

# PRENTICE COMPUTER CENTRE

UNIVERSITY OF QUEENSLAND, ST. LUCIA, QUEENSLAND, AUSTRALIA. 4067.



## NEWSLETTER

N-282

27-June-83

### CONTENTS

- 1.0 Newsletter Summary.
- 2.0 Non-Conforming Use.
- 3.0 Disk Pack Backup Facilities.
- 4.0 Non-used Accounts.
- 5.0 Private Tapes.
- 6.0 New Phototypesetter.
- 7.0 Computervision CAD/CAM System.
- 8.0 LABPAK.
- 9.0 SPSS Graphics.
- 10.0 FMS — Enhanced Facilities.
- 11.0 1981 Census Data.
- 12.0 Setting Terminal Characteristics for Central Hosts.
- 13.0 FORTRAN 77.
- 14.0 Information Concerning Courses.
- 15.0 Departmental Equipment for Sale.

Authorized by the Director of the Computer Centre

## Principal Service Centres

## Extensions

Operations Manager	3471
Contract Programming & Feasibility Studies	3944
System Status Automatic Answering	3101
General Enquiries & Course Enrolments	3018
Training & Courses	3021

## CONSULTING

PROBLEM AREA	MAIL BOX	NAME AND EXTENSION
OPERATIONS AND PROGRAMMING		
Accounts	ACCOUNTS	Carol Walker 2188
Cobol	COBOL	Richard Armstrong 2963
Commands, system use and probs	COMMANDS	Ian Otto 2923
Database (VG, 1022)	DATABASE	Brett Peterson 2836
Fortran	FORTRAN	Robert Morrison 2836
Graphics	GRAPHICS	Mark Williams 2962
Micros	MICROS	Geoffrey Dengate 2835
Network	NETWORK	Bryan Claire 2960
Operations	OPERATIONS	Senior operator 3212
PDP-11 software	PDP11	Amelia Shanahan 3022
Program Library, Tapes	LIBRARY	Lee MacDonald 3943
Statistics	STATISTICS	Peter Akers 2951
		Greg Lehman 3020
Text processing, Typesetting	TEXT	Andrew Broughton 2837
Non-specific problems	OPERATIONS	Senior operator 3212

## ENGINEERING AND MAINTENANCE

Development and communications	ENGIN	Graham Rees 3288
Mini/Micro support	ENGIN	Colin Lythall 3942
		Alan Langdon 2928
Mini and terminal maintenance	MAINT	Maralyn Kenley 3938

## GRIFFITH UNIVERSITY:

Consulting	7561
Computer Services	7560

## 1. Newsletter Summary

- A warning is given that the Centre monitors usage and that non-conforming use of the Centre's facilities or abuse of equipment will not be tolerated.
- The method of back-up of files in the on-line area is described. Users with private disk packs are required to arrange back-up procedures with the Centre at cost.
- Departments are requested to cancel accounts which are not being used.
- Unless users have registered private magnetic tapes for storage at the Centre, they will be returned with normal output distribution.
- The trial set of 16 fonts on the phototypesetter will be increased to 74 fonts as from 4 July. This includes Greek, chemical and mathematical characters as well as many European languages. Courses will be conducted on using the typesetting facility. At a later stage, typesetting will also be available from the VAX11/780 using UNIX facilities operating under EUNICE.
- Information is provided on the new Computer Aided Design/Computer Aided Manufacturing (CADS/CAM) system. It will be of particular interest to those involved with repetitive drawings and complex design. Analytical procedures covering a wide range of applications can be applied to the drawing's database. The system is the most advanced of its type in Queensland and interested users are requested to obtain further information from the Centre, or better still, attend one of the training courses on the dates notified in the newsletter.
- At last LABPAK, a comprehensive package of hardware, software and documentation for data acquisition purposes, is available from the Centre. A full description is provided.
- The SPSS Graphics Package (SPSSGR) has been deleted from the system.
- The File Migration System on the KL computer has been enhanced to support offline sub-file directories and to provide a "DECIDE" switch which will display files of a nominated extension to enable users to divide archiving action they wish to be taken on the files.
- The Collection District Summary for Queensland from the 1981 Census will be available in a more accessible form using the Software House 1022 Data Base System.
- Users will, in future, be responsible for setting any special characteristics for a terminal so that the central host systems know about them. Apart from fixed characteristics which cannot be changed, the Centre will set all new terminals to the default characteristics described. Commands are available to users to alter characteristics.
- Fortran 77 is now installed on the KL10 system ("New").
- Information is provided on Prentice Computer Courses – Introduction to PDP-10, Typesetting, Text Processing (RUNOFF), Elementary Fortran, Statistical Package for Social Sciences (SPSS), Plotting and Graphics, Software House 1022 Data Base System, Elementary TECO editing.
- A notice of departmental equipment for sale is included.

