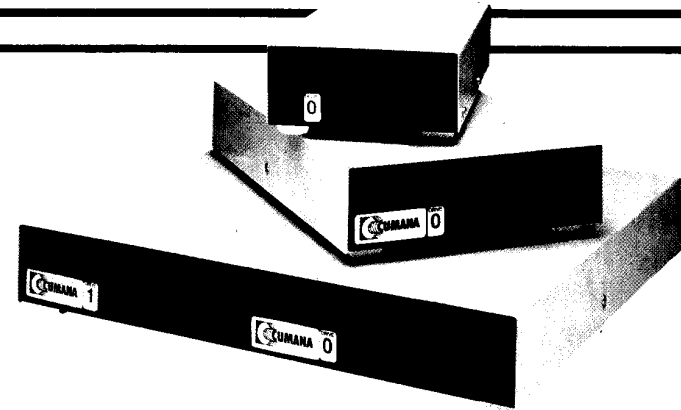

CUMANA

DISK DRIVE GUIDE



ORIC



Cumana Disk Drive Guide
for the
Oric Atmos Computer

Cumana
Disk Drive Guide
for the
Oric Atmos Computer

First Edition

A Cumana Publication

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WARNING: This Equipment must be earthed.

IMPORTANT: The wires in the mains lead for the disk drive are coloured in accordance with the following code:

GREEN AND YELLOW EARTH
 BLUE NEUTRAL
 BROWN LIVE

The colours of the wires in the mains lead may not correspond with the colours or markings identifying the terminals in your plug. Proceed as follows:

The wire coloured green and yellow must be connected to the terminal marked with the earth symbol and/or the letter E or coloured green or green and yellow.

The wire that is coloured blue must be connected to the terminal marked with the letter N, or coloured black.

The wire that is coloured brown must be connected to the terminal marked with the letter L, or coloured red.

If the socket outlet available to you is not suitable for the plug supplied, the plug should be cut cleanly off and disposed of immediately, the exposed mains wires will cause a potential shock hazard if the moulded plug were to be plugged in.

The moulded plug must only be used with the fuse and fuse carrier firmly in place. Plugs and fuse carriers from other manufacturers are not interchangeable. If the plug or fuse carrier should become damaged or the fuse carrier lost the plug should be replaced in accordance with the directions above. The plug **MUST NOT** be used without a suitable fuse carrier. Should the fuse blow the fault must first be cleared and the fuse replaced with a 3 AMP fuse that is ASTA approved to BS1362. If in doubt consult a qualified electrician.

Warning

There are no user serviceable parts inside a CUMANA disk drive or interface. Before attempting to remove the lid be sure to isolate the unit by switching off at the mains and removing the plug from the mains supply.

Chapter 1

Data Storage

There are a variety of devices in which data can be stored, and in general they are referred to as MEMORY.

Memory size is normally measured in kilo-bytes of information, where one byte is eight bits or one word. Incidentally half a byte is a nibble (four bits).

The ORIC Atmos microcomputer has 48 kilo-bytes of user memory known as RAM or Random Access Memory, and as the name suggests can be used in a number of different ways. The RAM normally holds the current program and its variables which is either under execution or at some stage of development.

As a new program is needed it is loaded into the same RAM space occupied by the previous program, thus causing the original program to be over-written.

Random access memory can only hold information whilst the power is switched on. Turning your computer off will result in the complete loss of any program or data contained within it.

The ORIC also contains a certain amount of ROM or read only memory. This memory contains the program or operating system that the ORIC needs to communicate and interface with the outside world. It is normally known as firmware and unlike RAM cannot be over-written or lost when the machine is turned off.

Other types of memory associated with micro (and indeed mainframe) computers are those known as media storage peripherals, i.e. disk drives, magnetic tape drives, punched tape and card machines, etc. These devices are normally used for long term data retention, the most popular now using magnetic media.

Data stored within a computer can be saved or down loaded on to a magnetic media device before the machine is turned off or another program is run. Data can also be up-loaded either in the form of a complete program or as additional data for a continuing process. This kind of memory is known as virtual memory.

More Speed

Cassette recorders when used as media storage peripherals are generally very slow in the task of loading and saving computer software. Most micro owners will have used a cassette recorder as a storage device and will be familiar with the tedious and time consuming process of searching an audio tape for a particular file. Now that you have a disk drive you will notice an incredible increase in filing speed. A disk drive can load or save a program several hundred times faster than a cassette recorder. There are many other advantages that the disk drive has over the cassette recorder that can only be appreciated by reading this book and experimenting with the drive.

Chapter 2

The 40 - 80 Track Theory

Before we begin to explain the floppy disk drive we must first take a look at the floppy disk and some of its terminology.

A floppy disk is a circular, thin piece of magnetic media contained within a flexible or rigid plastic jacket and when inserted in a disk drive rotates at 300 RPM. As with all diskettes, data is stored in concentric circles on the disk, known as tracks. The read/write head in the drive is moved in and out radially over the diskette to get to the correct track. This is known as stepping. The tracks are numbered 0 to 39 on a 40 track diskette and 0 to 79 on an 80 track diskette. Since the total distance covered by the head is the same for both 40 and 80 track systems, the head inside the 80 track drive must step twice as many times to go the same distance as the head inside the 40 track drive. This distance is measured in Tracks Per Inch or TPI. A 40 track 3 inch drive has a pitch of 100 TPI and an 80 track drive a pitch of 200 TPI. 3.5 inch drives have a pitch of 67.5 and 135 respectively and 5.25 inch drives have a pitch of 48 and 96 respectively.

Figure 2.1 below shows the basic physical arrangement of the diskettes' data.

