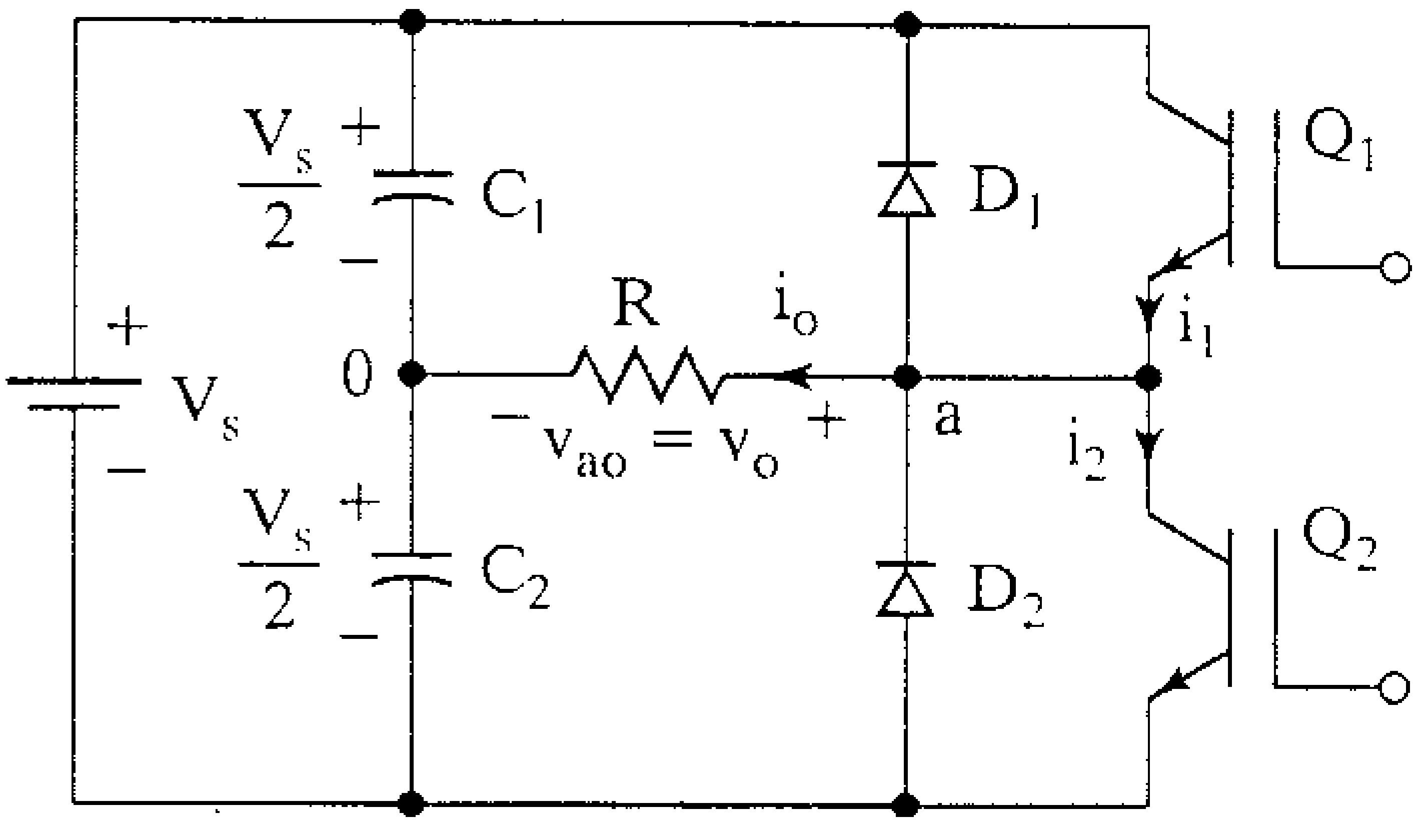
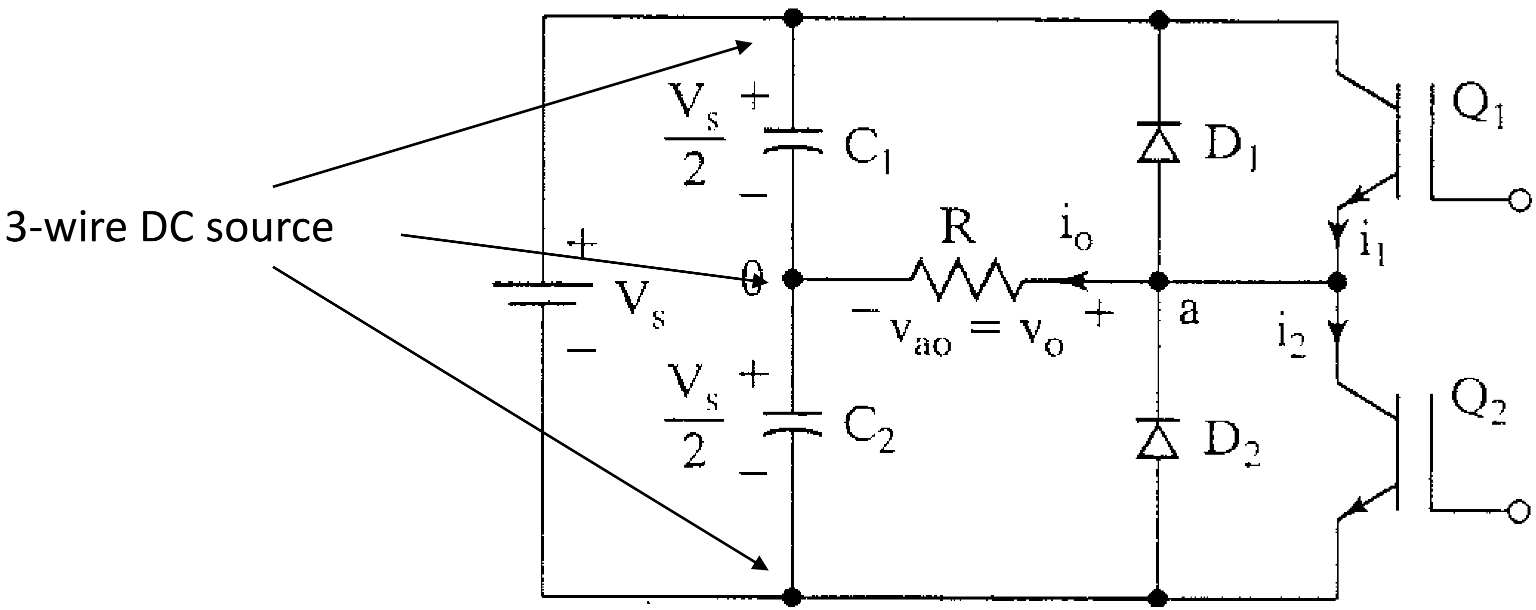
Single-phase half-bridge inverter

