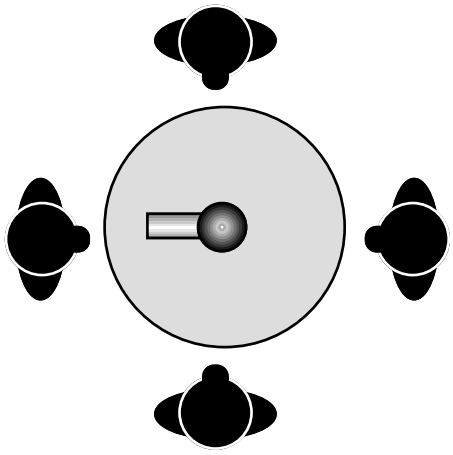
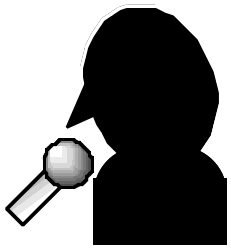
MONO MICROPHONE PLACEMENT

OMNIDIRECTIONAL

Performers can be all around the microphone.

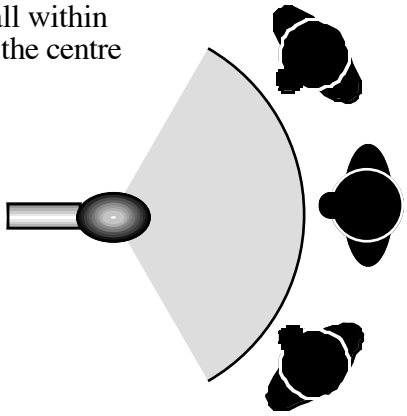


Close speech does not give excessive bass or popping

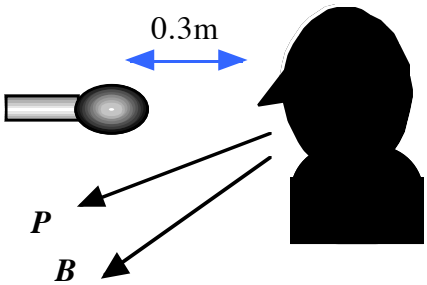


CARDOID

Performers all within about 60° of the centre line

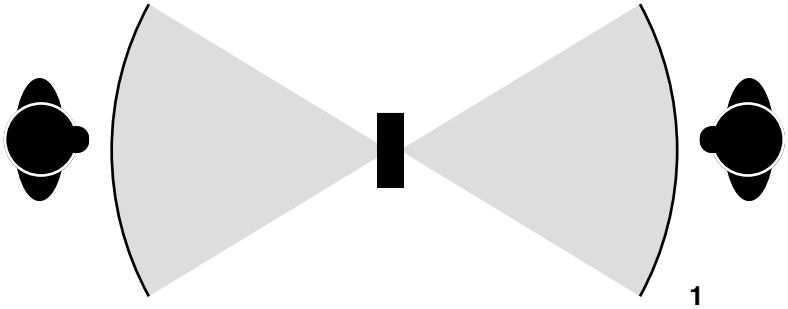


No closer than 0.3 m or there will be too much bass. Keep away from the blast of "P" and "B" sounds

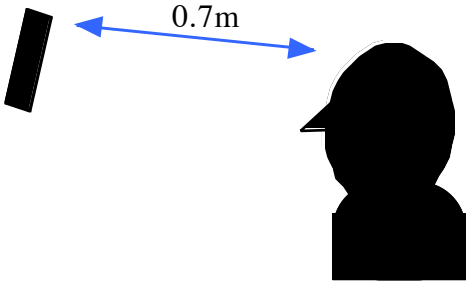


BIDIRECTIONAL (RIBBON)

Performers within 30° of centre line either side of mic



No closer than 0.7 m or there will be too much bass. Keep <u>well</u> away from the blast of "P" and "B" sounds



THE SPECIAL CHARACTERISTICS OF BIDIRECTIONAL (RIBBON) MICROPHONES

The term "Ribbon Microphone", as used here, includes other types of microphone with a directional response that is similar to the response of a true bidirectional ribbon microphone, whether or not they contain a ribbon.

