

# CROWN MICROPHONE APPLICATION GUIDE: TELECONFERENCING & DISTANCE LEARNING

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# CROWN MICROPHONE APPLICATION GUIDE FOR TELECONFERENCING AND DISTANCE LEARNING

Thanks to teleconferencing, we can hold meetings with people in another location without having to travel there. Distance learning lets a professor teach thousands of students in various locations, all at the same time, in a cost-effective manner. It's also used for corporate training.

Both teleconferencing and distance learning can save you or your company thousands of dollars in travel fees, not to mention the cost of hotels, meals, etc.

## Teleconferencing System

Here is an overview of a typical teleconferencing system (Fig. 1). Two meetings are set up around conference tables. One meeting is in your company, and the other meeting is in another company.

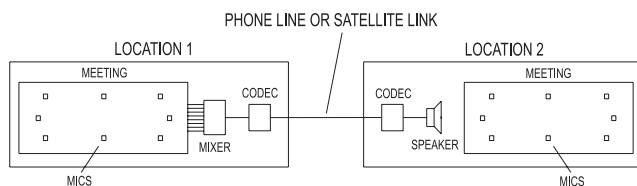


Figure 1. Teleconferencing system.

People at your meeting are picked up by microphones. The sound of their voices is sent over standard telephone lines, or a satellite link, to the other meeting location. There, the people can hear you through a loudspeaker.

Similarly, mics at their location pick them up. Their voices are sent over phone lines or satellite to your location. You hear them through a loudspeaker. You can talk back and forth, almost as if they were with you at the conference table.

There might be cameras and video monitors set up so that you can see the other people, and they can see you.

A teleconferencing system is made of the following components:

- **Microphones**

These pick up the voice of each participant. Mics can be on the conference table or on a lectern. The mics might be switchable: each user can turn his or her mic on and off.

- **Mixer**

This electronic device combines all the mic signals into one audio signal.

- **Telephone coupler or codec**

Short for coder-decoder, a codec takes the audio signal from the mixer, and sends it over the telephone lines. On the sending end, it digitally codes the audio into a telephone signal. On the receiving end, it decodes the telephone signal back into audio.

Some codecs also send and receive video. Video signals must be sent via satellite, which relays the signal to the distant location.

Some systems combine a mixer and codec into one unit. Other systems combine mics, mixer and codec into one unit.

- **Telephone lines**

Supplied by the telephone company, standard phone lines (or high-speed phone lines) carry your audio signal to the distant meeting location. There, a codec converts the phone signal back into audio, which is fed to a speaker. The meeting participants can hear you through this speaker.

- **Loudspeaker**

In your meeting room, a loudspeaker plays the voices of the people from the distant meeting.

- **Video cameras and TV monitors**

This is an option. Cameras and monitors let you see the people at the distant meeting, and let them see you. In many systems, the cameras automatically switch to show the person speaking.

## Distance Learning System

Now let's explain a distance learning system (Fig. 2). Typically, students will be in one or more classrooms, and a professor will be in another location. The professor talks to the students through a clip-on or lavalier microphone. The mic signal is sent by phone lines or satellite to the classrooms. There, several loudspeakers play the professor's voice to the students. The students can see the professor over a TV monitor. The students can see the professor over a TV monitor.

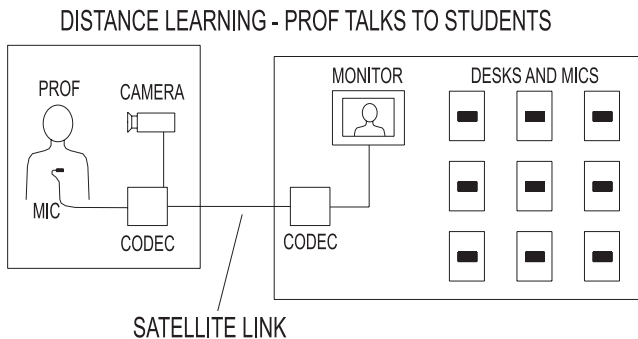


Figure 2

In the classroom, each student or pair of students has a desk mic or hanging mic. Students can switch on the mic when they want to ask the teacher a question. The mic signals are sent by phone lines or satellite to the teacher. The teacher and student can talk back and forth, almost as if they were in the same room.

