The DR280

By Bill Fitzmaurice

This latest addition to the DR lineup lies between the DR250 (Jan. '04 *aX*) and DR300 in both size and performance, with more power and lower frequency extension than the 250, but small and light enough for one person to carry.

DR280 is a two-way system composed of a woofer, loaded by a folded horn, and a vertical tweeter array (**Photo 1**). The folding of the woofer horn allows a much longer pathway, and thus lower cutoff frequency (fc) than otherwise would be possible from the same cabinet depth. Its vertically arrayed multiple tweeters give higher sensitivity and better directional pattern control than a single tweeter. The cutaway side view (**Figure 1**) shows the positioning of the drivers.

You can use a wide variety of tweeter horns—piezo or dynamic. For simplicity you may use standard tweeters right out of the box, but multiple elements on multiple throats terminating in a single mouth give the utmost in performance. Variations on this theme are used in top-of-the-line $3k plus line array cabs from EAW.EV, JBL, Meyer, and many others. There is simply no better way to get high-power high-frequency output, and while commercial multi-throat single-mouth tweeters are very rare and quite expensive, you can make one for about ten dollars.

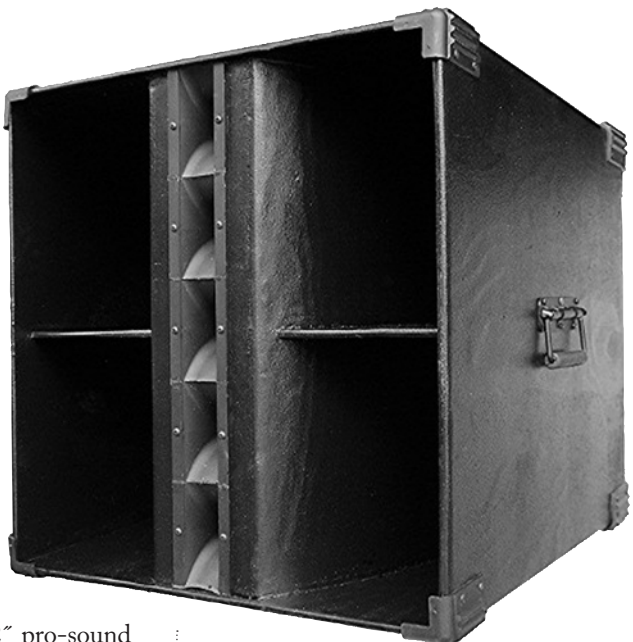
FEATURES

Smaller and lighter (70 lbs) than any commercial cabinet of similar capabilities, the DR280 has an 8° vertical splay angle built in. The lower boxes in a flown array may be fired downward, while a single box sitting onstage in backline duty will aim upward, so that the player can hear the highs. This is a critical feature, because vertical tweeter arrays have a very narrow vertical dispersion angle, while the splay of the box eliminates parallel walls in the woofer horn that would cause rough response. Rounded pathways through the horn bend allow it to work at least two octaves higher than folded horns built with flat panels, and these curved panels resist vibration better than flat panels triple their weight.

The recommended woofer is the Eminence Delta Pro 12. Pertinent T/S specs are fs 51Hz, SPL 98dB, Qts .35, Vas 82L, Xmax 3.2mm, and Pe 400W. You may substitute other 10 or 12″ pro-sound drivers with similar specs.

When shopping for drivers, consider seriously those with neodymium magnets, which are less than half the weight of ferrite magnet drivers, and also have more compact frames. The tweeters of the prototype are generic piezo horns sold under a variety of brand names, all using the 1025 model number. You can get drivers, as well as the rest of the cabinet hardware, from a variety of sources, including www.partsexpress.com and www.bltsound.com.

The SPL chart (**Fig. 2**) shows the response of the prototype cabinet, with tweeters and woofer only. Compared to the same driver in a bass reflex cabinet, the DR280 delivers 8dB higher average sensitivity from 100Hz to 1kHz. The 105dB/1W/1m



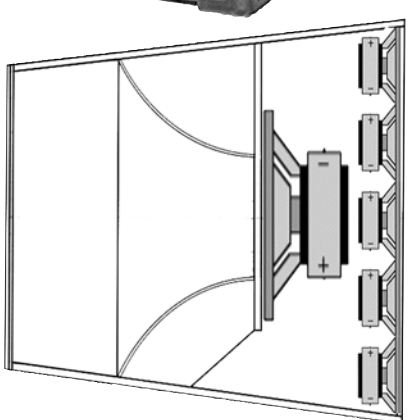


PHOTO 1 (top): The DR280.
FIGURE 1: (middle) Cutaway side view.

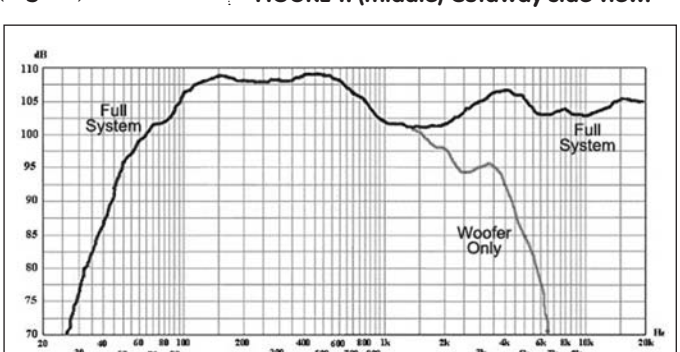


FIGURE 2: SPL 1W/1m half-space.

average SPL from 90 to 16kHz (±4dB) is a spec that very few cabinets at any price can match. The –6dB horizontal dispersion angle is 90°, suitable for most applications. With vertical stacking of more cabinets the horizontal dispersion remains unchanged, while the vertical dispersion is further reduced, for control of early reflections in difficult acoustic environments.