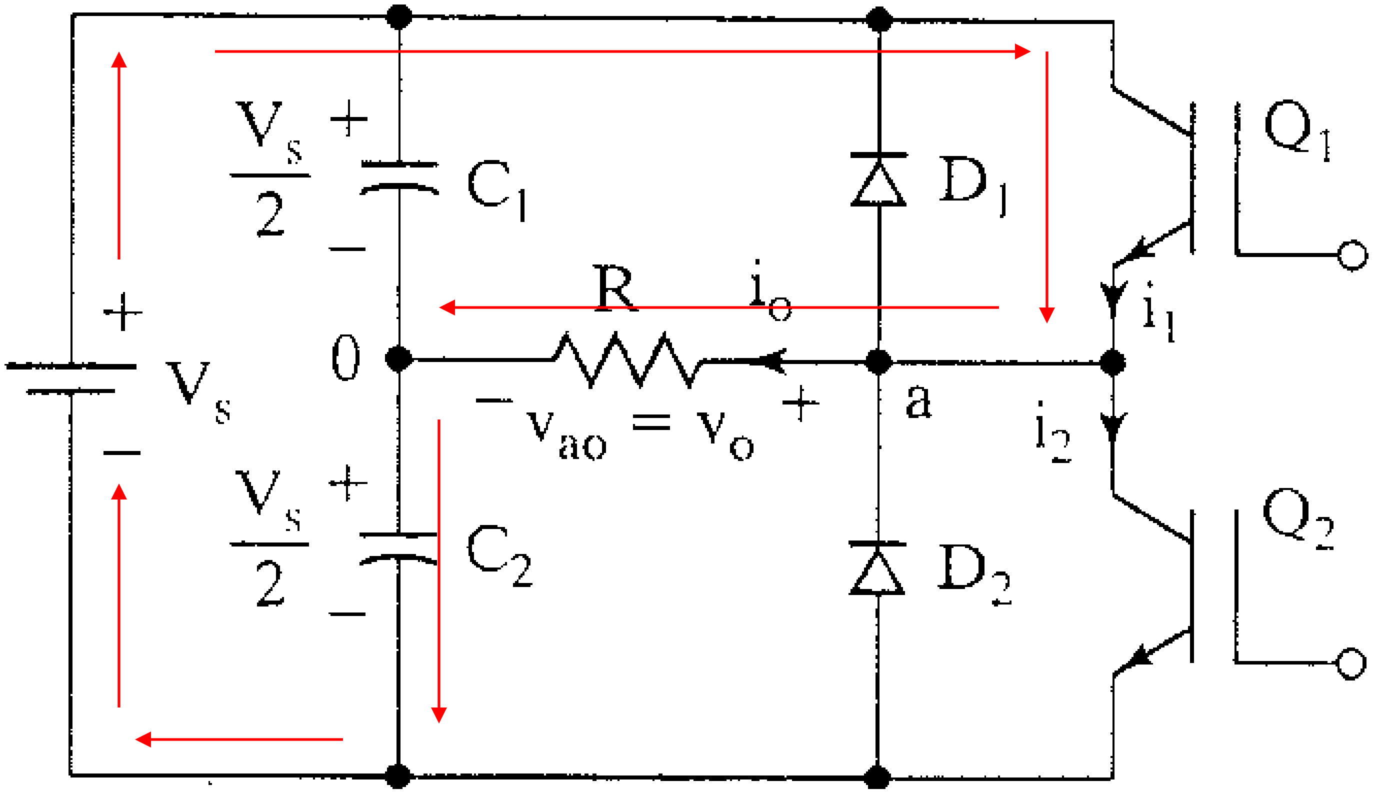


Operational Details



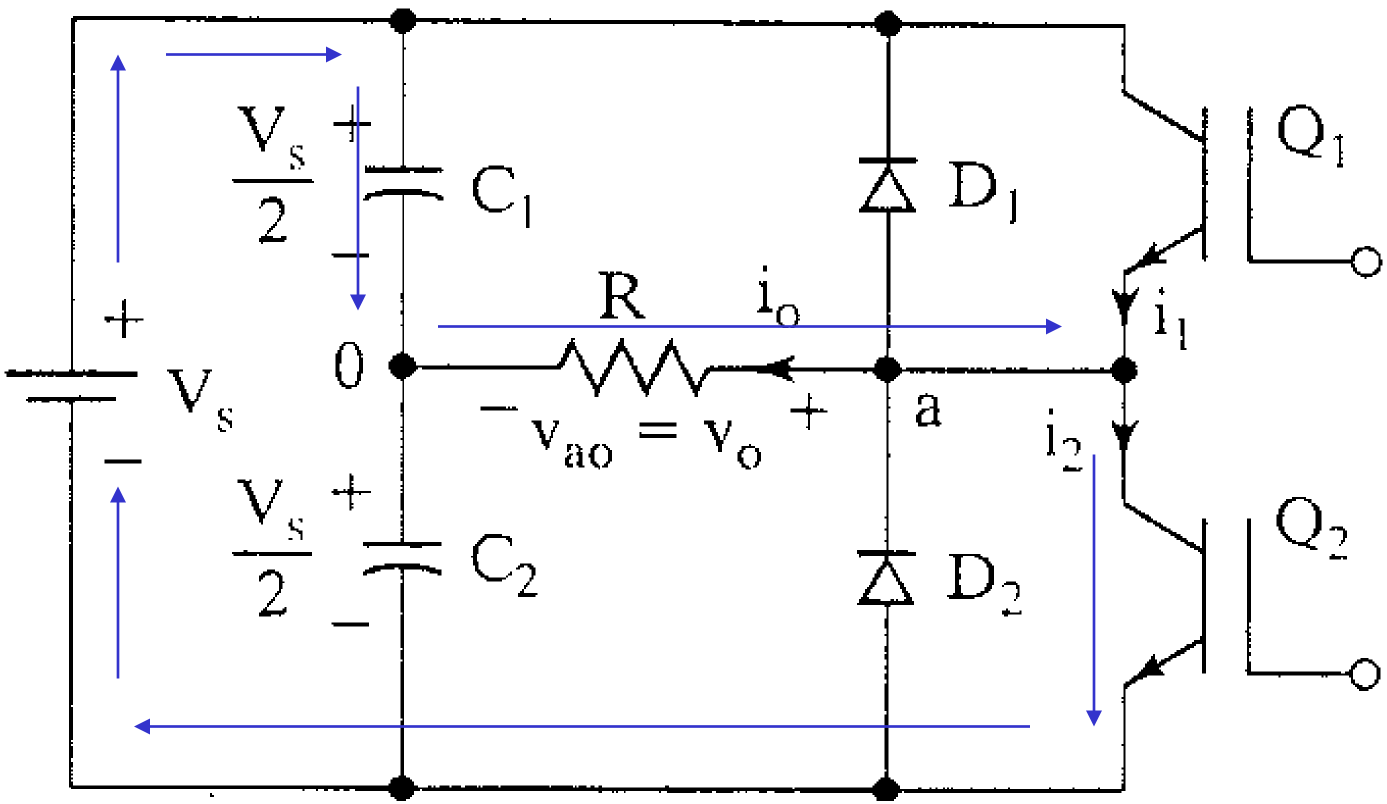
- Consists of 2 choppers, 3-wire DC source
- Transistors switched on and off alternately
- Need to isolate the gate signal for Q_1 (upper device)
- Each provides opposite polarity of $V_s/2$ across the load

