

61. The Trigger Delay Device, a little Time Machine

V1.5

UFO Doctor, Feb 9th, 2013

1. Introduction

Ultrasonic signals need some time to travel from speaker to Mic.

The received analog Mic signal and its analog processed PLL signal should be investigated with a time resolution of **MICROSEC**, but they arrive many **MILLISEC** later than the speaker start signal. The device here generates a time window in the future!

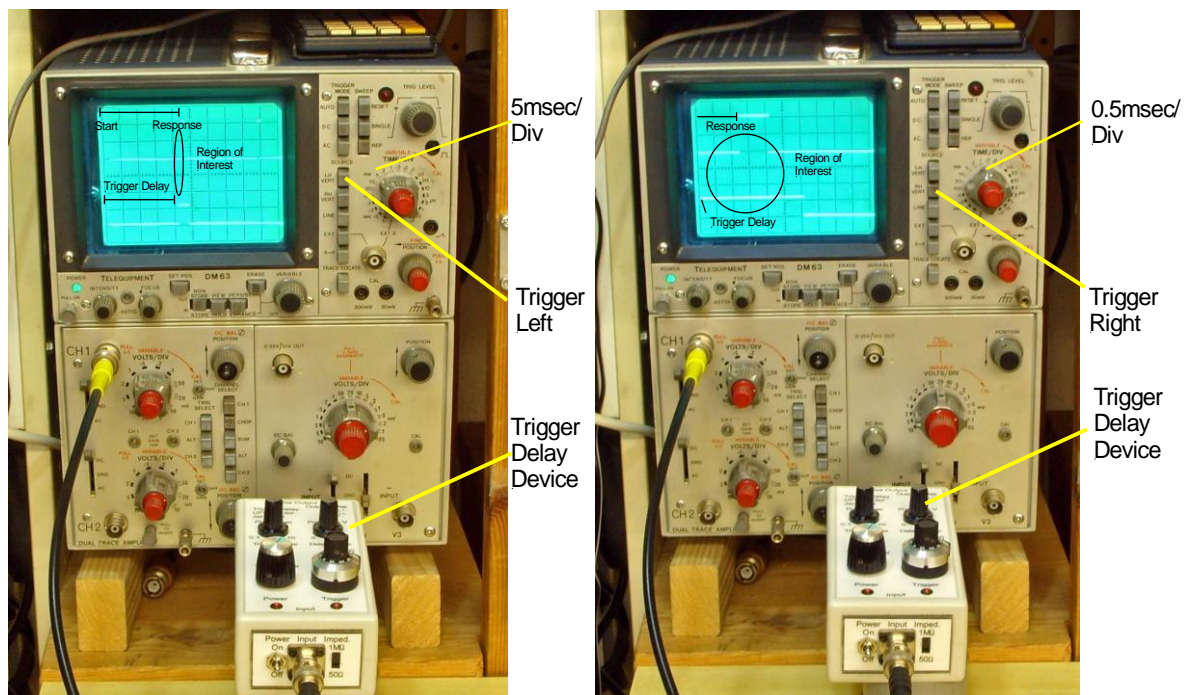


Fig.1a: Standard display of the late and short response signal, 5msec/Div

Fig.1b: Trigger delayed display of the enlarged response signal, 0.5msec/Div

2. Specifications and design considerations

- Trigger Delay: 0.05 to 1000 msec by a 10-turn potentiometer, 3 selectable ranges
- Input Signal: +/- 0.25 to +/-5V, Sinus or Pulse < 0.01Hz up to 2000 Hz
- Input Impedance: 1 MΩ and 50 Ω selectable
- Trigger Level Range: +/-6V, positive and negative slope selectable
- Trigger display: by LED, no retrigger within trigger delay
- Output Pulse: Positive, duration 0.1-10 msec selectable
- Output Pulse Logic: LHL and HLH selectable
- Output Voltage: 0 to 5V (suited also for 3.3V logic when used as a pulse generator)
- Output Impedance : about 50 Ω (with Potentiometer at maximum, HC-Logic Family)
- Power Supply: Battery 6xAAA, 4mA, with under voltage monitoring by LED
- Dimensions: case 131x67x45 mm, weight 420 grams

