ENEL 434   Electronics II
Lecture 7
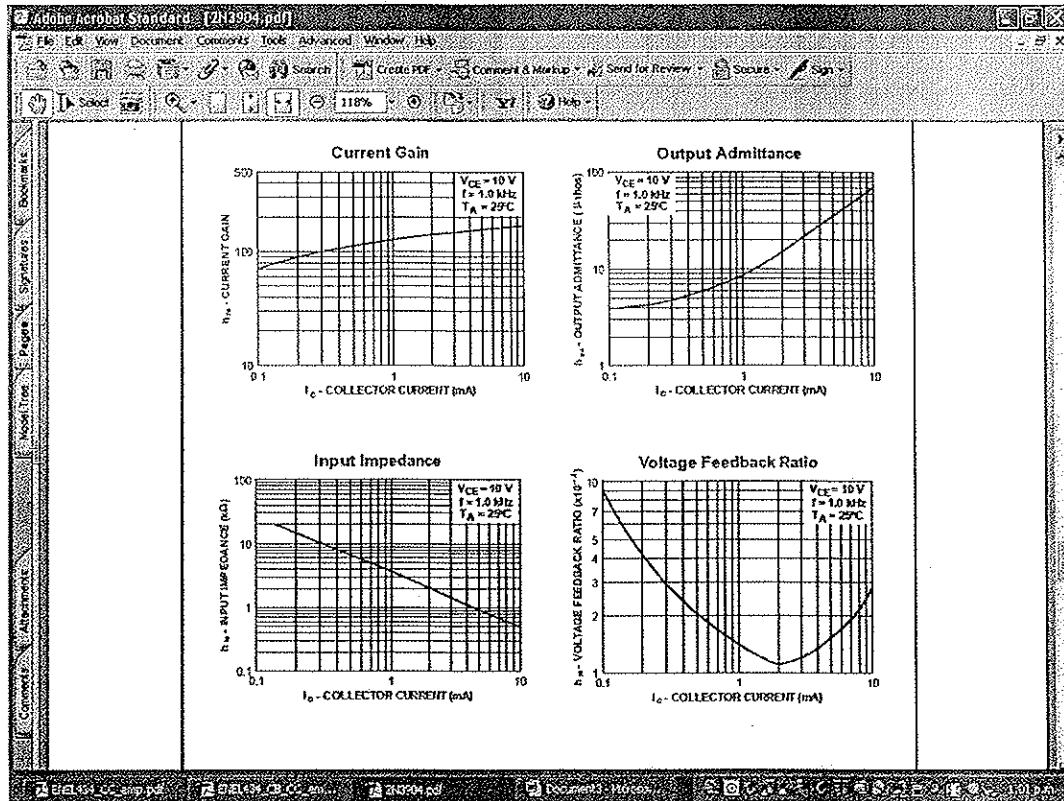

Fig 1   2N3904   H parameters.

