Audio Recording for Music Educators

Dr. Charles Laux, presenter

Alpharetta High School, Fulton County Schools
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 recorders can double as a USB audio interface!*

Basic Principles of Recording

- Live stereo recording = our 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 ($129)**
  - Good first recorder, inexpensive
  - XY or AB microphone settings
  - Only 1/8” mic in
  - No XLR mic in

Link

Handheld Digital Recorders

- **Zoom H4n Pro ($229)**
  - 90 or 12 degree microphone
  - Two XLR/TRS mic/line inputs
  - Record 4 channels simultaneously
  - Lots of flexibility
  - Doubles as Audio Interface

Link

Handheld Digital Recorders

- **Zoom H6 ($329)**
  - Comes with several microphone capsules
  - Capsules are removable/interchangeable
  - Four XLR/TRS inputs for mics/line
  - Record 6 channels simultaneously
  - Lots of flexibility

Link

Make your phone high fidelity!

- **Shure MV88 ($149)**
  - 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

Link

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!!

Link

USB Microphones (so simple!)

- **Blue Snowball ($49)**
  - 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 mics!!

Link

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!)

Link

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

Link

Demonstration of Zoom H6 (in my orchestra classroom)

- Main microphone
- Separate Small Mixer (Yamaha MG10-XU)
  - Harmony Director HD-200 keyboard
  - Dr. Beat metronome
  - iPad audio
- Two classroom microphones on boom stands

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

Link

Audio Interfaces

- **Focusrite Scarlett 18i8**, Gen 3 ($419)
- 4 Mic/Line Combo inputs
- 2 headphone jacks
- MIDI/Digital audio I/O

Link

Recording Equipment List

Listed in order by 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)

