



MICROPHONE FUNDAMENTALS

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Agenda



- ❖ What is a Microphone ?
- ❖ How the microphone hears
- ❖ How the microphone works
- ❖ What type of microphone should you use?
- ❖ How to hold your microphone?
- ❖ Where to position your microphone?
- ❖ Microphone Maintenance.

WHAT IS A MICROPHONE ?



- ❖ Is a transducer
- ❖ A transducer is a device that converts one form of energy into another
- ❖ Microphone refer to as Mic
- ❖ Mic changes the announcer's voice into an electrical signal that can then be mixed with other sound sources
- ❖ There is no one correct mic to use in radio production work, but specific types of mics will work better than others in certain situations

WHAT IS A MICROPHONE ?



- ❖ Good mic converts acoustic energy into electrical energy.
- ❖ Reacts quickly to the sudden onset of sound.
- ❖ When an announcer gets too close to the mic, the bass may be exaggerated—termed Proximity Effect.
- ❖ It reacts equally to all levels of pitch.
- ❖ Mic has electronic and operational characteristics.

ELECTRONIC CHARACTERISTICS



- ❖ Sound – generating element.
- ❖ Pick up patterns.
- ❖ Microphone features.

OPERATIONAL CHARACTERISTICS



- ❖ Mobile microphones.
 - ✓ Lip/Clip/ Neck mic.
 - ✓ Hand mic.
 - ✓ Boom mic.
 - ✓ Headset mic.
 - ✓ Wireless mic.
- ❖ Stationary microphones.
 - ✓ Desk mic, Stand mic, Hanging mic, Hidden mic & Long-distance mic.

Clip mics



- ❖ Often used in TV as they're less obtrusive.
- ❖ Where you clip the mic is very important - too far from the voice and it will sound distant; too close to the chin and it can sound muffled.
- ❖ You need to consider your interviewee's clothing . And if you clip a mic to a man's shirt, make sure that his tie doesn't fall across the mic.
- ❖ Clip mics have their uses but hand-held mics will generally give you a better sound.
- ❖ The use of Clip mics frees the lighting people from "lighting around the boom" to avoid shadows.
- ❖ Installed 5 to 8 inches below the chin.



PICKUP VS POLAR RESPONSE



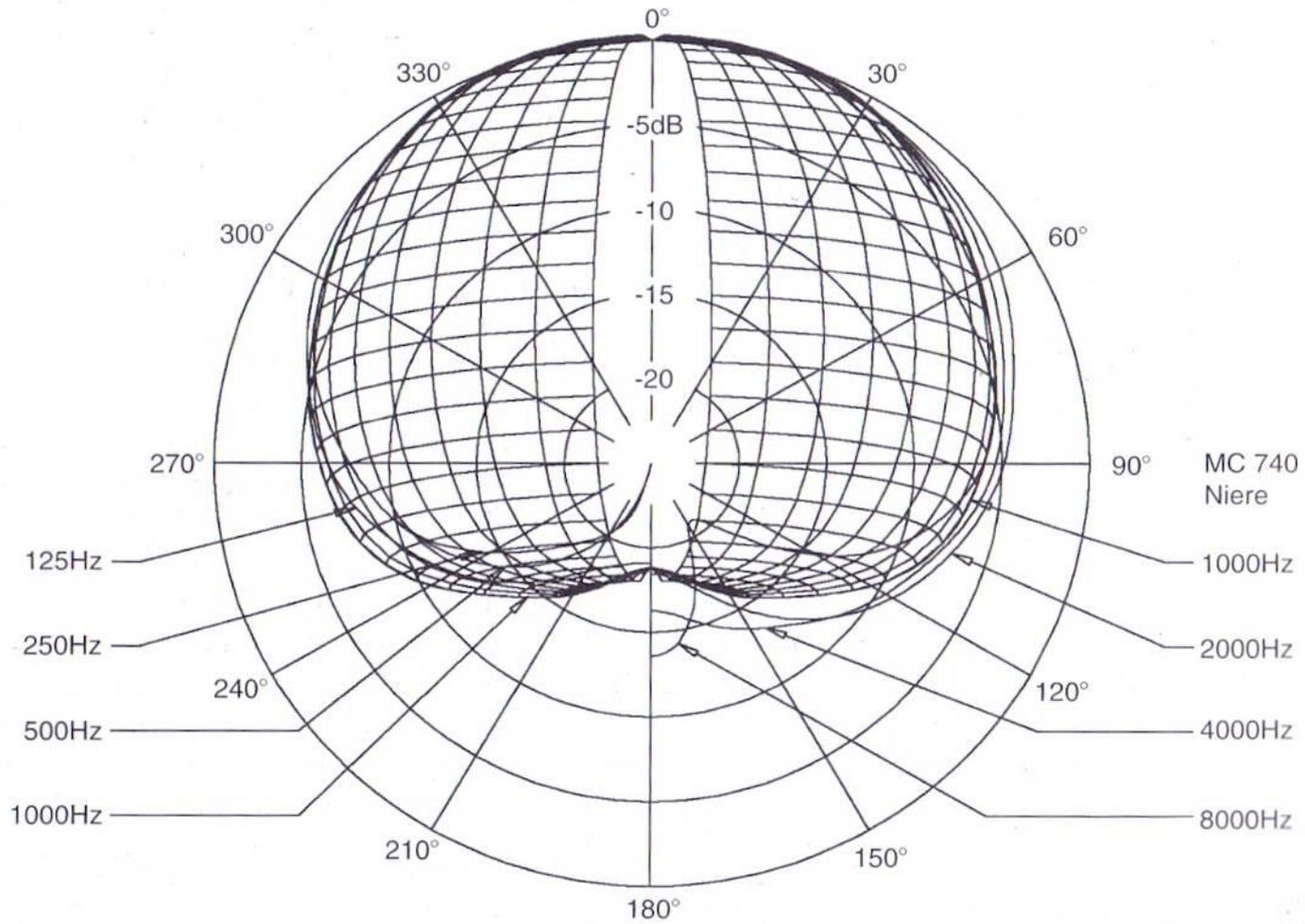
▶ Pickup Pattern

- ❖ 3-dimensional shape.
- ❖ The area around the mic which best picks up sound.

▶ Polar Response Pattern

- ❖ 2-dimensional shape.
- ❖ Shows how the sound will be attenuated as it pick up off-axis

CARDIOID PICKUP PATTERN



TYPES OF MICROPHONES



❖ DYNAMIC MIC

❖ CONDENSER MIC

❖ RIBBON MIC

❖ **Regulated Phase Mic** has a wire spiral embedded in a circular diaphragm as part of its sound generating element; used more in the recording industry- production studios.

