

REVERBERATION

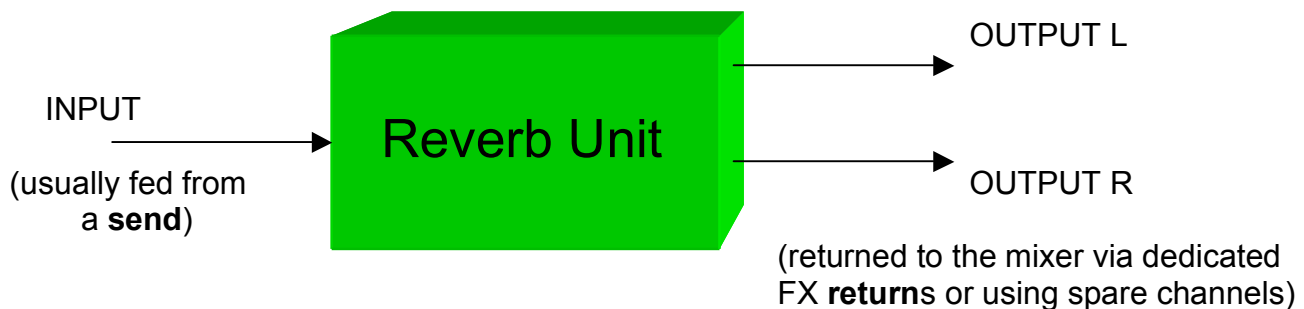
Reverberation can be defined as the amalgamation of many delays of different lengths and intensities (and relative phases!), created as reflections from different surfaces in an acoustic space when a sound is generated.

The use of this in recordings is partially to bring the sound and spaciousness of rooms, halls, etc. to them, but also to aid separation in a mix, or to make sounds blend (as if in the same room).

This can be achieved with mic'ing techniques (if we have an appropriate room or hall) but sophisticated artificial methods are also available to us today.

Artificial Reverb Units

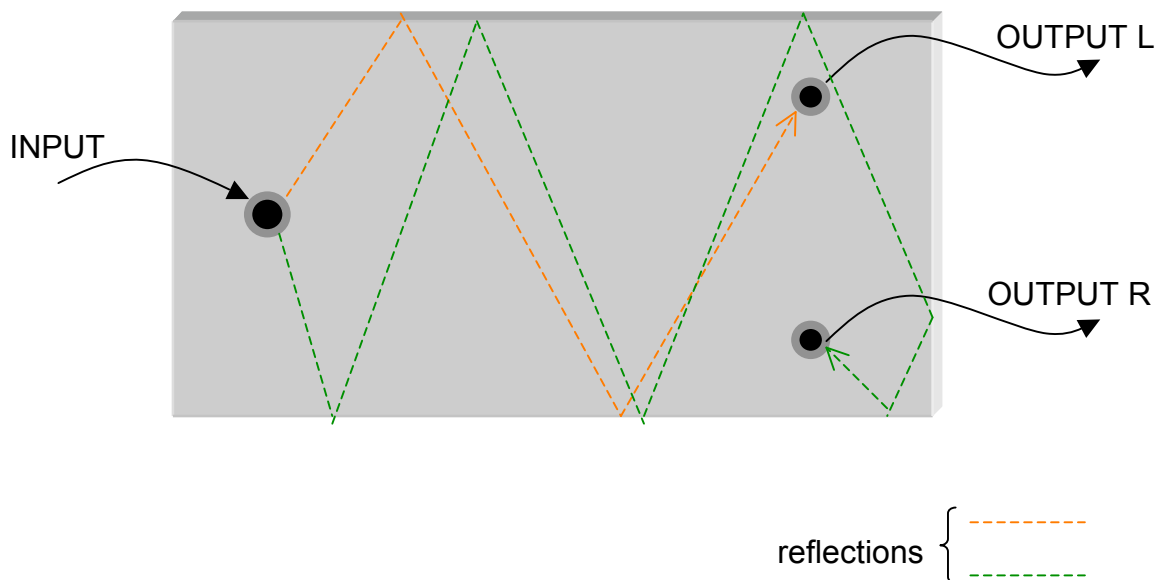
These are often applied as follows:



The configuration of 'mono in/stereo out' is commonly used for efficiency (particularly on analogue mixing desks with a limited number of auxiliaries), though stereo inputs are possible and invariably provided for.

