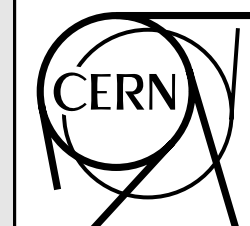


# CERN COMPUTER NEWSLETTER



JANUARY – MARCH 1994  
No. 215

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## Editorial Notes

Contributions to the CNL are accepted as plain text, although marked-up text in L<sup>A</sup>T<sub>E</sub>X is preferred. They should be sent as email to `cnl@cern.ch` with the subject line being:

**Subject: CNL ARTICLE**

We would like you to encourage to subscribe to the announcement of the PostScript version, a service which is becoming more and more popular. As before, you just send a mail to `cnl@cern.ch` with the subject line being:

**Subject: ANNOUNCE POSTSCRIPT CNL**

The CNL server will then send you a mail whenever there is a new CNL ready as a PostScript file.

To know more about what the CNL server can do for you, please send a mail to `cnl@cern.ch` with the subject line being:

**Subject: HELP**

Past experience shows that it is a good policy to have four CNL editions per year (one around Easter, one before and one after the summer, and the last one just before Xmas), unless the number of contributions makes it necessary to have a supplementary issue. Thus,

the date of the deadline for contributions to the next issue of the CNL is:

Issue number	Final date
216	Monday, 6 June 1994

This document was produced with L<sup>A</sup>T<sub>E</sub>X and the `cerncnl` style. Compressed PostScript files, containing the complete printable version of this CNL or parts of it can be obtained by anonymous ftp to `asis01.cern.ch` as follows (commands to be typed by the user are underlined>:

```
ftp asis01.cern.ch
Name (asis01.cern.ch:username): anonymous
331 Guest login ok, send your complete e-mail address as password.
Password: yourusername@yournode.domain.country
ftp> cd cnl/215
ftp> binary
ftp> get cnl215.ps.gz
ftp> quit
```

Please note that, if you do not have the gnu `gunzip` utility on your system you can get the uncompressed PostScript Version by typing the command `get cnl215.ps`, without the `gz` suffix. In order to save Internet bandwidth, you are, however, strongly urged to try and install the `gunzip` utility since gzipped files are about three times smaller than their unzipped equivalents.

The following files related to the present CNL are available in that directory:

<code>cnl215.ps.gz</code>	Complete CNL	<code>edithelp.ps.gz</code>	Editorial and help pages
<code>general.ps.gz</code>	"General"	<code>service.ps.gz</code>	"UNIX Workstations and Desktop Support"
<code>network.ps.gz</code>	"Communications and Networks"	<code>textproc.ps.gz</code>	"Text Processing"
<code>proglib.ps.gz</code>	"Program Library News"	<code>fortut.ps.gz</code>	"Fortran 90 Tutorial"
<code>charcode.ps.gz</code>	"Emacs and character codes"		

On all central systems one has access to the terminal version of the CNL via the command:

**XFIND CNL 215**

On CERNVM **XFIND** will give access to the printable (usually PostScript) version as well.

*Responsible editor:* Nicole Cremel

*Technical realization:* Michel Goossens

## IF YOU NEED HELP

Service	Name	Address	Telephone	E-mail Address
<b>USER CONSULTANCY OFFICE (UCO)</b> Opening hours 08.30-12.00 and 14.00-17.30		<b>513/R-052</b>	<b>4952</b>	user.support@cern.ch
All aspects	Miguel Marquina	513/1-005	4912	user.support@cern.ch
Accounting Service	Attila Koppanyi	513/1-019	4933	user.support@cern.ch
Registration, Documentation Office	M.C.Perler	513/1-017	5004	user.support@cern.ch
Consultancy Office	R. Woolnough	513/1-020	9156	user.support@cern.ch
<b>CENTRAL COMPUTER OPERATIONS (24 HOURS)</b>		<b>513/R-066</b>	<b>5011</b>	operator@cernvm
All aspects & IBM	David Underhill	513/R-035	4920	d.underhill@cern.ch
Central VAXes	Tim Whibley	513/R-033	4849	t.whibley@cern.ch
Remote Printers	Remy Bouvry	513/R-004	4929,13+5548	r.bouvry@cern.ch
Networks	Alasdair Ross	513/R-034	4927	netops@cern.ch
CORE services - CSF	C.Boissat	513/R-031	3195,13+5630	c.boissat@cern.ch
CORE services - SHIFT	Gordon Lee	513/1-020	4974	g.lee@cern.ch
<b>CERN PROGRAM LIBRARY OFFICE</b>				
All aspects	Jamie Shiers	513/1-002	4928	cernlib@cern.ch
VAX/VMS, IBM (VM/CMS)	Jamie Shiers	513/1-002	4928	cernlib@cern.ch
Apollo, HP/UX Support, SHIFT, CSF	Gunter Folger	513/1-003	5010	cernlib@cern.ch
DECstation, Sun Support	Ian McLaren	513/1-003	5010	cernlib@cern.ch
Distribution of CERNlib material	Lysiane Besson	513/1-014	4951	cernlib@cern.ch
<b>UNIX Workstations and X Terminals Support</b>				
Team Leader	Alan Silverman	31-1-030	4955	Workstation.support@cern.ch
UNIX Wks. and X Term. Front Desk	Christiane Ball	31-1-015	3349	Workstation.frontdesk@cern.ch
SUN s/w	Ignacio Reguero	31-1-027	4409	sun.support@cern.ch
DEC's OSF/1 s/w	Alan Lovell	31-1-024	4911	osf.support@cern.ch
RS/6000 s/w	Rainer Tobbicke	31-1-024	4911	aix.support@cern.ch
ULTRIX s/w	Alan Lovell	31-1-024	4911	ultrix.support@cern.ch
HP 700 s/w	Lionel Cons	31-1-022	4913	hp.support@cern.ch
SGI s/w	Ignacio Reguero	31-1-027	4409	sgi.support@cern.ch
Apollo/Domain	Rainer Tobbicke	31-1-024	4911	apollo.support@cern.ch
X terminals	Lionel Cons	31-1-022	4913	xterminal.support@cern.ch
AFS	Rainer Tobbicke	31-1-024	4911	afs.support@cern.ch
Printers	Rainer Tobbicke	31-1-024	4911	printer.support@cern.ch
<b>OTHER SERVICES</b>				
Operating Systems	Les Robertson	31/3-007	4916	les.robertson@cern.ch
Tape operations	R.P. Minchin	513/R-009	13+5559	ric.minchin@cern.ch
Tape purchase	Mario Vergari	513/R-009	13+5602	m.vergari@cern.ch
Experimental Tape Allocation	Hansjorg Klein	13/3-024	2124,2060	hans.klein@cern.ch
Computer Science Library, mornings only	Jutta Megies	513/1-024	2379	j.megies@cern.ch
Oracle	Sergio Santiago	31/3-011	4134,13+5580	s.santiago@cern.ch
Computer Security	John Gamble	31/3-030	3105	j.gamble@cern.ch
Central Vax Service Manager	Julian Bunn	31/1-025	5029,13+5551	j.bunn@cern.ch

### SEMINARS AND PRESENTATIONS

Designation	Organizer	Div.	Address	Telephone	E-mail Address
Computing Colloquia (Auditorium / bldg 500)	Frederick James	CN	513/2-012	4985	f.james@cern.ch
Computing Seminars (CN Auditorium 31/3-005)	Douglas Kemp	CN	31/1-011	5024	d.kemp@cern.ch
	Jean-Pierre Porte	ECP	3457	32-C07	j.pierre.porte@cern.ch
	Richard Keyser	SL	864/1-B23	4363	r.keyser@cern.ch
Technical Presentations (CN Auditorium 31/3-005)	Stanley Canon	CN	513/S-014	5036	stan.cannon@cern.ch
	Claudine Gentet	CN	513/S-014	5036	cla.gentet@cern.ch

## COMMUNICATIONS AND NETWORKS

Please use generic electronic mail addresses whenever possible. These mailboxes will be read even when the usual specialist is absent. It is helpful to use relevant keywords in the *subject* field of your message. Contact specialists directly only for very urgent cases or for very general consultations.

### Service

Software and interface consultancy  
Network infrastructure consultancy (backbone and FDDI)  
Network infrastructure consultancy (Ethernet in buildings)  
Network security alerts (hacking attacks)

General network operational problems

Specific Ethernet problems  
Internet (TCP/IP) registration requests  
LAT terminal server registration requests  
DECnet Registration Requests and Queries  
Other registration requests  
Queries about electronic mail  
Novell coordination and general PC networking advice  
Advice on Macintosh networking

### E-mail Address

John.Gamble@cern.ch or Mike.Gerard@cern.ch  
Joop.Joosten@cern.ch or Jacques.Rochez@cern.ch  
Leo.Sohet@cern.ch  
cert@cern.ch (if urgent: 4927 or 8665)  
[5011 night/weekend]  
netops@cern.ch (if urgent: 4927 or 8665)  
[5011 night/weekend]  
ether-support@cern.ch or 2299  
tcpip@cern.ch  
lat-support@cern.ch (2299 for problems)  
decnet-support@cern.ch (dxmint::decnet-support)  
netops@cern.ch  
mail-support@cern.ch  
nice@cern.ch  
macnet@cern.ch (2299 for problems)  
[4366 for general Macintosh problems]

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**ONLINE COMPUTING:** See "ONLINE", the Newsletter of Data acquisition and Computing for Experiments,

Available from Anne Perrelle 31/1-003 2406 a.perrelle@cern.ch

**COMPUTING FOR ENGINEERING:** See the CERN Computing Support for Engineering Newsletter,

Available from Monique Tate-Lavergne 513/2-010 2863 m.tate@cern.ch

**COMPUTER TIME ALLOCATION GROUP (COCOTIME):**

Secretary: A.E.Ball/ECP 14/6-023 3849 alan.ball@cern.ch

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### DIVISIONAL REPRESENTATIVES FOR COMPUTING

Div.	Representative	Div.	Representative	Div.	Representative	Div.	Representative
AS	M. Draper	AT	P. Heymans	CN	A. Koppanyi	DSU	M. Draper
ECP	A. Grant	FI	S. Lauper	MT	C. Delamare	PE	D. Duret
PPE	H. Klein	PS	J. Riche	SL	A. Hilaire	ST	G. Martin
TH	U. Wolff	TIS	G.R. Stevenson				

### DIVISIONAL REPRESENTATIVES FOR NETWORKING

Div.	Representative	Div.	Representative	Div.	Representative	Div.	Representative
AS	M. Moller	AT	R. Saban	DSU	M. Moller	ECP	J.-P. Porte
FI	J. Groz	MT	C. Andrews	PE	D. Duret	PPE	E. Pagiola
PS	A. Pace	SL	P. Lienard	ST	P. Ciriani	TH	U. Wolff
TIS	B. Moy						

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# 1. General

## 1.1 The Service Mandate of the Desktop Computing Infrastructure Group

*Chris Jones CN/DCI*

### Introduction

The DCI (Desktop Computing Infrastructure) group in CN Division provides support services for three computing environments:

- the well established VMS services in the computer centre,
- MS-Windows and Novell services based on the NICE architecture,
- Unix-based services, some well established and some being constructed.

In addition, DCI provides the traditional centrally-organized support functions of:

- the User Consultancy Office, UCO,
- the User Registration Service
- the Accounting Service.

### VMS-based Services

Two VMS clusters in the Computer Centre (VXCERN and VXENG) are managed by the DEC section. The VXCERN service offers a reference VMS platform on which the Physics community can find the latest VMS versions of the CERN Program Library, WWW code, TGV's Multinet, the VMS Bookreader documentation, the usual VMS Layered Products, and so on. Other VMS clusters, both on and off the CERN site, use VXCERN as a "model" environment from which they clone the logical name table structures, CERN Program Library disk structure, and various other features of the VXCERN cluster. In addition, VXCERN acts as a network hub in HEPnet, offering world-wide connectivity over DECnet, IP and X.25. The VXCERN service has recently been "right-sized" to take advantage of the latest Alpha machines and SCSI-based storage.

The VXENG service is used by a community of engineers based entirely at CERN. Features of this service include Matra Datavision's EUCLID CAD/CAM package, and Oracle database software. Attached to the main cluster are a number of standalone VMS workstations which are used for EUCLID work.

In addition to running these two clusters in the Computer Centre, the section also offers help and advice to all users of equipment running the VMS operating system at CERN.

*Contact:* J. Bunn, CN-DCI-DEC

### NICE Services

The NICE, (Novell Integration, Coordination and Evolution), service provides a complete and standardized environment into which PC's running MS Windows can be installed with minimum effort. Currently around 1000 PCs are supported in this way.

A standard installation tool is provided (DIANE), as are replicated read-only servers with a wide range of application software. Home directory file services are being built up, through which electronic mail services are provided using MS Mail. These home directory services are also available to Macintoshes or Unix machines and provide for file sharing between these platforms. It is envisaged to support Windows NT in a similar fashion.

The NICE environment has been created via an inter-divisional collaboration. The central infrastructure of NICE is supported via a new section in DCI group, in close collaboration with key people in other divisions. This NICE Working Group has provided "A Guide to Personal Computer Networks at CERN" / "Guide reseau pour les ordinateurs personnels au CERN", which is available in English and French from the UCO (User Consultancy Office) in building 513.

*Contact:* D. Foster, CN-DCI-NCS

### Unix-based Services

The Unix-based infrastructure services can be broken down into two areas, those existing and those emerging. Amongst those existing are:

- the well established DXCERN service, which offers a standard Unix environment for the general user community, based on DEC Ultrix, and is well configured with public domain and commercial software tools, compilers, etc. The user community includes cross-software developers, as well as experimental physicists and engineers.

*Contact:* D. Wiegandt, CN-DCI-DEC

- the DXNEWS machine, which acts as the Internet News Server for CERN

*Contact:* D. Wiegandt, CN-DCI-DEC

- Unix Workstation and X-terminal support, notably in the area of system software (see below).

*Contact:* A. Silverman, CN-DCI-UWS

- the ASIS service, which provides source and binary files for public domain applications and tools of a wide

variety and for the CERN Program Library (see also below).

*Contact:* P. Defert, CN-DCI-GS

## **Unix Workstation and X-Terminal Support**

The DCI-UWS section aims to provide to all CERN users of Unix Workstations and X terminals advice on system configurations, purchasing assistance, help for systems installations and updates and problem debugging at the systems level. All these services can be accessed via a single Front Desk or via standard electronic mail addresses. These services are available to all CERN Divisions and to visitors to CERN and are made available without charge, although software packages purchased, usually with significant discounts, from vendors will generally be resold at cost. In the case of NCD X Terminals, a full hardware support service is also offered in conjunction with the ECP team led by Chris Parkman.

### **Unix Workstations**

The currently-approved list of supported workstations includes HP Apollo Domain Series, HP Series 700, DEC ULTRIX DECstations and VAXstations, DEC OSF/1 Alpha, SUN Microsystems (SunOS 4 and Solaris 2), IBM RS/6000, and Silicon Graphics.

