

This is an article for readers who are not used to using high resolution and high colour displays. It doesn't go into too many specifics, just aims to give you a base level of information, to help you get started if you are thinking of trying to make use of the new systems.

Once upon a time, there was the QL. It had a 512x256 pixel screen and displayed 4 colours. Simple. It could also display 256x256 pixels in 8 colours. Also pretty simple.

The word 'pixel' means a 'picture element', or if you must "a dot on the screen".

The fact that the QL could display up to 512 pixels across in the 4 colour mode also meant it could display up to 85 text characters per line. QL text characters occupy 6 pixels across and 10 down in the smallest character size (both including a little spacing of one pixel between rows and columns).

However, things are no longer that simple! Machines such as the Atari ST's QL emulator cards, QXL, Aurora, Q40/Q60 and various QL emulators came along over the years and changed the rules a little. So the QL graphics are not quite as easy to master these days!

The various designers of the various systems have added more pixels to the QL display and a little later they also added more colours. Eventually even a new window manager came along. Many of these new facilities need the SMSQ/E operating system (more about this at the end of the article).

### **Standard QL Modes**

The QL as originally sold in 1984 has two display modes. One, called MODE 4 (or sometimes MODE 0) uses up to 4 colours and 512 pixels across, 256 pixels down. The other, called MODE 8, has 256 pixels across the screen, 256 pixels down the screen, and can display up to 8 colours on the screen. This is fixed. A standard QL cannot display more than 8 colours without significant extra hardware changes to a lot of the video circuitry, by which time it would probably no longer be recognisable as a QL. I for one would certainly hesitate to call such a modified computer a "QL".

### **High Resolution**

The term "high resolution" simply tells us that there are more pixels on the screen, so if your monitor is the same size, the pixels are smaller and packed together a bit more so that you get a greater detail on the screen.

The great advantage is more detail and room for more (and bigger) program windows on the screen, as you will have seen from my screen shots in the December/January issue on page 56.

Various systems such as Aurora have made it possible to have several screen resolutions, as the screen sizes are referred to. Sure, the Aurora card can use the original 512x256 (512 pixels across and 256 down) pixel display like a standard QL. It can also be set to various other resolutions up to 1024 pixels across by 768 down if a Super Gold Card is being used. N. B. This particular size (1024x768) is only possible with a special monitor, although most sizes can be used with a conventional monitor.

Ordinary QDOS does not support these “high resolution” screen sizes. If you are running a standard QL ROM such as versions JM, JS, MG or even a Minerva ROM, you can only use a 512x256 screen.

There is no exception to this, apart from two special cases:

1. A QXL with SMSQ (the original version, without the pointer environment) allows a small selection of screen sizes,
2. The uQLx emulator allows larger screens as long as you use a Minerva ROM image. I have never used uQLx to know if I am completely correct to say this, though.

If you are using SMSQ/E with the Aurora, you can use the high resolution screens by using the DISP\_SIZE commands to change the screen resolutions. For example, DISP\_SIZE 640,480 to change to a screen size of 640 pixels across and 480 pixels down.

This is similar for other platforms running SMSQ/E. The DISP\_SIZE command lets you change the screen resolution, but not all platforms will support all sizes. For example, a Q40 might only let you use resolutions of 1024 pixels across and 512 down, or 512 across and 256 down like a QL.

The reality is that different hardware or different emulators can do different things, so don't assume all resolutions will be available on all systems even if SMSQ/E is present!

### **High Colour and GD2**

In addition to high resolution, some QL systems allow you to use more colours than the standard 4 or 8 colours available on a standard QL. This is generally referred to as ‘colour depth’ – in simple words, the number of colours you can choose from and display on the screen.

The first of these was a computer produced by CST in the mid-1980s, called the Thor XVI. It took the mode 8 layout of the QL screen and used the flash bit to double the number of displayable colours. On a standard QL mode 8 screen, each pixel on the screen uses three bits in screen memory and one bit to specify flashing changing from off to on or on to off. This is explained in the “screen” and “colour” pages of the Concepts section of the QL user guide. In simple terms, the three binary bits used for colour in mode 8 allow values from 0 to 7. Using the flash bit as an extra bit for colours doubled this, allowing colour numbers 0 to 15 or 16 colours. I have never owned a Thor 16, so I don't know if these were all different colours or just different shades of the standard 8 colours.

