TRS-80 Model-1 modify HDRV from 15.840 to 15.608 kHz

LRo, 2021-10-17

Rationale

Horizontal drive (HDRV) frequency for PAL monitors is 15.625 kHz.
TRS-80 Model-1 has an HDRV of 15.840 kHz.

Some (small) PAL TFT flat-screen monitors do not sync at 15.840 kHz.
In a single monitor tested, sync required HDRV's between 15.490 and 15.655 kHz.

To obtain an HDRV around 15.600 kHz, two modifications can be considered

1) Change X-tal from 10.6445 to 10.4832 MHz (HDRV will become 15.600 kHz)
   Unfortunately, such X-tal's aren't available anymore

2) Lower HDRV by adding 10 dots to the horizontal video lines
   Originally, a horizontal line has 672 dots (X-tal 10.6445 MHz / 672 = 15.840 kHz)
   Adding 10 dots will result in 682 dots/line (HDRV 15.608 kHz)
   This would require adding a single 74LS90, piggy-backed on a 74LS93 in the Model-1

Changes for the later, "Japanese" Model-1 to add 10 dots to the horizontal lines

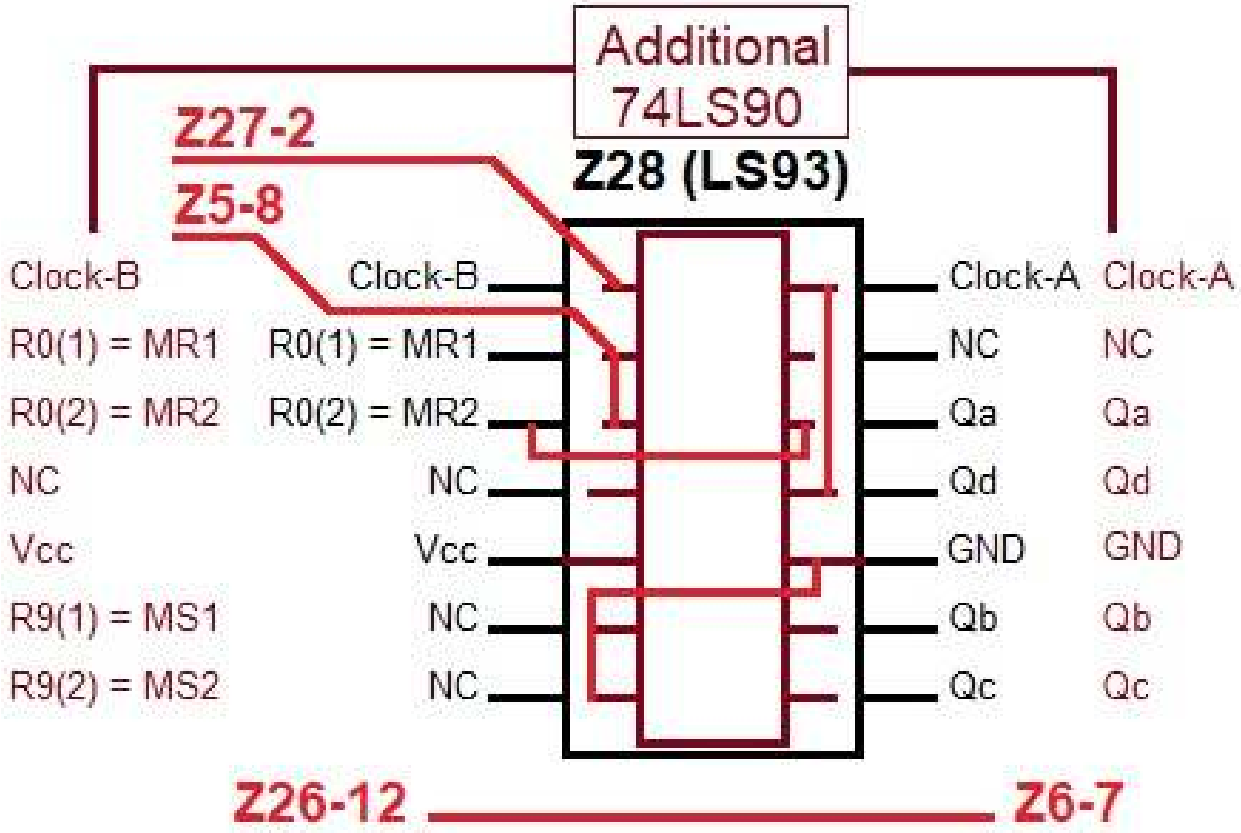
1) Cut 2 traces:
   - the trace to Z28 (74LS93) pins 2+3 (leave the 2 pins connected to each other)
   - the trace to Z6 (74LS92) pins 6+7 (leave the 2 pins connected to each other)

2) Prepare an additonal 74LS90
   - connect pins 6, 7 and 10 (pin 10, ground, is also used to piggy-back this ic)
   - connect pins 11 and 14 (Qd to be connected to Input-A / Clock-A)
   - connect a short wire you might wish to run under the 74LS90 to pin 12 (Qa) and connect this wire with Z28 pin 3
   - piggy-back the 74LS90 on top of Z28 with pins 5 (Vcc) and pin 10 (ground)
     for a more firm connection, you might wish to solder pin 13 (NC), too
   - connect 74LS90 pin 1 with Z27-2 (X-tal / 2 = 5.322 MHz)
   - connect 74LS90 pins 2+3 with Z5-8
   - connect Z26-12 with Z6-7

That's all, now HDRV will be 15.608 kHz

Wiring diagram and schematics on the next pages

Modification "Japanese" Model-1
HDRV from 15840 Hz to 15608 Hz



Cut LS92 Z6 pins 6+7 and LS93 Z28 pins 2+3

In brown additional 74LS90 piggy back on Z28 (74LS93) with pins 5 and 10

In red additional wiring

TRS-80 Model-1

Lowering Horizontal Drive (HDRV) from 15.840 to 15.608 kHz for better PAL Compatability by Adding 10 Dots to the Horizontal Lines Using a Single 74LS90 ic

Schematics of the Later ("Japanese") Version of the TRS-80 Model-1 **Modifications in Red**