VELOCITY
SPEAKER DESIGN

Velocity 6x9” OverDrive Instruction Manual

Important Information About Your Speakers

Velocity OverDrive series speakers are designed to be used with a digital sound processor to achieve both extreme output as well as exceptional frequency response. These speakers are not designed to perform well without equalization.

Equalization Details

Equalization settings are critical to the performance of your speakers. In the screenshot below you can find the equalization settings in detail.

Here is a link to the full resolution image: https://cdn.shopify.com/s/files/1/0579/8002/7060/files/R690-EQ_dc513e9c-3ee3-423e-939e-a44612cb8473.png?v=1679082247

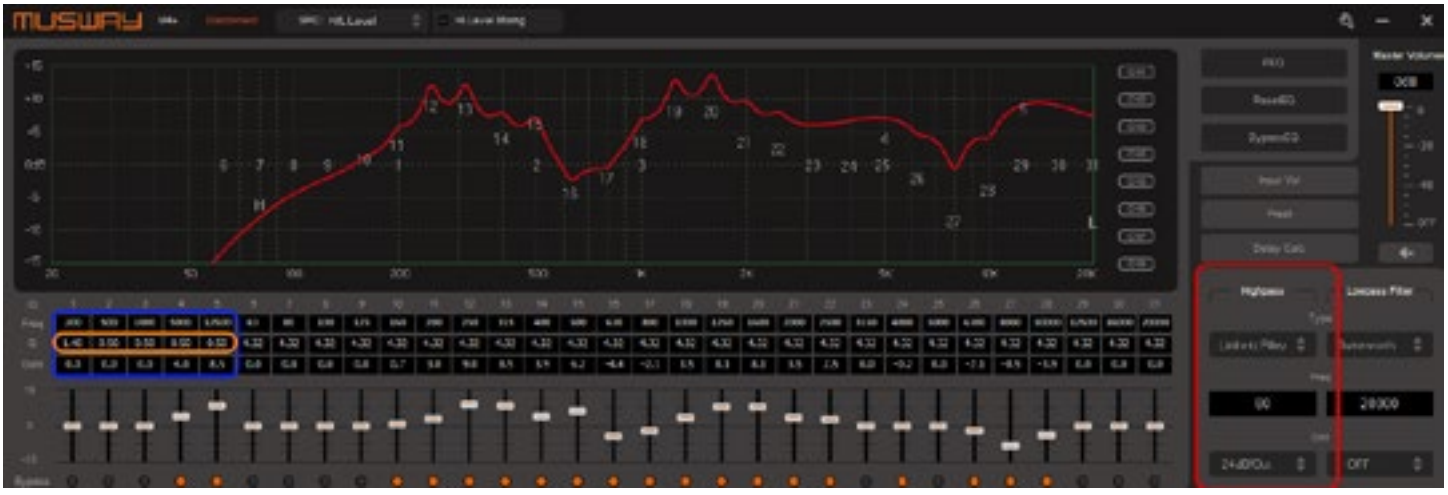
Important Notes

Graphic EQ Settings

Bands 10 through 28 use graphic equalization only. Meaning that the center frequencies are standard for a 31-band EQ and the Q factor for each band is 4.32 (1/3rd octave). These adjustments can be done on any standard 31-band EQ with any DSP. These adjustments will yield a smooth frequency response when the R690 6x9 woofer and RZ75H tweeters are used together along with the RZ75H passive crossovers. Copy these settings to your DSP for instant results. These settings have been carefully crafted to level out the response of these speakers.

Optional Parametric EQ Settings

Bands 1 through 5 are optional adjustments. These bands have had their center frequencies and Q factors re-adjusted. These frequency adjustments have been re-assigned to overlap the graphic EQ bands and can be used to add a personal taste or application-specific adjustment on top of the graphic equalization without disturbing the

