Rockford Fosgate®

INSTALLATION/ OPERATION

punch® 250m²
punch® 500m

Dear Customer,

Congratulations on your purchase of the world's finest brand of car audio amplifiers. At Rockford Fosgate we are committed to musical reproduction at its best, and we are pleased you chose our product. Through years of engineering expertise, hand craftsmanship and critical testing procedures, we have created a wide range of products that reproduce music with all the clarity and richness you deserve.

For maximum performance we recommend you have your new Rockford Fosgate product installed by an Authorized Rockford Fosgate Dealer, as we provide specialized training through Rockford Technical Training Institute (RTTI). Please read your warranty and retain your receipt and original carton for possible future use.

To add the finishing touch to your new Rockford Fosgate image order your Rockford accessories, which include everything from T-shirts and jackets to hats and sunglasses.

To get a free brochure on Rockford Fosgate products and Rockford accessories, please call 602-967-3565 or FAX 602-967-8132. In Canada, call Korbon Trading at 905-567-1929. For International orders, FAX +001-1-602-967-8132 or call +001-1-602-967-3565.

PRACTICE SAFE SOUND™

CONTINUOUS EXPOSURE TO SOUND PRESSURE LEVELS OVER 100dB MAY CAUSE PERMANENT HEARING LOSS. HIGH POWERED AUTOSOUND SYSTEMS MAY PRODUCE SOUND PRESSURE LEVELS WELL OVER 130dB. USE COMMON SENSE AND PRACTICE SAFE SOUND.

If, after reading your manual, you still have questions regarding this product, we recommend that you see your Rockford Fosgate dealer. If you need further assistance, you can call us direct at 1-800-795-2385. Be sure to have your serial number, model number and date of purchase available when you can.

The serial number can be found on the outside of the box. Please record it in the space provided below as your permanent record. This will serve as verification of your factory warranty and may become useful in recovering your amplifier if it is ever stolen.

Serial Number:_____

Model Number:_____

Table of Contents

Getting Started

Welcome to Rockford Fosgate! This manual is designed to provide information on the Punch 250m² and the Punch 500m Power amplifiers for owner, salesperson and installer. To accomplish this, the manual is divided into five main sections: Introduction, Installation, Troubleshooting, Specifications and Warranty Information. For those of you who want quick information on how to install this product, please turn to the Basic System Diagrams in the Installation section of this manual. Other information can be located by using the Table of Contents. We, at Rockford Fosgate, have worked very hard to make sure all the information in this manual is current. But, as we are constantly finding new ways to improve our product, this information is subject to change without notice.

Our Dream

In 1993 Rockford Fosgate engineers had a mission. Once and for all they wanted to establish themselves as the best car audio engineers in the world. Their goal was simple: to build the most powerful, best sounding amplifier the planet has ever seen. To accomplish this mission, the engineers decided there were different roads to take. One team designed a two-channel amplifier; the other, a mono block amplifier. Under the direction of V.P. of Engineering, Jim Strickland, the engineers implemented the trans•*nova* amplifier architecture that he created. The trans•*nova* topology has many advantages that the Pro sound and Home audiophile community has recognized for many years as the industry reference. Many other solutions the engineers devised would be considered overkill by other audio manufacturers. ***NOT AT ROCKFORD FOSGATE***. Today, the Punch 250m² and the 500m Power amplifiers represent the best Rockford Fosgate has to offer. We, at Rockford Fosgate, build products for those who have the same belief as that of our engineers; that too much is just right.

PUNCH 250m² & 500m POWER AMPLIFIER ACCESSORY PACKS

The accessory pack shipped with the Punch 250m² and Punch 500m Power amplifiers include the mounting hardware necessary to secure it to the vehicle as well as attaching the end caps.

Installation & Operation Manual
Punch Verification Certificate
(8) Hex Head screws for speaker and power connectors (250m²)
(6) Hex Head screws for speaker and power connectors (500m)
(4) Mounting screws for end caps
(4) Mounting screws for amplifier
(1) Allen wrench 7/64"
(1) Allen wrench 13/32"

ROCKFORD FOSGATE ACCESSORIES

The following accessories were designed to enhance the performance of the Punch 250m² and Punch 500m Power amplifiers.

Balanced Line Transmitter (FG-BLT)

The Balanced Line Transmitter converts signal RCA cables from the source unit to balanced signals. The BLT improves sound quality in the system by eliminating noises generated by vehicle electrical systems. The BLT is available for Rockford Fosgate products that offer a balanced input.

Energy Storage Capacitor (PCH-C1)

The Punch 1 farad capacitor is used to provide extra current needed by amplifiers to reproduce musical transients. The Punch Cap also has the natural ability to filter DC ripple caused by the alternator which can result in noise in the system. The PCH-C1 will maximize both the sound quality and performance that Rockford Fosgate amplifiers can deliver.

Punch Link (FG-LINK)

The Punch Link is a specially cast heatsink interconnect which allows you to join any of our current Punch or Punch Power amplifiers together. While providing additional cooling through the coupling process, the Punch Link adds the finishing touch by giving you the look of one awesome amplifier.

TECHNICAL DESIGN FEATURES

Many of the solutions to common design problems encountered by Rockford Fosgate engineers created entire new circuit designs as well as new ways to construct the Punch 250m² and 500m Power Amplifiers. In our flagship amplifiers, no expense was spared in design and construction from the unique circuitry design to the manufacturing process that has proven to be the industry reference for many years. Described below are just some of the accomplishments achieved by our engineering and manufacturing staff.

◆ trans•*nova*

The trans•*nova* (**TRANS** conductance **NO**dal **V**oltage **A**mplifier) is a patented circuit that allows the audio signal to pass through the amplifier at ***low voltage***. The trans•*nova* circuit was made possible by the advent of a new component in the car audio industry called a **FET** (Field Effect Transistor). These new amplifying devices became available around 1980 coming closer to the designer's ideal specifications than would ever have been expected. The new FETs encompass several technologies including vertical and lateral power MOSFETs and high gain, low-noise junction FETs. These new devices have a close resemblance to the best of ***tube technology***. Since these FETs ***behaved similarly to tubes***, they provided an opportunity for creative circuitry with possibilities for product excellence, reliability and value. Thus began the developments leading to the trans•*nova* amplification circuitry.

The resulting design utilizes an output stage with a simpler gain structure and a shorter total signal path than conventional high voltage bi-polar driver (amplifier) designs. The number of stages is reduced from five or more to three. The output stage is further refined into a trans-impedance stage (current to voltage converter) to achieve a short loop (fast) negative feedback. The output stage is driven cooperatively by a transconductance stage (voltage to current converter).

THE RESULT: An amplifier design with the benefits of tube and bi-polar transistor amplifier design without the limitations of either.

◆ MOSFET Devices

Rockford Fosgate is one of the few manufacturers in any of the sound communities to utilize MOSFET devices in both the ***power supply*** and the ***output stages***. ***MOSFET*** (**M**etal **O**xide **S**emiconductor **F**ield **E**ffect **T**ransistor) devices offer several important inherent advantages over the 30 year old technology of bi-polar design. These advantages include: thermal stability, switching speed, ultra low output impedance and wider bandwidth linearity. In addition, MOSFET and vacuum tubes share many important operating characteristics. However, the MOSFET device is much faster, wider in bandwidth, measurably lower in distortion and far more linear than vacuum tubes.

THE RESULT: Operational characteristics of vacuum tubes without the performance limitations of tube design.

◆ ITS (Increased Thermal Stability)

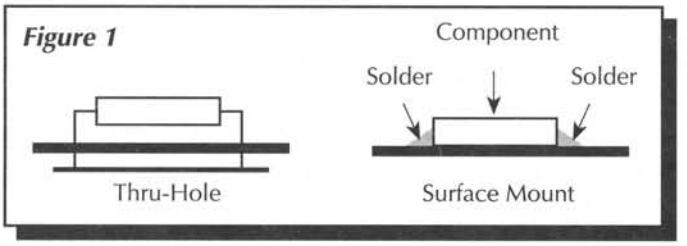
The ITS (**I**ncreased **T**hermal **S**tability) Power Supply design is new in Rockford Fosgate amplifiers. A major problem associated with any amplifier design is how to get rid of the heat generated by its circuitry. Clearly, it is highly desirable to minimize the amount of heat generated in the first place. The Punch 250m² and 500m Power amplifiers employ a new toroidal power transformer design in which the high current input leads are carried directly to the switching power MOSFETs. This both minimizes PC board heating and takes advantage of natural air cooling of these leads.

THE RESULT: Maximizes power supply efficiency by eliminating unnecessary heat generation.

◆ DSM (Discrete Surface Mount Technology)

The ***DSM*** (Discrete Surface Mount) manufacturing process combines the advantages of both discrete components and integrated circuitry. Rockford Fosgate is the only American amplifier manufacturer to have invested millions into this process. DSM components differ from conventional discrete components in three different ways. They are more compact and more rugged, and they take much better advantage of the PC board to allow them to get rid of any heat they generate. Using them wherever appropriate allows the advantages associated with discrete thru-hole circuitry to be retained while also providing room for both highly advanced processing features and generous PC board copper paths where needed. Their short lead-out structures allow maximum audio performance and highest signal-to-noise ratios to be obtained in amplifiers of desirable package size without resorting to "amplifier-on-a-chip" shortcuts. These advantages are shown below in Figure 1.

Figure 1



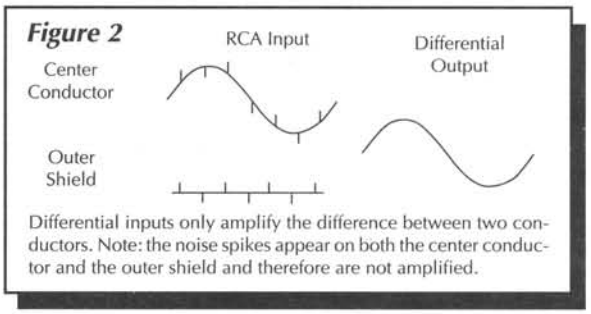
THE RESULT: Less connections, improved reliability, shorter signal paths, superior signal-to-noise ratio and awesome sonic performance.

◆ TOPAZ (Tracking Operation Pre-Amplifier Zone)

The ***TOPAZ*** (**T**racking **O**peration **P**re-**A**mplifier **Z**one) circuitry solves ground loop noise problems common to automotive amplifier design. This innovative new development allows vastly improved isolation of the input signal grounds from the power supply ground of the amplifier. This is accomplished by allowing the source unit to control the potential "environment" of the entire input structure or "zone" of the amplifier. This process improves the noise rejection of the amplifier by 30-40dB – an astounding 20-100 times better than amplifiers without TOPAZ.

THE RESULT: Elimination of troublesome ground loop noise between source and amplifier.

◆ Balanced Line Inputs (250m²)



Differential inputs only amplify the difference between two conductors. Note: the noise spikes appear on both the center conductor and the outer shield and therefore are not amplified.

Using the 250m² with the BLT (Balanced Line Transmitter) provides the last word in achievable rejection of noise induced in the cable between the source and the amplifier. The differential input circuitry (Figure 2) used in the balanced input system rejects whatever signals are common to both of the shielded, twisted-pair conductors. Balanced line is universal in concert installations where the stage and mixing consoles are hundreds of feet apart. Long signal cables and electrically-noisy environments make signal integrity and noise rejection an extremely difficult challenge.

THE RESULT: Dead quiet transmission of audio from source to amplifier.

◆ XCard (Internal Crossover)

The Punch 250m² and 500m Power amplifiers utilize internal active crossovers. These crossovers have many performance advantages such as using discrete components for exact frequency adjustments which are far superior to potentiometers. Additionally, the ***XCard*** can be configured for high-pass, low-pass and full range operation. With slight modification, many crossover frequencies and slope configurations can be achieved. The Punch 250m² and 500m Power amplifiers have special loop-through capabilities which make it easy to configure a multi-amp system without the increased cost of added electronic crossovers and the noise problems associated with external cables and processors.

THE RESULT: Increased system design flexibility with a precise electronic crossover without the limitations of conventional potentiometer designs.

◆ RTP (Real Time Protection) NOMAD (NOn-Multiplying Advanced Decision)

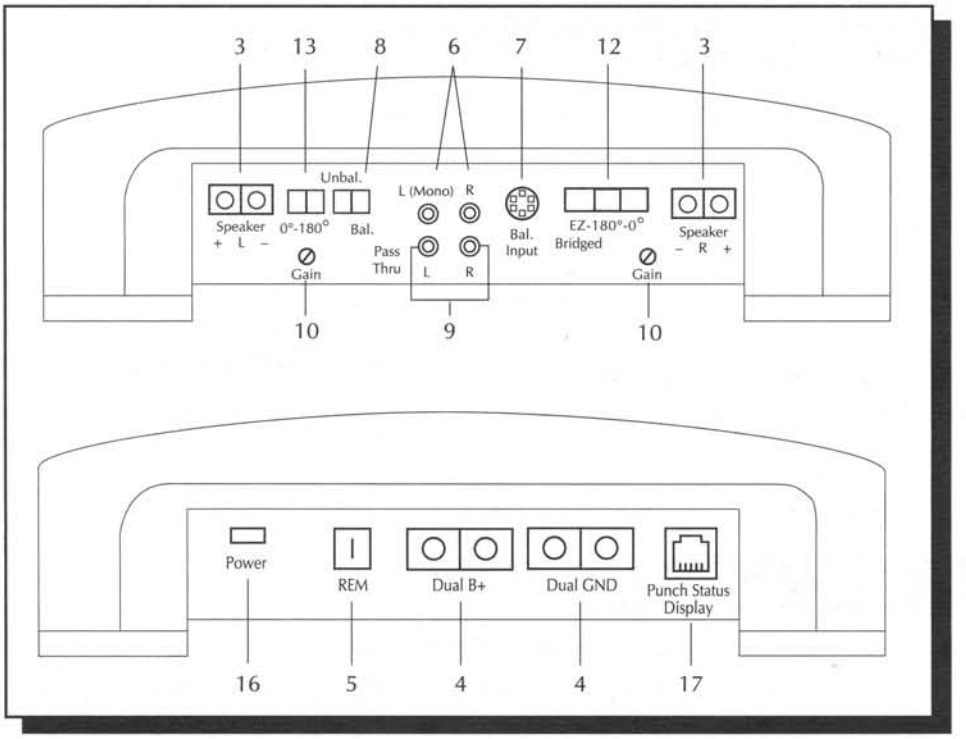
The Punch 250m² and 500m Power amplifiers use an ***analog computer process*** to absolutely maximize safe output power under all operating conditions. Rockford Fosgate pioneered and developed ***RTP*** (Real Time Protection), a crucial element in the performance edge of our amplifiers. The innovative ***NOMAD*** (**NO**n-**M**ultiplying **A**dvanced **D**ecision) system is the most sophisticated version of this technique ever used, bringing previously unavailable levels of accuracy, stability, temperature immunity and reliability to this critical process. NOMAD makes advanced decisions based on device voltages to precisely control the awesome levels of current available in the output MOSFETs to safe values – but only when absolutely needed.

THE RESULT: Extremely fast protection system that always protects the amplifier and never degrades the sound.

250m² Design Features

1. **Cast Aluminum Heat Sink –** The cast aluminum heatsink of the Punch 250m² Power amplifier dissipates heat generated by the amplifier's circuitry. The inherent advantage of casting provides a 30% improvement of cooling over conventional extrusion heatsink designs.

2. **End Caps –** Interchangeable end caps conceal the wiring and input cables, giving the amplifier a clean "stealth" look.



3. **Speaker Terminals –** The heavy duty, gold-plated terminal block connectors (+ and –) will accept wire sizes from 8 AWG to 18 AWG. These gold-plated connectors are immune to corrosion that can cause signal deterioration.

4. **Power Terminals –** The dual power and ground connectors on the Punch 250m² Power amplifier are gold-plated and will accommodate up to two 8 AWG wires maximizing the input current capability of the amplifier.

5. **REM Terminal –** This gold-plated spade terminal is used for the AP (auto power) or remote turn on of the Punch 250m² Power amplifier.

6. **RCA Input Jacks –** The industry standard RCA jack provides an easy connection for signal level input. They are gold-plated to resist the signal degradation caused by corrosion.

7. **Balanced Line Input–** This input will allow the optional Balanced Line Transmitter to be used in conjunction with the Punch 250m² Power amplifier to provide better noise rejection. The Balanced Line Transmitter converts standard RCA signals to balanced signals.

8. **Signal Input Switch –** This switch allows selection of either the RCA or Balanced Line inputs.

9. **RCA Pass Thru Jacks –** The Pass Thru provides a convenient source for daisychaining an additional amplifier. This eliminates the need for additional RCA cables or "Y" adapters. One of the internal crossovers can be designated to the Pass Thru output creating a dedicated low-pass, high-pass, or full range output.

10. **Input Sensitivity Controls –** The input level controls are preset for 500mV which will match the output of most source units. They can be adjusted to match input levels ranging from 150mV to 3V.

11. **Internal Crossovers –** These built-in crossover cards are configurable for a multitude of operating frequencies. The orientation of the card in its socket determines its function of high-pass, low-pass or full range operation.

12. **E-Z Bridge Switch / 0°-180° Phase Switch –** This dual purpose switch enables you to E-Z bridge the amplifier or invert the signal phase of the right channel.

