

CROWN MICROPHONE APPLICATION GUIDE FOR VIDEO



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MICROPHONE TECHNIQUES FOR VIDEO

No matter what your video application — sports, news, corporate training — the soundtrack quality depends on the microphones you choose and where you place them. This booklet covers microphone techniques to help you achieve better audio for your video productions.

There are many types of microphones, each designed to help you solve a specific audio problem. We'll sort out these types and tell where each one is useful. Then we'll cover specific applications — how to use microphones effectively in various situations.

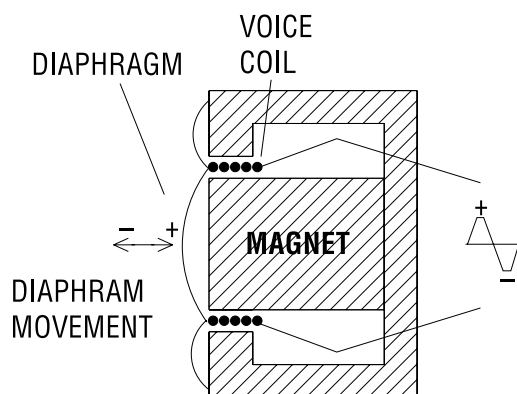
TRANSDUCER TYPES

A microphone is a transducer, a device that converts energy from one form into another. Specifically, a microphone converts acoustical energy (sound) into electrical energy (the signal).

Microphones differ in the way they convert sound to electricity. Three popular transducer types are dynamic, ribbon, and condenser.

In a **dynamic** microphone (Figure 1), a coil of wire attached to a diaphragm is suspended in a magnetic field. When sound waves vibrate the diaphragm, the coil vibrates in the magnetic field and generates an electrical signal similar to the incoming sound wave.

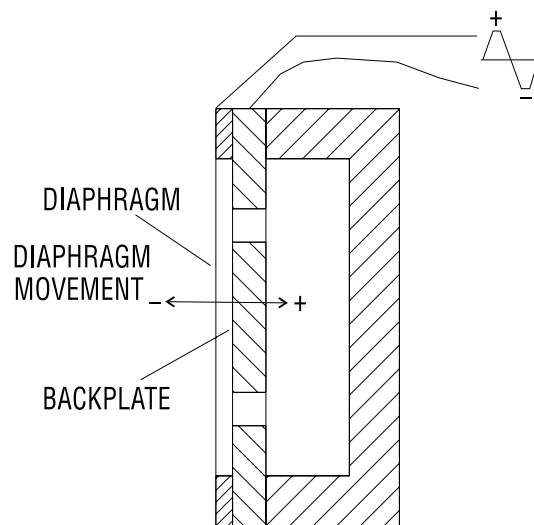
Fig. 1 – A dynamic microphone.



A **ribbon** microphone works the same, except that the diaphragm is also the conductor. It is a thin metal foil or ribbon suspended in a magnetic field.

In a **condenser** microphone (Figure 2), a diaphragm and an adjacent metallic disk (backplate) are charged to form two plates of a capacitor. Sound waves striking the diaphragm vary the spacing between the plates; this varies the capacitance and generates an electrical signal similar to the incoming sound wave.

Fig. 2 – A condenser microphone.



The diaphragm and backplate can be charged either by an externally applied voltage or by a permanently charged **electret** material in the diaphragm or on the backplate.

Because of its lower diaphragm mass and higher damping, a condenser microphone responds faster than a dynamic microphone to rapidly changing sound waves (transients).

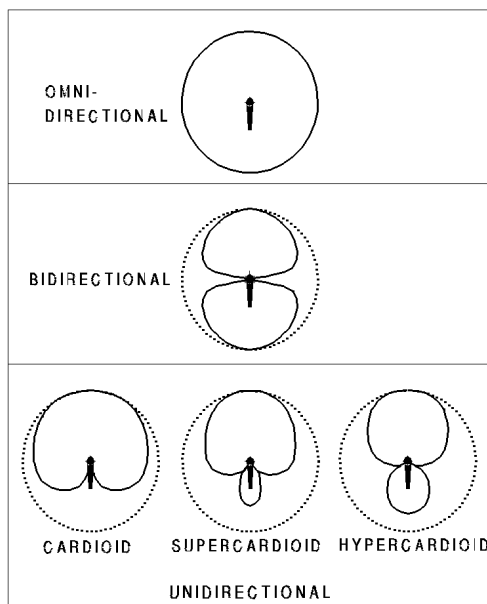
Dynamic microphones offer good sound quality, are especially rugged, and require no power supply. Condenser microphones require a power supply to operate internal electronics, but generally provide a clear, detailed sound quality with a wider, smoother response than dynamics.

Currently, all Crown microphones are the electret condenser type — a design of proven reliability and studio quality.

POLAR PATTERNS

Microphones also differ in the way they respond to sounds coming from different directions. The sensitivity of a microphone might be different for sounds arriving from different angles. A plot of microphone sensitivity versus the angle of sound incidence is called its **polar pattern**. Several polar patterns are shown in Figure 3.

Fig. 3 – Polar patterns.



An **omnidirectional** (omni) microphone is equally sensitive to sounds coming from all directions. A **unidirectional** microphone is most sensitive to sounds coming from one direction — in front of the microphone. A **bidirectional** (figure-eight) microphone is most sensitive in two directions: front and rear.

An omni microphone is also called a **pressure microphone**; a uni- or bi-directional microphone is also called a **pressure-gradient microphone**.

Three types of unidirectional patterns are the cardioid, supercardioid, and hypercardioid pattern. The **cardioid** pattern has a broad pickup area in front of the microphone. Sounds approaching the side of the mic are rejected by 6 dB; sounds from the rear (180 degrees off-axis) are rejected 20 to 30 dB. The **supercardioid** rejects side sounds by 8.7 dB, and rejects sound best at two “nulls” behind the microphone, 125 degrees off-axis.

