
**The Expert
User Club**



137 Stonefall Avenue, HARROGATE HG2 7NS.

**The expert
user club
Newsletter**



EXPERTISE

Here we go again, another really bumper issue this month. We've got all the regular features including the machine code for idiots section back plus some new features. Also I've been told to either check my spelling or take all the ear ache from some nasty letters. Well here goes then.

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REMARKS ABOUT WIZBALL

Well what do you think about Oceans software then? Especially Wizball. Even I must admit that the game held my attention for a few days playing it and then trying to put the game over to disk (that was another problem). At one stage in the process I really wished that I could have caught hold of that b****y ball and shoved it right up the programmers *****. (nose)

Anyhow, eventually I managed to get the game to disk, and as the game loaded back and was up and running I thought to myself yet another one bites the dust into my disk collection. After about 3 maybe 6 weeks I was on the old phone talking to a mate of mine up in the north when he said that he couldn't transfer his copy of Wizball to disk, I asked him if he had a copy of the utility disk to which he replied yes. Anyway as it turned out Ocean had only gone and released a new batch of Wizball with a completely different assembly, and where things were in the first batch they weren't there anymore. The two explanations I have heard for this are as follows.

- 1) The original assembly of Wizball would crash and not run on certain series of 64s. (Which is true).
- 2) So that the Expert would'nt work on it.

Well you make up your own mind. The protection on Wizball is by far some of the best I've seen, but alas Ocean, hard luck even the reassembled format can now be successfully put to rest, sorry I mean disk, by using Trilogics latest utility disk. Which not only allows you to successfully back the game up but also to have infinite lives as well.

I wonder if Gremlin will protect Trailblazer II because I know they're writing it because I've already seen a preproduction copy of it complete with sound, gameplay and mainscreen. Well actually I had a little play on it and its definitely going to be worth looking out for. According to Gremlin it should be released sometime in the near future, (I asked them at the PCW show).

Talking of the PCW show I was'nt that impressed by some of the rubbish that was on offer. Some of the good deals I spotted were things like disks at sensible prices I mean I picked up 25 disks for £8.00 which I considered a fair price, 2000 sheets of A4 size microperforated printer paper for £6.00 and just a little software.

PROGRAM SUBMISSIONS.

So you've written a program, or you've got a few cheats to send in have you, well if you have could you please, please try to follow the following format.

1) If you are sending in for software, membership or resubscription, then please send these enquiries to the normal user club address.

2) If on the other hand you are sending in enquiries, cheats as programs which are for my attention then send these to the same address but please enclose them on a separate piece of paper. This is because the secretary can then forward your enquiries and cheats etc, on to me, and it will give me a bit more time between newsletters to try them, and include them in the mag. Oh yes also please at the top of any submission on enquiry which you think requires my attention put the words FOR THE BOFFIN, and your name address and membership number (some people do forget).

Utility disks

Don't forget Trilogic's utility disks for hints and cheats plus help with transferring multi part tape games i.e. GUNSHIP to disk. Prices 5.95 for a new disk, or if you already have a utility disk you can return it to Trilogic with 2.00 for an update, but please note it must be the original utility disk. Club members 50p discount if you order through the club, but don't forget to include your membership number. Trilogic have told us that the utility disk should be updated between every 2 - 3 weeks. By the way don't forget about the deal we've negotiated with Trilogic. If anyone out there writes multi-part tape - disk transfer routines and sends them into the EUC and we use them, then you will receive 15 blank disks + 10.00. Winners names will be printed in the following newsletter, so get writing and sending them in and if you see your name in the following newsletter, then you know your prize is on its way to you. If we get more than one entrant for the same game then I'll either decide on merit (say if one was smaller or provided better options) or I'll draw the winner from a hat. Please supply a working copy of your routine on disk or tape, and if you wish for it to be returned include 50p p.p U.K. anywhere else including Europe 2.00. and don't forget your name, address and membership number.

MEMBERSHIP DETAILS AND BACK ISSUES

Membership costs 3.75 for a trial 6 months (overseas incl Europe add 2.00 to cover airmail postage). Or 7.50 for an annual subscription. Existing members who are receiving Expertise on the trial six month period are reminded that after their six months is up you should then send in an annual subscription fee. Expertise is sent either monthly or bi-monthly for double issues, but please note that the mag itself is done completely by volunteers who are both unpaid and not professionals, but we shall in future be endeavoring to make sure its out monthly.

SPECIAL NOTE

Some of you have written in complaining that you have not had your full six or twelve issues by the time your membership is due for renewal. (This mainly applies to members who have joined from February 87). If you have subscribed for either six months or twelve months you will receive your full quota of issues. But please bear in mind that some issues are double issues and therefore count as two. The main reason for the delays and hold ups have been due to getting a new writer for the news letter and trying to reorganise everything as the secretary and the editor live in two different parts of the country.

BACK ISSUES

These are available at 65p each. The first was OCTOBER '86. But JAN/FEB and MAR/APR are double issues so they cost 1.30

HELP US TO HELP YOU

Right then so you've bought a new piece of software or hardware (not games please) and you think it's either brilliant or garbage. Well why not write in and tell us about it so that we can pass it on to other readers, at least hopefully we should get a fair account of whats worth buying and whats not.

HARDWARE SECTION

AVON PRINTER TECHNOLOGY'S MOD FOR THE MPS 803.