The section maintains up-to-date product descriptions and CERN price lists both for vendor options and selected third party equipment such as discs, memory, Exabytes, etc. We offer advice on selecting appropriate configurations, and for visiting groups assistance is available at the Front Desk for submitting Internal Purchase Requisitions to Finance Division.

Assistance is available to install and subsequently update the system software and vendor-supplied layered software on workstations. Users may call upon our services to try to debug system problems. Where the problem is traced to an application, physics or desktop, users will be referred to the appropriate service elsewhere in CERN or to the vendor of the application.

We publish CERN-specific documentation and Computing Newsletter articles and we maintain news groups. All such information is maintained on a WWW homepage under the title "Unix Workstation Support" accessible from the CERN Home Page.

### **X terminals**

The officially-recommended X terminal supplier at CERN is NCD and a contract has been signed with Tekelec, Grenoble for their supply. In the case of X terminals from our approved workstations suppliers (HP, DEC, IBM and SUN), we try to offer a best-efforts service to assist users but cannot promise the same level of support as for NCD.

The services offered will be identical to those for Unix workstations as listed above and in addition we offer hardware support in collaboration with ECP/ESS/OS (Chris Parkman's team) for configuration changes and hardware repair.

We maintain and offer central default boot and font servers for NCD X terminals and we offer assistance to users who wish to establish their own local server. (This font server is also available for use by Unix workstations equipped with X11R5.) We maintain a small stock of X terminals from which users may borrow while their own terminal is under repair. In addition, we maintain a small (5 to 10 units only) stock of X terminals for resale to users with urgent requests.

### **Other services of the CN-DCI-UWS Section**

In collaboration with Central Operations we can equip Unix workstations with a comprehensive file backup utility which relieves the local administrator from the daily concern of user file backup.

We offer to Unix Workstation System Administrators some advice on system security, in particular the so-called CRACK password checking service to detect weak passwords is offered on a central server.

We maintain a central print spool service on which all network-attached printers may be declared and thus accessed from any authorised Unix workstation.

We have negotiated a site contract for Framemaker based on floating licences, as well as an upgrade path to the newly-released Framemaker 4 package. We are in the process of establishing a floating licence server for Unix users of Framemaker.

*Contact:* A. Silverman, CN-DCI-UWS

## **The New Unix-based Services**

A new Unix-based set of services is being constructed in the CN-DCI group to provide for the foreseen move away from mainframes towards Unix-based systems, particularly within the physics community. In order to provide meaningful support services in a heterogeneous Unix world with the limited manpower available it is considered essential to adopt some standards and a scalable architecture.

This has as a central focus an "institutional file system", currently AFS (Andrew File System), with the intention to move to DFS (Distributed File Services from OSF) as soon as this is generally available on CERN's major platforms. Binary application servers, exploiting the features of AFS (such as replication as necessary for performance), are being provided within a second phase of ASIS. Home directory file services based on AFS are being built up, as is an AFS-Mail service. Other tools are being provided or adapted in similar fashion to match the AFS-based environment.

At the same time DCI is building Unix-based Workgroup Servers (WGS) for certain specific physics groups and Public Login Unix Servers (PLUS) for general use, all based on this architecture. It is thus intended that these machines will be largely "anonymous", being equipped with only a standardised system disk and AFS client software with an AFS Cache. User files will be stored on the centrally supported home directory file service, and programs, applications, tools

etc. will be supplied via AFS from ASIS and other AFS servers.

We will also make the tools used to configure Work Group Servers and Plus machines available to workstation owners. "Shrink-wrapped Unix Environment" (SUE) scripts will provide an easy way to customise workstations for the CERN environment and will also allow for optional automatic updates when necessary.

The aim is to provide an environment so that all users, whether sitting at an X terminal or workstation, can work effectively whatever the machine they are connected to. This interactive environment will also be integrated with CORE services so that jobs can be developed and tested interactively and then submitted unchanged to the batch service. We will be providing the HEP wide user profiles developed at DESY (and currently being adapted for CERN use) and are investigating services such as Zephyr—the Athena messaging service—that have been developed for other interactive Unix environments.

*Contact:* A. Cass, CN-DCI-UES

### **User Migration Task Force**

Within the context of the migration of the user community away from VM/CMS, (currently more than 4000 users still use CERNVM each week), the CN Division has created a User Migration Task Force, UMTF, whose mandate is to provide a suitable selection of programs, tools and applications for CERN's user community within the new Unix environment that is being created. This work has some analogy with the creation of the "P-disk" for the CERNVM service. The UMTF will involve responsible people from other groups and divisions as appropriate, and will be chaired by M. Marquina.

*Contact:* M. Marquina, CN-DCI-ACT

### **ASIS in the AFS world**

Included in the decision to use AFS (and later DFS) as a strategic part of the new Unix services, was the decision that ASIS should move from being a repository of software that people could copy onto private machines, to become the file server for the CERN Program Library and publicly-available applications.

The master copy of all the software is now stored under AFS and the ASIS01 machine contains a regularly-mirrored copy of the master AFS version. While anonymous ftp access to the software will be maintained, it is hoped that the number of users accessing it via NFS will steadily decrease as AFS becomes more generally used.

The move to AFS has allowed us to introduce support for multiple versions of applications and to profit from the replication features of AFS to introduce new versions of software in a more controlled way. The replication features will also allow us to have multiple copies of the applications available on multiple servers providing both hardware backup and scalability to handle an increasing load.

As a service to people maintaining publicly-available software stored within ASIS, reference machines have been installed for generating the master copy in a CERN standard environment. The reference machines have been installed with the currently recommended version of the operating system, compilers and libraries and includes support for SunOS, Sun/Solaris, DEC/Ultrix, DEC/OSF, HP-UX, IBM/RS6000 and SGI/Irix.

The other important aspect of the ASIS service is the selection of software that is made available and the degree of support provided. It will be impossible to provide good support for all potentially interesting software and it will be one of the tasks of the User Migration Task Force to identify the 'recommended' products that will receive a higher level of support.

*Contact:* P. Defert, CN-DCI-GS  
J. Richards, CN-DCI-GS

## **General User Services**

The CN-DCI-ACT Section hosts a number of services covering the central Computing facilities provided by CN Division. These include:

- the User Consultancy Office;
- Information Retrieval support (XFIND, XNEWS, XWHO, PHONE, YELLOW, Mosaic...);
- Accounting and Registration on all central services.

### **User Consultancy Office**

The User Consultancy Office runs the Help Desk in building 513 and serves as the users' front-end to the Computing facilities provided by the Computing and Networking Division. The service is fully described in section 1.2 below.

*Contact:* R. Woolnough, CN-DCI-ACT  
M. Marquina, CN-DCI-ACT

### **Information Retrieval**

IR technologies cover an essential need of the information requirements of CERN staff, notably in the Research Sector. We have developed the main tools used currently on mainframes to retrieve various data, including online manuals, information in the accounting and user registry databases, etc.

We provide support for online access to documentation, either central or group-based, creation of newsgroups spanning across different platforms, coordination for the elaboration of the "Yellow Pages" Services, and assessment on structuring group information.

*Contact:* B. Pollermann, CN-DCI-ACT

## Accounting and Registration

We provide the management services for registration and budgeting for all centrally-supported services and corresponding follow-ups (space and CPU quota extensions, password resetting, account creation/transfer/deletion, annual reviews, etc).

We provide the production of the weekly accounting summaries and the maintenance of the associated procedures.

*Contact:* M.C.Perler, CN-DCI-ACT  
A. Koppanyi, CN-DCI-ACT

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## 1.2 The User Consultancy Office

*Miguel Marquina CN/DCI*

### Introduction

The User Consultancy Office runs the Help Desk installed in building 513, and created as a front-end service to the Computing facilities provided by the Computing and Networking Division. Although the UCO is mainly used by the Research sector, users from other Divisions address us for a variety of subjects including access and usage of facilities installed in the central services (handling of magnetic media, printers and plotters, etc), central accounting and registration issues, and slowly growing demand for Unix, Mac and PC expertise.

Our Help Desk deals on average with about 1000 requests/month coming via e-mail, telephone calls and personal visits. It is staffed at present by CN/DCI (80%) and CN/ASD (20%); we are currently asking other groups to improve the presentation of Computing Services.

About 10% of the questions are also on general aspects of CERN organization and non-computer subjects where, as a "Help Desk" we are pleased to give advice where we can or pass on the question to the competent service.

The Help Desk is affiliated to the International Help Desk Institute, which allows us to keep up to date with the latest available techniques used in such services. It is also a platform for exchanging ideas with similar services world-wide.

### Documentation and Information Retrieval

Most manuals and documents produced by the CN Division are distributed at the UCO, notably the CERN Program Library material as well as different guides covering various services: NICE PC environment, email, Unix system guides for different platforms, AFS, remote terminal access, etc.

In addition, we distribute different commercial computing books via a CERN stores card. They have been chosen for their quality and relevance in the field concerned: two Unix guides, L<sup>A</sup>T<sub>E</sub>X references, Introduction to C and C++, The Adobe PostScript reference manual, etc. Please type **XFIND COMPUTER DOCUMENTATION** or use **Mosaic** to access a complete up to date list of available books. We are currently looking towards extending the collection above with "state of the art" references in other computing disciplines of relevance to the research activities of the lab. However we need to start by streamlining the charging mechanisms followed, and are in discussion with the CERN Administration.

The service is responsible for the online availability of the documents above, and their access from all central services via the XFIND and Mosaic utilities. The document contributors bear ultimate responsibility for the accuracy of the information, but we may be contacted and serve as mediators in order to request documentation updates to the relevant person.

We are developing an online XFIND database in order to aid new/occasional Help Desk members. This database is also used by the "Operations" staff in order to assist occasional users requiring help during periods outside "prime shift" hours and weekends.

### Workstations, Terminals and Printers

The CN and AS Divisions offer in building 513, just in front of the Help Desk premises, a large user area which has been set up with Workstations, PCs, Macs, X-terminals and dumb terminals. Users will find a variety of printers of different quality, as well as the output bins where print jobs and graphic plots produced at the central printers are placed for collection or distribution.

The current hardware offering is:

#### Workstations/terminals:

- one NCD colour X terminal - another one coming after Easter;
- five terminals connected to Decserver (3 graphic);
- one RS6000 workstation for access to the PARC cluster;
- two PCs;
- two Macintosh computers complete with one scanner.

#### Plotters and printers:

- two colour postscript plotters (with X terminal for previewing, 513-cp2, paper or transparencies);
- one colour metafile plotter (a4color);
- two fast recto-verso postscript printers (513-lps & 513-qms);
- one DEC laserwriter 2200 (**SYS\$POSTSCRIPT** or **SYS\$TEXT**);
- one Large capacity Apple Laserwriter (513-pub);
- one IBM 3816 (accepts RV option for recto-verso) (DD513A);



## Service availability

The User Consultancy Office is open 7 hours a day 5 days a week, with the following schedule:

- Consultancy, documentation and book sales  
Monday-Friday at 8:30-12:00 and 14:00-17:30
- Self-service documentation  
Monday-Friday at 8:30-17:30

You can contact us by phone at +41 22 767 4952 (or just 4952 when calling from CERN) or via electronic mail as [user.support@cern.ch](mailto:user.support@cern.ch).

Operation staff are on duty 24 hours/day (tel. 5011 outside UCO opening hours), and may assist with various subjects including printers in the User Area. Access to the terminals and workstations installed there is freely available, as well as access to the distribution bins of printouts, plots and microfiche outputs.

---

## 1.3 Password Security on VM

*John Gamble CN/CS (CERN Computer Security Officer)*

### Password Security on VM

We have recently had an incident on one of our VM systems where a user's account was compromised and the intruder formatted his mini-disk. In this case the user had a rather easy-to-guess password.

A recent survey of passwords indicated that several VM users have "easy-to-guess" passwords.

In order to try and increase the security of VM user's accounts we will soon be introducing rules aimed at encouraging users to select passwords that are more difficult to guess. In addition, regular checks will be made to ensure that an "easy" password has not been selected.

Previous CNL articles (CNL212, 210 and 197) have given hints for users on choosing a "good" password. Please bear these in mind when choosing your own.

The new rules will be that passwords must be at least six characters long and that they must contain at least one alphabetic character and at least one digit. These rules will be applied when a user changes his password and the user will be informed immediately if the new proposed password does not comply.

The proposed implementation will proceed as follows.

1. The new rules to be applied will be implemented. Users will be informed of this through VM NEWS.
2. All VM accounts will be checked for "easy" passwords. On accounts with "guessed" passwords we will do the following:
  - (a) If the account has not been used in the last six months then the account will be blocked.
  - (b) Otherwise the password of the account will be "expired" and on the next login the user will be asked to select a new password.

If, during one of the regular checks, a password is guessed, then the user will be informed by E-mail and the procedure as outlined above will be followed. Should the user encounter problems in choosing a good password please contact the User Consultancy Office ([user.support@cern.ch](mailto:user.support@cern.ch))

We count on your understanding that security is in everyone's interest.

---

## 1.4 New Disk Manager Utility for VM

*Elia Perotto PPE/RD*

DLIST is an aid to the VM user who has several minidisks and often reaccesses them in order to change the search sequence. Its name (DiskLIST) is similar to FLIST (FileLIST) and RLIST (ReaderLIST), of which simulates the behaviour. DLIST can be abbreviated to DL. The HELP information is available on PF1 inside DLIST.

Disks can be accessed, released, defined, formatted, detached and linked without losing track of the whole situation. On each disk a FILELIST (or FLIST) session is possible, and XEDIT is usable inside FLIST. All transient and resident CMS commands are available from XEDIT or FLIST, like

COPY, ERASE, RENAME, and so on.

Temporary disks may be defined with PFK 5 and formatted. A copy of a whole disk is possible with PFK 12, defining target and source disks with the cursor (tab + PFK 12). A clear indication of the free MBytes (not blocks which are dependent on blocksize) available on each disk is presented, and intensified if it is the largest in the screen, which shows 18 disks on a standard 3270, and more on 3278/9 and 3179.

Accessed disks appear first, then linked but not accessed disks, with the same information as accessed ones less the

number of files, and then the "Catalog Disks" follow (disks not linked, but available).

The most useful feature of DLIST is the "Disk Description File". The Disk Description File is called DLIST INDEX and an example is on the same disk as DLIST, which contains the most used CERN disks. The format of the records is:

```
col. 1-6   = Disk Label (6 bytes)
col. 7     = Attribute byte
           (blank or '%' for highlight)
col. 8-29  = Disk description
           (up to 22 bytes)
```

In the attribute field, if the "%" is used, the intensified field ends at the first blank, and "-" is translated to blanks inside the intensified field (used to intensify a whole line).

Records with a blank in column 1 are pointers to a "Catalog File" which should reside on the same disk to avoid the case that it is on a disk that is not accessed. The pointer record's format is the following:

```
col. 1     = blank
col. 2-9   = Catalog File name
col. 10-17 = Catalog File type
```

The search mode is "\*" to search on all accessed disks; if several disks have a Catalog file with the same name and type, the first in alphabetical order will be used. Reversing the order of the disks will reveal the other Catalog file.