After that, things got a bit more complicated, so I'll try to provide a simple explanation.

High colour is generally only supported by having the SMSQ/E operating system on your computer or emulator and whether or not your system actually supports more colours in the first place – a QL doesn't, some emulators don't and so on. A computer able to make use of more than the standard 4 or 8 colours is broadly described as having GD2, or GD2 capable. The term ‘GD2’ stands for ‘Graphic Device Interface 2’ (source: Tony Tebby's original SMSQ/E 2.98 Display documents). Some people also refer to them as the “colour drivers”, a vague term from when GD2 was just a glint in Tony Tebby's eyes. So the new colour modes are generally referred to by any of these terms!

The **Aurora** card has two modes with more colours. One is a 16 colour mode which has never been supported even by SMSQ/E and is of little practical use these days. The other is a 256 colours mode, also known as an ‘8 bit’ colour mode. Whatever you call it, it provides 256 colours in a choice of

resolutions, but to use this mode you need (a) a Super Gold Card with the Aurora, and (b) the right version of SMSQ/E, which was specially put together by Marcel Kilgus to include suitable drivers for the new colours on the Aurora. Note that a standard Gold Card version of SMSQ/E does not support this 256-colour mode. You must use the special Aurora version and the Aurora must be fitted with a Super Gold Card. Of course, you can still use the standard QL-type display modes if you want to run old games which won't work in the new colour modes.

Other new QL hardware and emulators have used a 16-bit colour system. This allows for up to 65536 colours, but the actual way in which they use colour may vary.

The **QXL** card was an attempt by Miracle Systems Ltd to make a QL on a card to plug into a PC. Originally it was supplied with a version of SMSQ which did not include the pointer environment. It allowed you to use mode 4 and mode 8 screen colours, together with a choice of resolutions – you could use a QL-style 512x256 display. You could also use EGA graphics mode (640 x 350 pixels), VGA graphics mode (640 x 480 pixels) and SVGA mode (800 x 600 pixels). Originally, you could only have 4 or 8 colours, although a version of SMSQ/E was later produced which allowed for a 16-bit 65536 colour system.

The **Q40 and Q60** computers are advanced QL compatible computers designed by Peter Graf in Germany. These can use a 512 x 256 screen like a QL, but also use a 1024x512 screen with 16 bit colour system allowing up to 65536 colours. While it is just as easy to use – it uses the same commands in BASIC for example – the actual layout in memory for each pixel is pretty unique.

**QPC2** is an emulator which runs QL software in Windows on a PC by pretending to be a 68010 or 68020 processor. It has a very flexible graphics system which can use just about any resolution from a QL sized screen up to very large – I don't know the maximum size, but I regularly use it at up to 1920x1080, which is the best my monitor can handle. In terms of colour, QPC2 has 2 levels of colour available, in addition to modes which resemble the QL 4 and 8 colour modes:

1. 16-bit colour, up to 65536 colours
2. 8-bit colour, like an Aurora, but more choice of screen resolution sizes.

### **Low Colour**

Not really the correct name, but contrasts nicely with what we are talking about here. This refers to a unique 2 colour (black and white) mode available only, as far as I know, on some versions of the Atari ST QL emulator systems. Unless you use an Atari ST with a QL emulator board built in which supports this feature, you are extremely unlikely to encounter this particular graphics mode.

### **SMSQ/E**

This is an enhanced operating system for the QL and derivative computers (e.g. Aurora and Q40/Q60) and some emulators (e.g. QXL card, QPC2, QemuLator, Atari ST-QL boards).

QDOS on a QL occupies a standard 48 kilobyte ROM space. SMSQ/E is quite a lot bigger.

It adds new facilities and fixes some problem areas in the original QL ROMs. It adds an enhanced BASIC - there are many more commands and functions, some of which are to support the new graphics capabilities.

To quote Marcel Kilgus, "...some gold is required for SMSQ/E". If you want to use SMSQ/E on a QL, it must have a minimum expansion of Gold Card (or a Super Gold Card is even better).

If you are using QPC2, you don't need to think of how to add SMSQ/E. QPC2 is always supplied with SMSQ/E.

To use SMSQ/E on other systems you need to follow the instructions for the particular system in question – the installation procedure is different for most systems, which makes it sound like it will be complicated, but it isn't really as long as you follow the instructions.

