Bab 5 Prategangan BJT

Memahami karakteristik dan mampu menganalisis rangkaian dengan transistor

Prategangan DC

PRATEGANGAN DC

Prategangan DC

Tegangan-tegangan transistor NPN :

	$V_{CE\ sat}$	$V_{BE\ sat}$	$V_{BE\ aktif}$
Si	0,2	0,8	0,7
Ge	0,1	0,3	0,2

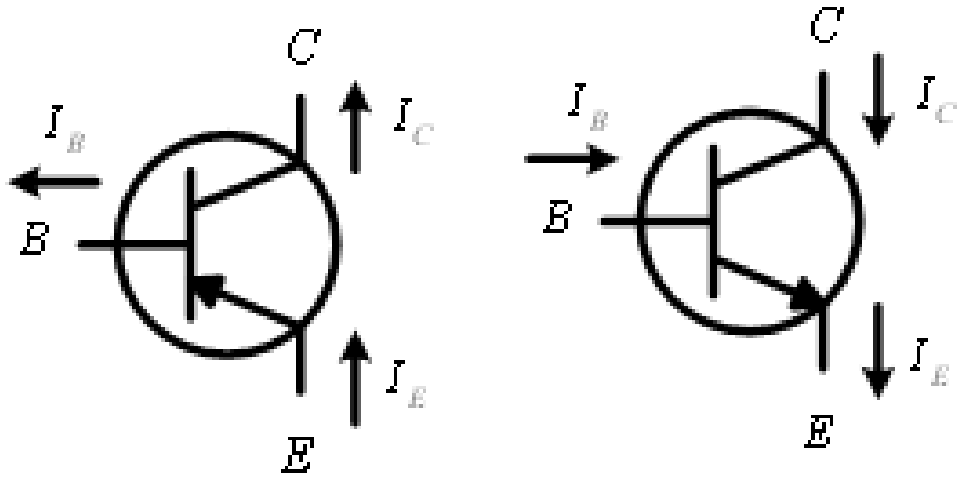
$$V_{BE} = 0,7V$$

$$I_E = (\beta + 1) I_B \approx I_C$$

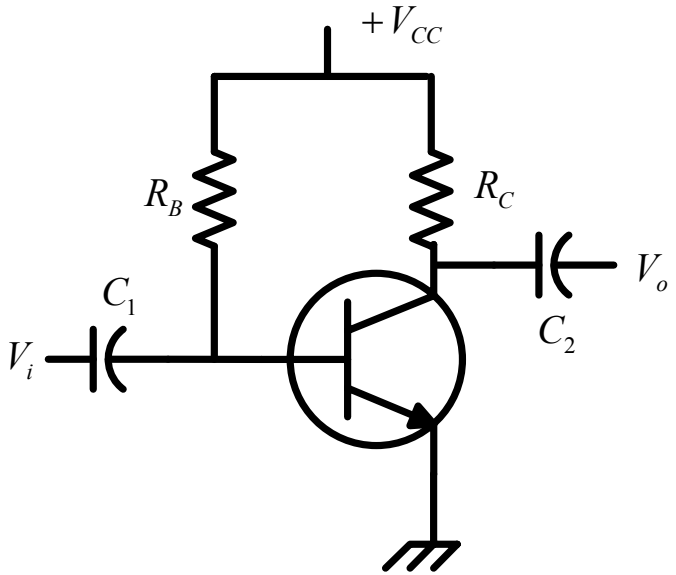
$$I_C = \beta I_B$$

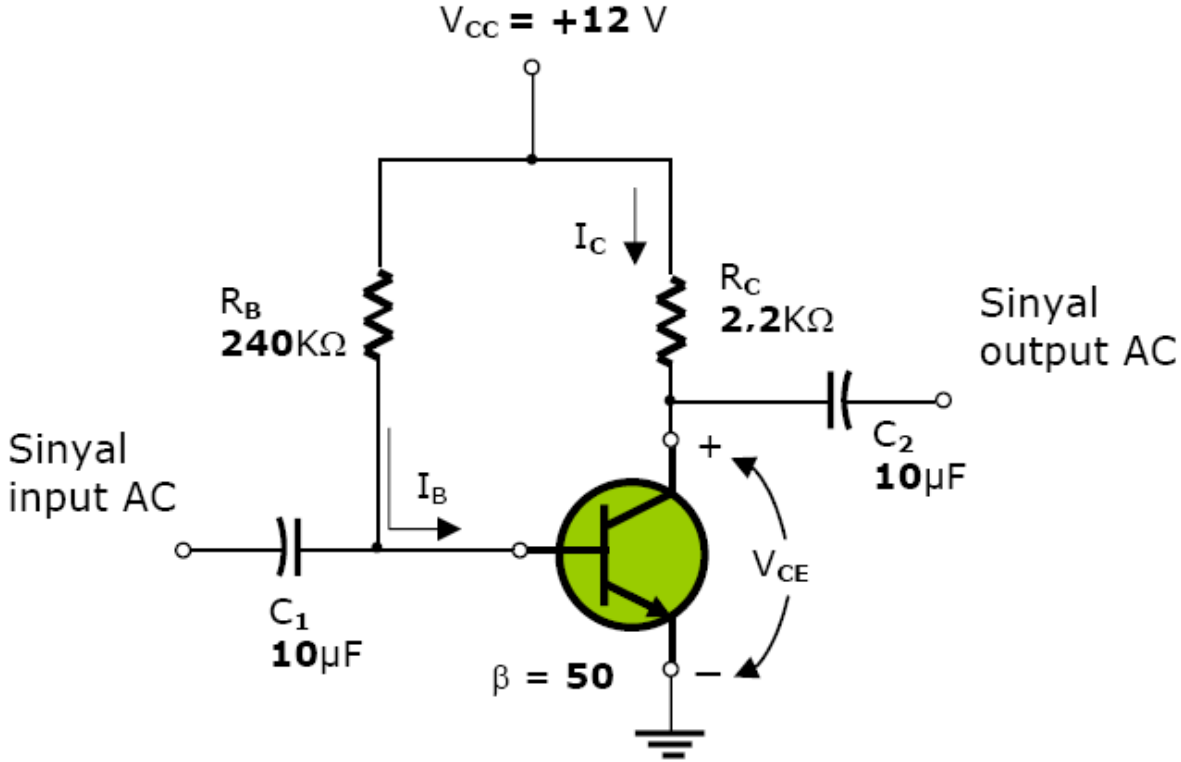
Prosedur Analisis Prategangan DC :

