TIB · PLC

DD - 001
OPERATING GUIDE

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INTRODUCTION

The Ultimate disc drive is the latest development in drive technology for the C64™ and incorporates many of the advantages of the Commodore 1541 and 1571 drives, together with the benefits associated with a cartridge interface. In short the Ultimate drive offers speed, capacity and MS DOS compatibility, together with the flexibility and reliability you would usually expect from a disc drive.

If you have previously used a cassette drive for data storage, you will already be familiar with the delays caused whilst the computer is searching for a programme. The Ultimate drive loads 64K in less than six seconds, with the rapid random access time associated with direct file access.

FEATURES OF THE ULTIMATE DRIVE

The unique feature of the Ultimate drive is that although files are created using standard C64™ commands, their format is changed via the cartridge interface and written to the disc in MS DOS™ format. This means that files created on the C64™ can be read in on MS DOS™ machine, and in many cases, visa versa. You now have the ability to create files at home and perhaps print them out on a friend's printer, attached to an IBM PC or clone. Alternatively if you are upgrading your C64™ , you can now translate your whole archive of files to be used on a PC.

The Ultimate drive offers a full 720K of usable storage space, allowing you the opportunity to create larger files or simply arrange your files in a more convenient way. The drive uses very little of the internal rom (approximately 4K) to hold DOS and in fact only uses this space when the drive is in DOS mode. A file can be pulled in from 0400 to FFFF (machine code) on a newly formatted disc.

The cartridge interface is also unique in both it's speed and design, because all programmes are directly accessed via a jump block, which means that the drive will achieve compatibility with any possible future rom changes on the C64™, whilst it's solid state circuitry makes it compact and reliable. Perhaps one of the most convenient features of the interface, is it's ability to automatically execute a load with any disc featuring a BOOT. EXE file, whilst dropping to basic, if no autoload file is present. Occasionally there is a small synchronisation delay whilst this is occurring. A message to this effect will be displayed on the screen.

Next the header screen will appear, giving you the chance to enter either the games or utility menu. Either depress the appropriate number key or select via the cursor.

## TIB · PLC

1) GAMES
2) UTILITIES

INSTALLING YOUR DRIVE

The first thing you need to do with your disc drive is unpack it. Inside the carton there will be the following items.

1) Warranty Card.

2) Games Instruction Booklet.

3) Cartridge Interface.

4) Disc Drive.

5) Floppy Disc.

6) This Manual.

First of all you need to complete the warranty card and return it to TIB PLC. This will register your ownership whilst alerting TIB to the fact that you have purchased a drive and may require regular newsletters about new software available in the correct format.

Next you will need to attach the interface to the cable from the drive as per figure 1. You will see that on both the cartridge and the cable, the connector has a notch and groove, which need to be matched for correct connection. The interface cartridge is correct when the moulded logo is faced upwards. Having made the connection, push the two end stops inwards until they click.

Figure 1
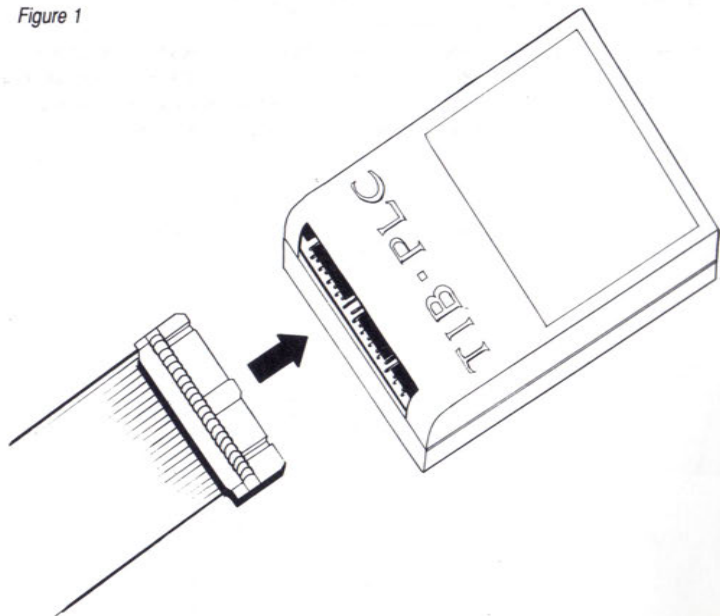
Having assembled the interface it is necessary to connect this to the C64™ (figure 2) using the expansion port (position 9). Gently push the cartridge onto the male connector, with the TIB logo facing upwards. On some systems, the cable may appear rotated through 180° but this is a function of the design for that particular model. It is important to remember that the interface connects through the expansion port (9) and not the serial port (7). Generally speaking the CBM 1541 or 1571 may be connected to position 7 and as such, you may find it necessary to reconfigure the "write address" in any commercial software used, to device 9.

