BEEBUG

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Welcome to Beeb, this is the first issue of the monthly newsletter, and we hope that you will find it interesting and informative. We have tried to include material appropriate to both beginners and more advanced users, but if you think that we have not pitched it right then let us know. It is up to us to act as an information exchange on all issues relating to the BBC micro, and to do this well we need contributions from members. Whether this be useful programming tips, new facilities that you have discovered in these ROMs or firmware, full programs, procedures/subroutines or hardware items.

If you write copy for the newsletter, please see 'If you wish to do' notes on the back page of this issue.

TWO PROGRAMS

This issue contains two main program items - Moon Lander and 3-D Noughts and Crosses, and since these have been fully tested and printed directly from the masters there should be no typographical errors on our side - we just hope that the two 16 second Moon Lander will run in either 16 or 32K versions - though if you have 32K you might prefer to use a different mode (such as mode 1 - 3-D Noughts and Crosses requires a 32K machine, and as well as having wide colour graphics it is not easy to use. There are not too many 32K machines in circulation as we write this, but we have included an article on upgrading to 32K in this issue, so others may be encouraged).

On the software side, we will be publishing a number of programs in each issue - though these will not generally be sections as the 3-D Noughts and Crosses program in this newsletter. We are also planning a program library, and are [illegible] program compilation - for details of this see elsewhere in this issue.

REVIEWS

As a totally independent user group, we hope that we can adopt a reasonably neutral and objective stance on all questions relating to the BBC machine, and we will be reviewing both hardware and software as and when it becomes available. This issue contains a very brief review of the BBC micro itself - the review is brief because there have already been countless others, but these were generally rather hurried assessments of pre-production machines. As with issue 2 onwards, we are general extremely pleased with the machine, especially in view of some of its more peculiar aspects of the machine's history, as an [illegible] of anything [illegible] comparable price, and certainly very pleasant to program. At the same time it possesses a [illegible] aspect of 'sophisticated' use - it is not covered in the [illegible] manual (eg the sound generator), somewhat much we have been software enough to use only a [illegible] though the [illegible] of firmware holds many more treasures simply [illegible] what about the unused [illegible] of firmware above the operational ROM, this must contain something too, though nobody will say what!

THE PRODUCTION SIDE

While we are very impressed by the machine, as conceived, we are much less happy about the production side of things. Initial supply has been very poor - Acorn consistently blame the ULA for this. (U.L.A. - Uncommitted Logic Array - a special integrated circuit, custom designed by Ferranti for the Beeb, with a few teething problems. ED1 (ie. it didn't work ED2)). Supply rates have now improved considerably on the A machine, and there are now signs that model Bs are beginning to appear. As we say later however, far too many would-be users suffer the frustrating experience of having waited up to 7 months for a machine, only to discover when it finally arrives that it doesn't actually work. This has happened to a number of our members, whose general experience was that faulty machines were not replaced with any great haste.

As a large national user group with a membership that is still growing at an extremely fast rate, we are in a position to exert some pressure on Acorn and the BBC on issues such as this, and we have written to them enclosing copies of letters from hapless would-be users.

BEEB PRICING

On the financial side of the project there are one or two observations to be made. The first concerns the price increase announced in February. According to an Acorn spokesman this was occasioned because during discussions with the BBC the machine's spec was considerably improved, but nobody thought to increase the price accordingly. This sounds a little weak, though the machine was arguably underpriced at £200 + VAT, and is still good value for money at the new price. The other issue is in many ways more contentious. A number of members have written to us asking to whom they should write in order to claim back interest on the money the BBC was sitting on (for a period as long as 7 months in some cases befor orders were fulfilled). We have taken this up with Acorn, and they have given us an address that members should write to if they want to try and claim their interest back:
John Radcliffe Executive Producer BBC Television Centre
Wood Lane London W12 7RJ
Acorn argue in mitigation, that they too had tied up their money in components for the machine which could not be made use of until the ULA problem was solved. On the other hand, it was Acorn and the BBC who promised the machine, and it seems quite unreasonable to penalise purchasers financially for ULA failure. It could of course be argued that the interest lost was much less than the amount saved by ordering early and securing the lower price, but I think that Acorn/BBC will be loath to use this argument, because it puts some obligation on them to compensate interest lost to those paying the higher price, and it is doubtful whether they would be prepared to do this. About the best argument for NOT plaguing Acorn/BBC on this issue is that the more Acorn's resources go into dealing with such problems, the longer they will take with their development of peripherals for the BBC machine, and with the 1.0 version of the machine operating system. (See machine review in this issue)

ACORN OUTPUT

While on the subject of Acorn, we are pleased to be able to pass on information about two publications from them. The first is a new machine manual designed to take the place of the provisional one sent out with all current machines. It is due for launch around the end of May, and from what we have seen of it already it will be most welcome. It will probably be about twice the size of the current manual, although because of its different internal organisation, you may still find the old manual useful for rapid reference. The second publication by Acorn is a monthly magazine (the first two issues will, we hear, be mailed free to all BBC machine purchasers). The magazine will cover all of Acorn's products, not just the BBC machine, though we are told that the first issue will have details of the SOUND and ENVELOPE commands on the BBC machine. We are also covering these commands in this issue, though because of Acorn's plans, we will be spending less time on this than we would have otherwise. Of course once they stop mailing them FREE, then we will no longer assume that BEEBUG members will have access to that publication.

NEWSLETTER CHANGES

Getting back to THIS newsletter, we have managed to keep reasonably close to the provisional contents mentioned in our advertisements and other documents. There are two main changes. The first is that, because we have details of the SOUND and ENVELOPE statements, (not covered in the provisional manual) we are investigating sound rather than graphics in this issue. We will do something on graphics next month. (We have an ellipse plotting procedure in this issue submitted by a member).

Secondly we have (at least temporarily) shelved the idea of a beginners guide to BBC BASIC indicated for this issue. We have given this a great deal of thought, and have come to this decision for three reasons - (1) The full manual, due out in a month or so, contains a vastly increased introductory section. (2) There appear to be far fewer newcomers to BASIC amongst our membership than we had anticipated. (3) At the rate of say 3 pages per month the beginner would only proceed at a snail's pace. In place of the guide we will be reviewing a number of books for beginners in the coming months, and we feel that this will prove to be somewhat more useful than producing our own guide at present.

Finally, we would like to thank all of you who have written to us wishing us well.

BRIEF REVIEW OF THE BBC MICROCOMPUTER

16k BASIC

It is a pity that a proper structured BASIC was not implemented (eg COMAL). This aside, it is very good, with a useful set of reserved words. Repeat loops, procedures, long variable names, and local variables are welcome additions to the boring run-of-the-mill BASICs found on the majority of micros. There are one or two minor syntax oddities left over from ATOM BASIC - eg ? for PEEK and POKE commands, but you soon get used to this. TRACE and RENUMBER are very useful, but it is unfortunate that individual sections of a program cannot be renumbered easily, since this would allow bulk editing. It is also a pity that program sections (eg procedures) cannot be loaded in sequence from tape, so that you can keep a series of procedures on separate tapes and load the ones that you want - though doubtless there is an FX call that allows this?

GRAPHICS

There are some useful modes here, although it would be good to be able to select the text size and the graphics mode independently. The restriction of only seven colours (not counting flashing combinations) may prove to be limiting for some colour work. The large potential for user defined graphics is extremely useful, as is the set of PLOT commands especially the 'fill triangle' routine. Any future graphics package should enable a lot more to be done here. We are particularly looking forward to working with the "Jackson" package and light pen when it is available, we hope to publish a review of this amazing designers tool in about six months.

SOUND

We are very impressed with the sound facilities that the machine has. What is particularly clever (apart from the sound chip itself) is the software implementation with software operated envelope control on both pitch and amplitude, plus the use of buffers to allow a queueing system with interrupt driven handling routines. This means that the SOUND and ENVELOPE instructions can be obeyed invisibly. See our "Sound article".

CASSETTE

Saving and loading is performed very easily. We have used a number of different recorders with no difficulties; and the speed is excellent. The default speed is actually 1200 baud; we had wondered if it would be 300 baud. The motor control is useful too, though inconvenient when you want to rewind.
(BAUD Data transfer rate in bits per second.)

