SCHLAPPI ENGINEERING BTMX Eurorack Module

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Contents

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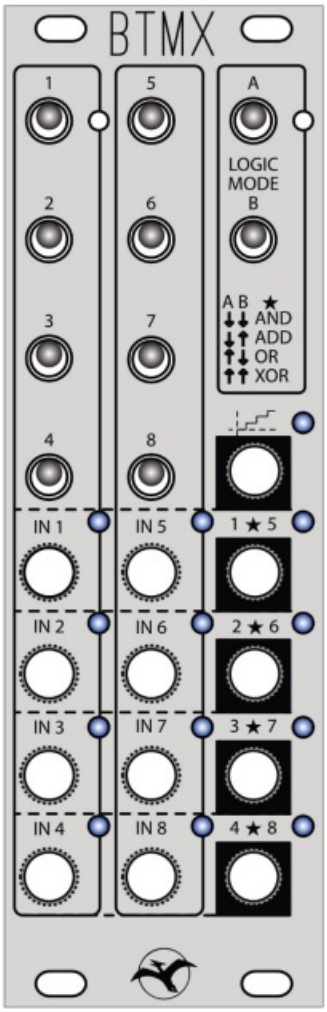
BTMX (BitMix) is a 4-channel selectable logic function module, with each channel having two inputs. All channels share the same logic function and the gateouts are summed with binary weights to create a stepped voltage. Each channel has a switch on the input allowing for hands on control over rhythms or other 4-bit logic signals.

OVERVIEW



INPUT SWITCHES 1-8
These 8 switches each relate to an input and can be used to mute that input or turn on and off a constant value if no input is present. Up is on, down is off.

GATE INPUTS 1-8
Gate/logic inputs 1-4 go to one side of the two input logic functions and 5-8 go to the other. Any unused input has a +10V input normalized and the low/high comparator threshold is at 2.8V

Binary VS Logic Gates
This module can either be viewed as four separate two-input logic gates with a selectable function or one selectable logic function that accepts two nibbles (four-bit logic word) as input. This only matters for the stepped out and the ADD logic function as two high signals will carry to the next channel up.

LOGIC MODE SWITCHES
These two switches set the logic function for all four logic gates

- **Both down:** AND Top up: OR
- **Bottom-up:** ADD Both up: XOR

STEPPED OUTPUT
Stepped voltage made by adding the 4 gate outputs together with binary weights. This output is a 0-10V unipolar stepped analog signal with 16 different values (including zero). The top bit (1 ★ 5) will provide about 5.3V, the next about 2.64, then 1.32, and the bottom about 0.66V

GATE OUTPUTS

1 ★ 5, 2 ★ 6, 3 ★ 7, 4 ★ 8 combined form a binary word. They can be used as clock dividers or to create rhythms. All gate outputs are 0 or 10V logic signals.

PATCHES TO START WITH

TRIGGER GATE COMBINER

- Set LOGIC MODE to OR
- Patch triggers into inputs and use switches to mute as desired
- Make sure any unused inputs are switched off or output will stay high
- Patch outputs as desired

GATE COMBINER

- Set LOGIC MODE to XOR
- Patch gates into inputs and use switches to mute as desired
- Make sure any unused inputs are switched off or output will be inverted
- Patch gate outputs as desired
- Try patching the stepped output to a pitch or modulation input
- Try other logic modes

BURST GENERATOR

- Set LOGIC MODE to AND
- Patch a long, slow gate into one side
- Patch a faster gate into the other
- The output will only be high when both gates are high at the same time

PHASE MODULATION

- Set LOGIC MODE to ADD
- Patch 4 bit audio rate signals into each side (from Nibbler or BTFLD for example)
- Listen to the stepped output
- Mute individual bits as a crude form of waveshaping

LOGIC FUNCTIONS

The AND logic function is high if both inputs are high and low otherwise. You can use it to create bursts by pairing a long, slow sequence with a short fast one, gating the fast one with the slow one. When used with unrelated rhythmic sequences this will generally simplify the sequence. WATCH OUT: If you have one of the two inputs muted then there will never be an output.

AND		
IN	IN	OUT
0	0	0
0	1	0
1	0	0
1	1	1

The XOR logic function is high if either input is high and low if both inputs are high. This means it can be used to combine two sequences but will also guarantee a change in the output state for every change in the input state. This is probably the easiest-to-use mode for combining two sequences. Also XOR is nice at audio rate as well.