Figure 2

COMMODORE PERSONAL COMPUTER
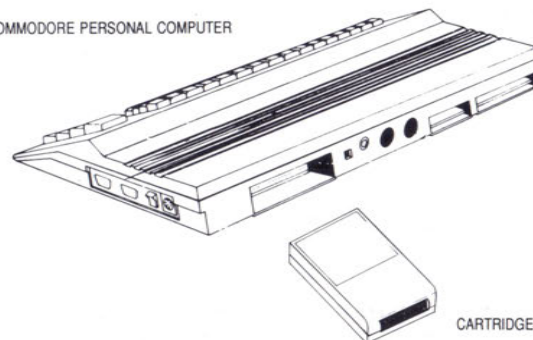
CARTRIDGE INTERFACE

The system is now almost ready to use. On the front panel of the drive unit (figure 3) you will see a drive light, which will be illuminated when the drive is in use.

It is very important to ensure there is nothing inside the disc drive such as a cardboard shipping sleeve. Next place the disc supplied with the unit into the drive, with the metal shutter edge first until you feel or hear a gentle click, the label on the disc should always be facing upwards. The drive is now ready to use, so turn the power on the C64™.

Figure 3
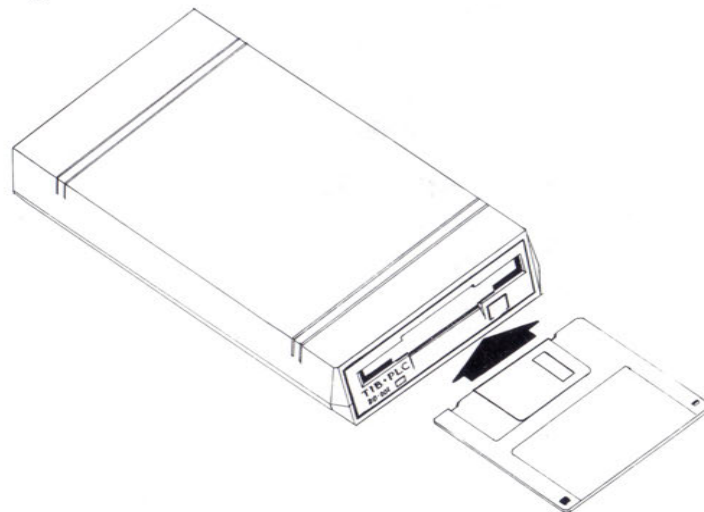
ASSEMBLY TROUBLESHOOTING GUIDE

SYMPTOM	CAUSE	REMEDY
Red indicator light is not on.	C64™ is not turned on. Disc is not in drive. Interface is not connected.	Turn unit on. Check power is on at electrical socket. Place disc in drive. Push interface to snug fit in the expansion port.
On switch on, drive does not activate, or works slowly and with excess noise.	Insufficient power. Power unit supply worn. Drive damaged .	Check all connections. Check power supply output with a meter. Drive needs 4.5 - 4.9v. If PSU is producing less obtain a new PSU. Contact your dealer.
Programmes won't load but computer and drive give no error message.	Another device on the serial bus is interfering.	Disconnect all other devices.
Disc in drive but drive drops to basic.	Not recognising the autoload on the disc.	Load the directory. Type load "$", 9 return and see if disc has an autoboot file present. Look for BOOT.EXE.
Programmes won't load and disc LED flashes several times.	A disc error has occurred.	Re-format new disc and try to copy file.
Your own programmes that used to load won't anymore but new programmes on newly formatted discs work.	Old discs are damaged. The drive has gone out of alignment.	Make copies if possible or re-copy from back-ups. Have dealer re-align the drive.

