

DOPE FROM HOPE

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BRIDGED CENTER LOUDSPEAKER AND PENTAPHONIC

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1. BRIDGED CENTER SPEAKER

Back in the days of some of the tube amplifiers it was possible to feed a center speaker from 2 amplifiers (or a stereo amplifier), provided the efficiency of the center speaker was within about 6dB of the efficiency of the flanking speakers.

With the advent of solid state power amplifiers, and particularly those of the "DC" type, it is usually bad practice to "derive" a bridged center signal from the outputs of 2 power amplifiers. If a polarity reversing transformer is used it tends to upset the feedback loops and has been known to cause "thumping" transients in the amplifier.

One maker of transformers for this purpose publishes a circuit which involves the half-winding inductance of the transformer across one amplifier output, and an electrolytic capacitor (without polarizing voltage) to block DC crossfeeds. I aver it is better to use the entire inductance with $\frac{1}{4}$ the exciting current and $\frac{1}{4}$ the distortion, and to use pairs of electrolytics back-to-back with a polarizing voltage. I aver it is still better to use 3 amplifiers, obviating the transformer with its exciting current and potential distortion, obviating the need for blocking capacitors, and obviating the limitation of differences in efficiencies between loudspeakers.

Benefits of using the bridged center speaker were recognized by Steinberg and Snow (Symposium on Auditory Perspective 1934)* and their teachings reiterated by this writer in 1958.* The basic improvement in adding a center speaker was analyzed in "Stereo Geometry Tests" in 1962.*

The best way we know of to derive a source for a bridged center speaker (erroneously called "center channel" — and I plead guilty to fostering this error) is shown in the accompanying sketch on page 3. The values chosen are such as to work well with either tube or solid state preamplifiers or amplifiers.

One way to use 3 amplifiers is provided on some modern pre-amps. This is acceptable in use only if the center speaker is equal in efficiency to the flanking speakers (and of course if the center amplifier affords the same gain, output and polarity as the stereo-pair amplifier feeding the flanking speakers.

*The Symposium, Stereo Geometry Tests and other papers are available in reprint form at \$1.00 for The Symposium and \$0.25 each for the papers; or \$5.00 for the complete set from KLIPSCH and ASSOCIATES, Inc.



... The mark of integrity in loudspeakers!

2. COMMENT on "PSEUDO QUADRAPHONIC" or "PENTAPHONIC" INVOLVING the INTRODUCTION OF REVERBERANCE at REAR OF LISTENERS BY USE OF ADDITIONAL LOUDSPEAKERS

Addition of "ambience" or "reverberation" components to the rear of the listener is aimed at enhancing "realism". In some demonstrations the "realism" is exaggerated to the extent that a soloist shifts back and forth from front to rear; many demonstrations have so exaggerated all the effects as to give the idea a bad review. Properly done, there seems to be some potential. To quote Sam Goldman, "A bad picture in 3D is 3 times as bad;" to paraphrase "Bad sound in Quadra is 4 times as bad". Whether we use one speaker or 2 or 3 or 5, the **quality** depends on the basic quality of the speakers used, not how many are used. For quality and tonality good speakers are needed; for stereo geometry proper number and spacing are needed. And with only 4 speakers, one still needs a leg-chain for the soloist or else a one-chair audience. The bridged center speaker is just as much needed in "4-D" as it is in stereo. The principles drawn from "Stereo Geometry Tests" * tell us that center stage events can be prevented from wandering only by this means.

So we propose an array of 5 loudspeakers, rather than 4, so the frontal array contains the bridged-center speaker so necessary to "prevent the shift of the virtual sound source" with different listener locations, as taught by Snow. The rear speakers and circuit arrangement were suggested by Mr. John M. Eargle, former Chief Engineer of Mercury Records. Here the idea is to "defocus" the center stage event by using a difference instead of sum signal for the rear speakers, and to invoke the Haas effect of simulating time delay with reduced volume.

We choose to call this "Pentaphonic" since 5 speakers are used, but the system is compatible with 2 channel program material since it is what we started with.

This system uses the same "2-3 Stereo Box" as for 3-speaker stereo, plus one L pad. The complete diagram, including the box, pad and geometric array is shown on page 4.

