



ST-X III SERIES
Owner's Manual

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

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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Protect your audio investment by using the correct type of wire for Power and Ground.
See **All Wire is not created equal** on Page 6

A new level of Sound Quality

Zapco has a reputation for sound quality that is unsurpassed. It is our dedication to sonic purity and our passion for performance that built that reputation. With all the new amplifiers coming into the market, none has been any threat to Zapco's standing as the premiere amp and processor company for pure sound quality.

Just check out the audio competition scene. The pros know what to use to win. Competition amps however, do not come cheap, and not everyone wants to compete. The challenge then, was to put Zapco's 40 plus years of experience to use in the development of an amplifier that would bring Zapco sound a line of products for everyday use and that everyone could afford. And the studio line is just that amplifier. In the time it has been out it has built a reputation as the best sounding amp in the class.

Of course, not everyone buys strictly by sound (although they should). Maybe it's the wrong color, maybe it's too big... or too small. But one thing is constant. Everyone who hears the studio amps agrees; it sounds better than any other product in the class.

History of the Studio Series

Perfection cannot be achieved. But that does not make its pursuit less valuable. Zapco is committed to making every product we make better than the last. We introduced the ST-X amps in 2013. In 2015 we improved the PCB design and upgraded components to make the sonically improved ST-X II.

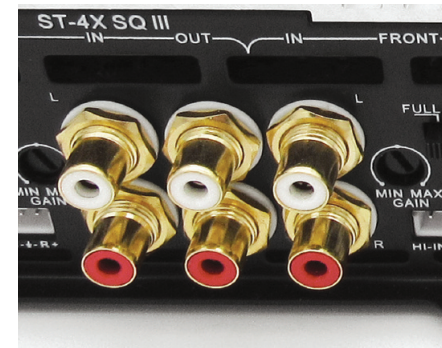
Three years ago we introduced the Studio-X SQ amplifier to take affordable sound quality to a new level. We added the proprietary RCA connectors from the Z-LX amplifiers, changed the capacitors to a higher end audio cap, and made a few other small changes. All this takes took the Studio sound to a new level of sonic performance for an affordable amplifier.

This year we bring you the Studio-SQ III series with a new high efficiency finned chassis and temperature controlled fans to assure that your amplifier plays all day long with no problems of overheating, even when you get that urge to really boogie. And with the new chassis, we even made a few tweaks to the internal components to take the sound quality up another notch.

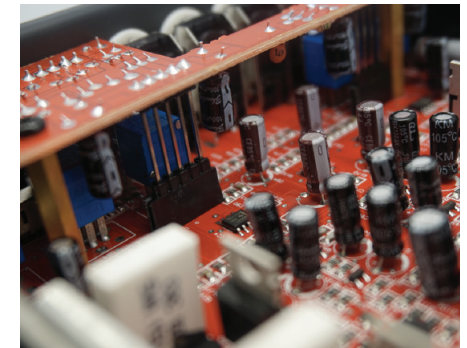
The Studio-X SQ Amplifiers

With the new Studio-X SQ III you get the sound quality that other companies offer only in their big competition amps (and better than many of them) in a new fan cooled aluminum heat sink for improved efficiency and reliability, with 70W RMS/Channel @ 4Ω and 95W RMS/channel @ 2Ω (100W/Ch. @ 4Ω and 150W/Ch. @ 2Ω for the ST-6X SQ III). You also get plenty of features, like 12dB/octave multi-function crossovers, bass boost, variable gain and even pass-through RCA outputs so you can daisy chain amps.

As for performance, the Studio-X SQ III gives you more than power. These amps have less than 0.1% THD+noise and over 95dB signal to noise for multi-ch. amps; less than 0.1% THD+noise and over 100dB signal to noise for mono amps.



Tiffany style Panel Mount RCA



SQ Upgrades: Op-amps, Caps, Etc.



Temperature controlled keeps air moving but only when really needed. New finned aluminum Chassis helps move heat off the output devices.

