Audio Recording for Music Educators

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Lassiter High School, Cobb County School District

Hal Leonard Corporation

D'Addario Orchestral Strings

Eastman Stringed Instruments

www.orchestrateacher.net

Why record your students?

- Assessment
  - Teacher - self and students
  - Student's self-assessment
- "Microphones don't lie"
- Keeping a record of accomplishment
- Auditions / Promotion
- Do it yourself and save $$!

www.orchestrateacher.net

What & Where

- Classroom rehearsals / Private Lessons

- Concerts & Recording sessions

- Individual Performance Evaluations

- Audition recordings

- Home – for student study, listening, play/sing along

Typical Recording Set-ups

- On the go

- Classroom

- Home Studio or Practice room

- Concert Hall/Auditorium

Choosing Equipment

- Can you use what you already have?

- Seek the advice of professionals or other teachers

- Establish a relationship with a vendor

- Read reviews!!

- **Buy the best you can afford**

Recording Devices

* **Handheld Digital Recorders** (saves to SD card)

* Audio Interface and computer (saves to hard drive)

* USB Microphone and computer (saves to hard drive)

* Mobile Devices: Phones, Tablets

* OLD TECH: Minidisk, CD Recorders, Cassette

* *Some audio recorders can double as a USB audio interface!*

Basic Principles of Recording

- Live **stereo** recording = our main focus

- Acoustical Terminology

  - Hertz (Hz)

    - Frequency Range

    - at birth human hearing is 20 – 20,000 Hz

    - Double Bass open E string = 41 hz

  - Decibel/SPL

  - Ambient Noise (Room Background Noise)

Handheld Digital Recorders

- **Many** different models available today

- Record to a memory card

- Becoming more affordable than ever

- Options to consider when purchasing:

  - Price ($99-$2000)
  - Audio quality
  - Size
  - Battery

  - Storage (media)
  - Input/Output
  - USB (USB-A or USB-C)
  - Special Features

Handheld Digital Recorders

- **Tascam DR-07X (~$120-140)**

  - Good first recorder, inexpensive

  - XY or AB microphone settings

  - Only 1/8" mic in

  - No XLR mic in

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Handheld Digital Recorders

- **Zoom H4n Pro (~$250)**

  - 90 or 12 degree microphone

  - Two XLR/TRS mic/line inputs

  - Record 4 channels simultaneously

  - Lots of flexibility

  - Doubles as Audio Interface

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Handheld Digital Recorders

- **Zoom H6 (~$350)**

  - Comes with several microphone capsules

  - Capsules are removable/interchangeable

  - Four XLR/TRS inputs for mics/line

  - Record 6 channels simultaneously

  - Lots of flexibility

  - Doubles as Audio Interface!

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Make your phone high fidelity!

- **Shure MV88 (~$150)**

  - Stereo mic

  - Plugs into lightning port of iPhone

  - Capsule has lots of recording options (Figure 8, M/S, etc.)

  - Use special app to control mic

  - Much better than built in mics

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Make your phone high fidelity!

- **Zoom Am7 (~$99)**

  - Rotating Capsule

  - Plugs into USB-C port of Android

  - 3-way stereo mode switch - select from 90°, 120°, and mid-side stereo modes

  - Works with any audio or video app

  - Much better than built in mics!!

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USB Microphones (so simple!)

* **Blue Snowball ($49)**

* **Rode NT-USB Mini ($99)**

   * Full-range, high quality sound

   * "Plug and play" into USB port

   * Works with any audio or video app including Zoom, Teams, Meet

   * Much better than built in laptop mics!!

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USB Microphones (cont.)

- **Samson Go Mic Portable USB Condenser Microphone ($49)**

  - High quality sound

  - "Plug and play" into USB port

  - Clips to top of laptop, standin, or mounted to a stand

  - VERY compact! (Folds up!)

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Video Camera with **GREAT** sound!

- **Zoom Q8 (~$348)**

- High quality sound **with** video

- *Doubles as audio interface!*

- Built in XY stereo mic

- Two XLR inputs for external mics

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Audio Interfaces

- **Plug and play into computer (USB)**

- Start at about $99

- MANY CHOICES!

