

SAM C

The language all the professionals use...
Almost as easy as writing in BASIC...
Yet it compiles to Machine Code...

Nev Young, June 1995 FORMAT - "very lively and easy to use ... well laid out and presented ... a very flexible tool"

Carol Brooksbank, July 1995 FORMAT - "allows you to write very sophisticated programs ... I would recommend SAM C to anyone who likes programming ... It is the language most professional programmers use, and I feel sure it will lead to many new and sophisticated programs being written for SAM."

Now out for only £19.99



FRED PUBLISHING, 40 ROUNDYHILL, MONIFIETH, DUNDEE, DD5 4RZ
Tel: 01382 535963

Vol.9 Nº4.

December 1995.

FORMAT

THE HOME OF Z80 COMPUTING



Packed Full Of
Christmas Cheer

£1.50 (UK R.R.P.)

ISSN 0963-8598.

MAKE LIFE HARD FOR YOUR SAM

What *Every* Sam Owner Has Been
Waiting For. **Megabytes** or even
Gigabytes of on-line disc storage.

Yes, The **SAM IDE Hard
Drive Interface IS HERE**

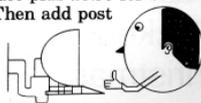
Only £60

Works with either
SAM Elite or
SAM Coupé 512K

Comes complete with **Hard Disc Operating System** on
3½inch floppy together with utility software. All you need is
a standard PC IDE drive (any size from the smallest to the
very largest) with a suitable power supply. We can supply a
70cm cable to connect your drive to the interface if you do
not have one. **Only £9.95** when ordered with the interface.

All S D Software customers will receive **FREE** software
updates until the end of 1996 - so there is no reason to delay.

Terms: Payment with order only. Send
cheque or postal order, in pounds sterling, for
£60.00 for each interface plus £9.95 for our
extra length cables. Then add post
and packing:
UK £1.00, EEC £1.50,
rest of the world
£2.00.
Please allow 28 days for



S. D. Software,
70, Rainhall Road,
Barnoldswick,
Lancashire, England,
BB8 6AB.

Other software still
available: See last
months advert.

CONTENTS

Vol.9 N°4.

December 1995.

♦ News On 4	4
♦ The Editor Speaks	5
♦ Short Spot	7
♦ The HELP Page	15
♦ Small Ads	17
♦ The L.S.D. Quiz	18
♦ Hard Driving - A First Look	19
♦ SAM Autostereogram	23
♦ Writing For FORMAT	25
♦ DTP Tips	27
♦ How Basic Is Stored - Part 2	29
♦ XMAS FUN	32
♦ Your Letters	33
♦ FORMAT Readers Service	39

THIS MONTHS ADVERTISERS:-

CHEZRON SOFTWARE (OUTLET)	32
FORMAT (SAM REPAIR SERVICE)	22
FRED PUBLISHING	Back Cover
HILTON COMPUTER SERVICES	22
KOBRAHSOFT	13
REVELATION SOFTWARE	6
S.D.SOFTWARE	2
WEST COAST COMPUTERS	26

FORMAT ISSN 0963-8598

© Copyright 1995 FORMAT PUBLICATIONS. All Rights Reserved.

No part of this publication may be reproduced, in any form, without the written consent of the publisher. The purchaser of this magazine may copy program material published herein for his or her own personal use and provided that any such programs are erased if and when the purchaser disposes of this magazine in any way. While every effort is made to ensure accuracy in FORMAT the publisher will not be held liable for any errors or omissions.

FORMAT is published by FORMAT PUBLICATIONS.
34, Bourton Road, Gloucester, GL4 0LE, England.
Telephone 01452-412572. Fax 01452-380890.

Printed by D.S.Litho. Gloucester. Telephone 01452-523198.

NEWS ON 4

JAIL FOR FORMER SAM PROGRAMMER

Chris Pile, author of Pro-Dos the CP/M environment for SAM, was jailed for 18 months at Exeter Crown Court on the 15th November.

He was charged with eleven offences resulting from his designing of two computer viruses 'Pathogen' and 'Queeg' and a third routine called 'Smeg' which helped to make the other two more difficult to trace.

Chris, who is a self-taught computer programmer, admitted the offences which some news paper reports claim caused millions of pounds worth of damage by corrupting data and programs. Operating under the title 'Black Baron' Chris, who has been unemployed for some time and lives in Plymouth, loaded his creations onto bulletin boards and the viruses spread all over the world.

NEW LASERS

Sharp has launched a new 300dpi laser printer with a street price of under £300. The new JX-9200 is aimed at small office users and also at home computer users and is claimed to be the smallest desktop laser printer on the market. At the same time Canon have announced their new LBP-460 which, although around £50 more, will have an effective printing resolution of 1200 x 300 dpi. The LBP-400 is also fanless, so there is no constant drone when the printer is switched on - ideal for the home environment.

Our recommendation would still be the Ricoh LP1200 because of the emulation modes it has.

GET A BETTER PICTURE

Most new SAM buyers have been opting for SCART connection for some time now, but many existing SAM and Spectrum owners are still using the TV connection with an old portable which has probably seen better days.

Well now everyone can afford the extra quality of display that a SCART connection gives you. High street retailer Tandy are selling the Nokia 14" TV with SCART input built-in for only £149.99 which is £20 below the normal price. However, check with Dixons (and others) before buying as you may be able to get one even cheaper.

AMIGA HIT BY TECH PROBS

The relaunch of the Amiga in Europe has been hit by technical problems with the disc system. Dealers have suffered the wrath of new owners who cannot get certain Amiga titles, including several new releases, to work on their brand new machine. Apparently the problem lies in the disc drives being used in the new version of the machine. These are falling foul of the protection routines that some programmers have used in their games.

CD-ROM PLAYERS HIT

The EC looks set to hit far-east imports of CD-ROM drives with an extra 10% tariff by re-categorizing them as consumer electronics rather than computer equipment. This move is due to their ability to play CD audio discs.

Credits:

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

'Tis the season to be jolly, deck the halls with boughs of holly, send Bob & Jenny lots of lolly.

HAPPY CHRISTMAS READERS

Yes, its that time of year yet again, the time to be planning your summer holidays, looking round the shops to see which one gets the first Easter egg on sale. You know, its silly time again.

Well there are a lot of things to cover this month so I wont bore you with my Christmas 'wants' list as I'm sure that whatever prezzies you send will be nice.

5:00am is not my best time of day, but that was the get-up time on Sunday the 12th November. Why? Bonny Scotland called, that's why. And if it had not been that I had promised Colin MacDonald that I would go, and if Nev Young wasn't already up and in the shower, I would very easily turned over and gone back to sleep. Anyway, 5:30 and off from Barnoldswick, headed for the M6 and north, I could hear the sound of bagpipes already. I must say it was a nice journey, nothing on the road and only a little light rain from time to time. Of course the rain got worse as we crossed the border but what do you expect.

8:55 and we found the show venue. Nice place, just a short caber throw from Edinburgh airport, and they even had a nice man to help move your stock through to the stand. Of course Colin was late, overslept again, so Nev and I just grabbed the best stands and started setting up. Colin by the way turned up at 9:30 full of excuses like "I was up to 6:30

watching the Grand Prix". Yes Colin, good excuse...

Well, all I need to say is the show was a success. Lots of people (well a few anyway) gave me lots of money (well a little anyway) but the main thing was we all met lots of people who we would not have met under other circumstances. The welcome was warm for those of us who had made the effort to be there and I would like to thank all **FORMAT** readers who turned out to support the event, I think it is safe to say we impressed the PC stalls that filled the rest of the hall.

I was staying with Nev Young by the way because his place is almost half way, so it broke the journey very nicely. I went up on the Thursday so that I could spend a couple of days helping (in what little way I could) with the ongoing development of the SAM hard disc system. Nev's daughter Emma, a lovely girl and a good cook as well, was most upset when presented with the dilemma of a trip to Edinburgh or the Queen special weekend on VH-1, Queen won by the way even before we decided there would not be room in the car after all (what's Freddy got that I haven't).

On the subject of the SAM hard drive, I'm publishing a 'First Look' in this months issue and I hope to have other mini reviews from other users in one or two future issues. While I have no details to give you just at the moment, I am aware of several software projects that are already under way for the hard drive and I will let you know all about them as soon as I can.

Until next month.

Bob Brenchley, Editor.

SAM GAMES AVAILABLE FROM REVELATION

SOPHISTRY

Our latest & BEST licenced game. Originally produced for the Spectrum by CRL, and now brilliantly converted for SAM, Sophistry is a game that is big, perplexing, colourful, frustrating, musical, bouncy, and above all DIFFERENT (and it even has the Spectrum version built in so you can take a trip down memory lane).

£9-95 (£8-95 to INDUG members)

TNT

Written by industry mega-star Matt Round - A game packed with humour, colour, sound and above all ACTION!

Loosely based on Bomb Jack (the game SAM owners have most requested over the years). As well as the normal one player game, TNT has gone one better by giving you TWO player action - competing against each other, in full glorious technicolour - at the same time. It even has a novel feature in a SAM game - a High Score Table, how many others have that?

Avoid the meanies, collect the bonus points, Jump, Hover, Fly - what more do you want???

£9-95 (£8-95 to INDUG members)

GRUBBING FOR GOLD

We spent a lot of time listening to what our customers wanted. And here is the result. You wanted a family game - you got it, you asked for colour and sound - you got it, you demanded long term interest - you got it.

GRUBBING FOR GOLD - the most advanced, the most playable, the most enjoyable quiz game since the legendary Quiz Ball. They said it could not be done - they said bringing a TV quiz show to SAM would not work. Well let them eat their hearts out because YOU GOT IT....

This game has everything. Animated and entertaining. Hundreds of questions, on a wide variety of subjects at levels to suit most people. It even has a question editor program on the disc so you can create your own sets of questions or alter those already on the disc. GRUBBING FOR GOLD will really keep the family playing during the long winters nights. This is the game you can never grow out of.

£9-95 (£8-95 to INDUG members)

More Games Coming Soon

Send SAE for full list of available games.

REVELATION FOR THE VERY BEST IN SERIOUS SOFTWARE

~THE SECRETARY - The most advanced word-processor for SAM, powerful, versatile and easy to use. **NEW Version 1.5 Available Now** - The BEST just got better £14.95 (INDUG £12.95)

~COMET Z80 ASSEMBLER - The SAM assembler many professionals use, yet easy enough for the beginner - so why settle for second best? £29.95 (INDUG members £21.95)

DRIVER

The Graphical User Interface for SAM

DRIVER works with the SAM Mouse (no mouse should be without one) or Keyboard. It provides a full WIMP (Windows, Icons, Menus, Pointers) system that puts you in full control of your SAM. Comes complete with many built-in utilities and ready to run applications. Full manual and a disc-based tutorial. DRIVER gives you the ease of use only found on big office computers before. So easy to use yet so powerful. **Fantastic Value £29.95** (INDUG members £24.95)

Now Includes FREE Copy Of DRIVER's Extras Disc 1

DRIVER's Extras Disc still available for existing users at £5.96 (INDUG members £4.95)

SCADS PD Yes, at last, we are please to re-release SCADS - the arcade game development system for SAM. Previously sold by Glenco at £24.95 we have now placed the software into the Public Domain so the disc costs you **Only £2.50**. The full manual (over 200 pages) is also available for £12.95 (overseas please add an extra £1 to postage rates below)

• All prices include UK postage and packing (Europe please add £1, other overseas please add £2).
• Payment by UK cheque (made payable to Revelation Software), PO or cash. Sorry but we can't accept orders by Euro-cheque or Giro.
• Please Quote INDUG membership number clearly on order if claiming discount.
• Send orders to -

Revelation
Software

Revelation Software, 45, Buddle Lane, Exeter, EX4 1JS.

SHORT • SPOT

YOUR HINTS, TIPS AND PROGRAMMING IDEAS

Edited By:- John Wase.

December already, folks, and here we are. Martyn Bader of Wallsend, Tyne and Wear, sent in this list of Alternative Definitions to Bob some time ago, and I thought they were just the thing to get readers chuckling over the Christmas Break. Some are a bit MS-DOS oriented, but what the heck! I liked them anyway.

Beginner: A person who believes more than one-sixteenth of a computer salesperson's spiel.

Advanced User: A person who has managed to remove a computer from its packing materials.

Power User: A person who has mastered the brightness and contrast controls on any computer's monitor.

Consultant: A former sales associate who has mastered at least the first ten pages of each of the many manuals in the 'Office 95' package.

Service: Cursory examination followed by the utterance of the phrase "It can't be our" and either of the words "hardware" or "software".

Support: Mailing advertising literature to customers who have returned a registration card.

