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Cover by Darren Blackburn

EDITORIAL
by D. Ledbury

This issue has been a chaotic one to put together. Not only did I have the problem of having to help out at my families business full time after my father had been warned off work by the family Doctor (and a grocer's is quite exhausting work, I must tell you!), but I then had to DTP and print out most of this issue single handedly, as Darren's computer chose the worst possible time to blow up! So, what's the betting that there may be one or two spelling mistakes again? My fault, obviously.

However, this issue has been put together ... just! And I'd like to thank Stephen Mullen for assisting in some of the DTP for this issue. I'm sure you'll see which pages he's done – as the difference is fairly obvious! Stephen is currently helping Darren with some new presentation ideas for ZAT. But more about this next issue.

Thank you for all those readers who sent in letters to the letters page. Keep them rolling in! We had a large number, which we couldn't fit in ... but we'll get to the more interesting ones in due course. Likewise, don't forget that we've now got a "readers soapbox" in the form of the new "Bubblesort" section. So write in!

We were unable to fit PlayPen in this issue. However, I'll try and see if we can squeeze in the odd review in the News section. In it's place, we've brought you some interesting Show Reports from Richard Swann, on some of the events you may have missed recently.

Speaking about shows, special thanks to everyone who attended the recent All-Format's Fair in Birmingham. We'll be attending the Birmingham All-Format's in mid Februrary – next year, for ZAT's birthday!

I hope you enjoy this issue, and hope to see you in the New Year.
Have a very Merry Christmas and a Happy New Year, from all at ZAT!

Letters to ZAT

We're starting this issue's long awaited letter's page, with a letter Daniel Cannon has passed around various SAM magazines. Perhaps it may provoke some further thought amongst you?...

This letter is basically an appeal to West Coast Computers. I've written direct to them as well, but this is to make make the appeal more public. See if you agree with what I'm saying.
I'd like to see a new SAM made. One which is compatable with the current one, and all its add ons, but one which has some new features.

If you've seen any Amiga/PC/console games you'll have noticed that most games have scrolling and sound. There are a few without scrolling (Ugh/Pushover/Pang are some of the latest) but the design of the game has extremely good to get around this. All games have sound, but in varying degrees of quality. With SAM it's just 'above' Spectrum 128K/Amstrad CPC type music - not too good really.

People blame SAM's graphics and sound chip because of this. The fact is that they're not to blame. The resolution and colours of the graphics are quite adequate (but obviously it would be nice to have these improved as well), and if you've heard any decent PD sample demo you'll know that SAM is on a par with the likes of an Amiga.

The problem is how they are used. The other computers that I've mentioned (apart from Speccy and Amstrad of course) have extra hardware on board to access the memory directly (DMA). This hardware can copy bytes around the memory and send bytes to the sound chip far more quickly that the processor ever can. Put simply the hardware can play samples, print sprites, or scroll the screen whilst the processor gets on with other work - so it isn't bogged down with doing this stuff itself. Result, Fast scrolling games with lots of sprites on screen and decent sampled music.

But even utility programs can benefit - wordprocessors, databases, and so on could use it to copy information around the memory faster. Art packages would work faster (especially the 'cut & paste' option in Flash). And at last there will be a proper sample sequencer program (like Sound Machine or ETracker but with samples, not waveforms).

Now I know that people who own SAMs know that their computer is good for programming, experimenting with, and so on, and they were probably part-way attracted to SAM because of that. But most of the people buying home computers choose their computers because of the quality (and also quantity) of the games available. To make SAM mass-market (or as mass-market as it will ever get to be now) we need better games - and lots of them.

Basically SAM needs a blitter chip, and a DMA sample player. Preferably in an interface box which can be easily plugged in the back so that older SAM owners can upgrade. There are a few other things I'd like to see, but these are the main two. I'm sure with the amount of talent around in the SAM world that it can be done - it just needs someone with the ability to get things co-ordinated (and the cash of course).

Unfortunately I know next to nothing about building hardware, but I can tell anybody who does know what I'd like (and I'm sure other programmers can tell the designer(s) what they'd like too).

But obviously if nobody wants this kit then it won't be built. That's why I've written to as many fanzines/user groups as I can find to see how people react. If enough people want this kit (and let's face it - you'd be mad not to want it) then it will probably be built. Please write in to say how you feel about the subject - and put forward any ideas which you may have yourself.

Daniel Cannon, programmer, Phoenix Software.

I won't bother to comment on all the

points that Daniel has rasied. Mainly as I'm not entirely sure of the hardware side of these things. However, I hope that someone with the technical knowledge is listening!

I personally believe that some sort of hardware upgrade for existing SAM owners would be an excellant idea. Furthermore, the work done on this upgrade could be put towards the next stage in SAM's evolution.

Although as many SAM owners know, there is nothing wrong with the computer, it could do with some things improved a little more. What do YOU think? Let's hear from you.

Now, we've had a letter from one of ZAT's more regular Letter's page contributors, Kevin Cooper....

Hi! It's me again. I haven't written for a while.

Thanks for issue 16 of ZAT, which I got the other day. As dod and even better than usual. I also saw your bit asking for letters, so here I am.

Well, this letter has got two points to it really.
Firstly, will you note my address is wrong on the address labels.
The second reason for writing is to show off my nice new Star LC-200 Colour Printer. I've got a printer, AT LAST! I got it at the All Formats Computer Fair today (well, yesterday now, it was the 24th then) and am very pleased with it. The only problem is that a part is missing from the box, the knob that you turn to move the paper manually. I'll get on to Star on Monday. I seem to manage without it okay, I've no real need for it, but I'm supposed to have it!

I also got hold of Spell Master, from Fred Publishing (the Spell-Checker) and from what I've seen so far (I haven't used it much yet!) it seems pretty good, and very easy to use. That means you'll be able to use it, Dave!

Right then, that's it for this time. But remember, I'LL BE BACK.

Kevin Cooper, Cumbria

Glad you liked issue 16 Kevin. We were fairly proud with it too - apart from a silly error in ChipShop that is! As for the label fault, I'll alter the address data as soon as possible. Glad you recieved the issue though! It seems that our postal service isn't always terrible.

It's a very impressive print quality from your printer. It is a shame that other readers can't see it. It certainly looks as good a model as my Star LC10.

Spell Master IS a good Spell Checker. However, it does not create the pure ASCII files that PCG DTP requires, which means that if I wanted to use it, I would then have to labouriously correct all the spacings manually. Quite a lot of hassle! Still, it is a great addition to the SAM software scene.

Now a letter from a reader with a few problems...

Please can you help me? I have just bought a second hand 3.5" drive for my Spectrum +3, and I have had trouble in getting it to work as a second drive.
Any ideas?

Well, to answer this readers - who's name seems to have vanished off my file - I contacted several people "in the know" about these sort of matters.

The best suggestion I had was to advise you to contact Dave Walker, who runs the D-Tel bulletin board service. His address was given in last issue's Mean Biz section.

That's all we've got space for for this issue, but I'm glad to say that the mail has got to a reasonable trickle now! Keep sending those letters in. David Ledbury.

SOAPBOX
WITH Martin Scholes
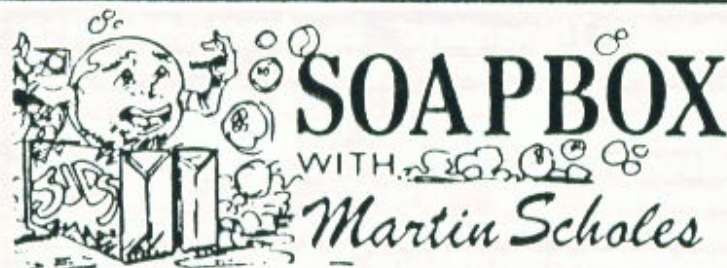
Well, Speccy and SAM friends here we are again, launching into another ZAT- this one in the Winter! (Brrr!!!)

First up, those kind Sega people have produced a nice little plug-in TV tuner unit so you can turn your 16 bit toy computer into a television set. "Why"? "WHY"? YOU ASK?! TSK! I would have thought that the answer was obvious! It's for all of those poor dopes who were sap enough to get lumbered with the things but can't afford the games! Mind you, as the tuner is a multi-standard UHF. and VHF unit I dread to think WHAT it will cost!! (It has to have VHF because for some reason best known to itself, the USA still thinks that VHF is the "Bees Knees"!)

A couple of months ago the BBC Watchdog consumer programme dealt with someone who offered a game cartridge swap service for a fee of a few quid. Needless to say, the poor souls did not get a game in exchange and I got the impression that Watchdog thought it was a rip-off. However, although a young Brother and Sister did say that they could not afford to buy many game cartridges due to the high prices. Curiously, Watchdog failed to notice that just perhaps the original con was perpertrated by companies that sell games at £40.00 + to kids who have to save up for months and months. (Market forces my foot!!)

Did you hear about the French Judo champ who had been working in London and decided to take on a "Rambo" arm wrestler machine in an arcade in London?
It broke his arm! Perhaps it was Xenophobic?

Rumour has it that at least two Regional Health Authorities are having difficulties with their computers, having spent VAST sums of money on systems that just do not work!

Step forward West Midland and Wessex Regional Health Authorities! (For it is they!) Wessex has reportedly wasted something in the order of at least £20 Million on a failed "Regional Information System Plan" (RISP)

Why, I wonder, are some software and hardware producers pulling out of the 8 Bit computer market? Sound economics? HA! How many Spectrums, Amstrad CPCs, Comodore 64s, BBCs, SAMs etc are still in use? -Tens and tens of thousands! And they are abandoning a market of THAT size?!

The problem is that they read the "funny papers" that somehow pass for the computer industry trade press and read such @*$% as; "8 bit is dead!", "SAM Coupe is a Spectrum Clone!", "CPC is dead!" Etc, etc. Of course, those statements and others like them are the result of miniscule brains too long marinated in alcohol to realise that what the computer industry requires is news and not space-filling garbage. Of course the trouble is that Joe Bloggs, owner of a small computer shop or even Joe Bloggs, buyer of a computer chain store may well rely on the computer trade press to tell him what is going on and what is available. Perhaps this negative stuff is believed by some producers of software and hardware? Who knows?

