Radiorør

OZ8JYL

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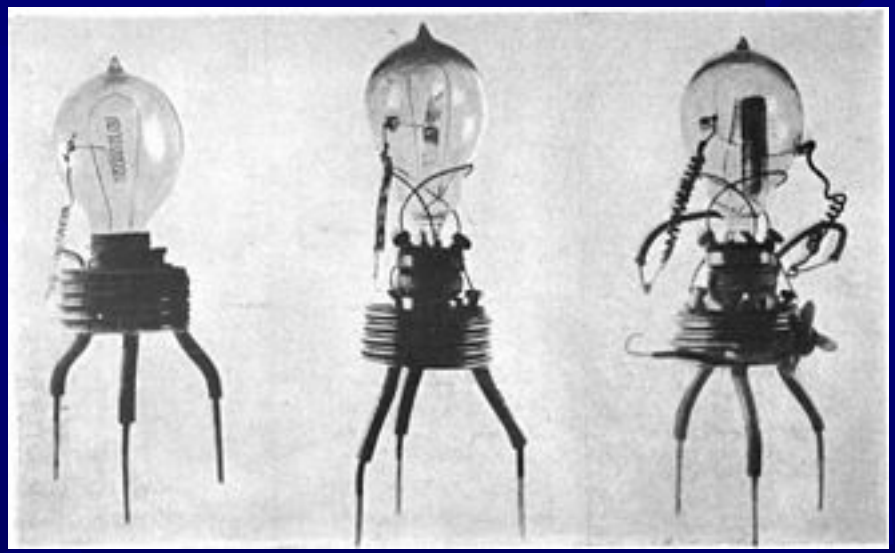
Thermionic valve - Vacuum tube

- Historie
  - Forstærkning
    - Telefonlinier
    - Telegraf (Trådløs og Fastlinie)
  - Demodulering
    - Kohærer

Thermionic valve - Vacuum tube

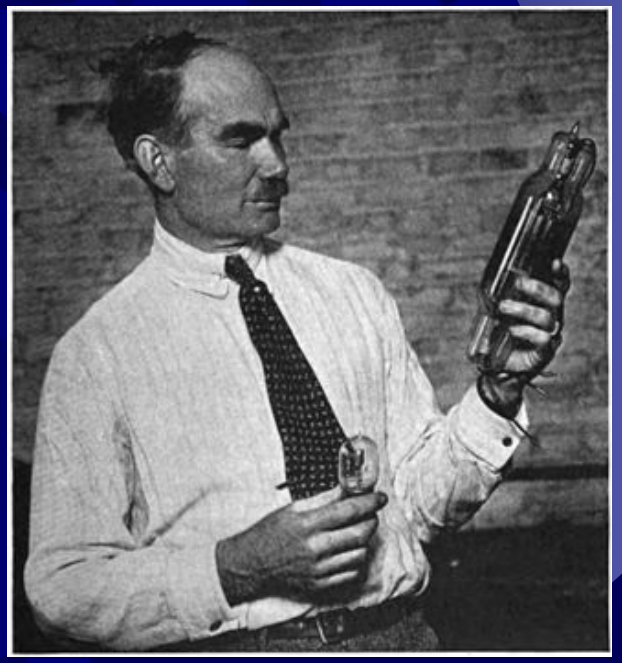
- Edison lamper (lyspærer)
- Dioden Sir John Ambrose Fleming 1904



Thermionic valve - Vacuum tube

- Edison lamper (lyspærer)
- De Forest (Trioden)

De Forest, some time between 1914 and 1922, with two of his Audions, a small 1 watt receiving tube (left), and a later 250-watt transmitting power tube (right), which he called an "oscillion".



Typer

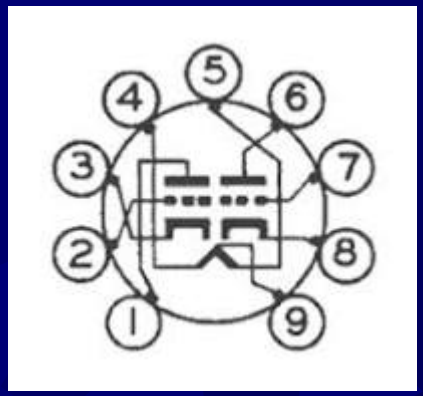
- Diode
- Triode
- Tetrode (Walter H. Schottky 1919)
- Pentode (Bernard D.H. Tellegen 1926)
- Øvrige rør
  - Heptode (UCH81)
  - osv.