Beta Test Version: Too buggy to be released: chargeable if by Microsoft.

Release Version: Alternative pronunciation of 'beta test version'.

Version 1.0: Buggier than Maine in June; eats data for breakfast.

Version 1.1: Eats data only weekly, upgrade free to avoid litigation by disgruntled users of version 1.0.

Version 2.0: The version originally planned as the first release (except for a couple of data-eating bugs that just won't seem to go away); no free upgrades or the Company would go bankrupt.

Version 3.0: The version still being written when the Company does go bankrupt.

Enhanced: Less awful in some ways than the previous model, and less likely to work as expected.

Convertible: Transformable from a second-rate computer to a first-rate doorstop or paperweight.

Upgraded: Didn't work the first time.

Upgraded and Improved: Didn't work the second time, either.

Fast (4MHz): Glacially slow.

Super-fast (8MHz): Not Fast enough.

Blindingly Fast (10MHz): Almost fast enough to work old software.

Astonishingly Fast (25MHz): Still won't run anything introduced during the last five years.

Incredibly Fast (50MHz): Runs new software slowly, and old software intermittently.

Lightening Fast (150MHz): None of the old software runs, and none of the new is written, anyway.

Memory-Resident: Ready to disable any programs running at the press of a key.

Application: Posh word for overfat program.

Application Error: Posh word for bug in overfat program.

Unrecoverable Application Error: Windows newspeak for crash.

Windows 3.0: A multitasking mystery which defies all known laws of physics by moving more slowly than a tablespoon of treacle on a cold rock, and which initiates UAEs (see above) every fifteen minutes.

Windows 3.1: Windows 3.0 in disguise.
Windows 3.11: Let's bug the whole network.

Win95: A multitasking mystery...

Multitasking: A clever method of slowing down the multitude of computer programs that insist on running too fast.

Encryption: A powerful algorithmic encoding technique employed in creating computer manuals.

Desktop Publishing: A system of software and hardware enabling users to create documents with a cornucopia of typefaces and graphics and the intellectual content of a formica slab; often used in conjunction with encryption.

British-Made: Assembled in Britain from parts made abroad.

So now you know: enough of this nonsense for now or I'll have nothing left to amuse you after Christmas - we'll continue with it next month.

And now, let's get serious. It's Miles again: Miles Kinloch of Edinburgh. I don't know how he does it, but he manages to come up with something new for the Spectrum time after time after time. And this time, here's one or two tips for those with PLUS D disc drive systems, and I guess that means most of us.

First, if you want a quick readout of just the free space on your disc, without having to wait for it to go through all your files, just type:-

```
CAT 1****
```

...and that should do the job rather neatly.

The second tip concerns the 'Scroll?' prompt when you're CATing from within a program. Annoying, isn't it, when you say 'no', and the stupid thing rudely deposits you in the Basic Editor, when better behaviour would have favoured aborting the CAT and returning simply to the menu. Well, here's a way, as Miles says, to teach an old CAT new tricks: POKE 23728,1 before it, and POKE 23728,0 after it. (It's advisable to stick a RANDOMIZEUSR 8 in there as well, just to protect the stack). Now, just press 'Space' or 'N' at the prompt, and nine out of ten Speccy owners will swear their pet programs prefer it...

For example:-

```
10 POKE 23728,1: CAT 1: RANDOM  
IZEUSR 8: POKE 23728,0
```

Thirdly, a point concerning the dreaded 'Disabled Interrupts Syndrome', i.e. the Z80 bug that sometimes causes a keyboard lock-up after a PLUS D operation. On most occasions, the Snapshot/Key '0' patch for G+DOS (and which Betados has built in) takes care of this, but there's one circumstance when it can't come to the rescue - and that's at the 'Scroll?' prompt during a PLUS D operation, i.e. during a CAT, or when MOVEing a file to #2, etc. The snapshot button must NEVER be pressed under these conditions, otherwise nasty crashes and/or disc corruption will ensue.

And if you don't believe him, just try CATing an UNIMPORTANT floppy disc, and press the button when the 'Scroll?' prompt appears. The Spectrum will invariably crash, and as likely as not, the disc catalogue will be wiped into the bargain, just for good measure.

Finally, here's a very short snippet and that's what I like to get - which will clear the RAMdisc on a 128k Spectrum. Miles mentions that he only has a grey +2 to

work on, but presumes it will also work on the Sinclair black 128k. Beware, though. IT WON'T WORK ON THE +2A OR THE +3.

This utility is an execute file, and runs on either a DISCiPLE or a PLUS D. It also has the advantage that as it is an execute file, it doesn't affect the contents of the main Spectrum memory, and that's useful, too.

Miles says that he often uses the RAMdisc, and finds that having to clear it by repeated use of ERASE! can be annoying - especially when there are lots of files. The RAMCLEAR utility, however, does it in an instant: great!

Here it is:-

```
10 REM 128K RAMDISC CLEAR  
20 REM By Miles Kinloch  
30 REM (NOT FOR +2A/+3)  
40 REM  
50 CLEAR 39999: LET c=0  
60 FOR a=40000 TO 40017  
70 READ d: LET c=c+d: POKE a,d  
: NEXT a  
80 IF c<>1845 THEN PRINT "Error  
in data!": STOP  
90 PRINT "Ready to save execut  
e file. Put disc in Drive 1  
and press a key."  
100 PAUSE 0: SAVE d1"RAMCLEAR.X  
"x,40000: CLS : PRINT "LOAD  
"RAMCLEAR.X"X TO CLEAR T  
HE 128K RAMDISC.": STOP  
200 DATA 33,236,235,34,131,91,3  
3,236  
300 DATA 43,34,133,91,33,135,91  
,54,1,201  
9999 SAVE d1"RAMCLEAR" LINE 10
```

That might be all from Miles for now, but I bet it won't be THAT long before he's back... Many thanks, Miles.

A call from Colin Rout of Hastings alerted me to there being something wrong with October's **FORMAT**. You see, he read the thing, and it looked just as though there ought to be a contribution from Peter Williamson of Sleaford on lotteries: instead, I'd gone straight on to consider another little

snippet. Now, the problem is that this wasn't your ordinary lottery program: it was a special SAM jobbie to check the twenty or so lottery number groups selected by a syndicate. And Colin was in just such a syndicate, and thought that it would be ideal. And there it wasn't, as it were. As October's **FORMAT** had already got buried, I had a little problem, for Bob was first in Edinburgh, then with Nev Young, sorting out technical matters with SAM's hard disc. So it was all being done at a distance. You might ask why I couldn't check what I'd written: well, I could, but that was not necessarily what would eventually appear in print, what with the twin perils of editing and whoopsies. Colin again to the rescue: he sent me the relevant passage. Yes; I'd put in the text all about Peter Williamson's lottery syndicate ticket-checking program, but quietly left the program out. Eventually, I found the relevant file and had a further calamity. Peter's disc had gone walkabout! Fortunately, all's well that ends well: Peter's put me a disc in the post. Here's the program.

```
10 REM LOTTERY PROGRAM.  
20 REM SYNDICATE NOS.CHECHER  
30 PRINT "ENTER:-"  
40 PRINT : PRINT ""0"" TO IN  
ITIALIZE"  
50 PRINT : PRINT ""1"" TO EN  
TER LOTTER NOS."  
60 PRINT : PRINT ""2"" TO DI  
SPLAY RESULTS"  
70 PRINT : PRINT ""3"" FOR S  
YNDICATE NUMBERS"  
80 PRINT : PRINT ""4"" TO SA  
VE PROGRAM"  
90 PRINT : PRINT ""5"" TO LI  
ST SYNDICATE DATA LINES"  
100 GET A: CLS  
110 IF A=0 THEN GOTO 190  
120 IF A=1 THEN GOTO 540  
130 IF A=2 THEN GOTO 710  
140 IF A=3 THEN GOTO 980  
150 IF A=4 THEN SAVIT  
160 IF A=5 THEN LIST 300 TO
```

```

170 GOTO 10
180
190 DIM P$(7,3): RESTORE
200 LET P$(1)="st.",p$(2)="nd.",
    p$(3)="rd.",p$(4)="th."
210 LET P$(5)=P$(4),P$(6)=P$(5)
)
220 LET N$="ABCDEFGHIJKLMNPOQR
STUVWXYZ"
230 INPUT #2"ENTER NO.OF SYNDI
CATE LINES ";N
240 DIM S(N,6): DIM L(7): DIM
M(N)
250 FOR X=1 TO N
260 FOR Y=1 TO 6
270 READ S(X,Y)
280 NEXT Y
290 NEXT X
300 DATA 5,15,21,45,46,48
310 DATA 4,6,9,17,28,37
320 DATA 14,16,26,27,38,43
330 DATA 3,7,10,12,35,40
340 DATA 8,11,20,24,32,47
350 DATA 2,13,22,23,31,44
360 DATA 1,13,29,36,39,41
370 DATA 19,25,30,34,42,49
380 DATA 2,5,14,18,22,25
390 DATA 24,27,38,39,41,45
400 DATA 3,6,8,26,35,36
410 DATA 17,19,20,21,37,46
420 DATA 1,12,30,42,43,48
430 DATA 7,15,31,40,47,49
440 DATA 4,16,28,29,33,34
450 DATA 9,10,13,23,32,44
460 DATA 6,8,11,14,19,30
470 DATA 4,7,10,33,46,47
480 DATA 1,9,22,36,38,49
490 DATA 2,5,28,35,40,44
500 DATA 12,21,25,27,31,32
505 DATA 2,9,20,24,41,44
510 DATA 3,17,26,29,39,41
520 CLS : GOTO 10
530
540 REM ENTRY OF LOTTERY NOS.
550 FOR X=1 TO 6
560 PRINT "ENTER ";X;P$(X); " L
OTTERY NO."
570 PRINT : INPUT #2; TAB 12;
L(X): CLS
580 NEXT X
590 PRINT "ENTER BONUS NUMBER"
600 PRINT : INPUT #2; TAB 12;
L(7): CLS
610
620 DIM M(N)

```

```

630 FOR X=1 TO 6
640 FOR Y=1 TO N
650 FOR Z=1 TO 6
660 IF L(X)=S(Y,Z) THEN GOSUB
1080
670 NEXT Z
680 NEXT Y
690 NEXT X
700
710 PRINT "LOTTERY NUMBERS ARE
:-"
720 FOR Y=1 TO 6
730 PRINT L(Y);" ";
740 NEXT Y
750 PRINT INVERSE 1;L(7)
760
770 PRINT
780 FOR X=1 TO N
790 IF INT (X/2)<>X/2 THEN PRI
NT TAB 8;N$(X);" ";M(X);
800 IF INT (X/2)=X/2 THEN PRIN
T TAB 20;N$(X);" ";M(X)
810 NEXT X
820 FOR X=1 TO N
830 IF M(X)>4 THEN GOSUB 910
840 NEXT X
850 PAUSE 0: CLS : GOTO 10
860
870 DEF PROC SAVIT
880 SAVE "LOTTERY" LINE 10
890 END PROC
900
910 PRINT : PRINT : PRINT "LIN
E WITH >4 MATCHINGS"
920 PRINT : PRINT N$(X);" ";
930 FOR Y=1 TO 6
940 PRINT S(X,Y);" ";
950 NEXT Y
960 RETURN
970
980 REM SYNDICATE NUMBERS.
990 FOR X=1 TO N
1000 PRINT N$(X);" ";
1010 FOR Y=1 TO 6
1020 PRINT S(X,Y);" ";
1030 NEXT Y
1040 PRINT
1050 NEXT X
1060 PAUSE 0: CLS : GOTO 10
1070
1080 LET M(Y)=M(Y)+1
1090 LET Z=6
1100 RETURN

```

Many thanks, Colin, for letting me know, and Peter, for putting up with my

carelessness and sending another disc. Without you nice **FORMAT** people, I just couldn't write this.

