VOLTMACE DATABASE

SERVICE MANUAL

by Derek Andrews
2021

This document and the accompanying schematic are available at
https://github.com/sig2650/Voltmace-Database-hardware

As of May 2021, this is very much a preliminary work-in-progress.

CONTENTS

Introduction	2
Power input	3

INTRODUCTION

These pages are from notes I have taken while working on my own two Database consoles. They are primarily a guide to the voltage levels and waveforms you might expect to see on a working console, along with notes about faults I have encountered. I hope they prove helpful in restoring other consoles.

The Voltmace Database is one of many clones of the 1292 Advanced Programmable Video System. In the UK these include consoles by Acetronic, Prinztronic, Rowtron and Teleng. Whilst they are software compatible, the cartridge connectors vary, and there is variation in some of the circuitry, particularly the implementation of power supplies, audio and video circuits.

The build quality of these consoles is not great, but probably comparable to other low-end consumer electronics of the late 70's. Early Videomaster boards were built in Hong Kong, and Voltmace took over the stock of these and reworked them as necessary. All of the electronics are assembled on a single pcb. This is double sided, but the holes are not plated through, so many components are soldered on the top side of the board. There is solder resist on the bottom side of the board only. They have not been cleaned of flux after soldering, and along with decades of tarnish, this can make it difficult to get a good connection with test probes. Solder splashes are common; if possible, they are best removed by picking them up with a hot iron. Orientation of the ICs is not consistent which can cause confusion.

NOTE THAT MINOR CHANGES WERE MADE AT VARIOUS TIMES TO THE CIRCUITRY. I have identified differences between the two consoles that I have on the schematics.

Most of the measurements in this document are taken with a Hantek DSO5102P 100Mhz oscilloscope and an Amprobe AM-510 digital voltmeter.

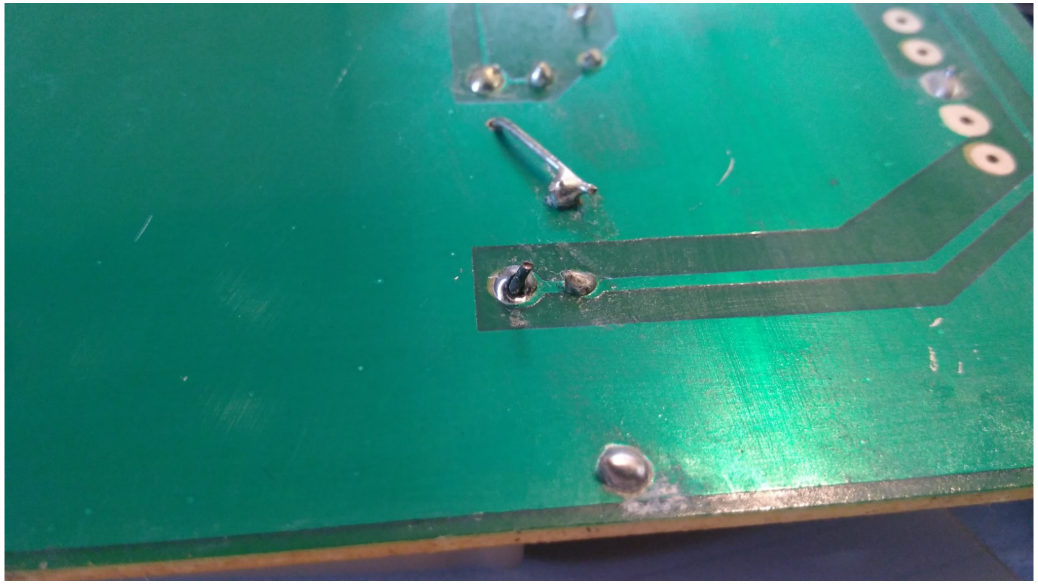

Figure 1: This bad joint caused no problems until I reassembled the console and applied some pressure to the large decoupling capacitor on the other side

POWER INPUT

Power to the console is provided to the console from a mains powered (240 volt AC) power pack that supplies nominal +9V and +18V DC. On some consoles the power pack is bolted to the back of the console and is hardwired into the pcb. Most seem to have a lead coming out of the console and connect to the pack with a 5-pin 180° DIN connector.

Measuring the voltages coming out of the power pack with no console connected I read 16.25Vdc with 6.6Vac ripple, and 8.85Vdc with 2.8Vac ripple.