DYNAMIC MIC



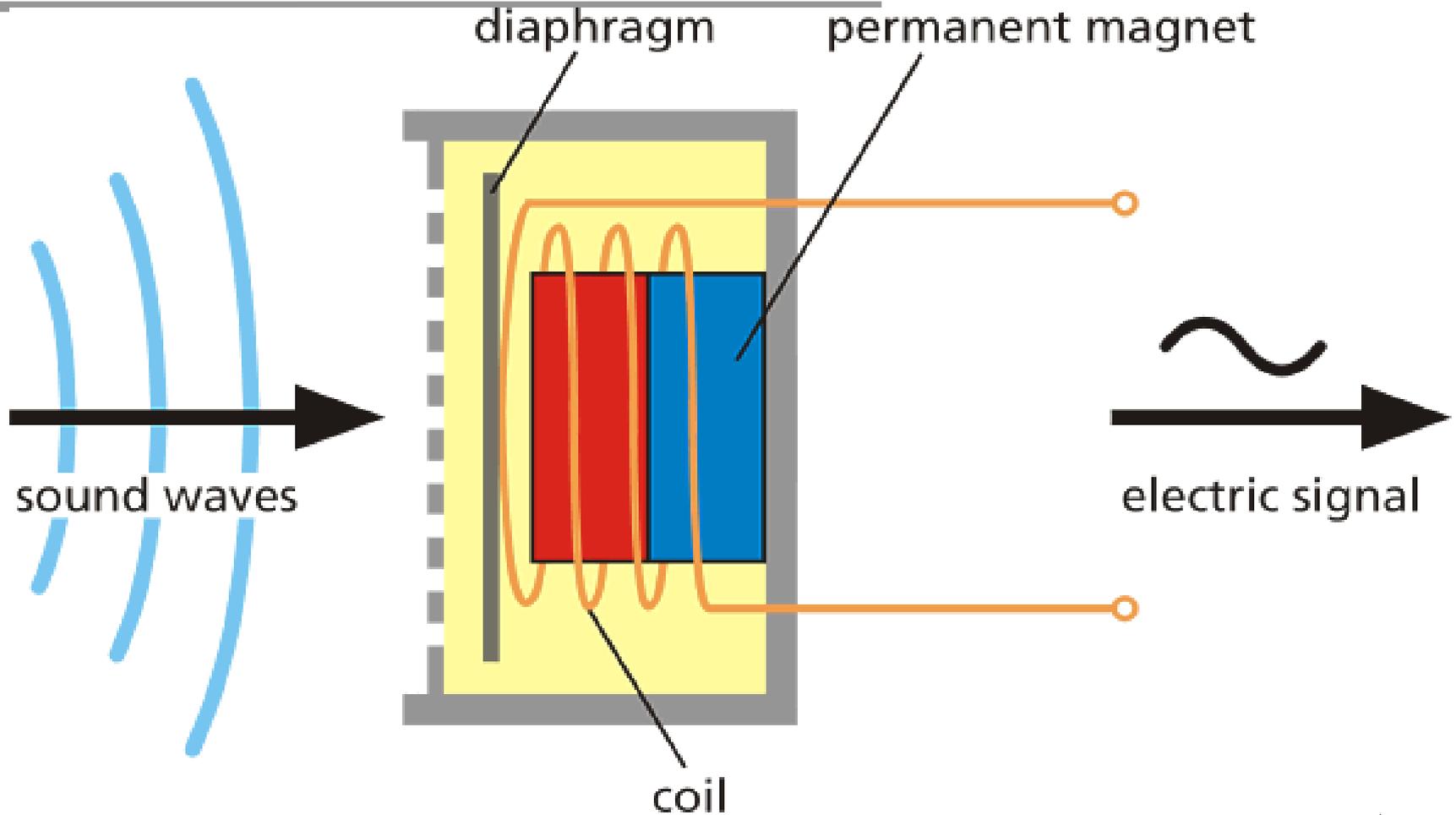
- ❖ Moving – coil mic / Pressure mic
- ❖ Relatively simple construction
- ❖ Cheap
- ❖ Produces very low self noise & has excellent frequency response
- ❖ Can withstand a moderate amount of abuse
- ❖ Can handle extremely high sound levels
- ❖ Does not satisfactorily reproduce sound levels.

DYNAMIC MIC



- ❖ Rugged
- ❖ Sound not as detailed as other types
- ❖ Ideal for outdoor applications and music- drums, vocals , guitar

DYNAMIC MIC

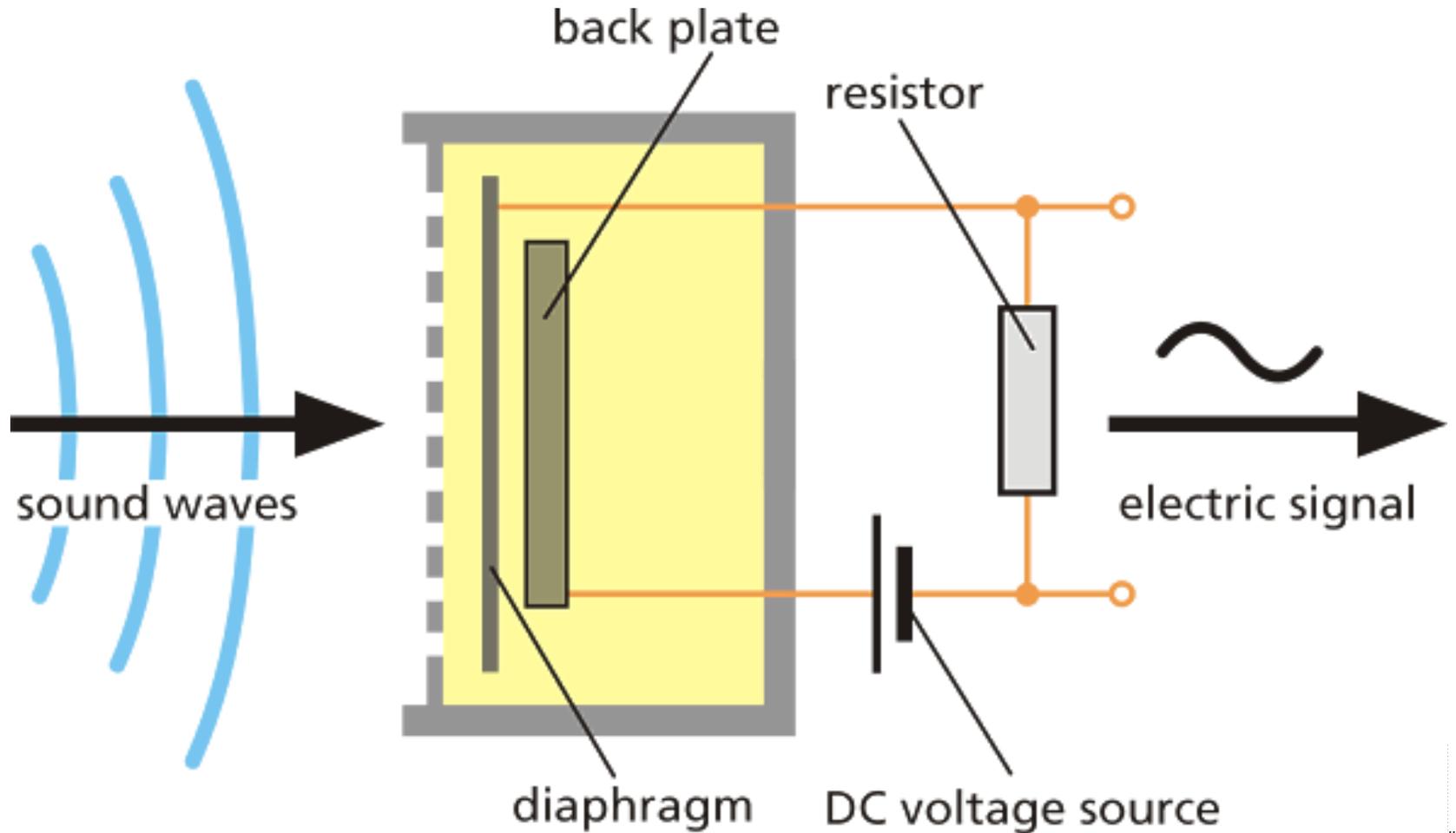


CONDENSER MIC



- ❖ Capacitor mic.
- ❖ Needs a small battery to operate.
- ❖ Much more sensitive to physical shock,
- ❖ It is fairly rugged and produces excellent sound quality and wide frequency response.
- ❖ Built-in microphone on many portable audio recorders are often CM
- ❖ Useful for “distant” recording applications such as room mics, overheads and choirs.
- ❖ Better suited to high frequency transduction.
- ❖ Another form of condenser mic is Electret Mic, its capacitor is permanently charged during manufacture.

CONDENSER MIC



RIBBON MIC



- ❖ A ribbon mic with its figure of eight directivity pattern is most useful for its lack of pick-up on the two sides.
- ❖ Once delicate & expensive, but modern materials make it durable.
- ❖ Ability to capture high-frequency details than moving coil types.
- ❖ Output levels are significantly lower than moving coil.

