



A brief guide to microphone selection and use for places of worship

audio-technica Introduction

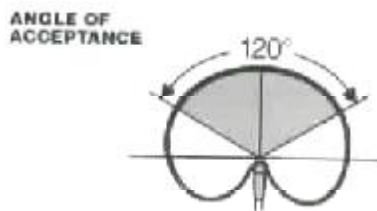
Many places of worship share architectural characteristics which have a serious impact on sound reinforcement. Typically the space is rather large, with high ceilings, often arched or peaked, and with hard, parallel wall surfaces. The space is created to be visually impressive and excellent for music, with relatively long reverberation times. However, it may be far from ideal for the clear understanding and intelligibility of speech. Yet this clarity of speech is essential if the worship service is to have maximum impact and meaning to the congregation.

Improving speech clarity, within the limits of the acoustics, is primarily related to the optimum choice and effective use of both loudspeakers and microphones in the sound system. Selection and application of loudspeakers is both an art and a science, and many books and computer programs are available to assist the user. This brief guide, however, will concentrate solely on microphone choice and usage.

audio-technica Uni-directional (cardioid) microphones

All else being equal, unidirectional or cardioid microphones will be much less sensitive to reverberation and/or sound radiated from the speakers than omni directional models. This ability to discriminate between sounds arriving from the front (on-axis) of the microphone and all other sounds, permits the use of higher system volume, while also feeding less of the blurred reverberant sound back into the system. The result is improved clarity and less tendency for the system to feed back, howl round or ring during operation.

Understanding the basic pickup characteristics of unidirectional or cardioid microphones can greatly assist in their proper placement and use. Almost all uni directional microphones pick up sound best within a cone-shaped area in front of the long axis of the microphone.

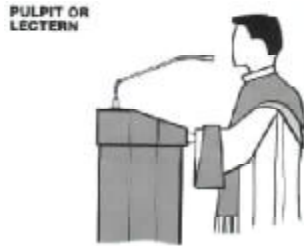


Within this 120 degree *Angle of Acceptance* the microphone is equally sensitive to all sound. Outside the acceptance angle, microphone sensitivity is reduced. A sound source located at a 90 degree angle to the side of the microphone, will seem to be twice the distance away as the same source located directly in front of the microphone (on-axis). And, when the same source is directly to the rear (180°) of the microphone, it will seem to be 10 times as far away.

By pointing the axis of the microphone directly at the desired sound, with the rear of the microphone facing any unwanted sound (such as the sound from a loudspeaker) problems with feedback and poor intelligibility can be reduced. The unidirectional or cardioid microphone also reduces pickup and re-amplification of room reverberation or echo (which usually comes from all directions), increasing the clarity of speech without the need to raise amplifier volume.

Pulpits & Lecterns

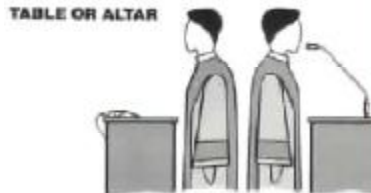
For good quality pick-up of sound with a uniform, flat and natural frequency response it is usual to use condenser microphones for these applications. As an added incentive to their use, condenser microphones, tend to be less visually conspicuous than their dynamic relatives. Condenser microphones must be operated from a phantom power or battery supply. A phantom power supply is always preferable to battery operation.



Low-profile plate or boundary microphones are rarely ideal on lecterns since they are more likely to pick up noise from books and loose papers and contact noise from the user.

Altar and Table

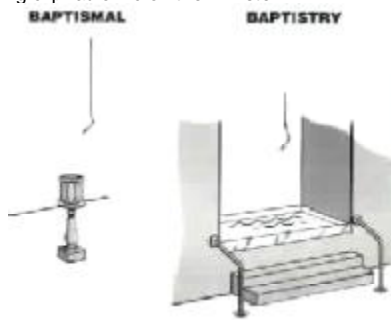
For very inconspicuous sound pickup at a table or altar you can use plate or boundary microphones. Laid on any flat surface they extend less than 3/4" above the surface, yet pick up clearly over a horizontal angle of about 120 degrees, and a vertical angle above the surface of about 60 degrees. The usual heavy die-cast construction and rubber base helps to reduce sensitivity to vibration from the table surface.



It is normal to use a microphone with an omni-directional pickup pattern so that sound from all around the altar or table is amplified in a fairly uniform manor – however, when feedback or howl is a problem a uni-directional cardioid microphone can be employed with beneficial results.

Baptistry or Baptismal Font

An enclosed baptistry offers special sound problems due to its acoustics, confined space, and the need to keep the microphone away from the water. A condenser microphone suspended above and forward of the baptistry is inconspicuous, out of reach and safe from excess humidity. An alternative approach is to use a clothing clip radiomic on the minister.



Minister

Normally an omnidirectional clip-on (lapel) microphone will serve in many circumstances, however a uni-directional (cardioid) pickup pattern model is preferred when maximum freedom from feedback and reduction of reverberation is desired.

When full freedom of movement is required for the wearer/user, a wireless or radio microphone system and a clip-on (lapel) microphone can be employed. The microphone is connected to a small transmitter which is worn on the belt or in a pocket, and a dedicated FM receiver picks up the signal and feeds it into the amplifier. Its quality is so accurate that wired and wireless microphones can be used simultaneously with no audible difference in response.

