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QL

Disk Drive



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INTRODUCTION

PURPOSE

This manual introduces you to the Sinclair QL Floppy Disk System. Please take the trouble to read all sections as it has been designed with you in mind and is intended to give you the confidence to fully utilise all facilities. In addition to helping you get started, we hope you will find it a useful reference guide and welcome your comments on its format or content.

The Sinclair QL Floppy Disk is an efficient, versatile and attractive Disk System. The 3.5 inch disk capability complete with the utilities disk will allow you to experiment and use a number of different programs. You have purchased a highly engineered and professionally manufactured Disk drive system – congratulations.

On the following pages, you will find the information required to get started quickly and easily. If you are new to this environment and perhaps slightly confused, you will find step by step instructions to guide you on your way.

Our objective is to cover everything from the initial connection and installation through to a detailed explanation of the operating system.

HOW TO USE THIS MANUAL

We aim to serve three levels of user. Complete novices – unfamiliar with disk drive units and diskettes. The user who has some knowledge of data storage and disk use concepts and maybe some experience of working with a system. And finally, the computer buff – completely at home with his computer and its peripherals.

Chapter 1. is devoted to the disk drive and the “how to” of getting started. An essential piece of reading for everyone.

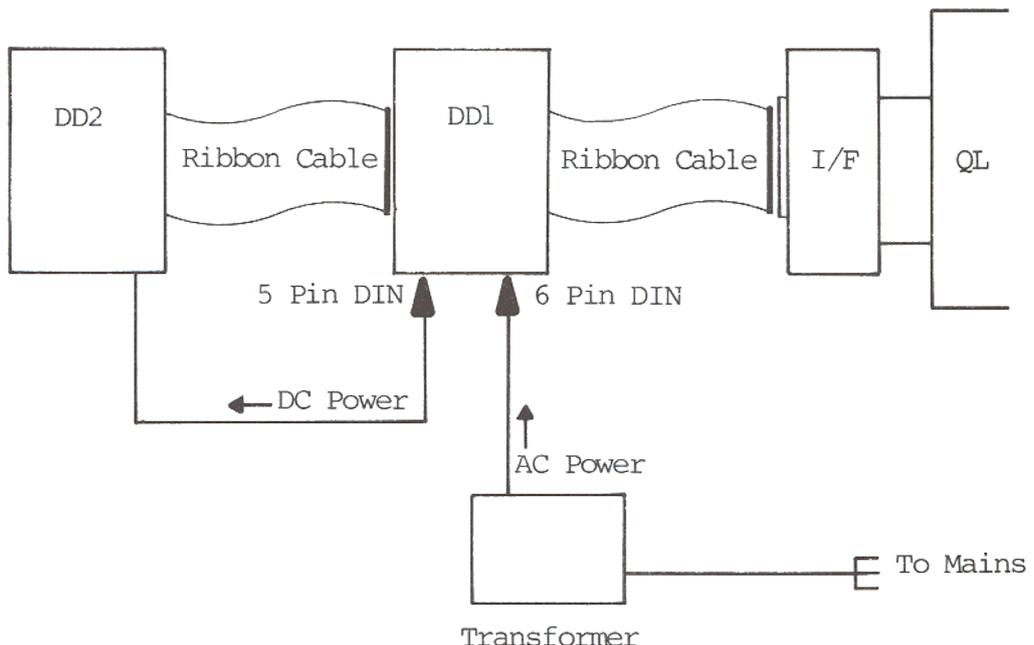
Chapter 2. explains how to configure and use your system. This section shows you how to make your disk drive unit work with the Sinclair QL providing also a definition of terms as well as a general overview.

Chapter 3. presents the uses of your utilities disk. A 3.5 inch diskette offering a range of programs from file handling to window manipulation, a special colour screen print dump program for the Canon PJ1080A and a Disk and Memory Editor.

The appendices A and B are designed for those individuals who are interested in the technical aspects of the Sinclair QL Floppy Disk System. Although you can use this disk drive unit without reading these appendices, the technically inclined will probably want to delve into them immediately.

FUNDAMENTALS OF YOUR DISK DRIVE SYSTEM

A disk drive system is so named because a 3.5 inch diameter piece of magnetically coated plastic – known as a floppy disk – is “driven” by the unit. Responding to instructions from the QL, the disk drive unit either reads information from the disk or stores data, or both. The Sinclair QL Floppy Disk System uses 3.5 inch floppy disks and is fully compatible with the Sinclair QL computer. The usable storage capacity of your system is 720K. This compares to an IBM PC disk drive whose capacity is 360K per disk.



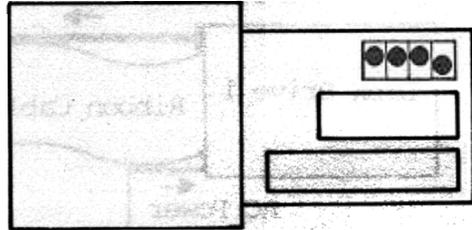
CHAPTER 1 GETTING STARTED

This chapter explains how to physically put your Sinclair QL Single Disk system together. Section 3. deals with adding a second drive.

