ZAPCO ST-X III Series Class A Amplifiers Owner’s Manual

ST-X III SERIES
Owner’s Manual

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

Contents

General Instructions

The installation of the product must be done by professional technicians. Always contact a ZAPCO Authorized Dealer.

Before you start your installation
ZAPCO highly recommends that a fuse or circuit breaker be placed within 18″ of the battery. 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 objects, including brake, gas and clutch pedals, etc.

Planning your power connections

- The +12V B is the main power input. This must be connected the vehicle battery's positive (+) terminal
- The GND is the main ground or negative connection. This must be securely attached to bare metal at the vehicle frame
- The terminal between the main power and ground is the +12 turn-on input (REM) 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

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

- The amplifier requires adequate ventilation. Creating power creates heat, and cooling requires air
- 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 and 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.
Continuous exposure to excessive sound pressure levels may cause hearing damage. 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.

Class, Power, Heat

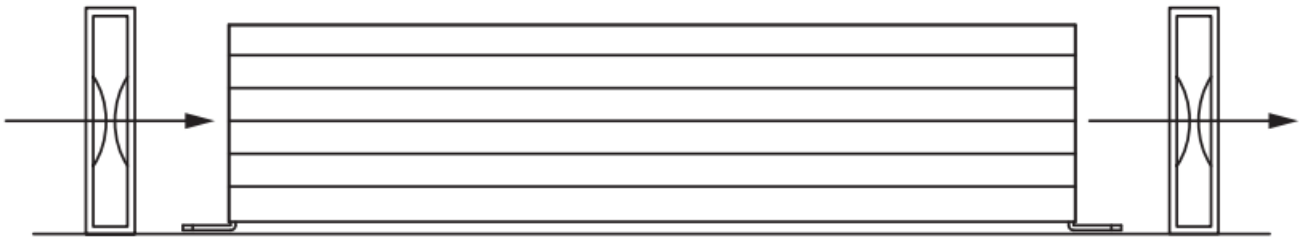
When buying or selling a car audio amplifier you need to consider more than just the power output. The basic design platform of the amplifier (Amplifier Class) will influence how the amp will work in any given situation, for any given user. All amplifiers make small signals bigger and in doing so create heat. Class A produces the most heat and Class D produces the least. If the amplifiers are not properly cooled, they will get too hot and problems will arise. Either the amp will be damaged, or protection circuits will engage to shut the amp off until it has cooled down enough to safely work again. Conversely, better cooling will allow an amp to make more power, longer, without damage or thermal shut down.

Class A/B amplifiers are used when audio fidelity is the primary goal and efficiency is of secondary concern. Class A/B amps have superior sound quality but with lower efficiency, they generate more heat and need more cooling.

Sound Quality and Dynamic Range: Our amps are designed solely for the best possible sound quality, so we do not current limit the amps. This gives Zapco amps more Dynamic Range that other amplifiers. Dynamic range, the ability to go from very quiet to extremely loud without distortion, is a major reason Zapco amps sound better than others. So, with Z-AP amplifiers, consumers have more dynamics plus the sound quality of class A/B amplifiers. If the Zapco Class A/B are used at the maximum dynamic range without distortion, they don't need so much cooling and never will shut down. But if they are driven into its distortion the amplifier will more easily reach maximum temperature and will shut down.

Critical: Volume does not make a system sound loud. Distortion sounds loud. With clean sound it is easy to drive an amp to full power and not know it because it still sounds clean. But when the power requested of the amplifier takes it into distortion the amplifier will overhead and shut down… and possibly be damaged. Zapco offers both Class A/B and Class D amps. Class A/B for the user who puts sound quality and dynamics first, and Class D for the user who wants big power in a small box.

Installation and Cooling: All the amplifiers need cooling, whether they are class A/B or class D. For cooling, the heatsink of the amplifier needs to exchange heat with air around it. So, the amplifier cannot be covered or put in a space where there is not enough air or ventilation. As noted above, in many cases a good installation needs to use external fans to make the ventilation more efficient. Some amplifiers have fans inside, but the problem is not solved if the fans cannot have an exchange of air with the environment.



All Wire is not created equal

Do not use CCA wire with Zapco amplifiers

It is easy to think of wire as just wire but the fact is there are major differences between the types of wires being offered today. The price of copper has gone up quite a bit lately, but you will notice that you can still buy heavy primary wire at very reasonable prices. How can this be? Simple… That lower price wire is not all copper, it is CCA wire. CCA stands for Copper Clad, Aluminum. That means it is aluminum wire with a thin coating of copper around the outside of the wire. Does it look like copper wire? Absolutely. But does it conduct electrical current like copper? **Absolutely Not.**

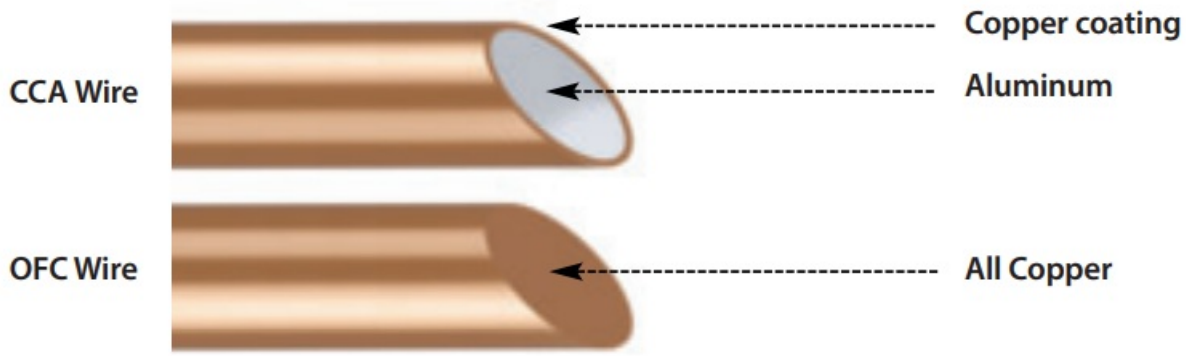
Two things can and likely will happen:

- Because CCA wire can not conduct DC electrical current like copper wire can, your amp will not get the current it needs to produce its rated power. That means you get less power and more distortion. It also taxes the amplifier that is trying to make its power, shortening the life of the amp

  CCA wire corrodes quickly and causes terminals that used to be tight to become loose. This causes arcing when electrons to fly around all the open space lookin for more copper. This causes heat that damages connections and can even eventually melt the terminal blocks on your amplifier

In short: While CCA wire is excellent for high frequency AC current (like tweeter voice coils), it is absolutely bad

for high current 12V DC like power and ground for a car audio amplifier. We have seen CCA wire become a major cause of amplifier failures as buyers are offered CCA as a low cost alternative to pure copper wire. So always look at the description of the contents of wire that you purchase. When someone offers to save you some money with CCA wire just say “No, thank you”.
Protect your investment with real copper wire.



Wire Size

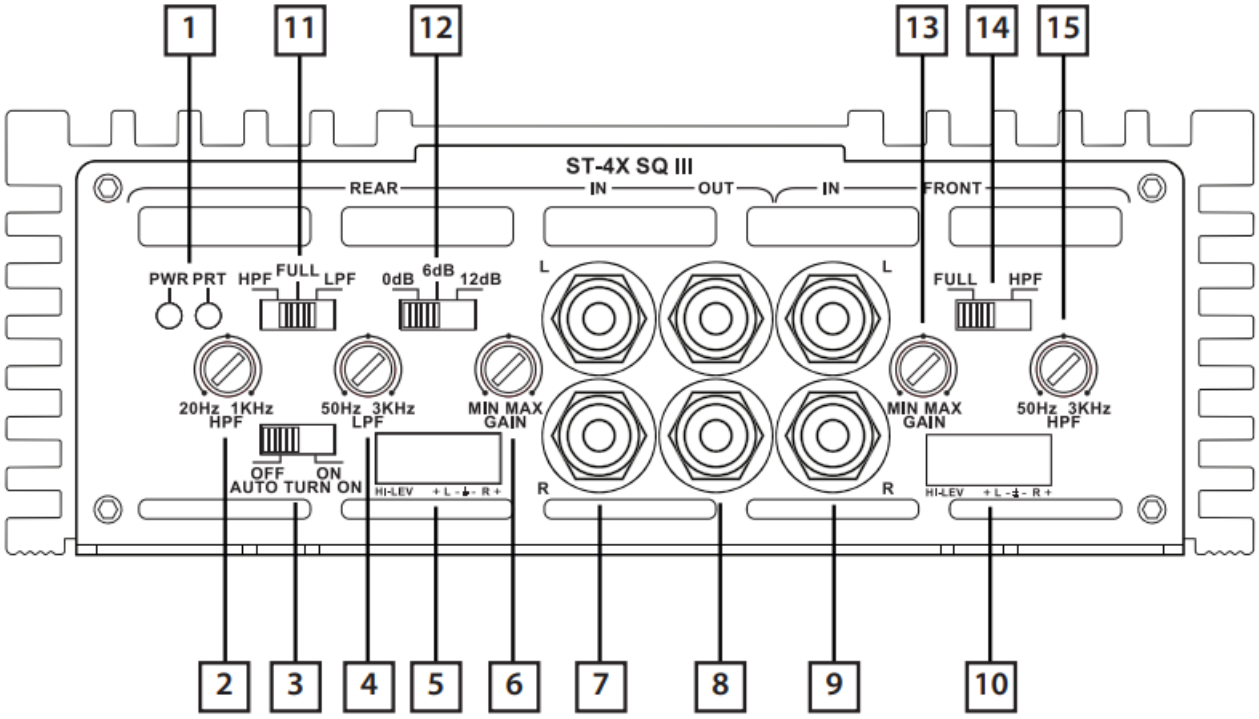
The second most common cause of under performing amplifiers is insufficient power current or a poor power connection. The most common cause of under performing amplifiers is insufficient ground current or a bad ground connection. 12-volt current: Battery power works only if it travels in a complete circuit 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 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.
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							
	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-Guage wire to provide 65 amps at the trunk. 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. 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.