The cabinet is constructed primarily from ½˝ plywood. You may use softwood if it has at least five plies. Baltic birch is a popular option, but be sure your birch is actually Baltic, i.e., Russian, Finnish, and so on. Northern birch from the US and Canada is also good. [Some large retailers sell "birch" plywood sourced from Asia that isn't actually birch. This product has a thin veneer outer layer that easily chips, and uses inferior glue that leads to delaminating. Quality Baltic birch has equal ply thicknesses and uses marine-grade glue. Baltic is usually found in 5 × 5´ sheets; you'll need one sheet per DR280.]

The curved throat horn sheaths and back halves are made from ⅛˝ birch, while the curved mouth horn sheaths are ¼˝ spruce or pine. Use plywood with three equal thickness plies, because plywood with two thin plies over one thick ply (commonly seen in lauan), or more than three plies as found in birch, doesn't bend well. A single sheet of each size will be more than sufficient for a pair of DR280s.

Bond all joints with adhesive and drywall screws, piloted and countersunk. Be sure to deeply countersink screws along the cabinet edges so that you won't hit the heads when rounding the edges over. Use 1.25˝ screws jointing ½˝ parts, 1˝ screws with the thinner materials. Because the joints must be absolutely airtight, I highly recommend using caulking-gun-applied polyurethane base construction adhesive, such as PL Pro, which expands as it cures to fill gaps and makes caulking joints unnecessary. You also will need a hot-melt glue gun and a couple of feet of 4˝ schedule 40 PVC water pipe, which measures close to 4.5˝ outside diameter.

If you're going to build more than one of these, make tracing patterns of all the parts, because laying parts out is one of the more time-consuming aspects of the project. However, you need to figure out how to build it with the first copy before going into an "assembly line" mode to crank out more. I suggest that you read the instructions and look at the photos three or four times before starting the job. If you have any qualms at all, log onto my forum at www.audioroundtable.com/BillFitzmaurice/, where you can chat with me and other builders who'll guide you through the process.

CONSTRUCTION

Note that all the measurements provided are somewhat approximate. The actual thickness of the materials used and the accuracy of your construction influence sizes of the finished parts. This isn't a problem, because the design is very forgiving of minor errors. However, you do not want to attempt cutting out all the parts ahead of time, because a very small size deviation in the early stages of construction can be magnified into a fairly large error by the end.

Cut out each part as you need it, trim-

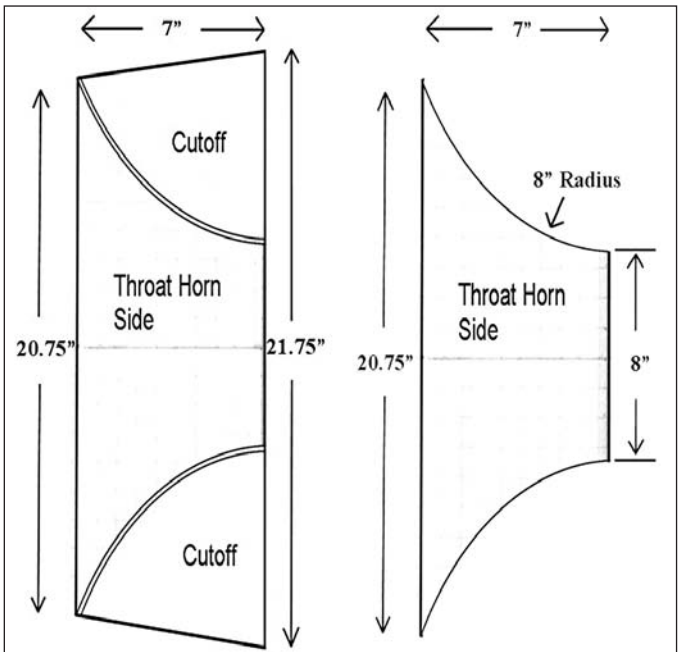


FIGURE 3: Throat horn side template.

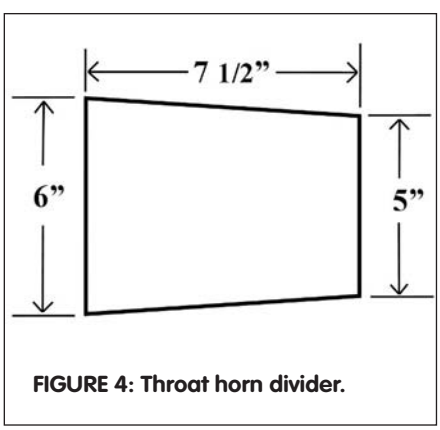


FIGURE 4: Throat horn divider.

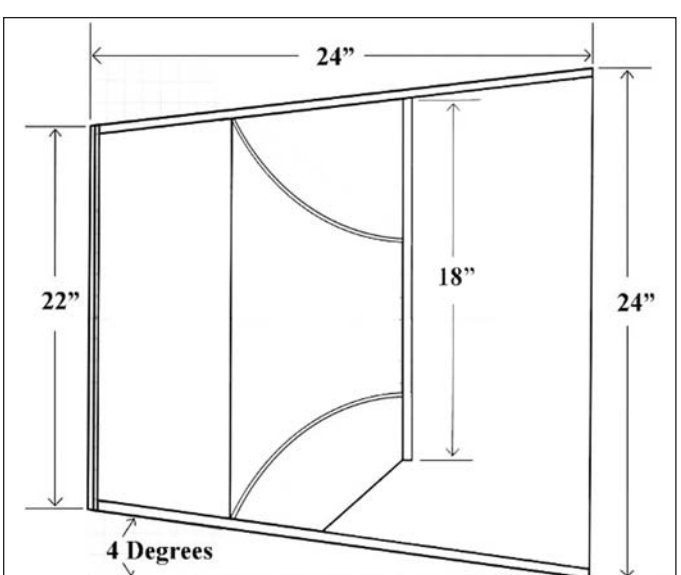


FIGURE 5: Side dimensions.

ming as required to actual finished size. When it fits properly, save it as a pattern to duplicate another. Always measure directly on the cabinet where each piece is to be installed to verify the true size required. When cutting parts from a full sheet of plywood, make them oversize and then trim them to final size on a tablesaw, preferably using a panel cutting jig for accuracy and safety.

