Choosing the Right

David Spencer looks at the various monitor types available for the

When the Archimedes was first launched, life was simple: you either had the standard Acorn colour monitor, or its black and white cousin. However, things have changed in the five years since then, and purchasers now have a wide range of monitors to choose from, be they first time buyers or existing users looking to upgrade. In this article we won t be comparing particular brands or models, but we will survey the different type of monitors, and indicate their strengths and weaknesses.

SCANNING AROUND

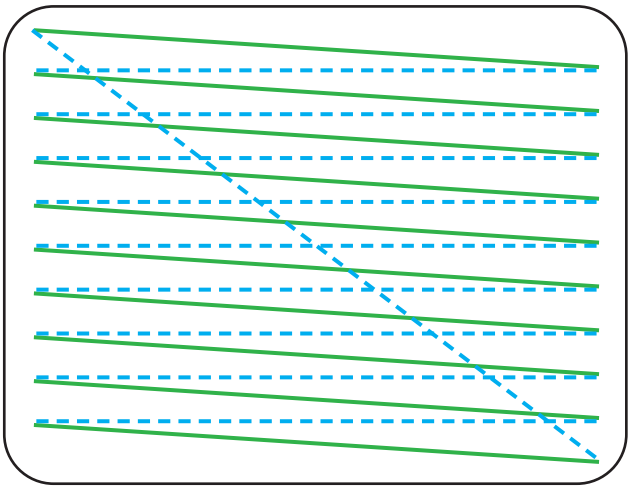
In order to understand how particular types of monitors differ, we need to look at how the computer produces its picture. As most people are aware, the screen display is made up of a rectangular array of dots called pixels, each of which can be one of several different colours. The computer displays these by sending them to the monitor one-by-one, starting at the top left and scanning across the first line, and then moving back for the second line and so on. The whole picture is sent in a fraction of a second, and then repeated continuously so that the eye sees what looks like a solid picture. Figure 1 shows this scanning process with the solid lines indicating the build-up of the display, and the dotted line the fly-back during which the scan returns almost instantaneously to the other side of the screen.

The exact rate at which pixels are output to the monitor depends on the particular screen mode and monitor type, but it must remain unchanged between each scan of the entire picture, or frame, in order to avoid a jumpy or flickery picture. Furthermore, the monitor needs to be synchronised to the scanning of the picture otherwise it will have no way of knowing where a particular pixel fits on the screen. To achieve this, the computer outputs two synchronising pulses (or sync pulses) along with the picture itself. The first of these is called the line sync pulse and is output at the end of each line to tell the monitor to return to the left hand side. The second pulse is the frame sync pulse and is sent at the end of the complete frame to return the monitor s scanning to the top of the screen again.

The rates at which the line and frame sync pulses occur are called the line rate and frame rate respectively, and the rate at which the actual pixels are output is called the dot rate. The choice of the scan rates, which as we shall see below is far from arbitrary for most monitors, has a major impact on the available screen resolutions. For example, if you have a dot rate of 6MHz, a line rate of 15 kHz and a frame rate of 50Hz, the total number of dots that can be fitted on one line is 6000000/15000 = 400, and the total number of lines is 15000/50 = 300. In practice some of the dots are needed for the sync pulses themselves, reducing the maximum resolution available with these scan rates to about 300 by 240 pixels.

BACK TO MONITORS

Having covered some theory, we can now look at the different monitor types. The original Archimedes monitors, and currently still the most widespread, are the TV-standard monitors. These monitors, which include the Acorn badged AKF17 at £199 as supplied with the Archimedes (but not the A5000) get their name from the fact that the scan rates



