

The Jack 10, Part 2

More applications for our versatile friend, Jack, the pro-sound speaker.

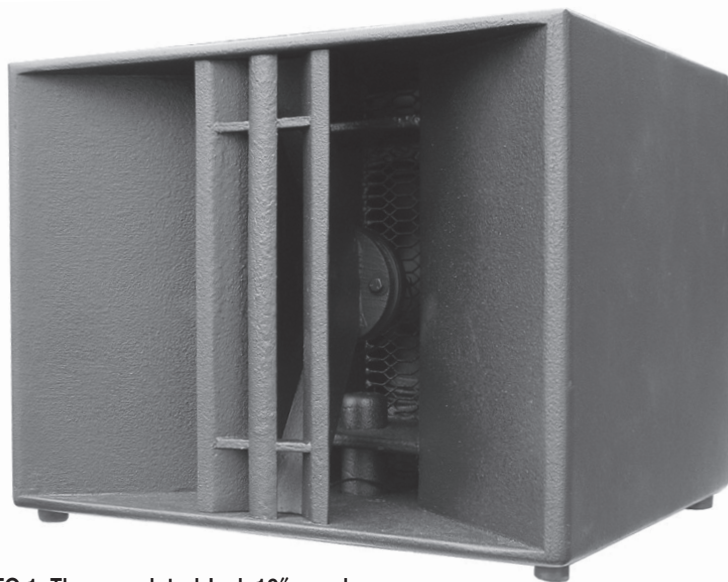


PHOTO 1: The completed Jack 10" speaker.

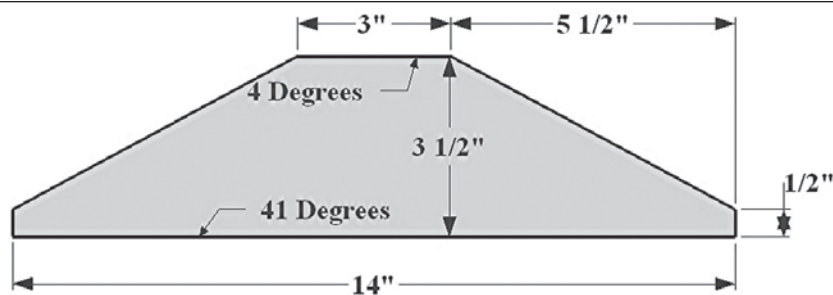


FIGURE 1: Horn sides.

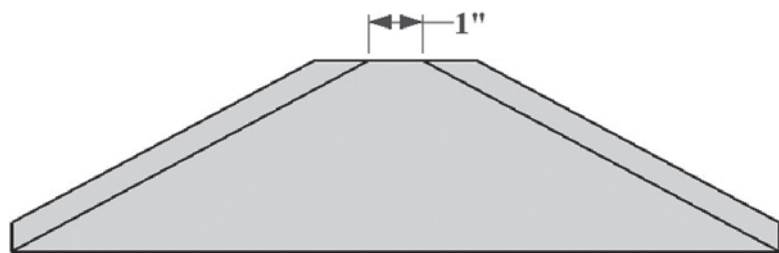


FIGURE 2: Side joints.

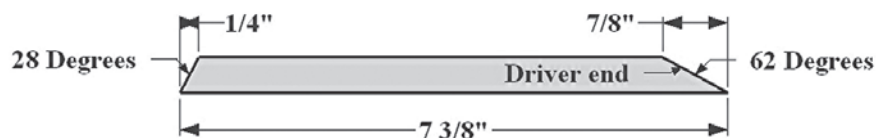


FIGURE 3: Reflector side view.

Last month I showed the woofer horn section of the Jack 10 (Photo 1), which you can leave tweeter-less for electric bass use. For PA or instrument use where a full-range response is desired, a high-frequency section is required. A vertical horn loaded by an Eminence ASD 1001 compression driver allows you to stack multiple Jack 10s in a line array, for superior cab-to-cab integration and system pattern control.

CONSTRUCTION

The parts are small, requiring great care to cut safely; a zero-clearance panel cutting jig on a table saw or a band saw is highly recommended. From quarter-inch or half-inch plywood, cut out two horn sides (Fig. 1). Note the angles, facing opposite directions. The diagram shows the inner face, which is the wider part.

Draw on the inner faces the joint lines with the reflectors (Fig. 2). Cut two reflectors from half-inch plywood. Start with pieces 2 to 3" wide and cut to length per Fig. 3. Cut the reflectors into trapezoids, with the sides angled at 4° and the resulting wider face on the inside of the horn, as shown in Fig. 4.

