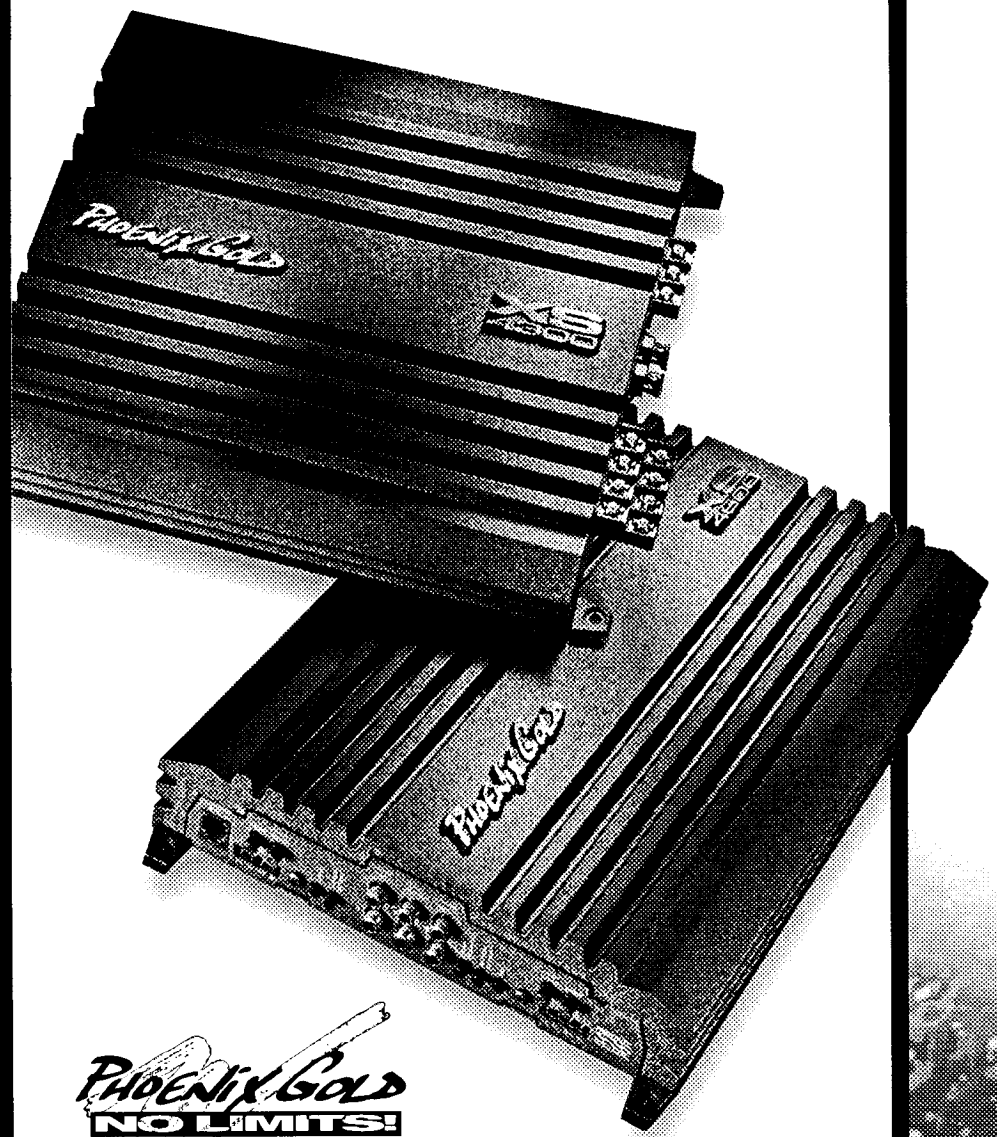
OWNER'S MANUAL

XS4300
XS4600

HIGH EFFICIENCY MOSFET AMPLIFIER



PHOENIX GOLD
NO LIMITS!

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 XS series amplifiers provide incredible power and sound quality 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

TABLE OF CONTENTS

FEATURES

- Separate Front and Rear Defeatable 24dB per Octave Highpass/Lowpass Crossovers, Adjustable via Plug-in Resistor Networks (RNets)
  - Capable of 48dB per Octave Rear Lowpass Output
- Auxiliary Output to Send Lowpass or Highpass Signals to an Additional Amplifier
- LPL Ready, Allows the use of an Optional LPL44 Lowpass Level Control to Adjust the Volume of both Front and Rear Outputs
- Fully Differential Hi-Level Input Capability for Easy Integration with most Factory Headunits
- Fully Differential Line-Level Inputs eliminate common noise problems
- Rear Fade/Non-Fade Switch Eliminates the need for "Y" Connectors by Sending Signals from the Front Inputs to The Rear Inputs Internally
- Tri-Linear™ Capability Allows Simultaneous Stereo and Bridged Mono Operation for both Front and Rear Outputs
- Adjustable Front and Rear "Twin T"™ Bass Equalization with +18dB of Boost Centered @ 45Hz
- 2 ohms Bridged/1 ohm Stereo Approved
- Advanced Muting Circuitry Eliminates Turn-on and Turn-off Noises
- Advanced Thermal and Overload Protection
- 2 layer, 2 ounce, Copper G10 Glass-Epoxy Printed Circuit Boards
- Power-on LED Indicator
- Audiophile Grade Metal Film Capacitors and 1% Metal Film Resistors
- PWM Mosfet Power Supply
- 24kt Gold Plated Power and Speaker Terminals
- Glass Filled Nylon Isolation Mounting Feet
- 24kt Gold Plated Signal Input and Output Jacks
- XS Linkable Using the Optional XS Link to Connect Multiple Amplifiers Together

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SPECIFICATIONS

- Frequency Response .....±1dB 20Hz to 20kHz
- Signal to Noise Ratio (A weighted) .....>100dB
- Input Sensitivity, Line level Inputs .....100 mVRMS to 3 VRMS
- Input Sensitivity, Hi-level Inputs .....1.75 WRMS to 35 WRMS
- Crossover Frequency, Factory Installed RNets 85Hz
- Crossover Slope, HP & LP .....24dB per octave
- Bass Boost @ 45Hz.....0 to +18dB
- DC Input Voltage Range .....10 volts to 15.5 volts
- Typical Current Draw at Idle .....2 amps
- Minimum Load Impedance, Two Channels Bridged .....**2 ohms**
- Minimum Load Impedance, Single Channel .....**1 ohm**

XS4300

- Continuous Output Power:
  - Into 4 ohms Stereo @ 12.5 VDC (IASCA).....12 watts x 4
  - Into 4 ohms Stereo @ 14.4 VDC.....35 watts x 4
  - Into 2 ohms Stereo @ 14.4 VDC.....75 watts x 4
  - Into 4 ohms Bridged @ 14.4 VDC.....150 watts x 2
- Continuous Current Draw @ Full Power * .....35 amps
- Peak Current Draw @ Full Power **.....50 amps
- Recommended Fuse Size .....20A x 2 ATO style
- Dimensions, Chassis.....10.5"L x 9.25"W x 2.0"H
- Dimensions, Overall .....12.25"L x 9.25"W x 2.1"H

XS4600

- Continuous Output Power:
  - Into 4 ohms Stereo @ 12.5 VDC (IASCA).....25 watts x 4
  - Into 4 ohms Stereo @ 14.4 VDC.....75 watts x 4
  - Into 2 ohms Stereo @ 14.4 VDC.....150 watts x 4
  - Into 4 ohms Bridged @ 14.4 VDC.....300 watts x 2
- Continuous Current Draw @ Full Power * .....55 amps
- Peak Current Draw @ Full Power **.....85 amps
- Recommended Fuse Size .....30A x 2 ATO style
- Dimensions, Chassis.....12.5"L x 9.25"W x 2.0"H
- Dimensions, Overall .....14.25"L x 9.25"W x 2.1"H

* Average continuous current draw when playing typical music material.

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

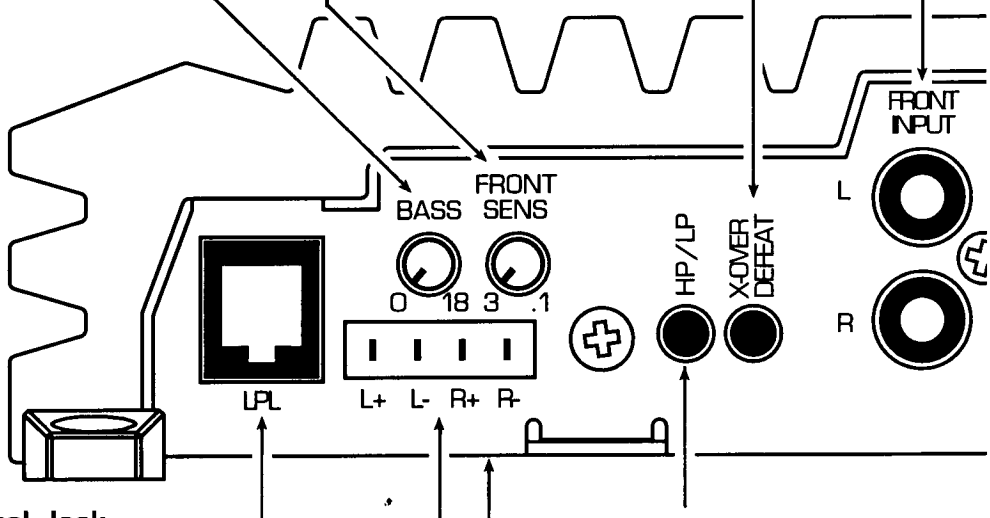
Due to continuous product development, features, specifications, and availability are subject to change without notice.

