



Microphone maintenance

Keeping check on the condition of your microphones is time well invested. Grant Bridgeman cleans up.



Storing microphones in a case may take up space, but it can prevent costly damage, especially during transit.

Microphones are among the few essential requirements if you're in the business of recording and performing music – even if they're used only for announcements or to supply an input signal to a vocoder. As such, they can be rather simplistically viewed as bits of kit that 'just work'. However, even in the studio they experience a fair amount of wear and tear – never mind the battering they can receive in the gig bag and onstage – so now's the time to give your mics a bit of attention and TLC.

First response

Picking a microphone that's suitable for a particular task – as well as knowing how to maintain it – requires some understanding of

the various types of mic out there and how the different designs work. The basic operational principle behind most microphone designs is a metal membrane that responds to sound energy by way of movement. In doing so it creates a varying electric current that is analogous to the incident sound. Satisfactory results rely on the correct mechanical operation of this membrane, so that the

conversion of the variations in air pressure to an electrical signal occurs as the designers intended.

The moving-coil dynamic mic achieves this through a very simple induction system: the diaphragm is

attached to a coil of wire that passes through a magnetic field. As the soundwaves move the diaphragm, the wire coil moves within the magnetic field, inducing a current within the wire. The physical weight of the coil and diaphragm assembly make for a robust capsule, but the overall mass means that the capsule may not be capable of responding quickly enough to rapid transients.

dynamic microphone and there are different types which have slightly different characteristics.

The basic design operates on electrostatic principles, whereby the diaphragm forms part of a capacitor, the capacitance of which changes in response to the variations in sound pressure. This capacitance is a combination of the area of two parallel plates, the dielectric (the material between the

Microphones experience a fair amount of wear and tear even in the studio.

The dynamic ribbon microphone is a more delicate design that sees a thin foil of metal suspended within a magnetic field. It operates on the same principle of magnetic induction, but because the length of the ribbon by comparison to the coil is much shorter, the resistance is much smaller. Its output therefore requires a conditioning step-up transformer or specialised preamp.

Ribbon microphones are very delicate. Although the technology has evolved, such microphones have to be used with care and potentially not subjected to very high SPLs, but the lightweight ribbon offers an improved transient response by comparison to moving-coil designs.

Capacitor (or condensing) microphones operate on a very different principle from the

plates, which should be air) and the distance between the plates. As the diaphragm forms one of the two plates, variations in sound pressure move it, altering the capacitance value. This means that the diaphragm can be incredibly thin and light and is therefore capable of responding quickly to rapid transient sounds.

Take care

Although different microphone designs exist, a common fundamental function requires that the diaphragm is exposed to the air. So, by their very nature they are continuously exposed to the various environments that go hand in hand with the performing and recording of music – everything from the air-conditioned haven of the high-end studio to the less-than-ideal roadie's back pocket.



The metal shield and foam inserts commonly found on dynamic mics can all too easily pick up dirt and saliva, detrimentally affecting the microphone's performance.

This means that the shields protecting the diaphragms themselves will in time become damaged and dirty (while hopefully still protecting the diaphragm). The whole operation of the microphone is based around the physical interaction of a carefully designed membrane and changes in air pressure; if the characteristics of the membrane change due to wear, then the sound of the microphone will also change.

High SPLs can damage mics that are not designed to withstand the extreme transients that loud sound sources can generate. Vintage ribbon mics were particularly prone to this, although newer designs with stronger ribbon elements can withstand higher sound levels. This is why an entire range of dynamic mics has been specifically designed for the task of recording kick drums, such as the AKG D112.

Living in a box

Most microphones ship with a reasonably sturdy box (or, more commonly, a fairly swish-looking flightcase). This is not just for aesthetic reasons – it's there to prevent your microphone from being physically damaged, especially during transit. Urban myths may exist about the bulletproof nature of the beyerdynamic M58, but most microphones are precision electrical instruments and should be treated as such.

