2X, 3X AND 5X

ELECTRONIC CROSSOVER

OWNER'S MANUAL

Rockford Fosgate

Dear Customer,

Congratulations on your purchase of the world's finest brand of car audio amplifiers. At Rockford Fosgate we are fanatics about 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.

Great product and competent installations are only a piece of the puzzle when it comes to your system. Make sure that your installer is using 100% authentic installation accessories from Connecting Punch in your installation. Connecting Punch has everything from RCA cables and speaker wire to Power line and battery connectors. Insist on it! After all, your new system deserves nothing but the best.

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

To get a free brochure on Rockford Fosgate products and Rockford accessories, in the U.S. call 602-967-3565 or FAX 602-967-8132. For all other countries, call +001-602-967-3565 or FAX +001-602-967-8132.

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 call.

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

PUNCH 2X/3X/5X PACKING LIST

Punch Electronic Crossover
Owner's Manual

INTRODUCTION

This manual provides information on the features, installation and operation of the Punch 2x, 3x and 5x Electronic Crossover. We suggest you save this manual for future reference.

We strongly recommend you have your Authorized Rockford Fosgate Dealer install your new active crossover. If you do choose to install the unit yourself, please be sure to read the entire manual before beginning your installation.

OPERATING FEATURES

The Punch 2x, 3x and 5x Electronic Crossovers provide for state-of-the-art flexibility and performance demanded by today's car audio enthusiasts. Features include:

XCards – 3-Way Selectable Electronic Crossover modules that feature 12dB per octave filters that give precise crossover points and allow for individual selection of high-pass, low-pass or full range filter operation.

Dual Filtered, Non-Faded Output with Phase Reversal Switch (3x and 5x only) allows you to create various pass band configurations. In addition, the phase reversal switch enables you to easily correct for phase problems that may be inherent in some system designs.

2 Channel Input on the Punch 2x

2 or 4-Channel Input Mode Switch (3x and 5x only) enables you to select two (2) or four (4) channels of input.

4 Outputs on the Punch 2x

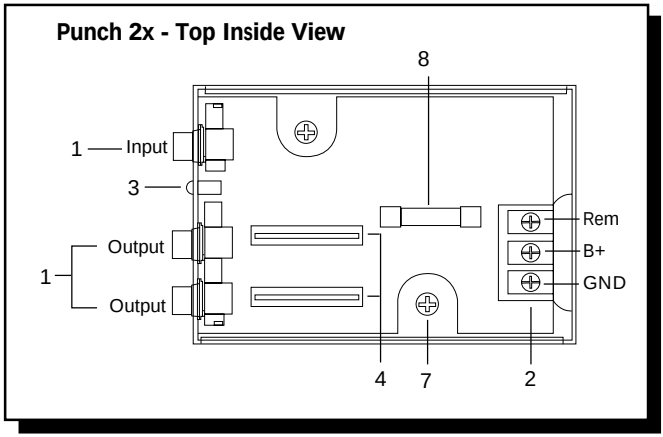
6 Outputs on the Punch 3x for Front, Rear and a Dual-Filtered, Non-Faded Output.

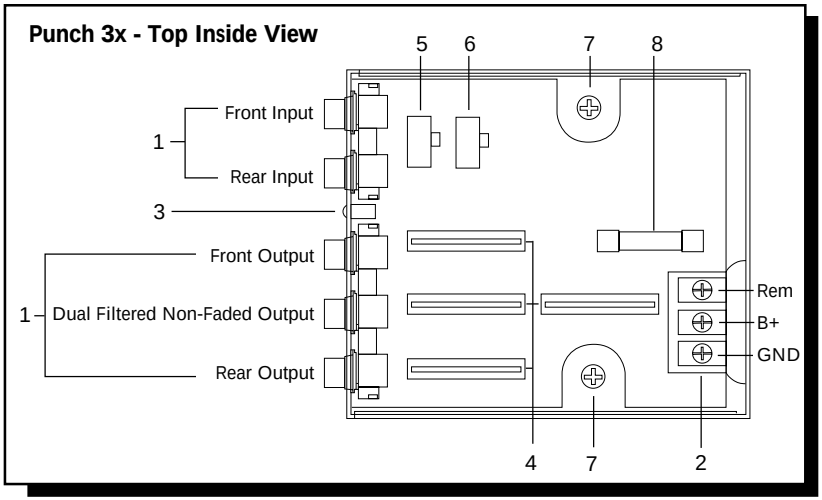
10 Outputs on the Punch 5x – In addition to the outputs found on the Punch 3x, the 5x also has Front and Rear Dual-Filtered Outputs for creating additional pass band filter combinations.

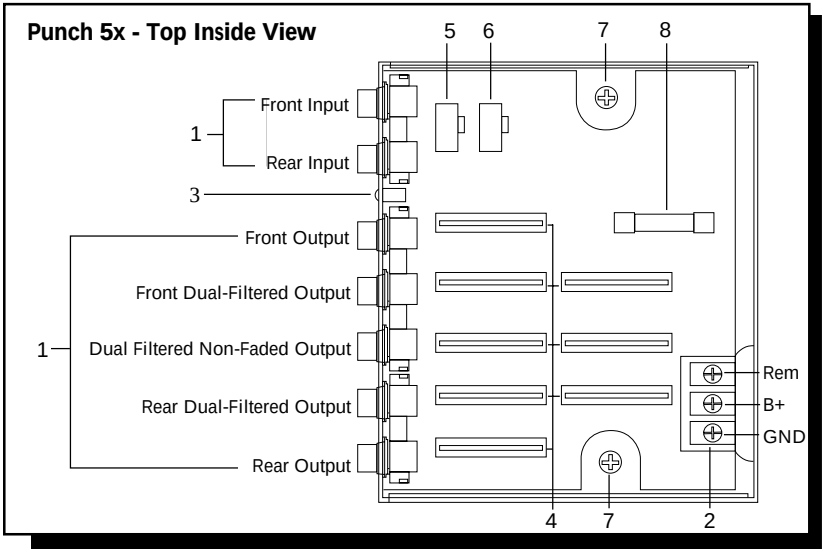
Gold Plated RCA Input and Output Jacks reduce corrosion which can cause signal deterioration over time.

