

VR AMPLIFIERS

FEATURES

VR142 VR202 VR302 VR402 VR602 VR1202 VR354 VR404 VR804 VR401 VR705D

Class "AB" Technology
Fully 2 Ohm Stable Stereo Operation
Military Spec. Audiophile Grade Components
High Efficiency MOSFET Power Supplies
Multi-stranded power torroid
Efficient Bipolar Output Transistors
Oversized Capacitor Bank
Wire Free PC Board Layouts
Nickel Plated Input and Output Connectors
Variable Highpass and Lowpass Electronic Crossovers
Simultaneous Mono/Stereo Operation Capability
Internally Bridgeable
5 Way Protection Circuitry
Soft Start, On/Off Circuitry
High Level Inputs

VR300D VR600D VR1000D VR2000D VR705D

Class "D" Technology
Military Spec Audiophile Grade Components
High Efficiency PWM Power Supply
-Multi-stranded power torroid
-Oversized torroidal core
MOSFET Input and Output Transistors
Oversized Capacitor Banks
Discrete Mount Power and Speaker Terminals
Variable Lowpass Electronic Crossover
Variable Subsonic Filter
RCA Preamp Output
-Variable HP/LP/Full crossover
Built in Bridging Module (600D,1000D)
-Master / Slave Selector
-0/180 Phase Selector
5 Way Protection Circuitry
Soft Remote On/Off Circuitry
Remote Subwoofer Level Control

SPECIFICATIONS

MODEL:	VR142	VR202	VR302	VR402	VR602	VR1202	VR354	VR404	VR804	VR401	VR300D	VR600D	VR1000D	VR2000D	VR705D
POWER/4 ohm	35 x 2	50 x 2	75 x 2	100 x 2	150 x 2	300 x 2	35 x 4	50 x 4	100 x 4	200 x 1	150 x 1	150 x 1	250 x 1	1000 x 1	50 x 4/150 x 1
POWER/2 ohm	70 x 2	100 x 2	150 x 2	200 x 2	300 x 2	600 x 2	70 x 4	100 x 4	200 x 4	400 x 1	300 x 1	300 x 1	500 x 1	2000 x 1	100 x 4/300 x 1
POWER/1 ohm	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	600 x 1	1000 x 1	N/A	N/A
BRIDGED/4 ohm	140 x 1	200 x 2	300 x 2	400 x 1	600 x 1	1200 x 1	140 x 2	200 x 2	400 x 2	N/A	N/A	N/A	N/A	200 x 2/150 x 1	
T.H.D.	0.02%	0.02%	0.02%	0.02%	0.02%	0.02%	0.02%	0.02%	0.02%	0.02%	***	***	***	***	0.02%
Bandwidth + 3dB	5-38KHz	5-38KHz	5-38KHz	5-38KHz	5-38KHz	5-38KHz	5-38KHz	5-38KHz	5-38KHz	5-38KHz	5-250Hz	5-250Hz	5-250Hz	5-250Hz	5-38KHz/5-250Hz
Signal To Noise	>93dB	>95dB	>97dB	>97dB	>100dB	>100dB	>95dB	>95dB	>95dB	>94dB	>90dB	>90dB	>90dB	>90dB	>95dB
Damping Factor	>150	>200	>200	>200	>300	>200	>150	>150	>150	>310	>200	>200	>200	>200	>250
Separation	60dB	60dB	62dB	62dB	68dB	68dB	61dB	61dB	61dB	N/A	N/A	N/A	N/A	N/A	60dB
Input Sensitivity	150mV-3.2V	150mV-3.2V	150mV-3.2V	150mV-3.2V	150mV-3.2V	150mV-3.2V	150mV-3.2V	150mV-3.2V	150mV-3.2V	150mV-3.2V	240mV-6V	240mV-6V	240mV-6V	240mV-6V	150mV-3.2V
Input Impedance	20Kohm	20Kohm	20Kohm	20Kohm	20Kohm	20Kohm	20Kohm	20Kohm	20Kohm	20Kohm	20Kohm	20Kohm	20Kohm	20Kohm	20Kohm
Power Fuse	20 Amp	25 Amp	30 Amp	(2)25 Amp	(2)30 Amp	N/A	25 Amp	(2)20 Amp	N/A	(2)25 Amp	N/A	N/A	N/A	N/A	N/A
Dimensions W:	9.3 IN	9.3 IN	9.3 IN	9.3 IN	9.3 IN	9.3 IN	9.3 IN	9.3 IN	9.3 IN	9.3 IN	9.3 IN	9.3 IN	9.3 IN	9.3 IN	9.3 IN
H:	2.1 IN	2.1 IN	2.1 IN	2.1 IN	2.1 IN	2.1 IN	2.1 IN	2.1 IN	2.1 IN	2.1 IN	2.1 IN	2.1 IN	2.1 IN	2.1 IN	2.1 IN
L:	8.5 IN	10.5 IN	11.5 IN	13 IN	15 IN	22 IN	12 IN	14 IN	17.6 IN	13 IN	9.5 IN	11.5 IN	14 IN	22 IN	17.6 IN

