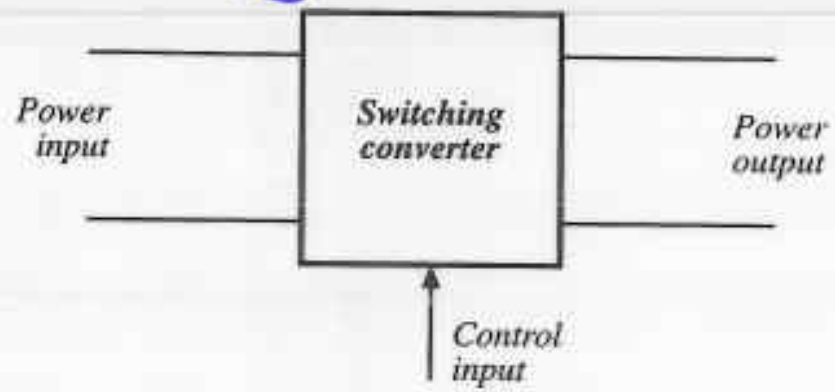
1.1 Introduction to Power Processing

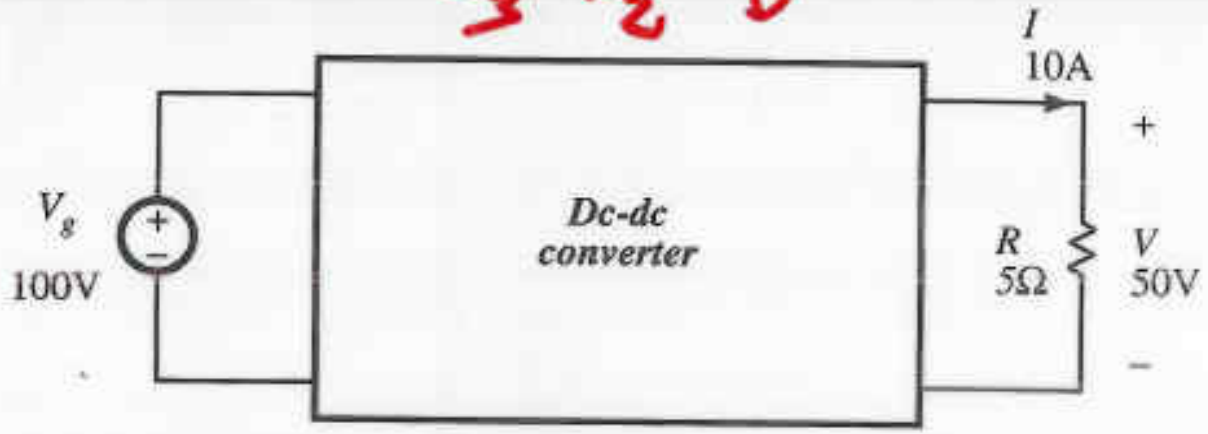
10 - 20KW Conversion
@ 95% efficiency



Dc-dc conversion:	Change and control voltage magnitude
Ac-dc rectification:	Possibly control dc voltage, ac current
Dc-ac inversion:	Produce sinusoid of controllable magnitude and frequency
Ac-ac cycloconversion:	Change and control voltage magnitude and frequency

A simple dc-dc converter example

DC Transformer
多变"D"