3. Device and circuit



Fig. 2: Trigger Delay Device

Trigger Delay

UFO Doctor, Febr 7th, 2013

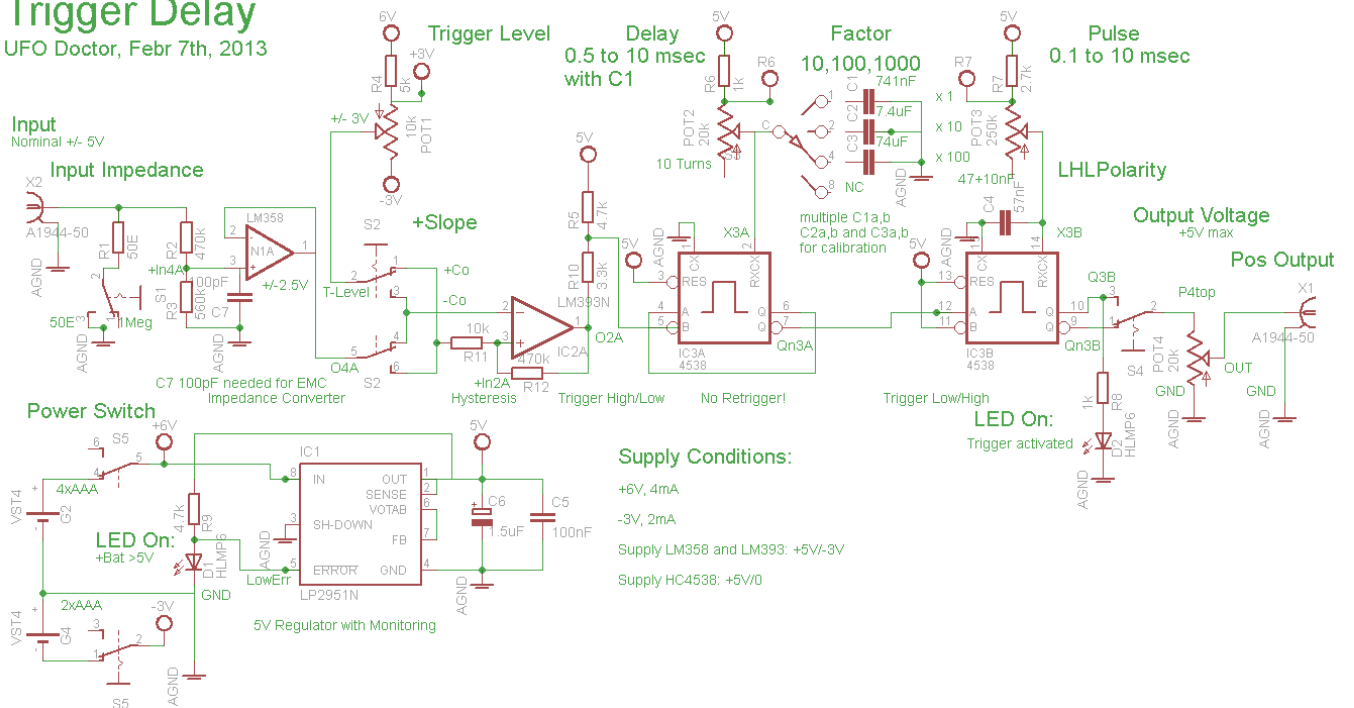
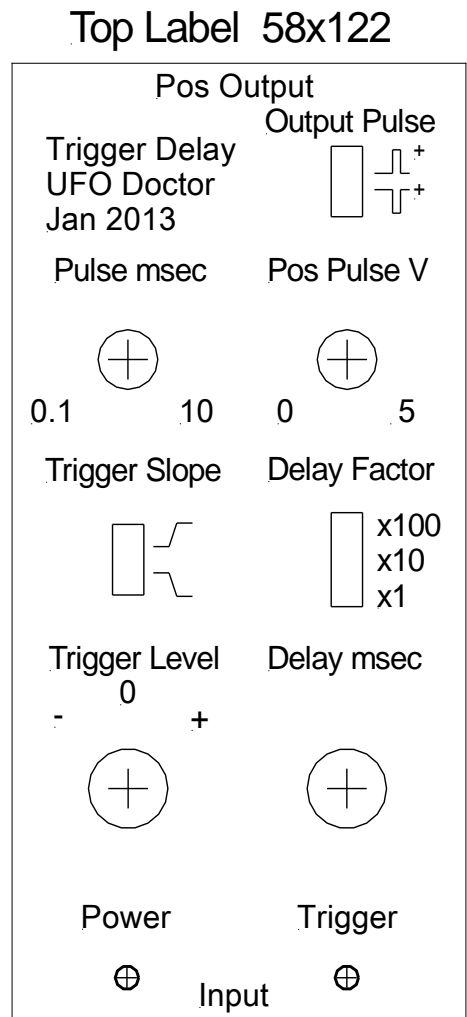
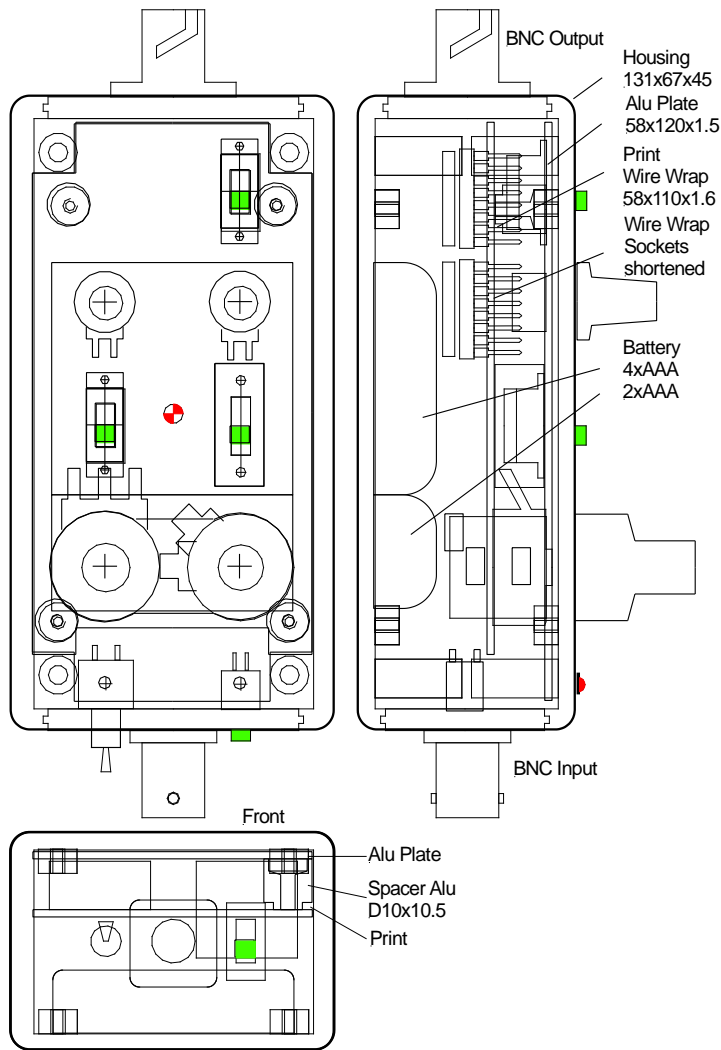


