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## Sound Reinforcement Systems

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### Introduction

The introduction of a Sound Reinforcement System into a church can be very beneficial in enhancing worship. However a sound system is not always required and parishes experiencing a sound problem in their church building should seek the advice of their professional adviser in the first instance. He or she may be able to suggest other more effective solutions to overcome the difficulty. These may include:

- re-siting a lectern or pulpit
- providing the pulpit with a sounding board
- making changes to the roof lining

In cases where a sound system is not needed, it is still important to consider installing a loop system for people with hearing aids.

### Matters to bear in mind

When considering installing a sound system it is important to think about the visual impact such a system is likely to have upon the interior of the church building. To be most effective, loudspeakers often need to be sited in prominent positions; however it is important that they do not detract from the beauty of the church building and their fixings must not damage historic stonework. It is preferable that loudspeakers are not fixed to pillars and any wiring should be as unobtrusive as possible.

As a general rule, sound systems should be installed in a way that makes them virtually invisible.

It is important that the sound system should be matched to the acoustics of the church. For this reason the advice of a qualified acoustic engineer should be sought at an early stage.

The Diocesan Advisory Committee is prepared to offer advice concerning the installation of sound systems at an early stage, as well as giving more formal advice in connection with the application for a faculty.

### Factors necessary for the effective use of a sound system

For the effective transmission of speech, several factors are required:

- Quiet conditions within the church
- Adequate loudness of the sound to be transmitted
- An acceptable balance between the needs of music (some reverberation), and of voice reproduction (no reverberation)
- Speech should sound natural, and there should be no obvious "time delay" between the speaker talking, and the congregation hearing the sound.

### The System

The main purpose of a sound system is to reinforce the sound of the voice in the more remote parts of the building. Congregation within 10-20 feet of the person speaking should be able to hear unamplified speech quite easily.

### Simple systems

These consist of a limited number of microphones, most of them in fixed positions. These should all have a pre-set input. Simple systems have a limited number of loudspeakers, placed to avoid "feedback" from the microphones. Such a system normally needs no adjustment during a service, except possibly altering the over-riding volume control.

### **Complex systems**

These may include many microphones, each needing continuous monitoring. These systems may also include a number of low powered "whisper" loudspeakers to avoid feedback if microphones are used in a mobile way all over the church. The danger of installing a complex system is that, although initially someone may be prepared to monitor the equipment throughout a service, it becomes an increasing burden, and so falls into disuse. One has to remember also that the equipment is very delicate, needs to be handled carefully, and may suffer from accidental misuse.

## **The Equipment**

### **Microphones**

Microphones, which respond mainly to sound coming from one specific direction are frequently used in sound reinforcement systems. These pick up a maximum of sound from the speaker and also lead to a reduced risk of acoustic feedback. To minimise the wear and tear it is better for microphones to be mounted on brackets or stands in fixed positions. Radio microphones, which need no wiring, can provide greater flexibility but they are more expensive than wired microphones. If you are considering installing a deaf-aid loop, it is sometimes useful to have it fed (through its own amplifier) from a suspended microphone located so that it receives all music, as well as speech.

### **Loudspeakers**

Multiple speakers (or whisper speakers) are generally more useful in very large churches and cathedrals where excessive resonance or echo hinders clarity. The number of speakers required will depend upon the size and layout of the building. For a 3-bay nave with 2 aisles, two carefully sited speakers should be sufficient. If possible loudspeakers should be situated so that they produce a sound beam that travels almost over the heads of the congregation, and parallel to the floor.

### **Amplifiers**

These should be of the highest quality. An average PA or domestic type amplifier is not satisfactory unless suitably and permanently modified. Amplifiers with large outputs are not usually required. A preset control should be provided to limit the overall amplification to prevent instability ("feed-back") in the worst conditions. An amplifier with little response to the low and high audio frequencies is generally required, but if music is to be played through the system (see 'Additional facilities' below) then a broader response is preferable. The amplifier can usually be placed anywhere convenient.

### **Controls**

It is important that the various parts of a sound system can be easily controlled. Microphones generally have their own switches. This is especially necessary in the case of radio microphones as they are battery operated. Microphones can be also be controlled at the amplifier, or be left "open". If individuals are controlling the microphones, they must remember to switch them on and off. If microphones are controlled at the amplifier, this will need constant and careful monitoring. In a simple system, it is often satisfactory to leave all microphones open. Volume control on the input side of the amplifier is, in theory, more precise. However, as only one

microphone should be used at a time, this is rarely required in practice. Often, it is found more satisfactory for the input volume to be preset, or the controls marked at an "average" level, as this avoids constant monitoring. If a particular speaker's voice is very loud or quiet, the volume can be altered by a conveniently located volume control.

### **Additional facilities**

It is often helpful to have facilities to play recorded sound and music through the sound system. In addition there may be occasions when there is a desire to record special services or events. It is normally possible for a tape/CD deck to be connected to a sound system. If it likely that recording and playback facilities will be required this should be mentioned at the outset to ensure that compatible equipment is installed.

### **Installing the sound system**

Once it has been decided that a Sound Reinforcement System is required, the design and installation of the system should be left to a firm of competent specialist engineers. Permission is needed by faculty to ensure the appropriateness of the design, so the DAC will need to be consulted. It's best to do this at an early stage. For Grade I and II\* churches, English Heritage will also need to be consulted on the visual impact the system will have. It is also important that all work is carried out under the direction of your professional adviser to ensure that the equipment is installed without disfiguring the interior the building or impairing the efficiency of the system.

### **Your questions answered**

*What sort of information will the installing engineers require?*

The firm will need to be told the exact purpose of the proposed sound system. For example:

- whether it is simply for the reinforcement of speech or for musical reproduction as well;
- whether or not deaf-aid facilities are required;
- which speaking positions will require microphones,
- whether or not speech reinforcement will be needed for the whole seating area.

Information about the architect will need to be given, so that he may be consulted on the aesthetic aspects of the installation. It must also be decided if wiring in the church is to be totally concealed. If plans of the church are available the firm will find these helpful.

*How should we maintain our sound system?*

As with all electrical equipment, a proper maintenance programme by qualified engineers is essential.

*Will the sound system help the hard of hearing?*

Sound reinforcement systems can clarify speech in large or reverberant places, but they will not generally help the hard of hearing. However, deaf-aid loop systems are beneficial to those with compatible hearing aids, and these can be tied in easily with a sound system or installed separately.

**Additional information and advice is available from the DAC team:**

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