ST-X SQ III Input/Controls

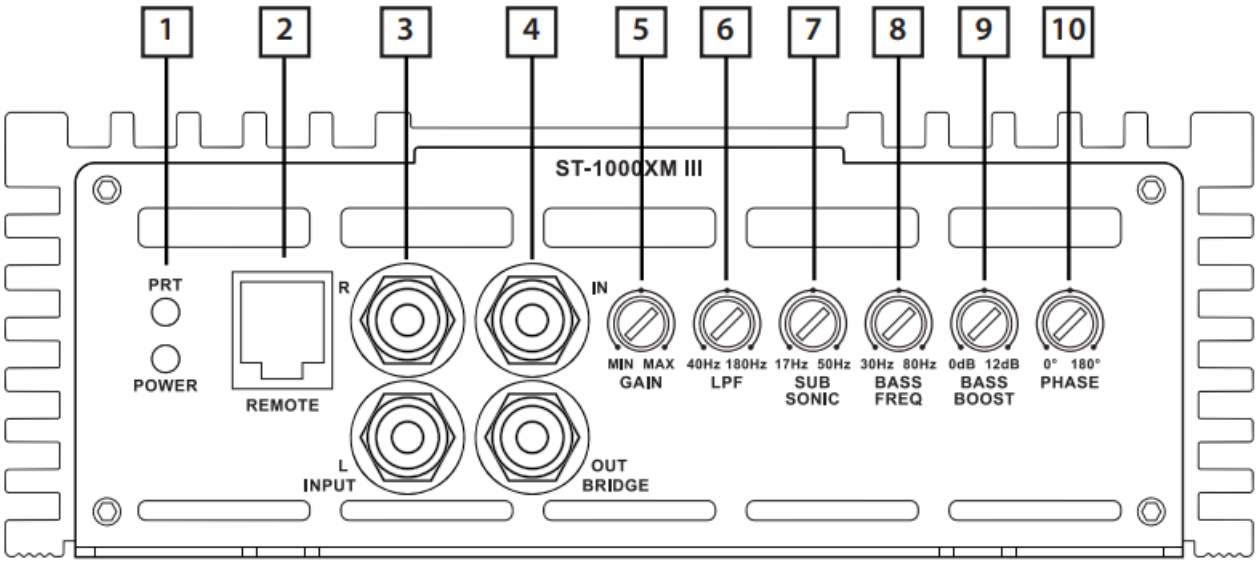
The ST-X SQ III amplifiers have similar functions, but different layout puts the controls in different positions. Showen here is the ST-4X SQ III 4-channel model.



1• Power and Protection LED 2• HP Rear frequency control 3• Auto-on switch 4• LP Rear frequency control 5• Speaker level input 6• Rear Gain control 7• Rear L+R RCA input connectors 8• Pass-through RCA outputs so you can “daisychain” multiple amps while only running one front-to-back RCA	9• Front L+R RCA input c 10• Speaker level input 11• Rear Crossover Type 12• Bass Boost control 13• Front Gain control 14• Front Crossover Type 15• HP Front frequency c

ST-X Mono III Input/Controls

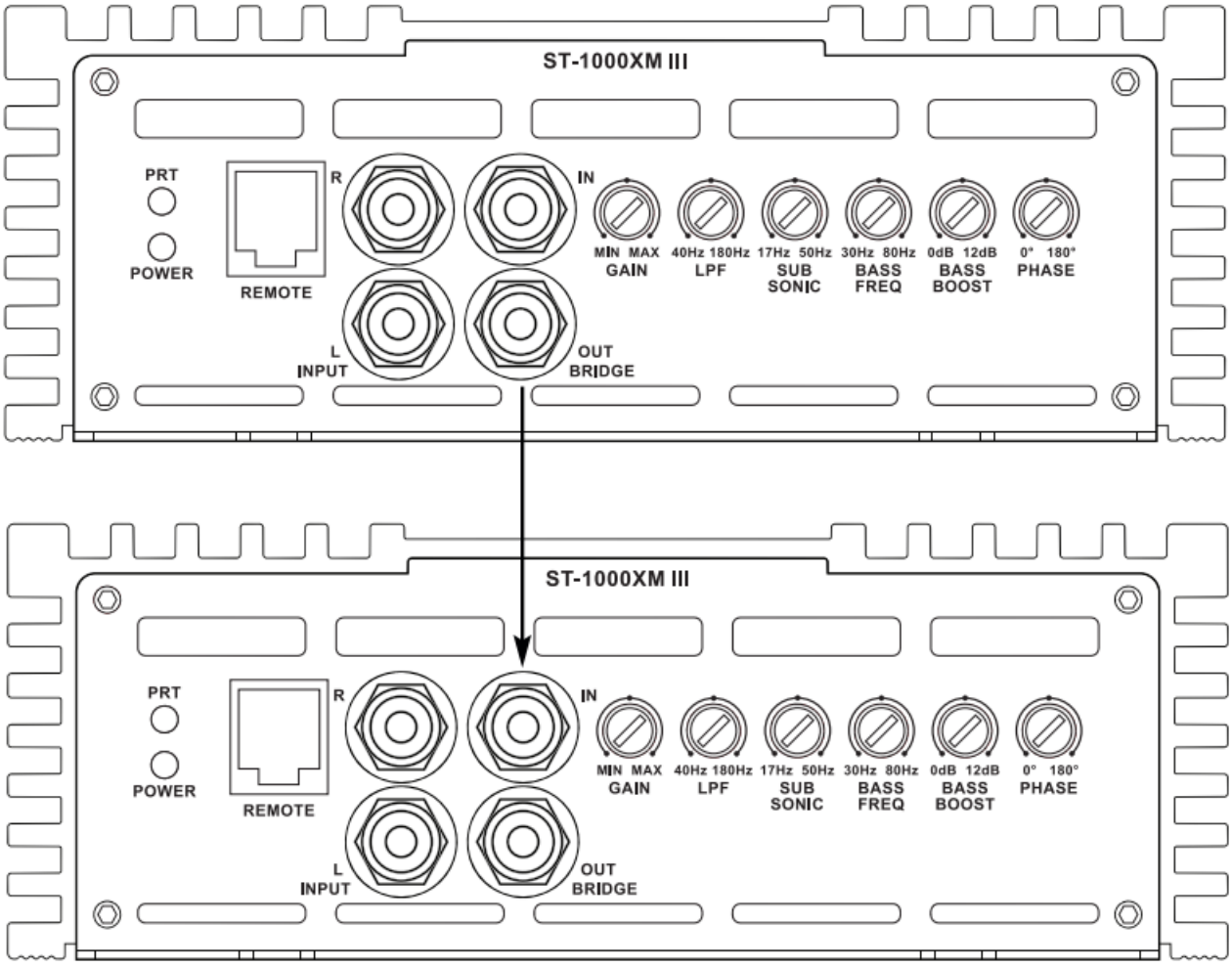
The ST-X Mono III amplifiers have similar functions and share the same input panel. Showen here is the ST-1000XM III model.



