THE ORIC MICRODISC MANUAL

SAFETY

All dangerous voltages are contained within the power supply unit which plugs directly into the mains electricity supply. If you suspect this unit of being faulty DO NOT attempt to remove the outer case and plug the unit into the mains with the inside exposed. Take the unit to your nearest ORIC authorised dealer.

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ILLUSTRATIONS

CHAPTER 1

About this User Guide

This user guide is intended to help you in the correct use of the ORIC microdisc system, and is aimed at existing and future users of ORIC-1 and ATMOS microcomputer users.

For those of you who have not previously owned a microcomputer. Chapter 2 explains what data storage is and why we need to have such a system. It also compares disc storage with tape storage and gives some useful information on exactly how data is organized on a magnetic disc surface. Chapter 3 deals specifically with the ORIC microdisc system, telling you exactly what you get, what the system is capable of and briefly how it works.

Chapters 4 and 5 are concerned with the practical side — connecting up, switching on. making sure the system is working correctly and finally, using the system.

IMPORTANT

We recommend that you read this User Guide thoroughly before using the system. When you do start to use it, observe the General Instructions given in the Introduction in Chapter 5, they will help you to use the system efficiently and avoid making too many mistakes.

CHAPTER 2
About Data Storage

WHY DO WE NEED DATA STORAGE?

If you have not previously used or owned a computer, you are probably wondering why it is necessary to have a data storage system at all!

Let's begin by talking about the computer's built-in memory which stores the information you type in on the keyboard. This memory is called Random Access Memory and is commonly referred to as RAM. One of the features of RAM is that it is not a permanent form of storage, in other words, when you switch off the computer the contents of RAM are lost forever. If these contents are important items of data or programs then it is desirable to be able to store them in some form which does not depend on whether the computer is switched *on* or *off*. For this reason your computer is designed so that it can be connected to a storage device which enables you to permanently store anything that is in computer RAM and (even more useful), put it back in RAM whenever you want.

Another reason for data storage is that although your computer has a large area of RAM (the ORIC-1 has space to store about 37,000 characters) it is obviously **not** endless. There will be times therefore, when it is necessary to store data in order to make RAM free to store new data.

The most commonly used way of storing data is on magnetic tape and when you buy a microcomputer you can also buy a cassette tape recorder (if you have not already got one) which plugs into the computer. The ORIC-1 BASIC PROGRAMMING MANUAL — Chapter 2 tells you about tape recorders.

An increasingly popular method of storage, however, is on magnetic discs, and this is described in the following pages.

MAGNETIC DISC STORAGE

The disc itself

A magnetic storage disc is a dark coloured disc similar to a record and comes in a number of different sizes (diameters).

For the purpose of storing data, a magnetic disc is divided into concentric circles called *tracks* of which there are 40 or 80 on each side of a disc (depending on the disc system in use). Each track is divided into a number of *sectors,* and each sector is used to store a number of *characters*. For example, an 80 track disc with 10 sectors per track and 256 characters per sector, can store 80 x 10 x 256 = 204,800 characters per side. Fig 1 shows the layout of a 40 track, 10 sector disc surface. Tracks are generally given numbers and sectors are given letters. Each sector therefore is identified with a track number and then a letter e.g. 29F, 49A.

Each character on the keyboard (alphanumeric or symbolic) is stored on a disc track in the form of an 8 bit coded electronic signal known as a *byte*. All storage devices as quoted as having so many *bytes* storage capacity, for example a disc having a capacity of 256k bytes can store 256,000 characters.

The two disc types which can be used on the ORIC system are very different to look at. The 5.25 inch flexible disc is almost identical to a 'single' LP record although it is permanently stored in a paper jacket (like the cover of a record), this prevents damage to the surface. There is a slot in the jacket to allow the read/write heads to access the disc surface. The 3 inch microdisc, apart from being smaller is permanently enclosed in a rigid plastic case which makes it more robust than the flexible disc.

All magnetic discs have provision for protection against the writing or erasing of data. In the case of the 3 inch microdiscs you will notice in one corner there is a small hole or slot which can be covered or left exposed by the operating of a small mechanical switch in the case edge. You can operate this switch with a small screwdriver and with the hole covered up the disc is unprotected which means it can be written to or data can be deleted from it. In the other position with the hole or slot exposed, data can be read from the disc but not deleted or written onto it i.e. it is protected.
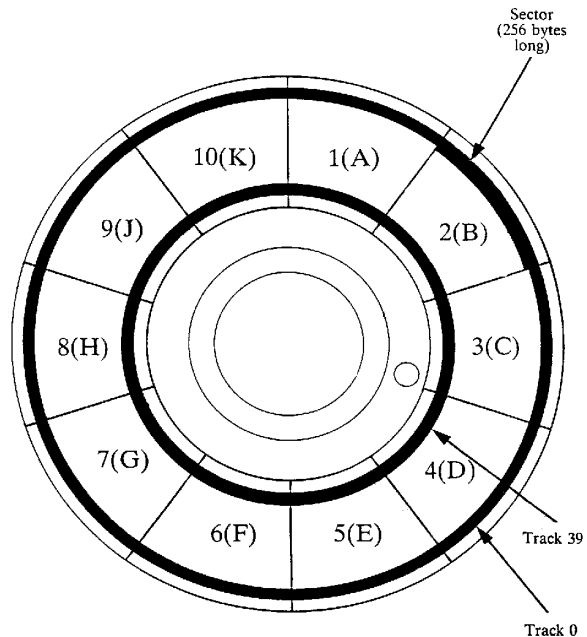
Figure 1 — Magnetic disc surface (40 tracks, 10 sectors)

In the case of the 5.25 inch flexible disc, the write protection device is a slot cut in the edge of the protective jacket which can be covered by small stickers provided with each pack of discs.

Disc files and directories
Everything you store on a disc (information, programs etc.) must be given a name which we commonly refer to as a 'filename', hence the term 'Disc files'. Each time you store some data in a new file, the filename, together with the location of the first sector of data, is written onto a specially reserved sector called a directory. The system allocates a directory sector for every fifteen filenames you create, for example, if you stored data in a total of 60 different files, four directories would be created. The directory makes it easy for the read/write heads to quickly locate a piece of information, and most systems have a facility which enables you to display the contents of directories to find out exactly which files are on a disc.

In addition to a list of filenames, each directory, when it holds the maximum of fifteen filenames, also holds the sector location of the next directory.

Figure 2 shows both types of disc with the write protect devices.

Formatting the Disc
Before a disc can be used for storing data it must be put through a process called *formatting*. As we explained previously, a disc is divided into a number of tracks and a number of sectors per track. When a disc *is formatted* the beginning of each and every sector is marked so that the system can recognise it.