REMOVING THE COVER

The design of the 2x, 3x and 5x allows the cover to be removed for access to the crossovers and ease of installation. The cover can be installed in either direction to match the rest of the system. The top end of the cover has two tabs which fit snugly into slots at either end of the base. Care must be taken not to bend the securing tabs when removing the top cover. A screw secures the cover. Remove this screw to release the cover for removal.







1. Gold Plated RCA Jacks

All input and output RCA jacks are gold plated. The gold plated finish resists tarnishing and corrosion from interfering with the signal quality.

2. Power Terminals

The B+, Rem and Gnd connections are made using gold plated screw terminals on the barrier strip. The gold plating resists tarnish and corrosion and maintains connection integrity. The terminals allow easy connection of the power wires through the use of forked lugs or bare wire up to 12 gauge. The barriers help prevent shorting from frayed wires.

3. LED Power Indicator

The LED, located by the input jacks, provides a visual indication of the status of the crossover, lighting when the unit is turned on.

4. XCards

Crossover filter functions are determined by the use of plug in cards. Each card can be configured for high-pass, low-pass and full range operation. Resistors on each module determine the operating frequency.

5. Input Mode Switch (3x and 5x only)

When the input mode switch is in the two channel position the front input jacks feed all the filters. When set to the four channel position, the front and rear input jacks feed the respective filters. Front and rear channels are summed for the non-faded filter.

6. Phase Switch (3x and 5x only)
The phase switch allows easy invertion polarity on the non-faded output to optimize sound quality.

7. Mounting Holes
The crossover must be mounted on a flat surface. Two mounting holes in the bottom are used to secure the crossover.

8. Fusing
The crossover has a 1/2 amp AGC fast blow power protection fuse. If it is necessary to replace the fuse, use only the same type and rating or the warranty may be voided.

INSTALLATION CONSIDERATIONS

This section focuses on some of the vehicle considerations for installing your new Punch Electronic Crossover. Checking your battery and current sound system, as well as pre-planning your system layout and best wiring routes will save installation time. When deciding how to lay out 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. Be sure to carefully read and understand the instructions before attempting to install the crossover.

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 electronic crossover in place.

4. Route all of the RCA cables close together and away from any high current wires. this will help reduce noise.

5. Use high quality connectors for a reliable installation and to minimize signal or power loss. See your Authorized Rockford Fosgate Dealer for wire enhancements.

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 for 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 fuse holder and fuse on the +12V power wire within 18" (45.7 cm) 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. Use of a continuity meter will confirm a proper ground.

MOUNTING AND WIRING THE ELECTRONIC CROSSOVERS

The information below describes the various considerations for mounting and connecting the active crossovers. For additional information see the wiring diagrams beginning on page 10.

We recommend mounting the crossover as close to the amplifier(s) as possible.

The **B+** (Power) supplies power to the unit. Connect this terminal to a constant +12 Volt power source by way of an in-line fuse.

The **GND** (Power Ground) grounds the unit. Connect this terminal to the chassis of the vehicle. When grounding the unit be sure to scrape all paint from the metal to ensure a clean electrical connection.

The **REM** (Remote Turn-On) turns on the unit by way of a +12 Volt supply source. Connect this terminal to the source unit's "Amplifier" or "Auto Antenna" lead, either of which will go to +12 volts whenever the source unit is on.

If your source unit does not have either a Remote or an Auto Antenna lead (or if the Auto Antenna goes down during tape operation), we recommend installing a switch to control the unit manually.

INPUT/OUTPUT LEVELS & CONNECTIONS

The Punch Electronic Crossovers are designed for preamp (input up to 2VRMS) levels. Net gain in the crossover is unity. (Output levels are equal to input levels.)

When connecting the input and output terminals be sure to use high quality shielded interconnecting RCA cables.

- Connect source unit's **OUTPUT** jacks to the desired crossover **INPUT** jacks.
- Connect the desired crossover's **OUTPUT** jacks to the Amplifier's **INPUT** jacks.

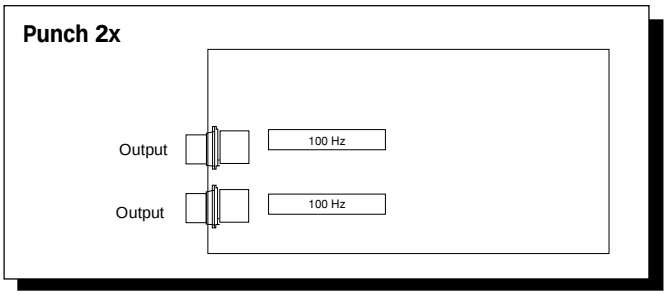
SELECTING THE XCARDS

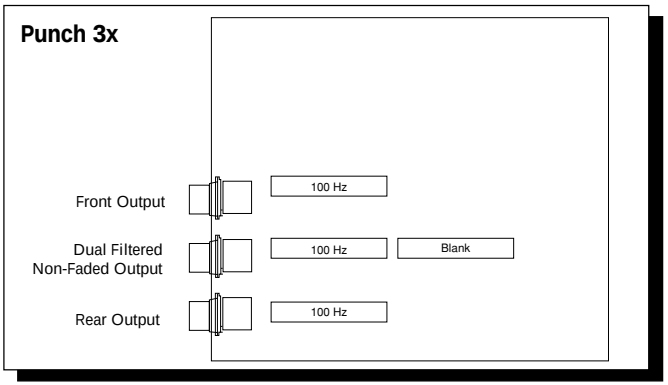
The Punch 2x is shipped with 100Hz cards. The 3x is shipped with 100Hz and blank programmable cards and the 5x is shipped with 100Hz, 6.5kHz and blank programmable cards. The following cards are available factory built from your Authorized Rockford Fosgate Dealer.