1• Power and Protection LED 2• Remote control port 3• RCA Inputs 4• Bridge In and Out to “strap” mono amps so they can work together to drive a single speaker 5• Gain control	6• LP frequency control 7• Subsonic filter 8• Bass boost frequency control sets the ce 9• Bass Boost level 10• Phase control

Strapping the ST-X Mono III

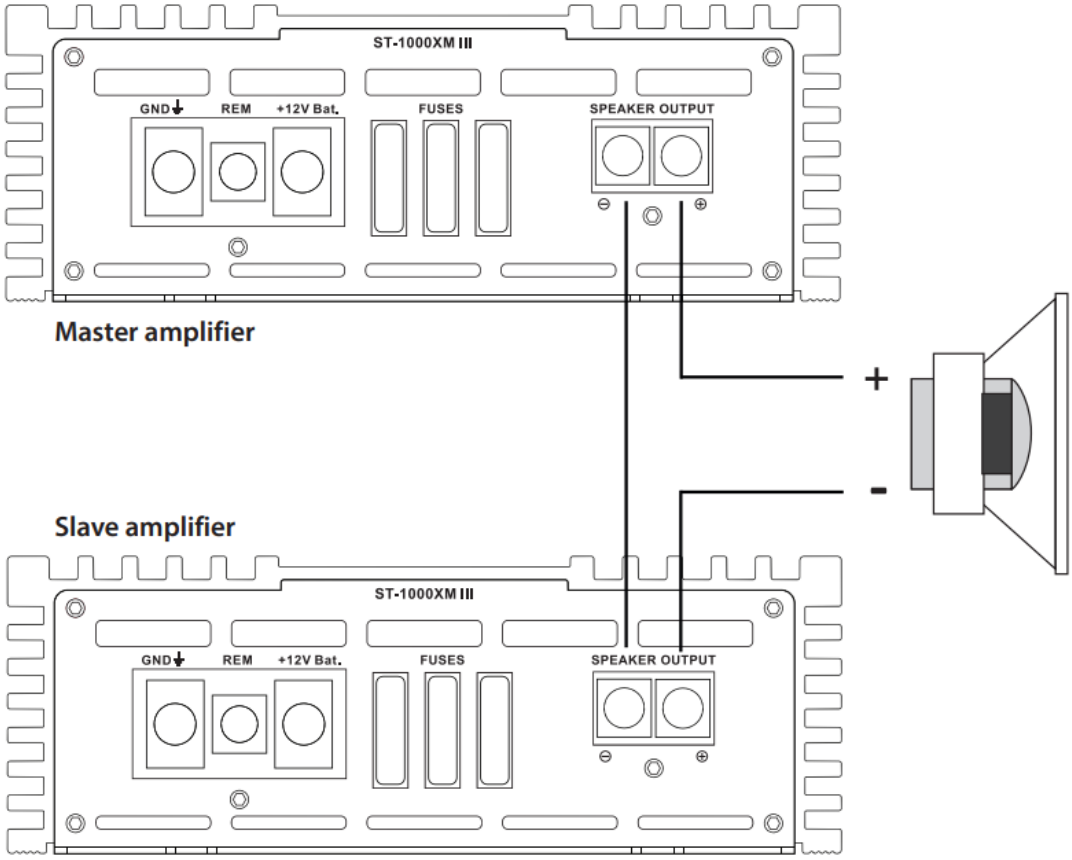
The ST-X Mono III amplifiers are true mono units and you can double their power by “strapping” two units of the same model together to drive a single voice coil. Always keep in mind that each amp must see a minimum load of 2 Ohm (1V per amp).



- Decide which amplifier will be the “master” and which will be the “slave” amplifier
- Connect the head unit bass output or full range output RCA to the R and L RCA inputs of the first (master) amplifier
- Connect the “Bridge Out” of the master amp amplifier to the “Bridge In” of the slave amplifier with a single RCA cable. Do not connect anything to the regular R and L Inputs of the slave amplifier
- Connect the Bass Remote to the Remote In of the master amplifier

The master amplifier is now the control amplifier. All the adjustments you make to the bass remote and to the master amplifier’s other controls will be transferred to the slave amplifier, and the slave amplifier will be driving the negative side of the signal and have no control functions of its own.

