PAT 200/500
Recording and Mixing PART 1:
Microphone Technique and Concepts

Overview

In this assignment we will learn basic microphone concepts and terms.

We will use a microphone virtualization system, the “Townsend Sphere,” to simulate a recording engineer’s in-the-recording-studio decisions.

These decisions, such as microphone type, positioning, polar pattern, proximity, etc., would be **committed** at the time of recording, and would be **impossible** to change after the recording has been made.

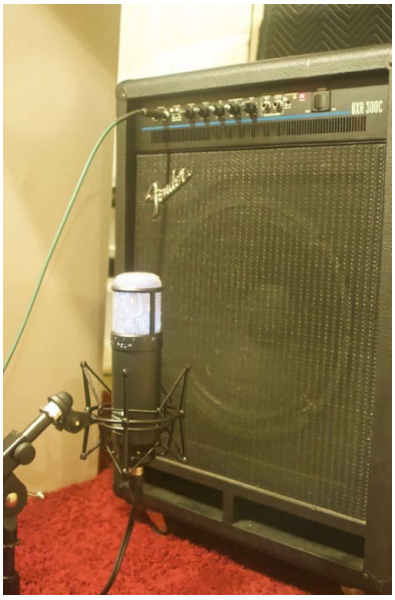
The “Townsend Sphere” virtualization system is powerful because it allows us to **change** microphone type, positioning, polar pattern, proximity, etc., **after the recording has been made**, leading us to new creative possibilities and learning opportunities.

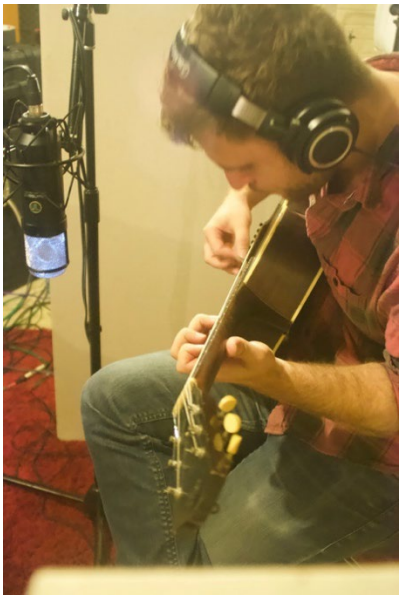
The software will:

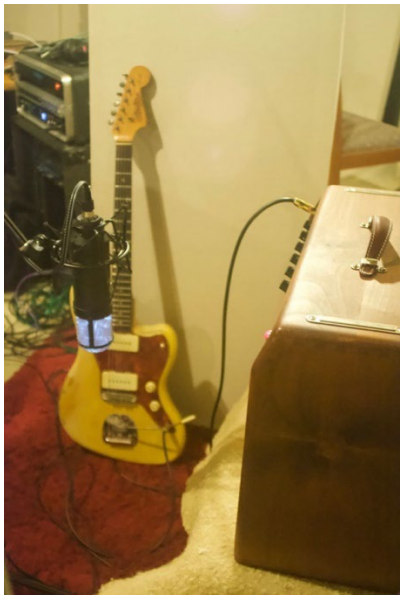
- Help you develop critical listening skills
- Learn about the various aspects of microphone selection and positioning
- Familiarize you with some of the common mics found in commercial recording studios

“In an Ocean” by the Skeleton Birds was recorded entirely with the Townsend Sphere. For each track you will be able to make microphone selection and positioning decisions.

The positions of the Sphere microphones for drums, bass, acoustic and electric guitars are pictured below - note the use of two Spheres in the drum setup.







PAT 200/500
Recording and Mixing PART 1:
Microphone Technique and Concepts

Note: Every track in this session was recorded using the Townsend Sphere L22 microphone. This is a special microphone-modeling system that requires the use of the Townsend plugin as the first plugin on each track. Removing or Bypassing the plugin will result in a less than desirable sound! We will be exploring this plugin in the next mix exercise, so for now, please leave it as is!

