NEXT USERGROUP MEETING

Enclosed with this newsletter is the glossy describing the forthcoming "Symposium on Language Design and Programming Methodology" to be held on 10-11th of September next. As Dennis Ritchie is one of the invited speakers at the Symposium I decided to ask him if he would like to attend our meeting.

The meeting will be held on Wednesday the 12th of September and the good news is that Dennis Ritchie will be present. The next issue will contain full details. If anybody has any ideas on how this next meeting might be arranged to best take advantage of his presence without imposing on him (presumably he has heard all our potential questions before) they should let me know.

LEVEL 7

Level 7 is available from Bell. There will be two distinct licences for level 7 one for PDP11s and another for VAX 11/780s. No mention of INTERDATA versions as yet. If you're keen, and an educational user the costs are the same as per level 6, however if you're a commercial type user see Jeff Tobias' letter herein for full details. It appears that a standard level 7 system WILL NOT run on anything less than a DEC PDP 11/45, PDP 11/70 or VAX11/780 . It is not clear at this stage whether UNSW's BIG_UNIX scheme for overlaying the system will enable level 7 to operate on smaller PDP's.

DEC FORTRAN

Recently Craig McGregor of UNSW's architecture facility has spent considerable time improving and debugging the linker that came with the Princeton version of DEC's RT-11 FORTRAN compiler. The linker has overlay facilities added and has also lost some of its bugs. It supercedes "linkr" which came with the MACRO assembler from Harvard. The linker, together with the FORTRAN compiler, MACRO assembler and object librarian are available from AGSM.

See Richard Wolff's letter this issue for some 'fixes' to the compiler to eliminate some of the nastier bugs.

NEW SOFTWARE

Recently arrivals from overseas have been the latest Berkeley Distribution which includes the latest PASCAL compiler plus many other interesting programs. These include a truly unbelievable 'mail' and yet another screen editor. Also received was the latest TORONTO distribution which contains so much software that I've been daunted by it and haven't looked at it much.

VAX/UNIX

Rumour has it that Sydney University's Department of Computer Science has ordered a VAX 11/780 from DEC. Rumour goes further to suggest our favourite operating system will be running on it and brightening the lives of 900 Computer Science students in 1979. The delivery date is thought to be late September. DEC have given Sydney University a very good deal for their money. The configuration seems to be:-

2.25 Megabytes of memory
3 * 67 mb Disk drives on 2 controllers
45 ips Tape drive
Floating point accelerator
72 Asynchronous lines

NEW UNIX USERS

The University of Wellington (NZ) and the University of Western Australia have recently become UNIX licencees, bringing the number of known sites in our part of the world to sixteen. Enclosed this issue is current mailing list for the Newsletter.

CONTRIBUTIONS

As regular readers of this newsletter may be aware, my mail and what I write is not always the most entertaining stuff. The only way I can see this being altered is if you (vast UNIX user population) write something. I will publish anything (libel excepted) and often do.

Ian Johnstone
AGSM
PO Box 1
Kensington 2033
AUSTRALIA

(02) 662-3752

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J D Shortridge	CSIRO Central Information Library,and Editoral Service
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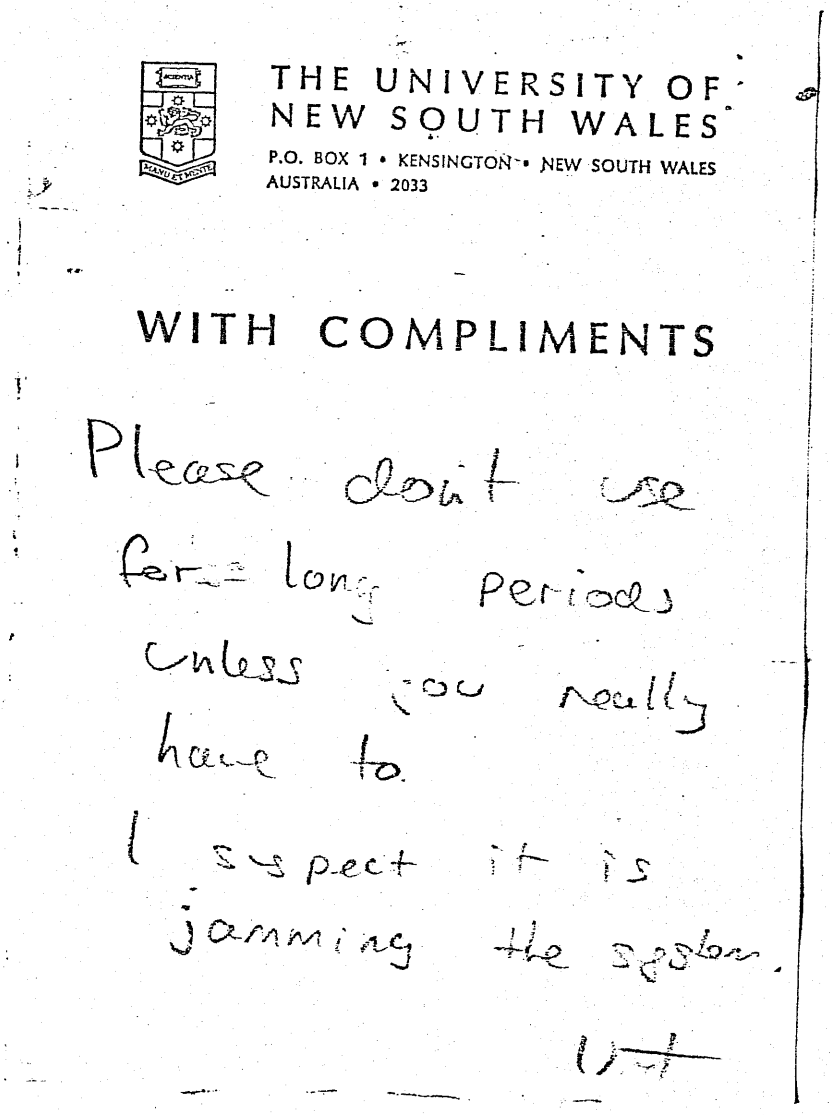
Don Richardson	Australian Atomic Energy Commission,Lucas Heights
Jeff Tobias	Australian Atomic Energy Commission,Lucas Heights
Don McNeil	Economic and Financial Studies,Macquarie University
Eddie Oliver	Economic and Financial Studies,Macquarie University
Geoff Bullen	Computer Science,NSW Institute of Technology
John Cady	Computer Science,NSW Institute of Technology
Wilma Stibbards	Computer Centre,Royal Military College,Duntroon
George Gerrity	Dept of Mathematics,Royal Military College,Duntroon
C J Barter	Department of Computer Science,University of Adelaide
Kelvin Nicolle	Department of Computer Science,University of Adelaide
Robert Elz	Computer Science,University of Melbourne
Ken McDonnel	Computer Science,University of Melbourne
Andrew Hume	AGSM,University of New South Wales
Ian Johnstone	AGSM,University of New South Wales
Craig McGregor	Architecture,University of New South Wales
Roger Miller	Architecture,University of New South Wales
Chris Doney	CSU,University of New South Wales
John Gergen	CSU,University of New South Wales
Dave Horsfall	CSU,University of New South Wales
Colin Webb	CSU,University of New South Wales
Ian Hayes	Computer Science,University of New South Wales
Peter Ivanov	Computer Science,University of New South Wales
Chris Maltby	Computer Science,University of New South Wales
Greg Rose	Computer Science,University of New South Wales
Ken Schofield	Faculty of Commerce,University of New South Wales
John Lambert	Computing Centre,University of Newcastle
David Blatt	Dept of Computer Science,University of Newcastle
Bruce Cheek	Dept of Mathematics,University of Newcastle
Ross Gaylor	Department of Psychology,University of Queensland
Robert Buckley	Dept of Computer Science,University of Queensland
Dick Kelly	Dept of Computer Science,University of Queensland
John Noad	Prentice Computer Centre,University of Queensland
Roy Giles	Basser Dept of Computer Science,University of Sydney
Wayne Harris	Basser Dept of Computer Science,University of Sydney
Ian Jackson	Basser Dept of Computer Science,University of Sydney
Bob Kummerfeld	Basser Dept of Computer Science,University of Sydney
Piers Lauder	Basser Dept of Computer Science,University of Sydney
Chris Rowles	Chemical Engineering,University of Sydney
Geoff Cole	Computing Centre,University of Sydney
Brian Rowswell	Computing Centre,University of Sydney
Arthur Watson	Computing Centre,University of Sydney
Kevin Rosolen	Electrical Engineering,University of Sydney
Terry Bead	Sample Survey Center,University of Sydney
Rob Freeth	Computer Science,University of Western Australia
Dr Tsang	Computer Science,University of Western Australia
Richard Miller	Computer Science,University of Wollongong
Juris Reinfelds	Computer Science,University of Wollongong

Somebody definitely has some interesting views about terminal usage. The following warning was discovered attached to a video terminal on this campus.