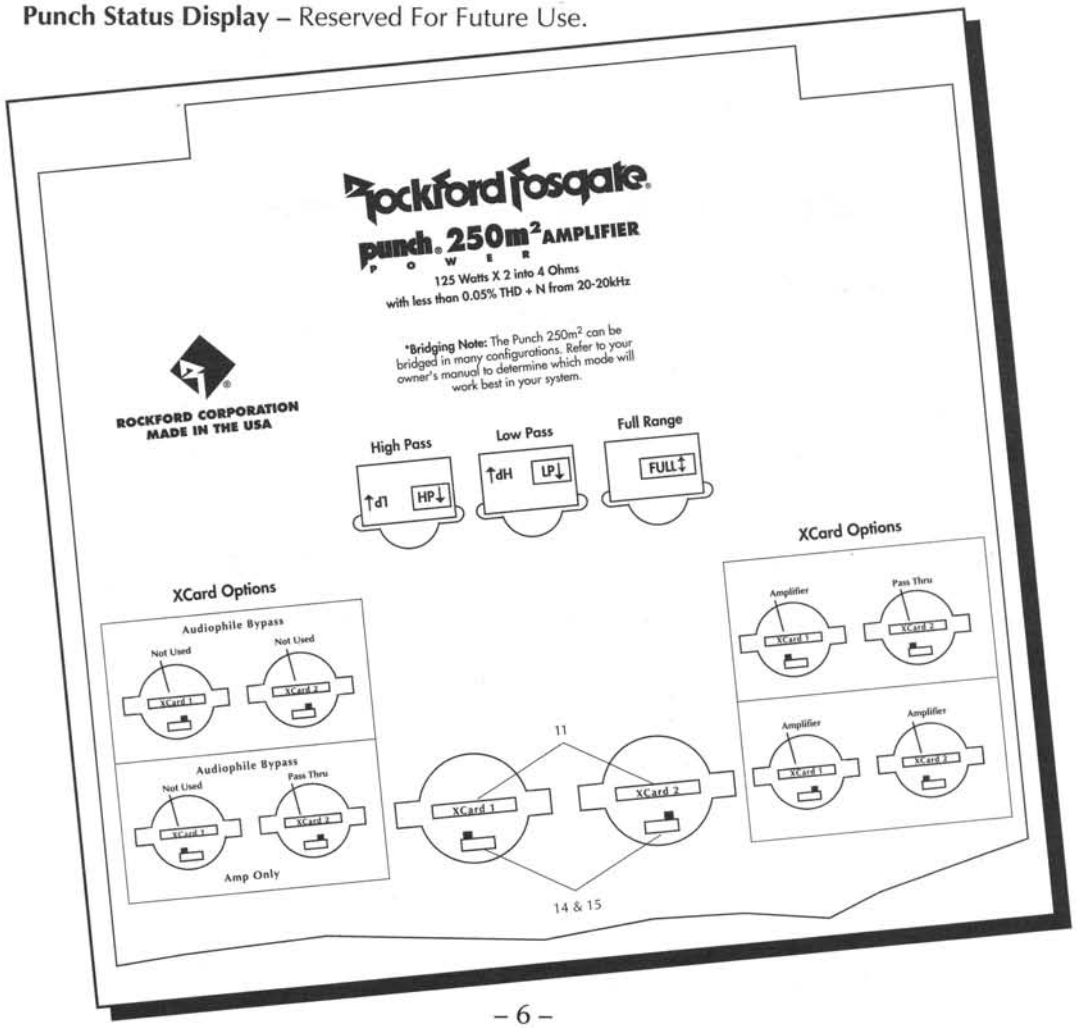
13. **Phase Switch –** This switch enables you to easily invert the phase of the left channel without having to disconnect the speaker wires.

14. **Crossover Switching –** These internal switches allow the crossover to be distributed to the amplifier and Pass Thru in many different configurations.

15. **Audiophile Bypass –** One of the crossover switching configurations allows the internal crossover circuit to be bypassed, maintaining Audiophile sound quality due to a shorter signal path.

16. **LED Power Indicator –** The LED gives a visual indication of the status of the amplifier, lighting when the unit is turned on.

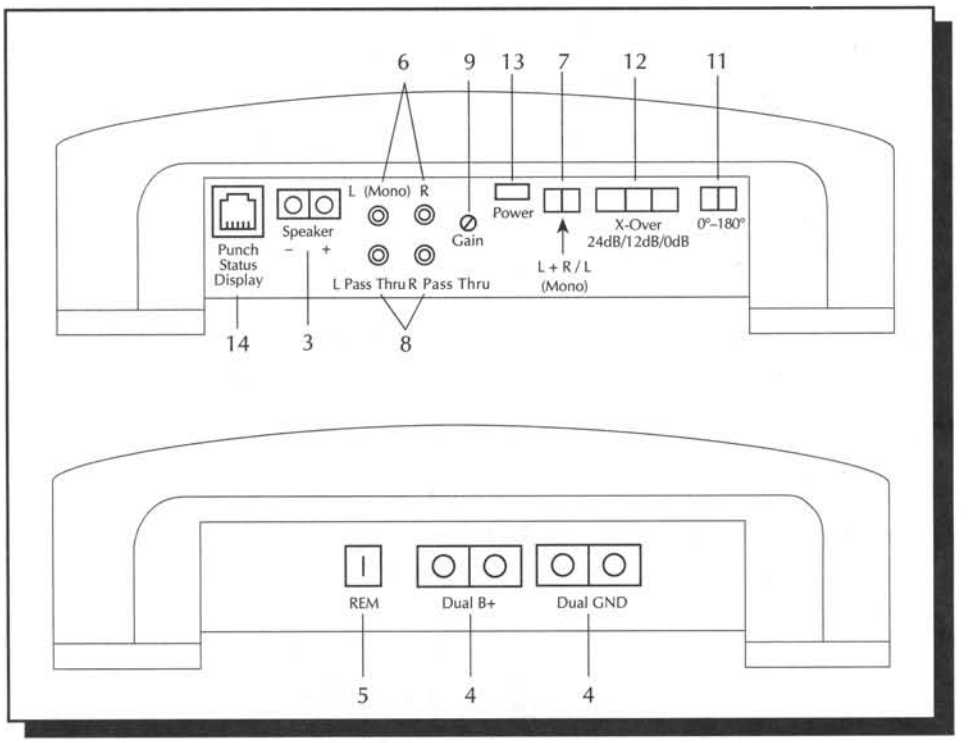
17. **Punch Status Display** – Reserved For Future Use.



500m Design Features

1. **Cast Aluminum Heat Sink** – The cast aluminum heatsink of the Punch 500m Power amplifier dissipates heat generated by the amplifier's circuitry. The inherent advantage of casting provides a 30% improvement of cooling over conventional extrusion heatsink designs.

2. **End Caps** – Interchangeable end caps conceal the wiring and input cables, giving the amplifier a clean "stealth" look.



3. **Speaker Terminals** – The heavy duty, gold-plated terminal block connectors (+ and –) will accept wire sizes from 8 AWG to 18 AWG. These gold-plated connectors are immune to corrosion that can cause signal deterioration.

4. **Power Terminals** – The dual power and ground connectors on the Punch 500m Power amplifier are gold-plated and will accommodate up to two 8 AWG wires maximizing the input current capability of the amplifier.

5. **REM Terminal** – This spade terminal is used for the AP (auto power) or remote turn on of the Punch 500m Power amplifier.

6. **RCA Input Jacks** – The industry standard RCA jack provides an easy connection for signal level input. They are gold-plated to resist the signal degradation caused by corrosion.

7. **Summed Stereo / Mono Switch** – This switch is used to select whether 1 or 2 signal inputs will be used to drive the amplifier.

8. **Pass Thru RCA Jacks** – The Pass Thru provides a convenient source for daisychaining an additional amplifier without running an additional set of RCA cables from the front of the vehicle to the rear amplifier location. The Pass Thru output is Full Range only.

9. **Input Sensitivity Controls –** The input level control is preset for 500mV which will match the output of most source units. It can be adjusted to match input levels ranging from 150mV to 3V.

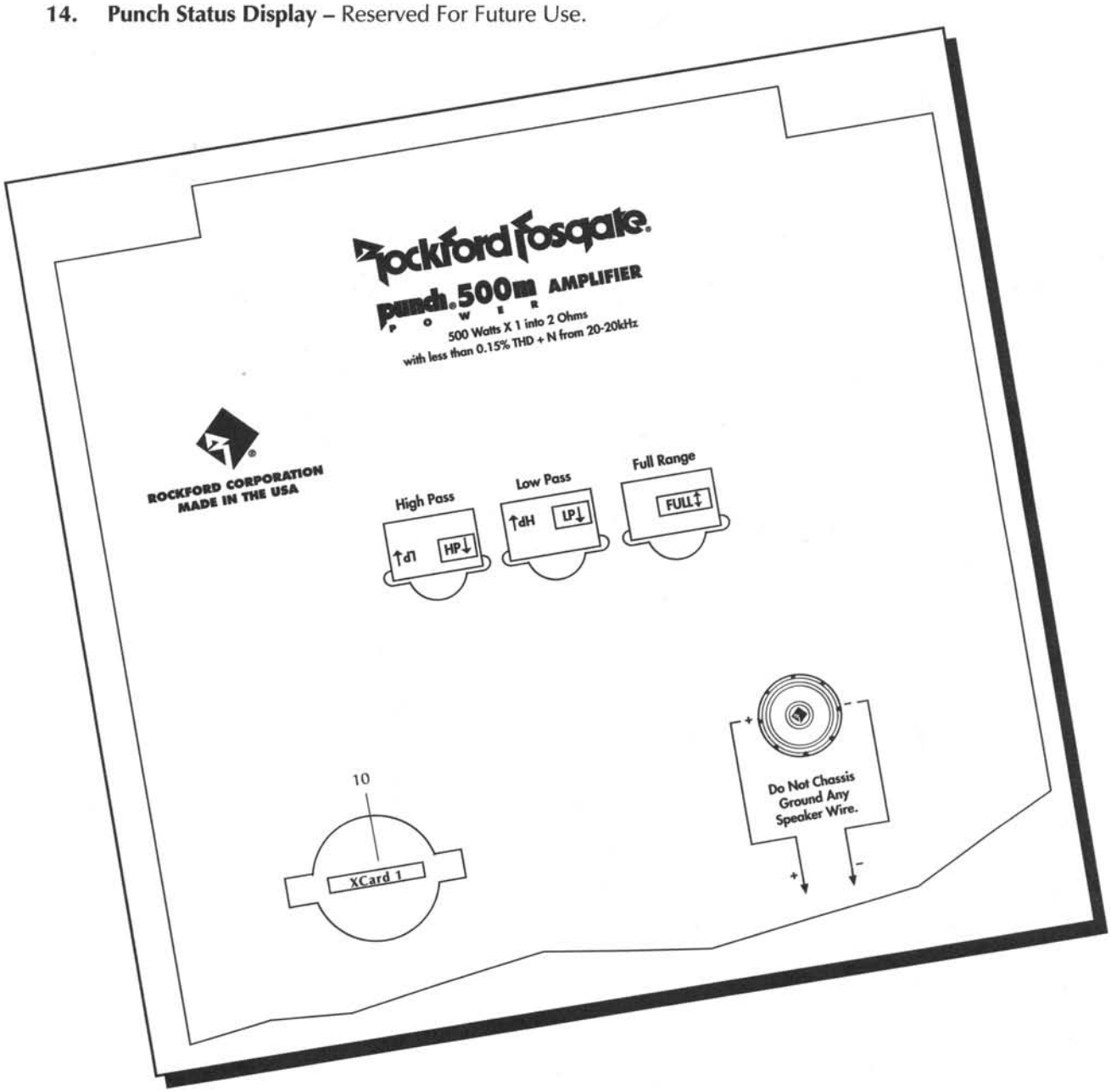
10. **Internal Crossover –** This built-in crossover card is configurable for a multitude of operating frequencies. The orientation of the card in its socket determines the function of high-pass, low-pass or full range operation.

11. **Phase Switch –** This switch enables you to easily invert the phase without having to disconnect the speaker wires.

12. **Crossover Switch –** This multi-function switch enables you to select a 12dB per octave slope or 24dB per octave slope of the internal crossover. When switched to 0, the internal crossover circuit can be bypassed, maintaining Audiophile sound quality due to a shorter signal path.

13. **LED Power Indicator –** The LED gives a visual indication of the status of the amplifier, lighting when the unit is turned on.

14. **Punch Status Display** – Reserved For Future Use.



INSTALLATION CONSIDERATIONS

Tools Needed

The following is a list of tools you will need for installing the Punch 250m² and 500m Power amplifiers:

Allen wrenches 7/64" & 3/32" (included)
Wire strippers
Battery post wrench
Electric hand drill and assorted bits
Wire Cutters
Voltmeter
Wire crimpers
Assorted connectors

This section focuses on some of the vehicle considerations for installing your new Punch amplifier. Checking your battery and present sound system, as well as pre-planning your system layout and best wiring routes will save installation time. When deciding on the layout of your new system, be sure that each component will be easily accessible for making adjustments.

Before beginning any installation, be sure to follow these simple rules:

1. Carefully read and understand the instructions before attempting to install the amplifier.
2. **For safety,** disconnect the negative lead from the battery prior to beginning the installation.
3. For easier assembly, we suggest you run all wires prior to mounting your amplifier in place.
4. Route all of the RCA cables close together and away from any high current wires.
5. Use high quality connectors for a reliable installation and to minimize signal or power loss.
6. **Think before you drill!** Be careful not to cut or drill into gas tanks, fuel lines, brake or hydraulic lines, vacuum lines or electrical wiring when working on any vehicle.
7. Never run wires underneath the vehicle. Running the wires inside the vehicle provides the best protection.
8. Avoid running wires over or through sharp edges. Use rubber or plastic grommets to protect any wires routed through metal, especially the firewall.
9. **ALWAYS** protect the battery and electrical system from damage with proper fusing. Install a fuseholder and fuse on the +12V power wire within 18" (45.7cm) of the battery terminal.
10. When grounding to the chassis of the vehicle, scrape all paint from the metal to ensure a good, clean ground connection. Grounding connections should be as short as possible and always be connected to metal that is welded to the main body, or chassis, of the vehicle.

Mounting Locations

The mounting location and position of your amplifier will have a great effect on its ability to dissipate the heat generated under normal operation. The design of our cast aluminum heatsink serves to easily dissipate the heat generated over a wide range of operating conditions. However, to maximize the performance of your amplifier, care should be taken to ensure adequate ventilation.

Trunk Mounting

Mounting the amplifier vertically on a surface with the fin grooves running up and down will provide the best cooling of the amplifier.

Mounting the amplifier on the floor of the trunk will work but provides less cooling capability than vertical mounting.

Mounting the amplifier upside down to the rear deck of the trunk will not provide proper cooling and will severely affect the performance of the amplifier and is strongly ***not*** recommended.

Passenger Compartment Mounting

Mounting the amplifier in the passenger compartment will work as long as you provide a sufficient amount of air for the amplifier to cool itself. If you are going to mount the amplifier under the seat of the vehicle, you must have at least 1" (2.54cm) of air gap around the amplifier's heatsink.

Mounting the amplifier with less than 1" (2.54cm) of air gap around the amplifier's heatsink in the passenger compartment will not provide proper cooling and will severely affect the performance of the amplifier and is strongly ***not*** recommended.

Engine Compartment Mounting

Rockford Fosgate amplifiers should ***never*** be mounted in the engine compartment. Not only will this void your warranty but could create an embarrassing situation caused by the ridicule from your friends.

Battery and Charging

Amplifiers will put an increased load on the vehicle's battery and charging system. We recommend checking your alternator and battery condition to ensure that the electrical system has enough capacity to handle the increased load of your stereo system. Stock electrical systems which are in good condition should be able to handle the extra load of any Rockford amplifier without problems, although battery and alternator life can be reduced slightly. To maximize the performance of your Rockford Fosgate amplifier, we suggest the use of a heavy duty battery, high output alternator and a stiffening capacitor like the Rockford Fosgate PCH-C1.

WIRING THE SYSTEM

CAUTION: Avoid running power wires near the low level input cables, antenna, power leads, sensitive equipment or harnesses. The power wires carry substantial current and could induce noise into the audio system.

1. Plan the wire routing. Take care when running signal level RCA cables to keep them close together but isolated from the amplifier's power cables and any high power auto accessories, especially electric motors. This is done to prevent coupling the noise from radiated electrical fields into the audio signal. When feeding the wires through the firewall or any metal barrier, protect them with plastic or rubber grommets to prevent short circuits. Leave the wires long at this point to adjust for a precise fit at a later time.

2. Prepare the **Power** cable for attachment to the amplifier by stripping 5/8" of insulation from the end of the wire. The use of 8 gauge power cable can interfere with the installation of the end caps. Proper wire dress can prevent this from occurring. To prevent the wire from fraying, strip the insulation at a 45° angle. Insert the bared wire into the B+ terminal with the long side of the insulation on the top. Bend the cable down at a 90° angle. Tighten the set screw to secure the cable in place. We recommend using (2) 8 gauge cables for power and for ground. This will give you the best performance possible.