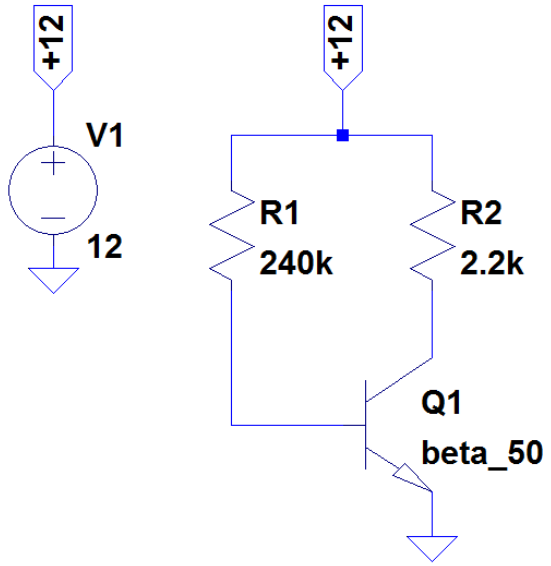
- Input ac diganti dengan tahanan dalamnya (prinsip superposisi)
- Komponen kapasitor dibuat open circuit
- Buat arus yang sesuai dengan jenis transistor



Rangkaian Prategangan Tetap

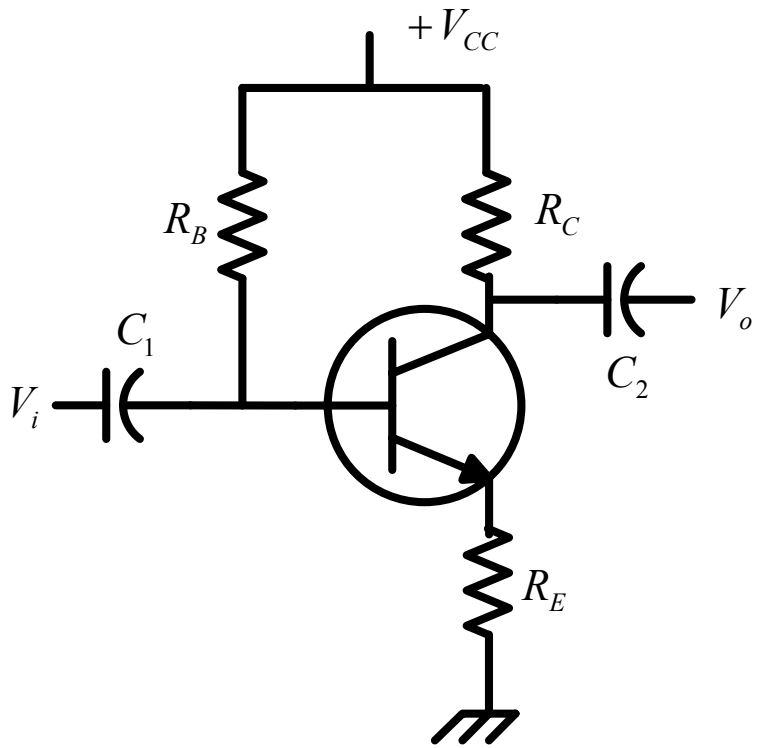


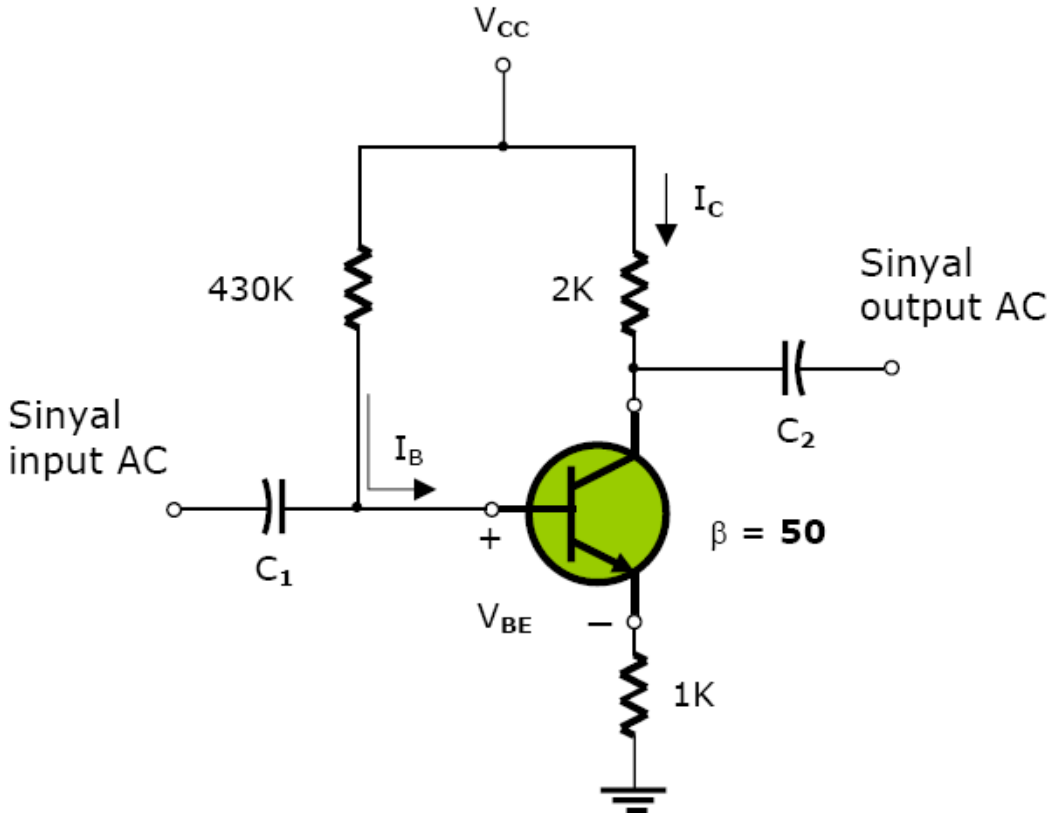


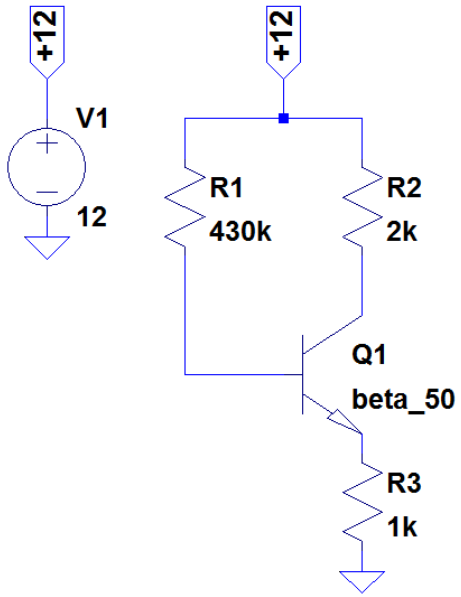



```
        --- Operating Point ---

V(+12):         12              voltage
V(n002):        0.796156        voltage
V(n001):        6.8649          voltage
Ic(Q1):         0.00233416      device_current
Ib(Q1):         4.66833e-005    device_current
Ie(Q1):         -0.00238085     device_current
I(R2):          0.00233413      device_current
I(R1):          4.66827e-005    device_current
I(V1):          -0.00238082     device_current
```

