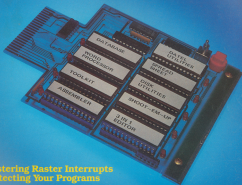


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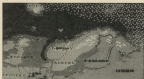


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**VOLUME 5
NUMBER 3**

**ARGUS
PRESS
GROUP**

**JAN ISSUE
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1988**

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DATA STATEMENTS

Pao-Man Bounces Back

As a follow up to Pao-Land, GrandSlam are now poised for a burst of Pao-Mania.

In his new adventures, Pao-Man is back in the maze world but this time it's a 3D scene and the popular side here can bounce out of trouble. The ghosts are still haunting the maze but Blinky, Pinky, Inky and Clyde have revealed two new characters, Sas and Jumpo, to help drive Pao-Man duty.

Pao-Mania attracted a lot of attention at the recent PC Show and will be available for the Amiga (£18.95) and C64 (£3.95 cassette and £14.95 disk).

Footline:

GrandSlam Entertainments, 12-14 Paul Street, London EC2A 4JX. Tel: 01-247 5413

Baybrook's Back

Andrew Baybrook, Benson defender and author of Paradoxi, Uridium and Morphous, has produced *Genesis* for British Telecom's Flamingo label. The game involves rescuing colonists from the beleaguered Cass Major space station, orbiting Sirius.

Active Try Kipling

Active Distribution, whose *ManoBall* showed the Americans how baseball should be programmed, have now signed a deal which gives them the marketing and distribution rights to Coktel Vision's software range. The French company currently hold two important licences for Walt Disney products and Active's Managing Director, Richard Stullbrass, was delighted to successfully negotiate and close the deal in the competitive atmosphere of the PC Show.

The two licences are for Kipling's *The Jungle Book* and *Bambi's First Fox*, two of Disney's largest grossing cartoon feature films. Future titles will also include *Frodoon*, *Tarzan* and *Erasmelle*.

Stullbrass's company has also been actively signing up the German

software house EAS whose *Zero Gravity* is currently receiving rave reviews in their home country. *Zero Gravity* is a cross between tennis and played in space and will cost £9.95 and £14.95 on C64 cassette and disk or £19.95 on the Amiga.

Also from EAS, we will be hearing and seeing *Ultimate Soundtracks*, a music utility with a choice of 127 instruments. The program is designed for both amateur and professional programmers who wish to add music to their programs without taking up too much memory.

Footline:

Active Distribution, Greyhound House, 18 Greyhound Road, Merton, London SW19 5JX. Tel: 01-897 2357.

Available for the C64, the game costs £9.95 on cassette and £14.95 on disk.

Footline:

Flamingo Software, 24 New Oxford Street, London WC1A 1PS. Tel: 01-637 5371.

European Arts

Electronic Arts has been busy signing up the best of mainland Europe's software houses. Spain's Dynamic and France's Ubi Soft have both recently signed distribution deals with the British branch of the American company.

Electronic Arts will be responsible for the European marketing of Dynamic's products except for Spain, Portugal and Italy. The Ubi Soft contract is a reciprocal agreement to handle the sales of the company's products in the UK and Euro in the same way as Ubi Soft have been handling EA's output to Europe.

Dynamic has already had success in the UK charts with *Game Over* and *Army Heroes*, previously released through Imagine Software. On behalf of Electronic Arts, its Director of European Publishing, Mark Lewis



EA's Mark Lewis looks a hand to Public Relations of Microcultural Soft/Dynamic.

Monster Release

The budget software houses seem to be racing to branch out into the full-price market. The latest contender for the big actors brigade is Alternative, whose sister label Again Again bursts onto the scene with a major license to produce the computer game based on The Munsters TV series, which has recently been successfully pulled out of moribundity by Channel 4.

The programming team responsible for the game is Trique, an offshoot of Granada Graphics, currently enjoying independent success with titles such as Tennessee and Pac-Mania.

The TV series features an average American family of assorted monsters who think that they are normal and the rest of the world is ugly and weird. Head of the family is Herman Munster, a Frankenstein clone, who is both clumsy and belittled. His wife, Lily, is the daughter of a vampire. Grandpa, who spends most of his life in the basement laboratory mixing up available for Herman. With parents like Herman and Lily, it's no wonder that their son, Eddie, is a crazy, mixed-up weirdo! The final member of the family is Marilyn, an orphaned cousin, considered hideously ugly by the rest of the family.

The game, scheduled for release in mid-November, is available for the C64 (£9.99) and the Amiga (£24.99).



The Munsters also

This month's award for manipulated press goes to the author of the Munsters' press release. Sort this one out. "Q: What do you get when you combine the freshness of a new full-priced software label, but which is the same company to the UK's most successful software house this summer (according to Gallup) with one of the most popular TV programmes

amongst computer games players at present, with one of the leading programming teams in the country?" How about, "A: Confused?"

Touchline:
Again Again, Unit 34, Sullygate Industrial Estate, Parkway, West Yorkshire WF5 2EN. Tel: (0877) 787777.

said, "Naturally we are delighted to have signed Dynamic as one of our affiliated labels. We were attracted to the professional Dynamic has shown both in the quality of its products and by the high standard of its marketing."

Of the Ubi Soft deal, Lewis goes on to say, "Ubi Soft's products are of a high quality and perfectly suited to the UK market. We are looking forward to working towards chain success with Ubi Soft's titles."

The first release from the new signings will be *Game Over II* from Dynamic and Ubi Soft's *Don Lowd, Skateball* and *PuSy's Saga*.

Touchline

Electronic Arts, 11-49 Burton Road, Limpley, Berkshire SL3 5EN. Tel: (071) 46442.



Konix director, Sandra Williams, practices resolution on the new Protonator.

Konix Sticks Out

Two new joysticks have been launched by Konix ready for the Christmas market. As desk top units, the Protonator and Megablaster are a departure from the hand-held Speed King design which has placed Konix firmly at the forefront of the joystick market.

The Megablaster is a smaller, budget version of the Protonator. The Megablaster (around £8) has bubble switches and a gearstick style handle but the Protonator (around £12) features microswitch operation with a contoured handgrip handle.

The new sticks are intended as a complementary line alongside the Speed King range rather than as a replacement for them.

Touchline

Konix Products, Unit 15, Roxton Industrial Estate, Ebbw Vale, Gwent, Wales NP23 5ZD. Tel: (0485) 150709.

Trilogic Open Up

Trilogic have extended beyond their mail order services to include a new computer showroom at their Bradford premises. On sale in the Trilogic Shop is the full range of Trilogic Commodore utility software and hardware, plus C64 computers, 1541C disk drives, Amiga 500 and 2000 machines. For the Amigas, there are also MS-DOS bridge boards, external floppy and hard drives, laser printers and a host of other add-ons.

The company also has a range of Commodore PCs at 'very competitive' prices and can supply all of the leads and connectors for the full range of products.

Trilogic's shop is open from 8.00am to 6.00pm Monday to Wednesday, from 8 till 5 on Thursdays and Fridays, and from 8 till 5 on Saturdays.

Frankline

Trilogic, Unit 1, 213 New Works Road, Bradford BD11 9QP. Tel: 0274 681715.

Daley Doesn't

When Daley Thompson leads his name to a project such as Ocean's Olympic Challenge game, he likes to get involved in the action. On a recent visit to check up on the progress of the game, before leaving for his ill-starred visit to Seoul, Thompson was so impressed with the advancement in graphics quality since Daley's Decision that he wanted to know all about the system used to create the realistic graphics.

The Ocean team have been liaising closely with Thompson so that the scoring system is as accurate as possible and his points book has been on loan to Ocean for reference purposes.

Unfortunately, the Decision was failed to fulfill a nation's hopes by only achieving a disappointing fourth place in the Olympics, despite an encouraging and impressive performance in the 100 metres event. Perhaps a workout in the Ocean game's gym would have helped to improve his performance.

For our view of Daley Thompson's Olympic Challenge, see our review in this issue.

Frankline: Ocean Software, 6 Central Street, Manchester M2 1JX. Tel: 061 832 6833.



Trilogic's stand gets the finishing touches from 'Cable'

PC Show

As computer shows go, the PC Show was a great assessment arcade with more promise than reality. In other words, the major companies went for the ultimate hype of providing the visitors' imaginations to run riot over the excellence of the forthcoming computer versions. Hype, type, hype!

There was a little finished software available that I would refer to the show as exhibiting SOFTWARE because there was so little in software. The three top-tips for the Christmas number one slot were Thunder Blade from US Gold, Afterburner from Activision and Ocean's Operation Wolf, but very little evidence of the Christmas versions was available. Time will tell.

The game which got everyone buzzing probably won't make the top ten because, at the moment, it's only available for the ST. It's name is World Demons and it is surreal madness from British Telecom. The gameplay is pretty understated but the concept is so totally OTT that it has to be an ST hit and I hope we'll see an enhanced Amiga version soon.

The year's show was held at the new Earls Court venue and most people I talked to seemed to be of the opinion that the atmosphere at the old venue, Olympia, was preferable. The frantic atmosphere of the Leisure Hall and the hallowed atmosphere of the Business Hall were separated by the Central Hall, which seemed to be a

midway of hardware and computer manufacturers, software houses, publishing houses and business software manufacturers. There was a special section for Taiwanese companies but with very few takeaways in sight.

Commodore's stand stood like a large, black monolith in the middle of the Central Hall. Its fortified exterior looked forbidding and unwelcoming compared to the Atari stand, which I found that I'd walked through without even noticing!

Elitism was the watchword, with US Gold building an impenetrable and unmovable citadel beside a more open display area. Microsoft had an impressive spaceship stand which would have stolen the show had the organisers laid on a suitable power supply for their dry-ice, mist machine!

Electronic Arts and Mediagenic (Activision) went to the lengths of avoiding the public by hiding behind sales and offering promotions and lower rates to their private venues by invitation. On the first day there were many scenes as chauffeurs vied for parking spaces, holding up the traffic and their fans in their eagerness to please their employers. For my part, I struck a blow for anti-elitism by arriving at EA in a taxi and plunged to travelling in a mini-bus to Mediagenic's venue.

Overall the 1988 PC Show left the body satisfied in food and alcohol but the spirit thirsting for more tangible Christmas fare.

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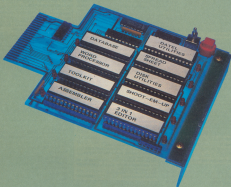
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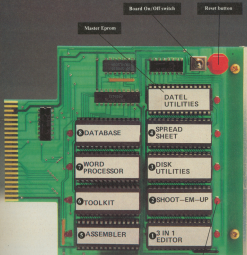
Broaden your mind with Davel's Super Rom Expander

By Kerry Fowler

A BIT ON



THE SIDE



How often do you think about what actually happens when you plug in a cartridge? Probably never, because this is one of the least documented but potentially most useful facilities which the C64 and C128 offer.

The main benefit of a ROM pack is that a program loads instantly and the main applications these days are for backup (wadge, wadge) cartridges and the occasional game cartridge. This betes the true potential of ROM expansion and the area of do-it-

active EPROM LED

yourself expander has only really been explained by Datal's range of cartridge constructors and the SuperRom Expander Board.

The SuperRom system is amazing because up to 256K of extra program can be recalled almost instantly via the cartridge port. The programs are stored on eight EPROMs supported by Datal's own loading and programming chip. The EPROMs may be 8K, 16K or 32K capacity or any mixture of these types.

The only problem with this lies, not in the expander, but in the operating system of the OS4 Cartridges are expected to occupy the 28000 to 59999 region of memory and this 8K capacity means that the larger EPROMs have to be banked in two or four 8K blocks. To compensate for this the Datal on-board operating system has a banking facility.

Making the ROM

To create a suitable EPROM for the board, there are two programs in the SuperRom on-board operating system but an EPROM blower is necessary to transfer the resultant disk-saved programs into a chip. Evidently suitable and convenient is the Datal EPROM programmer, Eprommer 84 (EPR.84), though any suitably interfaced EPROM blower would do.

The on-board EPROM generator is called up from the SuperRom menu by pressing the F3 key. This displays a secondary menu which allows directory display, the sending of DOS commands and the two program generators; one for machine code and one for Basic routines.

The Basic generator loads a specified file from disk and then allows the user to specify a load address. This means that relocated Basic programs, which leave the lower part of memory free for redesigned characters or code, can be relocated at the correct address. For normal Basic programs a simple press of the RETURN key is all that is necessary.

The generator next formats the program for booting up from SuperRom and prints up the last memory location that was accessed. The top right corner of the screen is used to display the minimum EPROM value that will accommodate the program.

The screen then displays the three EPROM types ready for the user to specify which type of EPROM will be used. This is an important decision

because an 8K formatted program can be stored on any EPROM but the banking systems differ on each type. Fortunately, the generator will not allow the accidental selection of a smaller capacity EPROM than the minimum required.

Before being asked for a filename for the formatted file to be saved under, another decision has to be made. The SuperRom sits in memory at location 28000 to 81FFF. This means that the EPROM replaces this section of memory so that any program which coincides with any, or all, of these locations will not run unless the SuperRom is switched out. For Basic, this is rarely necessary.

Once the program is saved, it may be transferred to ROM and then plugged into the board ready for use.

Using the machine code formatter follows roughly similar lines. The program is loaded from disk, the start address entered and then an extra selection panel appears.

The first option asks if a RAM/ROM is to be generated. This is to allow the system to create files suitable for replacing the OS4 operating system with a chip of your own. Even if you merely change the power-up message to display your name, this can be quite an interesting facility though not really applicable for use on the SuperRom board.

If the final EPROM is for inclusion on the board, the answer is both of the questions posed is 'no' and the memory shaping questions can be tackled. When these have been answered the program generator will input the value that you've given for location 801 and the STS location.

After this the process again follows the same steps outlined above for EPROM size selection, naming to disk and EPROM generation.

With both chips on the board, the start-up menu of the SuperRom operating system will change to display the names given to the two EPROM programs.

Selection of one of the programs is made by pressing the relevant number key from one to eight. Bank selection can be made with the F1 key, the EPROM generator returns by pressing F3 and the SuperRom can be switched out in favour of normal Basic mode by pressing F4. F7 displays a full EPROM directory which gives more information on the socket number on the board, EPROM type, the program name and type, location 801 value, and

Value for STS800				
EPROM type	32K	16K	8K	16K
2764 (8K)	1	(3)	-	-
27128 (16K)	2	1	-	-
27128 (32K)	4	2	2	1

EPROM Bank selection system

the program STS address for code overrides or RUN for Basic programs.

Normal, autostart EPROMs which operate just like cartridges can be fitted to the board. Full instructions for creating these EPROMs are given in the manual, including a sample autostart routine.

The SuperRom Experience

Using the board caused a few initial problems but these were ironed out by delving into the informative, if at times confusing, manual. The small booklet tends to be a little difficult to read if you don't understand how the cartridge system works. At first, I was a bit too ambitious and found that the best practice was to start with small, simple routines before building up to the longer, more complex program transfers.

Seasoned programmers should be able to get even more from the board because the potential for internal programming of a master chip to control the board is there for those who wish to investigate further.

An initial experiment with the board can be expensive because the SuperRom board costs £29.99, Eprommer 84 costs £10.99 and eight 32K EPROMs would provide a grand total of £103.98. This may seem expensive but it's a one-off charge because EPROMs can be removed and added to suit your purposes, and extra EPROMs only cost £4.50 each for 8K or £3.00 for 16K types.

An extra few pounds for an EPROM eraser would also be a good investment. Since Datal don't seem to provide one, you could try your local electronics supplier. Mail order suppliers, Maplin, have one in their catalogue for £49.95 but this particular store handles up to 40 EPROMs at one time.

Touchline

Product: 256K SuperRom Board.
Supplier: Datal Electronics, Unit 8, 8, Dewsbury Road, Preston Industrial Estate, Newton, Stockport-Trafford, Tel: (0928) 773810, Machine: OS4/128 word disk drive. Price: £29.99.

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▷ Basic II Tricks & Tips Volume 1

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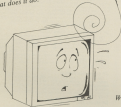
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Mastering The Raster

What does it do?



What's a raster?

How do you use it?



We reveal all

An interrupt is a short routine which is repeatedly executed during the main program but independently from it. Once the interrupt program (routine) has been dealt with (served), the main program continues as before. A simple allegory would be a man sitting at his desk, writing a letter when the telephone rings. He answers it and deals with the call, then he continues writing. In this example, the main task is the writing of the letter and the interrupt is the answering of the telephone. It is worth noting that an interrupt can influence or halt the main program through the alteration of memory loca-

tions, just as the telephone call could influence the man's letter.

An interrupt can be compared to a sub-routine but is much more powerful since it does not need any command in the main program to call it.

