

ERT 12

Opfg 2) $V_{rms} = \frac{V_0}{\sqrt{2}}$ $V = \sqrt{\frac{1}{T} \int_{t_1}^{t_1+T} v(t)^2 dt}$

$v(t) = V_0 \cos(2\pi f t)$

$$V = \sqrt{\frac{1}{T} \int_{t_1}^{t_1+T} V_0^2 \cos^2(2\pi f t) dt}$$

$$V = \sqrt{\frac{1}{T} \int_{t_1}^{t_1+T} V_0^2 \cdot \frac{1}{2} (1 + \cos(4\pi f t)) dt}$$

$$V = \sqrt{\frac{1}{T} \int_{t_1}^{t_1+T} \frac{1}{2} V_0^2 + V_0^2 \cos(4\pi f t) dt}$$

$$V = \sqrt{\frac{1}{T} \left[\frac{1}{2} V_0^2 t + V_0^2 \cdot \frac{1}{4\pi f} \cdot \sin(4\pi f t) \right]_{t_1}^{t_1+T}}$$

$$= \sqrt{\frac{1}{T} \left(\frac{1}{2} V_0^2 (t_1+T) + V_0^2 \cdot \frac{1}{4\pi f} \cdot \sin(4\pi f (t_1+T)) - (t_1+T) \right)}$$

$$- \left(\frac{1}{2} V_0^2 t_1 + V_0^2 \cdot \frac{1}{4\pi f} \cdot \sin(4\pi f t_1) \right)$$

$$= \sqrt{\frac{1}{T} \left(\frac{1}{2} V_0^2 T + V_0^2 \cdot \frac{1}{4\pi f} \sin(4\pi f T) \right)}$$

$T = \frac{1}{f}$

$$= \sqrt{\frac{1}{2} V_0^2 + V_0^2 \cdot \frac{1}{4\pi f} \sin(4\pi f T)}$$

$T = \frac{1}{f}$

$$= \sqrt{V_0^2 \left(\frac{1}{2} + \frac{1}{4\pi f} \sin(4\pi f T) \right)}$$

$$= \sqrt{V_0^2 \left(\frac{1}{2} + \frac{1}{4\pi f} \sin(4\pi f) \right)}$$

$$= \sqrt{V_0^2 \cdot \frac{1}{2}}$$

$$= \frac{V_0}{\sqrt{2}}$$

Opgave 4)

$$v_o(t)$$

$$V_{rms} = 1 \text{ mV}$$

$$R_{um} = 1 \text{ k}\Omega$$

$$R_{if} = 10 \text{ k}\Omega$$

$$V_{rms} = ? \quad v_i(t) = ?$$

$$V_{rms} - V_{R_{um}} - V_{R_{if}} = 0$$

$$V_{R_{if}} = V_{rms} - V_{R_{um}}$$

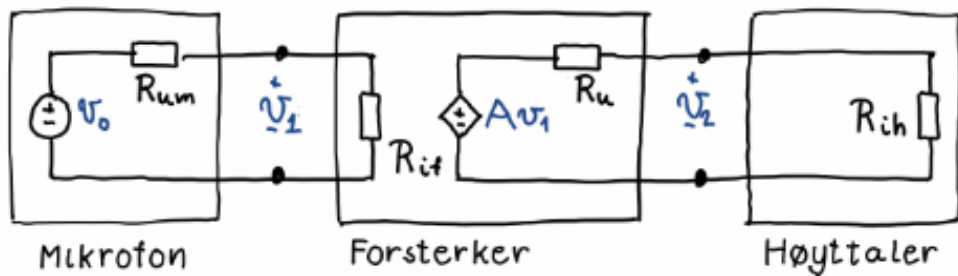
$$V_{R_{if}} = V_{rms} - I R_{um}$$

$$= V_{rms} - \frac{V_{rms}}{R_{um} + R_{if}} \cdot R_{um}$$

$$= V_{rms} \left(1 - \frac{R_{um}}{R_{um} + R_{if}} \right)$$

$$V_{R_{if}} = 9,09 \cdot 10^{-4} \text{ V} \quad \checkmark$$

$$V_{rms} = \underline{\underline{9,09 \cdot 10^{-4} \text{ V}}}$$



$$U = 12 \text{ V}$$

$$I = \frac{U}{R_{um} + R_{if}}$$

Opgave 5)