The angle at which parts edges are cut, where applicable, will determine the finished cab size. The nominal cut angle for most of the angled parts is 4°, but a tolerance of ±1° is OK. While the nominal finished exterior height of the front of the cab is 24˝, yours could end up a half inch shorter or higher. The same applies for the rear height. No worries, response won't be affected.

Start by cutting out the two throat horn sides and the throat horn divider. **Figures 3** and **4** show the blank that the throat horn side is cut from and the throat horn divider. **Figure 5** shows the side view dimensions of the entire cabinet.

To trace radii make a compass out of a strip of plywood, with a screw point or nail at one end, and a hole at the radius distance from that through which a pencil is inserted to draw the line. Trace a radius from each end of the part—where

the two radii overlap is where you place the compass point to trace the final curve. That junction may fall off the piece of wood you're cutting, so have another piece of plywood handy for the compass point to rest upon (**Photo 2**).

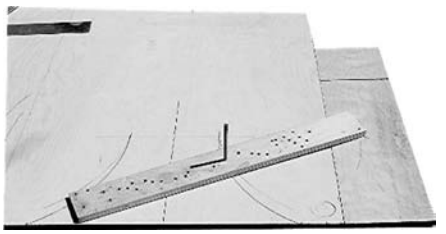


PHOTO 2: Drawing radii.

When you cut out the throat horn sides, you'll end up with four semi-triangular cutoffs; save two of them. Attach the throat horn sides to the divider, with the extra ½˝ of material protruding on the driver end. The narrow end of the divider goes toward the driver. Offset the divider ¼˝, so that one edge is on the centerline of the throat horn sides. This way the two halves of the horn are not quite exactly the same size, making for better response.

Temporarily screw the assembly to a piece of scrap plywood, squaring the sides, to stabilize the assembly (**Photo 3**). Cut the throat horn sheaths from ⅛˝ plywood. Flex the plywood first to determine the easier-bending axis. The sheaths are cut oversize at 8˝ wide by 11˝ long, to be trimmed to final size later.

PHOTO 3: Throat horn on assembly jig.

Attach one of the triangular cutoffs to one of the sheaths, down the middle, with the driver end of the sheath flush to

the end of the cutoff (**Photo 4**). Attach this to the throat horn assembly, with the sheath flush at the driver end, hanging over on the other. Repeat the process for the other side. To avoid splitting the wood, don't put screws within 2″ of the end of the parts. There will be gaps at the ends of the joints; use long clamps to hold those closed until the adhesive has set (**Photo 5**), after which you can remove the assembly from the jig.

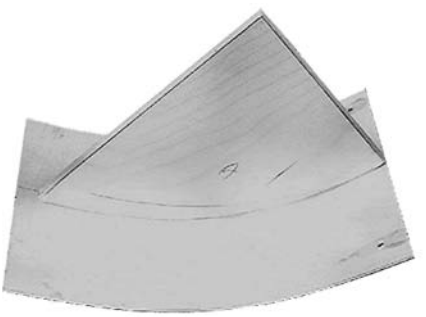


PHOTO 4: Throat horn sheath/brace.

PHOTO 5: The throat horn, clamped.

Trim and sand the sheaths flush to the sides, leaving the extra sheathing hanging over the ends. Cut out the throat horn supports, oversize at 22″ by 4″, with one long side at a 4° angle. Saw or drill holes in the supports, 3″ or so diameter. These holes allow the passage of air within the cabinet, lighten the assembly, and offer a handy spot to use a C clamp for assembly if you don't have any pipe clamps (**Photo 6**). Always clamp parts together when possible to hold them in alignment while you drive the screws.

Attach the horn supports to the throat horn, the 4° angled side to the horn. Make sure the angles face the proper direction so that the resulting assembly is flat. You need to drive the screws from the inside of the horn, which is easy if you have a right angle or short shaft screwdriver.

While the adhesive is setting up, cut out the top and bottom, according to **Fig. 6**. When you cut the excess from the rear, save the semi-circle scraps, which you'll need later. Draw all parts intersections on the top and bottom (**Fig. 7**). Onto the bottom draw and then cut out the driver access porthole per **Fig. 8**.

When the adhesive has set, trim the throat horn assembly to final size using a tablesaw, preferably with a panel-

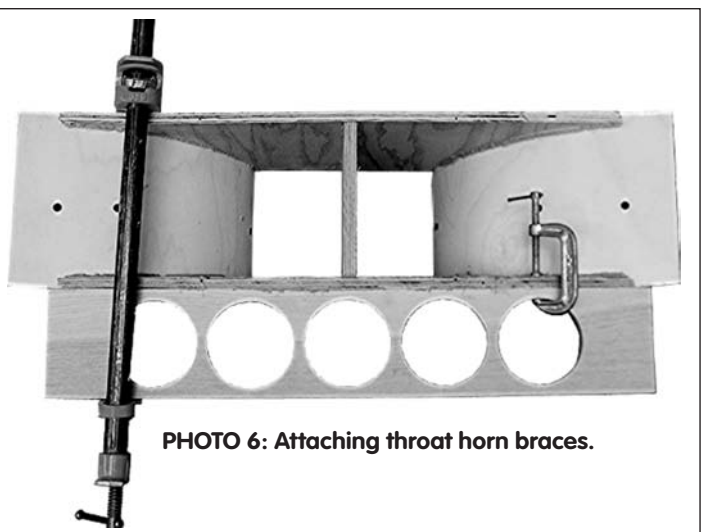


PHOTO 6: Attaching throat horn braces.