The **hypercardioid** pattern is the narrowest pattern of the three (12 dB down at the sides), and rejects sound best at two nulls 110 degrees off-axis. This pattern has the best rejection of room acoustics, and provides the most gain-before-feedback from the main sound reinforcement speakers.

Choose an omnidirectional mic when you need:

- All-around pickup
- Best pickup of room acoustics (ambience or reverb)
- Extended low-frequency response
- Low handling noise
- Low wind noise
- No up-close bass boost

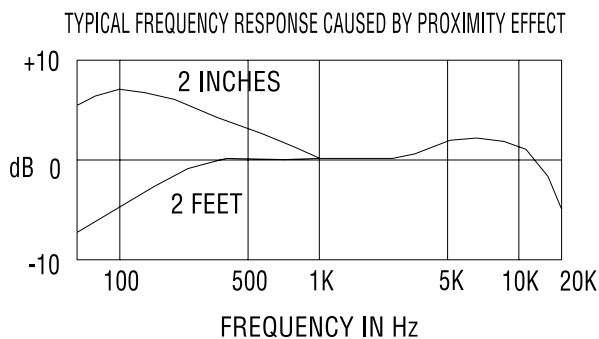
Choose a unidirectional mic when you need:

- Selective pickup
- Rejection of sounds behind the microphone
- Rejection of room acoustics and leakage
- More gain-before-feedback
- Up-close bass boost

An omnidirectional boundary microphone (such as a PZM) has a half-omni or hemispherical polar pattern. A unidirectional boundary microphone (such as a PCC-160 or PCC-170) has a half-supercardioid polar pattern. The boundary mounting increases the directionality of the microphone, thus reducing pickup of room acoustics.

Most unidirectional mics have **proximity effect**, a rise in the bass when used up close. Figure 4 is a frequency-response graph that illustrates proximity effect. When the microphone is 2 feet from the sound source, its low-frequency response rolls off. But when the microphone is 2 inches from the sound source, its low-frequency response rises, giving a warm, bassy effect.

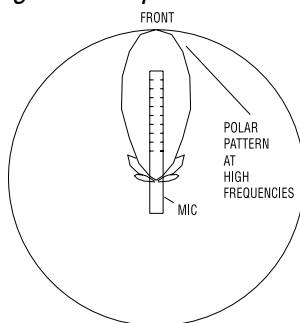
Fig. 4 – Proximity effect.



A special type of unidirectional microphone is the **variable-D** type. Compared to a standard single-D directional microphone, the variable-D has almost no proximity effect, so it sounds natural when used close up. The variable-D type also has less handling noise and pop.

The most highly directional pattern is that of the **shotgun** or **line** microphone (Figure 5). The shotgun microphone is used mainly for distant miking (say, for dialog pickup where you want the mic to be off-camera). It is highly directional at high frequencies and hyper-cardioid at low frequencies. The longer the shotgun mic is, the more directional it is at mid-to-low frequencies.

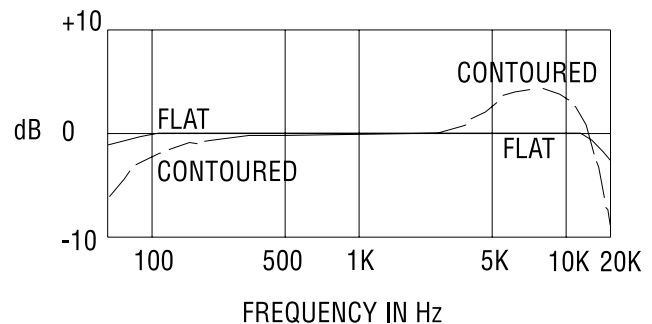
Fig. 5 – Shotgun microphone and its polar pattern.



FREQUENCY RESPONSE

Each microphone has a different frequency response, which indicates the tonal characteristics of the microphone: neutral, bright, bassy, thin, and so on. Figure 6 shows two types of frequency response: bright (contoured) and flat. A bright frequency response has an emphasized or rising high-frequency response, which adds clarity, brilliance, and articulation. A flat frequency response sounds natural.

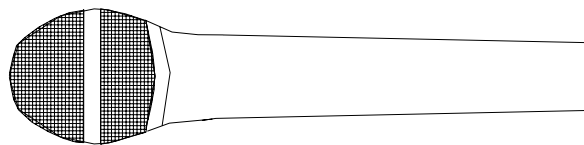
Fig. 6 – Frequency response.



FORMS OF MICROPHONES

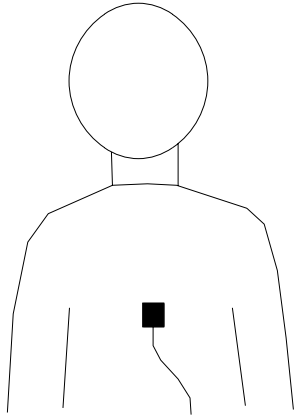
Microphones come in many shapes that have different functions:

Fig. 7 – Handheld microphone.



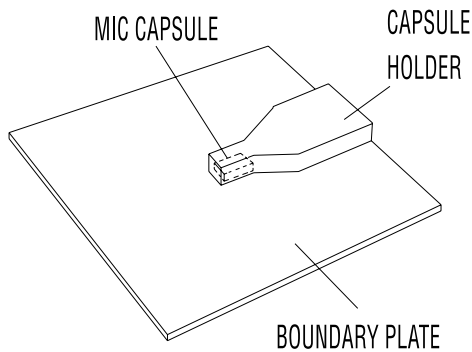
Handheld (Figure 7). Used in the hand or on a mic stand. An example is the Crown CM-200A cardioid condenser microphone.

Fig. 8 – Lavalier microphone.



Lavalier (Figure 8). A miniature microphone which you clip onto the clothing of the person speaking. Two examples are the Crown GLM-100 (omni) and GLM-200 (hypercardioid).

