CHOIRS ONTARIO

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How to record your choir

Collection of articles by Aaron Tan

Digital Recording Basics

Looking for a portable audio recording device that won't cut into your budget by thousands of dollars? Or a device that has built-in microphones that record better than some MP3 player/recorders, and even better than CD quality? These days, a steady stream of compact and relatively inexpensive recorders are being placed on the market that are perfect for the chorister who wants to record a rehearsal or church service. What's listed below are some parameters that one should consider when purchasing a portable audio recorder.

Inputs—portable recorders all have on-board microphones these days, but some also have XLR slots for plugging in external sources. Though the crossed microphone heads tries to emulate an omni-directional pickup radius, on-board microphones are likely not to give you the stereo effect (having sound seem to come at you from 2 different places) due to the proximity of the microphone heads (they're really just a couple centimeters apart).

Recording quality—if it says 'voice recording capable' or some variant of that in the specifications, then it's probably limited to just that. The bandwidth of most frequencies in a human voice is somewhere from 100Hz to 3000Hz, while perceptible musical and natural sounds require a bandwidth stretching from 20-20,000Hz—clearly a big difference in what needs to be picked up by a device. Most recorders meant for musical recordings will give you detailed information on bit-rates available. For reference, a CD-quality bit-rate for MP3 formats is widely considered to be at least 128 Kbps (and can be higher, depending on the equipment).

Recording format—most recorders offer MP3 and WAV formats, while others specialize further and offer OGG, PCM and WMA.

Storage—Flash, hard-drive, are the main ways that portable devices store your recordings. Flash is usually the cheaper way to go, but you have to buy your own memory cards.

Transfer—recorders virtually all record digitally these days, and thus all offer some means of connection to a computer to dump your data on. Most come with a mini-USB connection, and certain devices even have Firewire (IEEE1394) compatibility.

A good starting point is the "Portable Digital Recorder Comparison" on the Transom Tools website: http://www.transom.org/tools/recording_interviewing/200703_recorder_reviews/.

CNET offers information on each device: www.reviews.cnet.com.

Introduction to phantom power

A direct current (DC) electrical charge of some 9 to 48 volts that is sent along a microphone cable to energize the transducer is known as phantom power. The phrase "phantom power" is a result of the fact that there is no visible means of conductivity, no extra electrical line running from the DC power source to the microphone nor is the added DC voltage noticeable in the audio path. In other words, phantom power does its job of essentially powering the microphone invisibly and without interfering with the alternating current (AC) used for the actual audio reproduction and traveling in the same cable.

Phantom power essentially energizes the diaphragm and capacitors inside a condenser microphone, also known as a capacitor microphone. Condenser microphones are today considered the microphone of choice for quality audio reproduction but require a DC power source for proper functioning. Power sources for this DC voltage include a mixing desk, a battery or a power box. Phantom power energizes the transducer element inside the microphone, thereby polarizing the transducer's diaphragm and capacitor to essentially turn sound waves into electrical impulses. The energized element captures the audio input, ordinarily a voice or instrument, and returns the audio signal as alternating current (AC) to the preamp in the mixing desk. The electrically reproduced audio signal is undisturbed by the phantom power and is able to be amplified and/or recorded without distortion.

The audio signal produced by a condenser microphone is considered alternating current to be transferred from electrical energy into sound at the mixing desk. This AC current, however, is neither designed nor utilized to energize the condenser microphone's transducer. That's where phantom power comes in, to subtly power the audio reproduction elements within the microphone itself.

Audio video

My church recently celebrated the completion of its new 3-manual pipe organ in January. The dedication service was wonderful—two previously non-enclosed divisions allowed for great execution of the choral music of Ireland and Vaughan Williams, and the properly scaled pipework finally provided an adequate support for hymn singing. The service was followed in the afternoon by a full-house organ concert by John Weaver, retired Chair of the organ departments of the Juilliard School and the Curtis Institute of Music. Aside from the obvious raving compliments of Weaver's wonderful facility and mature expressivity (which moved some to tears), many in the audience also commented on how they enjoyed watching Dr. Weaver's feet and hands up close. For during the entire concert, we had three live cameras zoomed onto the organ's manuals and pedalboard, which were broadcast via a mixer onto a projection screen. Without too much of a stretch of the imagination, I could conceive the same concept being used during a choral performance. How often does the audience get to see a conductor's facial expressions during a concert? Wouldn't it be nicer if you could see a friend in the choir as more than a tiny speck in the sea of people? Using live camera projections during a concert gives audiences an added element of intimacy and interest.

