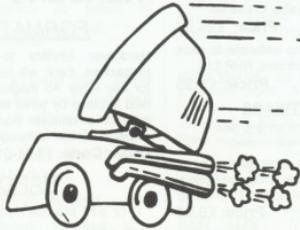


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NEWS ON 4

REVELATION CHANGE

Exeter based Revelation Software have announced that they are dropping their Post Office box number from the end of August. Their new address, which you can start using right away, is Revelation Software, c/o 45 Buddle Lane, Exeter, EX4 1JS.

The move is designed both to cut costs and to speed up the service they provide. Letters and orders addressed to the PO box will still get through but it will be quicker if you start using the new address from now on.

Frank Broughton, owner of Revelation Software, confirmed that he would continue to use Format Publications as his duplication and distribution agents and he also said that he plans a big expansion of Revelation Software later this year, when a change in his full time job will give him more time to concentrate on software.

POWERFUL YEN PROBLEMS

The increasing value of the Japanese Yen is causing major problems for the computer industry which may lead to big price hikes over the next few months. The ever rising Yen, coupled with the lower value of the US dollar, will lead to many companies, including printer, disc drive and other peripheral manufactures, upping their prices in the UK and most of Europe.

A few companies, notable Citizen, will be less affected because they have European production facilities. However, the rising Yen will still hit even totally European companies because most of their components are priced in Yen. So if you are looking to buy a new printer

then now may be the best time to do it, before the price rises hit the shops.

SCOTLAND SHOW

Fred Publishing hope to arrange a Scottish event, possibly in early October, riding on the back of a local show organizer they have contacted. Colin MacDonald hopes to arrange a special SAM & Spectrum section, probably at a show in an Edinburgh venue, which would certainly appeal to our Scottish readers as well as many in the North of England.

Both **FORMAT** and SD Software have promised to make best efforts to be there, and Colin would like to hear from any other company that would like to exhibit north of the border.

We will let readers have details of date and venue as soon as arrangements are finalised.

ZAT CRUMBLES

Confirmation was received this month the veteran (well since 1990 anyway) paper mag ZAT has closed down. Although issues were at times a little irregular they did manage to produce, on average, six issues a year since they started. The mag covered Spectrum and SAM but also included cartoon strips and other items of interest. Although their circulation was very small they had a fairly dedicated following. However, due mainly to the organizers leaving collage, and needing to get jobs, there was no time available to continue the mag.

Credits: M.Sturdy. B.Davidson.

URGENT we need your news. Anything you think other people should know about. Each item printed earns the contributor 3 months extra subscription (please claim when next renewing).

The Editor Speaks

Many of you have been asking what is happening with Mark Hall and Blue Alpha Electronics. I'm sorry to say that I just don't know. It is now over two months since I last spoke to Mark. On a recent visit neither Mark nor his wife were at home and the rumour is that Mark is now in hospital permanently, although I have yet to have confirmation. Mark's family just don't seem interested in the help Jenny and I have been trying to offer since long before Christmas.

We have managed to sort out some peoples problems, mostly regarding missing items sent in for repair. But, to be truthful, we have now exhausted all the avenues we had. It is sad that there are still several people, including ourselves, that have been unable to recover items from Blue Alpha.

There is now nothing else really that we at **FORMAT** can do while Mark fails to answer letters or make contact in some other way. Mark and his wife have both our office and my home number and have been asked on several occasions to ring (reversing the charge if necessary) to let us know how he is doing.

Jenny, mainly because she has borne the brunt of the many telephone calls from frustrated readers, has become increasingly infuriated by the situation - rightly feeling that Mark has let us down as well as his customers. I too feel that the effort we have put in to help Mark, particularly following the start of his illness last year, has been wasted due to his attitude. Please don't feel that I am being too hard on Mark, all we have been asking for over the last six months is information, so we could help him out of his mess.

Of course, if we receive any fresh news, on Mark we will let you know.

And now on to better things. I'm looking for ideas to help expand **FORMAT**'s readership. We have had membership drives in the past and these have proved quite successful, but I desperately need fresh ideas from you, the reader. All I want is for you to write and tell me how you would expand **FORMAT**'s readership, just a few lines is all that is needed. Is there something you would add, take away or just do differently. Do you have ideas on how to contact some of the thousands of Z80 users out there that have never heard of **FORMAT**. What is more, I'm going to make it worth your while. Every letter we publish with an idea will earn the writer an extra 3 months subscription (so remember to quote your membership number) while a star letter in each of the next two issues will get a full years subscription. In addition, one letter, picked at random from all those received before the end of August, will win a £25 book token.

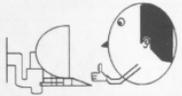
By the way, I've still not heard from any of you hardware experts out there. There are several projects, both for us and for West Coast, that need people able to help design and prototype hardware for the Sam and Spectrum. If you feel that you could help please give me a ring one evening.

And finally, is there a programmer out there? I need someone to convert and enhance a suite of business programs from the BBC to SAM, ring me if you have access to both machines.

Until next month.

Bob Brenchley, Editor.

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*Requires MasterDos and MasterBasic to use OPUS single density discs.

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SHORT SPOT

YOUR HINTS, TIPS AND PROGRAMMING IDEAS

Edited By:- John Wase.

Another weary fun-filled day. I dealt with the Malaysian fax about rice husk and hampas with one research student, and the Doctors note supporting temporary withdrawal of another. What with one thing and another, I was tired. Well, more than that. Opened the front door after the 30-mile grind home. Message on the ansaphone. "John; I assume you've posted 'Short Spot' by now!"

Oh Sh..sh..sh..sugar i. I hadn't even started. I'd forgotten it!

So it might be a little bit light this month, as I'm out tomorrow night. Anyway, let's get on with the start. The first thing I have to deal with is a recent letter from Miles Kinloch of Edinburgh. This, bless him, is a reprint of an earlier one he sent to me in the shambles, which I've also found. It's about various Spectrum problems. And it explains all (well, almost).

Miles first deals with the problems encountered by Debu Dutta over Tasword 128's Data Merge. Try as he might, however, he can't reproduce the symptoms that Debu mentions. In these circumstances, here are some general points which he might check.

One thing to watch out for concerns the original 'Tascon Bughunter' printed in **FORMAT** many years ago. If anyone's Tasword code contains this Bughunter modification, they'll need to run the 'Tascon' conversion program and convert the original Tasword 128 program again from scratch, before using 'Tasfix'. **TASFIX** and the **BUGHUNTER MODIFICATION** are **INCOMPATIBLE**.

Another clue which might have a

bearing on the symptom is that, looking at that Tascon Bughunter program again, it would seem, judging by line 120 that there may actually be more than one version of Tasword 128 in existence. Miles' own version is V1.02, and PEEK 29298 is 113. To cater for possible differences between versions, you should change line 100 of 'Tasfix' as follows:-

```
100 POKE 30763,0: POKE 30764,0:
    POKE 30765,0: LET x=(PEEK
    29298-205): POKE 27667+x,27
    : POKE 27668+x,45
```

This version will be absolutely essential if address 29298 in anyone's version of Tasword 128 holds 205, so this is an address one should check, just to make sure.

Additionally, you must note that in order for the 'Tascon'-converted Tasword 128 to work with Betados, the latter must always first be debugged with Betafix. The original Betados will always crash it.

Miles doubts if the fact that a DISCiPLE, rather than a PLUS D is in use, would account for the symptoms. As the Tascon-converted Tasword 128 doesn't make any direct calls to PLUS D ROM, but relies entirely on command codes, it should (at least in theory) work just the same on both interfaces, though Miles hasn't a DISCiPLE to test it on.

Both Miles and I are curious to see if this does the trick. Do tell us how you've got on, Debu.

Now over to the problem of Dospeek, which refused to work on the DISCiPLE. Miles can be much more definite on that one. It wasn't the offset: rather than on the day he wrote it, Miles didn't envisage

that it would be used on the DISCiPLE. The reason why it's PLUS D-specific is because the method Miles has used in the present form of the program to page the interface out: that is IN A, (231) and OUT (231).A. These ports are, of course, specific to the PLUS D, but there is fortunately an alternative way of doing it. If command code 71 is substituted for IN A,(231), this also serves to page the device in, but has the advantage of working on both the PLUS D and the DISCiPLE. Likewise, the OUT instruction can be replaced with a JP 80 command, which will again work on both interfaces. This method will make the routine 'universal' (that is, apart from the offset), so it will now work with either interface.

Finally, Miles mentions the problems over the command POKE 23728,1: SPECTRUM: POKE 23728,0 which produces a funny error report on a +2A, but works normally on a grey +2. This can be explained by some idiosyncrasies of the PLUS D's error-trap feature. Some of these have already been touched on (see Nev's Help Page, Vol.2, N°12, Aug. 1989), where Nev Young gave a very good account of what was going wrong. However, the good news is that although the problem might at first seem intractable, due to the routines being in the PLUS D's ROM, there is, in fact, a very simple remedy. As Nev points out, the problem is due to a corrupted machine stack, and in the example he gives, this causes things to go wrong in a subroutine, when the RETURN is executed. However, if you now include a RANDOMIZEUSR 8 command before the RETURN (and before POKEing 23728 back to zero), this has the effect of reforming the stack and therefore sorts things out.

Here, again, is the example from that Help Page (though note that lines 120 and 130 are, in fact, superfluous, and can be missed out):-

```
100 POKE 23728,255
110 CIRCLE 120,50,100
120 POKE 23728,0
130 POKE 23728,255
140 CIRCLE 120,50,40
150 RETURN
```

If you start this program with a GOSUB command, it will draw an incomplete circle that goes off screen, followed by a smaller one. The Spectrum will then hang at line 150, when it comes to the RETURN. But, if you now add the line:-

```
145 RANDOMIZEUSR 8
and preferably, for safety's sake, this one as well:-
```

```
146 POKE 23728,0
...you'll find it all works perfectly!
```

Although the stack corruption problem will always be apparent in subroutines, there are other situations where it can also give rise to some strange effects, and the funny report on the +2A sounds like one of them. Why just the +2A and not the grey +2? Perhaps we should ask Alan Sugar! He changed the +2 ROM to a +2A, after all, and little differences between the two can easily cause the effect to manifest itself differently on the two machines.