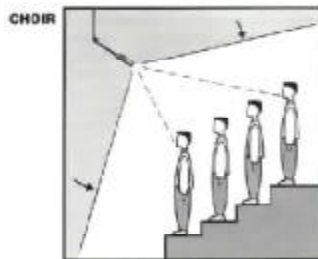


Clip-on (lapel) microphones work best when attached to clothing about 150mm below the user's chin. The tie-clip or clothing-clip mounting is most versatile.

Position the microphone to avoid any noise created by the microphone rubbing against vestments during normal activity and use a belt-mounted strain relief to reduce cable noise and avoid pulling on the microphone while the user is moving.

Choir

Being both extremely small and light in weight suspension condenser microphones can be suspended almost invisibly over the choir on a single cable without guy or additional support wires. Both the microphone and its cable are usually available in an off-white finish to blend unobtrusively with ceiling or wall.



Alternatively, most stand mounted condenser microphones are suitable for choir and other vocal pick-up.

Condenser microphones must be operated from a phantom power or battery supply. A phantom power supply is always preferable to battery operation.

Hand-Held Vocal Microphones

For clearest results, the user should speak or sing slightly "across" or over the microphone, rather than directly into it. This technique can help to reduce "popping" and breath noises and insures clearest reproduction. Be certain, however that the user stays within the acceptance angle of the microphone so that volume doesn't vary and feedback is kept to a minimum

This advice is equally valid for both cabled and wireless (radio) microphones.

audio-technica Grand Piano

Ideal microphone location for piano pickup depends on room acoustics and other nearby sound sources – figure A results in a good overall piano sound when leakage of sound from other sources and feedback from the sound reinforcement speakers are not problems. The microphone is about two feet above the strings. Two microphones, wired for stereo 'X-Y' configuration can also be used at this location.



Figure B shows close-up miking with two microphones inside the piano with the lid raised. One is centred over the low note strings, while the other covers the high note strings. They should be about 6" to 8" above the strings. In stereo recording the output of the microphones may be "panned" slightly left and right at the console.

Figure C shows the recommended placement for close-up pickup of the piano sound. The two microphones shown are centred about mid-way between the low and high note strings and about 6" to 8" above the strings. They are wired for stereo 'X-Y' configuration. For mono a single microphone should be located in the same position.

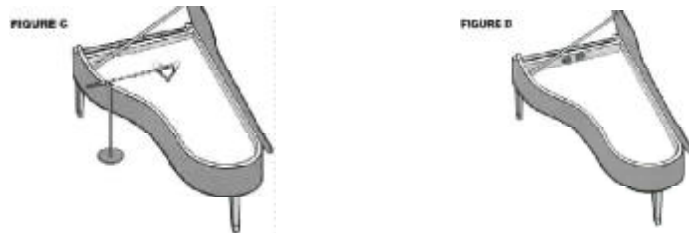
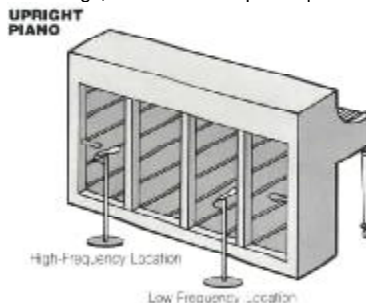


Figure D shows two plate or boundary microphones mounted inside the piano for stereo recording. A single boundary microphone can also be used for mono reproduction. For a wide stereo spread, place two plate or boundary microphones back-to-back in the middle of the brace across the top of the piano as shown.

audio-technica Upright Piano

Because the piano is a rather large instrument, two identical microphones, spaced about 6" to 18" behind the sound board are recommended. One microphone will pick up sound from the high note strings, while the other picks up the low notes.



If greater isolation of the piano sound is needed, remove the lower front cover (below the keyboard) and position a single microphone facing slightly upward, away from the pedals, and somewhat nearer the high-frequency strings. In stereo recording the output of the microphones should be panned slightly left and right at the console.

audio-technica Acoustic Guitar

For close-up perspective and minimum feedback you can mount a small condenser instrument microphone directly on to the guitar – these microphones have adjustable clamp adapters that allow easy fixing and condenser microphones offer excellent control and well-balanced sound.

ACOUSTIC
GUITAR



An alternative approach is to use a good quality condenser microphone on a stand or short boom, with the microphone pointing at the bridge of the guitar. If ultra-close miking is needed, avoid placing the microphone too close to, or directly facing, the sound hole to avoid a "tubby" sound.

Phantom Power

Because they offer many important advantages over dynamic models it is usual to recommend condenser microphones for use in Churches and other places of worship. The advantages include:-

- potentially higher sensitivity
- lower handling noise
- extended frequency response
- excellent reproduction of "transients" or sharp sonic impulses such produced by percussion and organ music.
- Condenser microphones can also be made much smaller and less conspicuous than dynamic microphones without compromising performance.

However, a power source must be provided for the internal electronics in all condenser microphones. While some models may be powered by an internal battery the more professional microphones are also designed to be "phantom" powered. Phantom power circuits send low-voltage DC through the same 2-conductor shielded or screened cable used to transmit the signal from the microphone to the amplifier or mixing desk. The phantom power has no effect on the sound quality and it will be ignored by any balanced line dynamic microphones that may be wired to the system. Phantom power must NOT be used with unbalanced signals or microphones.

Because phantom powering eliminates the need for battery replacement, it is often preferred in fixed installations. Phantom power availability is often built into recording, amplifiers and sound mixing consoles. If not a separate phantom power supply can be used between the microphones and the sound mixer or amplifier inputs.

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