CROSSOVER: * Selectable ON/OFF crossover-fully variable 50-150Hz HP/LP

Variable Low Pass	50-150Hz	50-150Hz	50-150Hz	50-150Hz	50-150Hz	50-150Hz	50-150Hz	50-150Hz	50-150Hz	50-150Hz	50-150Hz	50-250Hz	50-250Hz	50-250Hz	50-250Hz	50-250Hz
Variable High Pass	50-150Hz	50-150Hz	50-150Hz	50-150Hz	50-150Hz	50-150Hz	50-150Hz	50-150Hz	50-150Hz	50-150Hz	N/A	N/A	N/A	N/A	50-250Hz	
X-Over Slope	12dB	12dB	12dB	12dB	12dB	12dB	12dB	12dB	12dB	12dB	12dB	12dB	12dB	12dB	12dB	
45hz BOOST	YES	YES	YES	YES	YES	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	
Sub-Sonic Filter	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	20-50Hz	20-50Hz	20-50Hz	20-50Hz	
High Level Input	YES	[YES]	YES	NO	NO	NO	YES	YES	YES	YES	YES	YES	YES	NO	NO	
Pass-Thru Output	NO	NO	NO	NO	NO	NO	NO	NO	NO	YES*	YES*	YES*	YES*	YES*	NO	

*** T.H.D. levels vary depending on impedance load. Please see chart below. All specifications are with 12.5 volts DC. Typical output with 14.4 volts DC is approximately 20% higher.

T.H.D. LEVEL @ 4 OHM											@ .08%	@ .08%	@ .08%	@ .08%
T.H.D. LEVEL @ 2 OHM											@ .40%	@ .40%	@ .40%	@ .40%
T.H.D. LEVEL @ 1 OHM											N/A	@ 1%	@ 1%	N/A

IMPORTANT

Please read all instructions before installation!

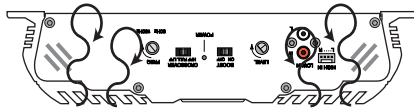
The quality of installation may affect the performance and reliability of your Crossfire product. If you have any doubts or questions regarding installation, you may wish to contact your authorized Crossfire dealer. Remember to follow all wire and fuse requirements suggested in this manual. Warranty may void if proper installation technique is not used (refer to warranty section in the rear of this manual).

MOUNTING

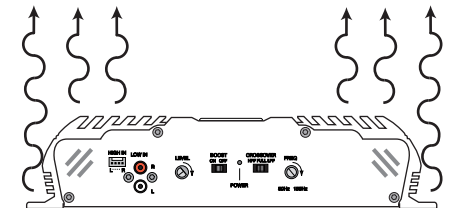
Appropriate mounting is very important for prolonged life expectancy of any amplifier. Select a location of applicable space that allows sufficient airflow and provides protection from moisture. Keep in mind that an amplifier should never be mounted upside down. Upside down mounting will compromise heat dissipation through the heatsink and will engage the thermal protection circuit much sooner. Excessive heat can shorten your amplifier's life. To maximize heat dissipation, be sure to leave at least 2.5 inches of clearance around the amplifier. Fans should be used in correspondence with an escape duct for heat when mounting the amplifier in an enclosed or restricted area.

