RANDOM×SOURCE

# Ian Fritz Dual T/G/T/S/H

## Threshold/Gate/Trigger/Sample/Hold Circuit

*This is a circuit that combines two important synthesizer functions. It produces trigger and gate signals whenever a "timing" signal input crosses a user-defined threshold. At the same time, the trigger pulse fires a high-performance sample-and-hold circuit that samples a second "main" signal input. Two of these circuits are contained on a single board..*

The Random*Source CHAQUO + TGTSH kit contains a main pcb for the TGTSH (comprising two identical circuits) and a matching component pcb serving as an interface to the front panel.

Main pcb:
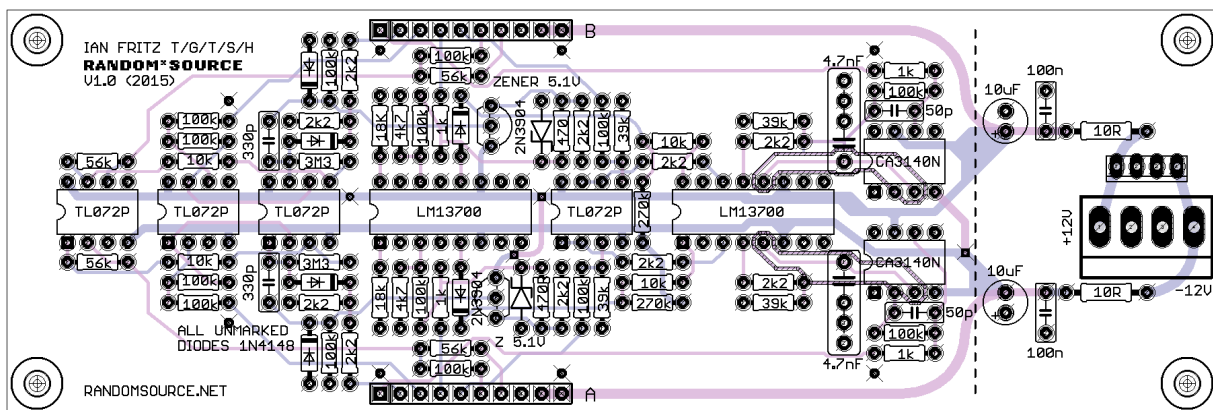


## Please note:

- With the recommended IC's this circuit has a very small droop rate of under 2 mV/sec and can sample at rates up to over 10 kHz. The CA3140 mosfet-input buffers can be replaced with low input- bias opamps. With OPA134's, the droop rate is increased to ~12 mV/sec. Expensive opamps with input bias currents under 10 pA make satisfactory substitutes, but at present the CA3140 is still in production and only costs around $1.

- Pcb contains 2 ring guards - be careful when soldering the relevant pins of the CA3140s and the LM13700.

- Assembly of the Random*Source module is described in the CHAQUO documentation.

- Orientation of the main pcb: **power header is at the bottom** (when looking at the module upright, e.g. in a rack).

- Module is designed to be powered by a +/-12V stabilized PSU, +/-15 V should work fine also.

## Bill of Materials

### Resistors (1%)

| | | | |
|---|---|---|---|
| 2 | 10R | F1, F2 | alt: ferrit beads |
| 4 | 1k | A-R15, B-R15, B-R27, R27 | |
| 10 | 2k2 | A-R11, A-R13, A-R14, A-R22, A-R24, B-R11, B-R13, B-R14, B-R22, B-R24 | |
| 2 | 4k7 | B-R17, R17 | |
| 4 | 10k | A-R7, A-R23, B-R7, B-R23 | |
| 2 | 18k | B-R18, R18 | |
| 4 | 39k | A-R21, A-R25, B-R21, B-R25 | |
| 4 | 56k | A-R4, A-R6, B-R4, B-R6 | |
| 14 | 100k | A-R2, A-R5, A-R8, A-R10, A-R20, B-R2, B-R5, B-R8, B-R10, B-R16, B-R20, B-R26, R16, R26 | |
| 2 | 270k | A-R19, B-R19 | |
| 2 | 3M3 | A-R9, B-R9 | |

