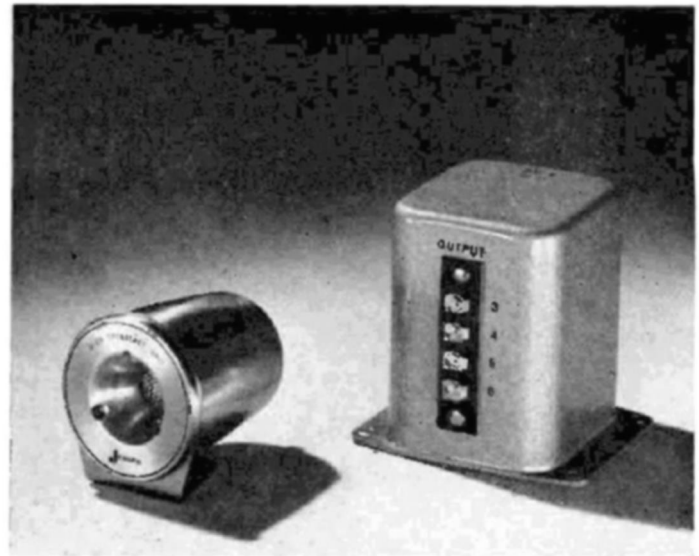


Fig. 1. The tiny super-tweeter, with its dividing network—a constant-resistance network, not just a series capacitor.

# New!



## "The Super Tweeter"

RALPH P. GLOVER\* and KARL KRAMER\*\*

Available at last—an accessory unit which provides smooth high-frequency response, including that top octave so hard to obtain, even with a good two-way system.

**A**FTER TWO YEARS of production and extensive public experience with the G-610 Triaxial<sup>1</sup>, a three-way loudspeaker with an unusually smooth and greatly extended high-frequency



Fig. 2. Similar in size and appearance to the Jensen high-frequency control, the super-tweeter may be installed in the baffle as shown here.

range, it is possible to draw some definite conclusions, important to everyone interested in truly high quality reproduction, conclusions which have fundamental significance apart from the merits of this particular loudspeaker. They are, as we see them:

1. The reproduction of the middle-to-extreme high frequencies with *smoothness* and *low distortion* is very much worthwhile; the condition is *essential* if we are to take full advantage of the potential contribution of the "highs" to realism in recreated sound.
2. The advantages of using a special high-frequency unit for the top end of the frequency range are very definite and readily appreciated when an opportunity for careful comparison of high-quality systems is presented, being evidenced by the elimination of these shortcomings of high-end extenders which over-reach sound design principles in their attempt to cover too wide a frequency range: Lack of "separation" of orchestral instruments; "smearly" reproduction of vocals; "throaty" or "nasal" coloration of the music; "wiry" roughness in high fundamental and overtone structure; perceptible "ringing" back-

ground noise. In the one case there is a definite satisfactory sensation of "transport to the original;" in the other a feeling of the interposition of a mechanical device with superficial attributes of "presence."

3. A perhaps not-to-be-expected dividend of the "clean" high end has turned up in respect to noise and system distortion. A loudspeaker system with a smooth (though well extended) high-frequency range has been found to be substantially more tolerant of distortion and of record, tape, and tube noise present in the incoming signal. Distortion from the source is not magnified and harshened; the noise is more "silky" and less tonally colored.
4. All of these unreal and undesirable effects can be eliminated by substituting a cleanly-extended high-end for the offending one. This can be done with virtually no mechanical difficulties, and with the simplest of wiring changes, by means of the accessory high-frequency unit and network described in this article; cost is only about one-third that of an upper-bracket 15-inch coaxial speaker.

As illustrated in Fig. 1, the RP-302 High-Frequency Unit is basically an externally modified version of the top (third) acoustic channel of the G-610 Triaxial, designed into a streamlined case with removable bracket for top-of-cabinet mounting, Fig. 3, and arranged so that it can be installed flush on the

\* Product Manager and \*\* Technical Service Manager, Jensen Mfg. Company.