HARDWARE OBSERVATIONS

The exterior looks good; the keyboard feels good, and there is no noticeable keybounce on our machines. Some of the earlier printed circuit boards were a bit messy with a number of discrete wires connecting tracks etc. This is now improved, although the power supply connections are somewhat crudely achieved and require tape on the board to prevent shorts. A more elegant solution would have been one or two multi-pin connectors. The power supply itself tends to get quite hot, and presumably gets hotter in the B implementation, although this will be alleviated by replacing the EPROMs with a ROM (see below).

If you remove the lid of your machine you will be struck by the rather quaint heatsink on the ULA chip for the video. This is apparently not to prevent it sizzling, but to keep it ultra cool. Unfortunately the heatsink in the two versions that we have seen does not clip on very well. The other sight to behold is the four EPROMS (bottom right hand corner just under the cover). These contain the operating system - the 16k BASIC is in the 28-pin ROM to their left. This is of course, only a temporary measure, a ROM replacement is due to be out in a month or two. A spokesman for Acorn says that the ROM will be supplied and fitted free because they want their EPROMs back. However, the replacement ROM will still only be version 0.1 of the operating system. There is, we hear, a version 1.0 at the development stage which will have an increased number of FX-type operating system calls, it will support the paged ROM system - when you plug in other ROMs such as Pascal or the word processor ROM into one of the 3 sockets vacated by the EPROMs. The 0.1 ROM will not do this, and you will need a piggy-back system of sockets to achieve paging with the 0.1. Finally, (though there's probably much more besides) the 1.0 ROM apparently runs at TWICE THE SPEED (the current version already runs faster than most micros). In view of all this, it might be worthwhile waiting for the 1.0 ROM to arrive before you give up your EPROMs; although the PSU (power supply unit) will run a bit hotter with them in.

WARNING

A word of warning - if you remove the lid, be very careful when replacing it that the little LEDs (light emitting diodes) in the bottom left hand coner of the keyboard fit in their appropriate holes in the lid. It is all too easy to force them down and permanently damage the PCB (Printed Circuit Board) underneath.

JARGON

EPROM is a programmable permanent memory store. It can be reprogrammed with a special device when required, though cannot be erased while it sits in the Beeb.

ROM is a factory programmed permament memory (Read Only Memory) which cannot be reprogrammed.

HARDWARE MOANS

There are one or two hardware kinks that need straightening out. The phono socket for the TV outlet is slightly too low for the hole, and the plug is difficult to insert. The keyboard surround sometimes rubs against the keytops - this can usually be cured by unscrewing the

two keyboard fixing screws and repositioning the keyboard. The PCB is not really well enough supported with only 4 screw points, though adding further fixings may produce its own problems. The hole in the left of the keyboard (designed for program cartridges) should really have a cover, you could lose all manner of things down it! The three LED indicator lamps to the left of the space bar are only held in place by the PCB track to which they are soldered; if any pressure is applied to them (as in replacing the lid with a LED bent out of vertical) they will cause the PCB track to come away from the board causing permanent damage. The LEDs should perhaps be glued in place.

Finally the audio is very noisy. Many members have commented on this. The noise, a mixture of mains spike and pick-up from address and data buses etc mostly comes from the unterminated 1MHz extension bus socket (which allows other audio devices eg a second speech processor or synthesiser to drive the internal amplifier and speaker). As a temporary fix we have terminated this line with a 100nF capacitor to earth. You can find the offending pin by searching for "analogue in" on the diagram on P222 of the provisional manual. We should add that we DO NOT RECOMMEND this fix unless you really know what you are doing, and will be able to remove all traces of it before fitting the 1MHz extension plug (since the soldering will probably block the holes intended for the plug). We don't recommend it, but life is a lot quieter with it in. If you have a model B of course, then you can wire a free socket with the capacitor, and plug it into PLii.

As we indicated in the editorial we are generally very impressed by the machine and feel that however unlikely this at first seemed, Acorn and the BBC have done a good job. We have yet to see if the peripherals are as good.

LOCAL USER GROUPS INDEX

BEEBUG is happy to act as an information point for small local groups. If you would like to be in our index, just drop us a line.

West Midlands Area - contact Roger Luff on Knutsford 288721

Bedfordshire - contact D L Evans. 23 Hitchin Road
Henlow Camp
Bedfordshire.

Brighton Area - contact Jim Price Bedford House
27/28 St Georges Rd
BRIGHTON
Sussex.

MACHINE ORDERING and SUPPLY

Everyone knows that the BBC Micro is vastly undersupplied; and a couple of months ago when the prices were raised, the press got hold of a figure of 12000 micros ordered (of which about 2/3 were said to be model B). At that time there were only a few hundred in circulation as far as we can tell.

Things have now improved considerably, and Acorn report that production rates have reached 800 model A and 1000 model B machines per week. Production at present is unequally split between two manufacturers - ICL and Cleartone, and in a month or so a third is due to join forces with them. Acorn have also given us ANTICIPATED despatch dates for orders placed on 31st March 1981. For the A machine this is 8th May, and for the B, it is 12th June.

If you are trying to decide whether to order a model A or B, then bear in mind two things: the reasonably satisfactory supply of model A, against the longer predicted delivery date for model B. But offset this against the problem of upgrading - either of doing it yourself, with the inherent ULA problem (see article "Upgrading to model B") or taking it in to a dealer for upgrading.

Perhaps even more important: be careful about what you order with your machine. If you order other items that are not in stock (such as an Econet interface for example), then your order may well be held up until all items on the order are available. Members report that the advertised cassette recorder is already in stock, and a spokesman for Acorn has informed us that the disc system is on schedule. Nevertheless if you are ordering anything else with your micro, and you want the micro as soon as possible, then order the other items separately.

BBC Micro Kit

Our first BBC Micro arrived as a kit. Fortunately someone had put in the ICs, and we only had to reconstruct the keyboard to get it going, although we have heard of some machines arriving with many ICs unplugged as well as keytops adrift. The problem here is one of postage and packing, and we have already brought this to Acorn's notice. They tell us that the packaging will be improved, to cope with the ravages of postal transport. They should also ensure that all boxes have a prominent "HANDLE WITH CARE" sticker on. Our box had this wording stamped on, but was almost completely illegible.

Blow outs

Worse yet are the many machines pronounced dead, or half dead, on arrival. We have had a number of letters from members whose machines had to be returned to Kettering because they did not work. The letter below is typical:

Dear Beebug,
---- here is my sad tale. I sent a cheque for model A and matching cassette recorder on 29th Oct 1981. My machine was delivered on 15th Feb 1982. Something was rattling loose inside it, and part of the support of the 'space-bar' had come off. The rattling turned out to be

the UHF modulator top, which eventually fell out of the machine. This was fixed, and when the machine was connected up it worked for 15 seconds before the display disintegrated, never to return. I wrote to Kettering the next day by recorded delivery and after two or three telephone calls (have you ever tried calling Kettering? they are always engaged) I was sent a pre-paid sticker to return the machine on 26th Feb. I returned the machine the next day. That was over three weeks ago, and I have heard nothing from them.....
G Hallam

Again we have already brought this question to Acorn's notice, and are waiting for a reply.

The frustrating experiences of many would-be Beeb users could probably largely be eliminated by a combination of better packing and longer soak testing before despatching. Of course this will not cure problems such as noisy audio, and self detaching UHF modulator covers, but these are hardly insermountable difficulties either.