In addition to sector marking, formatting has two more important uses: It enables you to give the disc a name and it reserves a 'system' sector on track 0 for the storing of certain essential information about the disc itself. For the more technically minded user, here is a list of items stored in the ORIC microdisc system sector:

— The name of the disc (this is the name you gave it during formatting)
— The version number of the disc operating system under which the disc was created (formatted)
— The number of sectors currently full of stored data (excluding directories)
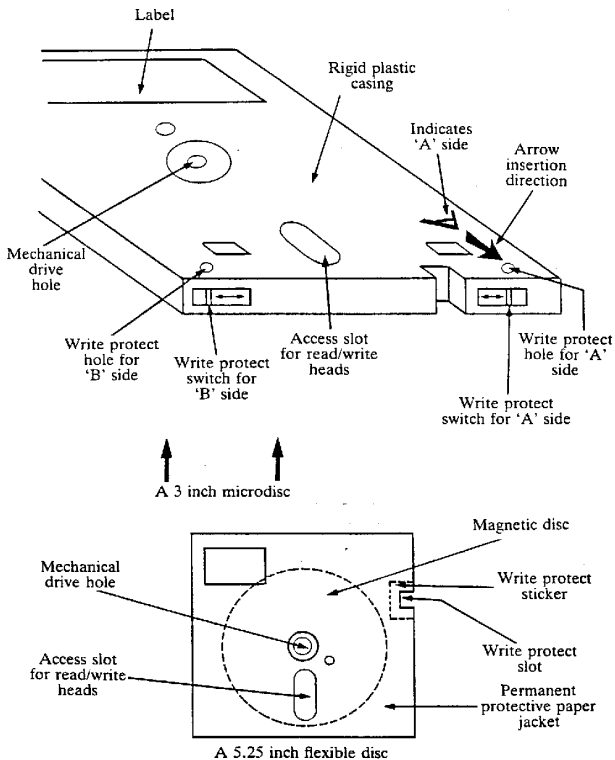
Figure 2 — A 3 inch microdisc and a 5.25 inch flexible disc

— The number of sectors currently free for storing data on (excluding directories)
— The location of the first directory sector and the first data sector free.

The Disc Drive Unit

Probably the most obvious difference between disc and tape storage is the speed of operation with a disc system, it is possible to write data to a disc and read data from a disc many times faster than from a tape system. Disc systems are also generally more reliable and there is less likelihood of the data being spoiled as it is being transferred to and from the disc.

The disc drive unit which holds the disc has no external controls (unlike a tape recorder which has a number of controls — Record, Playback etc). This means that control of storage and retrieval of data from disc is entirely with the computer and therefore more sophisticated data handling features can be built into the disc than is possible for a tape cassette storage system which usually requires manual operation of the 'press button' controls.

Because of the way in which a disc drive unit is engineered, it takes only seconds for an item of data to be found and loaded into the computer. With a tape system, the speed at which the tape moves means that it can take minutes rather than seconds.

The devices which actually record and read data on the disc surface are called the read/write heads and they move radially under control of the computer. The disc itself is spinning at high speed, so the read/write head can very quickly get to any sector of any track. Disc drive units come in single or double-sided versions, the double one having two sets of read/write heads (one for each side of the disc). With a double sided drive you don't have to turn the disc over in the drive in order to write to both sides (as you have to with a single sided drive).

CHAPTER 3
The ORIC Microdisc System

INTRODUCTION

When you purchase an ORIC microdisc system you get (in addition to this User Guide) a disc drive unit for 3 inch microdiscs, a power unit and a 3 inch microdisc. You will need to purchase some additional microdiscs for storing data, your dealer should be able to supply these.

THE DISC OPERATING SYSTEM

The microdisc which is supplied is called the 'system disc' and on each side is written a set of computer programs which are known collectively as the Disc Operating System (DOS) and without which the microdisc system will not work. When you connect up and switch on (see Chapter 4) the DOS is loaded into the computer RAM automatically. Once this has happened you can give instructions to the computer telling it how to use the microdisc drive(s). In addition to the DOS. there is also a lot of information on the system disc, in the form of 'help' pages and we shall tell you how to use these in Chapter 5.

Let's talk a little more about the DOS and what it does. The DOS is in fact seventeen completely separate programs (all of which perform different microdisc functions) and there are seventeen different instructions which you can give to the computer (one for each DOS program). We will not discuss the microdisc instructions in detail at the moment, this comes later in Chapter 5.

When you type in an instruction, the computer selects the appropriate DOS program from its RAM and then 'runs* the program, which results in the instruction being carried out. When the instruction is completed, control of the system is returned to the keyboard so you can type in another instruction.

Each instruction is made up of a short command word (which tells the computer which DOS program to select) followed by some qualifying data which the program must have before it can run. For example, one instruction enables the contents of a disc in one disc drive unit to be copied to a disc in another drive. The command word is COPY, which is followed by some qualifying data to tell the computer exactly which drive unit is to be read from and which drive unit data is to be sent to. Finally, to put the instruction into the computer having checked that it is correct on the screen, you simply press the RETURN key.

The addition of a disc system to your microcomputer does not reduce the amount of free RAM available to you for storing programs or data, the ATMOS (48K) and ORIC-1 (48K) microcomputers still give you a minimum of 37K bytes free.

THE DISC DRIVE

It is important to appreciate from the beginning that there are two types of microdisc drive unit called *master* and *slave*. The *master* contains electronic interface circuitry which enables it to be connected directly to and controlled directly from, the microcomputer. It also has a red 'reset' button on the rear, the purpose of which is explained in Chapter 4.

The *slave* contains no interface circuitry and no 'reset' button, in other words it cannot be connected directly to the computer and it is controlled by the computer via the *master* drive interface. This is why, when you have more than one disc drive, the drive units are all connected together in 'chain' fashion with only the *master* (at the end of the chain) being connected to the computer. The ORIC system can be fitted with up to four disc drives (one *master* and three *slaves)* as shown by Figure 3.

