

The W221 Outboard EQ Mod



The W221 is a terrific listening environment because it's so quiet and well-insulated. A car that offers a supreme driving experience like the W221 deserves a premium audio system, and unfortunately for many owners the stock system falls short. The good news is that while the stock system sound may be a bit underpowered and "dead", the stock amps and Harman Kardon speakers have plenty of untapped power, punch and clarity across the whole frequency spectrum, and they respond surprisingly well to a little bit of pre-amp gain and equalization.

This write-up covers the installation of an outboard equalizer (Clarion EQ5746, Amazon \$59) in the glove box to dramatically improve the stock system with minimal expense and time, utilizing the existing speakers and amps and without getting into the car's internal electronics at all.

<http://www.amazon.com/Clarion-EQS746-Graphic-Equalizer-Crossover/dp/B000EZV3T8>

It's a tool-less, solder-less install that can be completed in less than 15 minutes. For those of us (like myself) who remember Clarion as a car stereo brand sold in K-Mart's in the 70's for folks who couldn't afford a Kenwood or an Alpine, you'll be pleasantly surprised. This little EQ sounds terrific.

What To Expect

- Powerful, clean and punchy low end "hits" without getting boomy or muddy.
- Clean, distinct mid-bass.
- Smooth, clear midrange without getting brassy or harsh.
- Clean, transparent highs and an improved soundstage.

While this mod will completely transform your stock system's performance and bring you a new-found joy with your S Class, there are some conditions:

- Your audio source must play from your mobile device through the aux-in. Material played through the CD changer, Satellite Radio, AM/FM will not be affected by the mod.
- You will not have the music control (song selection) integration via COMAND, via voice control, or in the cluster display, and the steering wheel controls will only affect volume and mute.
- Your mobile device must be accessible in the cabin for song selection. A hard mount is recommended.

To *also* use the *optional* AudioForge Equalizer app (iTunes Store, \$2.99):

- Your music library must be on your Apple mobile device in the stock music player. Streaming sources, and on-demand sources like Spotify, MOG, Rhapsody, Pandora are not processed by the app, including on-demand music you've downloaded. Music stored on iCloud also cannot be processed by the app.

This schematic covers the glove box install in a 2010-2013 W221, with an existing 12v receptacle and an Aux In cable. The other parts and supplies are available at Radio Shack.

Car Requirements

Media interface cable with Aux In (or any Aux-In)
12v Receptacle in glove box

Parts Supply List (Radio Shack)

- (2) Mini plug-to-male stereo RCA adapters
- (1) 3 Way 12v Adapter
- (1) 12V Plug with binding posts
- (1) 12v 2-Port USB charging adapter
- (1) USB charging cable for your device

Equipment

Clarion EQS746 Equalizer/Pre-Amp (\$59 Amazon)