Strapping the Ouputs of the ST-X Mono III

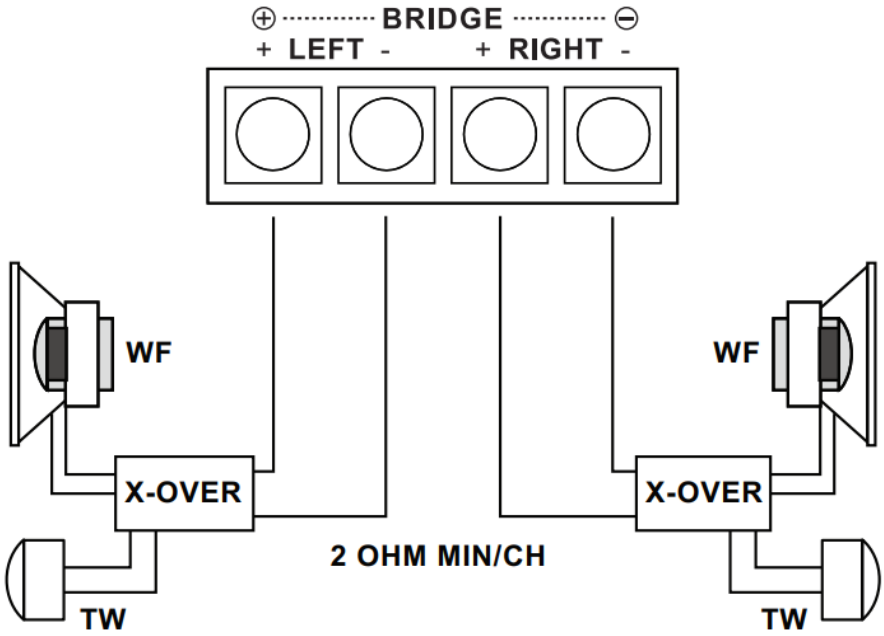


- Connect the master amplifier's speaker output + terminal to the + (positive) terminal of the woofer
- Connect the slave amplifier's speaker output + terminal to the – (negative) terminal of the woofer
- Connect the two amplifier's speaker output – (negative) terminals together

You are creating a much more powerful amplifier in this way and doubling the output.
Make sure your speaker wire can transfer the power, we recommend a minimum of 12 gauge speaker lead, and for best performances you should use 10 or 8 gauge.

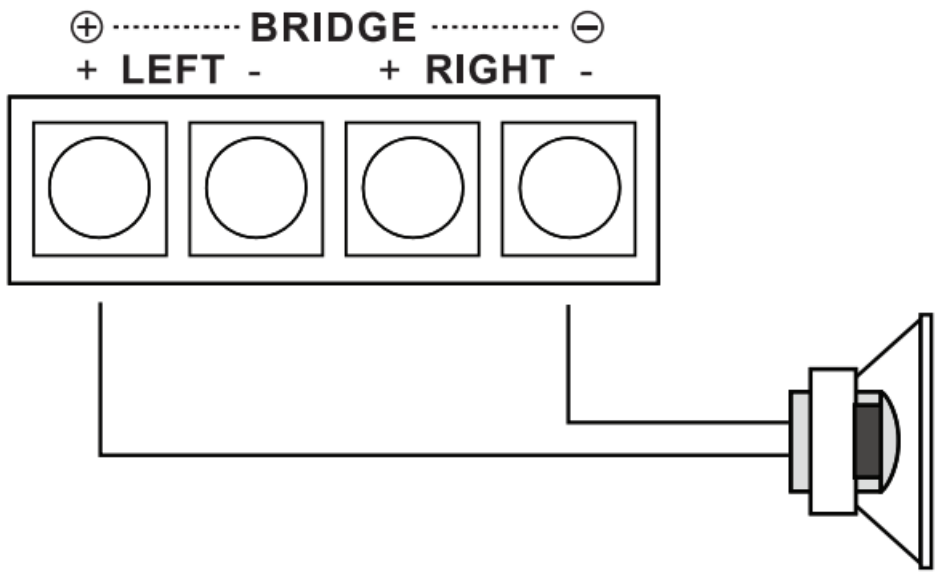
Speaker Wiring of the ST-X SQ III Amplifiers

The Very Basics
No speaker wires can be shorted to, or touching either ground or each other. This will put the amp into protect and may damage the amplifier. When bridging the left and right channels of any ST-X SQ III amplifier, you use the left channel (Ch1) positive and the right channel (Ch2) negative, as indicated on the chassis by the speaker terminals
2-Ch. Amplifer – Stereo Mode
A simple 2 channels hookup for a right and left stereo pair.



