January-March 1988 Volume 2. Issue 1.

Scorpio News

Scorpio Systems
P.O. Box 286 · Aylesbury · Bucks · HP22 6PU

Contents

Editorial 2
Letters to the Editor 5
Private Advertisements – 1 7
Doctor Dark's Diary - Episode 28 8
Folly Bidden Printed Circuit Designer 10
Adding Drivetec Drives to a Nascom 15
Private Advertisements – 2 21
Improving GEMPEN, ZCPR3, and Providing On–line HELP . 22
WordStar 4 for CP/M-80 32
The DH Bit 33
Next Issue 36
The NEC V20 and V30 Processors 37
For Sale 38

Editorial

Delays?

This issue of **Scorpio News** is probably reaching you much later than many of you expected. To be fair to us, we have not yet published the 1988 issue dates, but to be fair to you, Issue 1 last year was about a month earlier.

Why the delay? Well, last year we discovered that deciding to send an issue out at the end of December was a big mistake. Firstly, printers are exceedingly busy in the run up to Christmas, and secondly it isn't much fun packing up and sending out newsletters when you know that everyone else is stuffed full of turkey and booze and has their feet up watching the ninety–third re–run of *"The Wizard of Oz"*!

So this year we decided to wait until after the festivities, and here we are. I should also add that unfortunately many people were rather slow in re–subscribing. The first request for re–subscription was actually in the **Scorpio Bulletin**, sent out with

Volume 1, Issue 4 at the end of September. This produced a minimal response, and so valuable subscription funds were used to send out a further reminder in mid–December. As I write this re–subscriptions are still coming in every couple of days. The difficulty that this causes is in not knowing how many newsletters to have printed, and if we had gone to the printers in December, as we did with Vol.1 Issue 1, then we would have definitely had too few printed. Even now it is difficult to tell. Isn't life fun!

Now, I also have to confess that this issue is probably a bit on the skinny side. "Why is that?", you ask. Well, for one, **Scorpio News**, like its predecessors, largely depends upon the FREE supply of suitable material from you, our readers. We've no idea what has happened, but we have received virtually nothing this time round. (Probably because we hadn't published the issue dates??!!) Secondly, producing **Scorpio News**, fun that it is, does absolutely nothing to help our poor depleted bank balance, and so we have been exceedingly busy on other projects. Next, we have to get this out in a hurry before you all 'phone up and say "where is it", and we haven't time to write 30 pages ourselves. And finally, because we have used the amazing Xerox Ventura Publisher to produce this issue, the same amount of material fits onto far less pages. So here it is, rather thin, but with the promise that the next one will be somewhat thicker if YOU'll send in a letter or article.

Disks and articles

We still have a couple of disks that people sent us articles in on. Sorry that we haven't returned them to you yet, but we'll endeavour to do so once we've got this issue out. Despite the paragraph above we DO still have one or two articles in hand that we could publish, but they require various drawings/diagrams etc. associated with them, and we haven't had the opportunity to produce those yet.

COMPEC

Did anyone make it to Compec? What a waste of time! It seems to have totally lost direction, and it was very difficult to work out who on earth it was aimed at. Once upon a time it was THE computer show, and anybody and everybody who was anybody or hoped to be somebody used to be there. For some time it has been the ONLY show that Gemini has attended.

Well, Compec '87 was, in my opinion, a wash–out. As I wandered round trying to find certain companies' stands, I realised that they weren't there. And as I started to think about it I realised that virtually none of the major hardware or software companies were there. So there is little to report about Compec '87. What will happen at Compec '88? I, for one, doubt that I will be going there to find out.

PCW magazine

Readers of Personal Computer World magazine will perhaps have seen Scorpio News mentioned in the User Group section. I wrote to Rupert Steele, who edits the column, some time back, and in the December '87 issue we got an entry in the User Group Directory. Furthermore, in the January '88 issue we also got a nice little write–up that has already lead to a small number of new subscribers. Welcome to those people. If anyone knows of other ways of obtaining free publicity, please let us know, or better still drop a line directly to them.

Scorpio Bulletin Board

In the **Scorpio Bulletin** that accompanied the last issue of **Scorpio News**, we mentioned about the setting up of a Bulletin Board. This was duly set–up, admittedly a couple of weeks late, and was running until Christmas. However, the Octopus software that we were running turned out to have a number of serious bugs which kept resulting in either the system crashing, messages getting deleted, or the WHOLE message database getting destroyed!! Because of this, and a couple of other reasons, we took the Bulletin Board off air, and it has not been put back on since. I'm sorry to have to report that we are unlikely to resume this service.

Software etc.

Also sent with the **Scorpio Bulletin** was the *Enquiry/Subscription Form* that gave readers the opportunity to request further information on certain software upgrades, Public Domain software, etc. Many people ticked a number of these boxes when sending in their re–subscriptions. Yet another apology is due here, as we have sent out absolutely nothing in response to these requests yet. Sorry, but we have just been involved in too many other time–consuming projects.

What's available?

In the last issue of **Scorpio News** there were various articles about new 80–BUS products, particularly the 64180, Z280 and 80286 boards. Well, true to form for this industry, as I write this I have to inform you that NONE of them is in production yet. Plus la change, plus la meme chose.

Conclusion

Well, that just about wraps up my bit for this time. I must finish off with a quick apology for all of the apologies above!!! And please, please keep the material coming in, or the newsletter could just fizzle out.

Be seeing you.

Letters to the Editor

730K and ATs

The articles by David Hunt and John Parrot about their endeavours with 730k disks and AT High Density drives in Scorpio News (Vol. 1 nos. 3 and 4) make excellent reading. I tried using the DRIVPARM statement to persuade my Amstrad PC to read and write to a switchable 40/80 track drive, with considerable success – it really works and the extra disk capacity has been very useful.

I found that disks formatted in 40 track mode on the 80 track drive were inclined to give read errors when used in the standard 40 track drive, unless they were brand–new or had previously been formatted in the standard drive. This is, as John points out, due to the presence of portions of unerased tracks from previous usage but judicious use of a small magnet on the disk prior to formatting will avoid the problem. I haven't experienced any problems with differences in recording levels on the two types of drive but I have only used a Mitsubishi drive and other manufacturers' products may be less forgiving.

Has any Amstrad PC1512 user had problems with the printer when using MSDOS 3.2? My system, which had been working normally, now says "Write fault error writing device PRN" (which, if Ctrl/P is used to echo screen output to the printer, is interpreted as:

WWrriittee ffaauulltt eerrrroorr wwrriittiinngg.....

on the printer). The print screen facility still works and it is possible, when using WordStar, to print files normally, but not when using Word Perfect. The system performs and prints quite normally when using DOS PLUS, so I assume that whatever is going wrong under MSDOS doesn't happen under DOS PLUS but I'm not sure if I am dealing with a hardware or software fault and the most recent revision of MSDOS for the PC1512 does nothing to alleviate the fault. Any ideas would be gratefully received.

On another tack – I have been looking at BASICs for PCs. I don't like Basic–2 which is bundled in with the GEM software for the Amstrad and found GWBASIC to be as uninspired as its predecessors out of the Microsoft stable. Turbo–Basic (Borland) is very good, and so is Quickbasic (Microsoft), although for ease of use and facilities, Turbo is better than Quick. Both support the 8087 co–processor but if you haven't got one in your system, Turbo–Basic uses an emulator which works

very well while Quickbasic comes in two versions, and you use the one appropriate to your system. Their list prices are £70 and £85 (+ VAT) but Digitask (0342 24631) are offering them at £47 and £67. The best thing about these BASICs is the fact that they are compilers with excellent screen–editing facilities. They really make MS Basic under CP/M look positively antique. If you are looking for a good, well–featured alternative to Basic–2 at a price which won't bankrupt, go for Turbo–Basic.

Prospero have recently introduced MSDOS versions of PASCAL and FORTRAN–77 with GEM bindings at round about £100. You get quite a lot for your money but it is worth shopping around – try Grey Matter at Ashburton – they often have quite substantial discounts and very fast delivery. I didn't like GEM very much at first but, when trying out the Fortran version, found it to be quite friendly – much more so than ****** MSDOS!

P. D. Coker, Orpington, Kent.

User friendly CP/M with a Nascom system

Clive Bowden's very interesting article on "Making CP/M more User–Friendly (Scorpio News, Jan-March 1987) mentions that he has no knowledge of the Nascom BIOS. I have been using their Version 2.1 of CP/M 2.2 for several years, in conjunction with their AVC board and AVCTEXT terminal software, and have found it very satisfactory.

However, I recently wanted to make some changes to it.....! Being an ex–electronic design engineer in my early 60's I am more "at home" with hardware than software but, having acquired at least some ability in this over the past few years, I decided to "have a go". Nascom (Lucas Logic) would not supply the source code for their BIOS or AVCTEXT so I dis–assembled the BIOS and managed to identify a few of the ares of interest to me. Half of it is in ROM so I devised a simple hardware modification which enables me to switch out the ROM and operate entirely in RAM after the initial booting. (I haven't yet found a way of putting it all neatly on the disk system tracks, but don't regard this as a high priority at this stage.)

Without the original source it is still very difficult to make major modifications so I have tried to adapt a version of SYS (Version 16.0 for a Gemini system) for which I happened to have the source. This has proved very difficult, and I am not yet sure why, but having half the original BIOS at D600h and the other half at F000h certainly doesn't help!