   NOTE: The B+ cable MUST be fused 18" or less from the vehicle's battery. Install the fuseholder under the hood and prepare the cable ends as stated above. Connections should be water tight.

3. Prepare a length of cable to be used for the ground connection. Strip 5/8" of insulation from the end of the cable as described above and connect to the appropriate terminal of the amplifier. Prepare the chassis ground by scraping any paint from the metal surface and thoroughly clean the area of all dirt and grease. Strip the other end of the wire and attach a ring connector. Fasten the cable to the chassis using a screw.

4. Prepare the REM turn-on wire for connection to the amplifier by stripping 5/8" of insulation from the wire end and crimping an insulated spade connector in place. Slide the connector over the REM terminal on the amplifier. Connect the other end of the REM wire to a switched 12 volt positive source. The switched signal is usually taken from the source unit's auto antenna or the accessory lead. If the source unit does not have these outputs available, the recommended solution is to wire a mechanical switch in line with a 12 volt source to activate the amplifier.

5. Connect the source signal to the amplifier by plugging the RCA cables into the input jack(s) at the amplifier. If using Balanced Line Inputs, refer to page 21.

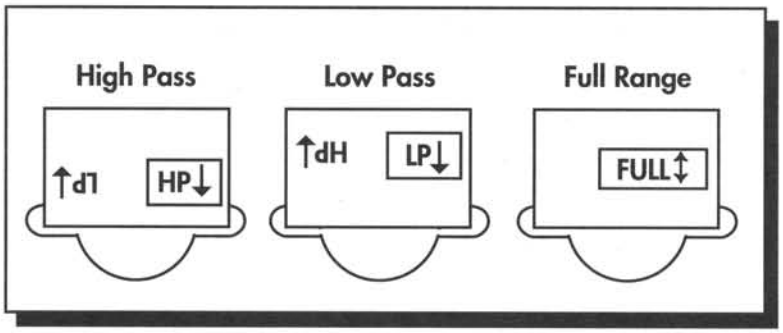
6. Connect the speakers. Strip the speaker wires 5/8" and insert into the appropriate terminal on the amplifier. Insert the bared wire into the speaker terminal and tighten the set screw to secure into place. Be sure to maintain proper speaker polarity. ***DO NOT chassis ground any of the speaker leads as unstable operation may result.***

7. Perform a final check of the completed system wiring to ensure that all connections are accurate. Check all power and ground connections for frayed wires and loose connections which could cause problems from road vibrations.

8. After the final inspection is complete, install the power fuse and enjoy listening. During the initial listening period, you may need to "fine tune" any phasing and level settings within your particular vehicle. To aid in this procedure, play a track with high musical content and cruise around your neighborhood. After fully evaluating the transient response of your system and making any final adjustments, all your neighbors within a 1 mile radius will assume that you have just successfully completed another upgrade to your audio system for which they will probably spill thumbtacks on your driveway.

USING THE XCARD

The crossover functions are controlled through the use of an XCard and can be set for high-pass, low-pass or full range operation. These cards are shipped in the most common frequency. Each crossover card has two faces: one face operates **Full Range**, the other has arrows to indicate the edge for selecting **HP** (high-pass) or **LP** (low-pass) operation. Orient the card with the desired operating edge, indicated by the arrow, toward the socket terminals inside the amplifier. Firmly, but carefully, plug the card into the socket.



CUSTOMIZING THE XCARD

The crossover point can be altered by changing the resistor value. Use the following formula to select the appropriate resistor value to be placed on the XCard.

$\frac{3386}{f_o}$ = R (in kΩ) for .047μf cap

$\frac{7234}{f_o}$ = R (in kΩ) for .022μf cap

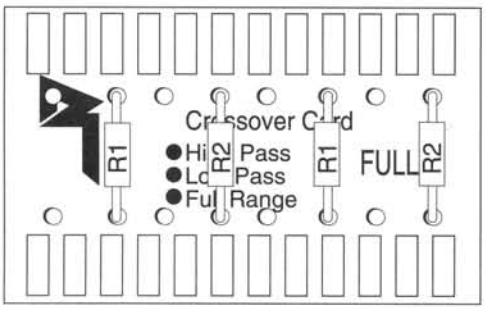
The actual formula is: $R = \frac{1}{2\pi f_o c}$

Where: R = Ω

f_o = desired crossover frequency

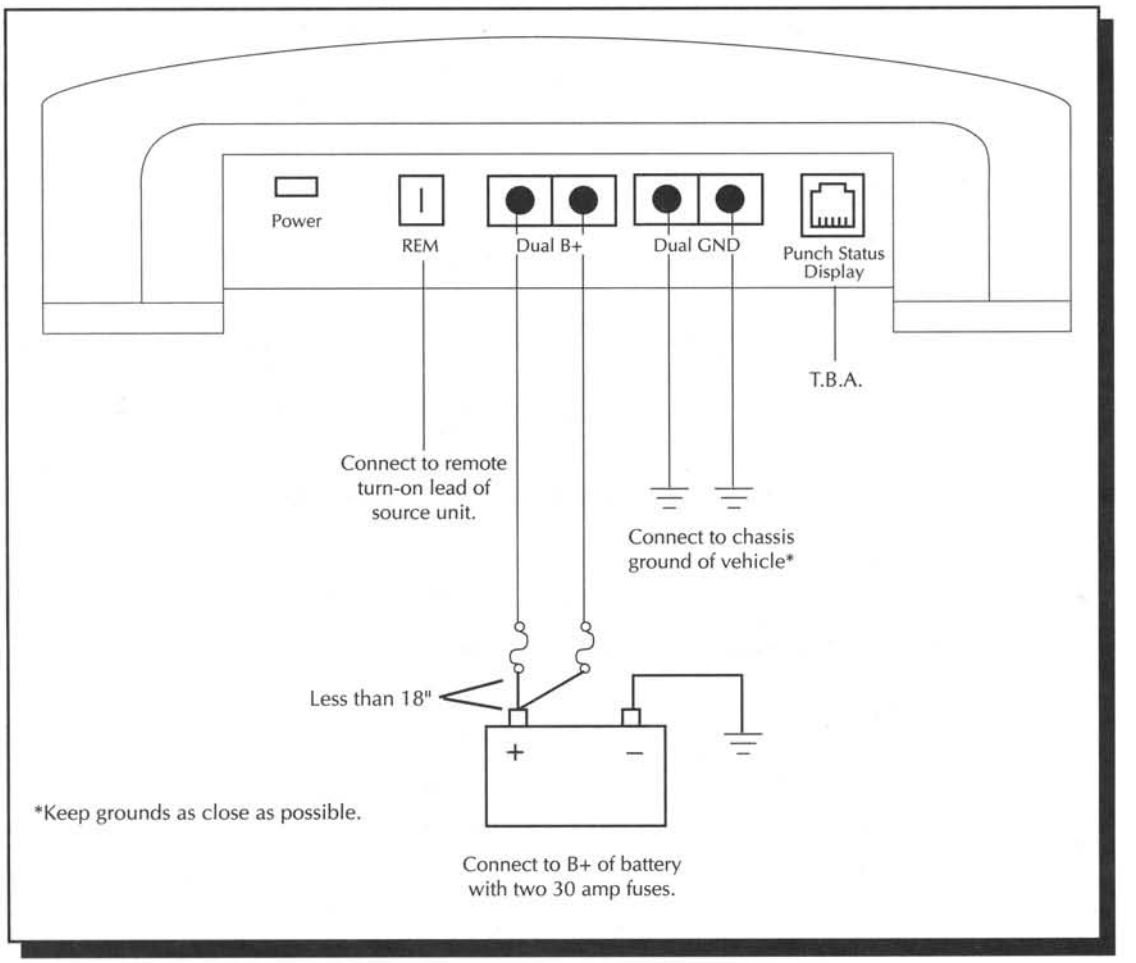
c = capacitor in farads

ex: .047 x 10^{-6} for .047mf cap

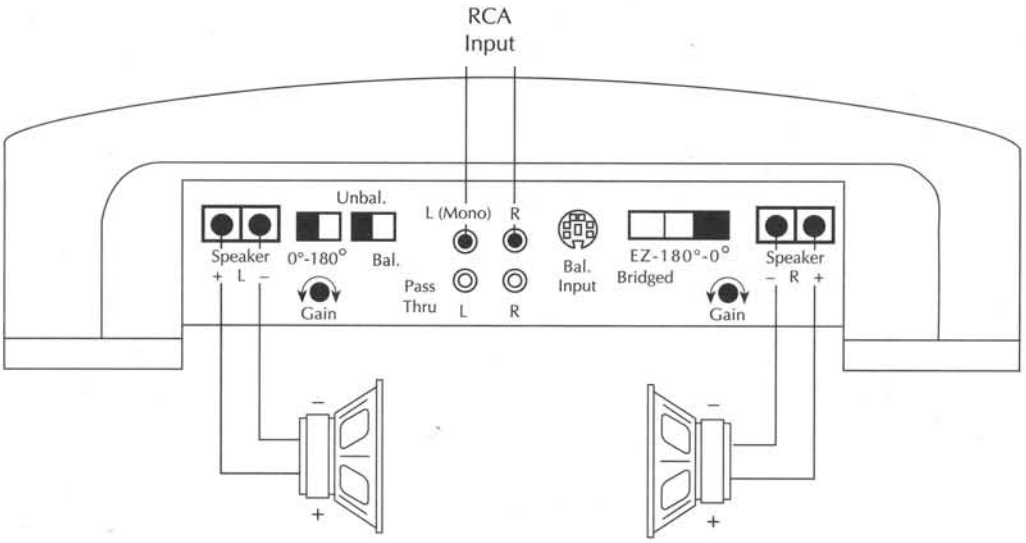


250m² Basic Connections

250m² Power Connections

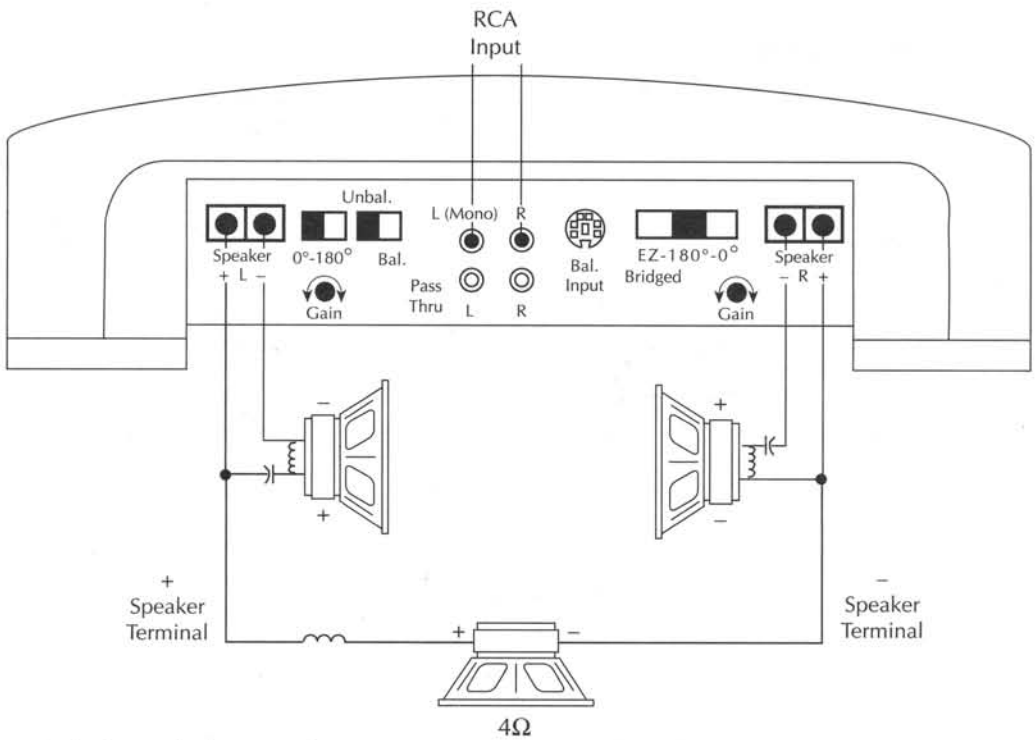


Stereo Operation



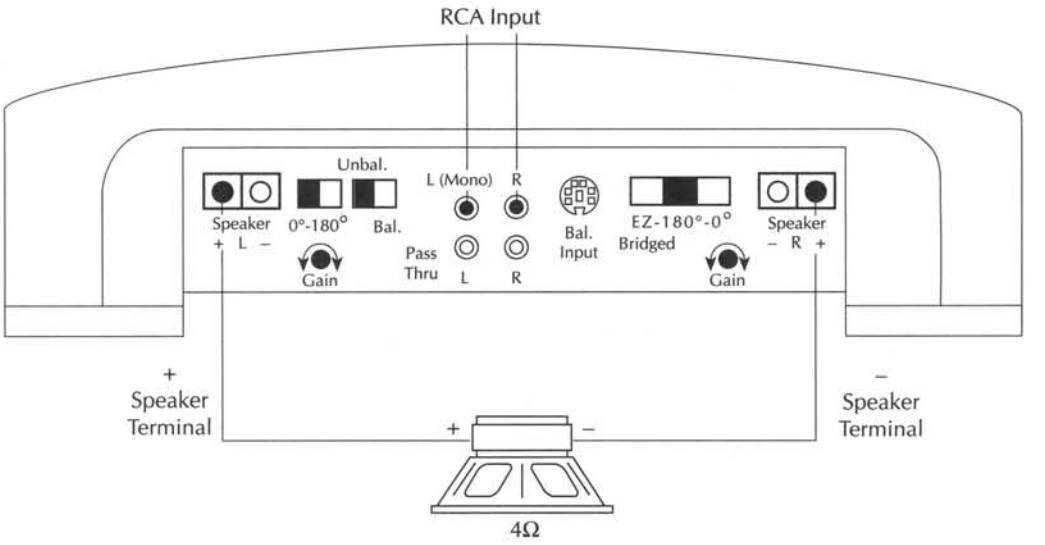
- Left channel phase at **0°.**
- Signal Input Switch to **Unbalanced** for RCA input.
- Right channel phase at **0°** for stereo operation.
- **Gain** for left and right channels operate independently.
- XCard can be High-Pass, Low-Pass or Full Range position.

Stereo/Mono Operation



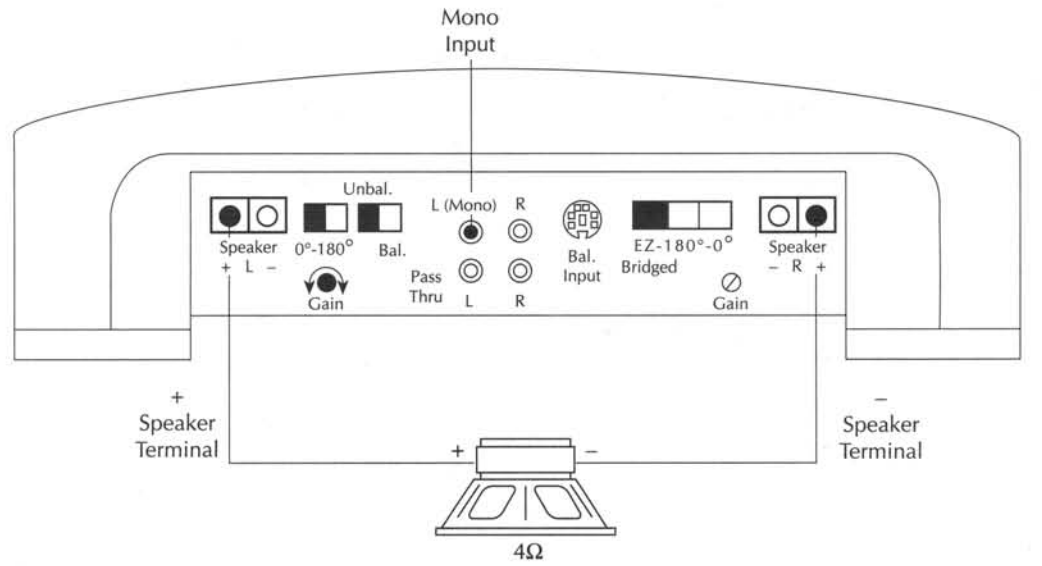
- Left channel phase at **0°.**
- Signal Input Switch to **Unbalanced** for RCA input.
- Right channel phase at **180°** for stereo/mono operation.
- All speaker polarity on right channel is inverted to correct for signal phase.
- **Gain** for left and right channels set equally to balance the subwoofer.
- XCard is in full range position.

Bridged Operation



- Left channel phase at **0°.**
- Signal Input Switch to **Unbalanced** for RCA input.
- Setting the right channel phase at **180°** will invert the signal and allow the subwoofer to operate correctly.
- **Gain** for left and right channels set equally to balance the subwoofer.
- XCard is in High-Pass, Low-Pass or Full Range position.

