

## 1.0 **GENERAL**

### 1.1 **Related UBC Guidelines**

- .1 [UBC Learning Space Design Guidelines](#)

## 2.0 **MATERIALS AND DESIGN REQUIREMENTS**

### 2.1 **Design Criteria**

- .1 A listen assist system shall be installed in teaching spaces of 100 net square meters (NSM) or greater or as required by the BC Building Code, whichever has the more stringent requirements. The coverage shall achieve 100% of the seating area. Where 100% coverage cannot be achieved, UBC IT Audio Visual shall be consulted to determine an approved solution.
- .2 *LAN*, Induction loop or *Radio Frequency (RF)* listen assist solutions are acceptable options with preference for *LAN and RF*. Induction loops require appropriate infrastructure and adequate spacing between spaces requiring listen assist technology.
- .3 Where multiple classrooms are served by one set of receivers, the minimum receiver count should be based on 5% of the largest classroom seat count.

### 2.2 **Listening Assistance Equipment and Materials**

#### .1 **Induction Loop Listen Assist Systems**

- .1 UBC will observe the British standard for induction loop systems (BS EN 60118-4). An install checklist conforming to BS EN 60118-4 will be completed for each system and included as part of any AV system commissioning and closeout documentation package (see appendix A).
- .2 Induction loop amplifier size will be dependent on coverage area. Induction loop amplifiers shall be UL 60065 listed.
- .3 Induction loop wire gauge is dependent on coverage area. Installations shall use single core tri rated cable. On-floor installations may use flat ribbon cable. Ribbon cables must be installed under final floor surface (carpet/linoleum)
- .4 Metal conduits cannot be used to enclose induction loop cables. Plastic conduits are acceptable for in-ceiling install applications.
- .5 Plastic in-concrete conduits can be used in concrete flooring applications. Imbedded plastic listen assist conduits are to be laid in concrete above any rebar. Imbedded plastic listen assist conduits should not be deeper than 3" from the concrete surface.
- .6 Compatible induction loop receivers will be procured as part of any new induction loop system install.
- .7 Induction loop amplifiers will require a mic or line level audio mix with all local, remote, and program feeds. The audio feed will require appropriate compressors and limiters to prevent excessive signal level fluctuations.

- .8 Induction Loop Receivers
  - .1 Induction loop receivers will have an on/off switch.
  - .2 Induction loop receivers will have volume adjustment control.
  - .3 Induction loop receivers will include a 3.5mm headphone jack.
- .9 Approved manufacturer is SigNET.

## **.2 RF-Based Listen Assist Systems**

.1 *UBC utilizes two types of RF-based listen assist systems: 72 MHz and 2.4 GHz.*

### **.2 72 MHz Listen Assist Systems**

#### **.1 72 MHz FM Transmitter**

- .1 The FM transmitters will operate in the designated FM listening assistance band of 72 MHz.
- .2 The transmitters will have selectable broadcast frequencies in the 72 MHz band allowing 16 operating channels to be selected. These frequencies will be on industry standard centres so that any brand of FM listening assistance receiver could be used on any system.
- .3 The transmitters should have both line and microphone levels inputs, and the input should have an integral audio compressor with peak stop limiter to prevent high peak levels.
- .4 The transmitters should be rack mounted with the AV equipment and the antenna should be mounted outside the rack, extended using 50 Ohm coaxial cable.
- .5 Where multiple classrooms are grouped in a single building, each room should have a dedicated transmitter with a visually conspicuous decal indicating the transmitting channel.
- .6 Approved manufacturer is Listen Technologies.

#### **.2 72 MHz FM Receiver**

- .1 The FM receiver will operate in the 72 MHz FM band.
- .2 The receiver will have selectable channels amongst the 16 available, with a visual display to indicate channel selected.
- .3 The receiver will have an easily accessible volume control and a 3.5mm headphone connector.
- .4 The receiver will be equipped with rechargeable batteries.
- .5 Each receiver should be supplied with a walkman type circumaural headphone, with 10 extra ear cushion sets for each receiver.

- .6 Each receiver should be supplied with an induction neck loop.
- .7 Where there are multiple classrooms equipped with listening assist systems in a single building, one set of receivers may be used for the group of classrooms.
- .8 Approved manufacturer is Listen Technologies
- .3 FM Receiver Battery Charger /Case
  - .1 Each listening assistance system FM receiver set should have a combination carrying/storage case and battery charger.
  - .2 Each charger should be able to charge all the available receivers simultaneously.
  - .3 Approved manufacturer is Listen Technologies
- .3 **2.4 GHz Listen Assist Systems**
  - .1 **2.4 GHz FM Transmitter**
    - .1 *The transmitter shall operate in the band of 2.402 – 2.480 GHz.*
    - .2 *The transmitter shall support an audio bandwidth of 100 Hz – 7200 Hz.*
    - .3 *The transmitter shall be mounted near the entry door to allow users to pair their receiver to the transmitter upon entering the space.*
    - .4 *The transmitter shall have a balanced line level XLR input as its primary signal input.*
    - .5 *The transmitter shall have minimum of two (2) year warranty.*
    - .6 *Laminated pairing instruction sheet shall be placed on the wall near the transmitter.*
    - .7 *Approved manufacturer is Phonak Roger Base Station.*
  - .2 **2.4 GHz Receiver**
    - .1 *The receiver shall operate in the band of 2.402 – 2.480 GHz.*
    - .2 *The receiver shall provide USB port for connection to third party devices and charging.*
    - .3 *The receiver shall include lanyards that can provide t-coil induction loop.*
    - .4 *The receiver shall pair transmitter upon button press at transmitter.*
    - .5 *Approved manufacturer is Phonak Roger Neck Loop.*

