TMachine
Random Sequence Generator
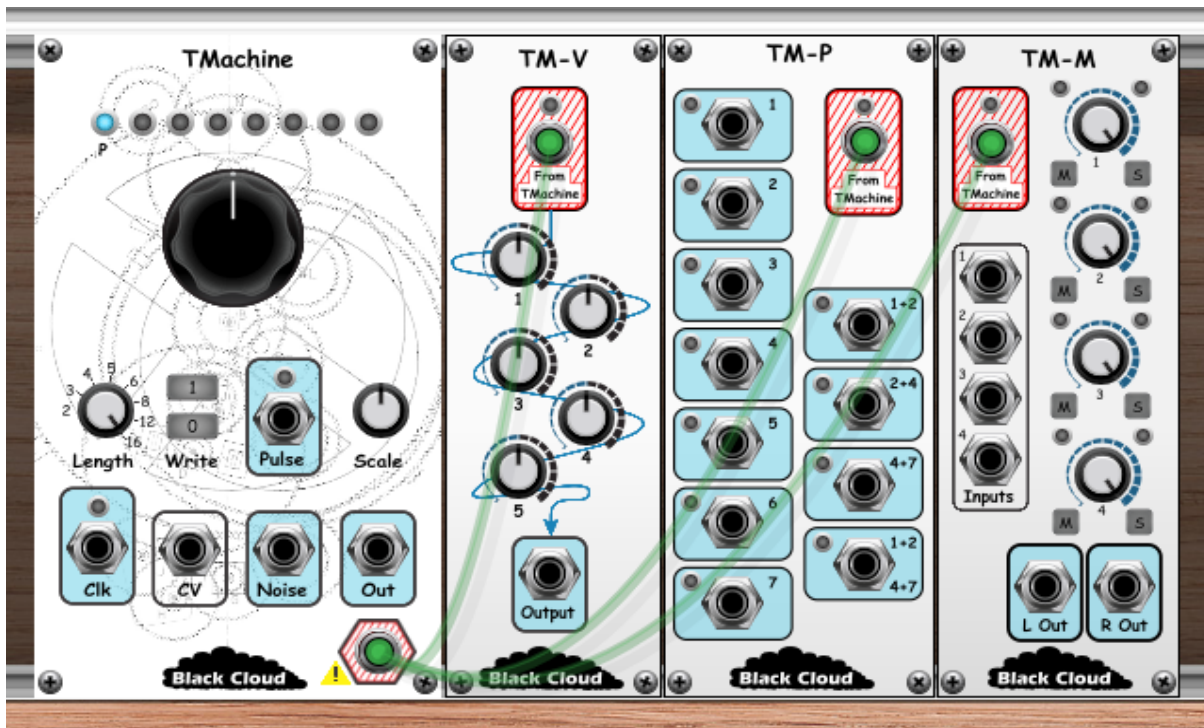
Introduction

Inspired by the Music Thing Modular Turing Machine, TMachine is a sequencer that you can't really control... at least not much!

At the core of the machine is a 16 bit ring buffer that is is pre-loaded with a random value and is rotated left one bit position on each clock pulse. The lower 8 bits of the buffer are displayed on 8 LEDs and converter into an output voltage that can be use to drive any other CV controllable parameter in your patch. You can control the rate at which bits in the buffer are flipped via knob or CV, and set the length of the bit loop.
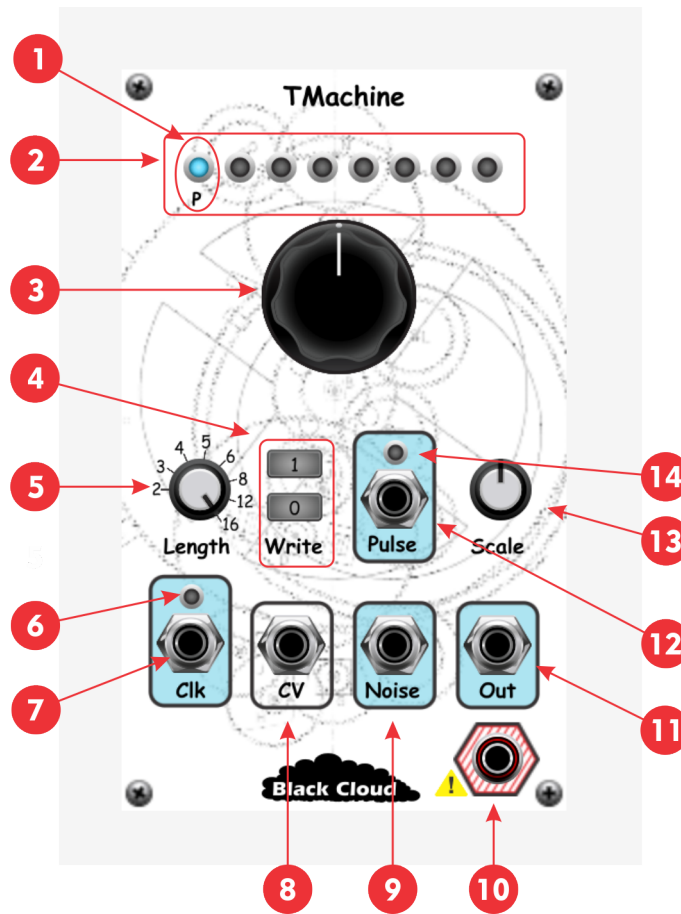
A "Pluse" output is provided that generates a pulse when the P bit in the ring is set, as is "Noise" output, driven by the machine's internal noise source.