THE UNIVERSITY OF NEW SOUTH WALES

P.O. BOX 1 • KENSINGTON • NEW SOUTH WALES
AUSTRALIA • 2033

WITH COMPLIMENTS

Please don't use
for long periods
unless you really
have to.
I suspect it is
jamming the system.

(JT)

The editor is still in a state of shock.

Capt B. J. Smithie: This sketch is getting silly. Stop it at once.

TELEPHONE: 377-1111
377-3952

University of Queensland
DEPARTMENT OF COMPUTER SCIENCE
ST. LUCIA, BRISBANE, AUSTRALIA, 4067

26th March, 1979

Mr. Ian Johnston,
Australian Graduate School of Management,
University of New South Wales,
KENSINGTON, N.S.W. 2033

Dear Ian,

Just a covering note to accompany our relocatable assemblers and link loader for the Z-80, 8080 and 6800 microprocessors (we may be producing one for the 6502 shortly). I have also enclosed a copy of the specifications for the Retrographics add-in to the ADM-3A - you may recall I mentioned it at the Wollongong meeting because of the papers on plotting.

I would also appreciate copies of the following programs which were discussed at the meeting:

C-compiler for 8080
" " 6502
Table-Driven Assembler for μP
LEX
LINT
Vritges PASCAL system
Memo Macros (& new NROFF, if required)
DED
C Plot
Plot-10

Would you be so kind as to copy them on to our RK05's and return them when available?

Many thanks,

Dick Kelly

R.E. Kelly
Senior Lecturer in Computer Science

Encl.

5

DIGITAL RESEARCH & ENGINEERING [redacted] • DAVIS, CA. 95616 • (916) 756-8055
5223 Glide Drive

DRE

Gentlemen: ?

Enclosed is the information you requested on the Retro-Graphics printed circuit card for the Lear Siegler Dumb Terminal.

The Retro-Graphics card offers many features available only on high priced raster graphics terminals. These include a 512 by 250 bit map graphics memory, point plotting and automatic vector generation, non-destructive alphanumerics overlays, and selective erase of points, vectors and characters. The Retro-Graphics card may also be equipped with an option which provides for Tektronix Plot 10 software compatibility.

Single quantity export price for the Retro-Graphics card is $970. The Tektronix compatibility option may be added for an additional $50.

At this time DRE has no distributor in your area. However, you may order directly from the factory. All orders must be accompanied by an international money order in US dollars for the full purchase price.

I believe you will find Retro-Graphics to be a capable, cost-effective solution to your graphics requirements. Please let me know if I can be of any further assistance.

Sincerely,

Keith J. Sutton

Keith J. Sutton
Marketing Manager

KJS:db
Enclosures

FND-1

6

RETRO-GRAPHICS

RG-512 TECHNICAL DATA SHEET

he Retro-Graphics RG-512 PC card converts the Lear iegler ADM-3A into a high performance graphics com- iuter terminal. Its features include a Z-80A nicroprocessor, 512 by 250 plotting resolution and a ektronix software compatibility option. The RG-512 nounts conveniently underneath the ADM-3A main elec- ronic card. The retrofit requires no soldering and can be iccomplished in a matter of minutes.

JTERFACE SPECIFICATIONS

The mounting procedure requires the transfer of the socketed ADM-3A UART to the RG-512 card. Seven cable connections are then required: four 5 circuit connectors, two 12 circuit connectors and one 40 pin ribbon cable. A block diagram in Figure 1-1 shows the electrical interconnect.

HARDWARE

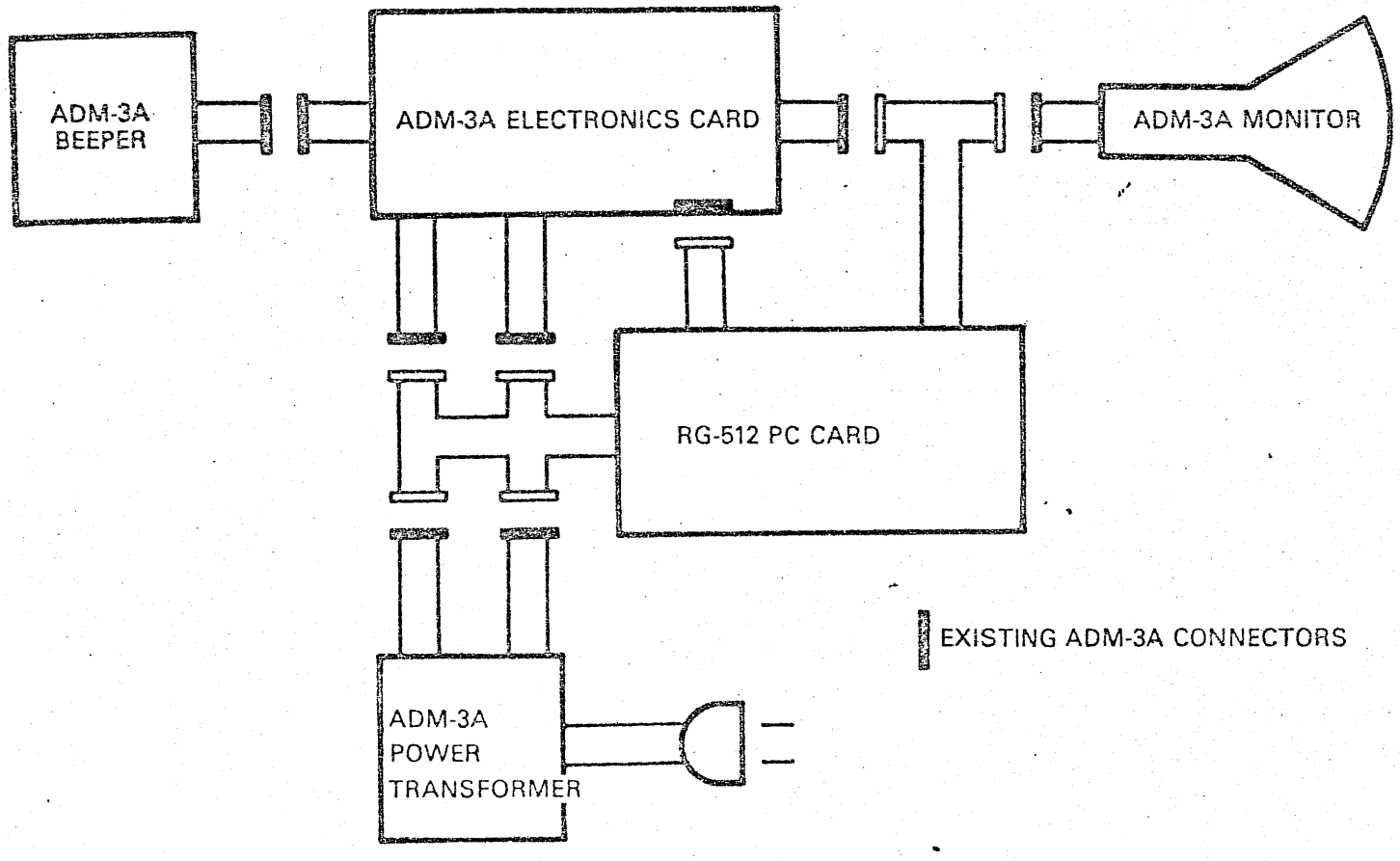
Z-80A Microprocessor: A 4 MHz Z-80A microprocessor performs point plotting, vector generation, and command decoding for the RG-512 card. Use of the "fast" Z-80A permits the rapid drawing of graphs and pictures.

Graphics Memory: The RG-512 contains 128,000 bits of low power, dynamic RAM graphics memory. The memory is organized in a 512 bit horizontal by 250 bit vertical array. This plotting resolution compares favorably with that of most high priced graphics terminals.