As we all know the MPS 803 is one of the range of Commodore printers that lacks true descenders in its character set. This has long been a cause of frustration to owners who want to be able to produce acceptable print for business or personal use but the only solution to date has been the adoption of software packages with their inherent disadvantages, particularly with regard to speed. Now from AVON PRINTER TECHNOLOGY (APT) there is a hardware solution which not only provides true descenders but also give other desirable features such as bold printing, an alternative character set in *italics* and single pass underlining. And because it is a hardware solution, fitted to the printer itself, it actually speeds up printing.

So why wasn't a product like this available earlier? After all the MPS 803 has been around for quite some time (remember how it was bundled with the PLUS/4 at one time). To understand this we need to look at the history of the 803. You see when Commodore designed it they took a proprietary print mechanism and designed their own Printed Circuit Board. In doing so they went for compatibility with earlier printers but failed to realise the full potential of the print mechanism and significantly used only 7 of the available pins of the print head.

Had the 803s PCB design been like that of other printers (e.g the 801) then the solution as far as descenders would have been a simple rom change. But unfortunately the 803s character set was masked inside the CPU (Central Processor Unit) and as such a simple Rom change could not be done.

This technical issue held up the industry until APT noticed that Commodore for their own mysterious reasons had made provision for an upgrade in their original design of the PCB. It took APT another fourteen months to research design and complete the very powerful upgrade package.

So what does PRINTKIT IV consist of? I hear you ask. Well the components supplied with the kit consist of two Integrated Circuits (an Eprom and a tri-state octal latch!) sockets for mounting the afore mentioned, a resistor and a switch. You will guess from this that some soldering is required and you will be right. Both the sockets, resistor and switch all need to be soldered into place. If you have the skill to perform simple soldering however fitting the kit is easy, largely thanks to the comprehensive and well illustrated manual supplied by APT which takes you step by step through the disassembly of the printer, fitting instructions and finally reassembly. One very good point I found in the manual, and also seeing that I have successfully fitted PRINTKIT IV myself, is that the component identification is simple to follow as Commodores PCB is already marked with component numbers, so its just a matter of finding the appropriate number and installing the relevant part.

For those of you who might be planning on upgrading your word processing package and now your 803 then its worth bearing a few things in mind before you buy your new software. 1) Make sure that the package contains the facility to customise itself. Take Tasword for example, on Tasword you can choose one of the various menus, one of which lets you define the printer control codes, like pressing control space then pressing the letter A gives you the control code for enlarged printing on, and control space then B turns it off. This is needed on a word processor to fully utilise the additional power which PRINTKIT IV offers. I mean whats the point of having these new features offered by PRINTKIT IV if your old crummy Word Processor can't utilise them.

I have tried a variety of different packages and printer utility's and didn't find not one which proved incompatible. So my honest opinion to anyone who wants to dramatically improve the quality of their printing and owns an MPS 803 is to definitely buy one of these kits. Just take a close look at the characters in this newsletter because it was printed on an 803 with Printkit IV fitted, and then photo reduced for the mag. APT also told me that they are having special high quality ribbons made which will last longer than the normal ones, sorry I have'nt a price on the ribbons yet but as soon as I do I will let you know.

APTs address is as follows:-

Avon Printer Technology,
Swindon House,
4, Howard Road,
Southville,
Bristol
BS3 1QH
Tele (0272) 667167

PRICE £30.00

Oh yes, as a comparison I tried Printer Controls MPS Control from MacGowan Consultants which is disk based and is advertised in most mags lately for the same price as PRINTKIT IV. Well if you want a choice go PRINTKIT everytime it hammers the hell out of MPS Control.

AMIGA OWNERS

Whilst on the subject of printers I have heard of a new product soon to be officially released by Trilogic.

If you own an AMIGA and a C64 and printer then Trilogic are in the process of producing a interface which allows the Amiga to print to any CBM printer which runs on the 64. How it works is like this, the Amiga will down load its text to the 64 and then allow the 64 to print the relevant document without tying up the Amiga. In other words you've got the 64 being used as a pretty large buffer for printing. Whilst on about the Amiga I read in my local evening paper that a 64 emulator had been written in the U.S.A. which is supposed to let you run 64 software on the Amiga. (Brilliant came the exclamation of amazement from my lips).

Then I heard another report which said the only slight minor problem that this emulator had is that it runs 64 software at upto two thirds slower than the standard 64. (I wonder if Commodore designed it). Well if it does exist we'll just have to wait and see.

Coming back to Trilogic for the moment I haven't as yet received a price for this new interface but as soon as I do I will pass it on.

TRILOGICS NEW ADDRESS AND TELEPHONE NUMBER.

In case you don't know Trilogic have moved to new premises and have a new telephone number. (see below)

TRILOGIC
UNIT 1
253 NEW WORKS ROAD
LOWMORR
BRADFORD
WEST YORKSHIRE
BD12 0QP
ENGLAND.
Telephone (0274 691115)

MACHINE CODE FOR IDIOTS

Sorry that there wasn't an installment of machine code for idiots last issue but we will try in future to keep it in.