This project has been dormant for quite a while now, but I intend to spend some more effort on it, partly because I want the results but also because I don't like being

defeated by a stupid computer! If there is anyone else out there with a similar interest who would like to collaborate with me (or who has already done it) I would be pleased to hear from you.

Incidentally the desired changes which originally prompted all this work were associated with the introduction of:–

(1) additional disk drives for 8" (possibly also 3.5" and 3")
(2) additional memory (beyond 64K)
(3) virtual disk

but, as Clive Bowden indicates in his fourth paragraph on page 51, above all I want to feel that I have control of this aspect of my system and can then adapt it as required in the future.

I also have to use, from time to time, an IBM XT and, on the whole, I see no good reason to abandon my trusty Nascom, (in which I am personally familiar with almost every individual component and soldered joint, many of which are my own modifications) in favour of this box of tricks....although I must admit that the IBM is prettier to look at! Given the required control of the BIOS, the Nascom based 8–bit CP/M will continue to meet most of my needs for several more years yet, and I repeatedly recognise how lucky I was when, in almost total ignorance about 6 years ago, I chose the basic Nascom 2 kit in preference to the many alternatives available at that time.

S.E. Gent, Portsmouth, Hants. 0705-593107. TC Gold 74:TCE009. •

Private Advertisements – 1

GOLFBALL I/O writer with full character set. Opto–isolated interface and Naspen/Gempen compatible software to drive from PIO and all included. Well worn but working, very robust and faithful. Also TANDY 4 colour plotter/printer (toilet roll type), little used and boxed with Centronics and serial interfaces. Desperate for space so open to all reasonable offers. Phone 01–435 2771 day or evenings.

Nascom 2 in Kenilworth Case, 5 card frame, Fan, PSU, and RAM B, GM803 EPROM with various ROMs inc. NAS–SYS, ZEAP, etc. Best Offer. MV256 Colour, GM816 I/O - £50 each O.N.O. All Items With Software, Manuals and circuits as appropriate. Tel. 0209-860480 (Evenings). •

Doctor Dark's Diary - Episode 28

I think I will start this by telling you my Open University results from last year. I did *T283 – Introductory Electronics* and *M352 – Computer Based Information Systems*, and in spite of my misgivings about the electronics course, I managed to get two distinctions. The misgivings were because the course was quite a tough one, and I thought I might get a grade 3. I have been feeling quite pleased with myself about this, as you may imagine. After all, I was a "dodo" once...

This year I am doing *M261 – Mathematics for Computing* and *M353 – Programming and Programming Languages*, so I will be kept off the streets quite well. The languages course involves a lot of use of the Open University mainframe (or it may be their VAX, I have forgotten), and I had hoped to be able to use Marvin. However, this particular course makes more stringent demands of the software used to access the machine, as it requires the ability to make screen dumps. I did consider attempting to modify the software I used during the last year to work on *M352*, but decided against this. Partly this was programmers' cowardice, as there was no source code to hand for the program in question, but it was mostly laziness caused by the availability of a new toy to play with, in the form of my Amiga. More of that in a moment.

As well as the lack of the source code, there was another mystery. The OU say nothing changed in their computer links last year, but part way through the course *Gemterm* refused to log on any more, and I had to switch to *UKM7*, which is not as nice to use. So this year I will be using the official hardware. I am getting quite worried about the floor loading in my computer room, so will be reducing the asking prices in my "for sale" list to get rid of some of this junk (oops) valuable equipment.

The effects of Amiga ownership

Apart from a pain in the wallet, I feel very good about the new toy. At the moment, all Marvin gets used for is accessing Prestel and bulletin boards, and the preparation of these articles. Things are at the stage where the only reason I don't try to sell the whole thing is the thought of how much money I would be losing. But the strength of this reason is fading fast in the face of the thought of expanding the Amiga. I now have the full set of technical manuals for it, and will be buying hardware add–ons like memory and a disk drive fairly soon. There is also considerable temptation to get a MODEM. I'm learning 68000 assembler, and I just can't see myself writing any new stuff on Marvin in Z80 unless it is for money.

Apart from effects on my attitude to the old machine, I find I keep reaching for a mouse when I want to do something. Machines without a row of pop–down menus seem slightly quaint. And the programs available are really something. A friend brought his Amiga round the other day, and we linked the two machines together with a simple 3 wire lead, and practised formation flying with the SubLogic Flight Simulator. You can see each other through the cockpit window when doing this. Far be it from me to criticise another Nascom programmer, but this sort of software is a considerable advance on "Revenge of the Drosophila". (Actually, I may run that again soon, I still can't believe it was possible at all.)

I'm sorry to go on for so long about the new machine, but it is what I have been using. It even has a *Hisoft Devpac* available, which is a relief to use, compared with the other Amiga assemblers and debuggers around. I had been thinking in terms of linking the Amiga and Nascom so that each could use the facilities of the other, but now I am not so sure. While it would be fairly simple (!) to get Marvin to pretend to be a MODEM for the Amiga, it would not result in any programs people might want to buy, and that is what I really want to do with the Amiga. Well, that and flying...

Dijkstra not all bad shock horror probe!

It is said that when Dijkstra is asked *"Can a computer think?"* he replies *"Can a submarine swim?"*. I suspect Noam Chomsky's reply would be *"It all depends what you mean by the word 'a'."* And now a joke for programmers. A hardware engineer, an analyst and a programmer are in a car with brake failure, which is rushing down a mountain road. Somehow they manage to stop safely. The engineer wants to take the car to bits and fix it, while the analyst wants to interview the other two about what they actually want the car to do. *"No,"* says the programmer, *"Let's drive on, and see if the fault reappears."*

Downwardly mobile prices for antiques

The asking prices (and they are negotiable) for the gear mentioned in the last issue are now as follows. The **Spectrum** complete with MODEM and games is £100. **Iotec Iona** £100. **S100 system** which actually has four memory boards, rather than three, and so is a 64K system, is now £100. **Ohio Challenger** £50. **Dolphin printer** £25. Wrecked **Nascom 1**, silly offers invited.

I might be persuaded to part with my Pluto board, Belectra floating point board, Gemini MODEM board, Hisoft C and Compas Pascal for sensible sums. And a realistic offer for the whole system would be very tempting. The list of bits is in Volume 1 Issue 1 of this magazine, and the phone number is 0823–276768. ●

Folly Bidden Printed Circuit Designer

by P. D. Coker

This interesting piece of software came my way as a result of an enquiry to our august editor about CAD packages for the 80–BUS range. I had seen and used some of the packages available for the BBC and PC market and wondered if there had been any developments from the program that Scorpio had offered last year. I hadn't come across any Folly Bidden software before (an unusual name which even in my usual absent–minded state, I would have remembered!)

It came, a little before Christmas, with the request that a review be done as soon as possible.... So here goes.

The software is presented as a single 80 track QDDS disc with a 23 page manual which, in the review copy, was done on a dot–matrix printer. The manual is well–laid out, with a good table of contents which should prove adequate for most users.

System requirements

This package requires the Gemini GM832 SVC (video controller card) and the program aborts if it is run on a system which includes the MAP80 Video–Floppy card. I couldn't test it with the Gemini GM812 IVC owing to lack of time but I suspect that problems might arise. *[Ed. – yes, as the IVC does not have a graphics mode.]* As supplied, the package requires CP/M–80 version 2.0 or higher, and should work with Nascom 2, Gemini (Z80) and MAP CPUs. Memory requirements are modest, with 44k quoted as "plenty". Hard copy can be produced using a dot–matrix printer with graphic dump facility – more or less any Epson RX compatible printer (Canon, Panasonic etc.) will work satisfactorily. For those lucky people with access to an X–Y plotter, a much higher quality copy will be produced. Suitable dump routines are provided on the disk. The recommended maximum size for the design is 8" square but in fact, larger boards could be produced in sections and the author states that it is capable of producing double–sided boards of almost unlimited size. From a perusal of the instruction manual, I gathered that the hard–copy output was at a 1:1 scale.

I used a used a fairly standard Gemini Multi–board system which included the SVC and produced dumps using a Panasonic KX–P1082 printer. I was unable to check the claims for the plotter output since the only X–Y plotter to which I had access

had developed severe personality problems and seemed to be determined to design knitting patterns.

Initial reactions

The manual is helpful and, as the author suggests, there is extensive on–line help on a variety of topics which are called up by pressing "?". The manual suggests that you call up the program by typing PCB – but in the review copy, the program is executed by typing RUNPCB. There are several other differences in file names and the review copy did not have a READ.ME file with late news, additional information etc. The manual suggests that there is one demonstration PCB on which you can practice, but I found two others. Because of limitations on the resolution offered by the graphics screen, the maximum area that can be seen on–screen at one time is 3" square. Additional areas are accessed by cursor movement.

The commands list is pretty comprehensive and standard 0.3" and 0.6" DIL packages from 8 to 40 pin are catered for. The track width is fixed at about 0.5 mm (but with a bit of ingenuity one can do double or greater widths). Tracks can be routed between DIL or ID plug pads and, when passing through a pad, leave the drill hole clear. I was pleased to see that there is a facility for indicating pin 1 on DIL packages but less pleased to see that pad outlines for ID plugs, transistors and TO72 can (or whatever the outline is) i.c.s weren't available. I would have liked to have been able to add my own pad layouts to a library, but wasn't able to. I understand that enhancements to the program are under way and I would be interested to see what the author has been up to!

