



American Hard Bag
4121 Citrus Ave
Suite 1
Rocklin, CA 95677

Tools You Will Need



Jig Saw



Router



Drill



Drill Angle
Adapter



Torx



Phillips



5 Min Epoxy

Supplies Will Need

Introduction

The BA10P Ported Bag Woofer Mount is designed to allow the saddle bag to function as a quality ported speaker enclosure by coupling the woofer mounting surface (inward-facing wall) to the outward-facing wall. This dramatically reduces bag flex and increases the speaker's output. Additionally, the woofer mount has an integrated port that can be used to alter the tuning of the saddlebag and dramatically increase output on the lower end. This setup can be used with lids that have speakers as long as the lid speakers are installed with hard air-tight enclosures that separate them from the woofer's air space.

How It Works

Mid-woofers and subwoofers in bike systems do not work the same as a subwoofer in a car audio system. The terms mid-woofer or subwoofer are subjective and there are no technical definitions between the two. Any speaker that plays low frequencies that extend below the all of the other speakers in a system is in fact a subwoofer. Even if that subwoofer also plays mid-range frequencies as well.

More Low End

Bag woofers in a bike system produce a lot more energy at low frequencies and that makes the entire audio system sound a lot more powerful. BUT low frequencies on a bike are not as low as in a car audio system. Bike bass is focused above 40hz and often above 50 hz. This is due to the bass playing in an open environment.

Wider Frequency Range

Another very important difference in bike subwoofers and car subwoofers is that on a bike the subwoofer is allowed to play at much higher frequencies. If you attempt to limit a bike subwoofer to 100hz and below like a car, the result will be almost no output and totally unreasonable demands on the subwoofer. So don't do that!

Subwoofer High Pass Crossover

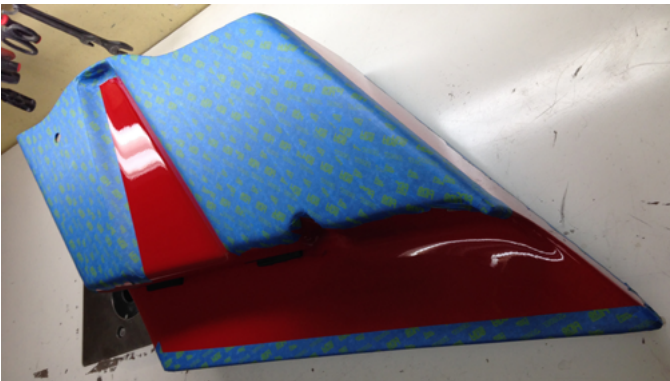
All mid-woofers and subwoofers should be high passed at or above the F3 frequency. Never crossover any bike speaker below its F3 frequency. F3 frequencies and other tuning topics are covered later in this instruction set.

Installing the Woofer Mount

Step 1 - Prep the Bag



Remove the bag from the bike and remove the lid. Tape up the bag with a quality delicate surface specialty tape to protect the painted surfaces of your bags. Frog Tape works very well. It is thick and tacky but releases nicely when it's time to remove the tape.



Tape the outside of the bag on the side that faces the wheel. There is no need to tape inside the shock cavity, but you do want to protect the rest of the surface. This surface will come into contact with the router templates.



Tape the inside of your bag on the wheel-facing wall with bright-colored tape. Take the time to get the tape applied smoothly without wrinkles.

Step 2 - Mark the Bag for Cutting



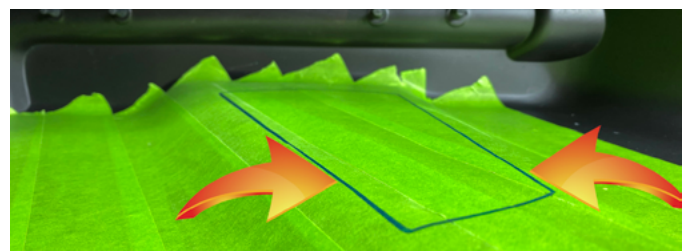
Place the woofer mount inside the bag. The woofer mount should sit flat and not ride up on any of the radiused surfaces of the bag. You want the woofer mount to sit as low and forward as possible but still make maximum contact with the bag's flat surfaces. The grill cut-out should be centered on the flat surface of the bag's shock cavity. Use a Sharpie to mark the grill location.



Use this marking to keep the mount lined up as you continue to the next step where you will be marking all of the fastener holes. If you are worried about the woofer mount shifting around, you can make even more marks around the outside of the mount.

Marking the grill location inside the bag serves two purposes.