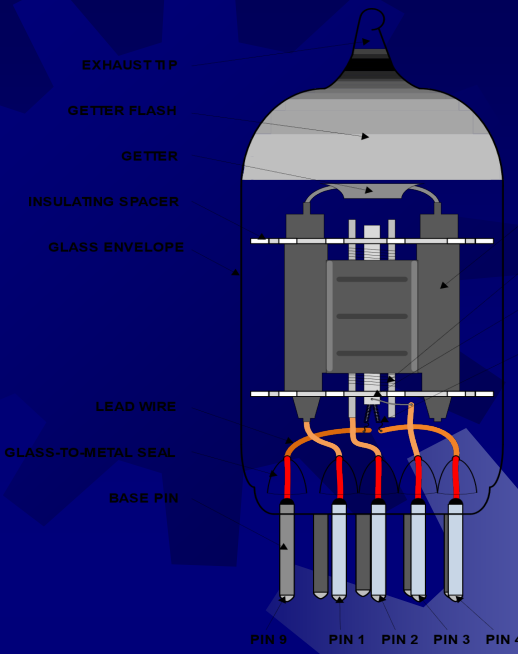
Opbygning

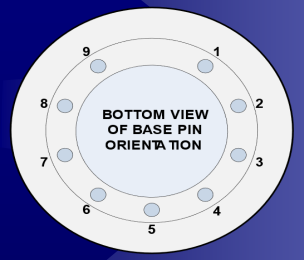
- Elektroder
  - Glødetråd H1 OG H2 (f)
  - Katode K
  - Styregitter G1 (Controlgrid)
  - Skærmgitter G2 (Screengrid)
  - Fanggitter G3 (suppressor grid)
  - Anode A -P

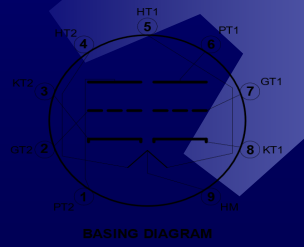
Opbygning

- Elektroder



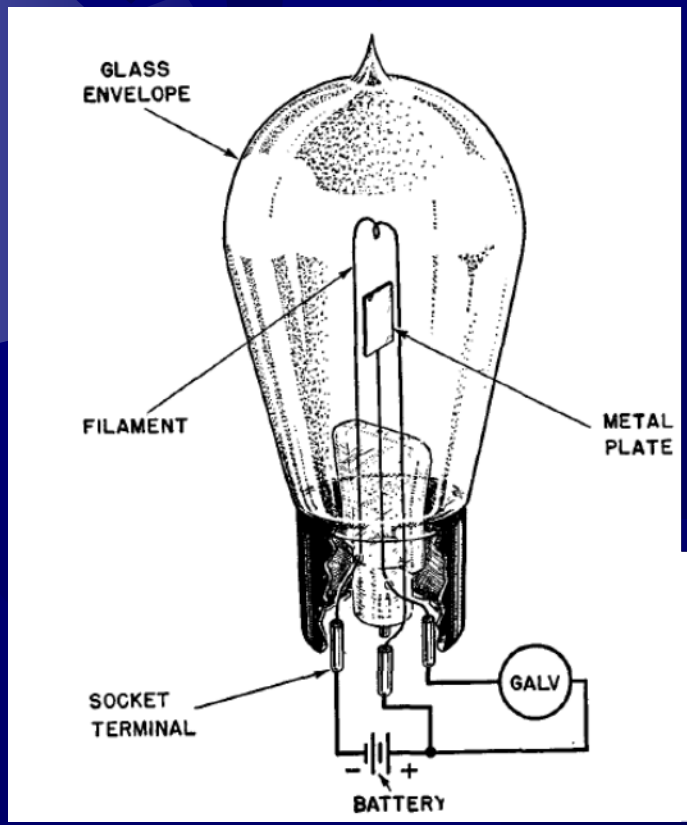


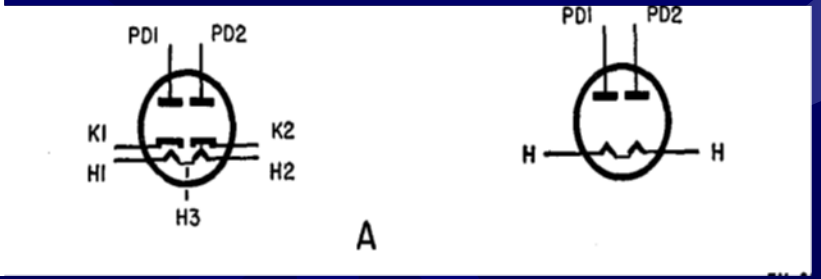




Dioden

- Edisons Lamp (dioden)