Each disc drive unit has internal switching which allows, it to be numbered Ø, 1, 2 or 3, this is how the computer recognises a disc drive. The microdisc drive which you purchase as part of the microdisc system will always be a *master* and its internal switching will always be set up for number Ø. If you purchase an additional drive, this must be a *slave* and will always be numbered 1. You may also wish to purchase up to two additional drives which must also be *slaves* and will also be numbered 1.
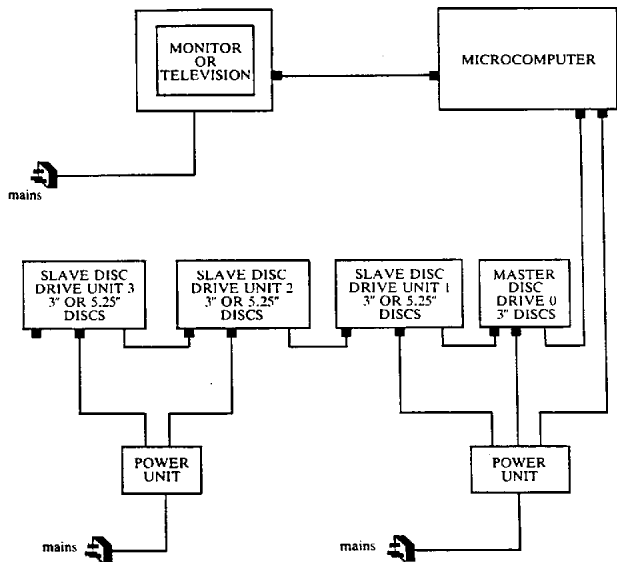
Figure 3 — A system with four disc drive units.

Every *slave* drive is accompanied by a leaflet explaining how to change the internal number and if you are purchasing second and/or third *slaves* then you will have to re-number them (from 1 to 2 or 3). You will note also (from figure 3) that with one or two extra drive units you will need an extra power supply unit. A 5.25 inch 'floppy' disc drive can also be used as a *slave,* however these are not sold by ORIC and you should refer to their manuals provided, for user instructions. A 5.25 inch 'floppy' disc drive connects with the microcomputer in the same way as the ORIC microdisc drive, however the power supply arrangement may be different.

Currently, all disc drives supplied by ORIC are single sided and all discs are double sided.

CHAPTER 4
Getting Started

CHECKING THE SUPPLIED ITEMS
First, make sure you have all the items listed in the separate checklist supplied. Make sure also that the dealer from whom you purchased the system has stamped the guarantee card for the disc drive unit.

If you have purchased a microcomputer and a microdisc system you will find separate instructions for setting up the ORIC-1 or ATMOS, in the packing with the microcomputer. You will also need some spare 3 inch microdiscs and your dealer will almost certainly be able to supply these.

CONNECTING UP AND SWITCHING ON
The power unit supplied with the ORIC-1 and ATMOS is not needed, since the power unit included with the microdisc system will supply the microcomputer and up to two disc drive units. If you already have an ORIC-1 or an ATMOS, disconnect and remove the power unit. and store it away. If you have just purchased a microcomputer, there is no need to unpack the power unit. Now refer to Page 11 of the ORIC-1 User Guide or Page 2 of the ATMOS Manual, you will see that one of the plugs on the rear of the computer is labelled 'Expansion Port' and this is used for the disc drive unit.

Next, take the *Master* disc drive (the one with a red pushbutton on the rear) and connect the 34 way socket on the end of its flat *ribbon* type cable to the EXPANSION port on the microcomputer. There is a slot in the plug and a locating piece on the socket so you cannot get it the wrong way round. If the socket does not go in fairly easily, DO NOT try to force it as there may be a bent pin or an obstruction. Be very careful if you attempt to straighten a bent pin, in fact it is probably better to let your dealer do it for you. If you have more than one disc drive, connect the remaining *slave* drives in 'chain fashion' to the *Master* drive as shown in Figure 4 (each drive has a 34 way plug just like the microcomputer).

Once the disc drives are all connected up, the next job is to connect up the power supply. You will notice that the power unit has four cables extending from it. One with a 3 pin plug for the mains electricity, one with a small 'jack' type plug for the microcomputer, and the remaining two each having a 4 way DIN socket for a 3 inch microdisc drive. Connect the jack plug into the power socket on the computer, and a DIN socket into the 4 way DIN plug on the back of each microdisc drive.

Remember we mentioned previously that each microdisc has a device for preventing its data from being overwritten or removed accidentally. It is very important that the system disc supplied has its' data (the DOS) protected so make sure both write protect holes (one in each corner) are exposed.

Next, plug the power unit and the television into the mains and switch on the electricity supply and the television (there is no on/off switch on the disc drive unit). There may or may not be a sensible message on the screen, however this does not matter because the next thing to do is press the red RESET button on the rear of the master disc drive. Two things will now happen: The message **'insert system disc'** will appear on the screen and a light will show on the front of the disc drive unit.

Note: On some units the light is green or red depending on which side of the disc is upper most. On other units the lights is always red.

Insert the system microdisc in the drive unit. It does not matter which side (A or B) is uppermost (since the DOS is on both sides), but make sure you insert the correct edge into the slot (see Figure 4). Push the disc fully home until the 'bar' type switch under the disc springs outwards, the disc is now locked in position.

The next thing to happen is that the DOS will be read from disc and loaded into the computer. When loading is finished, the green or red light will go out and you will see the following message on the screen:
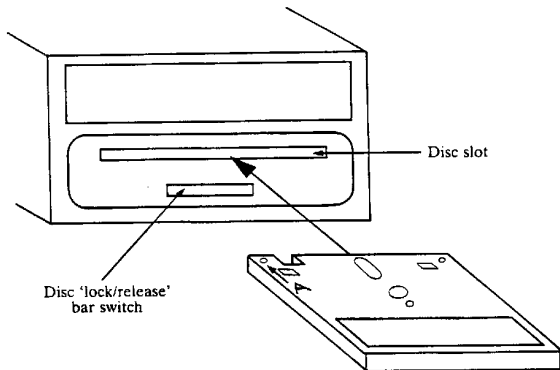
Front view of drive with disc being inserted
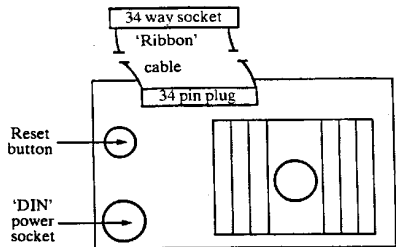
Rear view of drive

Figure 4 — ORIC Microdisc drive unit

ORIC DOS VI.1 (for the ORIC-1 or ATMOS).

OR1C EXTENDED BASIC V1.Ø (for the ORIC-1) or **VI.1** (for the ATMOS).

> **© 1983 TANGERINE**
> **37631 BYTES FREE** (ATMOS) or 47870 (ORIC-1)
> READY

This tells you that the DOS is now loaded and ready for use.

Note: If this message does not appear or is incorrect, remove the disc, remove the power plug from the back of the computer, then re-connect it and insert the disc.

Do not remove the system disc yet however as you will need it to make a backup copy, as explained in the next section. If however you do wish to remove the system disc, make sure the red (or green) light is 'out' then press the 'lock/release' bar on the front of the drive.

The disc will be partially ejected and you can withdraw it completely. The DOS is still loaded, in the computer memory so you can re-insert the disc without affecting the system in any way.