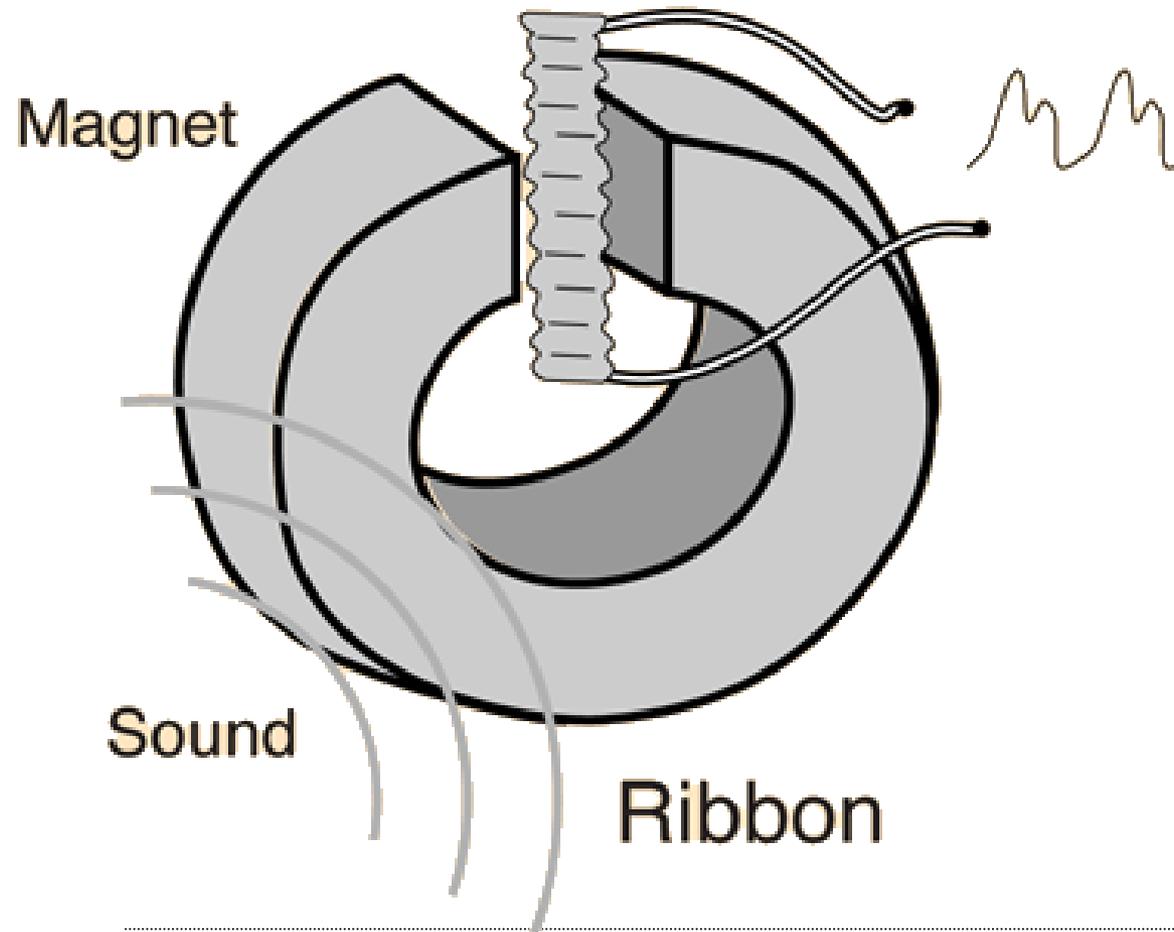
RIBBON MIC



- ❖ Ribbon mic – Lip mic
- ❖ Has excellent noise-cancellation properties.
- ❖ Ideal for commentary situations.
- ❖ The mouthguard is held against the broadcaster's lip while the mic is in use.
- ❖ Eliminates low frequency ambient noise & noise due to proximity effect.

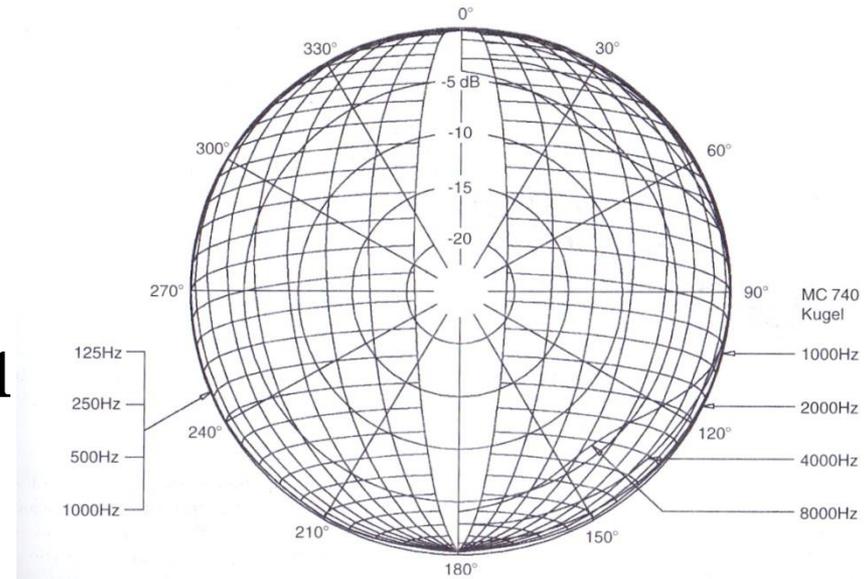


RIBBON MIC



OMNI-DIRECTIONAL MICS

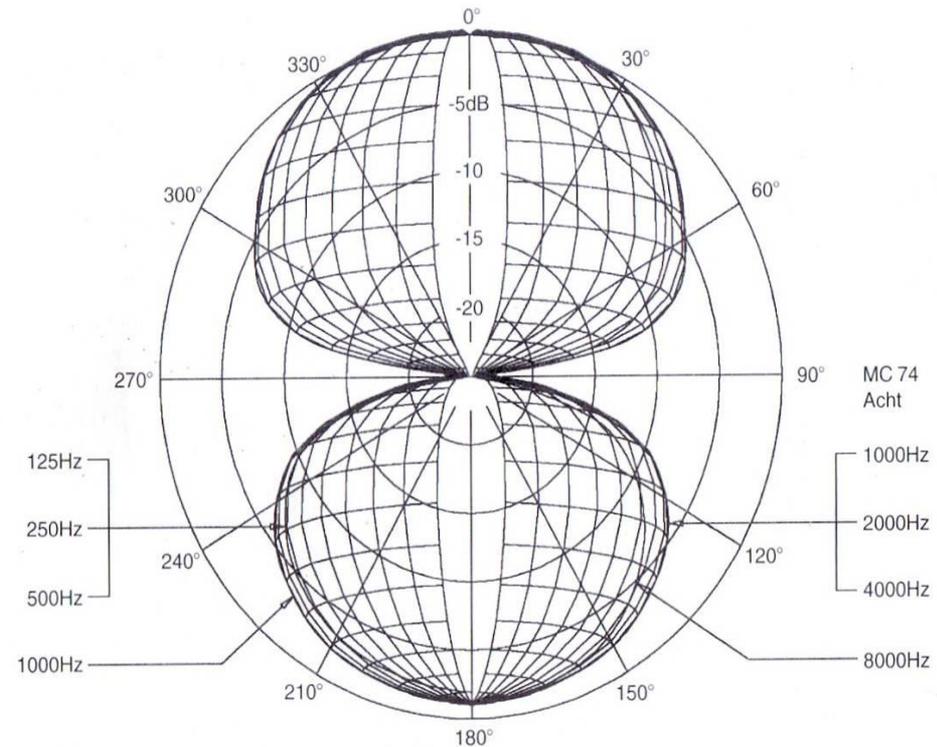
- ❖ A microphone that picks up sound equally well from all directions.
- ❖ Used whenever it is desirable to pick up sound evenly from all sides of the mic.
- ❖ Used outside the studio when the ambience of the location needs to be picked up along with the DCA voice. Most appropriate for conducting an interview on the sidelines at a football game.



BIDIRECTIONAL MICROPHONE



- ❖ A microphone that picks up equally from two opposite directions.
- ❖ The angle of best rejection is 90 deg. from the front (or rear) of the microphone, that is, directly at the sides.
- ❖ Used for radio dramas.
- ❖ Also used for the basic two person interview.



UNIDIRECTIONAL/CARDIOID MIC

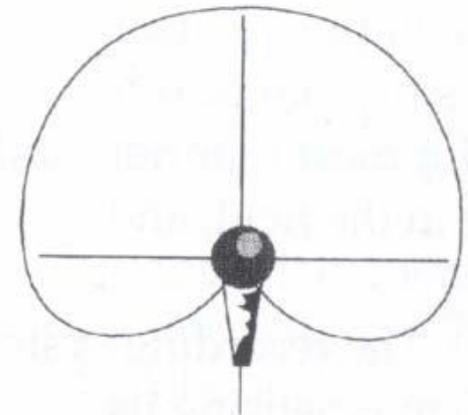


- ❖ Unidirectional mic hears better in one direction.
- ❖ The polar patterns of unidirectional mic are roughly heart-shaped, they are called cardioid.
- ❖ The supercardioid, hypercardioid & ultracardioid mics have progressively narrower pickup patterns which means that their hearing is more & more concentrated in the front.
- ❖ Their claim to fame is that they can hear sounds from far away & make them appear to be relatively close.

Cardioid Mics



- ❖ These mics are directional, and they're more sensitive to sounds coming from one particular direction, often the front of the mic.
- ❖ Moderately wide front pickup (131 deg.). Angle of best rejection is 180 deg. from the front of the microphone, that is, directly at the rear.
- ❖ Cardioid mics are good for favouring one sound while rejecting another from a different direction, but you need to know what you're doing.
- ❖ If you're just starting out, take an omni mic. It's the most flexible, and cardioid mics need more careful use.
 - ▶ Used for recording vocal & instrumental
 - ▶ Cable noise rejection.
- ❖ Offer great rejection of the sound from the sides.
- ❖ They reject unwanted sound- excessive reverb, feedback , background noise.
- ❖ Used in remote sports broadcasts.

