

technique

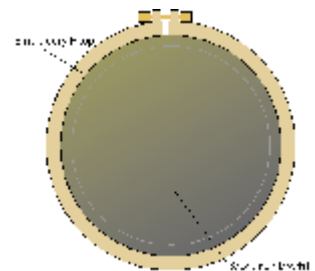
microphone
FAQ

mic mechanics

FREQUENTLY ASKED QUESTIONS: USING MICROPHONES

There are some questions of recording technique which seem to come up again and again. **Paul White** sets out to answer some of the most common queries on how to choose and use microphones...

The correct choice and use of microphones is fundamental to any recording project. While the number of microphone types may seem bewildering, and while mic techniques may seem like a black art, a few easy-to-follow guidelines will help you avoid most problems. At *Sound On Sound* we receive many reader queries about the choice, treatment and placement of microphones: in this feature, I've tried to address some of the most common problems that seem to arise.



What sort of microphone should I be using?

As a rule, dynamic mics are good for miking drums and electric instruments, whereas capacitor mics are better for high-quality vocal and acoustic instrument work. Large-diaphragm capacitor mics tend to be more flattering than small-diaphragm models, especially on vocals, though there are some exceptions.

Don't be confused by the fact that both true capacitor mics and back-electret mics are often both referred to simply as capacitor mics (or sometimes as condenser mics). Both work on the capacitor principle and both are capable of producing similar results. The main operational difference is that back-electret capsules lose their sensitivity over time, but with a well-designed model, this will happen over a period of decades, so there's no reason not to buy one on that account. There are also relatively few switchable pattern back-electret mics, as they're generally easier to design using conventional capacitor technology where the polarising voltage of one half of a dual-capsule system can be varied to control the pattern. All electret mics use a permanently charged material, so any pattern control requires more complicated electronic circuitry.

The microphone is the first and often the most important step in the audio recording chain - if the mic sounds poor, nothing you can do will fix it later. With so many good mics now available at attractive prices, there's no need to skimp. Leave that beaten up old dynamic in your gig bag or use it for recording electric guitar - try to budget for a decent large-diameter condenser mic for vocal recording. With quality models like the Rode NT1 starting at well under £200, there's little excuse to neglect this

vital area.

How can I find the best position for the mic in relation to the sound source?

When it comes to miking instruments, few instruments produce all their sound from one place, so don't place the mic too close, otherwise you'll only capture one element of the sound. It's true that drums and electric guitar cabinets are often miked very close, but that's because the sound we're after isn't necessary natural. When working with instruments such as guitars that have soundholes, try not to aim the mic directly at the soundhole - it may produce a seductively large signal, but it is likely to be too boomy and coloured. Pull the mic back until the sound you hear in the headphones seems natural.



If you're not sure where to place the microphone, estimate the length of the part of the instrument that produces the sound and use that as your minimum mic distance. In other words, a guitar mic should be at least a guitar body's-worth away and a piano mic should be around a piano's width away. The same applies to wind instruments - don't jam the mic down the 'noisy' end, pull it back to let all parts of the instrument contribute to the sound (for more precise advice on miking these instruments, see Hugh Robjohns' workshops in SOS January and April '99).

"No matter how many books you read about miking, the suggested mic placements can only ever be approximate."

When miking an electric guitar amplifier, it's very tempting just to hang the mic from the cabinet handle so that it dangles in front of the speaker. If you do this with a dynamic mic, the most sensitive part of the mic will be pointing at the floor so the amp sound will be picked up off-axis, making it less accurate. Either use a proper mic stand, or dangle an omni mic in front of the cabinet! The best position seems to be with the mic pointing directly at the speaker and virtually touching the grille cloth.

All cardioid-pattern mics exhibit a proximity effect, which means they produce more bass when used very close to the sound source. A good vocalist can use the proximity effect to advantage as a kind of real-time tone control, but inexperienced singers may find it a problem. Working at six inches or more from the microphone should be sufficient to avoid problems.

