

At the listener's position, the Doppler-shifted direct sounds will interfere in a complex manner with the indirect sounds, sometimes constructively/destructively – resulting in a beats-type/amplitude modulation/tremolo effect, especially at lower frequencies, for which diffraction effects from the mouth of the rotating sound source are larger than for higher frequencies {since the Airy disk is within an angular region of  $\theta \leq \sin^{-1}(1.22\lambda/D)$  from the instantaneous axis of the mouth of the Leslie speaker rotor}. However for mid-range and higher frequencies, the mixing of direct and indirect sounds from a Leslie operated in a room often results predominantly in more of a flanged/phase-shifted vibrato-type sounding effect.

b.) The musical sound(s) coming from a Leslie cabinet are almost never just a single/pure-tone frequency, but are complex musical sounds – *i.e.* all types of chords, which consist of multiple frequencies, and harmonics thereof. Thus, the direct and indirect sounds associated with a whole hierarchy of Doppler-shifted harmonics associated with these chords are heard.

Thus, the overall sound of a Leslie heard by a listener in a room is an extremely lush-sounding 3-dimensional, texturally shimmering “chorale” type of sound effect, made famous in many rock-and-roll songs over the years, by many talented/gifted Hammond B3 organ players (e.g. Booker T. Jones/Booker T. & The MG's, Matthew Fisher/Procol Harum, “A Whiter Shade of Pale”, Billy Preston, Keith Emerson/Nice/ELP, Al Kooper, Greg Allman/Allman Brothers Band, Benmont Tench/Tom Petty & The Heartbreakers, Garth Hudson/The Band, Jon Lord/Deep Purple, Paul Shafer, ...), many guitarists (e.g. George Harrison/The Beatles, “Let It Be”, and “Lucy in the Sky With Diamonds”, Eric Clapton/The Cream, “Badge”), it has also been used e.g. for harp (harmonica players) as well as vocals in various songs. More information on the Leslie cabinet is discussed e.g. in the book “The Hammond Organ – Beauty in the B”, by Mark Vail, 2<sup>nd</sup> Ed., Backbeat Books, 2002. Many websites for Leslies also exist on the internet.

The Leslie sound can be emulated (to a certain degree) e.g. via various types of analog and/or digital electronic FX circuits, however none of these truly fully captures the totality/complexity of the Leslie sound (although they are certainly more convenient to bring to/from a gig, as well as hook up and use in live performances). The most famous of these FX boxes is the Univox Uni-Vibe, as used e.g. by Jimi Hendrix (Band of Gypsys), David Gilmour (Pink Floyd) and e.g. Robin Trower in various of their songs on albums from the late 1960's/early 1970's.

**The Univox Uni-Vibe.** The pedal controls the speed of the vibrato/chorus effect(s).

