

A Tuned-Pipe Enclosure for Bass Enhancement

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A simple and easily-built enclosure will give excellent sound quality from any good 12-inch loudspeaker, with low-frequency reproduction equivalent to many larger cabinets.

ACCORDING TO LITERATURE presented in the September 1952 issue of **AUDIO ENGINEERING**—I refer specifically to the article written by Mr. John E. Karlson entitled "A New Approach in Loudspeaker Enclosures"—a long closed-end pipe, having a long notch at the open end, will give practically continuous radiation over the frequency range required for good audio reproduction. The pipe length must, of course, be considerably larger than the width and depth in order to achieve the proper effects. With these fundamental characteristics of the closed-end pipe in mind, I have developed a fairly simple yet effective corner enclosure for 12-in. speakers, shown in Fig. 1.

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The configuration was generated by considering first a long triangular shaped pipe 6 ft. long with the speaker mounted at one end and the other end having an exponentially tapered slot, as shown in Fig. 2. Since this is obviously a back-loading device, and we are interested primarily in enhancing the low-frequency response, the slot or notch at the open end can be made reasonably short—considerably less than the 2/3 indicated for broad coverage. Further, if we now fold the 6-ft. pipe, as shown in Fig. 3, we get a package that is of practical size. This configuration permits direct radiation of the middle and high frequencies while the lows are radiated directly and are also augmented by the back radiation through the short exponential slot. That was borne out by

impedance measurements, and was verified by extended comparative listening tests. Note in Fig. 4 that the free air resonance of 65 cps for the Electro-Voice SP12B is broken up and smoothed out with the curve essentially flat down to 30 cps. The non-resonant character of this enclosure has been demonstrated by extended listening tests using such records as the Cook organ records as well as the Capitol test record. There is no audible hoomy or boxy sound.

For those who are interested in constructing this enclosure the diagram shown in Fig. 5 will serve as a guide. The usual precautions of using wood screws and gluing all joints for an airtight seal apply. The slot dimensions are indicated on the drawing.

Figure 6 indicates the various pieces needed to assemble the enclosure. In constructing this enclosure the diagram shown in Fig. 5 will serve as a guide. The usual precautions of using wood screws and gluing all joints for an airtight seal apply. The slot dimensions are indicated on the drawing.

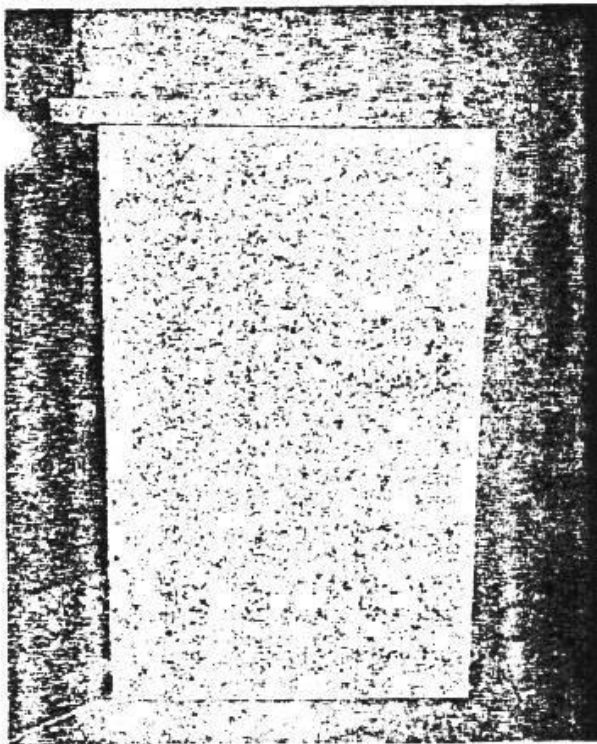


Fig. 1. The author's cabinet in finished form. Light appearance of front is due to the use of natural-colored monk's cloth for the grille.

