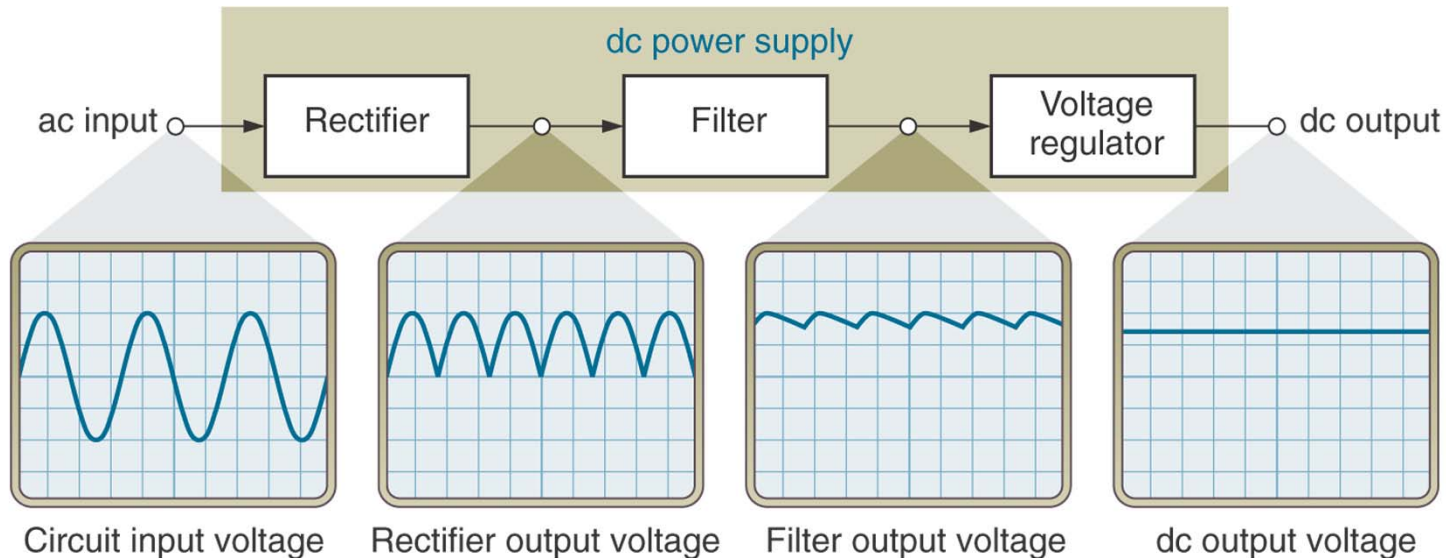


Kapittel 18 Grunnleggende diodekoplinger

Likeretter (Rectifier) – omforme AC til DC



Basic power supply block diagram and waveforms

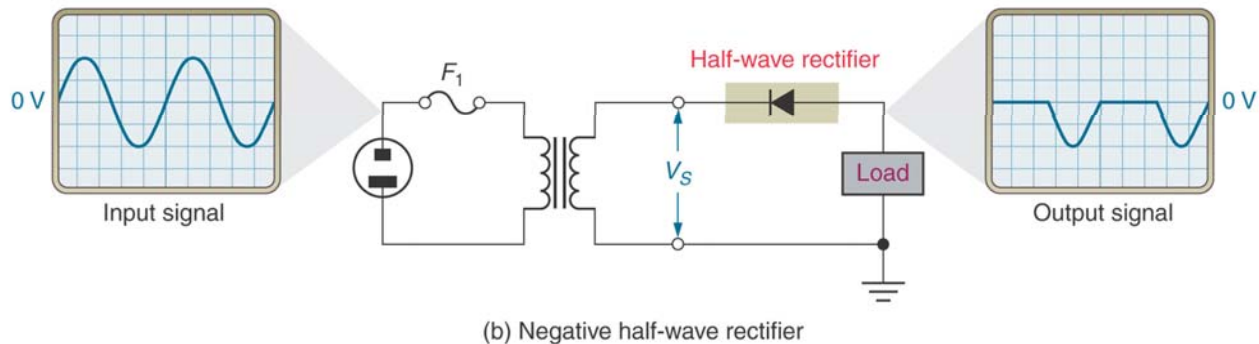
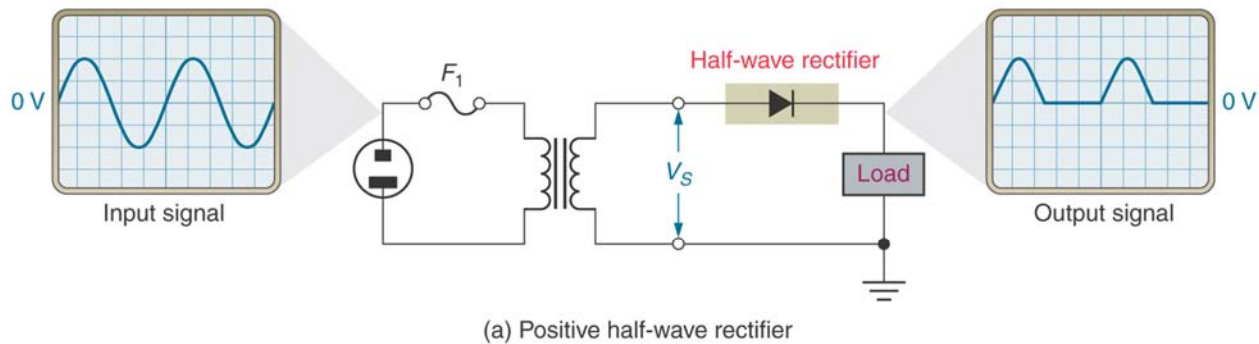
Rectifier (Likeretter) – en diodekrets som omformer en AC til pulserende DC

Filter – en krets som reduserer variasjonene i spenningen ut fra en likeretter

Voltage Regulator – Spenningsregulator – krets som opprettholder konstant spenning (DC-out) Spenningen holdes konstant selv om belastningen endres (!)

