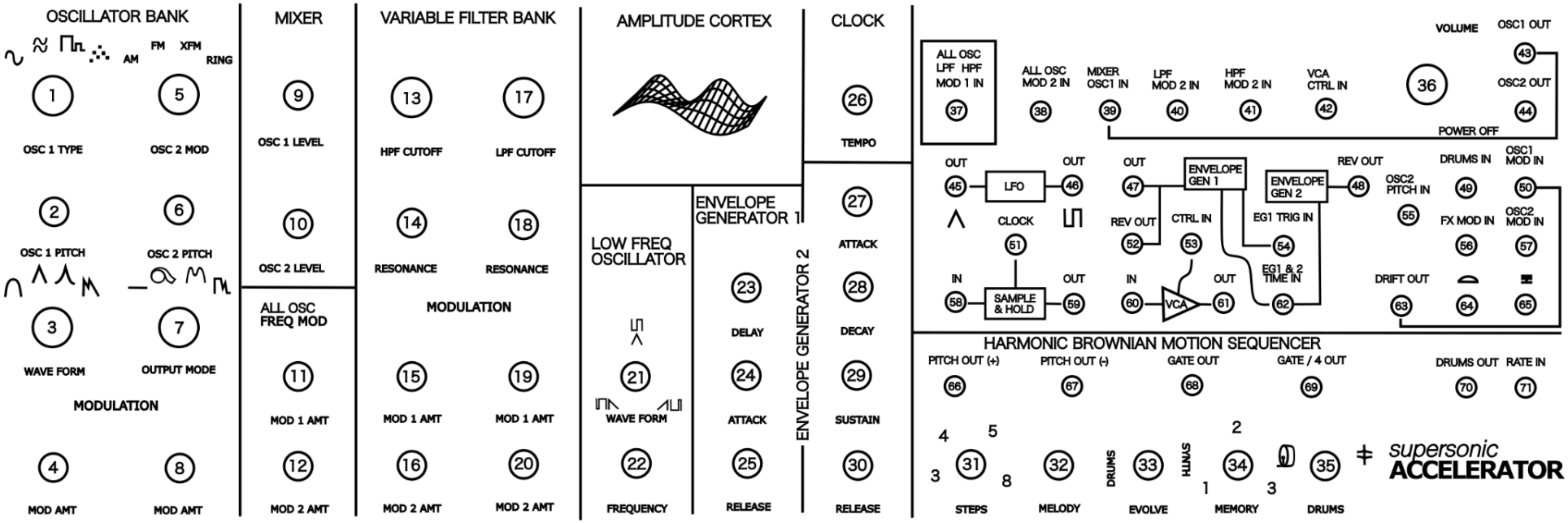

OSCILLATOR BANK

1. **OSC 1 TYPE - Select from four oscillator types: Sines, Polyphonic, Aggressive, and Granular**
2. **OSC 1 PITCH -** Adjust the base frequency of Oscillator 1. For some sampling or granular oscillator wave forms, this may scrub through the buffer instead.
3. **OSC 1 WAVE FORM -** Select from four different oscillators per **OSC 1 TYPE**, with mellower waves on the left and more jagged waves on the right. The wave forms are as follows:
   - **Sines -** Sine, Decoupled Sine, Sine + Random Harmonic, Bump
   - **Polyphonic -** Paraphonic Resonator, Chopped Sample, Pitched Sample, Pitched Sample 2
   - **Aggressive -** Triangle, Sawtooth, Comb Filter Resonator, Reese
   - **Granular -** Water, Percussion, Electrical 1, Electrical 2

