

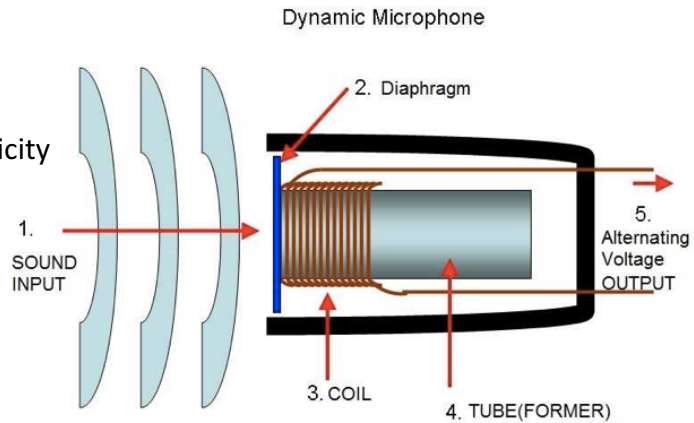
Maximizing your Microphones!

General Info

Transducer types

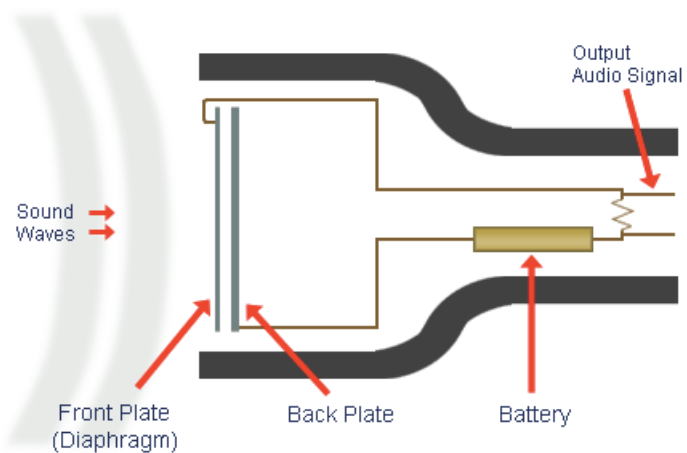
Dynamic

- the opposite of a speaker
- Uses a coil floating over a magnet to create a small amount of electricity
- Very durable, but lower quality and less sensitive
- Great for Live/Loud/Outdoor



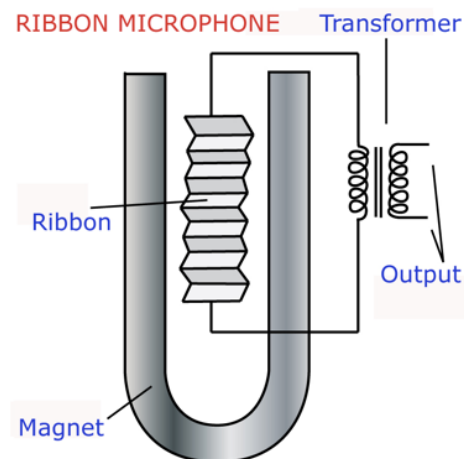
Condenser

- Uses Phantom Power to create a static electric charge between two thin pieces of metal
- Very sensitive, much better quality, but more delicate
- Great for studio recording



Ribbon

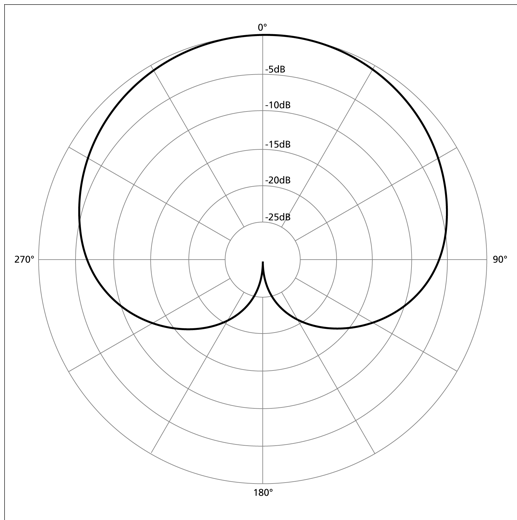
- A really thin (2-4 micron) ribbon of metal surrounded by a magnet
- Sensitive, but low power output.
- Great warm sound, but delicate
- Very rare to see these



