

Radiomicrophones

You may be a little bewildered by the range of prices and types of radio microphones, so here's a short introduction:

The quality and price ranges from home disco and 'karaoke' types costing £50 or less, right up to thousands of pounds for broadcast quality products. The main differences will be in transmission range, reliability of the radio (RF) link (see below), robustness of the hardware, and the audio / sound quality. With the cheapest, don't expect more than about 10 metres of range - any more, and you'll get gaps, or drop-outs, in the coverage, which may at worst give you a brief 'shhht' noise rather than silence.

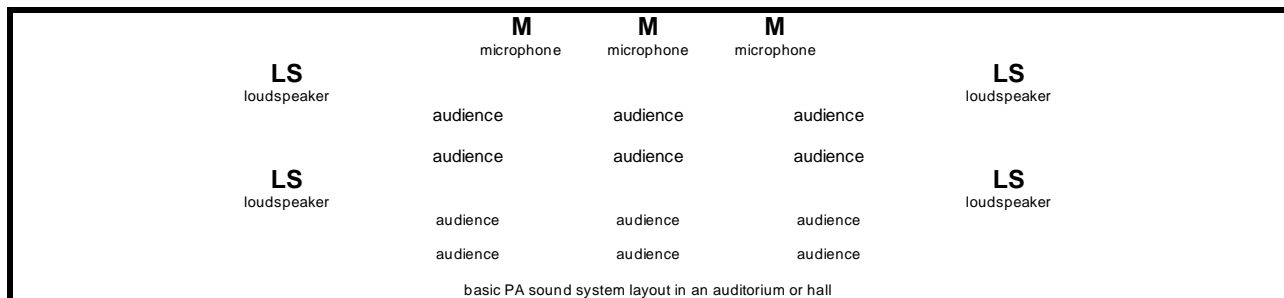
Go more expensive, and you'll get a 'diversity' receiver with your radio microphone. Diversity means two separate receivers in one box, with two separate receiving antennas or aerials. The receiver that's getting the better signal is selected automatically -- so there's a good chance that if one receiver sees a gap in coverage, the other one is still working well. (But watch out -- some cheaper receiver boxes have two antennas but aren't true-diversity).

There are three different types of transmitter. Hand-held transmitters have the microphone and transmitter in the same microphone tube, which opens to allow you to fit batteries. Add-on transmitters fit on to a standard microphone, making it into a radio mike, although the lump at the base of your mic may not appear very elegant. Lapel microphones, headworn microphones (headmics) connect to a separate bodyworn pack / box that you can wear on your belt or in your pocket. If you're using a lapel microphone, it's often worth getting a better microphone than the standard one that came with the radiomic kit, because it will pick up less clothing noise, and probably be tougher made and of higher audio / sound quality.

There are two legal radio bands in the UK that don't need a licence to use – these are called deregulated frequencies: the 'VHF' one is between 173.7 and 175.1MHz (megahertz), and the 'UHF' one is between 863 and 865MHz. The UHF one is a pan-European allocation, but note that other European countries also allocate other bands, so don't assume that a radio mic bought in Europe is legal in the UK -- check! Manufacturers and vendors should put the frequency of their radio mic on the equipment and sales literature etc. Naturally, if you are going to use more than one, each needs to have its own frequency. Some more sophisticated designs allow the user to select from a range of frequencies. Do not assume that you will be able to use all frequencies, as intermodulation distortion and interference are common occurrences – often it is best to have at least 250khz between the frequencies you are using – 500khz upwards between frequencies even better.

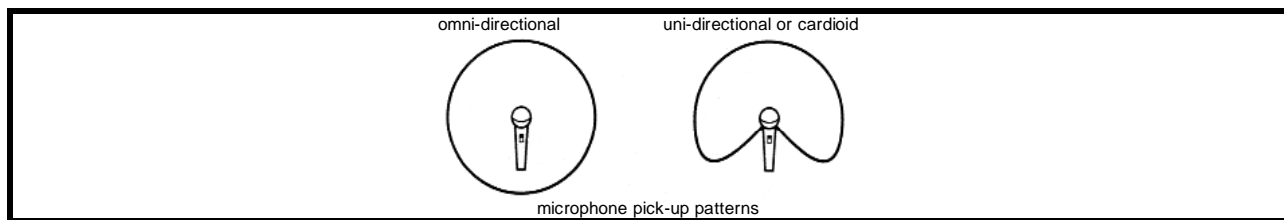
Radio mics all need a battery. Some designs use a PP3 style 9V battery, and operate for a time between 3 and 10 hours from an alkaline. Newer types often use a pair of AA or even AAA cells and last for 5 to 10 hours. Be aware that when the battery in a radiomic transmitter gets low on voltage (around 8.2v for a PP3, for instance) the radiomic audio signal (your voice) will often be muted by the radiomic receiver.