Please note that if the version number of SMSQ/E on your system is older than version 2.98 it is unlikely to support the new colour modes as these were first introduced, to the best of my knowledge, in version 2.98. Then, in version 3.00 of SMSQ/E, the new Window Manager was introduced and we never looked back!

## **Window Manager 2**

In addition to the new colours, we now have something called Window Manager 2. This is a little bit harder to explain and understand for those who have never come across it before.

The best explanation of the term "Window Manager" I have seen comes from Tony Tebby's QPAC2 manual, where he says: "The Window Manager provides a set of utility routines which simplify the handling of menus and pull-down windows...using it provides a reasonably uniform user interface to applications programs." In other words, it's a set of standardised routines programmers can use to make their programs look and work alike in a pretty standard way.

Window Manager 2 took the original concept and built on it to give extra features to support new facilities introduced by the arrival of the so-called "colour drivers" (the "GD2" mentioned above).

It's a system for making better use of the colours in a co-ordinated and standard way, so that programs look and work in a standardised and uniform sort of way. It provides for colour themes, where the Window Manager contains lists of standard colours which programs can use to make sure of a consistent appearance to programs. This list of colours is called the System Palette (actually, there are 4 of them, although most programs just use the first). There are BASIC commands starting with WM\_ such as WM\_INK and WM\_PAPER which let you make use of these colours so that your program can look similar to the colour scheme used by modern programs like QD and QPAC2. It provides for improved sprite handling too, as well as some fancy border colours and 3D effects.

Once the Window Manager 2 had been produced for high colour systems, it seemed logical to bring some degree of support for the new features to the original pointer environment for QDOS, to allow most programs written for the new systems to work to some degree on the older versions., albeit without so many colours. Thus pointer environment version 2 was born. Marcel Kilgus says that this has all Window Manager 2 features except for high colour support.

If you want a more visual idea of what GD2 and Window Manager 2 are all about, see Marcel Kilgus's web page at <http://www.kilgus.net/smsqe/gd2.html>

## **Glossary**

*8-bit colour modes* – graphics system capable of showing up to 256 colours on screen.

*16-bit modes* – graphics system able to display 65536 colours on screen.

*Aurora* – a QL compatible computer designed by Nasta for Qubbesoft PD several years ago.

*EGA mode* – a graphics system with up to 640 pixels across the screen and 350 down.

*Emulator* – a program which runs on a particular operating system which pretends to be a QL so that it can run QL software.

*GD2* – Graphics Device Interface version 2. Handles more colours than a standard QL.

*Gold Card (or Super Gold Card)* – a plug in circuit board made by Miracle Systems Ltd for a QL, which adds a faster processor, floppy disk interface and expanded memory.

*High Resolution* – a system which allows QL compatible systems to have more than the usual QL 512 x 256 pixels on the screen.

*Pixel* – picture element, a “dot” on the screen. A standard QL has 512 of these across the display, and 256 down.

*Pointer environment* – a system which enhances the QL by providing an on-screen pointer used to select things on the screen. Also enhances the computer by saving and restoring the display automatically, so that you don’t need to keep redrawing a program’s display when other programs may have written all over it.

*Q40 and Q60* – two QL compatible computers, designed by Peter Graf.

*QPC2* – a QL emulator program for Windows.

*QXL* – a QL-on-a-card which plugged into a PC, sold by Miracle Systems some years ago.

*SMSQ/E* – a replacement operating system for QL and compatible systems.

*SVGA mode* – a graphics system for the PC with up to 800 pixels across the screen and 600 pixels down.

*System Palette* – a “colour theme” system, whereby a list of colours is maintained, which programs can read and use to make sure programs look similar, e.g. all programs can have the same border colour or background colour.

*uQLx* – a QL emulator program, for the Linux operating system.

*VGA mode* – a PC graphics mode, with up to 640 pixels across the screen and 480 pixels down the screen.

*Window Manager* - provides a set of utility routines which simplify the handling of menus and pull-down windows. Window Manager 2 is a more advanced version, which knows how to handle the new graphics modes and colours.

## **Conclusions**

I hope that this article helps you understand a bit about what all these various facilities are about and encourage you to explore and use them. If there are specific areas you'd like to see covered in follow up articles, please do get in touch with me by email at [helpline@quanta.org.uk](mailto:helpline@quanta.org.uk) or via the contact details on page 2 of the magazine.