



Planning and Managing Assistive Listening Systems



Creating an Assistive Listening System (ALS) for your patrons shouldn't be a scab-on system that is there 'because we have to', but instead should be embraced as a means of reaching more customers with a great performance experience.

Acquiring a good signal to feed the system:

Microphones are necessary, but the way you pick-up the performance may vary depending upon the type of show. Orchestra and chorus presentation may need some broad area covering mics, whereas theatre or lecturers may require individual mics. Listen to the sound pick-up in an isolated environment (like headphones in another room) so you can hear how much of the ambient room noise and echoes are being picked-up. Many performance spaces are way too live to allow a good 'studio

like' mix to be achieved, but isolating the desirable sound sources from the undesirable sound sources is the key to a good ALS mix.

Staffing to have a separate audio engineer to mix for the ALS system can be difficult, so automating the system can be helpful. Simply gating unused channels on and off can help, but a algorithm-controlled automatic mixer is more suited to the task. The Dan Dugan Auto-mixer is **HIGHLY** recommended for this as it provides a fairly good emulation of a human operator's nuanced skills.

Signal Processing: Bandpass the system to optimize for speech intelligibility. Excessive low frequency content just muddies-up the mix, and high frequencies above your best soprano's range are not necessary, either. Don't be afraid to compress the signal so it sounds a little more 'produced' like a TV or Radio Broadcast. Picking a signal feed for the ALS that is downstream of the main PA equalizer is not recommended, as it has many filters that are set to compensate for shortcomings of the room acoustics and the PA speakers and these are detrimental to the ALS sound quality.

Signal Delays can be important, too. Inserting a delay in the signal processing so the audio picked-up by the mics onstage is delivered to the patrons at about the same time the natural sound arrives can improve intelligibility as they user is not having to separate the live sound from the ALS sound. It is usually helpful to figure the average distance from the center of the acting area to the middle of the audience area, and apply the corresponding delay based upon the speed of sound (approximately 1,130 feet per second -or- 344 meters per second).

Since the microphone mix is not going through the main sound reinforcement system, you have almost (but not total) unlimited gain-before-feedback. An ALS system can rock your socks off if properly set-up. For the best results, there should be a separate person mixing for the ALS and they should be in a semi-isolated space wearing earbuds similar to those used by the ALS patrons to do the mix. This way they are hearing what the ALS users are hearing.

A nice side benefit of this effort is that this mix can be used for the Lobby, Dressing Room, and streaming feeds, too.

**Getting full use of your investment:**

One of the things that drives the 'non-use' of the receivers is the lack of advertising that they are available. The ADA (www.ada.gov) requires that the 'Assistive Listening Devices are available' signs must be posted adjacent to *every* auditorium entrance, and (optional, but logically) should also be posted at the ticket booth(s) and maybe the main entrance doors, too. Note that the minimum / maximum elevation of the signs is also defined, as is the illumination cast upon the signs. It can also be informative to include the icon on brochures, programs, tickets, and pre-show advertising. Be aware that there are different variants of the signage graphics depending upon the type of ALS equipment installed (Loop, IR, RF). The addition of text below the signs that informs the reader where the ALS equipment can be check-out is also very helpful.

If you are a venue that also uses the system to transmit alternative languages (Simultaneous Interpreting and/or Descriptive Narrative for the sight impaired), then text in the alternative language(s) and/or braille are helpful for those users. Seek-out professional native language translators for these wordings so as to not make a cultural *faux pas* with the signage.

Equipment Availability: The ADA is very clear about the type of signage, illumination of the signage, and the location of signage that informs the incoming patrons that there is assistive listening equipment available and where it can be obtained. This means that the devices must be located where someone can readily access them and distribute them to those that request them. The equipment can't be locked away in a cabinet in an office that is in another building that is closed after normal operating hours.

Compassion:

Ergonomic considerations: There is a fairly strong correlation between the population requiring assistive listening devices and those that may also have other physical impairments. A fully able-bodied person can generally use just about any headphone, ear bud, or telecoil coupler that is available in the marketplace, however, persons with other physical disabilities must have devices provided that suit their ability to operate the receiver controls, make connections, if any, and don the listening appliance. Many products on the market are not well-suited for use by this segment of the population. Involve your patron community: A panel of the typical end-users should be assembled to introduce them to the various options available and to involve the product selection process.