Power Supply: Since the RG-512 contains its own DC power supply, no power connections are required other than to the ADM-3A power transformer secondary. This results in no additional loading of the ADM-3A power supplies.

Power Consumption: The total power consumption of the RG-512 card, including the series pass regulators, is only 15 watts. The card contains LSI and Low Power Schottky circuitry to achieve this modest power requirement. The 15 watt total power consumption of the RG-512 is a nominal increment to the 70 watts consumed by the ADM-3A.

FIGURE 1-1: RETRO-GRAPHICS ELECTRICAL INTERCONNECT



,OGRAMMING FOR THE RG-512

Functionally, the RG-512 is situated in series with the ADM-3A. The RG-512 acts on the terminal's incoming data and can perform one of four functions depending on the ASCII code received and the RG-512 operating mode. The RG-512 will either transmit data to the ADM-3A, transmit status to the computer, or perform a graphics drawing or graphics control command.

TABLE 3-1: GRAPHICS CONTROL COMMANDS

ASCII CODE	FUNCTION
ESC	BEGIN ESCAPE SEQUENCE (SEE TABLE 3-2)
FS	ENTER POINT MODE
GS	ENTER VECTOR MODE
US	ENTER ADM-3A ALPHA MODE

The RG-512 has three operating modes: the ADM-3A Alpha Mode, the Vector Mode, and the Point Mode. A mode transition diagram is shown in Figure 3-2.

FIGURE 3-2: OPERATING MODE TRANSITION DIAGRAM

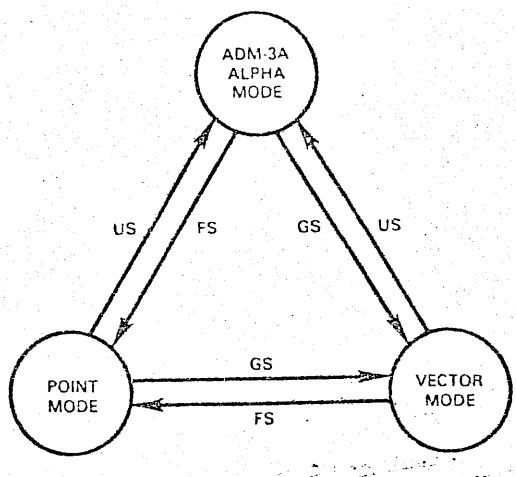
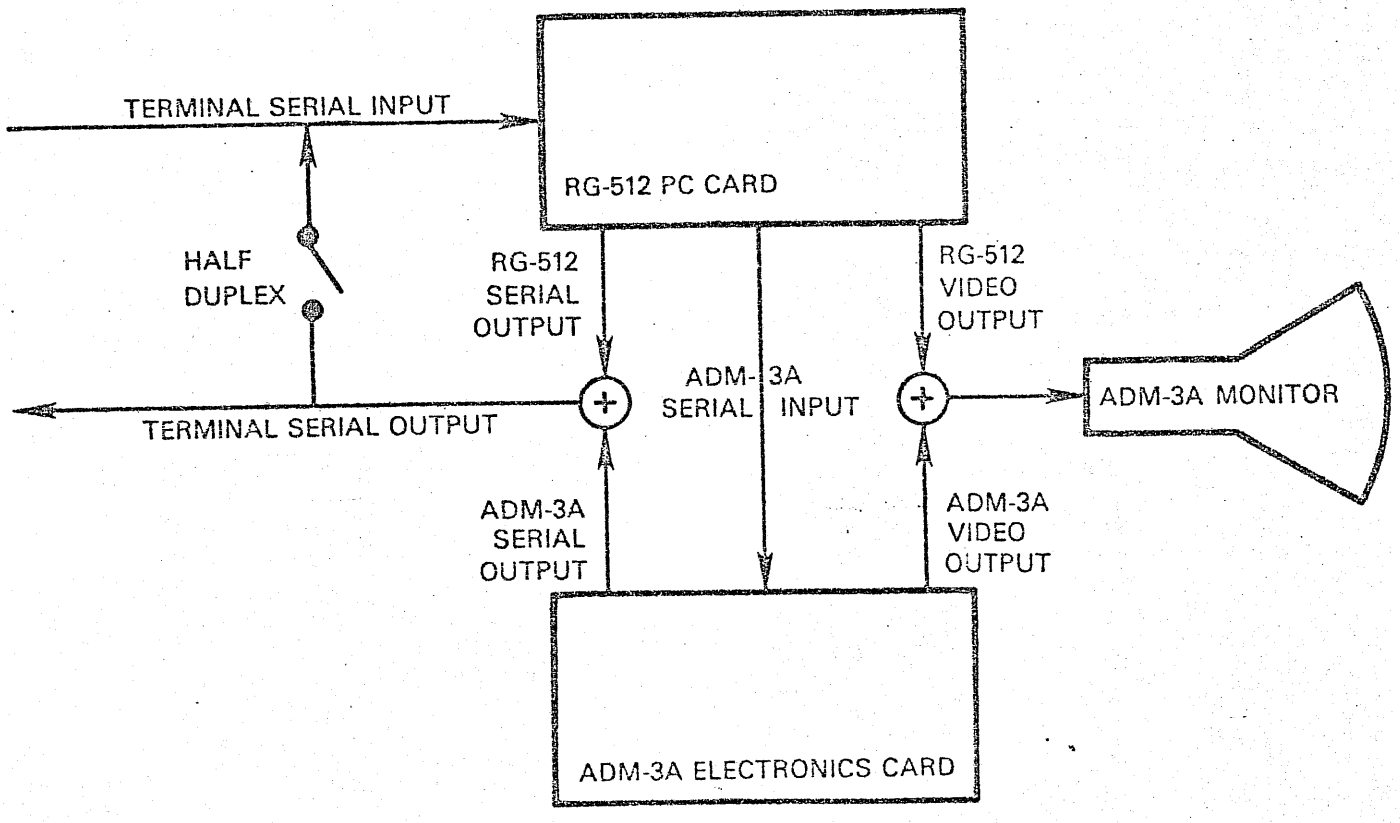


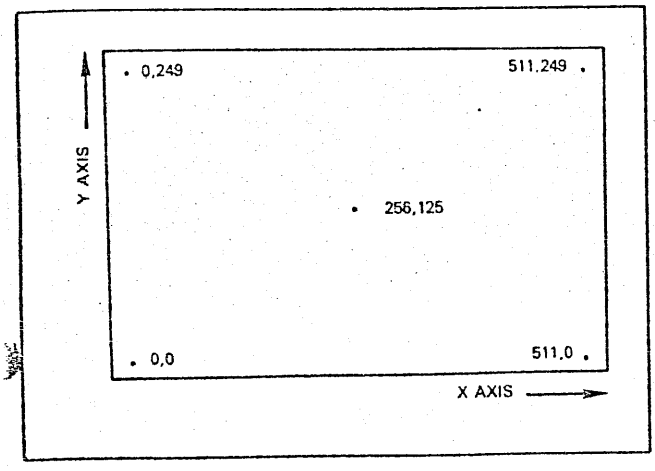
FIGURE 3-1: RG-512 FUNCTIONAL BLOCK DIAGRAM



M-3A Alpha Mode: Data will be transmitted to the DM-3A serial input when the RG-512 is in the ADM-3A lpha Mode and the incoming code is not an enter raphics code. If an enter graphics code is received, the G-512 will interpret subsequent input as graphics draw- ng or graphics control commands.

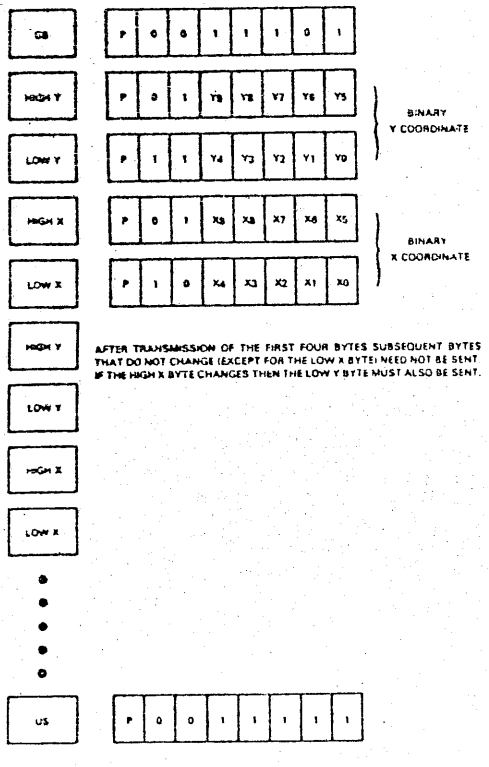
ector Mode: The RG-512 will enter the Vector Mode pon receipt of a GS control code. Vectors are generated utomatically from user specified endpoints.