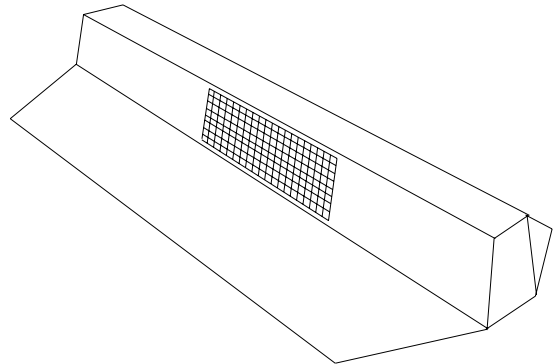
Fig. 9 – Boundary microphone.



Boundary (Figure 9). **Boundary microphones** are meant to be used on large surfaces such as stage floors, piano lids, hard-surfaced panels, or walls. Boundary mics are specially designed to prevent phase interference between direct and reflected sound waves, and have no off-axis coloration. **Free-field** microphones are meant to be used away from surfaces, say for up-close miking.

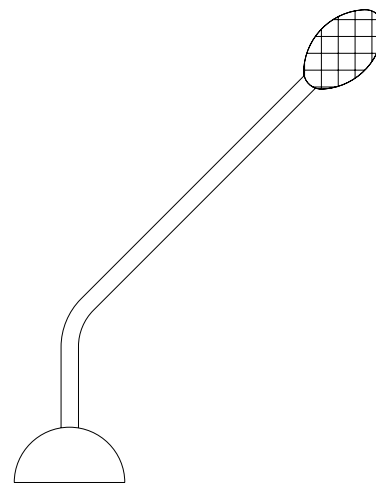
Crown Pressure Zone Microphones® (PZMs®) and Phase Coherent Cardioids® (PCCs®) are boundary microphones; Crown GLMs, CMs, and LMs are free-field microphones.

Fig. 10 – Unidirectional boundary microphone.



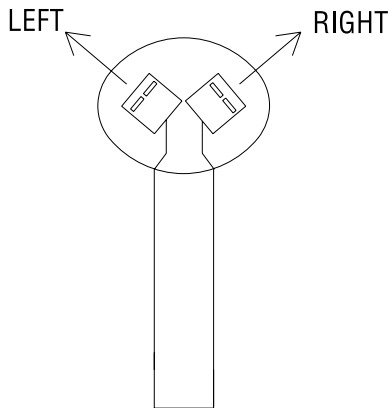
The PCC (Figure 10) is a unidirectional boundary microphone. When you place it on a surface, it has a half-supercardioid polar pattern. The rugged PCC-160 is especially useful for stage-floor pickup of drama and musicals; the PCC-170 has a sleeker look for miking a group discussion at a conference table.

Fig. 11 – Lectern microphone



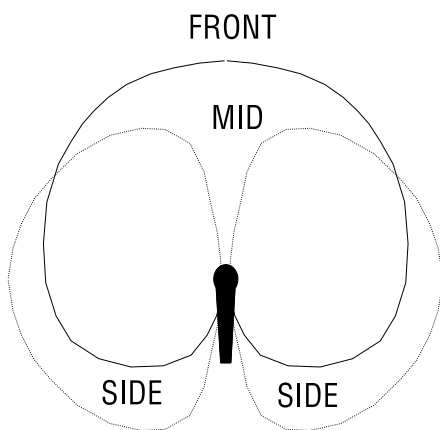
Lectern A **lectern microphone** (Figure 11) is designed to mount on a lectern or pulpit. For example, the Crown LM-300A and LM-300AL are slim, elegant units that plug into an XLR connector in the lectern. The LM-301A screws onto a mic stand or desk stand. Each has a silent-operating gooseneck. The Crown LM-201 mounts permanently on the lectern, and has a rugged ball-and-socket swivel that adjusts without any creaking.

Fig. 12 – Stereo microphone.



Stereo: A **stereo microphone** combines two directional microphone capsules in a single housing for convenient stereo miking (Figure 12). A special type of stereo microphone is called **mid-side** or **MS**. It uses two capsules: a MID unit aiming toward the middle of the sound source, and a SIDE unit with a bi-directional pattern aiming to the sides (Figure 13). The mid unit can have any pattern, but cardioid is most common.

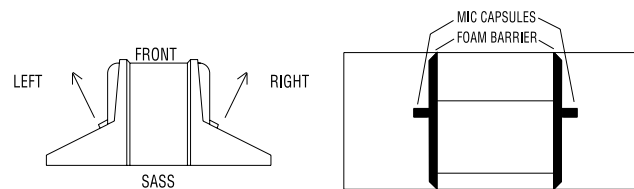
Fig. 13 – Mid-side microphone polar patterns.



Inside the microphone or in an outboard box, the mid and side signals are summed and differenced to produce directional patterns aiming left and right. By controlling the ratio between mid and side signals, you can control the stereo spread or stage width. This can be done during recording or during post-production.

A mid-side microphone is mono-compatible; that is, it has the same frequency response in mono or stereo. That's because there is no spacing between the mic capsules. If there were a spacing, this would create a delay between left and right signals which can cause phase cancellations in mono. The Crown SASS stereo microphone, explained next, has spaced mic capsules but is still mono-compatible because of its special design.

Fig. 14 & 15 – SASS-P MKII stereo microphone.



The Crown SASS-P stereo microphone is shown in Figure 14 (top view) and Figure 15 (front view). It is made of two Pressure Zone Microphones mounted on small boundaries that are angled apart left and right. The capsules are spaced apart the same distance as your ears. As a result, the SASS gives very precise and spacious stereo imaging.

Between the two mic capsules is a special foam baffle. The baffle creates amplitude or level differences between channels at high frequencies. Since the two channels are different amplitudes, any phase cancellations in the mono sum are incomplete, so the resulting dips in the frequency response are relatively slight. Thus, the SASS is mono-compatible.

ELECTRICAL CHARACTERISTICS

Whatever type of microphone you use, it should have a low-impedance balanced output with a 3-pin pro audio connector. This allows long cable runs (hundreds of feet) without hum pickup or high-frequency loss. All modern mixers are designed to work with low-impedance microphones.

