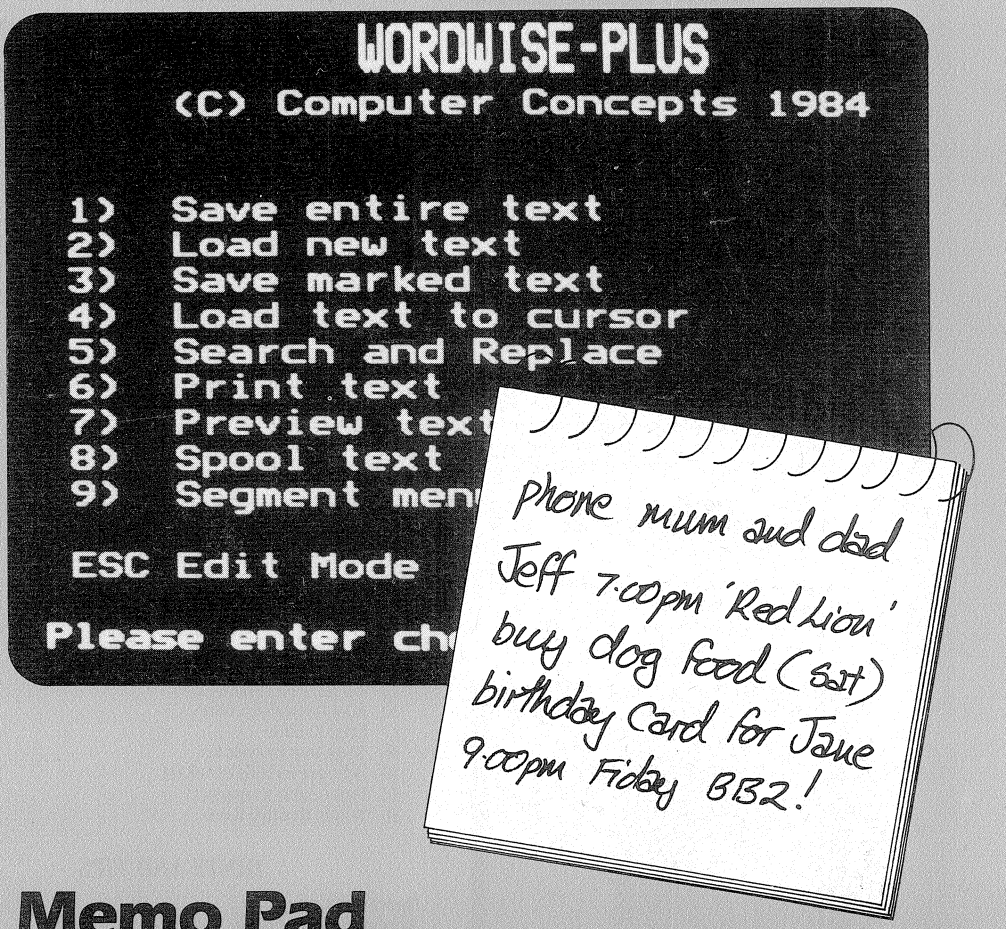
VOLUME 5 NUMBER 3 JULY 1986 PRICE £1.30

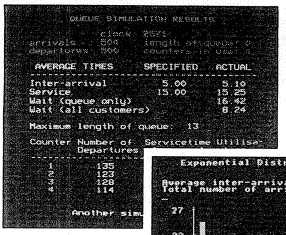
BEEBUG

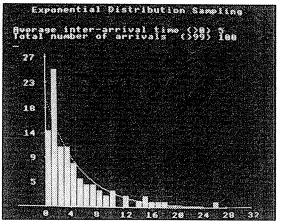
FOR THE BBC MICRO

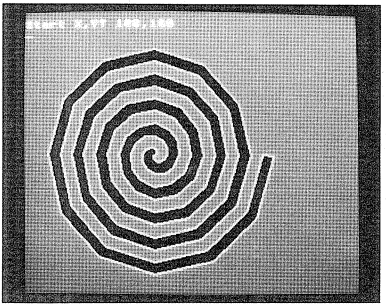


Memo Pad

Computer Simulation







Painting by Numbers

Fontwise Plus

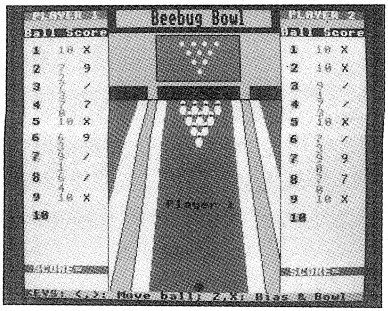
Fontwise Plus

lets you produce documents with a variety of different **typestyles. You can use:**

VIEW or
WORDWISE PLUS or
MINI OFFICE

to produce the text and make full use of all the ***normal features of the word processors.***

Tenpin Bowling



BEEBUG

VOLUME 5 NUMBER 3 JULY 1986

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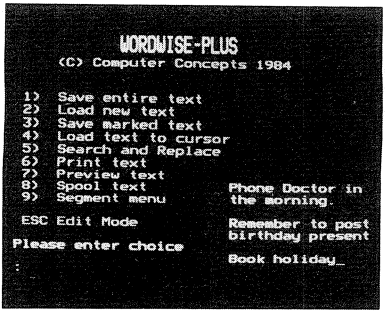
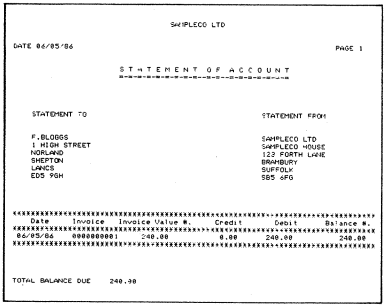
PROGRAMS

HINTS AND TIPS

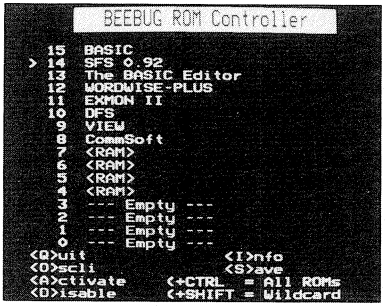
Memo Pad

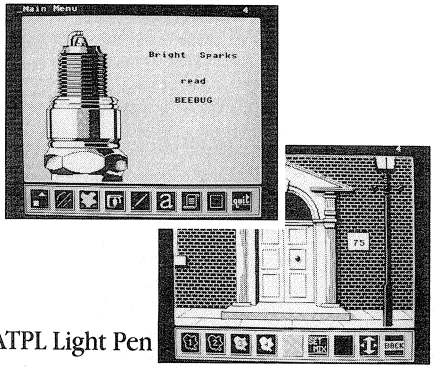


Peartree Business System



ROM Controller





ATPL Light Pen

EDITORIAL JOTTINGS

MAGIC MODEM

Too late to mention in last month's magazine is the news that BEEBUG has arranged a special deal on the BABT approved Magic Modem. This was reviewed in BEEBUG Vol. 4. No. 9 and was rated very highly. At that time the modem had not received BABT approval. Now that this has been obtained we can thoroughly recommend this modem to members. It is very versatile with excellent controlling software written by Soft Machinery. The Modem may be used for accessing Prestel, Micronet, Telecom Gold, and the many bulletin boards now in operation. Full order details are contained in the supplement.

COMPUTER SHOWS

It was very pleasing to meet many BEEBUG members at the May Electron and BBC Micro User Show in London. The show was extremely busy at times, particularly on the first day. This indicates the continuing level of support and interest in Acorn's products.

The Acorn User Show at the Barbican Centre will be taking place this July (24th-27th) and we shall have a large stand there with all our own products and many others besides. As with the Micro User Show, we have arranged a special discount on the entry price for BEEBUG members (see supplement) so why not come and meet us at what promises to be the major show for the BBC micro and Master series this year.

CLASSIFYING REVIEW PRODUCTS

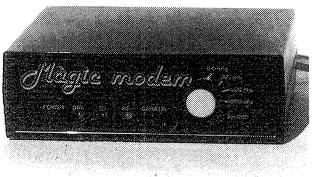
Several members have suggested recently, prompted we suspect by the appearance of the Master series, that we classify products we review in the same way that we do for programs published in BEEBUG so that it is clear on what systems any particular product will work correctly. We are introducing this idea in this issue using the same symbols as for software. However, instead of the distinction between Basic I and Basic II we shall just use a letter 'B' to represent the model B. Let us know if we can improve further on this.

PROGRAM CLASSIFICATION

All programs in the magazine, and on the magazine cassette/disc, are marked with the symbols shown below. An uncrossed symbol indicates full working, a single line through a symbol shows partial working for that configuration (normally some modifications will be required), and a cross through a symbol indicates a program that will not work on that type of system. There is a symbol for the B+ which includes the 128K version, and a symbol for the new Master series.

Basic 1		Electron	
Basic II		Disc	
Tube		Cassette	
Model B+		Master 128	

News News News News News News Ne



MAGIC APPROVAL

Datastar's Magic Modem, which received a rapturous review in BEEBUG Vol.4 No.9, has now been granted BABT approval. Datastar says that the controversial approval process has taken five months and cost the company more than £10,000.

The Magic Modem is the modem that BEEBUG has taking under its wing as the 'BEEBUG modem' and it is available to members at the special price of £109 including software on ROM. Details in the BEEBUG Retail price list.

GARDEN MARKETING

It is not often that gardening is considered on these pages but RAE Associates has brought together computers and this most popular hobby. The Planter's Guide is a dedicated database program for the BBC micro that will help you to plan your garden better, saving you time and money. The package will help you in choosing which plants to position in each area of your garden according to the conditions there.

The Planter's Guide Pack was originally devised for professional use at a garden centre but is now available for amateur green-thumbs for £14.95. An accompanying book giving a detailed description of each plant covered is also available for £8.95. Further details from the publishers RAE on 0923-32109.

MORE MOLE

The excellent 'Secret Diary of Adrian Mole' game from Mosaic Publishing (see BEEBUG Vol.4 No.8) has been given a sequel - 'The growing pains of Adrian Mole'. Based on the second Adrian Mole book by Sue Townsend, this latest game costs £9.95 from Mosaic on 01-226 0828.

MEMORY MAPS

Two new computer aided learning packages will help pupils get their bearings. General Map Reading and Coastal Map Reading are two packages that make full use of the Beeb's graphics capabilities to teach this subject in a interesting interactive way. The two programs are available for £23 each from their producers, Soft Teach, on 0985-40329.

TICK TACK

This multi-lingual letter writing package referred to in last month's news is currently available only from the original producers, Primrose Publishing, and not from Peartree Computers who supplied the press release on which last month's report was based. Primrose are on 0763-82512.

THE LAST WORD?

Norwich Computer Services and Computer Concepts have joined forces to produce the 'Complete Wordwise Plus Handbook'. Written and published by Paul Beverley, this provides over 400 pages packed with useful information, including over 60 Wordwise Plus segment programs. The book costs £17.50 inclusive of post & packing direct from Norwich Computer Services, and 57 of the programs are available separately on 40 or 80 track disc for £7.50. Norwich Computer Services are on 0603-621157.

RAMROD LAUNCHED

Ramrod, the latest software release from Clares Micro Supplies, is now available on ROM (£40) or disc (£35). Designed to work alongside Clares' Brom Plus to provide a sophisticated programming and debugging environment, Ramrod offers a comprehensive range of utilities claimed to be fully compatible with all machines from the model B to the Master Turbo. Ramrod includes commands dealing with both DFS and ADFS, with shadow RAM, sideways RAM, and the Master's private RAM, with the Tube, and many more besides. For more information contact Clares on 0606-48511.

BEEBUG SOFT FORUM

The Magic Boot

The Magic Modem allows both auto-dial and auto-answer, and comes packaged with the CommSoft terminal ROM, allowing easy access to both scrolling text and Viewdata formats. This software has a set of commands which allow the user to directly control the modem.

The following program makes use of these commands to give the user a booted menu from which he can select at a keypress, any particular service which he chooses to access. The menu then calls up an EXEC file which first sets the modem to the correct protocol, dials the number, and issues any required passwords etc.

The last menu option sets the function keys to give single key control as follows:

f0	Set TEXT format with 5 line user window
f1	1200/75 Originate
f2	1200/75 Answer
f3	300/300 Originate
f4	300/300 Answer
f5	Set Viewdata format at 1200/75 Originate

As the program stands there are 6 EXEC files called by the menu program. Their names are obvious from the last few lines of the Menu. These particular files were created on Wordwise, but you may alternatively use the *BUILD command. As an example, three of the EXEC files are listed below. The ones for Prestel, Maplin, and the function keys respectively.

The first line of the Prestel file calls up the CommSoft ROM, the second sets the Viewdata standard (see the manual for details), the third dials the number (01-618-1111 for the London area), and the fourth gives both customer number and password. A fifth line could be used to select a particular Micronet page etc. Each line ends with a Return, and you should have a blank line or two at the end of the file.

The Maplin file differs in that line two sets up the Text rather than the Viewdata standard, and no customer number or password is required.

In the function key file, the keys are set before calling the CommSoft ROM, and once inside the ROM, the keys are activated with Ctrl plus the chosen key.

```
  10 REM PROGRAM MAGIC B
OOT
  20 REM VERSION B0.5
  30 REM AUTHOR D.E.G.
  40 REM BEEBUG JULY 1986
  50 REM PROGRAM SUBJECT
 TO COPYRIGHT
  60 :
 100 MODE7
 110 PRINT'
 120 PRINTCHR$131;CHR$14
1;"     MAGIC MODEM BOOT"
 130 PRINTCHR$131;CHR$14
1;"     MAGIC MODEM BOOT"
 140 PRINT''
 150 PRINT CHR$134"1. PR
ESTEL DRYDEN"
 160 PRINT
 170 PRINT CHR$134"2. PR
ESTEL ENTERPRISE"
 180 PRINT
 190 PRINT CHR$134"3. TH
E GNOME"
 200 PRINT
 210 PRINT CHR$134"4. TE
CHNOMATIC"
 220 PRINT
 230 PRINT CHR$134"5. MA
PLIN"
 240 PRINT
 250 PRINT CHR$134"9. FU
NCTION KEYS ONLY"
 260 PRINT
 270 A=GET-48
 280 IF A=1 THEN *EXEC E
.DRYDEN
 290 IF A=2 THEN *EXEC E
.ENTPRIS
 300 IF A=3 THEN *EXEC E
.GNOME
 310 IF A=4 THEN *EXEC E
.TECHNO
 320 IF A=5 THEN *EXEC E
.MAPLIN
 330 IF A=9 THEN *EXEC E
.KEYS
 340 IFA>0 AND A<6 OR A=
9 THEN END
 350 RUN
```

E.DRYDEN:

```
*COMM.
~;AC5,1
~3016181111
12345678904444
```

E.MAPLIN:

```
*COMM.
~<~AC5,3
~30702552941
```

E.KEYS:

```
*KEY0 ~<|M~AS1,6|M
*KEY1 ~AC5,1|M
*KEY2 ~AC5,2|M
*KEY3 ~AC5,3|M
*KEY4 ~AC5,4|M
*KEY5 ~;|M~AC5,1|M
*COMM.
```

MAKING MORE USE OF TELETEXT

James Fletcher shows how a teletext adaptor can open the door to a whole host of new things to do with your BBC micro.

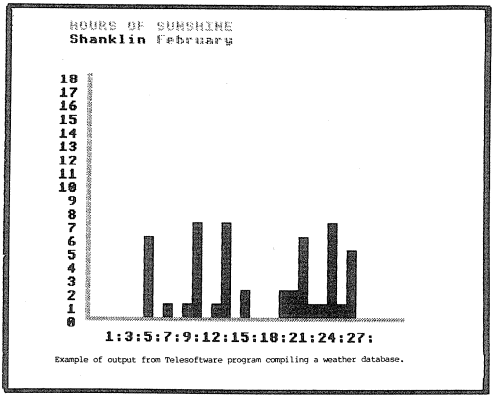
Previous issues of Beebug have given a good deal of information about teletext adaptors that are available for the BBC micro. Acorn's unit was reviewed in Vol.2 No.10, while Vol.4 No.10 not only reviewed the Morley teletext adaptor and its associated software, but also gave an up-to-date explanation about the broadcast teletext services and about the downloading of Telesoftware.

Acorn and the BBC always planned for the BBC micro to make good use of the broadcast teletext services, and for quite a while Acorn has had the field to itself, with a teletext adaptor that plugs into the 1MHz bus. Unfortunately, this originally cost around £225, so that very few non-business users felt able to afford it, although a good many schools found it worthwhile. The last few months have, however, seen the introduction of alternative decoders from other manufacturers, and this has had the effect of bringing down prices. An Acorn adaptor could recently be obtained as a 'special-offer' for around £70, and Morley Electronics and Volex are also offering their own designs at under £100.

As well as displaying teletext pages containing information such as news and weather forecasts, all the adaptors also allow you to download free software which is transmitted on special teletext pages, the service being known as Telesoftware. These computer programs are usually transmitted in a compacted form of BBC Basic. Since its inception, Telesoftware has become more sophisticated with more automation and faster access, as well as substantially broadening the scope of what is on offer. Now, with a choice of relative cheap teletext adaptors available to the user, the only real problem for the enthusiast is deciding which decoder to buy.

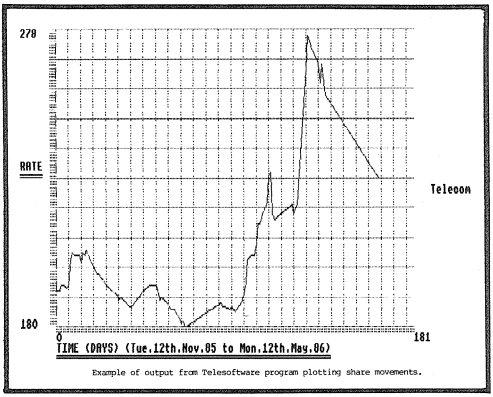
All of the adaptors use a ROM plugged into the BBC, but for some reason best known to themselves Acorn chose to make Telesoftware a separate filing system (known as Telesoft) which makes life fairly complicated at times. Having loaded a program from a Telesoftware page you then have to change to the disc filing system before you can save it, and then change back to the Telesoftware filing system before you can download the next item. Because the Acorn ROM was the first Telesoftware system to become available it is now showing its age, and you have to run a software patch (itself available via Telesoftware) before using it to download the latest software.

Once you have an adaptor, you can look at the teletext pages on Oracle and Ceefax, and you can also try your hand at downloading some of the free software. The BBC provide a regularly changing selection of programs on a weekly basis on BBC2, but although the IBA claims to be supporting Telesoftware there is in fact very little material currently available, although great things are promised for the future. Page 700 on BBC2 Ceefax acts as an index to the BBC service, and page 460 on Oracle's Channel 4 service gives you some indication of the very limited material currently available on this channel.



Example of output from Telesoftware program compiling a weather database.

One exciting new development means that you can now not only download software, but then use that software to access data on other teletext pages. You can also write your own programs to automatically extract data from teletext pages. One example of the use of this technique appears in a recent program from the BBC which allows your computer to look at the weather pages on Ceefax every day. It automatically takes the live data and plots graphs to show maximum and minimum temperatures, hours of sunshine, inches of rain, and thus you can automatically build up, for most parts of the country, a database of weather information, which can be recalled from disc at will.



Example of output from Telesoftware program plotting share movements.

Such databases can be made up automatically from any regular teletext page, so that you can keep a check on how your favourite football team is doing or you can show how the price of fish is changing in the shops from day to day. One facility that will appeal to any of you who have even modest holdings of shares is that it is possible to monitor the performance of your shares on the stock market day by day, and to have a graph plotted automatically each day, so that you can decide just when to sell or buy those Acorn or British Telecom shares!

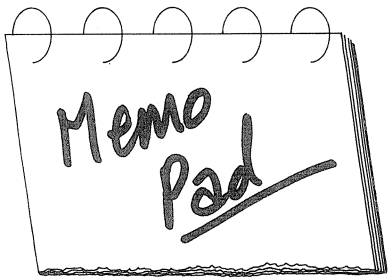
You can even make up your own electronic cookery book with the aid of the Ceefax 'Recipes' program. Each day this program automatically calls up page 191 of Ceefax, which carries a two or three page recipe for a different dish every day of the week. The recipes are stored on disc in a convenient database format which allows you to browse through up to about 180 different dishes. Having made your choice for the day, you can print out the instructions, or even a shopping list of the ingredients, merely by pressing the Copy key.

Another simple program allows you to print out any chosen teletext page, so that you really can use your computer to provide an up to the minute newspaper. Who knows, perhaps you could save the cost of the adaptor by not buying a daily paper! CEEFAX have also started to provide their own text files for school teachers, via Telesoftware, giving details of all their schools broadcasts, and fans of the television programme Micro Live may be interested to download pages of supplementary information about the programme each week. Other programs allow you to print out automatically a complete index of the hundreds of pages available on Oracle and CEEFAX, much easier than plodding through the on-screen indexes one at a time.

Potential decoder purchasers should note that many of these exciting database-type programs will, at the moment, only work with the Acorn adaptor, since some of the commands used are specific to this unit and its inbuilt Telesoft filing system. Seasoned BBC micro programmers will have no real troubles modifying the Ceefax programs to work on the other adaptors, which do have some real advantages in programming flexibility over the Acorn unit. However, if you are a beginner and you want to use the 'interactive' type of Telesoftware, you would be better off with the Acorn unit.

The use of teletext is growing steadily. Whilst it can never give you the versatility of a telephone-line based system like Micronet, there are no further charges once you have bought the equipment. Now that this initial cost has been much reduced, more people may be encouraged to investigate this form of communications, and the more people that show an interest in Telesoftware the more effort the broadcasters will put into this free service.

For more information on Telesoftware contact The Telesoftware Organiser, Ceefax, BBC TV Centre, Wood Lane, London W12 8QT.



If you are looking for an instant note pad on your Beeb then look no further. Memo Pad by M.E. Williams can be instantly at your finger tips to store notes and other information for later recall.

How often have you been working at the computer when the need to make a note of a line number, message for your wife, value of a variable or whatever arises? Why hunt for that piece of paper when you are sitting at a keyboard and can simply call up a note-pad onto the screen!

This utility allows you to do just that. Any time that you are in mode 7 command mode, pressing Ctrl-Shift-P puts up a note-pad in the bottom right hand corner of the screen, giving you a non-scrolling writing area of 12 lines of 16 characters. The pad appears in red, with text in yellow, but you may use Shift with the function keys to colour the text differently, and the normal Ctrl-VDU controls are also still active. Thus you may clear the memo pad with Ctrl-L, and move the writing cursor around with Ctrl-H, I, J and K.

When your note has been made, pressing Escape will cause the pop-up memo to disappear, and the original screen contents to be restored. When you want to see your notes again, just press Ctrl-Shift-P, and they will re-appear. The memo can also be accessed from the Wordwise Plus menu screen. Just type ':' before pressing Ctrl-Shift-P. This combination is used to avoid any conflicts with other Wordwise Plus functions and you are unlikely to encounter any problems.