MAKING A BACKUP COPY OF THE SYSTEM DISC.

Now that you have loaded the DOS into computer memory, it would be a good idea, before doing anything else, to make a backup copy of the system disc, in other words, copy everything on the system disc onto another disc. If anything should happen which damages the system disc or affects the DOS written on it, then you have the backup copy to use.

To make a backup copy you will have to use two of the DOS functions (FORMAT and BACKUP) and as this is a first attempt we will take you slowly through the instructions required to use these functions. Whilst carrying out these instructions you might like to compare what you are doing with the instructions in Chapter 5 for FORMAT and BACKUP.

One more thing! Chapter 5 contains a number of useful points to bear in mind when using the system. In particular it covers the standards to be observed when using the keyboard (see General Instructions 1 page 19).

Before making a backup copy of the system disc you will need to format a disc, so insert one of your new discs in the *MASTER* disc drive (Number Ø). Now type in the instruction which is **!FORMAT Ø** RETURN (the drive you are using is Number 0). You will now see a message on the screen asking you to give the disc a name. Type in the disc name, which can be a maximum of any nine characters *including spaces,* in any order, then press RETURN

The message load drive and press RETURN is now displayed. Insert the disc to be formatted, in the 'master' drive (Ø) and press RETURN.

The disc will now be formatted (sector marked, named, and initialised), and when this process has finished, a message asking if you wish to format another disc is displayed. If you wish to (format another disc), type Y and press RETURN remove the formatted disc and repeat the procedure starting with the typed instruction. If you do not wish to format another disc, type N (or any other character) and press RETURN

When formatting has finished, remove the disc.

Now you can make a backup copy with the disc you have just formatted. The BACKUP function you will note (Page 26) gives two procedures, one for a system with just one master drive unit and one for a system with two or more drives. We suggest that to start with, you use the first procedure (for one disc drive) irrespective of how many drive units your system has:

1. Insert the *system* disc in the drive unit, then type in:

   !BACKUP Ø TO Ø RETURN
   since you are only using DriveØ, the <source drive and <destination drive numbers are both Ø.

   Note: It doesn't matter which side of the disc is uppermost.

   Notice that the light on the front of the drive is now 'on'. Data will now be read from the system disc and stored in a specially reserved area of RAM called the buffer. When the buffer is full, a message will tell you to **insert target disc,** and the light will go out.

2. Remove the system disc and insert your formatted disc. The data stored in buffer will now be written onto the backup disc. When all the data has been written, a message will appear, telling you to **insert source disc** i.e. your system disc, so that more data can be read and stored in the computer buffer.

   CAUTION make sure both discs are always inserted with the same side uppermost

3. You do not have to type in the BACKUP instruction again, just keep alternatively inserting the system and backup discs until a message informs you that all the system disc data is now on the backup disc.

4. Remove the backup disc, label it (system backup) on the *correct* side, and store it away together with the system disc.

This completes the 'getting started' part and you have successfully used two of the DOS functions (FORMAT AND BACKUP).

The next Chapter (5) deals with each of the seventeen DOS functions individually, describing what each function does, the instruction to be typed on the keyboard and any restrictions or constraints regarding the use of the function. Before you use the microdisc there are one or two important points you should be aware of regarding disc handling, typing instructions on the keyboard, protecting your data, and making mistakes. These are given in the General Instructions in Chapter 5 and we recommend you read them thoroughly, they will probably save you a fair amount of time and trouble later.

Finally:

The important thing to remember is not to go too quickly at first just follow the general instructions and make sure you understand the function which you are going to use.

If at any time you find that the DOS instructions fail to do what they should (or even worse, fail to do anything) the first thing to do is remove the system disc, then press the RESET switch on the rear of the *master* disc drive. Next, re-insert the system disc and the DOS will then be reloaded into the computer.

If you have a power failure whilst a system disc is in the drive unit, it is a good idea to re-backup the system disc, just in case the data has been corrupted, this does not always happen but its better to be safe.

CHAPTER 5

Using the Microdisc Functions

GENERAL INSTRUCTIONS

1. Typing instructions onto the keyboard.
To avoid ambiguity in this manual, the following standards have been adopted when showing you the instruction to be typed in for each microdisc function: -

Where you see a word in brackets thus <Filename>. This is to be replaced with correct data when you actually type in the instruction. For example <Filename> means you have to type in the name of a file, DO NOT type in the brackets.

Where you see a word reversed out this means you must press a key, not type a word. For example <u>RETURN</u> means the <u>RETURN</u> key not the word 'return'.

Where you are required to type in text. characters and/or numbers, these are shown in bold typeface, likewise any messages appearing on the monitor screen in response are shown in bold typeface. For example:

— **!COPY Ø TO Ø** then press <u>RETURN</u>

— The message **loading** appears.

Number zero is shown thus Ø to distinguish it from letter O

Optional items which you may or may not wish to use in the instruction are indicated thus [OPTION]

All characters **typed** in as part of a microdisc instruction must be **in** CAPITALS

Every instruction starts with the character ! which is followed by the command word and finally the data.

2. Handling magnetic discs.
The following are a few do's and don'ts which apply when handling 5.25 inch floppy or 3 inch microdiscs.

Do not touch any part of the disc magnetic surface which is exposed by the gap in its protective cover. (5.25 inch flexible discs only).

Keep the disc from being exposed to magnetic fields at all times. Exposure to a magnetic field for an instant will corrupt the data on the disc.

Store the data in a dust free area with a temperature not greater than 50°C and away from bright sunlight.

Do not clean a disc with anything other than an approved agent (consult your dealer).

Do not bend or deform a disc. (5.25 inch flexible discs only).

Try to write on the label before you stick it to the disc jacket, writing could damage the magnetic surface. (5.25 inch flexible discs only).

Do not open the disc drive front shutter whilst a function is being executed (when the red/green light on the front of the drive unit is illuminated.

3. Protecting data on the discs.
You will find that there are certain instructions used for writing data onto discs such as COPY, BACKUP and SAVE. There is also the DELETE instruction for completely removing whole files of data. These instruction make it very easy to destroy large chunks of data and if it is important data not recorded elsewhere the results can be catastrophic! As explained previously, every disc (micro or flexible) has a 'write protection' device, however there is another way you can protect against loss of data (especially damaged discs) and that is to keep copies of all working discs, these copies are commonly known as 'backups' and if 'backups' are to be useful they need to be regularly updated depending on how often you change the information on your working discs.

4. Mistakes and error messages.

There is always the possibility that something could go wrong, either because you make a mistake in typing commands, or in the way the system responds which could mean that a fault has developed. To help you identify the problem and in some cases put it right, there are a number of error messages which are displayed on the screen in the event of some (not all) problem situations arising. The Appendix is a list of these messages and what they mean.

