Challenger

Tony Self

Opus have laid down the gauntlet — who will take up the Challenge?

It is not often that I have the opportunity to review a product that is unique in its field. The Challenger must surely be in this class and should take the market by storm. If I said the Challenger was a disc drive package, you might be forgiven for saying "So what!". Disc drives are hardly news these days, especially when you can pick one up for under £100. Well the Challenger is a lot more than just another disc drive.

Opus Supplies have adopted an Amstrad philosophy (sorry Alan) over the last eighteen months and have started producing "all in one" packages. They did it first for the Spectrum last year when they launched their Discovery unit. They are now repeating the idea for the Beeb.

So what is the Challenger, or to give it its full title the "Challenger 3 in 1". The basic unit consists of an eighty track double sided 5.25" disc drive, a double density disc interface based on the well proven OPUS DDOS (see my reviews in A&B Dec 84, May 85 and Jul 85) and a 256k RAM disc, with the option of expanding this to 512k. All of these items are housed in a single unit which plugs straight into the 1MHz bus and takes its power from the Beeb's own power supply. The only item which has to be installed inside the Beeb is the Challenger ROM, which contains the modified version of DDOS. Opus' major selling tactic is the "plug in and go" philosophy, however there are far more advantages than just that.

THE HARDWARE

The unit arrived through the post reasonable well packaged. But I must admit, I was some what horrified to find the Challenger ROM floating around loose inside the box, not even secured in a foam pad. I hope this only arose because Opus were doing their best to get the unit to me as early as possible. I hope the production units will be securely packed. (They are, we just recieved one — Ed.)

The Challenger comes in a metal case in BBC biege. The unit is some 3½" x 6" x 10½" in size, basically a standard dual disc drive case. A single drive is housed in the top of the unit with a blanking plate below sporting the Challenger logo. Behind this plate is situated the single PCB which holds the circuitry for the disc interface and the RAM disc. As I mentioned earlier, the Challenger is simple to install. The 34 way ribbon cable is inserted into the 1MHz bus socket (not the disc drive socket, which it will also fit) and the power lead into the Beeb's power outlet. The Challenger ROM is installed inside the Beeb in a vacant ROM socket. Additionally, if no disc interface has been installed, the supplied header plug is inserted in IC78 to short out a couple of pins. It is of course possible to have an ordinary disc interface installed as well with separate drives attached. However it is not possible to use both systems simultaneously.

The disc interface is capable of supporting a further two drives (which can each be double sided) although at present the Challenger ROM will only support 2 drives plus 2 RAM discs of 256k each. The additional drive is attached to the system by opening up the case and attaching the disc drive cable to the socket on the Challenger's PCB. This could cause annoyance to potential buyers who already have a single disc drive and wish to attach their drive to the Challenger unit and also be able to use it on their existing DFS. An exterior socket would have been preferable.

Also inside the case is an extension socket for the 1MHz bus, so that other peripherals can be attached. It is again disappointing to find that this has not been situated on the rear panel. The use of the 1MHz bus could cause problems in its own right. Although Acorn state in their specification that it is possible to daisy-chain up to sixteen devices off this port, this is not always the case. This is mainly due to the fact that most 1MHz peripherals are designed in isolation. To achieve compatibility manufacturers of 1MHz peripherals should comply with the Acorn standards and use the allocated addresses in JIM and FRED. Opus have told me that they have complied with these standards. However when I tried to connect the Music 500 System, marketed by Acorn, the Beeb crashed on trying to load a file from within Ample (Music 500's programming language). So who is not following the rules? Having advised Opus of this problem, they are now urgently investigating the situation. This does however highlight an inherent problem of utilising the 1MHz bus for disc drives. Whilst you might not need Music 500, an Eprom programmer or any other peripheral connected to the Beeb all of the time, you will almost certainly want the disc drives functional when you are using them. If you are contemplating buying one of these units and do use other 1Mhz peripherals, make sure that you see them working together before you buy.