To get POPUP running, simply type the listing into your machine, and save it away before running it. Once it has been run, and debugged, you can save away the machine code copy by typing the following:

```
*SAVE POP 900 +FF
```

You can call this version any time from disc with:

```
*POP
```

or from cassette with:

```
*RUN POP
```

and once again, Ctrl-Shift-P will call up the memo.

Alternatively if you save it with:

```
*SAVE POP 900 +FF 90B
```

then the command *POP (or *RUN POP) will not only install the memo pad but will call it on screen as if Ctrl-Shift-P had been issued.

Any memos that you write on the system can also be saved as follows. Firstly, Escape from the pad itself, then type:

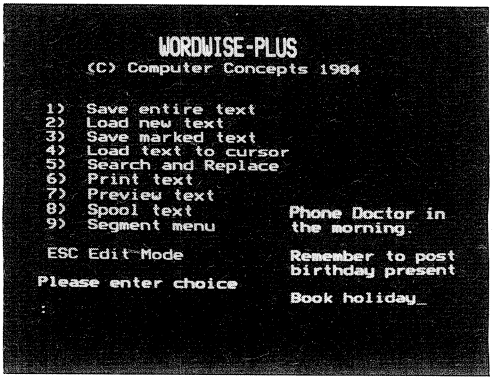
```
*SAVE MEMO A00+FF
```

To load this back in from disc or cassette, again get into Basic command mode by pressing Escape if you are in the memo pad, and type:

```
*LOAD MEMO
```

Now Ctrl-Shift-P will display what you have saved; and any number of separate memos may be saved with this method. And because the pad supports full Teletext codes, you could prepare mode 7 pictures within the pad, and save them as memos. The possibilities are endless.

For sideways RAM owners the program is even more versatile. Instead of the notepad being stored in vulnerable user RAM it can be stored in sideways RAM, and will remain there until the machine is switched off, or forever if you have battery backup. The modifications needed for this option are given at the end of the listing. And using the details given



in Bernard Hill's series (BEEBUG Vol.5 Nos 2 and 3) it should be a simple matter to put the whole program into sideways RAM so that it can be called with a * command just like a ROM facility.

Other possible extensions include its use to recall function key settings, operating system addresses, useful telephone numbers; the list is endless.

The routine works by intercepting the read character vector, and can be used either in immediate mode or from within a user's own program. It may be called from within a host program either by the instruction CALL popup (CALL &90B) or by issuing Ctrl-Shift-P from the keyboard during an INPUT statement. This should be done at the beginning of an input entry in order to avoid any loss of characters.

The listing is liberally sprinkled with comments, and needs little further explanation, but here are a few points to note.

1. If Break is pressed the vectors are reset. Popup can be restored by typing:
CALL &900

2. The addresses used in the listing for both program storage and memo buffer are suitable for disc users. Cassette users should move them to somewhere suitable such as &C00 for the program (currently &900) and &D00 for the buffer where the memo is stored (currently &A00). To do this alter lines 1060 and 1120 accordingly.

3. It is not recommended that you press Ctrl-Shift-P while in the notepad itself; recursive pop-ups are unpredictable!

4. Although the routine saves the cursor position before entering the pop-up memo, it does not save any text window that may be in use at the time. This is not hard to do, but has not been implemented in order to keep the program within one page of memory.

5. When you first call POPUP you may find that the screen is not clear. This is because the buffer space used for storing memos has been used by some other program (such as one of the ROMS in your machine). Simply clear it with Ctrl-L.

6. Although the cursor keys are not disabled when in the memo pad, they should not be used; and as a side effect, if you press one of the cursor keys followed by Return, you will enable scrolling of the memo pad.

7. If you wish to change the key which calls the pop-up memo, then alter line 1800 of the program. If, for example, you wish to use '@' instead of Ctrl-Shift-P, then line 1800 should be change to:
1800 CMP #64

8. To alter the initial colours of the memo-pad, lines 1360 (background) and 1380 (foreground) should be changed. To give blue on cyan, these lines should be altered as follows:
1360 LDA#134:STA buffer,X:INX
1380 LDA#132:STA buffer,X

```
  10 REM PROGRAM POP-UP MEMO
  20 REM VERSION B0.2
  30 REM AUTHOR  M.E.WILLIAMS
  40 REM BEEBUG  JULY 1986
  50 REM PROGRAM SUBJECT TO COPYRIGHT
  60 :
 100 MODE7
 110 PROCassemble
 120 CALL setvector
 130 END
 140 :
1000 DEFPROCassemble
1010 osbyte=&FFF4
1020 oswrch=&FFEE
1030 osasci=&FFE3
1040 osrdch=&FFE0
1050 WRCH=!&20E AND &FFFF
1060 buffer=&A00
1070 screen=&70
1080 store=&72
1090 temp=&74
1100 :
1110 FOR PASS =0 TO 3 STEP 3
1120 P%=&900 : REM or wherever
1130 [OPT PASS
1140 .setvector  \ modify wrchv
1150 LDA #testcharacter MOD 256
1160 STA &20E
1170 LDA #testcharacter DIV 256
1180 STA &20F:RTS
1190 :
1200 .popup
1210 LDA &319:PHA       \ save cursor p
osition
1220 LDA &318:PHA
1230 JSR init
1240 JSR swap
```

```
 1250 JSR print
 1260 JSR swap
 1270 LDA #26:JSR oswrch  \ default wind
ows
 1280 LDA #31:JSR oswrch  \ restore curs
or
 1290 PLA:JSR oswrch
 1300 PLA:JSR oswrch
 1310 LDA #0:STA &D0:JMP oswrch
 1320 :
 1330 .init
 1340 LDX #0
 1350 .box   \ poke in colour codes.
 1360 LDA #129:STA buffer,X:INX
 1370 LDA #157:STA buffer,X:INX
 1380 LDA #131:STA buffer,X
 1390 TXA:CLC:ADC #17:TAX:BCC box
 1400 .window
 1410 LDX #4
 1420 .wind1
 1430 LDA windowdata,X:JSR oswrch
 1440 DEX:BPL wind1
 1450 LDA #10:STA &D0 \ disable scroll
 1460 RTS
 1470 :
 1480 .swap
 1490 LDA &350:CLC:ADC #&1D:STA screen
 1500 LDA &351:ADC #2:SEC:SBC #&7C:AND #
3:CLC:ADC #&7C:STA screen+1
 1510 LDX #12    \ number of lines
 1520 LDA #buffer MOD 256:STA store
 1530 LDA #buffer DIV 256:STA store+1
 1540 .nextline
 1550 LDY #0:LDA #19:STA temp
 1560 .push LDA (screen),Y
 1570 :
 1580 :
 1590 PHA
 1600 :
 1610 LDA (store),Y:STA (screen),Y
 1620 PLA:STA (store),Y:INC store
 1630 DEC temp:BEQ doneline
 1640 INC screen
 1650 BNE push
 1660 INC screen+1:BPL push
 1670 LDA #&7C:STA screen+1:BNE push
 1680 .doneline
 1690 LDA #22:CLC
 1700 ADC screen:STA screen
 1710 LDA #0
 1720 ADC screen+1:STA screen+1
 1730 BPL notbasic  \ not yet &8000
 1740 LDA #&7C:STA screen+1
 1750 .notbasic
 1760 DEX:BNE nextline
 1770 RTS
 1780 :
 1790 .testcharacter
 1800 CMP #16  \ ctrl P
 1810 BNE notme
 1820 PHA
 1830 LDA &355:CMP #7   \ Mode 7 ?
 1840 BNE notme1
 1850 PLA
 1860 LDA#129:LDX#255:LDY#255:JSR&FFF4:C
PY#255:BNE notme
 1870 JMP popup
 1880 .notme1 PLA
 1890 .notme
 1900 JMP WRCH   \ wrch routine in BASIC
 1910 :
 1920 .print
 1930 JSR osrdch
 1940 BIT &FF:BPL noesc
 1950 LDA #&7E:JMP osbyte
 1960 .noesc
 1970 JSR osasci
 1980 JMP print
 1990 :
 2000 .windowdata  BRK
 2010 ]
 2020 !windowdata =&1818270D
 2030 windowdata?4=28
 2040 NEXT PASS
 2050 ENDPROC
 2060 :
 2070 REM For sideways ram buffer
 2080 REM store=&F6
 2090 REM buffer=somewhere above &8000
 2100 REM 1570 TXA:PHA
 2110 REM 1580 LDY #15:JSR osrdrm
 2120 REM 1590 LDY #0:STA (screen),Y
 2130 REM 1600 PLA:TAX
```

INBETWEENING COMPETITION

In the April issue of BEEBUG (Vol.4 No.10) we launched the Inbetweening Competition to find the most entertaining and attractive sequence to fit the excellent Inbetweening program featured in that issue. The response to the competition was tremendous with the BEEBUG office knee-deep in entries. The standard was very high but the £50 BEEBUG voucher is on its way to Mr D.P.Dyer from Constantine near Falmouth. Mr Dyer's entry made interesting use of the Inbetweening program to achieve fast animation, including movement, enlargement and shrinking of objects.

A copy of the Inbetweening program incorporating Mr Dyer's winning entry is included on this month's magazine cassette/disc.

PEARTREE BUSINESS SYSTEM

Looking for an integrated business package for the BBC micro? Simon Williams, author of "The BBC Micro and the Small Business", has been testing out Peartree's Main Business System.

Product : Main Business System
Supplier : Peartree Computers
: Falcon House, High Street,
: Huntingdon, Cambs PE18 6SS.
: Tel. 0480-50595
Price : £99.95 (2 discs and manual)

Despite something of a glut of word processors, databases and spreadsheets for the Beeb and Master, recent surveys have shown that after word processing, the most popular use of a micro in business is accounting. This is quite understandable, especially when you know how much work is involved in filling in VAT returns or preparing books for audit.

Until recently, there haven't been many accounting suites on the BBC Micro, and those that have surfaced cost several hundred pounds for a set of ledgers. This new suite from Peartree Computers, though, offers Sales, Purchase and Nominal ledgers, Invoicing, Stock Control, Bank and Petty Cash Control and Pro-Forma Quotations all for just under £100.

The suite, referred to as the 'Main Business System' (MBS) was developed for Peartree's own business micros, which are BBC B+ or Master circuit boards reboxed to look like 'real' Personal Computers. Shadow RAM is essential to run MBS as it works entirely in mode 0. Your system will also need twin 80 track discs, unless you enjoy swapping discs frequently.

What do you get for a hundred pounds? At first sight, not a lot. The impressive inch-thick box houses two discs and a thin spiral bound manual. This proves to be very well written, but just as thin on information as it looks. It's all very well to maintain that the programs are 'user friendly', and indeed they are in most respects; but they still need more than 35 pages to describe adequately.

When you first run the program, you have to enter the details of your company and a password to use the system. The MBS records the name and address and uses it to head invoices, receipts and the like. Once set, you subsequently have to enter the password, date and time before the suite will run. The time is displayed continuously while you're at the main menu, although not within all the modules.

Each screen is laid out very clearly, making full use of the space available on the 80x32 display. All headings and menus are outlined with separate boxes which makes them easy to read.

The main menu offers 11 options, plus exit to Basic or View. These options are the names of each of the modules within the system. Before using the suite, though, you have to create records on your discs to take the data. You'll need a blank formatted disc for data (not mentioned in the manual).

MBS allows you to select the number of records you create for each of its modules except Stock Control, which is automatically assigned 900 records. You can also specify the drive they're put on. The table below shows the maximum numbers of records that can be handled by the various files. If necessary, transaction files could hold the records for particular periods, e.g. for a month or a quarter.

File	Maximum Size
Customer	750
Purchase Order	750
Sales Ledger	1300
Nominal Ledger	600
Invoicing/Credit	130
Pro Forma	130
Bank A/C	225
Petty Cash	225
Stock Control	900

Once your records are created, you can start to use the programs in earnest. Each module prompts you as you enter selections or figures, and double-checks on deletions and modifications to existing data.

First you need to enter details of all items you hold in stock, your account

customers and suppliers, and Nominal Ledger categories. This will take quite a bit of typing, but once complete, you should find the automation provided by MBS speeds transactions considerably.

Invoices and statements can be printed at the press of a few buttons, and you can produce aged creditor lists, VAT analyses and stock valuations very easily. One notable exception to this list of features is a 'suggested payments' list. If you're keen to keep your money in the bank as long as possible, it's very useful to know which creditors you can afford to stall.

You can specify your own account names in the Nominal Ledger, and postings can then be made from the Sales and Purchase Ledgers. You'll need to draw up a cross reference list of account names and their numbers, but it's probably quicker to use numbers than the equivalent names.

End of term calculations (whatever the period) are made automatically, which is very useful for auditing and keeping the tax man happy. Once any of the ledgers are closed you have to reset them for use in the next period. This is an essential safeguard in electronic bookkeeping.

A separate printing section within the Nominal Ledger module produces a number of useful printouts, including trial balances, monthly and yearly reports, and even line and bar graphs.

The Stock Control module is well integrated into the ledgers, and sales and purchases will automatically update stock levels if requested. Similarly, entering stock item numbers or customer numbers in the sales or purchase ledgers will call up all relevant details from the Stock Control or Customer Database modules.

Even though all your main stock may be detailed in the Stock Control module, you can still buy or sell individual items and put them through the ledgers. You can also produce pro-forma quotations for one-off sales or contracts.

The Customer Database takes details of all your account customers. It can include contact names, standard discounts, credit limits and day's grace for payment. This last piece of information is added to the bottom of invoices and statements in the usual 'business terms' message.

So much for the good features. The MBS is solid Basic programming, is comprehensive in scope and should be adequate to handle the accounts of many small businesses. There are a number of oddities, however, which make using it less of a pleasure than I imagine its creators intended. These problems range from trivial to annoying.

One problem is the lack of consistency between modules. As an example, MBS uses numbers, the letter 'R' and the hash symbol (#) to return to the same main menu from different modules in the system. While this is clearly indicated in each case, it does leave an overall feeling of bittyness. There are also a number of spelling mistakes on-screen (three on one screen alone), and the print routines annoyingly insist on issuing a form feed before printing anything. This wastes a sheet of paper each time.

When you create records on disc, MBS always creates one more than you've asked for. Most of the programs use *SH. to switch on shadow memory. This clashes with the AMX Art ROM and generates an error if the AMX chip isn't first disabled. These may all seem trivial points, but if you're paying a hundred pounds, you expect the programs to have been thoroughly tested.

More annoying is the lack of editing on any of the data entry screens. This means if you have entered all the details of a stock item, for instance, and then notice a mistake, you have to re-enter all the information again - you can't just alter the relevant field.

The program refuses to let you create less than 900 stock records. This wouldn't be a worry, except that when you are searching for a stock item the MBS looks through the whole file. This is true even if only five records exist in the file.

In conclusion, the Main Business System should be the answer to a lot of requests from small business users. There are several features which detract from its friendly intentions, but it will still do what it sets out to.

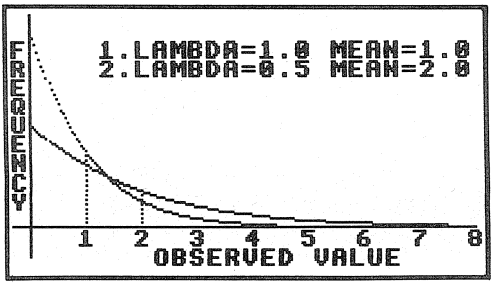
COMPUTER SIMULATION (Part 2)

Jan Stuurman concludes his introduction to computer simulation by looking at that popular pastime, queueing. Now you can get your computer to queue for you by writing a simulation program.

Queues seem to be an inescapable ingredient of modern life. Hardly a day goes by in which we do not have to join a queue somewhere. Wherever a service is provided, be it the bus, the supermarket checkout or when we visit our G.P., queues abound everywhere. For we that have to join them, and for those providing the service, queues are wasteful in terms of both time and money. Long queues usually lead to a loss of customers and facilities for waiting customers, e.g. parking spaces or waiting rooms have to be provided. A good understanding of queues is therefore important when looking for ways to improve service or planning new services.

THE EXPONENTIAL DISTRIBUTION

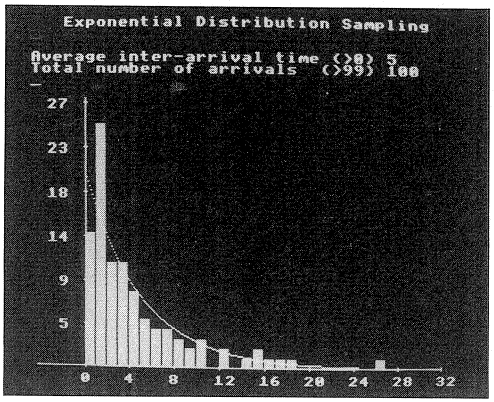
In many situations where queues are forming, the time between the arrival of customers (the inter-arrival time) and the time it takes to service a customer is random. However, unlike the Normally distributed random numbers that we looked at last month, we now find that most of the random numbers should be small with larger numbers becoming less frequent. This reflects the fact that most customers can be serviced relatively quickly, but now and again a customer requires a longer service time. Instead of the Normal distribution, another, known as the Exponential distribution, is found to have characteristics which match well with reality. The demonstration program lets us compare the theoretical curve of this distribution with a bar graph of random numbers produced by the function FNexpon.



The shape of any particular Exponential distribution is described by a parameter called LAMBDA. Curiously, both the mean and standard deviation of an Exponential distribution are equal to 1/LAMBDA. If LAMBDA is small, the random numbers are more spread out and their mean is larger. As with the Normal distribution, almost all numbers of an Exponential distribution lie in an interval about the mean. The demonstration program considers a range from zero to approximately 8 times the standard deviation and 99.97% of the numbers generated by FNexpon fall within this range.

```
   10 REM EXPONENTIALLY DISTRIBUTED RAND
OM NUMBERS
   20 REM Version B.1
   30 REM Author  Jan Stuurman
   40 REM BEEBUG
   50 REM PROGRAM SUBJECT TO COPYRIGHT
   60 :
  100 MODE1
  110 ON ERROR GOTO 2300
  120 PROCinit
  130 PROCdemo
  140 END
  150 :
 1000 DEFPROCinit
 1010 LOCAL I%:DIM bar%(31)
 1020 CLS:PRINTTAB(3)"Exponential Distri
bution Sampling"
 1030 REM SET-UP GRAPH AREA & AXES
 1040 VDU24,0;0;1279;799;
 1050 VDU29,160;64;
 1060 GCOL0,3
 1070 MOVE-144,0:DRAW1024,0
 1080 MOVE0,0:DRAW0,799
 1090 FOR I%=0 TO 1024 STEP 128
 1100 MOVEI%,4:DRAWI%,-4
 1110 NEXT I%
 1120 FOR I%=0 TO 720 STEP 120
 1130 MOVE4,I%:DRAW-4,I%
 1140 NEXT I%
 1150 ENDPROC
 1160 :
 1200 DEFPROCdemo
 1210 PRINTTAB(0,3)"Average inter-arriva
l time (>0)"
 1220 REPEAT PRINTTAB(31,3);SPC(9);STRIN
G$(8,CHR$127);:INPUT""intertime
```

```
1230 UNTIL intertime>0:lambda=1/interti
me
1240 PRINTTAB(0,4)"Total number of arri
vals  (>99)"
1250 REPEAT PRINTTAB(31,4);SPC(9);STRIN
G$(8,CHR$127);:INPUT""samplesize%
1260 UNTIL samplesize%>99
1270 REM LABEL AXES
1280 VDU5:@%=3
1290 hstep=INT(6.2*intertime+1)DIV8+1
1300 FOR I%=0 TO 8
1310 label%=hstep*I%
1320 MOVEI%*128-48+32*(label%<10),-24:P
RINTlabel%
1330 NEXT I%
1340 vstep=samplesize%*(1-EXP(-lambda*h
step/4))/4
1350 FOR I%=1 TO 6
1360 label%=INT(vstep*I%+.5)
1370 MOVE-144,I%*120+8:PRINTlabel%
1380 NEXTI%
```

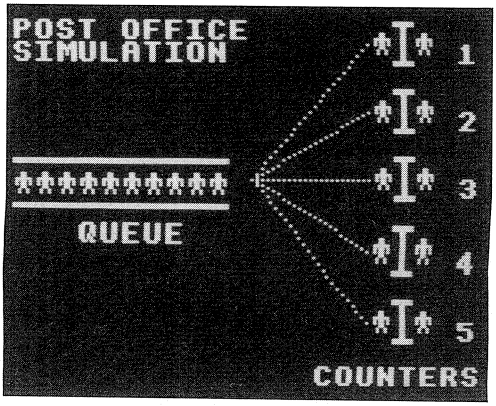



```
1390 VDU 19,2,4,0,0,0:GCOL1,2
1400 REM FIND RANDOM INTER-ARRIVAL TIME
S AND UPDATE BAR-GRAPH
1410 FOR customer=1 TO samplesize%
1420 exponrnd=FNexpon(lambda,RND(1))
1430 PROCbargraph(INT(exponrnd*4/hstep)
)
1440 NEXT customer
1450 REM DRAW THEORETICAL EXPONENTIAL C
URVE
1460 PROCexponcurve
1470 VDU4
1480 ENDPROC
1490 :
1500 DEFPROCexponcurve
1510 LOCAL I%,oldF,newF,x,y:GCOL0,1
1520 oldF=0
1530 FOR I%=4 TO 1024 STEP4
1540 x=I%*hstep/128:newF=1-EXP(-lambda*
x)
1550 y=(newF-oldF)*samplesize%*8
1560 oldF=newF
1570 PLOT69,I%,y*120/vstep
1580 NEXT I%
1590 ENDPROC
1600 :
2100 DEFFNexpon(LAMBDA,CDFVAL)
2110 =-LN(1-CDFVAL)/LAMBDA
2120 :
2200 DEFPROCbargraph(interval%)
2210 IF interval%<0 OR interval%>31 END
PROC
2220 LOCAL xleft,ytop
2230 bar%(interval%)=bar%(interval%)+1
2240 xleft=32*interval%:ytop=bar%(inter
val%)*120/vstep
2250 MOVE xleft,0
2260 PLOT0,24,0:PLOT81,0,ytop
2270 PLOT0,-24,0:PLOT85,xleft,0
2280 ENDPROC
2290 :
2300 ON ERROR OFF
2310 MODE7:VDU23;11,255;0;0;0;
2320 IF ERR<>17 REPORT:PRINT" at line "
;ERL
2330 END
```

SIMULATING QUEUES - AN EXAMPLE

A Post Office forms the basis for a simple queueing simulation model, and the program for this is listed below. Both inter-arrival times and service times are Exponentially distributed. In our model there will be a single queue of customers and up to five counters open for use.

The program allows us to vary such parameters as the inter-arrival time and the service time (this latter being directly related to the number of counters in use) and to observe the effects.



The simulation may start with a queue already in existence and it will stop when a specified number of customers has received service and has departed. Type in and run the second of this month's programs, and enter parameters as prompted. The simulation may be followed step by step through PROCprogress which reports on the state of our model as time passes. With this procedure in operation, simulating 1000 customers takes approximately 5 minutes. However, deleting line 1090 almost doubles the speed of the program, but only the final results of the simulation are displayed.