Pickup Patterns

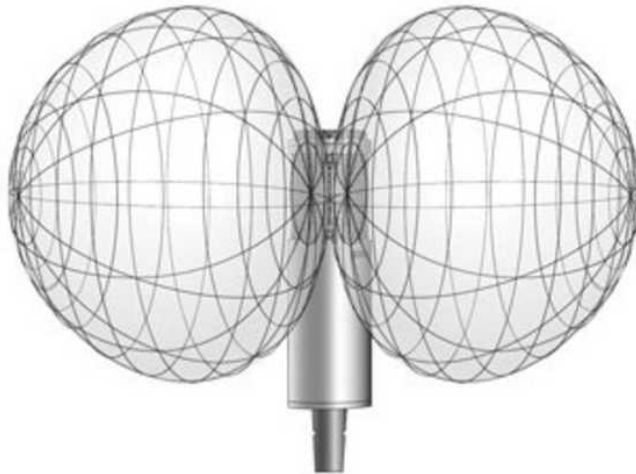
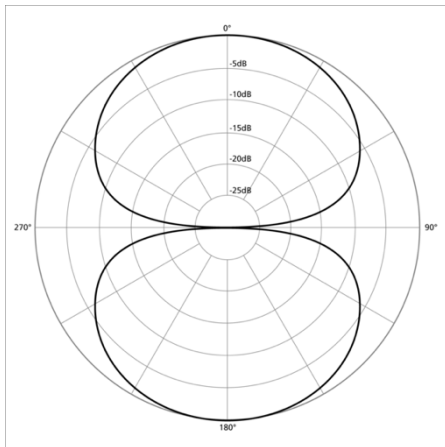
Unidirectional (cardioid, hyper/super cardioid)

- Hearing in “one” direction. Cardio = hear, cardioid = heart shaped pattern
- Can come in a more narrow Hypercardioid (Supercardioid/Shotgun mic) pattern



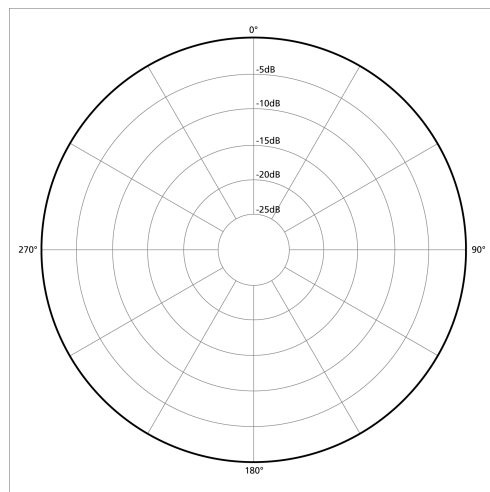
Bidirectional (Figure 8)

- Hearing in two (opposite) directions



Omnidirectional

- Hearing in all directions.
- Omnivore eats everything,
- omnidirectional hears everything.
-



Physical Format

Large/medium diaphragm condenser mics are typically used in a studio or one one instrument. They also sound great live, but are large.

Small diaphragm mics are very popular for live situations, but do not get the same low frequency response.

Micro styles are very small. The tiny surface area doesn't do as well with low frequencies, but they are really convenient

Dynamic mics typically don't sound as good on strings. SM57s are ok.

Podium mics– Usually a hyper-cardioid pickup pattern, and are usually small.

Can be a good double for strings.

Hanging mics – Usually small diaphragm condenser mics. Really versatile and convenient.

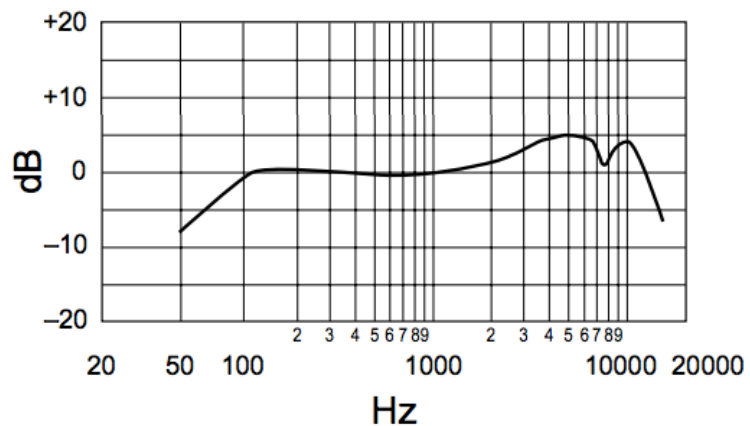
Portable Handheld Recording setups give quite and accurate representation, but not at the highest quality. Great for recording solos and rehearsals, not great for concert recordings.