Rangkaian Prategangan Penstabil Emitor

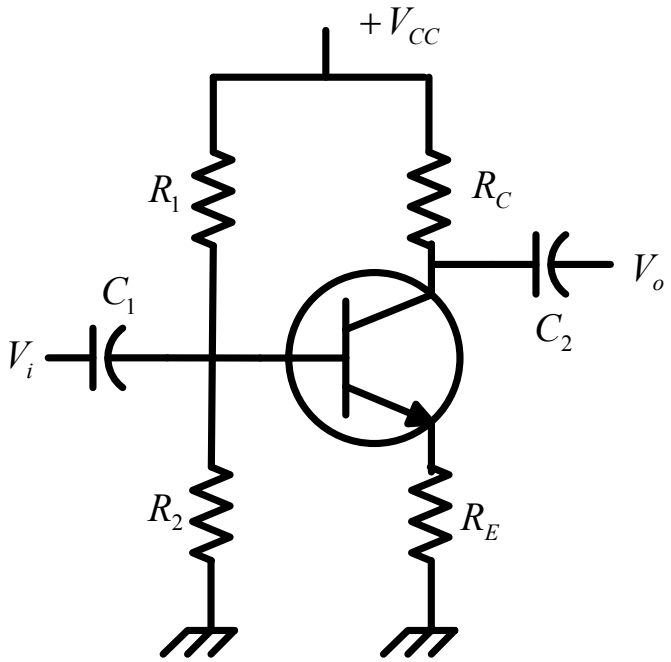


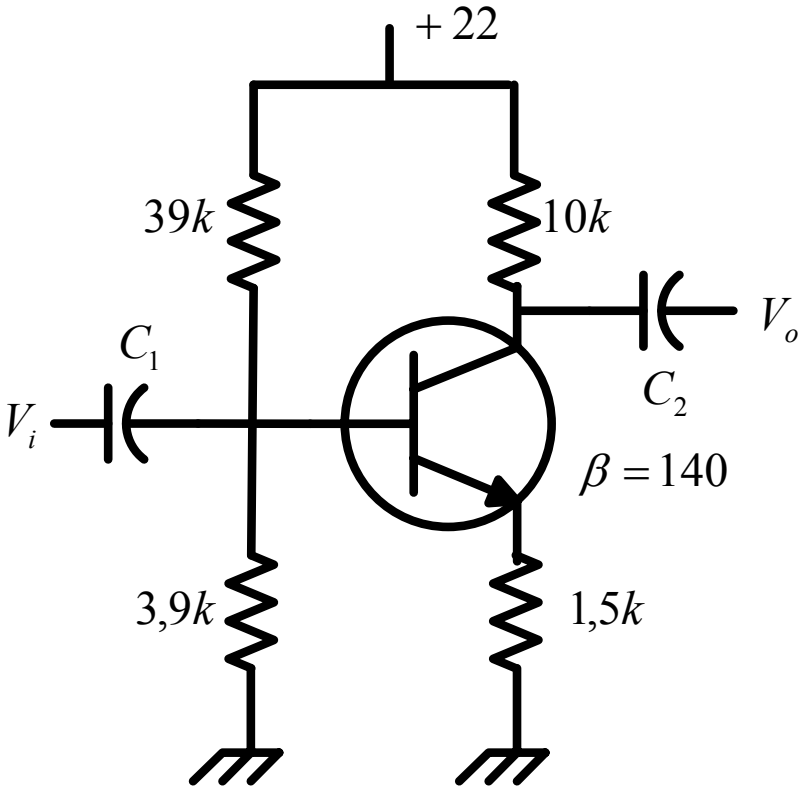


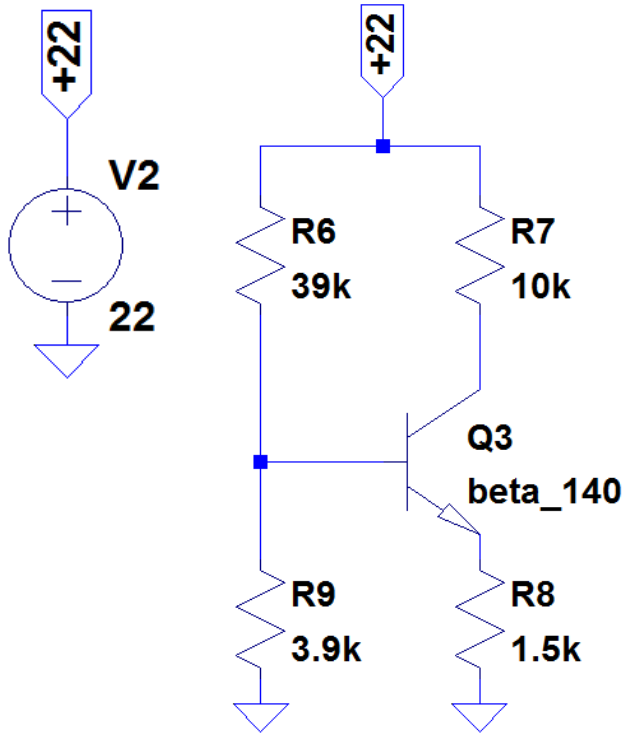



```
        --- Operating Point ---

V(+12):         12              voltage
V(n002):        1.96805         voltage
V(n001):        9.66699         voltage
V(n003):        1.18984         voltage
Ic(Q1):         0.00116651      device_current
Ib(Q1):         2.33301e-005    device_current
Ie(Q1):         -0.00118984     device_current
I(R3):          0.00118984      device_current
I(R2):          0.00116651      device_current
I(R1):          2.33301e-005    device_current
I(V1):          -0.00118984     device_current
```