MAINTENANCE TIPS

1) KEEP THE DRIVE WELL VENTILATED - It needs air circulation on all sides.

2) USE ONLY GOOD QUALITY DISKETTES - Badly made discs cause increasd wear or alternatively deposit ferric oxide on the heads. TIB PLC recommend Sony media as one suitable diskette, which may be purchased via the special offer on the rear of the games instruction manual or alternatively from any authorised Sony distributor.

3) AVOID USING PROGRAMMES THAT "THUMP" AS THEY LOAD - Sometimes a commercially purchased programme may contain a bad sector which causes the drive to make a chattering noise as it attempts to read. If possible copy onto a new disc.

4) Although not essential, like all appliances, the drive would benefit from being checked over once a year by your dealer. In addition the heads should be cleaned regularly with a suitable head cleaning kit, to avoid the harmful build up of oxide. Suitable kits are available on the reverse of this manual or from your dealer.

DISC DRIVE SPECIFICATION.

PHYSICAL SPECIFICATIONS OSDC

Environmental Limits	Operating	Shipping	Storage
Ambient Temperature	(5.0°- 45°c)	(-40°- 60°c)	(-20°50°c)
Relative Humidity	20 to 80%	1 to 95%	1 to 95%

Maximum Wet Bulb	85°F (29.4°c)No condensation
DC Voltage Requirement	+ 4.5volt to + 5.5 volt
DC Power Current	OSDC
Motor Start	0.88 A Max.
Read	0.37 A typ
Write	0.38 A typ
Seek	1.2 A Max

Stand by	0.004-2 A typ

Mechanical Dimensions
Height	(25.4mm)
Width	4" (101.6mm)
Depth	5.9" (150mm) with front bezel
Weight	1lb (430gram)

Shock
Operating:	10gs with duration of 11 millieseconds (No hard error)
	5gs with duration of 11 millieseconds (No soft error)
Non Operating	60gs withduration of 11 millieseconds

Vibration	Frequency	Displacement	Acceleration
Operating	5-20	0.01"	
	20-500		1.0G"
Non Operating	5-20	0.27"	
	20.500		4.5g

*Except resonant frequency

RELIABILITY SPECIFICATIONS

MTBF:	12,000 power on hours under typical useage* *Assumes the duty cycle of the drive spindle motor to be 20%
MTTR:	30 minutes
Componemt Life:	10 years
Error Rates:	
Soft Read Errors:	1 per 10^9 bits read
Hard Read Errors:	1 per 10^{12} bits read
Seek Errors:	1 per 10^5 seeks
Media Life:	
Passes per track:	30×10^5
Insertions:	30,000+

DISC DRIVE SPECIFICATION. *(cont.)*

PERFORMANCE SPECIFICATIONS OSDC

Capacity: (kbytes)	
Unformatted	
Per Disk	1000
Per Surface	500
Per Track	6.25
Formatted Per Disk	
256B / Sector	655.2 (16)
512B / Sector	737.2 (9)
1024B / Sector	819.2 (5)

720k Formatted Free Space
MS DOS Compatible (No Subdirectories allowed)
Up to 112 File Names

Transfer Rate (kbit/sec)	250
Average Latency (m/sec)	100
Access Time (m/sec)	
Track to Track without setting	3
Average with setting	94
Setting time (m/sec)	15
Motor Start time (sec)	0.5

Functional Specifications OSDC

|		
Rotational Speed (R.P.M.)		300
Recording Density	(BPI)	8717
Track Density(TPI)		135
Tracks		160
Encording Method		MFM

DISC DRIVE ACCESSORIES

TIB intend to launch an adaptor to replace the cartridge interface in early 1992. The adaptor will be designed to convert the Ultimate Drive back to a standard IBM PC type drive. This will offer the Ultimate Drive unique flexibility, making it CBM and IBM compatible. For further details please contact your local dealer.

DISKETTES

Diskettes are available in various sizes, ranging from 3", 3.5", 5.25" and 8" with 3.5" becoming increasingly the most popular. Having established the size of the disc, you must then decide how much data it is certified to store. **The diskettes you require for the Ultimate drive are 'Double Sided, Double Density, 135 TPI'.** Whilst many brands are available, Sony media was used during the drives development and produces excellent results.