Front Amplifier Sensitivity
Used to reach maximum front amplifier power with a wide variety of headunits. The amplifier is more sensitive to input signals when set to .1 and less sensitive when set to 3. See pages 23 & 24.

Front Line-level Inputs
Connect pre-amp cables from the headunit directly to these teminals. We recommend using Phoenix Gold QLX or TRX twisted pair interconnects. See page 19.

Front Crossover Defeat
Allows the front amplifier to receive signals directly from the front inputs bypassing the front crossover. This switch has no effect on the auxiliary outputs. See pages 13-17.
- Crossover
- Defeat

Front Twin-T™ Bass EQ
Used to boost the front amplifier's output from 0 to +18dB at 45Hz. See pages 23 & 24.



LPL Control Jack
Plug in the optional LPL44 and remotely control the volume of subwoofers. The LPL controls the lowpass output of both front and rear internal crossovers. The LPL circuit has no effect unless you use an internal lowpass crossover. See pages 13-17.

Front Crossover Select
Provides either a lowpass or highpass signal for the front amplifier. The auxiliary outputs receive the opposite signal. See pages 13-17.
- Amp. HP/Aux. LP
- Amp. LP/Aux. HP

Front Hi-Level Inputs
Connect speaker wires from a headunit without pre-amp level outputs directly to these terminals using .187" female spade connectors (PG# PR084). Maximum input power is 35 watts per channel. See page 19.

Front Crossover RNet (bottom)
Controls the highpass *and* lowpass crossover point for the front amplifier *and* the auxiliary outputs. See pages 13-17, 21 & 22.

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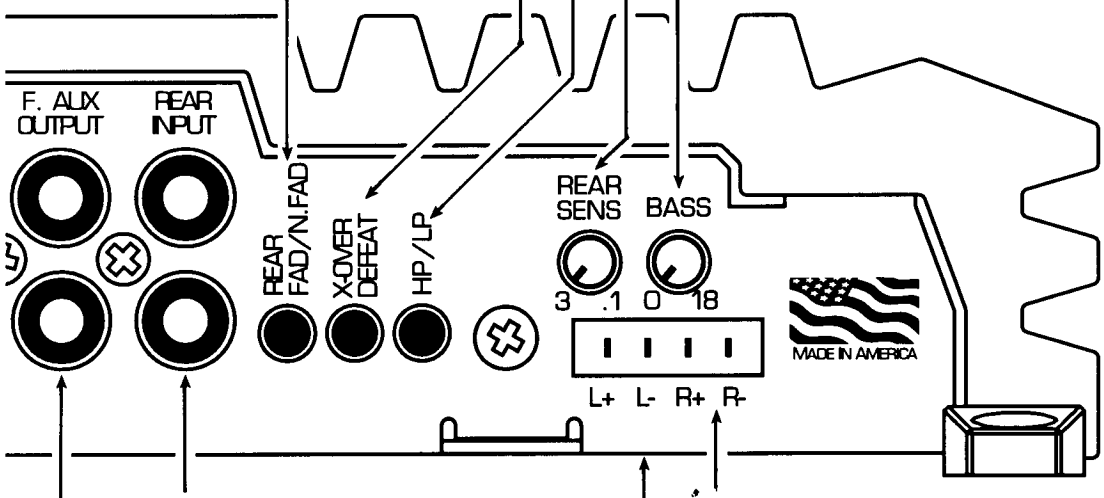
Rear Crossover Defeat
Allows the amplifier to receive signals directly from the rear inputs or front inputs bypassing the rear crossover. See pages 13-17.
- Crossover
- Defeat

Rear Fade/Non Fade
Allows the rear inputs to receive signals from the front inputs without using "Y" connectors. See pages 13-17.
- Rear input
- Front input

Rear Crossover Select
Determines the output of the rear crossover. Crossover frequency is set by the rear crossover RNet. See pages 13-17.
- Highpass output
- Lowpass output

Rear Amplifier Sensitivity
Used to reach maximum rear amplifier power. See pages 23 & 24.

Rear Twin-T™ Bass EQ
Used to boost the rear amplifier output from 0 to +18dB at 45Hz. See pages 23 & 24.



Rear Line-level Inputs
Allows the use of the headunit's fader to separately control the volume of the front and rear channels. Connect pre-amp signal cables from the headunit directly to these terminals. See page 19.

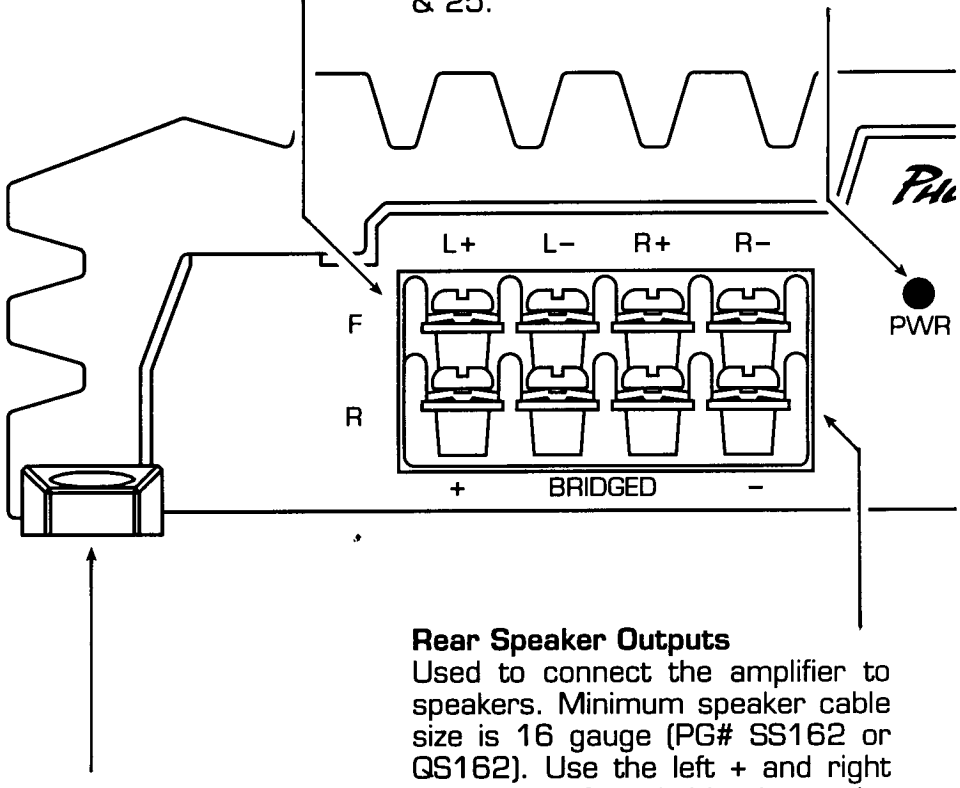
Rear Hi-level Inputs
Connect speaker wires from a headunit without pre-amp level outputs directly to these terminals using .187" female spade connectors (PG# PR084). Maximum input power is 35 watts per channel. See page 19.

Auxiliary Line-level Outputs
Provides either a lowpass or highpass signal for an additional amplifier. The signal is always the opposite of the front crossover select switch. The crossover frequency is set by the front RNet. See pages 13-17.

Rear Crossover RNet (bottom)
Controls the highpass and lowpass crossover point for the rear amplifier. See pages 13-17, 21 & 22.

Front Speaker Outputs
Used to connect the amplifier to speakers. Minimum speaker cable size is 16 gauge (PG# SS162 or QS162). Use the left + and right terminals for bridged mode. Minimum impedance is **2 ohms bridged** OR **1 ohm stereo**. See pages 13-17 & 20.

Power-on LED
This LED turns on whenever the amplifier is on. The amplifier cannot turn on unless it is grounded through the B-terminal and receiving 12 volts at both the B+ and R terminals. The LED will turn off if the amplifier shuts down due to overheating (thermal) or a shorted speaker (overload). See pages 23 & 25.



Rear Speaker Outputs
Used to connect the amplifier to speakers. Minimum speaker cable size is 16 gauge (PG# SS162 or QS162). Use the left + and right terminals for bridged mode. Minimum impedance is **2 ohms bridged** OR **1 ohm stereo**. See pages 13-17 & 20.

Isolation Mounting Feet
These glass filled nylon mounting feet allow the amplifier to be mounted to almost any surface. If damaged, they can be replaced by ordering PG# 5740.0002 (white) or 5740.0003 (black). See page 18.