But what if such dreck is belived? -After all, these ARE the trade papers and if they rely on filling up their pages with long, boring articles on the latest PC DOS upgrade (only needed because the last one caused more problems than it solved?) and the like and only shove in tabloid style argot instead of serious coverage of what's new in the 8 bit section of the computer markets, can we be too suprised when large stores and even smaller ones really only want to stock the latest in Amigatari or Nintsega offerings?

Okay, perhaps they SHOUD know better. You and I like to think that maybe we WOULD have known better, but are we in the happy position of being in the know? Knowing more than software producers? Can this be possible? Strewth, Blue. No wonder the industry is in such trouble! But I am only joking. OR AM I?

I must concede that although there may be a great deal of parody and even the odd touch of exageration in these last few paragraphs, there is

more truth than I would LIKE there to be. Are the computer trade press journals that bad? Not all of them, but enough, sadly, to make a difference.

Sadly, we are forced to leave Martin's thoughts here a little earlier than usual, as the cassette with this article became too corrupted to read. Let that be a lesson to everybody! Backup your work regularly!

We now join Richard Swann with ZAT's first...

BubbleSort

What's up with the big magazines?

Years and years ago, computer magazines for the spectrum were deadly serious. Most of them were black and white and consisted mainly of tips listings. Reviews were few and far between, and the tips section extended to things like "In Chuckie Egg, you can reach the 3 floating ladders on level 7 by holding down the up key and jumping", when anyone could work hat out anyway.
Tapes on magazines weren't even thought of as a possibility, and the whole article was not too dissimilar to ZAT, except a bit bigger.

Of course, all that's changed now, and magazines have to be all singing, all dancing articles to succeed thse days. Or do they? One month, I bought all the Spectrum magazines I could find (which wasn't too hard), and decided to see if they were any good.

Sinclair User incorperating Crash No.123 £2.20

This is the first issue of Sinclair User since EMAP (it's publishing company) decided to buy up Crash and incorperate it with itself, although quite frankly no-one would notice if the Crash logo was accidently left out.

The tape on the fornt cover is neatly boxed and contains 8 programs. There's a rerelease of a very old Elite game, Rollecoaster, which while good for it's time is now looking severly

dated. This game is described as a "Prize Password" games, meaning you have to guess a prize password to play the game. This is ridiculous as it discourages people to buy the tape, because the cryptic clue for the program is very difficult (but the program accepts "AAAAAM"). Other programs include a hopeless flip screen arcade adventure entitled Demon Slayer, a pointless program which prints tips fro very old games on the screen. There's a music demo featuring rip offs of other games's music, a reasonable adventure entitled Magnetic Moon, a demo of an up ad coming SAM game, and a spectrum assembler, which takes up far too much memory and has completely pathetic instructions. not even mentioning how to install the programs or how te disassembler works! Finally, there's a POKEs progeam by Graham Mason, featuring a good 128K rendition of "Axel F", and hacks for 6 games I have never heard of!

As for the magazine itself, there's 2 pages devoted to people grovelling for software! This only goes to show what low level of intellect this magazine assumes its readers have. The letters page also claims that there is nothing interesting to write about the SAM right now. If this really was the case, ZAT would be half the size it is now!

There is a colourful tips section containing several large maps and some tips which seem to have been "borrowed" from ZAT's Arcade Alley! There is a complete solution to Dizzy 5 and Rick Dangerous as well, which should prove to be very useful.

The reviewing system is very similar to the one in ZAT, but they do give a second opinion, which isn't always possible with ZAT's reviews.

The Adventure section consists of several bits of solutions, all of which being "from where we left off". Fair enough, but what happens if you didn't buy the previous issue?

And what's happend to Crash? The great sections that placed Crash above all the others – Playing Tips, Jetman, Lloyd Mangram's Forum, and Oliver Frey's superb covers had all vanished into thin air. In fact no Crash staff appear anywhere in the magazine [with the possible exception of Graham Mason. DL], and this issue looks no

different from an "ordinary" Sinclair User!

Your Sinclair No. 78 (May 1992) £2.20

"Britain's Best Selling Spectrum Mag" is what it claims on the front cover. Indeed it is, but "Britain's Best Selling Sensible Mag" as it claims on the back cover, is far from the truth.

In fact, virtually all of the magazine is littered with puerile humour, such as "Cheese was popularly used in the 18th Century as an early form of hair lacquer". Now I wouldn't want any magazine to be completely straight-minded, but it is unacceptable to have these stupid jokes appearing all over the place.

Mind you, it's hardly suprising, considering some of the things that some people write in, such as "Helmut the Aged man is being licked by my dog" (??!!) Now, that is just going a bit to far - I mean, it doesn't make sense. Mind you, I suppose it's fun to read - once.

However, therre are two pages packed full of SAM stuff which is a good read, although it's a shame it couldn't be bigger. It includes a review of Triltex (Brilliant game) [Not a bad cover too! DL], and some of the excellent SAMCO demos (which has more than just the slightest connection with ZAT).

There's a cartoon strip entitled "Ernie the Psychotic Madman", but don't expect it to be another Sentinel, because it's in a completely different league. The artwork is reasonable, but the humourous plot is a bit thin. Again, though, it's worth a read once.

The tips section is not as colourful as Sinclair User's, but it does include a help section, although you may be required to wait two or three months before your proble is answered - by which time you might have given up or solved the problem yourself! The POKEs section is even smaller than ZAT's, featuring a mere four pokes in total. There's a big map of Titanic Blinky, and a complete solution to the new Dizzy games.

There is a techinical help section, although I spotted 4 mistakes on 1 page, so I'm not sure about reliability

there.

And finally, there's a whole section dedicated to non-computer aspects (that's things like boks, films, records etc.) However, I felt that this section was too big (5 pages), and there should have been a wider range of material covered (comprising mainly of children's material). The Editor of YS says the section will be expanding because there's nothing to write about, but that's simply not true; there could be something similar to ChipShop or Soapbox instead.

Overall, I think this magazine is simply best suited to young people, but I think that it is the wrong target age. Stick with ZAT if you want a "proper" computing read.

Back-chat
BY ANDY DAVIS

This month, we'll start the long awaited series on graphics which I've promised. I've moved it back a few months as I wanted to first get adventures and comms out of the way.

Computers usually have 3 standards of graphics, called Resolution. Low resolution usually describes very large graphics, made by spaces and blocks, each a character size. Medium resolution means using the computers 'graphics characters'; a set of defined symbols which can be pieced together to make a picture. The Commodore went far and placed two graphics on each key, varying from circles to different sizes and positions of horizontal and vertical lines. The Spectrum had eighth graphics characters, or sixteen if you inverted them. The BBC has a larger amount, 64 to be precise. The finest style of graphics is high resolution, using 'pixels',the smallest dot area on the screen. The Spectrum is capable of 256*192 pixels. As SAM owners will know, different modes can be selected to choose different pixel sized screens. As low resolution hardly requires an in-depth article, we'll move straight to the most well used size: medium res.

As you now know, the smallest area on the computer screen is a pixel. The next size up is the size a character or letter takes up on the screen. This is referred to as a cell. This is determined in ROM what size it should be, but owners of SAMs and QLs can use the CSIZE command to select different heights or widths. With the Spectrum, you need a little bit of software to alter the size. To select a particular point on screen, you use the PRINT command with AT and two variables to tell the computer which column and row to start from. When printing in medium resolution, the first columns and rows are at the TOP LEFT corner, and start at 0,0.

Remember, columns go ACROSS the screen and rows go DOWN the screen!

If you're not satisfied with the style of character you're printing, you can alter it with ease. All it takes is a little planning and either lots of paper or a designer program. First, first out how many pixels make up a character cell. It's usually eighth, but some computers use 7*5 for a character cell. The very basic part you can redefine are the 'graphics characters' on the Spectrum. Beware: These are NOT the eighth symbols on the number keys, but 21 characters which you can alter to what you want. When the Spectrum is switched on, the 21 characters are not blank, but copies of the capital letters A-U. On the 128, graphics T and U are not allowed, unless you POKE 23611, 205. To restore it back to normal condition, POKE 23611,221. To show the characters, you press the GRAPHICS key and any letter A-U. Remember to press the GRAPHICS key again when finished to return to normal mode.

User defined graphics, or UDGs are usually held at 65368. To check, type PRINT USR "A" which tells you the address of user defined graphic 'A'. PRINT USR "B" would tell you B's address (which should be A's address plus 8) and so on. To alter the character you should get an idea of what you want to change it to. The best way is to draw an 8*8 grid...

128 64 32 16 8 4 2 1
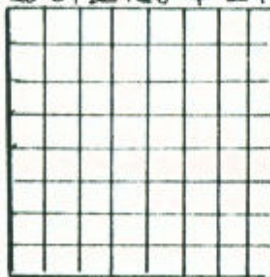
8 BY 8 GRID

At the top, label each column as follows...
128,64,32,16,8,4,2,1

Now, shade in the squares you wish to use to make up your character. When you have done, you add up the columns which have a shaded square in. For example, on column one, is column 128,32,2,1 are shaded, the total is 163. Do this for all eight rows and then you could enter the following program..

```
10 FOR x= USR "A" TO USR "A"+8
20 READ a: POKE x,a: NEXT a
30 DATA your eight numbers.
```

To show, press GRAPHICS "A" or PRINT CHR$ 144. Incidentally if you are using CHR$, graphics characters run from CHR$ 144 to 164 on the 48k or 144 to 162 on the 128k.

Another way to define characters, much quicker and easier os to use a UDG generator, which automatically draws the 8*8 grid and allows to colour or uncolour a little box. The numbers are also shown, as well as the actual graphic as you build it up. It also allows you to save them. If you wish to save them in BASIC, and you have started with graphic "A", then...

SAVE "UDGS" CODE USR "A", number of udgs*8. If you started with graphics "D" replace the A with D. If you want a UDG generator, write to the address at the end, enclosing a tape and SAE.

