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## ListenIR LT-82 Divisible Room Application

### Overview:

This tech-note covers the technology and setup required to design a wireless assistive listening and/or language interpretation system for multiple divisible rooms. Using the Stationary IR product, LT-82 Transmitter and LA-140 Radiator along with a suite of IR receivers featuring Auto-Seek mode, multiple divisible room applications are possible.

Note: In this application, the number and size of rooms changes on an as-needed basis. Each new room must provide its own wireless listening/language interpretation system regardless of the method chosen.

There are multiple methods that can be used to accomplish a complete and functioning system within divisible rooms. Here is a quick list of those methods to help determine which method will be the best to support a specific application:

### Single Channel Methods:

**Method 1 – Receiver Auto-Seek Feature** – a simple method of allowing the receiver to change channels automatically as it moves room to room. This method is used in smaller spaces and/or divisible room applications that contain 1-4 rooms.

**Method 2 – Control System** – This method uses an RF Switcher/Distribution Amplifier control system to control the route of the RF signals from the LT-82 IR transmitters to each room. This method is more often used when there are more than 4 rooms and/or have many LA-140 radiators that need to be controlled

### Multiple Channel Method:

**Method 3 – Control System w/ Multiple Channels** – This method is similar to method 2 except that multiple transmission channels are required for each additional audio signal and/or the addition of a language interpretation system.

### Single Channel Methods:

#### Method 1: Receiver Auto-Seek

This method uses the auto-seek function within the LR-4200-IR receiver to find the channel in any given room. Which allows the user to walk freely into any space and pick up the proper signal without having to physically change the channel on the receiver.

Example: When the LR-4200-IR receiver enters Room A it auto-tunes to Channel 1, when it leaves the room it squelches (mutes). When the LR-4200-IR receiver enters Room B it auto-tunes to Channel 2, etc.

There are four components needed to support this method, which are the following:

- LT-82 Stationary IR Transmitter
- LA-140 IR Radiator
- LR-4200-IR iDSP IR Receiver (LR-5200-IR iDSP IR Receiver optional)
- Audio Matrix Mixer

## Listen Equipment Setup:

- LT-82 Setup
  - Each individual room/section must have an independent transmitter, which will be located in the rack or audio cabinet housing all additional audio gear.
  - Each transmitter will be set to channels 1-4 depending on how many rooms (1-4) being supported.
- LA-140 Setup
  - Each individual room/section must have an independent radiator and installed in the appropriate location to provide proper IR coverage of the room.
  - Additional radiators may be required to provide proper IR coverage of the room.
- LR-4200-IR Setup
  - The Auto-Seek feature will be turned on within each LR-4200-IR receiver.
  - To enable the Auto-Seek feature and adjust squelch, the LR-4200-IR must be connected and configured via the iDSP Software Suite. A FREE download is available at <http://www.listentech.com/support/software/>.
  - **NOTE:** For optimal performance, the squelch setting may need to be adjusted. When moving from one room/section to another, the receiver will squelch and then quickly auto-tune to the next strongest signal. If the noise level becomes higher than desired during this transition, you will need to increase the squelch. If audio drops out during this transition, the squelch setting may be set too high and needs to be lowered.

Diagram 1 below shows how to implement this method in a four-way divisible room for ONE channel.

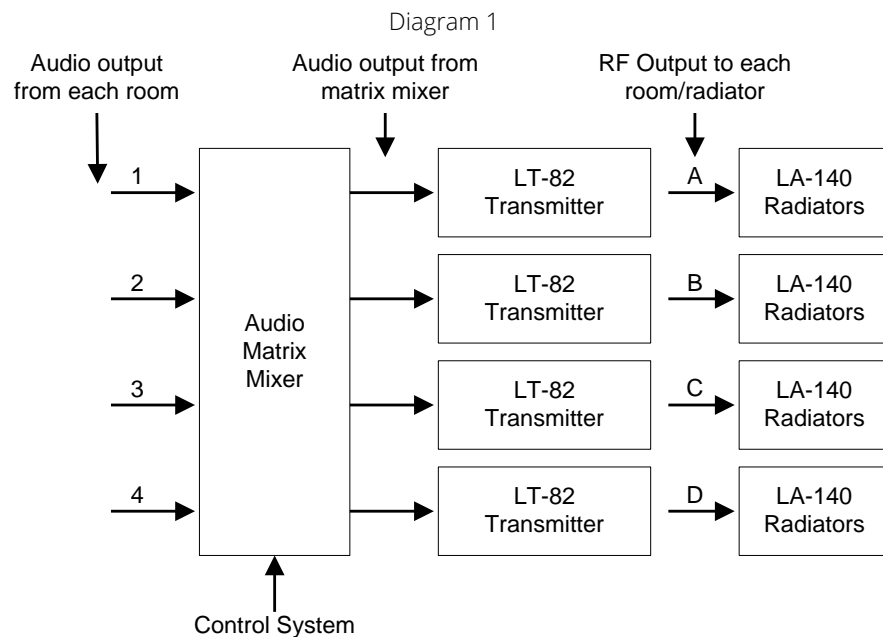


Diagram 2 below shows a four-way divisible room. In this configuration, the dividers are closed, forming four individual rooms. Each LT-82 for Rooms A, B, C and D operates independently and is set to a different IR channel.