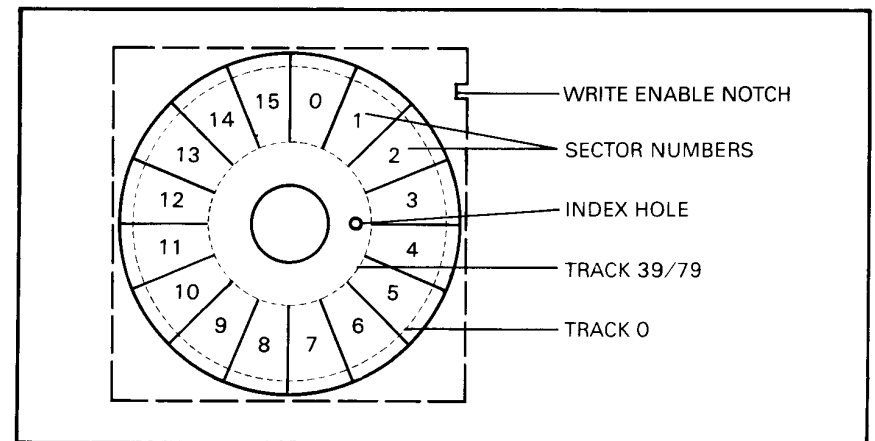


Fig. 2.1. The 16 sector double density format of a floppy diskette (the sectors are laid out during the format process).

Index Hole

This is a small hole in the jacket of the disk which when optically aligned with a further hole in the disk itself will produce a short pulse. This is referred to as the soft sector index and is used by the computer to time a single revolution of the disk.

Data Window

This is an elongated hole in the jacket which allows the read write head to make contact with the disk. The window appears on both sides of the disk as 40 or 80 track 3 inch drives will accept the disk either way up. You can therefore record on both sides. However, 3.5 and 5.25 inch drives can have dual heads which can write to either side of the disk without the user turning the disk over.

Write Enable Hole

These small holes appear on the rear or side of the disk and are used to enable or disable the disk drive's writing electronics. Covering the notch on a 5.25 inch disk with an opaque tab will prevent the drive electronics from writing to the disk. To prevent a drive from writing data to a 3 inch or 3.5 inch disk there is a plastic switch at the rear which can be moved to cover or uncover the write enable hole. Covering the hole will enable the write, uncovering the hole will disable the write. This option is useful for protecting valuable programs and utilities.

Hub Ring

This exposed portion of disk is mechanically engaged with the disk drives clutch and drive hub which spins at 300 RPM. The clutch engages as the disk drive door is closed.

Format and Density

Before a brand new diskette can be used by the computer it has to be formatted. This is a process which segments each of the tracks into a number of sectors. A sector is likened to a box which is capable of holding 256 bytes of information, the amount of sectors placed on a single track can vary. However the Oric Atmos uses double density and the MFM (Modified Frequency Modulation) technique and has a total of 16 sectors per track. (see Fig. 2.1. on the previous page)

Capacity

By knowing the number of tracks on a disk and how many sectors per track, we can calculate the storage capacity on each side of a disk and hence the total capacity, e.g. in double density mode there are 16 sectors per track with 256 bytes per sector creating a total storage space of 4,096 bytes. With 40 individual tracks the storage area on one side of the disk would be 163,840 bytes and for an 80 track disk 327,680 bytes. If you include both sides capacity is doubled. For convenience a disk drive's capacity is quoted to the nearest 10 kilo bytes. e.g. A 40 track single sided drive stores 160k and an 80 track single sided drive stores 320k.

Chapter 3

Diskette Type and Care

Soft/Hard Sectors

The diskettes to use in the various Cumana drives are known as mini-floppy diskettes and are the soft-sectored variety which is now the norm among mini and microcomputers, including the ORIC Atmos.

They have only one physical sector hole which is referred to as the index hole.

During the 'formatting' procedure the computer uses the index hole to time one complete revolution of the disk and then allows the 'format' software to lay down tracks onto the media surface whilst also dividing the tracks into magnetic segments called sectors.

This is known as soft-sectoring.

Hard-sectored diskettes have an entire series of physical sector holes (typically 10 or 16, plus an index hole) and are therefore "pre-formatted".

Hard-sectored diskettes cannot be used on this equipment.

Diskette Do's and Don'ts

Whichever way you buy your diskettes please observe the do and don't diagrams found on either the outer sleeve or carton. An example diagram is shown overleaf in Fig. 3.1. Never leave a diskette within the influence of magnetic fields produced by loud speakers, mains transformers, electric motors, television sets, monitors etc or anything you may suspect to be magnetic that could cause permanent loss or damage to your valuable files. As a point of interest leaving a diskette on top of an ORIC micro is fatal, as hidden beneath the case is a large power supply and a small but efficient loud speaker! When a diskette is not in use or in a drive always replace it in its protective sleeve. An unprotected disk lying around can pick up small particles of dust that when re-inserted in a drive can cause expensive damage to the read/write head, which in turn will damage each successive diskette used in the drive.

Dust and grit will score the diskette surface removing the oxide coating and rendering the media useless. Avoid physical stress on the diskette i.e. bending or folding. Do try and keep them in a rigid plastic diskette box or library case. Do not touch any magnetic recording surface, dirt and grease will cause soft errors. Keep your disks at room temperature, excessive heat or cold will cause them to warp.

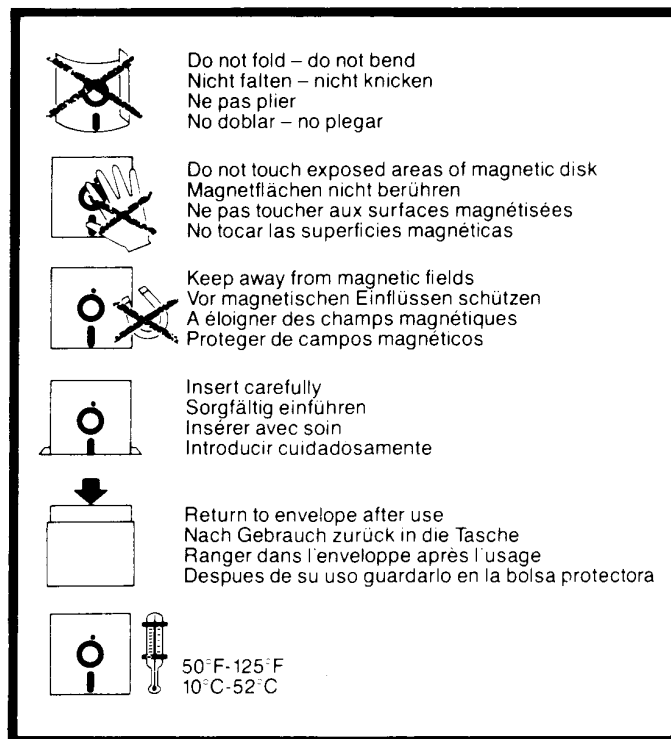


Fig. 3.1. Typical disk sleeve warnings.

