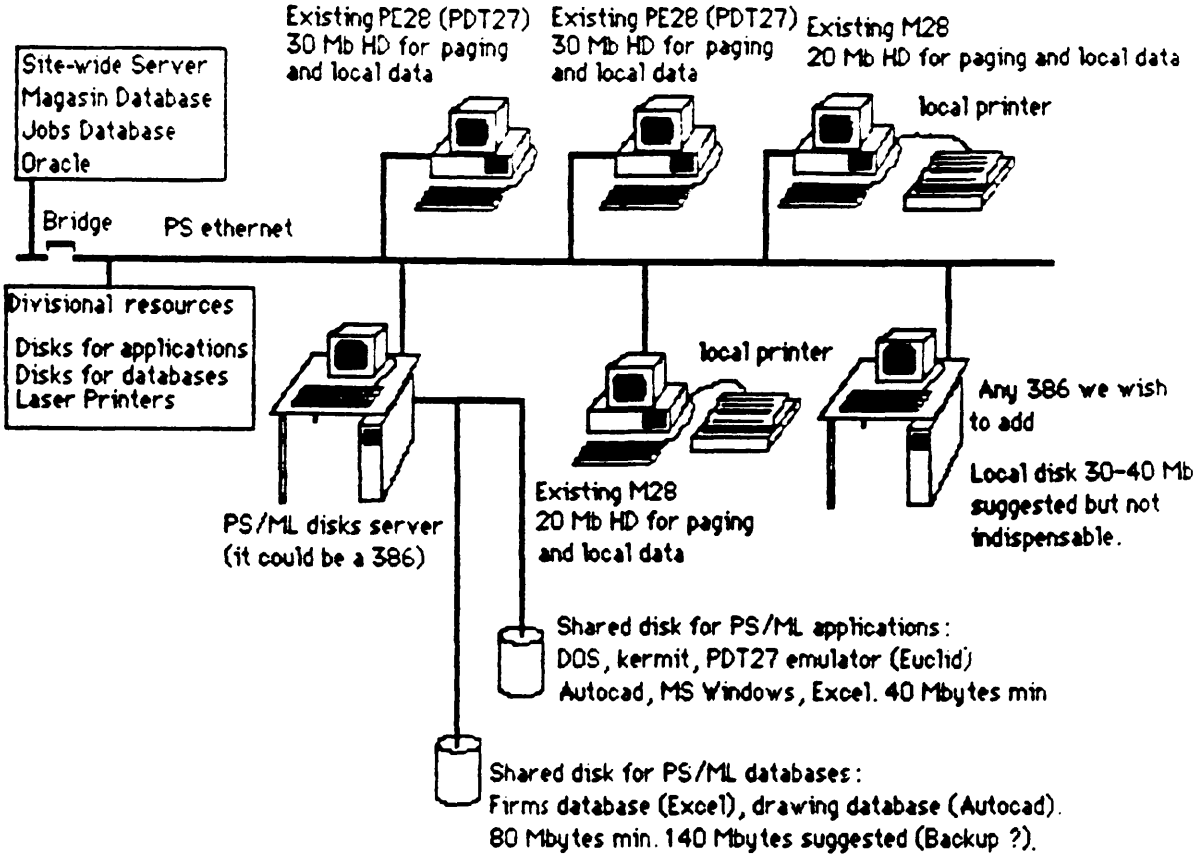
The hardware proposed to accomplish this task is a Personal Computers' network. This is in agreement with the tendency given by the Management Information System unit (MIS) recently created at CERN.

The machines suggested for these applications are the 80386 microprocessor based personal computers. An example could be the Olivetti M380 with a local hard disk of at least 40 Mbytes and a colour graphic monitor. Those machines are in agreement with the PC contract awarded last February and may be purchased at the CERN PC Shop (513/R-048).

The suggested network medium is Ethernet, which is the CERN Communication Board's recommended standard.

For each group, there should be a disk server machine where local databases can be stored. Then, one site-wide disk server for general databases and for the software package to interface the database is needed. The local group server could also be one of the M380s with sufficient disk space running "Novell" or "PC Lan". Note that at present there is no recommendation for disk servers. It is being established by the DD/CS group.

An example of this hardware architecture is shown in the diagram for the PS/ML group. All the envisaged hardware does not need to be purchased because it exists already except the 386s (a general PCs category, which includes the Olivetti M380s).