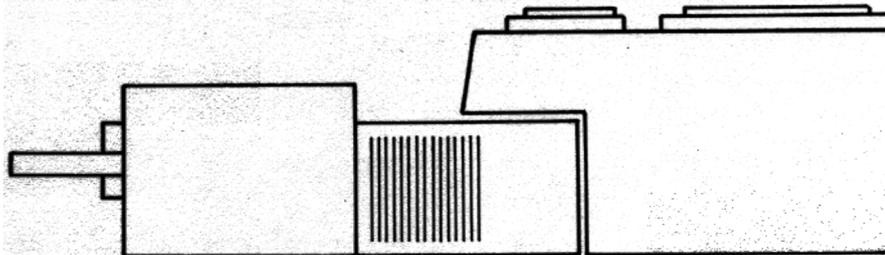
- (a) Switch off all power to the QL system.
- (b) Remove the plastic cover from the left hand side of the QL. This will now reveal the **EXPANSION PORT**.
- (c) Ensure that the DIP switches are correctly set up. If this is the first time you have installed your disk drives, it will be sufficient to check that the DIP switches assume their default settings. The diagram below will show you how to do this. The next chapter explains in detail what the precise function of each DIP switch is.

DIP SWITCH |

1	OFF
2	OFF
3	OFF
4	ON

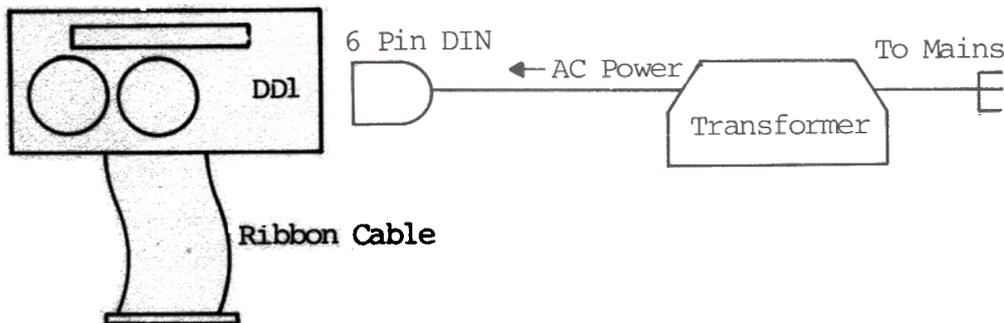


- (d) Without forcing the Interface, slide it carefully into the expansion port. Once resistance is felt (almost as soon as the plastic shroud meets the QL case) push firmly and the connection will be made. The Interface will then be solidly in place with the plastic shroud fitting flush against the QL.



- (a) Identify the 34-way connector on the end of the ribbon cable which is permanently connected to Drive 1. You will notice that there is a small bump on one side of the connector (this is known as a polarised connector). This polarised connector ensures that you connect the disk drive correctly to the disk interface.
- (b) With the bump uppermost, plug the 34-way connector into the disk interface which protrudes from the plastic shroud, and snap closed the latches to hold the connector in place.
- (c) Identify the 6-pin DIN connector on the end of the mains transformer and plug it into the center 6 pin DIN socket situated on the rear of Drive 1.

2. SINCLAIR QL DRIVE 1 INSTALLATION

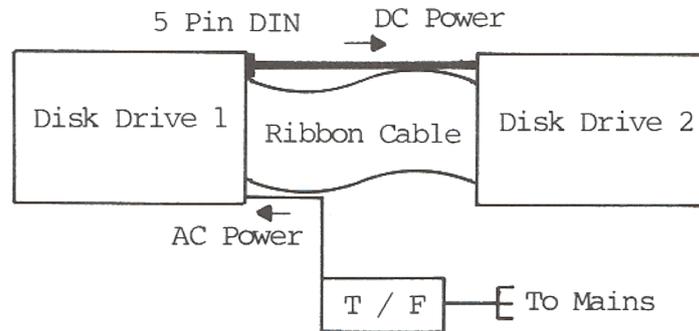


If you only have a one-drive system then proceed to Chapter 2; "Using The Disk Interface and Drives". However, if you have a two-drive system then proceed to the next section.

3. SINCLAIR QL DRIVE 2 INSTALLATION

Having completed connecting the Disk Interface and Drive 1, proceed as follows:

- Identify the 34-way connector on the end of the Drive 2 ribbon cable and plug it into the connector fixed at the rear of Drive 1. The polarised connector and the slot in Drive 1 will ensure that the correct connection is made.
- Identify the 5-pin DIN connector at the end of the other Drive 2 cable and plug it into the 5 pin DIN socket on the rear of Drive 1. Again this connector is polarised and cannot be connected incorrectly.
- Drive 2 may now sit on top, underneath, to the right or left hand side of Drive 1.



CHAPTER 2 USING THE SYSTEM INTRODUCTION

Now you are ready to use your Floppy Disk System. However, before you switch on it is important to recognise a few simple rules for operating and maintaining a fault-free system.

- 1) Before plugging in any connector or interface associated with the Disk System, turn **ALL** power **OFF**.
- 2) Before turning on either the QL or the Disk Drives, remove all disks from the Drives.
- 3) Although 3.5 inch disks are undoubtedly safer to use and more robust than 5.25 inch disks, they should still be treated with care and kept away from strong magnetic fields (T.V./Monitor, Hi-Fi speakers, bell telephones etc.) and of course, be kept well away from strong sources of heat.
- 4) Don't throw the disks about – think of them as your favourite cassette or record album.
- 5) Most importantly, keep regular back-ups of all your valuable programs and data files.

