# Thomas Henry's Super Controller Module (description)

**This PCB was designed and manufactured with kind permission of Thomas Henry. It provides his Supercontroller Circuit published in Polyphony Issue Sept./Oct. 1981 and his book "Build a better music Synthesizer" 1987.**

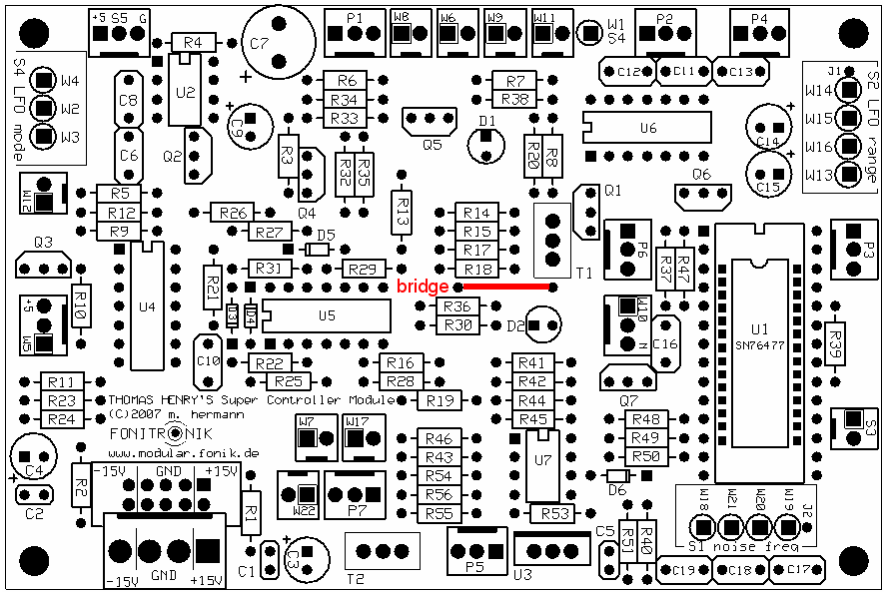

Thomas Henry:
*"If the VCO, VCF, and VCA form the heart of a synthesizer, then this module is surely the brain! It gives you most standard controller options (LFO, noise source, and sample and hold), but also includes some extras. The heart of the Super Controller Module (SCM) is the SN76477. This chip is known as a complex noise generator and was originally designed to provide sound effects for pinball machines and other computer type games."*

A great companion to the Thomas Henry SN76477 Voice Module…

**Short description:**
The picture above shows the front panel of my module.
There is the LFO section to the left: You will choose the mode of operation with a switch, in this case selecting delay or gate. In delay mode the LFO will start when triggered after a certain time depending on the delay time - so you can create delayed modulation. In gate mode the LFO is always "on" until you plug a cord in (switching jack socket). From now on the LFO is "on" when a gate signal is present. The status LED right from the mode selector indicates the LFO on-off-status. There is a selector for the LFO range, a rate control and a LED indicating the speed of the LFO. There are four outputs: triangle and square wave, a gate and a trigger output are derived from the LFO. The gate is derived from the square wave output but going from 0V to approx 10V (or whatever, depending on a resistor value). The trigger is derived from the triangle and delivers a 1ms pulse. Don't forget: The output is gateable or controlled by delay!
The S/H section in the middle: The S/H is clocked from the LFO trigger and provides a portamento (lag) and depth control. The input is normalled to the NOISE source.
The NOISE section to the right: the frequency range of the noise source is selectable by a switch. Thomas Henry: "*Something should be said about why you might want to change the clock rate. The best answer is »try it, you'll like it!« The sound is an incredible swooshing noise not unlike phasing or flanging. The noise takes on a new tonality ans sweeping the clock changes the spectra in a dramatic and eerie manner.*"
Furthermore there is a filter control (known from the SN voice) and a attenuated CV in for the sweep, which base is set by the initial control. you can select external or internal (LFO) sweep modulation