Records in the Catalog file contain logical disk names (VMS-type, up to 12 characters) which can be linked to and accessed

just by typing the mode letter into the mode field, or any other character (in this case the mode is the first free one starting with "H", the address used to link to the disk is the first free address from 192 to 1AF).

Care must be taken if a catalog disk is already linked or accessed, because it still appears on the Catalog, and one can link and access it more than once. The format of the catalog record is:

```
col. 1-12  = Logical Disk Name
col. 13-16 = Logical Disk owner Address
           (4 bytes right-justified)
col. 17-24 = Logical Disk owner Userid
col. 25    = Field attribute (% or blank)
col. 26-80 = Disk description
           (up to 55 bytes)
```

All DLIST INDEX files are read, on all accessed disks, which permits rarely accessed disks to have their own one-record DLIST INDEX.

Each user can have his own DLIST INDEX, and the Group Disks can have a group specific DLIST INDEX.

Only two Catalog Files are read: first and last specified (they must have different names or types). This because these files are intended for system and group use. If a user wants to describe a set of disks in addition to the system or group catalog, he can copy one of them, and add the necessary records. For any suggestion or request on this utility, send mail to **ELIA@CERNVM**.

---

## 1.5 DXCERN News Service will soon STOP

*Dietrich Wiegandt CN/DCI*

### DXCERN NEWS SERVICE WILL SOON STOP

The news service is being moved from the overloaded machine dxcern to a new news server machine - dxnews.cern.ch (128.141.202.51). The alias name news.cern.ch points to dxnews.

At the end of March 1994 the news service on dxcern will

be stopped except for remote NNTP access via DECNET by VMS hosts and local access. Remote news client machines using TCP/IP for NNTP access should by then have switched to connecting to news.cern.ch instead of dxcern.cern.ch.

In case of problems or questions send mail to **taddei@afsmail.cern.ch** or **dietrich@dxcern.cern.ch**.

## 2. UNIX Workstations and Desktop Support

### 2.1 New version of Mosaic Available

*Miguel Marquina CN/DCI*

Mosaic is an X11-based application to browse information stored in the World-Wide-Web system. It has been developed at NCSA and provides at present the best user interface available on Unix workstations.

We have released into the Public Area the Unix, VMS and Macintosh versions of Mosaic 2.2. Any release problems should be communicated to the User Consultancy Office (user.support@cern.ch, x4952) while feedback concerning the quality/bugs/improvement of the user interface should be communicated directly to the authors by using the "Mail Developers" entry inside the "Help" menu.

In addition Mosaic is available on PC/Novell as provided by Robert Cailliau/ECP.

#### Release Notes

The latest version of Mosaic, 2.2, may be found in /afs and the ASIS repository for the following platforms:

DECstation/Ultrix, Alpha/OSF,  
HP UX90, IBM AIX32,  
Sun/SunOS 4.x, Sun/Solaris,  
Silicon Graphics IRIX 4

the locations being:

/afs/cern.ch/asis/platform/usr.local/bin  
/asis/specific/platform/usr.local/bin

If you have proper pointers to it from your /usr/local directory, please remember to place the entries "usr/local/bin" and "usr/local/bin/X11" in your PATH precisely in this order. Failing to do so will not give you access to the default CERN Home Page.

Please notice that due to incompatibilities with version 1.x, the latest executable must be accessed by typing mosaic and

not xmosaic. See the corresponding Mosaic page on the documentation about the changes. Still the most relevant one is worth mentioning: all resources you may have created for customizing your Mosaic windows **will be ignored**. You must rename them to Mosaic\*xxx in order to use them under the new version.

The Alpha-VMS version currently available is still 2.0 (thanks to Julian Bunn/CN and Bjorn Nilsson/Aleph for providing it). Again the command mosaic has been set up in VXCERN to point to it.

The Macintosh version is available on the Mac\_DC server (thanks to Patrick Herzog/AS for providing it). This is the way you should proceed:

- Select from the Chooser the "AS" Appleshare zone;
- double-click on the "Mac\_DC" server;
- login as Guest and select the "Applications" disk;
- close Chooser;
- double-click on the "Application" disk, then open the "Other Apps" folder; you will find inside the "NCSA Mosaic 1.0.3" alias and the "Mosaic Readme" file. The first one may be dragged into your desktop;
- double-click "NCSA Mosaic 1.0.3" to invoke "Mosaic" from Mac\_DC.

Alternatively, if you have 1.6 Mb of disk available, we recommend you to install a local copy of Mosaic instead (to be located on the same server, in the "Public Domain" disk).

PCWeb is in fact the SUN version of Mosaic, displaying on PCs which have access to the XVision product. There is an icon called "World Wide Web" in the "Comms" folder inside "Program Manager". The inconvenience of this version, as opposed to all the others is that due to the way it has been set up, Mosaic will NOT remember the documents you have "visited".

---

### 2.2 Front Desk Support for UNIX Workstations and X Terminals

*Alan Silverman CN/DCI*

We are pleased to announce that our Front Desk service for Unix Workstations and for X Terminals is now fully operational. Among the services which we offer are the following:

- Price lists for those Unix Workstations and X Terminals which are recommended and supported by our group. Also we have in some cases guidelines to assist with configuration selection. We are currently working on producing a chart attempting to show relative perfor-

mance among the various brands and we hope to have a first release of this shortly.

- Small stocks of NCD X Terminals for urgent purchases. This will never be more than a very small number of devices so users should not rely on being able to obtain a device at short notice but we will try to keep one or two available at any one time. In addition, we will offer assistance to users to submit their own purchase

requests to Finance Division.

- For users who have problems with their workstation or X terminal, we will try to act as a dispatch service, pointing the user at the appropriate person within the group or outside most likely to be able to help.

Anyone wishing to use this service is invited to send mail to

`WORKSTATION.FRONTDESK@CERN.CH`

For particular questions on individual platforms, please use the e-mail address

```
format      <arch>.SUPPORT@CERN.CH
For example HP.SUPPORT@CERN.CH
            XTERMINAL.SUPPORT@CERN.CH
            etc....
```

See the Help pages in this newsletter.

General questions about Unix Workstation Support and X Terminal support, can be sent to `WORKSTATION.SUPPORT@CERN.CH`

---

## 2.3 Creating Accounts on Private Unix Workstations

*Judy Richards CN/DCI*

On Unix systems each userid has associated with it a unique numeric User ID, "UID" and a numeric Group ID, "GID" For several years, whenever a new user has registered to use any of the central computer services, we have automatically assigned a Unix userid and numeric UID to them. It has also been possible for users to register a userid and UID without having an account on any central machine. Numeric group IDs have been assigned to all existing Computer Groups and can also be reserved for groups not using central facilities.

As new central Unix services are introduced, such as the distributed file system AFS, you will need to have a common userid, UID and GID on your local machine and the central servers in order to profit from them. Although we cannot

force you to use a centrally registered account on your local workstation, we can't stress strongly enough that it will be to your advantage to do so!

Therefore, when setting up your workstation or server or adding new users to it, PLEASE consult the central database to find out the userid, UID and GID to use. The easiest way to do this is to use the Unix command 'phone' or the www interface to the phone book or the command XWHO on CERNVM. If the person (or project account) isn't already registered, please request your group administrator to do so. To find out who your group administrator is, use the phone interface in www or XWHO on CERNVM.

---

## 2.4 UNIX-VM-VMS Cross-Reference

*O. Barring PPE/DEE and D. M. Edsall CN/PDP*

*(DELPHI Collaboration)*

The DELPHI collaboration and other users at CERN are being asked to migrate their computing needs from CERNVM to a Unix-based working environment over the course of the next two years. As an aid to our users, we created a Unix manual for beginning users who had never worked in Unix before. In it we included a comparison of commands used in the Unix, VMS and VM/CMS operating systems. We felt it would be helpful to share this comparison with other CERN users as an aid in their eventual migration. Please note that some of these commands apply specifically to the CORE environment and are not standard Unix commands.

If you are just beginning to learn Unix but you have been

working in either a VM/CMS or VMS environment for some time, here is a table showing commands for each operating system which perform the same functions. Not all commands are represented, just those which are most useful. Certain commands exist in some operating systems and not in others (for example, there is no concept of a directory in VM/CMS). Also, there are some commands which, in Unix, are shell dependent. They are flagged below as \* and you are referred to the Unix manual pages for /bin/sh, /bin/csh, /bin/tcsh and /bin/ksh for more information. As DELPHI has chosen the C shell as the default shell, the answers are listed for the C shell.

<b>Unix-VM-VMS: Directories, Files and Devices</b>			
<i>Purpose</i>	<i>Unix</i>	<i>VM</i>	<i>VMS</i>
Create Directory	mkdir	space adddisk	create/directory
Remove Directory	rmdir,rm	space dropdisk	delete
Change Directory	cd	swapmode,gime	set default
List files	ls	filelist,filedir,fd	directory
Name of working directory	pwd	query disk	show default
Create a file	touch, cat	-	create
Edit a file	vi,emacs	xedit	edit
Copy a file	cp	copyfile	copy
Rename a file	mv	rename	rename
Merge two or more files	cat	copyfile ( append	copy
Delete a file	rm	erase	delete
Compare two files	diff,cmp	xcompare,differ	differences
String searches	grep	search4	search
Protecting files	chmod	dirmaint mdisk	set protection
Assign files	ln,setenv	filedef	assign,define
Deassign files	rm link name	filedef clear	deassign
Stage cassettes	tpread,tpwrite	stage	stage
Disk space	du,df	query disk,disklist	show device
Disk quotas	quota -v	space limit q	show quota
<b>Unix-VM-VMS: Executables, Procedures and Job Execution</b>			
<i>Purpose</i>	<i>Unix</i>	<i>VM</i>	<i>VMS</i>
Compile a FORTRAN program	f77,fort77	vfort	fortran
Link a program	f77,fort77,ld	load	link
Execute a program	program_name	start	run
Debugging programs	dbx	IAD	run/debug
Create or manipulate a library	ar, ld	txlib	library
User procedures	shell script	fn exec fm	file.com
Executing procedures*	script_name, source	exec proc_name	@name
Setting prompt*	set prompt=	set rdymsg	set prompt
Defining aliases*	alias	synonym	symbol == <i>string</i>
Local Variables*	set var= <i>string</i>	variable= <i>string</i>	symbol = <i>string</i>
Global Variables*	setenv	globalv	assign, define, symbol == <i>string</i>
Checking processes	ps	-	show system
Batch submission	qsub,program_name &	batch submit tabular	submit/queue
Checking batch queues	qjob,qstat	batch query	show queue
Stopping batch jobs	qdel, kill	batch cancel	stop/entry
<b>Unix-VM-VMS: Network</b>			
<i>Purpose</i>	<i>Unix</i>	<i>VM</i>	<i>VMS</i>
Read news	rn, nn, trn, xrn	xnews	news
Connecting to hosts	telnet,rlogin	tcpipbm telnet	set host, telnet,rlogin
Network File transfer	ftp, rcp	sendfile, tcpipbm ftp	copy, ftp, rcp
Mail	mail,elm,inc,pine	mail	mail
Talking to others	talk,write	tell	phone,talk
Disabling messages	msg n,biff n	set msg off, set wng off	set broadcast
Printing	lpr,xprint	xprint	print,xprint
Checking print queues	lpq	xprint q	show queue
<b>Unix-VM-VMS: Miscellaneous</b>			
<i>Purpose</i>	<i>Unix</i>	<i>VM</i>	<i>VMS</i>
Logging out	logout, CTRL-D	logout,logoff	logout
Changing Passwords	passwd, ypasswd	logon, racf	set password
Users logged in	who,finger	query users	show users
Help	man	help,xfind	help,xfind
Terminal characteristics	stty, setenv TERM	cp set, cms set	set terminal
Date	date	query time	show time

## 3. Communications and Networks

### 3.1 EMDIR inquiry via Email

*Maria Dimou-Zacharova CN/CS*

*This information is also included in the new CERN Electronic Mail User Guide, available from UCO on paper and also online via XFIND and WWW.*

You can send an email message to `cerndir@cern.ch` or `cerndir@dxmint.cern.ch` with the names of the persons you are looking for (separated by semicolon (;) or carriage return), on the "Subject:" field and/or in the body of the message. You will receive a reply with the retrieved EMDIR entries that match exactly or (in case of no exact match) approximately your query. The service has the capability of searching for approximate matches (up to two mistakes) and accepts the use of two wildcards ("?" for any one character and "\*" for any number of characters). If just one string is entered, e.g. *dupond*, it will be treated as a surname. If you want to specify firstnames as well, the syntax `firstname.surname` should be used, e.g., *herve.dupond*. If you want to retrieve all entries of a certain firstname, you have to terminate it with a dot and leave a blank before the separator, e.g., *herve. ;*. The allowed separators within parts of the firstname(s) and/or surname(s) are the dot, hyphen, underscore, whitespace and single quote.

E.g. sending mail to `cerndir@cern.ch` with "Subject: Alcibiades.", and no message body, you will receive a message as follows:

```
From CERNDIR Tue Feb  8 15:57:25 1994
Date: Tue, 8 Feb 1994 15:57:24 +0100
From: CERNDIR
Subject: Re: Your query to CERN DIrectory
Apparently-To: dimou
```

```
**** CERN DIrectory Lookup Mail Service ****
```

```
The following records match exactly your
requested query : Alcibiades.
```

```
1. First name(s): ALCIBIADES
```

```
*****Last name(s): APOSTOLAKIS
```

```
Cern phone number:6039 *****Beep number:
```

```
Division:PPE/LR ***** Office:20/R-030
```

```
E-mail address: APOST@CERNVM.CERN.CH
```

#### How to get help with problems

For information or problems related to EMDIR contact `emdir@cern.ch`. For information or problems related to the inquiry via email contact `mail.support@cern.ch`.

*Reminder* Please remember that your preferred email address in EMDIR should always be in the format `user@HOST.DOMAIN`, i.e. it **must** contain a host.

---

### 3.2 Ethernet Connectors on Workstations and PCs

*Brian Carpenter CN/CS*

CERN, like many sites, is progressively converting its Ethernet LAN infrastructure from the old thin-coaxial cable standard (IEEE 802.3 10base2) to the new twisted-pair standard (IEEE 802.3 10baseT). This conversion has started and will hopefully be largely complete within three years.

As this recabling proceeds building by building, workstations and PCs which have only coaxial (10base2) connectors will require convertor boxes to connect them to the new 10baseT system. Conversely, workstations with only 10baseT connectors will require the same convertors to connect them to the old 10base2 coaxial cables. These convertors require a 220 V power supply. However, workstations with transceiver connectors (DB15 AUI connectors) can be connected to either cabling system by a suitable transceiver. Transceivers are

cheaper than convertors and do not require separate power.

For more technical details, including where to obtain convertors and transceivers, please see CN/CS/155 (The CERN Internal Network Brochure, November 1993, available from the User Consultancy Office in Building 513). Convertors cost about 400 CHF and transceivers with cables about 150 CHF. Users are normally charged for such items, but they will be funded by CN when users are forced to add them by the recabling of a building.

