

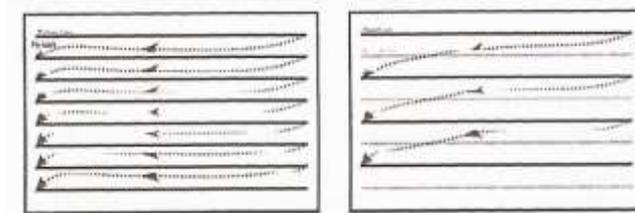
*From an article in Quanta Magazine, June/July 2011 (Volume 28, Issue 4)*

Home computing in the 1980s was just starting to bloom. After the huge impact of the ZX81 the public realised that science fiction of a computer in every house was going to be a reality. It was a very inexpensive means to have what was undoubtedly the future in your living room.

But one of the compromises to keep costs down, and was the case with all home computers of that era, was to use a TV as a monitor. It was a compromise that worked two ways; for the manufacturer they could keep complexity low, and to the consumer they didn't have to buy a very expensive monitor.

Viewing video at 25fps (frames per second) you will notice flicker, but at 50fps the picture is steady. This means for a flicker free picture you must use at least 50fps, twice the information of 25fps. How can you still keep the same information load of 25fps but the picture quality of 50fps? Television has a trick to make it look better than it is, and it's a process called Interlacing.

Taking advantage of the human eye's persistence of vision it was found that you need only send half the picture in every frame, Figure 1. Updating every second line in each "field" of the frame to build up a picture it's possible to give the impression of a full frame picture at 50fps but with the information load of a 25fps picture. It's the TV picture that we've all grown up with!



*Figure 1. Progressive video, left, and interlaced, right. Note only half the lines are updated every frame on interlaced video reducing the information load by half.*

As home-computers evolved the manufactures desired to break in to the lucrative business sector who would happily buy a dedicated monitor with the funds they'd saved on the "PC". So as more advanced variants of those home computers were produced an additional port was added to allow connection to a monitor.

These allowed for RGB (Red, Green, Blue) signal lines to be connected directly to the display and bypassing the composite video that home computing had used to this point. Simply put, a composite video signal is as the name suggests a mixture of all RGB signals in one video signal. Composite video falls down where the picture is busy with sharp changes in colour and is worst with text where characters become mushy and noise appears on the edges. Keeping the RGB signals separate gives a better picture and that's exactly the output from Sinclair QL we're interested in.

Modern PC monitors don't understand interlaced video. They don't need to as the lowest video mode they'll see is VGA, a non-interlaced format. In order to display interlaced video on a PC monitor we need a device which will take that video and produce non-interlaced or "progressive" video. Progressive being the term now in use when video isn't interlaced. To

that end we have a converter which will take the interlaced video and de-interlace it to a progressive format. We call it the “Simple Video Scalar” as its function is to de-interlaced interlaced video giving compatibility with a PC monitor.

### The Simple Video Scalar.

The Simple Video Scalar is a device which will take as an input SCART interlaced video and output on a VGA connector a de-interlaced version of the input. It is then compatible with most PC monitors to allow display of standard video from a variety of sources. Both composite and RGB SCART input can be used, with the converter auto-detecting the presence of RGB SCART through the pin-16 function.

For use with the Sinclair QL we need the RGB SCART lead (see other article Ed.). This gives the RGB lines for colour, but also the video line that we must have for correct timing. Since the timing output of the QL is set for a monitor it requires adjusting to allow for use with the converter, and hence why the make-up of the lead is essential.

Inside the converter is performing a two-stage conversion process, Figure 2. Firstly we must convert the input video to a digital format, one which we can then de-interlace. This allows us to also adjust the video connection type on the input too as we can select, in our software, from composite, to RGB and in some cases we can also take component video. For the Sinclair QL we have it set for RGB.

Second stage is the actual de-interlacing. Working with the digitised video information and a bit of memory the number of lines per frame is doubled. Hence why de-interlacers are alsoknown as line doublers!

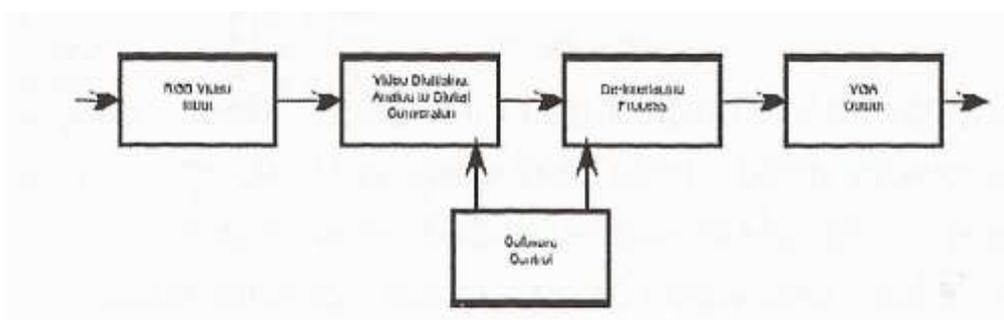


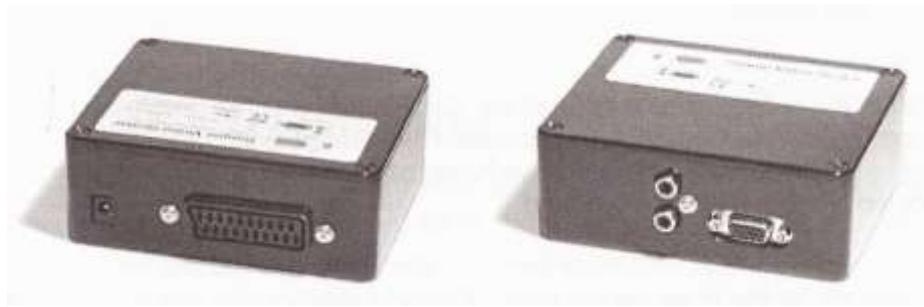
Figure 2. Process performed by the Simple Video Scalar.

The Sinclair QL also uses a split screen mode which takes advantage of an area of the screen known as the “over scan” area which is not normally visible. There are no real standards to describe how much over scan there should be and it varies from manufacturer to manufacturer as to how much is displayed. Essentially it’s an area for the tidy start and finish of a line to ensure that there no black boundaries to a picture. With the QL this area is utilised to the maximum which created a problem for our Simple Video Scalar; it was starting the conversion process too late to show the left edge. With a loan of a QL we were able to make adjustments to regain as much of this over scanned area as possible.

### Conclusions.

When the Sinclair QL was launched there were monitor options, but these were typically expensive and most home users would opt to use a TV, as had been the norm. Today monitors are inexpensive but they lack the compatibility to operate with the QL as they won’t work with interlaced video. A means of converting the interlaced video from the QL to a VGA

type connection that modern monitors use is required, and that is exactly what the Simple Video Scalar will do.



*Figure 3. The Simple Video Scalar.*

Using a process called de-interlacing the Simple Video Scalar, Figure 3, will take the interlaced RGB video using the type of lead made by Lee Privett and convert it for use with a VGA monitor. To improve the compatibility with the over scan mode (as used by the Sinclair QL - Ed.) we can offer the converters with a specific tweak pre-programed in to the converter too

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