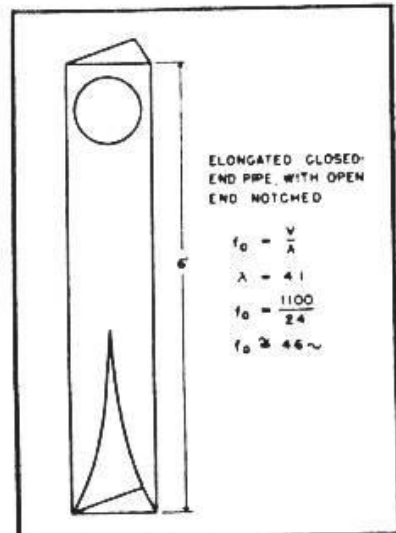


Fig. 2. Design of cabinet was developed from this long closed-end pipe with notched front.

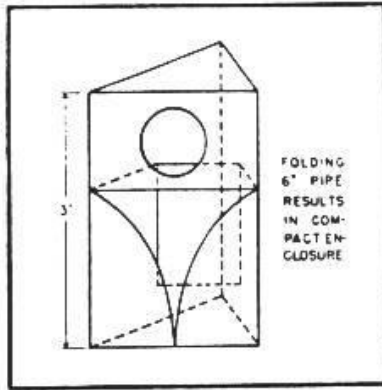


Fig. 3. Appearance of cabinet after folding from the original "pipe" of Fig. 2.

lower left pieces of Fig. 6 should be assembled using nails and wood glue, and then this sub-assembly should be glued and screwed to the two sides already assembled. See Fig. 5 for proper location of this sub-assembly. The front panel should next be fastened as indicated in Fig. 5, using wood screws and glue generously to insure an air tight seal at all contacting surfaces. This whole package should now be allowed to set for whatever time is indicated on the can of wood glue you may have used. I used Casco and let the enclosure set overnight, and should resemble Fig. 7.

The basic enclosure is now ready for final finishing. If you like the simple modern appearance that mine has, as shown in Fig. 8, you may now screw a foot piece to the bottom, cut the same size as the bottom piece, and then glue a 1/2-in. sheet of foam rubber thereon for acoustic insulation from the floor. The enclosure should now be set in whatever corner you have chosen for it (preferably one on the longer axis of the listening room) so that the sides of the enclosure do not touch the moulding along the base of the corner walls of the room so you can measure the top finishing piece. This piece should be sufficiently large to fit snugly against the two corner walls and still jut out over the front grill of the enclosure approximately 1 inch for good appearances. In my case this turned out to give dimensions of 20 x 20 x 28 in. Mount this piece to the top by inserting wood screws through from the

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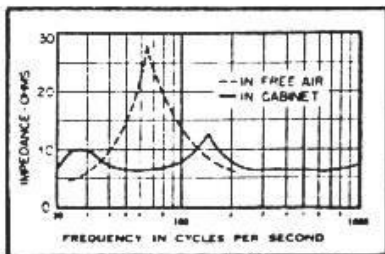


Fig. 4. Measured impedance curve of E-V SP-128 loudspeaker in the author's cabinet. Note reduction of natural resonant peak and extension of low-frequency range.

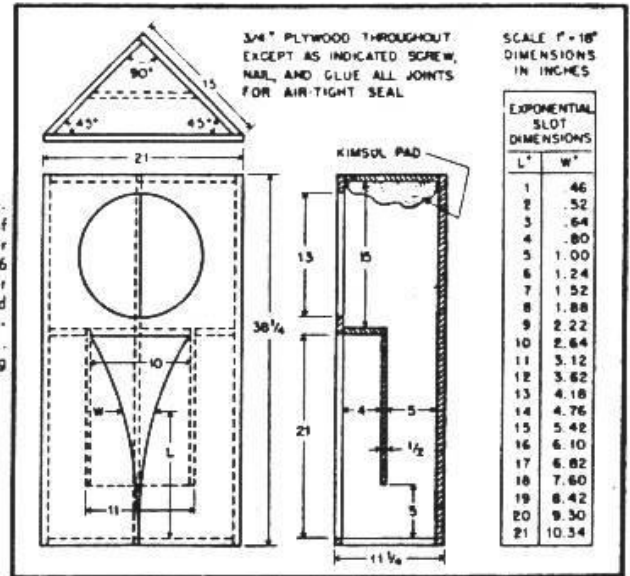


Fig. 5. (right). Sectional drawings of the simplified corner enclosure. Fig. 6 (below). Details for cutting plywood pieces for the cabinet. 15 x 15 in. speaker mounting panel.