The heart of your interface card is a program called the Disk Operating System (DOS). This is the program which performs all the operations to do with the Disk Drives. It is in fact an extension to the main QL operating system (called QDOS). QDOS will send a command to the interface card such as Format, Read or Write a file, and the interface will respond. The protocol the interface uses is compatible with the Sinclair standard and therefore with any other systems which also comply with this standard.

DISK OPERATING SYSTEM

In addition to the disk operating system, the interface card adds several extra utilities to the Superbasic vocabulary. These are listed below:

- MSET }
- FSET } Rename the disk drive device / Microdrive emulate
- VSET }

- DGET Read a sector into an array
- DPUT Write an array to a sector

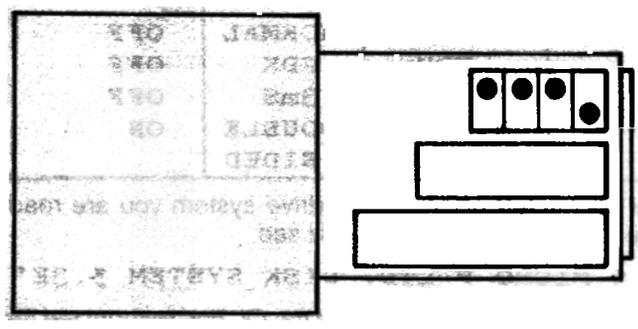
- SAVEO Save Superbasic programs with overwrite
- SEXECO Save machine code programs with overwrite
- SBYTESO Save data with overwrite

EXTENSIONS TO SUPERBASIC

All these Procedures will be described in full detail later in this chapter.

You will find four switches on the interface card as shown below.

DIP SWITCH SELECTION ON THE INTERFACE



The functions of these switches are as follows.

This is used during manufacture to set up the interface card. It should always be kept in the OFF position.

Dip Switch 1:

DIP Switch 2: Your disk interface is capable of making your disk drives emulate the Microdrives fitted to the QL. Moving between Microdrive emulate and Normal mode can be done through the commands 'FSET' and 'MSET'. However, to emulate Microdrives fully, one must be able to 'Boot up' from disk as well. That is the function of this switch. It selects the default mode of the disk interface; Microdrive emulate or Normal. With DIP switch 2 ON, the default mode will be Microdrive emulate, with the following results:

1. When the screen mode selection is taken (pressing F1/F2 after a reset) the QL will attempt to load and run a Superbasic program called 'BOOT' from disk drive 1.
2. Until otherwise directed, the disk drives will be referred to as 'MDV' and Microdrives will be disabled.
3. Any programs written for Microdrives, will work from disk in exactly the same way.

With DIP switch 2 OFF, the default mode will be as Normal, with the following results:

1. When the screen mode selection is taken (pressing F1/F2 after a reset) the QL will attempt to load and run a Superbasic program called 'BOOT' from Microdrive 1.
2. Until otherwise directed, the disk drives will be referred to as 'FDK' and the Microdrives as 'MDV'.

Remember that to completely emulate Microdrives, you must also have a two drive system (since there are two Microdrives!).

DIP Switch 3: This switch selects the track to track stepping time used by the interface. With this switch OFF, the interface will use a stepping time of 3mS. With it ON, a time of 6mS will be used. If you are using Sinclair QL recommended 3.5 inch disk drives, this switch should be kept in the OFF position.

DIP Switch 4: This switch determines whether disks are formatted as single or doubled sided. To format disks as double sided, DIP switch 4 is left OFF. In order to format disks as single sided the switch should be left ON.

Mixing single and double sided drives within a system is not recommended.

DIP SWITCH	FUNCTION		DEFAULT
	ON	OFF	
1	SET-UP	NORMAL	OFF
2	MDV	FDK	OFF
3	6mS	3mS	OFF
4	SINGLE SIDED	DOUBLE SIDED	ON

OPERATION

Now that you have connected up your disk drive system you are ready to start using it. Turn on the power to your QL. You will see

'(C) 1985 MICRO P LTD. DISK SYSTEM 5.3E'

appear at the top of the screen, indicating that the QL has recognized the installation of the disk interface (The version number may be greater than 5.3. The 'E' suffix means that it is the English language version). As usual, you should press F1 or F2 to select which type of monitor you are using.

With DIP Switch 2 ON, the disk system will be in Microdrive emulate mode and the QL will attempt to load and run a program called 'BOOT' from disk drive 1. We shall assume that DIP switch 2 is OFF so that your disk drives are referred to as 'FDK'. (NB The factory set condition for DIP switch 2. is OFF).

The essential point to remember is that all Microdrive-related commands will work with disk drives once 'FDK' is substituted for 'MDV' in that command.

The disks to use with the Sinclair QL disk drives should be Double sided, Double density, 135 TPI (Tracks Per Inch), 3.5 inch disks. You may use single sided diskettes but will reduce your capacity by half. (NB The factory set condition for DIP switch 4 is ON. ie Single Sided).

FLOPPY DISKS

When you first buy a floppy disk, it will be completely blank. It is nothing more than a specially coated piece of plastic. Before information can be written onto it, it must be changed into a form that a disk drive can understand; like drawing lines onto a blank piece of paper. This process is called **FORMATTING**. To Format a disk, type:

```
FORMAT drivename_diskname  
eg. FORMAT FDK1_TEST
```

This example will call the disk 'TEST'. Remember to ensure that DIP switch 4 is set correctly for single or double sided disks. A double sided disk will take a little under 2 minutes to format, after which the message '1434/1440 sectors' will appear. A single sided disk will take about 1 minute and the message will be '714/720 sectors'. Formatting a disk erases all data that may have been written onto it previously, so should be used with caution.