So on with the show. This time around I am going to take you through a couple of routines in the kernel to show you how to output a message at any given X and Y coordinate on the screen. The routines I will be dealing with are called Plot which is located at \$FFFF and Output string which is located at \$AB1E. With these two simple routines you can output a string upto 255 characters long starting at the given X and Y coordinate. Firstly look at the disassembly below of a small piece of code.

```
.. C000 20 44 E5 JSR $E544 : CLEAR SCREEN
.. C003 A2 04 LDX #$04
.. C005 A0 0A LDY #$0A
.. C007 18 CLC
.. C008 20 F0 FF JSR $FFFF : PLOT CURSOR AT X AND Y
.. C00B A9 13 LDA #$13
.. C00D A0 C0 LDY #$C0
.. C00F 20 1E AB JSR $AB1E : OUTPUT STRING
.. C012 60 RTS
```

With the above example the first thing the program does is to clear the screen, you can access this from basic or in direct mode by a SYS 58692. After we have cleared the screen what we want to do next is to move the current cursor position from the top of the screen to our new X and Y location. To do this the simplest way is to use the PLOT routine in the kernel. Take a look at the next line, which means in english load the X register \$04, this specifies the vertical position that you wish the cursor to appear at. In this example I have specified 4 rows down. By changing the number from a value of 4 to any number from 0 to \$16 changes the vertical position of the cursor.

The next instruction does exactly the same as the previous one but this time sets the horizontal position, which I have set to \$0A or 10 in decimal. Thus with six bytes of code you have so far told the 64 to clear the screen and to prepare to put the cursor at your predetermined X and Y position.

Right, the next instruction is to clear the carry flag. What this means without going into too much detail is to check to see if the carry flag is set and if it is unset it. Lost? I thought as much don't worry for now about what flags are as I will explain them more fully in a future article. The main reason you must clear the carry flag is because of how the plot routine works. For example, the plot routine can be used not only to specify where the cursor is to be set but also to check on its current location, (but thats something else). Now after you have specified the X and Y positions, cleared the carry flag you can then call the plot routine with JSR \$FFFF. What happens then is that the computer trundles off to address \$FFFF and executes the subroutine at that address, which when it has finished the subroutine it comes back to the next instruction after it was told to go to \$FFFF. (This is exactly the same as the gosub and return statements in basic). So to recap thus far, in 11 bytes of machine code you have made the computer clear the screen, and put the cursor where you want it. Now that we have the cursor where we want it the next thing to do is to output some form of message. Take a look at the next instruction after the JSR \$FFFF, and you will see that it says LDA #\$13 or load the accumulator with \$13 followed by LDY #\$C0 (or load the Y register with \$C0). If you look carefully at the two instructions you'll notice two specific numbers, namely \$13 and \$C0. Take the content of the Y register which is \$C0 and put it in front of the contents of the accumulator \$13, and you'll end up with an address of \$C013. By specifying these two numbers, one in the accumulator for the low byte address and one in the Y register for the high byte address, gives you have the starting point in memory of the string you wish to output. Therefore your starting point is \$C013 as specified by the contents of the accumulator and the Y registers. Now take a look below.

```
. M C013 C022
. , C013 57 45 4C 4C 20 44 4F 4E ' WELL DON
. , C01B 45 21 0D ' E!
```

You can see the message WELL DONE!. Then there is a number 0D. this number 0D is the ASCII code for a carriage return, and is used because it marks the end of the string which we are outputting using the output string routine at \$AB1E. After we have set the accumulator and the Y register with the string start address and make sure the string is no longer than 255 bytes (\$FF) and it is terminated with a \$0D all that is left to do is to call the output string routine with JSR \$AB1E and the 64 will do the rest for you.

If you want to experiment with outputting strings, below is the complete listing you need to enter. Type it in using the A for assemble command on your cartridge upto the RTS instruction and then at \$C013 use the M command to enter the message string. If you want to play about with moving the strings starting place on screen then all you have to do is to change the values of \$04 and \$0A within those specified earlier.

USE A COMMAND

```
. A C000 JSR $E544
. A C003 LDX #$04
. A C005 LDY #$0A
. A C007 CLC
. A C008 JSR $FFFF0
. A C00B LDA #$13
. A C00D LDY #$C0
. A C00F JSR $AB1E
. A C012 RTS
```

USE M COMMAND

```
. M C013 C022
. , C013 57 45 4C 4C 20 44 4F 4E ' WELL DON
. , C01B 45 21 0D ' E!
```

To activate exit the monitor and type sys 49152

In the next issue I shall be showing you how to move blocks of memory from one area to another.

I don't know if you are interested but a very good book I can recommend for learning machine code for the beginner is:-

Dr Watsons Computer learning series.
Beginners Assembly Language
For The CBM 64.

Isbn Number 0 90772 17 0

AUTHORS Dennick Bush and Peter Holmes.

Printed by Image Publicity,
2, Northington Street,
London,
WC1N 2JT

TELEPHONE 01 4055 333

If any other members know of any books that they can recommend on any subject to do with the 64 please write in and let us know so that we can tell others.

Well thats all for the idiots this time, but if you want to look at some more machine code I recommend that you look at articles printed in the computer magz with a decent book describing what the different instructions mean.

PROBLEMS PAGE.