Director  
extension 2189

## **2. Non-Conforming Use**

At this time of the year it is appropriate to bring to your attention that unauthorised use of the Centre's machines and facilities will not be tolerated. Those who use these systems improperly are disadvantaging other users. They are breaking the statutes of the University and in some cases may be breaking the criminal law.

Users are expressly directed not to:—

- use another users PPN, account number or UIC
- interfere with the work of other users
- access, copy, alter, or destroy files belonging to another user
- use others' programs without permission
- abuse or improperly use hardware or public software
- use your fund allocation for a purpose other than that for which it was granted
- use encryption techniques on information held on files
- knowingly overspend the fund allocations provided to you
- use strategies to avoid charging
- use the machines or facilities in any way contrary to conditions of use which may be advised from time to time by the Director, Prentice Computer Centre or your academic supervisor.

You may hear stories of how some users may have "beaten the system". It is fair to point out that we do monitor the use of the system, and that punitive action has been taken where necessary. The intention is to give specific warning that computer abuse is unacceptable to the University.

*Director  
extension 2189*

## **3. Disk Pack Backup Facilities**

The Centre provides a backup system for public structures in the form of:—

WEEKLY: A total backup of all public structures is done every Saturday morning. This backup is kept for three weeks.

DAILY: A copy of all files accessed since the previous daily backup is taken. This backup is kept for one week.

For those users who have private disk packs a backup service is provided on request from the user, at cost. It is strongly advised that private pack users avail themselves of this service, as loss of data through accident or malfunction can prove costly. The Centre will gladly advise on the appropriate backup procedures for each private pack bearing in mind both security and cost.

*Sandra Campbell  
extension 3471*

## **4. Non-used Accounts**

It would be appreciated if Departments could cancel any accounts which are not

being used. This includes any charge codes which have no corresponding Project Programmer Numbers.

Also, any charge codes which have no brought forward amount on the Prentice Computer Centre statement require cancellation or new orders submitted.

Carol Walker  
extension 2188

## 5. Private Tapes

Unregistered private tapes are, at the moment being left at the Centre for far too long. As we have a serious space problem, we will be returning all users' privately owned magnetic tapes which are not registered for permanent storage at the Centre (\$0.50 a month fee), to the users' pigeonhole each morning.

It would be appreciated if clients would help by collecting these tapes within a couple of hours of completion of processing, where possible.

If we find that this does not resolve the situation the offending tapes will be returned by internal mail.

Listed below are a number of privately owned tapes for which the Centre cannot locate owners. If you recognise one of the tapes as being yours or have information pertaining to their owners, please phone extension 3025.

I.D.	MANU TYPE
EDUDI (Nov 1981)	Scotch 2400'
TRAINER (6793)	Control Data 2400'
MCR001	Control Data 2400'
SIM (260,*)	CRC 2400'
COB BUREAU (357)	ICL 1200'
F8ZPH1 CHARLESTAPE	600'
AHM MODEL FLOWPK (2.5.80)	Memorex 600'
Hawkesbury Agricultural Computer Centre	Control Data 1200'

Carol Walker  
extension 2188

## 6. New Phototypesetter

In the Newsletter of 6th December, 1982 (N-278) it was mentioned that the Prentice Computer Centre had been chosen as the site for the University's new Compugraphic MCS8400 phototypesetting facility. This was installed in late February of this year, and after the necessary software packages had been upgraded, was formally released in early May.

When the initial system was installed only a trial set of sixteen fonts (typefaces) were available. In late April the University ordered a range of seventy-four fonts and these were delivered in late May. These have been chosen to provide phototypesetting capabilities for a wide range of disciplines. There are nineteen different typestyles for the production of straight textual material (including many European languages), a phonetic English font, an international phonetic font, a full range of Greek, chemical, and mathematical characters, and two special character fonts for display-advertising and to enhance the range of characters otherwise available.

A new version of the ITPS typesetting package, supporting the full seventy-four fonts will be released on Monday, 4th July. A technical manual describing use of

this system in full will be available for purchase from the Hawken Batch Station in late July. Until then the Batch station will have a short introductory guide to ITPS and dumps of the various fonts available for reference. Regular courses will be conducted on how to use the typesetting facility, and intending users should also enrol for an "Introduction to PDP-10" course if they are unfamiliar with using the KL-10 system. Full details of course dates and information on how to enrol are available elsewhere in this newsletter.

Now for a brief overview of how the new system works.