1. It gives you a way of relocating the mount as you work.
2. It allows you to inspect your grill location inside the bag. You want to make sure that the entire grill is well centered on the flat portion of the bag's shock cavity. You do not want the speaker grill to overlap the radiuses on either side of the bags shock cavity.



Installing the Woofer Mount

Step 3 - Test Fit Other Parts

Temporarily fasten the woofer onto the mount and put the mount in the bag. Use this opportunity to test fit the lids and lid speakers if you have them. Test fit the amplifier if one is going into the bag. It is better to find out how these things will fit together now rather than after you have drilled holes.



Step 4 - Locating Faster Holes



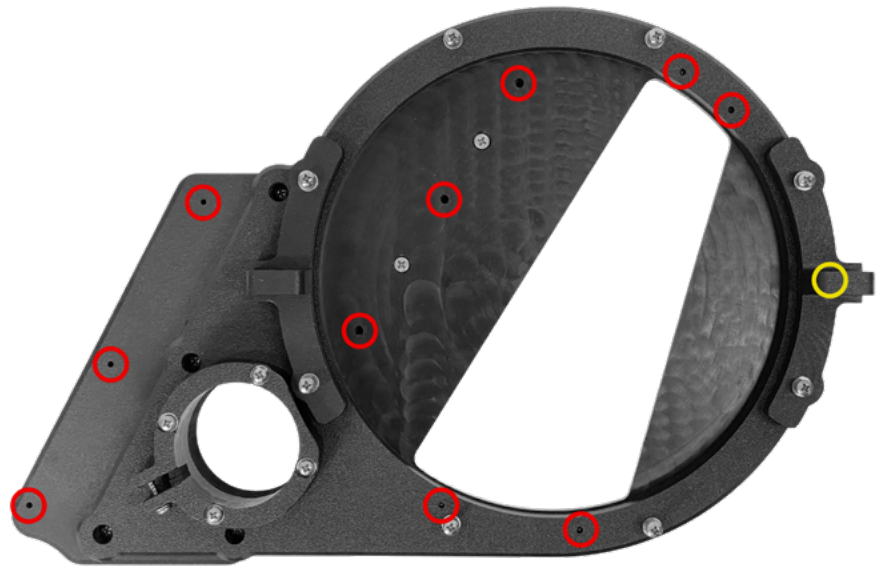
With the mount in the proper position, use a 1/8" drill bit to mark each fastener hole for screws that run through the bag and into the mount. Spin the drill bit by hand to make a visible mark in the tape.



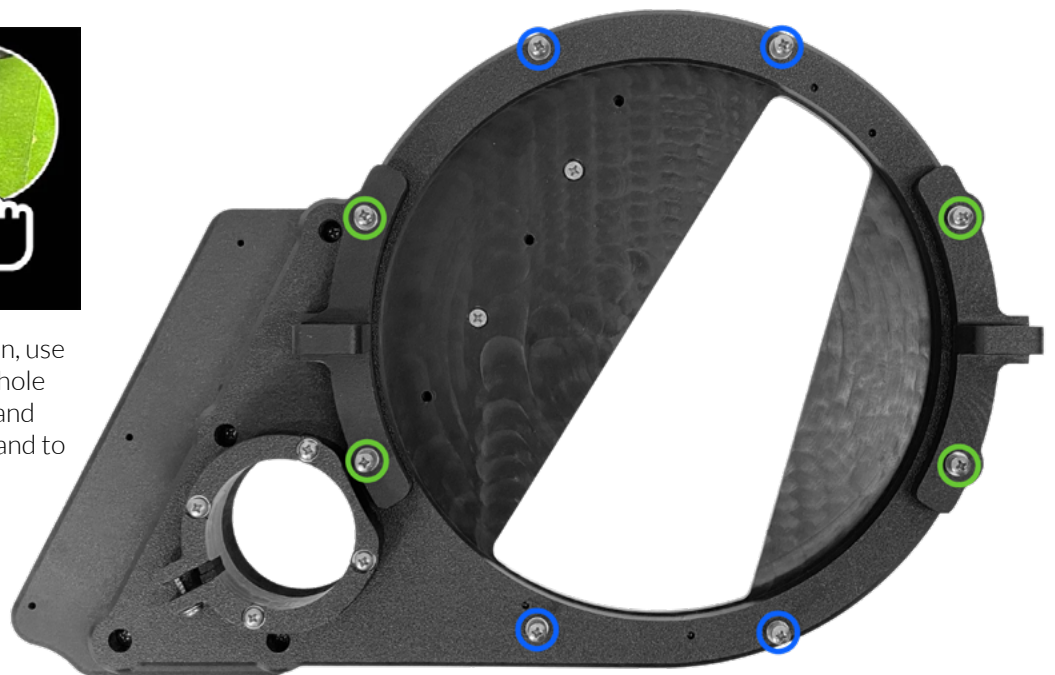
WARNING

Do not accidentally mix up the speaker mounting fastener holes with the through bag holes. It is recommended to put all of the speaker fasteners in place so that you do not confuse the bag to mount faster holes with the speaker faster holes. Just turn the speaker fasteners in a few turns to block those holes.