MICROPHONE-TECHNIQUE BASICS

How to reduce reverberation

Reverberation is sometimes loosely called “room acoustics,” “ambience,” or “reverb.” It is a pattern of sound reflections off the walls, ceiling, and floor. For example, reverberation is the sound you hear just after you shout in an empty gymnasium.

Too much reverberation in a recording sounds distant or muddy, and reduces intelligibility. To reduce reverberation:

- Place the mic closer to the sound source.
- Use an automatic (gated) mixer. This device turns off all microphones not in use, providing a clearer, less muddy sound.
- Pick up each electric instrument with a direct box or cable.
- Use a room or studio with dead acoustics. The walls, ceiling and floor should be covered with sound-absorbing material.
- Select a mic with a tighter polar pattern. Hypercardioid and super-cardioid patterns reject reverb more than cardioid. Cardioid and bi-directional patterns reject reverb equally well, and more than an omni.

The table below tells how many dB of reverb rejection you can expect from various polar patterns compared to an omni-directional pattern at the same working distance:

- Omnidirectional: 0.0 dB
- Cardioid: -4.8 dB
- Bidirectional: -4.8 dB
- Supercardioid: -5.7 dB
- Hypercardioid: -6.0 dB

How to reduce background noise

•Stop the noise at its source: turn off appliances and air conditioning; wait for airplanes to pass; close and seal doors and windows; use a quiet room.

•Mike close with directional mics.

•Pick up each electric instrument with a direct box or cable.

•Aim the null of the polar pattern at the offending noise source. The null is the angle off-axis where the mic is least sensitive. Different polar patterns have nulls at different angles. Shown below and in Figure 16 are the null angles for various polar patterns:

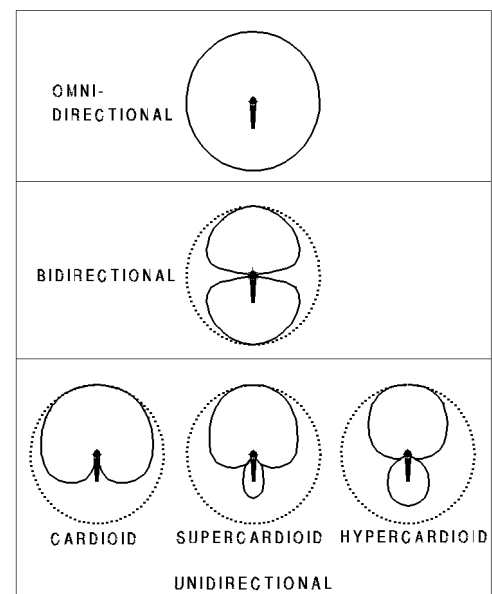
Cardioid: 180 degrees.

Supercardioid: 125 degrees.

Hypercardioid: 110 degrees.

Bidirectional: 90 degrees.

Fig. 16 – Polar patterns.



How to pick up sound at a distance

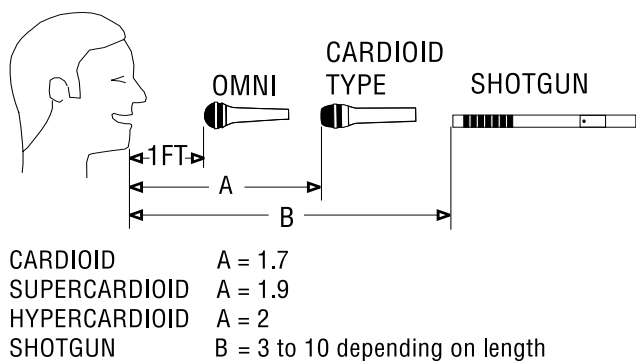
The farther a microphone is placed from a sound source, the more reverberation and background noise you pick up. Also, you hear more mixer self-noise relative to the signal because the mixer gain must be higher with distant miking.

To clearly pick up sound at a distance:

- Use a microphone with low self-noise (say, less than 22 dB SPL), such as the Crown PCC-160, PCC-170, CM-200A, or any PZM).
- Boost the presence range on your mixer’s EQ (around 5 kHz).
- If necessary, compensate for air losses at high frequencies by boosting EQ around 15 kHz.
- If you’re using a PZM, make it directional. To do this, mount the tip of its cantilever (mic-capsule holder) in a corner of the room, or in a corner made of three plexiglass panels. Large panels provide deeper bass and more directionality at low frequencies than small panels.
- Use directional microphones. You can place a directional mic farther from its source than an omnidirectional mic and pick up the same amount of reverberation. The table below and Figure 17 show the distance multiplier for each pattern:

Omnidirectional:	1.0
Cardioid:	1.7
Bidirectional:	1.7
Supercardioid:	1.9
Hypercardioid:	2.0

Fig. 17 – For various polar patterns, distances from the sound source that provide equal reverb pickup.



For example, if an omni mic is placed 1 foot from a sound source, you can place a supercardioid mic at 1.9 feet and pick up the same amount of reverb as the omni.

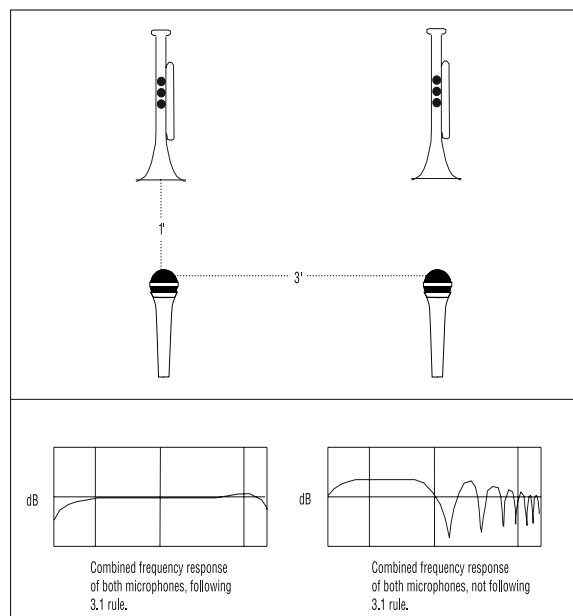
How to reduce phase cancellations between two mics:

If two microphones pick up the same sound source at different distances, and their signals are fed to the same channel, this might cause phase cancellations. These are peaks and dips in the frequency response caused by various frequencies combining out-of-phase. The result is a colored, filtered tone quality.