The Commodore 64 has four types of interrupt, which are:

reset
NMI (Non-Maskable Interrupt)
BRK (BRake)
IRQ (Interrupt ReQuest)

The interrupt we are interested in, the raster, is an IRQ interrupt. This is a

general term to describe maskable interrupts which simply means that they can be turned on and off using the following assembly language instructions:

SEI (SEt Interrupt flag)
CLI (CLear Interrupt flag)

SEI is used to disable the interrupts, while CLI is used to enable them.

We can also determine which sources will trigger an IRQ and the four main ones are: sprites to sprite collision, sprite to background collision, light pen and raster line. We are only interested in the raster.

What is a raster line?

A Commodore TV picture, or raster, is made up of 280 very fine lines. These are redrawn twenty times a second to create the impression of a moving picture. Each one of these lines is a raster line and a program can determine which line is being drawn by reading register 18 of the VIC chip, the raster register.

The top and bottom of the screen are usually around 20 and 280 respectively, although it varies on different TVs and monitors. The limits of the text screen, however, are always fixed at 40 and 240.

Here we see a problem, the raster line can be as high as 280 but the maximum number that a single register can hold is 255. An extra bit is needed so bit 7 of register 17 is used as the MSB of the raster line.

The VIC allows an interrupt to be generated when the screen display reaches a certain line. To cause this to happen correctly, we must first do three things:

1. We must tell the computer the screen line at which the routine should occur. This is done by writing the desired line number to register 18, the raster register, remembering to set bit 7 of register 17 as the MSB.
2. We must tell the computer that an interrupt is to be generated by the raster when it reaches that line. This is done by using VIC register 26. This location is called the IMR (Interrupt Mask Register) and unless the bit which corresponds to the desired interrupt is set, along with bit 7, an interrupt will not be generated. The bits have the following significance:

- Bit 6 - raster interrupt
- Bit 1 - interrupt by sprite-background col.
- Bit 2 - interrupt by sprite-sprite col.
- Bit 3 - interrupt by lightpen
- Bit 4 - to 6 are unused
- Bit 5 - must be set if an interrupt is to occur

Therefore to inform the computer to generate an interrupt by raster, we would set bits 6 and 7 of the IMR. This could be done using the following commands:

```
LDA  %100000000
STA  IMR
```

3. Now we come on to a slight problem

which involves register 25, the IMR (Interrupt Request Register). This is used to indicate the source of an interrupt if more than one is active. If bit 7 is set then an interrupt has been generated and you can determine which type by checking bits 0 to 3 which have the same significance as in the IMR. However, the problem lies in the fact that if this register is not cleared by the interrupt routine then another interrupt will be generated as soon as the routine is finished and the computer will crash. The register can be reset by reading it and then writing the same value back to it like this:

```
LDA  IMR
STA  IMR
```

To recap, this is how to generate a raster interrupt at line 100:-

```
LDA  #100          ;store the line
                    ;number
STA  VIC+18       ;in the raster reg.
LDA  VIC+17       ;and clear bit 17
AND  #%01111111  ;set bits 0 and 7
STA  VIC+17
LDA  #%10000000  ;set bits 0 and 7
STA  IMR          ;of the IMR
```

The interrupt will now take place, and the first commands of the routine should be:-

Now you now how to generate an interrupt, but there are still some important things which must be explained, such as what happens during an interrupt and where the routines can fit in.

What happens during an interrupt?

We have seen that, when an interrupt is generated, a routine is executed and then the main program continues, but we must be the computer know where the routine is. We do this by using the IRQ vector which contains the address of the interrupt routine. It is located at %87799 (\$0114/\$0115) and usually contains the address SEA31. This points to an address in ROM which checks the STOP key, increments the clock and flashes the cursor. If you

want these functions to continue, you must check the IMR to see if one of its sources generated the interrupt. If it didn't, the program should jump to SEA31. The address of the routine is stored in the IRQ vector in normal lo-hi format.

When changing the IRQ vector, set the interrupt flag first and clear it when you are finished. If this isn't done, an interrupt may occur when only half of the address has been changed, the program would then jump to some unknown address and would probably crash.

Now that we can cause an interrupt and know how to generate one, the only thing which remains is to mark the end. This is done using the assembly language command RTI (Return from Interrupt) but one more consideration must be taken into account. In order that the main program can continue unaffected, we must first save the registers by pushing them onto the stack (the program counter and flags register are saved automatically). This of course means that before we use RTI, we must first restore the registers by pulling them from the stack, as shown below:

```
PHA          ;save accumulator
TXA          ;then save
            ;X-register
PHA          ;and finally
TYA          ;the Y-register
PHA
...
perform interrupt routine
...
FLA          ;restore registers
TAY         ;making sure that
            ;they are in the
            ;right order
PLA          ;and then
PLA          ;return from
            ;interrupt
RTI
```

This is all the knowledge that is required to construct a raster interrupt, however, there are a few guidelines in programming them that you should be aware of.

Firstly, you need to write a short initialization program. This will only be run once, and will be responsible for the setting up of the first interrupt. During this, the IRQ vector will be changed, the IMR written to and the raster line set. Do not forget to set and clear the interrupt flag during this.

Secondly, after saving the registers, you must have a program which will

determine which source has generated the interrupt and act accordingly. This is needed because there are the four sources we have already mentioned plus the system interrupt (the one responsible for flashing the cursor etc.). This program should also be responsible for clearing the IRR.

Thirdly, we write the interrupt routine, or routines, and at the end prepare for the next interrupt, before restoring the registers and returning. This preparation for the next interrupt is only the setting of the next raster line - the EMR does not have to be reset.

Practical Examples

The first of the two example programs which I have included is very simple, but is a useful example of how the raster works. It allows three background colours to be used simultaneously and, though this can be achieved using extended colour mode, interrupts don't have the disadvantage of this mode.

The program works by changing the values in 5C208 and 5C209 when the raster reaches lines 8,108 and 260. When you type in the program and run it, this can clearly be seen as you will now have a three-tone screen. The colours can be changed by poking locations 5C208 (48208), 5C209 (49201) and 5C206 (48128). Fig 1 shows how this routine works.

Lines

80 - 280	These lines are used to set up the variables.
220	is the start address - 5C000 (48153).
240 - 370	This is the initialising routine which sets things up. It changes the IRR's vector to point to TEST.
400 - 460	This is the test to check that the interrupt is by raster line. Since, in this case, the only other possible interrupt source is the system interrupt, we branch to it if interrupt is not by raster.
480 - 580	These lines are the first test to determine the line. If it is greater than 198 the program jumps to test for the other two lines. Otherwise, it continues.

520 - 530	This sets things up for the main routine. The colour is put into the accumulator and the next raster line into the X-register.
540 - 570	This is the main routine where all the work is done. The already prepared value of the colour and raster are put in the proper places.
590 - 640	This restores the registers and returns from the interrupt.
670 - 740	These lines sort out the colours and raster lines for the COLOUR routines.

580 - 620	This is the main COPY routine. It sets up a loop and transfers the 16 values from the pre-defined table and copies them into the first 16 registers of the VIC. It then sets the raster for the next interrupt.
640 - 660	These lines are used to restore the registers.
670 - 710	These lines are used to prepare the registers.
720 - 770	These lines are used to prepare the registers when the other table of values is required. It works as lines 580 - 540.

Another thing to note about this routine is that the main work routines (lines 590-570) is only written once although in this case it is small. You should always try to make the main routine small with as little work to do as possible.

If you want to use this program as part of your Basic program, you can change the three colours by poking the colour into 49208 for the top colour, 49201 for the middle colour and 49208 for the bottom colour.

The second example is built around the same core, in fact line 10-500 are almost identical. This is because exactly the same procedures should be used each time.

The program gives 16 sprites simultaneously on screen. It works by copying the values from a table of sprite positions into the VIC registers when the line is at zero. Then, when the line reaches 136, new data is fetched from a second set of values. This is done continually so that the illusion of 16 sprites is created although the real number on screen at one time is actually eight. Fig 1 shows how this routine works.

Lines

500 - 540	These lines prepare the registers for the main routine. The X-register again contains the next raster line number, but this time the address of TABLE is stored at location 5F8 and 5FC.
-----------	--

Again, you will notice that the main routine is only written once and the registers are prepared for it. This is slightly more complicated than in the first routine but should not be too difficult to understand because the principles are the same.

To use the program from Basic, you must first load and execute it using 515 49152. You then put the values of your sprite positions into the two different tables, in the same format as the normal registers. The tables are located at 49408 (5C100) and 49664 (5C200).

Now for the drawback of this method. Since the first set of sprites are switched out at line 136, any sprite from the first data set which crosses this line will be cut off at that point. For the same reason, any sprite from the second set which gets too close to the line will disappear completely.

The guidelines should be that, for set one, the sprite's Y co-ordinate should not be more than 100, and for set two, it's Y co-ordinate should not be less than 135.

This example is only a very simple one and you are free of course to copy the sprites' colours, pointers and anything else you feel like copying.

In this article I have presented the necessary information to write your own raster routines. I have also included two simple examples to help you get the hang of things and I think you'll find that, if you use the raster well, it can be an immensely powerful aid to programming.

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Daley Thompson's Olympic Challenge



Developer:

Title: Daley Thompson's Olympic Challenge. Supplier: Ocean. 6 Central Ex. Manchester NJ 08855. Tel: 867-832 8633. Price: £8.95 (over)

Daley is back, in a game launched to coincide with his attempt to become the only man to win three Olympic gold medals in the toughest event of them all, the Decathlon.

As everyone now knows he failed and had to settle for fourth place. However, he will still be regarded by many as one of the greatest athletes of all time.

Now you can better his performance, as Ocean, once again, is first off the blocks with an Olympic game. It was four years ago that Ocean released Daley Thompson's Decathlon and set into motion the whole sports' game bandwagon that company after company has jumped on. There was even a second Daley game, Daley Thompson's Superstar, but by then the Olympic fever was over hot, now that it's back, Ocean is first off the blocks with Daley Thompson's Olympic Challenge.

Once more, this is a game that will test both you and your joystick, as the speed of waggles has a decisive effect on your chances of Gold by reaching the 9000 point total that will remain the world record.

However, it's now four years later and Ocean realise that a waggling game is no longer enough, so there are strategy elements thrown in to see whether your brain is still working, and you also have to get it before the Games. These not only help the game considerably but also keep the various sponsors happy because the money that you build up in the game is represented by cans of Lactadec and the strategy element involves choosing the right sports' shoe for the job and, yes you've guessed, they are all Adidas shoes.

In the gym, you must work out at the weights and set-ups to build up enough strength and power to tackle the grueling events.

Soon, you're ready for the start of the 100 Metres. The gun fires and you're off. You wobble as fast as you can and cross the line in a disappointing 13 seconds. Your coach doesn't think you can win and so the game ends for you. Are you going to let this get you down? Of course, but soon you're back for a second go and this time you pick the right pair of unattached shoes. Instead of running in a pair designed for high jumpers, you've got the sprinter's which let you fly, quickly and cheap, up 900 points.

You'll need the same combination of waggling speed and skill to compete in the 400 Metres and the last event, the 1500 Metres, but you'll be pleased to know that you only need slow joystick movements to make the pace until the final, frantic sprint.

Timing is the important factor in the high jump, long jump, hurdles and pole vault, where you must wobble to build up speed and then push far when you've ready to jump. As before, having the right type of shoes and building up enough strength in the gym is enough to carry you through.

Similarly, the javelin, shot and discus require speed in the wind up plus timing and power in the throw. As in all the events, the faster you move, the further you get and the more points you score, but if you don't reach a sufficient standard then the game will end.

Overall, Daley Thompson's Olympic Challenge is a worthy successor to the record-breaking game of four years ago and should test a few joystickers to destruction. If Daley is going to attempt another decathlon Gold in Barcelona, I'm sure Ocean will be training their programmers for Daley Thompson 1993.

Tony Hoffington

Choosing an Assembler

*Assemblers are essential programming aids so we offer
counsel to the aspiring machine coder.*

By Gordon Davis

There's currently a tremendous revival of interest in high-level languages, particularly on fast, high-capacity micros like the Amiga. On these machines it's possible to run some very advanced compilers that will enable your C, Basic or whatever to run at C64 machine code speeds. This is cold comfort for people like *us*, who are still hacking away on the C64. For us machine code is a must. There's certainly no other way to get those real-time speeds that we all crave.

If machine code is a must, then so is an assembler of some sort. Although there may well be some lousy people out there who are still programming in hex or on some toy assembler, the only route to real productivity is to use a proper symbolic assembler.

Talking to the Chip

As anyone knows, an assembler is just the way of achieving something like the full-on binary instructions which

only the machine's CPU can understand, the 6510 in this case. All assemblers require the entry of a source code which encodes these latter instructions for binary machine code instructions. These are then converted into machine code and other things.

Beyond this a wide variety of extra instructions can be added, some of which are essential, some not. I mentioned symbolic assemblers, and this is definitely essential.

Firstly, symbolic assembly gives you the ability to assign values to alphanumeric labels which you can use later on in the source code as appropriate and so on. Values are usually assigned using the EQU (equate) statement at the start of the code. This means that the alterations need only be made in one place in the program to change it all.

Secondly, and probably more importantly, labels are vital when it comes to assigning flow of control within a program. Branch relative

instructions can be impossible otherwise. These have to have an operand indicating a jump of between +127 and -128 bytes from the instruction.

You really do not want to have to recalculate relative branches every time you change the program, so a symbolic assembler will allow you to assign a label to an instruction. When the source code is assembled, the assembler will automatically calculate the relative branch to that address and assign it to that operand.

Knobs and Buttons

Like steers, assembler programs may have all the knobs and buttons you need. Also like steers, too many of these may simply confuse the beginner.

Look for the hazardous 'Two-pass'. This simply means that the assembler is symbolic - there's no way that you can assign values to labels without two passes through the source code.

One way to assess the strength of an assembler is the power and range of the "pseudo-opcodes" that the assembler uses. We've already met one pseudo-opcode, namely EQU. It's a three-letter code, like LDA, PHP or any 65H mnemonic, but it doesn't produce 65H machine code, merely tells the assembler to do something at "assemble time".

These codes are commonly known as assembler directives. All symbolic assemblers will have the directive EQU, but they vary widely with respect to others. A wide variety is possible when it comes to data opcodes. Supersoft's Micro has only three data directives, #WORD, #BYTE and #TEXT, which allow you to specify data as words, bytes, single bytes or strings. By contrast, Zax64 has seven such directives.

Monitors

Once you've written your programme and assembled it, you'll very likely want to debug it so one of the most vital systems in a monitor. Most assemblers do some checks with this, but they vary easily in their rigour.

A monitor may come with a small repertoire of commands: machine-code load/store/halt, trace, register dump, and so on. On the other hand, the Logic Genus Analyser is an incredible piece of software, hardly a monitor at all. It can even be programmed in a subset of Pascal.

Monitor of Logic Genus assembler brings us to two other hardware, macro and conditional assembly.

Macro assembly is a way of producing more compact source code. It allows you to set up a chunk of code that may be used more than once through a single keyword, which you can drop in wherever you want. The full thing is expanded out at assemble time.

Conditional assembly, on the other hand, means that you can set or unset variables in the source code, which enables you to control very closely which parts of the code are assembled at any one point. Of all the assemblers I know, only Logic Genus supports both macro and conditional assembly.

Getting one in

The trouble is, once you've decided

what you want from an assembler, there's precious little choice available these days. Historically, a very large number of assemblers have been produced for the C64, many of them excellent. The unfortunate thing is that most of them are no longer easily available although some reminders may still be found in the shops. This is due to the small margin involved in selling systems software. Companies that specialise in this area have a tendency to enter new markets.

As far as I can make out, the choice of easily available products comes down to just four products. There may be more but if I've left anyone out it's because they simply haven't bothered promoting the product properly. The four are M4Ker from Supersoft, the catchily named VERBOSAS64 from York Electronic Research, the Merlin 128 assembler from Financial Systems Software and Speedy Assembler which is from name rather than on. Your Commodore.

The Merlin 128 is a well-regarded 128 assembler which we reviewed a couple of issues back and though a C64 version is available in the UK, but not, as yet, in the UK.

I don't want to say a lot about Speedy Assembler, our product, except that it, of course, powerful, very reasonably priced, bug-free (well almost, amazingly well-documented, and that every purchaser has the chance to work right out with Stuart Cooker, the notorious, bon vivant, reconstituted Your Commodore editor, and an incredibly wonderful and warm human being. This man is nothing short of a... (That's quite enough - I've sick. SUB-EDITOR).

Ah, yes. Seriously though, I can say that Speedy Assembler has one unique feature, namely a second symbol table which provides global references across a whole set of source files. In general form, it basically assembles the late, lamented Zax64 assembler.

Supersoft's Micro may well appeal strongly to the first-line machine coder. It offers the convenience of being on cartridge and is simple, but adequate, and includes a monitor. The one drawback is the price, which is a little on the high side for this sort of product.

