CIRCLE 522

QUALITY PREAMP CUTS COST, SIZE

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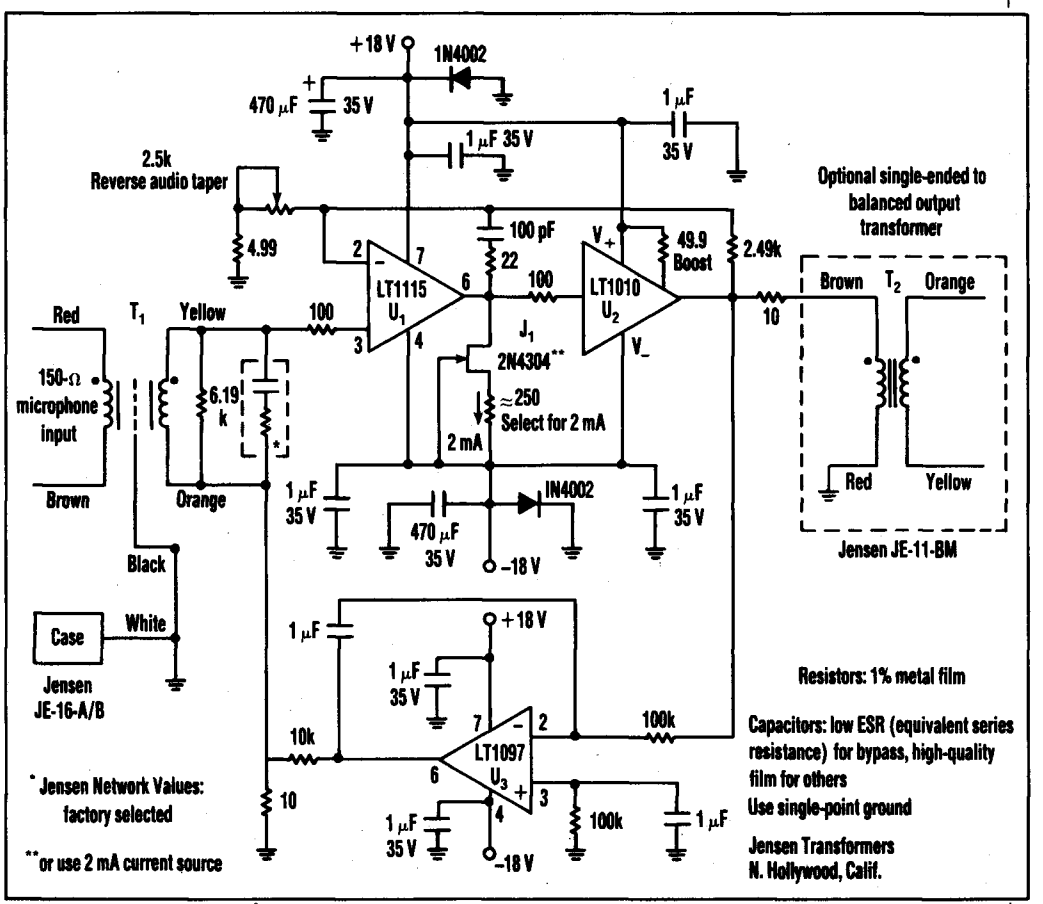
To achieve low noise and 600-Ω (or less) load capability, traditional recording-studio mixing panels use high-cost modular or hybrid amplifiers with matched input-stage transistors and push-pull A-B outputs. Though the expected high performance is achieved, the solution is large and expensive. An alternative approach uses a low-input-noise audio op amp added to a high-quality class-A buffer amp. The resulting circuit forms a variable-gain, transformer-coupled microphone preamp. The preamp is equal to the discrete design in performance, and superior in cost, size, and overall complexity.