OR		
IN	IN	OUT
0	0	0
0	1	1
1	0	1
1	1	1

The OR logic function is high if either input is high. You can use this to combine two unrelated rhythmic sequences into one. WATCH OUT: If one input is switched on with no input then the output with always be high. Similarly if a there are two long slow or very busy sequences being input, it may never go low.

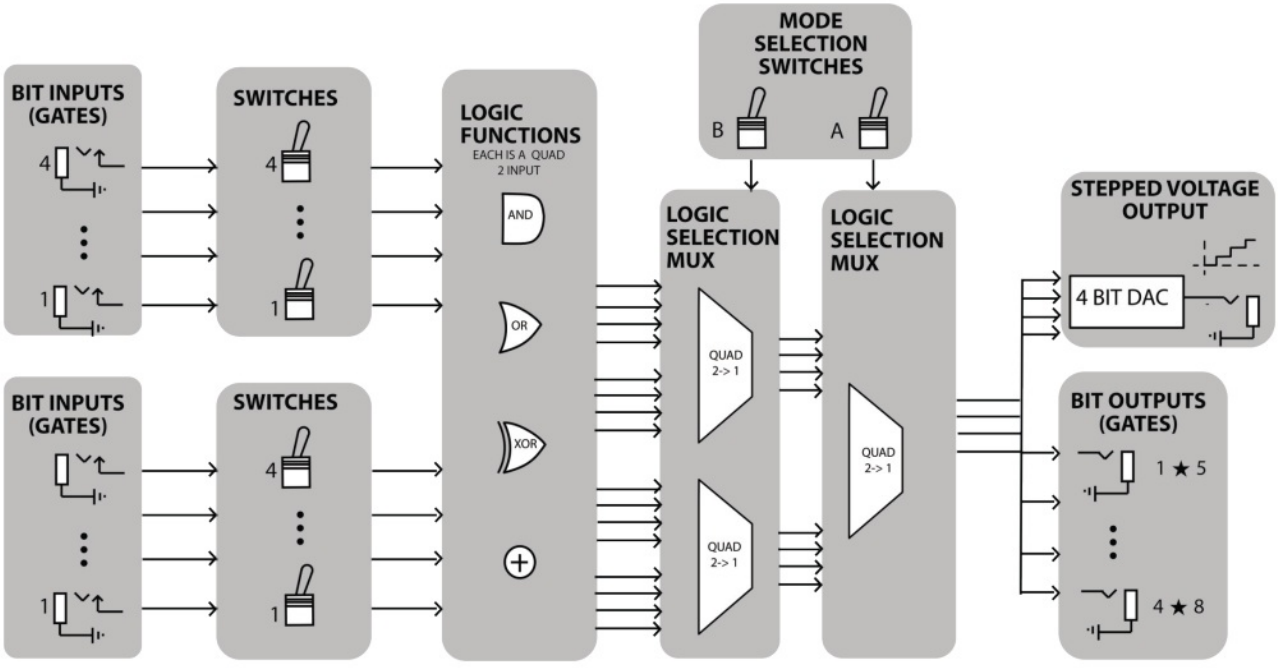
XOR		
IN	IN	OUT
0	0	0
0	1	1
1	0	1
1	1	0

The ADD logic function is high if either input is high and low if both inputs are high, same as XOR, except it will also carry a bit from a lower stage if both bits are high. This means at audio rate it is a form of phase modulation. It also means that if you are using it for rhythmic sequences with different outputs going to different instruments (for example kick and snare) it means that your different instrument sequences will affect each other, which can be a bit confusing if you aren't ready for it.

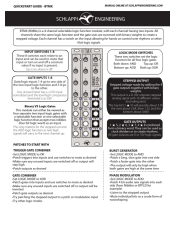
PLUS				
IN	IN	CARRY IN	CARRY OUT	OUT
0	0	0	0	0
0	0	1	0	1
0	1	0	0	1
0	1	1	1	0
1	0	0	0	1
1	0	1	1	0
1	1	0	1	0
1	1	1	1	1

BLOCK DIAGRAM

The BTMX is eight inputs and switches going to 4x quad2 input logic gates. The logic function at the output is selected with 3 quad 2 input muxes and two switches. The 4-bit DAC is the same resistor-weighted op amp circuit as the Nibbler and BTFLD.



Documents / Resources

	SCHLAPPI ENGINEERING BTMX Eurorack Module [pdf] User Guide 20240701, BTMX Eurorack Module, BTMX, Module, Eurorack, BTMX Module, Eurorack Module

References

- Schlappi Engineering – schlappiengineering
- User Manual