

University of Queensland

PRENTICE COMPUTER CENTRE

MINI/MICRO NEWSLETTER

## CONTENTS

- 1.0 WORDS FROM THE GURUS
- 2.0 COMPUTING DEVELOPMENTS IN THE UNIVERSITY
- 3.0 HANDS OFF EQUIPMENT UNDER ACCEPTANCE TEST OR CONTRACT MAINTENANCE
- 4.0 PDP11 USERS GROUP NEWS
  - 4.1 Inaugural Meeting Report
  - 4.2 Next Meeting - Network Discussion
- 5.0 REQUEST FOR CO-ORDINATION - TELL US NOT DEA
- 6.0 PDP11 SOFTWARE NEWS
  - 6.1 Distribution of RSX11MV3.1
  - 6.2 Documentation Now Available for PDP11s
  - 6.3 Software Developments for RSX11M
  - 6.4 New TECO Tutorial Manual
  - 6.5 UNIX
  - 6.6 MACY11 and LNKX11
  - 6.7 RT11 Version 3B
  - 6.8 An Effective Way of "Scratching" a Disk
- 7.0 WHAT IS PASCAL?
  - 7.1 Why PASCAL?
  - 7.2 PDP11 Implementation of PASCAL
  - 7.3 'BSM' Compiler for RSX-11/IAS and RSTS/E
  - 7.4 OMSI PASCAL-1 for RSTS/E and RT11
  - 7.5 UCSD PASCAL for RSTS/E
  - 7.6 Karlsruhe University Compiler for DOS/BATCH
  - 7.7 Swedish Compiler
  - 7.8 For Further Information
- 8.0 U.S. DEPT. DEFENCE ADOPTS PDP11-ARCHITECTURE
- 9.0 RLO1 DISK SYSTEMS
  - 9.1 Configuration
  - 9.2 RLO1 Environment
  - 9.3 Performance
- 10.0 CHARGE RATES
  - 10.1 Installation
  - 10.2 Hardware Maintenance
  - 10.3 Terminal Maintenance Charges
  - 10.4 Software Supplied by Digital Equipment Corporation
  - 10.5 General Hardware Software and Applications Programming Support
- 11.0 COMPUTERS IN RESEARCH - A MICROPROCESSOR APPLICATION



3/78  
28Jun78

3. oversight of the installation and acceptance testing of equipment
4. distribution and maintenance of software
5. user training
6. design and development of special purpose interfaces controllers etc
7. a hardware maintenance service on PDP11/03 and PDP11/34 equipment or special equipment developed by the Centre
8. development of application programs to user requirements
9. the provision of network software.

I believe it would be true to say that the significant progress that has been achieved to date has resulted from a real spirit of co-operation that has existed between the staff of the Centre and departmental staff. It would also be appropriate for me to state here my thanks to the staff of the Computer Centre involved in tooling up to provide these new services.

As you know the Prentice Computer Centre must balance its budget by receiving revenue for services provided. It would not be correct for the costs of supporting departmental mini-computers to be met by PDP10 users. The work associated with the purchase and installation of computing equipment and the distribution and maintenance of standard systems software is provided as a non-charged service to departments. It is necessary however to levy charges for specific services such as hardware maintenance and these are summarised elsewhere in this newsletter.

A further ingredient to success is the involvement of users with each other and with the Centre. I am personally very pleased that the User Group has now been established under the capable chairmanship of Bob Owen. A vibrant user group will go a long way to ensure that ideas are circulated, that wheels are not reinvented yet again, that problem areas and solutions found by some are known by all and that there is a consensus on matters impacting on future policies.

It would be fair to say that we do have some resource constraints and it is not always possible for the Centre to respond as quickly as some of our users would like. Nevertheless, much can be achieved by mutual respect and co-operation. What I can say is that I and the staff of the Centre will do all that we can to meet our responsibilities to assist departments in the effective application of the new computing resources now available.

Alan Coulter                      Director  
(extension 2189)

3/78  
28Jun78

## 1.0 WORDS FROM THE GURUS

Program testing can be used to show the presence of bugs, but never to show their absence!