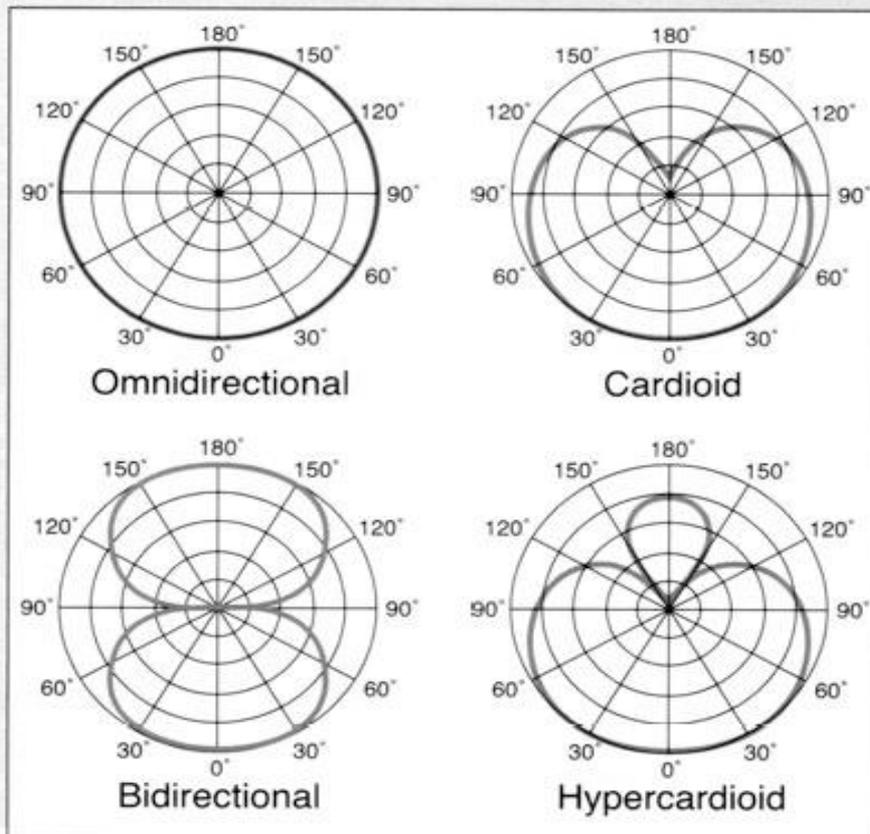


POLAR SHAPES



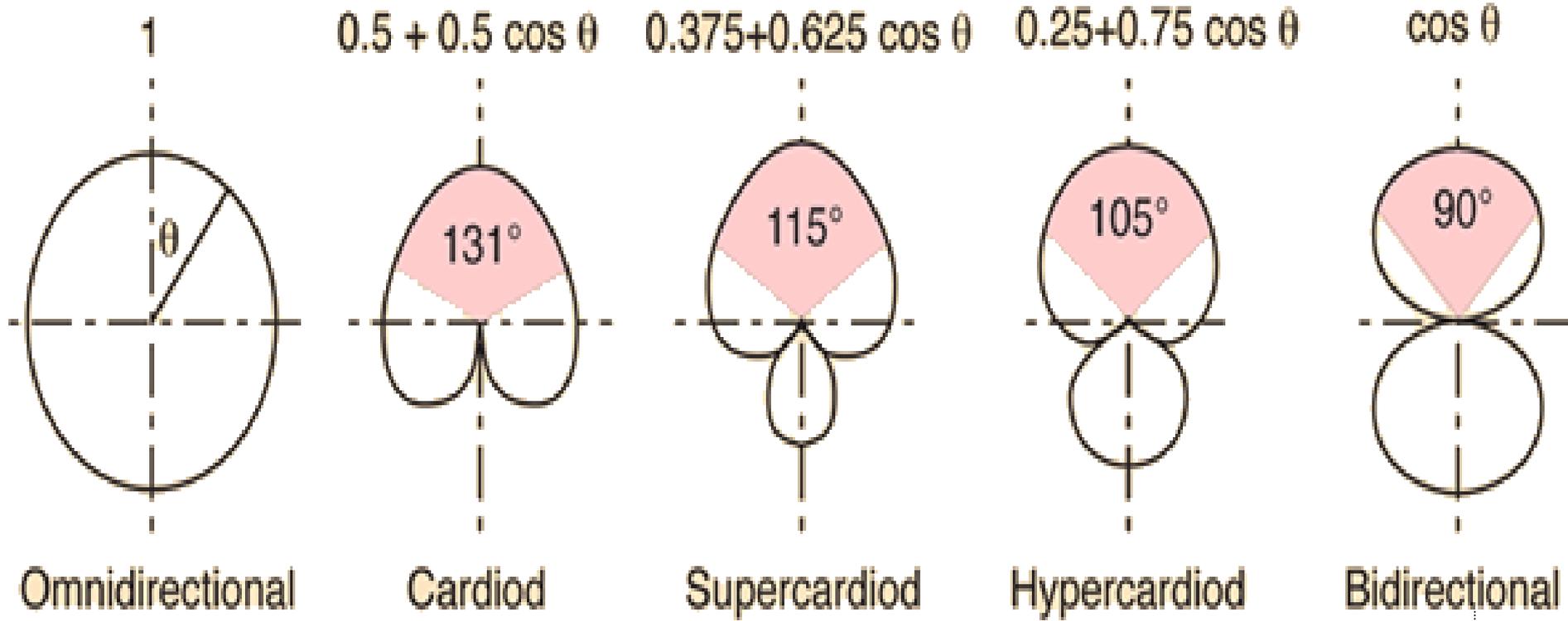
Polar Shapes

The two most basic polar response patterns are omnidirectional (doesn't discriminate against sounds from any direction) and cardioid (discriminates against sound that are 180 degrees off-axis). The other two polar shapes in this illustration are bidirectional (an omnidirectional pattern on each side off the mic) and hypercardioid (a bidirectional pattern with a large half and a small half).



Sometimes the on-axis position is noted at the top of the graph; other times it's noted at the bottom. In either case, the 0° position is always the front of the mic.

CARDIOID



What type of Mic should you use?



- ❖ There is no one correct microphone to use in radio production work, but specific types of microphones will work better than others in certain situations.
- ❖ A microphone that is perfect for voice-over work in the studio may not work well for recording a sound effect in the field.
- ❖ There is no substitute for experience and experimentation.
- ❖ An understanding of how the mic hear sound will aid in the proper selection of a mic for a given situation.
- ❖ If you are trying to pick up a loud or close-up sound, a mic with a lower sensitivity rating would be desirable

Gun mics



- ❖ Useful for recording more distant sounds, e.g. a voice on a stage or the speaker at a press conference, football to pick sound of the ball.
- ❖ Your gun mic should come with a grip or stand.



The mic and its accessories



- ❖ **A windshield:** often a foam cap which covers the business end of the mic. The windshield minimises wind noise on location & plosive sounds.
- ❖ **Shock mount:** help to isolate the mic from any mechanical vibrations
- ❖ **A lead:** connects your mic to your portable recorder. Before you set off, check you've got the correct lead with the right connections for the portable recorder you're using.