4. **OSC 1 MOD AMT -** Adjust depth of frequency modulation applied to Oscillator 1. If there is nothing connected to input **49**, this is internally connected to **DRIFT**.
5. **OSC 2 MOD -** Select from four methods of modulating Oscillator 2. Turn up **8** to hear the different modulation effects:
   - **AM -** sine carrier ring-modulation
   - **FM -** sine carrier linear frequency modulation
   - **XFM -** bass-compensated sine carrier synced exponential frequency modulation
   - **RING -** square carrier ring-modulation.
6. **OSC 2 PITCH -** Adjust the base frequency of Oscillator 2.
7. **OUTPUT MODE -** Choose between four output modes:
   - **Clean -** No processing.
   - **Tape -** Inserts a tape simulation effect at the end of the audio signal chain.
   - **Wavefolder -** Inserts a Buchla 259-inspired wavefolder in between the **Mixer** and the **Variable Filter Bank.** Different input levels lead to different tonal characteristics.
   - **Fuzz -** Inserts a fuzz effect at the end of the audio signal chain.
8. **OSC 2 MOD AMT -** Adjust depth of frequency modulation applied to Oscillator 1. If there is nothing connected to input **56**, this is internally connected to **OSC 1 OUT**.

MIXER

9. **OSC 1 LEVEL -** Adjust the level of Oscillator 1.
10. **OSC 2 LEVEL -** Adjust the level of Oscillator 2.
11. **ALL OSC FREQ MOD 1 AMT -** Adjust the depth of frequency modulation applied to Oscillators 1 & 2 simultaneously. If there is nothing connected to input **37**, this is internally connected to **LFO RAMP OUT.**
12. **ALL OSC FREQ MOD 2 AMT -** Adjust the depth of frequency modulation applied to Oscillators 1 & 2 simultaneously. If there is nothing connected to input **38**, this is internally connected to **ENVELOPE GENERATOR 1 OUT.**

VARIABLE FILTER BANK

13. **HPF CUTOFF -** Adjust the cutoff frequency of the high pass filter.
14. **RESONANCE -** Adjust the resonance of the high pass filter.
15. **MOD 1 AMT -** Adjusts depth of frequency modulation applied to the high pass filter cutoff. If there is nothing connected to input **37**, this is internally connected to **LFO RAMP OUT.**
16. **MOD 2 AMT -** Adjusts depth of frequency modulation applied to the high pass filter cutoff. If there is nothing connected to input **40**, this is internally connected to **ENVELOPE GENERATOR 2 OUT.**
17. **LPF CUTOFF -** Adjust the cutoff frequency of the low pass filter.
18. **RESONANCE -** Adjust the resonance of the low pass filter.
19. **MOD 1 AMT -** Adjusts depth of frequency modulation applied to the low pass filter cutoff. If there is nothing connected to input **37**, this is internally connected to **LFO RAMP OUT.**
20. **MOD 2 AMT -** Adjusts depth of frequency modulation applied to the low pass filter cutoff. If there is nothing connected to input **39**, this is internally connected to **ENVELOPE GENERATOR 2 OUT.**

LOW FREQ OSCILLATOR

21. **WAVE FORM -** Smoothly changes the shape of both simultaneous LFO outputs. **LFO RAMP OUT** ranges from a sawtooth to a triangle to a ramp, while **LFO PULSE OUT** ranges from a thick pulse to a square to a narrow pulse.
22. **FREQUENCY -** Adjusts the frequency of the LFO.

ENVELOPE GENERATOR 1

23. **DELAY -** Delays the attack stage of envelope generator 1.
24. **ATTACK -** Onset duration of envelope generator 1 to reach its maximum level after a gate signal is received (or a note is played).
25. **RELEASE -** Duration of envelope generator 1 returning to zero after a gate signal is lost (or a note is let up).

CLOCK

26. **TEMPO -** Adjusts the tempo of the sequencer. At extreme tempos the drum machine and tape delay will take different clock divisions, allowing the perception of different subdivisions.
    ****BUTTON + TEMPO -** Adjust the rate of the tape delay**.**

ENVELOPE GENERATOR 2

27. **ATTACK -** Onset duration of envelope generator 2 to reach its maximum level while a note is being played.
28. **DECAY -** Falling duration of envelope generator 2 to reach its sustain level after the maximum level has been reached.
29. **SUSTAIN -** Level at which envelope generator 2 remains after the decay stage while a note is played.
30. **RELEASE -** Duration of envelope generator 2 returning to zero after a note is let up.