Another 'non-use' factor is training the staff that issue these devices to be extremely courteous to those requesting the devices. This means both technology training to be able to explain the use *and* interpersonal skills training to be sensitive to the person's needs and patient with them if they have questions. Including a small hand-out that has pictograms (and multi-lingual text and braille, if necessary) on the use of the device can be helpful so the person does not have to be verbally instructed and be self-conscious about the attention it may draw. It is also important that the user be offered a telecoil neck-loop option in lieu of only an ear-speaker / earphone / headset. This allows them to use the telecoil receiver in their hearing aids, which is a much less visible and possibly embarrassing. Many people do not know that these are available, so they will not ask for them. There is a minimum number of the telecoil adapters required to be available, just like the minimum number of receivers.

Sometimes the stigma the user senses can be the real culprit. Wearing over-the-ear headphones, even small ones, can be embarrassing for them. Even wearing small earbuds that are like used with mobile phones is 'too much' as they think it draws attention to them (it does). For some, it is just not wanting to 'appear to be an old person that needs a hearing aid' (I know -- an awful stereo-type, but the truth about how many feel, regardless of age).

This is one of the reasons that Induction Loops (be they in the floor, seating, ceiling, or just a loop around someone's neck plugged into a receiver) are great -- the user can use their own hearing aid that they are comfortable with.



- An RF type ALS system feeding the portable receivers allow the user to place the receiver out-of-sight of others and only the neck loop wire may be visible.
- An IR type ALS system requires that the receiver's IR 'eye' be visible in order to pick-up the signal from the emitter panels. Most users don't understand this subtle, but important, difference and may try to conceal the IR receiver where it cannot acquire an IR signal.

To compound the person's sense of "being stared at", being instructed about how to wear the equipment and operate it can be a significant invasion of their personal space, and particularly unnerving if it occurs out in the lobby with everyone else around. Training your staff to understand this highly emotional issue is important. Have a plan to invite the patron in for a personal fitting before the show, offer to have a private room where this can be done discretely. Understand that having your hands really, really close to someone is a huge boundary issue for many. This all requires sensitivity training and good interpersonal skills (and a breath mint can't hurt, either).

Similarly, recovering the equipment after the show should be done discretely and with a similar concern for the patron's personal space and potential for embarrassment.

Managing ALS Assets:

Test your receivers with common 3.5mm earbud products like the customers may already be used to using with their personal mobile phone; if your receivers work OK with these without damaging the microphone or the receiver, then advise the customer that they have the option of using their own earphones. The use of an adapter to convert a TRRS (Tip-Ring-Ring-Sleeve) 4-circuit 'telephone' earbud set to a TRS (Tip-Ring-Sleeve) 3-circuit 'stereo headphone' earbud set may be a good option to offer, too.

Before the event, it is a good idea to set-up all of the receivers and make sure the batteries are new (if non-rechargeable batteries are used), or charged properly (if rechargeable). Charging takes time, so setting-up the charger system several hours, or a day, in advance of an event is recommended.

Assistive Listening System equipment is expensive, small, and easy to misplace. Establish a system to 'check-out' the equipment to your patrons so they will return it. If your receivers and accessories are in a storage box with individual compartments / zip-loc bags for each device, this can help you to know how many devices are available and how many have been checked-out. When it comes time to return the equipment after the event it will be immediately obvious if anything is missing.

People are very aware / suspicious that the ear-speaker / earphone / headset may not have been cleaned after the prior use, so having a well-documented staff training program to clean (change-out foam earbud covers, wipe-down with wet alcohol wipes, etc.) the devices upon recovery from the user is important.

Bagging them individually in a zip-loc (or even better: heat-sealed baggie) with a 'This device has been sanitized for your protection.' note inside each bag can also reinforce the facilities' concern for the patrons health.

People get caught-up in the commotion after an event and sometimes forget that they have the ALS equipment they have checked-out. It is usually a good idea to create a system whereby the user exchanges a credit card, student I.D., or driver's license to obtain the equipment. It is also prudent get a cellular phone number / email address so you can message them after the show to remind them to return the equipment. A cash deposit can work, too, but it is sometimes difficult to keep this secure. Credit Cards / Driver's License's / Student IDs should also be kept secure.

Of course, don't forget to turn-off each unit as it is returned, otherwise the batteries will just run-down during storage. Removing batteries is the best way to ensure that devices are powered-down.



If devices are to be in storage for more than a month, it is best to remove any batteries in them so that if the battery corrodes, then it will not damage the device. Rechargeable batteries should be charged prior to storage and checked / recharged every 2-3 months of inactivity.

