

# Kosmonaut

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version 1.0

## Version history

1.0    February 24, 2018    Initial publication

## Space Exploration

Kosmonaut is an effect plugin which combines a number of different classic mechanisms to add spatial qualities to a dry sound signal.

The plugin comes in Audio Unit (AUv3) format, so it will require a host app compatible with AU effect plugins to run. There is no standalone effect mode.

Kosmonaut is compatible with any iOS device running iOS 10 or higher.

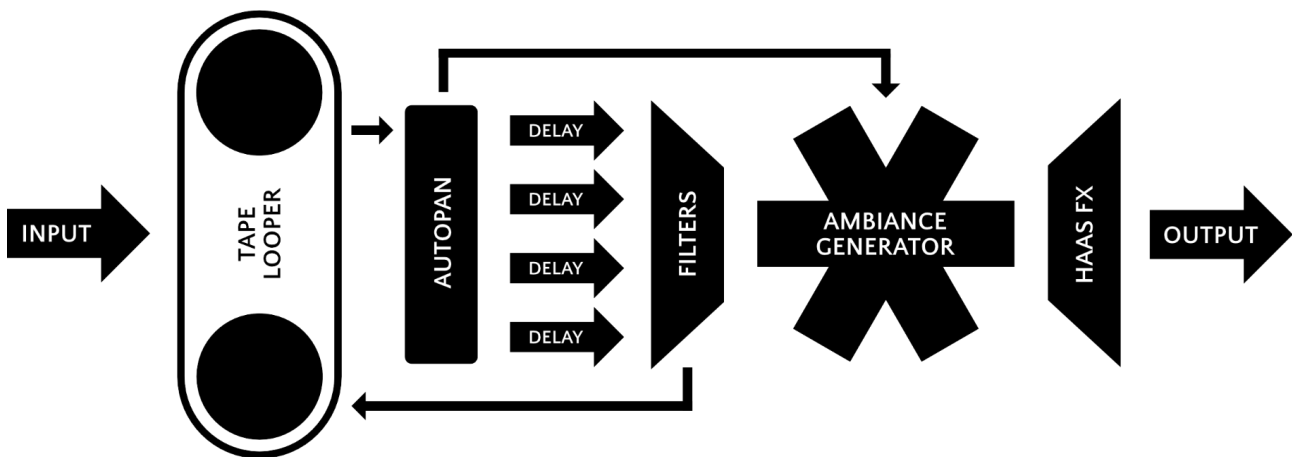
## Default Settings

Kosmonaut's default settings are set to 'neutral': no effect. So you'll have to adjust settings before you can hear the effect in action. This is the same as the '*Init*' preset in the Factory preset list. Choose this preset if you want to reset the plugin to its neutral state.

**Note:** double-tapping any knob will reset it to its default (neutral or center) state.



## Schematic Signal path



## Tape Loop

### Input Level

The input signal can be boosted or attenuated using the input level knob. Soft saturation is applied to the signal. This is a non-linear saturation algorithm that will result in nice and warm signal distortion when the signal strength approaches clipping level. This lets you use a pretty hot signal without resulting in nasty digital clipping.

### Tape Length

This lets you define the maximum length/duration of the delay line. It is measured in beats - so it will automatically adjust itself according to the current tempo. The maximum duration is 8 beats (which equals 2 measures when using a 4/4 time signature)

The tape length is important when using the plugin as a sound-on-sound looper as it will determine at what point the recording will loop. It also sets the maximum possible delay of the Multitap Delay effect.

## Sound On Sound

Kosmonaut has some basic looper functionality on board. By raising the Sound-On-Sound level, part of the previously recorded audio will remain on the tape while new audio is being recorded, rather than being completely overwritten.

When the knob is set to maximum level ('looper' mode is enabled) all existing audio will remain on the tape and any new audio will be recorded on top. Note that this may lead to distortion when too much sound is cumulatively recorded and the tape runs out of headroom. It is therefore recommended to leave the SoS knob slightly under its maximum setting - letting the recorded audio decay a little bit with every loop of the tape.

