

## TECHNICAL BULLETIN

# Jensen

in the interest of BETTER SOUND REPRODUCTION

## A BACK-LOADING FOLDED HORN FOR 15-INCH LOUSPEAKERS

This bulletin describes the back-loading folded horn design evolved in establishing a laboratory standard and to fill the need for an enclosure to effectively demonstrate the exceptional characteristics of the JENSEN G-610 Triaxial.

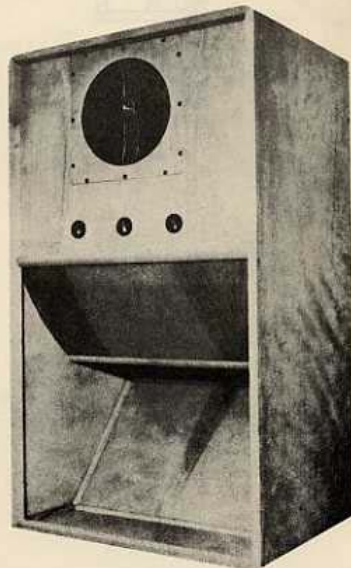
Now with the widespread use of the JENSEN G-610 Triaxial 3-channel loudspeaker system and also the use of the JENSEN RP-302 "Super-Tweeter" to supplement other speaker systems, high efficiency, low distortion, and truly extended h-f range to the upper limits of audibility are available. The increasing use of such loudspeaker systems has brought even greater recognition of the need for improved l-f performance; extension to lower frequencies and increased efficiency throughout the l-f region is necessary to balance the exceptional h-f performance now realized.

Properly designed bass reflex cabinets such as the JENSEN Type M in conjunction with suitable l-f equalization in the amplifier circuits, give acceptable results where space is limited. Under such conditions, these enclosures still offer optimum l-f results. No substantial improvement can be attained with conventional enclosures no matter how large. Such improvement can be achieved only by a marked increase in the acoustic "loading" throughout the l-f region. The most simple and straightforward method is the use of a horn structure; such a "fluid transformer" can then successfully "match" the air load to the loudspeaker.

In view of the widespread use of unitary multiple channel arrays such as the JENSEN Coaxial and Triaxial loudspeakers, it appears necessary to permit radiation directly from the front of the loudspeaker.

## FEATURES

- Optimum mouth size and path length for effective loading to 30 cycles.
- Folded horn path permits compactness and minimum size for given mouth size and path length.
- Back-loading design permits use of unitary multiple channel loudspeaker arrays.
- Hyperbolic-exponential formula maintains effective loading to lowest frequency.
- Efficiency increase of 4 to 6 db over best conventional enclosure in l-f region.
- Low diaphragm excursion minimizes non-linear distortion.
- Sound chamber design gives acoustic crossover of 300 cycles preventing interference between mouth and direct diaphragm (front-side) radiation.
- Permits use of higher frequencies for electrical crossover without loss in m-f region.
- Does not require corner position.
- Space available for amplifier, crossover and/or control networks.
- Can be "built-in" or used as separate self sufficient unit.
- Cuts economically from standard 4' x 8' plywood panels.



## CONSTRUCTION NOTES

1. Use good quality  $\frac{3}{4}$ " or thicker plywood panels for construction.
2. Construction must be rigid using additional bracing wherever necessary. Vibration of panels can easily give loss of 3 to 6 db at certain frequencies.
3. Tapping of any panel with hammer or fist should give a solid thud rather than a "drummy" sound.
4. Joints must be air tight particularly near throat area to prevent air leaks and resultant loss of efficiency. Suggested procedure is to use wood screws with glue in all joints during assembly.
5. Simplest procedure is to assemble the sound chamber and progressively add the pieces roughly in numerical order indicated on the drawing.
6. All parts should be laid out carefully before cutting to prevent wastage. About four panels of 4' x 8' plywood will be required with an approximate cost of \$45.00.
7. Framing around baffle should clear 15- $\frac{1}{4}$ " diameter speaker.
8. Framing around removable panel (9) should clear 5" x 11 $\frac{3}{4}$ " network base.
9. Do not scale drawing; angles should be measured only from larger scale layouts.

