SINGLE-ENDED RIAA "PRE-PREAMP" WITH 30/40dB GAIN

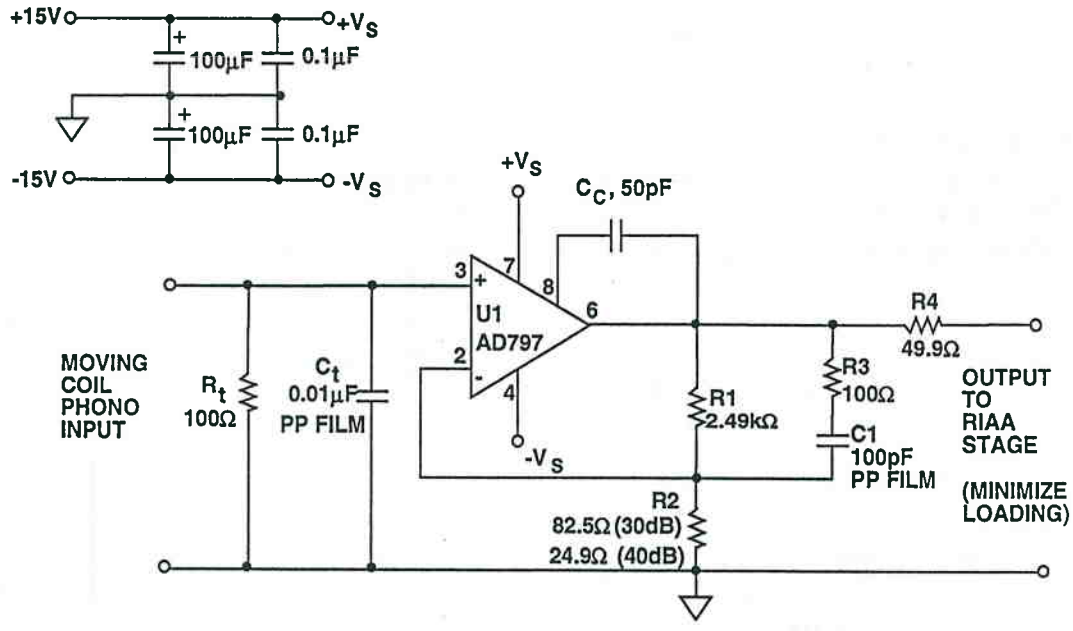

Figure 8.25

The circuit of Figure 8.25 is a pre-preamp suitable for low level input single ended applications. It uses an AD797 op amp in a low noise configuration, with either 30 or 40dB gain, adjustable by R_2. At the higher (40dB) gain the output noise of this circuit will be dominated by the source or the op amp, dependent upon the actual DC resistance of the cartridge in use. With a low resistance cartridge, it will be on the order of $2nV/\sqrt{Hz}$.

Input terminating resistor R_t should be adjusted to suit the cartridge. C_t is relatively non-critical, but should be a low inductance film type to minimize RFI effects. Capacitor C_c acts as part of a distortion cancellation loop, in conjunction with the AD797's internal stages.

In a system, this circuit can be used two ways. One is as a stand-alone pre-preamp, used with another RIAA preamp, in which case a short low capacitance cable connects the output to that stage, and R_2 is set for the desired overall gain. Another way to use this circuit is as the first stage in either a passive or hybrid RIAA equalizer circuit, for example as a U1 stage replacement in either Figure 8.21 or Figure 8.23.

This entire stage replaces the entire U1 stage in one of those circuits, and R_1-R_2 are adjusted for the desired 1kHz gain. Typically this will be of the order of 50-60 dB, or about 20 dB higher than with the moving magnet transducer.

Taking the passive equalizer of Figure 8.21 as an example: the gain of stage U1 becomes 5-20 times higher, making it in the range of 100-400 times. For an overall gain of 54dB, R_2 of Figure 8.25 should be 20Ω for a U1 stage gain of about 125 times, or 42dB. Combined with the N1 network and stage U2 of Figure 8.21, the overall gain is then ≈510 times, or close to 54dB. The gain expression generally follows Eq. 8.11, but with the values of R_1 and R_2 from Figure 8.25 used in place of R_4 and R_3. The resistor shown in Figure 8.25 as R_4 then becomes the input resistance of the network N1, with the remainder of the circuit similar to Figure 8.21.

The AD797 is a stable DC amplifier, but with an input offset of ±80μV and cascaded DC gains above 1000, some form of overall DC stabilization will be needed. If it is used in the circuit of Figure 8.21, a DC servo should be used with the loop adjusted to null out the input referred offset which is ±150μV. The output amplifier can be a buffered composite amp using the AD744 and the AD811, as described in the "Line Drivers" discussion. Details of this configuration are left as an"exercise for the reader".