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Obviously, we cannot guarantee to answer every query we receive, but we will do our best! Where we have been unable to answer the queries, we may print the help request as an open request in the newsletter to ask if any of the readers can come up with a solution. And, of course, if readers feel that they have a better solution than we came up with, or would like to correct any errors we make, please write to us!

Ram Discs

Q. I know how to save and load to and from a ramdisc, but not much more about them. I've heard of two different types: "static" and "dynamic". What's the difference and which would be best for me to use? I have a QL with a Gold Card.

A. A static ramdisc has a fixed size, set by a FORMAT command. For example, `FORMAT RAM1_100` would create a ramdisc of size 100 sectors. Each sector is 512 bytes, so a 100 sector ramdisc in theory holds up to 50kilobytes of data. In practice, things are never quite that simple with computers!

Some of the capacity is used by the system to keep a list of files stored, and each file might be a multiple of 512 bytes even if only one or two bytes long, because whole sectors are assigned.

So if you want to copy a full microdrive cartridge to a ramdisc you may have to format the ramdisc to a slightly higher number of sectors than that of the cartridge itself.

Once you have created the ramdisc, it remains at that size in memory even if you delete all the files from it. To release the

memory you have to reformat it to a different size, or use `FORMAT RAM1_0` to remove it completely.

Most ramdisc systems allow up to 8 ramdiscs numbered from `RAM1_` to `RAM8_`. It is completely up to you whether you use one large ramdisc or up to eight smaller ones depending on what you want to achieve and how you use the data. For example, back in the early days of the QL when I had a memory expansion card but no floppy disc drive, I used to copy the Psion program cartridges to memory to work faster, although it meant I had to remember to copy the documents and data to cartridges before switching off the QL or all would be lost – the contents of a ramdisc are forgotten when the QL is reset or switched off.

A ‘dynamic’ ramdisc on the other hand is a bit more flexible and automatic than a ‘static’ one. What the term ‘dynamic ramdisc’ actually means is that the ramdiscs changes its size automatically as required (as long as the QL has not run out of memory of course). The dynamic ramdisc does not need formatting – if the system realises that a ramdisc is full, it will ask the QL to grant it enough extra sectors to add more files.

The first ramdisc software for the QL was a static one, until the first dynamic ones came along.

At first, it would appear that the dynamic ramdisc is much better than a static one as you never have to format it and it never fills up (unless the entire computer memory fills up).

Indeed, most people use a dynamic ramdisc for this very reason and it is usually the best choice in most cases. However, there are circumstances when the static variety can be better than the dynamic ones:

1. Where a fixed size ramdisc is needed for some reason, e.g. to have the same capacity as a floppy disc or microdrive cartridge for copying, or for ‘temporarily’

running microdrive software from RAM, ensuring it never gets too big to copy back to the cartridge.

2. Ever heard of the term “common heap fragmentation”? This is a horrible QL disease whereby continually allocating and releasing chunks of memory while also running several programs and other activities at the same time causes the computer’s memory to become fragmented, or broken up into small chunks which may not be contiguous – chunks may be split by other sections still in use and so on, so eventually the QL finds it can’t get a big enough continuous chunk to allocate on request, with the result that the computer seems to run out of memory. Modern ramdiscs have some checks built in to reduce the risk of this, but it is still a theoretical risk.

The good news though is that the ramdiscs on more modern systems such as the Gold Card generally supports both types so you can choose which type to use, or better still just leave it to the computer to decide. With most modern systems ramdiscs default to ‘dynamic’ type so that you can just go ahead and use them without having to turn them on or use a FORMAT command. But the static types are also there, so if you want a fixed size ramdisc, just use the FORMAT command as described above.

Q. What else should I know about a ramdisc?

A. The name of a ramdisc can be changed if need be. So instead of the names RAM1_ and RAM2_ their names can be changed to, say, MDV1_ and MDV2_. This can be quite useful when you want to run microdrive-based software from a fast ramdisc. Just copy all the files from the microdrive cartridge to the ramdisc, then change the name of the ramdisc drives to MDV with the following command:

```
RAM_USE MDV
```

This command makes the ramdiscs pretend to be microdrive cartridges. The downside of this command is that in most cases the microdrives then cannot be used until the ramdisc name is changed back to the original name with a command such as `RAM_USE RAM`. If you have copied a program to ramdisc and saved some files, you cannot copy these back to the microdrive cartridges until you have restored the names.

Note that the three letter name after the `RAM_USE` command can be in upper case or lower case, and usually may be quoted or unquoted: `RAM_USE "MDV"` is usually the same as `RAM_USE mdv`

Note that not all ramdisc systems have a `RAM_USE` command – older systems or stand-alone ramdisc software may not include the command.

Many modern systems with ramdisc software built in have a very useful additional ramdisc facility called microdrive imaging. This allows the content of a microdrive cartridge to be loaded much faster than usual to a ramdisc. To use this facility, we use a special version of the `FORMAT` command with both the name and number of a ramdisc and the name and number of a microdrive:

```
FORMAT ram1_mdv1
```

This will create a fixed size ramdisc with all the files it could copy off the cartridge.

If you use a `DIR` command to list the files in the ramdisc afterwards, you may (if unlucky) see that one or more of the filenames have an asterisk after them.

This indicates that the file is damaged – one or more of the sectors of the file have not copied properly. This may indicate

that the file is damaged on the cartridge, although you may find that a cartridge which fails in one drive will sometimes work fine in another.

While that can be a reasonable test of a microdrive cartridge's integrity, it is always vital to keep backup copies of them.

