# Considerations for Four-Channel Engineering
by Scott A. Wyatt

first some terms:

translation - the perceived movement of the location of a sound source, which can be described as a vector in or outside of the horizontal listening field as created by the positioning of the loudspeakers. Translation is accomplished by simulating a change, over time, of the distance or direction of the sound source with respect to the horizontal listening plane. Parameters to change might include amplitude, frequency characteristics and balance of direct and reflected sound.

pan - the <u>lateral</u> translation of a sound source through or beyond the horizontal listening plane. This is accomplished through simulation of changes in relative amplitude balance between two loudspeakers.
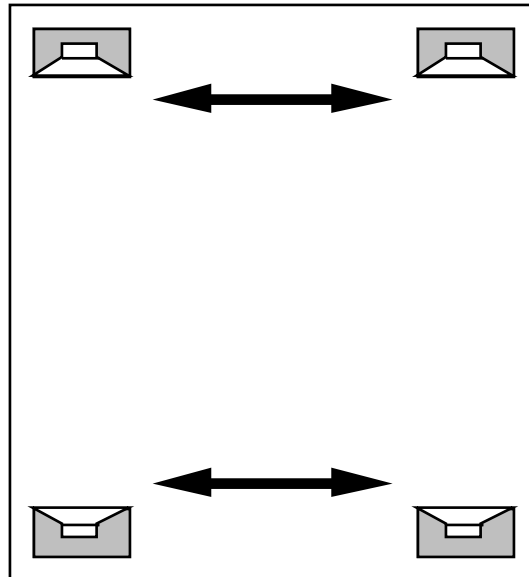
roll - the longitudinal translation of a sound source through or beyond the projection plane. This is accomplished through simulation of changes in relative amplitude balance between two loudspeakers.
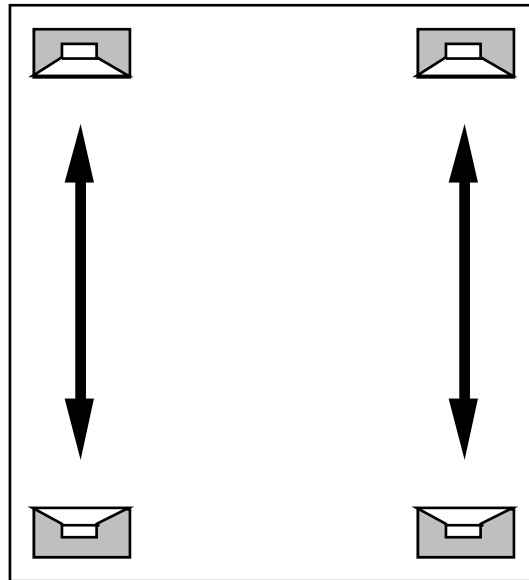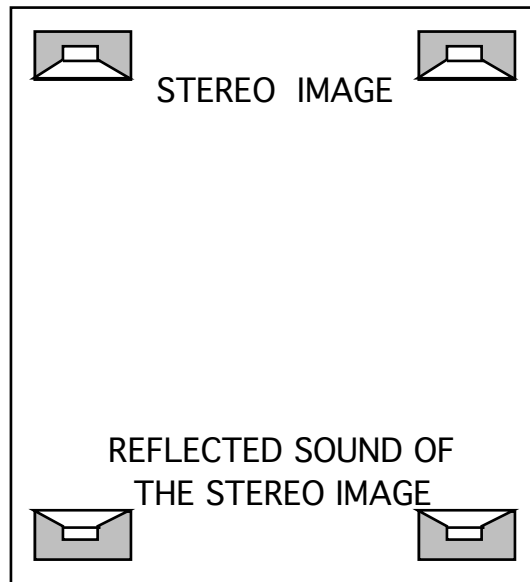
cross - the diagonal translation of the sound source through or beyond the projection plane. This is accomplished through a process that combines pan and roll.
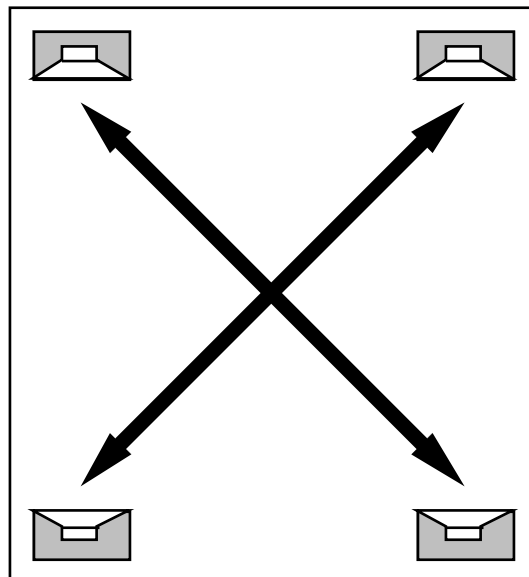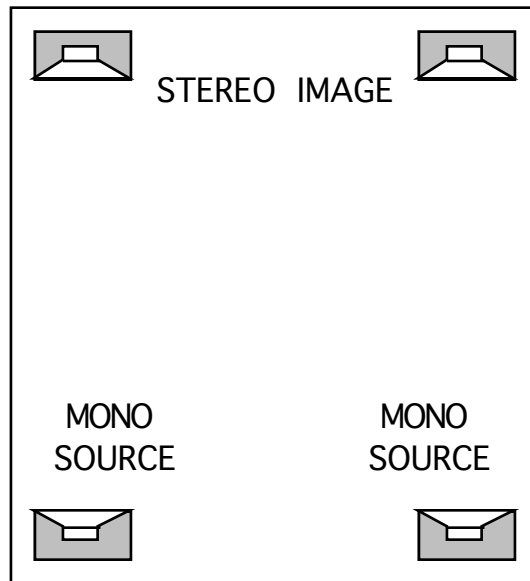
the obvious:

