ELEC-313
Lab 1: Amplifier Models

September 15, 2013

Date Performed: September 11, 2013
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Stephen Wilson

1 Objective

The objective is to verify the equivalence of four circuits used to model an amplifier, shown in Figure 3.

2 Schematics

Circuit Tested

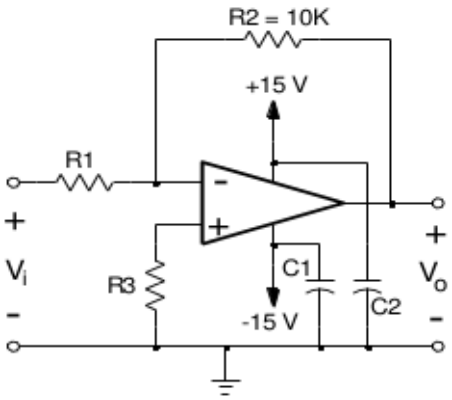

Figure 1: Circuit being tested. $C_1 = C_2 = 1\,\mu\text{F}$

Test Configuration

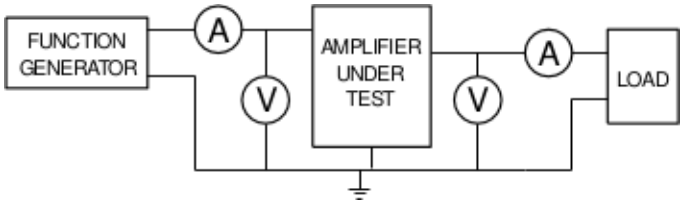

Figure 2: Test Configuration

3 Procedure

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4 Results

Name	**Nominal** ($k\Omega$)	**Measured** ($k\Omega$)	**% Error**
R_1	1	0.986	1.40
R_2	10	9.88	1.20
R_3	1	0.983	1.70

Table 1: Comparison of labelled and actual resistance.

	Voltage		**Current**		**Gain**	
	V_i (mV_{rms})	V_o (V_{rms})	I_i (mA_{rms})	I_o (mA_{rms})	A_v	A_i
No Load	200	1.98	0.2	nil	9.9	nil
Load	200	1.98	0.2	9.52	9.9	47.6

Table 2: Comparison of electrical characteristics of the amplifier under load.

5 Conclusions

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Equations

$$\%_{error} = \frac{|measured - nominal|}{nominal} \times 100\% \tag{1}$$

$$R_o = \frac{V_{noload} - V_{load}}{I_{load}} \tag{2}$$

$$R_i = \frac{V_i}{I_i} \tag{3}$$

$$A_v = \frac{V_o}{V_i} \tag{4}$$

$$A_i = A_v \left(\frac{R_i}{R_o} \right) \tag{5}$$

$$G_m = \frac{A_v}{R_o} \tag{6}$$

$$R_m = A_v R_i \tag{7}$$

6 Appendix

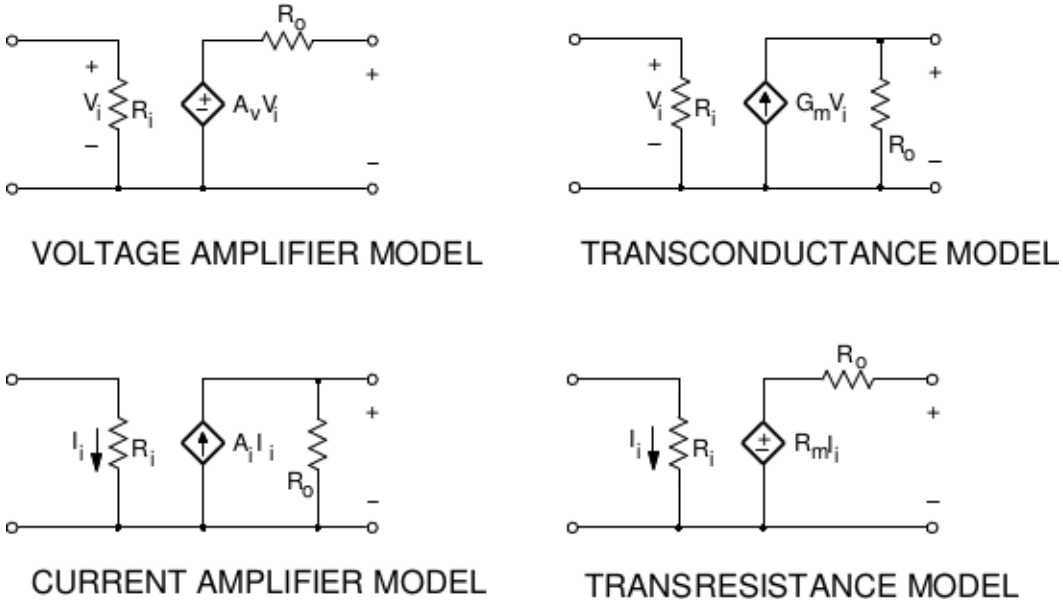

Figure 3: Four equivalent models of an amplifier