

# PHOENIX GOLD



**ZEROpoint**  
*titanium series*

**ZX475<sup>Ti</sup> Web Manual**

September 7, 1999

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- TCCH™ Thermal Convection Cooled Heatsink. This proprietary design uses a variable speed fan to ensure that the ZX<sup>Ti</sup> keeps its cool when the music gets hot!
- High-current Triple Darlington output stage. This tried and true topology is the standard for outstanding dynamic peak output performance
- TAIM™ Timed Acoustically Integrated Muting. Ensures dead silent turn on & off. No clicks, pops or buzzes
- Tri-linear™ capability allows simultaneous stereo and bridged operation
- Output current sensing allows the ZX<sup>Ti</sup> to automatically optimize the power supply and output stage to reliably operate at impedances as low as 2 ohms bridged or 1 ohm stereo
- Intuitive crossover configuration switch assures easy initial setup
- 24dB per octave, high pass or low pass crossover. Continuously variable from 40 Hz to 8 kHz front and 40 Hz to 800 Hz rear
- Auxiliary outputs route high pass, low pass or full range signals to another amplifier
- Twin-T™ Bass Boost circuit provides up to 18dB of boost at 45 Hz
- Superbrite™ Tri-LED power-on indicator
- Independent Thermal and Overload protection LED indicators
- Custom formed chassis with unique Titanium finish
- 24kt gold plated power and speaker terminals
- 2-ounce copper, double-sided G10 glass-epoxy printed circuit boards
- Replaceable insulated mounting feet
- Audiophile grade capacitors and 1% tolerance metal film resistors throughout the audio path
- Optional LPL44™ Low Pass Level controller allows the driver to adjust bass volume from the driver's seat
- Optional RDDP™ Remote Diagnostic Display Panel uses two tri-color LED's allowing the driver to monitor the amplifier's battery voltage, power-on, thermal and overload status
- Optional SDT™ Superior Digital Technology allows the driver to monitor the amplifier's battery voltage with a vacuum florescent display along with a tri-color LED indicating power-on, thermal and overload status



Continuous Output Power at 1% THD (Wrms):

**ZX475Ti**

Into 4 ohms Stereo @ 12.5 Vdc (IASCA/USAC)	18 x 4
Into 4 ohms Stereo @ 14.4 Vdc	75 x 4
Into 2 ohms Stereo @ 14.4 Vdc	150 x 4
Into 4 ohms Bridged @ 14.4 Vdc	250 x 2
Minimum Speaker Load, Bridged	2 ohms
Minimum Speaker Load, Stereo	1 ohm
Recommended Fuse Size, Stereo 4 ohms / Stereo 2 ohms / Bridged	60 / 80 / 80 amp
Continuous Current Draw @ Full Power *	60 amps
Peak Current Draw @ Full Power **	85 amps
Dimensions, Chassis (inches)	15.00 L x 9.00 W x 2.25 H
Dimensions, Overall (inches)	16.00 L x 10.00 W x 2.25 H
Total Harmonic Distortion	< 0.02 %
Signal to Noise Ratio (A-weighted)	> 100 dB
Frequency Response	+/- 1 dB, 20 Hz to 20 kHz
Bass Boost	0 to +18 dB @ 45 Hz
Crossover Frequency Range	40 Hz to 8 kHz
Crossover Slope	24 dB per octave
Input Sensitivity	200 millivolts to 6 volts
Input Impedance	> 30 kohms
Input Voltage Range	0.2 volts to 6 volts
Power Supply Operating Range	10.5 Vdc to 15.5 Vdc
Typical current draw at idle	< 3 amps

\*Average continuous current draw when playing typical music material.

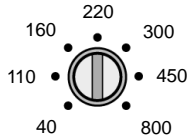
\*\*Average peak current needed for musical peaks (<20ms) when playing typical music material.

*Due to ongoing research and development, features, specifications and availability are subject to change without notice.*



**CROSSOVER FREQUENCY** Controls the high pass and low pass crossover point for front speakers and auxiliary outputs. Crossover frequency is adjustable from 40Hz to 800Hz with a 24dB per octave high or low pass slope.

**FREQUENCY x10** Multiplies the front frequency settings by 10, making the adjustments range from 400 - 8 KHz.



**SPEAKER OUTPUTS** Used to connect the amplifier to speakers. Use the left + and right - terminals for bridged mode. Minimum speaker cable size is 16 gauge (PG# SS162 or QS162). Use 12 gauge for bridged operation (SS122 or QS122). Minimum impedance is 2 ohms bridged or 1 ohm stereo.

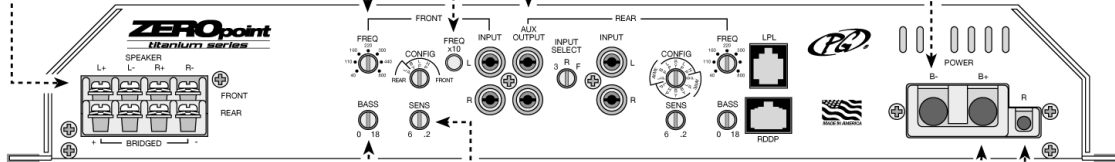
**AUXILIARY OUTPUTS**

Provides either a low pass, band pass, high pass or full range signal for an additional amplifier or signal processor. The CONFIG switch determines the state of the signal.

**INPUTS** Connect preamp signal cables from the head unit to these terminals. To maximize noise rejection, we recommend using Phoenix Gold ZEROpoint Musical Reference, ZEROpoint Pro, ZEROpoint QLX, ZEROpoint TRX, A560XS or A460XS series twisted pair interconnects.

**B- TERMINAL (Chassis Ground)**

Minimum 4 gauge or voids warranty. Connect to a clean, solid chassis ground. Remove all paint and dirt from the chassis connection point. Minimum cable size is 4 gauge. Keep the cable as short as possible.



**TWIN-T™ BASS EQ**

This control allows up to 18dB of boost at 45Hz for the speaker outputs. It cannot affect the auxiliary outputs. Use this control sparingly. Every 3dB of boost requires double the power at 45Hz.

**INPUT SENSITIVITY**

This control adjusts the amplifier's sensitivity to incoming signals. Clockwise increases sensitivity. Counter-clockwise decreases sensitivity. Higher signal levels allow for a lower sensitivity setting and lower overall noise floor. Lower signal levels will require increased sensitivity to reach full power. To maximize performance, we recommend using a PLD1 Professional Line Driver.

**B+ TERMINAL (Battery Positive)**

Minimum 4 gauge or voids warranty. Connect directly to the positive battery terminal. Minimum cable size is 4 gauge. Remember to properly fuse this cable within 18 inches of the amplifier and positive battery terminal.