The YER product is considerably cheaper, but much more Spartan. There is no monitor and a minimum of postscript and utilities. It is,

however, a most symbolic assembler and can be recommended to the beginner for its low price.

Also...

Just because a product isn't being marketed doesn't mean that you won't be able to find it. Copies may be gathering dust in a computer store or second-hand shop. Some excellent assemblers may turn up this way and I'll just like to mention three.

An honourable mention for the Commodore Micro Assembler, one of the earliest marketed and from Commodore itself, very usable for the price and still in use, as far as I can make out, by a large number of our readers.

My personal golden eldrie is Zax64, the one which I started out with. This has very clear documentation, and contains enough features to place it midway between simple beginners' packages and professional assemblers.

Logic Genus is one of the later. This is an extraordinary package with every one of the bells and whistles you could want. LG is a tripartite package: assembler, monitor, and that Fortran-based analyser I mentioned earlier. The assembler's got the lot, including macro and conditional assembly. I wouldn't recommend it for beginners but the 89-page manual is comprehensible enough.

Look out for it - you may be lucky. The package was marketed by Oasis Software, but it got dropped and disappeared recently. With some solid marketing it could have swept the field.

So there we are. There are so many of the currently available products out there, for the most part, not as sophisticated as the software of yesterday. The message is to keep looking through those reminder files.

Touchline:

Product: Micro Assembler **Supplier:** Supersoft, Winchester House, Canning Rd, Widdows, Harrow. Tel: 01-481-8966. Price: £17.95

Product: YER 65K ASM **Supplier:** York Electronic Research, The Fisheries Centre, 4 Fishergate, York YO1 1AB. Tel: 01904-272222. Price: £12.95

Product: FC Speedy Assembler **Supplier:** FC Readers Service, ASP Ltd, 9 Ball Rd, Naval Airpoint, Here. Price: £8.95

Creating Characters

Create better print quality for your Plus/4 with this handy utility

By Frank Carson

The Plus/4 and MPS 801 with built-in software provides a wordprocessor package at a price even my wallet approves of.

The MPS 800-800 printers leave a lot to be desired and any method of improving the output is very welcome.

In the February 1987 issue of *Your Commodore*, the program 'Word-Pro Add-On' was published which vastly improved the printout of these lovely machines.

The reasoning behind this program was to incorporate the *Service User Guide* (1987) descender set into the Plus/4 wordprocessor and to combine the two programs. The *Word-Pro Add-On* program sets the bit image printer mode to define certain characters and the descender.

Entering M/C Code

This is a complete machine code program and is entered using the built-in M/C monitor. For information regarding the monitor refer to Section 3 of the Plus/4 User Manual. The four listings in this program will be located between memory locations \$7000 to \$7A4F. To use the monitor print M then Shift +B and press Return. The monitor status will then be displayed. The section of memory we require can now be filled with zeros. Enter F700,7A4F,B0 and press Return.

Enter M700 and press return. The contents at \$7000 will appear (all zeros). The first line can now be altered (List 1) \$7000 to \$72FF.
 >7000 80 80 80 80 80 80 00 00 Return
 >7005 80 80 80 00 80 80 00 80 Return
 >7000 and so on

The new data is now in memory. Recheck the data and alter any errors

as you go along. This data can be stored on disk at any time. S"name".A.7000,7A4F.asm.

NB. In this mode files can not be updated - a new name each time! One system is to use the day and the location. Such as "THU57058" "THUR57058" etc. To load the file from the monitor: L"THUR57058" Return. Then M7130 return. This will display the next location for data entry.

List 2 is very short \$7580 to \$75A7
 List 3 is a little longer \$7660 to \$76A7
 List 4 is the main program. \$7800 to \$7A4F

List 1 was published in the *Service User Guide 1987* as a basic program. (New characters on the MPS801:3) DESCENDER SET.) Listings of four other characters sets are supplied or you can design your own sets. Reprints will be available, details later.

Using Nafcon

The program is loaded directly from the keyboard: LOAD"WORDPRO".A:J Return
 SYS\$M000 return will initialize the program and load the wordprocessor.

This will operate as normal. The screened printing commands are used with asc codes for enhanced type and underline. (See page 55 of the Plus/4 Software Manual.)

Use asc14 for enhanced mode
 asc15 to underline
 asc16 to cancel
 asc17 to cancel

Documents compiled using Nafcon or the standard software are interchangeable. Using the standard software the underline instructions will be ignored.



The asc commands can be called or cancelled at will. However the Plus/4 software has a mind of its own and you may find a command is ignored.

For instance I may ignore an asc command at the end of a line. In this case the command needs to be inserted at the beginning of the next line.

The Plus/4 makes no allowance for the extra space required in the enhanced mode. This must be taken into account by the operator.

The complete document can be in the enhanced mode but there will be only 40 chars to a line and the equivalent of 24 lines to a sheet. Word wrap will not work.

It is important that any underlines or enhance commands are cancelled prior to the end of a document. Failure to do so can cause trouble if more than one copy is to be printed.

MPS 801 owners please note: I do not own a MPS 801 however I can see no reason why this program should cause any trouble using the MPS 801.

For those of you without. Reprints of 'Wordpro Add-On' (*Your Commodore*, February 1987) and 'New characters on the MPS 801' (*Service User Guide 1987*) are available as photocopies from our Readers Services Department at HALF PRICE! £1.50 gets you two best articles (normally £1.50 each).

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See Listings on page 62.

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Foxx Fights Back

If you're the kind of person who feels more sorry for the pursued rather than the pursuer, then this fox hunt may appeal to you. For the first time the fox gets the chance to answer back - with lead bullets!

Image Works and the programmers, Denton Design, seem to have had their wires crossed over the name of the main character. The packaging sports the name Foxx but the program seems to prefer the more erudite spelling, Fox. Whichever is correct, the creature is still a main son of a vixen.

Foxx and his partner are hungry so, armed only with a pistol, it's out of the safety of the den and into the cold, strange world. The world is depicted in superb graphics with parallax scrolling giving an added feeling of depth.



Along the way to his first meal, Foxx has to run the gauntlet past malevolent squirrels who are hurling highly explosive nuts down from the trees. As he progresses, the dogs from the local hunt park swarm around - the Wolf's Beagles have found him.

This is the little touch that makes the game. If Foxx outpaces these wretched beasts, they leap on their motorbikes and give chase. Like Foxx's animation, the frames for the dogs give a truly cartoon feel to the game. Full praise must go to Denton Design who show all of their collective experience gained over years of programming the C64.

Hasting through the pack brings Foxx to the orchard where apples can be picked off the trees. There are only five of them but that's amazingly fortunate because our

hero can only carry that many. Now Foxx must go back to his lair to unburden himself.

At this point it is an advantage if all of the dogs have been wiped out. There is only a limited number of them and a strategist will help you out here. The best tactic, I discovered, was to gingerly approach the point where the dogs appear. The program seems to have a trigger point where the dogs are lured and, by trading on this spot and jumping back, only a handful of dogs appear who are then easily wiped out with the pistol. Eventually, you reach that happy state where the midnight stops and you have a clear path to the fruit and then on the return journey there are only the nutty squirrels to contend with.

Back at the den, I really started to feel sorry for Foxx. His wife is a real tartar in the sense that she's an acidic source of discontent. After hubby has risked his life for a handful of apples, she sends him on his way with a flea in his ear. Foxes were, returning empty handed results in a severe beating with a rolling pin. Absolutely no sympathy, if I were Foxx, I'd have left home long ago.

The next phase in the quest for food takes Foxx through the chicken shed. On the way, he passes a rabbit warren which is a handy source of food and a discarded rifle which has a greater range than his pistol.

Tactics in the coop involve leaping onto the nearest wall and blasting away. In this way, fewer chickens have to be shot and that means less likelihood of him being egg-stomachiated by a beverage from those forest creatures.

Later in the game, he meets malevolent moles, a stream which must be crossed to reach the lair of the humans, but all the time there are dogs, dogs, dogs.

Foxx Strikes Back is a really enjoyable game to play



but I really must take the advertising department of Image Works to task. They recommend this game to hunt substitutes as the way to turn the inevitable against the unspookable. I'm sure that anyone who affords unnecessary killing will be shocked by the waybards that a fox armed with a cat-machine gun can cause. Bad to tooth, claw and fur, this game is supreme entertainment. Eric Beagle

Footnote:

Title: Foxx Strikes Back. Supplier: Image Works, Wrexham House, 94-73 Silver Lane, London EC4P 4AP. Tel: 01-281 2642. Machine: C64/128. Price: £9.99 (Cass); £12.99 (disk).

The day Daniel's dad brought his office printer home.



My dad's firm is always busy so he has lots of LC-10 printers at his office.

In fact, he sometimes has so much work to do that he keeps a personal computer in his study so he can bring work home.

But when he's really busy, he brings home one of those Star printers too.

Of course, I know exactly how to use them because we have the colour version at school.

They print documents in six different colours.

So I'm not surprised 'WHAT MICRO!' called the LC-10 the 'Best Budget Dot Matrix Printer' on the market.

What's more it's a lot less expensive than other printers but much better quality.

(My friend, Phillip, even has one for his Commodore.)

For a start the front control panel is child's play.

The six different fonts give you so many different style options when you print things.

It's pretty fast too with a draft style speed of 144 cps and high density near letter quality at 36 cps.

There's also the LC-10's special feature called 'push-tracker' which gives the lowest tear-off position of the pages.

And you can park continuous paper and automatically load single sheets - and I think that's unique for this sort of printer.

You know, if I keep my paper round going for a few more weeks I'll soon have enough to buy my own LC-10.

And then for a small fee, dad can borrow mine.



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BATTLE ISLAND

Novagen have squeezed a quart into a pint pot - but does it taste as sweet?

Novagen don't do that many games as you may well be aware. Their first big hit was *Encounter* which first became the definitive *Runes* clone. This was followed up by *Mercenary* which really showed what could be done in 64k.

Now comes *Battle Island* which departs from their usual style of game in as much as we have a more conventional birds-eye view, Commando style game with more and adventure elements thrown in for good measure.

Sounds a bit run of the mill? Well yes and no. The scenario is certainly nothing new but the fact that there are 158 screens worth of scrolling action all of which is scenery rendered, thanks to a rather nifty data compression system conceived by Paul Winkler and programmed in by Gary Walton. Still, enough background, let's take a look at what *Battle Island* has to offer.



The Mission

The scene is set on a mid-Pacific island where, presumably, some *whack scientist* has built and started a *Neutron Bomb* (zap!) which will no doubt be used to get *Iranian* cheapies out of publishing houses quicker.

As is customary, vast teams of *crack* troops have been sent ahead of you but none of them made it back (of course) so lucky old you has been picked to save the day. So it's off in your little rubber dinghy onto *Battle Island* (shudder-dub!).

All you get in the way of equipment is a gun and a map showing the general outline of the island and the small

enclave in the centre which is where the bomb is stored. It's up to you to get round the maze-like island, find all eight pieces of a bridge which will allow you to cross the moat so that you can destroy this nasty weapon and make the world a safe place once more (!). Oh, and the other thing I forgot to mention was that there are also hostages on the island which need rescuing. All in all, you've got your work cut out for you.

Where does one begin on such a monumental adventure. Well, a good start is to have a close look at the map. This will give you a rough idea of scale and help you to avoid a few of the dead-ends caused by barbed wire fences, walls etc. Once you get the general feel for the terrain that lies ahead, you can start to play.

The game uses a single joystick which functions in the usual manner, the space bar fires off any smart bombs you may have accumulated and holding down the fire button activates any shields you've collected.

The backgrounds have a *Japanese* feel because of the way the perspective is depicted. The foreignised characters are simple but adequate in depicting you, enemy troops and the various objects that you can pick up on the way. Most of these objects have distinct uses and one in particular is essential if you are to complete the mission.

Extra firepower is earned by shooting huddies. Once half a dozen or so are shot, one of the corpses turns into a star which, when picked up, increases your ammunition by a factor of two. Once three of these have been picked up you can have three bullets flying across the screen at the same time. Once a fourth star is earned you are equipped with a shield which, as you may expect, is only useful in panic situations.

As for game play, I can safely say that it's one of those games that will infuriate you enough to keep going, without being so difficult that you just want to throw the joystick, the 64 and your mum out of the window.

Death is not terminal in this game because you can start from the last electronic gate you went through in the next, and all future games during that particular session. It's a shame you can't save and load positions into the game, as I can see a lot of players getting very proved if their goal is almost in sight and they have to end the session for the day and go back to the start. I guess that's all part of a graphic adventure's appeal.

The disk version could also have had a high score table that saved itself to disk (as could so many games - come on guys it only takes a couple of blocks).

Audio effects are a bit maffios. The sound of you losing one of your energy units is the sort of thing you hear when a contestant on a game show gets a question right. Mind you, the music is quite good so I shouldn't really complain too much, should I?

All in all, *Battle Island* is an enjoyable game but not really the sort of thing we've come to expect from Novagen, though it does make a change from all the *runes* shoot-em-ups and it's good to see one that actually requires a little thought.

Kevin Crosby

Footnote:

File: *Battle Island* **Supplier:** Novagen, 142 Alexander Road, Birmingham, B13 9HS. Tel: 021-449 8336 **Machines:** C64, 128. **Price:** £9.95 (inc) £14.95 (disc).

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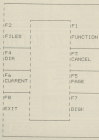
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Function Key Labeller

Looking through pages and pages of an instruction manual to find out which function key does what is a thing of a past.

*By
Colin Howard*

A printed label



strip of paper under telling you every thing you need to know.

In the past *Four Commodore* has published a function key template for the C64 that overcomes this problem. It used the 1520 printer plotter to draw a template that could be cut out and placed around the function keys. The operations of each key clearly marked.

Unfortunately 1520 printer plotters are now a little thin on the ground. This version of the program uses any Commodore compatible printer to produce a clearly labeled template.

Using the program

The program is presented here as a Basic listing. You should type it in using our *System Checker* (see Listings) to minimise typing errors. Once the program is typed in and saved simply RUN it.

When the program is started a screen offering options to edit the information to be printed is presented to the user. It is important to note that not more than 7 letters can be entered for each function key.

Because every make or model of printer is slightly different you may have to play around with the print statements that produce the template to get the best layout for your setup.

The wonderful designers of the C64 blessed it with some extremely handy function keys - four of them in fact. These function keys have been put to a variety of different uses; they've been used to bring up pop-up menus, activate disk functions or even activate that wonderful thing, the smart-bomb, in shoot-

em-up games. The only problem is remembering which key does what.

Manufacturers of other computers with function keys obviously realised that this could be a problem and so catered for it. One shining example must be Acorn's BBC computer, this has a clear plastic strip above the function keys under which you can slip a

Double Height

When you want to highlight something on your C64 monitor screen, the Commodore character set is somewhat lacking in impact.

The small program presented here changes the character set in such a way that a new double-height set is made available. Now important messages or game titles can be made to really stand out.

Getting it in

The program is presented in the form of a Basic loader. Type this in using our Syntax Checker (see listings page for more details). Once you have typed the program in save it to disk or tape BEFORE you run it.

The Basic Loader that you have just entered is designed to auto the machine code for Double Height on your own disk or tape. Before you run the loader make sure that you have the disk or tape that you want the program saved to in the relevant device.

When you run the Basic loader, after a few seconds the prompt 'SAVE TO TAPE OR DISK' will appear. Choose the correct medium and the machine code will be saved. If you now check your disk directory or tape you will find that a new program DBL HEIGHT is present. This is the

Enhance your text displays with an expanded character set.

By Clive Harner

program that you should now use, the Basic loader can be forgotten about.

To produce double height characters you use a combination of SHIFT plus the letter that you require or the Commodore key and the letter you require. If you try this you will notice that SHIFT + letter produces the top half of the letter and COMMODEORE + letter produces the bottom half of the character that you require.

You will, no doubt, notice that each line that you want to print in double height will have to be printed twice, once using SHIFT and then again a line lower using the Commodore key. To clarify this, let's say that you wished to print the letters ABC

in double height. A program to do this would look like the following:

```
10 PRINT "(SHIFTED A)
(SHIFTED B) (SHIFTED C)"
20 PRINT "(CRM ACRM B)(CRM
C)"
```

It is possible to make the top and bottom of your characters a different colour by using

POKE 646, new colour

before each PRINT line.

Using the program

When you want to use the DOUBLE HEIGHT program you should do the following:

Load the program DBL HEIGHT using

LOAD "DBL HEIGHT", 8,1 if using disk
or LOAD "DBL HEIGHT", 1,1 if using cassette.

When loaded type the following:
POKE \$1,48:POKE \$6,48
POKE \$5272,29:CLR

The new double height character set is now ready for use.

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Red Storm Rising

Based on the bestselling novel by Tom Clancy, *Red Storm Rising* casts you as a US submarine commander on patrol just as World War III breaks out. Unlike other simulations of the war that, hopefully, will never happen, this is a non-nuclear version and assumes that disarmament worked, which is just as well because a nuclear war would be decided in only a few minutes.

