

### **Introduction to Audioplex Infrared Repeating Systems:**

Most remote controls today use infrared light to send a signal from the remote to the device being controlled. Infrared is a form of light which has a longer wavelength than ordinary visible light; it is basically a “color” that the human eye cannot see. It pretty much has the same properties as visible light: it generally passes through transparent surfaces, is blocked by opaque surfaces, and can be reflected. Most sources of visible light give off infrared as well.

The simplest way to understand what a repeating system does is – IRTargets take an infrared light signal from a remote, translate it into an electrical signal, pushes it down a length of CAT-5 wire, then the electrical signal is translated back into infrared light by the emitters.

***When a signal is sent from a remote, it is given several properties to distinguish it from other signals:***

- The signal is infrared. The receiver will ignore signals of other wavelengths or “colors”.
- The signal is modulated. This means that it is rapidly switched on and off, typically at 40,000 times per second (40 kHz). The receiver is tuned to only respond to its particular frequency.
- The signal is digitally encoded. This is similar to sending dots and dashes with a telegraph key, but MUCH faster. The receiving equipment is designed to recognize a specific range of codes, each code within that range corresponding to a function such as power, volume up, etc.

Each piece of equipment has its own frequency and codes, so that a cable box remote will not affect a DVD player, etc. Universal remotes either have a library of codes built in, or can learn codes from another remote.

### **Basic Reason for Audioplex Technology’s IR Repeater Design:**

We use a technology that we call “narrow banding” which electronically filters out the interfering noise (light) and allows only the desired IR signals through. What does the user gain by this?? High sensitivity, which allows the sensors to be concealed out of sight. And out of sight is the way that most customers want their infrared repeating system. Narrow banding also gets you usability even in the harshest conditions, like outdoors, in direct sunlight, or mounted directly on the frame of a plasma/lcd television.

**The Two Main Reasons for Using an IR Repeating System:**

- 1.) ***Sharing equipment*** – These days, consumers pick one location to stack their A/V equipment and run their signals throughout the house, whether it be audio or video. IR repeating is used so that the equipment in the living room could be used and controlled in a bedroom, for example. IR repeating is now mostly used to control whole-house audio, so that a Receiver/Tuner/CD player can be operated from anywhere in the house.
- 2.) ***Hiding Equipment*** – It used to be that you put your cable box, DVD player, and satellite receiver on top of your CRT television. With the advent of plasma, front projection screens, and LCD displays, TV’s don’t have a whole lot of space to put things on top of. More and more users are putting all this equipment in a closet or cellar, and controlling it using a universal remote and IR repeating system. The result is a much less cluttered look: just a “picturesque” screen on the wall and a remote on the coffee table.

**Parts Needed for an IR Repeating System:**

- 1.) ***IR Target (sensor)*** – The IR Target, or IR Sensor, is the piece of equipment that is placed in the remote location where the user wants to control the equipment from. IR Targets take many forms: in-wall targets, in-ceiling

targets, table top targets, speaker-mounted targets, outdoor targets. Even very stealthy targets.

2.) ***Power Supply and Connection Block*** –

- a. *Hardwired Systems* - From these IR Targets, in a very simply IR repeating system, three wires are used (power, ground, and signal) and are “homerun” into a termination block generally located near the A/V equipment being controlled (IR-TB, available in a HW PKG). The wonderful thing about Audioplex IR systems are that we are able to hardwire emitters directly to the outputs of our targets, unlike other companies which require an expensive connection block. Instead of the termination block, other forms of connection may be used, such as wire nuts or crimp terminals. Multiple targets and emitters may be connected in parallel. The required power supply is a 12VDC, 500 mA supply and it is “pigtailed” as well as the emitters to make it easy to screw the wires to the IR-TB. Generally, a hardwired system is prescribed to a “price conscious” customer. The ups are that it is inexpensive and can be easily expanded by buying more emitters and hardwiring them in parallel. The downs are the fact that you have to wire everything yourself.
- b. *Plug-in Systems* – The IRB-4 and the IRStation is simply a termination point, ideally located near the A/V equipment stack, for the “homerun” wires from each of the IR Targets. Targets are connected to screw terminals and the emitters and power supply are simply plugged in. Audioplex recommends CAT-5 wire (does not need to be shielded) because –
  - i. *CAT-5 wire is commonly stocked wire*
  - ii. *If you are going to pull wire, you should only have to do it once*  
– think future proofing.

- iii. *If one of the conductors is damaged while pulling it through the walls then there are plenty of extra conductors you can use instead*
- iv. *Double up on conductors for long wire runs more than 500 ft.*

3.) **Emitters** – Emitters are the actual “repeaters” of the commands the remote control has issued. There are several different types of emitters to assist in the installation of such a system and they are all available in hardwired or plug-in versions:

- a. *IRBug* – Your typical run-of-the-mill emitter meant to be stuck directly on the sensor of your A/V equipment
- b. *IRFlood* – High-powered emitters and are usually placed off to the side, above, or below A/V equipment and “flood” a number of pieces of equipment with the repeated IR commands. In most cases, an IRFlood placed 2-12 feet in front of a rack of gear, will control it.
- c. *IRBug Adjustable* – Same as the original IRBug except for an added control to adjust the output strength, or “brightness”, used for certain units where signal strength is critical (typically cable boxes and satellite receivers). These are helpful for troubleshooting. If 5 out of the 6 pieces of A/V gear are being controlled correctly through the repeating system, there is a pretty good chance that the 6<sup>th</sup> piece is fussy about signal strength. This can also be mimicked by moving a non-adjustable emitter around on the front face of the piece of equipment that is not working correctly...the IRBug Adjustable just makes it a lot simpler.
- d. *IRBug LO (Low Output)* – This emitter has a darkened front shell and does not emit IR out the curved, front side of the emitter, used for isolated control of identical units. Most emitters have the tendency to spread IR signals beyond the intended target into the surrounding room, which in many cases is acceptable and in some cases desirable. Unfortunately, when a target can “see” an emitter, it will think that you pressed another button on the remote. This process will continue until

the system is permanently stuck on, unless you keep the emitter light from getting back to the target, which is where the low emission emitters come in. Otherwise, a whole lot of electrical tape works as well.

- e. *TB-HD, TB-T* – These are high-powered emitters that are built into either a wallplate (TB-HD) or a chassis (TB-T).
- f. *MM18* – A mono to mono 1/8” plug that can be plugged directly from a connection block into the back of SOME pieces of equipment that are outfitted with an 1/8” jack usually labeled IR IN. This is desirable for the customer that does not want visible emitters stuck on each piece of equipment.
- g. *RC-5 / RC-LGi* – Not actually emitters, but interfaces that can be used in place of IR emitters. The RC-5 can be used to control equipment that are RC-5 (Remote Control 5) based – Marantz, Philips, Denon. Simply look on the back of you’re A/V equipment for an orange RCA jack labeled RC-5 IN and follow the instructions to use the RC-5. The RC-LGi is a similar product designed to work with LG/Zenith plasma televisions.

### **Convenient IR Package Selection:**

- 1.) ***HW PKG*** (HardWired Package) – Includes, in addition to the desired IR Target, a hardwire power supply, one hardwire emitter (IRBug or IRFlood), a simple terminal strip (IR-TB) and 3 IRPrisms. Sell to price conscious customers that might not want to shell out the money for a plug and play connection block. Easily expandable by purchasing more targets and more emitters and wiring them in parallel to the existing ones.
- 2.) ***IRB-4 PKG*** – Includes, in addition to the desired IR Target, a plug-in power supply, (4) plug-in emitters, the IRB-4, and (4) IRPrisms. Originally designed to be a one zone connection block with expansion capabilities for anyone’s needs. Hook up to 12 IR Targets and as many as 10 emitters to this small,

versatile, and inexpensive connecting point for an infrared repeating system. Targets aren't the only expansion capabilities that the IRB-4 possesses, you can also add up to 6 extra emitters by utilizing the IRS-1 expansion plug. This would be plugged into the jack labeled EMITTERS (a strong output that can also be used with a plug-in IRFlood). Then you can hardwire on more emitters than were originally intended.

- 3.) **1 ROOM PKG** – Includes, in addition to the desired IRTarget, a plug-in power supply, (6) plug-in IRBugs, the six port IRStation and (6) IRPrisms. This is the biggest package offered and is generally used in large, complex systems with 6 or more targets and 6 or more emitters. The IRB-4 has all of the same capabilities, but the IRStation makes for a cleaner install.

***What are IRPrisms???*** – Some of the problems installers run into when placing IRBugs on the face of A/V gear is the fact that someone or something might eventually pull the emitter off the components. Humidity, kids, and cleaners play a big factor on how long an IRBug is going to stick to the front of gear. Ignoring equipment warranties, some installers go as far as taking apart components and placing the bug inside the unit. With the IRPrism, IRBugs, IRDirects, or high-powered IRFloods can be placed up to a 90 degree angle off the face of the component. The multifaceted lens gathers up the infrared signals from the emitter(s) and focuses them into the unit. The IRPrism also helps with remote control off-axis response in an open cabinet.

### **Specialty Add-Ons:**

- 1.) **IRZ-1** – This connection block is a zonable connection block which allows for up to 6 INDEPENDENT IR control groups. This is helpful if there is identical equipment, such as cable boxes, which need to be controlled independently. The IRZ-1 can be substituted for the IRStation in a 1 ROOM PKG.

- 2.) ***Rack IT IR*** – This is a rack-mounted version of the IRStation connection block. It is one rack unit high and is meant to be placed in the center of a rack system. It comes with IRDirects, which are directional emitters that can be aimed at the sensors on each piece of A/V equipment. It is a nice clean look with no visible wires, there are 5 emitter ports on the front as well as one on the back.

### **Something Cool to Tell Customers**

- 1.) The Stealth Xtreme is “future proof” because of the new digital filter. As televisions get thinner and thinner, more and more interference will be the result. Does that mean that 10 years down the road when you buy a new plasma you have to buy a new infrared repeating system because yours is ten years old?? No, simply turn the adjustment screw clockwise to eliminate any extra interference.
- 2.) Flashing emitters are terribly inefficient for transmitting infrared signals, but they are good for troubleshooting because you can see the signal being emitted. However, true infrared emitters are not visible to the human eye yet they work a hell of a lot better. Try taking a camera phone or ANY digital camera they are sensitive to infrared. You should be able to see the invisible light through the camera. Now you have the best of both worlds.