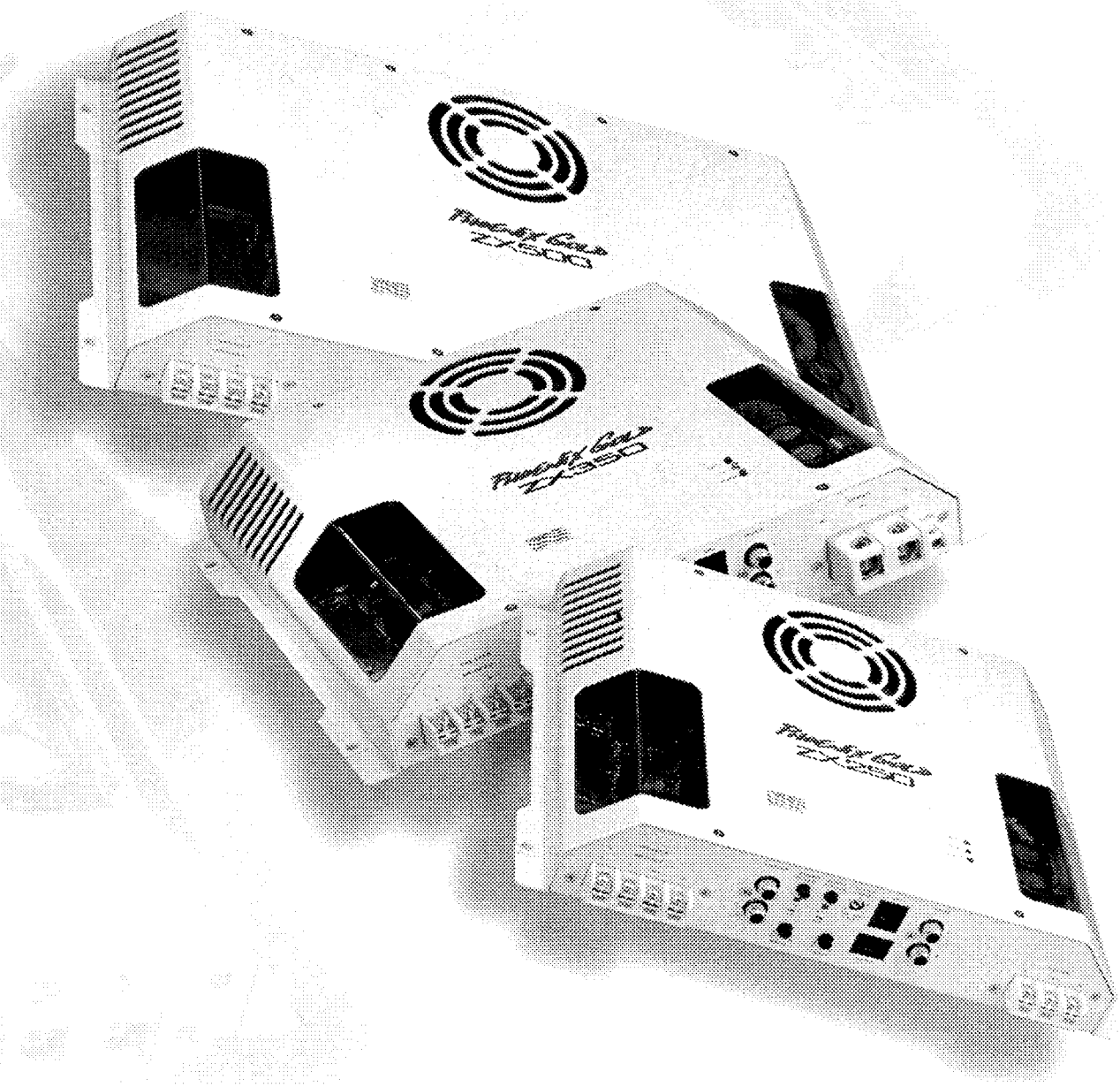
Phoenix Gold

ZX500 ZX350 ZX250

OWNERS MANUAL

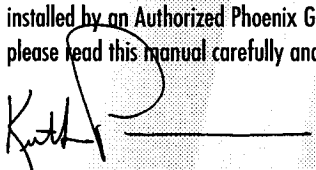


TRIPLE V2 DARLINGTON
HIGH DEFINITION AMPLIFIERS

Dear Phoenix Gold enthusiast,

I thank you for purchasing this Phoenix Gold product. By doing so, you have demonstrated a desire to own the finest audio components available for the car and home. At Phoenix Gold, we use state-of-the-art design, engineering and production methods to continually improve the quality, reliability and performance of our products.

The ZX V.2 amplifiers provide incredible power and system design flexibility for the most demanding audiophile or competitor. Properly installed by an Authorized Phoenix Gold Mobile Electronics Retailer, this equipment will provide years of enjoyment. For proper operation, please read this manual carefully and keep it for future reference.