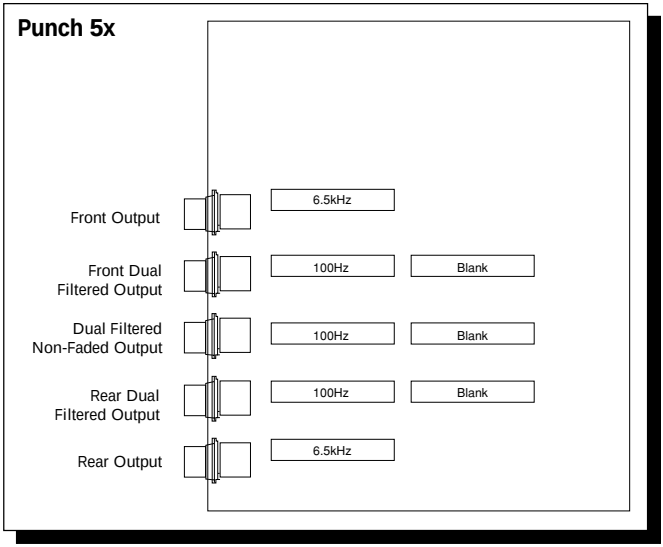
XM50	50Hz	XM275	275Hz
XM70	70Hz	XM400	400Hz
XM100	100Hz	XM4.5k	4.5kHz
XM150	150Hz	XM6.5k	6.5kHz
XM200	200Hz		

Each card can be used for high-pass, low-pass or full range operation. The mode of operation is determined by the orientation of the XCard in its socket. These same XCards are used in other Rockford Fosgate products.

The following illustrations show the XCards shipped in the Punch 2x, 3x and 5x. As configured, out of the box, each card is set for full range operation.







USING THE DUAL FILTER

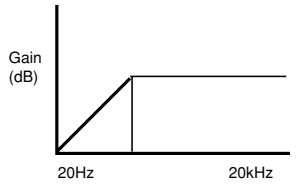
The Punch 3x and the Punch 5x both have Dual Filter sections. The Dual Filter is a two stage cascaded filter which uses two XCards. The first card determines the initial action and the second, the subsequent action. The most common usage would be to use a low-pass module in the first position followed by a high-pass module in the second to build a bandpass function. By using two cards of the same action at the same frequency, the filter slope is increased to 24dB per octave. Both sockets must be used for a simple 12dB per octave filter. Install the card in the second position for full range operation.

INSTALLING THE XCARDS

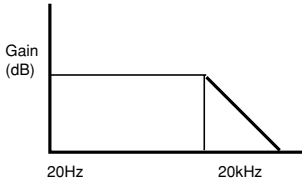
The operation of each filter section is determined by the use of plug in cards. These multifunctional cards are available for a multitude of operational frequencies, and their orientation in the socket determines their function. Each socket has a blank plastic side which positions the card against the spring loaded contacts. The front, or active, face of the card is marked with arrows to indicate which edge plugs into the socket. Orient the card with the chosen face toward the contacts and plug it into the socket of the appropriate filter operation. The rear face of the card is for full range operation and either edge can be used.

FILTER EFFECTS

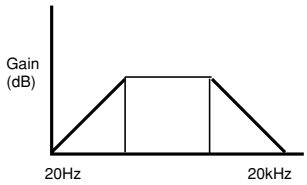
Example: The Punch 3x ships with three (3) 100Hz XCards set in the Full Range position. The crossover will pass through all 20Hz - 20kHz frequencies. The following diagram shows examples of the types of response curves when programming for a High-Pass, Low-Pass or Bandpass setting.



High-Pass Crossover Setting Response



Low-Pass Crossover Setting Response



Bandpass Crossover Setting Response
(3x and 5x only)

Note: The Punch 3x and 5x Dual-Filtered Output Channels contain a blank crossover card. As with the Front and Rear Outputs, the default positioning for these cards is set at Full Range.