VCC+10

Output

RL
8K

V
VM1

+ Vin
Input
Internal resistance 0

C2 = 10u

Ce = 100u

RC = 8K

Re = 1K

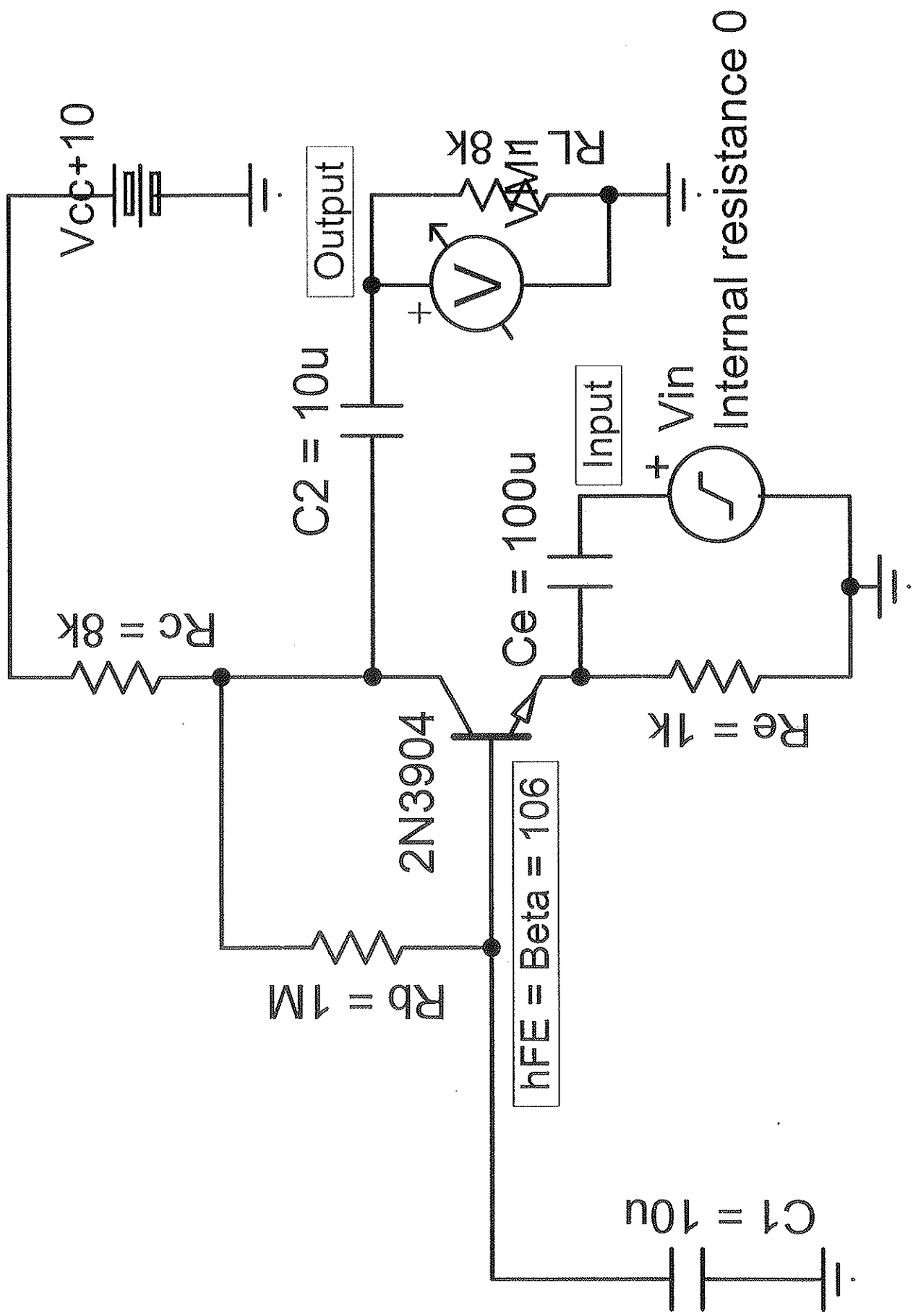2N3904

Rb = 1M

hFE = Beta = 106

C1 = 10u

