REVERB & DELAY

- **Echo:** A Distinct repetition of a sound.

- **Reverb:** Many closely spaced echoes as not heard individually.

As multi channel recording became available, the studio room acoustics were made less reflective (dead) in order to control leakage or “bleed” instruments other than intended. By reducing leakage more control in the mixing was available however, the recordings sounded less natural. Artificial reverberation and delay devices were created to bring back some of the missing acoustical naturalness.
COMPONENTS OF REVERBERATION

Direct

Early Reflections

Reverberation
DELAY BASED EFFECTS

- Echo
- Flanging
- Phasing
- Resonant filters
- Chorus
Tape Delay for Creating Echo

Diagram showing the flow of signals through an audio tape echo system, including input and output amplifiers, playback head switching, and feedback control.
Flanging is an effect that produces a varying “comb” filter by using a short delay (2 to 7 ms) that varies in length over time that, when added to the original sound, produces a “swishing” effect. A multiple voice “chorus” effect uses a longer delay (12-18 ms) and less delay change (modulation).
REVERBERATION DEVICES

- Dry
- Chamber
- Spring
- Plate
- Digital
CHAMBER REVERBERATION

A reflective room with speakers on one end & microphones on the other.
SPRING REVERBERATION DEVICE

A metal spring with a transducer on one end to vibrate the spring and another on the other end to pickup the vibrations which simulate reverb.
A plate reverb uses a tensioned metal plate with a transducer on one end to vibrate the plate and another on the other end to pickup the vibrations which simulate reverb.
DIGITAL REVERBS

There are two primary ways that digital reverberation can be realized.

- Software plugins in Digital Audio Workstations.
- Stand alone hardware devices.
DIGITAL REVERB FACTS

- Some use many closely spaced digital delays with a special algorithm to make separate delays not audible. Others use convolution based on impulse responses of real spaces.

- Most flexible of all the reverberation devices

- Parameters such as reverb time, room size, can absorption adjusted.

- Different spaces can be stored as presets.
ADVANTAGES

❖ Reverb chambers produce real reverberation.
❖ Spring reverbs are inexpensive.
❖ Plate reverbs have a better more dense sound compared to spring devices.
❖ Digital reverbs are by far the most flexible & can provide very high quality reverberation.
DISADVANTAGES

❖ Reverb chambers are costly & require isolation and dedicated speakers & microphones.

❖ Spring reverbs can sound “twangy” due to spring resonances.

❖ Plate reverbs require isolation and space.

❖ Digital reverbs can suffer from edgy harsh sound and unrealistic reverberation “tails” (loss of low volume resolution)
EQUALIZERS-EQ

- A device used to alter the frequency response, i.e., tonal balance, of a signal with many frequencies present.

- Originally used to correct or make equal, “equalize” losses incurred in a audio signal.
TYPICAL USES FOR E.Q.

- To correct losses or changes in frequency response incurred in the signal path.
- To enhance/shape the sound of instruments, vocals etc. by increasing or decreasing selected frequencies present in the signal.
- To reduce or eliminate unwanted sound. ie: noise and leakage.
- As an effect. ie: simulate the sound of listening through a telephone etc.
E.Q. FILTER CURVES

Peak

Dip

Peak/Dip (Q relates the bandwidth or range of frequencies effected.)

Notch
E.Q. FILTER CURVES

Shelving - Adds or reduces level at frequencies above or below a selected frequency.

High Frequency Boost

Low Frequency Boost

High Frequency Cut

Low Frequency Cut
E.Q. FILTER CURVES

High & Low-Pass Filters- Reduces level above or below a selected frequency.

Low Pass

High Pass
E.Q. FILTER CURVES

Band-pass- Reduces level above and below a selected frequencies. (a high & low pass combined)
EQUALIZER TYPES

- Graphic- Vertical sliders control level of a number of peak/dip E.Q.s (spaced at 1/3 octave centers, for example)

- Parametric- Peak/dip E.Q.'s with continuously adjustable center frequencies and Q.
GRAPHIC EQUALIZER
PARAMETRIC EQUALIZER
DOWNSIDE OF E.Q.

Can add distortion, noise & Phase Shift (time distortion of harmonics)
Can make sound “unnatural” or unreal