FORMATTING DISKS

The format command in fact does a little more than the example of drawing lines on a blank sheet of paper. It will verify that the disk is good by reading back all the data that was written during the format cycle. In addition, the disk is initialised with a directory and other special information.

In the same way as Microdrives, the disk system keeps a record of what files are stored on a disk. This record is actually a file itself and is called the 'Directory'. To list the directory of a disk, first ensure that the disk is inserted in the drive, then type:

```
DIR drivename  
eg. DIR FDK1_
```

for a directory of the disk in drive one. Typing 'DIR FDK1_' may produce the following printout on the screen:

```
TEST  
1297/1440  
sample1_prog  
boot  
pic1  
pic2
```

In this example, it means that the disk in drive 1 is called 'TEST', it has 1297 free sectors out of a total of 1440 and has four files on it called sample1__prog, boot, pic1 and pic2.

DIRECTORY

As discussed earlier, DIP switch 2 is used to select the default mode for the disk interface – Microdrive emulate or Normal. This default mode can be overridden using the three commands **MSET**, **FSET** and **VSET**.

MSET, FSET, VSET

Another way of looking at microdrive emulate is to think of the disk drive device being renamed. Fundamentally, this is all that is being done. DIP switch 2 selects the default name for disk drives as either "MDV" or "FDK" and the 'SET' commands simply rename them from the keyboard or a Superbasic program.

MSET assigns the name 'MDV' to the disk drives and will disable the Microdrives.

MSET

FSET assigns the name 'FDK' to the disk drives and will enable the Microdrives.

FSET

VSET can be used to assign any three letter name of your choice to the disk drives.

VSET

```
Type: VSET "device-name"
```

```
eg. VSET "DSK"
```

Now your disk drives will be referred to as **DSK1** and **DSK2**. The three letter name must be in quotes and can be typed in upper or lower case letters.

NB. THESE COMMANDS WILL ONLY BE ACCEPTED IF THERE ARE NO OPEN FILES, SO REMEMBER TO CLOSE ALL YOUR FILES FIRST.

One of the first things you will want to do with you disk system will be to copy some of your Microdrive programs to Disk. This is simplest to do by using the Superbasic command 'COPY'.

First of all, you must check that you are not in Microdrive emulate mode, because this mode disables the Microdrives. Second, you will need a formatted disk onto which to copy. The syntax of the copy command is:

COPYING PROGRAMS FROM MICRODRIVE TO DISK

COPY (source filename) TO (destination filename)
eg. COPY MDV1_TEST TO FDK1_DEMO

The example will copy a file called 'TEST' from Microdrive 1, to disk drive 1, where it will be called 'DEMO'.

On the utilities disk you will find some special programs which will, for example, copy all the files from one drive to another. The utility 'Backup__X will do this and can save a great deal of repetitive typing.

RUNNING MICRODRIVE BASED PROGRAMS FROM DISK

If the programs you are copying from Microdrive are of a type that will themselves attempt to access Microdrive, then you may find that you will have to force Microdrive emulate mode for them to run properly. Either type 'MSET' or use DIP switch 2 as described earlier. If the Microdrive programs 'BOOT UP' directly after pressing F1/F2, then by setting DIP switch 2, they will do exactly the same from disk.

An alternative to using Microdrive emulate is to be found in the utility 'Exchange__X' as described in the utilities disk section. You can use Exchange__X to replace every occurrence of the word 'MDV' with 'FDK' for example. The effect will be that whenever a program used to access Microdrives, it will access disks instead.

One of the most likely applications where you will want to substitute disk drives for Microdrives is with the **PSION** suite of programs. There are various ways of going about this. If you have a two drive system, then there will be no problem using any of the methods. With a one drive system, the options are limited, primarily because there are two Microdrives! Additionally, you may have to write a special 'BOOT' program, if you want to keep all the **PSION** packages on one disk (since each program has a boot program of its own).

The simplest method is to copy programs across to disk and then use microdrive emulate as usual. However, if you only have a one drive system, or you wish to maintain use of microdrives, then it will be better to use the **PSION** reconfigure program provided with the version 2. **PSION** packages. Refer to the relevant sections in the QL user guide. Finally, it is possible to use Exchange__X to replace 'MDV' with 'FDK' in all the packages, and this is to be preferred for the version 1. **PSION** packages.

With the version 2. **PSION** packages, if there is inadequate free memory when the package is first loaded, then it will attempt to open a temporary file on whatever the data device is. By default, the data device is **MDV2**. In consequence, if you only have a one drive system and are in Microdrive emulate mode, the message "Unable to start....." will appear, because it is trying to access a drive which is not there. The solutions are to either reconfigure the package (as described by **PSION**), or else not to use Microdrive emulate, but to Exchange__X the package and use it in conjunction with Microdrives.

SAVEO, SBYTESO, SEXECO

These three commands are extensions to the standard Superbasic commands, Save, Sbytes and Sexec. However, they will allow you to overwrite an existing file on disk or microdrive instead of having to first delete it. You will find this very useful when writing programs as it will allow you to periodically save your amended programs during development.