To minimise the total number of convertors ultimately required at CERN, all users and suppliers are advised that:

*Systems delivered to CERN from now on should have a 10baseT or AUI connector, regardless of whether they also have a 10base2 coaxial connector.*

# 4. Tutorial Section

## 4.1 Fortran 90 Tutorial

*Michael Metcalf CN/ASD*

### Part 9. Specification statements

This part completes what we have learned so far about specification statements.

#### Implicit typing

The implicit typing rules of Fortran 77 still hold. However, it is good practice to explicitly type all variables, and this can be forced by inserting the statement

```
IMPLICIT NONE
```

at the beginning of each program unit.

#### PARAMETER attribute

A named constant can be specified directly by adding the `PARAMETER` attribute and the constant values to a type statement:

```
REAL, DIMENSION(3), PARAMETER :: field = (/ 0., 1., 2. /)
TYPE(triplet), PARAMETER      :: t = triplet( 0., (/ 0., 0., 0. /) )
```

#### DATA statement

The `DATA` statement can be used also for arrays and variables of derived type. It is also the only way to initialise just parts of such objects, as well as to initialise to binary, octal or hexadecimal values:

```
TYPE(triplet) :: t1, t2
DATA t1/triplet( 0., (/ 0., 1., 2. /) )/, t2%u/0./ ! only one component of t2 initialized
DATA array(1:64) / 64*0/                          ! only a section of array initialized
DATA i, j, k/ B'01010101', 0'77', Z'ff'/'
```

#### Characters

There are many variations on the way character arrays may be specified. Among the shortest and longest are

```
CHARACTER name(4, 5)*20
CHARACTER (KIND = kanji, LEN = 20), DIMENSION (4, 5) :: name
```

#### Initialization expressions

The values used in `DATA` and `PARAMETER` statements, or in specification statements with these attributes, are constant expressions that may include references to: array and structure constructors, elemental intrinsic functions with integer or character arguments and results, and the six transformational functions `REPEAT`, `SELECTED_INT_KIND`, `TRIM`, `SELECTED_REAL_KIND`, `RESHAPE` and `TRANSFER`:

```
INTEGER, PARAMETER :: long = SELECTED_REAL_KIND(12), array(3) = (/ 1, 2, 3 /)
```

## Specification expressions

It is possible to specify details of variables using any non-constant, scalar, integer expression that may also include inquiry function references:

```
SUBROUTINE s(b, m, c)
  USE mod                                ! contains a
  REAL, DIMENSION(:, :)                 :: b ! assumed-shape array
  REAL, DIMENSION(UBOUND(b, 1) + 5)     :: x ! automatic array
  INTEGER                                m
  CHARACTER(LEN=*)                       c ! assumed-length
  CHARACTER(LEN= m + LEN(c))            cc ! automatic object
  REAL (SELECTED_REAL_KIND(2*PRECISION(a))) z ! precision of z twice that of a
```

## PUBLIC and PRIVATE

These attributes are used in specifications in modules to limit the scope of entities. The attribute form is

```
REAL, PUBLIC      :: x, y, z           ! default
INTEGER, PRIVATE :: u, v, w
```

and the statement form is

```
PUBLIC  :: x, y, z, OPERATOR(.add.)
PRIVATE :: u, v, w, ASSIGNMENT(=), OPERATOR(*)
```

The statement form has to be used to limit access to operators, and can also be used to change the overall default:

```
PRIVATE                                ! sets default for module
PUBLIC  :: only_this
```

For derived data types there are three possibilities: the type and its components are all **PUBLIC**, the type is **PUBLIC** and its components **PRIVATE** (the type only is visible and one can change its details easily), or all of it is **PRIVATE** (for internal use in the module only):

```
MODULE mine
  PRIVATE
  TYPE, PUBLIC :: list
    REAL x, y
    TYPE(list), POINTER :: next
  END TYPE list
  TYPE(list) :: tree
  :
END MODULE mine
```

## USE statement

To gain access to entities in a module, we use the **USE** statement. It has options to resolve name clashes if an imported name is the same as a local one:

```
USE mine, local_list => list
```

or to restrict the used entities to a specified set:

```
USE mine, ONLY : list
```



## Part 10. Intrinsic procedures

We have already met most of the new intrinsic functions in previous parts of this series. Here, we deal only with their general classification and with those that have so far been omitted.

All intrinsic procedures can be referenced using keyword arguments:

```
CALL DATE_AND_TIME (TIME=t)
```

and many have optional arguments. They are grouped into four categories:

1. elemental – work on scalars or arrays, e.g. `ABS(a)`;
2. inquiry – independent of value of argument (which maybe undefined), e.g. `PRECISION(a)`;
3. transformational – array argument with array result of different shape, e.g. `RESHAPE(a, b)`;
4. subroutines, e.g. `SYSTEM_CLOCK`.

The procedures not already introduced are:

- Bit inquiry

```
BIT_SIZE          Number of bits in the model
```

- Bit manipulation

```
BTEST            Bit testing
IAND             Logical AND
IBCLR           Clear bit
IBITS           Bit extraction
IBSET           Set bit
IEOR            Exclusive OR
IOR             Inclusive OR
ISHFT           Logical shift
ISHFTC          Circular shift
NOT             Logical complement
```

- Transfer function, as in

```
INTEGER :: i = TRANSFER('abcd', 0) ! replaces part of EQUIVALENCE
```

- Subroutines

```
DATE_AND_TIME    Obtain date and/or time
MVBITS           Copies bits
RANDOM_NUMBER     Returns pseudorandom numbers
RANDOM_SEED       Access to seed
SYSTEM_CLOCK     Access to system clock
```

## Part 11. Input/Output

### Non-advancing I/O

Normally, records of external, formatted files are positioned at their ends after a read or write operation. This can now be overridden with the additional specifiers:

```
ADVANCE = 'NO'          (default is 'YES')
EOR = eor_label         (optional, READ only)
SIZE = size             (optional, READ only)
```

The next example shows how to read a record three characters at a time, and to take action if there are fewer than three left in the record:

```
CHARACTER(3) key
INTEGER unit, size
READ (unit, '(A3)', ADVANCE='NO', SIZE=size, EOR=66) key
:
! key is not in one record
66 key(size+1:) = ''
:
```

This shows how to keep the cursor positioned after a prompt:

```
WRITE (*, *, ADVANCE='NO') 'Enter next prime number:'
READ (*, '(I10)') prime_number
```

## New edit descriptors

The first three new edit descriptors are modelled on the I edit descriptor: B for *binary*, O for *octal*, and Z for *hexadecimal*.

There are two new descriptors for real numbers:

```
EN engineering, multiple-of-three exponent: 0.0217 --> 21.70E-03 (EN9.2)
ES scientific, leading nonzero digit: 0.0217 --> 2.17E-02 (ES9.2)
```

and the G edit descriptor is generalized to all intrinsic types (E/F, I, L, A).

For entities of derived types, the programmer must elaborate a format for the ultimate components:

```
TYPE string
  INTEGER length
  CHARACTER(LEN=20) word
END TYPE string
TYPE(string) :: text
READ(*, '(I2, A)') text
```

## New specifiers

On the OPEN and INQUIRE statements there are new specifiers:

```
POSITION = 'ASIS'      'REWIND'  'APPEND'
ACTION   = 'READ'      'WRITE'   'READWRITE'
DELIM    = 'APOSTROPHE' 'QUOTE'   'NONE'
PAD      = 'YES'       'NO'
```

and on the INQUIRE there are also

```
READ      = )
WRITE     = ) 'YES'      'NO'      'UNKNOWN'
READWRITE= )
```

Finally, inquiry by I/O list (unformatted only) is possible:

```
INQUIRE (IOLENGTH = length) item1, item2,...
```

and this is useful to set RECL, or to check that a list is not too long. It is in the same processor-dependent units as RECL and thus is a portability aid.

**Note:** This is the last article in this series. Full details of all the items can be found in *Fortran 90 Explained*, M. Metcalf and J. Reid, (Oxford, 1990), the book upon which it has been based.

These tutorials can be found in hypertext form on WWW using the URL <http://asis01.cern.ch/CN/CNTUT/f90/0verview.html>.

The complete series of nine lectures is also available as a single PostScript file via anonymous ftp from the ftp server [asis01.cern.ch](http://asis01.cern.ch) as the file `/cernlib/doc/ps.dir/f90.ps`

## 4.2 Initializing Emacs

*Michel Goossens CN/ASD*

Emacs 19.22, the latest version of the popular Emacs editor, is not only a major step forward in the area of integration with the X-window system, but it also now supports 8-bit input by default, so that it becomes a lot easier to handle non-English documents containing diacritics (accents, umlauts), as in French or German.

To take advantage of those features, one has to load some files, and define some modes. This is most easily done by defining the necessary commands in a file called `.emacs` in the user's home directory, since Emacs, when it starts up, executes the Lisp commands in that file. It is also by modifying this file that an Emacs session can be customized. Note that this file is loaded after the system-wide initialization file `site.start.el`, which is in the directory `/usr/local/lib/emacs/site-lisp`. This file contains settings, which should be the same for all Emacs users at a site, e.g. at CERN the definition of the Gnus News server has been entered into that file:

```
;
; gnus configuration setup
;
(setq gnus-nntp-server "dxnews.cern.ch")
(setq gnus-local-domain "cern.ch")
```

It contains also entries for `tcl-mode`, the `vm` mail system, `auctex` and `TeX`, and `calc`. Note also that Emacs loads a site-defined file `default.el` after executing the user's `.emacs`

Below is a simple example of an `.emacs` file, which shows a few definitions that can make your Emacs session more productive, especially in the area of multi-lingual support. For more information about the Emacs Lisp language one should study the Emacs Lisp Reference Manual.

```
;;-----
;; .emacs initialization file for X Windows
;;-----
; Get the version of emacs being initialized
(defconst version
  (cond ((string-match "~18" emacs-version) 18)
        ((string-match "~19" emacs-version) 19)
        )
  )
; If version=19, put variable running-emacs19 to true
(defvar running-emacs19 (eq version 19) )
; Add the directory ~/elisp in front of the search
; path for files to be loaded. This comes handy if
; you want to (re)define some Lisp procedures.
(setq load-path (cons "~/elisp" load-path))
;;-----
;;-- general
;;-----
; Define global key-binding for some commands
(global-set-key "\C=" 'what-line)
(global-set-key "\M-g" 'goto-line)
; local key binding
(define-key ctl-x-map "\C-E" 'compile)
;;-----
;;-- File abbreviations
;;-----
; Use ll as an abbreviation for load-library
(fset 'll (symbol-function 'load-library))
; Use lf as an abbreviation for load-file
(fset 'lf (symbol-function 'load-file))
```

```
;;-----
;;-- Modes
;;-----
; Set the default values for the association list which
; defines the major mode functions to be used for the
; given file name patterns.
(autoload 'awk-mode "awk" "awk mode" t)
(setq auto-mode-alist
  (append (list (cons "\\.awk$" 'awk-mode))
          auto-mode-alist))
; Load modes from the given file when required
(autoload 'html-mode "html-mode" "Edit HTML docs" t)
(autoload 'w3 "w3" "WWW Browser" t)
; some hooks et al.
(setq default-major-mode 'text-mode)
(setq text-mode-hook 'turn-on-auto-fill)
(setq tex-mode-hook 'turn-on-auto-fill)
(setq latex-mode-hook 'turn-on-auto-fill)
; Electric c a la gosling
(add-hook 'c-mode-hook 'elec-c-mode)
(add-hook 'elec-c-mode-hook 'turn-on-auto-fill)
(autoload 'elec-c-mode "elec-c" "Electric C edit mode." t)
;;-----
;;-- Definitions for use with the Newsreader gnus
;;-----
(setq gnus-local-organization
  "CERN, European Research Center for Particle Physics")
(setq gnus-article-save-directory
  "/afs/cern.ch/user/g/goossens/News")
(setq gnus-use-generic-from "dxcern.cern.ch")
(setq gnus-large-newsgroup 100)
;;-----
;;-- Definitions for use with View Mail
;;-----
(setq vm-folder-directory "~/vm")
(setq vm-mail-header-from "Michel.Goossens@cern.ch")
;;-----
;;-- Some specific things for use with emacs-19 only
;;-----
(if running-emacs19
  (progn
    ;;-----
    ;; Load files containing ISO Latin 1 definitions
    ;;-----
    ; Display accented European characters (8-bit codes)
    (standard-display-european t)
    (autoload 'iso-tex-minor-mode "iso-tex"
      "Translate TeX to ISO 8859/1 while visiting file." t)
    ;;-----
    ;; Convenient cut and paste and highlighting
    ;;-----
    (setq transient-mark-mode t)
    (setq mark-even-if-inactive t)
    ;; supercite
    (autoload 'sc-perform-overloads "supercite"
      "Supercite 3.0")
    (setq mail-setup-hook 'sc-perform-overloads)
    (setq mail-yank-hooks 'sc-cite-original)
    (setq news-reply-mode-hook 'sc-perform-overloads)
    ;set hook to keep mark active
    (add-hook 'sc-pre-hook '(lambda ()
      (setq mark-active t)))
  )
)
;;-----
;;-- Define the font to be used for the frame
;;-----
(set-default-font
  "adobe-courier-bold-r-normal--14-140-75-75-m-90-iso8859-1")
```

## More about multi-language support

As version 19 of Emacs supports by default 8-bit text streams, it becomes relatively straightforward to enter and view national characters inside texts. Moreover, by setting the variable `standard-display-european` to `true` (as in the `.emacs` initialization file above), you can use the `iso-accent-mode`, which allows you to type accents and umlauts in a natural and convenient way, namely: ‘, ’, “, ^ and ~, preceding certain letters will result in entering accented characters into the text file, e.g.: ‘e1‘eve gives élève, “uber gives über, and ma~nana yields mañana. Furthermore the combinations ~c and ~C give the cedilla characters ç, and Ç, respectively. Figure 4.1 gives an example of some Latin 1 characters. If you want to use such files with T<sub>E</sub>X, you should use L<sup>A</sup>T<sub>E</sub>X<sub>2 $\epsilon$</sub> , and declare that you want to use 8-bit fonts by using the command `\usepackage{t1enc}`.

```
À Á Â Ã Ä Å Æ Ç È É Ê Ë Ì Í Î Ï
Ð Ñ Ò Ó Ô Õ Ö Ø Ù Ú Û Ü Ý Þ
à á â ã ä å æ ç è é ê ë ì í î ï
ð ñ ò ó ô õ ö ø ù ú û ü ý þ
```

Figure 4.1: Emacs 19 and Latin 1 characters

You can transform from a 7-bit T<sub>E</sub>X to an 8-bit Latin 1 representation by the command `tex-2-iso`, while the reverse is obtained by `iso-2-tex`. Both these Emacs commands are defined in the Emacs file `iso-tex`.