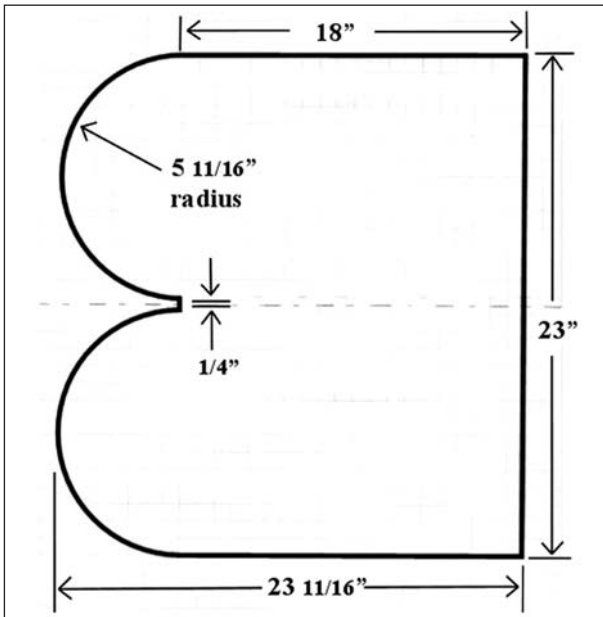


FIGURE 6: Top/bottom template.

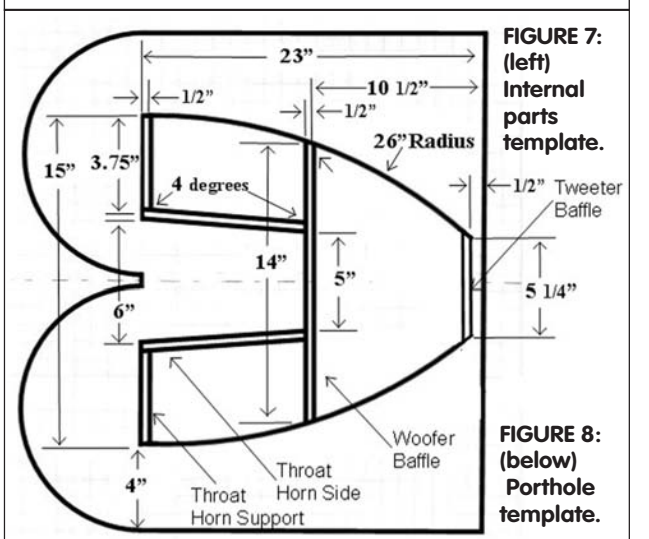


FIGURE 7: (left) Internal parts template.

FIGURE 8: (below) Porthole template.

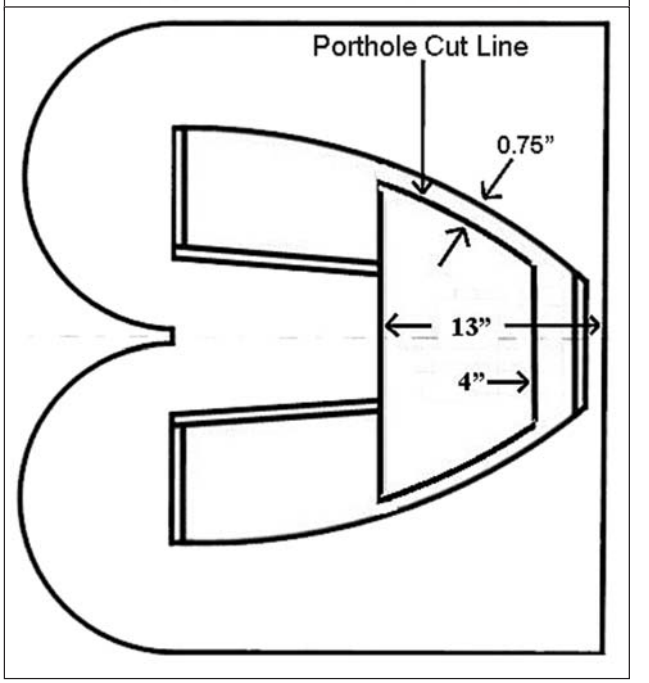


PHOTO 7: Throat horn before and after trimming.

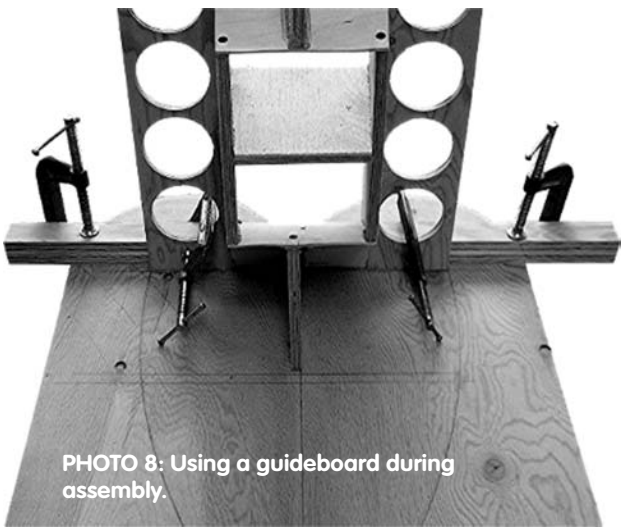


PHOTO 8: Using a guideboard during assembly.

cutting jig, which will square the assembly as you trim it. The edges of the supports are cut square, the top and bottom of the assembly at a 4° angle to match the taper of the box. Be sure the angle faces the right way.

Don't try to cut the height in one pass; ease it down cutting equally from both ends until you get it to about 20.75″. Trim/sand the cutoff braces as required to match the 4° box taper; cut about a 3″ triangle off the rear of one. **Photo 7** shows the trimming process atop a panel-cutting jig, and the before and after results.

Place a straightedge across the throat and braces where the baffle will be going, sanding the braces as required to true the assembly to flat. Attach the assembly to the cabinet top. This, and all jointing, is best done by pre-drilling pilot holes for the screws, clamping a straight 2 × 2″ guide board (made from a few layers of plywood) to the joint line, applying adhesive to the joint line, and then clamping the mating part to the guideboard (**Photo 8**).

Finish the job by drilling a pilot/countersink through the pre-drilled holes and drive screws, at least two per joint. To account for where the parts are at a 4° angle, cut one 4° edge on your guideboard. Also be sure to wipe any adhesive from the guideboard as soon as you remove it. Note that the untrimmed cutoff brace end of the assembly attaches to the top, the trimmed end to the bottom.