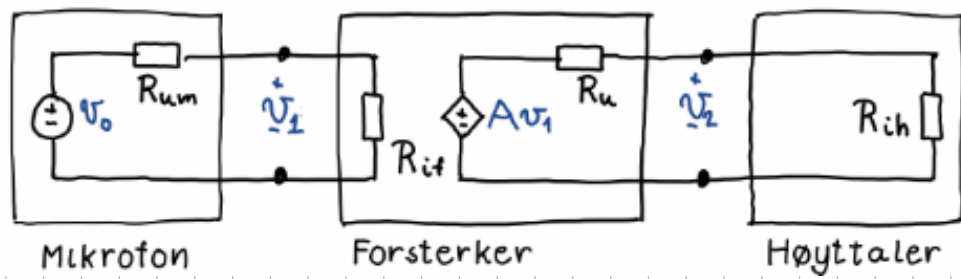
$$A = 100$$

$$U_{2,rms} = 85 \text{ mV}$$

$$R_{ih} = 8 \Omega$$

$$R_u = 2$$

$$U_{1,rms} = 9,09 \cdot 10^{-4} \text{ V}$$



$$A U_{1,rms} - U_{R_u} - U_{R_{ih}} = 0$$

$$U_{R_u} = A U_{1,rms} - U_{R_{ih}}$$

$$\Sigma R_u = A U_{1,rms} - U_{2,rms}$$

$$R_u = \frac{1}{\Sigma} (A U_{1,rms} - U_{2,rms})$$

$$U = 2 \Sigma \Rightarrow \Sigma = \frac{U}{2}$$

$$R_u = \frac{(R_{ih} + R_u)}{A U_{1,rms}} (A U_{1,rms} - U_{2,rms})$$

$$\frac{R_u}{R_{ih} + R_u} = \frac{1}{A U_{1,rms}} (A U_{1,rms} - U_{2,rms})$$

$$\frac{R_u}{R_{ih} + R_u} = 1 - \frac{U_{2,rms}}{A U_{1,rms}}$$

$$R_u = R_{ih} + R_u - \frac{U_2}{A U_1} R_{ih} - \frac{U_2}{A U_1} R_u$$

$$R_u - R_u - \frac{U_2}{A U_1} R_u = R_{ih} - \frac{U_2}{A U_1} R_{ih}$$

$$-\frac{U_2}{A U_1} R_u = R_{ih} - \frac{U_2}{A U_1} R_{ih}$$

$$R_u = -\frac{A U_1}{U_2} R_{ih} + R_{ih} = R_{ih} \left(1 - \frac{A U_1}{U_2} \right)$$

$$R_u =$$

Oppløst)

$$A = 100$$

$$U_{2,rms} = 85 \text{ mV}$$

$$R_{ih} = 8 \Omega$$

$$R_u = ?$$

$$U_{1,rms} = 9,04 \cdot 10^{-4} \text{ V}$$

$$U_2 = U_{R_{ih}} = A U_1 \cdot \frac{R_{ih}}{R_{ih} + R_u}$$

$$U_2 > 85 \text{ mV}$$

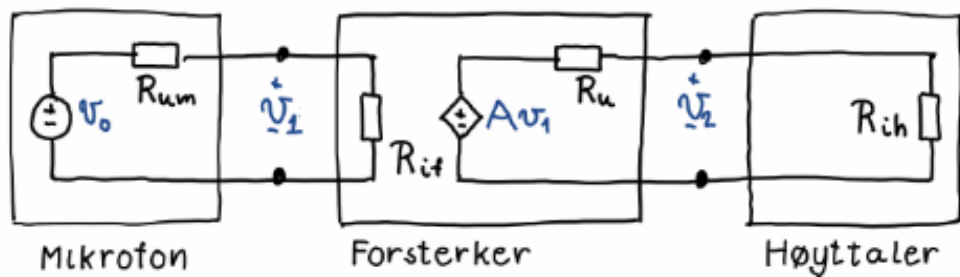
$$A U_1 \frac{R_{ih}}{R_{ih} + R_u} > 85 \text{ mV}$$

$$A U_1 R_{ih} > R_{ih} \cdot 85 \text{ mV} + R_u \cdot 85 \text{ mV}$$

$$A U_1 R_{ih} - R_{ih} \cdot 85 \text{ mV} > R_u \cdot 85 \text{ mV}$$

$$\frac{R_{ih}(A U_1 - 85 \text{ mV})}{85 \text{ mV}} > R_u$$

$$R_u < 0,56 \Omega$$



Oppg 6)

$$P = \frac{U^2}{R} = 0,04 e^{-4} \text{ W}$$