As an example of transforming 8-bit characters to a 7-bit T<sub>E</sub>X representation, consider the file shown in Fig. 4.1. Executing the command `iso-2-tex` will yield the following result (after loading the `iso-tex` file).

```
\‘A \’A \^A \~A \”A \AA{} \AE{} \c{C}
\‘E \’E \^E \”E \’I \’I \^I \”I
\Dstroke{} \~N \’O \’O \^O \~O \”O
\O \’U \’U \^U \”U \’Y \Thorn{}
\‘a \’a \^a \~a \”a \aa{} \ae{} \c{c}
\‘e \’e \^e \”e \’i{} \’i{} \^i{} \”i{}
\dstroke{} \~n \’o \’o \^o \~o \”o
\o \’u \’u \^u \”u \’y \thorn{}
```

Note that I have not shown a few characters (like the German letter ß, which is in a different position in Latin 1 and the EC font layout, and would hence be represented wrongly if you just run L<sup>A</sup>T<sub>E</sub>X on a file showing that character). Also the upper- and lowercase dstroke and thorn characters cannot be represented by a standard L<sup>A</sup>T<sub>E</sub>X command sequence.

## 4.3 International Character Codes

*Michel Goossens CN/ASD*

### History

Despite bold talk of the “information age” and the “shrinking globe”, it remains difficult, if not impossible, to store and transmit computer texts in different languages. The same often holds for simple texts in English exchanged between computers of different manufacturers or over computer networks. As an common example consider accented French characters or German with umlauts, both coded in 8-bit Latin 1 (see above). More often than not such text arrives through electronic mail without accents or umlauts at all, or with wrong characters.

Organizations and corporations whose operations are often spread over many countries have tried to develop standards to provide a global computer code for storage and transmission of text around the world.

Until recently the only successful code in general use was (and still is) ASCII (American Standard Code for Information Interchange). The code originated (as its name indicates) in America around 1967 and provided an unambiguous fixed-length 7-bit character set for over two decades. Its scope, however, was English/American, and it could not cope with most European languages, let alone East Asian ones. ASCII is equivalent to the International Standard ISO 646.

Western European countries started replacing certain characters in the base set with their own special characters, and they registered these changes as 7-bit ISO code sets, which are known under the official name of ISO 646 (ASCII with na-

tional variants). But in this way information could not easily be interchanged between countries using different codes, and therefore ISO extended the ASCII set to 8 bits, doubling its size. Several code sets were defined, e.g. 8859 Latin-1, which allowed texts to be interchanged correctly all around Western Europe. Other 8-bit ISO code sets have also been developed (see [1] and table 4.1) but their use is not yet fully established, and in several countries many incompatible variants co-exist. Moreover, the problems on how to translate between different sets remains. Only ISO 8859-1 (“Latin-1) has become widely implemented and may be seen as the de-facto standard ASCII replacement (see table 4.2 on page 19).

ISO 8859-1	West European languages (Latin-1)
ISO 8859-2	East European languages (Latin-2)
ISO 8859-3	Other Latin languages (Latin-3)
ISO 8859-4	North European languages (Latin-4)
ISO 8859-5	Latin/Cyrillic
ISO 8859-6	Latin/Arabic
ISO 8859-7	Latin/Greek
ISO 8859-8	Latin/Hebrew
ISO 8859-9	Latin-1 modification for Turkey (Latin-5)
ISO 8859-10	Baltic countries (Latin-6)

Table 4.1: Overview of the 8-bit “Latin” coding standards

Similarly, IBM developed the 8-bit EBCDIC codes, which could be adapted to the needs of its users around the world. In effect they provided different mappings between various national keyboards using so-called “code pages”. More often

than not these different code pages are a source of confusion if the text is coded in one given code page (e.g. 385 for French), and then printed on a machine using another one (e.g. 382 for German). At present several tens of EBCDIC code pages are in use all over the world.

East Asian countries have also tried to make inventories of the characters they use, and China, Japan, Korea and Taiwan (C/J/K/T) have each established national standards, which taken together contain over 30,000 characters. The problem remains that texts coded in any of these standards cannot be interchanged between countries.

## ISO 10646 and Unicode

ISO [2] and the Unicode Consortium [3], a set of computer manufacturers, have jointly developed a multinational character set that combines the majority of the world's character sets. ISO calls that standard ISO 10646 (note the last three digits 646, which, on purpose, were chosen to correspond to those of the old ASCII standard), and it proposes two- and four-octet character representations. *Unicode*, as the Unicode Consortium calls its standard, is a 16-bit (two-octet) subset of ISO 10646, and corresponds to its *Basic Multilingual Plane* (BMP), where the two first octet of the four-octet ISO identifier are zero. In fact, ISO-10646 can be seen as a three-dimensional encoding of character encodings, consisting of 256 Groups consisting each of 256 Planes, with the BMP being Plane 0 in Group 0 (see Fig. 4.2).

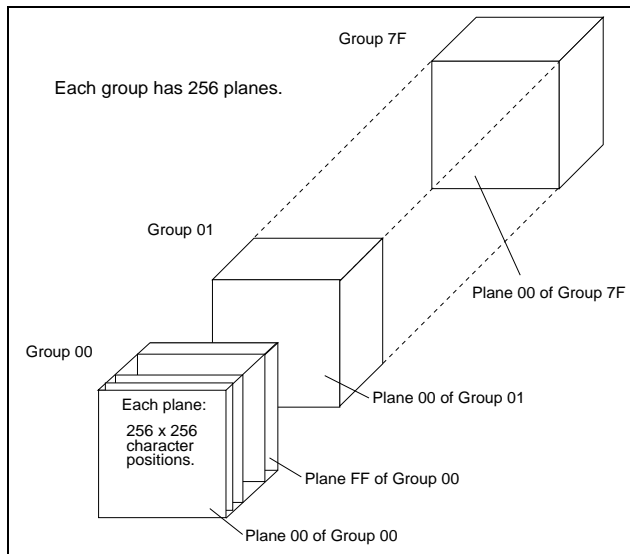


Figure 4.2: The full coding space of the UCS

The canonical form of the Universal Multiple-Octet Coded Character Set (UCS) uses a four-dimensional coding space, consisting of 128 three-dimensional groups. Each group consists of 256 two-dimensional planes, each plane has 256 one-dimensional rows of 256 cells.

In general, this four-octet structure, which is in line with modern processor architectures, is needed since 16 bits are not sufficient to encode all the characters in the world. However, as work since 1989 by the Unicode Consortium has

shown [3], an unambiguous, fixed 16-bit (2-octet) code set is possible to encode most major living languages and even a few ancient languages. Therefore, it has been decided to place the scheme worked out by Unicode in the BMP (Group 0, Plane 0) of the ISO-10646 encoding space (Fig. 4.3).

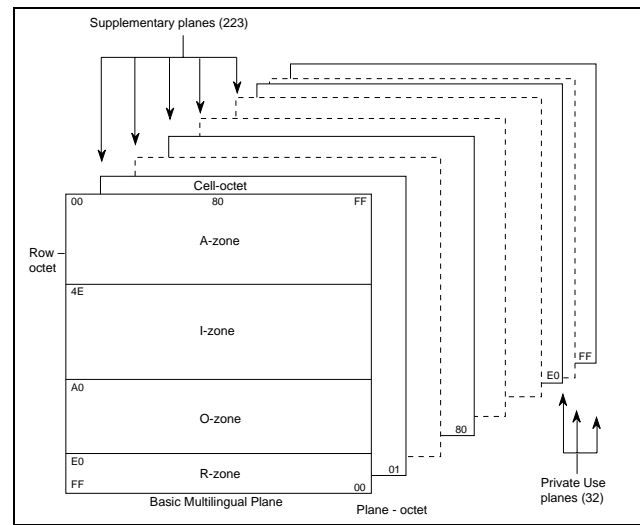


Figure 4.3: The layout of the ISO 10646 planes

Let us now look into some greater detail at the layout of the BMP (Fig. 4.4 on the next page), the only plane which is defined at present for ISO 10646. The eight lowest bits duplicate ISO Latin-1, so that the encoding is upwards compatible with ASCII and Latin-1. This is followed by pre-composed accented characters from ISO Latin standards, the International Phonetic Alphabet, and then floating diacritics. Then come characters for the Greek, Russian, and Armenian languages. There is some unassigned space for more alphabets, then there is a symbol area including punctuation marks, a few super- and subscripts, arrows, mathematical symbols, technical symbols, graphic symbols, etc. All these characters fall in the so-called *A-zone* with 19903 positions for alphabetic and syllabic scripts, whose upper part also contains a Chinese/Japanese/Korean/Taiwan phonetic area includes Hiragana and Katakana, Bopomofo and Hangul.

This is followed by the *I-zone* with 20992 positions, which contains Chinese-based ideographs from the Chinese, Japanese, and Korean languages. To simplify processing and preserve coding space the ideographs have been encoded into a common scheme called *Han Unification* [4], which eliminates over 11,000 common characters from the repertoire of over 31,000 if all characters of all standards of these the three languages were combined. This brings the number of Han code points down to 19,000.

Finally there is the *O-zone* of 16384 positions, which is reserved for future standardization, and the *R-zone* of 8190 positions. The latter is also called the *Restricted Use zone*, and contains three sets of characters, namely (a) Private Use, (b) Presentation forms, (c) Compatibility, and a User Area for private end user extensions.

	00	10	20	30	40	50	60	70	80	90	A0	B0	C0	D0	E0	F0
0	`	“	□	0	@	P	‘	p	Ǻ	Ř	ǻ	ř	À	Ð	à	ð
1	’	”	!	1	A	Q	a	q	Ą	Ś	ą	ś	Á	Ñ	á	ñ
2	^	„	“	2	B	R	b	r	Č	Š	č	š	Â	Ò	â	ò
3	~	«	#	3	C	S	c	s	Č	Š	č	š	Ã	Ó	ã	ó
4	“	»	\$	4	D	T	d	t	Ď	Ť	d’	t’	Ä	Ö	ä	ö
5	”	–	%	5	E	U	e	u	Ě	Ť	ě	ť	Å	Õ	å	õ
6	°	—	&	6	F	V	f	v	Ě	Ů	ě	ů	Æ	Ö	æ	ö
7	˘		,	7	G	W	g	w	Ğ	Ů	ğ	ů	Ç	Œ	ç	œ
8	˙	o	(	8	H	X	h	x	Ł	Ÿ	ł	ÿ	È	Ø	è	ø
9	-	i	)	9	I	Y	i	y	Ł	Ż	ł	ż	É	Ù	é	ù
A	·	j	*	:	J	Z	j	z	Ł	Ż	ł	ż	Ê	Ú	ê	ú
B	ˆ	ff	+	;	K	[	k	{	Ń	Ż	ń	ź	Ë	Û	ë	û
C	˚	fi	,	<	L	\	l		Ń	IJ	ń	ij	Ì	Ü	ì	ü
D	,	fl	-	=	M		m	}	Đ	İ	đ	ı	Í	Ý	í	ý
E	<	ffi	.	>	N	^	n	~	Ŏ	đ	ő	ı	Î	Þ	î	þ
F	>	ffl	/	?	O	_	o	-	Ŕ	ŝ	ř	£	Ï	ŠS	ï	ß

Figure 4.5: The T<sub>E</sub>X EC encoding

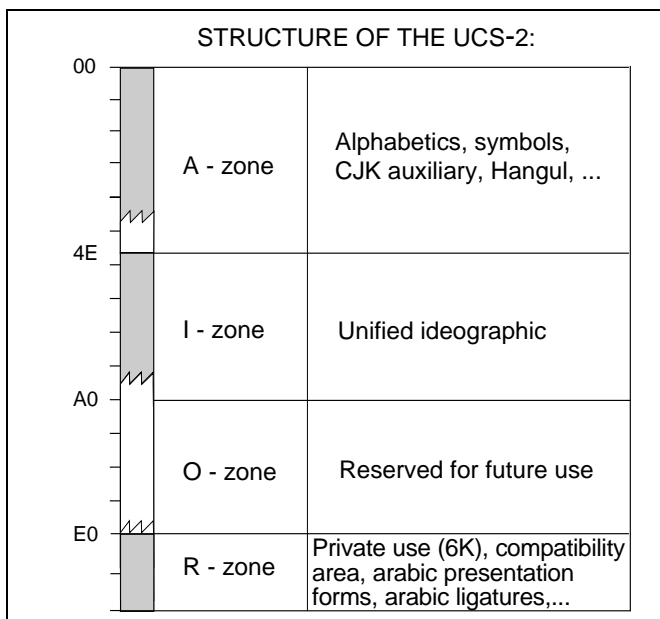


Figure 4.4: Layout of the ISO 10646 base plane

## The T<sub>E</sub>X EC encoding

In order to help users of T<sub>E</sub>X handle as many languages as possible with a single 256-character font set, in September 1990 at the European T<sub>E</sub>X Conference in Cork (Ireland) a

“European” font layout (the “EC” encoding) was adopted (see table 4.5), which corresponds in positions 32–126 (hex 20–7E), 192–222 (hex C0–DE) and 224–254 (hex E0–FE)) to Latin 1. The other positions have, however, been filled with diacritics and ligatures in positions 0–31 (hex 00–1F) and supplementary precomposed characters with diacritics. This permits a font implementing the EC encoding to support almost all European languages (recall that the ISO 8859 standards need six different encoding tables, see table 4.1 on page 16).

- [1] International Organization for Standardization. *Information technology—8-bit single-byte coded graphic character set—Parts 1 to 10*. ISO 8859-1:1987 to ISO/IEC 8859-10:1992, Geneva, 1987–92.
- [2] International Organization for Standardization. *Information technology—Universal Multiple-Octet Coded Character Set (UCS)—Part 1: Architecture and Basic Multilingual Plane*. ISO/IEC 10646-1:1993, Geneva, 1993.
- [3] The Unicode Consortium. *The Unicode Standard: Worldwide Character Encoding*, Version 1.0, Volumes 1 and 2. Addison Wesley, 1992.
- [4] Ken Lunde. *Understanding Japanese Information Processing*. O’Reilly & Associates, Inc. 1993.