The mic and its accessories



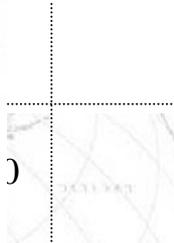
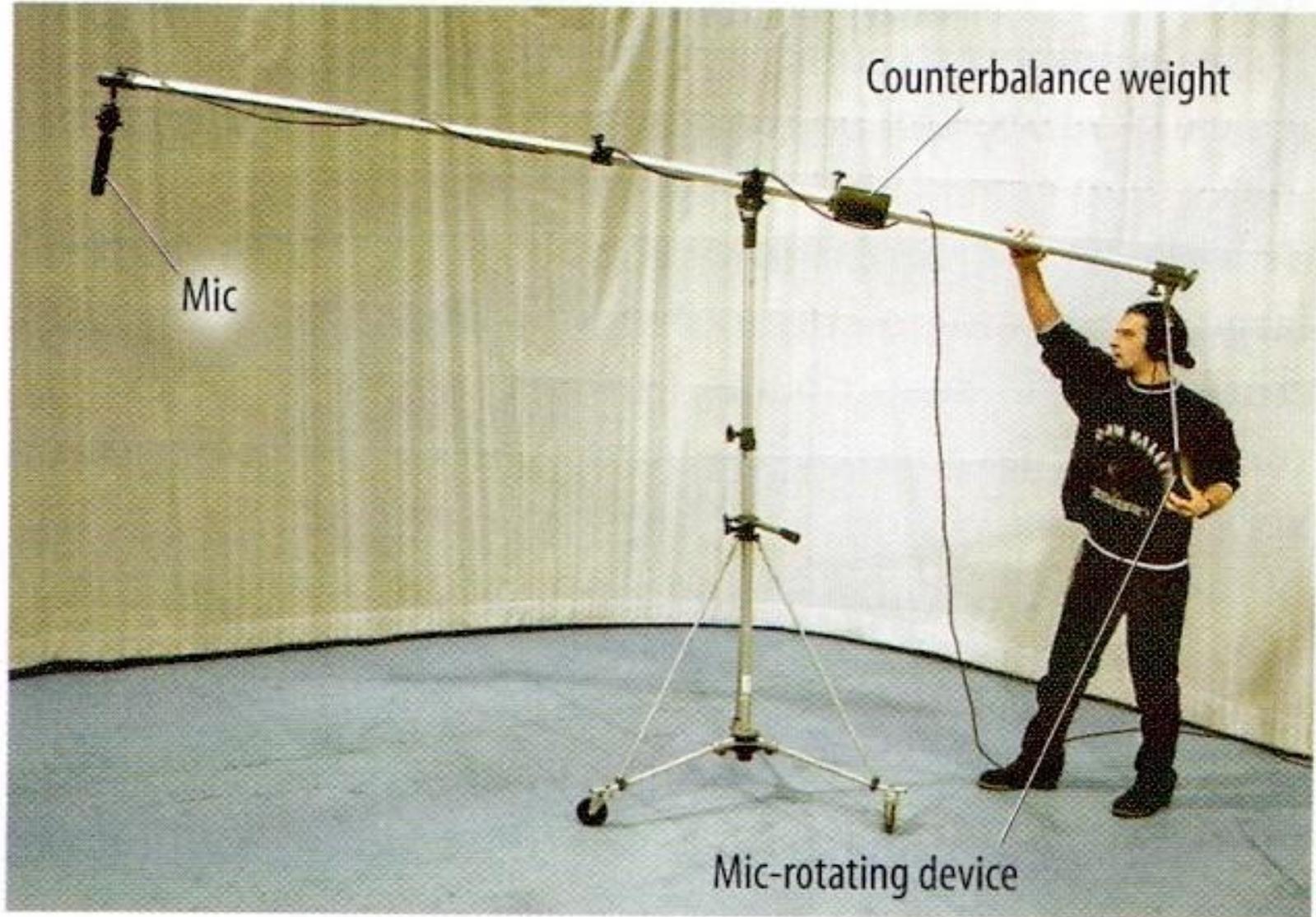
MIC STAND

- ❖ Floor Stand – used for standing position announcer.
- ❖ Desk Stand – used for seated announcer.
- ❖ Boom Stand – used for far away from a person & still allow the person to be close to the mic.

SHORT FISHPOLE BOOM



TRIPOD BOOM



PERAMBULATOR BOOM



Mic tilt and turn grip

Crank to adjust boom length

Operator's seat

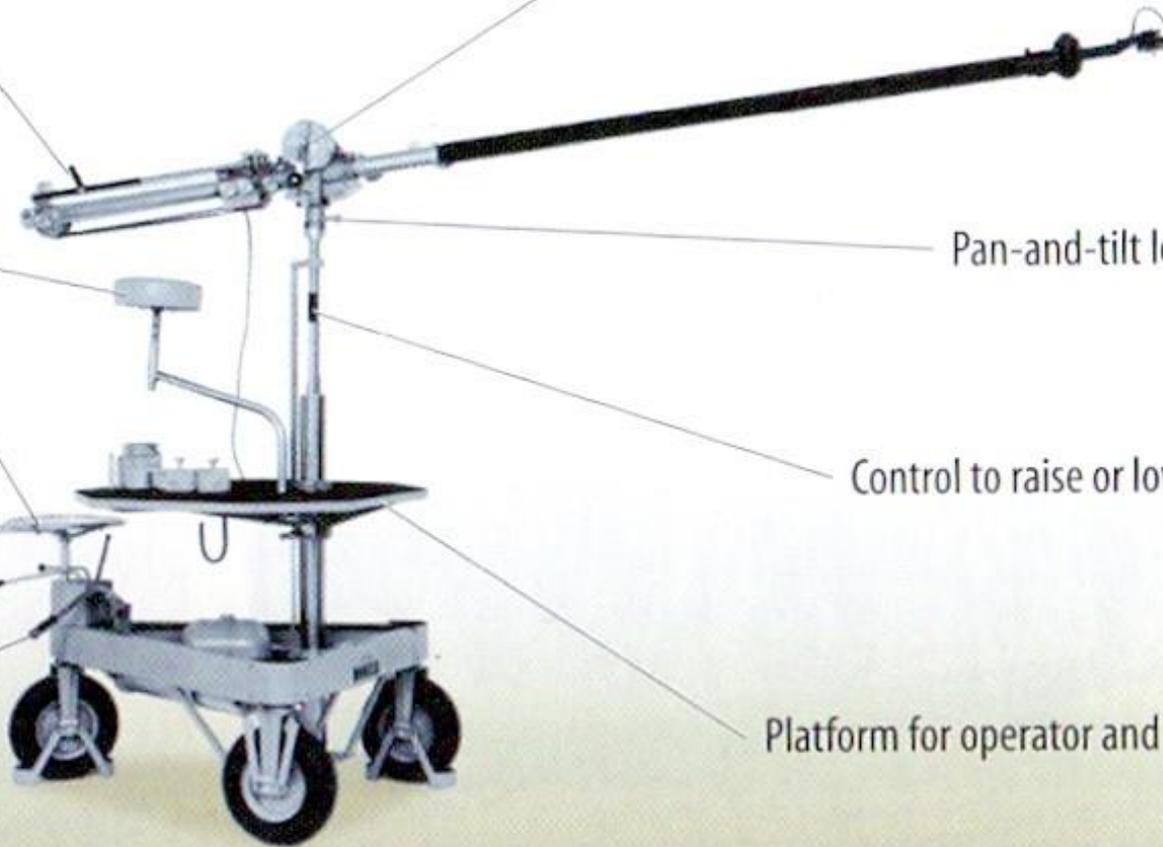
Pan-and-tilt lock screws

Steering control

Control to raise or lower platform

Break and gear change

Platform for operator and TV monitor



The mic and its accessories



- ❖ **Batteries:** some mics need to be powered by a small battery. Check before you leave and replace if you're in any doubt about how old the battery is. If you're going to be spending a long time on location, take spare batteries.
- ❖ **Tip:** For emergency waterproofing of your mic (if you really have to record that location interview in the pouring rain) slip a condom over your mic, under the windshield!



The mic and its accessories



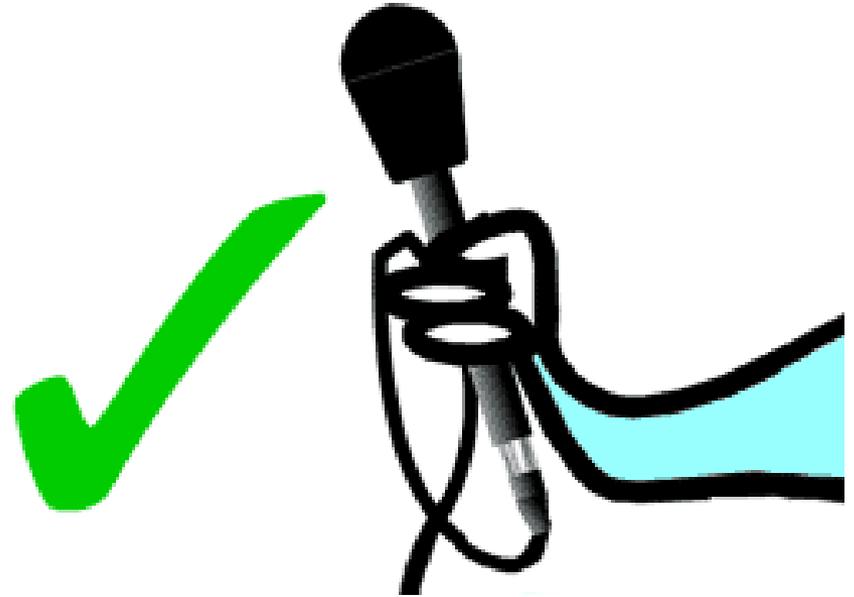
- ❖ **Cans:** Don't forget...a mic will pick up noises that you may not hear - or that your brain tends to filter out. So always wear cans (headphones) when you're recording.