The MCS8400 phototypesetter is connected to the KL-10 computer system, and is driven by a special spooler. (This is the program which actually sends your file to the typesetter, and controls various problems like whose file to process first, what to do when the bromide paper runs out, etc). The spooler handles two queues - a "normal queue" and an "urgent queue". Jobs on the normal (FORMS:MCS) queue have, at worst, a daily turnaround, and cost \$1.50 for each 300 mm of bromide film, over and above the charges for computer usage. Jobs on the urgent (FORMS:URGENT) queue will be typeset and developed as quickly as possible, but will incur a loading charge of \$4.50 to cover the extra operational overheads and paper involved. This loading charge is over and above the normal costs. So a job requiring 600 mm. of bromide will cost \$3.00 if placed on the normal queue, and \$7.50 (\$4.50 + \$3.00) if placed on the urgent queue. These charges are for your output only. The charges for computer time must also be taken into account, but because of the diversity of work performed, no accurate figure can be given.

On the KL machine two 'MIC' files will be available for queueing jobs to the MCS8400. They are CG.MIC for the normal queue, and GGU.MIC for the urgent queue. To place a file on the normal queue you would give the monitor command:

```
.DO CG myfile.lst
```

To place a file on the urgent queue you would give the command:

```
.DO CGU myfile.lst
```

Users of RUNOFF should note that RUNOFF now selects the MCS8400 as the default phototypesetter when you use the /TYPESET switch. The actual value used for selecting the Compugraphics MCS8400 is /TYPESET:CG8400. This will select a default page width of six inches, and a default face of English Times. The two menu systems for text processing (TXTMEN and JRNMEN) now use the new system defaults as well.

When you are entering your .TYP file, you need to use the [\*CG8400] macro to select the MCS8400 system. This macro will select a column width of 36 picas, a default point size of 10 point text on 12 point leading, and a default face of English Times. The medium, italics, and bold faces in the English Times series have the font access numbers of 100, 101, and 102 respectively. A full list of available type-faces will be printed in the Computer Centre technical manual, and a list will be available at the Hawken Batch Station for reference purposes.

At a later stage it will also be possible to have files typeset using the UNIX TROFF, EQN, TBL, and PIC package from the VAX system. This software was installed on the VAX by Mr. Rick Stevenson (formerly of the Computer Science Department); but it still requires some testing as well as the preparation of suitable documentation. Part of this project is the development of an automatic queueing mechanism of typeset output from the VAX to the MCS8400. When released the EQN program will allow users to typeset mathematical equations quite simply, and the PIC program will allow for the typesetting of simple diagrams. Full details about the UNIX typesetting package (which will run under EUNICE on the VAX) will be given in a future newsletter. If you are interested in more details in the interim you should contact Greg Lehmann (X3020).

Should you have any enquiries about the use of the system please contact either myself or Barry Maher (X3021).

Andrew Broughton  
extension 2837

## 7. Computervision CAD/CAM System

The Centre now has available for general use a monochrome workstation connected to a ComputerVision CAD/CAM system.

CAD/CAM (Computer Aided Design/Computer Aided Manufacture) provides a user with an integrated set of computer aids throughout the entire production cycle, from initial drawing, through detailed design, to final manufacture. A powerful interactive graphics facility allows the user to create a model of a required object, in 2 or 3 dimensions, as necessary. Drawings of this model can be annotated with text, dimensions, additional geometry, to produce final presentations of high quality. Standard components and shapes can be created as library parts to speed production of repetitive drawings.

Initial drafting of the object creates a model database, available to any subsequent operations. For example, later revisions of a drawing become straightforward updates of the existing database. The process is fast and efficient compared with the manual alternative. A variety of analytical procedures can be applied to the model database, depending on the specific application involved e.g. printed circuit board design, numerical control, finite element modelling, plant design, mapping. Finally the system can produce output directly relevant to the application e.g. Plot files for PCB artwork, control tapes for NC tools, materials lists etc.

CAD/CAM is capable of achieving dramatic increases in productivity in areas where it is possible to automate manual procedures, and exploit a common database to reduce redundant operations and improve communications between processes in the production sequence.

The system has a rich command set allowing great flexibility in use. The catch is, of course, that it takes a while to learn, and should be used fairly regularly to maintain familiarity. Some user applications, particularly once-only drawings, may be uneconomic for this reason, regardless of the very impressive level of presentation available from the system. The Centre runs 4 day courses covering basic 2D and 3D modelling, text manipulation, dimensioning etc. to allow effective presentation of drawings. A tentative schedule for the remainder of the year is:

July 12 – 15  
August 30 – September 2  
November 1 – 4  
December 6 – 9

Where possible courses have been arranged in semester breaks. Further courses, covering more advanced aspects of the graphics package itself, and specialist applications, will be arranged when appropriate.

Output from the system is currently via the Calcomp 936 plotter. An interface to the Compugraphics 8400 phototypesetter is under development, to allow photoplotting of artwork for small PCBs, illustrations for publication etc. For applications requiring higher quality output, arrangements can be made with photoplotting and pen plotting services outside the University. Additionally, each workstation has a dot matrix printer for small hardcopy dumps of screen graphics. This proves useful during drawing development.