Now, here's something a bit different. Our evergreen Roy Burford of Norton, Stourbridge, writes again, bless him. Over the last few months, I have, indeed, had several letters from him, with a number of bits and pieces, and including several different versions of 'rounding', as I mentioned last month. Well, he and Etrick Thomson have been having a good old get together over 'rounding'. The problem is that the original Wain and Flower concept embodied in 'rounding' is fouled up by a number of assumptions and approximations in the ROM of a Spectrum. Essentially, the problem arises often because 'rounding' is not just rounding, but also testing the Spectrum's accuracy. As some of these are rather interesting, I make no apology for once again including a section about this. For a start (let's get technical), binary arithmetic sometimes produces small differences from the corresponding denary arithmetic. So, did you know that on Roy's Spectrum+ 128k, which he rarely runs in 48 Basic, 1/2-0.5=2.3283064E-10. A half minus nought point five should be now! Again, a decimal multiplied by a power of ten does not always correspond to that decimal multiplied by ten the appropriate number of times. These entertaining little quirks are what gave rise to the bugs in the original versions of 'rounding': these have now been eliminated. The earlier program also could not deal with non-significant zeros which occur in decimals less than 0.1. Etrick also cleared up a number of other interesting quirks and provided some string-slicing sequences; Roy produced test decimals and fitted everything together. Now, I'd just like a few tests. For instance, Roy Burford quite rightly

points out that he knew I was only joking with my "Boo, Hiss!" at his Commodore 64, but he finds it a very useful check on Spectrum programs. In other words, each computer has quirks, and they need to be accommodated before programs of this nature can work. There's lots of you out there. Please could you test this rounding program on SAM, along with some of the features (quirks) mentioned above, and report on whether it works satisfactorily or not. We'd love to know, and it might also give me some SAM stuff, which is sadly lacking in my present postbag. While I'm talking about that, Christmas has clearly occupied the minds of our readers more than usual, for I'm in danger of running out of material for the January edition, and I've no SAM bits at all. C'mon, folks, please send me anything odd you've found, for I can't write a column about nothing! Anyway, here's the final, definitive version of 'rounding'. Destroy the last and put this in instead, and then test it on a SAM. And let me know what happens.

```

1 REM Vol.8 No12. FORMAT. Aug
ust 1995. Short Spot. p9. R
oy Burford and Rounding.
2 REM Rounding using Etrick
Thomson's string-based meth
ods producing mathematicall
y correct results.
3 REM Program elements merged
on ZX Spectrum+ 128K by B.
C.R.Burford 181095.
40 RANDOMIZE : DIM t(12): LET
t(1)=1: LET j=1
50 FOR i=2 TO 12: LET j=10*j:
LET t(i)=j: NEXT i
60 PRINT AT 10,8;"Rounding"
70 PRINT "Multiplier Index? (0
to 6):";
80 INPUT m: LET m=INT (m)
90 IF m<0 OR m>6 THEN GOTO 80
100 PRINT m
110 PRINT "No. problems? ";
120 INPUT q1: LET q1=INT (q1):
PRINT q1

```

```

130 PAUSE 50
140 IF q1=0 THEN LET c1=0: LET
t=0: GOTO 620
150 CLS : LET c1=0: LET t=0
160 LET c1=c1+1
165 LET n$=STR$(t(m+1)*RND): I
F INT (VAL n$)=VAL n$ THEN
GOTO 165
166 IF VAL n$<.00001 THEN GOTO
165
167 LET z=RND
170 IF n$(1)="." THEN LET n$="0
"+n$
180 LET l=LEN n$
190 LET d=0
200 FOR i=1 TO 1 STEP -1
210 IF CODE n$(i)>46 THEN GOTO
230
220 LET d=l-i: LET i=1
230 NEXT i
240 LET p=INT (d*RND)
250 LET sf=p+l-d-1
260 PRINT AT 10,0;"Q :c1;"/";q
l;" Multiplier=" ;t(m+1)
'
270 PRINT "Answer -1 to quit"
280 PRINT "Round ";n$;" to ";
290 IF z>.5 THEN PRINT p;" dp's
": LET f=0: GOTO 310
300 PRINT sf;" sf's ": LET f=1
310 INPUT LINE s$: PRINT "'
";s$;
320 IF s$="-1" THEN GOTO 620
325 LET i=0: LET j=0: LET k=0
330 LET i=i+1
335 IF n$(i)="." AND j=0 THEN L
ET j=i
340 IF n$(i)>"0" AND k=0 THEN L
ET k=i
345 IF j=0 OR k=0 THEN GOTO 330
350 IF f=1 THEN LET p=sf+k-j-(k
>j)
355 LET q=j+p
370 IF 1<=q THEN LET m$=n$+"000
000" ( TO q-1): GOTO 580
380 LET m$=n$( TO q)
390 IF n$(q+1)<"5" THEN GOTO 57
4
400 LET c=q
410 IF m$(c)="." THEN LET c=c-1
420 IF m$(c)<"9" THEN LET m$(c)
=CHR$(1+CODE m$(c)): GOTO
574
430 LET m$(c)="0": LET c=c-1:
F c>0 THEN GOTO 410

```

```

440 LET m$="1"+m$: IF f=1 THEN
LET m$=m$( TO LEN m$-1)
574 LET s=LEN m$
576 IF m$(s)="." THEN LET m$=m$
( TO (s-1))
580 IF m$=s$ THEN PRINT " Good
!": LET t=t+1: GOTO 600
590 PRINT "'";m$;" is co
rrect"
600 IF c1=q1 THEN GOTO 620
610 PRINT "Press any key:": PA
USE 0: IF c1<q1 THEN CLS :
GOTO 160
620 PRINT "You got ";t;" out o
f ";c1;" correct.": STOP
630 STOP

```

And while I'm at it, does anyone like fancy screens? You do? So do I. This is a rather wonderful drawer of a screen: it's again from Roy (modified from the Commodore 64 Omnibus), and it's called JRSHAT. And, if you stare at that long enough, it suddenly becomes obvious. It's J.R.'s Hat!

Type it in after the plum pudding, and see!

```

1 REM Lupton & Robinson. The
Commodore 64 Omnibus. Centu
ry Communications. 1985. p2
99. J.R.'s Hat.
2 REM Revised to ZX Spectrum+
128K by B.C.R.Burford 2009
95.
100 DIM u(424): DIM l(424)
110 LET xc=256: LET yc=99: LET
xr=140: LET zr=96
120 LET h=38: LET w=.052: LET x
a=86
200 FOR s=1 TO 424: LET u(s)=0:
LET l(s)=1000: NEXT s
210 PRINT AT 21,0;"JR's Hat"
500 FOR z=-zr+1 TO zr-1 STEP 5:
LET xl=INT (xr*SQR (1-(z*z
)/(zr*zr))+1/2): LET x=-xl
530 LET y=h*SIN (w*SQR (x*x+z*z
)): LET xl=x+xc+z: LET yl=I
NT ((yc+y+z/2)+1/2)
600 FOR x=-xl+1 TO xl-1
610 LET y=h*SIN (w*SQR (x*x+z*z
)): LET x2=xc+x+z: LET y2=I
NT ((yc+y+z/2)+1/2)
640 IF y2>=1(x2-xa) THEN GOTO 6
80

```

```

650 LET l(x2-xa)=y2
660 IF u(x2-xa)=0 THEN LET u(x2
-xa)=y2
670 GOTO 700
680 IF y2<u(x2-xa) THEN GOTO 7
30
690 LET u(x2-xa)=y2
700 PLOT x1/2,y1: DRAW x2/2-x1/
2,y2-y1
730 LET x1=x2: LET y1=y2: NEXT
x: NEXT z
740 PRINT AT 21,15;"Any key to
exit:"
750 PAUSE 0: STOP

```

Should you want to experiment with the constants assigned in lines 110 and 120 (as one does, in a manner of speaking, particularly during an alcoholic haze over Chrimbles), the originals were xc=320, yc=115, xr=175, zr=120, h=40, w=0.043 and xa=107. Roy finds essentially that the overall proportions depend on h and w; the others were simply proportioned downwards from the C64's 320x200

HIRES screen.

Many thanks, Roy.

And, alas, that's all for now, for I'VE COMPLETELY RUN OUT OF STUFF EXCEPT BITS FROM THE YEAR BEFORE LAST, WITH DISCS I CAN'T READ, OR CASSETTES THAT FAIL ON LOADING. IF YOU DON'T SEND IT, I CAN'T USE IT AND THERE WON'T BE A COLUMN. C'MON, FOLKS, YOU SURELY STILL HAVE SOME TALENT FOR FINDING ODDMENTS.

Please get those snippets in the post to:-

**John Wase,
Green Leys Cottage,
Bishampton,
Pershore,
Worces,
WR10 2LX.**

Bless you all, and do have a Merry and prosperous Christmas.

KOBRAHSOFT Spectrum & Sam Coupé Utilities

SAM DICE DISC UTILITY. *NEW!* Ver. 1.1 compatible with MasterDOS. Features READ, BACKUP, RECOVER erased files/lost data, REPAIR directories, DISC CHECK, LOCK OUT bad sectors, SEARCH for string, RENAME files, FORMAT all or just one track. Directory listing shows HIDDEN & ERASED file - recovered with one key press. Read file headers. Easy to use. **Price: £14.95 on disc, plus £0.45 P&P.**

SAM Z80 MACHINE CODE COURSE. *NEW!* Learn how to program your SAM Coupé in machine code. FULL course, suitable for all, with an assembler and disassembler. **Price: £20.00, plus £0.74 P&P.**

SP7 TAPE TO +3 DISC UTILITY. Transfer Spectrum tapes to +3 disc. Comes with a BEGINNER'S manual, an ADVANCED user's manual and an Encrypter demo tape. Also a superb DISC CATALOGUER. Transfer FULL 128K programs. Includes SP7 Companion - shows how to transfer many games. **Price: £14.95, plus £0.74 P&P.**

STILL AVAILABLE: GH1 Games Hacker Utility, DMS +3 Disc Management System, D.I.C.E. +3 Disc Utility, Spectrum Machine Code Course, DB2 +3 Disc Backup Utility, +3 Diary & Filing System, SD5 Tape to M/D utility, SO5 Tape to Opus utility, MT1 M/D Toolkit, SW1 Tape to Wafadrive utility, CT2 Sam Tape utility, SM1 Multiface Suite, SP7 Companion Vol. 2, SC7 tape backup utility. Please ring for FULL details.

MONEY BACK GUARANTEE - BUY WITH CONFIDENCE.

UPDATES:- Send old disc, tape etc, Plus ½ new price for latest version.

Send cheque/P.O. to:- KOBRAHSOFT, Dept. F, Pleasant View, Hulme Lane, Hulme, Longton, Stoke-on-Trent, Staffs, ST3 5BH.

Postage:- U.K. as above, Europe add £1 per item, others add £2 per item. Send SAE (9"x 4") for detailed FREE catalogue. Please mark envelope "ENQUIRY".

FOR MORE INFORMATION PLEASE PHONE 01782 305244.

ACCESS and VISA welcome - please phone above number (24 Hr. 7 Day Service for FAST Mail Order)

The HELP PAGE

Edited By:- Ray Bray.

We open this month with a letter from Dr.T.Wilson who lives in Falkirk. He has been trying to understand how the SAM Coupe stores its program variables but, although he has discovered where and how strings and arrays are stored, the way to find the location of numeric variables has defeated him. The first thing I should say is that you are not the first person to be puzzled by this, for the method used is completely different from that used on the Spectrum, mainly to give more rapid access to the stored values.

SAM stores the numeric variables in the alphabetical order of the initial letter of each variable name and, as each variable is declared, it is placed in the correct alphabetic order with all the variables with initial letters greater than the one being declared being moved to a higher address. To keep track of this, SAM employs an Offset Address Table for numeric variables, the start of which is given by System Variables NVARSP (23175) and NVAR (23176/7), which are respectively the page number and the offset address within that page. The other two System Variables associated with the numeric variables are NUMENDP (23172) and NUMEND (23173/4), giving the page number and offset address respectively of the end of the numeric variables storage area itself. Note that the NVAR and NUMEND values have to be reduced by 16384 to give the required page offset.

The Offset Address Table is 56 bytes long comprising two bytes for each letter of the alphabet, (all the variable names being converted to lower case), thus

bytes zero and one in the table will give the offset address for the start of numeric variables beginning with the letter 'a' and bytes two and three give the offset to the start of variables beginning with 'b', and so on. Where no variable has been declared for any letter then the two bytes will be set to 255. The start address of variables for each initial letters is given in Table 1 below.

BYTE NUMBER	INITIAL LETTER	START ADDRESS OF VARIABLE
0		
>	=a	(Table addr +1)+(byte 0 + 256 * byte1)
1		
2		
>	=b	(Table addr +3)+(byte 2 + 256 * byte 3)
3		
.		
.		
50		
>	=z	(Table addr +51)+(byte 50 + 256 * byte 51)
51		

Table 1

The variables themselves are held in blocks of up to 55 bytes with the layout given in Table 2 on the next page.

The start address of the Offset Table is calculated by:-

$$(16384 * PEEK NVARSP) + (DPEEK NVAR) - 16384$$

I think there is enough information there to gain access to all the numerical variables and to extract any other information required.

Questions on displays appear regularly throughout the year and I noticed on reading through the letters page last month that C.A.Watford wished to

CLIPART FOR THE SAM



Sampler pack available now at only £5.

