

GateGrinder

Kosmo format synth module, 10 cm wide, to generate clocks and act on triggers and gates (called “signals” generally herein).

Signals come from three sources. There is a jack for an external CV input ($\pm 12\text{V}$). There is a pushbutton for manually created gates. Finally, there is an internal clock to produce a stream of square gates. The clock can be switched On or Off and to Slow or Fast rate ranges, and its Rate can be set, on the front panel. (Slow is around 0.14 Hz to 15 Hz, fast is 3.2 Hz to 320 Hz using the specified components.)

If the Resize On/Off switch is set to Off, the OR of these three signal sources is sent to the Out jack. Otherwise the rising edges are used to trigger a one-shot whose output width is controlled by the Resize Narrow/Wide switch and the Width knob, and the resulting signals are sent to Out. Output widths can vary from about a few milliseconds to about 5 seconds.

(And yes, the width can be set to longer than the time between two pulses. It then ignores any pulses that come along until the resized pulse ends.)

The signal at the Out jack also goes to an inverter whose output goes to the ~Out jack. LEDs indicate when Out and ~Out are on. The rising and falling edges of the Out signal are used to generate trigger pulses which go to the On and Off jacks respectively.

So one can invert gates, change the lengths of gates, convert gates to triggers, convert triggers to gates, make a gate clock, make a trigger clock.

Repository at <https://github.com/holmesrichards/GateGrinder> includes KiCad format schematic, PCB design, and panel design.

Gate Grinder build notes

These build notes are for the first version of Gate Grinder. For the current version see https://github.com/holmesrichards/GateGrinder/blob/master/BUILD_NOTES.md . Differences pertain only to the main PCB.

This is a pretty standard Kosmo module. There are two PCBs, a large main one and a smaller panel PCB.

For some incomprehensible reason I made the main board about 15 mm too long to fit in a Kosmo case and then didn't use the bottom 15 mm. Use a cutting wheel on a Dremel to cut 15 mm off the bottom of the main board (where the logo is).

Most components go on the rear of the main board. Jacks, LEDs, and push button go on the front of the main board along with a 1x14 pin header. Toggle switches and pots go on the front of the panel board and a 1x14 pin socket goes on the rear. Panel and main board are joined via the pin header/socket and two 12 mm M3 spacers.

Toggle switches and pots need all nuts and washers removed before placing the panel. LEDs need either to have long enough legs to reach the main board or to have their legs extended with pieces of wire. The recommended push button fits the panel hole and, assuming a 1.6 mm panel, the solder lugs just barely extend to and through the main board. Note that since it is installed from the front of the panel, once it has been soldered the panel cannot be removed without cutting the push button loose.

With components as specified, the output levels are low, just under 4V. Replacing the 1.8k resistors in the output voltage dividers (R19, R21, R23, R25) with 1.2k will bring these up to 5V, or adjust however you like to suit your preferences.

BOM for the main board is here: https://github.com/holmesrichards/GateGrinder/blob/master/PCB/v1/gategrinder_v1_bom.md

BOM for the panel board is here: https://github.com/holmesrichards/GateGrinder/blob/master/PanelPCB/gategrinder_panelPCB_bom.md

gategrinder BOM

Thu 14 May 2020 10:39:47 AM EDT

Generated from schematic by Eeschema 5.1.5-52549c5~84~ubuntu18.04.1

This is BOM for the main PCB only

These build notes are for the first version of Gate Grinder. For the current version see https://github.com/holmesrichards/GateGrinder/blob/master/gategrinder_bom.md . Differences pertain only to the main PCB.

Component Count: 68

Value	Qty	Part	Description	Vendor
C1, C12	2	0.01uF	Unpolarized capacitor	
C2, C14	2	2.2uF	Polarized capacitor	
C3, C7, C8, C10, C11, C13	6	0.1uF	Unpolarized capacitor	
C4, C17	2	47uF	Polarized capacitor	
C5, C6	2	10uF	Polarized capacitor	
C9, C15, C16	3	100pf	Unpolarized capacitor	
D1, D2	2	1N5817	20V 1A Schottky Barrier Rectifier Diode, DO-41	
D3, D4, D5, D6	4	1N4148	100V 0.15A standard switching diode, DO-35	
D7, D8	2	LED	Light emitting diode	
J1	1	EURO_PWR_2x5	Eurorack style power header	
J3	1	Conn_01x14	Pin header, male 14 pins	
J6, J7, J8, J9, J10	5	AudioJack	¼" Audio Jack	
Q1, Q2, Q3, Q4, Q5	5	BC547	0.1A Ic, 45V Vce, Small Signal NPN Transistor, TO-92	
R1, R12, R20, R22, R24, R26	6	1k	Resistor	
R2, R5, R6, R7, R9, R10, R13, R14, R17, R18	10	100k	Resistor	
R3	1	1M	Resistor	
R4, R11	2	10k	Resistor	
R8	1	15k	Resistor	
R15, R16	2	RL	Resistor	
R19, R21, R23, R25	4	1k8	Resistor	
SW3	1	SW_Push	Push button switch, solder lugs, Tayda A-4326	
U1	1	NA556	Dual Precision Timers, DIP-14/SOIC-14/SSOP-14	
U2	1	4069	Hex inverter	
U3	1	TL072	Dual Low-Noise JFET-Input Operational Amplifiers, DIP-8/SOIC-8	
U4	1	4071	Quad Or 2 inputs	