## APPLICATION

Ideal for recording studios, laboratories, and other professional applications, this horn will also find application in the superior home reproducing system. Its advantages are obvious for use with electronic musical instruments.

Diligent study will usually result in a suitable plan for installation; often a closet or cupboard is available adjacent to the listening room; more often the horn may be built into other cabinetry such as counter-top or storage-wall units. Operation is satisfactory for either horizontal or vertical orientation with a slight preference for the latter. Also a corner position will give some advantage but this is not necessary. When feasible, place the m-f and h-f units at or slightly above listener ear level for added "presence" and naturalness of reproduction.

This horn has been designed for use with 15-inch loudspeakers and the JENSEN Model G-610 Triaxial 3-channel loudspeaker system is ideally suited. The JENSEN P15-LL special l-f unit is similarly ideal where a "separated system" is preferred. Also the JENSEN Model H-510 Coaxial and other high efficiency units can be used and these may be effectively improved by addition of the JENSEN Model RP-302 "Super-Tweeter". Because of the front-side radiation directly from the loudspeaker, higher first electrical crossover frequencies are permissible. However, care must be taken to carefully balance the output from the l-f, m-f and h-f units to obtain good listening balance. It may be necessary to attenuate the l-f channel to accomplish this when using less efficient m-f and h-f units. Ideally the free resonance (no baffle) of the l-f unit should be about 45 cycles; values up to 55 cycles will give reasonably satisfactory results.

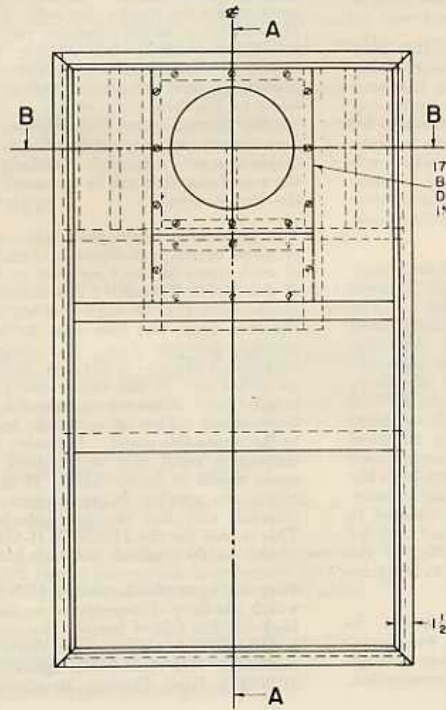
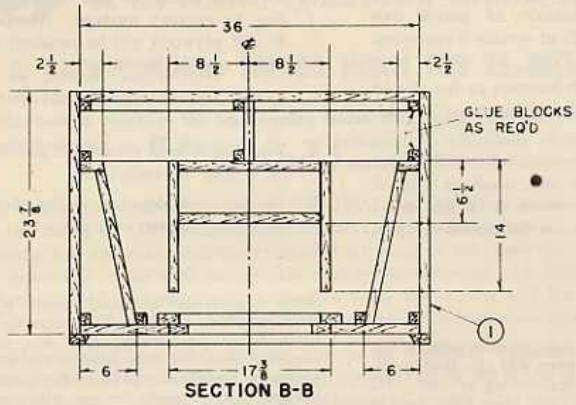
This horn represents the "irreducible minimum" in size for effective performance. The size was necessarily restricted to a unit that could pass through standard doors and be readily set up for demonstration.

Some improvement would result by extending its path length to obtain a larger mouth area, but in the interests of practicality this was not done. Note however that the floor reflects the sound so that the apparent mouth size is twice the actual size. Modifications can be made for use with smaller and larger speakers but the results may suffer if not expertly done. The cavity or sound chamber should be as small as possible to enclose the speaker used. No change should be made in the taper rate of the horn; for a smaller speaker the present throat can be carried inward to the new reduced sound chamber to give a smaller throat. As a first approximation, the throat area should be reduced in direct proportion to the diaphragm area reduction. Similarly for larger speakers the sound chamber will be necessarily larger along with the throat area.