Q_1 on, Q_2 off, $v_o = V_s/2$

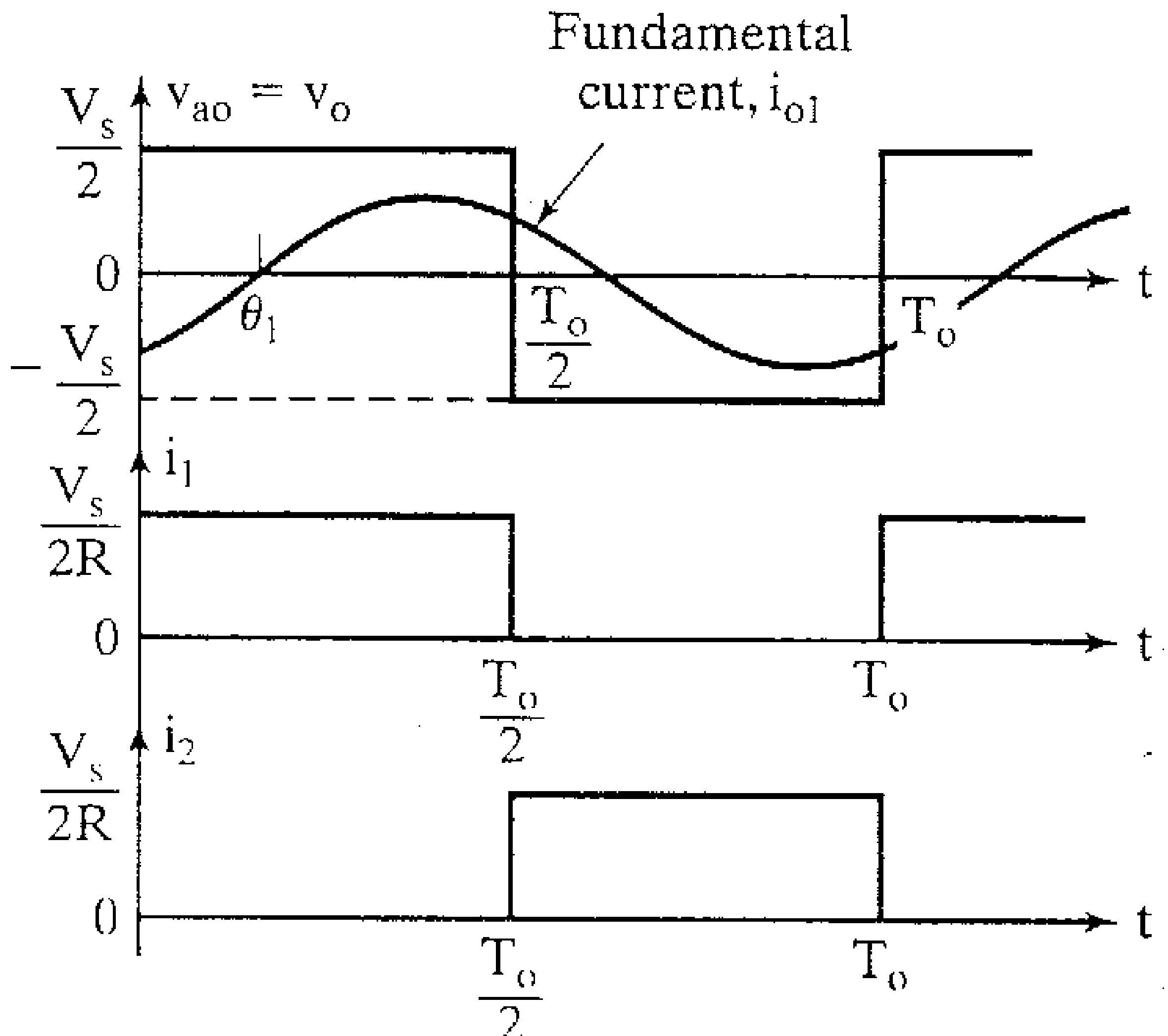


Peak Reverse Voltage of $Q_2 = V_s$

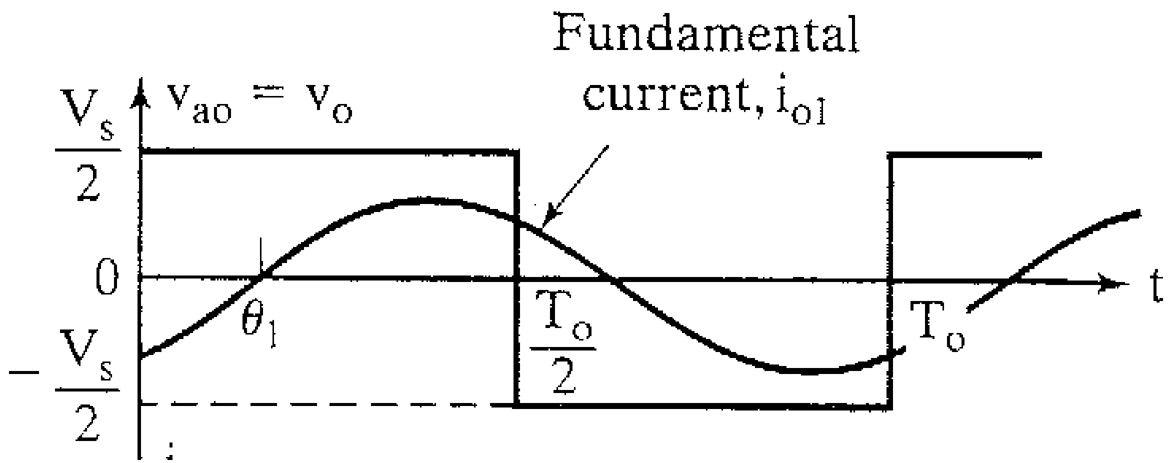
Q_1 off, Q_2 on, $v_o = -V_s/2$



Waveforms with resistive load



