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GRALE
SERIES

2000
ORION

CS100.2
Power Amplifier

CS150.2
Power Amplifier

ORION
HIGH PERFORMANCE CAR AUDIO



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INTRODUCTION

Thank you for your purchase of ORION s COBALT power amplifier. The COBALT line of amplifiers are designed to deliver all of the power and performance expected of an ORION product at an affordable price. Your COBALT amp is packed with features and performance. Reading this manual cover to cover will help you get the most from your amplifier in both performance and reliability.

COBALT CS100.2- 50 watt per channel,2 channel amplifier with continuously variable high pass or low pass crossover. Also equipped with 0-12dB XTRA BASS CONTROL circuit.

COBALT CS150.2- 90 watt per channel,2 channel amplifier with continuously variable high pass or low pass crossover. Also equipped with 0-12dB XTRA BASS CONTROL circuit.

The installation of your COBALT amplifier will determine its performance. For best results please have your local authorized OIRON dealer install your amp. They have been trained by ORION to maximize the performance of our products. Should you decide to install your new amplifier yourself, please be sure to read this manual carefully. If you should need assistance, contact the technical support team at ORION at (480)705-5600. They are able to answer the questions you might encounter while attempting to install the amplifier.

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ABOUT THIS MANUAL

This manual is designed to answer your questions about this product. In the event you have questions not covered in this manual, please refer questions to your local Authorized ORION Dealer. Additionally, you can call ORION s Technical Support Hotline at (480) 705-5600 for assistance.

PRACTICE SAFE SOUND

Continuous exposure to sound pressure levels over 100 dB may cause permanent hearing loss. High powered automotive sound systems can generate sound pressure levels in excess of 130 dB. When playing your system at high levels, please use hearing protection and prevent long term exposure.

RECORD YOUR SERIAL NUMBER AND DATE:

MODEL: _____

SERIAL NUMBER: _____

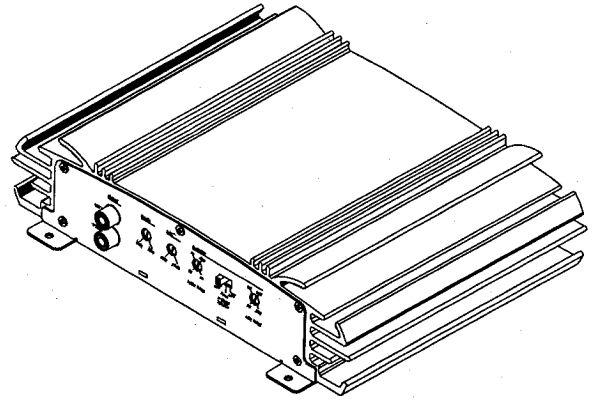
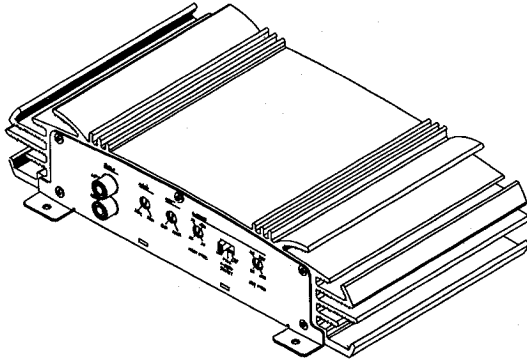
DATE OF PURCHASE: _____

COMPANY PURCHASED FROM: _____

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WHAT'S IN THE BOX

QTY	DESCRIPTION
1	COBALT Power Amplifier
1	COBALT Reference Manual



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ORION Industries Inc. warrants this product to be free from defects in material and workmanship under the following terms:

Parts and Labor are warranted for a period of 1 year IF:

- a. The product is purchased from an Authorized ORION Dealer
- b. The product is installed by an Authorized ORION Dealer

Parts and Labor are warranted for a period of 90 days year IF:

- a. The product is purchased from an Authorized ORION Dealer
- b. The product is NOT installed by an Authorized ORION Dealer

Parts and Labor are warranted for a period of 90 days IF:

- a. The product is NOT purchased from an Authorized ORION Dealer

If you are uncertain as to whether your dealer is authorized, please contact ORION at (480) 705-5600. In countries other than the USA, each distributor warrants the ORION product it sells.

The Following conditions and situations are NOT covered by this warranty:

Any product on which the serial number has been defaced, modified or removed

Damage or malfunction resulting from:

- a. Accident, misuse, abuse, unauthorized modification or failure to follow the instructions provided with this product.
- b. Repair by anyone NOT authorized by ORION.
- c. Damage due to shipping (these claims must be presented to the freight carrier).
- d. Removal or installation of this product.
- e. Any failure that has NOT been caused by a defect in material or workmanship.

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This warranty is in effect for the original purchaser only. ORION will pay labor and material expense for covered items. ORION does not cover removal or installation charges, payment of shipping charges to ORION, payment of OUT-OF-WARRANTY shipping charges, or damage to other property caused by any defects in this product.

