

**DSM**  
**2-CHANNEL AMPLIFIER**  
**OWNER'S MANUAL**



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.**

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 become useful in recovering your amplifier if it is ever stolen and serve as verification of your factory warranty.

Serial Number: \_\_\_\_\_

Model Number: \_\_\_\_\_

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# SPECIFICATIONS

## PUNCH 40DSM    PUNCH 60DSM    PUNCH 100DSM    PUNCH 200DSM

Dynamic Power Rating (IHF-202 Standard) - Measured at 14.4 Volts<sup>1</sup>

Mono into a 4Ω Load	160 Watts	260 Watts	420 Watts	500 Watts
Per channel into a 2Ω Load	75 Watts	130 Watts	200 Watts	240 Watts
Per channel into a 4Ω Load	40 Watts	80 Watts	110 Watts	150 Watts

Continuous Power Rating (IASCA Standard) - Measured at 11.6 Battery Volts

RMS continuous power <b>per channel</b> , both channels driven into a 4Ω load from 20 to 20,000 Hz with less than 0.05% Total Harmonic Distortion (THD)	20 Watts	30 Watts	50 Watts	100 Watts (@ 11.9 Battery Volts)
---------------------------------------------------------------------------------------------------------------------------------------------------------	----------	----------	----------	----------------------------------

RMS continuous power <b>per channel</b> , both channels driven into a 2Ω load from 20 to 20,000 Hz, with less than 0.1% Total Harmonic Distortion (THD)	40 Watts	60 Watts	100 Watts	200 Watts (@ 11.9 Battery Volts)
---------------------------------------------------------------------------------------------------------------------------------------------------------	----------	----------	-----------	----------------------------------

RMS continuous power mono into a 4Ω load from 20 to 20,000 Hz, with less than 0.1% Total Harmonic Distortion (THD)	80 Watts	120 Watts	200 Watts	400 Watts (@ 11.9 Battery Volts)
--------------------------------------------------------------------------------------------------------------------	----------	-----------	-----------	----------------------------------

Signal-to-Noise Ratio Over 110dB A-weighted

<sup>1</sup>See Appendix A - Dynamic Power Measurements for information on these specifications.

**PUNCH 40DSM    PUNCH 60DSM    PUNCH 100DSM    PUNCH 200DSM**

Dimensions  
 9-5/8" (24.4cm) W    9-5/8" (24.4cm) W    9-5/8" (24.4cm) W    9-5/8" (24.4cm) W  
 9-5/8" (24.4cm) L    10-5/8" (27.0cm) L    11-5/8" (29.5cm) L    12-5/8" (32.0cm) L  
 2-5/8" ( 6.6cm) H    2-5/8" ( 6.6cm) H    2-5/8" ( 6.6cm) H    2-5/8" ( 6.6cm) H

Bandwidth  
 15Hz to 100kHz  $\pm$ 3dB

Damping Factor @ 4 $\Omega$   
 At output connector - Over 200

Frequency Response  
 20Hz to 20kHz  $\pm$ 1.0dB / 10Hz to 100kHz  $\pm$ 3dB

Slew Factor  
 Over 5

IM Distortion (IHF)  
 Less than 0.05%

Input Gain  
 Variable from 40dB to 14dB (250mV - 1 Volt)  
 25dB                      26.8dB                      29dB                      32dB

The above figures are factory preset and are correct for 500 mV rated source units.

Protection  
 Internal analog-computer output protection circuitry limits power in case of overload. Thermal switch shuts down the amplifier in case of overheating.

Battery Fusing Rates  
 (External to Amplifier)  
 Fuse Type                      20 Amps                      30 Amps                      40 Amps                      50 Amps  
 ATC                      ATC                      ATC                      AGU

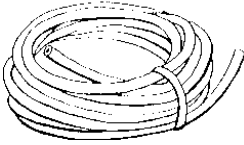
Equalization  
 Bass: +18dB Maximum at 45Hz  
 Treble: +12dB Maximum at 20kHz

Input Impedance  
 $\leq$  20k ohms

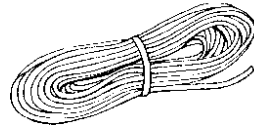
Specifications subject to change without notice.

# PUNCH ACCESSORY PACK

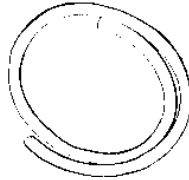
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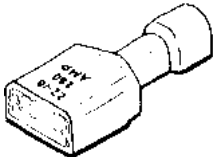
17'  
(518.16cm)  
Red Power  
Wire



12' (365.76cm)  
Blue Remote  
Turn-on Wire



1.5' (45.72cm) Black  
Grounding Wire



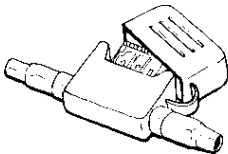
Remote Turn-on Wire  
Connector Plug



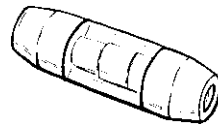
Power Ring  
Terminals



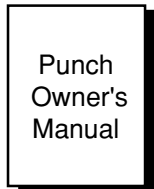
Hex Head and  
Mounting Screws



Power Fuse Holder  
with Fuse for Punch  
40, 60, and 100



Power Fuse Holder  
with fuse for Punch 200



# INTRODUCTION

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## Notes on Internal Circuitry

This manual provides information on the features, installation, and operation of the Punch 2-channel Amplifiers. We suggest you save this manual for future reference.