First a problem from Mr D Siclemore in Norwich. He says that he has been having a problem with Trilogics utility disk No1 when it comes to the anti freeze type games. Well your problem is probably one of misunderstanding or you could have a faulty disk. When you use the utility disk along with the cheat machine on a game which has anti freeze protection you must then use the Z command and save the game, DO NOT try to restart because some forms of protection will still cause the game to crash from the restart command. Once the game has been saved or crunched then you can use the restart command, and whilst the game is decompacting turn your expert to the off position and it should now work. Whilst we are on the subject of protection Mr Tim Richards asks why can't you use the R for restart command on Hizball. The answer is this, the game itself is extremely heavily protected, (see from the comments at the beginning of this months issue of Expertise) and once the game is stopped you need to use additional parameters which are found on the most recent version of Trilogics utility disk. Also whilst answering Mr Richards, I am sorry but the EUC does not except Transcash payments for membership, and to discover cheats in games requires two very important things. 1) You need a reasonable understanding of machine code. 2) You also need to know your way around the relevant chips within the 64 i.e. the Complex interface adaptors (C I A s for sort), and the vic chip. Knowing how the 64 works and the architecture of the chips helps make things a little easier, for example in the vic chip you have two registers which control when sprite to sprite or sprite to background collision takes place. If you look them up in your copy of the programmers reference guide you will see that their memory address's are \$D01E and \$D01F respectively. Then using the hunt command in your monitor try to find these locations and by entering nap bytes after their appearance you could cause the game to have weird and wonderful affects like an alien crashing into you could not you up or no alien bullet will hurt you. But please be warned, this method will not work on all games, especially the newer ones, because most games now use interrupts to flag when a collision has taken place. This brings me full circle to why you need to know how the C I A s and Vic chips work, this is because these chips are what triggers the interrupt which then leaves you to find the relevant part in the code which says handle sprite to sprite or sprite to background collision and modify it so that your Ship for example is not blown to bits when shot. Whilst we are on the subject of cheats, who knows in an up and coming issue I might write a small article giving you some of the little tricks you can use to help you find where lives are stored and that sort of thing.

Rune Bassmann in Germany writes and asks, why is it that when using the restart command on basic or when in direct mode his 64 locks up. Well the answers this, you must have an old operating system. On any operating system previous to 2.10 this problem was present, so I suggest that you send off straight away for version 2.10 and you will find that you will get no more lock ups.

Right then Dennis Fry from Australia, your enquiry on how to back up Fist and Fist Tournament. Well I am only going to tell you ripper if you promise to buy me a Castlemaine XXXX if I ever get to Australia (only kidding). O.K. this is what you do, leave your Expert switched on for both The Way of Exploding Fist, and Fist Tournament whilst they load, and you should find that when they have finished loading they will automatically jump into the monitor. Now just Z'filename' and save if using either 2.9 or 2.10 of the operating system. Anyway Dennis did you hear about crocodile dundee? He got eaten by an alligator.

We received a letter from Mr I B Aliterate from Ireland who really wants to know why his television picture stays blank when he plugs in his Expert cartridge. Simple, try turning your 64 back on. This guy definitely won the award of the year for in expertise. His prize, a free intelligence test for the under fives to be carried out underwater. (Sorry Ireland only a bit of fun).

We've had a few letters from people asking how to back up the tape version of Micropose 'GUNSHIP' to disk. Well, here you might have a problem and you might not. You see Micropose have done a Wizball so I have been informed and the current version of Gunship is different from the first. Anyhow if you can get hold of one of the first released then you can back it up successfully with a copy of Trilogics utility disk which is available to EUC members at a 50p discount providing you quote your membership number when ordering, and make sure you order your copy through the club at the clubs address. I'll have a look at the new release as soon as I can lay hold of it and let you know the outcome in a future issue.

Mr D P Palmer, Huntingdon.

Your enquiry on how to alter sprites or disable them, and as regard to you receiving documentation on how to change them in a game the answers are included in the Experts operating instructions. Anyhow, I take it you have a copy of both the Experts Immortaliser operating system (for disabling sprites. But remember what I said above about it) and a copy of both the sprite extractor and the sprite editor programmes. Well if you have and you should have seen you said that you only recently purchased your Expert you should find that on part 2 of the Expert manual is all the relevant instructions on how to lift out the individual sprite frames, and how to use the sprite editor program. Part 4 then tells you how to use the sprite immortaliser program.

QUICKY TIP.

A few people have had a problem entering our machine code for idiots listings, for example someone wrote in and I am not going to mention his name and said that when he typed in:-
A 1000 A9 00 LDA #00
He got A 1000 LDA #00 ?
Well firstly if you see a # sign in a listing before the dollar sign always read it as a hash sign (SHIFT 3) this is because some printers might not have this character on them. And secondly when entering code just enter it in the following example.

```
A 1000 LDA##00 ( then press return )  
This will then read:-  
A 1000 A9 00 LDA #00  
A 1002
```

COMPACTOR NEWS.

After the announcement in the emergency newsletter about the new program compactor which takes upto seven hours to compact we received loads of enquiries asking if you can purchase a copy. Well I'm sorry to have to tell you this but the program itself is only one which is featured on Trilogics utility disk and if you wish to purchase a copy you are going to have to buy the complete disk, again available from the EUC.

SOFTWARE HOUSE RIPS OFF EXPERT YET AGAIN.

This time the baddies are Mastertronic and to date we know of three games currently on sale which are using the Experts compactor. There are Dr Destructo, Street Beat and Motoss. I mean they could at least have had the decency to ask Trilogic for their permission to use the compactor but they did not. So on their own heads be it when Trilogic decide what to do about it.