Charges for use of the public workstation are \$20 per hour (internal rate).

Plotting on the KL will involve some additional charge, at appropriate KL rates. Some limited contract service will also be available from the centre, particularly in the area of PCB design.

For suitable applications CAD/CAM can provide tremendous savings in cost and time. If you think it can benefit you, call me on ext 2924 and have a talk, or better still, have a demonstration. A warning, though, I'm beginning to think its addictive.

John Currie  
extension 2924

## **8. LABPAK**

The following article gives a description of a package developed at the Prentice Computer Centre for data acquisition purposes.

The system which includes all hardware, software and documentation is priced at \$7500. The hardware includes an ADM-5 terminal fitted with a Retrographics board for graphics display.

For further information please contact Colin Lythall on extension 3942. Some systems are available for demonstration purposes or immediate purchase.

### **LABPAK: A PACKAGE FOR LABORATORY DATA ACQUISITION AND CONTROL**

Colin Lythall  
Prentice Computer Centre  
University of Queensland

#### **Abstract**

LABPAK provides a portable, simply interfaced, and easily programmed means of acquiring data and controlling equipment in a typical laboratory situation, at minimum expense. It consists of a microprocessor system together with software packages running on a supporting host computer, the two being linked by a standard asynchronous communication line.

#### **Introduction**

Within a University environment, the requirements for data acquisition and control are often markedly different from those found in industry. Industrial applications tend to be long-term, dedicated situations, designed and installed by computer specialists. In contrast, university applications tend to be short-term and frequently reconfigured, involve competition for computer resources, and are often sited in areas remote from the computer system. The users are mostly specialists in areas other than computing, and working with restricted funding.

To provide for the needs of researchers and teaching staff, the Prentice Computer Centre has developed the LABPAK concept. LABPAK is a hardware and software package consisting of four major components:—

1. a hardware system with data collection facilities
2. a language compiler
3. a run time logging and control system
4. a graphics package

The LABPAK system is designed to be a flexible easily operated and interfaced unit which may control up to eight instruments with digital or analog input/output connections. Typical applications for LABPAK include student teaching situations or research applications such as:—



1. for control of laboratory equipment which is located some distance from a host computer, and where the practicalities of running interconnecting cables carrying low level analog signals etc, prohibit direct use of the host machine itself.
2. where a portable system is required, for example, to be used in a number of laboratories throughout a building.
3. where ease of use is necessary, as in a student experiment, or where the researcher has limited computer experience.
4. where a minicomputer is not available, LABPAK may be used over standard communication lines to a central host computer, such as a VAX 11/780.

In more detail, the basic elements are:—

1. **MPDAS:**  
Microprocessor Data Acquisition System. This is a microprocessor system which accepts multiple digital inputs (up to 16 bit parallel) and analog inputs and provides digital and analog outputs. The microprocessor system has a simple RS-232 (RS-423) serial communication link with a host computer (PDP11, VAX 11/780 or PDP10) and all data storage and analysis is done on the host computer. A terminal with graphics capabilities is used as the controlling terminal of the microprocessor system.
2. **EXDESN:** This software package enables the programming in simple English-like steps, of a LABPAK system to perform the operations required for any experiment.
3. **LABLOG:**  
The data logging program which executes on the host computer. LABLOG initially controls the loading into MPDAS of code generated by the EXDESN program. LABLOG then controls the flow of input data to be logged, and output data as requested by MPDAS.  
  
Optionally, user-written FORTRAN subroutines of arbitrary complexity can be linked into LABLOG to enable real-time analysis of data. Results of this analysis may be returned to MPDAS to provide a closed loop control system.
4. **GRAPHX:**  
A software package for displaying graphically on the controlling terminal data acquired by a LABPAK system. Facilities are available for the plotting of acquired data against time either as line graphs or bar graphs (histograms). User tailored programs can easily interface with GRAPHX to produce complex graphical representations. GRAPHX also allows users to draw interconnection diagrams on the terminal to aid operators in carrying out experimental procedures.

### **The Hardware**

The MPDAS consists of two or more circuit boards, power supplies, cabling assemblies and I/O connectors, all housed in a sturdy cabinet. The main circuit board holds a Z80 microprocessor with 48 kbytes of RAM and 16 kbytes of ROM along with two RS-232 (RS-423) ports. The RS-232 (RS-423) ports have programmable baud rates for easy connection to a variety of terminals and communication lines. One of the serial ports is used for a communication link with a host computer (for example, at U of Q, PDP 11's, VAX 11/780, or the DECsystem-10) while the other is used for connection of a terminal which becomes the console of the MPDAS system.