Diagram 2

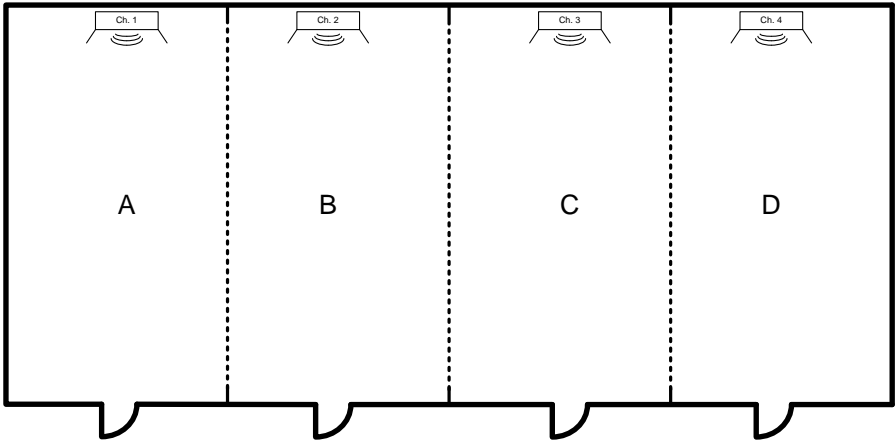
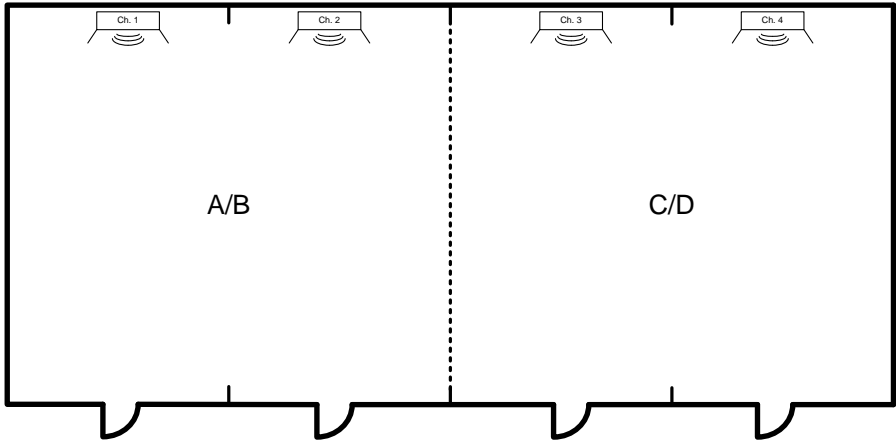


Diagram 3 below shows a combined room scenario. In this configuration, the dividers between rooms A/B and C/D are opened forming 2 larger rooms. The receiver auto-tunes to the strongest signal within the space.

Diagram 3



**Method 2: Control System**

This method uses an RF Switcher/Distribution Amplifier control system to control the route of the RF carriers from the LT-82's to each room. The LR-4200-IR receivers are simply set to channel 1, allowing users to walk freely into any space and pick up the proper signal without having to physically change the channel on the receiver.

NOTE: This method is more often used when there are more than 4 rooms and/or have many LA-140 radiators that need to be controlled.

There are five components needed to support this method, which are the following: (see diagram 4):

- LT-82 Stationary IR Transmitter
- LA-140 IR Radiator
- LR-4200-IR iDSP IR Receiver (LR-5200-IR iDSP IR Receiver optional)
- Audio Matrix Mixer
- RF Switcher/Distribution Amplifier

## Listen Equipment Setup:

- LT-82 Setup
  - Each individual room/section must have an independent transmitter, which will be located in the rack or audio cabinet housing all additional audio gear.
  - Each transmitter will be set to channel 1.
- LA-140 Setup
  - The compatibility switch (SW2) on the radiator must be turned On.
  - Each individual room/section must have an independent radiator and installed in the appropriate location to provide proper IR coverage of the room.
  - Additional radiators may be required to provide proper IR coverage of the room.
- LR-4200-IR Setup
  - The LR-4200-IR receivers will be set to channel 1 and will receive the appropriate audio within each room.