2-Ch. Amplifier – Single Channel Mode

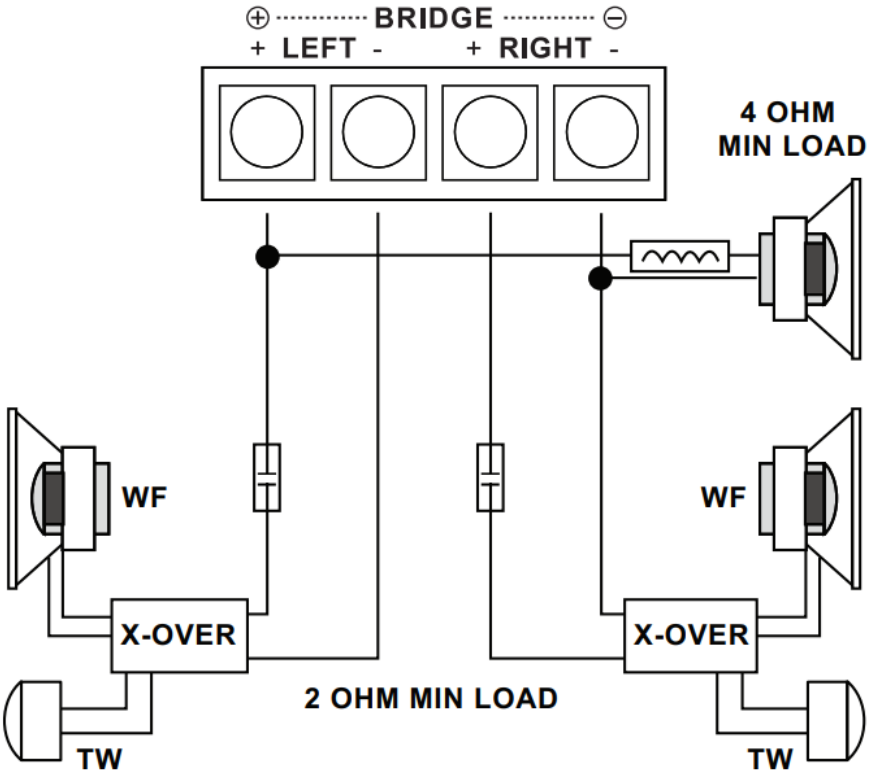
This method is used most often to drive a mono woofer but can also be used to run separate amplifiers for the right and left channel. The ST-X SQ III amplifiers are stable to 2Ω stereo and 4Ω Mono so the single bridged speaker must be of 4Ω minimum impedance



2-Ch. Amplifier – 3-Ch. 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.

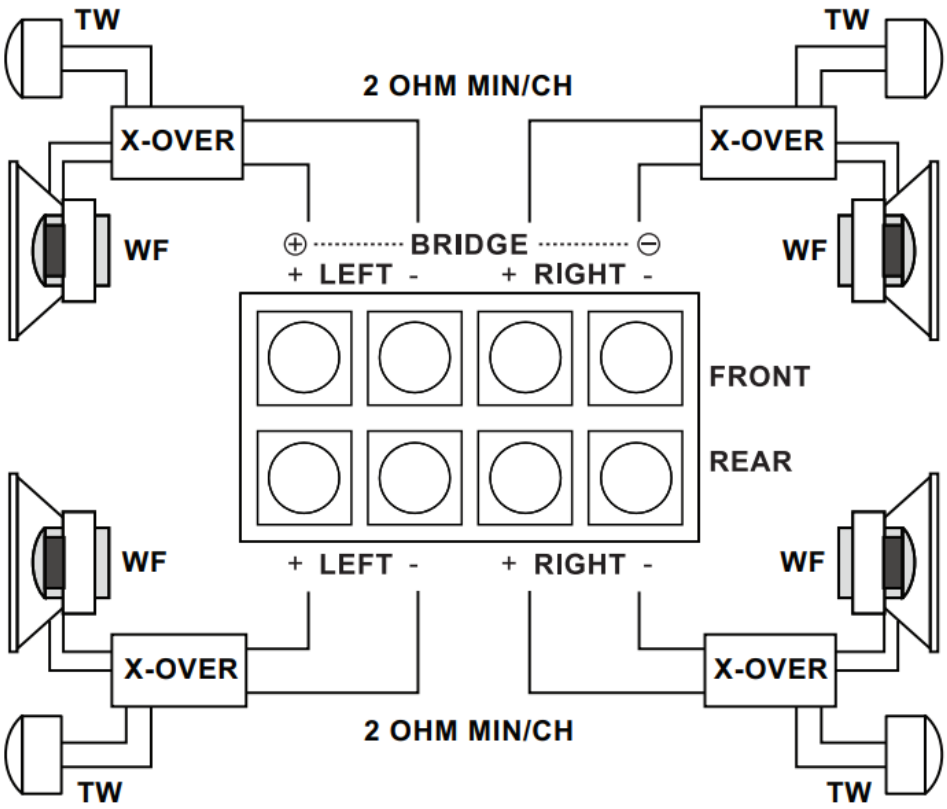
- Main speakers can be 2Ω~4Ω. Woofer can be 4Ω~8Ω but cannot be less than 4Ω (as in any bridged situation)
- The active amp crossovers are not used in this system



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.