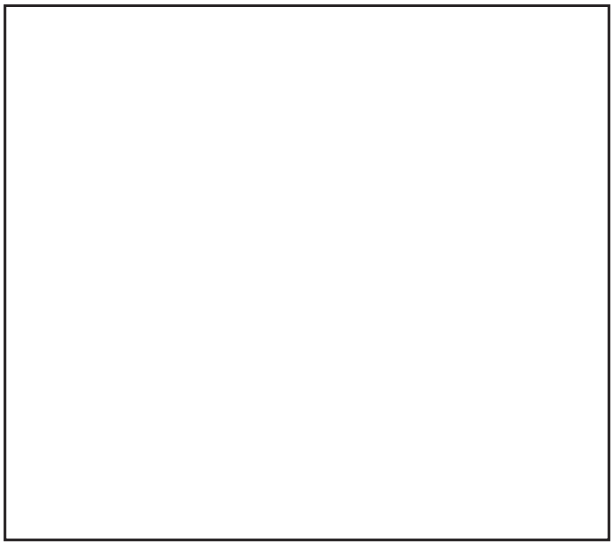
Scanning pattern of monitor display

they use are the same as that for broadcast television, namely a line rate of 15.625kHz, and a frame rate of 50Hz. The reason that these monitors were chosen in the early days was that they were much cheaper than any other options because their design was very similar to that of a television, which of course are made by the million. It was also a logical progression from the earlier Acorn computers that had to generate TV standard output because they used TVs as their monitors.

The main drawback of TV standard monitors is that the scan rates restrict the maximum resolution available. The best that RISC OS can provide without distorting the image is 640 by 256 pixels, and to achieve this it has to use pixels that are twice as high than they are wide, rather than being square. The chief advantage on the other hand is that TV standard monitors were the original standard, and are hence supported by all software. However the restricted resolution and non-square pixels gives fairly poor display quality, particular with anti-aliased fonts.

JOIN THE PC WORLD

The world of IBM PC compatibles gave up on TV standard monitors a long time ago and eventually settled on the VGA standard that offers a maximum resolution of 640 by 480. Not only has this got the advantage over TV standard monitors of square pixels, but the ratio 640 to 480 is 4 to 3, which just happens to be the same as the width to height ratio of the screen in most monitors. This means that the picture looks the correct shape, without any need to distort it at all. Another advantage of VGA monitors is that they use a slightly higher frame rate, which gives noticeably less flicker than a TV standard monitor.



Taxan 795 multisync colour monitor

Unfortunately, there were problems using standard VGA monitors on earlier Archimedes - the main one being that to achieve the scan rates needed by VGA, a dot rate of 25.175MHz is needed. The nearest the Arc could offer was 24MHz, which was a little too far away for the average monitor to produce a stable picture. The other problem is that the two sync signals mentioned earlier need to be inverted and separate for VGA, and combined for TV standard monitors. Providing separate signals can be achieved by configuring RISC OS, but inverting the signals required links inside the machine to be changed.

Acorn addressed these problems on the 540 by providing the 25.175MHz dot clock, and allowing the sync pulses to be inverted in software. The new generation of computers, starting with the A5000, goes even further by providing a standard 15-pin VGA socket, rather than the 9-pin socket of earlier computers, and detects the monitor type automatically from the cable wiring.

The big advantage of buying a VGA monitor is cost. They are already on a par price-wise with TV standard monitors despite their superiority, and prices are falling continuously. There are, however, as always, some disadvantages. Firstly, as already mentioned you really need an A540 or one of the new generation computers to get a reliable picture quality. Secondly, you exclude the use of the TV standard screen modes such as modes 12 and 15. This may be a problem for some programs, particularly games, which expect to run in these modes. RISC OS 3 attempts to get around this problem by emulating the lower resolution modes, but it can only do this by reducing the picture size so that you get a squashed up picture across the middle of the screen.

THE BEST OF ALL

Both classes of monitors that we have looked at so far have one thing in common - they can only support a single line and frame rate combination. Any attempt to display a picture with the wrong rates would just result in an un-synchronised mess on the screen. The class of monitors called the multisyncs (or multiscans) on the other hand can work with a wide range of both line and frame rates, rather than fixed rates. It is therefore perfectly possible to have a multisync monitor that can display TV standard modes, VGA modes, and any other in-between modes that you care to devise. RISC OS provides multi-sync only screen modes of 640 by 512 pixels. These offer square pixels at a resolution somewhat greater than standard VGA. It is a multisync monitor that is supplied as standard with the A5000.