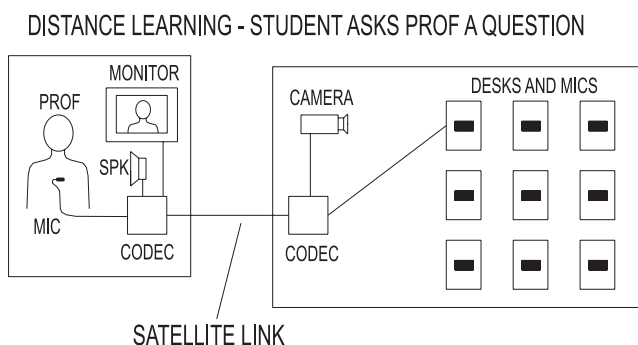


Figure 3

The parts of a distance learning system are the same as in a teleconference system. Crown makes one part of these systems: the microphones.

You should contact a consultant, codec manufacturer or system integrator to design and install your complete system.

## How to Send Clear Audio

When you transmit audio to the distant meeting, the audio should be clear and easy to understand. But there are some problems that prevent clear sound:

### Reverberation

This is the sound reflected off the room walls, floor and ceiling. Too much reverberation makes the speech sound hollow, distant, and blurred.

### Background noise

This is noise from ventilation ducts, fluorescent light ballasts, video equipment, and equipment cooling fans. Too much noise makes the speech hard to hear and understand.

### Feedback

This is the squealing or ringing sound you hear when the mics pick up the sound of the loudspeaker. The speech sound picked up by the mics is fed to a loudspeaker, and the loudspeaker sound re-enters the microphone. This creates a feedback loop and makes an annoying ringing sound.

Here are some ways to prevent all these problems. The result will be clear, intelligible audio:

- Place mics close to talkers. Put table-top mics within arm's length. Talk into lectern mics about 8 inches away. Wear a lavalier mic on the chest.
- Use directional mics. Some examples of directional mics are cardioid, supercardioid, and hypercardioid. These mics are designed to reject feedback, noise and reverberation.
- Use boundary mics on conference tables. A boundary mic is a low profile unit that lies on the conference table surface. It picks up less room acoustics than a conventional mic on a desk stand, so the boundary mic sounds clearer. Also, a mic on a desk stand picks up table-top sound reflections. These reflections cause phase interference, which may give the voice a strange tone quality. The boundary mic is designed to eliminate phase interference, so it sounds natural.

- Use an automatic mixer (gated mixer). You adjust the automatic mixer so that it turns all mics off except for the one in use. One mic by itself sounds much clearer than several mics on at once.
- Acoustically treat the conference room. To absorb reverberation, use acoustic-tile ceiling, carpet, and drapes. Hire a sound contractor to design or modify the air handling system for low noise.
- To prevent feedback, place the loudspeaker far from the mics, and behind them if possible. Use an acoustic echo canceller (AEC) with howling rejection.

Another problem with sound transmission is echo. Your audio signal is sent on a phone line, or via satellite, to the distant receiving site. It takes time for the signal to travel. At the distant site, the signal might be picked up by the mics there, and bounce or echo back to you after a short delay. If you hear this echo, it confuses the sound of speech.

The solution is an acoustic echo canceller (AEC), a device that senses the echo and cancels it out. Many codecs come with an echo-canceller circuit built in.

## Crown Mics for Teleconferencing and Distance Learning

All Crown mics are condenser mics, which need power to operate—either a battery or a *phantom-power supply*. A phantom power supply sends power to the mic along its mic cable. Two phantom supplies from Crown are the PH-4B (powers up to four mics) and the PH-1A (powers one mic). Most modern mixers provide phantom power for microphones, so that no external supply is needed.

Here are some Crown mics that work well for teleconferencing:

### Table-top or desk-top mics

These microphones lie on the surface of a conference table or a desk. They pick up speech with a clear, natural sound.

All these models are boundary mics. They eliminate the effect of reflections from the table top that would otherwise blur the sound.

An omni boundary mic picks up sound in all directions, so you put it in the middle of the table. Use one for a square table and two spaced apart for a long table. This works for conference recording, but has too much feedback for teleconferencing use.

Supercardioid or cardioid boundary mics pick up sound mainly from in front. These mics sound clearer and have less feedback than an omni mic. But they cost more because you must use several of them: one per person, or one for every two people.

