

Understanding Stereo Microphone Techniques and M/S Stereo

by Buzz Turner

And in the beginning....

I remember the first stereo system I ever saw. My parents brought home (and up two flights of stairs) a huge Magnavox combination TV/Tuner/Record Player. These early examples of high technology were known more for "exquisitely crafted cabinetry with a colonial fruit wood finish" than aural integrity. Nonetheless I was impressed! Buttons, knobs, lighted dials and four massive four inch speakers! The monster came with three 33 1/3 LP's. My Mom and Dad thoroughly dug the sound track albums from "Oklahoma" and "South Pacific," but the disc that got my attention was "Spike Jones, This is Stereo!" Along with several of Spike's better known hits, the disc contained an explanation of stereo and utilized different examples of music and sound effects to illustrate the "magic of high fidelity stereo sound." The disc contained a passage of music, first in mono and then in stereo. Anyone could hear the difference! The stereo recording brought the music to life with a realistic sound stage that the mono recording could not provide. Technically, what I heard on the stereo recording that was so striking can be summed up in two words; spatial localization.

The Goal

The goal in stereo microphone technique is simply to present an accurate sound field. Instruments or sounds on the left, right or center, are perceived in those locations upon listening to the playback recording. Most contemporary music, stereo broadcast TV and theatrical films derive their stereo electronically. Multiple mono recordings are panned to the location desired. The location of sounds is not fixed in the sound field but determined at mix down. When utilizing stereo microphone techniques, the location of instruments and sounds in the sound field is determined by the type of technique employed, the microphone type and the location of the microphones from the sound source.

Stereo Mic Techniques

There are three basic types of stereo mic technique; coincident, near coincident and spaced.

Coincident

The coincident technique employs a pair of directional microphones with the capsules symmetrically angled toward each other aiming at the left and right sides of

the sound source. Also known as "intensity stereo" popular coincident techniques include XY, two cardioid mics set between 90 degrees up to 180 degrees of each other and angled towards the left and right sides of the sound stage, MS or Mid Side, one cardioid mic and one figure eight mic aimed directly at the sound source and processed through a sum and difference matrix, and the Blumlein Array, two bi-directional (figure eight) mics angled 90 degrees apart and facing the left and right sides of the sound field.

Near Coincident

Near coincident technique employs a pair of directional microphones with the capsules symmetrically angled apart from one and other, aiming at the left and right sides of the sound source. This technique determines localization from level information as well as differences in arrival time. Near coincident techniques include ORTF, two cardioid mics angled out 110 degrees from the center line with capsule spacing of 17 cm. ORTF was named after the French National Broadcasting Organization (Office de Radiodiffusion-Télévision Française).

Spaced Technique

Spaced technique employs two microphones of the same polarity set symmetrically along a line perpendicular to the sound source and bisected by the mid line of the sound source.

Which Technique Works Best?

Ah.. decisions decisions. Which technique works best? The choices as well as the solutions are vast. Utilizing spaced omnis can result in an extremely open and lush sound field, the downside is possible phase anomalies present when the signal is summed to mono. Spaced techniques also require critical mic placement for accurate results. Near coincident technique works extremely well with larger sound fields such as those found in classical music recording. Along with good localization, listeners will also perceive a depth to the recording space. The technique does not work well when the mics are placed near the sound source as small movements are exaggerated in the recorded sound field. Coincident techniques can provide good sound field location, and work well with smaller ensembles. XY pairs can be employed very near the sound source and still provide spatial cues.

Mid Side Stereo

M/S recording shares the attributes of coincident technique with two important advantages for film and video production sound; 100% mono compatibility and the ability to alter the sound field in post production. Mid Side technique employs two microphones aimed directly at the sound source. The Mid mic can be of any pattern, but is most often of a cardioid or hyper cardioid design. The Side mic is a bi-

directional or figure eight pattern. What gives M/S stereo its flexibility and mono compatibility is the sum and difference matrix. The M/S matrix takes the sum information $M + S$, and sends it to the left channel, and the difference information $M - S$, and sends it to the right channel. When the left and right signals are combined, $(M + S) + (M - S) = 2M$, the sum is M information only. If the M/S signals are recorded discreetly (without going through the matrix) the signals can be matrixed in post, and the relative gain of the two signals can be adjusted to provide varying degrees of stereo width. When stereo recording techniques are used in large reverberant spaces, mono summing often results in objectionable amounts of "room sound" versus program material. When MS recordings are summed, Side information (most of the reverberant signal) is completely canceled, not added. M/S recording, compared with other stereo recording techniques, provides the best method for film and video sound.

Are we rolling yet Bob?

After all is said and done the bottom line is does it sound good? All the science in the universe isn't any consolation when you forgot to bring the tape. It's good to understand the reasons behind the techniques, but its better to let your ears have the final word. Try the techniques you are unfamiliar with, experiment with unorthodox mic placement and who knows, your next recording might turn out to be as cool as a Spike Jones record.

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