To work on your own computer, please download and install the **Townsend Plugin. The installer is available on the Canvas assignment page.**

Learning Objectives

- Develop critical listening skills
- Explore the sonic differences of various **microphone types** (Condenser, Dynamic, Ribbon) and **models** (Neumann, AKG, Sony, etc.)
- Discover how microphone **frequency response** affects the timbre of a recording
- Explore how the **polar pattern** of a mic affects the captured sound
- Discover how the **on/off axis response** of the mic affects the sound
- Discover how the **proximity effect** affects the frequency response of the mic
- Discover how the mic **filter** affects the frequency response of the mic
- Explore how the Townsend Sphere plug-in allows you to simulate a two-mic setup (recorded with one Sphere mic) and how it can be used to create interesting timbres via different **microphone types** and **phase alignments**.

PAT 200/500
Recording and Mixing PART 1:
Microphone Technique and Concepts

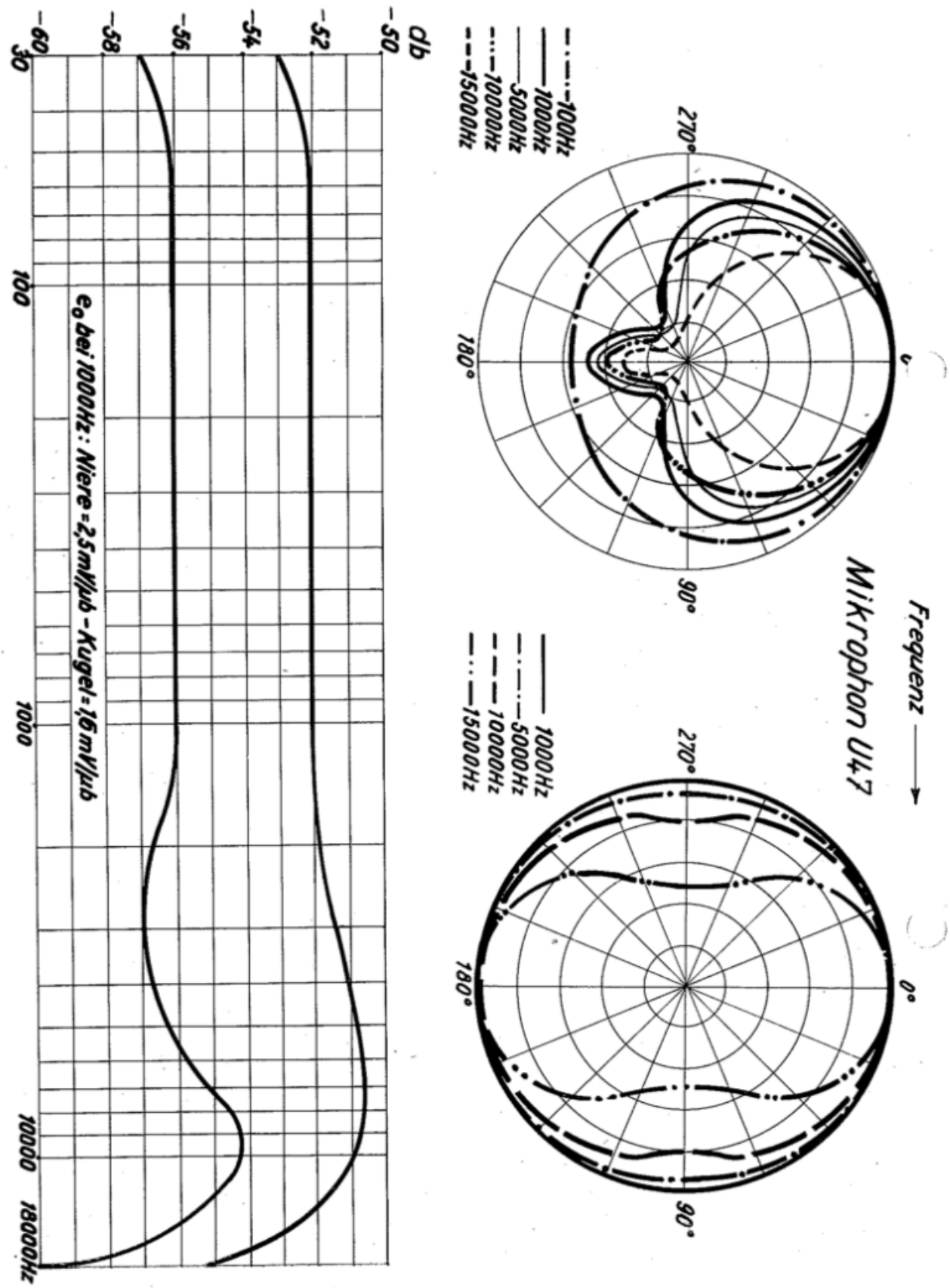
Part A
Critical Listening - Microphone Selection - Frequency Response