- mono point source positioning and panning among the four-channels

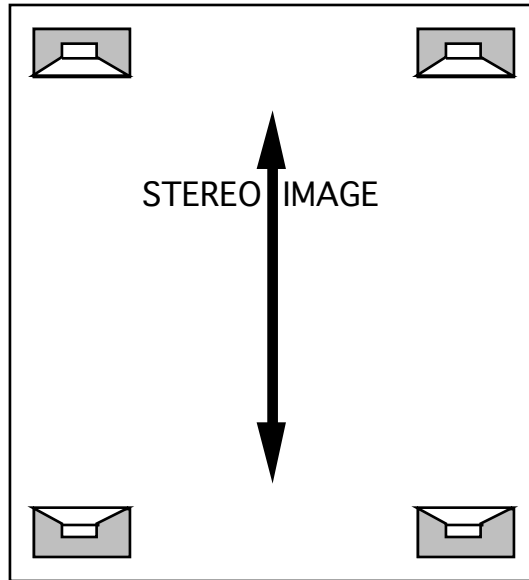- stereo image in front channels, reflected sound in rear channels

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┌─────────────────────────────────┐
│  ▭                        ▭      │
│                                  │
│          STEREO  IMAGE           │
│                                  │
│                                  │
│                                  │
│                                  │
│                                  │
│       REFLECTED SOUND OF         │
│         THE STEREO IMAGE         │
│  ▭                        ▭      │
└─────────────────────────────────┘
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- vice versa

- stereo image in front channels, mono point source items in rear channels

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┌─────────────────────────────────┐
│  ▭                        ▭      │
│          STEREO  IMAGE           │
│                                  │
│                                  │
│                                  │
│       MONO              MONO     │
│      SOURCE            SOURCE    │
│  ▭                        ▭      │
└─────────────────────────────────┘
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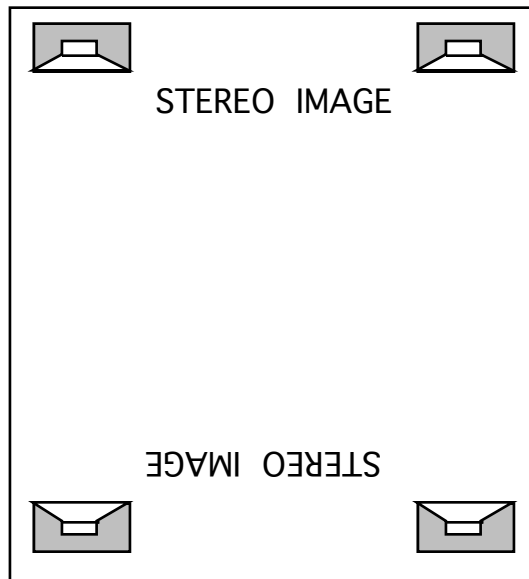
- vice versa

the not-so-obvious:

- stereo image rolling from front channels to rear
    channels while maintaining the channel integrity,
   and vice versa

