Flint Reverb Summary Paper – Three Classic Reverb Types

The magical combination of tremolo and reverb is the earliest example of a perfect guitar effects marriage. Our new Flint Tremolo & Reverb pedal delivers three classic tremolo circuits, along with three completely unique and complimentary reverb types.

You get the classic ’60s Spring Tank Reverb, the inventive ’70s Electronic Plate Reverb, and the nostalgic ’80s Hall Rack Reverb. Pete Celi, our Lead DSP Engineer and Sound Designer illustrates the research and sound design process that went into creating our reverbs in Flint.

Flint Reverb Summary Paper – Three Classic Reverb Types

The ’60s Combo Amp Spring Tank

The full-size 2-spring tank was commonly used in vintage amps, and it continues its popularity today for its classic tones. The 2-spring tank uses spring segments of differing delay times (a function of the mass and tension of the spring), which adds to the complexity of the sound and smooths out the time and frequency response of the reverb. Contributing greatly to the sound are the input (driving) and output (recovery) tube circuits. These circuits are designed to reduce low-end boominess and to minimize coupling of the low-frequency cabinet resonance into the tank. The high frequencies roll off naturally due to the limits of the spring’s ability to transmit the shorter wavelengths of the higher frequencies.

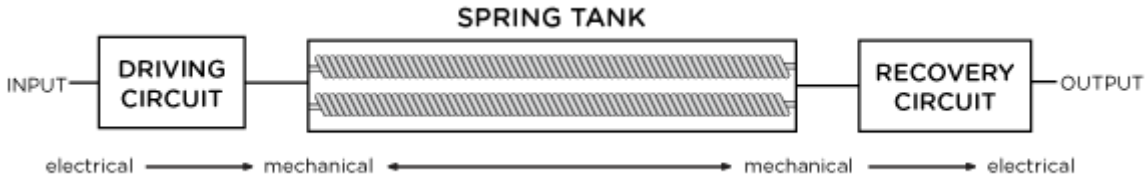

FIG. 1 SPRING TANK REVERB

The signal from the driving circuit drives a coil which in turn produces a fluctuating magnetic field that moves a magnet attached to the spring. This results in a twisting wave that travels down the spring. The time it takes for the wave to travel down the spring is a function of frequency, with lower frequency waves traveling down the spring more quickly than higher frequencies. This accounts for the ‘drippy’ or ‘boingy’ sound that the reverb produces when given a percussive attack. At the other end of the spring, the signal is recovered by the inverse process which includes coils, magnets, and a recovery circuit. In addition to being recovered, the wave will continue to reflect back and forth along the spring, creating a wash of reverberation that evolves in time due to the frequency-dependent delay times of the spring. The length of time that the reverb lasts when given an impulsive input is known as the ‘decay time’, which is controlled by physical dampers that absorb energy from the spring.

At low mix levels, the 2-spring tank adds a depth and dimension to the sound. Generally speaking, the 2-spring combo-amp reverbs tend to sound a bit less splashy and trashy than their 3-spring stand-alone counterparts at

the extremes, but add a full, integrated explosion of sound when cranked up.

The ’70s Electronic Reverb

During the 1970s, digital electronic systems advanced to the point where high-quality real-time electronic reverberation was possible. A single memory chip was capable of storing 1024 bits, and the possibilities seemed endless. The most famous early electronic reverb was a $20,000 plate-style reverb that used eighty(!) of these memory chips. The amazing hardware-based algorithm used multiple delay- lines configured in parallel, with each delay featuring multiple output taps and filtered feedback paths.