Miles writes that unfortunately, he doesn't have a +2A to check things with. However, if Steve Brook, or anyone else, for that matter, who is experiencing the NOT '40:1 report, could try the following instead, there's a pretty good chance that it will solve the problem:-

```
10 POKE 23728,1
20 SPECTRUM
30 RANDOMIZEUSR 8
40 POKE 23728,0
50 PRINT "YOU ARE NOW IN 48K"
60 STOP
```

Perhaps Steve can write in, letting us all know how he gets on, for we'd be interested to find out for sure.

Well...thanks for all that information, Miles. Let's see how Steve gets on, shall we...

Now over to SAM for a while. Ettrick

Thomson of Aldeburgh writes that Robert Brady's 'daydate' Short Spot, January 1995, reminded him of a program he (Ettrick) wrote, which appeared in Short Spot in October 1992. This gave the day of the week for any date in the Gregorian Calendar, not just the date derived from the SAMbus. The Gregorian Calendar was adopted in the UK in 1752, though many European countries had done so in 1582, when Pope Gregory III had got it designed: the previous Julian Calendar, with its simple 'leap year every four years' had made the calendar year get out of step with the solar year. Easter, in particular, was not tying up with the moon's phases as it should have done.

This revised SAM program covers all dates from 1st January 1 AD onwards: the Julian era, of which the last day in the UK was Wednesday, 2nd September 1752, and the Gregorian era, of which the first day was Thursday, 14th September, 1752. The 11 days 3-13th September were dropped to bring the Calendar into line with the solar year. I always find it amusing that among those who objected to being 'robbed' of 11 days was the Treasury. In the Julian era, their year started on the quarter-day 25th March. They couldn't stand a financial year 11 days short, so after the change, they added 11 days to that date, giving 5th April to start the next financial year, and that's the way it's remained to this day!

Here's the program.

```
10 REM weekday - Ettrick Thom
son
20 LET d$="Sunday Monday
Tuesday WednesdayThursday
Friday Saturday "
30 LET m$="January February
March April May
June July August
SeptemberOctober Novemb
er December "
40 DO : INPUT #2;"day:";dy;"
month(1-12):";mh;"
year(
eg 1992):";yr
```

```
50 LET j=yr-1752 OR yr=1752 A
ND mh<10
60 LET p=NOT yr MOD 4 AND (yr
MOD 100 OR NOT yr MOD 400
OR j)
70 LET dm=31-(mh MOD 2<>(mh<8
))-(2-p) AND mh=2)
80 LET valid=1<=dy AND dy<=dm
AND 1<=mh AND mh<=12 AND
(yr<1752 OR mh<>9 OR dy<3
OR 13<dy)
90 IF NOT valid THEN PRINT "d
ate not valid: please re-e
nter"
100 LOOP UNTIL valid
110 LET y=(yr-(mh<3)),d=dy-(11
AND yr=1752 AND mh=9 AND
dy>2)
120 LET wd=1+(y+y DIV 4+((2-y
DIV 100+y DIV 400) AND NOT
j))+VAL "510351362402"(mh
+d) MOD 7
130 LET u=2*dy MOD 10 AND dy D
IV 10<>1 AND dy MOD 10<4
140 PRINT TRUNC$ d$(9*wd-8 TO
9*wd);", ";dy;"thstndrd"(u
+1 TO u+2);" ";TRUNC$ m$(9
*mh-8 TO 9*mh);" ";yr
150 GOTO 40
20000 DEF PROC Lstprg L1,L2,m,w,
n
20010 DEFAULT m=0,w=40,n=0
20020 LOCAL e$: POKE SVAR 14,w-1
20030 LET e$=CHR$ 27: OPEN #5,"b
"
20040 PRINT #5,e$;"M";e$;"-";"1"
;e$;"R";CHR$ n;e$;"1";CHR$
m
20050 LLIST L1-1 TO L2
20060 PRINT #5,e$;"-";"0";e$;"@"
: CLOSE #5
20070 POKE SVAR 14,79
20080 END PROC
```

Incidentally, I have a letter from Harry Hamilton of Longthorpe, Peterborough. He failed completely in typing in "This month's offering on page 7". Er..What month's. Dunno. And I probably would not understand it at a glance any more than Harry.

My heart always falls through my stomach when I get a letter like that, firstly because I usually haven't the faintest idea of what's being referred to; secondly, because even when I've found it, I usually still don't know how it

works, and thirdly, even when I do, I haven't the faintest idea what's gone wrong! Moreover, there's a stamped addressed label enclosed, and I'm clearly expected to pull rabbits out of bags.

Sorry, folks, I'm not a magician. However, help is at hand. If Harry types in Ettrick's program listed above, this should solve his problems.

Let's stick with Ettrick, rather out of order, for this came through the door only a few days ago. You remember the queries on the Stripes? Well, Ettrick mentions that Stripes (Short Spot, September 1994, May 1995) arise because SAM's RND is not truly random, but, as with other computers, pseudo-random. There are all sorts of pseudo-random generators, but they all repeat eventually; for SAM and Spectrum after 65536 numbers. For most purposes, these generators can be treated as if they were truly random, but, exceptionally, a program shows that they are not: STRIPES is an example. Ettrick doesn't exactly know why they appear, but was able to verify that RND was the cause, because when he ran a version of the program using his 'Rabbit' pseudo-random generator, there were no stripes.

The SAM Lottery program uses in lines 200-270 a variant of Ettrick's program that first appeared in 'Help Page' for April 1995, but that version used the SAM (or Spectrum) RND in the equivalent of Line 240. Because of the 65536 cycle, you can get only 65536 different sets of 6 numbers. But there are 13,983,816 ways of choosing 6 numbers out of 49. Any program for producing Lottery entries that cannot produce these thirteen million odd possible entries is not much good. So the program here uses my 'Rabbit' generator, in which 'USR s' delivers a pseudo-random integer in the range 0-65535 with a cycle of $2^{31}-1$ (approximately 2000 million). It would, I

think, says Ettrick sagely, take up too much space in Short Spot to explain how Rabbit works. Saying it depends on a maximal-length pseudo-random binary sequence might help - but probably won't!

```

3 REM lottery entries with s
  special random number gener
  ator; Ettrick Thomson
5 REM rabbit
10 DIM r$(29)
20 LET r=LENGTH(0,r$),s=r+4
30 POKE s,42,0,0,125,41,172,7
  1,42,0,0,125,41,172,79,42,
  0,0,34,0,0,237,67,0,0,201
40 DPOKE r+5,r+2
50 DPOKE r+12,r+1
60 DPOKE r+19,r
70 DPOKE r+22,r+2
80 DPOKE r+26,r
90 DPOKE r,DPEEK &5c78
100 POKE r+2,PEEK &5c7a
195 REM lottery entries
200 LET n=6,m=49
210 DO : LET q=m+1
220 FOR r=n TO 1 STEP -1
230 DO : LET q=q-1
240 LOOP UNTIL q*USR s/65536<r
250 PRINT m+1-q;" ";
260 NEXT r : PRINT
270 LOOP UNTIL INKEY$="s"

```

Many thanks, Ettrick.
Deryck Morris of Newport, Shropshire has written with a tale of woe. He wants a lottery or a lucky numbers program and saw just what he wanted in Short Spot in February: indeed, there's another one just above. Except that once again, it is for SAM, and conversion to Spectrum is not obvious. The problem, of course, Deryck, is that someone's got to sit down and do a conversion, if we were to print programs for both machines. And often that's not even possible. However, it just so happens that David Russell of Pencoed, Bridgend, has sent in a random number generator for the Spectrum. I'm pretty sure that if you look at Ettrick's listing and alter it a bit, inserting David's generator, you'll have made a start on it. Let's have some feedback from you and from Ettrick.

So, here's David's programs-

```

10 CLEAR 50000
20 FOR A=50001 TO 50006: READ
  D: POKE A,D: NEXT A: DATA
  237,95,79,6,0,201
30 LET SM=6: LET PN=49: DIM P
  (PN): DEF FN F(X)=INT (X/1
  28*PN)+1
40 FOR A=1 TO SN
50 PRINT AT 10,15,A: PRINT #0
  ,"PRESS ANY KEY": PAUSE 0:
  INPUT ,
60 LET B=USR 50001: LET V=FN
  F(B): IF P(V) THEN GOTO 60
70 LET P(V)=1: NEXT A
80 CLS
90 FOR A=1 TO PN
100 IF P(A) THEN PRINT A
110 NEXT A

```

Add line 35 and replace line 100 with the version given below and the selected numbers are stored rather than printed.

```

35 DIM S(SN): LET T=1
100 IF P(A) THEN LET S(T)=A: L
  ET T=T+1

```

David writes that random numbers are generated by using the Refresh register as a high-speed dice, with the time of roll determined by the user. Randomness is achieved by the very high cycling rate of the Refresh Register (cf frames LSB), and the relatively slow reactions of the user.

This is achieved as follows-

```

BASIC
PAUSE 0          50001 LD A,R
LET R.V.=USR 50001 50003 LD C,A
                  50004 LD B,0
                  50006 RET

```

This gives R.V. (Random Variable) a value between 0 and 127. It is then scaled to size and sorted.

LINE	FUNCTION
10-20	Load 6-byte(!) machine code program into memory
30	Define functions and variables.
40-70	Generates Sn random numbers.
80	CLS
90-110	Outputs the generated numbers in order, using tick array

Sn is the sample number (size), Pn is the Population number (size), FnF is the scaling function and P() is a tick array which both verifies and sorts at the same time. The listing has very few frills as it's intended to be inserted into your program. Problems in randomness may occur if Pn is 128. It's easy to adjust to store the output in an array instead of printing it to the screen: both versions are given, since it's only a few lines.