A step on from UDGS is designing you own character set. A rather dashing gothic font would suit a medieval adventure, rather then Sinclair's ageing font. You may be asking how, as the Sinclair font is in ROM, and cannot be changed. However, there is a little 'arrow' in RAM telling the Spectrum where to look for the characters. All you have to do is design your own and then put the address of your new font in the little arrow. Designing your own font is a little bigger than designing pac-men and aliens in UDGS, but nevertheless it is possible. Most UDG generators usually feature FONT generators too. If you don't wish to create your own, you can buy one of many different styles from me. I have a library full of them, or I can create a custom font, specially for your game or program. I once designed a set of 'alien' characters and an alphabet of the Soviet Cyrillic letters to make me be able to encrypt my programs a little more and enhance my ability to write in a 'strange new language'. After a while, it's quite easy to read what you've done!

The characters you need to define for your own set are CHR$ 32 to CHR$ 127 or the ASCII set. ASCII stands for American Standard Code for Information Interchange, and means CHR$ 65 on any computer will print a letter "A". ASCII was set up to allow total transportability of text between computers. To print out the ASCII set...

```
10 FOR x=32 TO 127
20 PRINT CHR$ x;
30 NEXT x
```

Now, as I said earlier, the Spectrum character set is 32 columns by 24 lines. But with a little but of software, you can have many other sizes. The most common style is 64 column text. This redefines slightly the number of character cells per line so

it prints in a different size. Tasword uses 64 columns, but is a little poor as the characters are too small. 40 and 42 columns are ideal, and there are one or two available. Andrew Pennel's text printer [an old but very useful utility from Sinclair] features 16,32,21 and 42 column text. Fontasia from Alchemist PDa llows anything from 1 to 106 characters per line. They all work by altering a channel of the computer to another screen window. As you may know, channel 1 is the input line, channel 2 is the screen and channel 3 is the printer. Usually, channel 3 is redefined to jump to a machine code address to print the text. Andrew Pennel chose channel 15 in his 42 column printer. If channel 3 is used, you can use LPRINT, rather than the laborious PRINT £3;"blah".

From Micronet, I have a BBC mode 7 simulator, which allows you to type in BBC style, in 40 columns and also use the teletext graphics as seen on the BBC, Ceefax and micronet. The characters are different to the Spectrum as Sinclair only defined their block graphics as a 2*2 block. Acorn designed theirs as a 2*3 block, giving much more variety. So it is now possible to recreate almost any BBC game, as the code takes up less than 1k, leaving the rest available to you. And, seeing as how the BBC only had 32k memory, you can do some nifty programming to print up the characters to recreate the game!

Available from Alchemist Research..
Many Fonts.
Fontasia Program.
UDG Generator.
Font Designer.
64 Column Print.
40 Column Print.
BBC Mode 7 Simulator.
All are 20p each from Alchemist PD. Send a blank tape for the latest file catalogue and price list. Address in Mean Biz.

MINDGAMES
by PAUL NEALE and DAVID LEDBURY

Hello everybody, my name is Paul Neale. Like you I am just a subscriber to ZAT and thought I'd send in the odd contribution to do my bit for the Spectrum adventure scene.

After David'd recent offer to "FB" readers, there is probably a new adventure fans that have joined us, so let's hear from you all. If you would like to try your hand at reviewing games etc, or are stuck in a game, or anything else to do with Spectrum (or SAM) adventures then write to me now. The sooner the better, so we can have it printed in the next issue.

I will start off this month with a trilogy of adventures written by the mighty Balrog himself, John Wilson.

An Everyday Tale of a Seeker of Gold is far from just an everyday tale. The gold seaker is Bulbo Biggun, and like every self respecting Boggit, starts his adventure from the comfort of his Boggit hole, with the door to the East leading out into a world of Boggittish adventure. On his travels Bulbo encounters many J R R Tolkien type characters, not least of which is "Smog" the mighty Dragon, and it's rather large heap of treasure. The ultimate quest of which is to seperate the one from the other.
I wish I had more space to go into dedail, because to my mind this is one of the Balrog's finest games.

The tale continues in "Fuddo & Slam". After Bulbo squandered away his treasure and Gullem's ring in a game of Boggling, Fuddo takes onthe task to recover the lost ring with the aid of his constant companion, Slam. That is if you can find him.

Bulbo and the Lizard King is the final part of this wonderful trio, and Bulbo is once again pushed into te adventure by Grand-Alf the wizard. Typing the name of the Balrog's cat should see you merrily on your way. Your first task is to help Bulbo choose a party of companions to aid him on his quest to vanquish Staros the Lizard King.

If, like me, you are a Tolkien fan, then the Seeker of Gold is for you. Because I enjoyed them so much, it is not hard for me to rate them 10% but anyway, all the adventures accept the "usual coomands" and it comes wrapped in the usual Zenobi blue pacaging.

Accompanied with the "usual" A4 information sheet and far from the "usual" adventure, the Seeker of Gold is the funniest game I've played since the Behind Closed Doors saga.

Overall 99%   Personal 101%

I have a game here also written by the Balrog, heavily based upon a series of articles published in ZX Computing Monthly, and written by Alan Davies. "Elfin Wars" is a defeat the invading armies Map/strategy based game, not unlike Lords Of Midnight and Doomdarks Revenge, but with an added feature which enables you to plot out your own terrain and do battle with the "Black Riders" in a world of your own design. But there is a slight problem. The Balrgo says that he has no plans to release it, and include it on his price list, so I suggest that anyone interested in this type of game should grovel like anything to get your hands on a copy. A game I highly recommend.

Before I go, and leave you with David,

I'll leave you with a few tips. Read no further if you are currently playing these games and don't want to know.

Phoenix;certain events are governed by "TIME". Therefore you only have a set number of moves in which to carry out the necessary actions. A simple SAY "HELLO" if necessary will allow you to converse with anybody.
DOGBOY;Wake the Gatekeeper twice, bribe him to open the gate with the gift you got from the Queen for throwing the brick at the Magpie. Before leaving the city, make sure you are carrying a Tomato and a basket, because once outside the gates you can't come back.
WHITE FEATHER CLOAK;love, blacksmith, tree, moon, Grimbal's heart. [Eh? DL]
BLOOD OF BOGMOLE;If you type FB when an Orc patrol attacks, it stops that attack.
FAERIE;The only way to score any points at all is to create the score monster. To do this SAY XAIVE in the cave.

Thank you Paul. Now, a few words about a great new SAM Adventure which I've been looking at for a few weeks now....

Days Of Sorcery is the first major SAM title by programmer/publisher Nigel Kettlewell, (who some of you may know from the SAM Adventure Club, or from SAM PRIME) which he believes shows the features of the SAM at their best in an Adventure.

It's based on a simple traditional type of story: a threat hits a land, and guess who has to remove it? In this case, the threat is in the form of a mist which kills or sends mad anyone who is caught in it.

The game features both excellent graphics (from Phil Glover - Editor of the SAM Adventure Club), and some fairly detailed text from the hands of Nigel. These are combined in a split Moded3 & 4 form, (mode 4 pictures and mode 3 text) and come with a unique combination of facilities, which certainly make this game stand out on it's own. After all, how many games can you think of which allow you to change the numbers of characters across the screen? I can't think of many!

It also boasts a powerful line editor, alternative fonts, alternative colour schemes, and loads of other neat touches.

The parser itself is quite powerful, and fairly faultless. It only lacks the ability to use commas to seperate input.

The overall difficulty of the game seems to be pitched at an intermediate level. There are SOME tricky puzzles, but there is no shortage of helpful (and not so helpful!) characters to converse with. For example, there IS a maze, but this one even the most ardent of maze haters would be able to deal with ... with a little effort.

As I have a vested interest in the game - I helped design the impressive booklet - I will not give this game a rating. However, if you are looking for a first Adventure, then look no more. There is not much else I can say, but BUY THIS GAME!

It is available fom Nigel Kettlewell, at: 12 Limited Road, Moordown, Bournemouth, Dorsett. BH9 1SS, and costs £9.99. Knock off £1 if you are a member of the SAM Adventure Club.

Nigel has just started work on a new SAM project - which even from it's early stages looks to be VERY promising indeed, and should be of interest to many Adventurers and Arcade players alike.

INTERVIEW with..

Graham Burtenshaw Interviewed by David Ledbury

For this issue we have interviewed Graham Burtenshaw; Creator, publisher and co-Editor of the SAM diskzine Enceladus. Graham is also the author of the controversial Quest Software Spectrum 128K title: Doomsday.

What is your full name?
There's no way I'm going to tell you that!

When and where were you born?
Can you give us any info about your background - schools, etc?
I was born in Shropshire and moved about quite a lot (living in Malta for half a year). The longest I've stayed in one place was at Shifnal, also in Shropshire, and now I'm at Weston. It's not the most endearing of places, but it's not bad! I've attended six schools altogether and am now studying for A-levels.

What is your earliest memory?
I was always mucking about with the toilet cistern, and I managed to flood the house when I was about 2.

What was the first computer you ever bought?
The first computer I had was a rubber keyed Spectrum.

Can you remember the first thing you bought for this computer?
The computer came in a pack with "The Hobbit" and a few games - Escape, The Chess Player, Maze Death Race - don't know if anyone remembers those very early games, but they were great fun! The first piece of software we actually bought was "Penetrator" which I played for months.

How did you develop your interest in programming? Did you have any training?
I found that the programming side interested me as much as the games, and a good manual such as the Spectrum's naturally encourages you to experiment. I suppose I just taught myself, via the manual, magazines and just playing around.

What programmers do you admire - if any - and why?
I've always liked Pete Cooke's games on the Spectrum; nearly all of them were innovative, very playable and just nice to look at! They also had interesting storylines/backgrounds, and made a refreshing change to the usual stuff. There are a lot of very good programmers around on SAM, but I can't say I admire one more than any of the others.

What is your favourite and least favourite game?
My favourite Spectrum games are - Academy, R-Type and Rainbow Islands; I think Batz 'n' Balls is my top SAM game so far.

What is your favourite and least favourite magazine
I don't really read magazines any more..

