Sonic Distribution in conjunction with sE Electronics presents:

**A Guide to Recording in Stereo**

The following article is a collection of stereo recording techniques gathered from both web and text book sources. It is an attempt to gather the most common stereo recording methods in a concise and easy to use guide for the home recording engineer.

**How Stereo Works:**

A stereophonic image is created by two speakers reproducing sound. The most noticeable aspect of stereo is the balance of sound between each speaker, which creates the effect known as phantom imaging, or the appearance of sound coming from imaginary points between the two monitors. This acoustically pleasing monitoring method has equally interesting stereo recording applications, which, with some practice and experimentation, can add a new dimension to any audio production.

Recording in stereo gives the listener a better sense of:

- the recording space (natural reverberation, echo).
- relative positioning of each instrument to one another.
- distance from the audience to the performers.
- what it would be like to be in the room with live performers.

sE Electronics makes a variety of condenser microphones, both large and small diaphragm, ideal for stereo recording techniques. Please refer to our table of microphones at the end of this article to check prices, diaphragm sizes, and find the sound type you're looking for.

**Condenser Diaphragms:**

*Large diaphragm microphones* are ideal for vocal applications, or any application where warmth and enhanced low end is desired.

*Small diaphragm microphones* are excellent room mics as they capture the entire sound spectrum evenly. The smaller diaphragm lacks the warmth of its large diaphragm counterparts, but in tradeoff has a quicker transient response, capturing cymbals, snare drums, and other “fast” sounds, such as strings, more accurately.
Recording Techniques:

Generally characterized by the use of two microphones, stereo recording is often divided into two specific microphone placement categories, the coincident-pair and spaced pair. There is debate within the recording world as to which technique is better, but even after scientific studies, the best judge is still the individual's recording preference. There are a few major differences between the two. Use the following points to help you make an informed decision about which technique you’ll want to use for your project. Also keep in mind, though each method is well accepted, they are by no means the only way to record in stereo. Try experimenting with different mic placements throughout your recording project to see what you like best.

Coincident-Pair Techniques:

Coincident-pair benefits:
- Excellent stereo imaging
- No appreciable phase problems
- Tracks are mono-compatible

In the coincident-pair, large diaphragm directional microphones are placed on the same vertical axis, one above the other. Small diaphragms mics are placed facing each other, grills almost touching. Coincident-pair is the more accurate of the two techniques mentioned in this article. Since the microphones pickup sound at the same location, it allows for more phase accurate, though less ambient recording. Because of the microphones' location on the same plane, imaging is more directional, making it easier to detect phantom images in the stereo field upon playback. Of course, make sure you pan each track's channel equally left and right on playback so you hear the stereo image!

X/Y:

The most common form of the coincident-pair techniques is the X/Y combination. The angle between the microphone grills can vary from 90 to 120 degrees, facing towards the sound source. Cardioid microphones are the best choice for this setup, as the stereo images will appear more dramatic and focused. Be sure to pan one track hard left or right to ensure you hear the imaging.

The X/Y array always uses two microphones of the same make and model to ensure eveness between each track. sE has specially matched stereo pairs of the sE1 and sE3, ideal for this style of miking. sE offers a free 7-day loan service on all it’s mics, if you are interested in trying some out, click here to download the PDF file and we’ll process your order today!
Blumlein:

The original X/Y, this second style of coincident-pair microphone techniques is the Blumlein Array. Created by Alan Blumlein in the 1930’s after being disappointed by the sound quality of a monophonic movie he attended with his wife, the Blumlein Array has become a staple in stereo recording since its invention. Specific to this style of recording is the use of microphones with a figure of eight polar pattern. Try using a pair of sE’s R1 Ribbon, 3300A, Z5600AII, or Titan microphones for this set-up. This tried and true method places the mics on the same vertical axis at 90 degree angles to each other, the center angle facing the middle of the sound source. The balance of the two figure of eight patterns allows for an even balance of sound between the microphones. The additional pick-up of sound from the rear of the microphones creates extra natural room reverberation, and thus a more spacious sound. For more information on Alan Blumlein and his contributions as an early pioneer towards all things audio, including the development of stereo, visit this website.