Trioden

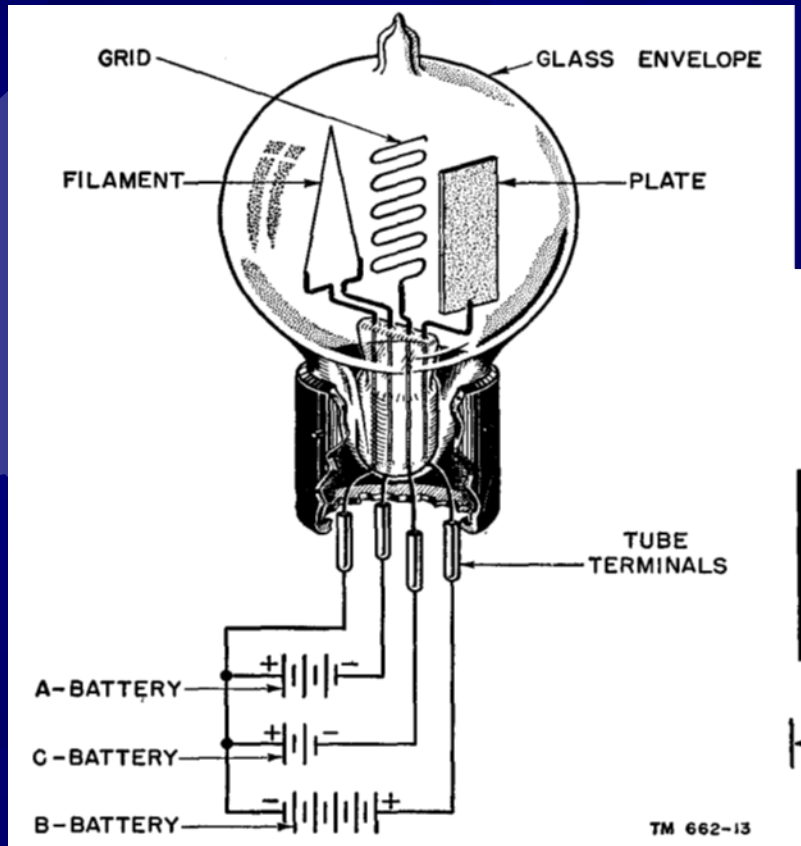


Figure 4. Construction of DeForest's three-element tube, or triode.