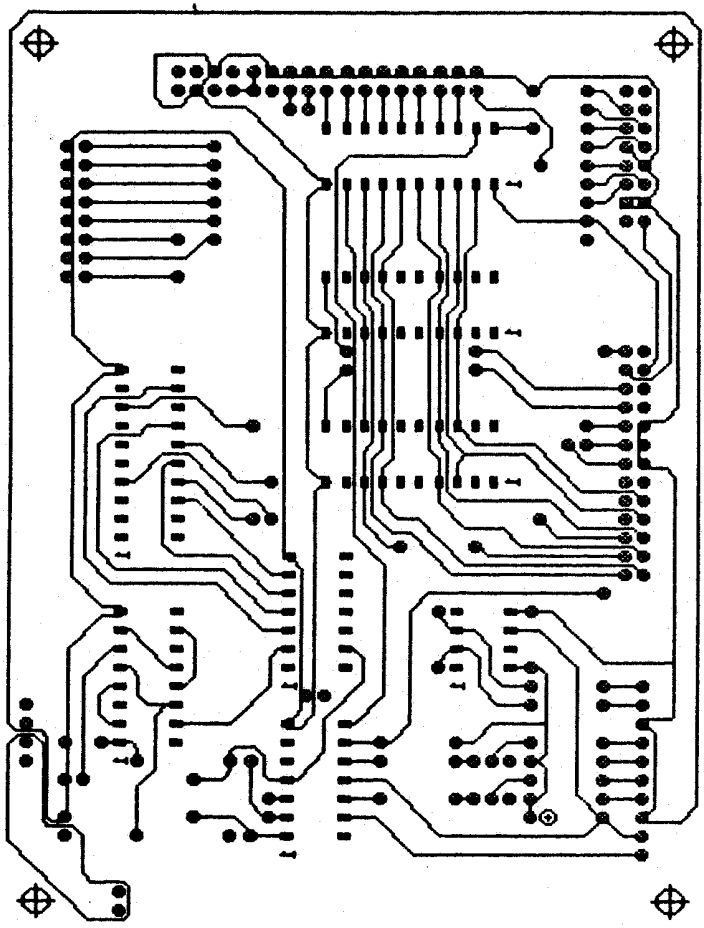
The commands for the circuit board editor take a bit of getting used to but this should pose no problem for those who have cut their teeth on PEN, or similar multi–command packages. A couple of hours soon had me placing pads, tracks and DIL packages where I wanted to and, the ease with which this could be done using the cursor control keys and "ring–sight" cursor was very pleasing.

I printed out one of the example PCBs and my own efforts and was quite pleased with the results.

Further thoughts

The printer dumps were adequate but not, as they were, suitable for use as PCB masters. To judge from the speed with which they were produced, I suspect that they are single density jobs, compared with the quad. density used, for example by Pineapple. This point is made in the manual and quite a lot of work had to be done using a fine pen and Indian ink to tidy up the fuzzy pad outlines and to ensure

electrical continuity of the tracks. The printer dumps I did, did not flood–fill (shade in the large areas of conductor) on both surfaces which were presumably ground and V_{cc} tracks. This would not be as much of a problem if you were designing your own board and were aware of the existence of these tracks. It could have been made more clear that for a double–sided board, one needs the top view, viewed from the top and the bottom view, viewed from the bottom – obvious, when you think about it, but not so obvious when you are answering questions on screen.



I was a bit peeved to find that the main menu did not have an option to list appropriate files, such as the .PCB ones. This would make a lot of difference to the user–friendliness and wouldn't take much to add. Currently, the only way is to exit

to CP/M and look at the directory....very tedious if you have forgotten the name of the file you want to edit.

The manual gives some useful help on what to do with the printer or plotter dumps but does not mention a simple technique for using the printer or plotter output directly in photo–etching.

The "touched–up" dump, after cutting to size, is sprayed with Isodraft which renders it highly translucent (for suppliers, contact Cannon and Wrin, 68 High Street, Chislehurst, Kent. 01 467 0935) and smoothed onto a piece of photo–resist–coated board after which it is exposed to UV light (you **must** wear protective goggles). The exact time would have to be found by experiment – it is about 5 – 10 minutes at 30 cm from a 300 watt "sun lamp". Full instructions on processing are normally provided with the ready–coated board or the resist spray. After development, the board is etched in your favourite mixture, followed by a good wash and clean–up prior to drilling. Readers of Elektor (the electronics magazine) will have seen this technique mentioned in the 1985 and 1986 issues. It works quite well, with very little tidying up needed.

The instructions are a little vague on how to handle dumps for double–sided boards – and the need to get the registration of the holes exactly right. I placed the top track/pad dump on the pcb, centre–punched and drilled the 4 holes in the corners, turned the pcb over and placed the bottom track/pad dump on the copper and pencilled in very lightly the orientation needed. Sounds complicated but try it out for yourself – it gets easier with practice.

Comparisons with other PCB programs (odious or otherwise)

In the last issue of Scorpio News, Robert Pearce (who is the author of this program) reviewed the pre–release version of an upgrade of the simple PCB program which is available on Scorpio's SVC–03 disk. His comments were fairly dismissive but I notice that Mr Pearce acknowledges that some of his routines owe their origins to the program that he was criticising. I would have liked to compare the SVC–03 program with this one.....

I understand that the program will sell for about £20 – 25 which is pretty reasonable for a simple CAD package. I expect that it would be of interest to 80–BUS users with an interest in the design and manufacture of short–run or one–off PCBs of low to moderate complexity.

It would be possible, provided one had the appropriate level of knowledge to design one's own answer to Gemini or MAP's RAM or FDC boards, but I wouldn't like to tackle something as complicated as a redesign of the GM813 CPU!

In the short time I have had this package, I have produced PCBs for two pieces of equipment – a pH meter, lightmeter etc. and the results have been quite acceptable. The author claims that this is a simple computer–aided design package – and it certainly does not aim to compete with the more costly end of the market. Most users will find it perfectly adequate, once they become accustomed to it. I found the package relatively easy to use, and without evident "bugs", but felt that the restricted nature of the library of predefined shapes was a disadvantage. A more important disadvantage is the lack of a facility to define shapes for use on future occasions.

Compared with the DROEGE PCB program which is available for PCs and clones, this one is much less sophisticated. A "Shareware" cut–down version of DROEGE is available for £5 – the full version costs about £92 but has an amazing range of facilities (including multilayer capability and excellent libraries to which more, user–defined shapes – such as connector or pad clusters – can be added).

Pineapple Software do a similar program for the BBC range which is very good but restricted in its some of its capabilities. The track pattern dumps are done in quad. density and need little attention if they are to be used as PCB masters. Another useful feature is the component mounting plan, but the size of PCB is limited at 8" x 5.6" and users cannot create their own library of standard shapes, whether of components or pads. It allows printing at 2:1 and 1:1 scale and track widths of 0.025, 0.05 and 0.075" are available together with flood–fill capability which allows wider tracks and other large copper areas to be designed very easily. With the plotter option, it will set you back £138.

Conclusions

The Folly Bidden program is quite good. There are a number of weaknesses, mainly concerned with the range of shapes, track width and lack of a user–definable library or flood–fill routine (which should be possible with the SVC), but on the whole, it is a useful basic tool and worth getting.

I would suggest that the author does some more development, concentrating on really useful features such as auto–routing of tracks (selection of the most efficient way to position a track between two pads), more choice of track width, user library facility and component overlay, as well as implementing the flood–fill facility. This would make the program a real winner and, with most users having a TPA of about 60k, the extra 16k of RAM on an 80–BUS machine would be well used. Most of these facilities are available on the Pineapple program which runs on the memory–deficient BBC B. ●

Adding Drivetec Drives to a Nascom

by Michael Hendry

Introduction

Like many readers of Scorpio News, I found much of interest in the surplus offers in the last issue but one (Vol. 1 Issue 3), and contacted Scorpio at once about what was to me the most tempting, the offer of two Drivetec drives (3.3 Mbytes each, unformatted) at £50 the pair. Although many of the other bargains had gone by the time I phoned, I was in time to order these and also an old-style Gemini two-drive enclosure with power supply, which would enclose my two new half-height drives and my existing 80 track Toshiba drives.

At that time my system comprised:–

- NASCOM 2 board
- Home-brew 128k memory board with 1M ramdisk
- MAP80 VFC card
- Twin 800k Toshiba drives
- Various operating systems:– NASDOS, CP/M 2.2, CP/M 3.1

and my main database included:–

- Over 1M of data files, with associated index files.

As my data files spread over more than one floppy, I was forced to split the whole database into two logical halves, each stored on one disk, and this meant that both my drives would be occupied with data after I had copied the main program files on to ramdisk. This implied several changes of disk after booting up for the day, and foolproofing became more and more difficult with the increasing number of disk changes.

The plan became:–

Drive A (QDDS) Main program disk
Drive B (QDDS) Supplementary program disk
Drive C (Drivetec) Database disk and backup source
Drive D (Drivetec) Auxiliary data, and backup destination
Drive M Temporary disk

This would provide for a complete session with one set of four disks, little scope for operator error, and a full backup at the end of the session.

The alternative option of buying a surplus hard disk was not attractive because I have no previous experience of these, and no hard disk controller. The ease of copying using identical floppy drives was also very seductive, as the copy is physically identical to the original. The sensible option of buying a plastic box from AMSTRAD at a very reasonable price was also rejected, on largely sentimental grounds!

