The composite current boosted line driver two, shown in Figure 6-53 below, summarizes a number of the above mentioned options, and adds some other features as well.

Similarities within this circuit to the predecessor are resistances R_1-R_4, which perform similar functions to the previous version. Overall gain is again calculated via R_1-R_2, while output stage gain is set via R_3, R_4, etc.

Here, note that an additional pair of resistances, R_C and R_D, form a local feedback path around stage U1. This addition allows the effective open loop bandwidth of U1 as it operates within the overall loop to be increased. For the values shown, using an AD823 for U1, the open loop bandwidth is about 100kHz. This means that the open loop bandwidth of the entire circuit is greater than the audio bandwidth, which means phase errors within the passband will be minimized.

An optional small capacitance (C_F, 10-20pF) can be useful for stabilizing the U1 stage, particularly if it employs a wide bandwidth device such as the AD825. When C_F is used, a like capacitor C_{IN} can also be used, to preserve high frequency impedance matching.

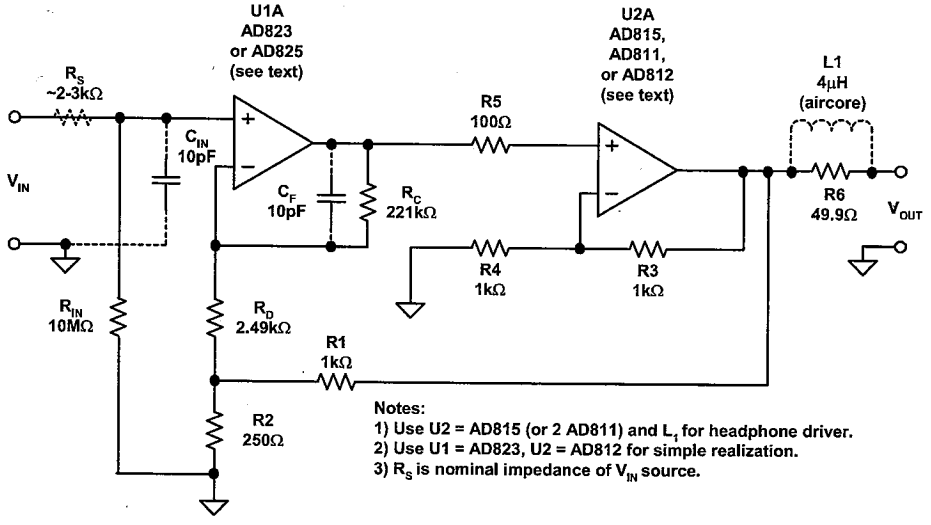

***Figure 6-53:** Composite current boosted line driver two*

The primary input impedance balancing of the circuit is accomplished via resistance R_D, which has a dual role. External resistance R_S is the nominal output resistance of a volume control (typical for a 50kΩ audio taper control at listening level). R_D is chosen to match R_S, and R_C will be approximately 100 times the R_D value when using the AD823.

The necessity of inductor output L1 depends upon whether the circuit is to be used with low impedance loads. For headphones, the L1 choke is necessary to prevent excessive voltage loss from a simple R_6 connection. R_6 is used, in either a headphone or line driver case. If configured as a headphone driver, the circuit should use several square inches of PCB area around U2, to heat sink the AD815 device (see device data sheet). The AD811 and AD812 can also be used to drive higher impedance phones, such as 100Ω or more.

Because of the vast number of options with this circuit, no performance is presented here. However, some insight into headphone driver performance is contained in Reference 12.