Keith Peterson
President

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FEATURES

- The TCCH Proprietary Thermal Convection Cooled Heatsink uses a variable speed axial fan to keep the amplifier cool
- High-current Triple-darlington Output Stages for high current capacity and low distortion
- Tri-linear™ Capability for Simultaneous Stereo & Bridged Mono Operation
- 2 ohms Bridged/1 ohm Stereo Operation Approved
- 24dB per octave, Continuously Variable, 30 to 600Hz Highpass/Lowpass Crossover
- Auxiliary Output RCA Jacks for Lowpass, or Highpass Output
- Crossover Circuit Bypass Switch
- Variable, Input Sensitivity Control
- Optional LPL Subwoofer Level Control
- Advanced Turn-on & Turn-off Output Muting Circuitry
- Independent Power-on, Thermal & Overload LED indicators
- 24kt Gold-plated High-current Power & Speaker Terminals
- 24kt Gold-plated 2-ounce Copper, Double-sided G10 Glass-epoxy Printed Circuit Boards
- Audiophile Grade Capacitors & 1% Tolerance Metal Film Resistors
- Nylon Isolation Mounting Feet
- Optional RDDP Remote Diagnostic Display Port

SPECIFICATIONS

Continuous Output Power at 0.02% THD (watts):

ZX500v.2

Into 4 ohms Stereo @ 12.5 Vdc (IASCA/USAC) .....75 x 2
Into 4 ohms Stereo @ 14.4 Vdc .....150 x 2
Into 2 ohms Stereo @ 14.4 Vdc .....300 x 2
Into 1 ohm Stereo @ 14.4 Vdc (current limited) .....300 x 2
Into 4 ohms Bridged @ 14.4 Vdc .....600 x 1
Into 2 ohms Bridged @ 14.4 Vdc (current limited) .....600 x 1
Minimum Speaker Load, Bridged .....2 ohms
Minimum Speaker Load, Stereo.....1 ohm
Recommended Fuse Size .....50 amp AGU
Continuous Current Draw @ Full Power * .....50 amps
Peak Current Draw @ Full Power ** .....80 amps
Dimensions, Chassis (inches).....14.00L x 8.60W x 2.00H
Dimensions, Overall (inches) .....15.00L x 9.30W x 2.00H

SPECIFICATIONS (CONTINUED)

ZX350v.2

Into 4 ohms Stereo @ 12.5 Vdc (IASCA/USAC) .....37 x 2
Into 4 ohms Stereo @ 14.4 Vdc .....100 x 2
Into 2 ohms Stereo @ 14.4 Vdc .....200 x 2
Into 1 ohm Stereo @ 14.4 Vdc (current limited) .....200 x 2
Into 4 ohms Bridged @ 14.4 Vdc .....400 x 1
Into 2 ohms Bridged @ 14.4 Vdc (current limited) .....400 x 1
Minimum Speaker Load, Bridged .....2 ohms
Minimum Speaker Load, Stereo.....1 ohm
Recommended Fuse Size .....40 amp AGU
Continuous Current Draw @ Full Power * .....40 amps
Peak Current Draw @ Full Power ** .....55 amps
Dimensions, Chassis (inches).....10.20L x 8.60W x 2.00H
Dimensions, Overall (inches) .....11.20L x 9.30W x 2.00H

ZX250v.2

Into 4 ohms Stereo @ 12.5 Vdc (IASCA/USAC) .....18 x 2
Into 4 ohms Stereo @ 14.4 Vdc .....75 x 2
Into 2 ohms Stereo @ 14.4 Vdc .....150 x 2
Into 1 ohm Stereo @ 14.4 Vdc (current limited) .....150 x 2
Into 4 ohms Bridged @ 14.4 Vdc .....250 x 1
Into 2 ohms Bridged @ 14.4 Vdc (current limited) .....250 x 1
Minimum Speaker Load, Bridged .....2 ohms
Minimum Speaker Load, Stereo.....1 ohm
Recommended Fuse Size .....30 amp AGU
Continuous Current Draw @ Full Power * .....30 amps
Peak Current Draw @ Full Power ** .....40 amps
Dimensions, Chassis (inches).....9.20L x 8.60W x 2.00H
Dimensions, Overall (inches) .....10.20L x 9.30W x 2.00H

Common Specifications

Total Harmonic Distortion .....<0.02%
Signal to Noise Ratio (A-weighted) .....>100dB
Frequency Response .....+/- 1dB, 20Hz to 20kHz
Bass Boost .....0 to +18dB @ 45Hz
Crossover Frequency Range .....30Hz to 600Hz
Crossover Slope .....24dB per octave
Input Sensitivity .....200 millivolts to 6 volts
Input Impedance .....>30k ohms
Input Signal Voltage Range .....0.2 volts to 6 volts
Power Supply Operating Range .....10.0Vdc to 15.5Vdc
Typical current draw at idle .....3 amps

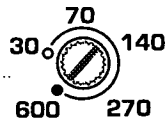
*Average continuous current draw when playing typical music material.

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

Due to continuous product development, features, specifications, and availability are subject to change without notice.

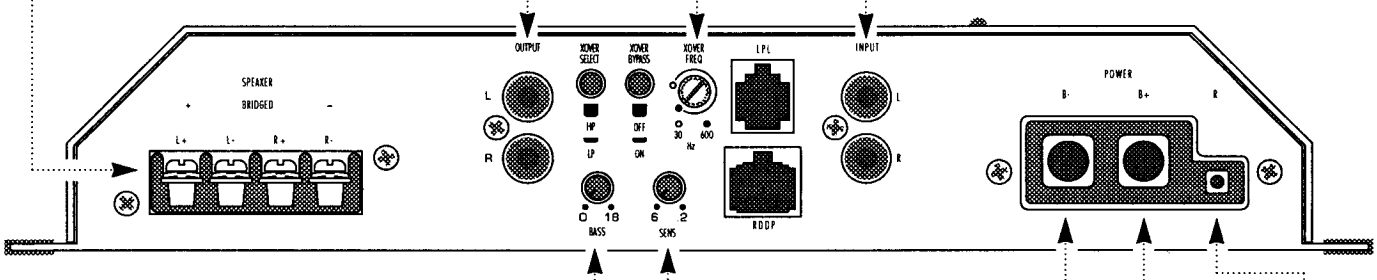
AUXILIARY OUTPUTS Provides either a lowpass or highpass signal for an additional amplifier or signal processor. The signal is always the opposite of the crossover select setting. These outputs cannot receive signal directly from the input jacks.