To reduce phase cancellations between two microphones:

- Mike close.
- Spread sound sources farther apart.
- Follow the 3-to-1 rule (Figure 18): The distance between mics should be at least three times the mic-to-source distance. For example, if two microphones are each 1 foot from their sound sources, the mics should be at least 3 feet apart to prevent phase cancellations.
- Don’t use two mics when one will do the job. For example, use just one mic on a lectern. If the talker wanders, use a lavalier mic instead, such as a GLM-100.

Fig. 18 – The 3-to-1 Rule.



How to reduce phase cancellations from surface reflections:

Sometimes you must place a microphone near a hard reflective surface. Situations where this might occur are reinforcing drama, musicals, or opera with the microphone near the stage floor, recording a piano with the mic near the raised lid, or recording an instrument surrounded by reflective baffles.

This situation can cause phase cancellations which give a strange tone quality. Solve the problem by using a Crown PZM or PCC microphone taped to the piano lid, wall, floor, table, or other large flat surface.

How to reduce handling noise and thumps

- Use an omnidirectional microphone, such as a GLM-100 or any PZM.
- Use a directional microphone with low sensitivity to handling noise and thump, such as the CM-200A, CM-310A, PCC-160, PCC-170, or PCC-200.
- Use a directional microphone with an internal shock mount.
- Use a shock-mount stand adapter, either handheld or on a mic stand an example is the CM-SM.
- Place the mic stand on foam or sponges.

How to reduce lavalier clothing noise

- Tape the cable to clothing.
- Strain-relieve the cable by using a belt clip.
- Use an omni-directional lavalier (GLM-100) rather than a uni-directional lavalier (GLM-200). The omni type has less pickup of mechanical vibration.

How to reduce proximity effect:

Proximity effect is the bass boost you hear when you mike close with a single-D directional microphone. “Single-D” means that the microphone has a single distance from its front sound entry to the rear sound entry. The closer the mic is to the sound source, the more bass you hear. To reduce proximity effect:

- Use an omnidirectional microphone such as a Crown GLM-100 or PZM.

- Use a unidirectional microphone, but turn down the excess bass with your mixer’s EQ.
- Use a variable-D unidirectional microphone.

How to reduce pop

Pop: is an explosive breath sound produced by the letters “p,” “b,” or “t.” When a person says words containing these sounds, a turbulent puff of air is forced from the mouth. This air puff hits the microphone and makes a thump or little explosion called a “pop.”

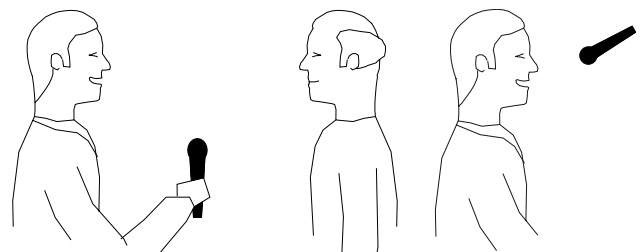
To reduce pop:

- Use an omnidirectional microphone, such as a Crown PZM.
- Use a microphone with a built-in pop filter or ball-shaped grille, such as the Crown CM-200A or CM-310A.
- Place an external foam pop filter on the microphone.
- Roll off low frequencies below 100 Hz.
- Place the microphone out of the path of pop travel — above, below, or to the side of the mouth.

For example, Figure 19 shows an interview with the microphone placed midway between the two people, below their mouths. Figure 20 shows how a studio announcer can be miked to prevent pop. The microphone is at eye level so that pops shoot under the microphone and miss it. A hoop-type pop filter also works quite well.

Fig. 19 – Reducing pop during an interview.

Fig. 20 – Miking a studio announcer to prevent breath pops.



How to reduce wind noise:

Use the same methods mentioned under “How to reduce pop.” For best wind-noise rejection, keep an air space between the foam windscreen and the microphone. The bigger the windscreen, the better it works. A large windscreen called a blimp is available for a shotgun mic. A blimp is covered in fur and attenuates high frequencies somewhat, but is more effective than a foam windscreen.

How to reduce distortion:

If you’re picking up a very loud sound source such as a person yelling into a microphone, the microphone will generate a high-voltage signal that can overdrive the mic preamp in your mixer, causing distortion. To prevent this,

- In your mixer, switch in the pad or reduce the gain trim, if any.
- Plug an in-line pad between the mic cable and the mixer mic input.
- If a condenser mic has a pad built in, switch it on.
- Place the mic farther from the sound source.

How to achieve a natural tone quality:

- Use a microphone with a flat frequency response, such as a PZM-30D, GLM-100, CM-700, LM-300A, or LM-201.
- Place the microphone as far from the sound source as the source is big. For example, the sound board of a guitar is about 18" long. Place the mic at least 18" away to pick up all the parts of the guitar about equally.
- If you must mike close to reduce feedback or leakage, use your mixer’s EQ to restore a natural tonal balance.

Recommendations for stereo TV productions:

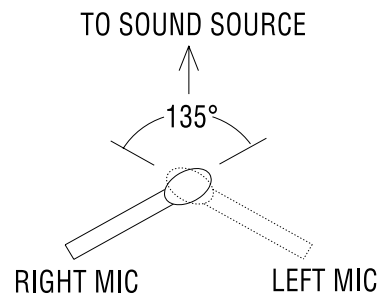
Dialog that has a lot of stereo motion is distracting, so record dialog in mono in the center or with a narrow stereo spread. Record effects, audience reaction, and music in stereo. You can allow off-camera sounds to be imaged away from the TV screen because the screen is considered a window on a larger scene.