HOW TO PROGRAM THE LITTLE BROWN BOX

After a lot of nagging and a lot of negotiating I have finally been granted permission to tell you how the Expert works and how to put your own code into it. But be warned well in advance that this article is not intended for the machine code for idiots, as it is sometimes going to be pretty hard to follow, and only those of you who feel confident enough to have a go at programming the Expert should continue reading.

Right then first things first. What exactly makes the Expert cartridge different from all the other types of cartridges like Freeze Frame MK 9999, or Action ripoff. Well the first thing to remember at all times is that it is a ram based piece of hardware consisting of 8K of ram, and additional logic chips for its addressing.

Exactly how it works in a brief outline is as follows. When you switch the Expert to the program position the 8K of ram within the cartridge replaces the 8K computer block of memory from \$8000 to \$9FFF. As an example try this, turn your cartridge to the on position and enter this basic statement.

```
Poke 32768,34 (return)  
Now print peek(32768) (return) and you will get 34 returned.
```

Now switch the cartridge to the on position and take your cursor back to the print peek statement and press return. This time you should'nt get 34 returned, because the cartridge is now invisible to the operating system.

As we all know there are two ways in which the Expert can be switched on, one is by a hardware reset and the other is by a NMI (non maskable interrupt) which occurs when you tap the restore key. You see when an nmi is generated the 6510 microprocessor stops what it is doing and jumps off to perform the nmi routine at \$FE43. How do I know its \$FE43 I hear you ask, well its quite simple, the last six bytes which the 6510 can access are always reserved for hardware vectors and if you were to look at them from \$FFFA to \$FFFF they would read like this: \$FFFA 43 FF E2 FC 48 FF; which if you break them into pairs you get \$FFFA which is the NMI hardware vector which equals \$FF43 (low byte high byte). Reset Vector is \$FCE2 and finally the IRQ vector is \$FF48.

So as you can see when the restore key is pressed the 6510 looks to this nmi vector and jumps to the nmi routine at \$FF43. Now when you have an Expert plugged in the cartridge port and it is switched to the on position the Experts hardware is designed in such a way that as soon as a nmi occurs the Expert cuts in and replaces the block of memory from \$E000 to \$FFFF (version 1 only of the Expert) and what is clever is that you can both read and write to the Expert at that address. Now with version 2 of the Expert, when a nmi occurs thus switching it on, the Expert replaces both the memory at \$8000 to \$9FFF and \$E000 to \$FFFF but it can only be read and written to at the \$8000 to \$9FFF block, and only read at \$E000.

Well this is where you have got to start paying particular attention. When you write a program to run inside the Expert you must bear these things in mind. Your code on version 1 of the Expert must have its nmi handling routine addressed inside the block of memory from \$E000 to \$FFFF because as stated on version 1 when the Expert is enabled it replaces the kernel block of memory. So look at this example, say at the time you programmed the Expert you put the bytes \$00 at \$9FFA and \$E0 at \$9FFB. Now when a nmi occurs the Expert would cut in and the nmi would be vectored to your new address of \$E000 where you would have your program waiting to start execution.

Version 2 of the Expert which is the most popular version is different from that of version 1, in that when the Expert is enabled it replaces both the blocks at \$8000 to \$9FFF and \$E000 to \$FFFF the reason for this is so as to allow the Expert to work on 128s in 64 mode, because certain 128s produce false write cycles at the \$E000 block. Now on version 2 (and this is what all the future examples will be for) you must address your nmi routine to the block of memory at \$8000 to \$9FFF and not to \$E000 to \$FFFF. So as with the above example where I showed you how to change the nmi vector it would be like this say.

Version 1 \$9FFA and \$9FFB point to somewhere in \$E000 block.

Version 2 \$9FFA and \$9FFB point to somewhere in \$8000 block.

One very important thing which I must tell you before I start to show you an example routine is whilst the Expert is in the program position and before you program it use a little routine like the one below.

```
Example.
LDX #105
INC $DE00 : SWITCH
DEX
CPX #100
BNE $SWITCH
```

The reason you need to do this is because on some early Experts the line which is used to turn the Expert off is not set up correctly and thus you could get a few problems. Don't worry too much for now about how to switch the cart off as this will be explained later.

TIME FOR THE NITTY GRITTY.

Below you will see a small piece of code. Take a good look at it and then continue reading.

```
91FF 20 00 91 BIT $9100 : Nmi vector of $9FFA and $9FFB.
9202 10 01 BPL $9205 :
9204 40 RTI
9205 78 SEI
9206 8D 01 80 STA $8001 : Save contents of accumulator.
9209 A9 FF LDA $FFF : Stop further NMIs on the
920B 6D 00 91 STA $9100 : restore key.
920E 8E 02 80 STX $8002 : Save contents of X reg.
9211 8C 03 80 STY $8003 : Save contents of Y reg.
9214 68 PLA : Pull extra byte off the stack.
9215 8D 04 80 STA $8004 : Pull high byte of program counter.
9218 68 PLA : Pull low byte of program counter.
9219 8D 05 80 STA $8005 : Pull low byte of program counter.
921C 68 PLA : Pull low byte of program counter.
9220 EE 20 D0 INC $D020 : Flash background to show its
9223 AD 01 DC LDA $DC01 : working and scan the keyboard
9226 29 10 AND #10 : matrix for the space bar.
9228 D0 F6 BNE $9220 :
922A AD 05 80 LDA $8005 : Get high byte of PC from store.
922D 8D 00 09 STA $033C :
9230 AD 06 80 LDA $8006 : Get low byte of PC from store.
9233 8D 01 09 STA $033D :
9236 A9 00 LDA #00 : Allow future NMIs.
9238 8D 00 91 STA $9100 :
923B AD 06 80 LDA $8006 : Load acc with low byte of PC
923E 48 PHA : and push it on the stack.
923F AD 05 80 LDA $8005 : Load acc with high byte of PC
9242 48 PHA : and push it on the stack.
9243 AD 04 80 LDA $8004 : Load acc with extra byte
9246 48 PHA : and push it on the stack.
9247 AD 01 80 LDA $8001 : Load A with saved number.
924A AE 02 80 LDX $8002 : Load X reg with saved number.
924D AC 03 80 LDY $8003 : Load Y reg with saved number.
9250 40 RTI : Return from interrupt.
```