Valve microphones are obviously more delicate than most and will benefit from having the valve replaced every few years, but even the most basic of hand-

held microphones demand a little respect to maintain optimal operation. Many hand-held microphones achieve their cardioid polar response pattern by way of a labyrinth network within the capsule. This enables soundwaves to reach the rear of the diaphragm, but because it's slightly delayed it is effectively phase-shifted, creating a nulling effect when the sound arrives off-axis. Blocking these rear ports by damaging the microphone or allowing dirt to build up will affect the microphone's performance and potentially reduce its off-axis rejection capabilities, which are essential when working with onstage monitors.

In the case of dynamic mics, many have grilles and built-in pop shields that are easy to remove and replace. It is also feasible to clean these styles of grille and remove the years of spit that will have been thrown at them. It may require only gentle brushing, but do the work away from the capsule itself to ensure that you don't make the situation worse.

A culprit behind contamination on the diaphragm itself can be a very old pop shield that is beyond its expiry date and beginning to disintegrate. It's therefore worth keeping an eye on any microphones that have been packed away for a bit too long with their foam cover in place.

Rising damp

Capacitance microphones (and to some extent all microphones) can suffer badly if exposed to moisture. However, in the case of capacitance microphones



Gentle brushing with a toothbrush will remove dirt and other foreign matter adhered to the grille. Do this away from the body and sensitive microphone diaphragm.

moisture is a real problem because of the way in which they work. The presence of moisture within the dielectric (the gap between the two plates of the capacitor) will affect the capacitance of the system and, because of the high impedance of the circuit, can cause crackles and pops.

The RF design of capacitor microphone is not prone to this problem as the capsule works in a different way and has a lower impedance. These types of mic are far more tolerant of external use and humid environments.

Prevention can be as simple as storing your microphones correctly, sometimes within plastic bags if they're left out in the studio. Bags of silica gel can also help ensure that moisture doesn't build up when in storage, but be aware that silica gel can absorb only a fixed amount of moisture before it needs 'recharging' (generally achieved by placing in the oven for a few hours at a medium heat). Fortunately, however, capacitor microphones affected by moisture are relatively easy to restore. The simplest solution is often to simply let the microphone sit in a warm, dry room for 24 hours. The problems will resolve themselves as the moisture naturally evaporates.

In service

Only basic maintenance should be carried out at home as damaging the capsule or diaphragm will only make any problems much worse. Microphones should be a long-term investment and taking care of them will go a long way to maximising the audio performance from that investment – they may simply need servicing by the manufacturer. This is why the

advice to buy the best microphone that you can afford is sound – a good microphone should be with you for years to come. **MTM**

Tech Terms

■ Diaphragm displacement

In the case of an average condenser microphone, sound pressure levels of 134dB will move the diaphragm only one millionth of a metre; quieter sounds will obviously move the diaphragm fractions of that distance. This is how fragile these devices are!

■ Valve microphones

Some vintage and new top-end microphones utilise a valve as part of the electrical circuit. Clearly, these can be very delicate and are designed for studio use.

■ Silica gel

A chemical that absorbs moisture, usually packed with electronic equipment in small porous sachets. Depending on the type, it is possible to 'recharge' the gel after it has absorbed its maximum amount of water by gently heating it in an oven (always check the sides of the packet).

FURTHER INFO

■ For a more detailed look at microphone restoration and what is possible to do yourself, look no further than MTM's article at www.musictechmag.co.uk/mtm/features/mic-restoration-and-modification

■ If you're unsure as to which microphone type you should be using for a particular task, Shure's online library offers a wealth of information, particularly in respect to simple cleaning techniques for microphone grilles and shields: www.shure.com/ProAudio/Resources/HowToUse/index.htm

■ The Pro Sound Web Forum has some good advice on storing microphones in cold climates: <http://recforums.prosoundweb.com/index.php/t/2622/0>



Storing condenser microphones and sachets of silica gel within a sealed plastic bag can help to prevent problems associated with excess moisture.