- **Things to consider:**

  - Number of microphone inputs

  - Audio quality/construction

  - Ease of use/software

Audio Interfaces

- **Focusrite Scarlett 2i2**, Gen 3 ($169)
- 2 Mic/Line Combo inputs

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Audio Interfaces

- **Focusrite Scarlett 18i8**, Gen 3 ($419)

- 4 Mic/Line Combo inputs

- 2 headphone jacks

- MIDI/Digital audio I/O

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Recording Equipment List

Listed in order of the signal flow:

* Microphones

* Microphone Stands

* Microphone Cables

* Audio Interface

* Recording Device(s) and media

* Surge protector/power conditioner

* Headphones and/or Audio Monitors (speakers)
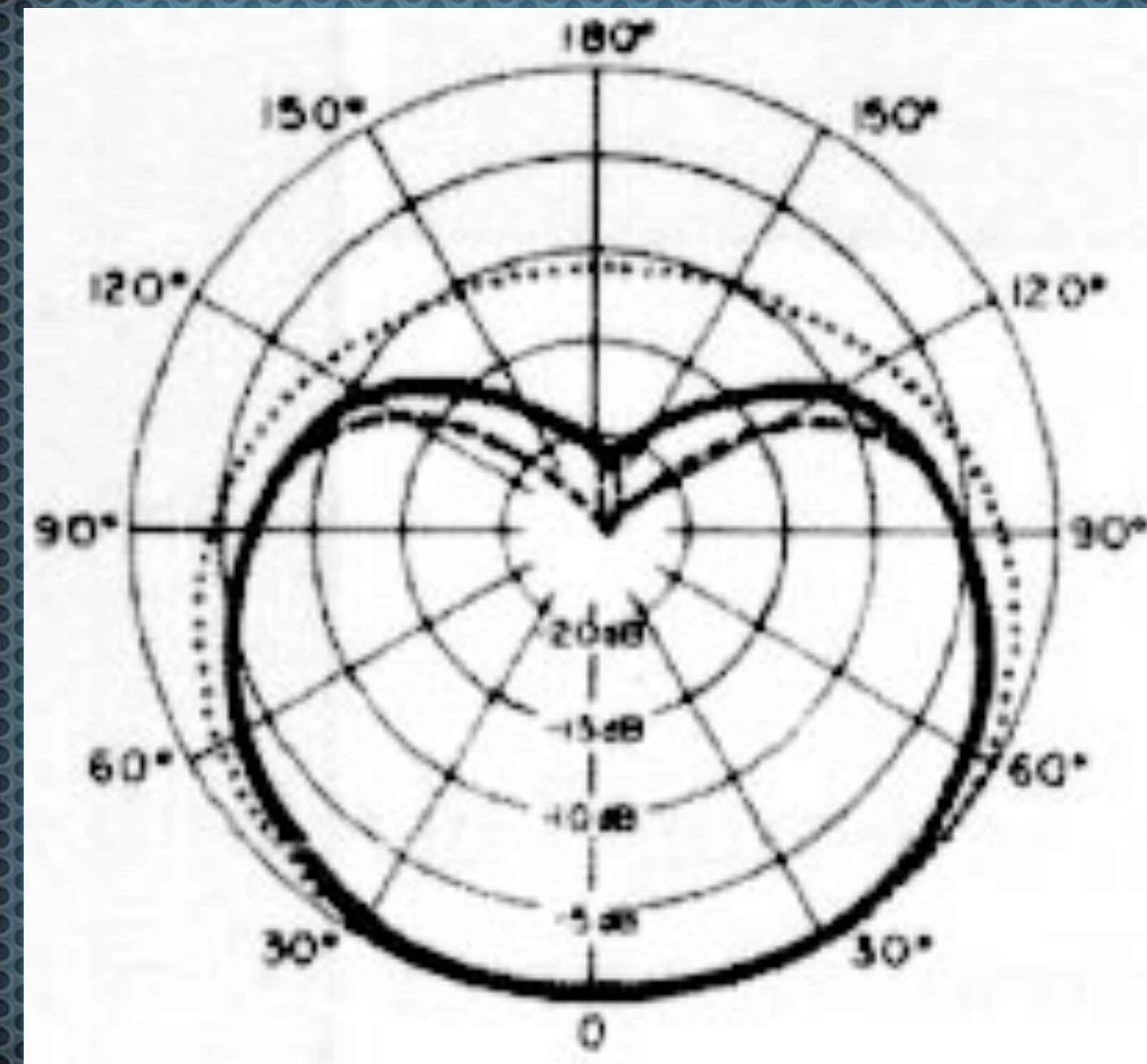
Microphones