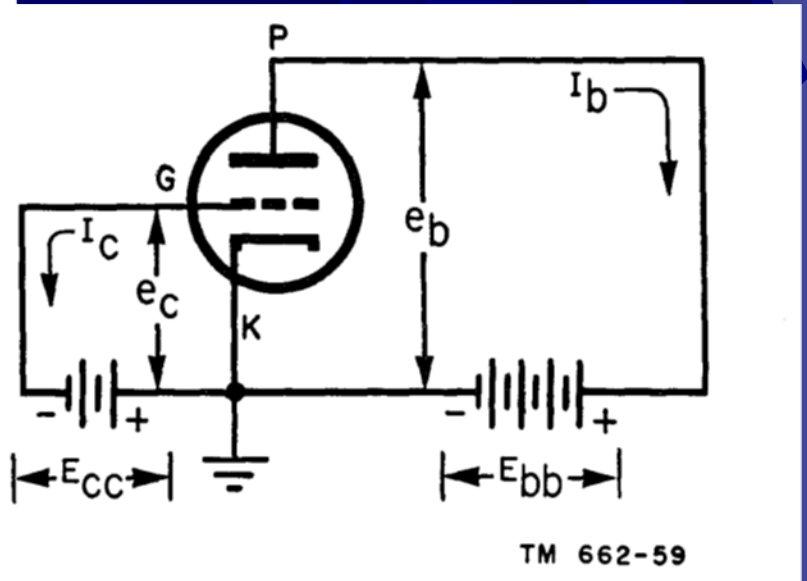
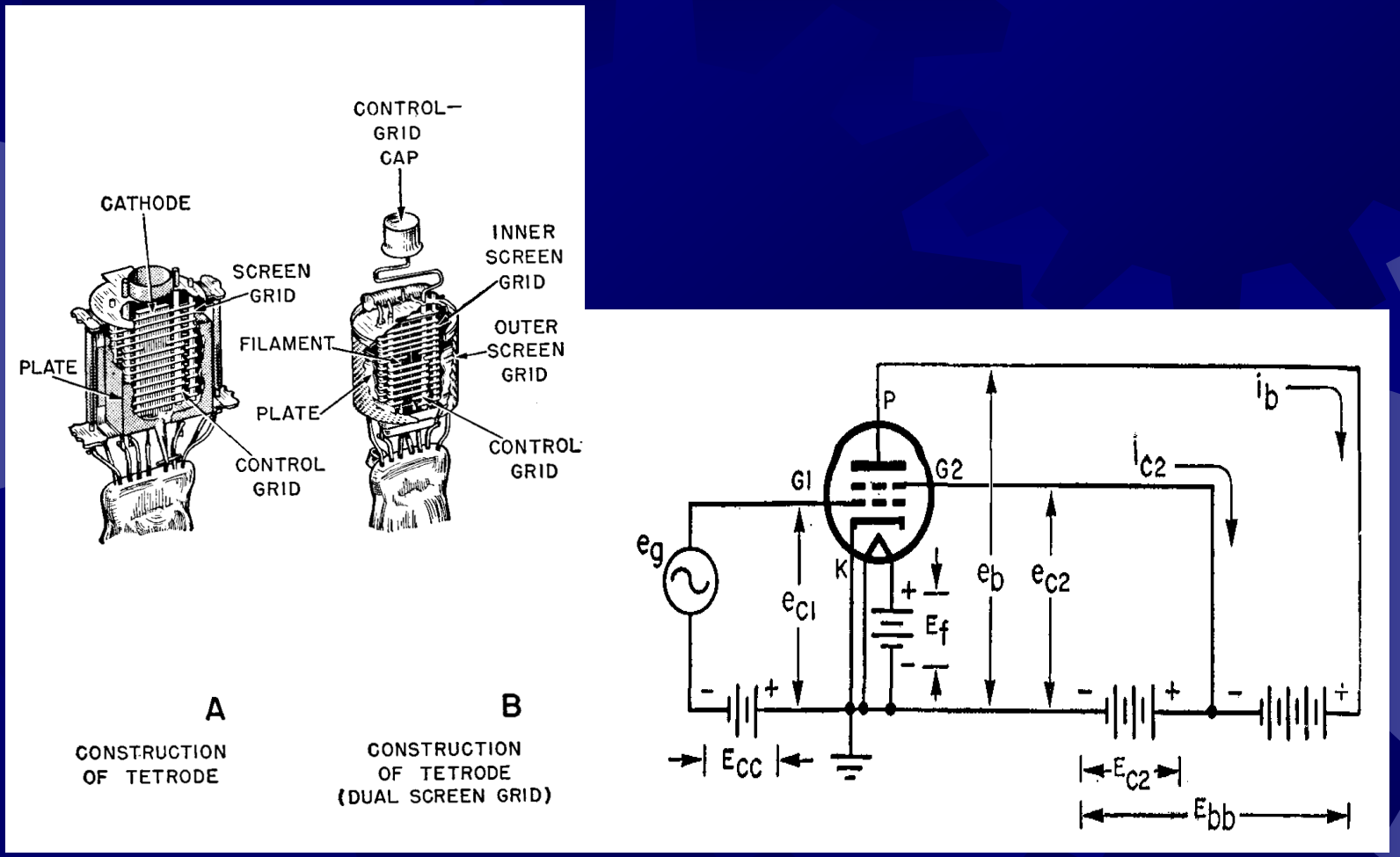
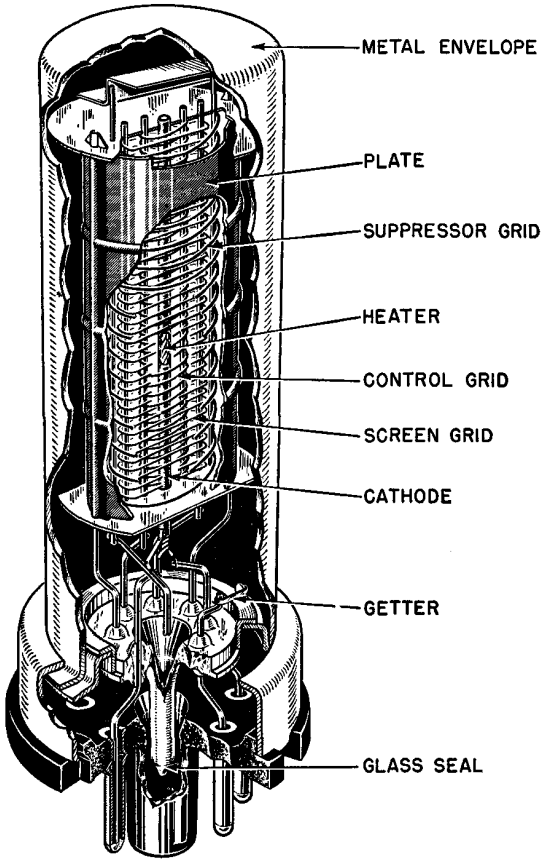