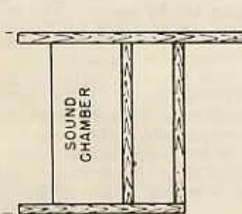
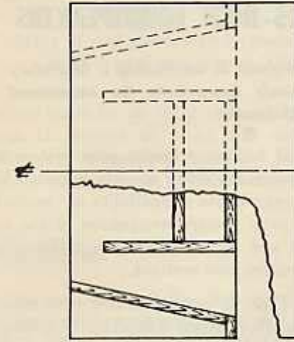
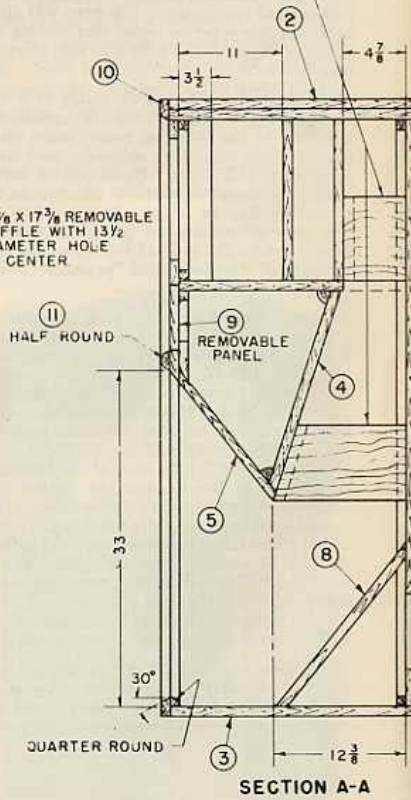
The removable panel just below the speaker baffle provides access to a dead-air chamber for installation of such items as the Crossover and Control Network of the G-610 Triaxial. The connecting cable to the speaker can pass through a notch in the shelf (sound chamber floor) but this must be an air-tight seal to prevent pressure loss. The escutcheon cups and controls of the above network can easily be installed on either side of the removable panel. A clearance hole 1-11/16" diameter on each side will accommodate these items. The network can be attached directly to the removable panel. Incoming leads can be passed through a small hole in the back of the chamber—again sealed to be air tight. It may be necessary to rotate the speaker in some cases so that the sound chamber will clear elements attached to the speaker. This is true for the JENSEN H-510 Coaxial when the Model A-110 Control Network is attached.

Why don't you plan to use the JENSEN G-610 Triaxial which has been demonstrated so successfully with this back-loading folded horn? No one has ever heard a G-610 who didn't want one! Write for Data Sheet 160 describing this remarkable speaker and for the new JENSEN High Fidelity Brochure 1020.

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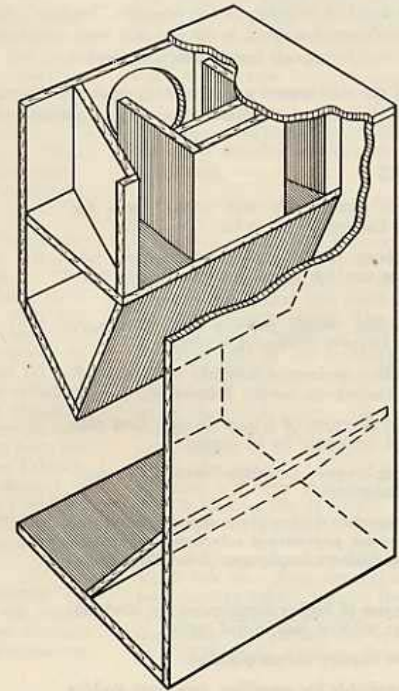


⑥ BRACES, 1" NOM. BOARDS APPROX 8" WIDE. USE GLUE BLOCKS AS REQ'D



SOUND CHAMBER & SHELF ASSEMBLY

⑫ CUTOUT FOR AMPLIFIER



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