DIRECTIONAL RESPONSE

The best-known characteristic of a ribbon microphone is that it responds equally to sounds arriving from the front or the back. Another important characteristic, which is less well-known, is that it has a 'circle of deadness', which means that it does not respond to sounds arriving from the sides or above or below. This 'circle' should lie in a plane at right angles to the maximum responses and should be very sharp and deep. Commercial ribbon microphones achieve this to a greater or lesser extent, depending on the quality of their design and construction. It is difficult to demonstrate the depth of the null indoors, because reflected sounds from the walls of the room will be picked up from the sensitive directions of the microphone and may easily mask the rejected direct sound or.be mistaken for it.

SOUNDING CLOSER

The ribbon microphone has the peculiar property of making performers sound nearer to the microphone than they actually are, so a ribbon microphone can be placed almost twice as far away as the equivalent cardioid microphone. This has many advantages.

ONE PERFORMER

To obtain a natural balance between sounds from the nose, mouth and chest, a microphone needs to be positioned some distance from the performer. This can sometimes lead to a poor balance between direct and reverberant sounds which is particularly troublesome in a room with bad acoustics. By using a ribbon microphone, the distance from the performer can be increased, so that the wanted sounds are well balanced, but the room reverberation does not become too obtrusive.

This increased distance is also a great advantage when working with video. A ribbon microphone can be kept further away and out of shot more easily than a cardioid microphone. Although it is not as directional as a shotgun microphone, a ribbon's off-axis response is much cleaner; it does not distort unwanted sounds arising from reflections, so it makes them less intrusive.

TWO PERFORMERS

When there are two performers in a studio, the natural position for them is facing each other, either directly or at a slight angle. The bidirectional ribbon response is ideally suited to this layout and, if it is placed somewhat above or below their direct line of vision, it allows the performers to interact in a natural way.

With television or video, where both performers have to face the camera, a single ribbon microphone can be placed between them, concealed either above or below the camera's field of view.