M-S:

The Mid-Side, or M-S technique, uses two microphones; one cardioid and one figure of eight. The major advantage of M-S recording is the ability to have a left, right, and center image while using only two microphones. The cardioid microphone is placed facing the sound source while the bidirectional mic is placed perpendicular to the cardioid pattern, creating a T like polar pattern. To capture the left and right lobes of the figure of eight microphone, the track must be doubled in record mode, so that two identical tracks are captured. Then, using either a decoder matrix (found on some mixers) or computer software, one of the tracks must be placed out of phase/polarity with the other, isolating each lobe on playback. Check your EQ plug-
ins for a phase/polarity switch, usually appearing as a ☐ symbol. Pan the original figure of eight track to one side and the other track (after selecting the phase switch) to the other. It is a good idea to sandwich the cardioid track between the figure of eight tracks for easy reference. By adjusting these two tracks together against the center mic, the engineer will find he has excellent control over the amount of stereo imaging in the recording. In our example, two sE 3300A microphones are used, the similar mic choice a good idea as it helps create more uniform input signals.

**Spaced Pairs:**

Spaced benefits:
- Ambiance of room is enhanced
- Better low-frequency response
- Stereo images are wider and enhanced

The Spaced Pair microphone technique is by nature more difficult to use due to potential phase problems. However, when used properly, they can yield a more spacious recording. There are a wide variety of spaced pair techniques, angles, distances, and mic choices.

Potential Problems:

Before recording with a spaced pair, it is important that the engineer understand the potential phasing problems that may arise. Phasing often occurs when two microphones, recording simultaneously, capture different portions of the wavelength of the original sound source. Upon playback, they are perceived slightly out of time with each other by the listener, causing most notably a loss of bass and “smear” of higher frequencies. This will create either constructive or destructive interference in the recording, resulting in volume and delay issues. There are a couple of simple methods for determining microphone placement to eliminate phase issues.

First, mix both tracks to mono, then move microphones around until there is bass reduction. If it is difficult to hear the bass reduction, flip one microphone out of phase with the other using the same method as described in the M-S Section of this article. With one mic out of phase/polarity, move the microphones around until the bass volume is as low as possible. At this point, phase is most accurate.

Special case: 3:1 Rule. When miking larger instruments with a wide range, such as piano or marimba, place your mics three times the distance to the sound source from each other to avoid phasing.
Recording in Stereo

An example of the 3:1 Rule. By placing the mics above the hammers, a bright percussive sound is captured, as well as a great stereo mix, with bass notes on the left mic, and treble notes on the right.

ORTF, NOS, Faulkner, and The Stereo 180 Technique:

These set-ups are all variations of the spaced and near-coincident-pair. Their designs are very similar, with the majority of the differences between them being the distance between the mics and the angles they splay outwards. The ORTF, or “Office de Radio-Television Diffusion Française” (designed by the French Broadcasting Organization) uses two cardioid microphones angled at 55 degrees away from center, spaced at 17 centimeters. This set-up is designed to approximate the human head and the effect of sound hitting the outer-ear. The NOS Array (Nederlands Omroep Stichting, a Dutch broadcasting company design) uses two cardioids splayed at 45 degrees off center with a spacing of 30 centimeters between. The Faulkner Array, designed by Tony Faulkner in the late 1970’s, uses two figure of eight microphones, facing parallel towards the sound source and spaced at 20 centimeters. The Stereo 180 technique is the most precise of the near-coincident arrays. With a distance of 4.6 centimeters between capsules, two hypercardioid microphones are splayed 67.5 degrees off center.
Finally:

Even after all of the stereo recording techniques that have been explained in this article, there are many more, ranging from microphones inside the ears of dummy heads (also called binaural recording) to mics separated with hard baffles. The vast variety of techniques available is just a reminder that recording is not an exact science. Every session has its own unique needs, and the knowledge of the engineer is most important in determining the final sound of a recording. Stereo miking is just one technique that can be used to enhance your recording. For the best results with each technique, pay attention to detail; be precise with your mic placements and remember that the best final recording comes from the best initial miking. Experiment with sE mic types, numbers and placement until you get a sound you like. Be sure to check back soon for more information on other miking techniques using sE microphones.

### sE Electronics Microphones:

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