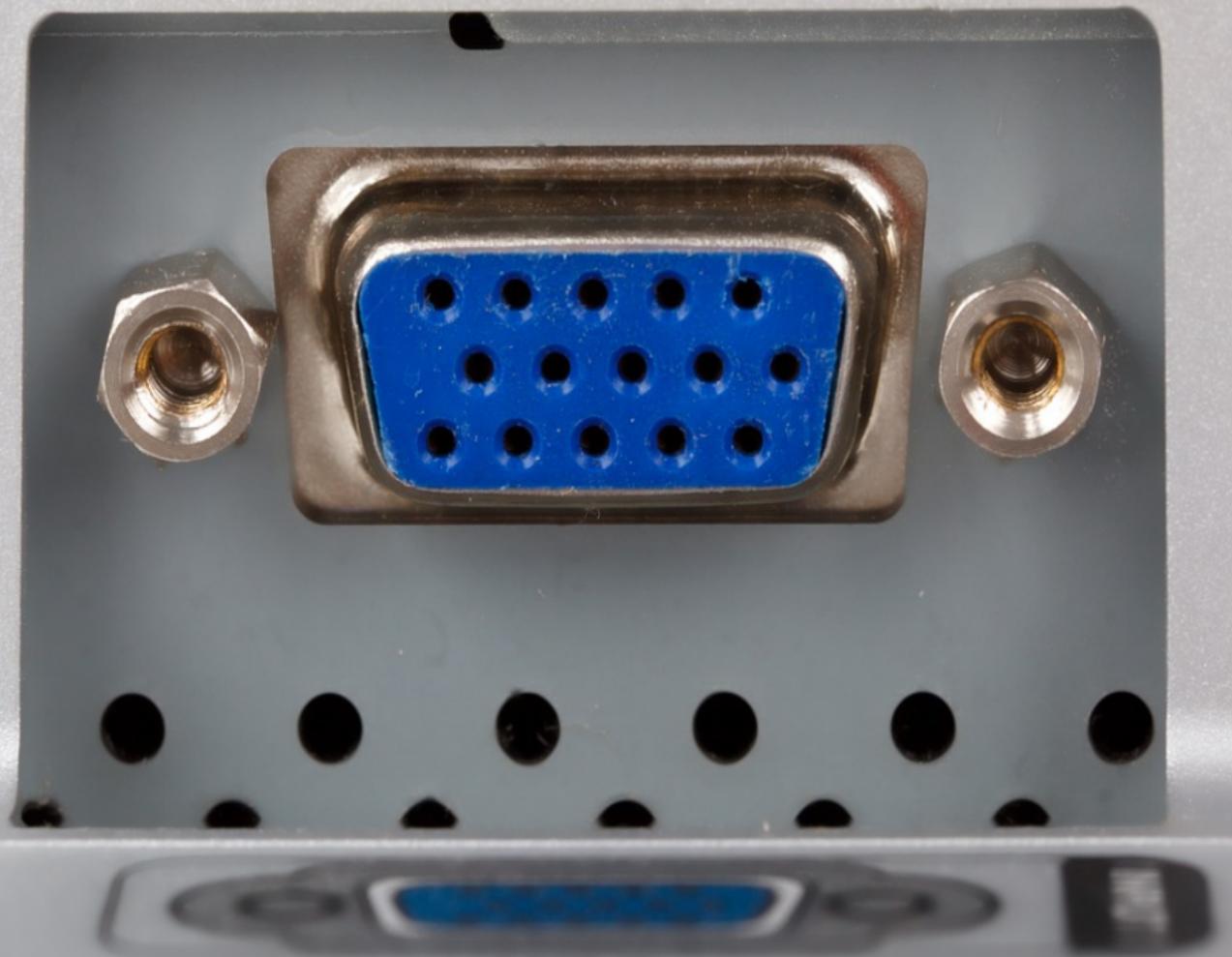


Bit-banging VGA with the GAL44

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Even though it is from 1987, VGA is not quite dead.
Plenty of monitors have VGA connectors today.
It is an easy way to make a display – just 5 signals.