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 objects, including brake, gas and clutch pedals, etc.

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.

Upgrading a Factory Stereo

If you are upgrading a factory stereo, the ST-X SQ amps have a separate speaker level input plug that senses current, so you do not need to run a turn-on wire. However, auto-on is not useful in all cars as the amplifier can come on in some cars even when the stereo is not on, because of the car's electrical system. The ST-X SQ amps have a switch that allows you to defeat the auto-on if you find you do not want to use that function.

All Wire is not created equal

Please 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!

If the wire does not say OFC Copper wire or Solid Copper wire do not use it.

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.

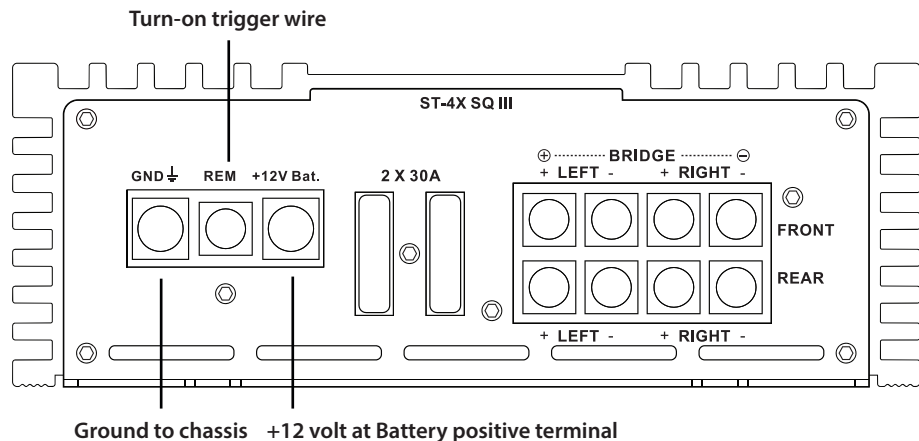
Planning your power connections

The power end plates of the Zapco ST-X III amplifiers carry the power connections and the speaker connections and vary somewhat by the number of channels. The main 12-volt power input, the 12-volt turn-on wire, and the main Ground connection are common to both models.

- The large 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 large 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 ST-X III amplifiers have terminals that do not require connectors. You simply insert a bare portion of wire and tighten the connection with the supplied Hex tool. 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

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.

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. 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.

Mounting your ST-X III amplifier

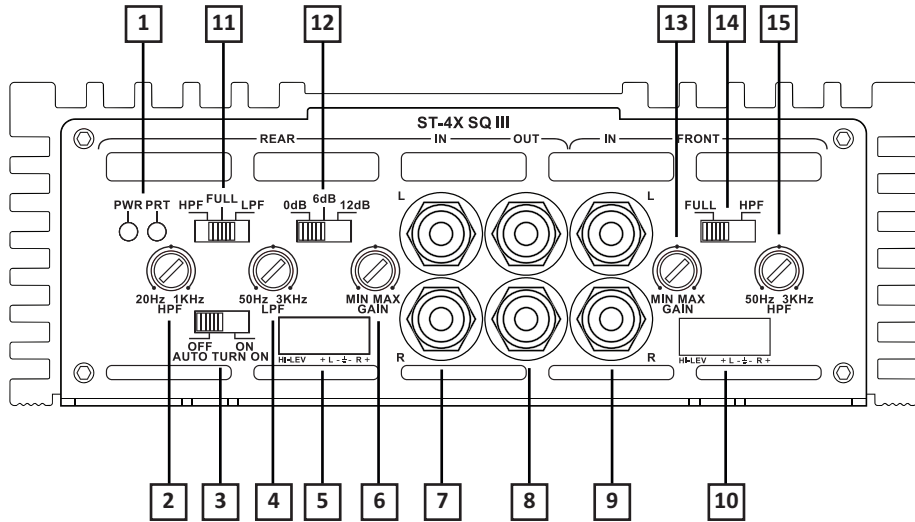
Mounting your Zapco amplifier is easy. Just keep in mind a few guidelines:

- 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 plates clear for future access
- 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.