Contains a 2 disc set of 45 Mono and 15 colour clipart pictures with sample printouts, plus a free massive catalogue, (to be sent out separately around Christmas time). The catalogue will contain over 1,000 clipart pictures from 30 categories which may be purchased in sets or each individual picture chosen separately.

Most clipart collections were created on the spectrum as Screen5 files and outputted at the time when only 9 pin printers were available. During the 90's Hi-resolution 24 pin and Ink/bubblejet printers became available at affordable prices, however picture quality has not kept up, one can only print out these pictures on the Sam at Spectrum resolution with 9 pin software. Building on the success of SC_WORD pro to bring you high quality text output never seen before on the Sam.

Steves Software has now developed high quality pictures for the Sam. Each picture is 12 times the resolution (750x750 pixels) compared to spectrum screens. By using special software as used in SC_WORD pro, pictures come out smooth and far less doty in appearance matching any quality output you would get from PC computers etc.

Below are a few pictures from the Clipart Sampler pack:-

Please state Printer model and make when ordering



You will need any 9 pin printer, Epson/Citizen/Panasonic or Star 24 pin printer or Canon bubblejet printer. Other printers supported soon. You also need a 512K Sam.

SC_WORD pro £29.99

To complement the clipart pictures why not add beautiful crisp sharp text with no jaggies the same quality as PC computers can produce, you will not find any other word-processor like SC_WORD pro.

For SC_WORD to work you will need a 512K Sam, MasterDos disc operating system (extra £12 for a copy). Any 9 and 24 pin printer, and bubble jet except Deskjet and other 300dpi ink/ bubble jet printers.

HARD DRIVES & POWER UNITS, For S.D. Softwares Sam Disc Interface.

High quality all metal heavy duty power supply case unit for powering Hard drives. Highly attractive smooth curved edge design, with built in supply unit, cooling fan and Led lights. Measures- Height 95mm, Width 115mm, Length 215mm. £89. 210MB Hard disc drive, tested and Formatted for errors. £89. Power Unit and 210MB Hard drive £174 (save £4).

Power unit & 210MB Hard drive & NEW SC_WORD pro Hard drive version 2.2 ready installed onto hard drive, with 6 free font packs worth £18. No more disc access, everything works from hard drive. £214. (price included free upgrade to enhanced DTP style exclusive hard drive version later next year).

Please Phone order first, to check availability of hardware and software for the above. Separate SC_WORD pro hard drive version for existing owners of SC_WORD pro, see next months advert.

STEVES SOFTWARE

7 NARROW CLOSE
HISTON
CAMBRIDGE
CB4 4XX

01223 235150
(after 6pm)

Buy now pay later.

The ideal way to pay for a Christmas present, just phone the number below, which items you would like, your name and address, then a couple of days later first class you should receive the software with payment slip for which you have upto 1 month to pay back.

SPECIAL CHRISTMAS OFFER
If you purchase SC_WORD pro by 23 December 95, you will receive a free copy of the Clipart Sampler pack as above.

BYTES	MEANING
1	Bits 0-4 The name length minus 1 Bit 5 is set if no longer in use Bit 6 is set when FOR-NEXT variable Bit 7 is set when LOCAL variable in PROC
2 - 3	Gives the offset to the next variable with the same initial letter or is set to 0,0 if the letter is not used, or 255,255 if it is the last variable with that initial letter.
4 up to 31	The name in lower case minus the first letter. In the case of a single letter variable this section is omitted.
5 bytes	The value held in integer or floating point form.
19 bytes	Additional bytes for FOR-NEXT variable. 1-5 Value, 6-10 Limit, 11-15 Step, 16-18 Loop Address, 19 Statement number within line.

Table 2

connect his Spectrum 128 to a Sony KV-M1400U television but did not have a copy of the pin layout on the TV SCART socket. I use a Sony KV-M1410U via a SCART lead and my friendly TV repair man tells me the pin layout should be the same on the M1400, so the the following pins are of interest to 128K users:-

128K Pin	SCART Pin	Use
8	7	Blue In
4	16	CSYNC
6	11	Green In
1	20	CSYNC
2	14	CSYNC Gnd
Shield	21	Ground
7	15	Red In

One other thing to note is that pins 16 and 21 normally need to be connected and sometimes, to get a stable picture, they need to be connected using a resistor with a value between 100 Ohms and 1K. The audio output should go to pins 2 and 6 (I'm not sure which one is used on the Sony TV but connect to both to be sure), and the cable screen should be connected to AUDIO GROUND on pin 4 of the SCART socket.

Another question on displays has arrived in this month's post from Keith Watt of Donaghmore, County Tyrone. He has been forced to purchase a 486 PC (shame!), but being a true SAM addict he still wishes to use his SAM. The problem is that he had to sell his Philips monitor and now wonders if it would be possible to link up his SAM to his PC monitor. Unfortunately Keith doesn't know the specifications of the monitor apart from the fact that it is able to produce Super VGA output. All I can suggest is that if there is manufacturer's plate on the monitor, send me the details and I will try and find out whether it will accept an alternative video input compatible with SAM.

Keith would also like to know whether any reader has used E-Tracker to produce any rave/dance music - any dedicated ravers amongst our readers?

Darren Williams from Ashby de la Zouch has written with three items, one of which appears in the Help Wanted spot at the end, the others I will deal with here. Firstly, Darren wishes to know if it is possible to connect SAM to the Internet or any bulletin board using the Comms Interface. Although in theory it should be possible to communicate with viewdata services and bulletin boards using SAM, in practice it is not a capability which is generally available. In order to communicate with the outside world via the telephone network, a modem with suitable operating software is required. Although you can

buy a modem and software for the Spectrum, which will give limited access to some of these services, and I understand that any Hayes compatible modem should work with the SAM comms interface enabling wider access. However, I am not aware of any commercial software which is available for SAM. If any of our readers know of any software, or perhaps have developed their own, would they please let us know. I suspect that the possibility of connecting with Internet might be a different matter but it would be interesting to hear the views of someone who is knowledgeable on this subject. Darren's second query was whether West Coast's price lists feature every piece of hardware available for SAM; the answer is, as far as I know, yes.

The last item in his letter was a tip for SAM programmers who might wish to disable the Escape key and change the break button into a reset button. For the Escape key POKE 23361,1 and for the break button POKE 23264,1.

HELP WANTED

One problem this month that I hope a reader can help with.

Darren Williams would like to know. Does anyone know a way to print on Cardfile using Driver Extras?

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.

SMALL ADS

DIGITISER I would like to hear from anyone interested in a SAM Digitiser (£55). Please contact Derek Morgan, 18 Mill Lane, Skelmersdale, Lancs, WN8 8RH. 01695 731163. No news hounds.

FOR SALE SAM Coupé 512K, ROM 3, 1 Drive, Lerm Samdisc, SC_DTP, SC Assembler, VoiceBox, Sound Machine, D.O.E, Joystick, 20 Blank Discs. As new and with all manuals. £160 o.n.o. Call Phil on 0161-432-8394.

BOOKS FOR SALE Programming Your ZX Spectrum (Hartnell), The Spectrum Pocket Book (Toms), Information Handling For ZX Spectrum (Street), The Sinclair Story (Dale), 60 Progs For The Spectrum (Erskine), Spectrum Spectacular (Valentine), 40 Educational Games (Apps), 2 copies of 100 Progs For The ZX Spectrum (Maclean), Step Programming For Spectrum (Letcher), 30 Hour Basic Course (NEC), Dr. Watson Beginners Basic, with tapes, Spectrum Microdrive Book (Logan), Intro To 280 Mchine Code (Logan), Computer Hobbyist's Handbook (Penfold). All the books for £25 plus postage (weight about 12lbs.) Harry Weston, Gleneagles, Trevelmond, Liskeard, Cornwall, PL14 4LY. Also offers wanted for Spectrum +1F1+Mdrive, Spectrum+128+1F1+Mdrive, ZX81 with manual - working but slight fault.

SAM Coupé 256K 1 Drive, Tape Lead, Printer Interface, Mouse Interface and Mouse. Software including Gamesmaster, Legend Of Esham, Manic Miner, Outwrite. All copies of **FORMAT** from Vol.3 N°8. With dust cover and spare PSU. Excelent condition. £130 ono. Also Citizen 120D+ dot matrix printer. Good condition, £80 ono. Buy all for £200. Ring Robert on (01443)435907.

WANTED SAM with one disc drive, with or without power pack. Advantage if with dot-matrix printer and interface. State price. L.Simpson, Phone 01623-26532.

YOUR ADVERTS

Selling, Buying, Pen Friends, etc.
Any PRIVATE advert, subject to acceptance, will be printed FREE in the next available issue. Any software sold MUST be original. The publishers will not be held, in any way, responsible for the adverts in this column.
Due to shortage of space, if your advert remains unpublished after two months then please send it in again. Trade advertisers contact the publisher for rates.

THE LSD QUIZ

Do you remember £.s.d.? A Quiz By:- Carol Brooksbank.

This is a little quiz I found some time ago and I thought **FORMAT** readers would find it interesting. Some answers are easy, some fiendishly difficult. The only clue I will give you is that the answers add up to 35.2s.3½d. For the youngsters among you (and those with short memories) remember:- 20s=£ 1 and 12d=1s).

	CLUE	ANSWER	£	s	d
1	A Stone				
2	A Bicycle				
3	A Singer				
4	Part of a monkey's leg				
5	A Man's name				
6	Kind of pig				
7	Sun, moon and Pluto				
8	Leather worker				
9	50% of panties				
10	Royal head-dress				
11	Hit repeatedly				
12	Unwell sea creature				
13	Double Robert				
14	King or Queen				
15	Five policemen				
16	A Robber				
17	A score of Bics				
18	Sing a song				
	Total		£35	2s	3½d

The best thing to do is photocopy this page and fill in the amounts in the spaces provided. It will make a lovely change from watching all those repeats on telly over the Christmas break.

Once you have filled in the answers you can turn to page 32 to check that you have got them right. No cheating now, only look to the answers when you have finished.

HARD DRIVING

A FIRST LOOK AT S.D.SOFTWARE'S SAM IDE INTERFACE By:- Bob Brechley.

Want to have fast access to lots and lots of storage on SAM? Well now you can. Yes folks, it is here at last, the SAM IDE Hard Disc Drive Interface from S.D.Software. Officially launched at the Gloucester show in October, the interface is already selling well and first feed back from users is very favourable. I don't think I am exaggerating when I say this is the biggest thing to happen to SAM for several years.

So, what is it? Well let me start off by explaining what a Hard Drive is. Anyone who has used a modern office machine will already know, but I want to cover this ground for those of you who have never encountered one before.

We all know what a floppy disc is like don't we? Just think of a hard drive as being a very big floppy and you will not go far wrong. The two main differences are that the media on which you store the information (the discs themselves) are not removable - they are what is correctly known as *fixed discs*. The other difference is the amount of storage. SAM does well in storing 800Kb on a double sided disc (the MS/DOS machines only manages 720Kb using the same technology) but a hard drive can hold Mega Bytes (1Mb = 1024*1024 bytes). Most hard drives that typical SAM owners will want to use will be around the 100Mb size, although IDE drives can be found in sizes as small as 10Mb and as large as 1.2Gb (that is 1,289,748,480 bytes).

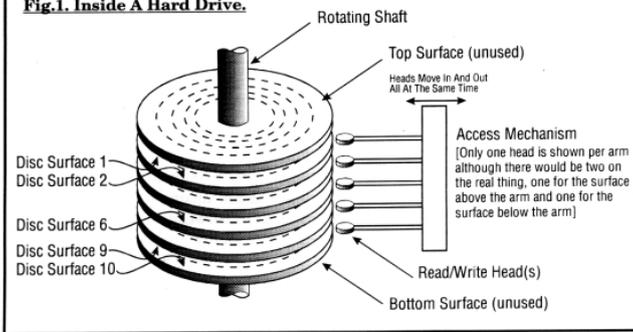
Hard drives consist of a spindle with one or more (and it usually is about 5) hard discs mounted on it with small spaces in between so that the read/write heads (usually one per surface) can slip in and out (see Fig.1 on the next page). Because the discs are fixed in place it is possible to work to much closer tolerances than on a floppy drive, this means that the packing density of information on the discs surfaces can be much higher. The standard 3½" IDE drive has a disc of very similar size to the floppy disc you insert in your SAM but in the same space they squeeze nearly twice as many sectors and many times the number of tracks.

At this point I would like to mention a funny, an IDE drive that tells you it has 7 heads, 18 sectors and 1024 tracks, is almost certainly telling fibs... Why? Well it is all down to the way MS/DOS machines historically accessed drives. This pseudo head/track formation is mapped by the drives hardware onto the real drive architecture. You don't really need to know that, it makes no difference to you as a user, but never complain that **FORMAT** fails to inform you of all the facts.