CROSSOVER FREQUENCY Controls the highpass and lowpass crossover point for the speaker and auxiliary outputs. Crossover frequency is adjustable from 30Hz to 600Hz with a 24dB per octave slope.



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.

INPUTS Connect preamp signal cables from the headunit to these terminals. To maximize noise rejection, we recommend using Phoenix Gold QLX, TRX, XS560 or XS460 series twisted pair interconnects.



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.

B- TERMINAL (CHASSIS GROUND) Connect to a clean, solid chassis ground. Remove all paint and dirt from the chassis connection point. Minimum cable size is 4 gauge for the ZX500v.2 and ZX350v.2, 8 gauge for the ZX250v.2. Keep the cable as short as possible.

INPUT SENSITIVITY This control adjusts the amplifier's sensitivity to incoming signals. Clockwise increases sensitivity. Counterclockwise 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 or its equivalent.

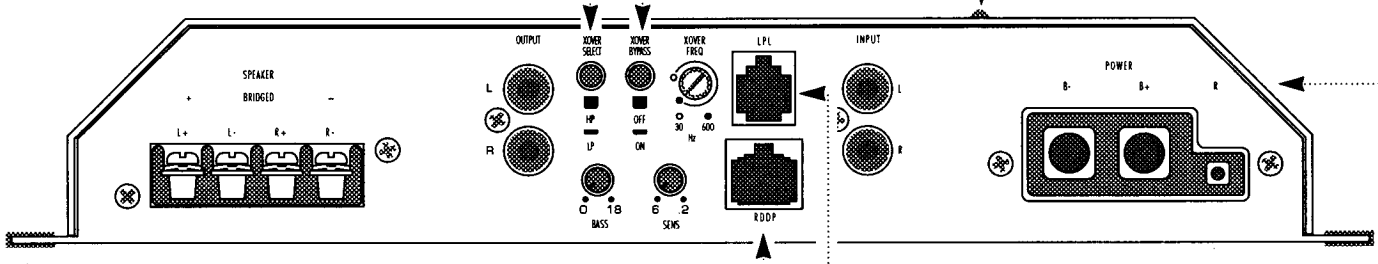
B+ TERMINAL (BATTERY POSITIVE) Connect directly to the positive battery terminal. Minimum cable size is 4 gauge for the ZX500v.2 and ZX350v.2, 8 gauge for the ZX250v.2. Remember to properly fuse this cable within 18 inches of the positive battery terminal.

REMOTE TURN-ON TERMINAL Connect to a switched 12 Vdc source such as the headunit'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.

CROSSOVER BYPASS This switch determines if the speaker outputs receive full range or highpass/lowpass signals. When set to ON, signals come directly from the input jacks bypassing the crossover circuitry. When set to OFF, the speaker outputs receive either highpass or lowpass signals from the crossover circuitry.

CROSSOVER SELECT This switch affects both the speaker and auxiliary outputs. When set to HP, the speaker outputs receive frequencies higher than the crossover frequency control's setting while the auxiliary outputs receive the remaining lower frequencies. When set to LP, the speaker outputs receive frequencies lower than the crossover frequency control's setting while the auxiliary outputs receive the remaining higher frequencies.
Note: This switch will have no affect on the speaker outputs when the crossover bypass switch is set to ON.

STATUS LEDS (TOP OF AMPLIFIER)
PWR: Lights 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.
THM: Lights if the amplifier shuts down due to overheating. If the internal heatsink reaches 115 degrees Celsius, the amplifier shuts down. The fan continues to run at high speed until the internal temperature falls below 115 degrees.
OVL: Lights if the amplifier shuts down due to excessive output current. Excessive output current could have many different causes:
- A chaffed speaker cable touching the vehicle chassis.
- Speaker cables or speaker tinsel leads touching each other.
- Damaged speaker voice coil or passive crossover components.

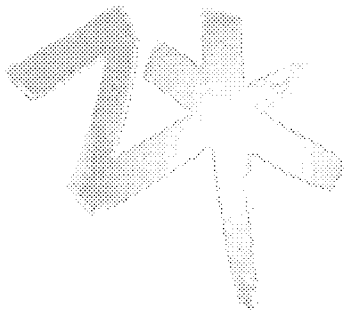


REMOTE DIAGNOSTIC DISPLAY PORT This port is for connecting the optional Remote Diagnostic Display. The display indicates the amplifier's condition with additional status LEDs and a DC voltmeter.