## Here's how this method works:

1. Each room has its own audio system i.e. wireless microphones, computer audio, etc., which is then provided to a DSP type audio matrix mixer. The audio matrix mixer is then managed by a control system (such as AMX or Crestron) which controls the audio flow from each room to the input of the LT-82 transmitters.
2. A single audio output is delivered to the input of each LT-82 transmitter. The transmitter modulates the signal and creates an RF signal on a frequency between 2 - 4MHz. This signal is then delivered to the RF Switcher/Distribution Amplifier.
3. The RF Switcher/Distribution Amplifier is required because it has sufficient bandwidth to pass the RF signal. The RF Switcher/Distribution Amplifier routes RF carriers to the radiator zones (multiple radiators) and is controlled by a separate control system such as AMX or Crestron.
4. In this method, all transmitters and receivers are set to channel 1. Users of the system simply use the same receiver (without having to tune the channel) for any room configuration.

Diagram 4 below shows how to implement this method in a four-way divisible room for ONE channel.

Diagram 4

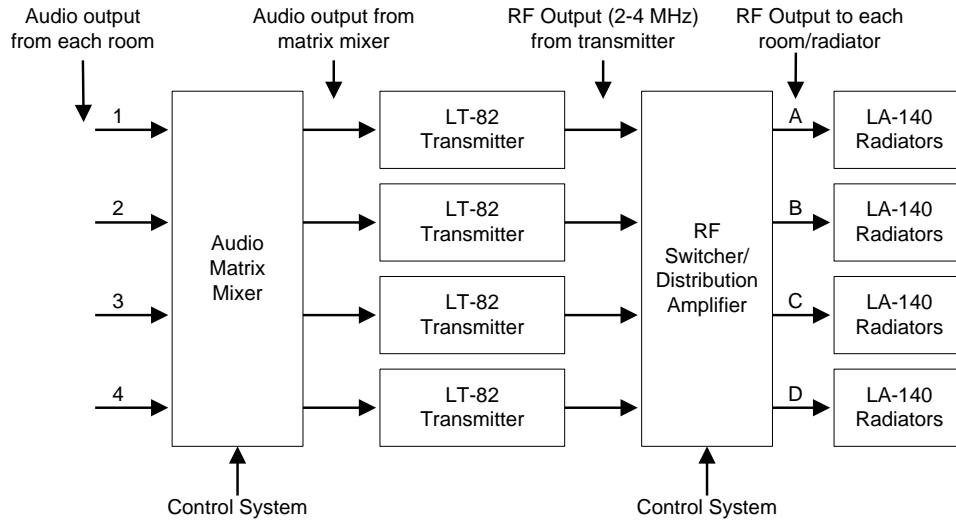
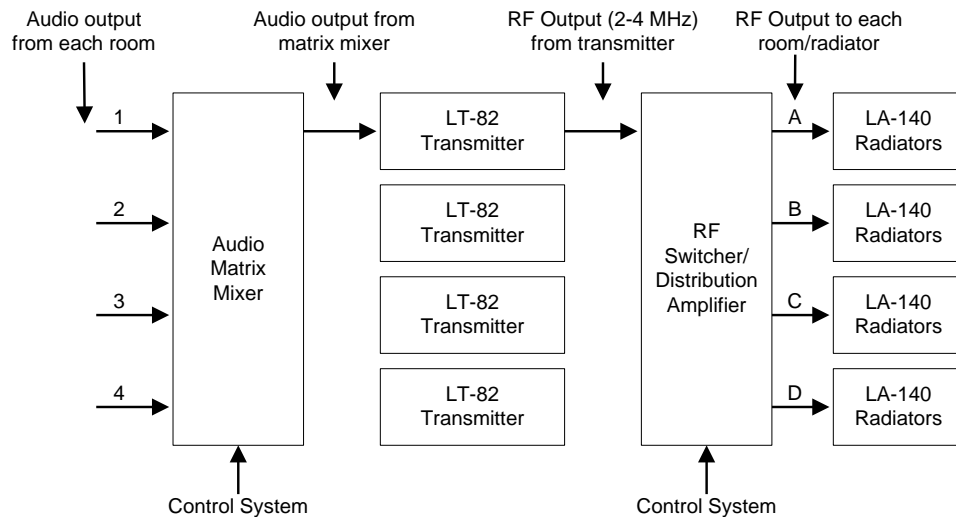


Diagram 5 below shows an All Rooms Combined scenario with one channel. In this scenario, the control signal tells the matrix mixer to combine all four audio mixers into one audio source. This audio source is delivered to output 1 and to transmitter 1 only. Transmitters 2-4 are not used. The control signal then tells the RF Switcher/Distribution Amplifier to take the RF input from transmitter 1 and distribute to the radiators in all rooms.