2x Basic System

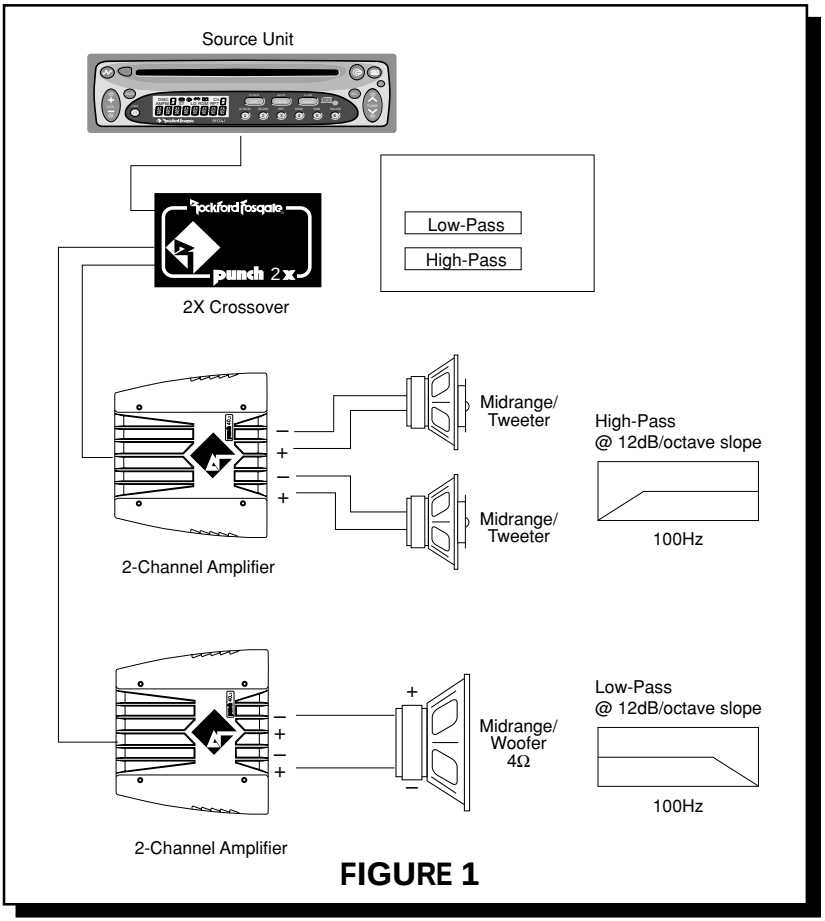


FIGURE 1

2x - 2 Way with Passive Crossovers

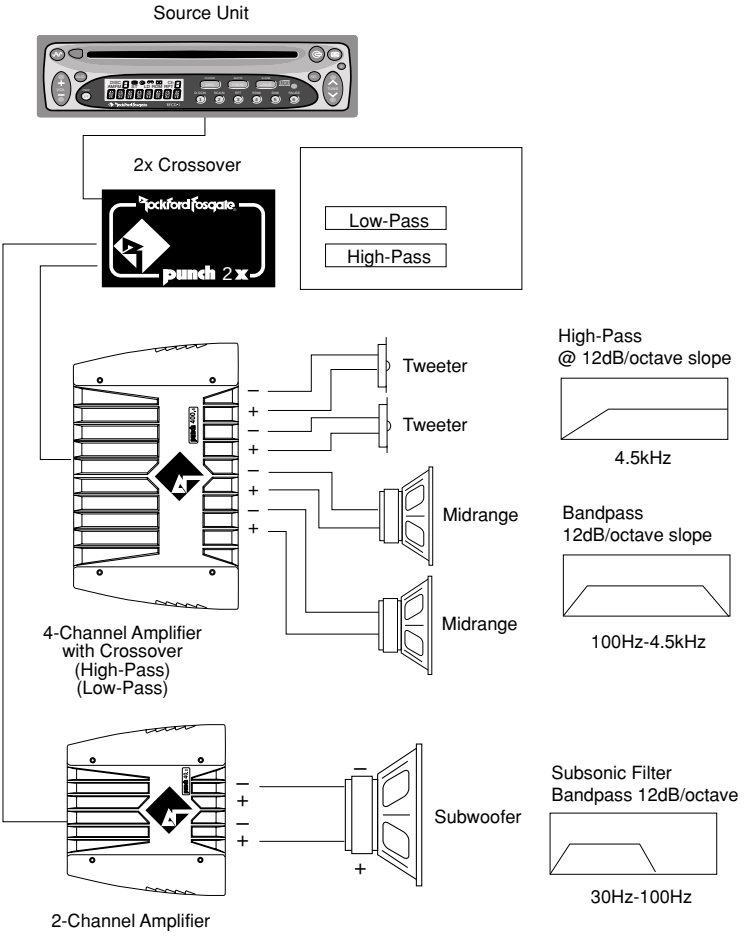
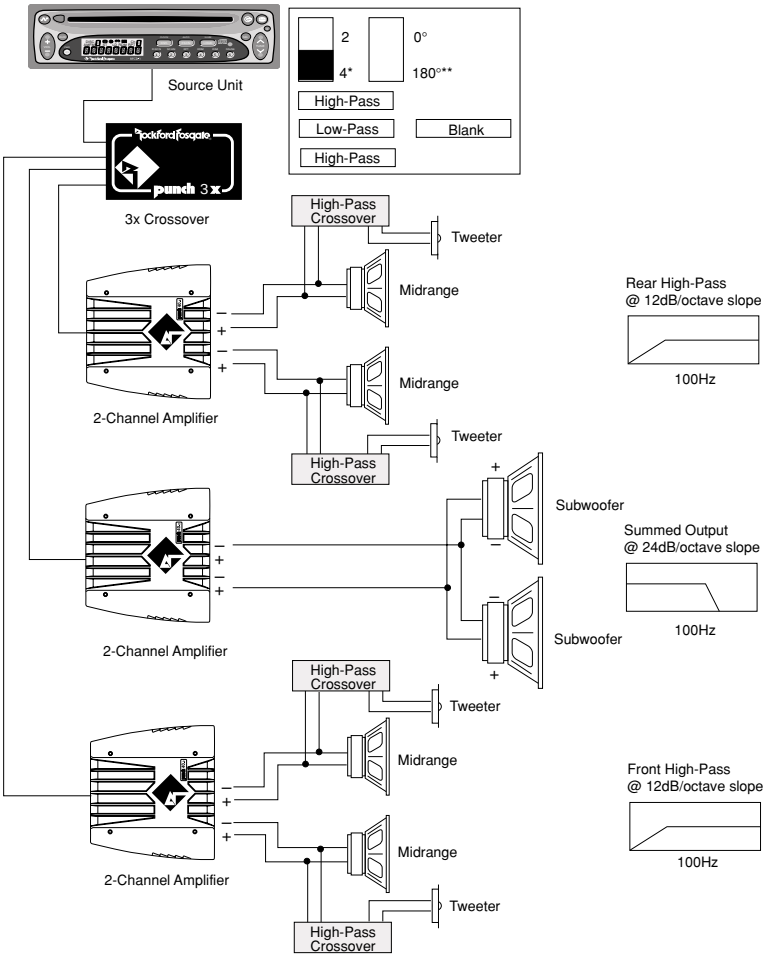