EZ-Bridged Operation



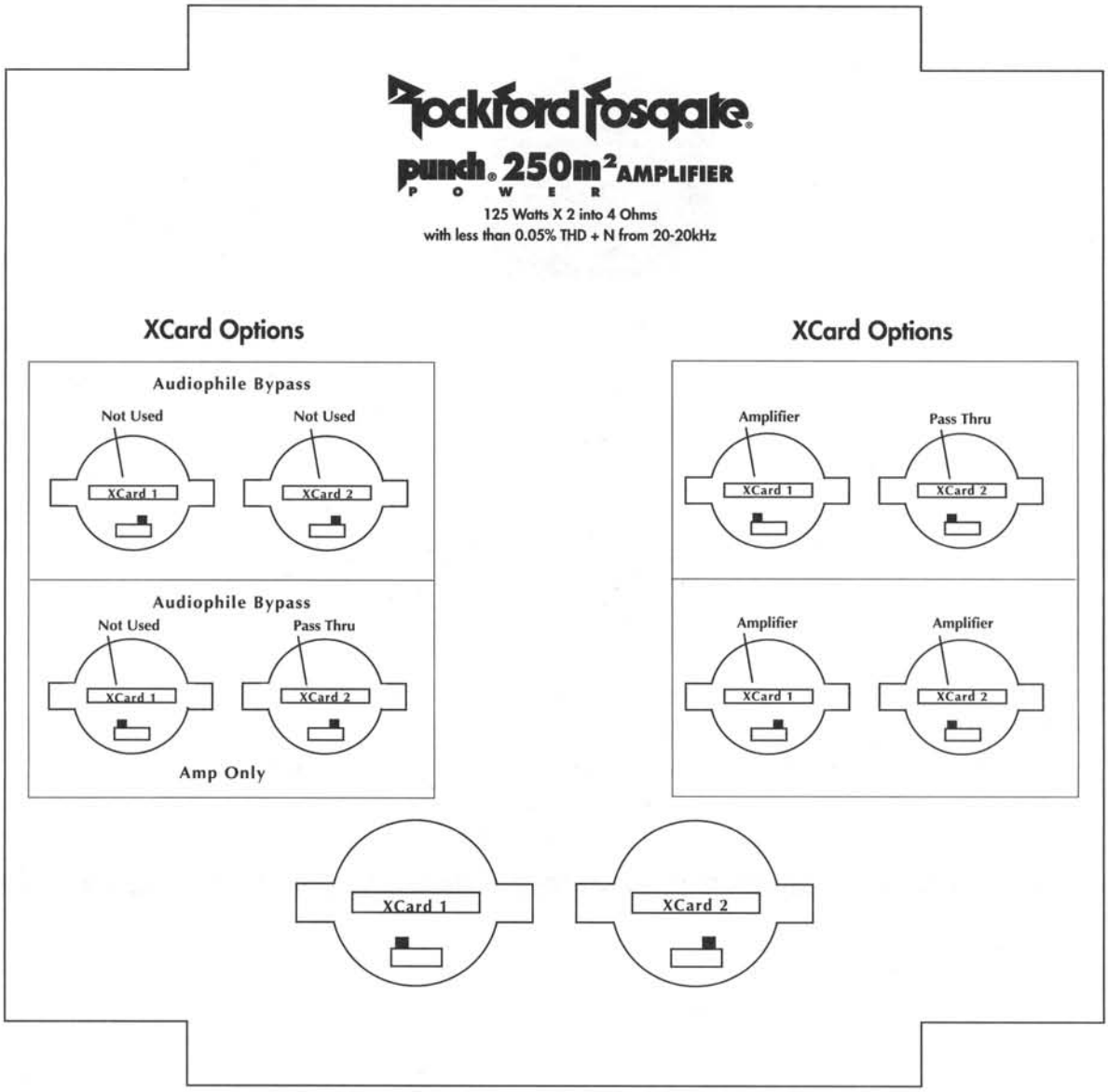
- Left channel phase at **0°.**
- Signal Input Switch to **Unbalanced** for RCA input.
- Selecting **E-Z Bridged** will allow the following to occur:
  L (Mono) RCA input to drive both the left and right channels.
  The left **Gain** to control both the left and right channels.
  Inverts the right channel **180°** allowing the subwoofer to operate correctly.
- XCard is in the High-Pass, Low-Pass or Full Range position.

USING THE 250m² INTERNAL SWITCHING NETWORK

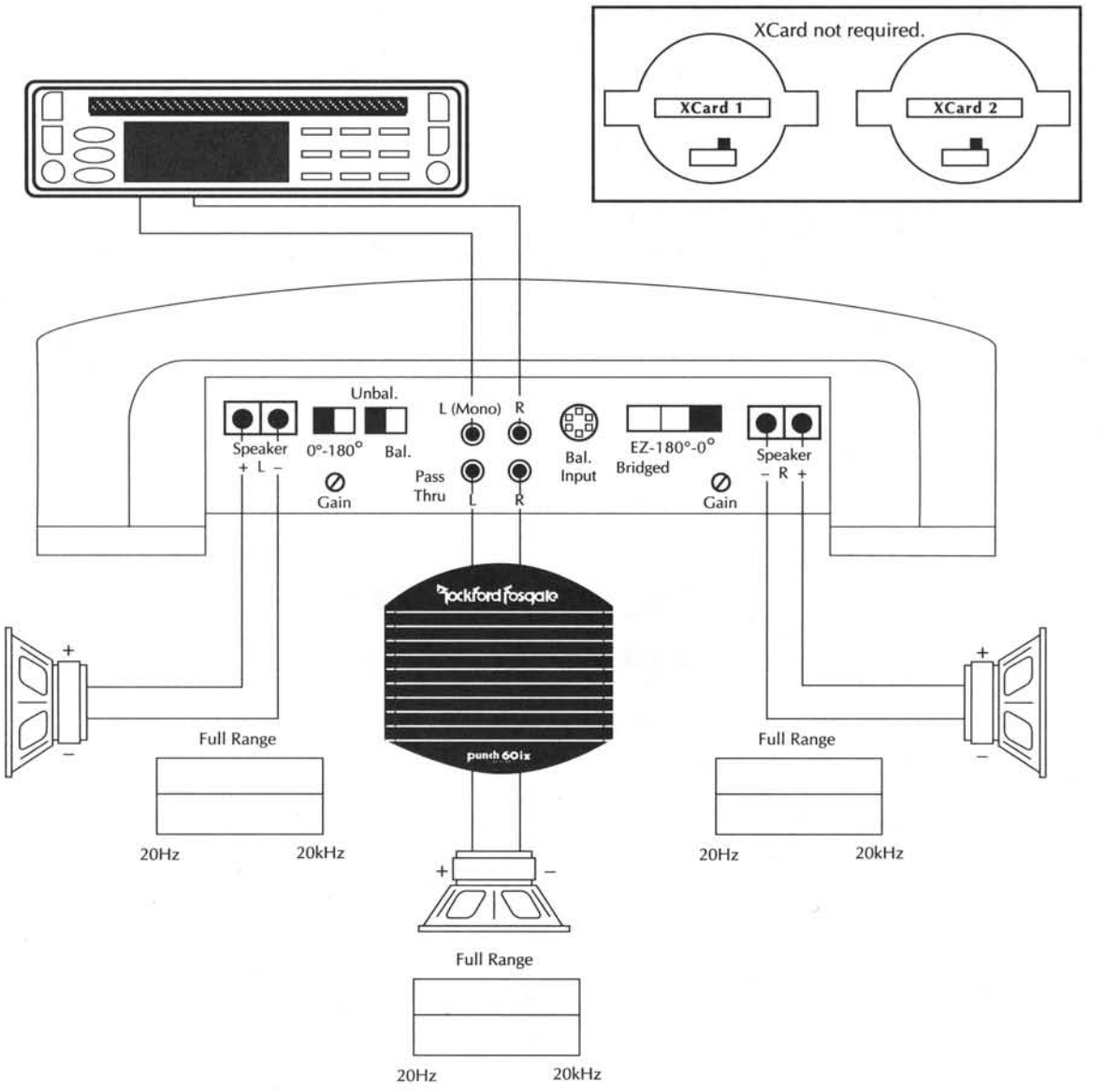
The Punch 250m² Power amplifier has a crossover switching network which enables you to:

- "Audiophile Bypass" the 250m² and Pass Thru
- Configure a 12dB per octave filter for both 250m² and Pass Thru
- "Audiophile Bypass" the 250m² and configure a 12dB per octave filter for the Pass Thru
- Configure a 24dB per octave filter for the 250m² and "Audiophile Bypass" the Pass Thru
- Configure a 12dB per octave bandpass filter for the 250m² and "Audiophile Bypass" the Pass Thru

The crossover switching network allows the crossover to be distributed to the amplifier and Pass Thru in many different configurations. The orientation of both switches configure the distribution pattern to where the crossover signal will be routed.

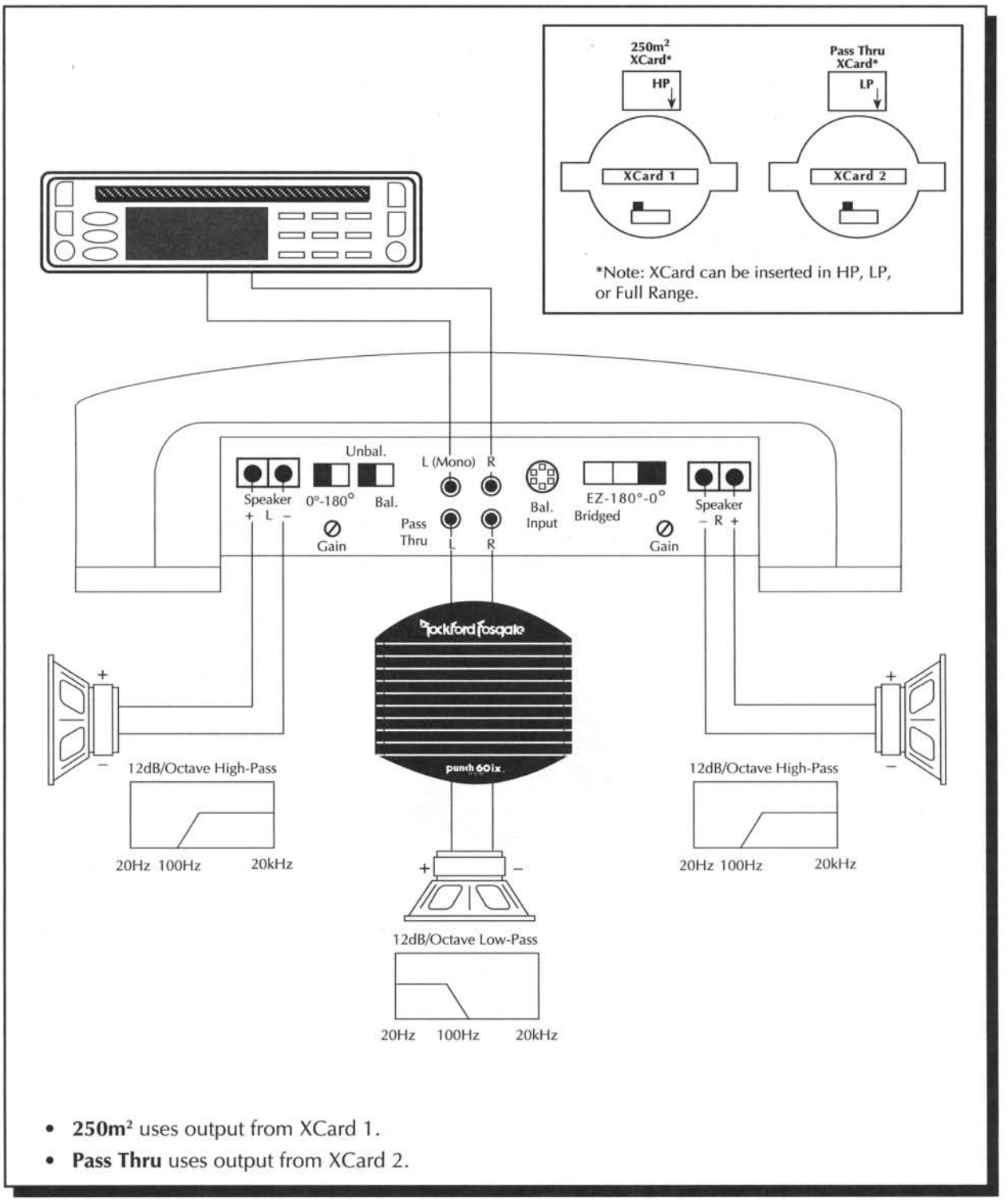


"Audiophile Bypass" as it affects the output of the 250m² and Pass Thru.



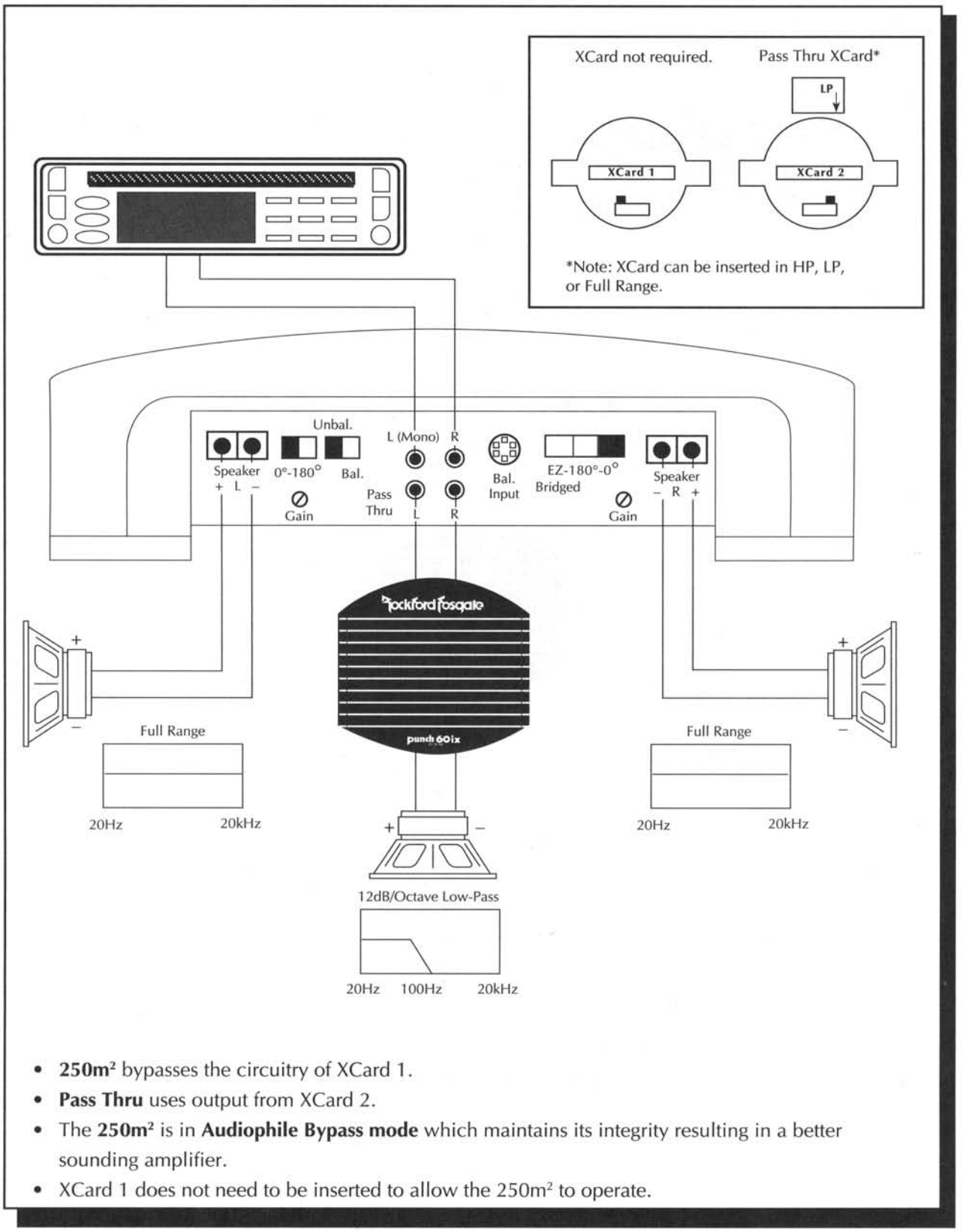
- **250m²** bypasses the circuitry of XCard 1 and XCard 2.
- **Pass Thru** bypasses the circuitry of XCard 1 and XCard 2.
- In **Audiophile Bypass** mode, the signal maintains its integrity which results in a better sounding amplifier.
- The XCards do not need to be inserted to allow the 250m² or Pass Thru to operate.

Configure a 12dB per octave filter for both the 250m² and Pass Thru.