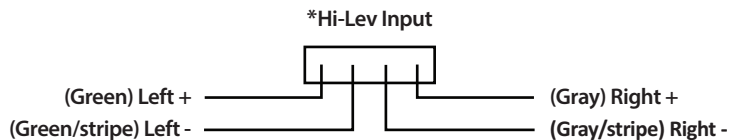
ST-X SQ III Input/Controls

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



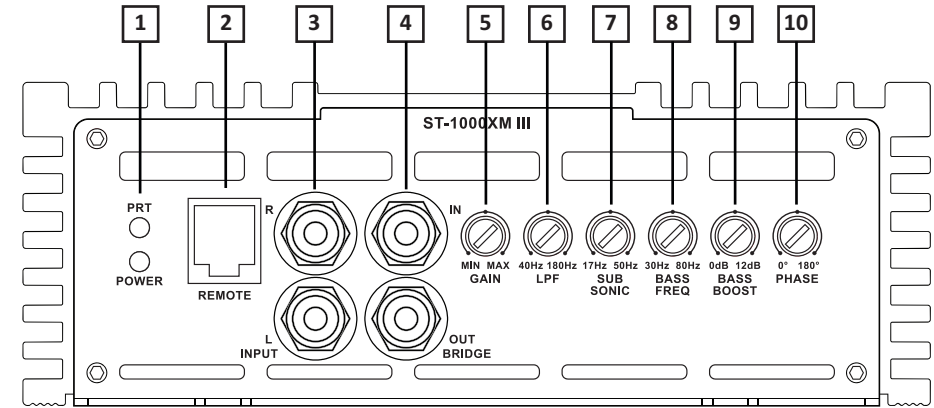
- 1• Green power-on LED and red protect LED
- 2• Rear High Pass frequency control
- 3• Auto-on switch for OEM integration
- 4• Rear Low Pass frequency control
- 5• Rear speaker level input plug for OEM hookup
- 6• Rear channels variable gain control
- 7• Rear channels RCA inputs
- 8• Pass through RCA output (rear channels can feed another)

- 9• Front channels RCA inputs
- 10• Front speaker level input plug for OEM hookup*
- 11• Rear crossover function switch for high pass, full range, or low pass
- 12• Rear channels Bass Boost switch for 0, 6dB, or 12dB
- 13• Front channels variable gain control
- 14• Front crossover function selector for full range of high pass
- 15• Front High Pass frequency control