FIGURE 2

3x – 2-Way with Passive Crossovers

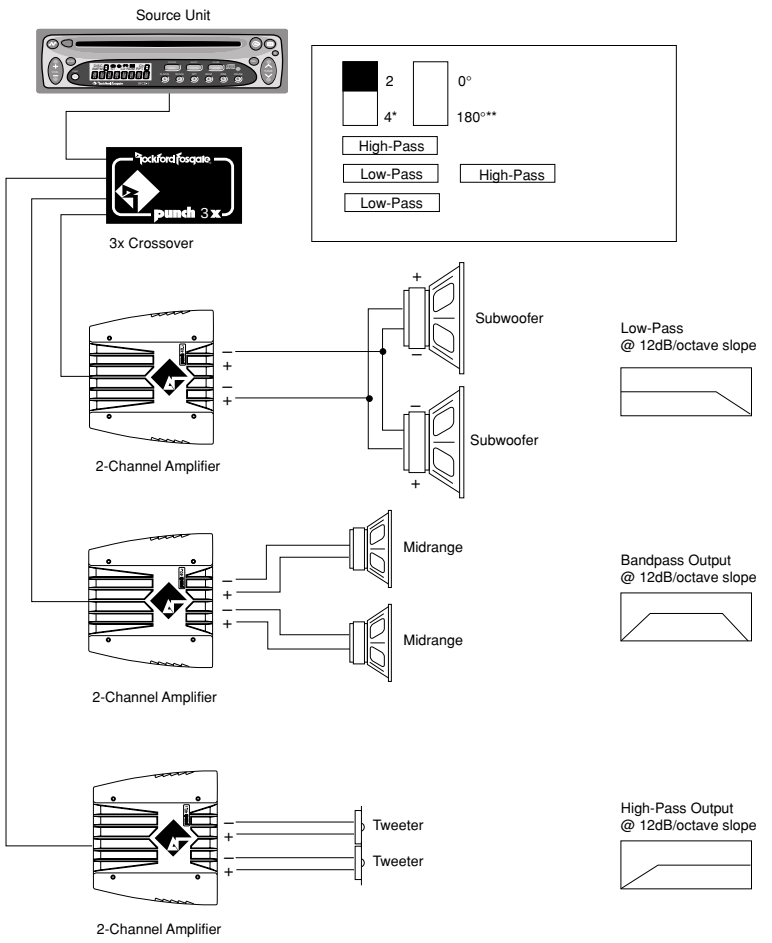


*2 or 4 Channel can be selected if user desires fader capability.

** Try Phase Switch for summed output and set to position that sounds best.

FIGURE 3

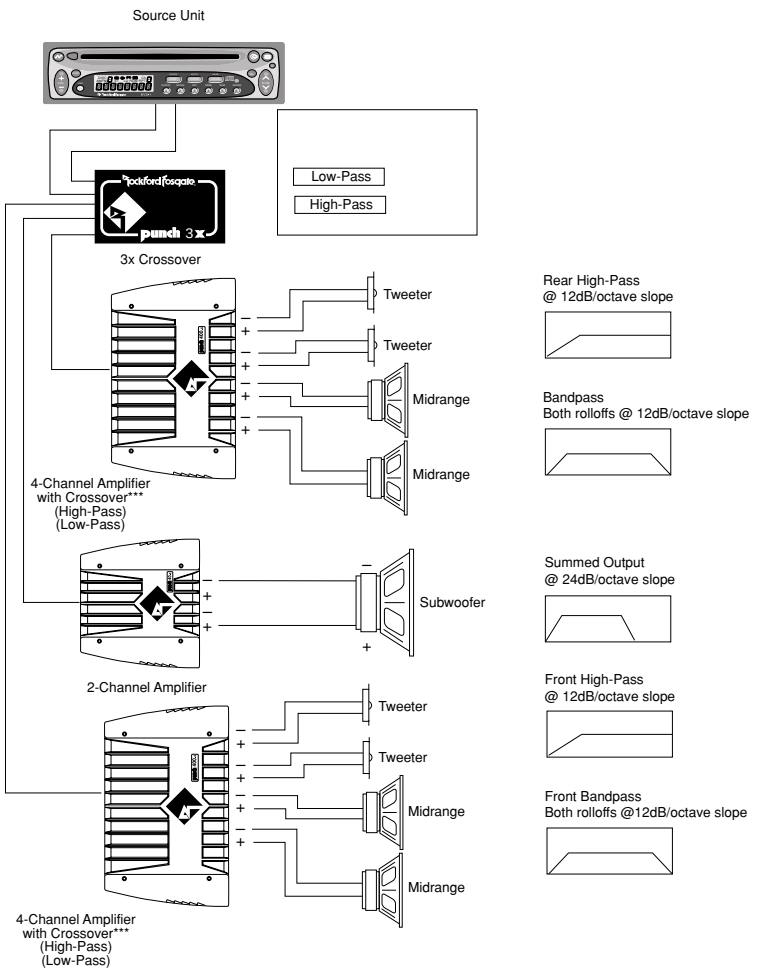
3x – 3-Way Basic System



* Try Phase Switch for summed output and set to position that sounds best.