Diagram 5



## Multi-Channel Method:

## Method 3: Control System w/ Multiple Channels

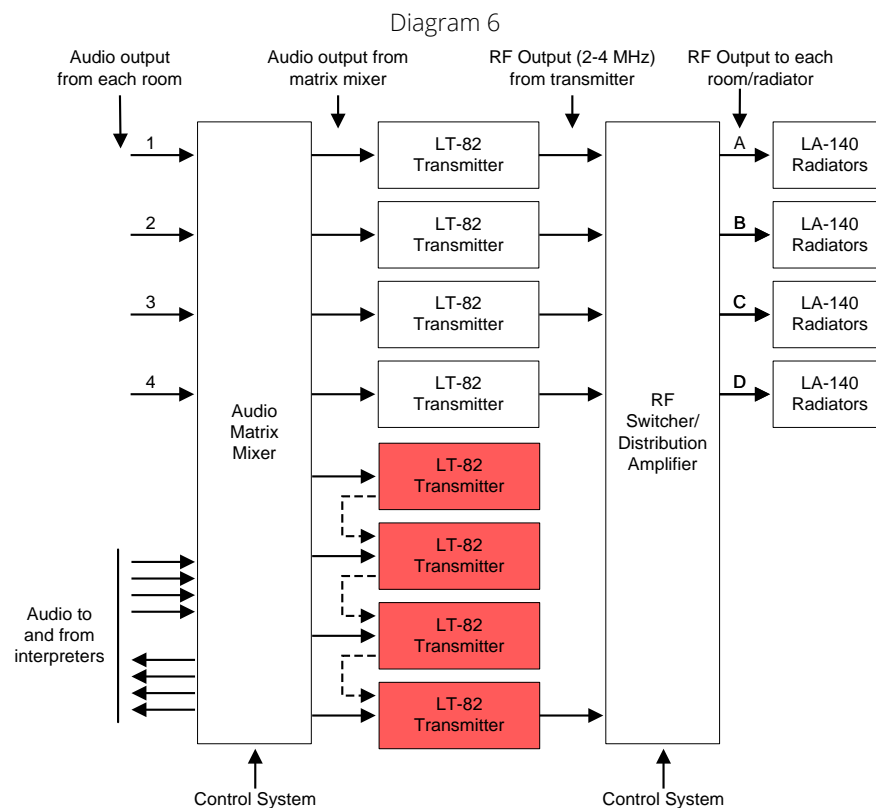
It is probable that some or all of the rooms you are designing will require both assistive listening and language interpretation. The addition of language interpretation is straightforward and adds great value to the venue for end users that speak different languages.

This method is similar to a single channel system (method 2) except that multiple transmission channels are required for each additional audio signal and/or interpreted language.

There are five components needed to support this method, which are the following:

- LT-82 Stationary IR Transmitter
- LA-140 IR Radiator
- LR-4200-IR iDSP IR Receiver (LR-5200-IR iDSP IR Receiver optional)
- Audio Matrix Mixer
- RF Switcher/Distribution Amplifier

Diagram 6 below shows four LT-82 transmitters that are daisy chained together to create a four-channel language interpretation system. The output of the last one is routed to the RF switcher/distribution amplifier. This RF signal carries four IR channels in ONE RF signal. The RF switcher/distribution amplifier routes this signal to the appropriate room(s). To use additional interpretation systems, add additional daisy chained transmitters to the system.



## Overall Design Considerations

When designing such rooms, you will need to keep the following in mind:

1. Delay. The coaxial cable used to route the RF signal from the transmitter to the RF switcher/distribution amplifier and to the radiators causes delay in the RF signal. This delay can cause the IR signals to be out of phase creating drop out zones in the rooms. Therefore, you will need to time align the entire system to ensure all radiators receive the RF signal at exactly the same time. All of the delay calculations must be determined by looking at the system as if it were one large room and all of the walls are removed.
  - a. For setting the delay on the LA-140 IR Radiators, Refer to the delay compensation instructions available in the Stationary IR System Design Guide. The [Stationary IR Design Guide](#) is available on the Listen website.
2. Radiator Coverage. It is important to ensure that the system be designed so that the radiators cover the space adequately. Keep in mind that as the number of channels doubles, the coverage halves. Thus, if you're doing a multiple channel system, you'll need additional radiators.

Should you have additional questions or require further assistance, please contact Listen Technologies at [support@listentech.com](mailto:support@listentech.com) or by calling 1-800-330-0890.