3D SURFACE

Here is a program contributed by David Jakeman and Max Dutton of Warrington. It plots a 3 dimensional surface on the screen (model A or B). They write that interesting results can be obtained by changing values in line 150. Also, changing SIN in line 300 to COS or other mathematical functions will change the surface plotted.

```
  100 REM 3D GRAPH
  110 REM BY DAVID JAKEMAN AND MAX
DUTTON
  120 MODE5
  130 COLOUR129
  140 COLOUR2
  150 YS%=16:XS%=100:ZS%=100:CLS
  160 PRINTTAB(2,6)"MAXSOFT (C) 198
2"
  170 FORX=0TO9STEP.3
  180   MOVE FNX(X,0),FNY(X,0)
  190   FORY=0TO9 STEP .3
  200     DRAW FNX(X,Y),FNY(X,Y)
  210     NEXT:NEXT
  220 VDU19,2,12,0,0,0
  230 COLOUR3
  240 FORY=0TO9 STEP.3
  250   MOVE FNX(0,Y),FNY(0,Y)
  260   FORX=0TO9 STEP.3
  270     DRAW FNX(X,Y),FNY(X,Y)
  280     NEXT:NEXT
  290 DEFFNX(X,Y)=512+(.8*X-.6*Y)*X
S%
  300 DEFFNY(X,Y)=100+(.2*X+.4*Y)*Z
S%+(SIN(X)*SIN(Y)*4)*YS%
  310 PRINTTAB(2,8)"THAT'S ALL FOLK
S"
  320 REPEAT UNTIL TRUE = FALSE
```

S O U N D

Acorn/BBC have kindly allowed us a preview of the details of the SOUND and ENVELOPE commands to be included in the full manual; and have let us publish the details here. Taken together the two commands allow great flexibility in sound production, and some incisive thinking on the software side has allowed the relatively advanced features (for a micro) of software envelope control handled by interrupt, enabling the processor to appear as if it has 100% of its mind running your BASIC program, while at the same time playing the tunes you requested earlier. Clever stuff. To achieve this there are buffers for both SOUND and ENVELOPE commands.

The SOUND command is the logical one to start with. Its syntax is simply SOUND A,B,C,D. Ranges of permitted values are given in the table.

Variable	Value	Effect
A	1 - 3	Sound channel
	0	Special effects channel (see text)
		Other effects (1)
B	-15 - 0	Volume (-15 is loudest)
	1 - 4	Enables envelope control (4 possible user-defined envelopes)(2)
C	0 - 255	Pitch of note (255 is high frequency) (See table for octave numbers)
D	0 - 254	Duration in twentieths of a second.
	255	Set infinite duration (stop by sending another note or ESCAPE key)

1) Other effects - this is mainly concerned with the synchronization of notes so that they can be played simultaneously on different channels. It allows the queueing of notes in the sound buffer.
2) For envelope details please see below.

Essentially A controls the sound channel, B the amplitude, C the frequency, and D the duration. The command SOUND 1,-15,89,100 will give five seconds of a particular tone at maximum volume. To see what tones correspond to what data, see below:

Octave no:	1	2	3	4	5	6	7
B	1	49	97	145	193	241	
A♯	0	45	93	141	189	237	
A		41	89	137	185	233	
G♯		37	85	133	181	229	
G		33	81	129	177	225	
F♯		29	77	125	173	221	
F		25	73	121	169	217	
E		21	69	117	165	213	
D♯		17	65	113	161	209	
D		13	61	109	157	205	253
C♯		9	57	105	153	201	249
C		5	53	101	149	197	245

The channel number A should range from 1 to 3. If you put A=0, then this selects a special effects option. Which of the 8 special effects is called up is determined by the value of C (normally the pitch variable) as follows:

C Effect

0 High frequency periodic noise
1 Medium frequency periodic noise
2 Low frequency periodic noise
3 Periodic noise of frequency determined by the pitch setting on channel 1
4 High frequency "white" noise
5 Medium frequency "white" noise
6 Low frequency "white" noise
7 Noise of frequency determined (continuously) by the pitch setting of channel 1

Thus the command SOUND 0,-15,6,40 will give a two second burst of low frequency white noise.

ENVELOPE

You can, if you wish, incorporate any of the SOUND data into a FOR loop so as to control pitch or volume, for example:

```
10  FOR A%=1 TO 255
20  SOUND 1,-15,A%,1
30  NEXT A%
```

But software is included in the operating system to enable both pitch and amplitude change to be carried out automatically in quite a sophisticated manner. This is achieved with the ENVELOPE command. The syntax for this is complex, and incorporates 14 variables; but it is well worth mastering since some very nice effects can be obtained using it - but also, since it is machine transparent, the ENVELOPE command can vary the pitch and amplitude while the machine is continuing with a program in BASIC.

Try the following:-

```
10 ENVELOPE 1,1,5,-5,-3,50,25,25,0,0,0,1,126,126
20 SOUND 1,1,0,100
```

This produces a constantly varying pitch. To change the length of time that the sequence runs for, just alter the value of the fourth parameter (100) of the SOUND statement.

ENVELOPE PARAMETERS

The 14 envelope parameters are:

```
ENVELOPE N,T,PI1,PI2,PI3,PN1,PN2,PN3,AA,AD,AS,AR,ALA,ALD
```

PARAMETER	RANGE	FUNCTION
N	1 to 4	Envelope number
T bits 0-6	0 to 127	Length of each step in hundredths of a second
bit 7	0 or 1	0=auto-repeat the pitch envelope, 1=don't repeat
PI1	-128 to 127	Change of pitch per step in section 1
PI2	-128 to 127	2
PI3	-128 to 127	3
PN1	0 to 255	Number of steps in section 1
PN2	0 to 255	2
PN3	0 to 255	3
AA	-127 to 127	Change of amplitude per step during attack phase
AD	-127 to 127	decay
AS	-127 to 0	sustain
AR	-127 to 0	release
ALA	0 to 126	Target level at end of attack phase
ALD	0 to 127	decay

In the example given earlier the envelope number is 1, and T is set to 1 to achieve steps of one hundredth of a second, and auto-repeating the pitch envelope.

There are three time sections to the pitch envelope, and the pitch changes of each time step within a section are given by PI1, PI2, and PI3. In the above example they are set to 5, -5 and -5 respectively. Thus in the first section the note will increase in pitch by 5 units every hundredth of a second, then decrease in the second and third sections.

The values PN1-PN3 set the number of steps in the three sections. We have used the values 50,25,25 so that for half a second the pitch increases, then for two times a quarter of a second (ie one half) it decreases.

In this example we have not made use of the amplitude envelope. The amplitute envelope has four (rather than three) time sections, and the values AA, AD, AS and AR set the amplitude changes per time step in each section. Note though that if AR is zero that the envelope will be auto repeating.

There are just two more parameters: the target levels at the end of the attack and decay phase ALA and ALD. The amplitude envelope differs from the pitch envelope in having four, rather than three, time sections. But as well as this, the envelope period is made up in a different way. The duration of the pitch is determined by the total number of steps used multiplied by 1/100th of a second. The duration of the amplitude envelope however, is determined by the final parameter in the relevant SOUND statement.

To illustrate this, try the following:-

```
10 ENVELOPE 1,1,0,0,0,50,25,25,127,-1,0,-1,126,90
20 SOUND 1,1,150,100
```

In this example the pitch parameters are kept constant, and the amplitude parameters: 127,-1,0,-1 in conjunction with the target values 126 and 90 cause a sharp attack followed by a small decay down to amplitude 90. There is then a relatively long sustain, followed by a release phase. If you shorten the note by changing the last parameter in the SOUND statement to say 50, you will not lose the final release phase, the sustain phase will simply be reduced accordingly.

Below is an example of a combined frequently repeated pitch envelope with a single amplitude envelope:-

```
10 ENVELOPE 1,1,20,-15,-15,6,3,3,127,0,-1,-1,126,126
20 SOUND 1,1,100,20
```

But we are still only scratching the surface of possibilities. It is also possible to put several SOUND channels under the command of a single envelope, enabling the simulation of certain musical timbres, plus a host of other effects. The software also allows for the simultaneous or controlled sequential playing of sounds, but we hope that this will tell you enough to keep you going until the full manual comes out, or until Acorn publish their promised magazine.

THE 10 MOST ASKED QUESTIONS

We have noticed that in the floods of questions received, these are the 10 most frequently asked questions

1. HAVE YOU ANY NEWS ON MACHINE DELIVERY?
   See the article in this issue.
2. CAN I INCREASE THE MEMORY ON MY MODEL 'A' SYSTEM WITHOUT A COMPLETE MODEL 'B' UPGRADE?
   See upgrading article in this issue.

3. THE SOUND COMMAND DOES NOT APPEAR TO WORK, WILL THIS BE AVAILABLE IN A LATER VERSION?
   It does work, but the syntax is difficult to guess. See "Sound" article in this issue.