HARMONIC BROWNIAN MOTION SEQUENCER

31. **STEPS -** Selects between (mostly) repeating sequences of length 3, 4, 5, or 8.
32. **MELODY -** Controls the amount of melodic diversity. At low values, rhythmic diversity increases.

33. **EVOLVE -** Biases of the evolution of sequences. Low values cause drum patterns to evolve more quickly, while high values cause synth lines to evolve faster. The center point causes both to evolve slowly and naturally.
34. **MEMORY -** Selects between three memory banks to create musical form. Only the selected memory bank evolves, while the others maintain their current state. This can be used to create song sections that can be freely switched between, drops, or to reset the sequencer if things spin out of control during a live performance.
35. **DRUMS -** Selects between different drum mute-mixes. Low values represent kick-focused mixes, and high values represent hi-hat-focused mixes. Center points contain the most active drum elements.

**** BUTTON + DRUMS -** Adjust the DJ-style low pass/low shelf filter for the **DRUMS IN** input **(48)**. Turning the knob to the left engages the low pass filter, and to the right engages a low shelf cut, removing sub bass frequencies. There is a virtual “notch” in the center position where neither filter is engaged for ease of use and on-the-fly lofi, levels, and drops.

VOLUME

36. **VOLUME -** Adjusts master volume.

****BUTTON + VOLUME -** Adjust the tape delay feedback amount.

****BUTTON + MOD WHEEL -** Adjusts the tape delay FX send amount. At high values, the original signal fades away, like a wet/dry mix control. At low values, the dry signal does not lose level as delay is added.

PATCH BAY

37. **ALL OSC LPF HPF MOD 1 IN -** Allows connection of an external modulation source to Oscillators 1 & 2, low pass filter cutoff, and high pass filter cutoff simultaneously. Modulation amounts to the three destinations are set by knobs **11**, **15**, and **19** respectively. If nothing is plugged in here, the **LFO RAMP OUT** is available as the default modulation source.
38. **ALL OSC MOD 2 IN -** Allows connection of an external modulation source to Oscillators 1 & 2 simultaneously. The modulation amount is set by knob **12**. If nothing is plugged in here, **ENVELOPE GENERATOR 1 OUT** is available as the default modulation source.
39. **MIXER OSC1 IN -** Allows connection of an external audio source into the oscillator mixer. Audio level can be set by knob **9**. If nothing is plugged in here, **OSCILLATOR 1 OUT** is the default audio source.
40. **LPF MOD 2 IN -** Allows connection of an external modulation source to the high pass filter cutoff. The modulation amount is set by knob **16**. If nothing is plugged in here, **ENVELOPE GENERATOR 2 OUT** is available as the default modulation source.
41. **HPF MOD 2 IN -** Allows connection of an external modulation source to the low pass filter cutoff. The modulation amount is set by knob **20**. If nothing is plugged in here, **ENVELOPE GENERATOR 2 OUT** is available as the default modulation source.
42. **VCA CONTROL IN -** Allows external modulation of the main VCA. This controls the level of the post-filter audio signal. If nothing is plugged in here, **ENVELOPE GENERATOR 2** is available as the default modulation source.
43. **OSC 1 OUT -** Outputs the audio signal from oscillator 1.
44. **OSC 2 OUT -** Outputs the audio signal from oscillator 2.
45. **LFO RAMP OUT -** Outputs the LFO ramp waveform, as selected by knob **21**.
46. **LFO PULSE OUT -** Outputs the LFO pulse waveform, as selected by knob **21**.
47. **ENVELOPER GENERATOR 1 OUT -** Outputs the unipolar modulation signal from envelope generator 1. Ranges from 0 to 1.
48. **ENVELOPE GENERATOR 2 REV OUT -** Outputs the reversed unipolar modulation signal from envelope generator 2. Ranges from 1 to 0.
49. **DRUMS IN -** Allows connection of an external audio source at the end of the signal chain. Audio connected here will also be routed to the sidechain input of the master compressor. This input has its own DJ-style filter accessible via knob **35**.
50. **OSC 1 MOD IN -** Allows connection of an external frequency modulation source to oscillator 1 exclusively. The modulation amount is set by knob **4**. If nothing is plugged in here, **DRIFT OUT** is available as the default modulation source.
51. **SAMPLE & HOLD CLOCK -** Allows connection of an external clock signal to the sample & hold circuit. If nothing is plugged in here, **SEQUENCER GATE OUT** is the default clock, which also fires when the keyboard is played.
52. **ENVELOPE GENERATOR 1 REV OUT -** Outputs the reversed unipolar modulation signal from envelope generator 1. Ranges from 1 to 0.
53. **PANEL VCA CONTROL IN -** Allows connection of an external modulation source to vary the level of signal passing through the panel VCA.
54. **ENVELOPE GENERATOR 1 TRIG IN -** Triggers envelope generator 1 whenever it receives a signal that is greater than zero. Envelope generator 1 releases when it receives a signal less than or equal to zero. If nothing is plugged in here, **SEQUENCER GATE OUT** is the default trigger source, which also fires when the keyboard is played.
55. **OSCILLATOR 2 PITCH IN -** Allows connection of an external frequency modulation source to oscillator 2.
56. **FX MODULATION IN -** Allows connection of external modulation of the stereo tape delay time.
57. **OSCILLATOR 2 MOD IN -** Allows connection of an external modulation source to oscillator 2 exclusively. The modulation type is set by knob **5**. The modulation amount is set by knob **8**. If nothing is plugged in here, **OSCILLATOR 1 OUT** is available as the default modulation source.