How to hold your mic



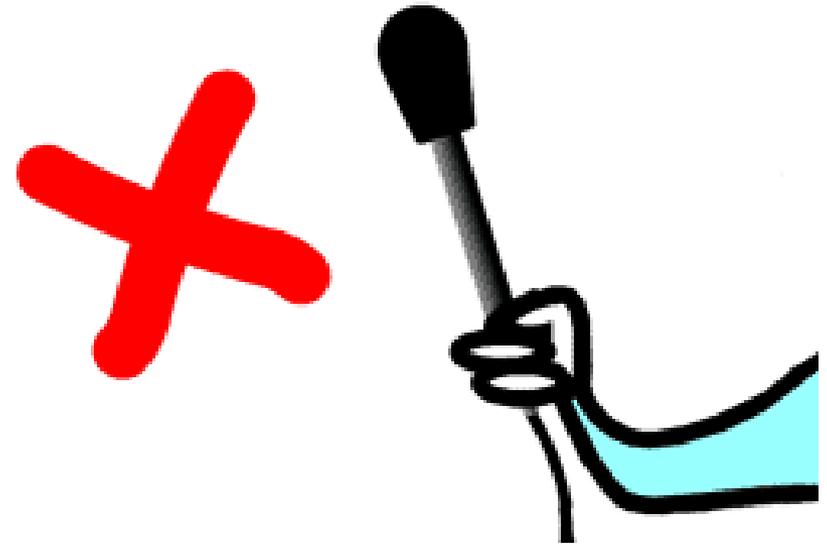
- ❖ Hold the mic firmly but comfortably, and well away from the connection at the bottom
- ❖ If you're recording a lengthy interview, you may want to rest your mic-holding arm on a chair or table
- ❖ Support the lead so that it doesn't sway or knock against chairs, tables, yourself etc.
- ❖ The placement of the mic can be as important as the choice of mic.



How to hold your mic : DON'T



- ❖ Let rings or bracelets knock against the mic or the lead
- ❖ Grip the mic too hard - your hand will go numb and may start shaking. If your arm does start to feel tired (and it will), simply ask the interviewee to pause for a moment, and swap to the other arm/hand.
- ❖ Twizzle the mic in your hand as you use it - this will cause mic bumps



Hearing what your mic will hear



- ❖ If you're inside, listen for the noises of air conditioning, clocks, the hum of electrical equipment, distant toilets, music or traffic, lifts, etc. These can cause you editing problems later on. Ask if electrical equipment can be switched off or clocks moved - but don't do this yourself, just in case any accidents occur. Check you're not on a airport flight path.
- ❖ Computers, mobile phones and fluorescent lighting may cause RF (radio frequency) interference. This will give you an unwanted buzzing, clicking or humming sound.



What kind of room are you in?

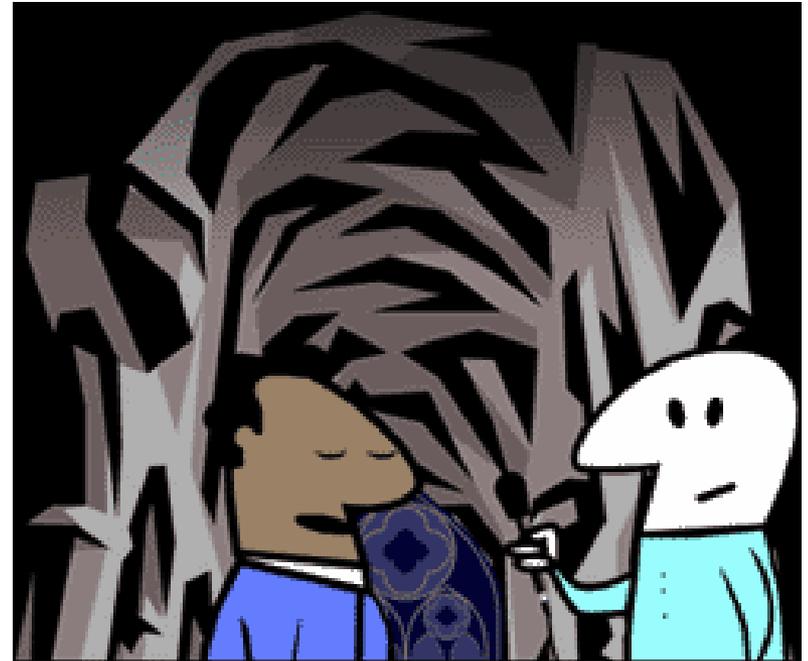


- ❖ Large rooms (like halls, churches etc) can be very reverberant, giving you a bathroomy sound to your interview. You can cut down on this boomy sound by holding the mic closer to your interviewee's mouth. (But beware of 'popping'.) You could also try to find a smaller room - even a cupboard may give you a better sound

What kind of room are you in?



- ❖ If you have to do your interview in a large reverberant room or hall, don't do your interview near the centre of the room.
- ❖ Try to move to the side but not a corner (which would give you a boxy sound).
- ❖ Don't stand too close to the wall, or you'll pick up too much reflected sound.
- ❖ Closing the curtains (if there are any) will cut down the reverberation in a large room.



What kind of room are you in?



- ❖ If you're outside, find a sheltered location if possible to protect the mic from wind noise. Rain will make a noise if it hits the mic. (In fact, water and any technical equipment don't get on together.) If you're near traffic, choose a side street rather than a main road. A car makes a useful temporary studio if the weather or traffic noise is awful.



Where to position your mic

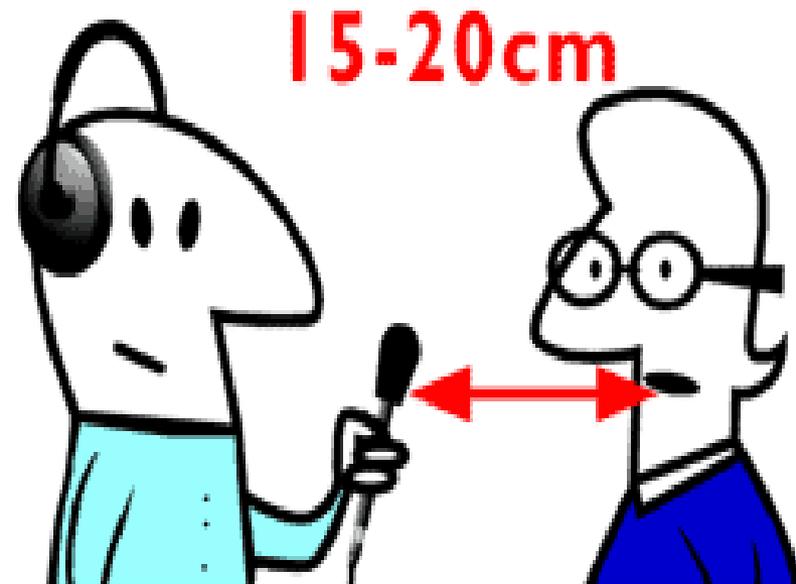


- ❖ Exactly where to place your mic depends on what kind of mic you're using - but here are some general rules:
- ❖ In a quiet location and using an omni mic, hold the mic about 6-8 inches / 15 -20 cm from the voice (yours or your interviewee's). If you want use your voice and your interviewee's, they need to be the same level.
- ❖ Do not talk directly into any mic, if you do, it will not only pick up excessive breath noise but also cause sibilance
- ❖ Talk into the mic from a very short distance will boost the bass range & your voice will sound warm. This also reduce leakage.
- ❖ Position the mic level with your nose & tilted down toward your mouth & talk beneath the front of the mic

Where to position your mic



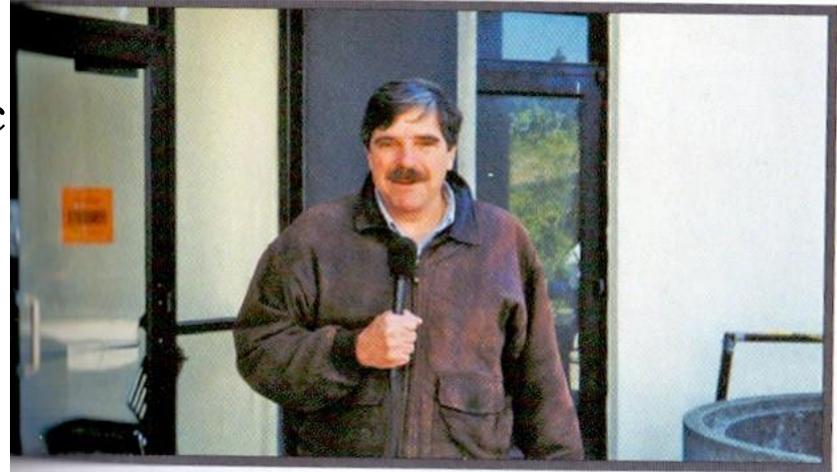
- ❖ In a quiet location - find the midway point between you and your interviewee and hold mic there (or slightly nearer the quieter voice)
- ❖ In a noisy location - move the mic between you and your interviewee as you take it in turns to speak, but beware of mic noises that may be caused by the movement of the mic and the lead.