ST-X Mono III Input/Controls

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

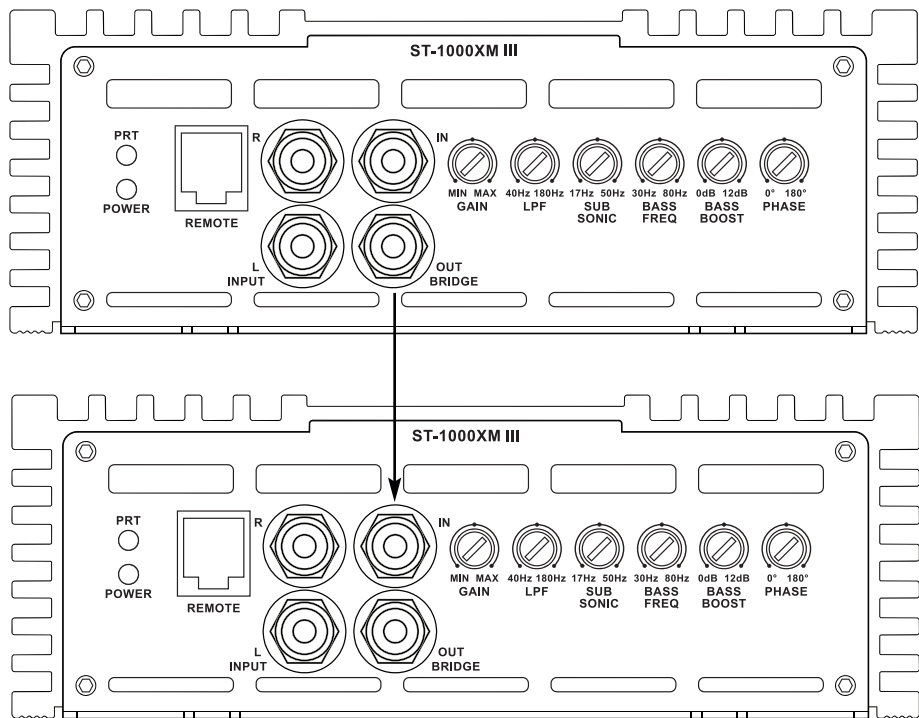


- 1• Green power-on LED and red protect LED
- 2• Remote control for the bass aoutput
- 3• RCA inputs
- 4• Bridge In and Out to "strap" mono amps so they can work together to drive a single speaker
- 5• Variable gain control

- 6• Low Pass frequency control
- 7• Subsonic filter
- 8• Bass boost frequency control sets the center point of the boost
- 9• Bass Boost level
- 10• Phase control

Strapping the ST-X Mono III

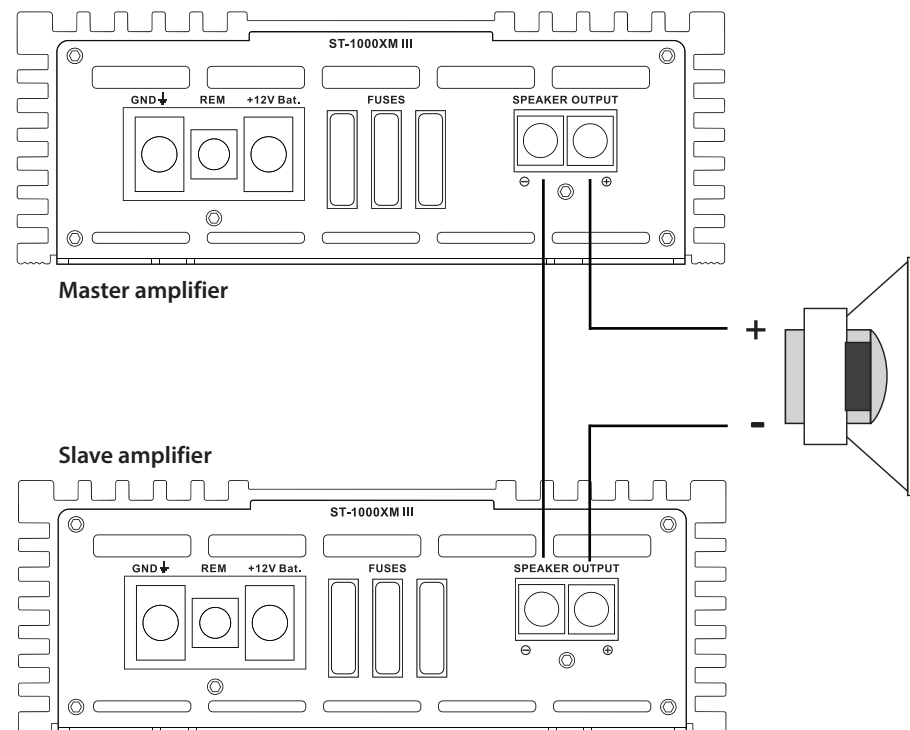
The ST-X Mono III amplifiers are true mono units and you can double their power by “strapping” two units of the same model together to drive a single voice coil. Always keep in mind that each amp must see a minimum load of 2 Ohm (1V per amp).



- 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 Outputs 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.