Quality and cost

Mics have many descriptions to help assess quality. EQ response is one of the more telling signs. Your “perfect ear” would hear a flat line at 0 dB. That is to say, your ear is no different from “reality”. The graph below shows how the mic differs from “reality” due to its physical and mechanical characteristics. The mic below performs well in the 100-1000 Hz range. Below 100, the mic is not as sensitive to (and will not pick up as well) low frequencies. Between 3 and 10 kHz, the mic is overly sensitive. Therefore, it may sound bright or harsh as the upper order overtones are slightly accentuated.

SM58 - \$99 – “Vocal mic”

Frequency response



Find a friend or vendor that you trust to get opinions. Quality and cost are directly related. However, the law of diminishing returns applies. \$200-\$800 per mic will set you up nicely for concert recording.

Recording Ensembles

Environment

- Avoid using your classroom unless it really does sound good, and you have a fair amount of space in front of the group before the wall.
- Place mic pairs at least 10' up and 10' behind the conductor

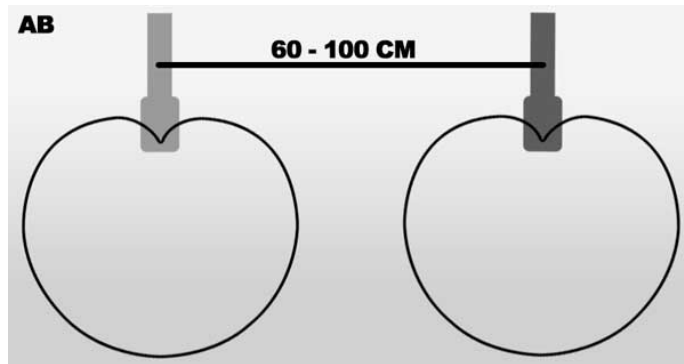
Microphones

- At least a pair, as many as you want
- The best you can get
- Do not send the sound of these mics to your main speakers if you are amplifying

Common Stereo Recording Techniques

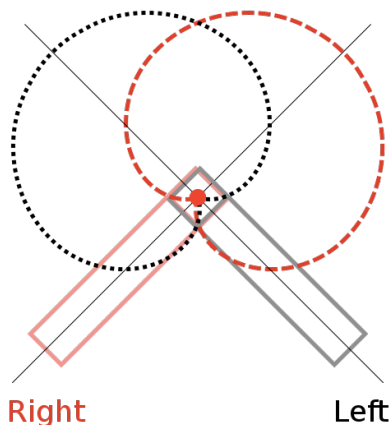
AB

- very straight ahead and easy to set up. Can sound passible in most environments
- Really common for large groups, esp. concert bands.
- This is frequently used with choir, and at CMEA



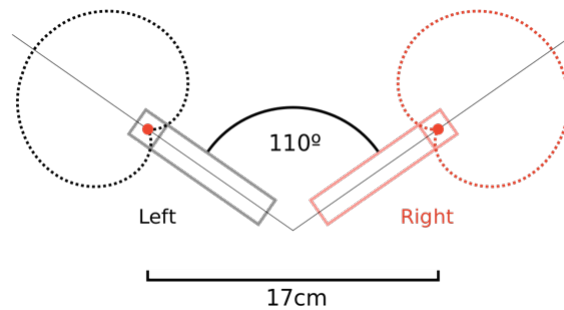
XY

- easy and versatile, works in many environments
- Two mics placed at a 90 degree angle. A wider angle may be used for a wider image, especially if they are very close to the ensemble.
- The capsules need to be as close together as possible
- Unidirectional mics are best for this. Figure 8/Bidirectional may be used to capture more "room" sound. This is called a Blumlein Pair