Having taken the plunge and ordered the drives, I had a number of problems to solve, some of which I anticipated, and others which appeared later. Any project involving a mix of hardware and software poses diagnostic problems when it doesn't work, and this was no exception.

I had anticipated the following problems: –

1. Interfacing to the VFC board.
2. Clock changes on the VFC board for the higher data rate.
3. Power supply requirements.
4. BIOS changes, to deal with two–byte track numbers.

I should also have expected: –

5. Incorrect and incomplete hardware documentation.
6. Faulty drives.

The Drives

The Drivetec 320 floppy disk drive is a double sided half height 5–1/4 inch unit. It uses 160 tracks per side, with an unformatted capacity of 3.3 Megabytes. The disks supplied were formatted with seventeen 512 byte sectors per track, giving a total formatted capacity of 2720 k.

In order to cram so much data on to a track, it is essential to use the higher data rates used for 8 inch drives (i.e. 500 kHz instead of 250 kHz), and to double the track density to 192 tracks per inch. This requires exceptionally accurate tracking, and a dual stepper closed loop servo system is used to achieve a claimed accuracy of 200 micro inches. Like eight inch drives there is a head load solenoid which lifts the head off the disk after a time–out delay set by the FDC, and this solenoid also actuates a door lock. Although the manual states that the motor runs continuously, this is not so.

Power requirements are:–

+ 12V dc 1.2 amps maximum during stepping
+ 5V dc 0.42 amps maximum

After a visual check of the drives when they arrived, I read the *"Preliminary OEM Manual"* which came with them. I understand that this was all that was supplied to Gemini when the drives were purchased for evaluation purposes, and it leaves a number of questions unanswered. The signal interface is virtually identical to the Shugart interface used for the VFC, and I was able to plug the drives in directly. Similarly, the power supply is via a standard +5v and +12v socket. After connecting the power and signal connectors, and using a simple program to check the ability to step in and out, I found that one drive was not working and that it became very hot in the process. Fortunately, Scorpio Systems were able to supply another drive, but this too proved to be faulty (though not so dramatically). More of this later.

With one drive apparently working mechanically, I had to tackle the problem of the clock rates, so as to test its ability to read from the supplied (and pre–formatted) disks.

Board Modification

No modifications were required for the signal interface. In common with most 80–BUS products, the MAP80 VFC card is supplied with a circuit diagram, and this was invaluable in dealing with the next stage, switching from a 5–1/4 to an 8 inch data rate under software control.

The clock signal for the 2797 floppy disk controller (FDC) chip is derived by division from the system clock. A wire link option is provided to adjust the clock between 1MHz for 5–1/4 and 2MHz for 8 inch drives. This is not so useful as it sounds, because there is no link to set up pin 17 of the FDC chip, which adjusts the internal VCO frequency for the two data rates, the pin being held low to indicate 5–1/4 inch data rates.

Perusal of the circuit diagram revealed a spare bit in the latch that is used for drive and density selection. This bit can be controlled by software, and can therefore select the appropriate clock rates. The method is similar to that described by R Mohamed in his article *"GM809 Fast Stepper"* in Scorpio News Volume 1 Issue 2 pp 46–49. I used the overkill solution of a multiplexer (74LS157), thinking that other signals might need to be switched by this latch, but I could as well have used the 74LS00.

I describe my method as I know it works on the MAP80 VFC board, but the Mohamed method should work, with the relevant pin and chip numbers adjusted.

1. Extract the 2797 chip and bend pin 17 out at right angles. Connect this pin to IC13 pin 2. (The faint-hearted might prefer to replace the 2797 in a wire wrap socket, and bend pin 17 of the socket out at right angles before inserting the whole assembly into the PCB!)
2. Connect IC13 pin 2 to pin 1 of 74LS157 (Select pin).
3. Connect L3 pin a (2 MHz clock) to 74LS157 pin 3.
4. Connect L3 pin c (1 MHz clock) to 74LS157 pin 2.
5. Connect L3 pin b (CLK for 2797) to 74LS157 pin 4.
6. Connect 74LS157 pin 15 to 74LS157 pin 8.
7. Connect 74LS157 pin 16 (VCC) and pin 8 (GND) to +5 and 0 volts respectively.

On reset the latch is set up for 5-1/4 drives, but setting bit 5 of the drive port will select the higher clock rates for 8 inch disks.

There remained the analogue adjustments to be made. I had originally thought that I would have to provide two separate sets of presets for the two data rates, but found empirically that both sets of drives would perform correctly with one (compromise) set-up procedure.

1. Press RESET.
2. Connect TP to ground.
3. Connect frequency counter to pin 16.
4. Adjust trimmer VC1 for 200kHz (400kHz for 8").
5. Connect scope to pin 29.
6. Adjust P3 for a pulse width of 400nS. (leave P2 as before.)

Although these settings appear well away from those recommended in the 2797 manual, the only loss of performance I have noted is in a fast disk copy utility, which reads sectors in physical sequence and writes them in the same order to the destination disk. The source disk is read in to the buffer as quickly as before, but the sector write routine isn't quite quick enough to pick up the sector address of one sector after writing its predecessor, and has to wait a full revolution of the disk before trying again. It is possible that further experiment might remove this mild nuisance, but at the risk of other problems.

Software

The above compromise settings were arrived at after I had developed a disk verify utility to cope with the two byte track numbers required for the Drivetec, which

enabled me to check that I could read the disks. The next stage was to write a new BIOS to use the disks properly. I decided to keep my existing QDDS drives for booting the system and to use the new drives without system tracks. The disk parameter block was therefore defined thus: –

```
Hex     Dec     Description
0044    68      ; SPT   – CP/M Sector (128 bytes) per Track
05      5       ; BSH   – Block Shift Factor
1F      31      ; BLM   – Block Mask
01      1       ; EXM   – Extent Mask
02A7    679     ; DSM   – Disk Size in blocks – 1
00FF    255     ; DR    – Number of directory entries – 1
C0              ; AL0   – Reserved directory..
00              ; AL1   – .. blocks
0040    64      ; CKS   – Checksum Size
0000    0       ; OFF   – Number of system tracks
02      2       ; PSH   – Physical Record Shift Factor
03      3       ; PHM   – Physical Record Mask
```

These parameters are described in M W T Waters' article in Scorpio News Volume 1 Issue 4, and I will not go into them more fully here, except to note that the last two are relevant only to CP/M 3.x systems, and to point out that I decided to keep the 4k block size used in the QDDS system, but to double the directory size to 256 entries. I have never run into problems with directory overflow with the QDDS format, and I expect to have a preponderance of large files on these disks.

Those who are familiar with the SYS BIOSs will be aware that the sector read and write routines are given track and sector requests in registers D and E respectively. The low level routines deal with the arithmetic necessary for side selection. With track numbers running from 0 to 319 two bytes are necessary, and CP/M 2.2 and 3.1 already make requests for track and sector using two bytes. All that was necessary therefore was to arrange for the calling routine (that previous passed track in D and sector in E) to store two bytes for track and two bytes for sector in RAM for the low level routine, which I adjusted accordingly. A minor modification to the disk error routine to deal with track numbers greater than 255 completed the adjustments.

But!

Full of confidence, I now attached the second drive and powered up. It was obvious that the Gemini FDC power supply was inadequate for the purpose, because the new drives crashed whenever there were two connected at once, and a high capacity switch mode supply was obtained at very reasonable cost from Henry's Radio.

Unfortunately, the second drive still did not work, and returned "Drive Not Ready" errors via the BIOS, although it did respond to stepping command issued via a monitor (the excellent public domain Z8E.COM). By this time there were no more drives available, but Scorpio very kindly suggested I keep the dud for spares and accept a partial refund. This I did, but was able to send the refund back, as the problem was mechanical and (relatively!) easily solved. The main stepper motor operates a lead screw which moves the head assembly via a "nut" (which is biased with a set of small springs to keep the head assembly on its guide rails) and an intermediate cupped washer. This washer had become displaced, and as a result the track 0 position of the stepper motor left the heads several track widths outside the genuine track 0.

Replacement of this washer brought the second drive into action, and I was off. Or so I thought! Both drives could now read and write reliably, and repeated verifications of the disks were successful. However, one of my database applications involves an alphabetic printout of a large random access file, and during this the BIOS would crash out with a "Drive not Ready" error. Numerous fiddles with head settling time etc. failed to cure the fault, which tended to occur at the same pages of the printout each time, but occasionally did not happen at all. I also tried all sorts of extra decoupling of the power supply to no avail.

Eventually the penny dropped! During the printout, there were times when the head was unloaded after a period without disk activity, and then immediately loaded again as a new sector was requested. If the head–load/door–lock solenoid had not returned to its de–energised position before being re–energised, it could not quite reload the head. The Drivetec derives the index pulse from pre–formatted data on the disk, not from the index hole; the drive motor time–out period elapsed without an index pulse being received and the drive appeared to be empty.

The solution was to test the head–load status before any disk read or write was performed, and if the head was unloaded to wait for a further 100 mS before reloading it. This is a rare event, and has no significant effect on performance.