War has broken out because the Soviets mounted an invasion into the Middle East after Islamic nationalist terrorism had blown up their Siberian oil fields. As the Russians massed on the border a clash between East and West was inevitable.

Although you were at sea when the hostilities began, you quickly realize what has happened when the missions you are asked to carry out become tougher and more frequent. As the game unfolds, you learn just how important your success or failure is to the outcome of the war.

Your craft is an American, nuclear-powered, attack submarine that's armed with MK48 torpedoes and Harpoon missiles (there are other subs available with slightly different weapons but the balance remains the same). The submarine is also fitted with the latest sonar and radar equipment and it is with these that you will seek and attack your prey which varies between Soviet submarines, wolfpacks, carrier task forces, or anti-submarine patrols with support fleets and landing craft.

You operate from your base at Holy Loch in the north of Scotland and into the Norwegian theatre of operations that stretches from the UK in the east to the Barents Sea in the west and from Iceland and the Arctic in the north down to mainland Europe. It is vital to the outcome of the war to cause as much damage as possible to the Soviet fleet as it tries to engage in the Mediterranean Sea and Atlantic Ocean. The more damage you do, the

more seriously you will damage its war effort.

The Norwegian theatre also contains a variety of conditions that will challenge all submarine commanders, as you may have to fight a battle in deep water, shallow water or even in among the iceflakes in the north and the east. This will make an already difficult, on-and-onner game almost impossible.

Although the game is written by Sid Meier, author of *F-15 Strike Eagle* and *Silent Service* (in collaboration with Tom Clancy and Larry Bond), it is as different from the *World War II* action of *Silent Service* as you could imagine, because the end-armored attack tactics of them just won't work now.

One reason for this is the incredible range of the weapons in modern naval warfare, another is the accuracy of today's sonar and radar. Learning to use this well will determine the difference between success and failure.

The main screen of the game is the sonar display which remains blind until a contact is made. Each sonar contact appears grey until your sonar operator is certain that there is something there. A numerical display also shows the contact's course and speed (when this data has been determined), its bearing and the percentage of continuity. If this rating is over 70 per cent then you're almost sure there is something there and its colour on the screen becomes lighter. Over 90 per cent you can already discern a ship, its speed and course, and you can then prepare your attack.

You have three ways of finding the enemy: towed sonar, active sonar and radar. Towed or passive sonar uses a range of equipment that you tow behind the submarine and can be disrupted by sudden manoeuvres or

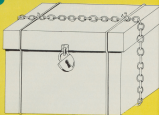


Program

Preventing your latest masterpiece from being listed and copied can be quite a problem.

We give you a few ideas on how to protect your work.

By F. Moore



Protection

Keeping prying eyes from looking at your latest program can be quite a problem. This article is an attempt to give a comprehensive guide to most of the methods of protection. All these methods are to stop your friendly neighborhood hacker from breaking into your program.

Unfortunately it is almost impossible to stop a person from actually copying your work with the range of cartridges and nibblers available today. Anyway, have fun poking round your Commodore.

RUN STOP/RESTORE

Commodore 64

RUN STOP - RUN STOP/
RESTORE

Disable: POKE 808,34:POKE
808,35

Enable: POKE 808,237:POKE
809,246

RUN STOP - RUN STOP/

RESTORE - LIST

Disable: POKE 808,234

Enable: POKE 808,237

RUN STOP - INTERNAL CLOCK

Disable: POKE 788,52

Enable: POKE 788,49

RESTORE

Disable: POKE 792,60

Enable: POKE 792,71

Commodore 128

RUN STOP - RUN STOP/

RESTORE

Disable: POKE 808,100

Enable: POKE 808,118

RUN STOP

Disable: POKE 808,112

Enable: POKE 808,119

RESTORE

Disable: POKE 782,180

Enable: POKE 792,62

Disabling other keys

SHIFT

Disable: POKE 657,0

Enable: POKE 657,128

CTRL/SHIFT

Disable: PRINT CHR\$(9)

Enable: PRINT CHR\$(9)

WHOLE KEYBOARD (for joystick
(input etc))

Disable: POKE 699,0

Enable: POKE 649,18

Prevent Reset

There is a method to defeat a reset switch on the 64 or the built-in switch on the 128. It simulates an autostart cartridge and is used only with a machine code routine, which is executed on a reset call.

Basic programmers could also use this method by pointing to a machine code routine which would run their program.

The locations are as follows:

20000-20003 (22790-22793)

Start address of routine to jump to on reset in low byte/high byte format.

20001-20003 (22776-22778)

Address for the RESTORE key to jump to when pressed in low byte/high byte format.

20004-20008 (22772-22776)

Put the bytes 5C3, 5C2, 5C0, 5B8, 5B6, (155, 154, 202, 56, 48) into these locations. Values are ASCII for C0040, the cartridge identification code.

Some games authors define the RESTORE key to restart the program and the RESET key to point to a warning message, or even a small game!

Preventing List

If, by accident, your Basic program hits with an error, it is easy for a hacker to list the program. POKE 86,254 does the job of assembling LIST but the methods discussed here are tougher to disable.

The simple methods:

At the start of your program put a line with a REM statement followed by a SHIFTED L. The program will list with a SYNTAX ERROR.

This protection is easy to defeat, since not listing the line with the REM statement will reveal the rest of the program.

POKE 774,134:POKE 75,227

stops the computer once LIST is typed. If you use the reset protection, your program will restart. That should last too!

The more complicated methods:

Load in your program and PRINT PEEK(2049). Note this down and then POKE 2049,255. The program cannot be listed but will RUN correctly.

This method has a drawback as if there is a GOTO or GOSUB in the program to a lower line number, Basic gets confused. Before such an action, POKE 2049 with the value that you previously noted and remember to put 225 in 2049 when the GOTO or GOSUB is finished.

Add the following lines to your program exactly as shown.

05Y52063
[.....]

Now, enter the following string of POKEs in direct mode, each separately.

**POKE2063,169: POKE 2064,26:
POKE 2065,132: POKE 2066,42:
POKE 2067,31: POKE 2068,89:
POKE 2069,168: POKE 2070,76:
POKE 2071,174: POKE 2072,167:
POKE 2073,6: POKE 2069,0**

These POKEs are machine code to move the start of Basic to the start of your program. The last two POKEs set the end of program's "two-end" to just after line 0. Feel free to disassemble the machine code.

The result of all this is a program that runs as normal, but lists as 05Y5 2063

Practically impenetrable!

LIST Tricks!

LIST is a powerful command. A couple of one liners can modify it considerably.

POKE 774,0

This has the strange effect of listing only the line numbers of a program! This POKE could be placed in a loader program to protect the subsequently loaded main program.

POKE 22,23

An instant wordprocessor! Using the Commodore's powerful screen editor, text can be manipulated, printed and saved without a program. The method is to type your text as a BASIC program with line numbers, when finished, enter the POKE and the line numbers magically disappear!

Autoran

Most Commodore owners will be familiar with the concept of chaining programs, ie, loading a second program from within the first. This has the advantage of automatically running the second program. Problems are sometimes encountered if the second program is longer than the first.

Using this method, protection can be set up in a short loader program so that interrupting the load would be impossible.

```
10 POKE 80,254:REM RUN
STOP:RESTORE
20 POKE 774:REM LIST
PROTECT
30 PRINT CHR$(147)
"LOAD">CHR$(34)+ "PROGRAM
NAME"> CHR$(34)+"X,1"
40
FORN=(100:PRINTCHR$(7):
NEXT
PRINT"RUN">REM LOAD AND
RUN PROGRAM
50 POKE 65,100:POKE 66,2
13:POKE 63,13:POKE 100,3
60 REM SET KEYBOARD
BUFFER WITH HOME AND 2
RETURNS AND QUEUE TO
THREE PASSES
70 NEW:REM ERASES THE
LOADER AND LOADS THE
PROGRAM
```

I hope the REMs explain what the program does. This method is only useful if there is no printed material on the screen to be corrupted. Of course, the loader program itself can be listed. A *REM SHIPPED* could cure this.

Programs are provided to illustrate two other methods of protection. The *INPUT BUFFER* program uses the input buffer to simulate a keyboard entry, without disrupting the screen.

The *AUTOWON* program is more sophisticated in that it uses machine code to alter your original program so that it always RUNs itself. Protection from RUN STOP/RESTORE is included and a message can be put on the screen.

To use this utility, have the *AUTOWON* program in memory and your Basic program on disk. When asked for a message, enter the text that you wish to be displayed before your program runs. Input the name of the old program, and a different name for the autostart version.

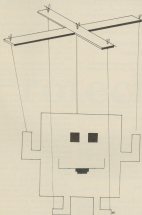
Obviously, the new program will take slightly more space on the disk. However, if you use the protection methods in this article, you will have a program which autostarts, defeats RESET switches, is impossible to stop, and restarts when LIST is typed!

You can't damage the computer with software, so experiment. I would warn you to keep backup copies, as some of the methods could result in the loss of the program. Remember to save your programs with the protection before running, as there is usually no way to get out of it!

Sprite manipulation for Basic programmers can sometimes be a real chore - but not any longer.

By Alan Ober

SPRITE



CONTROLLER

You probably have a sprite designer such as *Your Commodore's 3 in 1 Editor*. With which you designed some aliens or fancy letters for a title screen that will never exist. One reason why this will never exist, may be because you don't know how to program the sprites to appear on the screen, or maybe you just can't be bothered to set up all those sprites, colours and X and Y co-ordinates exactly how you want them. Sprite Controller can solve both of these problems.

Sprite Controller allows you to place up to eight sprites on your C64 screen. Your sprites can be displayed in any way you wish: hi-res, multi-colour, X expanded, Y expanded, whatever is necessary. Then a stand-alone machine code program can be created and executed with a SYS call which will run the compiled file. All of this is done without the need to know or even understand machine code.

Using the program

Type in **SPRITE PROGRAMMER CODE** and save it temporarily just in case anything goes wrong when you try to run it. If all goes well, running the program will result in a file called **S.PROGRAMMER** being saved to tape or disk.

Next, type **NEW** then enter and save **SPRITE PROGRAMMER** which is a normal Basic program.

The finished program is very easy to use. It can be used by an experienced programmer who doesn't wish to play around with the tedious task of manipulating sprites and trying to get the exact screen positions, or by a beginner because of the simple method in which data is entered.

The way in which a series of sprites is set up is by using switches - 1 for on and 0 off. To make it easier, let's go through the process of setting up two sprites.

First load *Sprite Programmer* and

ran it. The machine code then loads it and the title screen appears. Pressing a key takes you to Page 1.

This screen has three boxes: ENABLE X-EXPAND, Y-EXPAND.

These categories are all fairly self-explanatory.

To set up two sprites, let's use sprites 0 and 7 which must first be enabled, so press E for enable. A prompt will appear, at the top right of the screen, asking for 0-3. What it's asking for is the sprite we wish to enable, in this case we first want to enable sprite 0. Press 0, a 1 appears under sprite number 0 in the enable box. Repeat the process for sprite 7.

This operation works as a toggle, so to turn sprite 7 off, just repeat the process.

Once sprites 0 and 7 have been enabled you can expand them. It's time the X and Y expansion for you to play around with, it uses a similar method to enable.

Pressing F1 will take you to Page 2. The three boxes here are Multi-colour, One and Colour. To make sprite 7 multicolour, press M and then 7. The box now tells us that sprite 7 is multicolour (on) to 15, and the others are bit-on (not to 0).

The One box shows which sprite is under control when playing sprites on the screen.

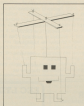
The Colour box works slightly differently to the others. Press C and the familiar prompt will appear: 0-7. To set sprite 0's colour to white, press 0 and another prompt will appear: 0-15. As you may have guessed, it's asking for one of the sixteen colours available to you on your C64. We want our sprite to be white, so look up the colour code for white in the manual and enter the value (which happens to be 1).

The colour box will now show a 1 under sprite 0, telling us it is set to white. Try and set sprite 7's colour.

Pressing F1 again will take you to the last page. Here you are presented with eight boxes. In boxes found 7 there should be sprites of some description because these were the ones we enabled, but not necessarily the ones you want!

Beneath the boxes are some numbers, these are the sprites' data pointers. When you designed your sprites, they were placed in a certain part of memory and these data pointers can be used to tell the computer where, in memory, to get your sprites.

Sprite Controller allows you to use blocks 160-255 (RAM-BPP hex). If you use the 1 in 1 Editor, the blocks are shown at the corner of the grid. Let's say you have designed your two sprites in blocks 2A1 and 2A3, first convert this to decimal, so 2A1 is 161 (10 x 16 + 1) and 2A3 becomes 163 in decimal. Now we have to give the program these new values, so press B and enter the sprite number you wish to alter, for sprite 0 this is key 0. A prompt will then appear ready for you to enter your new value, key in 161. We have now given sprite 0 its new data pointer of 161. Now change sprite 7's data pointer to 163.



Placing sprites on screen

We are now ready to place the two sprites on the screen. Remember on Page 2 the One command? At present it should be 0, meaning that will be positioning sprite 0 on the screen. Usually you would have to switch between Pages 2 and 3 when Using and Placing sprites but it is possible to use the One command on Page 3 even though it's not shown.

After you have selected the sprite you wish to use press P on Page 3. The screen will clear and display all the sprites that are enabled, but you can only move the sprite that you have selected. The cursor keys will move your sprite around the screen. When you are happy with it's position, press RETURN.

Before entering this screen, the screen colours are stored so you may change the colours without affecting the other colours. Note that the colours on the position screen will appear on the compiled program.

Extra options

Pressing F7 will take you into a menu of other options, which may be called up from any of the three pages. You should understand most of the commands but one or two need to be clarified.

When you use the Save Variables option, you are only saving the data you have entered up to date and it can be reloaded to be completed later. Be careful when loading sprites in because blocks lower than position 160 will result in the sprite programmer being over-written.

Creating the code

After you have entered in all of the data and placed the sprites in their correct positions, you are then ready to compile your program. I recommend that you save your data first because the compiled file cannot be edited. On Page 3, press C and enter the decimal value for the start address. In other words, where in memory you wish your code to be produced. The default location is 49132 (\$C000).

When compilation has finished the start and end address are displayed. If you wish to have more than one compiled program in memory at a time, then I advise you to jot down the end address of each part so you know where to enter the new code after the previous one.

You will now be asked for a device number (RETURN = disk) and a filename for your code to be saved under. A STS number will be given after you have saved your code, make a note of it.

When you load your created file, the STS number can be used in your program to activate the routine. Machine code programmers can convert the STS number into hex and use a JSR or JMP command, e.g. JSR \$C000 or JMP \$C000.

Better late than never

I made a late addition to the program, so it is now possible to display a background screen to help when placing your sprites. By pressing PS, a screen can be loaded at location 32768 (\$8000). I thought this useful for situations when sprite positioning needs pixel accuracy, such as for start positions in games.

Have fun.

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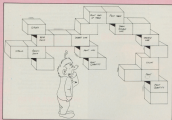
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STRUCTURED PROGRAM *Design*



The follow-up article to improving the standard of your programs with structured programming

By Derek Barrett

Following on from last time we'll continue to look at the third element — repetition.

Figure 7 shows the simple construction of a loop. Box A leads us into the routine and serves as a comment. B shows that it is a repetition box and the figure 100 determines the number of times that the actions of C, D and E will be carried out. The variable name for the counter is usually written in the box.

What happens here is that actions C, D and E will be repeated, in a sequence, 100 times. This fragment of code should show the idea.

```

80 REM Process Number
100 FORH count = 1 TO 100
110 GET number
120 PRINT number
130 total = total + number
140 NEXT count
150 REM remainder of program
  
```

WHILE and REPEAT constructions are similar with the conditions included in the repetition box. (Figure 8).

This construction does not have a fixed number of repetitions as a number is included in the box. The controlling element in this case is that the variable TOTAL is less than 500. Hence the action will be carried out at least once and repeated until TOTAL exceeds 500. Those of you who do not have WHILE or REPEAT constructions in your language will have to re-arrange your code slightly to achieve the same result.

This is one occasion where GOTO will have to be used. Look at the following fragment of code:

```

10 REM Process Number
20 GET number
30 PRINT number
40 total = total + number
50 IF total < 500 THEN GOTO 30
60 REM End Remainder of program
  
```

This will simulate a WHILE condition and as the GOTO only jumps a few lines the program is still readable. As you cannot show a jump in Top Down design you should draw your design as Figure 8 so that it remains portable.

As I showed in the examples on selection, multiple conditions can also determine the repetition construction (Figure 9). Complex conditions can be shown alongside the box to avoid trying to cram too much into a small space.