4. I SENT MONEY FOR MY BBC MICRO SIX MONTHS AGO AND THE CHEQUE WAS CASHED. HOW DO I SET ABOUT GETTING A REFUND ON THE INTEREST THAT I LOST?
   The person to write to is given in the 'Editorial' earlier in this issue.

5. THE LISTO COMMAND DOES NOT WORK, IS THAT SO?
It does work, except that the manual does not make it clear that you have to follow it with LIST. For example to get your program indented use:-

```
LISTO 7
LIST
```

6. WHEN WILL THE LIGHT PEN BE AVAILABLE?
There will be two types - one that reads bar codes, and one that reads off the screen. Acorn have no timescale on production of these but hinted that August is possible. Spies tell us that both have been tested in-house. DO NOT send any orders for them though.

7. THERE ARE SOME EPROMS IN MY MACHINE, WILL THEY BE REPLACED AT A LATER DATE WHEN I UPGRADE?
The brief answer is yes, for more detail see under the section entitled "Brief machine review" in this issue.

8. WHAT PRINTER SHOULD I GET FOR MY MACHINE?
Virtually any printer should work with the BBC machine, one exception appears to be the Teletype Model 33 or any other printer that works at 110 baud. The only low speeds implemented on the serial interface are 75, 150, 300 baud. You would do well to look for a printer that can print the high resolution graphics, but you will have to wait for us to publish routines for printing graphics on particular printers (unless you write them yourself, in which case send us a copy for the newsletter). Acorn will be bringing out their own printer and will also supply a 'Toolkit' ROM for their printer. Again PLEASE DO NOT send any money until it is officially announced.

9. CAN I USE ANY CASSETTE RECORDER WITH THE BBC MICRO?
It appears that the answer is yes. We have tried several and had no problems yet. What is probably more critical is the use of good quality tape. When choosing a recorder it would be best to get one with motor control, and a counter. You could also use a reel-to-reel recorder if you have one.

10 DOES THE BBC MICRO COME WITH CASSETTE AND TV LEADS?
Yes, but the cassette lead only has a plug on the BBC Micro end. You will have to connect an appropriate plug to the other end to suit your recorder. Pin connections are given in the provisional user guide. The TV lead comes complete, however, if you wish to use a monitor you will have to make up (or buy) a cable with a BNC plug for the micro end, and a suitable plug for your monitor on the other end as no lead is supplied.

HINTS AND TIPS

To be included under this heading are all items that we consider useful, but not long enough to warrant an article on their own. Please contribute to this section by marking your envelope "HINTS & TIPS" and posting it to the address for contributions mentioned later under "If you write to us".

SCREEN SCROLLING (PAGING)

Control-N and Control-O switch on and off respectively the screen paging feature, the provisional manual has these round the wrong way. With it on, the screen stops scrolling after each screenful, you restart it by pressing the 'shift' key. (Control-N means hold down the 'control' key and press the N key). These can be incorporated in a program by saying VDU 14 (for control-N or VDU 15 for control-O.

CLEAR THE SCREEN

This is achieved by pressing Control-L.

HEX TO DECIMAL

PRINT ~14 prints HEX equivalent of 14 ie E

PRINT &20 prints DEC equivalent of 20 ie 32

CASSETTE FILE SPEEDS

```
*TAPE 0
*TAPE 3    sets speed to  300 baud
*TAPE 12   sets speed to 1200 baud
```

The disc, network, or Prestel filing systems will be selectable by:
*DISC *NET *TELESOFT when implemented.

VDU COMMANDS

The VDU commands have some distinctly unusual syntax, the following have been discovered:

VDU 29,X;Y;	Define graphics origin to be coordinates X,Y. Note the semicolons!
VDU 23;8202;0;0;0	Disable the cursor. (In immediate mode, press return twice).

WINDOWS

There are two independently controllable windows, the text and the graphics windows. Normally they both coincide, however, using the VDU 24 and the VDU 28 commands you can set up separate windows. Try entering VDU 28,10,30,19,5 Notice how you have a small area for text only. MODE 4 will reinstate your original position. The graphics and text windows may be set as follows:

VDU 24,A;B;C;D; note semicolons and commas. The window will be set for grahics with the coordinates of the bottom left-hand corner (A,B) and the top right-hand corner (C,D).

VDU 28,A,B,C,D note different syntax, will set the text window with bottom left-hand corner at (A,B) and top right-hand corner at (C,D) with respect to the text origin note (ie top left-hand corner of the screen). Now you can see that the CLG and CLS commands actually do different things. But not in mode 7, the default mode!

COLOURED TEXT

N. Clifton discovered several of the FX calls. He also found the following:
PRINT CHR$ 129 "TEST" produces the word TEST in RED

Other values are:
129 RED
130 GREEN
131 YELLOW
132 MAGENTA
133 CYAN
134 BLUE
135 WHITE
136 FLASHING BLACK AND WHITE
141 DOUBLE SIZED CHARACTERS
152 BLACK

Note that to produce double sized characters you must print both halves of the letters eg: PRINT CHR$ 141 "TEST" ' CHR$ 141 "TEST"

*FX CALLS

We are most grateful to Acorn/BBC for permission to publish the following

FX means "effects", and is a way of accessing some of the operating system routines without going into machine code or using POKE. The values quoted in the table below is the function concerned, these should be followed by a value or values to alter the effect of the function, for example:

*FX 137,1 will turn on the cassette motor, this should be heard as a click and the cassette motor LED will light.
*FX 137,0 will turn it off again.

The following are the calls implemented in version 0.1 of the operating system.

```
 F  FUNCTION (use by calling *FX F,X)

 0  Prints operating system version number (eg "EPROM 0.1")
 4  Enable/disable cursor edit keys
      (X=0 enable cursor editing)
      (X=1 disable cursor editing)
      (X=2 make cursor control keys act like extra soft keys) - see below
 5  Select printer type
      (X=0 output ignored)
      (X=1 Centronics printer)
      (X=2 RS423)
 6  Set printer ignore character (default character=10 decimal
    see upgrading article)
 7  Set RS423 receive baud rate
      (X=1   75 baud,    2=150 baud,     3=  300 baud)
        4=1200, 5=2400, 6=4800, 7=9600, 8=19200 baud)
 8  Set RS423 transmit baud rate
      (X=same as in *FX 7 above)
 9  Set flash period of first colour
      (X<>0 sets the mark period to X centiseconds)
      (X= 0 sets the mark period to infinity, and forces
            the mark state if the space period is infinity.)
10  Set flash period of second colour
      (X= as in *FX 9 above)
11  Set auto repeat delay
      (X=0 no repeat)
      (X>0 repeat after X centiseconds)
12  Set auto repeat period
      (X=0 no auto repeat)
      (X>0 repeat every X centiseconds)
15  Flush all or just input buffer
      (X=0 flush all buffers)
      (X=1 flush currently selected input buffer)
      (X>1 reserved for future expansion)
16  Select number of ADC channels to be sampled
      (X=0 sampling suppressed)
      (1<=X<=4 sample from channel X)
124 Reset ESCAPE flag
125 Set ESCAPE flag
126 Acknowledge detection of ESCAPE condition
127 Check end of file status
128 Read ADC channel/fire buttons/last conversion
129 Read key within time limit
130 Read machine high order address
131 Read top of operating system RAM address
132 Read bottom of display RAM address
133 Read lowest address for particular MODE
134 Read text cursor position
137 Turn cassette motor on/off (X=0 off,X=1 on)
139 Set file options
140 Select cassette file system and select speed
144 Alter TV display position/interlace
```

FX 4 NOTE - Once enabled in this way, the keys can be used like the 9 red ones, Copy 11, Left 12, Right 13, Down 14, Up 15. Alternatively they can be detected using GET$ or INKEY$. Their values here are Left:CHR$136, Right:CHR$137, Up:CHR$139, Down:CHR$138, Copy:CHR$135.

ELLIPSE DRAWING

The following useful procedure was sent in by Mr I G Nicholls of Kidderminster.

It will draw an ellipse at any point on the screen, you can specify the centre, angle, major axis, and whether you want it filled or not.

A semi-major axis
B semi-minor axis
INC angle between semi-major axis and the horizontal axis (in degrees)
N% Number of points to be used in plotting the ellipse (the program calculates N points around the ellipse and joins them with straight lines, the more the points the smoother the outline, but the longer it takes to plot).
X,Y Horizontal and vertical coordinates of the centre of the ellipse
FILL Set to TRUE if you want ellipse filled in. If not set it to FALSE.