Diolch yn fawr iawn, David, and I'll drop Deryck's sae in when I next go past - I attended Adam's Grammar as a child, and my mother still lives at Edgmond! [Editor's comment - I assume the words at the start are not rude...]

Let's continue with this theme in which we manipulate numbers. We'll try Matthew Gallagher again. As an example of how events have compounded themselves, I asked Matthew Gallagher of Maidstone for another disc just before my affairs tumbled downhill, since the first had gone astray. Like a good 'un, he's sent one, and now I can't find the folder with the original letter. Fortunately, Matthew is a man of resource and sagacity, and has included the text of his original letter on disc as well as the programs, so all is well. His letter is no doubt somewhere, and one day will resurface, the danger being that I will then appeal for the disc once again... Enough of this, Wase. Matthew asks if we ever watch 'Noel's House Party' on the telly. The answer is, of course, a resounding "Yes Matthew", for Crinkley Bottom is a place forever near and dear to my trousers, or something. Anyway, this is a game which they play, in which a telephone box is placed somewhere in the country and the Great British Public are invited to enter the box, armed only with the code which has been given out over the ether by Noel and his minions. Once inside, the poor mug is locked in until our Noel decides

he's been softened up enough, and it's therefore time to play 'Number-Crunching'. This involves presenting the poor hapless victim with a 4-digit number, which is then scrambled into a new combination. Of course, the victim can't see this, though you can! The victim then has 45 seconds, a rather arbitrary time, to work out the new code, which stops the timer. Failure is followed by the inevitable 'Gunging'. Each correct digit entered clocks up cash which is won if the victim survives un-gunged.

Matthew pondered many a weekend on this bizarre spectacle, and was struck by how difficult it seems to be to guess the combinations, even with pointed prompting. So, more often or not, the poor victim ends up well and truly gunged. Matthew wondered if SAM could be used to help...

The result was Numcrunch1, which asks for a 4-digit number, and then randomly generates scrambled versions, checking each new combination against all the previous ones for 'uniqueness', resulting in 24 combinations of the original number. These, in turn, can be sorted by lines 320-340, provided you've got MasterBasic. Just one little problem. Time. If you remember, time is of the essence, when it comes to this game, and Numcrunch1 is, well, a little tardy.

Matthew's answer to this is ingenious. He used Numcrunch1 to calculate the addresses of each digit in each possible combination by using the number 1234. Confused? Read on. The number 1234 represents the POSITIONS of the digits in the original 4-digit number. Gedditt? So in the number 1234, 1 represents position 1 in the original number, 2 represents position 2 and so on. Numcrunch1 there produces a list of all the possible combinations of digits 1, 2, 3 and 4 which therefore corresponds to all the possible positions of the four original digits. For example, 1423 means that one combination of my four digits is the one

where the first digit comes first, the fourth second, the second third, and the third fourth. So, by using this list of 24 combinations produced by Numcrunch1, one can write a program which already subsumes the 24 address combinations, and simply applies these to the four digits of any number input. The result is Numcrunch2, which does the same thing as Numcrunch1, but in less than half the time.

Now all Matthew's got to do is to work out how to get a SAM and a TV into the right telephone kiosk, and.....

```

1 REM NUMCRUNCH1
  by Matthew Gallagher
10 CLEAR
11 REM Create array for list
  of numbers
20 DIM a$(24,4)
30 INPUT "First number",a$(1)
31 REM Input first number and
  start count loop
40 PRINT a$(1): LET count=1
41 REM Main Loop
50 LET count=count+1
60 IF count=25 THEN GOTO 160
70 PRINT AT 0,0;"Count = ";count
  unt
71 REM Call PROC that
  generates a random
  order of the numbers
80 genord
81 REM Loop that checks new
  order against previous
  selections for
  uniqueness
90 LET a$(count)=a$(1,b)+a$(1
,c)+a$(1,d)+a$(1,e)
100 IF count<3 THEN GOTO 150
110 FOR test=1 TO count-1
120 PRINT AT 2,0;"Test =";test
130 IF a$(count)=a$(test) THEN
  GOTO 80
140 NEXT test
150 GOTO 50
151 REM End of Main Loop
152 REM Call PROC to Sort
  Results
160 sortit
161 REM Print the result
170 CLS : FOR count=1 TO 24
180 PRINT a$(count)
190 NEXT count
200 STOP

```

12

```

201 REM PROC to Generate a
  random order of the
  four numbers input
210 DEF PROC genord
220 LET b=RND(3)+1
230 LET c=RND(3)+1
240 IF c=b THEN GOTO 230
250 LET d=RND(3)+1
260 IF d=b OR d=c THEN GOTO 25
  0
270 LET e=RND(3)+1
280 IF e=b OR e=c OR e=d THEN
  GOTO 260
290 LET ord=(b*1000)+(c*100)+(
  d*10)+e
300 PRINT AT 1,0;ord
310 END PROC
311 REM PROC to Sort A$( Needs
  MasterBASIC but could
  be omitted)
320 DEF PROC sortit
330 SORT a$
340 END PROC

```

```

1 REM NUMCRUNCH2
  by Matthew Gallagher
10 CLEAR
20 DIM a$(24,4)
30 INPUT "Number ";a$(1)
31 REM Create the variations
40 FOR count=2 TO 24
50 READ ord
60 ordnos
70 LET a$(count)=a$(1,b)+a$(1
,c)+a$(1,d)+a$(1,e)
80 NEXT count
81 REM Print the results
90 FOR count=1 TO 24
100 PRINT a$(count)
110 NEXT count
120 STOP
121 REM PROC to convert data
  into order addresses
130 DEF PROC ordnos
140 LET b=INT(ord/1000)
150 LET ord=ord-(b*1000)
160 LET c=INT(ord/100)
170 LET ord=ord-(c*100)
180 LET d=INT(ord/10)
190 LET e=ord-(d*10)
200 END PROC
201 REM DATA Created by
  NUMCRUNCH1
210 DATA 1243,1324,1342,1423,1
  432,2134,2143,2314,2341,24
  13,2431,3124,3142,3214,324
  1,3412,3421,4123,4132,4213
  ,4231,4312,4321

```

Many thanks, Matthew.

And that really is all for now. I fly to Denver at the beginning of June for some consultancy, and I have to give a lecture in Mexico, but before I go, I'll try to put something else together, though it mustn't be too complicated.

Meanwhile, please send all your snippets to:-

**John Wase,
Green Leys Cottage,
Bishampton,
Pershore,
Worcs,
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See you next month.



"I got fed up talking to it,
so I started teaching
it to read..."

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I SEE SAM C

The New C Compiler For SAM Reviewed By:- Nev Young.

SAM C which I received a few months ago is a very lively and easy to use version of C. For your money you get a disc that is ready to use, and thankfully unprotected so you can copy it, and a hefty, very smart and well produced manual. The manual does not claim to teach you how to program in C, but it has plenty of examples that should let anyone who has programmed before to start programming almost straight away. After all there is not that much difference between one language and another.

Probably the biggest obstacle, for any one who has only used Basic before, is that you have to think things out a little better before you sit down and start to write. One reason for this is that C is a compiled language so, unlike the Basic built into the machine that interprets every command as it executes it, C first has to be compiled to produce an assembler source which is then assembled to produce an executable object. I know that sounds like hard work but don't worry SAM C will do all of that for you with just two key presses.

I have found SAM C a very easy to use program which is well laid out and presented. SAM C has a fully integrated development environment so you can type your programs in at the keyboard and produce running machine code without ever leaving SAM C. However, you can write your code elsewhere if you wish, which lets you bring source in from

other systems and you can stop the process after the production of the assembler to give it to your own assembler or so that you can later link files together. This makes SAM C a very flexible tool and I am sure that you will be able to find a method of working to suit your own preferences.

The development system uses menus to get around from one function to the next and these can be selected by use of the keyboard, cursor keys or a mouse. The main areas are file functions, the editor, compilation, debugger, options and browser. Each function has its own subset of functions, for example file functions let you load, save, merge etc. Compile lets you start the code generation process and select a number of options such as save the C source, save the generated assembler, run the code and a few others. Options let you set your preferences and save them so the program works in that manner next time you run it.

The remaining two options Browse and Debug can be very useful, I'm told, The Browse function will let you look through the generated assembler. This is very interesting if you want to know more about what is actually going on inside the compiler. Debugger will let you step through the final code to try and find out what is going wrong although I regret to say I found this of limited use as there is no watch facility, that is you cannot tell the debugger to print, step by step, the

contents of variable etc. as the program is run.

Hello World

I have to admit that it was with some sense of achievement that I first got this message on my terminal back in 1984. That is when I was teaching myself C. It is such a simple little task but can be fraught with the unexpected. The problem with C is that it is a very simple and largely unsophisticated language, on the other hand, the best feature of C is that it is a very simple and largely unsophisticated language. This apparent contradiction can be explained.

Being a very simple language you can do some very low level things, even drop into and out of assembler in many versions, and this is very useful, but on the other hand, in C, you get very little for free.

SAM C has with it a number of library include files and it is these that give you the ultimate power of C. An include file is really little more than more C that is written for you. Many people will confuse C and the libraries, thinking they are one and the same. They are not. Admittedly without any of these libraries you would find it quite hard to make any program written in C to do anything as all the interaction with the outside world is, generally, done via calls to the library routines. The *Hello World* program in the book uses one of these libraries, `stdio`. Now you could produce a program to do hello world without the call to the library function `'printf'` but would you really want to have to get involved in turning pixels on and off on the screen, as you would have to do.

C itself is, as I have said, very simple, but there are many library functions and as these mostly take parameters then learning how each can be used to do the

job that you want can be a little tricky. Just to save you the trouble of counting them SAM C comes with eight libraries including a total of 144 functions. So although C has only 25 keywords and 38 operators to get the most out of it you will need to keep referring to the manual to see what functions are available. I have been using C for years and still need to look them up (maybe its old age). You will find a good description of each function in the manual. A little word of warning here though, You may well have been told that C is a portable language and something written in C on one machine will compile and run on another. This is most often not as true as it should be, mainly due to the fact that every machine will have libraries that are unique to it - and SAM C is no exception to this. For example, unsigned `fatpfix(int s)` would be of little use to a mainframe or even to an MSDOS machine. Conversely SAM C does not have many of the functions that I am used to having in the C I use on the PC and so programs written there would not compile on SAM. Also SAM C does not support float or double types and this could cause porting problems. Or perhaps I should say opportunities to show your abilities.