The site-wide server should be one of the services supported by the DD Division. If it is not the case, each group would provide their own databases server for use by the other groups. For example, the access to the stores database, could be provided by ST division.

Software

Two kind of software packages are necessary. The first should be a database management system and the second should be used for job planning and progress.

For the database management the choice is between Microsoft Excel and Oracle.

Excel is suggested for its very powerful, easy to learn, user friendly, graphic interface integrated in Microsoft Windows (the interface is similar to Macintosh). Excel' s databases are Macintosh compatible.

Oracle is suggested for the existing applications that are already using it. The ST workshop is now using VM/CMS Oracle, and the LEP/IM Design office is developing a system which will integrate VAX/VMS Oracle together with Euclid (See the last chapter). Of course Oracle will not be less powerful, but the actual version 4 suffers from the lack of a graphic user interface. It would therefore be of considerable interest to exploit

these programmes under Oracle version 5.1 in order to edit graphs with SQL GRAPH. With SQL NET it is possible to interrogate a mainframe computer from a PC.

On PCs, the Oracle version 5.1 does not allow the use of SQL GRAPH, but it is possible to gain access to LOTUS 1-2-3 using ADD-IN.

The software for jobs planning could be - for example - Microsoft Project. Experience has usually shown that the software packages which accomplish that task are more complicated than the objective needs. That is also why a simple program developed at CERN, which retrieves information from the databases and produces the planning (and a graphic representation !) can be envisaged.

Use of the management system

In any choice made in the future, the three following points seem to be crucial.

- The software must be compatible with the existing databases
- The software and the hardware must have a graphic user interface.
- The software and the hardware must be easy to use and little training should be necessary to use it (this is not an easy task).

In any case it is indispensable that the database may be consulted by anybody interested and that the consultation does not require a dedicated operator between who is consulting and the machine (as happens now with Oracle and Euclid databases).

Open problems

(In increasing order of importance)

- All the local group databases will require a certain maintenance (tape backup every week, for example). Who is going to do this work? (proposed answer: The person(s) who modifies the database or DD if it is a site-wide database in a server managed by DD)

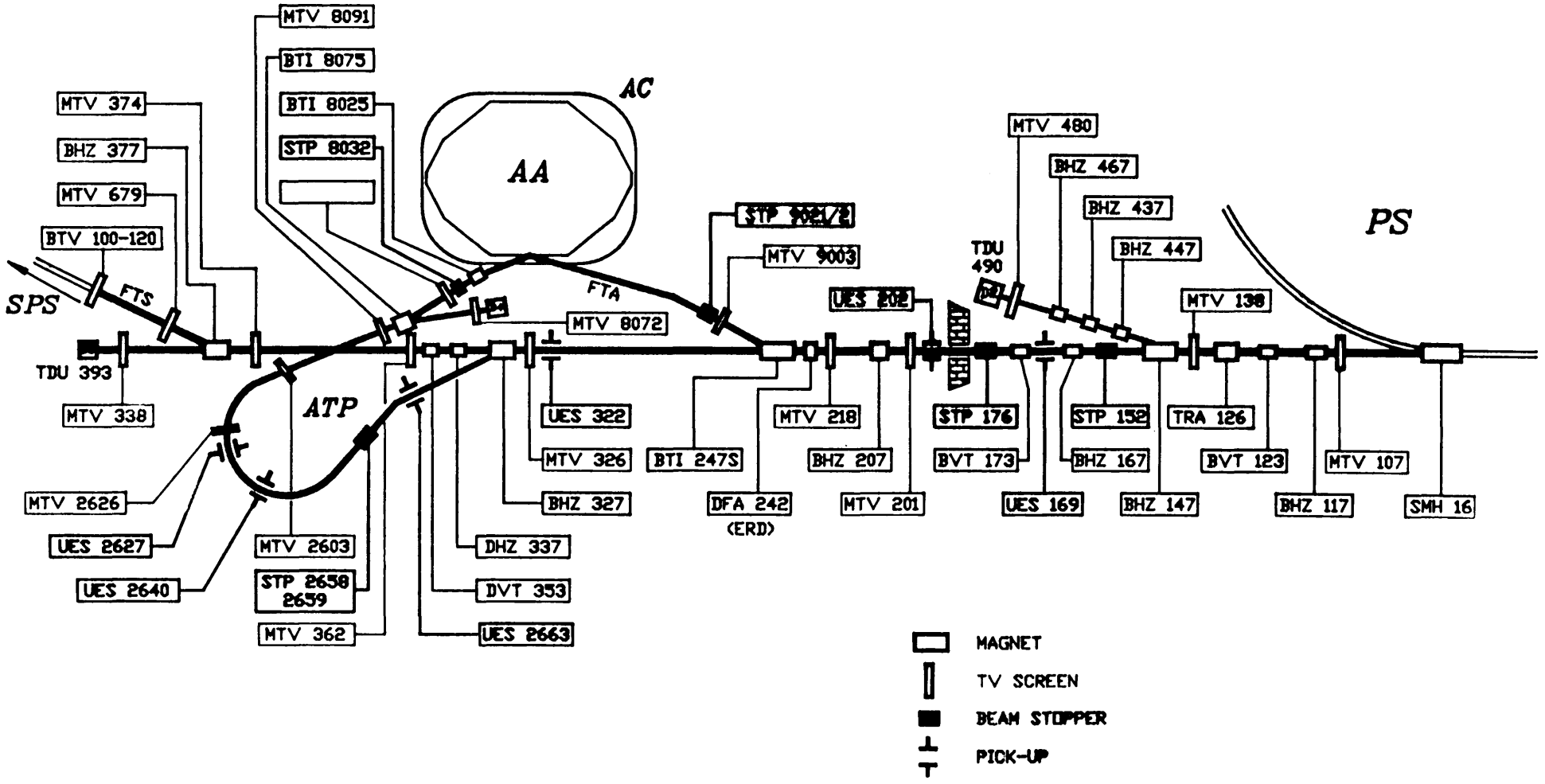
- The problem of the Macintoshes is still unsolved. What to do with the existing machines and for the next coming ones (LEP division) ?