Figure 50. Triode circuit bearing several voltage and current notations.

Tetroden

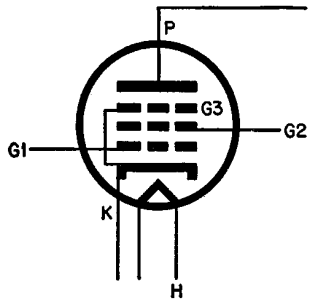

CONTROL-
GRID
CAP
CATHODE
SCREEN
GRID
INNER
SCREEN
GRID
FILAMENT
OUTER
SCREEN
GRID
PLATE
PLATE
CONTROL
GRID
CONTROL
GRID
A
CONSTRUCTION
OF TETRODE
B
CONSTRUCTION
OF TETRODE
(DUAL SCREEN GRID)
P
G1
G2
K
i_b
i_{c2}
e_g
e_{c1}
e_b
e_{c2}
E_f
E_{cc}
E_{c2}
E_{bb}

Pentoden



PENTODE CONSTRUCTION

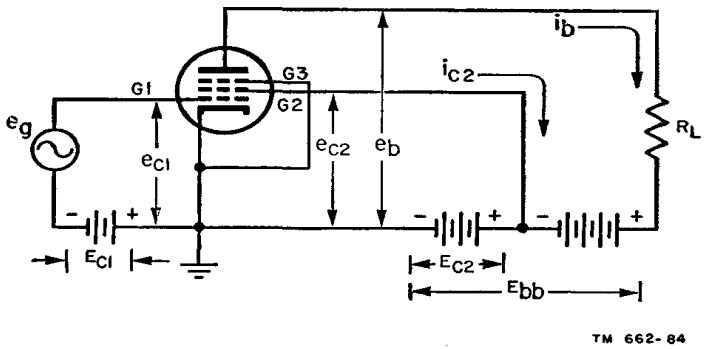
A



PENTODE SYMBOL

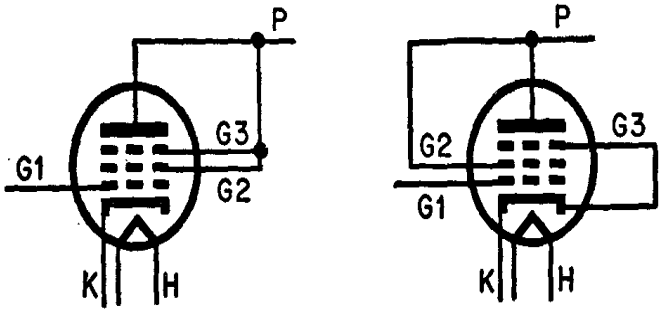
B

TM 662-82



TM 662-84

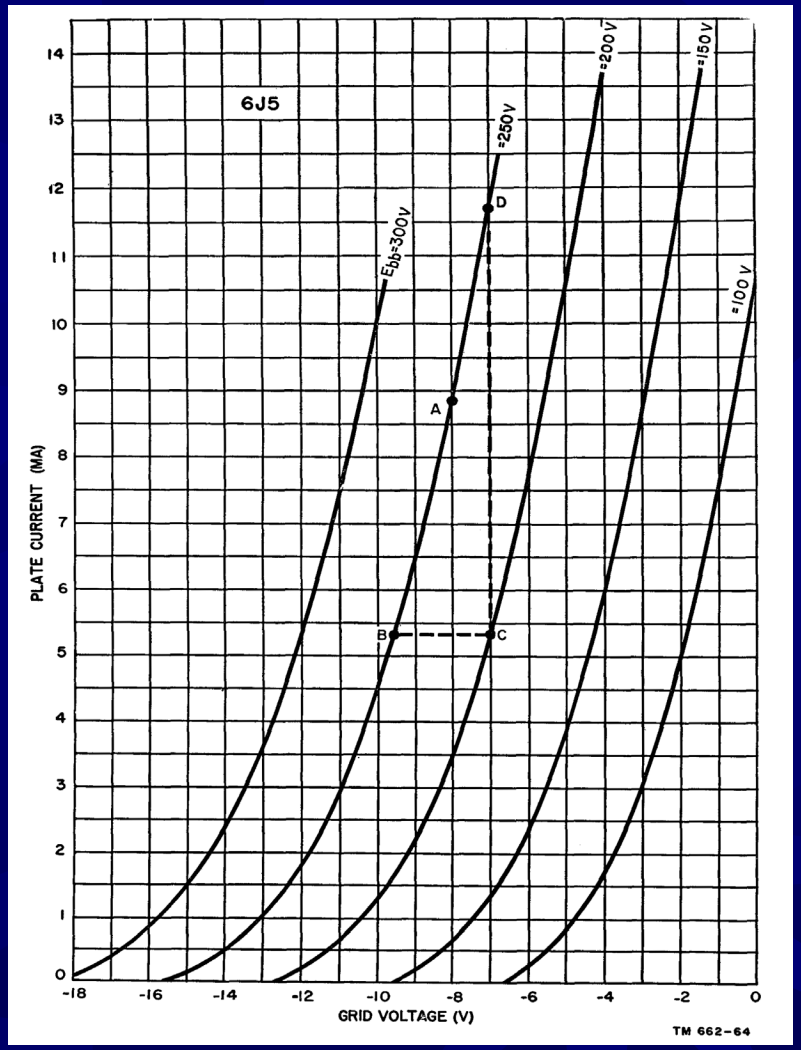
Figure 75. Circuit representation of pentode.



TM 662-95

Figure 86. Typical example showing pentode connection to triode.