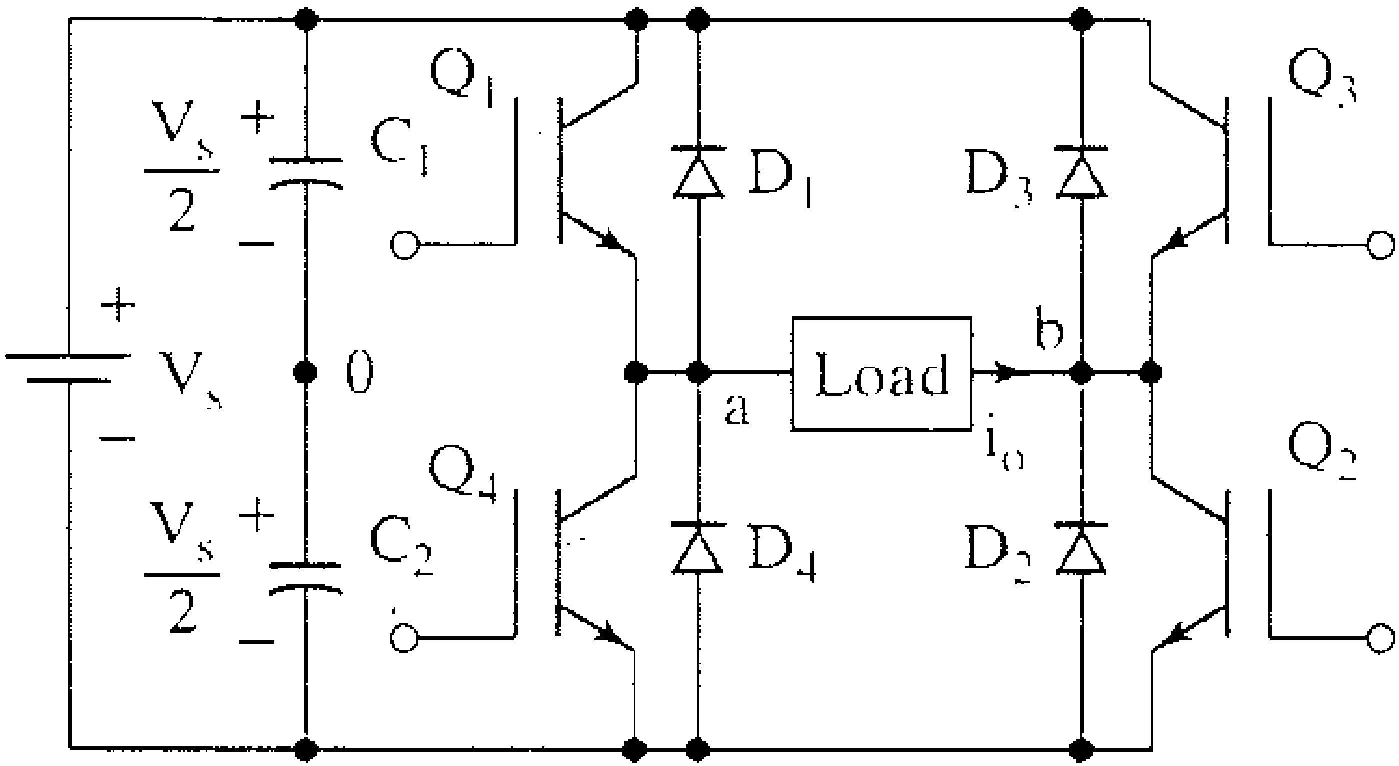
Look at the output voltage



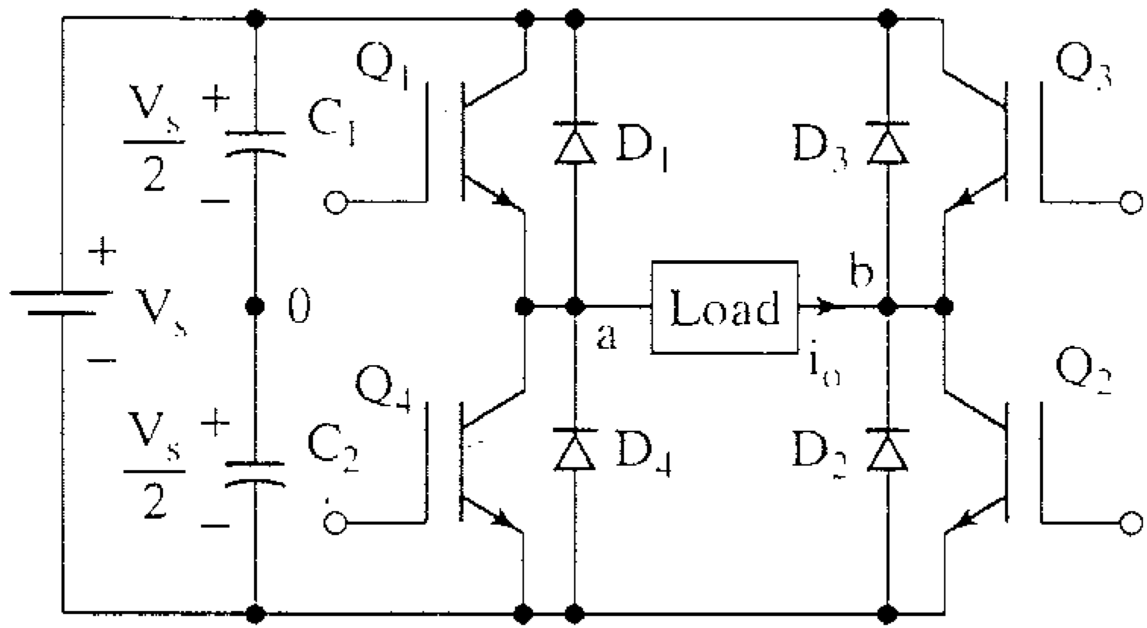
rms value of the output voltage, V_o

$$V_o = \left(\frac{2}{T_o} \int_0^{\frac{T_o}{2}} \frac{V_s^2}{4} dt \right)^{\frac{1}{2}} = \frac{V_s}{2}$$