The image (top right) shows all of the fastener holes that need to be marked to the bag. Red indicates 1" long fasteners and yellow indicates the single 2" long faster (to be covered later in this instruction set).



The image below shows all of the speaker faster holes that should not be confused with the bag-to-mount fastener holes.



Blue circles indicate 1.5" long fasteners and green indicates 1" long fasteners. The longer fasteners are required where the woofer anchor points are located. **Be sure to use washers on every speaker fastener.**

Use a drill angle adapter with a small hex end drill bit to drill through the bag at every marked hole. Then follow up by drilling a larger 3/16" hole from the outside of the bag to the inside.



Step 5 - Mount the Router Templates



Your kit comes with two identical router templates. The templates have three fastener holes that line up with three of the holes you drilled into the bag. One template goes inside of the bag and one goes on the outside. Using the supplied template bolts and lock nuts, bolt the templates onto the bag so that the bag is sandwiched between the two templates. Use a large drill bit to drill starting holes in each of the four corners of the grill opening. Stay $\frac{1}{8}$ th to $\frac{1}{4}$ of an inch away from the edge of the opening in the template.

Step 6 - JigSaw

Use a jig saw with a blade long enough to reach past the $\frac{3}{4}$ inch template and the 1 inch recess of the bag's shock cavity. The blade needs to be about 2" in length past the base plate of the jig saw when at full upstroke. Leave about $\frac{1}{8}$ th of an inch of material around the edge. Be sure to also cut out the port opening as well as the speaker grill opening.

Step 7 - Router

Use the supplied $\frac{1}{2}$ inch flush cut router bit to trim out the remaining material in the grill opening as well as the port opening. Be sure to check that the router bit bearing collar is tight before you start. Be sure not to run the router at too high of a speed. It is not recommended to use a single-speed router, because single-speed routers tend to run at a full 24,000 RPM. It is advised to either clamp the bag to a solid surface as you route it or to use a fenceless router table.

Router Alignment

Adjust the height of the router bit so that the bearing will safely ride along the template attached to the outside of the bag as shown in the image.



Fiberglass Bags

Fiberglass bags require the use of a specialized router bit that is made for composite materials. It is not recommended to use the supplied router bit on fiberglass bags.



Warning

Always use safety glasses and understand your tools before using them. Use common sense and caution when using power tools.

Step 8 - Install Speaker Grill



Use the supplied double-sided foam gasket around the grill opening. Take your time getting this gasket material in place. The trick is to peel the backing as you apply the gasket. Next, stick the grill in place. Make sure that you line it up properly.



Once installed properly the grill should look like the image above with perfectly crisp edges.

Step 9 - Gasket the Woofer Plate



It is critical that the speaker grill and the port holes are absolutely airtight. Air leaks anywhere in the bag are not good for bass reproduction but near the port and the grill, small air leaks have a much more negative effect on the speaker's output than in other places like the lid or the hinge that are further away from the port. Note that the flat areas around the grill area as indicated by the orange arrows do not need to be gasketed. This is because these areas do not make contact with the bag.

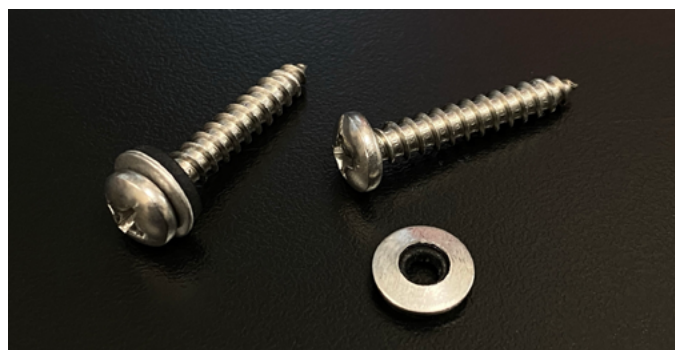
Tip: After installing the woofer mount, use a flashlight in a dark room to check the gasketed areas for possible leaks. If you see light come through, air is definitely going to make it through as well.