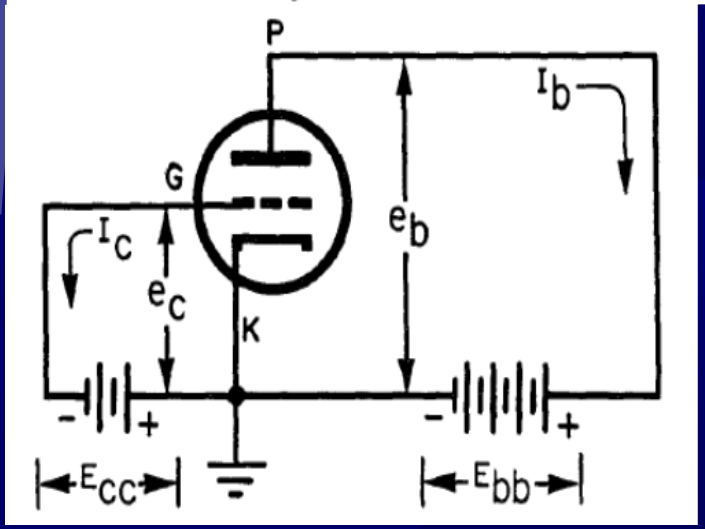
Grafisk fremstilling



Rørkonstanter

Forstærkningsfaktor (mu) μ kaldet S(tejlhed) ma/volt

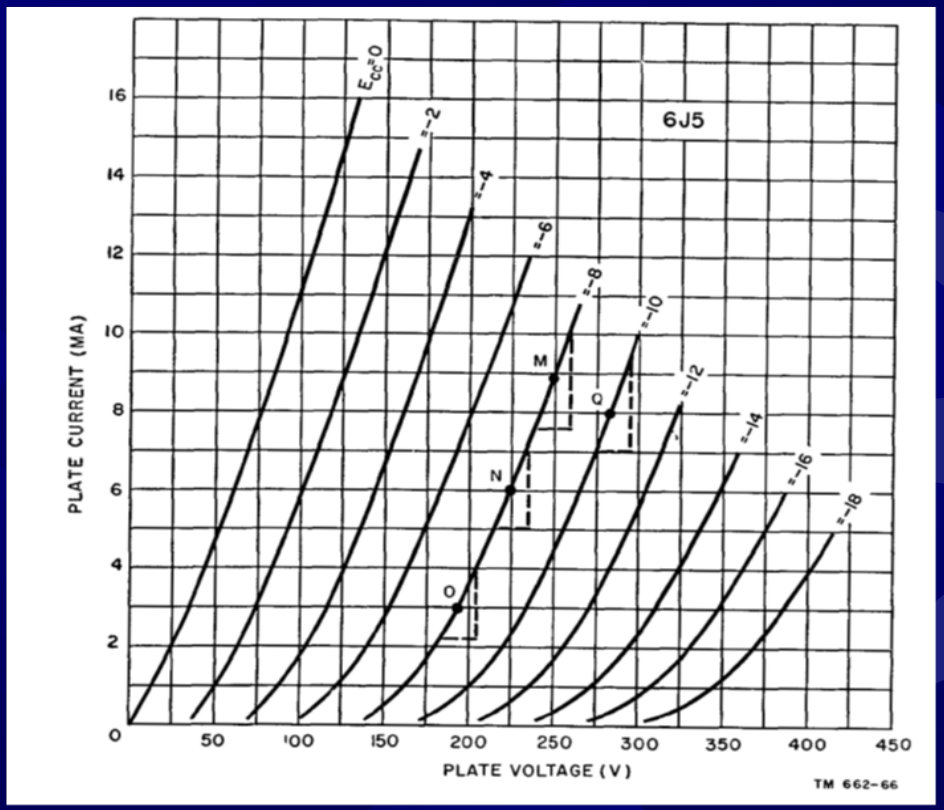
$$\mu = \frac{\triangle e_b}{\triangle e_c} \quad (i_p \text{ constant}) \quad \text{Amplification factor} = \frac{\text{Small change in plate voltage}}{\text{Small change in grid voltage}}$$



Rørkonstanter

- **Rørkonstanter**
  - DC modstand og AC modstand (Rp)

$$R\ (\text{ohms}) = \frac{E\ (\text{volts})}{I\ (\text{amperes})}$$



Rørkonstanter

- Transconductance

$$g_m = \frac{\triangle i_b}{\triangle e_c} \ (e_b \text{ constant}).$$

- Måles i millimho eller micromho ?