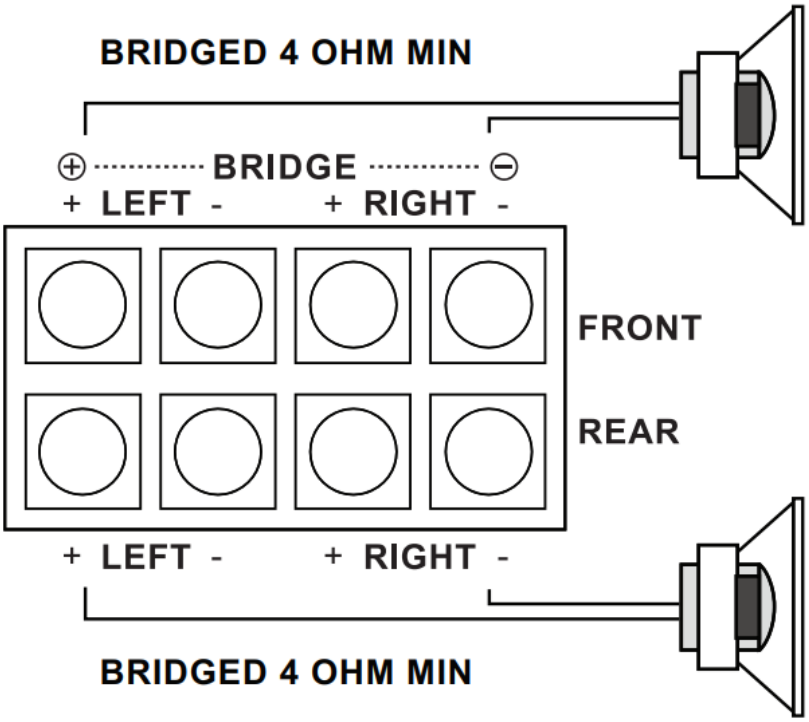
4-Ch. Amplifier – Stereo Mode

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



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

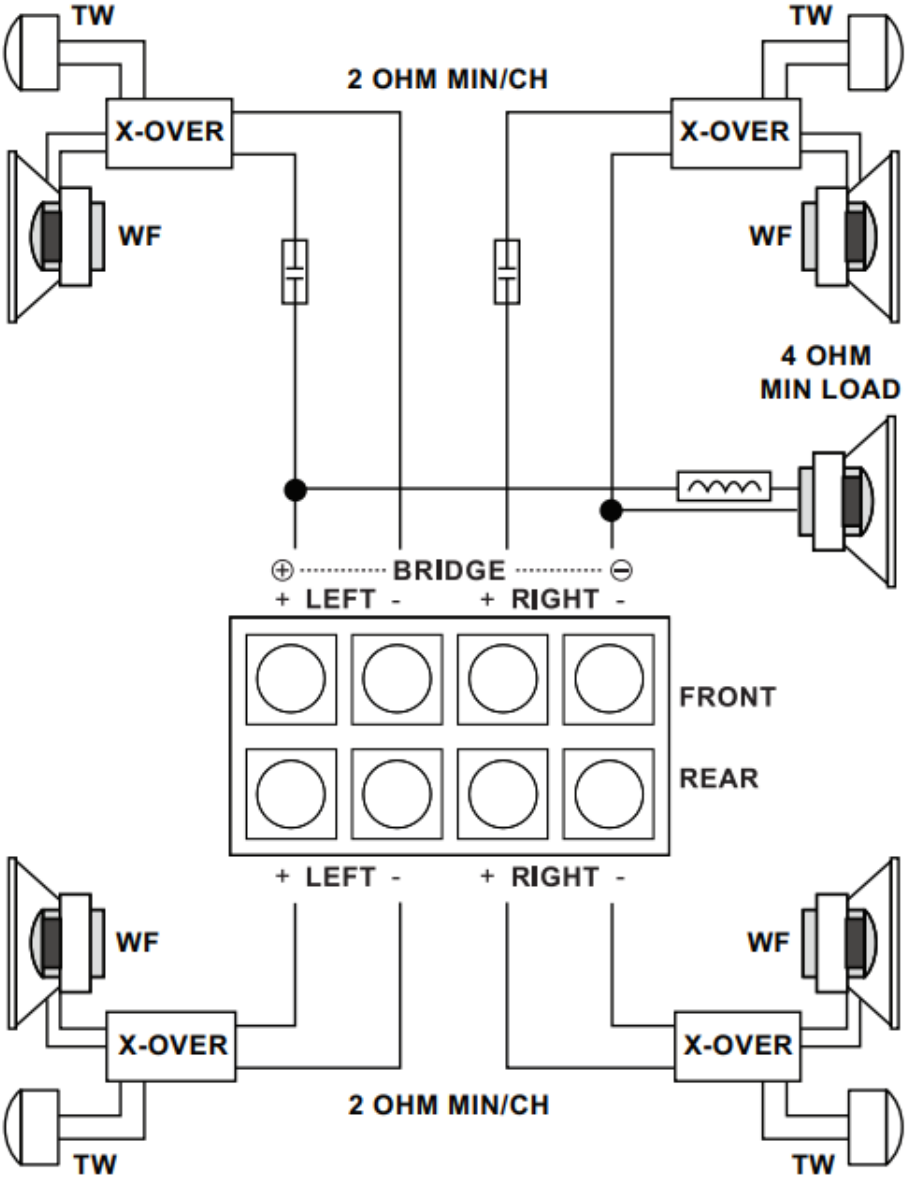
Similar to bridging a stereo amp to a mono woofer, you can use the 4-Ch amp in a dual mono mode to create (in this case) a stereo amp with 190 watts RMS/ch. As with any bridged setup the speakers must be a minimum of 4Ω impedance. If you are using the active crossovers you should be sure that they are set to the same frequency.