Fig 2. CB amplifier with Collector to base bias.
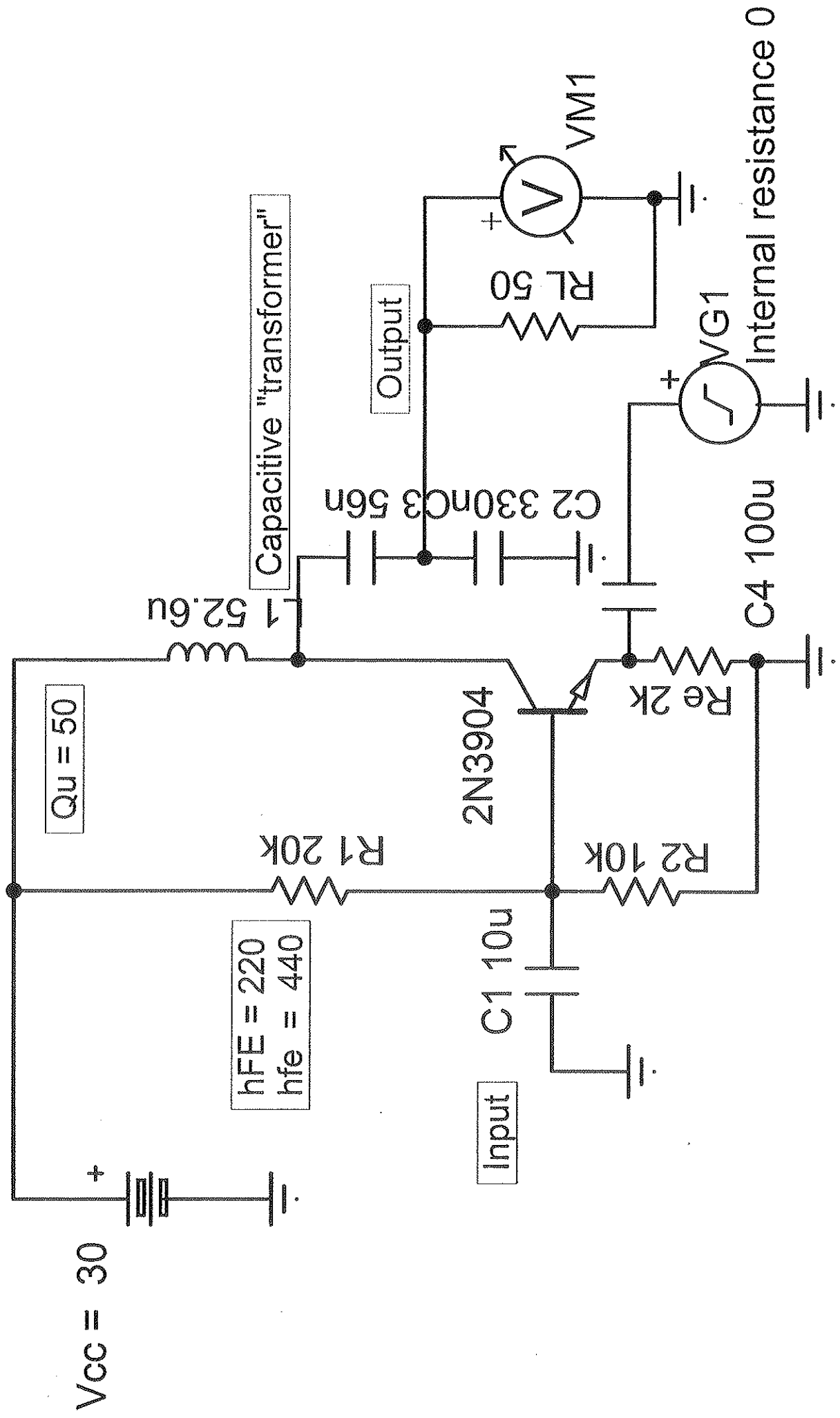
Fig 3 CB amplifier with tuned collector load
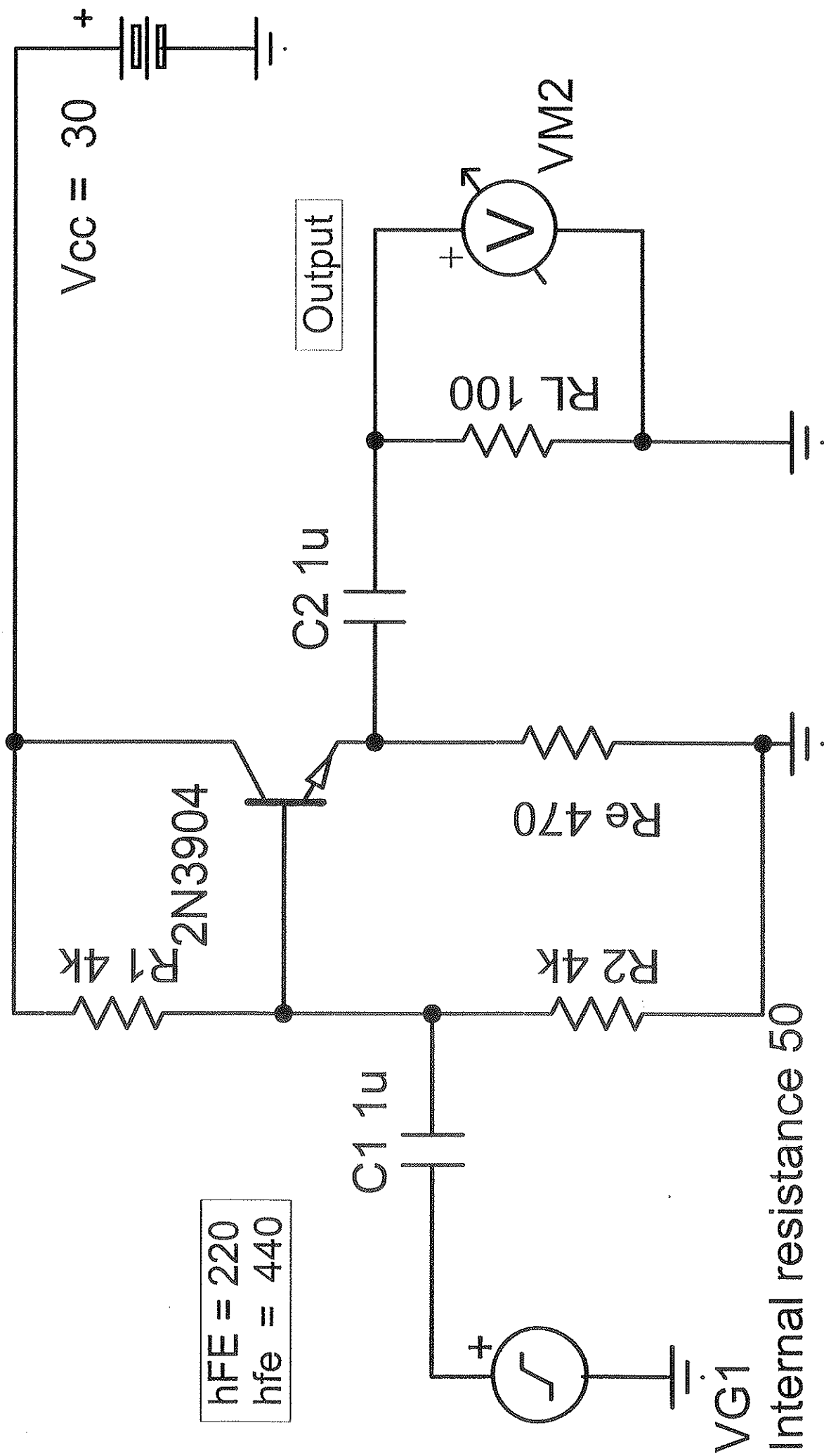
Fig 4 Common Collector amplifier