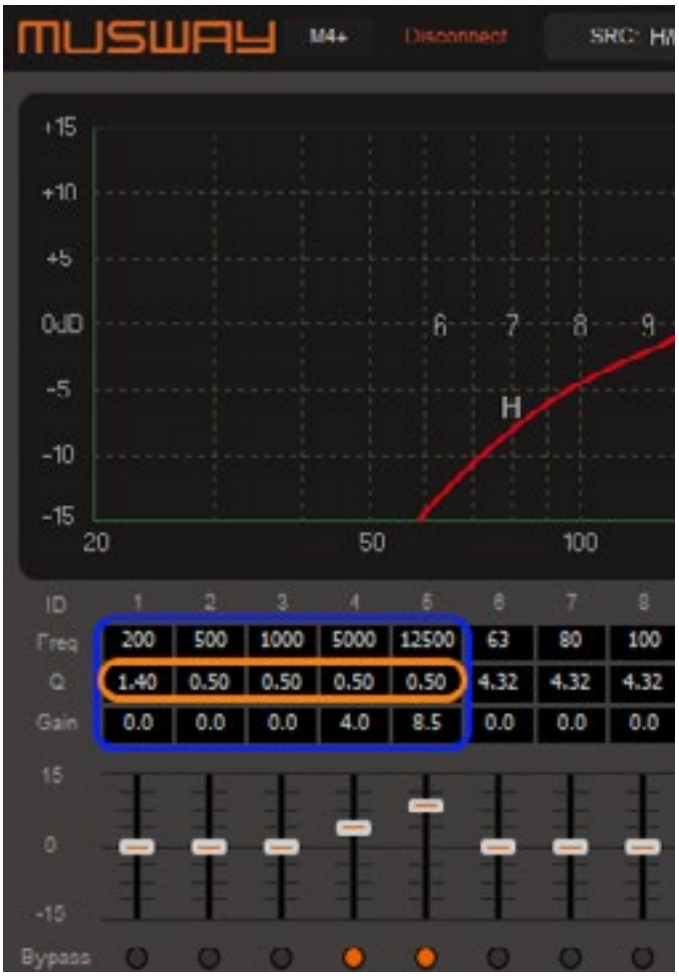


fine detailed adjustments in the graphic equalization. This in effect gives you a second 5-band equalizer. The adjustments shown here have been tested and shown to add a lively effect that most people prefer. If these bands are not used, the graphic equalization will still yield a smooth and desirable response.

Important Note

Parametric settings should be used with caution and moderation. Adding large amounts of positive gain will add huge amounts of extra burden to both the amplifier as well as the speakers. Always reset the amplifier's gain after making any changes to the speaker's equalization. Especially when changing parametric equalization. Below is a brief description of how to make use of each of the 5 parametric bands.

Close up of Optional 5 Parametric Bands



Band 1. - 200HZ

This band has a Q factor of 1.4 which is one full octave. This band can be used to add or remove the lowest frequencies from the R690 mid-woofers. Adding any boost to this band will result in added cone excursion and amplifier demand which in turn reduces the high volume ability of the speaker. This band can be used if the speakers are not reaching their mechanical limitations at the system's full volume level. If however, you are finding that the speakers are reaching or exceeding their mechanical limitations, this adjustment should be set to zero gain. Another option is to reduce the speaker channels output gain by an equal amount to any gain you ad to band 1. This will null out any added burden on the speaker while still giving you control over the speaker's low end frequency response. When doing this you are trading off the speaker's output in favor of low-frequency response.

Band 2. - 500HZ

With a Q factor of .05 this band covers multiple octaves. This is a very wide frequency adjustment. This band affects the lower human vocal range often referred to as the mud range. It can be used to add or remove some extra presence and boldness to vocals. Use caution as too much output in this range can cause speaker cone break up which is a very audible distortion in the mid-bass range.

Band 3. - 1kHZ

With a Q factor of .05 this band covers multiple octaves. This is also a very wide frequency adjustment. This band covers the middle to high end of vocals. Too little output in this range leaves the system sounding hollow and too much output makes the system sound nasal.