UNDERSTANDING THE PROGRAM

After we have entered the parameters of the model, PROCinit initialises the variables and sets the (simulated) clock to zero. If a starting queue was given, customers are assigned to any counter that is open and not in use. PROCsimulate then takes over. The simulation is based on the idea of 'events'. An event in this sense is something that changes within the model. In our example an event is either the arrival in the Post Office of the next customer (distinguished as event type 1), or the departure of a customer from a counter (event type 2).

It is first assumed that the next event is an arrival and each counter is then checked to see if a departure will have occurred before then. In general, having found the next event, the clock is advanced to this new time, waiting time (qwait) and counter-in-use times (use(C%)) are updated and control is passed to PROCarrival or PROCdeparture, depending on which event has happened.

PROCarrival increments the number of arrivals and sets the time, by sampling from an Exponential distribution, for the next arrival. It checks to see if a counter is free and if so, calls PROCassign to assign the new customer to a free counter and set, by sampling again, the service time for that customer.

PROCdeparture is called when the next event is a departure (from a counter). The procedure checks to see if a customer is waiting and if so, again calls PROCassign.

Throughout the simulation a record is kept, for statistical purposes, of various counts and queue lengths. These statistics can then be printed out at the end of the simulated period of time if required. Even if you select the same initial parameters when running the program several times, the random sampling will ensure a certain degree of variation in the results. Statistically, any particular model should be run several times (statisticians would say about 30) and averaged out to give a final picture.

```
    QUEUE SIMULATION PROCESS REPORT

          clock: 2571
arrivals  : 504    length of queue: 0
departures: 500    counters in use: 4

 Press SPACE for summary of results

   ** INPUT VARIABLES OF MODEL **

Number of counters      (1-5)     4

Average time between
arrival of customers    (1-99)    5

Average service time
per customer            (1-20)    15

Number of customers
to be served            (1-9999)  500

Length of queue at
start of simulation     (0-999)   0
```

```
  10 REM POST OFFICE SIMULATION
  20 REM Version B.1
  30 REM Author Jan Stuurman
  40 REM BEEBUG
  50 REM PROGRAM SUBJECT TO COPYRIGHT
  60 :
 100 MODE7:ON ERROR GOTO 2700
 110 PROCintro
 120 PROCinit
 130 PROCsimulate
 140 PRINTTAB(0,6)CHR$129"Press SPACE f
or summary of results."
 150 VDU7:REPEAT UNTIL GET=32
 160 PROCresults
 170 PRINTTAB(6,24)CHR$135 "Another sim
ulation? (Y/N)";
 180 ans$=CHR$(GET AND &5F):IF ans$="Y"
 RUN ELSEIF ans$<>"N" VDU7:GOTO180
 190 MODE7
 200 END
 210 :
1000 DEFPROCsimulate
1010 REPEAT:event%=1:nevnt=nxarr
1020 FOR C%=1 TO N%
1030 IF dep(C%)<nevnt AND dep(C%)>clock
 event%=2:nevnt=dep(C%):cntr%=C%
1040 NEXT
1050 per=nevnt-clock:clock=nevnt
1060 FOR C%=1 TO N%:use(C%)=use(C%)+sta
tus%(C%)*per:NEXT
1070 qwait=qwait+Q%*per
```

```
1080 IF event%=1 PROCarrival ELSE PROCd
eparture
1090 PROCprogress
1100 UNTIL end%
1110 ENDPROC
1120 :
1200 DEFPROCarrival
1210 arr%=arr%+1
1220 nxarr=clock+FNexpon(alambda,RND(1)
)
1230 IF NOT full% nowait%=nowait%+1:PRO
Cassign:ENDPROC
1240 Q%=Q%+1
1250 IF Q%>maxQ% maxQ%=Q%
1260 ENDPROC
1270 :
1300 DEFPROCdeparture
1310 dep%=dep%+1:busy%=busy%-1:full%=FA
LSE
1320 status%(cntr%)=0:ndep%(cntr%)=ndep
%(cntr%)+1
1330 IF Q%>0 PROCassign:Q%=Q%-1
1340 IF dep%=samplesize% end%=TRUE
1350 ENDPROC
1360 :
1400 DEFPROCassign
```

```
        QUEUE SIMULATION RESULTS

              clock: 2571
arrivals:   504    length of queue: 0
departures: 500    counters in use: 4

 AVERAGE TIMES      SPECIFIED   ACTUAL
-------------------------------------
Inter-arrival          5.00       5.10
Service               15.00      15.25
Wait (queue only)                16.42
Wait (all customers)             18.24

Maximum length of queue:  13

Counter Number of  Servicetime Utilisa-
        Departures (average)   tion
-------------------------------------
   1        135        16.13      0.85
   2        123        16.06      0.77
   3        128        13.83      0.69
   4        114        14.97      0.66

        Another simulation? (Y/N)
```

```
1410 C%=0:REPEAT C%=C%+1:UNTILstatus%(C
%)=0
1420 status%(C%)=1
1430 dep(C%)=clock+FNexpon(slambda,RND(
1))
1440 busy%=busy%+1:IF busy%=N% full%=TR
UE
1450 ENDPROC
1460 :
1500 DEFPROCprogress
1510 PRINTTAB(12,2)"clock: ";INTclock
1520 PRINTTAB(0,3)"arrivals  : ";arr%;T
AB(19,3);"length of queue:";SPC4;STRING$
(3,CHR$127);Q%
1530 PRINTTAB(0,4)"departures: ";dep%;T
AB(19,4);"counters in use:";SPC4;STRING$
(3,CHR$127);busy%
1540 ENDPROC
1550 :
1600 DEFPROCresults
1610 VDU28,1,24,39,0,12:PRINTTAB(6)"QUE
UE SIMULATION RESULTS"
1620 PROCprogress:PROCcalc
1630 PRINTTAB(0,6)CHR$131"AVERAGE TIMES
";TAB(19,6)"SPECIFIED";TAB(31,6)"ACTUAL"
'STRING$(38,"-")
1640 PRINT"Inter-arrival";TAB(20)FNr6(i
ntertime);TAB(30)FNr6(acarr)
1650 PRINT"Service";TAB(20)FNr6(serveti
me);TAB(30)FNr6(acser/N%)
1660 PRINT"Wait (queue only)";TAB(30)FN
r6(waitqonly)
1670 PRINT"Wait (all customers)";TAB(30
)FNr6(allwait)
1680 PRINTTAB(0,13)"Maximum length of q
ueue:  ";maxQ%
1690 PRINTTAB(0,15)"Counter Number of
Servicetime Utilisa-";TAB(8,16)"Departur
es  (average)   tion"
1700 PRINTTAB(0,17)STRING$(38,"-")
1710 FORC%=1TON%:PRINTTAB(3,17+C%);C%
1720 PRINTTAB(10,17+C%);RIGHT$("   "+ST
R$ndep%(C%),4)
1730 IFndep%(C%)>0 PRINTTAB(20,17+C%);F
Nr6(use(C%)/ndep%(C%))
1740 PRINTTAB(30,17+C%);FNr6(use(C%)/cl
ock)
1750 NEXT
1760 ENDPROC
1770 :
1800 DEFPROCcalc
1810 IF arr%>0 acarr=clock/arr% ELSE ac
arr=0
1820 acser=0:FOR C%=1 TO N%:IF ndep%(C%
)>0 acser=acser+use(C%)/ndep%(C%)
1830 NEXT
1840 IF arr%+startQ%<>nowait% waitqonly
=qwait/(arr%+startQ%-nowait%) ELSE waitq
only=0
1850 IF arr%+startQ%>0 allwait=qwait/(a
rr%+startQ%) ELSE allwait=0
1860 ENDPROC
1870 :
1900 DEFFNinput(low,high)
1910 PRINTTAB(22)"(";low;"-";high;")";T
AB(32);SPC6
1920 REPEAT PRINTTAB(38);CHR$11;STRING$
(6,CHR$127);:INPUT""input:UNTILinput>=lo
w AND input<=high
1930 =input
1940 :
2100 DEFFNexpon(LAMBDA,CDFVAL)
2110 =-LN(1-CDFVAL)/LAMBDA
```

```
 2120 :
 2200 DEFFNr6(nbr)
 2210 @%=&1020200:nbr$=RIGHT$("     "+STR
$nbr,6):@%=0
 2220 =nbr$
 2230 :
 2300 DEFPROCintro
 2310 FORI%=0TO24:PRINTTAB(0,I%)CHR$(130
-(I%>6)+(I%=0));:NEXT:VDU28,1,24,39,0,12
 2320 PRINTTAB(10,0)"QUEUE SIMULATION"
 2330 PRINT'"This program simulates sing
le queues  in a Post Office or supermar
ket. The  Exponential Distribution is u
sed to  find the times of arrival and
service. You can open up to 5 service co
unters."
 2340 PRINTTAB(3,8)"** INPUT VARIABLES O
F MODEL **"
 2350 PRINT'"Number of counters";:N%=FNi
nput(1,5)
 2360 PRINT'"Average time between"'"arri
val of customers";:intertime=FNinput(1,9
99)
 2370 PRINT'"Average service time"'"per
customer";:servetime=FNinput(1,N%*intert
ime)
 2380 PRINT'"Number of customers"'"to be
 served";:samplesize%=FNinput(1,9999)
 2390 PRINT'"Length of queue at"'"start
of simulation";:Q%=FNinput(0,999)
 2400 ENDPROC
 2410 :
 2500 DEFPROCinit
 2510 DIMstatus%(N%),use(N%),dep(N%),nde
p%(N%)
 2520 end%=FALSE:full%=FALSE:VDU23;11,0;
0;0;0;
 2530 clock=0:qwait=0:nowait%=0:lost%=0
 2540 arr%=0:dep%=0:busy%=0
 2550 alambda=1/intertime:slambda=1/serv
etime
 2560 nxarr=clock+FNexpon(alambda,RND(1)
)
 2570 IF Q%>0 REPEAT PROCassign:Q%=Q%-1:
UNTILQ%=0 OR full%
 2580 startQ%=Q%:maxQ%=Q%
 2590 VDU28,1,7,39,0,12:PRINTTAB(3)"QUEU
E SIMULATION PROGESS REPORT"
 2600 PRINTTAB(2,6)CHR$136CHR$129"** SIM
ULATION IN PROGRESS **"
 2610 ENDPROC
 2620 :
 2700 ON ERROR OFF
 2710 VDU23;11,255;0;0;0;
 2720 IF ERR=17 END
 2730 REPORT:PRINT" at line ";ERL
```

```
        QUEUE SIMULATION RESULTS

              clock: 2523
arrivals:   501    length of queue: 0
departures: 500    counters in use: 1

 AVERAGE TIMES      SPECIFIED    ACTUAL
-------------------------------------------
Inter-arrival           5.00       5.04
Service                15.00      15.22
Wait (queue only)                  9.06
Wait (all customers)               2.50

Maximum length of queue:  9

Counter Number of  Servicetime Utilisa-
        Departures (average)    tion
-------------------------------------------
   1        133        15.04       0.79
   2        112        16.96       0.75
   3         96        16.34       0.62
   4         89        13.02       0.46
   5         70        14.75       0.41

      Another simulation? (Y/N)
```

Many queueing situations can be based on the model used here and the number of ways in which the program can be adapted is almost endless. It is only possible to give just a few examples that would seem most useful.

1.Replacing lines 1250 and 1680 with:

```
1250 IF Q%>8 lost%=lost%+1:Q%=Q%-1
1680 PRINTTAB(0,13)"Customers lost: ";
     lost%
```

will ensure that there are never more than 8 customers waiting in the queue (assuming that a customer will leave if there are more than 7 people ahead of him in the queue). We may now investigate if the cost of opening another counter makes economic sense. Changing line 1250 to:

```
1250 IF RND(1)<.1*Q% lost%=lost%+1:
     Q%=Q%-1
```

models a situation where the chance of a customer turning away depends on the length of the queue.

2.Replacing line 1430 with:

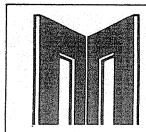
```
1430 dep(C%)=clock+8
```

models such as an automatic car-wash facility with fixed service times.

3.Service times at cash dispensing machines are more realistically modelled by a Normal distribution (few people draw out just £5 or £10). Incorporating DEFFNnorm from last month's program and changing line 1430 to:

```
1430 dep(C%)=clock+FNnorm(4,1,RND(1))
```

will handle this situation.



MASTER SERIES

Using Sideways RAM

This month, Thomas Nunns explains how to use the Master's sideways RAM and provides a utility for loading and saving sideways software, and it all works on the B+ too.

The new BBC Master and the 128K BBC B+ have four extra 16K paged blocks of sideways RAM. Unfortunately, buyers of the new Master will find no details of how to use the extra RAM in the 'Welcome Guide' supplied with the computer. The details are hidden away in section G7 of the expensive 'Reference Manual - Part One'. Buyers of the 128K BBC B+ are a little better off as a nine page application note is supplied with the machine; though the command syntax differs a little from the B+ to the Master.

On both machines the RAM can be specified for use either for code which works as a ROM image, or for use with data which is used by the resident program. This article presents an easy way to use the sideways RAM for ROM images. Sideways ROM code can be loaded into these 'boxes' of sideways RAM and used in exactly the same way as an actual chip. The code survives everything but switching off the machine or loading another ROM on top of it, so it's quite secure.

The commands to access the extra RAM are contained in the MOS in the Master, but with the BBC B+ they are contained in the DFS, so this must be present in the B+ even if an ADFS is being used. Code can still be loaded if the ADFS is accessing the disc using the DFS commands. Typing *HELP SRAM <Return> on the Master or *HELP UTILS <Return> on the BBC B+ will list the commands and their syntax:

*SRSAVE <Filename> <Start Address> <End Address> (<ROM ID>) (Q)

*SRLOAD <Filename> <Load Address> (<ROM ID>) (Q)

*SRWRITE <Start Address> <End Address> <Start Address> (<ROM ID>)

*SRREAD <Start Address> <End Address> <Start Address> (<ROM ID>)

*SRROM <ROM ID>

*SRDATA <ROM ID>

*SRSAVE and *SRLOAD work as *SAVE and *LOAD except that they apply to the sideways RAM blocks. All four sideways RAM blocks have addresses in the range &8000 - &BFFF, they do not follow on one after the other as might be expected. Thus in almost every case the <Start Address> for *SRSAVE and the <Load Address> for *SRLOAD will be 8000. The <ROM ID> tells the computer which block of sideways RAM to use, but just to confuse things, on the BBC B+ the four blocks are designated 0,1,C and D while on the Master they are 4,5,6 and 7. The (Q) parameter is explained later. A typical save of sideways RAM code to disc on the Master might be:

*SRSAVE buffer 8000 AFFF 5

while to reload it on a BBC B+ use:

*SRLOAD buffer 8000 C

The program listed below is a short menu program which can be used to load items of code or ROM images into the sideways RAM blocks when required. Unfortunately, the *SRLOAD command is very slow (17 secs to load 16K of code into a block), so Acorn have provided a 'Q' (quickly) parameter. But using the 'Q' option corrupts main memory so it is not possible to use it in the menu program. Instead, it is possible to *LOAD the code into RAM above the menu program and then use the *SRWRITE command to copy the code into sideways RAM - the *SRWRITE command works incredibly quickly.

Using *SRWRITE or *SRREAD the first two parameters <Start Address> <End Address> apply to the code in main memory - this can be confusing when using *SRREAD as one would expect them to apply to the code's start address in sideways RAM. The third parameter <Start Address>, when using *SRWRITE, refers to the code's new start address when it has been transferred to sideways RAM, but when using *SRREAD it refers to the first byte of the code before it is transferred. Therefore:

*SRWRITE 2000 3000 8000 D

on the BBC B+ will produce a copy of the main memory between &2000 and &3000 at the start of block D of sideways RAM.

```
*SRREAD 2000 4000 9000 7
```

on the Master will produce an image in main memory of the first 8K of the sideways RAM in block 7 starting at &2000. Note that the computer gets the length of code to be read from the area designated for it to be copied to.

Because of the different designation of the blocks on the two computers the function 'reduce' is used in the accompanying program. As it stands the program refers to the Master but the only changes needed to make it suitable for the BBC B+ are shown as REM statements at lines 290 and 440 to 470. Lines 400 and 410 force a 'hard' Break to initialise the ROMs - so beware - save the program first.

The data in the program at line 500 must be changed to the actual filenames of the pieces of code on the disc. The final item of data must be 'zzz' which is used as a terminator by line 170. Up to four ROMs can be loaded, but if less than four are selected, the remaining blocks are designated as RAM by using the command *SRDATA in line 390.

All the sideways blocks are initially available for ROMs. Unfortunately, it is not possible to re-designate a block as RAM once a ROM has been loaded into it. An error message appears, 'RAM occupied', so lines 110 and 490 ignore this error and force a Break. The only way to clear the blocks once they have been designated as ROMs and filled seems to be to switch off and start again.

Use of the blocks for data is beyond the scope of this article due to the new method of psuedo addressing required but the information sheet from Acorn mentioned above is quite detailed in this area. The sideways RAM is there to be used - if it isn't you might just as well have a basic 32K BBC - but there is still very little software which uses it and very little information for the home programmer. The sooner both become available the better.

```
10 REM Sideways RAM loader
20 REM for Master and 128K B+
30 REM by Thomas Nunns
40 REM BEEBUG July 1986
50 REM Program subject to copyright
60 :
100 MODE 7
110 ON ERROR GOTO 490
120 DIMn$(20)
130 C%=-1
140 REPEAT
150 C%=C%+1
160 READ n$(C%)
170 UNTIL n$(C%)="zzz"
180 C%=C%-1
190 PRINT'''CHR$(141);CHR$(134);SPC(7)"S
ideways RAM Loader"
200 PRINTCHR$(141);CHR$(134);SPC(7)"Side
ways RAM Loader"'
210 FOR D%=0 TO C%
220 PRINT CHR$(131);CHR$(65+D%);" ...
";n$(D%)
230 NEXT
240 PRINT'"Enter letter or letters ...
";
250 INPUT""N$:IF N$="" THEN RUN
260 IF LEN(N$)>4 VDU7:PRINT'"Only room
for four ... ";:VDU7:I=INKEY(200):RUN
270 CLS
280 PRINT TAB(0,8)
290 P$="7" : REM for BBC B+ use P$="D"
300 FOR D%=1 TO LEN(N$)
310 n%=ASC(MID$(N$,D%,1))-64
320 IF n%<1 OR n%>C%+1 THEN PRINT'"Input
out of range ";:VDU7:I=INKEY(200):RUN
330 PRINT'"Loading ";n$(n%-1);
340 OSCLI("SRROM"+P$)
350 OSCLI("LOAD "+n$(n%-1)+" 3000")
360 OSCLI("SRWRITE 3000 7000 8000 "+P$)
370 P$=FNreduce
380 NEXT
390 IF P$<>"" REPEAT:OSCLI("SRDATA
"+P$):P$=FNreduce:UNTIL P$=""
400 *FX151,78,127
410 CALL !-4
420 :
430 DEF FNreduce :REM for BBC B+ use rem
statements
440 IFP$="7" ="6":REM IFP$="D" ="C"
450 IFP$="6" ="5":REM IFP$="C" ="1"
460 IFP$="5" ="4":REM IFP$="1" ="0"
470 IFP$="4" ="" :REM IFP$="0" =""
480 :
490 IF ERR=131 GOTO 400 ELSE
REPORT:PRINT" at line ";ERL:END
500 :
510 DATA ROM1,ROM2,ROM3,zzz
520 REM Replace "ROM1" etc with the
filenames of your own sideways ROM
software
```

ROM CONTROLLER

This most useful utility from Andrew Ho will help you in looking after your ever increasing ROM library.

Sideways ROMs have proved to be a particularly popular feature of the BBC micro, and a vast number of users have long ago filled the few available ROM sockets in their machines, and resorted to sideways ROM boards to allow them their full complement of sixteen ROMs.

When you have that many ROMs in your machine however, you really need some kind of ROM-management system: something that will at least catalogue your ROMs for you, and allow you to temporarily disable those causing internal conflicts of command names or workspace.

The ROM controller presented here does just that, and a bit more besides. In precise terms it offers the user the three following features:

1. It will tabulate all ROMs (and RAM) present, giving socket number, name and whether enabled or not, and will provide information on ROM type, ROM size and copyright message.

2. It permits selection and de-selection of individual ROMs, with the state of each remaining intact even across a hard Break.

3. It will allow you to save any ROM to disc so that it may be reloaded into sideways RAM. This option does not permit protected software to be run from sideways RAM.

To use the ROM Controller, type in the listing and save a copy first. When it is run, the program will announce itself, and then pause while it reads in the data from each ROM. It then presents the ROM names in tabular form, with a key legend below. Empty sockets will be labelled accordingly, and any RAM containing no ROM

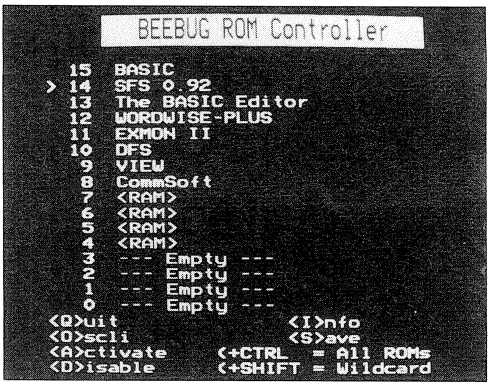


image will be labelled "RAM". Disabled sockets, including empty sockets and empty RAM are highlighted in red. You will also notice a cursor against ROM 15, the highest priority socket. This cursor is moved with the up/down cursor keys, and is used to select individual ROMs for the various functions outlined below.

To disable the ROM currently selected (by the cursor position), press <D>, and to indicate this the ROM name will turn red. If, however, you are holding <Ctrl> at the same time, all the ROMs in your machine will be disabled; and if you hold <Shift> then you will be asked for a wildcard name and then any ROM with that name contained in its title will be disabled. To enable a ROM you have to press <A> (for Activate), and this works in exactly the same as the disabling procedure. However, before any of the above commands can take effect, you must exit from the controller with the Q option (see below).

To save the currently selected ROM to disc or cassette, press <S>. You will then be asked for its filename (which is automatically truncated to seven characters so as to avoid a 'bad filename' error on disc) and the required drive number. A null filename aborts the save, while a null drive number is used to indicate a cassette save. Disc users will find their file saved on the required drive in directory R, and will see the result of a *INFO on the saved file before returning to the main screen. Cassette users will not witness this spectacle.

