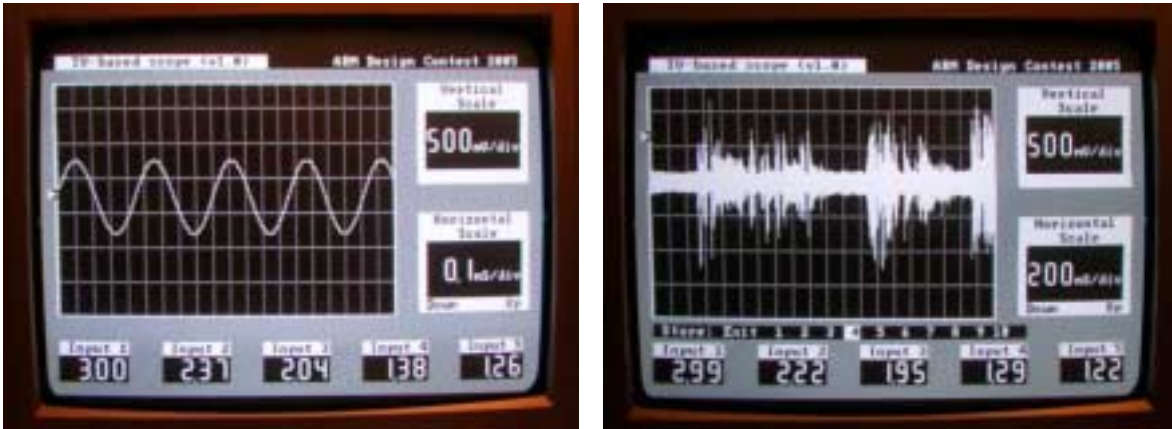


TV-Based Oscilloscope



Associated Project: Yes
Associated Part Family: LPC2138
IDE: uVision3 with C Compiler 2.00d

Summary

This single chip solution turns your TV into a digital storage oscilloscope with a sampling rate 160 Ksps. As a bonus, five voltages on the five analog inputs can be monitored.

No additional video-controller and video-RAM are required. Main goal of this project is an implementation of a high-resolution (512x240 pixels) video generator inside the ARM microcontroller, LPC2138. This video generator operates in the background mode, with a low CPU loading that allows the other high-intensive tasks (such as the data collection and visualization) be run.

Both of standards, American NTSC and Europe PAL are supported.

The code size of this project is less than 16 KB so you can use the Evaluation Version of Keil CARM Compiler. Two files, VideoController.c and VideoGUI.c, can be easily exported to other projects.

Generating Video

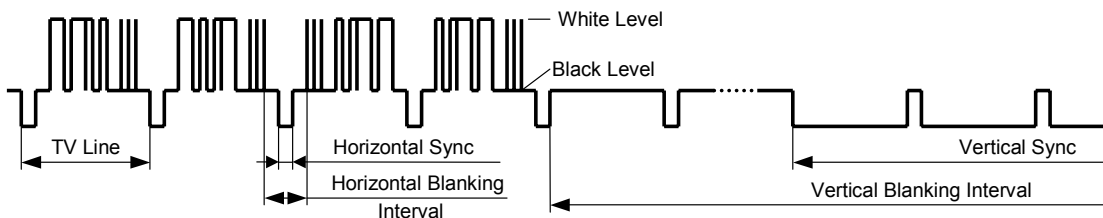


Figure 1: Structure of Monochrome Video-signal. This project uses the simplified structure of Vertical Sync pulses (without equalization pulses), number of lines is even.

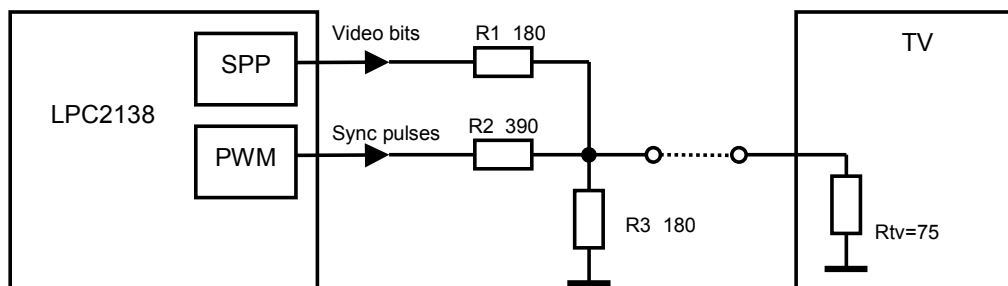


Figure 2: Generating Video by SPP and PWM. Matrix of R1, R2 and R3 composes the external DAC.