4-Ch. Amplifier – 5-Ch. Mode

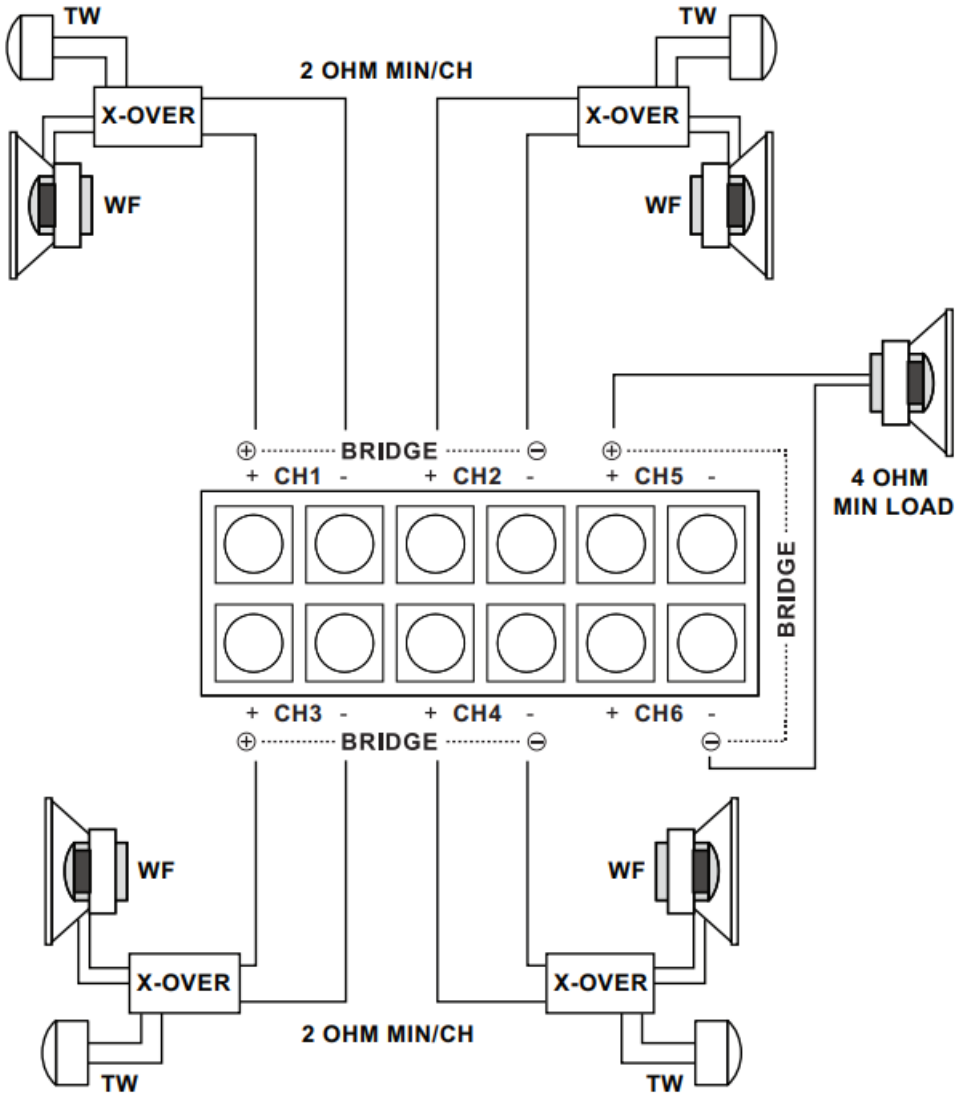
A 3-way system with front stage, rear stage and subwoofer in mixed mono configuration.

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 chan- nels are full range.



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
ST-2XP SQ III	2-Ch, Class AB	2 x 150 (4Ω) 2 x 250 (2Ω) 500 (Br, 4Ω)	< 0.1%	95dB	15Hz – 30KHz
ST-4X SQ III	4-Ch, Class AB	4 x 70 (4Ω) 4 x 95 (2Ω) 2 x 190 (Br, 4Ω)	< 0.1%	95dB	15Hz – 30KHz
ST-4XP SQ III	4-Ch, Class AB	4 x 150 (4Ω) 4 x 250 (2Ω) 2 x 500 (Br, 4Ω)	< 0.1%	95dB	15Hz – 30KHz
ST-6X SQ III	6-Ch, Class AB	6 x 100 (4Ω) 6 x 150 (2Ω) 3 x 300 (Br, 4Ω)	< 0.1%	95dB	15Hz – 30KHz
ST-500XM III	Mono, Class D	200 (4Ω) 300 (2Ω) 400 (1Ω)	< 0.1%	100dB	10Hz – 200Hz
ST-1000XM III	Mono, Class D	500 (4Ω) 700 (2Ω) 1000 (1Ω)	< 0.1%	100dB	10Hz – 150Hz
ST-1500XM III	Mono, Class D	800 (4Ω) 1150 (2Ω) 1600 (1Ω)	< 0.1%	100dB	10Hz – 150Hz
ST-2000XM III	Mono, Class D	1000 (4Ω) 1450 (2Ω) 2000 (1Ω)	< 0.1%	100dB	10Hz – 150Hz

ARPA of AMERICA, 801 Davis St. Unit C, Vacaville, CA 95687 – USA
ARPA of EUROPE, Via Isonzo snc, Centro L'Orologio – 04100 Latina – ITALY
ARPA of CHINA, Room201,Unit 7, Dahongshan Industrial zone, No.143 Guanlong Road, Guancheng Street, Dongguan City, Guangdong Province, CHINA, 523008
APEX GROUP – APEX Business Development (ABD) CO LTD
Bright Way Tower, office 04 7/Fl, 33 Mong Kok Road
Kowloon City, Hong Kong 999077

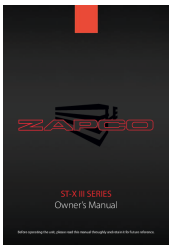
https://www.zapco.com

fb.com/zapcocaraudio

instagram.com/zapco_official

ZAPCO is a brand of APEX Group

Documents / Resources

	ZAPCO ST-X III Series Class A Amplifiers [pdf] Owner's Manual ST-X III Series, ST-X III Series Class A Amplifiers, Class A Amplifiers, Amplifiers

References

- Facebook
- ZAPCO - The Driving Force
- User Manual