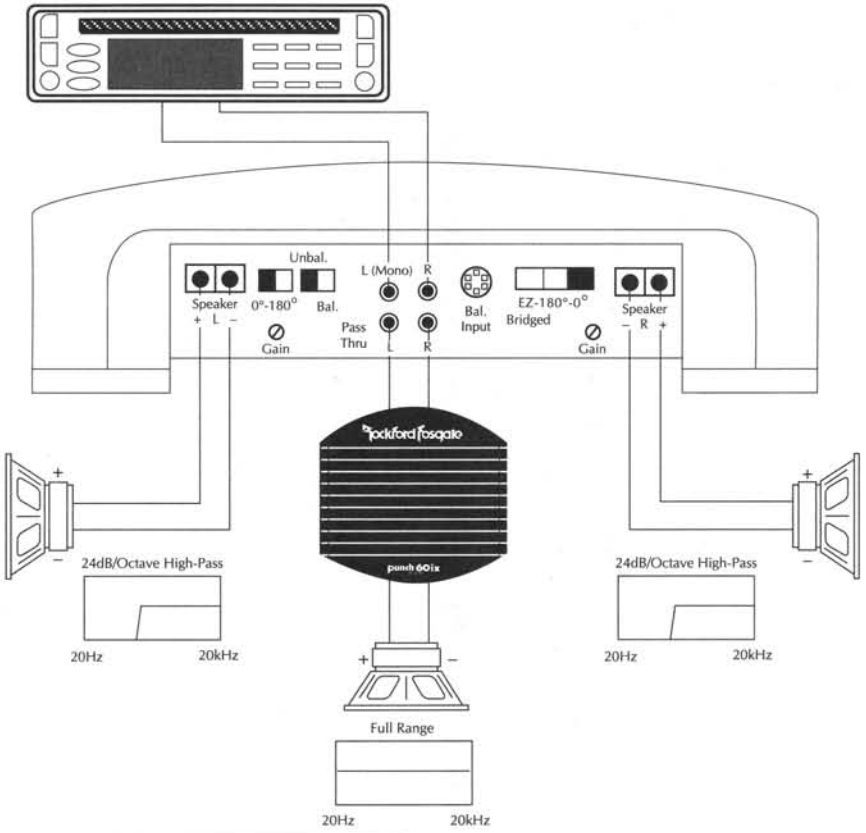
- **250m²** uses output from XCard 1.
- **Pass Thru** uses output from XCard 2.

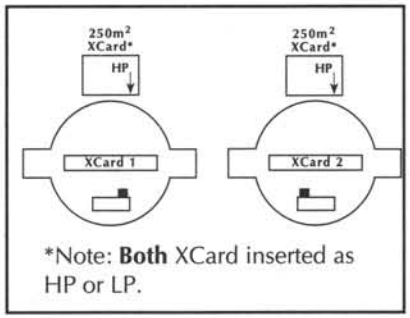
"Audiophile Bypass" the 250m² and configure a 12dB per octave filter for the Pass Thru.



- **250m²** bypasses the circuitry of XCard 1.
- **Pass Thru** uses output from XCard 2.
- The **250m²** is in **Audiophile Bypass mode** which maintains its integrity resulting in a better sounding amplifier.
- XCard 1 does not need to be inserted to allow the 250m² to operate.

Configure a 24dB per octave filter for the 250m² and "Audiophile Bypass" the Pass Thru.

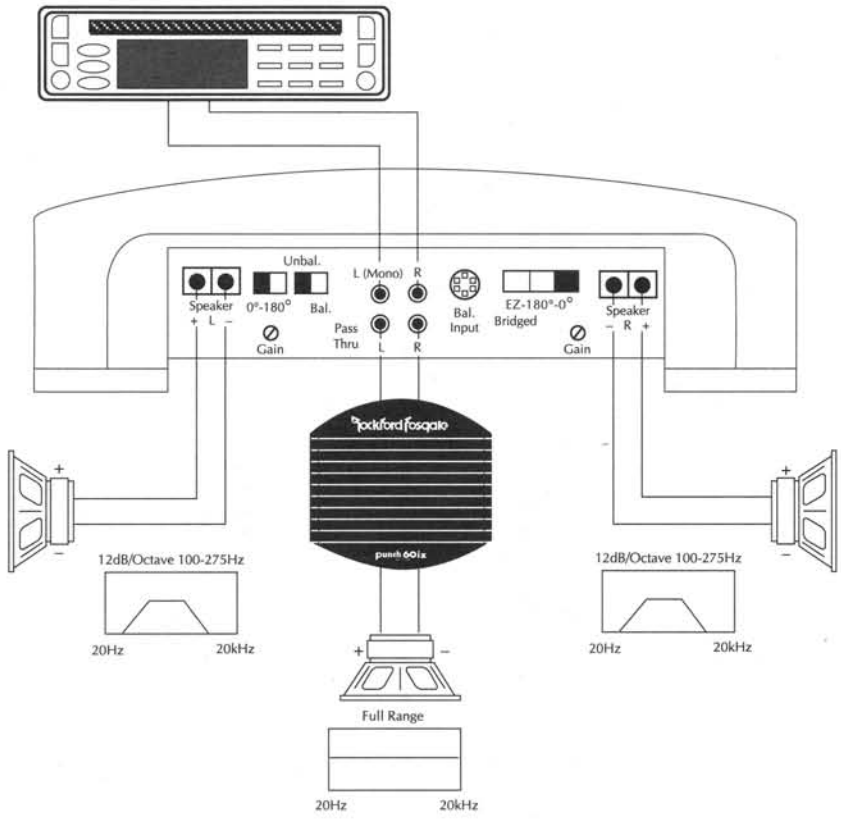


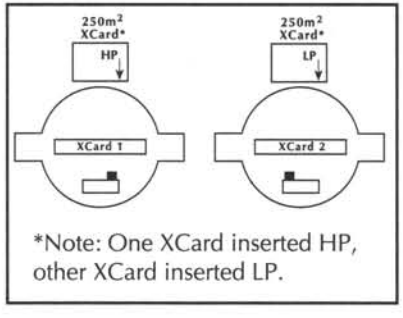


*Note: **Both** XCard inserted as HP or LP.

- **250m²** uses output from XCard 1 and XCard 2.
- **Pass Thru** bypasses XCard 1 and XCard 2.
- **Pass Thru** is in **Audiophile Byapss mode** which maintains signal integrity resulting in a better sounding amplifier.

Configure a 12dB per octave bandpass filter for the 250m² and "Audiophile Bypass" the Pass Thru.



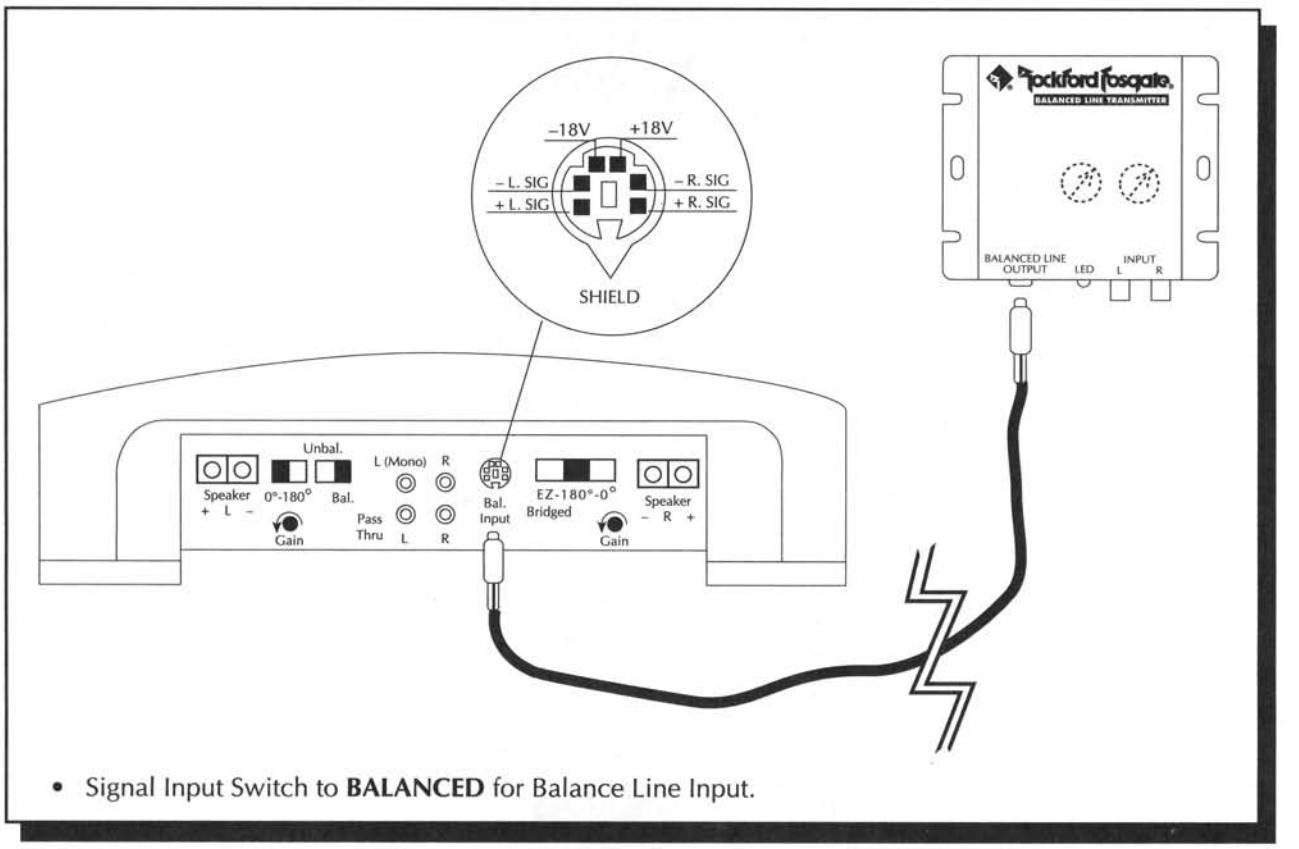


*Note: One XCard inserted HP, other XCard inserted LP.

USING THE 250m² BALANCED LINE INPUTS

The Balanced Line Inputs can be utilized with the optional Balanced Line Transmitter. Unlike standard RCA cables that use two wires to carry the audio signal and ground, balanced lines use three. In a balanced line, the output signal and its inverted replica travel down a pair of wires where the ground connects via the shield. As the amplifier receives the signals, it cancels out whatever signals are common to both wires. The use of balanced lines helps in preventing radiated noise pickup in the signal cables and has been proven effective in studio installation where long cable runs and magnetic fields make maintaining signal integrity difficult.

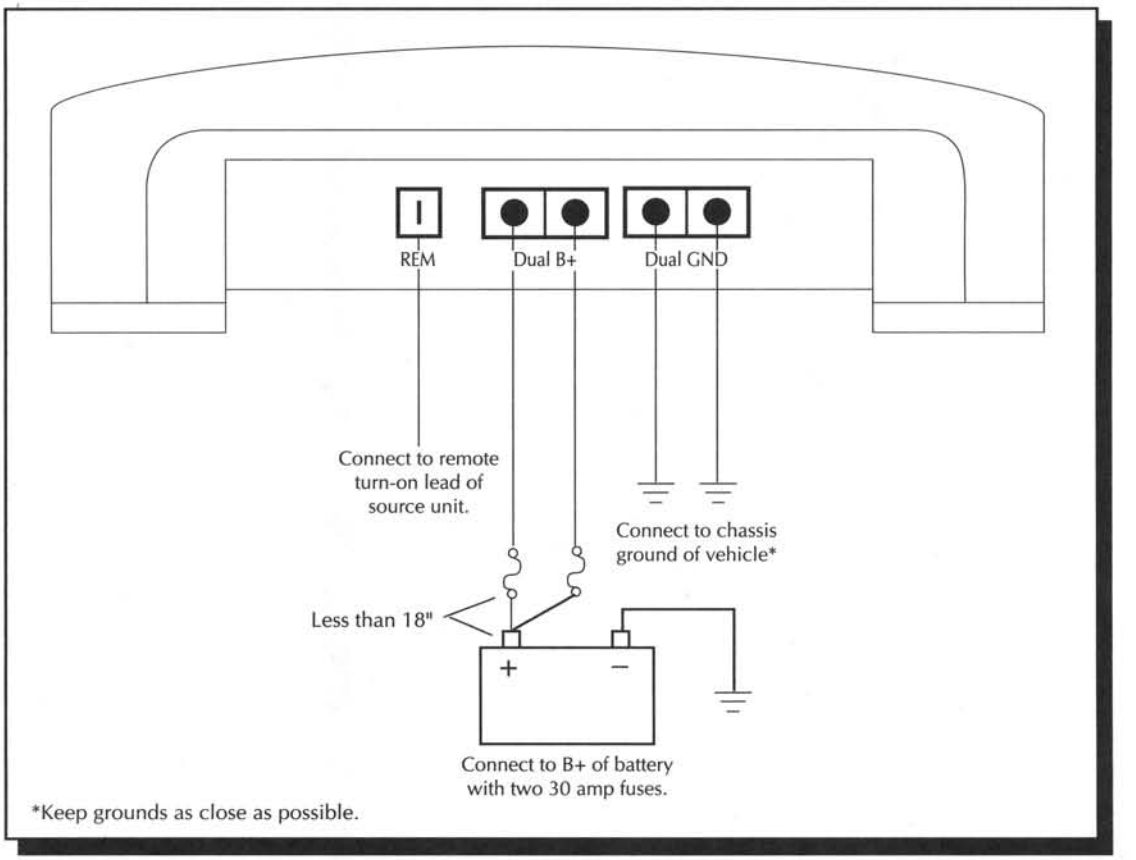
CAUTION!! You must turn the gain controls to minimum when using the Balanced Line Transmitter. If the input gains need to be adjusted, this can now be done in the Balanced Line Transmitter.



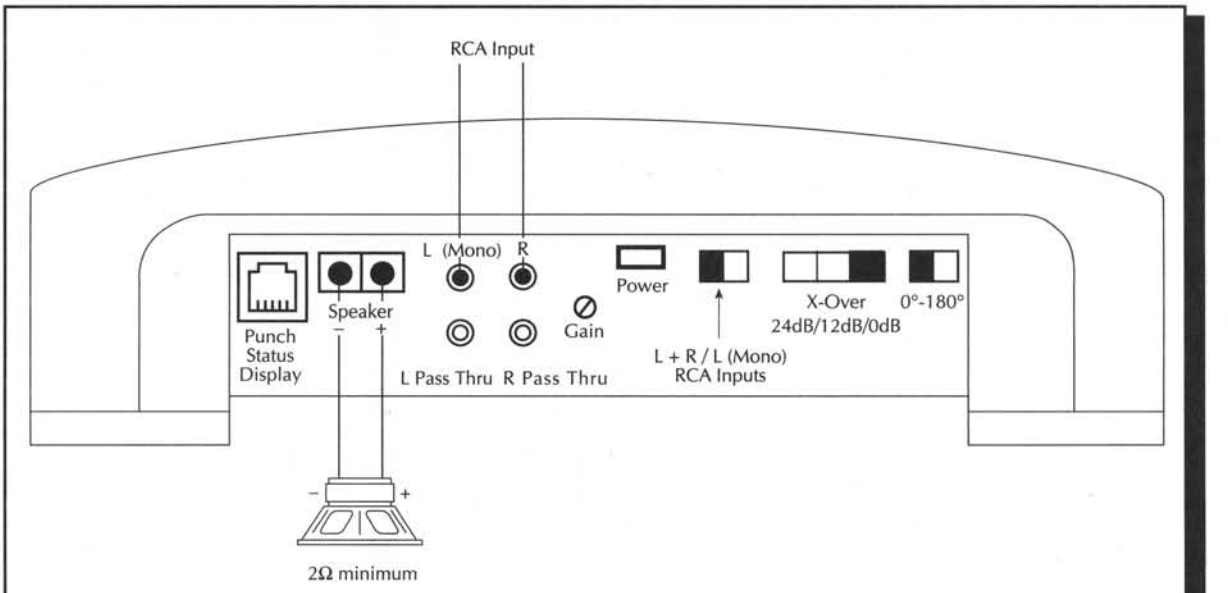
- Signal Input Switch to **BALANCED** for Balance Line Input.