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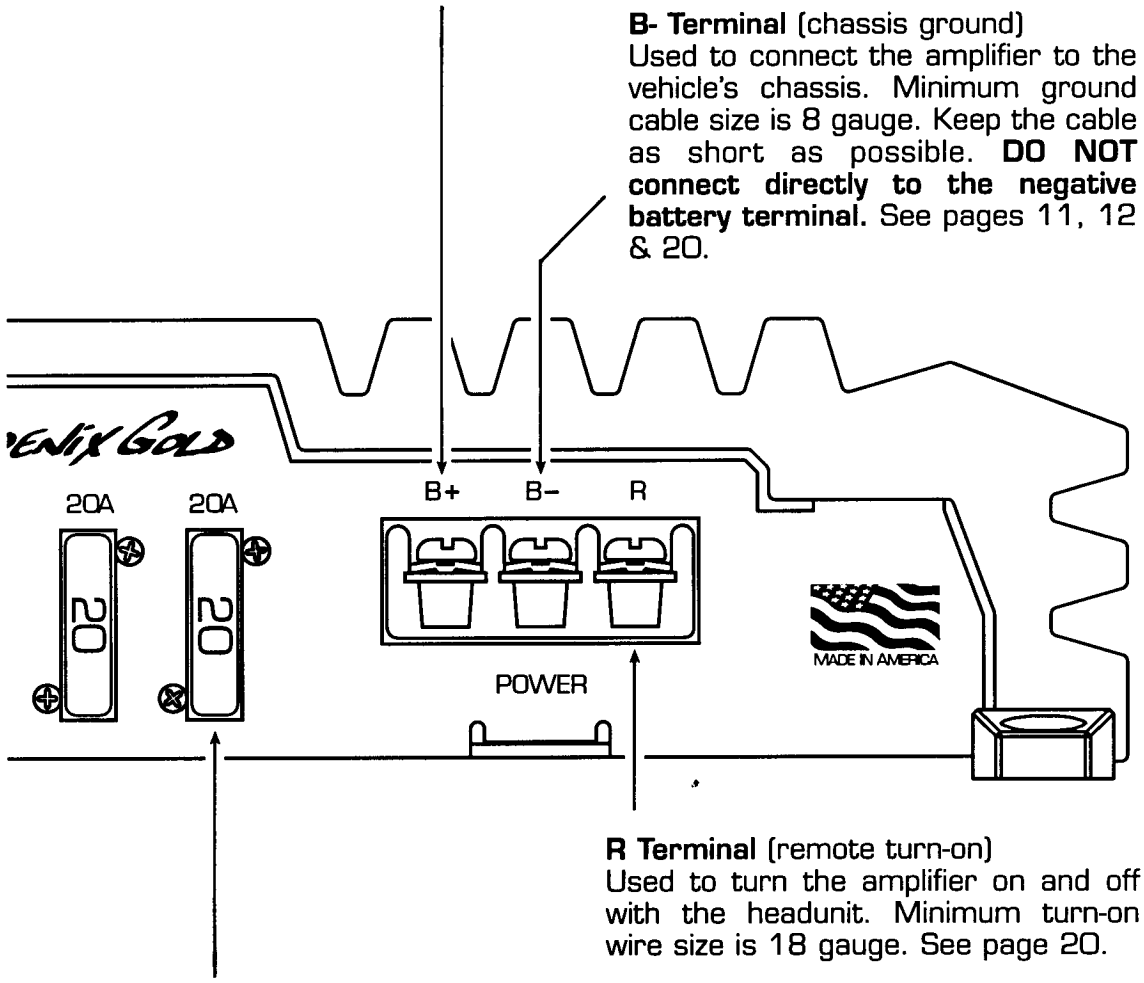
B+ Terminal (battery positive)
Used to connect the amplifier to the vehicle's battery. Minimum power cable size is 8 gauge. This cable must be fused within 18" of the positive battery terminal. See pages 11, 12 & 20.

B- Terminal (chassis ground)
Used to connect the amplifier to the vehicle's chassis. Minimum ground cable size is 8 gauge. Keep the cable as short as possible. **DO NOT connect directly to the negative battery terminal.** See pages 11, 12 & 20.



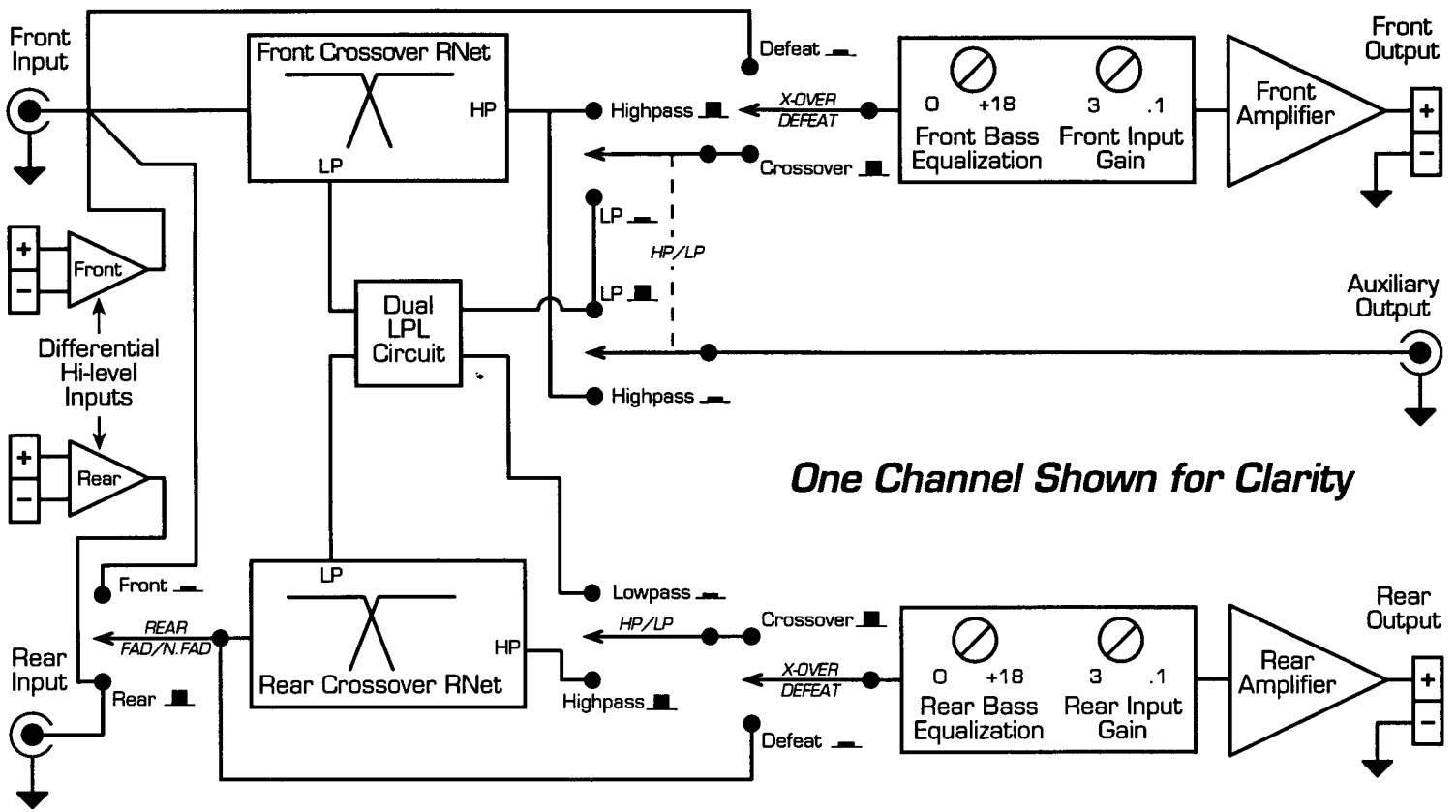
R Terminal (remote turn-on)
Used to turn the amplifier on and off with the headunit. Minimum turn-on wire size is 18 gauge. See page 20.

DC Power Fuses
Used to protect the amplifier's power supply from improper connection (reversed B+ and B-). If replacement is necessary, use the same size and type.

XS4300 two 20A ATO style (40 amp total)
XS4600 two 30A ATO style (60 amp total)

Never use fuses with a higher amp rating.

SIGNAL FLOW DIAGRAM



PLANNING

A successful installation must begin with planning. There are several things to consider before beginning the installation.

1. **Inspect the vehicle's electrical system:**

   The vehicle's battery and charging system must be in excellent condition before installing the amplifier. If the condition of the electrical system is in doubt, have it inspected and repaired by a qualified technician.

2. **Plan the mounting locations for all components:**

   The only way to determine if your system requires custom work is to decide on a location for each component. Consult with a qualified custom installer before beginning any custom work. Attempting to modify your vehicle without the proper tools and experience can lead to damaging the equipment or vehicle.

3. **Plan all system cable routes:**

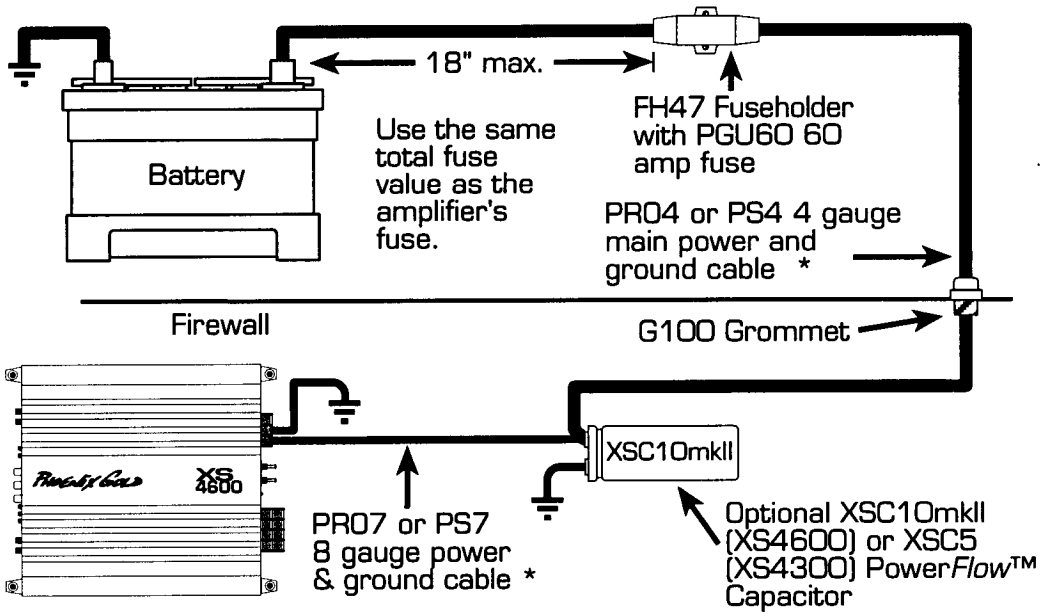
   When choosing cable routes, make sure there is no chance of interference with the mechanical operation of the vehicle controls such as the steering wheel, gas, brake, clutch, trunk hinges, etc.

   a. Power cables: All main power cables must be fused within 18" of the positive battery terminal. Do not route power cables near hot engine components such as exhaust manifolds. Power cables must be protected with grommets when they pass through any metal panels such as the firewall.

   b. Signal cables should ***never*** run alongside amplifier power cables, other vehicle wiring, or electrical components such as engine control computers.

   c. Speaker cables can run next to electrical or signal cables without interference. However, passive crossover components may receive interference from electrical cables.