Optional

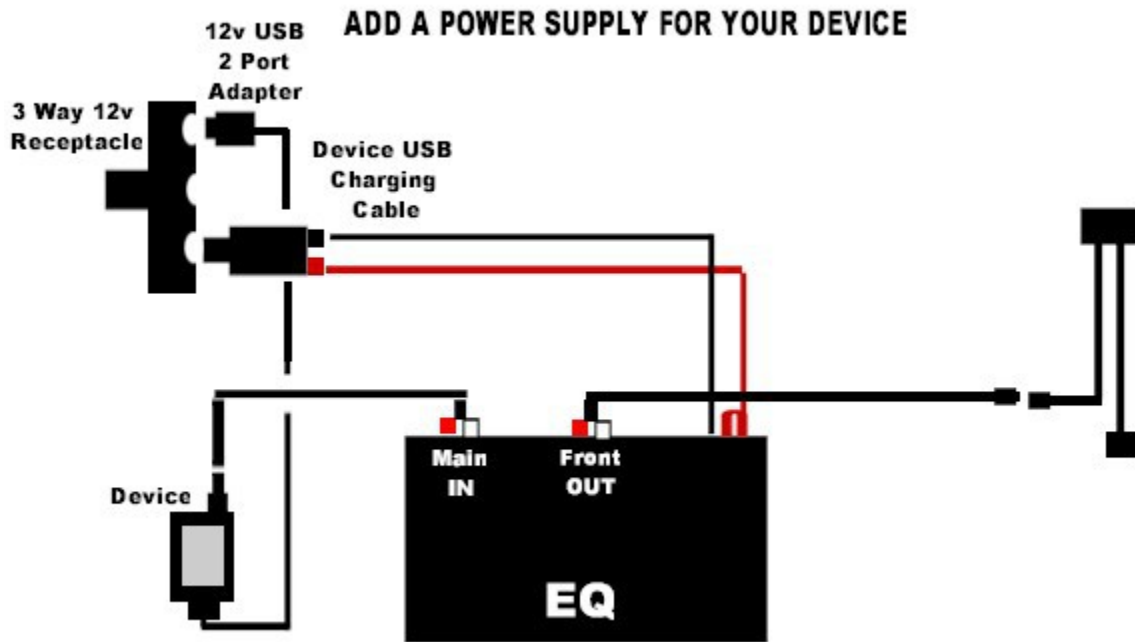
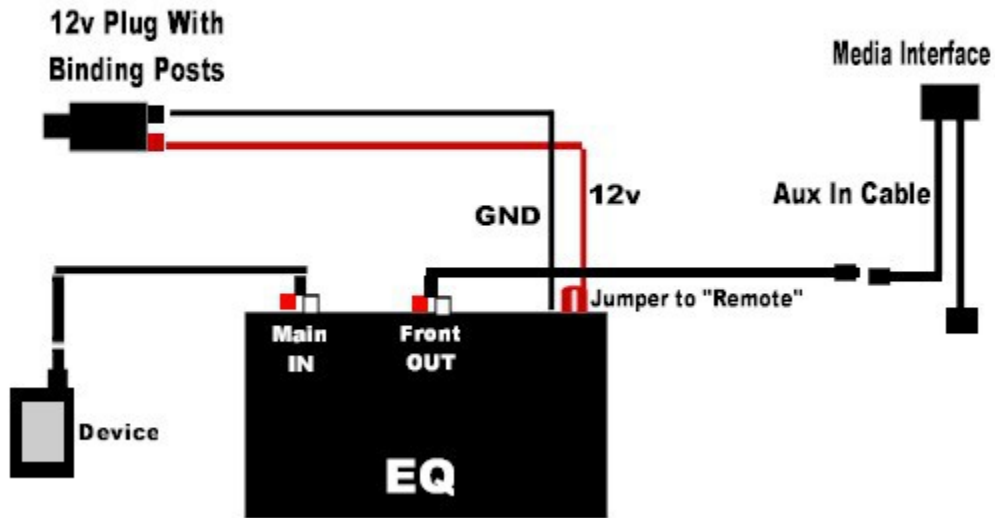
Micus BluBridge Mini Jack Bluetooth Audio Receiver (Amazon \$39)

<http://www.amazon.com/BluBridge>

AudioForge EQ App for Iphone/Ipod (Itunes Store \$5)

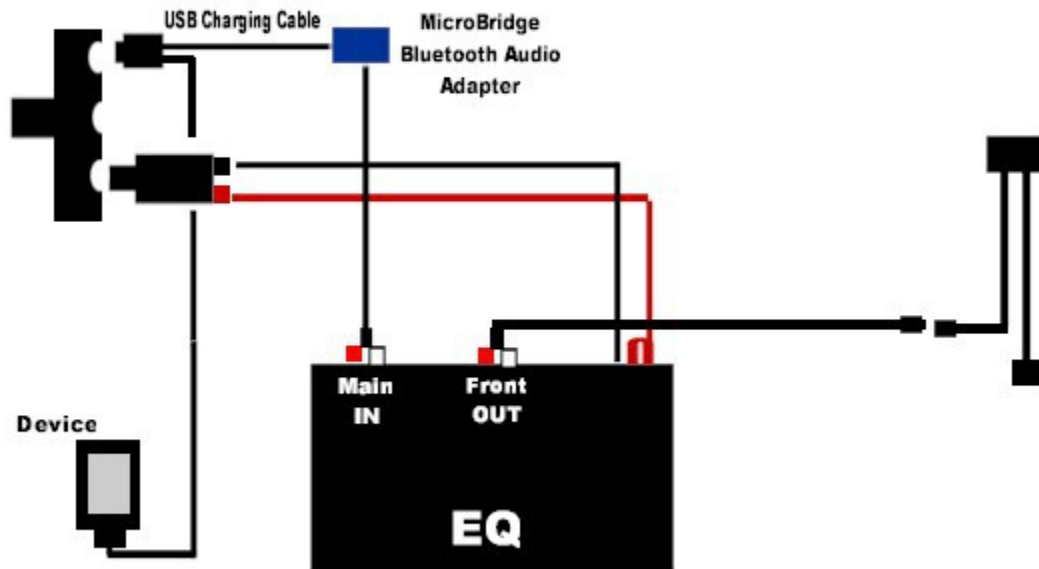
ProClip Dash Mount or Console Mount (www.proclipusa.com)

The basic power and audio connections:



Add streaming audio to eliminate an extra cable in the cabin. Note that adding the streaming BT adapter will reduce the available volume versus a direct wired configuration, although sound quality is virtually unchanged.