For all warranty and non-warranty service issues, please refer to your nearest Authorized ORION Dealer for assistance. If you require additional information or assistance regarding service repair issues, please call (480) 705-5600.

Exclusion

1. This warranty is in lieu of all other warranties expressed or implied
2. In no event will ORION be liable for any consequential damages resulting from the use of this product or any defect of this product.

This Warranty gives you specific legal rights and you may also have other rights which vary from state to state.

SAVE YOUR RECEIPT!



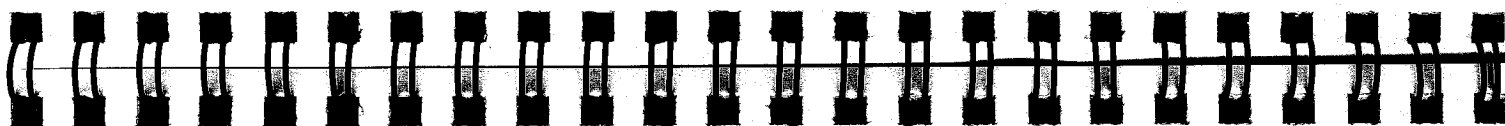
SPECIFICATIONS

AMPLIFIER SECTION	CS 100.2	CS 150.2
Power output 4 Ohm Stereo (watts)	50 watts	90 watts
Power output 2 Ohm Stereo (watts) ¹	70 watts	140 watts
Power output 4 Ohm Mono (watts) ¹	140 watts	260 watts
Distortion all channels driven (from 20Hz to 20kHz)	<.05% THD	<.05% THD
Frequency Response	20Hz to 20kHz 0.5 dB	20Hz to 20kHz 0.5 dB
Linear Bandwidth	6Hz to 50 kHz 3dB	6Hz to 50 kHz 3dB
Signal-to-noise ratio full bandwidth @ rated output power	> 100 dB	> 100 dB
Damping factor @ output connector full bandwidth	>300 at output connector	>300 at output connector
Slew Rate	> 45V/ s	> 45V/ s
Input sensitivity ³	150mV to 2.5 Vrms	150mV to 2.5 Vrms
Input impedance	10kΩ	10kΩ
Fuse type	25A AMP ATC	20A x 2 AMP ATC

SPECIFICATIONS (CONT.)

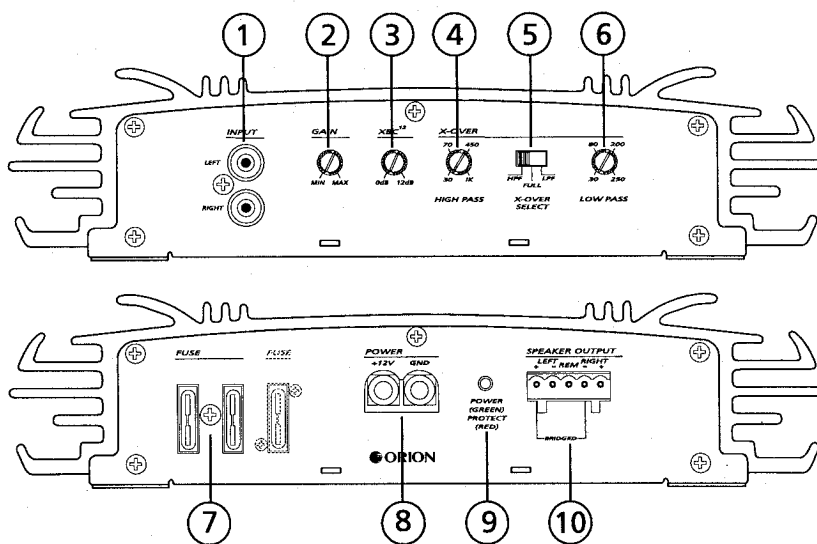
CROSSOVER	CS 100.2	CS 150.2
Low-pass crossover†	Continuously variable	Continuously variable
Low-pass frequency range	30Hz to 250Hz	30Hz to 250Hz
High-pass crossover	Continuously variable	Continuously variable
High-pass frequency range	30Hz to 1kHz,	30Hz to 1kHz,
XBC12 boost range	0dB to 12dB @ 45Hz	0dB to 12dB @ 45Hz
GENERAL	6.9" x 10.5" x 2.3" 175mm x 266mm x 59mm (L x W x H)	8.3" x 10.5" x 2.3" 210mm x 266mm x 59mm (L x W x H)

1. All channels driven, continuous 4 W load, 20 Hz to 20,000 Hz, <.05% THD, power input voltage at 13.8 VDC.
2. All channels driven, continuous 2 W load, 20 Hz to 20,000 Hz, <.05% THD, power input voltage at 13.8 VDC.
3. Crossovers are with a slope rate of 12 dB/Octave.



