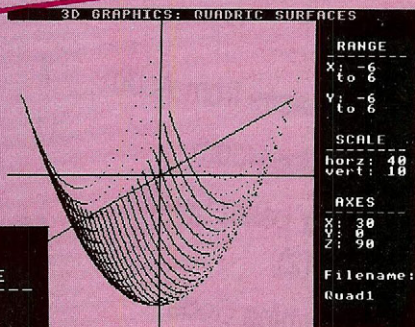
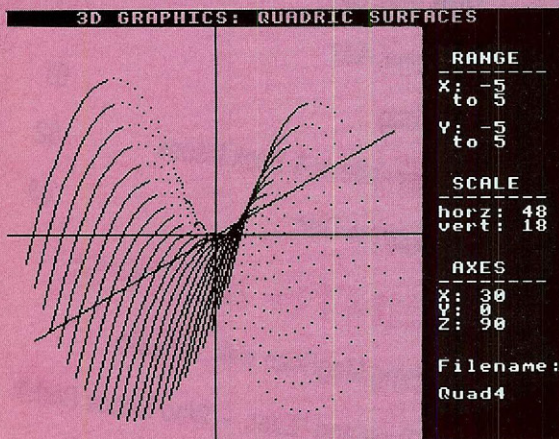


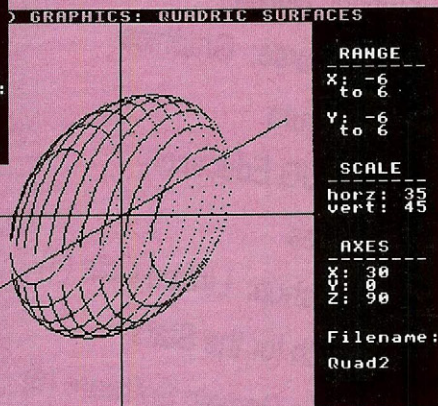
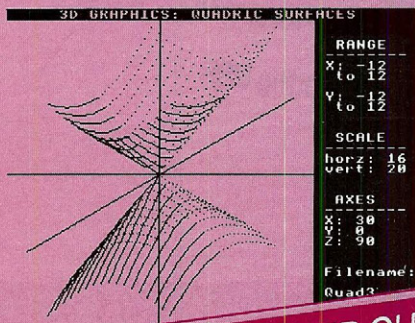
Vol.11 No.5 October 1992

# BEEBUG

FOR THE  
BBC MICRO &  
MASTER SERIES



## Quadric Surfaces



● DESIGNING NEAR LETTER QUALITY CHARACTERS ● PENTILES  
DEMOS IN THE CLASSROOM ● MAJOR NEW RELEASES FROM ACORN

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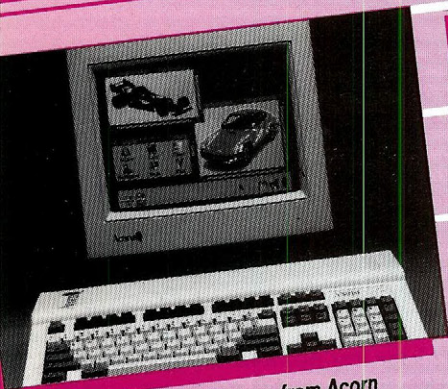
Using MagScan with HiBasic	
*Type and *Exec - Who Needs Both?	
Half Procedures	
Decoding USR	

## PROGRAM INFORMATION

All listings published in BEEBUG magazine are produced directly from working programs. They are formatted using LISTO 1 and WIDTH 40. The space following the line number is to aid readability only, and may be omitted when the program is typed in. However, the rest of each line should be entered exactly as printed, and checked carefully. When entering a listing, pay special attention to the

difference between the digit one and a lower case l (L). Also note that the vertical bar character (Shift \) is reproduced in listings as |.

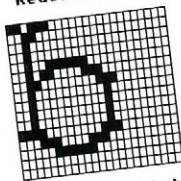
All programs in BEEBUG magazine will run on any BBC micro with Basic II or later, unless otherwise indicated. Members with Basic I are referred to the article on page 44 of BEEBUG Vol.7 No.2 (reprints



## Major New Releases from Acorn

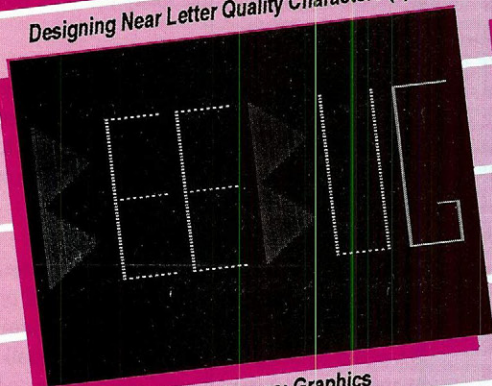
**N.L.Q. Character Designer**  
Press RETURN when you have finished

Redefining b



The Space Bar sets a point  
The Delete key clears a point  
Use the arrow keys to move the cursor  
Grid co-ordinates: 5 7 Flag: 0

## Designing Near Letter Quality Characters (2)



## First Course: Graphics

Save: MOVE Text move Line Edge Outl S Fore Fix Reel Abs x= 488.5 y= 487.8  
Filename: FIGURE1 Scale: 0.381times Vector: 274.6

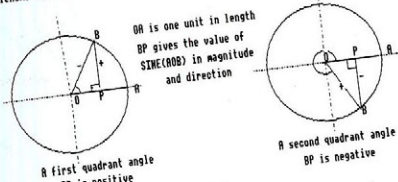
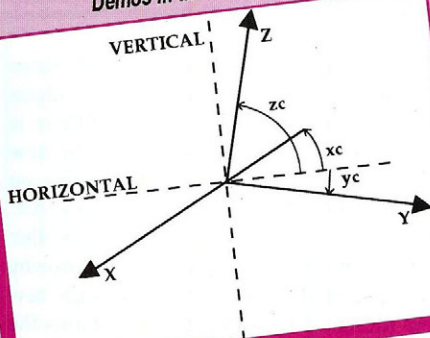
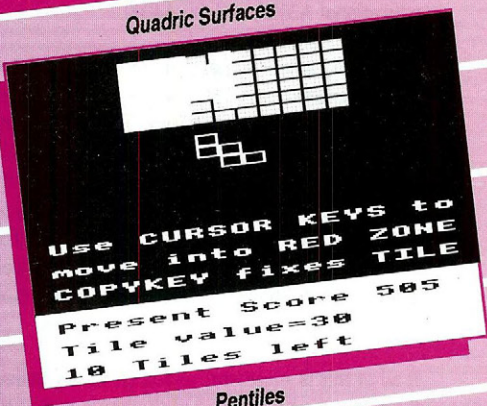


FIGURE 1

## Demos in the Classroom



## Quadric Surfaces



## Pentiles

available on receipt of an A5 SAE), and are strongly advised to upgrade to Basic II. Any second processor fitted to the computer should be turned off before the programs are run.

Where a program requires a certain configuration, this is indicated by symbols at the beginning of the article (as shown opposite). Any other requirements are referred to explicitly in the text of the article.



Program needs at least one bank of sideways RAM.



Program is for Master 128 and Compact only.

# Editor's Jottings



## ACORN TO THE FORE

As you will read in our pages this month Acorn has announced a whole range of new products for the autumn period. Technically there is nothing really revolutionary here. The new ARM250 chip is interesting, but offers no advance on the ARM2, MEMC, VIDC and IOC chips used in previous Archimedes systems other than to continue the process of miniaturisation by packaging all these functions into a single new chip (designed by ARM Ltd.). This forms the basis of the new consumer model, the A3010, the educational A3020, and the A4000.

So nothing revolutionary maybe, but the latest announcements by Acorn may yet turn out to be a milestone in Acorn's history. The design and marketing of the A3010 marks Acorn's first official foray into the mass consumer market since the days of the ill-fated Electron (remember that?). At just £499 inc. VAT this machine offers full Archimedes capability in a compact low-cost formula which should do much to encourage more people to join the ranks of Archimedes users.

If all of this is successful, as Acorn clearly believe it will be, the broadening of the lower end of the Acorn market should eventually filter through in increased sales of the more powerful machines too, and should also enhance both the general perception of Acorn as a significant supplier of computers, and Acorn's reputation regarding the technical quality of its machines. An expanding market should also do much to encourage the development of more and better software and hardware products for the Archimedes.

Let's hope that Acorn have got it right. It is certainly true to say that anyone contemplating upgrading to an Archimedes (or Acorn RISC OS machines as they are more likely to be called from now on), has a greater choice of systems offering better value for money than ever before.

## BBC ACORN USER SHOW

The BBC Acorn User Show makes its annual appearance, this year from 16th to 18th October at the Wembley Conference Centre (the same venue as last year). Acorn will clearly be intent on showing off all its new machines, and this will be the first opportunity that many will have had to see them.

As always, many other companies will be there, showing their latest products to entice the keen user - many software houses use this show to release new products, or to give a first glimpse of forthcoming products.

Beebug and RISC Developments (the latter publishers of BEEBUG) will be there as well on stand 20/21, adjacent to Acorn's own stand area. We would be delighted to see you there, to talk, to answer your questions, and offer advice and help if you need it.

If you haven't already done so, mark the dates in your diary now. We'll be there - we hope you will be too.

M.W.

**ACORN LAUNCHES NEW CONSUMER RANGE**

Major news this month is the release of a new Acorn micro aimed firmly at the mass consumer market, and providing the cheapest RISC OS machine yet. The new A3010 comes in two packages starting at just £499 inc. VAT. There is an enhanced version of this, the A3020, for the education market (and others), and a further new system the A4000, aimed at the more serious home user.

Acorn has also updated its A5000 model with higher capacity hard disc, and lowered the price at the same time. Acorn has also announced its *Acorn Universal Network* standard (AUN) which allows both Econet and Ethernet to be combined. Finally, in this new flurry of activity, Acorn has released details of its *Pocket Book*, based on the Psion Series 3 but with Acorn specified software.

We have a full report on all the new products in this month's special four-page feature. All Acorn computers can be obtained from Beebug Ltd. and other Acorn dealers, who can also provide more information on the new models.

Acorn Computers Ltd. are at Fulbourn Road, Cherry Hinton, Cambridge CB1 4JN, tel. (0223) 245200.

**ALL FORMATS COMPUTER FAIRS**

The latest All Formats Computer Fairs are listed as follows:

- 10 Oct Assembly Rooms, Edinburgh, Scotland (off end M8).
- 11 Oct City Hall, Candleriggs, Glasgow (off M8).
- 17 Oct Novotel, Hammersmith, London (off M4/A4).
- 18 Oct Brunel Centre, Temple Meads, Bristol (M32).
- 24 Oct Haydock Park Racecourse (J23 - M6)
- 1 Nov University Sports Centre, Leeds (end M1).
- 6 Nov National Motorcycle Museum, Birmingham (J6 - M42).
- 7 Nov Sandown Racecourse, Esher, Surrey (J9/10 - M25).

**ESSENTIAL FIX FOR THE 512**

FIXEXE, the latest 512 product from Essential Software, is a program which amends troublesome DOS .EXE programs which until now required an extra copy of COMMAND.COM to be loaded before they would run in the 512. FIXEXE permanently fixes such programs so that they run normally. Benefits to the user are the simplification of both manual and batch commands, plus faster loading of programs. In addition, FIXEXE releases almost 30K of user RAM, previously occupied by the extra copy of COMMAND.COM, now no longer required. FIXEXE costs £5.00 complete.

Contact Essential Software at P.O.Box 5, Groby, Leicester LE6 0ZB.

**BEEBUG TENTH ANNIVERSARY COMPETITION RESULTS**

Imagine the scene... BEEBUG office, rainy Monday morning - the day of the Tenth Anniversary Competition Results.

Rat-tat-tat (we can't afford a proper drum roll, so we've had to make do with a pencil and an empty can of Coke). The crowd stirs restlessly as the BEEBUG glamour girl brings forward the hat from which the smartly dressed famous personality will pluck the ten lucky winners (well, Sue from subs gives Mike the entries in an in-tray so that he can pick the ten winners - journalistic licence never hurt anybody!).

Oh the excitement! As each of the ten lucky winners is pulled from the hat, there is a gasp from the crowd, until the list of the winners looks like this:

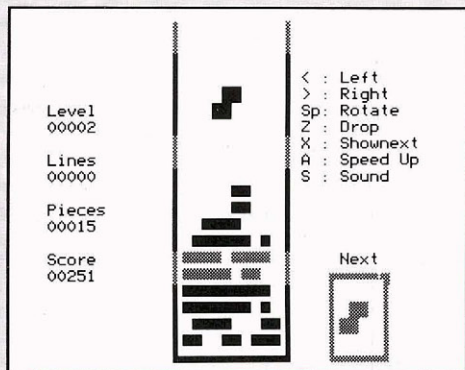
S Myers, Tyne & Wear. F W Nevin, Tyne & Wear. C W Culpitt-Smith, Perth. T A Collins, Essex. G G Riddick, Surrey. R B Cohen, Cleveland. D A Foster, North Yorkshire. A Sale, East Sussex. D E Hoy, Surrey. M Bobrowski, Poland.

So, it's Tenth Anniversary Discs to these skilled problem solvers - and for those of you who are still stuck, the missing word was 'Compact'. Better luck next time!



To celebrate the tenth anniversary of the founding of BEEBUG magazine, we have put together a selection of the best programs which we have published over the past ten years. This disc is packed with applications, utilities and games most of which have not been available previously other than when first published in BEEBUG. All the programs come with full on-screen help files, which can be printed out as well for permanent reference.

## BEEBUG 10th Anniversary Disc



Celebrate BEEBUG's 10th anniversary with this disc at the special low price of £4.95 and you will have something to celebrate too.

**DRAUGHTS** - An implementation of the classic board game in which you pit your wits against a computerised opponent.

**KEYPSTRIP DESIGNER** - A very well written program to enable the creation, editing and printing of function key strips.

**GARP** - GARP (Geographical Atlas using Radial Projection) allows views of the globe to be displayed from any point above the Earth's surface.

**MULTI-COLUMN PRINTING** - This utility formats any text file into columns, and prints the result using an Epson FX-80 or compatible printer.

**PERPETUAL CALENDAR** - This program can display or print the calendar month by month for any year between 1753 and 5000 A.D. in the United Kingdom, or even earlier in other countries.

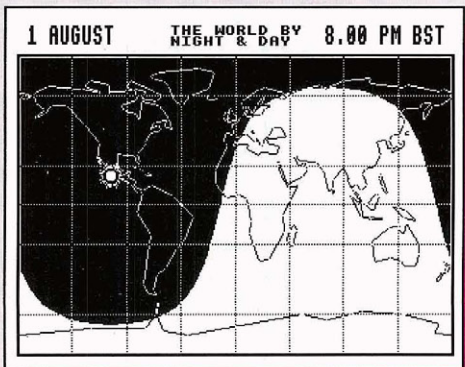
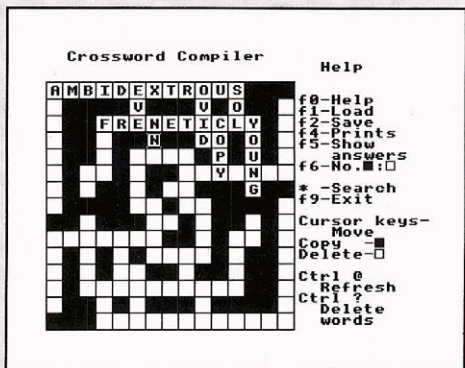
**QUAD** - Quad is a Tetris-like game, in which you must manipulate falling blocks to slot into each other. Dangerously addictive!

**STEALTH** - In this game you play against an opponent (or the computer), who sets a number of targets for you to find, and you must use your skill to discover the locations of the targets in as few goes as possible.

**RECURSIVE TREES** - This fascinating program uses recursion to create an infinite variety of tree-like designs - you choose a set of numbers, and the computer does the rest.

**THE WORLD BY DAY AND NIGHT** - This program will draw a map of the world showing graphically where the sun is in the sky or where it's night at every spot on earth.

**CROSSWORD COMPILER** - This program allows crosswords to be designed and the clues compiled.



PBB3a 3.5" ADFS £4.95 inc. VAT + £1 p&p  
PBB5a 5.25" DFS 40/80T £4.95 inc. VAT + £1 p&p

# Major New Releases from Acorn

*Facts and first impressions from Mark Moxon and Mike Williams.*

Acorn Computers has announced a wealth of new products for the autumn, and while there may be no major surprises or revolutionary developments, the impact of the new product range on the consumer and educational computer markets could be considerable. In this review we focus on the more significant of the new releases.

Foremost among the new products is a range of new A3000 systems (the original A3000 was reviewed in BEEBUG Vol.8 No.2). The new A3010 is targeted firmly at the consumer market, and the A3020 version is aimed squarely at educational users, and both machines are available in a number of different packages. The new A4000 provides a similar package to the A3020 but in a three-box A5000 style arrangement. All these systems feature a new ARM250 chip.

Acorn has also upgraded the A5000 (as reviewed in BEEBUG Vol.10 No.6), the present model being replaced by two new versions: the A5000 2Mb HD80 and the A5000 4Mb HD120, with 80Mb and 120Mb hard discs respectively. The new HD80 version is £100 less than the original A5000, and the HD120 model with 4Mb of RAM weighs in at just £1599 ex. VAT. There are also two new A5000 models which have no hard discs, but come with a network interface already fitted. The A5000 ES has Econet fitted

for £1299 ex. VAT, and the A5000 NS has Ethernet fitted for £1399 ex. VAT.

All the new systems referred to above come complete with the RISC OS 3.10 operating system. The new style mouse, introduced on the A4 portable, is now standard on all systems.

Acorn has also announced a new networking standard, AUN (Acorn Universal Networking), as part of its move towards adopting the Ethernet standard for all RISC OS systems, while still maintaining compatibility with its own low cost Econet network. However, BBC micros and Masters will not be able to make full use of the main AUN advantage, which is the ability to access separate clusters linked by an Ethernet system, so this will only affect Archimedes stations already on Acorn networks.

Finally, Acorn has also announced a completely different machine, the Acorn Pocket Book, based substantially on the Psion series 3, but with Acorn specified software. This costs around £200.

Details of all these new releases are covered in the following pages. All new products are scheduled to be available from the beginning of September.

## ACORN'S NEW A3000 RANGE AND THE A4000

Amongst the wealth of new products released by Acorn this autumn, the updated, revitalised A3000 series (plus the A4000) must be the most important and significant development. However, the range of new machines may seem confusing at first, so let's see what is happening.

### ARM250

At the heart of the new A3000 range is the ARM250. This is an integrated chip comprising ARM2 processor, VIDC (video controller), MEMC (memory controller), IOC (input/output controller), and PC bus interface (previously a set of four separate chips).

The processor operates at 16MHz with a performance of around 7MIPS (Million Instructions Per Second). ARM Ltd., the designer, claims that the ARM250 offers performance 1.4 times that of a 386DX PC running at 33MHz. The ARM250 thus clocks in somewhere between the ARM2 at 4MIPS and the ARM3 rated at 13MIPS. Compare this to the BBC Master, which operates at speeds more like 0.5MIPS, and with only 8-bit data paths, and you can see the speed differential.

The ARM250 is based on four ARM macrocells (ARM2 CPU, MEMC1, VIDC1, IOC1) providing a direct interface to DRAM (dynamic RAM) and

## Major New Releases from Acorn

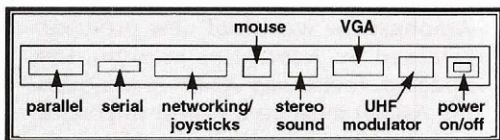
ROM with support for memory mapping and protection, bit-mapped displays with integral palette, and on-board video and stereo sound: digital to analogue converters (DACs). ARM Ltd. says that the ARM250 has been developed as a direct response to Acorn's need for a low cost power house for its new machines.



*The new A3010 for the consumer market*

### MOTHERBOARD

All the new A3000 style systems use the ARM250 mounted on a newly designed and sparsely populated motherboard. The new board design accommodates the power supply as well as all interfaces (including a single mini-expansion slot as used in the A3000), and fits in a totally new style of casing (see illustration). All the connections fit along the rear (see fig. 1), with a high density (2Mb unformatted) floppy disc drive mounted to the right (seen from the front), and a recessed reset button to the left. The entire system is now fully screened to meet international standards on interference from RF radiation, but this does, of course, add to the weight.



*Figure 1. Rear connectors on new A3000 series*

### THE NEW ARM250 MODELS

There are essentially three different ARM250-based models, with a number of variants in each case. The A3010 and A3020 share the same new style case (combining motherboard and keyboard). The A4000 has similar components but is packaged up as a three box system (similar to the A5000). All models run RISC OS 3.10, and thus provide the same powerful Desktop environment as the A5000.

### THE A3000 SYSTEMS

The A3010 is the new consumer model, and is finished in a warm grey case with green function keys - the result, apparently, of Acorn's market research. This model features 1Mb of RAM (upgradable to 2Mb) and comes with twin joystick ports (suitable for standard Commodore and Atari style switch joysticks). The A3010 also has a built-in TV modulator, the first Acorn computer to do so since the Master. It has no hard disc interface, but an IDE or SCSI hard drive could be added in conjunction with a suitable interface.

This machine is being sold in two packages. The *Family Pack* comprises an A3010 with software pack including Minerva's Easiword word processor, Quest for Gold (a game) and supporting audio cassette tapes at just £499 inc. VAT. The *Learning Curve* version provides the same machine and software as above, but also adds the Genesis Collection, the PC Emulator (now called PCSoft) and DR DOS 6, together with an Acorn standard



## Major New Releases from Acorn

colour monitor (with a new tilt and swivel base) all for £799 inc. VAT.

The new A3020 uses the same casing as the A3010, but in cream with the usual red instead of green function keys. It has 2Mb of memory expandable to 4Mb, a built in IDE hard disc controller, and a new standard networking socket in place of the twin joystick ports of the A3010. Missing is the TV modulator of the A3010.

Acorn says this system has been designed primarily for the needs of the educational market. It will be available in two versions, with and without a 60Mb hard disc drive. It will again be supplied with an Acorn standard monitor, but a multiscan monitor will be an alternative for an extra £50 (plus VAT).

Acorn also says that the existing A3000 will continue to be supplied "while there is demand" (at the new price of £525 ex. VAT), but it seems very likely that the attractions of the new machines will rapidly cause the demise of the old A3000. This system's only merit, in comparison with the new machines, is that it can be upgraded with the faster ARM3 processor, but it doesn't have the high density floppy drive of the new systems, or the new networking capability.