- Choosing the correct type

  - Dynamic

  - **Condenser**

- Polar patterns – **cardioid** (unidirectional), omnidirectional

- Purchase stereo "matched pairs" of condenser microphones

- Stereo microphones - "2 in 1"

Cardioid Pattern Mic

Back

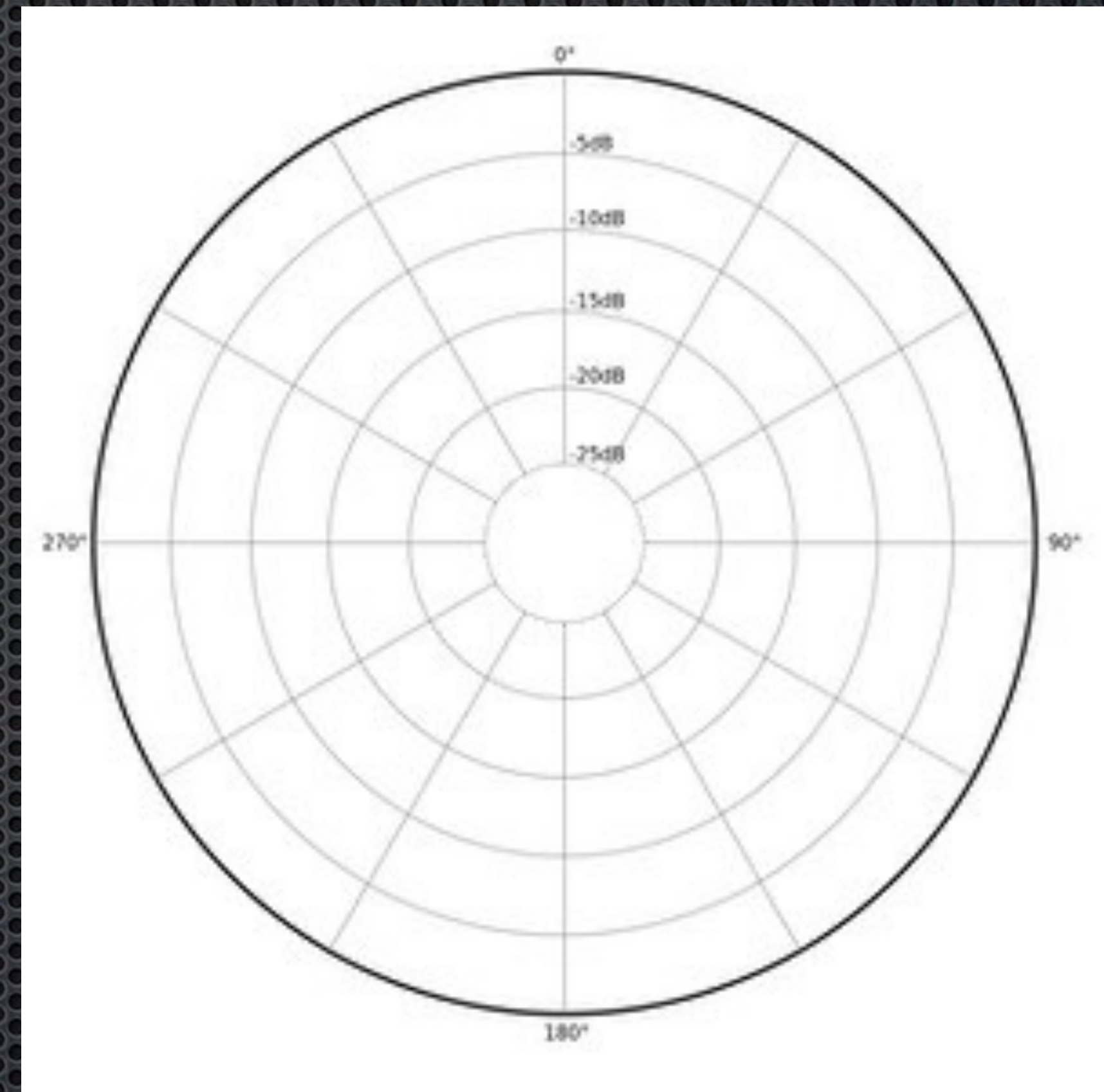- Picks up sound from the **front** of the microphone