Amplifier	Outputs	Fuse size
ZX475Ti	4 ohms stereo	60 amp
ZX475Ti	2 ohms stereo	80 amp
ZX475Ti	4 or 2 ohms bridged	80 amp

**REMOTE TURN-ON TERMINAL**

Connect to a switched 12 Vdc source such as the head unit's "remote" or power antenna wire. **Note:** Use a voltmeter to verify that the power antenna wire remains on when operating the CD or tape.



**REAR CONFIG SWITCH**

This switch affects both rear speaker outputs and auxiliary outputs. The top half of the switch indicates the type of signal fed to the speaker outputs. The bottom half indicates the type of signal fed to the auxiliary outputs. Note: Full range signals bypass all internal crossover circuits. In "3 way" mode, a band pass signal is created between the selected "front frequency" and selected "rear frequency."

**FRONT CONFIG SWITCH**

This switch effects the type of signal being fed to the front speaker outputs.

**INPUT SELECT SWITCH**

The switch determines where the "Rear/Aux Output" gets its signal from.



Rear/Aux Output in "3 way" mode gets its signal from the front input after the crossover.



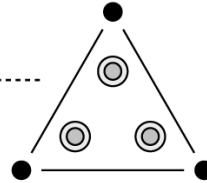
Rear/Aux Output gets its signal from the rear output.



Rear/Aux Output gets its signal from the front input before the internal crossover.

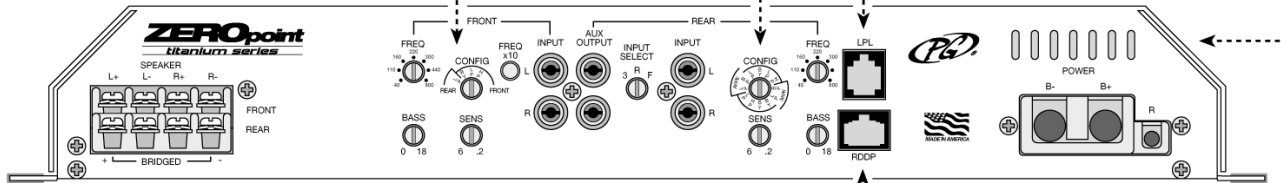
**POWER-ON LEDS (Top of Amplifier)**

Three Superbrite™ blue LED's light when the amplifier is turned on indicating that the amplifier is grounded through the B- terminal and is receiving voltage through the B+ and remote turn-on terminals.



**LPL CONTROL PORT**

This port is for connecting the optional LPL44™ Remote Lowpass Level Control knob allowing up to 20dB of subwoofer volume adjustment from the driver's seat. Note: The LPL44™ controls the low pass output of the internal crossover regardless of whether the low pass output is routed to the speaker or auxiliary outputs. It will not affect high pass or full range signals.



**REMOTE DIAGNOSTIC DISPLAY PORT**

This port is for connecting the optional Remote Diagnostic Display Port or SDT. The display indicates the amplifier's condition with additional status LED's and a DC voltmeter.

**PROTECTION LEDS (Visible Through Plexi Window)**

**YELLOW:**

**Thermal** - Lights if the amplifier shuts down due to overheating. If the internal heatsink overheats, the amplifier shuts down and continues to run the fan at high speed until the internal heatsink temperature cools down.

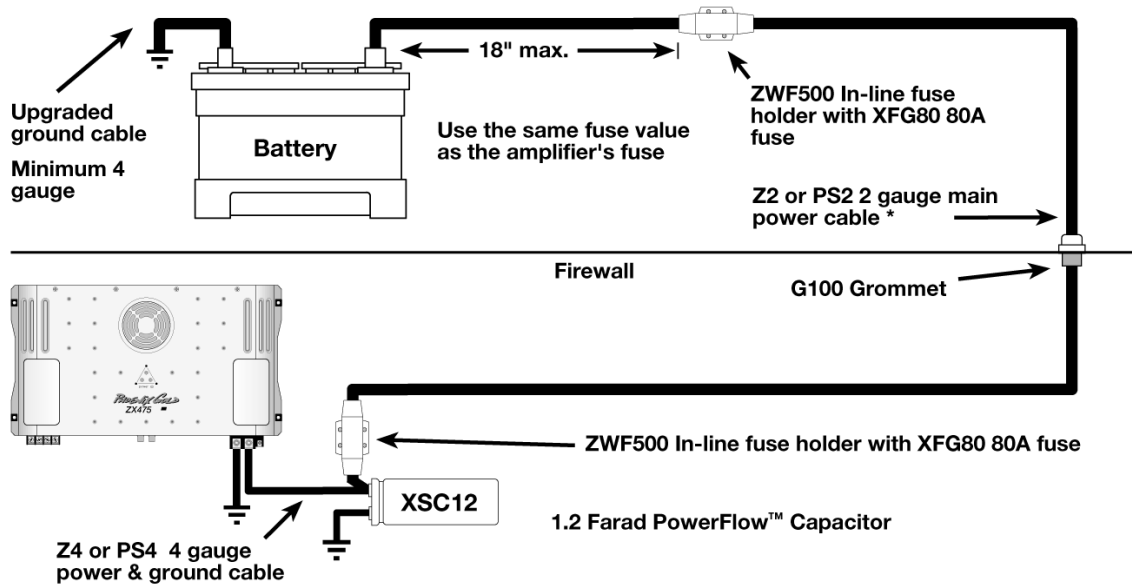
**RED:**

**Overload** - Lights if the amplifier shuts down due to excessive output current. Common reasons for excessive output current:

- Total speaker impedance too low causing excessive output current.
- Exposed copper from speaker cable touching the vehicle chassis.
- Speaker cables or speaker tinsel leads touching each other.
- Damaged speaker voice coil or passive crossover components.



**SINGLE AMPLIFIER POWERFLOW™ SYSTEM**



\* Use the power cable calculator for the exact gauge of cable required.