END PANEL LAYOUT

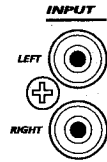
1. Input RCA Jacks- Accepts line level RCA inputs from a head unit or ORION signal processor.
2. Gain Control- Adjusts the input gain of the amplifier to accept different levels of signal inputs.
3. XBC12- Controls the amount of 40Hz boost form 0dB-12dB
4. High Pass X-Over Frequency Control- Adjusts the crossover frequency from 30Hz to 1kHz. Crossover frequency is set by the number of detents on the pot (see guide on page13)
5. X-Over Selection Switch- Determines whether the cross over runs high-pass, full range, or low-pass.
6. Low Pass X-Over Frequency Control- Adjusts the low-pass frequency point from 30Hz to 250Hz. Crossover frequency is set by the number of detents on the pot (see guide on page12)
7. Fuse- Protects the amp from damage from dangerous amounts of current.
8. Power/Ground Connections: Removable plug that accepts up to an 8ga power and ground connections.
9. Power LED- Illuminates green when the amplifier is on. LED will turn to red when the amp goes into protection mode.
10. Speaker Connections- Removable plug that accepts up to 12ga speaker wire. Also contains the amplifier's remote 12VDC turn on lead.



ADJUSTING THE AMPLIFIER

RCA INPUTS

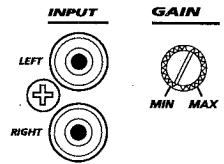
The RCA inputs will accept line level signals from the preamp output of most aftermarket head units or from ORION accessories such as the 300 PSW. Run the signal wires from the source unit to the amplifier and plug them in.



GAIN ADJUSTMENT

The GAIN control adjusts the gain level of the amplifier. This is used to match the signal level of various head units to the amplifier. To adjust the gain of your amplifier follow these steps:

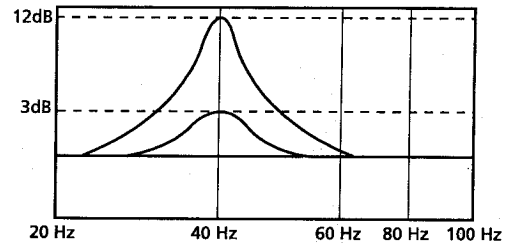
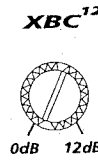
- 1) Adjust the input gain controls of the amplifier to just above the minimum level (fully counterclockwise).
- 2) Use a clean source (CD) with dynamic music content and adjust the head unit volume to just below the distortion point (usually about 3/4 of full volume).
- 3) Increase the amplifier's gain (clockwise) until you hear audible distortion. At this time, decrease the gain to just before the amount of distortion. This setting will minimize background noise and prevents overload.



XBC¹²

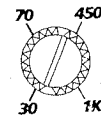
The XBC12 control allows you to boost your bass by up to 12dB! XBC12 boosts the low end bass centered at 40Hz, by anywhere from 0dB to 12dB. This will dramatically alter your bass response. Set according to personal listening tastes and woofer capabilities. Listen carefully for distortion when setting the boost.

CAUTION: Be careful when determining the amount of XBC12. Adding too much to a subwoofer that is not capable could result in damage to your subwoofer. XBC12 should NEVER be used on mid-range speakers.



HIGH PASS X-OVER FREQUENCY CONTROL

The high pass crossover frequency control adjusts the frequency point of the high pass crossover from 30Hz to 1kHz. You can determine the exact frequency point by counting the "clicks" while adjusting the frequency control. See the chart to the right and counting the "clicks" while adjusting the frequency control. The high pass crossover can be used when running midrange speakers to prevent them from playing inefficient lower frequencies that they are not designed to play.

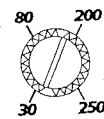


HIGH PASS

0 Clicks.....	30Hz
14 Clicks.....	70Hz
26 Clicks.....	450Hz
41 Clicks.....	1kHz

LOW PASS X-OVER FREQUENCY CONTROL

The low pass crossover frequency control adjusts the frequency point of the low pass crossover from 30Hz to 250Hz. You can determine the exact frequency point by using the chart on the next page and counting the "clicks" while adjusting the frequency control. See the chart on to the right for exact frequency counts. The low pass crossover should be used when using the amplifier for subwoofers.