A diskette is much like a cassette in function in that it is a piece of plastic (mylar) coated with ferric oxide, encased in a plastic shell for convenience.Whilst you may pull back the shutter on the disc to examine the media, the media itself should never be touched. Notice also there is a hole in the plastic in the bottom right hand corner of the disc which contains a movable plastic tab. When the tab is moved to obscure the hole, you may read and write to the disc. When the hole is not 'protected' (ie see through) you may only read from the disc. In the centre of the disc is a metal capstan in which the drive spindle will locate to turn the disc.

Figure 4
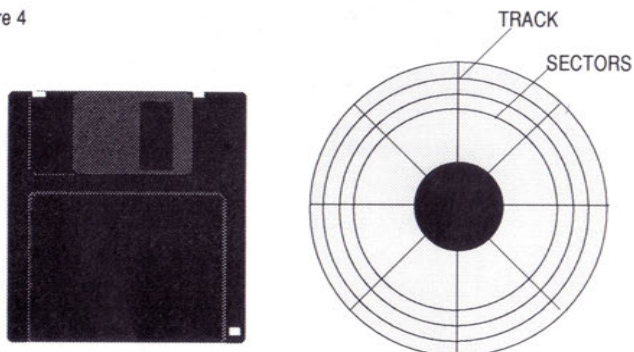
TRACK

SECTORS

DISKETTE ORGANISATION

There are a total of 720 blocks or sectors on a 3.5" diskette, as per the table below. The diskette surface is divided into tracks, which are consecutive circles of decreasing diameter on the surface of the disc and upon which data is recorded. In total there are 80 of these tracks in use, numbered 0 to 79.
Each track is divided into sectors, rather like slices of a cake, for a speedy method of following data. The structure is a s follows:

Track	Sector Numbers	Total Sectors
0 - 79	1 through 9	9

HOW TO PREPARE A DISKETTE

A diskette needs a magnetic pattern imprinting upon it in order that the drives' heads can find information. The pattern consists of tracks and sectors and when completed, builds a filing system for information stored on the disc. This pattern or format, is not usually on the disc when purchased (although pre-formatted discs are available from TIB PLC) and needs to be placed on the disc, prior to undertaking any work. With the Ultimate drive,there are two methods of doing this.

1) Using the Command, Type
> OPEN 15 , 9 , 15 RETURN.
> PRINT # 15, "N: Name you want to give disc" RETURN
> CLOSE 15 RETURN

2) Using the format facilities.
> Turn on the C64™ with TIB disc in the drive.
> At the main menu, select utilities.
> Remove the utilities disc from the drive and insert a new diskette.
> On the utility menu, select format and press return. You can select format by either moving the cursor or pressing 8 RETURN. The disc will now format in approximately one minute and fifty seconds.

BACK - UP DISKETTES

Although disc technology is generally more reliable than cassette, and 3.5" discs the most reliable form of disc technology, the disc itself is still relatively fragile and has a useful life of only a few years. Therefore it is very important that you make copies of any important programmes and files. The general rule is that you will always make a back up when you don't want to re-create your current work. If you are creating a new programme with frequent changes, back up at each revision.

The Ultimate drive offers two useful utilities to make back ups of either files or complete discs.

BACKING UP FILES
From the Utilities menu select "File Copy , device to device". To achieve this you may select with the cursor or by depressing 6. This will then ask you the name of the file or programme you want to copy and where you want to copy it from and too. The protocol is as follows.

'Device (from), device (to) return.

So the following options are available:
From 1541, 1571, 1581 to the Ultimate	*8,9 RETURN
From tape to the Ultimate	* 1,9 RETURN
From the Ultimate to the Ultimate	* 9,9 RETURN

Please note that if the last option is selected, you will be asked to insert a diskette after the programme has read into the memory. This must be a formatted diskette (see preparing a new diskette).

BACKING UP A COMPLETE 3.5" DISKETTE
When you want to copy several files onto a new disc, it may be more convenient to copy the total disc, with all the files. To do this you must select "Copy 3.5" to 3.5" from the utility menu, by either moving the cursor or depressing 5.