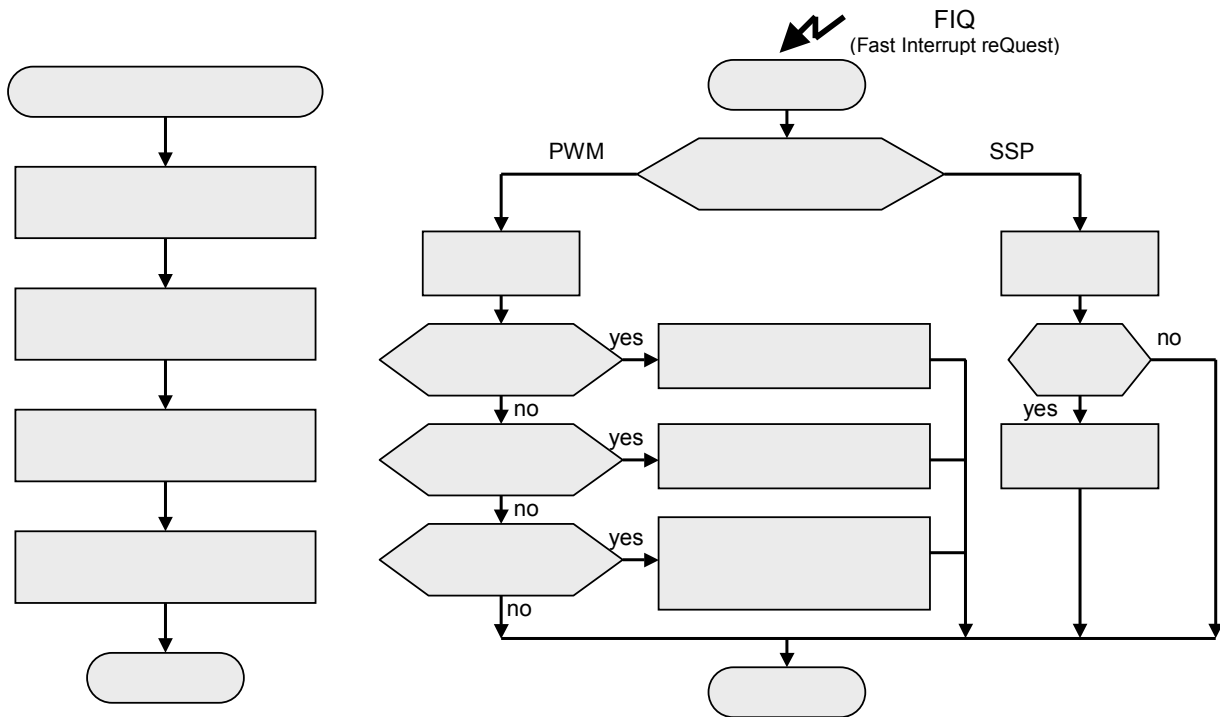
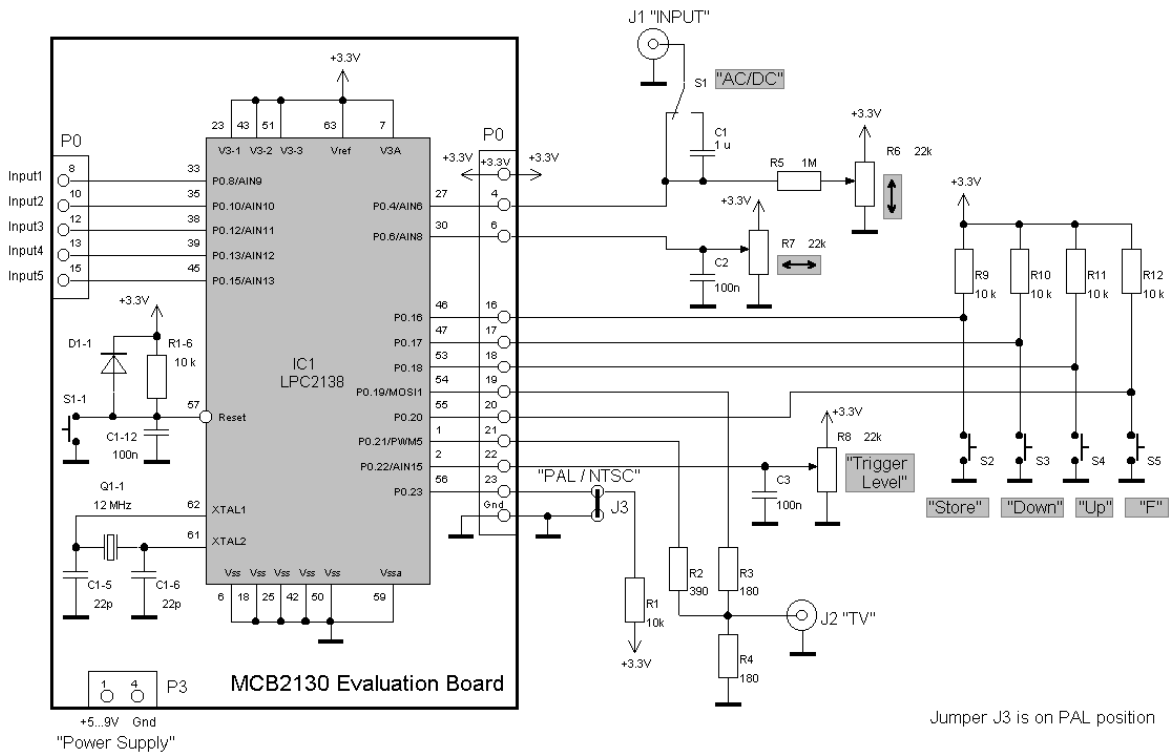