FIGURE 4

3x – 2-Way with Amplifier's Active Crossover



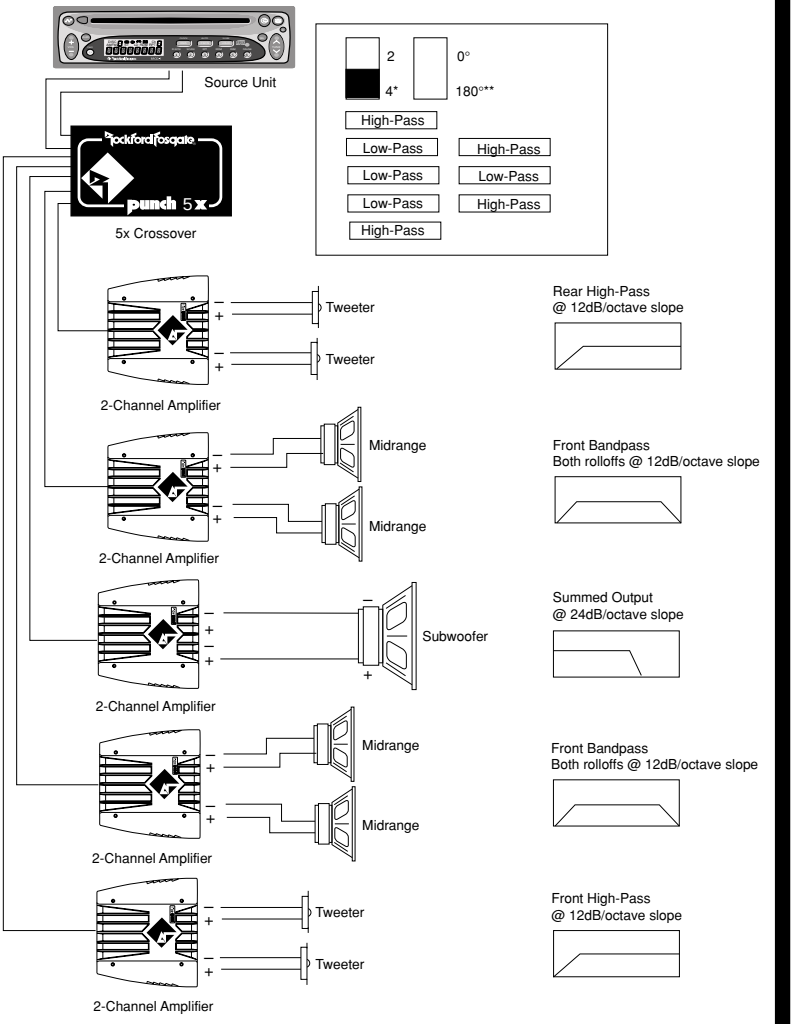
*2 or 4 Channel can be selected if user desires fader capability.

** Try Phase Switch for summed output and set to position that sounds best.

*** Additional filtering provided by internal crossovers in the amplifiers.

FIGURE 5

5x – Basic System

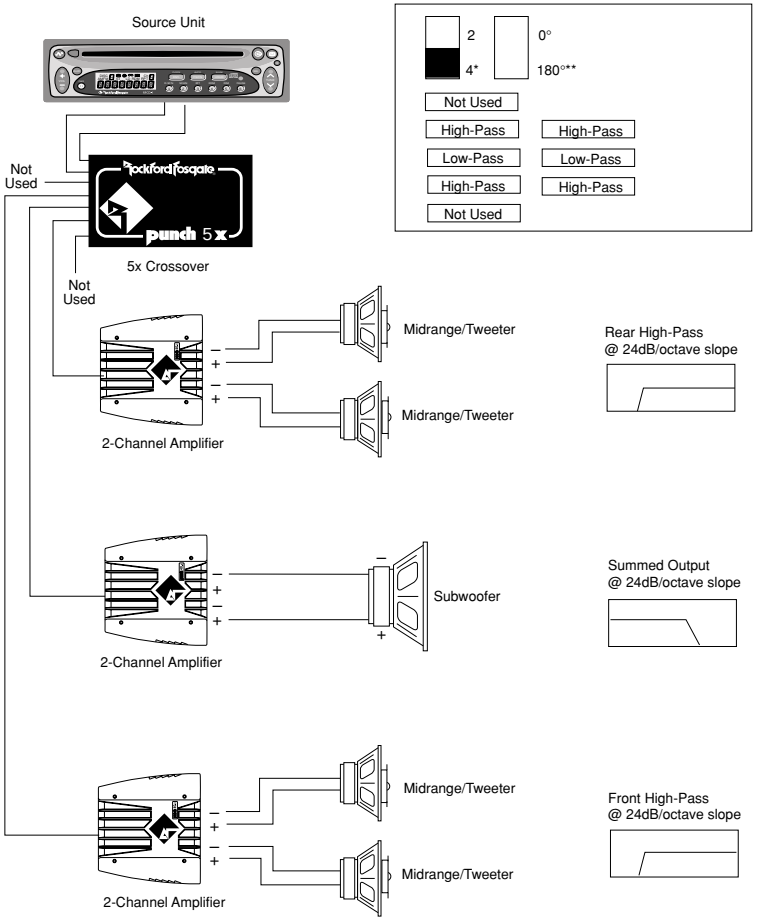


*2 or 4 Channel can be selected if user desires fader capability.