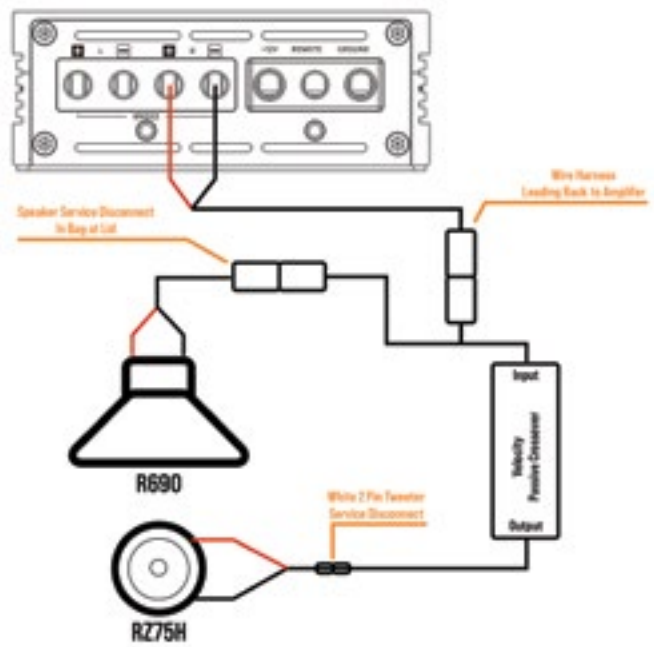
Band 4. - 5kHZ

With a Q factor of 0.5 this is also a very wide adjustment. This single band can be used to make the entire high-frequency range more or less bright without compromising all of the fine detailed graphic EQ adjustments. Be sure to listen to multiple music tracks when making this adjustment (as you should do with all adjustments). Too much positive gain on this band will result in a lot of extra burden on the tweeters which can then lead to burned voice coils. Use to set the high-frequency level to your taste but use it with caution and moderation.

Band 5. - 12.5kHZ

With a Q factor of 0.5 this is also a very wide adjustment. This band is useful for adding a bit of sparkle to a system that is plenty loud on the high end but still sounds dull. Whenever using this adjustment it is a good idea to play with a balance of band 4 and band 5 since they overlap each other. Adding too much gain to either or both bands is a really bad idea as it will almost certainly result in an unbalanced hissy sound and will definitely overburden the tweeters nad result in damage. This band is useful in compensating for obstructions in the tweeter's path such as tall bars or an off-axis situation such as an installation in lowers.

Passive Crossover Connections



RZ75H tweeters ship with connections that are plug-and-play with American Hard Bag and Velocity rear speaker harness part# WH-SBB2-PNP. The tweeter has a white 2-pin service disconnect that allows the tweeter and 6x9 to be serviced separately. This way the 6x9 can be removed without removing or disconnecting the tweeter. Additionally, this gives you a service point that you can use for diagnosing the tweeter and even inserting an optional phase reversal harness. Due to interactions with other speakers on the bike, there are times when reversing the phase of just the tweeter can be an advantage.

A "**T**" adapter has been installed on the input side of the passive crossover so that the mid-woofer can be connected directly to the amplifier and the horn tweeter can be filtered through the passive crossover with all plug-and-play connections. This "**T**" adapter places the tweeter in parallel with the mid-woofer. The final speaker impedance the amplifier sees in this configuration is 2 Ohms. This is because the mid-woofer and the tweeter are operating in separate frequency ranges. So even though the mid and tweeter are in parallel, the final impedance is not divided down to a lower Value.

RZ75H High-Pass Crossover Settings

When the RZ75H tweeter is driven by a dedicated amplifier channel you have the option to either use the included passive crossover or to eliminate the passive crossover and use your DSP crossover. The included passive crossover is designed to function without any additional amplifier or DSP crossover needed. It is not recommended to use both an amplifier/DSP crossover as well as the included passive crossover as this will cause phase and frequency gap issues between speakers.