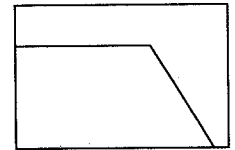
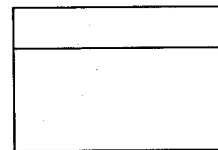
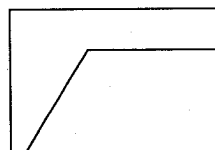


LOW PASS

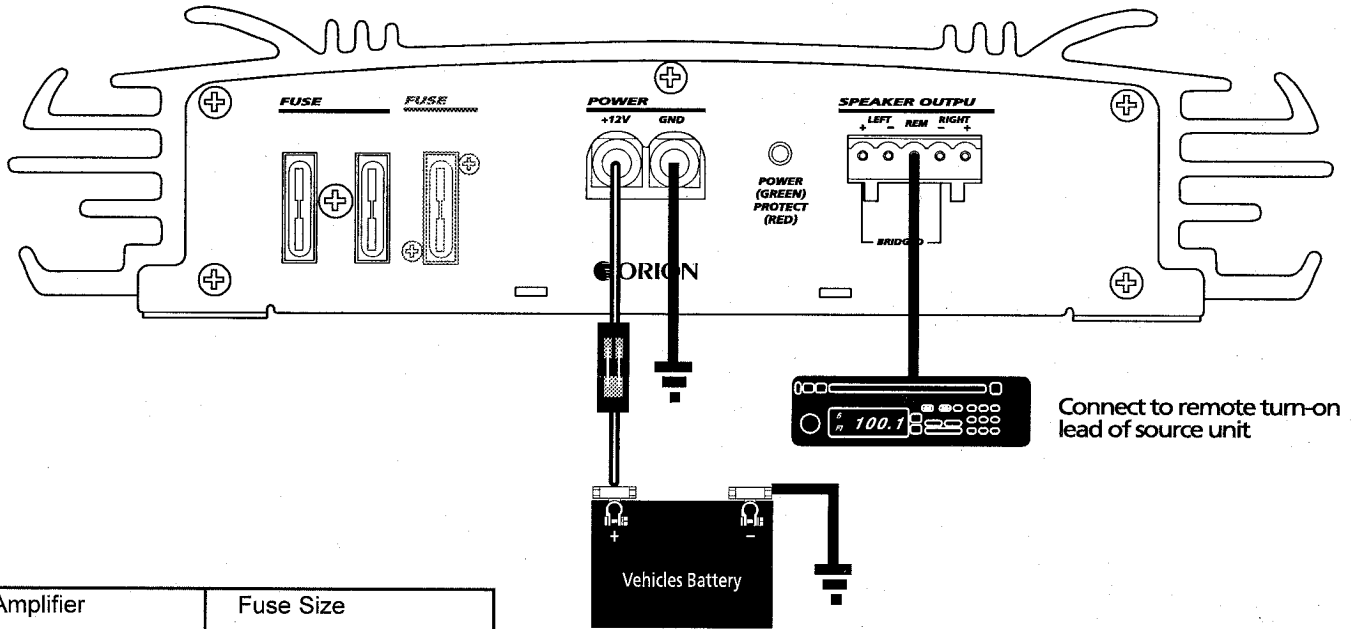
0 Clicks.....	30Hz
14 Clicks.....	80Hz
26 Clicks.....	200Hz
41 Clicks.....	250kHz

X-OVER SELECTION SWITCH

The crossover selection switch determines whether the amplifier will operate in low pass, high pass, or full range mode. In high pass mode, it will play the frequency set on the high pass frequency control and above. In low pass, it will play the frequency set on the low pass crossover frequency control and below. In the full range position, the settings of both the high pass and the low pass frequency control will have no effect on the amplifier.



POWER CONNECTIONS CS100.2 AND CS150.2



Amplifier	Fuse Size
CS100.2	25 AMP
CS150.2	(2) 20 AMP

MAKING POWER GROUND AND REMOTE CONNECTIONS

Solid power and ground connections will improve both the performance and reliability of your new COBALT amplifier. Read the following section carefully to ensure proper performance and safety.

WARNING: Dangerous amounts of current exist in an automobile's electrical system. Use caution when installing your amplifier.

POSITIVE POWER CONNECTION:

Before starting to run your power connections, make sure that you disconnect the negative (-) terminal of your battery. This will prevent a short of your battery to ground. It will also help to keep you from getting shocked during the install process.

It is very important to properly fuse your positive power connection. The fuse (or circuit breaker) should be placed in the positive power connection no more than 18 inches from your battery (see diagram on previous page).

GROUND CONNECTION:

Your amplifier ground should be located as close as possible to your amplifier. Use the same gauge wire as your power connection. Find an area about the size of a quarter and use sandpaper to scrape the paint away to bare metal.

Terminate the ground wire with a ring connector. Using a sheet metal screw or a bolt, attach the ground to the bare metal.

We recommended that you coat both sides of the connection with silicone or some similar material to prevent corrosion and performance decreases.

REMOTE TURN ON LEAD:

Locate the lead on your headunit marked "remote" or "power antenna."

Connect your turn on wire to this lead and run it to your amplifier. Insert the wire to the connection marked REM.