Chapter 4

Connecting Up

After you have carefully unpacked your Cumana disk drive and interface no doubt you will be eager to try it. Read on and you will find out how to connect it to the host micro.

First and foremost make sure all units are isolated from the mains power supply. Next position the disk drive in close proximity to the host micro, then locate the flat 34 way ribbon cable protruding from the rear of the disk drive. Insert the connector into the slot marked 'Disk drive' on your Cumana interface. (See diagram 4.1 overleaf). This connector will only go in one way and the coloured indicator stripe should be on the right hand side as you look at it. Do not attempt to force the connector into the socket as it is possible to mis-align the connector and so damage the header. If the connector refuses to go in, check for bent pins in the header, or incorrect orientation of the connector. The same procedure now applies to the short 6 inch flat cable found in the box. Connect one end of this cable into the slot marked 'Host' on the Cumana interface and the other end into the slot marked expansion on the rear of the Oric microcomputer.

Note: The cable can go either way round but the connectors will only fit in one way up, i.e. symmetrical cable assembly.

Now that you have the disk drive interfaced with the micro all you need to do is connect the power supply, here you have a choice. The power supply inside the Cumana interface is able to also power the Oric microcomputer and so an extra DC Power cord has been supplied. This should be inserted into the Oric in place of the original wall mounted supply. Alternatively you could continue using the original power supply at the expense of occupying another mains outlet.

Assuming you already know how to connect up your TV set/monitor and have already done so, then switch on. If not then consult the relevant chapter in your Oric user guide.

After switching on, press the RESET button found on the left hand side of the Cumana interface. The prompt line on your TV set should read 'Insert

system disk' and the disk drive indicator lamp should be lit. At this stage insert the master system disk and close the door. For correct insertion of diskettes see Chapter 9 – “3 inch, 3.5 inch, and 5.25 inch drives”.

Before trying the various DOS commands read the following Chapter 5 “Making a backup”. This is very important as you only have one master system diskette and if it gets corrupted or damaged you will not be able to use your Cumana disk drive and interface.

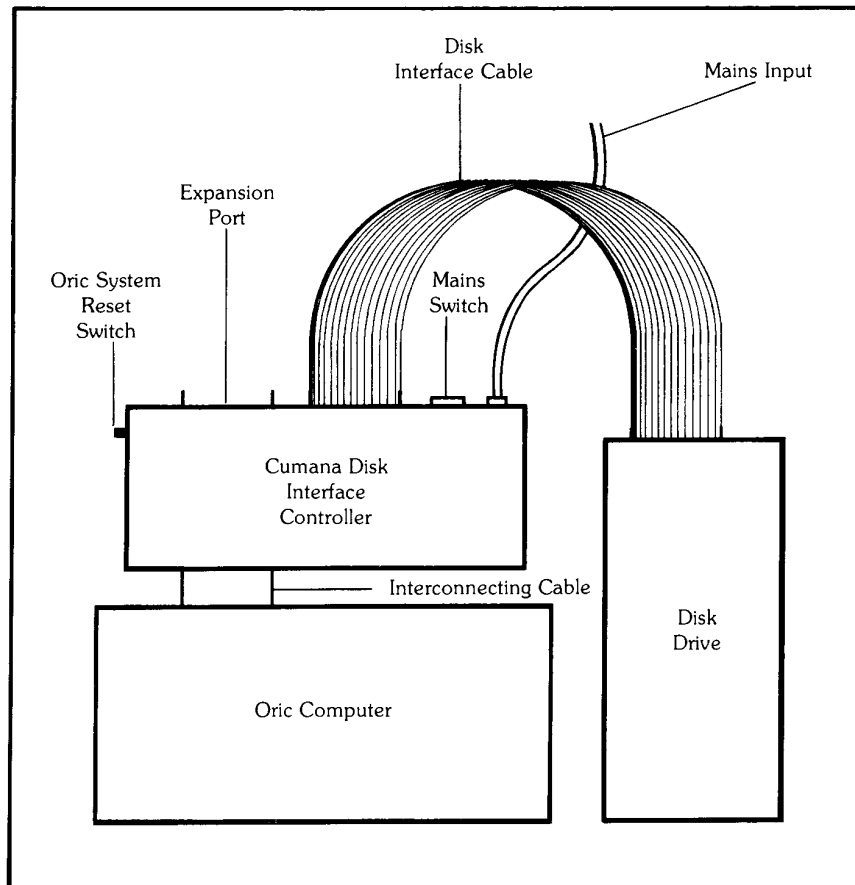


Fig. 4.1. Block diagram showing the units connected.

Chapter 5

Making a backup

The following backup procedure will enable you to copy the entire contents of one diskette onto another.

In Chapter 2 it states that before a brand new disk can be used it has to be formatted and so before we can make a backup of the system diskette we must first format a new one. The following is a description of the procedure:-

Remove the master system diskette and type in the command:-

`!FORMAT` followed by a press of the <RETURN> key

The computer will then display :-

**Load disk on drive 0
and press RETURN**

Insert a blank disk to be formatted into drive 0 and press RETURN. The computer will proceed to format the disk and when it has finished will display:

“Formatting complete.”

You now have a newly formatted disk ready for making a backup. There are two procedures for making a backup: One for a system with one drive unit and one for a system with two or more drive units.

Instructions

For one drive unit type the following:-

`!BACKUP 0 TO 0 <RETURN>`

Note: That both drive numbers are the same since you only have one drive – drive 0

The TV screen should display:-

**Load source disk on drive 0
and press RETURN**

Insert the master system diskette in drive 0 and follow the prompts on the screen. The computer will proceed by reading a number of tracks into an area of memory called the buffer. When the buffer is full (after reading 10 tracks) the screen will display:-

Load target disk and press RETURN

Remove the master system disk and insert the formatted disk or target disk as it is called then press <RETURN>. The computer will then dump the buffer contents onto the target disk. When it has finished the TV will display:-

Load source disk and press RETURN

Simply continue alternating between source and target until the backup is complete and the screen displays:-

“Backup complete.”