SINGLE AMPLIFIER POWER*FLOW*™ SYSTEM



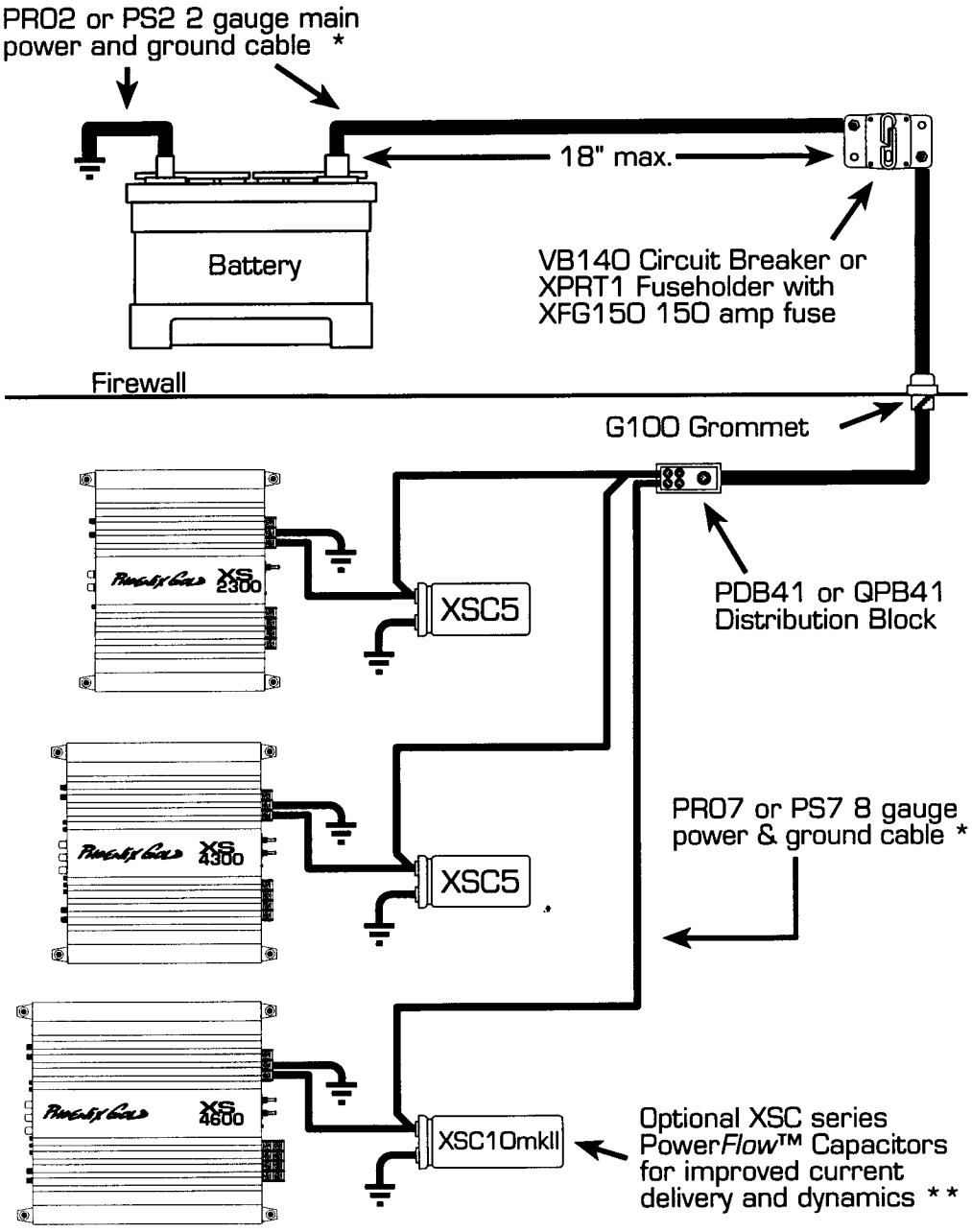
If not using Power*Flow*™ capacitors, you can connect 4 gauge cable directly to the amplifier using PG# PR040 spade terminals.

* Use the Power Cable Calculator below for the exact gauge of cable required.

Find the total wattage that the cable must support on the left and the distance of the cable run along the top. Where the two meet indicates the proper gauge cable. When in doubt use a larger gauge.

	4ft	8ft	12ft	16ft	20ft	24ft
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

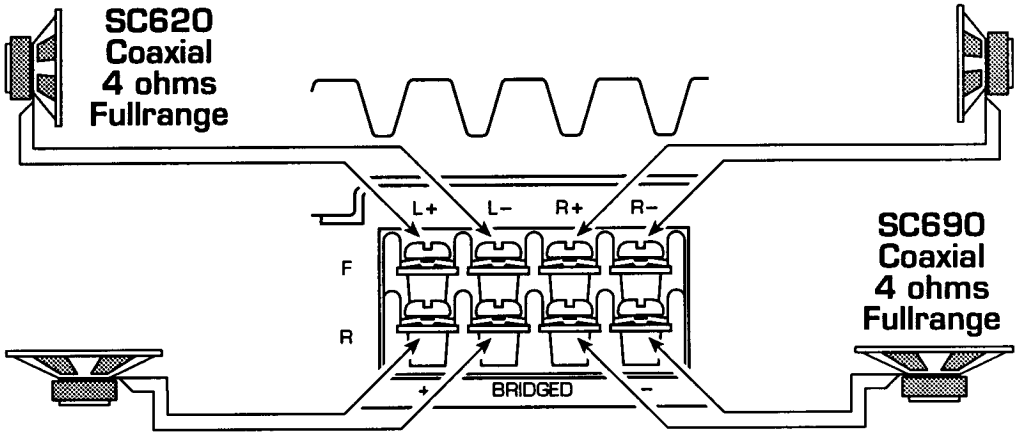
MULTI AMPLIFIER POWER*FLOW*™ SYSTEM

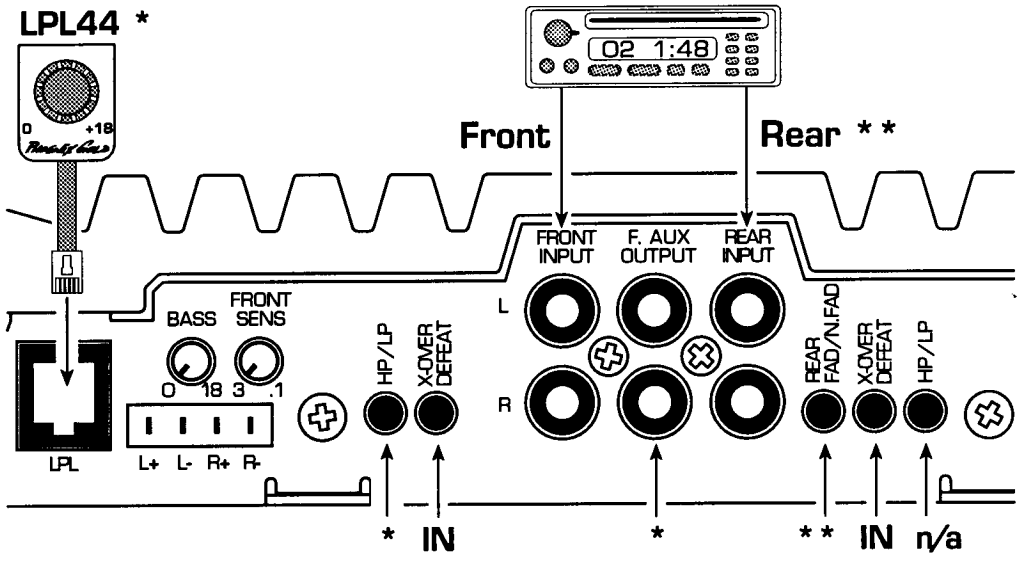


* Use the Power Cable Calculator on page 11 for the exact gauge of cable required.

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

OUTPUTS		
FRONT	**REAR**	**FRONT AUX.**
Full Range	Full Range	Highpass/Lowpass





* The front crossover select button determines if the auxiliary output is highpass or lowpass. Set the button ***in*** for highpass or ***out*** for lowpass. The front RNet determines the crossover frequency. The optional LPL44 can only affect the auxiliary output's level when set for lowpass output.

** The rear fade/non-fade button *internally* routes signals from the front inputs to the rear inputs. Set the button ***in*** for headunits with only one pair of line-level ouputs. Set the button ***out*** for headunits with front and rear line-level outputs.