You do not need to be concerned if there is no provided library function to do some job that you need, as one of the main advantages of C is that you can write your own library routine and then that code is available for any other programs that you might write later on.

There are one or two little things that are unusual in SAM C, that at first caught me out. The first is that when you include a library header at the start of your program you then also have to

Continued on page 30.

VARIABLES ON A THEME

A Look At The Spectrum's System Variables.

By:- Dilwyn Jones.

System variables are bytes in memory which help the Spectrum to remember certain things it needs to know about itself - if you like, these are the stores for the housekeeping routines that make the Spectrum work.

This is the first of a small series of articles in which I will attempt to 'Delve Deeper' into the Spectrum and investigate the complete set of system variables, giving (if I can) comprehensive guide-lines as to what you can and can't do with them.

This article, and the ones that follow are extracted from my book, *Delving Deeper* into your Spectrum ROM - first published in the UK by Interface Publications. You should still be able to borrow a copy from your local library.

The information, such as how the Spectrum's memory is laid out, is held in the system variables in these addresses so that the computer can get hold of it and update it as and when required.

We can make use of the information stored in these memory locations in our programs, either by reading information already there or changing it to make the computer do something it might not otherwise do, or sometimes do it more easily.

Not all of them are that much use to us. And certainly not all of them ought to be changed. Some will cause the computer to crash, or the computer may simply ignore you. Some can be happily changed under certain circumstances

only, and most within strict limitations.

I hope to give you some guide-lines as to what can and can't be done, but hopefully you will learn your own little PEEKs and POKEs in time as well.

Some of the variables are single byte, others two byte, and a few are longer still. In each case I will give you the address in memory, the system variables name, what it is mainly used for, and finally tell you as much as I can about it.

So, here goes part one.

• 23552 to 23559 [8 bytes]

• KSTATE

• Reading the keyboard

When the processor is interrupted (50 times every second in the UK version of the Spectrum) one of the things that is done is to read the keyboard and store the results here. The bytes have different uses. Not all can be practically used by the programmer.

You can use this program to examine what's going on in the eight bytes of KSTATE. Run it and press various keys to see what effect individual keys have, such as the Shift keys, and what effect going from one key to another has.

```
10 FOR A =23559
20 POKE 23692,0: REM KEEP SCRO
   LLING
30 LET B=PEEK A
40 PRINT A;TAB 10;B TAB 20;CHR
   $ B AND B>31
50 NEXT A
60 GOTO 10
```

The first four bytes of KSTATE deal with something called 'two key roll-over'

which allows you to press a second key before you actually let go of the first. The descriptions given to the main four bytes, 23556 to 23559, will apply to the first four also as long as you bear in mind that these only come into operation for two key roll-over. PEEK 23556 can return the code of the upper case version of the key pressed, so if you pressed Symbol Shift A you would get the code of 'A', not the code of 'a' nor the code of 'STOP'

This may be useful where it is essential that upper case be entered, etc. The effect of pressing a key is temporary and lasts only as long as the key is being pressed. The value in 23556 would be 255 if no key was being pressed at the time the interrupt had occurred. For the Enter key a value of 13 is returned. For the Space key, a value of 32 is returned.

Pressing both Shift keys simultaneously produces 14. This program will demonstrate this:-

```
10 LET A=PEEK 23556
20 POKE 23692,0
30 PRINT A, CHR$ A AND A>31
40 GOTO 10
```

23557 is used for timing to prevent intermittent key contact, etc. causing problems - known to the experts as keyboard debouncing.

23558 is the auto repeat timer which times the pause before the keys start repeating, then the pause between repeats once the key has actually started repeating. The delays used are those in the system variables that hold these delays (23561/2).

23559 contains the code of the last character pressed on the keyboard. This depends on whether the Shift keys were pressed or not. The numbers produced are those that would be returned by PRINT CODE INKEY\$ except that these

are the last key pressed and not necessarily the key currently being pressed. Try this program to display what can happen - RUN it and try pressing various keys making use of the Shift keys.

```
10 LET A=PEEK 23559
20 POKE 23692,0
30 PRINT A, CHR$ A AND A>31
40 GOTO 10
```

See also under 23611 FLAGS.

- 23560
- LASTK
- Newly pressed key

Every time the keyboard is scanned, a key is found to have been pressed and proved valid, the value of this system variable is updated. Its content is the code of the last key pressed.

This system variable does not really do much you could not do with INKEY\$, except that it could be used to type ahead one character.

Try the program given below, you will find that if you press a key when invited to do so, the key is indicated on the screen in a short while even though the program may not have got as far as line 50 when you pressed a key. The code of the last key pressed is stored here and stays here until another key is pressed. It is possible to test for a newly pressed key by examining bit 5 of the system variable FLAGS (23611). This would be '1' for a key just pressed.

```
10 PRINT "Press a key now"
20 FOR A=1 TO 900
30 NEXT A
40 CLS
50 LET A=PEEK 23560
60 PRINT A: IF A>31 THEN PRINT CHR$ A
```

This could be used for testing for a y/n (yes or no) type situation - if you knew one was coming up, you could indicate your response before the program got

there and the program would respond when it got round to it. Also, if two keys were pressed simultaneously, the program would respond if one were released without having to wait for the keyboard to be released completely.

Control characters can be generated using Caps Shift in conjunction with the number keys. Enter returns 13. Pressing both Shift keys together returns 14. To see this, try this program.

```
10 LET A=PEEK 23560
20 PRINT A,CHR$ A AND A>31
30 GOTO 10
```

- 23561
- REPDEL
- Repeat delay

This system variable contains the length of time that a key must be held down before it starts to auto-repeat. The unit of time delay is one-fiftieth of a second and starts off at 35/50 of a second. You can happily POKE this if, for instance, you want the key to start repeating immediately. The cursors become rather difficult to control if you, say, POKE 23561,1. You should note that POKE 23561,0 effectively turns off the auto-repeat, actually giving a delay of about five seconds like POKE 23561,255.

- 23562
- REPPER
- Delay between repeats

This system variable controls the length of time between repeats once the auto-repeat has actually begun. The time is in fiftieths of a second, just like REPDEL. If you effectively want to turn off the auto-repeat for any reason, POKE 23562,0 or POKE 23562,255 gives about five seconds between repeats. If you wish to edit long program lines (eg, a long PRINT statement) then POKE

23562,1 will speed up moving the cursor to the right place. But beware of changing 23562 too much at the same time or you may speed up the cursor so much it becomes difficult to control. Its normal value is 5/50 to a second or one tenth of a second.

- 23563/4
- DEFADD
- Pointer to user defined function.

The address of the argument of a user-defined function in a program, ie, if you had DEF FN A(B) in a program line, the value in 23563/4 would be the address of the letter B in the brackets in that line while only the function is being used. The best way to PEEK into 23563/4 to show this is to put the PEEK as a part of the FN to be evaluated as there is always a zero there unless the function is being evaluated. So the line:-

```
10 PRINT PEEK 23563+256*PEEK 23564
```

would always return zero. On the other hand:-

```
10 DEF FN A(B)=PEEK 23563+256*PEEK 23564
```

```
20 PRINT FN A(999)
```

would return the address of the B in line 10. The 999 is not significant, just something to actually give a value to B to prevent an error. In the case of a function with no argument:-

```
10 DEF FN A()=PEEK 23563+256*PEEK 23564
```

```
20 PRINT FN A()
```

This would print the address of the closed bracket symbol.

Ok, that is all I have room for this time. Next month (if the Editor gives me the space) I will continue this look at the Spectrum's system variables from the point I am now forced to desert you at. Back soon.

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BITS & BOBS

Exploring Your Printer's Bit-Image Graphics With Carol Brooksbank.

When I first bought a printer, the handbook was a weighty tome, explaining in great detail what every printer control code did, complete with sample listings and illustrations of the output. These days you often get only a list of control codes, and if you want any sort of explanation of what they do and how they work, you have to ask the manufacturer for a 'technical handbook'. If you are lucky it will be free, but some will demand an arm and a leg before letting you into their secrets. It is a sad sign of the times that most printer users want to hitch the thing up to a PC, press a few buttons and have everything happen as though by magic. **FORMAT** readers are different however, we actually like to get the best out of our computers and printers, and are willing to do a bit of programming to achieve that. We need to know about printer codes.

In this article I want to blow away some of the mists around the 'bit-image graphics' codes. I am going to deal with the most common standard EPSON codes which are available on most 9-pin and 24-pin dot matrix printers. When you get into the world of bubble-jet and laser printers, there are several systems around. But even those often have enough Epson compatibility to use these most common codes in much the same way as dot matrix printers.

When you use LPRINT, or send the codes for some text to the printer, the

codes it receives are the ASCII codes - a standard list in which, for instance, 'A' is represented by 65. The printer receives the a byte containing the binary value 65, searches its own memory for the correct dot pattern, and prints out the dots so that 'A' appears on the paper. If you use LLIST, the computer will expand the codes for the Basic command tokens, and send the correct ASCII codes to the printer to spell out the command.

But suppose you want to do a screen dump, or print a pattern of dots of your own devising? This is where bit image graphics come in. When the printer is in bit image mode, it will not interpret the numbers it receives as codes for printable characters, but will draw a pattern of dots corresponding to the pattern of the binary form of the number it receives. But the byte will be drawn vertically. So, if we send 65 in bit image mode, instead of printing 'A', a 9-pin dot matrix printer will react to its binary form 01000001 and print two dots, firing the second pin from the top of the head and the second pin from the bottom.