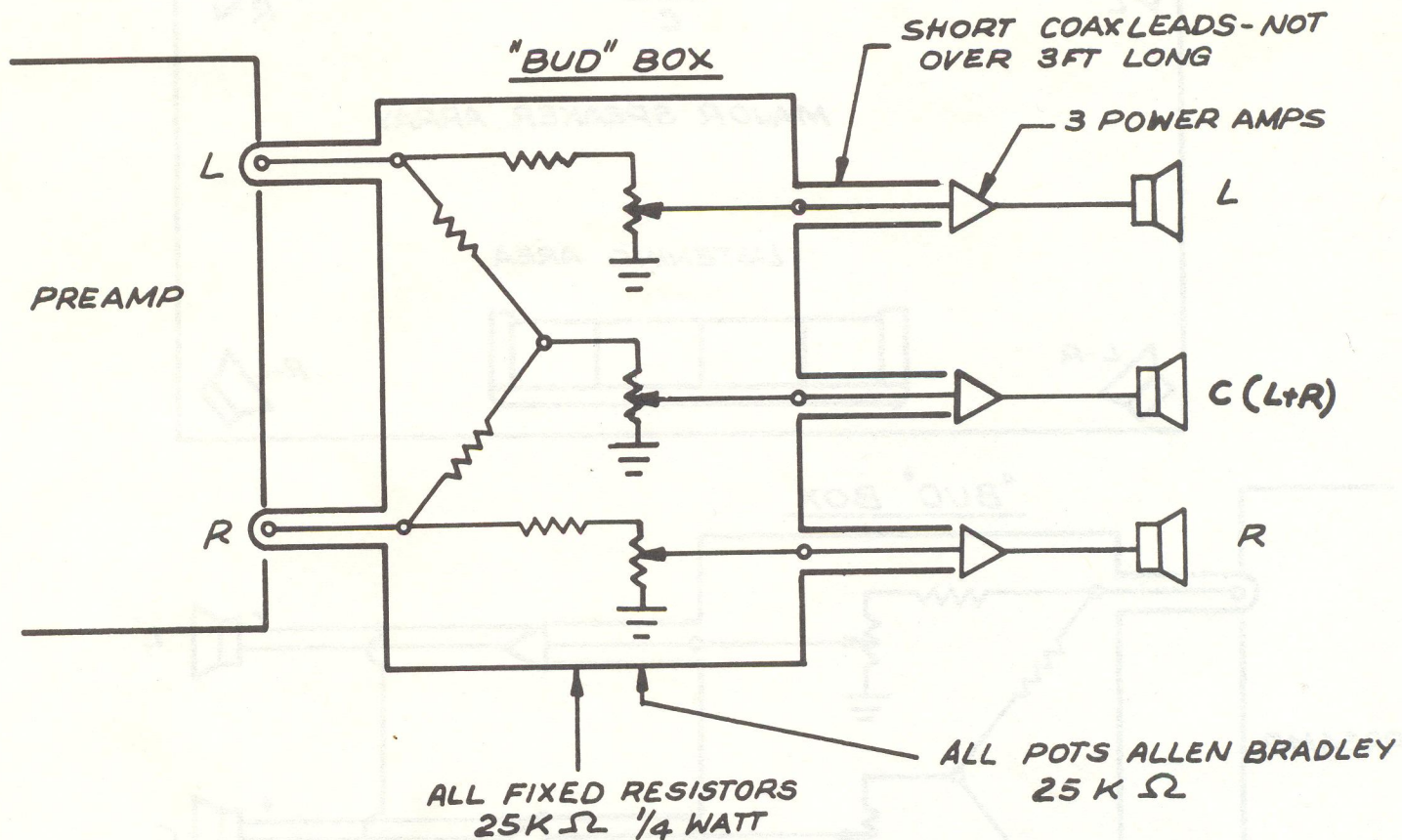
Three and five are awkward numbers for power amplifiers, but most makers of stereo amplifiers make also monophonic or "mono" amplifiers so a stereo and a mono amplifier can be used to form 3 "channels" for the 3 front speakers.

The 2-3 Stereo Box shown in the sketch may be made up by any radio serviceman or by the user himself.

Klipsch and Associates, Inc. does not produce this box, but if demand is such that it would be economically feasible we will consider it as a product. We would do this only in acceptable quality of components [such as Allen-Bradley pots (volume controls —) any pot will wear out eventually but the A-B pots exhibit high longevity. They cost about 4 times as much as some of the pots found in hi-fi preamps].