SAVEO will allow you to save a basic program over the top of an existing disk or Microdrive file.

SBYTESO will allow you to save an area of the QL's memory on top of an existing disk or Microdrive file.

SEXECO will allow you to save an executable program on top of an existing disk or Microdrive file.

CHAPTER 3 DISCOVERING YOUR UTILITIES DISK

These utilities have been provided to assist you in using your Sinclair QL Disk Drives and the QL Microdrives. They include:

BACKUP_X	For copying multiple files
EXCHANGE_X	To replace characters in a file
DEL_FILES_X	Will delete multiple files
EX_DIR_X	An extensive directory utility
INSPECT_X	Will allow file inspection
SPOOL_X	A general file spooling utility
COPY_X	For selective file copying
REDIRECT_X	A powerful file transfer utility
REPOS_BAS	A window manipulation utility
COLPRINT	A colour screen dump program for the CANON PJ1080A
DAME	Disk and Memory Editor

All the utilities ending with `__X` are executable jobs and can therefore be run concurrently with each other and / or any Superbasic programs (subject to memory available). They also include powerful window manipulation facilities, which help you keep your screen clean and tidy. To load one of the `__X` utilities, type:

```
EXEC filename
eg. EXEC FDK1_EX_DIR_X
```

By pressing `CTL+C`, the cursor can be moved between jobs (which includes `BASIC` of course). Any utility can be removed and its associated memory freed by pressing `SHIFT+ESC`.

The remaining three utilities are, at least in part, Superbasic programs. They can be loaded in the same way as any other Superbasic program by typing:

```
LRUN filename
eg. LRUN FDK1_REPOS_BAS
```

Both `REPOS__BAS` and `COLPRINT` will attempt to load a machine code program into the QL resident procedure area. They assume that their respective machine code programs can be found on the device called "FDK1__". If the utilities disk is not in drive 1, or microdrive emulate mode has been entered, then these programs will not be found and an error message will result. It is vital that these situations are avoided.

An error condition will occur if the QL has already allocated memory before the `RESPR` statement in the `BASIC` program is reached (`RESPR` allocates memory in the resident procedure area). If this situation arises, the error message `NOT COMPLETE` will result, informing you that memory in this area cannot be allocated. The QL will have to be reset and the program re-run.

The remainder of this chapter describes in detail how to fully use these utilities.

Each of the `__X` utilities may be run as an independent, executable job. In other words, as many copies of the same routine can be run concurrently as memory permits. Alternatively several different jobs can be run concurrently. Each job has associated with it a "window". This is an area of the QL screen which acts as the command console for that particular job. The `__X` utilities all include a special facility for manipulating that job's associated windows. In some of the programs, pressing '?' will enter the 'Window Menu'. In others, pressing 'F2' will perform the same function. Once in the 'Window Menu', the function keys operate as follows:

THE X UTILITIES

F1 (Upper/Lower screen)

F1 will move the screen window to the top or bottom half of the screen. You will find this key very useful for positioning the screen.

F2 (Move screen)

This key allows you to move the screen window. F1 selects fine or coarse movement of the screen window. Use the cursor keys to move the window to the desired position.

F5 will display the current screen size and position.

Press Enter to confirm the screen position and return to the source device prompt.

F3 (Clear screen)

Will clear the whole display except for the current screen and then return to the source device prompt.

F4 (Change screen size)

Use **CTRL** and cursor keys to make the screen larger.
Use **ALT** and cursor keys to make the screen smaller.
F1 selects fine or coarse movement.

F5 (Screen Info)

F5 will give the values for the screen position and size.

For all the __X utilities, typing **SHIFT+ESC** and **ENTER** will remove the job and release it's associated memory. **CTRL+C** will move the cursor between jobs and will sometimes need to be typed after a job has been removed.

All the descriptions below assume that the utilities disk is in drive 'FDK1__'. If it is not, or the drive device has been renamed, then the appropriate substitutions should be made.

BACKUP. X This is a multi-tasking routine to copy files from one media to another (either disk or microdrive). It will allow selective copying and overwrite.

Backup__X is loaded by typing: **EXEC FDK1_BACKUP_X**

You will notice the backup screen appear. The first prompt is for the name of the source device. Type the device name:

eg. **MDV1__**

You will then be prompted to enter the name of the destination device. Type the device name:

eg. **FDK2__**

The next prompt is for an extension. **BACKUP__X** will use this extension as a search key. Any file ending with this extension will be copied across and all other files will be ignored. If no extension is given, then all files will be copied regardless of their name. Typing 'TEST__BAS' will for example only copy files ending with 'TEST__BAS'. You can use this facility to copy individual files of course. Typing '__Q' will copy all files ending with '__Q'.

A screen prompt requesting whether you wish to overwrite will be displayed. Typing 'N' will not copy files which already exist on the destination device. If you type 'Y', then files which already exist on the destination device, will be overwritten by the new file.

Type 'Y' in response to the 'Ready?' prompt to commence backing up files.

If you respond to the prompt for a source device by typing '?', you will enter the Window Menu. The function keys will operate as described in the beginning of this section.

To remove the job, type **SHIFT+ESC** and **ENTER**.

EXCHANGE. X This is a multi-tasking routine which will replace all occurrences of an ASCII string in a file with another ASCII string of the same length. For example, replace 'MDV' with 'FDK'. Exchange__X is loaded by typing: **EXEC FDK1_EXCHANGE_X**

You will notice the Exchange screen appear.