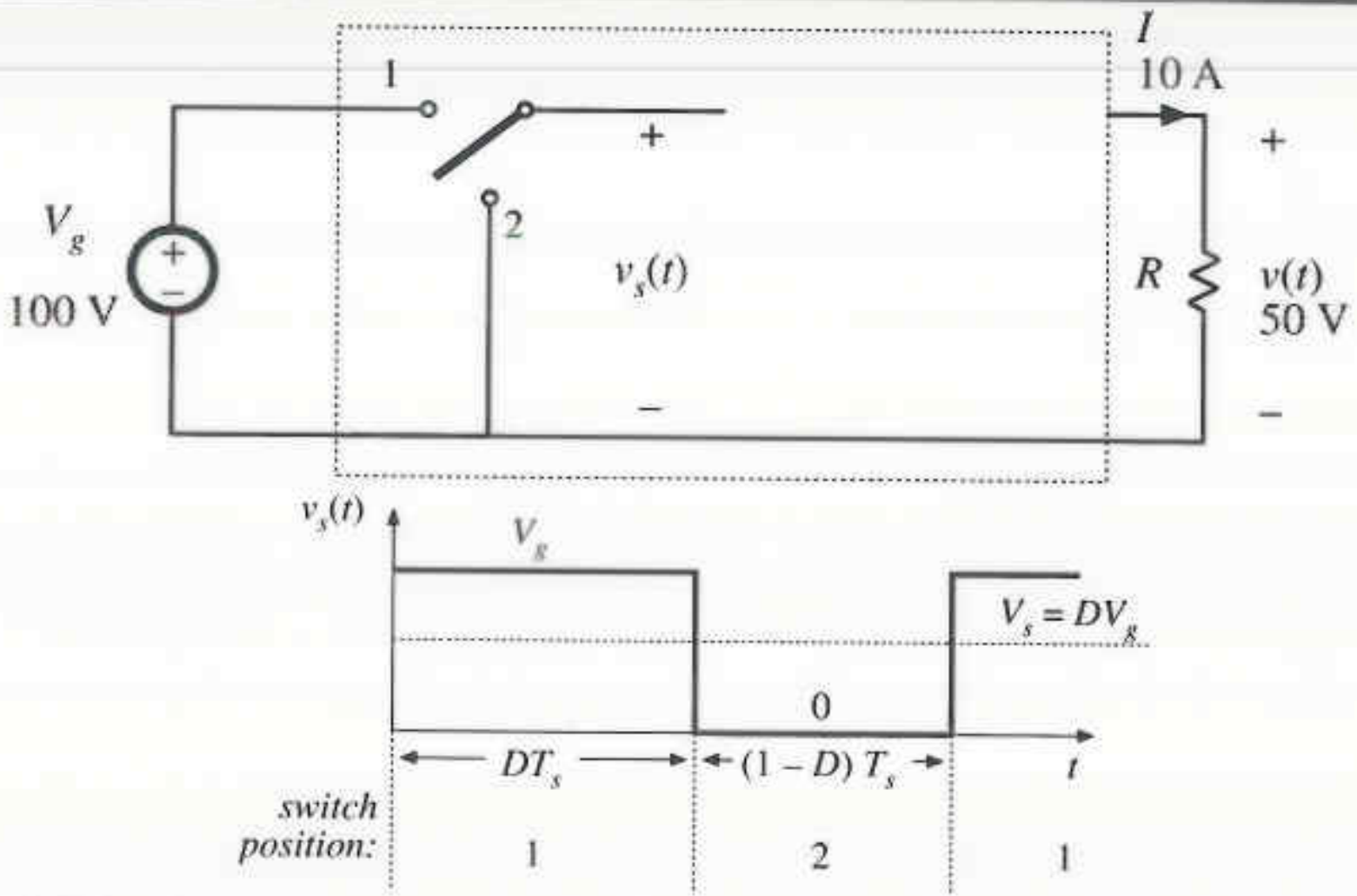


Input source: 100V

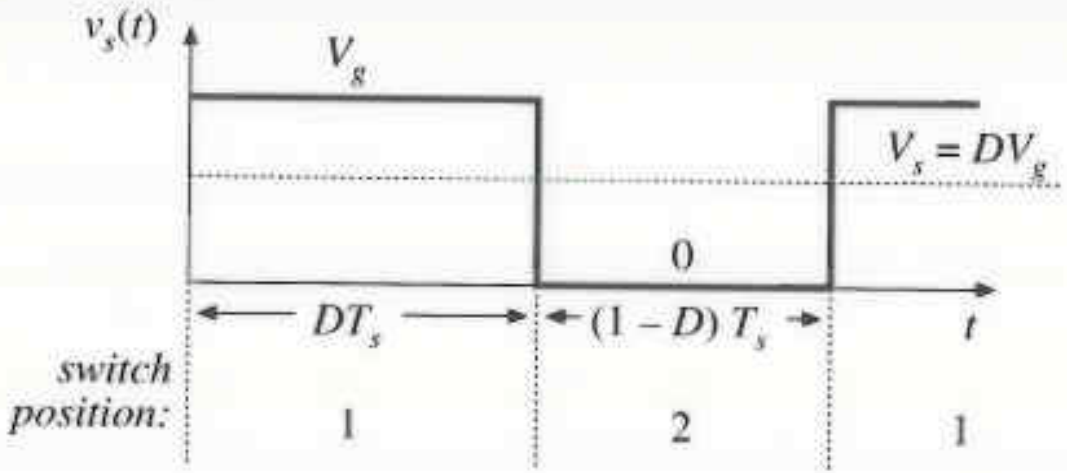
Output load: 50V, 10A, 500W

How can this converter be realized?