Avoid slipping and scratching your new Crossfire amplifier by pre-drilling the mounting holes with either a 1/8" or 3mm diameter drill bit when using the screws supplied in the accessory kit. Always investigate the mounting area thoroughly for electrical wires, vacuum lines, and brake or fuel lines before you start to prevent any

X Incorrect Mounting
Heat is trapped inside the amplifier, shortening the life of the electronic components.



O Correct Mounting
Heat is lifted from the amplifier heatsink.



Power Connections

All Crossfire amplifiers are designed to work within 10.5 to 16 volts DC. Therefore, as a precaution, the vehicle's electrical system should be checked for correct voltage supply with the help of a voltmeter. First, connect the test leads of the voltmeter to the battery terminals with the ignition of the vehicle in the off position. The voltmeter should read no less than 12 volts. Next, check voltage of the battery with the engine running between 1500 and 2000 rpms. The voltmeter should now read between 13.5 and 14.5 volts. If your vehicle's electrical system is not up to these specifications, we recommend having it checked by an automotive mechanic before you further the installation.

POWER WIRE AND FUSE

The proper wire size is very important for an amplifier capable of these power levels. The following are the minimum recommended fuse values and wire gauge for lengths up to 20ft.

MODEL:□	WIRE AWG□	FUSE□	MODEL:□	WIRE AWG□	FUSE
VR142□	10□	20□	VR804□	4□	100
VR202□	10□	25□	VR401□	8□	50
VR302□	10□	30□	VR705D□	4□	100
VR402□	8□	40□	VR300D□	8□	40
VR602□	8□	60□	VR600D□	8□	60
VR1202□	4 x 2□	170□	VR1000D□	4□	120
VR354□	10□	25□	VR2000D□	4 x 2 □	240
VR404□	8□	40			

POWER

Power wires need to be connected directly to the battery using the wire requirements listed above. Never use the fuse box or any other wire as a source for the power for an amplifier. Before you start, choose the easiest and safest path to run the wire from the battery to the amplifier. Generally, try to keep the power wire on the driver's side of the vehicle (See Signal Inputs & Outputs for explanation). Follow the rules below for running the power cable through the vehicle:

1. Use grommets when passing the power wire through any metal wall of the vehicle.
2. Avoid sharp corners or sharp body parts that may easily cut through the insulation on the wire.
3. Avoid running the power wire over engine components and near heater cores.
4. Avoid the gas, brake and clutch pedals and their mechanisms.
5. Use an inline fuse at the battery to eliminate the risk of a fire caused by a short in your power wire.
6. Connect the fuse holder as close to the battery positive terminal as possible.

GROUND

The wire used for ground should be of the same gauge as the power wire. Make sure to choose a different color (generally black) so that you do not reverse the polarity at the amplifier terminals. Follow the rules below for connecting the ground wire properly:

1. Avoid using seat bolts, seatbelt bolts, and fender wells for ground.
2. Choose a metal area close to the amplifier that appears to be a good source of ground, such as the floor.
3. Investigate the area you wish to use for electrical wires, vacuum lines, and brake or fuel lines.

Directions for connecting the ground wire to the vehicle:

1. Find a nut and bolt to fit the ring terminal you have chosen.
2. Drill a hole just large enough for the bolt to fit through at the source of ground.
3. Use either a wire brush or sandpaper to eliminate unwanted paint around the hole you have drilled, doing so will supply a better contact for your ground.
4. Terminate the ground wire to the ring terminal and attach it to the bare metal using the nut and bolt. It is very important for this connection to be solid.
5. Spread silicon over the screw and bare metal to prevent rust and possible water leaks.

