

# Life in the Fast Lane

*Turbo charging your snail paced peripherals opens up a wide and confusing world of cartridges, tapes and chips.*

by Norman Doyle

Commodore's tape and disk systems are probably the most reliable available on any microcomputer but they are also the slowest. In my old VIC 20 days this wasn't too much of a problem with only a few kilobytes of memory to fill but even with the CB loading can take a long time.

The software houses solved this with their own fast load systems which revolved in names like Turbo and Blaster but it has been the cartridge revolution which has made these kind of facilities available to the home programmer. Much of this revolution started in Germany and Holland where Commodore owners seem to approach programming their machines with a "brutistic gusto for order and control."

Companies such as Robotek, Everston Micros, Data! and B&P seized the opportunity to strap up these foreign products and launched them on the British market. In many cases the popularity of these products was not just because of the fast loaders and tapes but the back-up facilities which allowed commercial

games to be transferred onto disk or tape.

The first fast disk facility that awakened me to the fact that my 1541 could actually operate faster than normal was *Disk Express* and *Flash!* which both originated from Supersoft. Disk Express was a plug-in device which claimed a modest increase of five times the normal loading speed and could be fitted in seconds. *Flash!* was a little more sophisticated and required changes in both the C64 and the 1541.

To fit *Flash!* caused a problem for most C64 owners because the Basic ROM chip had to be removed to make room for the new operating system. The space left by the newly de-soldered chip could then be filled with a DIL socket to take the new operating system chip assembly. The problem was that the original ROM chip had to be re-inserted into the new assembly, so any careless slips with the soldering iron and heat sink would cripple the computer for several weeks until a replacement ROM could be acquired.

Inside the disk drive the problem was not so dramatic. For many years all the

major chip components on the drive boards have all been held in sockets and could be removed by gentle leverage. A connecting lead from the user part on the C64 to the drive then supplied the data line, with a switch to select *Flash!* or normal operating mode.

A side benefit of the new system was that the new operating system also gave



some extra commands to assist the programmer. Cursor movement was aided with commands to move the cursor to an area of the screen in large jumps, just as the HOME key moves the cursor to the top left from anywhere on the screen, so the new system allowed a/reverse/ bumping of the cursor to the bottom right, jumping to the end of lines and erasing of large areas of the screen at will.

Flash! was suitable for a limited and skillful few who could afford the expense of a new system plus the cost of having it inserted if they lacked the ability to do it themselves.

In real terms the speed increase with either of the SuperSoft systems was only about twice the normal, nowhere near the claimed five times improvement. This is something worth bearing in mind when reading advertisements, the stated speed benefits always take the optimum conditions into consideration. As a general rule always halve the advertised ratings to get a more realistic figure.

Next in line was a cartridge based utility from **Robotek**. The Robotek series could be used by the novice simply by plugging one of them in. Top of this range was **Robotek Turbo 50** which increased disk speeds by five times and held a cassette system which was ten times faster than normal. Additionally the user gained extra, very useful Basic wedge commands which allowed programs to be merged, slow run with a TRACE facility, and listed in a page system one screenshot at a time. There was also a simple monitor to assist machine code programmers to develop and check their own programs.

Unfortunately the one, most insupportably drawback of this system was the fact that it downloaded itself from the cartridge and into the computer RAM. This greatly inhibited its use and meant that it could easily be over-written by long Basic programs or by machine code.

This brings us up to the recent past and a new series of cartridges and devices but before we go on to these considerations you may still be wondering how its possible to speed up a tape or disk system.

## Routine changes

One myth which should be firmly knocked on the head is that tape turbos

actually speed up the recorder. A cassette recorder works at just under two inches per second and there is no practical way that it can be speeded up or slowed down without internal mechanical or electrical changes. The use of tape turbos results in the erosion of the reliability which is built into the standard operating system.

Under normal control each bit of every byte is recorded in a form of electrical-Morse code/ signifying the lengths and ones of binary. Added to this is an odd parity bit whose value depends on the preceding eight bits. This is followed by another signal which indicates the end of a word/ the nine bits of data. Then the next byte is recorded.

After each block of 80 bytes the computer leaves a two second gap, once again adding to the length of the record. Before moving on to the next block, the system re-reorders the previous block to insure against tape droplets corrupting the data. This means that each program is effectively recorded twice to ensure reliability.

Simply by stripping away the structure of the tape system over 50% of the normal loading and saving time can be achieved. For many loaders this is increased to a greater degree by cutting the lengths of the pulses which form the 'Morse code' used to record the data. This increases the concentration of data per inch on tape but does make it more vulnerable to failure.

