

MANGROVE

FORMANT OSCILLATOR WITH SPECTRAL BALANCE AND SUB-HARMONICS

MANGROVE holds the essence of instrument in the form of an oscillator. As the earth shakes under foot, a whistle blows on the wind; Sounds are defined not only by pitch but by spectra.

Inspired by the reedy tones of woodwind instruments and timbral definition of natural resonators. MANGROVE fits into your sonic landscape without dominating. Sculpt a harmonic outline with the BARREL and AIR, or flip into pitch division and melody folding with FORMANT.

OUTPUT

MANGROVE has two independent outputs accessed by the jacks in black rectangles. This dark background indicates outputs on all Mannequins modules.

SQUARE is a raw output affected only by pitch & frequency modulation. This is the most typical element of the MANGROVE and provides a constant modulation or synchronisation source.

FORMANT is a spectrally focussed wave-impulse output. It creates pulses based on all the settings of the MANGROVE and is the principal out.

AIR

AIR is necessary to make any sound - space is silent. Increase AIR flow to hear the output rise in volume, then blow out into odd-harmonic overtones.

AIR is a voltage controlled amplifier with a linked overdrive and subtle wavefolding circuit. Using the attenuverter (white on grey knob) control voltages can be applied to increase or decrease gain of the amplifier, while adding harmonics in the extreme.

The response is incredibly capable of audio rate amplitude modulation. Attach an envelope generator to the AIR input and your synth voice is complete, or use a subtle LFO for voltage controlled harmonic-content.

PITCH & FREQUENCY MODULATION

PITCH controls the frequency of the oscillator; the rate of repetition. Standard one-volt-per-octave input is available, abbreviated here as 'V/8'. The PITCH knob provides coarse frequency control, plus an additional octave via FINE.

FM INPUT allows linear through-zero frequency modulation from another audio source. This input is coupled to the FM INDEX, a voltage controlled multiplier for altering the amount of FM applied. When no FM INDEX is connected, 100% modulation occurs. Connecting a CV to FM INDEX stops modulation, increasing with higher voltages and inverting when negative.

SYNC resets the oscillation cycle for hard-sync.

FORMANT & BARREL

FORMANT & BARREL interact with one another to spectrally shape MANGROVE's output. FORMANT shifts from *contrabass* through *soprano*, sculpting the resonant peaks to emphasise the desired spectrum. BARREL provides control over harmonic density and the *weight* of a sound. Together these controls define an *impulse* that is clocked at the given PITCH.

Set BARREL to twelve o'clock for triangular shapes, and roll clockwise into a *ramp*. The character will intensify as even harmonics are filled in. With BARREL rotated counter-clockwise the wave-impulse becomes *sawtoothed*.

With BARREL here in 'utone' position, FORMANT takes on a new role, allowing the PITCH to be *divided*. Decrease FORMANT and the frequency will drop by an octave, then a fifth, then a fourth...

In this state BARREL & FORMANT are intimately linked. Any change will affect the other. This is a setting off point.

SWITCH: constants

The final and most radical piece of this puzzle. CONSTANT allows two entirely different ways of approaching MANGROVE.

constant wave is the traditional *waveform* approach. Forget all the mention of formants and impulses above, the panel controls simply define your waveform. PITCH stretches it up and down with frequency.

constant formant decorrelates the impulse from the frequency. This separation splits the pitch and spectra of the oscillator. FORMANT controls how big your instrument is, BARREL makes your trumpet a saxophone.

POWER CONSUMPTION

83mA @ +12V
76mA @ -12V

Shrouded power connector Red Stripe (-12V) to left when viewed from rear.

TRIMMING PROCEDURE

This new edition Mangrove has additional calibration points versus the original design.

There are 2 controls for volt-per-octave scaling "Pitch-v8" for the Square oscillator, and "Impulse-v8" for the Formant circuit.

Additionally there are 2 controls to calibrate the triangle-to-ramp circuit aka BARREL - essential for accurate pitch in PPM modes.

See our wiki for guided instructions:
whimsicalraps.com/pages/wiki

FREQUENCY MODULATION SPECTRA

While FM functions rather traditionally in *constant wave*, *constant formant* allows the spectra of FM to be dialed in.

Patch an FM source to the FM INPUT and note how the apparent depth of modulation is altered with the FORMANT control. High frequency modulators are most intense with a high FORMANT level.

MULTIPHONICS

Due to MANGROVE's analog implementation there is an area of uncertainty between pitch divisions.

Using *constant wave* mode, set BARREL full CCW and dial in the first division (1 octave down) with FORMANT. Now slowly increase BARREL to create a split tone of the fundamental and sub-octave.

MELODY FOLDING & TRANSPOSITION

Attach a melody CV source to PITCH. Set BARREL CCW for pitch division. As you decrease FORMANT into the pitch division range the sequence will be transposed down (*constant wave*) or folded down, highest notes first (*constant formant*).

SUGGESTIONS

Chaotic LFO: *constant wave* mode. PITCH, FORMANT & BARREL full CCW. AIR is LFO level, FINE controls speed, and BARREL controls chaos & waveshape.

SQUARE to AIR: Patch the SQUARE output to AIR input and adjust attenuverter for added odd harmonics. This is particularly buzzy when pitch dividing.

Cross-Modulation: Patch SQUARE to SYNC between two MANGROVES, then FM one from the FORMANT output of the other. Or, patch FORMANT out to PITCH between two for touchy chaotic SQUARE wave bursts.