To reload a ROM image saved in this

way, back into sideways RAM is an easy matter if you are using an ATPL board. Just type:

*LOAD <filename>

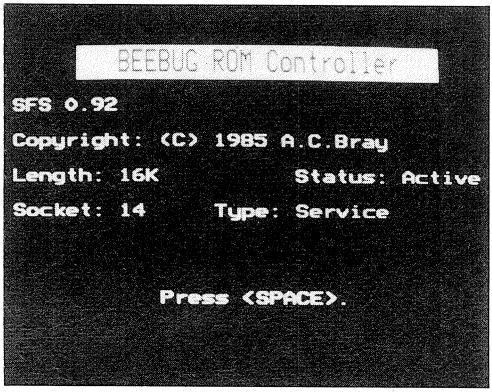
Disc users should remember to use directory R for this operation. When the file has loaded, press Ctrl-Break to allow the ROM to claim its workspace. If your RAM is installed in another make of ROM board, you may need to refer to the manufacturer's instructions to find out how to load ROM images to RAM.

To obtain further information about a selected ROM press <I>. This gives the full copyright message together with the ROM type - whether Service, Language or both, the length of the ROM and whether it is currently enabled or not.

Pressing <O> from the main screen allows star commands to be performed, while <Q> will quit the routine in a proper manner, and set the on/off status of each ROM, as currently selected.

MEMORY USEAGE

As the program stands, the machine code sections are assembled into an area of memory at &A00, and the oscli routine uses a few bytes at &900 for passing commands to the operating system. Neither of these areas should cause any conflict. If you do wish to alter the locations used however, you will need to modify lines 1010, 1390 and 1890.



PROCEDURES

assemble Sets up the machine code routines for downloading parts of ROMs, and also OSCLI commands.

swrtst Tests if Sideways RAM is present and if so tests to see if there is ROM software in it.

list Prints out the names of the ROMs.

instr Prints out the key controls.

cursor Prints string beside the ROM currently chosen.

os Performs the OS commands specified in Q$.

break Sets up the BREAK intercept routine for disabling ROMs through control/shift/soft/memory clear BREAK.

status Prints out all information about the ROM currently selected (length, type, name, copyright, active/disabled, & socket number).

oscli This allows the user to perform any OS command.

disable This tests if Shift is being pressed and if so goes to the wildcard disable procedure. If Ctrl is being pressed it goes to the universal disable procedure otherwise the currently selected ROM is disabled.

enable This does exactly the same as the disable procedure, but enables ROMs instead of disabling them.

alloff Disables all ROMs.

allon Enables all ROMs, while not enabling empty sockets.

wcoff Asks for a wildcard name, and then disables all ROMs containing that wildcard name.

wcon Similarly as 'wcoff' but enables instead (again not enabling empty sockets).

inputname Input procedure for the two wildcard procedures.

VARIABLES

A% Number of currently selected ROM.

AC%() Current codes in the ROM table for each ROM.

A$ Character to be used as pointer (" " for deleting old pointer and ">" for pointer).

C Y co-ordinate of pointer (">").

C$() Copyright messages of ROMs.

DR$ Drive number.

F$ Filename of ROM to be saved.

L%() Lengths of ROMs (8/16 K)

N$() Names of ROMs.

O$ OS command entered by user in PROCoscli.

Q$ OS command to be carried out.

```
R$        Wildcard name.
SP%       Sideways RAM: 0 if not present, 1
          if present.
SU%       Sideways  RAM in use: 0 if not in
          use, 1 if in use.
T%()      ROM types.

   10 REM PROGRAM ROM CONTROLLER
   20 REM VERSION B0.4  28.05.86
   30 REM AUTHOR  ANDREW HO
   40 REM BEEBUG  JULY 1986
   50 REM PROGRAM SUBJECT TO COPYRIGHT
   60 :
  100 ON ERROR GOTO410
  110 MODE 7:VDU23,1,0;0;0;0;
  120 FORL%=0TO1:PRINTTAB(5,L%);CHR$131;
CHR$157;CHR$129;CHR$141;"BEEBUG ROM Cont
roller"SPC(3);CHR$156:NEXT:VDU28,0,24,39
,3
  130 PROCassemble:PRINT;CHR$134;"Initia
lizing... ":?&275=1:PROCos("FX4,2")
  140 DIM N$(15),C$(15),AC%(15),L%(15),T
%(15)
  150 FOR A%=0 TO 15:VDU31,17,0:PRINT;A%
:?&66=A%:?&60=&80:?&61=&3C:?&62=1:CALL c
opy:?&60=&A0:?&61=&5C:?&62=1:CALL copy
  160 IF !&3C09=&80808080 OR !((?&3C07)+
&3C00)<>&29432800 N$(A%)="--- Empty ---"
:T%(A%)=0:L%(A%)=0:C$(A%)="":AC%(A%)=0:P
ROCswrtest:GOTO250
  170 B%=&3C09:REPEAT:IF ?B%>31 N$(A%)=N
$(A%)+CHR$?B%
  180 B%=B%+1:UNTIL ?B%=0 OR B%=&3C29
  190 T%(A%)=?&3C06
  200 B%=(&3C00+?&3C07):REPEAT:IF ?B%>31
 C$(A%)=C$(A%)+CHR$?B%
  210 B%=B%+1:UNTIL ?B%<10
  220 D$="":B%=&5C09:REPEAT:IF ?B%>31 D$
=D$+CHR$?B%
  230 B%=B%+1:UNTIL ?B%=0 OR B%=&5C29
  240 IF D$=N$(A%) L%(A%)=8 ELSE L%(A%)=
16
  250 AC%(A%)=?(&2A1+A%):NEXT
  260 VDU23,1,0;0;0;0;:PROClist:C=0:PROC
cursor(">")
  270 REPEAT:L=INKEY(5)
  280 IF INKEY(-58) AND C>0 PROCcursor("
 "):C=C-.5:PROCcursor(">")
  290 IF INKEY(-42) AND C<15 PROCcursor(
" "):C=C+.5:PROCcursor(">")
  300 IF INKEY(-17) GOTO 370
  310 IF INKEY(-82) GOTO 900
  320 IF INKEY(-38) PROCstatus
  330 IF INKEY(-55) PROCoscli
  340 IF INKEY(-51) PROCdisable
  350 IF INKEY(-66) PROCenable
  360 UNTIL FALSE
  370 CLS:?&275=0:PROCos("FX15"):PROCos(
"FX4")
  380 PROCbreak
  390 END
  400 :
  410 ON ERROR OFF:ON ERROR GOTO 410
  420 CLS:PRINT':REPORT:PRINT" at line "
;ERL
  430 PRINT"Press Spacebar to continue:"
;:REPEATUNTILGET=32
  440 GOTO260
  450 :
  460 DEFPROCswrtest
  470 IF FNtestswr(A%)=1 N$(A%)="<RAM>"
  480 ENDPROC
  490 :
  500 DEFFNtestswr(Q%):Y%=Q%:!&F6=&8000:
!&70=USR&FFB9
  510 ?&71=(?&70)+1:CALLtestit:IF?&71=?&
70 =0 ELSE =1
  520 :
  530 DEF PROClist
  540 CLS:FOR A%=15 TO 0 STEP -1:VDU136,
32,137:IFA%<10 PRINT;" ";
  550 PRINT;A%;:IF AC%(A%)=0 PRINT" ";CH
R$129;N$(A%) ELSE PRINT" ";CHR$131;N$(A%
)
  560 NEXT:PROCinstr:ENDPROC
  570 :
  580 DEF PROCcursor(A$)
  590 PRINTTAB(1,C)A$
  600 ENDPROC
  610 :
  620 DEF PROCoscli
  630 PROCos("FX15"):PROCos("FX138,0,127
")
  640 CLS:INPUT"Command: *"O$
  650 PROCos(O$)
  660 PRINT'SPC(12);"Press <SPACE>.":REP
EAT UNTIL GET=32:PROClist:PROCcursor(">"
)
  670 ENDPROC
  680 PRINTSPC(8);:REPORT:GOTO 660
  690 :
  700 DEF PROCROMoff
  710 FOR A%=15 TO 0 STEP -1:AC%(A%)=0:?
(&2A1+A%)=0:VDU31,6,A% EOR 15,129:NEXT
  720 ENDPROC
  730 :
  740 DEF PROCROMon
  750 FOR A%=15 TO 0 STEP -1:AC%(A%)=T%(
A%):?(&2A1+A%)=T%(A%):IF AC%(A%)<>0 VDU3
1,6,A% EOR 15,131
  760 NEXT:ENDPROC
  770 :
  780 DEF PROCstatus
  790 CLS:A%=C EOR 15:PRINT;CHR$131;N$(A
%)''CHR$131;"Copyright:";CHR$133;LEFT$(C
$(A%),27);
  800 IF LENC$(A%)>27 PRINT;SPC(12);CHR$
133;MID$(C$(A%),28,27);CHR$11
  810 PRINT''CHR$131;"Length:";CHR$133;L
%(A%);"K";SPC(9);CHR$131;"Status:";CHR$133;
```

```
  820 IF AC%(A%)<>0 PRINT;"Active" ELSE
PRINT;"Disabled"
  830 PRINT'CHR$131;"Socket:";CHR$133;A%
;SPC(4);CHR$131;"Type:";CHR$133;
  840 IF (T%(A%) AND 128)=128 PRINT;"Ser
vice";
  850 IF (T%(A%) AND 128)=128 AND (T%(A%
) AND 64)=64 PRINT;" / ";
  860 IF (T%(A%) AND 64)=64 PRINT;"Langu
age"
  870 PRINT''''SPC(12);"Press <SPACE>."
:PROCos("FX15")
  880 REPEAT UNTIL GET=32:CLS:PROClist:P
ROCcursor(">"):ENDPROC
  890 :
  900 CLS:VDU23,1,1;0;0;0;:A%=C EOR 15:P
RINT;CHR$131;N$(A%):?&66=A%:?&60=&80:?&6
1=&3C:?&62=(L%(A%)*4):CALL copy:PROCos("
FX15")
  910 PRINT'CHR$131;"Filename:";CHR$133;
:INPUT""F$
  920 PRINT'CHR$131;"Drive (Tape users p
ress <Return>):";CHR$133;:INPUT""DR$
  930 IF DR$<>"" PROCos("DRIVE "+DR$):PR
OCos("DIR R")
  940 F$=LEFT$(F$,7)
  950 PROCos("SAVE "+F$+" 3C00+"+STR$~(L
%(A%)*&400)+" D9DC 8000")
  960 IF DR$<>"" THEN PRINT';CHR$11:PROC
os("INFO "+F$)
  970 PRINT''''SPC(4);CHR$133;"Press any
 key.";CHR$11;CHR$13:G=GET:VDU23,1,0;0;0
;0;
  980 CLS:PROClist:PROCcursor(">"):GOTO
270
  990 :
 1000 DEF PROCos(Q$)
 1010 $&900=Q$:CALL oscli:ENDPROC
 1020 :
 1030 DEF PROCdisable
 1040 IF INKEY(-2) PROCROMoff:ENDPROC
 1050 IF INKEY(-1) PROCalloff:ENDPROC
 1060 A%=C EOR 15:AC%(A%)=0:VDU31,6,C,12
9:?(&2A1+A%)=0:ENDPROC
 1070 :
 1080 DEF PROCenable
 1090 IF INKEY(-2) PROCROMon:ENDPROC
 1100 IF INKEY(-1) PROCallon:ENDPROC
 1110 A%=C EOR 15:IF AC%(A%)=0 AND T%(A%
)<>0 AC%(A%)=T%(A%):VDU31,6,C,131:?(&2A1
+A%)=T%(A%)
 1120 ENDPROC
 1130 :
 1140 DEF PROCbreak
 1150 FOR I%=0 TO 2 STEP 2:P%=&132:[ OPT
I%
 1160 LDY#0:.loop:LDAtable,Y:STA&2A1,Y:I
NY:CPY#16:BNEloop:RTS
 1170 .table:]:FORU%=0TO15:P%?U%=U%?&2A1
:NEXT:P%=P%+16
 1180 NEXT:!&287=&01324C:ENDPROC
 1190 :
 1200 DEF PROCinstr
 1210 PRINT;CHR$133;"<Q>uit";SPC(14);"<I
>nfo"'CHR$133;"<O>scli";SPC(13);"<S>ave"
'CHR$133;"<A>ctivate";SPC(3);CHR$135;"(+
CTRL  = All ROMs"'CHR$133;"<D>isable";SP
C(4);CHR$135;"(+SHIFT = Wildcard":ENDPRO
C
 1220 :
 1230 DEF PROCalloff
 1240 PROCinputname
 1250 FOR C=0 TO 15:A%=C EOR 15:IF INSTR
(N$(A%),R$)<>0 PROCdisable
 1260 NEXT:?&259=0:C=?&70:ENDPROC
 1270 :
 1280 DEF PROCallon
 1290 PROCinputname
 1300 FOR C=0 TO 15:A%=C EOR 15:IF INSTR
(N$(A%),R$)<>0 PROCenable
 1310 NEXT:?&259=0:C=?&70:ENDPROC
 1320 :
 1330 DEF PROCinputname
 1340 ?&70=C:VDU28,0,24,39,20,12
 1350 PROCos("FX15"):INPUT"Wildcard name
: "R$
 1360 ?&259=1:CLS:PROCinstr:VDU28,0,24,3
9,3:ENDPROC
 1370 :
 1380 DEF PROCassemble
 1390 FOR I%=0 TO 2 STEP 2:P%=&A00:[ OPT
I%
 1400 .test
 1410 LDA &F4
 1420 STA &65
 1430 LDA #&F
 1440 STA &F4
 1450 STA &FE30
 1460 LDY #0
 1470 .tloop
 1480 LDA &8000,Y
 1490 STA &70,Y
 1500 INY
 1510 CPY #16
 1520 BNE tloop
 1530 LDA &65
 1540 STA &F4
 1550 STA &FE30
 1560 RTS
 1570 .copy
 1580 LDA &60
 1590 STA &A9
 1600 LDA #0
 1610 STA &A8
 1620 STA &AA
 1630 LDA &61
 1640 STA &AB
 1650 LDA &F4
 1660 STA &65
 1670 LDA &66
```

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by Mitch

ADVENTURE GAMES ADVENTURE GAMES

Title : Project Thesius
Supplier : Robico Software,
: 3 Fairland Close, Llantrisant,
: Mid Glamorgan CF7 8QH.
Price : £9.95 (Cas.), £11.95 (Disc)

This latest saga from Rob the Welsh wizard, is a follow up to his previous spy adventure "Rick Hanson 1". Yet again, your impossible mission is to boldly go where the bullets are thickest and the dames are slimmest to retrieve the secret plans from an impregnable fortress.

Trigger-happy guards, ferocious dogs, and minefields surround the perimeter to the castle, which is hidden deep in the woods. As in "Hanson 1", previous agents have left clues and equipment to assist you which they have 'thoughtfully' hidden in the least likely locations.

To add realism to the game the author has added a sneaky touch. Should you, by mistake or design, use a piece of information gained on some previous attempt at the game, but not obtained during your current attempt, the game will respond as if the solution was incorrect. For example, should you discover a correct password and then replay the game from a previous saved position prior to your password discovery, the password will not work. This fact can cause quite a few headaches so ensure you take no shortcuts.

A distressing part of the game is the appearance of the village maze. In retrospect I found the reason for it, but I gnawed the keyboard just the same. The game has been written to fit the reduced memory of the Electron and it shows. On a number of occasions the normally clever command interpreter used by Robico becomes singularly stupid. There are at least two occasions where great problems are to be experienced trying to find the one word which the game insists on obtaining before it will understand. Having just recently finished playing 'Enthar Seven' (which is arguably the best BBC adventure around, and is also by Robico) this game suffers in comparison. The problems are at an 'average' level which makes it suitable for those among us who find the likes of Level 9 problems a bit below the belt - it's good but he's done better.

Title : Midge Message Compression
: System
Supplier : Robico Software
Price : £11.95 (Disc only)

The secret of compressing the vast amount of data contained within the Robico games can now be used within your own creations. This text handling toolbox enables would-be authors to Create, Modify, Compress and Recall text messages.

Essentially the package is for the use of adventure writers, but it could prove equally useful wherever large amounts of text data are to be held in memory. The package is very easy to use and consists of a number of menus which act upon the text file containing your messages.

All messages are initially entered in upper case, within which you may add special characters which are interpreted at write-out time. These characters may be used to specify the colour of text, the line width of the printed message, begin and end of case change and the speed at which the message is to be printed. Using this technique, colourful, upper and lower case text may be quickly or slowly printed in a laid out format. For example, the message:

@MY NAME IS @FRED.I AM 9.

would be finally be printed as:

My name is Fred. I am 9.

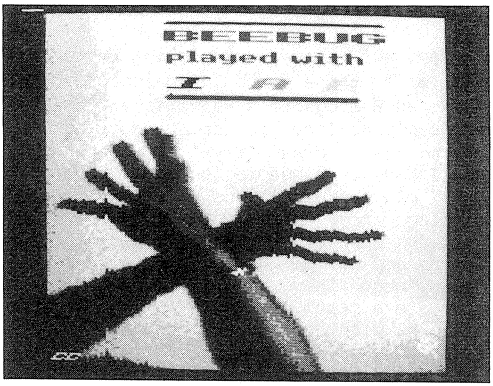
To use the resulting data you simply *LOAD the file at the top of your memory and do a CALL MPRINT or JSR MPRINT to access your messages. A professional text compressor like this which averages 45% compression is a very useful tool for the Beeb adventure writer and this one is as good as they come.

While on the subject of home-grown adventures, it is to be hoped that the anticipated Graphic Adventure Creator from Incentive Software will live up to its promise. I hope to review this shortly.

Colourful Images

'Image' is a software package that allows the creation and manipulation of complex graphics images, particularly in colour. Colin Cohen, an expert in graphic arts, reports on this impressive new package.

Product : Image
Supplier : Cambridge Micro Software
: The Edinburgh Building,
: Shaftsbury Road,
: Cambridge CB2 2RU.
: Tel. 0223-312393
Price : £45.88 inc VAT (Disc only)



Attention to detail is the hall-mark of good programming, and would-be programmers would do well to look at Image published by Cambridge University Press as part of the (now concluded) Micro-electronics in Education Programme. This comprehensive colour-graphics package stretches the Beeb's capabilities in this direction to the limit. The manual is written with admirable clarity and, thanks to the MEP subsidy, is printed in full colour wherever needed. The colour is of particular importance when it comes to dealing with three-colour theory, and underlies the strengths of the programs and manuals as educational aids for physics or art, rather than just as entertainment.

An example of the care taken in preparation and presentation is that control can be from an AMX Mouse, joysticks, tracker balls and a variety of touch pads and graphics tablets. A colour monitor is clearly better than a domestic TV. The *SYSTEM program comes ready configured, but by cycling through menus it can be reconfigured for new control, input and output selection. The new parameters write themselves to disc so that it will !BOOT in that configuration until such time as it is reconfigured. The only ambiguity I found in the manual was in this start up procedure. Otherwise, the manual's claim that Image can be used by someone with no previous computer experience seems justified, and in particular, load and save operations are particularly well 'error-trapped'. I was very grateful for it when for no apparent reason the program crashed, but I was able to pick it up from the last save.

Partly as a result of the 'error-trapping' and partly due to the many overlay programs needed because of memory limitations on the Beeb, the program does often seem slow. The use of overlays does not cause the main program to lose track of pre-set parameters - for instance, if you choose to save a picture on one of the pages of the 'sketch book', not only is your original picture still on the screen, if you go back to the main program, but the functions such as nibs and colours are reset to where you left off.

As one of that large minority who are left-handed, my expectations were certainly raised by finding that the package contained an overlay for a Concept Keyboard, laid out for the majority on one side, and for me on the reverse! Oddly enough, I am now so used to right-handed keyboards that I doubt if one with numeric or cursor controls on the left would be any easier. I used an AMX mouse with Image, alternating with the keyboard, but I suspect that the ideal combination would be a Grafpad as I find that a mouse tends to be rather inaccurate (lacking positive control of co-ordinates), and while the cursor keys are perfect for drawing straight lines and small, precise movements, they are difficult to use for 'freehand' drawing. Control of movement on-screen is automatically passed back from the mouse or other device to the cursor keys simply by pressing the

cursor-right key.

Many of the functions in Image are similar to those found in paint programs, such as Beebugsoft's Paintmaster, but the program's ability to create arcs between two points or draw 'rays' are better than any I have seen before on an 8-bit micro. Most of the functions are accessed by placing the cursor over a series of letters down the left hand edge of the screen and clicking the mouse to reveal a pop-up menu. These, too, can be clicked to activate a particular size of nib, or type of line, with the current choice shown on a status line. On the other side of the screen a wide range of colour functions are available, and pop-up menus can also be used to select lettering, which can be in a wide range of sizes in Roman or Italic, and rotated in 90 degree steps.

If you make a mistake (even in lettering, where positioning is rather difficult to gauge), the situation can usually be rectified by using the 'fill' function to change the incorrect part to the background colour. This perhaps shows up one shortcoming of the system. If for example, a red area adjoins a blue area, either colour can be changed to any other. However, if you change any colour to the same as its neighbour, the boundary is no longer retained and from then on they cannot be manipulated separately.

The 'sketch book' allows from 5 (40 track, single-sided) to 24 (80 track, double sided) pictures to be stored on a disc, and these can be recovered at will. Additional features allow them to be changed automatically at variable intervals to provide a slide show or animation, and using the extremely flexible colour-change facilities, pseudo-animations are also possible within a single frame.

The effect of cycling through the colours, either changing each colour to its opposite or its next logical colour has to be seen to be believed. As well as the standard save routine, screen dumps from other programs can be loaded, or Image graphics saved, from &3000 to &7D80 in mode 2, for instance to use as program titles.

The chief use of Image would appear to be by those who need to create sophisticated Beeb graphics in colour, (though few will be able to afford a colour printer to enjoy the effects on paper), in teaching of colour theory and appreciation, and even in generating colour separations for conventional printing. Image is a thoroughly professional and robust software package that has much to offer all those interested in colour graphics on the Beeb. It compares very well for quality with the likes of Tesselator and Graphito, reviewed last year in BEEBUG Vol.4 No.2, though the relatively high price of Image may dissuade some.

←23

ROM Controller (contd.)

```
1680 STA &F4
1690 STA &FE30
1700 LDX #0
1710 .cloop1
1720 LDY #0
1730 .cloop2
1740 LDA (&A8),Y
1750 STA (&AA),Y
1760 INY
1770 BNE cloop2
1780 INX
1790 INC &A9
1800 INC &AB
1810 CPX &62
1820 BNE cloop1
1830 LDA &65
1840 STA &F4
1850 STA &FE30
1860 RTS
1870 .oscli
1880 LDX #0
1890 LDY #&09
1900 LDA #0
1910 JSR &FFF7
1920 RTS
1930 .testit
1940 LDX&F4
1950 STY&FE30
1960 STY&F4
1970 LDA&71
1980 STA &8000
1990 LDA &8000
2000 STA&71
2010 LDA&70
2020 STA &8000
2030 STX&F4
2040 STX&FE30
2050 RTS
2060 ] NEXT:ENDPROC
```

INTRODUCING THE BEEBUG MAGIC MODEM

In the March 1986 edition of BEEBUG we reviewed the Magic Modem. This is what we said:
"Using the software and the modem is simplicity itself"
"Simply a delight to use... performed perfectly... in my opinion the best terminal software yet for the BBC"

It was also reviewed on Micronet 800. They said:
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THE SOFTWARE
Supplied with custom designed communications software supplied on a 16k rom written by Soft Machinery. This enables you to auto dial, and contact any of the services (Prestel, etc.) that you may require. The software is truly excellent and features a mailbox frame editor, telesoftware downloader, frame tagging, load, save, print, etc. all at the press of a function key.