Rangkaian Prategangan Sendiri/ Pembagi Tegangan



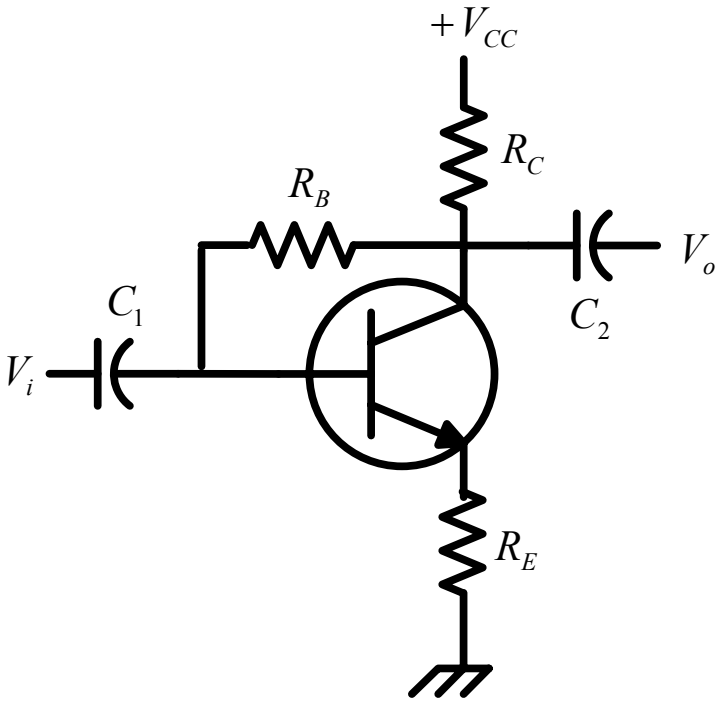


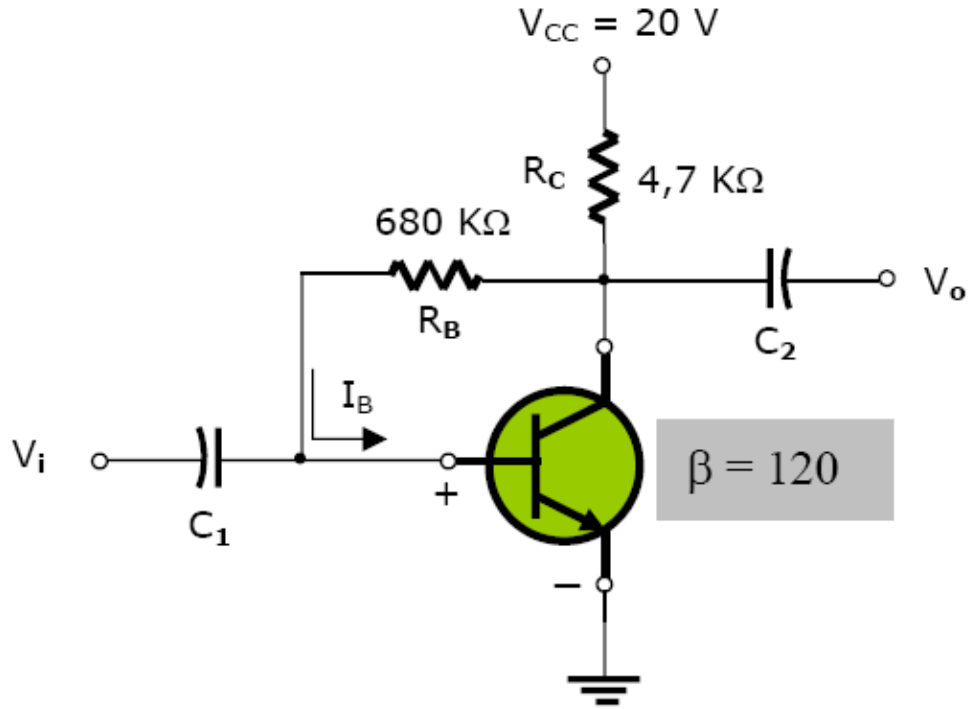


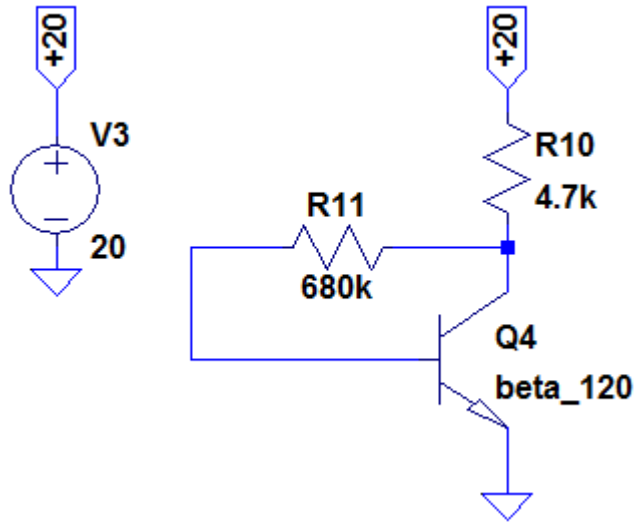
--- Operating Point ---

V(+22):	22	voltage
V(n002):	1.9797	voltage
V(n001):	13.9827	voltage
V(n003):	1.21118	voltage
Ic(Q1):	0.00080175	device_current