TWO CHANNEL STEREO CONFIGURATION

Speaker connectors will accept up to 16 gauge wire

Recommended configuration for midrange speakers

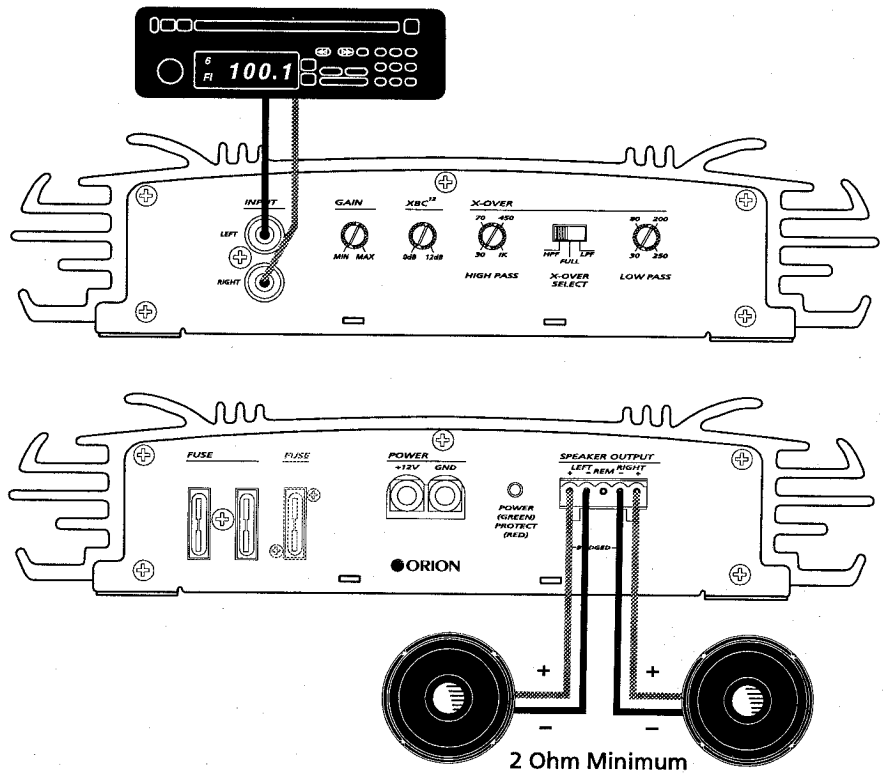
XBC12 should be set to 0dB when using midrange speakers

Lowest recommended impedance is 2 Ohms stereo

Set the gain according to the procedure on page 11

We suggest using the high pass crossover to increase the efficiency of your midrange drivers

Set the high pass crossover frequency above the lower operating range of the speakers. 100Hz is an average setting



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MONO BRIDGED CONFIGURATION

Speaker connectors will accept up to 16 gauge wire

Recommended configuration for subwoofers

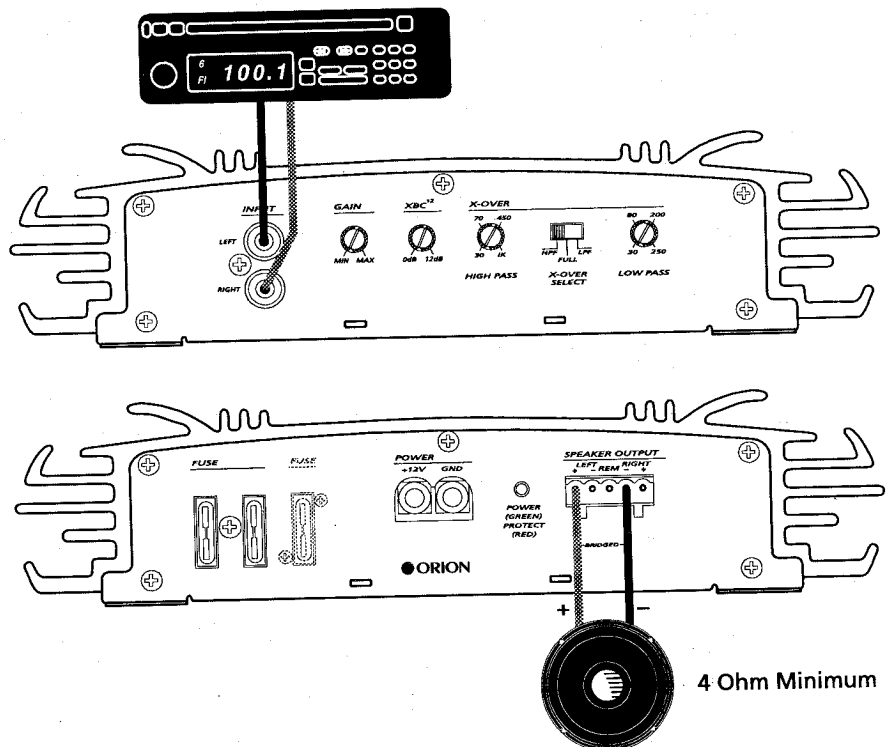
Set XBC12 according to listening preference (page 11)

Lowest recommended impedance is 4 Ohms mono

Set the gain according to the procedure on page 11

Crossover selection should be set to low pass to prevent high frequencies from playing through subwoofers

Set the low pass crossover frequency according to system integration and woofer capabilities. 80 Hz is a typical starting point