ADD STREAMING BLUETOOTH AUDIO



(If you're thinking that the open 12v socket would be a good place to plug in your hardwired radar detector, you'd be correct!)

Here's my device (a dedicated iPod Touch) friction mounted (held in place by tension between the CD Changer door and the load buttons) and running the AudioForge app's Spectrum analyzer, which also serves as a player control. Alternately, ProClip makes great vehicle specific snap-in mounts at <http://www.proclipusa.com>



Configuring The Sound

Setting up the audio for optimum sound is probably intuitive for most listeners; Just keep moving stuff around until you find the combination most pleasing to you. However, in the outboard EQ mod there are a lot of possible variables and combinations, especially if you're also using the AudioForge EQ app on an Apple device.

After about a month of tweaking I settled on a final configuration. It sounds good (to my ear) across a variety of material. I'll share the config here and also get a little into the nuts and bolts of how equalization affects your sound so you can make changes based on your taste.

We all hear a little differently, depending on age and how much damage we've done to our hearing over time. I've played drums professionally and recreationally for the past thirty years, so what now sounds "good" to me may not to you.

The function of equalization is to compensate for deficiencies in the sound system by attenuating (decreasing) or emphasizing portions of the frequency spectrum that are over or under emphasized in the system itself. Much of this is subjective. It's not important that it sound "right" with deference to the original recording...only that it sounds pleasing to you. That's because, aside from the musicians, engineers and producers involved in the creation of the original recording, nobody truly knows how something is "supposed" to sound.

Tuning To The Drum Kit

I've found that if I can get the drums in a recording to sound the way I know real drums actually sound in a studio and live performance setting, the rest of the instruments and the vocals will sound accurate as well. Tuning your equalization to optimize the drums works because it's an instrument that plays across the entire frequency spectrum, from the bass drum at the low end, to the tom toms in the middle, to the snare and cymbals at the highs. They also have the most explosive dynamic range.

Problems Specific To The W221

The stock audio system in the W221 definitely has its share of deficiencies. The mids are extremely over-emphasized, resulting in a sound that's thin and shrill at higher volume levels. The culprits are the midrange drivers in the front doors, so my equalization scheme involved pushing the signal to those drivers way down, essentially changing a 3 way component speaker set up to a 2 way. 2 Ways are by their nature smoother sounding. (If you ever get a chance to visit a recording studio you'll find that the main playback monitors are almost exclusively 2-way.)

I like a tiny bit of overemphasis on the bass drum so that there's a physical sensation (or "hit") in the cabin. I also want a little push at the extreme highs, to emphasize the cymbal sounds. Since highs are very directional (you can easily distinguish left from right), pushing them up improves the sense of stereo channel separation which in turn creates the impression of a wider soundstage.

Logic 7

Speaking of the sound stage and stereo imaging, the Logic 7 can be a helpful tool, although it does add some artifacts that require a slightly different EQ. Logic 7 serves as an "expander" that gives the sound the characteristic of being fuller, a little less focused, and in a larger space. It does this in part by co-opting the rear door speakers to serve as "surround" speakers. They play a signal that has been slightly delayed from the front speakers to recreate the rear reverberations

that occur in a large venue. However, with the rears doing duty as surrounds, it falls on the front door speakers to handle the main signal, and since they suffer from horrible midrange drivers, if you use Logic 7 (and I do) you'll need to compensate the mids more.

The Settings

Here are my settings for the Clarion EQ. Use these as a starting point if you're not familiar with equalizers:



Here's a representation of where instruments generally fall on the frequency spectrum as it applies to the Clarion's controls, if that sort of thing interests you. It may also help you determine which frequencies you need to adjust based on what you're hearing.