IC U_1 is a low-noise LT1115 audio op amp that's operated in a class-A mode by J_1, a 2-mA current source *(Fig. 1)*. U_1's output is buffered by U_2, an LT1010 buffer amp. U_2 can be adjusted to supply a class-A stand-

ing current by the 49.9-Ω resistor at the Boost pin, and is capable of very low open-loop distortion.[1] U_3, an LT1097 precision op amp, is configured as a dc servo to null output offsets that can cause distortion in the output transformer, T_2. T_1 is carefully selected to match R_n, the LT1115's characteristic noise resistance.[2] Both transformers should be properly shielded and grounded for optimum performance in this low-level application.

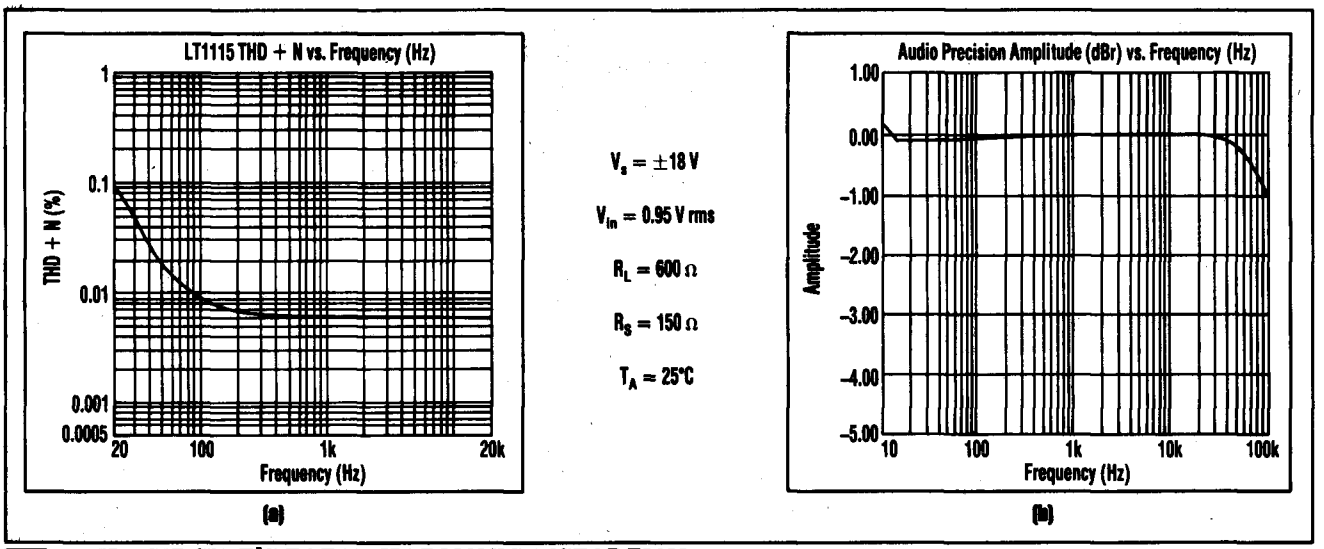
Using the gain control, the circuit's overall gain can be adjusted from 12 to 50 dB. The distortion and frequency-response, plotted at an operating gain of 20 dB, illustrate the circuit's performance *(Fig. 2)*. The risetime of the preamp approximates the Bessel response characteristic, now favored by specialists in the audio field. For top performance, the circuit should be operated with well-bypassed, low source-impedance power supplies.□



1. A LOW-INPUT NOISE AUDIO OP AMP (LT1115) is coupled with a class-A buffer amp (LT1010) to form a variable-gain, transformer-coupled microphone preamp. By altering the gain control, the circuit's overall gain can be adjusted from 12 to 50 dB.

[1]Jung, W.G., R.N. Markell, "Low Distortion Video Buffer," ELECTRONIC DESIGN, March 9, 1989.

[2]Jung, W.G., *Audio IC Op-Amp Applications*, Third Edition, Howard W. Sams and Co., Indianapolis, Ind., 1987.



2. THE CIRCUIT'S TOTAL HARMONIC DISTORTION (THD) plus noise is plotted against frequency (a). A second plot shows the circuit's frequency response (b). Both plots illustrate an operating gain of 20 dB with a balanced input-output.