

## **FM+ Assistive Listening System**

- A. Furnish and install a dual FM and WiFi wireless assistive listening system for use by the hearing impaired. The assistive listening system (ALS) shall be capable of broadcasting via RF on 17 wideband channels to an unlimited number of users or via WiFi to up to 45 users in unicast mode. A WiFi multicast mode option must also be available for larger numbers of users with broadcast capability limited only by network capacity.

### A1. Transmitter

The transmitter unit shall provide a combined 3-pin XLR / TRS audio input that allows for connection to either a balanced or unbalanced line level analog audio source or a balanced or unbalanced microphone with selectable phantom power. The unit shall be offered with an optional Dante audio input. The unit shall provide an unbalanced phono headset jack for monitoring program audio. The unit shall provide a web control interface that allows users to configure and manage the unit including channel naming and channel security controls. The unit shall employ a DSP (Digital Sound Processor) with an adjustable +24 to -60 dB audio input gain in 1dB increments, automatic gain control, audio signal limiters, high and low pass filtering, and an adjustable-range audio compressor control in order to optimize hearing assistance for hearing loss, music for high-fidelity playback, and voice for maximum speech intelligibility through custom presets. The unit shall employ a ADC (analog to digital converter) that provides a 16-bit, 48 kHz digital stream. The unit shall have a signal-to-noise ratio of 64dB or greater and shall have an audio frequency response of 31 Hz - 16 kHz,  $\pm 3$  dB and shall have a THD (total harmonic distortion) of less than 0.25% @ 1 kHz. The unit shall incorporate front panel buttons to control the unit via menus on a built-in OLED display, an audio input level indicator, and input overload indication.

#### a) Transmitter FM Operating Mode

The unit shall provide a screw-on antenna with a transmission range of up to 1,000 ft (304 m). The unit shall have the option of using a remote antenna instead for better coverage depending on the installation environment. The unit shall be capable of broadcasting on 17 wideband channels using a 72.1 MHz to 75.9 MHz frequency band and shall be frequency agile. The frequency accuracy shall be  $\pm 2$  ppm stability with a deviation of  $\pm 75$  kHz maximum.

#### b) Transmitter WiFi Operating Mode

The unit shall provide a 10/100 Base-T IEEE 802.3 compliant Ethernet port to stream audio to the network and broadcast audio over an existing or new WiFi wireless network.

### A2. Receivers

Dedicated FM multi-channel or FM single-channel or WiFi receivers shall be available to comply with legal assistive listening requirements. The devices shall employ a DSP to reduce background noise. The devices shall have the option of connecting a neck loop that sends optimized audio signals directly to hearing aids and cochlear implants equipped with telecoils. When connected to the dedicated FM or WiFi receiver the neck loop shall have a magnetic field strength of 1.7 A/m (25 mW input @ 1000 Hz) 6" above the center of the loop.

#### a) FM 8-channel receiver

The device shall incorporate a channel seek button in the battery compartment with an operating frequency range between 72.1 MHz and 75.9 MHz. The device's audio frequency response shall be 200 Hz to 15 kHz ( $\pm 3$  dB) and the signal to noise ratio shall be 65dB or greater. The receiver sensitivity shall be 2 $\mu$ V or better at 12dB Sinad with squelch defeated. The device shall accept up to  $\pm 75$  kHz FM deviation and have a 75  $\mu$  s de-emphasis time constant. The device shall operate up to 50 hours with two disposable AA Alkaline batteries and up to 32 hours with two AA NiMH

rechargeable batteries and shall have a battery-saving sleep mode. The device shall be compatible with a multi-slot charger. The device shall include a detachable belt-clip for hands-free operation.

b) FM 17-channel receiver

The device shall incorporate a channel seek button in the battery compartment with an operating frequency range between 72.1 MHz and 75.9 MHz and shall have a channel lock capability to prevent accidental channel change. The device's audio frequency response shall be 200 Hz to 15 kHz ( $\pm 3$  dB) and the signal to noise ratio shall be 65dB or greater. The receiver sensitivity shall be 2 $\mu$ V or better at 12dB Sinad with squelch defeated. The device shall accept up to  $\pm 75$ kHz FM deviation and have a 75  $\mu$  s de-emphasis time constant. The device shall operate up to 50 hours with two disposable AA Alkaline batteries and up to 32 hours with two AA NiMH rechargeable batteries and shall have a battery-saving sleep mode. The device shall be compatible with a multi-slot charger. The device shall include a detachable belt-clip for hands-free operation.

c) FM 17-channel receiver with digital display

The device shall have a selectable operating frequency range between 72.1 MHz and 75.9 MHz. The device shall have control buttons and a corresponding full color OLED display to configure the device and choose a channel from a list of active channels and lock the settings to prevent accidental change of settings. The control buttons allow users to control and mute the volume. The OLED display indicates battery status, channel and signal strength. The device's audio frequency response shall be 200 Hz to 15 kHz ( $\pm 3$  dB) and the signal to noise ratio shall be 65dB or greater. The receiver sensitivity shall be 2 $\mu$ V or better at 12dB Sinad with squelch defeated. The device shall accept up to  $\pm 75$ kHz FM deviation and have a 75  $\mu$  s de-emphasis time constant. The device shall operate up to 50 hours with two disposable AA Alkaline batteries and up to 32 hours with two AA NiMH rechargeable batteries and shall have a battery-saving sleep mode. The device shall be compatible with a multi-slot charger. The device shall include a detachable belt-clip for hands-free operation.