We strongly recommend you have your Authorized Rockford Fosgate Dealer and Service Center install the new Punch amplifier. If you do choose to install the amplifier yourself, please be sure to read the entire manual before beginning.

The Rockford Punch 40DSM, 60DSM, 100DSM and 200DSM automotive stereo power amplifiers provide state-of-the-art sound in cars, vans, boats, or wherever a high current 12 volt power source is available.

“Discrete Surface Mount” (DSM) technology is utilized in the crafting of all our Punch amplifiers. This process provides greater ruggedness and consistency of both components and layout. Already used heavily in aerospace, industrial and automotive applications, this technology is also highly advantageous in the hostile automotive environment.

The Punch adjustable input circuits are designed to match almost any music source. The amplifiers will drive most normal speaker types.

Internal circuitry in the Punch amplifier prevents damage due to speaker terminal shorts. The Punch incorporates internal battery line filtering and extensive noise prevention circuitry.

The Punch Equalization circuit is best utilized and designed to compensate for the acoustic inadequacies of the automotive environment. This patented circuitry will correct for the poor bass response and natural high frequency roll-off inherent in the world of automotive stereo. The result is full-range sound without the unpleasant changes in the mid-range sound produced by most tone control and equalizer circuits.

High powered audio amplifiers must always address the problem of power device reliability. In particular, load fault conditions can easily destroy an amplifier that is not carefully designed. Rockford Fosgate has answered this problem with the development of Real Time Power Protection (RTPP).

The RTPP circuits protect the Punch amplifiers by multiplying output device voltage and current values to obtain approximate instantaneous device power. This instantaneous power calculation is then processed through a time constant closely modeling the device heating time. If the resulting modeled junction temperature exceeds a set threshold, gate drive to the output devices is limited.

To get a better understanding of the Punch let's take a closer look.



## CONTROLS AND FEATURES

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This section describes the various controls and features of the Punch amplifiers.

### Top View of Amplifier and End Caps



#### **Punch Housing**

The cast aluminum heatsink of the Punch is designed for high performance cooling. The raised design of the housing allows cables and wires to run underneath the unit. This provides for greater wiring flexibility and protects the cables from damage caused by excessive heat and bending.

#### **End Caps**

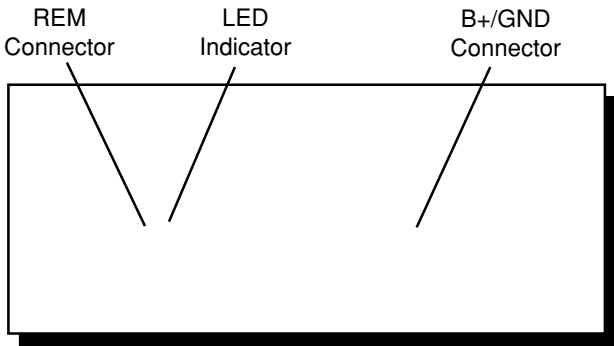
Interchangeable end caps conceal the wiring and input cables, giving the amplifier a clean, "stealth" look. Also incorporated, is a holding dimple built into the end cap. This small feature enables the cap to be held in place while being mounted.

The end caps are secured to the housing with flush mounting, captive screws.

#### **Mounting Screws**

Four (4) custom, round, hex screws included in the accessory pack hold the unit in place. These screws are covered when the end caps are installed.

## Front View of Power Side



### **REM Connector**

The Punch is turned on by connecting the blue remote turn-on wire to the source unit's "Accessory" or "Auto Antenna" lead, either of which will go to +12 volts when the source unit is turned on.

### **LED Power Indicator**

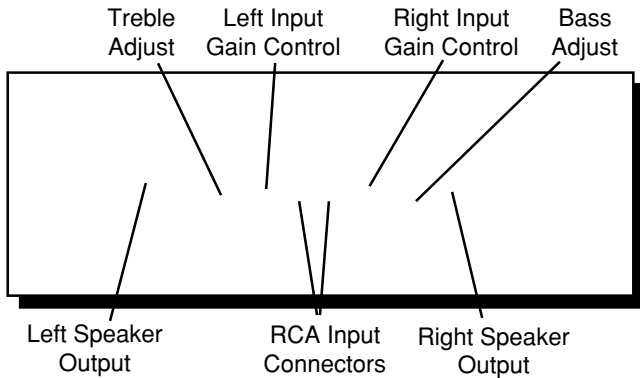
The LED illuminates red when the unit is turned on.

### **B+/GND Power Connector**

These connectors are used to supply power and ground to the amplifier and accept 12 AWG - 8 AWG wires.\*

\*Rockford Fosgate's Perfect Interface line of accessories includes high quality power and speaker wire, gold plated RCA interconnecting cable and other products to complete your installation. Ask your Authorized Rockford Fosgate Dealer about Perfect Interface.