At this point you will be asked to insert the source diskette and a proportion will be read into the memory. You will then be asked to insert a formatted diskette and the process will be repeated until you are told the copy is completed. Do not be alarmed if you need many insertions as the disc capacity is 720K.

DISC ERROR MESSAGES

Unlike many other drives, which display an error message number, the Ultimate Drive displays the nature of the message on the screen, together with the error number for ease of useage. The following is a list of all the possible error messages associated with the drive.

Code	Message	Abbreviation
0	"OK"	OK
1	"Disc is write protected"	WRITEP
2	"Disc is unusable"	UNUSE
3	"Disc is unformatted"	UNFOR
4	"File is corrupt"	FCORPT
5	"Formatting Disc"	FORMA
6	"Renaming File"	RENAM
7	"Scratching File"	SCRA
8	"Error During Write"	ERRW
9	"Error During Read"	ERRR
10	"Disc may be damaged"	DAMAGE
11	"File not found"	NOFILE
12	"No file extension specified"	NOEXT
13*	"File too large"	FILTBIG
14	"No more directory space"	NODIRSPC
15	"Disc found to be unreliable"	DISCUNREL
16	"File name too long"	TOLONG

*Please note that the maximum file length allowed on the Ultimate drive is C800 or 200 BLKS. For files greater than this length, we recommend that you use Jumbo Jump Block to split the file and re-join it.

DIRECTORIES

One of the most impressive features of a disc drive is that it can access data on any part of the diskette very quickly and jump from data address to data address at will. Whenever a file has been created onto disc, it will have been given a specific address in the format. A directory is a list of programmes and data files that exist on the disc, together with their size and location.

WHAT A DIRECTORY SHOWS

Because the Ultimate Drive creates files which are MS DOS™ compatible, it's directory looks similar to the type used on IBM PC or clones.

File Name   Extension   Size

The file or programme name appears on the left and is usually followed by the type of file. The following alternatives are often seen and used by you in programming.

PRG = Programme file in machine code with executable address in the programme.
DOC = Document file
BAS = Basic file
EXE = Executive file

Sometimes you will have seen other extensions such as SEQ or REC but please note that the Ultimate drive handles sequential and relative files in a differnet manner using jumbo jump blocks. (see advanced programme)

On the right hand side of the directory is the length of the individual file.

VIEWING A DIRECTORY
The Ultimate drive offers two methods of viewing the directory. Firstly you can load it like a programme but like any load sequence, you run the risk of losing anything in basic memory, so be certain to save your work first.

For example, to load the entire directory from disc device 9, type:
LOAD "$" , 9 RETURN

This will automatically display the directory to the screen. You slow the listing by pressing the CONTROL key or halt it entirely by pressing STOP. Having then viewed a list of files and programmes on the disc, you can load them in the usual manner.
Alternatively you can view the directory using the fast find and execute utility (Browser) which is on the disc supplied with the unit. This has the additional benfit that having viewed the contents of the disc, you can select the programme or file to be loaded by means of the cursor and the file loads from where the file executes, thus saving time.

DISC BROWSER UTILITY
From the main menu select utilities (Using the cursor or by depressing 2).
From Utilities select Disc Browser. (Use the cursor or depress 8).
The directory will now appear. Select the file you wish to load using the cursor and press RETURN.

WILD CARDS
Just as a cassette user can load programmes without giving the full name, disc users can use special characters to load a programme from a partial name. The special chracter used is the asterix * and it's function is something like a wild card in a game of cards. The asterix makes all characters in and beyond it's position wild. For example:

LOAD "A*" , 9 , loads the first file that begins with A

LOADING

Remember when loading a disc, the shutter is inserted first, with the label facing you. Push gently until you hear a click. To remove the disc simply press the eject button. Never turn off the power with a disc in the drive. Similarly do not attempt to remove a disc when the red light is on, as the heads are trying to read or write to the disc.

Sometimes you will want to load a commercially pre-packaged Basic programme which you have purchased on a diskette. With software developed by TIB PLC, available by mail order (you must tick the appropriate box in the registration form to be kept in touch with new products) there will be an autoload feature, whereby the disc will automatically load when the power is switched on. For other programmes, the standard CBM method can be used.