PRICE
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Modem (inc. Auto Answer) and lead **£94** inc. VAT
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- Build up a rhythm accompaniment on the rhythm machine
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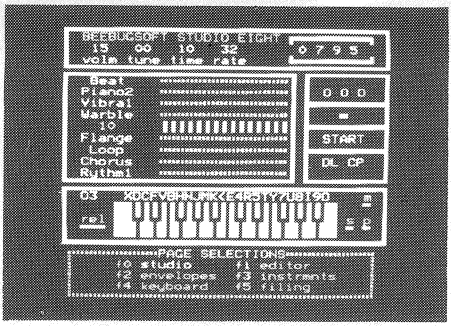
- Use the studio mixer to add an accompaniment from a different instrument played in real-time on the synthesiser



- Press "Rewind"; watch the tape indicator
- Press "Stop" at any point: then press "Play" to hear the mix

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Simple instructions are given to add an external speaker and keyboard.

Examples of the music that can be created with **STUDIO 8** are included on the disc/tape.

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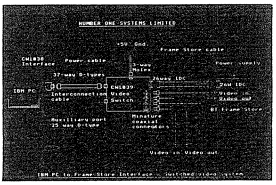

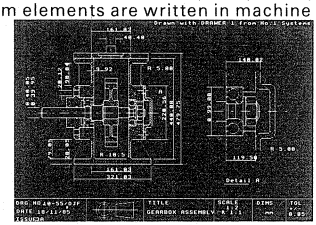

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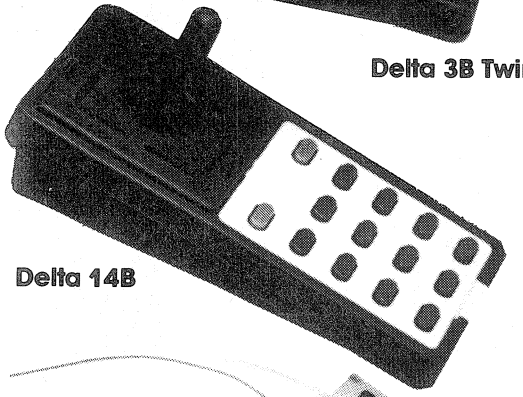

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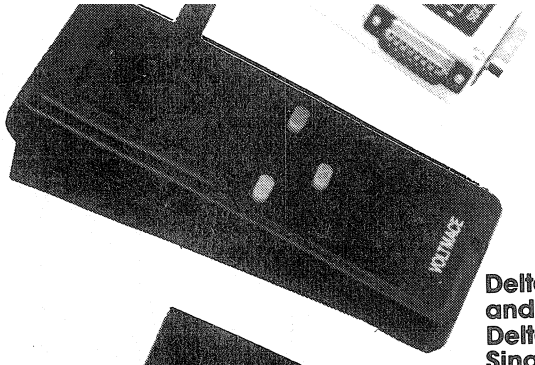
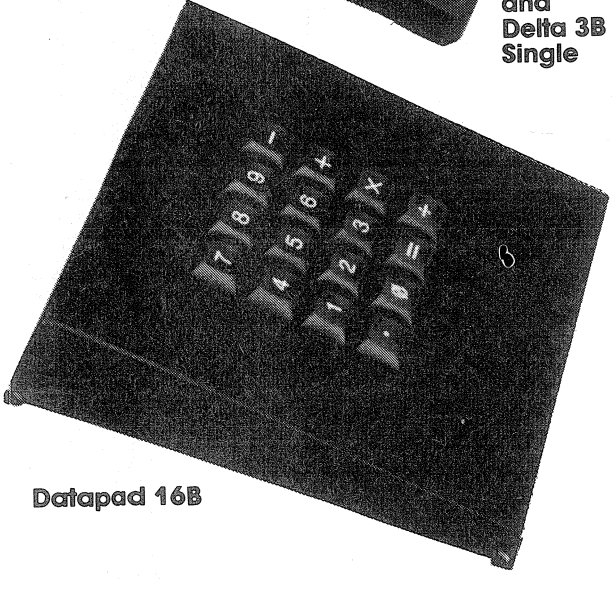


Delta 3S and Delta 3B Single



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→X

Events

Acorn User Exhibition	Barbican Centre, Golden Lane, London EC2	24-27 July
Electron and BBC Micro User	UMIST, Manchester	26-28 Sept
Electron and BBC Micro User	Royal Horticultural Halls, Westminster	7- 9 Nov

Discounts Update

Chalksoft are offering 10% a discount to BEEBUG members on all their educational software. Just quote your BEEBUG membership number with any order.

Chalksoft can be found at P.O.Box 49, Spalding, Lincs. PE11 1NZ.

CLASSIFIED ADS (continued)

BBC-B with Acorn DFS, 1.2 O.S and manuals etc. £270. Tel: Hatfield (07072) 69245.

The foods you eat - a program to calculate the calories, fat, protein, carbohydrate, vitamins and minerals in 470 foods, then compare your intake with the recommended levels. Disc only - please specify 40 or 80 tracks. £12.50 from David Bender, 17 Hightrees Court, Manor Court Road, London W7 3HD.

For sale. Taxan Kaga KP810 printer. 2 years old, as new, £140 ono. Tel: (0582) 36879.

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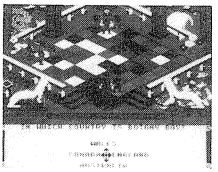
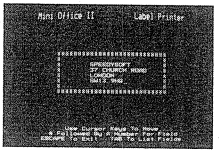
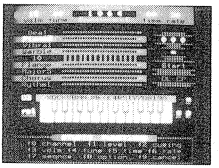


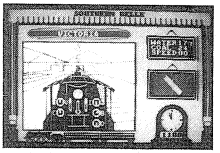
Power Play



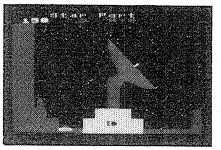
Mini Office II



Studio 8



Southern Belle



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5-86

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PAINTING BY NUMBERS

A comprehensive fill routine

Add some colour to your graphics displays with Grahame Blackwell's flexible paint routine.

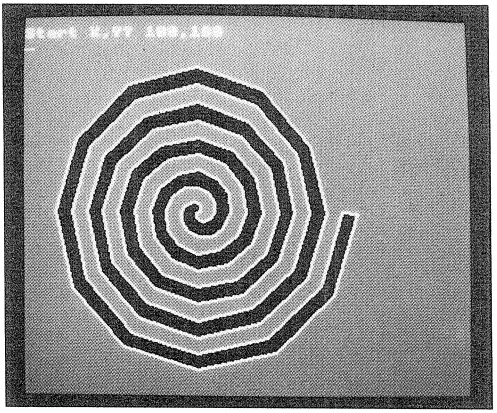
Although the standard BBC micro has very considerable graphics potential, it lacks a good number of commands to enable that potential to be fulfilled. This has been rectified somewhat with the availability of graphics packages such as those from Computer Concepts, and Acornsoft. And now the Master comes ready packaged with on-board graphics firmware. Many users, however, are still without quite essential graphics routines.

To try to bridge the gap, we present here a very effective fast colour fill routine that is both capable of filling very complex shapes, and which also gives the user full control over the filling logic. In other words, you are able to specify not only the colour of fill, but also the response of the fill routine to boundaries of any colour.

In order to achieve the necessary speed of operation, the routine is of course written in machine code, but no knowledge of machine code is necessary to use it. To start with, type in the listing of the program called "FILLER" at the end of this article. Take care to copy it exactly as presented, then save the program to cassette or disc just as if it were a normal Basic program.

The program just saved is in assembler. To get to machine code we need to assemble it. To do this, type RUN. You will see the assembly listing scroll up the screen, and if no errors are reported the code will be assembled into an area of memory at &900 in your machine. The code is 722 bytes long, and is therefore just a shade less than three "pages" in length. To save the machine code for later use, type:

```
*SAVE FILL 900 +300
```



To test out the routine we can use the program called "SPIRAL" listed below. This draws a double spiral in any graphics mode, and uses the fill routine to fill either the spiral itself or the background. To try this out, first type in the listing and save away the program before running it. If you have corrupted the machine code fill routine since assembling it (e.g. by switching off your

```
 10 REM PROGRAM SPIRAL
 20 REM VERSION B0.5
 30 REM AUTHOR G. Blackwell
 40 REM BEEBUG JULY 1986
 50 REM PROGRAM SUBJECT TO COPYRIGHT
 60 :
100 MODE 7
110 INPUT''"MODE: "M
120 IF M>5 OR M=3 VDU7:GOTO 100
130 MODE M
140 MOVE 500,500
150 FOR A=30 TO 1800 STEP 30
160 X=500+A/4*COSRADA
170 Y=500+A/4*SINRADA
180 DRAW X,Y
190 NEXT
200 DRAW 905,500
210 FOR A=1800 TO 180 STEP -30
220 X=500+(A/4-45)*COSRADA
230 Y=500+(A/4-45)*SINRADA
240 DRAW X,Y
250 NEXT
260 REPEAT
270 VDU30:PRINT'SPC(20):VDU30
280 INPUT '"Start X,Y? "X%,Y%
290 UNTIL POINT(X%,Y%)=0
300 A%=&FFFFFF01:B%=&FFFFFFFF
310 C%=B%:D%=C%
320 paint=&900:CALL paint
```

machine etc) then reload it by typing:

```
*LOAD FILL
```

Then run the Basic SPIRAL program. You will first be asked for a graphics mode - enter a number between Ø and 5 (but not 3). The spiral will be drawn in outline in the chosen mode, and you will be prompted for the co-ordinates of the start of the fill. X must be between Ø and 1279, and Y must fall between Ø and 1Ø23. If the point falls within the spiral, then the spiral itself will be filled; if not, the background is filled. As you will see, the filling is fast and efficient, and copes with the intricacies of the shape quite satisfactorily.

In order to use the fill routine in your own programs you will need to pass two sets of parameters to the code. The first is simply the X and Y co-ordinates of the start of fill, and these should be within the range already specified, and should be placed in the X% and Y% resident variables before your program calls the fill routine, achieved on line 28Ø in the SPIRAL program.

The other parameters concern the filling logic, and are a little more complex. A% - and in mode 2 also B%, C% and D% - provide a colour mask for the fill process. Each of these integer variables holds a 4-byte number, each byte giving the effect of the fill on one of the displayed colours: A% gives the transformation for logical colours 3,2,1,Ø in that order; B% covers colours 7,6,5,4; C% 11,1Ø,9,8; and D% 15,14,13,12. Each of the 4 variables thus contains the masks for four colours, each mask being expressed by a 2 digit hex number.

In each case, the mask either indicates what colour a given logical colour will be changed to after the fill, or it indicates that a given logical colour is to be regarded as a fill boundary. A mask of FF(hex), or any value greater than 7F, means that the corresponding colour is to be regarded as a boundary colour. A mask of the form Ø2, Ø6, ØE etc. indicates the replacement colour for a non-boundary pixel. For example:

```
A% = &FF02FF01

   logical colour  3    2    1    Ø
   mask value      &FF  &Ø2  &FF  &Ø1
```

indicates that:

- Colour 3 (mask &FF) is a boundary pixel
- Colour 2 (mask &Ø2) is passed over without changing (i.e. change colour 2 to colour 2)
- Colour 1 (mask &FF) is also a boundary pixel
- Colour Ø (mask &Ø1) is 'painted' with colour 1 (if within the boundary)

Extending the principle to mode 2: B% = &FFFFØDFF: C% = &FFFFFFFF: D% = C% would make colours 4-15 all boundaries, except colour 5 pixels which are to be changed to colour 13 (hex D). These variables are not affected by the routine, and so do not need to be re-set every time it is used in the program, unless a different colour mask is needed. Moreover, in two-colour modes only two bytes of A% need be set.For example A% = &FFØ1. As a general principle however, any colour used for filling should itself be defined as a boundary colour, to avoid repeated overfilling.

To check this out in a practical example, we can take a look at the SPIRAL program. This uses the following masks, set up on lines 3ØØ and 31Ø:

```
A%  &FFFFFFØ1
B%  &FFFFFFFF
C%  &FFFFFFFF
D%  &FFFFFFFF
```

In other words, logical colour zero (the black background) is to be replaced with logical colour 1. All other colours are to be treated as boundaries. In modes Ø and 4, logical colour 1 is white by default. In modes 1, 2 and 5 it is red; and if you run the SPIRAL program in these different modes, you should indeed see the fill execute in the corresponding colour. You can of course redefine any of the logical colours to any of the 16 possible physical colours available on the BBC micro using VDU 19. See the User Guide page 382 for further details.

As a further example of using the fill routine, we will look at the colouring of a simple box on screen. The program to draw the box is listed below under the name BOX. When you run it, you will see it draw a rectangle on screen in mode 2. To fill the box, you must first make sure

that you have the fill routine loaded into memory. If not, execute:

```
*LOAD FILL
```

Then set up A%, B%, C% and D% to give the desired effects when FILL is called. For example, the following data:

```
A%=&FFFFFF02
B%=&FFFFFFFF
C%=B%
D%=B%
```

will cause a green fill. To fill the rectangle, set X% and Y% to any co-ordinates within the box - for example X%=500 and Y%=500. Now if you execute:

```
CALL &900
```

you should see the rectangle filled in green.

```
100 REM BOX
110 MODE 2
120 MOVE300,300
130 DRAW300,700
140 DRAW900,700
150 DRAW900,300
160 DRAW300,300
```

If you set X%, Y% outside the rectangle, you should see the background filled, and if you alter the value of A% you will change the colour of the fill. For example:

```
A%=&FFFFFF06
```

will fill in cyan.

To illustrate how to incorporate this into the program itself, you could add the following lines to the BOX program:

```
 10 *LOAD FILL
200 X%=500:Y%=500
210 A%=&FFFFFF06
220 B%=&FFFFFFFF
230 C%=B%:D%=B%
240 CALL &900
```

The program will then load the machine code, draw the rectangle, set up the necessary parameters, and execute the fill. It is left to the reader to add a line to avoid reloading the machine code if it is already present.

TECHNICAL NOTES

As the program is presented the machine code routine is assembled at &900, and occupies three pages of memory. This should cause no problems unless you wish to make use of the RS423 port, the cassette port, or the function keys during the actual running of the program. If you do, then you will have to assemble the code into a different area of memory. To do this, just change line 110 in the assembly listing of FILLER, and alter the parameters used to save the assembled code, and of course the calling address.

Calling the routine once it is saved away as machine code can be accomplished in a number of ways. For example, you could incorporate the line:

```
*LOAD FILL
```

early in a program, and call the routine each time that it is needed with:

```
CALL &900
```

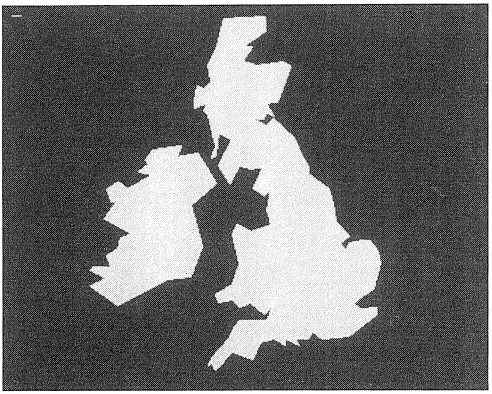
You may even call the routine directly from disc just as if it were an extra command in Basic by typing:

```
*FILL
```

from immediate mode or from within a program. This will load and then run the fill routine. Cassette users will need to call:

```
*RUN FILL
```

to achieve the same effect.



NEXT MONTH

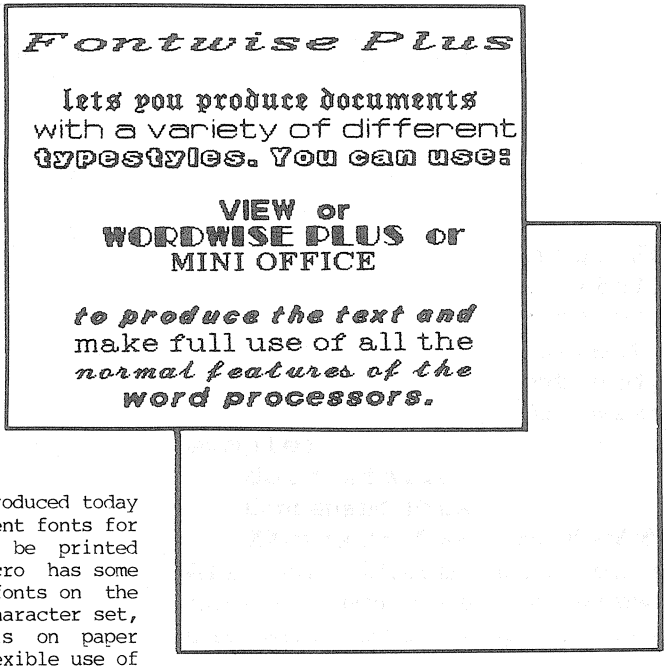
Next month sees the completion of this article, with a short program to draw and fill a map of the British Isles, together with a more detailed explanation of how FILLER operates.

```
10 REM FILLER
20 REM VERSION B0.5
30 REM AUTHOR G. Blackwell
40 REM BEEBUG JULY 1986
50 REM PROGRAM SUBJECT TO COPYRIGHT
60 :
100 FOR C=0 TO 3 STEP 3
```

```
110 P%=&900
120 [OPTC
130 .paint
140 STX&70:LDA&465:STY&72:RORA
150 ROR&72:RORA:ROR&72
160 LDA#135:JSR&FFF4:STY&8F
170 LDX mode,Y:BPL P%+3:RTS:LDY#0
180 LDA&8F:AND#3:STA&84
190 .L99 LDAzp,X:STA&85,Y:INX:INY
200 CPY#8:BNE L99:LDA&89:STA&8D
210 LDA#3:SEC:SBC&8D:TAX:LDA&461
220 .L9 CLC:RORA:ROR&70:DEX:BNE L9
230 STA&71:LDA#&87
240 LDX#4:STX&77:DEX:STX&76:LDY#255
250 STY&78:.L9C INC&78:INC&76:LDY#0
260 STY&75:LDX&8A:LDA(&76),Y:BMI L9R
270 .L9P LDY&88:RORA
280 .L9Q ROR&75:DEY:BPL L9Q
290 DEX:BNE L9P
300 LDA&75:.L9R LDY&78:STAcoltab,Y
310 CPY#15:BNE L9C
320 LDAcoltab:LDY#0:STY&8E:LDX&88:CLC
330 .L9S TAY:ORA&8E:STA&8E:TYA:ROLA
340 DEX:BPL L9S:JSR rout3:STA&7D
350 STA&7F:LDA&7A:STA&7C:STA&7E
360 LDA#1:STA&82:LDA#0:PHA:JMP L71
370 .rout1
380 LDA&71:CMP&8D:BCC L12:BNE L11
390 LDA&70:CMP&8C:BCC L12
400 .L11 LDA#&FF:STA&77:RTS
410 .L12 LDA&85:AND&70:STA&73
420 LDA&71:STA&74:LDX&84:BEQ L1B
430 .L1A CLC:LDA&73:ROLA:STA&73
440 LDA&74:ROLA:STA&74:DEX:BNE L1A
450 .L1B LDA&72:EOR#255:STA&76
460 AND#7:CLC:ADC&73:STA&73:LDA#0
470 ADC&74:STA&74
480 LDA&76:LDX#3:.L1C CLC:RORA:DEX
490 BNE L1C:CLC:STA&76:STX&75:RORA
500 ROR&75:RORA:ROR&75:ADC&76:STA&76
510 LDX&87:.L1D LDA&73:ADC&75:STA&73
520 LDA&74:ADC&76:STA&74:DEX:BNE L1D
530 ADC&86:STA&74
540 LDA&70:AND&88:STA&75:TAY
550 LDA(&73,X):STA&89:STX&76
560 LDX&8A:.L1E ROLA:DEY:BPL L1E
570 LDY&88:ROL&76:DEX:BNE L1E
580 LDX&76:LDA coltab,X:STA&77:RTS
590 .rout2
600 LDA&75:EOR&88:STA&76:LDA&8B
610 LDX&76:BEQ L22
620 .L21 ROLA:ROL&77:DEX:BNE L21
630 .L22 EOR#255:AND&89:ORA&77
640 STA(&73,X):RTS
650 .rout3
660 LDA&70:STA&78:STA&7A
670 LDA&71:STA&79:STA&7B
680 JSR rout1:LDA&77:BMI L34
690 LDA&89:BNE L31:JSR rout3A:STA&7A
700 .L31 JSR rout4:LDA&77:BMI L32
710 LDA&89:BNE L3A:LDA&75:CMP&88
720 BNE L3A:JSR rout3A:JSR rout3C
730 JMP L31:.L3A JSR rout2:JMP L31
740 .L32 LDA&70:STA&78:LDA&71:STA&79
750 LDA&7A:STA&70:LDA&7B:STA&71
760 JSR rout1
770 .L33 LDA&77:BMI L34
780 LDA&89:BNE L3B
790 LDA&75:BNE L3B:JSR rout3B:JMP L3C
800 .L3B JSR rout2
810 .L3C JSR rout5:JMP L33
820 .L34 LDA&70:STA&7A:LDA&71:STA&7B
830 RTS
840 .rout3A LDA&70:AND&85:STA&70:RTS
850 .rout3B LDA&70:ORA&88:STA&70
860 .rout3C LDA&8E:LDX#0:STA(&73,X)
870 RTS
880 .rout4
890 DEC&70:LDA&70:CMP#255:BNEP%+4
900 DEC&71:JMP rout1
910 .rout5
920 INC&70:BNEP%+4:INC&71:JMP rout1
930  .rout6
940 STA&71:STX&80:STY&81:LDA&82
950 EOR&72:BMI L60:LDA&72:BEQ L6F
960 CMP#255:BNE L60:.L6F RTS
970 .L60 JSR rout5:SEC:LDA&70:SBC&80
980 LDA&71:SBC&81:BPL L6F
990 TSX:CPX#30:BCC L6F
1000 .L61 LDA&77:BMI L60:PLA:STA&83
1010 PLA:STA&73
1020 LDX#0:.L62 LDA&70,X:PHA:LDA&80,X
1030 PHA:INX:CPX#4:BNE L62:RTS
1040 .rout7
1050 STA&82:PLA:STA&72:PLA:STA&7F
1060 PLA:STA&71:STA&7D:PLA:STA&7E:PLA
1070 STA&70:STA&7C:JSR rout3
1080 LDA&7A:STA&70:LDA&7B
1090 LDX&7E:LDY&7F:JSR rout6
1100 .L71 CLC:LDA&72:ADC&82:STA&72
1110 LDA&78:STA&70:LDA&79
1120 LDX&7A:LDY&7B:JSR rout6
1130 LDA&82:EOR#255:STA&82:INC&82
1140 CLC:LDA&72:ADC&82:CLC:ADC&82
1150 STA&72:LDA&78:STA&70:LDA&79
1160 LDX&7C:LDY&7D:JSR rout6
1170 LDA&7E:STA&70:LDA&7F
1180 LDX&7A:LDY&7B:JSR rout6
1190 PLA:BNE rout7:RTS
1200 .zp
```

Fontwise and Fancy Free

Clares' Fontwise will allow you to print your text files in many different sizes and styles. And if you want to design your own character styles then there's the Fontwise editor as well. Geoff Bains reports.