NOTE TO SELF: are these pictures opposite taken with the unit powered on?

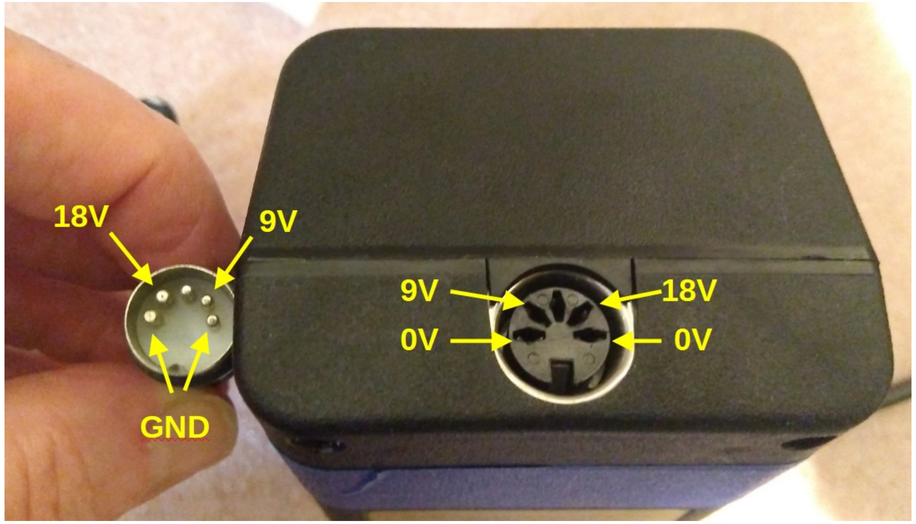

Figure 2: Pin assignments. Note that the two supplies are entirely independent. The 0V lines are united to ground in the console.