NOTE that for a circle A=B and INC can be of any value.

This program was adapted by Mr Nicholls from one contained in Rogers and Adams "Mathematical Elements for Computer Graphics" McGraw Hill, 1976.
We have added lines to show how the procedure is used. Once you have seen how it works you may like to save the procedure section by itself ready for incorporation in later programs you may write.

```
  100 REM ELLIPSE BY I.G. NICHOLLS
  110 MODE4
  120 PROCLEAR
  130 INPUT"Semi-major axis ";A
  140 PROCLEAR: INPUT"Semi-minor ax
is ";B
  150 PROCLEAR: INPUT"Angle with x-
axis ";INC
  160 PROCLEAR: INPUT"No of points
 ";N%
  170 PROCLEAR: INPUT"x-coord of ce
ntre ";X
  180 PROCLEAR: INPUT"y-coord of ce
ntre ";Y
  190 PROCLEAR: INPUT"Fill ellipse
(Y/N)";F$
  200  FILL=(F$="Y") OR (F$="y")
  210  PROCLEAR
  220  PROCELLIPSE(A,B,INC,N%,X,Y,F
ILL)
  230 GOTO130
  240  DEF PROCELLIPSE(A,B,INC,N%,X
,Y,FILL)
  250  LOCAL P,C1,C2,C3,S1,S2,S3,M%
,T1,Z%,X1,Y1
  260 P=2*PI/(N%-1):INC=INC*PI/180
  270 C1=COS(INC):S1=SIN(INC)
  280 C2=COS(P):S2=SIN(P)
  290 C3=1:S3=0
  300 VDU29,X;Y;
  310 FOR M%=0 TO N%
  320   IF M%=0 THEN Z%=4 ELSE Z%=5
  330   IF FILL THEN Z%=Z%+80: MOVE
3,0
  340   X1=A*C3:Y1=B*S3
  350   PLOT Z%,(X1*C1-Y1*S1),(X1*S
1+Y1*C1)
  360   T1=C3*C2-S3*S2
  370   S3=S3*C2+C3*S2
  380   C3=T1
  390   NEXT M%
  400 ENDPROC
  410 DEF PROCLEAR
  420  PRINT TAB(5,30);"
                        ";
  430  PRINT TAB(5,30);
  440  ENDPROC
```

UPGRADING TO MODEL B

In this article we give details on upgrading 2 aspect of the A machine:-
(1) Memory upgrade to 32k.
(2) Addition of a printer interface.
But first a word of warning. If you have no hardware experience you could wreck your machine, (though the memory upgrade is easier to perform than the printer one) and you may also invalidate any guarantee that the machine carries. Secondly Acorn/BBC do not encourage upgrading; and they will only supply COMPLETE upgrade kits, and these only to dealers. This would not matter very much, except that there is one component that cannot be obtained except through Acorn/BBC. The offending item is a ULA, and although all model As contain the required chip, at least some of them have been fitted with low speed devices (ones that failed tests for use in a model B).

Although we can understand Acorn/BBC's reluctance to support piecemeal upgrading, we do not consider it defensible resolutely to refuse to supply the higher grade ULAs (especially since they should be in the model A machines anyway). Furthermore, when we asked a spokesman for Acorn what happens if someone's ULA blows after the guarantee is up, the answer was the same: we only supply ULAs as part of the upgrade kit. This is obviously not an acceptable response, and we will be taking this matter further. In the meantime for those who dare:

MEMORY UPGRADE

This is easy, though not as cheap as we hoped it would be; but the price of memory ICs continues to fall. For this you need eight 4816 ICs. The ones used in the machine (at least in our models) are labelled HM1481G J6P-3. The 3 means 100ns response time. Suitable ICs may be obtained from a number of retailers. Happy Memories quoted us £3.30+VAT (10% off for members) and are expecting stocks shortly. Technomatic supplied us (cost is £3.20+VAT). Take care not to subject these ICs to static charges eg from nylon clothing.

To fit them first unplug the mains lead. Then remove the 4 Phillips-type screws labelled "Fix", and carefully remove the top cover. The 8 sockets for the ICs are at the bottom right close to the keyboard. They are labelled IC 61 - IC 68. Plug in all eight chips with the notch end pointing away from the keyboard (ie as with the resident memory ICs). You then need to change a single link. This is a small shorting plug (with no wires connected) labelled S25. It is located to the left of IC45, and is 10 cm or so beyond the IC with the fins. Remove this plug and replace it so that it connects the middle board pin to the upper one (rather than the lower one).

That's all. Carefully replace the lid, making sure the 3 LED indicators appear in the three holes near to the space bar; and when you switch on, the screen should tell you that you have 32k.

If this does not happen, then unplug the micro again an check that all the IC pins are properly inserted, and that the link is in the correct position. If you still have no success then the ICs may be suspect.

PRINTER UPGRADE

The following deals with the installation of the Centronics-compatible parallel printer interface, and requires a certain amount of soldering. If you are not a reasonably skilful solderer we do not recommend that you undertake this upgrade.

You will need two ICs: a 6522 and a 74LS244, plus a 26 pin (2 x 13) 90 degree pcb mounted I.D. type plug (agin we obtained our from Technomatic Ltd, but many suppliers stock these items).

Remove the lid as directed in the memory upgrade notes. Next unplug the ribbon cable attached to the keyboard, and unscrew the two fixing screws holding the keyboard in. Lift away the keyboard, and unplu the loudspeaker plug on the main board. Fit the 6522 in the socket labelled IC69 (close to the big fin); and fit the 74LS244 into the socket labelled IC70 (close to IC69). Both ICs are orientated the same way as all others on the board (ie notch away from the keyboard). Next solder in the I.D. pcb plug to the set of pads labelled PL9. This is the second plug position on the left, on the row of connector pads directly beneath the keyboard.

The circuitry for the printer interface, is given on page 220 of the provisional manual, and this should be used as a guide to wiring up the socket and printer lead. The plug contains 13 earth connections (and a good number of these should actually be used in order for the interface to function correctly) plus 8 data lines, a strobe and one further which Acorn insist is an 'Acknowledge' line. Because it is 'Acknowledge' they have placed it at pin 19 of PL9 so as to be completely pin compatible with the Centonics configuration. Just to confuse things, the provisional manual shows the 'Acknowledge' line on pin 23, and the 'Busy' pin without a connection. Unfortunatley however, the line which is generated on pin 40 of IC69 (see provisional manual p220) is actually a 'Busy' line not an 'Acknowledge' line. We have drawn Acorn's attention to this.

The upshot of this is that the handshaking for the printer interface is a Centronics type Busy line (active high), and it is connected to pin 19 of the Beeb's PL9 instead of pin-21. The fact that it comes out on the wrong pin is not vastly important, but the signals themselves, Busy and Acknowledge, are under no circumstances interchangeable.

There is one further complication if you have a very early machine, the pcb track from pin 40 of IC69 carrying the Busy line has been cut close to the socket PL9. This is easily spotted visually, and if your track is terminated in this way, it is a simple matter to scrape away the solder resist and wire it up to pin 19 or pin 21 - the choice is yours.

contd/

USING THE PRINTER

Control-B switches on the printer output, and prints anything that is going to the screen. Control-C turns it off. Lastly, if your printer does not do auto line feeds, then all lines will be printed on the same line of paper. There are two solutions to this:

1) Fix your printer so that it does perform auto line feeding. (See the printer manual as there are usually switches provided to alter effects such as auto line feeds).
2) Execute the FX call *FX 6,0 before printing. This sets what is called the "Printer ignore character" - the one ASCII value that the Beeb software suppresses. The default value is 10, and this is the ASCII code for 'line feed'. The call *FX 6,0 tells the software to suppress the unused character whose ASCII value is zero.

DISCOUNTS

BEEBUG have arranged discounts for members at a number of retail outlets who supply computer books, software and hardware. We are at present negotiating further discounts including one with a service agent for the BBC Micro.