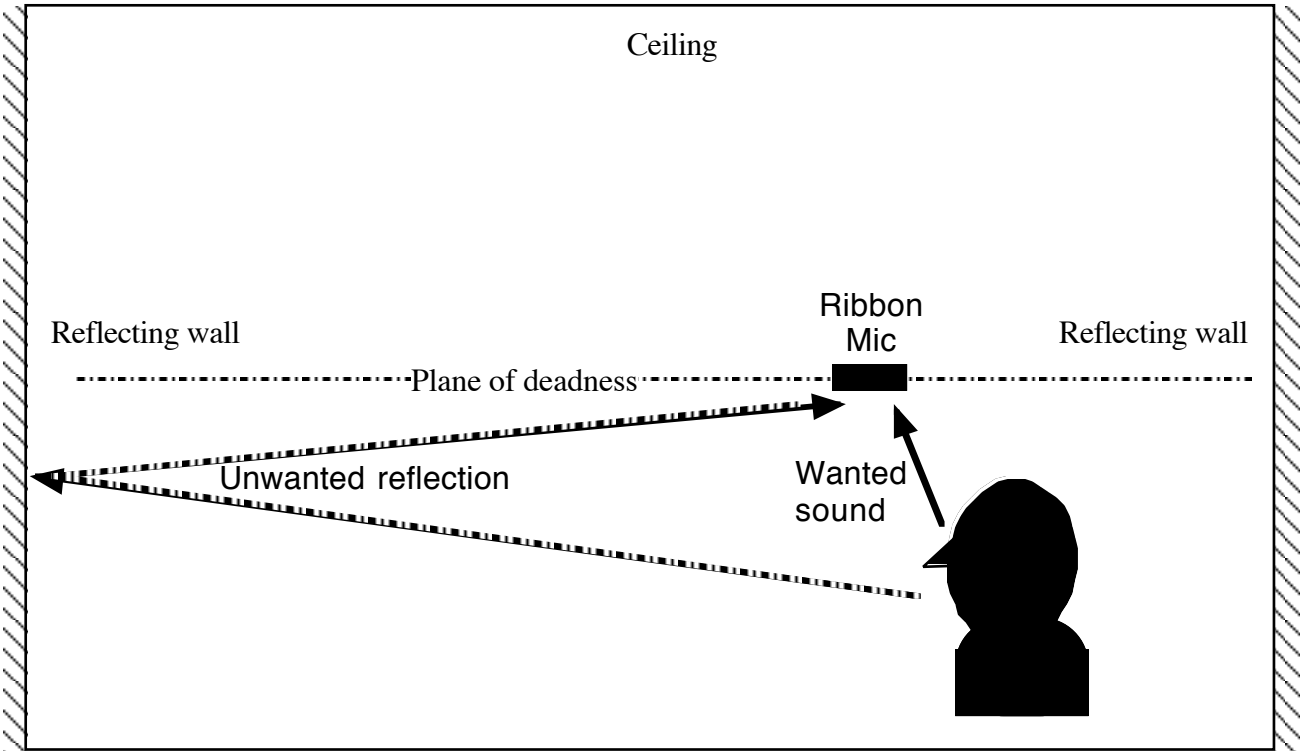
SELECTING INDIVIDUAL INSTRUMENTS OR PERFORMERS

The greatest advantage of a ribbon microphone is its ability to pick up sounds from one performer, or group of performers, whilst rejecting sounds from other performers, even though they may all be a similar distance from the microphone. Balancing a solo singer against a piano accompaniment with two microphones is difficult if each microphone picks up the opposite performer, but ribbon microphones have sharp nulls which can prevent breakthrough of one performer on another's microphone. This is particularly effective in a small studio which is fairly acoustically 'dead', but can also be helpful in many other circumstances, such as balancing a soloist against an entire orchestra or band.

DEALING WITH ECHOS

In generally reverberant surroundings it may not be possible to take full advantage of the directional characteristics of a ribbon microphone (or any other type of microphone) unless the unwanted reflections come predominantly from one direction. In a large building, where one particular delayed echo is troublesome, the microphone may be positioned to minimise that echo.

In a room where the walls are the main source of unwanted echoes or reverberation, the ribbon can be mounted with its plane of deadness horizontal, so as to reject the echoes from the walls. It is them mounted above the wanted source of sound and 'looks down on it'. (This direction of mounting may damage some older types of metal-ribboned microphones, so check with the manufacturer's instructions.)



HORIZONTALLY-MOUNTED RIBBON MIC REJECTING WALL REFLECTIONS

It is also possible to mount the microphone horizontally below the performer, but in this position it will be vulnerable to being brushed against, knocked or tripped over.

BACKGROUND NOISE
As a ribbon microphone is brought nearer to a performer, there is an undue increase in the bass response, this effect can be used to advantage in a noisy environment. Higher frequency background noise can usually be reduced with acoustic screens, but the screens would have to be very large indeed to have any effect on low frequency sounds. If a ribbon microphone is mounted close to a performer, the increased bass can be reduced to its proper level by judicious use of the Bass Cut control. This simultaneously reduces the low frequency background noises that have not been intercepted by the acoustic screens.

CLOSE SPEECH
When it is necessary for a performer to speak close to a ribbon microphone, the 'plosive' sounds, such as "P" and "B" can give rise to troublesome blasting effects. Placing the microphone above the performer or to one side will usually overcome these effects. The use of a'pop screen' can sometimes be effective as long as the mesh is close-woven and attached to a rigid base material so that it cannot flex and transfer unwanted air movement from one side to the other. A gap should be left between the pop screen and the microphone to allow any air movement to dissipate.

DISADVANTAGES
Ribbon microphones are very sensitive to wind noise and some of the earlier types with fragile metal ribbons can be damaged by moderate wind speeds. Those types can also be damaged by prolonged mounting in a horizontal position.

Some types of ribbon microphone contain very strong magnets which can attract metal particles that interfere with proper operation and are very difficult to remove. The stray magnetic field from these magnets can attract larger objects, causing physical damage, and can erase magnetic tapes, floppy disks and credit cards.

Earlier models of ribbon microphones were relatively insensitive, requiring specialised pre-amplifiers with high gain and very low noise levels. The thermal noise level of a few of the smaller types was so high that they could not be used satisfactorily for quiet perfomances.

Ribbon microphones work by sensing air movement, not air pressure. If a ribbon microphone is placed very close to a wall or any other large flat surface where there is almost no air movement, it will become insensitive. A little further from the wall, the frequency response will exhibit dips and peaks as the sound waves are cancelled and reinforced by reflected air movement. This will sound hollow and 'phasey' and the sound quality will change significantly as the distance from the wall is varied.

Ribbon microphones in unskilled hands will give 'unexplained' poor results, it is only by fully understanding the differences between a ribbon microphone and the more usual cardioid microphone that the sound engineer will get the best out of it. It takes time and thought to set up a ribbon microphone, but that will be well repaid when tackling situations where other types of microphones prove inadequate.