### A4000

The last model to be launched as part of this series (though it is something of a hybrid) is the A4000. This packages an A3020 in a three box configuration, like the A5000. The motherboard fits in a slim height A5000 style case, and has a separate keyboard similar to but not identical to that of the A5000. The A4000 is also supplied with an 80Mb hard drive, instead of the A3020's 60Mb unit.

Acorn says that this system is particularly aimed at the needs of secondary schools who prefer the industry standard three box approach to their computing needs, rather than the A3000 style. The A4000 is certainly an attractive and slim looking system, but it has no more expansion capability than the A3020, so no ARM3, and no expansion other than the single mini-expansion slot. There is also an A4000 *Home Office* package with EasiWriter word processor, Desktop Database and optional inkjet printer.



*The A4000 in its Home Office guise*

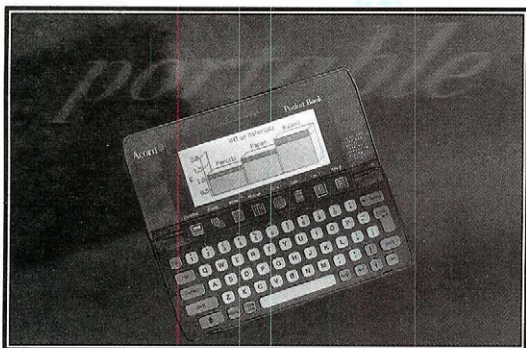
With five different systems now slotted in below the higher specification A5000, Acorn now has a highly competitive range of 32-bit systems, and should be well placed to attack both its traditional educational and enthusiast market, as well as the mass consumer markets through stores such as Dixons and Argos.

### THE ACORN POCKET BOOK

The Acorn Pocket Book is a very different product from the computers described

## Major New Releases from Acorn

above. It is a very small, hand-held computer, based on the Psion Series 3 portable organiser. The software included in the Pocket Book has been specially created to fit in with Acorn's guidelines, and a link system has been devised to enable the Pocket Book to integrate easily with the RISC OS Desktop.



**Acorn's new Pocket Book**

The Pocket Book's resident software consists of *Write* (a word processor with spelling checker), *Abacus* (a spreadsheet), *Cards* (a database), *Time* (clock and alarm) and *Calc* (a scientific calculator). The operating system, which is Psion's standard Series 3 OS, is multi-tasking, and allows the user to switch between the various tasks at will. There is 256K of RAM, and so-called Solid State Discs (SSDs) optionally provide up to 4Mb of additional data storage. There are two

types of SSD that can be used: Flash SSDs require no battery backup, but deleted files still take up memory, and RAM SSDs have their own lithium battery to keep data stored. The two standard AA batteries used by the Pocket Book last for about 80 hours of active computing, or a separate mains adaptor can be used.

There is also a programming language called OPL, which can be used to write applications on the Pocket Book. The OPL editor, used to write OPL programs, is available only as a separate product - just the run-time system is provided as standard.

Acorn hopes the Pocket Book will be bought by schools to enable pupils to collect data out in the field and process it in the classroom. It also hopes that concerned parents will invest in Pocket Books for their children, as at £249.95 inc. VAT (£199 ex. VAT to education) they are quite a lot cheaper than full Acorn RISC computers. We will have to wait and see.

### THE NEW PRODUCT RANGE

The following is a list of all new or repriced Acorn computer products, but does not show the whole Acorn range. Prices shown do not include VAT, and educational prices are shown in brackets where applicable.

A3000 1Mb FD	£525.00	(£475)	A4000 2Mb HD80 Multiscan	£999.00	(£999)
A3010 1Mb FD Family Solution	£424.68		A4000 Home Office Colour	£999.00	
Colour monitor for A3010	£220.00		A4000 Home Office Multiscan	£1049.00	
A3010 1Mb FD Learning Curve			A5000 2Mb HD80 Multiscan	£1399.00	(£1199)
(inc. Colour monitor)	£680.00		A5000 2Mb HD80 Learning Curve	£1445.96	
A3020 2Mb FD Colour	£749.00	(£649)	A5000 4Mb HD120 Multiscan	£1599.00	(£1399)
A3020 2Mb FD Multiscan	£799.00	(£699)	A5000 ES (Econet)	£1299.00	(£1149)
A3020 2Mb HD60 Colour	£899.00	(£799)	A5000 NS (Ethernet)	£1399.00	(£1249)
A3020 2Mb HD60 Multiscan	£949.00	(£849)	A540 4Mb HD120 (no monitor)	£1995.00	(£1699)
A4000 2Mb HD80 Colour	£949.00	(£849)	Acorn Pocket Book	£212.72	(£199)

All Acorn RISC machines are available from our sister company Beebug Ltd., from whom more information can be obtained.



# Demos in the Classroom

*Denis Atkinson looks at alternatives on the computer in the classroom.*

The majority of educational software is specifically designed to make the maximum use of a dialogue between the computer and the student. By carefully graded questions or by multi-choice techniques they are led through the steps of a particular learning process. In the event of an error or difficulty the user is brought back to an earlier stage and then encouraged to try again. By repetition of this technique it is anticipated that the student will gain an understanding of the principles and thought processes involved and will commit the essential facts to memory. Those teachers who have introduced computer assisted learning into their classroom will be familiar with this technique.

The use of a menu at the start of a program is also a well established and helpful feature of most educational software; as is the program which is a half-way house between a computer game and a purely academic exploration. How far *learning made easy* has inherent dangers is an interesting pedagogic question which, although outside the scope of this article, does raise important philosophical issues which we ignore at our peril.

## OTHER APPROACHES

Effective though this approach can be, I suggest that there is also an important place in the educational field for programs which are written specifically for class demonstration purposes. Such programs have a valuable contribution to make to the learning process and can be designed to be attractive to the class.

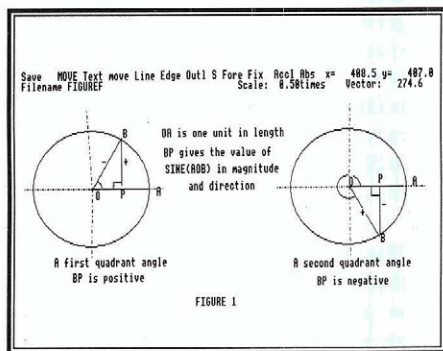
The demonstration program is especially useful where the associated graphics are somewhat complicated and so virtually impossible to reproduce on a conventional blackboard. In most cases the listing of such a program would be reasonably brief and the running time need not take more than a few minutes of the lesson. One important asset of such an approach is that, when presenting an academic subject or topic, pictures are generally more readily recalled by the student than, say, written statements, laws or mathematical formulae. Further, following a demonstration, the program can be run through again by the individual student just as easily as can the more familiar teaching software.

The argument is sometimes advanced that a demonstration program is merely an alternative to an educational film. To an extent this is true, but a computer program does have certain advantages over the film. For example, the listing can be amended to illustrate important ideas and facets of the theme being presented. Often very simple changes may alter the whole nature of a graphic and the impact of this upon a class can be most rewarding. Again, a menu may be used, just as in the more traditional program, to enable the user to select various paths to understanding the theme of the lesson. Few of us possess the expertise or the money to make our own films, but increasing numbers of teachers are able to write (or, at least, to amend) a computer program.

The listing, *Curves*, at the end of this article, which is intended for use with a

## Demos in the Classroom

class of students studying mathematics, is an example of a demonstration program. The fundamentals of trigonometry are often difficult to understand. In particular, the reason why the algebraic signs associated with the sine, cosine and tangent functions differ in each of the four quadrants can be hard to grasp. Also, students tend to forget which functions are positive and which are negative in the various quadrants. The object of the program, therefore, is to clarify the logic and to act as an aid to memory.

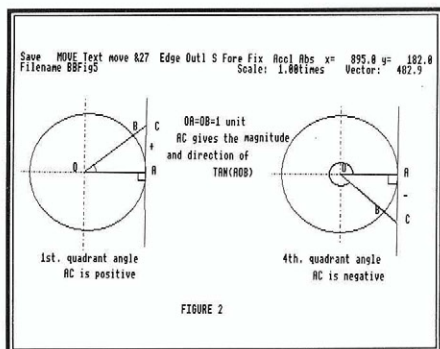


### Explaining the Sine function

Before reading further, type in and run the program, selecting speed 10 and the sine curve.

Now let's examine the graphics in detail. The sine function is plotted as the projection of the rotating unit vector on the 'y' or 'y' direction. Figures 1 and 2 illustrate this for two possible positions of the rotating vector. Since OB is unity, the value of  $\text{sine}(\text{AOB})$  is numerically the length of BP. In the case of the acute angle the algebraic sign is positive; and for the fourth quadrant angle, PB is in the negative direction of the conventional y axis. In the program, the vector passes through its entire sweep of 360 degrees

and the sine curve is plotted by projecting BP parallel to itself to measure off the value of each particular angle-sine as the vector rotates. Two circles are used merely for convenience. The graphic would be too confused if all the angle-sine measures were taken from the one circle.



### Explaining the tangent function

The cosine could have been treated in a similar manner but, instead, the opportunity is taken to derive the curve by using the idea of the rotating vector leading the sine function vector by 90 degrees. This is achieved by starting the rotating vector along the 'x' or 'y' axis.

The tangent function is plotted from the intercept on the tangent at (1,0) of the unit circle by the rotating (and extended) vector. Figure 2 illustrates this.

This demonstration program could not be produced on a blackboard; and the graphics are visually attractive. Figure 3 shows the final frame for the sine curve option, but the gradual construction of the graphic needs to be viewed to appreciate the theory which the program illustrates.

For class use there should be some preliminary explanation, but this is inherent in most demonstration programs.

Discussion after the running of the program should clarify the following.

1. The algebraic signs of the three functions in each of the quadrants.
2. The sine and cosine, in modulus, are less than or equal to unity.
3. The sine of (say) 120 degrees is equal to the sine of 60 degrees.
4. Names: cosine= ComplimentarySINE, tangent is derived from the intercept on the TANGENT to the unit circle.

### ABOUT THE PROGRAM

The listing is written for the model B or Master 128, and is structured with five main procedures. *PROCtime* enables the selection of a variable rate for the rotating vector. *PROCmenu* enables the selection of the sine, cosine or tangent function. *PROCcircle* draws the two circles which are common to each of the options. *PROCaxes* draws the relevant axes and calls up the particular procedure to plot the chosen trig function. *PROCend* presents a choice of a re-run, or a different rate or exit.

*PROcline*, *PROCfirst* and *PROCsecond* produce the rotating vector and the lines for projection or for the tangent intercept. The latter is in red to make it easier to follow what is happening.

There are a huge range of concepts that can be supported with this electronic blackboard approach; it would be interesting to see what ideas other readers can come up with.

```

10 REM Program Curves
20 REM Version B 1.0
30 REM Author D.N. Atkinson
40 REM BEEBUG October 1992
50 REM Program subject to copyright
    
```

```

60 :
100 MODE 1
110 ON ERROR GOTO 230
130 PROCtime
140 PROCmenu
160 VDU23,1,0;0;0;0;
170 PROCcircle(230)
190 PROCcircle(1050)
210 PROCaxes
230 ON ERROR OFF:MODE7
240 IF ERR<>17 THEN REPORT:PRINT" at 1
ine ";ERL
250 END
251 :
1000 DEF PROCmenu
1010 PRINT:COLOUR 129:CLS:PRINT TAB(8,4
);"GRAPHS OF TRIG FUNCTIONS"
1020 PRINTTAB(8,5);"-----
-----"
1030 PRINT:PRINT"Select the trig functi
on to be displayed and then press RET
URN"
1040 PRINT:PRINT" 1. SINE"
1050 PRINT:PRINT" 2. COSINE"
1060 PRINT:PRINT" 3. TANGENT"
1070 PRINT: INPUT F%
1080 IF F%<1 OR F%>3 THEN PRINT:PRINT "
Enter 1, 2 or 3": GOTO 1070
1090 COLOUR 128:CLS
1100 ENDPROC
1101 :
1110 DEF PROCcircle(L)
1120 FOR A=0 TO 8*ATN(1) STEP 0.1
1130 X=L+180*COS(A):Y=512+180*SIN(A)
1140 PLOT 69,X,Y
1150 NEXT
1160 IF F%=2 THEN PRINT TAB(3,25);" No
te that Cosine(A) is produced"
1170 IF F%=2 THEN PRINT TAB(3,26);"
by plotting sine(90+A)"
1180 ENDPROC
1181 :
1190 DEF PROCaxes
1200 MOVE 435,512
1210 DRAW 845,512
1220 MOVE 460,300
    
```

## Demos in the Classroom

```
1230 DRAW 640,724
1240 MOVE 640,300
1250 DRAW 640,724
1260 MOVE 820,300
1270 DRAW 820,724
1280 VDU28,3,4,37,1
1290 COLOUR 129:CLS
1300 IF F%=1 THEN PROCsinecurve
1310 IF F%=2 THEN PROCcosinecurve
1320 IF F%=3 THEN PROCTangentcurve
1330 ENDPROC
1331 :
1340 DEF PROCsinecurve
1350 PRINT TAB(2,3);"Sine curve from 0
to 360 degrees"
1360 PRINT TAB(2,3);"_____
"
1370 FOR A=(F%-1)*PI/2 TO F%*PI/2 STEP
0.1
1380 PROCline(230)
1390 FOR A=F%*PI/2 TO (F%+1)*PI/2 STEP
0.1
1400 PROCline(1050)
1410 FOR A=(F%+1)*PI/2 TO (F%+2)*PI/2 S
TEP 0.1
1420 PROCline(230)
1430 FOR A=(F%+2)*PI/2 TO (F%+3)*PI/2 S
TEP 0.1
1440 PROCline(1050)
1450 PROCend
1460 ENDPROC
1461 :
1470 DEF PROCcosinecurve
1480 PRINT TAB(0,3);"Cosine curve from
0 to 360 degrees"
1490 PRINT TAB(0,3);"_____
"
1500 FOR A=(F%-1)*PI/2 TO F%*PI/2 STEP
0.1
1510 PROCline(230)
1520 FOR A=F%*PI/2 TO (F%+1)*PI/2 STEP
0.1
1530 PROCline(230)
1540 FOR A=(F%+1)*PI/2 TO (F%+2)*PI/2 S
TEP 0.1
1550 PROCline(1050)
```

```
1560 FOR A=(F%+2)*PI/2 TO (F%+3)*PI/2 S
TEP 0.1
1570 PROCline(1050)
1580 PROCend
1590 ENDPROC
1591 :
1600 DEF PROCTangentcurve
1610 PRINT TAB(0,3);"Tangent curve from
0 to 360 degrees"
1620 PRINT TAB(0,3);"_____
"
1630 MOVE 550,140
1640 DRAW 550,825
1650 MOVE 730,140
1660 DRAW 730,825
1670 MOVE 410,140
1680 DRAW 410,825
1690 MOVE 1230,140
1700 DRAW 1230,825
1710 T=INKEY(100)
1720 FOR A=0 TO PI*.35 STEP 0.075
1730 PROCfirst
1740 Q=INKEY(50)
1750 NEXT
1760 FOR A=-.65*PI TO PI STEP 0.075
1770 PROCfirst
1780 Q=INKEY(50)
1790 NEXT
1800 FOR A=PI TO 1.35*PI STEP 0.075
1810 PROCsecond
1820 Q=INKEY(50)
1830 NEXT
1840 FOR A=1.65*PI TO 2*PI STEP 0.075
1850 PROCsecond
1860 Q=INKEY(50)
1870 NEXT
1880 PROCend
1890 ENDPROC
1891 :
1900 DEF PROCend
1910 VDU28,0,31,39,0
1920 PRINT TAB(5,28);"Type 1 for anothe
r trig function"
1930 PRINT TAB(5,29);"Type 2 to change
the speed"
```

*continued on page 20*

# Designing Near Letter Quality Characters (Part 2)

*Elaine Kemp continues her series on making your printer jump through hoops.*

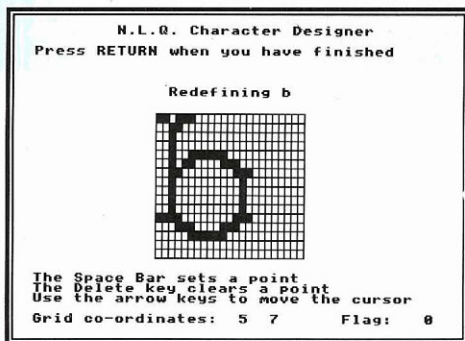
Last month, the program Design was presented as an aid for designing printer characters. This month, we look at designing both NLQ and draft characters. The first part of the program SciFont is given and this shows the definitions of some draft characters for scientific notation. Next month's listing will give the definitions of the NLQ characters (it is assumed that your printer can accept redefined characters). If your printer uses a different matrix from 11x8 for draft and 23x16 for NLQ then SciFont will not work for your printer without extensive modification.

## ENTERING THE PROGRAM

Design calculates the data which must be sent to the printer in order to redefine the characters in the printer's RAM. SciFont illustrates one method of actually using this data in order to redefine several characters - each character has been defined individually. The advantage of this approach is that you need only type in the definitions of the characters you require. You should type in line 100, and also include lines 1250 to 2180.

Now type in the two lines necessary for each character you require using the REM statements as a guide. Do not alter the line numbering or the program will not work and you would find it impossible to add further lines next month. However, you should alter any control codes to suit your own printer. Save the first part of the program as *ScPart1*.

If you wish to design your own characters, then the program should act as a guide for you to use your own data. The first number in PROCdata(N%,M%) is the line number of the data for the character, and the second is the number of data items, 17 for draft characters and 52 for NLQ. The definitions given for the characters include horizontally adjacent dots.



*Redefining the letter 'b'*

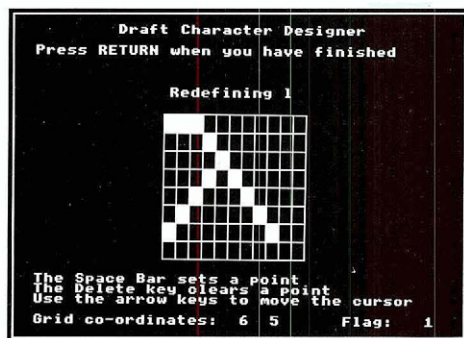
## DESIGNING CHARACTERS

You should consult your manual for guidance on designing new characters for your printer. If the characters you design are to be used in conjunction with your printer's own font, then they should have a similar appearance. A careful examination of several letters of the NLQ font on the Panasonic KX-P1180 indicated the following:

Lower case letters without descenders or ascenders have their base on the third row and their top in the twelfth

## Designing Near Letter Quality Characters

row. In draft these positions are the second and sixth rows. The grid coordinates of the cursor are displayed in the program Design, to help positioning the dots.



*Designing mu*

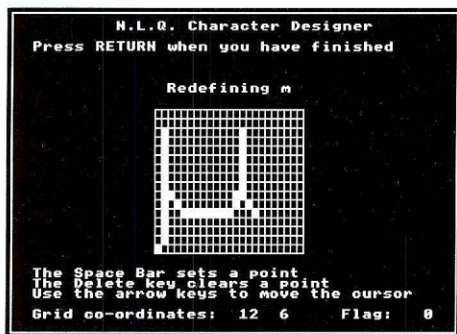
If there is an ascender, as in b and d, then the ascender occupies rows 13 to 16 as well (see Fig.1). In draft these positions are rows 7 and 8 (see Fig.2). Upper case letters occupy rows 3 to 15. Most of the Greek capital letters in Scifont occupy rows 3 to 16.

Lower case letters with descenders like q and p are printed using the lower eight pins. The base position of these letters is then in row 5 and the top row 14 (see Fig.3). In draft these will be rows 3 and 7.

The Panasonic printer manual suggests that for NLQ letters the start and end positions should be in odd numbered columns. It is not easy to determine the widths of characters, but 19 columns for wide characters, and 15 for 'medium' width characters gives a satisfactory appearance. Characters should usually start in the first column. Not all the

characters in Scifont conform to these guidelines.

When designing draft characters, remember that for horizontally adjacent dots the second dot will not be printed out normally, even if you are required to specify them (they are included in the definition to enable printing in NLQ mode when selected from the control panel). Thus, when placing dots next to each other in the same row, an odd number of dots will usually give a better appearance.



*Designing lambda*

### STORING CHARACTERS

When a new character has been designed, the definition of the character is stored in the printer's RAM. Before you download any new characters, the entire character set should be copied by the printer from its ROM definition set to its RAM. If this is not done then the remaining character definitions are empty. If only a few new characters are needed they can be stored in place of infrequently used characters with ASCII values below 128. These few characters could also be redefined for the screen as well. In this case the printer should be set



to print using the download font, either being selected from the Basic program, or by sending control codes from a word processor. Direct substitution may then be used.

## USING THE PROGRAM

The program should be run from Basic with the printer on line. If you have typed in the whole program PROCdemo will be run. This will print out the full character set in draft, but if it doesn't then look at your manual to check that the correct codes are being sent. The program leaves the printer with the internal font selected. In some printers the reset command (ESC @) will clear the download font, if this is the case with your printer you must ensure that this command is not sent. You may then enter your word processor.

Scifont redefines the printer's character set in both the normal ASCII locations and in those of the alternate character set (sometimes called the Italic set). If your new characters are stored in locations below 128, then it is easy to print a new character. When the printer's internal font is selected, all characters appear as normal, both on the screen and on paper. If the download font is selected then the redefined characters are printed out on paper. Printing new characters will be considered in more detail next month.