What is your favourite and least favourite book
My favourite book is probably "Titus Groan"; I'd like to see a feature length cartoon similar to the Lord of the Rings film made of it, or even a computer adventure...? I also have a

lot of books on astrophysics and related subjects (there are LOADS of books around about whether we are in danger of finding something really profound (why we are here and such like) which can make bizarre reading..). I love Gary Larson cartoons and have several books by him (getting a bit lighter now).

What is your favourite and least favourite TV program

Preferred TV programs include Red Dwarf, HIGNFY (everyone seems to be quoting these two recently!) and so on; the ones which irritate me the most are cheap local programs (about forthcoming local jumble sales etc) and also all soap operas (although I will admit to watching Neighbours every other day..)

What is your favourite and least favourite music

I like most types of music, although there's a lot of crap about these days

What are your views on demo software?

Demo software can be a very good thing (a "boon" if you like), even if it just shows off some of the clever things the SAM is capable of. It also provides an outlet for clever programmers and generally enhances the credibility of the Coupe! Long scrollers which can't be speeded up can be a bit annoying though

What software or hardware would you personally like to see appear on SAM?

There's a lot a excellent utility software appearing at the moment, but I think that there's real need for a new art package. (lucky then that I'm writing one!) Other than that, we just need more of the mundane stuff like games to create a reasonable software base. On the hardware side, anything extra will really be "luxury"

stuff. The mouse and the 1Mb extension (in that order) were the most useful pieces of hardware; the Kaleidoscope was an excellent idea, just a shame that it doesn't work!!

What prompted you to write Doomsday?

I got 1984 from the library and read it in a couple of nights— the connections between this and Doomsday aren't hard to see, so it was basically literary inspiration. The game doesn't represent my personal views or anything like that, and it's not supposed to be taken so seriously that everyone starts asking me why I wrote it!! I was also rather dismayed at the lack of diversity (in terms of storylines) of adventures, and wanted to do something a bit different. Anyway, Tim Kemp likes it, it's a brilliant game, so why not buy a copy?!

What do you think about SAM Software? How could it be improved? Given the number of machines around, what price should it actually be?

The price of SAM software is very strange – on the one hand, there are games such as Splat, which are terribly overpriced, but on the other there are lots of excellent games, utilities and demos available very cheaply through PD libraries and diskmags. This can actually be a bit of a problem, as at least some people are perfectly happy with the stuff given away with magazines and would never buy any full price software. There are still no "real" games, but any which do appear should be priced between £10 and £30. (A wide range, but the quality can vary immensely).

What do you think about the SAM 'zines? Which are the best?

On the whole, they do a good job of

getting news across to SAM owners, and of generally maintaining interest in the computer. If it wasn't for the diskzines, I think the Coupe would be in a far worse position that it is now. As for the best ones... obviously Enceladus is the best, but discarding Enc., I'd go for Fred. There are quite a few obscure diskmags which are in some cases of extremely high quality, but unfortunately only seem to last a couple of issues and then disappear.

When programming, what method of planning do you preffer to use? Why?

I don't try to conceal the fact that I'm a very messy programmer. I only plan out a program on paper if it's a complex machine code program, although even then it's rarely more than a few mentions of "concepts" – ie, never any actual lines of code.

I have tried once or twice to plan a program right down to the level of program sections, but found that 1) half the time it doesn't work as you had hoped so you have to change it anyway and 2) I often think of extra bits which can be added, or more efficient (if untidy) methods of carrying out tasks.

If I want to write a machine code program to, say, do a gradient fill (which is what I've just finished, for the art package), then I would usually think about it for a while, then dive straight in! Then the procedure would consist of building up the program in small sections, testing and saving after each one, until it all works properly.

UNLESS I know that I'm likely to alter a program subsequently, I feel that it's a waste of time structuring and annotating. If it works, who cares how it's programmed?!

Any projects you would like

to tackle, if you had more time? Any future planned projects?

When/if I finish the art package, I'd like to have a rest, but I wouldn't mind having a go at writing some sort of arcade game. I would quite like to do another adventure, but this would be on the Spectrum, as I know PAW well, and I wouldn't have to worry about doing mode 4 graphics!

Why did you think of the name ENCELADUS for your magazine?

Hmmm; there's no real significance in the name "Enceladus", which is the name of a moon of Saturn (and also of a mythological character); it just sounded a bit more interesting than the usual names.

If I'd known how many people would mispronounce it, or go "Enzela-whatsit" (which REALLY annoys me) then maybe I'd have changed my mind!

What was your most embarasing moment?

What do you want to know that for?

It was probably during a session of indoor cricket in the first year at school, when I totally mucked up my bowling. Everyone laughed at me, even the PE teacher! (sadist!) You really didn't want to know that though...

Hope you realise I charge a fiver per answer.

ZAT would like to thank Graham for giving us this interview.

Next issue, we are featuring an interview with Linda Barker: Editor of Your Sinclair. This inteview was recently granted to Richard Swann on behalf of ZAT.

ON THE ROAD ~ The Adventurer's Convention 1992

Regular readers of ZAT will remember that in issue 16 we advertised the 1992 Adventurers' Convention, held in the wonderfully smart Royal Angus Thistle Hotel in Birmingham. And, because I'm incredibly nice, I'd like to tell all those who couldn't make it along all about it.

The show was formerly known as the Adventure Probe Convention, but as you are probably aware, Adventure Probe closed down earlier this year, hence the renaming. It was, in fact, the first time I had attended this convention as such, and I expected it to look like one of the large computer shows with lots of stalls in not a lot of space, but I couldn't be more wrong - it was very neatly laid out, and the whole place looked very smart.

Arriving at 11am, I quickly found the ZAT stand, where David was entertaining people with "Doomsday" for the SAM. Darren and Tony Littley from Square One arrived shortly afterwards, whereupon we started to "mingle with the crowd," and flog copies of ZAT and Square One to everyone who walked past.

Unlike some computer shows I could mention that start with F, end with S and have E in the middle, there was plenty of Spectrum and SAM Software at unbelievably cheap prices, and lots of new adventures to test. Tony immediately made himself at home on a Commodore 64 (AAARRRGGHH!), David started conversing with everyone with a view to selling lots of ZATs. Darren put on his

around, and I went and tested all the games. One of the best games there was "The Secret Of Monkey Island II" on an Amiga (DOUBLE AAARRRGGHH!), which kept me occupied for ages, even through I didn't get very far. SAM conversion, anyone?

There were many adventures from all sorts of computers around on the day. Two that I recognised were Scott Denyer and Gareth Pitchford (ZAT readers, no less!!), and the Balrog even turned up to poke his hairy nose into the convention! There was no appearance from Mandy Rodrigues (former head of Adventure Probe), but she did send her regards to the show.

There were two main highlights of the day. First of all, there was the MegaPoints game. The idea was that everyone had 20 minutes to score as many points as possible in a special game, "Exploits In A Wheelie-Bin" (no, I don't know why it's called that either), from the tortured mind of Scott Denyer. The winner scored eight; sadly David and I managed only two. However, Scott had secretly prepared a slightly rigged version of the game which was full of bad language and didn't have any points to be scored - which was given to the show organisers to play in place of the real game!!! And then, there was the moment that everyone had been waiting for - the awards. There were lots of categories to win in, and even more nominations, but did ZAT get a mention? Sadly not, but never mind, we'll try for next year. Anyway, the awards in full were as follows:

BEST 16 BIT GRAPHICAL / ANIMATED ADVENTURE - "The

BEST ROLE PLAYING GAME / WARGAME - "Eye Of The Beholder" by US Gold

BEST COMMERICAL COMPANY - Lucasfilm

BEST HOMEGROWN ADVENTURE COMPANY - WoW Software

BEST TEXT ADVENTURE AUTHOR - Larry Horsfield

BEST GRAPHIC ANIMATED ADVENTURE AUTHOR - Ron Gilbert & Margaret Crewdson (tie)

BEST PD ADVENTURE COMPANY -Adventure PD c/o Debby Howard

MOST HELPFUL ADVENTURER - Joan Pancott

ADVENTURER OF THE YEAR - Mandy Rodruiges

ZAT would like to congratulate all those who won an award, and to those who were nominated as well.

All, in all, I thought the day was very enjoyable and well worth the trip. Everyone was extremely friendly, and it felt more like a posh party than your usual computer show. I know I'd like to come back next year.

The Future Entertainment Show

Most ZAT readers will have heard of this show, even though we did not advertise it at all. However, commercial magazines, and even the daily papers did advertise it. As you might expect, this extravaganza at Earl's Court Exhibition Centre early last November is the opposite extreme to the Adventurers Convention, in quality as well as quantity.

The worst problem was that, if you didn't have a ticket, you had to queue for hours on end to get in, and some people didn't actually get in at all, due to overcrowding of Earl's Court, which doesn't happen that often. There was litter EVERYWHERE - all the time I was there, I was walking through bits of paper, and security guards kept directing people around.

Okay, time for the main problem? WHERE WAS THE SPECTRUM AND SAM MATERIAL? I tried in vain to find even the hint of a Spectrum or SAM, but failed miserably. The Your Sinclair team weren't there (maybe that's a good thing), and none of the copies of their latest issue (which has half the content of ZAT for double the price) were present either, even though Future Publishing organised the whole thing! The best excuse I could get was "It's not a good games machine." Well, excuse me, I was under the impression that ZAT had a section called Playpen which reviews games, and that some of them actually get good marks. Silly me! Now, the Adventure Convention and the All Format Fair Show (review on that one next issue) prove that there's plenty of life in our beloved ZAT machines, so why wasn't there any here? If anyone from Future would like to give us

the exhibition was taken up by big displays and video walls, and a "3D Experience" on the Future stand, which I really couldn't be bothered to queue for. Now, is this really necessary? I think not; how about selling some games instead?

There was a contest to find out the "greatest gamesplayer in Britain," according to the "despicable duo" of Andy Smith and Neil West, who hosted the competition. Unfortunately, they merely found out the greatest gamesplayer amongst three machines, namely the "Amoeba", the "Megadrivel", and the "Sneeze" (the real names have been changed to avoid offending ZAT readers). And what were the challenge games? Adventures? Strategy games? Simulations? Arcade Adventures even? No, they were all ARCADE games - two monotonous "Mario Bothers" or "Chronic the Hedgehog" type games and a pinball simulation. Hardly what I'd describe as a wide variety of games! And the winner of the "Wheelie Bin" contest (read the Adventure Convention report if you don't know what I'm talking about) certainly didn't get ten grand for winning it. What a total farce! Oh yes, I've always thought that "entertainment" includes anything that isn't business, so I was expecting some non-serious utilities and PD software. But no - it all had to be GAMES for some reason!