The woofer baffle (**Fig. 9**) is very tricky, so pay close attention to what you're doing. The rough dimensions are 18″ high by 14″ wide. The top edge is cut at a 4° angle, the sides at a 12° angle, the angles facing opposite directions. Refer to the diagrams to be sure of getting the angles right.

Cut a 5″ wide × 8″ high throat hole. Its center is about 11″ from the cabinet top; measure the assembly to confirm the

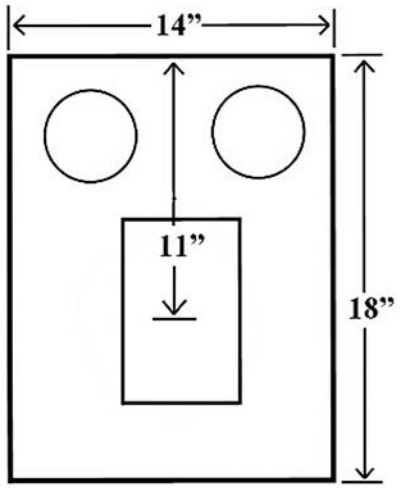


FIGURE 9: Woofer baffle.

exact distance. You also will need to add a ⅜″ or ½″ plywood spacer to prevent cone slap in long excursions. The hole in it is 11″ in diameter, while the outer edge is cut into a 12.5″ hexagon. For a 10″ driver make the hole 9″ in diameter. Using the woofer to determine their locations, drill holes through both the spacer and the baffle for T-nuts.

As large as this cabinet is, there's still not much room in the driver chamber, so I highly recommend that you use 3⁄16″ × 1.5″ Allen socket-head mounting bolts that you can drive by feel. Don't locate bolts at the baffle edges. Check the baffle edge angles to be sure that the wider side faces the throat horn and the narrower side the driver before installing the T-nuts or spacer. Drill or saw a couple of 4″ holes in the baffle to minimize internal reflections.

Install the T-nuts on the side of the baffle opposite the woofer and glue the spacer in place, holding it there with attaching bolts (**Photo 9**). Attach the baffle to the assembly, using a T-square to check the alignment. No screws are possible at the joints with the sheaths, so use plenty of adhesive there, as well as where the sheaths joint the top and bottom. Add the bottom to the assembly (**Photo 10**).

TWEETER ASSEMBLY

You may use dynamic horn tweeters if you wish, but they will add greatly to the speaker cost, have the added complexity of a crossover, and, despite what you may have heard, don't work any better than piezos. The best result occurs with tweeters whose frames have been

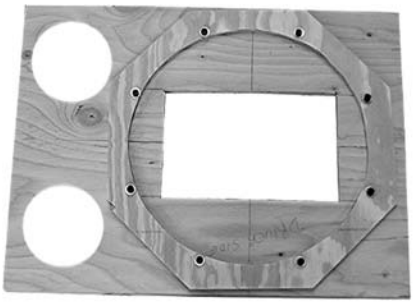


PHOTO 9: The woofer baffle.

PHOTO 10: Top, bottom, and throat horn.

PHOTO 11: Trimming a tweeter.

trimmed and glued together, forming a large horn with one continuous mouth. My prototype used model 1025 tweeters, though there are other options.

Five of these will fit the DR280 baffle after you trim them to 4.5″ long. Cut them on a table saw, preferably using a panel-cutting jig (**Photo 11**). Use either a very fine tooth plywood/laminate blade or abrasive blade. Trim an equal amount from each end of three tweeters to arrive at the desired 4.5″ length, but on the last two cut only one end.

Trim the flash from the cuts with a knife. Glue them together one at a time with medium body ABS cement, which, used to glue black plastic water pipe, is black in color and fills any small voids. While the glue sets, place the array facedown on a flat surface, with waxed paper underneath so it isn't glued to the work surface, and with the edges aligned with a straightedge. Make sure all the + and – polarity markings on the drive elements are aligned in the same direction.

Let them set for a half-hour or so and then apply another layer of cement to the joints. Wait a day, then sand the faces, first with 200 grit sandpaper to even things out, then 400 grit. They end up with a nice even satin finish that looks as though they were cast as one unit (**Photo 12**).

The tweeter baffle is made in two halves, one edge cut at 35°, each about 1.56″ wide on the narrower face, so that when mounted there is a 2.12″ gap between them. Measure the box to be sure of the exact required length, which should be in the vicinity of 23″. Check the flatness of the top and bottom with a straightedge; if there's any warping you can cut the baffle to the required length to push or pull the warp out, as the case may be. Don't forget the 4° angle on each end of the baffle halves.

The drive elements of the tweeter assembly will not fit through a 2.12″ gap, so where the drive elements will go through the baffle assembly the equivalent of 2.75″ diameter holes are required (**Photo 13**). These cutouts are 4.5″ apart, on-center, and they are all shifted 1″ up so that when you install the tweeter unit it slides down an inch; otherwise, the mounting screws would fall on the holes. Install the tweeter baffles (**Photo 14**). Now you can cut the tweeter to its measured final size, both ends at 4°.

BRACING

Cut out four horn braces and two side braces (**Fig. 10**). When laying this out

PHOTO 12: The multi-throat single mouth tweeter array.

PHOTO 13: Tweeter baffle.

on the plywood, nest three more horn braces against the first to speed the cutting process. After cutting them, trace another side brace from the first and cut it out. The bottom horn braces span the throat horn supports and the tweeter baffle, acting as mounting flanges for the access porthole cover. Trim them at either end to fit.

The top horn braces are bisected to accommodate the woofer baffle. Cut four 24″ × 1.5″ half-inch plywood strips. Trim two to span the horn brace from the top to the bottom, about halfway between the baffle and the throat horn supports, with the narrow edge facing the horn sheath. Install the other two about halfway between the woofer and tweeter baffles, with the wide face parallel to the horn sheaths so that they won't interfere with accessing the driver mounting bolts.

Two more similar size strips with one edge at 35° back up the tweeter baffle so that it's a full inch thick. **Photo 15** shows a closeup of the bracing, looking at the cabinet top. Note the 4″ hole in the cutoff brace, to remove unnecessary weight from the box.