Single-phase full-bridge inverter

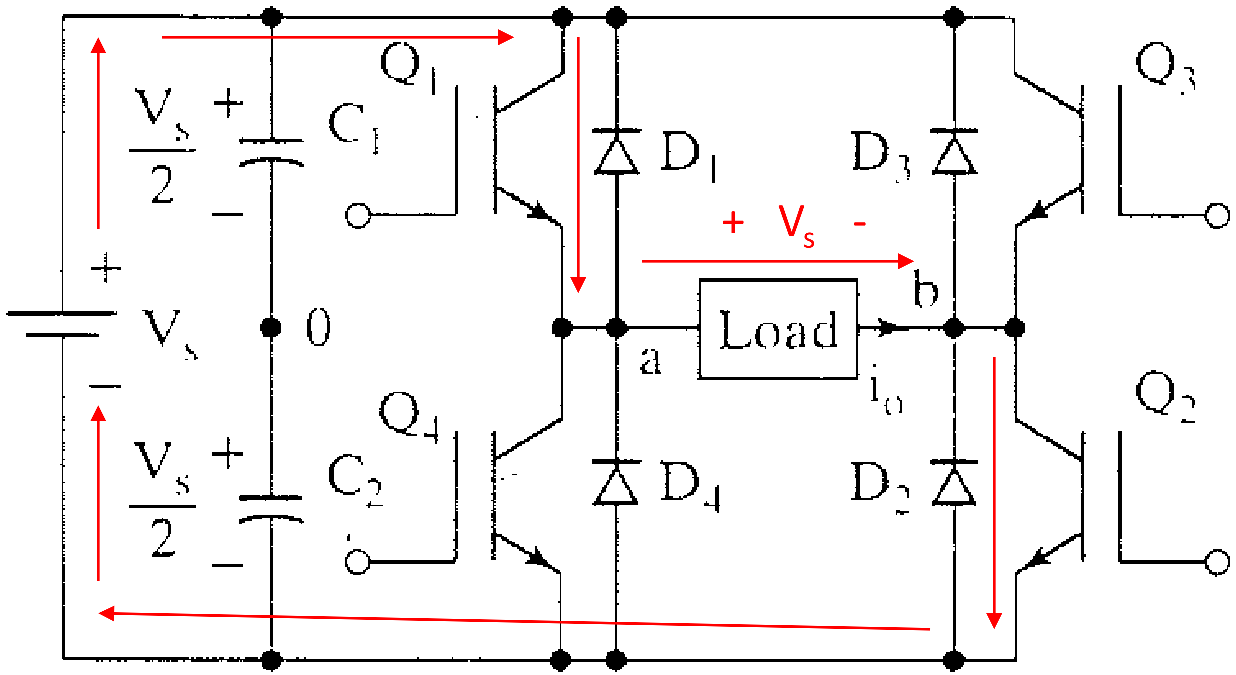


Operational Details

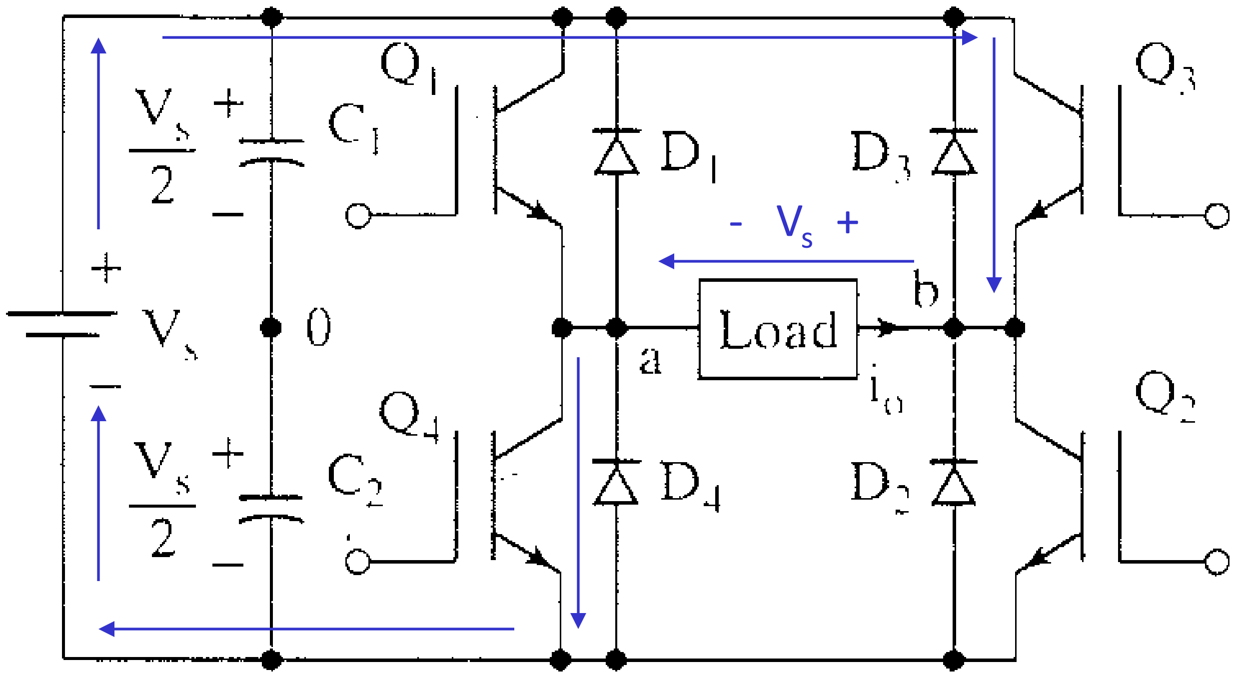


- Consists of 4 choppers and a 3-wire DC source
- Q_1-Q_2 and Q_3-Q_4 switched on and off alternately
- Need to isolate the gate signal for Q_1 and Q_3 (upper)
- Each pair provide opposite polarity of $V_s$across the load