IGURE 3-3: SCREEN FORMAT SHOWING CENTER AND CORNER POINT COORDINATES



The first coordinate transmitted determines the initial point for vector drawing. Transmission of a second coordinate will cause a vector to be drawn between the two points. The previous coordinate becomes the starting point for the next vector, causing one vector to be drawn for each subsequent coordinate transmitted. Operation above 1200 baud may require a handshake since the drawing time for long vectors may exceed the transmission time for vector coordinates. Figure 3-4 shows the vector drawing sequence.

FIGURE 3-4: VECTOR DRAWING SEQUENCE



Point Mode: The Point Mode is similar to the Vector Mode except no vector generation occurs. An FS control code followed by a series of coordinates will result in those points being plotted on the display screen.

Status Readback: Receipt of the escape sequence ESC, ENQ will cause the RG-512 to return status information to the computer. When using a handshake protocol, status readback is required to determine if a vector drawing sequence has been completed. See Figure 3-5 and Table 3-2.

FIGURE 3-5: RESPONSE TO ESC, ENQ

GRAPHICS STATUS	P	0	1	1	0	0	0	1
CR	P	0	0	0	1	1	0	1
EOT	P	0	0	0	0	1	0	0

THE GRAPHICS STATUS BYTE IS RETURNED UPON COMPLETION OF THE VECTOR DRAWING SEQUENCE. CR AND EOT ARE SENT WHEN THE RESPECTIVE TRAILER CODE SWITCHES ARE SET. ADDITIONAL TRAILER CODE COMBINATIONS ARE CR, CR ETX AND NO TRAILER CODES.

TABLE 3-2: ESCAPE SEQUENCES

ASCII CODE	FUNCTION
ESC,a	SET DATA LEVEL TO WHITE
ESC, DLE	SET DATA LEVEL TO BLACK (USED FOR SELECTIVE ERASE)
ESC, ENQ	RETURN STATUS INFORMATION
ESC, =	BEGIN ADM-3A CURSOR ADDRESS

Selectiv e Erase: Selective erase of vectors and points can be accomplished by specifying a black data level when entering the respective graphics mode. An ESC DLE will change the data level to black. The data level may be reset to white with an ESC a. The data level is independent of mode changes. Any operation which clears the screen or the receipt of a CR, will also set the data level to white.

Annotation: Graphs and pictures can be annotated by using the alphanumerics capability of the ADM-3A. Annotation is non-destructive since the ADM-3A alphanumerics memory is independent of the RG-512 graphics memory. Text can be written or scrolled over the display without disturbing the graphics data.

To annotate at a particular graphics grid location, the adjacent ADM-3A character position must be determined. Table 3-3 shows the necessary conversion procedure.

The conversion formulas in Table 3-3 result from the difference in size of the ADM-3A alphanumerics grid (560 by 214) and the RG-512 graphics grid (512 by 250). Use of the conversion formulas allows the user to place a character near the desired graphics grid location.

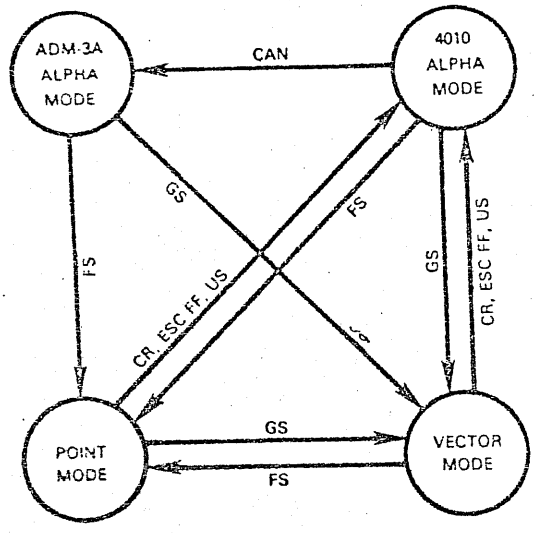
TABLE 3-3: EQUIVILENT CURSOR ADDRESS

GRAPHICS GRID COORDINATE	CHARACTER ADDRESS
X	$\left\lfloor \frac{X}{6.4} \right\rfloor$ = COLUMN NUMBER
Y	$\left\lfloor \frac{Y-17}{9} \right\rfloor$ = ROW NUMBER

10 COMPATIBILITY OPTION

ıe X-10 Option modifies the operation of the RG-512 to ovide Tektronix Plot 10 software compatibility. The op-ɔn extends the performance of the RG-512 with the addi-ɔn of the 4010 Alpha Mode, automatic scaling, compati-e status readback and a hard copy provision.

GURE 4-1: MODE TRANSITION DIAGRAM WITH THE X-10 OPTION

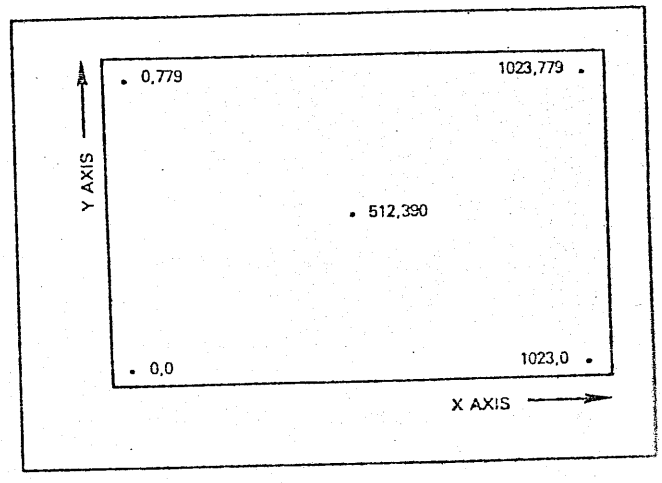


4010 Alpha Mode: The 4010 Alpha Mode allows the user to ɔrecisely annotate graphs and pictures by placing a ɔharacter anywhere on the display screen. Incoming ASCII characters are mapped into upper case and then written in-to the RG-512 graphics memory. To accomplish this, the X-10 Option supplies additional ROM space that contains an upper case character set. The character set consists of the same 64 printing alphanumeric characters used by the Tektronix 4006 and 4010. When in the 4010 Alpha Mode, the ADM-3A can display 35 lines of 73 characters.

The 4010 Alpha Mode also features a blinking alpha cursor which indicates the next writing location. The alpha cursor will move to the last coordinate specified when in either the Vector or Point Modes. A character can be written at any graphics grid location by using this capability.

Automatic Scaling: The X-10 Option automatically scales the Plot 10 graphics grid (1024 by 780) to the graphics grid of the RG-512 (512 by 250). This insures that the difference in resolution of the two grids will not effect the positioning of graphs on the display screen. Figure 4-2 shows the RG-512 screen format with automatic scaling.

FIGURE 4-2: SCREEN FORMAT WITH AUTOMATIC SCALING



Compatible Status Readback: Response to a request ɔ status is compatible with the Plot-10 software. The rece of an ESC ENQ causes the RG-512 to return the alpha c sor position and graphics status information. See Fig 4-3 and Table 4-1.