Right then the next thing is to explain what is going on. Take a look at the first 4 instructions at the top of the listing. This is where you would set your new NMI vector in the Expert cartridge at \$9FFA and \$9FFB to point to (These routines are only example routines as you could put your NMI vector to point anywhere within the \$8000 block). What these do is to test to see if the NMI generated can switch on the Expert, because when you tap the restore key it produces more than one NMI (this is called key bounce). The next instruction saves the contents of the accumulator into the Expert at \$8000 thus allowing you to now use the accumulator. The next two instructions lock out any more NMIs until you are ready to allow them to occur.

Then the contents of both the X and Y registers are stored in a safe place within the Expert. The next instructions pull the contents of the program counter off the stack and stores them, you might be asking yourself by now why I have pulled an extra byte off the stack, this is because of how the 6510 works, you see when you perform a RTS or a RTI the 6510 always puts 1 extra byte more back on the stack than is needed, so you must also do the same thing.

The next routine just increments the background colour to show you that the routine is working, it also scans for the space bar. Now when you press the space bar the next thing that happens is that the high byte and low byte of the program counter are stored at \$033C and \$033D this is so you can see where you stopped the computer at a later date. Then the program resets location \$9100 to \$00 to allow further NMIs switch the Expert on again, then the extra byte is put back on the stack along with the high byte low byte of of the program counter and finally the accumulator and X and Y registers have their original saved contents put back into them and the RTI is executed.

Now that you've had the explanation guess what ? to see exactly how this program works load your Expert and using the assemble command copy the program into the 64s memory at the start address shown ignoring the comments, for example where the program reads 91FF 20 00 91 BIT \$9100 enter:-
A 91FF BIT\$9100 and so on all the way to the end of the listing. Now when you have finished entering the listing and you have checked it save it. Still using your Expert change the contents of \$0318 to FF and \$0319 to 91 and use the R command to restart the 64. Done it ? Good.

O.K. turn your Expert to the off position and tap restore. The background should now be flashing, if it isn't then check that you have entered the code correctly and that you have set \$0318 and \$0319 as well.

This is what is happening, \$0318 and \$0319 is the NMI ram vector which you have changed to point to our demo routine, this is just to give you a ideal of how the Expert uses the NMI hardware vector to achieve similar results. What as happened is that the 64 as been told to stop what is was doing and service the nmi which we have generated. The 64 then jumps to our demo, from where we are now controlling its operations, so now press the space bar and the 64 will continue where it left off apart from the boarder being a different colour. Now switch your Expert back to the on position and using the M command look at locations \$033C and \$033D these tell you in high byte low byte form where you stopped the 64. Now type N for new and continue reading.

All that I have tried to do so far is to give you a brief understanding of how a NMI can be used to achieve our ends, in the next section it will be time for you to actually put some code into the Expert and learn how to switch the Expert back off from the operating systems detection. Whilst I'm talking about the operating system there is some thing else that you had better bear in mind, and that is that, as with the example program when I wanted to scan the keyboard for the space bar I used the keyboard matrix locations and not the kernal, this is because once the Expert is switched on via an NMI the Expert itself replaces block \$E000 to \$FFFF and you cannot use the kernal routines at that time. I will however show you or tell you how this can be overcome a little later. Below you will see another listing of machine code, this time however it is in a easier format for you to enter, again using the A command on your Expert. This program is very similar to the one earlier but this time it actually runs inside your Expert.

Type in the code on the next page and save it from:-
\$9200 to \$9269 using your Expert.

```

A 9200 BIT $9100
A 9203 BPL $9206
A 9205 RTI
A 9206 SEI
A 9207 STA $8001
A 920A LDA #$FF
A 920C STA $9100
A 920F STX $8002
A 9212 STY $8003
A 9215 PLA
A 9216 STA $8004
A 9219 PLA
A 921A STA $8005
A 921D PLA
A 921E STA $8006
A 9221 INC $D020
A 9224 LDA $DC01
A 9227 AND #$10
A 9229 BNE $9221
A 922B JSR $924B : Jump to transfer routine.
A 922E LDA #$00
A 9230 STA $9100
A 9233 LDA $8006
A 9236 PHA
A 9237 LDA $8005
A 923A PHA
A 923B LDA $8004
A 923E PHA
A 923F LDA $8001
A 9242 LDX $8002
A 9245 LDY $8003
A 9248 JMP $02A7 : Start address for switch off routine.
A 924B LDX #$00 : Transfer routine
A 924D LDA $9259,X : for outputting
A 9250 STA $02A7,X : the Experts
A 9253 INX : switch off
A 9254 CPX #$10 : routine.
A 9256 BNE $924D :
A 9258 RTS
A 9259 PHA : Push content of A on stack
A 925A LDA #$37 : reset location 1 to normal or with
A 925C STA $01 : what was stored there earlier.
A 925E LDA $DE00 : Pulsing the $DE00 line causes the
A 9261 LDA $FD0D : Expert to switch itself off and
A 9264 BNE $925E : become invisible again.
A 9266 PLA : Pull the contents of A of the stack.
A 9267 RTI : Return from interrupt.