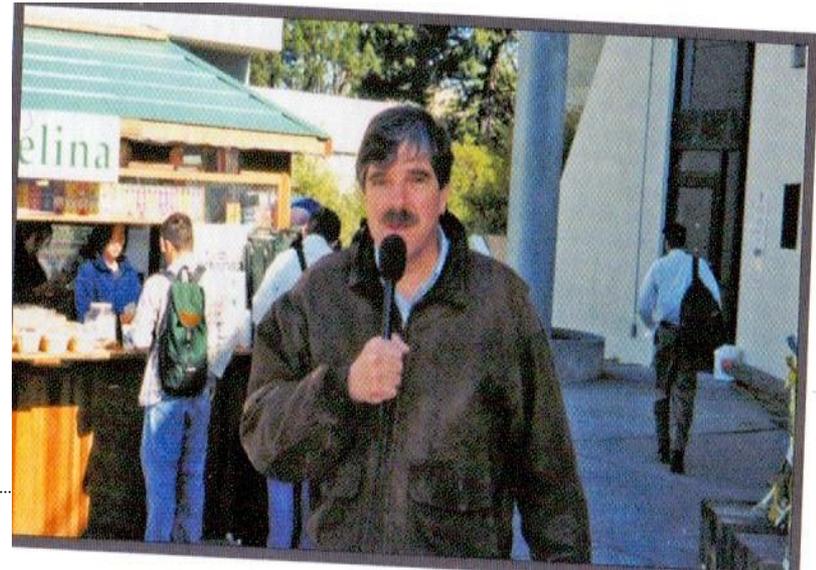
Where to position your mic



- ❖ When in a fairly quiet environment, the hand mic should be held chest high, parallel to the body.



- ❖ In a noisy environment, the hand mic must be held closer to the mouth.



Where to position your mic



- ❖ You can, of course, record your interview sitting, standing or walking. You always want to get as close as you can to your interviewee, without imposing on their space. It's better to sit or stand slightly to one side rather than directly opposite, which can feel confrontational.
- ❖ When interviewing a child, bend down to the child's eye level.



Microphone Feedback



- ❖ Feedback is a “howling” signal generated when a sound picked up by a microphone is amplified, produced through a speaker, picked up again, amplified again, and so on.
- ❖ To counteract feedback tendencies, some mic has a cardioid /hyper cardioid convertible polar response.

Microphone Impedance



- ❖ Impedance is an electrical characteristic similar to resistance.
- ❖ High impedance – 10,000 ohms.
- ❖ Low impedance – 600 ohms.

Multiple Mic Interference



- ❖ 2 or more mics receiving the same sound fed in the same mixer.
- ❖ The combined signal becomes out of phase.
- ❖ Results to very poor sound quality.
- ❖ This situation is known as multiple mic interference.
- ❖ Can be avoided by remembering a 3 – to – 1 ratio.

Avoiding 'popping' and other mouth noises:

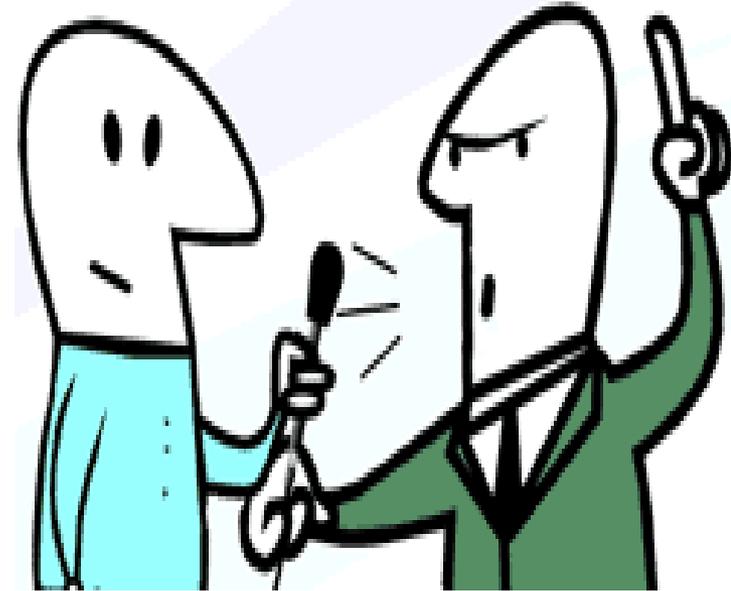


- ❖ If you hold the mic too close to some interviewees, you'll get a nasty 'popping' sound caused by the blast of air on plosive syllables (b/p) hitting the mic.
- ❖ The nervous interviewee may have a dry mouth which makes clicking or smacking noises when they speak. Give them a drink of water.

Avoiding 'popping' and other mouth noises:



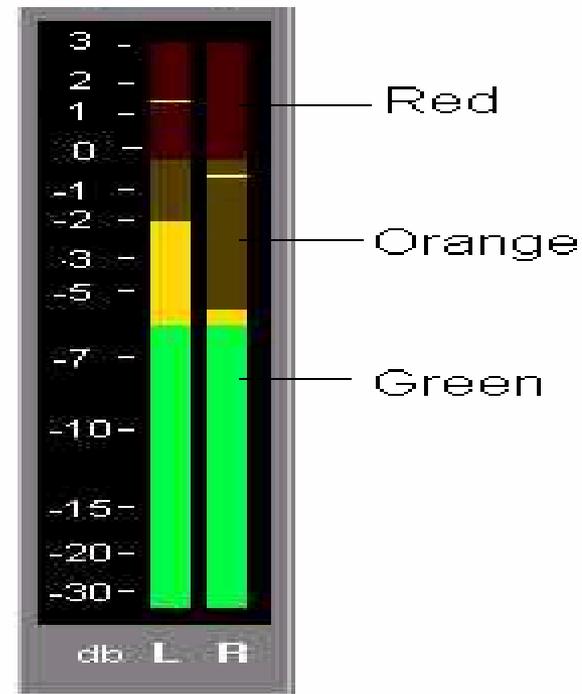
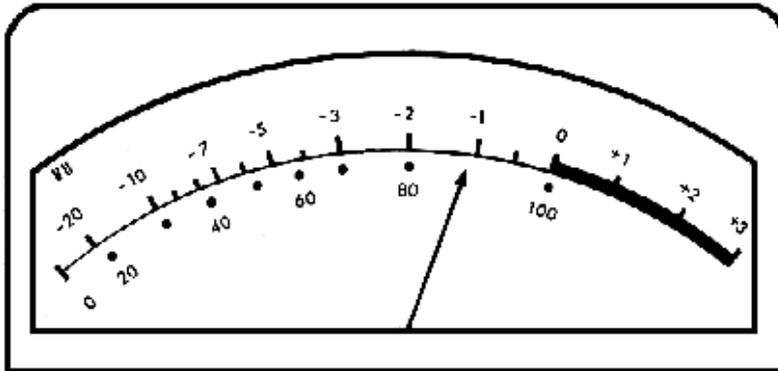
- ❖ Always wearing cans so that you'll hear it when it occurs
- ❖ Angling the mic to one side of the popping person's mouth.



Mic positions and controlling levels



- ❖ Often you'll need to do more than simply set levels and let the recording run. Here are some common problems and their solutions...



Mic positions and controlling levels



▶ **Problem 1:**

Recording an interview in a noisy environment (e.g. busy street, sports event, press conference) and trying to get a good level on the speaker/interviewee above the background noise

▶ **Solution 1:**

Position the mic closer than usual, but be very careful to avoid popping. Set your level with the mic in this position.