FIGURE 4-3: RESPONSE TO ESC, ENQ WITH THE X-OPTION

		P	0	1					
GRAPHICS STATUS		P	0	1	1	0	G	M	1
ALPHA CURSOR POSITION	HIGH X	P	0	1	X9	X8	X7	X6	X5
	LOW X	P	0	1	X4	X3	X2	X1	X0
	HIGH Y	P	0	1	Y9	Y8	Y7	Y6	Y5
	LOW Y	P	0	1	Y4	Y3	Y2	Y1	Y0
CR		P	0	0	0	1	1	0	1
EOT		P	0	0	0	0	1	0	0

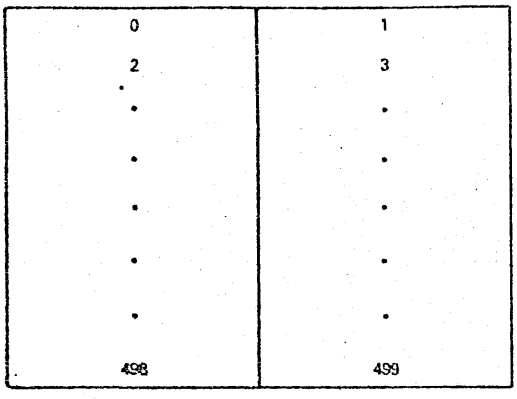
TABLE 4-1: STATUS BITS

BIT	EXPLANATION
2	0 MEANS VECTOR OR POINT MODE, 1 MEANS 4010 ALPHA MODE
1	1 MEANS MARGIN 1

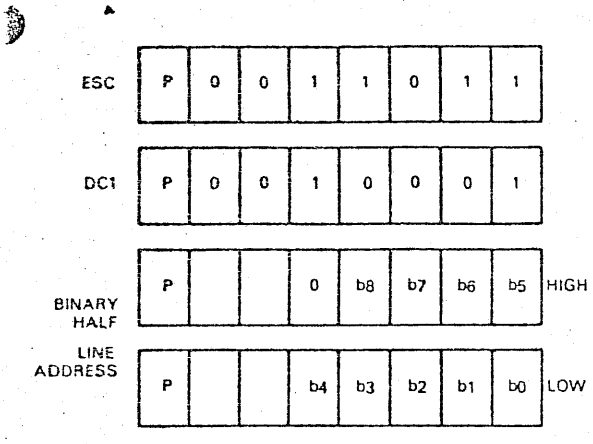
THE MARGIN 1 FUNCTION IS INCLUDED FOR FUNCTIONAL COMPATIBILITY. MOST ALPHANUMERICS APPLICATIONS CAN BE BETTER HANDLED USING THE MORE CAPABLE ADM-3A ALPHA MODE.

rd Copy Provision: An additional feature of the X-10 Op-n is a graphics memory readback capability for use in rd copy applications. Upon receipt of an ESC, DCI, and half line address, the RG-512 will transmit the informa-n contained in that half line to the computer. Figure 4-4 ows the graphics memory half line addresses. A request r a graphics memory readback is shown in Figure 4-5.

GURE 4-4: GRAPHICS MEMORY HALF LINE ADDRESSES



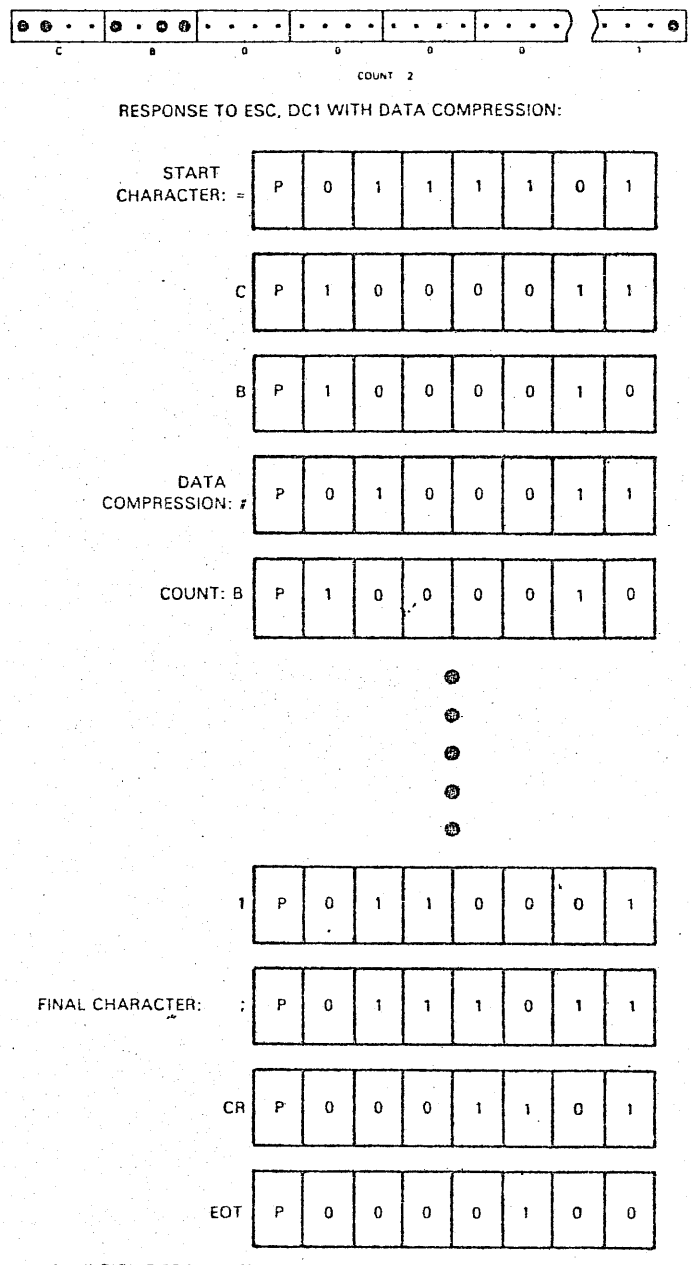
GURE 4-5: REQUEST FOR GRAPHICS MEMORY READBACK



ıe RG-512 formats the graphics data into hexadecimal efore transmission to the computer. Using standard SCII instead of a straight binary readback insures com-atibility with a broad range of operating systems. The quivalent packing efficiency is four bits per byte.

The RG-512 uses data compression to reduce the time required to perform a graphics memory readback. Sequences of zero bytes are transmitted as a "#" followed by a count. An example is shown in Figure 4-6.

FIGURE 4-6: USE OF GRAPHICS MEMORY READBACK



A ";" SIGNIFIES THAT THE REMAINDER OF THE HALF LINE IS BLANK. A BLANK HALF LINE IS SENT AS " ;". THE MOST SIGNIFICANT BIT OF THE COUNT BYTE IS SET TO 1.

CONTROL CODE SUMMARY

NOP: No Effect

Functions performed by the X-10 Option are in color.

ASCII CODE	ADM-3A ALPHA MODE	4010 ALPHA MODE	VECTOR OR POINT MODE
BEL	Sounds Audible Tone	Sounds Audible Tone	Sounds Audible Tone
BS	ADM-3A Cursor Left	4010 Cursor Left, Cursor X = Cursor X-14	4010 Cursor Left, Cursor X = Cursor X-14
HT	NOP	4010 Cursor Right, Cursor X = Cursor X + 14	4010 Cursor Right, Cursor X = Cursor X + 14
LF	ADM-3A Cursor Down	4010 Cursor Down, Cursor Y = Cursor Y-22	4010 Cursor Down, Cursor Y = Cursor Y-22
VT	ADM-3A Cursor Up	4010 Cursor Up, Cursor Y = Cursor Y + 22	4010 Cursor Up, Cursor Y = Cursor Y + 22
FF	ADM-3A Cursor Right	NOP	NOP
CR	Carriage Return	Carriage Return, Set Data Level to White	Enter 4010 Alpha Mode. Carriage Return, Set Data Level to White
SO	Unlock Keyboard	NOP	NOP
SI	Lock Keyboard	NOP	NOP
CAN	NOP	Enter ADM-3A Alpha Mode	NOP
EM	NOP	Clear Graphics Memory, Set Data Level to White	Clear Graphics Memory, Set Data Level to White
SUB	Clear ADM-3A Alpha Memory	Clear ADM-3A Alpha Memory	Clear ADM-3A Alpha Memory
ESC,a	NOP	Set Data Level to White	Set Data Level to White
ESC, DLE	NOP	Set Data Level to Black	Set Data Level to Black
ESC, DC1	NOP	Read Back Graphics Memory	Read Back Graphics Memory
ESC, FF	NOP	Home 4010 and ADM-3A Cursors, Clear Graphics and ADM-3A Alpha Memories, Set Data Level to White	Enter 4010 Alpha Mode, Home 4010 and ADM-3A Cursors, Clear Graphics and ADM-3A Alpha Memories, Set Data Level to White
ESC, ENQ	NOP	Return 4010 Cursor Position, Return Status Information	Return 4010 Cursor Position, Return Status Information
ESC, =	Begin ADM-3A Cursor Address	NOP	NOP
FS	Enter Point Mode	Enter Point Mode	Enter Point Mode
GS	Enter Vector Mode	Enter Vector Mode	Enter Vector Mode
RS	Home ADM-3A Cursor	NOP	NOP
US	NOP	NOP	Enter ADM-3A Alpha Mode Enter 4010 Alpha Mode

SPECIFICATIONS

General
Microprocessor: Z-80A
Graphics Memory: 128,000 bits of NMOS dynamic RAM
Plotting Resolution: 512 horizontal by 250 vertical
Vector Drawing Time (1200 baud): 13.5 ms - half screen;
25.0 ms - full screen

Environmental Conditions
Operating Temperature: 41 to 100 °F
Humidity: 5 to 95% (non-condensing)

Physical Specifications
Weight: 2.5 lbs
Dimensions: 12.00" by 12.31"

Power Requirements
Input Voltage: 9.4 VAC, 20.5 VAC and 31 VAC, ± 10%
Power Consumption: 15 watts

Warranty
90 day parts and labor

ERRATA: All references in this document to ASCII DLE should be changed to ASCII DEL (177 octal).