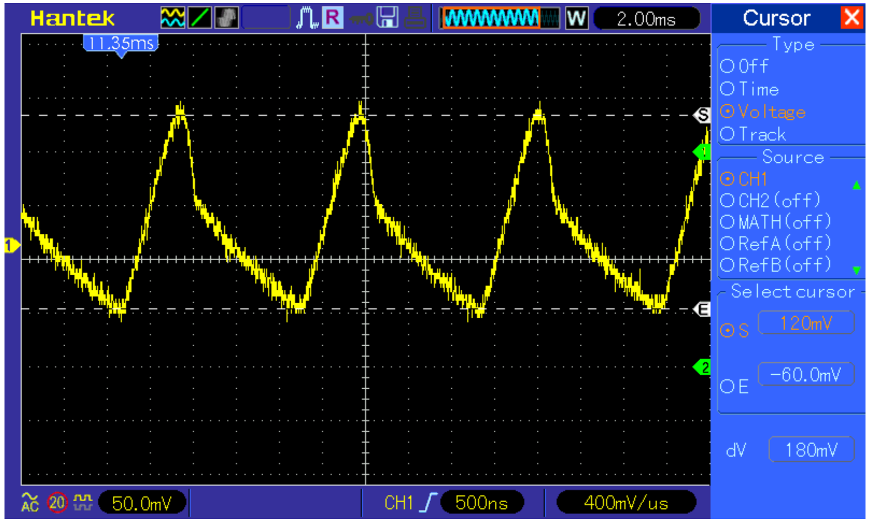

Figure 3: 120Hz noise on the 18 volt supply input on the pcb

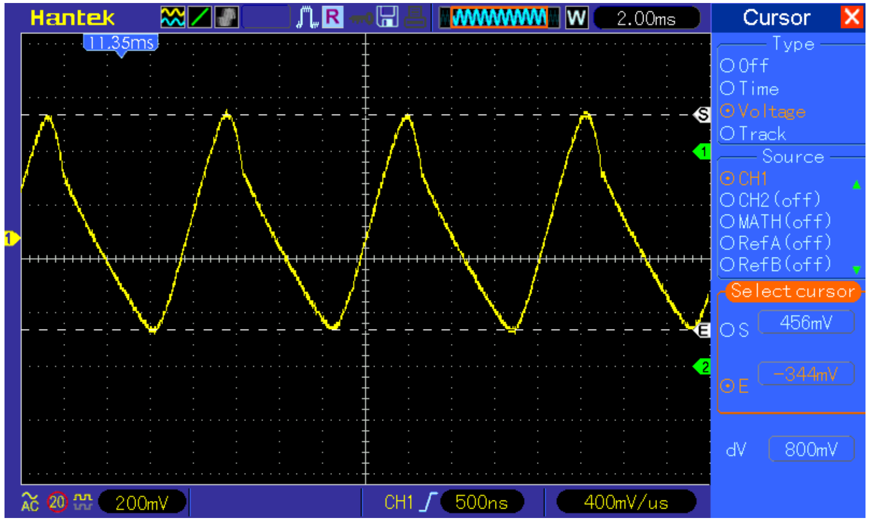

Figure 4: 120Hz noise on the 9V supply input on the pcb

POWER REGULATION

The power inputs both go through the on/off switch and are smoothed by large electrolytic capacitors and 220nF capacitors. 78 series regulators, fitted to large heatsinks, provide 12V and 5V supply rails. The 12V line is stepped down further by Q6 to provide a 6V supply. On one board I have this is regulated by a zener diode, on another by two resistors.

The 12V and 6V lines are decoupled by single 100nF capacitors (the capacitor for the 12V line has no ID on the silkscreen, but is located near the large 4700uF capacitor and adjacent to R33). The 5V line is decoupled by a 100uF electrolytic and seven 100nF capacitors.

TEST VOLTAGES	Board A	Board B
12v	11.85	12.16
5v	4.95	5.04
6v	6.31	5.61
Q6 base	6.99 (resistor divider)	6.30 (zener)