So, back to business. The S.D.Software IDE Interface needs an IDE drive. There are other types of drive but we won't go into them here. So where do you get one?

Well just for the moment S.D. are not selling them. They may well do in the New Year but you will have to watch

Fig.1. Inside A Hard Drive.



their adverts for that. The reason is simple, if S.D. sell a drive and power supply the need to case it, not as easy as it sounds. So during the start-up period the only extra bit they will sell you is the connection cable if your drive does not have one.

In the meantime, judging from the calls I've had, the majority of purchasers seem to be acquiring drives from people who are upgrading their MS/DOS machines to cope with the ever increasing space demanded by Windows programs. 80 to 300Mb drives are no longer enough for Windows programs, many of which each grab 60 or more megabytes of hard disc just to install themselves. These second-hand drives, provided you know the providence, are the cheapest way forward - often costing you only a few tens of pounds (or less).

If you can't find a second hand drive then you will have to buy a new one from a dealer. The only problem here is size. Very few dealers have drives of less than 500Mb and most now only stock 850Mb and above - hardly practical for SAM. Fred Publishing hope to have some

smaller drives available for SAM users but I do not have firm details as I write this.

Which ever way you go you will also need a power supply. When Nev Young of S.D. Software is demonstrating the hard drive system he uses an old 5¼" disc drive housing with built-in power supply. For most of the IDE drives I have come across this is the perfect solution as it both cases the drive and powers it at the same time. There were lots of 5¼" drives floating about at one time, used with computers like the BBC'B, so it is worth keeping your eyes peeled. Make sure though that it is a self powered drive before you cannibalize it as some BBC drives took their power from the computers PSU.

The other option is to acquire a power supply from an IBM type machine. These are available separately from dealers but you may find that someone is throwing out an old 8086 or 286 machine that you can scavenge the power supply from. In most cases this type of supply is screwed inside the outer case of the computer and are easy to detach, their casing is

earthed so the only danger they pose is if you stick things into their ventilation grills, something I'm sure **FORMAT** readers would never dream of doing. They then have a multitude of low voltage wires coming out of the case, several of which will have the correct connector on them for attaching to the hard drive. I hope to explain in a future article how you can power your SAM from the same PC power supply so you only need one mains voltage cable coming up to your machine.

Only one other bit of hardware is needed. A cable to connect the drive to the SAM interface. Some IDE drives come with a cable, other users will grab one from the PC they purloin their drive and/or power supply from. The cable is a straight 40 way IDC cable with a connector at each end. Some of the cables you will see will be a little short for use in the SAM situation but you can order a longer cable (70cm approx) from S.D. for £9.95 plus p&p.

OK, so you have got your interface, drive, cable and power supply. Now what?

The interface, which is housed in the standard SAM interface box, can be fitted to the expansion connector of your SAM either directly or via a CARD CAGE or TWOU. It is handy to mount it in the vertical position if possible because you can then see the little LED that lights up every time the interface accesses the hard drive.

The system comes with a few sheets that form a very provisional manual and a disc containing HDOS, the hard disc operating system. At the moment HDOS is not fully integrated into the SAM system, you have to access the functions by using the CALL statement. This however, is not as messy as it sounds

and the syntax of the CALLs is very similar to the commands used in MasterDOS.

The first thing you need to do is to prepare your drive for use by HDOS. This involves formatting the drive and copying HDOS on to it. The format routine checks to see how many heads, tracks and sectors there are on your drive and then either sets up only the initial disc structure it needs or does a complete surface check on the disc so that it can build a bad sector list as well. I have tested HDOS on the largest available IDE drive currently on sale - a 1.2Gb drive - and it recognised it right away. However it is worth pointing out that the S.D. interface will work with IDE drives of any size.

I would strongly recommend that you do the complete surface check. It takes a very long time on a big drive, but you only have to do it once after all. If you don't do it at this time then you may end up with the odd problem in future when bad sectors are encountered - not a disastrous problem in most cases but one you could avoid by spending a little time at this stage.

There are a number of other utility programs provided, F2H and H2F copy disc images from floppy to hard disc and vice versa. HDLOOK is a little utility that allows you to look at and sector on your hard drive, the technical among you will have great fun with this one as it will allow you to follow exactly what HDOS is doing on the disc.

Another utility, HDFRAG, performs the important roll of compacting the disc to free up space vacated by deleted files. The DOS actually tells you when it thinks it is time you should be running DFRAG. I'm sure other disc utilities will be written in the future that will do the

job in slicker/faster ways but at least the system comes with this important piece of software - it took MS/DOS years to realize how important a defragmentation program is to a hard disc system.

HDOS itself allows you to CATalogue the drive in a variety of ways and by including a pathname in the command you can look at specific subdirectories even if you are not currently logged onto them. MKDIR creates a new subdirectory while CHDIR sets the default pathname to the required subdirectory, in other words it selects a directory you want to work in. RMDIR removes a subdirectory from the drive, all the files must have been deleted from it first just like MS/DOS requires.

Commands also exist to HIDE and UNHIDE files or to PROTECT and UNPROTECT them. "PROTECT /mywork/letters/*" will prevent all the files currently in the named directory from being deleted. The Wildcards * and ? work just as they do in normal DOS.

You can of course SAVE and LOAD files (Basic, Code and Screen\$ at the moment) and you can ERASE files provided they are not PROTECTED.

Full details of the disc layout and the format of the directories and other control blocks are given for those of you who want to explore HDOS at a more technical level.

This first version of HDOS is a little limited at the moment, but please don't let that put you off buying the IDE Interface now. All early users will receive upgraded versions of HDOS as S.D. Software make them available. As it stands the system greatly expands the power of SAM, in the future I'm sure we will come to wonder how we lasted so long without it. At £60 plus p&p this is a must for every serious SAM owner.

Money, Sex, Free, Girls, 11.30 ...

OK, now we have your attention here is an important announcement.

We apologise to all readers and clients who have tried to telephone us recently and have had difficulty in getting through. Yes, we admit it, we changed our telephone number and kept it secret.

Look out for news of our new product that will make you all fantastic programmers ...

Jack Gibbons ☎ 01483 826375
Hilton Computer Services Ltd
3 Suffolk Drive, Guildford, Surrey, GU4 7FD

FORMAT SAM REPAIR SERVICE

We are pleased to be able to offer readers an official, West Coast approved, repair service for SAM Coupé and SAM élite computers and add-ons.

PRICING

Because every fault is different we don't think it is fair to charge a fixed rate. When we receive a machine it is tested and a quote is sent to you for the repair. If you decide for some reason not to go ahead with the repair you are under no obligation.

Pack your machine well (we will use your packing for its return). Please phone us on 01452-412572 for advice on dispatch (we can even arrange collection). In many cases we can also give an estimate over the phone. All repairs returned by overnight carrier so tell us which days there will be someone in to sign for the parcel. Please quote your INDUG membership number and give an evening contact phone number

Send your machine to:-

Format (SAM Repairs),
34, Bourton Rd, Gloucester, GL4 0LE.

SAM C

AUTOSTEREOGRAM

By:- Nick Carthey.

Most of you will be aware of 'autostereograms', those coloured patterns displayed in shop windows, which turn into 3D images if stared at hard enough. Well, when I came across a program in the magazine *New Scientist* of October 1993, which drew such an autostereogram on a computer screen, I was intrigued. Could this program be ported onto SAM? For there was a snag, the program was in the 'C' language.

After close examination, I realised there was little chance of translation into BASIC, as my knowledge of the more esoteric aspects of 'C' was fairly limited. Now we have SAM C, and the challenge remained: would it work on SAM? The answer, fortunately, turned out to be "yes", but not without a few additions.

The modified program is reproduced at the end of this article; readers may like to consult the original *New Scientist* article, as a number of changes had to be made, and some function definitions written (larger libraries may keep *New Scientist* back copies). The *New Scientist* article does not fully explain the algorithm involved, but the program purports to draw the 'Top Hat' illusion. This, quote, "is a shape, that, although square, looks taller than it is wide". My own experience is that you can see a smaller square projecting from the top of a larger square shape. Readers may like to vary the values of `brimRadius`, `headRadius`, and `brimHeight`, as these change the dimensions of the squares. If

you are unfamiliar with the techniques required to see an autostereogram, consult a suitable book.

Essentially you need to stare at the screen, from a distance of say, 40 - 50 cm, until a 3D image appears. Some practice may be required! I find it helps to go 'cross-eyed'.

Returning to the program, if you type in the 'C' code correctly and compile and run, you should observe a random dot pattern building up line by line on the screen. I will not attempt to analyse the program, but simply note the modifications that were required. The first modification was that the variables `WIDTH`, `HEIGHT` and `EYES` were adjusted to accommodate the dimensions of the SAM screen. Some alterations and additions to the 'C' code were then made. For readers attempting to translate 'C' programs into SAM C, it may be useful for them to note that the following modification of the 'draw 3D' function definition was required for conversion of the autostereogram program: -

```
void draw 3D(int(*z)(int,int))
became:-
void draw 3D(int(*z)(int x,int y))
(The variable z here is a pointer to a function (!))
```

Additionally, the functions `randomBlackWhite`, and `dot(x, y, colour(x))`, though present in the program, were actually undefined, so I wrote appropriate definitions for them. The former function returns one value

from a pair of random values, and uses the rand() function to obtain a 16-bit random number. This is then converted to either 0 or 1, by using the modulus function %. Thus, you can select one colour of the autostereogram by substituting e.g. temp = temp*2 + k, where k is a number from 2 to 14 (temp is the pen colour). This value is passed to the dot function, which then plots the required point at co-ordinates x, y.

I have used k=5 in the program, which gives temp = 5 or 6. The following line: if (temp==5) {temp=0;} changes temp to 0 if temp=5, so that the colours are pen 0 and pen 6. Alternatively, you can simply use temp = temp%k to give up to 16 colours selected at random (k = 2..16); the autostereogram remains visible. Choose whichever colour scheme suits you.

You can also change the MODE, by inserting, e.g. mode(3); after the main() statement; alter WIDTH to 512 accordingly. Experiment with HEIGHT, EYES, brimRadius, etc. Note the use of kbhit(); this pauses the program until a key is pressed, otherwise a message is displayed, and spoils your picture.

Finally the program itself is reproduced below. This appeared in New Scientist 9th October 1993, author Harold Thimbleby, Professor of Information Technology, Department of Psychology, Stirling University. Do any readers know of any other autostereogram programs?

```
#include <stdio.h>
#include <graphics.h>
#include <stdlib.h>

extern void pen(int i);
extern void plot(int x, int y);
extern int rand();

#define WIDTH 256 /* Width of picture */
```

```
#define HEIGHT 192
/* Height of picture */
#define EYES 90
/* Eye Separation (all in pixels) */
void draw3D(int (*z)(int x,int y))
{
    int x, y, same[WIDTH], colour[WIDTH], sep, i, j, s;
    for (y = 0; y < HEIGHT; y++) {
        for (x = 0; x < WIDTH; x++) same[x] = x;
        for (x = 0; x < WIDTH; x++) {
            sep = z(x, y); i = x - (sep + (sep&1))/2; j = i + sep;
            if (0 <= i && j < WIDTH) {
                for (s = same[i]; s != i && s != j; s = same[i])
                    if (s > j) { same[i] = j; i = j; }
                else i = s;
                same[i] = j;
            }
        }
        for (x = WIDTH-1; x >= 0; x--) {
            if (same[x] == x) colour[x] = randomBlackWhite();
            else colour[x] = colour[same[x]];
            dot(x, y, colour[x]);
        }
    }
}

#define GROUND (EYES/2)
#define HAT (GROUND-1)
int topHat(int x, int y)
{
    int brimRadius, headRadius, brimHeight;
    brimRadius = 70;
    headRadius = 15;
    brimHeight = 25;
    if (y >= HEIGHT/2 - brimRadius) {
        if (y < HEIGHT/2 + brimRadius - brimHeight) {
            if (x >= WIDTH/2 + headRadius) return HAT;
            else if (y < HEIGHT/2 + brimRadius)
                if (x >= WIDTH/2 - brimRadius &&
                    x < WIDTH/2 + brimRadius) return HAT;
            else return GROUND;
        }
    }
}
```

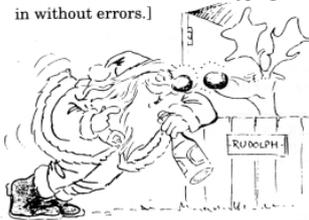
24

```
main ()
{
    border (6); /* Set border */
    draw3D(topHat); /* Draw autostereogram */
    while ( !kbhit() ); /* Wait for keypress */
    void dot(int x, int y, int k)
    {
        pen(k); /* Plot point */
        plot(x, y);
    }
    int randomBlackWhite()
    {
        unsigned temp;
        temp = rand(); /* Assign pen colour */
        temp = (temp % 2) + 5;
        if (temp == 5) {temp = 0;}
        return temp; /* temp = 0 or 5 */
    }
}

#include <graphics.h>
#include <stdlib.h>
```

Author's note: my computer locks up if this program is compiled with the 'optimize size' option on - try switching this off if you have the same problem - 'optimise speed' is O.K.