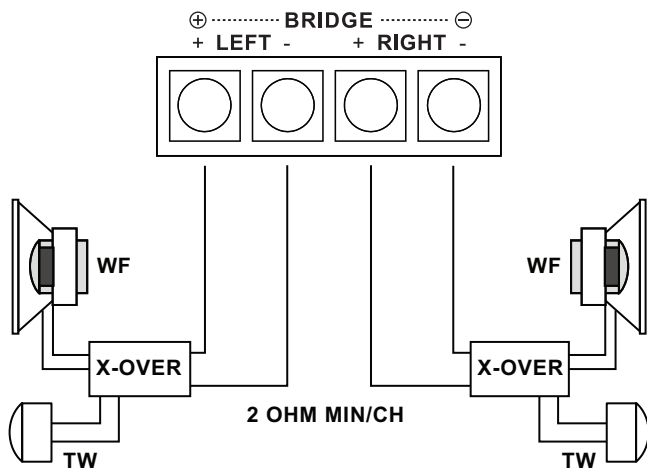
Speaker Wiring of the ST-X SQ III Amplifiers

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

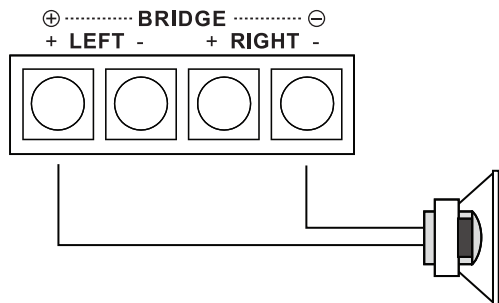
2-Ch. Amplifier - Stereo Mode

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



2-Ch. Amplifier - Single Channel Mode

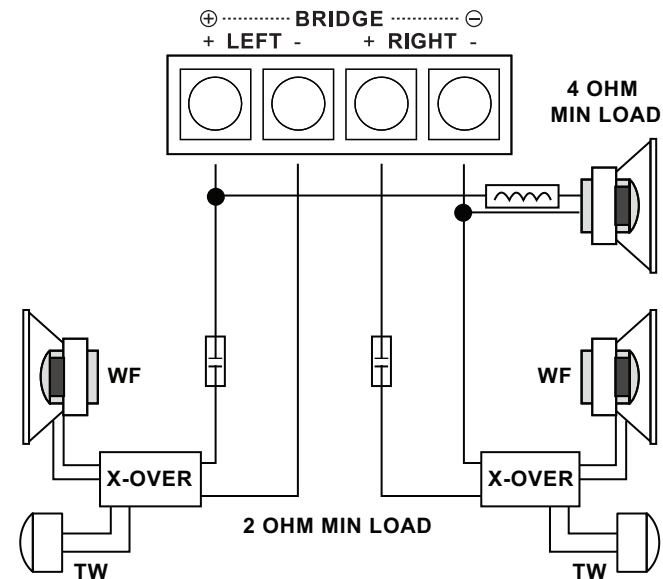
This method is used most often to drive a mono woofer but can also be used to run separate amplifiers for the right and left channel. The ST-X SQ III amplifiers are stable to 2Ω stereo and 4Ω Mono so the single bridged speaker must be of 4Ω minimum impedance



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.