- Rejects sound from the back

Front

Omnidirectional Pattern

* Picks up sound **360 degrees** (sphere)

* Not the best choice for most live applications - picks up audience sound

Stereo Microphones

* Ease of use - "Point and Shoot"

* May lack stereo spread of using dual microphones (versatility)

* Usually more expensive than buying a stereo pair of microphones

* Popular stereo microphones:

  * Rode NT4, Audio Technica 825, ShureVP88

Microphones

- Shure SM58 Cardioid Dynamic Vocal Microphone (~$99)

- Great handheld vocal mic

- Durable!

- Samson C02 Small-diaphragm Condenser Microphone - Stereo Pair (~$129)

- Inexpensive matched pair

- Rode M5 Matched Pair with Stands, Cables, and Stereo Bar (~$200)

- GREAT value

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Microphone Stands

- Recording Individuals

  - use standard **boom** mic stands

- Group recording (on stage)

  - use *very* high stands (10-14 ft)

  - photography light stands

  - May require adapters for threading

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Cables

- Use best cables you can afford

  - Reliability, Signal quality

- Types

- XLR - 3 pin (microphone)

- 1/4" Tip Sleeve (TS, unbalanced)

- 1/4" Tip Ring Sleeve (TRS, balanced)

- 1/8" (3.5mm) stereo plug

- RCA (patch)

Steps to Recording

Follow the signal path!

- � Mic placement

- ✖ Cable placement

- ✖ Capturing your sound

- ✖ Edit & Master (optional)

- ✖ Distribute or Duplicate (optional)

Microphone Placement
(Individuals)

* Balance of direct/indirect sound

* Every instrument has specific places mic sounds best

  * Strings (generalization) - a few feet in front of the instrument pointing at the f-holes

  * Experiment to find the sound you like

Microphone Placement
(Ensembles)

- Distance
  - Room characteristics
  - Reverb
  - Ensemble size
- Height
  - Generally 6-8 ft. above the conductor's head (this is why you need tall stands)

Cable Placement

* Leave some **Slack** (incase you need to move them)

* Use **Gaff tape** on floors across walk ways (to avoid tripping on cables)

* If available, use a good **power conditioner** to reduce hum, noise, etc.

* **PRO TIP**: Don't run signal cables in-line with power cables. Cross them perpendicularly when possible.

Capturing Your Sound

- Make all connections are made before applying power to devices.

- Check levels on mixer. Should be in middle and peak in yellow.

- Check levels on recording device. Should never hit "the red" to avoid clipping.

- Rehearsals vs. performances

Capturing your sound (cont.)

- Begin recording well before the downbeat

- Stop recording after applause is over

- Separate track vs. continuous recording

  - Some recorders have file size limits and can cause gaps in recording

- Some recorders offer "back-up" tracks incase levels get too loud

Listening to your recording

* During recording, be sure to have sealed over-the-ear headphones to monitor what is being recorded

* For editing/mixing, etc. it's best to have audio monitors (speakers) so you can hear the full range of sound

* Computer or stereo speakers work, but they generally "color" the sound

* For best results use stereo monitors (speakers)

Headphones/Monitors

- Sennheiser HD 280 Pro Closed-Back Studio and Live Monitoring Headphones ($99)

- JBL 305P MkII 5-inch Powered Studio Monitors - Pair ($239)

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Setting Input levels

- If possible, test to capture loudest sound before performance and set levels

- Keep your input signal peak between -12db and -6db on the meters

- Best signal to noise ratio

- Setting levels too high will cause clipping

- Setting levels too low will capture noise

Setting recording levels

Too Low   Just right   Too hot! (clipping)

Stereo Microphone Techniques

- Experimentation with different types & scenarios is key

- There is no perfect microphone

- There is no perfect stereo technique

- Some require 2 microphones attached to a stereo T-bar on a single mic stand.