- Please ensure that the radiomic transmitter is not closer than 3m and not further than 30m from the radiomic receiver.
- Radiomic systems usually have two outputs – the XLR output should preferably be connected to inputs marked 'mic' on amplifiers and the jack output should preferably be connected to inputs marked 'aux' or 'line' on amplifiers
- Remember - you must still project your voice when using any sort of microphone amplification system
- To avoid acoustic feedback (howl) microphones must never be used in front of or otherwise near to any loudspeakers. Always ensure that the person wearing/using the microphone/radiomic does not go within 3m to 4m of the loudspeaker(s)
- Body worn (lapel) mics should be central on the body and around 20cm below the mouth (on a tie, for instance). Feedback is very likely with this sort of microphone – body worn microphones can only be used to reinforce the voice.
- Headworn microphones should always be protected by a foam windshield and be worn as near to the mouth as possible
- Hand held microphones sound 'warmer' and exhibit less feedback if they are close to the mouth
- Feedback is primarily caused by proximity of microphone(s) to loudspeaker(s), incorrect placement of loudspeakers, too much volume and/or incorrect tonal settings on the amplifier such as far too much bass.
- The microphone(s) must always be behind the loudspeakers



- DO NOT use re-chargeable Nicad or NiMh batteries with radiomic systems as the voltage sensor in the radiomic transmitter will not allow the battery to be discharged correctly.
- Radiomics will normally transmit up to 30m (100ft) from the receiver in the poorest conditions - in optimum conditions this distance can, at times be doubled.
- Always remember to keep radiomic transmitters at least 2 to 3m from their receivers and use each transmitter at least a 1m or away from other transmitters
- Remember that the radiomic transmitter and receiver should have 'line of sight' between each other
- Please note that radiomic receivers can be effected by CD players - keep your radiomic receiver at least 300mm away from any CD player, ghetto blaster or music system
- Please read all manufacturers instructions prior to using any equipment
- For sports, aerobics, dance and other exercise based activities it is preferable to wear you radiomic transmitter belt pack in a custom pouch and belt such as the Strike or Pacific belts
- Remember – radiomic transmitters have an integral battery voltage sensor – if the battery voltage falls below (usually 8.2v dc approx) then the audio signal will be muted even though the battery may still appear to be in a charged state.

Polar Response or the way in which a microphone picks up sound can also vary, and careful selection is needed to ensure the correct type is chosen to suit the customer's needs. There are two common types of pickup response - Omni-directional and Uni-directional. **Omni-directional microphones** such as lapel types will pick up sound from all directions equally. They might be used anywhere that sound needs to be heard from all around, such as a meeting or conference table. Unwanted sounds may also be picked up. **Uni-directional or cardioid microphones** such as most hand-held and headband types, as the name implies, pick up sound from one direction only, usually directly in front. Sound from unwanted directions may be rejected to a large extent. The latter is by far the most popular type and in this category, the cardioid polar response is common. The heart-shaped appearance of the pick-up pattern is useful for its capability to reject rearward sounds by some 70%. This helps to reduce acoustic feedback or howl, and can equally help to reduce audience noises, background music, telephones, etc.



Radiomics - Frequently Asked Questions



please take a moment to visit the **sound services** website - www.soundservices.co.uk

Q - What is the difference between Single channel, Diversity and True Diversity?

A - Single channel receivers have one antenna and one receiver circuit. Diversity receivers have two antennae and a circuit, which selects the strongest aerial signal. True Diversity receivers have two aeriels and two totally independent RF receiver modules and a circuit, which selects the best channel for both signal strength and signal-to-noise ratio.

Q - How many transmitters can I use with my radiomic receiver?

A - Only one. Two transmitters operating on the same frequency will interfere with each other. It is possible to have both a handheld and guitar or tie-clip mic transmitter on the same frequency, and use them with the same receiver, but not at the same time.

Q - How far from the receiver can I place my antenna?

A - As long as you use 50 Ohm fully screened RG58 aerial cable up to ten metres, but the closer the better. It is possible, by employing antenna amplifiers to run longer cables.