I hope this explains a bit about ramdiscs and helps you get acquainted with some of their lesser used features.

Add-on Interfaces

Q. I recently returned to using a QL after many years. I bought an old disk interface which I think also has extra memory. Someone told me that it may also contain a copy of Toolkit 2. As is often the case with second hand hardware, it came without a manual so how can I tell what facilities it has?

A. This is something I am asked quite frequently. I have some replacement manuals for older interfaces and QL add-ons on my website's QL Documents page:

<http://www.dilwyn.me.uk/docs/index.html> - scroll down to the link to the 'Replacement Manuals' page and click on the link.

Most interfaces (ones which have an onboard ROM - apart from memory add-ons) usually include a copyright notice on the startup screen as the QL starts.

After that, the easiest way to check the type of an interface is to have a look at the circuit board to see if the manufacturer included a description or copyright notice.

If that fails, compare the interface to photos on QL websites such as Rich Mellor's QL Wiki, which includes pictures of just about every QL interface ever released. The QL Wiki can be found at http://www.rwapadventures.com/ql_wiki/

Regarding memory, if it is not obvious from the chips you can see on the circuit board, most interfaces have a command (well, a function actually) which tells you the amount of free memory on your system. Type in the command `PRINT FREE_MEM` and it will print a number indicating how much free memory is available. The command is not implemented on an unexpanded QL. As it is the amount of **free** memory, it is best used immediately after turning on the QL. The QL screen will always use at least 32768 bytes, so an unexpanded QL there would never be more than 98304 bytes, although on an unexpanded memory QL it will in practice be even less than this because of memory used for system variables and other operating system information.

If you get a result of more than 128kilobytes (131072 bytes) it will indicate that there is an expanded memory fitted to the computer, although it may be a little hard to figure out exactly how much as the number of free bytes is less than might be expected because of memory used for the screen and system variables, for example.

Most older disc interfaces with onboard memory expansions have 128K, 256K, or 512K memory onboard. Usually, this is in addition to the QL's built in memory, so the QL will have the following amounts of RAM in practice:

128KB extra: 262,144 bytes (256KB total)

256KB extra: 393,216 bytes (384KB total)

512KB extra: 655,360 bytes (640KB total)

Internal 512K expansion RAM: 524,288 bytes (512K total)

So whatever figure is returned by `PRINT FREE_MEM`, from the closest figure above you may be able to work out how much memory the system has in total.

For systems which do not have a `FREE_MEM` function built in, a rather more long-winded method is needed, involving some

PEEK_L commands. This is not recommended except where this no other better method available, but may work on unexpanded QLs and QLs with older add-on cards.

```
PRINT PEEK_L(163840+32) - 131072
```

This command checks the system variable 32 which keeps a note of the top address of RAM. From this you have to deduct where RAM starts, which on a QL is at address decimal 131072. This returns the number of bytes on a QL system and you have to divide this by 1024 to get the number of kilobytes.

In the case of a 128K memory QL, this will return 131072 bytes (which just happens to be the same as where the screen starts on an original Sinclair QL).

Note that this is not a reliable method on modern systems, although on older systems it is good enough to give you a quick idea of how much memory the system contains.

When the QL was first launched, its design was fixed and documented. Fixed areas in the address range were to be used for RAM, and this only allowed for up to 512KB of extra RAM to be added to the built in 128K of RAM, making a theoretical maximum of 640KB of RAM. Then along came the Trump Card and smashed those rules, adding enough memory to make a total maximum of 896KB. It did this by adding RAM in address spaces reserved for additional interfaces. This did mean that once you had added a Trump Card to use those memory locations for extra RAM, you could no longer add any further devices in a "legitimate" manner (i.e. conforming to Sinclair documentation), even if you did have a 2, 3 or 4 slot expansion backplane.

Moving on to extensions now, most floppy disc systems have at least a part if not most of the Toolkit 2 extensions along with the extensions to BASIC associated with whatever make of disc

system it is. Entering the command EXTRAS on most disc systems will list the names of all the extensions to BASIC added by the disc interface ROM.

The list is not usually in alphabetical order. In fact, if you want to be adventurous you can send the output of the EXTRAS command to a file and read it back to sort it. Or, you can read through the list to see if your system has a particular extension. Here's an example.

```
100 REMark check if extension name exists
110 CLS : CLS #0
120 INPUT #0,'Check for which extension name > ';search$
130 OPEN_NEW #3,FLP1_TEMP_FILE
140 EXTRAS #3
150 CLOSE #3
160 OPEN_IN #3,FLP1_TEMP_FILE
170 INPUT #3,t$ : REMark skip the medium name
180 INPUT #3,t$ : REMark skip the medium capacity numbers
190 found% = 0
200 REPEAT loop
210   IF EOF(#3) THEN EXIT loop
220   INPUT #3,t$ : REMark get one line of EXTRAS output
230   IF t$ == search$ THEN found% = 1 : EXIT loop
240 END REPEAT loop
250 CLOSE #3
260 DELETE FLP1_TEMP_FILE : REMark get rid of the
evidence!
270 PRINT search$;' ';
280 IF found% = 1 THEN
290   PRINT'exists'
300 ELSE
310   PRINT'does not exist'
320 END IF
```

Some disc interfaces include a Toolkit 2 or subset of it, but need a command to activate it when you first switch on the QL. The command needed to activate the toolkit is usually TK2_EXT.

The above information will hopefully help you to identify the basic facilities of an older interface. More modern systems such as Gold Card and Super Gold Card (and to some extent Trump

Cards) may vary somewhat. At least, replacement manuals are readily available for them.