Designing resistor values for modulator,

Given $V_{cc} = 12V$

$I_C = 2mA$

$\beta = 100$

$\boxed{R_1 = 1k\Omega}$

using the formulas,

$$R_c = \frac{V_{cc} - 0.3}{I_C} = \frac{12 - 0.3}{2mA}$$

$$\boxed{R_c = 5.85k\Omega}$$

$$R_B = \frac{V_{in} - 0.7}{10(I_C/\beta)} = \frac{1 - 0.7}{10\left(\frac{2mA}{100}\right)}$$

$$\boxed{R_B = 1.5k\Omega}$$

assume $A_V = 3$,

$$A_V = 1 + \frac{R_2}{R_1}$$

$$3 = 1 + \frac{R_2}{1k}$$

$$\boxed{R_2 = 2k\Omega}$$

Thus, G(on) = 3 and G(off) = 0.25

Designing resistor value for demodulator,

$$f = \frac{1}{2\pi RC}$$

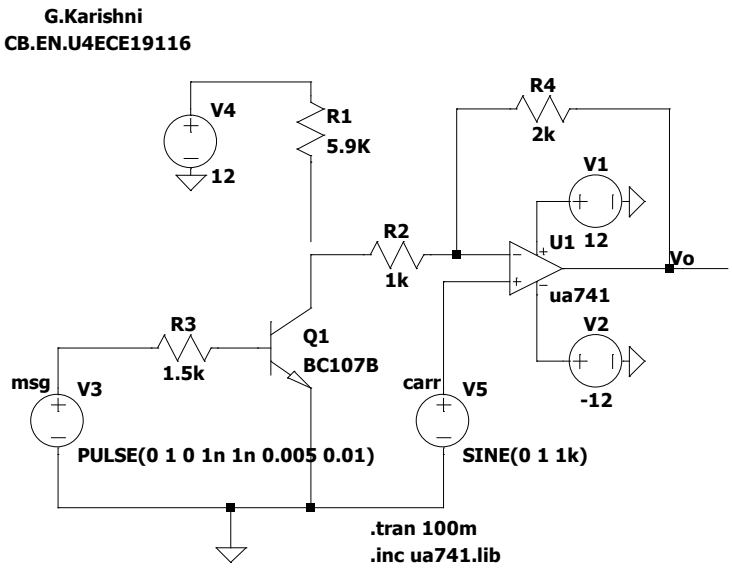
assume $C = 0.1\mu F$

$$\Rightarrow 100Hz = \frac{1}{2\pi \times R \times 0.1\mu}$$

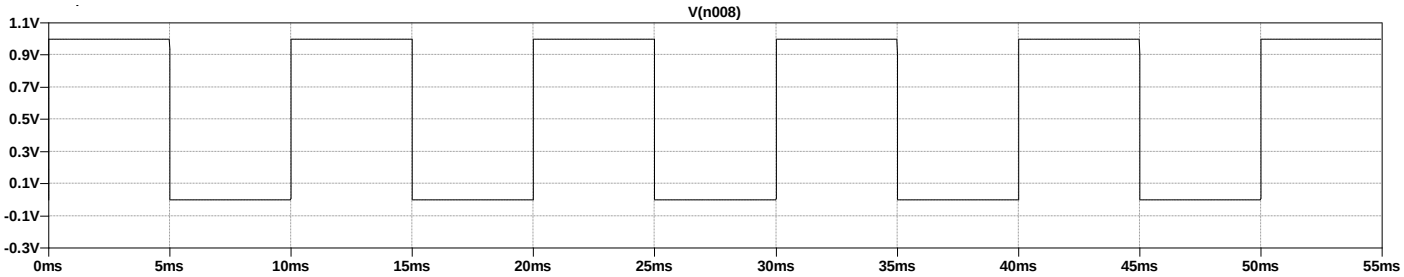
$$\Rightarrow R = \frac{1}{2\pi \times 100 \times 0.1\mu}$$