[Editor's note: It has taken much work to edit this article and I hope that in doing it I have not screwed up the program for you. The problem is that C looks best if each level is indented but because of the limited line length in a text column this is not possible. I would be grateful for comments and ideas from SAM C users on how we should present listings to give the user the best chance of typing them in without errors.]



"Who needs ya' baby"

Writing
for **FORMAT**

We try our best to get a good mix of articles together for each issue of **FORMAT** - but we always need more. Filling these pages is not easy, we start with a pool of around thirty articles and try to pull out a reasonable mix of Spectrum, SAM, and general purpose computing articles that we believe will appeal to the wide spread tastes of our readers. To judge from your comments we normally succeed.

However, we need your help, and we need it now. We need more material to fill these pages. Even some small items for Short-Spot and the Letters Page are better than nothing - and there can't be anyone out there who does not have something they want to say.

Larger contributions, from 1 page to a regular column, are also needed - urgently. Articles on computer languages, how to program, useful routines, listings, games hacking, hardware, experiences with printers... And don't sit there thinking "well everyone knows what I know" because they probably do not, things you take for granted could be a revelation to others.

FORMAT is your magazine, it keeps a very dedicated bunch of enthusiasts together and helps to keep their hobby alive. The Spectrum and SAM (and other Z80 machines) need **FORMAT**, and we need your contributions to help keep **FORMAT** out there in front - where it has been since 1987.

It will not cost much to send in a short piece for **FORMAT** and at the very least you will see your name in print and get a few months added to your subscription. Please help, we need you, every one of you.

25

Below you will find details of the full range of SAM hardware now available.

CODE	DESCRIPTION	PRICE
COMPUTERS - Now with extended two year warranty.		
W1010	SAM <i>elite</i> - 512K - Single Drive. The latest computer in the SAM family. 512K RAM, Single Drive Machine now with Built-in Printer Interface. <i>Last Few</i>	£199.95
W1011	SAM <i>elite</i> - 512K - As above but with Dual Drives fitted. <i>Last Few</i>	£259.95
W1020	SAM <i>elite</i> - 512K - Single Drive. As W1010 except we supply scart to scart lead instead of TV modulator so you get the best possible picture from you SAM.	£199.95
W1021	SAM <i>elite</i> - 512K - Dual Drive. As W1011 except we supply scart to scart lead instead of TV modulator.	£259.95
INTERFACES (work with both SAM <i>elite</i> and SAM Coupé unless otherwise stated)		
W1101	SAM Disc Drive Upgrade. Have a second drive fitted to your SAM <i>elite</i> or a replacement/second drive for your Coupé. Fitting and return postage included in price. Ring 01452-412572 for instructions on how to send your computer.	£79.95
W1121	SAM Coupé Disc Upgrade Kit - all you need to upgrade to a twin drive machine. Needs good soldering skills to fit. You also need de-soldering tools to remove one of the connectors on the main SAM board. Comes complete with all instructions, components and a top quality 3 1/2" drive mechanism.	£64.95
W1122	SAM Coupé Disc Upgrade Kit - as above but without drive mechanism.	£29.95
W1102	External Parallel Printer Interface - the SPL. (for Coupé)	£24.95
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
W1107	External Disc Drive Interface and Parallel Printer Port (for Coupé)	£44.95
W1108	Internal 256K Upgrade (for older SAMs with only 256K of memory)	£34.95
W1109	TWO ^{OP} allows 2 interfaces to connect to SAM expansion port at same time.	£19.95
W1401	SAM Power Supply	£24.95
W1402	SAM Power Supply with TV Modulator	£34.95

Prices valid until 1st April 1996. E & O.E.

Ordering: Write your order clearly, state your name, full address and phone number and quote your INDUG number (if you are a member) as this helps to speed orders. **Payment:** Cheques and UK Postal Orders, should be made payable to **FORMAT PUBLICATIONS**.

Postage & Packing: Price includes UK P&P. European customers add 15% for delivery, other overseas customers please write for quote. Overseas customers can pay using the **FORMAT** foreign exchange scheme.

STOP PRESS We have a very limited number of 512K SAM Coupé computers available. These are brand new single drive machine which we are able to offer to **FORMAT** readers at a very special price of £145 including UK p&p. They have our normal full 1 year warranty plus our usual extended 2 year warranty on the main board. Place your order right away as we will deal on a strict 'first come - first served' basis

By:- Mark Sturdy.

This short article has been put together on the basis of several years' experience with the SAM version of PCG's DTP Pack. As this version is much the same as the various Spectrum versions, much of the information here should be useful to all users of the software.

Making a 'bootable disc (SAM only)

Unless it was changed when **FORMAT** re-released the software, the SAM version consists mostly of PLUS D files (which cannot be copied using the back-up function on the SAMDOS disc) and has no SAMDOS2 or AUTO file. To boot the program, you can either load the DOS from a different disc and then type LOAD 1 with you DTP disc in the drive, or use this method:-

1. Format a new disc and copy the DOS on to it.
2. Load up the program. Break into it by cataloguing the disc and pressing ESC at the Scroll? prompt.
3. Change the part of line 1000 that reads SAVE "WORD" LINE 500 to SAVE "AUTO" LINE 500, insert your blank disc and type RUN 1000.
4. RUN the program.

Unfortunately, the only way I've found of copying the rest of the files (Typeliner!, Headliner!, the other extension programs and the fonts) is to individually LOAD them using the main menu, SAVE them on to your work disc, delete them from memory and load the next file. This is fiddly and time-consuming, but the end result will

be a bootable disc that you can easily make back-ups from.

Converting screens (SAM only)

Due to it being a converted Spectrum program, Headliner can only handle 6912 byte MODE 1 format files. Unless they're monochrome and/or MODE 2 (in which case you can easily convert them using any art package), there isn't a straightforward way of loading graphics from higher modes into the program, but you can make standard MODE 1 screens compatible with this bit of BASIC:-

```
10 CLEAR 29998
20 LOAD "SCREEN" CODE 30000
30 SAVE "SCREEN" CODE 30000,
6912
```

What this does is simply cut the bottom two attribute lines off the bottom of the screen. If you want to keep these and lose the top two lines instead, then load the screen into Flash! (or equivalent graphics processing suite), go into MODE 4, SCROLL the screen until the unwanted two lines are at the bottom, go back into MODE 1, save the screen and cut it down using the same method.

(The above program actually comes from the later version of the WordMaster manual, which has a lot of extra SAM-specific information. If you own a SAM and you've got the earlier version, Bob might be able to provide you with the up-to-date model if you phone him up and ask him really nicely.)

24-pin compatibility

I don't know about other printers, but when printing out from Typeliner using a Citizen Swift 200, you may find that

output is vertically distorted, ie it looks stretched and overruns the paper by about an inch. If this is the case, just select IBM emulation (rather than Epson or 'auto' mode) from the printer's menu, as this mode works in the same way as a 9-pin printer and should print out fine. However, you'll have to switch back to Epson to print from WordMaster, as the IBM mode won't recognise certain control codes.

Watermarking

You may think it impossible to do fancy shaded backgrounds on Typeliner; not so. If you have a black and white heading or other graphic, load it into Headliner. Use the colour option to shade it in yellow (or green for a darker watermark), and put this version of your graphic into Typeliner (ensuring that you select shaded mode from the graphics menu). If you put a block of text over this graphic, you should find that it is readable and the stippled background creates a nice effect. The only problem with this technique is that some of the smaller fonts, especially C-Light, tend to blend in with the background. Stick to the bigger fonts and it should work fine.

Page numbers

Typeliner leaves quite a large gap at the bottom of printed pages. One way of filling this (if you're producing more than one page) is to add a page number. A simple way of doing it is to print a short text file from WordMaster along the lines of:-

```
>at 53
>large
>centre
PAGE 1
```

The >at 53 command sends the printer to the very bottom line of a sheet of 11" paper in 12 spacing mode. If you use exact A4, you may want to change it to 54 or 55. Other size papers will need you to work out the value yourself.

File Conversion

The two main problems with other word processors are that (1) they use different control codes to WordMaster and (2) they often don't include line-feed characters and instead simply space down to the next line, which looks a mess if you try to print them out from Typeliner.

There's often no easy way to convert the control codes. Sometimes you can type a character into the SEARCH mode, type its WordMaster equivalent into REPLACE, set AUTOREPLACE on, and let the program do the rest. In many cases, however, the control codes are untypeable, leaving you with no option other than to replace them manually.

To add line-feeds, what you need to do is first go through the file and press RETURN at the end of each paragraph. This makes things look even messier, so what you should now do is enter two spaces into SEARCH, one space into REPLACE, set AUTOREPLACE on and wait. You may have to do this a couple of times to get rid of all the unwanted spaces, but it does work eventually.

People have in the past mentioned programs that automatically convert between the various formats. I've never seen one of these myself; does anybody know where one might be available from?

I hope you've found this article useful. If you have any questions, amendments or further tips, send them to me via **FORMAT** and if I get enough, I'll put together a follow-up article. If not, I'll pass on anything I do get to the Help Page or Short Spot. Either way, they will reach an audience eventually.

In particular, I'd be very interested to hear from anyone who had managed to load MODE 4 graphics into the suite, or produce bold/italic/underlined text from Typeliner without altering the font.

HOW BASIC IS STORED

Part 2.

By:- Chris Lord.

Hi, I'm back with the second part of this look at how Spectrum Basic stores its statements in memory. Last time I left you looking at a line which contained numbers, I hope you managed to work out what was going on. If not, don't worry because I am going to explain in my own fashion anyway.

Statements which involve numbers - such as assignments - are a little more complicated at first glance, especially as the Spectrum has various ways of handling numbers depending on whether they are integers or floating point.

To keep things simple, we shall be looking mainly at integers. Even so, you should pick up enough ideas to give you an insight into the general operating procedures of the machine, and to help you write more economical programs.

Briefly recapping, we found that when we entered the one-line program:-

```
10 LET P=1
```

and then investigated the way in which it was stored, the computer responded by showing the sequences of numbers shown in Fig.1 below.

You will notice that the number 1 is stored in two different ways - once for

LISTing purposes (49 is the character code for 1) and once for the computer's own internal uses.

This is done by inserting the code 14 in the byte immediately after the ASCII code(s) representing the number, and this acts as a signal to the Basic interpreter that the next five bytes are to be taken together, and that they contain a number.

All numbers on the Spectrum require five bytes for their representation, but the way in which this is done varies. If the number is an integer between +65535 and -65535, the first byte holds a zero. The second holds zero for a positive number or 255 for a negative number - that is, it acts as a sign byte. The third and fourth bytes contain the actual value of the number (lo byte/hi byte format), and the final byte holds zero again.

Real numbers are a bit more complicated. Briefly, the first byte contains the exponent of the number with 128 added to it, while the other four bytes store the mantissa. Zero is stored by all five bytes containing 0.

But don't worry if you don't understand any of that - just be grateful

Line Number	Line Length In Bytes	LET	P	=	1	Code For Number	Internal Format For 1 (5 Bytes)	Enter (End Of Line)
0	10	241	112	61	49	14	0 0 1 0 0	13

Fig.1 A Basic Line With Numbers

you are programming on the Spectrum and don't need to make the distinction between floating point numbers and integers, as you do on so many other computers!

Something which is easily forgotten when working out how much memory a program will require is that the RAM has to hold both the program and a certain amount of working space. When your program is run, a number of extra locations in RAM are allocated to hold the variables. Information about this is contained in another systems variable, at locations 23627 and 23628.

To see how this works, type in NEW to get rid of your program, then enter the following:-

```
10 LET a=1
20 PRINT a
30 STOP
40 FOR i=0 TO 5:PRINT PEEK (PEEK 23627+256*PEEK 23628+i);
  **:NEXT i
50 LET a=a+1
60 GOTO 20
```

When the program is RUN, it will print 1 at the top of the screen and then wait for you to CONTINUE. When you do, you will see the following on screen beneath the 1:-

```
97 0 0 1 0 0 2
```

Disregarding the last number - which is the new value of 'a' being printed as the program returns to line 20 - the other values represent the way in which the variable 'a' is held in the variables store, the location of which is found by the PEEKs in line 40.