500m Basic Connections

500m Power Connections

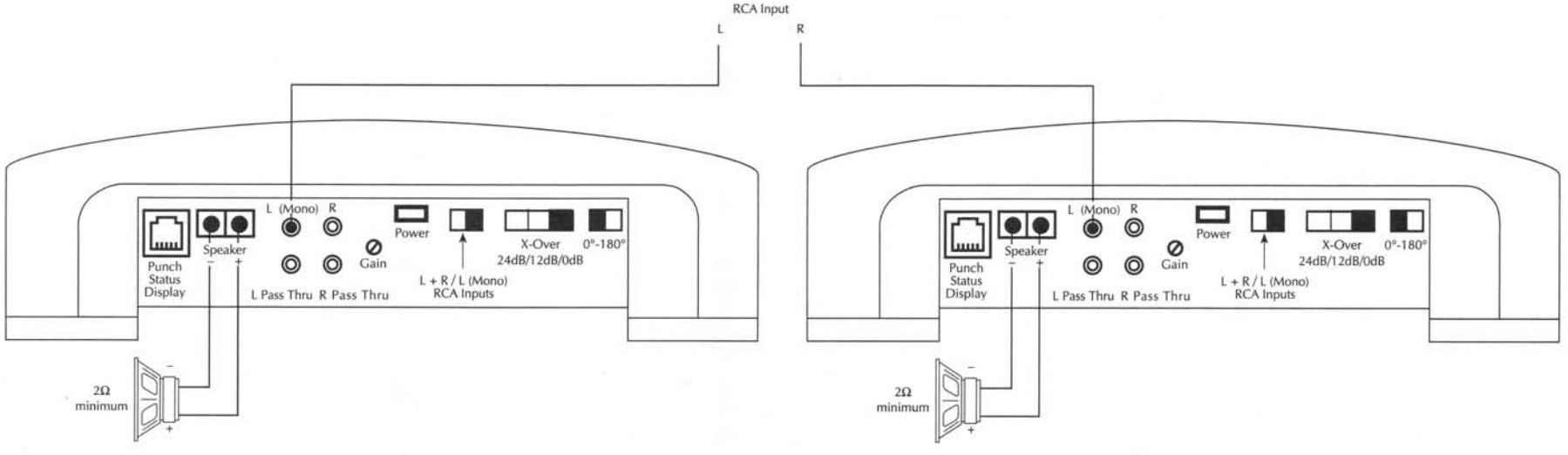


Mono Operation



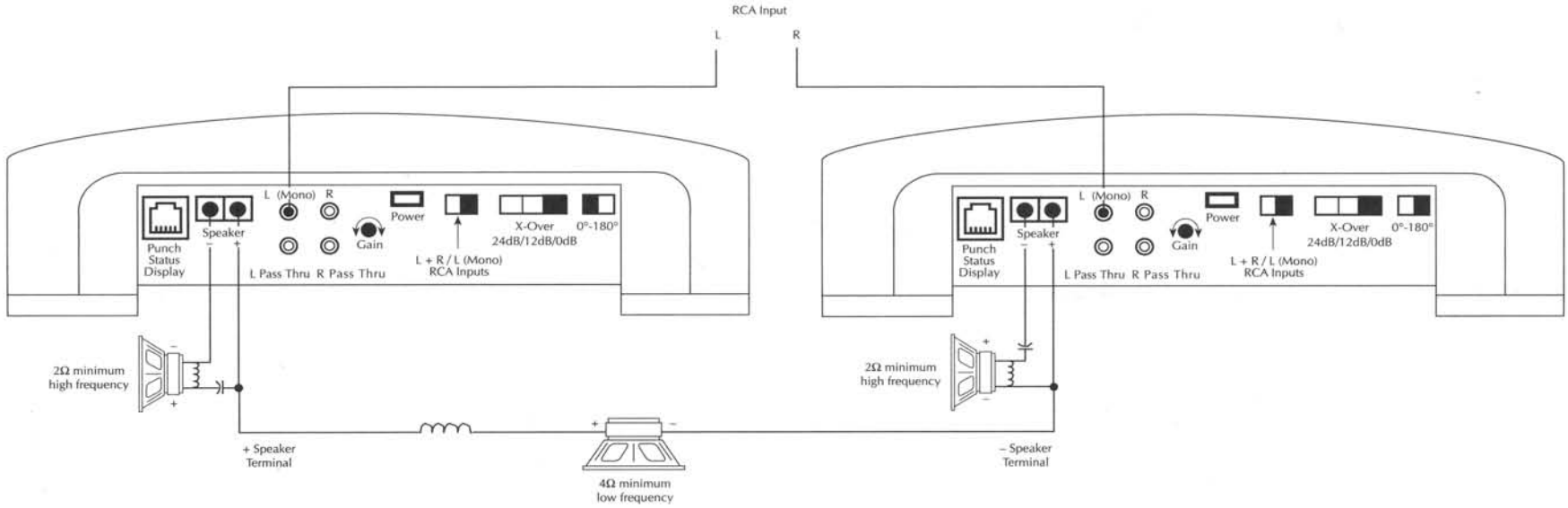
- 500m set to **L + R** for RCA Input.
- Crossover set to **0dB, 12dB** or **24dB**.
- Phase at **0°**.

Stereo Operation using two Punch 500m Power Amplifiers



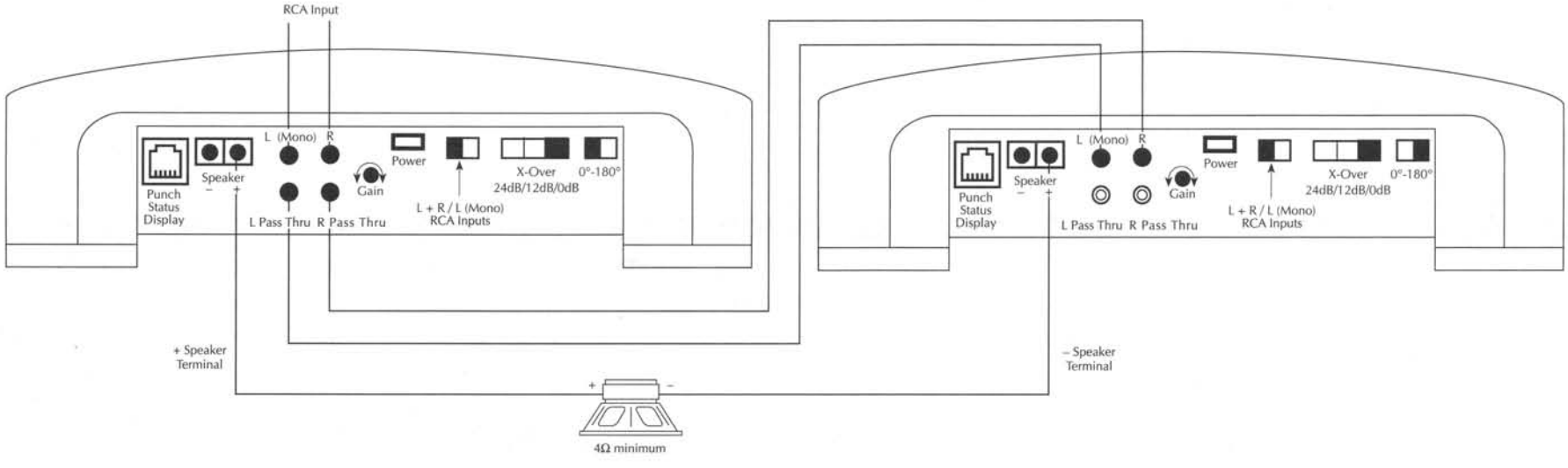
- Left and right amplifiers set to **L (Mono)** for single RCA input.
- Crossover set to **0dB, 12dB** or **24dB**.
- Left and right amplifier phase at **0°**.

Stereo/Mono Operation



- Left and right amplifiers set to **L (Mono)** for single RCA input.
- Crossover set to **0dB, 12dB** or **24dB**.
- Left amplifier phase at **0°**.
- Right amplifier phase at **180°**.
- All speaker polarity on right amplifier is inverted to correct for signal phase.
- **Gain** for left and right amplifiers set equally to balance the subwoofer.

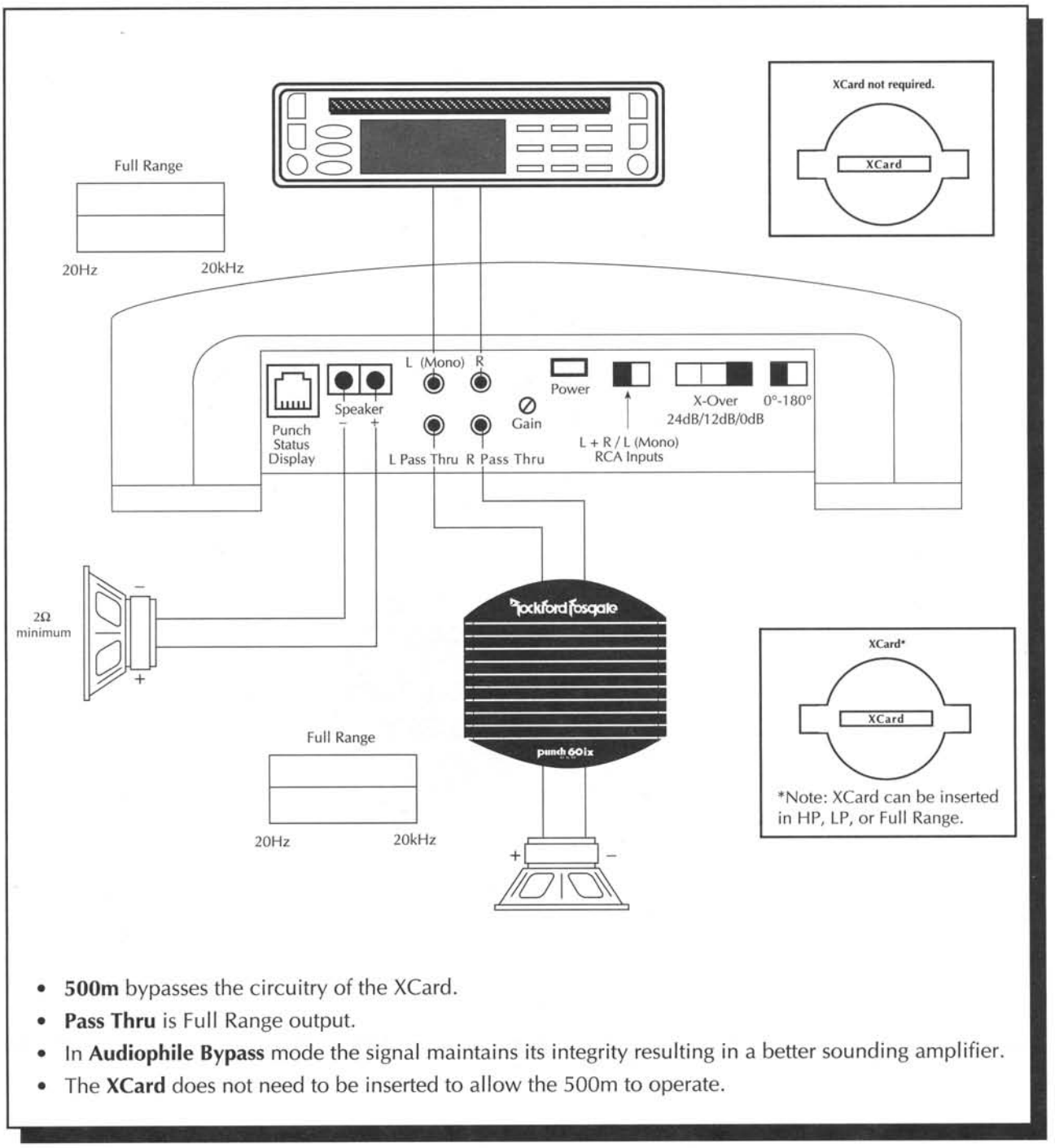
Bridged Mono Operation



- Left and right amplifiers set to **L + R** for RCA input.
- Crossover set to **0dB, 12dB** or **24dB**.
- Left amplifier phase at **0°**.
- Right amplifier phase at **180°**.
- **Gain** for left and right amplifiers set equally to balance the subwoofer.

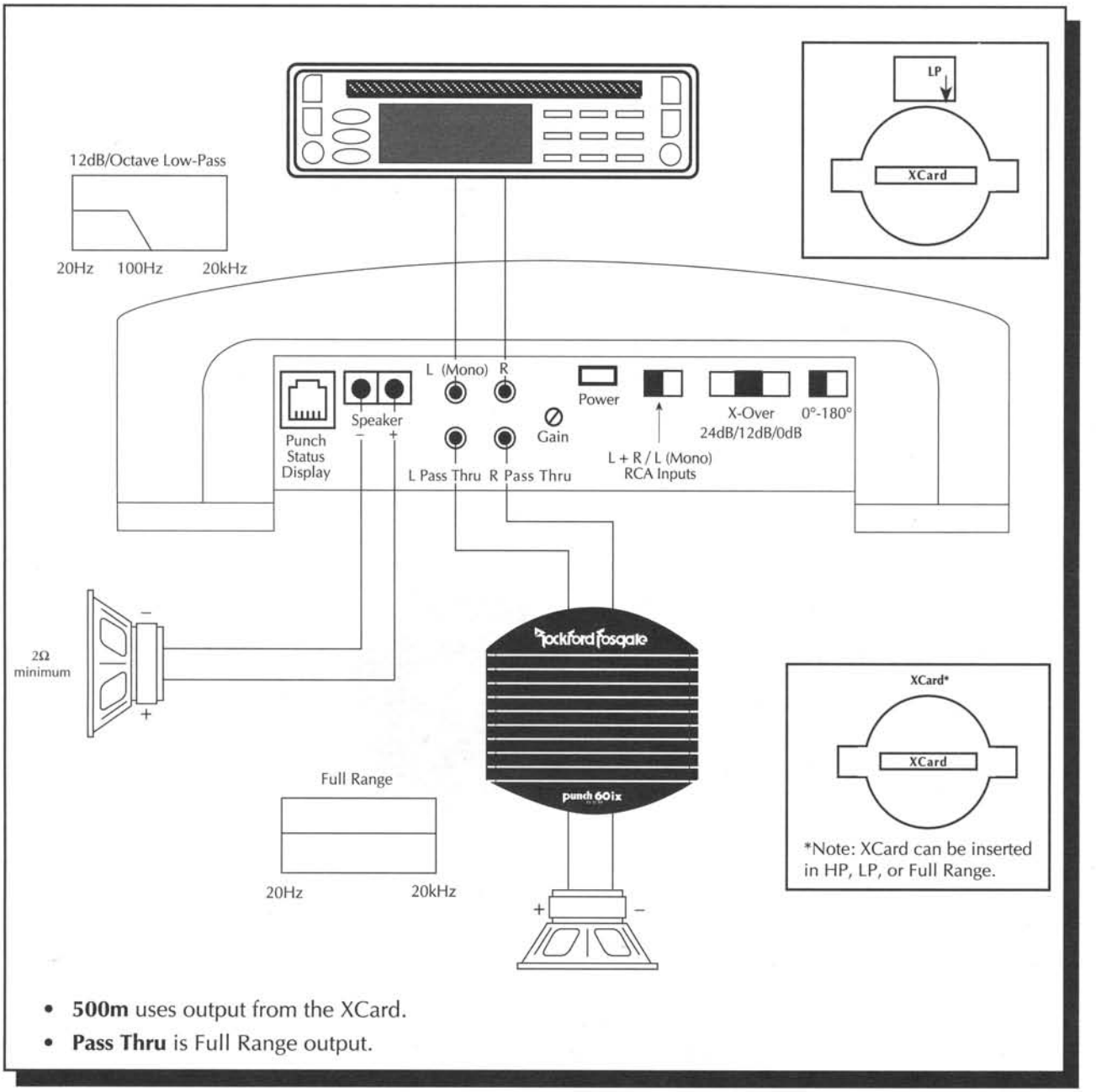
USING THE 500m INTERNAL SWITCHING NETWORK

"Audiophile Bypass" the 500m.



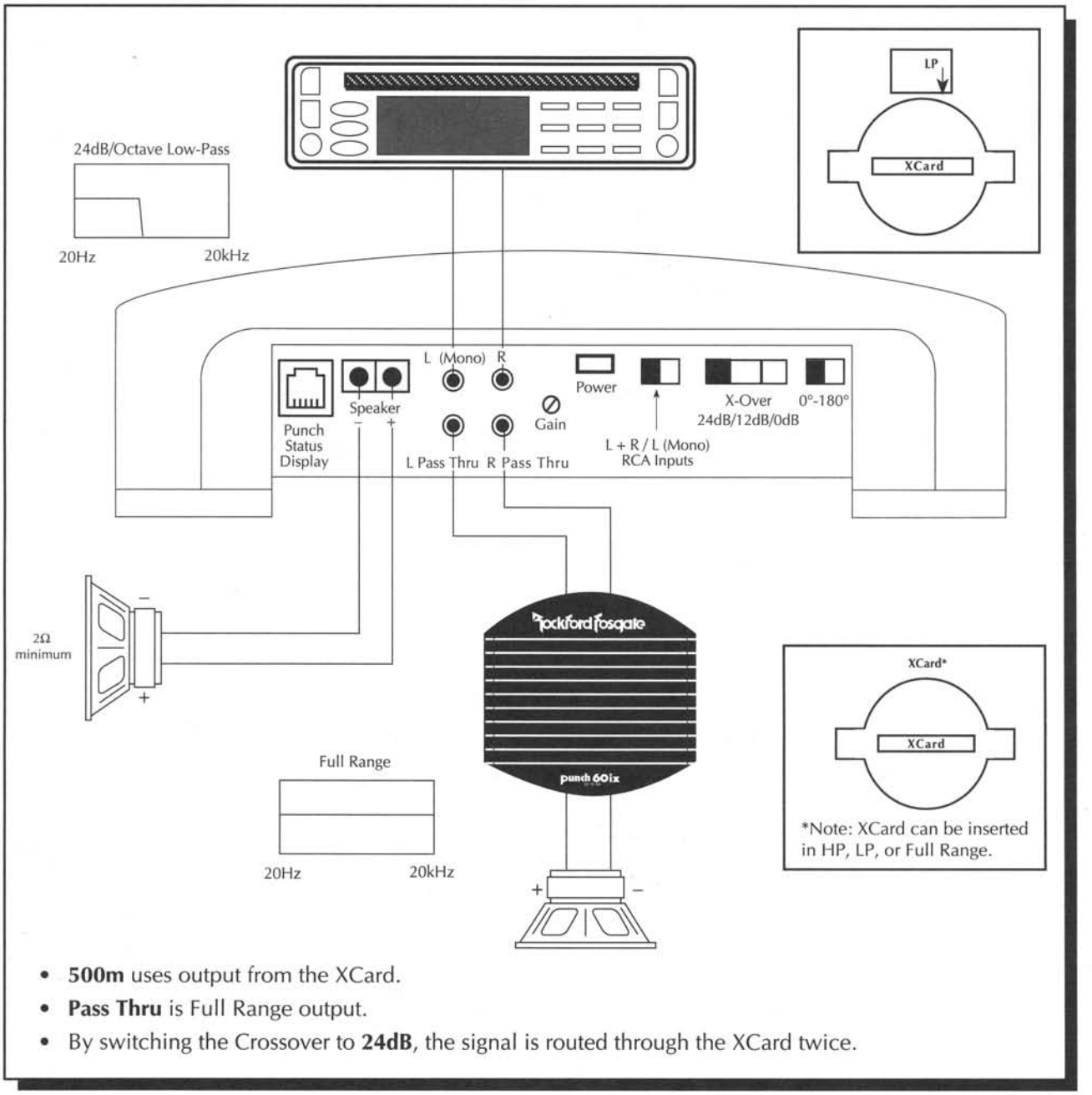
- **500m** bypasses the circuitry of the XCard.
- **Pass Thru** is Full Range output.
- In **Audiophile Bypass** mode the signal maintains its integrity resulting in a better sounding amplifier.
- The **XCard** does not need to be inserted to allow the 500m to operate.