Reading Ahead

A common application of the top down technique is the reading of an undefined number of data items. Such a list usually has an End of File (EOF) marker (often -1 or -999) which must be detected to terminate the loop. To design this you can use a WHILE loop with the condition 'NOT END OF FILE'. This means that we must already have read an item of data before entry and read again at the last box before re-testing the condition. This is commonly known as the READ AHEAD technique. (Figure 10).

This construction is a common trap for the beginner. Make sure that you understand it and test it thoroughly.

Find out for yourself what would happen for the following:

- It was omitted.
- E and F were reversed.
- After several numbers have been read in an EOF marker is read.
- The first item read is an EOF marker.

Procedures

When designing your latest masterpiece you will often find that the same part of the design crops up in several places. Why not group them together, as sub-routines or procedures, saving space in the final code and aiding legibility? In fact most

professional programs consist almost entirely of procedures, with the main part of the program being simply a list of calls to the procedures. This greatly aids legibility and also allows easier modification of the final program. All you have to do is write a new procedure and call it when needed.

Unfortunately Commodore BASIC does not support PROCEDURES but does have GOSUBS which, although not as versatile, can be used for a similar function.

Procedures are shown on top down designs by a horizontal dividing line a short way down the box. The procedure name is written in the box. When a procedure is called from the main design no further subordinate (lower) boxes are drawn from it. The procedure itself is shown on another sheet with the procedure box at the top. It may help in very large designs to show the page number of the procedure in the box as well.

Figure 11 shows an example. It calls the procedure DASHED-LINE which is on page 2 of the design. The result of running this will be to jump from B to the procedure, which draws a line of dashes across the page, then return to C, where 20 items and their quantities are printed. D calls DASHED-LINE twice, to put a double line of dashes across the page.

Putting It On Paper

The designs you produce will use up

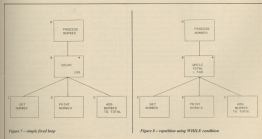


Figure 7 - single fixed loop

Figure 8 - repetition using WHILE condition

lots of paper. I tend to sketch mine out on A3 sheets before walking through them, modifying where needed, and then producing a final form, with a flowchart attached, before I start to code them. Very often the design grows so much that a single sheet of paper is not enough and some way of linking several sheets is needed. I will now introduce the only other symbol that you will need. It is a circle with the page number in it as shown in Figure 12. (2a shows a link to page 3 and 12b shows the opposite link from page 1. Such advanced ideas are taxing on the brain aren't they? What will I come up with next?

Conventions

We have now covered all of the constructions that are needed for even the most complex of designs.

Before we go on to to look at some practical examples there are a few conventions to top down design that I will go out of the way. Most of these will be apparent from the designs and some have already been mentioned.

There can only ever be one path from an elementary box back to the top of the structure.

The design reads from left to right and from top to bottom.

Subordinates of a box must be:

- all sequence boxes or
- all selection boxes or
- one repetition.

Only one path of a selection applies.

Problem Solving

Now that you understand the constructions needed in Top Down Design we can have a look at a practical problem and go through its design.

The first example is, at first sight, very simple but will show the principle involved and also shows how Top Down Design can be applied to problems other than programming.

Playing In The Garden

Imagine that you are a keen gardener and you want to plan your bulb-sowing into orderly rows.

You have decided that each bed must be prepared, planted with bulbs and finally watered.

This is easy. Start by putting a single box at the top centre of the page and title it Process Garden. That just a sequence of three boxes below,

leaving a reasonable gap between each as we will expand downwards later. Label these boxes Prepare Bed, Plant Bed and Water Bed respectively.

You should now have something like Figure 13. That has solved the problem but let us expand it a little. Suppose now you decide that the bed should consist of:

- One row of Begonias, spaced 25cm apart.
- One row of Gladioli, spaced 50cm apart.
- One row of Dahlias, spaced 50cm apart.

Here we must use repetition to determine the row. So add a repetition box below PLANT BED, label it ROW and indicate that it will be repeated 3 times. Now we must use selection to select the correct type of bulb. Add three selection boxes below the repetition box. Label them IF ROW = 1, 2 or 3 respectively.

At the action of planting the bulbs will be the same in each case so we can use a procedure. But first we must set up the parameters that we will pass to it. That is, the type of bulb and its spacing.

Add three boxes below the first selection box. Label the first Bulb 1

Figure 9 - repetition with complex WHILE condition

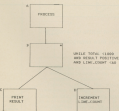


Figure 10 - read ahead technique

Main program design

Figure 11 - use of procedures for common code



Procedures on page 2

INITIALISE
MARK



I



Figure 12 - links between pages of design

PROCESSING
MARKER



Figure 13 - first step to design for writing help

beginning. The next Spacing = 25 and the last a procedure called SOW.

Now we can design the procedure. On a fresh sheet of paper, start with the procedure block SOW. To row our bulb there are two actions, marking the row and sowing it, so add two boxes, MARK ROW and SOW ROW.

Let's look at SOW ROW first. You must row the correct bulb at the correct spacing until you reach the end of the row so this looks like a good place to use repetition again. Add the box below SOW ROW and label it UNTIL ROW LENGTH > MAX (You could also use WHILE ROW LENGTH < MAX). I have assumed that MAX is a variable that is set up elsewhere but could be replaced by a figure if the row length is known.

The use of a variable allows for easier modification later if desired.

There are now three actions to

sowing the row, sowing a bulb, moving along by the spacing and adding the spacing to the row length. I think by now that you can do that on your own.

There is a trap here, the next time you call the procedure ROW LENGTH will already be set to greater than MAX so the procedure would exit before any bulbs had been sown. To get round this add another box, before MARK ROW, labelled SET ROW LENGTH TO ZERO. This will ensure that the procedure will be reset each time you enter it. You could have it at the end of the procedure but once again it is tidier if conditions are set on entry.

Now you can go back to MARK ROW. Here we need two action boxes. The first can be labelled something like MOVE LINE BY SPACING and the second DRAW ROW.

Having now designed the procedure you can go back and finish

off the design by filling in the detail for the remaining two selection boxes. You should have a finished design that looks something like Figures 14 & 15.

Did you arrive at the same solution? Good, you have just designed your first program. You will have seen that the design was taken one stage at a time and that you haven't had to think about details at the early stages but progressed logically by breaking each step into manageable chunks.

There is never just one solution to a problem. Sometimes a more complex design lends itself to easier modifications at a later stage. Always try to look for alternate solutions.

Problem No. Two

Let's take a look at another design. Some time ago I was working on a program for a sales ledger. This was written in Pascal on a mainframe

computer but I re-coded it into Commodore Basic to show that you can use any language. As the design was already proven it ran fast time on my C64.

My favoured method is to design a complex program in fairly small modules, thoroughly testing each, before incorporating them into a final design. This avoids the problem of debugging a very large program in one go.

Figure 16 shows the Top Down design for part of the program. This segment reads in three items of information about a stock item (its description, quantity and price) and displays them in a table with total quantities and discount prices. Listing 1 is the source code in Pascal and Listing 2 is the same design in Commodore Basic. The only change that I made was to incorporate some test data at the end to avoid having to create a data file on disk first.

This listing is heavily commented to show how the code follows the design. It is good practice to comment your programs this way as it is a good aid to debugging and later modification. You can always remove the comments from a working BASIC program to speed it up a little.

You will notice that the top down design includes a box marked INITIALISE VARIABLES. This is included because many languages require that all variables are defined before they are used.

There is another box, INITIALISE CONSTANTS. It is good programming practice to use constants wherever possible and to put these high up in the program, so that they can be easily modified if the need arises. Here they are used for the discounts given and so will probably change during the lifetime of the program.

The rest of the design should be easy to follow from what you have already learnt.

That's the lot then. If you make a conscious effort to use Top Down Design in all your future projects you will soon gain the experience to be able to design efficient, well structured programs that are a pleasure to code and much easier for others to follow. Who knows? Perhaps one day magazines will start to include Top Down Designs in their pages and allow the reader to program them in their favourite language. Don't just sit there, get designing your next, wordbearing, program. 71



Figure 16 - solution to purchasing problem

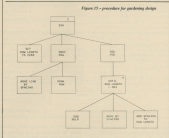


Figure 17 - procedure for purchasing design

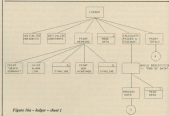


Figure 18 - design - about 1



Figure 100 - Ledger - sheet 1



Figure 101 - Ledger - sheet 4



Figure 102 - Ledger - sheet 3

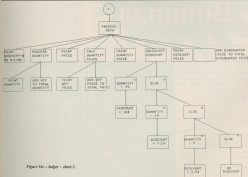


Figure 103 - Ledger - sheet 2



The Fantastic Combat Bonanza

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Why imagine flying an F16 into a combat zone filled with MIGs when Digital Integration's F16 Combat Pilot could take you there. Add to this one of two brilliant books from publishers Ian Allen and you have all of the elements that makes this competition a challenge you can't refuse.

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We have twenty copies of Digital Integration's masterpiece to give away and for the top three winners there's also a book to help them to stand down between missions.

Ian Allen's have offered a copy of Top Gun Fighters and American Jet Power to the first winner printed from the list. In addition there are copies of the F16 Fighting Falcon by Peter R. Foster for the two runners up.

How to enter

Study the two cartoons on this page and find the differences between them. When you think you've found them all, fill in the entry form and also write the number of differences on the back of your envelope, otherwise your entry won't be accepted. Send your entry to the address on the form by the 31st December and keep your fingers crossed.

The rules

Entries will not be accepted from employees of Argus Specialist Publications, Digital Integration or Ian Allen Ltd. This restriction also applies to employees families and agents of the companies.

The entry instructions form part of the rules and the Editor's decision is final. No correspondence will be entered into. In the event of a postal strike, we reserve the right to extend the closing date.

F16 Entry Coupon

Name

Address

Postcode

Number of differences found

Closing date: 31st Dec 1988

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F16 Competition
ASP Ltd
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Programmer Profile

Individually, Tony Crowther and Dave Bishop have enviable reputations but now they have combined forces.

By Eric Doyle

The ability to program is not the sole key to success in games writing. An additional skill is to be able to come up with an original game which in some way captures the imagination and interest of a whole range of people. Tony Crowther has learned this by trial and error.

Devising an excellent game for a computer but being unable to find anyone to precisely convert it into a program is another problem. Dave Bishop has learned this.

Put together an innovative programmer and a visionary games developer from contrasting backgrounds and the result can spark

as brightly as an arc lamp. The combination of Crowther and Bishop could set the software world alight.

Ratt's Tale

Anyone who has watched scrolling messages on Compaq demos will be familiar with Tony Crowther's alias of Ratt. Alongside his friend, Yak (Jeff Mince), Tony must be one of the most respected programmers in the industry. A programmer's programmer, he is renowned for the speed with which he can cobble together a program, yet he still programs in decimal, avoiding hex as much as possible.

At school, Tony was never very good with figures, in fact, he was not very interested in academic subjects generally but he could relate to anything with a practical application. Not surprisingly, his main interest at A level was Technical Drawing though he supported the course more in spirit than in the flesh during his first year.

"I can't resist a challenge so when the teacher asked me if I wanted to pass or not I started to take things more seriously. Halfway through the first year I was turning in good work and the course turned into a competition between myself and the rest of the class. The result was that everyone passed the exam that year!"

The underlying message in this tale is that Ratt is competitive and hates to be beaten. If he takes on a challenge, he likes to excel which can make him an inspiration to work with but difficult to control.

His first encounter with computers occurred while ducking out of lessons. While almost everyone else was studiously attending class, Tony could be found playing on the computers in the school library. It was late at first sight and he was hooked.

For fun, he would help out at a local Sheffield hi-fi shop, Superior Systems, which had recently branched out into selling computers. His spare time was spent in messing around with a VIC 20 on which he would amuse himself by translating programs into Commodore Basic from versions he saw on other machines.



Time

Although his own version of an adventure like *Golden Arrow* was an exciting project at that time, the lack of speed lured him to try his hand at arcade machines early. Armed with a crude monitor and a copy of Nick Humphrey's *VIC Adventure* it wasn't long before someone at Superior Systems started to take notice of the games he was producing and a long, but not successful, relationship with Alligata Software was born.

Tony openly admits that his ultimate aim is to achieve fame and glory. He would love to have created *Pearman* or to have been in Geoff Crammond's shoes as the originator of *Scandal*. Consequently, one criticism of the younger Tony was that he would guard his projects jealously and refuse outside 'interference' no matter how well meant it may have been.

Eventually, fed up that staying with Alligata was not in his best interests, Tony switched to Granada for a while and then found total freedom with Wizard Developments. William Wobbles was his final project with the company and, technically, one of his greatest achievements but the take was disappointing and with the demise of the company he returned to Alligata but as a better footing than before.

Unfortunately, Alligata's move was starting to wane and despite great critical acclaim for *Ran's Trap* and a large advertising campaign, the game flopped badly and the follow-up *Kerby* went much the same way.

About this time, Ariolasoft released Electronic Arts' *Marble Madness* which Tony saw as a good idea gone bad. Two weeks later, armed with his own demo version of the game, he approached Ariolasoft with all the cheek of *Yasser* in the TV series *Roy* from the *Black Stuff*. It's almost possible to envision Tony, slipping the over-the-hill Marble Madness into the nearest disk drive, saying, "I could do that. Give a job."

The team at Ariolasoft were impressed but couldn't release the game because they didn't hold the copyright rights to the game. They did, however, give him a job.

Once more Tony's ambitions were curbed by Ariolasoft hitting hard times. Electronic Arts decided to control their own operations in this country and Ariolasoft's other owners, Broderbund, had already decided to the US Gold banner.

This was the long and torturous



path which led Tony to Mirrosoft's door, and his teaming up with Dave Bishop.

The Bishop's Tale

Dave Bishop has been involved with computers for several years but he has never been interested in programming. For him, the thrill is to devise the games he'd like to see and leave the rest to programming specialists like Tony.

On leaving Aston University with a Degree in Marketing, he worked for a while as buyer for the Games Centre chain before setting himself up as a distributor for Vulcan chess computers. During this period, Dave also imported the first Space Invaders Quakebush joysticks and their success pulled him firmly into the world of computer games.



During a spell as the software developer for Hungarian software house, Andromeda, he forged close links with Ariolasoft. When he later launched his own public relations and game design company, Tigraa Marketing, Ariolasoft snapped up programs like *Demotronics*, *They Sate A Million* and *The Golf Construction Set*. Strangely enough, this was happening at the same time as Tony was working with the company.

In mid-1986 Bish cut loose and became a freelance games designer working for companies like Magnetic Scrolls and Real Time (British Telecom's main supplier and program developer), Mirrosoft and Progress.

When Bish and Tony were teamed up for Mirrosoft's new Image Works label, they formed an immediate

mutual appreciation society.

"Tony's really great to work with. He's got it sorted and knows what he's doing. He'll try anything. When I showed him the design for Zig Zag, he said it was impossible so I shelved the idea. A week later I had received his demo and it was up and running!"

"Bibi seems to pull his ideas out of thin air. Just before Christmas, he was visiting our house. I went to bed and the following morning I found that he'd woken up at about five o'clock with the idea for Bombard. By breakfast time the gameplay had been sorted out and the game was ready for me to start work on. By Christmas, the first demo of the game was ready for approval as a special present for Image Works."

The Bombard project was shelved for a while in favour of *Fernandes*. *Blas* Die but that didn't stop work on the game. As a result, *Bombard* is ready for launch within weeks of its critically acclaimed *Fernandes*.

Hopes and Fears

Tony realises that the Commodore 64 can't go on forever but, even for such a seasoned programmer, the thought of working the Amiga hangs over him like a dark shadow.

"I wish I was like Ross, he can turn his hand to anything. Show him a machine with a microprocessor and he'll master it."

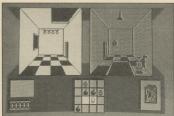
Ross Goodley, friend and long-time associate, has been with Tony from the *Alligato* days of yore, through *Acidault* and is now working on the ST version of *Bombard* for Image Works. Unlike Ross, Tony feels that he needs to study a computer for some time and he's now very excited about his first pure Amiga project, *Phobia*.

"I wanted to quickly try programming something on the Amiga so I worked out the gameplay for *Phobia* myself. When I started to feel that it would work, Bibi moved in and developed the gameplay further.

"I always start my games to be perfect and often I get an idea which seems a totally new approach and programming starts again from scratch. This happened with *Phobia*, in fact it always happens, I just can't help it."

One thing Tony can't stand is the current trend of porting ST games across to the Amiga.

"Anyone who thinks that the ST is as good as the Amiga has got things totally wrong. The potential of the



Amiga to produce arcade quality sound and graphics is being underrated. Barring *Zaxxon*, all the games I've seen so far look lousy. It would be better if games were developed on the Amiga and then modified for the ST."

One of the many things that Tony and Dave have in common is their unconventional lifestyle.