Fig. 2 may make the sequence a little clearer. Incidentally, all variable names are treated as being lower case when stored on the Spectrum, so if the variable

a	Zero Byte	Sign Byte	Value Of Number	Zero Byte
97	0	11 0	1 0	0

Fig. 2 - How Variable 'a' Is Stored In Memory

had been 'A' instead of 'a', the representation at this point would have been exactly the same.

CONTINUE once more and the display will change to read:-

```
97 0 0 2 0 0 3
```

with the final number giving the latest value of 'a' and the others showing how that value is updated in the variables storage area every time the program executes line 50.

Only single-letter variable names are stored in this simple way. For longer names the complete name is stored, but with 64 added to the value of the code of the first character and 128 to the value of the last. This is a great advance on older versions of Basic which often regarded only the first two letters of a variable name as significant, but it does mean that if you are not careful, you can spend a lot of room storing unnecessarily lengthy variable names.

The Spectrum recognises many different kinds of variable, and stores each kind in a slightly different way. Those controlling FOR ... NEXT loops are perhaps the most interesting as all the information required to organize the loop is held in just 18 bytes.

Here the first byte contains the code for the variable name, with 128 added to it. The fact that only one byte is allocated explains why loop variables can have only a single-letter name on the Spectrum.

The next 15 bytes are shared between the start value of the loop, the end value and the size of the STEP - five bytes each in the order indicated.

The last two bytes contain the line number, stored in the usual hi byte/lo byte way.

There are several useful pointers to be picked up from our look at the Spectrum's handling of Basic. The first is that because it is always possible to tell just where any particular line is stored in RAM, lines can be used for purposes other than the ones for which they were designed.

REM statements in particular make excellent stowing places for numbers which will form part of machine code instructions - they can be extracted with a PEEK, and then POKEd into the appropriate place while the Basic program is running.

The only thing to be careful about here is that you must know exactly at what address the statement is stored, as an error here will almost certainly result in the program crashing.

You can also use what you have learned here to cut down on the workspace requirements of your programs. Remember that unnecessarily inventing new variable names rapidly swallows up storage space, as each name is stored twice - once in the program line and once in the workspace.

Secondly, keeping variable names short is doubly efficient, as it saves room in both program and workspace. Of course, both of these tips conflict with the equally good advice to make your programs readable and easy to debug - the choice is yours.

Finally, what happens when you type NEW? In some computers, getting your program back is tolerably

straightforward as it is not actually erased from memory.

The BBC Micro has the command OLD to restore the program without any fuss. The Spectrum doesn't do this - once you have scratched your program from RAM, then unless you have previously SAVED it, it's gone for good. If you try that now, and then re-enter an immediate command to check up on it, you'll see what I mean.

What's that? Not gone completely - there's a little of it still there? I'm afraid not. What you are seeing is the representation in memory of the immediate mode Basic command which you've just entered!

And that brings me to the end of this short look at how Spectrum Basic is stored in memory. There are of course many things that could still be covered but I'm sure other readers can write in with their little bits of info. Also, as someone who is about to buy a SAM Elite, I would welcome a similar article on how the SAM does things. Thanks for sparing the time to read this.



"As you forgot so many things last year, I thought I would make sure you did not get the list wrong this year and so I have put my list on a computer disc for you."

XMAS LIVE FULL



"I was just telling him the one about the snowman and the prostitute and he laughed his head off!"



"Well you don't think I wear this stupid beard all year...!"



"Hello... is that SNOW HOLIDAYS? I have a complaint I would like to make...!"



OUTLET

The Disk Magazine!

+D +3 PC state which you want!
(PC not converted but pure VGA/HDD)

Software, articles, ideas, advice, letters

No unzipping or guesswork...
WE RUN IT FOR YOU!

Share ideas, programs and problems with others. Clear, graphic presentation. A joy to explore new software and information!

Only £2.00 to newcomers!

Chevron Software, 34 Saltersgate Drive
Birstall, Leicester, LE4 3FF
(Producers of OUTLET monthly since 1987)

ANSWER	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	Total
1	14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14
2	0	14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14
3	0	0	14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14
4	0	0	0	14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14
5	0	0	0	0	14	0	0	0	0	0	0	0	0	0	0	0	0	0	14
6	0	0	0	0	0	14	0	0	0	0	0	0	0	0	0	0	0	0	14
7	0	0	0	0	0	0	14	0	0	0	0	0	0	0	0	0	0	0	14
8	0	0	0	0	0	0	0	14	0	0	0	0	0	0	0	0	0	0	14
9	0	0	0	0	0	0	0	0	14	0	0	0	0	0	0	0	0	0	14
10	0	0	0	0	0	0	0	0	0	14	0	0	0	0	0	0	0	0	14
11	0	0	0	0	0	0	0	0	0	0	14	0	0	0	0	0	0	0	14
12	0	0	0	0	0	0	0	0	0	0	0	14	0	0	0	0	0	0	14
13	0	0	0	0	0	0	0	0	0	0	0	0	14	0	0	0	0	0	14
14	0	0	0	0	0	0	0	0	0	0	0	0	0	14	0	0	0	0	14
15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14	0	0	0	14
16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14	0	0	14
17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14	0	14
18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Here are the answers to the quiz set on page 18. I hope you enjoyed the quiz and did not have to cheat too much.



YOUR LETTERS

Dear Editor,

In Vol.7 N°3 'Your Letters' B.P.Beer, refers to a Video Titling program by a Mr J.White of London. I am interested to know more about this, (I already use 'Protitler' by Bill Hall), is it possible for you to let me have either of their address's or telephone numbers, Mr Beer also asks about a 'Genlock' for the SAM and your reply was "that you think that a Digitiser (presumably a Video Digitiser) is on its way and that this may well contain a genlock, more news as we get it from West Coast". I have waited eagerly but alas no news as yet, what's the latest? is there any progress and any hope of seeing the 'Genlock' or even the "Digitiser"?

Yours sincerely, Deryck R.J.Morris.

I'm sorry to say that at this late stage we have been unable to locate Mr Beer's address. If he is reading this then I'm sure we will be able to get you in contact, if not then perhaps someone else can help you.

The digitiser was never finished. Partly due to lack of interest from SAM owners and also because the hardware designer could not produce a good enough product for production within the target price to meet West Coast's requirements.

Maybe one day some hardware designer can be found to take up the challenge, I myself would love to see a hand scanner for SAM. Ed.

Dear Editor,

Just a note to urge you to drop your policy of only printing 'hard news' about

the SAM. It makes your News Pages look awfully dull and the SAM scene look completely stagnant.

Perhaps you could have two News Pages, one for the news you print at the moment and another, written in a more light-hearted tone, for rumours and gossip. Some of us LIKE rumours and gossip you know!

This seems to work well in other magazines. One of the music weeklies has a column called 'The Rumour Mill' and 'Comics International' magazine has a paged called 'Movers and Shakers' detailing unconfirmed reports from the comics world. I hope you will give this idea some consideration.

Yours sincerely, Nick Xylas.

Mmmm... There are a few problems with rumours, one being that all too often in the past rumours have been used to test the water but have never led to products being available (see the first letter this month). Let us assume someone was designing some hardware, and suddenly saw that 'rumour had it' another company was looking at the same type of product. Could this lead to neither product ever seeing the light of day? It is a difficult situation and one where we have to tread very carefully.

What do other readers think about rumours? Write and tell us your views. Ed.

Dear Editor,

I've just received the latest **FORMAT** and was pleased to see the Hard Drive interface is available at last, now if only I can twist Father Christmas' arm....

Actually I was surprised that although the interface is available, we have to find our own drives. I can understand the thought behind this because, as you say, there are bound to be people who know someone who has an old drive lying around after their upgrade to fit Windows 95 onto their 'PC', but it leaves people who don't rather stranded. Can I suggest that your review of the Hard Drive interface also talks a little about the other part of the set-up, the hard disk drive?

Not being an idiot I can easily get hold of a drive from a magazine advert, but all the IDE drives I've seen are uncased and assume, logically enough, that a 'PC' will be supplying the power. Your news item about the interface says that we have to supply our own drive and a suitable power supply.

How about some hints to those of us without easy access to a second hand hard drive about the following important issues;

What exactly constitutes a 'suitable power supply'?

What do I do if my Hard Drive doesn't have a case?

On another tack, whilst I'm writing, I'd also be interested to know if the promised replacement to the SAMBUS clock is still in the pipeline as the 'Coming Soon' bit of the West Coast advert now tells us about the impending withdrawal of the SAM with TV Modulator.

Finally, in preparation for Father Christmas, I enclose a cheque to order yet another 'Two Up' so I have another expansion slot handy, just in case....

Thanks for **FORMAT** and all your hard work.

Yours sincerely, Matthew Gallagher.

I hope the hard drive review in this issue meets with your approval and answers all your questions. And yes, the clock/calendar board is coming but I'm

not sure exactly when. **Ed.**

Dear Editor,

As my old PLUS D finally gave up the ghost, and I was not able to get the SAM Coupé to function properly, I eventually decided to get a PC with all the Multimedia whistles and bells on which I have installed the excellent Spectrum emulator written by the Dutch fellow.

In consequence, I shall not be renewing my subscription to **FORMAT**.

I have a quantity of Spectrum bits and pieces, including books and programmes and a functioning black 128K Spectrum which I would like to give away to anyone who is ever in this part of the woods at any time. My telephone number is 01635-40794.

Yours sincerely, David Bradley.

Oh David, now is not the time to be deserting **FORMAT**, just as we start covering the Spectrum emulators.

And what problems have you been having with your SAM? You know we are always here to help with problems. **Ed.**

Dear Editor,

I noticed that in a reply to a letter in November's **FORMAT**, that it may be possible at times to get hold of reconditioned disc drives for the SAM. I presume these would be the original type fitted to the SAM when it first came out. If so I would be very interested in obtaining one should they ever be available. I regret that as a Senior Citizen of 74 I am not able to get to any of the shows, but I would be obliged if you could add my name on any waiting list that you have.

Yours sincerely, George Robson.

At the last two Gloucester shows we have had a hand-full of reconditioned slim-line drives on which West Coast have given a 90 day warranty and selling at £60. However, there is no reliable supply and so we cannot normally take

orders. We will though, in your case, let you know when we do get a few more.

I would like to remind readers that the modern type of drive (as fitted in the Elite) can be fitted to Coupés either by buying one of the conversion kits or by sending your machine in to us for the drive to be fitted by experts. The new drives are superior in many ways to the old slim-line and there is a full 12 month guarantee on the drive. If anyone is experiencing problems with a slim-line drive then give me a ring on the hot-line and I will go through the options with you. Remember that the £79.95 quoted in the advert includes the supply and fitting of the new drive and electronics as well as return carriage. **Ed.**

Dear Editor,

I've managed to wear out the letters on a couple of keys on my SAM keyboard. Other than that the keyboard is working perfectly OK.

Do I have to get a new keyboard or can I get hold of some key tops.

Yours sincerely, Daniel Parker.

I don't know, wearing sandpaper gloves is just not on when typing on a computer keyboard. But, **FORMAT** to the rescue yet again. We do have a handful of keyboards that failed to work from new, so if you jot down which keys you need and the colour of the keyboard (blue/grey or brown/fawn) and send it to us I'm sure we can help out. Include a stamped addressed padded envelope for us to use to send you your keys.

Warning though, anyone sending a list of more than a few keys will have their order treated with the contempt it will deserve, if your keyboard is that bad then get a new one. **Ed.**

Dear Editor,

I have very little to advertise, so I thought I would write a letter you can publish. I already have started having calls asking where my ad has gone, so I

thought this would be the best way. I guess I will leave it to you whether you charge me for the blatant advertising! Here goes...

As many of you have probably noticed, B.G.Services' advert has not been in **FORMAT** for a couple of months. I have more or less closed the business now. The only part that remains is support for Z80, the Spectrum emulator on the PC. Those ordering this should notice no difference at all. I took the decision due to falling cash flow, and my worsening eyesight. In order to keep it running, I would have needed to find some other things to sell, and the stress of this when your eyes are already bad enough to be registered blind was just too much to bear. I had to cut down my time in front of this and my CCTV Screen! I am now on benefit and B.G.Services is classed as therapeutic work. I will thus survive at least!

I have very little stock left. So, if readers want any of it, RING me, or send an SAE, and I will let you know if the items you want are available. DO NOT just send money of on the off chance.

I also have quite a lot of VTX5000 modems left. I could part with these for £8.50.

Ribbon re-inking is now handled by John Paine. Prices remain the same, but cheques must be payable to J.Paine, and the address to send to is: 1, Elm Close, Raynes Park, London, SW20 9HX. He can also build electronic devices and cables to a high standard. Send him an SAE with all enquiries.