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TRI-MODE CONFIGURATION

Speaker connectors will accept up to 16 gauge wire

Allows you to run an entire system on one amplifier

Use capacitors on the midrange drivers to block lower frequencies

Use a coil on the subwoofer to block higher frequencies

Ensure that the selected values of the capacitors and coils do not cause a frequency overlap

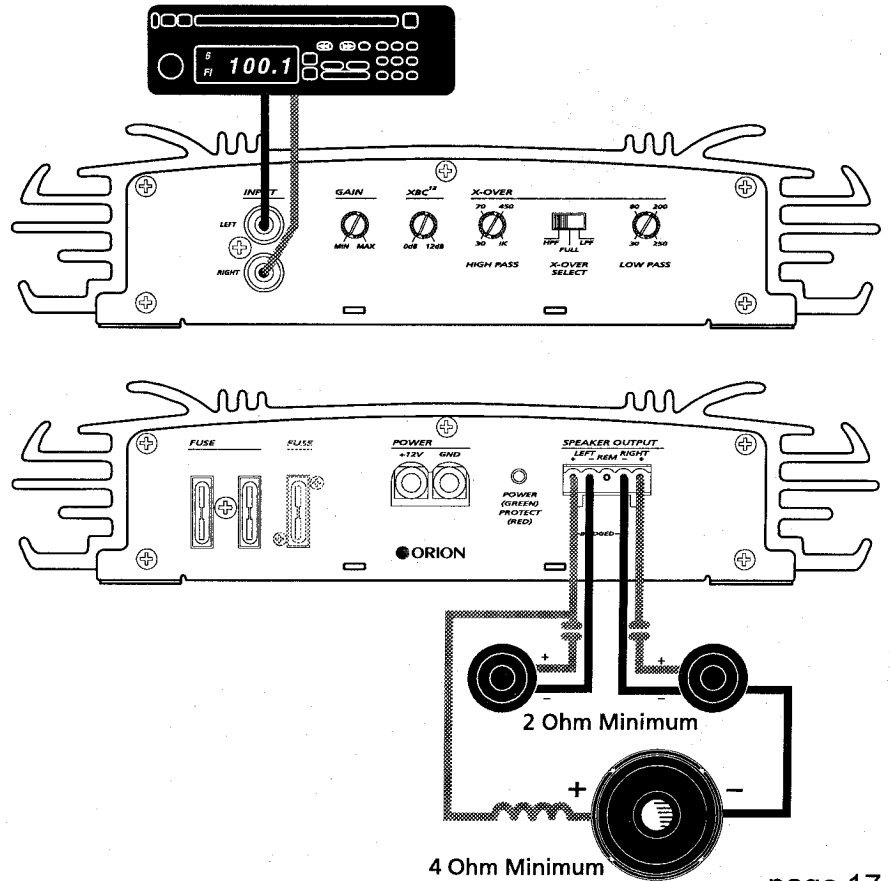
Lowest recommended stereo impedance is 2 Ohms

Lowest recommended subwoofer impedance is 4 Ohms

Set XBC12 to 0dB to prevent damage to midrange speakers

Set the gain according to the procedure on page 11

Crossover selection should be set to full range. Crossover frequencies will be determined by the values of the capacitors and coils in the passive crossover network (page 12)



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INSTALLATION TIPS

TOOLS OF THE TRADE

Listed are the majority of the tools required to perform the installation. Having the proper tools will make the installation that much easier. Some of these tools are necessities. Some make the job much easier.

marking pen

electric drill with assorted drill bits

utility knife

Phillips and flat blade screw drivers

pliers (standard and needle nose)

wire brush or sandpaper for chassis grounding

solder iron and solder

grommets
(all bits high)

heat shrink tubing

nylon tie straps

volt-ohm meter (optional)

wire cutters

wire crimpers

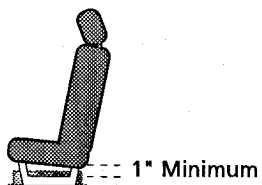
wire strippers

RTA (real time analyzer)

Reference CD with 1 kHz Sine Wave at 0dB level

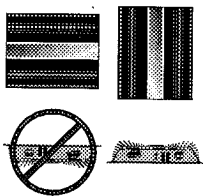
CHOOSING MOUNTING LOCATIONS

The location of your COBALT amplifier will depend on several important issues. Due to the low profile size of the COBALT amplifiers, there are many possible installation locations that will yield satisfactory amplifier performance. Always mount the amplifier in a place that protects the amplifier from the elements. In addition, mount the amplifier on a stable, flat mounting surface. As with any amplifier, there are several possible mounting locations and configurations that can be optimal. We will cover the most obvious of situations.