Especially when looper mode is combined with Delay Feedback the audio will get louder with every pass, leading to overdriven sound levels at some point. Use this particular combination of settings with caution!

**Caution:** when combining high Sound-on-Sound levels with Multitap Delay Feedback, it is possible to cause a runaway loudness increase of your signal. Use these two features together with caution!

## Multitap Delay

The Multitap Delay is a delay effect that comprises 4 separate delay effects placed in series. This means that each subsequent delay processor can pick up the feedback of the previous delay, allowing complex delay loops and feedback effects.

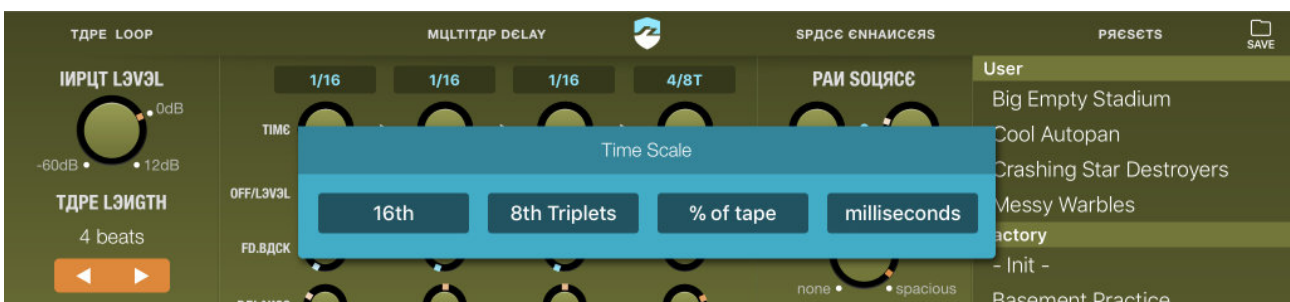
The maximum delay time of each delay tap is determined by the length of the Tape Loop. If the Tape Loop is shorter than the time set for the delay tap, the tape read head is placed outside of the tape loop and the delay tap will be silent until you increase the length of the Tape Loop.

**Note:** the Tape Length parameter determines the maximum effective delay time. If a delay time is set beyond the current tape length its read head will only pick up silence.

Each delay has 5 parameters for its setup.

### Time Unit (tap the time display label to change)

There are four different ways to specify the delay time: 16th note steps, 8th triplet steps, milliseconds, percentage of tape loop length. All except the milliseconds, which is an absolute time, are relative to the current tempo.



**Time (delay time)**

Sets the delay time of the delay tap. If the specified delay time is longer than the current tape loop length, the play head will be outside the active tape and the delay will remain silent until the delay time (or the tape length) are adjusted.

**Off/Level**

This determines the strength of the delay effect of this delay tap. When completely turned to the left (0) the delay tap is disabled. The blue LED next to the level knob will be active or off respectively to indicate the status of the delay tap.

**Feedback**

The feedback level specifies how much of the delayed signal will be written back to the tape. If feedback is set to 0 (no feedback) then each echo will sound only once and will then disappear. If there is feedback then each echo will repeat (fainter with each pass) until it has died off completely.

**Caution:** because the delay taps are placed in series they can pick up each other's feedback. Watch out for runaway feedback loops when using high feedback levels in subsequent delay taps.

**Balance**

Sets the pan levels for this delay tap.

## Delay filters

**Lowpass**

This is a typical 6dB/Oct lowpass filter which will remove high frequencies from each subsequent delay echo - i.e. making the sound more muffled with each pass. If there is no delay feedback only the first echo will be affected.

**Highpass**

This will remove low frequencies from the delayed signal, making the echos increasingly brighter, 'airy'. This is also a 6dB/Oct filter.

When both the lowpass and highpass filter are active simultaneously, the effect will resemble a bandpass filter.