As you have discovered in your reading and our discussion in class there are many decisions that need to be made when recording a source. In the case of this assignment the positioning of the microphone with respect to the source has been predetermined, although some changes to that position can be simulated. [See Pictures Above]

In Part A you will hone your critical listening skills by listening to the sonic characteristics of different microphones. Since we are using microphone virtualization, all of the variables of a recording can be held constant while you explore the sound of different microphones and their inherent frequency responses. As you begin to explore the different microphones available in the Townsend Sphere plug-in, it may, at first, prove difficult to hear the differences between models. Be patient, the more time you spend exploring the better you will be at hearing these subtle differences and eventually it won't seem that subtle anymore!

[TIP: *When trying different mics pick a specific frequency band (low, mid, high) to focus on and toggle between two models. Start with the low aspects of the sound and switch back and forth until you can hear how it is changing, then repeat this with the mid and high frequencies. This will help you to hear the sonic differences and develop your critical listening skills. It is also important to use high quality headphones or studio monitors.***]**

1. Open up the Ableton session "In an Ocean" and "save as" to create a new project file "In an Ocean PART 1." **Solo the vocal track.** Make sure an instance of the Townsend Sphere plug-in is instantiated on the track. *Note: The Townsend Sphere mic utilizes a stereo file (front and back capsules) to create an accurate model of the mic being modeled.*
2. Create a looped section of one of the vocal phrases and open up the Townsend plug-in. Listen a few times to the sound of the U47 (LD-47K in Townsend plugin).
3. Click on the picture of the mic to advance to the next microphone model and listen to a couple of passes.
4. Now click on the microphone name under the image and switch back to the U47. What sonic difference do you hear? Focus on the high frequencies first, then mid, then low. Try switching back and forth ("A-Bing" the two microphone models) a few times. Examine the frequency response chart for the U47 [See Image Below] and compare it to what you are hearing. Look up the frequency response to one of the other modeled microphones and see if what you are hearing corresponds to what you see.
5. Explore the various large diaphragm mics available taking time to "AB" (or toggle between) the various models.
6. Now try the ribbon and dynamic microphones, taking time to identify what you like and do not like about how they affect the sound of the voice.
7. As you move through the microphones try to identify two to three that you like the most. Compare those models against each other and then select a single model to use in your mix. Click the "i" button to read more about each mic.


db
-50
-52
-54
-56
-58
-60
30
100
1000
10000
18000Hz
e₀ bei 1000Hz: Niere = 2,5mV/µb - Kugel = 16mV/µb
100Hz
1000Hz
5000Hz
10000Hz
15000Hz
270°
180°
90°
0°
Frequenz
Mikrophon U47
1000Hz
5000Hz
10000Hz
15000Hz
270°
180°
90°
0°

PAT 200/500
Recording and Mixing PART 1:
Microphone Technique and Concepts

Part B
Critical Listening - Polar Pattern and Axis

In Part B we will discover how the polar pattern, axis positioning, proximity and filters affect the sound captured by the microphone.