So now you know how to design an entire character set - if anyone produces a good one then please let us have a copy here at BEEBUG.

```
10 REM Program ScPart1
20 REM Version B 1.0
```

```
30 REM Author Elaine Kemp
40 REM BEEBUG October 1992
50 REM Program subject to copyright
60 :
100 PROCdownload
110 REM All the following are Draft characters
120 REM The character in brackets is the character used for substitution
130 REM If the character is preceded by I then it is defined in the Italic position
140 PROCdata(3000,17):REM half (")
150 PROCdata(3010,17):REM third (#)
160 PROCdata(3020,17):REM quarter ($)
170 PROCdata(3030,17):REM plus/minus (+)
180 PROCdata(3040,17):REM divide (/)
190 PROCdata(3050,17):REM degrees (0)
200 PROCdata(3060,17):REM 2 subscript (2)
210 PROCdata(3070,17):REM 2 superscript (I 2)
220 PROCdata(3080,17):REM 3 subscript (3)
230 PROCdata(3090,17):REM 3 superscript (I 3)
240 PROCdata(3100,17):REM 4 subscript (4)
250 PROCdata(3110,17):REM 4 superscript (I 4)
260 PROCdata(3120,17):REM Contains (:)
270 PROCdata(3130,17):REM Does not contain (I :)
280 PROCdata(3140,17):REM Is an element of (;)
290 PROCdata(3150,17):REM Is not an element of (I ;)
300 PROCdata(3160,17):REM Less than or equals (<)
```

## Designing Near Letter Quality Characters

```
310 PROCdata(3170,17):REM Much less th
an (I <)
320 PROCdata(3180,17):REM Approximatel
y = (=)
330 PROCdata(3190,17):REM Not equal to
(I =)
340 PROCdata(3200,17):REM Greater than
or equals (>)
350 PROCdata(3210,17):REM Much greater
than (I >)
360 PROCdata(3220,17):REM Equivalent (
?)
370 PROCdata(3230,17):REM Not equivale
nt (I ?)
380 PROCdata(3240,17):REM Infinity (∞)
390 PROCdata(3250,17):REM Delta (Δ)
400 PROCdata(3260,17):REM Phi (Φ)
410 PROCdata(3270,17):REM Gamma (Γ)
420 PROCdata(3280,17):REM Lambda (Λ)
430 PROCdata(3290,17):REM Omega (Ω)
440 PROCdata(3300,17):REM Pi (Π)
450 PROCdata(3310,17):REM Psi (Ψ)
460 PROCdata(3320,17):REM Sigma (Σ)
470 PROCdata(3330,17):REM Theta (Θ)
480 PROCdata(3340,17):REM alpha (α)
490 PROCdata(3350,17):REM beta (β)
500 PROCdata(3360,17):REM delta (δ)
510 PROCdata(3370,17):REM eta (ε)
520 PROCdata(3380,17):REM phi (φ)
530 PROCdata(3390,17):REM gamma (γ)
540 PROCdata(3400,17):REM iota (ι)
550 PROCdata(3410,17):REM kappa (κ)
560 PROCdata(3420,17):REM lambda (λ)
570 PROCdata(3430,17):REM mu (μ)
580 PROCdata(3440,17):REM nu (ν)
590 PROCdata(3450,17):REM omega (ω)
600 PROCdata(3460,17):REM pi (π)
610 PROCdata(3470,17):REM psi (Ψ)
620 PROCdata(3480,17):REM rho (ρ)
630 PROCdata(3490,17):REM sigma (σ)
```

```
640 PROCdata(3500,17):REM theta (θ)
650 PROCdata(3510,17):REM tau (Τ)
660 PROCdata(3520,17):REM xi (Ξ)
670 PROCdata(3530,17):REM zeta (Ζ)
1240 :
1250 PROCdemo
1260 TIME=0:REPEATUNTILTIME>200:VDU3
1270 END
1280 :
2000 DEF PROCdownload
2010 CLS:PRINT"Please wait while the da
ta""is downloaded to the printer"
2020 VDU2,1,27,1,58,1,0,1,0,1,0
2030 ENDPROC
2040 :
2050 DEF PROCdata(N%,M%)
2060 RESTOREN%:FORI%=1TOM%:READdata%:VD
U1,data%,:NEXT
2070 ENDPROC
2080 :
2090 DEF PROCdemo
2100 VDU1,27,1,37,1,1,21:REM Select dow
nload font
2110 FOR I%=32 TO 126:PRINT CHR$(I%);:N
EXT:PRINT
2120 FOR I%=160 TO 254:PRINT CHR$(I%);:
NEXT:PRINT
2130 VDU6,1,27,1,120,1,1,21:REM Select
N.L.Q.
2140 FOR I%=32 TO 126:PRINT CHR$(I%);:N
EXT:PRINT
2150 FOR I%=160 TO 254:PRINT CHR$(I%);:
NEXT:PRINT:PRINT
2160 VDU6,1,27,1,120,1,0:REM Select dra
ft
2170 VDU1,27,1,37,1,0:REM Select ROM fo
nt
2180 ENDPROC
2190 :
2200 REM Draft definitions follow
```

## Designing Near Letter Quality Characters

2210 REM Note change in line numbers  
3000 DATA 27,38,0,34,34,138,2,244,8,16,  
32,73,147,17,21,9,0:REM half  
3010 DATA 27,38,0,35,35,138,2,244,8,16,  
32,81,149,21,29,19,0:REM third  
3020 DATA 27,38,0,36,36,138,2,244,8,16,  
34,70,138,18,63,2,0:REM quarter  
3030 DATA 27,38,0,43,43,135,34,34,34,25  
0,34,34,34,0,0,0,0:REM plus/minus  
3040 DATA 27,38,0,47,47,137,16,16,16,21  
4,214,214,16,16,16,0,0:REM divide  
3050 DATA 27,38,0,48,48,133,96,144,144,  
144,96,0,0,0,0,0:REM degrees  
3060 DATA 27,38,0,50,50,5,9,19,17,21,9,  
0,0,0,0,0:REM 2 subscript  
3070 DATA 27,38,0,178,178,133,72,152,13  
6,168,72,0,0,0,0,0:REM 2 superscript  
3080 DATA 27,38,0,51,51,5,17,21,21,29,1  
9,0,0,0,0,0:REM 3 subscript  
3090 DATA 27,38,0,179,179,133,136,168,1  
68,232,152,0,0,0,0,0:REM 3 superscript  
3100 DATA 27,38,0,52,52,7,2,6,10,18,31,  
2,2,0,0,0:REM 4 subscript  
3110 DATA 27,38,0,180,180,135,16,48,80,  
144,248,16,16,0,0,0:REM 4 superscript  
3120 DATA 27,38,0,58,58,136,28,34,34,34  
,34,34,34,34,0,0:REM Contains  
3130 DATA 27,38,0,186,186,136,28,34,34,  
34,127,34,34,34,0,0:REM Does not conta  
in  
3140 DATA 27,38,0,59,59,136,28,42,42,42  
,42,42,42,42,0,0:REM Is an element of  
3150 DATA 27,38,0,187,187,136,28,42,42,  
42,127,42,42,42,0,0:REM Is not an ele  
ment of  
3160 DATA 27,38,0,60,60,135,2,34,2,82,2  
,138,2,0,0,0:REM Less than or equals  
3170 DATA 27,38,0,188,188,136,16,40,68,  
130,16,40,68,130,0,0:REM Much less tha  
n

3180 DATA 27,38,0,61,61,137,36,72,72,72  
,36,18,18,18,36,0,0:REM Approximately =  
3190 DATA 27,38,0,189,189,137,40,40,42,  
44,56,104,168,40,40,0,0:REM Not equal to  
3200 DATA 27,38,0,62,62,135,2,138,2,82,  
2,34,2,0,0,0:REM Greater than or equal  
s  
3210 DATA 27,38,0,190,190,136,130,68,40  
,16,130,68,40,16,0,0:REM Much greater  
than  
3220 DATA 27,38,0,63,63,137,84,84,84,84  
,84,84,84,84,84,0,0:REM Equivalent  
3230 DATA 27,38,0,191,191,137,84,84,84,  
84,254,84,84,84,84,0,0:REM Not equivalen  
t  
3240 DATA 27,38,0,64,64,139,28,34,34,34  
,20,8,20,34,34,34,28:REM Infinity  
3250 DATA 27,38,0,68,68,138,2,6,10,18,3  
4,66,130,98,26,6,0:REM Delta  
3260 DATA 27,38,0,70,70,137,24,36,36,16  
5,255,165,36,36,24,0,0:REM Phi  
3270 DATA 27,38,0,71,71,138,130,254,130  
,128,128,128,128,128,128,64,0:REM Gamma  
3280 DATA 27,38,0,76,76,139,2,6,10,16,3  
2,64,128,96,26,6,2:REM Lambda  
3290 DATA 27,38,0,79,79,137,50,74,134,1  
28,128,128,134,74,50,0,0:REM Omega  
3300 DATA 27,38,0,80,80,137,130,254,130  
,128,128,128,130,254,130,0,0:REM Pi  
3310 DATA 27,38,0,208,208,139,128,64,48  
,8,137,255,137,8,48,64,128:REM Psi  
3320 DATA 27,38,0,83,83,137,130,198,170  
,146,130,130,130,130,198,0,0:REM Sigma  
3330 DATA 27,38,0,84,84,139,56,68,130,1  
86,146,146,146,186,130,68,56:REM Theta  
3340 DATA 27,38,0,97,97,136,28,34,34,34  
,20,8,20,34,0,0,0:REM alpha  
3350 DATA 27,38,0,98,98,98,7,127,132,164,1  
64,164,164,88,0,0,0:REM beta  
3360 DATA 27,38,0,100,100,135,12,82,162

## Designing Near Letter Quality Characters

```
,162,162,146,12,0,0,0:REM delta
3370 DATA 27,38,0,101,101,9,64,124,32,6
4,64,64,64,64,63,0,0:REM eta
3380 DATA 27,38,0,102,102,7,56,68,68,25
5,68,68,56,0,0,0,0:REM phi
3390 DATA 27,38,0,103,103,8,64,64,32,22
,9,22,32,64,0,0,0:REM gamma
3400 DATA 27,38,0,105,105,184,0,0,0,60,
2,0,0,0,0,0:REM iota
3410 DATA 27,38,0,107,107,134,62,8,8,20
,20,34,0,0,0,0:REM kappa
3420 DATA 27,38,0,108,108,137,130,132,1
36,80,32,16,8,4,2,0,0:REM lambda
3430 DATA 27,38,0,109,109,9,1,126,4,4,4
,4,4,120,4,0,0:REM mu
3440 DATA 27,38,0,110,110,138,32,32,32,
16,8,2,4,8,80,32,0:REM nu
3450 DATA 27,38,0,111,111,137,28,34,2,2
```

```
,60,2,2,34,28,0,0:REM omega
3460 DATA 27,38,0,112,112,137,34,60,32,
32,32,32,32,60,34,0,0:REM pi
3470 DATA 27,38,0,240,240,9,120,4,4,4,1
27,4,4,4,120,0,0:REM psi
3480 DATA 27,38,0,114,114,7,63,72,68,68
,68,68,56,0,0,0,0:REM rho
3490 DATA 27,38,0,115,115,137,28,34,34,
34,34,50,44,32,0,0,0:REM sigma
3500 DATA 27,38,0,116,116,137,56,84,146
,146,146,146,146,84,56,0,0:REM theta
3510 DATA 27,38,0,244,244,137,32,32,32,
32,60,34,32,32,32,0,0:REM tau
3520 DATA 27,38,0,120,120,136,128,120,1
64,164,165,165,133,2,0,0,0:REM xi
3530 DATA 27,38,0,122,122,136,64,56,101
,165,165,165,69,2,0,0,0:REM zeta B
```

## Demos in the Classroom (continued from page 14)

```
1940 PRINT TAB(5,30);"Type 3 to END"
1950 PRINT TAB(5,31);"Now press RETURN"
1960 INPUT I%
1970 IF I%<1 OR I%>3 PRINT":GOTO1920
1980 COLOUR 128:CLS
1990 IF I%=1 THEN GCOLOR,3:GOTO 140
2000 IF I%=2 THEN GOTO 130
2010 COLOUR 128:CLS:END
2020 ENDPROC
2030 DEF PROCline(M)
2040 MOVE M,512
2050 DRAW M+180*COS(A),512+180*SIN(A)
2060 DRAW 460+(A*180/PI-(F%-1)*90),512+
180*SIN(A)
2070 W=INKEY(n*10):NEXT
2080 ENDPROC
2081 :
2090 DEF PROCfirst
2100 GCOLOR,3
2110 MOVE 230,512
2120 DRAW 230+180*COS(A),512+180*SIN(A)
2130 DRAW 410,512+180*TAN(A)
2140 GCOLOR,1
2150 DRAW 460+(180*A)/PI,512+180*TAN(A)
```

```
2160 ENDPROC
2161 :
2170 DEF PROCsecond
2180 GCOLOR,3
2190 MOVE 1050,512
2200 DRAW 1050+180*COS(A),512+180*SIN(A)
)
2210 DRAW 1230,512+180*TAN(A)
2220 GCOLOR,1
2230 DRAW 640+((180*A)/PI-180),512+180*
TAN(A)
2240 ENDPROC
2241 :
2250 DEF PROCtime
2260 PRINT":PRINT" Select the time bet
ween the vector rotations and then
press RETURN"
2270 PRINT":PRINT" Select 1 to 10, one
being the fastest"
2280 PRINT: INPUT n
2290 IF n<1 THEN n=1
2300 IF n>10 THEN n=10
2310 ENDPROC B
```

# Mr Toad's Machine Code Corner

*This month the chips are down and our toad's in a hole.*

Happy Autumn, Toad fans. This month, Mr T was going to describe a marvellous project: you could use the spare bit in the flags register, bit 5, like this:

```
PHP:PLA
(put flags in the accumulator)
ORA #&20
(or AND #&DF set/reset bit 5)
PHA:PLP
```

See? A user flag of your very own, inside the 6502. You could test it with:

```
PHP:PLA:
AND #&20.
```

However, the best-laid plans o' toads an' men... it doesn't work; not for Mr T, anyway. The bit is always set, whatever you do. Maybe someone will write in and explain why. It may be that it would work on another version of the chip - I was using the 65C02 of a Master. Try it on an earlier Beeb, if you've got one.

## CHIPS WITH EVERYTHING

I'm sure you're aware that popular chips like the 6502 are made by several manufacturers and are not necessarily identical internally. All they have to do is execute the documented instruction set in the prescribed way, i.e. when certain pins on the chip go high or low, the chip must respond by pulling certain pins high or low in the right pattern. How this is achieved is basically up to the manufacturers: they can redesign the chip internally if they want. One could make up a circuit out of triodes or relays which would interpret 6502 instructions correctly - it would just be a few thousand times bigger, draw many kilowatts of power and run a few hundred or thousand times slower. It is said that in Ancient Greece, CPUs took the form of vast mazes inhabited by trained hamsters which ran through various gates on seeing certain little flags. Computing power was limited by the fact that the

hamsters would die of old age during any but the shortest routines.

We all know, for example, that the Master's CMOS (Complementary Metal Oxide Semiconductor) 65SC12 chip reacts quite differently from the older version when it comes to undocumented instructions, and others like the Turbo's R65SC102 are different again. So muck around with mystery flag five and see what turns up. Best effort sent in wins the customary "I'M A SWOT" badge.

Two points of interest do emerge from Mr T's failure, though:

1. Have another look at the timings and effects on the flags of all the push and pull instructions. They vary.
2. It's worth remembering that you can fiddle with the real flags by the above technique, also you can do tricks like TXY (transfer X to Y) by pushing one and pulling the other. And, when the only purpose of a pull is to balance the stack, pull any register you like.

While we're on about hardware, this seems like a good time to answer Trefor Greeb of Llanibwng Isaf, who writes: "What is all them ROM and RAM and EPROM, then? They are very confusing, isn't it, Dai Broga?" Thank-you very much, Mr Greeb, don't call us...

## THE NAMING OF PARTS

The funny thing about the name 'RAM' is that it isn't used to mean what it stands for - Random Access Memory. 'Random Access' simply means that one can retrieve the contents of any address without going through all the addresses in front of it. The only medium still in use which *isn't* random access is cassette tape, which has to be wound to the start

## Mr Toad's Machine Code Corner

---

of any given block of data. Discs are random access, since the head can be stepped to any desired track, and although it may have to wait for the right sector to spin past, this is virtually instantaneous.

In the early days of computing, many weird and wonderful lashups were used to store data, including (honestly!) long glass tubes full of mercury with a piezo-electric device at one end turning the bits of data into pulses of pressure, and another device at the other end to pick up the signals a little while later, clean them up and send them back to the start again. To read any given bit, you had to wait until it got to the end of the tube: not random access. Still, ROM wasn't built in a day.

Any modern type of memory chip is random access, be it RAM, ROM, EPROM or whatever, in that any address can be read by the CPU which puts the address on the address bus and sets the read/write line to 'read'. The chip in which the selected address resides decodes the address and reads the contents. It puts the byte onto the data bus and Bob's yer uncle. What we call RAM is, in fact, any type of read/write memory, and in practice RAM is also volatile - it loses its memory when the power is off.

The most common type of RAM chip is Dynamic RAM or DRAM. Each bit of data is held in just one capacitor which is either charged or discharged. You can get an awful lot of capacitors on one chip but, because the tiny capacitors formed on the chip are far from leakproof, each address has to be refreshed every few milliseconds. This means that the CPU, or some other device, has to read the byte in each address and then write it back. A lot of power is wasted by the leakage of current and losses in the constant read and write operations, so the chips get

very hot. In hamster-maze RAM, you had to keep feeding the critters every day, hence the word refresh. HRAM was also mainly nocturnal, which slowed it down a lot. On the Beeb, the video circuitry looks after the refreshing in the intervals between CPU cycles, so no time is lost.

There is also a type of memory known as Static RAM, in which each bit of data is stored in a flip-flop. This is quicker and flip-flops don't leak, so no refreshing is needed and little power used - almost no power at all if the chip is idle - but since each flip-flop contains many components, much more space is taken up.

The Master's clock chip contains 50 spare bytes of CMOS static RAM which is maintained by the battery and holds the 'CONFIGURE' information. What a pity the whole memory can't be held in battery-backed RAM! Most of the 50 bytes are free, though, and you can use them. Perhaps we'll discuss it in a future issue.

The word ROM means what it says - Read-Only Memory. It cannot be written to, but the data is not lost when you switch off. Things like the MOS ROM, which are produced in quantity, have the data built in when they are made (mask-programmed), but quite a lot of commercial Sideways 'ROMs' come in EPROMs - Erasable Programmable ROMs. These are blank ROM chips which hold stored charges a bit like DRAMs, but can only be written to by a device called a *blower*, which uses a higher voltage than the normal supply of 5V. The charges then last for years, but they can be erased under ultra-violet light. Blowers are also sometimes still called *burners*, because before EPROMs there were PROMs which were programmed by

*continued on page 24*

# Interrupt Driven Motor Control

*In which John Richardson plays secretaries.*

I recently had to catalogue a collection of old books that was composting away in our loft. Being a reader of this magazine, I naturally turned to BEEBUG's Filer for this task. However, it was not practical to take a Master up into the heights of the house and so I dictated the details of the books as I found them and returned with relief to the keyboard ready to enter them into Filer for sorting and cataloguing.

It was only then that I realized that controlling a tape player with one hand and typing with two exposes certain anatomical inadequacies which I suspect I share with most BEEBUG readers. I found myself wishing for one of those foot operated switches beloved of secretaries.

Now the BBC and Master have provision for controlling a cassette player that most of us will not have used since those prehistoric days when disc drives were £600 and we spent half our lives "Searching", "Loading" or pressing "RECORD then RETURN". If, like me, you have a redundant tape recorder with motor control it is a simple matter to program a key to switch it on or off and thus emulate a foot switch. The program listed at the end of this article does this via the key-pressed interrupt and thus should work from most applications.

When the code produced is installed, the Tab key is turned into a toggle that operates the cassette relay and thus elicits that click you will not have heard for years. The Tab key was an obvious

choice because of its prominence; normal function of the Tab key can still be accessed by pressing down Shift simultaneously, which bypasses the routine.

## PROGRAM NOTES

Type in the short program and save it to disc before running it. When run it will assemble the required code at &AB3 - the memory normally reserved for cassette or serial operations and which should be free on most machines. Master users may opt instead for &DD00 by changing the value of start% in line 120. It will then ask whether you wish to save the code and on receiving a 'Y' it prompts for a filename. Once saved the code is most conveniently placed in a library directory where it can be accessed with the normal \*filename. The program works from Basic, View, Wordwise and even the usually impenetrable Interword. Strangely, however, it does not work in Edit.

```
10 REM Program Motor Control
20 REM Version B 1.0
30 REM Author J M Richardson
40 REM BEEBUG October 1992
50 REM Program subject to copyright
60 :
100 MODE 3
110 osbyte=&FFF4:oswrch=&PFEE
120 start%=&AB3
130 FOR pass=0 TO 3 STEP 3
140 P%=start%
150 [
160 OPT pass
170 :
180 .prepare
190 LDX #2:LDA #14:JSR osbyte
```

## Interrupt Driven Motor Control

```
200 LDA #service MOD 256:STA &220
210 LDA #service DIV 256:STA &221
220 LDA #0:STA flag
230 RTS
240 :
250 .service
260 PHP:PHA:TYA:PHA:TXA:PHA
270 :
280 CPY #9
290 BNE carryon
300 LDX#&FF:LDY#&FF:LDA#&81:JSR osbyte
310 CPX #&FF
320 BEQ carryon
330 :
340 LDA flag
350 EOR #1
360 TAX:STA flag
370 LDA #&89:LDY #0:JSR osbyte
```

```
380 :
390 PLA:PLA:PLA:PLP:LDA #0
400 RTS
410 :
420 .carryon
430 PLA:TAX:PLA:TAY:PLA:PLP
440 RTS
450 :
460 .flag
470 ]
480 NEXT pass
490 :
500 PRINT"Save Code (Y/N)? ";
510 IF INSTR("Yy",GET$)=0 PRINT "No":E
ND
520 INPUT"Yes.""Filename: "name$
530 c$="SAVE "+name$+" "+STR$(start$)
540 PRINT "***+c$:OSCLI(c$) B
```

## Mr Toad's Machine Code Corner (continued from page 22)

burning out internal links like thousands of tiny fuses.

There are often EPROM blowers and erasers going cheap in the BEEBUG small ads, and Mr T would suggest you consider buying one. The inimitable TOAD ROM 90 lives in SRAM socket 8 and contains a customised collection of extra star-commands. It also plays 'Land Of Hope And Glory' when you switch on and displays a pretty screen. You can put your own EPROMs into cartridges, too.

In the Compact, the CONFIGURE parameters are held in an EEPROM instead of CMOS RAM. This is an Electrically Erasable Programmable ROM which is not volatile - it keeps its data without a battery when the power is off - but can be erased and programmed without special devices. Both EPROMs and EEPROMs have a limited number of erase/program cycles, after which they conk out.

### WHEN IS A ROM NOT A ROM?

Finally, a bit of jargon peculiar to the Beeb - 'ROMs' in RAM. Being a philologist by training, Mr T likes that one as a nice example of semantic drift: because Basic, View, etc. as well as a lot of commercial programs for the BBC B were in separate ROM chips - and much commercial stuff still is for the Master - the word ROM acquires the extended meaning 'any software to run on a Beeb between &8000 and &BFFF'. The correct 'ROM image' is even more confusing. That's the way language goes, reptile readers.

Got it, now, then, is it, Mr Greeb? The Nobbler's Arms in Llanbibwg will never be the same again once you've held forth on this lot for an hour or two.