Review

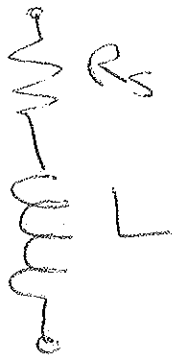## Step by step design

1. Find approx f_0 [ω_0]

2. Insert R_{coil} (eg R_p)

3. (a) Change // to series

   (b) Change series to //

4. Collect together (in A) all the resistances. (Check hie)

5. Find peak gain at f_0 (check to closest changes)

6. SS gain   vs   large signal gain.

7. R_{in}

8. CE vs CB.

9. Monte Carlo (after) BJT

10. Parameter stepping Temp

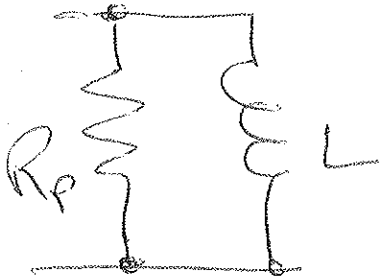# Review:
Quality factor Q

(A)

$$Q_s = \frac{X_L @ f_o}{R_s}$$

(B)

$$Q_p = \frac{R_p}{X_L @ f_o}$$

(C)

$$Q = \frac{f_o}{BW}$$

Gain dB

BW

3dB

DC

f_o

ω_o

freq.