E.W. Dijkstra

In retrospect we must rate FORTRAN as a successful coding technique, but with very few effective aids to conception, aids which are now so urgently needed that time has come to consider it out of date. The sooner we can forget that FORTRAN ever existed, the better, for as a vehicle of thought it is no longer adequate; it wastes our brainpower and it is too risky and therefore too expensive to use.

E.W. Dijkstra in 'The Humble Programmer' CACM October 1972

## 2.0 COMPUTING DEVELOPMENTS IN THE UNIVERSITY

When I first came to the Computer Centre in late 1972 I, in common with many of my colleagues, was concerned that there was a total reliance for computing on the central computing resource and that mini-computers were not greatly in evidence. The first positive and vital step came in 1973 when it was recognised that equipment funds should be separately included in the 1976-78 triennium submission for departmental computing equipment. Such funds were first able to be distributed by the Computing Policy Committee in 1977. They were added to from other funds available to departments and in late 1977 a number of departments ordered PDP11/34 and PDP11/03 mini-computers covering a wide range of disciplines within the University. At the same time a start was made on the replacement and enhancement of the central PDP1055 system and the new PDP1090 system was operational in April 1978. At the lower end of the computing equipment scale microprocessors are becoming more widely used for specific tasks in a number of areas within the University.

At least therefore we do have a much improved capacity and range of computing resource within the University. The challenge will be to use the equipment appropriately and demonstrate to those who are responsible within the University that the investment in computing equipment has provided worthwhile gains in teaching and research.

The Prentice Computer Centre as the computing support unit of the University of Queensland and Griffith University has a responsibility to provide services and assistance to departments so that they may move ahead with their applications without a great deal of technical or administrative inertia. Such services include:

1. initial consultation on the appropriate equipment configurations
2. the ordering of equipment (where possible by collective purchase under contract)

### 3.0 HANDS OFF EQUIPMENT UNDER ACCEPTANCE TEST OR CONTRACT MAINTENANCE

I guess it is fairly obvious that any interference with the equipment during acceptance tests could make it very difficult for us to force the supplier to meet the obligations of the contract.

If you have a maintenance contract with us then I hope you will agree that it is not profitable to try to fix the system yourself. Our maintenance charges are very low and include no allowance for user education on trying to fix faults. When you wish to connect user supplied equipment to the system please obtain our advice first. It is probably worth paying us for a couple of hours of work to connect the equipment.

The following conditions therefore apply:

- (a) when a department has authorised the Centre to conduct acceptance tests on their behalf only approved Computer Centre staff and DEA staff members are permitted access to the system until a partial or full acceptance certificate has been issued (excepting of course situations of emergency).
- (b) where a system is covered by a Computer Centre Maintenance Contract any interference with the hardware or the connection of devices to the system by the user is at the user's risk and expense.

### 4.0 PDP11 USERS GROUP NEWS

#### 4.1 Inaugural Meeting Report

The Inaugural Meeting of the PDP-11 Users Group was held on 16th May with 17 representatives from various departments attending.

The meeting adopted the constitution circulated in the Mini/Micro Newsletter No. 2 (April) and elected the following people to its executive.

Chairman:	Bob Owen (Pharmacy) extension 2352
Secretary:	Al Henderson (Computer Science) extension 3003
Committee Members:	George Cooper (Physics) John Fairbairn (Griffith University) Geoff Smith (Social & Prev. Medicine) Arthur Hartwig (Prentice Computer Centre) Col Lythall (Prentice Computer Centre)

In the discussion which followed, it was decided to investigate affiliation with DECUS and to hold regular meetings with talks on subjects of interest to members.

3/78  
28Jun78

#### 4.2 Next Meeting - Network Discussion

The next public meeting of the PDP11 User Group will be on Tuesday July 11 at 2.00pm in room 2.14 of the Hawken Building. The meeting will discuss with representatives of the Computer Centre the Network Development proposal published by the Computer Centre in Newsletter 229 dated 20 May. All those interested in the University network or the connection of mini-computers to the central computer are invited to attend.