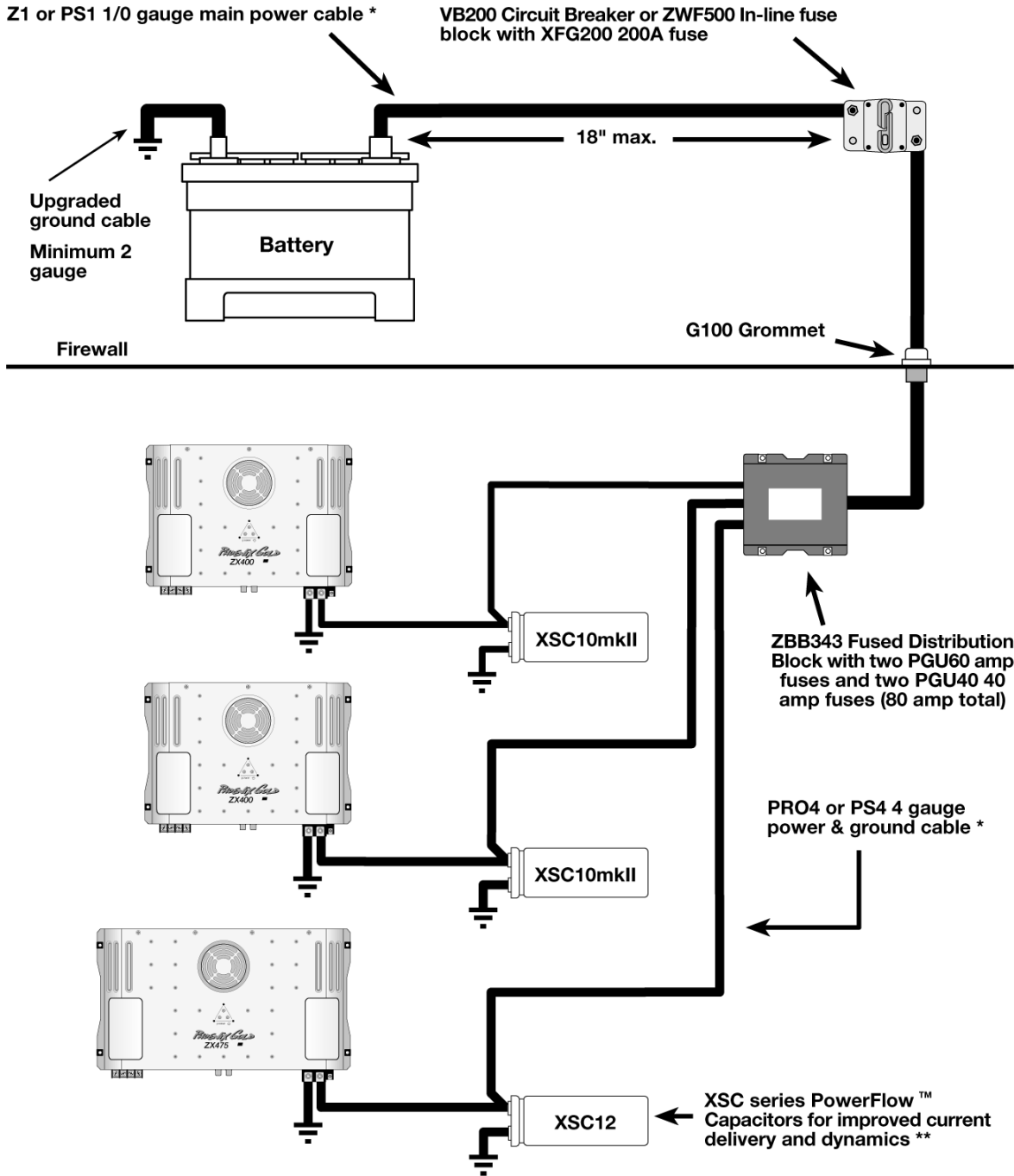
**POWER CABLE CALCULATOR**

	4 ft	8 ft	12 ft	16 ft	20 ft	24 ft
100 w	10	10	8	8	4	4
200 w	10	8	8	4	4	4
400 w	8	8	4	4	4	2
600 w	8	4	4	4	2	2
800 w	4	4	4	2	2	2
1000 w	4	4	2	2	2	1/0
1400 w	4	2	2	2	1/0	1/0
1800 w	2	2	2	1/0	1/0	1/0
2200 w	2	2	1/0	1/0	1/0	1/0 x 2
2600 w	2	1/0	1/0	1/0	1/0 x 2	1/0 x 2
3000 w	1/0	1/0	1/0	1/0 x 2	1/0 x 2	1/0 x 3

1. Find the distance (feet) of the cable run along the top.
2. Find the total power (watts) the cable must support on the left.
3. Where the two meet indicates the proper gauge cable.

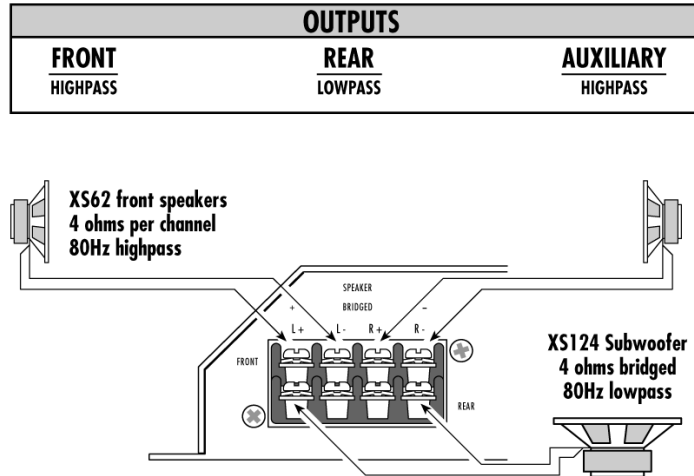
If the distance or power falls between two columns or rows, always round up to the next larger cable size or distance.

**MULTIPLE AMPLIFIER POWERFLOW™ SYSTEM**

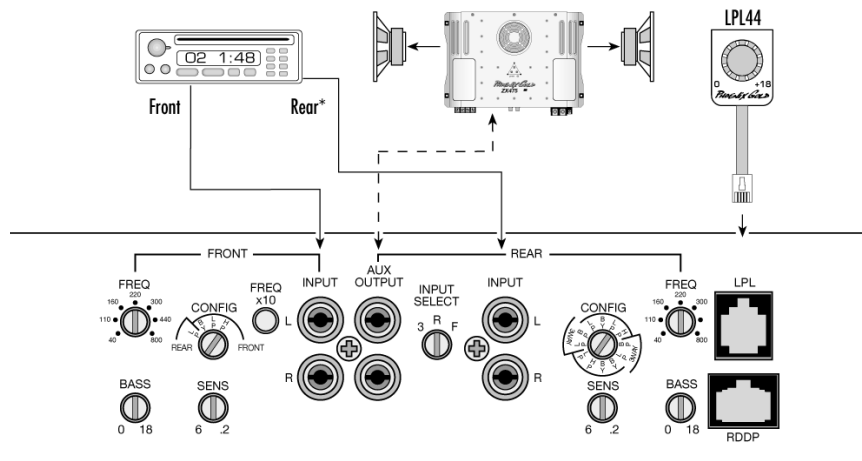


\*\* Use at least 1 farad of capacitance for every 1,000 watts of amplifier output.