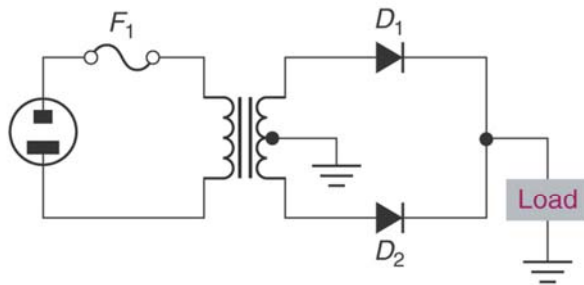
Kapittel 18 Grunnleggende diodekoplinger

- Halvbølge likeretter – en diode er plassert i serie mellom en transformator og lasten (mottakerkretsen).
 - Positiv halvbølge likeretter – leverer en serie positive pulser
 - Negativ halvbølge likeretter – leverer en serie negative pulser

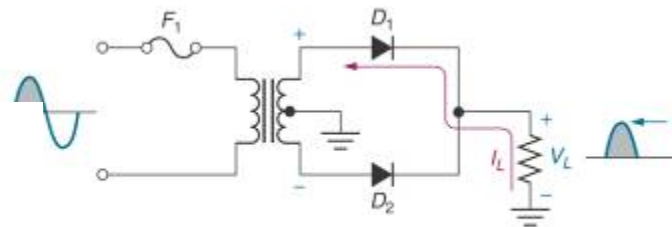


Kapittel 18 Helbølge likeretter

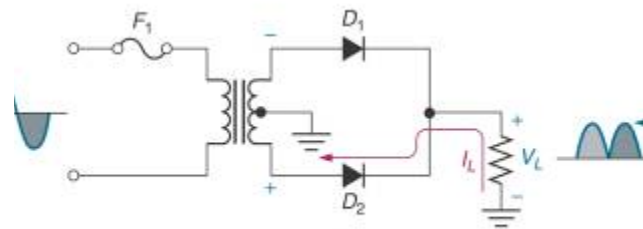
- Helbølge likeretter – 2 dioder tilkopleet en sentertappet transformator