Fig.1, over the page, shows you the pin layout of a 9-pin dot matrix printhead, and the value required to fire each pin. To send a particular pattern of dots, you add together the value of each pin you want to fire, and send that number to the printer. The bottom pin is not usually used, but some printers have a code for firing the ninth pin, and we shall look at that later

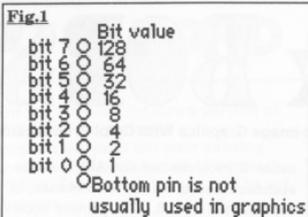
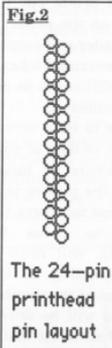


Fig.2 shows the pin layout of the 24-pin dot matrix printhead. We shall



deal later with the hi-res modes which fire all 24 pins. When it receives 9-pin codes a 24-pin printer will fire a selection of its pins and give a printout that looks like the one you would get from a 9-pin. So, where the illustrations are of 9-pin heads, you will find that you will get much the same result if your printer has the most basic level of Epson compatibility, ESC/P-80,

27, so when the printer receives the numbers 27, 75 (75 is ASCII code for 'K'), it knows that it must go into single density bit-image mode. It also needs to know how many bytes it is to print in this mode, before reverting to printing characters, and the two numbers which follow the bit-image mode letter hold the number of bytes to be printed, in the form: **number to print = n1+256*n2**. So to send 300 bytes in single density mode we should send:-

```
CHR$ 27;"K";CHR$ 44;CHR$ 1;
followed by the 300 pattern bytes we wished to print.
```

But to send bytes as binary data like this, we must stop the computer from treating them as Basic command tokens, which it must interpret and convert into ASCII codes, as it would for an LLIST. This is done by opening a stream for binary data, and the commands for this will depend on your setup. Here is a list of the computers/interfaces that I think **FORMAT** readers are most likely to be using. In the listings, replace the lines which read 'REM OPEN STREAM' or 'REM CLOSE STREAM' with the appropriate command for your setup

```
from this list:-
To open a stream
SAM : OPEN #3;"b"
Spectrum with:-
DISCIPLE/PLUS D : POKE @6,1
Kempston E : COPY:REM CHR$ 0
Interface 1 : FORMAT "b";baud rate
Spectrum +3 : FORMAT LPRINT "U"

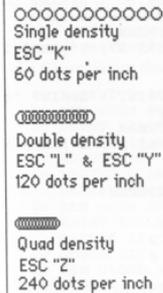
To close a stream
SAM : CLOSE #3
Spectrum with:-
DISCIPLE/PLUS D : POKE @ 6,0
Kempston E : COPY:REM CHR$ 1
Interface 1 : FORMAT "t";baud rate
Spectrum +3 : FORMAT LPRINT "E"
```

Next, we must look at the effect of the various densities on the printout. Fig.4 shows how far apart the dots are printed in each mode. Single density prints the dots side by side, so the pattern is wider than in double or quad density, when the dots overlap by varying amounts. The more the dots overlap, the darker the printout becomes, and the more squashed the pattern becomes. Also, in high-speed double density, and in quad density, the print head moves too fast to print dots which are adjacent

horizontally, so every other adjacent dot is missed out. If you type in this listing and RUN it, you will see the effect of the various modes on printing the pattern in Fig.3.

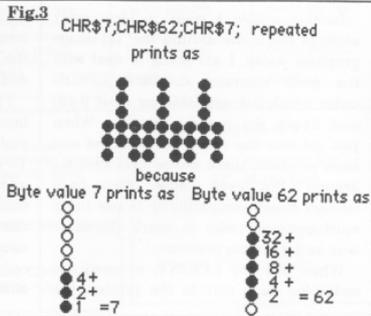
```
10 LPRINT "single density"
20 REM OPEN STREAM
30 PRINT #3; CHR$ 27;"K";CHR$
120;CHR$ 0;
40 GOSUB 200
50 LPRINT "double density"
60 REM OPEN STREAM
70 PRINT #3; CHR$ 27;"L";CHR$
120;CHR$ 0;
80 GOSUB 200
90 LPRINT "high speed double d
ensity"
100 REM OPEN STREAM
110 PRINT #3; CHR$ 27;"Y";CHR$
120;CHR$ 0;
120 GOSUB 200
130 LPRINT "quadruple density"
140 REM OPEN STREAM
150 PRINT #3; CHR$ 27;"Z";CHR$
120;CHR$ 0;
160 GOSUB 200
170 STOP
200 FOR N=1 TO 40
210 PRINT #3; CHR$ 7;CHR$ 62; C
HR$ 7;
220 NEXT N
230 PRINT #3;CHR$ 13;
240 REM CLOSE STREAM
250 LPRINT : LPRINT
260 RETURN
```

Fig.4



In single density and double density, adjacent pins can be fired, but in high speed double density and quad density the print head moves too fast, and will print only every other dot, even if adjacent pins are programmed to be fired, so will print like that in double density, but as in high speed double density

The high-speed double density sample is lighter at the bottom of the printout than the double density sample, because alternate dots are omitted in the two lines where dots are next door to each other horizontally. In the listing, we specify 120 bit-image bytes each time, because the 3-byte sequence is sent 40 times by the loop in lines 200-220. Some printers have a master graphics command,



ESC *. This command is followed by a number which selects a particular mode. ESC * 0 to ESC * 3 correspond to ESC-K, L, Y and Z. There are other modes, whose availability will vary from printer to printer. Fig.4a shows ESC * 5, a particularly useful mode for screen dumps because the centres of each dot are exactly one dot's width apart, so the result is a perfectly proportioned representation on paper of what is on the screen. Mode 4 - CRT (Cathode Ray Tube) graphics (80 dots per inch) - will also give a pretty good screen dump.

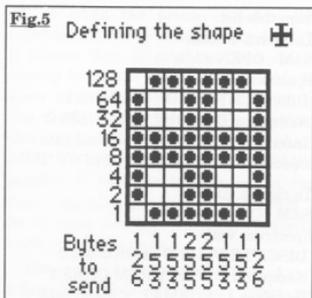
If your printer has ESC *, try the following program, but you may have to change it to leave out modes your printer does not have. 24 and 48-pin printers may have modes numbered above 30. These are the hi-res modes which we will look at later. Don't try them out with this listing because they work differently.

```

10 FOR M=0 TO 7
20 LPRINT "mode ESC ***** ";M
30 GOSUB 250
40 NEXT M
50 STOP
250 REM OPEN STREAM
260 PRINT #3;CHR$ 27;"**";CHR$ M
   ;CHR$ 120;CHR$ 0;
270 FOR N=1 TO 40
280 PRINT #3;CHR$ 7;CHR$ 62;CHR$ 7;
290 NEXT N
300 PRINT #3;CHR$ 13;
310 REM CLOSE STREAM
320 LPRINT : LPRINT
330 RETURN

```

If you want to know how the horizontal bytes held in a computer screen file are converted into the vertical ones needed to print a screen dump in bit image



graphics, look back to Machine Code Without the Tears, part 7, *FORMAT* Vol.5 N°7 March 1992, which explains how to do it in machine code. It can't be done from Basic.

The next listing prints the figure in Fig.5, twice.

```

10 LPRINT "single density"
20 REM OPEN STREAM
30 PRINT #3;CHR$ 27;"K";CHR$ 1
   6;CHR$ 0;
40 GOSUB 190
50 LPRINT : LPRINT : LPRINT "d
   ouble density"
60 REM OPEN STREAM
70 PRINT #3;CHR$ 27;"L";CHR$ 1
   6;CHR$ 0;
80 GOSUB 190
90 LPRINT : LPRINT : LPRINT "h
   igh-speed double density"
100 REM OPEN STREAM
110 PRINT #3;CHR$ 27;"Y";CHR$ 1
   6;CHR$ 0;
120 GOSUB 190
130 LPRINT : LPRINT : LPRINT "q
   uad density"
140 REM OPEN STREAM
150 PRINT #3;CHR$ 27;"Z";CHR$ 1
   6;CHR$ 0;
160 GOSUB 190
170 REM CLOSE STREAM
180 STOP
190 RESTORE 290
200 FOR R=1 TO 2
210 FOR N=1 TO 8
220 READ A
230 PRINT #3;CHR$ A;

```

```

240 NEXT N
250 RESTORE 290
260 NEXT R
270 REM CLOSE STREAM
280 RETURN
290 DATA 126,153,153,255,255,15
   3,153,126

```

I said that some 9-pin printers - those which have ESC ^ - will let you fire the bottom pin. 9-pin graphics are only possible in single and double density, and they are selected by

ESC ^ 0 (single) ESC ^ 1 (double)
Like all the other bit-image graphic mode commands, these are followed by the numbers holding the number of characters.

Now, however, each vertical line of dots needs two bytes, one which holds the pattern for the top eight dots as before, and one which says whether the ninth pin is to be fired on this line. It will be fired if this number is 128 or higher, but not if the number is below 128. However, although we have to send twice as many bytes, the number specified after the mode bytes is not doubled, because it represents the number of vertical lines of dots to be sent, and in this mode the printer expects two bytes per line.