STEREO   IMAGE

- stereo image in front channels with reverse image in
    rear channels
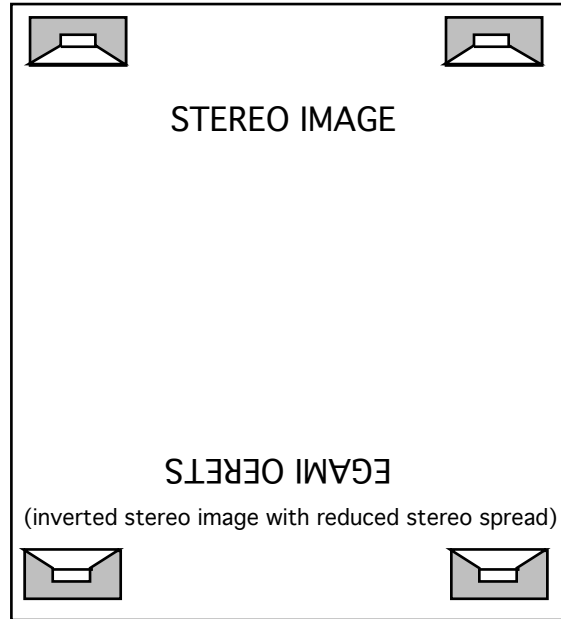
STEREO   IMAGE

STEREO IMAGE

- mono point source crossing

- simulated point source locations within (inside of) the four-channel field with distant reflected sound in all four-channels
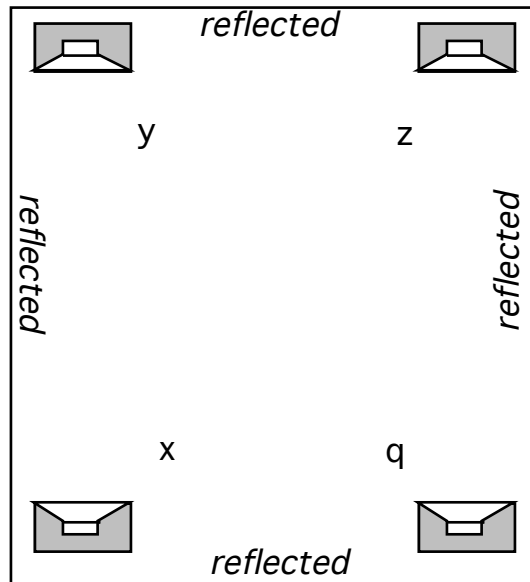

- flipping the stereo image from the front channels to one of the side channels by crossing one of the front channels to the remaining channel of the side
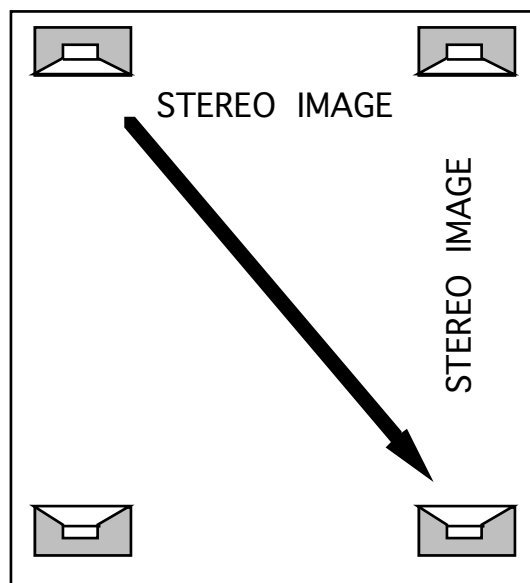
- copying the stereo image to rear channels, then
    inverting the image while also reducing the
   stereo field width

STEREO IMAGE

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(inverted stereo image with reduced stereo spread)

- copying the stereo image to the rear channels, then
    delaying the image (time-wise) ever so subtly