To prevent shifting sound images, don’t move (pan) a stereo microphone once it is set up.

Avoid extreme differences between sound and picture. Be careful not to reverse left and right channels (say, by inverting an end-fired stereo microphone).

Mono compatibility is important in stereo-TV productions because many people will listen to your program in mono. For this reason, when miking with a stereo pair of mics, use a mid-side stereo microphone or a coincident pair (Figure 21). The grille of the left-aiming microphone is aligned vertically over the grille of the right-aiming microphone. Since there is no spacing between mics, there are no time or phase cancellations to degrade the frequency response when the mics are summed to mono. The Crown SASS stereo microphone is also mono compatible.

Fig. 21 – A coincident pair.



Often your microphone setup must be invisible on-camera. Use miniature microphones such as the GLM-100 (omni), GLM-200 (hypercardioid), CM-30 or CM-31 (supercardioid). You can hang these over an orchestra or choir, mount them onto musical instruments, or hide them under clothing. A PZM can be hidden under a table cloth.

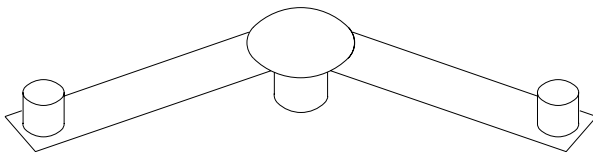
MICROPHONE ACCESSORIES

We've already mentioned microphone shock mounts, windscreens, and pads. Some other useful accessories are described below:

Stereo bar

This device mounts two directional microphones on a single mic stand for convenient stereo miking (Figure 22). An example is the CM-SB.

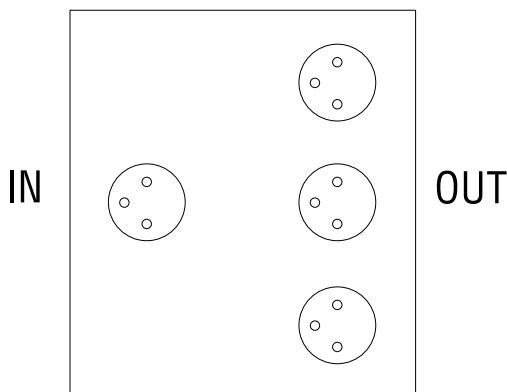
Fig. 22 – A stereo bar.



Splitter

This is a box with one input for a microphone and two or three isolated outputs that feed individual mixers (Figure 23).

Fig. 23 – A splitter.



You might use a splitter to feed one mic signal simultaneously to a sound-reinforcement mixer, recording mixer, and broadcast mixer.

To prevent ground loops and hum, only one mixer should provide phantom power and ground. To do this, you switch in the ground-lift switches on the splitter to remove the grounds for the other mixers.

Combiner

If you have more mics than inputs, a combiner comes in handy. This resistor network mixes the outputs of two or three mics into a single output.

SPECIFIC TECHNIQUES

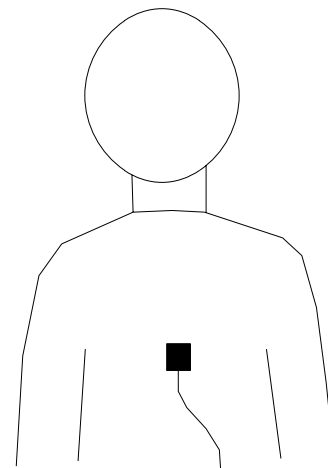
The soundtrack of most video productions has four elements: narration, ambient or environmental sound, sound effects, and music. Let's look at miking techniques for each of these.

Announcer

In these examples, we'll assume it's all right to see the microphone on-camera.

- Clip a lavalier mic (such as the Crown GLM-100) onto the announcer's shirt about 8 inches below the chin (Figure 24). Aim the front of the microphone at the mouth.

Fig. 24 – Using a lavalier mic.



- Use a handheld omni dynamic.
- To reject background noise, try a handheld uni-directional dynamic, variable-D type, with a foam pop filter. Place it close to the mouth.
- If the announcer is hard to hear because of loud background noise (sirens, rock concert), try a CM-310A Differoid® with lips touching the grille. The CM-310A is a handheld cardioid microphone that is noise-canceling or differential.

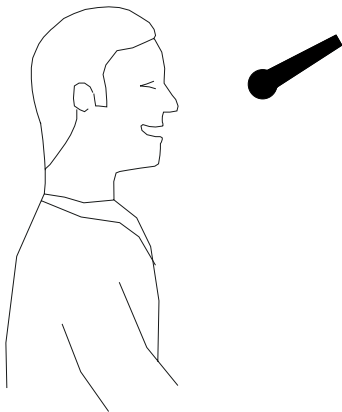
“Differential” means it cancels sounds at a distance, and “cardioid” means it cancels sounds from behind the microphone. Because of these abilities, the CM-310A permits extreme isolation from background noise. When used as a stage vocal mic, it provides extremely high gain-before-feedback.

To keep from canceling the announcer’s voice, the microphone must be used with lips touching the grille. Also, the announcer must talk directly into the front of the microphone, not the side, or the voice may get canceled and sound thin.

The Differoid is used by the Indianapolis 500 Speedway announcer who announces while sitting in the stands. Even with the loudspeakers blaring in the background, the Differoid rejects the sound of the P.A., the cars, and the crowd.

In the studio, the announcer’s mic is often placed about 8" away at eye level to prevent pops (Figure 25). A hoop-type pop filter also works quite well.

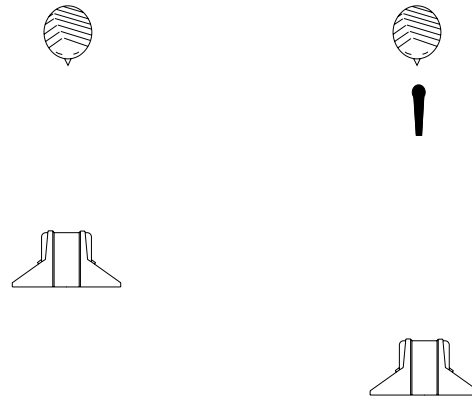
Fig. 25 – Placing an announcer’s mic to avoid breath pops.



