Views of the "Californian, Jr." showing the attractive "wrap-around" grille cloth styling. Rear view with back removed shows the tunnel plate which forms the ducted port.

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# "Ultraflex" Speaker Enclosure

*Construction and performance of Argos-built and Jensen-designed small ducted-port reflex enclosure.*

IF YOU are looking for a compact, attractively styled, and well-designed enclosure for your 8- or 12-inch loudspeaker, the "Californian, Jr" is for you. Pre-built or available in kit form, this *Argos Products Co.* enclosure (Model DSE-2) is a *Jensen*-designed "Ultraflex," a special type of ducted-port reflex unit. A pair of these enclosures may be used for an inexpensive stereo system.

The actual volume of the "Californian, Jr." is only 2.5 cubic feet. In order that it may resonate at a fairly low frequency of 55 to 65 cps and so be suitable for use with speakers having this order of cone resonance, several expedients are followed. First, a fairly small port area of 24 square inches is used. This lowers the resonant frequency of the enclosure. However, this usually results in a reduction of bass radiation from the port compared to that obtainable from a larger port-larger volume combination. Second, a 9-inch tunnel plate is installed just above the port in such a way that a duct, extending the entire width of the cabinet, is formed.

## Effect of Duct

In order to see just how effective the duct is, we conducted a number of impedance measurements shown in Figs. 1 and 2. These measurements are actually voltage readings taken directly across the speaker voice coil. But since the speaker was isolated from the audio oscillator feeding it by means of a large resistor, the oscillator was, in effect, converted into a constant-current source. Then, as the speaker impedance rises and falls while the current remains steady, the voltage across the voice coil also rises and falls in direct proportion to the impedance. Hence, although the curves are voltage curves, they are directly proportional to the speaker impedance.

First, a fairly low-priced 8-inch coax speaker (*Jensen* K-80) was used. The free-air cone resonance of the particular speaker checked was found to be close to 65 cps (curve 1, Fig. 1). Next the speaker was mounted in the enclosure but the tunnel plate forming the duct was not yet installed. Without the duct the typical double-peaked curve was produced with the peaks straddling the single free-air resonance peak of the speaker alone. Upon examination, though, it can be seen

