
Aural and Visual Communication in Churches

Introduction

Until the mid-twentieth century the normal means of communication was either by the written word – books or leaflets – or by the spoken word directly to the congregation assembled in church. Gradually, as technology advanced, contact between celebrants and congregations improved, firstly by the introduction of sound reinforcement and images projected on screens and latterly over the internet to congregations at home.

This advisory leaflet explains how the following aural and visual communication equipment can best be installed in churches.

1. Sound reinforcement systems
2. Audio visual systems
3. Streaming systems
4. Closed circuit television systems

For all systems an initial informal approach to the DAC is advised. If the church is listed grade I or II*, consultation with Historic England is required, and depending on the complexity of the system one or more of the Amenity Bodies may need to be consulted. If any part of a system is visible externally the Local Authority should be notified as planning permission may be required.

Technical terms

With increasing use of technology and to aid clarity, the following terms are explained:

- **AV** refers to the combination of aural and visual information
- **Sound reinforcement** is what is necessary to enable the spoken word, musical or other sounds to be heard clearly throughout a defined space, usually a church
- **Streaming** is the dissemination of AV information to places remote from where it is produced and **live streaming** is doing this instantaneously
- **Wi-fi** is a wireless (radio wave) method of enabling electronic devices to communicate with each other
- **Cable Broadband** is a (glass) fibre or copper cable method of accessing the internet, for example for streaming
- **Mobile Broadband** (using a 3G, 4G or 5G network) is a method of accessing the internet wirelessly using a dongle or mobile broadband router
- **PtP (point to point) Wi-fi** is a method of accessing the internet wirelessly from a remote building or site
- **Feedback** is the howl produced when a microphone picks up its own sound from being too close to a loudspeaker
- **CCTV**, closed circuit television, which may be added or combined with other AV systems.

1 SOUND REINFORCEMENT SYSTEMS

The introduction of a Sound Reinforcement System can be very beneficial in enhancing worship. 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 3-6 metres of the person speaking should be able to hear unamplified speech quite easily.

In small churches a sound system is not always required and parishes experiencing a sound problem in their church building should seek the advice of a professional adviser in the first instance, who may be able to suggest other more effective solutions. These may include:

- re-siting a lectern or pulpit
- providing the pulpit with a sounding board
- making changes to the ceiling or floor surfaces.

When considering installing a sound system it is important to consider the visual impact it is likely to have upon the interior of the church building. To be most effective, loudspeakers often need to be sited in prominent positions, but it is important that they do not detract from the beauty of the church building and their fixings must not damage historic stonework.

Even if a sound system with loudspeakers is found not necessary, microphones linked to a deaf-aid loop or wi-fi system can be installed giving a signal to be picked up by hearing aids.

As a general rule, sound systems should be installed in a way that makes them practically invisible, but if loudspeakers are fixed to pillars they should be shaped to follow the proportions or mouldings of the masonry.

It is important that a sound system should be matched to the acoustics of the church. *For this reason the advice of a qualified acoustic engineering company familiar with church requirements should be sought at an early stage.*

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 initial 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
- There should be no obvious 'time delay' between the speaker talking and the congregation hearing the sound.

Simple systems

The main advantage of such a system is that it normally needs no adjustment during a service, except possibly altering the volume control, so a control desk is not required. These consist of a limited number of loudspeakers and microphones, most of them in

fixed positions, but can include roving microphones. All should have pre-set inputs and outputs. The loudspeakers should be located to avoid 'feedback' from the microphones.

Complex systems

More complex systems will need continuous monitoring from a sound desk. These may include many microphones and a number of low-powered 'whisper' loudspeakers which avoid feedback if mobile microphones are used 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, eventually it becomes a burden and so falls into disuse.

Both in simple and complex systems one has to remember that the equipment is very delicate, needs to be handled carefully, and can suffer from accidental misuse. To minimise the wear and tear it is better for microphones to be mounted on stands or brackets in fixed positions.