PPM

Parts per million? Patch Programmable Mangrove! Grab hold of Mangrove's internals, complecting your very own oscillator. No longer is SQUARE a second-class citizen, inverting control & implicit heirarchy.

Two precision analog oscillators lie beneath, modulable forward, back or round the twist. SQUARE earns some geometric friends, while FORMANT is joined by it's angular brother in bass. A new palette ready for a gentle touch or sweeping brush.



CORE outputs

In the beginning there was only 2 - high and low. Now the SQUARE output is joined by other classic synthforms. SAW and SINE are moulded from the underlying triangle core oscillation. Subtler spectral imprints opening up a previously closed system. Entangling both oscillators, BARREL sweeps the pulses of the PWM output.

Through-zero modulation takes on far greater utility from SINE, while the sharper waveforms fascinate in self-patched stateful modulations.



INTERTWINED TRIGGER & modes

PPM has a three-position switch controlling the connection between CORE and IMPULSE oscillators. The classic setting is *impulse*, where SINE is normalled to TRIGGER, pulsing the FORMANT output.

If a signal is connected to TRIGGER, the SINE from CORE is overridden. The FORMANT output will create tones related to the frequency of the input signal. Or, set FORMANT very low and pulse TRIGGER with a clock for fast envelopes.

Beyond *impulse* mode, *sync* & *cycle* change the behaviour of the IMPULSE oscillator, causing it to cycle endlessly. Totally separate the two oscillators in *cycle*, where FORMANT controls the pitch of the IMPULSE oscillator and BARREL the waveshape. TRIGGER can be used to soft-sync that oscillator, only while the waveform is falling.

BARREL DETUNE When IMPULSE is in *cycle* mode, there is a small detuning effect as BARREL is swept. Two trim pots are pre-calibrated to minimize this effect, but expect some subtle pitch deviations when dynamically changing waveshape.

sync is identical to *cycle* except that the SINE to TRIGGER normal is still active, creating an inverted Mangrove sound - turning FORMANT clockwise now introduces overtones, versus the traditional undertones when counter-clockwise.

Keep in mind that the *constant* switch will link the CORE & IMPULSE pitch when in *constant wave*. Use this when you want IMPULSE to be offset from the CORE base pitch & FM, or *constant formant* to totally isolate the two circuits.



IMPULSE to-air

Beauty in simplicity. Injecting an additional signal into the AIR circuit along with the IMPULSE oscillator's output. Striking AIR's overblown distortion with greater excitation gives rise to all kinds of intermodulation and clipping anomalies. Detuned or unrelated sources touch on the musical edge of ring modulation.

Dial back the AIR control and feel warm in the gentle saturation. Self-patch a CORE output here and articulate classic thick leads and harmonies. An envelope here works wonders at plucking the non-linearity, creating a sharp accent without relying on volume modulation.



IMPULSE hollow

Affected by the FORMANT/BARREL/AIR trinity, HOLLOW introduces divided pulse waveforms. A tri-state of PWM and sub-octave edges, HOLLOW follows the FORMANT output's motion. The high and low of PWM matching FORMANT's rise and fall, resting on the ground between pulses.

These odd-harmonic rich sounds form the bass clarinet you never thought to imagine. Ideal for layering beneath FORMANT, or filling a room with deep clicks and rumbles.

Pushing air into HOLLOW opens to the full dynamic & harmonic range, while lower settings subtly roll-off high-frequencies as the volume fades away.

TO AIR has no effect here, letting the raw waves sing. Meanwhile, patching HOLLOW into TO AIR will create a dense unfolding of overtones at the FORMANT output.

ALWAYS LEARNING In addition to these scrolling articulations we also make Technical Maps for the circuit curious & technophile amongst you.

whimsicalraps.com/pages/wiki

REMOVING PPM

If you need to save the additional 2hp, the PPM expander can be removed by pulling the two pieces apart horizontally. Keeping the faceplates in the same plane.

You'll notice the header at the top of the main Mangrove module with two yellow jumpers installed. Move these to the top to positions, maintaining the vertical orientation.

Mangrove is a great oscillator in it's own right! No need to get lost in the spaghetti all the time.

JUMPING OFF

Self-patching with PPM can be incredibly rewarding, though tricky to always stay in control of what's happening! A few patches for your first steps into the dense possibilities:

OVER/UNDER

Patch PWM to BARREL in *cycle* mode. Listen to FORMANT output. As you rotate the FORMANT control you will hear overtones when turning up, and undertones when falling down.

QUADRICYCLE

Patch HOLLOW to PITCH in constant formant & *cycle*, and turn FORMANT to the minimum. Listen to SINE output, and hear it *cycle* through 4 separate tones. Balance high/low tones with BARREL and pitch-spread with AIR

GET COMPLEX

Patch FORMANT to FM-INPUT in constant formant and *cycle*. Listen to SINE. Create those classic belltone through-zero FM sounds.

DETUNE PARTY

Patch SINE or SAW into TO AIR, and listen to FORMANT. Use constant wave and *cycle* modes. Set AIR to around half way and dial in unison with FORMANT. You'll get a timbral beating between the oscillators, animated with BARREL.

WAVESHAPER

The IMPULSE oscillator is totally independent in constant formant, and with a source patched to TRIGGER. Use another oscillator to drive in *impulse* mode, letting Mangrove define a new spectral zone. The CORE oscillator is free to be used independently. Try driving from another Mangrove's FORMANT for stacked-down undertones.

ERRATA

With some power supplies, the IMPULSE oscillator can fail to start if set to *CYCLE* mode when turned on. Just flip the PPM mode switch up then back down to get it moving.