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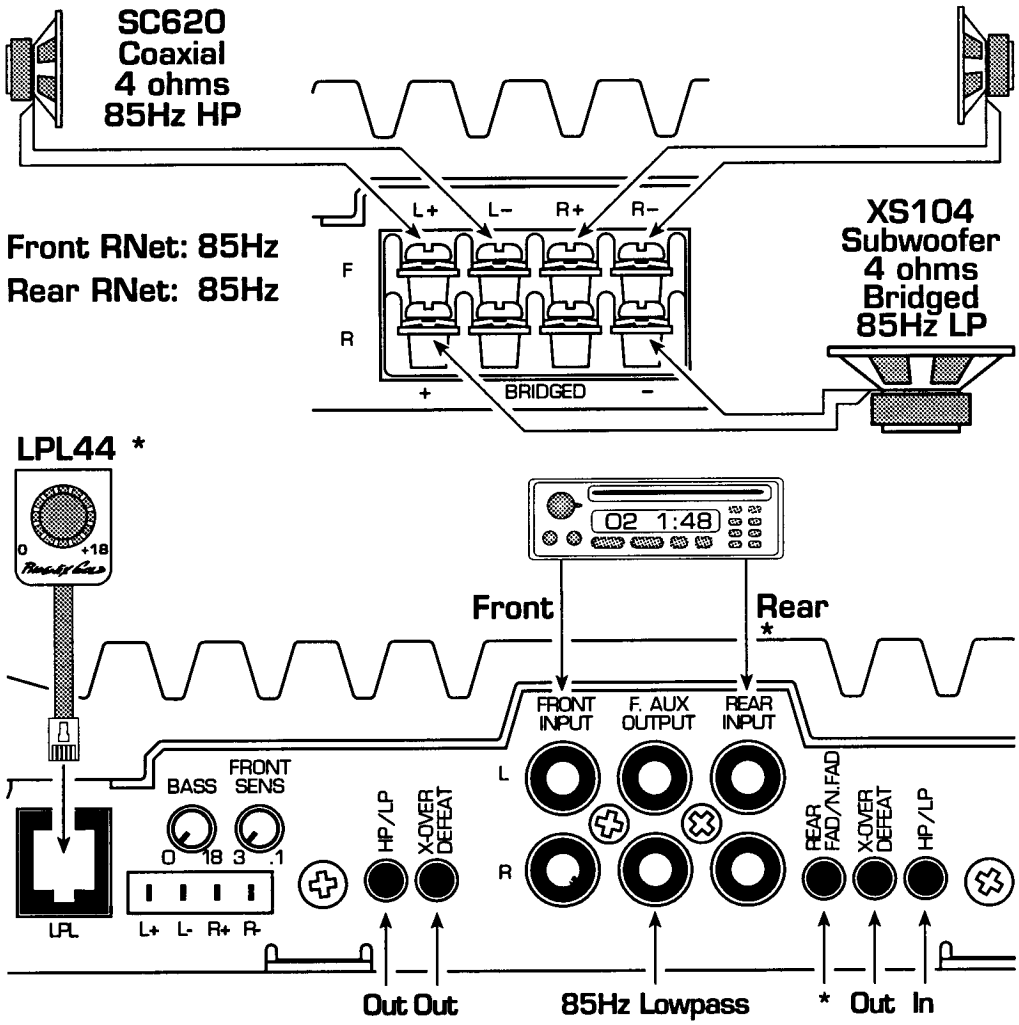
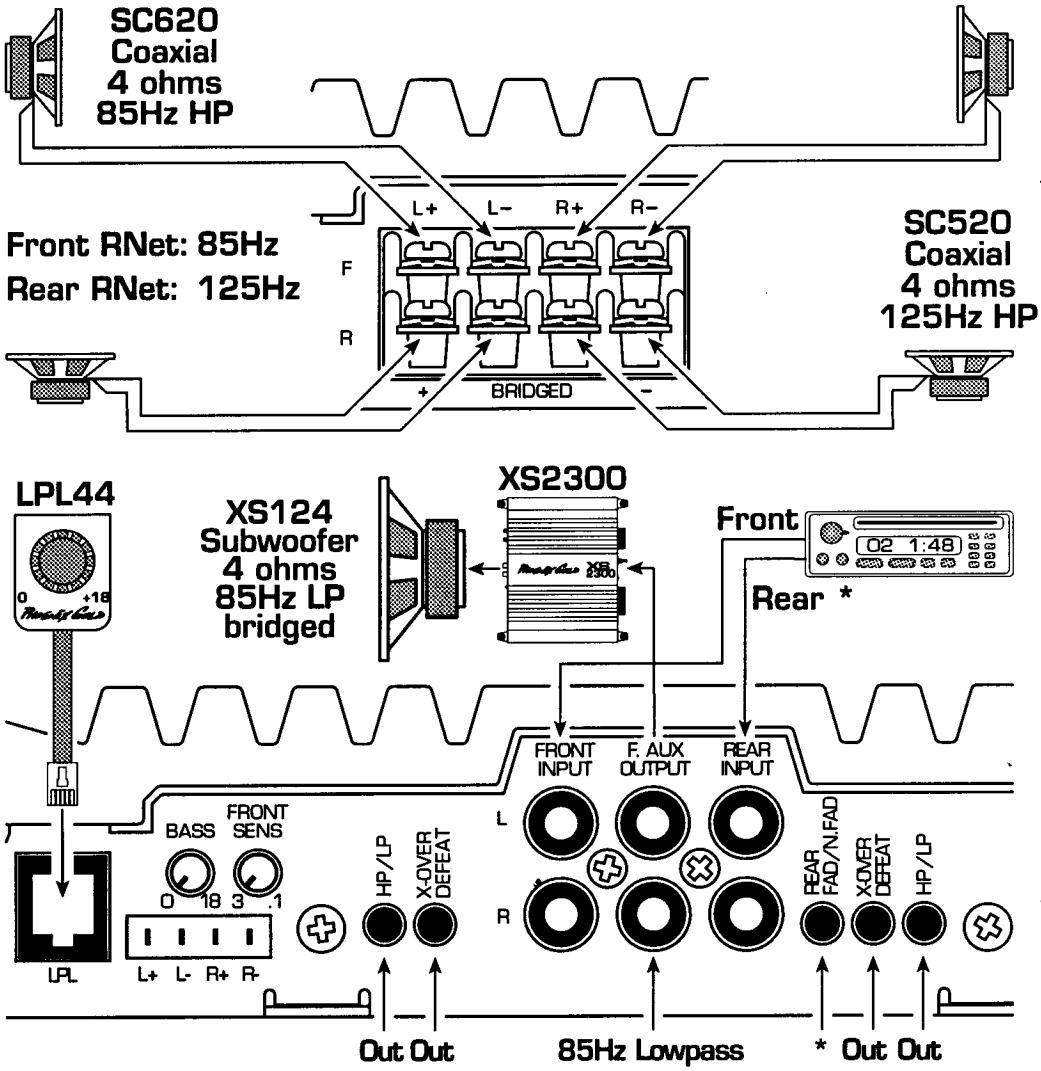
OUTPUTS		
FRONT	**REAR**	**FRONT AUX.**
Highpass	Lowpass	Lowpass



The front RNet determines the highpass crossover frequency. The rear RNet determines the lowpass crossover frequency.

* Either the headunit's fader or optional LPL44 can control the volume of the subwoofer. For headunits with only one pair of line-level outputs, use the LPL44 with the rear fade/non-fade button pressed ***in***. For headunits with front and rear line-level outputs, use the headunit's fader with the rear fade/non-fade button ***out.***

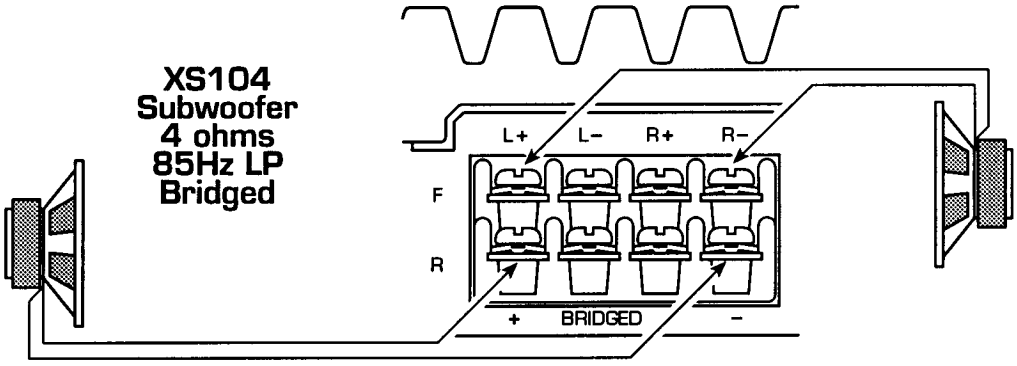
OUTPUTS		
FRONT	**REAR**	**FRONT AUX.**
Highpass	Highpass	Lowpass

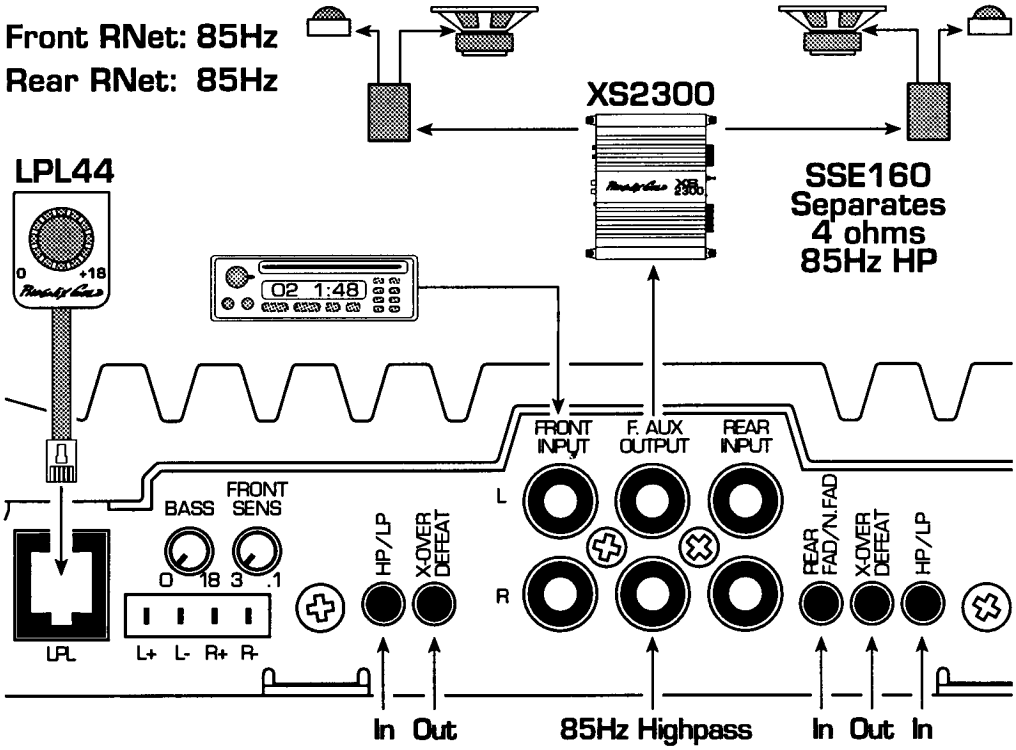


The front RNet divides frequencies between the front speakers and the subwoofer amplifier. Use the optional LPL44 to control subwoofer volume.

