Busy to dual pulse transformer 'Pulse generator 3000'

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Abstract

At the neutron beamlines NARZISS, SANS I and II of the PSI in Villingen, the first detectors in the beamline emit a busy signal while there is a flow of neutrons. The Cascade detector of the nEDM experiment requires a separate start and stop pulses as input for which the pulse transformer in question was constructed. This report contains the details pertaining to the pulse transformer.

Contents

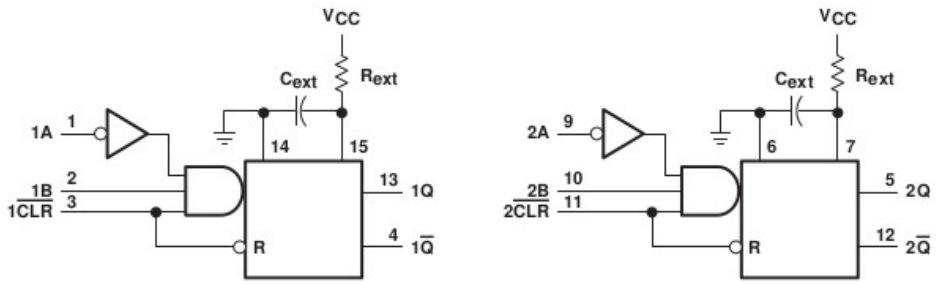

Figure 1. 'LS123 Logic Diagram

Figure 1: SN74LS123 logic diagram

1 TTL circuits

A Texas instruments standard series SN74 Chip was chosen for the generation of the pulses. In particular, the SN74LS123 is capable of detecting positive/negative voltage flanks. The general diagram of the SN74LS123 is depicted in Fig. 1. Fig. 2 illustrates how the SN74LS123 is wired for the purpose of negative/positive voltage change detection.

Since the 'LS123 is a symmetrically built dual TTL, only a single chip is necessary to accomplish the setup of Fig. 2. As suggested by the manual [1], an SN74LS32 was used for the final AND gate. All diagrams are extracted from the manual.

2 Construction and housing

A bredboard was chosen to build the pulse generator. R_{ext}. and C_{ext} were chosen such that the pulse has a duration of no less than 200 μs in order to ensure firing of the LED in the optical transducer between the pulse generator and the detector. introduction of the latter was necessary due to undesired behaviour of the detector when triggered directly.

The circuits power supply was ensured through an ordinary USB cable for easy use. Finally, an aluminium casing was chosen to protect the pulse generator, as seen in Fig. 3.

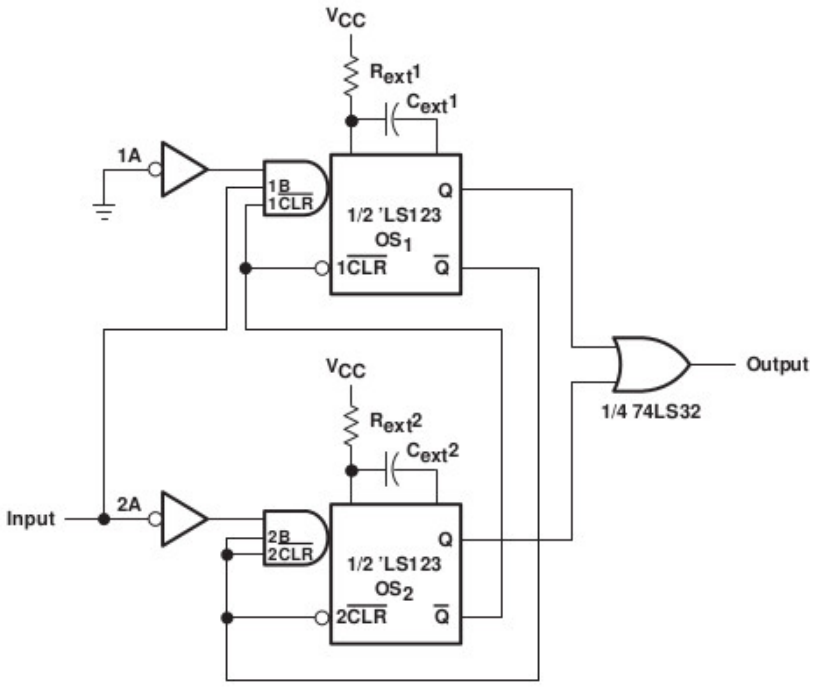

Figure 2: Positive/negative voltage triggered pulse generator

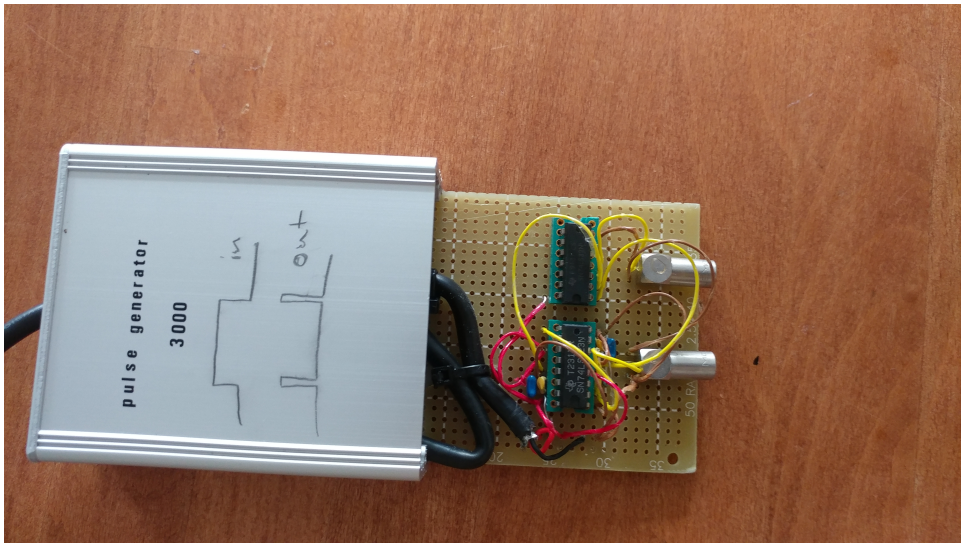

Figure 3: Pulse generator circuit and aluminium casing.

References

[1] Designing With the SN54/74LS123, Texas Instruments (1997)