Conclusion

I am very pleased with the addition of these drives to my system, which now offers the disk capacity of a small Winchester system but allows me to remove data files completely for security and backup purposes. As far as I can tell, they are now performing up to specification. I had anticipated some problems in obtaining (and paying for!) disks, but these are readily available and cost £18 for 5 plus VAT, which is not a lot when their capacity is taken into consideration.

I understand that Verbatim are selling comparable drives at £370 pounds plus VAT, and at that price they are really not worth considering for the amateur (or even the professional, unless someone else is paying) with Winchesters-on-a-card available for less for IBM compatible machines.

At the price offered, they are excellent value. Many thanks, Scorpio, for giving me many hours of innocent fun, and my elderly NASCOM 2 a substantial new lease of life!

Post Script

It took a week or two of routine use before I came across another problem, which was more obscure, and I still do not fully understand. During the course of an editing session, records of 128 bytes were being written to a file, which might be closed then re-opened for use by a "chained" program. If the drive motors had timed out in the interim, some records were lost in the middle of this file, while later records were written at the correct relative position in the file.

This problem was solved by ensuring that the routine which checked for motor-on status would load the heads, and wait for a short settling time before proceeding, if the motors had stopped. This appeared to duplicate a head-load and delay section in the sector write routine. I had expected that if the heads were not properly loaded, the relevant physical sector would not be found, a sector-write would not be attempted, and an error flag returned to the BIOS. In this instance, the write failure was not flagged.

I am still not happy with this explanation, but so far all seems to be well! ●

Private Advertisements — 2

Gemini MultiBoard System in 19" frame. P.S.U., 8-slot backplane, GM813 CPU/RAM, GM812 IVC, GM829 FDC, GM827 keyboard, GM808 EPROM programmer. CP/M 2.2, BBCBASIC (Z80), MBASIC, Tiny BASIC, several disks Public Domain software, many manuals, 80-BUS News, etc. Used < 2000 hours. It cost me £1200 - I'm open to sensible offers. Telephone: Chris Hellen, Wivenhoe (020622) 5671. ●

Improving GEMPEN, ZCPR3, and Providing On–line HELP

Some problems are also discussed.

by C.Bowden

As readers may be aware from articles that have been printed in this magazine or its predecessors, I use the ZCPR3 Operating System. This is the case both at home, and on a couple of Gemini systems at my place of work. All of these systems are equipped with a Winchester Drive, and the ZCPR3 Operating System makes using the machine a pleasure.

I have developed one or two ideas that improve on the user friendliness of the overall system by adding features to the BIOS, some of which have been described in earlier articles. In this article I suggest how the Gemini SVC alternative screen can be used to provide an instant HELP screen.

I have modified ZCPR3 to improve even further system password security. I have also recently discovered a problem that can arise when several other operating systems such as CP/M 2 and CP/M 3 are also run on the same system as ZCPR3, and I have been having a small problem with the ZCPR3 MCOPY utility. These points are all discussed.

Gempen

I also use the Gempen Editor a lot. However much I try I just cannot get to like Wordstar. Even when run from a RAMDISK, I find it slow. I have extensively customised it, to use the cursor keys, and changed menu's and other command keys. I acknowledge that it is much more powerful than Gempen, and can do things that Gempen cannot, such as handle files longer than the TPA. I find it frustrating however that it is necessary to save a document before printing it, and as for printing an extract !

Gempen however, was not exactly forgiving if one made certain errors, and annoyed me in the way that it carried out certain commands. Its lack of ability to write selected blocks to disk also meant that to extract sections of text was quite a problem. There was only one solution. I disassembled it, and modified it extensively. Below I describe the modifications that I have made.

For Copyright reasons I cannot sell modified copies of GEMPEN, but I see no reason why I cannot 'patch' a serialized copy for a small fee to cover postage, copying and patching. If anyone is interested in this, or any of the other software modifications as described, or has a patch to MCOPY, I can be reached on 0209 – 860480.

Modifications Carried Out On Gempen Text Editor

I first attacked Gempen with a disassembler in 1984. Recently I have had several more goes, as a result of requests for certain other features from other users at my place of work, and due to my dissatisfaction with the way some commands still operated. There are problems about altering any program, and Gempen is no exception. Certain areas of the program have to remain compatible with various overlays.

In order to alter Gempen it was necessary to disassemble it at least to the state where reassembly would generate the same code. The next step was to determine as far as possible where the various routines were. The keyboard dispatch table was a great help here, as were the embedded text messages. The data supplied on the patch areas was also of great usefulness. As a result of many evenings work, I arrived at a source code, of which I could understand enough for my purposes.

By rewriting many of the error messages and prompts, writing out Nascom related routines, modifying the keyboard dispatch system, and re–arranging the code I was able to save a fair amount of space. As a result of the modifications my version of Gempen now provides these extra or altered features, but will not run on Nascom systems using the Nascom keyboard and screen, but it should work where a Nascom drives an IVC/SVC with attached keyboard.

A a result of my hacking, my version of GEMPEN now provides the following modified features.

Command Protection.

This has gone through two stages. In earlier versions, I added "Are you sure?" type protection to many commands, together with an SVC 'Beep', since I had lost text by typing things like 'by' when not in insert mode, and often hit the 'e' key and exited when not intending to. This added protection was still not entirely satisfactory though, since inadvertent keystrokes still led to distracting 'Sure?' queries. The frequent occurrence of the invitation to 'W/w' was also thought to be unnecessary, since this option is available at all times anyway. This query has been removed. In any case it did not make complete sense to protect the 'W/w' command with a query

that itself asked 'W/w', and which on exit asked:
"BACKUP DONE – PROCEED (with original command)?".

I have now completely changed the system of command access. The philosophy now is that any command that can cause a disk operation, cursor movement, printer output or change the printer or screen format is protected in some way.

All lower case (a–z) commands, except "f", are converted to upper case, allowing great shortening of the dispatch table code. Protection is applied to ALL A–Z commands EXCEPT I,J,M,D,F,f,V. (M,D,F,f require parameters anyway, so they can be aborted, and I,J and V commands do not cause serious problems if invoked in error.)

The remaining A–Z commands can have unwanted results if accessed in error, so they are ALL accessed via a lead–in key. I have chosen '^Q' for this purpose, since it was not used as a command, and 'Q' is near the control key. A small amount of extra code has been added which has widened the scope of this, so that a total of four key sequences are available to access the required protected commands. e.g.;

^QE or ^Qe or ^Q^E or ^Q^e keys will ALL access the 'E' command.

Where the command in question can have particularly awkward results, such as 'E', 'W', 'K' etc.;, a further prompt is printed for security. Since most of these extra security keys are only used a few times in a session, this double protection is not a problem.

In some cases like formatting, the ^Q protected command requests extra parameters, and so this request provides a way of escape, without the need for GEMPEN to ask if it is safe to proceed.

Modifications to Commands.

a) F/f – Find and Replace

1. ^X during string input will abort command without cursor moving. Originally once a string was started there was no way to abort, and ^Z would cause the cursor to move to some other place which depended on what had been entered.

2. Find and Replacement Strings now allow ? wildcard Characters. (Advisable not to use ?'s in replacement string since they will be left in the text.)

3. Typing 'I' during a find goes to Insert mode as before, but ^Z after the Insert returns to the FIND operation and the screen says 'FIND'. A second ^Z key will terminate the find. During the Insert period, the screen says 'F–Insert'.

b) Formatting with ^QL, ^QS, ^QX

1. The Cursor stays at the place in the text at which the command was issued instead of moving to the start of the text after one of these commands. I used to find this extremely irritating.

2. The user has the Option of Formatting ALL of the text after the cursor, or just the NEXT PARAGRAPH. Formatting is thus much faster and controllable. Variable width text is simpler to create. The use of the ^U and ^F formatting flags can be dispensed with if desired.

c) D – Delete Line.

1. The ONLY acceptable answer to the 'D' key is 'Y/y'. ALL other input aborts. A Y/y reply allows repetition of the command.

d) I, ^QA – Text Insertion or Append.

1. A RULER Line is displayed along the bottom of the text screen, and a moving cursor below the line relates to the text cursor location so that it is possible to see how far from the end of the line one is at all times.

e) ^QO – Output File or Block

1. Now allows a marked Block of text to be written to Disk under a file name given by the user. The required block is marked with the Block Move/Delete markers. After the 'O' command is finished the 'M', ^QD, ^QN commands are all permissible as usual.

2. Restores the original file name for a subsequent '^QE' or '^QW' command. The way the name was originally permanently changed resulted in possible loss of files if naming and backing up were not carried out carefully.

f) V/v – Clear HELP and Change Screen Format.

1. Video format change redundant and removed, to create space. 'V' or 'v' now only removes the HELP screen.

g) Screen Scroll Line Height.

1. The '5' & '6' commands are redundant and have been reallocated, and a '7' command added. The Screen normally scrolls when the cursor is 7 lines above the two prompt lines. The '6' command changes this to 2 lines, so that more text can be seen above the scroll point and the input line is nearer the RULER line. The '7' command puts the scroll line at 20 above the prompt line which is useful for source code editing when you want to see ahead. The '5' command restores the line to 7 above.

h) HELP Menu Screens. (HELP.OVL)

1. All HELP screens have been updated to reflect the above changes.

i) GEMPEN1 and GEMPEN2 .DOC Files.

1. Updated to fully explain the use of the revised programme.

A number of other small changes have also been made, that are mainly cosmetic. Some of the specially programmed screen characters have been altered. If time and memory space permit, I still have some further changes in mind.

