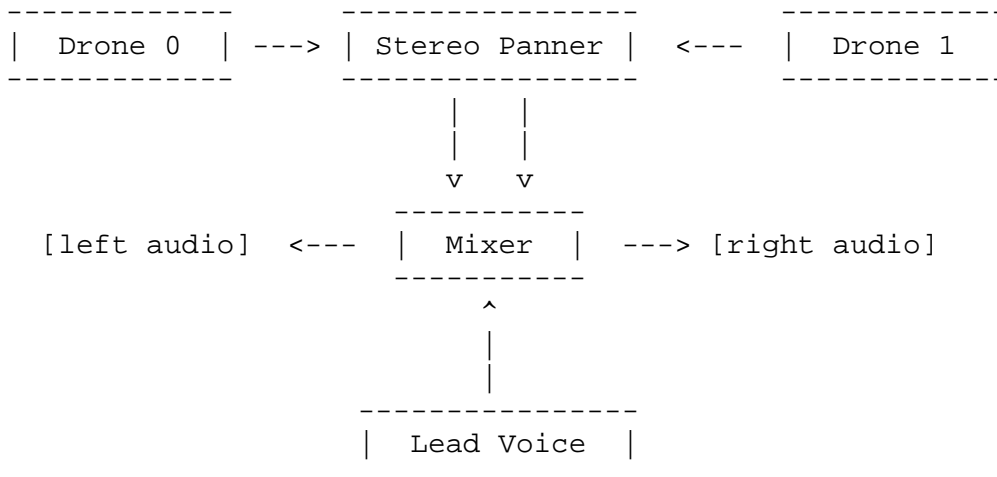


## Dronetic

A droning synth using massed quantum square wave oscillators.

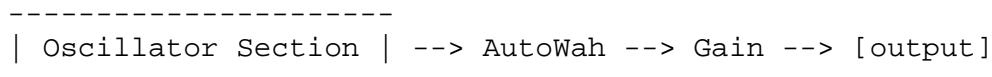
Includes many presets, for beautiful, spacey, or noisy drones, on top of which you can play your own melodies