Listed below are the Crown boundary mics. We'll suggest which models to use later in this guide.

**PCC-170:** supercardioid

**PCC-170SW:** supercardioid with on/off switch

**PCC-170SWO:** supercardioid with switch and two additional remote sensing leads.

**PCC-130:** cardioid, smaller than PCC-170

**PCC-130SW:** cardioid with on/off switch



PCC-170

### Mini Boundary mics

These are very small mics with a half-supercardioid pattern. Five models are available:

**MB-1:** Plugs into a brass cup in the table.

**MB-2:** Plugs into a jack in the table.

**MB-3:** Tubular; mounts in ceiling, wall or table.

**MB-4:** For temporary use. Has a thin cable with an XLR connector.

**MB-4E:** Lowest cost. Cable fits through small hole in table.

Models MB-1, MB-2 and MB-4E require a Crown MB-100 or MB-200 interface. The MB-200 interface allows remote sensing of switch closure, so it can be used with a video switcher. Each interface can take up to four mics.



*An example of an MB mic: The MB-2.*

### **Hanging mics**

Normally, these mics are hung over the students in a distance learning setup.

The Crown hanging mics are the CM-30 and CM-31. Each mic rejects sound from the rear, and rejects muddy-sounding room acoustics.



*CM-30*

CM-30 electronics mount in an electrical box in the ceiling. CM-31 electronics are in a tubular interface which you plug into a microphone cable.

Mics hanging over a conference table do not work well compared to table-top mics. Hanging mics are too far from the talkers for clear pickup without feedback.

### **Lectern mics (gooseneck mics)**

These mics are permanently installed on a lectern, student desk, or conference table. Compared to table-top mics, lectern mics pick up less paper shuffling and less room acoustics because the mics are closer to the user. Lectern mics, however, are more conspicuous and are more susceptible to breath pops.



*LM-300A and LM-301*

Listed below are the Crown lectern mics:

**LM-300A:** Miniature gooseneck. Can be shock mounted with LM-SM shock mount.

**LM-300AL:** Same as LM-300 but 5" longer.

**LM-201:** Rugged ball and socket swivel, built-in shock mount.

**LM-301A:** Fastens to a flange on the lectern; allows cable to exit down or out the side.

**LM-SM:** Shock mount for models LM-300A, LM-300AL, and LM-301A.

## Lavalier mic

This is a miniature mic that clips onto the talker's tie or shirt (Figure 4). It's useful if the talker moves around while speaking. The teacher in a distance-learning system often uses a lavalier mic.

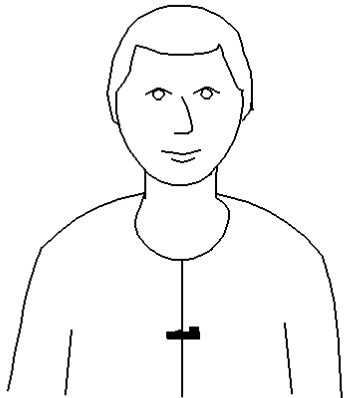


Figure 4. A lavalier mic.

The rest of this guide suggests the best Crown mics for various applications. It also suggests how to place them to achieve the best sound quality.

## Distance Learning Applications

In a distance learning system, each mic needs to be near its user to prevent a hollow, muddy sound. Desktop mics tend to pick up too much paper shuffling, but gooseneck or lectern mics work well. You can mount a gooseneck mic on a desk to pick up two to three people. Or, hang a mic about 2 feet in front of, and 2 feet above, every two to three people. Angle the mics to aim at the people (Figure 5). So that only one mic will be on at a time, run the mics through an automatic mixer.

In a distance learning auditorium without desks, mount lectern mics onto the seat backs, or use hanging mics.

For best results consider treating the room acoustics. Add some carpet, acoustic tile ceiling, and drapes over the windows. This will greatly increase clarity and reduce the hollow sound you hear with hard room surfaces.

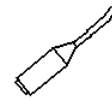


Figure 5. A hanging mic.

## Teleconferencing Applications

As we said earlier, the sound picked up at a conference is much clearer if you use several mics, and turn off all mics except the ones in use. In a teleconferencing system, there are two ways to switch each mic on and off:

1. Manually, by each user.
2. Automatically, by an automatic mic mixer (gated mixer).

Let's look at both options.