All in all, on a scale from one to ten, this show gets a big fat zero. It was a complete waste of time and money, and I hope no-one else ever has the misfortune to set eyes on this piece of rubbish next year, or ever again. Future Publishing should be ashamed of the trash they pulled out at the expense of not just Spectrum owners, but ST, PC, Amstrad and C64 owners as well. ABSOLUTELY RUBBISH - more like the "Futile Entertainment Showup" if you ask me!

Mean biz

by DARREN BLACKBURN & ANDY DAVIS and CO.

In this issue's packed Mean Biz, we find out more about what the Spectrum scene is like over in the far side of Europe. So, here's Andy Davis with more on this facinating subject...

Earlier on this month, I awoke to find a small collection of packages on my doorstep. The wrapping paper was of poor quality and upon further examination, were dotted with foreign stamps. When I opened them, I found they were Romanian.
The first was an excellent Romanian magazine, called "hobBIT" mainly for the Spectrum,but with the odd PC review and Commodore poke. Sadly it was all in Russian, but featured a very good Spectrum Virus M/C program and an in-depth look on the Multiface Loader.
The other two letters featured some PC programsand a lovely letter from a Romanian Spectrum owner asking about games. Apparently, the most popular games over there at the monent are Terminator2 and Finders Keepers. Yes, I did say F.K.! They seem to be going wild over Magic Knight games. They are also short on imported utilities. They only know of GAC. I've now informed them all of Quill and PAW, sent them some examples and now wait for the rush of offers for PAW!
Since these three letters, I've had at least 15-20 letters arrive from Romania, mainly Bucharest, asking about Alchemist Research and wanting help, games and info. I'm currently waiting for some software over there to produce and publish in this country. I'm also sending out programs, games and utilties which they will find invaluable.
It just goes to show how popular the

Spectrum still is, even though it is on the other side of Europe.

Some facts on Romania Spectrum.
* They are big on Computer Clubs.
* The current exchange rate is 685Lei=£1
* The best selling 'review' (mag) is "hobBIT" costing 70L (around 9 pence!)
* Average postal price for a small package containing 3*A4 letters and 1/2 tapes is around 80L (10p)
* Post takes around 6-7 days to arrive
* A standard letter costs 28p for us to send.
* A small package costs around 60p
* It's definetly an export market for the Romanians.
* Computer shops and Spectrum Repair shops are almost non- existent. They rely on us for all spares, repairs and games.
* There are no copyright laws for games.
* They have Spectrum compatible "Cobra" computers, rather like the soviet HOBBIT and our SAM.
* If you'd like a Romanian pen pal,then drop me a line to the usual address and I'll see what I can do, or if you'd like to subscribe to "hobBIT".

Thank you Andy.
We've recently recieved a copy of HobBIT, and it's a facintating read. The only trouble is, as Andy points out, is that the magazine is in Russian (or is it Romanian?). It's similar to the earlier issues of Sinclair User in style ... or so it seems!

Hanving a computer is one thing if you want to play games alone. But if you're using it for programming or for business purposes - as many people do - then a printer is a MUST peripheral to have.
There are many differet brands and varieties on offer, laser, bubblejet, 24 pin dot matrix and of course the ever popular 9 pin dot matrix models. A good make is Star's LC range and here is Stephen Mullen with a good look at the LC20...

The Star LC-10 has long been established as THE 9-pin dot matrix printer. However, technology devlops and Star have just released it's successor, the LC-20.

The unit itelf is reassuringly sturdy. It weighs 1 pounds and is obviously well built. The LC-20 is actually bigger than my Atari ST, so a space on your desktop will be required.

There are 8 fonts and these are selected via a front control panel, comprising of 4 push to select buttons. The paper handling is impressive, with one button cotrolling the paper parking. The printer can also handle single sheet stationary.

Installation of the ribbon is not a problem, as it is easily replaced ... it just clicks into place.

The printer buffer is 4k, the same as on the LC-10. The main difference between this model and the LC-10 is the print speed: the LC-20 can manage a swift 180cps in draft mode and 44 cps in "final" copy mode. The LC-20 is reasonably quiet too, and with the quicker printing speed, noise is not a major problem.

Print quality is really excellent. 9 pin technology is really up to the task of any text based printing jobs. Only in the graphics field does the printer become limited.

Settings such as the character set and auto sheet feeder can be set up using the DIP switches. These are really well located and are easy to change. The printer's manual explains these DIP functions in detail and this often shady area is well handled on the LC-20.

The RRP of £233,.83 is, to say the least, a bit steep but mail order companies can offer the printer at a much lower price. I got mine for £159.95 from a company in Preston. To sum up, I heartily recommend the Star LC-20. It offers good performance and should give good service to both home users and small business users alike.

And now, a review of the latest piece of programming magic, from Steve Nutting. Reviewed here by Daniel Cannon...

SC_Monitor is another utility program from Steve Nutting. I've always liked SC_Assembler, so I looked forward to this. You are supplied with an 8 page leaflet and a boot disc. First you create your own version of the program and a 32K code file is saved onto your own disc. In SAM terms this is small enough to keep in memory with almost any other program, especially if you have 512K.

I decided to test if it could work its way through Powercrunched files, because the decrunching process does a lot of paging and copying, and if it could cope with those it could probably cope with anything. So I loaded in Light Cycle, then I loaded in the monitor. A simple CALL sets things off.

First I tested the built-in disassembler. Normally disassemblers don't list backwards (the disassembler equivalent of holding down the up cursor in BASIC) because each machine code instruction can be anything from 1 to 4 bytes long, and there is no easy way to know which byte the previous instruction starts. But there are a few rules to work by, and on the whole SCM generally gets things right. If it doesn't, you can see that the disassembly doesn't make sense and adjust things. The disassembler also can peek, poke, and search memory using decimal, hex, binary, and ASCII letters. Using all these features you can track down the part of the program which you want.

Once you've found the place in the program which you want to test (is a routine to add numbers), you may want to set some registers up to see how it copes with them. This is easily done by typing eg. HL=1234. You can also set the flags in the F register,

PUSH and POP values, and so on. Now you can execute the piece of code to see what happens. The processor itself doesn't execute the code, but SCM does the job for it. Otherwise if the code was left to its own devices, it easily corrupt, overwrite, or page out the monitor causing a crash. So the monitor does the executing to check for these occurances and avoid them. The side effect is that the executing is so much slower. It can execute up to 120 instructions per second. To put things in perspective, at top whack, SAM can execute 1.5 million. So I was prepared to wait a while when it worked through the Light Cycle decruncher, but not half an hour!

When that was finished, the second part of the decrunching (when the levels briefly appear on screen) worked OK until it was time to copy the 24K level into another part of the memory, then it crashed. I think that this was because a ROM routine which it didn't agree with was executed. So if you use ROM calls in your program then be prepared for a bit of trouble. Whilst executing, you can tell the monitor to stop when certain conditions occur. This is called a breakpoint. For example, you may know that the addition routine crashes sometimes when HL is set to 12. So you can use that as a breakpoint, let the monitor execute the program until it stops automatically when HL is at 12, then you can work through the addition routine to see the effects on registers and check if everything works as it should.

You can also set up to 10 breakpoints which stop the execution at a specific address and page, or for complete checking, you can get the monitor to return to BASIC so that you can run your own tests. Including this option does slow execution time down massively – for each instruction executed you are running a short BASIC program.

Hackers will know that a special register – R is used to help protect programs. It's a sort of automatic clock used especially to trip up things like monitors, and this one is no exception. The monitor doesn't support anything to do with R, which could make hacking protection systems slightly difficult. This is the only major flaw in my opinion, and to make the monitor useful to hackers, the R register really should be implemented. My only other moan is that the monitor always displays a status screen as it executes, except on 120 per second speed where a chosen screen number is displayed instead. The only problem with this is that this the screen number is set up on the installation program, and can't easily be changed. I would prefer it to display the screen held in VMPR (port 252) instead, because this holds the screen number that the program wants to use, not the one that the monitor wants to use.

Because of the different speed of execution, any program which is time critical can't be done. Unlike the R register there is no real way to get around this.

You could easily manage to hack Spectrum games by loading the emulator, loading the game, returning to SAM BASIC, and loading the monitor. This seems like quite a good idea, I could never get the hang of Spectrum Devpac, and my Multiface is incompatable with my +D (anyone want to swap???).

I tend to feel that SCM would come in more useful for hacking than for finding errors in your own programs – I've always been able to sort out bugs using the assembler and a bit of patience, but then you may be different. Altogether a good piece of software, spoiled by the fiddly screen option and lack of refresh support. But still recommended.

CHIP SHOP

Compiled By D.Ledbury
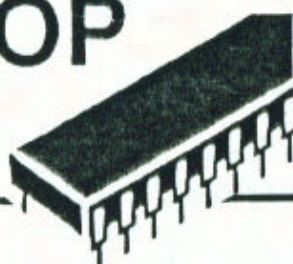
Like the new look logo? It does mean that we can pack even more material into this section now, so there should be even more to interest you all!

Enough of this idle banter! I believe it's time to introduce yet another .....

CODE BREAKER by Daniel Cannon

Hopefully you should have been able to work out the password section of the program of last issue (if not, write in and say so!). The important thing was the conversion of upper case to lower case. If you look at the list of ASCII codes (in your manual or with a program given earlier) you should notice that RES was used to convert lower to upper. The 5th bit has a value of 32, and resetting it subtracts this value – SOMETIMES! In this case it works, because in all the upper case letters bit 5 was set, and resetting it produces the lower case codes. If you wanted to eg. subtract 32 from 64 then it wouldn't work (think of the binary pattern of 64. What would resetting bit 5 do to it?).