REMOTE TURN-ON

Between the power and ground of the amplifier is a remote turn-on terminal. This terminal must be connected to a switched +12 volt source to make the amplifier operational. Typically, remote turn-on leads are provided at the head unit that will turn on and off the amplifier in correspondence with the source. This means you will most likely have to remove the head unit from the dash to find the source +12V output wire.

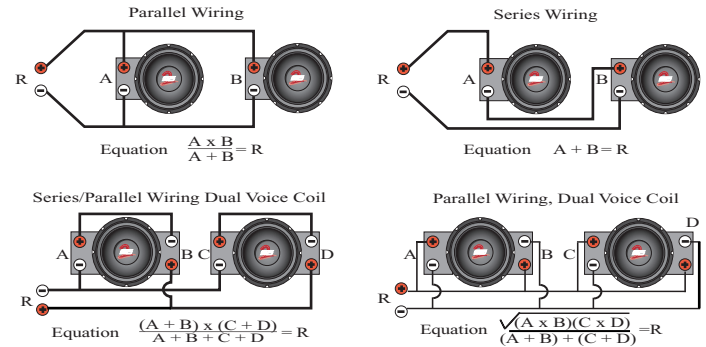
Once the head unit is pulled from the dash, find the remote turn-on located in the wiring harness of the head unit. The majority of vehicles will be using an after market head unit when installing an after market amplifier. These after market head units generally use a blue or blue/white colored wire as the remote turn-on lead. In most cases the blue/white lead is usually the remote turn on lead. However, when using a factory radio, the power antenna wire may be used as a turn-on lead. You must first test this lead to make sure that it remains energized regardless of the source the head unit is switched to. The antenna lead will energize when switched to the tuner mode, but turn off when the unit is switched to tape/CD player. Only if a lead is not available at the source, a switched +12 volt supply, such as a toggle switch should be applied. Use a minimum of 18-awg wire to connect the amplifier to this lead. Connect this lead to the head unit using a mating terminal or by soldering the three points together, but be sure to heatshrink the connection. If possible run this wire along side of the power wire using the same precautions.

SPEAKER OUTPUT

LOAD

Please be aware of the minimum impedance you may apply to your particular model amplifier. See chart below for more information. Any lower impedance than the minimum can send the amplifier into current protection or possibly damage the circuitry. To prevent damage, use the following formulas to help you figure out the load you are placing on your amplifier. If you have any difficulties, please contact your local Crossfire dealer or Crossfire's Technical Assistance at (562)906-0800.

MODEL	STEREO	MONO	MODEL	STEREO	MONO
VR-142	2 Ohm	4 Ohm	VR-404	2 Ohm	4 Ohm
VR-202	2 Ohm	4 Ohm	VR-804	2 Ohm	4 Ohm
VR-302	2 Ohm	4 Ohm	VR-705D (F&R)	2 Ohm	4 Ohm
VR-402	2 Ohm	4 Ohm	(Sub)	N/A	2 Ohm
VR-602	2 Ohm	4 Ohm	VR-300D	N/A	2 Ohm
VR-1202	2 Ohm	4 Ohm	VR-600D	N/A	1 Ohm
VR-401	N/A	2 Ohm	VR-1000D	N/A	1 Ohm
VR-354	2 Ohm	4 Ohm	VR-2000D	N/A	2 Ohm



WIRING

Always choose speaker wire wisely. Make sure that the wire is appropriate for the speaker you are applying it to. It is highly recommended not to use anything smaller than 16awg. Consult your dealer. As with the power wires, use caution around sharp corners or body parts that may easily cut through the insulation on the wire. If running into the doors, it is important to use a protective boot in the door jam to protect the wire from being pinched as well as keeping water or moisture from entering the vehicle. Use the factory boots whenever possible. As a precaution, always make sure the wire is out of the way of the window track or any other moving parts. To connect the wire to the speaker, strip off approximately 1/2" (12mm) of the insulation and terminate the wires using insulated speaker terminals (not supplied) or by soldering the connection to the loudspeaker. Be sure that the polarity at the loudspeaker is correct.