Also needed/recommended:

- 1 IC socket, 8 pin
- 3 IC sockets, 14 pin
- 1 Eurorack style power cable
- 2 knobs (I used MF-A03, Tayda A-1006)
- 4 M3x6mm screws
- 2 spacers, 12 mm, Tayda A-3317
- 4 Mounting screws

gategrinder_panelPCB BOM

Mon 18 May 2020 11:31:23 PM EDT

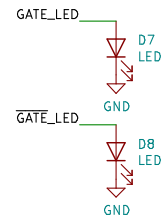
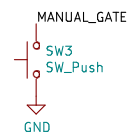
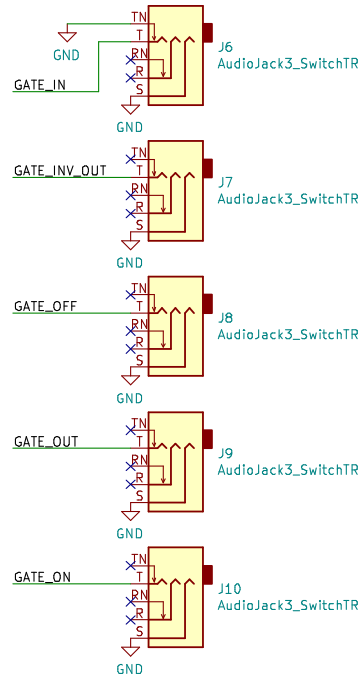
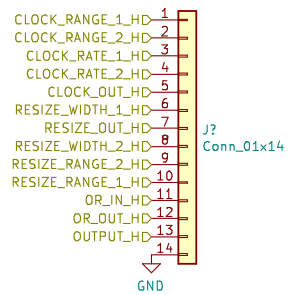
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This is BOM for the panel PCB only

Component Count: 7

Value	Qty	Part	Description	Vendor
J1	1	Conn_01x14	Pin socket, female 14 pins	
RV1, RV2	2	100K	Potentiometer, 9 mm board mount, Tayda A-1848	
SW1, SW3	2	SW_SPST	Single Pole Single Throw (SPST) switch	
SW2, SW4	2	SW_SPDT	Switch, single pole double throw	

GATE_IN_HD ————— GATE_IN
 GATE_INV_OUT_HD ————— GATE_INV_OUT
 GATE_OFF_HD ————— GATE_OFF
 GATE_OUT_HD ————— GATE_OUT
 GATE_ON_HD ————— GATE_ON
 GATE_LED_HD ————— GATE_LED
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 MANUAL_GATE_HD ————— MANUAL_GATE



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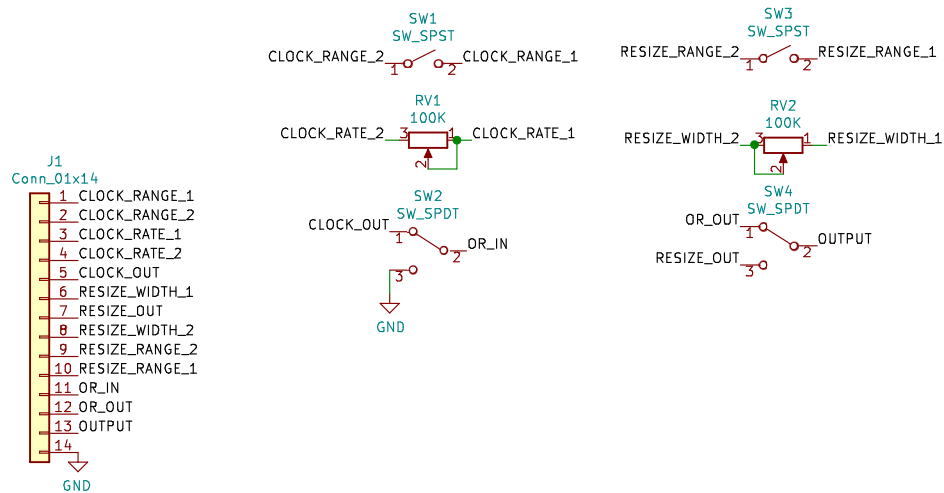
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Rich Holmes / Analog Output

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