58. **SAMPLE & HOLD IN -** Allows connection of an external signal to be sampled and held until the next tick of the clock. If nothing is plugged in here, white noise is available as the default modulation source.
59. **SAMPLE & HOLD OUT -** Outputs the sampled and held modulation signal.
60. **PANEL VCA IN -** Allows connection of audio or modulation signals to be modulated with the panel VCA.
61. **PANEL VCA OUT -** Outputs the modulated signal from the panel VCA.
62. **ENVELOPE GENERATOR 1 & 2 TIME IN -** Allows simultaneous modulation of the time parameters of envelope generators 1 & 2 with an external source. The parameters modulated are Attack, Decay, and Release.
63. **DRIFT OUT -** Outputs a slow smooth random modulation signal. Use this for subtle modulations.
64. **MOD WHEEL OUT -** Outputs a constant modulation signal according to the position of the mod wheel (located next to the keyboard). Ranges from -1 to 1.
65. **BUTTON OUT -** Outputs a constant modulation signal according to the button position. When the button is pushed, it outputs a 1. When it isn't, it outputs a 0.
66. **SEQUENCER PITCH OUT (+) -** Outputs a modulation signal proportional to changes in pitch from either the sequencer or keyboard playing. When the sequencer is running, these values are sent to the pitches of oscillators 1 & 2 regardless of whether you plug something in here. Ranges from -1 to 1.
67. **SEQUENCER PITCH OUT (-) -** Outputs a modulation signal inversely proportional to changes in pitch from either the sequencer or keyboard playing. Ranges from 1 to -1.
68. **SEQUENCER GATE OUT -** For each note played on the keyboard or by the sequencer, this outputs a pulse. The pulse lasts the duration of the note played. Ranges from 0 to 1.
69. **SEQUENCER GATE / 4 OUT -** For every fourth note played on the keyboard or by the sequencer, this outputs a pulse. The pulse lasts the duration of the note played. Ranges from 0 to 1.
70. **SEQUENCER DRUMS OUT -** Outputs the audio signal from the internal drum machine.
71. **SEQUENCER RATE IN -** Allows connection of an external modulation source to the sequencer rate clock divider. When nothing is plugged in here, the rate is 0. When a cable is patched in here and left unconnected on the other side (dummy-plugged), the rate is a constant 1.

BASIC SIGNAL FLOW

[NO MODULATION]