Stereo T-Bar

* Holds 2 microphones on a single microphone stand.
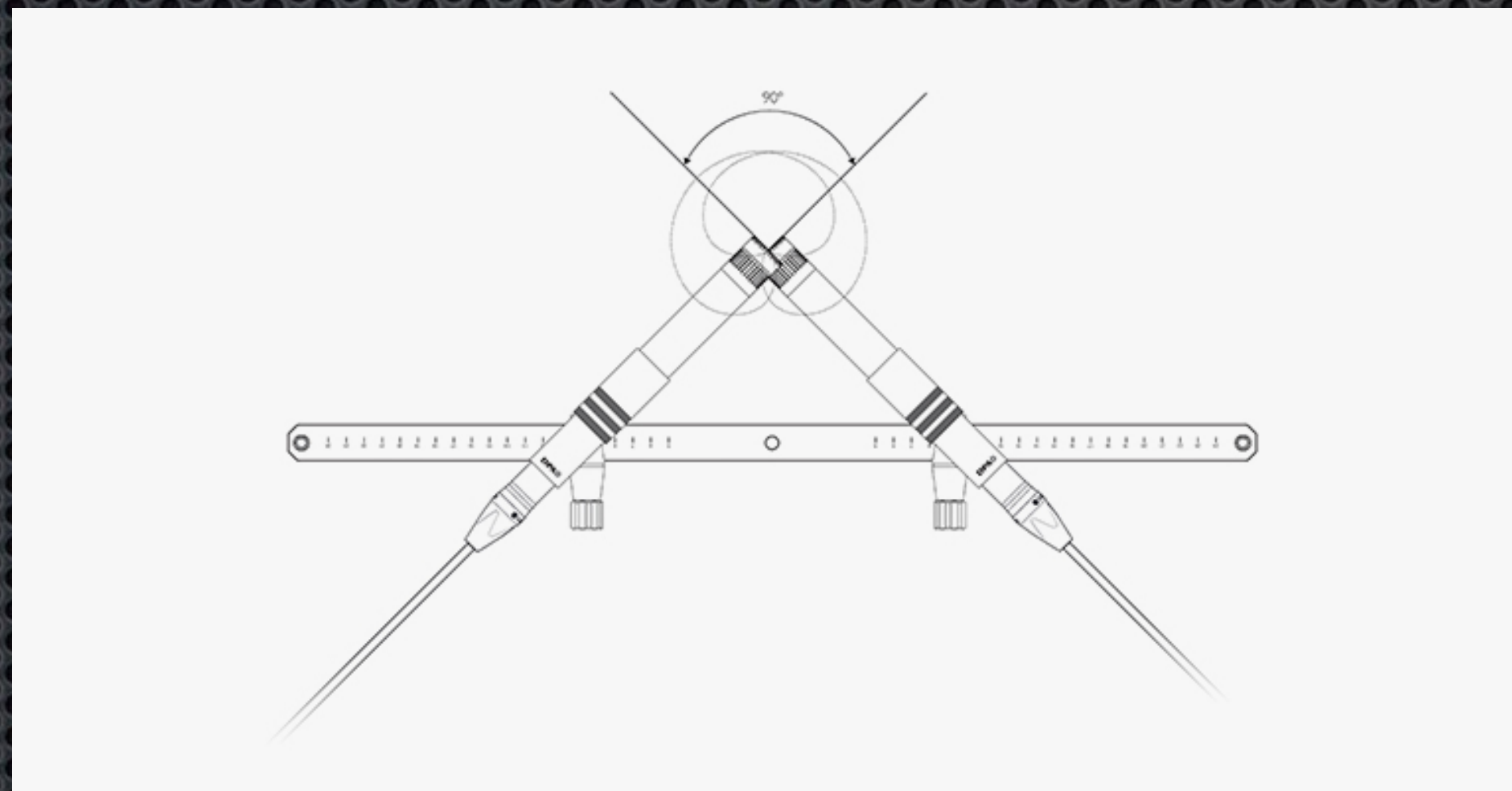
* Pictured: Sabra ST2 It has adjustable mic mounts