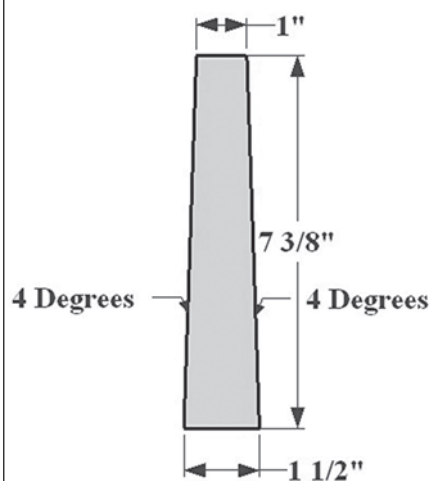


FIGURE 4: Reflector front view.

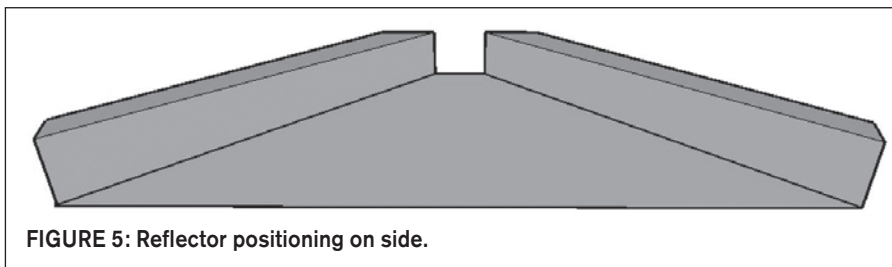


FIGURE 5: Reflector positioning on side.

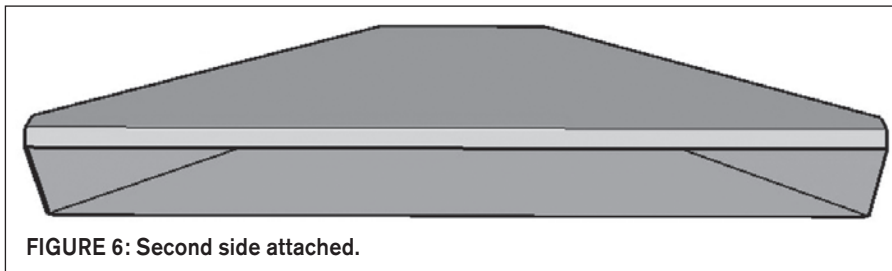


FIGURE 6: Second side attached.

The parts are too small to be easily fastened, so the best way to begin assembling the horn is with traditional woodworking glue, leaving the parts in place until the glue sets. Alternately, you may use quick-setting urethane glue, holding the parts in place while it sets. Sand/trim the reflectors for a good fit, coat one edge with glue, and set them in place on one side (Fig. 5). When the glue has set, the assembly will be stable enough so that you may use both glue and fasteners to attach the second side (Fig. 6).

Cut the baffle from quarter-inch plywood per Fig. 7. Attach it to the horn (Fig. 8). If you use a bolt-on driver, you may bolt it directly to the baffle. With a screw-on driver, you'll need a screw-on to bolt-on adapter.

From half-inch plywood cut two mounting flanges, 14¼" long, with the cross-section shown in Fig. 9. From quarter-inch or half-inch plywood, cut two diffuser brackets per Fig. 10. Glue

the brackets to the flanges per Fig. 11, with the brackets 2" from either end of the flanges. This job also is easiest using woodworking glue.

Place the flange/bracket assembly face down on the workbench to set, putting waxed paper between the assembly and bench so that they won't stick together. Dry-fit the horn assembly to the flange assembly to be sure everything aligns,

then glue the brackets to the flanges. When the glue has set, attach the horn to the flanges (Fig. 12). Use urethane adhesive here to fill any gaps in the horn to flange joints.

When the adhesive has set, attach the diffuser, a piece of ¾" quarter-round molding, cut 14" long (Fig. 13). On a tablesaw, or with a circular saw and sled, trim the ends of the assembly to finished height to match the cabinet. Cut a little from each end until the horn will just slide into place. The horn mounts centered in the cab, ½" back from the front of the cab. Drill pilot holes for mounting screws through the cabinet top and bottom into the flanges.

HOOK-UPS

The cab may be bi-amped, or passively crossed over. Figure 14 is the schematic for an 8Ω 2kHz 4th order high-pass filter. The capacitors are 200V or better poly caps. The inductors are air core, of the smallest gauge available. A value tolerance of ±10% is acceptable.

Figure 15 shows a 2nd order 2kHz low-pass filter to be used on the woofer.