"I must be getting older. I used to have all my computers set up on the floor and I'd program them while lying on a large bean bag. At the PC Show I bought a large computer desk and chair."

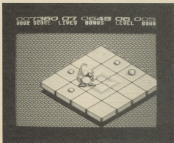
A typical day for Tony starts at

3 o'clock in the afternoon. He'll then program through till about six, the following morning. He then spends a couple of hours watching videos of the TV programmes he may have missed while he was working. These are recorded by his extremely understanding and patient wife, Lisa.

Plans and Schemes

Dave Bishop's life is slightly more conventional, unless an idea hits him.

"Some of my ideas are sparked off by seeing a game and thinking how it could be made better but occasionally I'll be inspired by a



creens. My dream games are extremely vivid and I can recall them quite well when I wake up so I have to grab a pen and write down the details before I forget, no matter what time it is."

Years of experience has given Dave a definite idea of how game designs should be marketed.

"First of all, a new game plan should be original and not just a straight copy of something that already exists. The next stage is to find a publisher or development group to take on your idea. Even if you can program the game yourself, marketing is an expensive business to do well, so you're best advised to get a non-exclusive agreement drawn up by a solicitor and get it signed by the

company you approach before you tell them anything about your game.

"There's more money to be made if you approach a publisher first, especially if you're a programmer as well, but if your game isn't extremely well presented and worked out your best recourse would be a development group.

"Try to impress anyone you approach by being as professional as possible. Research the company, make sure they would be interested in your type of game and work out what you want to say before you meet them.

"Start off by telling them the name and the aim of the game and then present the game as a storyboard. Be enthusiastic but resist the temptation to get carried away. Just because they're talking to you doesn't mean they'll be easily sold on the idea.

"If possible, get an advance that is every case insist that you have a signed contract, making sure you let a solicitor see it before you accept. Don't be in a rush to sign, if your idea's good, they'll wait.

"Ask about what will happen if the game is released abroad, and if the company has an affiliate label in the States make sure that you get a percentage of the American income and not merely a one-off rights payment.

"If the game is going to be converted to a range of computer systems ask for a percentage as the originating author."

Dave is also sceptical when it comes to launching anything into the USA market.

"A game has to be cost effective for a publisher to be interested, if it's going to the States it must be convertible to the PC because 43-50% of the machines over there are PC. Don't be fooled by offers of vast ST sales - the ST is dead and ready for burial over there."

When asked what programs he'd like to have designed, Dave's memory goes back a long way.

"I'd like to have designed *Star* at the time it was launched. Looking back, the game seems fairly trivial now but at the time it was a major breakthrough.

"Other games in my top ten include the Manhattan version of *Delta Fu* and *Whodunnit's* Guide to the Galaxy. *Rain* I rate as the best every dining game and Electronic Arts' *MALE* is a long time favourite.

"Although I'm currently hooked

on *Demigod Manor*, *Swindon* stands head and shoulders above any other game I've ever seen. It's 100% original and Geoff Crammond is nothing short of a genius in my opinion. A truly great mind.

"Next to Crammond, I also respect *Jeremy Sans* and *Dave Stubbs*'s work."

Swindon is yet another area for agreement between Dave and Tony. As two agents, it's not a far-fetched conclusion that their professional lives will run parallel for long. The bond of respect that obviously links them should ensure they work on several more projects before the call of other challenges becomes too strong to resist.



The Ratt Pack

Aligato
Son of Slapper

Grindin
Potty Pigeon
Muddy Mole

Wizard Developments
Black Thunder
Griffin
William Wobbler

Aligato
Tasp
Kettle

Armadillo
Killer Kings
Coloss
Centurion

Image Works
Zig Zag
Fernando Must Die
Bombard



Bob's Pieces or some of them!

Misadventur
Carnar the Cat

Green
Chinese Juggler
Chink

Armadillo
Gold Construction Set
Deactivator
They Stole A Million
Mess Struck

Image Works
Zig Zag
Fernando Must Die
Bombard

Software for Sale

If you think that one of our programs looks very interesting, but you can't afford the time to type it in then our software service will help you out

In those a'clock in the morning. You sit at the computer keyboard having just finished a marathon typing session entering one of the superb programs from Your Commodore. Your fingers reach for the keyboard and press the letters R, U and N. You press RETURN, sit back and nothing happens.

Everyone has probably faced this problem. What it does happen it's a matter of spending hours searching through the program for any typing mistakes. No matter how long you look or how many people help you, you can usually guarantee that at least one bit is long steps through unnoticed.

The Your Commodore Software Service makes a valuable all of the programs from each issue on both cassette and disk at a price of \$6.00 for disk and 04.00 for cassette. None of the documentation for the programs is supplied with the software since it is all available in the relevant magazine. Should you not have the magazine then back issues are available from the following address:

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HP4 0HL
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Please contact this address for prices and availability.

The Disk

Programs on the disk will also be supplied as totally working versions, i.e. when possible we will not use Basic Loaders thus making use of the programs much easier. Unfortunately at the moment we cannot duplicate C16 and Plus/4 cassettes. However programs for these machines will be available on the disk.

What programs are available?

At the top of each article you will find a strap containing the article type, C64 Program etc. So that you can see which programs are available on which format, you will also find a couple of symbols after this strap. The symbols have the following meaning:



This symbol means that the program is available on cassette.



These programs are available on disk.

Please Note

Since the programs supplied on cassette are total working versions of the program, we do not put disk-only programs on tape. There is no sense in placing a program that expects to be reading from disk on to tape.

JULY 88

EASYPRIINT — New C16 and Plus/4 owners can access their printer functions with a set of 68 easy to use Basic commands (available on disk only).

HANDY INPUT ROUTINES — Make your Basic programs idiot-proof and more attractive with these two Basic input routines (C64).

MAKING MUSIC — A simple C64 synthesiser to accompany our popular series.

DIV PARALLEL INTERFACE — Use this software and a load of your own manufacture to drive a Centronics printer (C64).

CP/M CENTRONICS INTERFACE — Give your IBM or CP/M mode access to a Centronics printer.

CASSETTE INLAY PRINTER — Use your printer to produce neat inlays for your cassette collection (C64).

DISK ASSEMBLER — Disassemble your programs direct from disk with this program for the C64 (Disk Only).

ORDER CODE

DISK YDIJUL88 0400

TAPE YCJUL88 0400

AUGUST 88

MAKING MUSIC — Programs to accompany August's installment of our super music series (C64).

SHORT INTERLUDE — Overcome the problems of handling more than one interrupt with this handy routine for machine code programmers (64).

TAPE ORGANISER — A high speed program filing system for cassette users (C64).

SPLIT BAUD RATE TERMINAL — Drive an RS232C modem with this TTY software for C64 or C128.

SPRITE LIBRARY — Aeroplanes are the subject of this installment (C64).

EDUCATING SYDNEY — Create an image of the SID chip in memory so that you can see when it's up to whenever you require (C64).

SIMPLE — Give your Plus/4 the facility to use letters and

pull-down menus. Available on disk only.

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MUSIC COMPOSER - Compose your own three part harmonies on your C64 with this superb package - disk only.

MUSICAL FX - An excellent effects generator that allows you to produce several effects in your own C64 programs.

SAMPLER 64 - The quality may not be suitable for studio use but you can have great fun using this C64 sound sampler.

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SET THE ALARM - Use the C64's in-built clock as an alarm.

BACK IN THE BOX - A handy box utility for Basic and machine code programmers (C64).

FILE EXTENSIONS - Modify your disk directory so that you can load all your programs with ease. (C64 disk only.)

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(C64)
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UNLOCK HIDDEN 128 POWERS - Use the full layout of your C128 in C64 mode.

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YDDEC88 - for the disk.

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Please allow 78 days for delivery.

Pool of Radiance

"You are in a dark passageway with a door at the end. You listen at the door and hear hideous noises but still decide to investigate, so you enter and see a small group of orcs playfully torturing a tall, fair girl. The orcs see you and, annoyed at the interruption, lunge at you."

If you imagine such an encounter, then you have, no doubt, heard of, and probably played, *Dungeons and Dragons*. If you haven't, then it's about time you started.

Dungeons and Dragons was the first of the so-called role-playing games and directly influenced the writers of the first computer adventures, a whole host of other table playing games and, of course, computer games such as *Bard's Tale* and the *Ultima* series.

Many have tried to get the license for the computer version of *D&D*, or AD&D (Advanced *Dungeons and Dragons*) as it is now known, but onlySSI has succeeded. This is the first game that has resulted from their five year deal with AD&D authors, TSR.

As the game begins, you control a party of six characters that are created by adding dice to determine their ability scores in Strength, Intelligence, Wisdom, Dexterity, Constitution and Charisma. These scores then decide what type of character they will be. For example, a fighter must be strong to cause more

damage when he hits an opponent, a cleric should be wise so he can pray for spells, a thief should have a high dexterity to enable him to use a bow, and a magic user needs intelligence to learn the spells that he can cast.

You can then decide whether the character will be human, elf, dwarf, halfling or gnom. You can use the level editor to design how each character will appear on screen or, if you want to start playing straight away, load up the sample party on the disk that contains one fighter, a fighter mage/ian (multi-class characters are allowed), two clerics, a fighter thief and a magic user. When your party is assembled, you begin the game by entering into the city of Pilam.

This was once a great city that gradually fell as bandit and thug, villain and monster moved in. Now the council is trying to regain the city it once ruled and to expand its influence from the small confines of the civilized area into the hostile occupied areas. To this end the council is hiring groups of adventurers to clear areas of the old city. In this game to

clear means to risk your life in battles with hideous monsters, evil gang leaders and powerful magic users that see your presence as a minor irritation.

Naturally, it's cash on delivery, once you've completed the mission, and they'll also pay a bonus for gang leaders killed and for any maps and books that were written in the old times. With only a slight feeling of uneasiness, you head off into the area known as the slums.

The screen display is similar to many seen in computer role-playing games and is split into four areas. The main screen is a 3D view of what your party can see and alongside it there is a display that shows the names of your party members, their current amount class (how difficult it is to hit them), the lower the value, the better), and the number of hit points they have remaining. If this figure reaches zero, then the character is unconscious and probably dying.

Behind this display is a message window and the first of a series of dashboard menus. These joystick controlled menus allow you to party





out all the commands and actions that set this apart from other games. For example, your magic users can cast spells, use the wand and wand spells, clerics can pray for spells and turn away the undead, fighters can select weapons and thieves can fire their bows. The party can also set up camp to rest and heal, trade items, and examine them to see whether they are magical.

When you meet a group of monsters, you can select, from options, to attack them, wait and see what they are going to do, run away from them or talk to them in a variety of ways. Sometimes they will retreat or give away valuable information, such as the location of their treasure, but usually these encounters lead to combat.

Whenever combat occurs, the screen display changes to a full-screen, 3D, Gauntlet-style view of the battle where each combatant attacks in turn until the battle is won or lost. When it's the turn of one of your characters to act, another menu will appear through which your character can move, attack, stand on guard, cast a spell (you pick the target with a cursor) or fire a bow.

To the left of the main screen, you literally get a blow-by-blow commentary of what's happening. It states whether arrows, spells, wounds and axes hit their target and what effect, if any, they had. All this gives you total control over the battle tactics and the fate of your party. Tactics are important and it's up to you to decide your own but you should try and take out the enemy leaders and magic users first, to weaken the resolve of the others. When monsters break and die you can either pursue them and cut them down, or settle with what you've done and heal your wounds.

The best way to heal wounds is for your clerics to cast spells but, if they

have none or are laying in a pool of blood, then you will have to rest and gain a hit point for every day you are in camp. This is painfully slow and should be used as a last resort as it also leaves you open to attack from wandering monsters.

As you kill monsters and collect items, you will add to your experience points and, perhaps, impress the tutors at the training centre back in civilisation. However, you will also need 8000 gold pieces which may be more difficult to amass than the experience points. Should you manage both criteria, then your character will be trained, get more hit points and gain other benefits. For example, fighters get additional attacks as they reach higher levels and clerics and magic users can learn more spells from a larger selection. In fact, as they climb up through the levels, the magic users become the most powerful characters, despite beginning as the weakest who need the protection of the others.

Also in the city you will find shops selling weapons and objects that you think may be useful, taverns offering hospitality and rest, temples proffering healing at a price, and the crown's chamber where you will be rewarded for deeds that you have done.

There is a lot more to *Pool of Radiance* than mere monster bashing and you can even diagnose with most of that by opting for quick combat when the computer controls it all. As you get stronger the commissions you can accept will take you further afield, bring you into contact with more game characters and help you piece together the history of Phlan. Then you will begin to notice that something is very wrong and there is evil at work and you are the people to stop it.

The *Pool of Radiance* is a massive game and is supplied on four double

sided disks that you must copy before you begin as you must make sure you have a stack of nine disks (eight for the game and a ninth for one to save onto) ready before you begin. A disk box would also be useful as there is a fair amount of disk swapping to do and the disk you need is nearly always at the bottom of the pile.

The game disks are accompanied by an instruction book that contains details of the game menu and low level spells, a reference card for CBI game controls, a code wheel that you must use to decipher a copy protection test and the *Adventurer's Journal* that contains a host of information such as the monsters you will face and things that you find. These journal entries are numbered and should only be read when the game prompts you to and include maps and fragments of Phlan's history.

Pool of Radiance is a superb role playing game which both benefits and loses out because of the official AD&D label. On the plus side, you are using the weapons and spells you know and fighting the monsters that you have fought before. The minus, that will only affect existing AD&D players, is that the game uses the exact AD&D rules whereas most players only use them as a guide. A small point which is important to some, but most players will enjoy the opportunity to explore the world of *Dungeons and Dragons* and relish the thought that there are more to come.

Tony Bathurst/Jan

TwelveLine

Title: Pool of Radiance, Supplier: SSI (US Gold), Units: 2/3, Modified, Birmingham Tel: FAX, Feb 89 £16.99, Price: £24.99 (Disk only).

Directory Editor

*Whip your directories into shape
and replace chaos with order*

Commodore disk directories suffer from one main drawback: deleting an old file in the middle of the directory leaves an irritating gap which is filled by the next program to be saved.

When you save your next program, its name disappears somewhere in the depths of the directory instead of being added to the end. This can cause great confusion if you save a program which leads in two or more parts and the parts get separated and spread out.

Directory Editor should alleviate this problem, allowing you to rearrange the directory in any way you see fit. It will also simplify various operations such as locking files and moving scratched or split files.

Most of the options are fairly self-explanatory and foolproof but a brief manual of the commands is necessary.

DIRECTORY

This shows filename, filetype (including DELETED files), split and locked files (shown respectively by a * before the file type and a < after it). The directory scrolls up and down under the control of the cursor keys.

Pressing the space bar inserts a space next to the pointer (the > on the left of the screen), and RETURN moves the file beside the pointer to a previously inserted space.

F1 stores the indicated file so that subsequently pressing F1 in other options results in that filename being taken as an input.

ESC returns to the main menu.

SCRATCH A FILE

The same as Basic SCRATCH.

UNSCRATCH A FILE

Restores a file which appears in the directory as DEL.

UNSPLAT A FILE

A split file is one which was not closed properly. This option will not rebuild files which are split, but it may allow you to read data and re-write it to another file.

LOCK A FILE

This allows you to protect a file against being scratched.

UNLOCK A FILE

This reverses the previous option.

RENAME A FILE

The same as Basic RENAME.

ALPHANUMERIC SORT

This sorts all files into alphanumeric order (similar to alphabetical order, but including numbers and punctuation characters). Repeating "Y" to "Sort by file type" will group files in the order PRG, RFL, SEQ, USR, @



this order doesn't suit you change SORT in line 1580. Both options place any DEL'ed files at the end.

REWRITE DIRECTORY

This option should only be used when all alterations to the directory have been made. Nothing is changed on the disk until you select this.

If you change your mind halfway through and want to leave your disk as it is, press RUN/STOP.

Run before you work

The program will run, as written, on the Plus/4, C16 and C128, and should be compatible with all drives, although I'm not sure whether it will cope with double sided disks on the 1571. If you have mistyped anything you'll probably have to READER your disk again, so try it out first on an unused disk with some dummy programs.

Listings

Get it right first time with our deluxe program system for the C64.

You may have noticed that our listings are free of those horrible little black blinks which send you searching around the keyboard for a suitable graphic symbol. You may also have noticed the fancy numbers by the side of each line of the listing. First no more, it's all part of our easy entry aid.

Instead of those messy graphics and rows of countless spaces in PRINT statements and strings we use a special coding system. The code, or mnemonic, is always contained in square brackets and you'll soon learn to decipher their meanings.

For example, [SA] would mean type in a Shifted A, or an set of spaces in layman's terms, and [SAH] would mean a row of ten of those symbols.

[S+2] means hold down the shift key and press the plus key twice, it doesn't take a great leap of logic to realize that [C+2] means exactly the same thing except that the Commodore key (bottom left of the keyboard) is held down instead of the shift key.