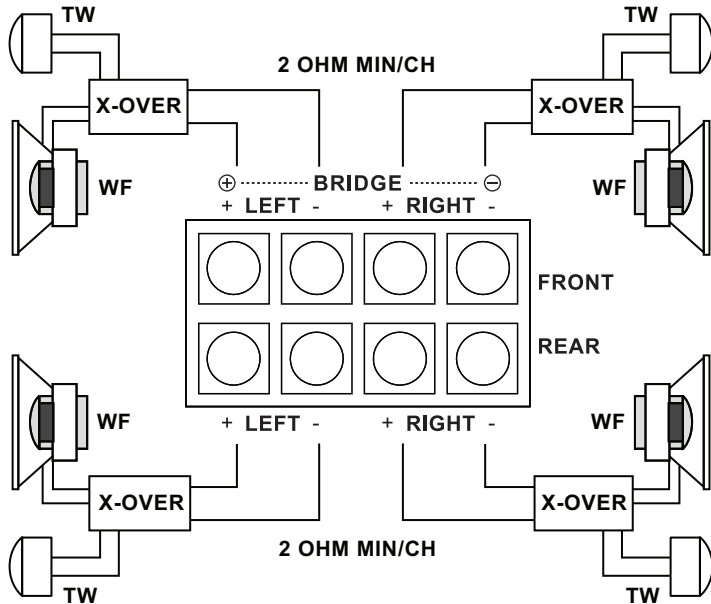
- Main speakers can be 2Ω~4Ω. Woofer can be 4Ω~8Ω but cannot be less than 4Ω (as in any bridged situation)
- The active amp crossovers are not used in this system



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.

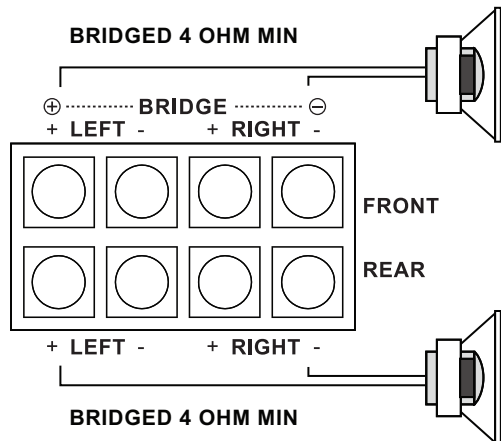
4-Ch. Amplifier - Stereo Mode

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



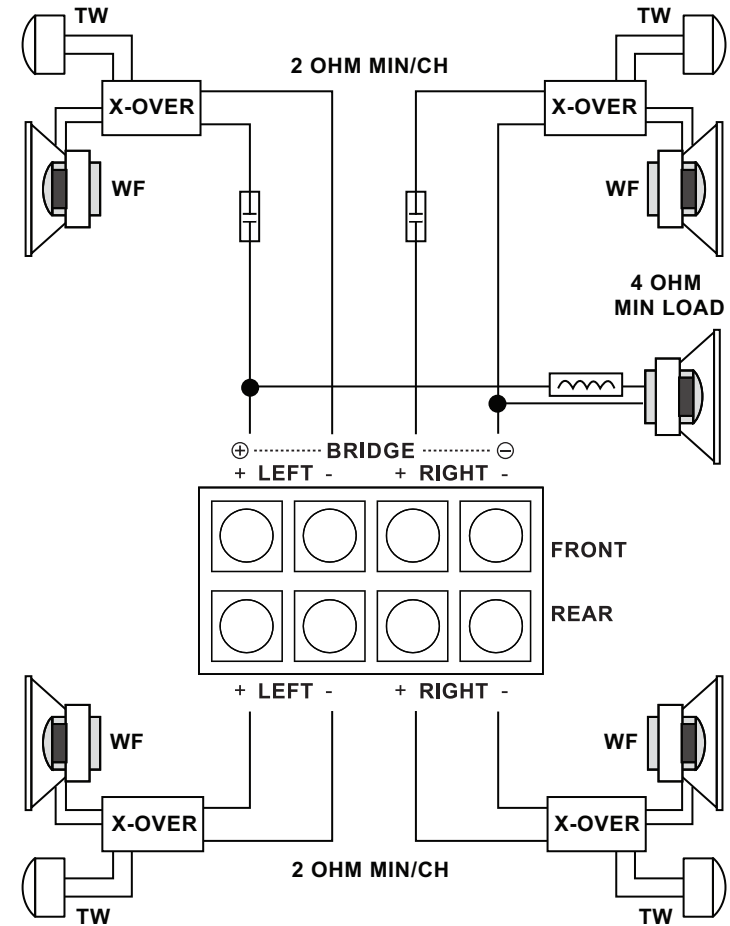
4-Ch. Amplifier - High Power 2-Ch. Mode

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.



