HOW TO BUILD YOUR OWN AMPLIFIER RACK

CAR STEREO REVIEW

THE MOBILE ELECTRONICS AUTHORITY

Radio Races

9 CD Heads Tested Head To Head

EVERYDAY PEOPLE

Daily-Driver Systems In A Chevy Astrovan, Olds Calais, And Honda Accord

07
03904
0 272601 4

JULY 1998
USA $3.99
CANADA $4.99
UK £2.50

Board of education: Audio Coupe's Jason Venne lays out some of the basics of building your own amplifier rack; here, to get an idea of placement and position, Venne traces the outlines of 3 components on a piece of MDF

Rack Jobs

WHEN IT COMES TO INSTALLING AMP RACKS, IT'S ALL ABOUT LOCATION, LOCATION, LOCATION

ONE OF THE MOST CRITICAL STEPS WHEN YOU'RE IN the design stage of planning your car-stereo system is determining the location for each component in your car. A few issues ago, we took a look at how to best integrate a subwoofer system into a vehicle without cluttering up the interior ("Stealth Care," April 1998). Similar design-integration objectives hold true for amplifiers, crossovers, and signal processors (such as equalizers and DSP units), which all have to be properly mounted so that they can be neatly wired and carefully placed in order not to use up too much cargo space. The favored technique for economically and ergonomically assembling these devices is to install them on an amplifier rack.

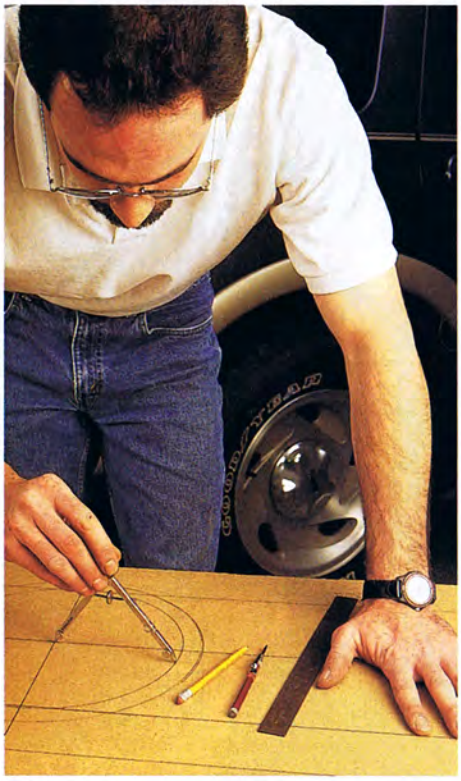
Although the overall design may vary from car to car and/or from installer to installer, the amp-rack concept is a common element found in many systems. A number of different materials are used to construct amp racks, including painted or laminated wood, Corian, and Plexiglas.

The most common method of arranging components on an amp rack is to set them in their proper places on the rack based on physical fit and cosmetic integration, and then lay out and connect all of the wiring on the workbench rather than trying to make numerous terminations while working upside down in a trunk or hatchback. Some stereo systems are designed around a subwoofer enclosure, so it's not uncommon to see amplifiers artistically arranged on one side of the woofer box (though vibrations from a poorly braced panel may reduce component reliability). Everything from wood screws, nuts and bolts, rivets, and industrial-grade Velcro can be used to secure gear to amp racks. Some amplifiers even have heatsink "bridges" avail-

JIM RAYCROFT

BY MICAH SHEVELOFF

Rack Jobs

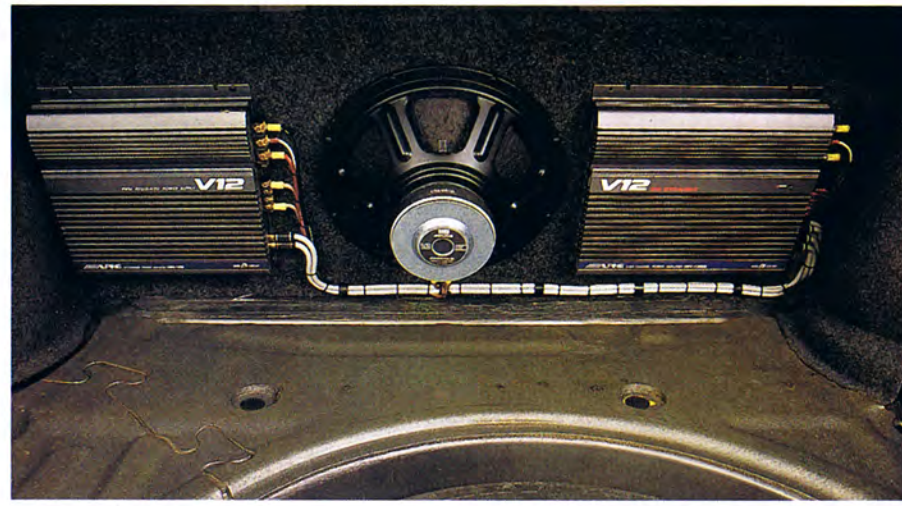


able as an option, which cover the connections completely.