Microphones

There are three kinds of microphone commonly used in churches:

- Surface mounted - attached to a pulpit, lectern, stand or hand-held, these are generally cardioid, which means they respond mainly to sound coming from one specific direction. These pick up a maximum of sound from the speaker and have a reduced risk of acoustic feedback. They may be wired to a socket outlet or be radio-transmitted, needing no wiring
- Hung or flown - these microphones can be either omni-directional or cardioid and are useful as ambient or wider-zone pickup for congregational and choir music as well as speech
- Lapel (or lavalier) - fully mobile radio microphones with local switching. These are ideal for celebrants as they can be operated hands-free in almost any location in the church.

Loudspeakers

There are numerous types of loudspeaker but only a limited number that, for acoustic or visual reasons, are suitable to be used in churches. A single loudspeaker case may contain many small speakers and tall slim loudspeakers can often be discreetly located on masonry walls or moulded columns. Set just above head level, they can deliver a wide 'flat' beam of sound so that distant worshippers can hear clearly without those closer to the loudspeakers being deafened.

For small churches a single set of loudspeakers located towards the east end of the nave and aisles, perhaps with small eastward-facing speakers in the chancel, may be all that is necessary.

Larger churches may require multiple or 'whisper' speakers, but the initial aim should always be to locate loudspeakers between the actual speaker and the hearer. It can be very distracting if the angle between the two is more than about 30 degrees.

The speed of sound also needs to be allowed for, especially in long naves. Where speech and music are mostly from the east end, a time delay can be set for each loudspeaker so

that the amplified sound, which would otherwise arrive at the speed of light, arrives at the listener at the same time as the actual sound which, of course, arrives at the slower speed of sound.

Amplifiers

These should be of the highest quality. An average PA or domestic type of amplifier is not satisfactory unless suitably and permanently modified. Amplifiers with large outputs are not usually required. A pre-set 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. Amplifiers can usually be placed anywhere convenient in a simple system and are usually within the control desk in complex system, but allowance needs to be made for the heat they produce.

Controls

First and foremost, according to the number of controls, is the size and location of the control desk or cabinet. A simple system will not require one, but a conveniently accessible site should be identified where normally fixed controls can be located.

Control desks should generally be built far from, but within sight of the normal sources of amplified sound. For churches with pews, a desk can often be integrated between two rows, but the controls must be within reach of a seated operator. Where there are no convenient or adaptable pews a free-standing desk will be necessary, which should be designed to complement nearby furniture or timberwork. The desk may also accommodate other AV or CCTV controls and if the church does not currently have such systems provision may be made for future extension of the desk.

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 also be controlled at the amplifier or be left 'open'. In a simple system it is often satisfactory to leave all microphones open, but if individuals are controlling the microphones, they must remember to switch them on and off. In a complex system microphones are controlled at the amplifier which will need constant and careful monitoring. 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 pre-set, 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.

Provision should be made for a tape/CD deck, solid state player and 'minijack' input for smartphones, laptops, etc., to be connected to record and also play recorded sound and music through the sound system.

Installation and training

Companies from whom quotations for sound reinforcement systems are sought will need to be told the exact purpose of the proposed 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.

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. Information should be given to the architect so that advice may be given 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, preferably in digital (CAD) format, the installing company will find these helpful.

As with all electrical equipment, a proper maintenance programme by qualified engineers is essential and this should be specified by the installing company.

Finally, it should be recognised that a sound reinforcement system will not clarify indistinct or poor speech. All regular users should have training so that they know how loud to speak, with what speed and how far from the microphone. Brief clearly written instructions should also be provided for occasional users.

2 AUDIO VISUAL SYSTEMS

Using projectors and screens in your church

The printed word is no longer the most familiar means of communication for many people in the community. Video projection offers a way of selecting from the wide choice of graphical and textual material available as visual aids for the liturgy. It can provide a means of illustrating and explaining the concepts and ceremonies of worship and also allows the introduction of a wider range of hymns and songs.