The range of the generated output CV is adjustable, allowing the output voltage range to be tuned a particular application.

There are also three output expander modules: TM-P (Pulse Generator), TM-V (Voltage Generator) and TM-M (Mixer).

Knobs, Buttons and Sliders

1	**"P" Bit/Bit One LED** Bit Zero in the machine is the "Pulse Bit". If it's set, a pulse will be generated at the Pulse output (11) when the machine is clocked.	**5**	**Sequence Length** Sets the length/loop point of the sequence, in bits. All displayed 8 bits are always used to generate the output value.
2	**Bit LEDs** Bits 1 thru 8 in the machine. These bits create the output value generated by the machine (10).	**6**	**Clock LED/Manual Step** Flashes once per clock step. Can be clicked to generate a manual clock signal.
3	**Flip Chance** Controls the rate at which the "P" bit is flipped when stepping the sequence, from 0 to 100%. Can also be CV controlled (8).	**7**	**Clock Input** Advance the machine one step for each clock pulse.
4	**Bit Write Switches** Writes a one or zero into the P bit (1) per clock step while pressed.	**8**	**Flip Chance CV Input** Controls flip chance %.

9	**Noise Output** White noise source.	12	**Pulse Output** A short pulse is generate whenever the "P" bit (1) value is set to 1.
10	**Expansion Output** Connects TMachine to it's expansion modules. <u>ONLY</u> TO BE CONNECTED TO TMACHINE EXPANSION MODULES	13	**Output Scale** Limits the magnitude of the output voltage for use with whatever comes next.
11	**Output** CV output generated from lower 8 bits of the machine.	14	**Pulse LED** Flashes when a pulse is generated at the Pulse Output (11).

How It Works

TMachine uses a the lower 8 bits of a 16 bit ring buffer to generate it's output voltages:
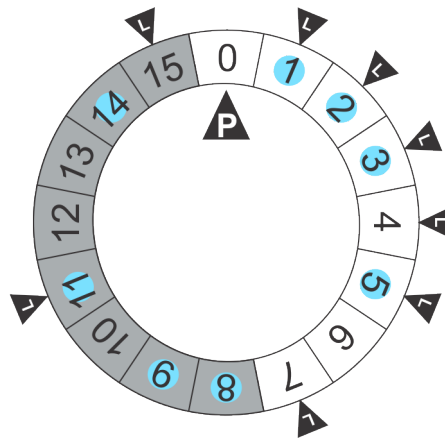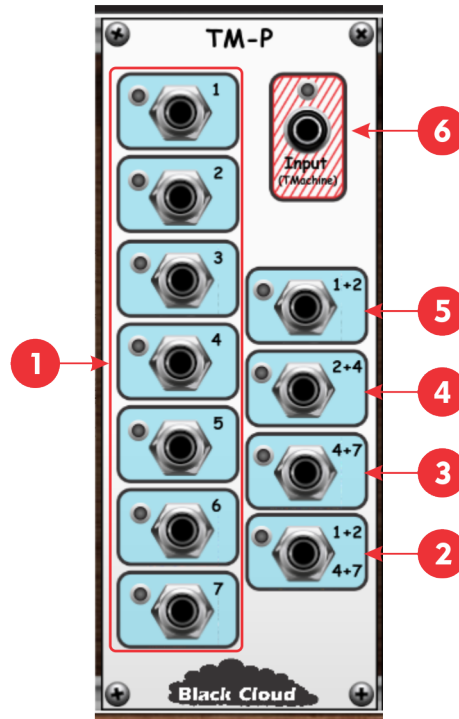

Bit zero in the ring is the "P" bit, which generates a pulse at the Pulse output if it's set. The first 8 bits of the ring are displayed via LEDs, while the remaning are "hidden" within the module. The size of the ring is always 16 bits long, but the length of the sequence (number of bits) being propagated around the ring can be adjusted with the length control (4). The "L" points around the ring correspond to the available loop lengths. Note that the visible 8 bits are always used to generate the output voltage, even when the loop length is set to less than 8.