d) WiFi receiver

The device shall incorporate a setup button for configuration and shall incorporate a channel button that displays a list of available channels. The device shall have a multi-functional full color LCD touch display that allows users to choose a channel from a list of active channels, control and mute the volume and indicates battery status, channel and WiFi connection status. The device's audio frequency response shall be 31 Hz - 16 kHz ( $\pm 3$  dB) and the signal-to-noise ratio shall be 67 dB or greater. The device shall have a USB connector used for charging and firmware upgrades. The device shall incorporate automatic battery charging circuitry and use a Lithium-Ion battery. The device shall be compatible with a multi-slot charger. The device shall have a battery life of 6 hours under normal conditions and charge time of two hours. The device shall have the option of being lanyard worn.

e) WiFi-enabled smartphone or tablet

Additionally, a dedicated downloadable iOS or Android WaveCAST app shall be available to allow users to use their WiFi-enabled smartphones or tablets. App will allow users to access available audio channels and adjust or mute volume on their device. The FM+ system shall provide an option to protect audio channels that require a code to join.

Williams AV, LLC products are specified.

B. Furnish and install the following:

1. Williams AV FM+ T55C Dual FM and WiFi Base Transmitter, including ANT 025 39" telescoping FM antenna (Qty: 1ea.)
2. Williams AV FM+ T55C D Dual FM and WiFi Base Transmitter with Dante input, including ANT 025 39" telescoping FM antenna (Qty: 1ea.)
3. Williams AV RPK 005 Rack Mount Kit (Qty: 1ea.)
4. Williams AV ANT 005 Remote coaxial antenna for FM+ T55 Transmitter (Qty: 1ea.)
5. Williams AV ANT 021 Rubber duckie antenna for FM+ T55 Transmitter (Qty: 1ea.)
6. Williams AV ANT 024 Dipole wall-mount antenna for FM+ T55 Transmitter (Qty: 1ea.)
7. Williams AV ANT 028 39" Telescoping FM antenna with swivel connector for FM+ T55 Transmitter (Qty: 1ea.)
8. Williams AV ANT 029 Remote Antenna Kit for FM+ T55 Transmitter. Includes ANT 021 Rubber duckie antenna, F-Connector, coaxial cable and mounting bracket (Qty: 1ea.)
9. Williams AV ANT 034 Remote antenna (RPK 005 mounting) for FM+ T55 Transmitter. Includes ANT 021 Rubber duckie antenna, RF barrel connector and coaxial cable (Qty: 1ea.)
10. Williams AV R37-8 8-channel FM receiver with 2 AA alkaline batteries (Qty: 1ea.)
11. Williams AV R37 17-channel FM receiver with 2 AA alkaline batteries (Qty: 1ea.)
12. Williams AV R38 17-channel FM receiver with digital display and with 2 AA alkaline batteries (Qty: 1ea.)
13. Williams AV BAT 026-2 AA NiMh rechargeable batteries for R37, R37-8 and FM R38 FM receivers (Qty: 2 each or as needed, see note\*)
14. Williams AV CHG 3512 12-Slot Charger for R37, R37-8 and R38 FM Receivers (Qty: 1 each or as needed, see note\*)
15. Williams AV CCS 062 BK Receiver Skin with Lanyard / Wrist Strap (Qty: 1 each or as needed, see note\*)
16. Williams AV CHG 404 WF 4-Slot Charger for WF R1 WiFi Receivers (Qty: 1 each or as needed, see note\*)
17. Williams AV NKL 001 S Neck Loop, 8-16  $\Omega$ , 20-20 kHz, 118 dB @ 1 kHz (Qty: 1 each or as needed, see note\*)
18. Williams AV IDP 008 ADA Wall Plaque (Qty: 1ea.)

\*The Americans with Disabilities Act (ADA) 2010 ADA Standards requires public facilities to provide auditory assistance devices:

<http://www.ada.gov/regs2010/2010ADASTandards/2010ADASTandards.pdf> (Section 706: Assistive Listening Systems)

Summary of the Americans with Disabilities Act (ADA): <https://williamsav.com/wp-content/uploads/2020/05/ADASummary2018.pdf>

Summary of Global Disability Legislation: [https://williamsav.com/wp-content/uploads/2021/02/Global\\_summary\\_of\\_disability\\_21.pdf](https://williamsav.com/wp-content/uploads/2021/02/Global_summary_of_disability_21.pdf)

**ADA Table 219.3 & IBC Table 1108.2.7.1 Receivers for Assistive Listening Systems**

<b>Capacity of Seating in Assembly Area</b>	<b>Minimum Number of Required Receivers</b>	<b>Minimum Number of Required Receivers Required to be Hearing-aid Compatible</b>
50 or less	2	2
51 to 200	2, plus 1 per 25 seats over 50 seats <sup>1</sup>	2
201 to 500	2, plus 1 per 25 seats over 50 seats <sup>1</sup>	1 per 4 receivers <sup>1</sup>
501 to 1000	20, plus 1 per 33 seats over 500 seats <sup>1</sup>	1 per 4 receivers <sup>1</sup>
1001 to 2000	35, plus 1 per 50 seats over 1000 seats <sup>1</sup>	1 per 4 receivers <sup>1</sup>
2001 and over	55 plus 1 per 100 seats over 2000 seats <sup>1</sup>	1 per 4 receivers <sup>1</sup>
<i>Rules differ in California</i>		<sup>1</sup> or fraction thereof

ADA & IBC Compliance Calculator: <https://williamsav.com/hearing-compliance/>

**Contact Williams AV for a customized quote to accommodate area:**

(952) 943-2252 | [info@williamsav.com](mailto:info@williamsav.com) | [www.williamsav.com](http://www.williamsav.com)

A&E Specs are available in Microsoft Word format. Call Williams AV.