* The rear fade/non-fade button *internally* routes signals from the front inputs to the rear inputs. Set the button ***in*** for headunits with only one pair of line-level outputs. Set the button ***out*** for headunits with front and rear line-level outputs.

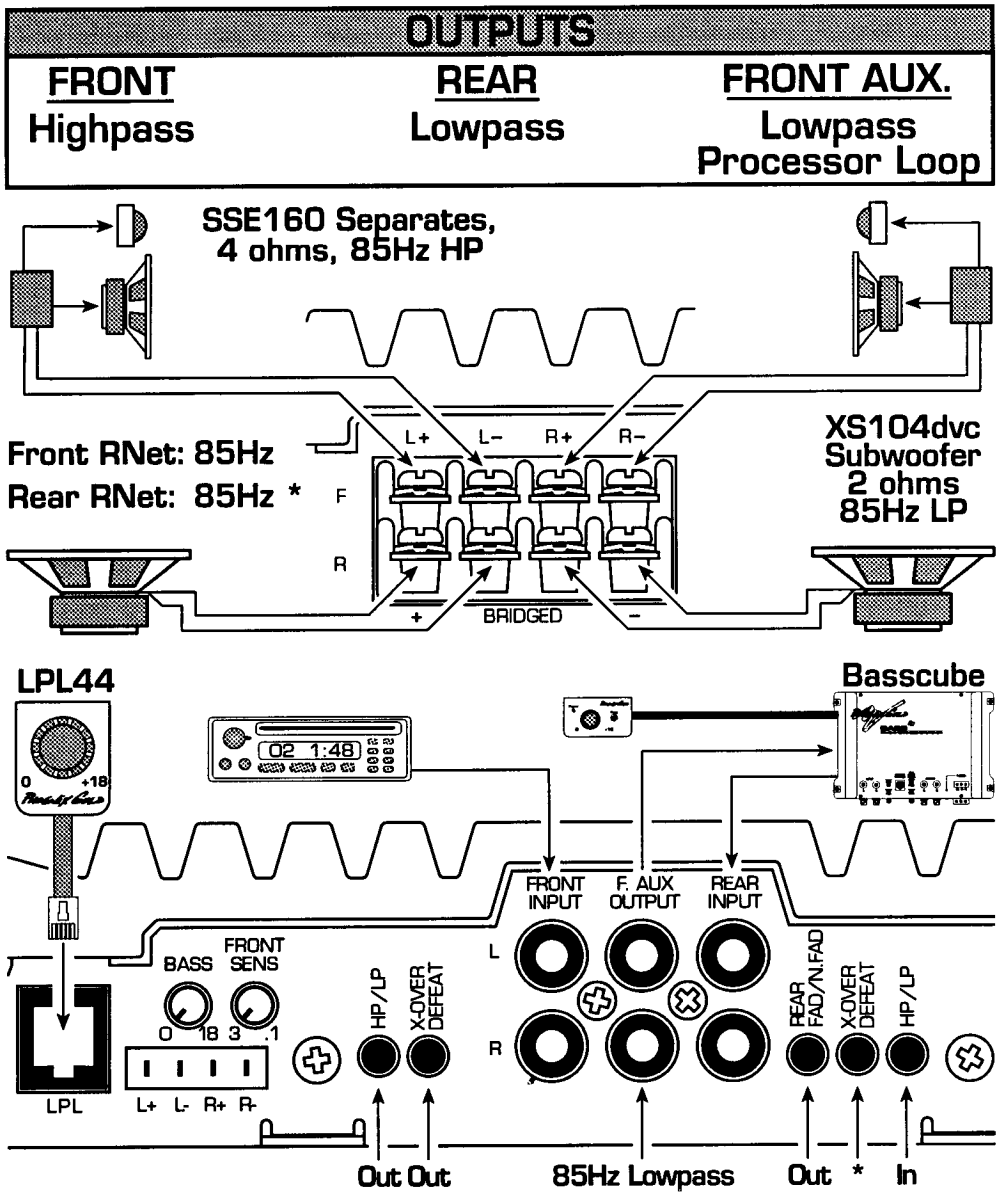
OUTPUTS		
FRONT	**REAR**	**FRONT AUX.**
Lowpass	Lowpass	Highpass





The front and rear RNets must be the same frequency. Use the optional LPL44 to control subwoofer volume.

The rear fade/non-fade button *internally* routes signals from the front inputs to the rear inputs.

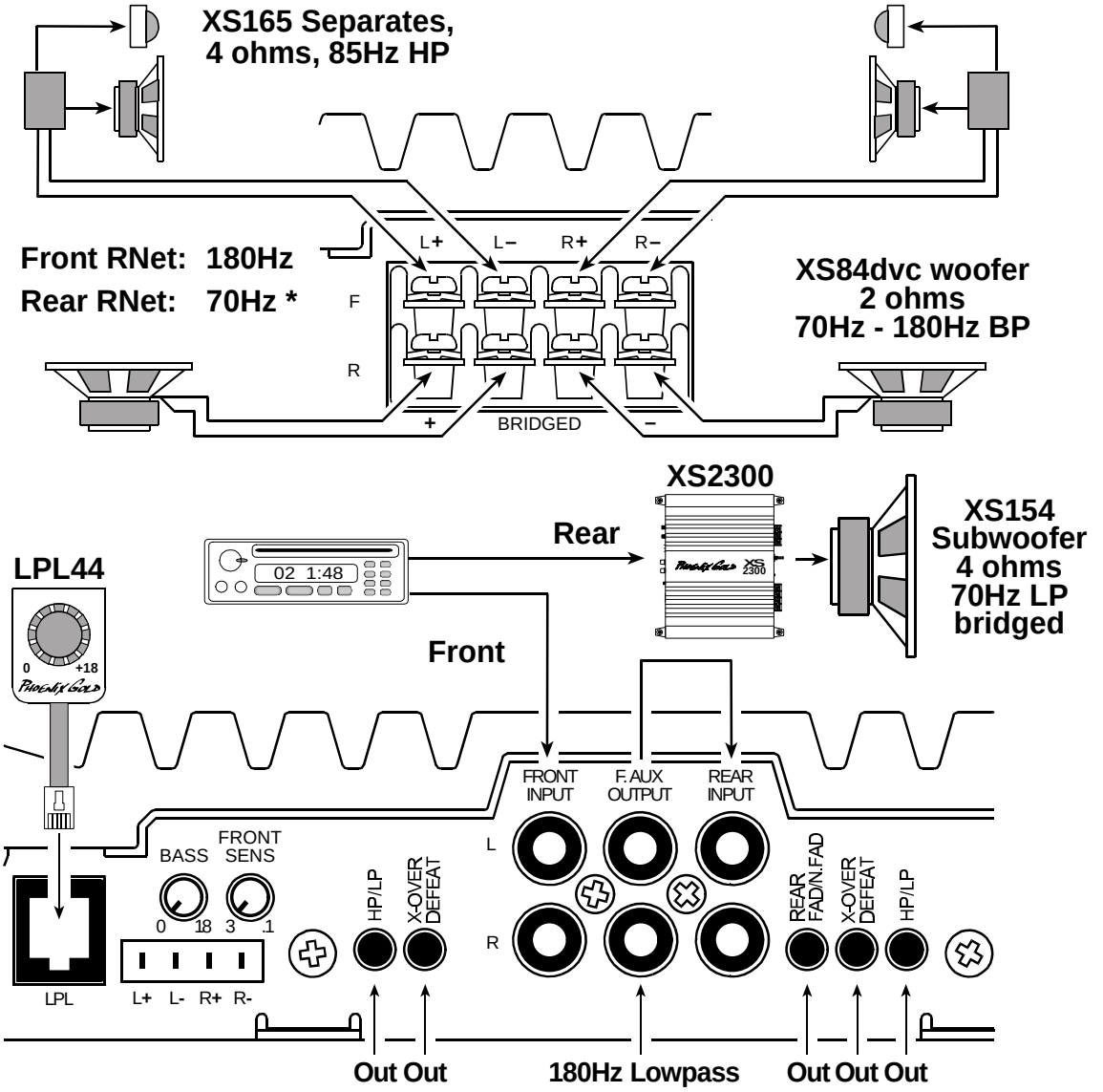


Use the optional LPL44 to control subwoofer volume.

The front auxiliary output sends signals to the Basscube. The Basscube returns the processed signals to the rear inputs.