The tape speeds achieved with a well-designed turbo now equals that achievable with a disk drive head. Accordingly, the tape recorder must be in tip-top condition. The record/playback head must be accurately aligned and the use of an animals alignment tape is essential. The Robotek Turbo 50 has a built-in alignment program and separate tape for this purpose. I know of no other system which applies such thought and for most people their only resort is to invest more money on one of the commercially available alignment systems such as that produced by **Autogenic** or **Automatic 3000** from **Eurochem Micros**.

Disk turbos can work in one of two ways. Either the head rate (the speed at which it communicates with the computer) is changed or the way that the program is physically stored on the disk is changed.

The most radical disk turbo system that I saw was **TurboDisk** from **Cookerch Software** of Australia. This took over the normal disk storage system and formatted the disk to suit its own requirements. Unfortunately this does not help when a commercial disk is acquired and it has no turbo of its own. It's far better to get a system which accepts the disk storage system on the 1541 but ups the head rate.

## Today's Turbos

Much of the attention these days is turned towards disk turbo systems which, at best, can achieve speed increases of up to 25 times the normal rate.

Most turbo systems are only available on cartridge. Unlike the Robotek cartridge, this new generation is virtually invisible to the system. Rather like an electronic iceberg, the tip of the system only protrudes into a few bytes of the C64s internal memory. The main part of the program resides externally within the cartridge, totally unaccessible.

If its a non-sensical turbo-disk operating system that you want then it's still possible to buy **QuickDisk+** from **Eurochem Micros**. The **QuickDisk+** system offers a basic operating system, giving five to seven times a speed increase, whose commands are similar to the DOS wedge supplied on the demonstration disk which comes with the 1541.

This system eliminates the necessity to type in OPEN commands to read error channels or issue disk commands.



replacing this complex and time-consuming system with a single keypress. It also has a facility for listing the directory onto the screen, a simple Centronics printer driver and a help menu for only £19.95.

**Datell** have a cartridge to compete with the speed of Quickdisk+. Called **Ultimate II**, it not only has a more attractive price at just £11.99, but also has a wider range of functions including extended Basic commands and a monitor.

It's Eversham who supply the excellent **Freeze Machine** which absolutely bristles with facilities apart from its disk and tape turbo. The speeds of the turbo are further enhanced by the inclusion of a program compressor on the cartridge. This reduces the program to the minimum possible number of bytes and then re-expands the program after loading.



The Freeze Machine contains two fast disk routines. The first is equivalent to the Quickdisk system giving about five times normal speed but the second, Laser II, system claims an amazing 20 times faster than normal.

The only drawback with the Laser II routine is that it saves the program file as a USB file on disk. This means that transfer and creation of the program is impossible. If you want to remove a program from a Laser II disk, then you have to load and erase the programs that you want to keep onto another disk, and then reformat the old disk.

Despite this, Laser II and the Freeze Machine form the fastest combination in

any cartridge system. Eversham Micros claim that you could load your favourite game in as little as ten seconds and no more than 8! Considering that the Freeze Machine only costs £28.95.



**Action Replay** AMM's companion program, **Marp 20**, claims to be the fastest list loader available. Unfortunately I wasn't able to test this claim but I doubt if the difference is particularly significant over Laser II. What is important is that it can be obtained on disk (from **Datell** for just £2.90).

At £70 and with a disk speed only six times normal, the **Flash Cartridge** from **H&P Computers** may seem to be a little outmoded now but it has many other things to offer in addition to its disk speed. If your needs are for a faster disk system but backed up by plenty of Basic facilities and a machine code monitor, then this could be well worth the money.

My favourite system is the **Trilogic Expert** cartridge. Unlike the other

cartridges, this is a RAM chip which can have the current Trilogic software loaded up onto it. The disadvantage of this system is that any spike through the mains supply will upset it and require the system to be reloaded. This is a small price to pay, I feel, for a system which can be kept at the forefront of the laptop and disk speed revolution at low cost.

The other nice thing with the Expert is the way that the monitor drops in with a monitor of the memory location at which it was interrupted, a fantastic debugging facility.

I think I'm digressing a little! The main point about the Expert is that it incorporates an excellent compression system which is the envy of many a software house. This, and the turbo loader, means that no program takes longer than 30 seconds to load and the cartridge is competitively priced at £28.99.

Deciding on a cartridge system is not merely a case of weighing up the pros and cons of the disk and tape turbo. They are package deals and just as I prefer the Expert, another programmer may prefer Action Replay, Final or Freeze Frame. The only way to decide is to read the ads, decide how much you believe and sift through the range of facilities to see how many you need and how many would not be used.