<b>Control characters.</b>		<three>	051	3	<i>	105	i	<PM>	158	<Eth>	208	Ð
<NUL> or <NU>	000	<four>	052	4	<j>	106	j	<APC>	159	<N-tilde>	209	Ñ
<SOH> or <SH>	001	<five>	053	5	<k>	107	k	<b>Printable characters.</b>				
<STX> or <SX>	002	<six>	054	6	<l>	108	l	<no-break-space>	160	<O-grave>	210	Ò
<ETX> or <EX>	003	<seven>	055	7	<m>	109	m	<inverted-exclamation>	161	<O-acute>	211	Ó
<EOT> or <ET>	004	<eight>	056	8	<n>	110	n	<cent-sign>	162	<O-circumflex>	212	Ô
<ENQ> or <EQ>	005	<nine>	057	9	<o>	111	o	<pound-sign>	163	<O-tilde>	213	Õ
<ACK> or <AK>	006	<colon>	058	:	<p>	112	p	<currency-sign>	164	<O-diaeresis>	214	Ö
<BEL> or <BL> (<alert>)	007	<semicolon>	059	;	<q>	113	q	<yen-sign>	165	<multiplication-sign>	215	×
<BS> (<backspace>)	008	<less-than>	060	<	<r>	114	r	<broken-bar>	166	<O-slash>	216	Ø
<HT> (<tab>)	009	<equals-sign>	061	=	<s>	115	s	<paragraph-sign>	167	<U-grave>	217	Ù
<LF> (<newline>)	010	<greater-than>	062	>	<t>	116	t	<diaeresis>	168	<U-acute>	218	Ú
<VT> (<vertical-tab>)	011	<question-mark>	063	?	<u>	117	u	<copyright-sign>	169	<U-circumflex>	219	Û
<FF> (<form-feed>)	012	<commercial-at>	064	@	<v>	118	v	<feminine-ordinal-a>	170	<U-diaeresis>	220	Ü
<CR> (<carriage-return>)	013	<A>	065	A	<w>	119	w	<left-angle-quotation>	171	<Y-acute>	221	Ý
<SO>	014	<B>	066	B	<x>	120	x	<not-sign>	172	<Thorn>	222	Þ
<SI>	015	<C>	067	C	<y>	121	y	<soft-hyphen>	173	<sharp-s>	223	ß
<DLE> or <DL>	016	<D>	068	D	<z>	122	z	<registered-mark>	174	<a-grave>	224	à
<DC1> or <D1>	017	<E>	069	E	<left-brace>	123	{	<macron>	175	<a-acute>	225	á
<DC2> or <D2>	018	<F>	070	F	<vertical-line>	124		<degree-sign>	176	<a-circumflex>	226	â
<DC3> or <D3>	019	<G>	071	G	<right-brace>	125	}	<plus-minus>	177	<a-tilde>	227	ã
<DC4> or <D4>	020	<H>	072	H	<tilde>	126	~	<superscript-2>	178	<a-diaeresis>	228	ä
<NAK> or <NK>	021	<I>	073	I	<delete> or <DEL>	127		<superscript-3>	179	<a-ring>	229	å
<SYN> or <SY>	022	<J>	074	J	<b>Control characters</b>			<acute-accent>	180	µ	230	æ
<ETB> or <EB>	023	<K>	075	K	<PAD>	128		<micro-sign>	181	¶	231	ç
<CAN> or <CN>	024	<L>	076	L	<HOP>	129		<pilcrow-sign>	182	·	232	è
<EM>	025	<M>	077	M	<BHP>	130		<middle-dot>	183	¸	233	é
<SUB> or <SB>	026	<N>	078	N	<NBH>	131		<cedilla>	184	¸	234	ê
<ESC> or <EC>	027	<O>	079	O	<IND>	132		<superscript-1>	185	¸	235	ë
<IS4> or <FS>	028	<P>	080	P	<NEL>	133		<masculine-ordinal-o>	186	»	236	ì
<IS3> or <GS>	029	<Q>	081	Q	<SSA>	134		<right-angle-quotation>	187	¼	237	í
<IS2> or <RS>	030	<R>	082	R	<ESA>	135		<one-quarter>	188	½	238	î
<IS1> or <US>	031	<S>	083	S	<HTS>	136		<one-half>	189	¾	239	ï
<b>Printable characters.</b>		<T>	084	T	<HTJ>	137		<three-quarters>	190	¿	240	ð
<space>	032	<U>	085	U	<VTS>	138		<inverted-question>	191	¿	241	ñ
<exclamation-mark>	033	<V>	086	V	<PLD>	139		<A-grave>	192	À	242	ò
<quotation-mark>	034	<W>	087	W	<PLU>	140		<A-acute>	193	Á	243	ó
<number-sign>	035	<X>	088	X	<RI>	141		<A-circumflex>	194	Â	244	ô
<dollar-sign>	036	<Y>	089	Y	<SS2>	142		<A-tilde>	195	Ã	245	õ
<percent>	037	<Z>	090	Z	<SS3>	143		<A-diaeresis>	196	Ä	246	ö
<ampersand>	038	<left-square-bracket>	091	[	<DCS>	144		<A-ring>	197	Å	247	÷
<apostrophe>	039	<backslash>	092	\	<PU1>	145		<AE>	198	Æ	248	ø
<left-parenthesis>	040	<right-square-bracket>	093	]	<PU2>	146		<C-cedilla>	199	Ç	249	ù
<right-parenthesis>	041	<circumflex>	094	^	<STS>	147		<E-grave>	200	È	250	ú
<asterisk>	042	<underscore>	095	_	<CCH>	148		<E-acute>	201	É	251	û
<plus-sign>	043	<grave-accent>	096	`	<MW>	149		<E-circumflex>	202	Ê	252	ü
<comma>	044	<a>	097	a	<SPA>	150		<E-diaeresis>	203	Ë	253	ý
<hyphen>	045	<b>	098	b	<EPA>	151		<I-grave>	204	Ì	254	þ
<period>	046	<c>	099	c	<SOS>	152		<I-acute>	205	Í	255	ÿ
<slash>	047	<d>	100	d	<SGCI>	153		<I-circumflex>	206	Î		
<zero>	048	<e>	101	e	<SCI>	154		<I-diaeresis>	207	Ï		
<one>	049	<f>	102	f	<CSI>	155						
<two>	050	<g>	103	g	<ST>	156						
		<h>	104	h	<OSC>	157						

Table4.2: The ISO 8859 Latin 1 character codes

# 5. Text Processing

## 5.1 Text Processing: An Update

*Michel Goossens CN/ASD and Sebastian Rahtz/ArchaeInformatica*

### **L<sup>A</sup>T<sub>E</sub>X<sub>2 $\epsilon$</sub> is coming!**

As announced in CNL 213 (September 1993) a new and standard release of L<sup>A</sup>T<sub>E</sub>X, known under the name L<sup>A</sup>T<sub>E</sub>X<sub>2 $\epsilon$</sub> , is now in advanced beta-testing, and will be released around Easter 1994. We have both been working with the developers of the L<sup>A</sup>T<sub>E</sub>X core team to test the beta-releases, as they became available, and we think that the version is now stable enough to make it available at CERN. As this version will be *standard* L<sup>A</sup>T<sub>E</sub>X the day it is released, we plan to make it the default version at CERN sometime after the summer. In principle, in so-called *compatibility mode* (for which you have to issue no special command) your old documents will run *unmodified* through the new system. However, if you want to use the new features of L<sup>A</sup>T<sub>E</sub>X<sub>2 $\epsilon$</sub> , you will have to make a few changes to be compatible with the new syntax.

So we would ask those of you who are familiar enough with L<sup>A</sup>T<sub>E</sub>X to run your existing documents through the new system and signal any unexpected results. It is enough to replace the commands `latex` and `dvips` by the new commands:

```
latex2e filename  
dvips2e filename -options
```

The new functionality of L<sup>A</sup>T<sub>E</sub>X<sub>2 $\epsilon$</sub>  is described in the book *The L<sup>A</sup>T<sub>E</sub>X Companion*, by Goossens, Mittelbach and Samarin and later this year there will also be a new edition of Lamport's *L<sup>A</sup>T<sub>E</sub>X—A Document Preparation System* (both books are published by Addison-Wesley). Note, however, that these two books are complementary, with the first for more advanced users (there are many at CERN), while the second is the “official” user guide for the language. Both will be available as stores item from the UCO.

### **The seminar style revisited**

Many users, at CERN and elsewhere, are now using the style `seminar.sty`, which we described in CNL 213, pages 37–40. We have got a lot of questions, and, to optimize your (and our) time we give here a few clarifications.

If you do not like the layout we prepared for the CERN layout, you can “roll your own”, and for this you will need to customize the file `seminar.con`, which we described in detail in our article. In the simplest case, you might just write:

```
% A do-nothing file seminar.con  
\endinput
```

Of course it might be more sensible to build on our work by redefining the commands so that they do what you want.

To change the default set-up to black on white and use a plain pagestyle and frame (see pages 37 and 38 of our article

for other possibilities) just add the following in front of the command `\begin{document}`:

```
\documentstyle{seminar}  
\pagestyle{plain}  
\slideframe{plain}  
\renewcommand{\SlideFront}{\color{Black}}  
\begin{document}  
\begin{slide}  
...  

```

If you still would like colour backgrounds for your slides by keeping the SlideColours interface, but with a plain border and no CERN logos etc., you can use the following set-up:

```
\documentstyle{seminar}  
\pagestyle{plain}  
\renewcommand{\SlideColours}[2]{%  
  \renewcommand{\SlideFront}{\color{#1}}%  
  \slideframe%  
  [\psset{fillcolor=#2,fillstyle=solid}]%  
  {splain}%  
}  
\begin{document}  
\SlideColours{Red}{Yellow}  
\begin{slide}  
...  

```

The complete syntax of the many other commands, which you have at your disposal, is described in the user guide, which is available as a (gzipped) PostScript file on `asis01` in the directory `/usr/local/lib/tex/docps` under the name `seminar.ps.gz`. On CERNVM it is available as `SEMINAR.PS` on the minidisk `TEX 202`. In the same locations you can find `palette.ps`, which is a map showing available colours and their names.

### **Finding the fonts**

As the size of the text on your slides is larger than that for normal text (articles, manuals, etc.), often you will find that some fonts (especially for mathematics) are not available at the size needed. Dvips tries to generate these fonts but does not always find the necessary Metafont input files to successfully complete the generation of the new font bitmaps. Therefore we advise you to run `dvips` with the `PSA` option, which will load the public domain type 1 PostScript version of the Computer Modern fonts (see page 30 of CNL214). In this case you need to type:

```
Unix:      dvips -a -PPSA -oout.ps dvifile  
CERNVM:   DVIPS DVIFILE (-A -PPSA -OOUT.PS  
VMS:      DVIPS/PRI=PSA/OUTP=OUT.PS DVIFILE
```



## 6. Program Library News

### 6.1 Release 94A of the CERN Program Library

*CERN Program Library Office CN/ASD*

#### Introduction

Release 94A of the CERN Program Library is scheduled for Tuesday, March 15th 1994. 94A will become the production version (PR0) at that time on CERNVM, VXCERN, asis01 and other central systems.

The *tar* files will be available for export shortly after the release, towards the end of the month. An announcement will be made on the HEPLIB mailing list and the central NEWS groups when these files are ready.

In addition to the traditional platforms, this release will include a Windows/NT version of the library.

A preliminary version of an installation guide is also available, from the UCO, via WWW or via anonymous ftp from `asis01.cern.ch`.

#### New features

As of this release, the *doc* directory, e.g. `/cern/94a/doc`, will contain the release notes of various packages. For example, the new features of the latest version of PAW will be found in the file `paw.news2030`.

#### New versions of the Monte Carlo generators

Release 94A of the CERN Program Library contains new versions of many of the Monte Carlo generators. The following versions will become the defaults as from this release.

- Pythia 5.7
- Jetset 7.4
- Herwig 5.7
- Photos 3.0

- PDFLIB 4.17
- ISAJET 7.6

#### CERNLIB HELP library on VXCERN

The CERNLIB help library on VXCERN has not been updated for many years and the information that it contains is now largely incorrect. Users are recommended to use [WWW](#), [FIND](#) or [XFIND](#) to access CERNLIB or other information. The CERNLIB help library will be deleted.

#### Network distribution of VMS and VM versions of the library

As from this release, we will be testing the distribution of the VMS (both VAX and AXP) and VM/CMS versions of the library via our anonymous ftp server, `asis01.cern.ch`. The VMS distribution kits will be BACKUP savesets and the VM/CMS kits will be compressed *tar* files.

#### VMS BACKUP savesets

The VMS BACKUP savesets are created with a blocksize of 2048 bytes. This means that they can be transferred to systems running Multinet TCP/IP using `TYPE BACKUP`. In other cases, the `RESIZE` command may be used to change the blocksize to 2048 bytes.

#### VM/CMS tar files

After unpacking the tar files for VM/CMS, the files should be transferred to the target node using binary ftp (N.B. use `BIN F 1024`) and then unpacked using `COPYFILE (UNPACK REPLACE)`.

---

### 6.2 Support for CERN Program Library software

*CERN Program Library Office CN/ASD*

#### Introduction

This article serves as a reminder on how users may report problems with, or request enhancements to, CERN Program Library software.

Furthermore, we take this opportunity to repeat that the expiry mechanism, introduced into PAW and CMZ in the 1993 releases, has been removed as of release 94A.

#### Problem reports and requests for enhancements

Problem reports and requests for enhancements may be sent by e-mail to `cernlib@cern.ch` or to a distribution list such as `heplib@cern.ch`. In the case of the latter, the item will be distributed automatically to a list of around 800 people. In both cases, users are kindly requested to give a **subject** that is as clear as possible, indicating (at least) the following information:

- the release of the library to which the mail refers;

- the package(s) to which the mail refers;
- the system(s) to which the mail refers.

This is a significant help to both the support staff and other readers of the list.

Note that a number of application specific mailing lists and corresponding news groups also exist, namely LFATMEN, LGEANT and HEPDB for FATMEN, GEANT and HEPDB related discussions, respectively.

We regret that we are unable to follow up problems relating to a version of the library that is older than the current PRO version at CERN.

### Accessing the HEPLIB discussion list

The HEPLIB discussion list can be accessed in a number of ways:

- by electronic mail;

- via XNEWS (HEPLIB);
- via the `cern.heplib` news group using your favourite news reader, including WWW or Mosaic.

In the first case you may subscribe by sending one of the following methods:

- using the command:  
`TELL LISTSERV AT CERNVM SUBSCRIBE HEPLIB`
- by sending an e-mail to `LISTSERV@CERNVM.CERN.CH` containing as its first line the text:  
`SUBSCRIBE HEPLIB firstname lastname`

### Unsubscribing from HEPLIB

You may unsubscribe using the above methods, replacing the word `SUBSCRIBE` by `SIGNOFF`.

N.B. if you are unable to signoff, please send a mail to `cernlib@cern.ch` and not to the list itself!

---

## 6.3 PAW Release (2.04)

### *The PAW Team CN/ASD*

A new version of PAW (2.04) will be released together with `CERNLIB 94A`. The major new features and enhancements in this version are summarized below. The complete list of bug fixes and improvements since the last release is available via `anonymous ftp` on `asis01` in the file:

`/cern/pro/doc/paw.news2040`

### New PAW commands and options

#### VECTOR/FIT

New options “Z” and “W”.

**W** When the maximum likelihood fit is selected “LW” When this option “W” is selected, bins with an error = 0 are not taken into account in the fit. Note that this is the default behaviour with the standard  $\chi^2$  method.

**Z** The user is assumed to provide a COMIS routine `FCN.F` with his own fitting model. It is the user’s responsibility to compute in `FCN` the quantity to be minimized. When the option “Z” is selected, `Vector/Fit` does not produce a graphics output. See `paw.news2040` for more details.

#### H PLOT/AERRORS

New option “O” (also in `H PLOT/ERRORS`). By default, the symbols are not drawn if they are one the edges of the plot: the option “O” allows one to turn off this symbols clipping. See the help for more details.

#### NTUPLE/CUTS

New option “X” in order to define graphical cuts using a tracking cross cursor. This is useful on some black and white Xterminal on which the crosshair cursor is not visible.

#### NTUPLE/PLOT

With four variables, the colour scale used is drawn.