<sup>1</sup> Plach and Williams, "A new loudspeaker of advanced design," AUDIO ENGINEERING, October 1950.

front surface of a cabinet or baffle, as in Fig. 2. The unit is intended to serve (1) as a moderate cost *acoustic* replacement (mechanical and electrical changes in present speaker equipment are unnecessary) for the h-f end of loudspeakers with insufficiently extended, deficient, or distorted h-f response, and (2) as the third or top channel of a three-way divided system being built from "scratch."

Figure 4 is an exploded view of the "super tweeter" showing how the unit comes apart for flush mounting. The three screws are removed from the front, after which the horn piece can be inserted into a 1-11/16-in. diameter hole in the panel. The driver unit is then re-assembled to the horn and the cover acts as a clamp from the rear to hold the assembly tight to the panel. Figure 3 shows the unit in place, flush mounted on the cabinet.

#### Electrical Connections

As will be seen from the block wiring diagrams, there are several ways of applying the "super-tweeter" to existing loudspeakers or systems:

1. Eliminate highs above 4000 cps from the existing loudspeaker or system electrically by means of a crossover network such as the A-402; feed the RP-302 from the crossover network, so that it alone is reproducing in the range above 4000 cps. See Fig. 5, (A) and (B). (This method has outstanding advantages since it eliminates rough and distorted high-end acoustic output from the original equipment as well as improving the efficiency and extending the range of the h-f response. If you think your present coaxial or divided two-way system is as good as it can be, try this.)
2. The high frequency unit may be bridged across the input to the present



Inconspicuous, yet effective, this unit has been tested for over a year in the original McProud speaker cabinet with exceptionally pleasing results. Now it can be told—

speaker with a 1- $\mu$ f condenser in series with the unit as shown at (C) and (D). (The series condenser is essential here to keep low frequency power out of the h-f unit, which may be damaged otherwise. This method is useful for extending h-f range and improving efficiency and gives good results with many speakers.)

The efficiency of the super-tweeter is appreciably higher than that of most commercial speakers, and an L-pad is usually desirable between the network and the unit to adjust the h-f balance.

#### Technical Data

The RP-302 super-tweeter has an impedance of 16 ohms, and the voice coil is wound with aluminum wire to minimize mass. The phenolic diaphragm works into a high-frequency horn designed in accordance with the Hypex formula. The frequency range extends from 3500 to 18,000 cps, and the coverage angle is useful over 120 deg. The power handling capacity of the unit is adequate for a system of 30 to 40 watts output, when used with the A-402 Cross-

over Network. Obviously, if a test signal at this level were applied to the unit over the high-frequency range, damage would result, but with normal power distribution of speech or music, the super-tweeter is capable of handling the output of a high-power amplifier.

The A-402 Crossover Network is of the constant resistance type, in a parallel configuration. It consists of two inductances and two capacitances, and has an insertion loss of less than 0.25 db in the pass band, and with an attenuation of 12 db per octave each side of the 4000-cps crossover in the two channels. Its impedance is 16 ohms, to match the speaker unit.

(EDITOR'S NOTE: Over a year ago, one of these units was sent to us for our trial in the field. On the evening of the day it was received, it was connected to our present two-way system, consisting of a 15-in. woofer in a corner cabinet, shown above, with an 8-cell high-frequency horn of excellent performance. The super-tweeter adds considerably to the entire installation, providing the extra bit of brightness that aids in establishing the illusion of reality. The improvement is definitely noticeable, and all who have heard it have been anx-

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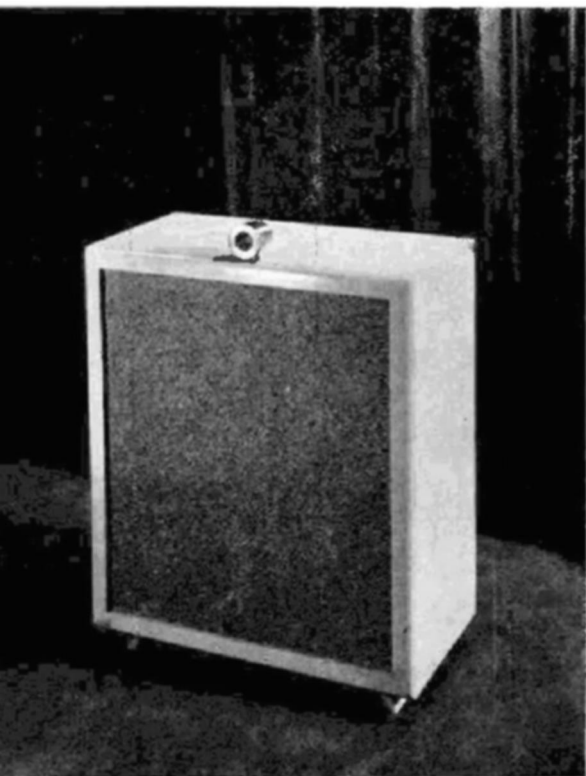