Step 10 - Gasket The Woofer

Next gasket around the woofer. It is easier and cleaner to run a gasket around the woofer mount instead of the woofer. Pay attention to the screw holes. You do not want the gasket to overlap any screw holes because the gasket will wind around the screws and tear creating an air leak. Be sure that the end result is airtight when the woofer is mounted.

Tip: always remove the woofer mount from the bag when fastening or unfastening the woofer from the mount. Don't bolt the woofer in place with the mount in the bag. Don't be lazy. It will just cause you time and frustration to try to cut this corner.

Step 11 - Mount the Mount



Place the mount back into the bag and thread in all fasteners. Note that there are two different size fasteners. there are six 1" long screws and one 2' long screw. The two-inch long screw is used at the front of the mount. Use the supplied rubber-backed stainless washers on all 11 mounting screws to protect the bag paint and to increase the clamping surface area.

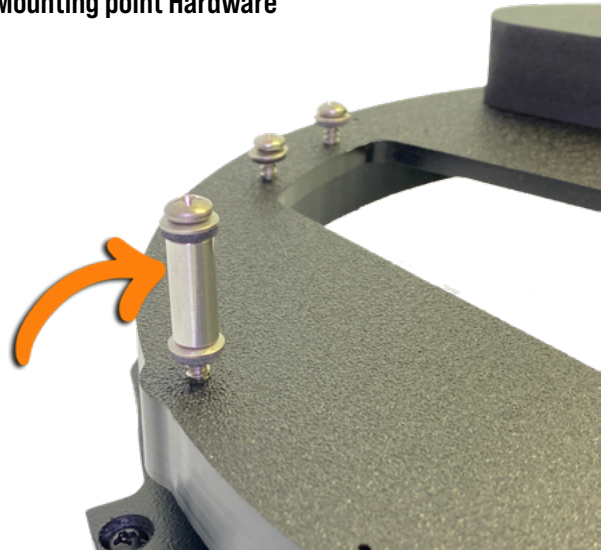
Front Mounting Point



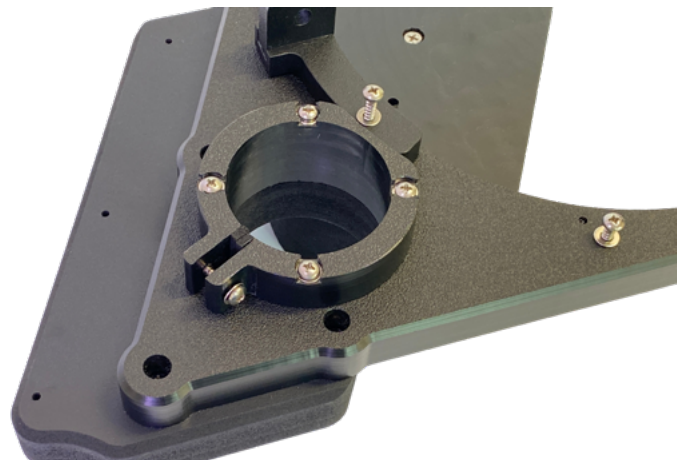
The picture above shows how the hardware should be arranged at the forward most mounting point. Looking down into the bag at the mounting point that is located at the front of the bag. This fastener uses an aluminum spacer and two washers on the inside of the bag and a third washer on the outside (painted side) of the bag not seen in this picture. Notice that there is one washer that goes on before the aluminum spacer and another after the aluminum washer. Both with the rubber facing the woofer mount.

When screwing the mount in place it is easiest to start with the front mounting point and then move on to the remaining 10 mounting points in the rear, one at a time. If you have a pick tool with a 1/8" shaft at your disposal it makes finding the holes in the woofer mount and lining everything up a little easier. This can also be done without a pick tool. In either case you want to get all of the screws started and then tighten it all down evenly. Afterwards use a flashlight to make sure that the gasket around the grill has made a complete seal all the way around the grill opening. If there are any unexpected gaps, remove the mount and add a second layer of gasket to the problem area. As long as the bag was cut correctly this should not be a required step.