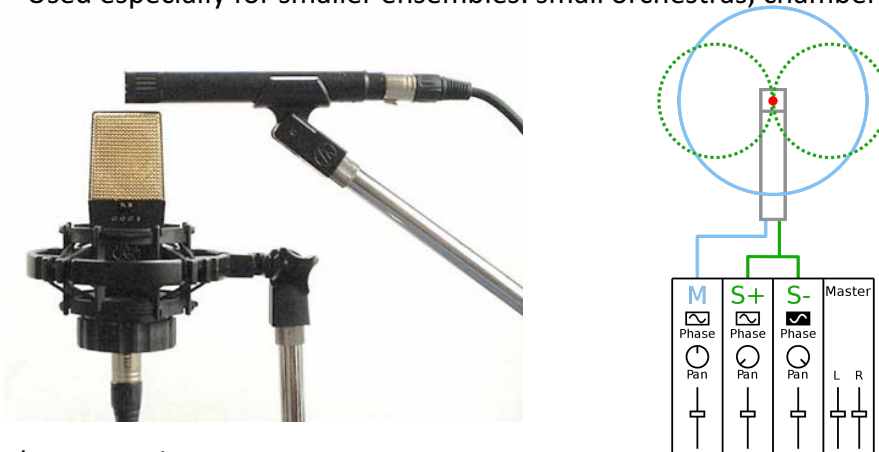
ORTF – Office of Radio and Television of France

– great sound, but one of the hardest to get “tuned” into a space



MS – Mid Side

- great sound, but requires nice mics and some know how.
- One unidirectional or omnidirectional mic facing the ensemble (for a center sound) and one bidirectional mic facing the walls to the left and right of the ensemble.
- Used especially for smaller ensembles: small orchestras, chamber ensembles, solos.



More than two mics

- Individually mic for each section sounds nice, but hearing more than just the people closest to the mic can be hard. Still recommend at least one ambient/room mic

Amplified/Live Situations

- Be conscientious of where your speakers and mics are placed. Feedback is the enemy
- Try to stick with small unidirectional mics
- If it's a really loud environment use dynamic mics or sound shields
- Consider how each instrument creates sound and where it comes out of the instrument.
- Changing the direction you aim the mic at the instrument can drastically alter its sound.
- Guitar
 - o over the fingerboard: warm, rich, mellow
 - o At the bridge: bright, raspy
 - o Over the tone hole: boomy tone, finger/pick noise
- Woodwinds
 - o Aiming at the bell or “end” of the instrument is usually not the best.
 - o For Flute, 6-8” away from the flute, aimed at the lips, slightly higher than, and slight off to the right (looking head on, the flute on the left)
 - o Clarinet and sax: 12” away aimed at the tone holes/fingers
 - o Certain pitches will often over resonate due to aim or resonance

- When this does not work due to proximity or volume, revert to the bell/end of the instrument
- Strings
 - I try to aim to get the F hole and string/bow/contact point in the “image” of the mic on the bass side
 - While this is often too bright with the bow noise, rolling off around 2k or 5k on the EQ for the mic can often correct this
 - Strings are one of the hardest things to mic and get to sound “real”. Instead of fussing so much with trying to get it to sound “real”, maybe embrace a more electronic amplified sound.
- Brass
 - Going fairly close to the edge of the bell is fine
 - Avoid pointing the mic straight down the bell
 - Aim to the side wall of the bell

Some mics I like

Consider versatility - can you use the mics for the singers in the musical? A podium mic? Hanging? Prices are per EACH mic. Some pros and cons are listed.

For recording:

Rode NT2a – \$400, AB MS or ORTF, fairly large so better for studio than on stage

Rode NT5 - \$215, ok sound, AB or MS. Great double with pit/front ensemble in marching band.

Miktek C7e - \$900, AB XY MS ORTF, really versatile, beautiful sound, physically large

DPA4098 – \$560, A pair in AB, can double for podium, can also be XY or ORTF, good solo mic

For amplified sound

Shure SM57 - \$99, the lowest cost mix I would use live. Doubles for most instruments. Decent sound, but not lovely.

Isomax2 - \$263, very small, meant for instruments

Countryman e6 - \$450, great head-worn mic for singers, can use on instruments

DPA4099 - \$620, multiple models for different needs, great instrument mounts, pricey

Not a mic, but Fishman (and other pickups) can be used both for live and recorded sound. Loss of some low and high frequency content results in a more nasally sound quality. But they tend to be cheap and easy.

How do I afford this? Partners!

Band – Marching Band (Front Ensemble), Jazz solos

Choir - (piano, jazz)

Theater – Head-worn mics, hanging mics, podium mics

Music Tech – or theater tech, video production, etc

Technology Grants

Other Gear you may want/need

- Mic stands, telescoping or regular
- Black cable and fishing line to hang
- Quality mic cables
- Preamp and Interface
- Mixing Board
- Spacer Bar

Robert Stahly
Longmont High School
RJStahly@gmail.com