Also contained on the board is circuitry for parallel digital input and output together with three programmable timers whose basic rates can be programmed in units of milliseconds, seconds, or minutes. Each timer/counter has a range of 1 to 65536 counts.

The second standard board contains a high speed 12 bit resolution, 16 channel analog to digital converter (ADC), and two digital to analog converters (DAC). The ADC has programmable gains of 1, 10, 100, and 1000. The mode of operation of the ADC (i.e. SINGLE-ENDED or DIFFERENTIAL) is programmable as is the range (BIPOLAR or UNIPOLAR).

Subsequent boards can contain further analog input and output circuits or any specialized interfaces required (e.g. Voltage to Frequency converters, custom analog circuits, IEEE-488 controllers).

A multitasking operating system is implemented in the 16k bytes of ROM.

### **The Software**

Three host-resident software packages are provided to control the operation of MPDAS and the formatting and interpretation of returned information.

#### **EXDESN**

In normal operation, the user defines the functions required of the MPDAS using EXDESN (EXperiment DESigN language), a simple English like command language. The aim was to produce a language oriented to data acquisition tasks. The result is a verbose but easily understandable and readable language. It is not necessary to have any knowledge of programming languages or knowledge of microprocessor operation. EXDESN steps can be entered on any terminal connected to the host computer, not just from the MPDAS terminal.

The EXDESN program is a one pass cross-compiler generating microprocessor code, with input either directly from the user's terminal or from disk files. The grammar used for syntax checking is stored as a disk file in a special UIC, on each system, in the case of PDP-11's, or in the user's UIC on hosts such as a VAX. (It is assumed that all users of a LABPAK system using a given PDP-11 will have similar grammar requirements. However on a large host, several LABPAK systems may be used, by users with different grammar requirements or with different LABPAK configurations.) To cater for different LABPAK configurations, a system configuration file is read by EXDESN, and is stored with the grammar file. This approach allows grammars to be customised by adding special commands for a particular user if required.

At any time during the execution of EXDESN, the user may obtain on-line HELP on either the operation of EXDESN or, more usually, the syntax and usage of EXDESN commands. As the sequences are being entered, EXDESN checks the commands for syntax and for validity (as defined in a system configuration file). Generated code is stored in an ASCII file for later down-loading to the MPDAS system. At the end of the code generation process, EXDESN prompts the user for 'set-up' details, which are stored as a separate ASCII file. The set-up file is used to record text information regarding connections to be made to the MPDAS.

The next step after generating an EXDESN sequence is to execute the code on the MPDAS unit. On power up, the MPDAS unit runs a series of internal self checks and calibration tests. The inclusion of calibration self checks without user intervention was thought necessary to give users confidence in the results produced by the system.

The self calibration procedures internally switch the input of the ADC in succession to;

1. a high quality ground
2. an internal voltage reference

3. the output of a DAC as it is ramped from minimum to maximum output.

Should deviations beyond defined limits occur, warning messages are displayed to alert the user.

On successful completion of the testing phase, MPDAS prompts the user for commands. Local parameters which can be initialised on the microprocessor system include TIME, DATE, and the communication line speed. The time and date are required if the EXDESN program uses the TIME STAMP command to record timing information with the logged data, the communications speed only being required if an alteration from the default is required.

#### LABLOG

After parameters have been set, the user logs onto the host in the normal manner. At this point the MPDAS unit is in a 'transparent' mode. A program called LABLOG down-loads the EXDESN command sequence previously generated into MPDAS.

Along with the user code down-loaded is a 'standard subroutine' block. This usually consists of only a jump table pointing to routines in ROM basically corresponding to EXDESN commands, with possibly one or two short subroutines. These subroutines may be 'patches' to ROM routines (the jump table points to the new routine in RAM), or they may be the code for extensions to the standard grammar. The subroutine set is stored on the same UIC as the grammar and system configuration files.

The set-up file previously generated is also typed to enable the equipment to be correctly configured. Once the code is loaded, the user is prompted for file names for logged data and for input data (if required). Following a start command, MPDAS reinitialises itself to configure the I/O ports as requested in the command sequence, and execution commences. During execution, the operator can be prompted for data or character strings, or directed to take certain action. For example,

ENTER THE REQUIRED NUMBER OF PASSES [0-50]:

or

ADD WATER NOW TILL MARKED LEVEL REACHED.

Data or character strings entered may be transmitted to the host for logging in the log file if desired.

All results from the execution of the command sequences are stored on the host computer in disk files specified by the operator. Results are stored in sequential order along with the identification of the I/O port and channel from which it was derived. The time of acquisition of each data item may also be logged.