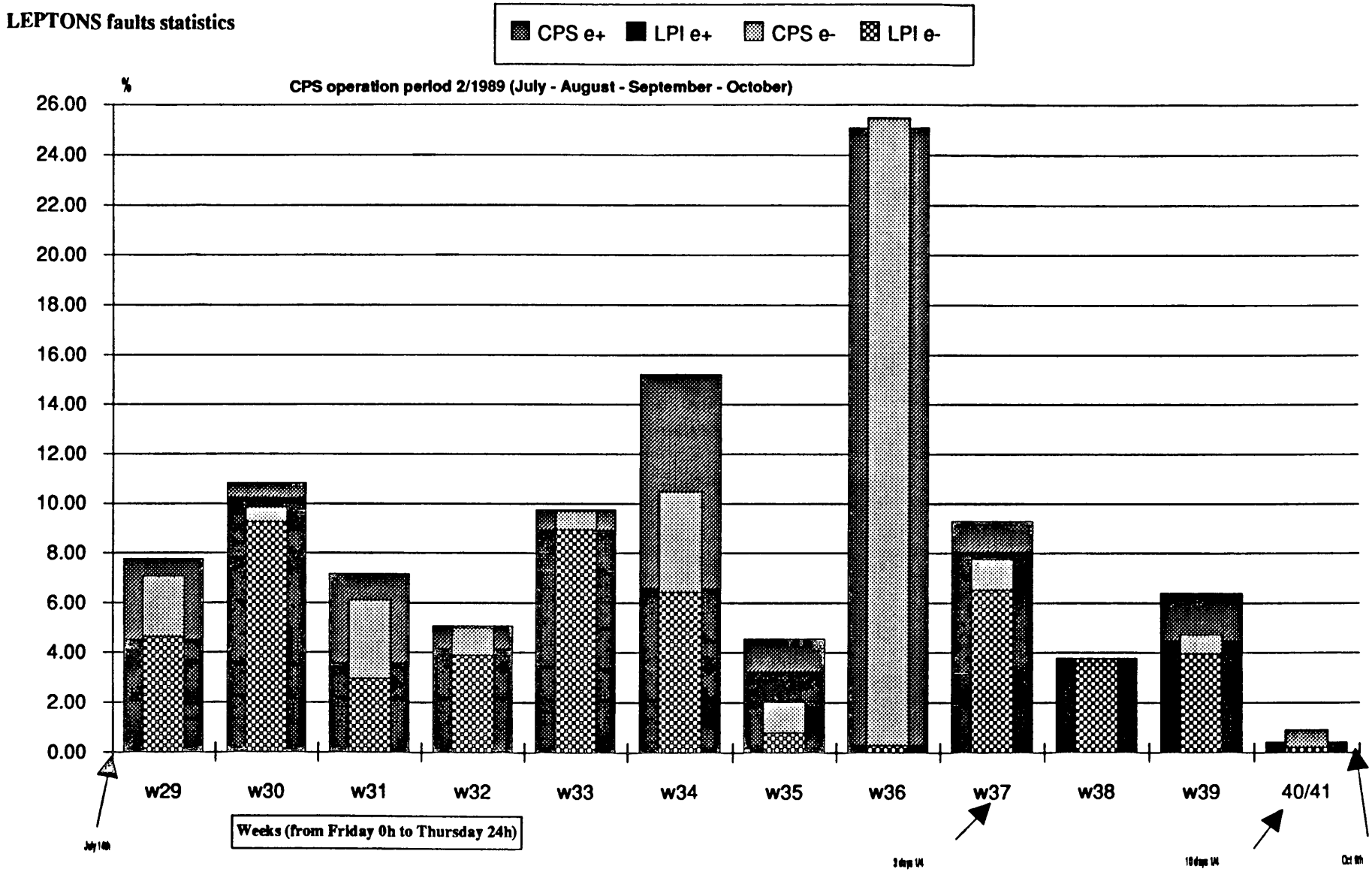
- When will the Ethernet network be site-wide available ?