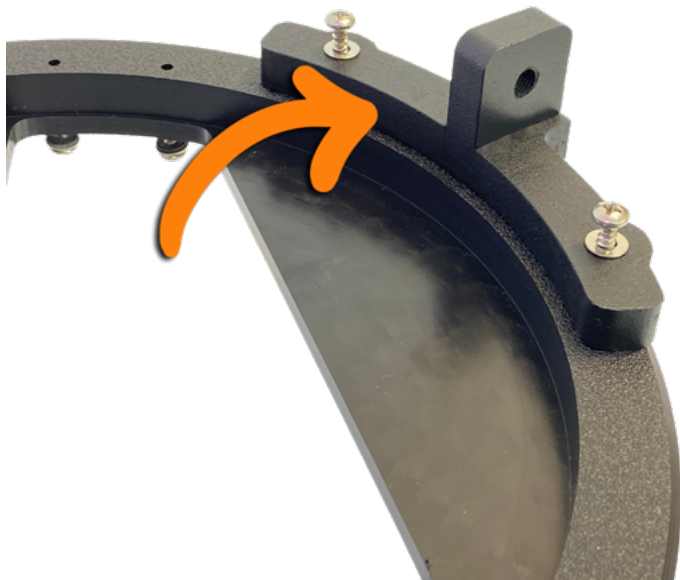
Front Mounting point Hardware



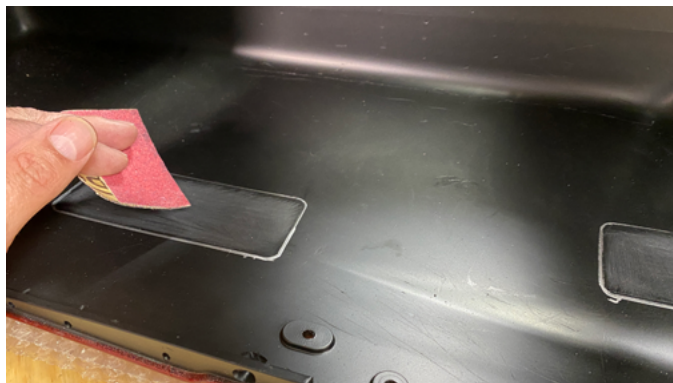
Port Clamp



The woofer mounting plate has an integrated clamp that is used to fasten a lengthened port to the mount. Later in this article, there is more information about selecting the best port length for your application. This clamp is designed to accept a standard 2-inch PVC pipe. It should be noted that with no length of pipe inserted in the clamp, the thickness of the bag, woofer mount, and clamp all add up to a port length of 2.7 inches. If you remove the clamp the port length is then 1.95 inches. The port diameter is also 2.3 inches with no pipe inserted and 2 inches with a pipe inserted. This is by no coincidence. The most useful port lengths for the DB Drive Euphoria Expet 10-inch woofers, as well as many other woofers, is in this length range (no pipe length inserted). The point is, do your homework and know what port length you want to use and for what reason. Shorter port lengths yield a higher output and higher tuning frequency. Longer pipe lengths yield a lower tuning frequency and reduced output. The difference in just an inch or two of length one way or another is profound.

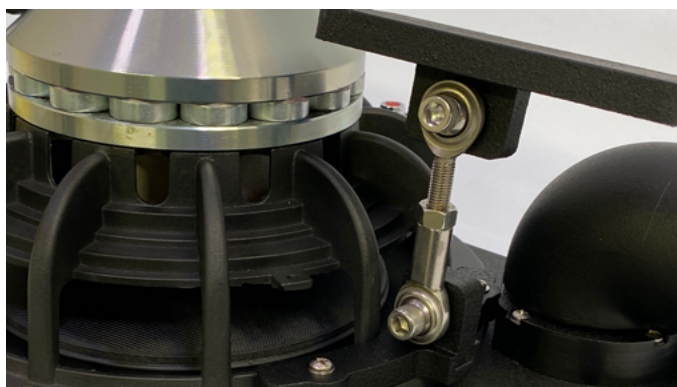


Install the two heim joints as shown in the picture. Adjust the length so that the anchor points are pressed up against the bag and hold their position. In the picture, the anchor points are wrapped in masking tape. This is done so that when we mark the anchor positions on the bag wall, the silver marker does not get all over the anchors. The anchors are textured and not as easy to clean and paint over as the inside of the saddlebag. Alternatively, you can mark the anchor positions with pencil. It is not as easy to see but it is much less messy. The front anchor should be oriented so that the angled side points toward the front of the bag. The rear anchor should be oriented so that the shorter side is closest to the woofer magnet. Position the anchors so that the heim joints are as straight as possible. The straighter they are the stiffer and more effective the braces will be.