5. Filenames

Where you see <filename>, this means you have to type in the name of a file and there are certain rules regarding the number of characters you can put in a filename, and what those characters are.

A filename can consist of three parts: the first part is a number which identifies the *disc drive,* the second part is called the *name* and the third part is called the *extension.*

The name part can be a maximum of any six alphanumeric characters in any order, and the extension part can be a maximum of any three alphanumeric characters, also in any order.

For example "1-PROG1.JOB" is a valid filename when the disc drive is number 1, the name part is PROG1 and the extension is JOB.

The extension part is optional, and the drive number is strictly speaking not part of the filename since it merely refers to the disc drive. You will see in the COPY instruction (Examples) there are some filenames without extensions, some without drive numbers and some without both. If you specify the filename as being just the disc drive number, there's no need to put double quotes (" ") round it. If however you do specify a name part, (with or without an extension and irrespective of whether or not there's a disc drive) you must put double quotes round it as shown above.

Below are some examples of correct and incorrect filenames:

Correct

"JOB.1A" Filename including an extension on the default drive.

"2-PROG25" Filename with no extension on disc drive 2.

"2-5JOB. MY" Filename with extension on drive 2.

Incorrect

"l-PROGRAM.25" Name part is too long (7 characters).

"FRED+3" + is not alphanumeric and is therefore not allowed.

6. Ambiguous filenames.

You will see that some instructions include <ambiguous filename>. This means that as well as specifying one filename, you can specify a number of filenames. The way in which you specify an ambiguous filename is by using *wildcard* characters, of which there are two (* and ?) * specifies any number of letters and/or digits in any combination and ? specifies any number or letter. The only requirement is that you must specify no characters after the * in the name part or the extension. Below are some correct and incorrect examples of the use of *wildcard* characters:

Correct

P*.JO? This looks at all files and any with P at the beginning of the name and JO at the beginning of the extension will be selected.

J?B?.B? Only filenames with four name characters and two extension characters will be looked at (? specifies only one character). Any filenames with J and B as the first and third name characters and B as the first extension character will be selected.

Incorrect

 "P*J2.NO?" There are characters after the * in the name part.

"PROG1?.*B" There is a character after * in the extension part.

7. Specifying disc drives

Some instructions contain <source drive> and <target drive>. The drive (number) being read from is the source and the drive (number) being written to is the target. If you do not specify a drive number where the instruction requires one. the system will allocate the default drive.

8. Information messages

From time to time. messages are generated by the system and displayed. to keep you informed of what is happening. These messages are self explanatory e.g. **Formatting finished.**

HELP pages

Description

As well as the DOS, a number of information 'pages' are written onto both sides of the system disc (by 'page' we mean a screenful of information). The information contained on these pages is mainly in the form of examples of microdisc instructions, and is intended to supplement the information contained in the remainder of Chapter 5 rather than be an alternative User Guide to this manual.

Instruction

The first thing to do is make sure your system disc is in drive 0, this is so that the help pages can be loaded into the computer when you request them.

Next, type in **!HELP** RETURN**.** This will result in a list being displayed showing you what is available in the help pages, in addition, there are also instruction telling you what to type in for displaying pages.

You will notice that the list contains the names of information items (most of which are the command words) to be found in the instructions e.g. DEL for DELETE, and each name has a number. You can use either the name *or* the number, for selecting the item, for example:

To display information on DEL, you can type in either **!HELP DEL** RETURN **or !HELP** <number> RETURN

The first page or screenful of information will then appear on the screen. If there is more than one page, you simply press SPACE to display each subsequent page.

Try typing in both the above instructions and check you get the same page each time. You will notice that the light on the drive unit front, comes on each time information is sent from disc to computer.

You are not restricted to selecting one item of information, in fact you can select as many as you like. For example let us suppose you want to see items 1, 4, 5 and 12, just type in **!HELP1** SPACE **4** SPACE **5** SPACE **12.** Equally you could type in the names rather than the item numbers but still separated by pressing SPACE**.** Don't forget to press RETURN at the end.

Another way of selecting more than one item is to specify a character or characters common to the items you want. For example if you type **!HELP D** RETURN all information items whose names start with D will be loaded into the computer and the first page of the lowest numbered item will be displayed. Similarly if you specified DEL, all items whose names start with or consist of DEL, will be loaded. This method is not unlike the *wildcard* character way of specifying ambiguous filenames.

If at any time you wish to display the index page, just type in **!HELP RETURN.**

BACKUP a complete disc

DESCRIPTION
To copy the entire contents of one disc onto another disc. There are two procedures: one for a system with one disc drive unit and one for a system with two or more disc drive units.

INSTRUCTION

For one disc drive

1. Insert the disc you are going to *copy from,* in the drive unit. Then type in:

!BACKUP <drive no.> TO <drive no.> RETURN

Note: In this case both the drive numbers are the same.

2. Data will now start to be read from the disc and put into a specially reserved area of computer memory known as the buffer. The buffer can only take so much data. and when it is full, no more data is read from the disc, at this stage the message **insert target disc** is displayed.

3. Now remove the source disc and insert your blank disc. The data in the buffer is now written onto the disc. and when it is all written, the message **insert source disc** is displayed on the monitor.

Keep alternately inserting the 'system' (source) and 'backup' (target) discs until a message appears, telling you that the entire disc has now been copied.

Do not forget to remove your backup disc. label it correctly and store it.

For systems with more than one disc drive unit.

1. Insert the disc to be copied from and the disc to be copied to. into any two disc drives. Remember which drives they are in or you could end up copying the wrong way round in which case the data will be lost!

2. Type in:

!BACKUP <source drive number> TO <target drive number> RETURN

All the data will now be read from the source disc and written onto the target disc. When backing up is completed a message to that effect will be displayed.

3. Remember to remove both discs and store them.

COPY file(s)

DESCRIPTION
COPY is probably the most versatile and therefore the most complex function of the DOS. It allows you to copy the contents of an existing (old) file or set of files, to a new file or set of files. This is the general function, however there are a number of variations and these are:

The new file(s) can be on the same disc as the old files, or on a different disc.

A number of old files can be merged into one new file.

You can give the new file the same filename as the old file, or a different one.

Copying (either to the same disc or a different disc) can be done using one or two disc drives.

The new file(s) can be given a write protected or unprotected status, or can assume the status of the old file, you can decide which option to set.

In addition to the above variations, there are a number of constraints and rules, and these are fully explained in the notes which follow the options.

Note: The disc drive being copied *from* is called the *source drive* and the drive being copied *to* is called the *target drive.* Similarly, the file being copied *from* is the *old* file and the file being copied *to* is the *new* file.