### Manual switching of mics

With this system, use a standard non-gated mixer with several mics. Choose one of these mic models:

**PCC-130SW:** Small mic with a half-cardioid pattern.

**PCC-170SW:** Larger mic with a half-supercardioid pattern for extra clarity.

**PCC-170SWO:** Like the PCC-170SW, but provides remote sensing of switch closure. These mics can be used with a video camera switcher. When a person turns on his or her mic, the camera aiming at that person is switched on. Then the TV-monitor view will track whoever is speaking.

**Mini Boundary Mics:** Very small mics with a half-supercardioid pattern. Three switchable models are available:

**MB-1:** Plugs into a brass cup in the table.

**MB-2:** Plugs into a jack in the table.

**MB-4E:** Lowest cost. Cable fits through a small hole in table.

These models require a Crown MB-100 or MB-200 interface. The MB-100 interface has connections for an on/off switch near each user. The MB-200 interface also allows remote sensing of switch closure, so it can be used with a video switcher.

### Automatic switching of mics

In this system, use an automatic mic mixer with several mics. Choose one of these mic models:

**PCC-130:** Small mic with a half-cardioid pattern.

**PCC-170:** Larger mic with a half-supercardioid pattern for extra clarity.

**Mini Boundary mics:** Very small mics with a half-supercardioid pattern. Five models are available:

**MB-1:** Plugs into a brass cup in the table.

**MB-2:** Plugs into a jack in the table.

**MB-3:** Tubular; mounts in ceiling, wall or table.

**MB-4:** For temporary use. Has a thin cable with an XLR connector.

**MB-4E:** Lowest cost. Cable fits through small hole in table.

Models MB-1, MB-2 and MB-4E require a Crown MB-100 or MB-200 interface. The MB-200 interface allows remote sensing of switch closure, so it can be used with a video switcher. Each interface can take up to four mics.

### Mic placement

Once you have chosen a suitable mic model, place a group of them as shown in Figure 6.

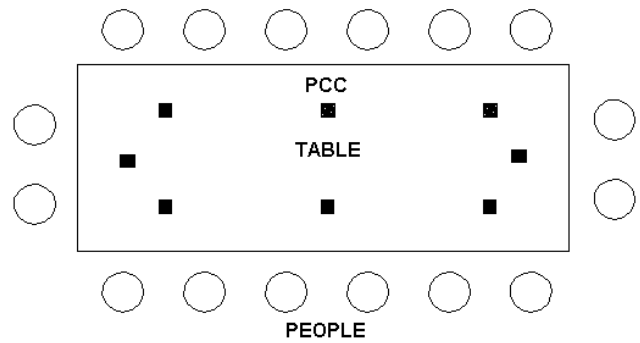


Figure 6. Teleconference mic placement.

1. Place one mic at arm's length from each person, or place one between every two people.

2. At a lectern, mount a Crown LM series lectern mic of your choice. If the leader of the meeting moves around while talking, he or she needs a lavalier mic. Clip the mic onto the shirt, about 8 inches below the chin.

3. If your mixer has phantom power, connect the mics to the mixer mic inputs (Figure 7). Models MB-1, MB-2, MB-4E connect first to the MB-100 or MB-200 interface, then to your mixer.

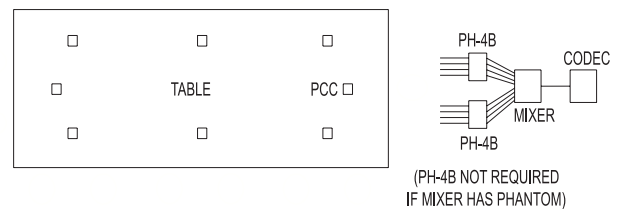


Figure 7. Teleconference system block diagram.

4. If your mixer does not have phantom power, connect the mics to a Crown PH-4B phantom power supply. Connect the power-supply outputs to your mixer mic inputs. Models MB-1, MB-2, and MB-4E connect first to the MB-100 or MB-200 interfaces, then to the PH-4B, then to your mixer.

5. Connect the mixer output to the line input in the teleconference codec.

By following these suggestions, you can look forward to clear sound in your teleconference and distance learning systems.