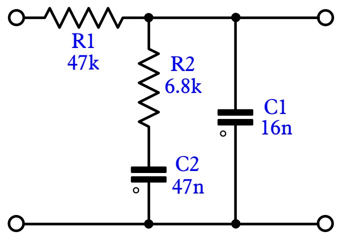
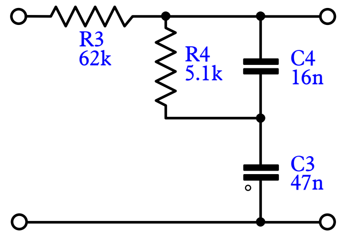
These tables give the relative values of R and C for 'lumped' networks capable of performing RIAA record replay equalisation where τ_3 is the 'break point' (*-3dB*) of the lowest frequency and τ_1 that of the highest. The results are based on calculations published in Wireless World 1957 by W. H. Livy of E.M.I Studios London (*now Abbey Road Studios*). In 1982 I expanded the calculations to include the 4th possible variant (*but not a 4th time constant*) and to show the numerical results of all the combinations of R and C. In 1985 the results were used to make a simple iterative program that enabled entry of any one component value to calculate the other three. The 'voltage driven' networks should be inserted between a low output impedance amplifier and a high input impedance amplifier to create a passive RIAA 'phono stage'. The 2 terminal variants are suitable for inclusion in negative feedback loops or can be 'current driven' with the output voltage developed across the network and amplified by a high input impedance amplifier. Keith Snook ~ www.keith-snook.info

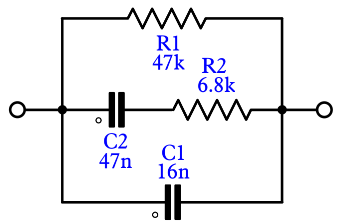
RIAA–1
Voltage driven



RIAA–2
Voltage driven



RIAA–1
Current driven



$$\frac{R_1}{R_2} = \frac{\tau_1+\tau_3-\tau_2-\frac{\tau_1\cdot\tau_3}{\tau_2}}{\tau_2} = 6.877$$

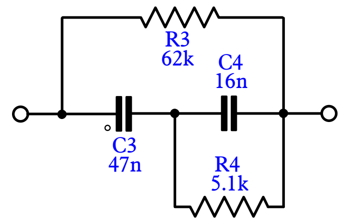
$$R_2\cdot C_1 = \frac{\tau_1\cdot\tau_3}{\tau_1+\tau_3-\tau_2-\frac{\tau_1\cdot\tau_3}{\tau_2}} = 109\mu s$$

$$R_2\cdot C_2 = \tau_2 = 318\mu s$$

$$R_1\cdot C_1 = \frac{\tau_1\cdot\tau_3}{\tau_2} = 750\mu s$$

$$R_1\cdot C_2 = \tau_1+\tau_3-\tau_2-\frac{\tau_1\cdot\tau_3}{\tau_2} = 2187\mu s$$

RIAA–2
Current driven



$$\frac{R_3}{R_4} = \frac{\tau_1+\tau_3-\tau_2}{\tau_2-\frac{\tau_1\cdot\tau_3}{\tau_1+\tau_3-\tau_2}} = 12.4$$

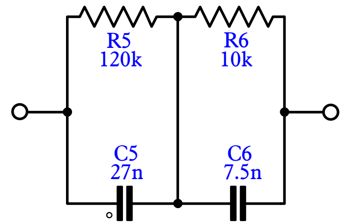
$$R_4\cdot C_3 = \tau_2-\frac{\tau_1\cdot\tau_3}{\tau_1+\tau_3-\tau_2} = 236.8\mu s$$

$$R_4\cdot C_4 = \frac{\tau_1\cdot\tau_3}{\tau_1+\tau_3-\tau_2} = 81.2\mu s$$

$$R_3\cdot C_3 = \tau_1+\tau_3-\tau_2 = 2937\mu s$$

$$R_3\cdot C_4 = \frac{\tau_1\cdot\tau_3}{\tau_2-\frac{\tau_1\cdot\tau_3}{\tau_1+\tau_3-\tau_2}} = 1007.2\mu s$$

RIAA–3
Current driven only



It is obvious why this circuit with its nice symmetry became a favourite from the beginning for feedback record reply equalisers ~ RIAA or otherwise.

$$\frac{R_5}{R_6} = \frac{\tau_3-\tau_2}{\tau_2-\tau_1} = 11.7\dot{7}$$

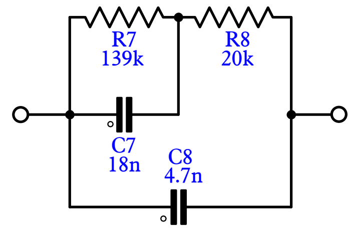
$$R_6\cdot C_5 = \tau_3\cdot\frac{\tau_2-\tau_1}{\tau_3-\tau_2} = 270\mu s$$

$$R_6\cdot C_6 = \tau_1 = 75\mu s$$

$$R_5\cdot C_5 = \tau_3 = 3180\mu s$$

$$R_5\cdot C_6 = \tau_1\cdot\frac{\tau_3-\tau_2}{\tau_2-\tau_1} = 883.\dot{3}\mu s$$

RIAA–4
Current driven only



Rather than simplifying some formulae some were expanded to show repeating block patterns which later helped simplify my program.

$$\frac{R_7}{R_8} = \frac{\tau_1+\tau_3-\tau_2-\frac{\tau_1\cdot\tau_3}{\tau_2}}{\tau_2} = 6.877$$

$$R_8\cdot C_7 = \tau_2\cdot\frac{\tau_1+\tau_3-\frac{\tau_1\cdot\tau_3}{\tau_2}}{\tau_1+\tau_3-\tau_2-\frac{\tau_1\cdot\tau_3}{\tau_2}} = 364.24\mu s$$

$$R_8\cdot C_8 = \frac{\tau_1\cdot\tau_3}{\tau_1+\tau_3-\frac{\tau_1\cdot\tau_3}{\tau_2}} = 95.2\mu s$$

$$R_7\cdot C_7 = \tau_1+\tau_3-\frac{\tau_1\cdot\tau_3}{\tau_2} = 2505\mu s$$

$$R_7\cdot C_8 = \frac{\tau_1\cdot\tau_3}{\tau_2}\cdot\frac{\tau_1+\tau_3-\tau_2-\frac{\tau_1\cdot\tau_3}{\tau_2}}{\tau_1+\tau_3-\frac{\tau_1\cdot\tau_3}{\tau_2}} = 654.79\mu s$$