## Front View of Input/Output Terminals



### Speaker Output Terminals

These gold plated terminal blocks connect the Right and Left channel outputs to the speakers and accept wire sizes from 8 gauge through 18 gauge. Gold plated connectors are immune to corrosion that can cause signal deterioration.

### Treble / Bass

These controls adjust the amount of treble and bass response desired. To increase the amount of response, turn the dials clockwise; to decrease, turn the dials counterclockwise.

### Input Gain Controls

These controls are factory preset to 500 millivolts to match most head units and are variable from 250 millivolts to one volt. (***More than likely they will not need adjusting.***)

If just a little volume from the source unit drives the amplifier into distortion, reduce the input gain controls so that the distortion doesn't start until the source volume is at about 3/4 of its rotation.

### Input Connectors

The amplifier's signal input, female, RCA jacks should be connected to the source unit's signal outputs with high-quality RCA cables. The connectors have been plated in gold to eliminate the possibility of corrosion that can cause signal deterioration.

# INSTALLATION CONSIDERATIONS

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This section focuses on some of the vehicle considerations for installing your new Punch amplifier. 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. Carefully read and understand the instructions before attempting to install the amplifier.
2. For easier assembly, we suggest you run all wires prior to mounting your amplifier in place.
3. Use only quality connectors for making connections. See your Authorized Rockford Fosgate Dealer for Perfect Interface wire enhancements.
4. **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.
5. **For safety**, disconnect the battery ground cable prior to connection of the amplifier.
6. Never run wires underneath the vehicle. The cleanest, safest wiring connections are made by running the wire under the carpet or behind the side panels. Never leave wires exposed.
7. Avoid running wires over or through sharp edges. Use grommets to protect wires routed through holes in metal.
8. **ALWAYS** protect the battery and electrical system from shorts with proper fusing. A fuse holder and fuse must be installed within 18" (45.72cm) of the battery terminal to safeguard from possible damage or injury.
9. When grounding scrape paint off metal to ensure a good, clean ground connection. Grounding connections should be as short as possible and always be

**Tools  
Needed**

connected to metal that is welded to the main body, or chassis, of the vehicle.

The following is a list of tools you will need for installing the Punch amplifier:

Allen Wrenches (7/64" & 3/32")

Wire Strippers

Battery Post Wrench

Electric Hand Drill with assorted bits

Voltmeter

Wire Crimpers (i.e., Perfect Interface RT-KT1)

## **BATTERY AND CHARGING**

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Punch amplifiers will naturally put an extra load on your battery and charging system. We recommend you check your alternator capacity to insure ample charging capability to handle the additional load of your new Punch equipment. Stock electrical systems in good condition should typically handle the extra load of any individual Punch unit without problems, although battery and alternator life may be slightly reduced. If problems arise, we suggest you use a heavy duty battery and a high output alternator.

## **MOUNTING AND LOCATION**

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**Trunk  
Mounting**

The mounting location and position of the Punch will have a great effect on its ability to dissipate the heat generated in normal operation. The Punch has a heatsink designed for heat dissipation and internal shutoff circuitry to avoid overheating, so it is reasonably tolerant of mounting variations. However, care should be taken to ensure adequate ventilation.

The temperature inside a trunk can reach as high as 175° F (80° C) during the summer months. Since the thermal shutoff point for the Punch is 195° F (90° C), it is easy to see that the amp must be mounted for maximum cooling capability. Mounting the amplifier on the floor of the trunk prevents sufficient convectional air flow cooling. Mounting the unit vertically on a surface with the fin grooves running up and down usually results in the best cooling.

## Passenger Compartment Mounting

Under the seat or floor mounting will work as long as there is a minimum of 1" (2.5cm) of air gap above the amplifier's heatsink.

Vertical mounting is still the best, and under dash mounting is satisfactory as well.

## WIRING THE PUNCH

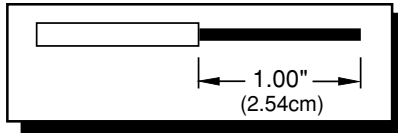
### Preparing Wires and Fuses

**Caution! Be sure to avoid running the power wires near the input cabling antenna, power leads, sensitive equipment or harnesses. The power wires carry substantial currents and can induce noise.**

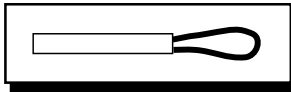
The following instructions explain how to prepare the wires for connecting the fuses and connectors. We suggest you perform these procedures prior to wiring and mounting your new Punch amplifier.

### Wiring the Fuse Holder

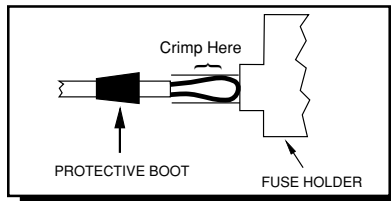
1. Cut approximately 18" (45.72cm) off the *red* power wire. Strip one end of the short piece of wire back 1" (2.54cm) as shown in the following diagram:



2. Double back the piece of bared wire 1/2" (1.27cm) as shown below.



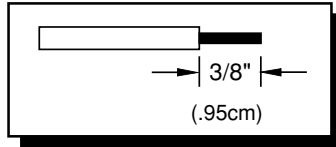
3. Insert the wire into one end of the fuse holder so that the insulation is just inside the crimp area as shown in the diagram. Crimp the wire in place with the notched portion of a crimping tool.



