Handout 2 - Magnetic Tape and Multitracking

Thomas Edison’s phonograph, patented in 1877, launched the recording industry. The phonograph funneled sound through a large horn with a needle at its narrow end. The sound waves moved the needle which then cut grooves into a cylinder or flat wax disc. The photo to the right shows president Warren G. Harding recording a speech into a phonograph around 1921.

Guitarist and inventor Les Paul conceived of what he called “sound on sound” recording in the 1930s. Paul experimented first with recording himself through a phonograph to disc and then recording himself performing with a playback of that disc. Upon acquiring an early magnetic tape recording machine, Paul continued tinkering, outfitting it with a second recording head so it could capture two signals at once.

Inspired by Paul’s recordings and ideas, singer Bing Crosby invested in the Ampex Corporation’s development of a multitrack tape machine. In the early 1950s, Ampex released the first 3-track machine, and over the ensuing decades the track count increased to 4-, 8-, 16-, 24- and 32. All of these machines divided a strip of magnetic tape, either ¼-inch, ½-inch, 1- or 2-inch wide, into sections, or “tracks.” Each track could contain separate, autonomous sound, but all were synched together. Any one of the tracks, or all of the tracks, could be erased and then re-recorded without destroying the tape. The diagram above shows how recording heads divide various sizes of magnetic tape into tracks.

Why all these tracks?
Think back to the clip of Duke Ellington leading his band in a phonograph recording. The musicians are positioned around a single microphone with the acoustic guitar and bass closest, so they’ll be heard, and the drums in the back to prevent them from overpowering the recording, a different configuration than they would use in concert. Ellington’s recording was then notched directly, and permanently, to disc. However, a magnetic recorder with four tracks allows an engineer to mix four independent audio signals to tape, either simultaneously or at separate times. Moreover, the tracks maintain this
independence; if the instrument on track three is not loud enough, the engineer can turn that channel up after the recording. Or, if the musician recorded on track 4 makes a mistake, she can re-record on that track without changing the music on tracks 1 through 3. The image below demonstrates a common usage of four track recording: recording the instruments together but leaving a blank track to work separately on a vocal track later.

You can play the part of a 4-track engineer mixing the the Beatles using the Rock and Roll Foundation Mixing Board widget. Experiment with the faders on the four tracks of the Beatles’ groundbreaking song, “Tomorrow Never Knows.” How does the feeling change when you raise the volume on the drums and bass? What happens when you hit the mute button?

Musicians and recording engineers embraced the creative possibilities of multitracking to layer sounds in ways that would not be possible in live performance. The musicians and producers associated with bands such as The Beatles, The Beach Boys and Pink Floyd pioneered the art of “bouncing” a set of several tracks from one multitrack machine to a single track on another. For instance, after recording on tracks 1-4 of the above diagram, the engineer can then “bounce” these tracks through a mixing board to a single track on a separate machine, thus opening three more tracks on which to record. This process, and the increase to machines capable of recording 24 tracks of audio, allowed nearly limitless possibilities. It also led to track notes such as those in the image below for Mike Oldfield’s 24-track recording “Taurus II.” New Digital Audio Workstations allow musicians to record on an infinite number of tracks, but they also display the music on the computer monitor, creating an interactive version of the track notes seen below.