THE FIRMWARE

The Challenger ROM is a modified version of OPUS DDOS, which I have previously reviewed, so I shall not dwell on the details, but just highlight the changes and extensions. In fact I have already received one update to the original ROM as it did lack some important facilities in respect of the RAM disc. Unfortunately both of these ROMs are version 1.00, but it is easy to tell the difference as the upgrade is the only one which displays the version number.

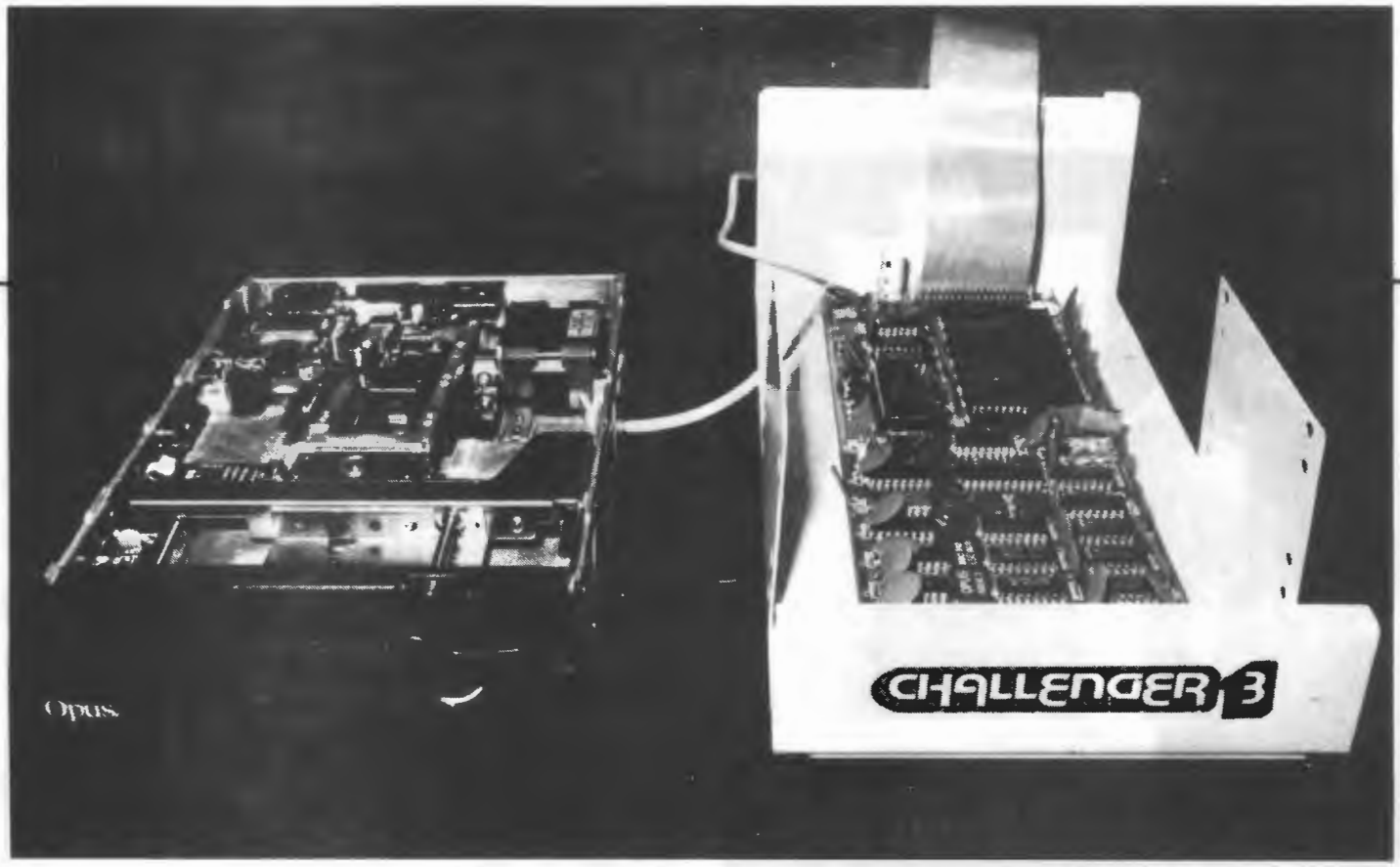
Fig.1 shows a list of the commands available. A comparison with the original DDOS list shows only two additions and a number of omissions. The main reason for this has been a rationalisation of the commands to conserve space and squeeze all the code into 16k. However you do not lose any of the original facilities. For instance commands such as ***DENSITY** , ***4080** and ***SROM** are now all included as further extensions to the ***OPT** command. Also included here is an option to alter the step rate, similar to the ***FX255** command, but not requiring the break key to be pressed before taking effect. Unfortunately pressing Break will cancel this option, unlike ***FX255**