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UNIVERSITY OF GLASGOW

TEL: 041-339 8855
EXT. 478/7458

Computing Science Department,
THE UNIVERSITY,
GLASGOW, G12 8QQ.

5th April, 1979.

Dr. I. Johnstone,
Australian Graduate School of Management,
University of New South Wales,
P.O. Box 1,
Kensington,
New South Wales,
AUSTRALIA 2033.

Dear Ian,

I am returning, under separate cover, your tape containing the amendments to your third distribution, which we have distributed to most people in the U.K. who are using your software. Unfortunately we were unable to read the other tape with collected software from the U.S., though we tried on another computer in St. Andrews as well as our own. (As of the last two weeks our own drive is out of action).

We have just returned from the biggest-yet Unix meeting in the U.K., at the University of Kent at Canterbury. There were about 150 people there, and the main speakers were Ken Thomson and Brian Kernighan. The first day was meant to be a publicity exercise for those new to Unix, and the second day for the cognoscenti, but in practice both days were made open to anyone interested, so no user group business was transacted. A full report will be published in the next U.K. newsletter, (which must be soon!), but perhaps a summary of the highlights now might be of interest.

Principal item of hard news is that Version 7 is now available, though distribution may be held up because of delays in getting the manuals printed (they are much larger than Version 6 manuals). You can have a licence either for a normal PDP-11, a VAX or an Interdata 8/32. Goodies included are two C compilers (the system-specific one and the portable), new shell, lint, lex, learn (a CAI package for learning about Unix), and - guess what - Fortran 77. They don't seem quite sure whether to be proud or apologetic about this item! The new Shell is one of the largest programs on the distribution (!) but there was some relief that version 7 kernel need be only around 2K larger than version 6. Most utilities (Fortran 77 being one exception) will run on systems without separate I & D spaces. Indeed Bell already have version 7 running on the new LSI 11/23 (which has the full 11/34 instruction set, with memory management and floating point available on additional boards). Good news also that 'nroff' and 'troff' have been cleaned up and made compatible, and a standard set of useful macros is provided. Security has also been tightened up to some extent, with a new password encrypting system.

Most/

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Most U.K. users were astonished to hear that one thing which has not changed in Version 7 is the default for "delete character" and "delete line" in the teletype handler - we thought we'd seen the last of # and @! What was very clear was that version 7 is a "snapshot" of a still developing system, and indeed neither speaker seemed quite sure of when the snapshot was taken or exactly what it contained. The general feeling among users at the meeting was that the new tools provided with version 7 were too good to resist (though many had doubts about the new Shell). We were, however, relieved by the assurance that there would never be a version 8!

Ken Thomson finished with a presentation which might have been titled (but wasn't) "How I took on the world (at computer chess) and won". Truly a tour de force. Like all good ideas, incredibly simple once explained - what was astonishing was that no-one had done it before. His "chess machine" cost less than £1000 to build, and was connected to an 11/70 via three DR11 interfaces. It could, he said, just as easily be attached to an LSI-11; the 11/70 acts mainly as a huge database of book openings and endings. A very clever method of organising the opening book enables him to decide if a position is in the book, and if so generate the next move, in under a second. The mark II version, using more modern technology, will be about 10 times faster. Ken was modestly sceptical about predictions that this would put Belle (the name of the program) in the Grand Master class.

Software available at the meeting included the latest release of the Vrije (Andy Tanenbaum) Pascal System. This included the option of either interpreting or compiling the EM1 intermediate code, with very good run-time diagnostic on the interpreted version. If you are interested I can probably arrange for a copy to be sent, even if our mag. tape does not get fixed soon. Also being distributed was release 2 of the Modula system - I guess you should request this direct from York if you want it.

Finally a quotation, attributed to Steve Johnstone, with which Brian Kernighan introduced his excellent sales campaign for Unix on the first day of the conference: "Using TSO is like kicking a dead whale along the beach". Unix rules.

Best wishes,

Yours sincerely,

Alistair C. Kilgour

Alistair C. Kilgour.

Department of Computer Science,
University of WA,
Crawley, WA 6009.

Friday, 6-April-1979.

Dear Ian,

Please find enclosed the UNIX tape from Bell Labs. An RK06 pack will be delivered by DEC in the near future, if not already.

Our configuration is 11/60 processor, 64K words memory
DZ-11 (8-lines)
RK06 (one only!)
TS03 magtape (only takes 600' spools

Dr Tsang, of this Department, mentioned that you could supply us with a working system; we would be most grateful, as this will start us in the direction for becoming (hopefully!) contented UNIX users!

Yours faithfully,

Rob Freeth

(ROB FREETH, for Dr TSANG.) 16

University of Hawaii at Manoa

Institute for Astronomy
2680 Woodlawn Drive • Honolulu, Hawaii 96822
Telex: 723-8459 • UHAST HR

April 10, 1979

Ian Johnstone
Australian Graduate School of Management
University of New South Wales
P. O. Box 1
Kensington, New South Wales
Australia 2033

Dear Ian:

I received your tape a few weeks ago, but have waited to reply until the University saw fit to produce the check for A$100, which is enclosed. Since you offered the DEC FORTRAN linker that handles overlays and since I would like it, I have enclosed a tape, and a second check (A$20) which I hope will cover mailing costs. I presume the linker will run under the v6unix/updat system. The FORTRAN we are using came from Princeton (via Stanford and UCSD); there are some bugs, two of which I found, and UCSD corrected. I assume you know of them - I have enclosed the patches just in case they are unfamiliar. Do you know of any others?

Not to be greedy, but do you have a screen editor (two dimensional)? All we have is 'ed' but are used to having a window into the text (on our GT44 running RT-11). We did get a copy of 'abe' (a better editor), from friends in Boulder, that has an addressable cursor, is character oriented, and will display a section of text on video terminals, as opposed to decwriters and the like. However, it is written in Fortran and uses control characters for all commands. I'm not too keen on either aspect and so am casting about for something else.

Regarding "difficulties encountered with the distribution," it was a comedy of errors. I could not read the tape on our system (TJU16 drive), but had access to an 11/45 with TM10 drives and so got 'dtp' onto disk. However, the 45 is not meant for unix and has only 32K memory; 'dtp' wouldn't fit. Back to the 11/40 to "try something," but all that happened was that the tape drive inserted a crease into the tape (in the middle of usr/docmentation/c/c5, as I found later; I was lucky - we have the fortran documentation or some version of it, and so only lost the mlist.Sept76). After some effort, I got the directory printed out (there was none with the distribution) and parts of the tape split up into tp format (lots of use of 'dd'). Back to the 11/40 to compare the 'ht.c' drives - yours and mine;

I found two bugs in the v6unix ht.c: 'htphys' should read

'unit = dev.d_minor ε ϕ3;'

and in 'htread', 'int desired;

desired = u.u-count;'

and before the return,

'u.u-count = desired - rhtbuf.b_resid;'

I can now read the tape without difficulty; it will be very useful. It was a painful but educational process; the only useful information for you, I suppose, is to suggest that users of v6 patch their ht drivers before reading the tape.