If you have ESC ^, the following listing will print Fig.6, and if you compare it with the output of the previous program, you will see the little 'tail' underneath the figure where the ninth pin has fired.

```

10 LPRINT "single density"
20 REM OPEN STREAM
30 PRINT #3;CHR$ 27;"^";CHR$ 4
   8;CHR$ 16;CHR$ 0;
40 GOSUB 110
50 LPRINT : LPRINT : LPRINT "d
   ouble density"
60 REM OPEN STREAM
70 PRINT #3;CHR$ 27;"^";CHR$ 4
   9;CHR$ 16;CHR$ 0;
80 GOSUB 110
90 REM CLOSE STREAM
100 STOP

```

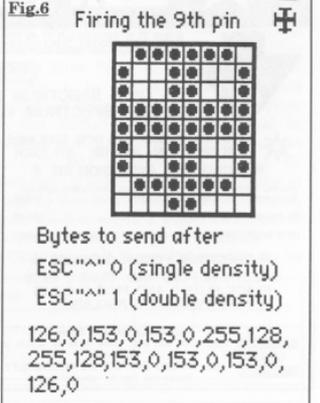
```

110 RESTORE 210
120 FOR R=1 TO 2
130 FOR N=1 TO 16
140 READ A
150 PRINT #3;CHR$ A;
160 NEXT N
170 RESTORE 210
180 NEXT R
190 REM CLOSE STREAM
200 RETURN
210 DATA 126,0,153,0,153,0,255,
   128,255,128,153,0,153,0,126
   ,0

```

The bytes for firing the ninth pin have been inserted in the data line - 0 for no fire, 128 for fire - between the bytes we used before. In line 130, we have had to change the loop to 16, because now there are 16 bytes per character, but in lines 30 and 70, we leave the total number of bit-image characters in the line unchanged at 16 - 8 lines of dots per figure sent twice.

24-pin printers have ESC * modes which allow you to fire all the pins. My Citizen has modes 32 (single density), 33 (double density), 38 (CRT), 39 (triple density) and 40 (HEX). In all these



modes, each vertical line of dots needs 3 bytes of data. The first byte controls the firing of the top 8 pins, the second one the middle 8 and the third one the bottom 8. So you design your pattern on a grid 24 dots high, then divide it into three blocks of eight to work out the value of each byte. Just like firing a 9-pin's bottom pin, you still specify the number of vertical lines of dots after the mode selector codes, but in the data lines you will need 3 bytes per vertical line.

Remember the 24-pin layout when you are working out a pattern - two overlapping banks of 12 pins - so the 24-pin vertical line is only a little deeper than a 9-pin. If you design a 24 * 24 dot pattern it will print three times as wide as it is high in single density, and you will need triple density to print the true proportions.

48-pin printers have similar hi-res

ESC * modes, but they require 6 bytes of data per vertical line and you design on a 48-square high grid.

I hope that this quick run-through of bit-image graphics will help you to exploit your printer's capabilities more fully. You can actually draw quite complicated pictures from Basic, using bit-image graphics, if you plan it all out on graph paper and work out what bytes need to be sent. You will need to adjust the line feeds, so that each line of graphic bytes touches the one above, without overlapping or leaving a white line across the printout. ESC J n (which gives a line feed of n/216" with 9-pin and n/180" with 24-pin) is often the most useful command to use. But that is for you to experiment with. The listing for a program like that could fill an issue of **FORMAT** all by itself.

Have fun.

The HELP PAGE

Edited By:- Ray Bray.

been given as follows:-

- 0 =Free
- 64 =BASIC
- 192 =SCREEN
- 96 =DOS
- 32 =Utilities
- 211 =RAMDISC
- 48 =MasterBASIC
- 255 =Non-existent (ie. on 256K SAM).

On the question of whether ROM0 is always in place; unless the programmer has decided otherwise, it is permanently in the first 16K slot of memory. As you know, SAM views the addressable memory in 4 sections, A to D; in most instances ROM0 is always resident in Section A and when required, it switches ROM1 into Section D. It is best to think of the two ROMs being permanently attached to their respective Sections but being switched on or off when required, rather than being paged in and out. This means that Page 13 can be paged to Section A to enable a machine code routine in Page 14 to be used in Section B, but ROM0 remains operational in Section A if Bit 5 of the LMPR stays set to 0 (ROM1 is controlled by Bit 6). However, if there is also a m/c routine in Page 13 that it is required to be accessed, then Bit 5 is set to 1 which switches off ROM0 and makes Page 13 available.

Of course, all the switching has to be

Our first query this month comes from P.J.Williamson of Sleaford who is a bit confused as to how the memory on SAM is arranged, and although he understands the paging in of memory, it is the initial conditions that are the problem. Particular questions he wants answering are; why is the RAMTOP on the unexpanded SAM at 81919 and not at 65535; in the unexpanded state is the ROM 0 always at 0 to 16384 or is it paged in and out as required; and what is this 'offset' business?

In replying to this query the difficulty is knowing how much detail to include or leave out. On the question of the initial value of RAMTOP, the simple answer is that the operating system was designed to allocate four 16K pages to BASIC on start-up, therefore these, on top of the 16K for ROM1, requires 5 X 16384 bytes of memory hence the 81919 RAMTOP. In addition to the four pages reserved for BASIC, the operating system sets aside two pages for the screen and one for Disc Operating System, which are placed in the top three pages of memory. The initial set-up on an unexpanded SAM is as shown in Fig.1.

The allocation of pages is recorded in the Page Allocation Table which comprises 32 bytes starting at memory location 20736. The codes used in the table indicate what use each page has

Page Numbers				
ROM 0	0 to 3 BASIC	4 to 12 FREE	13 DOS	14 15 SCREEN

Fig.1.



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executed from a routine in a Section other than A and ROM0 has to be switched back on before returning to Basic. You can see from this how ROM1 can be switched on and off in Section D when operating a Basic program in Sections B to D.

Finally the term 'offset' is a means of referring to an address (be it the start of m/c routine or a stored parameter), by means of its position relative to the start of the page or table in which it is located. For example, if a routine located in Page 5 started at address 100000, then its offset address would be 100000 minus the start address of Page 5 (98304), i.e. offset 1696. Now if Page 5 is paged into Section D to CALL the routine, then the CALL'ing address becomes the start address of Section D plus the offset address, i.e. 49152 plus 1696 equals 50848. Equally, if the offset applies to a table, then the parameter address is given by the start address of the table plus the offset.

The next letter concerns programing on SAM and comes from Carol Riman of Loughborough. She uses a 256K SAM (without MasterDOS or anything else), and wishes to produce her own version of the Disc Directory. The ability to RECORD the Directory to a string as given in the Technical Manual, page 60 (ie RECORD TO a\$: DIR #16;1: RECORD STOP), promised to be the answer to her problem enabling manipulation of the string to vary the presentation of the Directory data. However, when she tried to use this command all that happened was the error message: "90 Invalid Station". Carol wishes to know why this does not work and could we suggest any ways of getting hold of the file names in order to use them?

Unfortunately Carol, it seems that although the Technical Manual lists this command, the standard DOS does not accept stream 16 as a valid option, whereas the MasterDOS does.

However, all is not lost for you as there is another instruction which enables the use of streams other than stream 16, in the same way. The following routine will enable you to record the directory to a\$:-

```
10 CLOSE #15: OPEN #15;"$"
20 RECORD TO A$
30 DIR #15;1
40 RECORD STOP
50 CLOSE #15
```

This will record the normal full directory listing to a\$ but if you require only the names of the files, as given in the short directory listing, then change line 30 to:- 30 DIR #15;1!

Enough of SAM for the moment. As we have had few questions on the Spectrum recently, I thought that Spectrum operators who dabble in machine code programming might be interested in the following routine. The routine is extremely useful in program development as it enables a break-out from an infinite loop to be made with the code address at which the break-out occurred displayed on the screen. The routine first appeared in ZX Computing Monthly in June 87 and was sent in by Ray Reeves who amended an earlier program (by Andrew Vellacott), which did not have the address display. On a bare Spectrum the program is initiated with the command RANDOMIZE USR 65316 but with a PLUS D fitted (and presumably a Discovery), both the routine and your program have to be included in a single direct instruction (eg RANDOMIZE USR 65316: RANDOMIZE USR 40000), or the machine crashes.

```
10 REM "m/cBREAK"
20 CLEAR 65278: RESTORE
30 FOR A=65279 TO 65322
40 READ C: POKE A,C
50 NEXT A: STOP
60 DATA 1,255,245,205,84,31,48,4,241,195,56
70 DATA 0,241,62,2,205,1,22,1,6,24,205
80 DATA 217,13,193,205,43,45,2,05,227,45,237,86
90 DATA 255,195,3,19,62,254,23
```

Of course, SAM users can make use of the NMI button to break into infinite loops but that does not provide a break address. I have tried without success to devise a routine similar to the above for SAM but as far as I can see the stack on which the program address is kept is paged out as the NMI button is pressed. Perhaps it would be possible to use another button such as ESC using a dedicated interrupt routine? I have always considered it a pity that the designers of the Z80 gave the programmer the facility to read all registers but the program counter.

Now for an item, first raised by Basil Lankaster in 1993, which we were unable to answer at the time but now, through the persistent efforts of a few readers, we have a solution for. The subject in question was the transfer of files and data between the Amstrad NC100 Notepad and SAM.

Phil Glover has written giving me the details of how he has at last obtained two-way file transfers with the help and encouragement of Anthony Drage and Cliff Jackson. The main problem appeared to be in the wiring of the supplied connecting cable which should be modified to connect the pins of the RS232 9-pin plugs as follows:-

NOTEPAD	SAM
1	not connected
2	to 3
3	to 2
4	to 8
5	to 5
7	not connected
8	to 4

Using Cliff Jackson's software Phil writes: "To send from SAM to Notepad, I select the necessary OUTWRITE file, convert it to ASCII form with the utility on the original OUTWRITE disc, load Cliff's ASCII transfer program (on SAM),

and set BAUD to 9600 and DATA and STOP bits to 8 and 1. Set the Notepad to SERIAL/ASCII transfer mode, BAUD rate etc. as the SAM. Load the file into the SAM's transfer program and prepare to send. On the Notepad press FUNCTION and L to list documents present, then MENU key to access transfer options, select RECEIVE option and input a receive file name when prompted. The file will then be transferred to Notepad."

"For Notepad to SAM, add a character 26 (EOF marker), to the end of the text file you wish to send. (In edit text mode, press SYMBOL and MENU for the extra characters, and select the right arrow sign). Once done, drop out to the TRANSFER menu, (FUNCTION and L, then MENU). On SAM, load Cliff's MULTI transfer utility, setting SAM parameters as above (9600,8,1). Select option 2 (Receive with End of File Marker 26). Press SEND on the Notepad, and the data is sent rapidly to SAM. Both machines recognise when transfer has been achieved. On SAM press 5 to check the file contents. A few extra spaces may be found, due to hidden codes used by Notepad machines, which will need editing out. (Any good SAM programs for stripping such codes?)"