HAPPY MEMORIES Gladestry Kington Herefordshire HR5 3NY (054 422) 618	Computer hardware 10% off all 'one-off' prices. Quantity prices may be negotiable.
MINE of INFORMATION Ltd (Mail order) 1 Francis Avenue St Albans Hertfordshire St Albans 52801	Computer Books 5% discount.
TECHNOMATIC Ltd 15 Burnley Road London NW10 01-452 1500	Hardware, software and books 5% discount.

Members should simply quote their membership number with their order, though members taking discount will not necessarily be given credit card facilities, (you must check on this). We are not acting for these companies, nor receiving payment from them, and cannot be held responsible for their services.

MOON LANDER

Moon Lander runs in a 16k machine. Instructions are included in the program. There are three controls, left thrust, right thrust, and vertical thrust; and you must land the craft using a combination of these - though because of the way the craft is designed (?) you can only use one control at a time. The noise emitted is determined by the speed of descent, and provides a useful indicator of this. The lander leaves a vapour trail (would you believe?) so that you can see the full trajectory of descent. Crash and successful landing noises are also given, though we had not mastered the ENVELOPE syntax at this stage, and have used a FOR loop for amplitude and frequency control. The readout consists of 'remaining fuel' and 'descent speed', and a score is given based on the value of these two for each successful landing.
You may exit the program by pressing "S" at any point. If you exit using ESCAPE you will find that the flashing cursor has disappeared. (This was cancelled with the command VDU 23;8202;0,0,0). The cursor can be reinstated by changing MODE.

Before the game starts you are asked to choose skill level (1 or 2) and whether you want colour or black and white. The latter option has been put in because some black and white TV sets do not give an acceptable picture when the machine is producing colours. Happy Landings.

```
  100 REM BEEBUG MOON LANDER MARCH
82
  110 MODE5:PRINTTAB(4,8)"MOON LAND
ER"
  120 PRINTTAB(1,12)"Enter Skill Le
vel"
  130 PRINTTAB(1,13)"1 or 2   ";
  140 INPUTS%:IFS%>2 OR S%<1 THEN 1
10
  150 PRINTTAB(1,12)"
    "
  160 PRINTTAB(1,13)"Colour - Y or
N ";
  170 INPUTC$:IF C$<>"Y" AND C$<>"N
" THEN160
  180 VDU5
  190 I=RND(-TIME)
  200 MODE4
  210 PROCINST
  220 IFF%=0THENPRINTTAB(0,8)"Press
 'G' when ready to start ";
  230 F%=0
  240 Z$=GET$:IFZ$="G"THEN 270
  250 IF Z$="S"THEN 600
  260 GOTO240
  270 MODE4
  280 IFC$="Y"THENVDU19,0,4,0,0,0,V
DU19,1,1,0,0,0
  290 PROCMOUNTS
  300 Y=1024
  310  PRINT TAB(25,5);"Fuel:"
  320  PRINT TAB(25,6);" Vel:"
  330 VDU23;8202;0,0,0
  340 IF S%=1 THEN YS=1:X=0:Y=1024:
GOTO 400
  350 X=RND(1280)
  360 IFX>640THENYS=-(RND(90)+10)/1
00:GOTO400
  370 IFX<480THENYS=(RND(90)+10)/10
0:GOTO400
  380 YS=RND(1)-.5
  390 IFYS>-.1ANDYS<.1THEN380
  400  K=0.2:REM Velocity=K*100
  410  FUEL=400:REM Amount of fuel
=F%
  420 IFFUEL<=0THENFUEL=0:GOTO490
  430 Z$=INKEY$(0)
  440  IF Z$="S" THEN 600
  450  IF Z$="." THEN YS=YS+0.04:FU
EL=FUEL-1
  460  IF Z$="," THEN YS=YS-0.04:FU
EL=FUEL-1
  470  IF Z$="F" THEN K=K-0.01:FUEL
=FUEL-2
  480 *FX 15,0
  490  K=K+0.005
  500  X1=X+30:Y1=Y+50
  510  Y=Y-K*10
  520  X=X+YS*20
  530 IFX<0ORX>1280THENZ=10
  540 IFY<10THEN610
```

```
  550  PLOT 69,X,Y:PLOT69,X+4,Y:PLO
T69,X,Y+4
  560  PRINT TAB(30,5);FUEL;"    ";
  570 SOUND1,-8,K*200,2
  580  PRINT TAB(30,6);INT(K*100);"
  ";
  590 GOTO420
  600 MODE7:STOP
  610 REM
  620 IFX>620ORX<580THEN710
  630 IF INT(K*100)>15THEN710
  640 PRINTTAB(27,29)"GOOD LANDING"
  650 PRINTTAB(27,30)"SCORE ";INT(2
0*(16-100*K))+3*FUEL
  660 FORIX=1TO20
  670   SOUND1,-12,30,1
  680   SOUND1,-12,100,1
  690   NEXT
  700 GOTO220
  710 REM CRASH
  720 PRINT"BANG"
  730 SOUND0,-15,6,20
  740 FORIX=-15TO0
  750   SOUND0,IX,6,3
  760   NEXT
  770 GOTO220
  780 DEF PROCINST
  790 PRINTTAB(14,5)"INSTRUCTIONS"
  800 PRINTTAB(5,10)"You must land
 the craft within the "
  810 PRINTTAB(5,11)"crater at the
 centre of the screen"
  820 PRINTTAB(5,13)"Landing veloci
ty must be < 16 kph"
  830 PRINTTAB(10,16)"CONTROLS"
  840 PRINTTAB(10,18)"< Left thrust
"
  850 PRINTTAB(10,19)"> Right thrus
t"
  860 PRINTTAB(10,20)"F Vertical th
rust"
  870 PRINTTAB(5,23)"Press 'G' to s
tart"
  880 FX=1
  890 ENDPROC
  900 DEF PROCMOUNTS
  910 LOCALIX,JX,K,L
  920 RESTORE
  930 FORIX=1TO10
  940   FORJX=1TO3
  950     READK,L
  960     PLOTINT(JX/3)*81+4,K,L
  970     NEXT
  980   NEXT
  990 ENDPROC
 1000 DATA0,0,0,550,150,0
 1010 DATA0,0,200,300,300,0,150,0,3
00,250,420,0
 1020 DATA300,0,300,150,600,0,600,0
,800,100,950,0
 1030 DATA800,0,900,350,1100,0,1050
,0,1100,400,1200,0
 1040 DATA1100,0,1250,550,1280,0
 1050 DATA0,0,500,30,580,0,1280,0,6
20,20,620,0
```

3 - D NOUGHTS AND CROSSES (32 K)

Games such as noughts and crosses, although trivial at the ordinary (2-dimensional) level, become quite fascinating at the 3,4, or 5-dimensional level. Many people will find it instructive to play at the 3-D level before graduating to higher orders!

3-D noughts & crosses must be played on a 4x4x4 board, otherwise on a 3x3x3 board the centre position assures a trivial win for the player going first. The published game is you versus the computer. You can choose if you wish to go first. Moves are entered and displayed as three digit numbers, the digits representing the level, column, and row respectively. Play continues until either you or the computer has a line of 4 pieces in ANY direction. For example the following are both winning lines:

111 - 122 - 133 - 144
112 - 212 - 312 - 413

If you have a poor quality picture on a black and white set, you may wish to change the colours of the playing pieces so that they are more clear. Lines 160 and 170 allow you to change the computer's and your colour respectively, so experiment with different values by consulting page 55 of the provisional user guide.

```
  100  REM BEEBUG 3D NOUGHTS AND CR
OSSES
  110  REM MARCH 1982
  120  REM See page 55 of the user
guide
  130  REM to change colour of the
pieces
  140  REM Change values in lines 8
00,810
  150  REM according to your prefer
ence.
  160  COMPCOLOUR=9
  170  YOURCOLOUR=2
  180  MODE 5
  190  VDU 19,2,COMPCOLOUR,0,0,0
  200  VDU 19,1,YOURCOLOUR,0,0,0
  210       MEX=10:MEY=26:REM MESSAG
E COORDS
  220     NEX=10:NEY=10:REM COORDS F
OR YOUR MOVE
  230     LEX=11:LEY=1:REM COORDS TO
R LAST MOVE
  240     SFX=4:REM SCALE FACTOR X
  250     SFY=4:REM SCALE FACTOR Y
  260     SFD=45:REM DISTANCE BETWE
EN PLANES
  270  RESTORE
  280     DIM M(63,6)
  290     DIM N(75),E(18),W(63),P(63
)
  300     DIM H(7),C(18),S(63),S(3,7
)
  310       DIM G(15),B(13),YY(4),Y(
3)
  320  CLS
  330       PRINTTAB(4,3);"3-D NOUGH
TS"
  340       PRINT TAB(6,5);"AND"
  350    PRINT TAB(6,7);"CROSSES"
  360    PRINT TAB(2,23);"Press spac
e bar"
  370    REPEAT
  380          X=RND(1)
  390        UNTIL INKEY$(0)<>""
  400  CLS
  410  FOR AX=0 TO 6
  420    FOR BX=0 TO 63
  430          READ M(BX,AX)
  440       NEXT
  450    NEXT
  460    FOR AX=0 TO 15:READ Q(AX):N
EXT
  470    FOR AX=0 TO  7:READ H(AX):N
EXT
  480    FOR AX=0 TO 63:READ W(AX):N
EXT
  490    FOR AX=0 TO 18:READ C(AX):N
EXT
  500    FOR AX=0 TO 63:READ P(AX):N
EXT
  510     FOR AX=0 TO 13:READ B(AX):
NEXT
  520     FOR AX=0 TO 75:N(AX)=0:NEX
T
  530     FOR AX=0 TO 63:G(AX)=0:NEX
T
  540     FOR AX=0 TO 18:E(AX)=0:NEX
T
  550     M=0:Q=76
  560   GOSUB 1720
  570    C=22:M=1
  580       PRINT TAB(NEX,NEY);"Shal
l I go"
  590    PRINT TAB(NEX,NEY+1);"firs
t";:INPUT A$
  600   PROCLEAR(NEX,NEY)
  610   GOSUB 1200
  620    IF F=-1 THEN 560
  630      IF F=1  THEN 680
  640    M=1
  650 PROCLEAR(MEX,MEY):PROCLEAR(N
EX,NEY):PRINT TAB(NEX,NEY);" Your m
ove"
  660    PRINT TAB(NEX+1,NEY+1);:INP
UT F
  670   PROCLEAR(NEX,NEY)
  680    IF F<11 THEN 710
  690    F=16*F-159*(F DIV 10)-6*(F
DIV 100)-21
  700     IF F>=0 AND F<=63 THEN 720
  710       PRINT TAB(MEX,MEY);"  IL
LEGAL  ":GOTO 650
  720       IF G(F) THEN PRINT TAB(M
EX,MEY);" OCCUPIED":GOTO 650
  730   PROCLEAR(MEX,MEY)
  740    M=M+1:G(F)=1:GOSUB 1050
  750      FOR B=0 TO 6+3*(M(F,6)=76
)
  760        N=N(M(F,B)):E=E(M(F,B)/
4)
  770          IF N=3 THEN PRINT TAB
(MEX,MEY);"   YOU WIN ":GOTO 1130
  780            IF (N MOD 4)=0 AND
N>3 THEN Q=Q-1
  790        IF Q=0 THEN 1120
  800        N(M(F,B))=N+1
  810         E(M(F,B) DIV 4)=E-((E
MOD 8)<7)
  820       NEXT B
  830   PRINT TAB(MEX,MEY);" THINKIN
G"
  840     N=((M-1) DIV 4)*8:P=-10000

  850    FOR A=0 TO 63
  860       IF G(A) THEN 940
  870          T=0:E=0:B=6+3*(M(A,6
)=76):G=B/3*7-7
  880       FOR C=0 TO B
  890      D=Q(N(M(A,C))):T=T+ (N+D
)+P(E(M(A,C) DIV 4))* ((C+C)
```

```
 900              E=E+M(D)
 910              NEXT C
 920           IF E>10 THEN E=10
 930             T=T+C(E):IF T+RND(1)>
F THEN F=T+.5:F=A
 940           NEXT A
 950  S(F)=2:GOSUB 1050
 960   FOR B=0 TO 6+3*(M(F,6)=76)
 970    N=N(M(F,B)):E=E(M(F,B) DIV
 4)
 980           IF N=12 THEN PRINT TA
B(NEX,NEY);"   I WIN  ":GOTO 1130
 990         IF N<4 AND N<>0 THEN Q=
N-1
1000           IF Q=0 THEN 1120
1010           N(M(F,B))=N+4
1020     E(M(F,B) DIV 4)=E-8*(E<56)
1030           NEXT B
1040  GOTO 650
1050  C=F DIV 16: E=F MOD 16
1060    D=E DIV 4: E=E MOD 4: B=36
-3*C: A=20+10*D+2*E
1070  GOSUB 2350
1080   IF M=0 THEN RETURN
1090  PRINT TAB(LEX,LEY);"Lose mov
e"
1100           PRINT TAB(LEX+3,LEY+1);
D+1;E+1;C+1
1110  RETURN
1120   PRINT TAB(NEX,NEY);"   A DR
AW "
1130  REM COME HERE AT END OF GAME
1140  REM-----------------------
-
1150   PRINT TAB(0,29);:INPUT"Do y
ou want another game ";A$
1160  GOSUB 1200
1170   IF F=1  THEN 320
1180    IF F=-1 THEN 1150
1190  END
1200   IF LEFT$(A$,1)="Y" THEN F=1
:RETURN
1210   IF LEFT$(A$,1)="N" THEN F=0
:RETURN
1220   F=-1:RETURN
1230  DATA 0,0,0,0,1,37,38,1,2,41,
42,2,3,3,3,3
1240  DATA 32,4,4,35,5,5,5,5,6,6,6
,6,44,7,7,47
1250  DATA 32,8,8,35,9,9,9,9,10,10
,10,10,44,11,11,47
1260  DATA 12,12,12,12,13,37,38,13
,14,41,42,14,15,15,15,15
1270  DATA 16,33,34,28,16,20,24,28
,16,20,24,28,16,45,46,28
1280  DATA 17,21,25,29,36,21,25,29
,40,21,25,43,17,21,25,29
1290  DATA 18,22,26,30,36,22,26,29
,40,22,26,43,18,22,26,30
1300  DATA 19,33,34,31,19,23,27,31
,19,23,27,31,19,45,46,31
1310   DATA 32,20,24,35,36,1,1,39,
40,2,2,43,44,20,24,47
1320  DATA 4,33,34,4,17,37,38,29,1
7,41,42,29,7,45,46,7
1330  DATA 8,33,34,8,18,37,38,30,1
8,41,42,30,11,45,46,11
1340  DATA 32,23,27,35,36,13,13,39
,40,14,14,43,44,23,27,47
1350  DATA 48,65,66,52,57,48,52,61
,58,52,48,62,52,69,70,48
1360  DATA 49,56,60,53,64,49,53,67
,66,53,49,71,53,59,63,49
1370  DATA 50,60,56,54,68,50,54,71
,64,54,50,67,54,63,59,50
1380  DATA 51,69,70,55,51,51,55,57
,62,55,51,58,55,65,66,51
1390  DATA 56,76,76,60,76,76,76,76
,76,76,76,76,59,76,76,63
1400  DATA 76,76,76,76,76,57,61,76
,76,58,62,76,76,76,76,76
1410  DATA 76,76,76,76,76,61,57,76
,76,62,58,76,76,76,76,76
1420  DATA 60,76,76,56,76,76,76,76
,76,76,76,76,63,76,76,59
1430  DATA 64,76,76,67,76,76,76,76
,76,76,76,76,68,76,76,71
1440  DATA 76,76,76,76,76,65,66,76
,76,69,70,76,76,76,76,76
1450  DATA 76,76,76,76,76,69,70,76
,76,65,66,76,76,76,76,76
1460  DATA 68,76,76,71,76,76,76,76
,76,76,76,76,64,76,76,67
1470  DATA 72,76,76,73,76,76,76,76
,76,76,76,76,74,76,76,75
1480  DATA 76,76,76,76,76,72,73,76
,76,74,75,76,76,76,76,76
1490  DATA 76,76,76,76,76,75,74,76
,76,73,72,76,76,76,76,76
1500  DATA 75,76,76,74,76,76,76,76
,76,76,76,76,73,76,76,72
1510  DATA 0,4,5,6,1,7,7,7,2,7,7,7
,3,7,7,7
1520  DATA 0,0,5,0,0,1,0,0
1530  DATA 5,10,1,4000,1,4,700,0
1540  DATA 5,10,1,4000,1,5,700,0
1550  DATA 5,15,5,4000,5,6,700,0
1560  DATA 5,15,25,4000,1,12,700,0
1570  DATA 25,20,40,4000,1,15,700,
0
1580  DATA 25,30,40,4000,1,15,700,
0
1590  DATA 25,1,1,4000,10,40,700,0
1600  DATA 25,1,1,4000,10,40,700,0
1610  DATA 0,0,160,180,200,0,20,18
0,200,200,400
1620  DATA 0,0,0,5,50,100,200,300
```

```
1630  DATA 0,0,0,0,2,60,80,100
1640  DATA 0,0,0,0,0,1,40,60
1650  DATA 5,0,0,0,0,0,1,20
1660  DATA 55,5,0,0,0,-5,0,0
1670  DATA 60,50,10,0,0,-20,0,0
1680  DATA 120,100,20,0,0,0,-20,0
1690  DATA 150,120,25,0,0,0,0,-20
1700  DATA 1,1,1.5,1,1,1,1
1710  DATA 1.5,1.5,1.5,1.5,1.5,1.5,1.5
,1.5
1720  CLG
1730   A=-12
1740     FOR T=0 TO 3
1750    RESTORE 1940
1760            A=A+8*D-T
1770       VDU 29,0;5*A+1;
1780       FOR R=0 TO 4
1790            READ X,XX,TV
1800            YY(R)=TV
1810                  PROCMOVE(X,Y
Y(R)-R*T,3)
1820                  PROCDRAW(XX,Y
Y(R)-R*T)
1830       NEXT
1840    DATA 0,100,1,14,107,17,25,
112,30,34,116,41,40,120,50
1850          Y=50-T*4
1860       FOR R=0 TO 4
1870       PROCMOVE(25*R,1,3)
1880            PROCDRAW(20*R+40,Y)
1890       NEXT
1900    REM **** PLOT NUMBERS ****
1910    REM----------------------
-
1920    RESTORE 1980
1930     FOR R=0 TO 3
1940         FOR RR=1 TO 7
1950             READ S(R,RR)
1960        NEXT
1970       NEXT
1980    DATA 0,1,1,0,0,0,0
1990    DATA 1,0,1,1,0,1,1
2000    DATA 2,1,1,1,0,0,1
2010    DATA 0,1,1,0,1,0,1
2020     FOR R=0 TO 3
2030      RESTORE 2110
2040         FOR RR=1 TO 7
2050             READ X,Y,XX,YY
2060             IF S(R,RR)=0 THEN

2080
2070             X1=12+25*R
2080        GOSUB 2160:GOSUB 2190:
GOSUB 2270
2090        NEXT
2100       NEXT
2110    DATA 0,0,2,0,2,0,2,2,2,2,2
,4,0,4,2,4,0,2,0,4,0,0,0,2,0,2,2,2
2120    NEXT
2130  REM Draw layer numbers

2140       PRINTTAB(0,6);1'TAB(0,12
);2'TAB(0,19);3'TAB(0,26);4
2150  GOTO 2310
2160        PROCMOVE(X+X1,Y-1,3)
2170       PROCDRAW(XX+X1,YY-1)
2180  RETURN
2190   ON R+1 GOTO 2200,2210,2220,
2230
2200  X1=107:Y1= 6-R*1.5-T        :
GOTO 2240
2210    X1=113:Y1=22-R*1.9-1.5*T  :
GOTO 2240
2220    X1=118:Y1=53-R*2.8+3*(2-T):
GOTO 2240
2230    X1=123:Y1=56-R*4.6-3*T
2240      PROCMOVE(X+Y1,Y+Y1,3)
2250     PROCDRAW(XX+X1,YY+Y1)
2260  RETURN
2270    IF R<>3-T THEN RETURN
2280   PROCMOVE(2*XX-10,2*YY,1)
2290    REM PROCDRAW(2*XX-10,2*YY)
2300  RETURN
2310  FOR RZ=0 TO 3:READ Y(RZ):NEX
T
2320  DATA 270,200,129,55
2330  VDU 29,80;4;
2340  RETURN
2350   DY=49-(3-D)*4
2360    DX=20*(E+2)-25*E
2370    XD=20*(E+3)-25*(E+1)
2380    VDU 29,80;Y(D)*3;
2390      Y1=YY(C)-C*(3-D)+2
2400      Y2=YY(C+1)-(C+1)*(3-D)-2
2410  FOR Y=Y1 TO Y2
2420                  PROCMOVE(Y*D
X/DY+25*E+2,Y,G(F))
2430            PROCDRAW(Y*XD/DY
+25*E+23,Y)
2440     NEXT
2450  RETURN
2460   DEF PROCFILL(X1%,Y1%,X2%,Y2
%,COL%)
2470       PROCMOVE(X1%,Y1%,COL%)
2480       PROCMOVE(X2%,Y1%,COL%)
2490       PLOT 85,X1%,Y2%
2500       PLOT 85,X2%,Y2%
2510  ENDPROC
2520  DEF PROCMOVE(X%,Y%,C%)
2530        GCOL 3,C%
2540          MOVE X%*SFX,Y%*SFY
2550  ENDPROC
2560  DEF PROCDRAW(X%,Y%)
2570          DRAW X%*SFX,Y%*SFY
2580  ENDPROC
2590   DEF PROCLEAR(X,Y)
2600   PRINT TAB(X,Y);"
"
2610   PRINT TAB(X,Y+1);"
2620  ENDPROC
```