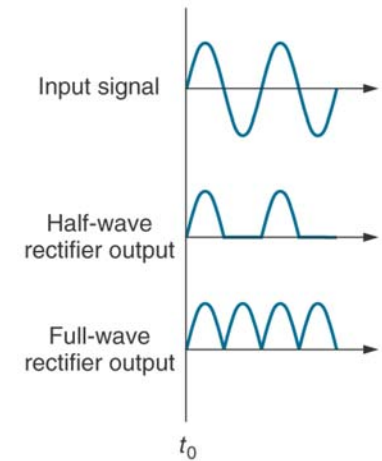
A full-wave rectifier



(a)



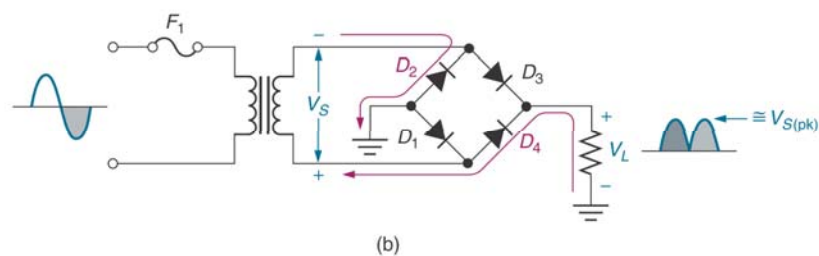
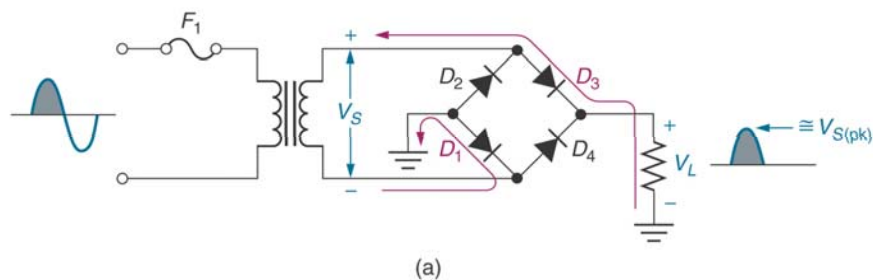
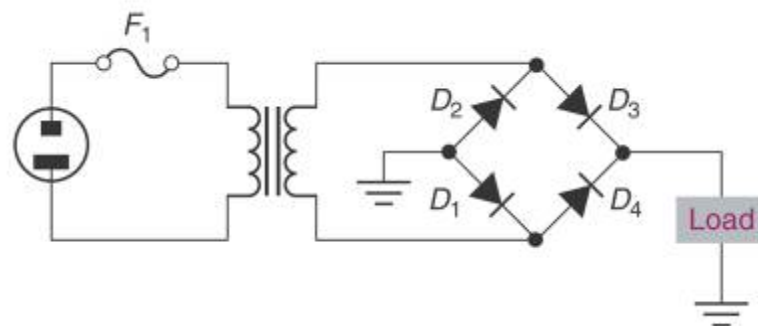
(b)



Typical rectifier waveforms

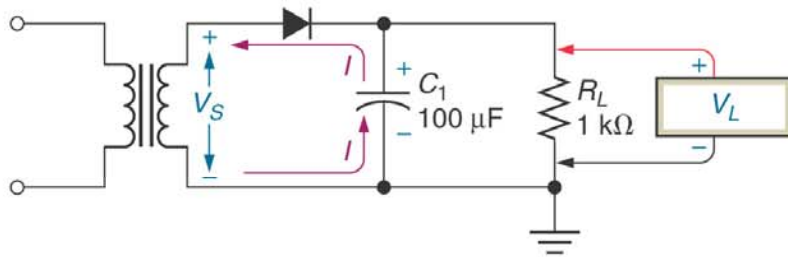
Kapittel 18 Helbølge likeretter

- Helbølge likeretter – uten sentertappet transformator , - men med 4 dioder
Dette er den mest benyttede likeretterkopling.
(Sentertappet transformator er en kostbar komponent – dioder er billige)