Very many thanks for that information Phil and also to Cliff and Anthony for their help. Reference stripping out the codes from the Notepad file, if you have *The Secretary* WP you could IMPORT the file and this gives the facility for stripping out all control codes. If anyone would like a copy of Cliff's MULTI transfer program then send me a formatted 3½" disc and a stamped addressed envelope and I will forward one.

Phil also offers his help to anyone who wishes to make NOTEPAD/SAM transfers and he can be contacted at: 43, Ferndale Road, Hall Green, Birmingham, West Midlands, B28 9AU.

Finally, in response to our recent appeal for the address of a firm called MICROSNIPI, Ben Curren of Chorley Lancs kindly sent me a copy of their 1991 catalogue which shows their address in Birkenhead and the phone number. Unfortunately, a call to Directory Enquiries revealed that they were no longer at that address so it looks like they have ceased trading.

And that's all we have for this month. Please keep sending your problems/answers to the following addresses:-

Anything SAM or General Purpose:-

Ray Bray (Format Help Page),
Spring Cottage, Bourne Close,
Porton, Salisbury, Wilts, SP4 0LL.

Anything +3, CP/M:-

Mike Atkins (Format Help Page),
70, Rudgwick Drive,
Bury, Lancashire, BL8 1YE.

Please remember that if you want any discs/printouts etc returned then you must include an SAE.

Continued from page 16.

include the library file proper at the end, and another is that files cannot be nested - that is to say you cannot have an include statement inside a library file. I also had a bit of fun with my own habit of nesting comments which is also not allowed. All these are just a matter of getting used to a particular style and I am happy to say that I quickly got used to these restrictions.

SAM C, written by Marián Krivos, is available from FRED Publishing as advertised in **FORMAT**. I would most definitely endorse the sentiment in the first two lines of their advert which reads "Basic too slow? Machine code too hard?". SAM C can definitely bridge that gap. I also eagerly wait to see what you can produce using SAM C, as I know that FRED are keen to receive any new libraries to include on the C disc or a supplement of it.

Uni-Dos Corner

By:- Henk van Leeuwen. Edited by:- Adrian Russell.

As users of UNI-DOS will already know, CREATE files are used to add new commands and functions which can be used in your own Basic programs. The CREATE files, when loaded, are stored in the Basic memory space so they must be written to be relocateable.

With this month's CREATE file it is possible change from 128K to 48K mode. It is necessary to load the CREATE in 128K mode to make it work properly. The syntax is USR # and USR @

```
START      ORG 60000
           DEFB 1 ;only one syntax
           DEFB 192
; character value for 'USR'
L_USR      DEFW USR_LEN
           CP "#";code 35
           JR Z,MODE48
; if yes   jump to 48 mode
           CP "@";code 64
           JR Z,MODE128
; if yes   jump to 128 mode
           RET NZ
; if reject if wrong
MODE48     RST 40
           RST 24
           DEFB 13 ;SYN.END
           .LD HL,4867
           LD DE,7030
           LD B,0
           JR EINDE
MODE128    RST 40
           RST 24
           DEFB 13 ;SYN.END
           LD HL,23325
; load HL with ONERR
           LD DE,6177
           LD B,16
           LD SP,(23613)
EINDE     LD SP,with value in ERR_SP
; load SP with value in ERR_SP
           EX (SP),HL ;exchange it
           PUSH DE
```

```
; save DE to stack
           LD A,(23611)
; FLAG to A register
           AND 239
           OR B
           LD (23611),A ;and back
           LD A,16
           XOR B
           LD B,A
           LD A,(23388)
; load A with BANKM
           AND 239
           OR B
           LD (23388),A ;and back
           LD BC,32765
; value from page number
           OUT (C),A ;page in
           RST 24
           DEFB 14
;COM.END
USR_LEN   EQU $-L_USR
```

And again, for all you cheap-skates who still have not bought an assembler, the DATA Basic lines for the code.

```
300 DATA 1,192,68,0,254,35,40,5
301 DATA
254,64,40,14,192,239,223,13
302 DATA 33,3,19,17,118,27,6,0
303 DATA
24,11,239,223,13,33,29,91
304 DATA
17,33,24,6,16,237,123,61
305 DATA
92,227,213,58,59,92,230,239
306 DATA
176,50,59,92,62,16,168,71
307 DATA
58,92,91,230,239,176,50,92
308 DATA
91,1,253,127,237,121,223,14
```

When finished typing this program save it as:-

```
SAVE d* "USR_code"USR 60000,72
See you again soon.
```

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W1104	1 MegaByte External Memory Pack. (Needs MasterDOS to run from Basic).	PHONE
W1106	SAM Mouse System. Interface, Mouse and Software. Plugs into mouse port on rear of SAM. More and more software now works better if you use a mouse.	£39.95
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YOUR LETTERS

Dear Editor, Megga Dude, Sir,

We, the undersigned, would sincerely like to take this opportunity to compliment you on a most excellent computer, the SAM Coupé 512.

We have had zillions of hours of stupendous fun on it, and have at times found it to be most useful. We would like to thank you for this most bodacious item, because if it wasn't for you, we, the undersigned, wouldn't have been able to keep our, 'er in doors (mother) quiet for so long - Party on Dude.

If this letter has been intercepted by 'er in doors - Mafia Ltd., we would appreciate most gratefully that you forward, lovingly and secretly ie:- keep shtum about this chaps, a program or two to keep the Mafia off our backs, we're in enough trouble as it is, either that or send her a large slice of cheesecake.

Tatty by Boss Man, Lifetime of thanks. Oh, and thanks to Aunty Rose for a nice tea.

Party on Wayne, Party on Rick,

Sorry to inflict my nephews on you folks, their mother has no control...

Anyway boys, take good care of your SAM and make sure all your friends buy one soon. As for programs, work long hours like I do, and then buy your own (or wait for Birthdays). **Uncle Bob(Ed).**

Dear Editor,

Thanks for advertising my spare SAM Coupé a while ago. That's now sold. Off the top of my head I've had about twenty calls concerning it.. Anyway, it shows there are people still interested in the

Coupé. I myself will not be selling my remaining SAM.

In the meantime, I'm still after a +3 version of *Elite* and, if anyone ever did it, a Coupé version, or at least a version which loads and saves commanders to disc, please let me know.

Yours Sincerely Martin Wilson.

Dear Editor,

I have owned a SAM for about 3 years and the keyboard has just packed up. Do I need to buy a new membrane, or the whole unit, and how much do they cost? Also, is it possible to replace the crystal in the SAM to run it at Spectrum Speed to improve compatibility?

I would like in the future to see a hardware section dealing with how to add bits on to the SAM using the expansion connector.

Thankyou very much for a great magazine.

Yours Sincerely, Ashley Martin.

The keyboard is available from us as a complete unit at £12.95 including UK p&p. As it would be difficult to change the membrane MGT never ordered any separately as spares.

When in Mode 1 the SAM runs only slightly faster than the Spectrum so there should not be compatibility problems, except with a few speed-loader tape routines. However, there has been a couple of items in the past that have dealt with modifying the tape routines in the Spectrum ROM-image, by adjusting the time constants. Look through back issues in volume 3 and 4 and you should find something. **Ed.**

Dear Editor,

I bought an Amstrad colour monitor and would like to know if it is compatible with the SAM Coupé and would the 5v supply run the SAMBUS without damage.

Yours Sincerely, Colin Urwin.

If you mean an Amstrad CPC monitor then I have seen them working on a SAM. However, I'm not sure if they display all the colours or not. And yes, the 5v supply will run the SAMBUS - after all, the SAM power supply is a modified CPC power supply that Bruce Gordon purchased from the company that made them for Amstrad. *Ed.*

Dear Editor,

On your questionnaire (on the back of the renewal form you send out) you ask for comments on the articles which appear in *FORMAT*. I cannot answer them accurately because I read the magazine from cover to cover and really enjoy all the articles, although I must admit I don't always agree with all the letters from readers.

Having on my work-station a Spectrum, a SAM, a Laptop and a Desktop all coupled up for instant use, I have a lot of enjoyment trying to alter programs in Basic from one to the other. When using Spectrum Basic on the PC Emulator I often have the Spectrum keyboard on the screen of the Laptop for reference. I use the Tape interface which I bought from BG Services last year while in the UK (I live in South Africa), for transferring the programs to my Spectrum. All very complicated but a lot of fun.

I am retired and 'playing', as my wife calls it, computers is my main hobby.

I do look forward to the latest issue of *FORMAT* each month, keep up the good work.

Yours Sincerely, Peter Hyde.

Dear Editor,

With regard to the query from Glyn Kennington, in the March issue, about the Opus Discovery. It will just about tolerate a ribbon cable so long as it is kept as short as possible. Opus recommended a maximum length of 75mm for a non-standard keyboard, though for some years I have been using a slightly longer cable as it was readily available at the time. Any peripherals must be plugged into the through-port on the side of the Discovery rather than between the computer and the disc drive.

Possibly DATEL may still stock suitable cables.

For anyone who is interested, the Spectrum Discovery Club is still alive and well at 76, Mannville Road, Keighley, West Yorkshire BD22 6AT.

Yours Sincerely, Stanley Betts.

Dear Editor,

Please explain the different keywords on the newer machines (SAM) to enable me to convert programs to run on my simple Spectrum.

Yours Sincerely, Alan Boyles.

Some SAM keywords have been explained in past articles, but if there are any that you do not understand then let me know and I will try to get something printed for you (and others).

The same applies in reverse, if there is anyone who does not understand a Spectrum keyword (or more often a POKE) that you have come across in the process of converting to SAM, then all you have to do is ask. *Ed.*

Dear Editor,

Why is it that most members seem to write to you when either, their membership is due or are no longer wishing to subscribe.

For me, this sadly is the latter, since recently I have sold my SAM.