Ib(Q1):	5.72678e-006	device_current
Ie(Q1):	-0.000807477	device_current
I(R4):	0.000507615	device_current
I(R3):	0.000807454	device_current
I(R2):	0.000801727	device_current
I(R1):	0.000513341	device_current
I(V1):	-0.00131507	device_current

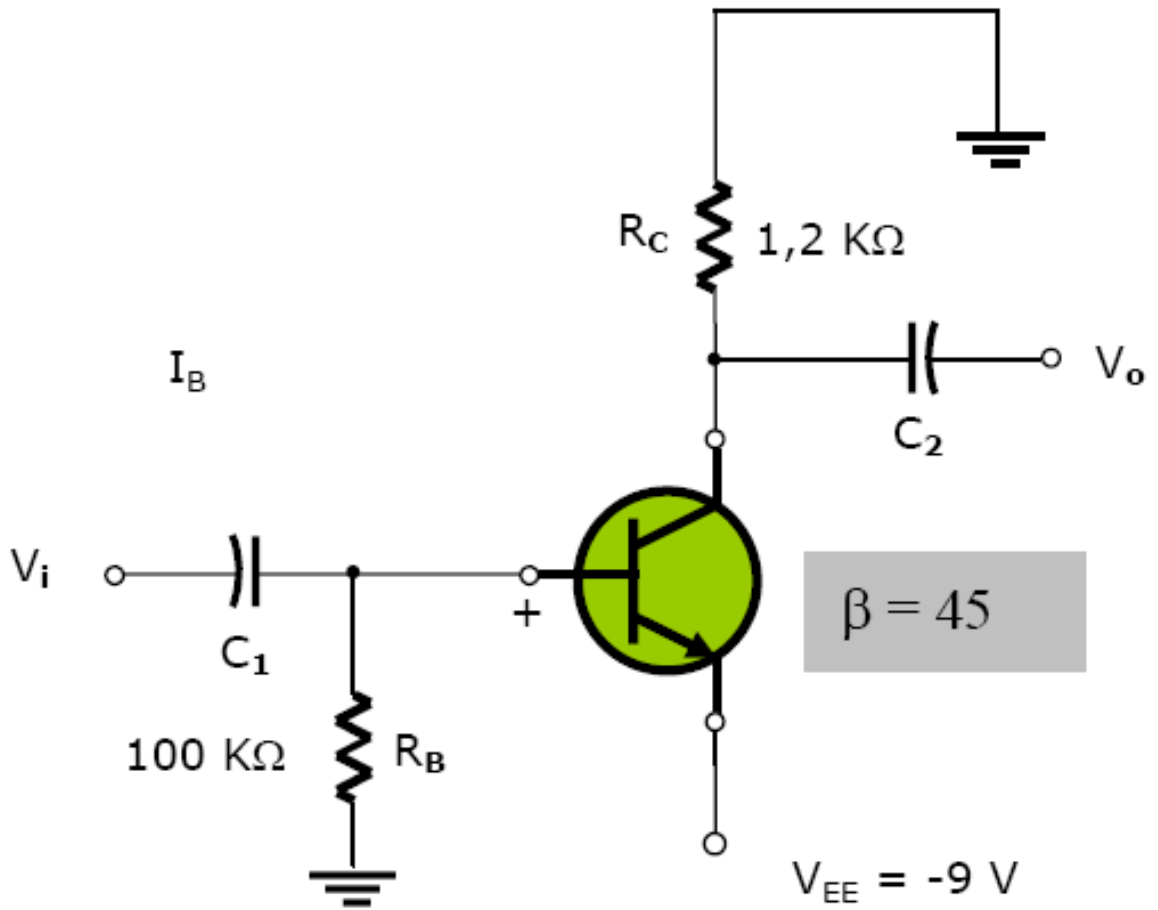
Prategangan DC Collector ke Basis / Umpan Balik