Many manufacturers make multisync monitors of varying quality, though the two that crop up most often in the Archimedes world are Taxan and Eizo. Taxan offer the 14 770+, 775 and 795 (each one an improvement on the previous model), the 16 875 and the 20 970, among others. Eizo s main models are the 14 9060, and the better quality 9070. The prices range from about £380 for the 770+ and 775 up to around a £1000 for the larger screen models.

While multisyncs are often the answer to all your monitor problems, there are a couple of points to watch out for. The first and most serious is that increasingly, the minimum line scan rate supported by multisyncs is not low enough for TV standard modes. This is a problem with both the Taxan 795 and the Eizo 9070. If this is the case, the only possible solution is to add a VIDC Enhancer to your computer. This is a little hardware add-on that allows the dot rate, and hence the line and frame rate, to be increased by 50%. This is usually enough to take the line scan rate into the range supported by the monitor. This solution is not necessary on the A540 and newer machines, as they effectively have a VIDC Enhancer built in.

The second problem is one of adjustment. To achieve a well proportioned picture that fills the screen at all scan rates is very hard, and earlier multisyncs, notably the Taxan 770+ and 775, left this job up to the user by providing a vast array of preset controls and knobs that are a nightmare to

adjust. I m sure that there are many 770+ owners that still haven t got their monitor set up quite right! Thankfully the more modern monitors such as the Taxan 795 can automatically adjust themselves to give the best possible picture. Some multi-syncs, for example the one supplied by Acorn with the A5000, compromise in that they will adjust automatically to display a VGA picture, but leave it up to the user for other screen modes.

LOOKING GOOD

So far we have looked only at the resolutions at which various monitors can technically display a picture, while totally ignoring the quality that you can expect.

As you can probably imagine, quality can vary greatly between model and manufacturer, but there are a couple of pointers that you can glean from the spec sheets. The first of these is the dot pitch or mask pitch, which is a measure of the distance between the individual dots that make up the display tube. It doesn t matter how high a resolution you try to display, two adjacent dots will only appear to be separate if they are at least the mask pitch distance away from each other on the screen. Otherwise, the dots will merge into one. For a 14 monitor, a maximum value for the dot pitch to give a good crisp display is about 0.32mm, and a value of 0.28mm or even 0.26mm is preferable. As the screen size increases, the dot pitch becomes less important, but still the smaller the better.

The other pointer to quality is the quoted video bandwidth which will be a figure in

entered into them, and can then be saved in one or more of four different formats - most often, perhaps, to export onto a PenDown Plus page as a Draw file.

DOCUMENTATION

There are two manuals to go with PenDown Plus. The well indexed and laid out User Guide covers facilities in a straightforward way by explaining each of the three areas of control outlined above (icon-strip toolbox, menus and configuration). There is no tutorial, but there is an ample introduction to the conventions used throughout, and an indication of keyboard equivalents (e.g. Ctrl-S for Save), which menus on screen do not always display.

The separate MailMerge and Table Editor manual is equally easy to use though it carries no index. Since the operations dealt with here are necessarily more complex, and indeed will be new to some users, it is as well that an approach is adopted that takes you by the hand and leads you closely through the steps and stages necessary to create tables and insert data into documents.

CONCLUSIONS

PenDown Plus will make an ideal word and text-with-graphics processor for the regular as well as first-time user. There is very little that cannot be done with PenDown Plus, and the drawbacks already mentioned are but a small price to pay for what is in most respects an application packed with just the right features and yet at the same time extremely easy to learn.

Despite its relatively low price (compared to the likes of Pipedream 4 and Impression), PenDown Plus does not in the least feel a cut-down package. It is a fully integrated product which does what is asked of it extremely well. PenDown Plus is definitely recommended.