FONTWISE PLUS

Many business computers produced today can offer a range of different fonts for use both on the screen and to be printed out on paper. The BBC micro has some ability to display different fonts on the screen by redefining the character set, but no way of reproducing this on paper except by the slow and inflexible use of screen dumps.

Clares has changed all this with Fontwise Plus - a very flexible package that gives users of Wordwise Plus, View, or Mini Office, with a printer capable of quad density graphics (most Epsons and compatibles), the ability to print text in whatever style they may want.

Product	**: Fontwise Plus**
Supplier	**: Clares Micro Supplies**
	: 98 Middlewich Road,
	: Rudheath, Northwich,
	: Cheshire CW7 7DA.
	: Tel. 0606-48511
Price	**: £20**

Fontwise Plus is supplied on a 40 or 80 track disc along with a twenty page manual (printed, of course, using Fontwise Plus). The package is used separately from the word processor. When the disc is booted a menu screen allows you to switch between View, Wordwise Plus, and Mini Office, load the text file to be printed and, after changing any of a variety of controlling factors, print out the file in the typestyle chosen.

There are twelve typestyles provided on the disc. These range from Gothic and Script to a very effective shadowed outline font. Each font can be printed in normal size (about the same size as your printer's normal print), and in condensed or enlarged form. The characters can also be evenly or proportionally spaced.

The Fontwise Plus characters are based on an 18 by 17 grid. They are printed, a line at a time, in three passes on the printer with a very small (one 216th inch) paper feed between each pass. The result is very good and remarkably fast - only a little slower than the built-in NLQ printing on most printers.

The package also looks after the formatting of the print on the paper, allowing all the normal control commands to fix the margins, indentations, centring, page length, line spacing, justification, and tab positions.

Some of the print control commands, such as left margin and type size, can be changed from Fontwise Plus's menu screen. However, these and many others are altered with control codes embedded in the text

itself. So you can change type size and style within the document and alter the format of the printed result.

Wordwise Plus users will be very familiar both with the idea of the embedded commands and their actual syntax. The codes are preceded in the text by a 'green' code and followed by Return. The only difference is that the codes must be followed by the Return, not the 'white' code that Wordwise Plus also allows, and must each be on a line of their own.

The vast majority of the codes are exactly the same as used in Wordwise Plus. This means that on the whole you can write your document exactly as you would normally do, except that it is actually printed by the Fontwise Plus program.

Mini Office user's will also find Fontwise Plus reasonably simple to adjust to as this word processor follows Wordwise Plus quite closely. Again, a few alternative commands are provided to avoid clashes within the word processor.

For View user's, things are not quite so simple. The commands are embedded in the text using the edit command function (f8), which is simple enough, and parameters entered in the text area on the same line. Again, only a single command is possible on each line. However, as the command mnemonics for Fontwise Plus are based on those of Wordwise Plus, a different set is used for View to avoid conflicts and allow a normal previewing of your text in View. More importantly, the whole concept of rulers in View is ignored by Fontwise Plus and so View users must learn the Wordwise Plus principles to use this program.

However, once the problems of your own word processor have been overcome, Fontwise Plus provides a very efficient way of printing text in a variety of fonts. The only real drawback is the limitation of the twelve fonts supplied. That is where Clares' other Fontwise package comes in...

FONTWISE FONT EDITOR

The Fontwise Font Editor extends the use of Fontwise Plus no end. Not only does this second disc provide a further 10 fonts but also an editor to alter the fonts provided or create entirely new ones of your own design.

The Fontwise Font Editor is basically a character designer like the numerous programs published to design characters for the Beeb itself, albeit on an 18 by 17 grid. However, there are some features of the editor that make it so good as to be miles ahead of any previous designer.

The first is its speed. On the screen is displayed the entire character set of a font as small as the resolution of a mode 4 screen will allow. The character currently selected is also displayed much enlarged. Moving the cursor around the character set puts each character in turn in the enlarged box. That's pretty usual but the speed with which it's done puts all previous designers to shame.

Product	**: Fontwise Font Editor**
Supplier	**: Clares Micro Supplies**
	: 98 Middlewich Road,
	: Rudheath, Northwich,
	: Cheshire, CW7 7DA.
	: Tel. 0606-48511
Price	**: £20**

A character is edited in the enlarged box by toggling individual pixels on and off. In addition, the whole character can be shifted around within the confines of the grid. Characters can be transferred from one position in the character set to another - very useful when altering a complete set, as a 'G', say, is most easily created by altering a 'C'.

Once the whole set is finished it is saved to disc. To do this it is 'scanned' and converted into the data for the three printing passes. Again this is terrifyingly fast considering what is being done. The fonts are saved with a fixed file format of 'F' followed by a number. In this way Fontwise Plus is able to recall them by number according to simple embedded commands in your text. There is no limit to the number of fonts you can create and use in this way, although, of course, the DFS limits you to the number of files.

The Fontwise Font Editor provides a very valuable extension to a very useful product. Together, Fontwise Plus and the Fontwise Font Editor enable you to produce very professional looking documents with a bare minimum of equipment and at a very reasonable cost.

COMMUNICATING WITH COMMSOFT

Soft Machinery have now released the Commsoft ROM, sold with the BABT approved Magic Modem, as a communications ROM for all modem users. Peter Rochford, who reviewed the Magic Modem for BEEBUG, gives his assessment.

Product : Commsoft Terminal ROM
Supplier : Soft Machinery
: 68 Botley Road,
: Oxford OX2 0BU.
: Tel: 0865-726803
Price : ROM £36.22 inc VAT & P&P
: Modem Driver (Disc) £6.90 inc.

Soft Machinery were responsible for writing the original viewdata terminal software for Prestel Microcomputing. Their latest release is Commsoft, supplied on a 16K ROM and featuring both viewdata and scrolling text terminals. Compatible with Model B, B+, Master and 6502 second processors, it will operate with manual dial modems or can control intelligent modems with its Modem Command function. Alternatively, modem drivers can be supplied on disc for most of the popular units around giving control of auto dial, auto answer, and baud rate selection if possible from software. The software supports tramsmission rates of 300/300 baud, 1200/75 and 75/1200 baud, but not 1200/1200 full duplex.

VIEWDATA

The viewdata terminal mode provides a large range of options which are selected by the Beeb's function keys. No key strip is needed as help is available at all times in the form of a pull-down screen menu. Further commands are available via the cursor, Delete and Copy keys sometimes in conjunction with Shift or Ctrl. The facilities included are loading and saving of frames, frame printing, tele-software downloading, both to buffer and filing system, and frame tagging and recall.

The Edit function provides a very sophisticated off-line frame editor for creation of mailbox frames with an on-screen, pull-down, help menu. All viewdata display attributes can be utilised and a pixel editor allows complex graphics frames to be produced with relative ease.

TEXT

The scrolling text terminal in Commsoft provides access to Bulletin Boards and Telecom Gold etc. Like the viewdata terminal, most of the facilities are via functions keys with a pull down menu for instant help. The terminal can operate in 40 or 80 column mode and a split-screen window can be defined for local echo of keyboard input. Incoming text can be sent to printer, RAM buffer or direct to the filing system. Previously created text files can be uploaded either from buffer or direct from disc.

Error corrected file transfer is by the popular Xmodem standard and allows files of all kinds to be transmitted. All the usual status messages are provided and there is monitoring of incoming/outgoing data in a split-screen window.

AUTO LOG-ON

Commsoft has the ability to program a set of function key definitions that are held on a viewdata frame. IDs and passwords are concealed within the frame and extracted by the terminal software. The frame is created using the viewdata Edit function and enables dial-up, log-on and routing to your favourite page by a single key stroke chosen from your menu.

CONCLUSION

The one thing about Commsoft I can say that bothers me is that the modem driver is on disc and not in the ROM, but then I may be lazy! That apart, it is hard to fault software as refined as this. The facilities are excellent, it is very user-friendly and comes with a really good manual. In my opinion, this is the best terminal software yet for the Beeb.

SPECIAL OFFER

Commsoft is available from BEEBUG Retail (not High Wycombe) at the special price of £28 plus p&p. Commsoft is also supplied with the Magic Modem (reviewed in BEEBUG Vol.4 No.9). Now that it has received BABT approval, this modem, and the ROM if required, is now available to BEEBUG members as a special offer. See the supplement for full details.

Colouring Stick

After some initial interest, light pens for the Beeb seem to have gone out of fashion, in favour of the ubiquitous 'mouse'. ATPL's Colour Stick could change all that. Geoff Bains reports.

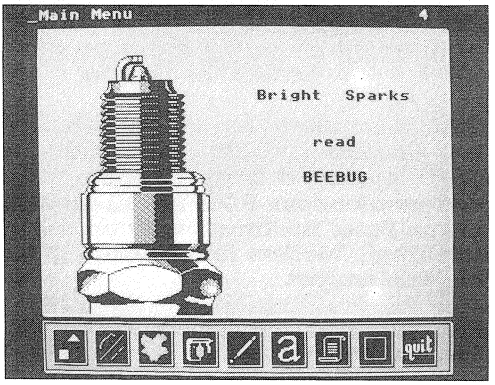
Product : Colour Stick
Supplier : Advanced Technology
: Products Ltd.
: Station Road, Clowne,
: Chesterfield, S43 4AB.
: 0246-811585
Price : £45.45

There was a time when it seemed that everyone produced light pens for the Beeb. To produce a new one at this late stage must mean that ATPL reckons that its Colour Stick is a good deal better than the competition.

The Colour Stick package includes some software. First, however, there is the pen itself. This is based on (or rather, in) a commercial felt-tip pen case in fluorescent green plastic. There is a light sensor at the nib end and from the other a 6 foot (extended) curly black cable with a plug to fit the analogue socket in the back of your Beeb. On the side of the pen body is a small square button used to signal to the micro.

The whole pen is well made and the use of the plastic pen body means that it looks and feels attractive too. The real test of the pen, however, is how it works. As is true for all such devices, this is very much dependent on the software used in conjunction with the light pen. This is where the Colour Stick package really comes into its own, and justifies its relatively high price.

There are three software packages that accompany the Colour Stick - a couple of games, a suite of utilities for use in your own programs, and a drawing package. These are supplied on two 40 track discs



along with facilities to copy them onto 80 track format.

The two games are Pontoon and Solitaire and, of course, they are chosen from suitable menus controlled by light-pen. In the Solitaire game, the pen is used to select the counter to be moved and its destination. In Pontoon, the pen is used to select cards and change the stakes. However, there are considerable problems on a monochrome screen as the darker background will not trigger the light sensor. However, with a colour monitor or TV the results are impressive.

Presumably, the games are only included to give some idea of the possibilities of the Colour Stick in your own programs and in this they do demonstrate the convenience of selections on the screen using the pen.

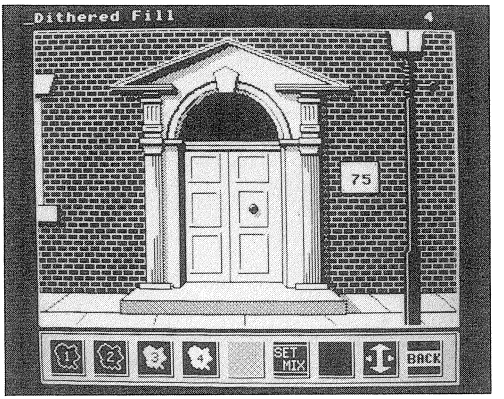
To implement such pen-controlled selection in your own programs you should use the utilities supplied with the Colour Stick. These comprise a suite of Basic procedures spooled on the disc according to the line numbering you choose.

There are five of these procedures. These comprise the assembler code to use the pen, a calibration procedure, a set up procedure for any one of the Beeb's eight display modes, a procedure to return the pen position in character co-ordinates on the screen, and one to return the state of the pen button. The calibration is not essential but is recommended for accurate use of the pen, to accommodate differences between individual pens and monitors.

The five utilities work well and provide a very easy interface with the hardware. However, like the software supplied with the AMX mouse, the real strength of this package lies in the drawing program supplied.

'Palette' is a four-colour mode 1 drawing program controlled totally with the light pen. In the central area of the screen the picture is created and along the base a menu of icons is displayed.

The operation of the program is very similar to AMX Art - each drawing operation is selected by pointing to the required icon and then the position on the picture indicated by pointing to the desired area of the screen. However, the



pointing is achieved with the light pen (a process even more natural and easy than pointing with a mouse) and there are many more icon menu choices than the single menu used with that package.

The menus are arranged in a tree structure so that, for example, to draw a square, first the shape drawing menu is selected from the main menu, the squares menu from that and, when the square is drawn, various fine adjustments have their own menus selected from that.

There are twenty seven menus in all. These cover just about every conceivable operation of picture creation. Lines can be drawn free hand or by rubber-banding, and squares, rectangles, polygons, circles and ellipses drawn in full or in part.

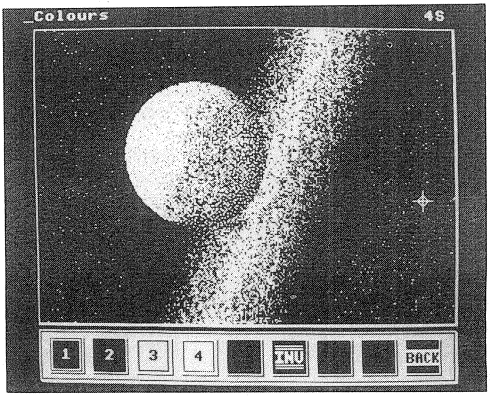
A light pen cannot cope with screen manipulation at pixel accuracy. However, ATPL get around this problem with a position-trimming menu used with all the drawing operations. Once a line or shape has been roughly positioned with the pen the trimming menu is selected and icons touched with the pen to shift the line or shape one pixel in the required direction.

This procedure is obviously more tedious than, say, using a mouse to position a line directly where it is needed. However, it is surprising how quickly it becomes second nature and the end result is always more accurate.

Once the picture outline is complete, areas can be filled in with colours or a wide range of textures and stippled colour mixtures. Text can be printed on the picture either vertically or horizontally. The typestyle of the text can be altered too. Three typefaces are provided, including normal Beeb style, and ATPL promises a further editing package to create your own fonts.

The whole Palette package is, with practice, a joy to use. The multiple menu system provides great flexibility and, as it operates fast and efficiently, is also convenient and easy to use.

The manual provided for the whole Colour Stick package is not a glossy work but it describes all the functions well. Although ATPL has been late in providing its runner in the light pen stakes, the quality of the hardware and the flexibility and complexity of the Palette package make Colour Stick a clear winner.



BEEBUG WORKSHOP — CALLING PROCEDURES

This month, Surac describes a routine that does for procedures what GOSUB does for subroutines. However, cleaning up Basic is not without its drawbacks.

The situation often arises in a Basic program where one of a large number of procedures has to be called in response to some input. For example, a program might display a menu of options to which the user enters a number or letter to indicate his choice.

In a non-structured program, Basic's ON-GOSUB construction is often used to call up the appropriate subroutine on the basis of this index value. For example, suppose we have a fictitious statistics program which has four main menu options. The skeleton for such a menu program is listed opposite.

BBC Basic allows a further modification of this approach in that GOSUB can also be followed by a variable or expression whose current value determines the line number jumped to. In the example program, line 160 could be rewritten as:

```
160 GOSUB (100+index*100)
```

This technique has to be used with caution as any renumbering of the program can result in the subroutines being given new line numbers, and the GOSUB may be directed to the wrong place unless the expression is amended accordingly.

Unfortunately, in programs which adopt the more preferred approach

MENU PROGRAM 1

```
100 REPEAT
110 PRINT" 1 = Enter Data"
120 PRINT" 2 = Display Statistics"
130 PRINT" 3 = Printer On"
140 PRINT" 4 = Printer Off"
150 INPUT index
160 ON index GOSUB 200,300,400,500
170 UNTIL FALSE
200 REM Subroutine to Enter Data
299 RETURN
300 REM Subroutine to Display Stats
399 RETURN
400 REM Subroutine to turn Printer On
499 RETURN
500 REM Subroutine to turn Printer Off
599 RETURN
```

of using named procedures there is no equivalent structure for accessing the one that is required via a Basic variable - no 'call by reference' facility is available for procedures. If the name of the procedure we want to use is stored in a Basic variable called 'index$', there is no way of saying:

```
PROC index$
```

The most usual way out is a list of IF statements such as:

MENU PROGRAM 2

```
160 IF index=1 PROCenter
161 IF index=2 PROCstatistics
162 IF index=3 PROCprinton
163 IF index=4 PROCprintoff
200 DEF PROCenter
299 ENDPROC
300 DEF PROCstatistics
399 ENDPROC
400 DEF PROCprinton
499 ENDPROC
500 DEF PROCprintoff
599 ENDPROC
```

This solution, and other variations on it, often uses up significant amounts of memory (particularly when a large number of options is involved) and is also inefficient. In the above example, if PROCenter has been selected, index is still tested for each of its other possible values.

A mechanism to call procedures by reference can, however, be implemented fairly easily. This routine, called here PROCdespatch, is a procedure which you can add to the end of any Basic program, and is shown below:

```
30010 DEF PROCdespatch(proc$)
30020 maxlen=20 :REM longest name
30030 proc$=LEFT$(proc$+STRING$(maxlen,
      ":"),maxlen)
30040 $(TOP-maxlen-4)=proc$+":"
      +CHR$(&E1)
30050 PROC********************:ENDPROC
```

The actual line numbers you use are not important as long as they are higher than any of the others in the rest of the program.

The name of the procedure that you actually want to call is passed as a parameter to PROCdespatch. In the example program used previously, this could be set up in a variety of ways, for example by using a DATA statement:

```
160 RESTORE
161 FOR i=1 TO index
162 READ index$
163 NEXT
164 DATA enter, statistics, printon,
    printoff
165 PROCdespatch(index$)
```

The menu option is used here to READ the appropriate procedure name to be placed in index$ before calling PROCdespatch.

The names of procedures passed to PROCdespatch may themselves include parameters. For example, instead of 'printon' and 'printoff', we might have a single procedure to toggle the printer on and off and called by parameters to PROCdespatch of 'print(1)' and 'print(0)' respectively.

The power of PROCdespatch becomes even more apparent in the use of command-driven rather than menu-driven programs, for example in a Logo graphics interpreter. As each command line is entered, the keyword at the start of the line can be used to call up the appropriate procedure directly. In outline, such a program would look something like the following listing (at the top of the next column).

```
100 REPEAT
110 INPUT LINE command$
120 keyword$=LEFT$(command$,
    INSTR(command$+" "," ")-1)
130 PROCdespatch(keyword$)
140 UNTIL FALSE
200 DEF PROCRIGHT
299 ENDPROC
300 DEF PROCLEFT
399 ENDPROC
400 DEF PROCFORWARD
499 ENDPROC
etc.
```

PROGRAMMING NOTES

Within PROCdespatch, it is necessary to decide upon the maximum length of the procedure names that can be handled. This is assigned to the variable 'maxlen' in line 30020. In the example, maxlen is equal to 20. The required procedure name is padded out with colons to this maximum length (line 30030), and then in 30040 the BBC Basic $ indirection operator is used to plant the name (together with a following colon, ENDPROC token and Return character) directly into the memory occupied by line 30050. The expression (TOP-maxlen-4) is the memory address of the first character immediately following the PROC keyword in line 30050. The 20 (or however many you want) '*' characters in line 30050 are just used to initialise the area that will be used by the procedure name when the program is run.

To check that you have set up PROCdespatch correctly (and assuming maxlen=20) type:

PRINT ?(TOP-24) <Return>

This should give an answer of 42 - the ASCII code for an asterisk. Then enter:

PRINT ?(TOP-25) <Return>

and this should give a value 242 - used by Basic to store the PROC keyword.

It is also safest to store your program before running it, as it may get corrupted if the despatch routine has not been set up correctly. If the program is interrupted (e.g. by pressing Escape), line 30050 should contain the name of the last procedure that was called.

PROCdespatch thus achieves the desired effect, though some might argue that the technique of directly poking into memory, used by this routine, is even less structured!

SOFTWARE FOR SIDEWAYS RAM

(Part 2)

This month's sideways RAM software from Bernard Hill is all about *commands.

Last month we saw how a sideways ROM reacts to a service call from the Beeb's OS and we introduced a program to set up a sideways ROM to respond to service calls 1 and 9 (Break and *HELP). This month we shall be concerned mainly with responding to service call 4 - * commands.

STAR COMMANDS

When you enter a * command, the OS goes through a clearly defined sequence of actions. First it decides whether it is a command for the OS itself - such commands as *TAPE, *MOTOR and *KEY. If the command is not known (e.g. *DISC), then the paged ROMs are asked in turn (starting at number 15) whether they recognize the command. If the command is still not understood, it is passed to the disc filing system (if fitted) to see if a file of that name exists. Finally, if none of these attempts succeed, a 'Bad Command' error is issued. Some filing systems, and the Master, have more stages than this but the principle is the same. Our ROM must recognize its * commands when offered.

When a service call 4 is issued to the ROMs by the operating system, the contents of &F2, &F3 and the Y register indicate the location of the command string in memory, (&F2),Y pointing to the first character. Each ROM inspects this area of memory to see if it recognizes the command. If not, then the ROM should perform an RTS with all registers and locations &F2 and &F3 restored. If the command is recognized, the ROM should respond to the call and then RTS with the accumulator zero. This signals to the OS that the command has been processed and need not be passed to any other ROM.

STAR COMMAND HANDLING

The code to interpret the command can be complex. A simple version appeared in BEEBUG Vol.4 No.6 for one-letter commands. Here, we introduce a complete * command interpreter in lines 7000-7630 of the accompanying program. It is complete in the sense that it is driven from a table of commands with execution addresses, and it responds correctly to lower case and to abbreviations (such as *E. as well *ELITE).

This table-driven command interpreter is very similar to that used in many commercial ROMs such as BEEBUGSOFT's ROMIT, with one addition: on successful recognition of the command the location &A8 also contains the position of the command in the table (0=1st, 1=2nd, etc).

The command handler is in the same form as used last month - a procedure assembles appropriate code into the ROM listing when called. Its one parameter is the address of the start of the table. This table is itself organized as:

```
<command> <execution address>
<command> <execution address>
&00
```

This must be 256 bytes or less in total. The command is stored in ASCII, and the address is stored, high byte first, one less than the real start address so that this can be placed on the stack and executed with an RTS (lines 7570-7600).

THIS MONTH'S UTILITY

The purpose of the program listed is to respond to a series of * commands which can be used to send characters to a printer, and so change type faces, sizes, styles, and so on. It does not affect the enable status of the printer.

