DEVELOPMENT OF A SERIAL INTERFACE FOR TV MONITORS ADJUSTMENT WITH COMPUTER

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Abstract

The modern TV monitors and TV receivers are made with possibilities to automatically adjustment of there parameters, for example horizontal and vertical frequencies in dependence from the input horizontal and vertical synchronization pulses. This is done with implementation of programmable integrated circuits, using a build in the monitor or receiver microcomputer and a memory for these values.

It is very interesting to have the possibilities to control this process of adjustment, made this manually and do the appropriates measurements of the defined horizontal and vertical frequencies, when the monitor or receiver can be repaired or tested. Of course, it is possible to combine these measurements with some visual observations of displayed testing signals and data on the monitor screen of the computer. All that can be made with the proposed tool, which is connected to a computer with a serial interface.

1. Introduction

The modern CRT and Flat TV monitors and TV receivers are controlled by the embedded microcomputers. This is the common way to free the users from unusual and some time “unclear” adjustments, which are necessary to prepare. At the time of manufacturing the necessary parameters of each TV monitor or receiver are stored in the memory connected to the embedded microcomputer. When TV monitor or receiver are switched on the current setting parameters are transmitted from the microcomputer to control registers of the programmable integrated circuits. This procedure is sufficient for the normal operation of TV monitor or receiver. But at the time of repairing TV monitors or receivers there is the need some time to update all or to change some of the parameters stored in the memory. For making this operation it is necessary to have the possibility to input values of these parameters and changing it dynamically. This can be done if there is a special interface between the TV monitor or receiver and a desktop computer. Therefore the goal of this article is to propose a minimal additional hardware and software to connect the desktop computer and TV monitor or receiver, using both the standard desktop computer interfaces and the standard I2C characteristics.

2. The Block Schema of the proposed Serial Interface

The block schema is shown in Fig. 1.

Desktop computer have some standard interfaces like Parallel, Serial, USB etc. [1]. From the characteristics of the I2C standard it is know [2], that the speed of the I2C interface used in the TV monitors or TV receivers is not so high. The Standard – mode data transfers can be made at up to 100 kbit/s, which is sufficient for the transferring of data for/to Desktop Computer and TV monitor or TV receiver. Here it is chosen to use the Standard – mode I2C data transfer and this give the reason to

choose as a standard desktop interface - the Serial RS 232 Interface [3]. As it is shown in Figure 1, when this choice is made, it is necessary to design a special hardware part, named RS-232 to I2C Converter to resolve the differences between the to types of interfaces.

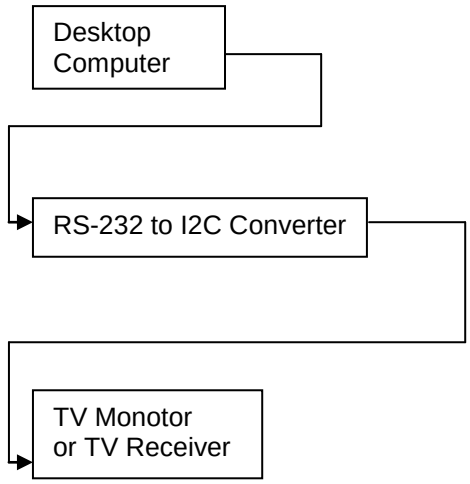

Figure 1. Block schema of the proposed serial interface

3. RS-232 to I2C Converter

The schema of proposed RS-232 to I2C Converter is shown in Figure 2.

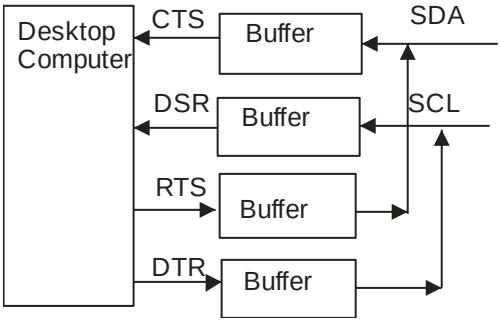

Figure 2. The schema of the proposed RS-232 to I2C Converter

In principle, the standard serial interface is designed to transfer serial data between the desktop computer and other devices equipped with this interface. The signals and protocol for data transferring via this interface are described in details in Standard RS-232, but it is possible to imagine, to take the control over the each of these signals and to produce the signals equivalents and corresponding to the standard I2C signals. This is the main idea of the proposed RS-232 to I2C Converter shown in Figure 2. In the RS-232 standard there are some modifications related to the number of pins of the used connectors, for example 9 – pin connector or 25- pin connector. Some of them, TXD - Transmit Data and RXD–Receive Data, are related directly to the data transmission, other are named control signals, for example RTS - Request to Send, CTS - Clear to Send, DSR - Data Set Ready, DTR - Data Terminal Ready etc. are control signals, driven the right data transfer. It is more convenient to choose these control signals for proposed RS-232 to I2C Converter. On the Figure 2 it is shown, that the desktop computer part of the converter use four signals CTS, DSR, RTS and DTR. On the other hand, the I2C part of the proposed converter use only two signals SDA and SCL. To resolve this differentce there are placed the blocks named "Buffer" and the arrow directions give the idea how the transfer is arrange.

7. Conclusion

The proposed serial interface for TV monitors and receivers is described briefly, but it is realized as a hardware module and it is made an user friendly software as a Windows Application in Visual C++ 6.0. The tests with designed serial interface for TV monitors and receivers adjustment are given the good results for the range of application – the professional dynamically adjustment or changing the programmable TV monitors and receivers parameters.

References

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