I have had fun supporting the Spectrum and SAM, and I do not intend to give up using the machines, though obviously, my eyes are the limiting factor. Just let me say this. I do not need sympathy, I am fine. The best way you can help is to bear the visually impaired in mind in your everyday life. Do not clutter pavements with cars, bicycles etc., cut your hedges and rose bushes

back to your boundaries, and if you cycle, try not to shout abuse at us when we walk out in front of you!

Yours sincerely, Brian Gaff.

Dear Editor,

You asked in a recent issue for readers to write in with the story of how they became involved with computers. Here is my story, a little late but I hope you can use it.

In 1958 I worked for a chemical subsidiary of a large British chemical company in research and development. I was given the brief of finding out what the new fangled 'computers' could do for us. I was sent on a course near Winchester on an IBM 7060. This computer occupied a space about the size of a 2 storey house, used punch cards which had to be 'verified' with an 'imitation' card puncher and woe betide you if you dropped the cards and got them out of order. Punched paper tape came later. This system was descended from Hollerith. You put your program in the queue and eventually it got run by the operators. We programmed in 0's and 1's, machine code, or Fortran - the forerunner of Basic. We had to write a program to find the square root of 2 from a mathematical series or something. They were a bit upset when they ran mine as I put a for/next loop in the print statement. Print statements were a nightmare as you had to format them precisely.

We stayed in a 5 star hotel in Southampton with the other engineers on the course. On the last night we drank a lot of Watneys Red Barrel and played Brag which proved very expensive as I had a series of very good hands but there was always one better. Stick to Poker! On the last morning we hung around the IBM establishment waiting for our programs. I read my newspaper from beginning to end and then the ads and all the small columns till I found an

account of a man run over by a steam roller. This reduced me to hysterics as he was 'treated for shock'. I would have thought they would at least try and pump him up again.

I found two areas of interest for my firm given the exorbitant prices charged by 'Big Blue'. Using interactive calculations for distillation columns where I had already established we had that rarity, a thermodynamically 'ideal' system, which means the molecules were inert towards each other although they reacted violently with the atmosphere. The other one was to draw an imaginary box into which we fed the company's raw materials as costs, and out which came the products as income. Gradually we would fill the inside of the box with the relationship between the two in terms of costs.

I now realise that at that time Shell, BP and others set about doing exactly that, modelling their businesses so that when a tanker of crude oil from, say Abadan, arrived off Land's End they could simulate the company's operation for a year to determine which refinery to send it to maximise profits. Unfortunately nobody understood what I was talking about except one product development manager and that was not enough to get the firm to back the idea. As they had the capability to produce knocking on a million different chemicals some rationalisation of their costs would have saved subsequent events.

Thereafter I emigrated to the United States where they were far behind us and used a mechanical calculator on which you wound a handle to do your statistics. Statistics were new to them too, even though I worked for a large American chemical company on 6-6 nylon. On return from the U.S. of A, I discovered they had replaced me at the first outfit with 200 graduates! (Coincidence!?) Subsequently the parent firm which had not moved with the times

got taken over and lost its identity and the subsidiary was returned to America whence its technology had derived. One more example of poor management.

I felt that computers would eventually become more accessible and 20 years later I felt that 48K was enough memory to do something useful with and that my young offspring should be exposed to computers. So I got a 48K Spectrum. With great excitement I tested it out before Christmas morning. Nothing! Back to W.H.Smith's - no problem. Eventually discovered a break in the extension line connected to the TV. Phew! So we read the manual, typed in a game and took it to a friend to debug the basic. Then we got a simple game for our youngest, 'Aquaplane'. More games, my favourite is still 'The Hobbit', basically all games are a variation on it! They had an atmosphere which gets lost with sophistication, like Valhalla, for instance. 'Elite' was an addictive milestone.

Various utilities came along, Tasword, Toolkit, Sinclair's Logo (great) but my real interest was in programming. Sinclair is supposed to have designed the Spectrum to teach Basic programming. It certainly worked for me although my programming is still fairly limited. My first magnum opus was a business program to help my wife bill her customers for a little cosmetic business she ran. Finally I wrote a chess program to create a database of games and ran out of memory.

About this time with various add-on's like Multiface and Wafadrive I plugged one in with the power on. However, the second hand market was very good and I got a Plus 2 but I regret the loss of the first Spectrum. I am now three years down the road into the chess base program.

The best magazine was Your Spectrum. Sinclair User was all right for a while and there were a number of good

ones for the programmer about like 'ZX Programming'. Sinclair User was for Beano and Dandy fans and most of the others got to be as bad. Happy days.

Sorry this is late and long but the time factor was out of my control.

Yours sincerely, Jerry Hathorn.

Dear Editor,

Here is a short piece which I think may amuse a few people at this time of the year.

A PSALM FOR COUCH POTATOES

The TV is my Shepherd; I shall not think.

It maketh me to sit about all day doing nothing; for there are so many programmes I just must see.

It keepeth me from evensong lest I miss the beginning of Lovejoy; But I watch Harry Secombe so God should not feel neglected.

It broadeneth my mind; For I watch Neighbours and Prisoner Cell Block H, so I know how the other half lives.

Yea, though Casualty and Morse may clash, I feel no despair; My video recorder doth comfort me.

I prepare my meals in the commercials; Through the radiance of my microwave.

When I balance the plate on my lap; The gravy runneth over.

Surely Bob Monkhouse and Cilla Black shall follow me all the days of my life; And I shall Dwell in the Rovers Return forever.

Glory be to the BBC, and to ITV, and to the Satellite stations.

As it was in the days of Logie Baird, is now and ever shall be; Transmission without end.

Amen.

Yours sincerely, Carol Brooksbank.

Dear Editor,

Here is a short quiz for the Christmas

issue, just to keep readers thinking between bouts of festive feasting. In each case the answer is the name of a computer (hence the title).

NAME THAT COMPUTER COMPO

- 1) You will find it in a rainbow.
- 2) This one is not advertised.
- 3) A good year for Datson.
- 4) A Greek Philosopher.
- 5) The USA needs you.
- 6) Air force big wig.
- 7) I'll do it and I'll do it now.
- 8) Hamlet's friend with no beginning.
- 9) Mr Trotter.
- 10) The driest computer in Scotland.
- 11) This one could be a bit too sweet for you.
- 12) A very keen computer that drinks lager.
- 13) Evil note leads to an animal's den. (see 5).
- 14) Adam's downfall.
- 15) It takes most of the month to reach the bed.
- 16) A cad returns to me.
- 17) It's not quite likely his best.
- 18) Initially it beats most.
- 19) This one's a planet.
- 20) Marks and Spencers is the wrong store.
- 21) The dog that went back to the future.

I will send you the answers after Christmas so there can be no cheating.

Your sincerely, Derek Morgan.

Well you certainly have me stumped on a few of them, can't wait to see how many I've got right. **Ed.**

Dear Editor,

It has been good to see more articles in **FORMAT** that are aimed at the beginner. But one article that has been missing I feel is one that covers the jargon that the computer fraternity seem to spout so much of. What is a 'NIBBLE' and what do you do with a 'BOOT-STRAP'?

I know that you have to cater for all levels in **FORMAT** but there are some of us out here that do not always understand what words mean.

Yours sincerely, Mike Robertson.

Not a bad idea Mike, I will try to fill in a few spaces in future issues if I can find the time. If there are any jargon words people want explained then drop us a line and I will see what we can do.

However, for a full understanding, get yourself a copy of the 'Dictionary Of Computing' from Oxford Science Publications - the ISBN on my copy is 0 19 853905 3. **Ed.**

Dear Editor,

Now that the SAM hard drive is here how about one for us Spectrum users. We seem to be left out in the cold these days, no new hardware or software has appeared for ages. We still want to spend money on our machines you know.

Yours sincerely, Garry Smith.

Well Garry, I don't think I am letting the cat out of the bag if I tell you that the original design for the SAM IDE Interface was adapted from a Spectrum interface designed by someone in Europe. The problem was that nobody was ever able to produce a workable DOS for the Spectrum. The SAM hard disc operating system is already around 32K when you include buffers so I don't know what would be practical on a Spectrum. If anyone has any thoughts on the subject I would love to hear from you. **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 01452 380890.

SOFTWARE

SAM Coupé Software On 3 1/2" Disc

PCG's DTP PACK. The famous package including WordMaster, TypeLiner, HeadLiner. Complete on disc for SAM. R.R.P. £37.50. **SPECIAL READER'S BONUS** - Now includes 2 extra font packs worth £15.90 bringing the total pack value to £53.40.

Order Code: SCD-04 Price: £24.95

COLOUR DUMP. Screen dump software to work with Epson compatible colour printers. Special +3 disc available (Spectrum files only). RRP £8.95

Order Code: SCD-05 Price: £7.95

SAMSPEC SOFTWARE

SAM + Spectrum versions on one disc (5 1/4 or 3 1/2")

FONT LIBRARY. 100 screen fonts plus support software, easy to use on either computer. Special +3 disc available (Spectrum files only). RRP £8.95

Order Code: SSD-01 Price: £5.95

MONEY MANAGER. Advanced personal budgeting system for both machines. Spectrum version needs 128K (+2 not +2a or +3). RRP £15.95

Order Code: SSD-02 Price: £9.95

SPECTRUM SOFTWARE

Unless otherwise indicated these are DISCIPLE/PLUS D programs. Please state 3 1/2" or 5 1/4" disc (80 track only) on order.

ARTIST 2. The best art package ever written for the Spectrum. 48K and 128K versions on the same disc. With page-maker and utility software. Full manual. RRP £19.95

Order Code: SPD-01 Price: £12.95

UTILITY DISC #1. Six of the best and most useful disc utilities for DISCIPLE or PLUS D. Added bonus program - not to be missed. RRP £9.95

Order Code: SPD-02 Price: £6.95

PCG's DTP PACK. The famous package including WordMaster, TypeLiner, HeadLiner. R.R.P. £37.50. **SPECIAL READER'S BONUS** - Now includes 2 extra font packs worth £15.90 bringing the total pack value to £53.40.

Order Code: SPD-04 Price: £24.95

Special 3" disc version for +3

Order Code: SPD-04C Price: £29.95

FORMAT BACK-ISSUES

Volumes 1, 2 and 3 are no longer available. Volumes 4, 5 and 6 are now available only as complete volumes.

Order Code: FBI-V4 (Vol.4) Price: £12.00

Order Code: FBI-V5 (Vol.5) Price: £12.00

Order Code: FBI-V6 (Vol.6) Price: £12.00

All issues, from Volume 7 No 1 to the latest issue, are available separately. To order just quote the Volume/Issue No. Price: £1.50 each, (5 or more £1.25 per copy).

FORMAT

READERS SERVICES

FORMAT BINDERS

We are sorry to say that the range of binders we have been selling for a number years has now been discontinued.

We are urgently attempting to source a new binder and will bring you news of it as soon as we can. In the meantime, if any reader has a source for a suitable A5 binder we would love to hear from you.

HARDWARE

(For SPI please see West Coast advert.)

DUC LEAD. For use with DISCIPLE or PLUS D. This 'Dueling Up Cable' allows two disc drives to be attached without the need for opening one drive to alter its ID. Allows you to switch drives to even out wear without opening cases. RRP £16.95

Order Code: DUC-01 Price: £11.95

PRINTER LEAD. Top quality parallel printer lead (BBC standard). 2 metres long. For use with DISCIPLE, PLUS D or SAM. RRP £10.95

Order Code: PPL-01 Price: £7.95

+3 **PRINTER LEAD.** For +3 or +2a. RRP £12.95

Order Code: PPL-02 Price: £9.95

SAM COUPÉ TECHNICAL MANUAL Version 3.

The real inside info on SAM. No SAM is complete without one. RRP £16.95

Order Code: STM-01 Price: £12.95

Music Maestro

Supplied on 3 1/2" disc for PLUS D/DISCIPLE (3" for +3) this excellent program allows you to write music either just for the fun of it or to include in your own games software where it plays under interrupts. Full manual, lots of demo tunes. The ideal way to write music on the Spectrum. RRP £9.95

Order Code: SPD-05 Price: £7.95

+3 version: SPD-05C Price: £7.95

ORDERING All prices include UK p&p, overseas readers please add 10% for extra postage.

Clearly state Order Code, Product description, Quantity required and Price. Remember to add any postage and don't forget your Membership Number or we can't process your order. Payment in STERLING by Cheque (drawn on a UK bank), P.O. Euro Cheque or Cash. Make cheques payable to FORMAT. Payment MUST be in same envelope as order. Send to **FORMAT's address** on page 3. Normally dispatch is at the same time as your next issue of **FORMAT**. We will not be held liable for delays or non-delivery due to circumstances beyond our control.