There are three "Output Expanders" that can be used in conjunction with Tmachine:

- TM-P which generates a number of additional pulses for each clock step.
- TM-V which provides an additional CV output based on the first 5 bits in the machine.
- TM-M which is a 4 input x 2 output "Left/Right" mixer controlled by the machine.

Output Expanders

TM-P Pulse Generator

1	**Pulse Outputs/LEDs** The LED will flash and a pulse will be generated if the corresponding bit is set in the machine when clocked it's clocked.	4	**2+4 Pulse Output/LED** The LED will flash and a pulse will be generated if bits 2 and 4 both set in the machine when clocked it's clocked.
2	**1+2+4+7 Pulse Output/LED** The LED will flash and a pulse will be generated if bits 1, 2, 4 and 7 are all set in the machine when clocked it's clocked.	5	**1+2 Pulse Output/LED** The LED will flash and a pulse will be generated if bits 1 and 2 are both set in the machine when clocked it's clocked.
3	**4+7 Pulse Output/LED** The LED will flash and a pulse will be generated if bits 4 and 7 are both set in the machine when clocked it's clocked.	6	**Expansion Signal Input** Connect to the Expansion Output of the TMachine module.

TM-V Voltage Generator
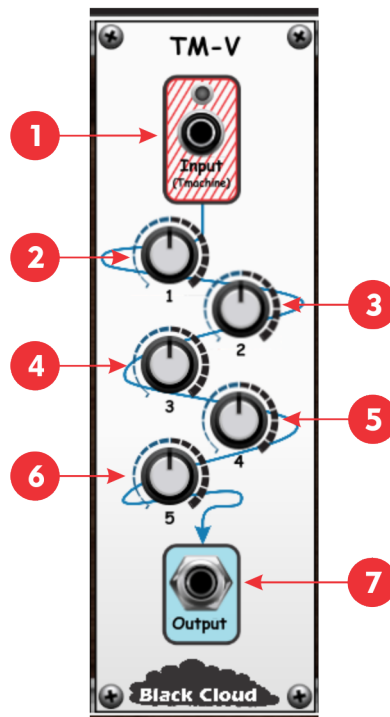
1	**Expansion Signal Input** Connect to the Expansion Output of the TMachine module.	5	**Bit Four Amount** Controls the influence bit 4 from the machine will have on the output value.
2	**Bit One Amount** Controls the influence bit 1 from the machine will have on the output value.	6	**Bit Five Amount** Controls the influence bit 5 from the machine will have on the output value.
3	**Bit Two Amount** Controls the influence bit 2 from the machine will have on the output value.	7	**Output** Voltage generated by summing the adjusted valued of the 5 bits.
4	**Bit Three Amount** Controls the influence bit 3 from the machine will have on the output value.		

TM-M Mixer
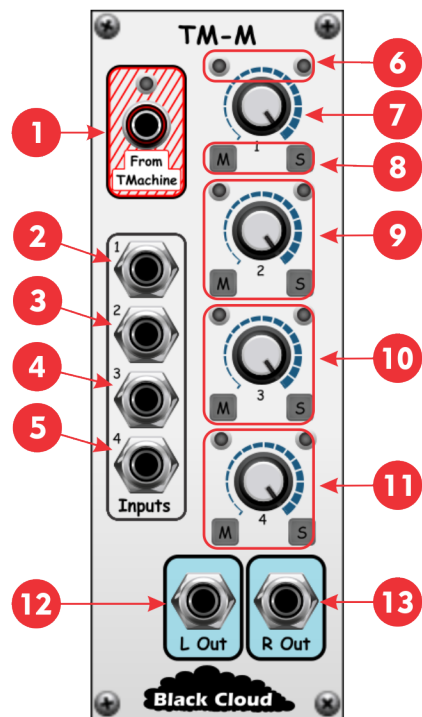
1	**Expansion Signal Input** Connect to the Expansion Output of the/a TMachine module.	**7**	**Channel One Level** Adjust the level of channel 1's input, from 0 to 100%
2	**Channel One Input** Input to channel 1.	**8**	**Channel One Mute/Solo Switches** Mute or Solo Channel one.
3	**Channel Two Input** Input to channel 2.	**9**	**Channel Two Controls** Left/Right LEDs, Level and Mute/Solo controls for Channel 2.
4	**Channel Three Input** Input to channel 3.	**10**	**Channel Three Controls** Left/Right LEDs, Level and Mute/Solo controls for Channel 3.
5	**Channel Four Input** Input to channel 4.	**11**	**Channel Four Controls** Left/Right LEDs, Level and Mute/Solo controls for Channel 3.
6	**Channel One Left/Right LEDs** Shows the current routing status for channel 1: left, right, both or neither.	**12**	**Left Output** Summed "Left" output for all four channels.

13	**Right Output** Summed "Right" output for all four channels.		