INSTRUCTION
!COPY "<old filename>" TO "<new filename>"
[,<option>][,<option>][,<option>] RETURN

CAUTION

Make sure you specify the correct disc drive numbers so that the source drive is part of the old filename and the target drive is part of the new filename.

OPTIONS

There are three options which you can specify as part of the instruction and they are described as follows.

,P or ,**N** (Write protect option)
Only one of these can be
specified.
If you want the newly created file to be write protected, specify **,P,** if you want it to be unprotected, specify ,N and if you want it to have the same status as the old file, specify neither (P nor N).

,**C** (Single disc drive option)

If you only want to use one disc drive for copying, specify **,C.** This will ensure that the messages **insert source disc** and **insert target disc** will be displayed, so that you know when to change discs.

,O or **,M** (Overwrite or merge options) Only

one of these can be specified.

It is often necessary to create a new file with the same name as on existing file (for example if you are updating files). Ordinarily, this would result in a message telling you that a file of the same name is already on the disc and no copying will take place. If, however, you specify **,0,** the existing file will be overwritten and a message telling you so will be displayed. The exception, of course, is when the existing file is 'write protected' which renders the ,**O** option ineffective.

You can merge a number of existing files into one new file by specifying ,**M**. You can use *wildcard* characters to specify a number of files (to be merged) in the form of an ambiguous filename. For example, the instruction:

'COPY "Ø-JOB*.B?" TO "PROG1", M

will select all files (on drive 0 disc) which satisfy "JOB*.B?" and merge them into one new file called "PROG1'.

If you are not sure about *wildcard* characters and ambiguous filenames, refer to 5. and 6. of General Instructions in this chapter for a full description.

When merging has finished, a message inviting you to specify another filename for merging, will be displayed. You can either type in a <filename> and press <u>RETURN</u> (to merge) or simply press <u>RETURN</u> if you do not want to merge any more files.

To keep you informed, a message is displayed each time any of the old files is merged into the new file.

NOTES
1. When a new filename is created as a result of copying, a message to that effect is displayed.

2. If the new filename is the same as the old filename, the new filename need not be specified.

3. The old filename need not include the disc drive number if copying from the default drive. The same applies to the new filename.

4. If you are not using default drives, you must specify the drive numbers in old and new filenames, even if the drive numbers are the same.

5. You can specify all the files on a disc in one instruction either by the use of * as wildcards to give a totally ambiguous filename or by specifying only the disc drive number without quotes (see example instructions 6 and 7).

6. When using COPY (with or without the Merge option), if the 'new' filename already exists on the disc, the message **File already exits** is displayed and the copy instruction is cancelled. There is one exception and that is when the ,0 (Overwrite) option is specified, in which case the message is not displayed and the instruction is carried out. (See Appendix 2 Error 9 for message).

7. If the filename you are COPYING to (with or without 'merge') is 'write protected', the message **<filename> is write protected** will appear and the copy instruction will be cancelled. In this case the ,0 option cannot be used with COPY.

EXAMPLE INSTRUCTIONS

The COPY function is extremely versatile and probably the best way of illustrating its many uses is to give you some examples of instructions:

1. To copy the file FRED.EXT on drive Ø to file JOE.12 on drive 1, and give it a write protected status.

   !COPY "Ø-FRED.EXT" TO "2-JOE.12",P <u>RETURN</u>

2. To copy the file ALEX on drive 1 to a file of the same name on drive 2 and give it an unprotected write status.

   !COPY "1-ALEX"" TO 2,N <u>RETURN</u>

   Note that because there is no change of filename, only a destination drive is specified, also there are no quotes round the destination drive.

3. To copy all files whose names begin with JOB but which have no extension characters, from drive 0 to drive 1. The destination files have the same write protect status as the source files.

   !COPY "Ø-JOB*" TO 1 <u>RETURN</u>

4. .To merge all files whose names begin with JOB and which have extensions from drive 0 into a file called BOX.205 on drive 2 with write protection.

   !COPY"Ø-JOB*.*" TO "2-BOX.205",P, M <u>RETURN</u>

Note — the file BOX.205 must not already exist on drive 2. If it does, an error message will be displayed.

5. Copy a file called GEORGE on the disc in the default drive, to a file called PETER on the same disc in the default drive with no change of write protection status.

   !COPY "GEORGE" TO "PETER" <u>RETURN</u>

6. Copy a file called GEORGE on the disc in drive 2 to a file called PETER on the same disc with no change of write protect status.

   !COPY "2-GEORGE" TO "2-PETER" <u>RETURN</u>

7. Copy all files on the default drive disc to drive number 1 disc, with no change of write protect status.

   !COPY "*.*" TO 1 <u>RETURN</u> or **!COPY TO 1**

8. Copy all files on source disc to another disc, using only one disc drive unit (number 0).

!COPY "Ø-*.*" TO Ø, C <u>RETURN</u> or **!COPY Ø TO Ø ,C**

or **! COPY Ø, C** <u>RETURN</u>

DELETE a file or set of files

DESCRIPTION
To remove a specified file or set of files from the disc, and to remove the name(s) of the file(s) from the directory. The area previously occupied by the deleted files is free to be used again.

INSTRUCTION

 !DEL "<ambiguous filename)"

Notes
 1. If no disc drive number is specified in (ambiguous filename) the default drive is used.

 2. You cannot delete files which are 'write protected' and if you attempt to do so, a message **File is write protected** will be displayed.

 3. The DIRECTORY command will tell you if a file is protected.

DIRECTORY listing

DESCRIPTION
We mentioned previously that the name of every file stored on disc is also listed in the directory sector. In addition, the length of each file in sectors and its write protect status is also listed. This function allows you to display a list of all files, a set of files or one file, together with the file length in sectors and the write protect status.

INSTRUCTIONS

!DIR [<drive number>] <u>RETURN</u> for all files on the disc
!DIR <ambiguous filename> <u>RETURN</u> for a set of files
!DIR <filename> <u>RETURN</u> for one file

Remember that you specify the drive number as part of the filename or ambiguous filename and that you can use wildcard characters to specify an ambiguous filename.

When you request a directory listing for a complete disc the display will look something like this.

1-MY DISC Directory Page 1

```
Z A P P E R . G A M 8 P   P I R A T E . B A S 6 5
F R O G G Y . C M D 2 3   F R E D D Y . X     6 P
D E L T A     1
```
103 used 535 free out of 638

where:

On the top line 1-MYDISC tells you the drive number is 1 and the name given to the disc in FORMATTING is MYDISC. Directory Page 1 is the first screenful of filenames.

If there are more filenames than can be displayed on the screen there will be other directory pages, 2, 3, 4 etc.