Configure a 12dB per octave filter for the 500m.



- **500m** uses output from the XCard.
- **Pass Thru** is Full Range output.

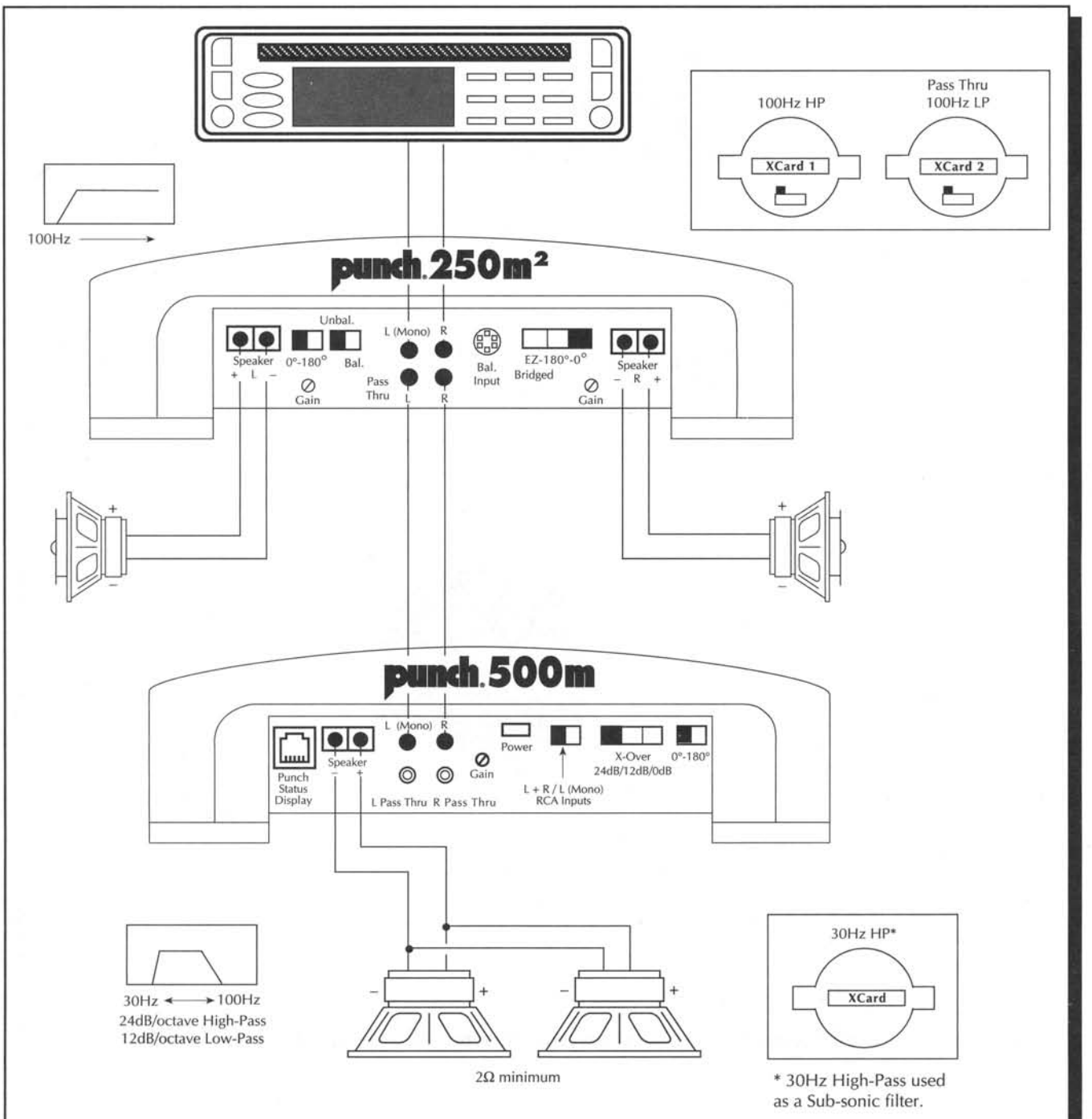
Configure a 24dB per octave filter for the 500m.



- **500m** uses output from the XCard.
- **Pass Thru** is Full Range output.
- By switching the Crossover to **24dB**, the signal is routed through the XCard twice.

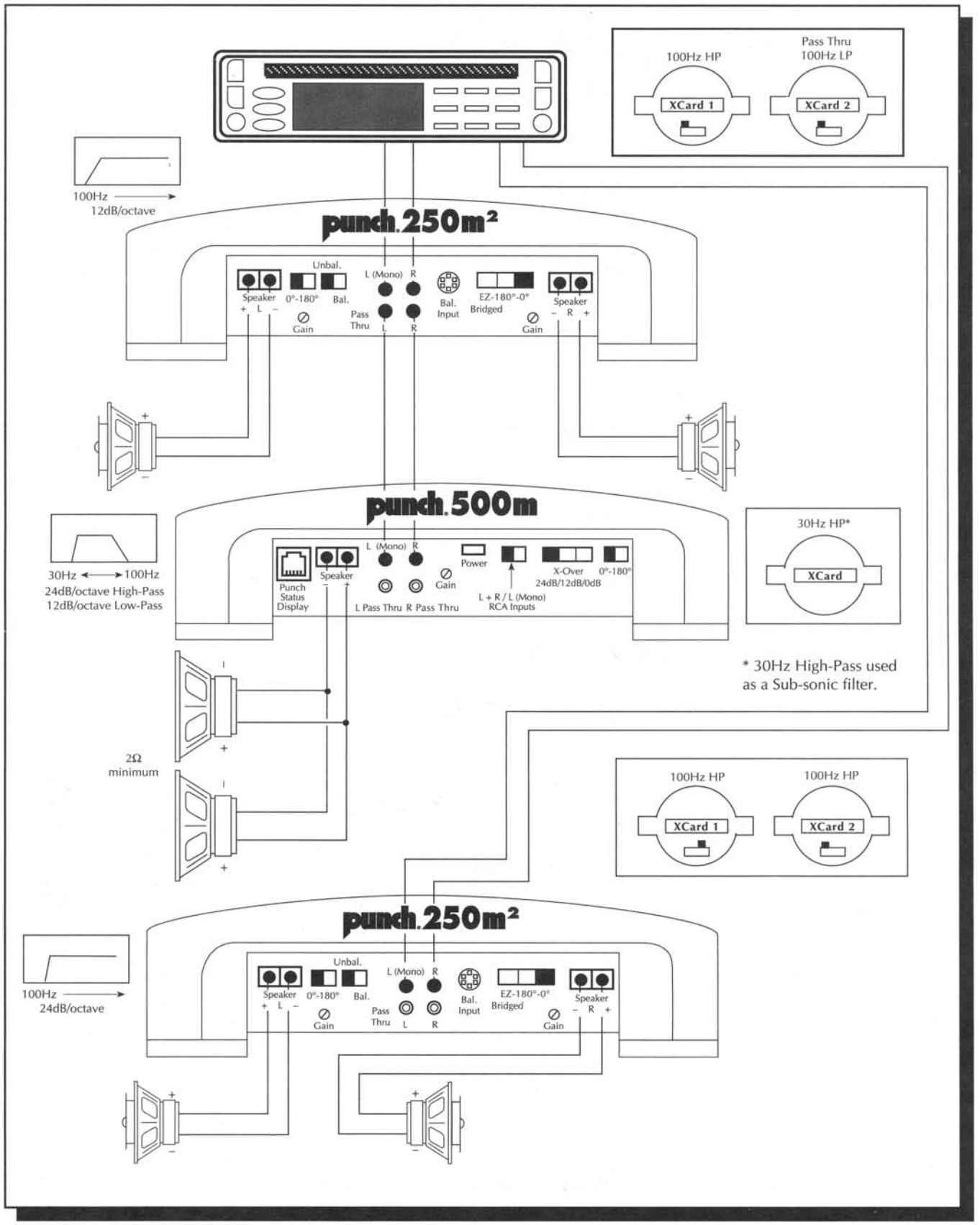
System Diagrams

500 Watt System

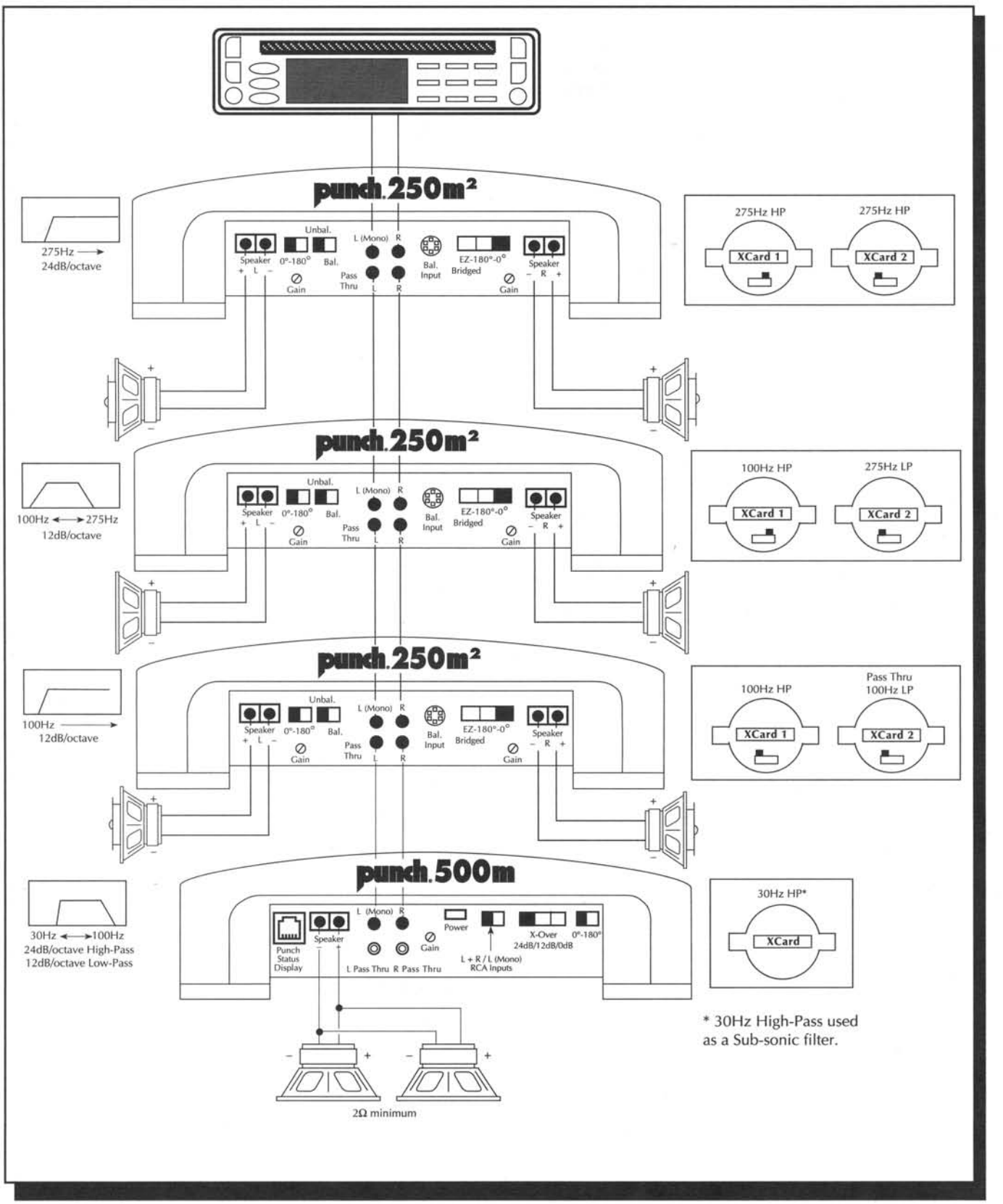


- A sub-sonic filter is a high-pass filter that limits the input signal below a certain motion below that frequency. Below a certain frequency a woofer has no output, just motion. If you try to drive this woofer at these lower frequencies, the woofer could self destruct. Please refer to the crossover section of the manual or see your local Authorized Rockford Fosgate Dealer for more information.