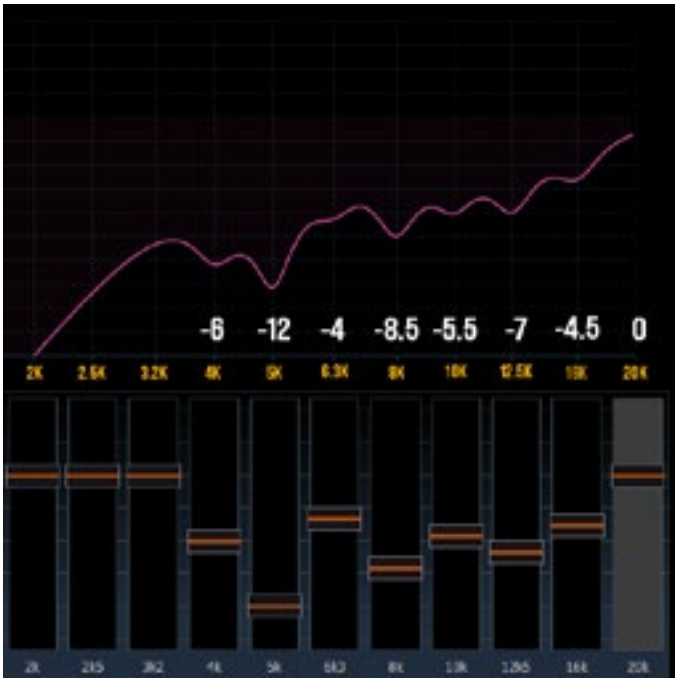
Warning!
Using the your DSP's active crossover in lieu of the included passive crossovers is an advanced option that is not recommended for novice users. Never use an amplifier's built-in crossovers for RZ75H tweeters. If the DSP crossover is not properly set, the tweeters will become overloaded resulting in burned voice coils and a voided warranty. Use active crossovers at your own risk.

DSP High-Pass Crossover Settings for RZ75H Tweeters

4KHZ @ 24db Per-Octave - Linkwitz Riley with Equalization

RZ75H Equalization

The RZ75H horn tweeter is designed to work with proper equalization and therefore should only be used with a DSP. Failure to use proper equalization to level out the tweeter's response will result in poor sound and likely damage. These are pro-audio type speakers and equalization is mandatory for proper function. Use the following equalization for best results. Yellow numbers are band frequencies and white



numbers are adjustment values.

This equalization applies to a standard 31-band EQ with Q factors of 4.32 on all bands. Note that they are all negative values. Positive EQ values should never be used on horn tweeters. If a positive value is ever needed on any horn the frequency is outside of the horn's usable range. Adding EQ boost outside of the horn's range only adds unnecessary demand on the horn and increases distortion. For example, it is common for a horns output to roll off at the very highest frequencies. This is a physical limitation of a horn design and should not be compensated for with equalization. These ultra-high frequencies are outside the hearing range of most people and definitely not audible over the noises on a bike. So attempting to achieve them through equalization is pointless and potentially harmful.

Setting Amplifier Gain

Incorrect amplifier gain will lead to poor performance and possibly a burned voice coil which is not a manufacturing defect and is not covered under warranty. So the goal is to get it right the first time.

Amplifier gain should always be set for the speaker's mechanical limits and never for a target power number. Amplifier gain should ***never*** be set for the speaker's RMS or Peak power rating. These are thermal ratings and have nothing to do with a speaker's maximum or optimum power requirements. A speaker's maximum power capabilities are determined by mechanical limitations. Once Xmax has been achieved (maximum linear cone excursion) there is no more volume or performance to be gained. Fortunately, a speaker's mechanical limitations are far below its thermal limitations. By correctly setting your amplifier gains and practicing a little common sense, you should not run into thermal issues.

RZ75H Gain Settings

Unlike mid-range drivers, tweeters do not use a tone and voltage to set gian. And a tweeter's mechanical limit can not be determined by ear. By the time you hear the tweeter reach its mechanical limits, it is too late. The tweeter's gain should be set to match the level of the mid-range driver. Always set the mid-range gain first and then set the tweeter gain to match that level. When properly equalized the tweeter will always be able to play to a higher level than the mid-range driver. So if the tweeter is set to the same level as the mid-range driver not only will the sound be well balanced, but the tweeter will be well within its safe thermal and mechanical operating range.

We Make It Easy!

Set your amplifier gain to 2.82 volts as shown in the video. See the full amplifier gain setup procedure here: https://www.americanhardbag.com/pages/setting-gains-by-voltage-the-correct-way

RZ75H

Impedance	4 Ohms
RE	3.95 Ohms
FS	1571 Hz
QMS	6.129
QES	2.192
QTS	1.614
L @ 10Khz	.01128 Mh
Sens	107 db

R690

Impedance	2 Ohms
RE	2.569
FS	64
BL	3.884
QMS	3.53
QES	1.184
QTS	.88
VAS	22.7
L @ 10Khz	.1997 Mh
Sens	89 db
MS	17.04 G
CMS	.353

Crossover Frequency

80 Hz High Pass
24db - Linkwitz