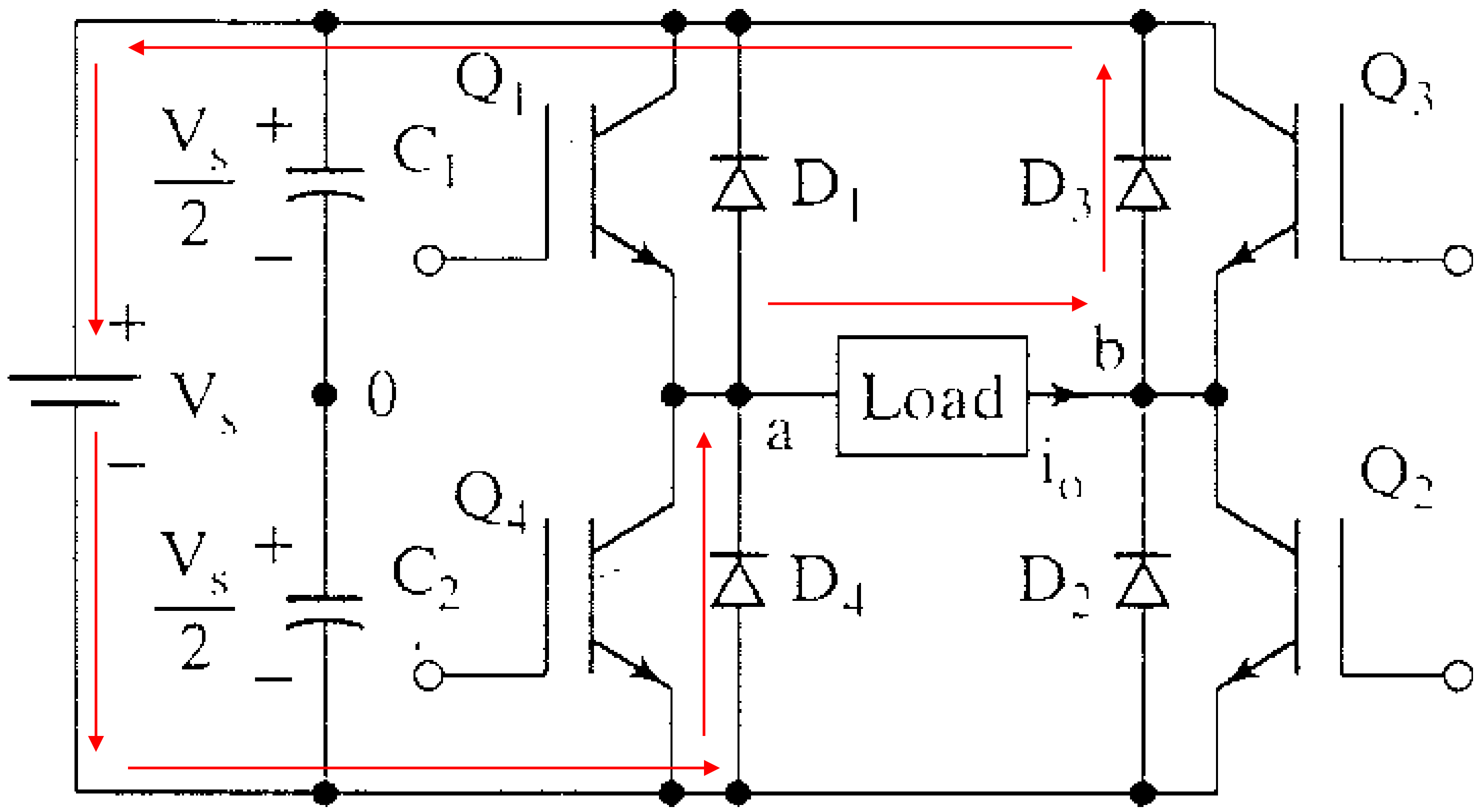
Q_1-Q_2 on, Q_3-Q_4 off, $v_o = V_s$



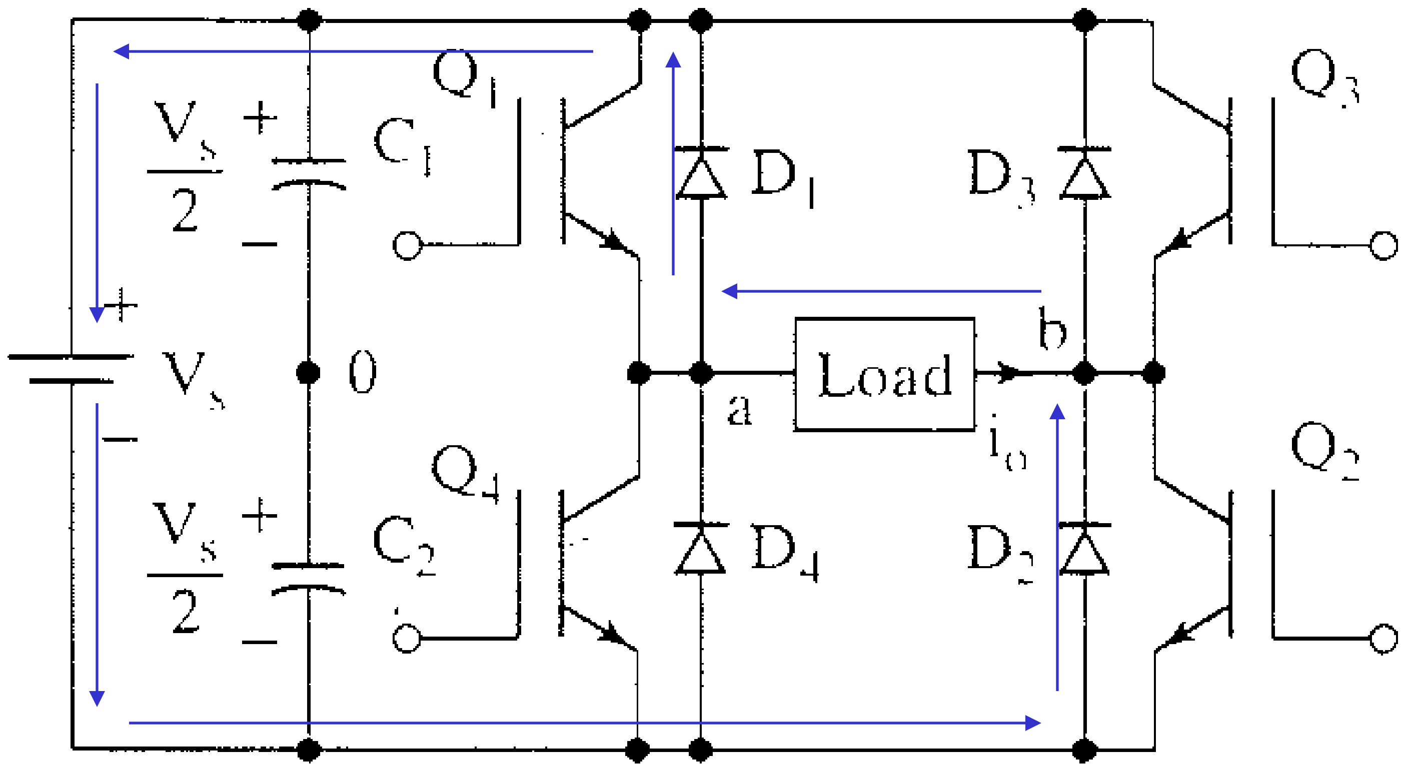
Q_3-Q_4 on, Q_1-Q_2 off, $v_o = -V_s$



When the load is highly inductive
Turn Q_1-Q_2 off – Q_3-Q_4 off



Turn Q_3-Q_4 off – Q_1-Q_2 off



Load current for a highly inductive load