Another reason not to work too close to a vocal microphone is that any slight changes in distance will affect the signal level as well as the proximity bass boost. However, moving too far away will result in a greater proportion of the room reverb being recorded, often resulting in a boxy sound. A distance of six to 12 inches is generally fine for solo vocal recording. If the room still makes the sound too boxy, hang up some sleeping bags or blankets either side and behind the singer to create a local dead area to record in.



No matter how many books you read about miking, the suggested mic placements can only ever be approximate. To find the best location, wear fully enclosed headphones to monitor the mic output while you move the mic around the performer. As the performer runs through the material, you can choose the best mic position by ear.

Before adding EQ, try moving the mic or changing to a different type of microphone. Even the best EQ units won't compensate for a poorly chosen or badly positioned mic, so get the best possible sound before you even think of switching in the EQ.

What precautions can I take to eliminate unwanted noise?

Use a pop shield between the mic and the vocalist to prevent 'bumping' sounds on B and P sounds. Commercial models are available, but a nylon stocking stretched over a wire hoop or wooden ring is cheaper - see the diagram on page 42. Placing the shield midway between the mouth and mic works well. External pop shields (and the removable foam inserts inside the basket of some dynamic models) can be cleaned using warm water to which a little antiseptic mouthwash (such as TCP) has been added.

Field Recording Tip

If you're using a portable digital recorder, such as a DCC or Minidisc machine, you might find that the mic inputs don't always produce great results with studio mics. First, check the manual to see if the mic inputs are high- or low-impedance. If they're high, you can probably get away by using a fairly sensitive battery powered back-electret mic patched via a low-in, high-out impedance converter transformer. On the other hand, if the impedance matches OK but you're still short of gain or getting too much noise, then an external battery-powered mic preamp may be the only solution. Providing your mics can be battery powered, you won't need a preamp with phantom power.

Also, take care to secure mic cables, as a surprising amount of vibration reaches the mic if a hanging cable is accidentally knocked or kicked. Taping the cable to the mic stand will help, but leave a loop of cable at the mic end to allow for adjustment. The low-cut filter on the mic or mixer may help reduce very low-frequency vibrations, but always get the signal as clean as possible at source before switching these in.

Clean mic connectors and cable connectors with Caig Deoxit. Mic signals are very small by comparison with line signals, which means the effect of noisy connectors is far more noticeable. Most connector problems are due to an oxide film building up on the pins, resulting in a higher-than-usual contact resistance that varies whenever the connector is moved.

Some microphone cable is itself microphonic due to the way the spacing between the conductors changes when the cable is bent or subjected to vibration. In extreme cases, this results in audible noise whenever the cable is moved or bent. Good-quality cable designed for microphone use should be quiet, so if you experience this problem, use the cable for something less demanding and buy yourself a new mic lead.

What can I do to look after my microphones?

Capacitor mics are delicate pieces of precision engineering, so avoid dropping them or using them in excessively humid environments. If condensation occurs within the mic, the sound quality and sensitivity will suffer, though placing the mic in a warm place for a while should restore it to normal operation. Using a pop shield helps prevent condensation from the singer's breath.

Don't plug or unplug capacitor mics while the phantom power is switched on, as some older, less robust models could be damaged. After switching off the phantom power, wait for around 30 seconds before unplugging the mic so that the phantom power supply can discharge. Apparently 'hot-plugging' capacitor mics used to be a sackable offence in the days of engineers in white coats!

Balanced dynamic mics can be plugged into a phantom-powered mic input with no problem, but unbalanced mics

Phantom-powering PZM

will not work properly when phantom power is applied and they could be damaged. As a general rule, avoid applying phantom power to any input that doesn't need it.

How can I control ambient noise, spill and crosstalk?

When recording quieter instruments, try to be aware of what else the mic is picking up in addition to the sounds you want. For example, I've had quartz watches ticking away on acoustic guitar tracks, and then there are wall clocks, central heating systems, computer drives and fans, and outside noises to worry about too. The best way to check is to use enclosed headphones - this way you should only be able to hear the instrument you're miking. If there's anything else, do what you can to minimise it before continuing.