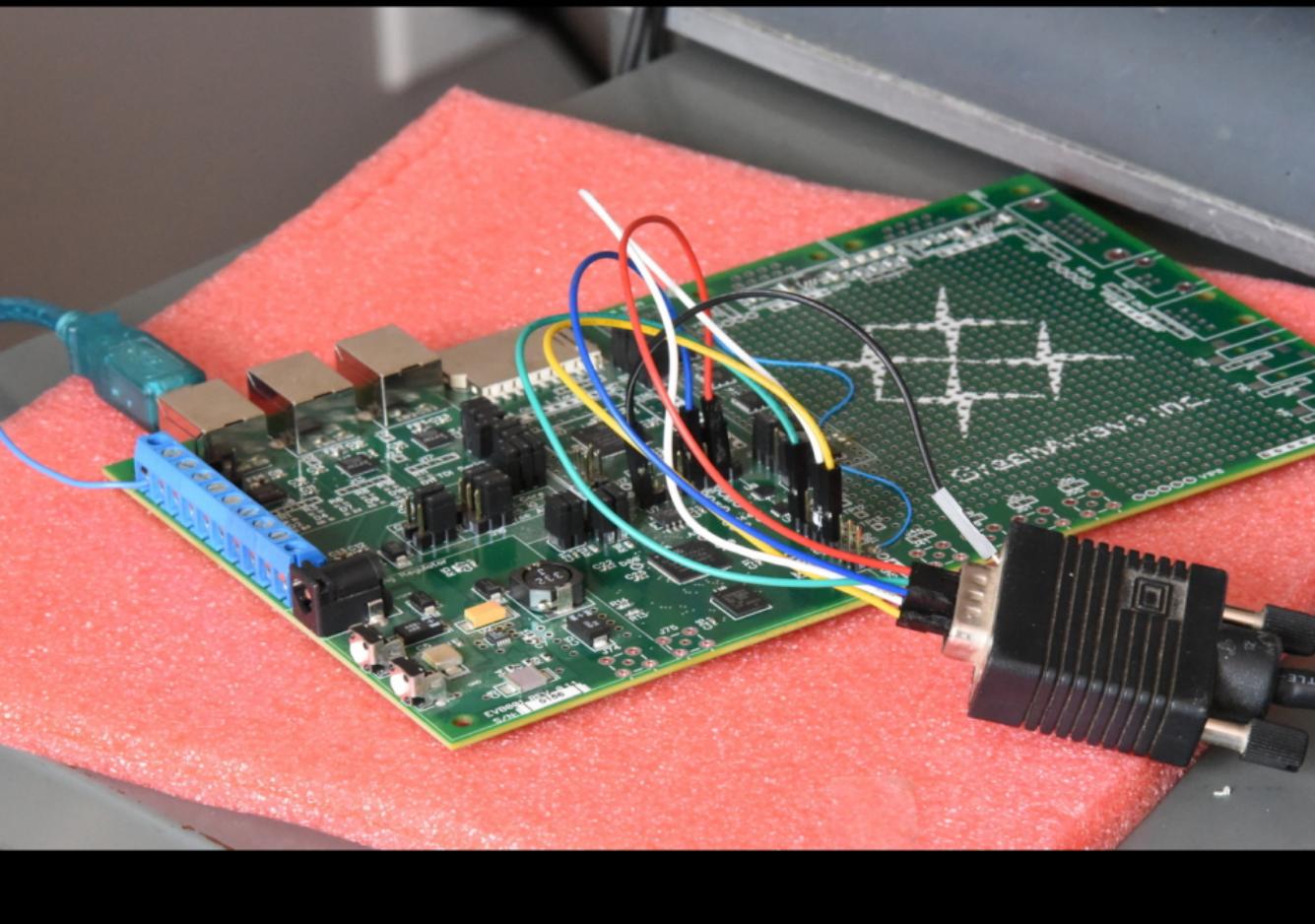
640x480 at 60 Hz

Pixel frequency is 25.175 MHz

tinyvga.com has a really useful list of VGA timings.

<http://tinyvga.com/vga-timing/640x480@60Hz>

A VGA 640x480 picture is clocked at 25 MHz, so each pixel takes 40 ns. This is enough time for GAL44 to execute 8-32 instructions.