CONNECTING THE WIRES

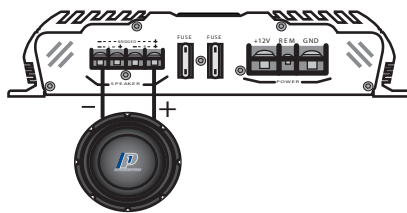
At this point, the power, ground, remote, and speaker wires should be run to the general location of where the amplifier is to be mounted. If the wires are to be hidden under the carpet, you now need to cut a slit for them to come through. To do this, place the amplifier in the location it is to be mounted to verify where the slits need to be. Make sure that there will not be a conflict with the mounting of the amplifier and the wires. Pull the wires through the slit to the terminals leaving approximately 6" (150mm) of slack and cut the wires to an equal length. Locate the spade connectors supplied with the amplifier. Strip approximately 1/2" (12mm) of insulation from the end of each wire. Crimp the spade connectors onto the stripped end of the wire. Loosen the terminal screws on the amplifier. Insert the wires into the proper terminals and tighten the screws securely. Check your connections by giving the wires a slight tug.

NOTE: Not all models have screw type connectors. Other models use "Discrete Mount" connectors which require bare wire installation (no connector needed).

WIRING DIAGRAMS

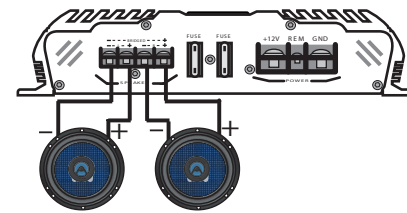
Single Channel Operation (bridged)

MODELS
VR 142
VR 202
VR 302
VR 402
VR 602
VR 1202



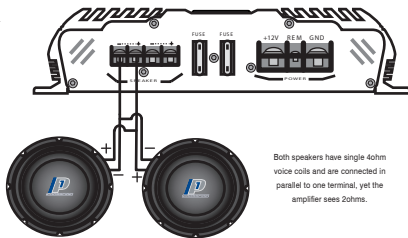
Two Channel Operation (stereo)

MODELS
VR 142
VR 202
VR 302
VR 402
VR 602
VR 1202

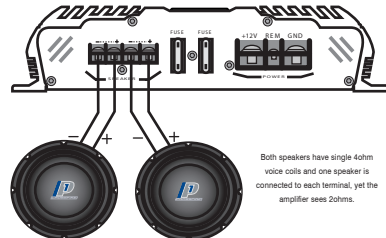


Mono Block Configuration Only

MODEL
VR 401



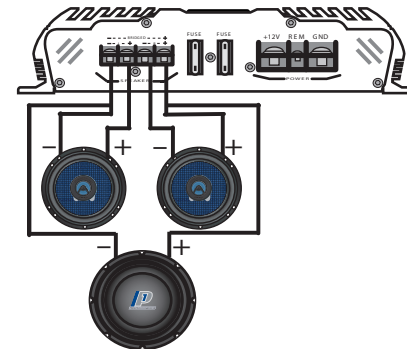
Both speakers have single 4ohm voice coils and are connected in parallel to one terminal, yet the amplifier sees 2ohms.



Both speakers have single 4ohm voice coils and one speaker is connected to each terminal, yet the amplifier sees 2ohms.

Three Channel Operation (stereo/mono)

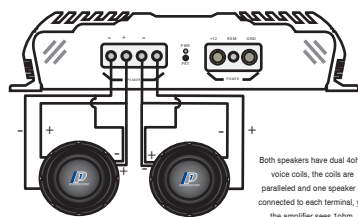
MODELS
VR 142
VR 202
VR 302
VR 402
VR 602
VR 1202



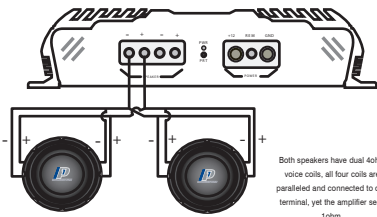
WIRING DIAGRAMS CONTINUED

Mono Block Configuration (cont)