In response to the source prompt, type the full filename eg. 'MDVI__TEST__CODE'

Then type the characters you want to replace, eg. 'TEST', then the new characters, eg. 'DEMO'. Press **ENTER** after each selection.

To remove the job, type **SHIFT+ESC** and **ENTER**.

Pressing '?' in response to the prompt for the source device name, will enter the Window Menu as usual. The function keys will then operate as described in the beginning of this section.

This is a multi-tasking routine which will delete files from a disk or Microdrive. Multiple deletions may be performed in one go. Del__files__X is loaded by typing:

DEL__FILES__X

EXEC FDK1_DEL_FILES_X

You will notice the Delete screen appear.

Type the number of the device you wish to use. For example, if FDK__? is shown in the top left corner, and you type 1 (**DO NOT PRESS ENTER**), a numbered directory of the device FDK1__ with file sizes will appear followed by the word **DELETE**.

To delete files, type their line numbers separated by spaces. The deletion will take place when you type a non-numeric character and press **ENTER**. If there are more than three columns of files, use **ENTER** to scroll down. The directory will remain open until you reach the end.

Be very careful not to delete wanted files!

F1 will toggle the source device between MDV to FDK.

F2 will enter the Window Menu (as described at the beginning of this section).

F4 – Auto screen size: This will toggle automatic window sizing On and Off. With automatic screen sizing On, the size of the window will be adjusted to suit the number of files which are to be displayed.

F5 – Auto Update. This will toggle the automatic updating of the directory. When this mode is On, the directory on the screen will be periodically updated. Any changes to the directory of the disk will be reflected on the screen as it is updated. This automatic update will continue in the background even when you are performing other tasks.

This is a multi-tasking routine which will list the directory of a Disk or Microdrive to screen (including the length of the file in bytes). Ex__dir__X is loaded by typing:

EX__DIR__X

EXEC FDK1_EX_DIR_X

You will notice the Ex__dir__X window appear. Enter the drive number you wish to look at. The directory will appear, also giving the size of each file. The function keys operate as described below.

F1 will toggle the source device between MDV to FDK.

F2 will enter the Window Menu (as described at the beginning of this section).

F4 – Auto screen size: This will toggle automatic window sizing On and Off. With automatic screen sizing On, the size of the window will be adjusted to suit the number of files which are to be displayed.

F5 – Auto Update. This will toggle the automatic updating of the directory. When this mode is On, the directory on the screen will be periodically updated. Any changes to the directory of the disk will be reflected on the screen as it is updated. This automatic update will continue in background mode when you are performing other tasks.

This is a multi-tasking routine which will allow you to inspect a Microdrive or Disk file, including the header. The output can be displayed on screen or directed to a printer. The routine allows you to scroll backwards and forwards through the file. It will display ASCII characters as normal and "unprintable" characters in hexadecimal. Inspect__X is loaded by typing:

INSPECT__X

EXEC FDK1_INSPECT_X

You will notice the Inspect screen appear. The first prompt will be for a source file. Enter the full file name. **FDK1_TEST_BAS**

You will then be prompted for the destination. Enter the device name.

FDK2_SAVE or SCR_ or SER1_

which will copy the file, list it to the screen, or to the printer respectively. Press **ENTER** after each selection.

You can use the cursor keys to scroll up and down the file. You will notice that the file header will remain at the top of the display screen, and has the usual format. Pressing **ENTER** will return to the main menu and close the file. The function keys are used as follows:

F1 – Ascii/Hex. This is used to select whether the file is displayed in Hexadecimal or ASCII format.

F2 – Send to printer. This will direct the output to a printer connected to the serial port SER1.

F3 – Clear screen. This will clear the displayed file from the screen window.

F4 – Screen Size. This key will toggle the display window size between full and half height.

F5 – Auto Update. This will toggle the automatic updating of the screen display. When this mode is On, the file on the screen will be periodically updated. Any changes to the file will be reflected on the screen as it is updated. This automatic update will continue in background mode when you are performing other tasks.

To enter the Window Menu, type '?' in response to the prompt for the source device name. Type SHIFT+ESC and ENTER to remove the job.

SPOOL__X This utility will allow you to output a file to screen, printer or disk. Its use is primarily in the fact that it is a multi-tasking utility. A file can be printed in background mode whilst you are running another job. Spool__X is loaded by typing:

EXEC FDK1_SPOOL_X

You will be prompted for a Source device/filename, followed by a Destination device/filename. All characters and control codes are sent without modification. To halt the output you must use CTRL+F5 as you would normally do to halt a listing. Unlike Inspect this utility does not output the file header. You will have to wait for the file output to be completed before selecting a new file or ending the program.

Pressing '?' in response to the prompt for the source device name will enter the Window Menu as described earlier. SHIFT+ESC and ENTER will remove the job as usual.

COPY__X This utility is used to copy files from Microdrive or Disk. It is useful when several files need to be copied from one device to another, because the selection is by a line number rather than the full filenames. Copy__X is loaded by typing:

EXEC FDK1_COPY_X

Type in the device number to be read, do NOT press ENTER. The directory will appear in the screen window and you will see that each file has been given a number. You will now be asked which file(s) you wish to copy. Type in the relevant numbers, separated by spaces and then the device name where you wish them to be copied to; eg 'FDK2__' and press ENTER.