**Filter LFO**

This feature lets both filters open and close coupled to a low frequency oscillator wave (LFO). The higher the knob's setting the faster the filters will oscillate. If the knob is set to 0, the LFO is off and the filter settings will be static.

Using the filter LFO you can make the delay effect sound more dynamic and 'alive' by making it change all the time. When using high LFO rates the effect becomes more like an artificial special effect.

## Pan Source (Autopan)

The autopanner takes the signal coming from the input and the tape, combines them (using the current sound-on-sound levels) and applies a realtime pan/balance setting using the current Pan Source settings. The panned signal will not be written back to tape, so the pan settings will be different with each pass of the tape loop - constantly swaying across the stereo field.

### Rate

The rate setting determines the speed at which the signal is panned. Low settings are slow (each pass will take several seconds), high settings are fast (up to several passes per second).

### Off/Width

The width of the effect specifies how far from the center the balance will sway. For subtle fluctuations around the centerpoint, use low settings. For extreme pan-swings, use high width settings. When set to 0, the effect will be switched off.

## Ambiance

The ambience generator is based on an algorithmic reverb (the algorithm is known as “Datorro’s Figure-Of-Eight”). The Ambiance knob simultaneously adjusts a dozen parameters of the reverb algorithm in a complex non-linear way, resulting in a simulation of space ranging from subtle and compact to a clear wide-open space.

## Haas Processor

The ‘Haas Effect’ (the correct scientific term is Wavefront Precedence Effect) uses a tuned delay mechanism to trick the listener’s ears into thinking that a sound source is closer to one ear than the other. It gives predominantly-monophonic sound the appearance of coming from a massively wide source.

The usual implementation of the Haas effect can have a detrimental effect on stereo tracks when forced out of a monophonic output due to signal cancellation. Kosmonaut’s implementation avoids this unwanted effect by placing a ‘mono-safe’ signal buffer in the center of the stereo field. This buffer will counteract most of the signal cancellation and undesired comb-filtering.

### Haas Effect L/R knob

This knob sets the strength of the Haas effect, and lets you choose a left or a right channel bias for the sound. When centered the Haas effect is inaudible/off.

### Thickness

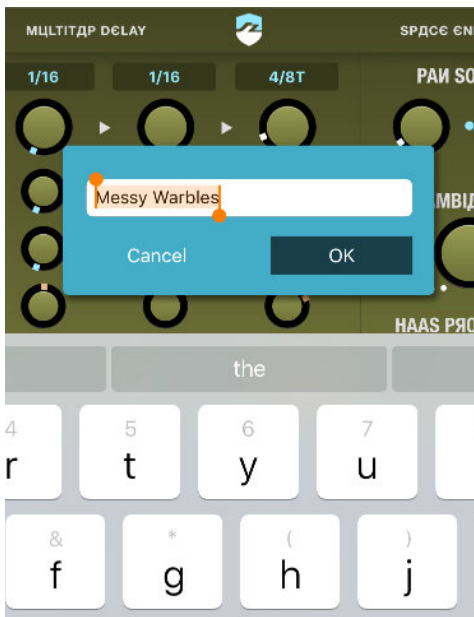
This is an additional effect which adds to the mass of the effected signal. It resembles a chorus and can be active even when the Haas level is minimal/centered.

**Note:** the Thickness parameter can also be used when the Effect L/R knob is in its neutral, inactive state. It will then resemble a typical chorus effect.

## RANDOM Button

Tapping the random button will randomize all settings. No safety features are built in to avoid runaway feedback loops (because they are mathematically very difficult to predict and also depend on the input signal). So there is a tiny chance that these may occur; although the chance is small, watch out for this.

## Preset Management



### Saving a user preset

To add the current settings to the list of user presets, hit the “SAVE” button in the top-right corner of the plugin window. You can then choose a new name for your preset.



### Deleting a user preset

If you want to delete a previously saved user-preset, simply look it up in the preset list and swipe it to the left (like in most other iOS apps that present lists of documents).

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