PACE_1
AutoCad

PS/ML/VAC/ar
11.09.89

LIGNES DE FAISCEAUX
PS – AAC – SPS




LEPTONS faults statistics
CPS e+
LPI e+
CPS e-
LPI e-
%
CPS operation period 2/1989 (July - August - September - October)
26.00
24.00
22.00
20.00
18.00
16.00
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
w29
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w35
w36
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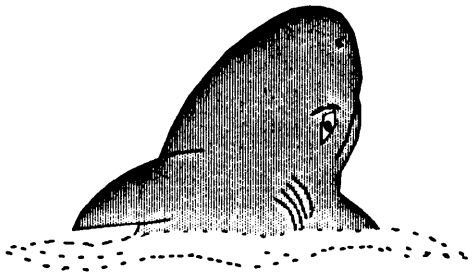
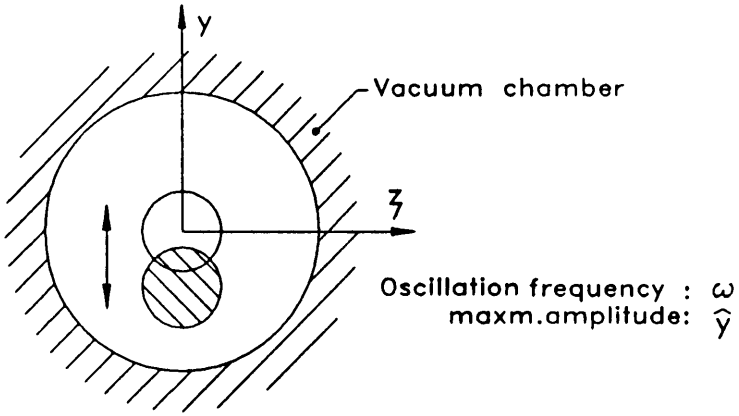
40/41
Weeks (from Friday 0h to Thursday 24h)