This 'mono in' connection obviously limits the spatial and directional information of any signal within the reverb space itself, but in practice (other than in the classical field or music with very sparse instrumentation) these subtleties are masked to the point of being swamped.

PLATE REVERB:

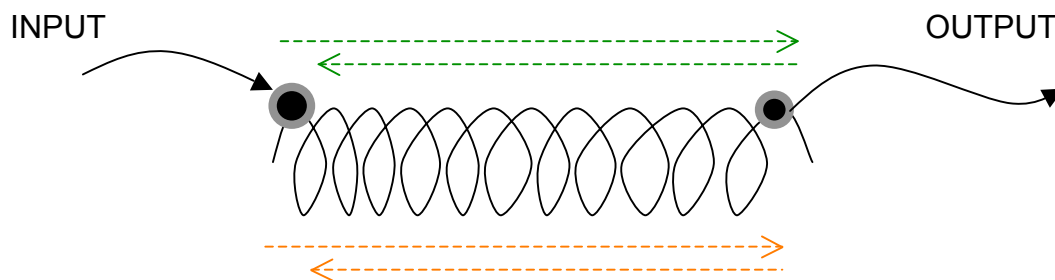


Plates became popular in the 1960s, they're are still highly desirable today for their warm smooth sound, and frequently still found in commercial studios.

They are constructed from a sheet of steel loosely suspended to allow vibrations to propagate reasonably unhindered. A transducer (similar to a speaker) converts the signal 'vibrations' to be passed onto the sheet and bounce within its surface. Pickups (similar to microphones) then re-convert the bounced vibrations back to an electrical signal to be mixed with the original signal.

SPRING REVERB:

Similar in principle to plates but substituting a metal spring for the plate.

