

SYSTEMS INTEGRATION AMPLIFIER® APPLICATION NOTES

These four applications will help you design effective systems using Niles Systems Integration Amplifiers. Be sure to review the Critical Knowledge and Tips From The Pros sections for more in-depth information

APPLICATION 1: MUSIC IN SIX ROOMS USING DUAL TWO-CHANNEL AMPLIFIERS

Many installers default to speaker selector boxes as their choice for music distribution. But it is important to remember that speaker selector boxes use resistors that raise the impedance to a level that most receivers can handle. Typically, this makes speaker selector boxes only 60% efficient. The illustration below will show you what this means in terms of actual amplifier power to the loudspeakers. (See **Diagram 1**).

To be fair, 10 watts is enough power to make most in-wall or in-ceiling loudspeakers play relatively loudly, but the sound fidelity suffers. Improved sound fidelity and higher volume levels can be achieved by replacing the speaker selector box with dual two-channel amplifiers. Since Niles two-channel Systems Integration Amplifiers can drive up to three pairs of 8-ohm loudspeakers, we can power the entire system with just two amps.

In this application we will use an SI-250 and an SI-2100 amplifier (**Diagram 2** shown on next page). The SI-250 will be used where limited volume is needed and the SI-2100 will be used for the more demanding areas. Even with three pairs of loudspeakers, the SI-250 will be delivering over 30 watts to each speaker (more than double what a speaker selector box would provide!). The tape output of the receiver will feed a fixed level signal to the first amplifier. The cascade output will feed the signal from the first amp to the second one.

CRITICAL KNOWLEDGE

- Speaker selector boxes will not provide adequate power levels for speakers in outdoor locations.
- Niles two-channel amplifiers can drive three pairs of 8-ohm speakers without a speaker selector box or other impedance magnification device.
- The maximum amount of speakers that can be controlled by a single volume control is two pairs.

TIPS FROM THE PROS

- Use the second zone output, if available, to separate the source playing in the home theater from the whole-house music system.
- For diagram two all volume controls have their impedance magnification switch set for 2x

SPEAKER SELECTOR POWER LOSS

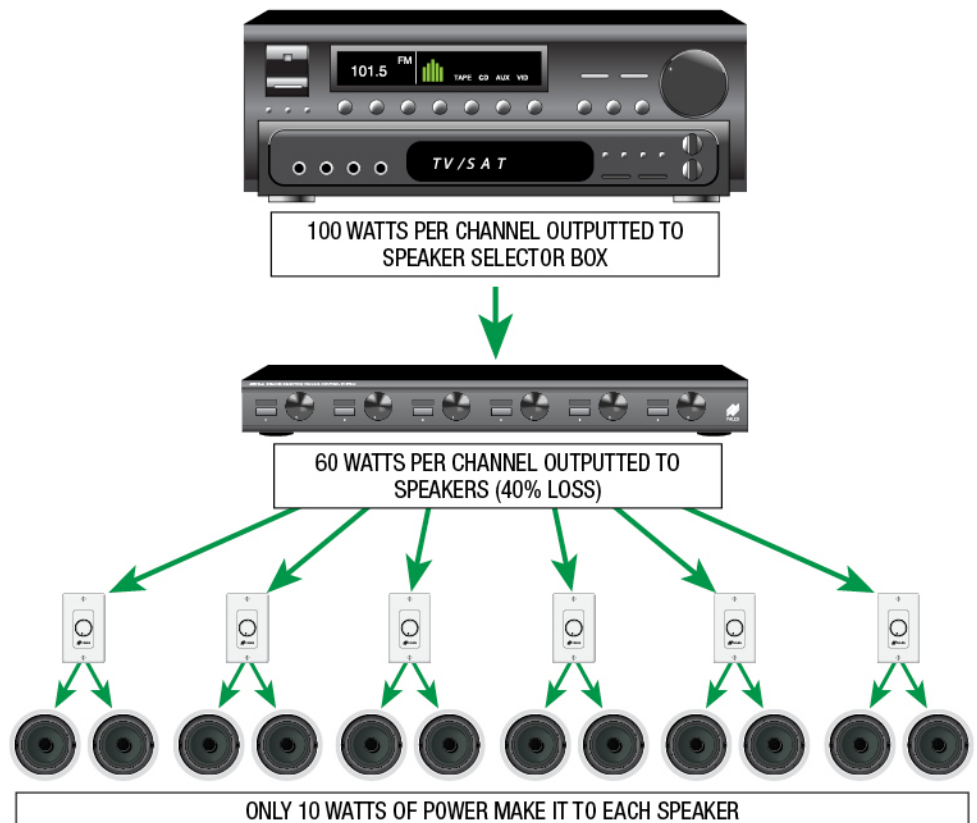


Diagram 1

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APPLICATION 1: MUSIC IN SIX ROOMS USING DUAL TWO-CHANNEL AMPLIFIERS

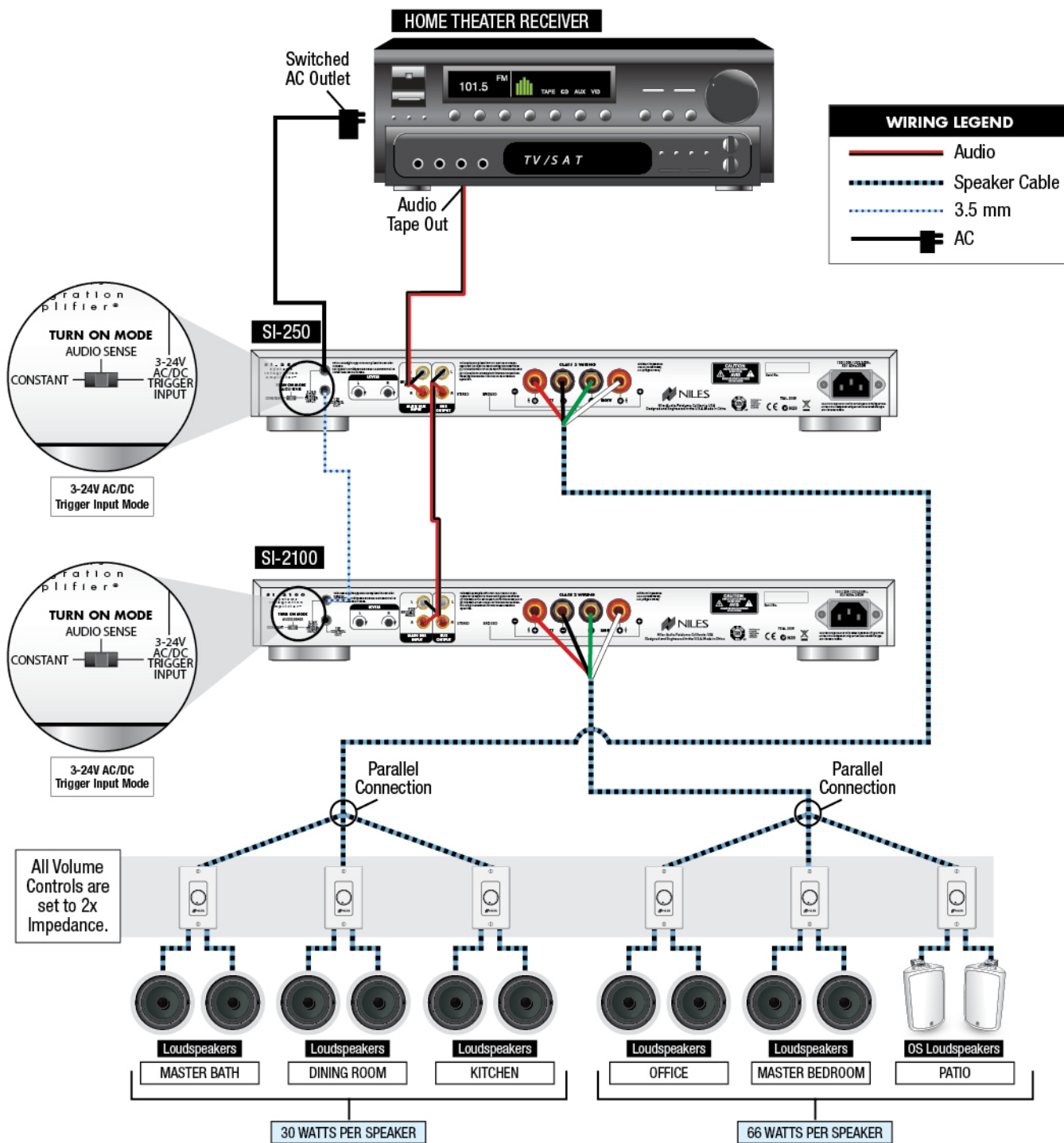


Diagram 2

APPLICATION 2: MUSIC OUTDOORS WITH TWO PAIRS OF LOUDSPEAKERS AND A TWO-CHANNEL AMPLIFIER

Today, outdoor music systems are very popular, but they require more volume than indoor areas because:

- There are higher levels of ambient noise from sources such as cars, wind, and neighbors that must be overcome.
- There are no enclosed spaces for speakers to pressurize and no boundaries to reinforce the sound.

Because of these factors, you need more amplifier power outdoors to generate adequate volume levels. Also keep in mind that if the outdoor speakers are not adequately powered, the customer runs the risk of the overdriving the amplifier clipping in an attempt to generate adequate volume levels. This is why many outdoor speakers are damaged (blown speakers). It's not too much power, but rather not enough power that can damage speakers. The solution is to drive the outdoor speakers with a separate amplifier that provides sufficient power.

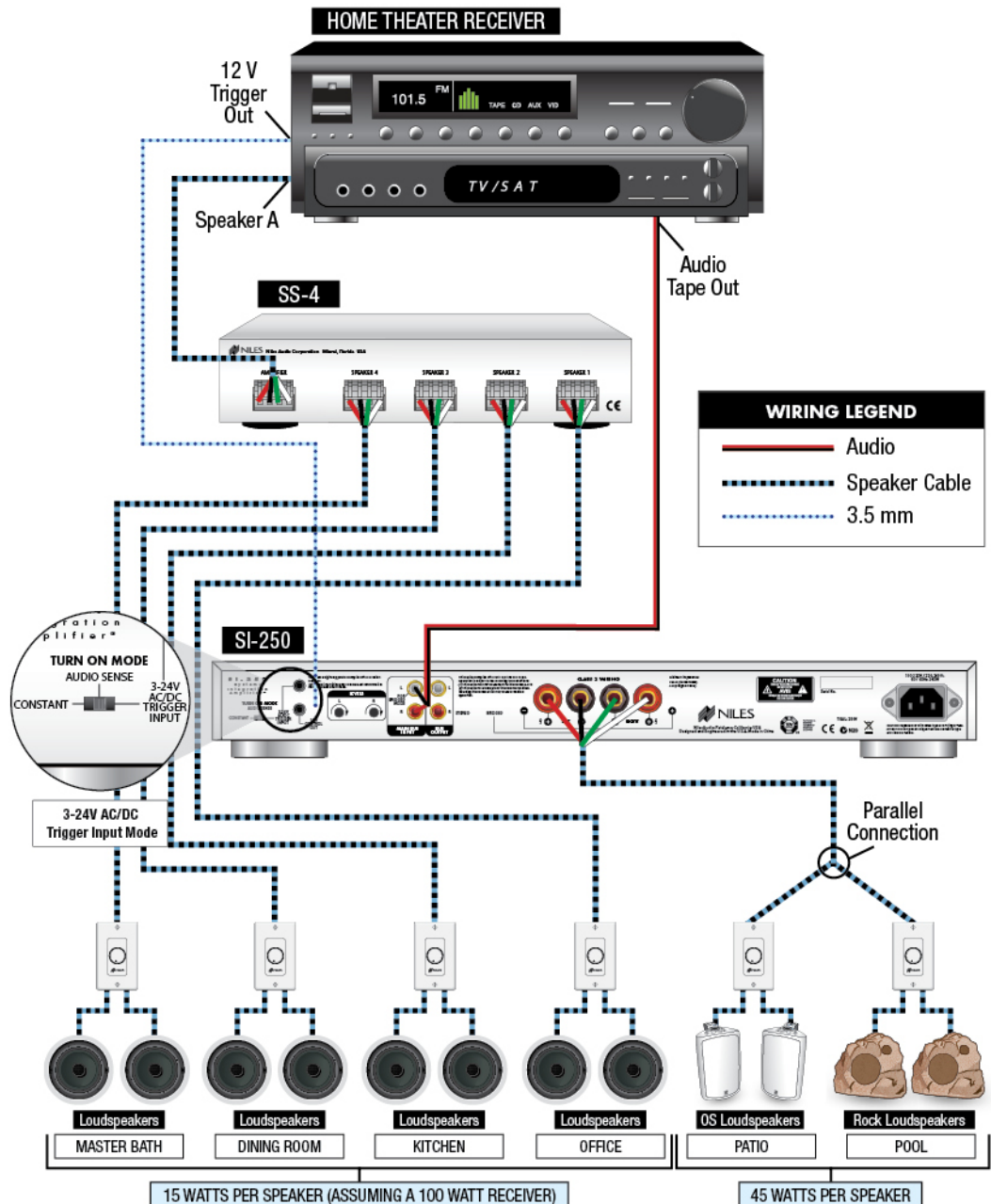
In this application, we will use a speaker selector box to control the indoor speakers and a separate amplifier to power the outdoor speakers. Niles System Integration Amplifiers can drive up to three pairs of 8-ohm speakers, but in this application, we will drive two pairs of speakers using one amplifier. Each pair of speakers will have a dedicated volume control.

CRITICAL KNOWLEDGE

- Outdoor speakers require at least 2.5 times the power of indoor speakers.
- Underpowered outdoor speakers can be damaged (blown) resulting in a service call.
- Speaker selector boxes will not provide adequate power levels for outdoor speakers (see previous application for more information).
- Niles Systems Integration Amplifiers can drive three pairs of 8-ohm speakers without a speaker selector box or impedance magnification.
- The maximum number of speakers that can be controlled by a single volume control is two pairs.

TIPS FROM THE PROS

- Because outdoor entertaining is so popular, properly powered, great-sounding outdoor systems generate lots of customer referrals
- Whenever you use multiple pairs of speakers for an outdoor area with separate listening zones, always specify separate volume controls.
- Adjust the input level on the amplifier so the speakers cannot be overpowered. The amplifier level should be set for the maximum required volume when the volume control is set to maximum.



APPLICATION 3: MUSIC OUTDOORS IN MULTIPLE AREAS WITH A 12-CHANNEL AMPLIFIER

These days, more and more system designers are designing for elaborate outdoor areas. Outdoor kitchens, large pool areas, pool houses, gazebos, gardens, and multiple decks and patios areas are increasingly becoming popular with consumers. These elaborate outdoor areas require large amounts of amplifier power and individual area controls. Niles 12-channel amplifiers can deliver the power necessary while allowing for control flexibility.

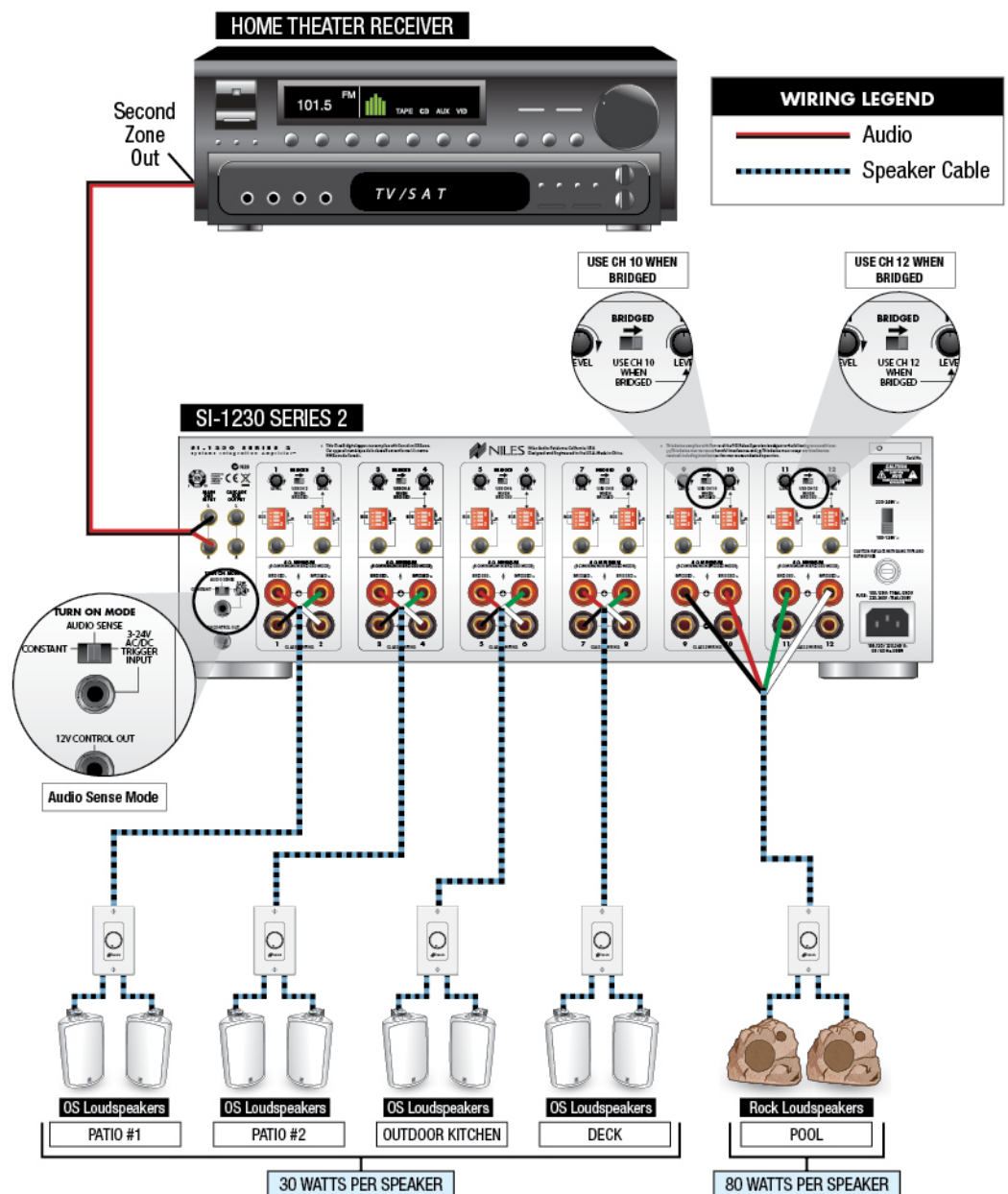
In this application, we will use the second zone output of a home theater receiver to feed the twelve-channel amplifier. Because individual channels on the amplifier can be selected to be a left channel, right channel, or left + right channel, we will run some areas in stereo and others in summed stereo (Left + Right). Niles twelve-channel amplifiers can also bridge adjacent channels for even more power, which we will use to provide more power to the pool speakers.

CRITICAL KNOWLEDGE

- Outdoor speakers require at least 2.5 times the power of indoor speakers.
- Underpowered outdoor speakers can be damaged (blown) resulting in a service call.
- Each channel on a Niles 12-channel amplifier can select from Left, Right, or Left + Right, which allows speakers to operate in stereo or summed stereo (Left + Right).
- The maximum number of speakers that can be controlled by a single volume control is two pairs.

TIPS FROM THE PROS

- Because outdoor entertaining is so popular, properly powered, great-sounding outdoor systems generate lots of customer referrals.
- Whenever you use multiple pairs of speakers for an outdoor area with separate listening zones, always specify separate volume controls.
- Bridge adjacent channels for more power to drive important outdoor areas.
- Run areas in summed stereo (Left + Right) when stereo sound is not necessary or desirable



APPLICATION 4: MUSIC EVERYWHERE WITH A MULTIZONE RECEIVER AND A HIGH-POWER 16-CHANNEL AMPLIFIER

With a multizone system, you can play different sources in different zones. Niles MultiZone Receivers feature preamp outputs, making it possible to add amplifiers. Most people can hear that speakers sound much better when powered by more than 25 watts. Consider this:

- When powered by 25 watts, outdoor rock speakers have a maximum volume level of approximately 90 dB at 4 meters (approx. 13 feet).
- When powered by 125 watts, the same outdoor rock speakers have a maximum output of approximately 97 dB at 4 meters (approx. 13 feet).

Using amplifiers with a multizone system makes it possible to expand the number of speakers in a single zone. But when using multiples of speakers, you must also consider your source of volume control. Niles MultiZone systems feature preamp outputs that can be set to either fixed or variable. A variable output means that the keypad controls the output for all speakers connected to the amplifier. A fixed output means that a full output signal is fed to the amplifier and speakers will have manual volume controls.

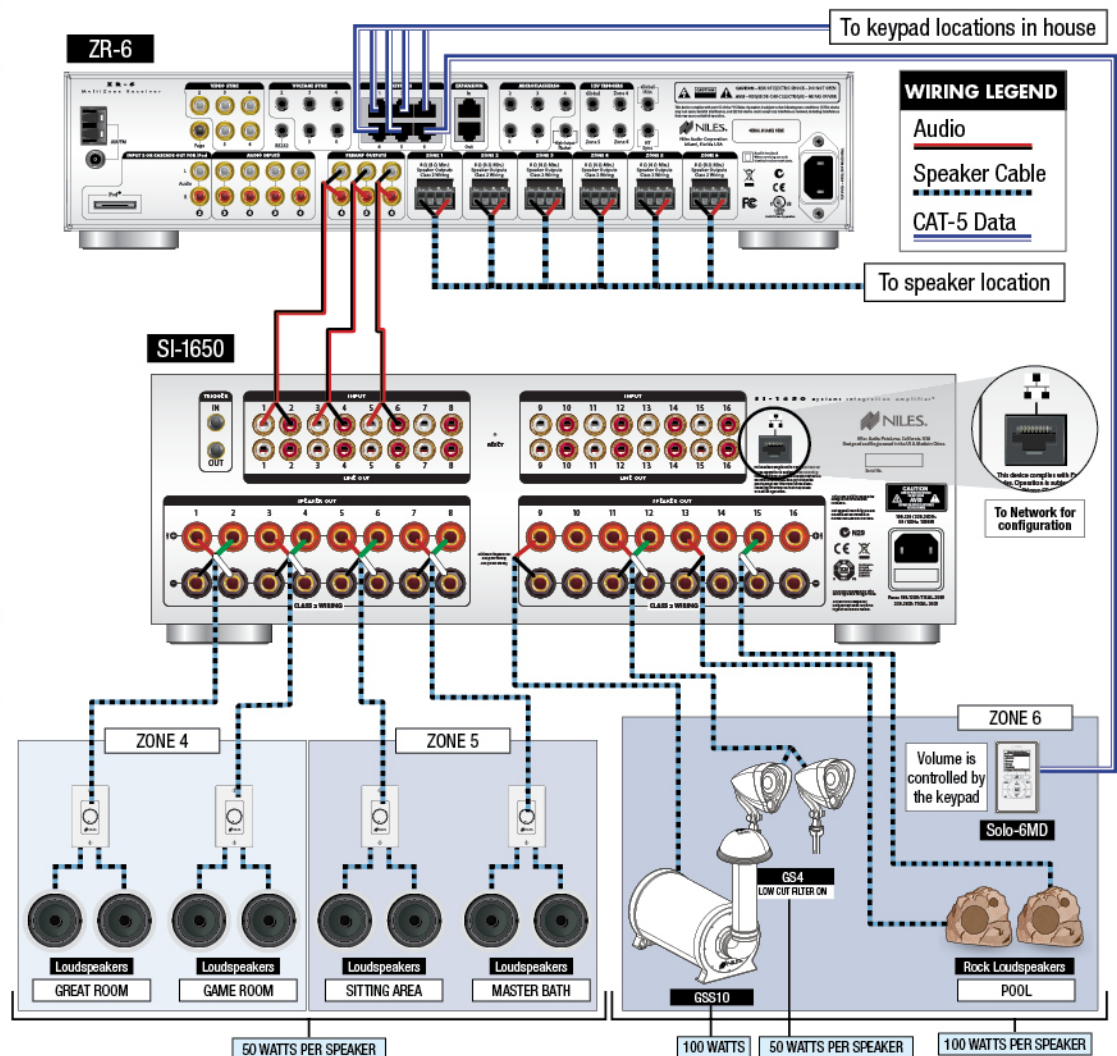
In this application, we will run the zone 4 preamp output to the audio inputs 1 and 2 of the SI-1650. Channels 1, 2, 3, and 4 will power two pairs of speakers with volume controls in the great room and game room. The zone 5 preamp output will be connected to the audio inputs 3 and 4 of the SI-1650 allowing channels 5, 6, 7, and 8 to feed two pairs of speakers with volume controls in the master bedroom sitting area and master bath (the master bedroom is fed directly off of the ZR-6). Zone 6 preamp output of the ZR-6 is connected to the input 5 and 6 of the SI-1650. Channels 13 and 15 of the SI-1650 will be set to HIGH power mode to provide more power to the outdoor pool speakers which are controlled through a keypad mounted outdoors (zone 6 preamp output is set to variable). Additionally channel 9 of the SI-1650 has been set to HIGH power mode as well as the Low Pass filter has been set to send just bass to a Niles GSS10 bury-able sub woofer. Finally channels 11 and 12 are being used to power a pair of Niles GS4 Garden Speakers.

TIPS FROM THE PROS

- Because outdoor entertaining is so popular, properly powered, great-sounding outdoor systems generate lots of customer referrals
- When using multiple pairs of speakers for an outdoor space that feeds separate areas, always use separate volume controls
- High Power Mode allows more power to drive important outdoor area
- Run areas in summed stereo (Left + Right) when stereo sound is not necessary or desirable

CRITICAL KNOWLEDGE

- Outdoor speakers require at least 2.5 times the power of indoor speakers.
- When using fixed preamp outputs, always spec manual volume controls for each pair of speakers
- High power mode and hi/lo pass crossover settings are adjusted in the SI-1650's IP Configuration & Set-up tool



NILES SYSTEMS INTEGRATION AMPLIFIER® SPECIFICATIONS: POWER OUTPUT

Amp Model	Type	Stereo Mode (unbridged)			Bridged mode	
		Power per channel into 8 ohms, all channels driven	Power per channel into 4 ohms, all channels driven	Able to drive 3 x 8-ohm speakers paralleled per output (2.67 ohms)	Power into 8 ohms, adjacent channels bridged	Able to drive 2 x 8-ohm speakers per output paralleled (4-ohms) when in bridged mode
SI-250 	Stereo	50	100	yes	225	yes
SI-2100 	Stereo	100	220	yes	400	yes
SI-2150 	Stereo	150	270	yes	550	yes
SI-1230 Series 2 	12-channel	30	40	No (only 2 x 8-ohm spkrs)	80	no
SI-1650 	16-channel	50	100	no	High Power Mode: 100	no