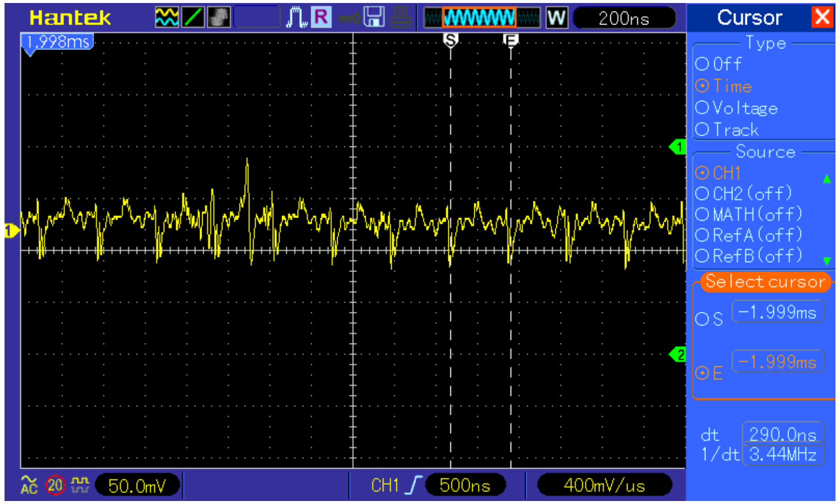

Figure 5: Noise on the 12V line, about 100mV p-p predominantly at roughly 3.4MHz

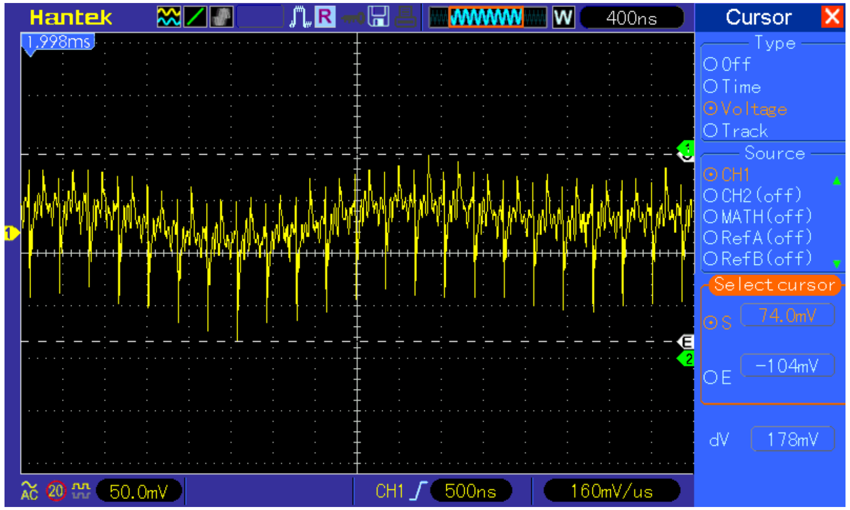

Figure 6: Noise on the 5V line, about 178mV p-p, again predominantly at 3.4MHz

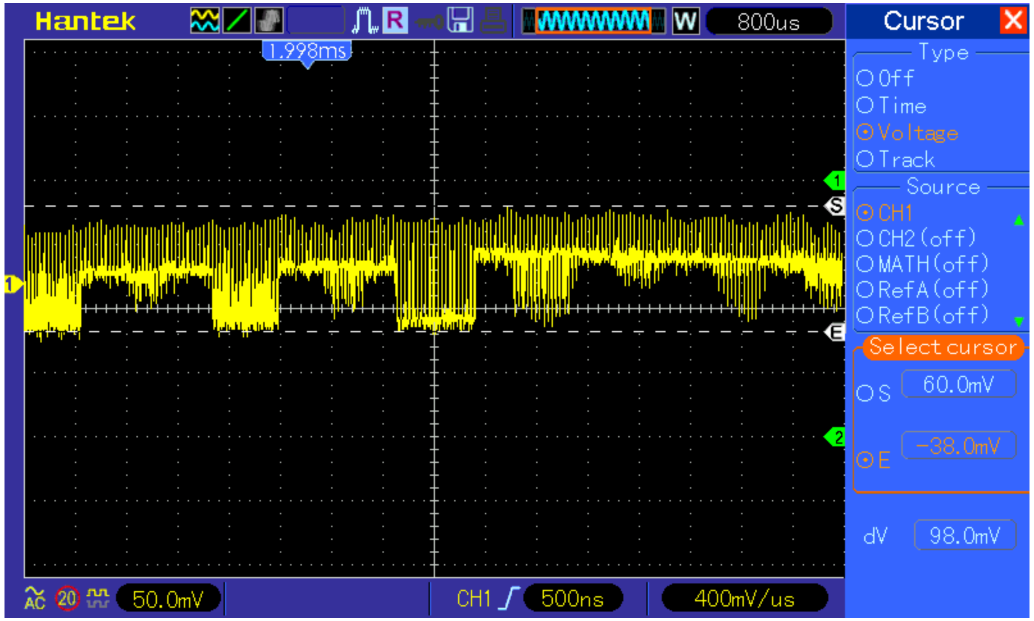

Figure 7: Noise on the 6V line from the video circuitry.

SYSTEM CLOCKS AND TIMING SIGNALS

The clocks for the processor and video circuitry are all derived from X1, an 8.867MHz crystal. IC3 is a PE1X or TEA1002 **PAL encoder**, and it takes the input from the crystal oscillator on pins 13 and 14, and divides it by 2½ to generate a 3.54MHz clock at pin 17.

This signal is conditioned by R54, C37, R55 and D9 and presented to the clock input (pin 12) of IC4, a CT430I or S2621 **Universal Sync Generator** (PAL). The USG divides the input clock by 4 (CK4, pin 10) to drive the 2650 microprocessor at 887kHz.