### ==== Audio Flow Diagram for the Dronetic Synth ====

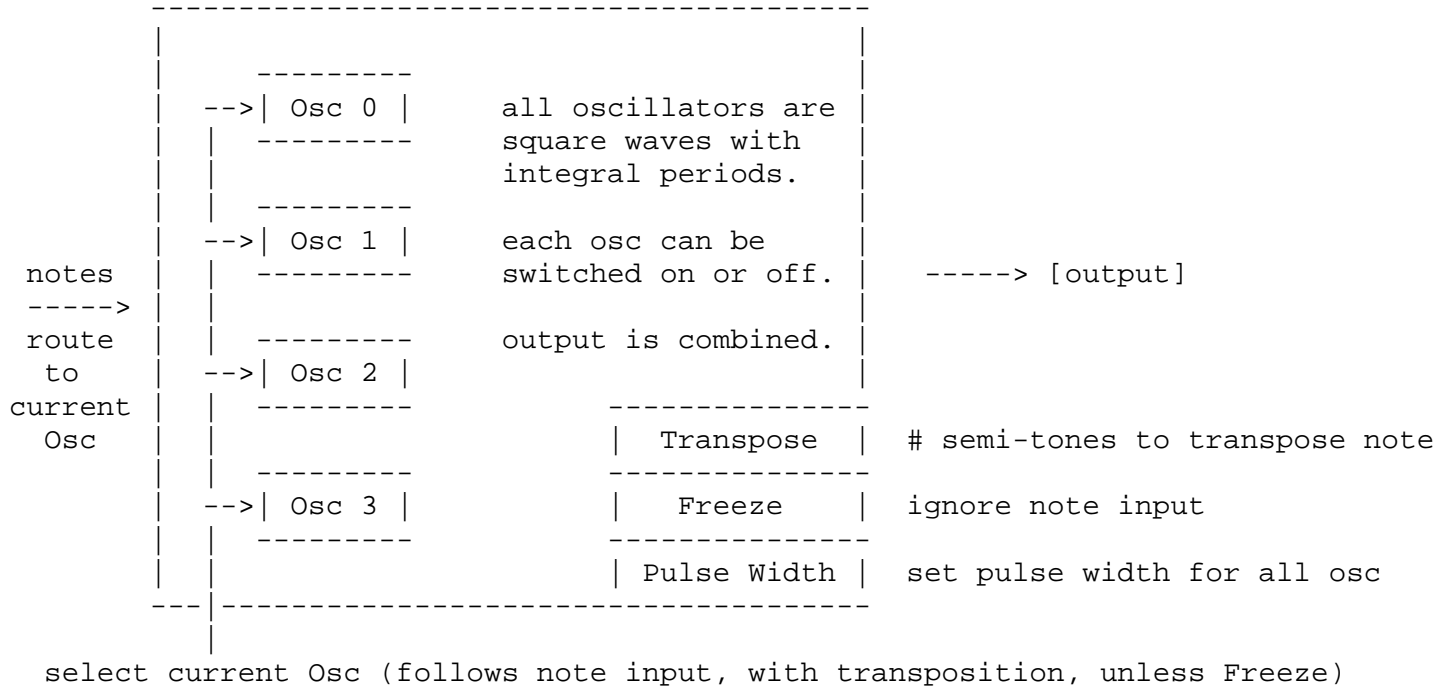


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### ==== Diagram of the Drone Voice ====

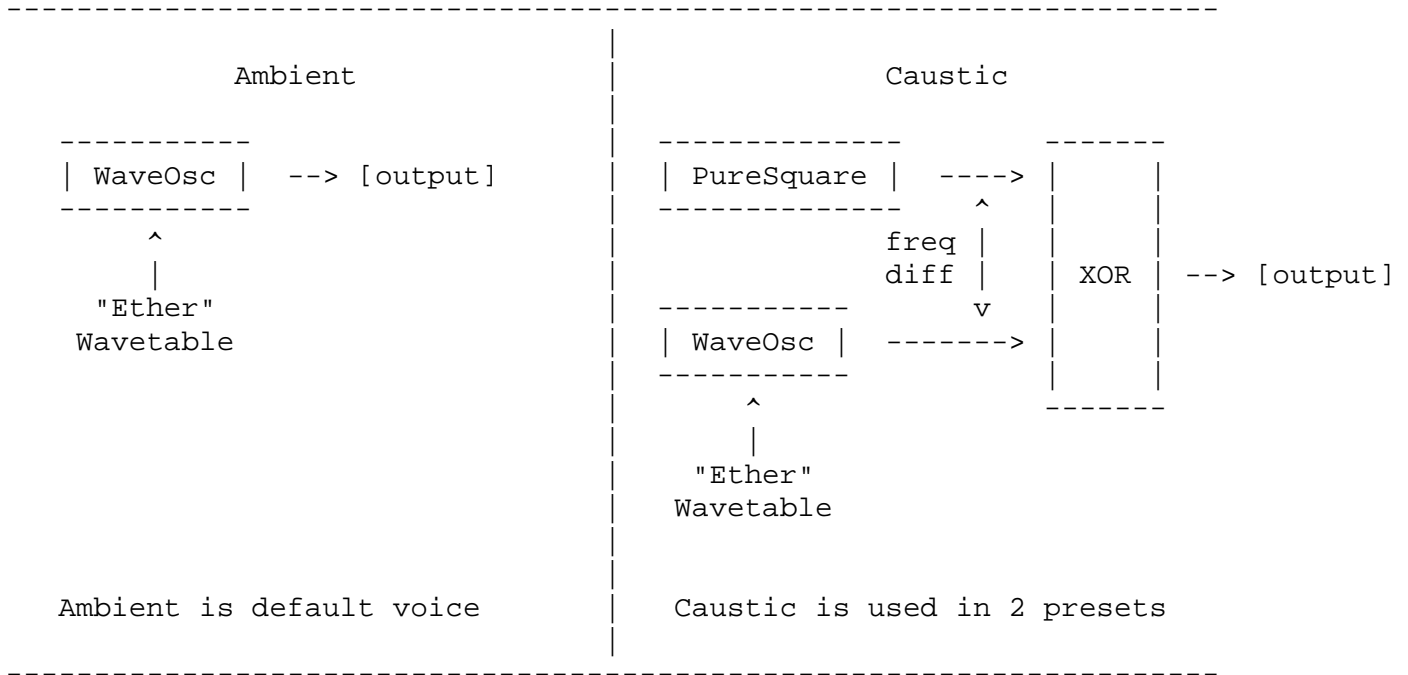


==== Diagram of the Drone Oscillator Section ====



#### ==== Diagram of the Lead Voice ====

Lead Voice comes in two varieties, Ambient and Caustic



#### Interaction between Lead Voice and Drones

When a note is played by the lead voice, that note is also routed to each drone. The drone will then either ignore the note (because Freeze is enabled -- see diagram for Drone Oscillator Section above) or it will play the note (transposed by the number of semi-tones specified by Transpose) using its currently selected oscillator.