Churches left open during the day can use projected images to welcome visitors, provide texts for reflection or details of services and events.

Things to bear in mind from the start

When embarking on a project to bring such equipment into the church, it is essential to gain some background information.

It is extremely important to be aware of the architectural importance of the building, and of the tradition that church furnishings should, as far as possible, enhance the building through the quality of their design.

A site visit by representatives from the Diocesan Advisory Committee together with the church architect or surveyor and a consultant from a company specialising in AV installations in churches is a good first step.

Screens

Consider the possible areas of viewing from the congregation, seated and standing:

- Those nearest to a screen should not have to look up sharply and those furthest away should be able to read the smallest text
- The furthest viewing distance from a screen should not be more than six times its diagonal size
- This will indicate, especially in small or medium-sized churches, whether a single screen is adequate or whether repeater screens are needed in the length of a long building.

Consider preferred locations for one or more screens:

- Are additional screens required in aisles or transepts?
- What is the visibility of the screens when not in use?
- Would they obscure key elements of the worship, e.g. the altar or east window, when in use?

Consider types of screens:

- Projection onto a wall can provide a simple and effective way to display projected images/words without the visual clutter of a framed screen. If the wall is not entirely smooth, proprietary Projector Paints are available to provide a smooth reflective surface, but the church architect or surveyor should be consulted to ensure such paint is not applied to an historic wall surface.
- Fabric screens, which may be rolled or folded when not in use. Screens electrically rolled into cases above chancel or other arches, or at timber roof truss level are often good solutions. The cases should always be coloured to match the background on which they are fixed
- Flat screen monitors, usually used for smaller displays, which do not require separate projectors. They are black when not in use but can have a 'default' lighter plain colour needing a constant signal
- 'Intelligent' or 'smart holographic glass' screens, which can be 'powered' to be clear when not in use and can therefore hang in prominent positions.

In all cases incident daylight also needs to be considered, including light at the rear of fabric screens. Some windows may need shutters or adjustable vertical louvres to allow images on the screens to be adequately visible.

Attachment of screens to columns should be avoided if at all possible; for flat screens free-standing supports can be preferable.

Projectors

High quality laser projectors are preferable, powerful enough to provide bright, clear and sharp images or viewing can otherwise cause eye strain. For small or medium-sized churches, projectors are best located at the liturgical west end at a height accessible for maintenance or adjustment, but not below 2m or shadows could be cast by standing congregation. They should also be secured high enough and preferably be covered to deter casual theft.

Good long-range projectors are available, but it may be preferable in large churches for them to be mounted discreetly on shelves or brackets on the north or south walls. In all cases it should be possible for the projected images to be made to fit the screens without distortion.

Controls and cables

Projectors and LCD screens can be operated from a computer plugged in at a control desk, or by a tablet such as an i-pad via wi-fi. Rolled screen gear is often locally switched, though central operation from a control desk is possible. If the computer is kept in the control desk the desk cover or lid should be secured to prevent theft and could be alarmed as most thefts of this kind take place during daylight hours. Concealment of cables is highly desirable; their location should be provisionally agreed with the church architect or surveyor before being submitted to the DAC.

Content/use of copyright material

The brief for any liturgical material and for material supplementary to the liturgy should be prepared by the ministerial team. The preparation of the visual material can be in the hands of lay members of the congregation. Non-liturgical use of the screens should always be subject to ministerial oversight. The need for permission to use material under copyright and performing rights legislation should always be checked in advance. Separate advice is available from the Diocesan Office on this matter.

3 STREAMING

Just as the introduction of computer applications such as Zoom and Teams has enabled individuals to join 'virtual' meetings far and wide, so it has been realised that services can be relayed to parishioners in their homes. This is achieved by streaming.

Streaming, in its simplest form, can be done using a tablet or smartphone which, if broadcast directly is known as 'live streaming', or the video material can be recorded and made available at a later date.