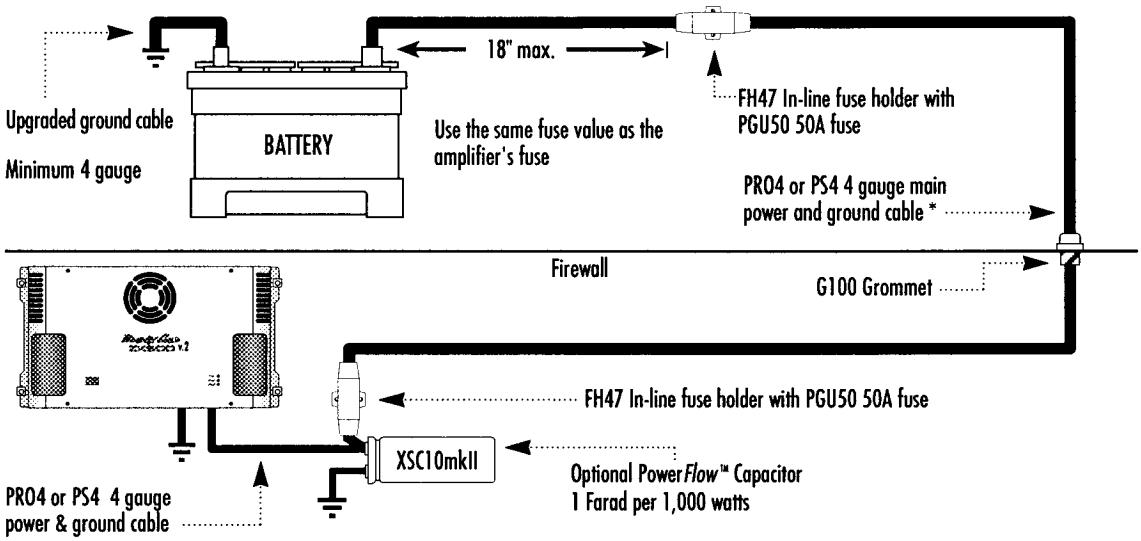
LPL CONTROL PORT This port is for connecting the optional LPL44 Remote Lowpass Level Control allowing woofer volume adjustments from the driver's seat. The LPL44 provides up to 20dB of adjustment.

ISOLATION MOUNTING FEET These nylon mounting feet allow the amplifier to mount to almost any surface. Replacements may be ordered through an authorized Phoenix Gold dealer.
White - PG# 5620.0005
Black - PG# 5620.0006

INTERNAL FUSE All ZX models feature an internal DC power fuse except the ZX500. If replacement is necessary, replace only with the same rating and type of fuse:
ZX250v.2 - 30 amp AGU
ZX350v.2 - 40 amp AGU
Note: The ZX500 does not have an internal DC power fuse. Use an external 50 amp fuse located within 18 inches of the amplifier.



SINGLE AMPLIFIER POWER*FLOW*™ SYSTEM



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

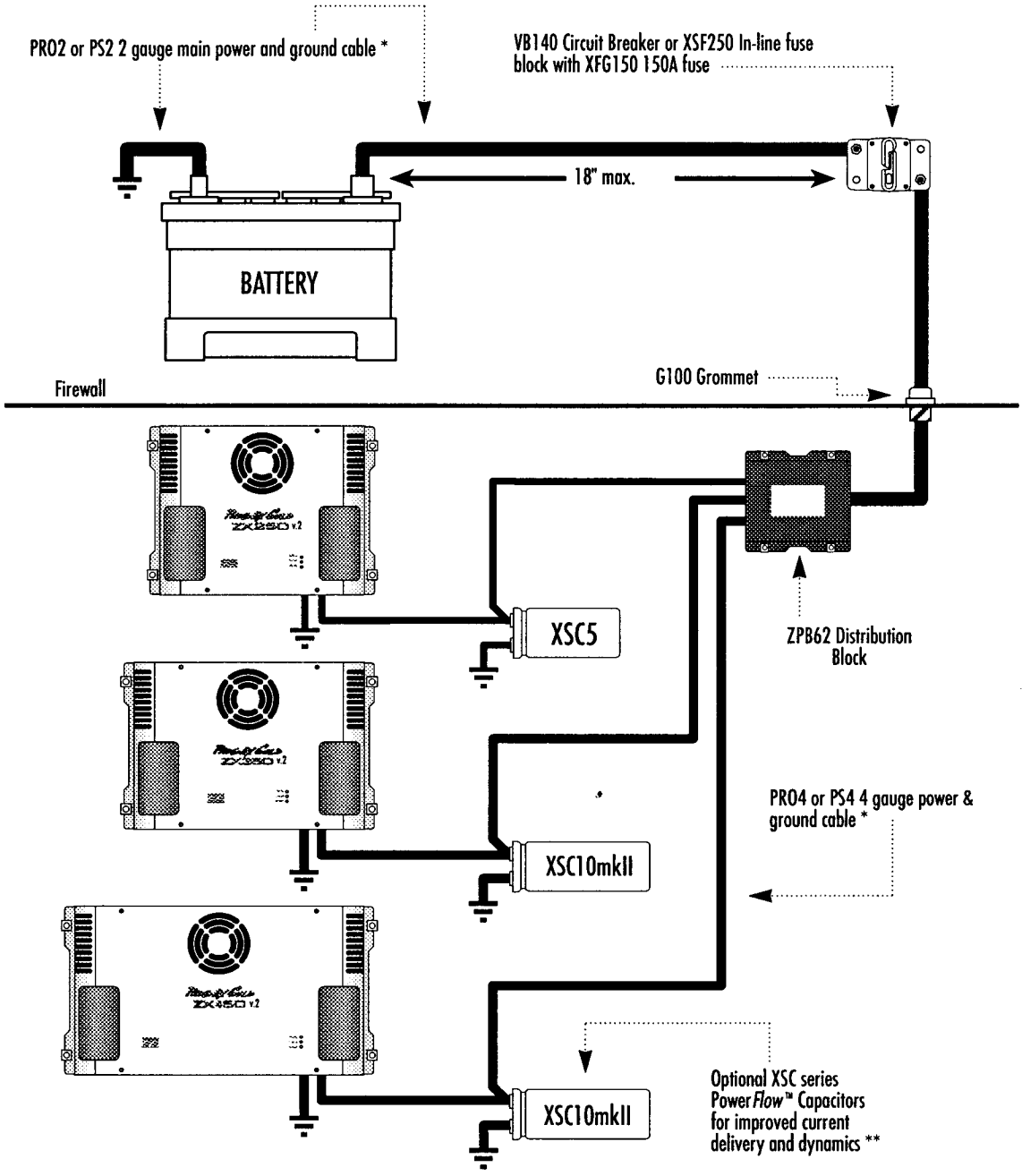
POWER CABLE CALCULATOR

	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.