**Setting up the SCM:**
First you need to reset T1 (LFO offset trim), which is the dc offset trim for the triangle wave output. The fastest way to set this is to simply monitor the triangle wave on an oscilloscope and set the trimmer T1 so that the triangle wave is symmetrically oriented about ground. If you don't have a scope, monitor the triangle wave with a voltmeter. Then set the trimmer so that you get an equal value for the negative and the positive swing. If you are not fussy about zeroed-out triangle waves, simply set the trimmer in mid-position and leave it. This should give you good enough results for most applications.
To adjust the noise clock offset trimmer T2, monitor the noise with an amplifier. Turn P5 (initial noise clock) and P7 (noise clock CV attenuation.) completely down, then spin trimmer T2 around a few times to get familiar with it's effect. At one extreme you won't hear anything through the monitor amp; at the other extreme you will hear a very shrill white noise sound. Starting from a no-noise position, ease the trimmer up until the noise just starts. This is the optimum position. By setting the trimmer in such a way, the initial set pot P5 will have a fill range effect.

# Thomas Henry's Super Controller Module (components diagram)




If the VCO, VCF, and VCA form the heart of a synthesizer, then this module is surely the brain! It gives you most standard controller options (LFO, noise source, and sample and hold), but also includes some extras
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This PCB was designed and manufactured with kind permission of Thomas Henry.
Schematics are redrawn with kind permission of Thomas Henry, for your private use only, do not copy by any means

| Capacitors | |
|---|---|
| mono or poly | |
| C8, C16 | 1n |
| C6, C10, C17 | 10n |
| C12, C18 | 47n |
| C1, C2, C5, C19 | 100n |
| C11, C13 | 220n |
| electrolytic | |
| C14 | 2.2uf |
| C9 | 4.7uf |
| C3, C4, C15 | 10uf |
| C7 | 100uf |

| Semi's | |
|---|---|
| D1 (low current LED) | lfo status |
| D2 (low current LED) | lfo rate |
| D3, D4, D5, D6 | 1N4148 |
| Q1, Q2, Q3, Q4, Q5 | 2N3904 |
| Q6, Q7 | MPF102 |
| U1 | SN76477 |
| U2 | LM555 |
| U3 | LM7805 or 78L05 |
| U4 | CD4001 |
| U5, U6 | TL074* |
| U7 | LM1458 |

*Thomas Henry's original circuit utilized a TL084 and a 4136. Since the 4136 has a non standard layout we would have been limited if I considered that for the PCB layout, so I decided to use standard quad OpA's only.

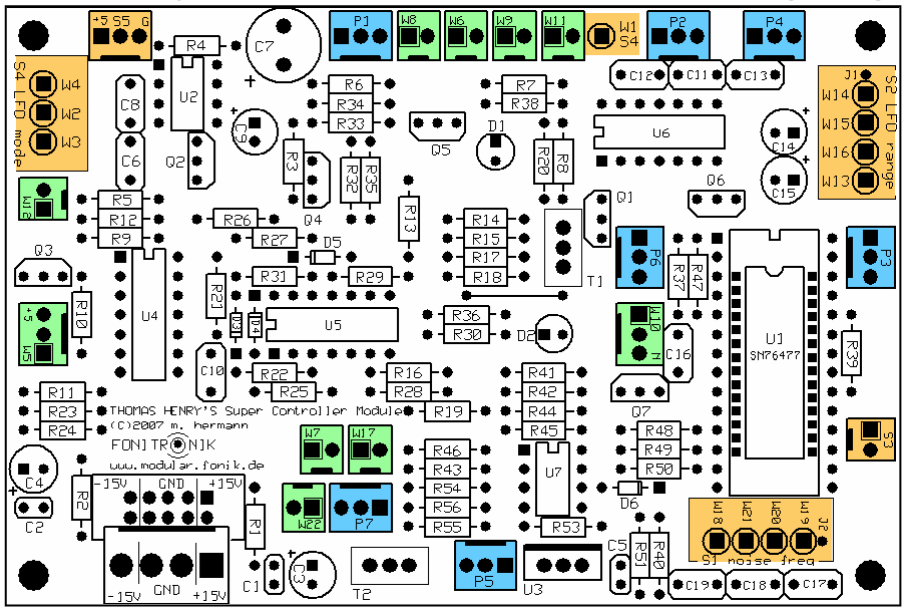
| Resistors | |
|---|---|
| R3 | 10R |
| R1, R2 | 22R |
| R30 | 680R |
| R6, R28, R38, R46 | 1k |
| R27, R33 | 1.5k |
| R7, R14, R21, R29 | 2.2k |
| R26, R32 | 3k |
| R12, R24, R34, R39, R40, R47 | 10k |
| R20 | 15k |
| R41 | 22k |
| R8, R51, R53, R55 | 33k |
| R9 | 39k |
| R43 | 47k |
| R54 | 56k |
| R19 | 68k |
| R4, R5, R10, R11, R13, R15, R23, R25, R35, R37, R42, R49, R50, R56 | 100k |
| R45, R48 | 200k |
| R16, R44 | 390k |
| R18, R36 | 1M |
| R22, R31 | 2.2M |
| R17 | 5.6M |