$$\boxed{R = 16k\Omega}$$

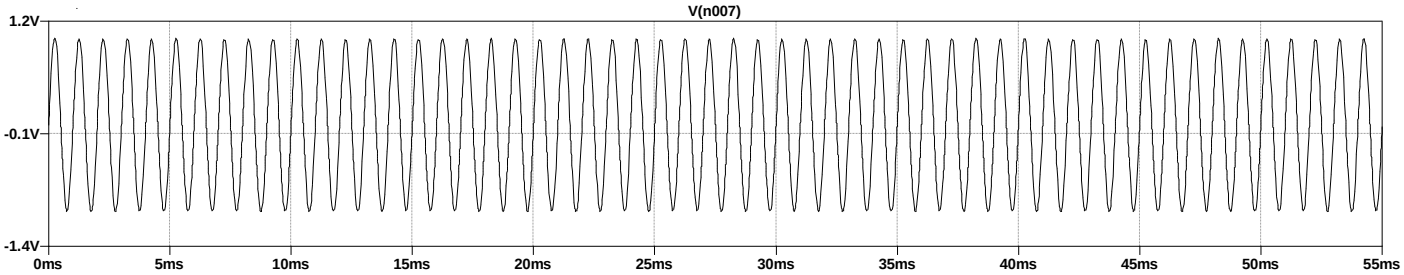
ASK Modulator circuit



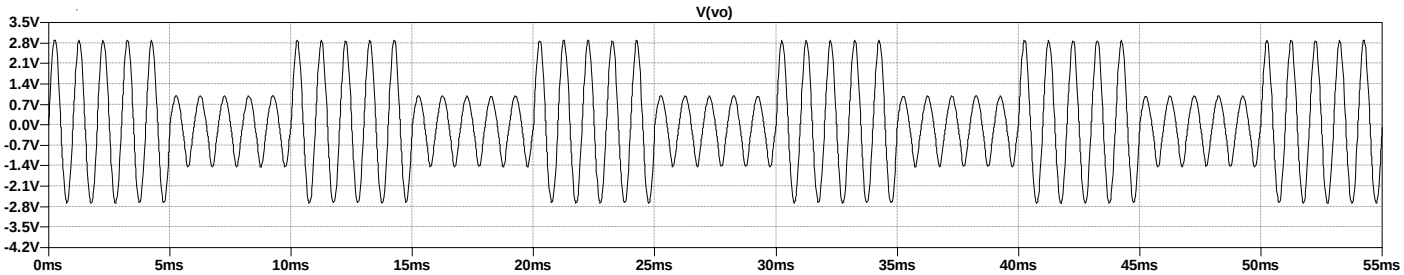
Message signal



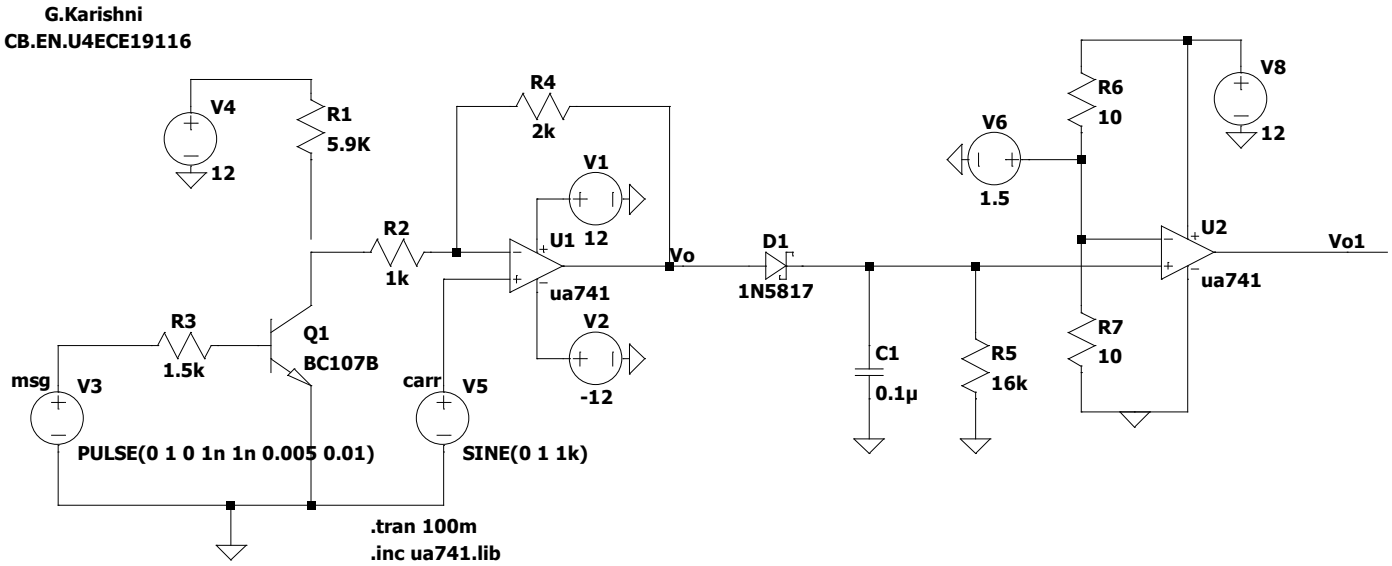
Carrier wave