### Capacitors

| | | | |
|---|---|---|---|
| 2 | 50p or 47p | B-C3, C3X | C0G/NP0 10% or better |
| 2 | 330p | A-C1, B-C1 | C0G/NP0 10% or better |
| 2 | 4.7nF | A-C2, B-C2X | Styrene (10% or better) |
| 2 | 100n | C3, C4 | Bypass caps |
| 2 | 10uF | C1, C2 | Electrolytic |

### ICs

| | | | |
|---|---|---|---|
| 6 | 1N4148 | A-D1 , A-D2, A-D4, B-D1, B-D2, B-D4 | 1N4148 (or similar) switching diode |
| 2 | CA3140N | U7-A, U7-B | (or other low bias-current opamp) |
| 2 | LM13700 | U4, U6 | OTA |
| 4 | TL072P | A-U1, A-U2, U3, U5 | or similar op amp |
| 2 | ZENER 5.1 V | A-D3 , B-D3 | 5.1 V Zener diode |
| 2 | 2N3904 | A-T1, B-T2 | NPN Transistror |

### Misc

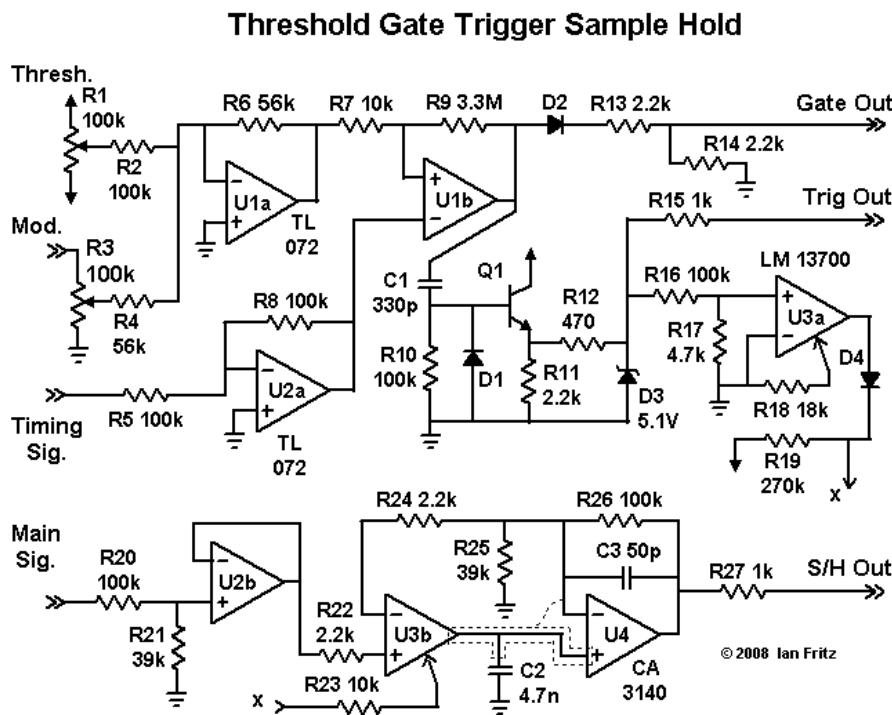| | | | |
|---|---|---|---|
| 4 | Potentionmeter 100k | linear (B100K) | Alpha 9mm vertical pcb mount available from Thonk, Tayda |
| 1 | MTA-156 | | MTA-156 power connector |
| 2 | SIL header 10pol | | 8-pin connector, links main pcb to component pcb |
| 8 | Banana Jacks | | Emerson-Johnson Thonk / Mouser: 530-108-0903-1 (black) |
| 4 | Potentionmeter 50k or 100k | linear (B50K or B100K) | Alpha 9mm vertical pcb mount available from Thonk, Tayda |

## Building and Module Assembly

The module shares a component pcb with the Ian Fritz CHAQUO - **please refer to the Random*Source CHAQUO documentation** for the assembly of the module.

## Setup and Operation

*There are no calibration or other adjustments for these circuits.*

## Original Schematics



Threshold Gate Trigger Sample Hold

(Version 01 February 2017)