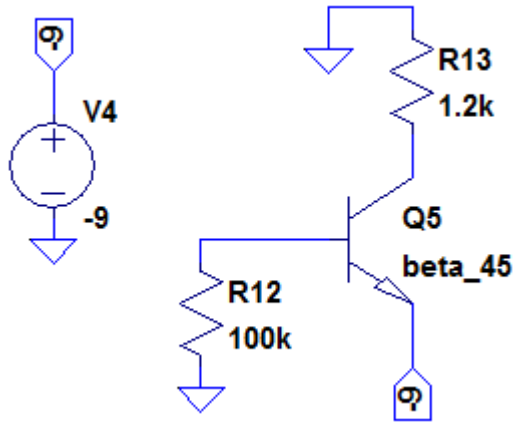




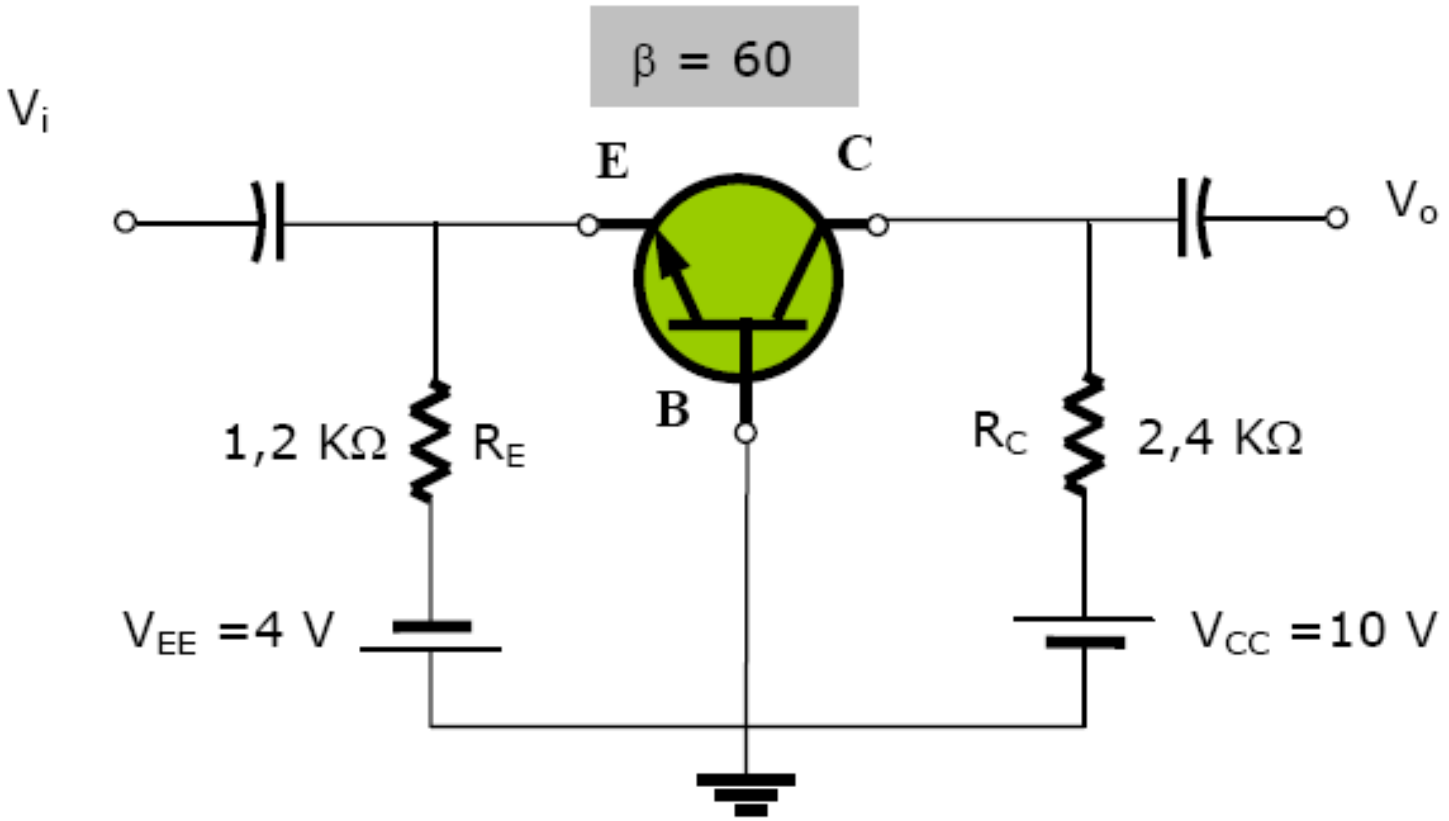


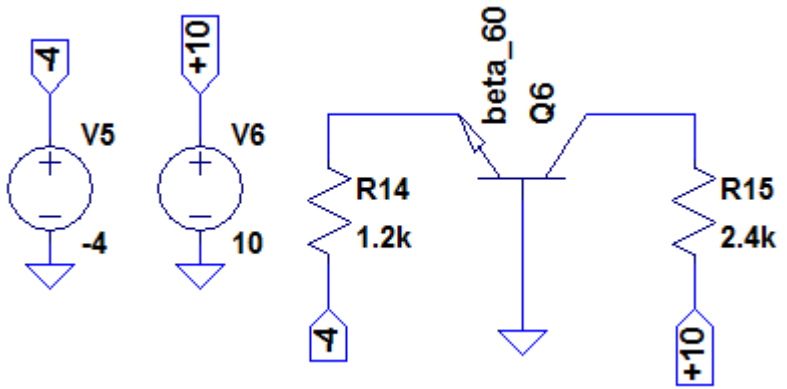

```
        --- Operating Point ---

V(+20):         20              voltage
V(n002):        11.2512         voltage
V(n001):        0.790088        voltage
Ic(Q1):         0.00184607      device_current
Ib(Q1):         1.53839e-005    device_current
Ie(Q1):         -0.00186146     device_current
I(R2):          1.53839e-005    device_current
I(R1):          0.00186146      device_current
I(V1):          -0.00186146     device_current
```


R_C 1,2 KΩ
I_B
V_o
C_2
V_i
C_1
+
β = 45
100 KΩ
R_B
V_{EE} = -9 V

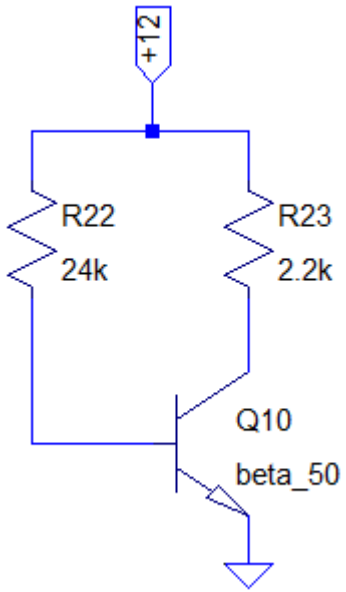


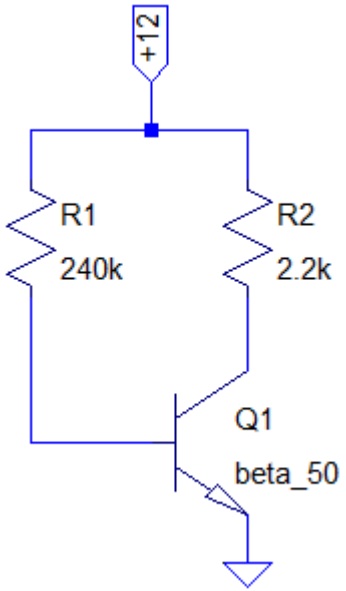

```
      --- Operating Point ---

V(-9):          -9              voltage
V(n002):        -8.19202        voltage
V(n001):        -4.42369        voltage
Ic(Q1):         0.00368641      device_current
Ib(Q1):         8.19202e-005    device_current
Ie(Q1):         -0.00376833     device_current
I(R2):          0.00368641      device_current
I(R1):          -8.19202e-005   device_current
I(V1):          0.00376833      device_current
```