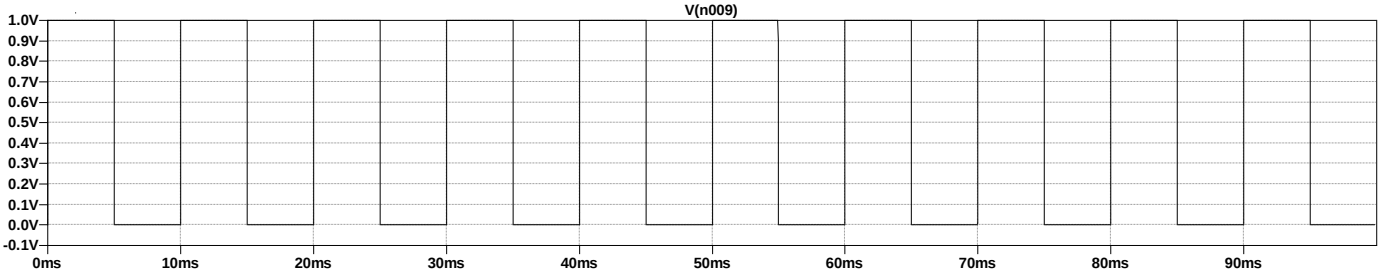
Modulated signal



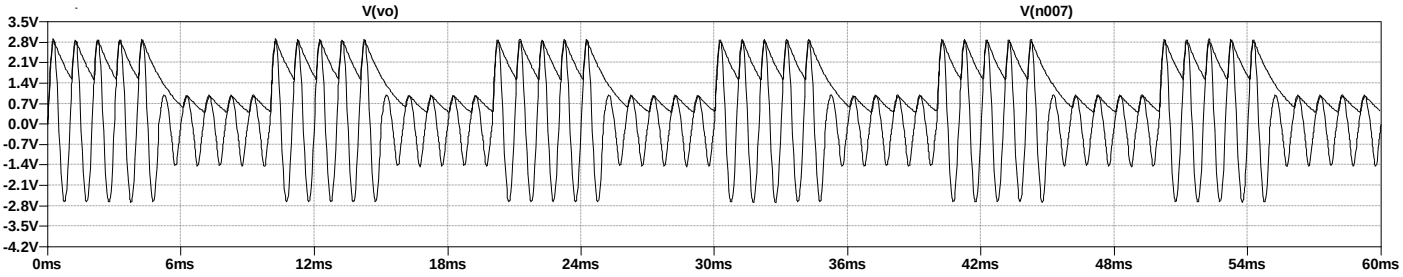
ASK Demodulator circuit



Message signal



Envelop detector of modulated signal



Demodulated signal