Fig. 3. The simplest mounting—on top of the existing cabinet.

## THE SUPER TWEETER

[from page 23]

ious to obtain such a unit for their own use—which to date they haven't been able to do. In the original test connection, a 2- $\mu$ f capacitor was used in series with a 25-ohm potentiometer, with the super-tweeter connected from the arm of the potentiometer to one end, to permit adjustment of volume. It has been found that the optimum adjustment is about 6 db down from the maximum. C.G.McP.)

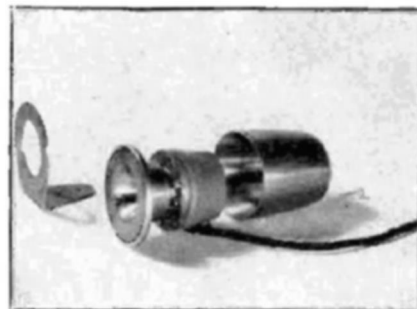


Fig. 4. For mounting in cabinets or on baffles, the unit comes apart readily.

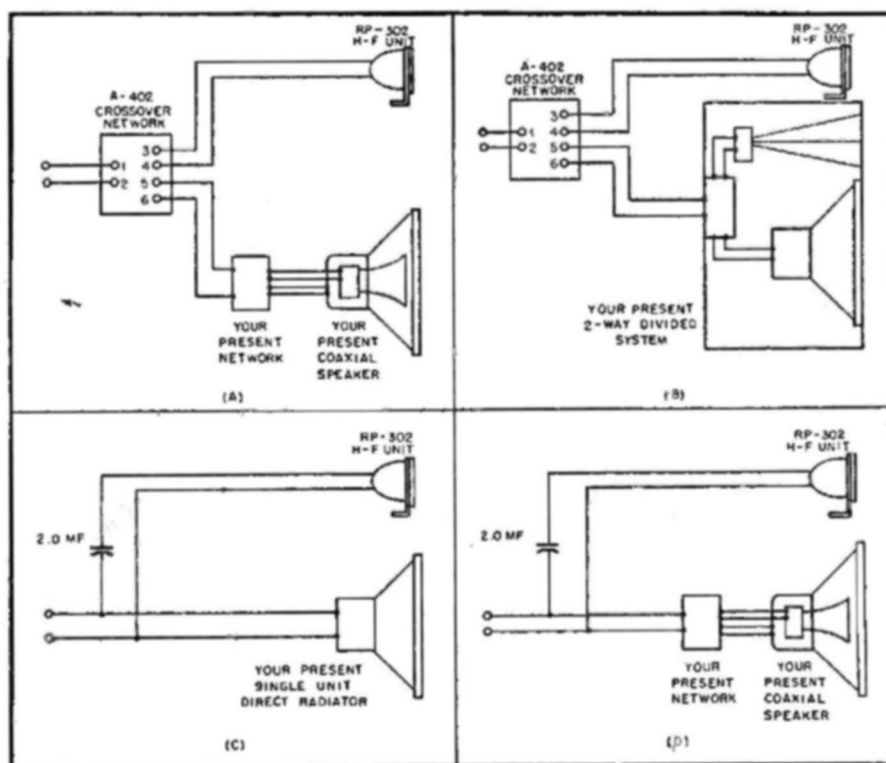


Fig. 5. Typical methods of connecting the super-tweeter—(A) and (B), using the associated network; (C) and (D), using a series capacitor.