Fig. 3: Circuit of the Trigger Delay Device.

Note: Take care to EMC, apply ground plane below R2, R3 and C7!

4. Mechanical Overview and Labels



Front Label 51x29

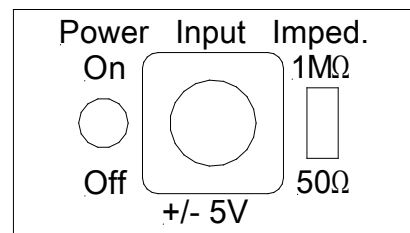


Fig. 4a: Mechanical Overview

Fig. 4b: Labels at scale M1:1

Note to label manufacturing:

Compare the printed output with the monitor preview!

This is a PDF document and you may assume that it can be printed as you see it on the PC monitor.

But sometimes (see Google) the characters are wrong or are in a wrong place. You may try to update the driver software of the printer or to convert the PDF to post scrip (PS). The easiest and more reliable solution is to download the free Foxit Reader and to print it from this application.

Having a paper printout with correct dimensions and appearance, cut the outer dimensions and go to a copy shop for heat sealing lamination. These plastic protected labels can be now glued to the case.

5. Print board and wiring

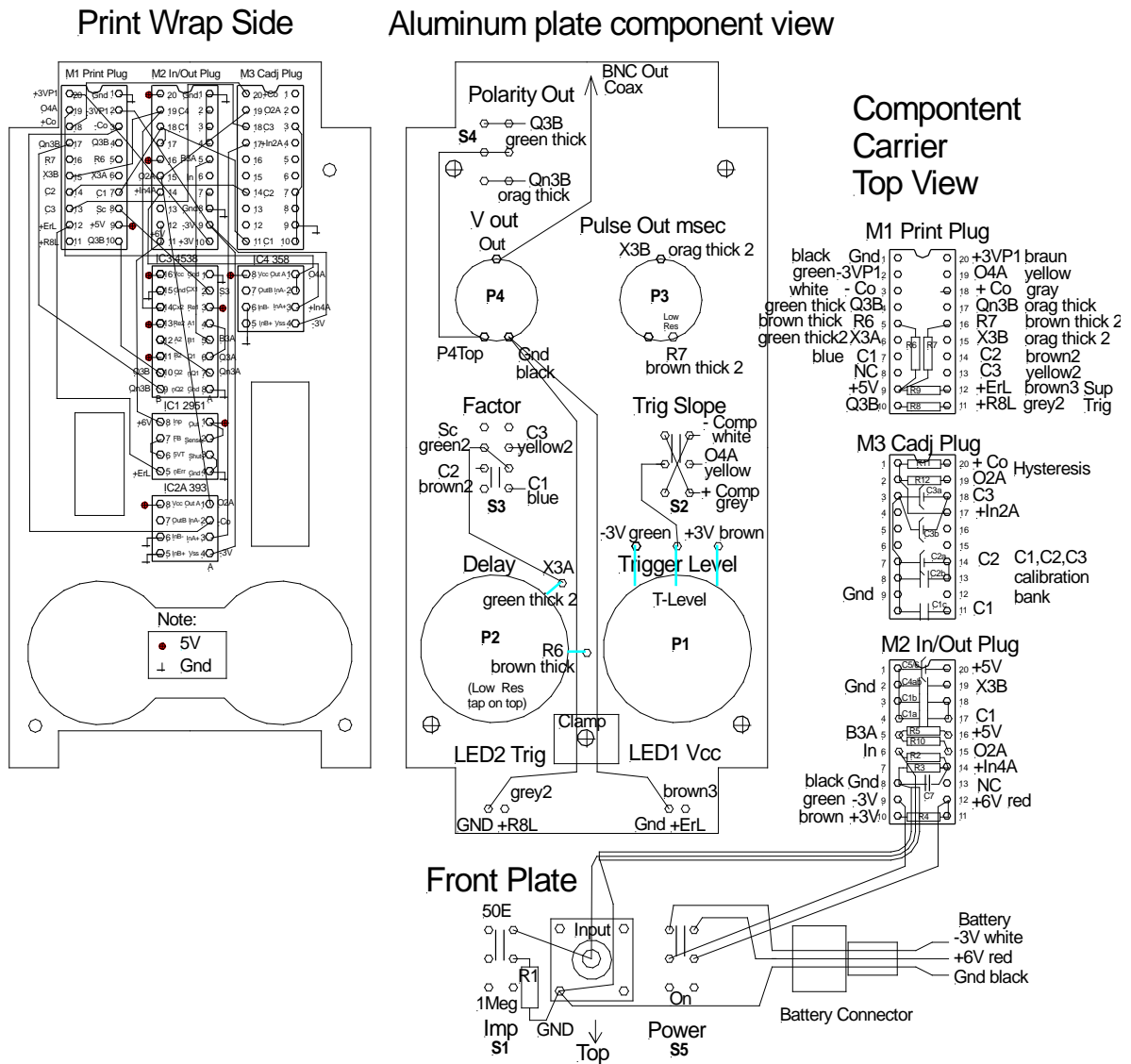


Fig. 5: Wire Wrap Print , components on aluminum plate and components on carrier plugs

Notes:

The print to the left is a Wire Wrap Print, viewed from the wiring side (or solder side if PCB)

The plate in the middle is an aluminum plate with mounted components such as switches and potentiometers, viewed from the solder side.

The components and cables to the right on the 20 Pin component carriers are viewed from the component side.

This layout is ok for a prototype, but it could be designed better!

