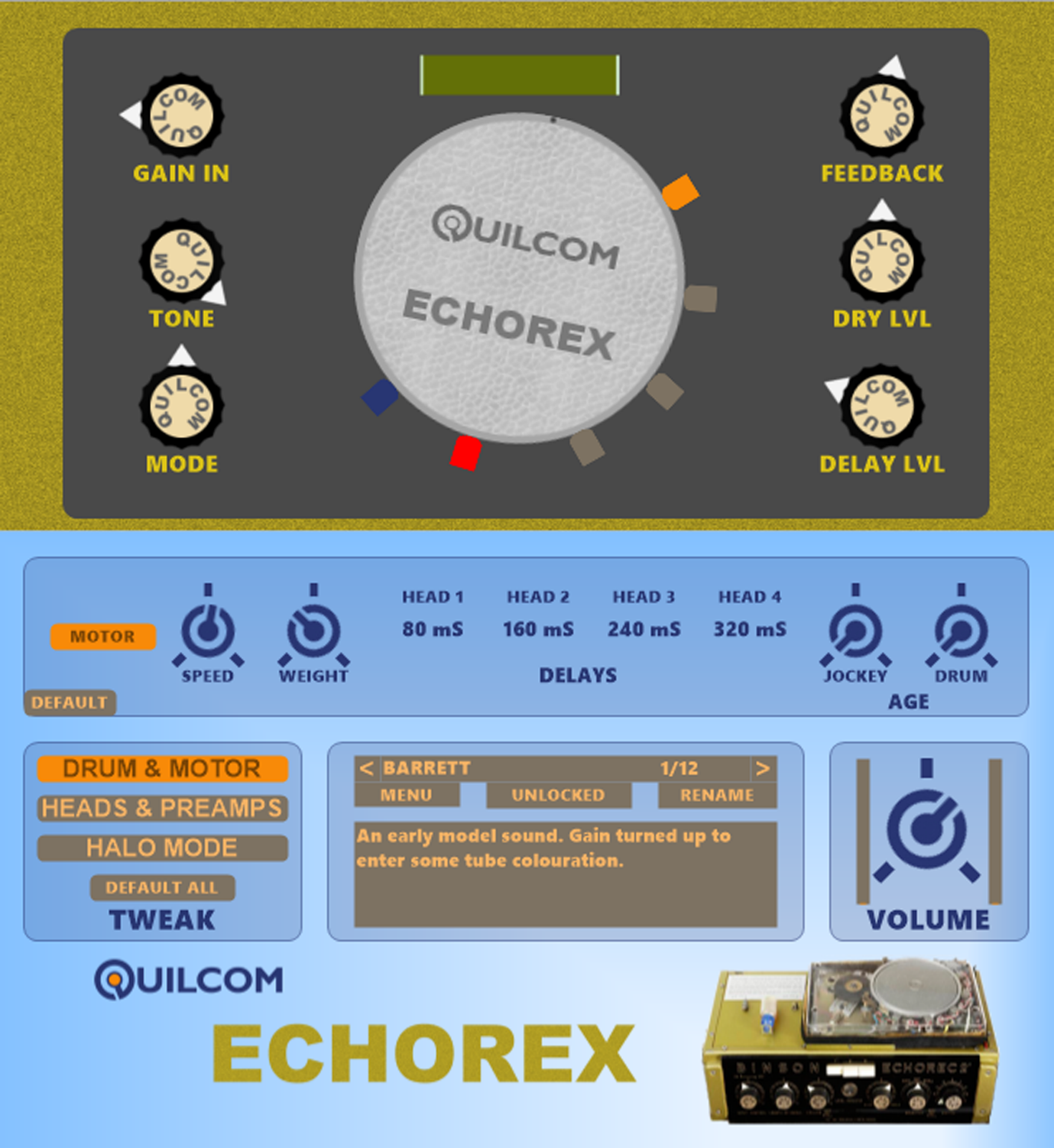
**Quilcom ECHOREX**



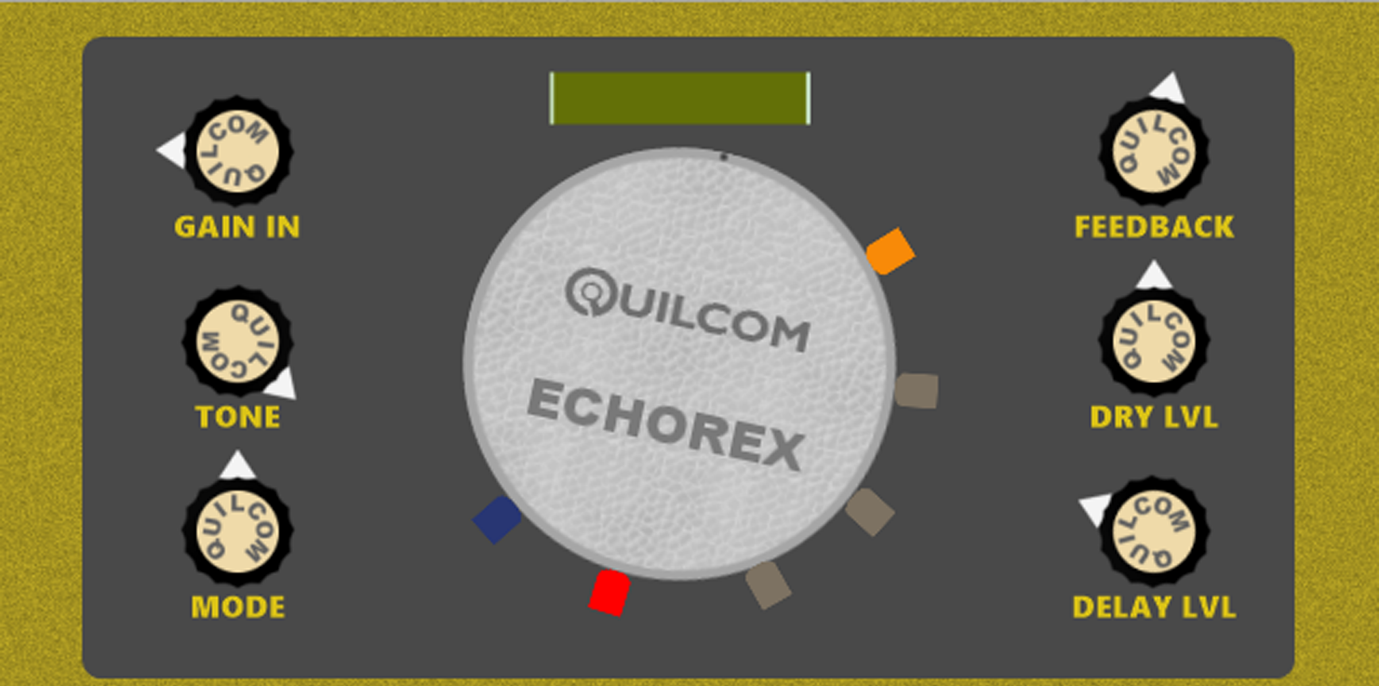
**Design**

Someone suggested I make a plugin like a Binson Echorec, as used in the early years of Pink Floyd and others. I discovered there were many different models with varying capabilities and configurations, so I decided to try and capture something of the spirit and sound of these wonderful echo machines, rather than choose a particular model to simulate.

The distinguishing feature of all the original Binsons was the rotating drum, used instead of a tape loop. Tape was prone to wearing out quickly and needed to be spliced, which was a point of sonic and mechanical weakness. The Binson drum was wound with fine magnetisable stainless steel recording wire and several tape heads were held with light pressure against the wire surface. To reduce wear on the heads and wire, the drum had to be lubricated with light oil and, with proper maintenance, the machine would stay in good functional condition for many years.

If you’re interested to find out more about these remarkable and finely engineered machines, take a look in the *Background info* folder included with the download.

**Top panel**



I chose to try to pay homage to the look of the classic ECHOREC 2 for this panel. I’m not good at GUI design!

**GAIN IN:** This control can be used to drive the “preamp” harder to move the signal into the saturation region.

**TONE:** This simulates the tone control on the originals, and thus affects the dry and wet levels. Reducing the knob setting reduces the treble of both.