The bottom line gives the number of sectors used up by files, followed by the number of sectors free which can still be used for files and finally, the total number of sectors on the disc excluding those used for systems and directory information.

The files are shown between the top and bottom lines. There are two files per line and each has a number showing the number of sectors in that file. P indicates a file is 'write protected'. In this case there are 5 files, two of which are write protected.

In cases where there is more than one directory page, a message will tell you to press RETURN to display subsequent directory pages.

NOTES
1. For a 40 track disc of 16 sectors per track, this gives a total of 640 sectors. Of these, one sector is reserved for directory information for every 15 files.

DRIVE default setting

DESCRIPTION
Some instructions (COPY for example) give you the option of specifying a disc drive number or not. If you do not specify the drive number, the system automatically selects the default drive as defined by this function.

INSTRUCTION

!DRV [<drive number>] **RETURN**

You do not have to enter a drive number, in which case drive 0 becomes the default drive unit.

NOTES
1. This instruction is only of use with more than one disc drive unit.

FORMAT a disc

DESCRIPTION
To format, initialise and name, a disc in a specified drive unit.

INSTRUCTION

Type in **!FORMAT** <drive number> <u>RETURN</u>

When you have pressed <u>RETURN</u>, a message asks you to give the disc a name. This can be a maximum of any nine characters (alphanumeric, symbolic and spaces) in any order.

Type in the name you want to give the disc, and press <u>RETURN</u> .

A further message will now appear asking you to load the blank disc into the drive and press <u>RETURN</u> .

Insert the blank disc in the drive unit and press <u>RETURN</u> .

Formatting will now take place and a message will tell you when the disc is formatted and will also ask if you wish to format another disc.

If you do (wish to format another disc) type in Y <u>RETURN</u> and a message (as before) asking for a name, will be displayed.

If you do not (wish to format another disc) type N or any other character and press <u>RETURN</u> The system will then exit the FORMAT program and you are free to select other instructions.

NOTES

1. You must specify a drive number, the default drive does not apply for this function.

LOAD a file from disc

DESCRIPTION
This function loads a BASIC or machine code file.

If the program you wish to load was saved:

a) with the AUTO option (for a BASIC program)

<div align="center">or</div>

b) with a transfer address (for a machine code program)

then the program will automatically 'run' as soon as it is loaded.

INSTRUCTION

!LOAD <Filename> [,D] [,N] [,J] [,A<address>] <u>RETURN</u>
You will note that there are four options you can specify:
,D — This will display the start, end and transfer execution) addresses in hexadecimal (see SAVE a file).

,N — If the program was saved with the AUTO option or a transfer (execution address), this option will prevent it from being automatically run after loading has taken place.

,A<address> — When a program is saved, the start and end addresses in memory from which it was saved, are filed with the program. If you want the program to commence loading at a different address from the start address, you must specify **,A** followed by the new start address in hexadecimal.

,J — Use this option if you want the program to be joined onto the end of a program already in memory. If the program you are loading was saved with the AUTO option, then once loading has taken place, the two joined programs will automatically 'run'. You can prevent automatic 'run' by specifying the **,N** option. The **,J** option should only be used with BASIC programs.

PROTECT a file

DESCRIPTION
Changes the write protect status of a specified file or set of files.

INSTRUCTION

!PROT <ambiguous filename> [,<option>] **RETURN**

Where <option> = **P** to protect file
                 N to remove protection from a file
                 I to protect a file and remove its name from the
                 DIRECTORY listing when displayed, in other
                 words the file becomes 'invisible'.

NOTES
1. You do not have to include the option, in which case the file will be
   protected by default.

RENAME a file

DESCRIPTION
To change the name of a file held on disc

INSTRUCTION !REN   <Filename>To<Filename> RETURN

NOTES
1. Ambiguous filename cannot be used.

2. The new filename must not be already in use on the disc.

SAVE a file to disc

DESCRIPTION To
save:
— A BASIC program as a file
— A machine code program as a file
— A block of memory as a file

INSTRUCTIONS
Save a BASIC program

!SAVE <Filename> [,AUTO] <u>RETURN</u>

Where the ,AUTO option ensures the program will automatically 'run'
when loaded (see LOAD a file).

Save a machine code program.

!SAVE <Filename> ,A# <start address>
,**E** <end address> [,**T**# <transfer address>] <u>RETURN</u>

where ,**A** and ,**E** define the start and end of memory to be saved and
option ,**T** defines the address at which the program will be automatically
run when loaded.

Save a block of memory (not a program).

The instruction is as for a machine code program except that the ,T
<transfer address> option does not apply, since we are not loading a
program.

NOTES

1. Not specifying the options **,AUTO** (for a BASIC file) or ,**T**
   <address> (for a machine code file) means that the program will not
   automatically run when loaded. You will have to type in **RUN**
   <u>RETURN</u> for a BASIC program or **CALL** <address> <u>RETURN</u>
   for a machine code program.

2. If the filename specified, already exists on disc,' a message to this
effect is displayed.

Following are some examples of instructions.

'SAVE 'PROG', AUTO <u>RETURN</u> a BASIC program is stored under
the filename PROG. The AUTO option is included so the program will
automatically 'run' when it is loaded.

!SAVE 'PROGM',A# B400, E# C250 <u>RETURN</u> **.** An area of machine
code memory from address hexadecimal B400 to C250 is saved under
the filename PROGM. There is no transfer address included so the
program will not run automatically when loaded, you will have to use
CALL.

!SAVE 'PROGA' ,A# **B400, E# C250, T# B420** <u>RETURN</u> **.** As above
but with the transfer address included. When loaded, to program will
'run' starting from address hexadecimal B420.

SYSTEM disc drive reconfiguration

DESCRIPTION
This function enables you to tell the computer how many disc drives are connected and whether each one is single sided or double sided, 40 track or 80 track. In addition, you can also change the name of a disc.

This function is different from all the other DOS functions in that it is not held in memory, but remains on disc until it is called up by the command word.

INSTRUCTION
Insert the system disc in any drive unit, then type in:

!SYS <drive number> RETURN

A page is displayed with the following information:

— The title and version number of the DOS on the disc.

— A list of which keys to press in order to specify the various configuration details.

— The currently specified configuration of drive Ø.

If you wish to change drive Ø configuration for example, to double sided 80 track, simply type in the appropriate characters (D8 in this case), you will see the characters change on the display. Repeat the procedure for each drive, if you do not wish to change an existing configuration, Just press RETURN.

After you have pressed RETURN or re-configured, for the fourth time, a message inviting you to change the name of the system disc will be displayed.

Now, type in the new name and press RETURN or if you do not wish to change the name, simply press RETURN.