Following the network discussion opportunity will be given for departments to report on the progress of installation of their PDP11s and any problems encountered.

#### 5.0 REQUEST FOR CO-ORDINATION - TELL US NOT DEA

Many PDP-11 users may not be aware that, as part of the agreement to purchase the PDP-10, Digital Equipment provided the University with a special licence for a wide range of PDP-11 software.

In effect the Prentice Computer Centre has one single supported licence which allows it to distribute the software to any department with a PDP-11.

The basis of this special agreement is that the Prentice Computer Centre will provide software support for PDP-11's at the University and co-ordinate all queries from the University to DEA, hopefully resolving many of the problems before they reach DEA. Indeed special communication arrangements have been set up between the appropriate Centre and DEA staff to ensure that all problems are resolved in the minimum time.

PDP-11 users are asked to assist us to honour our side of this agreement by directing all queries on PDP-11's to the Centre; Col Lythall for hardware and Arthur Hartwig or Bryan Claire for software.

#### 6.0 PDP11 SOFTWARE NEWS

##### 6.1 Distribution Of RSX11MV3.1

The distribution of the RSX11MV3.1 operating system is slowly progressing. There are now five (5) departments with systems installed. These include Commerce (Batch Station), Electrical Engineering, Clinical Sciences (Royal Brisbane Hospital), Physics, Chemistry.

Electrical Engineering have RSX running on a PDP11/40 with 80K words of memory, a RK05F/J disk set, floppy disk drives and three terminals. Their students have access to it and lack of disk space already shows the need for a close look at system procedures and restrictions in cases where large numbers of users are using limited resources. As far as distribution to other University departments is concerned, it has been decided to distribute a "standard system" which

3/78  
28Jun78

seems sufficiently applicable to most installations for the initial purpose of "getting to know the system". After a brief teething period, arrangements can be made with the Computer Centre to have a tailored system generated. This standard system should happily support two users in 32K word memory systems doing any type of data entry, program preparation, compiling or task building (linking), although compiling and linking is best done by one person at a time. Program size can be up to 16K words.

This system has with it the following compilers

MACRO-11 (Assembler)  
FORTRAN-IV (V1C)  
BASIC-11 (V2)

This system also has the following utilities:

PIP - Peripheral Interchange Program  
EDI - RSX Line Editor  
EDT - New DEC Editor  
TECO - Text Editor and Corrector  
LBR - for generating object module libraries or macro definition libraries  
FLX - for interchange between RSX (Files -11) DOS-RSTS/E or RT11 file structured devices  
RNO - Runoff-report generation  
CMP - comparison of two ASCII files

plus a few other system maintenance utilities.

## 6.2 Documentation Now Available For PDP11s

Some PDP11 documentation is now available from the Centre. Items may be purchased by completing the attached form (at the back of this Newsletter) and sending it to the Administrative Officer of the Centre.

Manuals will also be on sale at the Hawken Building batch station. Other PDP11 documentation will be made available if there is sufficient demand.

## 6.3 Software Developments For RSX11M

Another accounting package has been acquired from KMS Fusion Inc. of Michigan U.S.A. to operate under RSX11M V3.1. It consists of a number of patches to the distributed software and although we have not as yet had a chance to implement the package, the accompanying documentation suggests a number of nice features including the keeping of stats on a user's processor time and disk usage and a method of setting a maximum limit on a user's disk block allocation. This may prove invaluable in situations where disk space is at a premium in large (many) multi user installations.

Bryan Claire ext. 3938

#### 6.4 New TECO Tutorial Manual

A TECO tutorial manual written by Dr. Steve Algie of the Mining and Metallurgy department is now on sale from the Prentice Computer Centre for \$2. It is identified as MNT-16. It could be of particular interest to PDP11 users since TECO is the only known editor with a set of commands common to the DEC10 version and the PDP11 versions which run under RSX11M, RT11 and RSTS.