** Try Phase Switch for summed output and set to position that sounds best.

FIGURE 6

5x – 2-Way with 24dB Slopes

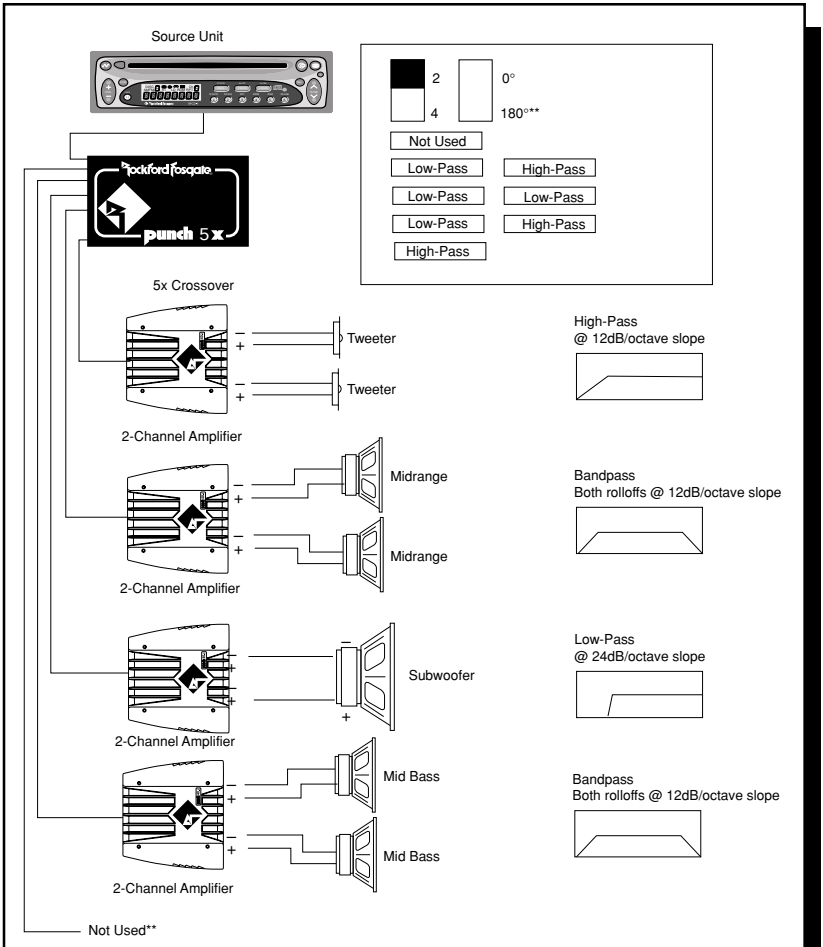


*2 or 4 Channel can be selected if user desires fader capability.

** Try Phase Switch for summed output and set to position that sounds best.

FIGURE 7

5x – 4-Way System



*2 or 4 Channel can be selected if user desires fader capability.

** Try Phase Switch for summed output and set to position that sounds best.

FIGURE 8

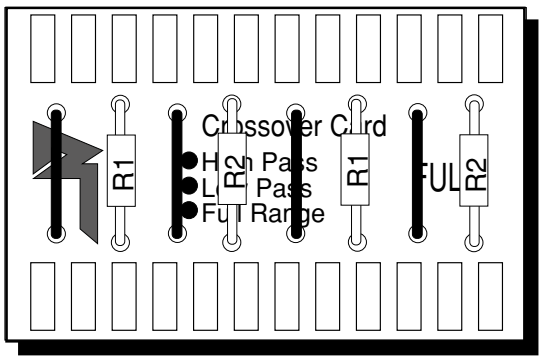
APPENDIX A
BUILDING A CUSTOM XCARD

The 3x and 5x both ship with blank cards which can be assembled to select any frequency you need for your system's design. Each card is built using 4 capacitors and 4 resistors, the value of the resistors determines the operating frequency. The custom cards are also available as model number XM00 from your Authorized Rockford Fosgate Dealer. The following section has instructions on assembling the card. The PC Board is fragile and extra care should be taken to avoid damage.

Items Needed:

1. Soldering Pencil
   40 to 60 Watt electronic soldering iron
2. 60/40 resin core solder
3. Solder Braid - to keep surface free of excess solder
4. Capacitors - Each card uses four .022µF capacitors. These should be metal film capacitors with a minimum rating of 16 volts.
5. Resistors - Each card uses four resistors. The resistance is determined by the operating frequency (refer to the following chart). These can be either 1/8 or 1/4 Watt, 1% or 5% tolerance.
6. Wire Cutters

Refer to the following illustration for component placement. Install the resistors, from the full range face, and fold the leads slightly toward the inside of the board to hold them in position. Solder the resistors in place and use the solder braid to remove any excess solder. Install the capacitors in the same manner. Trim the component leads. Examine the board carefully to ensure there is no solder splashed, paying particular attention to the contacts on each edge. Make sure that the leads do not interfere when plugging the card into the socket.



Electronic Crossover Field Programmable Card Resistor Chart

Butterworth Alignment

Use 5% resistors in conjunction with .022µF standard capacitor.