Extending ZCPR3 Password Protection to DU's

The ZCPR3 system is very flexible in the way that access is permitted to Drive and User Areas. This is essential when dealing with larger drives like Winchesters, in order to allow satisfactory ordering of files, personal directory allocations to individual users, and yet retain flexibility.

For example ZCPR3 allows, using Disk and User (The DU: form)
A0>B5: --> B5>3: --> B3>C: --> C3>M0: --> M0:> etc.;

Or using Directory Name. (DIR: form)
ROOT>BAK: --> BAK>BAS: --> BAS>CAT: --> CAT> etc.;

Either form may be selected at assembly time, but most users would probably select both, allowing either form of address, e.g.;
A0:BASE>C: --> C0:BAK>BAS: --> A6:BAS>JOHN: --> A4:JOHN>

As explained in earlier articles, the many utilities supplied with Z3 can recognise and accept both forms, so that commands like:

M0:MDSK> MCOPY =B6:SC.COM; ERA ROOT:*.REL; XD BAK:*.COM

are all legal and acceptable. (Extra spaces for clarity)

The author of the Z system, recognising that this freedom destroys any security between different users, has provided several security systems. These include the 'Wheel Byte', which can be set to deny users access to selected system commands. This can also stop non authorised users for example, from using the system 'P' (Peek) command, to read system passwords. It can also be used to prevent remote access users from 'vandalising' the system. The system operator or anyone with sufficient knowledge of the system can set the wheel byte to allow himself access.

The system also allows a limit to be set to the maximum user number that can be accessed. By loading a different system overlay, the system operator can allow himself access to higher user numbers, where 'sensitive' files like Disk Editors, Debuggers and System files may be kept. Programs like these could of course be used to read passwords from system files, disk tracks, or RAM.

The main security measure provided in ZCPR3 is to 'Password' protect certain directories. In the Z system directories are based on simple Disk/User structures, rather than on any elaborate 'tree' structure. Depending on the amount of RAM one is prepared to allocate to named directories, 14 names are available for each 256 bytes of RAM. In practice, 14 names seem adequate. The system operator needs only decide which DU is to be allocated to a function or operator, and to name the DU. Thus if an operator is to be allocated the 'DIR' JOHN: on User 4 of drive A, then when the system operator makes up the named directory, the relevant entry will be:

	D U	Name	Password
BYTES >	01 04	4A 4F 48 4E 20 20 20 20	58 45 47 48 20 20 20 20
	A 4	J O H N	X E G H

The name may be up to 8 characters in length, but this would only make for more typing, and up to 4 characters is usually adequate. The second block of 8 bytes may be left as spaces, or any ASCII code may be entered, which will be used as the password for access to that directory. In this example the password XEGH has been allocated.

When JOHN wishes to access his directory, he types JOHN: and presses enter. Since there is a password, he will be asked to type it in. If he makes a mistake, he is given one more try, after which the system defaults to the current DU.

If the relevant ZCPR3 was assembled to only allow DIR: type access, then all would be well, since attempts to access by typing A4: would fail. Limiting the system to allow only DIR: access reduces flexibility however since access to unnamed DU's: is frequently very useful. Unfortunately if Z3 is assembled to accept DU and DIR

forms, then anyone typing A4: would succeed in entering JOHN:, since Z3 does not check to see if there is a password associated with a DU before granting access.

The modified code listed in Appendix 'A' will cause the Z3 CCP to check DU forms as well as DIR forms for password protection. Space is a problem in the Z3 CCP. Not all routines in the CCP are available in the RCP segment, and some perform slightly differently. In order to get the modified code into the CCP, I had to reduce the number of CCP commands to just ERA, GET and SAVE. The ZCPR3 RCP however has room to give me all of the remaining commands that I need.

The ZCPR3 source code is written in 8080 mnemonics. Some Z80 specific code is used in the CCP segment, but this is generated by the use of Macros. It is possible to save a useful number of bytes in this code by adopting more standard Z80 operations. This task is made easier if the source is translated to Z80 with a program like XLATE3.COM. I have found some dozen extra bytes without really trying too hard, and there are probably more that could be saved.

By modifying the ZCPR3.ASM file as described and re-assembling, then the Z3 CCP will check both DU: and DIR: forms of address for passwords before granting access.

Using the SVC Alternative Screen as a Command List

Some time ago I described in 80-BUS News how I had modified my BIOS so that a lead in key (^T) provided access to a number of single key operations. From relatively simple beginnings, this direct command feature grew into an extremely useful tool. For example a ^P would page the Printer and BIOS, ^S would toggle the screen paging, ^D would do a screen dump, and several keys would alter lines per page, skip-over, change the printer type, etc. In more recent versions, it was possible to strike ^F as the second key, and this would switch SVC screens. This appeared to me to be an attractive operation, but subsequently I never found much use for it.

In the version described in a previous 80-BUS News, when ^T was hit, a prompt line appeared on the top line of the screen, reminding the user of the option keys available. The main problem with this was to remember which key did what operation since they were not all functionally related and there was not enough space on the top line to display the detail needed.

Recently, whilst setting up a Z3 startup menu, it occurred to me that it would be extremely useful if entry of a ^T key switched to screen 2 of the SVC, on which could be displayed a full list of the second key options then available. After the

second key was struck, the system switched to the first screen again and carried out the command.

I have modified the software to enable this. On system cold boot, the embedded command in the Z3 multiple command line buffer is:

SAK;^C for system, saving TPA. Other keys load Help and Menus;CSET; SWSCR;TYPE TKEYS.TXT;SWSCR;SETUP

In turn, this allows the user to go direct to the system (in case of reboot of a crashed system where a SAVE is needed), or loads a preferred character set to the SVC, Switches to Screen two, Types the ^T command menu, switches back to screen one, loads a system set–up menu. (SETUP.COM is MENU.COM, renamed and modified to load a file named START.MNU.)

When the user types ^T, code in the BIOS keyboard routine detects this and calls code within the BIOS similar to that in SWSCR.COM to switch screens, thus presenting the user with a more descriptive display of the options available. After the second key control key has been entered, the BIOS switches back to SVC screen one, and processes the command.

Multi–Operating System Data Corruption Problem

Despite my preference for ZCPR3 as a much more powerful and friendly operating system, it is sometimes necessary to use some other system. At work, MAP80 CP/M Plus is available, together with a suite of MAP80 programs that allows reading, writing and formatting of a large number of disk formats including CP/M, BBC, and MSDOS. This suite needs CP/M Plus to run, and so I have a version of CP/M Plus set up that will access the Winchester, as well as several floppy formats. Recently I was asked to transfer a large number of files from a 'foreign' CP/M format (ICL) to IBMPC format. Since I could not do this directly between the floppies, I had to read the files on to an unused DU: on the Winchester, and then to load a special MSDOS transfer program to write the files to the MSDOS disks. This exercise was completed without problem. On completion the ICL files were ERAsed from the Winchester.

The ZCPR3 system allows access to USER areas up to 31 inclusive, instead of 15 as with CP/M. The ZCPR3 installation notes suggest that the .HLP (system HELP) files are held in USER 16. The HELP.COM file supplied with ZCPR3 will find these files, and by putting them in USER 16 they are out of the way and will not interfere with normal directory displays. Recently I tried to use some of the 500k odd bytes of ZCPR3 .HLP files that reside on the Winchester and I found them

nearly all corrupted. Since the corruption was ASCII text, I could read it and recognised it as some of the data which had been copied from the ICL disks.

Examination of the directory of the Winnie with SPZ.COM showed that the .HLP files were still described correctly, with USER set to 10H, and block numbers from about 0193H upwards. The directory also still held references to some of the files transferred from the ICL disks, although they were of course marked E5 in the USER byte since they had been erased. The block numbers for these files however were in the same region as the .HLP files (0193H upwards). Obviously the transferred ICL files had been written to the area of the Winnie that had been holding the .HLP files.

It appears that when I used CP/M Plus to copy files to the Winnie from the ICL disks, CP/M Plus did not overwrite the .HLP file references in the directory, probably because the first byte was not 0E5H. On the other hand it did not mark the relevant .HLP file blocks from 0193H up as 'used' in its allocation map, probably because the first byte was 10H, an unrecognised user number. Consequently, as each ICL file was copied, CP/M Plus opened a new directory entry for it, but used blocks from 0193H to store the data. It took some time to recopy the ZCPR3 .HLP files back from my floppy backups and 'USQ' many of them en route, but at least no valuable files were lost.

I rarely revert to CP/M 2.2, and when I have done so the systems loaded have not in general been set up to access the Winchester. I suspect however that the problem could equally well arise when writing files to the Winnie under a CP/M 2.2 that allows Winchester disk access.

There are several ways around the problem, such as not using a USER above 15, or temporarily moving the files down to a lower user. The program MAKE.COM is ideal for this. Unfortunately it will not move them back, since it too baulks at a USER above 15. Other alternatives are possible such as not using the Winnie, and letting drive A: be a floppy. At least users of ZCPR3 (or any other system that makes use of USER areas above 15) who read this will now be aware of the problem.

Problems with the ZCPR3 Utility MCOPY.COM

MCOPY is, in common with most of the ZCPR3 utilities, extremely flexible, allowing a string of files and DU's (or DIR's) to be defined in the command line. The only thing that it will not do during copying is to rename a file, but this if permitted would be inconsistent with its other abilities. At times however, MCOPY does not behave correctly. I get SRC = DEST error messages, or No Files error messages. e.g.;

C0:BAK > MCOPY MDSK: = BAK:FILE1.TYP,FILE2.TYP
works O.K.