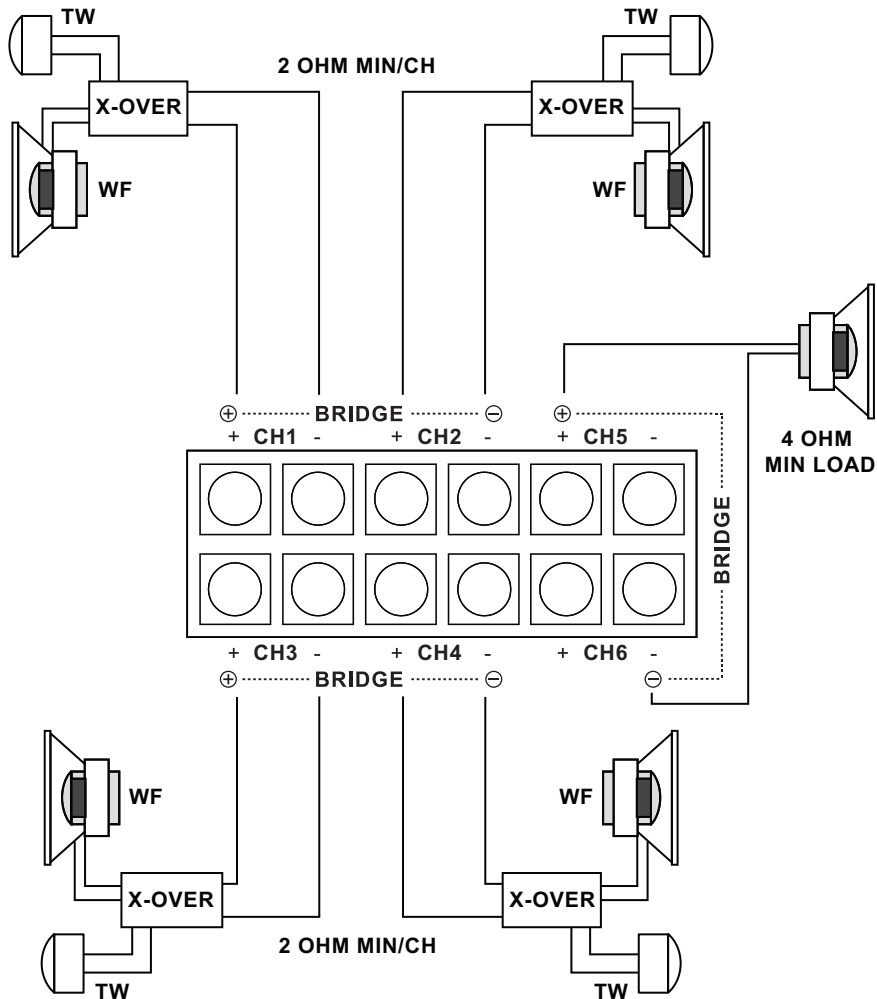
4-Ch. Amplifier - 5-Ch. Mode

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 channels 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-2X SQ III	2-Ch, Class AB	2 x 140 (4Ω) 2 x 190 (2Ω) 380 (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-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) 500 (1Ω)	< 0.1%	100dB	10Hz - 200Hz
ST-1000XM III	Mono, Class D	450 (4Ω) 750 (2Ω) 1050 (1Ω)	< 0.1%	100dB	10Hz - 150Hz
ST-1500XM III	Mono, Class D	750 (4Ω) 1100 (2Ω) 1650 (1Ω)	< 0.1%	100dB	10Hz - 150Hz
ST-2000XM III	Mono, Class D	1000 (4Ω) 1500 (2Ω) 2000 (1Ω)	< 0.1%	100dB	10Hz - 150Hz

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



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