#### 6.5 UNIX

The UNIX Operating System developed by the Bell Telephone Laboratory for PDP-11s is widely used throughout a number of Universities in Europe, America and Australia. The Prentice Computer Centre has acquired a licence for this software.

The Department of Computer Science is currently running an experimental UNIX system on their PDP11/34 system.

Other PDP11/34 users interested in seeing a demonstration of UNIX may care to contact Dick Kelly of the Department of Computer Science.

#### 6.6 MACY11 And LNKX11

MACY11 and LNKX11 are now available on the DEC1090. MACY11 produces relocatable object code compatible with that produced by MACRO-11. LNKX11 produces absolute format programs from object modules produced by MACY11 and MACRO-11 (with some restrictions). Further details may be obtained by printing the files MXI:MACY11.HLP and MXI:LNKX11.HLP.

#### 6.7 RT11 Version 3B

RT11 version 3B has been released. It supports the new RL01 disks (described elsewhere) and RK07 disks as well as previously supported peripherals. Two new utilities are supported: FORMAT to format RK05 disks on any unit and RESORC which displays "useful" information about monitor status, devices, terminals and system configuration. Some problems in V3 monitors have been corrected. There have been some utility enhancements: DUP transfers data more quickly. DIR has a /V option to print volume identification and owner name; use command "DIRECTORY/VOLUMEID".

SYSGEN'd V3B monitors will be available from the Centre in early July. Contact Arthur Hartwig (extension 3021) to arrange this. Support for RT-11 V3 will cease at the end of August.

## 6.8 An Effective Way Of "Scratching" A Disk

The latest release of RSX11M (V3.1) includes an option for writing a "crash dump" file when the system discovers an irrecoverable error. If the system types on the console a message of the form "Please mount scratch disk in DK0 then continue" then halts, it is about to write a crash dump and is waiting for the user to mount a scratch disk in the designated drive before writing the dump. It is important to note that the crash dump is written in a non-file structured fashion and will overwrite bootstrap, and directory information. If you don't want the dump just re-boot the system otherwise be careful what disk is in the designated drive for any files on that disk will be irretrievably lost.

There is a crash dump analysis utility (CDA) which reads the crash dump and reports what was happening in the system at the time of the crash. This information is sometimes helpful in isolating problems which cause the system to crash.

## 7.0 WHAT IS PASCAL?

PASCAL is a procedure oriented high level programming language designed by N. Wirth of ETH Zurich (an educational establishment) in the late 1960's.

Educators are showing interest in PASCAL because it allows them to teach programming concepts without becoming entangled in language details. Some of the attractions are:

- clean but strict syntax which allows clear self documenting statements.
- variables are predefined before they are used
- variable names may be any length
- data types include integer, real, Boolean and character
- statements are not restricted to one line or one-per-line
- data structures (array, record, set, file) may be combined and nested
- block structure and if-then-else encourages the application of structured programming ideas

A sample of PASCAL program is shown below.

```
while not EOM do
begin
  NSTAR := 0;
  for I:=1 to 4 do
    if input^ = '*' then
      begin NSTAR := NSTAR+1; get(input) end;
  if NSTAR = 4 then EOM := true
  else
    begin for I:=1 to NSTAR do write('*');
      while not eoln(input) do
        begin read(C); write(C) end;
      writeln;
    end;
  readln;
end;
```

## 7.1 Why PASCAL?

PASCAL proponents will typically cite the following reasons why existing languages are inadequate for their teaching requirements:

PL/1: "Too complex"  
COBOL: "Inconvenient and too much overhead for teaching general concepts"  
FORTRAN: "outdated and full of idiosyncrasies"  
BASIC: "Too simple and lacking in expressive power"  
CORAL: "What?"

For people just jumping on the PASCAL bandwagon: the BASIC extensions of BASIC-PLUS may be enlightening. It offers many of the PASCAL features mentioned above and in EPG we know its proven effectiveness in a teaching environment. However, there is a lot of emotion surrounding PASCAL and its number of followers increase daily. There is a world-wide PASCAL Users Group (PUG) and a very active PASCAL SIG in DECUS.