XCAT** which was used to display all the volume catalogues on a double density disc in one go has been superseded by allowing a wildcard character with the ***CAT** command. So ***CAT„1 will display all the catalogues on drive 1. ***MCOPY** , which was the mass copy routine to allow backing up between different density discs,

TABLE 1 - Benchmark timings

Opus Challenger version 1.00

Benchmark	Single	Double	Ram disc
1	3.30	2.63	0.18
2	3.11	2.24	0.17
3	1.84	1.83	0.49
4	6.08	5.87	3.38
5	5.94	5.53	2.35
6	9.21	8.83	4.16
7	8.81	8.23	2.86
8	3.26	3.24	1.35
9	3.10	2.86	1.05



has now been combined with the standard ***COPY** command. ***COPY** will now read in as many files as it can before writing to the destination disc. This obviously speeds up the copying process, particularly when dealing with small files.

Other improvements over DDOS can be found in ***FORMAT** and ***VOLGEN** ***FORMAT** now offers the opportunity to format another disc, while ***VOLGEN** is much friendlier in now accepting volume sizes to to allocated by sector. This certainly avoids the confusion which arose in the DDOS version. However space on a track can still not be split over two volumes.

***MAP** is one of the new commands, which is similar to the command now found on the new Acorn 1770 DFS. It displays a map of the used and free space on a disc surface. ***CONFIG** is the other new command, which has been implemented to aid the use of the RAM disc. It is used to configure a physical drive to appear as a different logical drive. Confused? Well think of the way you change colours with VDU19. The command can be really useful when using commercial software which either doesn't recognise a drive number greater than 3 or expects the programs or data to reside in drive 0. For example ***CONFIG 0=4** will make the RAM disc (physical drive) appear to the software as drive 0 (logical drive).

THE RAM DISC

Here is the *piece de resistance* of the whole system – a 256k RAM disc. I honestly don't know how Opus can do it for the price.

So what is a RAM disc? Well the simplest explanation is to say that it is a block of ram chips which to all intents and purposes behave as if it were a floppy drive, except for to distinct differences. Firstly accessing the disc is very fast indeed, in my tests up to 18 times faster. Secondly the memory is volatile (i.e. when you switch off, goodbye memory). For the more initiated into the internal workings of the Beeb, the memory is arranged in pages of 256bytes on the JIM bus (&FD00 – &FDFF) and uses addresses &FCFF and &FCFE on the FRED bus as paging registers.

The advantages of having a RAM disc are quite considerable, though there are obviously disadvantages as well. The first main advantage is obtained, not directly from the RAM disc, but because of the way Opus have designed the system. Of the 256k of RAM available, only 253k is allocated to the RAM disc. The other 3k has been given over to the disc filing system, thereby allowing PAGE to remain set at &0E00. This is a very real advantage when you are transfering tape software to disc – no worries at all about using downloading routines. This advantage though does have its drawbacks in some situations, where disc software is expecting to find a copy of the disc catalogue at page &0E00 of the Beeb's memory. However Opus have overcome this with an extension to the ***ENABLE** command. ***ENABLE CAT** will copy the current catalogue into page &0E00 and move the OSHWM up to &0F00.

The remaining 253k forms the RAM disc and is configured as a single density drive (i.e. max 31 files and imaginary tracks of 10 sectors each). It was in this area that my first Challenger ROM fell down. Although it behaved quite normally for all the standard filing system commands, problems arose with software using OSWORD &7F calls. The reason for this was that the software had configured the RAM disc as a single track with over 1000 sectors. The new version has cracked this, and in my tests so far the RAM disc has behaved well. The types of software which were originally affected, were disc sector editors, automatic menu programs and in particular Beebugsoft's Spellcheck II.