Use plywood scraps to complete the driver access port flanges. **Photo 16** shows how notches are cut into the flanges to allow the driver frame to fit

PHOTO 14: Tweeter baffle installed.

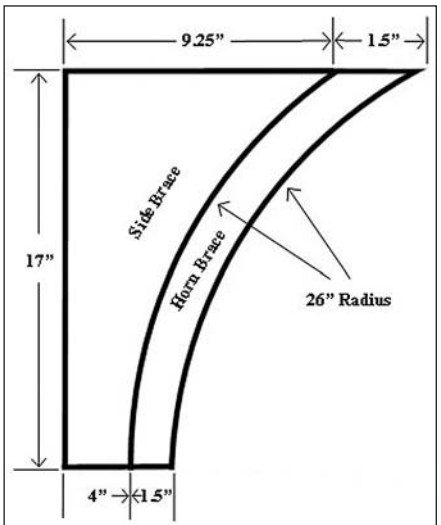


FIGURE 10: Horn/side brace template.

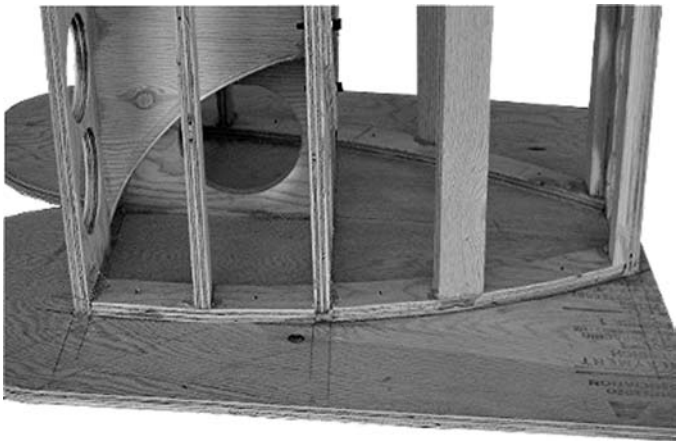


PHOTO 15: Bracing detail.

PHOTO 17: Measuring for the horn sheath.

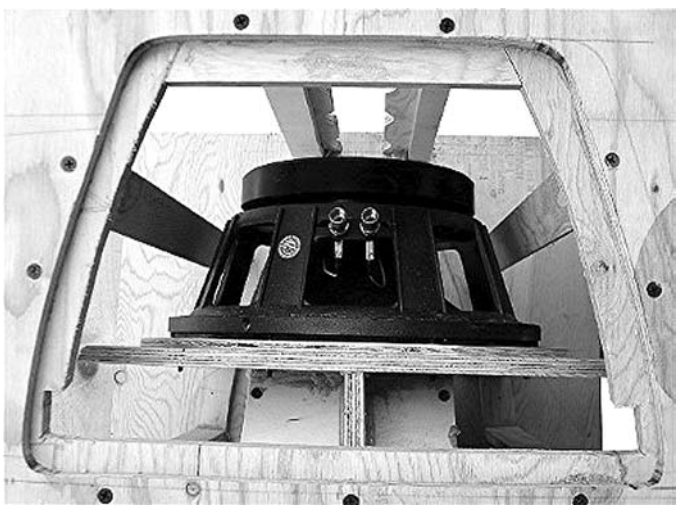


PHOTO 16: Driver access porthole.

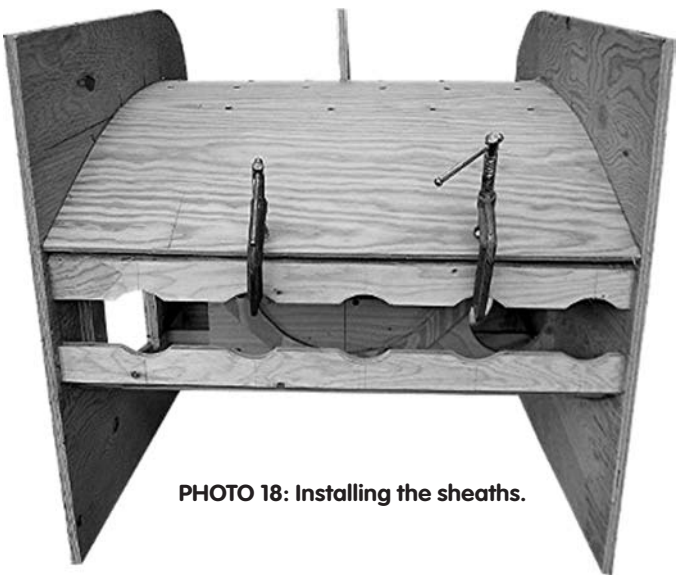


PHOTO 18: Installing the sheaths.

through. Make absolutely sure that your driver fits now, because you won't be able to make any necessary changes later.

Make two back braces—semi-circles the same size as the semi-circular sections on the top and bottom. Install these braces roughly midway on the throat-horn supports, with one end mating with the throat horn divider. Use a clamp and a couple of scrap plywood cauls to hold them in place while you screw them to the supports from the inside of the cabinet. Before attaching them, use a straightedge spanning the top to the bottom to be sure everything aligns properly, trimming the braces as required.

Cut the horn sheaths from ¼″ plywood. Before cutting, flex the plywood to determine the easier bending axis. The rough size of the sheath is 23″ high, 19″ wide. Measure the cabinet to be sure of the actual size before cutting.

Use a framing square to determine the exact shape of the sheaths. First measure the height at the horn supports. Clamp the square to the support (**Photo 17**). Measure at the horn mouth the distance from the edge of the square to the top to see how much higher the sheath must be at that point. Repeat the process with the measurement to the bottom.

To find the width of the sheath, use a flexible tape to measure along the curve of the horn. Cut the length a bit long, and sand off excess. Attach the sheaths starting at the throat horn supports, and screw them to the supports, all the braces, and both baffles. Mark on the top and bottom where the vertical braces and baffle are so that you'll be able to find them with the sheath in place. Use a clamp or two to help hold the sheaths in place while you screw them down (**Photo 18**).