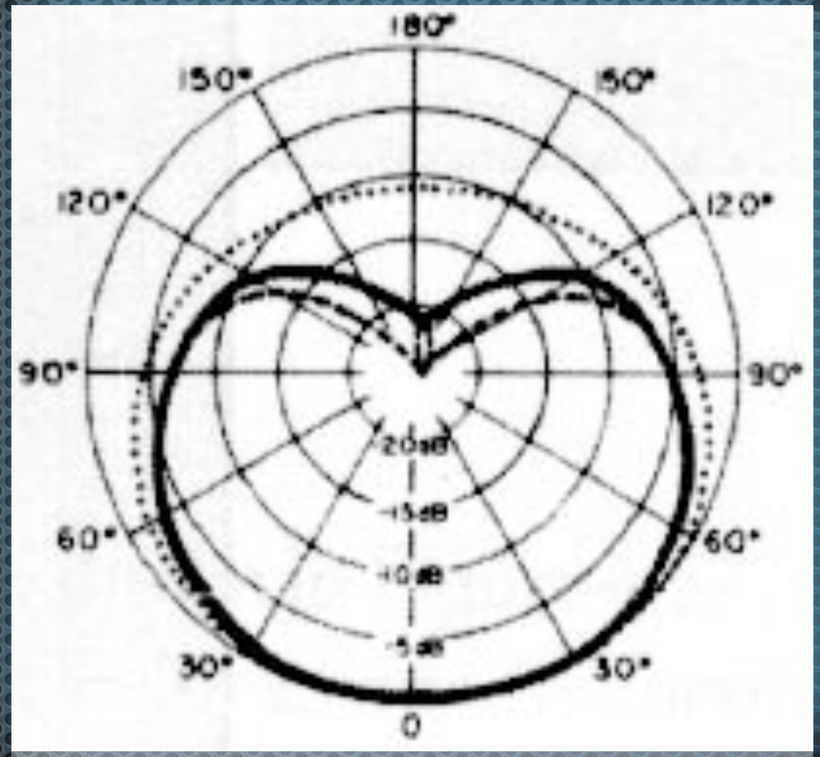
Microphones

- 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

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

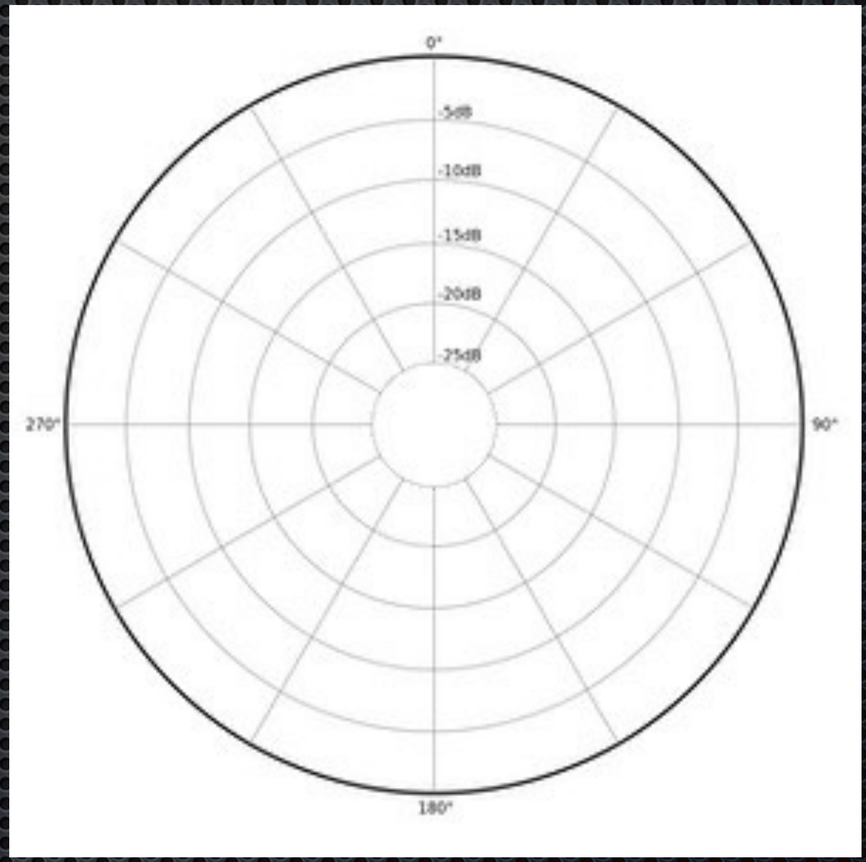
Back



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!

LINK

- Samson C02 Small-diaphragm Condenser Microphone - Stereo Pair ($129)
- Inexpensive matched pair

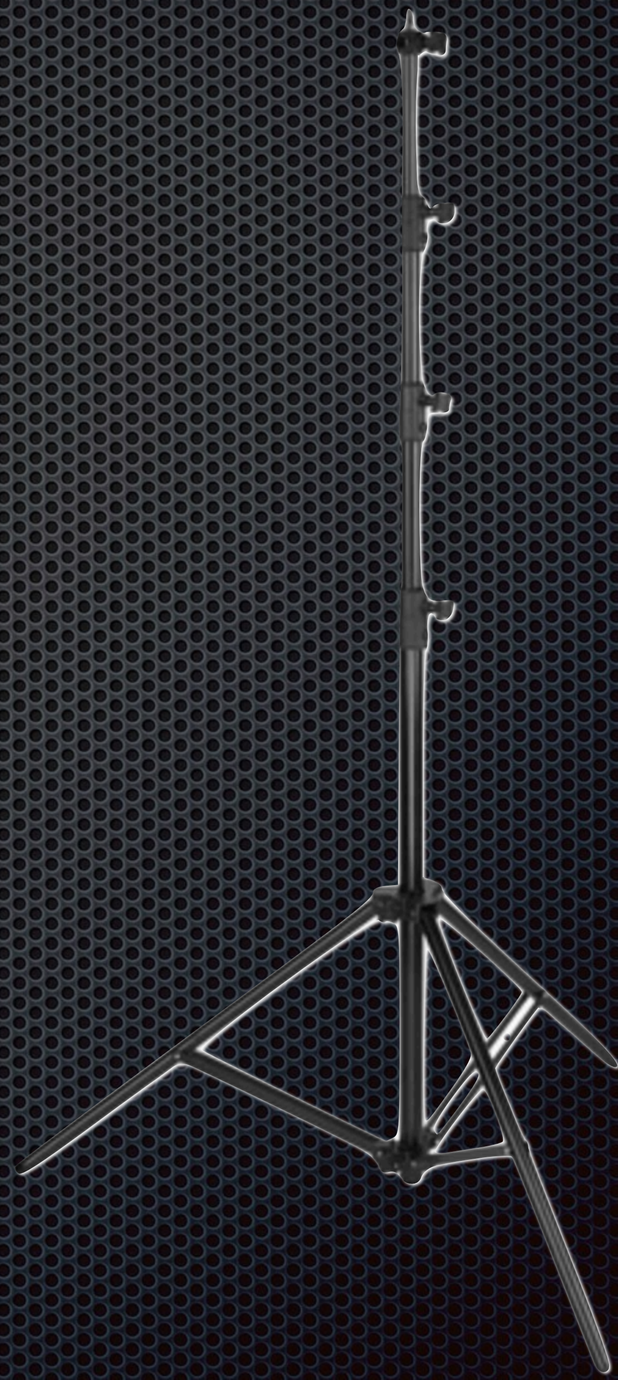
LINK

- Rode M5 Matched Pair with Stands, Cables, an Stereo Bar ($339)
- GREAT value

LINK

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



LINK

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.

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

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

Headphones/Monitors

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

LINK

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

LINK

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.