M0:MDSK > MCOPY = B3:FIL1.TYP,FIL2.TYP
FIL1 copied O.K. FIL2 gives SRC = DEST err.

C0:BAK > MCOPY MDSK: = B3:FIL1.TYP,FIL2.TYP
FIL1 copied O.K. but MCOPY tries to find FIL2 on C0: and gives a Not Found err.

The problems seem to mainly arise if one is not logged into the source directory when using MCOPY. If anyone has a patch for this I would be interested to hear from them, since it can cause batch processing to abort.

Appendix. A

Code modifications to ZCPR3 CCP to allow password protection of DU's

In general, only changed or extra lines are shown here, or enough of the original to allow the correct location to be found.

```
;
        IF      ACCPTDU         ;ALLOW DU: FORM
DUSCAN:         ...
        ...                     ;Change target of next JRC
        JRC     DUS1X           ;IF LESS THAN 'A', MUST BE DIGIT
;
; SET DISK NUMBER (A = 1)
;
        ...
        ...
        CPI     ' '             ;Original code
        JRZ     DUPW?           ;Changed from RZ.
        CALL    DIGCK           ;CHECK FOR DIGIT
        RC                      ;(ALSO NZ IF 'C'). Original Code.
;
        JR DUS1                 ;Now 4 Extra Lines
;
; If Digit only entered, we must set TEMPDR to the current Drive
;
DUS1X:  LDA CURDR               ;GET CURRENT DRIVE
        INR A                   ;CONVERT TO DRIVE
        STA TEMPDR              ;SET INTO TEMPORARY USER
;
; SET USER NUMBER
;
DUS1:   ...                     ;Code here not changed
        ...                     ;to
        STA TEMPUSR             ;SAVE USER NUMBER
```

```
;
;       Now Extra code from here to XRA
;
DUPW?:                          ;This Label must be left, in case
;                               ;DUPWCK is set FALSE
;
; SEARCH FOR PASSWORD ASSOCIATED WITH THE REQUIRED DU:
;
        IF DUPWCK               ;Additional Equate in Z3HDR.LIB
;
        LXI H,Z3NDIR            ;POINT TO NDR
        LXI D,0018              ;OFFSET TO START OF NEXT ENTRY
ANYPW:  MOV A,M                 ;GET 1ST BYTE
        CPI 0                   ;IF 0, IS END OF NDR
        RZ                      ;SO NO PW FOUND. EXIT and CONTINUE
        LDA TEMPDR              ;GET DEST. DRIVE
        CMP M                   ;SAME AS NDR ENTRY ?
        JRNZ NOMAT              ;SKIP IF NOT
        INX H                   ;POINT TO USER IF DRIVE O.K.
        LDA TEMPUSR             ;REQD. USER TO 'A'
        CMP M                   ;SAME AS NDR USER ?
        DCX H                   ;MOVE POINTER BACK TO START OF ENTRY
        JRZ MAT                 ;IF USER MATCHED, EXIT SEARCH
NOMAT:  DAD D                   ;ELSE ADD IN OFFSET TO NEXT ENTRY
        JR ANYPW                ;LOOP AND CONT. SEARCH
;
MAT:    LXI D,10                ;OFFSET TO 1ST BYTE OF POSSIBLE PW.
        DAD D                   ;ADD OFFSET TO POINTER TO NDR ENTRY
        CALL PASSCK             ;CHECK PASSWORD
        RZ                      ;IF 'Z', PW WAS O.K.
        JR DUSE1                ;EXIT WITH 'NZ'
;
        ENDIF                   ;End of Extra Code. (Except for PWOK:)
;
PWOK:   XRA     A               ;SET OK
        RET
DUSE:
        POP     H               ;CLEAR STACK
DUSE1:  ...
        ...
```

WordStar 4 for CP/M-80

by P.A. Greenhalgh

In the last issue of Scorpio News I wrote a brief review of WordStar 4, and ended it by saying that I felt it unlikely that WordStar 4 would find its way to CP/M. Well, you'll be pleased to hear that I was wrong, and also that MicroPro are offering an upgrade service from your current WordStar to WS4 for CP/M–80 for c.£135. ●

The DH Bit

by D.R. Hunt

Christmas has come and gone, copy date was last week and Paul hasn't phoned, "Has he forgotten me I wonder?". If it hadn't been for the Mrs. banning all use of the computer as an antisocial activity whilst guests are around, then perhaps I'd have been on time. (I didn't really want to talk to the mother–in–law anyway.) Still, no use bemoaning my fate or the fact that my computer withdrawal symptoms have reached such a state that I keep bashing the wrong keys and the words end up spelled all wrong. Are these symptoms of not touching a computer for a week or too much booze? Must be withdrawal symptoms, I haven't had that much liquid refreshment. This explains why my bit isn't likely to run to more than a page or two this time. Anyway, enough of my troubles, have you had a good Christmas?

Now about this time last year I was muttering in print that my favourite computer company (Gemini) was nowhere near producing the sort of computer, which at the time, I needed to get to know and understand. Well it was rumoured sometime ago that they were to capitulate and join the IBM clone camp and at COMPEC there it was. A fast, full spec. IBM AT clone. It's made of bought in components, but the motherboard is, surprisingly, not of far eastern origin, but British made. It's the BAe board, which to date has had something of a motley history and had recently emerged in the Spectrum branded range of computers as well as Gemini, but for some reason seems to have already disappeared from Spectrum's range. I haven't had a good look at it yet, a passing poke at it at COMPEC that's all, but it seemed well behaved and was running one of Io Research's High Res colour cards instead of the more usual EGA card.

It's fast, it runs at 12MHz and is selectable to lower speeds. The slower speed selection is important; when I got my 10MHz clone this time last year, the first thing I had to do was fit a 'Go Slower' switch, as it refused to load up some of the more time sensitive protected software I was using. Over the past year, the trend to remove protection from large and expensive lumps of software has continued, mainly at the insistence of large corporate users who get upset about the inability to tape–backup protected software, but there's still enough protected stuff around to cause problems, if you're fortunate enough to have a fast computer and unfortunate enough to need to run protected software. I'd better clarify that, the software runs Ok at high speed once loaded, it's just that the loading process comes unstuck.

Mind you, all this hype about increasing the crunching speed isn't everything. I recently heard of a 20MHz 80286 AT clone (at about half the cost of the Gemini)

but the increased speed wasn't echoed elsewhere, the hard disk strolled along at a leisurely 65mS (average seek time) and I guess it took more time getting and storing results than it did actually doing the computing bit. Also, it used standard video cards so the ability to manipulate the video using standard DOS calls wasn't any better. There's been a tendency lately to promote 80386 based AT clones as ordinary AT types with 'Go faster' stripes. All well and good, but what a waste of the potential crunching power of the 80386, mind you, there isn't exactly a lot of software to make use of the 80386 in its native mode yet! Maybe I'm wrong, but it looks to me as if this year the advertisers and hype boys will all be jumping on the 'Get the speed up and the price down' band wagon. If you actually need the speed, it'll still cost a fortune for 23mS voice coil hard disks and super fast video and peripheral cards. Perhaps it's all sour grapes on my part, in the space of a year my computer which was one of the fastest around at the time, has now been overtaken by machines which will go twice as fast and actually cost less. Still, mine's got a 35mS hard disk, so for most of the stuff I do these days (database crunching) it's still faster than the latest 'Go faster' toy fitted with the ubiquitous Seagate ST–255 drives.

This brings me neatly round to another topic, actually deciding how fast a computer is going. One of my commercial lumps of software has to use real time clocking to make it work. In other words, it has to have precision delays in the software and rather better than the nominal 18 'ticks' a second clock built into the IBM. The piece of machinery it has to drive has to have timing intervals as short as 1/50th of a second, and is very fussy and makes expensive noises if it gets it wrong. As the software is supplied for any number of IBM clones, ranging from the Amstrad PCW1512 (cheapest) and the IBM XT (slowest) through to one which is running on a Compaq 386 (fastest and most expensive). I've been faced with the problem of deciding how fast a computer actually crunches.

The software to produce the delay is simple, it's nicked from NASSYS, and is Richard Beal's TDEL routine, but instead of counting down a 16 bit number in HL in the Z80, I count down a 48 bit number in the BX, CX and DX registers in the 8086. The actual number to count is set up in a little data table which is created when the software is initialised and in each case, it is finally trimmed by trial and error with a special little delay routine and a good old fashioned stop–watch over a period of about five minutes. The problem is – faced with an unknown computer, brand X, how fast does it actually go, as opposed to how fast do the manufacturers say it goes.