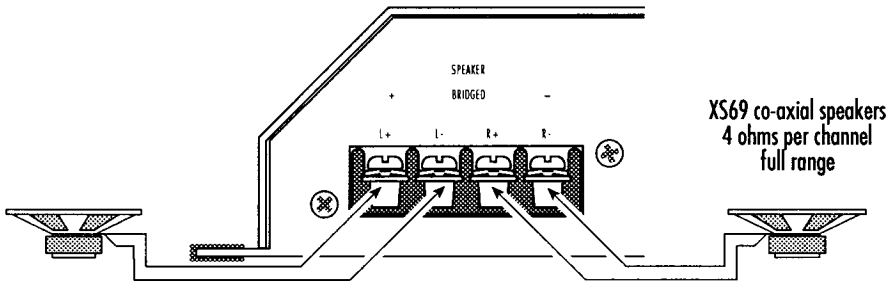
MULTIPLE AMPLIFIER POWER*FLOW* ™ SYSTEM



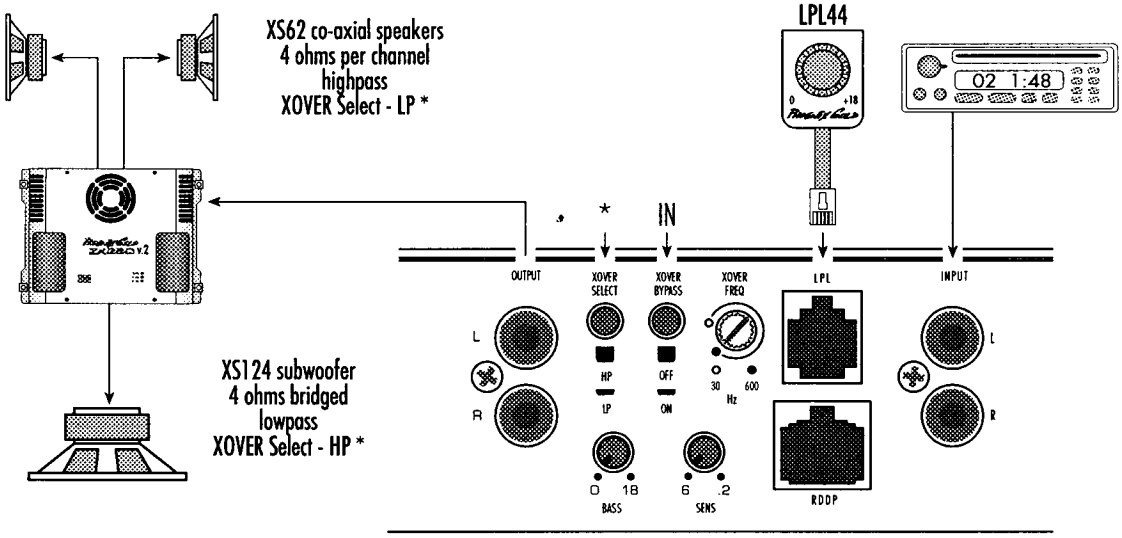
* The ZX500v.2 does not have an internal DC power fuse. Use an external 50 AMP fuse located within 18 inches of the amplifier. All other ZX amplifiers have built-in fuses.

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

OUTPUTS	
SPEAKER	AUXILIARY
FULL RANGE	HIGHPASS or LOWPASS



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



The XS69's receive full range signals.

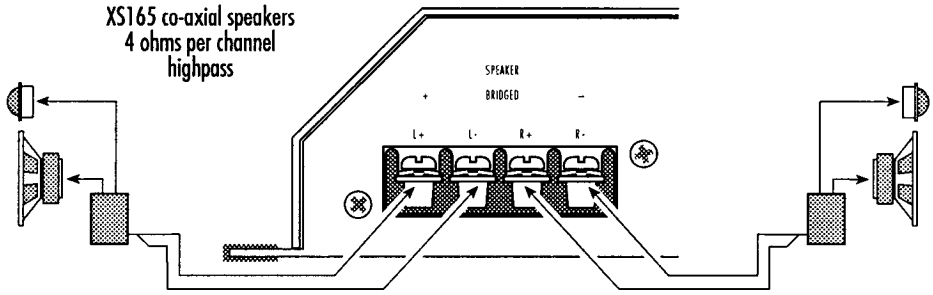
The auxiliary output jacks send either highpass or lowpass signals to another amplifier.

*The auxiliary output is opposite the crossover select button's setting. The output is highpass with the button set to LP. The output is lowpass with the button set to HP.