SOFTWARE COMPETITION

Programs of all types (eg games, educational, business etc) are eligible. They should be submitted on a cassette with explanation, instructions, and documentation on paper (typed if possible), and accompanied by the application form below (or a copy of it). Members may submit more than one program, but each entry must be sent under separate cover. If you require the tape to be returned, please enclose a suitable stamped addressed package.

Prizes range from £10 to £50. There will also be two special reserved prizes of £100 which will be awarded at the editors to programs which they judge to be of outstanding merit. Should no programs fulfil this criterion within the date limit of the competition, the date limit for these two prizes will be extended.

Programs must arrive by 30th June 1982. Judging will be carried out by the editors, and their decision is final.

Post to BEEBUG, PO Box 50, St Albans, Herts AL1 4AN
Mark parcels in top left hand corner - "COMPETITION"

BEEBUG SOFTWARE COMPETITION - ENTRY FORM

Program Title..... Name.....

Category..... Membership No(s).....
(Games, Educational, Utility or Business, other) Address:.....

Will run on Model A, B.....

The program submitted here is my own work, and has not been submitted to another organisation.
I understand that if I am a prize winner my program may be used by BEEBUG for its program library or for publication, in either case this would be with acknowledgement but without further payment.

Signed..... Date.....

IF YOU WRITE TO US

Please note our new address is:

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St Albans
Herts AL1 2AR

Please do not send mail to the old address, it will be considerably delayed, and please do not call personally.

If you write requiring a reply then please send an SAE, and write the word QUERY on the top left-hand corner of your (outer) envelope.

Contributions for the newsletter are welcome - copy date is 1st of the month, although we need more notice for substantial items. Longer items should preferably be typed. Please write the word NEWSLETTER on the top left hand corner of your envelope.

PROGRAMS - if these are longer than a few lines, please send us a cassette (with appropriate SAE if you want it back) - if instructions to use the program are not contained within it then please send written instructions (preferably typed).

MEMBERSHIP APPLICATIONS should be addressed to:

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Langley, Slough,
Berks SL3 8DA.

Membership costs £6.50 for 1 year, £12 for 2 years, £17.50 for 3 years. Cheques should be made payable to BEEBUG.

NEXT MONTH

Next month's newsletter is due out around mid-May. We have already planned a number of articles for both beginners and advanced users. It will also contain some more programs, and we hope a lot more readers contributions. (NOTE - copy date 1st of the month, but please give us prior warning of anything substantial).

Plus exploring the graphics further, notes on upgrading, and details not treated in the manual.

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