Next month Mr T looks for a new nation to offend. (It's 1992 - why not France? Ed.) We will also be publishing the layout of a hamster-maze co-processor for the BBC B, modified for racing-gerbils on the Turbo version. B



# Quadric Surfaces

*This fascinating program by Jan Stuurman, originally published in BEEBUG Vol.6 No.3, allows exciting three-dimensional images to be displayed.*

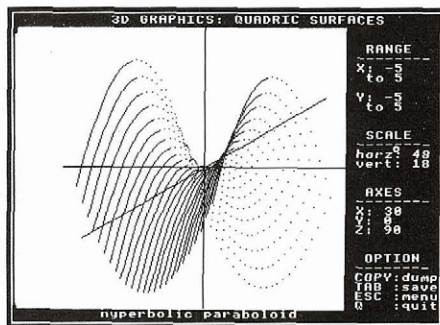
Three-dimensional graphics on a computer screen are always fascinating to watch. Wire-frame graphics are the most popular, and computationally the easiest way of picturing a graph in three dimensions. However, ordinary wire-frame pictures are often confusing to the viewer, as it is often difficult to see which lines are in the foreground and which are behind. Removing hidden lines is one way of solving this ambiguity, and a program to do this was published in BEEBUG Vol.4 No.6. The price we usually pay for removing hidden lines is the loss of all details of the hidden parts of the surface.

The method used here, in the program *Quadric*, also creates an illusion of depth, but retains some details of the parts in the background. This is achieved by a combination of colour and dot density. The part of the surface that is "closest" to the viewer is more brightly coloured and its dots are connected by lines (using PLOT 5). Points in the background are separated (using PLOT 69) and coloured less brightly.

## RUNNING THE QUADRICS PROGRAM

To illustrate the power of this method, data for seven different surfaces is included as part of the Quadric program listed below. Type in the program and save to disc before running. After choosing a surface from the menu, the user is asked to enter values for the co-ordinate angles. The default values are 30, 0 and 90 degrees for the x, y and z-axes respectively. Pressing Return leaves

the angles of the co-ordinate axes unchanged. The user is finally asked whether or not the axes are to be drawn.



*An example graph*

The values of the most important parameters are shown in a text area on the right of the screen, leaving an almost square graphics window on the left. Once plotting of a surface is completed, the user is offered a number of options. Screens may be dumped to a printer, using any suitable mode 1 screen dump routine. Alternatively, the screen may be saved to disc for quick \*LOADing. Remember to use the same colour assignments (VDU 19) before reloading previously saved screens. Pressing the Escape key at any time will take you back to the menu screen. Option 'Q' will quit the program.

You can readily experiment with the program by varying any of the parameters contained in the data statements (lines 10000 to 10630), or the functions themselves in the same lines. If you want to try alternative colour combinations, then change the VDU 19 statements at lines 1020 and 1030, and

## Quadric Surfaces

the assignments at line 1040. Users with monochrome screens may well find this worthwhile.

### MATHEMATICAL NOTES

The first six sets of data statements generate the main types of quadric surface (derived from quadratic equations). All other (non-degenerate) quadric surfaces are derived from these by rotation, translation and scaling. The seventh set of data statements creates a non-quadric surface around a multiple saddle point.

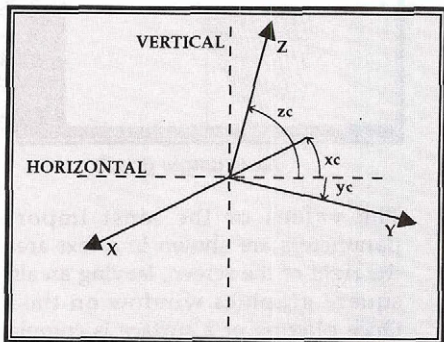


Figure 1

The position of the co-ordinate axes is determined by their angle relative to the BBC's horizontal and vertical axes as shown in figure 1. Positive angles are rotated anti-clockwise. The orientation of the x-axis is later reversed by the program so that positive x-values lie "towards" the viewer.

### PROGRAM NOTES

The last set of DATA statements (lines 10700-10720) shows the general format. The user can easily add new graph specifications using this format. Note, however, that the last data statement must contain a "?" as at line 10700, and that sets of data start at consecutive

hundreds, i.e. 10200, 10300, etc. When experimenting with new graphs, choose large values for *xstp* and *ystp* initially. Once the co-ordinate end points and scaling factors are determined, the step values can be adjusted to give the clearest picture.

If the expression of the graph includes the function SQR, the variable S% is set to TRUE. Lines 2200-2240 then extract the argument of the SQR function, *arg\$*, from the expression by balancing brackets: when the number of opening and closing brackets after SQR are equal, *arg\$* is contained between the outermost set of brackets and MID\$ is applied.

Similar treatment will be necessary for expressions that contain other Basic functions with restricted domains. For the functions LOG and LN line 6060 becomes:

```
6060 IF S% IF EVALarg$<=0 GOTO 6100
```

while for ACS or ASN we get:

```
6060 IF S% IF EVALarg$<-1 OR EVALarg$>1 GOTO 6100
```

It is, of course, also necessary to change the SQR in line 2190 to the new Basic function keyword. In all these cases lines 6020 and 6120 must be omitted from the program, and line 6070 simplifies to:

```
6070 Z=EVAL(expr$)
```

When the expression includes SQR, both branches of the surface are plotted corresponding to the positive (CHR\$ 43) and the negative (CHR\$ 45) value of the square-root function. This is achieved most easily by the REPEAT-UNTIL construct as in lines 6020 and 6120.

```
10 REM Program Quadric
20 REM Version B 1.4
30 REM Author Jan Stuurman
```

```

40 REM BEEBUG October 1992
50 REM Program Subject to Copyright
60 :
100 MODEL:ON ERROR GOTO 900
110 PROCinit:DIM os 40
120 PROCmenu
130 PROCaxes:PROCparam
140 PROCsurface:PROCOption
150 MODE7:*FX4,0
160 END
170 :
900 IF ERR=17 GOTO120
910 VDU26,23,1,255;0;0;0;:*FX4,0
920 REPORT:PRINT" at line ";ERL
930 END
940 :
1000 DEFPROCinit:*FX4,1
1010 VDU23,1,0;0;0;0;
1020 VDU19,0,0;0;0;19,1,4;0;
1030 VDU19,2,5;0;0;19,3,7;0;
1040 black=0:blue=1:magenta=2:white=3
1050 COLOUR128+white:CLS:COLOUR blue
1060 PRINTTAB(5)"3D GRAPHICS: QUADRIC S
URFACES"
1070 VDU24,0;32;956;988;29,480;512;
1080 L=476:GCOL0,128+black:Q%=0
1090 xc=30:yc=0:zc=90:dr=PI/180
1100 ENDPROC
1110 :
2000 DEFPROCmenu LOCALB%,G%,N%,O%,P%
2010 VDU28,0,31,39,1,12:COLOUR blue
2020 PRINTTAB(15,2)"GRAPH MENU":N%=-1
2030 REPEAT N%=N%+1:RESTORE (10000+100*
N%)
2040 READname$:IF name$="?" GOTO 2060
2050 PRINTTAB(8,4+N%)name$
2060 UNTIL name$="?":COLOUR black
2070 PRINTTAB(2,5+N%)"Use CURSOR (UP/DOW
N) keys and RETURN"
2080 PRINTTAB(11)"to select option."
2090 REPEAT
2100 PRINTTAB(5,4+O%)SPC2;TAB(5,4+Q%) ">
>";
2110 O%=Q%:G%=GET
2120 IF G%=138 Q%=(O%+1)MODN%
2130 IF G%=139 Q%=(O%+N%-1)MODN%
2140 UNTIL G%=13
2150 RESTORE (10000+100*O%)

```

```

2160 READ name$,expr$
2170 READ xmin,xmax,xstp,ymin,ymax,ystp
2180 READ hscale,vscale
2190 P%=INSTR(expr$,"SQR"):IF P%=0 S%=-F
ALSE:ENDPROC
2200 S%=TRUE:arg$=MID$(expr$,P%+3)
2210 B%=0:P%=0:REPEAT P%=P%+1
2220 IF MID$(arg$,P%,1)="(" B%=B%+1
2230 IF MID$(arg$,P%,1)=")" B%=B%-1
2240 UNTIL B%=0:arg$=MID$(arg$,2,P%-2)
2250 ENDPROC
2260 :
3000 DEFPROCaxes LOCALG%
3010 VDU28,0,30,39,20,12:COLOUR blue
3020 PRINTTAB(4,0)"Enter angles of coord
inate axes"
3030 PRINTTAB(4)"or <RETURN> to leave u
nchanged."
3040 COLOUR black:PRINTTAB(4,3)"ALL ANG
LES ARE GIVEN IN DEGREES":COLOUR blue
3050 PRINTTAB(14,5)"X-axis:":xc=FNI(xc
)
3060 PRINTTAB(14,6)"Y-axis:":yc=FNI(yc
)
3070 PRINTTAB(14,7)"Z-axis:":zc=FNI(zc
)
3080 XC=xc*dr+PI:YC=yc*dr:ZC=zc*dr
3090 sx=SIN(XC):sy=SIN(YC):sz=SIN(ZC)
3100 cx=COS(XC):cy=COS(YC):cz=COS(ZC)
3110 PRINTTAB(6,9)"Draw coordinate axes
?(Y/N)"
3120 REPEAT G%=GETAND&5F:UNTIL G%=78 OR
G%=89
3130 VDU28,0,31,39,1,12:CLG
3140 IF G%=78 ENDPROC ELSE GCOL0,white
3150 MOVE L*cx,L*sx:DRAW -L*cx,-L*sx
3160 MOVE L*cy,L*sy:DRAW -L*cy,-L*sy
3170 MOVE L*cz,L*sz:DRAW -L*cz,-L*sz
3180 ENDPROC
3190 :
4000 DEFFNI(A) LOCALG%,X%,Y%,G$
4010 X%=POS+1:Y%=VPOS:PRINT" ";A
4020 VDU31,X%,Y%:*FX15,1
4030 G%=GET:IF G%=13 =A
4040 PRINTSPC8:VDU31,X%,Y%,G%:G$=CHR$G%
4050 REPEAT G%=GET
4060 IF G%=127ANDLENG$>0 G$=LEFT$(G$,LE
NG$-1):VDUG$

```

## Quadric Surfaces

```
4070 IF G%>45ANDG%<58 G$=G$+CHR$G%:VDUG
%
4080 UNTIL G%=13:=-VALG$
4090 :
5000 DEFPROCparam
5010 PRINTTAB(15-LENname$/2,30)name$;
5020 VDU28,31,24,39,3:d$=STRING$(8,"-")
5030 PRINT" RANGE" 'd$
5040 PRINTTAB(0,2)"X: ";xmin'" to ";xma
x
5050 PRINTTAB(0,5)"Y: ";ymin'" to ";yma
x
5060 PRINTTAB(0,9)" SCALE" 'd$
5070 PRINTTAB(0,11)"horz: ";h$scale;
5080 PRINTTAB(0,12)"vert: ";v$scale;
5090 PRINTTAB(0,15)" AXES" 'd$
5100 PRINTTAB(0,17)"X: ";xc'"Y: ";yc'"Z
: "zc
5110 ENDPROC
5120 :
6000 DEFPROCsurface LOCALX,Y,Z,D%
6010 fore=blue:back=magenta
6020 sign=41:REPEAT sign=sign+2
6030 FORY=ymin TO ymax STEPystp
6040 FORX=xmin TO xmax STEPxstp
6050 IF X<0 D%=69:GCOL0,back
6060 IF S% IF EVALarg$<0 GOTO 6100
6070 Z= EVAL(CHR$sign+expr$)
6080 PLOTD%,(X*cx+Y*cy+Z*cz)*hscale,(X*
sx+Y*sy+Z*sz)*vscale
6090 IF X>=0 D%=5:GCOL0,fore
6100 NEXT
6110 NEXT
6120 UNTIL NOT S% OR sign=45
6130 ENDPROC
6140 :
7000 DEFPROCoption LOCALG%
7010 REPEAT VDU28,31,31,39,25,12
7020 PRINT" OPTION" 'd$
7030 PRINT"COPY:dumptab :saveESC :menuQ
:quit";
7040 REPEAT G%=GET:UNTIL G%=135 OR G%=9
OR G%=81
7050 IF G%=135 PROCdump
7060 IF G%=9 PROCsave
7070 UNTIL G%=81:ENDPROC
7080 :
8000 DEFPROCdump CLS
```

```
8010 REM INSERT CALL TO YOUR
8020 REM SCREEN DUMP ROUTINE
8030 ENDPROC
8040 :
9000 DEFPROCsave CLS
9010 INPUT"Filename: "'fn$
9020 PROCoscli("SA."+fn$+" 3000+4FFF")
9030 ENDPROC
9040 :
9500 DEF PROCoscli($os):LOCAL X%,Y%
9510 X%=os:Y%=os DIV 256:CALL &FFFF7
9520 ENDPROC
9530 :
10000 DATA paraboloid,X*X+Y*Y-40
10010 DATA -6,6,.4,-6,6,.4
10020 DATA 40,10
10030 :
10100 DATA ellipsoid,SQR(36-X*X-Y*Y)
10110 DATA -6,6,.15,-6,6,1
10120 DATA 35,45
10130 :
10200 DATA cone,SQR(X*X+Y*Y)
10210 DATA -12,12,.8,-12,12,1.5
10220 DATA 16,20
10230 :
10300 DATA hyperbolic paraboloid,Y*Y*.8-
X*X
10310 DATA -5,5,.4,-5,5,.4
10320 DATA 48,18
10330 :
10400 DATA hyperboloid of 1 sheet,SQR(X*
X+Y*Y-8)
10410 DATA -8,8,.25,-8,8,1
10420 DATA 16,30
10430 :
10500 DATA hyperboloid of 2 sheets,SQR(Y
*Y-X*X-1)
10510 DATA -20,20,.4,-20,20,2
10520 DATA 10,16
10530 :
10600 DATA not a quadric surface,X*X*X-3
*X*Y*Y
10610 DATA -3,3,.1,-3,3,.15
10620 DATA 80,6
10630 :
10700 DATA ?,EXPRESSION IN X AND Y
10710 DATA xmin,xmax,xstp,ymin,ymax,ystp
10720 DATA hscale,v$scale
```

# 1<sup>st</sup> course

## Graphics

### Alan Wrigley continues his look at graphics programming

In the last issue we introduced graphics co-ordinates, and we saw that text could be displayed either on the text character grid or at the graphics cursor. This month I want to look more closely at the commands which allow you to draw graphics on the screen.

#### PLOT

The basic graphics command is:

```
PLOT n,x,y
```

where *n* is a number from 0 to 255 which determines the exact plotting action to be performed, and *x* and *y* are the horizontal and vertical OS co-ordinates required to perform the action. The PLOT command can carry out a wide range of functions from drawing straight lines to plotting filled triangles. A filled rectangle can be created using two triangles. On a Master, the range of PLOT codes is extended to include circles, arcs, ellipses, rectangles and parallelograms, as well as a flood fill function. Incidentally, if you don't have a Master, you will find some useful routines to draw circles and ellipses in the *BEEBUG Function/Procedure Library* (Vol.11 No.2).

Two of the actions which can be performed by PLOT, i.e. moving to an absolute position and drawing a solid line, are so fundamental that each has its own Basic keyword. Thus instead of PLOT 4,x,y you can use MOVE x,y, and for PLOT 5,x,y you can use DRAW x,y.

A full list of PLOT codes and their actions is given in the User Guide and the Master Reference Manual, so we will not duplicate that information here. The PLOT codes are divided into groups of eight, with each group relating to a particular function, for example solid lines, dotted

lines, triangles and so on. Each function can be plotted using either *relative* or *absolute* co-ordinates; in the first case, the co-ordinates specified in *x* and *y* are taken to be relative to the cursor position, while in the second case they are taken as absolute screen positions. Each of these methods has advantages in certain circumstances.

To see how the PLOT codes work, try out the following short program:

```
10 MODE 2:GCOL 0,1
20 PROCfill(100,600):PROCfill(100,400)
30 GCOL 0,6:PROCe(280,800)
40 PROCe(460,800):GCOL 0,1
50 PROCfill(640,600):PROCfill(640,400)
60 GCOL 0,6:MOVE 820,800
70 PLOT 21,820,400:PLOT 21,948,400
80 PLOT 21,948,800:GCOL 0,2
90 MOVE 1128,800:DRAW 1000,800
100 DRAW 1000,400:DRAW 1128,400
110 DRAW 1128,500:DRAW 1080,500
120 END
130 DEF PROCfill(x%,y%)
140 MOVE x%,y%:MOVE x%+128,y%+100
150 PLOT 85,x%,y%+200
160 ENDPROC
170 DEF PROCe(x%,y%)
180 MOVE x%+128,y%:PLOT 17,-128,0
190 PLOT 17,0,-400:PLOT 17,128,0
200 MOVE x%,y%-200:PLOT 17,128,0
210 ENDPROC
```

The result of running this program is shown in Figure 1. As you will see, we have used a number of different graphics commands and PLOT codes here. *PROCfill* creates a filled triangle (two of which make up the letter B) using PLOT code 85

(plot filled triangle at absolute co-ordinates). *PROCe* creates the letter E, this time using code 17 (plot dotted line relative to cursor position). The letter U is drawn in lines 70-90, using code 21 (plot dotted line at absolute co-ordinates), and finally the letter G is created using *DRAW* since this is made up of straightforward solid lines plotted at absolute co-ordinates (we could just as easily have used *PLOT 5*).

### COLOUR

If you run the program above, you will see that various letters are drawn in different colours. All graphics plotting is done in a pre-determined colour, which is normally the current graphics foreground colour (some *PLOT* codes allow you to use the background colour or the inverse of the current colour but we will not consider these for now). This means that the colour must be set beforehand, and this is done with the *GCOL* command. This is similar to the *COLOUR* command used to set the text colour, but it takes two arguments instead of one, providing a number of variations which make it especially useful for graphics programming. The *second* argument is the colour number, while the *first* allows you to specify a plotting action. We will look more closely at this in a moment (for the time being we are using 0 as the first argument, which means "use the specified colour to plot"). First of all, though, it is necessary to explain the difference between logical and physical colours, since you will often come across these terms when programming graphics.

You will no doubt be aware that there are eight available colours on the BBC micro, plus a further eight flashing colour pairs, making sixteen in all. These are the "physical" colours and are numbered from

0 to 15, such that black is 0 and flashing white/black is 15. The full list of physical+colour numbers is given in the User Guide.

However, not all screen modes can display 16 colours, and so for each mode there is a range of "logical" colour numbers, from 0 to 1, 0 to 3 or 0 to 15 depending on whether the mode supports 2, 4 or 16 colours. In each mode, a specific physical colour is "mapped" onto each logical colour; for example, in mode 1 which is a 4-colour mode, the default colours are black, red, yellow and white in that order. *GCOL 0,2* would therefore set yellow as the graphics foreground colour, while *GCOL 0,3* would set white, even though yellow and white have physical colour numbers of 3 and 7 respectively.

It is important to note that when using the *GCOL* command (and for that matter *COLOUR* too), it is the logical number that is specified, not the physical colour number. In other words, when you use *GCOL 0,1* you are telling the operating system "use whichever colour is currently mapped to logical colour 1". However, you can at any time alter the mapping of the colours by choosing a different physical colour for any given logical number. This is done with the *VDU19* command. For example, if you decided you would rather have blue instead of red as logical colour 1, you would use:

```
VDU19,1,4,0,0,0
```

The first parameter to the command is the logical number you wish to change, in this case 1, while the second parameter is the *physical* colour number you wish to map onto that logical number. In this case it is 4, since that is the physical number of blue. The three zeros have no significance but must be included to complete the

command. Changing mode reverts to the default mapping for the new mode.

There is nothing to stop you mapping the same physical colour to two separate logical colours, and indeed in next month's article we will be describing a programming technique which makes use of this facility to enable you to move one object behind another.

## GCOL

GCOL can be used to set either the foreground or background graphics colours to the logical colour specified. For the foreground you simply use the logical number itself, while to alter the background colour you add 128 to the number. Thus in mode 1, using the default colours, the following line would set the foreground colour to black and the background colour to yellow:

```
GCOL 0,0:GCOL 0,130
```

Note that these commands only set the *graphics* colours, i.e. the colours which will be used whenever a graphics command is issued. They have no effect on text which is displayed using PRINT, the colour of which is determined by the COLOUR command. This means that you can have different colours set at the same time for text and graphics, but you are still restricted to the range of physical colours which are currently mapped, since VDU19 operates globally on all colours displayed on the screen.

So far we have only used the simplest plotting action available with GCOL. However, the first argument to the command can have a number of different values, which determine the effect of the plot. These are as follows:

- 0 plot the colour specified
- 1 OR the colour with the one already

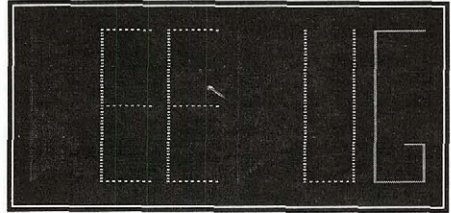
there

- 2 AND the colour with the one already there
- 3 EOR the colour with the one already there
- 4 invert the colour already there

Plot actions 1-3 perform a bitwise logical operation on the two colours (the one already on screen and the one specified in the second GCOL argument). In other words, they perform in exactly the same way as the Basic keywords OR, AND and EOR. For example, if you type:

```
PRINT 1 OR 2
```

the result will be 3. So if the pixel you are plotting is currently displayed in colour 1, and you have set the colour using GCOL 1,2, it will change to colour 3.



*Screen display produced by program*

This allows you to achieve effects on the screen which would be difficult to do otherwise, for example animation. By selecting the mapping of physical to logical colours carefully, you can make use of this technique to speed up animation and use less code in the process. If you are using a 16-colour mode, you can map colours 8-15 (normally flashing) to various non-flashing colours, thus allowing you to map more than one logical colour to a given physical colour, as we mentioned earlier. In next month's article we will give some examples of the use of these plotting actions, as well as some specific techniques used in graphics programming, for example how to draw circles, and how to mix text and graphics. **B**

# SPECIAL

## 50% Members Discount on

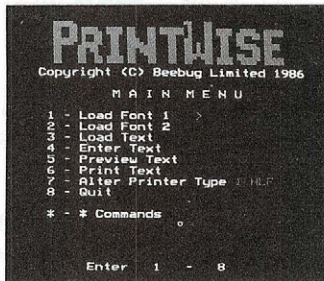


### Beebug C & Stand Alone Generator

Beebug C is the much acclaimed C programming language for the BBC Micro and Master 128. Although normally only available on more powerful computers, Beebug C is a full implementation of the Kernighan & Ritchie standard. Features include:

- ★ Runs on BBC B, B+ and M128.
- ★ Comprehensive set of ANSI functions.
- ★ OS functions vdu, osbyte, mode etc.
- ★ Command line interpreter.
- ★ Floating-point maths.
- ★ Linker for multi-source programs.
- ★ Maths functions.
- ★ Expandable run-time library.
- ★ Stand alone generator.
- ★ Full macro handling facilities.
- ★ Supplied on 2 ROMs & library disc

Normal price: **£79.69** inc VAT  
Offer price: **£39.85** inc VAT  
Stock code: 0074 40T, 0075 80T  
Please add £2.00 carriage.