* Set the rear crossover defeat button **in** for 24dB per octave rear output (uses the front RNet). Set the rear crossover defeat button **out** for 48dB per octave rear output (uses the front and rear RNets in series). The front and rear RNets must be the same frequency for 48dB operation.

OUTPUTS		
FRONT	**REAR**	**FRONT AUX.**
Highpass	**Bandpass**	**Lowpass loop Rear Input**



The front auxiliary output sends lowpass signals to the rear inputs.

The front RNet determines the crossover frequency between the mid/tweet separates and the midbass. The rear RNet determines how low the midbass is allowed to play.

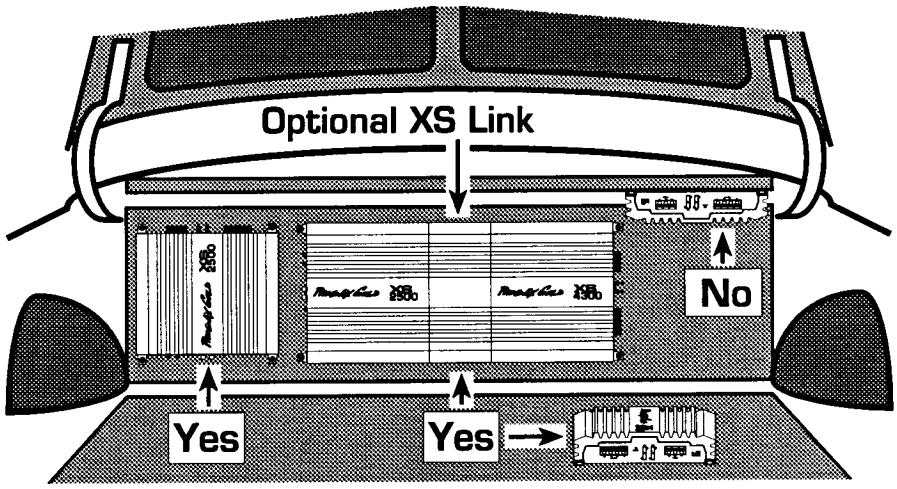
Use the optional LPL44 to control midbass volume.

Use the headunit's fader to control subwoofer volume.

MOUNTING

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

Never mount the amplifier upside down. This traps heat within the heatsink causing the amplifier to overheat and shut down.



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

The glass-filled nylon mounting feet allow the amplifier to mount to almost any surface. If damaged, they can be replaced by ordering PG# 5740.0002 (white) or 5740.0003 (black).

Use fans when mounting the amplifier in an enclosed space like a small storage compartment or enclosed amp rack. Design your cooling system to circulate at least 25cfm (cubic feet per minute) for each amplifier.

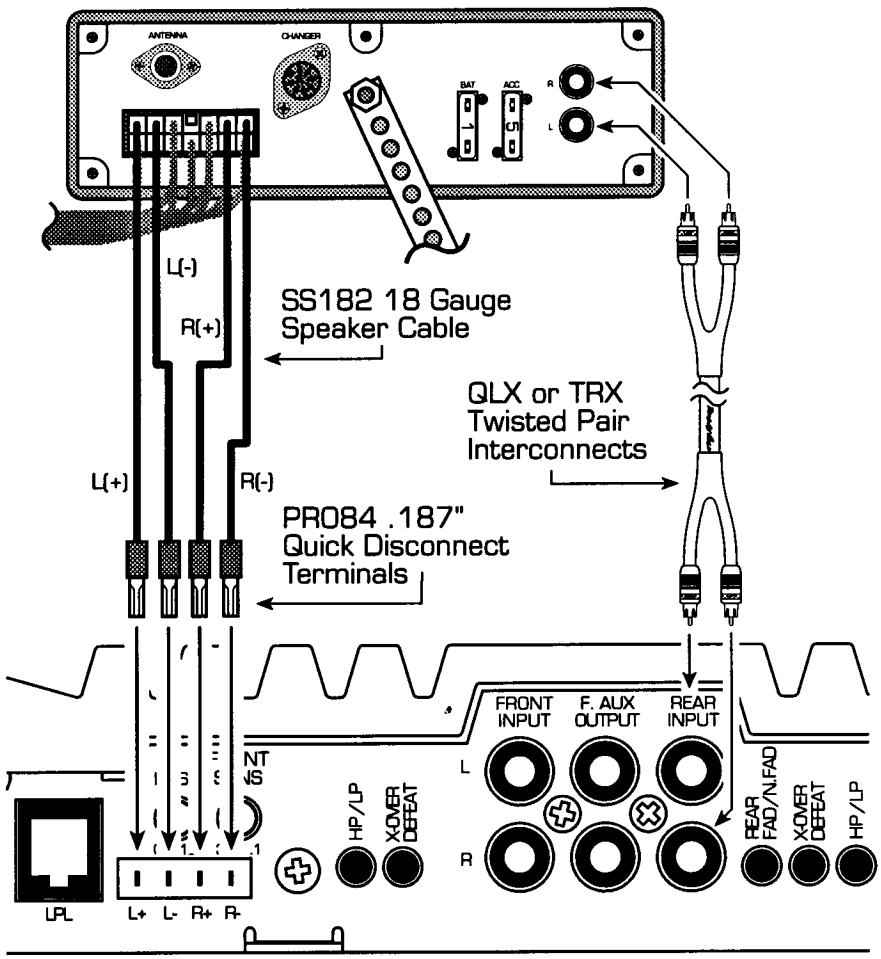
Example - An XS4600 in an enclosed amp rack requires two 25cfm fans. One fan for intake and one for exhaust.

INPUT CONNECTIONS

You can use line-level and hi-level inputs at the same time. For example - using line-level for the rear inputs and hi-level for the front inputs.

Note: Never use both on the same half of the amp.

Maximum hi-level input power: **35 watts per channel.**

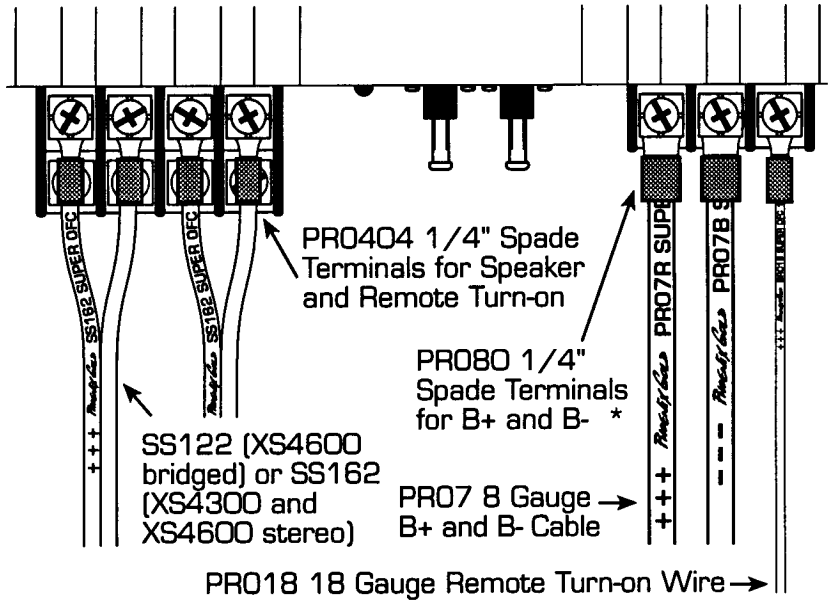


Line-Level: Connect high quality RCA style signal cables to the front, rear or both inputs depending on your system design. Use both left *and* right input jacks for stereo, bridged or Tri-Mode™ operation. For maximum noise rejection, we recommend Phoenix Gold QLX or TRX twisted pair signal cables.

Hi-Level: Connect the positive hi-level inputs to the headunit's positive speaker outputs. Connect the negative hi-level inputs to the headunit's negative speaker outputs

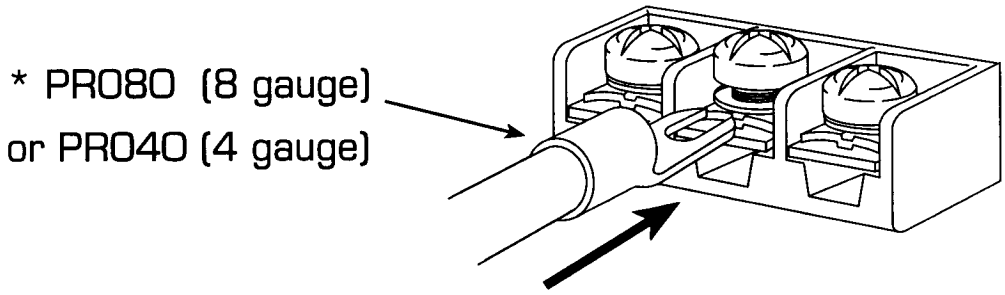
POWER AND SPEAKER CONNECTIONS

Use crimp-on terminals for connecting battery and speaker cables to the amplifier.



Use a tool designed to crimp noninsulated terminals. For extra reliability, crimp and solder each terminal.

* You can connect 4 gauge cable directly to the amplifier using PG# PR040 spade terminals.



Use a #2 phillips screwdriver to tighten each terminal.

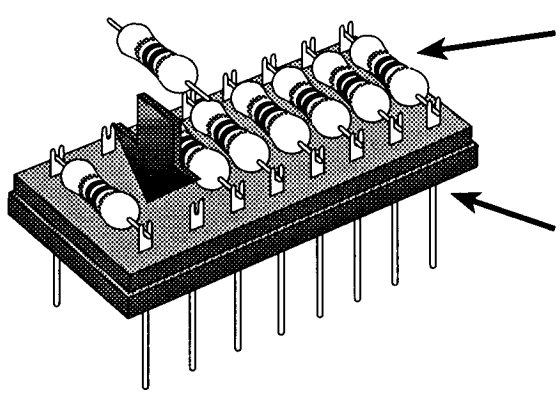
Note: Do not use powered screwdrivers to tighten the terminals. This can damage the gold plating and strip the screw's head.