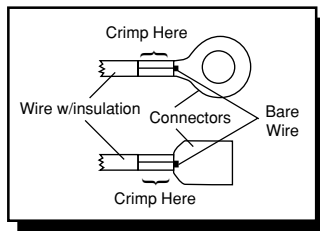
4. Cover the crimped area with the protective boot that is supplied with the fuse holder.
5. Repeat the above steps to connect the remainder of the red power wire to the other side of the fuse holder and route to the amplifier mounting location.

### Wiring the Power Connectors

1. Strip back approximately 3/8" (.95cm) of wire.



2. Insert the bared wire into the connector and crimp in place as shown in the following diagram.



### Power

The gold **B+** terminal must be connected *directly* to the positive (+) terminal of the battery with an appropriate size fuse. (See the Specifications Table for more information.) This provides a power source with a low voltage drop and low noise. **Be sure to use the supplied fuse and fuse holder within 18" (45.72cm) of the battery's positive terminal. Failure to do so may cause damage to the vehicle and the amplifier.**

If the power wire must be extended beyond 17' (518.16cm), we recommend you use 8 gauge, or heavier, stranded wire.

<b>Ground</b>	The <b>GND</b> terminal grounds the amplifier and is connected to the chassis of the vehicle with 12 gauge, or heavier, stranded wire. To prevent ground loops, we recommend you refrain from extending the ground wire beyond 18" (45.72cm) in any installation. The ends of the Power and Ground wires that are connected to the amplifier should be stripped back 5/8" (1.59cm).
<b>Remote Turn-on</b>	<p>The Punch amplifiers are turned on by supplying positive (+) 12 volts to the <b>REM</b> terminal. Usually the terminal is connected to the source unit's "Accessory" or "Auto Antenna" lead, either of which will go to +12 Volts when the source unit is turned on.</p> <p>Although the majority of high-quality automotive source units have an Accessory or Antenna output, there are many which require different turn-on methods. If the source unit has no Auto Antenna lead (or if the Auto Antenna goes down during tape operation):</p> <ol style="list-style-type: none"> <li>a. Find the internal switched power voltage inside the source unit and solder a lead to it. Run the lead out through the back of the unit (being sure to use a grommet for insulation from the case) and connect the Punch remote turn-on wire; or:</li> <li>b. Install a switch in the car with one terminal connected to +12 volts and the other to the Punch lead.</li> </ol>
<b>Input</b>	<p>The amplifier's signal input RCA jacks should be connected to the source unit's signal outputs with high-quality braided or double-shielded interconnecting RCA cables.</p> <p><b>Note: Be sure to route the Punch signal input cable away from the main power wire and the car's wiring harnesses to avoid noise coupling.</b></p>
<b>Speakers</b>	Punch amplifiers are rated for safe operation into loads of $2\Omega$ or greater in stereo mode or $4\Omega$ in bridged mono configurations. The primary loads on any amplifier come from directly connected speakers without using capacitors. The measured resistance for each side should not be less than $2\Omega$ .



## **Mono Configuration**

The Punch amplifiers are capable of bridged mono configurations. This configuration enables you to:

- Run a single woofer in a stereo system
- Run two bridged amplifiers as a high power stereo system
- Run one amplifier with a bridged mono woofer and another as a high-frequency stereo amp, etc.

For more information refer to the wiring diagrams beginning on page 17.

**Caution! Punch amplifiers are not recommended for impedance loads below  $2\Omega$  stereo or  $4\Omega$  bridged.**

**Be sure to observe proper speaker terminal polarity throughout the system. It is critical for the Punch to use the correct negative terminals for right and left channels, since the RIGHT NEGATIVE (–) terminal is the “hot” terminal for the right speaker. DO NOT chassis ground any of the speaker leads as unstable operation may result.**

When wiring speakers to the amplifiers, we recommend using fuses for speaker protection. (See your Authorized Rockford Fosgate Dealer for more information.)

## **Passive Crossover Impedance**

A passive crossover is a circuit that employs capacitors and/or coils and is placed on speaker leads between the amplifier and speaker to delegate frequencies in the speaker's optimum performance range.

The most commonly used filter networks are 6 dB per octave systems. These are easy to construct and require a minimum number of parts. A filter network can perform one of three functions. These are highpass (capacitors), lowpass (inductors, chokes or coils) and bandpass (combination of a capacitor and a coil).

This result, limiting the types of frequency to the speaker, is directly dependent upon the speaker's impedance and component values.

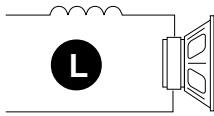
High and low pass filter sections have a cutoff rate that increases as the number of components in the filter increases. This means that a complex filter with a number of parts will stop the unwanted frequencies faster than a simple filter. The amount of reduction is measured in dB per octave. The most common filters used in speaker crossovers, as stated above, are 6 dB per octave which uses one component per filter. Placing this filter in series with the circuit will reduce power to the speaker by 6 dB every octave. When passive crossover components are used in multiple speaker systems, the crossover system's impedance must be considered along with the speaker's impedance when determining amplifier loading.