In ZAT 14 program 7 is wrong, and it wasn't my fault, honest! Replace 257 with 256, and all should be OK. Blame David, that's what I say...[I get blamed for everything! DL]

Right then, the start of the ZAT Invaders game. In it we should be

Z80 and many of the programming methods of the Speccy and SAM.

First a word about the listing itself. You're free to alter it in any way which you want, so you can build up on the game to create whatever masterpiece you want. The program is split into parts, and each month's listing builds up upon the last. Your assembler should be able to cope with labels up to 6 letters long (most do) and 64 character lines. If not, just rename the labels to something shorter, and split the lines up. If your assembler doesn't understand DB, DW, or DM try DEFB, DEFW, or DEFM instead. Finally I've chosen an ORG of 32768, but you can alter this.

First I'm going to describe the title screen, so skip over the first bit for now. The title needs PLOT, DRAW, and CIRCLE in machine code. To make programming easier I've stored the commands needed to draw the title in a table. They're stored in the following way:

```
0       : Stop drawing
1,x,y   : PLOT x,y
2,x,y   : DRAW x,y
3,x,y,r : CIRCLE x,y,r
```

I've also used something to tell the computer to stop drawing, for obvious reasons. Once we have the table set up all we need is a program to read off the information and draw the proper shapes. This is fairly simple to do.

First we clear the screen, and then set HL to the start of the picture table. Then the choice of command (0 to 3) is put into the A register. After each read of the table the HL has 1 added onto it so that on the next read it will point to the next position in the table.

with the AND instruction (last time). If you AND a number with itself nothing happens, but the F register reports the result (Z, NZ, etc). If the A register is zero then the drawing has finished, so jump to the next part of the program. Otherwise take 1 off A and see if it is 0. If yes, jump to the PLOT routine. If not, 1 is taken off again, and if it is 0 the DRAW routine is jumped to. Otherwise the CIRCLE routine is assumed to be used (this means that any value from 3 to 255 will be taken as a circle).

The CP instruction could be used to check which command is needed, but the Z80 is slightly faster at subtracting 1 than comparing, so I've decided to subtract. Simple maths will show you how the subtracting works.

The end routine (command 0) just RETurns. Next time some text will be printed, and the computer will wait for you to press fire to start the game.

The CIRCLE routine (command 3) reads the x, y, and radius into the C, B, and A registers, and calls the circle draw routine. While the circle is drawn the HL register (which points to where we are in the table) is stored on the stack. This is because HL is used by the ROM whilst drawing a circle, and the program will loose track of where it is in the table if HL is left altered. Then it jumps back to check the next command in the table. The PLOT and DRAW routines work in a similar way. Here, just the x and y co-ords are needed in the C and B registers.

When the DRAW command is used, the concept of negative numbers must be understood, because we may want to draw left and down as well as up and right (eg. as in DRAW -10,-10). How does the computer understand a negative number? After all, registers only hold values between 0 and 255.

To the computer, a negative number is like a very big positive number. To convert a negative number to a positive one we "two's compliment" it. It's difficult to explain mathematically, and everybody just takes it for granted about how it works, so let's not break the tradition. Basically it makes use of the processor's ability to wrap numbers around from 255 back to 0 (described in ZAT 12 under INC and DEC).

To convert a positive number to its negative you simply use 256-number. Another way of remembering this is to 'flip the bits and add 1' – because if you change all the 0s to 1s and all the 1s to 0s (in binary) and add 1, you get the same result.

Sooner or later the number will have to wrap around across a barrier – not from 0 to 255 this time, but from -128 to +127. Why? It makes things easy to check if a number is negative or not – you just check bit 7. If it is reset the number is positive (bit 7 is always reset for numbers between 0 and 127), and if it is set, the number is negative (the lowest negative number, -128, gives 256-128=128, and 128 has bit 7 set). Try it out with the program in ZAT 9.

So 256-3 will give 253, which looks positive but acts like a negative number. So if you tried LD A,6 : ADD A,253, the result would be 3. Most assemblers will understand LD A,6 : ADD A,-3 instead, so you don't have to worry about doing the conversion yourself. SC_Assembler (which I'm using to write the program) has a quirk in it which means that it won't recognise negative numbers without a 0 infront of them. If you don't use SCA then you can forget the 0.

Large lines, eg. DRAW -200,150, cannot be stored in the table. If you

want to draw a longer line, construct it from two shorter ones instead.

That's the main program described, now it is the turn of the computer dependent routines, needed because the program must work on both Speccy and SAM. These routines do the job of converting information from the program to information which the your computer's ROM can understand. Only type in the routines for your computer.

First the SAM. To clear the screen all you need to do is to set A to 0 and CALL £14E.

The SAM PLOT routine needs the y co-ord to be 0 at the top and 191 at the bottom - our program wants 175 at the top to 0 at the bottom. So B is converted to the new value before the PLOT routine is called.

The DRAW routine needs negative numbers to be stored differently that the way they are stored in the table. E holds the sign of the x co-ord (255 left or 1 right), and D holds the sign of y (1 up or 255 down), and B and C hold the actual number. First D is set to down and E is set to right (I've used hex numbers to show this).

If the y direction (in B) is positive then the next few lines are skipped over. The test is done with the BIT command. But if B is negative then it is converted to its positive form using NEG. NEG does a 256-A or "flips the bits and adds 1" for the A register, depending on how you feel (remember that 256-A will also convert - to + as well as + to -). Then D is set to 1 to signal "down".

Similar things are done with the x direction. If negative, C is converted to its positive form using NEG, and E is set to 255 to signal left. Then the DRAW routine is called.

The CIRCLE routine alters the y co-ord again, as in the PLOT command. However the ROM circle routine (not the BASIC one) has a bug in it which must be fixed (otherwise you could end up with anything from squares to dots). To do this a small routine 4 lines long must be executed before the routine itself can be called.

The Spectrum routines: To clear the screen all you need is a CALL £D6B. PLOTting needs no conversion work done - the Speccy expects 175 at the top to 0 at the bottom. DRAWing converted in a similar way to the SAM version, except that D is set to 1 for up and 255 for down. At the end of the DRAW routine the alternate HL register must be set to 10072 to avoid a crash. Don't worry about how that works for now - I'll explain alternate registers later.

The CIRCLE routine requires the x, y, and r co-ords to be put on the calculator stack before the routine is called. The calculator is a complex program in the ROM which can deal with decimal numbers (eg. 3.1415927), and the calc stack is used to store these numbers for the calc to work on.

First x (in C) is put on the stack, then y (in B), then r (in A). The routine to put the number in the A reg on the calc stack (at £2D28) also does a fine job of messing up most of the registers, which is why we have to mess around with PUSH and POP. It has to be said that the calc and calc stack have nothing to do with the Z80's stack, so don't confuse the two. Next the CIRCLE routine at £232D is called, and alternate HL is set again.

To try the program, type it in, save it, assemble it, and call the ORG address used with eg. CALL 32768 or RANDOMIZE USR 32768. Hopefully you

will see our glorious ZAT logo splattered across the top of the screen. SAM users must type in a non-MODE 3 mode before the CALL to make sure that the graphics axes are set to the proper range.

And if you don't think that you've got very far, then think again! With a little bit of modifying this has the makings of a picture generator routine for use in an adventure game, in a similar way to Quill, GAC, or PAW! Next month the title screen will be finished, and we'll start the game. Bye.

```
00010 ;ZAT Invaders, by Daniel Cannon.

00020 ;No copyright - free to alter in
any way.
00030        ORG   32768
00040 start:CALL menu
00050        RET
01000 ;SAM routines:
01010 ;CLS:
01020 cls:XOR   A
01030        CALL  £014E
01040        RET
01050 ;PLOT C,B:
01060 plot:LD   A,175
01070        SUB   B
01080        LD    B,A
01090        CALL  £0139
01100        RET
01110 ;DRAW C,B:
01120 draw:LD   DE,£FF01
01130        BIT   7,B
01140        JR    Z,draw1
01150        LD    A,B
01160        NEG
01170        LD    B,A
01180        LD    D,£01
01190 draw1:BIT  7,C
01200        JR    Z,draw2
01210        LD    A,C
01220        NEG
01230        LD    C,A
01240        LD    E,£FF
01250 draw2:CALL £013C
01260        RET
01270 ;CIRCLE C,B,A:
01280 circle:PUSH AF
01290        LD    A,175
01300        SUB   B
01310        LD    B,A
01320        POP   AF
01330 ;CIRCLE bug fix:
01340        LD    D,A
01350        LD    E,A
01360        PUSH  DE
01370        POP   AF
01380 ;End of bug fix.
01390        CALL  £0142
01400        RET
02000 ;Spectrum routines:
02010 ;CLS:
02020 cls:CALL  £0D6B
02030        RET
02040 ;PLOT C,B:
02050 plot:CALL £22E5
02060        RET
02070 ;DRAW C,B:
02080 draw:LD   DE,£0101
02090        BIT   7,B
02100        JR    Z,draw1
02110        LD    A,B
02120        NEG
02130        LD    B,A
02140        LD    D,£FF
02150 draw1:BIT  7,C
02160        JR    Z,draw2
02170        LD    A,C
02180        NEG
02190        LD    C,A
02200        LD    E,£FF
02210 draw2:CALL £24BA
02220        LD    HL,10072
02230        EXX
02240        RET
02250 ;CIRCLE C,B,A:
02260 circle:PUSH AF
02270        PUSH  BC
02280        LD    A,C
02290        CALL  £2D28
02300        POP   BC
02310        LD    A,B
02320        CALL  £2D28
02330        POP   AF
02340        CALL  £2D28
02350        CALL  £232D
02360        LD    HL,10072
02370        EXX
02380        RET
03000 ;MENU:
03010 menu:CALL cls
03020        LD    HL,menut1
03030 ;JP to routine:
03040 menu1:LD   A,(HL)
03050        INC   HL
03060        AND   A
03070        JP    Z,menu4
03080        DEC   A
03090        JR    Z,menu2
03100        DEC   A
03110        JR    Z,menu3
03120 ;CIRCLE routine:
03130        LD    C,(HL)
03140        INC   HL
03150        LD    B,(HL)
03160        INC   HL
03170        LD    A,(HL)
03180        INC   HL
03190        PUSH  HL
03200        CALL  circle
03210        POP   HL
03220        JR    menu1
03230 ;PLOT routine:
```

```
03240    menu2:LD    C,(HL)
03250        INC   HL
03260        LD    B,(HL)
03270        INC   HL
03280        PUSH  HL
03290        CALL  plot
03300        POP   HL
03310        JR    menu1
03320 ;DRAW routine:
03330    menu3:LD    C,(HL)
03340        INC   HL
03350        LD    B,(HL)
03360        INC   HL
03370        PUSH  HL
03380        CALL  draw
03390        POP   HL
03400        JR    menu1
03410 ;MENU TABLE 1 - drawing:
03420 ;Letter Z:
03430 menut1:DB
1,32,175,2,64,0,2,0-8,0-8
03440        DB
2,0-64,0-24,2,48,0,2,0-8,0-8
03450        DB
2,0-64,0,2,8,8,2,64,24,2,0-48,0
03460        DB    2,8,8
03470 ;Letter A:
03480        DB
1,128,175,2,16,0,2,40,0-40,2,0-16,0
03490        DB
2,0-16,16,2,0-32,0,2,0-16,0-16
03500        DB
2,0-16,0,2,40,40,1,132,163,2,4,4
03510        DB    2,4,0-4,2,0-8,0
03520 ;Letter T:
03530        DB
1,168,175,2,64,0,2,8,0-8,2,0-24,0
03540        DB
2,32,0-32,2,0-16,0,2,0-32,32
03550        DB    2,0-24,0,2,0-8,8
03560 ;Circles & end:
03570        DB
3,80,139,4,3,160,171,4,0
03580 ;More next time...
03590 menu4:RET
```