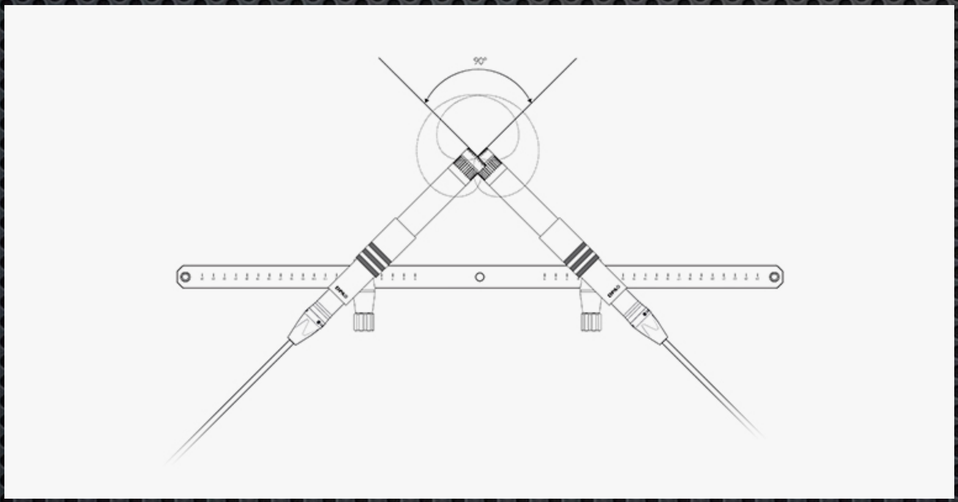
Stereo T-Bar

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

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.

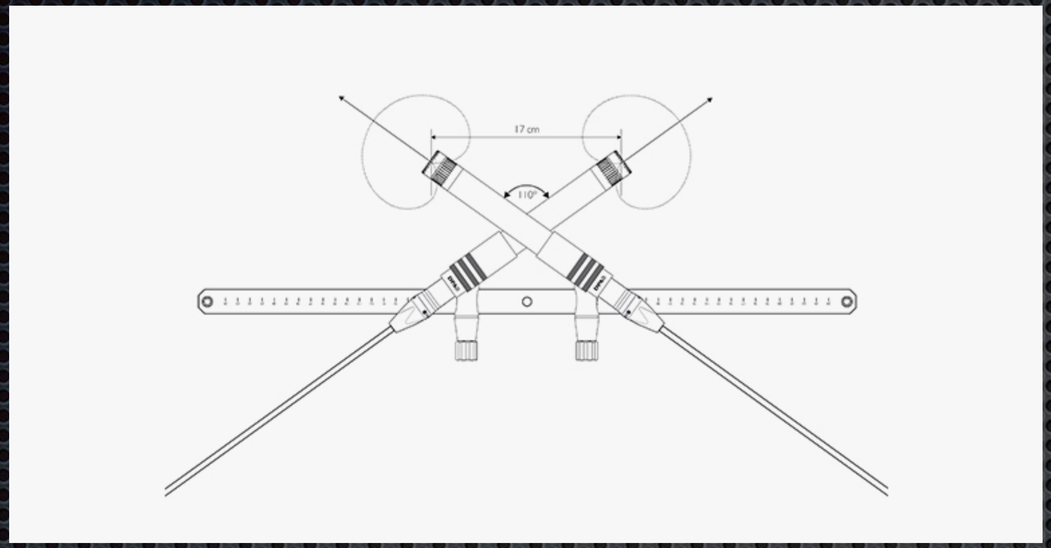
Top View

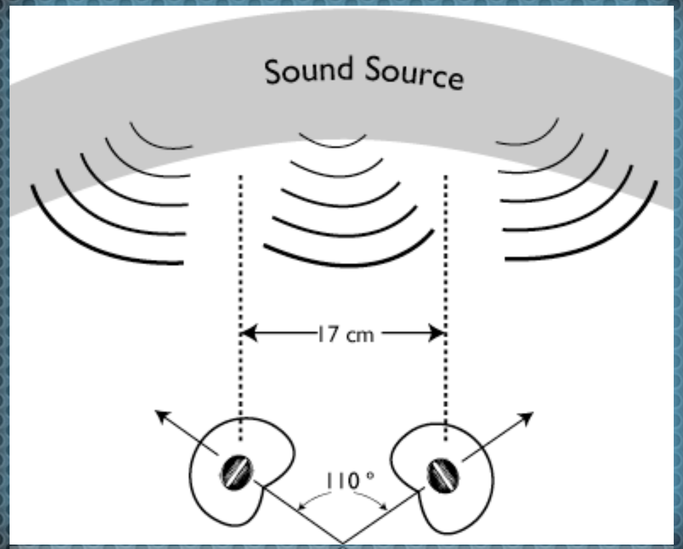


Photos from www.dpamicrophones.com

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.

Photos 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

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)

Audio Editing Demo

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

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!

Fulton County Schools
Where Students Come First

HAL LEONARD CORPORATION

D'Addario

Eastman Strings®
Modern Instruments · Old-fashioned Quality

Questions? Contact Me!

charleslaux1@gmail.com

/charleslaux

@charleslaux

Slides, links and more information:

www.orchestrateacher.net