Announcer with ambience. If you want to pick up the announcer along with ambient sound in stereo, use a SASS microphone about 4 feet away (Figure 26, left side). For more flexibility in post production, use a SASS several feet away for ambience,

and mix it with a closeup mic on the announcer (Figure 26, right side). This produces mono centered dialog with stereo ambience.

Fig. 26– Two ways to pick up an announcer and ambience with a SASS-MK11 stereo microphone.



Dialog at a video shoot

In this case, you don’t want to see the microphone on camera.

- Shotgun microphone. The most common choice is a shock-mounted shotgun mic placed above the actor and in front, as close as possible but just out of the camera view.
- Lavalier microphone. To hide the microphone, attach it under clothing. Since clothing can attenuate high frequencies, boost the highs with your mixer EQ until the sound is natural. Go wireless if the actor moves around a lot. The Crown GLM-100-E is an omni lavalier without electronics, which you plug into a wireless transmitter.

Ambience or environmental sound:

Try a stereo mic (Crown SASS-P MK11), or two spaced omnis 25 feet apart (such as PZMs), or a single omnidirectional mic for mono. The ambience mic can be handheld, on a stand, on a camera hot shoe, or on a Steadicam platform.

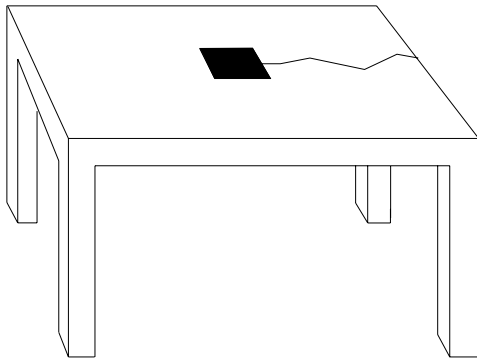
General Television Network used two PZMs in ear-spaced plexiglass pyramids to create the soundtrack of an air show and a Muzzleloaders festival. Both

these soundtracks won Emmys. The SASS was used in the Indy 500 to pick up the audience and race cars in stereo.

Interviews

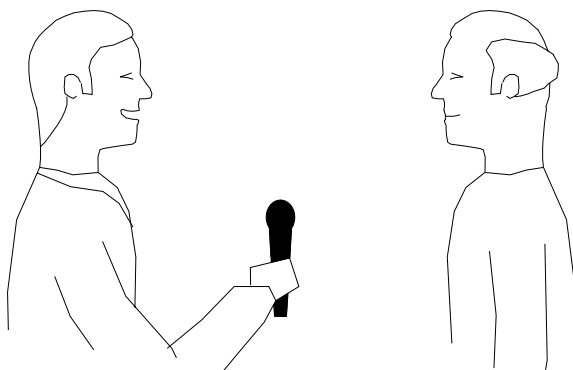
For people seated at a table, try a PZM-6D in the center of the table (Figure 27).

Fig. 27— Miking an interview with a PZM.



For on-the-street interviews, if a handheld mic is acceptable, use a handheld omni dynamic. Either place it midway between the two people (Figure 28), or hold it about 3 inches below the chin of the person speaking. Do not move the mic while talking, or the level will vary.

Fig. 28— Miking an interview with a handheld mic.



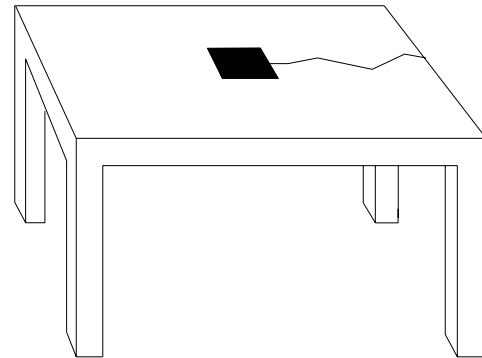
If you want to omit the handheld mic because it is intimidating, try a PZM in your shirt pocket. If background noise is excessive, try a handheld uni-directional dynamic microphone, variable-D design, with a foam windscreen. Place it close to the mouth.

Group discussions

If the group is seated at a small table, try a PZM-6D in the center of the table (Figure 29).

If the table is large, place a PCC-160 (Figure 30) or

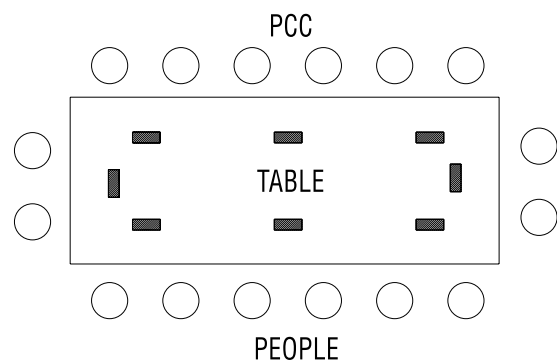
Fig. 29— Miking a group discussion with a PZM.



PCC-170 on the table between every two people. Run the mics through an automatic (gated) mixer for the clearest sound.

If you don't want to see mics on the table, try hang-

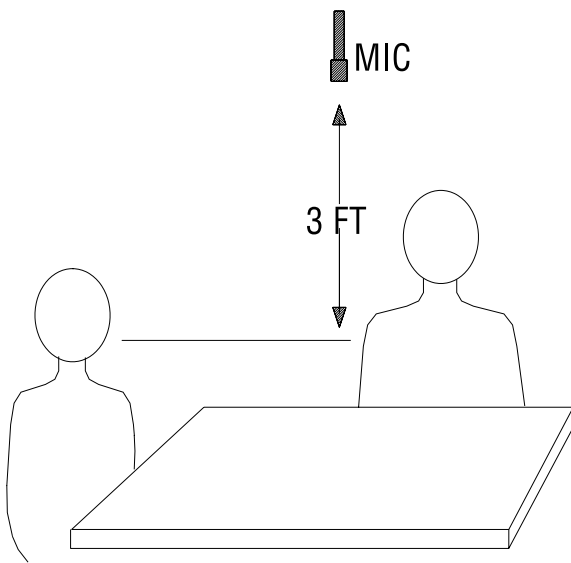
Fig. 30— Miking a group discussion with PCC microphones.



ing a CM-30 or CM-31 miniature supercardioid mic over the table, about 3 feet above the talkers' heads (Figure 31).