Each preset pre-determines whether note input is frozen, and what the selected oscillator is for each drone. The value of Transpose can be changed via the onboard pots. See below for more details.

## How to use:

*Double-tap* the left button and the drone voices will begin.

*Double-tap* the left button again and the drone voices will stop.

So, *double-tapping* the left button toggles the drone voices on and off.

When the drone voices are off you can also start them by touching any keyboard key (which will also be played as a note in the lead voice).

Once the drone voices have started, notes that you play on the keyboard will control the lead voice (and perhaps the current osc in each drone).

To raise the lead voice by an octave, *tap* the right button once.

To lower the lead voice by an octave, *tap* the left button once.

Each LED can be in one of 3 states : OFF - ON - BLINKING

The LEDs indicate what parameters the pots control:

red LED	blue LED	top POT	bot POT
-----	-----	-----	-----
OFF	OFF	autowah 0 FREQ	autowah 0 DEPTH
ON	OFF	autowah 1 FREQ	autowah 1 DEPTH
BLINK	OFF	panning FREQ	panning DEPTH
OFF	ON	autowah 0 CUTOFF	autowah 1 CUTOFF
ON	ON	drone 0 PULSE WIDTH	drone 1 PULSE WIDTH
BLINK	ON	drone 0 TRANSPPOSE*	drone 1 TRANSPPOSE**
OFF	BLINK	lead ATTACK	lead DECAY
ON	BLINK	lead SUSTAIN	lead RELEASE
BLINK	BLINK	XOR FREQ DIFF***	lead PORTAMENTO

To bump the red LED state: *press* left button

To bump the blue LED state: *press* right button

So, by *pressing* the left and right buttons you can change what parameters are controlled by the pots.

\* current osc only, effective on presets: Eire, Oslo

\*\* current osc only, effective on presets: Borea, Crystal, Eire, Faroe, Oslo

\*\*\* effective on presets: Cerebus Riven

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## Guide to Dronetic's Presets

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Load presets by *double-tapping* the right button and then *pressing* any "white" key. Once a preset is loaded, the drone voices for that preset will begin to play.

The presets are as follows:

Key	Name	Performance Notes
---	----	-----
C	Borea	ambient. play in E minor / A
D	Crystal	ambient. play in D minor / Bb major
E	Eire	ambient. play in C major
A	Faroe	ambient. play in D major
G	Oslo	ambient. play in C major
A	Riven	caustic. hold notes then slide finger for pitch bend
B	Cerebus	caustic.

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## About Dronetic's Tuning

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When you start playing notes on the keyboard you will probably notice that the 'C' key plays an 'F'. And if you have a really good ear you may also notice that the interval between C# and G# is not exactly a 5th.

Why is this?

To explain the 2nd observation first, Dronetic uses Harmonic Tuning (also known as Just Temperament or "Helmholtz's scale") instead of the usual Equal Temperament (which is the system default).

Harmonic Tuning is actually more "natural" than Equal Temperament (which was created as a compromise so that keyboard instruments could play in all keys). In Harmonic Tuning the relative frequencies of all notes compared to the tonic ('C' in our case) are rational numbers:

Unison	1/1
Minor Second	25/24
Major Second	9/8
Minor Third	6/5
Major Third	5/4
Fourth	4/3
Diminish 5th	45/32
Fifth	3/2
Minor Sixth	8/5
Major Sixth	5/3
Minor Seventh	9/5
Major Seventh	15/8
Octave	2/1

Dronetic uses quantum square wave oscillators which can only be set to frequencies which have integral wavelengths. The frequencies produced by these oscillators conform more closely to a scale in Harmonic Tuning than one in Equal Temperament.

But why does the 'C' key play an 'F'?

The short answer is that on the ArduTouch, whose audio rate is ~15.6 kHz, 'F' (in octave 1) has a period of 360 samples. 360 is a number favored by the ancients because it is divisible by a large number of integers: 1, 2, 3, 4, 5, 6, 8, 9, 10, 12, 15, 18, 20, 24, etc. It so happens that by using a tonic frequency whose period is 360, we are able to use quantum oscillators to closely approximate the Harmonic Tuning scale over several octaves. Low 'F', so to speak, is the natural tonic frequency of the ArduTouch.\*

\*actually, on the ArduTouch a waveform with a period of 360 samples generates a tone with a frequency of 43.578 Hz. In the equal temperament scale, 'F' in octave 1 has a frequency of 43.654 Hz.

## Types of button presses:

*Tap:* quickly tap a button

*Press:* long-press a button

*Double-Tap:* quickly double-tap a button