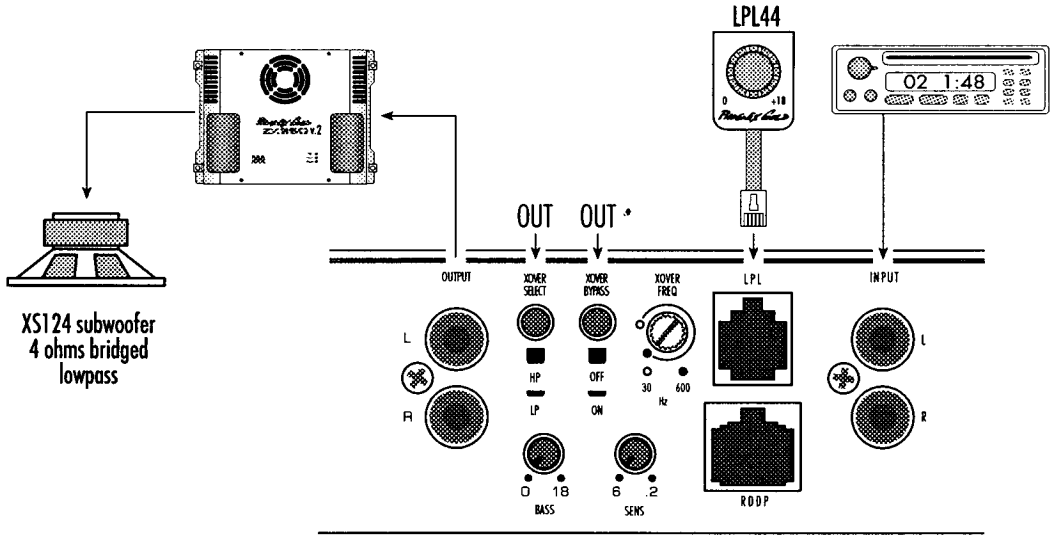
Use the crossover frequency control to set the auxiliary output's cut-off frequency.

Use the LPL44 to control the auxiliary output's volume from the driver's seat. The LPL has no affect unless the auxiliary output jacks send out lowpass signals (crossover select button set to HP).

OUTPUTS	
SPEAKER	AUXILIARY
HIGHPASS	LOWPASS



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



The XS165s receive highpass signals.

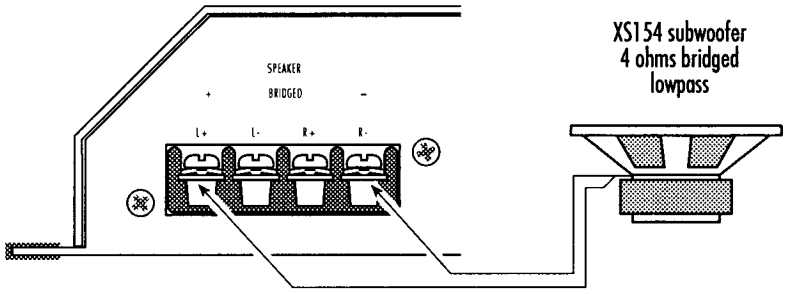
The auxiliary output jacks send lowpass signals to another amplifier.

The auxiliary output is opposite the crossover select button's setting. The output is lowpass with the button set to HP.

Use the crossover frequency control to set the speaker and auxiliary output's cutoff frequencies.

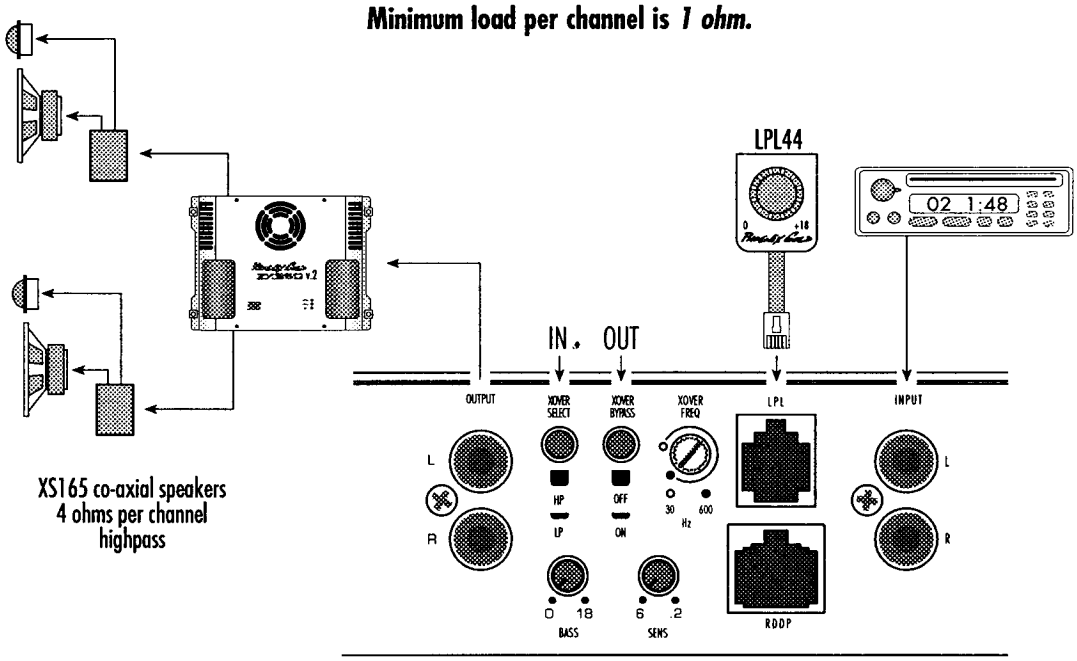
Use the LPL44 to control the auxiliary output's volume from the driver's seat.

OUTPUTS	
SPEAKER	AUXILIARY
BRIDGED LOWPASS	HIGHPASS



XS154 subwoofer
4 ohms bridged
lowpass

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



XS165 co-axial speakers
4 ohms per channel
highpass

The XS154 receives lowpass signals.

The auxiliary output jacks send highpass signals to another amplifier.

The auxiliary output is opposite the crossover select button's setting. The output is highpass with the button set to LP.

Use the crossover frequency control to set the speaker and auxiliary output's cutoff frequencies.

Use the LPL44 to control the XS154's volume from the driver's seat.

MOUNTING You can mount the ZX 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.