## Flash Successors

The Flash! system needed a chip change in the C64 and this seems to be the trend since then. All three of the big utility suppliers have a chip change system: **Datell's Professional 2026**, **Trilogic's Phantom** and **Eversham Micros' Dolphin 2026**.

Much higher speeds can be achieved if the data is sent in parallel through the computer's user port. This means that its limitation can be exchanged between disk and computer a byte at a time instead of a bit at a time in serial interactions. Obviously this is about eight times faster but it does mean a new operating system has to be installed.

One fact that all the systems seem to gloss over is that fitting these systems isn't child's play. I've seen inside many a C64 and in all but one case the ROM chips



were soldered directly onto the PCB. This means a desoldering job for most people.

Don't attempt this job yourself unless you know what you're doing. The complexity and vulnerability of both the chip and the PCB trace is a formula for total disaster. If a good heat sink isn't used the chip will be irreparably damaged and, if all of the solder isn't removed, you could strip the pathways off the surface of the board and then you've got serious problems.

Given these two situations it's better to risk overheating the chip to ensure that the PCB is undamaged. I say this for two reasons: firstly because a replacement chip can be acquired more readily and, secondly, because you may never need the chip anymore!

Using a solder sucker and a substantial heat sink I've removed many a ROM without causing damage. I've had more problems soldering in the replacement IC socket which seem more ready to shed a leg than a dragonfly in the mating season. The lesson I've learnt is not to settle for a cheap, flimsy and, therefore, shoddy solder.

Once you've spent an hour or so modifying the board, it's just as well you fitting only takes a few minutes and usually requires no soldering! Pah!

Professional DOS includes an operating system called Disk Demon. It boots an autoformatting fast rate of 80 times faster than normal load. This means that a 302 block file loads in under 3 minutes, a transfer rate of over 15,000

bytes per minute or 15,000 baud! A rate this high is, frankly, suspect. Data! could not supply me with a copy of Professional DOS by the time that this magazine went to press but I want to be convinced of the reliability of this data transfer rate.

The rest of the system's claims seem to be much more moderate with program and sequential file save times 20 times the normal rate and a sequential file load 25 times faster than normal.

The system also adds thirty new commands to Basic and includes a fast file copier. The Professional DOS costs 464.99 on the C64 or 109.99 for the XT2864 version.

Triologic's DOS claims a 240 block load in 7 seconds which, at just under 70,000 baud is a more plausible rate than Data!'s claim.

Triologic boast that full error checking has been retained while other systems have sacrificed in favour of speed. An additional 60 commands include those which allow the system to ignore write protect tabs. To the user this means that disks can be doublets simply by flipping them over, no more hole punching.

An 178.99, Phantom is not a cheap system and their is no XT2864 mode version but it is 100% British, by Acra.

Dolphin DOS isn't British but it's probably the model for the new generation of turbo DOS chips. Having been around longer, this system is one that I'm very familiar with and one slightly worrying factor is possibly a cause for concern with the Data! and Triologic systems as well.

Dolphin DOS seems to make the 6522 output chip more vulnerable than before and the recommended switch on procedure of C64 on and then 6541 must be adhered to every time the system is powered up. Through several careless moments, I have succeeded in burning out this chip twice during the year that I've had the system running and it does add quite a lot to the cost of the system!

Cats is rewarded with a system which will load 302 blocks in less than 5 seconds (85,000 baud), a save speed which is 12 times the normal rate for program and eight times for sequential files. Like the old Phish! system there is also a full screen editor system.

The on-line monitor is a very basic but useful facility and the single bypass

command channel access is carried over when in Basic programming mode. Apart from this only three extra Basic commands are added with Dolphin but you do get a free Dolphin Copy disk.

At 109.95 it falls midway between the other two systems but does have a long and reliable track record to support its claim to be the established standard note for the XT2864 with 1540 drive.

Tariffs have now gone as far as they can go. Any further increase in speed will definitely be at the expense of reliability and chip safety. The C64 can only cope with so much and who really needs a full memory load faster than 5 seconds?

## Touchline

Data! Electronics  
Units 8/7  
Dewsbury Road  
Fenton Industrial Estate  
Fenton  
Stoke-on-Trent  
Tel:0902 27883

Excelsior Micros  
64 Bridge Street  
Exmouth  
Worce  
WR11 4AP  
Tel:0186 41999

H&P Computers UK  
5 Hornbeam Walk  
Widham  
Essex  
CM8 2SG  
Tel:0456 31411

Supersoft  
Winchester House  
Canning Road  
Widkham  
Harrow  
Middlesex  
HA5 7SD  
Tel:01-880 186

Triologic  
Dept FN 3  
329 Tong Street  
Bradford  
BD4 6QY  
Tel:0274 68015