MODELS
VR 300D
VR 600D
VR 1000D
VR 2000D



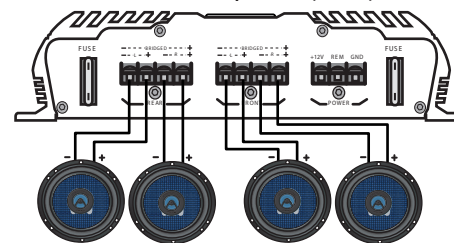
Both speakers have dual 4ohm voice coils, the coils are paralleled and one speaker is connected to each terminal, yet the amplifier sees 1ohm.



Both speakers have dual 4ohm voice coils, all four coils are paralleled and connected to one terminal, yet the amplifier sees 1ohm.

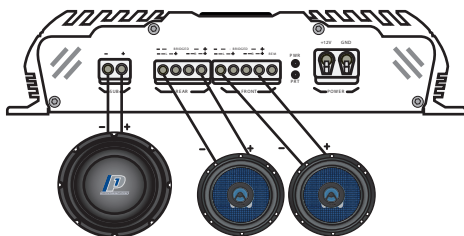
Four Channel Operation (stereo)

MODELS
VR 354
VR 404
VR 804



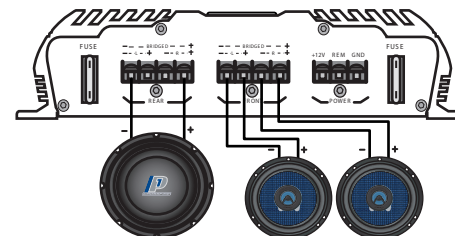
Three Channel Operation (mono)

MODEL
VR 705D



Three Channel Operation (stereo & mono)

MODELS
VR 354
VR 404
VR 804



The VR 401, VR 300D, VR 600D, VR 1000D and VR 2000D are single channel amplifiers. Unlike most Crossfire amplifiers, these operate as single channel, therefore one amplifier cannot be bridged by itself. Do not be fooled by the two sets of speaker outputs. Two outputs are provided strictly for convenience and are paralleled internally on the circuit board of the amplifier. This means that if both outputs are used with one driver each, the amplifier sees the same load as if the same two drivers are connected to only one output terminal.

PREAMP FEATURES

CROSSOVER

On the side panel of your amplifier is a potentiometer marked 50Hz - 150Hz or on some models it is marked 50Hz-250Hz. This controls the relative crossover point for the amplifier. To apply the crossover feature, locate the switch on the same side panel that reads HPF/Full/LPF. For highpass applications, such as component sets or coaxials, choose HPF. For lowpass applications, such as subwoofers, choose LPF. If you are looking for a full range application, place the switch on FULL. Note that full will override the crossover completely.

Note: All four channel amplifiers have two sets of crossover controls, one for the front channels and one for the rear channels.

Listed below are recommended crossover points for various size speakers. These are only guidelines. Actual crossover points recommended by the speaker manufacturers may vary.

Speaker size	Crossover recommendation
4" (100mm) component/coaxial	HPF 130Hz - 150Hz
5.25" (130mm) component/coaxial	HPF 80Hz - 110Hz
6" (160mm) component/coaxial	HPF 70Hz - 100Hz
8" (200mm) woofer	LPF 90Hz - 120Hz
10" (250mm) subwoofer	LPF 70Hz - 100Hz
12" (300mm) subwoofer	LPF 70Hz - 100Hz
15" (380mm) subwoofer	LPF 50Hz - 80Hz

BOOST

If your system is lacking low bass response, locate the boost switch next to the crossover. By placing this switch in the "ON" position, 6dB of boost centered around 45Hz will be added. In the "OFF" position no boost is added to the output signal. This boost switch is available on specific models only. Please see specification chart for verification. Crossfire highly recommends using this feature only on amplifiers powering subwoofers.