Using the RAM disc is a real dream with disc based applications. I have been trying it out with a number of products. Acornsoft's Database, while not being a particularly good database, with a very slow sort routine, seemed ideal for an initial test. I copied the program files and a small database file of just over 50 records, onto the RAM disc and performed a sort. Apart from the distinct silence instead of the noisy chatter of the drive, the sort was finished 5 times quicker than when performed on the floppy. Also browsing through the records was virtually instantaneous. The other database I tried was StardataBase. This is a ROM based system with a series of utilities on disc. When you create a database a number of files are setup. Apart from the main database, these files include details of record length, field names, screen layout and other housekeeping information. Anyone who has used this system will be aware of the vast amount of time which is lost when selecting the various options from the menus, as the drive head steps in and out between the main database file and the housekeeping files. Once these files are transfered to the RAM disc, transition between the options is again immediate. This program is also a good example of the need for the ***CONFIG** command, as StardataBase expects

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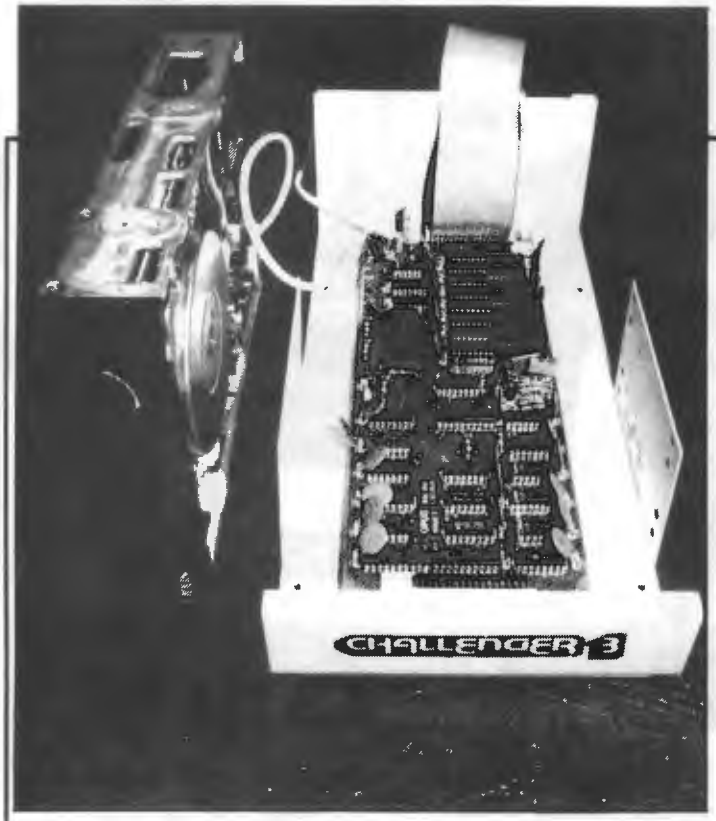

the database files to be on drive 0.

I also tried a sort with this program. Because the sort routine was much faster anyway and did not rely so heavily on disc access, the speed improvement was only around 200%. If you look at the benchmarks in fig. 2 you will see what I mean. Benchmarks 1 and 2 show tremendous increases in speed; these are the ***SAVE** and ***LOAD** routines, whereas benchmarks 8 and 9, which use **BPUT** and **BGET** are held up by the FOR/NEXT loop in the BASIC program and so only show a meagre improvement of between 200% and 300%.