You will have to alternate between source and target about 4 times. Make sure you do not get confused or the backup will fail and if the master diskette is write enabled ie., without write protect tab, you could easily corrupt the master.

After backup your master diskette should be filed away for archival purposes and subsequent backups made from the new master.

For systems with two or more drive units

Typically the backup will be performed on a dual drive system although up to 4 disk drives can be connected to the Oric at any time. The same command for the single drive backup is used for the dual drive backup, only this time the source and target drive numbers have to be specified ie.,

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

eg., `!BACKUP 0 TO 1 <RETURN>`

This will copy the entire disk in drive 0 onto the formatted disk in drive 1. Follow the prompts given and press RETURN. The screen will indicate when the backup is complete.

After backing up remember to store the master in a safe place and use the new master system diskette for subsequent backups.

Chapter 6

File Specifications

Programs or files (as we will refer to them from now on) are normally given names to identify them. This name or filespec abbreviated to <fsp> can consist of numbers and letters up to a total of six. In addition each filespec can have a three character extension e.g.:- !SAVE “PROG25.BAS”. As well as the 6 character filespec and extension the disk drive number can be specified. e.g. “1-PROG25.BAS” This is a valid filename with optional extension characters that will operate using drive one.

Below are some examples of correct and incorrect filenames:

Correct:

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

“2-FILE85” Filename with no extension on disk drive 2.

“2-JOB1.MY” Filename with extension on drive 2.

Incorrect:

“1-PROGRAM.25” Name too long (6 characters max).

“FRED+3” ‘+’ is not alphanumeric and is therefore not allowed.

Ambiguous filenames:

You will notice that some DOS instructions include; <afsp> in the command line meaning ambiguous filespec. Commands that have <afsp> will allow you to specify not only a single file but a range of files if you wish. The way in which to do this is by using the two wildcard characters * and ?. ‘*’ specifies any number of letters and/or digits in any combination and ‘?’ specifies any single letter or digit. The only requirement is that you must not specify characters after the ‘*’ in either the name part or the extension part of the <afsp>.

Below are some correct and incorrect examples using wildcards:

Correct:

“P*.JO?” – This will operate on any file with ‘P’ as the first character of the name part and ‘JO’ as the first part of the extension.

“T??E.B?” – Only files with four name characters and two extension characters will be looked at e.g. ‘TIME.B1’, ‘TUNE.BA’, ‘TONE.B5’ etc.

Incorrect:

“P*J2.NO?” – There are characters after the ‘*’ in the name part of the <afsp>.

“PROG1?.B*B” – There is a character after the ‘*’ in the extension part of the <afsp>.

Specifying disk drives

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

Information messages

From time to time, messages are displayed by the system to keep you informed of what is happening. These messages are self explanatory e.g.

Saving. PROG1.BAS

Chapter 7

Disk Operating System Commands

All Cumana DOS commands for the Oric are preceded by a special character known as ‘pling’ or ‘!’ this is achieved by pressing the shift key and number 1; e.g.:- !FORMAT.

Where you see <RETURN> in bold type face used in examples, press the RETURN key on the key board after typing the line.

The following is a summary of the Cumana DOS commands in alphabetical order.

!BACKUP <source drive> TO <target drive>

Backup is a command that allows a complete copy to be made from any master diskette, one or more disk drives can be specified and single or dual drive backups are possible. For an explanation of the backup command see Chapter 5 “Making a backup”. Remember the target disk will be totally overwritten, it is advisable to ensure that you no longer require any of the previous data.

!COPY

The copy command 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 a generalized view however there are a number of variations and these are:-

The new file(s) can be on the same diskette as the old file(s) or on a different diskette. A number of old files can be merged into one new file and you can give the new file the same name as the old file or change it. Copying (either to the same or a different diskette) can be done using one or more disk drives.

The new file(s) can be given a protect or unprotect status to guard against accidental writes to the diskette, or alternatively the new file can assume the

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

Note: The drive that is used to copy from is the source drive and the drive being copied to is the target drive. Similarly, the file being copied is the old file and the file being created is the new file.

Instructions:

!COPY "old filename" TO "new filename", (opt), (opt), (opt) <RETURN>

Caution:

Make sure you specify the correct drive number in the filename i.e. source drive goes with old filename, and target drive goes with new filename.

Copy options:

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

,P or ,N (This is the write protect option).

Only one of these can be specified. If you want the new file to be write protected or locked specify ,P. If you want the new file to be unprotected then specify ,N. If you want the new file to assume the same protection as the old file then do not specify either.

,C (Single drive option)

If you want to use one disk drive for copying, specify ,C. This will ensure that the messages 'Insert source disk' and 'Insert target disk' are displayed as appropriate so that you know when to change diskettes. (Caution – avoid mixing them up!)

,O or ,M (over-write or merge options).

Only one of these can be specified. It is often necessary to create a new file with the same name as an existing file (for example if you were updating files). Ordinarily, this would result in a message telling you that a file with the same name already exists and that no copying will take place. If however you specify ,O, the existing file will be overwritten and a message telling you so will be

displayed. The exception of course, is when the disk or file is 'write protected' which renders the ,O, option ineffective.

You can also merge a number of files into one file by using the ,M, option in conjunction with the wildcard characters. For example, the instruction:

!COPY "0-JOB*.B?" TO "PROG1",M

Will select all files (on drive 0 disk) that satisfy "JOB*.B?" and merge them into one file called "PROG1".

If you are not sure about the use of 'wildcard characters' refer to the explanation in Chapter 6, page 13.

To keep you informed, a message is displayed each time an old file is merged into a new file.