#### NTUPLE/SCAN

Is able to process CWN ntuples with variable length events: `PX(Ntrack)`.

#### PRIMITIVES/DLINE

Draws a line taking care of log scales. The syntax conforms to `BOX`, `ARROW`, etc ...

#### LOCATE

Has been modified. It is now possible to invoke a user COMIS routine in locator mode. When a mouse button is pressed, the user routine is called and the user has access to the current mouse coordinates. See “`HELP LOCATE`”.

### New PAW system functions

- `$GRAFINFO(‘?TXFP’)` and `‘?TXAL’`.
- New `$GRAFINFO(‘TXFONT’)`, `TXPREC`, `TXALIH`, and `TXALIV` to return text font, precision, and horizontal and vertical alignment as separate values.
- New function `$RGBINFO(icol,‘R’|‘B’|‘G’)` to return values from colour tables.

- New function `$HCDIR()` to return current HBOOK directory.

Typing `HELP KUIP/FUNCTION` gives more details.

## Start PAW

It is now possible to pass the workstation type to PAW without being prompted.

```
ex: paw           (default) You get the prompt:
      "Give workstation type"
      paw -w       no prompt.
      Use default workstation type
      paw -w 3     no prompt.
      Use workstation type 3.
```

`pawX11` can be invoked from the `paw++` module also with the option `w`:

```
/cern/new/bin/paw++ -w 2
```

## PIAF

A PIAF connection can be opened automatically with the command `HI/FILE`:

```
PAW > hi/file 45 //piaf/test.hbook
```

The command `CONNECT` is not necessary. Enter `HELP PIAF` for more information.

## PAW main program

Important restructuring of the PAW main program and initialisation routines. This new structure has been introduced to facilitate the calls to PAW and PAW++ from user's programs, e.g. GEANT.

```
PROGRAM PAMAIN
*
PARAMETER (NWPBW=2000000)
COMMON/PAWC/PAWCOM(NWPBW)
CALL PAW(NWPBW,IWTYP)
CALL KUWHAG
CALL PAEXIT
STOP
```

N.B. For PAW++, `PAWPP` should be called instead of `PAW`.

## PAW++

Global sections and shared memory are now visible in the PAW++ browsers.

## COMIS

On HP, SUN and Silicon Graphics machines, COMIS is now able to invoke the local compiler and to load the object file generated in the current PAW session. This is done via the shared libraries mechanism.

To access this facility, new rules for file extensions have been defined:

```
file.f77 The FORTRAN file, "file.f77" is compiled
with the local FORTRAN compiler and loaded in
the current PAW session.
file.c   The C file "file.c" is compiled with the local C
compiler and loaded in the current PAW session.
file.sl  The precompiled shared library "file.sl" is
loaded in the current PAW session.
```

New routines callable from COMIS:

**MATHLIB GAUSS, DGAUSS;**

**HBOOK HKIND, HRENID;**

**ZEBRA MZSTOR, MZDIV, MZLINK, MZWORK, MZBOOK, MZDROP, MZPUSH, MZLOGL, MZWIPE, MZGARB, MZFORM, LZFIND, LZFID, DZSHOW, DZVERI, FZin, FZOUT, FZFILE, FZENDI, FZENDO, RZCDIR, RZLDIR, RZFILE, RZEND, RZIN, RZOUT, RZVIN, RZVOUT, RZOPEN, RZIOD0, RZCLOS, RZQUOT.**

Type `HELP CALL` to get a more complete list.

## New HBOOK routines

### HKIND

Returns histogram attributes in the 32 status bits output argument `KIND`.

```
SUBROUTINE HKIND (ID, KIND*, CHOPT)
```

### HRENID

Renames an HBOOK ID (histogram or Ntuple).

```
SUBROUTINE HRENID (IDOLD, IDNEW)
```

### HF1E

Fills a 1-D histogram with weight and errors.

```
SUBROUTINE HF1E (ID, X, W, E)
```

### HBOOKNC

This routine has a calling sequence very close to `HBOOKN` and creates a `CWN` instead.

```
HSTAF SUBROUTINE HSTAF (CHOPT).
```

If `CHOPT='YES'`, statistics are computed at filling time.

A more complete description is in on see `paw.news2040`.

## Obsolete HBOOK routines

The following obsolete routines from HBOOK version 3 have been deleted: `CORE`, `DISKF`, `FNEXT`, `ISTGO`, `LCM`, `LCM3`, `LOK`, `STORE`, `UNLOK`, `WRITE`.

## HIGZ/HPLOT

The limitations of 1000 points in IGRAPH and IGHIST are now removed. This is also available in all the PAW command using these routines (H/PLOT, GRAPH, etc..)

A set of 3-D primitives are available in HIGZ/HPLOT (IPL3, IPM3, ISWN3, ISVP3, etc.).

A new routine IGDWK to Get the Default Workstation type. This routine is called by IGWKTY.

The `xverttext` package to rotate and scale X11 fonts is now available in directory `higzcc/rotated` (thanks to Alan Richardson, `mppa3@symba.sussex.ac.uk`). It is used in the routine ITX.

## Enhancements in KUIP

Apart from various bug fixes the main improvements made in KUIP for this release are:

**KUOPEN:** new status code "DONTKNOW" which opens the highest cycle on VMS ("UNKNOWN" creates a new cycle). On other systems this is equivalent to "UNKNOWN".

**KUGETF:** allow KUGETL mechanism to get a list of filenames.

New command "MACRO/DATA" to be used as "APPL DATA `file.name`" to write text from immediate data in a macro.

New commands "HOST\_PRINTER" and "KUIP/PRINT" to send a file to the printer. The possibility to print is now included in the action menus of the file system browser (KUIP/Motif).

New system function \$IQUEST(I) returning the status vector element. "IF \$IQUEST(1)=0 THEN ..." allows one to test the success of the last command.

Routine KUFDEF is now allowed for functions without arguments given as "\$name()".

Comma-separated list of names are now allowed for ALIAS/DELETE and VECTOR/DELETE.

Some changes have been made for the Convex machines.

Various improvements in the Motif version:

- on VMS: break interception, disable Control-C, set Motif host editor to "/DISPLAY=DECW", remove version number from various file specifications in the browser;
- implement the possibility to build user-defined panels with icons (instead of alphanumeric labels).
- new command "panel 0 c [title]" to close a user-defined panel (this was previously only possible with the mouse).

---

## 6.4 The ZEBRA RZ Package

*Sunanda Banerjee PPE/LE (L3 Collaboration), Rene Brun and Jamie Shiers CN/ASD*

### Introduction

This article describes the recommended methods for transferring ZEBRA RZ files between machines, how they may be accessed over distributed file systems such as NFS and describes some enhancements which are planned after the 94A release.

### Transferring RZ files between machines

The ZEBRA RZ package has supported the so-called *exchange mode* files for a number of years. These files may be transferred between machines or accessed over the network using binary ftp. The use of tools such as RTOA, RFRA, RTOX, RFRX or ZFTP is neither required nor recommended for these files.

*You are strongly recommended to use exchange mode files for all new applications and convert existing ones where possible.*

### Transferring exchange mode RZ files to VM/CMS systems

To create the file with the appropriate record format, use the command `bin f lrecl` inside ftp. For example, to transfer an RZ file created with a record length of 1024 words, use `BIN F 4096`. As this example shows, RZ uses units of ma-

chine words to describe the record length whereas ftp requires the record length in bytes.

### Transferring exchange mode RZ files to VMS systems

After transferring an exchange mode RZ file to a VMS system, one should either:

- Correct the file attributes using the `RESIZE` command, e.g. `resize -s 4096 test.hbook`.
- Process the file using C I/O, as described below.

The `RESIZE` command is available in:

`VXCERN: :CERNVAX: [PRO.EXE]RESIZE.COM`

### Accessing RZ files over the network

This is of particular interest to VMS users wishing to share files with Unix systems over NFS.

Files resident on Unix systems may be accessed over NFS from VMS systems using the C I/O option in RZ. This option, which may also be used for files on the local system, is required as Fortran expects the file to have fixed length records, whereas NFS mounted files are seen as STREAMLF files.

For more information, see the ZEBRA manual.

## Future changes to ZEBRA RZ

The current version of ZEBRA RZ limits individual RZ files to 64K records. This limitation will be removed in a future version. Existing RZ files will be treated as now, i.e. the limitation will continue to exist unless the files are converted. *New files, however, will be created in the new format.*

As the RZ package is fundamental to many applications, we want to ensure that these changes are tested as heavily as possible. Therefore, the changes will be introduced into the NEW area shortly after the 94A release, becoming final in the 94B release. Files in the new format will be unreadable by applications linked with old versions of the ZEBRA RZ package.

---

## 6.5 GEANT Release (3.21)

*Simone Giani CN/ASD and Sven Ravndal CN/ASD*

A new release of GEANT, GEANT3.21, will be submitted together with the 94a release of the CERN Library. Also for the future it is foreseen to submit GEANT releases and update/correction cradles together with the CERN Library releases.

The new release of GEANT3.21 has new features and contains substantial improvements concerning the geometry and tracking package:

*New ray tracing package.*

The new tracking of GEANT3.21 is also used to visualize the detectors. This technique allows a realistic rendering with light processing, the speed being largely independent of the number of the visible volumes and with no need for large memory allocation. The main advantage is that it is a quick tool to investigate the correctness of the geometrical description and of the tracking parameters of a detector (the image reflects the detector "seen" by the tracked particles).

*Boolean operations between geometrical shapes.*

In the geometry part of GEANT it is now possible to extend the definition of various geometrical shapes from the previous 16 different types to a larger number. This is obtained by the definition of boolean operations between the existing shapes. The implementation of the boolean operations is backward compatible, so that existing geometries are treated as in the previous versions of GEANT.

*New tracking based on "virtual divisions".*

The tracking is now able to handle overlapping volumes in the most general sense: the concept of MANY volumes has been extended to automatic clipping for producing objects. Thanks to this MANY technique, any 3-D or 2-D geometrical pattern can be reduced to a single dimensional structure, basically cancelling the need for GUNEAR at tracking time.

*Improvement in tracking.*

Modifications in routines `GTELEC`, `GTGAMA` and `GDRAY`.

---

## 6.6 PYTHIA and JETSET: New Versions

*Torbjörn Sjöstrand TH/SP and Jamie Shiers CN/ASD*

The two programs PYTHIA and JETSET can be used to generate high-energy-physics events, in particular for multi-hadronic final states. Possible applications include comparisons with and predictions for events at LEP 1, LEP 2, LHC, HERA, fixed-target experiments, and so on. While originally developed separately, today the two programs are closely linked. Recently new subversions of the two programs have been introduced, PYTHIA 5.7 and JETSET 7.4.

### New features

The programs are essentially completely backwards compatible with the previous versions of PYTHIA 5 and JETSET 7. A number of new features have been introduced, however. The list includes, among others:

- Default values have been changed in many places, some features previously only available as options are now

on by default, new options have appeared, particle data and decay tables have been updated, etc.

- A few new processes have been added, and old ones expanded.
- Top is now assumed to decay before it has time to fragment, and is in this (default) scenario treated like other resonances.
- The CTEQ 2 parton distributions have been included as replacement for some older sets; CTEQ 2L is the new default.
- The photoproduction description has been expanded.
- The total, elastic and diffractive cross section parametrizations have been brought up to date, and the treatment of the elastic and diffractive events has been correspondingly improved.
- Angular ordering requirements have been included for the matching of initial- and final-state QCD parton showers to the hard scattering (of relevance for hadron-

hadron collisions).

- PYTHIA can be used to generate events with varying energies or externally defined subprocesses.
- A number of minor bugs have been corrected.
- Sub-subversion numbers have been introduced. The currently available programs thus are PYTHIA 5.700 and JETSET 7.400. These numbers will be incremented anytime new modifications are introduced in the public versions.

### Library and documentation

Both programs are being made available in the CERNlib PROduction area in separate sources, but in a single library:

```
VM/CMS  JETSET74 TXTLIB Q
         JETSET74 CAR fm
         PYTHIA57 CAR fm
Vax/VMS CERN: [pro.lib]jetset74.olb
         CERN: [pro.src.car]jetset74.car,
         pythia57.car
Unix    /cern/pro/lib/libjetset74.a
```

```
/cern/pro/src/car/jetset74.car,
pythia57.car
```

where `fm` is the filemode of the VM minidisk hosting the CERNlib sources after linking it via the command `GIME /cern/pro/src/car`.

The recommended way to access the library is via the `CERNLIB` command; Pythia and Jetset are recognized keywords which translate into the default current production version, i.e., Pythia57 and Jetset74.

A brief description of the programs is available in T. Sjöstrand, CERN-TH.7111/93. This paper has been submitted to Computer Physics Communications; once published, it will become the new “official” reference to PYTHIA and JETSET.

The long writeup (over 300 pages) is available as T. Sjöstrand, CERN-TH.7112/93. This is an updated version of CERN-TH.6488/92. The long writeup is being made available in the self-service area of the Computer Centre and on `asis01` software server in the directory `/cernlib/doc/ps.dir` as the file `pythia.ps`.

---

## 6.7 Garfield: New Version

*Rob Veenhof PPE*

### CELL section

Small refinement of the numerical quality of the potential used for phi-periodic cells in a cylindrical tube.

Correction in the potential for chambers with precisely one plane in x, one in y, no periodicities treated in vector mode. Summing of the single wire contributions for this potential is now done in double precision so as to enhance the accuracy.

Triangular, square and up to octogonal tubes are now available. Tubes with more edges can be added on request. Phi-periodicity in polygonal tubes is not yet available.

New option `CHARGE-CHECK` to verify the quality of the capacitance matrix inversion. Not meaningful for IBM vector compilations because the capacitance matrix is solved without inversion in this case.

Compact format cell datasets written with earlier versions of the program cannot be read with the present version.

### GAS section

The Lorentz angle has been added to the list of gas properties that can be specified in the `TABLE`. The extrapolation and interpolation methods can be specified as for other entries.

Both the transverse and the longitudinal components of the diffusion coefficients can be entered via the `TABLE` statement. The extrapolation and interpolation methods can be specified as for other entries.

Compact format gas datasets written with earlier versions of the program can not be read with the present version.

### DRIFT section

If a Lorentz angle has been specified in the gas section, then this angle will be used instead of the angle used in earlier versions.

An accuracy problem has been detected in the `ARRIVAL` instruction. The mean arrival time of all electrons was wrong by a few percent as a result of this—the mean arrival time of the selected electron should be correct with the default parameter settings.

The plots and tables produced by the `ARRIVAL` instructions now also show the spread in the arrival time of all electrons and of the elected electrons. The format of the output dataset has been changed accordingly.

### Formulae

String concatenation should be done with `/` rather than `+`, since the latter is a commutative operator and the order of the concatenated strings is therefore arbitrary.

The functions `GLOBAL` and `TYPE` have been added. `GLOBAL` returns the value of the global variable whose name is given as argument (of type string). `TYPE` returns the type of its argument in the form of a string.

Several new procedures have been added: `DRIFT_ELECTRON`,

`INQUIRE_TYPE`, `INQUIRE_HISTOGRAM`. Their parameter lists are described in the manual and in the help file.

