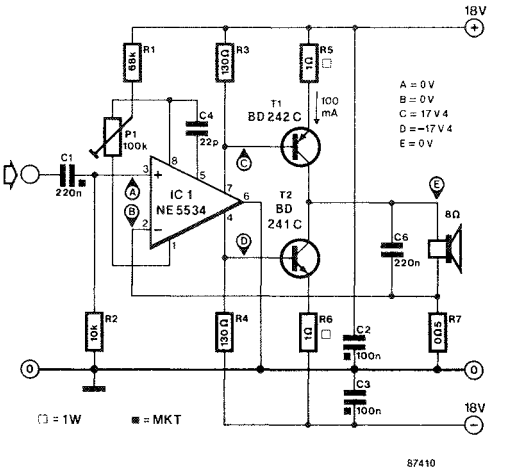
005 CURRENT CORRECTED AF AMPLIFIER

The majority of modern AF power amplifiers drive the loudspeaker(s) with a voltage that is simply a fixed factor greater than the input voltage. It is fairly evident, therefore, that the power delivered by such amplifiers is inversely proportional to the loudspeaker impedance, since the cone displacement of a loudspeaker is mainly a function of the current sent through the voice coil, whose impedance may vary considerably over the relevant frequency range. In multiway loudspeaker systems, this difficulty is overcome by appropriate dimensioning of the crossover filter, but a different approach is called for when there is but one loudspeaker.

This amplifier is based on current feedback to ensure that the current sent through the voice coil remains in accordance with the input signal. The current through the voice coil and R_7 develops a voltage across the resistor. A negative feedback loop



is created by feeding this reference voltage to the inverting input of IC_1. The overall amplification of the circuit depends on the ratio of the loudspeaker's impedance, Z_L, to the value of R_7. In the present case the amplification is 16 times ($Z_L/R_7 = 8/0.5 = 16$).

The connection of the opamp's output to ground is slightly unusual, but enables the base current for output transistors T_1-T_2 to be drawn from the supply rails, rather than from the opamp. Capacitor C_6 functions to set the roll-off frequency at about 90 kHz. The quiescent current of the amplifier is of the order of 50 to 100 mA for class A operation, and is determined by R_3-R_4 and R_5-R_6. The complementary power transistors should be closely matched types to avoid fairly large offset currents (and voltages) arising. Some redimensioning of either R_3 or R_4 may be required to achieve the correct balance for the power output stage. The emitter current of T_1 and T_2 is about 500 mA when the amplifier is fully driven.

The harmonic distortion of this amplifier is less than 0.01% at $P_o = 6.25$ W and $U_b = \pm 18$ V.

Source: *Texas Instruments Linear Applications.*