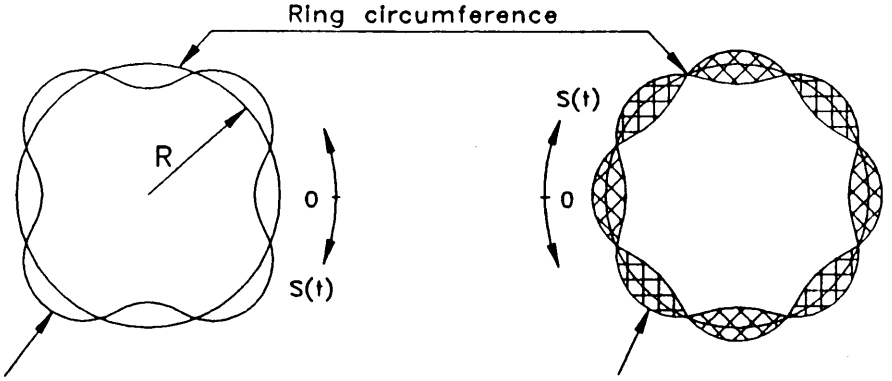



PARTY
ANIMAL

COHERENT MODES

— — DIPOLE OSCILLATIONS — —





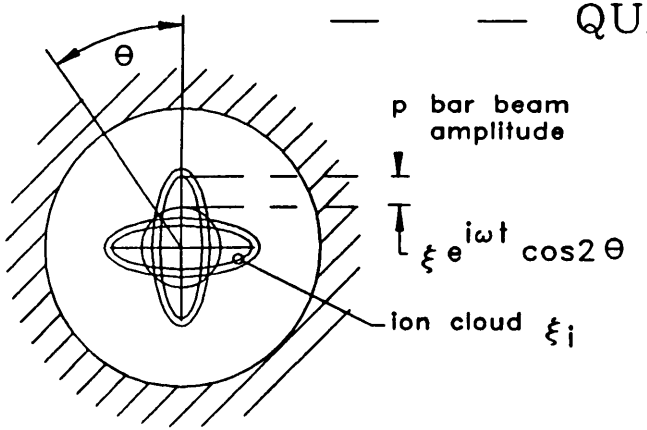
Dipole pattern with n waves

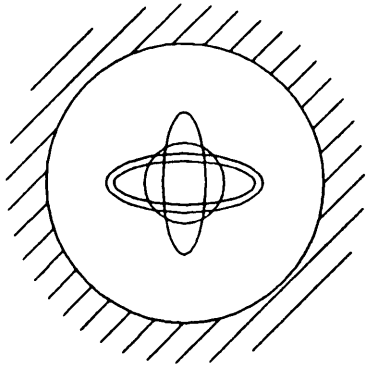
$$y = \hat{y}\, e^{[\,i(n-0)S/R - i\omega t]}$$

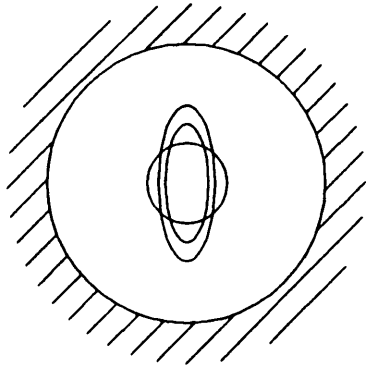
Quadrupole pattern

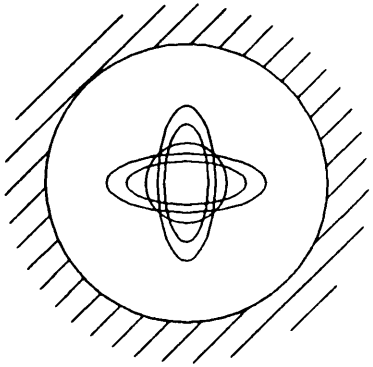
$$\xi = \hat{\xi}\, e^{[\,i(n-2Q)\,S/R - i\omega t]}$$