Figure 3: Video Generator Flowchart. Specific values for comparisons are corresponded the PAL mode, NTSC uses another values.

Implementing Oscilloscope. Schematic.



Jumper J3 is on PAL position

Figure 4: Scope Schematic. Outlined part is a Keil MCB2130 Eval Board, unused components of this board are not shown.

Implementing Oscilloscope. Flowchart

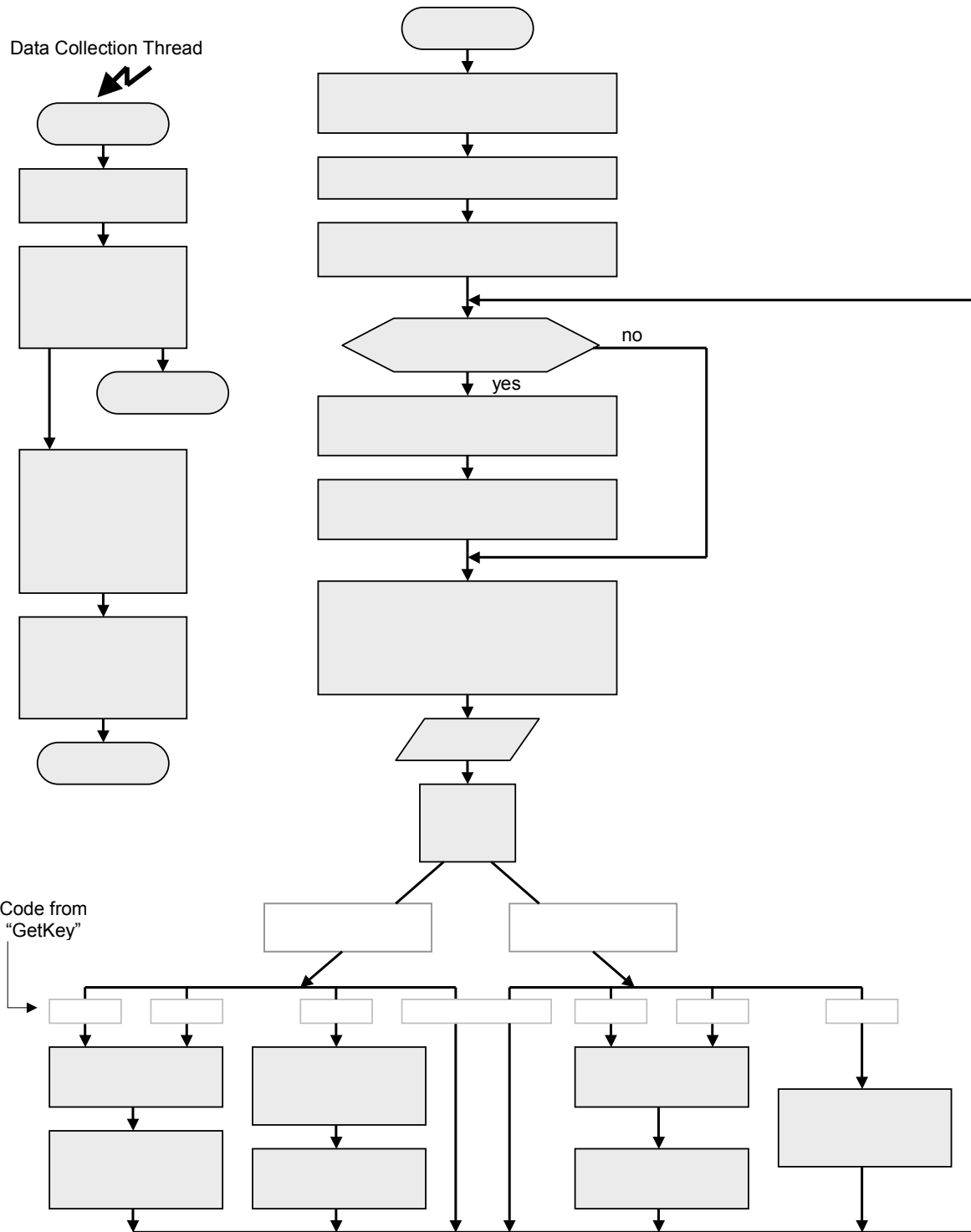


Figure 5: Main Flowchart. Procedure "GetKey" does not suspend the loop, just returns the code ("0" when the keys are not pressed).

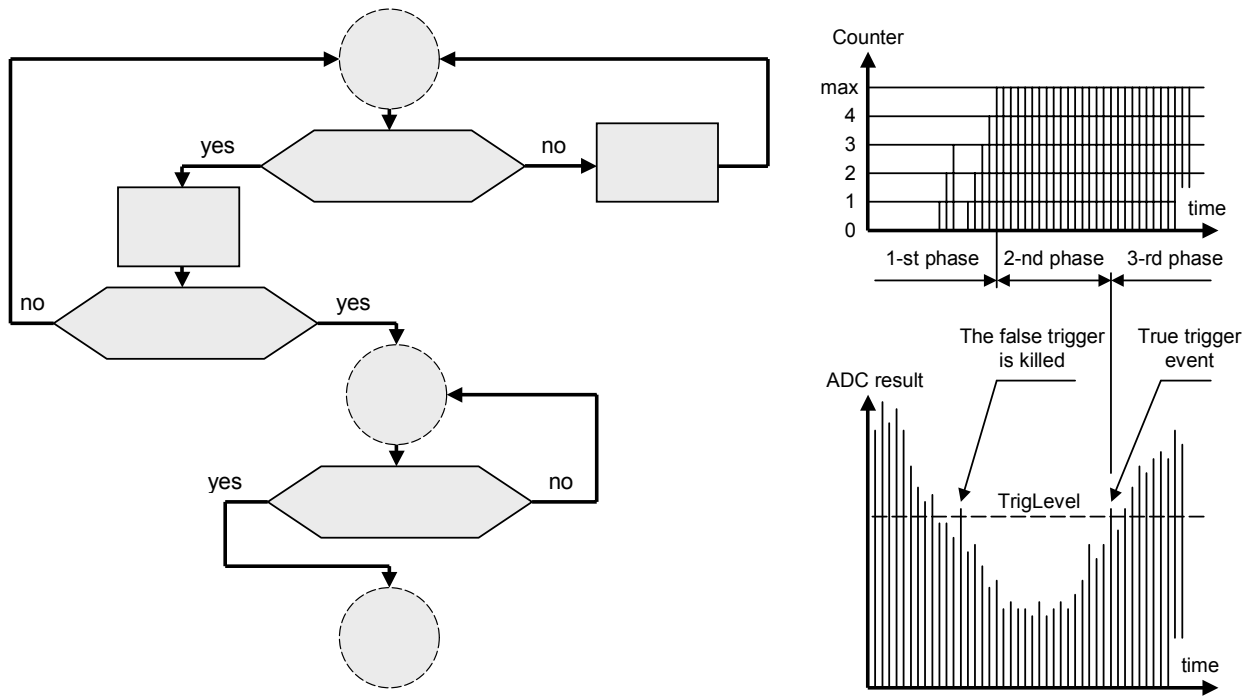


Figure 6: De-bouncing algorithm in trigger mechanism.

Construction



Photo 1: Front Panel with Attached MCB2130 Eval Board



Photo 2: Back Side View