

DAB Antennas and Installation

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1 INTRODUCTION

The release of the TAG McLaren Audio "Tuner AvantGarde T32R" has brought Digital Audio Broadcasting (DAB) into the realms of true hi-fidelity reproduction. However, in order to fully realise the performance available from this new medium the choice of antenna must be carefully considered.

The antenna is the first link in the chain to achieve the desired high quality audio signal. If you live in an area of poor reception or have a poor antenna, no matter what you do later in the chain, performance is likely to be compromised.

While DAB has been designed to be immune from multi-path interference which so often plagues FM reception, a reasonable signal strength is still required. A weak FM signal is easily recognised because it will suffer from increased background hiss and, in severe cases, distortion. DAB however will continue to provide hiss-free reception until a minimum threshold is reached. Beyond this, the digital data can no longer be accurately decoded and the output from your DAB tuner will mute. A drop of three decibels on a DAB receiver is enough to make the difference between crystal clear reception and no reception at all.

Before muting point is reached however, parts of the digital signal will be lost or become corrupted. The sophisticated error correction and concealment algorithms used in our DAB decoder can mask these effects to a certain degree, but this is second best compared to having the full quality original

signal - which is achieved with a good quality antenna installation.

2 FREQUENCY RANGES

DAB signals are transmitted on either Band III (174 - 240 MHz) or L-Band (1452 - 1492 MHz). Some countries may only use the Band III signals, while others may only use the L-Band signals. Some countries use both frequency ranges within the same geographical area, which puts increased demands on the antenna system.

The United Kingdom uses at present Band III only.

To extract the maximum signal strength from any received transmission, the antenna needs to be correctly matched to the local transmitter configuration and frequency band. It is for this reason that the T32R is not shipped with a DAB antenna.

This document gives technical background to the antenna issues, but your local antenna supplier should be able to advise which antenna is best suited for your particular location.

3 ANTENNA TYPES

DAB antennas can be broadly classified into two categories, those suitable for indoor use, and those for outdoor use.



In areas of strong DAB signals, it may be possible to get a DAB signal from an existing FM or TV antenna. The efficiency of such a system may be variable, and for best results a splitter should be used to allow the DAB receiver to be split from the FM (or TV) receiver. In these circumstances, it is often the antenna down-lead that contributes to the signal reception more than the antenna itself. The efficiency of such a system will be poor and such an installation is not recommended.

3.1 Indoor

The demands of practicality and aesthetics mean that indoor antennas must be relatively small and inconspicuous; the choices here being:

- Ribbon dipole - a T-shaped antenna constructed from a flat, two-cored cable. The stem of the T feeds the receiver while the top of the T is the antenna itself. The T should be oriented on its side with its 'top' (650mm long for band III), running vertically.
- Monopole (half dipole) - a thin, resilient vertical metal rod (mostly on a heavy base), 300mm long for band III.

The above antennas have low gains and as such are only suitable for areas with good to moderate DAB signal strength.

3.2 Outdoor

Outdoor antennas have the luxury of being much larger and allow for more sophisticated antenna technologies to be used to obtain the best signals. The two most popular for DAB reception are:

- Dipole - This antenna has a moderate gain and is omni-directional. This means the antenna will work well for moderate to strong signal levels of DAB transmissions and provided it is installed

with vertical polarisation, will pickup DAB stations from all directions.

- Yagi - This antenna type has a much higher gain than the dipole, but is directional. This antenna is best suited to areas where DAB reception is poor. The antenna must be pointed directly at the DAB transmitter and should be installed with its elements running vertically. Being directional, the antenna will pick up signals very well from its main direction, but will be compromised for stations from alternative directions. However, this directionality can be beneficial in rejecting strong, unwanted signals that lie in a different direction.

4 ANTENNA INSTALLATION

Having chosen the antenna for your DAB system, it needs to be positioned and installed. *This should only be done by a specialist, such as your local antenna supplier.*

4.1 Polarisation

DAB signals are transmitted using vertical polarisation (which aids mobile reception). To maximise the efficiency of your antenna system, the antenna should be aligned to receive vertically polarised signals (i.e. the rods of the antenna should be vertical).

4.2 Location

An outdoor antenna should only be installed by a specialist, such as your local antenna supplier. A wrong installation can be life threatening.



All antennas should be located away from possible sources of electrical interference such as mains wiring or digital equipment (e.g. computers or video recorders). Loft mounted antennas should be mounted away from water tanks and metal pipes.

Indoor antennas may be adversely affected by the building's construction (e.g. reinforced concrete or steel frames). In these cases, positioning the antenna near a window may help.

In cases of weak signal strength, the higher the antenna can be mounted (e.g. in the loft or on the exterior of the building) the better the reception is likely to be. The increased height is also likely to minimise any signal masking effects from local buildings or geographical features.

4.3 Connections

DAB antennas are designed with a 50 Ω output impedance instead of the 75 Ω used for TV and FM antennas. DAB tuners are fitted with 50 Ω BNC connectors to ensure compatibility with the antenna. For optimum performance a 50 Ω low loss coaxial cable should be used between the antenna and tuner.

All connections should be made using quality connectors, with appropriate precautions being taken for weather proofing of external connections. Please refer to your local antenna supplier for assistance.

4.4 Directivity

In areas of weak reception where a directional antenna is employed, this will need to be oriented for maximum signal strength - normally at the nearest DAB transmitter. It is preferable not to point the antenna through any

metal work or nearby building structures.

For other types of antenna, the best method to adopt is to listen to the radio while moving the antenna's location and orientation to find the "sweet spot" where best reception is obtained.

4.5 Antenna Amplifiers

In cases of very weak reception or where long cable runs are required, an antenna amplifier may be necessary. The amplifier should be mounted as close to the antenna as possible and matched to the correct local frequency band. In weak reception areas the amplifier should be regarded as a 'last resort', a higher gain antenna on a taller mast will generally give better results. The installation of an antenna amplifier should only be carried by a specialist, such as your local antenna supplier.

5 CONCLUSION

DAB is a very robust transmission system, enabling high quality audio to be received under relatively difficult conditions. While sometimes some DAB stations can be received by plugging a standard FM or TV antenna into the DAB tuner, or using a small monopole antenna, the best performance will always be achieved by using a properly installed antenna of a type which matches your local DAB frequency and signal strength conditions. Please contact your local antenna specialist for more details.