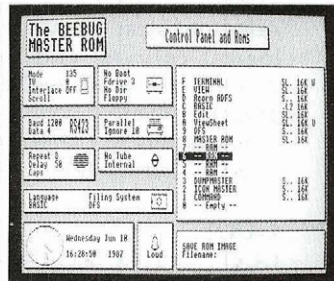
### Printwise

Printwise is a low-cost publishing aid allowing you to create professional looking magazines, leaflets, posters etc - the possibilities are endless. Simply take your text file, use embedded commands to specify the font styles you require, and let Printwise do the rest.

- ★ 9 authentic fonts from 4pt to 40pt.
- ★ Font designer for creating new fonts.
- ★ Fonts may be used on the same line.
- ★ Italics, bold, condensed, reversed etc.
- ★ Proportional spacing.
- ★ Subscript and superscript.
- ★ Left, centre, right & full justification.
- ★ Suitable for Epson compatible printers.

Printwise is easy to use and requires no programming skills. It may be used with text files created on Wordwise, View, InterWord, Mini Office and almost any text editor.

Normal price: **£30.66** inc VAT  
Offer price: **£15.33** inc VAT.  
Stock code: 0085 40T, 0086 80T  
Please add £2.00 carriage.



### Master ROM

The Master ROM is a powerful 32K ROM packed with features to enhance the facilities of the Master 128.

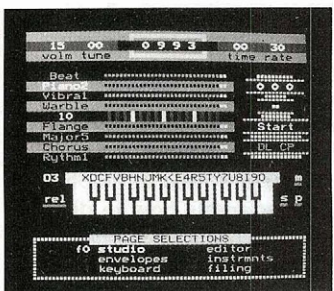
**Disc Menu** - A single command takes you to a full feature disc menu displaying all the items in the current directory. You can change directories or run, copy, delete, rename selected files.

**Control panel** - This displays all the computers status settings and the ROMs fitted. The cursor keys may be used to adjust any of the settings, which may be saved for future loading at any time.

**Disc commands** - A whole range of useful ADFS commands, including: \*FIND, \*FORMAT, \*VERIFY, \*BACKUP, \*MERGE, \*WIPE etc.

Plus: **16K-64K Printer buffer**  
**Simple 16K-64K RAM disc**  
**Diary and automatic alarm**

Normal price: **£39.84** inc VAT  
Offer price: **£19.92** inc VAT  
Stock code: 0087 ROM  
Please add £2.00 carriage.



### Studio 8

Studio 8 is a real-time studio system with digital recorder, rhythm and drum machines which give hours of entertainment.

**Studio** - Allows playing and recording in real time with keyboard and sequencer.  
**Editor** - A full-screen editor allowing the precise editing of notes.

**Envelope editor** - allows the definition of up to 16 amplitude and pitch envelopes.

**Instrument definer** - Create up to 32 instruments by combining pitch and amplitude envelopes, volume & sustain.  
**Plus many more features.**

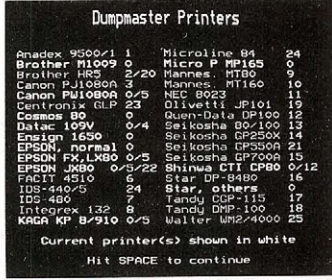
Normal price: **£22.48** inc VAT  
Offer price: **£11.24** inc VAT  
Stock code: 0009 80T  
Please add £2.00 carriage.



Offer available while stocks last

# OFFER

## BBC & Master software



### Masterfile II

Masterfile II is the best selling general purpose database for the BBC Micro and Master 128. It has many powerful features, but is easy-to-use and ideally suited for home, business or school. It is supplied ready to run and no programming skills are required.

- ★ Menu driven for ease-of-use.
- ★ Fast 'tag' sorting.
- ★ Flexible print layouts.
- ★ Global calculations.
- ★ File size limited only by disc capacity.
- ★ File append options.
- ★ Search for a particular match.
- ★ Sorting on any field or fields.
- ★ Direct fast access to any record.
- ★ Form designer.
- ★ Label printing facility.
- ★ Record insertion.
- ★ Example database and tag files.

Normal price: **£22.48** inc VAT  
 Offer price: **£11.24** inc VAT  
 Stock code 0024 40T, 0025 80T,  
 0081 ADFS for Master 128 only  
 Please add £2.00 carriage.

### Command

The Command ROM is a powerful communications package that may be both menu or command driven. Command may be used with Hayes and other intelligent modems.

**Text terminal** - Use this to access scrolling text services such as Telecom Gold. XMODEM file transfer allows files to be sent around the world.

**Viewdata terminal** - A full feature terminal giving access to Prestel and other Viewdata services. Frames may be saved to disc, printed, tagged etc. and a full feature Viewdata editor is provided.

**Telephone directory** - Set up the name, number and log-on for services you wish to recall at a later date.

**Command driven** - A wide range of commands may be used in Basic to create applications for your own individual needs.

Normal price: **£39.84** inc VAT  
 Offer price: **£19.92** inc VAT  
 Stock code: 0073 ROM  
 Please add £2.00 carriage.

### Dumpmaster II ROM

Dumpmaster provides fast screen dumps using up to 8 shades from any screen mode. It includes a 'snapshot' facility to dump screens from programs while they are running. A wide range of printers are supported, including Epson compatibles and the Star LC10 colour.

Normal price: **£31.68** inc VAT  
 Offer price: **£15.84** inc VAT  
 Stock code 0053. ROM  
 Please add £2.00 carriage.

### Exmon II

This acclaimed ROM adds over 60 commands to manipulate and debug machine code programs. Features include:

- ★ set breakpoints
- ★ trace
- ★ set registers
- ★ full-screen RAM editor
- ★ single-step
- ★ disassembler
- ★ dual screens
- ★ search
- ★ line assembler
- ★ program relocater

Normal price: **£32.70** inc VAT  
 Offer price: **£16.35** inc VAT  
 Stock code: 0004 ROM  
 Please add £2.00 carriage.

### Quickcalc

Quickcalc is an easy-to-use disc based spreadsheet enabling you to use the calculating power of your computer without any need to program. It is ideal for personal accounts, stock control, and general financial planning.

Normal price: **£18.39** inc VAT  
 Offer price: **£9.19** inc VAT  
 Stock code: 0029 80T DFS  
 Please add £2.00 carriage.

### Features include:

- ★ 20 x 50 default spreadsheet.
- ★ Load, save and print spreadsheet.
- ★ Replicate into row, column or area.
- ★ Simple histogram capability.
- ★ Individual column widths may be altered at any time.
- ★ Min, max and sum functions.
- ★ Very easy to use.

RO CO	BEEBUG QUICKCALC	11821	P
0	0	1	3
1	0	1	3
2	0	1	3
3	0	1	3
4	0	1	3
5	0	1	3
6	0	1	3
7	0	1	3
8	0	1	3
9	0	1	3
10	0	1	3
11	0	1	3
12	0	1	3
13	0	1	3
14	0	1	3
15	0	1	3
16	0	1	3
17	0	1	3
18	0	1	3
19	0	1	3

	JAN	FEB	MAR
SALARY 1	332.78	370.93	386.54
SALARY 2	116.78	99.45	101.56
INTEREST	15.00	15.00	15.00
TOT. INCOME	464.56	485.40	503.10
MORTGAGE	289.65	289.65	289.65
TRAVEL	35.45	42.12	37.56
FOOD	48.78	46.12	51.00
CLOTHES	0.00	46.78	124.32
TOT. EXP.			
SURPLUS	90.67	60.73	0.57



# 512 Forum

by Robin Burton

After last month's brief interlude on applications compatibility

we'll again turn our attention to CHKDSK, continuing from the Forum of two months ago.

We've looked at an example of how CHKDSK can recover loose clusters by creating a new directory entry for them and how this might help you to recover files or perhaps parts of files in certain circumstances. This month we look at another of CHKDSK's capabilities, but first there's a short item prompted by one member's experiences.

## DOS PLUS

I mentioned again at the end of 512 Forum in the tenth anniversary issue (Vol.11 No.1) that all 512 users should now be using DOS Plus 2.1. I also gave Acorn Customer Service's address for the upgrade for any members who were still using 1.2.

One reader followed the advice, but received a reply from Acorn, without the upgrade, substantially to the effect that Customer Services didn't deal directly with customers (no comment necessary, I trust).

To cut a long story short I telephoned Acorn Customer Services and learned that they were temporarily out of stock of upgraded discs, but this would be remedied shortly. However, that wasn't the cause of the problem. Why this particular member had received such an odd and incorrect reply was unknown, since neither of us had sight of the original letter. The perplexing reply was presumably the consequence of the letter going to the wrong department, to

someone who, unfortunately, didn't know and/or couldn't be bothered to find out who should have received it.

I can definitely confirm that Acorn will upgrade your DOS Plus 1.2 discs to 2.1 and it's still free of charge. In this area at least credit is due to Acorn for maintaining some support for the 512 in spite of the age of the system. I've often been quite blunt in the past in my criticism of Acorn for their lack of 512 support, but in this particular area they are to be congratulated for maintaining support long after other suppliers would have lost interest. That it's also a free service is even more remarkable.

As an example of an alternative way of doing things, on the release of Windows 3.1 in April Microsoft did offer a special upgrade price, but only to those who had purchased Windows 3.0 within the thirty days following the release of the new version. Even so it wasn't free, or even particularly cheap in the circumstances, but to add insult to injury the announcement was timed so that it didn't appear early enough for many people to become aware and to take advantage of it. Result? Pay again, in full!

All credit to Acorn then, but there are a few points that you must remember if you use the DOS Plus upgrade service. The upgrade may be free of charge to you, but it certainly isn't to Acorn. It actually costs them both in staff time and postage. Bear this in mind and try to make it easier for those who have to do the job.

First, don't ask for an upgrade unless you return an original set of four 1.2 issue discs. Acorn copy and send discs free of charge, so why should they supply free discs? Quite reasonably the

rule is: no discs sent, none returned and no upgrade. Next, since they're doing you a favour don't expect a response by return of post. For cost and common sense reasons disc copying and despatch is done in small batches, as and when it is justified. There might therefore be a delay of a week or two before you get a reply.

Next, two of my own pet hates, and I know they frustrate and annoy others just as much as me. When you're giving time and effort free of charge there's nothing more infuriating than having to write out a return address label and paying for the postage too! If you can't be bothered to provide these items why should anyone else? As a matter of courtesy, when free help is sought you must supply a self-addressed label or packaging, complete with adequate return postage. I can assure you that even if it isn't used in all cases, the gesture is always appreciated.

The other point is equally frustrating for one of two reasons. A short note of polite explanation of your request is needed. Don't expect all Acorn staff who happen to open the mail (ever heard of temps?) to recognise four 512 DOS Plus 1.2 issue discs and work out by divine inspiration what they're for. They might ask someone who knows (or they might not) but they shouldn't have to do so. Make sure your package is clearly addressed to Acorn Customer Services, not to Acorn in general, ideally including mention of the 512 DOS Plus upgrade.

Equally important, don't hand write letters if your handwriting isn't clear and legible. The fact that you might be able to read it is no guarantee that anyone else can! I have a handwritten letter right now that I can't answer because I can't read it. No S.A.E. was supplied and I can't decipher the name and address (nor can anyone else I've asked) so I can't write and ask for a readable copy either.

If it was you, write again, but clearly this time please!

While it's true that for genuinely personal correspondence a hand written letter is correct and a printed letter is, strictly speaking, impolite, that doesn't apply to business letters at any level. For business purposes, if you must write by hand perhaps because you have no printer, take the time to do so legibly. If you do have a printer, use it.

All these points are common sense and basic courtesy, but you'd be surprised just how often these items are overlooked. If you're looking for free help you must make it easy for the person you're asking, then you may very well get what you want. If you make it difficult don't be surprised if you don't.

As a final point, don't delay if you've been meaning to upgrade to DOS Plus 2.1 but keep putting it off. Acorn made the point that they can't provide the service for ever.

Now back to CHKDSK matters.

## **DIRECTORIES**

Just as it's possible to lose a file from the failure of a disc write, a directory can also be lost after an update. The cause is a similar corruption to those which can affect files, although thankfully the loss of a directory is much less common.

However, countering that is the fact that losing a directory obviously can be a much more serious problem. The immediate consequence is not just that all the files in the missing directory can no longer be accessed, but also, if there were any subdirectories in the directory all the files in those are now inaccessible too.

However, as was mentioned two Forums ago, help may be available in the form of CHKDSK. It may not always be worth

trying to recover individual files - that's a decision only you can make - but remember that a CHKDSK fix can be a much more attractive proposition than reformatting an entire disc, even if you simply delete all the recovered temporary files afterwards and replace them from good backups with working copies. This particularly applies to winchester users.

It's also very worthwhile to bear another important point in mind when a directory has been lost and CHKDSK might recover it. Just because the top-level directory is lost, there's no certainty that any of the sub-directories or the files it contained are affected, they could very well be perfectly OK - if only you could access them. Well, so long as the 'lost' directory was in the root you may be able to.

Using the same disc and contents as for the previous exercises, I've arranged an example to illustrate the point. All that was necessary was (manually in an editor) to delete the root directory entry for SUBDIR1, with the result that neither it, nor the files it contained can now be accessed by normal means. Check the Forum two months ago for what the disc originally contained if you missed it or have forgotten, but after this corruption the root directory display simply shows:

```
Volume in drive A has no label
Directory of A:\
File not found
```

just as if there never were any directories or files on the disc.

### ALTERNATIVE METHODS

At this point you actually have two options. You could tell CHKDSK to recover files from loose clusters, as in the example two months ago, in which case it will report four loose chains on the disc, three of them being the inaccessible 'real' files from SUBDIR1, the fourth being the subdirectory itself. To illustrate,

the display from a CHKDSK run with no parameters (i.e. check files) looks like this:

```
Errors found, F parameter not specified.
Corrections will not be written to disk.
```

```
13 lost clusters found in 4 chains.
Convert lost chains to files (Y/N)? n
```

```
13,312 bytes disk space
would be freed
```

```
362,496 bytes total disk space
362,496 bytes available on disk
```

Of course, on a working disc with more files and maybe several subdirectories in a path too, if you choose this option all the recovered objects will end up in the root directory together. They'll be a mixture of files from all the subdirectories, as well as the subdirectories themselves, each of those also appearing as recovered files.

The problem with this approach is that you've then got to sort out which 'files' were really subdirectories, plus which files belonged to which (original) subdirectory as you copy them to a new disc or rename them. That might not sound too bad, but remember that none of your original filenames will be used for the recovered files, so you might have trouble identifying many of them. You can, though, identify subdirectories reasonably easily by looking at the contents, since the (old) filenames will be readable.

If the lost directory wasn't in the root this approach might be your only option, but for subdirectories lost from the root there's a better way. The /R parameter tells CHKDSK to recover only root directory subdirectories, so the subdirectory files remain untouched and keep their original names. By issuing the CHKDSK command on our faulty disc with the appropriate switches, only

entries in the root that appear to be old subdirectories will be recovered. The way this works is that CHKDSK examines all deleted or otherwise invalid used root entries and reinstates only those which have the directory attribute bit set (bit four of the twelfth byte).

Note that the /F switch must be supplied if you want a fix. The command itself and its effects can be seen in the following display.

```
CHKDSK /R /F
```

```
13 lost clusters found in 4 chains.
Recover first level directories (Y/N)? y
```

```
362,496 bytes total disk space
 1,024 bytes in 1 recovered
        directories
349,184 bytes available on disk
```

As you can see, I confirmed the recovery request, and in this case a single directory was recovered, although CHKDSK clearly knew about three other loose clusters. This means that the three real files previously contained in SUBDIR1 have remained unchanged (and un-named).

Using /R means that the only recovered objects that will appear in the root directory are directory entries, hence the complication of files being mixed with directories is avoided. Naturally, at the same time the number of recovered objects is going to be far fewer anyway, another very helpful point.

However, even with /R helping, there's still a bit more work to do, as you'll see from the following DIR display. This was issued immediately after the above recovery run.

```
Volume in drive A has no label
Directory of A:\

FILE0002 CHK <DIR>
 1 File(s)      349184 bytes free
```

You can see that we only have one recovered object and that it's a directory. Note also that there's neither a date nor a time for the recovered object.

So far so good, but as you'll discover if you now try to access the recovered directory, for example using 'CD', all you'll get is an 'Invalid directory' message. The problem is that directory names don't (and must not) have an extension.

This means that you must now do a bit of manual disc editing, so that your recovered directory names are no more than eight characters long. Even if you don't change the names themselves, all the extension bytes in each entry (byte numbers 9 to 11) must be filled with spaces. Precisely where the root directory is on the disc depends on the disc capacity in question, for example on the 360K disc I used the first sector of the root was number five, but in an 800K disc the first root directory sector would be number two.

If you know enough about DOS discs you can work out where the root starts, but for any format you can rely on the fact that it's very near the beginning of the disc. Therefore, the easiest way to find the root, if you don't know where it is, is to start at sector zero and simply examine sectors one at a time until you find it. You can easily recognise it by the simple fact that it contains readable file or directory names.

Having found the root directory sector and searched for the name or names you need to amend, simply fill the three extension bytes with spaces. You'll find that, regardless of disc format, all DOS directory entries are always 32 bytes long. Any entry that starts with hex E5 is a deleted entry so don't touch those even if they otherwise match one of your real names - amend only those entries created by CHKDSK.

*continued on page 40*

# BEEBUG Education

by Mark K. Sealey

<b>Products:</b>	<b>Peek-a-boo (Opposites and Around Our House)</b>
<b>Supplier:</b>	<b>Sherston Software Ltd Swan Barton, Sherston, Malmesbury, Wiltshire SN16 0LH. Tel. (0666) 840433</b>
<b>Price:</b>	<b>£21.50 ex. VAT</b>

of clearly printed soft card sheets. The latter can be used as prompts, flashcards or even - in an increasingly eccentric educational world - for spelling tests!

Both programs are entirely self-contained, though there are many possibilities for work away from the computer, always a good sign. These include the development of essential, grouped, sight vocabulary, appreciation of traditional literature and nursery rhymes, discussion arising from the programs' use of some rudimentary aspects of personal safety and hygiene, work on pets, food and the senses etc.

The subject matter is very, very simple: ideal for children of Reception, Year 1 and possibly Year 2; though not really for children with learning difficulties or indeed for those whose first language is not English.

Colourful graphics are used throughout and 'control' of what is happening is chiefly through the cursor keys, the Space Bar and Return. To use the program is to move through a series of interlinking locations (the woods, the garden, rooms in the house and so on), exploring objects on the way and frequently interacting with them - usually in a purposeful manner.

It is possible, though, to press Escape and exit the current scene; this is a minus point as inquisitive or inexperienced fingers could well find themselves having to start from the beginning if they experiment with that little (perhaps unknown) key at the top left of the keyboard.

The graphics are good, what is more, the sound effects appealing and just enough

## INTRODUCTION

Sherston Software - established, not to say stalwart, producers of educational software for the entire Acorn range - is one of an increasingly limited number of firms still publishing titles for the original BBC micro; this is surely one indication of the lasting worth of those systems. Three titles have recently appeared for use in Infant classrooms: Peek-a-boo at Opposites, Peek-a-boo Around Our House and Three Little Pigs at Home. A fourth (Peek-a-boo Around Our Town) was released last month but was not available for review.

The first two (reviewed this month) are described as "discovery packs", by which the somewhat unusual author team of mother and son means that there exists a world awaiting discovery by the user(s). To explore it, the children will have to use both elementary computer skills (familiarity with keyboard and screen etc.) and the techniques of simple reading.

Is there a place in the market for this type of simple product; how well do these offerings from Sherston match it if there is, and how could it be used?

## PEEK-A-BOO

In each case for your money you get a single disc (5.25" DFS or 3.5" ADFS format), a teacher's book, two Concept Keyboard (A3 and A4) overlays and a set

pictorial detail is given to make the children feel that there is something likely to be worthy of investigation - a closed cupboard, stairs to ascend, a tap to turn on etc.

Effectively, the packages consist of a series of screens each of which can be explored independently. However, it is necessary to complete them all in order to get to the climax of the Opposites adventure, when Goldilocks is confronted with the three bears and the users are invited to decide whether "Goldilocks has been good or bad... a discussion point for social and moral work", as the teacher's book says.

### **THE TWO 'ADVENTURES'**

Peek-a-boo at Opposites is just that: everywhere in the series of single screen scenes that the children explore they are presented with opposites. Goldilocks is either dressed or undressed, it is either night or day, she is either asleep or awake. If she is looking for something, she looks either to the right or to the left. The users travel with Goldilocks as she explores the rooms and environs of the house and eventually confronts the startled bears.

No opportunity is missed to explore words in context and hence present the concept of opposites. It is this extra reinforcement of a sometimes difficult concept for the very young that makes this just the better of the two packages.

Peek-a-boo Around Our House explores a non-specific set of rooms and outbuildings with just the right sorts of differences between them to make them interesting: what will the flowerpot reveal? What will that mouse do this time? There is variety and yet consistency of language use, affording it interest and making young children want to return to the environment contained within the program.

### **TEACHER CONTROL**

In accordance with the varying needs, likely skills and previous experiences of the users, it is necessary to alter certain parameters in the programs; to this end a Teacher's Control option is presented at the start of each application. This displays the instructions and allows setting of sound level, and a time limit before which a response is expected in steps of 5 minutes from 10 to 30 - or with no limit. This function could be most useful for a teacher engaged on some other task who would be alerted if a child or group of children were completely stuck or off task in some way and yet had not drawn the teacher's attention to the fact.

Unfortunately, control of this section is not as smooth as it might be: there is a menu with an arrow at its side, but if, say, the sound level chosen is displayed in a box, a route out of this menu screen is not immediately obvious. In fact, this is achieved by moving the arrow off the level selected and back down to the 'teacher control' icon, which is the section you are in anyway.

Otherwise the amount of say that the teacher (or child?) has in how the program is used is just about right.

### **DOCUMENTATION**

The booklets to go with each program are slim - 20 pages - but well produced and contain all the information you are likely to want. The booklet for Opposites contains a minimal index as well.