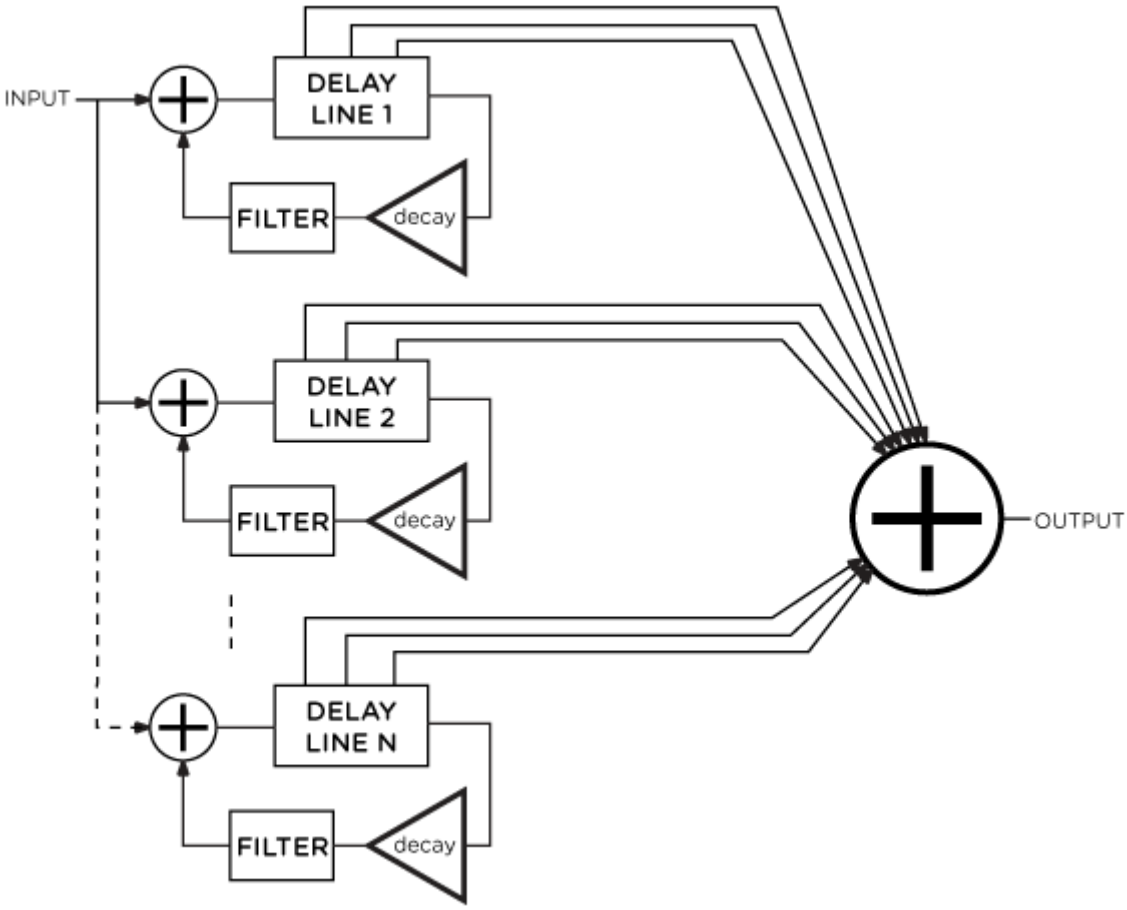

FIG. 2 SIMPLIFIED ELECTRONIC PLATE REVERB STRUCTURE

The lengths of the delay lines and individual taps were derived mathematically to produce the most natural reverberation. The reverb algorithm also employed modulation by mixing various taps under internal control to create changes in reflection phases to further reduce undesirable resonances and add depth. The result is a rich, smooth reverb with a quick build-up in density due to the summation of the many parallel output taps.

The ’80s Hall Studio Rack Reverb

By the late ’80s, continued advances in digital ICs and microprocessors lead to (relatively) low-cost digital reverbs that could run many different reverb algorithms and allowed for preset storage and deep parameter editing. Cost sensitivity and the limited available processing power of the day led to the necessary invention of efficient algorithms with minimized computational and memory requirements. To create a Hall-style reverb, a well-practiced technique was to create an early reflections section that fed into a late reverb generator.

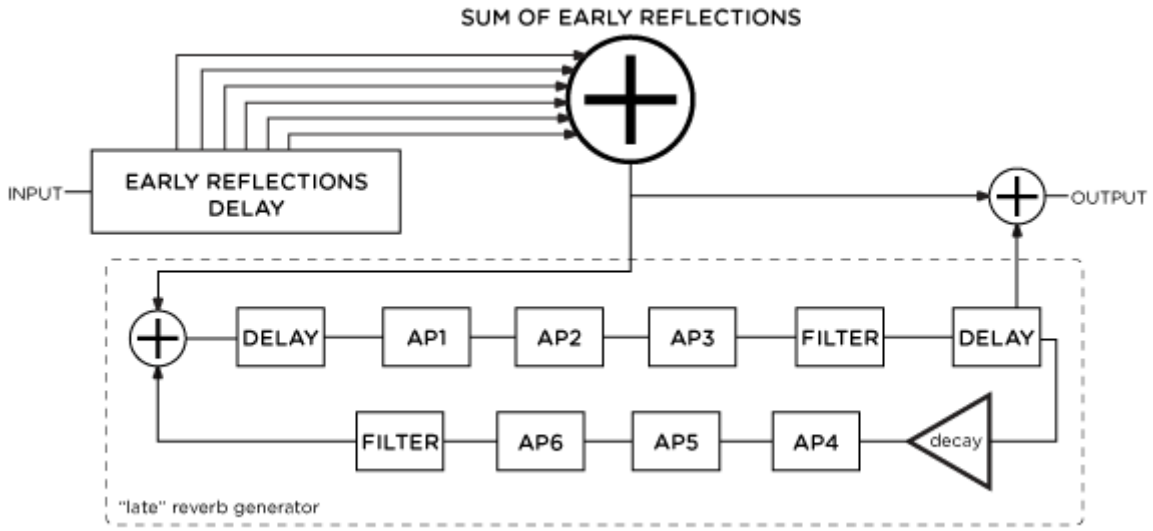

FIG. 3 SIMPLIFIED ’80s HALL REVERB

A simple multi-tapped delay line was sufficient to create early reflections. The late reverberation was accomplished by a regenerating ‘series-loop’ of delays, all-pass filters, and low-pass filters. Inputs could be injected into the loop in more than one place, and the outputs might consist of the summation of several points from the loop. Delay-line modulation was employed to reduce artifacts and achieve a smoother, more pleasing decay. These hall reverbs have a signature sound of distinctive early reflections followed by the slowly-building density of the late reverberation. The modulation adds an increased sense of warmth and depth.

Enter the World of Flint

The three reverb types in Flint pay homage to these three classic reverb sounds. While not focusing on any specific recreation, these classics served as philosophical and sonic guides in the creation of our ’60s, ’70s and ’80s reverb types.