**Minimum bridged load is 2 ohms.  
Minimum load per channel is 1 ohm.**



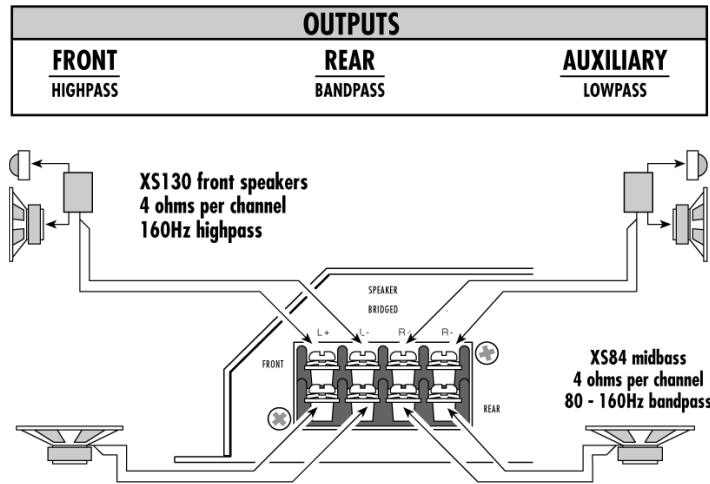
The front crossover frequency control determines the XS62's highpass frequency independently of the XS124 and rear speakers.

The rear crossover frequency control determines the XS124's lowpass frequency and auxiliary output's highpass frequency.

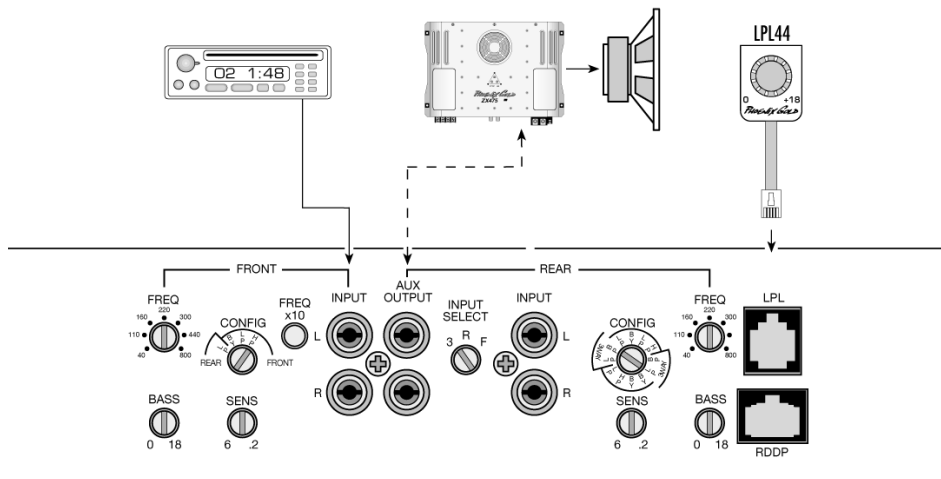
The auxiliary outputs send highpass signals to another amplifier.

Use the LPL44 to control the XS124's volume from the driver's seat.

\* For single preamp headunits, set the input select switch to FRONT. This allows signals from the front inputs to reach the rear crossover without the use of "Y" connectors.



Minimum bridged load is 2 ohms.  
Minimum load per channel is 1 ohm.



The front crossover frequency control determines the XS130's highpass.

The bandpass signal for the XS84's midbass is created between the front and rear crossover frequency settings.

The rear crossover frequency control determines the auxiliary output's lowpass frequency.

The auxiliary output sends lowpass signals to another amplifier.

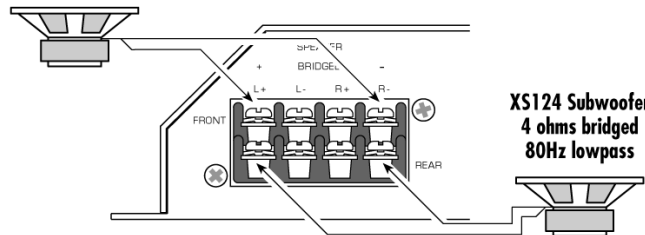
Use the LPL44 to control the auxiliary output's volume from the driver's seat.

**NOTE:** If connecting tweeters to the front outputs, set the *frequency multiplier switch* to X10. This multiplies the front crossover's frequency range by a factor of ten. The range becomes 400 to 8kHz.

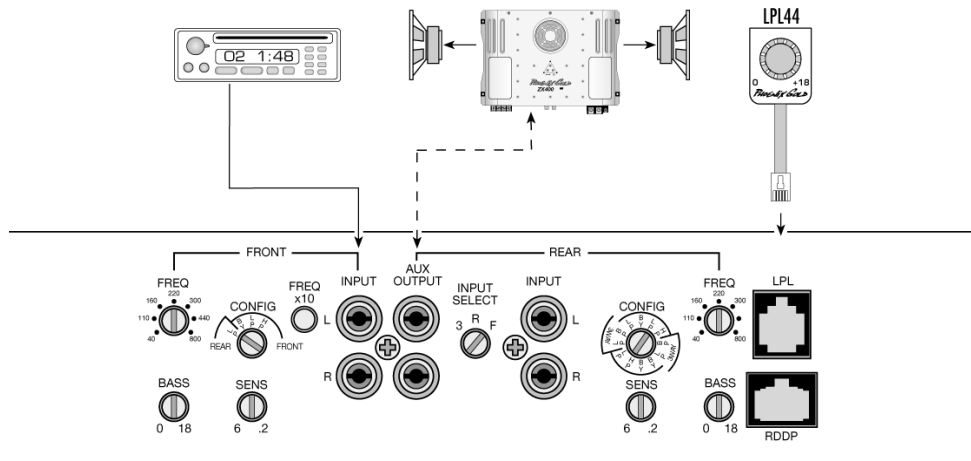


OUTPUTS		
<b>FRONT</b> LOWPASS	<b>REAR</b> LOWPASS	<b>AUXILIARY</b> HIGHPASS

**XS124 Subwoofer**  
4 ohms bridged  
80Hz lowpass



**Minimum bridged load is 2 ohms.**  
**Minimum load per channel is 1 ohm.**



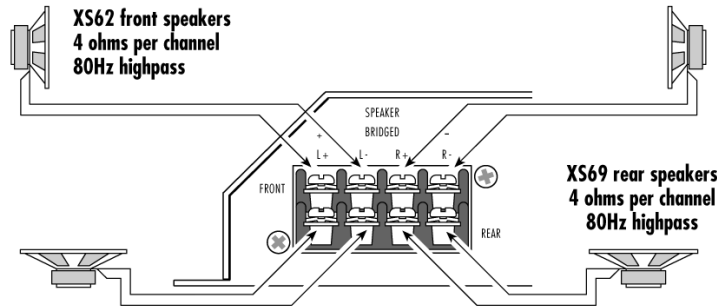
The rear crossover frequency control determines the crossover frequencies of all outputs.