	Low-Pass		High-Pass	
Freq.	R1	R2	R1	R2
18.5Hz	390k Ohm	390k Ohm	390k Ohm	390k Ohm
26Hz	270k Ohm	270k Ohm	270k Ohm	270k Ohm
33Hz	220k Ohm	220k Ohm	220k Ohm	220k Ohm
40Hz	180k Ohm	180k Ohm	180k Ohm	180k Ohm
48Hz	150k Ohm	150k Ohm	150k Ohm	150k Ohm
60Hz	120k Ohm	120k Ohm	120k Ohm	120k Ohm
72Hz	100k Ohm	100k Ohm	100k Ohm	100k Ohm
88Hz	82k Ohm	82k Ohm	82k Ohm	82k Ohm
106Hz	68k Ohm	68k Ohm	68k Ohm	68k Ohm
130Hz	56k Ohm	56k Ohm	56k Ohm	56k Ohm
154Hz	47k Ohm	47k Ohm	47k Ohm	47k Ohm
185Hz	39k Ohm	39k Ohm	39k Ohm	39k Ohm
220Hz	33k Ohm	33k Ohm	33k Ohm	33k Ohm
270Hz	27k Ohm	27k Ohm	27k Ohm	27k Ohm
330Hz	22k Ohm	22k Ohm	22k Ohm	22k Ohm
400Hz	18k Ohm	18k Ohm	18k Ohm	18k Ohm
480Hz	15k Ohm	15k Ohm	15k Ohm	15k Ohm
600Hz	12k Ohm	12k Ohm	12k Ohm	12k Ohm
720Hz	10k Ohm	10k Ohm	10k Ohm	10k Ohm
880Hz	8.2k Ohm	8.2k Ohm	8.2k Ohm	8.2k Ohm
1.06kHz	6.8k Ohm	6.8k Ohm	6.8k Ohm	6.8k Ohm
1.3kHz	5.6k Ohm	5.6k Ohm	5.6k Ohm	5.6k Ohm
1.54kHz	4.7k Ohm	4.7k Ohm	4.7k Ohm	4.7k Ohm
1.85kHz	3.9k Ohm	3.9k Ohm	3.9k Ohm	3.9k Ohm
2.2kHz	3.3k Ohm	3.3k Ohm	3.3k Ohm	3.3k Ohm
2.7kHz	2.7k Ohm	2.7k Ohm	2.7k Ohm	2.7k Ohm
3.3kHz	2.2k Ohm	2.2k Ohm	2.2k Ohm	2.2k Ohm
4.0kHz	1.8k Ohm	1.8k Ohm	1.8k Ohm	1.8k Ohm
4.8kHz	1.5k Ohm	1.5k Ohm	1.5k Ohm	1.5k Ohm
6.0kHz	1.2k Ohm	1.2k Ohm	1.2k Ohm	1.2k Ohm
7.2kHz	1k Ohm	1k Ohm	1k Ohm	1k Ohm
8.8kHz	820 Ohm	820 Ohm	820 Ohm	820 Ohm
10.6kHz	680 Ohm	680 Ohm	680 Ohm	680 Ohm
13.0kHz	560 Ohm	560 Ohm	560 Ohm	560 Ohm
15.4kHz	470 Ohm	470 Ohm	470 Ohm	470 Ohm

SPECIFICATIONS

Maximum Input Level		2V RMS
Input Impedance		20,000Ω
Maximum Output Level		2V RMS
Output Impedance		500Ω
Frequency Response		20Hz to 20kHz
		+0dB –0.5dB
Signal-to-Noise Ratio		>105dB
Distortion		<0.02% THD + Noise
Channel Separation		>75dB
Dimensions	Punch 2x	4.8" x 2.9" x 1.8"
		12.19cm x 7.37cm x 4.57cm
	Punch 3x	4.8" x 4.1" x 1.8"
		12.19cm x 10.41cm x 4.57cm
	Punch 5x	4.8" x 5.55" x 1.8"
		12.19cm x 10.41cm x 4.57cm
Factory Equipped XCards		100Hz (2x/3x)
		100Hz & 6.5kHz (5x)
Crossover Slope		12dB per octave
Factory Supplied Alignment		Butterworth

Specifications subject to change.

WARRANTY INFORMATION

Rockford Corporation offers a limited warranty on Rockford Fosgate products on the following terms:

- **Length of Warranty**

3 years on electronics	90 days on electronic B-stock (receipt required)
2 years on source units	30 days on speaker B-stock (receipt required)

- **What is Covered**
  This warranty applies only to Rockford Fosgate products sold to consumers by Authorized Rockford Fosgate Dealers in the United States of America or its possessions. Product purchased by consumers from an Authorized Rockford Fosgate Dealer in another country are covered only by that country's Distributor and not by Rockford Corporation.

- **Who is Covered**
  This warranty covers only the original purchaser of Rockford product purchased from an Authorized Rockford Fosgate Dealer in the United States. In order to receive service, the purchaser must provide Rockford with a copy of the receipt stating the customer name, dealer name, product purchased and date of purchase.

- **Products found to be defective** during the warranty period will be repaired or replaced (with a product deemed to be equivalent) at Rockford's discretion.

- **What is Not Covered**
  1. Damage caused by accident, abuse, improper operations, water, theft
  2. Any cost or expense related to the removal or reinstallation of product
  3. Service performed by anyone other than Rockford or an Authorized Rockford Fosgate Service Center
  4. Any product which has had the serial number defaced, altered, or removed
  5. Subsequent damage to other components
  6. Any product purchased outside the U.S.
  7. Any product not purchased from an Authorized Rockford Fosgate Dealer

- **Limit on Implied Warranties**
  Any implied warranties including warranties of fitness for use and merchantability are limited in duration to the period of the express warranty set forth above. Some states do not allow limitations on the length of an implied warranty, so this limitation may not apply. No person is authorized to assume for Rockford Fosgate any other liability in connection with the sale of the product.

- **How to Obtain Service**
  Please call 1-800-669-9899 for Rockford Customer Service. You must obtain an RA# (Return Authorization number) to return any product to Rockford Fosgate. You are responsible for shipment of product to Rockford.

Ship to:
Electronics
Rockford Corporation
Warranty Repair Department
2055 E. 5th Street
Tempe, AZ 85281
RA#:_____

Ship to:
Speakers
Rockford Acoustic Design
(Receiving-speakers)
609 Myrtle N.W.
Grand Rapids, MI 49504
RA#:_____

NOTES

NOTES

Rockford Corporation
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In U.S.A., (602) 967-3565
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In Japan, Fax (81) 559-79-1265

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