| Precision Trimmers | |
|---|---|
| T1 (LFO offset) | 100k |
| T2 (Noise clock offset) | 100k |

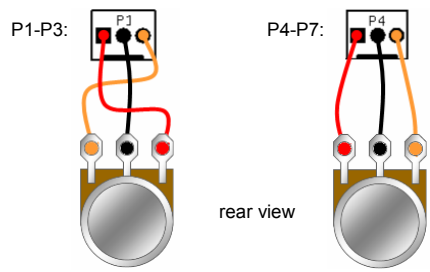
| Potentiometer | |
|---|---|
| P1, P2, P3, P4 | 1M |
| P5, P6, P7 | 100k |

| Connectors (refer to wiring diagram) | |
|---|---|
| P1 | DELAY time |
| P2 | S&H portamento |
| P6 | S&H depth |
| W10 | S&H in |
| W11 | S&H out |
| P4 | NOISE filter |
| P5 | NOISE initial clock |
| P7 | NOISE clock CV attenuation |
| S3 | NOISE sweep int/ext |
| W17 | NOISE out |
| W18 | S1 (NOISE frequency select) |
| W19 | S1 (NOISE frequency high) |
| W20 | S1 (NOISE frequency medium) |
| W21 | S1 (NOISE frequency low) |
| W22 | NOISE clock cv in |
| P3 | LFO rate |
| S5 | LFO on/off (hold) |
| W13 | S2 (LFO range select) |
| W14 | S2 (LFO range high) |
| W15 | S2 (LFO range medium) |
| W16 | S2 (LFO range low) |
| W1 | S4 (LFO mode select) |
| W2 | S4 (LFO mode delay) |
| W3 | S4 (LFO mode gate) |
| W4 | S4 (LFO mode hold switch) |
| W5 | GATE in |
| W12 | TRIGGER in |
| W6 | TRIGGER out |
| W7 | LFO triangle out |
| W8 | LFO square out |
| W9 | GATE out |

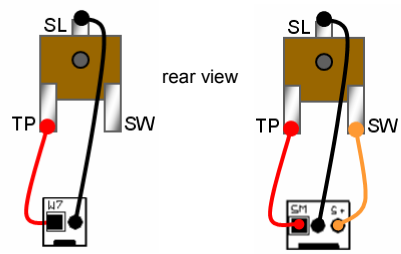
# Thomas Henry's Super Controller Module (wiring diagram)




| Potentiometers | |
|---|---|
| P1 | DELAY time |
| P2 | S&H portamento |
| P3 | LFO rate |
| P4 | NOISE filter |
| P5 | NOISE initial clock |
| P6 | S&H depth |
| P7 | NOISE clock CV attenuation |




| Jack Sockets | |
|---|---|
| W5 | GATE in (normalled to +5V) |
| W6 | TRIGGER out |
| W7 | LFO triangle out |
| W8 | LFO square out |
| W9 | GATE out |
| W10 | S&H in (normalled to NOISE out) |
| W11 | S&H out |
| W12 | TRIGGER in |
| W17 | NOISE out |
| W22 | NOISE clock CV in |