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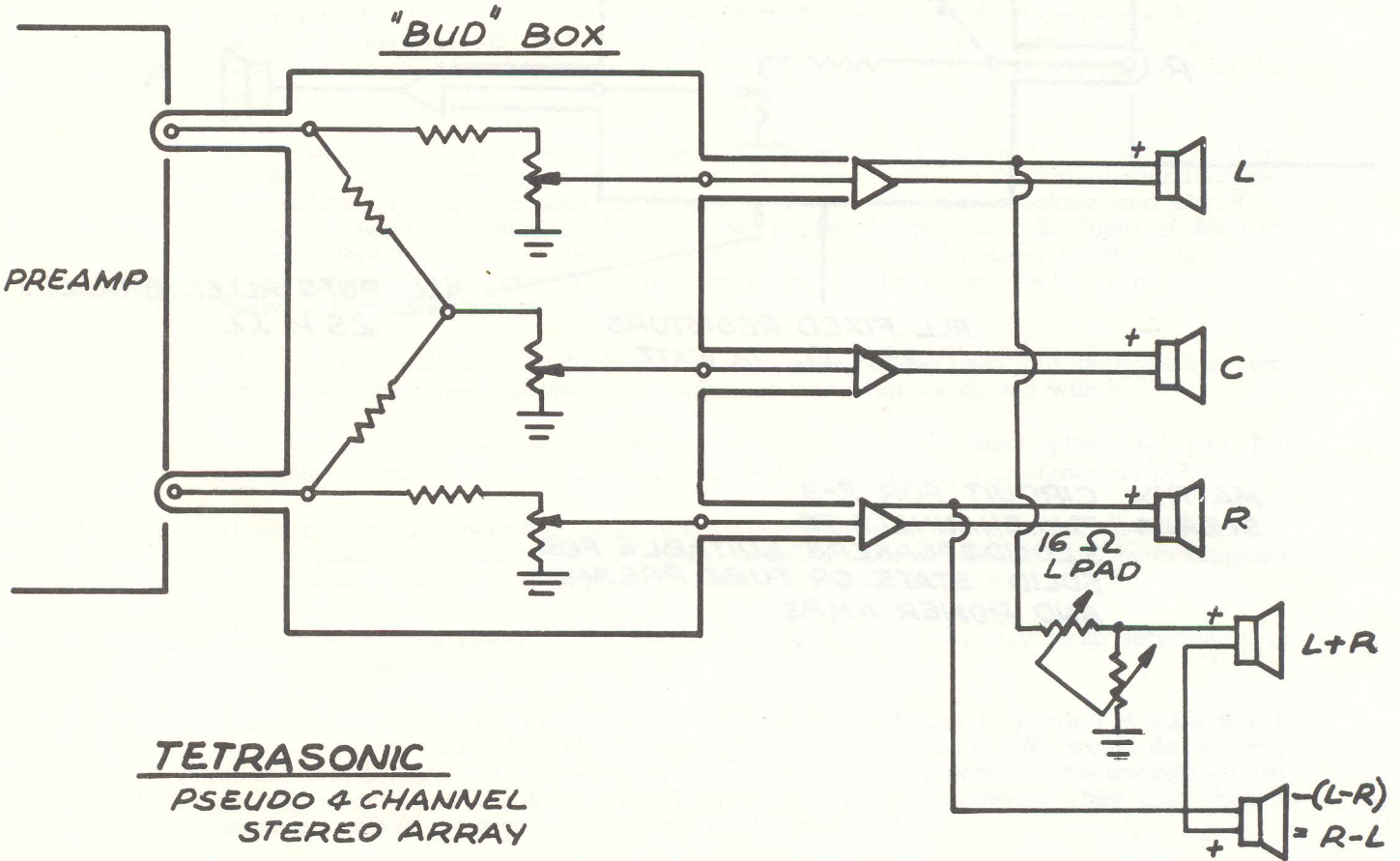
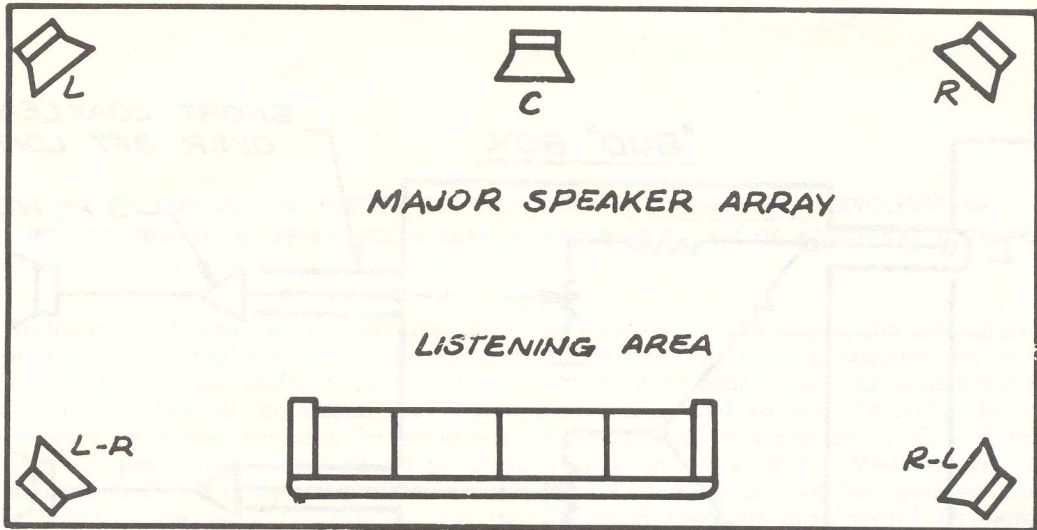


**MATRIX CIRCUIT FOR 2-3
STEREO : TWO CHANNELS TO
3 LOUDSPEAKERS SUITABLE FOR
SOLID - STATE OR TUBE PREAMPS
AND POWER AMPS**

**KLIPSCH AND ASSOCIATES INC.
HOPE / ARK**

**DATE: 10-JUNE 1971
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FIG. 1



TETRASONIC
PSEUDO 4 CHANNEL
STEREO ARRAY

ALL FIXED RESISTORS
25 K Ω 1/4 WATT

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FIG. 2