So what do you need? First, two or three video cameras with S-video output. Second, you need S-video cables (we used 100-foot cables, and only the S-video can do this without large amounts of signal loss over long distances). Third, you need something called a video mixer. This nifty device allows you to plug in various video/audio inputs into it (not just camcorders—computers, VHS, etc. also work), and it generates an output. The mixer allows you to seamlessly transition between different input signals. For example, you could to a fade transition from the video input of the camera focused on the conductor to one focused on the accompanist. Fourth, you need to connect the mixer's output to a projector. I should mention that perhaps the rarest component of the above 4 things you need is the mixer. It can also likely be the most expensive (most are in low thousands, but I got mine, a Videonics MX-1, for $300 on eBay). If you are resourceful, I'm sure you can pull together a couple cameras and a projector. The S-video cables can be found online for a relatively inexpensive price as well ($20 for 100 feet). The final thing you need is a Person to control the mixer during the concert!

Sure, I know that some may think this is too much work, too gaudy, or too expensive. But the fact is that most people today are not acquainted with sitting quietly in a concert hall or church with the sole purpose of listening. Televisions have hindered the ability of people to have pure aural experiences, and the technological advances in portable music devices have made the sound arts a commodity instead of something to ponder. Moreover, both choral and organ music are no longer mainstream forms of musical expression. If we value such forms and believe that they can still speak to people, it is absolutely necessary to present them afresh. Live video projection can provide an added visual element to 21st century concertgoers whose lives are immersed in—and *expect*—multimedia.

Large-ensemble recording

From dry to extremely reverberant, the room is the number one factor in determining microphone positioning. Here are 3 that work well for various kinds of acoustic spaces.

ORTF technique for reverberant rooms

Mount two cardioid mics on a short stereo bar, angling each 55° off axis, making sure the distance between the heads is 17 cm.

Place the microphone pair about 2 to 2.5 meters higher than the floor of the performance area (where the ensemble is), about 1.25 to 2.00 meters behind the conductor. If the floor of the audience area is higher or lower than the performance area, you will have to deduct or add the difference in height. Slightly point the whole array about 50 downwards.

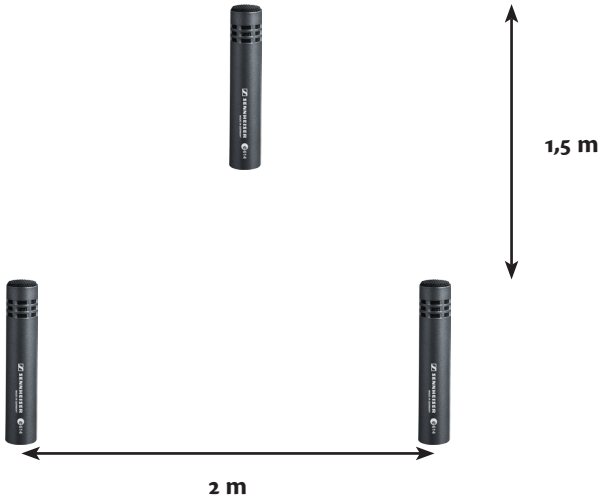
Listen carefully to the results and adjust the working distance and height until you are satisfied. This miking technique will reduce the amount of ambience in your recording and provides good imaging.

The Decca Tree for rooms with shorter reverberation times

Use three omnidirectional microphones. Note that for this setup, you will need to mix the three inputs down to two tracks. To do this, set the L and R microphone levels to unity gain, and the center microphone to -5 to -10 dB. Listen carefully, and adjust the center microphone level until it doesn't "stick out", but before the point that you get the impression of a "hole in the center".

Place the center microphone right behind the conductor with the other two about 1.5 m behind and spaced 2 m apart. Make sure all microphones are about 1.8 to 2 meters above the performance area floor.

As omnidirecitonal microphones do not pick up omnidirectionally at all frequencies, but tend to approximate cardioid pickup patterns at higher frequencies, point them at the ensemble directly. This array will pick up much more reverberation and provide a recording with beautiful ambience. If you don't have enough space for one of the two setups described above, try the XY technique below.



XY technique

Mount two cardioid microphones on a stereo bar, similar to the ORTF technique. But now, angle them 900 relative to each other, and place the heads one on top of the other, just short of touching.

Place the setup right behind the conductor 2 meters above the performance floor, pointing 50 down. This will give you less ambience in the recording and you may have to add some artifical reverberation later on.

Always remember to listen, listen again, and take your time. Don't be ashamed to experiment with and move around your microphones during rehearsals until you get the best sound you can.

A final hint: set peaks to be 6 dB below saturation for the loudest passages. This leaves some headroom for the actual performance's recording. Experience shows that musicians and singers are louder during the actual performance than they are during rehearsals!

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