The auxiliary output sends highpass signals to another amplifier.

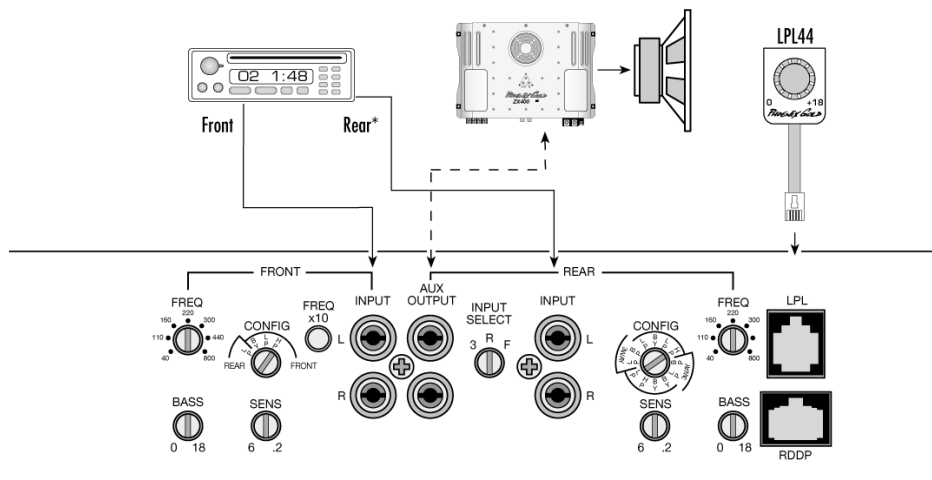
Use the LPL44 to control the volume of both front and rear outputs.



OUTPUTS		
<b>FRONT</b> HIGHPASS	<b>REAR</b> HIGHPASS	<b>AUXILIARY</b> LOWPASS



Minimum bridged load is 2 ohms.  
Minimum load per channel is 1 ohm.



The front crossover frequency control determines the XS62's highpass frequency independently of the XS69's and auxiliary outputs.

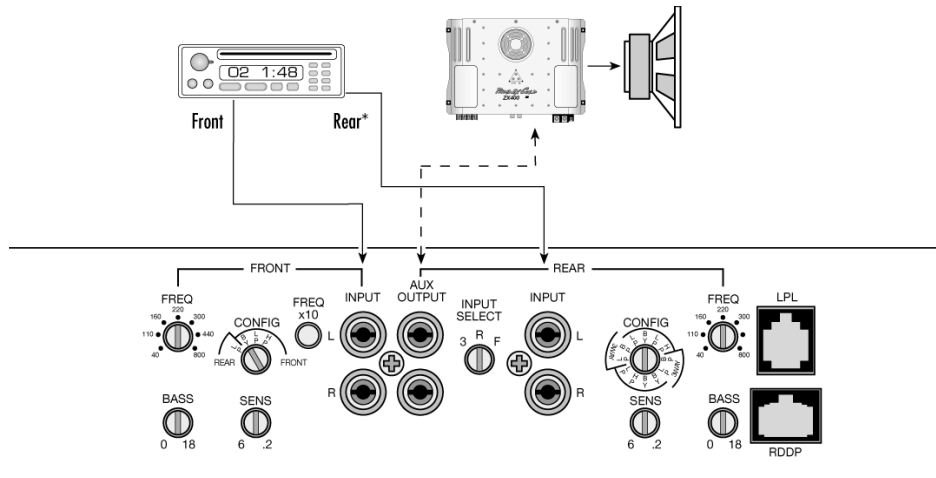
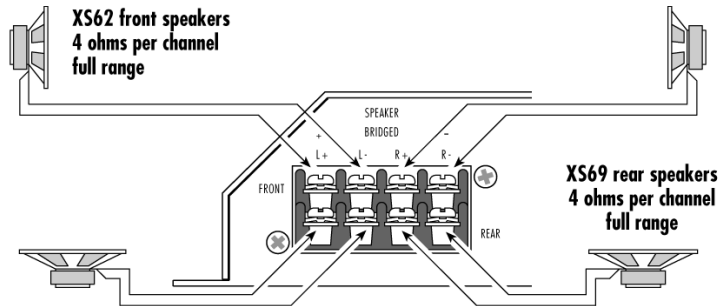
The rear crossover frequency control determines the XS69's highpass frequency and auxiliary output's lowpass frequency.

The auxiliary output sends lowpass signals to another amplifier.

Use the LPL44 to control the auxiliary output's volume from the driver's seat.

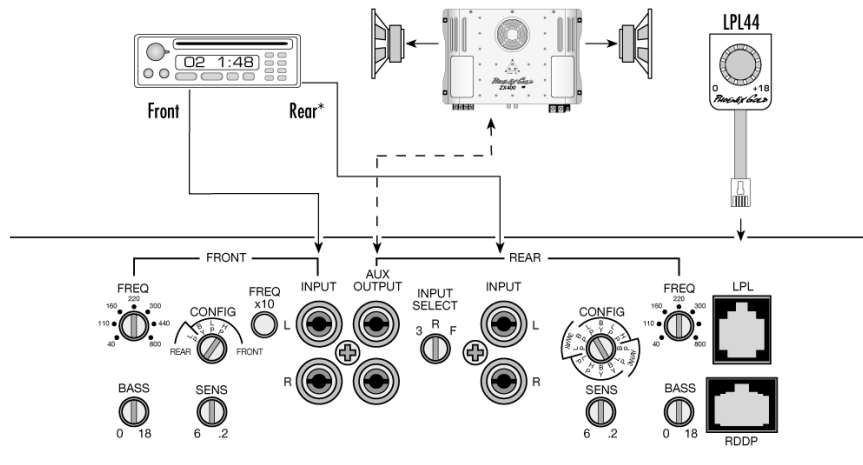
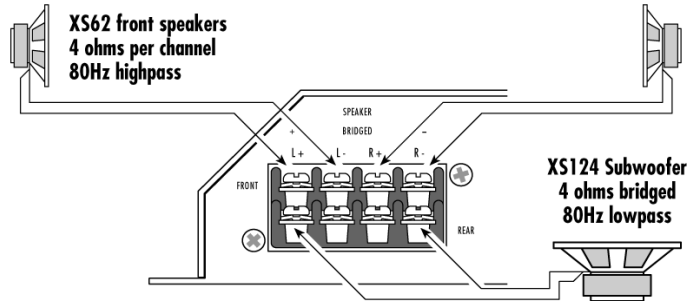
\* For single pre-amp headunits, set the input select switch to FRONT. This allows signals from the front inputs to reach the rear crossover without the use of "Y" connectors.