For 6 dB systems (where a single filter [highpass, lowpass or bandpass] is used in series) the net impedance of the system will be increased and problems are unlikely. For example, if you are using a  $4\Omega$  speaker at 100Hz with a 6 dB filter, the net impedance will be about  $5.6\Omega$ .

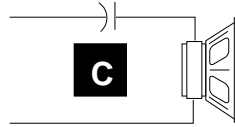
12 dB per octave systems (where two filters are used in a series for each speaker) can cause trouble. A 12 dB choke/capacitor pair forms a series-resonant circuit to ground. This impedance at resonance is determined by the speaker's dynamic independence. For example: if the speaker is open or disconnected, the crossover input impedance can approach ZERO at resonance resulting in A DIRECT SHORT!

Since speaker impedance varies considerably from rated values at various frequencies, it is common to find that "standardized" 12 dB per octave crossovers (which are designed for pure resistor loads) have serious impedance dips near their crossover frequencies, possibly causing overheating.

We recommend you use caution when using 12 dB per octave crossover systems unless they are specifically designed to have minimal impedance variations for the speakers in use.



6 dB/Octave Low Pass



6 dB/Octave High Pass

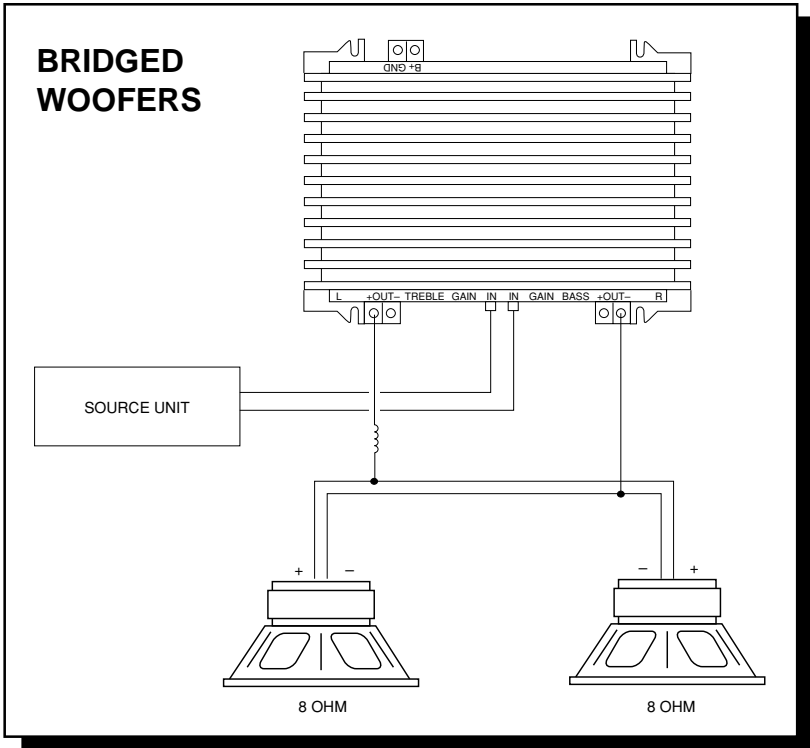
Freq. Hertz	Speaker Impedance					
	2 OHMS		4 OHMS		8 OHMS	
	L	C	L	C	L	C
80	4.1mH	1000μF	8.2mH	500μF	16mH	250μF
100	3.1mH	800μF	6.2mH	400μF	12mH	200μF
130	2.4mH	600μF	4.7mH	300μF	10mH	150μF
200	1.6mH	400μF	3.3mH	200μF	6.8mH	100μF
260	1.2mH	300μF	2.4mH	150μF	4.7mH	75μF
400	.8mH	200μF	1.6mH	100μF	3.3mH	50μF
600	.5mH	136μF	1.0mH	68μF	2.0mH	33μF
800	.41mH	100μF	.82mH	50μF	1.6mH	26μF
1000	.31mH	78μF	.62mH	39μF	1.2mH	20μF
1200	.25mH	66μF	.51mH	33μF	1.0mH	16μF
1800	.16mH	44μF	.33mH	22μF	.68mH	10μF
4000	.08mH	20μF	.16mH	10μF	.33mH	5μF
6000	51μH	14μF	.10mH	6.8μF	.20mH	3.3μF
9000	34μH	9.5μF	68μH	4.7μF	.15mH	2.2μF
12000	25μH	6.6μF	51μH	3.3μF	100μH	1.6μF

