THE ULTIMATE LSH LOUDSPEAKER

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Major Premise[2] and S. P. Canard[3] have made the final major breakthrough in loudspeaker design with their ULTIMATE LSH[1] loudspeaker.

We take the original LSH loudspeaker as a point of departure, build a forced-draft box on which to set the LSH, Fig. 1, and wire a shunt resistor R_2 of 0.1666 ohm rated at 50 W and a series resistor R_1 of 3.837 ohms rated at 1200 W, Fig. 2. This will give an effective load
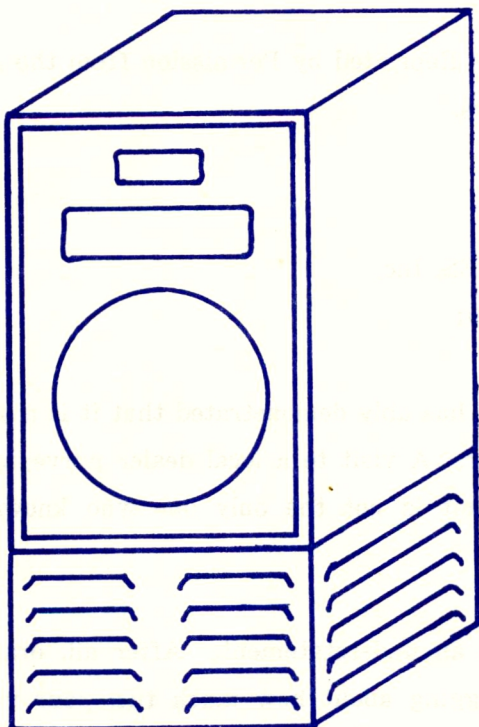

Fig. 1. ULTIMATE LSH loudspeaker on heat-sink base.

resistance of 4 ohms and a continuous power input capacity of 1200 W. The total impedance will vary from perhaps 3.999 ohms to 4.003 ohms peak at the primary speaker resonance frequency. The lay press may be quoted as saying[4] that the more nearly constant the impedance, the better. A small battery of "whisper fans" driven from 115-V 60-Hz (or 50-Hz) house current will dissipate the heat and keep the house warm. A battery of three zero-

phase 400-W amplifiers in series–parallel could drive this system to continuous capacity. Electric-to-acoustic efficiency will be desirably low, in full acknowledgment of the modern doctrine that to obtain highest quality the efficiency must be ever lowered.[5]

The acoustic output of the new ULTIMATE LSH at full 1200-W input is 100-dB sound-pressure level at 61 cm. Compare this to the standard LSH system which
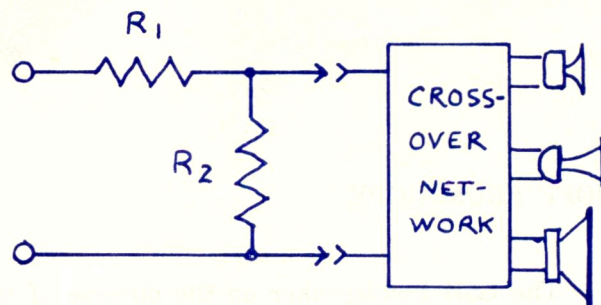

Fig. 2. Circuit for ULTIMATE LSH crossover network. $R_1 =$ 3.837 ohms, 1200 W, continuous, 12 000 W intermittent. $R_2 =$ 0.1666 ohm, 50 W continuous, 500 W intermittent.

produces 100 dB at 61 cm at only 1-W input. Here we have increased the input power handling capacity to 1200 times as much as the standard speaker can absorb. Also the damping factor has been modified to a value of 8/0.16 or about 50, assuming that the amplifier damping factor is infinite. The cost of this breakthrough will be nominal; the 2 resistors and battery of fans should not cost over a couple of hundred dollars (July 1973). Thus for less than doubling the cost of the speaker one has increased its power input capacity more than 1000 fold.

A quad of such speakers in four-channel will be capable of absorbing 4800 W continuous; allow 10-dB headroom for transients, and the "music power" rating can be as high as 48 kW (peak). It is proposed to offer the speakers at $2000 in sets of 4, with a four-channel 48 000-W (12 000-W per channel) amplifier at the usual one-dollar-per-watt price.[6] Thus the system will cost just about an even $50 000. This seems to be about the customary ratio of amplifier-to-speaker price of 24 : 1.

Placement of the thermal unit below the LSH assures a dry environment for the voice coils.

The designers feel that this must be the major breakthrough to end all major breakthroughs. If 700 W is questioned as sufficient, here 48 000 W is offered. If low efficiency is the way to achieve quality, then a new low is achieved by three orders of magnitude. Surely a further step in this direction would be milking a mouse. The new ULTIMATE LSH must be hailed as truly the ultimate achievement.

Aftersong: To improve the weight per horsepower ratio, cavities are partially filled with 34.019776 kg of cast iron sash weights. Also a torque wrench is furnished to adjust the tweeter level control. Owner's Manual states that guarantee is voided if calibration is altered from 2200 g-lb.

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[1] Loudspeaker and Space Heater.

[2] Major Premise, formerly with the Air Corps Horse Marines, is now Engineer with Hurtz and Associates, Inc.

[3] S. P. Canard, formerly with Proctor and Gamble Inc., is now Vice President and General Manager of Hurtz and Associates, Inc. Mr. Canard was asked to author this paper but was preoccupied with his reverse-feathered wing by which means he proposes to fly forward and backward simultaneously.

[4] A reviewer of equipment cites a loudspeaker as having a commendably low variation in impedance (1972).

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[5] Robert Carver (*Audio*, p. 34, Feb. 1972) states, "Whenever a loudspeaker engineer makes an attempt to extend or smooth the frequency response of his design, or lower the distortion, the laws of physics demand that the loudspeaker become ever less efficient." (This law stated without proof).

[6] Hirsch (*Stereo Rev.*, p. 60, Apr. 1972) wonders if 700 W is enough.