Woofer Anchor Points

There are two anchor points that attach to the bag. These anchors get epoxied in place (one front and one rear). These should be added after the woofer is in place on the mount. These anchor points have 1.5 inch long screws that run through the anchor, through the speaker, and into the mount.



Now that you have marked the anchor positions, remove the anchors and the woofer and woofer mount. Position the bag on a table on its side. Degrease and sand each area where the anchors will be bonded in place with 80-grit sandpaper.



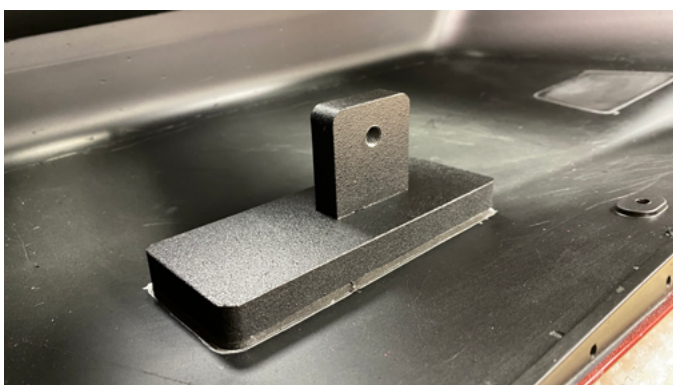
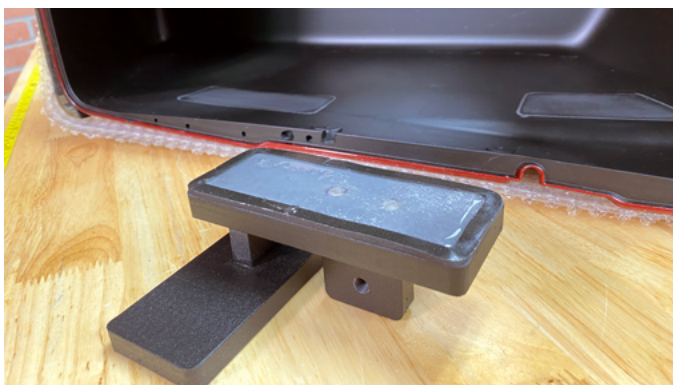
Step 12 - Installing Bag Anchor Points



Use the supplied double-sided gasket to create a dam around the perimeter of each anchor. Epoxy and bond one anchor in at a time. Situate each anchor on your workbench so that the bonding area is facing up and the anchor is level. Use 5-minute epoxy to flood the back side of the anchor. Then in one smooth motion, flip the anchor so that the epoxy side is facing down and stick it in place. Allow the bags to cure for 24 hours.

Tip: You can find self mixing 5 minute epoxy at your local hardware store for about \$8. You will need two .47 fluid ounce epoxy kits per bag. One for each anchor.

Flooded with Epoxy



Step 13 - Finishing up the Install



Clean up any visible markings around the anchor points. If you want a pristine-looking bag, pick up a can of SEM brand satin black color coat upholstery paint (part number 15243). This paint is available at most any automotive paint store. Alternatively, Duplicolor makes a satin black equivalent that can usually be found in more consumer-driven stores such as Autozone, Walmart, Pepboys, etc. This stuff sprays like paint but does not build up like paint. When it dries it bonds very well to the plastic. No primer or sanding is needed. The end result will look like pristine new plastic.

Now reinstall the woofer mount, woofer, braces, and port if adding one. Assuming that you have figured out what port length you

want to go with, this will be the last time you assemble all of these items. So take your time and get it right. Be sure to double-check that everything is air tight.

Euphoria EX10NMB-CFXL Tuning Guide



Introduction

The BA10P Ported Bag Woofer Mount is designed to allow the saddle bag to function as a quality ported speaker enclosure by coupling the woofer mounting surface (inward-facing wall) to the outward-facing wall. This dramatically reduces bag flex and increases the speaker's output. Additionally, the woofer mount has an integrated port that can be used to alter the tuning of the saddlebag and dramatically increase output on the lower end. This setup can be used with lids that have speakers as long as the lid speakers are installed with hard air-tight enclosures that separate them from the woofer's air space.

Tuning & Configuration Options

We have documented several recommended configurations to aid you in your decision-making.

Saddlebag Air Space

A standard Harley saddlebag has .8 cubic feet of air space. Factory extended bags have .84 cubic feet of air space. Aftermarket stretched bags need to be measured for air space in order to calculate port length. The easiest way to do this is to fill the bag with packing peanuts. And then measure the volume of peanuts using a container with a known volume.