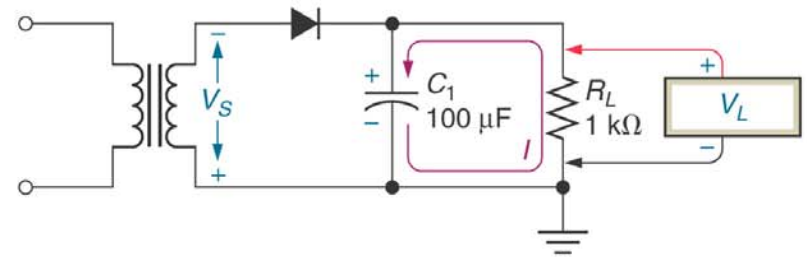
Kapittel 18 Likeretter med filter

- Power Supply Filter – en krets som reduserer variasjonene I DC spenningen ut fra likeretteren. En stor kondensator koples parallellt med lasten = RC-filter



Charge circuit

(a)

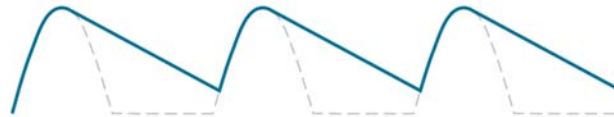


Discharge circuit

(b)

C_F constant

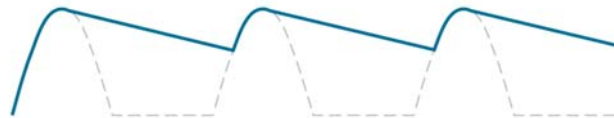
$R_L = 500 \Omega$



R_L constant

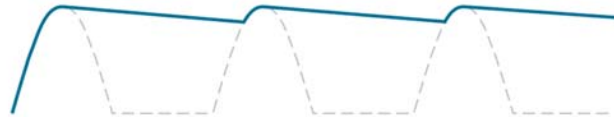
$C_F = 150 \mu\text{F}$

$R_L = 1 \text{ k}\Omega$



$C_F = 300 \mu\text{F}$

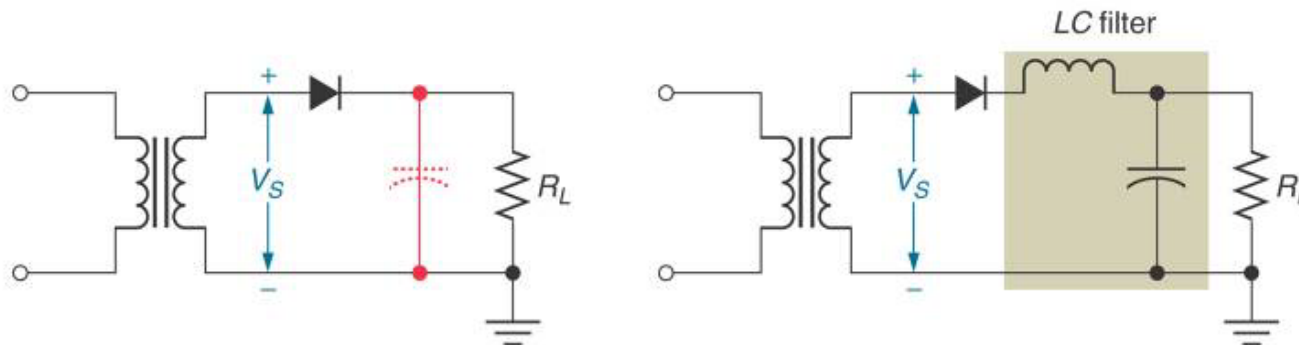
$R_L = 1.5 \text{ k}\Omega$



$C_F = 470 \mu\text{F}$

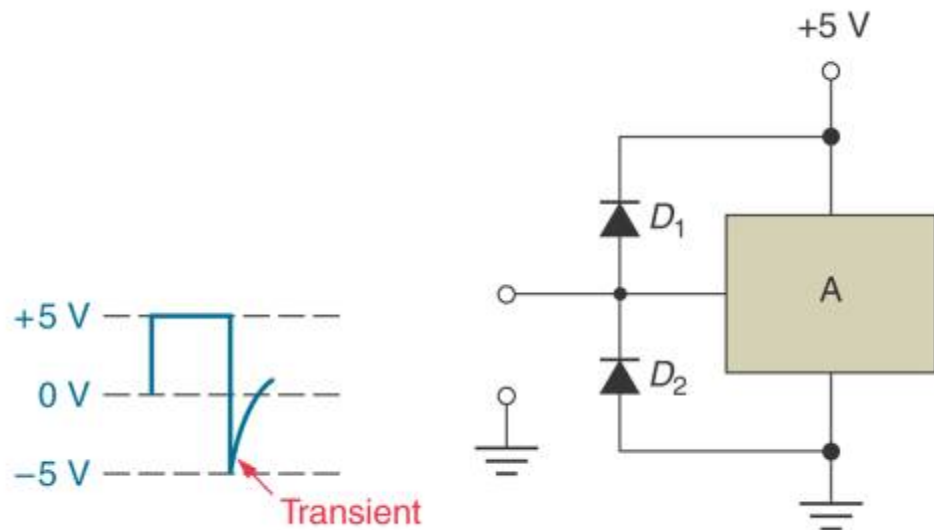
Kapittel 18 Likeretter med filter

- Surge Current – ladestrøm til kondensatoren
 - I det øyeblikk dioden begynner å lede – og kondensatorspenningen er 0 volt – vil kondensatoren virke som en kortslutning. Strømmen begrenses kun av:
 - Motstanden i transformatorens sekundærvikling
 - Motstanden i ledningene
 - Den interne motstanden i dioden (Bulk resistance)
 - Ladestrømmen kan bli redusert hvis vi setter inn en spole i serie.



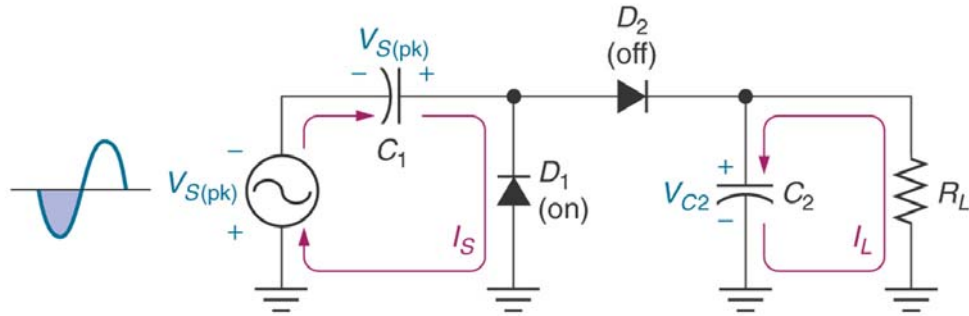
Kapittel 18 Klippere

- Transient beskyttelse
 - Transient – en meget rask endring i enten strøm eller spenning – Kan ødelegge halvlederkomponenter. Forekommer ofte som elektrostatisk utladning når man berører komponenter. Har du klær av syntetisk materiale kan du fort “lades opp” til spenninger på over 1000 volt. Det er viktig at du er “jordet” når du behandler transistorer og integrerte kretser !
 - Mange kretser må beskyttes mot overspenninger – til dette brukes diode“klippere” . Diode D_1 leder hvis input-signalet overstiger +5,7volt --- D_2 leder hvis input-signalet blir lavere enn - 0,7volt

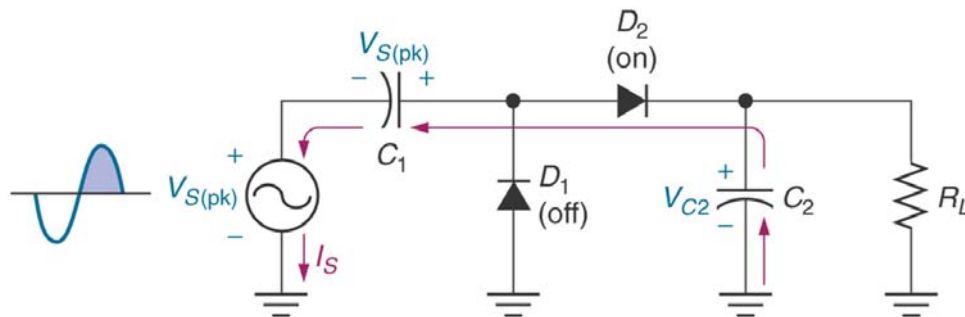


Kapittel 18 Spenningsdoblere (Voltage Multipliers)