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X/Y Stereo

- Two cardioid mics with center of mic's capsule positioned at 90 degree angles.

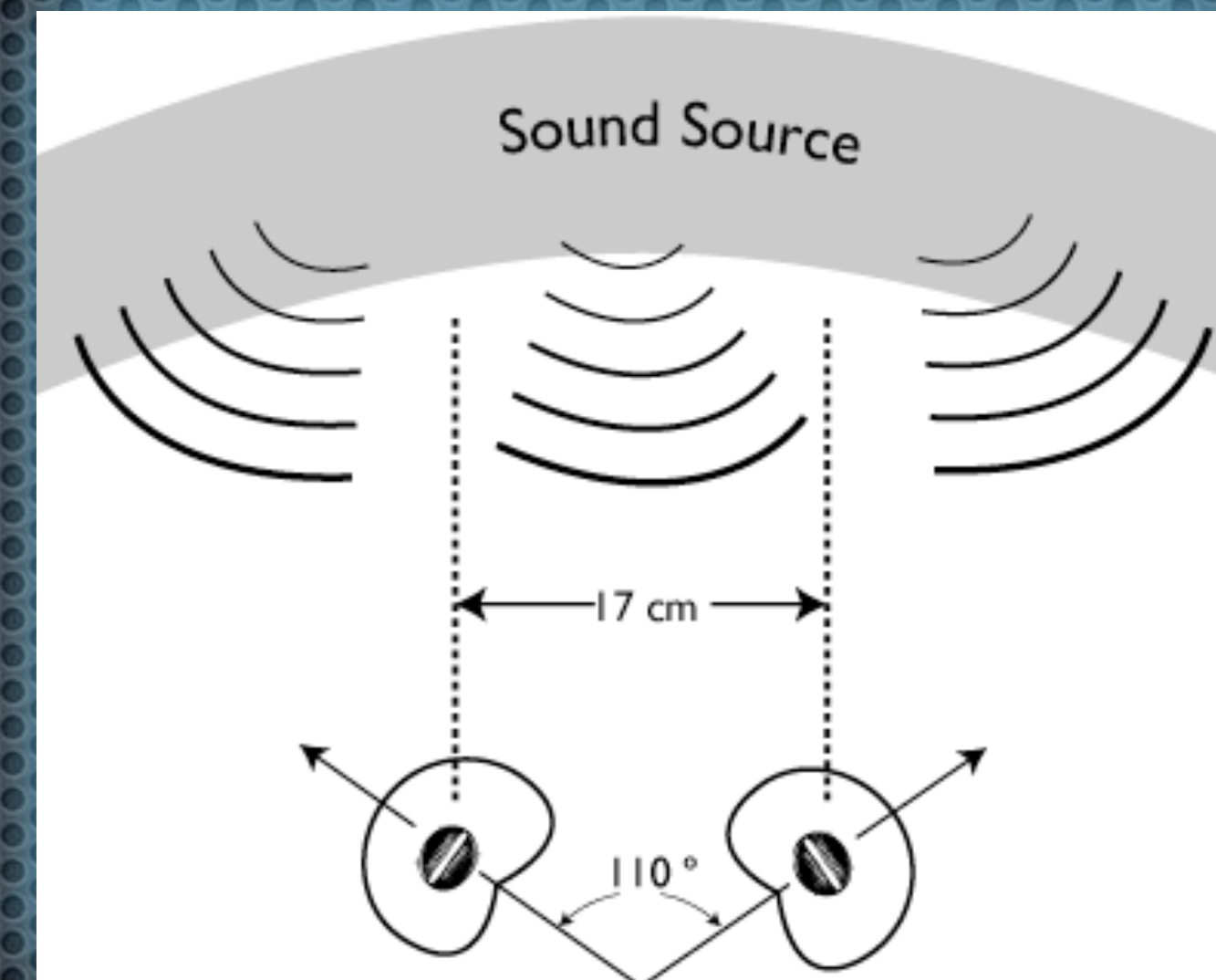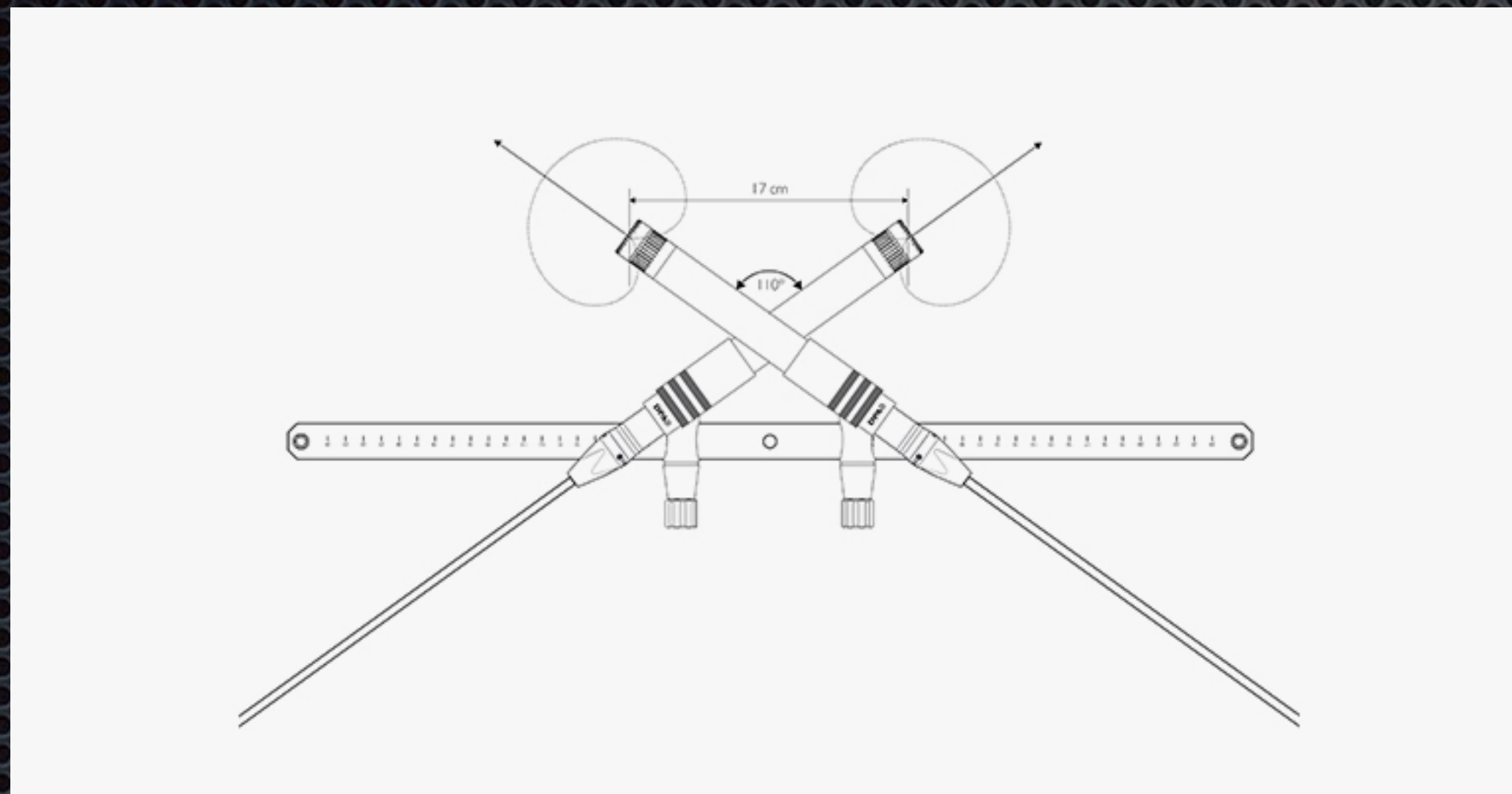- One on top of the other, **not** touching.