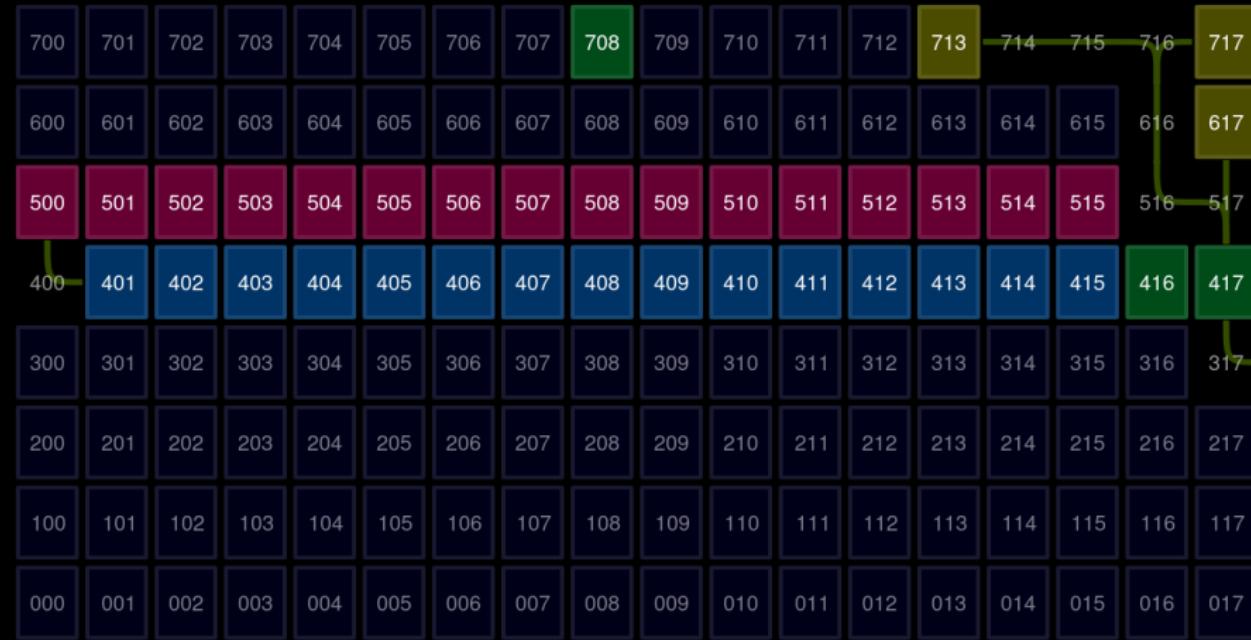


More details and links are at <http://www.excamera.com/sphinx/article-ga144-vga.html>

Source is at

<https://github.com/jamesbowman/ga144tools/blob/master/src/vga.ga>

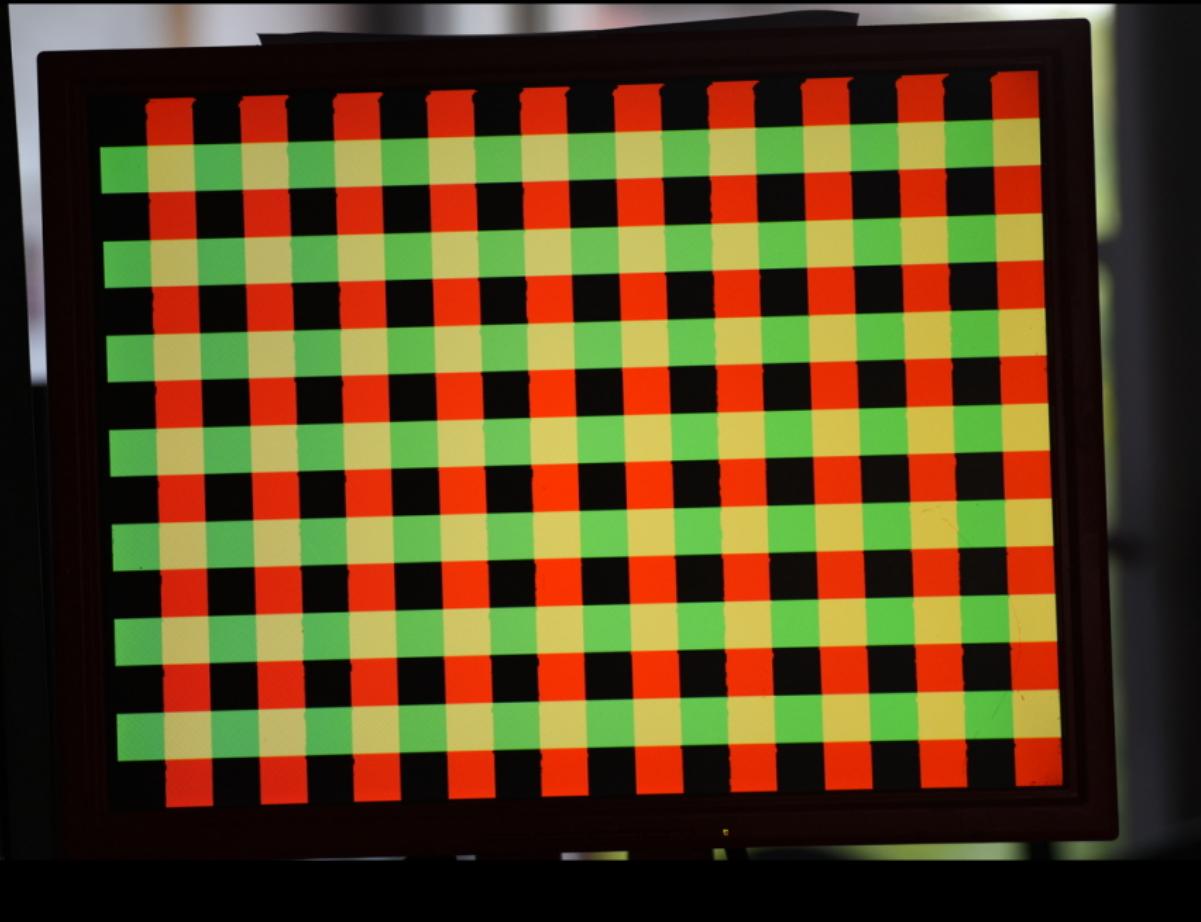
This is the layout



This is RAMPS



CHECKER



CIRCLES



CHECKER