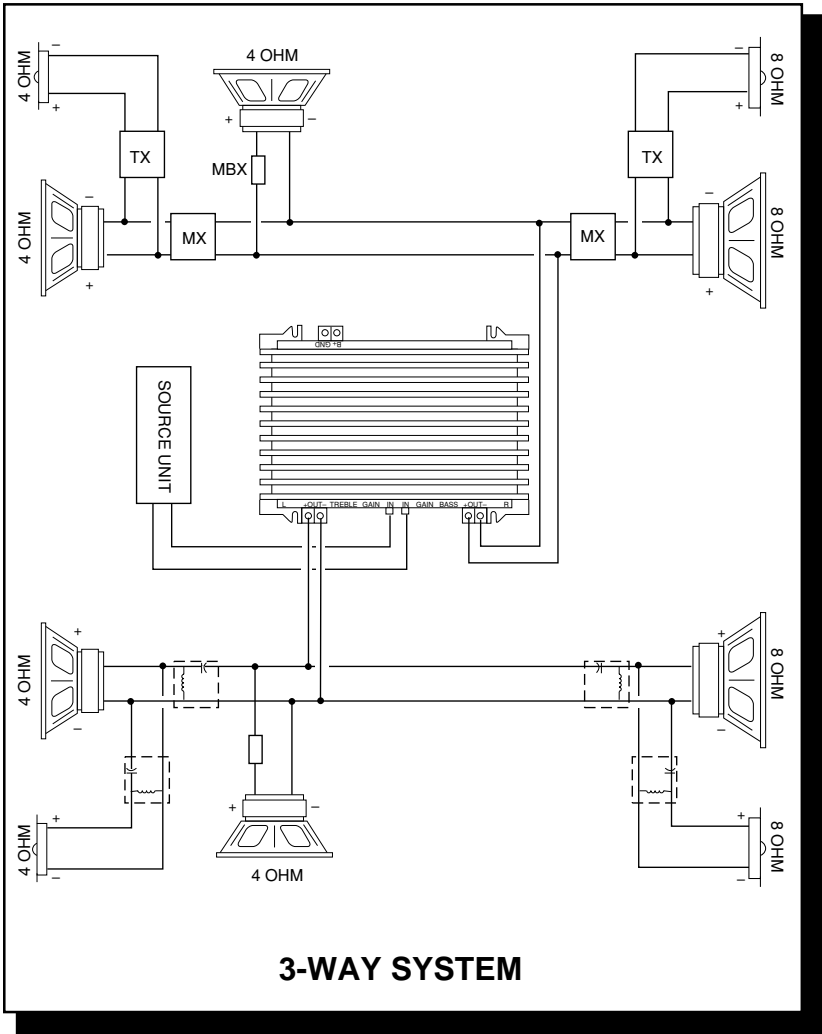
6 dB/Octave High and Low Pass Filters  
**Table of Component Values**

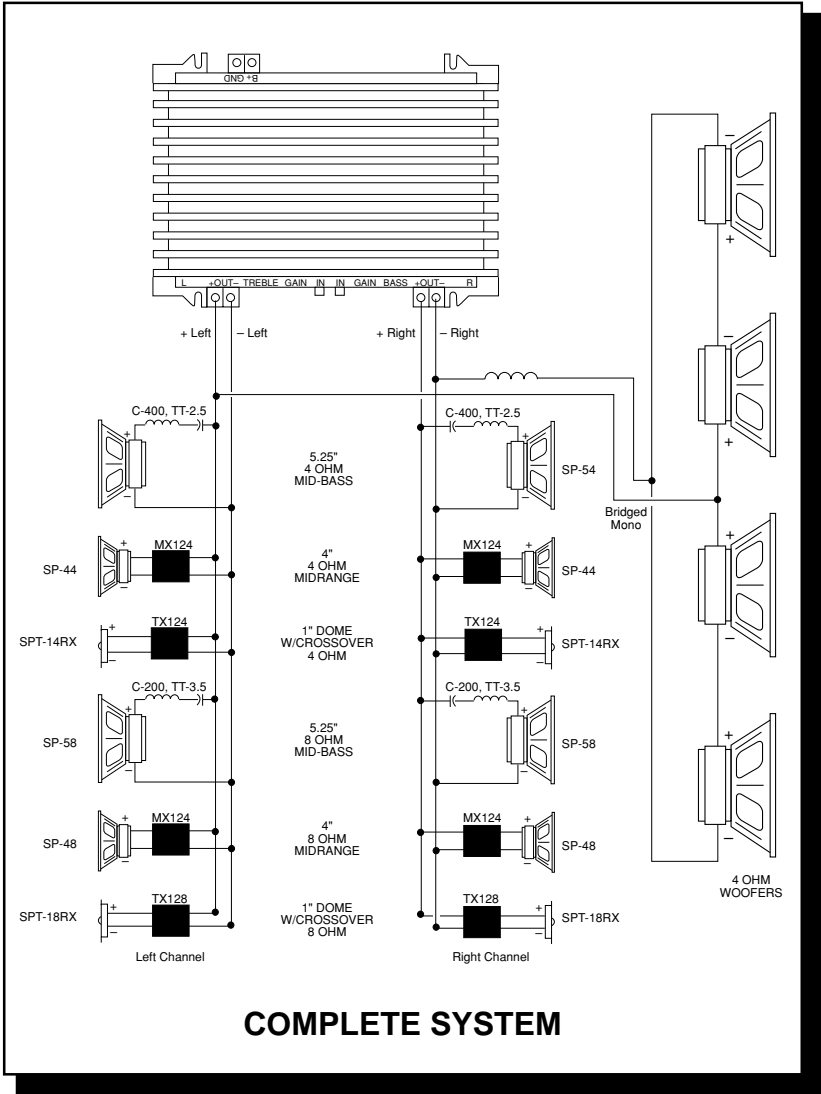
L = Low Pass (Inductor)  
 C = High Pass (Capacitor)

For more information, see your Authorized Rockford Fosgate Dealer.