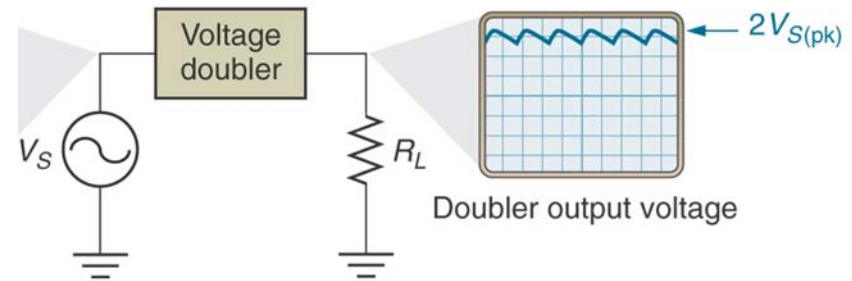
■ Halvbølge "Voltage Doublers"



(a) C_1 charges and C_2 discharges during the negative alternation of the input.

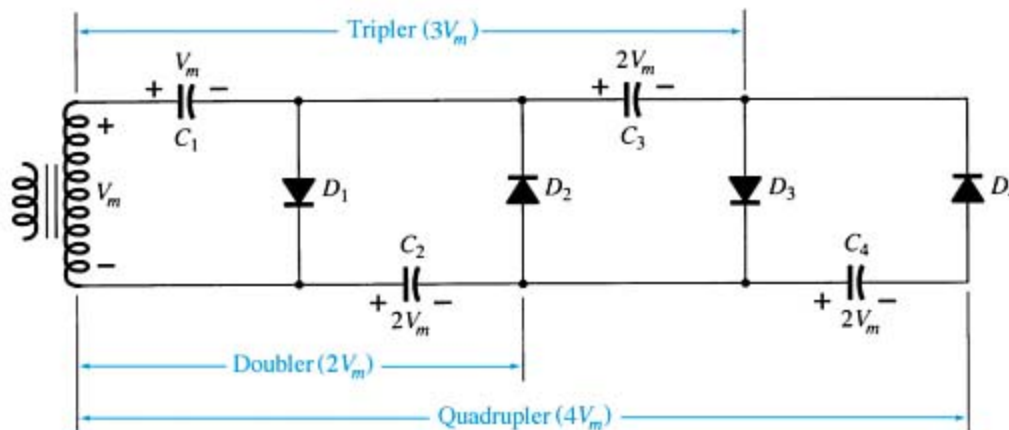
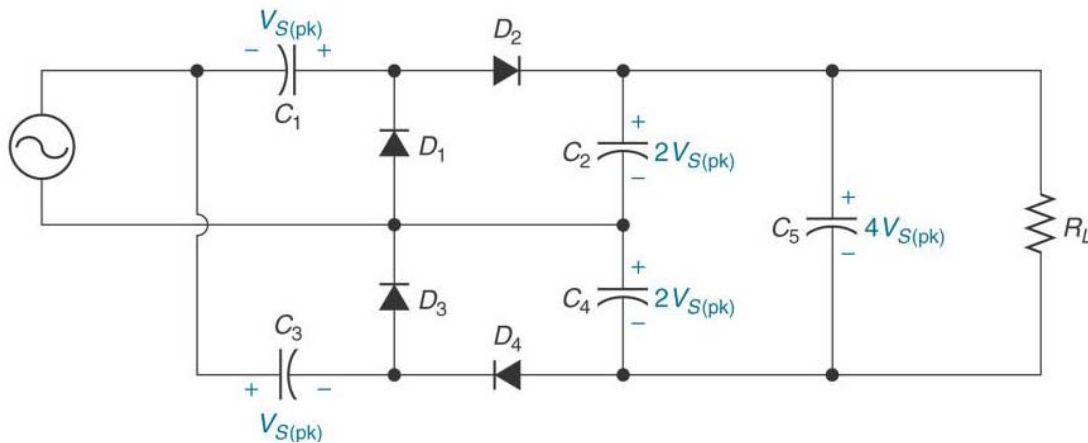


(b) The source and C_1 charge C_2 during the positive alternation of the input.



Kapittel 18 Spenningsdoblere (Voltage Multipliers)

- Kvadrupler Vi øker spenningen 4 ganger (4 kV -> 16 kV)
- De 2 figurene under viser samme krets – men tegnet opp litt forskjellig



End