An amp rack can be attached to a vehicle in numerous ways. You can build a "stealth" rack with a cover that'll make it completely disappear from view. Or you can rig it so that the entire rack can hinge or swivel out of the way, allowing for easy access to a spare tire or storage area. This concept can be carried one step further with the use of motorization, which, through extensive custom assembly, can raise and lower an entire amp rack electronically. *[You can see this method used in many of the competition systems that we profile here in* CSR, *such as the amazing amp rack in Jason Shoefstall's '90 Toyota 4Runner that was featured in "4 In The Family," June 1998—Ed.]* An amp rack can also look quite at home when covered in upholstery that matches the car's interior. This type of cosmetic treatment is often used when the rack is attached to a subwoofer enclosure to give the system package a uniform appearance.

For this article, we've concocted 2 separate and individual real-world amp-rack applications. The first is for the trunk of a 1986 BMW 325, illustrating the practicality of a 5-channel system while utilizing one of my favorite techniques for attaining deep, rich bass: the free-air woofer. The second is in a 1998 Ford Expedition, a particularly large vehicle without an outwardly obvious space for an amp rack.

While these applications can be implemented by the experienced DIYer, I'd suggest consulting a professional installer to



The plotting thickens: Venne's first order of business when building the Bimmer's amp rack was to measure and cut the MDF panel (top left) so that it fit snugly up against the rear wall of the trunk. He paid close attention to size and shape so that there were no gaps between the panel and the trunk walls. Satisfied with the panel's fit, Venne carefully mounted the 12-inch Alpine subwoofer in the center of the rack so that it would fire through the Bimmer's optional trunk pass-through hole (lower left), then flanked the 12-incher on either side with Alpine power amplifiers (top right; different amps were used for this photo shoot than those that appear on the finished rack). All was covered in carpet and mounted behind the rear seat for a uniform look (lower right)

handle anything you're not comfortable with. Let's rack 'em up!

