Ben Damaii : Z left Delta Transformation (B Band, 0 on left)

Step 1:

R_{32} 10K, R_{30} 100K, R_{31} 10K, R_{32} 10K

Step 2:

R_{32} 10K, R_{30} 100K, R_{31} 10K, R_{32} 10K
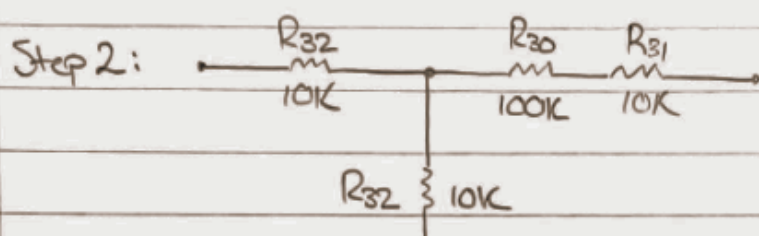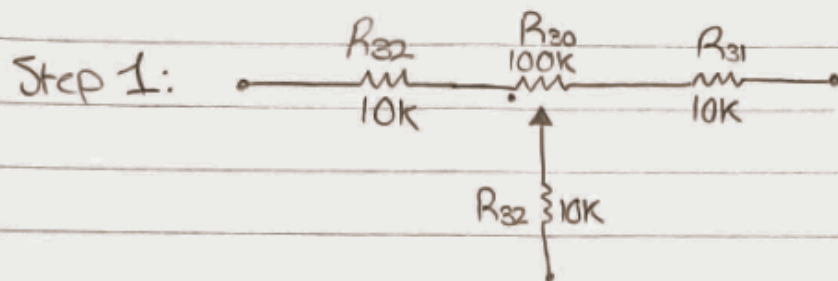
Note: Due to my potentiometer orientation, 100% of the potentiometer's resistance is on the right branch.

Step 3:

$R_{III} = 110K$, $R_I = 10K$, $R_{II} = 10K$
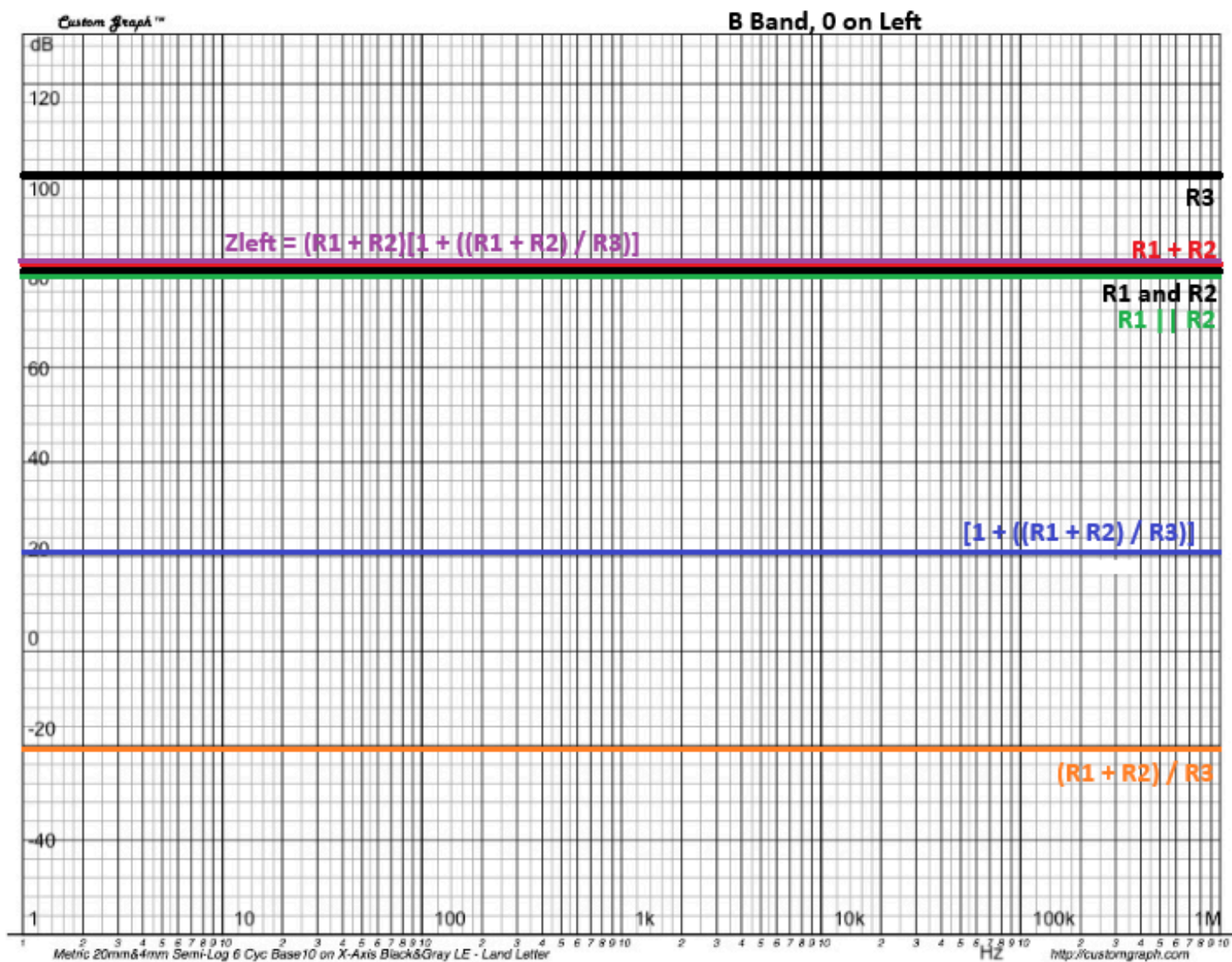
Step 4:

R_B, R_A, R_C
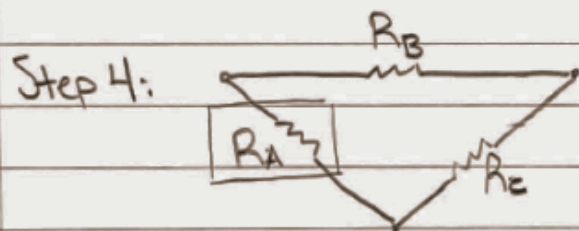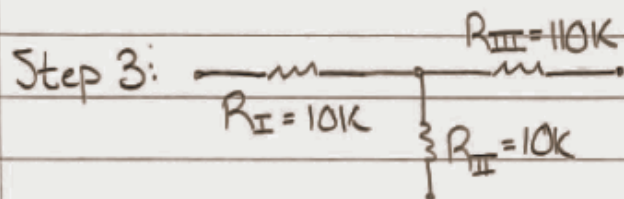
Note: For this problem, we are interested in Z_{left} which is derived from R_A.

Step 5:

$$Z_{left} = (R_I + R_{II})\left[1 + \frac{R_I \| R_{II}}{R_{III}}\right]$$

$$Z_{left} = (10K + 10K)\left[1 + \frac{10K \| 10K}{110K}\right]$$

$$= (20K)\left(1 + \left(\left(\frac{10K \times 10K}{10K + 10K}\right) / 110K\right)\right)$$

$$= (20K)\left(1 + \frac{5K}{110K}\right) \approx \boxed{21K}$$

dB

120

100

R3

Zleft = (R1 + R2)[1 + ((R1 + R2) / R3)]   R1 + R2

R1 and R2

R1 || R2

60

40

[1 + ((R1 + R2) / R3)]

20

0

-20

(R1 + R2) / R3

-40

1   10   100   1k   10k   100k   1M

Metric 20mm&4mm Semi-Log 6 Cyc Base10 on X-Axis Black&Gray LE - Land Letter   HZ   http://customgraph.com

Custom Graph ™

R1 and R2 = 10K ohms -> 20log10(10000) = 80dB
R3 = 110K ohms -> 20log10(110000) = 100.83 = 101dB