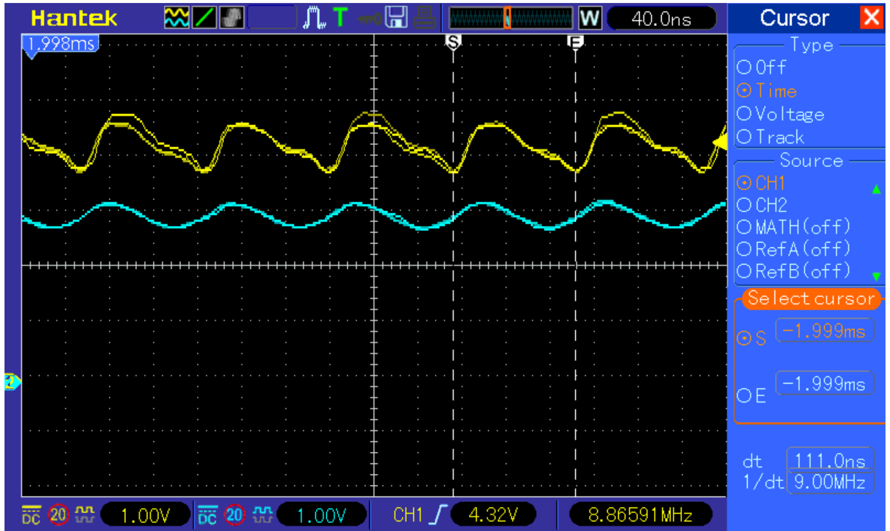

Figure 8: Crystal inputs, PAL encoder pin 14, and pin 13

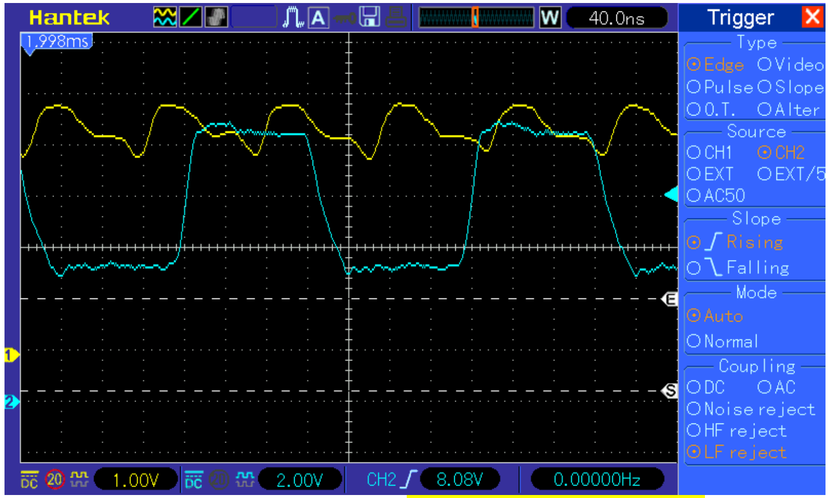

Figure 9: PAL encoder crystal input on pin 14, and ÷2½ clock output on pin 17

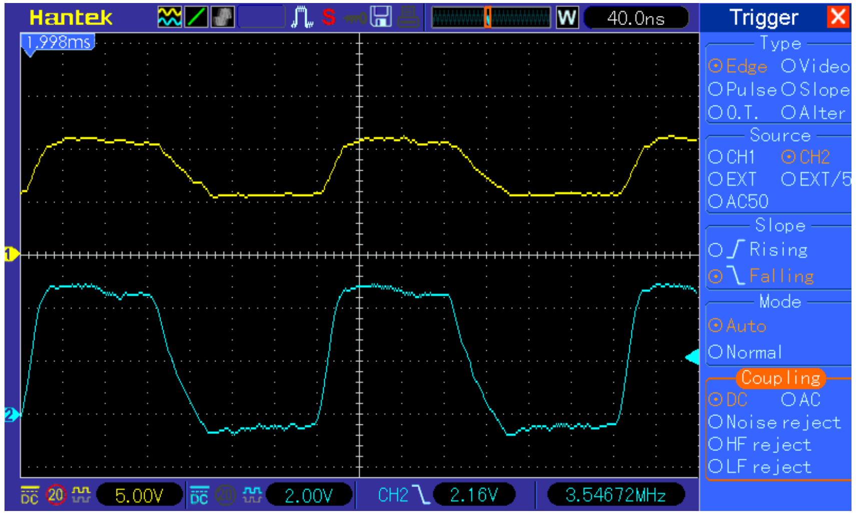

Figure 10: 2621 USG clock input on pin 12 and PCK on pin 11.

TAKE THIS AGAIN, clarify which is which, same scales

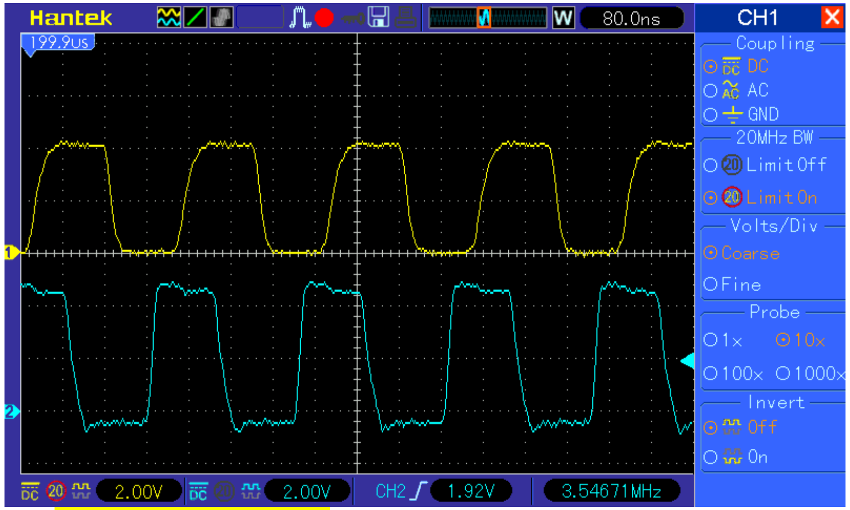

Figure 11: WHAT IS THIS?????