.4 **LAN Based Listen Assist Systems**

.1 *LAN Transmitter*

- .1 *The transmitter shall have latency no greater than 60 ms.*
- .2 *The transmitter shall have an audio frequency response of 40Hz – 20KHz.*
- .3 *The transmitter shall have a balanced XLR input.*
- .4 *The transmitter shall have a Dante input.*
- .5 *The transmitter shall support PoE power or 110V wall power.*
- .6 *The transmitter shall be able to broadcast audio signal over building network and Wi-Fi infrastructure.*
- .7 *The transmitter shall be able to support up to 100 client per devices.*
- .8 *Approved manufacturer is Sennheiser MobileConnect Station.*

.2 *LAN Receiver*

- .1 *The receiver is a mobile device such as Android or iPhone phones.*
- .2 *The receiver application shall be compatible on Android and iOS.*
- .3 *The receiver shall be able to pair with the transmitter by pin code or QR code.*

**3.0 EXECUTION**

**3.1 Induction Loop Listen Assist Systems**

**.1 Wiring**

- .1 All audio circuits, unless otherwise specified, shall be balanced, floating and shielded two wire circuits with the red or white wire hot (connected to pin 2 of XLR3 connectors and to the Tip of phone connectors) and the black wire cold (connected to pin 3 of XLR3 connectors and to the Ring of phone connectors).
- .2 Install ribbon cables (if used) flat on floor and tape with floor tape. Turns will be facilitated by folding the ribbon cable once at the angle required to achieve the turn (eg: 90 degree turn is a single fold of 45 degrees).
- .3 Loop wire must be twisted together for at least 1' prior to being connected to the induction loop amp. Twisted portion of loop wire will be soldered to ribbon cables as required for floor installs. Twisted portion of induction loop wire shall not exceed 30'.

## **.2 Grounding and Shielding**

- .1 Isolate the shields of all shielded cables from both the conduit system and any other shielded cables. Provide continuous shield from source to input point, with shields lifted at the source and grounded at the input point. Properly serve all unconnected shielding. Pin 1 on XLR type connectors must not be connected to the connector barrel or shell.

## **.3 Testing**

- .1 System testing will be conducted with a Fosmeter Pro (FPRO):
  - .1 If the integrator does not own a Fosmeter Pro, one will be purchased by the integrator at no cost to the owner.
  - .2 Results will be recorded in the BS EN 60118-4 compliance checklist.
  - .3 Results will be within required parameters to meet BS EN 60118-4 compliance.
  - .4 An inductive loop receiver will also be used to validate acoustical performance of induction loop system
  - .5 Limiters and or compressors will be tuned during commissioning to prevent amp cutoff triggering when audio signals fluctuate from normal levels.

## **3.2 RF-Based Listen Assist Systems**

### **.1 Wiring**

- .1 All audio circuits, unless otherwise specified, shall be balanced, floating and shielded two wire circuits with the red or white wire hot (connected to pin 2 of XLR3 connectors and to the Tip of phone connectors) and the black wire cold (connected to pin 3 of XLR3 connectors and to the Ring of phone connectors).
- .2 Install coax cable in a manner that will prevent sharp bends or kinks. Use right angle coax connectors where necessary to prevent cable kinking in shallow electrical boxes.

### **.2 Grounding and Shielding**

- .1 Isolate the shields of all shielded cables from both the conduit system and any other shielded cables. Provide continuous shield from source to input point, with shields lifted at the source and grounded at the input point. Properly serve all unconnected shielding. Pin 1 on XLR type connectors must not be connected to the connector barrel or shell.

### **.3 Testing**

- .1 Conduct tests to demonstrate that the Listening Assistance system is properly functional:
  - .1 With speech program at nominal levels in the room, verify that the transmitter is able to function without clipping or overload.

- .2 Ensure that the receivers are able to receive the signal at all seats in the room. Adjust the transmitter antenna if necessary to ensure complete coverage.
- .3 Ensure that the receiver signal in the headphones is free of audible distortion with the speech test signal.

Appendix A

<b>Test Certificate for AFILS in accordance with BS EN 60118-4</b>		
This test certificate is used to log the results detailed in the Fosmeter Pro (FPRO) Instruction (Doc. No. DCM0004006).		
Tested to BS EN 60118-4 at any point within the useable volume.		
1	Background Noise Acceptable: <-42 to <-22 dB L	Is background noise acceptable? Yes <input type="checkbox"/> No <input type="checkbox"/> If No _____ dB L
1	System Noise Acceptable: <-42 to <-22 dB L	Is system noise acceptable? Yes <input type="checkbox"/> No <input type="checkbox"/> If No _____ dB L
2	Magnetic Field Strength using a pulsed 1 kHz signal Acceptable: 400 mA/m (0 dB L)	Is field strength acceptable? Yes <input type="checkbox"/> No <input type="checkbox"/> If No _____ dB L
3	Frequency Response Acceptable: signal @ 1 kHz +/-3 dB L, 100 Hz to 5 kHz	Is frequency response acceptable? Yes <input type="checkbox"/> No <input type="checkbox"/> If No _____ dB L
Was a metal compensation test performed? Yes <input type="checkbox"/> No <input type="checkbox"/>		
Was an overspill test performed? Yes <input type="checkbox"/> No <input type="checkbox"/>		
Was a subjective audio test performed? Yes <input type="checkbox"/> No <input type="checkbox"/>		
Please note, a plan showing the loop location is required by BS EN 60118-4. Attach a plan to this document (this can be a building drawing or a simple sketch).		
Customer: _____		Site/Location: _____
Install Company: _____		Installer: _____
Equipment Used: _____		Serial Nos.: _____
Installer Comments:		
The system has been tested in accordance with BS EN 60118-4.		
Signed: _____		Date: _____

\*\*\*END OF SECTION\*\*\*