F1 will toggle the source device between MDV to FDK.

F2 will enter the Window Menu (as described at the beginning of this section).

F4 – Auto screen size: This will toggle automatic window sizing On and Off. With automatic screen sizing On, the size of the window will be adjusted to suit the number of files which are to be displayed.

F5 – Auto Update. This will toggle the automatic updating of the directory. When this mode is On, the directory on the screen will be periodically updated. Any changes to the directory of the disk will be reflected on the screen as it is updated. This automatic update will continue in background mode when you are performing other tasks.

REDIRECT. X This utility will allow you to output all files with a particular extension to screen, printer or disk. All characters and control codes are sent without modification. To halt the output you must use CTRL+F5 as you would normally do to halt a listing. Unlike Inspect this utility does not output the file header. You will have to wait for the file output to be completed before selecting a new file or ending the program. Redirect__X is loaded by typing: **EXEC FDK1_REDIRECT_X**

This utility could, for example, be used to obtain a printout of Superbasic programs from a Disk or Microdrive.

Answer the prompts for a Source device, Destination device and extension in the same way as you would for Backup__X. If you press **ENTER** in reply to the prompt for the file extension, then all the files will be redirected.

Typing '?' in response to the prompt for a Source device will enter the Window Menu as usual. Type **SHIFT+ESC** and **RETURN** to remove the job.

Read the instructions, experiment using the safe routines eg

EX_DIR_X, INSPECT_X, SPOOL_X

Move the windows about, load several routines and experiment switching between them using **CTRL+C**. Practice quitting them using **SHIFT+ESC**. After a short time you will find these utilities second nature and an invaluable aid to file or program generation.

If a routine fails to load you have probably run out of memory. Delete routines you are not using and reload.

If a routine fails it will abort and quit itself – Type **CTRL+C**.

Hints and tips

This is a Superbasic Procedure which enables you to change the size and location of up to 9 windows. **REPOS__BAS** is loaded by placing the utilities disk in drive 1 and typing: **LRUN FDK1_REPOS_BAS**

This will then load an assembler program called **REPOS__CODE** from **FDK1** into the Superbasic **RESPR** area.

It is used as a normal Superbasic procedure by typing: **REPOS # X**

Where X is between 1 and 9, and specifies the screen window to be repositioned.

F1 – Fine/Coarse movement: **F1** will toggle between fine and coarse movement of the screen position or screen size.

Cursor keys: Use the cursor keys to move the current window.

CTRL+Cursor keys: Hold down **CTRL** and use cursor keys to increase the window size.

ALT+Cursor keys: Hold down **ALT** and use cursor keys to decrease the current window size.

ENTER: Press **ENTER** to leave the window in its new position. At this time the coordinates of the new window position will be displayed in the top left hand corner.

This program will enable you to 'Dump' a high resolution **MODE 4** screen from the QL to a suitable colour printer, eg. Micro Peripherals' **CANON PJ-1080A**.

To load this program proceed as follows:

- 1) Place Utilities disk in Drive 1.
- 2) Type: **LRUN FDK1__COLPRINT**.
- 3) Follow the screen prompts thereafter.

Colprint assumes that the printer is connected to the **SER 1** serial port.

This utility also provides a range of printer control abbreviations (only while **COL-PRINT** is in Basic memory) which will simplify operating the printer. The commands are as follows:

REPOS BAS

Keys used

COLPRINT

	DESCRIPTION	COMMAND	COMMENT
	PPrint PRepare	PR	Sets channel 5 to printer, gives init code, sets BOLD mode.
Print head positions	Carriage Return New Line	CR NL	Carriage returns to line start. LF and CR performed.
Page parameters	Page length Page length Form Feed SKIP perforations	INCHES n LINES n FF SKIP n	Set length to n inches (norm. 11). Set length to n lines (norm. 66). Print buffer, next top of page. Paper fed n lines at page end. (n=0 gives no skip).
Layout	Horizontal Tab Vertical Tab Line SPACE	HT VT SPACE n	Move to next tab (every 8 chars). Move to next tab (every 8 chars). When n=1, gap.
Character properties	Character Colours Background Colours Solarised Mode Enlarged Size Bold Mode Underline Mode	CC n CB n SM n ES n BM n UM n	QL colours 0 to 7. QL colours 0 to 7. n=1: reverse B&W. n=0: normal. n=1: enlarged. n=0: normal. n=1: Bold chars. n=0: normal. n=1: underline on. n=0: off.
Printer Controls	CANcel Printer Reset Printer Select	CAN CLR PS n	CANcels last line in buffer. Reset to power up conditions. If n=0: Off line. n=1: On Line.
Listing	Program Listing	LLIST n1, n2	Lists lines n1 through to n2 onto printer

DISK AND MEMORY EDITOR. (D.A.M.E.)

This program is provided on the utility disk to enable the more advanced user to load and display a disk sector onto the screen, edit it and then save it back to the disk. It will also allow you to display and directly edit the QL's memory. It must be stressed that random editing of either the QL's memory or the disk could produce unexpected or fatal results.

The program is run by placing your Utilities Disk into Drive 1 and typing **LRUN FDK1__DAME**.

The function keys F1-F4 are used as follows:

F1 – Edit Mode (Hex, Ascii, Dec)

This will allow you to make changes in Hex Ascii or Decimal. You will see the mode indicated in the top left of the screen.