# SAMPLE WIRING DIAGRAMS







# TROUBLESHOOTING

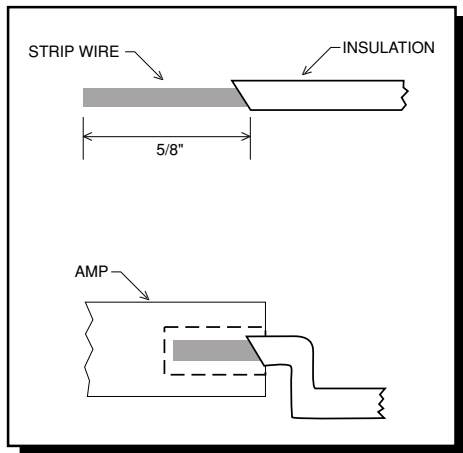
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## Problem

Connecting end caps when using large gauge wire.

## Solution

Cut the wire casing on the diagonal as shown in the following diagram. Insert the wire into the connector. Twist the wire around so that the long end of the insulation faces up. Bend the wire prior to tightening in place.



**Note:** For easier assembly, only 5/8" (1.89cm) of wire should be bared.

**Problem**

Amplifier will not play – Remote turn-on light is off.

**Solution**

1. Check the DC voltage at the amplifier's B+ terminal with a voltmeter. The voltage should measure between 11.5V - 15.5V.

If voltage is not found, check the battery, fuse, fuse housing and wire connections. Fix, repair, or replace accordingly.

2. Check the voltage at the amplifier's remote turn-on lead. The voltage should measure between 11V - 15V.

- a. If voltage is above or below the prescribed measurements, have the head unit checked by an Authorized Dealer or Service Center.

- b. If the remote turn-on current draw from the head unit is connected to multiple amps and/or electronics, the current draw may be too great. Check for proper connections. (Use a relay to suppress the excessive current draw.)

If you are still having problems, have the amplifier checked out by an Authorized Rockford Fosgate Dealer.

**Problem**

Amplifier will not play – Remote turn-on light is on:

**Solution**

1. Unplug the head unit and test the amplifier with another working source unit (i.e. bench-test radio, walkman, etc.) If the amplifier plays, check the in-dash leads for cuts, breaks and/or shorts.

2. Disconnect the existing speakers and connect a set of test speakers to the output of the amplifier (any type of speaker will do - i.e. simple home box type, bookshelf, raw speaker, etc.). If the amp plays, check for shorts or blown voice coils in the vehicle's speaker system.

If you are still having problems, have the amplifier checked out by an Authorized Rockford Fosgate Dealer.



**Problem**

Amplifier gets too hot.

**Solution**

1. Be sure the amplifier is properly mounted. You should be able to place your hand a few inches above the amplifier housing and feel the heat rising when the unit is on.
2. Be sure the amplifier is properly vented. An ideal situation is to have the air flow through the heatsink fins. Hot air rises, so mount the heatsink by aligning the fins vertically. This allows the air to flow freely, carrying away the heat. Check to see that the heatsink fins are free of any obstruction (i.e., carpet, seats, etc.).
3. Check to see that the impedance of the overall system is not less than  $2\Omega$  as described on page 14. Using an AC impedance meter (Perfect Interface IM-1), sweep from 20 Hz - 20 kHz, and look for dips below the  $2\Omega$  rating.

Be sure to test the bass region (20 Hz - 150 Hz) of your system. If the amplifier is bridged to those speakers, the load the amp sees is one-half (1/2) of the reading on the AC impedance meter.

If the impedance level is below  $2\Omega$ , check for bad speakers and/or crossovers, proper use of passive crossovers, or try rewiring the entire system.

**Problem**

Amplifier Noise (Turn-On Pop)

**Solution**

1. Disconnect the RCA plugs from the amplifier and recheck the amp by turning the unit on and off. If turn-on pop goes away, connect a delay turn-on module (Perfect Interface DT-1) to the amplifier. (See your Authorized Rockford Fosgate Dealer for more information.)
2. Disconnect the turn-on wire from the head unit and use a different 12 volt power source to turn on the amplifier (i.e. battery direct). If the noise is gone, use a relay to

switch from the clean power source.

### **Problem**

Engine Noise (Whine)

### **Solution**

1. Disconnect the speakers from the amplifier. Connect a test speaker to the amplifier output terminals. If the noise goes away, check your speaker leads, speakers and crossovers.
2. Use a "shorting plug" to mute the input signal at the amplifier. If the noise goes away:
  - a. Bypass all of the other equipment (i.e., crossovers and equalizers) and connect the head unit directly to the amp. If the noise disappears, reconnect the equipment, being sure to test for noise after each install. Logic indicates that the last unit installed is the culprit. Refer to the unit's owner's manual for more information.
  - b. Connect a new RCA line from the head unit to the amplifier. If there is no noise, replace the RCA cable.
  - c. Run the RCA cable on a different route.
  - d. Run a new RCA line from your head unit so there is only one grounding point. If the noise disappears, install the radio, using only one (1) grounding point. Isolate the radio chassis from the grounding on the dash, and use an antenna grounding loop isolator on the antenna.