Mic positions and controlling level



▶ **Problem 2:**

Recording both a quiet and loud voice - and getting the balance of levels right

▶ **Solution 2:**

So that you're not constantly fiddling with the levels, set your level against one of the voices and then position the mic so that it is nearer to the quiet voice and further away from the loud voice

Microphone care



- ❖ Beginning announcers often misuse a microphone by blowing into it to see if it's live or to set a level. This is the worst way to test a mic and can result in serious damage to the mic.
- ❖ The best way to set a mic level is to read several sentences of your script or you say "Testing 1, 2,.. 9, 10"
- ❖ Protect mic from dirt & damage by storing & transporting them in their original packages or in a specialized mic case.
- ❖ Avoid mic falling or mechanical vibration.
- ❖ Remove & wash the windscreen in a soap solution.

Microphone care



- ❖ Mic easily damaged by excessive sound, pressure exposure, physical shocks
- ❖ Dirt, dust, moisture can degrade mic performance dramatically.
- ❖ Accessories like windscreens & desiccants will help keep moisture off the mic.
- ❖ The more expensive a mic , the more fragile.
- ❖ Store mics in their protective cases when not in use.



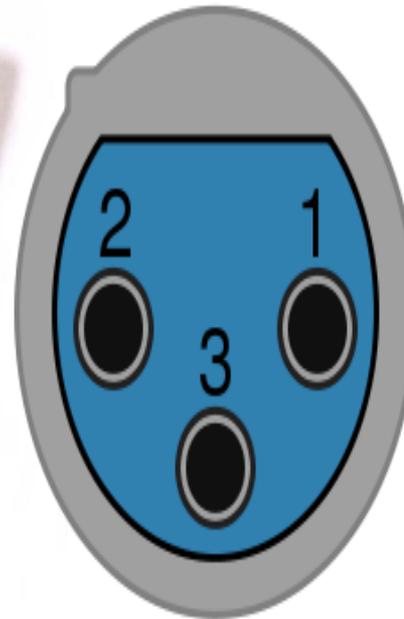
TALK STUDIO



XLR CONNECTOR



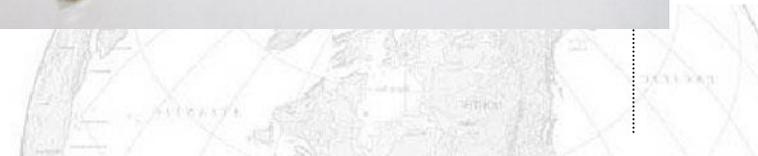
Female



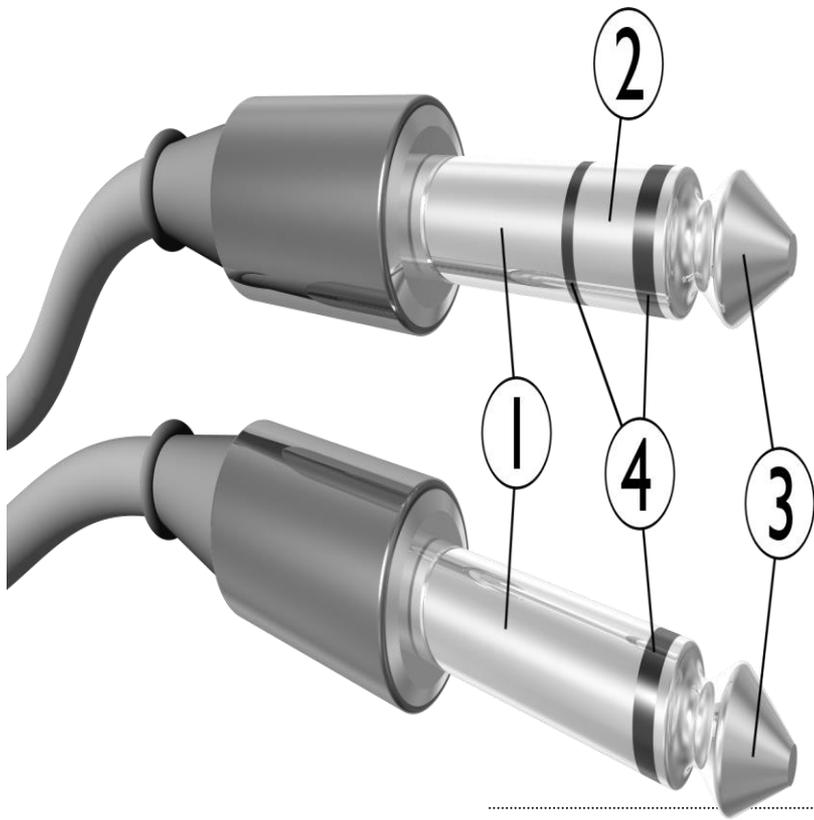
Male



RCA CONNECTORS



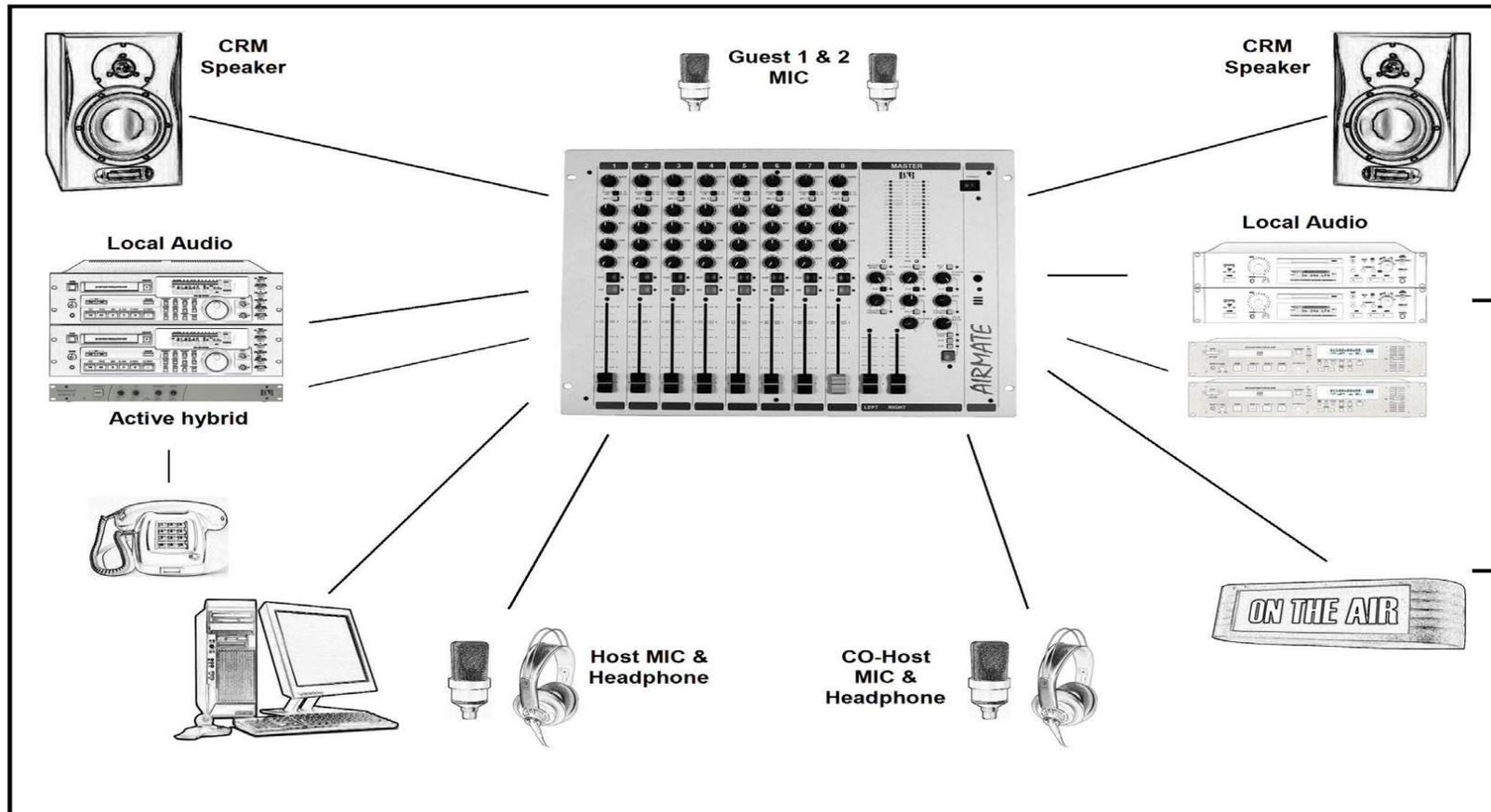
PHONE (JACK) PLUGS



MASTER CONTROL ROOM LAYOUT



Control room solution with D&R AirMate





Questions??