Sincerely,

Richard Wolff

RJW/mm
Enclosures

P.S: If the A$20 is sufficient, and it is not too much bother, would you send me a receipt -- maybe I can get my money back.

date: January 19, 1979

to: All persons using Princeton FORTRAN as supplied by the UCSD Chemistry Department Computer Facility

from: John Stafford
UCSD Chemistry Department Computer Facility
Mail Code B-014
La Jolla, Calif. 92093
(714) 452-4016

re: Compiler Bug

A bug in the optimizer phase of the compiler which causes source of the form

```
iaray[C] = n - iaray[C]
```

(where C is a constant subscript) to result in improper code generation or abnormal termination of the compilation has been reported to us. The bug has been located and a fix is described below.

Load the FORTRAN system source if necessary. Change directory to the 'compiler' directory and do the following with the UNIX editor (things in [] are my comments and are not part of the dialog).

```
        % ed fl3.mll
ed:     [character count will be reported]
you:    /negmm=/
ed:     negmm=  035400 + trcneg          ;negate memory-memory header wo
you:    ?.r3?
ed:     inc     @r3                      ;else indicate offset present
you:    s//-2(r1)/p
ed:     inc     -2(r1)                   ;else indicate offset present
you:    w
ed:     [character count will be reported]
you:    q
UNIX:   %
```

If all goes well then it is only necessary to rebuild the compiler. Examine the make_fortran file for the section which builds the compiler proper and either extract it into another command file or simply type it in at the terminal. Once you have sucessfully rebuilt and installed the corrected compiler '/bin/fortran' and the overlay file '/lib/fortovr' the corrected system source should be copied back to tape for safe keeping.

If any problems are encountered in this process feel free to call me for help.

Another bug is known to exist. If an implicit do loop in an I/O statement is followed by a simple variable but the comma that should separate them is left out, the compiler will often terminate with a core image. Since this is in fact a syntax error and the existing documentation does note that some syntactically incorrect programs will give compiler core images, it is a low priority item. However if we find it, we will let you know.

John Stafford

date: 3/6/79

to: ALL USERS OF PRINCETON FORTRAN AS SUPPLIED BY UCSD/CDCF

from: John Stafford
UCSD Chemistry Department Computer Facility
Mail Code B-014
La Jolla, Calif. 92093
(714) 452-4016

re: BUG in FORTRAN BUG FIX — "assigned goto" causes fatal error

The bug fix I sent you dated 2/26/79 IS IN ERROR. If you have made this fix as I specified you need to REMOVE it as follows:

```
% ed fcode.mll
[size will be reported]
/check for label/+1
        mov     #o.text,-4(r2)  ;fake absolute text segment reference
d
w
[size will be reported]
q
%
```

The CORRECT FIX (I sincerely hope) can then be made as follows:

```
% ed fcode.mll
[size will be reported]
/check for label/+4
        mov     #-6,r0          ;else set adrs type = immediate
a
        mov     #o.text,-4(r2)  ;fake absolute text segment reference
.
w
[size will be reported]
q
%
```

Then recompile the compiler as noted in my previous memo.

FOR THE RECORD, THE FIXED AREA SHOULD LOOK LIKE:

```
        mov     @(r3)+,-(sp)    ;check for label
        bic     #^c<usgmsk>,@sp
        cmp     (sp)+,#usglab
        bne     2$              ;branch if not a label
        mov     #-6,r0          ;else set adrs type = immediate
        mov     #o.text,-4(r2)  ;fake absolute text segment reference
2$:     add     type2(r0),pusher+4 ;insert adrs type in name
        mov     r5,r3           ;handle result
```

If things don't end up looking this way, please let me know before 3/31 (my phone number is above). I'm really sorry about this. I don't usually send out BUG fixes with BUGS in them. I shall try not to do so again.

John Stafford

P.S. Here is the official fix to the fix we discussed 3/6.

PRENTICE COMPUTER CENTRE

UNIVERSITY OF QUEENSLAND

ST. LUCIA, QUEENSLAND, AUSTRALIA, 4067

TELEPHONE:

TELEX—UNIVQLD AA40315

DIRECTOR:
ALAN W. COULTER
B.ECON., F.A.C.S., M.A.PS.S.

GD:emm

9th April, 1979.

Ian Johnstone,
Australian Graduate School of Management,
University of New South Wales,
P.O. Box 1,
KENSINGTON. N.S.W. 2033.

Dear Ian,

Here is the site information for the PDP-11 at the Prentice Computer Centre.

Hardware:	11/34 32 Kwords DEC MOS memory 32 Kwords National Semiconductor MOS memory 64 Kwords INTEL MOS memory RKØ5f disk drive RKØ5j disk drive 2 RLØ1 disk drives RXØ1 dual floppy disk drive (on order) DZ11 mux LA180 printer (occassionally)
User pop.:	5
Terminals:	LS120 console LA36 TEKTRONIX 4014 (occassionally)

The machine is currently used for:

(a) Hardware fault tests for any of the hardware problems that develop on campus.

(b) Patching and System generations for the Dec Operating Systems that are supported on campus.

(c) Communications software development.

(d) Unix (at last).

Yours sincerely,

Geoff Dengate.

Geoff Dengate.

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TELEPHONE 370 0111
TELEX—UNIVQLD AA40315
TELEGRAMS—BRISBANE UNIVERSITY

YOUR REFERENCE:

OUR REFERENCE:

University of Queensland

ELECTRICAL ENGINEERING
DEPARTMENT

ST. LUCIA, BRISBANE
AUSTRALIA, 4067

8th May, 1979.

Mr. Ian Johnstone,
Aust. Graduate School of Management,
University of New South Wales,
P.O. Box 1,
KENSINGTON. N.S.W. 2033

Dear Ian,

I have arranged to have a disc delivered to you by '3M'. I would appreciate it if you could send us copies of your local PLOT/GRAPH routines and libraries and also the Plot 1Ø Graphics package.

We are very happy with the performance of UNSW UNIX. We made some timing comparisons with RSX. They showed a UNIX improvement over RSX of at least one third. Needless to say we are sold on UNIX.

Regards,

C. Harridge

Clary Harridge.

Department of Computer Science
University of Canterbury Christchurch 1 New Zealand

9 April 1979

Mr. Ian Johnstone,
A.G.S.M.,
P.O. Box 1, Kensington 2033,
AUSTRALIA.

Dear Mr. Johnstone,

This Department is a recent licensee of UNIX and we have been impressed with the efficiency with which we have received the UNIX Users Group Newsletter. I don't know if this means that I am officially on the mailing list or not, but, if not, would you please ensure that this is so.

Although enthusiastic about UNIX, and its range of softare, (we have a version of the UNIX Editor, running on our DG Eclipse), we are not at this stage regular UNIX users! We are attempting the task of converting UNIX to run on a Data General Eclipse computer, taking either a similar path to that used by Richard Miller at Wollongong, or by microprogramming. The article by Fraser & Ritchie in the latest newsletter was of particular interest here. If anyone has any comments/advice on this project, we would be very pleased to hear from them. At present we are licensed to run UNIX on a "borrowed" system as follows:-

PDP-11/34
48KW Memory
RK05 F/J disc drives
LA36 Terminal

but this will cease shortly.

I look forward to further copies of the Newsletter.

Yours sincerely,

R.E.M. Cooper,
Senior Lecturer,
Department of Computer Science.

REMC/AS

22

Victoria University of Wellington

Telephone 721-000

Private Bag
Wellington
New Zealand

9 May 1979

Dr I. Johnson
AGSM
P.O. Box 1
Kensington 2033
AUSTRALIA

Dear Dr Johnson,

I understand that you are the co-ordinator of a UNIX users group in Australia. We are in the processing of installing a VAX in the computer centre at the University here and are considering installing the UNIX operating system on it next year. The Information Science Department here is also looking at up-grading it's PDP11/10 to run mini-UNIX. We would therefore be grateful if we could be included in the mailing list of the UNIX users group. I would be very grateful also if you could send me all back copies of newsletters that you have produced in the past.

I look forward to your reply.

Yours faithfully,

Dr C.R. Boswell
DIRECTOR
COMPUTING SERVICES CENTRE

Victoria University of Wellington

Telephone 721-000

Private Bag
Wellington
New Zealand

Department of Information Science

9 May 1979

Mr. Ian Johnstone,
Australian Graduate School
of Management,
P.O. Box 1,
Kensington,
N.S.W. 2033,
Australia.

Dear Mr. Johnstone,

We are currently in the process of obtaining Mini-Unix for our department's PDP-11/10. The Computing Services Centre here is also considering UNIX for use on its VAX 11/780. We are interested in receiving the Unix Newsletter and would appreciate receiving subscription information.

Thank you for your prompt reply.

