Letters to the Editor

Linsley Hood class A amplifier

Recent measurements on this amplifier have indicated that the gain and power bandwidths of this design, using the component layout shown on page 152 of your April 1969 issue, are wider than indicated by the Figs. 4 and 5 of the article. The apparent fall-off in gain beyond about 100kHz was, in fact, due to shortcomings in the measuring apparatus, and measurements made with better equipment suggest that the –3dB points for voltage gain are above 1.5MHz although the power output falls beyond 200kHz.

Since the output is in phase with the input, it is necessary to take care that the output leads and the output capacitor are not close to the input. (A 2-inch separation will be adequate for normal lead lengths.) However, an additional point must also be noted. If a capacitive load is connected with short leads between the output and the earth line near the input connection, the potential developed along the earth line, due to its inductance, can inject an in-phase signal, and thereby cause instability, in the MHz region. To avoid this possibility, it is recommended that the earthy lead to the loudspeaker terminal be returned to the earth line at the same point as the emitter of Tr1. The inclusion of a small r.f. choke (25 turns of 26-28 s.w.g. wire wound round the outside of a 10-ohm 1-watt resistor is ideal) between the output (point 'X') and C2 will also prevent this possibility of trouble.

In practice, with the components and layout suggested, the inductance of the normal 12 to 18 inches (or more) of loudspeaker connecting lead prevents instability with capacitive loads, so this should be only of academic interest.

As an alternative, it is possible to reduce the r.f. response of the amplifier to give a smooth 6dB roll-off beyond 50kHz – which removes much of the need for care in the layout of components, without detriment to the harmonic distortion in the audible range, and without any audible alteration to the performance – by connecting a 1,000pF capacitor between the collector of Tr3 and the emitter of Tr4; a 1,000pF in series with 100 ohms between the collector of Tr4 and earth; and a 0.01µF in series with 8 to 10 ohms between the output ('X') and earth. (It should be noted that either all of these components should be added or none at all, they are not alternatives.) If the r.f. response is reduced in this manner, the use of a series r.f. choke would be unnecessary.

A series of measurements has also been made, using the amplifier design exactly as described in the article (without r.f. chokes or other modifications), to determine the voltage waveform produced, actually across the loudspeaker, with a square wave input to the amplifier. It was found, in practice, with several different loudspeaker systems, that the output waveform was virtually identical to that obtained with an equivalent resistive load – photographs of which were reproduced in the April issue. It was, in fact, the discovery that a good square wave was reproduced up to the 1MHz limit of the generator in use which prompted a reassessment of the r.f. response of the amplifier. The absence of any overshoot or significant ringing also provides confirmation of the stability of the amplifier under practical conditions.

A correspondent has reported that this design has been up-rated successfully to 15 watts into a 15-ohm load, to give a direct power equivalent to the Williamson amplifier, using 2N3055 output transistors with a 43-volt supply (1.1 amp per channel), and rather larger heatsinks. There would seem no good reason why this could not also be done using MJ481s.

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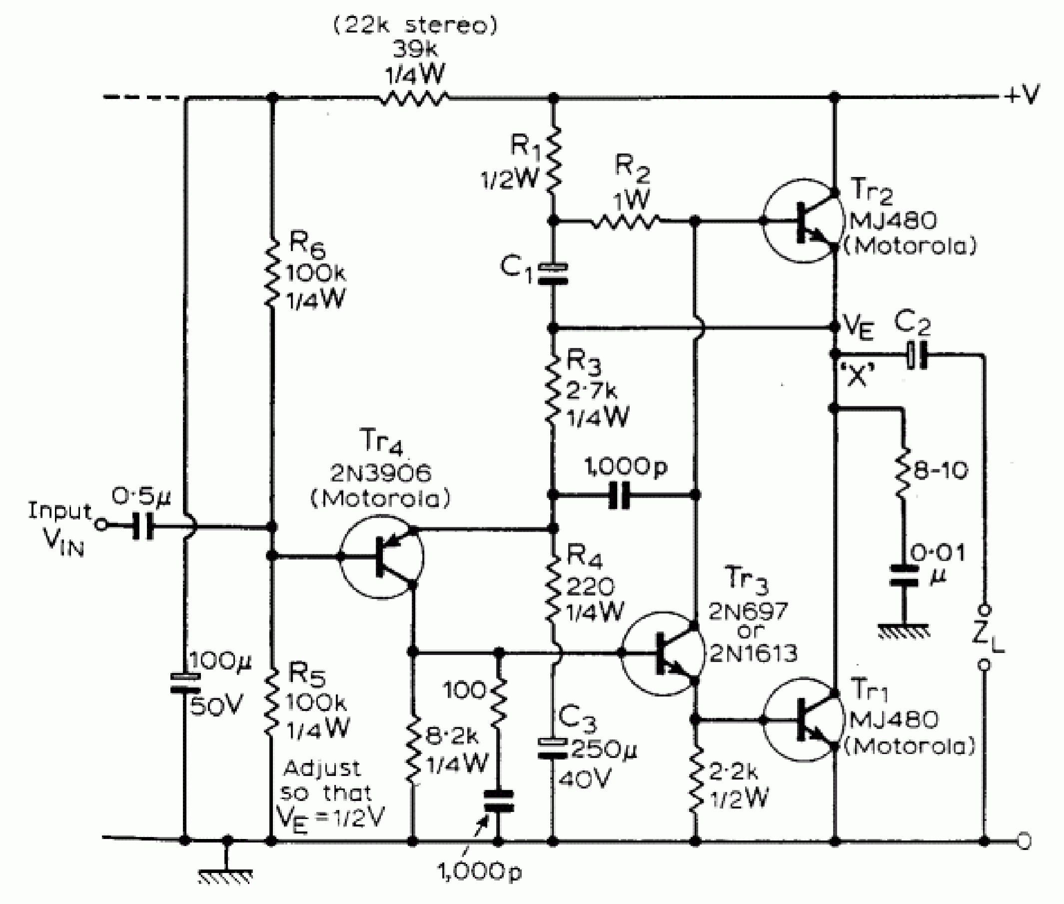

Mr Linsley Hood's amended circuit of his class A amplifier originally described in the April 1969 issue.