Several EXDESN verbs cause data interchange between MPDAS and the host. Each verb generates a different record type to define the action required of the host. A partial listing of these verbs is:-

1. SEND  
generates a data record of 1 or more data items to be logged
2. RECEIVE  
generates a request record, requesting data from an input file on the host.
3. CALCULATE  
generates a data record to be logged similar to SEND, and additionally is passed to a user supplied real time analysis routine (see below).
4. RESULT  
generates a request record (similar to RECEIVE) requesting data from a

user supplied real time analysis routine (see below).

5. **DEFINE PORT**  
generates a record containing the attributes for a particular port each time attributes of that port are varied. The record is both logged and passed to the user supplied routine.
6. **TIME STAMP**  
generates a record containing the current time of day and is both logged and passed to a user supplied routine.
7. **SEND 'message'**  
generates an ASCII message which is logged.
8. **SEND 'chars'**  
generates an ASCII message from characters typed by a user. It is logged only.

A very interesting feature of LABLOG is the ability of a user to link in a custom Fortran subroutine of arbitrary complexity to do 'real time analysis' of incoming data. As the user routine is a Fortran subroutine, the user has access to all normal Fortran operations, producing an extremely flexible and powerful system. The user routine receives via a defined subroutine interface, all information from the EX-DESN commands –

CALCULATE  
RESULT  
DEFINE PORT  
TIME STAMP

The information from these records is decoded by LABLOG and passed as parameters to the user routine. The CALCULATE and RESULT commands take a flag (1–255) as arguments. The flag is passed to the user routine to be used as a switch. Predefined subroutines are available to return ASCII messages to MPDAS, to be displayed on the controlling terminal and to alter the MPDAS error flag settings. Three levels of severity are available:–

1. Warning, displays a user message only
2. Error, displays a user message and sets the MPDAS error flag which can be tested by EXDESN commands
3. Fatal, displays a user message and aborts execution.

## GRAPHX

All data transferred to and from the MPDAS system are hexadecimal values in ASCII form. The data may be displayed graphically or converted to decimal values suitable for further analysis by the GRAPHX program.

GRAPHX is a program which generates graphical output suitable for reproduction on any Tektronix compatible video terminal or plotter. In particular GRAPHX is useful for manipulating and displaying the results of analysis of data acquired by LABPAK. Data from LABPAK may be produced from a number of devices connected to the system. As the data is transmitted from the LABPAK it has identifying characters included to indicate from which LABPAK port and channel it was acquired. GRAPHX may be used to separate data files into individual files for each input port and channel to allow further analysis of the data.

Modules are available within the GRAPHX package to perform the following functions:

1. plot the data against time
2. plot any variable against any other variable

3. superimpose plots, using perhaps data from previous runs
4. do scalar arithmetic on data acquired
5. produce histograms
6. apply various manipulation algorithms such as
  1. windowing
  2. smoothing
  3. bestfit
  4. integration
  5. differentiation
  6. Fast Fourier transforms
  7. convolution
  8. peak detection and envelope processing

As with the user supplied routine facility in LABLOG, there exists in GRAPHX the ability for a user to link in a custom Fortran routine for special processing of data. Data from files is stored in GRAPHX in two buffers, referred to as a main and an auxiliary buffer, each storing up to 2000 samples. A user routine can easily manipulate the main buffer data and return results in the auxiliary buffer. The procedure is somewhat more complex than with LABLOG, but does enable extensions to the standard package.

A problem arises with the use of an analog to digital converter configured by software, in that the configuration may be changed at any time during the course of the experiment. Attributes such as device configuration, BIPOLAR or UNIPOLAR, and the GAIN setting will affect the interpretation of logged data. To overcome this uncertainty, each time the EXDESN command

DEFINE PORT n [gain], [range], [mode]

is executed, a special attributes message is transmitted to the host for logging. This procedure allows any program reading the logged data file to apply scaling factors to correctly interpret the data. The GRAPHX program does exactly this, enabling both the correct display of data, and the writing of a decimal file containing true values.

### **State of Production**

At the time of writing, six production units have been under field test for some time. Considerable interest has also been shown by organisations. The software has been implemented in its current form on PDP 11/34s and PDP 11/23s running RSX-11M (V4 and V3.2), a VAX 11/780 under VMS (V3.2), and a KL10 running TOPS-10. Implementation on PDP 11/03s running RT-11 is in progress, but the limited memory and slow peripherals usually found on these systems is restrictive.

### **Conclusions**

The development of the LABPAK system at the University of Queensland, has produced considerable interest from many University departments. It would appear that many previously difficult problems of data acquisition or simple control can be easily solved using this approach.

The simplicity of EXDESN commands has been appreciated by 'sample' users from botanists to engineers. The method by which the grammar has been implemented allows quick alterations or extensions to the language, if necessary, to tailor it to a specific application. The ease of programming has allowed researchers with limited computer knowledge to effectively use computers as a tool in their research.