If more than two spaces appear on a statement then this will be printed as [SPC4] or, exceptionally, [SPC4]. Translated into English this means press the spacebar four times or in the latter case hold the shift key down while you do it.

A string of special characters would appear as: [CTRL N, DOWN2LEFTS, BLUE, PACT]

This would be achieved by holding

down the CTRL key as you press N, press the cursor key down twice, the cursor left key five times, press the key marked BLUE while holding down the CTRL key, press the F3 key and, finally hold the Commodore key down while pressing the number two key (C2 would of course make the computer print in binary).

Always remember that you should only have a row of graphics characters on your screen with no square brackets and no comments, unless something like this appears:

[SS][C']

In this case the two characters should have a comma between them.

On rare occasions [REV T] will appear in a listing. This is a delete symbol and is created by entering the line up to this mnemonic. Then type a closing quotation mark (SHIFT B D) and delete it. This gets the computer out of quote mode. Hold down CTRL and press the number nine key (RYSO9), type the relevant number of reversed T's and then hold down CTRL and press zero (RYSO0). Next type another quotation mark and delete it again. Now finish the line and press RETURN.

A list of those special codes is given in the table but remember that only one of these mnemonics will appear outside of a PRINT string; the symbol for pi. This may appear when its value is needed in a calculation so this may look something like:

π=COS(PI/PI);

Ignore the square brackets and just type in a shifted upward pointing arrow (ie, the pi symbol).

PROGRAM SYSTEM CHECKER	
00	REM SYSTEM CHECKER - 1910 BOWEN
10	BL=10 : L=0000 : M=000000
20	FOR I=0 TO 20 BL=20-I:FOR J=0 TO 10
30	PRINT I; " "; M; " "; " "; " "; " "
40	IF I=0 THEN GOTO 100:FOR K=0 TO 10
50	IF I=0 THEN GOTO 100:FOR K=0 TO 10
60	IF I=0 THEN GOTO 100:FOR K=0 TO 10
70	IF I=0 THEN GOTO 100:FOR K=0 TO 10
80	IF I=0 THEN GOTO 100:FOR K=0 TO 10
90	IF I=0 THEN GOTO 100:FOR K=0 TO 10
100	PRINT " "; " "; " "; " "; " "
110	PRINT " "; " "; " "; " "; " "
120	PRINT " "; " "; " "; " "; " "
130	PRINT " "; " "; " "; " "; " "
140	PRINT " "; " "; " "; " "; " "
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330	PRINT " "; " "; " "; " "; " "
340	PRINT " "; " "; " "; " "; " "
350	PRINT " "; " "; " "; " "; " "
360	PRINT " "; " "; " "; " "; " "
370	PRINT " "; " "; " "; " "; " "
380	PRINT " "; " "; " "; " "; " "
390	PRINT " "; " "; " "; " "; " "
400	PRINT " "; " "; " "; " "; " "
410	PRINT " "; " "; " "; " "; " "
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960	PRINT " "; " "; " "; " "; " "
970	PRINT " "; " "; " "; " "; " "
980	PRINT " "; " "; " "; " "; " "
990	PRINT " "; " "; " "; " "; " "

by Eric Doyle

Checksum Program

The hexadecimal numbers appearing in a column to the left of the listings should not be typed in with the program. These are merely checksum values and are there to help you get each line right. Don't worry if you don't understand the hexadecimal system, as long as you can compare two characters on the screen with the corresponding two characters in the magazine you can use our line-checking program.

Type in the Checksum Program, make sure that you've not made any mistakes and save it to tape or disk

immediately because it will be used with most of the present and future listings appearing in *Your Commodore*.

At the start of each programming session, load Checksum and run it. The screen will turn brown with yellow characters and each time you type in a line and press the RETURN key a number will appear on the screen in white. This should be the same as the corresponding value in the magazine.

If the two values don't relate in one another, you have not copied the line exactly as printed so go back and check each character carefully. When you find the error simply correct it and

















press RETURN again.

















If you want to turn off the checker simply type SYS4952 and the screen will return to the familiar blue colour. You can then do whatever it was you wanted to do and if this doesn't use the area where Checksum lies you can go back to it with the same SYS command.

No system is foolproof but the chance of two errors cancelling one another out is presented in lower case. To turn your computer to lower case mode press the Commodore key and the SHIFT key at the same time.

and just pointing

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Mnemonic	Symbol	Keypress
[RIGHT]		CTRL left/right
[LEFT]		SHIFT & CTRL left/right
[DOWN]		CTRL up/down
[UP]		SHIFT & CTRL up/down
[F1]		F1 key
[F2]		SHIFT & F1 key
[F3]		F3 key
[F4]		SHIFT & F3 key
[F5]		F5 key
[F6]		SHIFT & F5 key
[F7]		F7 key
[F8]		SHIFT & F7 key
[HOME]		CLR/HOME
[CLR]		SHIFT & CLR/HOME
[F9/ON]		CTRL & 9
[ESC/FF]		CTRL & 0

Mnemonic	Symbol	Keypress
[BLACK]		CTRL & 1
[WHITE]		CTRL & 2
[RED]		CTRL & 3
[CYAN]		CTRL & 4
[PURPLE]		CTRL & 5
[GREEN]		CTRL & 6
[BLUE]		CTRL & 7
[YELLOW]		CTRL & 8
[POUND]		£
[LARBROW]		←
[UPARROW]		↑
[F7]		SHIFT & ↑
[INST]		SHIFT & INST/DEL
[KEY T]		see text
[Clear]		CEM + later
[Shift]		SHIFT + later

YOUR

COMMODORE

Listings

F-Key Labeler



PROGRAM: FUNCTION KEY TEMPLATE
- DR

```

80 1 FKEY BOARD,IP
81 10 KEY ***F1 E. BOARD***
82 20 KEY ***COMPLETED WITH SUBJ
83 30 KEY ***FUNCTION KEY TEMP.
84 40 KEY ***
85 50 KEY ***
86 60 KEY ***
87 70 KEY ***
88 80 KEY ***
89 90 KEY ***
90 100 KEY ***
91 110 KEY ***
92 120 KEY ***
93 130 KEY ***
94 140 KEY ***
95 150 KEY ***
96 160 KEY ***
97 170 KEY ***
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99 190 KEY ***
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101 210 KEY ***
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180 1000 KEY ***

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181 1010 KEY ***
182 1020 KEY ***
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188 1080 KEY ***
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190 1100 KEY ***
191 1110 KEY ***
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230 1500 KEY ***
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240 1600 KEY ***
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274 1940 KEY ***
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276 1960 KEY ***
277 1970 KEY ***
278 1980 KEY ***
279 1990 KEY ***
280 2000 KEY ***

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281 2010 KEY ***
282 2020 KEY ***
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292 2120 KEY ***
293 2130 KEY ***
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296 2160 KEY ***
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298 2180 KEY ***
299 2190 KEY ***
300 2200 KEY ***
301 2210 KEY ***
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310 2300 KEY ***
311 2310 KEY ***
312 2320 KEY ***
313 2330 KEY ***
314 2340 KEY ***
315 2350 KEY ***
316 2360 KEY ***
317 2370 KEY ***
318 2380 KEY ***
319 2390 KEY ***
320 2400 KEY ***
321 2410 KEY ***
322 2420 KEY ***
323 2430 KEY ***
324 2440 KEY ***
325 2450 KEY ***
326 2460 KEY ***
327 2470 KEY ***
328 2480 KEY ***
329 2490 KEY ***
330 2500 KEY ***
331 2510 KEY ***
332 2520 KEY ***
333 2530 KEY ***
334 2540 KEY ***
335 2550 KEY ***
336 2560 KEY ***
337 2570 KEY ***
338 2580 KEY ***
339 2590 KEY ***
340 2600 KEY ***
341 2610 KEY ***
342 2620 KEY ***
343 2630 KEY ***
344 2640 KEY ***
345 2650 KEY ***
346 2660 KEY ***
347 2670 KEY ***
348 2680 KEY ***
349 2690 KEY ***
350 2700 KEY ***
351 2710 KEY ***
352 2720 KEY ***
353 2730 KEY ***
354 2740 KEY ***
355 2750 KEY ***
356 2760 KEY ***
357 2770 KEY ***
358 2780 KEY ***
359 2790 KEY ***
360 2800 KEY ***
361 2810 KEY ***
362 2820 KEY ***
363 2830 KEY ***
364 2840 KEY ***
365 2850 KEY ***
366 2860 KEY ***
367 2870 KEY ***
368 2880 KEY ***
369 2890 KEY ***
370 2900 KEY ***
371 2910 KEY ***
372 2920 KEY ***
373 2930 KEY ***
374 2940 KEY ***
375 2950 KEY ***
376 2960 KEY ***
377 2970 KEY ***
378 2980 KEY ***
379 2990 KEY ***
380 3000 KEY ***

```


LISTINGS

```

1000 PRINT "*****PROGRAM LINE
WAIT"
1010 PORT=0:LOCATE=0
1110 FOR Y=1 TO 10
1210 PRINT Y
1310 GOTO 1110
1410 PRINT "*****PROGRAM LINE
WAIT"
1510 FOR Y=1 TO 10
1610 PRINT Y
1710 GOTO 1510
1810 PRINT "*****PROGRAM LINE
WAIT"
1910 FOR Y=1 TO 10
2010 PRINT Y
2110 GOTO 1910
2210 PRINT "*****PROGRAM LINE
WAIT"
2310 FOR Y=1 TO 10
2410 PRINT Y
2510 GOTO 2310
2610 PRINT "*****PROGRAM LINE
WAIT"
2710 FOR Y=1 TO 10
2810 PRINT Y
2910 GOTO 2710
3010 PRINT "*****PROGRAM LINE
WAIT"
3110 FOR Y=1 TO 10
3210 PRINT Y
3310 GOTO 3110
3410 PRINT "*****PROGRAM LINE
WAIT"
3510 FOR Y=1 TO 10
3610 PRINT Y
3710 GOTO 3510
3810 PRINT "*****PROGRAM LINE
WAIT"
3910 FOR Y=1 TO 10
4010 PRINT Y
4110 GOTO 3910
4210 PRINT "*****PROGRAM LINE
WAIT"
4310 FOR Y=1 TO 10
4410 PRINT Y
4510 GOTO 4310
4610 PRINT "*****PROGRAM LINE
WAIT"
4710 FOR Y=1 TO 10
4810 PRINT Y
4910 GOTO 4710
5010 PRINT "*****PROGRAM LINE
WAIT"
5110 FOR Y=1 TO 10
5210 PRINT Y
5310 GOTO 5110
5410 PRINT "*****PROGRAM LINE
WAIT"
5510 FOR Y=1 TO 10
5610 PRINT Y
5710 GOTO 5510
5810 PRINT "*****PROGRAM LINE
WAIT"
5910 FOR Y=1 TO 10
6010 PRINT Y
6110 GOTO 5910
6210 PRINT "*****PROGRAM LINE
WAIT"
6310 FOR Y=1 TO 10
6410 PRINT Y
6510 GOTO 6310
6610 PRINT "*****PROGRAM LINE
WAIT"
6710 FOR Y=1 TO 10
6810 PRINT Y
6910 GOTO 6710
7010 PRINT "*****PROGRAM LINE
WAIT"
7110 FOR Y=1 TO 10
7210 PRINT Y
7310 GOTO 7110
7410 PRINT "*****PROGRAM LINE
WAIT"
7510 FOR Y=1 TO 10
7610 PRINT Y
7710 GOTO 7510
7810 PRINT "*****PROGRAM LINE
WAIT"
7910 FOR Y=1 TO 10
8010 PRINT Y
8110 GOTO 7910
8210 PRINT "*****PROGRAM LINE
WAIT"
8310 FOR Y=1 TO 10
8410 PRINT Y
8510 GOTO 8310
8610 PRINT "*****PROGRAM LINE
WAIT"
8710 FOR Y=1 TO 10
8810 PRINT Y
8910 GOTO 8710
9010 PRINT "*****PROGRAM LINE
WAIT"
9110 FOR Y=1 TO 10
9210 PRINT Y
9310 GOTO 9110
9410 PRINT "*****PROGRAM LINE
WAIT"
9510 FOR Y=1 TO 10
9610 PRINT Y
9710 GOTO 9510
9810 PRINT "*****PROGRAM LINE
WAIT"
9910 FOR Y=1 TO 10
10010 PRINT Y
10110 GOTO 9910

```

```

1000 GOTO 1000
1010 PRINT "*****PROGRAM LINE
WAIT"
1020 FOR Y=1 TO 10
1030 PRINT Y
1040 GOTO 1020
1050 PRINT "*****PROGRAM LINE
WAIT"
1060 FOR Y=1 TO 10
1070 PRINT Y
1080 GOTO 1060
1090 PRINT "*****PROGRAM LINE
WAIT"
1100 FOR Y=1 TO 10
1110 PRINT Y
1120 GOTO 1100
1130 PRINT "*****PROGRAM LINE
WAIT"
1140 FOR Y=1 TO 10
1150 PRINT Y
1160 GOTO 1140
1170 PRINT "*****PROGRAM LINE
WAIT"
1180 FOR Y=1 TO 10
1190 PRINT Y
1200 GOTO 1180
1210 PRINT "*****PROGRAM LINE
WAIT"
1220 FOR Y=1 TO 10
1230 PRINT Y
1240 GOTO 1220
1250 PRINT "*****PROGRAM LINE
WAIT"
1260 FOR Y=1 TO 10
1270 PRINT Y
1280 GOTO 1260
1290 PRINT "*****PROGRAM LINE
WAIT"
1300 FOR Y=1 TO 10
1310 PRINT Y
1320 GOTO 1300
1330 PRINT "*****PROGRAM LINE
WAIT"
1340 FOR Y=1 TO 10
1350 PRINT Y
1360 GOTO 1340
1370 PRINT "*****PROGRAM LINE
WAIT"
1380 FOR Y=1 TO 10
1390 PRINT Y
1400 GOTO 1380
1410 PRINT "*****PROGRAM LINE
WAIT"
1420 FOR Y=1 TO 10
1430 PRINT Y
1440 GOTO 1420
1450 PRINT "*****PROGRAM LINE
WAIT"
1460 FOR Y=1 TO 10
1470 PRINT Y
1480 GOTO 1460
1490 PRINT "*****PROGRAM LINE
WAIT"
1500 FOR Y=1 TO 10
1510 PRINT Y
1520 GOTO 1500
1530 PRINT "*****PROGRAM LINE
WAIT"
1540 FOR Y=1 TO 10
1550 PRINT Y
1560 GOTO 1540
1570 PRINT "*****PROGRAM LINE
WAIT"
1580 FOR Y=1 TO 10
1590 PRINT Y
1600 GOTO 1580
1610 PRINT "*****PROGRAM LINE
WAIT"
1620 FOR Y=1 TO 10
1630 PRINT Y
1640 GOTO 1620
1650 PRINT "*****PROGRAM LINE
WAIT"
1660 FOR Y=1 TO 10
1670 PRINT Y
1680 GOTO 1660
1690 PRINT "*****PROGRAM LINE
WAIT"
1700 FOR Y=1 TO 10
1710 PRINT Y
1720 GOTO 1700
1730 PRINT "*****PROGRAM LINE
WAIT"
1740 FOR Y=1 TO 10
1750 PRINT Y
1760 GOTO 1740
1770 PRINT "*****PROGRAM LINE
WAIT"
1780 FOR Y=1 TO 10
1790 PRINT Y
1800 GOTO 1780
1810 PRINT "*****PROGRAM LINE
WAIT"
1820 FOR Y=1 TO 10
1830 PRINT Y
1840 GOTO 1820
1850 PRINT "*****PROGRAM LINE
WAIT"
1860 FOR Y=1 TO 10
1870 PRINT Y
1880 GOTO 1860
1890 PRINT "*****PROGRAM LINE
WAIT"
1900 FOR Y=1 TO 10
1910 PRINT Y
1920 GOTO 1900
1930 PRINT "*****PROGRAM LINE
WAIT"
1940 FOR Y=1 TO 10
1950 PRINT Y
1960 GOTO 1940
1970 PRINT "*****PROGRAM LINE
WAIT"
1980 FOR Y=1 TO 10
1990 PRINT Y
2000 GOTO 1980