SIGNAL INPUTS

Getting a clear signal from the head unit to the amplifier is very important. To achieve this, the proper signal cables (RCA style) must be used. Estimate the length of the cables necessary. Take note that signal cable manufacturers will probably not have the exact length necessary for your vehicle. If you are between sizes, purchase the slightly longer cable. You can always hide the extra wire.

Be aware of the differences in cable. Better RCA's usually have multiple layers of shielding and/or twisted pair wiring for better noise rejection. Ask your local dealer for his recommendation.

LINE LEVEL INPUTS

Car environments are notorious for poorly insulated wires. This means that hiss, engine noise, and electrical noise can easily be picked up through RCA cables if run incorrectly. To avoid inducing noise into the system, run the RCA's away from large wire looms and electric fans if possible. And always make sure to position your signal cables away from the power wire, preferably on the opposite side of the vehicle. As with the power wire, use caution around sharp corners or body parts that may easily cut through the cables.

When connecting the signal cables, check the balance to the source unit and the amplifier. The cables should be marked: red is right and black or white is usually left. Once you have connected the signal cables to the head unit, slide the unit back into the dash. Make sure the unit is in securely.

A proprietary feature to the four channel amplifiers including the VR705D is a "Combining" switch located underneath the amplifier. With this switch set to the "2CH" position allows you to only feed the "Front" inputs an audio signal, but still use all four output channels with independent gain controls. This is a great convenience factor if the headunit you are using only has a single pre-amp output. Separate to the VR705D only is a "Sub Input" selector switch. With this switch positioned to "CH 1-4" the fifth channel will sum to the signal input of "CH 1-4". Please see diagram on PG-8 for more information. Or if you have any doubts please call your authorized Crossfire dealer or contact Crossfire directly at (562) 906-0800

HIGH LEVEL INPUTS

Select models have "High level Inputs" marked "High In". Use these inputs only if your current head unit does not have low level outputs. These inputs may be tapped to the closest left and right speaker wires available. Please see diagram on PG-8.

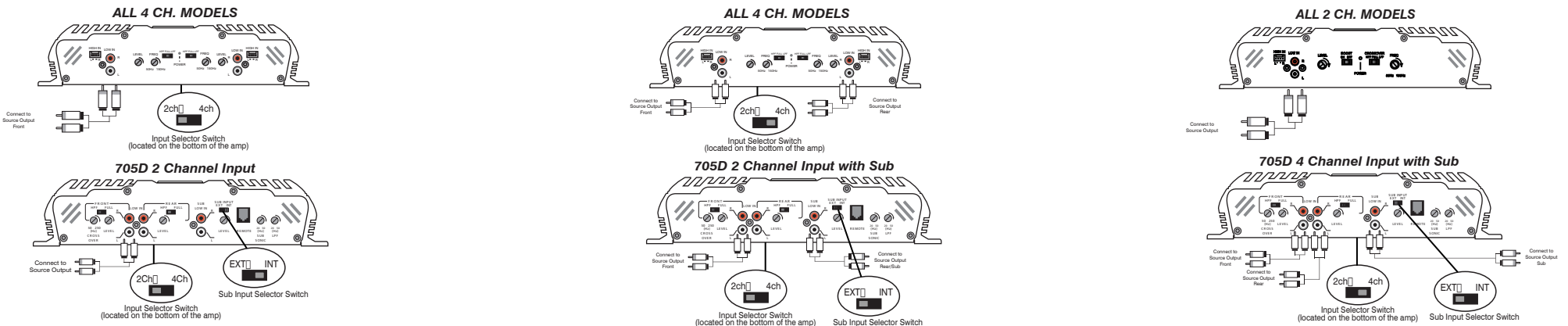
LEVEL CONTROL

Next to the preamp inputs on the side panel of the amplifier is the level control, commonly referred to as the gain. The gain allows you to match the output level of your source unit or signal processor to the input level of the amplifier. Matching the input can be accomplished in three simple steps:

1. Turn gain (level) control to minimum.
2. Turn on the source unit and adjust to 2/3 of max volume while playing music.
3. Adjust the gain control until desired, maximum volume is achieved without audible distortion.