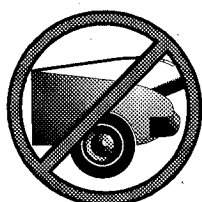
PASSENGER COMPARTMENT MOUNTING

If you are going to mount the amplifier in the passenger compartment, make sure you have adequate room for ventilation. The COBALT amplifiers have been designed to make possible under seat mounting. When mounting your amplifier under a seat or similar area, keep a minimum of 1 of clearance around the amplifier for adequate cooling.



TRUNK COMPARTMENT MOUNTING

Mounting the COBALT amplifier in the trunk provides excellent performance as long as you do not mount the amplifier upside down or restrict the airflow around the heatsink of the amplifier. For optimal results, mount the amplifier with the cooling fins in the vertical position. This type of mounting will yield the best cooling due to the convection effect of the amplifier chassis.



ENGINE COMPARTMENT MOUNTING

Do not mount the COBALT amplifier in the engine compartment. The amplifier was not designed to endure the harsh environment of the exterior elements.

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GENERAL PRECAUTIONS AND INSTALLATION TIPS

Caution: Be careful not to cut or drill into gas tanks, fuel lines, brake lines, hydraulic lines, vacuum lines, or electrical wiring when working on your vehicle.

Disconnect the vehicle's ground wire at the battery before making or breaking connections to the audio system's power supply terminals.

Do not use the COBALT amplifier unmounted. Failing to securely mount the amplifier can result in damage or injury, particularly in the event of an accident. An unmounted amplifier acts like a heat-seeking missile in the event of a crash. Never mount a COBALT amplifier where it might get wet. Mount the COBALT amplifier so the wire connections will not be pulled. Route the wires where they will not be scraped, pinched or damaged in any fashion.

The +12V power supply wire must be fused as close as possible to the battery terminal, ideally within 18". Use the recommended fuse size or circuit breaker listed in the POWER CONNECTIONS section of this manual.

If you need to replace the fuse plugged into the side of the COBALT amplifier, replace the fuse with the same size ATC type fuse that came with the amplifier. If you are not sure as to the correct value, refer to the POWER CONNECTIONS section of this manual for details. Using a higher current fuse may result in damage to the COBALT amplifier which is not covered under warranty.

NOTE: Make sure all the equipment in the system is turned off when making or breaking connections to the HCCA input RCAs or speaker terminals. Turn on the system and slowly turn up the volume control only after double checking all wire connections.

Power for systems with a single COBALT amplifier can be supplied by most any automotive electrical system. Systems with multiple amplifiers may require a higher capacity battery, alternator or the use of a storage capacitor. We strongly recommend the use of both a transient storage capacitor and an MBR70 with an extra battery in larger stereo systems.

COBALT amplifiers generate a certain amount of heat as part of their normal operation. Be sure the area around the cooling fins is unobstructed to allow adequate air circulation. Remember, beach blankets, last week's laundry, school books and homework papers located on top of the amplifier does not improve air flow.

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STEP BY STEP INSTALLATION

- Step 1 Determine the location for the amplifier. Refer to the Mounting Locations section in this manual for detailed information.
- Step 2 Decide on the system configuration for your amplifier. For system suggestions, refer to the System Planning section of this manual.
- Step 3 Run all the wires from the amplifier location to the speakers, source unit and battery. Do not connect the battery at this time. Be sure to run RCAs, power and speaker wires away from factory electrical wires and system as they pose a great potential for induced system noise.
- Step 4 Pre-drill amplifier mounting holes. Be sure to think before you drill. Gas tanks, fuel lines, and other obstructions have a nasty way of hiding themselves. For best results, use a marking pen to mark the mounting holes and pre-drill these holes with a standard 1/8" drill bit.
- Step 5 Mount the amplifier. Make sure the amplifier is mounted on a flat surface. If this is not possible, do not over tighten the screws such that the chassis of the amplifier is twisted or bent.
- Step 6 Turn the vehicle's key switch to the off position.
- Step 7 Disconnect the vehicle's battery ground terminal.
- Step 8 Connect the RCA and speaker wires to the amplifier. Check the quality of your speakers and signal connections. This will determine the ultimate performance of your ORION amplifier. Refer to the Installation Quick Reference section of this manual for correct wiring instructions.
- Step 9 Connect power wires to the amplifier. At this time do not connect the fuse at the main battery.
- Step 10 Reconnect the ground terminal to the battery.
- Step 11 Set crossover and signal routing configurations. Refer to the Input Configurations and the Internal Crossover Configuration sections of this manual for detailed instructions.
- Step 12 Once satisfied that all connections and settings are correct, install the fuse at a location near the vehicle's battery and proceed to the Testing the System section of this manual.

WARNING!!!! Never exceed the recommended fuse size of this amplifier. Failure to do so will result in voiding of your warranty.

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ADJUSTING THE SOUND OF THE SYSTEM

Once you have checked the system's operation, adjust the sound of the system. Adjusting the sound of the system is accomplished by setting the level controls and adjusting the internal crossovers.