And we'll have more of this facinating listing of the first part of ZAT Invaders in next issue's Code Breaker.

Now, we jump from Machine Code over to BASIC – or more to the point, the Spectrum System Variables. As it's now over to Steven Kemp with......

Program Box by Steven Kemp

If there's one system's variable that

everyone needs to know about it's RAMTOP, so here we go...

In many programs it is necessary to ask the user for an address and then CLEAR below it, for example a turbo loader may ask for the start address of a block of code, or a hexloader may require the assembly address. The beginning of the program may go something like this:

```
10 REM Hexloader by J.Bloggs
20 INPUT "Enter start address";start
30 CLEAR start-1
```

This program does, of course, have one major drawback. The value held in the variable "start" would be cleared by the clear in line 30.

In these situations it is usual to poke the value into a safe area of memory, probably over the screen or user defined graphics area, and then execute the CLEAR. Then to return the value it is only necessary to instruct the computer to take a "peek" in the relevant area. Doing this in our example program:

```
20 INPUT "Enter start address";start
30          POKE          USR
"a",start-256*INT(start/256):
POKE USR "a"+1,(start/256)
40 CLEAR start
50    LET    start   =   PEEK   USR
"a"+256*PEEK (USR "a"+1)
```

This storing and recalling of the variables does all seem a bit demanding on our poor old Speccy doesn't it? Well now with the aid of RAMTOP we no longer have to do this.

This is how we do it. INPUT the value and then CLEAR without bothering to store the variable then just PEEK RAMTOP, which lives at 23730 and add 1 to the value. This makes our program a more managable 3 lines long.

```
20 INPUT "Enter Start address";start
30 CLEAR start-1
40 LET start=(PEEK 23730 +
256*PEEK 23731)+1
```

Line 40 returns the value held in the system's variable RAMTOP. This variable holds the last value CLEARed or 65536. Whatever number is held here is considered to be the last value available for use by the BASIC system. The value held at this address is always 62. So for example poking this with, say 28000 would prevent long programs from being loaded.

Well, that's about all for now. Just one humble request: if you have a Speccy 48k and adapter going cheap – or even free – then why not drop me a line. Pleeeease!!

Thank you Steven. I'm sure that a kind reader can help you out with your search for a replacement Spectrum!

Leaving one area of programming to another, it's time once again to join Richard Swann for yet another of his facinating Spectrum ROM tit-bits ....

ROMARAMA

By Richard Swann

Hello, and welcome to another exciting installment on ROM routines. This month, it's time to bring out the Beethoven (or Bros!) in you, because we'll be looking at some ROM routines to do with sound. Okay, one of them isn't strictly speaking a ROM routine, but an I/O routine, but who cares?

As you are probably aware, there is quite a difference between sound in a 48K and 128K Spectrum. Consequently,

there are two very different ROM routines to generate sound. I'll look at the 48K's sound routines, because everyone can use those.

It helps if you know how a sound is actually created. All sounds are created from vibrating waves. Most ordinary sounds, such as the human voice or an orchestral instrument consist of a wave which varies between two extreme values. You can see an example of this on your Spectrum by typing the following program:

```
10 FOR N=0 TO 255
20 PLOT N,88+80*SIN (N/128*PI)
30 NEXT N
```

RUN this, and you should see a curved line, which goes up, then down, and back up again. You may well recognise the shape of the graph; it represents a sine wave, the bane of Maths lessons! Anyway, most ordinary sounds have soundwaves which look like this curve.

Some things however, like a CD player, a synthesiser, and your beloved Spectrum make sound in quite a different way. The soundwave has only two values. Type this in:

```
10 PLOT 0,44:DRAW 64,0:DRAW 0,88
20 DRAW 64,0:DRAW 0,-88
30 DRAW 64,0:DRAW 0,88
40 DRAW 64,0:DRAW 0,-88
```

RUN this, and you'll see what I mean. And this is how sound is created on a Spectrum. You can think of the high value as ON, and the low value as OFF. To create a sound, you send an ON signal, wait a while, send an OFF signal, wait a while, then send an ON signal and so on ad infinitum.

It is quite possible to create sound using this method, by using the output port 254. Apart from setting the

border colour and sending a signal out to cassette, it can also send a signal to the beeper. Try this program:

```
10        ORG £5B00
20 L1     LD A,£17
30        OUT (£FE),A
40 L2     LD B,£20
50        DJNZ L2
60        LD A,£7
70        OUT (£FE),A
80 L3     LD B,£20
90        DJNZ L3
100       LD BC,£7FFE
110       IN A,(C)
120       BIT 0,A
130       RET Z
140       JR L1
```

A quick explanation of the program. Lines 20 and 30 send an ON signal to the beeper. Lines 40 and 50 wait a while. Lines 60 and 70 send an OFF signal to the beeper. Lines 80 and 90 wait a while again. Lines 100 to 140 check for the SPACE key being pressed, and stops the program if it is, otherwise the program loops to do the whole thing again. (If you don't understand how any of the above is done, read Code Breaker for further info.)

Assemble and run this program with RANDOMIZE USR 23296. You will hear a gargling beep; press SPACE to stop it and return to BASIC.

You can change the LD B,£20 in lines 40 and 80 to other values to get various types of beeps.

Now, change the ORG £5B00 in line 10 to ORG £8000. Assemble and run the program with RANDOMIZE USR 32768. And....good grief! The gargle's gone and you can hear a "pure" sound. But how's this possible when we haven't changed any of the program merely relocated it?

The answer lies with what is technically called CONTENDED and UNCONTENDED RAM. All the memory from £4000 to £7FFF is contended, which means the ULA inside your Spectrum is always accessing it. A good thing too, because the screen memory resides there, and if the ULA didn't continually access this memory, the screen would never be updated! However, the memory from £8000 to £FFFF in uncontended, which means the ULA leaves it alone.

The upshot of all this is that a sound program in contended RAM will be continually interrupted by the ULA, and hence the sound will be generated in irregular bursts. Hence the gargle.

That's the first problem with creating sound this way, although if you want sound effects then it's probably okay. If you want to play notes, you can use uncontended RAM, but you'd have to calculate lots of important timing loops, which can be both complicated and boring. So, why not use a ROM routine?

And, lo and behold, there is a ROM routine specifically designed at playing notes. It can be found at address £03B5, and takes the following inputs:

HL= frequency in hz * duration in seconds
DE= (437500/frequency in hz) – 30.125

The frequency is another way of expressing the pitch of the note. The higher the frequency, the higher the note will be. A very low value will sound more like clicking, whereas a very high value will probably sound inaudible (just DON'T let any dogs hear it!!!).

Two notes, one of which has exactly double the frequency of the other will sound similar. This is called an octave (because on a piano, these notes are

eight white keys apart). If you know music, you can now work out that each note has a frequency 2↑1/12 or 1.059 times that of the note directly below it. In standard tuning, the note A on octave 3 has a frequency of 440hz, so given that, you can work out the frequencies for every other note. A table of some of these can be found in ZAT issue 9, page 27. If you missed that, why not order a back issue?

When you've worked out your frequencies, you'll need a machine code program to play them. The best way of doing this is to use a table of values for HL and DE, use each of them in turn, and call the ROM routine. And I just happen to have such a program here for you to use. Type this out, assemble it and run it with RANDOMIZE USR 32768, and you'll hear a short tune to enjoy....

```
10 START  ORG £8000
20         LD IX,DATA; DATA points to
the start of the table
30 LOOP    LD L,(IX+0); first two bytes
are the HL value
40         LD H,(IX+1)
50         LD E,(IX+2); second two
bytes are the DE value
60         LD D,(IX+3)
70         LD A,H; if H=0, we assume
we've reached
80         OR A; the end of the table
90         RET Z
100        PUSH IX; store the value of
the IX temporarily
110        CALL £03B5; call the ROM
routine
120        POP IX; take back the value
of IX
130        INC IX; set IX to point to
the next piece of data
140        INC IX; which is forward
four bytes
150        INC IX
160        INC IX
170        JR LOOP
180        ;Lines 200 onwards contain
```

the note data. The end of
190   ;of the table is given with
the value £0000
```
200 DATA   DEFW
£08A5,£0061,£0737,£0074,£066E,£00D
8
210        DEFW
£08A5,£0061,£0737,£005E,£060D,£004
5
220        DEFW
£066E,£00D8,£08A5,£0061,£0737,£007
4
230        DEFW
£066E,£00D8,£0737,£0074,£08A5,£006
1,£0000
```

When you've had enough of listening to that, change the values in lines 200–230 to your own values. The first two bytes are the HL value for the note, and the second two bytes are the DE value for the note. You calculate these values using the information I gave earlier.

