Introduction

Welcome to ZRev. ZRev is the mother of non-convolution digital reverbs. Think of it as a tool to hand-tune delay coefficients in various types of feedback delay networks and allpass delay networks. ZRev was only made available under the premise that certain parameter meanings, units, and connection diagrams are not disclosed.

When asked for more information about ZRev Urs said, "*Before tweaking any knob on Zrev one should use google on the following search terms: comb allpass filter, feedback delay network, jot householder matrix, and finally schroeder moorer reverb*". How each of these terms actually apply to ZRev and exactly how they are implemented has not been disclosed. The idea for ZRev is similar to the SETI@home project. If many people try different delay coefficients then eventually someone will stumble onto a nice sounding set. In general, the ratio of the delay times for each delay/allpass node is crucial to the sound of a reverb. Some argue prime numbers or other special ratios work best. Unfortunately for now it seems the only real proven solution is to try a set and listen, then repeat.

If you think you've found a set of T0-T7 and AP0-AP7 that produces **almost no metallic ringing** then please send them via e-mail to anybody [at] u-he [dot] com. It's likely your settings will make it into a new optimized reverb model for Zebra2 and Zebrify!

Overview

The high-level design of ZRev contains 5 basic elements as shown below:

The center screen is identical to that of Zebra2, Zebrify, or Zebralette. It simply displays the name and value of a parameter when adjusted.

Section 1: Feedback Delay Units

The left-hand section of the display is used to interact with ZRev's feedback delay network (FDN).

T0 through T7 control the delay times for each of the 8 delay units. The resolution of the time unit is unspecified. Depending on the Mode selected these knobs can either

drastically alter the sound to doing almost nothing. The relative setting of the time knobs determine the quality of the room. The more irregular these are set, the better.

Size adjusts the "room size" for the FDN. Smaller values seem to produce high-pitched shorter sounds while larger values tend to emit longer, lower sounds.

Diff is the diffusion amount present in the FDN. A value of 0 seems to disengage the FDN and a value of 100 seems to produce endless feedback.

Damp works similar to a low-pass filter for the FDN. A value of 0 is similar to bypassing the filter while a value of 100 blocks considerable amount of the higher-frequencies.

Section 2: Allpass Filters

The right-hand section of the display is used to interact with ZRev's allpass filters. ZRev has two cascades of nested allpass filters with feedback adjustable for each of the cascades.

AP0 through AP7 control the comb filter delay times for each of the 8 allpass filters. The resolution of the time unit is unspecified. Depending on the Mode selected these knobs can either drastically alter the sound to doing almost nothing. The relative setting of the time knobs determine the quality of the room. The more irregular these are set, the better.

AP Size adjusts the "room size" for the allpass filters. Much like the FDN Size knob smaller values produce shorter, higher pitched sounds and larger values produce longer, lower pitched sounds.

Col1 and Col2 adjust the diffusion level for the allpass filters. Since the allpass filters have two cascading levels it's possible these knobs adjust the feedback for each level.

Section 3: The Mixers

The top section provides controls for ZRev's outgoing mix.

Dry is the volume level for the original, unprocessed, input sound.

Wet is the volume level for the reverberation generated by ZRev.

This leaves the mysterious knob Emt Mix. This sets the volume level for a secondary audio path within Zrev. When the knob Wet is set to 0, Emt Mix does nothing in all 8 of the Modes. Furthermore, when Emt Mix is set to 0 knobs on the right hand side seem to do nothing, implying a link between the allpass filter network and Emt Mix.

Section 4: The LFOs

The bottom-middle of ZRev is reserved for controls to adjust 2 LFOs. What the LFOs are modulating is unknown. Depending on the mode these knobs can have subtle to drastic changes to the overall reverb.

Speed sets the LFO speed for the delay network LFO and Depth sets the modulation amount applied to the modulation targets within the FDN.

AP Speed and AP Depth work in the same manner as Speed and Depth except for the allpass filter network.

Section 5: ZRev's Mode

The small pulldown in the center of ZRev selects one of 8 Modes. It's likely FDN refers to the delay network AP refers to the allpass filter network in these different modes. It's also likely each mode has different feedback routings too. The numbers such as "4" and "8" placed at the end of certain networks likely mean the number of FDNs and allpass filters used in this particular mode. Nothing is known as to what "Par" and "Ring" means in this context.

It's possible certain modes do not use all the knobs. For example, in mode "FDN4 – AP" knobs T4 through T7 do not seem to change the sound.