It is useful that screenshots of each scene are also reproduced in the booklets and these are accompanied by exhaustive lists of the words relating to the objects and events themselves - together with exact indications of what will happen at each and even elementary clues to help you progress.

## SUPPORTING IDEAS AND ACTIVITIES

Sherston have provided many of these; they range from the utterly sound such as the suggestion to make a word-families book of those words taught, to an exhortation that the children should not do what Goldilocks did! Each book contains some half-dozen or so practical ideas, none of which would be out of place in a good Infant classroom. Only a few of them, though, are unlikely to suggest themselves to even the most inexperienced teacher.

## CONCLUSIONS

Here are two not entirely original ideas with some small negative points; but they are reasonably priced, contain much that will extend the concepts and skills addressed by the programs themselves. Because the scenarios will be familiar to

children (though do not cater directly for flat-dwellers... too many stairs!) and are very much of their world, motivation to make the most of them is high.

The graphics and easy interaction are well executed, what happens in each 'scene' ideally suited to the concentration spans of the target age-range and the amount that actually happens (ears wiggle, babies splash, trains move) will draw and keep young users' attention.

So, if you are looking for a way of squeezing a wealth of language (and some simple maths etc.) activity out of a straightforward yet intriguing computer environment and want to teach very young children some of the elements of keyboard use, Peek-a-boo could well be for you. **B**

## 512 Forum (continued from page 37)

NOTE: Take great care during this operation. The byte after the third extension byte is the attribute byte and you MUST NOT change it. The most likely error of course, is that you overtype the attribute byte with a space which makes the entry into that of a normal file with the archive bit set. If you do have a slip and the attribute byte is altered, you MUST reset it to that of a directory entry, that is, it must contain the hexadecimal value 10 (decimal 16).

I duly space-filled the extension bytes of the name on our test disc and the resulting display from DIR is now:

```
Volume in drive A has no label
Directory of A:\
```

```
FILE0002 <DIR>
          1 File(s)  349184 bytes free
```

There's still no date or time but they aren't functional. You can also amend the

directory name to something more meaningful at the same time, but that's up to you. The vital change is to the extension, so that 'CD' now selects the directory correctly. The three files (previously in SUBDIR1) therefore once again become normally accessible, as shown here.

```
Volume in drive A has no label
Directory of A:\FILE0002
```

```
 .      <DIR>          21-07-92   13:11
 ..     <DIR>          21-07-92   13:11
FILE1   3119   21-07-92   13:11
FILE2   3119   21-07-92   13:11
FILE3   3119   21-07-92   13:11
          5 File(s)    349184 bytes free
```

The Forum has had a bit more space this month, but once again that's all for now. We'll round off our look at CHKDSK next month. **B**

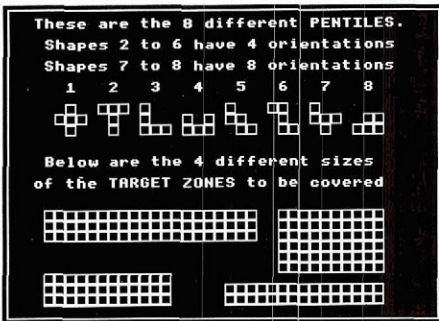


# Pentiles

*Alan Gray invites you stop zapping and use your brain.*

Pentiles is a game which has elements of skill, strategy and luck; you will also need a good memory, and in the hard version, be able to think and act swiftly.

Pentiles are composed of 5 rectangles called Tiles, which are joined to form the 8 shapes shown in the diagram. Tiles are meant to be square, but in mode 5 they appear as oblongs. The Red Target Zone always contains space for 60 tiles (12 Pentiles), and can be any one of the 4 sizes shown.



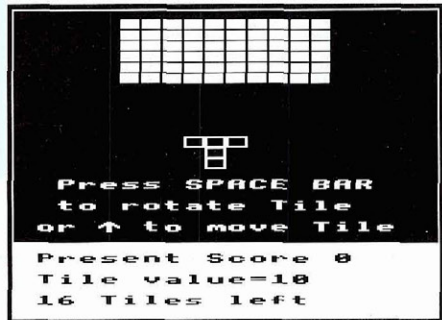
*Grid Layouts*

The object of the game is to cover completely the Red Target Zone with a series of Pentiles.

You can choose either the easy or hard version at the beginning of each game, and then you are offered 1 of the 8 Pentiles in random order. The Pentiles may be rotated successively through 90 degrees by pressing the space bar. Shapes 6, 7 and 8 have mirror images and have to be flipped over to give all possible orientations by continuing to press the space bar.

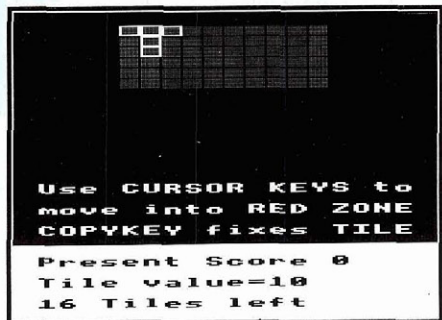
When you reach the required orientation, press cursor up. This will

allow you to move the Pentile into the Target Zone, but you can no longer rotate it. Use the cursor keys to position the Pentile somewhere within the Target Zone, then fix it by pressing Copy.



*Starting Off*

When you press Copy, each segment of the Pentile fixed in the Target Zone will score points and these points will be added to the current total. Each time all 5 segments of a Pentile are fixed entirely within the Target Zone, the current tile value is increased by 5 points, otherwise the value is decreased by 5.

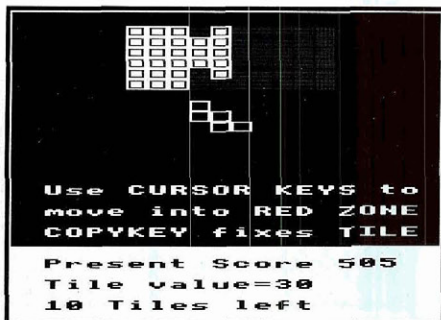


*Pentile on the grid*

The first 6 or 7 shapes should be fairly easy to fix entirely within the Target Zone, and you will see the tile value and current total progressively increase.

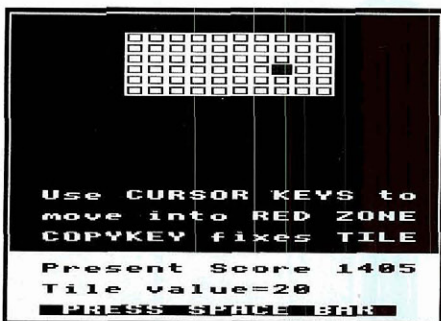
## Pentiles

After the 8th or 9th pentile, you will find it more difficult to place the next one without creating problems for subsequent play, and may decide to fix only part of the shape within the Zone. Segments outside the Target Zone are erased.



*Getting the hang of it now*

Once you are familiar with the shapes you should be able to decide where to leave spaces for pentiles which have not yet been offered. You get a maximum of 16 Pentiles during a game, 2 of each shape.



*Doing quite well*

### WHEN WILL IT ALL END?

The game ends when you completely covered the Target Zone, have used all 16 Pentiles or when you have fixed Pentiles in such a way that you cannot move the next one into the Target Zone. In the hard game you can also run out of time.



*High score table*

You get a bonus of 500 points if you completely cover the Target Zone or 200 if there is a single uncovered tile. If you score more than one of the famous little people, you can enter your name in the top score table.



*The hard game*

### GETTING HARDER

The differences between the hard and easy games are as follows: in the easy game the target zone always has a depth of 6 tiles, but the hard game gives you a random depth between 3 and 5. There is a time limit of about 3 minutes in the hard game indicated by a barrier which grows from left to right just below the Target Zone, until it stretches right across. The scoring potential is greater in the hard game as it starts with a tile

value of 25 points, and gives a maximum possible score of 3650 points (very difficult). The easy version starts off with a tile value of only 10 points (with a maximum score of 2750).

While playing the hard game with the barrier almost closed, you may find that you have to move some Pentiles partly off screen so that you can squeeze past into the Target Zone.

## PROGRAM NOTES

If you don't like the sound effects, you can change line 100 to s%=0 to turn the sound off or to s%=-15 for maximum volume.

Warning! Pentiles uses the POINT command which seems very unreliable when using a second processor, so if you have one it must be switched off before playing.

```

10 REM Program Pentiles
20 REM Version B 1.0
30 REM Author Alan Gray
40 REM BEEBUG October 1992
50 REM Program subject to copyright
60 :
100 s%=-10
110 REM:s% controls volume(0 to -15)
120 DATA 140,140,150,180,190,220,230,2
60
130 DATA 270,300,310,340,350,420,430,5
00
140 DATA 0,-1,-1,0,0,0,1,0,0,1
150 DATA-1,-1,0,-1,1,-1,0,0,0,1
160 DATA1,-1,-1,0,0,0,1,0,1,1
170 DATA0,-1,0,0,-1,1,0,1,1,1
180 DATA-1,-1,-1,0,0,0,1,0,-1,1
190 DATA-1,-1,-1,0,-1,1,0,1,1,1
200 DATA-1,-1,0,-1,1,-1,-1,0,-1,1
210 DATA-1,-1,0,-1,1,-1,1,0,1,1
220 DATA1,-1,1,0,-1,1,0,1,1,1
230 DATA-1,0,1,0,-1,1,0,1,1,1
240 DATA-1,-1,0,-1,-1,0,-1,1,0,1
250 DATA-1,-1,0,-1,1,-1,-1,0,1,0
260 DATA0,-1,1,-1,1,0,0,1,1,1
270 DATA-1,-1,-1,0,0,0,0,1,1,1

```

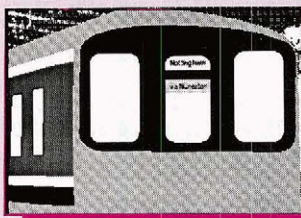
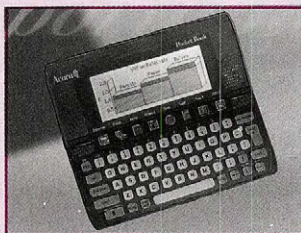
```

280 DATA0,-1,1,-1,-1,0,0,0,-1,1
290 DATA-1,-1,0,-1,0,0,1,0,1,1
300 DATA1,-1,0,0,1,0,-1,1,0,1
310 DATA-1,-1,0,-1,0,0,0,1,1,1
320 DATA1,-1,-1,0,0,0,1,0,-1,1
330 DATA0,-1,1,-1,0,0,-1,1,0,1
340 DATA-1,-1,-1,0,0,0,1,0,1,1
350 DATA-1,-1,-1,0,0,0,1,0,0,1
360 DATA0,-1,1,-1,-1,0,0,0,0,1
370 DATA0,-1,-1,0,0,0,1,0,1,1
380 DATA0,-1,0,0,1,0,-1,1,0,1
390 DATA1,-1,-1,0,0,0,1,0,0,1
400 DATA0,-1,-1,0,0,0,0,1,1,1
410 DATA0,-1,-1,0,0,0,1,0,-1,1
420 DATA-1,-1,0,-1,0,0,1,0,0,1
430 DATA0,0,1,0,-1,1,0,1,1,1
440 DATA-1,-1,-1,0,0,0,-1,1,0,1
450 DATA-1,0,0,0,1,0,-1,1,0,1
460 DATA-1,-1,0,-1,-1,0,0,0,0,1
470 DATA-1,0,0,0,-1,1,0,1,1,1
480 DATA-1,-1,0,-1,-1,0,0,0,-1,1
490 DATA -1,0,0,0,1,0,0,1,1,1
500 DATA 0,-1,-1,0,0,0,-1,1,0,1
510 sp$=STRING$(20," ")
520 DIMu$(5),v$(5),x$(5),y$(5),sb$(5),
sb$(5)
530 DIM px$(5),py$(5),pt$(16),s1$(8),s
2$(8)
540 VDU23,240,24,60,126,219,153,24,24,
24
550 VDU23,241,255,129,129,129,129,129,
129,255
560 VDU23,242,0,-2,-2,-2,-2,-2,-2
570 VDU23,243,0,0,60,60,60,60,0,0
580 VDU23,244,90,255,102,219,219,102,2
55,90
590 u$=CHR$240:a$=CHR$241
600 b$=CHR$242:c$=CHR$243
610 FORJ%=1TO8:READ s1$(J%),s2$(J%):NE
XT
620 RESTORE 3560
630 FORJ%=1TO5:READ sb$(J%),sb$(J%):NE
XT
640 REPEAT:MODE4:PROCset1
650 MODE5:PROCset2
660 REPEAT:*FX11,50
670 *FX15,0
680 xp%=9:yp%=16:c%=pt$(n%)
690 r%=s1$(c%):RESTORE(r%)
700 PROCread

```

*continued on page 56*

# RISC USER



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# Linked Lists (Part 3)

By Mike Williams

This month I propose to move on and develop further some of the concepts we have considered previously. Much time has been spent studying linked lists and their properties, and no doubt many books have also been written on this subject. I don't intend to go to that extreme by any means,

list operations it becomes necessary to keep a record not only of the pointer to the next element, but also of the pointer from the previous element to the current one. This occurs when inserting an element into a list.

These limitations can be overcome by associating two pointers with each element in the list, one pointer to the next element, and a second pointer back to the preceding element. This is illustrated graphically in figure 1.

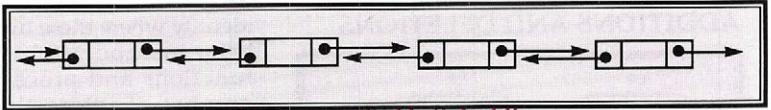


Figure 1. A doubly-linked list

but there is one form of linked list which is worth looking at in some detail, and that is the *doubly-linked list*.

In the linked list which we looked at previously, the pointers linked the elements of the list together in one direction only. There are various consequences of this: having reached one element, the only way to reach another element near to but preceding that one in the list is to follow the linked list from the head of the list. It also means that in some of the

Before looking in more detail at operations on doubly-linked lists, there are two other variations to consider. With either a simple linked list as before, or with our new doubly-linked list, it can often make sense to have the tail of the list point back to the start of the list - in effect what we have is then a circular list. Again, our previous ideas involved the use of a head pointer to point to the first element or head of a list, but once we start using circular lists, it becomes easier to make the head pointer one of the elements of the list itself. This is illustrated in figure 2 for a doubly-linked list.

If we implement a doubly-linked list in terms of arrays (as before) then we can choose the zero element to be the list head. We will also require two link arrays, which we shall call LLink() and

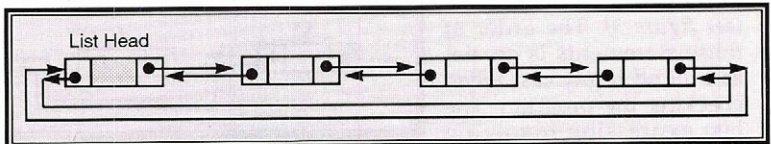


Figure 2. A doubly-linked circuit list including list head

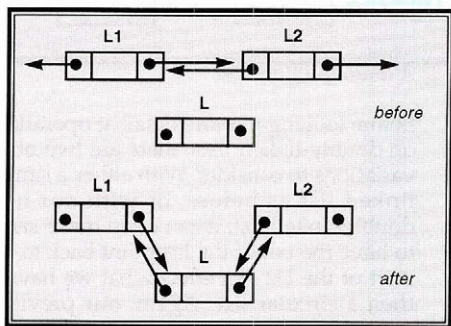
RLink() to contain the links to elements to the left and right respectively of the current element. In an empty list both left and right pointers of the list head point to itself.

We will still need a free list, but since we only ever take or return elements to the head of the free list we will implement this just as before, using the RLink pointers. The only difference is that the free list starts initially at element one, as the zero element is used as the list head even when the list is empty. Using this arrangement, the relationship:

$$\text{RLink}(\text{LLink}(X)) = \text{LLink}(\text{RLink}(X)) = X$$

holds for any element X.

## ADDITIONS AND DELETIONS



**Figure 3. Including an element into a doubly-linked list**

If in a doubly-linked list we wish to insert a new element L between successive chained elements L1 and L2, we can perform this from a knowledge of L1 or L2 alone. For example, to insert the new element before L2:

```
LLink(L) = LLink(L2)
RLink(LLink(L2)) = L
LLink(L2) = L
RLink(L) = L2
```

(see figure 3). The order of these statements is crucial as I found to my cost when checking the program. The last expression involving RLink(LLink(L2)) interprets

as the right pointer of L1, which is of course set equal to the new element L.

Similarly, we can now delete an element L from such a list from a knowledge of L alone (see figure 4):

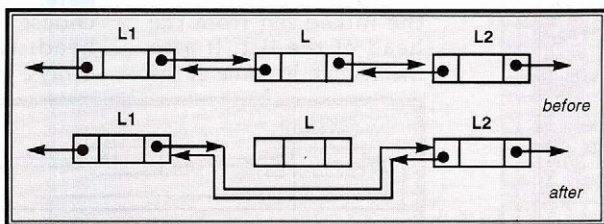
```
RLink(LLink(L)) = RLink(L)
```

```
LLink(RLink(L)) = LLink(L)
```

These processes are implemented in the program listed with this article which implements for a doubly-linked list the same functions as we implemented previously for a simple list.

If you examine the program listing, which corresponds in broad outline with the previous implementation for simple linked lists, you should be able to identify where these two algorithms have been incorporated into the relevant functions and procedures. There are number of interesting points which emerge from examining this listing, and these illustrate some of the advantages of this structure over the supposedly simpler form.

First of all, because the head of the list is simply a node in the list (albeit one whose identity is fixed), we no longer have to treat references to the list head as a special case. This greatly simplifies the coding. Likewise, the fact that we have both forward and backward pointers (in relation to the diagrams right and left) reduces the complexity of the coding in some ways as less information is now needed. Compare the versions of the relevant procedures with those in the previous program.



**Figure 4. Deleting an element into a doubly-linked list**

There are also other advantages and possibilities. I have included two versions of the *Display data* option, one to display right (in ascending order) and one to display left (in descending order). The only differences between the two procedures is in the use of left or right pointers as appropriate.

The process of adding an element to the list inserts it before a specified element; it would be just as easy to insert after an element by interchanging left and right references. In general the only real disadvantage of a doubly-linked lists over a simple linked list is that the former needs more storage space (because we need to accommodate two pointers). In most instances that is a small price to pay for the greater simplicity of coding, and greater flexibility in manipulating the list.

```

10 REM Program List02
20 REM Version B 1.0
30 REM Author Mike Williams
40 REM BEEBUG October 1992
50 REM Program subject to copyright
60 :
100 ON ERROR REPORT:PRINT" at ";ERL:EN
D
110 DIM Data(500),LLink(500),RLink(500
)
120 FOR I%=1 TO 499:RLink(I%)=I%+1:NEX
T
130 LLink(0)=0:RLink(0)=0:free=1:end%=
FALSE
140 :
150 REPEAT
160 MODE7 :choice=FNmenu
170 IF choice=1 THEN PROCinput_data
180 IF choice=2 THEN PROCdelete_data
190 IF choice=3 THEN PROCfind_data
200 IF choice=4 THEN PROCdisplay_dataR
210 IF choice=5 THEN PROCdisplay_dataL
220 IF choice=6 THEN end%=TRUE
230 UNTIL end%
240 END
250 :
1000 DEF PROCadd_element(data)

```

```

1010 LOCAL L,L2,f%:f%=FALSE:L2=0
1020 L=free:free=RLink(free):Data(L)=da
ta
1030 REPEAT
1040 L2=RLink(L2)
1050 IF L2=0 THEN f%=TRUE ELSE IF dat
a<Data(L2) THEN f%=TRUE
1060 UNTIL f%
1070 LLink(L)=LLink(L2):RLink(LLink(L2
))=L:LLink(L2)=L:RLink(L)=L2
1080 ENDPROC
1090 :
1100 DEF FNdelete_element(data)
1110 LOCAL L:L=FNfind_element(data)
1120 IF L=0 THEN =L
1130 RLink(LLink(L))=RLink(L):LLink(RLi
nk(L))=LLink(L)
1140 RLink(L)=free:free=L
1150 =L
1160 :
1170 DEF FNfind_element(data)
1180 LOCAL f%,L:L=0:f%=FALSE
1190 REPEAT
1200 L=RLink(L):IF L=0 THEN f%=TRUE E
LSE IF Data(L)=data THEN f%=TRUE
1210 UNTIL f%=TRUE
1220 =L
1230 :
1240 DEF PROCdisplay_dataR
1250 LOCAL L:L=RLink(0)
1260 PRINT""Display Data"
1270 IF L=0 THEN PRINT""List empty":END
PROC
1280 REPEAT
1290 PRINT Data(L)
1300 L=RLink(L)
1310 UNTIL L=0
1320 PRINT""Press any key to continue":
L=GET
1330 ENDPROC
1340 :
1350 DEF PROCdisplay_dataL
1360 LOCAL L:L=LLink(0)
1370 PRINT""Display Data"
1380 IF L=0 THEN PRINT""List empty":END
PROC
1390 REPEAT
1400 PRINT Data(L)
1410 L=LLink(L)
1420 UNTIL L=0

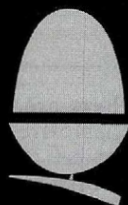
```

*continued on page 53*

**BBC**

OCTOBER 16-18

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 DIMENSION SNAP COMPUTER SUPPLIES OREGAN SOFTWARE  
 DEVELOPMENTS ADVANCED COMPUTER SERVICES CLARES  
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# Reach for the Stars

David Cox presents a short routine to run Basic programs from \*RUN.

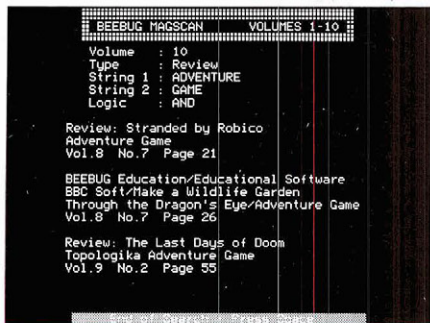
This little utility can be very useful as it provides a quick way of running Basic programs, especially from within other programs, by using the \*RUN command. Type in the listing on this page and save it as *Starrun*.