- Step 1 Turn the signal source volume control down all the way. Set any tone controls to their flat or defeated positions. This includes the loudness control.
- Step 2 Turn the level controls of the amplifier to their minimum positions.
- Step 3 Choose music with high dynamic content that you like, that you are familiar with and will be most often used in the system.
- Step 4 Turn the unit up to its highest undistorted output level. If you lack test equipment, this point occurs between 3/4 to full volume depending on the quality of your source unit. Listen for any audible distortion. If any distortion is audible, reduce the volume of the source unit until you have an undistorted output. Leave the volume control at this position during your system tuning.
- Step 5 While listening to your chosen dynamic music, turn up the level control corresponding to the midrange output until you hear slight distortion and turn back the level control slightly for an undistorted output. Depending on your system, the midrange and tweeter output may be on the same output channels.
- Step 6 Turn up the level control corresponding to the tweeter output until you hear slight distortion and turn back the level control slightly for an undistorted output. Depending on your system the midrange and tweeter output may be on the same output channels.
- Step 7 Fine tune the crossover setting and output level between the midrange and tweeters. Refer to the "Internal Crossover Configuration" section of this manual for detailed instructions.
- Step 8 Repeat Steps 5-7 for the rear speakers. If you do not have rear speakers, continue to Step 10.

ADJUSTING THE SOUND OF THE SYSTEM (CONTINUED)

- Step 9 Set levels between the midrange and tweeters for optimum front/rear balance.
- Step 10 Turn up the level control corresponding to the woofer output until you hear slight distortion and turn back the level control slightly for an undistorted output.
- Step 11 Fine tune the crossover setting and output levels between satellite speakers and the woofers. Refer to the internal crossover configuration section of this manual for detailed instructions. If using an RGC-1, adjust the level to match the output of the woofer to match the sonic requirements of the system.
- Step 12 Enjoy your ass kickin ORION sound system.

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TROUBLESHOOTING TIPS

SYMPTOM	PROBABLE CAUSE	ACTION TO TAKE
No output	Low or no remote turn-on voltage	Check remote turn-on voltage at amplifier and repair as needed.
	Fuse blown	Check power wire integrity and check for speaker shorts. Repair as needed and replace fuse.
	Power wires not connected	Check power wire and ground connections and repair or replace as needed.
	Audio input not connected	Check RCA connections and repair or replace as needed.
	Speaker wires not connected	Check speaker wires and repair or replace as needed.
	Speakers are blown	Check system with known working speaker and repair or replace speakers as needed.
Audio cycles on and off	Thermal protection engages when amplifier heatsink temperature exceeds 90 C (190 F)	Make sure there is proper ventilation for amplifier and improve ventilation as needed.
	Loose or poor audio input	Check RCA connections and repair or replace as needed.
	Loose power connections	Check power wire and ground connections and repair or replace as needed.
Distorted output	Amplifier level sensitivity set too high exceeding maximum capability of amplifier	Readjust gain. Refer to the Adjusting the Sound of the System section of this manual for detailed instructions.
	Impedance load to amplifier too low	Check speaker impedance load. If below 2 Ohms stereo or 4Ohm mono, rewire speakers to achieve a higher impedance.
	Shorted speaker wires	Check speaker wire connections and repair or replace as needed.
	Speaker not connected to amplifier properly	Check speaker wiring and repair or replace as needed. Refer to the Speaker Connections section of this manual for detailed instructions.

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Distorted output	Internal crossover not set properly for speakers	Readjust crossovers. Refer to the "Internal Crossover" section of this manual for detailed instructions.
	Speakers are blown	Check system with known working speakers and repair or replace as needed.
Poor bass response	Speakers wired with wrong polarity causing cancellation at low frequency	Check speaker polarity and repair as needed.
	Crossover set incorrectly	Reset crossovers. Refer to the Internal Crossover Configuration section of this manual for detailed instructions.
Battery fuse blowing	Impedance load at amplifier is too low	Check speaker impedance load, if below 2 Ohms stereo or 4 Ohms mono rewire speakers to achieve a higher impedance.
	Short in power wire or incorrect wiring	Check power and ground connections and replace or repair as needed.
	Fuse used is smaller than recommended	Replace with proper fuse size.
	Too much current being drawn	Check speaker impedance load. If below 2 Ohms stereo or 4 Ohms mono Rewire speakers to achieve a higher impedance.
Amplifier fuse blowing	Too much current being drawn	Check power and ground connections and replace or repair as needed.
		Check speaker impedance load. If below 2 Ohms stereo or 4 Ohms mono, rewire speakers to achieve a higher impedance and replace with recommended size fuse.
		Check power and ground connections and replace or repair as needed.
	Fuse used is smaller than recommended	Replace with proper fuse size.
	Impedance load at amplifier too low	Check speaker impedance load. If below 2 Ohms stereo or 4 Ohms mono, rewire speakers to achieve a higher impedance
Speaker is blown with shorted outputs	Check system with known working speakers and repair or replace as needed	