The only real disadvantage about this is that the computer stops when you play a note. It is possible, however, to use interrupts (see ZAT issue 16) and play very short notes every 1/50th of a second, but if you do this, you will have an incredibly large table of data which can be very complicated to calculate!

Next month, I'll be looking at some ROM routines which are so useful that they've been given their own Z80 machine code instructions. So I'll see you all next time.

Don't forget. Write in to ZAT if you are stuck on ANY technical matter whatsoever!

Until next time,

David Ledbury.

ARCADE ALLEY
Richard Swann & Co

ULTIMATE SPECIAL

Well, here we are again with another edition of Arcade Alley. This month is a bit special, because it is the tenth anniversary of probably the best Spectrum software house ever - Ultimate Play The Game. So, as a celebration, I have decided to compile as many POKEs for Ultimate games as I can find.

Before we start, I'd like to remind everyone how to get a POKE into your Spectrum with minimum of fuss. Type out the program as printed, and check that you have made no mistakes. Then save the POKE to tape for future use. Then RUN the program, and start your game tape from the beginning. Then cheat to your heart's content!

MAIN ULTIMATE LOADER

Most of the Ultimate games have the same loaders. So to make everything easier, here is a MultiPOKE. First of all, type out this listing, which is common to all games.

```
10 REM ULTIMATE BY RICH
20 CLEAR 24300:LOAD "" SCREEN$
30 FOR N=0 TO 3: LOAD STR$ N
CODE: NEXT N
```

Now add one of the following lines, depending on which game you want to POKE.

ATIC ATAC
40 POKE 36519,0:PRINT USR 23424

COOKIE
40 POKE 28695,62:POKE 28696,5

GUNFRIGHT
40 POKE 47919,0:POKE 47920,0
50 PRINT USR 23424

JETPAC
40 POKE 26917,0:POKE 26918,0
50 POKE 26919,0:POKE 26920,0
60 PRINT USR 23424

LUNAR JETMAN
40 POKE 36965,0:PRINT USR 23424

NIGHTSHADE
40 POKE 53442,0: POKE 53443,12:PRINT USR 23424

SABRE WULF
40 POKE 44786,0:PRINT USR 23424

TRANZ AM

If you have a Multiface One or similar device, you can just load the game and put all the POKEs in via the Multiface. (If you haven't got a Multiface, but would like one, ring Romantic Robot on 081-200 8870). Some other Ultimate games do not have this loader, but are nevertheless easy to POKE. For the following three games, to get the POKE working, you must first enter MERGE"" and start the tape. Stop the tape as soon as you see the OK message, and using BASIC, insert the POKE before the PRINT USR statement. Then run the whole program and restart the tape. Or you can use a Multiface as before.

BUBBLER

POKE 57515,0: POKE 57516,0:POKE 57517,0

CYBERUN

POKE 36168,175

PENTAGRAM

POKE 49917,0: POKE 50751,0

The remainder of the Ultimate games have fast loaders on them, so here is a POKE to deal with those. As with the other routines, type out the main bit of BASIC, and add whichever lines are appropriate.
```
10 REM SPEEDLOCK BY RICH
20 FOR N=23296 TO 23348
30 READ A: POKE N,A: NEXT N
40 RANDOMIZE USR 23296
50 DATA 221,33,203,92,17,13
60 DATA 4,62,255,55,205,86,5
70 DATA 48,241,62,97,33,252
```

Now type the sets of lines 90-130, depending on which game you want hacked.

UNDERWURLDE
```
90 DATA 205,197,96,33, 43,91
100 DATA 17,213,243,1, 10,0
110 DATA 237,176,195, 166,243
120 DATA 175,50,239, 231,50
130 DATA 240,231,195, 242,103
```

KNIGHT LORE
```
90 DATA 205,201,96,33, 43,91
100 DATA 17,217,243,1, 10,0
110 DATA 237,176,195,166,243
120 DATA 175,50,30,196,50,63
130 DATA 209,195,0,97
```

Unfortunately that's all I have time for this issue. Before I go, however, I'd just like to apologise for the mistake in issue 15's Arcade Alley. Line 50 of the Riptoff POKE should have read:

50 DATA 49,225,95,243,221,33

I hope that's relieved a little frustration from you readers.
If you've managed to get a POKE for anything at all - or perhaps some tips you'd like to share with the rest of the ever growing ZAT population, just send them to Arcade Alley, ZAT, 33 Dawley Bank, Telford.

Realm Quest

Libe Action Rol· Playing

For more information contact:
ALAN DAVIES, 19 Lower Wood The Rock, Telford,
Shropshire, TF3 5DN, or ring Tel: [0952]506052

ZAT NEWS 17

Again we'd like to take this opportunity to wish all our readers a very merry Christmas and a prosperous New Year ahead. The new year will be of special interest to all, as it marks our 4th year in print..time, it seems, does fly by.. To mark this, issue 18 will feature an improved look (you'll have to wait and see what this means), and to let you involve yourselves in the festivities, we'll be having a special stand at the All Formats Fair at the Birmingham National Motorcycle Museum on February 14th. Issue 18 comes out on this date too, we hope.....

For now, as of writing this newsletter, we have to relate to you a piece of bad news which may result in several changes that we did not want to have to take. Due to unclear circumstances, our local council has implemented a number of cutbacks on certain community services. This includes the Printing Centre that ZAT has used for the last 2 years.

As a result of this, the Manager has had to increase his rates to print magazines like ZAT (and other locally produced media). We faced a similar situation a year ago, which resulted in a price rise for ZAT, but this new increase is simply astronomical, as the prices have increased by a massive 200%! Basically, the new policy dictates every stage to produce a booklet, zine, etc has had to be individually priced, unlike before when all the stages were included in the one quoted figure.

Simply, the price to print ZAT now is now so high that quite frankly it is beyond our present means. As it is, issue 17 was photocopied, which is something that hasn't been done since issue 6. Photocopying is a good stop-gap, but not a feasible solution to duplicate future issues. With the amount of readers we now cater for, plus the continuing surge of new readers that wish to read ZAT (which in the past wasn't as intense as it is now) to use photocopying would be both more costly and time consuming, than to produce the required number of issues per run we need today.

Obviously our first objective is to find alternative means to print the fanzine. We have already made several contacts, and gained several quotes. Unfortunately, as present times now dictate, these quotes still do not come near to the once very reasonable rates and service once provided by our now, heavily-overpriced printing shop. So even if we do find alternative facilities, it may mean we need to consider the options listed below. As usual we wish to consult you the readers, and to hear your suggestions and opinions.

As issue 18 also marks our newlook (which incidentally does not cost anything as Steven Mullen has invested in a Mac!) and the Reader's Poll for 1992, this is a very good opportunity to approach you all with the above dark cloud looming above us here in Telford. Do bear in mind that the Poll, and your views on the options below, are voluntary, however the more of you who do participate in this, will mean that whatever final decision is made, and made quickly, as we need to kn ow before ZAT 19 is produced, the outcome of ZAT's future will be made a certainity.

Here are the options that we have come up with:
1) Stay as a bi-monthly paper zine, but with the possibility that in the near future we may have to increase both cover and subscription prices to cover the new costs. Content will alter as dictated by the results of the Poll.

2) Change the frequency of the zine to quarterly, as per Square One, which would not necessarily alter cover and subscription price to a larger degree as option 1.

Content would be dictated again by Poll results, with the emphasis that content would contain information and sections that are the most popular to the majority of ZAT readership. To fill up the long 2 and a half month gap per issue, SAM Prime and Alch-News's release dates could be altered so issues of same would be available for continued reading.

An alternative is that an inexpensive newsletter would be produced to give information on events, news, etc that occurs in the gap per issue of ZAT. A seperate price may have have to be given to produce the newsletter, to single readers, or could be included in a revised subscription rate.

3) The most drastic option would be to abandon the paper format and either produce ZAT as a diskzine or transfer relevant sections into SAM Prime or Alch-News respectively. Subscribers would have the option of which magazine their remaining subscription would be transferred to, and would receive, at no extra cost the remaining number of issues their subscription is due.

Obviously, an increased influx of new readers will not harm our current situation - and may in fact help it.

With the above in mind, our P.R. Manager, Martin Scholes, has co me up with a few suggestions for a re-subscription drive for 1993, to boost ZAT's readership. See what you think of them:

1) If a subscriber gains 6 new subscribers for ZAT they will gain a free subscription for one year.
2) Permitting, a re-subscription prize draw, with every re-subscriber's name, on their approval, place in a free draw to win a prize.

If in the extreme - and needless to say, unlikely - event that no alternative options to print ZAT, or that any above idea, or alternative ideas from reader suggestions and from from the Poll results is found, then Subscribers will be refunded what is due to them.

We only say this if fate dictates a final blow, but rest assured that we have faced similar problems like this before, and always found the means to come out on top. WE aim to insure that ZAT, in whatever form it takes, will become more successful, better, and with solid backing from its loyal readers, the best SAM and SPECTRUM fanzine in the world of today.

On a much lighter note, we'd like to point out that ZAT Soft has now got a new identity, and it's first SAM release! The lable is now renamed Phoenix Software Systems - the Phoenix of the name coming from Phoenix Way - as a tribute to SAMCo. It was suggested by Richard Swann.

Aptly enough, the first release contains a title due to be released by SAMCo before their recent "problems" - i.e. Craft. Also featured is SnakeMania. Both of these games have been programmed by Maciej Kasatkin - a new member of ESI.

The two games form the compilation DYADIC (apparantly meaning 2 as 1), and cost £13.99. If you hurry, you can buy the games in a lower cost packaging (ie black and white!) for £11.99. A full demo of SnakeMania appears OFFICIALLY on SAM PRIME 2.

DYADIC is available from: 5 Beacon Flats, Kings Haye Road, Wellington, Telford. TF1 1RG. Cheques made payable to D.Ledbury.