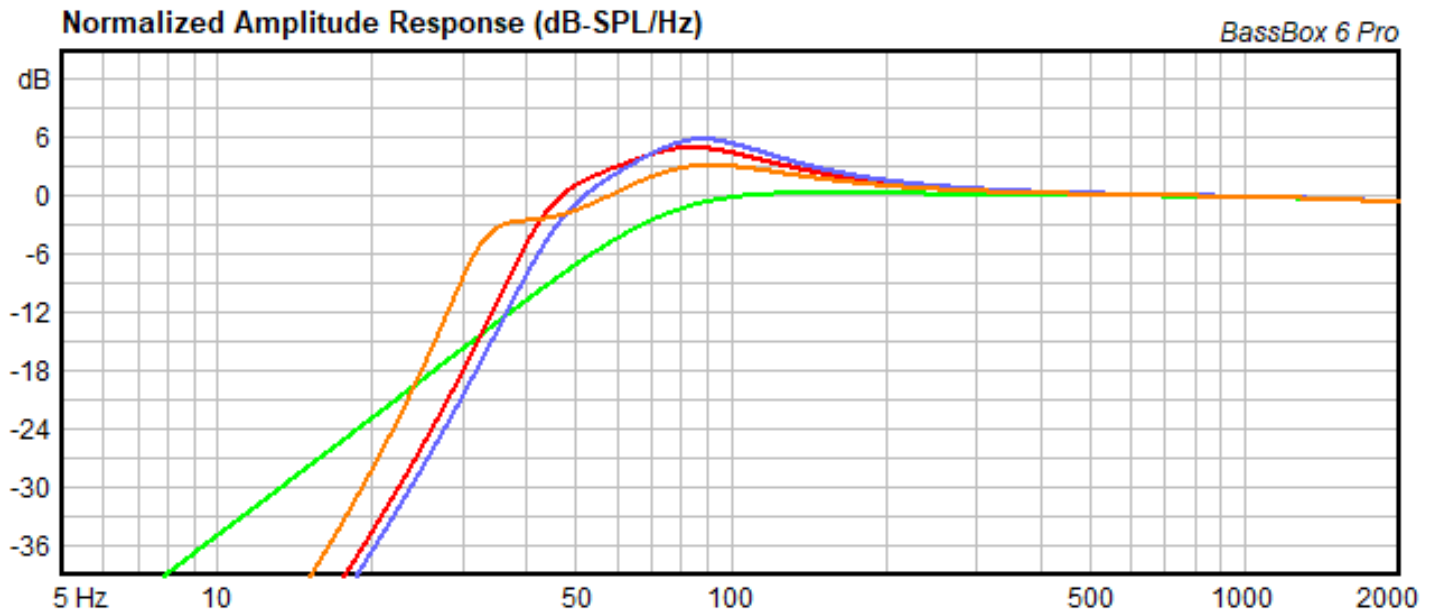
Port Length Options

The port is removable so that the woofer mount can be fitted with various port lengths for different tunings and to account for various saddlebag air volumes. For both standard and factory extended bags, when using the Euphoria Expert woofers, it is recommended to use a port length of 4.9 inches (Orange in the graph). This creates an

ideal port length for most installations. A longer port can be added for a lower tuning frequency but will come at the expense of output. For aftermarket stretched saddlebags with a larger volume, a lower tuning frequency can be achieved without a trade-off in output. As with anything, there will be a limit to how much lower of a tuning frequency can be achieved before output takes a hit.

Tuning Frequency Vs Output

All ported speaker enclosure volumes (big and small) have a lower frequency limit to how low they can be tuned before the output takes a dive. To aid you in your port-length decisions we have documented 5 port-length scenarios and plotted them



below. The tuned frequency of the enclosure is the point at which the port and woofer are both working together. This is generally the most efficient output range but is not necessarily the low-end limit of the subwoofer system. The F3 frequency is the more important number to pay attention to and is the lower frequency limit of the design and represents the lowest usable frequency the subwoofer design is capable of. Below this frequency, the woofer will quickly lose mechanical cone control. It is not practical or advisable to play a woofer below the F3 frequency. All woofers should use a high pass crossover at or very near the F3 frequency in order to avoid damaging the speaker. F3 is defined as the 3db down point where the subwoofer runs out of gas.

Green - Sealed factory saddlebag with .8 cubic feet of air space. This is the least desirable configuration. This is how the EX10NMB-CFXL woofer will perform without a port. This design has an F3 of 66hz and no tuned frequency because there is no port.