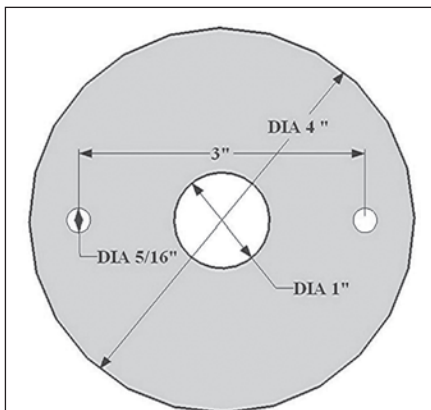


FIGURE 7: Compression driver baffle.

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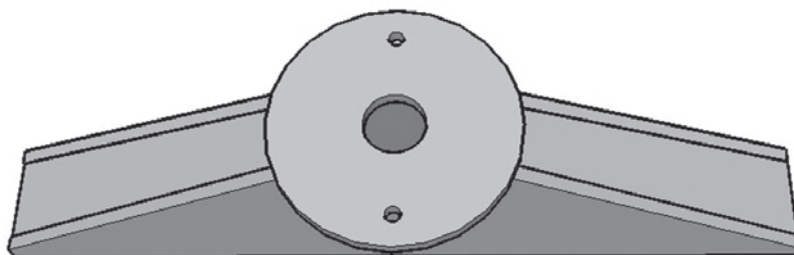


FIGURE 8: Baffle installed.

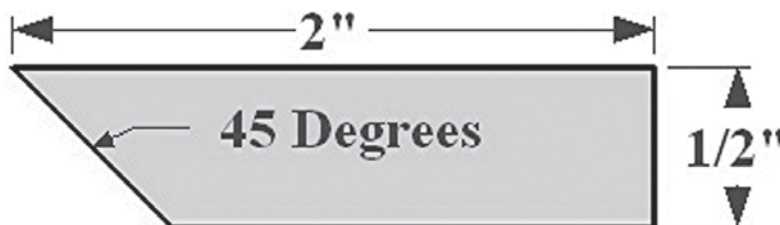


FIGURE 9: Mounting flange cross-section.

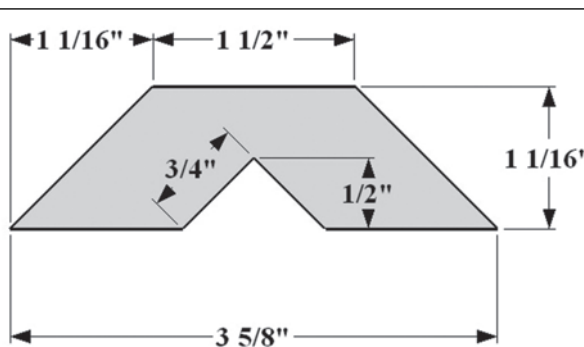


FIGURE 10: Diffuser brackets.

If you are bi-amping, omit the high-pass filter but still use a 200V 20μF polypropylene crossover capacitor in series with the HF driver for turn-on transient protection. You should still use the low-pass filter, because it's a Chebyshev configuration that increases woofer sensitivity near the top of its passband.

The inductor should be at least 16 ga., with a DCR of less than 0.4Ω. Because the capacitor is a shunt, a 100V rated non-polar electrolytic is adequate.

Figure 16 shows axial response with this configuration, compared with that of the similar size Peavey Versarray 112, which at \$1200 is one of the least ex-

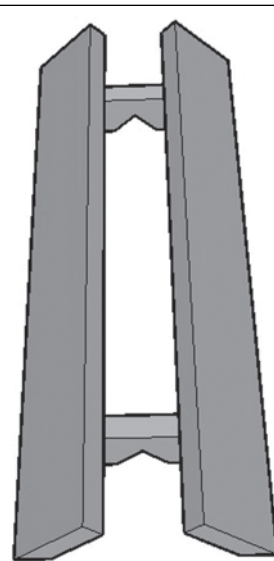


FIGURE 11: Diffuser/flange assembly.

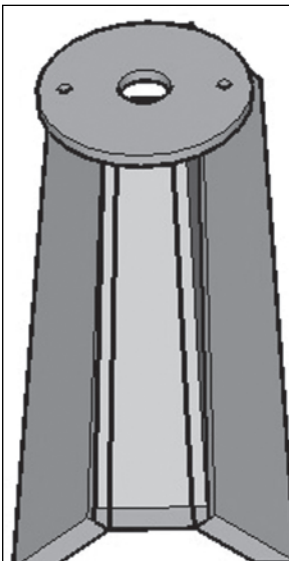


FIGURE 12: Horn/flange assembly.