```

Double Height



```

PROGRAM: 88, HEIGHT CHARACTERS
10 4 40000, 80, 40000, 80, CLR
20 1 30000, 0, 141, 30, 700, 141, 3
30 1 300, 300, 0, 100, 0, 87, 300, 40,
40 1 2, 0, 20, 0, 0, 0, 0, 0, 0
50 4 30000, 80, 100, 0, 700, 0, 0, 0
60 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
70 3 30000, 0, 80, 100, 0, 100, 0, 0
80 1, 0, 1, 0, 0, 0, 0, 0, 0, 0, 0, 0
90 1 30000, 0, 0, 0, 0, 0, 0, 0, 0, 0
100 1 30000, 0, 0, 0, 0, 0, 0, 0, 0, 0
110 1 30000, 0, 0, 0, 0, 0, 0, 0, 0, 0
120 1 30000, 0, 0, 0, 0, 0, 0, 0, 0, 0
130 1 30000, 0, 0, 0, 0, 0, 0, 0, 0, 0
140 1 30000, 0, 0, 0, 0, 0, 0, 0, 0, 0
150 1 30000, 0, 0, 0, 0, 0, 0, 0, 0, 0
160 1 30000, 0, 0, 0, 0, 0, 0, 0, 0, 0
170 1 30000, 0, 0, 0, 0, 0, 0, 0, 0, 0
180 1 30000, 0, 0, 0, 0, 0, 0, 0, 0, 0
190 1 30000, 0, 0, 0, 0, 0, 0, 0, 0, 0
200 1 30000, 0, 0, 0, 0, 0, 0, 0, 0, 0

```

```

81 0 30000, 0, 0, 0, 0, 0, 0, 0, 0, 0
82 0 30000, 0, 0, 0, 0, 0, 0, 0, 0, 0
83 0 30000, 0, 0, 0, 0, 0, 0, 0, 0, 0
84 0 30000, 0, 0, 0, 0, 0, 0, 0, 0, 0
85 0 30000, 0, 0, 0, 0, 0, 0, 0, 0, 0
86 0 30000, 0, 0, 0, 0, 0, 0, 0, 0, 0
87 0 30000, 0, 0, 0, 0, 0, 0, 0, 0, 0
88 0 30000, 0, 0, 0, 0, 0, 0, 0, 0, 0
89 0 30000, 0, 0, 0, 0, 0, 0, 0, 0, 0
90 0 30000, 0, 0, 0, 0, 0, 0, 0, 0, 0
91 0 30000, 0, 0, 0, 0, 0, 0, 0, 0, 0
92 0 30000, 0, 0, 0, 0, 0, 0, 0, 0, 0
93 0 30000, 0, 0, 0, 0, 0, 0, 0, 0, 0
94 0 30000, 0, 0, 0, 0, 0, 0, 0, 0, 0
95 0 30000, 0, 0, 0, 0, 0, 0, 0, 0, 0
96 0 30000, 0, 0, 0, 0, 0, 0, 0, 0, 0
97 0 30000, 0, 0, 0, 0, 0, 0, 0, 0, 0
98 0 30000, 0, 0, 0, 0, 0, 0, 0, 0, 0
99 0 30000, 0, 0, 0, 0, 0, 0, 0, 0, 0
100 0 30000, 0, 0, 0, 0, 0, 0, 0, 0, 0

```

```

PROGRAM: 88, CHARACTER INFO
10 8 80000, 0, 0, 0, 0, 0, 0, 0, 0, 0
20 1 30000, 0, 0, 0, 0, 0, 0, 0, 0, 0
30 1 30000, 0, 0, 0, 0, 0, 0, 0, 0, 0
40 1 30000, 0, 0, 0, 0, 0, 0, 0, 0, 0
50 1 30000, 0, 0, 0, 0, 0, 0, 0, 0, 0
60 1 30000, 0, 0, 0, 0, 0, 0, 0, 0, 0
70 1 30000, 0, 0, 0, 0, 0, 0, 0, 0, 0
80 1 30000, 0, 0, 0, 0, 0, 0, 0, 0, 0
90 1 30000, 0, 0, 0, 0, 0, 0, 0, 0, 0
100 1 30000, 0, 0, 0, 0, 0, 0, 0, 0, 0

```

```

66 30 PRINT#1,0
67 30 PRINT#1,0
68 30 PRINT#1,0
69 30 PRINT#1,0
70 30 PRINT#1,0
71 30 PRINT#1,0
72 30 PRINT#1,0
73 30 PRINT#1,0
74 30 PRINT#1,0
75 30 PRINT#1,0
76 30 PRINT#1,0
77 30 PRINT#1,0
78 30 PRINT#1,0
79 30 PRINT#1,0
80 30 PRINT#1,0
81 30 PRINT#1,0
82 30 PRINT#1,0
83 30 PRINT#1,0
84 30 PRINT#1,0
85 30 PRINT#1,0
86 30 PRINT#1,0
87 30 PRINT#1,0
88 30 PRINT#1,0
89 30 PRINT#1,0
90 30 PRINT#1,0
91 30 PRINT#1,0
92 30 PRINT#1,0
93 30 PRINT#1,0
94 30 PRINT#1,0
95 30 PRINT#1,0
96 30 PRINT#1,0
97 30 PRINT#1,0
98 30 PRINT#1,0
99 30 PRINT#1,0

```

```

100 30 PRINT#1,0
101 30 PRINT#1,0
102 30 PRINT#1,0
103 30 PRINT#1,0
104 30 PRINT#1,0
105 30 PRINT#1,0
106 30 PRINT#1,0
107 30 PRINT#1,0
108 30 PRINT#1,0
109 30 PRINT#1,0
110 30 PRINT#1,0
111 30 PRINT#1,0
112 30 PRINT#1,0
113 30 PRINT#1,0
114 30 PRINT#1,0
115 30 PRINT#1,0
116 30 PRINT#1,0
117 30 PRINT#1,0
118 30 PRINT#1,0
119 30 PRINT#1,0
120 30 PRINT#1,0
121 30 PRINT#1,0
122 30 PRINT#1,0
123 30 PRINT#1,0
124 30 PRINT#1,0
125 30 PRINT#1,0
126 30 PRINT#1,0
127 30 PRINT#1,0
128 30 PRINT#1,0
129 30 PRINT#1,0
130 30 PRINT#1,0
131 30 PRINT#1,0
132 30 PRINT#1,0
133 30 PRINT#1,0
134 30 PRINT#1,0
135 30 PRINT#1,0
136 30 PRINT#1,0
137 30 PRINT#1,0
138 30 PRINT#1,0
139 30 PRINT#1,0
140 30 PRINT#1,0
141 30 PRINT#1,0
142 30 PRINT#1,0
143 30 PRINT#1,0
144 30 PRINT#1,0
145 30 PRINT#1,0
146 30 PRINT#1,0
147 30 PRINT#1,0
148 30 PRINT#1,0
149 30 PRINT#1,0
150 30 PRINT#1,0
151 30 PRINT#1,0
152 30 PRINT#1,0
153 30 PRINT#1,0
154 30 PRINT#1,0
155 30 PRINT#1,0
156 30 PRINT#1,0
157 30 PRINT#1,0
158 30 PRINT#1,0
159 30 PRINT#1,0
160 30 PRINT#1,0
161 30 PRINT#1,0
162 30 PRINT#1,0
163 30 PRINT#1,0
164 30 PRINT#1,0
165 30 PRINT#1,0
166 30 PRINT#1,0
167 30 PRINT#1,0
168 30 PRINT#1,0
169 30 PRINT#1,0
170 30 PRINT#1,0
171 30 PRINT#1,0
172 30 PRINT#1,0
173 30 PRINT#1,0
174 30 PRINT#1,0
175 30 PRINT#1,0
176 30 PRINT#1,0
177 30 PRINT#1,0
178 30 PRINT#1,0
179 30 PRINT#1,0
180 30 PRINT#1,0
181 30 PRINT#1,0
182 30 PRINT#1,0
183 30 PRINT#1,0
184 30 PRINT#1,0
185 30 PRINT#1,0
186 30 PRINT#1,0
187 30 PRINT#1,0
188 30 PRINT#1,0
189 30 PRINT#1,0
190 30 PRINT#1,0
191 30 PRINT#1,0
192 30 PRINT#1,0
193 30 PRINT#1,0
194 30 PRINT#1,0
195 30 PRINT#1,0
196 30 PRINT#1,0
197 30 PRINT#1,0
198 30 PRINT#1,0
199 30 PRINT#1,0

```

```

200 30 PRINT#1,0
201 30 PRINT#1,0
202 30 PRINT#1,0
203 30 PRINT#1,0
204 30 PRINT#1,0
205 30 PRINT#1,0
206 30 PRINT#1,0
207 30 PRINT#1,0
208 30 PRINT#1,0
209 30 PRINT#1,0
210 30 PRINT#1,0
211 30 PRINT#1,0
212 30 PRINT#1,0
213 30 PRINT#1,0
214 30 PRINT#1,0
215 30 PRINT#1,0
216 30 PRINT#1,0
217 30 PRINT#1,0
218 30 PRINT#1,0
219 30 PRINT#1,0
220 30 PRINT#1,0
221 30 PRINT#1,0
222 30 PRINT#1,0
223 30 PRINT#1,0
224 30 PRINT#1,0
225 30 PRINT#1,0
226 30 PRINT#1,0
227 30 PRINT#1,0
228 30 PRINT#1,0
229 30 PRINT#1,0
230 30 PRINT#1,0
231 30 PRINT#1,0
232 30 PRINT#1,0
233 30 PRINT#1,0
234 30 PRINT#1,0
235 30 PRINT#1,0
236 30 PRINT#1,0
237 30 PRINT#1,0
238 30 PRINT#1,0
239 30 PRINT#1,0
240 30 PRINT#1,0
241 30 PRINT#1,0
242 30 PRINT#1,0
243 30 PRINT#1,0
244 30 PRINT#1,0
245 30 PRINT#1,0
246 30 PRINT#1,0
247 30 PRINT#1,0
248 30 PRINT#1,0
249 30 PRINT#1,0
250 30 PRINT#1,0
251 30 PRINT#1,0
252 30 PRINT#1,0
253 30 PRINT#1,0
254 30 PRINT#1,0
255 30 PRINT#1,0
256 30 PRINT#1,0
257 30 PRINT#1,0
258 30 PRINT#1,0
259 30 PRINT#1,0
260 30 PRINT#1,0
261 30 PRINT#1,0
262 30 PRINT#1,0
263 30 PRINT#1,0
264 30 PRINT#1,0
265 30 PRINT#1,0
266 30 PRINT#1,0
267 30 PRINT#1,0
268 30 PRINT#1,0
269 30 PRINT#1,0
270 30 PRINT#1,0
271 30 PRINT#1,0
272 30 PRINT#1,0
273 30 PRINT#1,0
274 30 PRINT#1,0
275 30 PRINT#1,0
276 30 PRINT#1,0
277 30 PRINT#1,0
278 30 PRINT#1,0
279 30 PRINT#1,0
280 30 PRINT#1,0
281 30 PRINT#1,0
282 30 PRINT#1,0
283 30 PRINT#1,0
284 30 PRINT#1,0
285 30 PRINT#1,0
286 30 PRINT#1,0
287 30 PRINT#1,0
288 30 PRINT#1,0
289 30 PRINT#1,0
290 30 PRINT#1,0
291 30 PRINT#1,0
292 30 PRINT#1,0
293 30 PRINT#1,0
294 30 PRINT#1,0
295 30 PRINT#1,0
296 30 PRINT#1,0
297 30 PRINT#1,0
298 30 PRINT#1,0
299 30 PRINT#1,0

```

Listings

Program Protection



```

10 30 PRINT#1,0
20 30 PRINT#1,0
30 30 PRINT#1,0
40 30 PRINT#1,0
50 30 PRINT#1,0
60 30 PRINT#1,0
70 30 PRINT#1,0
80 30 PRINT#1,0
90 30 PRINT#1,0

```

PROGRAM: AUTOPH CREATE

```

10 30 PRINT#1,0
20 30 PRINT#1,0
30 30 PRINT#1,0
40 30 PRINT#1,0
50 30 PRINT#1,0
60 30 PRINT#1,0
70 30 PRINT#1,0
80 30 PRINT#1,0
90 30 PRINT#1,0

```

Splice Controller



PROGRAM: SPINTE PROGRAMS CODE

```

10 30 PRINT#1,0
20 30 PRINT#1,0
30 30 PRINT#1,0
40 30 PRINT#1,0
50 30 PRINT#1,0
60 30 PRINT#1,0
70 30 PRINT#1,0
80 30 PRINT#1,0
90 30 PRINT#1,0

```


LISTINGS

74	1130 1744**P**4000**1744**4000	75	1130 1744**P**4000**1744**4000	76	1130 1744**P**4000**1744**4000	77	1130 1744**P**4000**1744**4000	78	1130 1744**P**4000**1744**4000	79	1130 1744**P**4000**1744**4000	80	1130 1744**P**4000**1744**4000	81	1130 1744**P**4000**1744**4000	82	1130 1744**P**4000**1744**4000	83	1130 1744**P**4000**1744**4000	84	1130 1744**P**4000**1744**4000	85	1130 1744**P**4000**1744**4000	86	1130 1744**P**4000**1744**4000	87	1130 1744**P**4000**1744**4000	88	1130 1744**P**4000**1744**4000	89	1130 1744**P**4000**1744**4000	90	1130 1744**P**4000**1744**4000	91	1130 1744**P**4000**1744**4000	92	1130 1744**P**4000**1744**4000	93	1130 1744**P**4000**1744**4000	94	1130 1744**P**4000**1744**4000	95	1130 1744**P**4000**1744**4000	96	1130 1744**P**4000**1744**4000	97	1130 1744**P**4000**1744**4000	98	1130 1744**P**4000**1744**4000	99	1130 1744**P**4000**1744**4000	100	1130 1744**P**4000**1744**4000
----	--------------------------------	----	--------------------------------	----	--------------------------------	----	--------------------------------	----	--------------------------------	----	--------------------------------	----	--------------------------------	----	--------------------------------	----	--------------------------------	----	--------------------------------	----	--------------------------------	----	--------------------------------	----	--------------------------------	----	--------------------------------	----	--------------------------------	----	--------------------------------	----	--------------------------------	----	--------------------------------	----	--------------------------------	----	--------------------------------	----	--------------------------------	----	--------------------------------	----	--------------------------------	----	--------------------------------	----	--------------------------------	----	--------------------------------	-----	--------------------------------

B A E A H

Bug Finder

We'd like to remind our readers that we run a Bug Finder service.

If you have typed in one of our programs and despite much checking, you still can't get it to run, then send us the following:

Two copies of your program on tape or disk.

A short piece of your problem.

If possible a listing of your work (you may omit this).

A stamped, self-addressed envelope for return of the program to you.

Should any of the above be missing then we will not be able to deal with your query.

We will try to point out where you have made errors and place a corrected copy of the program back on to your tape or disk before we return it to you.

Do not send a program to us as soon as it stops working, please check it several times first.

We do get a large number of queries and so it may take a while for us to deal with yours personally.

Note: we can only deal with problems relating to programs published in *Your Commodore*.

Readers Problems

Though the Commodore 64 is one of the world's most popular microcomputers, it can be very difficult to find specific information about your particular machine.

At the Four Commodore office we receive literally hundreds of letters from you, our readers, on a wide range of subjects ranging from the simple "Can you give me the telephone number for ...", to the more complex "I'm trying to write a program that uses a split screen. How do I do it?"

Unfortunately, the volume of mail received has become so great that it is impossible to answer every letter and still manage to publish a magazine each month.

For this reason we have felt it necessary to produce a number of guidelines for getting information from us.

1) We cannot guarantee to answer every letter sent to the magazine. Should it become apparent that a number of readers are suffering from the same problem, then we will reply to the letter via the Letters page.

2) A new helpline has been set up. This will be open for your queries on

Tuesday and Thursday afternoons between 2.00pm and 4.00pm. We will not be able to deal with your telephone queries at any other time. If our technical adviser is not available when you ring, then a message will be taken.

3) If you are having problems with one of our listings, can you please let us know in writing. This will enable us to see if a number of people are having the same problem. When a common problem becomes apparent with a program, then a correction sheet will be issued. Enclose a self-addressed, stamped envelope and we will send you a copy of the correction sheet as soon as it is available.

We are sorry that it has become necessary to institute these rules. However, we are sure that you will agree with us that the more time that we can spend making *Four Commodore* the most informative magazine around, the better.

For program queries write to:

Program Corrections

Your Commodore

1 Golden Square

London

W1P 3AH

If you wish to telephone then call: 01-437 8636 Even 222

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*14400 baud serial modem, includes Compunet serial software

Compunet, Unit 26, Sheraton Business Center, Watlington Road, Purville, Middlesex UB8 7JB. Phone (voice) 01-997 1591

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.....Please send me your information pack with details of Compunet for the CBM 64 and 128 / Amiga / Atari.

Name: _____

Address: _____

I enclose cheques/postal order for £39.95/Please debit my Access/Visa card

No. _____ Signed: _____

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- The latest world-wide micro news from Newsbytes, the award-winning on-line newspaper from the US net.

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These programs have sold thousands of copies, and yet you won't have seen them in the charts — why?

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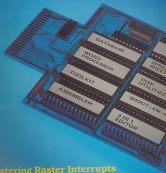
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