The other type of software where I was expecting vast improvements in performance was with spelling checkers. I use Beebugsoft's Spellcheck II myself, which is a ROM based program with a dictionary on disc. As I mentioned earlier, this program caused problems with the old Challenger ROM as Spellcheck was unable to recognise the RAM disc as holding the dictionary data. This was caused either by the OSWORD &7F problem, or more likely because there is information contained on the first two sectors of the dictionary disc which was not copied across to the RAM disc using the ***MCOPY** or ***COPY** commands. What is required is a ***BACKUP**. This was not allowed on the original Challenger ROM, but is allowed now. In fact there still is a small problem with the RAM disc that has yet to be resolved. When you perform a ***BACKUP** to the RAM disc all the contents of the source disc are copied across apart for two vital bytes. These are the ones which tell the filing system the size of the disc in sectors. These remain at &3F6. Spellcheck II checks these bytes to see whether the dictionary is a 40 or 80 track version, if neither you get an error message. It is therefore necessary, using a disc sector editor, to amend these bytes to reflect the current size of the dictionary disc (i.e. &320 for 80 track or &160 for 40 track). Editing of these bytes is also essential if you want to be able to ***BACKUP** the RAM disc back to its original floppy. If the source disc is larger than the destination disc Challenger will refuse to perform the backup. I have discussed these problems with Opus and Slogger (the firmware writers) and they are looking to resolve these problems either by making sure that ***BACKUP** copies all the information across byte for byte or by including a new command which will allow you to configure the apparent size of the RAM disc by writing to the appropriate locations. Personally I favour the latter option.

Getting back to the actual performance of Spellcheck II, with the dictionary disc set up in the RAM disc the result is amazing. When in automatic checking mode the text scrolls past so fast it is difficult to read. To put some figures on the improvements in speed, I checked a document just over 21k long, which took 5 mins 56 secs on floppy and only 1 min 7 secs using the RAM disc.

Other software I have tried which benefits from the RAM disc are wordprocessors, such as Scribe and Wordwise Plus used in conjunction with Paul Beverley's CP ROM (reviewed in Plustalk this issue). Also programs which use disc overlays (e.g. Elite) or long adventure programs, where data is read in from the disc (e.g. Adventurescape A&B Nov 85). With the advent of the B+128 which has 64k which can be configured as a RAM disc, we should be seeing more software which takes advantage of these type of facilities.

I mentioned at the beginning of this section that the RAM disc does have disadvantages. I am sure you will have realised the main problem — it's volatile. It hasn't happened to me yet, but I'm sure it will — switching off the Beeb before backing up the RAM disc to floppy. Obviously, if you are going to use the RAM disc for serious applications it is essential to get into good habits of backing up to floppy on a regular basis. To some extent this defeats the object of having a RAM disc, but in my opinion the speed advantages far outweigh this slight inconvenience. I did ask Opus why they had not included battery backup and was advised that this would have added approximately £100 to the cost, as CMOS ram chips would have been required plus the boards own clock circuitry.

FINAL THOUGHTS

One aspect I haven't mentioned yet is the manual. Again this is based on the original DDOS manual, but has been vastly improved. Apart from the standard command descriptions the manual now includes a good introductory section and appendices explaining all the technical details. I in fact received two versions of the manual one ring bound and one stapled. I hope the production version is ring bound.

One thought which has struck me is that there are a lot of Beeb owners who already have dual disc drives who may be put off the Challenger because they can see no point in buying a unit which includes another disc drive. I must admit that I would tend to agree with them. I hope it won't be long before we see a Challenger "2 in 1".

I have really enjoyed reviewing the Challenger. This system has held up very well. I know I have criticised the unit in one or two ways, but these aspects will only affect a small minority and even they may be satisfied after Opus have finished their fine tuning. It is always difficult when developing a new product to cover all the eventualities when testing it. In my tests I have found no bugs in the system only areas where refinement will further improve an excellent product. Opus have told me that anyone who does experience any problems due to having any early Challenger ROM will be able to have this upgraded free of charge in the initial stages.

It is difficult to find a realistic competitor for this system. Solidisk is the only other manufacturer I know of who produces a 256k RAM disc. Putting a similar system together from their equipment would cost £375 against £250 for the Challenger and then for another £50 you can upgrade to 512k.

Opus have got a winner on their hands. They tell me that they have already trebled their dealer outlets. Apart from that A&B have actually bought one for the office.

If you are looking for a disc upgrade you can't go far wrong by buying a Challenger, even if you already have a single drive this would be a sensible upgrade path. This certainly gets my vote as best buy of the year.