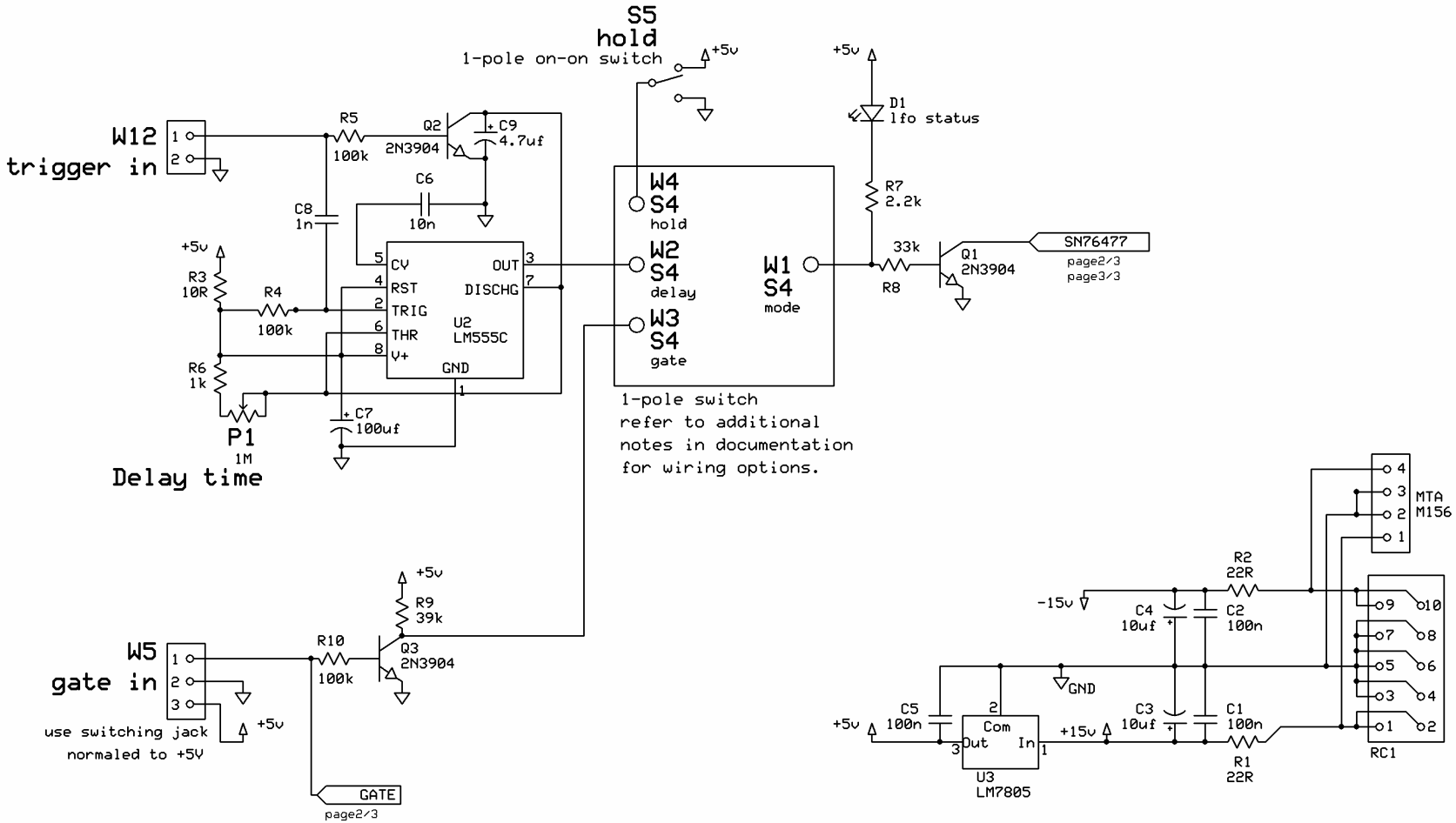

| Switches | |
|---|---|
| W18 | S1 (NOISE frequency select) COM |
| W19 | S1 (NOISE frequency high) |
| W20 | S1 (NOISE frequency medium) |
| W21 | S1 (NOISE frequency low) |
| W13 | S2 (LFO range select) COM |
| W14 | S2 (LFO range high) |
| W15 | S2 (LFO range medium) |
| W16 | S2 (LFO range low) |
| S3 | NOISE sweep int/ext |
| W1 | S4 (LFO mode select) COM |
| W2 | S4 (LFO mode delay) |
| W3 | S4 (LFO mode gate) |
| W4 | S4 (LFO mode hold switch) |
| S5 | LFO on/off (hold) |

**S1** and **S2** can be wired at least in two different ways, depending on the type of switches you have on hand, 1-pole *on-on-on* or *on-off-on*.
*on-on-on*:
Wire as usual. W18 resp. W13 to com of the switch.
*on-off-on*:
Solder little jumpers to connect J2 to W19 resp. J1 to W14. This way one of the three capacitors is always in series with one of the two remaining which will then be wired to the switch. CAUTION: this way the sequence of the LFO-speed-range resp. NOISE-frequency-range is different, such as Medium/High/Low instead of High/medium/Low. The value of the smallest capacitor is always added to the selected capacitor in series; you may want to try different values that satisfy your needs before soldering.