$\frac{1}{\sqrt{LC}}$

ω_o = radian frequency

ω

σ

DC

X

$Q_u = \infty$

R_{coil}

$\sim$
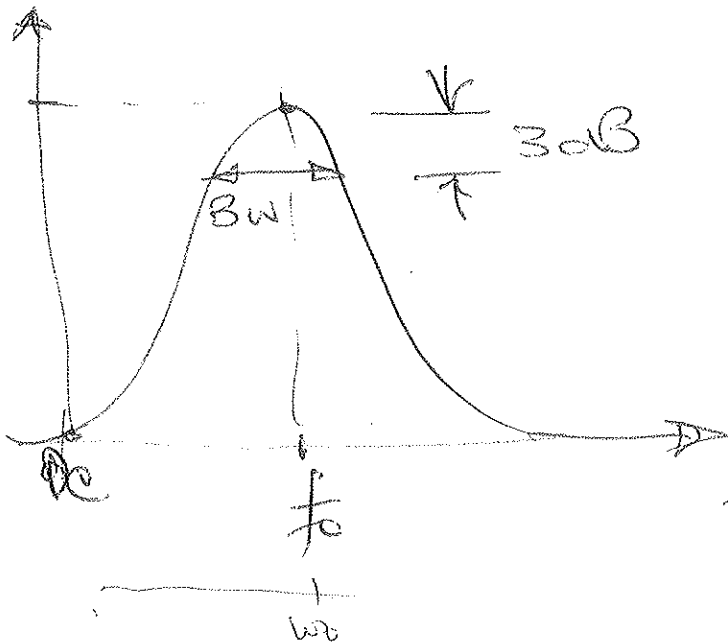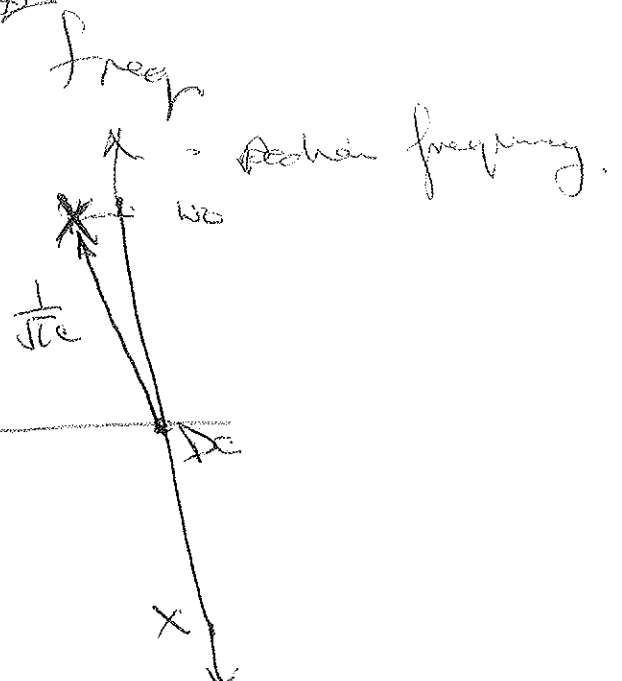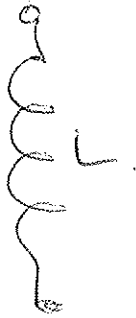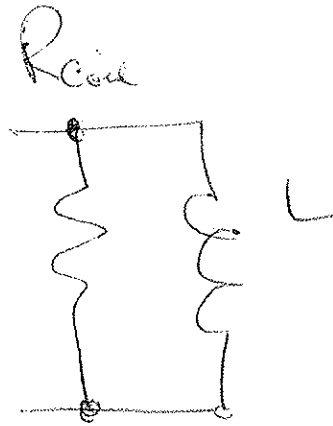
Not realistic but math convenient

$Q_u = Q_{unloaded}$

or

Realistic, a coil with series resistance

R_c

L

$Q_u = \infty$

V_{cc}

L

R_c

C

Perfect lossless inductor

R_{cu}

R_c

$R_c' = R_c \| R_{cu}$

L $R_{cu} \| R_c$

$Q_{loaded} < Q_u$