Notes:

1. When a file name 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, then the new filename need not be specified.
3. The old filename need not include the disk drive number if copying from the default drive. The same applies to the new filename.
4. If you are not using the default drive, then you must specify the drive number in old and new filenames, even if the drive number is the same.
5. You can copy all the files on a disk in one instruction, either by using the '*' to give a totally ambiguous filename, or by specifying the disk drive number without quotes. See examples 5 and 6 in this chapter. This method of copying files is often faster than a backup especially if there are only a few files on the disk.

Examples:-

The following examples are given to show the many ways in which the copy instruction can be used.

1. To copy the file FRED.EXT on drive 0 to file JOE.12 on drive 1, and give it a protected status.

`!COPY "0-FRED.EXT" TO "1-JOE.12",P <RETURN>`

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

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

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

`!COPY "JOB*" TO 1 <RETURN>`

4. To merge all files with the name JOB and that have extensions on drive 0 to a file called BOX.205 on drive 2 with the protected status. Note the file BOX.205 should not already exist on drive 2 else the error file exists will be displayed.

`!COPY "0-JOB.*" TO "2-BOX.205",P,M <RETURN>`

5. To copy all the files on drive 0 disk to the disk in drive 1 with no changes to the protection status.

`!COPY "*.*" TO 1 <RETURN>` or `!COPY 0 TO 1 <RETURN>`

6. To copy all the files on one disk to another disk using the default drive only (drive 0).

`!COPY "0-*.*" TO 0,C <RETURN>` or `!COPY 0 TO 0,C` or `!COPY 0,C <RETURN>`

`!DEL <afsp>`

The delete command is used to remove a specified file or set of files from the disk, the name of the file(s) is removed from the directory and the space that was previously occupied is free to be used by another file.

Note: You cannot delete a file that has the write protect status set, if you attempt to do so the message "File is write protected" will be displayed.

The directory command will tell you if a file is write protected.

`!DIR <afsp> <RETURN>`

The name and position of every file saved on the disk is held in a reserved area of the disk known as the directory, in addition the length of the file and its write protect status is also kept and together these items can be displayed along with the filename. When requesting a directory the ambiguous filename can be used so that you can specify the drive number and a range of files.

Examples:

`!DIR <RETURN>`

This will simply display all the files on the default drive.

`!DIR 1 <RETURN>`

This will display all the files on drive 1.

`!DIR "2-JOB.*" <RETURN>`

This will display all the files on drive 2 that have the filename JOB and any extensions.

When you request a directory of all the files the display will look something like this:-

Directory of Drive 1-MY DISK

```
ZAPPER.GAM 8P      PIRATE.BAS 65P
FROGGY.COM 23      FREDDY.TXT 66P
DELTA          1
```

5 Files 535 Blocks free

Where:

On the top line 1-MY DISK tells you the drive requested was drive 1 and the name given to the disk when formatting was MY DISK. The bottom line gives the number of files, followed by the number of sectors free that can still be used for future files. The actual files are shown between the top and bottom lines, in this case 5 files are shown. The number shown after the filename is the length of the file in sectors and the letter 'P' shows files that are write protected, in this case 3 files are write protected and 2 are not.

If there are more files in the directory than the screen can display, the space bar can be used as a scroll stop ie, press the space bar once to stop the screen scrolling, press again to continue.

Notes:

For a 40 track drive with 16 sectors per track the total number of sectors on a disk is 640. Of these, one sector is reserved for every 15 directory entries.

`!DRV <drive number> <RETURN>`

Some DOS commands give the user the option to specify a drive number in the command line, if the number is not specified then the default drive is used. The command `!DRV` is used to alter the value of the default drive e.g.

`!DRV 2 <RETURN>`

Any command issued with the default drive option will now go to drive 2

Notes:

This command is only of use with more than one drive unit. Typing `!DRV <RETURN>` and not specifying a drive number will set the default drive to 0.

`!DSTEP <val> <RETURN>`

This command is used to alter the disk drive seek step time. Where `<val>` is a numeric value either 6, 12, 20 or 30 ms (milliseconds). Your master system diskette is factory preset to 12 ms. If you intend altering the seek access time of the disk drive make sure the drive can operate at the new speed. Permanent damage may result if the disk drive mechanics are operated at the wrong speed. If in doubt consult the manufacturer's recommended operating limits. After pressing the reset button on the interface the disk drive head will seek to track zero at 30 ms.

Note: When a new `dstep` speed is issued the system tracks on the disk are updated so that the new speed will operate each time the system is used, a temporary change in speed can be achieved by write protecting the disk and then using the `dstep` command.

`!FORMAT "disk name" <RETURN>`

This command is used to format, initialise and name a disk in a specified drive unit. The disk name can be a maximum of any nine characters (alphanumeric,

symbolic, and spaces) and can be prefixed by a drive number as in filenames ie.

`!FORMAT "1-MY DISK" <RETURN>`

A message will ask you to load the disk in the specified drive and press `<RETURN>`

Formatting will then take place and a message will tell you when the operation has finished.

`!LOAD "filename" (,D) (,N) (,J) (,A<address>) <RETURN>`

This command is used to load into memory, either a basic program or a machine code program. If the program you wish to load was saved with either:-

A) The auto option (for basic programs)

or

B) The transfer address (for machine code programs)

Then the program will 'auto-run' as soon as it has loaded.

You will note there are four options that you can specify:

`,D` – This will display the start, end and transfer addresses in hexadecimal (for a clear understanding see `!SAVE`).

`,N` – If the file was saved using the auto run option or transfer (execution) address, this option will prevent it from running after the file has loaded.

`,J` – Use this option if you want the file to be joined on to the end of a file currently in memory. If the program you are loading was saved using the auto run option then once loading has finished the two joined programs will automatically 'run'. You can prevent auto run by specifying the `,N` option. The `,J` option should only be used with basic programs.

`,A <address>` – When a file is saved, the start and end addresses are saved with the file and so when loading the computer knows where to put the file. If you want the program to load at an address other than the start address saved

with the file, then the program can be force loaded using the ,A <address> option. Note: The address can be either decimal or hexadecimal, in the latter case prefix the value with the '#' symbol.

!PROT <afsp> (,opt) <RETURN>

This command is used to change the protection status of the ambiguous filename.

Where (opt) =

P to protect a file from writing.

N to remove protection from a file.