OUTPUTS		
<b>FRONT</b> FULL RANGE	<b>REAR</b> FULL RANGE	<b>AUXILIARY</b> FULL RANGE



\* For single pre-amp headunits, set the input select switch to FRONT. This allows signal from the front inputs to reach the rear channels without the use of "Y" connectors.

OUTPUTS		
<b>FRONT</b> HIGHPASS	<b>REAR</b> LOWPASS	<b>AUXILIARY</b> FULL RANGE



The front crossover frequency control determines the XS62's highpass frequency independently of the XS124 and rear speakers.

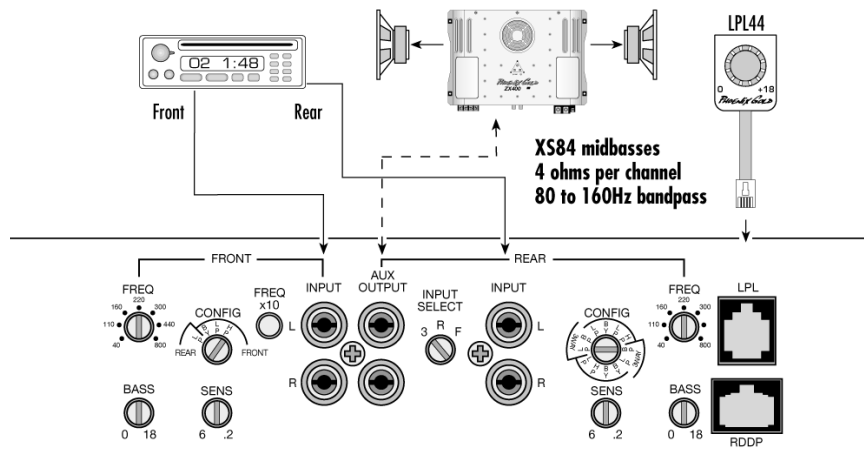
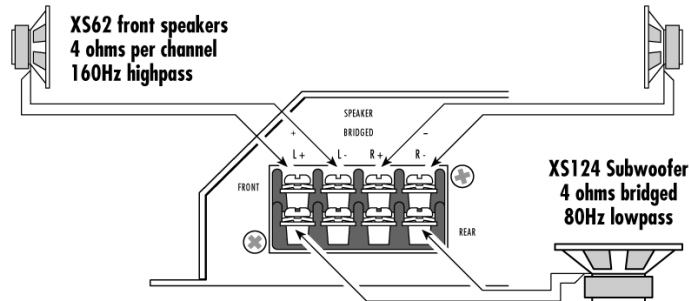
The rear crossover frequency control determines the XS124's lowpass frequency.

The auxiliary outputs send full range signals to another amplifier.

Use the LPL44 to control the XS124's volume from the driver's seat.

\* For single preamp headunits, set the internal select switch to FRONT. This allows signals from the front inputs to reach the rear crossover without the use of "Y" connectors.

OUTPUTS		
<b>FRONT</b> HIGHPASS	<b>REAR</b> LOWPASS	<b>AUXILIARY</b> BANDPASS



The front crossover frequency control determines the XS62's highpass frequency.

The rear crossover frequency control determines the XS124's lowpass frequency.

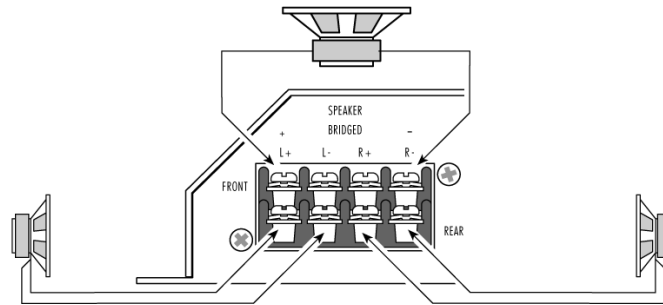
The bandpass signal for the XS84 midbasses is created between the front and rear crossover frequency settings.

The auxiliary outputs send bandpass signals to another amplifier.

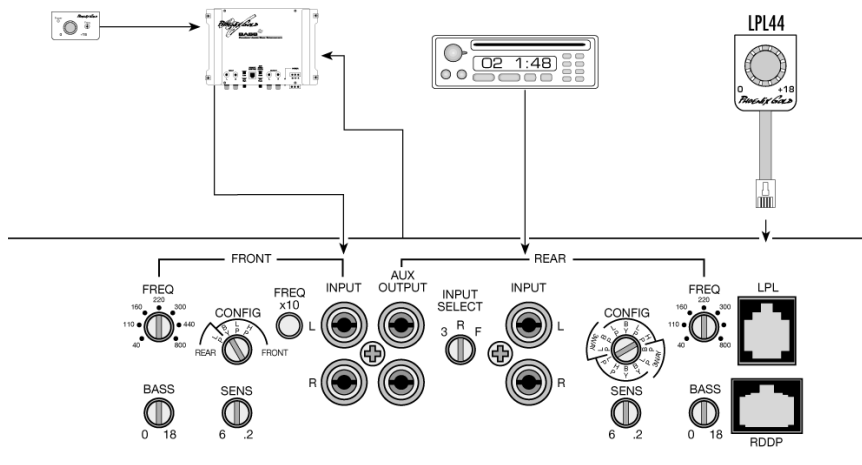
Use the LPL44 to control the XS124's volume from the driver's seat.

OUTPUTS		
<b>FRONT</b> BYPASS	<b>REAR</b> HIGHPASS	<b>AUXILIARY</b> LOWPASS PROCESSOR LOOP

**XS124 Subwoofer powered by front channels at 4 ohms bridged 80Hz lowpass**



**XS62 speakers 4 ohms powered by rear channels at 80Hz highpass**



The auxiliary outputs send lowpass signals out to the Bass Cube and then back into the front inputs.

