Transistors

A transistor acts like a switch:

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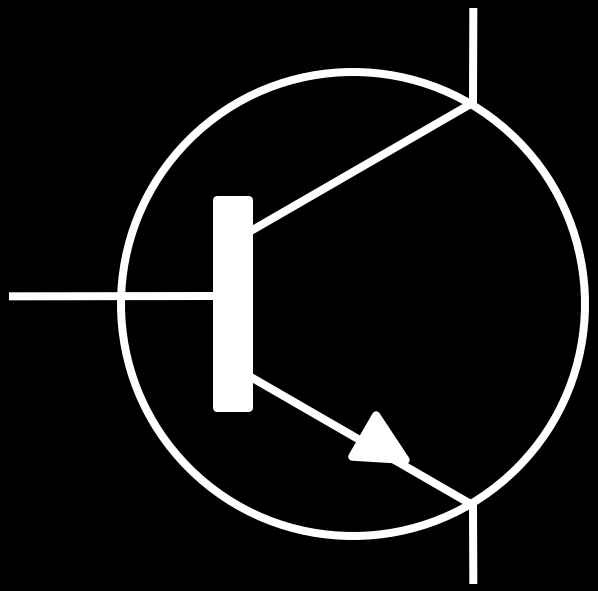

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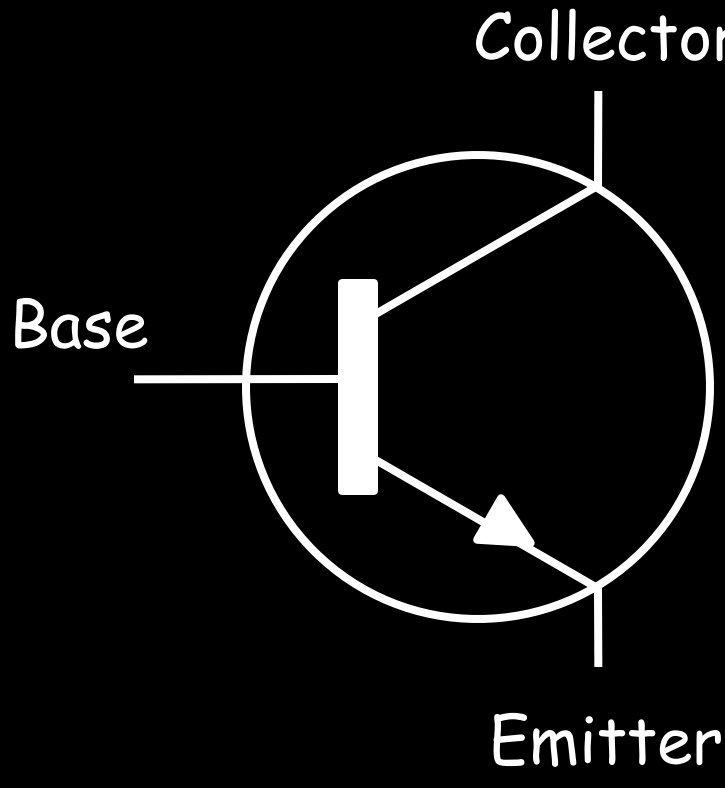

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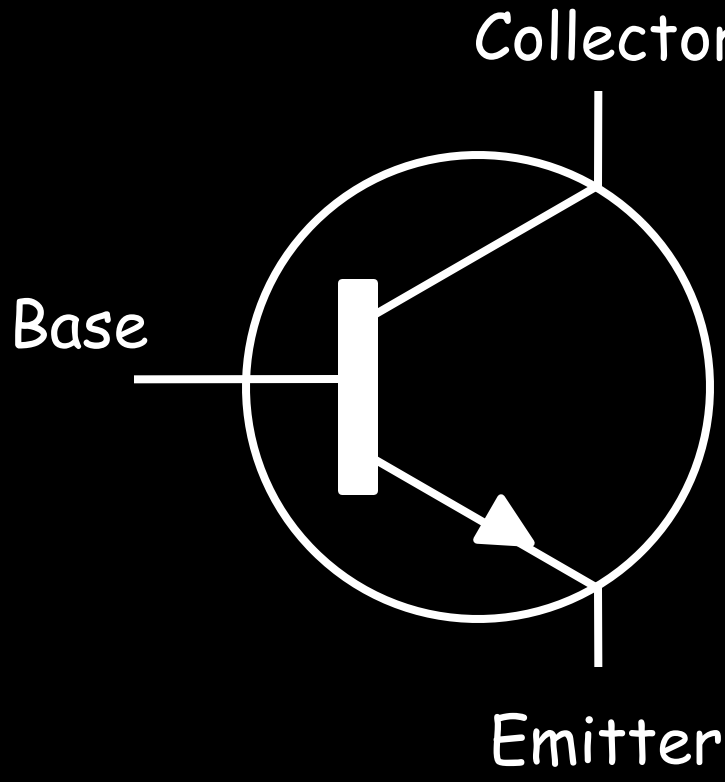

When a SMALL current flows through the base-emitter part of the transistor a different current is switched on through the collector-emitter part.