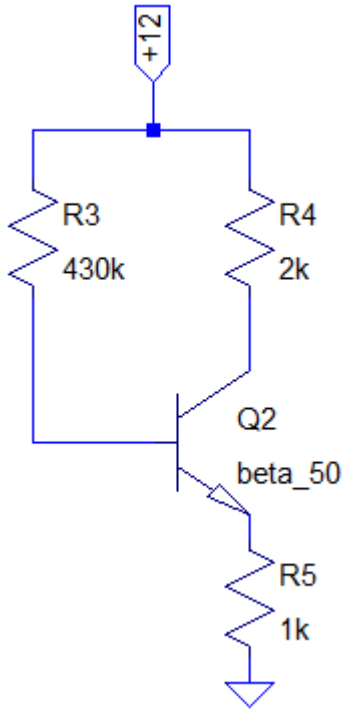

β = 60
Vi
E
C
Vo
B
1,2 KΩ
RE
RC
2,4 KΩ
VEE =4 V
VCC =10 V

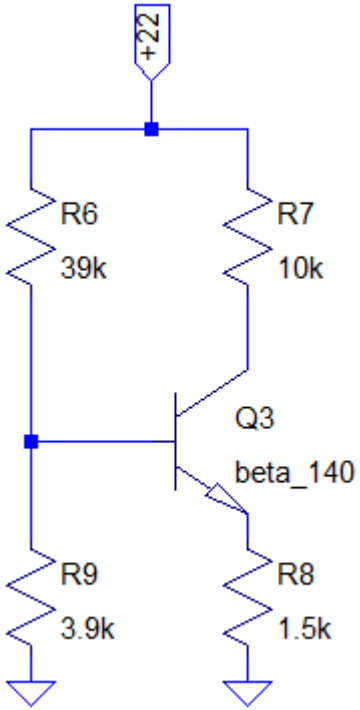


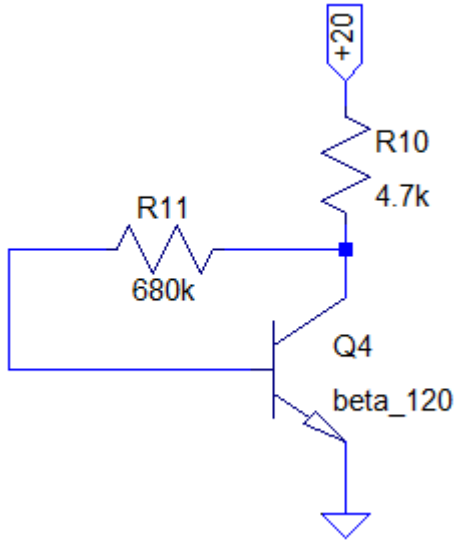

```
        --- Operating Point ---

V(n002):        3.7033          voltage
V(n001):        -0.79918        voltage
V(-4):          -4              voltage
V(+10):         10              voltage
Ic(Q1):         0.00262363      device_current
Ib(Q1):         4.37272e-005    device_current
Ie(Q1):         -0.00266736     device_current
I(R2):          -0.00262362     device_current
I(R1):          0.00266735      device_current
I(V2):          -0.00262362     device_current
I(V1):          0.00266735      device_current
```