Student experiments have also increased in interest and extent because of the easy interconnection and control of laboratory equipment and subsequent output of results onto disk files for analysis and display.

### **Acknowledgements**

The author wishes to express his appreciation to John Currie and Bryan Claire for converting concepts into code, and to Alan Langdon and Martin Nicholls for undertaking the painstaking work of PCB layouts.

Colin Lythall  
extension 3942

## **9. SPSS Graphics**

The SPSS graphics package (SPSSGR), previously on PLO: is no longer available. It was deleted from the system on the 31st May, due to lack of use and the prohibitive cost of the renewal license fee.

Lee Macdonald  
extension 3943

## **10. FMS – Enhanced Facilities**

A new version of FMS, the file archival and retrieval system is now running on the KL10. This new version incorporates two major improvements over the old FMS:

- offline sub-file directories are supported;
- a /DECIDE switch has to be implemented.

### *Offline SFDs*

FMS can now process files in offline SFDs in the same manner as online SFDs. However, it is not necessary to actually create the offline SFDs. FMS will automatically create the required offline SFDs (as supplied by the command file specs.).

- (a) ARCHIVE input file spec
- (b) ARCHIVE output file spec = input file spec

If the input file spec in case (a) contains SFDs then the input file will be archived to those offline SFDs. Thus ARCHIVE THIS.FIL[10,522,A,B] will create the following offline files:

A.SFD[10,522]  
B.SFD[10,522,A]  
THIS.FIL[10,522,A,B]

Similarly in case (b) any SFDs in the output file spec will be created in the offline area as required.

An ODIRECT after the above archive would show only A.SFD since this is the only offline file in [10,522].

To show all offline files it is necessary to give FMS the command

ODIR [10,522,\*,\*]

An ODIR [10,522,A,B] will show only those offline files found in [10,522,A,B]. Full wild carding of file specs is supported.

ORENAMES, ODELETES and RETRIEVES work in a similar way, where the output file spec is made equal to the input file spec if no output file spec is sup-

plied. Once again, any required offline SFDs (and in the case of RETRIEVES, on-line SFDs) are created. (As a special bonus, and, at no extra cost, FMS will also automatically delete any empty offline SFDs that result from ORENAMES, ODELETES, and RETRIEVES!).

#### *FMS and PATH*

If you have used the PATH command to set your default path to an SFD, then FMS will use your default path as the path port of any input file spec that you supply. Thus .PATH [10,522,A,B] followed by .ODIR will show only THIS.FIL since it is the only offline file in [10,522,A,B]. To show all offline files it is necessary to give the command

.ODIR [10,522,\*,\*]

This facility applies to all FMS commands.

#### *Offline SFD nesting*

Offline files can be nested to a maximum depth of (a) four, or (b) the maximum allowed by the monitor; whichever is the least. For the UQ KL10, the monitor allows a maximum nesting of three levels.

#### *Files with .SFD extension*

FMS will not allow the user to process any .SFD file. Any required manipulation of .SFD files is performed automatically by FMS.

A wild specification which attempts to process (ORENAME, for example) a file with a .SFD extension will cause a warning message to be given to the user; that file will not be processed, but other matching files will be processed as expected.

#### */DECIDE*

A new switch /DECIDE allows the user to process individually files specified by a wild file spec.

.ARCH/DEC \*.FOR will cause FMS to display for the user each file with a .FOR extension and request an action for that file.

e.g. .ARCH/DEC \*.FOR

[10:31:29]

ARCHIV \*.FOR[10,522]=\*.FOR[10,522]/DECIDE

DSKD:WORK.FOR[10,522](Y/N/Q/G):-

A "Y" response will archive the displayed file and display the next file for action. An "N" response will not archive the file but will display the next file for action. A "Q" will cause FMS to ignore the currently displayed file and ignore any further files while a "G" will archive the current file and any further files.

It is not necessary to press the RETURN key, just Y,N,Q, or G.

Ian Burgess  
extension 2959

## **11. 1981 Census Data**

Collection District Summary information for Queensland from the 1981 Census of Population and Housing is currently undergoing transformation in order to make it easier to access subsets of the data. By the time this newsletter goes to print we expect the data to be available via 1022. More information will be published in a future newsletter. Meanwhile, anyone requiring further details may contact Geoffrey Dengate on extension 2835.

Depending on demand we may also make past census information (1976, 1971)

available under 1022. Contact Geoff or myself if this interests you.

*Allan Woodland  
extension 2921*

## **12. Setting Terminal Characteristics for Central Hosts**

The majority of terminals connected to the central systems are now connected via the MICOM Circuit Switch, however there are still some direct connections to the KL10. There are about 500 connections in total to the Centre at present and this is currently growing at a rate of 100 per annum.