If noise persists, see your Authorized Rockford Fosgate Dealer.

# DYNAMIC POWER MEASUREMENTS

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## About the Dynamic Power Measurements

The Audio Graph PowerCube is a test instrument used to measure the output of an amplifier in accordance with IHF-202 industry standards. The IHF-202 standard is a Dynamic power measurement and was developed as a means of measuring power in a manner that best represents the Real World operation of an amplifier. Many manufacturers, including Rockford Fosgate, at times will measure amplifier power into a fixed resistor (4 ohm, 2 ohm). While this method is useful in some types of evaluation and testing, it is not representative of an amplifier that is connected up to a speaker and playing music.

## Music

Music is dynamic; the sound waves are complex and constantly changing. In order to simulate this, the IHF-202 standard calls for the input signal to the amplifier to be a 1kHz burst tone. This signal is input (on) for a short period of time and then off for a "rested" period. The signal is gradually increased in level until the amplifier's output exceeds 1% Total Harmonic Distortion (THD). At 1% distortion becomes audible, therefore, any power produced above that level is considered *not usable*. Many manufacturers represent their amplifiers' output power in excess of 10% distortion. They use many names for this measurement, such as Total Maximum Power or Maximum Output Power. This is not indicative of the *actual usable output power*.

## Listening to Loudspeakers - Not Resistors

A loudspeaker is not a resistor. A resistor's value (resistance measured in ohms) is fixed. A loudspeaker's impedance is dynamic. It is constantly changing in value, dependent upon the frequency of the input signal. Therefore, measuring power with the amplifier loaded into a 4 ohm resistor is not the same as measuring power with the amplifier connected to a 4 ohm speaker. Most people do not listen to music through a resistor.

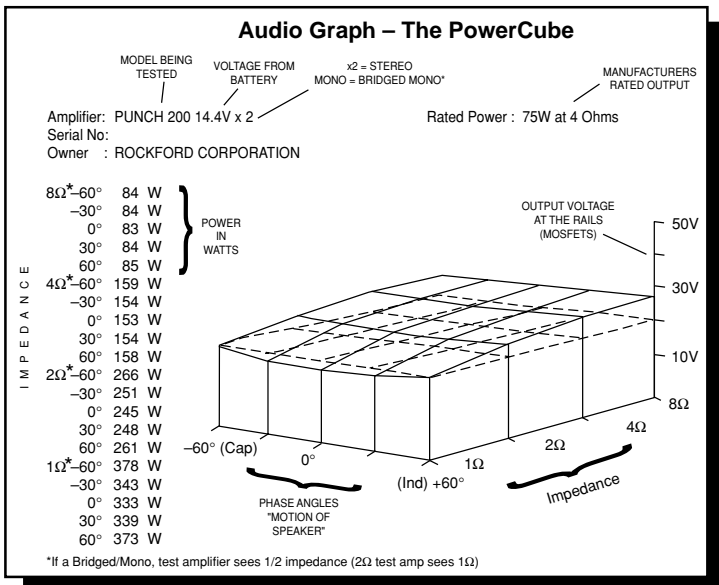
A 4 ohm speaker may experience a drop in impedance 4-6 times lower than its nominal (printed) impedance. A speaker will also create phase shifts in the signal that is passed through it. These phase shifts happen because a speaker is an inductor (voice coil) and a capacitor (compliance of the surround/spider), as well as a resistor (voice coil wire).

To simulate a speaker the Audio Graph PowerCube measures output power into 20 different loads. It tests at 8 ohms, 4 ohms, 2 ohms and 1 ohm. Each of these impedances is also tested at  $-60^\circ$ ,  $-30^\circ$ ,  $0^\circ$ ,  $+30^\circ$  and  $+60^\circ$  phase angles. These different impedances and phase angles represent the shifts in impedance and phase that can occur in a typical loudspeaker.

### Information Cubed

The data acquired in the testing procedure is then graphed in the form of a 3-dimensional cube. Hence the name **PowerCube**.

The *Phase Angle* is expressed on the horizontal axis, the *Output Voltage* is presented on the vertical axis and the *Impedance* is displayed on the Z axis. *Output Power*, in watts, is listed on the left hand side for each impedance at each phase angle.



## **What is an Amplifier?**

An amplifier by definition is a voltage generating device, recreating the signal which is input to it identically but with increased volume. It will be connected to a reactive load (the speaker). The impedance of this load and phase of the signal passing through the load will vary, dependent upon the frequency of the input signal (music).

Therefore, a perfect amplifier will be able to maintain the same output voltage regardless of load characteristics and will not alter the signal it is reproducing. A perfect amplifier when measured by the AudioGraph PowerCube would present data that forms a perfect cube. Unfortunately, amplifiers are not perfect. The laws of physics generally prevent it. A great amplifier is about the best one can hope to attain.

As you can see by the PowerCube and as you will experience by listening, your Punch amplifier is a GREAT AMPLIFIER!

# WARRANTY INFORMATION

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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 should 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**

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