In 1990, I was one of the first to

purchase the SAM Coupé, when Amiga's and ST's were around three to four hundred pounds, and the PC286 was over a thousand pounds. Even then the SAM was good value at two fifty with disc drive.

I chose the SAM because of four main reasons;

- a) To learn basic computing.
- b) Word processing.
- c) Gameplay via Lermtape's excellent Spectrum emulator.
- d) Price.

After spending a few happy hours with Alan Jones of Y.V.J., Caversham, I was convinced it was the one for me, and over the past five years, the family and I have had many hours of pleasure using the SAM.

Since that time I have been a member of INDUG and received *FORMAT* every month, it's an excellent magazine, and may I suggest with more interesting articles than any of the so called major Mags!, without the umpteen adverts too.

I was tempted to renew my subscription just for the continuing saga's on the letters page, some months are better than Eastenders.

I, like many others, am changing to a PC/AT for many reasons. My excuse is that my eldest Son is taking Information Technology at College, and his tutor recommended that he should have a computer of this format at home to assist with his studies. I also use this format at work, so in the end I decided the SAM had to go.

It is obvious that you are all avid Spectrum and SAM enthusiasts, you are doing a fine job and I wish you all the best for the future.

Yours Sincerely, R.J.Chapman.

Sorry to lose you of course, but hopefully - like many others - you will return to the fold one day. SAM, and indeed the Spectrum, is so much more 'user friendly' than a MSDOS machine,

but if you do have to stick with your new computer then at least make sure you get a copy of the excellent Spectrum emulator from BG Services, it is the only way I would think of writing a program on my 386. *Ed.*

Dear Editor,

Please can anyone help me. I have got a 'Mannesman Tally 290' printer but there isn't an instruction manual with it. Do you know if anyone has one or where I can get one?

Also do you know of anyone who has some mags (Your Sinclair, Crash, Sinclair User) for sale as I have some mag tapes and no instructions for them. Hope you can help.

Yours Sincerely, Dorothy Taylor.

If anyone can help Dorothy we will of course be happy to pass on your letters. In the meantime readers, be warned, a bargain printer is not such a bargain if it ain't got the manual. Most manufacturers will sell manuals (so you could try Mannesman Tally on 01734-771688) but the price is usually high. *Ed.*

Dear Editor,

Owing to sudden unemployment at the beginning of the year, I was unable to renew my subscription to *FORMAT*. I would like to rectify that and also order the issues that I have missed in the time between.

A word on hardware. Since Mr Parker is no longer in the SAM scene, I have been able to get three old books on designing and building hardware for the Z80 type computers (Z80, Spectrum 48, Jupiter, etc.) Being in German though, they're not much good to most, but here are the English titles which may help others interested in experimenting.

Easy Add-on Projects For Spectrum ZX81, And Ace by Owen Bishop (ISBN 3-7643-1589-X).

Simple Interfacing Projects by Owen Bishop (ISBN 3-7643-1552-0).

Spectrum Hardware Manual by Adrian C. Dickens (ISBN 3-7643-1621-7).

The first two books give details of making a decoder as well as various projects for clocks, picture digitizer, or model train sets. I have not built all projects, and the books do not deal with the SAM, though with a bit of thinking I suppose they could be built to work with the SAM as well.

The third book is simply information about the internal workings of the Spectrum.

I hope this information may be of interest to someone out there.

PS Just in case I forgot, a (perhaps belated) thank you for your help in the past with my orders.

*Yours Sincerely, I.W. Canfield.
(Germany).*

Thanks for the info on the books. By the way, when it comes to renewing we always backdate renewals automatically so that any issue that have been missed will go out with the next issue. The only time we don't do this is if someone has been out for over 9 months. Anyway, what we have done in your case is take the total money you sent and divided it by the monthly rate and given you that number of months on your membership.

Ed.

Dear Editor,

I am enquiring about the cost, inc VAT and postage, of a replacement G+DOS ROM chip for my PLUS D Interface.

I read in a recent FORMAT issue you are trying to arrange a repair service for PLUS D's, but I would not need to send my PLUS D for repair as I know what is wrong. When I swap G+DOS ROM for Uni-DOS ROM, Interface works OK.

I enclose a SAE and I look forward to your reply.

Yours Sincerely, Malcolm Gent.

We can get a new ROM for you at £12.95 inclusive. **Ed.**

Dear Editor,

Like Norma Wrangham, in the April issue of FORMAT, I prefer to program in Forth. I use two versions of Forth on SAM, but neither of them are what you would call standard.

One version is my own composition. I wrote it originally for the Memotech MTX 512, because I found the official Forth extremely cumbersome to use. Since the Memotech was a Z80 computer it converted quite easily to SAM.

The other version began life as a Jupiter Ace emulator, I saved the Ace ROM to tape and loaded it into SAM using a short piece of machine code. I then wrote the necessary machine code to make the ROM image work on the SAM. But the Ace only had black and white graphics and feeble sound, so gradually I began to add extra features by calling SAM's ROM from Aceforth. The program ceased to be an emulator and became a version of Forth for SAM.

The main peculiarity of Aceforth is that you have no source code. An Aceforth program is saved as a compiled Forth dictionary. If you wish to edit a word, Aceforth recreates temporary source code in an edit buffer and allows you to make the necessary amendments.

I have always liked using Aceforth but I find I can do more with it on SAM than I ever did on the Jupiter Ace.

PS Have included a Vlist for each version, and a bell ringing program written in my own version, to show what they're like.

Yours Sincerely, John Avis.

Ah, Forth, some happy memories of hours spent trying to work out how to move something on the stack. Give me a ring sometime, maybe others would like to have access to a SAM Forth. **Ed.**

Dear Editor,

Having been a reader of FORMAT for the past three years I thought I would take this opportunity to thank you for

producing such a great magazine.

As a SAM Coupé owner, it can sometimes feel like I am the only person in the world to own such a machine therefore it's good to know that my monthly dose of hope will soon drop through my letterbox.

One of my favourite parts of the magazine is the letters pages. But over the last few months people seem to have started whinging a lot, be it about the failings of their computer or even the standard of spelling in FORMAT.

It seems to me that the only way we can get round the first fault is by all working together to try and make the SAM the successful computer it deserves to be. But not all of us, myself included, are good at developing new pieces of hardware or writing classic computer programs so it is up to us to encourage and support the work of the developers, be it by letter (telling them what we want) or by just buying their products. For instance, it was good to see all the latest software and hardware on display at the last FORMAT show in April, especially the hard disc working on a SAM! I'm sure that if this could be developed further we would see more and more software appearing on our beloved machine.

On the second fault of bad spelling I must admit that the spelling in some articles, letters and even adverts does leave a lot to be desired. As a local newspaper journalist I understand that some mistakes do creep through. I regularly type in letters from readers and I agree with Bob Brenchley when he says he likes to do as little editing as possible to allow the writer to express themselves fully. But surely if there is a spelling mistake in a letter or article it wouldn't do any harm to correct it.

Finally, and it's not a gripe really, in the April edition of FORMAT you printed an article by David Finch called BASICally Mousing. Now I'm sure that I

saw this article printed in **FORMAT** only a few months ago. If this is so, was it intentional or did the gremlins strike again? Or, even worse, are you running out of articles to print?

Whatever the answer you have my continued support.

Keep up the good work.

PS Is there any more news on the books you were planning to reprint?

Yours Sincerely, Paul Bacon.

I am absolutely appaling at spelling, so I use both the spell-checker (built into Ami-Pro on the 386) and Jenny to correct things. Two problems. First spell checkers do not check words in context and very often have alternate spellings of a word as well. Secondly, Jenny is always telling me that 'he (or she) that makes no mistakes - makes nothing'. Usually just after I have found one she has missed. We try to be perfect, and in doing so manage to get it right more often than some, which is all I ask for.

Yes, as I appologised for last month, the mouse article was my fault, but it was so good wan it not?

Books are coming, I'm working on two at the moment, but the response to my bits in FORMAT have not been as enthusiastic as I expected. Only a few letters asking for specific books - which just brings us back to the early part of your letter - it would be nice if more people spent just a few moments to write us a little note telling us (and other companies) what they want.

An example of this lack of user participation was the Video Digitizer. SAMCO thought there would be a good market, but there was not. Reason? Lack of feed-back from SAM owners. If I had 100 letters asking for a particular book to be reprinted then I could plan on printing say 250 copies and selling at a reasonable price. If I only get 20 letters, then the price has to go up because the print quantity has to come down - or

even worse still, the book never gets reprinted because the numbers don't add up. Feed-back please, tell us what you want and you just might get it - sit on your bum and rely on others to write in and the odds are you will lose out 'cos that book (or program or piece of hardware) just will not appear. **Ed.**

Dear Editor,

I saw mention of a hard disc drive coming for the SAM, but could you tell me if there is one available for the Spectrum? If not, do you think that there would ever be one, indeed would it be possible to use the SAM drive?

Your sincerely, Mike Looker.

There has often been rumours of a Spectrum hard drive but I must admit the only one I ever saw was in the offices of ZX Africa, in South Africa, in 1983 - and in fact that was running on a ZX81 because Spectrums were in such short supply that the designer preferred to blow up ZX81s instead of risking his valuable Speccys.

In theory, an IDE drive can be made to work quite easily. The difficulty however, is the operating system. On SAM, taking 16K (or even 32K) of memory for a hard-DOS is not too bad. On a Spectrum, it would be far too large an overhead. Both the DISCiPLE and PLUS D use shadow RAM/ROM, as did Interface 1, to provide an extension to the normal Spectrum ROM. It would be possible to do something similar, but would anyone pay the price? Any comments readers? I would like to know if you would buy, and at what price. **Ed.**

Letters may be shortened or edited to fit on these pages although we try to edit as little as possible.

This is YOUR letters page so it is up to you to fill it with interesting things. Come on, get writing, any subject even remotely related to computers. Just keep things as short as you can so we can fit in as many as possible each month. Please write clearly or type your letters. Send them to the address on page 3 or fax them to us on 0452 360890.

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