**MODE:** There are 3 modes available which are **ECHO**, **REPEAT** and **HALO**. **ECHO** gives a single repeat, **REPEAT** allows **FEEDBACK** and **HALO** is a special mode which I believe is unique to these machines. When **HALO** is selected, the outputs from *all* the head preamps is mixed in with the wet output signal, at a reduced level. This mix is independent of the heads selected for playback and is best heard when fewer than 4 heads are turned on.

Note that I used the name **HALO** rather than “SWELL”, since I think this was a mistranslation from Italian to English. Halo is the same word in both languages and appears on the Italian models and in the schematics. I think the term Halo better describes the effect.

**FEEDBACK:** the knob will display a % readout, but this only relates to the knob’s *position*. Feedback is only active when the **MODE** knob is on **REPEAT** or **HALO**. It was very popular to turn up this knob (*also* called “SWELL” on the originals) to get self-oscillation for psychedelic effects. The self-oscillation level will not keep increasing indefinitely due to the saturation system incorporated.

**DRY LVL:** This adjusts the dry level sent to the output. The source of this signal is from the *output* of the preamp DSP, as in the originals.

**DELAY LVL:** This adjusts the level of the delay system.

Note that if you want to use the plugin as a send effect, you can turn down the **DRY LVL** knob to minimum.

**MAGIC EYE:** This displays a closing curtain based on the *internal* level of the dry and wet signals. When the curtain is closed and overlapping, the saturation effect will start to come into play. The output volume and level control settings don’t affect the display, like in the originals. I believe the original magic eye was more eye-candy than actually doing something useful!

**Tape heads**



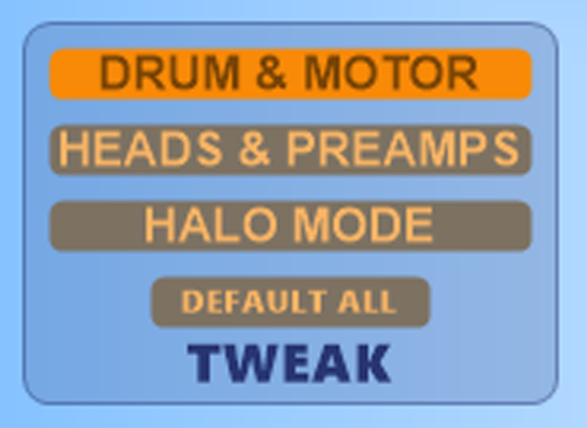
The heads can be turned on and off by clicking on them.

BLUE is the erase head. Normally this is left ON. If you turn it OFF, the sound will repeat at the rotation speed and die away in volume and treble. This repeating is not affected by the **FEEDBACK** setting, so even when **FEEDBACK** is fully down there will be a slow and dying longer repeat. To hear this, at least one playback head must be turned ON.

RED is the record head. This must be turned ON to enter a sound into the delay’s input. It can be turned OFF to quickly cancel self-oscillation, or automated to add repeats on demand. Like all the selection systems, this is click-free.

ORANGE heads are for playback. Different combinations can be used for interesting rhythmic repeat effects, with or without **FEEDBACK**.

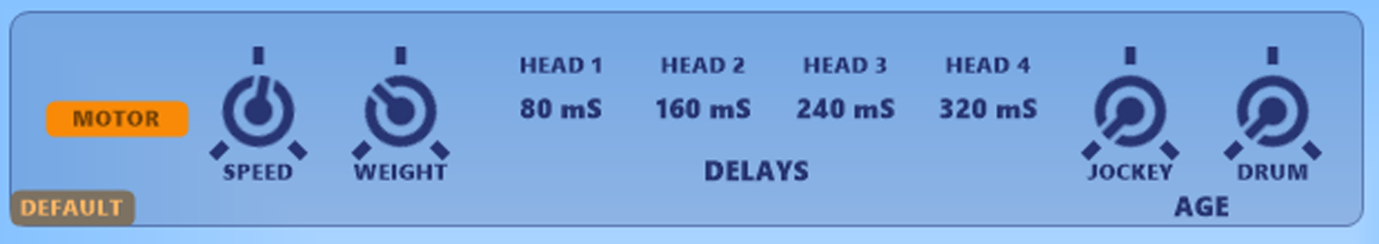
**TWEAK**



There are 3 panels for tweaking various parameters, as per the labelled selector buttons.