Rørkonstanter

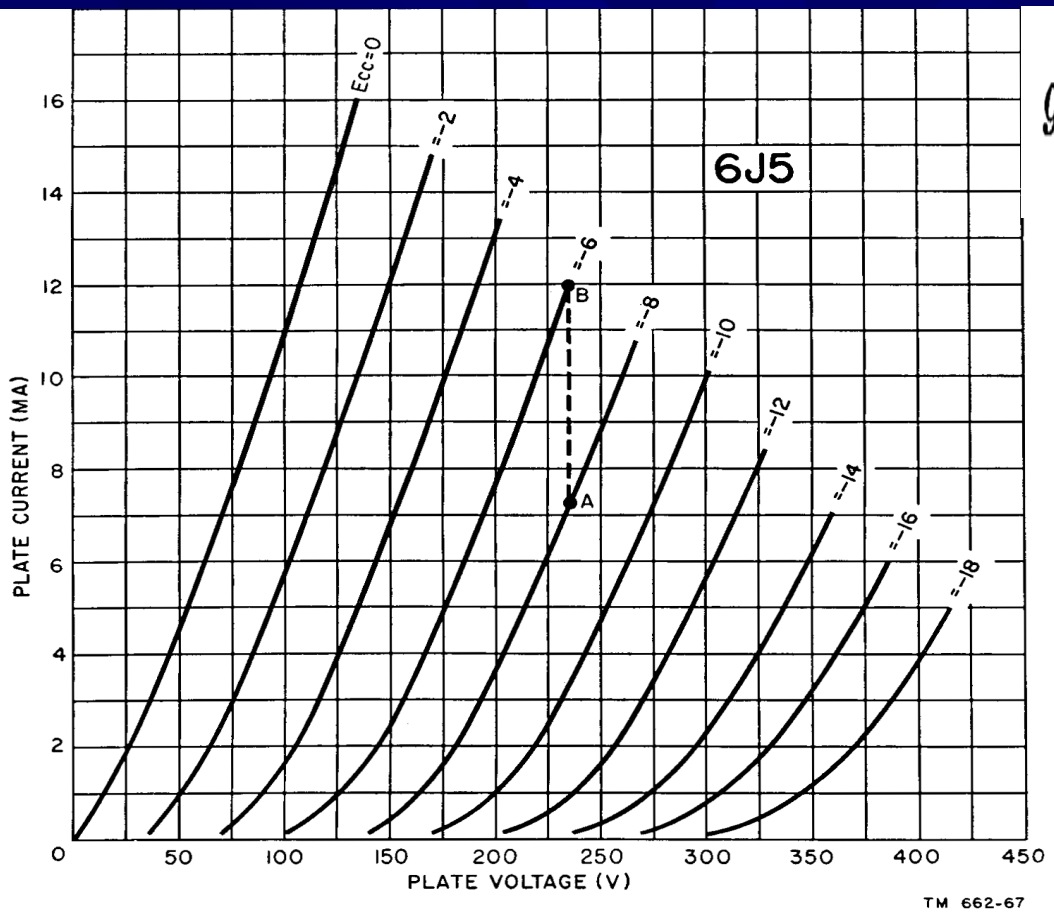


Figure 58. Plate family of curves used to determine transconductance of 6J5 triode.

$$g_m = \frac{\Delta i_b}{\Delta e_c} = \frac{.012 - .0071}{8 - 6} = \frac{.0049}{2} = .00245 \text{ mho}$$

Rørkonstanter

- Relation mellem mu (μ), rp og gm

$$\text{amplification constant } (\mu) = \frac{\triangle e_b}{\triangle e_c}$$

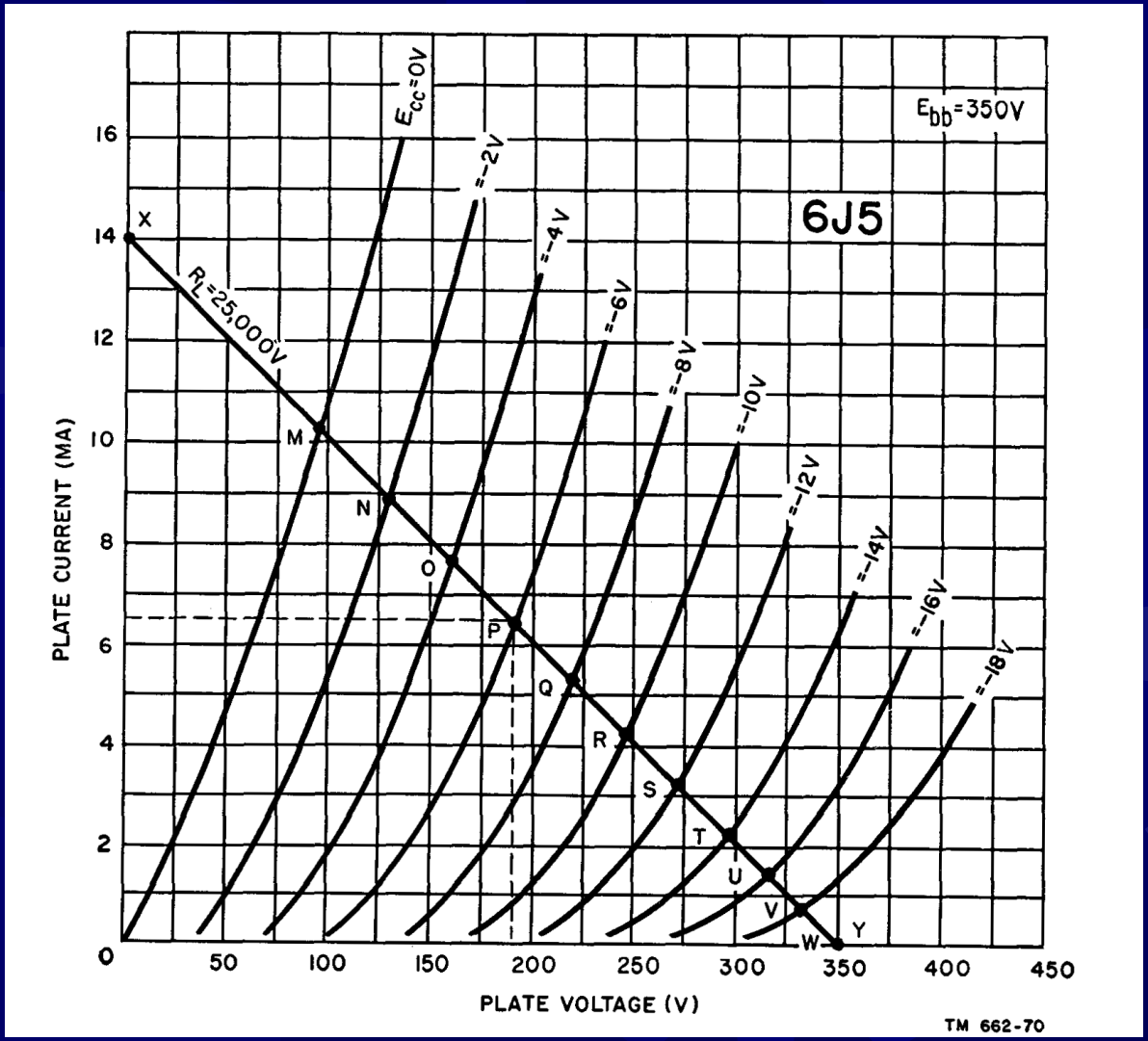
$$\text{a-c plate resistance } (r_p) = \frac{\triangle e_b}{\triangle i_b}$$

$$\text{transconductance } (g_m) = \frac{\triangle i_b}{\triangle e_c}$$

Rørkonstanter

- μ = rp x gm
- rp = μ/gm
- gm = μ/rp

Arbejdspunkt for et rør



Radiorør

- Fejltilstande
  - Gas
  - Kortslutning
  - Arching -flashover
  - Åbne tilslutninger
  - Selvsving