Try a PZM-6D on the wall near the group.

Fig. 31— Miking a group discussion with an overhead mic.



Use a lavalier mic (GLM-100) on each participant. Consider running the mics through an automatic (gated) mixer for clearer sound.

Audience:

To pick up questions in the audience, try a shotgun mic aimed by an operator.

For a clearer pickup of questions, use a handheld wireless mic. Have an assistant hand the mic to each person who wants to ask a question.

Try hanging several cardioid mics over the audience. To record audience reaction, try a single stereo mic such as the Crown SASS-PMK11. Or try a PZM on a 2-foot-square plexiglass panel.

Basketball

A typical setup employs headset mics for the announcers mixed with a another mic aiming at the crowd. To pick up the floor action, use a shotgun mic operated by a person seated in the bleachers. This person should follow the action with the shotgun mic. If you don't want to use an operator, mount a shotgun microphone on each backboard support, aiming at the action on the floor. Try one or two PCC-160s just outside the court. To pick up backboard sounds, tape a PZM-30D on the backboard just below the hoop.

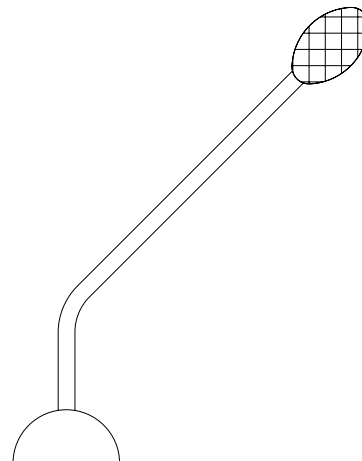
Golf, bowling

Place PZMs on the grass or near the pins.

Speeches at a lectern

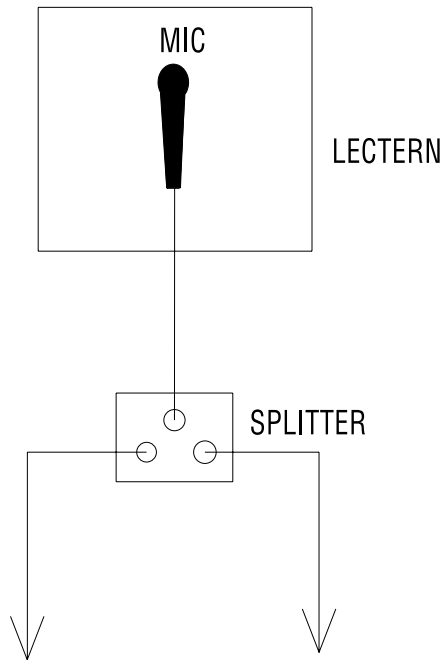
For permanent installations, use a slim gooseneck mic such as the Crown LM-201 or LM-300 (Figure 32). Place the included foam pop filter on the microphone, leaving an airspace between the pop filter and the microphone grille.

Fig. 32— A lectern microphone.



For temporary setups, place a cardioid mic (Crown CM-700) on a boom stand 8" away from the talker's mouth (Figure 32). Place a foam pop filter on the mic. If necessary, use a splitter to feed the mic signal to the P.A. mixer and the broadcast mixer.

Fig. 33– Miking a speech.



Parade

- Use a mid-side shotgun microphone.
- Use a Crown SASS-P MK11.
- Try a PCC-160 on either side of plexiglass panel over the street. Cover the panel with silk to reduce wind noise.
- Try a PZM-30D on a 2-foot-square plexiglass panel. Again, cover the panel with silk.

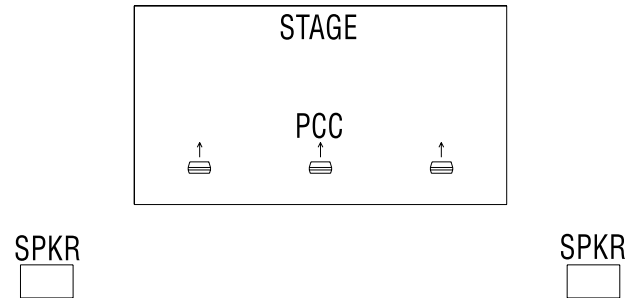
Wedding

Place one or two PZM-30Ds on the floor near the minister. Two PZMs on the floor can pick up the musicians who play at the reception.

Theater

Place two or three PCC-160 supercardioid boundary mics on the stage floor a few feet from the front edge (Figure 34). For maximum gain-before-feedback and clarity, turn up only the microphone nearest the person talking.

Fig. 34– Miking a theater stage floor.



Sound effects

To record sound effects on location, use a stereo mic to accurately track the motion, not a spaced pair of mics. With the spaced pair, sounds may jump from speaker to speaker as the sound source moves.

Audio people at the Indy 500 used a SASS to record a promo for the Dodge Viper pace car. Movies such as *Days of Thunder* and *Hunt for Red October* employed the SASS for sound-effects pickup.

Security and surveillance

A microphone designed for this purpose is the Crown PZM-11. It can be mounted in the ceiling or wall in a standard electrical outlet box. The PZM-11 is designed to look like a light switch so as not to draw attention.

Use it in factories, jailhouses, classrooms, subway platforms, military installations. Put it anywhere there's a need to listen for intruders, listen for people in trouble, monitor conversations, or monitor machinery noise.

Musical applications

See the *Crown Microphone Application Guide*, *Microphone Application Guide for Studio Recording*, and the *Crown Boundary Microphone Application Guide*, available free from Crown or your Crown dealer.