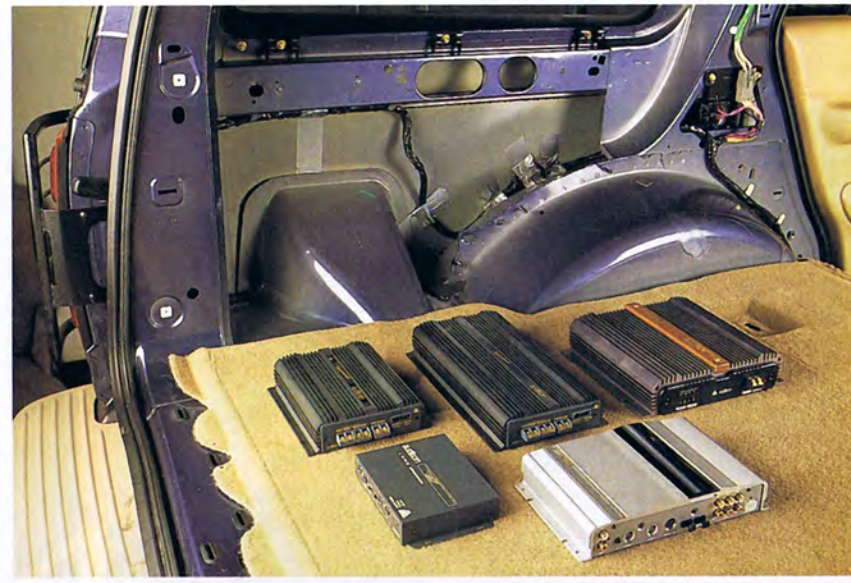
APPLICATION ONE: 1986 BMW 325

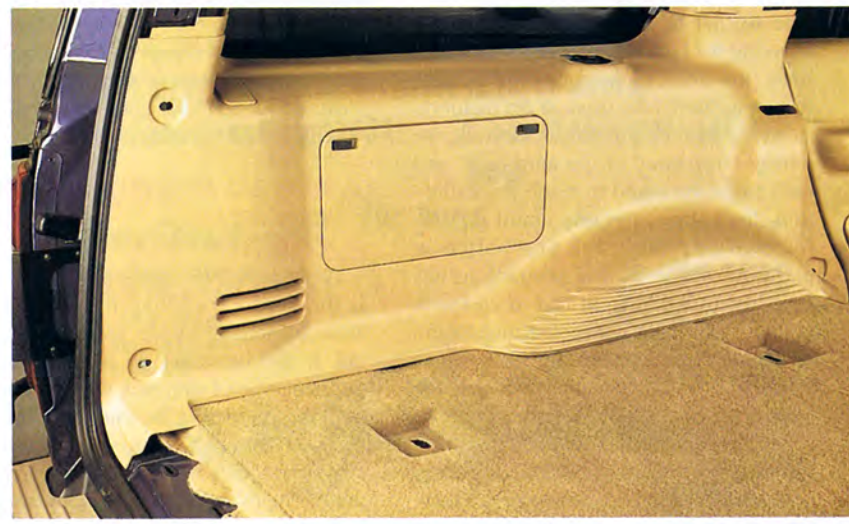
In the Bimmer application, the amp rack also serves double duty as a baffle board for the system's subwoofer, an Alpine 3045F 12-incher (now discontinued), sealing the space between the trunk and the passenger compartment. This forces the output of the Alpine woofer forward through the rear seat via the optional trunk pass-through. (BMW offers an optional trunk pass-through that provides a tunnel between the car's trunk and the passenger compartment for skis, ski poles, or anything too long to fit in the trunk.)

I've achieved excellent results using the free-air technique in previous applications, but only when the baffle board's been solid and the surrounding sheet metal deadened against resonances. The crossover networks must also be variable for both the low-pass woofer output and the high-pass front and rear outputs. This flexibility is critical to fine-tuning the entire system upon completion. The advantage of the free-air design is that there's no need for a bulky enclosure that takes up space, adds weight, and increases installation costs. Unfortunately, it's difficult to construct such a system in most hatchbacks or sport-utility vehicles (SUVs) because of the absence of a trunk or dividing wall that'd separate the front and back sides of the woofer. Never fear; our BMW system is a perfect example of an amp-rack and baffle-board combo.

The 2 Alpine amplifiers I've chosen provide 5 channels of power. The MRV-F300 on the right of the rack is a 4-channel unit responsible for 2 front and 2 rear speakers. The MRV-T500 on the left is a bridged stereo amp assigned to power the free-air Alpine sub mounted in the center. The beauty of a system configured this way is in how little cargo space is taken up by stereo equipment, leaving ample space in the trunk for such things as luggage or golf clubs. Both of the Alpine amps have internal electronic crossovers, eliminating the need for an external crossover and reducing the amount of wiring between components.

The construction of the Bimmer's amp rack began with installer Jason Venne and a large sheet of 0.75-inch medium-density fiberboard (MDF). The MDF was measured to fit snugly up against the rear wall of the trunk (which, in this case, butts up against the back seat). By following the outline of the rear wall and cutting precisely, Venne ensured that there were no gaps. Once he was satisfied with the fit, the board was laid out on the work table and the 2 Alpine amps and the Alpine woofer were arranged to fit, al-





Hide and go seek: The driver's-side rear quarterpanel of the vehicle used in Application Two, the '98 Expedition, turned out to be the perfect place to hide the system's amp/processor rack (top) when Venne discovered it was hollow by folding down the interior side panel (middle). He placed all of the components on a 0.5-inch MDF rack that was mounted in the space and then replaced the interior panel for a clean finish (bottom)

Rack Jobs

Adapt and conquer: To Venne's dismay, there wasn't enough surface area on the back of the Expedition's interior panel to mount all of the components properly, so he mounted the Alpine processor horizontally on the metal side wall so that it wouldn't touch the other components, using industrial-grade Velcro (above). After mounting the processor (right), attaching the rack to the back of the interior was an easy task

lowing the speaker to remain centered so that it could vent through the aforementioned trunk pass-through in the steel wall of the trunk. With each component positioned properly, holes were then marked and drilled to allow each individual wire to come through the board in exactly the right place. Venne drilled the holes through the MDF and out the other side so that he could locate them after covering the face of the board with trunk-liner (the material used by BMW when they upholstered the trunk at the factory).

With everything mounted securely, the wiring terminated at the amp rack, and each cable measured to reach its destination, the entire assembly could now be lowered into the trunk and bolted in place. All of this careful planning results in a system wired from end to end with nothing spliced or connected midstream. A dense, closed-cell foam gasket was formed to fit between the rack and the steel wall of the trunk, and a layer of sound-deadening material was adhered to the entire surrounding area. This greatly reduces the chance of annoying vibrations messing up a great piece of music and clouding the detail in the bass region.