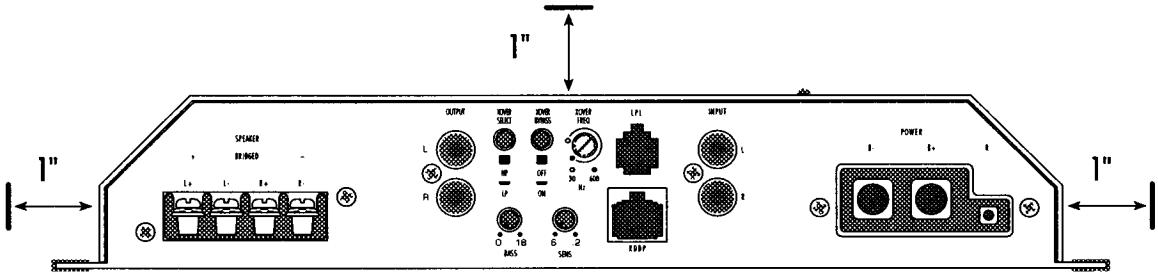
Make sure the amplifier has adequate ventilation. Leave at least one inch of clearance on the sides and top of the amplifier.

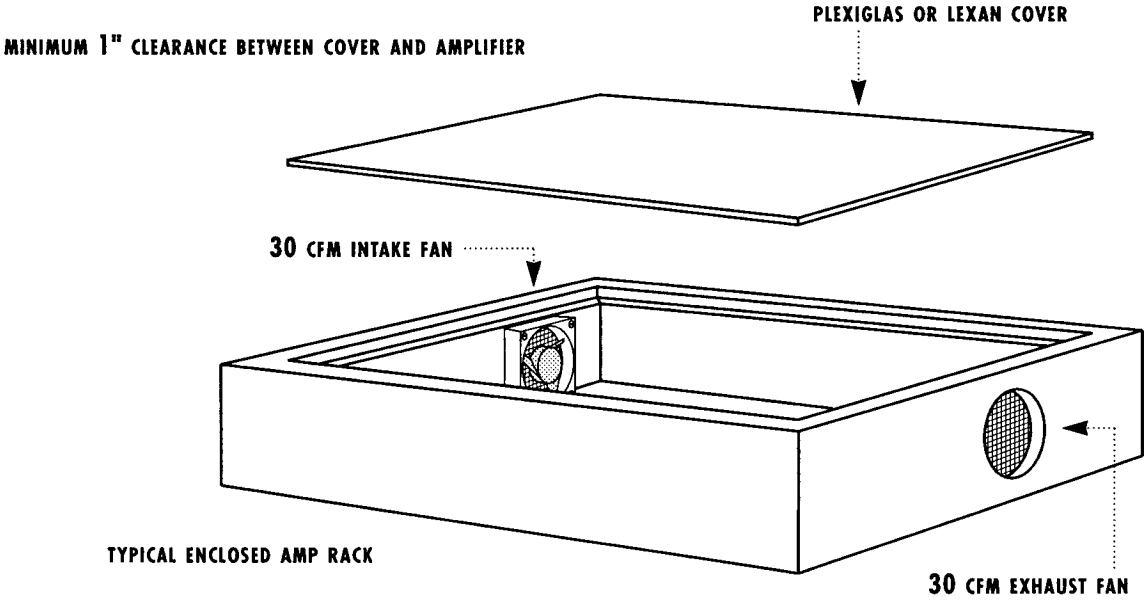
Mounting the amplifier inside an enclosure is not recommended unless the enclosure itself has ventilation fans to circulate fresh air through the enclosure. Design your cooling system to circulate at least 30cfm (cubic feet per minute) for each amplifier.

Example - A ZX500v.2 in an enclosed amp rack requires two 30cfm (cubic feet per minute) fans. One fan for intake and one for exhaust.

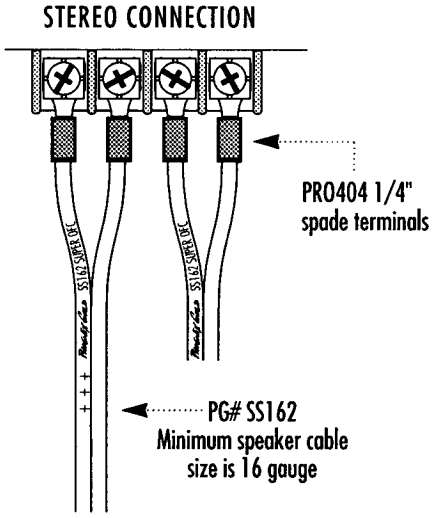
Mount the amplifier to flat surfaces only. Make sure the amplifier's base does not flex or distort.

The isolation mounting feet may be replaced if damaged. Order PG# 5620.0006 for black and PG# 5620.0005 for white. Contact an authorized Phoenix Gold dealer for details.



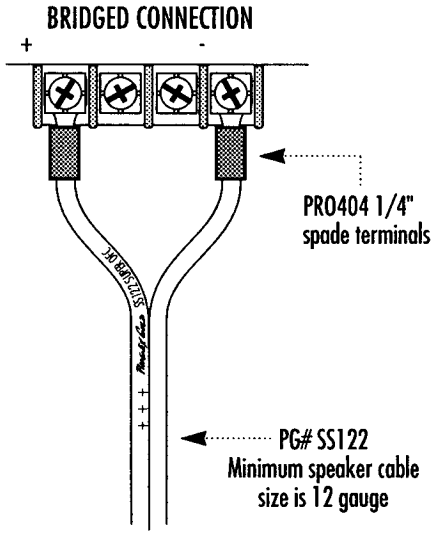


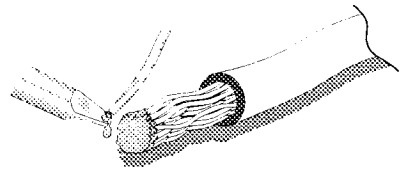
POWER & SPEAKER CONNECTIONS Use crimp-on terminals for connecting speaker cables to the amplifier. Use a tool designed to crimp non-insulated terminals. For extra reliability, crimp and solder each terminal.



