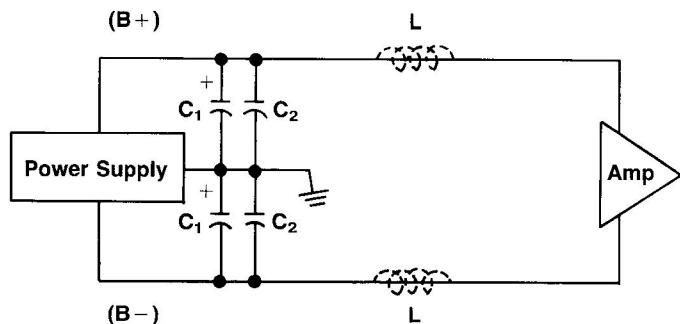


A quick review of the formulas for  $Q$ ,  $DF$ , and self-resonant frequency shows how easily a high-performance capacitor can be degraded. Very short termination paths are needed at each terminal to prevent degradation: just a few milliohms of ESR or nanohenries of inductance will reduce a  $Q$  of thousands to hundreds or tens.

Substituting different brands of conventional capacitors in existing circuits is also problematic, particularly when those circuits have been specifically designed with one particular brand exhibiting non-ideal characteristics. Another brand's idiosyncracies may have audible effects. For highest performance, a circuit should be designed with the most nearly ideal components available. These components allow more stable signal processing with finer detail and resolution.

Of course, circuit layout and wiring methods can also create stray parasitics that dominate a high performance capacitor's own parasitic contributions. Actual execution of an equalizer or filter circuit model, for example, sometimes falls short of expectations. This usually occurs because the model did not include the effects of the component's parasitic elements and the stray parasitics that result from the layout and wiring of the circuit. Again, optimizing the complete design with the more ideal capacitor will produce the best results.



**FIGURE 12**

Typically, the power supply electrolytics ( $C_1$ ) are bypassed with film capacitors ( $C_2$ ) at the location of  $C_1$ .  $C_1$  is usually remote from the amplifier. Therefore, the intended benefit (lower  $Z$  at high frequencies) of  $C_2$  is nullified by the distributed wiring inductance ( $L$ ) as indicated in Figure 9.