## 7.2 PDP-11 Implementation Of PASCAL

Officially DIGITAL is keeping a "watchful eye" on PASCAL developments. We are also watching closely other developments in high level structured languages, such as the forthcoming language specification for the US Department of Defense.

However, DIGITAL does liaise closely with the PASCAL SIG and is aware of several PDP-11 PASCAL implementations. The most widely known compilers are listed below. In addition there are several university implementations which circulate on an informal basis (Colorado & Edinburgh are examples).

## 7.3 "BSM" Compiler For RSX-11/IAS And RSTS/E

This "Block Structured Macro" compiler was originally developed under DOS-11 by Brian Lucas at the National Bureau of Standards. The DECUS PASCAL SIG under the direction of John Barr has been active in implementing and debugging it under other operating systems. An RSX-11M version was widely circulated at Spring & Fall DECUS Sessions in 1977. It is a two pass compiler implementing most standard PASCAL features. It needs approximately 20K words of RSX task space. When the RSTS/E version is completed (around April) it will be submitted to DECUS.

Environment: PDP-11/34 and higher (needs EIS).  
RSX-11M, RSX-11D, IAS and RSTS/E

Availability: Prior to DECUS release contact:  
John R. Barr  
377/C209  
Hughes Aircraft Company

3/78  
28Jun78

Box 92919  
Los Angeles, California 90009  
Phone (213) 648-8295 (Wednesdays only)

Price: Send 500' magnetic tape. No cost.

#### 7.4 OMSI PASCAL-1 For RSTS/E And RT11

This compiler is a descendant of the Electro Scientific Industries RT-11 version (see reference 2). It is intended for users who need a powerful fast version of standard PASCAL and gives full access to RSTS/E system facilities. It is not suitable for naive users since it demands a reasonable level of sophistication and knowledge of linking and loading procedures.

Environment: RT11 on 16K 11/03 or higher  
RSTS/E V6A with OMSI-RT; or RSTS/E V6B

Available from: OREGON Minicomputer Software, Inc.  
2340 S.W. Canyon Road  
Portland, Oregon 97201  
(503) 226-7760  
and distributors in Canada, Australia, UK,  
Germany, Switzerland and Israel.

Price: \$1500 for first operating system or  
\$995 for non-profit organisation

#### 7.5 UCSD PASCAL For RSTS/E

A RSTS/E adaption of a UCSD PDP-11 stand-alone version. This compiler is designed for teachers interested in the "PSI approach" to CAI. It is more suitable for novices than OMSI PASCAL-1.

Availability: after mid 1978 from:  
OREGON Minicomputer Software (see above)

Price: To be determined.

#### 7.6 Karlsruhe University Compiler For DOS/BATCH

This compiler was developed on a PDP-11/45 and is described in the Proceedings of DECUS, Europe, September 1974.

Environment: DOS/BATCH V09

Availability: DECUS 11-246

### 7.7 Swedish Compiler

This is a DEC-10 cross-compiler developed by Seved Tor-Stendahl of L.M. Ericsson. It generates code for PDP-11/34 and higher. EIS, FIS and FPP are switch selectable.

Environment: RSX-11M

Availability: To be submitted to DECUS. Until then contact DECUS PASCAL SIG. Address as above for "BSM" compiler.

Note: DIGITAL accepts no responsibility for the accuracy of the above information, nor can it attest as to the suitability of these compilers for a specific configuration or application requirement. The information is supplied solely to assist you in locating PDP-11 implementation of PASCAL.

### 7.8 For Further Information

Please contact the Computer Centre (Arthur Hartwig or Bryan Claire) for further information.

The Computer Centre has copies of both the "BSM" and "Swedish" compilers and is investigating obtaining the OMSI compiler. As yet we do not have a suitable means of distributing these compilers but when we do they will be available to departments on request.

### 8.0 US DEPT. DEFENCE ADOPTS PDP11-ARCHITECTURE

Arthur Sale (Professor of Computing Science, University of Tasmania) has a comment of interest.