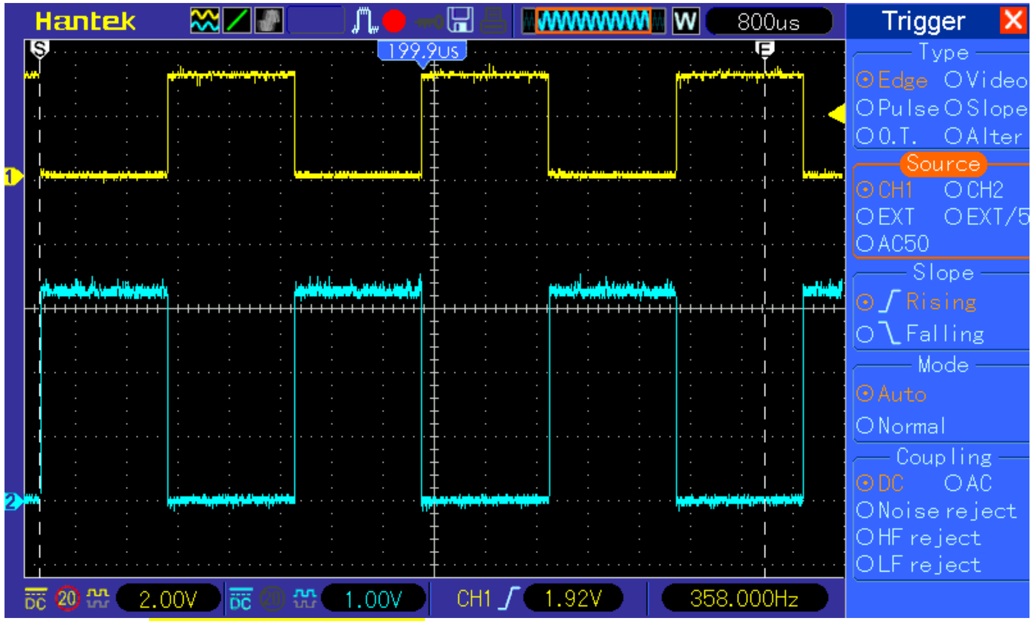

Figure 13: WHAT IS THIS?????