Radiorør

- Selvsving
  - Barkhausen formel

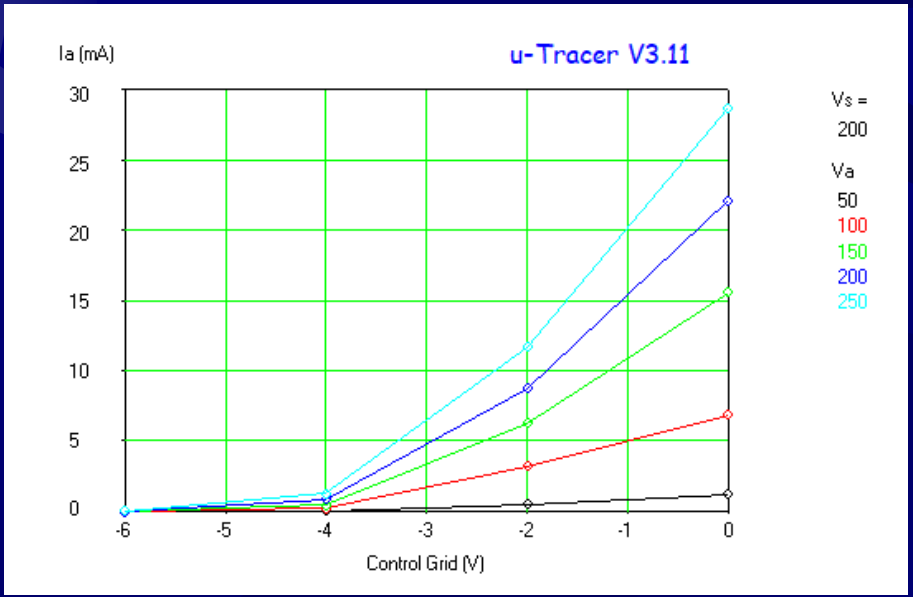
It states that if *A* is the gain of the amplifying element in the circuit and β(*j*ω) is the transfer function of the feedback path, so β*A* is the loop gain around the feedback loop of the circuit, the circuit will sustain steady-state oscillations only at frequencies for which:
1.The loop gain is equal to unity in absolute magnitude, that is, and
2.The phase shift around the loop is zero or an integer multiple of 2π:

Testning af radiorør

- Emission
- Transconductance
- Gas
- Lækager og kortslutninger
- Åbne tilslutninger

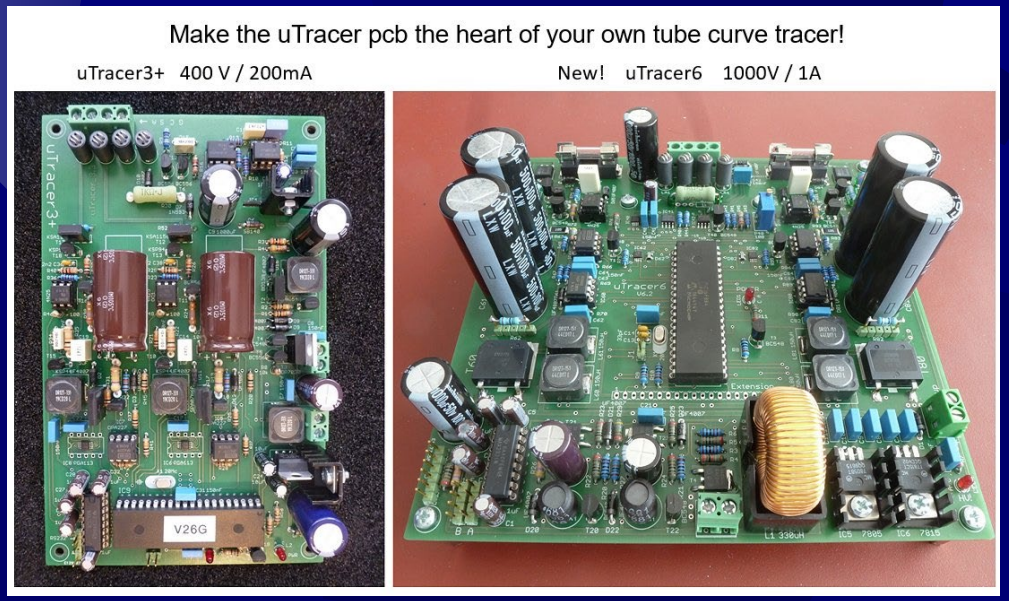
Testning af radiorør

- To typer af test
  - Emission
  - Tranconductance



Testning af radiorør

- Sylvania 220 (1951)
- AVO MK1 (1935)
- Moderne tester (Utracer3+ & Utracer6)



Spørgsmål

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