LOAD "Programme Name", device number, relocate flag.

Return Try the following, with the TIB disc in the disc drive.

LOAD "Browser. Exe", 9,1 return.

This will load the Browser programme, which pulls the directory to the screen and allows you to select a file using the cursor.

The relocate flag may require some explanation. It can have one of two volumes 0 and 1. If the relocate flag is 0 or omitted, the C64™ will automatically relocate programmes being loaded to live in the part of the computer memory reserved for BASIC. If the volume is 1, auto relocation is turned off and the programme is loaded into the exact part of the memory from which it was originally saved.

Having instructed the machine to load Browser, you will see the following:

LOADING
OK
READY

When the word "Ready" and the flashing cursor reappear on the screen, the programme named Browser has loaded into the computer. This usually takes six seconds. If you type :

SYS 4096 RETURN,

This will execute the programme.

OTHER OPERATIONS

COMMANDS AND COMMAND CHANNELS

The Ultimate Drive will expect to see many of it's commands over the command channel, much in the same way that CBM 1541 drive operates. Lets now look at some of the commands your drive needs to carry out essential operations.

To instruct the command channel, we need to use a basic open statement, with a secondary address to 15.

Open 15 , 9 , 15

The first 15 is a file number to match the secondary address. The middle number is the device number and is usually 9 when used in conjunction with the Ultimate Drive. If the Ultimate Drive is being used in conjunction with the CBM 1541, the latter would usually be referred to as device 8.

Once the command is open, use the Basic Print # command to send information to the disc drive.

SEQUENTIAL & RELATIVE FILES

Unlike the CBM 1541, the Ultimate Drive is unable to handle sequential and relative files in the normal manner, due to the design changes necessary to achieve MS DOS compatibility. However both types of file can be handled using the Jumbo Jump Block. (See Advanced Programming).

The Jumbo Jump Block can read and write to selected parts of a particular file. All file parts can be located using the File Allocation Table contained on the disc.

As an alternative you may prefer to save off all the variables using a machine code programme (CBM FFD5 and FFD8) to set the start and end of the variables and re-set when you have finished, back to the actual programme.

ERASING OLD PROGRAMMES

When a disc is full, you can free up valuable space for new work , by erasing old or unused programmes, using the Scratch command. Scratch can be used to erase a single file or a group of files. The command is as follows:
Print #15 , "S: Name"
Then to establish it is gone, type LOAD $. 9 RETURN command, to check the directory. (See Loading).

RENAMING PROGRAMMES

The renaming programme is a very quick way of altering the name of a programme or file in the directory. This may be very important if you are converting files from a CBM 1541 drive to the Ultimate because theyhave a length of 16 characters on the 1541, whereas the Ultimate drive requires a length of only 8 characters, plus an extension. The command is as follows:

Print#15 , "R : Old Name = New Name"

COPYING PROGRAMMES

The traditional method of copying a file, employs the following syntax.
Print#15 , "Copy Drive# : New File = Drive# : Old File"
However to copy a file or programme on the Ultimate Drive, simply select the appropriate utility to copy either a file or the whole disc, fromthe utilities menu, as discussed earlier under the section back ups.

IMPORTANT

On a conventional disc drive it is impossible to save a file once it exists because the disc drive allows only one copy of any given file name per diskette. However the Ultimate Drive will automatically overwrite any amendments to a file if it already exists on the disc.

SAVING PROGRAMMES

Before you can save a programme, the disc must be formatted as discussed earlier, using the format utility. The command is as follows:
Save "File Name" , Device#Return
The file name must not exceed eight characters, preceded by the drive number and a colon, followed by the device number of the dirive, usually 9.

MACHINE CODE MONITOR SAVE

To copy programmes which are not in the basic text area, or any machine language programme, you will need to use the .S command of the machinelanguage monitor bulit into the CBM 16 and Plus 4. To access a built in monitor, type MONITOR. To exit a monitor type X alone on a line.
S "File Name", Device#, Start Address, End Address +1

Where	"File Name"	is any valid name up to eight characters long.
	"Device#"	is a two digit device number (usually 09).
	Addresses	are given in hexidecimal but without a leading $ sign.