I to protect a file from writing and remove its name from the directory listing when displayed ie, to make the file 'invisible'.

Note: if no option is specified the P option is given by default.

!REN <old fsp > TO <new fsp> <RETURN>

This command is used to rename a file on the current default drive where <old fsp> is the name you wish to change and <new fsp> is the name you wish to change to.

Note: ambiguous filenames cannot be used. The new filename must not exist on the diskette prior to command execution or else an error message will result.

!SAVE <filename> (,AUTO) <RETURN>

Three types of file can be saved using the !SAVE command. The above example shows how to save basic programs, where <filename> is the name you wish to call the file, and the auto option decides whether the file will automatically 'run' after loading.

!SAVE <filename> (,A start) (,E end) (,T transfer) <RETURN>

The above example shows how to save machine code programs where, <filename> is the name of the file ,A and ,E define the start and end of the block of memory to be saved and ,T decides the transfer (execution) address that the file will begin execution. The !SAVE command can also be used for saving a block of memory. Use the above example but omit the ,T option, this will prevent the file from automatically running after it has been loaded.

Notes:

1. Not specifying the options ,AUTO (for a basic file) or ,T (for a machine code file) means that the program will not run automatically when loaded. You will have to type in RUN <RETURN> for a basic program or CALL <address><RETURN> for a machine code program.
2. If the filename specified already exists, a message to this effect is displayed.

Following are some examples of instructions:

!SAVE "PROG",AUTO <RETURN>

A basic program is stored under the filename PROG. The AUTO Option has been specified so the program will automatically 'run' when it is loaded.

!SAVE "PROGM",A#B400,E#C250,T#B420 <RETURN>

An area of machine code memory from address hexadecimal B400 to C250 is saved under the filename PROGM. The transfer address is B420 and so when the file is loaded this is the address from which execution will commence.

!SAVE "PROGA",A#B400,E#C250 <RETURN>

An area of memory saved as above but this time without the transfer address. When the file is loaded it will not automatically 'run' instead you would have to use CALL.

!SET (drv), (trks), (sides) <RETURN>

The set command is used to tell the operating system how many drive units it has and what type they are. Where (drv) is the disk drive number you wish to set, (trks) is a value either 40 or 80 depending on what type of drive you have, and (sides) is a letter either 'S' for single sided drives or 'D' for double sided drives. The set command works by updating the master system diskette, if the master system diskette is write protected ie, it has the write enable notch covered, an error message will be displayed however the resident system will be temporarily set allowing you to use the drive. The master system disk is factory preset for both drive 0 and drive 1. To remove a drive from the system type !SET (drv) <RETURN> without any parameters.

Example:

```
!SET 2,40,D <RETURN>
```

This will set drive 2 as a 40 track double sided drive.

```
!STAT <RETURN>
```

The stat command is used to find out what has been set with the !SET command. The display should look something like this:

```
Drive 0 – 40 Tracks Single-sided.  
Drive 1 – 40 Tracks Single-sided.
```

TEXT FILING.

```
!OPEN a file (for writing or reading)
```

```
!CLOSE a file (from reading or writing)
```

```
!GET data from a file
```

```
!PUT data in a file
```

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 file for writing (you cannot put data in an existing file). When writing is finished you must CLOSE the file. Once the file is CLOSED (created) you can OPEN it for reading only, GET data from it and CLOSE it from reading.

```
!OPEN <filename> (,opt) <RETURN>
```

To open a file for reading or writing. Where <filename> is the name given to the data file and (,opt) is one of two options. They are;

,R If you wish to read from the file (use the GET instruction).

,W If you wish to write to the file (use the PUT instruction).

Note:

1. If you specify the ,R option be sure that the file already exists on the diskette.

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

```
!CLOSE (,opt) <RETURN>
```

To close a file that is currently open (for reading or writing). If the file was open for writing, a new file is created by CLOSE. The options are;

,R If the file was open for reading.

,W If the file was open for writing.

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

```
!PUT <data><RETURN>
```

Note the PUT data instruction will not work unless a file has been opened for writing ie, using the ,W option.

The <data> must be in the form of expressions. An expression can be a numeric or string variable. All expressions must be separated by commas. A numeric expression will be written to the disk as a single byte and a string expression will be written to the disk as a series of bytes.

```
!GET <data><RETURN>
```

Note the GET data instruction will not work unless a file has been opened for reading ie, using the ,R option.

Each expression can be numeric or string, and expressions must be separated by commas.

The expression format is the same as the PUT instruction.

```
!STORE <array name><filename><RETURN>
```

To store a basic array (string, real or integers) under a specified filename. Where <array name> is the name allocated to the array you wish to store, note the array name should be used without any dimensions.

Note:

1. The array can have any number of dimensions but they must not be included as part of the array name.

2. The array must already be in memory, you cannot type in the instruction and then the array.
3. If you do not specify an extension with the filename the default extension .DAT will be used.

!RECALL<new array name><filename><RETURN>

To read a basic array (string, real or integer) and load it into RAM under your own array name. Where <new array name> is the name you wish to give the array, and <filename> is the name the array was stored as. If you do not specify an extension in the filename the default extension .DAT will be used. An array name can have any amount of memory allocated to it ie, any number of dimensions. If the array specified is larger than the file on the disk, the remainder of the array is filled with 0's or null strings.

If the array specified is smaller than the file on the disk then only enough data to fill the array is read in from the disk.

Chapter 8

Switchable Disk Drives

The switchable disk drive is a machine that is capable of reading disks created on either a 40 Track drive or an 80 Track drive. This drive is in essence an 80 track disk drive with some clever electronics incorporated that allow the user to choose the track pitch he desires. This choice is made by the setting of a switch found on the rear of the unit.