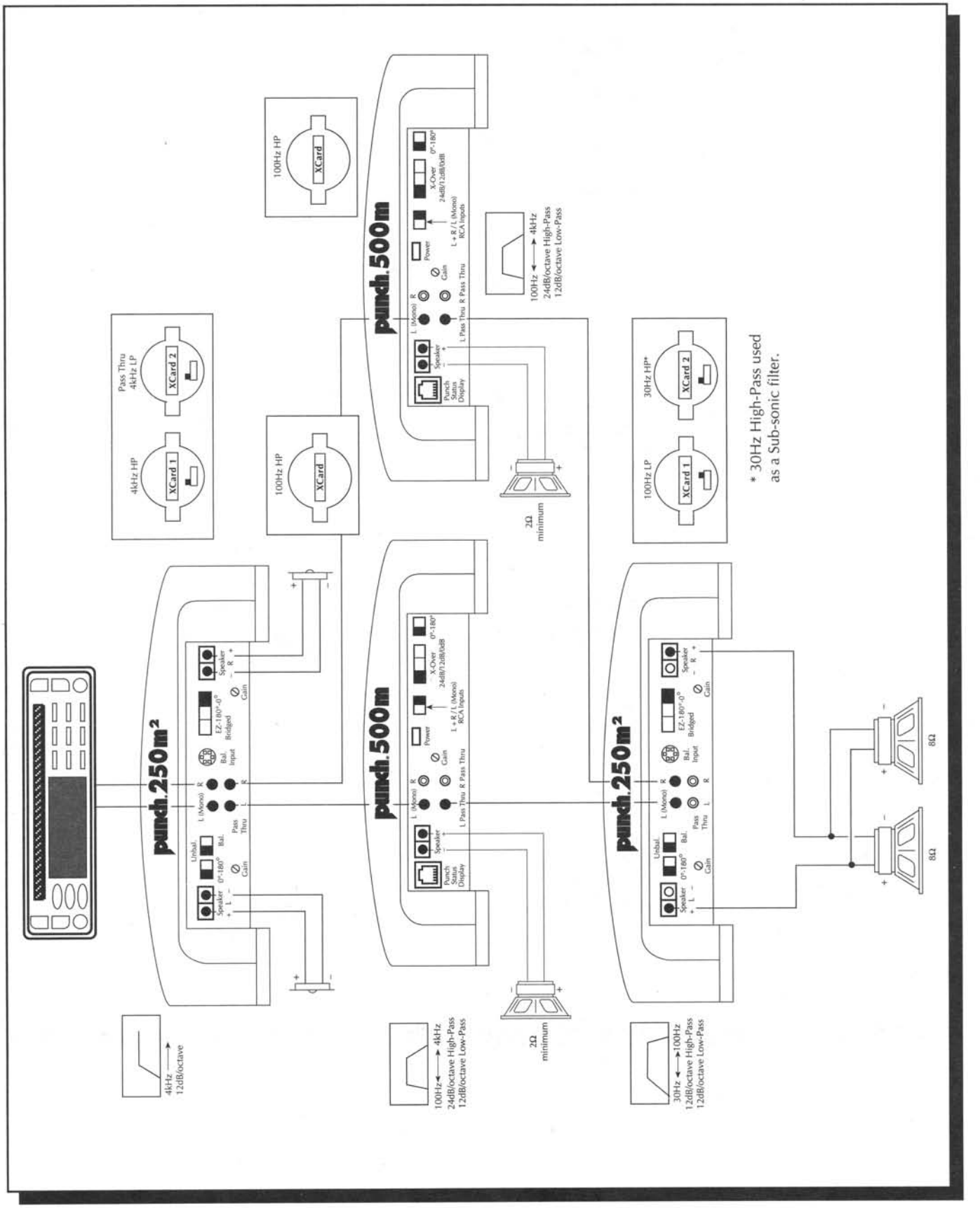
750 Watt System



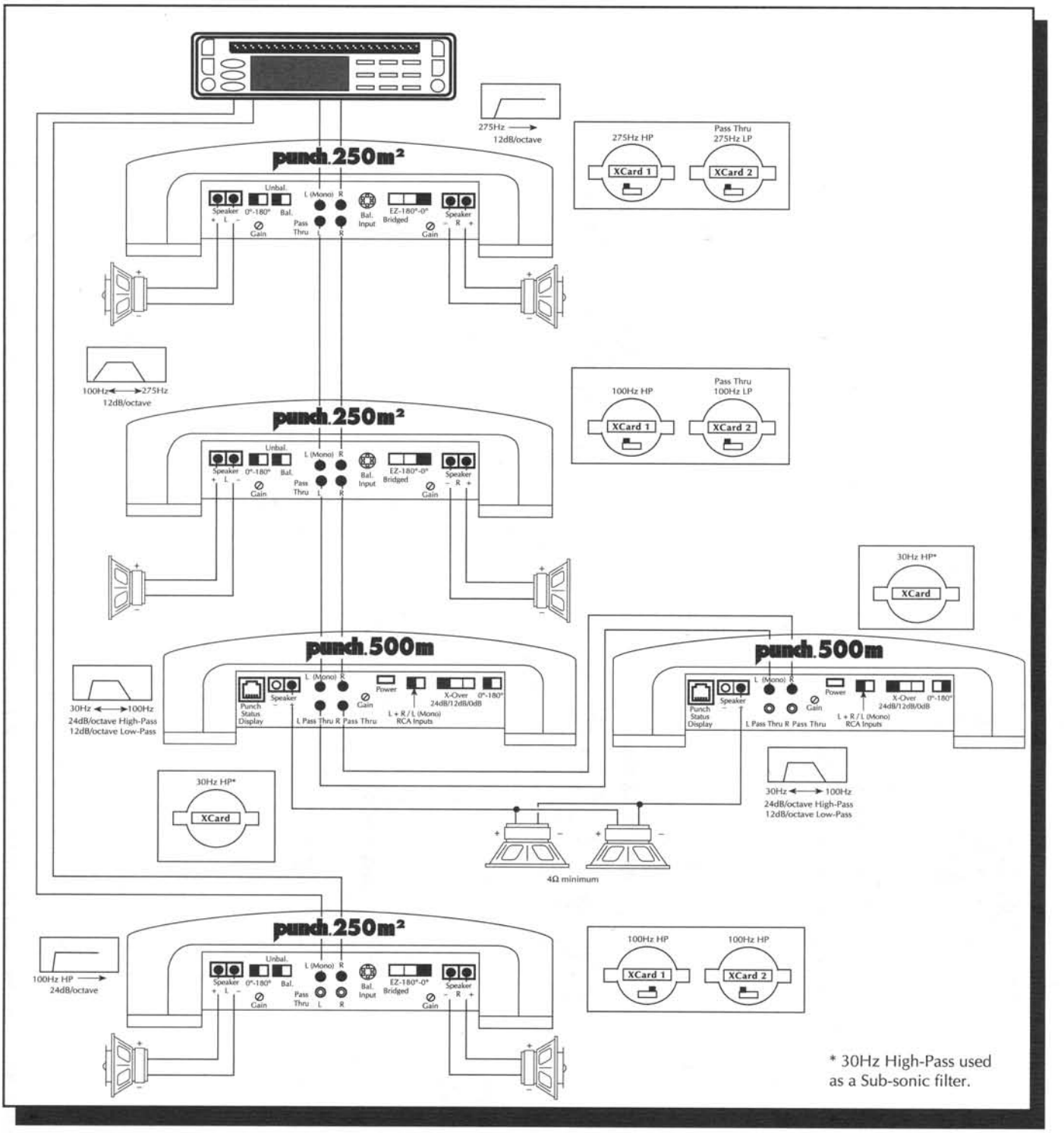
1000 Watt "Boomer" System



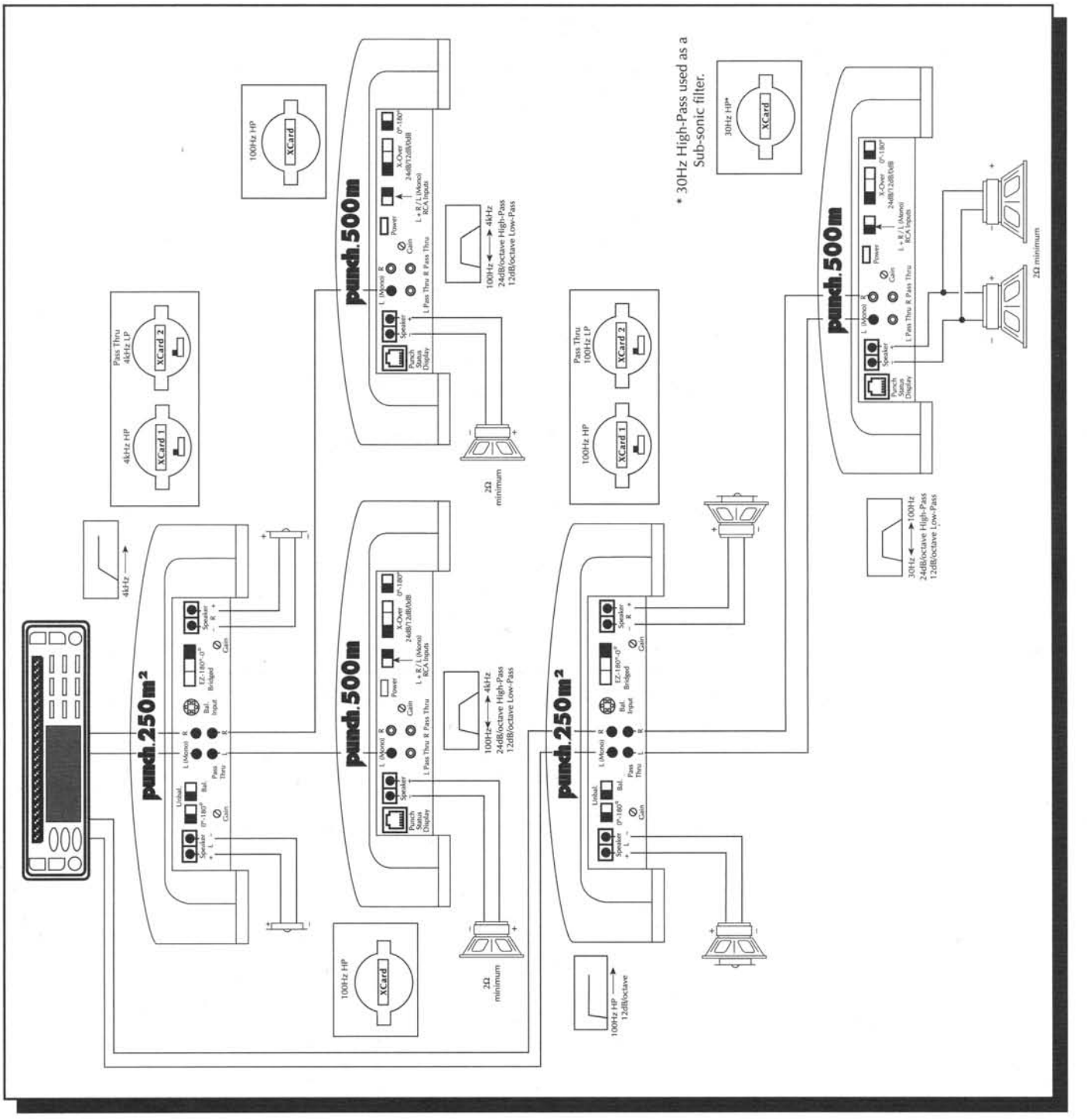
1000 Watt "Audiophile" System



1250 Watt "Boomer" System



1250 Watt "Audiophile" System



TROUBLESHOOTING

Symptom	Diagnosis	Remedy
Amplifier does not turn on. (Power LED is off)	Voltage applied to the REM terminal of the amplifier is not between 10.5 and 15.5 volts or there is no voltage present.	Check the alternator, battery, fuse, and wiring and repair as necessary. If the voltage is above 15.5 volts, have the electrical system inspected by an authorized car service center.
	Voltage to the B+ terminal of the amplifier is not between 10.5 and 15.5 volts or there is no voltage present.	Check the alternator, battery, fuse, and wiring and repair as necessary. If the voltage is above 15.5 volts, have the electrical inspected by an authorized car service center.
	Amplifier is not properly grounded.	Check wiring and repair as necessary.
Amplifier has no sound. (Power LED is on)	RCA Input from source unit is not connected or not functioning properly.	Check connections, substitute with known working source and cables and repair or replace as necessary.
	When using the BLT, Balanced Line Input from BLT is not connected or not functioning properly.	Check connections, substitute with known working BLT and cables and repair or replace as necessary.
	Unbalanced/Balanced Line switch is not selected for corresponding input.	Check switch position and correct as necessary.
	Amplifier is in E-Z Bridge operation but incorrect signal input, speaker wiring, and/or left channel 180° phase selection is chosen.	Check signal, speaker wiring, and left channel phase selection installation and correct as needed.
	XCards are missing or not placed properly in crossover slots and/or switches are not properly selected.	Check crossover switches and XCard positions and repair or replace as necessary.
	Speaker leads are shorted to each other or to the chassis of the vehicle.	Disconnect existing speakers and test with known working speakers and wires. If amplifier plays, check and repair wiring and installation of speakers as necessary.
	Speakers are defective.	Disconnect existing speakers and test with known working speakers. If amplifier plays, check and repair speakers as necessary.

Symptom	Diagnosis	Remedy
Speaker Output Low or Distorted	Input gain signal for amplifier set too low.	Readjust input gains of amplifier.
	Source unit output too low or source unit has no output.	Check system with known working source and repair or replace original source as needed.
	Phase selection of amplifier incorrectly selected or speakers wired out of polarity from the left to right channel.	Check speaker polarity and phase switch position and correct as needed.
	XCards are missing or not placed properly in crossover slots and/or switches are not properly selected.	Check crossover switches and XCard positions and repair or replace as necessary.
	Low battery voltage or large voltage drops to the amplifier under load.	Check the alternator, battery, fuse or circuit breaker and power and ground wiring and repair as necessary.
Amplifier Noise (Turn-on Pop)	Voltage spike from output of preceding component is entering amplifier through input signal.	Disconnect input signal to amplifier and turn amplifier on and off. If noise is eliminated, connect REM lead of amplifier to source unit with a delay turn-on module.
	Voltage spike from remote turn-on lead is entering through REM input terminal.	Use different 12 volt source for REM lead of amplifier (i.e., battery direct). If noise is eliminated, use relay to isolate amplifier from noise turn-on output.
No output from Pass Thru output of amplifier.	RCA Input from source unit is not connected or not functioning properly.	Check connections, substitute with known working source and cables and repair or replace as necessary.
	When using the BLT, Balanced Line Input from BLT is not connected or not functioning properly.	Check connections, substitute with known working BLT and cables and repair or replace as necessary.
	Unbalanced/Balanced Line switch is not selected for corresponding input.	Check switch position and correct as necessary.
	XCards are missing or not placed properly in crossover slots.	Check crossover switches and XCard positions and repair or replace as necessary.

Symptom	Diagnosis	Remedy
Low or distorted output from the Pass Thru output of the amplifier.	Input gain signal for amplifier set too low.	Readjust input gains of amplifier.
	Source unit output too low.	Check system with known working source and repair or replace original source as needed.
	XCards are missing or not placed properly in crossover slots and/or switches are not properly selected.	Check crossover switches and XCard positions and repair or replace as necessary.
	Low battery voltage or large voltage drops to the amplifier under load.	Check the alternator, battery, fuse or circuit breaker and power and ground wiring and repair as necessary.
	RCA cable or amplifier connect through Pass Thru output is defective.	Check connections, substitute with known working amplifier or cables and repair or replace as needed.
Amplifier Noise (Engine Noise)	Installation problems causing ground loops in the signal chain or power and ground connection.	Refer to System Noise Flow Chart in this manual.

250m² Specifications

Continuous Power Rating (Competition Standard) measured at 12.6 battery Volts RMS continuous power per channel, both channels driven into a 4Ω load from 20-20,000Hz with less than 0.05% THD	**125 Watts**
RMS continuous power per channel, both channels driven into a 2Ω load from 20-20,000Hz with less than 0.1% THD	**225 Watts**
RMS continuous power mono into a 4Ω load from 20-20,000Hz with less than 0.1% THD	**450 Watts**
Common Mode Rejection Ratio (CMRR):	Typically 40dB
Signal-to-Noise Ratio:	>100dB (A-weighted)
Frequency Response:	20Hz-20,000Hz ±0.5dB
Bandwidth:	10Hz–250kHz ±3dB
Damping Factor:	@4Ω >200 at output connector
Slew Rate:	50V µs
IM Distortion (IHF):	<0.05%
Input Sensitivity:	150 mV to 3.0 V
Protection:	RTP/NOMAD - Internal analog-computer output protection circuitry limits power in case of overload. Thermal switch shuts down the amplifier in case of overheating.
B+ Fuse Size:	60 Amp or two 30 Amp
Fuse Type:	AGU / Maxi Fuse
Input Impedance:	20,000 Ohms
Crossover Alignment:	12dB/octave Butterworth with selectable high-pass, low-pass and full range via interchangeable XCards.
Factory Crossover Frequency:	100Hz
Factory Default Crossover Setting:	Full Range
Dimensions:	9-5/8"W x 13-5/8"L x 2-5/8"H (24.4cm) x (34.6cm) x (6.6cm)

Specifications subject to change without notice.

500m SPECIFICATIONS

Continuous Power Rating (Competition Standard) measured at 12.6 battery Volts RMS continuous power, into a 4Ω load from 20-20,000Hz with less than 0.10% THD	**250 Watts**
RMS continuous power, into a 2Ω load from 20-20,000Hz with less than 0.15% THD	**500 Watts**
RMS continuous power bridged, (using 2 Punch 500m Power amplifiers in the same system) into a 4Ω load from 20-20,000Hz with less than 0.15% THD	**1000 Watts**
Signal-to-Noise Ratio:	>100dB (A-weighted)
Frequency Response:	20Hz-20,000Hz ±0.5dB
Bandwidth:	10Hz–250kHz ±3dB
Damping Factor:	@4Ω >200 at output connector
Slew Rate:	50V µs
IM Distortion (IHF):	<0.05%
Input Sensitivity:	150 mV to 3.0 V
Protection:	RTP/NOMAD - Internal analog-computer output protection circuitry limits power in case of overload. Thermal switch shuts down the amplifier in case of overheating.
B+ Fuse Size:	60 Amp or two 30 Amp
Fuse Type:	AGU / Maxi Fuse
Input Impedance:	20,000 Ohms
Crossover Alignment:	12dB/octave Butterworth with selectable high-pass, low-pass and full range via interchangeable XCards.
Factory Crossover Frequency:	100Hz
Factory Default Crossover Setting:	Full Range
Dimensions:	9-5/8"W x 13-5/8"L x 2-5/8"H (24.4cm) x (34.6cm) x (6.6cm)

Specifications subject to change without notice.

Warranty Information

Rockford Fosgate warrants all electronics to the original consumer/purchaser to be free from defects in materials or workmanship for a period of three (3) years. We will cover parts and labor provided the product was purchased from an Authorized Rockford Fosgate Dealer. This warranty does not apply to any product on which the seals and/or serial number have been broken, removed, tampered with, defaced or altered in any manner. This warranty only applies to the original consumer/purchaser and is not transferable.

Electronics found to be defective during the warranty period will be repaired or replaced at Rockford Fosgate's discretion. Repaired or replaced electronics will be covered by the balance of the original warranty period only. Rockford Fosgate shall not be responsible for any incidental or consequential damages resulting from a defect in electronics. Some states do not allow the exclusion or limitation of incidental or consequential damages, so the previous limitation may not be applicable.

The warranty does not cover any appearance item, any cost or expense related to the removal or reinstallation of the product, any accessory used in conjunction with the product, damage to the product resulting from alteration, accident, misuse or abuse, or improper installation. This warranty does not apply if the parts or labor, which would otherwise be provided without charge under this warranty, are obtained from any other source than Rockford Fosgate or an Authorized Rockford Fosgate Service Center.

This warranty is the only express warranty and does not create any implied warranties. Rockford Fosgate limits its obligations under any implied warranties under state laws to a period not to exceed the written warranty period. Some states do not allow limitation on how long an implied warranty lasts, so the above limitation may not apply. This warranty applies only to products sold in the United States of America or its possessions. For warranty outside the U.S.A., please contact the nearest Authorized Rockford Fosgate Dealer. This warranty gives the consumer specific legal rights, and the consumer may have other rights which vary from state to state.

A defective product must be shipped prepaid to the Authorized Rockford Fosgate Dealer from which the consumer purchased the product or to the Rockford Fosgate factory in Tempe, Arizona in the original factory carton or equivalent. Any shipping loss or damage will be borne by the consumer or the consumer's shipper. A consumer returning a product to the factory must call (800) 669-9899 for a Return Authorization Number. All shipments shall be clearly marked with the Return Authorization Number on the outside of the shipping carton.

Ship to:
Rockford Corporation
Warranty Repair Department
2055 E. 5th Street
Tempe, AZ 85281 U.S.A.
Return Authorization Number:_____

Rockford Fosgate
Rockford Corporation
546 South Rockford Drive
Tempe, Arizona 85281 U.S.A.
In U.S.A., (602) 967-3565
In Canada, call Korbon (905) 567-1929
In Europe, Fax (49) 4207-801250
In Japan, Fax (81) 559-79-1265

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