Opus Supplies Ltd can be contacted on 0737-65080.

Challenger your BBC a megabyte

By ROBIN NIXON

THE latest product from Opus combines a 5.25in double sided 40/80 track disc drive, a double density disc interface and a fast solid state RAM disc in a single unit, the Challenger DDOS system.

This unit, much the same size as a standard double disc drive, plugs neatly into the 1MHz bus. With 256k built-in RAM – which can be expanded up to 512k – plus the double sided, double density 80 track drive, the Challenger can upgrade the memory capacity of your BBC Micro to 1 megabyte.

Despite this, PAGE remains at &E00, the same as with a cassette filing system. This is because Challenger has its own RAM workspace.

Let's concentrate on the disc part first. The 40/80 track mechanism is fully software controllable. The way it works is by double stepping the 80 track mechanism when accessing a 40 track disc. Detection of whether a disc is 40 or 80 track can be set to automatic, so you can always ensure that your discs are readable.

The Challenger can also tell the difference between single and double density formats. As you know, double density is a way of cramming almost twice the information on to a disc. However to make the best use of the Challenger you must ensure the discs you use are double density quality, as single density discs are not guaranteed to work in a double density format.

Of course it's not just a versatile disc drive, Opus also provides you with 256k of RAM to play with. This RAM thinks it's a disc and the DDOS treats it as drive 4. If you have the 512k version you get a drive 5 too.

The RAM disc allocates sectors to files so that errors such as "can't extend" are eliminated. In other words, it is a simple matter to use the RAM disc for most of your random access files then copy completed files from the RAM to a floppy disc.

Having said that it's drive 4, you can reconfigure the first RAM disc as drive 0, thus enabling you to run software that insists on using drive 0.

One of its main uses will be the copying into RAM of disc files which are too big to fit into the processor's memory. There they can be worked on at 10 times the speed of a disc drive. Once updated the files can be transferred back to disc.

You might imagine that having all this extra memory floating about in the two different formats of disc and RAM could cause data handling to become rather complicated.

Not so. Challenger's solution is to divide the system's memory – disc or RAM – into volumes, each having roughly the same memory as a standard single density 40 track disc. You can see the idea in Figure II. There are also a number of new DFS commands to handle these volumes. These are explained in detail in the panel on the right.

If you already have a standard DFS in your micro and wish to use it, the only effective way of doing so is to unplug the Challenger from the 1MHz bus. However other drives can easily be connected to the first, as Figure I shows.

The Challenger appears to be fairly upward compatible with the standard DFS. Most of my discs of various formats will work on it, including commercial and protected discs (with the exception of Elite, which is a shame). THIS IS NOW FIXED.