Yours sincerely,

John H. Hine

Dr. J.H. Hine
Senior Lecturer Computer Science

AUSTRALIAN ATOMIC ENERGY COMMISSION

NUCLEAR SCIENCE AND TECHNOLOGY BRANCH

RESEARCH ESTABLISHMENT, NEW ILLAWARRA ROAD, LUCAS HEIGHTS

TELEGRAMS: ATOMRE, SYDNEY
TELEX: 24562
TELEPHONE: 531-0111

IN REPLY PLEASE QUOTE: JMT:mwb

ADDRESS ALL MAIL TO:

AAEC RESEARCH ESTABLISHMENT
PRIVATE MAIL BAG, SUTHERLAND 2232
N.S.W. AUSTRALIA

17 May, 1979.

Mr. Ian Johnstone
Fearless Leader
UNIX Users Group
AGSM
University of New South Wales
KENSINGTON, 2033.

Dear Ian,

It is about time that I got down to writing this letter, as there are a number of news items that will undoubtedly interest you.

The first concerns our Symposium in September, and the visit of Dr. Dennis Ritchie to Australia. As you know, the Australian Atomic Energy Commission and the University of New South Wales are sponsoring a Symposium on Language Design and Programming Methodology to be held on September 10th and 11th. Initially, Prof. Niklaus Wirth was our only guest speaker, however, after some prompting from John Lions and Juris Reinfelds, we decided to invite Dennis Ritchie as well. I spoke to Dr. Ritchie on the phone some weeks ago, and he gladly agreed to come. So now we have two personalities, Wirth and Ritchie, which should prove to be a most interesting and stimulating combination.

The Symposium will be officially opened on the Monday (the 10th) morning, however, activities (to be announced) will really begin on the Sunday night. The venue is the Sydney Science Centre in Clarence St., and it is well situated as far as buses, trains, etc. The Symposium runs for two days, with the Symposium Dinner being held on the Monday night. The total all inclusive fee is $60 (not the cheapest, I know, but we have to pay for our visitors somehow!) The numbers that can attend will be strictly limited to 200, so can I strongly recommend that everyone register as early as possible, as I am expecting quite a large response. Anyway, all the details, including registration forms, are in the brochure enclosed with this letter.

As we discussed earlier, we really should co-ordinate your UNIX Users Group Meeting with Ritchie being in Sydney, and Wednesday the 12th seems a reasonable time, especially for those coming from interstate. I have included a paragraph about the meeting in the brochure, so now sit back and wait for the flood of enquiries!

As far as the actual program for the Symposium, I am trying to arrange that Wirth and Ritchie are exposed as much as possible to people attending, and that there should be enough free time for people to meet and to get to know each other. Both Ritchie and Wirth will be speaking, of course, and I have just finished going through the refereeing process (with a most helpful and knowledgeable panel) of about 25 papers, of which we will only accept about

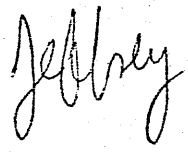
half. I also want to stage a panel discussion, perhaps even a debate as well, so the whole event seems to be shaping up quite nicely.

Moving onto other areas, Western Electric seem to be keen to sell us Level 7 Unix and VAX UNIX (after all, we are a commercial customer!). I recently received a whole heap of literature about these beasts, as well as the prices for level 7 UNIX. To upgrade from Level 6 to Level 7 costs a measly $12,000 for the initial cpu, and $4,000 for each additional CPU previously licensed for Level 6. New CPUs not previously licensed may be licensed for Level 7 for the small sum of $9,400. At those prices, together with the fact that Level 7 (or Edition 7, as Western Electric prefer to call it) won't run on machines without separate I and D space, it is unlikely that we will obtain Level 7 for some time (it is tempting, though ....). We weren't given the prices on VAX UNIX, although I shudder to think what they might be - maybe it will be cheaper to buy the computer than its software?! Perhaps we could have it for a 10 day free trial....

It seems pointless to try and cover all the details of the literature here, as I will be bringing you a copy in a few days anyway. In short, the VAX UNIX, known as UNIX V32, looks very similar in content to Edition 7. Minimum VAX configuration is 256K bytes of memory, an RP06 or equivalent, and a 9-track MASSBUS-compatible tape drive (shucks, no floppies!) Resident code occupies 40-55K, and system data 30-55K, but who's counting on a VAX anyway? It also, of course, runs in native mode.

Well, thats probably all for now, and of course we will keep in touch regarding the Symposium, Ritchie, etc. Before signing off, let me once again sincerely thank you for all the help you have given me with respect to our two UNIX systems here, with copying distribution tapes, and generally letting me pick your brains now and then. It really is appreciated by all.

With best wishes,



Jeffrey Tobias
Leader, Computer Science Group

A brief note on UNIX System Performance.

30th May 1979

Recently at UNSW a concerted effort has been made to obtain the the best results from the PDP11/70 in Computer Science. Rather than approach this problem in the usual ad-hoc way it was decided that a systematic approach should be used. A novel idea, you might say.

With the help of a tame electrical engineer a programmable clock to suit our needs was designed and built (at a cost of $100 dollars approx). This clock is capable of interrupting the CPU at a rate settable between 500ns and 250ms.

Software for the system was written which uses interrupts at a rate of 317HZ. When an interrupt occurs, information describing the state of the machine is saved in a large buffer. Noting the program counter at interrupt time allows a profile of the system's execution to be taken, also time spent at each hardware priority level was recorded. The cost of these changes is less than 1% of CPU time plus a large chunk (10%) of our available memory. The memory chunk is of a variable size, depending on how detailed the profile is to be. In the system we used, one long word (32 bits) was used for every four bytes of instructions. This allowed identification of individual C procedure usage since each begins with a four byte instruction and thus its entry point would have a unique entry in the profile table.

Besides the system code changes, there are only two other programs required to make use of the profiling system. The programs `suck' and `examine' are used to extract the profiling information from the system, and analyse the results.

We began by profiling the system that was currently in use. It was a mapped buffers system, with 96 buffers, 170 processes, and 400 inodes. The system in this configuration reached saturation (subjectively) with 42 users logged on. The initial results gave us immediate hope. Over periods of up to several hours in the busiest time of the day, kernel cpu time was seen to be 85% [all percentages given are approximate, full and complete results are in the pipeline] of the time available, with no idle time. Of the time spent in the kernel mode, 20% went in servicing output interrupts on the terminal multiplexors (7 DZ11's), 15% was used by the routine 'swtch', the rescheduler, and a further 12% was absorbed by procedure call overhead.

The immediate thrust was to reduce the time taken to reschedule by chaining ready-to-run processes together, (as in PWB/UNIX). This had the effect of reducing the time spent in 'swtch' to about 1%. As a result, the proportion of kernel time declined to 75%.

The 'dzxint' routine was the next target. By recoding to use an external synchonization (a KW11-P), the time spent in this routine was reduced to 13% of the kernel time, which now fell to about 70% of total time. This effort showed that although the DZ11 apparently is an acceptable multiplexor it is in fact far from it.

The routines which now seemed to be using most time were: dzxint 13%; procedure overhead 14%; getblk 10%; copyseg 6%; and wakeup 3%. A change to getblk, the buffer pool managing routine, which hashed the 'dev', 'blkno' for each buffer in the pool, with a hash table size of 113, reduced the time consumed in getblk to 1% of kernel time. In conjuction with this, a change was made to copyseg which halved the time spent in this routine. As a result of these two changes, kernel time dropped to an all time low of 65%.

A further reduction without a loss of service was gained by reducing overheads on certain interrupts by not rescheduling after interrupt processing was complete.

Subjectively, the system now seemed to reach saturation (still) with an extra five users, or at around 47. These results are probably close to the limit that can be achieved by this technique. Changes are still in the air for the DZ11 driver, as are slight improvements to wakeup (by hashing). It seems unlikely that any improvement can be made to the register save routines 'csv' and 'cret', except by perhaps getting at the 11/70 microcode. Neither is the effect of the UNIBUS disk controller being accounted for. Due to the design of the 11/70 memory system, UNIBUS disk I/O can degrade the speed of the CPU, even with maximum cache hit rates, by upto 50%. Under normal running we calculate the degradation from this source to be of the order 20%. The only practical solution to this problem requires a considerable capital outlay (the purchase of MASSBUS drives).

Ian Johnstone
Chris Maltby
Greg Rose