Please note that the ending address must be one location beyond the last location to be saved.

PROGRAMMING UTILITIES

SELECTION

All Utilities can be loaded from the Utilities menu screen by depressing the appropriate Utility number appearing on the screen, or alternatively by selecting the desired utility with the cursor by moving the joystick and pressing fire.

> 1) **DROP TO BASIC**
> 2) **DISC MONITOR**
> 3) **DISPLAY ASCI FILE**
> 4) **DISPLAY HEX FILE**
> 5) **COPY 3.5" TO 3.5"**
> 6) **FILE COPY DEVICE TO DEVICE**
> 7) **DISC BROWSER**
> 8) **FORMAT DISC**

DROP TO BASIC

If you have turned on the C64 system whilst a disc is resident in the Ultimate Drive, the disc will automatically load, assuming that it contains an autoload file. This could be inconvenient if you wanted to work in Basic. Therefore there is a quick route back to Basic, without the need to re-set.

First select the Utilities menu from the main screen.

Next depress key 1, "Drop to Basic". In a few moments you will have exited the TIB utilities and will be back in Basic mode.

DISC MONITOR UTILITY

The utility enables the programmer to look at exactly where data is being written to the disc. To access this utility, you can either load directly from the utility menu on the screen by depressing the appropriate key (key 2) or selecting the cursor.

Type R1   (Read current sector into the buffer. Example R1 reads the sector between 0 and 5AOH into buffer).

Type W1   (Write Sector 1 back to the disc. If no number is specified the write will automatically occur in the same sector).

Type M   List all buffer. By depressing Runstop, you can abort the list, whilst CRL slows it down.

Type +   (Advance one sector then use Read after this function, Example > R).

Type -   (Retard the first sector of a cluster and then use Read after this function, Example > R).

*Type C2   (Reads the first sector of a cluster and then use + to read the second sector).

Changing Data after A > : 0000 will modify buffer in memory. Please do not change the screen if possible and try to keep it in the same format as this will give you more consistant results.

* Please note that two sectors are equal to one cluster.

DISC ASP UTILITY

This enables the user to display on ASCII file directly to the screen. It is loaded by depressing the appropriate key (Key 3) from the utility menu. At the prompt, simply type the name of the file you wish to view.

Example : At the prompt, type MULT . DOC and the file will be displayed in ASCII.

To slow down the file display, press CTRL

To stop, press RUN STOP

DISPLAY HEX UTILITY

This enables the user to display a file in HEX. It is loaded by depressing the appropriate key (key 4) from the utility menu. At the prompt, simply type the name of the file you wish to use.

ALTERNATIVE LOAD METHOD

For DISPASC, DISPHEX or DISPMON

Should you wish to load from basic type:

Load "File" , 9 , 1
SYS4096

COPY 3.5" TO 3.5"

See page 10, backing up a complete diskette.

FILE COPY DEVICE TO DEVICE

See page 10, backing up files.

DISC BROWSER

See page 12 "Disc Browser Utility"

FORMAT DISC

See page 9 "How to Prepare a Diskette", Point 2.

ADVANCED PROGRAMMING

The following information is of assistance to the advanced programer only and consists of both the Jumbo Jump Block and the Variable Area. These can be seen on the Utilty disc using the DISPASC Utility, and selecting file MULT. ASC. Should you wish to take full advantage of the flexibility of the drive, you may also obtain the full ROM source file in which you can see how to set up and use the vectors and utilise the drive routine fully.

To obtain the source file, please send cheque made payable to TIB PLC for twelve pounds., and we will forward a disc by return. Applications should be sent to TIB PLC, 36 - 50 Adelaide Street, Bradford, BD5 0EA.

JUMBO JUMP BLOCK

The block is designed for advanced machine code users and is used in much the same way as the Kernal resident in the C64. It's function is to allow users to access the disc drive with the minimum of set up requirements, in a similar manner to direct access routines in the C64. The various sub routines contained on the Jump Block and the actual rom jump vectors are listed below. The syntax of using the Jump Block is:

JS Name ____?   i.e. JS LOAD FILE?