The nature of the Circuit Switch and the logistics of maintaining accurate records make it impossible for us to retain the practice of setting up special line characteristics to match terminals. Therefore, all new line connections will be set at the default characteristics detailed below. However, you can change most of the important characteristics by command to suit any special terminal or application.

Existing direct connections to the KL10 with special characteristics will remain as is. New connections will be set to the defaults.

This article does not apply to network lines, only character-mode terminal lines.

### **MICOM**

The MICOM Circuit Switch accepts any combination of character length, parity etc. that is acceptable to the hosts.

The maximum terminal line speed on the MICOM is 2400 bps. Connections up to 9600 bps require special arrangement.

### **KL10**

#### **Default characteristics**

AUTOBAUD  
7 bit even parity 1 stop bit  
PAGE FILL:0 WIDTH:80 ECHO GAG

#### **Fixed characteristics**

Character format  
Receive (by KL10)  
8 bit with 8th bit = 0 or 1, or  
7 bit any parity  
Transmit (from KL10)  
7 bit even parity

Autobaud means that the line speed is not fixed initially. The KL10 expects to receive a few carriage returns first to enable calculation of the line speed.

#### **Settable characteristics**

Many characteristics can be altered by the SETTTY command. For information on this type

**.HELP SETTTY**

Further information can be obtained from the TOPS-10 Note Book 16 – INITIA or by typing .HELP INITIA.

### **VAX**

#### **Default characteristics**

AUTOBAUD  
8 bit with 8th bit 0



Fixed characteristics

The character format of 8 bits no parity cannot be changed.

Settable characteristics

For information on all alterable characteristics type

HELP SET TERM

If you have any problems please contact Bryan Claire (ext. 2960) or Arthur Hartwig (ext. 2958).

Graham Rees  
extension 3288

### 13. FORTRAN 77

A new version of the FORTRAN compiler, FORTRAN 77, has been installed on the KL and is currently available on NEW:. This version brings the KL into line with the version of FORTRAN running on the VAX. Notable changes are the inclusion of character variables and operations, the inclusion of structured programming constructs and the pre-testing of DO loops. Help is available in the file F77.HLP on the HLP: area.

Lee MacDonald  
extension 3943

### 14. Information Concerning Courses

The table below lists the courses scheduled for the period June–September (up to and including the mid-semester break).

*Please Note:* With the impending installation of a new computer system, it is very possible that the Centre will not be able to offer either the number or variety of courses on the PDP-10 system and packages which are normally conducted in the November/December period, since this time may well be needed for training and the development and presentation of courses appropriate to the new system.

While we cannot be definite about such arrangements as yet, it is recommended that those planning to attend courses in November/December should seriously consider enrolling in an earlier course.

#### **Schedule:**

##### *June*

Introduction to PDP-10	June 27-28 2 full days 9-12am + 1-4pm each day
Elementary TECO Editing	June 29 1 full day 9-12am + 1-4pm
Typesetting	June 30-July 1 2 full days 9-12am + 1-4pm each day

##### *July*

Elementary FORTRAN Programming	July 4-8 2 full days 9-12am + 1-4pm each day
SPSS (extra course)	July 11,12,15 11th & 15th 9-12am + 1-4pm 12th 9-12am only

Plotting and Graphics	July 12-14 3 half days 9-12am each day
Introduction to PDP-10	July 19-22 4 half days 9-12am each day
RUNOFF	July 25-29 5 half days 1-4pm each day

#### August

Introduction to PDP-10	August 2-5 4 half days 1-4pm each day
SPSS	August 8-12 5 half days 9am-12.30pm each day
Typesetting	August 15,16,18,19 4 half days 9-12am each day
Introduction to PDP-10	August 22-23 2 full days 9-12am + 1-4pm each day
Elementary TECO Editing	August 25 1 full day 9-12am + 1-4pm
Introduction to PDP-10	August 29-September 1 4 half days 9-12am each day
1022	August 29-September 2 5 half days 1-4pm each day
SPSS	September 5-9 5 half days 9am-12.30pm each day
RUNOFF	September 5-9 5 half days 1-4pm each day

#### Notes:

1. Users without basic knowledge and experience of the DEC-10 system, together with some facility in the use of an editor, MUST attend the course "Introduction to PDP-10" before enrolling in any other course.
2. A brief description of the content of each course was provided in Newsletter N-279.
3. All of the above courses will be held in Room G13A - Hawken Building.
4. Enrolments for all courses may be made by phoning extension 3018.

Barry Maher  
extension 3021

### 15. Departmental Equipment for Sale

2 x ADM5 in new condition. These VDUs were acquired in November 1982 but have seen little use since then. Price: \$600 each.

DSD440 Dual 8" double density disk drives. Excellent condition. \$1800 o.n.o.

Contact Admin. Officer, School of External Studies and Continuing Education, on extension 2380.