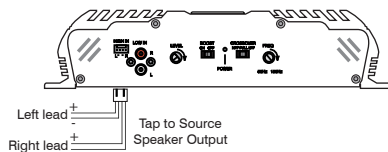
Remember that the gain control is not a volume knob. Ignoring the three steps above may leave you with damaged speakers and possibly a damaged amplifier(s).

Low Level Inputs

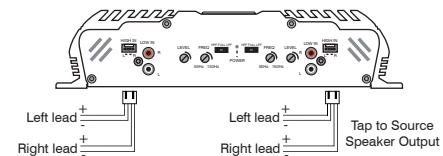


High Level Inputs

MODELS
VR142
VR202
VR302
VR401
VR300D



MODELS
VR354
VR404
VR804



"Strapping" Two VR-600Ds or Two VR-1000Ds

Bridging the two like amplifiers together is fairly easy. Study the following instructions as well as the diagrams on PG-10 to assure proper connections. If you experience any difficulties, please contact Crossfire's Technical Assistance at 562-906-0800.

BRIDGING CIRCUIT (Invert output)

The internal bridging module can only be used when a pair of either VR1000Ds or VR600Ds are used. Bridging allows for the two amplifiers to be run in series and achieve double the output into one load. However, this does change the minimum impedance stability to 2ohms. Bridging the amplifiers should only be done if the proper impedance cannot be achieved with the amplifiers separated.

It is very important to set the Master/Slave control on the amplifier whether you are using the bridging module or not. If the settings are in the wrong position, the amplifier(s) may not work. There are three settings for this control: Master 0, Master 180, Slave. Use the following to determine what position to set your amplifier(s) in. For further reference, please review the drawings following.

Master 0: this setting will maintain the same phase as the signal applied to it.

- 1. Use this setting if the amplifier is not bridged with another amplifier.
- 2. When bridging the amplifiers, use this setting only on the amplifier that is connected to the head unit.

Master 180: this setting will reverse the phase 180 degrees of the signal input into the amplifier.

- 1. Use this setting if the amplifier is not bridged with another amplifier and the subwoofer(s) are out of phase with the satellite speakers in the vehicle.
- 2. When bridging the amplifiers, use this setting only on the amplifier that is connected to the head unit. Only apply this if the subwoofer(s) are out of phase with the satellite speakers in the vehicle.

Slave: this setting limits the controls of the secondary amplifier in a bridged pair.

- 1. Use this setting only on the second amplifier in a bridged pair. All crossover, subsonic and level controls of this amplifier will be bypassed. The amplifier set on one of the two Master settings will then control each of the preamp functions for both amplifiers.

SUBSONIC FILTER

The subsonic filter is used to reduce the amount of low frequency harmonics and/or subsonic noise picked up in audio systems. Both of these can be damaging to subwoofers and possibly the amplifier(s). As well, harmonics and subsonic noise can cause the amplifier(s) to pull excess power from your electrical system.

This filter is switchable, ON/OFF, and variable from 20Hz to 50Hz. The subsonic filter is switchable as every system is different. For most people it is desirable to have the filter ON. However, if you have an outright SPL system, it may be beneficial to turn OFF the subsonic filter because harmonics can actually increase the sound pressure in many cases.

So what frequency should you set the subsonic filter at? For most applications it is desirable to leave this between 20Hz and 30Hz. If you are using a ported enclosure designed for SPL, yet you are using the system on a daily basis, a higher filter frequency may be desired. This will allow the enclosure to be tuned higher and reduce the chance of the woofer to becoming non-linear and destroying itself.

LINE LEVEL OUTPUTS

The line level output is to be used as an easy solution to link multiple amplifiers together without the use of problematic RCA y-cables. The signal is buffered so that there is minimal loss. Please note that the signal passing through these outputs is affected by the gain control of the amplifier.

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