Cardioid pattern mics pick up less spill than omnis, but off-axis sounds may appear slightly nasal or coloured, making them sound less natural. In many situations, using an omni mic and accepting a little more spill will produce a noticeably more natural result. The difference in spill between an omni and a cardioid isn't always as much as you might imagine, and even with on-axis sounds, omni mics tend to produce a more open, natural result.

In any situation where multiple mics are being used to record separate mono sound sources, it is important to minimise crosstalk into adjacent mics, otherwise the overall sound may be compromised and you'll have less control over the individual instruments at the mixing stage. The general rule is to try to space your mics at least five times further apart than the distance between the mic and the instrument. For example, if you have two mics placed 12 inches away from two acoustic guitars, the mics should be at least 60 inches apart. This '5:1' rule does not apply to stereo miking setups, as the intention there is for both mics to pick up the same sound, but from a slightly different perspective.

How can I get better drum sounds?

Drum miking has been covered in depth on various occasions within this magazine - most recently in last month's article by Hugh Robjohns - but the real secret is to get the drums sounding good before you start. However, the choice and placement of mics is also hugely significant. While general-purpose dynamic mics are OK for snare and toms, use capacitor mics for overheads and choose a mic for the kick drum that is either specifically designed for the purpose (for example, the AKG D112) or a more general-purpose mic that has a good bass response (for example, the Sennheiser 421). Snare and tom mics may be placed around two inches from the head and two or three inches in from the edge of the drum, while the kick drum mic is usually positioned inside the shell around six inches from the point where the beater impacts the head. This requires a hole to be cut in the front head (most drummers do this anyway), and any necessary damping can be achieved by placing a folder blanket in the bottom of the drum. Observe the '5:1' rule when setting up the mics so as to minimise spill between the drums.

Microphones


We still get regular calls from readers who remember seeing an article way back in the '80s describing how to balance and phantom-power Tandy PZM microphones. In fact there have been several revisions of this microphone, so the phantom-powering mod isn't particularly straightforward, and the fact that you need to buy special aluminium solder further compounds this problem. Fortunately, the same improvement in performance can be had by soldering a regular PP3 9V battery clip (with around six inches of wire attached) to the battery terminals inside the battery compartment (observe the correct polarity here please!), clipping on a 9V battery, then fixing the battery to the outside of the battery box using elastic bands or sticky tape.

To balance the mic, snip off the jack and you'll find that the cable already has two cores, (black and red), so it's a simple matter to solder on an XLR wired pin 1 screen, pin 2 red and pin 3 black. This balances the signal from the battery box onwards, but if you're worried about picking up interference between the mic and the battery box, you'll need to shorten the cable, ideally at the battery box end.

"You can get a good recorded vocal sound from virtually any decent mic, dynamic or capacitor, so if you're having serious problems, look for the real cause before you spend a fortune on a better mic that may just record your problems more accurately!"

Overhead mics should be positioned at least three feet above the cymbals and should be spaced apart by about the width of the drum kit. The overhead mics don't have to obey the '5:1' rule, as they are used to pick up a stereo impression of the kit.

How can I get my recordings to sound 'warmer'?

Much is said about microphones and warmth, but warmth is pretty subjective and can be achieved in different ways. As a very general rule, large-diaphragm capacitor mics (with a capsule diameter of 0.75 inches or more) tend to produce a warmer, more flattering sound than the more clinical small-diaphragm models, but at the expense of a less-accurate off-axis response. Well-designed valve mics also tend to have a warm sound (where warm in this context means a thicker-sounding low mid and an open top end that isn't harsh), though no two experts agree on exactly why this is. However, you don't have to buy a valve mic to get a warm sound - using a valve preamp or other valve processor in the signal chain may create the effect you're after, as may compression. Photo-electric compressors tend to sound very flattering on vocals. You can get a good recorded vocal sound from virtually any decent mic, dynamic or capacitor, so if you're having serious problems, look for the real cause before you spend a fortune on a better mic that may just record your problems more accurately! 

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