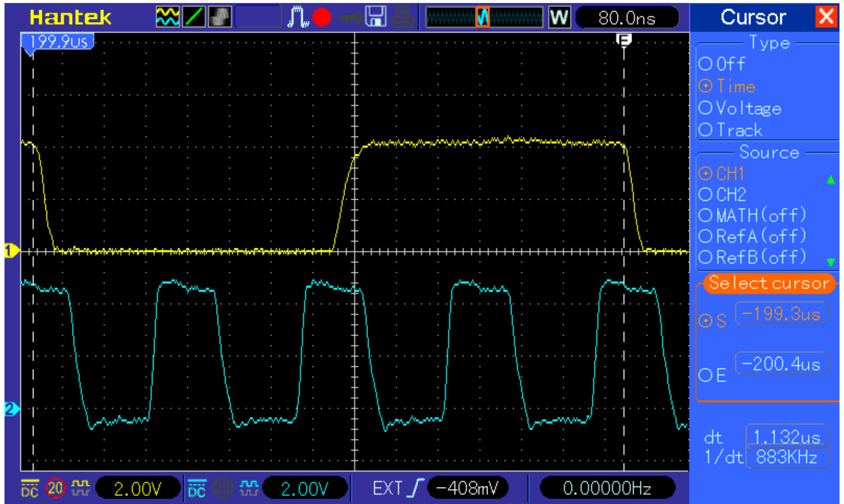

Figure 12: USG clock input and CK4 output to the processor

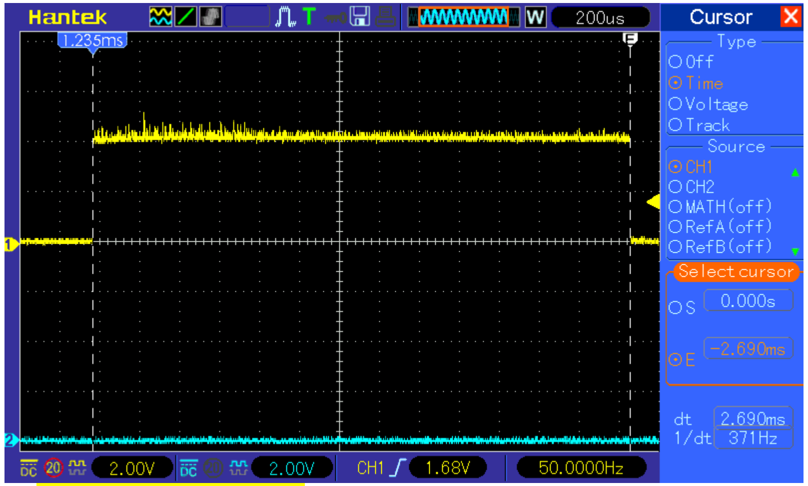

Figure 14: VRST (vertical reset), input to pin 37, PVI. A positive pulse of of about 2.7ms duration at a frequency of 50Hz.

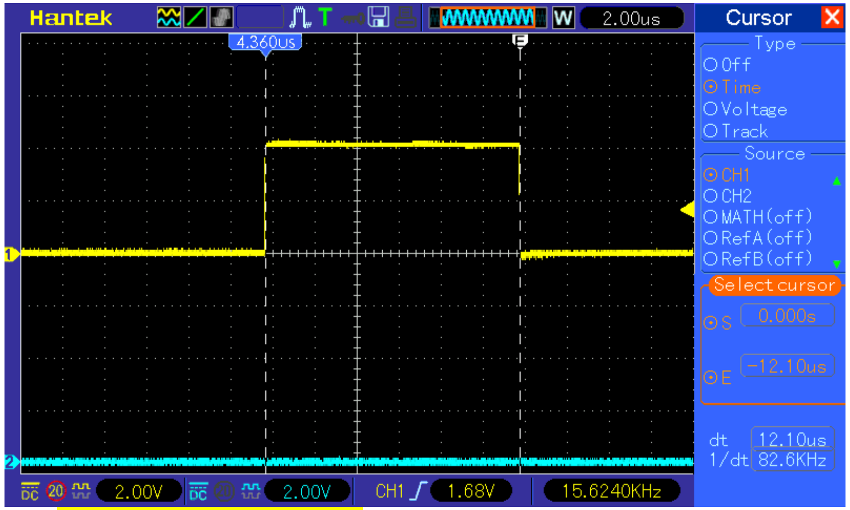

Figure 15: HRST (horizontal reset), input to pin 36, PVI. A positive pulse of about 12µs duration at a frequency of about 15.6kHz.

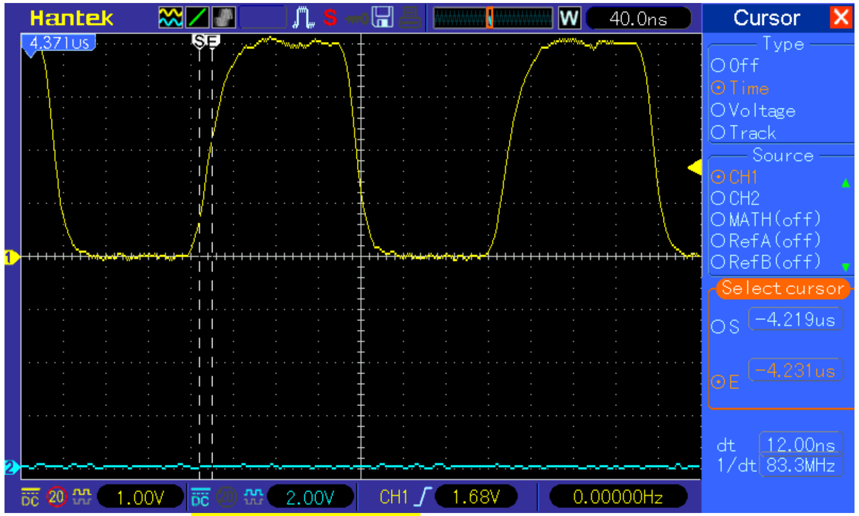

Figure 16: PCK (pixel clock), input to pin 1, PVI at about 3.5MHz. The 20ns rise time is ok, and this signal meets the specified t_{PL}(low) of 90ns(min).