SCALE 1" = 18" DIMENSIONS IN INCHES

EXPONENTIAL SLOT DIMENSIONS	
L"	W"
1	.46
2	.52
3	.64
4	.80
5	1.00
6	1.24
7	1.52
8	1.88
9	2.22
10	2.64
11	3.12
12	3.62
13	4.18
14	4.76
15	5.42
16	6.10
17	6.82
18	7.60
19	8.42
20	9.30
21	10.34

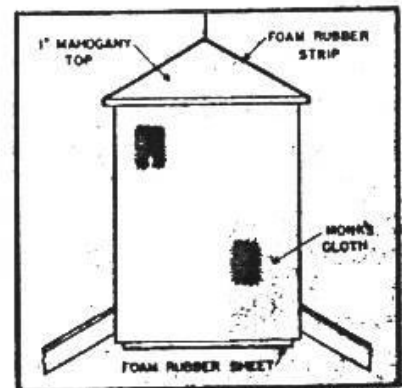
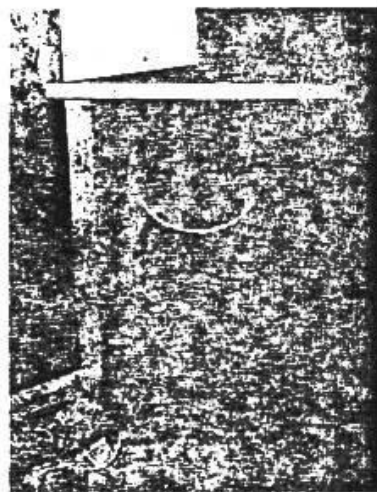
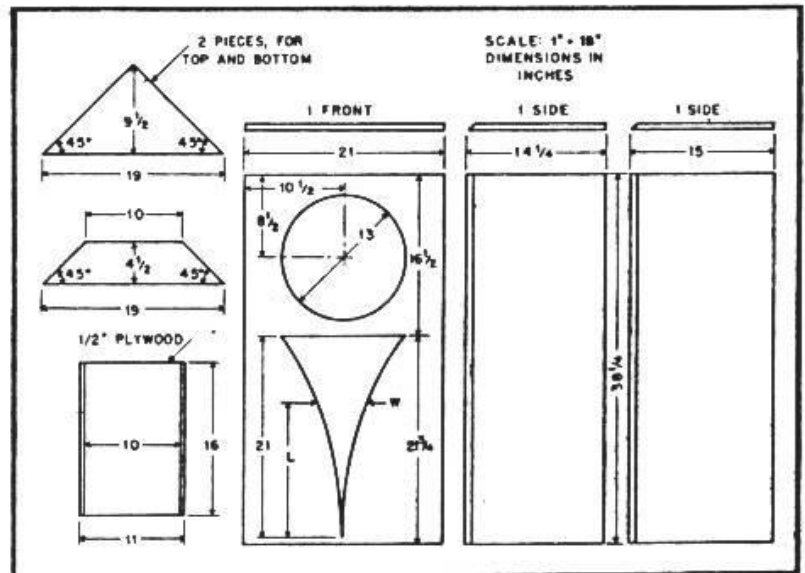


Fig. 8 (above). Sketch of finished appearance.

Fig. 7 (left). Cabinet in stage of construction before mounting loudspeaker panel.

around 22 minutes. Somebody made a dreadful mistake and my friend here fell for it with a vengeance.

So the "expensive fraud" turns out to be only half as expensive, per minute! My friend can now go out and buy it if he wishes, but it seems to me that if he had worried less about playing length and thought more about content he might have got there sooner.