Q - Can I use my handheld radiomic and receiver from different manufacturers – they are on the same frequency?

A - Sometimes yes, but careful attention must be paid to specifications, because different makes and models have different technical parameters for equalisation, compression and expansion. Sometimes there are even compatibility issues between different models from the same manufacturer. It would be prudent not to assume compatibility between different manufacturers, unless tried and tested first.

Q - Is there a performance difference between UHF and VHF?

A - No - there is little audible performance difference but, with the high demand for a greater number of usable, interference free frequencies, the UHF band offers more opportunities – however the VHF band can often transmit a longer distance without dropouts.

Q - What is a compressor, expander or compander?

A - The audio signal is compressed (squashed) before being transmitted and the radiomic receiver expands the signal back to its original state, thereby improving the signal-to-noise ratio.

Q - What is FM Modulation?

A - FM is the abbreviation for Frequency Modulation, which is the method of transmitting information by modulating a carrier frequency on a radio transmitter. The frequency of the carrier wave is varied in accordance with the amplitude of the input signal, while the amplitude of the carrier remains unchanged.

Q - What is the difference between Squelch and Mute on different radiomic receivers?

A - Nothing. A squelch circuit mutes the output of a receiver when the received signal falls too low for good reception. Some units have preset mute levels while others have manual settings. It should be set so that the receiver mutes when the transmitter is switched off, or goes out of range, before the signal is swamped with noise or interference. To achieve a good setting, turn the transmitter off - Set the squelch control to minimum and then turn it up until noise starts disappears.

A good, tried and tested position for mute/squelch controls is around a quarter turn from the fully anticlockwise position.

UK radiomic frequency information

This summary users guide should help you understand the main choices and limitations of radio microphone use in the UK. For further information visit the JFMG website at <http://www.jfmg.co.uk> they administer licences and site allocations. Reserved news (ENG, EFP etc.) and broadcast frequencies are not shown here. To the best of our knowledge, this information is accurate at the time of publication (February 2006). No liability is accepted for any errors or inaccuracies or consequences thereof – please check with JFMG.

| VHF deregulated frequencies. Anyone can use these frequencies for MPT1345/1311 type approved equipment. | VHF regulated frequencies. MPT1350 type approved equipment may only be used at the licensed site. | VHF regulated frequencies. MPT1350 type approved equipment may be used anywhere in the UK. |
|---|---|---|
| Free of charge | £75 per year or £135 for two years for up to fifteen frequencies | £75 per year or £135 for two years for a block of fifteen frequencies |
| 173.800 MHz 174.100 MHz 174.500 MHz 174.800 MHz * 175.000 MHz * OK on it's own but may interfere with other units. | 176.400 MHz 177.000 MHz 192.300 MHz 200.100 MHz 207.700 MHz 208.100 MHz | 175.250 MHz * 175.525 MHz 176.600 MHz * 191.900 MHz 192.800 MHz 193.000 MHz 199.700 MHz 200.300 MHz 200.600 MHz 208.300 MHz 208.600 MHz 209.000 MHz 216.100 MHz 216.600 MHz 216.800 MHz |

Radio Microphones <http://www.jfmq.co.uk> - tel: 020 7299 8660

JFMG Ltd has been contracted by Ofcom (previously the Radio communications Agency (RA)) since April 1997 to manage and license the part of the radio spectrum used for Programme Making and Special Events (PMSE) in the UK. PMSE includes the use of radio for microphones and production services for theatrical performances, radio and television programmes, rock and pop shows, sporting events, conferences and in places of worship.

VHF Exempt Frequencies

All new equipment should use the following frequencies:

173.800
174.000
174.200
174.400
174.600
174.800
175.000

Older equipment may continue to use the legacy frequencies:

173.800
174.100
174.500
174.800
175.000

Availability

These frequencies are available for both indoor and outdoor use throughout the United Kingdom, (including Northern Ireland, the Isle of Man and the Channel Islands)

Sharing

As these frequencies are shared with other users, interference may be experienced occasionally.

Technical Note

RF Bandwidth is limited to 200 kHz. Transmitter power is limited to 10mW if handheld, 50mW if body-worn

UHF Exempt Frequencies

Low power radio microphones and other cordless audio equipment may be operated in the band 863.000MHz – 865.000MHz, with a maximum power of 10mW if handheld, 50mW if body-worn.

For most equipment, with a 200kHz bandwidth, the lowest frequency will be 863.100MHz, and the highest, 864.900MHz.