**Fig. 1. Impedance curves obtained with 8-inch loudspeaker unit.**

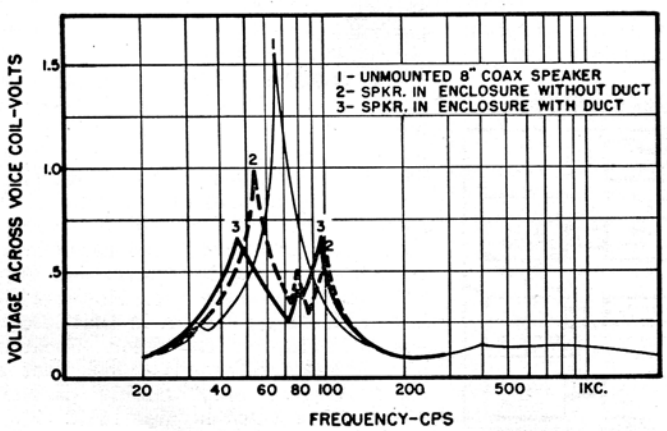



**Fig. 2. Impedance curves obtained with 12-inch loudspeaker unit.**

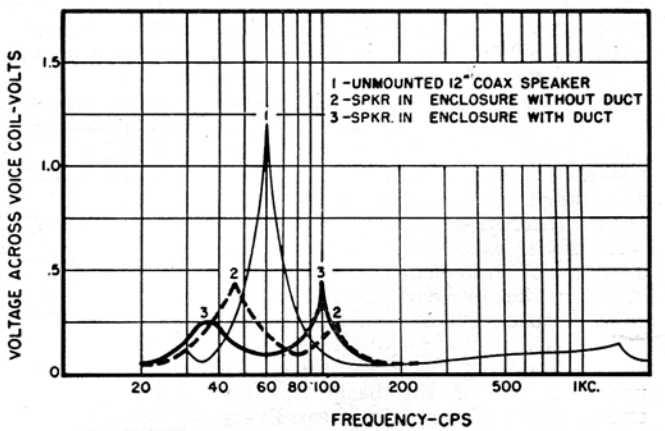
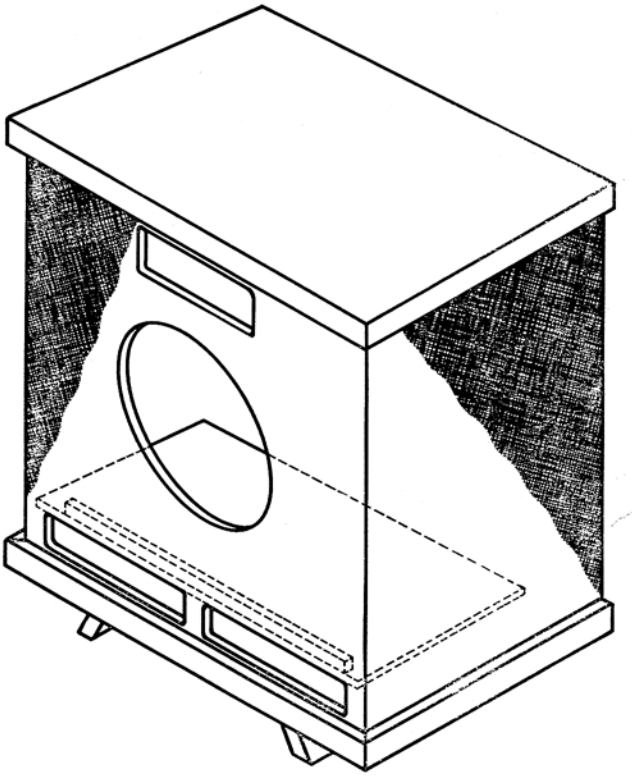
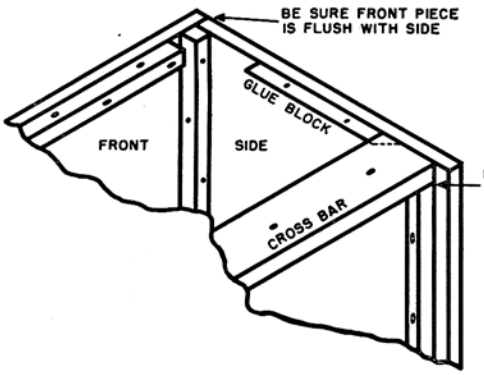


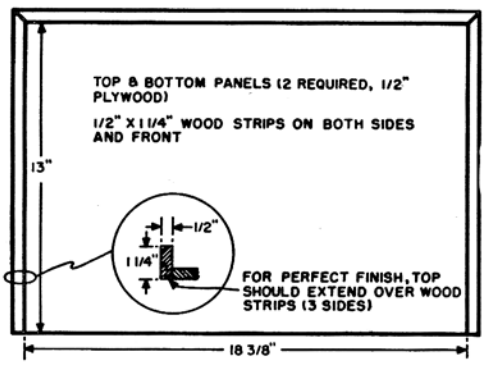
Fig. 3. Constructional diagrams for the Argos "Californian, Jr." Enclosure is a ducted-port reflex type which will accommodate a 12-inch speaker and a separate tweeter, if required. An 8-inch speaker may be used in place of the 12 by means of reducer ring shown below. Tunnel plate forms the ducted port required.

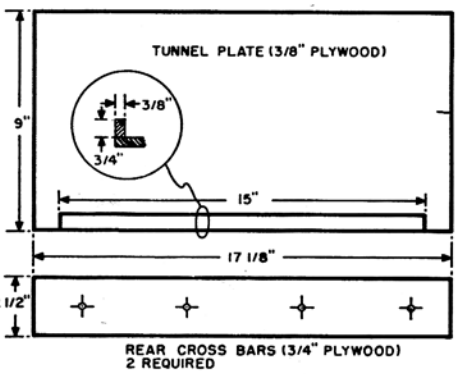


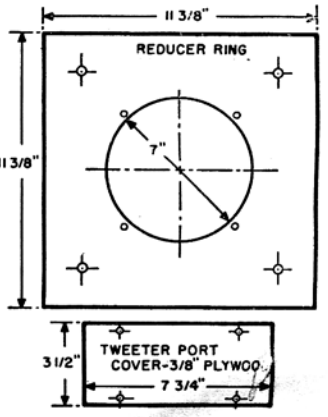
NOTES:

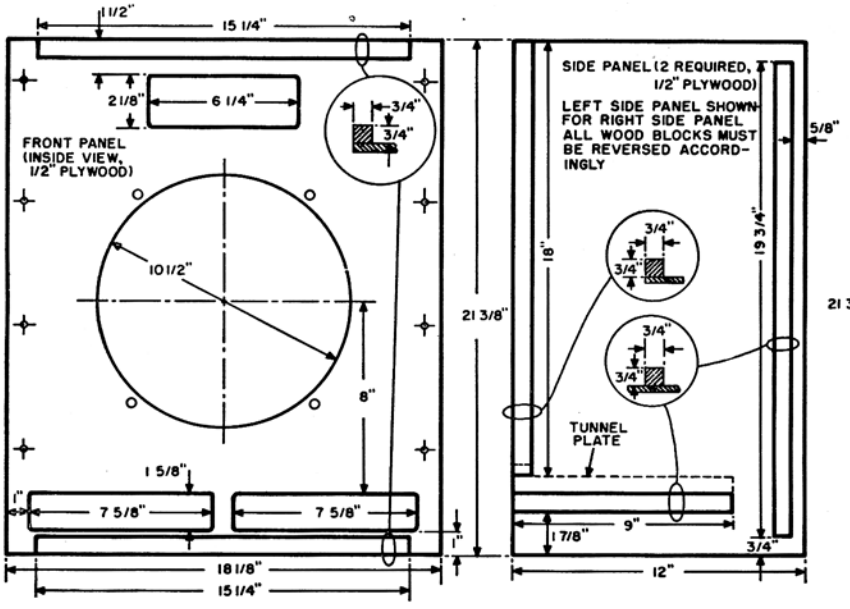
1. Mount sound absorbing material on inner surfaces of back, top and one side.
2. Glue and screw all joints except back which is only screwed on; use glue blocks as required.
3. Paint front and side surfaces black as these are to be covered with grille cloth.
4. Cover tweeter port if not used.
5. Feet or casters are added as desired.



(curve 2, Fig. 1) that the two peaks do not straddle the single peak evenly. What is more, the low-frequency peak is just about twice as high as the high-frequency peak and about two-thirds the amplitude of curve 1. This is characteristic of a reflex enclosure that is tuned *too high.* With the tunnel plate installed, note how the picture changes (curve 3, Fig. 1). Both peaks straddle the speaker resonance peak evenly and are of exactly equal amplitude. This indicates a properly matched condition that is the goal in the design of a reflex enclosure.

A moderately priced 12-inch coax speaker (*Jensen* H-222) was tried next. The speaker on hand was found to have a free-air cone resonance of 60 cps, as shown in curve 1, Fig. 2. With this speaker mounted in the enclosure from which the tunnel plate had been removed, the impedance curve shown as curve 2 results. The lack of symmetry about 60 cps and the greater amplitude of the lower frequency peak again indicated that the enclosure was tuned too high. Finally, the tunnel plate was permanently installed and the resultant curve (curve 3, Fig. 2) occurred. Both peaks have moved lower in frequency so that they now seem to straddle the speaker's resonant frequency quite well. The amplitude of the low-frequency peak has been reduced, but the high-frequency peak has become larger. Even with this increased height, note that the amplitude is only one-third the height of the free-air resonance curve. Curve 3 is usually produced in a reflex cabinet that is tuned too low in frequency; however, in such cases the two peaks do not straddle the single peak of the speaker alone as well as appear to be the case here.

From the foregoing it would appear that if the tunnel plate were not made quite so long, it would be possible to equalize exactly the amplitudes of the two peaks. In an effort to smooth out curve 3, a single, 1-inch thickness of Fiberglas was stretched temporarily across the port. This resulted in a reduction by one-third of both impedance peaks. The Fiberglas was not left in place as it was felt that this would impair the low-frequency output from the small port.

In studying the curves shown in Figs. 1 and 2, it appears that the enclosure would be a good match for any 8- or 12-inch loudspeaker having a cone resonance in the order of 60 to 65 cps.

## Performance

Acoustic measurements were taken in an anechoic room with the 12-inch speaker installed in the enclosure. The output was found to be fairly smooth down to about 85 cps, below which the response fell off at a rate of about 12 db per octave. Measurements in a live