F2 Source (Disk, Memory)

You can select whether you wish to display memory or a sector from the disk and you will see the memory address or the sector address indicated in the top right of the screen.

Memory mode: This will allow you to view and amend the QL's memory directly.

Press F3 to change the memory address and hit enter to confirm the new address. You will see the memory displayed on screen and any changes you make to this will be made directly to the QL's memory. Use the four cursor keys to move to the byte or bytes that you wish to change.

Please note that some addresses correspond to **ROM** and therefore the changes will not take place.

Disk mode: This mode will allow you to read any sector from your disk, change it and write it back to the disk.

Press F3 to change the sector address, use the left and right cursor keys to move to the parameter that you wish to change and press enter to display the selected sector.

SECTOR (1-9)
SIDE (0-1)
TRACK (0-79)
DRIVE (1-4)

Use the four cursor keys to move to the byte or bytes to be changed. If you press F1 or F2 you will be given the option to save the amended sector back to disk if you have made changes to the sector.

In both disk and memory mode this key will produce a hard copy of the sector or section of memory displayed on a printer connected to the serial port SER1. **F4 – Print**

APPENDIX A TECHNICAL SPECIFICATIONS INTERFACE

Format:	720 KB (80 TK, DS, DD). 360 KB (80 TK, SS, DD).
Drive requirements:	80 Track, double density, single or double sided. 6ms track step time. (maximum) 15ms settling time.
Hardware options:	Single/double sided. FDK/MDV on power up. 3ms/6ms track step time.
Firmware:	File utilities. Disk editor. Microdrive emulation option (FDK/MDV). Device rename facility. File rename, overwrite and truncate implementation.
Capacity:	1 MB unformatted. 720 KB formatted.
Transfer rate:	250 Kbits per second.
Average latency time:	100ms.
Access time:	3ms track to track. 94ms average (including settling time). 15ms settling time (max).
Motor start time:	250ms (max).
Recording density:	8717 bits per inch (max).
Recording method:	MFM Standard.
Track density:	135 TPI.
Cylinders:	80.
Tracks (double sided):	160.
Rotational speed:	300 RPM.

SINCLAIR QL
DISK DRIVES

APPENDIX B

DISK SYSTEM ERROR MESSAGES

Below is a list of the error messages generated by your disk interface. These error messages supplement those that you will find in your QL manual.

CYCLIC REDUNDANCY ERROR:

This error is similar to a parity error for serial data transmission. At the end of each sector on the disk are two bytes that are known as CRC bytes. When a sector of data is stored onto the disk a complex calculation is performed based on the stored data. The result of this calculation is then stored in the CRC bytes. When this sector is later read back from the disk the same calculation is performed and the result is compared to the CRC bytes. If they differ then the data is considered incorrect. This would usually indicate a corrupted or bad disk.

RECORD NOT FOUND:

This means that the disk controller cannot find the sector it is looking for on the disk. Each sector on the disk is immediately preceded by an identification block which is used by the disk controller to check which sector side and track it is on. These ID. blocks are written to the disk when it is formatted. Record not found will usually mean that the disk has not been formatted but it could mean that it has been damaged or corrupted at some time.

DRIVE NOT READY:

Put simply it means that the disk drive is not responding to the interface. This usually means that the disk has not been inserted into the drive unit but will also occur if the disk drive is not plugged in or switched on.

SEEK ERROR:

Each time the disk drive read/write head is moved to a new track it will check the identification block to make sure that it has reached the correct track, if it is not then the disk system will produce a seek error. This will occur if the disk is not formatted or has been corrupted or is damaged.

LOST DATA ERROR:

This error message is not very common but it means that the disk system was unable to read or write all of the 512 bytes belonging to the disk sector.

APPEDIX C ADVANCED PROCEDURES

The Superbasic procedures **DGET** and **DPUT** are both 'Resident' when you have your interface card connected. Their function is to allow direct access to a disk, bypassing the QL filing system. Any disk which has been formatted to the IBM standard, Double density, 80 tracks, 9 sectors per track and 512 bytes per sector can be accessed using **DGET** and **DPUT**.

This procedure will allow you to load any sector from a disk and store it in an integer array.

DGET

SYNTAX: DGET (ARRAY),[SECTOR],[SIDE],[TRACK],[DRIVE]

Parameters

- 1) **ARRAY** must be a one-dimensional integer array of at least 512 elements.
- 2) **SECTOR** must be within the range 1-9.
- 3) **SIDE** must be either 0 or 1.
- 4) **TRACK** must be in the range 0-79.
- 5) **DRIVE** must be in the range 1-4.

For example, to read sector 1, track 0, side 0 of the disk in drive 1, type:

```
DIM AX(511)      (Dimension an array of 512 integers)  
DGET AX,1,0,0,1
```

NB. Any of the sector, side, track and drive parameters may be omitted and will assume the default values:

Sector 1, Side 0, Track 0, Drive 1.

This resident command will write a 512 element integer array to a specified 512 byte sector on the disk.

DPUT

SYNTAX: DPUT (ARRAY),[SECTOR],[SIDE],[TRACK],[DRIVE]

Parameters:

The parameters are the same as those used for **DGET**.
(**NB.** The array will be corrupted by **DPUT**.)

For example; **DPUT B%, 5, 1, 36, 1**

will write 512 elements of the array **B%** to sector 5, side 1, track 36 of drive 1