The **DEFAULT ALL** button sets *all* the controls on *all 3* panels to their default settings.

**DRUM & MOTOR**



**DEFAULT** sets all the controls on this panel to their default settings.

**MOTOR** turns the drum “motor” on and off. If there is sound present in the delay system and the **MOTOR** is turned OFF, the pitch will drop as the drum slows to a halt. Starting it again *very soon* will create a chirp sound to simulate speeding up a slowed-down recording.

**SPEED** adjusts the rpm of the virtual drum, and this will affect the delay times from the 4 fixed playback heads which are displayed in the **DELAYS** section. Many early machines were modified with dc motors to get variable speed.

**WEIGHT** controls the virtual weight, and thus inertia, of the drum. Early models had very heavy drums which were later replaced with lighter ones. The **WEIGHT** setting affects the rate at which a changed speed will reach its target setting. For a longer motor-stop effect, set a high **WEIGHT**.

**AGE**

Several YouTube videos feature machines which are in poor condition, being several decades old and not properly maintained or reconditioned. In some cases, the quality of sound was pretty dreadful! However, some people seemed to warm to this degradation, so I’ve provided 2 controls to simulate tired old units.

**JOCKEY** simulates cyclic slip of the driving jockey wheel which leads to wow on the delayed signal. Increasing the adjustment makes the effect more apparent. The rpm of the drum will have an influence of course.

**DRUM** simulates a poor drum surface condition and creates a cyclic modulation of amplitude and high frequency response.

For best results, both of these knobs should be left at zero. To audition the effects, listen to decaying repeats.

**HEADS & PREAMPS**



**HEADS:** The earliest machines had tape heads with a larger gap than ideal. Later on, Photovox heads were used which had a better high frequency response.

The most recent machines had Photovox “Brass” heads which could play back up to 20kHz (assuming the drum and the record heads were perfect).

The selector showing **OLDEST** allows you to choose the head type.

Playback tape heads have a frequency response which increases at +6dB/octave until the gap size limits the upper frequencies. This means the record and playback amplifiers had to be equalised to get something approaching an overall flat frequency response. This is never ideal, especially with the use of passive R-C filter networks which would also be prone to component tolerances and ageing effects. For these reasons no two machines would sound exactly the same, more so as they aged.

I’ve provided 4 controls for shaping the record-playback spectrum:

**LOW CUT** *reduces* the low frequency content.

**HI CUT** *reduces* the high frequency content.

**MID BOOST** enables you to *increase* the mid-range.

**FREQ** adjusts the frequency range used for the **MID BOOST.** The readout is a ratio rather than an actual frequency, because internally the 4 tape head preamps have slightly different values to simulate component tolerance effects.

**NOISE:** A tape head produces a very weak signal, so the head preamps have to have a very high gain. Valves, and in later models transistors, produce noise. The **NOISE** knob sets the level of amplifier noise. In the originals, the preamps’ outputs are switched rather than the heads. This means that the more heads turned ON, the more noise will be heard.

I’ve heard many comments that this noise adds “warmth” to the sound, and typifies these types of machines. At least you can set the level and have no noise if you want!

If you set the **NOISE** high, you can use it to bring in self-oscillation with high **FEEDBACK** levels, and this was quite popular for creating a range of psychedelic sounds, especially when manipulating the motor speed (only available on units which could control motor speed).

The early units used valves (tubes) throughout, but Binson eventually changed over to transistors. These two types of amplification have different transfer curves and clipping behaviour. Valves have a soft saturation over their nearly linear range and at high input level the saturation turns into soft clipping. Transistors are more linear, but clipping is harsher (but not as harsh as digital clipping). This is a generalisation of course, because a lot will depend on design factors and ageing.

I’ve provided two characteristics, one for **VALVE** which can be changed to **TRANSISTOR**. The **DISTORT** knob adjusts the balance between no distortion and full. This is best listened to with a high signal level, since at low levels there’s little difference.

**MAX FEEDBACK** simply adds to the **FEEDBACK** knob’s value and allows fine adjustment of where self-oscillation starts. This adjustment is available on the originals as a preset pot.