"You may have missed one of the most important announcements of the last year from the USA. In the detailed information reaching us, the US Department of Defence have now adopted a uniform standard computer architecture for all future MIL-SPEC computers. It turns out that the PDP-11 architecture was chosen, with a few modifications, mostly to the addressing capability. The implications are very important: because the Department won't tolerate monopolies, the PDP-11 architecture will be manufactured by several suppliers; therefore there will be intense competition and volume production; therefore there will be a civilian spin-off.

So don't be surprised if in a few years time you find PDP-11 architectures all over the place in the areas we now call the mini- and micro-markets. I only hope we manage to keep some variety alive; perhaps by then we will be able to get a 370-on-a-chip to provide some competition?"

## 9.0 RL01 DISK SYSTEMS

Listed below is a summary of RL01 disk drive specifications (courtesy of DEA).

1. RL11 is now supported by RSX11-M 3.1 and RT11 V3B.
2. The disk cartridge is type number RL01K-DC, cost \$170.00 approx.

### 9.1 Configuration:

1. Disks are top loading
2. The controller mounting space requirement is a single HEX slot.
3. The controller consumes 5A max at 5V, 0.5A max at +15V, and 0.5A Max at -15V.
4. Bus LOADS drawn is one.
5. Requires min of 16K to run diagnostics.
6. Bootstrap is via MR11-EA (M9312).
7. Max Subsystem cable length 30.5 m.
8. Max drives per controller, 4.
9. RL11 will operate on all UNIBUS PDP11's.

### 9.2 RL01 Environment

1. The drive is rack mounted with standard rack mounting and slides for ease of access.
2. AC requirements are 180V-264V at 50/60 HZ.
3. Disk current START/RUNNING 2.5A/0.85A @ 230V.
4. Heat Dissipation - 600 BTU/HR/DRIVE.
5. Operating Temperature - 10 °C to 40°C.
6. Relative Humidity - 10%-90% max, wet bulb 28°C4.
7. Max Operating Altitude - 2438M at 35.6°C.

### 9.3 Performance

1. Capacity - 5.2 Mbytes
2. Embedded Servo - no alignment cartridge required.
3. Access Time - Average Seek - 55 mSec Average Latency - 125 mSec
4. Peak Transfer Rate - 512 Kbytes/sec.
5. BPI - 3725
6. TPI - 125
7. Number of Platters - 1
8. Recording surfaces - 2

Cost is approximately \$5200 for controller and first drive and approximately \$3800 for subsequent drives.

Note that RL01s are not supported by existing bootstrap devices.

### 10.0 CHARGE RATES

The following charge rates apply to University of Queensland and Griffith University only. The services are not available to groups external to the Universities.

#### 10.1 Installation

1. Digital Equipment Corporation Packaged Systems - installation and acceptance tests of hardware and software.  
No charge
2. Digital Equipment Corporation or Centre supported add-on equipment installation.  
2% of capital cost
3. Provision of special equipment cabling etc.  
Parts at cost + 15% and labour rates\*
4. Non Centre supported equipment  
negotiable

3/78  
28 Jun 78

## 10.2 Hardware Maintenance

Equipment supplied by Digital Equipment Corporation or supported by the Centre

1. Supply of spares (Boards will not be loaned for testing)  
Cost + 15%
2. Printed circuit board (PCB) swap and repair  
15% of capital cost of PCB
3. Contract Maintenance - a complete preventive and remedial maintenance service including supply of spares for computing equipment and associated peripherals including console terminal but excluding other connected terminals.  
7.5% of capital cost of equipment
4. Engineering consulting service to provide support to departmental staff in diagnosis of faults.  
Parts at cost + 15% and labour rates\*
5. Installation of Engineering Charge Orders (ECOs)  
Parts at cost + 15% and labour rates\*
6. Non-Centre supported equipment  
negotiable

## 10.3 Terminal Maintenance Charges

1. TI723                \$240 p.a.
2. LA36                \$200 p.a.
3. Teletype 43        \$200 p.a.
4. ADM-3A             \$200 p.a.
5. VT55                \$300 p.a.
6. Diablo 1620        \$350 p.a.
7. LS120              \$400 p.a.
8. LA180              \$300 p.a.