Use of a SPDT switch



The switch changes the dc voltage level



D = switch duty cycle

$0 \le D \le 1$

T_s = switching period

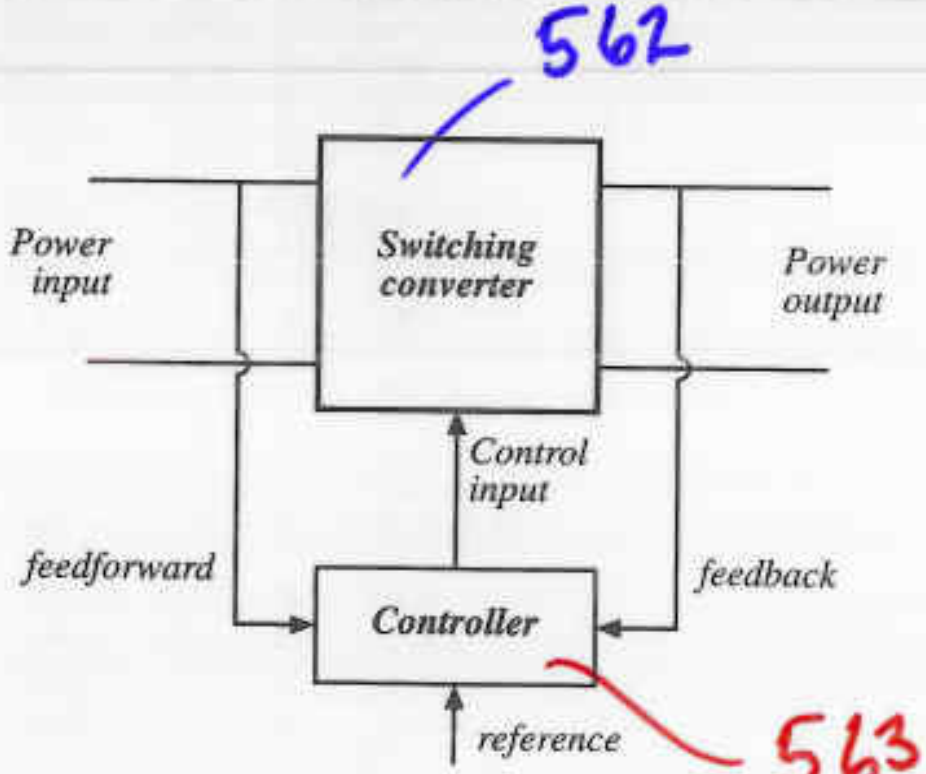
f_s = switching frequency

$= 1 / T_s$

DC component of $v_s(t)$ = average value:

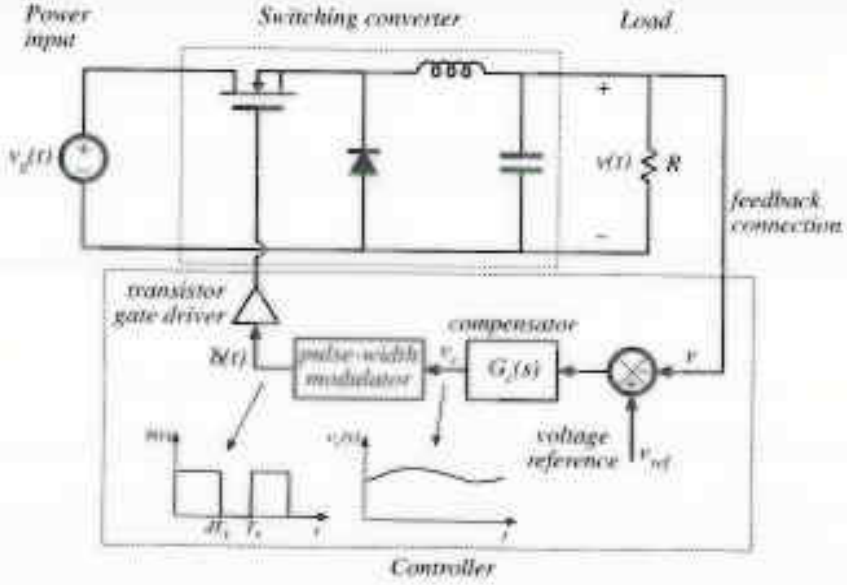
$$V_s = \frac{1}{T_s} \int_0^{T_s} v_s(t)\, dt = DV_g$$

Control is invariably required

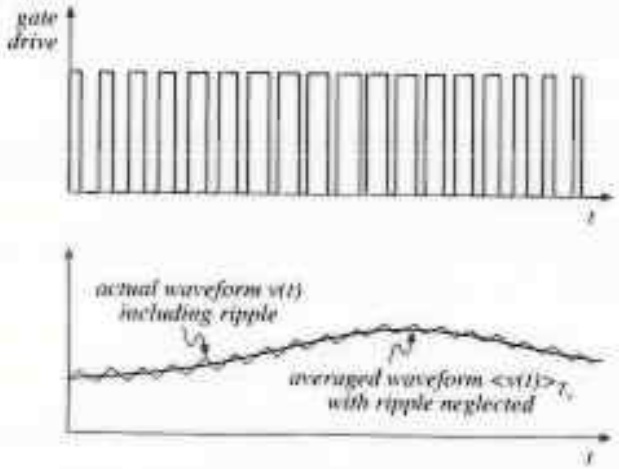


Part II. Converter dynamics and control

Closed-loop converter system



Averaging the waveforms



Small-signal averaged equivalent circuit