1. On the vocal track, open the Townsend Plugin and switch back to the U47. Locate the Polar Pattern control. Some microphones offer multiple polar patterns; others are fixed in a single pattern. In the plugin, the patterns with green indicators are the actual polar patterns that are available on the real mic hardware. The other patterns are virtual and simulate versions or behaviors of the microphone that do not actually exist.
2. The **polar patterns** describe the directionality of the microphone, essentially from what direction the mic is picking up sound. For instance, if you select cardioid, sound is captured at the front of the mic and rejected at the back. However, it is not that simple! The true polar pattern of the mic is frequency dependent, often describing how the mic behaves with upper-mid to high frequencies, not the entire range.
3. With the vocal track solo-ed and a phrase looped, try exploring different polar patterns. First try the original patterns (labelled with green dots), then move through the entire range. More directional patterns like **super-cardioid** and **cardioid** should capture less room sound, since the reflections off the back wall of the room are being rejected/attenuated. This will give a more isolated sound, possibly with some coloration of the recorded frequencies. If you choose **omni** directional, where the response is quite even all around the mic you will have a sound that is truest to the sound as it would have been heard in the room.
4. Choose a few of your favorite mics from Part A and explore how the polar pattern can change the sound.
5. Now let's explore the **Axis** control. We say a mic is "on axis" if it is pointed directly at a source (e.g. a singer's mouth) and off axis as we rotate the front of the mic capsule away from the source. If we choose a directional polar pattern such as super-cardioid or cardioid we will hear a noticeable change in the timbre as the microphone will begin to reject certain frequencies. Why might we want to do this? Perhaps your source sounds a bit harsh or **sibilant**. By rotating the mic slightly away from the source you might be able to reduce this and capture a better sound.
6. Experiment with the axis control with other polar patterns selected, try bi-directional "figure of 8" and even omni. Because these recordings were made with a close-positioned mic in a relatively dry / non-reverberant environment, you probably won't hear too much change on most mics when listening to omni patterns with axis changes.

PAT 200/500
Recording and Mixing PART 1:
Microphone Technique and Concepts

Part C
Critical Listening - Proximity and Filter

Proximity effect is a low frequency boost that occurs when a directional microphone (cardioid patterns and "figure of 8") is placed close to a source. This low end enhancement can be beneficial if you need to get more low end out of a source, however, it can also make source sound muddy. The proximity control on the Townsend plugin allows you adjust the amount of proximity effect in your recording - this would be akin to moving the mic closer (turn towards +100) or farther from a source (-100).

The plugin's **Filter** control simulates the **High Pass filter** found on many microphones. This common microphone filter is often used to avoid picking up rumble from the floor and/or building heating/cooling systems, and also to lessen the proximity effect when close to a source. Also contained in the filter control is a **Pad**, a control on a mic that reduces its sensitivity so that loud sources can be recorded without distortion or overload. **NOTE:** The Pad control is only available for certain microphones, where it will be listed as one of the three filter options. The Townsend plugin models the Pad for microphones where the pad results in unique sonic characteristics.

Note*: when you add the Pad in the plugin the signal is not attenuated.*

1. Open the Townsend Plugin and switch to the U47 (LD-47K) cardioid on the solo-ed vocal track.
2. Locate the **Proximity** control and slowly move it back and forth focusing on how it affects the timbre of the voice. You should hear a slight increase in the lower frequencies.
3. Try the effect out on a few different mic models and find a setting that you like.
4. Set the proximity back to 0 and now explore how the **Filter** affects the timbre. You should hear some of the low end roll off.
5. Next, find a mic that has a modeled **Pad** and listen to hear how it is changing the sound. You may need to switch it on and off a few times to hear how it is changing.
6. Now that you have gone through all of the basic controls on the Townsend plugin, it is time to fine tune each control to get a vocal setting that fits the song. As we move forward in the Recoding and Mixing Assignment, continue experimenting with different microphones on all tracks. EQ, Compression, Reverb and Delay will bring out the differences in microphone type.

WRITE UP: Please tell me how you used the Townsend Plugin in your mix. Can you hear the difference between microphones? Was adjusting polarity and axis useful? Did they improve the mix? Did you have any issues? Do you have any suggestions for this handout? **Submit your write up to Canvas by the deadline.**