— — QUADRUPOLE OSCILLATIONS — —









TWO DIMENSIONAL/
TWO DIMENSIONAL COUPLING

Symmetric case $\xi_i = \xi$

Antisymmetric case $\xi_i = -\xi$

$$Q_{y\bar{p}} = Q_{z\bar{p}} \; ; \; q_{zi} = q_{yi}$$

ONE DIMENSIONAL/
TWO DIMENSIONAL COUPLING

$$Q_{y\bar{p}} \neq Q_{z\bar{p}}$$

$$q_{zi} = q_{yi}$$

ONE DIMENSIONAL/
ONE DIMENSIONAL
UNCOUPLED
OSCILLATIONS

$$Q_{y\bar{p}} \neq Q_{z\bar{p}}$$

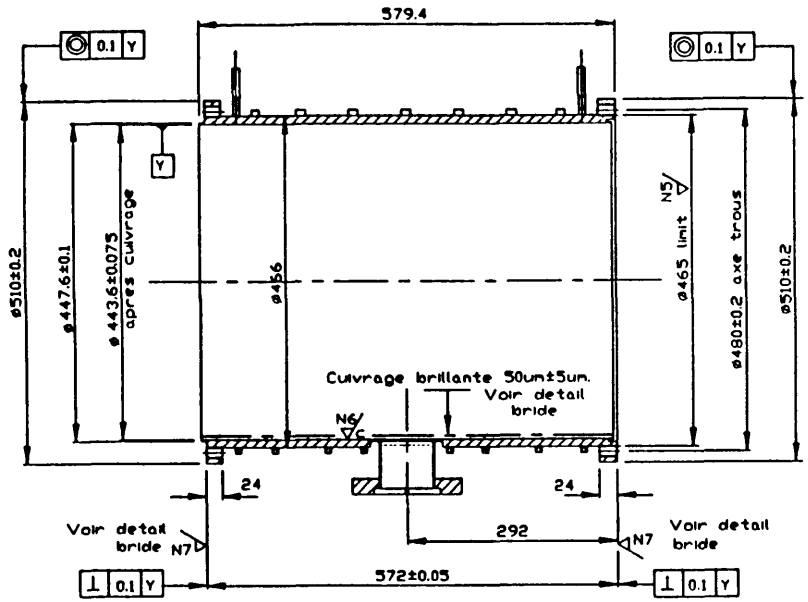
$$q_{zi} \quad q_{yi}$$

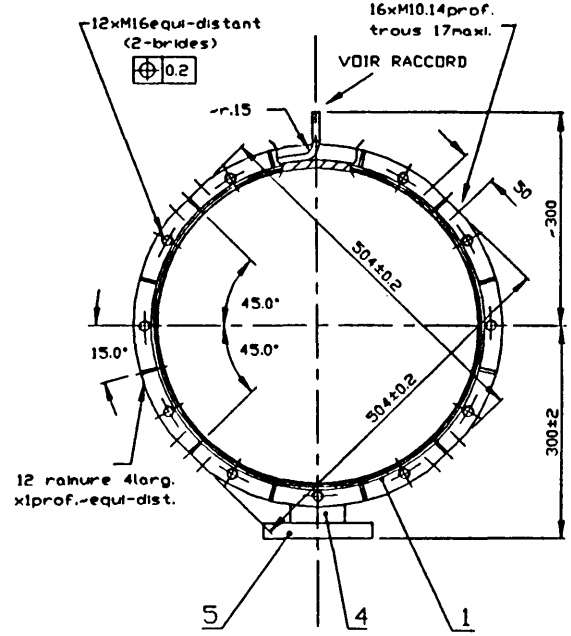
TWO DIMENSIONAL/
TWO DIMENSIONAL
UNCOUPLED
OSCILLATIONS

$$Q_{y\bar{p}} \neq Q_{z\bar{p}}$$

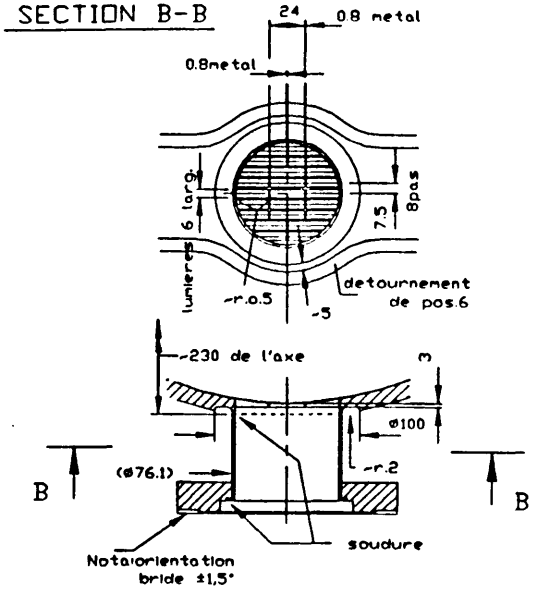
$$q_{zi} \neq q_{yi}$$

SECTION A-A





SECTION B-B



PIQUAGE VIDE
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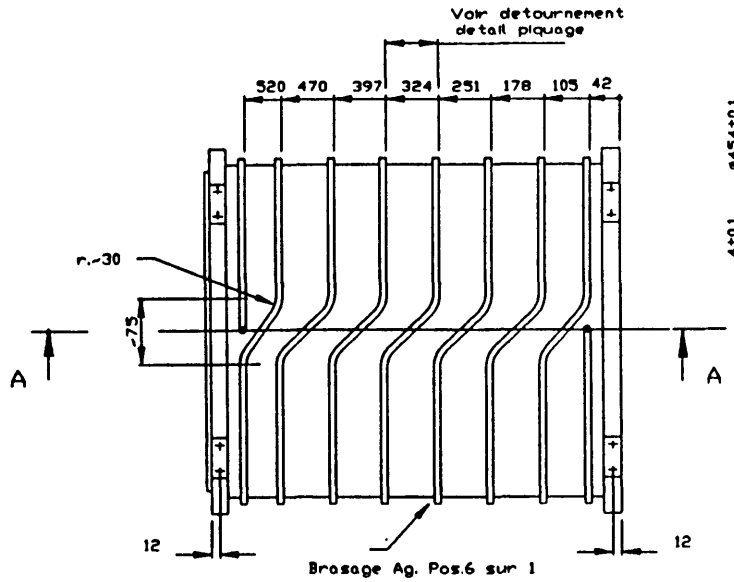
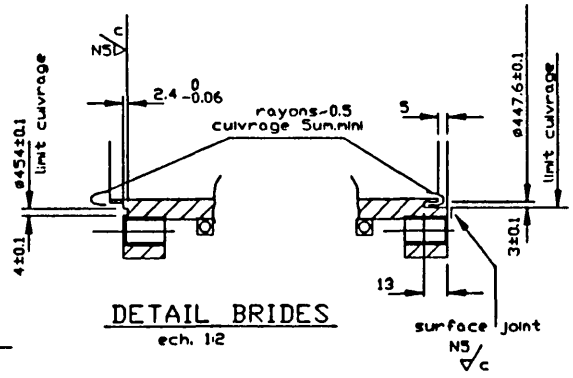
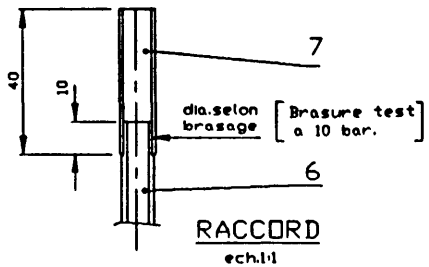




DETAIL BRIDES
ech. 1:2



RACCORD
ech.1:1

POIDS

N8 [N7, N6, N5]

NOTES:

SOUDURE SELON Reference Technique PS/ML TR-07

TRAITEMENT THERMIQUE SELON Reference Technique PS/ML TR-03

NETTOYAGE SELON Reference Technique PS/ML TR-01

TEST AU VIDE SELON Reference Technique PS/ML TR-05

QUANT.	DESCRIPTION	POS.	MATIERE	OBSERVATIONS
2	TUBE ø10/ø8	7	INOX	40lg. CERN scem 393905 010.4
1	TUBE ø9 /ø6	6	CUIVRE	12,5M " 397115 059.2
1	BRIBE UHV DN100	5	INOX	" 186020 015.8
1	TUBE ø76.1/ø72.1	4	INOX	lgr.selon5 " 393905076.6
		3		
		2		
1	CORPS (3pc. souder)	1	INOX	QUALITE ULTRA-VIDE

ENSEMBLE/ASSEMBLY — S. ENS./S. ASSY. LIL7ME lips 00091

PSML Job No. 9027

LIPS CAVITY

ECHELLE/SCALE 1:5 (1:1) (1:2) (1:2.5)

	NOM	DATE
DESSINE	J.D.Pearce	23.08.89
CONTROLE		
VU		

REMPLACE

EUROPEAN ORGANIZATION FOR NUCLEAR RESEARCH

LIL 7ME LIPS 1498 2 INDICE

INDICE	DATE	NOM	ZONE	MODIFICATION

DESIGN FLEXIBILITY, TOLERANCES SELON NORMES ISO

DRAWINGS, FLEXIBILITY, TOLERANCES ACCORDING TO ISO STANDARDS

Projection européenne / First angle projection

THIS DRAWING WAS PRODUCED BY AUTOCAD.