Cameras

Where streaming is regularly used it is more convenient for cameras to be installed at fixed points. In a simple system a single camera would be pre-set to record, say, all activity in the area of the chancel, but more usually a number of PTZ (pan-tilt-zoom) cameras are employed to allow close-up views of particular parts of church services.

The location of cameras (which can be quite small) should be chosen initially in consultation with a streaming specialist company and be discreetly located avoiding fixings in any historically valuable or architecturally significant material. The cameras also should not be placed facing the congregation, members having a right of privacy.

The height of cameras generally should be not too far above head height, although an occasional bird's eye view would be acceptable.

Microphones

If a sound reinforcement or AV system is already installed the same microphones could be used for streaming. Otherwise refer to these sections in this leaflet for information about microphones.

Lighting

Views seen by the cameras both in natural and artificial light need to be balanced regarding light and shade. A camera should not be directed towards a light or a window, or the remainder of the picture could be in deep shadow. Participants of the action viewed should not be seen in silhouette.

Controls and cables

The cameras would normally be operated from the control desk, which should have monitors of all of them, highlighting or otherwise identifying the one currently in use. Cable routes should be planned in conjunction with AV service cable routes taking care that each service is separately identified and again with advice from the church's architect or surveyor.

Transmission

Usually, connection is made for streaming by broadband. Ideally, this would be by a direct underground fibre connection to the nearest BT box. A route from the church alongside a path would minimise archaeological disturbance, but this can be relatively expensive. Alternatively a route through an adjoining church hall or similar building may be possible.

Often, therefore, an overhead cable is preferred but again there can be snags:

- There may not be an accessible telephone pole.
- There may be trees between the church and the pole.
- The route from the church may be in a conservation area or an area of outstanding natural beauty.
- The cable should not cross any principal views of the church from public places.

If distances are great and a cabled broadband connection is not feasible, as in remote country churches, then a mobile broadband connection can be economical if there is sufficient 4G or 5G coverage in the area. PtP (point to point) wi-fi may also be possible, but this can be subject to weather conditions, and an external aerial may be required.

Licenses

Before streaming services, a CCLI (Christian Copyright Licensing International) license is necessary, the cost of which is dependent on the anticipated coverage and extent of music and copyright hymns and songs used.

All these matters, including safeguarding, which arise from issues of livestreaming are considered in our document relating to [delivering services online](#) and guidance for [PCC's for policy and practice relating to livestreaming](#).

4 CLOSED CIRCUIT TELEVISION SYSTEMS

CCTV systems can have several applications in and around church buildings:

- As, or in conjunction with, a security system
- To identify arrivals and departures of wedding and funeral participants
- To aid an organist or choirmaster who would otherwise not see critical parts of a service.

Some cameras might share streaming views, but others should be on separate circuits. Again, it is important that all communication systems are coordinated, especially in terms of the locations of equipment, to avoid the building being disfigured by disparate paraphernalia.

Security CCTV systems

These systems will normally have fixed cameras beyond easy reach and continuously record activities from 4 weeks to 12 months. For 24 hour recording the cameras should have infra-red capability.

Externally, they should cover all entrances, vulnerable windows and car parking spaces. In conjunction with an alarm system, they should also cover access to all roofs (even roof tiles and slates as well as lead and copper are known to have been stolen!). Note that they should be used solely to identify potential trespassers within the site boundaries and should not extend over public areas.

Internally, again all entrance doorways should be viewable, vestries, sacristies and any area containing high value or historically valuable articles.

Security CCTV would normally be viewed only at a control desk monitor, but views could be captured on a computer, tablet or smartphone if required.

Arrivals and departures

These views might be covered by the security cameras but should be displayed on switchable monitors in the bellringing room and by the organ console, also exceptionally on the AV screens generally, the latter switched at the control desk.

Special viewing

It is quite common practice for an organist to have a CCTV link to a choirmaster and to the celebrant, say at the altar during communion and at the font during baptisms. These would be discrete links switched by the organist and would not be available on other monitors.

Additional information and advice is available from the DAC team at dac@stalbans.anglican.org.

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