LOADFILE	EQU $8009	BN2DEC	EQU $806F
SAVEFILE	EQU $800C	STRIPSP	EQU $8072
FORMATDISK	EQU $800F	SEARCH	EQU $8075
DISPLAYDIR	EQU $8012	FINDBLANK	EQU $8078
READSEC	EQU $8015	PADOUT	EQU $807B
WATCHDOG	EQU $8018	WOFF	EQU $807E
READSECTORS	EQU $801B	SPARE	EQU $FFFF
WRTESEC	EQU $801E		
READSTAT	EQU $8021		
SCRATCH	EQU $8024		
RENAME	EQU 18027		
FORMAT	EQU $802A		
INIT	EQU $802D		
SETUPSEC	EQU $8030		
SPECIFY	EQU $8033		
RECAL	EQU $8036		
SETSOACE	EQU $8039		
GETNEXTCLUS	EQU $803C		
ENFILE	EQU $803F		
MARKFAT	EQU $8042		
FINDFAT	EQU $8045		
FINDNEXTFAT	EQU $8048		
WRITEFATS	EQU $804B		
CLEARFATS	EQU $804E		
CALCFIRST	EQU $8051		
GETFATS	EQU $8054		
SEEK	EQU $8057		
FINDFILE	EQU $805A		
WRITEDIR	EQU $805D		
READDIR	EQU $8060		
SAVERLOC	EQU $8066		
SHOWERR	EQU $8069		
SHOWBYTESFREE	EQU $806C		

VARIABLE AREA

The following is a list of where the disc drives store the variables used:
ORG $33C

```
; COMMANDS
STATS
```

STO	DFB O	; READ PHASE		
ST1	DFB O			
ST2	DFB O			
C	DFB O			
H	DFB O			
R	DFB O			
N	DFB O			
ST3	DFB O			
PCN	DFB O			
COMMAND	DFB $60+6	;DFB 2+$40+$20		;DFB 6+$40+$20
HSEL	DFB $O			
CYLINDER	DFB 2	; TRACK NUMBER		
HEAD	DFB 0	; SIDE OF DISK		
RECORD	DFB 1	; SECTOR NUMBER		
NUMBER	DFB 2	; DATA BYTES IN SECTOR		
EOT	DFB 1	; END OF TRACK		
GPL	DFB $1B	; GAP LENGTH		
DTL	DFB $FF	; DATA TOTAL		
DRIVE	EQU 0			
CYLIND	DFB 4			
TEMP	DFB 0			
TSTACK	DFB 0			
ERROR	DFB 0			
FRED	DFS 4.0			
SCLUSTER	DFB 0,0			
LCLUSTER	DFB 0,0			
CLUSTER	DFB 0,0			
CLUSTER 2	DFB 0,0			
LENGTH	DFB 0,0,0,0			
BYTESLEFT	DFB 0,0			
NBUF				
PASS	DFB 0			
TRYS	DFB 0			
OFFSET	DFB 0			
HOWMANY	DFB 0			
DIRSEC	DFB 0			
LOADAD	DFB 0			
FILEBUF	DFS 30,0			
FILETEM	DFS 11,0			
FILELEN 2	DFB 0			
TEMP 1	DFB 0			
TEMP 2	DFB 0			
TEMP 3	DFB 0			

QUICK REFERENCE GUIDE TO INSTRUCTIONS

INSTRUCTION	TYPE
Format Disc	Open 15 , 9 , 15 return Print #15 , "N:Format Disc" return
Scratch File entry of dics	Open 15 , 9 , 15 return Print #15 , "S:File.PRG" return
Rename (cannot support sequential files)	Open 15 , 9 , 15 return Print #15 , "R:Name.PRG = New Name.PRG" return
To load file from tape	Load "File Name"
To load file from 1541	Load "File Name" 8
To save a file	Save "File Name" , 9
To copy a file from tape	Copy File Utility *1,9 "File Name" return "New File Name" return
To copy a file from 1541	Copy File Utility *8 , 9 "File Name" return "New File Name" return
To copy from the Ultimate to 1541	Copy File Utility *8 , 8 "File Name" return

DISCLAIMER
Please note that TIB PLC or it's agent will not accept responsibility or liability for any loss of
data or associated costs incurred when using the Ultimate disc drive, howsoever caused.