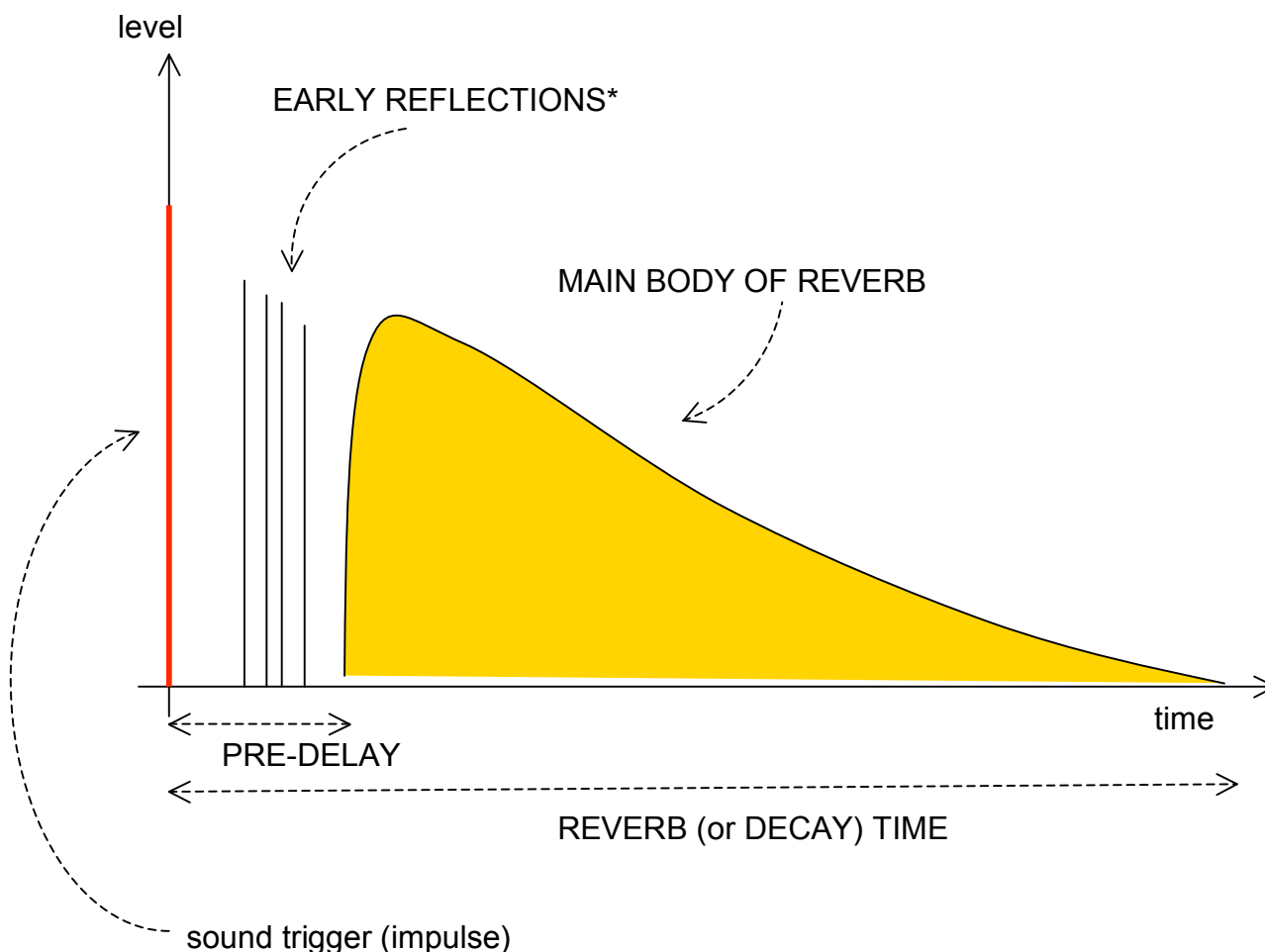


This construction is alot cheaper and more portable than the large plates (hence their popular installation in guitar amplifiers), but have a cruder but characteristic sound (hence studio units get frequent use in Reggae, Punk and Hip-Hop music for their uniqueness).

DIGITAL REVERB:

At the beginning of the 1980s computer technology had developed to a point where it was viable to run an acoustic space simulation and feed digital audio into it. Companies such as Eventide, Lexicon, EMT (who had made their name with plates) and AMS then came up with **algorithms** that modelled natural reverberation characteristics, though it wasn't long before sounds that cannot occur in nature were also added to the repertoire.

Graphic time-domain representation of a typical algorithm:



* Note the early reflections are drawn separately from the reverb body for clarity, in practice these elements often overlap.

Algorithm parameters (often available for adjustment):

- the **reverb time** is the time taken for the reverb to audibly decay (technically to $1/60^{\text{th}}$ of its peak level), measured in seconds
- the **pre-delay** is the time taken to reach the first reflective surface (usually in mS), which can be significant for larger spaces e.g. its effect can be heard in the 'tumbling' ambient sound from a church organ played in a sizeable church or cathedral

- **high frequency damping** simulates the faster decay of the high frequency components of the reverb sound
- the **early reflections** are usually treated as a simple cluster of delays (which is a good approximation), so level and delay time are often variable
- **diffusion** and/or **density** allows us to vary the reverb character from ‘fluttery’ (the component delays are just perceptible) to ‘smooth’ (the component delays are so complex that it’s just a wash of sound)

These are the main important parameters, though others are frequently offered as alternatives, substitutes or extensions.

Being digital devices, settings can easily be stored as presets and recalled (as alternatives to the pre-programmed ones) when required.

A recent type of digital unit uses **convolution** techniques. That is, real spaces (or desirable artificial devices) can be ‘sampled’ by setting off a short burst of sound (an impulse) and recording the resultant ‘impulse response’. This can then be used to impose the characteristics of the space onto any sound we choose e.g. as if our sound was recorded in the Sydney opera house, or a well-known studio live room.

ROOM or CHAMBER REVERB:

Of course if we have a space available we can impose an artificial acoustic on a recorded sound (as opposed to recording the sound in an acoustic) by feeding it into a speaker and it picking up with mics (a stereo pair is a good choice). Though care and consideration has to be taken with the balance of the direct sound to the reflections.

PRACTICAL: Practice choosing and listening to reverb sounds and the variation of parameters. Listen to the effect of adding reverb to a sound in a mix and the variation of parameters. Learn to pick out reverbed sounds from commercial recordings, working up to identifying basic algorithm types (hall, room, plate, etc). and basic parameters (short, long, bright, dark, pre-delayed, etc.). You may have to listen for sparse moments in the music to make these observations and/or recall/recognise reverberant textures from your own productions