You should merge this program with that listed last month, as detailed then, to form the complete ROM generator. Again it fits the philosophy that each module is to be quite independent of the others and can be called at any point between PROCromhead and PROCendrom. Note the CLEAR statement at line 154; this is so that there is no confusion between the labels of the various sections. The complete program is on this month's magazine cassette/disc.

This month's listing consists essentially of a call to PROCprinter and some DATA statements to support it. Again

these can be very easily customized for your own uses. The parameters of PROCprinter are the line number of the DATA statements (12000) and a string ("PRINTER") to support extended *HELP, so that the contents of the command table are printed out when *HELP PRINTER is entered.

The DATA statements from line 12000 should have the following form:

1. The *command in upper case (without the *). e.g. PAGE
2. The number of bytes this will send to the printer (e.g. 1)
3. The values of actual bytes to be sent (e.g. 12 = new page)

This is repeated as many times as required, and terminated with a null string DATA statement as shown. The data provided works well on a Taxan KP810, but you should consult your printer manual for your own custom ROM codes.

Next month, we shall extend the ROM with, amongst other functions, further utilities to list the ROMs present in your machine and deflect duplicated commands to the right ROM.

```
  10 REM PROGRAM SIDEWAYS ROM
  20 REM Version B1.1
  30 REM Author  B.R.HILL
  40 REM BEEBUG  July 1986
  50 REM Program subject to copyright
  60 :
 154 CLEAR
 155 PROCprinter(12000,"PRINTER")
6000 DEF PROCprinter(dataloc,help$)
6010 Q%=P%:R%=O%
6020 FOR opt=4 TO 7 STEP 3
6030 P%=Q%:O%=R%:REM for pass 2
6040 [ OPT opt
6050 JMP cmdhandler     to cmd handler
6060 .print             the routine
6070 LDA &A9:PHA        need a couple of
6080 LDA &AA:PHA        0 page locations
6090 TYA:ASL A:PHA      save 2 x cmd no.
6100 LDA#&75:JSR &FFF4    printer o/put?
6110 STX &AA:PLA:TAX    store, restore
6120 LDA printtable,X     load code addr
6130 STA &A8              to A8-A9
6140 LDA printtable+1,X:STA &A9
6150 LDY #0             and load ascii
6160 LDA (&A8),Y:TAX     count into X
6170 INY                next code
6180 LDA #2:JSR &FFE3   VDU 2
6190 .sendloop
6200 LDA #1:JSR &FFE3   send to printer
6210 LDA (&A8),Y        the code in the
6220 JSR &FFE3:INY:DEX     table until
6230 BNE sendloop            all sent
6240 LDA &AA:AND #1     printer enabled?
6250 BNE finiprint      yes - skip
6260 LDA #3:JSR &FFE3   no - VDU 3
6270 .finiprint
6280 PLA:STA&AA:PLA:STA&A9 restore regs
6290 PLA:TAY:PLA:TAX:PLA:STA &A8
6300 LDA #0 : RTS       A=0, back to OS
6310 .printtable
6320 EQUS STRING$(64,CHR$0)    <=32 cmds
6330 .ascicodes          up to 256 codes
6340 EQUS STRING$(128,CHR$0)    in all
6350 EQUS STRING$(128,CHR$0)
6360 .printcmds                  1 page
6370 EQUS STRING$(128,CHR$0)    commands
6380 EQUS STRING$(128,CHR$0)
6390 .cmdhandler
6400 ]:NEXT opt
6410 PROCcommandhandler(printcmds)
6420 PROCcommandhelp(help$,printcmds)
6430 RESTORE dataloc
6440 c=printcmds-P%+O%
6450 a=ascicodes-P%+O%
6460 p=printtable-P%+O%
6470 REPEAT:READ command$
6480 IF command$="" THEN 6580
6490 $c=command$
6500 c=c+LENcommand$
6510 ?c=(print-1) DIV 256
6520 c?1=(print-1) MOD 256:c=c+2
6530 ?p=(a-O%+P%) MOD 256
6540 p?1=(a-O%+P%) DIV 256:p=p+2
6550 READ n:?a=n:a=a+1
6560 FOR i=1 TO n
6570 READ code:?a=code:a=a+1:NEXT i
6580 UNTIL command$="":ENDPROC
6590 :
7000 DEF PROCcommandhandler(cmdtable)
7010 Q%=P%:R%=O%
7020 FOR opt=4 TO 7 STEP 3
7030 P%=Q%:O%=R%
7040 [ OPT opt
7050 CMP #4             * command?
7060 BEQ starcmd        yes
7070 JMP notforme       no - do nothing
7080 .starcmd
7090 LDA &A8:PHA        need &A8 so save
7100 TXA:PHA:TYA:PHA    with registers
7110 LDX #&FF           A8 will contain
7120 STX &A8:INX        a counter
7130 .nextcmd
7140 PLA : TAY : PHA    get Y back
7150 INC &A8:DEX:DEY    inc cmd count
7160 .nextchar          try next char
7170 INX:INY             in
7180 LDA (&F2),Y          command line
7190 CMP #ASC"a"        make upper
7200 BCC notlc            case if
```

```
7210 CMP #ASC"z"+1          between
7220 BCS notlc:AND #&DF      'a' and 'z'
7230 .notlc
7240 EOR cmdtable,X      compare with
7250 BEQ nextchar          command
7260 BPL nomatch         table no, & end of cmd
7270 LDA (&F2),Y         test if input
7280 BEQ gotcmd            char is the
7290 CMP #13                 last in the
7300 BEQ gotcmd                command
7310 CMP #32                    .. if yes
7320 BEQ gotcmd                   go ..
7330 .nomatch
7340 CPX #0              make sure its
7350 BEQ overcmd           not a *. cmd
7360 LDA (&F2),Y         test to see
7370 CMP #ASC"."           if its abbrev'd
7380 BEQ dotmatch            with a "."
7390 .overcmd            search on
7400 LDA cmdtable,X        so that find
7410 BMI eocm:INX            the start of
7420 JMP overcmd               next command
7430 .eocm               end of command
7440 INX : INX           skip exec addr
7450 LDA cmdtable,X      done all cmds?
7460 BNE nextcmd         no - try next
7470 PLA:TAY             yes restore regs
7480 PLA:TAX:PLA:STA &A8
7490 LDA #4                 and A and
7500 JMP notforme            abort
7510 .dotmatch           ended with .
7520 INX                   so search
7530 LDA cmdtable,X          for the exec
7540 BPL dotmatch               address
7550 .gotcmd
7560 LDY &A8             cmd into Y
7570 LDA cmdtable,X      put exec address
7580 PHA
7590 LDA cmdtable+1,X     on stack, and
7600 PHA:RTS             execute it
7610 .notforme           here if not 4 us
7620 ]:NEXT opt
7630 ENDPROC
7640 :
8000 DEF PROCcommandhelp(help$,cmds)
8010 Q%=P%:R%=O%
8020 FOR opt=4 TO 7 STEP 2
8030 P%=Q%:O%=R%
8040 [ OPT opt
8050 CMP #9              help?
8060 BNE exithelp        no.
8070 PHA                 save all
8080 TXA:PHA:TYA:PHA
8090 LDX #0              get char after
8100 LDA (&F2),Y         *HELP command
8110 BEQ barehelp        ends, so its
8120 CMP #13              *HELP alone
8130 BNE notalone        .. more to follow
8140 .barehelp
8150 LDA #32:JSR &FFE3          indent
8160 JSR &FFE3:JSR &FFE3      3 spaces
8170 LDY #0
8180 .hloop
8190 LDA help,Y          and output
8200 BEQ endhelp         help$
8210 JSR &FFE3
8220 INY:JMP hloop
8230 .help EQUS help$+CHR$0
8240 .endhelp
8250 JSR &FFE7           followed by CR
8260 JMP finihelp        that's all
8270 .notalone           message follows
8280 CMP #ASC"a"          *HELP. So put in
8290 BCC nolc              uppercase
8300 CMP #ASC"z"+1:BCS nolc:AND #&DF
8310 .nolc
8320 CMP help,X          ... and see if
8330 BNE notsame           its our message
8340 INX:INY:LDA (&F2),Y
8350 JMP notalone        maybe, test more
8360 .notsame            not same, but
8370 LDA help,X           maybe ended
8380 BNE finihelp        No. Not for us
8390 LDX #&FF            yes! So
8400 .help1loop            print out
8410 LDY #0                 all the
8420 .help2loop               commands
8430 INX:LDA cmds,X
8440 BMI overaddress:BEQ finihelp
8450 JSR &FFE3
8460 INY:JMP help2loop
8470 .overaddress
8480 INX:LDA #32         pad out to 10
8490 .hloop3              characters with
8500 INY:CPY #11             spaces
8510 BEQ help1loop
8520 JSR &FFE3:JMP hloop3
8530 .finihelp           wrap up
8540 PLA:TAY:PLA:TAX:PLA
8550 .exithelp
8560 ]:NEXT opt
8570 ENDPROC
8580 :
12000 REM printer driver data
12010 DATA PAGE,1,12, NLQ,2,27,40
12030 DATA PICA,2,27,80, ELITE,2,27,77
12050 DATA UK,3,27,82,3, US,3,27,82,0
12070 DATA RESET,2,27,64
12080 DATA TINY,10,15,27,85,1,27,83,0,27
,65,6, BIG,6,27,85,0,27,87,1
12100 DATA CONDENSED,4,27,85,1,15, NORMS
IZE,11,27,50,27,85,0,27,84,18,27,87,0
12120 DATA BOLD,4,27,69,27,71
12130 DATA NOBOLD,4,27,70,27,72
12140 DATA PERFSKIP,3,27,78,8
12150 DATA NOSKIP,2,27,79
12160 DATA ITALIC,2,27,52
12170 DATA UPRIGHT,2,27,53
12180 DATA ""
```

ViewSpell

ViewSpell, Acorn's latest release for the View family of products, will check your spelling whether in View, Wordwise or other format. Mike Williams has been trying out this latest electronic dictionary.

Product : ViewSpell
Supplier : Acorn Computers Ltd
: Cambridge Technopark,
: 645 Newmarket Road,
: Cambridge CB5 8PD.
: Tel. 0223-214411
Price : £33.00 inc VAT (Disc only)

The package consists of a ROM, a dictionary on 40 or 80 track disc, a user guide and reference card. The dictionary, reputed to contain some 70,000 words, is based on the Longman Concise English Dictionary. Acorn says every word in the Longman dictionary should be on the disc and vice versa. You cannot add to or change this master dictionary, but you can set up additional user dictionaries, either to extend the vocabulary of the master dictionary, or to provide specialised word lists.

ViewSpell follows the command-driven approach standard with the View family of products. LOAD is used to load a text file into memory. As it does so, ViewSpell counts the number of unique words, which can be displayed with the LIST command. CHECK then checks these against the master dictionary and reports the number of words not found. You can also continue to check these unrecognised words against any number of user dictionaries if required. Because the number of unknown words at this stage is likely to be quite small, checking user dictionaries after first checking the master dictionary takes very little time.

One useful feature at this point is the ability to use the LIST command to list the unrecognised words. In many cases this is sufficient to identify any real mis-spellings. However, if you want to correct these words the process becomes rather more tortuous. ViewSpell cannot itself be used to change your original text. Instead a separate 'marked' file can be created in which every unrecognised word is marked by two special characters. You then use your word processor to search through the marked file for the markers, editing each word and removing the markers as you come to them.

You may well wish to add any valid words not recognised by the master dictionary to your own user dictionary. Such a dictionary file is easily created, and any number of words can be added directly by typing them in. ViewSpell will also take a word list and automatically present each word in turn for you to confirm whether or not it should be added to your user dictionary.

I feel that ViewSpell loses out here in terms of convenience of use. The fact that unrecognised words may have to be checked twice, once when editing a marked file, and again when updating a user dictionary, will seem tedious to many. However, the very large number of words in the master dictionary should mean that additions to any user dictionary are quite few in number, unless you make frequent use of unusual or specialised words.

ViewSpell recognises 18 different commands providing several other supporting functions beyond those already described. Some of these take a little getting used to, and error messages can sometimes be confusing. As far as speed is concerned, I timed Viewspell against Beebugsoft's Spellcheck for a number of typical magazine files and articles. I found that ViewSpell took 2 to 3 times as long to check a text file, all be it using a dictionary with twice as many words as that used with Spellcheck.

In conclusion, ViewSpell is a worthy addition to the View family, if rather late in the day. It is provided with a truly massive master dictionary but is less satisfactory when correcting mis-spellings and building up your own user dictionaries. Although it is best suited to View, it works just as well with Wordwise Plus text files and no doubt those of many other wordprocessors.

1st course

Using the ADVAL Function (Part 2)

Mike Williams concludes this look at the ADVAL function by explaining the theory behind its less well known applications and provides some guidance for simple experimenting with the Beeb's analogue port.

Last month I finished our first look at the ADVAL function with a short routine which allows any program to check whether or not a printer is on line. I now want to look more closely at this and other similar uses of ADVAL before returning to its more obvious use with the analogue port.

The program in question (repeated below for convenience) uses ADVAL(-4) to achieve its purpose. This tells us the amount of free space in the printer output buffer. Now this may sound rather technical, so some words of explanation are called for before we continue. All computers have to communicate with the outside world in various ways. On the Beeb, the most important are the screen, the keyboard, disc or cassette and, if attached, a printer. Apart from the screen, all these devices are slow compared with the speed of the micro itself. To even things up a little, the micro uses a number of 'buffers'.

```
          PRINTER TEST
100 MODE 7:VDU23,1,0;0;0;0;
110 IF FNtestprinter THEN
    PRINT"Printer operational" ELSE
    PRINT"Printer switched off"
120 END
130 :
1000 DEF FNtestprinter
1010 VDU2,1,0,1,0,3
1020 =(ADVAL(-4)=63)
```

A buffer is just an area of memory allocated to the temporary storage of data on its way between the CPU and some external device. When a program is being executed by the Basic interpreter, any printer output is sent not to the printer but to the printer buffer. The contents of the printer buffer are then output more slowly direct to the printer. To some extent this is not very noticeable as the Beeb's 6502 processor is rushing around doing 101 things very quickly. One of these tasks is to see if the printer buffer has a character waiting to be sent, and, if the printer is ready, to send it.

Sometimes when outputting to a printer, most noticeably when listing programs, you will see the screen display pause for a moment before continuing. This is because the printer output buffer is full, the printer being unable to extract characters for printing as fast as the Beeb can produce them.

Let us now look at the printer test routine in detail to see how it works. It outputs a couple of null characters (so nothing actually appears) to the printer. In reality, this means to the printer output buffer. It then checks the number of free spaces in the buffer (maximum 63) to see whether the characters have been sent to the printer (printer on-line) or whether they are still just sitting in the buffer (printer off-line, or non-existent).

There are a number of these buffers in the Beeb and the ADVAL function can be used to check some of them as shown below:

ADVAL(-1)	keyboard buffer	(31)
ADVAL(-2)	RS423 input buffer	(255)
ADVAL(-3)	RS423 output buffer	(191)
ADVAL(-4)	printer output buffer	(63)
ADVAL(-5)	sound channel 0	(15)
ADVAL(-6)	sound channel 1	(15)
ADVAL(-7)	sound channel 2	(15)
ADVAL(-8)	sound channel 3	(15)
ADVAL(-9)	speech buffer	(63)

In the case of the two input buffers (ADVAL values -1 and -2), the value returned is the number of characters in the buffer, not the amount of free space. The numbers in brackets at the end of each line indicate the size of the relevant buffer.

The use of a buffer also helps to explain how it is possible to type ahead of the output on the screen - all the input is going into the input buffer. Try running the following short program:

```
100 MODE 7
110 REPEAT
120 REPEAT UNTIL ADVAL(-1)>=20
130 REPEAT
140 C%=GET:VDU C%
150 UNTIL ADVAL(-1)=0
160 UNTIL FALSE
```

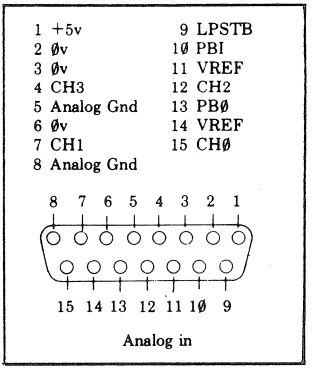
After typing RUN <Return> nothing appears to happen. Keep typing away at the keyboard and after a while all your input will suddenly start to appear on the screen. The program waits until the keyboard input buffer contains 20 characters before the second part of the program starting at line 130 begins to extract these characters from the keyboard buffer and display them on the screen. Once the keyboard input buffer is empty, the second part of the program terminates, repeating the whole sequence from the beginning. If you just keep typing away at random, you will keep finding that the screen display does nothing for a while, and then rushes to catch up before going quiet again.

Testing the input buffer can be very useful in games programs. If the buffer is empty then no action is required. If a key has been pressed, then the program can determine which key and take appropriate action. This saves time testing for several different key-presses when in fact none has occurred.

The ADVAL function also allows you to test, in a similar way, the state of the four sound channels. In particular, a program can check that all three main sound channels (1, 2 and 3) are empty (have played all the notes previously issued) before sending the next sequence of notes to the appropriate channel.

THE ANALOGUE PORT

To conclude this introduction to the ADVAL function let's return and take a further look at its uses in connection with the analogue port. This provides for a total of nine different signals as shown in the diagram on this page.



One point to note here is that the User Guide, in describing the analogue port channels, refers to channels 1 to 4 but on the diagram (reproduced with Acorn's permission from the User Guide) these are referred to as channels 0 to 3. As long as you know this you shouldn't get confused. The analogue port also provides, as output, three different voltages, 0v (connections 2,3 and 6), 5v (connection 1) and VREF (connection 14). VREF provides a stable voltage of 1.8v which is the maximum that should be fed into any of the four input channels. The other signals referred to on the diagram of the analogue port, like the Light Pen Strobe (LPSTB), cannot be accessed with the ADVAL function and are thus beyond the scope of this article.

If you have a potentiometer (variable resistor) with a minimum resistance of about 5K handy, you can experiment quite easily with the analogue port. A potentiometer will have three tabs and to these you should solder three short fairly stiff wires each about an inch long. The wire should be a good push fit into the analogue port sockets. The centre wire should be inserted into one of the four channel inputs (marked CH0 to CH1) and the other two wires into a 0v connection and the VREF connection.

Take care to avoid using the input marked 5v as you may overload the analogue channels. In any case, a more permanent and satisfactory connection can be made by using a standard 15-way minature D-type connector.

If you run the first program listed last month and vary the resistor you should see the value for the corresponding channel changing on the screen. A potentiometer used in this way not only provides an opportunity for some simple experimenting with the analogue port, but where more serious work is intended provides a simple means of testing out more complex software.

POSTBAG

Master Manuals

I have been reading the review of the Master series in BEEBUG Vol.4 No.9. There is one item you fail to mention in the review, the fact that you have to pay extra for a two-part reference manual at £14.95 for each part.

To add insult to injury, the View and Viewsheet manuals must also be purchased separately for £10 each. I find this a rather disturbing trend and something of a confidence trick. I would be interested in your comments.

E.F.Lord

We agree that most purchasers of the Master 128 are likely to need these extra manuals and that the price is not cheap. The Reference Manual provides much needed information for most users and can hardly be called advanced.

We understand that Acorn are preparing their own Advanced User Guide for the Master, so it is perhaps a pity that the standard Reference Manual, and the View and Viewsheet manuals, which have been in existence now for some while, could not have been included with the machine.

Pagemaker not Networked

I refer to Pagemaker from AMS which is currently receiving good reviews (see BEEBUG Vol.4 No.9) and would add my own endorsement to the favourable comments made.

However, it should be pointed out to prospective purchasers that Pagemaker will not run on a BBC micro fitted with an Econet interface unless the 68B45 chip is removed. This is indeed a drastic solution and losing a machine from the network is a high price to pay for the software. Any help with this problem would be appreciated.

D.Hamilton

Mastering Direct Display

Regarding the Direct Display Utility in BEEBUG Vol.4 No.10, I have discovered the Basic IV ROM routines to allow its use on the Master 128. The relevant addresses are:

printchar	&BD94
ptokens	&BD37
lineno	&A081
chkgoto	&9B26
exit	&8F86

The following line MUST also be added:

```
2085 STY &F4
```

J.Spink

Mastering Basic

I have modified the Basic Extensions program from BEEBUG Vol.4 No.10 so that it will work on the Master. The modifications required are as follows:

```
1040 IF R% PROCbas4
9600 DEF PROCbas4
9610 cont=&89AE
9620 chkend=&9BA6
9630 phex=&BD6C
9640 plnum=&A085
9650 ENDPROC
```

Brian Knott

Our thanks to both Mr Spink and Mr. knott for providing the information above.

A Change of Mode

On my operating system (O.S.1.0) the 'mode change' routine starts at &CB1E and not, as Paul Ganney states, at &CB1D. The correct address is very critical to the operation of the program. Hence, for use with O.S.1.0, line 1060 should be:

```
1060 FOR N%=0 TO &D2:
     N%?&902=N%&CB1E:NEXT
```

D.R.Jupe

A poor View

The article 'Getting a Better View' in BEEBUG Vol. 4 No.10 explained the use of *FX125 for switching from command to text mode, or using a function key loaded with |[(i.e. ASCII 27). I have used these methods to produce various !BOOT files and function key definitions but having recently changed to View3.0 I find these instructions do not now work.

K.J.Thomas

We have confirmed with Acorn that View 3.0 handles Escape differently to View 2.1, and thus, as Mr Thomas states, the use of *FX125 (or |[), described in the article, for returning from command mode to text mode does not work. As the article stated, one solution is to use SEARCH/ /, which will position the cursor at the first space, or, as Acorn suggests, use SEARCH^? which will return to edit mode with the cursor at the first character. It is, however, impossible to return to the original cursor position.

HINTS and tips HINTS and tips HINTS and tips HINTS and tips HINTS and ti

MODES ON BREAK

Although the display mode used after a Break can be altered from the usual mode 7 by way of *FX255 and the keyboard links, another method is to press several keys while Ctrl-Break is executed. For the 6 other modes these are as follows. A previous *FX255 or non-default keyboard link settings will alter them.

Mode	Keys with Break
0	Ctrl-A-@-:-Return
1	Ctrl-A-@-:
2	Ctrl-A-@-Return
3	Ctrl-A-@
4	Ctrl-A-:-Return
5	Ctrl-A-:
6	Ctrl-A-Return

L. and R. Watts

WORDWISE PAGED PREVIEW

To include a paged facility in the Wordwise Plus preview mode (option 7), add a call to a segment at the top of the document and put the following program into that segment:

```
IF ?&EC=164 T.V.14
```

Briefly pressing '7' from the menu will give a normal preview whereas keeping your finger on the '7' key for a little longer will display the document in paged mode.