When the computer sends a step pulse, the drive head moves one track, either in towards the centre of the disk or out away from the centre. It would normally take 80 step pulses to move the drive head across the complete range of tracks, however, when the drive is set in the 40 track mode the electronic device adds a second pulse to every one received from the computer. So the computer only needs to issue 40 pulses to get the head all the way across the disk. This does however present a small problem. The width of the head in an 80 track drive is smaller than the head in a 40 track drive, so when the switchable drive reads a track created on a 40 track machine, it only reads half the full track width. This it does with ease, but the problem occurs when you attempt to write to a disk in the 40 track mode. Since the head width is smaller, data is only written to half of the correct track width. The switchable drive will read this data back without fail, however if the disk were to be placed in a real 40 track drive, the drive would attempt to read half the old data plus half the new data. Ultimately this ends with an error message typically DISK ERROR 16 DRIVE XX TRACK YY SECTOR ZZ. Which means data not found at the indicated track and sector. See the diagram overleaf for a clearer understanding. For users wishing to write 40 tracks on a switchable drive ensure that:

- (A) The disk used is either brand new or a previously used disk that has been bulk erased.
- (B) The disk is formatted on a switchable drive set in the 40 track mode.

If these simple steps are adhered to there should be no problem, but remember as soon as the disk is written to in a 40 track drive the width of the track will be increased and so rewriting again with a switchable drive can cause

a problem. The golden rule is this:- When swapping disks with friends or colleagues remind them to copy it first, then any modifications they make can be made on the copied disk without the fear of read/write errors, and if you abide by the same principle then the rule will work both ways.

NOTE: If a disk becomes corrupt, copy the files that are readable and then reformat the disk. If you always keep a backup you will be one step ahead of an accident.

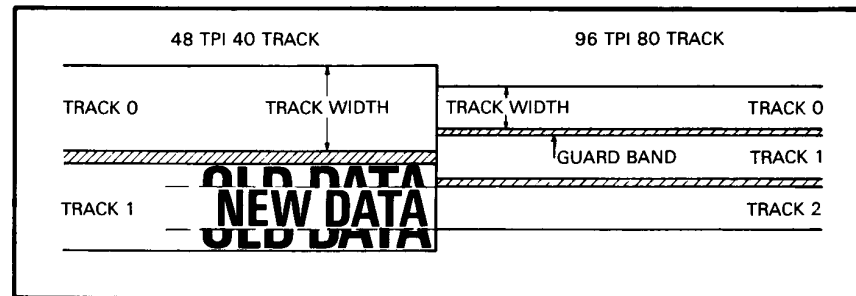


Fig. 8.1. Showing the overlap from a 40 track to 80 track drive.

Chapter 9

Different Types of Disk Drive

One of the obvious differences between 3" inch, 3½ inch drives and 5¼ inch drives is the physical size and the different disks used. The 3 inch and 3.5 inch flexible disk is encased in a rigid plastic jacket. The advantage is that it cannot be bent severely and get damaged. Also the data window is protected whilst not in use and so prevents fingers, dust and grit from damaging the delicate surface. The write protect notch is still optically sensed but instead of using countless sticky tabs to enable and disable the write option, the 3 inch and 3½ inch disks have a small plastic switch that covers or uncovers the protection indicator. Unlike a 5¼ inch disk, the 3½ inch media is no longer clamped between a hub and a clutch, instead it has a metal disk fixed to the media that engages directly with the drive motor. The 3 inch disks have a nylon sprocket drive that engages directly with the spindle motor of the drive. Inside the 3 inch and 3½ inch drives advanced technology allows even smaller read/write heads with larger scale integrated electronics. To the user the changes are transparent. We still have 40 and 80 track drives, single or double sided, with the same corresponding storage capacity for each type. However, the drives are a lot quieter and the track seek times are much improved. Below is detailed some of the more relevant technical information regarding the 3 inch and 3½ inch drives.

The number of tracks per inch has increased as you might expect, this is the reason for the quieter performance and speedier access times. Track pitch for a 40 track 3 inch drive is 100 TPI. The 3½ inch 40 track has 67.5 TPI and the 80 track 135 TPI.

The 3 inch and 3.5 inch drives are completely SA400 bus compatible with the 5¼ inch drive, they can therefore take the place of existing 5¼ inch drives or can be added to existing 5¼ inch drive systems.

Fig. 9.1. Inserting a 3" disk into the drive.

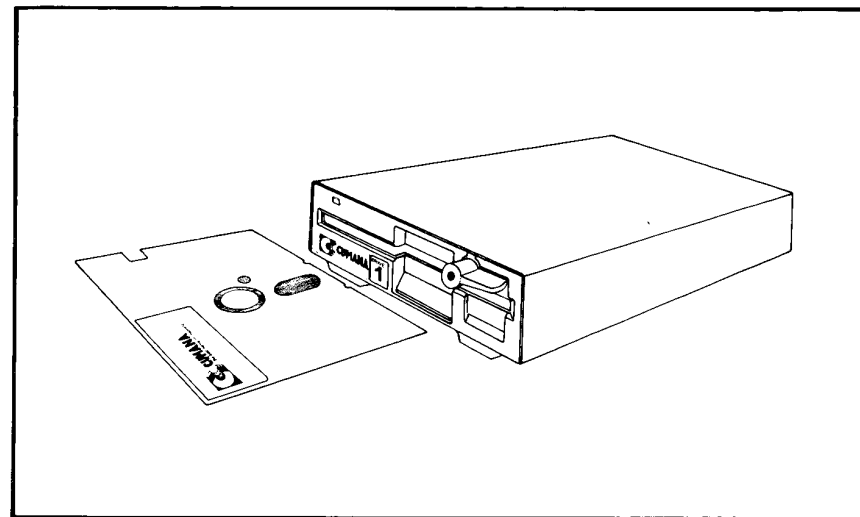
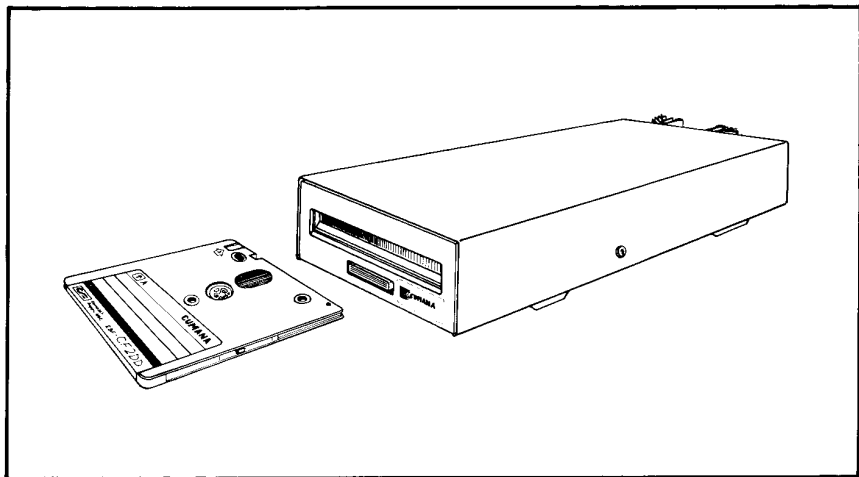


Fig. 9.3. Inserting a 5 1/4" floppy disk into the drive.

