PROTOKOLL

for laboratory practice

Oscillator

Gruppe / Klasse	Protokollführer	Unterschrift:
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Übungs- / Abgabedatum	Mitarbeiter	Unterschrift:
11.3.2014 18.3.2014	Thomas Asch	
Lehrer	Mitarbeiter	Unterschrift:
Tillich	Peter Neunteufl	
Note:	Mitarbeiter	Unterschrift:

Oscillator

VERWENDETE GERÄTE:

Tektonix TDS1001B

Protokoll wurde auf EL-Labor Abgabeordner gespeichert: am: 18.3.2014

Task 1:

Calculate a Phase-Shifting-Oscillator Circuit with an OPV and realize it.
f_0 = 1kHz
Asymmetric Source = 10 V.

Circuit:

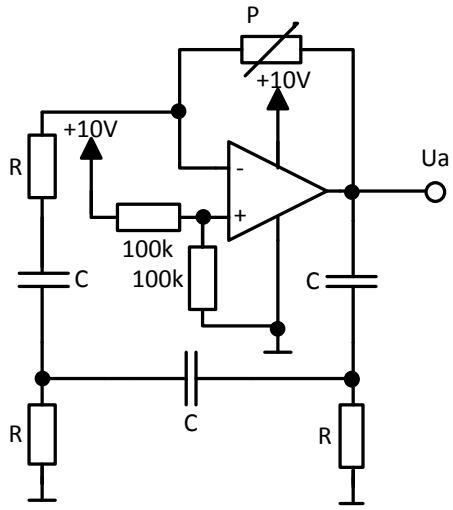

Fig.1: OPV Phase-Shifting Circuit

Calculations:

Assumption:
C = 22nF

$f_0 = 1/(R * 2 * \pi * \sqrt{6} * C)$

$\rightarrow R = 1/(f_0 * 2 * \pi * \sqrt{6} * C)$

R = 2,95kΩ
⇨ R = 2,7 kΩ

V = P/R ≥ 30!

→ P > R*30 → P = 100k

Measurment:

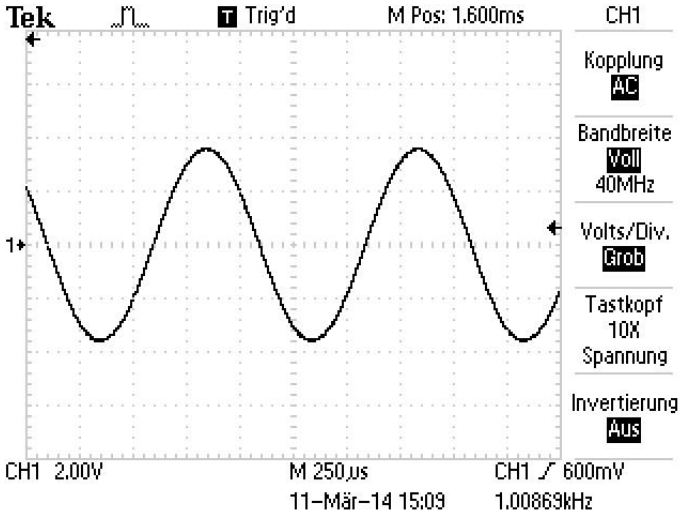

Fig.2: Ua(t) with good Potentiometer position

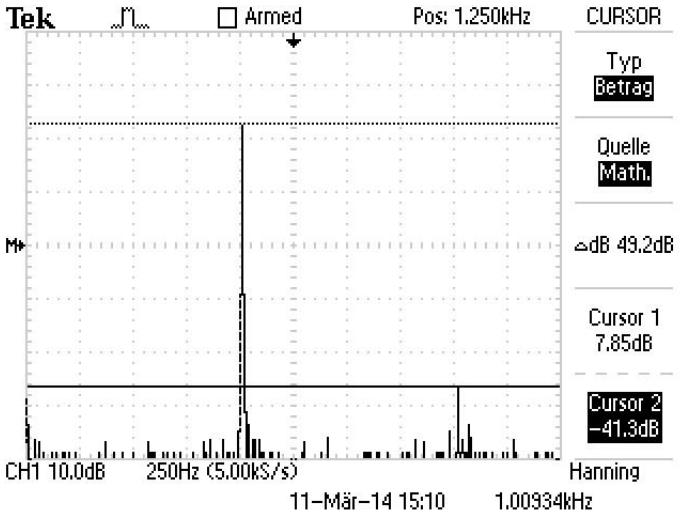

Fig.3: Spectrum of Ua(t) with good Potentiometer position

THD = -49,2 dB

⇨ THD = 0,346%

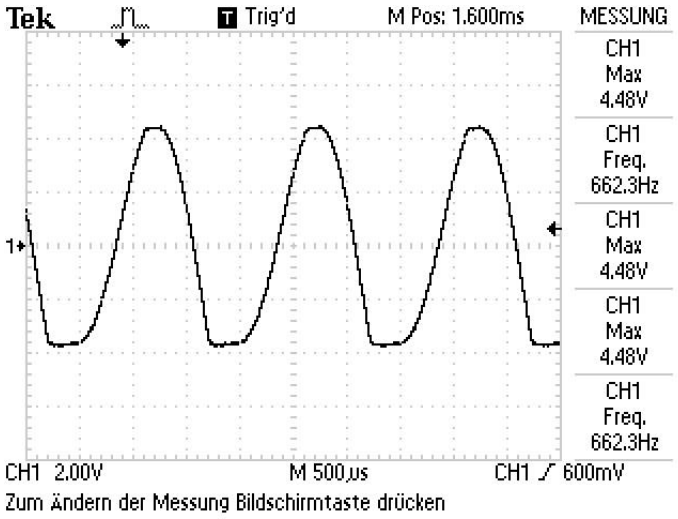

Fig.4: Ua(t) with bad Potentiometer position

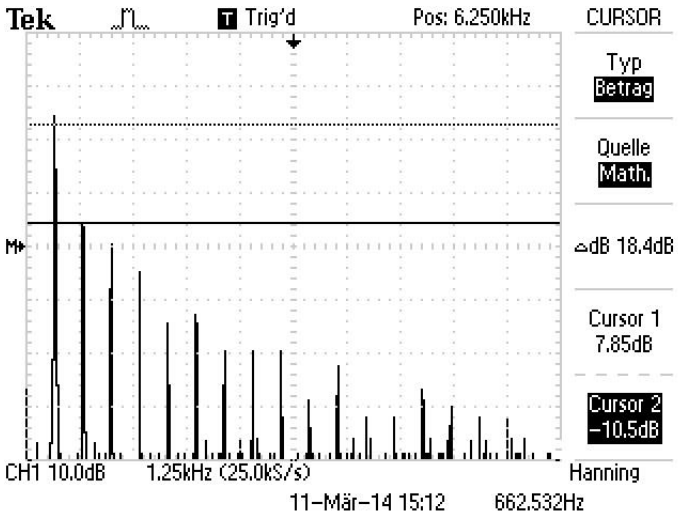

Fig.3: Spectrum of Ua(t) with bad Potentiometer position

THD = -18,4 dB

⇨ THD = 12,022%

Comment:

In the first measurement the Output Signal Ua(t) had very low harmonics. In the second measurement the THD was up to 12%, that means the difference between fist Harmonic and second Harmonic is very low and the sinus isn't perfect.

Task 2:

Calculate a Phase-Shifting-Oscillator Circuit with a Transistor and realize it.

f_0 = 1kHz

Asymmetric Source = 12 V.

Circuit:

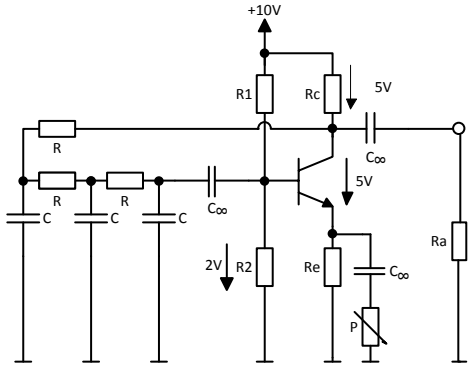

Fig.5: Circuit of Phase-Shifting-Oscillator with a Transistor

Calculation:

Assumption:
C = 22nF
I_C = 1 mA

$f_0 = \sqrt{6}/(2*\pi*C*R)$

$\rightarrow R = \sqrt{6}/(2*\pi*C*f_0)$
R = 17,72 kΩ
⇨ R = 18kΩ

$R_1:R_2$ = 8V:2V = 4:1
Assumption:
R_2 = 12 kΩ

$R_1 = 4*R_2$ = 48 kΩ
⇨ R_1 = 47 kΩ

$R_c = 5V/I_c$ = 5 kΩ
⇨ R_c = 4,7 kΩ

$R_E = 2V/I_c$ = 2 kΩ
⇨ R_E = 1,8 kΩ

Comment:
Also, through the help of the teacher, the build circuit didn't oscillate. A problem could be the calculation, because there is no or rather a too low Voltage between the Base and the Emitter of the Transistor.