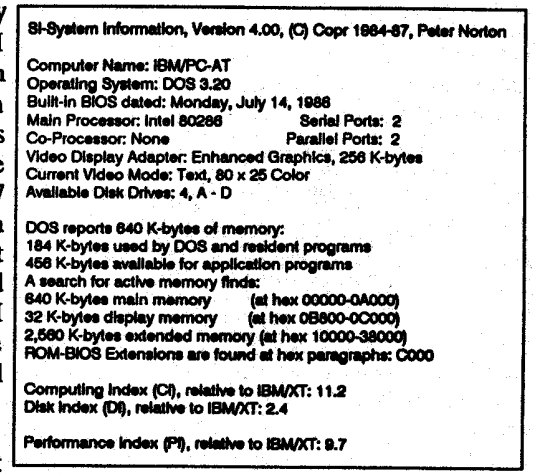
Ok, so over a period of time, I've built up a table of likely numbers for different types of computer: an AT at 6MHZ with one wait state is 1.000, a 4.77MHz XT is 0.3564 – and so on. These numbers give me ball park figures to get down to the final business of honing the number with a stop–watch. But what if I don't know the ball park figure? In my travels I've collected a number of speed testing programs.

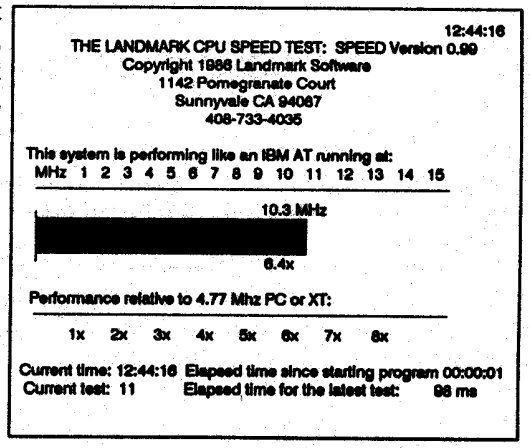
Perhaps the most universally used is Peter Norton's SI (System Information) program which sits and chugs for a moment or two and finally spits out a 'goodness' number relative to a bog standard IBM PC at 4.77 MHz. A 6MHz IBM AT with one wait state clocks in at about 8.5, my toy shows up at 11.5 and so on. The latest version of SI goes on to test the relative goodness of the hard disk as well (which can be very revealing).

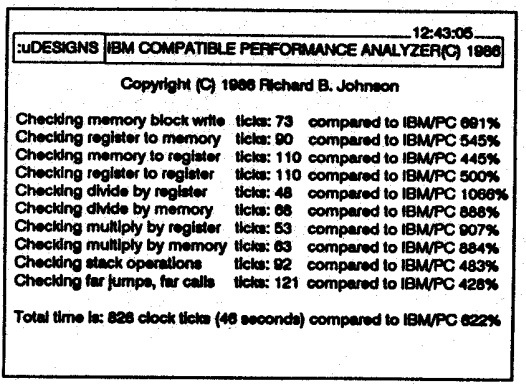
I've just done that, seems a bit slow today, perhaps the recent inclusion of NDOSEDIT has slowed the keyboard interrupt up a bit anyway she still performs adequately.

Another program for coming up with a relative performance index is SPEED by Landmark, there's is simple, to the point and gives a graphical display like a thermometer. It's not as good as SI for telling you whats going on in the computer but its ideal for my ball park speed figure and pretty too, impresses the customers.

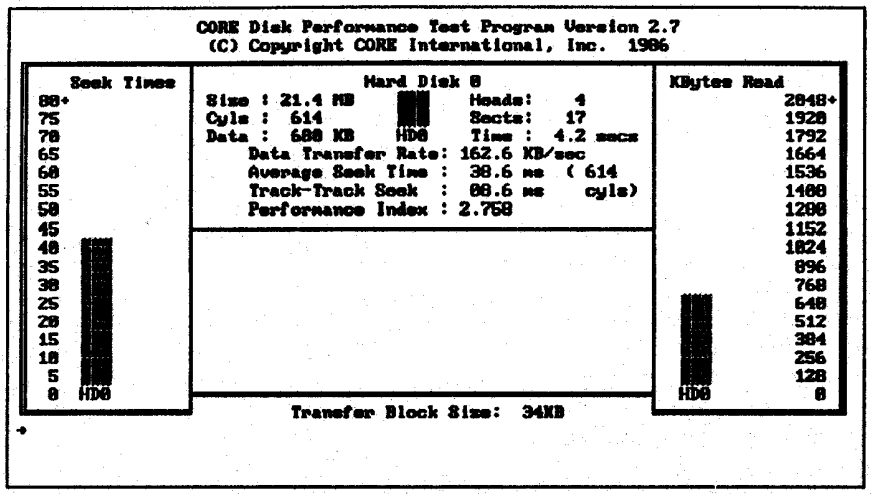
The best for really putting the CPU through the hoops is the Microdesigns Performance Analyser but it's results are difficult to interpret. But it does show BUS hang-ups and all sorts of strange goings on.







Lastly, is my favourite for upsetting people who think their disk drives actually perform to the manufacturers spec. I haven't found a drive yet which will actually do what the spec says. CORETEST by Core International only works on hard disks but it's fun and you can really hear the disk drive working as it does its thing.



Armed with these programs, I can walk into a customers premises and sit down in front of a brand X computer and get a very thorough idea of what the thing capable of, and get my ball park figures for the timing within minutes. The programs are also fun when trotting round a computer manufacturer's facility. Just pop a disk in the hole, run a couple of tests, nod sadly and say, "Hmmm, I thought so." It's very effective on persistent 'know–nothing' salesmen who immediately say they'll go and find someone technical for me to talk to. Come to think of it, I'll try it on that national High Street photographic and computer store, you know the one – the one where Jasper Carrot reckons the staff have a combined IQ of 4. Should produce some interesting results.

Still I think I'd better stop here. I'll visit Paul this evening and give him a disk with this on it. It should take him a while to sort out the screen dumps!! ●

Next Issue

The dates for **Scorpio News** Volume 2, Issue 2 – April–June 1988 – are as follows: Letters & articles in by 2/3/88, adverts in by 9/3/88, posted to you by 1/4/88. ●

The NEC V20 and V30 Processors

by P.D.Coker

Readers of this magazine and its illustrious predecessor will know of my pre–occupation with benchmarks (groans from Chris Blackmore), a state of affairs which has arisen mainly because I do a lot of number–crunching as part of my research.

Those lucky people who purchased the GM888 boards which Scorpio were offering at a very reasonable price (or the less lucky ones who already had them at the full price) will have noticed that there is an 8088–2 processor and next to it an unused 40 pin DIL socket for the horrendously expensive 8087–2 co–processor. The latter device will set you back something like £150 but is a tremendous help if the CP/M–86 version of your favourite language supports it.

The NEC V–series of processors were introduced a few years ago and two of them will be of interest to readers. The V20 (correctly described as the uPD70108) is an 8088 pin–compatible with a considerably extended instruction set (including 80186 instructions and 8080 emulator mode); the V30 (uPD70116) is a pin–compatible replacement for the 8086 (as used in true 16–bit micros such as the Amstrad PC) and has the same, extended instruction set and emulator mode of the V20.

I have been using both chips – the (8/16 bit) V20 in my GM888 board and the (true 16 bit) V30 in the Amstrad – for several months now and I have been very pleased with the improvement in performance they have brought to both systems. With the V30, the improvement is a decrease of just over 50% on timings of a wide range of programs. Because of the 8 bit bus on the GM888, the improvement in speed is less marked, but averages out at about 12% on the mix of programs that I tend to use. This is due in large measure to the way in which the arithmetic instructions are coded in the NEC chips and there would be little advantage in using one of these in a system which was, for example, used primarily for word–processing.

Currently (December 1987), the chips are available from Technomatic Ltd. (01 208 1177) at £10 + VAT – a great deal cheaper than anywhere else. You need the 8MHz versions – V20–8 or V30–8. Technomatic do a very rapid mail order (credit cards etc.), but if you are in the Edgware Road area, looking at the well–known shop where Dave Hunt used to disseminate pearls of wisdom, Gemini boards etc., it is worth calling in at no. 305 where Technomatic have a shop (close your eyes if you don't like Beebs).

If you really want an 8087, which will speed up your programs by 2 – 20 times (depending upon the amount of floating point maths involved), Technomatic are

not the cheapest suppliers. You need the 8MHz version and Computer Express (0727 37451) have them at £135 + VAT – there may be cheaper sources around.

Installation of the chips on your GM888 board is easy – just lift out the 8088 and, after bending the pins of the V20 against a hard surface to get them perpendicular to the chip, insert with the U–shaped notch facing the LED. The 8087 goes in with the same orientation. Do take care with the latter – it is a ceramic encapsulated chip (it gets very hot) and a friend of mine broke one in half while attempting to insert it in his PC. Note that the modification will (theoretically) invalidate Gemini's guarantee.

If you are contemplating carrying out this upgrade on your PC, don't attempt it unless you feel competent enough to locate the 8088 or 8086 without causing mayhem inside the case. Check the type number of your processor and order the appropriate replacement – it does no harm to have an 8MHz V20 in an IBM PC–XT (4.77 MHz) although the 5MHz 8087 at £95 is a lot cheaper than the 8MHz. version. Most people will extract the appropriate i.c. using a small, flat–bladed screwdriver, rather than a chip–puller but some care is needed. Makers' guarantees are invalidated by the change.

A two–part article on these processors appeared in the American magazine Micro/Systems Journal in the Nov/Dec 1985 and Jan/Feb 1986 issues (pages 32–43 and 32–36 respectively). The author is Stephen Davis, the article is "Turbocharge your 8086/8088 computer" and it is full of interesting information of considerable importance to anyone who has more than a passing interest in the topic. I have a couple of copies of the article which are available on a first–come basis (with an A4, 20 pence SAE please).

Have fun!