Finally, here's the setting on the COMAND's "Sound" screen under the Audio submenu:

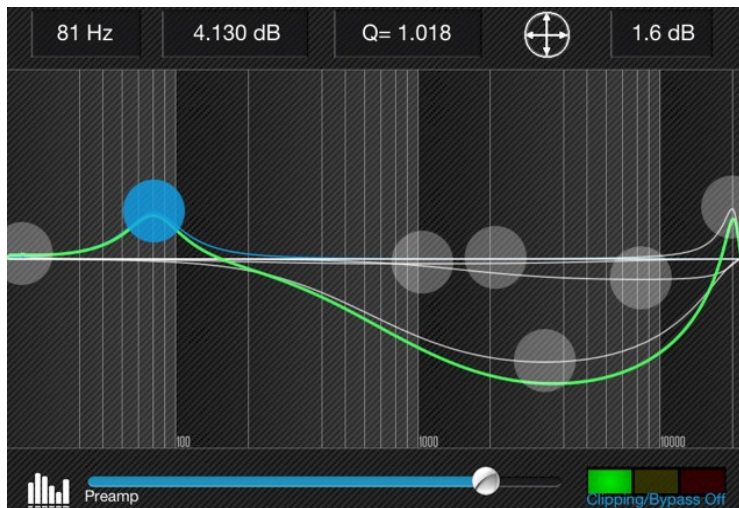
- ÿ Bass & Treble halfway between midpoint (0) and full.
- ÿ Fader to -3
- ÿ Logic On

The AudioForge Equalizer App

This little \$2.99 app from the iTunes store is amazing, and coupled with the Clarion you'll have a system that fully realizes the potential of the W221's stock audio set up:

<http://audioforge.ca/equalizer.php>

The heart of the app is the Equalizer Curve screen, where you can visually shape the equalization curve. Ignore that mumbo jumbo at the top...it's just a numerical representation of what's happening on the graph. Here's my curve for the W221.



You can change the curve by clicking on a control point (it turns blue), then moving it by dragging. In this example, the blue dot is controlling a little emphasis on the bass, specifically on the kick-drum.



Here's the control for the mids. Note the slow, gradual slope from the bass control point (also known as the "Q") down to the bottom of the curve and back up to the little spike at the high end. This is controlled by "rubber banding" while the control point is blue like you would to zoom in or out on a photo.

The mid control will have the greatest impact on your sound overall. Pushing it down will reduce harshness but will take away some liveliness with it. Find a balance that's pleasing to you.



A tiny spike right at 20,000 hz to add some sparkle to the highs. Use rubber banding to tighten that up.

Finally, note that blue "preamp" slider at the bottom. For maximum power, nudge that to the right until the VU meter beside it holds a solid yellow.

Some common problems and fixes:

Not enough power overall when at the car's volume control limits.

Device volume to 100%

Increase Pre Amp gain on the AudioForge to a solid yellow. (Disable Auto Normalization if necessary)

Push up Treble and Bass on the COMAND to 100%

Make sure Clarion fader is fully set to your input (Front or Rear)

Clarion Volume should be at 100%

Roll up 125htz and 315htz on the Clarion

Switch from BT adapter to wired connection.

Lead instruments (lead guitar solos, keyboard solos, brass instruments) sound too bright or harsh.

Drag the mids down to the basement on the AudioLogic EQ. If still too harsh, reduce Treble on the COMAND. If still too harsh, roll down the Clarion at the 2.2K htz and 6K htz buttons.

Vocals aren't emphasized enough.

Try reversing each of the above in sequence.

Cymbals sound "phasey" or "swishy":

Your MP3 tracks were recorded at too low a bitrate.

You're listening to a highly compressed streaming source like Sirius XM

There's too much variance between the 16k htz and 8k htz controls.

Bass gets boomy or muddy.

Reduce the Bass control on the COMAND. Roll down the 315htz button on the Clarion until you

can hear distinct bass guitar notes in the mix.

Not enough low-end punch in the drums.

Maximize the Pre-Amp (Gain) on the AudioForge app. Get the signal to the point where it turns the VU meter Green and Yellow. (Disable Auto Normalization if the gain keeps backing itself down.) Push up the slider on the AudioLogic EQ. Slide it slightly left or right to pinpoint where the bass drum lives.

The sound seems too broad and diffuse

Disable Logic 7

The soundstage seems too low to the ground, too focused and too directional.

Enable Logic 7

The sound gets too bright when using Logic 7.

Move the COMAND fader back until the harshness disappears. (Moving it too far back will reduce the systems overall power).

Bring the mids down in the AudioForge App.

The music sucks

Delete anything recorded after 1979.

Questions or comments? Email me at s550eqmod@gmail.com