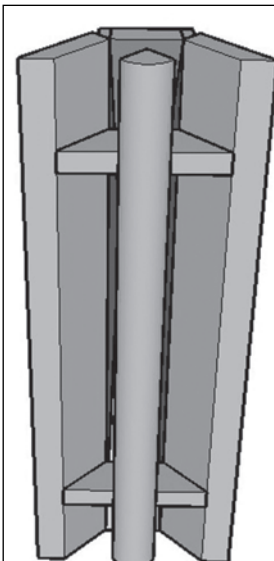


FIGURE 13: Completed HF horn.

pensive commercial line array speakers available. **Figure 17** shows the Jack 10 response on-axis and 45° off-axis, which is no more than 6dB down all the way to 15kHz.

Whether bi-amping or using a passive crossover, before sealing the cab, test it using a sine wave generator or test CD signal at the crossover frequency. Try it with the woofer only, and then attach the leads to the HF driver. Then reverse-wire the HF leads. Whichever way sounds louder is the correct polarity. If you don't have a meter to test the level, have another person listen to the cab from a few feet away while you switch the leads. Also test the woofer using a

50Hz test tone at a fairly high level.

If you hear any buzzing, it might be caused by the cone hitting the throat filler, or by the suspension hitting the spacer. Sanding the filler will fix the first problem, while adding a layer of cardboard to the frame gasket will fix the second. As you build more cabs, stack the newer one atop the older. Run a 100Hz test tone through the bottom cab, and then plug in the top cab. The volume should go up. If it goes down, the polarity of the new cab is backwards.

You can add a top hat for pole mounting, installed forward of the baffle. Use adhesive to seal it airtight. It's OK to have the top hat extend through the duct plate. *ax*



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FIGURE 14: High-pass filter.

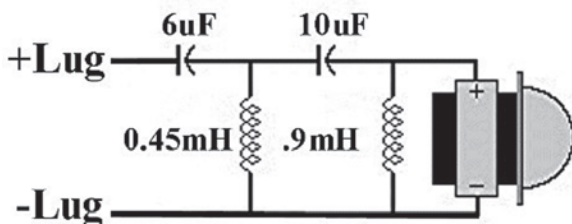


FIGURE 15: Low-pass filter.

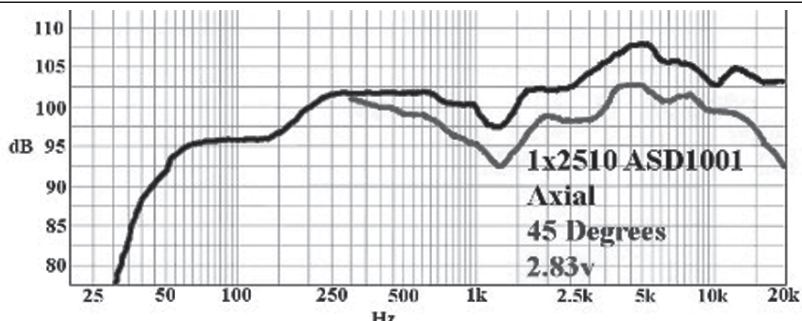
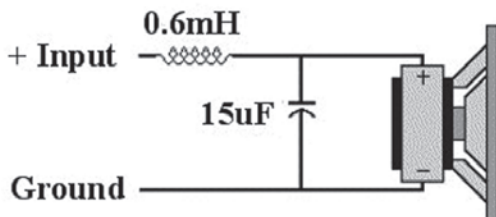


FIGURE 16: SPL Jack 10 and Peavey Versarray 112.

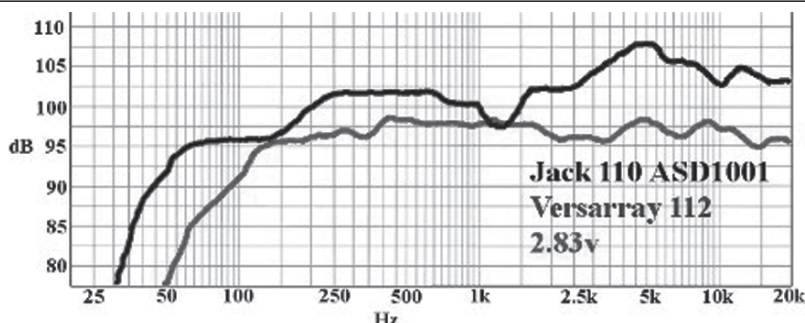


FIGURE 17: Jack 10 axial and 45° response.