RF Antennas for FM ALS

RF ALS systems sometimes don't behave as they should. Antennas are a good place to begin the investigation. Antennas get installed in all sorts of crazy, non-functional, ways. Get 'eyes-on' with the antenna. If it is a dipole antenna and it is high over the center of the room, and vertically oriented, then the null axis of the dipole lobes may be pointed right at the main seating area. One must understand the radiation pattern of the installed antenna (or IR emitters) so you can ensure that the signal is directed towards the intended audience.

Also, if a mono-pole or dipole antenna whip is installed parallel to, and in close proximity to, conduit, pipe, air duct, rebar (inside concrete), metal wall studs bar-joint, steel beam, ceiling tile rib, catwalk hanger, wire rope, solid wire ceiling hanger, metal roof deck, metal window frame, metal door frame, etc., then it may have the coverage area affected. Yeah, I know, that doesn't leave a lot of options as to where you *can* install the antenna, but that is the nature of RF to reflect and/or cancel (null) off of other nearby metal.

Typically, there is only one ALS antenna in a system, unless there is both a 72MHz and a 216MHz system in place. This is not like a wireless mic diversity receiver system that requires two physically separated antennas.

Also look to see what cable is connected between the transmitter and the antenna. The cable and connectors should match the impedance specified by the ALS transmitter manufacturer (50 Ohms or 75 Ohms), and, depending on how long the cable run is, be the appropriate size (RG-58/59 small diameter for short distances, or RG-6/8 large diameter for longer cable runs). Sadly, some contractors just grab whatever is lying around and don't check to see if it is the recommended type of cable for the installation conditions. Kinks and pinches in the coax type cables also can disrupt the signal flow to the antenna.

Antennas for Hearing Loop ALS

ALS Loops are not as simple as their name implies. Just like FM transmitter antenna patterns, the geography / topology of the transmitter loop must be engineered to minimize unwanted nulls (dead-spots), uniform B-field strength, and to minimize interaction with other nearby systems. There are many ways to conceal the antennal wire loop so it is not architecturally distracting or a foot traffic tripping hazard. If it is not practical to get the loop wire installed in a plastic conduit embedded in a concrete floor slab as it is poured, then there are other options that work well:

If the building is older and has a wooden floor and substructure, it may be possible to install the loop wire from the underside if the floor (crawl-space, or ceiling void of a basement).

Under floor tiles or carpet you can use a flattened wire like that made by Taperwire (www.taperwire.com).

The loop wire does not have to be run in the floor:

- Embedding the loop in the wall is also an option. Flat type wire can also be run behind wall trim moldings like base coves, and wainscot trim.
- PVC conduit wire loops can also be run across ceilings (below them if across exposed structure, or above them if plenum-rated materials are utilized). If a ceiling is sheetrock (drywall), then Taperwire can be taped and bedded onto the surface and painted-over (be sure to avoid long runs that are parallel to metal studs or channels that support the ceiling).

**Planning for Success**

Other considerations are to determine where throughout the facility / campus the assistive listening systems are to be installed. The ADA requires these systems in performance venues of any seating capacity, so lecture halls, gymnasiums, cafetoriums, gymatoriums, theatres, and auditoriums all fall in this category. Based on the current ADA standard, classrooms now require them if there are audio systems present, therefore, since an AV system is a very common component in most modern classrooms and convention center meeting spaces, the inclusion of an assistive listening system in the AV layout and design of these spaces should always be considered.

Outdoor venues like soccer fields, football fields, baseball fields, and amphitheatres also require assistive listening systems. These present a bigger challenge as they are much larger spaces and they are typically inherently outdoors and used under full daylight. IR type systems do not work in full sunlight as the sun emits IR energy that is much stronger than the assistive listening system emitter panels can produce. These venues can only use an RF based (FM or Induction Loop) transmitter system. Just as with the adjacent classrooms, adjacent outdoor venues must be designed to operate on different channels.

In facilities where multi-lingual events occur, a multi-channel IR or FM Assistive Listening System can be utilized and interpreters can relay the program to the foreign language listeners.

The retrofitting of an entire campus or school district with a quality Assistive Listening System can be a complex project that will require careful integration of the equipment with the existing systems. Each room will undoubtedly have unique issues with the proper placement of equipment, storage and charging facilities, and in the case of RF based systems – frequency coordination.

The training of staff regarding the proper use and maintenance of the equipment should be a part of the project specifications. A professional independent AV Consultant can provide an objective systems design and product specification that can be equitably bid and installed by the successful contractor, and can provide project administration that will assure the venue that their funds are responsibly applied.