CROSSOVER ADJUSTMENT

You can adjust the front/front auxiliary and rear crossover frequencies by changing the resistor networks (RNets) located inside the amplifier.

Your local Phoenix Gold electronics dealer stocks the following optional RNets:

120 Hz	PG# RNXS120
100 Hz	PG# RNXS100
70 Hz	PG# RNXS70
55 Hz	PG# RNXS55
Blank Module	PG# RNXSB



You can build your own RNet by using a blank module and installing eight resistors. Calculate the resistor value using this formula:

$$\frac{18150}{f\,(Hz)} = \mathrm{R}\,(k\Omega)$$

For example, if you want a crossover frequency of 325Hz, simply plug 325 into the formula:

$$\frac{18150}{325} = 55.8$$

The closest commercially available resistor value is 56kohm. Use eight 56k, 1/8 watt, 5% tolerance (or better) resistors.

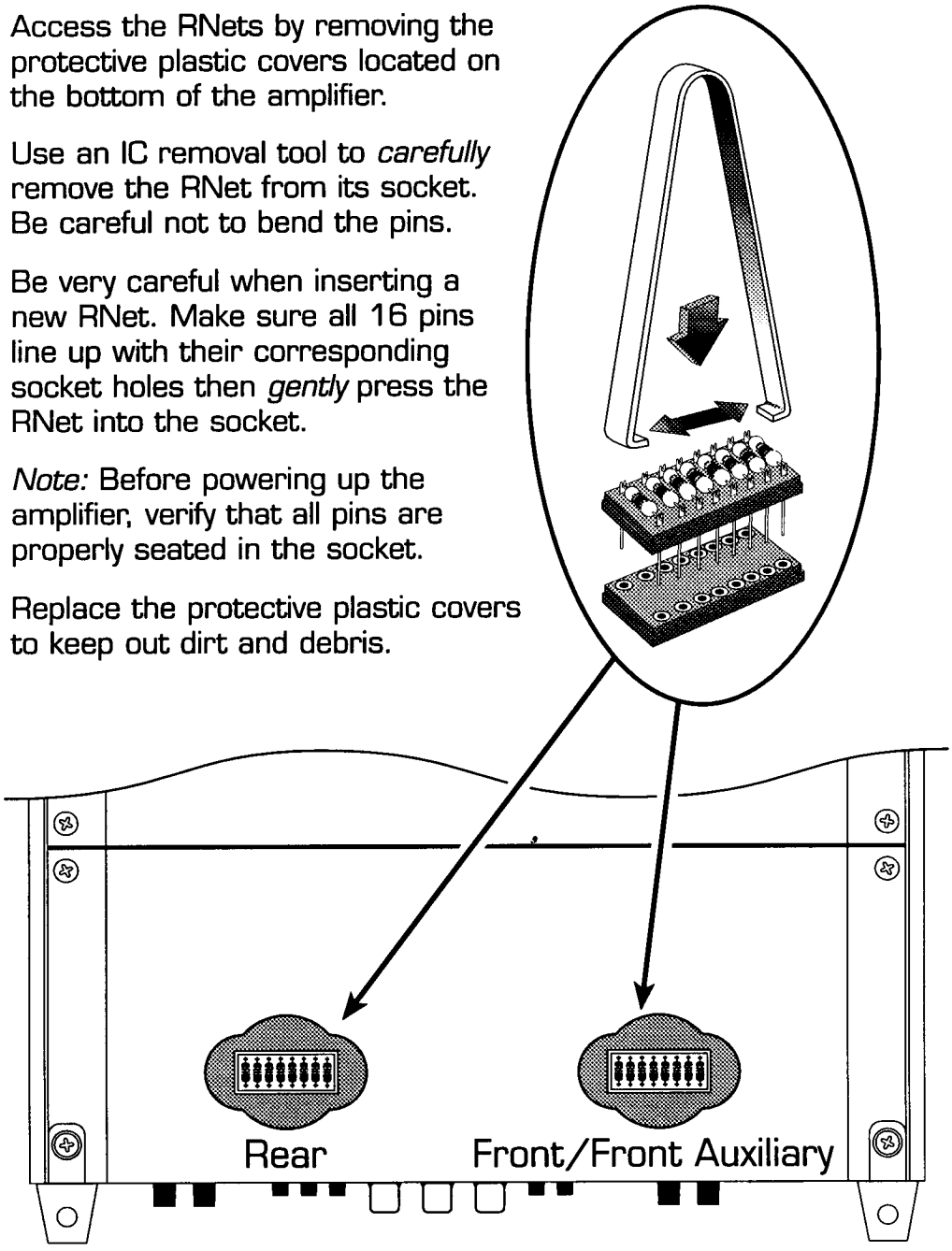
Access the RNets by removing the protective plastic covers located on the bottom of the amplifier.

Use an IC removal tool to *carefully* remove the RNet from its socket. Be careful not to bend the pins.

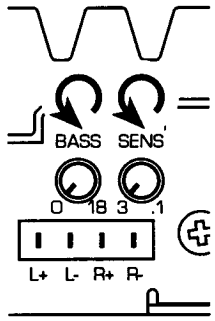
Be very careful when inserting a new RNet. Make sure all 16 pins line up with their corresponding socket holes then *gently* press the RNet into the socket.

Note: Before powering up the amplifier, verify that all pins are properly seated in the socket.

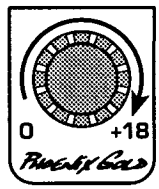
Replace the protective plastic covers to keep out dirt and debris.



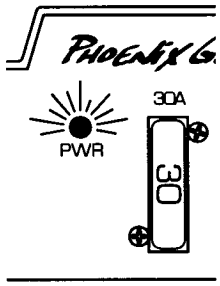
INPUT SENSITIVITY & BASS ADJUSTMENT



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. See pages 13-17.
4. If using an LPL44, set it to *maximum* (full clockwise).
5. Turn the headunit on with the volume set to *minimum.*



6. Visually check the amplifier's condition. The green power LED should be on.
7. Check the condition of all other components to make sure they are powered up and working.
8. Set the headunit's tone controls, balance, and fader to the center (flat) position. Turn off any loudness or other signal processing features.
9. 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.

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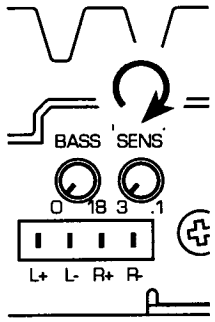
NO LIMITS!

10. Use the amplifier's front and rear input sensitivity controls to reach maximum undistorted output for each speaker set. Repeat this for all other amplifiers. The idea is to find maximum undistorted output for each set of speakers independently.



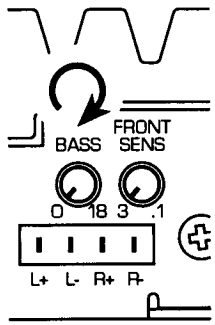
11. Reduce the headunit's volume to a comfortable level.

12. 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 10. 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.

13. Adjust the Bass Equalization Controls according to taste.

    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.



14. With all levels set correctly, the system will reach overall maximum undistored output at the volume level set in step 9.

TROUBLE-SHOOTING

SYMPTOM	PROBABLE CAUSE	SOLUTION
No output and Power-on LED is not on	No battery, ground, or remote connection	Connect B+, B-, & a remote turn-on to the amplifier (page 8,11,12 & 20).
	Blown power fuses	Check for a short to chassis ground in the B+ cable. Install a new fuse (page 8).
No output and Power-on LED is on	No signal from the headunit	Check the headunit for proper output.
	Faulty input signal cables	Try substituting different signal cables.
	Faulty speaker or speaker cables	Try substituting another speaker or cables.
Distorted sound	Clipped input signal	Make sure the headunit is not producing a clipped signal (pages 23 & 24).
	Input sensitivity too high	Lower input sensitivity (pages 23 & 24).
Amplifier cuts off when driven hard	Thermal protection circuit activated (overheat)	Check for poor mounting location (page 18) and low impedance load (page 4).
	Overload protection circuit activated (excessive current through the outputs)	Check for low impedance loads (page 4), damaged speaker cables, rubbing speaker voice coils or shorted tinsel leads.

LIMITED WARRANTY

Phoenix Gold provides a limited warranty on all electronics (free of manufacturing defects in materials and/or workmanship) to the original consumer/purchaser for a period of eighteen (18) months when installed by an Authorized Phoenix Gold Mobile Electronics Retailer. Returning a copy of the original sales receipt with the warranty registration card extends the period to thirty-six (36) months. The limited warranty period is thirty (30) days if installed by anyone other than an Authorized Phoenix Gold Mobile Electronics Retailer. We will cover parts and labor provided the product was purchased from an Authorized Phoenix Gold Retailer. This warranty does not apply to any product where the tags and/or serial numbers have been cut, removed, tampered or altered in any manner. This limited warranty is applicable to only the original consumer/purchaser and is not transferable. Electronics that are deemed defective during the warranty period will be repaired or replaced at the discretion of Phoenix Gold. Repaired or replaced product will be covered until the original warranty period expires. Phoenix Gold will not be responsible for any incidental or consequential damages that may result from a defect in the product. Select states may not allow the exclusion or limitation of incidental or consequential damages, so the prior limitations may not apply.

Dealer's Name _____

Telephone Number _____

Sales Person's Name _____

Installer's Name _____

Model Number _____

Serial Number _____