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.

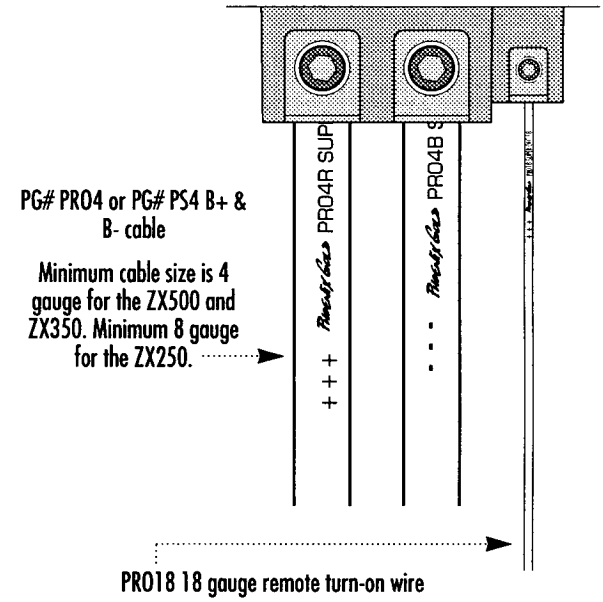




B+ battery, B - ground and remote turn-on cables connect directly to the terminal block without the need for special connectors.

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 & BASS ADJUSTMENT

1. Install all system fuses.

2. Set the amplifier's input sensitivity controls 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 front and rear crossover frequencies. Check the manufacturer's specifications for the proper frequency range of each speaker. It may be necessary to fine tune the crossover frequencies 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.

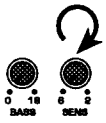
7. Visually check the amplifier's condition. The green power LED should be on.

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.



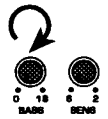
12. Repeat input sensitivity adjustments for all other amplifiers. *Note:* The ZX450's sensitivity and bass controls have no affect on the auxiliary outputs. An amplifier connected to the auxiliary outputs receives the same signal level available to the ZX450's inputs (unity gain).

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

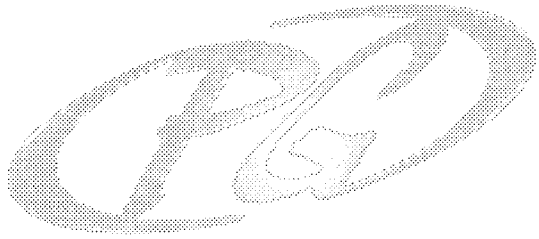
14. Listen to various musical selections to check overall system balance. Compare front to rear, midbass to midrange, etc. If one speaker set is too loud compared to another, then its level must be lowered to blend correctly with the other speakers. The idea is to reference all speakers to the weakest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



SYMPTOM	PROBABLE CAUSE	SOLUTION
No output and Power-on LED is off	No battery, ground, or remote connection	Connect B+, B-, and a remote turn-on to the amplifier (pages 5, 6 & 11). The amplifier must have a clean solid chassis ground connected to the B- terminal and receive at least 10.5 volts through the B+ and remote turn-on terminals.
	Blown power fuse	Use an ohmmeter to check for a short to chassis ground in the B+ cable with the B+ cable disconnected from the amplifier, battery and all other devices. Correct any short and install a new fuse. All ZX models feature an internal DC power fuse except the ZX500v.2. If replacement is necessary, replace only with the same rating and type of fuse: ZX250v.2 - 30 amp AGU ZX350v.2 - 40 amp AGU *Note:* The ZX500v.2 does not have an internal DC power fuse. Use an external 50 amp fuse located within 18 inches of the amplifier (page 4).
No output and power-on LED is on	No signal from the headunit	Use an AC volt meter to check for voltage at the headunit's preamp outputs. The level should fluctuate with the peaks in music.
	Faulty input signal cables	Use an AC volt meter to check for voltage at the signal cable's 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	Make sure the headunit is not producing a clipped signal (page 12). Most headunits clip their own output above 7/8 volume. Distorted signals coming into the amp will sound distorted at any input sensitivity setting.
	Input sensitivity too high	Lower input sensitivity (page 12). 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 (yellow LED on)	Thermal protection circuit activated	Check for poor mounting location causing blocked fan intake/exhausts or re-circulated hot air (page 10). If the internal heatsink reaches 115 degrees Celsius, the amplifier shuts down and the green Power-on LED turns off. The fan continues to run at high speed displaying the yellow LED until the internal temperature falls below 115 degrees.
Amplifier cuts off when driven to high output levels (red LED on)	Overload circuit activated by excessive output current. Various causes are:	
	- Total speaker load impedance is too low	Minimum bridged impedance is 2 ohms. Minimum stereo impedance is 1 ohm.
	- A damaged speaker cable touching the vehicle chassis, speaker cables or tinsel leads touching each other, or damaged speaker voice coil	With the wires disconnected from the amp, Use an ohm meter 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.
	- Damaged passive crossover components	Visually examine inductors, capacitors and resistors for signs of heat stress. Use a soldering iron to touch up connections to the circuit board. Try substituting a different crossover network.

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