The front crossover frequency control determines the XS62's highpass frequency and the XS124's lowpass frequency.

Use the LPL44 to control the XS124's volume from the driver's seat.

**NOTE:** Locating the Bass Cube in this position of the signal flow allows only the low pass signal for the XS124 to be boosted. The XS62's high pass signal will be unaffected by the Bass Cube's boost.





**MOUNTING** You can mount the ZXTi amplifier in a variety of positions. *There are only a few precautions that must be observed:*

Never mount the amplifier where it can get wet. Water damage is not covered by the limited warranty.

Do not mount the amplifier where debris such as stray wire strands could fall into the fan intake or exhaust openings. This could cause serious damage to the electronic circuitry. Damage from debris is not covered by the limited warranty.

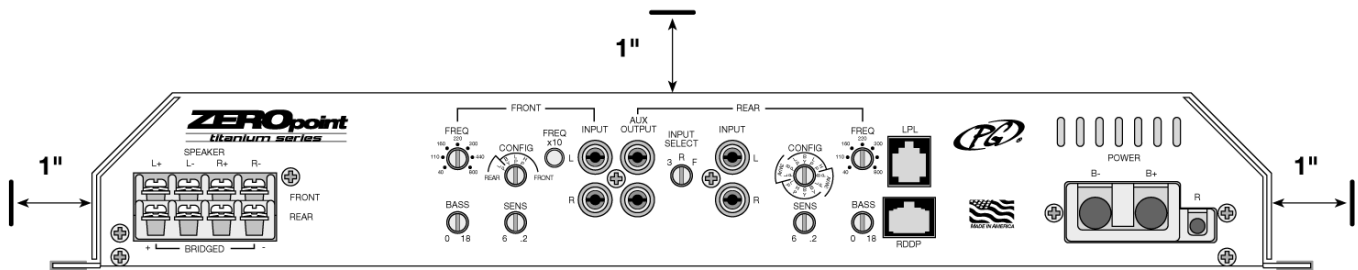
Make sure the amplifier has adequate ventilation. Leave at least one inch of clearance on the sides and top of the amplifier.

Mounting the amplifier inside an enclosure is not recommended unless the enclosure itself has ventilation fans to circulate fresh air through the enclosure. Design your cooling system to circulate at least 30cfm (cubic feet per minute) for each amplifier.

**Example:** A ZX475Ti in an enclosed amp rack requires two 30cfm (cubic feet per minute) fans. One fan for intake and one for exhaust.

Mount the amplifier to flat surfaces only. Make sure the amplifier's base does not flex or distort.

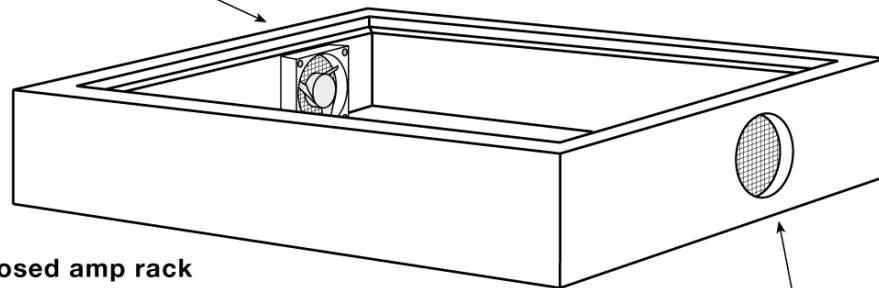
The isolation mounting feet may be replaced if damaged. Order PG# 5620.0006. Contact an Authorized Phoenix Gold Dealer for details.



**Minimum 1" clearance between cover and amplifier**

**Plexiglas or Lexan cover**

**30 cfm intake fan**



**Typical enclosed amp rack**

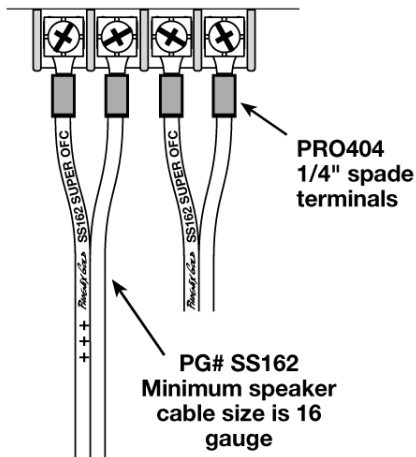
**30cfm exhaust fan**



**POWER and SPEAKER CONNECTIONS**

Use crimp-on terminals for connecting speaker cables to the amplifier. For extra reliability, crimp and solder each terminal.

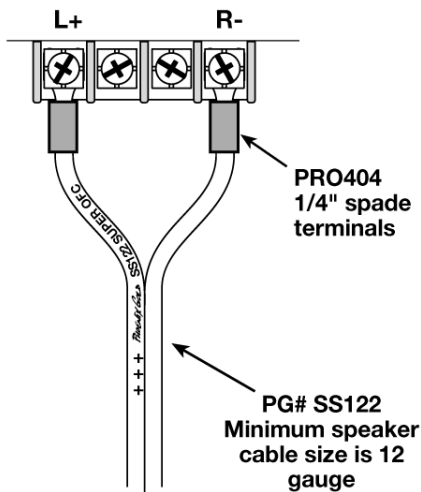
**STEREO CONNECTION**



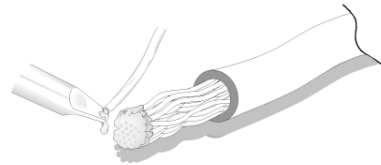
Use a #2 Phillips screwdriver to tighten each speaker terminal.

**Note:** Do not use powered screwdrivers to tighten the terminals. This can damage the gold plating and strip the screw's head.

**BRIDGED CONNECTION**

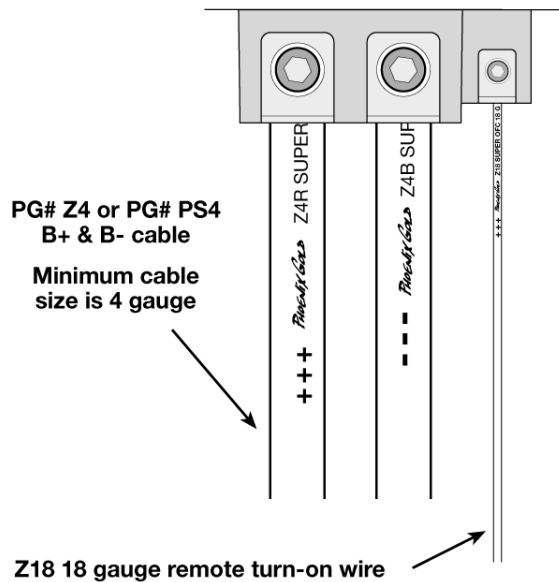


B+ battery, B - ground and remote turn-on cables connect directly to the terminal block without the need for special connectors.