Top View

Photos from www.dpamicrophones.com

ORTF Stereo Technique

Top View

- Two cardioid microphones with a spacing of 17 cm (6.7 inches) between the microphone diaphragms, and with an 110° angle between the capsules.

Diagrams from www.dpamicrophones.com

A-B Stereo

- 2 cardioid microphones spread apart from each other.

- Can use a long stereo bar or 2 mic stands.

- Tricky to get the right balance, easy to mess up

  - If mics are placed too far apart, your recording will have "a hole in the center"

Stereo Mic Technique Review

- **X/Y** - good for smaller groups

- **ORTF** - good for larger groups

- **A-B** - good for large groups, but can be tricky

- Other stereo microphone techniques (not discussed today)

  - NOS
  - MS
  - DIN

  - Decca Tree
  - Blumlein

  - Binaural
  - Baffled

Editing Digital Audio

- **Single Track waveform editing**

  - Audio from stereo recorders, etc.

  - No mixing, just editing (effects, trim, fade, etc.)

- **Multitrack recording, editing, mixing**

  - Ability to mix/adjust each audio track separately

  - Effects, adjust gain/balance of each track

Editing Digital Audio

- Limited editing be done on some recording devices

- Easiest on the computer with software

  - Audacity, Adobe Audition, etc.

- Cut concert/recital into pieces, one song per file

- Cue to the start of each piece

- Fade applause (usually 8-12 seconds)

Mastering

- Good classical recordings **shouldn't** need much mastering

- "Normalize" levels - brings levels to maximum

- Other possible options:

  - Remove ambient noise

  - Add reverb if in a dry room (be tasteful)

- Competition entries = no doctoring the audio

Distribution

* When sharing, use a **compressed** audio format that will be compatible with all devices

* **MP3** is tried and true format for sharing.

  * Different compression settings. The higher the quality, the larger the file.

  * Recommend **256kbps** setting

Duplication

- Read, re-read, and follow all copyright laws!!

- Can copy CD's direct from another CD or from files on a computer hard drive

- Stand-alone duplicators work well too

  - Mechanical licenses (a license to duplicate a copyrighted recording) must be paid for if you are making more than one copy

  - **One copy is permitted for educational use only**

Typical Recording Set-ups

- Classroom

- Home Studio or Practice room

- Concert Hall/Auditorium

- On the go

Classroom Set-Up

- Your choice of recording device

- Hanging microphones (if possible)

  - Audio Technica ($80 - $300 each)

- Mixer?

  - Small to medium size

- Cables can be run over ceiling tiles and down front wall.

Concert Hall Set-up

- Tall microphone stand(s) or installed hanging mics

- Audio Interface

- Large mixer (if you do live sound)

- *Recommend to have several recording devices incase of failure. Second one can be less fancy.*

- Cabling can be tricky in a fixed installation (will need professionals)

Studio Set-up

- Recording device(s)

  - computer with audio interface

  - portable digital recorder

  - Single or stereo mic

- Standard microphone boom stand(s)

General Recording Tips

★ Experiment to get the best sound

★ Adjust microphone placement

★ Ensure levels are optimal without clipping

★ Research equipment by asking people about their experiences

★ Always record to more than one recording device in a live performance

Software

* Adobe Audition (Free for FCS Secondary Teachers, part of Adobe Creative Cloud)

* Audacity (Free, Mac/Win)

* Amadeus Pro ($40, Mac) - My editor of choice.

* Apple Garageband (Free, Mac)

* Apple Logic Pro ($199, Mac) - My DAW of choice.

* *Others?*

* *Some interfaces will come with bundled software!*

Special Thanks!

Questions? Contact Me!

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Slides, links and more information:

www.orchestrateacher.net