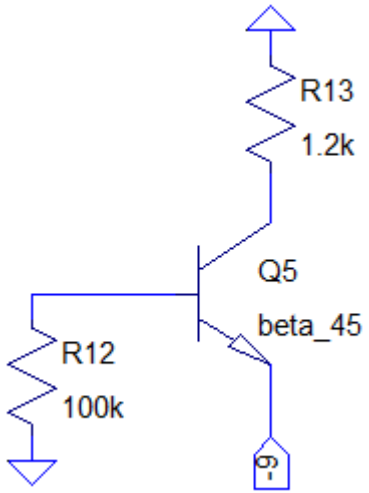

+12
R22
24k
R23
2.2k
Q10
beta_50

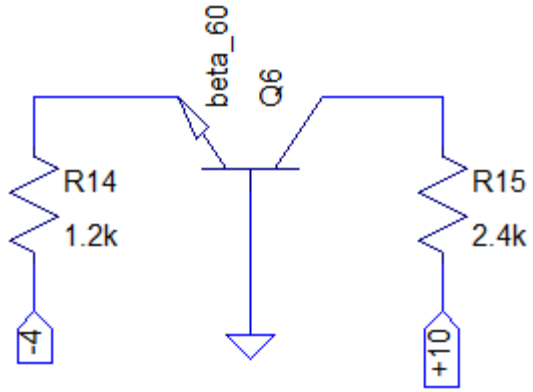

+12
R1
240k
R2
2.2k
Q1
beta_50

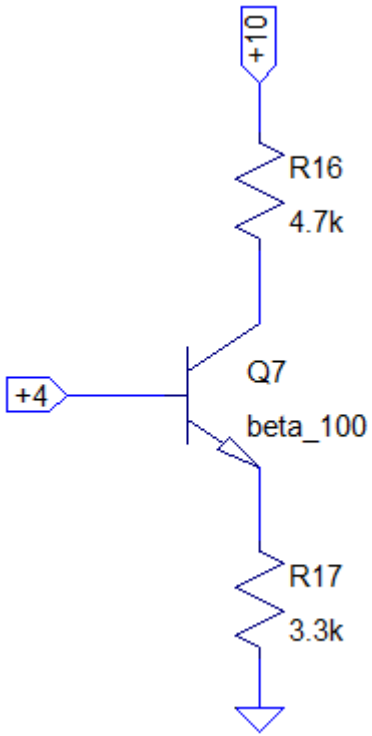

+12
R3
430k
R4
2k
Q2
beta_50
R5
1k

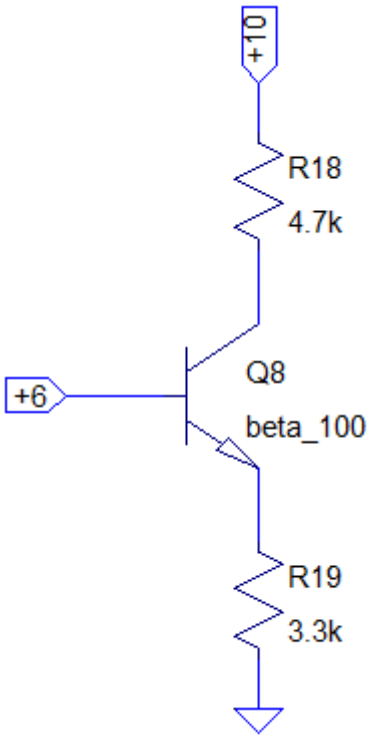

+22
R6
39k
R7
10k
Q3
beta_140
R9
3.9k
R8
1.5k

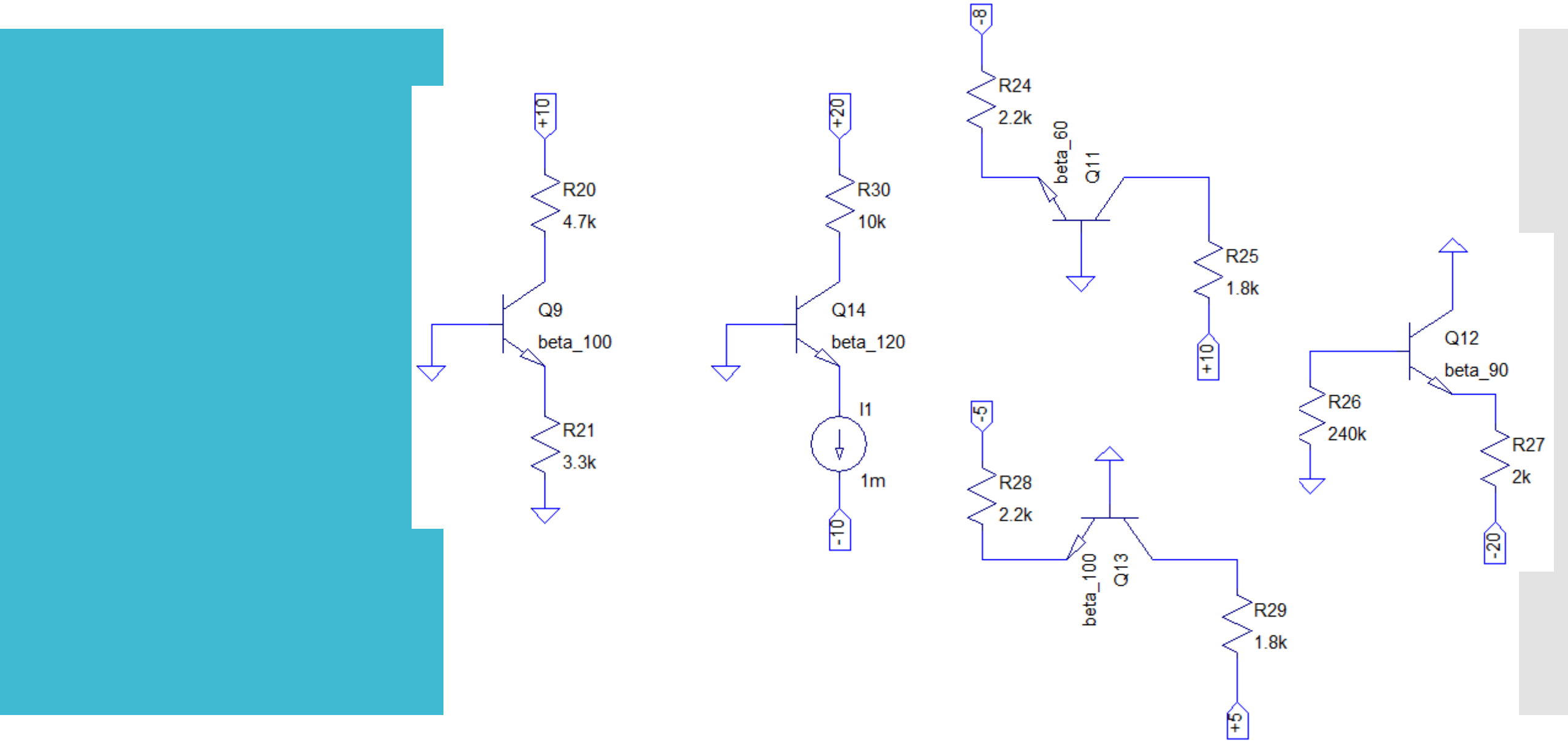

+20
R10
4.7k
R11
680k
Q4
beta_120


R13
1.2k
Q5
beta_45
R12
100k
-9


beta_60
Q6
R14
1.2k
R15
2.4k
-4
+10


+10
R16
4.7k
+4
Q7
beta_100
R17
3.3k


+10
R18
4.7k
+6
Q8
beta_100
R19
3.3k


+10
R20
4.7k
Q9
beta_100
R21
3.3k
+20
R30
10k
Q14
beta_120
I1
1m
-10
-8
R24
2.2k
beta_60
Q11
R25
1.8k
+10
-5
R28
2.2k
beta_100
Q13
R29
1.8k
+5
Q12
beta_90
R26
240k
R27
2k
-20