Strip 1/2" of insulation from the end of the wire and "tin" the tip with solder as shown. This will prevent wire strands from fraying and still provide for maximum contact area between the terminal block, set screw and bare copper cable.

Tighten the remote turn-on set screw with the supplied 2mm hex wrench. The 4mm hex wrench tightens the B+ battery and B - ground terminals.

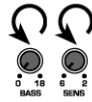




## INPUT SENSITIVITY and BASS ADJUSTMENT

1. Install all system fuses.

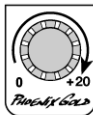
2. Set the amplifier's input sensitivity and bass equalization controls to their minimum positions (full counterclockwise).



3. Set all amplifier signal routing switches according to your system's design.

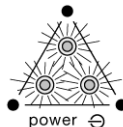
4. Make preliminary adjustments to the crossover frequency. Check the manufacturer's specifications for the proper frequency range of each speaker. It may be necessary to fine tune the crossover frequency later for the best overall sound quality.

5. If using an LPL44, set it to maximum (full clockwise).



6. Turn the headunit on with the volume set to minimum.

7. Visually check the amplifier's condition. The blue power LEDs should be on.



8. Check the condition of all other components to make sure they are powered up.

9. Set the headunit's tone controls, balance, and fader to the center (flat) position. Turn off any loudness or other signal processing features.

10. Set the volume control of the headunit for maximum undistorted output (on most headunits this will be approximately 7/8 of maximum volume). Use a very clear and dynamic recording.

11. Turn up the input sensitivity control until the speakers reach maximum undistorted output.



12. Repeat input sensitivity adjustments for all other amplifiers.

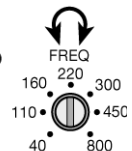
**Note:** The ZXTi amplifier's sensitivity and bass controls have no effect on the auxiliary outputs. An amplifier connected to the auxiliary outputs receives the same signal level available to the ZXTi's inputs (unity gain).

13. Reduce the headunit's volume to a comfortable level.

14. Listen to various musical selections to check overall system balance. Compare front to rear, midbass to midrange, etc. If one speaker set is too loud compared to another, then its level must be lowered to blend correctly with the other speakers. The idea is to reference all speakers to the weakest set.

**Note:** For subwoofers controlled by an LPL44, keep the sensitivity setting from step 11 or 12. Use the LPL44 to blend subwoofers with the rest of the system. The correct subwoofer volume will change depending on road noise and differences in recordings.

15. Fine tune crossover frequencies to achieve the smoothest possible blending of each speaker set.



16. Adjust the Bass Equalization Controls if necessary.

**Note:** Use these controls sparingly. Every 3dB of boost requires double the power at 45Hz. If your subwoofer system requires 18dB of boost to sound good, there may be a problem. Look for out-of-phase woofers, a leaking subwoofer box, or incorrect box size.



17. With all levels set correctly, the system will reach overall maximum undistorted output at the volume level set in step 10.

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**SYMPTOM**

**POSSIBLE CAUSE**

**SOLUTION**

No output and Power-on LEDs are off

No battery, ground, or remote connection

Verify that the B+, B-, and remote turn-on terminals are properly connected and that the headunit is turned on. Use a DC voltmeter to check for 12 volts between the ground terminal and the B+ terminal. Also, check between the ground terminal and the remote turn-on terminal.

Blown or melted power fuse

Use an ohmmeter to verify that the fuse has continuity between its ends. Disconnect the main B+ cable from the battery and the inputs of all devices in the system (including capacitors). Use an ohmmeter to check for a short between the power cable system and the vehicle's chassis. Correct any short and install a new fuse. Replace only with the same rating and type of fuse.

No output and power-on LEDs are on

No signal from the head unit or previous signal processor

Use an AC voltmeter to check for voltage at the headunit or processor's preamp outputs. The level should fluctuate with peaks in the music. An analog gauge works well for this test.

Faulty input signal cables

Use an AC voltmeter to check for voltage at the signal cables' outputs. Try substituting different signal cables.

Faulty speaker or speaker cables

Try substituting another speaker or cables.

Distorted sound

Clipped input signal feeding the amplifier or signal processor

Make sure the headunit and all other components are not producing a clipped signal. Most headunits clip their own output above 7/8 volume. Distorted signals coming into the amp will sound distorted at any input sensitivity setting.

Amplifier or signal processor's input sensitivity too high

Lower input sensitivity (counterclockwise). Setting the sensitivity too high causes distortion. Distortion causes speakers to rapidly overheat and can result in speaker failure.

Amplifier cuts off when driven to high output levels. Thermal protection circuit activated (yellow LED on).

Poor ventilation

Check for a poor mounting location that allows hot air to be re-circulated within the heatsink. Check for blocked input or exhaust openings.

Total speaker impedance is too low causing excessive heat.

Re-wire speakers to raise the total impedance seen by the amp. Minimum impedance is 2 ohms bridged or 1 ohm stereo.



**SYMPTOM**

**POSSIBLE CAUSE**

**SOLUTION**

Amplifier cuts off when driven to high output levels. Overload circuit activated (red LED on).

Excessive output current is the only thing that can cause the Overload LED to light. **There are only a few possible causes:**

A damaged speaker cable touching the vehicle chassis, speaker cables or speaker tinsel leads touching each other, or damaged speaker voice coil.

With the speaker wires disconnected from the amp, use an ohmmeter to check for a short from any speaker cable to chassis ground. Check the DC resistance of the speaker's voice coil. It should be close to the speaker's nominal impedance specification and should fluctuate when the cone is touched. Visually check each speaker for damaged tinsel leads, or other broken parts. Smell the speaker's magnet area for a burned scent indicating a damaged voice coil.

Damaged passive crossover components.

Visually examine inductors, capacitors and resistors for signs of heat stress, water, or physical damage. Use a soldering iron to touch up connections to the crossover circuit board. Try substituting a different crossover network.

Total speaker impedance is too low causing excessive output current.

Re-wire speakers to raise the total impedance seen by the amp.

Defective output transistor inside the amplifier

This condition will cause the overload LED to stay lit without speaker wires connected to the amplifier. The amplifier must be returned to an authorized service center for repair.

**Authorized Phoenix Gold Service Centers**

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**877.745.3782**

**Canada**

Trends Electronics

**604.988.2966**





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