```

After you have entered this code and both checked it and saved it new your computer. Now enter the following assembly at \$C000, and type N for warm start.

```

LDX #$05
INC $DE00 : SWITCH
DEX
CPX #$00
BNE $C002
RTS

```

Now switch your Expert to program and then type SYS49512. Load back in the above assembly file which you saved from \$9200 to \$9269, type new and enter these pokes:-

Poke 40954,00 :Poke 40955,146 :Poke 40361,1

Now turn your Expert on and press restore, the computer should be responding exactly the same as before except this time the code is inside the Expert. The poke for 40361,1 is used by the switch off routine and is explained as follows.

Look at the assembly listing at \$924B, and you will no doubt recognise that all this does is transfer the switch off block from inside the Expert to \$02A7. Well the switch off routine works like this, when the Expert is enabled it replaces the kernal, right! So if you pulse the \$DE00 line and at the same time check to see if a byte in the kernal appears different to the one in the Expert then you know that when the BNE instruction fails the Expert is off. This means that when you know the Expert is off you can then use the kernal as normal. Also contained at the top end of memory are the hardware vectors for Reset and IRQ. To handle the IRQ routine I usually set the vector to a piece of code something like this :- BIT \$DC0D RTI

And for the reset vector you could have another small routine which transfers itself out of the cartridge like the one in the demo program and instead of finishing with either a RTS or a RTI you could do some thing like this:-

```

After the Expert has switched off from the BNE instruction
you could use this
LDA #$00
STA $8005 ( THIS STOPS CBM 80 AUTOSTARTS)
LDA #$2F
STA $00
LDA #$37
STA $01
LDA #$7F : Stops
STA $DC0D :
STA $DD0D : Interrupts.
JMP $FCE2

```

For all you really clever people here's an added bonus for you. Remember what I said about how the Expert is turned on by a NMI, well lets say for example that you had more than one routine inside the Expert which you would like to be able to call from software and not from the hardware side of the 64. This is one way of doing it, after you have first initialised the Expert you could change the NMI vector at \$9FFA and \$9FFB to point to a routine which checks to see what the value held in say the X register is, and if the value is what you want then you could jump your new routine straight away. Look at the following Example.

X register contains 03

Code to check where you want to jump to inside the Expert.

```

CPX #$01
BEQ $8100 : Not taken
CPX #$02
BEQ $8200 : Not taken
CPX #$03
BEQ $8300 : Taken

```

Lets say that you have turned the Expert off because you wanted to use a kernal routine, Well what follows is a piece of code to allow you to turn the Expert back on without having to hit the restore key.

```

SEI
LDA #$00
STA $DD07
STA $DD06
LDA #$82
STA $DD0D
LDA #$11
STA $DD0F
LDX #$03 : value for above mentioned check routine.
WAIT BNE $WAIT

```

Now that you have most of all the information on how the Expert works as I have get writing !

The Boffin.

PEN PALS PAGE

We're beginning to receive a few names for the pen pals page so keep them coming in. Please include your age and any other interests that you might have.

Robert Robinson, 30 Buxted Road, Southdene Kirkby, Liverpool, Merseyside, L32 6SQ, England.

Gary Fawcett, P.O. Box 21243, Henderson, Auckland 8, New Zealand.

Derek Whayman, 100 Long Ley, Harlow, Essex, England.

Peter Williams, Clun Road Bakery, Craven Arms, Shropshire, SY7 9QS, England.

Shu!, 49 Onslow Gardens, South Woodford, London, E18 1ND, England.

Bryan P. Gardner, 9 Tate Close, Wistow, Nr Selby, YO6 0YH, England Age 20. Interests:- Computers (owns a C128), Music i.e. Madonna, Magnum, and home brewed cider.

Mr and Mrs G.W. Ferguson, 522 Kotthoff St, Lavington, N.S.W. 2641, Australia. (C64) Since Christmas would like to get in touch with other Australian users.

Soapy Age 17, 307 South Eldon St, South Shields, Tyne & Wear, NE33 5SX.

Brett Cooper age 19, 128 Argyle Street, Hawera, New Zealand is a student at university and would like to contact other Expert users.

LATE NEWS.

Trilogic have asked the EUC if we could pass on this additional information about the CBM 1901 monitor conversion service which they do. In case you have not heard or seen the advertisements in the computer mags Trilogic can convert your 1901 monitor so that it can display the full 4096 colours of the Amiga without fuzziness or wavering by fitting a 21 pin scart socket to it and a special lead from the Amigas 23 pin socket to the 1901. The original inputs are also retained.

Price £29.95

Trilogic can also collect and deliver your monitor for an additional £12.00 each way via a courier. (Seems like a good deal to me, at least you won't have to wait up to 5 days each way delivery time from the post office.)