10.4 Software Supplied By Digital Equipment Corporation

1. Generation and distribution of initial software and subsequent maintenance releases  
No charge
2. Subsequent generations of software for new hardware configurations  
Labour rates\*
3. Modifications of standard systems software to meet special requirements of users  
labour rates\* + 30%

Note that where it is necessary to supply software on media (e.g. disk pack) a charge will be made for the cost of the pack + 15%.

10.5 General Hardware Software And Applications Programming Support

The Computer Centre will endeavour to assist by way of consultation and/or design and development with any mini/micro computer problem. Our advice may be to direct you to an external group who are better set up to do the job more economically and effectively than the Centre. Any work undertaken by the Centre not covered by specific charge rates above must be the subject of a quotation by the Centre and authorisation by the department.

\* Labour Rates

1. Projects involving 25 hours or less of continuous work, or for projects not of a continuous nature  
\$12.00 per hour
2. Projects of a continuous nature greater than 25 hours  
Actual salary costs of staff involved (based on 230 day year) plus a 15% management fee.

Director extension 2189

3/78  
28 Jun 78

## 11.0 COMPUTERS IN RESEARCH - A MICROPROCESSOR APPLICATION

Allan Woodland  
Prentice Computer Centre

The Computer Science Department is currently developing, under a grant from the ARCC, a self-contained microprocessor-based word-processing system. The software associated with this project is being developed by the Computer Centre under contract to the Department.

The system is designed to produce high-quality documents with complex layouts. The textual, diagrammatic and formatting information which makes up a document are captured or edited in essentially the same order in which their effects are seen in the printing of the document. An operator needs no knowledge of formatting commands as in, for example, RUNOFF. Rather, characters are produced, and formatting and editing functions are invoked, via key strokes. The system may be used as an electric typewriter, as an intelligent computer terminal, or as a stand-alone system with its own storage.

The software which controls the various components of the system runs on a Motorola M6800 microprocessor. A keyboard with a standard ASCII key layout supplemented by approximately 40 additional keys is scanned by the software, which maps keystrokes into "characters", performs debouncing and n-key rollover, and provides accelerating automatic repetition of selected keys. The supplier uses a Diablo incremental printer which can be positioned to an accuracy of 1/120 inches horizontally and 1/48 inch vertically. It can operate at approximately 45 characters per second. The software which drives the printer supplies it with characters and positive or negative vertical and horizontal movements. Local storage is provided by two floppy-disk drives with direct-memory-access to RAM. LED displays which physically form a part of the keyboard convey various information such as horizontal and vertical position (of the Diablo), error codes and the current status (on/off) of certain modes. Communication with another system is via a standard (EIA RS232C) serial interface.

The software modules which control the above components are all interrupt driven and are written in Assembly language.

A non-interrupt task which runs in the background implements required functions and so provides the system with its intelligence. It processes a stream of characters (textual, formatting or editing) which comes from the keyboard and/or a file and translates them into appropriate characters and movements for the printer. In the case of editing, the stream (possibly modified) is passed to a new file. This part of the system is written in PL/W which is a high-level language similar to Intel's PL/II.

It is hoped that the system will gain wide acceptance principally because of its ease of use in the production of high quality documents.

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3/78  
28Jun78

PDP11 Documentation Order

Qty.	Description	Unit Price	Total Price
	PDP11 Fortran Language Ref Manual	\$14	
	IAS/R SX Fortran IV User's Guide	\$14	
	Basic 11 Language Ref Manual	\$16	
	IAS/R SX Basic User's Guide	\$16	
	RSX11M Pocket Reference Card	\$1	
	IAS/R SX Basic V2 Doc Kit	\$35	
	IAS/R SX FIV Doc Kit	\$35	
	RSX11M V3.1 Doc Kit	\$320	

Charge to Account No.:

Ordered by:

Phone number:

Department: