



# Z-AP SERIES

## Owner's Manual

Before operating the unit, please read this manual thoroughly and retain it for future reference.

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### MISSION STATEMENT

#### Committed to Excellence

ZAPCO is dedicated to the pursuit of audio fidelity. Our prime objectives are to design and manufacture audio products of unsurpassed quality, to provide unparalleled support and service for these products and to conduct business in a manner that will enhance the quality of life for all involved.

#### Experience (Knowledge from doing)

There is absolutely no substitute for experience; that is a simple fact of life. Another simple fact is that ZAPCO has, for over forty years, been the leader in defining quality standards for the car audio industry.

These years of experience have led to a thorough understanding of the challenges that are unique to the world of car audio. ZAPCO's relentless quest for sonic purity consistently yields imaginative designs that utilize the most innovative technologies. The resulting products set the criteria by which all others in the industry are judged.

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## The Zapco Z-AP Series of Audiophile Amplifiers

Audiophile: An audio fanatic whose sole passion is accurate sound reproduction that brings all the purity of a live performance to recorded music. It is a familiar term with high-end home gear like McIntosh or Bryston, but a term always considered unattainable in the automotive environment.

Zapco disagrees! In 1974 Zapco began a quest for perfect sonic reproduction. While perfection may be unattainable, the quest is no less worthy. In 2000 we introduced the C2K Competition amplifiers and by 2003 Zapco accounted for over 33% of ALL awards at the IASCA car Audio Finals. The closest competitor accounted for only 9%. In 2012 we introduced the new Z-Series amps with high end internal components matched for pure sound quality. This was our first line developed by listening rather than by measuring. That series was favorably compared to both McIntosh and Bryston home amps, and quickly went straight to the winner's circle in Audio contests. They were called the best Zapco ever. How did we respond?

We said "thank you, but we think we can do even better". And we did. We upgraded to the newest audiophile caps and op-amps, redesigned the power supply, and made board modifications to create the Z-Series LX amps. Not only did they top the car audio comparisons, but home speaker makers even brought their speakers to our CES suite to demonstrate what their speakers could do. The LX was beating their demo home amps in sound quality. How did Zapco respond?

We said "thank you, but we think we can do even better". And we did! This year we built an amplifier to set new sound quality standards for both home and car sound reproduction. The Z-Series AP amplifiers. Home? Absolutely! In home or in car, the job of an amplifier is the same; pure, accurate sonic reproduction. The only difference is the power supply. If you really want to hear what your home speakers can do, get a AC~DC power supply and a Zapco Z-Series AP amplifier. Then you'll know why your car system can sound better than your home system.

How did we do it? We took the best of the LX amp and we tweaked the circuitry. We used the same high-end audio quality electrolytic caps in the power supply that we used in the LX amplifiers. In the Signal path we replaced the electrolytics with the high-end WIMA poly caps. We used a new low noise, audio op-amp for the input stage and the smoothest audio op-amp we could find for the signal path (the right op-amp for the right job).



We doubled the output drivers, and increased the operating voltage of the matched final output devices. To get heat off the output devices faster, and increase efficiency, we used a new insulator material developed for aerospace. At the differential input stage, we used 0.1% resistors... not 1% but 0.1%... to assure the lowest possible floor. We developed our own patented, multi ground RCA connectors with extra heavy gold plating for perfect signal transfer. We even improved the low noise gain pots had added detents to make watching levels a breeze.

And what the heck! To top it all off, we gave it a new look, with a matt black finish and a solid copper plate with the logo and serial number engraved right in for posterity.

The Result: The ultimate SQ amplifier designed by listening with ears and much as by measuring. So we get the possible smoothest, purest overall sound quality and, at the same time, a signal to noise ratio of over 110dB, so you get all that pure sound quality in even the quietest of musical passages.

#### ***Z-Series AP Amplifier Highlights and Technical Specifications:***

- Low distortion and low signal to noise of > 110dB
- Coupled the output drivers
- Highest HFE (Gain) Sanken selected output devices
- Differentially balanced input stage
- 0.1% resistors for lowest possible noise floor
- TI LME49720 (BJT) op-amps on the inputs and signal path
- WIMA MKS2 series caps in the signal path
- Extremely low ESR caps throughout
- Proprietary patented RCA connectors
- New look to compliment the high performance
- THD @ Rated Power < 0.05%
- Frequency Response 15Hz to 30KHz  $\pm$ 1dB
- Dimensions in mm: Z-150.2 AP > 190(W) x 62(H) x 300(L) - Overall 328(L)  
Z-300.2 AP > 190(W) x 62(H) x 450(L) - Overall 478(L)  
Z-400.2 AP > 190(W) x 62(H) x 480(L) - Overall 508(L)  
Z-600.2 AP > 190(W) x 62(H) x 600(L) - Overall 628(L)  
Z-150.4 AP > 190(W) x 62(H) x 440(L) - Overall 468(L)  
Z-150.6 AP > 190(W) x 62(H) x 600(L) - Overall 628(L)  
Z-1100.1 AP > 190(W) x 62(H) x 480(L) - Overall 508(L)  
Z-2000.1 AP > 190(W) x 62(H) x 600(L) - Overall 628(L)

## **Before you start your installation**

ZAPCO highly recommends that a fuse or circuit breaker be placed within 18" of the battery. Although you will add a fuse or fuse block near the amplifier it is still a possibility that a pinched power wire between the component fuse and the battery could result in a short, or even a fire. The protection device should be placed where it can be accessed easily and all wiring should be routed safely and correctly according to the following guidelines:

Do not run wiring close to hot or spinning objects.

Always use wire grommets when routing wire through the firewall or any other metal panels.

Make sure that the potential for pinched wiring is avoided by routing all wires away from moving hinges and seats. This also includes brake, gas and clutch pedals, hood and trunk hinges, etc.

Continuous exposure to excessive sound pressure levels may cause permanent hearing loss. ZAPCO strongly advises that you use common sense when setting volume levels. If you experience ringing in the ears, it could cause permanent hearing damage!

When connecting our amplifiers to pre-wired stock speakers, care must be taken that there are no common connections between left and right speaker wires, i.e. two or more speakers using the same ground connection (very common in pre-85 cars), as this will cause the amplifier to go into immediate protection or may cause damage to the amplifier. Output connections are not common chassis ground. Please follow the hookup instructions in this owner's manual. Any questions should be directed to your local ZAPCO dealer.

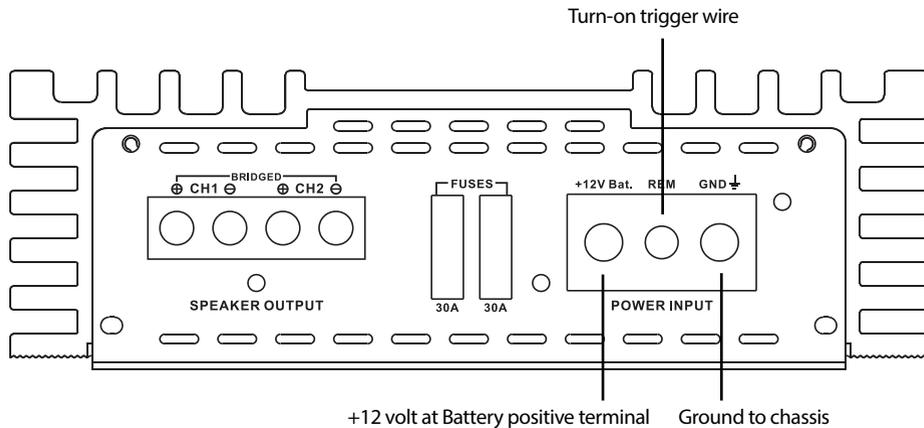
## Planning your power connections

The power end plates of the Zapco AP amplifiers carry the power connections and the speaker connections and vary somewhat by the number of channels. One model, the Z-150.2 AP has on-board fuses, while all other models will require an in-line fuse. The main 12-volt power input, the 12-volt turn-on wire, and the main Ground connections are common to all models.

- The connection at the interior of the end plate is the main power input. This must be connected the vehicle battery's positive (+) terminal, and a main system fuse should be placed close to the battery.
- The connection at the outside of the end plate is the main ground or negative connection. This must be securely attached to bare metal at the vehicle frame, or other heavy chassis component with a direct connection to the frame.

**Note: Seat bolts and seat belt bolts are NOT good ground points**

- The small terminal between the main power and ground is the +12 turn-on input and can be connected to the head unit turn-on output wire. If none is available it can be connected to an accessory (ACC) terminal. You should avoid using any ignition-on (IGN) wire, as they can be noisy.



**Note:** The Z-Series AP amplifiers have terminals that do not require connectors. You simply insert a bare portion of wire and tighten the connection. As the wire conforms to the connector the connection can loosen. You should re-tighten the connection after about a week.

## Some words about Power and Ground

**Note:** The second most common cause of underperforming amplifiers is insufficient power current or a poor power connection. The most common cause of underperforming amplifiers is insufficient ground current or a bad ground connection.

12-volt current: Battery Power works only if it travels in a complete circuit from the battery positive terminal to the battery negative terminal. Main power input, of course, is attached to the battery positive terminal. Ground current is returned to the battery through the chassis to the to the point where the battery is grounded.

The current available for your amplifier to use to produce power will be restricted by the smallest gauge of wire in the circuit and by the weakest physical connection in the circuit.

## Wire Size

It's often surprising how many people will obsess about signal wire but routinely provide the amplifier with only a fraction of the current it needs to do its job. The most common wire gauge used in car audio is 10-gauge, and the most common location for amplifiers is in the trunk.

### Wire Sizing Chart

	Length of Run							
	4 ft	7 ft	10 ft	13 ft	16 ft	19 ft	22 ft	28 ft
0-20 amps	14	12	12	10	10	8	8	8
20-35 amps	12	10	8	8	6	6	6	4
35-50 amps	10	8	8	6	6	4	4	4
50-60 amps	8	8	6	4	4	4	4	2
65-85 amps	6	6	4	4	2	2	2	0
85-105amps	6	6	4	2	2	2	2	0
105-125 amps	4	4	4	2	2	0	0	0
125-150 amps	2	2	2	2	0	0	0	0

Let's look at a fairly small system. If you use a 50 watt/ch amp (25 amps) for the highs and a 100 watt/ch amp (40 amps) for the woofers, you need at least a 4-gauge and maybe a 2-Gauge wire to provide 65 amps at the trunk. Anything less and your car won't go boom. It'll just go Blap!

Note: It takes lots of current to make lots of power!

Remember! An electrical circuit is just that... a complete circuit. For current to travel, you must complete the circuit from the positive terminal to the negative terminal (which is connected to the vehicle frame). So what ever Gauge wire you use for power (B+) you must also use for ground (B-).

Note: A 4-gauge power wire needs 4-gauge ground wire!

Use the Wire Sizing Chart! Add up the fuse values on the amplifier(s) then choose the proper size wire based on the distance from the car battery to the amplifier location. Again, always use the same gauge wire for the main ground as you do for the main power. Always make your ground as short as possible and secure it to a clean solid surface, preferably the vehicle frame.

## Mounting your Z-Series AP amplifier

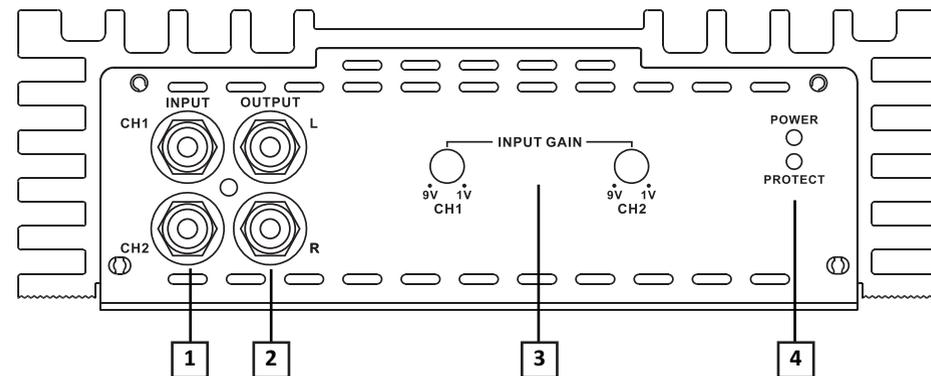
Mounting your Zapco amplifier is easy. Just keep in mind a few guidelines:

- The amplifier can be mounted in any direction, on wood, metal, or carpet
- The metal chassis of the amp can be grounded or left isolated
- The amplifier requires adequate ventilation. Creating power creates heat, and cooling requires air. Position the amplifier with sufficient surrounding area for air supply and keep the end plate and side vents clear for internal cooling
- Keep the amplifier out of the engine compartment or other locations that may cause excessive heat or moisture
- Do not mount the amplifier to a subwoofer box or other place that may have excessive vibration

Setting Gains: Gain pots are not volume controls. Before you first turn on your system, you should make sure all gain controls are set to minimum. Gain controls should be used only if absolutely necessary. Turning up gain controls causes increased noise, makes distortion more likely and reduces the dynamic range of your system. If your head unit does not have sufficient output, you will get much better results by investing in a line driver to provide more signal to the amplifier.

## 2-Ch. Amplifer Input Ends

The Input ends of the AP amplifiers is where you find the signal input connectors and controls. All the AP amps have the same basic functions, adapted slightly to fit the expected use of each model. We look first at the stereo (2-Channel) amps, since they share exactly the same functions and controls.

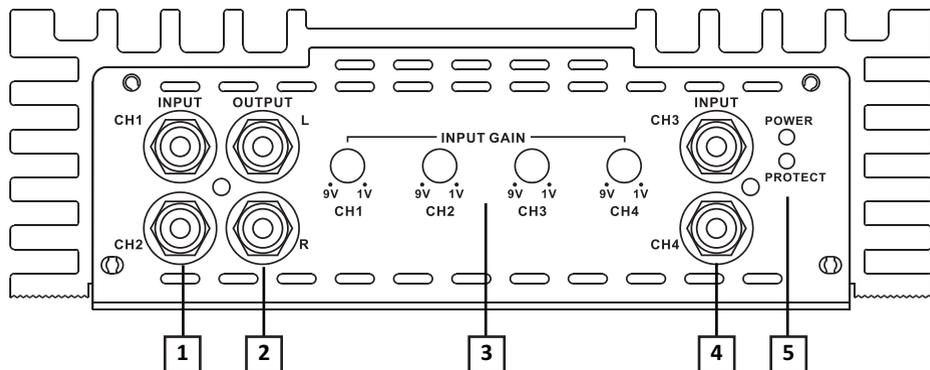


**1**• Ch. 1 and Ch. 2 RCA input connectors using Zapco's proprietary gold plated connectors  
**2**• Pass-through RCA outputs so you can "daisy-chain" multiple amps while only running one front-to-back RCA

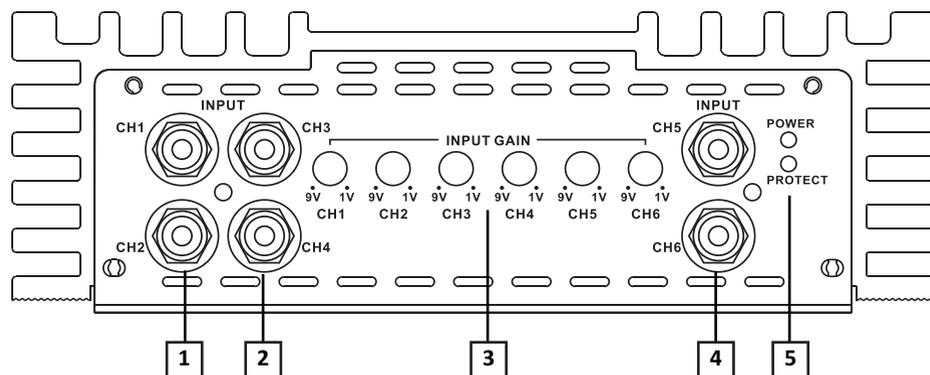
**3**• Variable gain control  
**4**• The power on (green) LED and the protect (red) LED

## 4-Ch./6-Ch. Amplifier Input Ends

The Z-150.4 AP is the 4Ch amp and has the same basic controls and features as the 2Ch amp but adapted for 4-channel use, as the Z-150.6 AP has been adapted for 6-channel use.



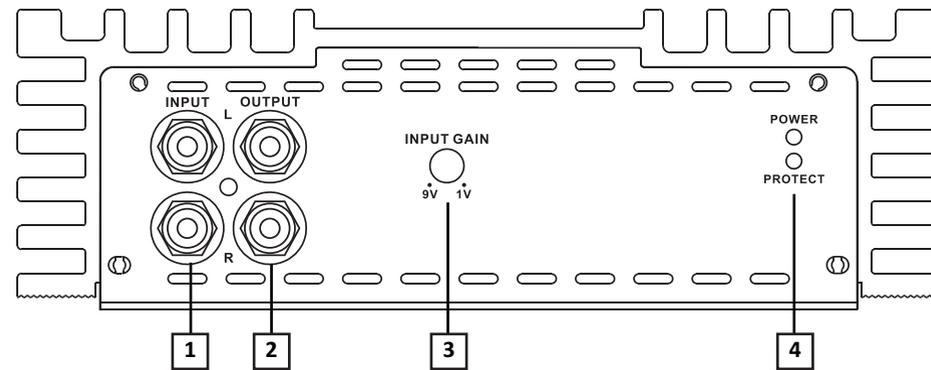
- 1• Ch. 1 and Ch. 2 RCA input connectors using Zapco's proprietary gold plated connectors
- 2• Pass-through RCA outputs so you can "daisy-chain" multiple amps while only running one front-to-back RCA
- 3• Variable gain control
- 4• Ch. 3 and Ch. 4 RCA input connectors using Zapco's proprietary gold plated connectors
- 5• The power on (green) LED and the protect (red) LED



- 1• Ch. 1 and Ch. 2 RCA input connectors using Zapco's proprietary gold plated connectors
- 2• Ch. 3 and Ch. 4 RCA input connectors using Zapco's proprietary gold plated connectors
- 3• Variable gain control
- 4• Ch. 5 and Ch. 6 RCA input connectors using Zapco's proprietary gold plated connectors
- 5• The power on (green) LED and the protect (red) LED

## 1-Ch. Amplifier Input Ends

The Z-1100.1 AP is the 4Ch amp and has the same basic controls and features but adapted for 1-channel use.



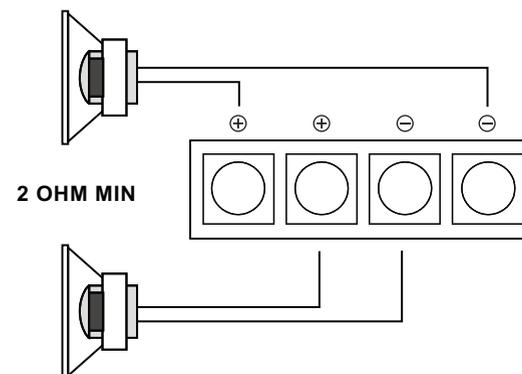
- 1• RCA input connectors using Zapco's proprietary gold plated connectors
- 2• Pass-through RCA outputs so you can "daisy-chain" multiple amps while only running one front-to-back RCA
- 3• Variable gain control
- 4• The power on (green) LED and the protect (red) LED

## Speaker Wiring of the AP Amplifiers

No speaker wires can be shorted to, or touching either ground or each other. When bridging 2 channels, see as indicated on the chassis by the speaker terminals.

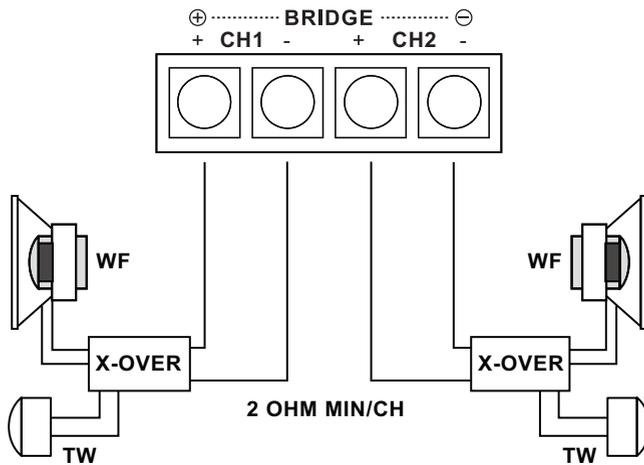
### 1-Ch. Amplifier

A simple 1 channel hookup for a single speaker or two speakers.



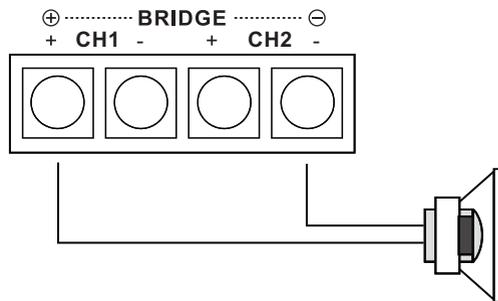
## 2-Ch. Amplifier - Stereo Mode

A simple 2 channels hookup for a right and left stereo pair.



## 2-Ch. Amplifier - Single Channel Mode

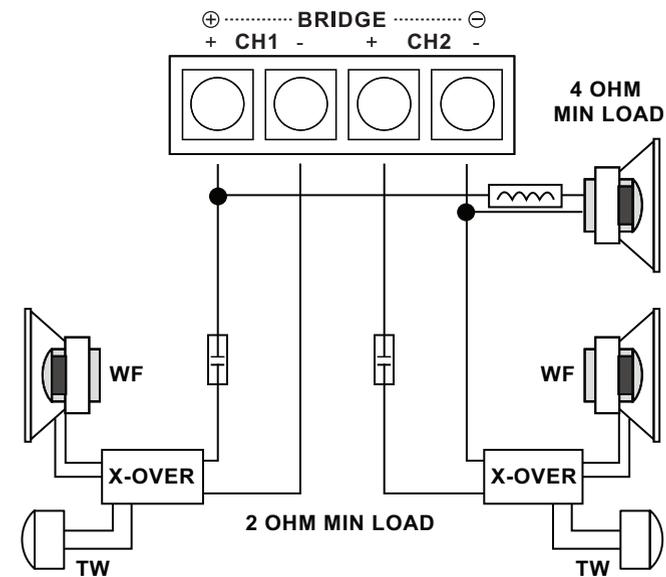
This method is used most often to drive a mono woofer but can also be used to run separate amplifiers for the right and left channel. The bridged speaker must be of 4Ω min. impedance



## 2-Ch. Amplifier - 3Ch Mode

It is possible to run the 2Ch amps in "3-Channel" mode by running a pair of speakers for the mids and highs on left and right channels, and at the same time run a woofer bridged between the L+ and R- terminals as shown. However, since each channel will see 1/2 the impedance of the woofer you must use a woofer of no less than 4Ω. The amplifier sees impedance by frequency, so you can have two 2Ω loads but you must use a passive crossover on each speaker in the three channel mode. With the crossovers in the line, the amplifier will always see a minimum load of 2Ω on each channel at all frequencies.

- Main speakers can be 2Ω~4Ω.
- Woofer can be 4Ω~8Ω but cannot be less than 4Ω

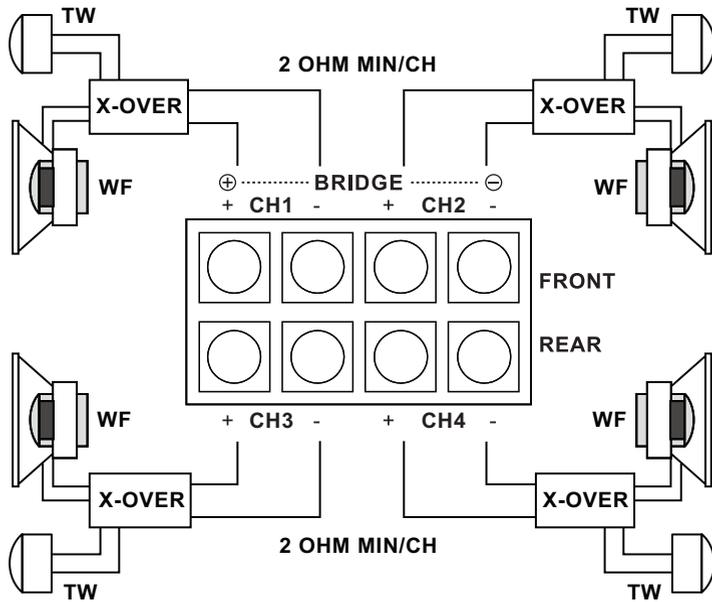


A 3-Way hookup requires a coil on the woofer and capacitors on the highs to act as a crossover and maintain correct impedance. Consult the speaker manufacturer for correct cap and coil values.

### 4-Ch. Amplifier - Stereo Mode

A simple 4 channels hookup for a right and left stereo pair.

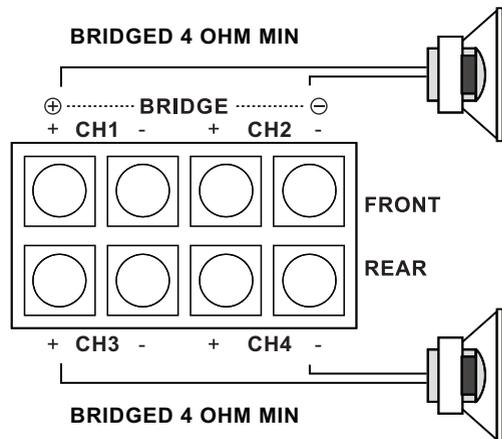
- This is the standard hookup for full range front and rear speakers
- Speakers can be  $2\Omega\sim 4\Omega$



### 4-Ch. Amplifier - High Power 2-Ch. Mode

Want more power? Instead of 4 channels of 150 watts, you can have two channels of 500 watts each by bridging both front and rear amp sections to one speaker each.

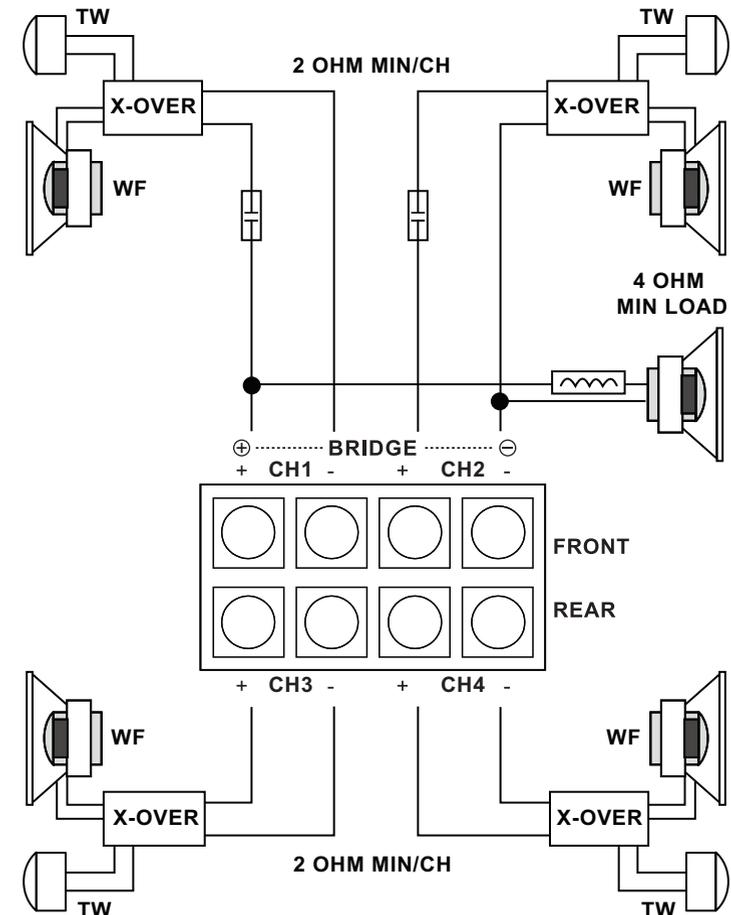
- Speakers must be a minimum of  $4\Omega$  impedance



### 4-Ch. Amplifier - 5-Ch. Mode

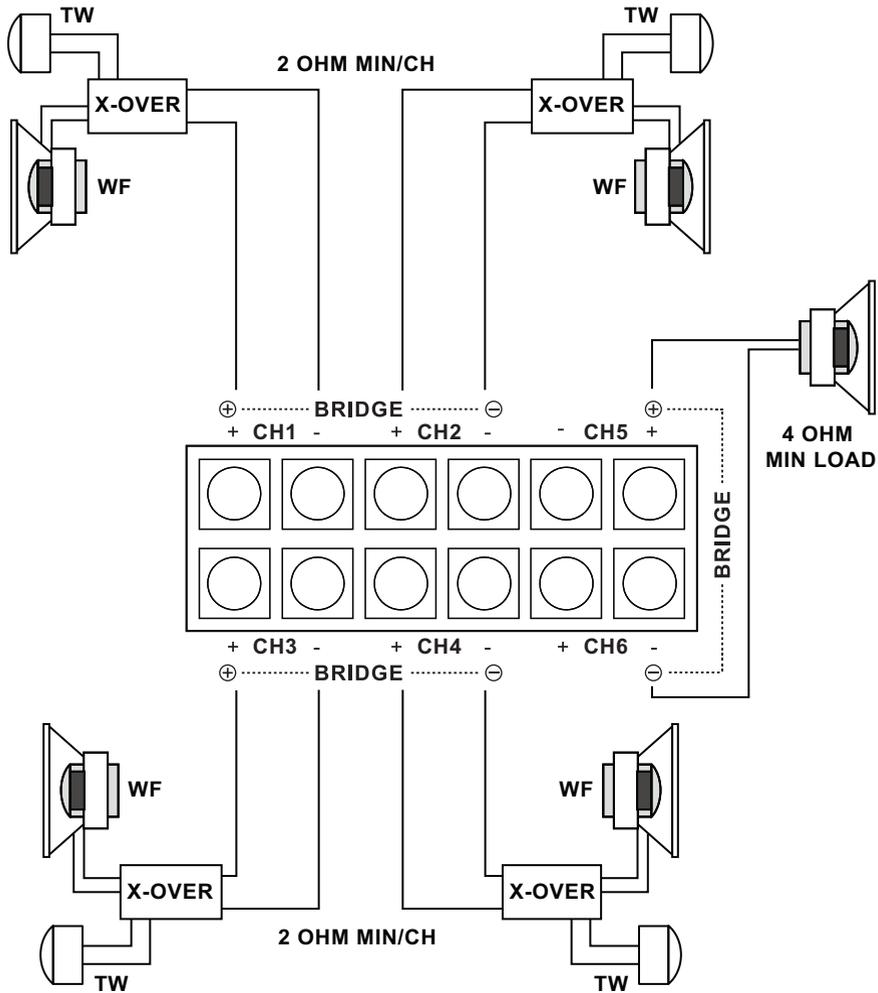
A 3-way system with front stage, rear stage and subwoofer in mixed mono configuration. The 5-speakers system requires a passive crossover between the front highs and the mono woofer, with capacitors on the front highs positives and a coil on the woofer positive. All amplifiers channels are full range.

- This is the standard hookup for full range front and rear speakers
- Speakers can be  $2\Omega\sim 4\Omega$



## 6-Ch. Amplifier - 5-Ch. Mode

The most popular system for a six channel amplifier is right/left front, right/left rear, and a mono sub. Note the hookup especially of the sub as Ch5+ and Ch6-. This gives the sub the combined power of the 2 channels. Note that since the sub is a bridged hookup the sub must be 4Ω minimum.



## Technical Specifications

Model	Type	Power (W) Channel/RMS	THD	S/N	Frequency Response
Z-150.2 AP	2-Ch, Class AB	2 x 150 (4Ω) 2 x 250 (2Ω) 500 (Br, 4Ω)	< 0.05%	>110dB	10Hz - 30KHz
Z-300.2 AP	2-Ch, Class AB	2 x 300 (4Ω) 2 x 500 (2Ω) 1000 (Br, 4Ω)	< 0.05%	>110dB	10Hz - 30KHz
Z-400.2 AP	2-Ch, Class AB	2 x 400 (4Ω) 2 x 600 (2Ω) 1200 (Br, 4Ω)	< 0.05%	>110dB	10Hz - 30KHz
Z-600.2 AP	2-Ch, Class AB	2 x 600 (4Ω) 2 x 1000 (2Ω) 2000 (Br, 4Ω)	< 0.05%	>110dB	10Hz - 30KHz
Z-150.4 AP	4-Ch, Class AB	4 x 150 (4Ω) 4 x 250 (2Ω) 2 x 500 (Br, 4Ω)	< 0.05%	>110dB	10Hz - 30KHz
Z-150.6 AP	6-Ch, Class AB	6 x 150 (4Ω) 6 x 250 (2Ω) 3 x 500 (Br, 4Ω)	< 0.05%	>110dB	10Hz - 30KHz
Z-1100.1 AP	Mono, Class AB	800 (4Ω) 1200 (2Ω)	< 0.05%	>110dB	10Hz - 30KHz
Z-2000.1 AP	Mono, Class AB	1200 (4Ω) 2000 (2Ω)	< 0.05%	>110dB	10Hz - 30KHz

Continuous exposure to excessive sound pressure levels may cause permanent hearing loss. ZAPCO strongly advises that you use common sense when setting volume levels. Everything written in this manual is for the proper use of the products. Some features or specifications could be modified during production to improve the product performance. The technical specifications and functionalities stated here are current as of the time of publication. General instructions and safety warnings are intended in any case to be always effective for this type of product. The latest manual with any updates is always available at [www.zapco.com/download](http://www.zapco.com/download)



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