To convert a Basic program, first load *Starrun* then insert the disc containing your program into the drive; running *Starrun* will display the disc's contents. To convert a file called *Fred* you would just type 'Fred' and away you go; \*RUN Fred or just \*Fred will now run that program. The converted file is also secure from prying eyes, including your own, so make sure you keep a normal Basic copy of your converted file.

```
10 REM Program StarRun
20 REM Version B 1.0
30 REM Author David.C.Cox
40 REM BEEBUG October 1992
50 REM Program subject to copyright
60 :
100 MODE 7
110 IF PAGE<>&1100 THENPAGE=&1100:CHAI
N"StarRUN"
120 PROCAssemble
130 REPEAT
140 PROCLoadFile
150 PROCSavefile
160 UNTIL FALSE
170 END
180 :
1000 DEF PROCAssemble
1010 osbyte=&FFF4
1020 FOR ION=0 TO 2 STEP 2
1030 P%=&18D7
1040 [OPTION
1050 .runfile
1060 LDA #&19
1070 STA &18
1080 LDA #&8A
1090 LDX #&00
```

```
1100 LDY #82
1110 JSR osbyte
1120 LDA #&8A
1130 LDX #&00
1140 LDY #85
1150 JSR osbyte
1160 LDA #&8A
1170 LDX #&00
1180 LDY #78
1190 JSR osbyte
1200 LDA #&8A
1210 LDX #&00
1220 LDY #13
1230 JSR osbyte
1240 RTS
1250 ]
1260 NEXT
1270 ENDPROC
1280 :
1290 DEFFNlen(file$)
1300 PRINT"Getting len. of file"
1310 file=OPENUP(file$)
1320 handle=EXT#(file)
1330 CLOSE #file
1340 =handle+42
1350 :
1360 DEF PROCLoadFile
1370 OSCLI(".")
1380 INPUT"Filename : "fname$
1390 start%=&18D7
1400 len%=FNlen(fname$)
1410 exec%=&18D7
1420 PRINT"Loading file."
1430 OSCLI("Load "+fname$+" 1900")
1440 ENDPROC
1450 :
1460 DEF PROCSavefile
1470 PRINT"Saving file"
1480 OSCLI("Save "+fname$+CHR$(32)+STR$
~(start%)+CHR$(32)+STR$~(start%+len%)+CH
R$(32)+STR$~(exec%)
1490 PRINT"Type *RUN "+fname$+" To run
file.":FORTIME%=0T08000:NEXT:CLS
1500 ENDPROC
```

An updated version of Magscan, which contains the complete indexes to all BEEBUG magazines from Volume 1 Issue 1 to Volume 10 Issue 5



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**1458a** 3.5" ADFS disc

Magscan allows you to locate instantly all references to any chosen subject mentioned anywhere in the 95 issues of BEEBUG magazine to date.

Just type in one or two descriptive words (using AND/OR logic), and you can find any article or program you need, together with a brief description and reference to the volume, issue and page numbers. You can also perform a search by article type and/or volume number.

The Magscan database can be easily updated to include future magazines. Annual updates are available from BEEBUG for existing Magscan users.

**Some of the features Magscan offers include:**

- ◆ full access to all BEEBUG magazines
- ◆ rapid keyword search
- ◆ flexible search by volume number, article type and up to two keywords
- ◆ keyword entry with selectable AND/OR logic
- ◆ extensive on-screen help
- ◆ hard copy option
- ◆ easily updatable to include future magazines
- ◆ yearly updates available from BEEBUG

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<b>0006b</b>	Magscan Vol.1 - 10 80 Track	9.95	<b>0084b</b>	Command	29.88
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<b>0010a</b>	Magscan Update 80 track	4.75	<b>0004b</b>	Exmon II	24.52
<b>1458a</b>	Magscan Update 3.5" ADFS	4.75	<b>0087b</b>	Master ROM	29.88
<b>PAG1a</b>	Arcade Games (5.25" 40/80T)	5.95	<b>1421b</b>	Beebug Binder	4.20

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# Public Domain Software

*A legal investigation and a couple of real-life tales occupy Alan Blundell this month.*

## COMPUTER MUSIC

Last month, I said that I would report further on the subject of computerised music and sampled sounds. What prompted me to talk about it was the interest reportedly shown by the Performing Rights Society in Amiga and Atari ST public domain libraries.

The Performing Rights Society represents composers and recording artists and seeks to protect their interests. One of these interests is in protecting the copyright in their members' works, which include music and video as well as other recorded artistic forms. The report which came to my attention concerned approaches made to ST and Amiga PD libraries about the vast quantities of music samples and soundtracks available for those machines. Whilst neither of these computers have particular relevance to BEEBUG, they do have in common with the BBC micro range a certain musical ability.

Under copyright law, a rendition of someone's copyright artistic work may only legally be produced on a computer with the permission of the original artist or composer, and with the payment of any applicable royalties. This point has not really been appreciated over the years but I suppose that awareness of the point has increased with the wider appreciation of the abilities of computers in relation to sound and music. Computer versions of popular tunes have been common fare on bulletin boards for years and, more recently, samples of musical recordings have become more widespread. To the best of my knowledge, all of this is

probably without permission or the payment of royalties.

This is not to suggest that anyone has deliberately been in breach of copyright. In fact (like all other BBC micro PD libraries I know of), I have myself amassed several discs of such software over the past three years. Everyone is aware of the copyright in computer software, largely due to the efforts of FAST (the Federation Against Software Theft), but the issue of copyright in relation to computer implementations of popular music has not been raised to a level of public awareness in the same way.

Not all musical implementations are restricted in this way, notably most classical music, as copyright in any work expires 50 years after the death of the copyright holder. So, whilst some software is unaffected by this, much of the more common material is.

I therefore expect to see a lot less of such software in the future, as awareness grows; I have withdrawn all such software from my own library. To many people, this may seem to be a good thing, if some of the comments which I receive are anything to go by. It is true that much of the musical software available has been less than perfect and, if you want to listen to the music, the original recording can't be beaten. In some respects, though, the main interest in such software, like a good demo, is that it shows just what your computer can do. In this respect, the tune itself is almost irrelevant: some of the examples which I have heard have succeeded very well at showing just what a capable machine the BBC micro is in that direction.

### NEVER GO WITH STRANGERS

On a completely different subject, I thought it might be of interest to relate the story of one program and the good use to which it has been put. The program in question is called *Never Go With Strangers*, written by Paul Shreeve in 1988. The program's purpose is summarised by its title and it is aimed at younger children, reinforcing the importance these days of not being enticed by unexpected offers from strangers.

Mick Drury of High Wycombe obtained a copy of the program some months ago from BBC PD. Being a member of his local Lions Club, a branch of the international organisation which sets out to do charitable deeds, he quickly realised the possible usefulness of the program in the classroom. The Club, with sponsorship from a local computer business, distributed copies of the program to local schools. In the few months before this, there had been reports of a dubious character who was hanging around outside schools trying to entice young children into his car, so the program was particularly relevant and received universal praise and welcome. Over 70 schools responded positively to the distribution and this led to other branches of the Lions taking up the program in their areas around the south-west. Eventually it may receive national distribution, possibly making this the most widely distributed PD program for the Beeb ever (unless, as they say, you know better...).

### SPRITES & OTHER CONFUSING THINGS

In my last column, I briefly wrote a plea for information about the existence or otherwise of the program *Spriter* on the Welcome discs which readers using

Master series machines had received with their micro. I have already received lots of replies, for which I thank all concerned (especially those who I haven't had time to write to individually).

*Spriter* is a sideways RAM image containing the parts of the earlier Graphics Extension ROM (GXR) for the BBC B which deal with the design and use of sprites. It appears on all Master Compact Welcome discs and, I thought until recently, all Master 128 Welcome discs also. It certainly appears on mine. The reason for mentioning the program here was that it is needed by a number of PD programs for them to work, ranging from games to drawing packages. In 1991, I wrote to Acorn asking if I might include the image on discs with the programs which used it - the idea being that the disc would be fully functional without copying of the file by each user onto their copy of the disc. I reasoned that, since everyone with a Master had a copy anyway, and since the PD programs concerned were only designed for the Master, there would be no loss or disadvantage to Acorn. I received a short 'No' reply and, without pursuing the matter further, simply put a message on each disc saying that the file needed to be copied before the programs on the disc could be used.

That would have been the end of the story except that, early this year, I received a letter from someone who had been unable to find *Spriter* on his Welcome disc. I wrote back telling him exactly which filename to look for and which directory to look in, only to receive a further letter a few weeks later, accompanied this time by a letter from Acorn. The letter from Acorn was again brief and to the point: "the file *Spriter* is

only licensed for use on the Master Compact and is therefore not present on the Master 128 Welcome disc". Momentarily placed in doubt, I checked my original Welcome disc, but yes - the program was there. I wrote to Acorn, telling them that the file was on my disc and on several others to my knowledge, explaining why it was of interest to me and asking for clarification of what was going on. The reply was "The file Spriter to which you refer in your letter is subject to Acorn copyright and has not been licensed for use with the Master 128."

I began to wonder if there were several varieties of Welcome disc in existence, but apart from Acorn's statements and the evidence of my correspondent, every disc I knew of was the same and did contain the file. Hence, the request for information. From the replies, every

Master 128, whenever bought, has the file on the disc, in the same directory and with the same filename. I have written to Acorn again on the strength of this evidence; hopefully the mystery of the missing file will at last be resolved. In the meantime, if you use a Master 128 and are considering obtaining a copy of a program which makes use of the ROM image, check your Welcome disc first!

### NEXT MONTH

Next month, for a change, I will take a look at some of the vast range of PD and shareware for DOS and the Master 512 co-processor. Robin Burton's recent comments about compatibility of the co-processor are borne out by some of the programs which don't work on the 512, but as I have found out, there are some excellent packages which do. B

## BEEBUG Workshop (continued from page 47)

```

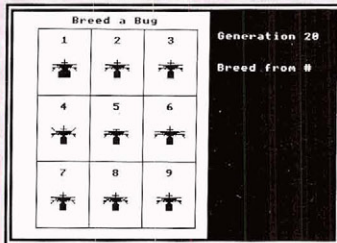
1430 PRINT"Press any key to continue":
L=GET
1440 ENDPROC
1450 :
1460 DEF PROCinput_data
1470 LOCAL f%:f%=FALSE
1480 PRINT""Input Data"
1490 REPEAT
1500 INPUT"Data: " data
1510 IF data=9999 THEN f%=TRUE ELSE P
ROCadd_element(data)
1520 UNTIL f%
1530 ENDPROC
1540 :
1550 DEF PROCdelete_data
1560 LOCAL f%,f1%:f%=FALSE
1570 PRINI""Delete Data"
1580 REPEAT
1590 INPUT"Data: " data
1600 IF data=9999 THEN f%=TRUE ELSE f
1%=FNdelete_element(data):IF f1%=0 THEN
PRINT data;" not found"
1610 UNTIL f%
1620 ENDPROC
1630 :
1640 DEF PROCfind_data

```

```

1650 LOCAL f%,f1%:f%=FALSE
1660 PRINT""Find Data"
1670 REPEAT
1680 INPUT"Data: " data
1690 IF data=9999 THEN f%=TRUE ELSE f
1%=FNfind_element(data):IF f1%=0 THEN PR
INT data;" not found" ELSE PRINT data;"
found at position ";f1%
1700 UNTIL f%
1710 ENDPROC
1720 :
1730 DEF FNmenu
1740 LOCAL c%
1750 PRINT"LINKED LIST DEMONSTRATION"
1760 PRINTTAB(5)"1. Input Data"
1770 PRINTTAB(5)"2. Delete Data"
1780 PRINTTAB(5)"3. Find Data"
1790 PRINTTAB(5)"4. Display Data Right"
1800 PRINTTAB(5)"5. Display Data Left"
1810 PRINTTAB(5)"6. Exit"
1820 PRINT"Use '9999' to terminate dat
a entry"
1830 PRINT"Enter 1 - 6:;"
1840 REPEAT:c%=GET-48:UNTIL c%>0 AND c%
<7
1850 =c%
B

```



- PERSONALISED ADDRESS BOOK** - on-screen address and phone book  
**PAGE DESIGNER** - a page-making package for Epson compatible printers  
**WORLD BY NIGHT AND DAY** - a display of the world showing night and day for any time and date of the year

## Applications I Disc

- BUSINESS GRAPHICS** - for producing graphs, charts and diagrams  
**VIDEO CATALOGUE** - catalogue and print labels for your video cassettes  
**PHONE BOOK** - an on-screen telephone book which can be easily edited and updated  
**PERSONALISED LETTER-HEADINGS** - design a stylish logo for your letter heads  
**APPOINTMENTS DIARY** - a computerised appointments diary  
**MAPPING THE BRITISH ISLES** - draw a map of the British Isles at any size  
**SELECTIVE BREEDING** - a superb graphical display of selective breeding of insects  
**THE EARTH FROM SPACE** - draw a picture of the Earth as seen from any point in space

## File Handling for All

on the BBC Micro and Arc4 Archimedes  
 by David Spencer and Mike Williams



Computers are often used for file handling applications yet this is a subject which computer users find difficult when it comes to developing their own programs. *File Handling for All* aims to change that by providing an extensive and comprehensive introduction to the writing of file handling programs with particular reference to Basic.

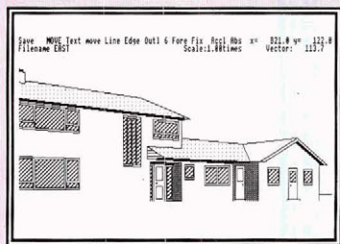
*File Handling for All*, written by highly experienced authors and programmers David Spencer and Mike Williams, offers 144 pages of text supported by many useful program listings. It is aimed at Basic programmers, beginners and advanced users, and anybody interested in File Handling and Databases on the Beeb and the Arc. However, all the file handling concepts discussed are relevant to most computer systems, making this a suitable introduction to file handling for all.

The book starts with an introduction to the basic principles of file handling, and in the following chapters develops an in-depth look at the handling of different types of files e.g. serial files, indexed files, direct access files, and searching and sorting. A separate chapter is devoted to hierarchical and relational database design, and the book concludes with a chapter of practical advice on how best to develop file handling programs.

The topics covered by the book include:

- Card Index Files, Serial Files, File Headers, Disc and Record Buffering, Using Pointers, Indexing Files, Searching Techniques, Hashing Functions, Sorting Methods, Testing and Debugging, Networking Conflicts, File System Calls

The associated disc contains complete working programs based on the routines described in the book and a copy of Filer, a full-feature Database program originally published in BEEBUG magazine.



## ASTAAD

Enhanced ASTAAD CAD program for the Master, offering the following features:

- \* full mouse and joystick control
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Arcade Games (3.5" ADFS)	PAG2a	£ 5.95
Board Games (3.5" ADFS)	PBG2a	£ 5.95

All prices include VAT where appropriate. For p&sp see Membership page.

## Board Games

**SOLITAIRE** - an elegant implementation of this ancient and fascinating one-player game, and a complete solution for those who are unable to find it for themselves.

**ROLL OF HONOUR** - Score as many points as possible by throwing the five dice in this on-screen version of 'Yahtzee'.

**PATIENCE** - a very addictive version of one of the oldest and most popular games of Patience.

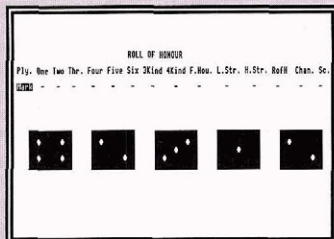
**ELEVENSES** - another popular version of Patience - lay down cards on the table in three by three grid and start turning them over until they add up to eleven.

**CRIBBAGE** - an authentic implementation of this very traditional card game for two, where the object is to score points for various combinations and sequences of cards.

**TWIDDLE** - a close relative of Sam Lloyd's sliding block puzzle and Rubik's cube, where you have to move numbers round a grid to match a pattern.

**CHINESE CHEQUERS** - a traditional board game for two players, where the object is to move your counters, following a pattern, and occupy the opponent's field.

**ACES HIGH** - another addictive game of Patience, where the object is to remove the cards from the table and finish with the aces at the head of each column.



## Applications II Disc



**CROSSWORD EDITOR** - for designing, editing and solving crosswords

**MONTHLY DESK DIARY** - a month-to-view calendar which can also be printed

**3D LANDSCAPES** - generates three dimensional landscapes  
**REAL TIME CLOCK** - a real time digital alarm clock displayed on the screen

**RUNNING FOUR TEMPERATURES** - calibrates and plots up to four temperatures

**JULIA SETS** - fascinating extensions of the Mandelbrot set

**FOREIGN LANGUAGE TESTER** - foreign character definer and language tester

**SHARE INVESTOR** - assists decision making when buying and selling shares

**LABEL PROCESSOR** - for designing and printing labels on Epson compatible printers

## Arcade Games

**GEORGE AND THE DRAGON** - Rescue 'Hideous Hilda' from the flames of the dragon, but beware the flying arrows and the moving holes on the floor.

**EBONY CASTLE** - You, the leader of a secret band, have been captured and thrown in the dungeons of the infamous Ebony Castle. Can you escape back to the countryside, fighting off the deadly spiders on the way and collecting the keys necessary to unlock the coloured doors?

**KNIGHT QUEST** - You are a Knight on a quest to find the lost crown, hidden deep in the ruins of a weird castle inhabited by dangerous monsters and protected by a greedy guardian.

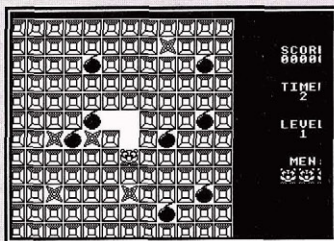
**PITFALL PETE** - Collect all the diamonds on the screen, but try not to trap yourself when you dislodge the many boulders on your way.

**BUILDER BOB** - Bob is trapped on the bottom of a building that's being demolished. Can you help him build his way out?

**MINEFIELD** - Find your way through this grid and try to defuse the mines before they explode, but beware the monsters which increasingly hinder your progress.

**MANIC MECHANIC** - Try to collect all the spanners and reach the broken-down generator, before the factory freezes up.

**QUAD** - You will have hours of entertainment trying to get all these different shapes to fit.



### Stock Code Price

<b>File Handling for All Book</b>	BK02b	£ 9.95
<b>File Handling for All Disc (40/80T DFS)</b>	BK05a	£ 4.75
<b>Joint Offer book and disc (40/80T DFS)</b>	BK04b	£ 11.95
<b>Magscan (40 DFS)</b>	0005a	£ 9.95
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<b>Magscan (3.5" ADFS)</b>	0007a	£ 9.95

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<b>Joint Offer book and disc (3.5" ADFS)</b>	BK06b	£ 11.95
<b>Magscan Upgrade (40 DFS)</b>	0011a	£ 4.75
<b>Magscan Upgrade (80T DFS)</b>	0010a	£ 4.75
<b>Magscan Upgrade (3.5" ADFS)</b>	1458a	£ 4.75

All prices include VAT where appropriate. For p&p see Membership page.

Tel. (0727) 40303

Fax. (0727) 860263

## Pentiles

```
710 IF n%=1 PROCdisplay
720 PROCqturn:COLOUR3:PROCmove
730 PROCfix:PROCclose:n%=n%+1
740 PROCruntot:PROCdisplay
750 UNTIL wall%>18
760 PRINTTAB(1,30)" PRESS SPACE BAR ";
770 *FX15,0
780 A=GET
790 MODE4:VDU19,0,4,0;19,1,3,0;
800 *FX11,50
810 *FX4,0
820 PROCscore
830 PRINTTAB(0,22)SPC(39);
840 PRINTTAB(4,22)"Another game? Y/N"
850 REPEAT:q$=CHR$(GET AND &DF) :UNTIL
q$="Y" OR q$="N"
860 UNTIL q$="N"
870 *FX11,50
880 *FX4,0
890 CLS
900 END
910 :
1000 DEF PROCset1
1010 VDU19,0,4,0;19,1,3,0;
1020 FORJ%=1TO16:pt%(J%)=0:NEXT
1030 FOR J%=1TO 8
1040 REPEAT:c%=RND(8):t%=0
1050 FOR ch%=1TO J%
1060 IF c%=pt%(ch%) t%=t%+1
1070 NEXT
1080 UNTIL t%=0
1090 pt%(J%)=c%
1100 NEXT
1110 FOR J%=9 TO 16
1120 REPEAT:c%=RND(8):t%=0
1130 FOR ch%=9 TO J%
1140 IF c%=pt%(ch%) t%=t%+1
1150 NEXT
1160 UNTIL t%=0
1170 pt%(J%)=c%
1180 NEXT
1190 REPEAT
1200 PRINTTAB(14,10);"PENTILES"
1210 PRINT"" Hard or Easy game ? EN
TER H or E"
1220 PRINT"" ONLY 3 minutes to complet
e hard game"
1230 *FX15,0
1240 lev$=CHR$(GET AND &DF)
1250 UNTIL lev$="H" OR lev$="E"
1260 SOUND 0,s%,2,3
```

```
1270 ENDPROC
1280 :
1290 DEF PROCset2
1300 VDU19,0,4,0,0,23;8202;0;0;0;
1310 *FX4,1
1320 IFlev$="E" dth=6 ELSE dth=RND(3)+2
1330 IF dth=3 D%=0:E%=1216
1340 IF dth=4 D%=128:E%=1024
1350 IF dth=5 D%=256:E%=960
1360 IF dth=6 D%=320:E%=896
1370 IF lev$="E" THEN val%=10 ELSE val%
=-25
1380 F%=895:G%=911-32*dth
1390 VDU5,18,0,1
1400 FOR J%=D% TO E% STEP64
1410 FOR K%=F% TO G% STEP-32
1420 MOVEJ%,K%:PRINT;b$:NEXT,
1430 VDU4,17,3
1440 n%=1:sc%=0::TIME=0
1450 bon%=0:new%=0:old%=0:wall%=0
1460 ENDPROC
1470 :
1480 DEF PROCread
1490 FOR K%=1 TO 5:READ x%(K%),y%(K%)
1500 PRINTTAB(xp%+x%(K%),yp%+y%(K%));a$
1510 SOUND 0,s%,K%,2
1520 NEXT
1530 ENDPROC
1540 :
1550 DEF PROCruntot
1560 new%=0
1570 FOR J%=D% TO E% STEP64:FOR K%=F% T
O G% STEP-32
1580 C%=POINT(J%+32,K%-16)
1590 IF C%=2 THEN new%=new%+1
1600 NEXT:NEXT
1610 area%=new%-old%
1620 sc%=sc%+area%*val%
1630 IF area%>5 val%=val%+5
1640 IF area%<5 AND val%>0 val%=val%-5
1650 old%=new%
1660 IF n%=15 OR wall%=19 PROCdisplay
1670 ENDPROC
1680 :
1690 DEF PROCdisplay
1700 VDU28,0,31,19,25,17,130,17,0,12
1710 PRINTTAB(1,1)"Present Score ";sc%
1720 PRINTTAB(1,3)"Tile value=";val%;
1730 PRINTTAB(1,5);17-n%;" Tiles left"
1740 VDU26,17,128,17,3
1750 ENDPROC
```



```

1760 :
1770 DEF PROCqturn
1780 PROCdel(19,23,2)
1790 VDU17,2
1800 PRINTTAB(2,19);"Press SPACE BAR"
1810 PRINTTAB(2,21);"to rotate Tile"
1820 PRINITAB(1,23);"or ";u$;" to move
Tile"
1830 COLOUR3
1840 REPEAT
1850 *FX15,0
1860 ans=GET
1870 IF ans=32 PROCturn
1880 UNTIL ans=139
1890 SOUND1,s%,0,3
1900 ENDPROC
1910 :
1920 DEF PROCturn
1930 r%=r%+10: IF r%>s2%(c%) r%=s1%(c%)
1940 RESTORE(r%)
1950 PROCcrub:PROCread
1960 ENDPROC
1970 :
1980 DEF PROCmove
1990 PROCdel(19,23,2)
2000 COLOUR2
2010 PRINTTAB(1,19)"Use CURSOR KEYS to"
2020 PRINTTAB(1,21)"move into RED ZONE"
2030 PRINTTAB(1,23)"COPYKEY fixes TILE"
2040 PROCcrub
2050 VDU5,18,3,3
2060 xp%=xp%*64+32:yp%=1007-yp%*32
2070 FOR K%=1TO5
2080 px%(K%)=x%(K%)*64
2090 py%(K%)=y%(K%)*(-32)
2100 NEXT
2110 PROCcalcpt:PROCprshp
2120 *FX11,5
2130 REPEAT
2140 *FX15,0
2150 a%=GET:IF a%<135 OR a%>139 ng%=1
2160 IF a%>135 AND a%<140 PROCcalcpt:ng
%=1
2170 IF a%=136 AND xp%>32 PROCleft
2180 IF a%=137 AND xp%<1238 PROCright
2190 IF a%=139 AND yp%<944 PROCup
2200 IF a%=138 AND yp%>532 PROCdown
2210 IF ng%=0 PROCcalcpt:PROCprshp
2220 UNTIL a%=135
2230 ENDPROC
2240 :