**S3** is an 1-pole on-off switch. ON for internal sweep.

**S5** is an 1-pole on-on switch. If you take a look at the schematic you will recognize that there are several options how to wire **S4** and **S5**: The LFO is ON for 0V(GND) and OFF for +5V present at W1(**S4**). W4(**S4**) offers the option to add a switch (**S5**) for manually holding the LFO. For my own module i ignored this switch at all.

# DELAY/MODE circuitry

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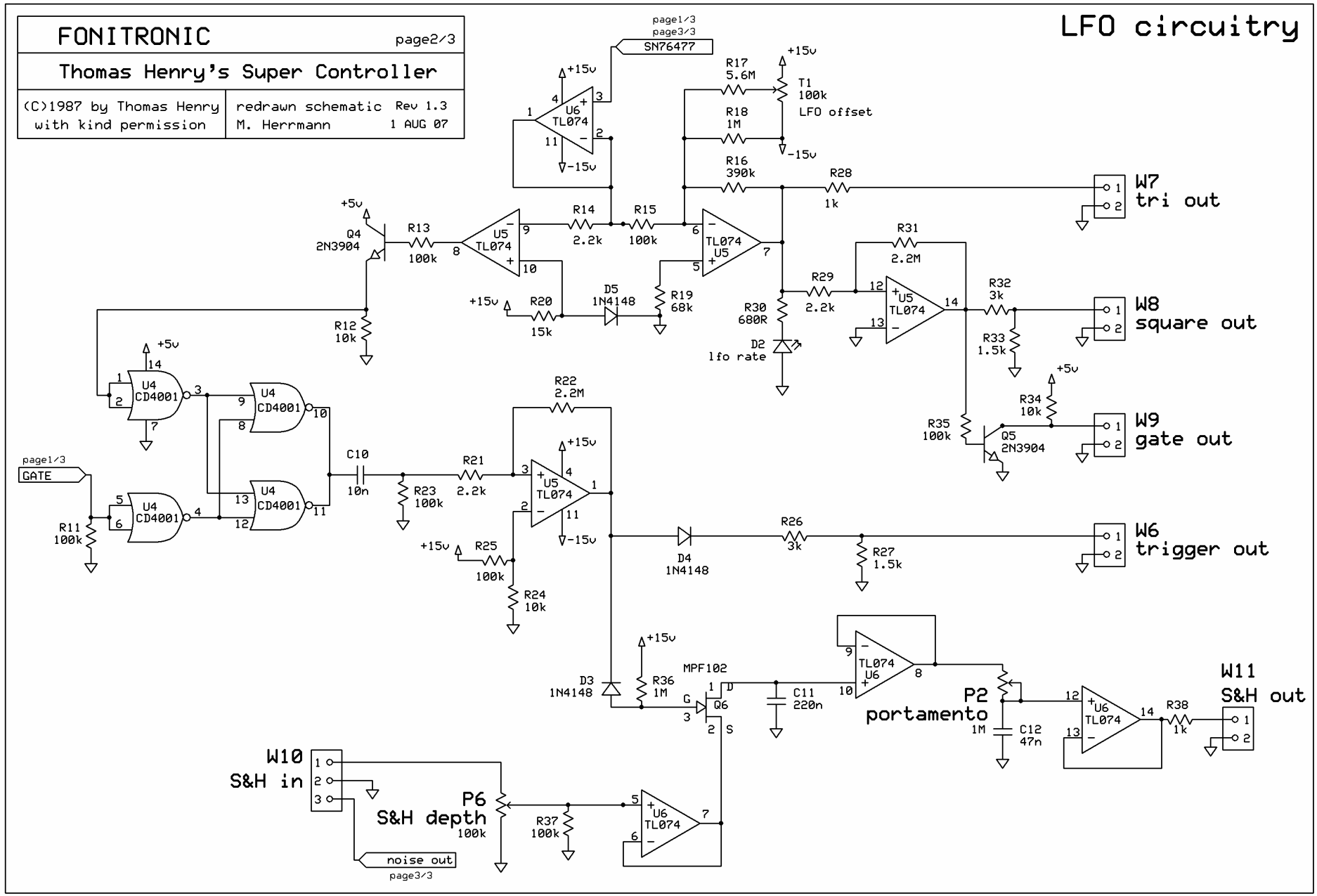
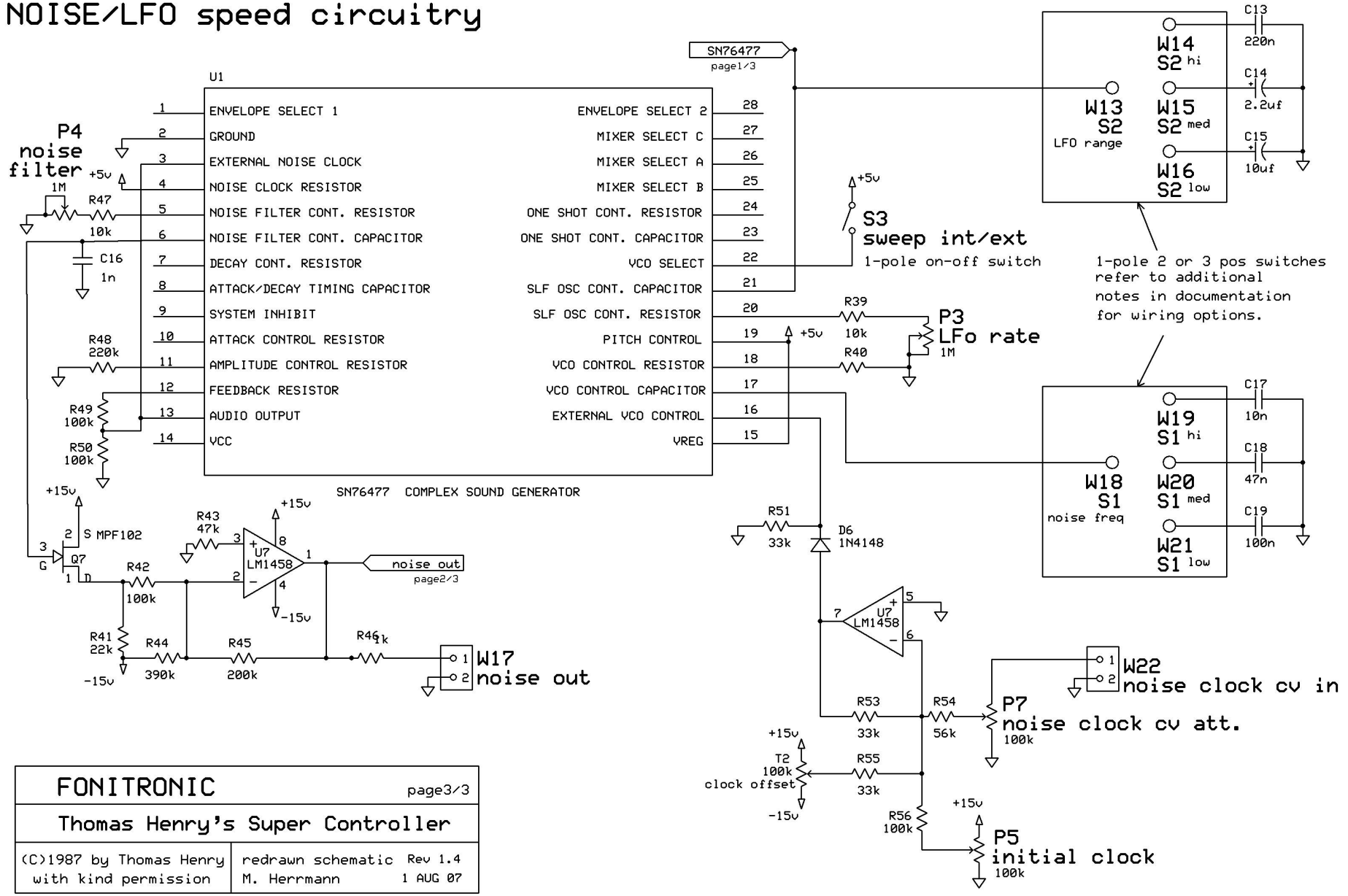


# NOISE/LFO speed circuitry

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