STEREO IMAGE

time

STEREO IMAGE
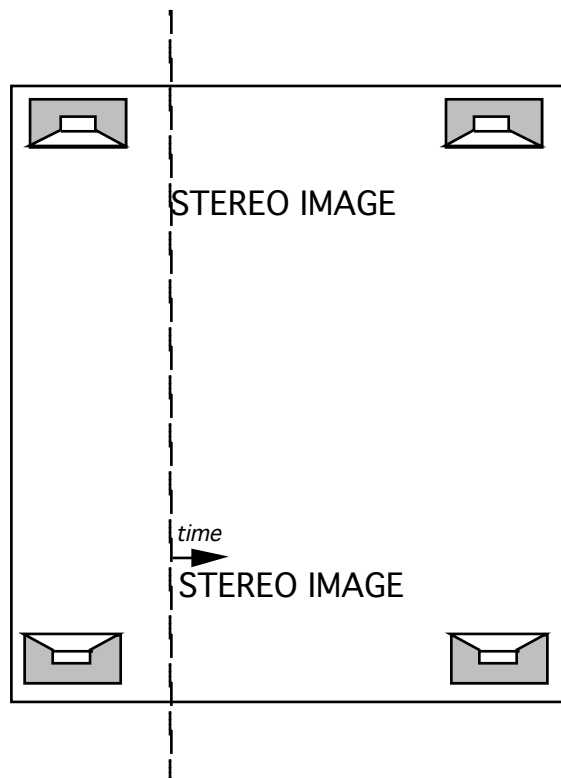
- copying only the reverb of the front channels to the
rear channels, then delaying the left rear reverb
independently from the right rear reverb

STEREO REVERB

STEREO
REVERB
L

STEREO
REVERB
R
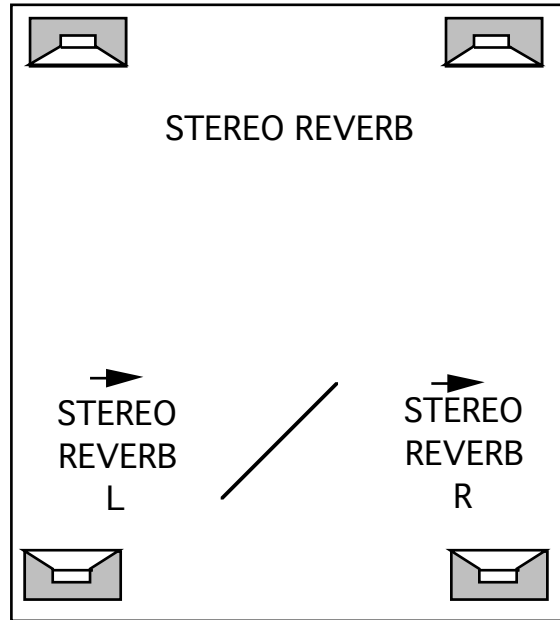
- copying only the reverb of the front channels to an
analog recorder, then playing back the reverb at 1
or more speeds slower (1 or more octaves lower
with time expansion - without artifacts) and
recording this to the rear channels

STEREO REVERB

STEREO REVERB
slowed down 1 or more
octaves via analog recorder
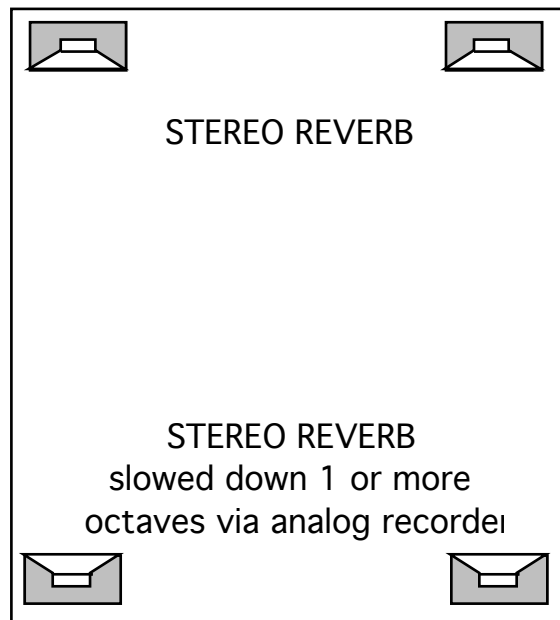
Remember:

- Be careful to not use all channels all of the time - as this makes the "extra channels" less relevant.

- Juxtapositioning these images, reflected sounds/reverbs is the KEY to creating an impressive impact on your listeners - HOWEVER - ALL effects must be tastefully composed and applied, and related to the music.

- Effects can subvert the music and intent of the composition! AVOID THIS.

- The dynamics of the rear channels should be lower in comparison to the front channels (audience members are generally positioned closer to the rear channels than the front channels).

- Generally speaking, the audience is positioned closer to the rear loudspeakers and will receive the sound from the front loudspeakers slightly delayed, therefore any intentionally composed delay for the rear channels MUST be delayed somewhat MORE than what you think, and what you would normally set-up within the studio.