6. Bore Dimensions and Assembly

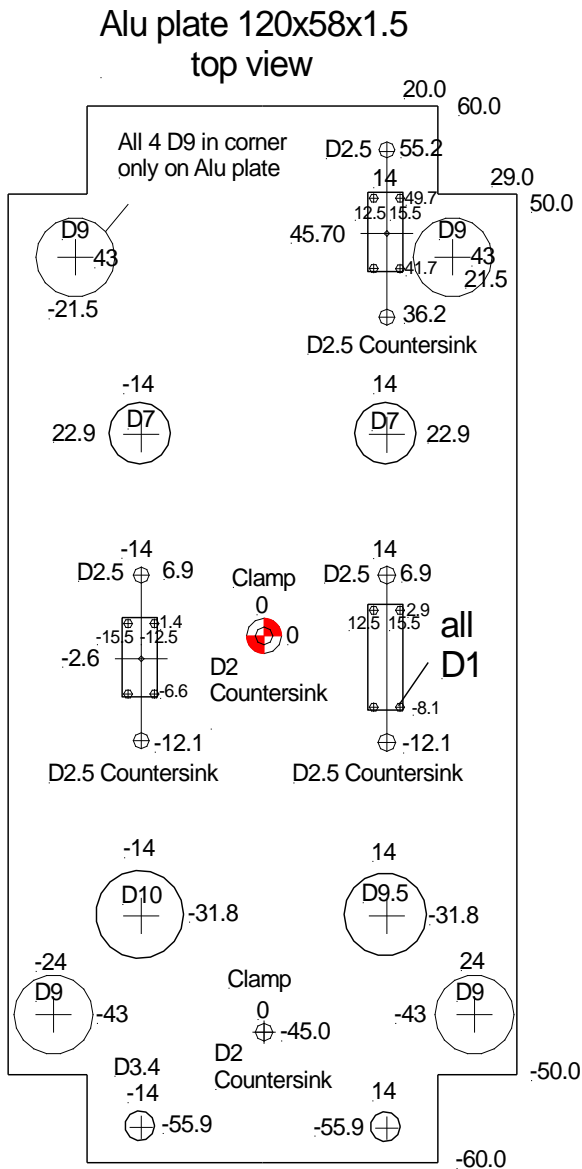


Fig. 6: Dimensions of the aluminum plate (and without the four corner D9 bore and all the D2 and D2.5 holes for the top case)

7. Final Comments

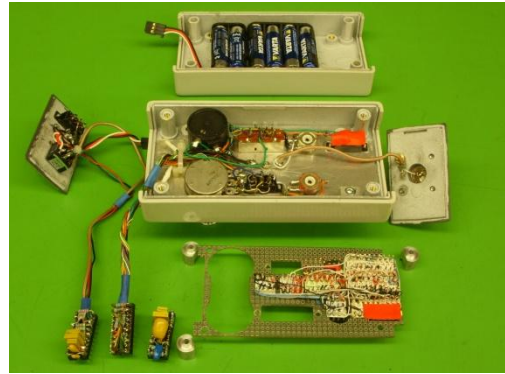
This trigger delay device is a reliable prototype, manufactured with Wire Wrap Technology which makes later circuit changes easy. Tests with small and slow sinus input signal proved the need for an input signal impedance converter and a hysteresis network for the comparator.

The absolute trigger delay time is not accurate, but quite stable. You may add a μC for accurate delay time generation, but take care for an easy manual time setting procedure.

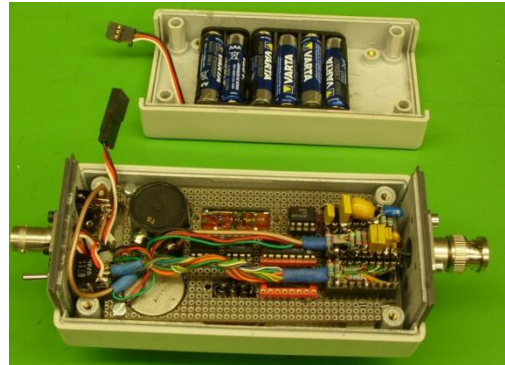
A PCB with SMD components would be nice, too.

Have a lot of fun with your little time machine!

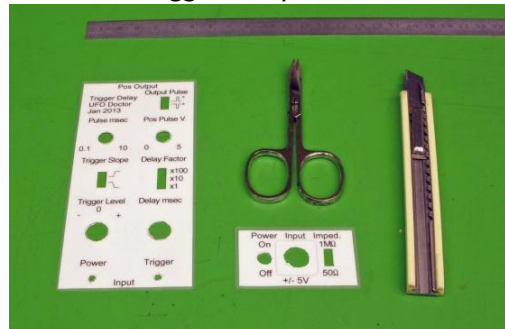
Kind regards from UFO Doctor



Components with plugs and battery



Assembled trigger delay device



Cutting of the laminated labels

Fig. 6: Assembly details