Red - Ported factory saddlebag with .8 cubic feet of air space. This is how the same woofer will perform with a 2.7 inch long port that is 2.3 inches in diameter. The F3 of this design is 42hz and a tuned frequency of 53.5hz. Not using any added port length but leaving the port clamp in place will get you this result.

Blue - Ported factory bag with .65 cubic feet of air space. This is the amount of air space that you end up with if you are using 6x9 lid speakers with small hard sealed

enclosures. The F3 is 46hz and a tuned frequency of 59.5hz. The port length is 2.7 inches with a diameter of 2.3 inches (the same as the Red design).

Orange - Ported factory saddlebag with .8 cubic feet of air space (no lid speakers). This design has an F3 of 35.5hz and a tuned frequency of 40hz. A port length of 4.9 inches, and a port diameter of 2 inches. This design allows the woofer to play lower at some expense of output. Because this configuration extends the woofers response a full octave below the typical 6x9" or 8" lid speaker this is generally considered an ideal tuning.

Port Length Rules

Longer ports have lower tuning frequencies and shorter ports have higher tuning frequencies. Smaller diameter ports have lower tuning frequencies and larger diameter ports have higher tuning frequencies. Smaller volume enclosures require longer port lengths to obtain the same tuning frequency as a larger volume enclosure and larger volume enclosures require shorter length ports for the same tuning frequency as a small enclosure.

Elbow Ports

When a port has an elbow the length is measured down the center of the port. Or by measuring both the shorter inside length and the longer outside length and then averaging the two for a final length.

Important Details

Ported speaker enclosures are not just enclosures with holes in them. The mass of air inside the port acts as a counterweight to the movement of the woofer cone. The balance of mass between all of the air inside the saddlebag, the moving mass of the speaker cone assembly, and the mass of air inside the port are critical to a ported enclosure's performance. This counterweight interacts with the movement of the woofer cone differently at different frequencies. In order for the saddlebag to perform as a good ported enclosure there are steps that must be taken to make sure that the bag can retain air pressure, so that the balance of all three masses Enclosure, cone, and port are as intended. Otherwise, the port can not act as a counterweight and will start to act like a hole in the bag which will result in low output and dramatically reduced bass response.

Make Sure To

- Add gasket between the lid hinge bracket and the lid.
- Ensure that the lid gasket is in good firm condition and that the point where the lid gasket joins together creates an air-tight seal.
- Insure that all rubber grommets and mounting points are in good condition and will make an air-tight seal.
- Ensure that the lid hinge cover is gapped properly so that it does not rattle against the side of the lid or the bag.
- Ensure that the woofer mount makes an air-tight seal to the bag around the port and grill openings.
- Ensure that the woofer is well sealed to the woofer mount.
- Ensure that if a lid speaker is being used that the lid speaker is installed with an air-tight enclosure that separates it from the woofer's air space.

How It Works On A Bike

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the subwoofer. So don't do that!

Subwoofer High Pass Crossover

All mid-woofers and subwoofers should be high passed at or above the F3 frequency. Never crossover any bike speaker below its F3 frequency.



Very Important!

How to Set the Subwoofers Gain in Relation to the Rest of the System

Never attempt to set the subwoofer up first. EVER! Always tune the entire system without the subwoofer on at all. Only after the rest of the system has been phase optimized, gained, and equalized should you ever introduce the subwoofer into the system. To set the gain of the subwoofer you should play the system at 90% of its capable volume level, then slowly turn up the subwoofer gain. When doing this you need to pay very close attention to the mechanical stresses on the subwoofer. Pay attention to the heat being generated by the subwoofer. You do not want to go thermal and melt your subwoofers voice coil. You want to find but not exceed the mechanical limitations of the subwoofer system. Once you find the mechanical limitations back the gain off a bit and try running the rest of the system to 100% of its volume capabilities, making sure that the subwoofer does not push past its limitations in the process. When set up correctly all speakers will be able to run right up to their mechanical imitations all at the same time. When speakers run into their mechanical limitations they are no longer able to play any louder without causing damage or audible distortion. You can hear this limit if you just listen for it.

Don't Go Thermal!

Speakers have two limitations

- Mechanical
- And Thermal

Thermal is when the speaker is overdriven to the point that the wire inside the voice coil burns. This can easily be avoided because thermal limitations come way after mechanical limitations. If you don't drive your speakers past their mechanical limitations, you will never encounter the thermal limitations. When a speaker goes thermal you have ignored all of the signs. Remember that burned voice coils are not covered under warranty.



Don't Void Your Warranty!