Once completed and tuned, the stereo system in the BMW was dynamic and had plenty of impact for any style of music. The kick drum on "Who You Are," from Dada's *Puzzle* (I.R.S.) came through clear enough that I could discern the pedal hitting the drum skin. I also appreciated the centered, soulful, and warm vocal. In fact, there was clear detail all throughout the frequency range. As an added bonus, the owner of the BMW still has a usable trunk because of the practicality of the free-air woofer system and the well-designed amp rack combo. Total time for installation of the rack: 6 hours. Cost: About $575 for parts and labor (excluding car-stereo components).

APPLICATION TWO: 1998 FORD EXPEDITION

At the top of the sport-utility food chain is the Ford Expedition, the Godzilla of SUVs: It's long, it's wide, and it stands way tall. It also illustrates the need for a very different type of amp rack than the one we built for the BMW. The interior of the Expedition is a wide-open space about the size of an NBA basketball court (give or take). There's no trunk to conveniently hide equipment in. Hmm . . . what to do?

After disassembling the inside of our '98 Expedition project vehicle, we discovered that the driver's-side rear quarterpanel was hollow, and that Ford had kindly left the space unused. After a short celebration, Venne set out to design an amp rack that would fit within the vacant area and be capable of housing several stereo components.

The system we designed consisted of 5.25-inch front speakers from an a/d/s/ Model 335is component set, 5.25-inch coaxial rear speakers from an MB Quart QM 130.03KX set, and a JL Audio Stealthbox subwoofer box that we located in the passenger's-side rear quarterpanel. This configuration required a stereo amp for the front speakers and for the rear speakers, as well as a mono amp for the subwoofer. An Alpine PXA-H600 digital wave-alignment processor and an Audison LX R2 active crossover completed the package.

Venne quickly discovered by measuring his work area that there wasn't enough surface area available to mount all 5 units, so he formulated a plan to conceal the digital processor behind the amp rack and keep everything tucked neatly behind the original trim panel by using industrial-grade Velcro to attach it to the metal side wall. Once the Alpine processor has been mounted, an Alpine Model 7949 CD tuner and Alpine CHA-S605 CD changer connected directly to it through Alpine fiber-optic cables and data cables. This

all-digital interaction reduces noise pick-up and eliminates the need for bulky signal harnesses running throughout the vehicle. The 3 Audison amps—a VR-206 (front), LR-230 (rear), and LR-1140XR (subwoofer)—were powered by a single 4-gauge StreetWires cable run from under the hood and terminated at the battery.

Behind the amp rack, the StreetWires 4-gauge power cable was divided by a StreetWires distribution block so that each component on the rack was fed by a stable source. The speaker wires were terminated at the amps and run to their proper destinations, following the same game plan utilized with the BMW install. Even though the stereo system in the Expedition is larger and more complex, the signal wiring is greatly simplified by the design of the Alpine Ai-Net components, which all plug directly into the Alpine processor located behind the amp rack.

Both systems are excellent examples of how a well-designed amp rack can make the most efficient use of limited space.

The only RCA-style signal cables used in the entire system went from the amps to the processor, both of which are located within the left quarterpanel.

Venne fabricated the amp rack for the Expedition out of 0.5-inch MDF, and covered it with trunkliner even though it would be completely concealed by the interior trim panel. Ford provided an access door for a storage box that we eliminated; however, we kept the door, which allowed us to make some amplifier adjustments even after the system was completed—and, of course, to show off the installation. Once assembled, the entire rack was hidden from sight by putting the quarterpanel back in place.

To the music. For starters, I cued up The Beach Boys' classic *Pet Sounds* (Capitol) and enjoyed the sweetness of track 8, "God Only Knows." I know the focus and placement of this old analog recording very, very well, and was satisfied with the Expedition's reproduction of this Brian Wilson masterpiece.

Next, I marveled at the midbass and kick-drum tuning evident on "It's Love," track 2 on *Faith, Hope, Love* by King's X (Atlantic). But the capper came with the devastating natural piano timbre on "She's The One," track 5 on World Party's *Egyptology* (The Enclave). Midrange and upper midrange were especially good with this track. In short, it gave me the chills.

Total time for this rack install: 9 hours. Cost: About $900 for parts and labor (not including the car-stereo components).

ALTHOUGH THE SYSTEM DESIGN IN THE BMW was vastly different from the layout in the Expedition, both vehicles are excellent examples of how a carefully designed amp rack can make the most efficient use of a limited space. These 2 ergonomic and fully functional rack jobs are also fine examples of an installer's creativity and craftsmanship. ■