The plugin internally is stereo at all times, but the input can be switched between **MONO IN** and **STEREO IN**. With the **SLIP** knob set at zero, processing for the input is identical for left and right. Binson made one stereo unit which was actually just two identical ECHORECs in one box. So, I provided the **SLIP** knob which slightly varies the speed between the 2 channels. This creates a nice rich stereo field from a mono or stereo input. Increasing the **SLIP** setting will increase the speed on one channel and decrease it on the other channel by the same amount. This preserves the overall *average* delay time.

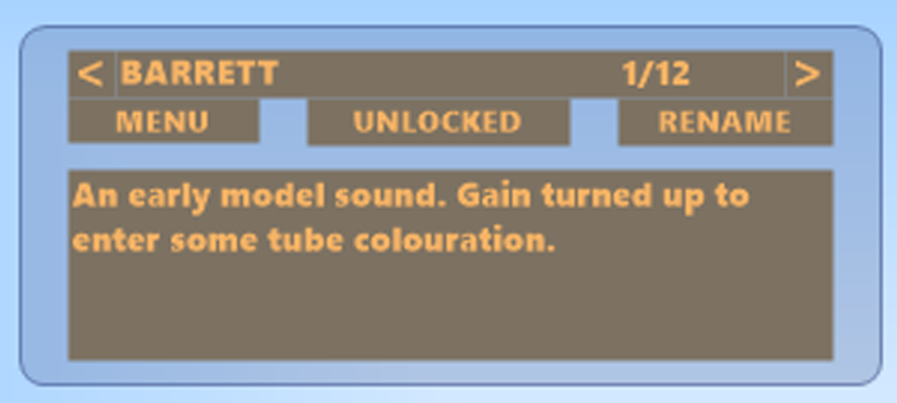
**HALO MODE**



As mentioned before, **HALO MODE** is, I believe, unique to these machines. A reduced amount of signal from all 4 heads is added to the wet *output* signal. Some models allowed you to set the amount of each head’s signals added together by tweaking preset pots. These levels are adjustable using the **HEAD 1** to **HEAD 4** knobs. The default level is 0.5 of the full head level which I’ve estimated from the schematics. Each **HEAD** level knob goes from 0 to 1 times the default value. The **ALL** knob adjusts this *mix* from 0 to 2 times.

In the originals, the **HALO** mix was never fed into the feedback loop, but you can do this with the **TO FBK** knob. I’m surprised this was lacking, since it can make the **HALO** mode even more interesting and richer. Note that you may need to adjust the top panel’s **FEEDBACK** knob with higher **TO FBK** levels.

**Preset manager**



I’ve provided a few presets to demo some variations. These could be useful as starting points for you to adapt according to the input signal etc.

At the top of the preset manager is the section where you select the preset by clicking on the preset name or paging though them using the arrow buttons. The synth is silenced and reset when a preset is changed.

The **MENU** selector is where you operate on presets and banks. You can save, load, copy or paste presets, or save and load a bank from this menu.

All changes made to any settings will be stored with the DAW song file unless the switch **UNLOCKED** is changed to **LOCKED**. This locking feature is to avoid losing settings if you just want to mess with editing but want to keep the original default parameters.

The **RENAME** button allows you to name or rename a preset, providing the preset manager is **UNLOCKED**. Otherwise, the **RENAME** button is dimmed.

At the bottom is a free text area for adding comments to the preset. These comments are saved with the song, and the preset if you save it, providing the preset manager is **UNLOCKED**. Please be aware that you shouldn’t use a carriage return (Enter) in this text because the system won’t store any text after that. Also please be aware that when you **RENAME** a preset this text will clear, so if you want to keep it and just rename the preset, highlight the text, copy it then paste back in after you’ve renamed.

**VOLUME**



The output **VOLUME** knob has 2 bar meters which indicate average peak values. If the signal goes outside +/-1 even very briefly, the inner circle will turn red for 1 second to indicate clipping. If you need accuracy or a different type of level indication, please rely on your DAW’s meter system.

In this plugin it’s best to reduce the volume, for high levels, by using the **DRY LVL** and **DELAY LVL** knobs.