FINISHING TOUCHES

After the adhesive has set, remove any screws penetrating into the driver chamber, lest they bite you later. Fill all of the screw heads and any other glitches in the plywood with polyester auto body filler, which grips tenaciously, doesn't shrink, is ready to sand in a half-hour, and is very inexpensive. Sand it all smooth, slightly rounding over the joint at the tweeter baffle.

Halve lengthwise a 20″ long piece of 4″ ID schedule 40 PVC pipe. To do this use an abrasive blade, securely clamping the pipe to a panel-cutting jig (**Photo 19**). Be careful when finishing the cut because the pipe may have a tendency to close on the blade. Cut the PVC sections to fit between the top and bottom and the back braces (**Photo 20**).

One end will be square, one will be at a 4° angle. Attach these to the cabinet using a hot-melt glue gun. Sand a bit of a chamfer on the edges and ends of the PVC, and on the cabinet where the PVC joints it, producing shallow troughs to hold the glue. Be sure it is

totally airtight.

The side braces divide the horn into not quite equal sections; just like the back braces and throat divider, they are offset ¼″ from center, extending from the PVC reflectors to about 2″ back from the tweeter baffle. Use a clamp and wood blocks to temporarily clamp them in position and trace on them the contour of the sheath if the existing shape is more than ⅛″ off, trimming it if that's the case. Then run a straightedge from the top to the bottom at the front and rear to determine their final size.

Attach the braces, driving a couple of screws from the inside of the box. Also clamp the joints with the back braces, using wax paper or polyethylene to prevent gluing the wood blocks as well. Use adhesive to fill gaps in the joints with the sheaths and let the adhesive set before proceeding further.

Cut the back halves from ⅛″ Baltic birch, again flexing it first to determine the easy bending axis. The nominal size of these is 21.5″ high by 23″ wide, which should allow them to extend at least 2″ onto the sides of the cabinet. Attach first one and then the other to the cabinet. Clamping is not required, as the plywood bends easily on this fairly large radius, but a web-style clamp or two makes the job much easier.

After the adhesive has set, trim and sand them flush to the top and bottom. Rough-trimming them is a snap using a saber saw or reciprocating saw equipped with a fine tooth blade at least 6″ long.

This is a good time to put a finish on the inside of the horn. I recommend DuraTex (available from Acry-Tech at 1-800-771-6001), which is a water-base urethane acrylic that goes on with a standard paint roller, drying quickly with a lightly textured finish that's very durable and easily recoated if you ding it. It costs not much more than paint, covers quite well, and you can finish a cabinet of this size in about 20 minutes exclusive of drying time. Use a small trim roller to reach tight spots. Before coating, sand well with 100 grit to minimize wood grain.

Drill a hole through one horn sheath, large enough to run a 14- or 16-gauge speaker wire through to the driver

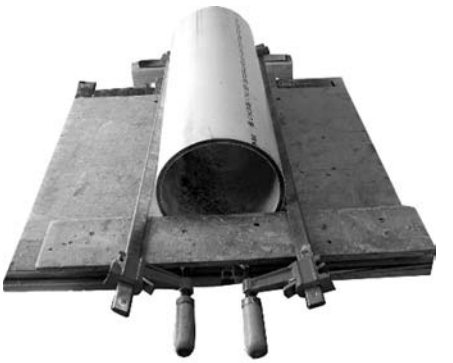


PHOTO 19: Slicing PVC on a jig.

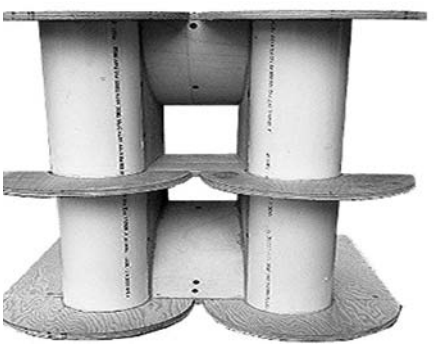


PHOTO 20: PVC reflectors in place.

chamber. Drill another hole in one of the back pieces, as close as you can to the center of the box. Run the speaker wire through, sealing both holes airtight with hot-melt.

Cut out the sides, roughly 24″ high by 24.5″ wide. To mark the final cut lines, attach the rough-cut side to the assembly with a couple of screws or long clamps. Lay a straightedge across the back at both the top and bottom, marking the junction with the sides (**Photo 21**). Add ¼″ to account for the thickness of the back cover, which is overlapped by the sides, and you have your cut marks for the width.

PHOTO 21: Finalizing the side dimensions.

Trace the actual joints with the top and bottom. When cutting to size, leave the panels about ⅛″ oversize. Using a router or dado blade, cut a ⅛″ relief roughly 2.5″ wide where the side overlaps the back. You won't be able to sand the inner surfaces of the sides easily later, so do it now.

Attach the sides. Use a long clamp to square up the side braces until you screw them. If you want to use flush-mounted handles, drill holes for them now, making sure not to hit any braces. Locate the handles so that you can drive screws through the lower mounting holes right through them into the braces, with the remaining fastening done with short bolts and T-nuts.

Trim the ¼″ plywood back cover, rough dimensions 21.5″ by 23″, to the exact height of the back (those edges at a 4° angle to match the taper of the top and bottom) and to the exact width of the cabinet, less 1″ to account for where the side extensions will overlap it. Cut a rectangular hole, about 3″ high by 5″ wide, centered in the back sheath. Install the back sheath, being sure it is centered and true to the cabinet, with the speaker wires reachable through the hole. There is room to clamp a guideboard in place at the rear corners to assist in the attaching process, which is best done with a few small nails. Make sure the nails are set deep so that they won't be hit later when you round off the edges.

Trim the cutoffs saved from the top and bottom to fit the gaps at the top and bottom rear of the box. You can tell by the wood grain where each piece came from. These pieces are very small, so use a panel jig and an attached wood caul for safe cutting (**Photo 22**). To install, slather the joints with plenty of adhesive and hold the filler piece in place by screwing the caul to both it and the cabinet until the adhesive cures, again using wax paper or polyethylene to keep the cauls from being glued (**Photo 23**).