## Compilation

Garfield now runs also on the DEC Alpha. The program has been linked with `VEST` translated versions of the `GTS-GRAL/GKS` shareable images. A few problems related to the DEC Fortran compiler are under study by DEC.

## Front-end programs and EXEC files

The front-end EXEC file on VM will now by default give the metafile the same file name as the input file. The file type if

specified as `*` will be set to `METAFILE` for Appendix E format metafiles, to `PS` for PostScript and to `EPS` for encapsulated PostScript. If you already have defaults stored, then please change the default metafile name to `=.*`

At the request of users, several array dimensions have been increased. As a result, Garfield now needs approximately 10 Mb to run on VM.

The front-end program for VAX now selects an executable depending on the machine on which the program is to be run.

The LSE file is no longer part of the distribution.

---

## 6.8 CMZ Release (1.45)

*Marthe Brun/CodeMe*

A new version of CMZ (1.45/17) has been released with version 94A of CERNLIB. This new version is compatible with the previous versions of CMZ. It includes some additional facilities to support a multi-language environment. The full details on this new release can be found in the file `/cern/pro/doc/cmz.news45`. This article only summarizes the main points.

### Quick Guide

A CMZ quick guide is available at the UCO and accessible via anonymous FTP from `asis01.cern.ch` in the directory `"cernlib/doc/ps.dir/cmzguide.ps"`

### CMZ discussion list

A new discussion list dedicated to CMZ has been set up. You can subscribe to that list by sending the following line via

e-mail to `LISTSERV AT CERNVM`:

`SIGNUP CMZ name firstname`

### Added or modified features

- New argument `X` when invoking CMZ;
- NFS files mounted on Unix are accessible from VAX;
- length of file names is now 128 characters;
- new commands for better support of source code in languages like C or C++, and documentation files (`LATEX`);
- new CMZ directives;
- new options for the `DIFFERENCE`, `SET` and `VERSION` commands;
- extensions to the use of the history file;
- new command `CIMPORT`.

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## 6.9 Reissued Subprograms

*K.S. Kölbig CN/ASD*

### C304 ALGAMA: Logarithm of the Gamma Function

Function subprogram `C310 ALGAMA` (Logarithm of the gamma function) with entries `ALGAMA`, `DLGAMA` and `QLGAMA` has been reissued as `C304 ALGAMA` in MATHLIB. This has no influence on its usage.

### C305 CGAMMA: Gamma Function for Complex Argument

Function subprogram `C306 CGAMMA` (Gamma function for complex argument) with entries `CGAMMA` and `WGAMMA` has

been reissued as `C305 CGAMMA` in MATHLIB. This has no influence on its usage.

### C306 CLGAMA: Logarithm of the Gamma Function for Complex Argument

For reasons of consistency with the naming of `C305 ALGAMA`, function subprogram `C333 CLOGAM` (Logarithm of the gamma function for complex argument) with entries `CLOGAM` and `WLOGAM` has been reissued as `C306 CLGAMA` in MATHLIB, with a `COMPLEX*16` version `WLGAMA` on IBM and

similar computers. For convenience, the old entry names **CLOGAM** and **WLOGAM** are kept for a transitional period. They will eventually be deleted.

### **C332 DILOG: Dilogarithm Function**

Function subprogram **C304 DILOG** (Dilogarithm function) with entries **DILOG** and **DDILOG** has been reissued as **C332 DILOG** in MATHLIB. This has no influence on its usage.

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## **6.10 New/Changed Subprograms**

*F. James (V115 – V122) and K.S. Kölbig CN/ASD (E408 – H301)*

### **E408 RCHPWS: Conversion of Chebyshev to Power and Power to Chebyshev Series**

A new subroutine subprogram **E408 RCHPWS** (Conversion of Chebyshev to power and power to Chebyshev series) with entries **RCHPWS** and **RPWCHS**, written in Fortran, which performs the conversion of a finite Chebyshev series to a finite power series (a polynomial) and *vice versa*, has been submitted to MATHLIB for CDC and Cray computers. A double-precision version **DCHPWS** with entries **DCHWPS** and **DPWCHS** is provided on IBM and similar computers. This subprogram replaces subroutine subprogram **E401 ECTRAD** in MATHLIB, which thus becomes obsolete. The old routine will be left in MATHLIB for a few months and will then be deleted.

### **H101 RSMPLX: Linear Optimization Using the Simplex Algorithm**

A new subroutine subprogram **H101 RSMPLX** (Linear optimization using the simplex algorithm) written in Fortran, which calculates a vector for which a certain linear form assumes a maximum under linear inequality or equality constraints, has been submitted to MATHLIB for CDC and Cray computers. A double-precision version **DSMPLX** is provided on IBM and similar computers. This subprogram replaces subroutine subprogram **H100 SIMPLE** in MATHLIB, which thus becomes obsolete. The old routine will be left in MATHLIB for a few months and will then be deleted.

### **H301 ASSNDX: Assignment Problem**

A new subroutine subprogram **H301 ASSNDX** (Assignment problem) written in Fortran, which selects certain elements of a rectangular matrix such that the sum of them is minimal, has been submitted to MATHLIB. This subprogramm replaces subroutine subprogram **H300 ASSIGN** in MATHLIB, which thus becomes obsolete. The old routine will be left in MATHLIB for a few months and will then be deleted.

### **V115 RANLUX: Uniform Random Numbers of Guaranteed Quality**

A new subroutine subprogram **V115 RANLUX** (Uniform random numbers of guaranteed quality) written in Fortran, has been submitted to KERNLIB. It generates pseudorandom numbers uniformly distributed in the interval (0,1), the end points excluded. Each call produces an array of single-

precision real numbers of which 24 bits of mantissa are random. The user can choose a **luxury level** which guarantees the quality required for his application. The lowest luxury level (zero) gives a fast generator which will fail some sophisticated tests of randomness; the highest level (four) is about five times slower but guarantees complete randomness. In all cases the period is greater than  $10^{165}$ . Independent subsequences can be generated. Entries are provided for initialization and checkpointing.

### **V116 RM48: Double-Precision Uniform Random Numbers**

A new subroutine subprogram **V116 RM48** (Double-Precision Uniform random numbers) written in Fortran, has been submitted to KERNLIB. It generates pseudorandom numbers using a double-precision (64-bit) adaptation of **V113 RANMAR**. The floating-point numbers in the interval (0,1), the end points excluded, have 48 significant bits of mantissa (additional bits of mantissa, if supported by the hardware, are zero). Both the code and the results are portable.

### **V120 RNORML: Gaussian-distributed Random Numbers**

New subroutine subprogram **V120 RNORML** and **RNORMX** (Gaussian-distributed random numbers) written in Fortran, has been submitted to KERNLIB. **RNORML** and **RNORMX** generate (vectors of) single-precision random numbers in a Gaussian distribution of mean zero and variance one. **RNORML** uses the uniform generator **V113 RANMAR** underneath, and **RNORMX** allows the user to choose the uniform generator to be used underneath. The code is portable, but the results are not guaranteed to be identical on all platforms because there is branch on a floating-point compare which may (very rarely) cause the sequence produced on a given platform to be out of step with that of a different platform.

### **V122 CORSET: Correlated Gaussian-distributed Random Numbers**

New subroutine subprogram **V122 CORSET** and **CORGEN** (Correlated Gaussian-distributed random numbers) written in Fortran, has been submitted to MATHLIB. The subprogram **CORGEN** generates vectors of single-precision random numbers in a Gaussian distribution of mean zero and covariance matrix **V**. The generator must first be set up by a



call to **CORSET** which transforms the covariance matrix **V** to an appropriate *square root* matrix **C** which is then used by **CORGEN**. **CORGEN** uses the Gaussian generator **V120 RNORML** underneath, which in turn uses the uniform generator **V113 RANMAR** underneath. The code is portable, but the results are not guaranteed to be identical on all platforms as explained

in **V120 RNORML**.

Subprograms **V115 RANLUX**, **V116 RM48**, **V120 RNORML** and **V122 CORSET** replace older subprograms for the generation of random numbers, which thus become obsolete. For details see Section 6.12.

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## 6.11 Obsolete Subprograms

*K.S. Kölbig and J. Shiers CN/ASD*

The following packages are declared obsolete and scheduled for eventual deletion:

Code	Package	Library	Last Revision	Notes
C333	CLOGAM	MATHLIB	1993	Use C306 CLGAMA
E401	ECTRAD	MATHLIB	1976	Use E408 RCHPWS
E410	CPSC	MATHLIB	1974	Obsolete. Use, e.g., <i>Mathematica</i>
H100	SIMPLE	MATHLIB	1972	Use H101 RSMPLEX
H300	ASSIGN	MATHLIB	1978	Use H301 ASSNDX

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## 6.12 Obsolete Random Number Generators

*F. James and J. Shiers CN/ASD*

The following random number generator packages are declared obsolete and scheduled for eventual deletion:

Code	Package	Library	Last Revision	Notes
G900	RANF	KERNLIB	1985	Use V113 RANMAR or V114 RANECU or V115 RANLUX
G901	RAN2VS	KERNLIB	1985	Use V130 RAN3D
V100	RANNOR	KERNLIB	1978	Use V120 RNORML
V101	NORRAN	MATHLIB	1988	Use V120 RNORML
V102	NORMCO	MATHLIB	1979	Use V122 CORSET
V104	RNDM	KERNLIB	1978	Use V113 RANMAR or V114 RANECU or V115 RANLUX
V105	NRAN	MATHLIB	1976	Use V113 RANMAR or V114 RANECU or V115 RANLUX
V106	RN32	MATHLIB	1986	Use V113 RANMAR or V114 RANECU or V115 RANLUX
V107	RNDM2	MATHLIB	1978	Use V113 RANMAR or V114 RANECU or V115 RANLUX
V108	RG32	MATHLIB	1978	Use V120 RNORML

Note that:

1. The corresponding short write-ups will be marked OBSOLETE and kept in the Program Library Manual until further notice.
2. The following *additional* entries are affected:

G900	RANF	DRANF , RANGET , RANSET	V105	NRAN	NRANIN , NRANUT
G901	RAN2VS	RAN3VS , VRAN2S , VRAN3S	V106	RN32	RN32IN , RN32OT
V101	NORRAN	NORRIN , NORRUT	V107	RNDM2	IRNDM2 , RD2IN , RD2OUT
V104	RNDM	IRNDM , RDMIN , RDMOUT	V108	RG32	RG32IN , RG32OT

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## 6.13 Deletion of Subprograms

*K.S. Kölbig and J. Shiers CN/ASD*

The packages below were declared obsolete and are finally deleted from the source and binary with this revision.

Code	Package	Library	Declared obsolete	Notes
B400	POWEZE	KERNLIB	CNL 194	Use inline code
C203	NZEROS	MATHLIB	CNL 207	Use C210 NZERFZ
C204	MULLER	KERNLIB	CNL 207	Use C202 RMULLZ
C206	POLY2	MATHLIB	CNL 207	Use C209 CPOLYZ
C308	ELLICK	KERNLIB	CNL 207	Use C347 RELI1C
C314	THETA1	MATHLIB	CNL 207	Use C349 RTHETA
C317	ADIGAM	MATHLIB	CNL 207	Use C316 RPSIPG
C319	ELIN1	MATHLIB	CNL 207	Use C346 RELI1
C333	CLOGAM	MATHLIB	CNL 215	Use C306 CLGAMA
C341	ALOGAM	KERNLIB	CNL 207	System-supplied or Use C304 ALGAMA
D106	GQUAD	KERNLIB	CNL 207	Use D107 RGQUAD
D600	FRED1	MATHLIB	CNL 207	Use D601 RFRDH1
E201	CUR2FT	PGMLIB	CNL 201	Obsolete
E202	LSQFIT	PGMLIB	CNL 201	Obsolete
E204	PSI1	PGMLIB	CNL 201	Obsolete
E206	TRICOF	GENLIB	CNL 201	Use D700 RFT
E209	SPLIN3	GENLIB	CNL 198	Use E211 RCSPLM
F100	MATIN1	KERNLIB	CNL 194	Use F010 RINV
F104	SYMINV	GENLIB	CNL 191	Use F010 RINV
F107	SMXINV	KERNLIB	CNL 194	Use F012 RSINV
F108	MUXMAC	GENLIB	CNL 191	Use F004 RMMLT
F109	MXEQU	KERNLIB	CNL 194	Use F010 RINV
F110	MXPACK	KERNLIB	CNL 194	Use F003, F004, F010, F011, F012
F119	DIST	GENLIB	CNL 191	Use inline code
F120	DIRCOS	GENLIB	CNL 204	Obsolete
F124	CXJOIN	GENLIB	CNL 191	Obsolete
J510	GD3	PACKLIB	CNL 196	Obsolete
J512	MGD3	PACKLIB	CNL 196	Obsolete
K402	WEOR	KERNLIB	CNL 204	Obsolete
K510	RETRNF	KERNLIB	CNL 204	Obsolete
K511	DETACH	KERNLIB	CNL 204	Obsolete
L220	BCPL	None	CNL 193	Obsolete
L301	CPSPY	None	CNL 201	Obsolete
L420	PATHIS	PGMLIB	CNL 204	Obsolete
L710	DOUBLE	COMPL. PROG.	CNL 191	Obsolete
M106	SORTX	KERNLIB	CNL 194	Use M107 SORTR
M219	CVT360	KERNLIB	CNL 204	Obsolete
M224	SETFMT	KERNLIB	CNL 204	Obsolete
M251	UFLINT	KERNLIB	CNL 204	Obsolete
M415	UHOLLR	KERNLIB	CNL 204	Obsolete
M416	UBLOW1	KERNLIB	CNL 204	Use M422 PKBYT
M425	LXBITS	KERNLIB	CNL 204	Obsolete
M430	FT0360	KERNLIB	CNL 204	Obsolete
M440	FIO999	KERNLIB	CNL 204	Obsolete
M435	CHMOVE	GENLIB	CNL 204	Obsolete
M504	GETSST	GENLIB	CNL 204	Use M432 CHPACK
M505	LOCHAR	GENLIB	CNL 204	Use M432 CHPACK
N106	TRACEQR	KERNLIB	CNL 204	Obsolete
N202	DUMRZL	KERNLIB	CNL 204	Obsolete
Q800	FLODIA	COMPL. PROG.	CNL 191	Obsolete
Q900	TIDY	COMPL. PROG.	CNL 191	Obsolete
R200	LISP	None	CNL 191	Obsolete
X602	PRIPAR	GENLIB	CNL 204	Obsolete
Z033	LINEPG	KERNLIB	CNL 204	Obsolete
Z038	REPINIT	KERNLIB	CNL 204	Obsolete
Z039	REPFL	KERNLIB	CNL 204	Obsolete
Z200	XBAS	KERNLIB	CNL 204	Obsolete
Z202	IXFPZL	KERNLIB	CNL 204	Obsolete
Z260	EQUBUF	KERNLIB	CNL 204	Obsolete
Z261	KFILE	KERNLIB	CNL 204	Obsolete