OPEN a file (for writing or reading)

CLOSE a file (from reading or writing)

PUT data in a file

GET data from a file

DESCRIPTION (in general)
These four instructions are concerned with data (as opposed to arrays and programs) and are interdependent to a large degree. For example before you can PUT data in a file, you must OPEN a new file for writing, (you cannot PUT data in an existing file).When writing is finished you must CLOSE the file. Once a file is CLOSED (created) you can OPEN it (for reading only) GET data from it and CLOSE it (from reading).

OPEN a file (for reading or writing)

DESCRIPTION To make a file available (OPEN) for reading from or writing to.

INSTRUCTION
!OPEN <filename> [,<option>] RETURN

The <options> are:

R if you wish to read data from the file (use the GET instruction).

W if you wish to write data to the file (use the PUT instruction).

1. If you specify the R option, the filename must already exist on the disc

2. If you specify the W option, the filename must NOT already exist on the disc.

CLOSE a file (from reading or writing)

DESCRIPTION
CLOSE a file which is currently OPEN, (for reading from or writing to).
If the file was open for writing to, a new file is created by CLOSE.

INSTRUCTION
!CLOSE, [,<option>] <u>RETURN</u>

Where the <options> are:

W if the file is open for writing

R if the file is open for reading

If you wish to close a read file *and* a write file, do not specify an option.

PUT DATA in a file

DESCRIPTION To read specified data from RAM and write it to a file on disc.

INSTRUCTION
!PUT <data> <u>RETURN</u>

NOTES
1. This instruction can only be used after an OPEN instruction has specified the name of a file for writing data into, i.e. with the ,W option.
2. The data must be specified in the form of expressions. An expression can be numeric or string and expressions must be separated from each other by commas.
3. A numeric expression will be written to disc as a single byte and a string expression will be written as a series of bytes.

GET DATA from a file

DESCRIPTION
To read specified data from a file on disc and load it into RAM.

INSTRUCTION
!GET <data> <u>RETURN</u>

NOTES
1. This instruction can only be used after an OPEN instruction has specified the file you can GET data from, i.e. with the ,R option.
2. Each expression can be numeric or string, and expressions must be separated from each other by commas.
3. A string of bytes is read into a string variable and a single byte is read into a numeric variable i.e. the format is the same as for the PUT instruction.
4. If you specify more data than the file contains, an error message is displayed.

STORE a BASIC array

DESCRIPTION
To store an array of BASIC variables (string, real or integer) under a specified filename.

INSTRUCTION
!STORE <array name (excluding dimension)> <filename> <u>RETURN</u>

NOTES
1. The array name can have any number of dimensions

2. The array must already be in memory, in other words you cannot type in the instruction and then the array.

3. If you do not specify an extension to the filename, a default extension of .DAT will be specified in the filename.

RECALL a BASIC array

DESCRIPTION
To read a BASIC array (string, real or integers) and load it into RAM under your own array name.

INSTRUCTION
!RECALL <new array name>, <filename> <u>RETURN</u>

NOTES
1. If you do not specify an extension to the filename, the system specifies a default extension of .DAT (as is the case in STORE).

2. The file must have previously been stored using STORE (not SAVE) instruction.

3. An array name can have any number of dimensions, i.e. you can allocate it any amount of memory. If the array specified is greater than the file on disc, the remainder of the array (after loading the file) is filled with 0's or null strings.

If the array specified is smaller than the filename, then only enough data to fill up the array is read from the file.

Appendix

ERROR NUMBERS AND MESSAGES

Normally when an error occurs a message is printed indicating this. However this action can be suppressed by POKE 1277,1 or re-enabled by POKE 1277,0. When an error occurs the error number corresponding to that error is left in location 1279, if no error occurred then this location will be zero.

ERROR 1 — file not found
The command specifies a file that does not exist.

ERROR 2 — invalid command end
The command name was understood but the option was not.

ERROR 3 — no drive number
!FORMAT requires a drive number.

ERROR 4 — bad drive number
The system does not have a drive with the drive number used.

ERROR 5 — invalid filename
The filename used does not conform to the correct filename format.

ERROR 6 — fderr = (error number)
This error should only occur with a defective disc. The error number given is the status from the disc control hardware.

ERROR 7 — illegal attribute
!PROT did not understand the attribute (i.e. not **N**,**P** or **I**).

ERROR 8 — wildcard(s) not allowed
A wildcard filename was used where it is not allowed e.g. **!LOAD "*.BAS".**

ERROR 9 — file already exists
The file you have attempted to copy to. already exits on the target disc.

ERROR 10 — insufficient disc space
There is less room on the disc than required to store the file.

ERROR 11 — file open
It is not possible to use !STORE while a file is open for writing or to use !RECALL while a file is open for reading. It is also not possible to use !OPEN more than one file for reading or for writing.

ERROR 12 — illegal quantity
The number used is illegal

ERROR 13 — end address missing
If a start address is specified in !SAVE then an end address must also be given. In this case, no end address was found.

ERROR 14 — start address > end address
The start address of the file exceeds the end address, the command is therefore meaningless. Occurs only in !SAVE.

ERROR 15 — missing *'to'*
TO was expected but none found. E.g. !REN "FRED"

ERROR 16 — renamed file not on same disc
!REN changes the name of a file but does not move it. Therefore the new name must specify the same drive as the old.

ERROR 17 — unknown array
!STORE and !RECALL may generate this error. These commands require that the arrays they specify must previously be DIMed.

ERROR 18 — target drive not source drive
The change disc option (C) of !COPY requires that only one drive is used.

ERROR 19 — destination not specified
The target drive has not been included.

ERROR 20 — cannot merge and overwrite
!COPY will not allow merge and overwrite together this is because if one of the files to be merged is the one overwritten then the file may extend itself until disc space is exhausted.

ERROR 21 — single target file illegal
!COPYing a group of files and specifying a target file is illegal unless the merge option is specified.

ERROR 22 — syntax
You have made a mistake in typing an instruction.

ERROR 23 — filename missing
A filename was expected but none was given (in the instruction).

ERROR 24 — source file missing
The specified source file **was** not found on the disc.

ERROR 25 — type mismatch
This error is generated by !RECALL if the file specified was not created by !STORE or if it was created by !STORE using an array of a different type to that specified by !RECALL.

ERROR 26 — disc write-protected
It is not possible to change the contents of a disc if the write-protect tab is in the protected position. Any command that must change the disc may give this error.

ERROR 27 — incompatible drives
This error is generated by !BACKUP. It is not possible to backup a double sided disc to a single sided drive for example.

ERROR 28 — file not open
This error is generated by trying to !PUT or !GET without a file being OPEN.

ERROR 29 — file end This error is caused by 'GET beyond the end of a file.