But please ring them first about conversions especially if you want your monitor picked up and delivered. Also Trilogic do a range of different leads for TV monitors at between £10.00 to £14.95 for lots of different makes, again ring them to see if your model is covered. Their number is:- (0274 691115).

BURST NIBBLER 1.7. CRACKED BY THE BOFFIN. V2.10

For all you people who want to know how to make a back up of this program then simply do the following. Load and run Burst nibbler 1.7. and then stop it using your Expert. Then change \$0900 to read 4C C2 20 (JMP 20C2). Now enter /0900 and press return. Now switch your drive off and then on again and put in a disk with at least 40 blocks free on it and then Z'filename' to save.

Well thats all for this issue and I hope my spelling has improved. Ah Ah Ah.

Keep sending in all your cheats and hints and don't forget about the multi-part tape to disk offer.

Loyally hitting nestone.

THE BOFFIN.

CHEATS CHEATS CHEATS CHEATS CHEATS

Heres some cheats for you all to try.

THE LAST NINJA. V2.10

When game has loaded stop in the normal way. To remove the anti Expert protection enter the following.
F 55A0 55AC EA

Now type 0 return to redisplay the registers, and take the cursor under where it reads SP and change it to FF.
For unlimited lives change the contents of 7867 to A5.
For unlimited energy change the contents of EDC6 to A5.
R to restart.

If anyone out there as written a routine to transfer the tape version to disk please let us know.
Whoever it was who rang Trilogic with this cheat thanks.

ON THE TILES. V2.10, By Taz.

Leave your Expert switched on and it will jump straight into the monitor. Just then Z'filename' to save.

MEGA APOCALYPSE. V2.10

Needs E.S.M.

Stop game by pressing the E.S.M. and change the SP to FF.
For unlimited lives for player 1 enter:- F 7EA1 7EA3 EA.

For unlimited lives for player 2 enter:- F 7EFD 7EFD EA.

TIGER MISSION FULL CHEAT. V2.10 by The Boffin.

1) Stop game in the usual way.
2) Now change all the following for infinite lives, bombs, missiles, and turbos.
Enter D 8128. (don't forget the fullstop) and change the line to read EA EA.
Now do the same on all the following locations.

\$8A3E and F
\$95FC and D
\$9839 and A

To remove the anti cartridge protection enter:-

F 03F7 03F7 60

Now change memory locations \$0002 to \$0009 to any number from \$01 to \$ff. And change 9AD5 to \$03.
Now you can either restart or save. If you decide to save then please make sure you turn your drive off and then on first.

CURSE OF SHERWOOD.

Infinite lives. Change 1903 from 01 to 00.

Thanks to Mr A. E. Cleminson, Scarborough.

3 CHEATS. From Graham Smith and Rick Woodham, North Wales.
Thanks guys. V2.10

NEMISIS. Infinite lives.
Change \$1C3E to E0.

POB. Infinite lives.
Change \$66FC to AD.

EQUALISER. Infinite lives.
Change \$65F2 and 3 to EA.

DIZZY DICE. V2.10

To enable transfer to disk.

Stop game as usual. And change SP to FF.

MAGMAX. V2.10

F \$2F3A to \$2F3A EE. for infinite lives.

ARMY MOVES (1)

F \$2824 to \$2824 EE.

ARMY MOVES (2)

F \$3A28 to \$3A28 EE. for infinite lives for each.

From SOAPY. Tyne and Wear.

CORRUPTED SOUND.

We received a letter from Gareth Kitchener in Hitchin, Herts who wrote in to tell us that he had sound problems on a game called SPORT OF KINGS when he reloaded the Expert file. Along with his letter a solution and some cheats.
(Nice one Gareth).

Enter the following code at \$0804.

```
A 0804 LDA#$00
A 0806 LDX#$00
A 0808 STA$D400,X
A 080B CPX#$1C
A 080D BNE$0812
A 080F JMP$0A00
A 0812 INX
A 0813 JMP$0808
```

Then enter the restart address to \$0804. i.e. /0804.
then R to restart.

HADES NEBULA. Infinite lives. Change locations \$1971 to \$1973 to EA. The restart address is \$4876.

LOCO. RESTART ADDRESS is \$6AFB.

IMPOSSIBLE MISSION.

Apparently according to Mr E.S. Hampton, of Southampton, the cheat published in issues 6/7 March/April doesn't seem to work for him. So he sent this in instead.

Leave the cartridge on whilst the game loads and it will jump straight into the monitor.

Using the M command enter M 9517. (full stop time again)
and change the line to read:-

```
9517 A9 00 EA A6 47 E0 FF F0
```

Q VALUE = QSD.

Now when the game reloads the robots can't exterminate you.

DELTA.

Yet another delta cheat. As soon as the game is loaded stop it and enter the following:- F \$0952 to \$0952 00. This will mean that as soon as you have gained an additional weapon you will no longer lose it.

Change SP to FF and then enter /1770 and restart. But make sure you turn the sound option on or the cheat won't work.

ROAD RUNNER.

For infinite lives enter:- F A8E9 A8E9 A5.

UBIKS MUSIC. What a hard time for the programmer.

Heard the one about the programmer of UbiKs music who went to a lot of trouble to anti Expert this synthesizer program. Only to find out that all his elaborate protection worked fine on version 2.9 but when it comes to 2.10 it goes straight to disk. (Hardluck Gwan).