

Studio Exercise 1

Music 192a 2010

We will take advantage of the Yamaha Disklavier digital player piano to try several ways of miking a piano. Since the Disklavier will play itself, we can concentrate on the placement and hook-up of the microphones. The first order of business is to become familiar with the Yamaha DM2000 mixer by reading through the mixer documentation section below. To start the piano playing, insert the Disklavier Sample disk and let it load. You can then just push “play” or change the program with the Song Select buttons. (The controls are on the small box at the lower right below the keyboard: the on/off button is on the left of the control box.) You can also change the tempo and volume if you wish.

The exercises will be recorded to CD-R using the Tascam CD-RW700 recorder. Although the cheapest CD-R blank discs are fine for the computer, when recording audio CDs it is advisable to use better quality discs. While computers can re-read bad sectors, audio CDs are played continuously and must use error-correction on-the-fly. This causes them to be more particular about the blank media used. Most name brand CD-Rs (TDK, Maxell, Taiyo Yuden, Mitsui/MAM-A) are fine. So-called “audio” CD-Rs are not necessary, but will also generally work reliably.

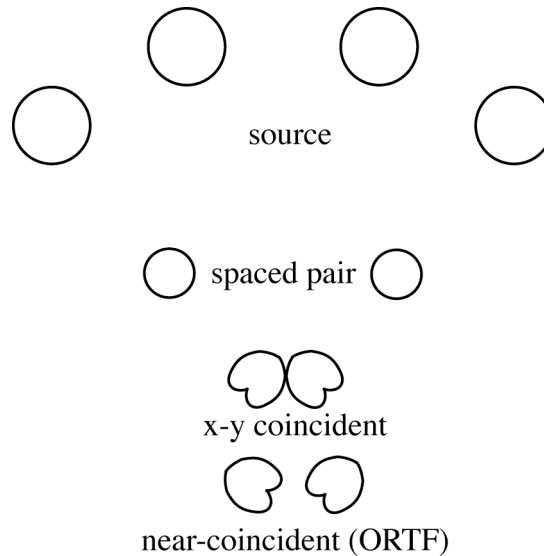
Connection to the mixer’s microphone inputs is made through the patch box on the studio floor: the larger box leading to the Yamaha DM2000 microphone inputs 1-16 and the smaller box leading to the Presonus M80 preamps. We will start by connecting to the DM2000 directly, using inputs 1-16. Be sure to pan the mixer input channels you are using L/R or the microphones will be mixed into mono. Start by finding the Shure KSM141 omni/cardioid condensor microphones (use their omnidirectional setting) and Josephson C42 cardioid condensor microphones. We will use these in several configurations to compare their application in stereo recording.

The microphones we are using are condensor mics that require phantom power to operate. Phantom power is available on each input channel at the top of the mixing board. Since phantom power applies 48 V DC directly to the mic, it is important to turn the power on and off only when the channel fader and gain trim knob are turned down. It is best to connect the mics and cables before turning on the phantom power. Once the mics are connected and the phantom power is turned on, you can turn up the gain trim knob, starting about half way. Then turn up the fader on that channel and be sure the “ON” LED is on and the Insert button is in the OFF position (up). With the master fader up, “STEREO” selected in the Monitor section, and the speaker volume control up you should hear sound now.

Once you hear sound, you can record the signal to the CD burner. (The Waves L2 limiter is connected between the mixer output and the CD recorder input, so for the time being it should be set to bypass mode.) You can now record to the CD-R and hear the output by setting the control room selector to 2TR D3 instead of STEREO. (As long as the CD recorder is in Record or Monitor mode it will pass the signal through.) Do not select both STEREO and 2TR D3 at the same time: there is a delay between the two caused by the L2 limiter that feeds the CD burner and combining these signals leads to phase cancelations when they sum. Listen to one or the other.

Now it’s time to experiment with different ways of miking a piano. (See Chapter 6 in the Huber Microphone book.) The main approaches to stereo miking are the spaced pair and the coincident pair. Somewhere between these are the near-coincident techniques like ORTF. An additional technique is mid-side (MS) in which a forward-facing directional microphone is combined with a side-facing figure eight microphone to produce a synthesized stereo pair by matrixing. Each of these techniques involves the localization cues to different

degrees. We will compare their sounds to determine which produce the most convincing stereo image and best sound for the piano.



The spaced pair technique uses two matched microphones spaced apart to capture the sound, placed in front of the sound source at a distance approximately $\frac{1}{3}$ to $\frac{1}{2}$ of the distance from the center to the outer edge of the source. Spaced microphones will capture both time-of-arrival and intensity spatial cues. Spacing the microphones too far apart will cause a hole in the center of the stereo field while too close together will make the edges of the sound source seem indistinct. Spaced microphones are usually omni-directional although directional types like cardioids may also be used. The directional characteristics of the mics will determine the optimum distance apart and from the sound source.

Coincident pairs rely entirely on amplitude (intensity) differences to create a sense of spatial placement, since both microphones are in the same place there is no time-of-arrival difference. This is usually done with a pair of cardioids (or other directional mics) placed next to or above/below each other and angled from 90-120 degrees apart, depending on the size of the sound source and the distance from the mics. This technique tends to have problems with the outer edges of the sound source if the mics are too close to the source or too narrowly angled. The angle between the mics will determine how wide the stereo field seems in the recording.

Somewhere in between these extremes are the near-coincident placement techniques like ORTF. ORTF is a tradeoff between spaced and coincident systems and clearly violates the 3:1 rule, since the mics are much closer together than the rule would suggest. These techniques make use of both intensity and time of arrival information, but they risk causing comb-filtering effects if the tracks are combined into mono. For any combination of more than one microphone, you should always check what happens when you combine the channels into mono, as this will show you any comb-filtering problems that may arise.

For both coincident and near coincident mic mountings, use the stereo bar. It holds two microphones and attaches to the stand while allowing manipulation of the angle and spacing between the mics. We use quick-release adapters on all the microphone stand adapters, both to speed up mounting and to avoid cross-threaded stands and adapters. Please use these quick-release mounts and don't remove them.

If you can't make up your mind or wish to be able to alter the stereo sound field after recording, you can employ the M-S system. This system uses a directional mic facing the source (M) and a very close figure-eight mic with its null facing the source (S). These may be recorded to separate tracks and added together on the mixer to produce a phantom coincident pair with an adjustable angle between them. This is accomplished by panning the M to the center and assigning the side mic to two separate channels on the mixer, one of which is

set out-of-phase with the rest. The side mic channels are panned hard right and left. By varying the balance of mid to side mics in the mix you can widen or narrow the stereo image. Another advantage of this technique is that if you collapse the stereo to mono there is no chance of phase problems since the side mic channels cancel, leaving just the mid mic. The DM2000 allows adjacent channels (1,2; 3,4; etc.) to be paired and decoded as M-S. See page 103 of the DM2000 manual to see how to select the M-S pairing and choose which input is set to M.

Page 73 of the Huber Microphone Manual describes several potential ways of placing microphones on a piano. For this exercise, you should try the spaced pair, coincident X-Y and near-coincident (ORTF) configurations. Feel free to try other combinations of microphone placement as well. Record a short sample of each to CD-R and write a short description of the placements you used and how you think they sounded.