When cured, remove the cauls and fill any remaining joint gaps with adhesive. Sand the whole shebang down, fill any remaining imperfections, and then sand it all again. Use a round-over bit and router and/or sander to round all the exterior edges. Complete applying the finish. Install protective corners and feet.

PHOTO 22: Rear corner filler with caul.

PHOTO 23: Gluing up the rear fillers.

Put the porthole cover in place, drill and countersink for the attaching screws, remove it, and put a finish on it. Fully line the driver chamber and porthole cover with an inch thick layer of either acoustic foam or polyester batting. Install the woofer. To reach the woofer bolts use a ¼″ ratchet wrench outfitted with a 10″ extension shaft and a U-joint adaptor with an Allen head bit, working through the tweeter baffle hole.

WIRING

Cut a piece of ⅛″ plywood an inch or so larger than the hole in the cabinet back for your jack(s). Install the jacks to the plate, wire them, insert the plate, rotate it 90°, and screw it in. Wire the tweeters, connecting all the like polarity terminals, plus two long leads to connect to the jack wire.

Terminals are OK, but a soldered connection is more secure. Use a color coded speaker wire. The same wire you used for the lead to the jacks is OK, but because the current load going to the tweeters is quite small, you can use wire as light as 20 gauge.

Install the tweeter assembly. An airtight fit is critical, so use a silicone sealant to caulk all the joints between them and the cabinet. Connect the long leads from the tweeters to the wire from the jack and then connect that to the woofer terminals, the + coded wire to the red terminal. Gasket the access cover flanges with weather stripping foam and attach the cover. Rock on.

TWEETER OPTIONS

You can use unaltered model 1005 piezos, which measure about 3.375″ square; six of them will fit on the tweeter baffle (**Photo 24**). Instead of the two-piece baffle of the prototype, use a one-piece baffle 5.25″ wide on the front face, with 3″ diameter mounting holes evenly spaced. Wire all six tweeters in parallel. This option, and the five 1025 tweeter version, will handle average input levels of up to 200W. That's plenty for backline bass and keyboard use, or for small to medium club PA.

For higher power levels you need at least eight tweeters. The easiest option is to use model 1016 piezos, which measure about 2.62″ by 5.62″. You can

fit eight of them horizontally aligned on the baffle (**Photo 25**). Use a single baffle 5.25″ wide (the sheaths add another half inch, so the tweeters won't overhang) with 3.75″ wide by 2.12″ high mounting holes, evenly spaced. The tweeters are series/parallel wired for 400W power handling. Two banks of four tweeters each are parallel wired, with the two banks series wired.

Other tweeter scenarios achieve both superior wave-front integration and high power handling simultaneously. The first is to use eight 1005 tweeters, cut to a height of 2.875″ (**Photo 26**). Start with a full width baffle, drilled with 3″ diameter holes on 2.875″ centers, which will result in a dual baffle. The wiring scheme is the same as with eight 1016s, for 400W power handling.

Gluing together twelve 1016s (**Photo 27**) offers the ultimate in integration, dispersion, power handling, and looks cool. They are horizontally mounted, with height trimmed to 1.9″. This requires a two-piece baffle with an opening 3.75″ wide, resulting in a face width of only .75″, too narrow for adequate strength. However, the backing reinforcement strips on the baffle need only a 2.25″ gap, so you can cut them wider to afford the baffle adequate strength, as per **Fig. 11**.

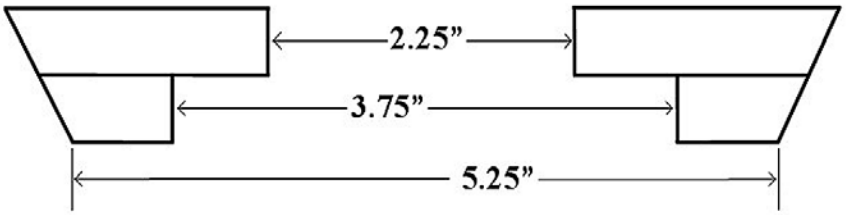


FIGURE 11: Tweeter baffle template/twelve 1016 option.

Wire this super array of tweeters for the highest possible sensitivity and 400W power handling with two banks of six tweeters each in parallel, the two banks in series. For 700W power handling, with a bit less sensitivity, wire three banks of four tweeters each in parallel, the three banks in series.

You also can add a professional touch to your DRs with the addition of this logo (**Figure 12**). Use this link (www.billfitzmaurice.com/logo2.gif) to copy the original .gif image, size it as desired, print it at high resolution on photo quality paper, and use a piece of Plexiglas to protect it. aX

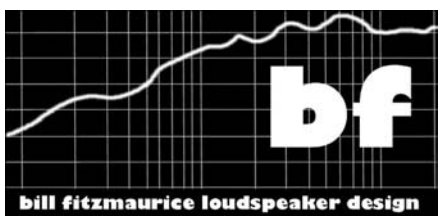


FIGURE 12: BF Loudspeakers logo.

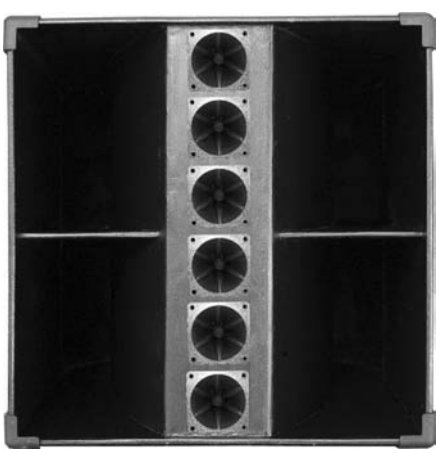


PHOTO 24: Six 1005 tweeters.

PHOTO 26: Eight 1005 tweeters.

PHOTO 25: Eight 1016 tweeters.

PHOTO 27: Twelve 1016 tweeters.