Having said that, there will inevitably

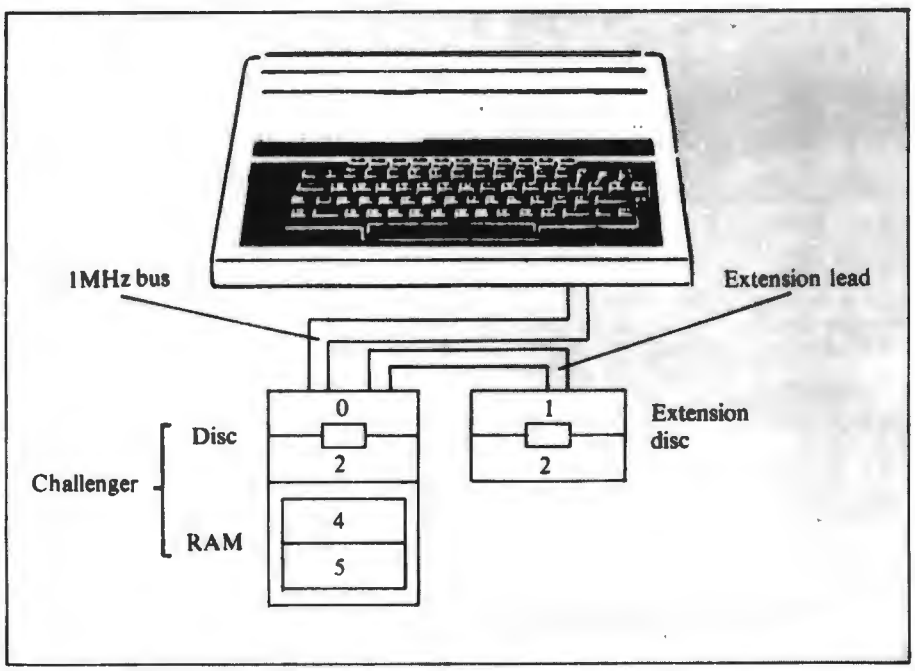

Figure I: A fully expanded Challenger System

gives Micro boost

be more and more exceptions, owing to the ever-evolving art of software protection.

Although Challenger is a flexible and versatile system for handling large amounts of data I think it unlikely that I would use it myself for two main reasons:

- I rarely handle large amounts of data.
- If I did, I could buy more than 130 floppy discs (13 megabytes) for the same price as a Challenger.

However for the serious user Challenger could make file handling far easier and a good sight faster to use than a standard DFS, as well as bringing a permanent end to "is it 40 or 80 track, single or double density?" problems.

In addition, all the workspace used by a standard DFS is reclaimed and made available to the user by Challenger.

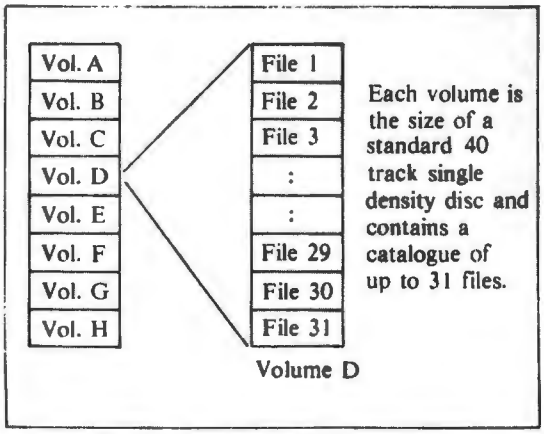

Figure 11: How memory is divided into volumes

THE * COMMANDS

*4080	Allows you to choose the format of the disc you wish to use.
*4080 ON	Allows only 40 track discs to be used in an 80 track drive.
*4080 OFF	Allows 40 track discs to be used in a 40 track drive and 80 track discs to be used in an 80 track drive.
*4080 AUTO	Automatically works out the format of a disc for you and allows either 40 or 80 track discs to be used in an 80 track drive.
*CAT	As with the standard DFS except that you can specify a volume as well as a drive.
*COMPACT	As *CAT.
*DENSITY	Allows the disc interface to be configured so that either single density or double density discs are readable.
*DENSITY AUTO	As *DENSITY except that selection is automatic.
*DRIVE	Allows you to specify a volume as well as the drive.
*FDCSTAT	Returns the value of any DDOS errors.
*FORMAT	A very versatile command which allows you to choose between 40/80 track and single/double density.
*MAP	Displays a map of the specified volume, showing the tracks and sectors occupied by files.
*MCOPY	Files on a source volume are copied to a target volume. Similar to *BACKUP.
*SROM	Will save to disc the contents of a specified sideways ROM.
*STAT	Displays the size of a volume plus its remaining space.
*TAPEDISC	Automatically transfers a file from tape to disc in the specified volume and drive.
*VERIFY	Verifies a disc.
*VOLGEN	Allows you to change the amount of space allocated to a volume on double density discs.
*XCAT	Catalogues all the volumes on a specified drive.
*CONFIG	Configures a physical drive to become a logical drive – just as VDU 19,1,4,0,0,0 sets physical colour 1 (red) to logical colour 4 (blue) – that is colour 1 becomes blue, so *CONFIG sets a specified drive to "think" it is another.
*OPT 6	Controls the density assumed by the filing system.
*OPT 7	Sets up the drive's step rate.
*OPT 8	Controls the 40-80 track mechanism
*OPT 9	Specifies the socket number of the sideways ROM which is to be read by the *SAVE command when saving data in the address range &8000 to &BFFF.