```

```

2250 DEF PROCfix
2260 GCOL 0,3:PROCprshp
2270 FORh%=1TO5:SOUND 1,s%,h%*8+53,3:NE
XT
2280 E1=0:E2=0:E3=0:E4=0
2290 GCOL0,2
2300 FORk%=1TO5:MOVE u%(K%)-32,v%(K%)+1
6
2310 PRINTc$:NEXT
2320 FOR J%=D% TO E% STEP 64:P%=POINT(J
%,879):IF P%=1 THEN E1=E1+1
2330 NEXT
2340 FORJ%=D% TO E% STEP 64:P%=POINT(J%
,G%):IFP%=1THENE2=E2+1
2350 NEXT
2360 FORJ%=F% TO G% STEP-32:P%=POINT(D%
+32,J%-16):IF P%=1 THEN E3=E3+1
2370 NEXT
2380 FORJ%=F%TO G% STEP -32:P%=POINT(E%
+32,J%-16):IFP%=1 THENE4=E4+1
2390 NEXT
2400 IF E1=0 AND E2=0 AND E3=0 AND E4=0
wall%=19
2410 IF E2=0 AND dth=3 wall%=19
2420 VDU4,17,3
2430 IF dth<>3 PROCsidewipe
2440 PROCdel(0,3,1)
2450 PROCdel(dth+4,18,1)
2460 ENDPROC
2470 :
2480 DEF PROCclose
2490 IF n%=16 wall%=19
2500 IF lev$="E" OR wall%=19 ENDPROC
2510 COLOUR 2
2520 wall% =TIME DIV 1000
2530 IF wall%>17 wall%=19
2540 FORJ%=0 TO wall%
2550 PRINTTAB(J%,13);CHR$(244):NEXT
2560 COLOUR 3
2570 ENDPROC
2580 :
2590 DEF PROCscore
2600 IF new%=60 bon%=500
2610 IF new%=59 bon%=200
2620 sc%=sc%+bon%
2630 FOR J%=1 TO 4
2640 PRINTTAB(4,J%+6)LEFT$(sb$(J%),10),
sb$(J%)
2650 NEXT
2660 FOR J%=1 TO 5
2670 IF sc%>sb%(J%) THEN I%=J%:J%=5

```

## Pentiles

```
2680 NEXT
2690 PRINTTAB(1,16)"Your current score
is ";sc%;" points"
2700 IF bon%>0 PRINT" including a ";bon
%;" points bonus"
2710 IF I%<5 PROCupdate ELSE PRINTTAB(4
,20)"Better luck next time"
2720 ENDPROC
2730 :
2740 DEF PROCupdate
2750 PRINTTAB(4,22)"Enter your name"
2760 INPUTTAB(20,22)name$
2770 PROCshuffle
2780 ENDPROC
2790 :
2800 DEF PROCshuffle
2810 FOR J%=4 TO I% STEP -1
2820 sb$(J%)=sb%(J%-1):sb$(J%)=sb$(J%-1
)
2830 NEXT
2840 sb%(I%)=sc$:sb$(I%)=name$
2850 FOR J%=I% TO 4
2860 PRINTTAB(4,J%+6);SPC(20)
2870 PRINTTAB(4,J%+6)LEFT$(sb$(J%),10),
sb%(J%)
2880 NEXT
2890 ENDPROC
2900 :
2910 DEF PROCcalcpt
2920 FOR K%=1TO5:u%(K%)=xp%+px%(K%)
2930 v%(K%)=yp%+py%(K%):NEXT
2940 ENDPROC
2950 :
2960 DEF PROCprshp
2970 FOR K%=1 TO 5:MOVE u%(K%)-32,v%(K%
)+16
2980 PRINTa$
2990 NEXT
3000 ENDPROC
3010 :
3020 DEF PROCleft
3030 ng%=0:FOR z%=1 TO 5
3040 IF POINT(u%(z%)-64,v%(z%))=2 ng%=n
g%+1
3050 NEXT
3060 IF ng%=0 PROCprshp: xp%=xp%-64
3070 SOUND1,s%,xp%/16+11,5
3080 ENDPROC
3090 :
3100 DEF PROCright
3110 ng%=0
```

```
3120 FOR z%=1 TO 5
3130 IF POINT(u%(z%)+64,v%(z%))=2 ng%=n
g%+1
3140 NEXT
3150 IF ng%=0 PROCprshp: xp%=xp%+64
3160 SOUND1,s%,xp%/16+11,5
3170 ENDPROC
3180 :
3190 DEF PROCup
3200 ng%=0:FOR z%=1 TO 5
3210 IF POINT(u%(z%),v%(z%)+32)=2 ng%=n
g%+1
3220 NEXT
3230 IF ng%=0 PROCprshp: yp%=yp%+32
3240 SOUND1,s%,(30-yp%)/4-1,4
3250 ENDPROC
3260 :
3270 DEF PROCdown
3280 ng%=0:FOR z%=1 TO 5
3290 IF POINT(u%(z%),v%(z%)-32)=2 ng%=n
g%+1
3300 NEXT
3310 IF ng%=0 PROCprshp: yp%=yp%-32
3320 SOUND1,s%,(30-yp%)/4-1,4
3330 ENDPROC
3340 :
3350 DEF PROCrub
3360 COLOUR0
3370 FOR K%=1 TO 5
3380 PRINTTAB(xp%+x%(K%),yp%+y%(K%));a$
3390 NEXT
3400 COLOUR3
3410 ENDPROC
3420 :
3430 DEF PROCdel(f%,l%,st%)
3440 FOR J%=f% TO l% STEP st%
3450 PRINTTAB(0,J%);sp$:NEXT
3460 ENDPROC
3470 :
3480 DEF PROCsidewipe
3490 IF dth=4 l$=STRING$(2," ") ELSE l$
=STRING$(dth-1," ")
3500 r$=STRING$(dth-1," ")
3510 FOR d%=4 TO dth+3
3520 PRINTTAB(0,d%);l$;TAB(21-dth,d%);r
$
3530 NEXT
3540 ENDPROC
3550 :
3560 DATA Happy,2000,Sleepy,1500
3570 DATA Grumpy,1000,Dopey,500,DUMMY,0
```

# HINTS and tips HINTS and tips HINTS and tips HINTS and tips HINTS and tips

Please do keep sending in your hints for all BBC and Master computers. Don't forget, if your hint gets published, there's a financial reward.

## USING MAGSCAN WITH HIBASIC

*D.Jowers*

To run MagScan on a BBC with a 6502 second processor using HiBasic, PAGE needs to be reset by replacing the line

```
IF PAGE>&1400 THEN PAGE=&1400
```

by

```
PAGE=&E00
```

in the !Boot file. It is best if the MagScan disc contains a copy of HiBasic so that \*HiBasic can be added to the !Boot file as the first command.

## \*TYPE AND \*EXEC - WHO NEEDS BOTH?

*Kenneth Clarke*

Here is an interesting tip which may allow you to reduce the number of files you need on a disc. The reduction is not large, but with the restriction to 31 files when using the DFS, saving just one filename can be very useful. Imagine the situation where you have a file which needs to be \*TYPEd to display some instructions (for example), and you also have a file which needs to be \*EXECd to perform a specific task (like loading a Basic program).

These two files can actually be combined into one file by putting the \*EXEC part of the file first, then putting CLOSE#0, and then putting the \*TYPE part, for example:

```
*BASIC
LOAD "MYPROG"
CLOSE#0
Instructions
...
```

If the file is \*TYPEd, then the instructions will be shown normally, with a little bit of garbage at the start. However, if the file is \*EXECd,

then the first three lines will be executed, but the last instruction, CLOSE#0, will close the file and prevent the instruction text from being executed. This provides a neat way of combining these two types of files, and can save you that one precious filename on your DFS disc.

## HALF PROCEDURES

*N.Silver*

If you want to use a section of an existing procedure as a procedure in its own right without repeating the program lines, then you can simply add a second DEF PROC statement. This does make the program somewhat unstructured, but it is economical on memory. For example, these two program sections are equivalent:

```
100 DEF PROCone
110 PRINT "one"
120 PRINT "two"
130 ENDPROC
140 :
150 DEF PROCtwo
160 PRINT "two"
170 ENDPROC
```

```
100 DEF PROCone
110 PRINT "one"
120 DEF PROCtwo
130 PRINT "two"
140 ENDPROC
```

## DECODING USR

*Jonathan Temple*

The most difficult aspect of using the USR function is separating the four parts of the number returned into the accumulator, X register, Y register and the status register. This is most easily done like this:

```
!&70=USR(address)
```

The accumulator will then be stored in location &70, X in &71, Y in &72 and P in &73.

**B**

# Personal Ads

**BEEBUG members may advertise unwanted computer hardware and software through personal ads (including 'wants') in BEEBUG. These are completely free of charge but please keep your ads as short as possible. Although we will try to include all ads received, we reserve the right to edit or reject any if necessary. Any ads which cannot be accommodated in one issue will be held over to the next, so please advise us if you do not wish us to do this. We will accept adverts for software, but prospective purchasers should ensure that they always receive original copies including documentation to avoid any abuse of this facility.**

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## Public Domain Software and Shareware for the BBC Micro, Master and Master 512 co-processor

Amongst the latest additions are - the sequel to Acornsofts 'Gateway to Karos' and Howard Spurr's 'Disc Duplicator III'

Send £1.50 for catalogue and sampler disc to;

**BBC PD, 18 Carlton Close, Blackrod, Bolton BL6 5DL**

Make cheques payable to A Blundell or send an A5 s.a.e. for more details

**WANTED:** BBC B in any condition for spares. Tel. (0821) 642652 eves.

**Z88**, one 128k RAM cartridge, two 128k EPROM cartridges, EPROM eraser, mains adaptor, parallel printer lead, serial printer lead, User Guide and carry case, plus Z88-BBC link including 5.25" BBC disc, serial cable and user guide £100, Z88-to-Mac link including 3.5" Apple Mac disc, Eprom card for Z88, serial cable and user guide £15, View->Mac 3 utility for transferring between BBC word processors and Apple Mac wp's (includes 3.5" Apple Mac disc, Mac-BBC serial cable and user guide) £70. Tel. 071-267 15533.

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**Acorn Master 128** fitted with BEEBUG internal Master Modem and 512 co-processor that has been upgraded to 1Mb by Solidisc, GEM mouse and software, all manuals and original packing for computer, Welcome software, may separate modem and PC board £480. Also available various ROMs, hardware and software, magazines and books. Please telephone for full detailed list. Tel. (0263) 711330.

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**BBC B** issue 4 with Opus 40/80T DS DD, Watford DDFS, 32k Shadow RAM and Sidedays RAM (64k fitted) with associated software, Wordwise+ and Watford NIQ ROMs; Wapping Editor DTP with mouse, all manuals plus other books, BEEBUG mags vols 1,2,4-8 £195, Epson RX80 F/T+ with BBC cable £65, Gemini Nominal Ledger business accounting package for the BBC £35. Tel. 061-624 1007.

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## REAL HELP FOR VIRTUAL NEEDS

Someone who may be able to help Mr. de Bourcier (see BEEBUG Vol.11 No.2) is Mark Cook, who used to work for the now defunct Torch Ltd. He is happy for his address to be published which is 70 Stubbs Lane, Braintree, Essex CM7 6XB.

**J.Wilbraham**

*We previously publicised the service which Mark Cook is offering in support of former Torch products in the news pages of BEEBUG Vol.10 No.2. Please send an SAE with any enquiry which you make.*

## DFS/ADFS TO DOS FILE TRANSFERS

I have found Bernard Hill's DFS to MS-DOS conversion program from Vol.7 No.1 extremely useful. Would it be possible to alter the program to run under the ADFS?

One slight problem I have found is in trying to use certain symbols in file names. I had been unable to include the '&' character in the original ADFS file names, so I resorted to the '/' character instead. These files were transferred to the DFS, and then to DOS. However, DOS doesn't like the '/' character in file names. The BEEBUG convertor had saved the files with this character in their file names, but DOS wouldn't recognise them; it wouldn't even allow me to delete them. Fortunately neither DOS nor DFS objects to the '&' character, so I was able to rename the DFS files and convert them again.

Lastly, may I recommend BBC PD to everyone. Send off for the sampler disc (only £1.50) and you will be impressed.

**Simon Myers**

*Bernard Hill's conversion program would be difficult to adapt to work with the ADFS, though it would not be impossible to write a program to*

*do this. If any reader has such a program or would like to write one, we would certainly be pleased to consider it for publication in BEEBUG. Readers may also like to refer to updates to these programs published in BEEBUG Vol.10 No.4.*

## DATASHEET IMPROVED

On running DataSheet (see BEEBUG Vol.11 Nos.1 & 2) I became aware of a useful improvement. Having loaded a sheet from disc and updated it, wishing to resave it under the old name meant typing that name in again at the prompt. Apart from the inconvenience, any error in typing could result in a second copy being saved with a slightly different name. To overcome this I have changed line 3340 to read:

```
3340 PROCCLS:PRINTTAB(5,9)CHR$131"Current
file = "f$ TAB(5,11) CHR$131"Save filena
me ";:INPUT"? "F$:IF F$="" F$=f$
```

I also added two lines to support this change:

```
3205 f$=F$
5935 f$=STRING$(7, ". ")
```

Line 5935 reserves enough space for any DFS file name, and line 3205 uses f\$ to store the name of the file loaded from disc.

In use, the "Save" screen now also displays the current file name, and pressing Return saves the file under that name. If the file is to be saved under a new name then this should be typed at the prompt before pressing Return.

**Bernard Beeston**

*We always welcome extensions and improvements from readers to previously published programs, and where appropriate will publish these in BEEBUG for the benefit of other readers.*

**B**

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We are always seeking good quality articles and programs for publication in BEEBUG. All contributions used are paid for at up to £50 per page, but please give us warning of anything substantial that you intend to write. A leaflet 'Notes to Contributors' is available on receipt of an A5 (or larger) SAE.

Please submit your contributions on disc or cassette in machine readable form, using "View", "Wordwise" or other means, but please ensure an adequate written description is also included. If you use cassette, please include a backup copy at 300 baud.

In all communication, please quote your membership number.

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# Magazine Disc

October 1992

**DESIGNING NLQ CHARACTERS (PART 2)** - The program SCPart1 downloads a scientific font consisting of NLQ characters, suitable for those printers that allow fonts to be downloaded.

**DEMOS IN THE CLASSROOM** - Curves is a program which demonstrates the fundamentals of trigonometry using a graphical approach. This shows the usefulness of computers in educational demonstrations, as described in the related article.

**PENTILES GAME** - Pentiles is a game which involves trying to fit shapes into a rectangular space by sliding them in from the sides. The game has two levels, and on both levels you will need a good memory and a modicum of luck.

**QUADRIC SURFACES** - Quadric is a program which allows 3D graphs to be displayed using a method of plotting which creates an illusion of depth.

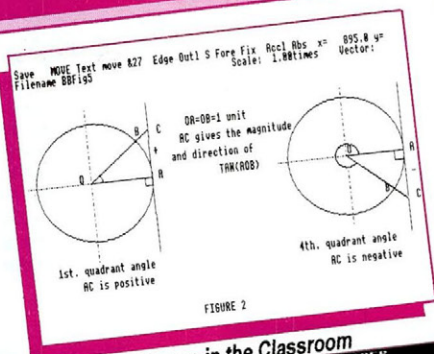
**FIRST COURSE: GRAPHICS** - A very short and simple Basic program which prints out the word BEEBUG using the graphics commands described in the First Course article in the magazine.

**REACH FOR THE STARS** - This program takes Basic programs and converts them into files which can be executed using \*RUN. This has the added advantage of protecting your Basic programs from prying eyes.

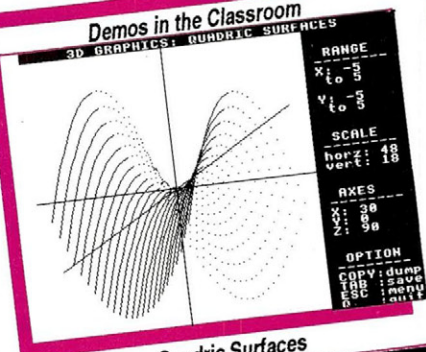
**BEEBUG WORKSHOP: LINKED LISTS** - The program on this disc implements the data structure of doubly-linked lists. Using this program you can enter data, delete data, search for data and display data, all using doubly-linked lists.

**INTERRUPT DRIVEN MOTOR CONTROL** - The program Motor installs a machine code routine which allows the cassette motor to be controlled using the Tab key. This enables audio note taking to be done easily, as the cassette can be stopped and started without having to move your hands from the keyboard.

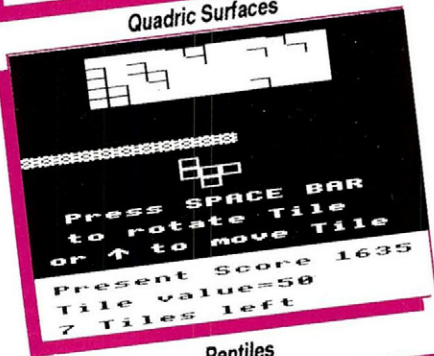
**MAGSCAN DATA** - Bibliography for this issue (Vol.11 No.5).



## Demos in the Classroom



## Quadric Surfaces



## Pentiles

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# Upgrading to an Archimedes

We know that many BEEBUG readers have already upgraded to an Archimedes, and no doubt many more will choose to follow a similar route. For their benefit we offer our advice to help them make a sensible decision on whether to upgrade and if so, what path to take.

Any prices quoted relate to our associated company Beebug Ltd., but note that all prices, particularly those on trade-ins and secondhand items, are likely to change without notice. You should always telephone or write for the latest information.



Archimedes A5000

## What System to Choose

All Archimedes systems still use the RISC OS 2 operating system, except the A5000 and A4 which use RISC OS 3. Based on the experience of existing users, we would strongly recommend a minimum of 2Mb of RAM. Most users find a hard disc adds significantly to the convenience of using an Archimedes, but you can always add a low-cost hard drive later, and more memory, but check on the likely price of future expansions - it is not necessarily the same for all machines. If you might be interested in more specialised add-ons (scanners, digitisers, etc.) then check the expansion capability of your preferred system.

## Compatibility and Transferability

You will need to decide to what extent you wish to continue to use existing discs and disc drives on an Archimedes. An Archimedes and a BBC micro can be directly connected for transfer of files. You can also connect a 5.25" drive to an

Archimedes via an additional interface to continue to access 5.25" discs (ADFS format). Our DFS Reader will also allow files to be transferred to the Arc from DFS format discs. Much software will run directly on a Archimedes, or via the 6502 emulator. However, consider this carefully; in our experience, despite prior misgivings, most Archimedes users find that they rapidly adjust to the Desktop environment of the Archimedes, and quickly abandon the software and data of their old system after an initial period.

## Software for the Archimedes

The Archimedes is supplied complete with a range of basic applications software. Before embarking on any further purchases it may be better to familiarise yourself with the new machine. Most users look for a word processor (or DTP package), maybe a spreadsheet, or a database, plus other more specialist software. We cannot give detailed guidance here, but back issues of RISC User contain a wealth of useful

systems (except the A5000) are priced without monitor. The details given in the table are minimum specifications of the different Archimedes models. Note that unlike a BBC micro, there is seldom much need for a second floppy disc drive on an Archimedes.



A3000 Learning Curve

It may also be possible to trade in an existing monitor and/or disc drive, but check if your existing monitor is suitable for use with an Archimedes first. You may find it better to advertise your BBC system in

## Archimedes Systems - Typical or Current Prices

	Secondhand	New
+ A310 1Mb RAM	£350	
+ A410 1Mb RAM	£590	
+ A420 2Mb RAM, 20Mb hard drive	£675	
+ A440 4Mb RAM, 40Mb hard drive	£750	
+ * A3000 1Mb RAM	£425	£ 703.83
* A5000, 2Mb RAM, 40Mb hard drive		£1761.33
+ * Acorn standard colour monitor	£145	£ 234.94

All systems above include a single floppy disc drive.

New (\*) and secondhand (+) - all prices inc. VAT.

The A5000 price includes a multiscan colour monitor.

## BBC Micros - Typical Trade-in Prices

Model B (Issue 7)	£ 35
Model B (issue 7) + DFS	£ 75
Master 128	£125
Master Compact	£ 50

information - we can advise on suitable issues.

## General Advice

It is advisable to discuss your requirements with the BEEBUG technical team before making a final decision on what you want. Try to anticipate future expansion needs at the outset. Note that Archimedes

BEEBUG and sell privately - this applies particularly to any software and hardware add-ons which cannot be accepted for a trade-in. In future, all personal ads for Archimedes systems in RISC User will also be included in BEEBUG. You may also defer a trade-in until a later date provided you make this clear at the time of purchase.

For further information on all Archimedes systems contact:

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