I admit that there is a possibility for trouble in the ultra-short LP length. There have been some mighty short sides put over on the buyer. But I'm willing to guess that if all factors, including a convenient and useful division of the musical sections, are honestly taken into account, most of these short-sided LP's can be put into a "matter-of-opinion" category.

As for myself, long, long experience with the LP breed makes me feel this-a-way: If I receive two LP records, one of which contains a single Beethoven symphony and the other two Beethoven symphonies, my immediate expectation is that (performance factors aside) the single-symphony disc is going to be the better bet.

I am aware of the new longer long-play records. There is no doubt at all that Vox, for instance, is doing a brilliant job in getting the absolute maximum of quality

out of the disc medium at an extraordinary length-of-play. Few will doubt that Vox has managed to get better over-all sound for longer play than ever before (to use a safe advertising phrase!).

But there are still limits and always will be. The question is simply, how far into the potentially dangerous area is it worth while going, for longer play? I don't think any individual can decide. I think Vox is fully as well justified in working towards longer playing time as, say, Westminster is in working with a much shortened playing time in its Lab series. The point to keep in mind is that each one of us must juggle what the engineers like to call the parameters. The factors involved.

And so I shall continue to do no timing (and make no dreadful mistakes) and I'll hope that the timing factor will take a reasonable but not undue importance in our readers' estimations.

Extra note: While many of our musical-minded correspondents have been objecting to the too-short LP records, most of my engineering friends are equally disturbed by the too-long LP records. Both sides are quite vehement about it. Dare I say that if you average the two you'll come out with . . . well, an average? Uh-uh.

TUNED - PIPE ENCLOSURE

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inside of the enclosure. Now glue a thin strip of foam rubber along the edges that contact the wall in order to obviate any vibrations being set up at the points of contact. Next the Kimsul pad can be fastened to the top with glue and a few furniture tacks. You are now ready to mount the speaker. A 15 x 15 in. speaker

mounting board should be cut from $\frac{3}{8}$ -in. plywood stock, with a 10 $\frac{1}{2}$ -in. circular hole cut in the center for mounting the 12-in. loudspeaker. Speaker lead-in wires should be connected through two $\frac{3}{8}$ -in. holes conveniently placed in one side of the enclosure near the top. The speaker board may now be mounted over the 13-in. hole in the front panel using eight wood screws equally spaced about the periphery of the mounting board as shown in Fig. 9. Finally the front grill frame, 38 $\frac{1}{4}$ x 23 in., should be fabricated from $\frac{3}{4}$ -in. square pine stock. This frame should be covered with lumite in your choice of color. The completed front cover may now be fastened to the enclosure front by means of four cabinet door catches. These should be mounted on the sides, two near the top and two near the bottom. This expedient allows for ready access to the speaker in case you want to change speakers etc. In my case, the top was finished by sanding and then applying clear varnish to bring out the natural grain of the mahogany. The over-all effect is very modern. The simplicity of this basic enclosure permits of flexibility in final exterior finish so that if you do not like the modern approach you may apply some other type finish.

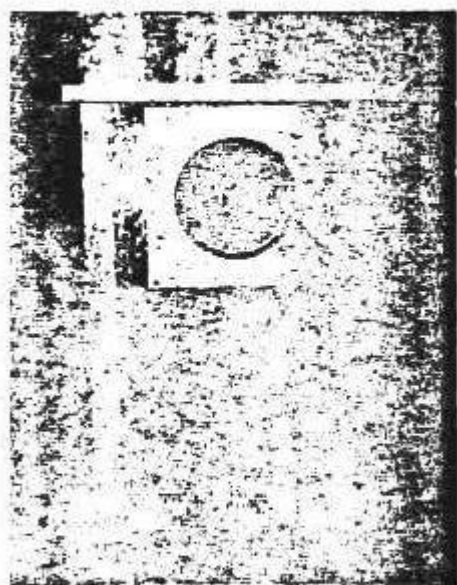


Fig. 9. Semi-finished cabinet with loudspeaker in place on its mounting panel. Note brackets on edges of front panel for mounting the trimming frame.