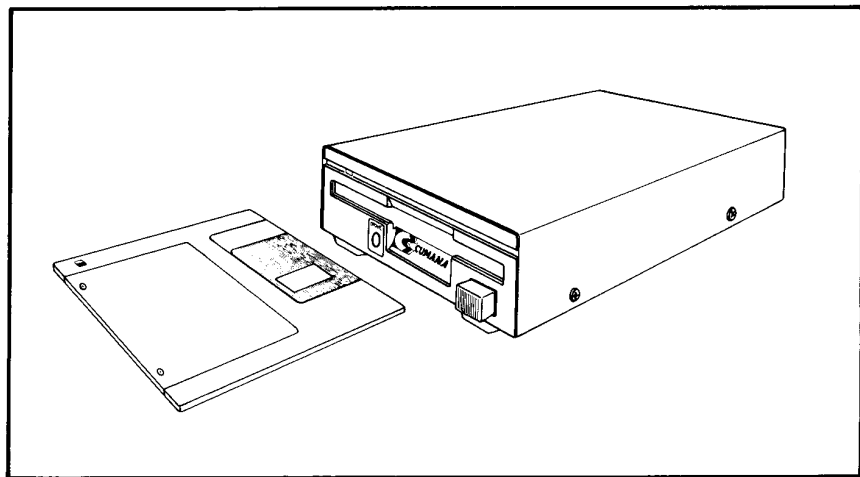


Fig. 9.2. Inserting a 3 1/2" disk into the drive.

Appendix A

Error Numbers and Messages

Normally when an error occurs a message is printed. However, this action can be suppressed by POKE 1277,1 or re-enabled by POKE 1277,0. If an error occurs the error number corresponding to that error is left in location 1279. If no error occurs 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 disk. The error number given is the status from the disk 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 exists on the target diskette.

ERROR 10 – insufficient disk space

There is less room on the disk 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 !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 disk

!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 DIM'ed.

ERROR 18 – target drive not source drive

The change disk 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 disk space is exhausted.

ERROR 21 – single target file illegal

!COPY'ing 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 disk.

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 – disk write-protected

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

ERROR 27 – incompatible drives

This error is generated by !BACKUP. It is not possible to backup a double sided disk 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.

Appendix B

Maintenance Warning

There are no user serviceable parts inside a CUMANA disk drive or interface. Should your equipment require servicing refer it to qualified service personnel, or alternatively return it to CUMANA direct with details of the fault you experience.

Risk of Electric Shock

Should you attempt to remove the lid on a CUMANA disk drive be sure to isolate the supply first by switching off at the mains and removing the plug from the mains outlet.

Appendix C

Connecting a Second Drive

If you bought a single Cumana disk drive, either 5¼, 3½ inch or 3 inch with an internal power supply fitted, with either the UK or European plug, you can easily upgrade to a dual drive system. On the cable that connects your single* drive to the host micro computer there is an additional 34 way edge connector. *This connector is used to daisy chain another single disk drive of the same type. i.e. if you have a 5¼ inch drive then the connector will only suit another 5¼ inch drive. The same applies to 3½ inch. You can however mix 40 and 80 track drives on the same system. All 80 track drives are switchable to the 40 track mode. If you consider purchasing an 80 track drive to use in the 40 track mode you are advised to read the chapter on switchable drives first.

When ordering a second drive for your system be sure to specify it as a second drive by post fixing your order with 'E'. This means a disk drive excluding this user guide, connecting cable*, and system utility disk. The disk drive will also come factory preset to drive 1.

Note

*In the case of 3 inch drives, the second drive will be supplied with the interface cable for connecting 2 drives to your computer.

Connection

To connect the second drive to your existing system is a simple task. First be sure to isolate all units from the mains supply before proceeding. Remove the cover on the second drive by undoing the screws on either side of the lid and locate the cable entry point at the rear of the unit. Here you will find a 34 way cable strain relief fixed by two screws, remove the screws and the strain relief. Next locate the second connector on your existing 34 way drive cable and plug it into the rear of the drive mechanism adjacent to the cable entry point. The red or blue indicator stripe on the cable should go to the right hand side of the drive connector. Once this is connected, replace the cable strain relief, clamping the cable firmly in place. Lastly replace the cover and you are ready to use your dual drive system.

If you have any doubts about the fitting of a second drive, refer the job to qualified personnel or alternatively refer it to your dealer who will arrange to have it done for you.

Appendix D

Booting Original Oric Disks

If you have any original Oric software on diskette and you wish to use it on your Cumana system you may find that the disk will not boot. This is because the disk interface when reset will look at the disk in drive 0 and attempt to load a file called 'CUMANA.DOS'. This is the system file, a large machine code program that recognises all the commands beginning with the '!' character. If you want your Oric disk to boot on the Cumana system you must copy the system file onto the disk, to do this see the !COPY command in Chapter 7 (page 15) on how to copy files from one diskette to another with either a single drive or a dual drive system. Alternatively you could boot the Cumana system disk supplied with your interface, and then run any program on the Oric disk as you wish. The system file on an Oric diskette is called 'SYSTEM.DOS' and is not boot compatible with the Cumana system. It cannot therefore be booted by the Cumana interface. If the Oric file is renamed to CUMANA.DOS only a small portion of the file will load causing your computer to hang until reset again. If this file is not required it can be deleted from the disk and the Cumana system copied to take it's place.