A.E. Wilmshurst

SAFE COPY AND COMPACT

*COPY and *COMPACT must usually be used with great care as they corrupt main memory and any program in it. This can be avoided by altering the OS high water mark. This marks the memory page number below which such disc operations will not affect. Use:

```
*FX180,N
```

to alter the OSHWM to page N. To restore it to &1900 (=page 25) use:

```
*FX180,25
```

COLOURFUL REMARKS

To brighten up a listing and to increase its readability teletext colour codes (accessed with Shift and the function keys) can be included in REM statements. So that Basic will not interpret these as keyword tokens, the colour code should be preceded (though not necessarily followed) with a quote (").

Jonathan Temple

TROUBLE WITH PRINT

To print a table of numbers occupying the whole screen width requires that the last print item be followed with a ';' to avoid extra line feeds. I.e.:

```
10 MODE 7
20 FOR I=1 TO 20
30 PRINT I,I,I,I;
40 NEXT I
```

Unfortunately a bug in Basic means that such a table has an offset every few lines. (Try it!). This is because the tally on how many characters have been printed since the last new line (accessed in Basic with COUNT) is only kept in one byte. When more than 255 characters have been printed, the value of COUNT will wrap around and mess up the field tally used by the comma in PRINT. One solution is to do a WIDTH40 (or 80) before printing to force a new line (and reset COUNT) after each line on the screen has been printed. However, this just double spaces the table. Better, but inelegant, is to reset COUNT after each screen line. As COUNT is a read-only variable this must be done by poking:

```
35 ?&1E=0
```

A more legal solution is to use a separate PRINT statement for each item:

```
30 PRINT I;:PRINT I;:PR
INT I;:PRINT I;
```

K.H. Kraig

DAYS IN THE MONTH

The following short function returns the number of days in month M in the year Y.

```
30+ABS((M>7)+(M AND 1))
+(M=2)*(2+((Y AND 3)=0))
```

Frank McAree

DEFINITION HIGHLIGHTING

The following routine, once run, can be deleted and function key zero will then list any program in memory and highlight all the procedure and function definitions:

```
10 FOR pass=0 TO 1:P%=&9
00:[OPT pass*2
20 PHA:LDA &74:BEQ co:LD
A #0:STA &74:LDA #130:JSR &
FFEE:BNE rt:.co LDA &37:CMP
 #&DD:BNE rt:INC &75:LDA &7
5:CMP #3:BNE rt:STA &74:LDA
 #0:STA &75:.rt PLA:JMP (&7
0):]:NEXT pass
30 *KEY 0 !&70=!&20E:!&7
4=0|M?&20E=0:?&20F=9|MMODE7
|ML.|N|M|M!&20E=!&70|M
```

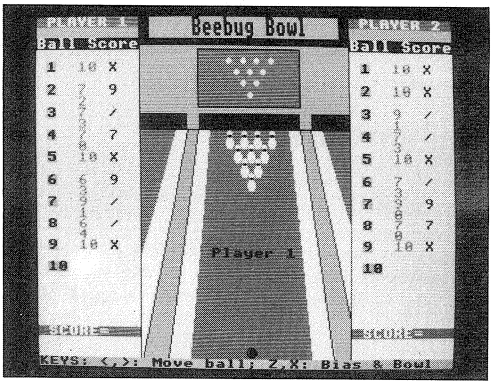
TENPIN BOWLING

Remember when tenpin bowling was all the rage? Alex Kang's well written program allows you to recapture all the excitement of yesteryear in this authentic implementation.

Tenpin bowling brings the thrill and action of the real game right into your own home. Now you don't need to sneak out at nights, making excuses, just to get away to the local bowling alley.

The computer version of Tenpin Bowling is presented as a three dimensional view, looking down the bowling lane, complete with drains and neighbouring lanes on both sides. Above the pins is the status board showing the plan view of the pins (i.e. from the top down) which makes it easier to see which pins have fallen (all bowling alleys are equipped with this - whether they work or not is a different matter). The ball may be positioned using the '<' and '>' keys. To bowl, simply press the 'Z' key (for left spin) or the 'X' key (for right spin). There is a random factor which alters the amount of spin slightly, so that the ball will not always travel the same path even when bowled from the same position. Altering the random factor (RF%) to 4 in line 110 will make the game slightly harder.

The scores of both players are constantly shown on the scoreboards on both sides of the screen, one scoreboard for each player. Scores for each bowl are noted in red, and the total score for each ball in black. These are automatically tallied at the end of the game to produce the total score. A strike is denoted by an "X" mark, and a spare by a "/" mark. Extra balls are given for strikes or spares scored on the tenth ball. For those of you not familiar with the scoring in this game; a strike (all pins down with first bowl) will score 10 + (score of next two bowls). A spare (all pins down with both bowls) will score 10 + (score of next bowl). Other scores are added as normal.



As the program is fairly long and in mode 1, disc users should set PAGE to &1300 (type PAGE=&1300 <Return>) before typing in and running the program.

PROGRAM NOTES

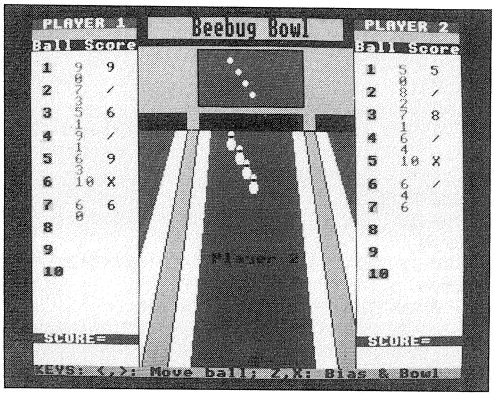
The main variables, procedures and functions are listed below:

B%	- ball
B$	- ball definition
E%	- no. of extra balls
F%	- no. of fallen pins
F%()	- pin status (down/upright)
N%	- position of first pin hit
P%	- player
P$	- pin definition
S%()	- individual bowl scores
sy()	- plan view pin y-coordinates
T%()	- total score of players
W$	- wipe pin definition
X%,Y%	- ball coordinates
X%,Y%()	- 3-D pin coordinates
x%	- amount of spin

PROCinit	- initialise arrays etc.
PROCset	
PROCdraw	- sets up screen display
PROCplot	
PROCms	- plays tune on miss
PROCpins	- draws pins
PROCbowl	- bowls the ball
PROCip	- position and bias inputs
PROCmvb	- moves ball position
PROCpt	- checks for a hit
PROCchit	- checks first pin hit
PROCfall	- wipes away hit pins
PROCrnd	- controls which pin falls
PROCrs	- resets all pins upright
PROCscore	- adds up total score

```
PROCex   - extra balls and bowls
PROCstr  - strike message & sound
PROCspa  - spare message & sound
PROCmu   - victory fanfare
PROCdb   - double height printing
PROCps   - prints score
PROCd    - timing delay
FNst     - calculates strike score
FNsp     - calculates spare score
```

```
  10 REM Program TENPIN BOWLING
  20 REM Version B1.0
  30 REM Author  Alex Kang
  40 REM BEEBUG  JULY 1986
  50 REM Program subject to copyright
  60 :
 100 ON ERROR MODE7:REPORT:PRINT" at li
ne ";ERL:END
 110 MODE1:RF%=3
 120 VDU23,1,0;0;0;0;
 130 PROCinit
 140 PROCset
 150 VDU19,0,2;0;19,3,6;0;19,1,7;0;4
 160 FORB%=1TO10
 170 FORP%=1TO2
 180 PROCrs:S%(P%,1,B%)=F%:a$=STR$F%:PR
OCps(0)
 190 IF F%=0 PROCms
 200 IF F%=10 PROCstr:GOTO240
 210 IF F%<10 PROCbowl:S%(P%,2,B%)=F%-S
%(P%,1,B%):a$=STR$(S%(P%,2,B%)):PROCps(1
):IF S%(P%,2,B%)=0 PROCms
 220 IF F%=10 PROCspa
 230 IF F%<10 a$=STR$(F%)
 240 PROCps(2)
```




```
 250 NEXT,
 260 PROCscore:n$="1"
 270 IF T%(1)<T%(2) n$="2" ELSE IF T%(1
)=T%(2) PRINTTAB(18,20)"DRAW!":GOTO290
 280 PRINTTAB(16,20)"PLAYER "+n$;TAB(18
,21)"WINS!"
 290 PROCmu:PROCdb("Game Over",15,24)
 300 PRINTTAB(15,27)"PRESS SPACE"
 310 REPEATUNTILINKEY-99:*FX15,1
 320 CLS:GOTO140
 330 END
 340 :
1000 DEFPROCinit
1010 DIM X%(10),Y%(10),sy(10),S%(2,2,12
),F%(10),T%(2)
1020 ENVELOPE1,1,10,20,-30,10,5,15,127,
-2,0,-1,127,100
1030 ENVELOPE2,3,0,0,0,0,0,0,127,-10,-5
,-2,120,120
1040 ENVELOPE3,5,0,0,0,6,3,3,127,-5,-5,
-5,120,60
1050 FORI%=1TO10:READ X%(I%),Y%(I%),sy(
I%):NEXT
1060 VDU23,224,0,24,60,60,24,24,60,60,2
3,225,126,126,126,126,60,60,0,0,23,226,0
,0,0,0,24,24,0,0,23,227,0,0,24,60,60,24,
0,0,23,229,112,112,62,63,63,63,30,0,23,2
30,14,14,124,252,252,252,120,0,23,231,60
,94,191,191,191,255,126,60
1070 B$=CHR$231:P$=CHR$18+CHR$0+CHR$1+C
HR$224+CHR$10+CHR$8+CHR$225+CHR$18+CHR$0
+CHR$2+CHR$8+CHR$11+CHR$226:W$=CHR$18+CH
R$3+CHR$1+CHR$224+CHR$10+CHR$8+CHR$225+C
HR$18+CHR$0+CHR$0+CHR$8+CHR$11+CHR$226
1080 ENDPROC
1090 :
1100 DEFPROCset
1110 PROCdraw
1120 COLOUR131:COLOUR2:?&D0=2:PRINTTAB(
0,31)"KEYS: <,>: Move ball; Z,X: Bias &
Bowl  ";:PROCdb("    Beebug Bowl    ",10,
0):COLOUR132:COLOUR1:?&D0=0
1130 PRINTTAB(0,0)" PLAYER 1 ":PRINTTAB
(30,0)" PLAYER 2 ":PRINTTAB(0,28)" SCORE
=    ":PRINTTAB(30,28)" SCORE=    ":COLOUR
130:PRINTTAB(0,2)"Ball Score"TAB(30,2)"B
all Score"
1140 COLOUR131:COLOUR2:PRINTTAB(0,1)SPC
10;TAB(30,1)SPC10
1150 FORI%=1TO10:A%=I%*2+2:PRINTTAB(1,A
%);I%;TAB(31,A%);I%:NEXT:COLOUR128
1160 VDU5:GCOL0,128
1170 ENDPROC
1180 :
1190 DEFPROCms
1200 FORw=13TO5STEP-4:SOUND1,2,w,6:NEXT
1210 ENDPROC
1220 :
1230 DEFPROCdraw
1240 RESTORE1380
1250 FORI%=0TO3:VDU19,I%,0;0;:NEXT:GCOL
0,130:VDU24,320;704;956;1023;16,26
1260 PROCplot(16,1):PROCplot(16,3):PROC
plot(4,0):PROCplot(21,2):COLOUR129:VDU28
,0,31,9,0,12,28,30,31,39,0,12,26
```

```
 1270 ENDPROC
 1280 :
 1290 DEFPROCplot(J%,C%)
 1300 GCOL0,C%:FORI%=1TOJ%:READK%,X%,Y%:
PLOTK%,X%,Y%:NEXT
 1310 ENDPROC
 1320 :
 1330 DEFPROCpins
 1340 VDU5:FORI%=1TO10:MOVEX%(I%),Y%(I%)
:PRINTP$:GCOL0,1:MOVEX%(I%),sy(I%):PRINT
CHR$227:NEXT
 1350 ENDPROC
 1360 :
 1370 DATA640,584,816,620,624,848,660,62
4,848,600,664,880,640,664,880,680,664,88
0,576,704,912,620,704,912,660,704,912,70
4,704,912
 1380 DATA4,400,0,5,464,0,85,498,704,85,
530,704,4,846,0,5,910,0,85,772,704,85,80
4,704,4,224,0,5,320,0,85,434,704,85,466,
704,4,990,0,5,1086,0,85,836,704,85,868,7
04
 1390 DATA4,320,0,5,400,0,85,466,704,85,
498,704,85,466,940,85,498,940,4,910,0,5,
990,0,85,804,704,85,836,704,85,804,940,8
5,836,940,4,320,752,5,956,752,85,320,940
,85,956,940
 1400 DATA4,498,768,5,804,768,85,498,928
,85,804,928
 1410 DATA4,320,0,5,466,704,4,990,0,5,83
6,704,4,320,704,5,956,704,4,320,940,5,95
6,940,4,498,768,5,804,768,5,804,928,5,49
8,928,5,498,768,4,320,0,5,320,1023,4,956
,0,5,956,1023,4,400,0,5,498,704,4,910,0,
5,804,704
 1420 :
 2000 DEFPROCbowl
 2010 PROCip
 2020 REPEAT
 2030 GCOL3,2:MOVEX%,Y%:PRINTB$:Y%=Y%+y%
:X%=X%+x%:MOVEX%,Y%:PRINTB$
 2040 IF Y%<526 PROCd(4)
 2050 IF (Y%>=526 AND X%>=530 AND X%<=74
0) PROCpt(X%,Y%-8):PROCpt(X%+28,Y%-8):PR
OCpt(X%+12,Y%)
 2060 UNTILY%>728
 2070 MOVEX%,Y%:PRINTB$
 2080 ENDPROC
 2090 :
 2100 DEFPROCrs
 2110 FORI%=1TO10:F%(I%)=FALSE:NEXT:F%=0
:PROCpins:PROCbowl
 2120 ENDPROC
 2130 :
 2140 DEFPROCps(bl%)
 2150 SX%=-4*(P%=1 AND bl%<2)-34*(P%=2 A
ND bl%<2)-7*(P%=1 AND bl%=2)-37*(P%=2 AN
D bl%=2):SY%=B%*2-2*(bl%<>1)-3*(bl%=1):V
DU4:COLOUR129:col%=-2*(bl%=2):COLOURcol%
:PRINTTAB(SX%,SY%);a$:VDU5:PROCd(50)
 2160 ENDPROC
 2170 :
 2180 DEFPROCd(D%)
 2190 TIME=0:REPEATUNTILTIME>D%
 2200 ENDPROC
 2210 :
 2220 DEFPROCpt(J%,K%)
 2230 IF POINT(J%,K%)=3 PROCchit
 2240 ENDPROC
 2250 :
 2260 DEFPROCchit
 2270 RESTORE1370:N%=0:C%=0:H%=0
 2280 REPEAT:C%=C%+1:READ x1%,y1%,s%
 2290 N%=-C%*((J%>=x1% AND J%<=x1%+28) A
ND (K%>=y1%-52 AND K%<=y1%-4))
 2300 H%=(N%>0):UNTILH% OR C%=10
 2310 IF H% AND F%(N%)=FALSE F%=F%+1:SOU
ND0,2,5,1:PROCfall:PROCrnd
 2320 ENDPROC
 2330 :
 2340 DEFPROCfall
 2350 F%(N%)=TRUE:MOVEX%,Y%:GCOL3,2:PRIN
TB$:MOVEX%(N%),Y%(N%):PRINTW$:GCOL3,2:MO
VEX%,Y%:PRINTB$:GCOL3,1:MOVEX%(N%),sy(N%
):PRINTCHR$227
 2360 ENDPROC
 2370 :
 2380 DEFPROCrnd:m%=RND(2):IF N%>6 ENDPR
OC
 2390 REPEAT:N%=N%-1*(N%=2 OR N%=3)-2*(N
%=4 OR N%=5 OR N%=6)-m%*(N%<7):IF F%(N%)
=FALSE PROCfall:F%=F%+1
 2400 UNTILN%>6
 2410 IF NOT (F%(1)=-1 AND F%(2)=-1 AND
F%(3)=-1) GOTO2440
 2420 FORN%=4TO10:IF RND(RF%)=1 AND F%(N
%)=FALSE PROCfall:F%=F%+1
 2430 NEXT
 2440 ENDPROC
 2450 :
 2460 DEFPROCip
 2470 GCOL0,2:MOVE532,360:PRINT"Player "
;P%:GCOL3,2:X%=640:Y%=64:MOVEX%,Y%:PRINT
B$:bx%=X%:by%=Y%:*FX15,1
 2480 REPEAT
 2490 IF INKEY-103 bx%=bx%+4*(bx%>440):P
ROCmvb
 2500 IF INKEY-104 bx%=bx%-4*(bx%<840):P
ROCmvb
 2510 UNTILINKEY-67 OR INKEY-98
 2520 MOVE532,360:PRINT"Player ";P%:u%=R
ND(2):x%=u%*INKEY(-98)-u%*INKEY(-67):y%=
16
 2530 ENDPROC
 2540 :
 2550 DEFPROCmvb
 2560 MOVEX%,64:PRINTB$:MOVEbx%,64:PRINT
B$:X%=bx%
 2570 ENDPROC
 2580 :
```

```
 2590 DEFPROCscore
 2600 FORP%=1TO2:IF S%(P%,1,10)=10 PROCe
x(2)
 2610 IF S%(P%,1,10)<10 AND (S%(P%,1,10)
+S%(P%,2,10)=10) PROCex(1)
 2620 NEXT
 2630 FORP%=1TO2:T%(P%)=0:FORB%=1TO10
 2640 IF S%(P%,1,B%)=10 T%(P%)=T%(P%)+FN
st
 2650 IF S%(P%,1,B%)<10 AND (S%(P%,1,B%)
+S%(P%,2,B%)=10) T%(P%)=T%(P%)+FNsp
 2660 IF S%(P%,1,B%)+S%(P%,2,B%)<10 T%(P
%)=T%(P%)+S%(P%,1,B%)+S%(P%,2,B%)
 2670 NEXT:VDU4,26:COLOUR128:COLOUR2:PRI
NTTAB((P%-1)*30+7,28);T%(P%):NEXT
 2680 ENDPROC
 2690 :
 2700 DEFPROCex(E%)
 2710 PROCrs:S%(P%,1,11)=F%:B%=11
 2720 IF F%=10 PROCstr:PROCps(2)
 2730 IF E%=1 AND F%<10 a$=STR$(F%):PROC
ps(2)
 2740 IF E%=1 ENDPROC
 2750 IF F%<10 PROCbowl:S%(P%,2,11)=F%-S
%(P%,1,11):IF F%=10 THEN PROCspa:PROCps(
2):ENDPROC ELSE IF F%<10 a$=STR$(F%):PRO
Cps(2):ENDPROC
 2760 B%=12:IF F%=10 PROCrs:S%(P%,1,12)=
F%:IF F%=10 PROCstr:PROCps(2):ENDPROC
 2770 a$=STR$(F%):PROCps(2)
 2780 ENDPROC
 2790 :
 2800 DEFPROCstr
 2810 MOVE532,880:PRINT"STRIKE!":SOUND1,
1,100,20:PROCd(80):GCOL0,0:MOVE532,880:P
RINT"STRIKE!":a$="X"
 2820 ENDPROC
 2830 :
 2840 DEFPROCspa
 2850 MOVE566,880:PRINT"SPARE":SOUND1,2,
165,5:SOUND2,2,101,5:SOUND1,2,129,5:SOUN
D2,2,69,5:PROCd(80):GCOL0,0:MOVE566,880:
PRINT"SPARE":a$="/"
 2860 ENDPROC
 2870 :
 2880 DEFFNst
 2890 IF S%(P%,1,B%+1)=10:=20+S%(P%,1,B%
+2)
 2900 =S%(P%,1,B%+1)+S%(P%,2,B%+1)+10
 2910 :
 2920 DEFFNsp
 2930 =10+S%(P%,1,B%+1)
 2940 :
 2950 DEFPROCdb(s$,k,l)
 2960 A%=&A:X%=0:Y%=&A:D=&A00:FORn=1TOLE
Ns$:b$=MID$(s$,n,1):?D=ASCb$:CALL &FFF1:
VDU23,240,D?1,D?1,D?2,D?2,D?3,D?3,D?4,D?
4,23,241,D?5,D?5,D?6,D?6,D?7,D?7,D?8,D?8
:PRINTTAB(k+n,l);CHR$240;TAB(k+n,1+l);CH
R$241:NEXT
 2970 ENDPROC
 2980 :
 2990 DEFPROCmu
 3000 RESTORE3030
 3010 FORn%=1TO7:READn1%,n2%,d%:SOUND&10
1,3,n1%,d%:SOUND&102,3,n2%,d%:NEXT
 3020 ENDPROC
 3030 DATA149,129,4,129,117,2,129,117,2,
133,121,4,129,117,8,145,81,4,149,101,8
```

POINTS ARISING POINTS ARISING POINTS ARISING POINTS

MANDELBROT GRAPICS (BEEBUG Vol.5 No.1)

This program regrettably suffered from two bugs. Line 1095 appears to call a non-existent procedure PROCbnd. This line was itself a late correction to the program, and the further problem can be resolved by adding the line:

```
1665 DEF PROCbnd
```

In addition, line 1940 contains 4 invisible teletext control character that did not appear when the program was listed. You will need to type *FX4,1 <Return> and then re-enter this line as follows:

```
1940 IF INSTR("abcdLR",A$)=0 A$=GET$:ENDPROC
```

where 'a' means press 'cursor left', 'b' means 'cursor right', 'c' means 'cursor up' and 'd' means 'cursor down'. This will ensure the correct codes are entered.

SOFT SCREEN SHUFFLE (BEEBUG Vol.5 No.1)

This program also encountered some hiccups in getting into the magazine. The '.shrink' above line 1090 was missing its line number and should, of course, read '1080 .shrink'. Lines 1230 and 1310 order the stack operations incorrectly, though this does not appear to effect the working of the program. The correct versions are:

```
1230 PHP:PHA:TAX:PHA:TAY:PHA
1310 PHP:PHA:TAX:PHA:TAY:PHA
```

Finally, line 1490 should read P%?4=&FF. Again, we do apologise for these errors.

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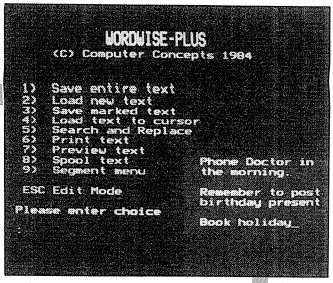

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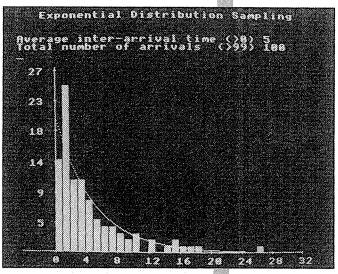

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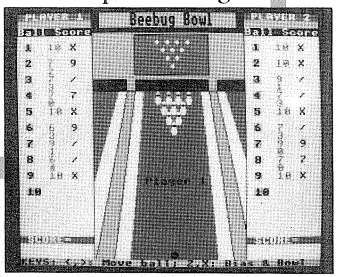

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