A light dependent switch

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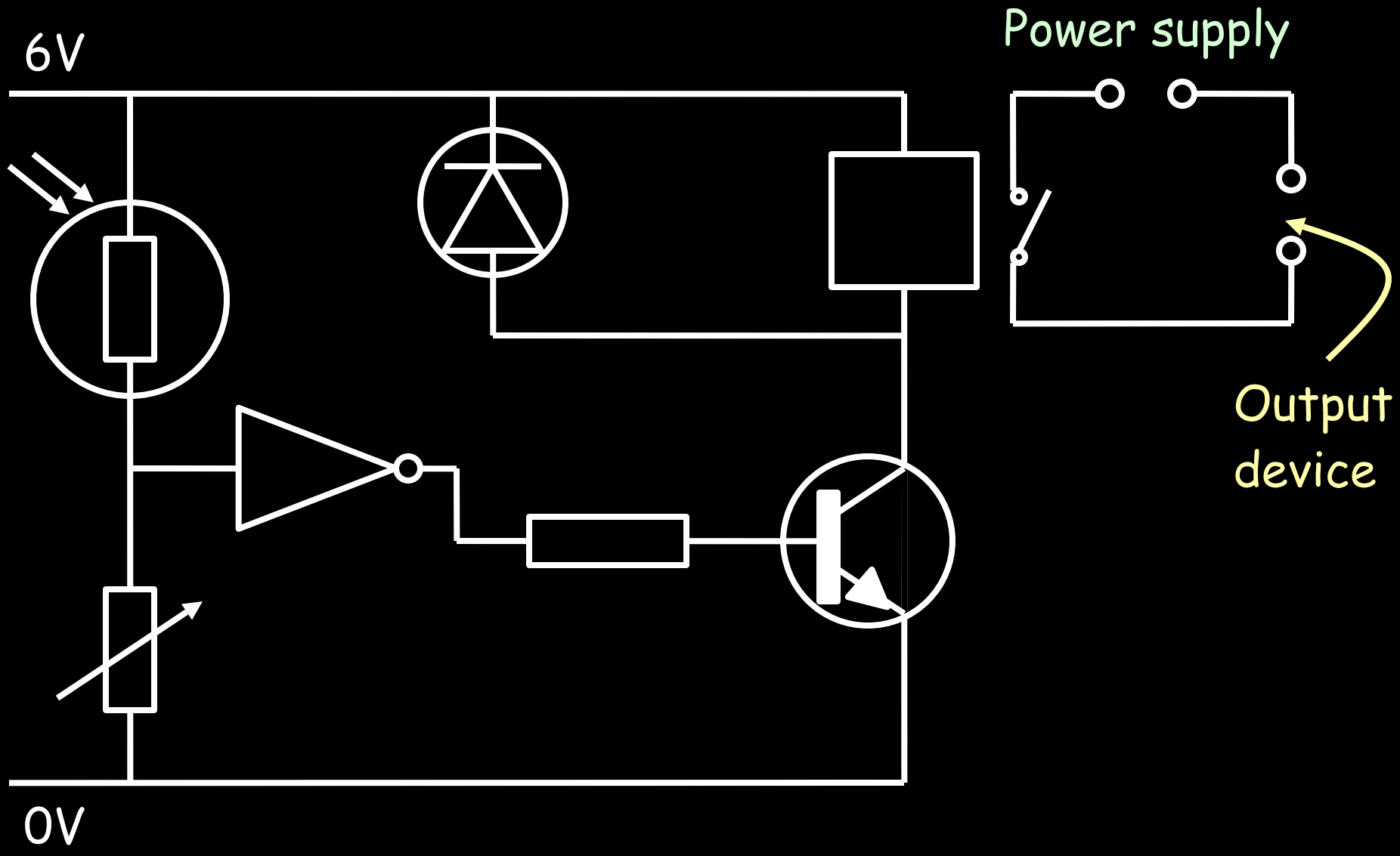

A light dependent switch

1) When the light on the LDR decreases its resistance _____, which will decrease the _____ across the variable resistor

2) This will cause V_{OUT} to _____. The_____ gate will recognise this as a "0" and convert it into a "1", i.e. a current will flow into the resistor

3) The resistor limits the amount of current flowing into the transistor, to avoid _____ it

4) When the transistor detects the current at its _____ it will "switch __" the collector-emitter current

5) A small current will then flow through the _____

6) The relay will then switch on a _____ current in the output circuit

7) The "reversed biased" diode is also placed in the circuit to act as a "_____" to prevent current flowing back into the transistor when the relay is switched _____

Words - base, buffer, on, increases, damaging, relay, off, larger, voltage, drop, NOT

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We could modify this circuit (if we wanted to…)

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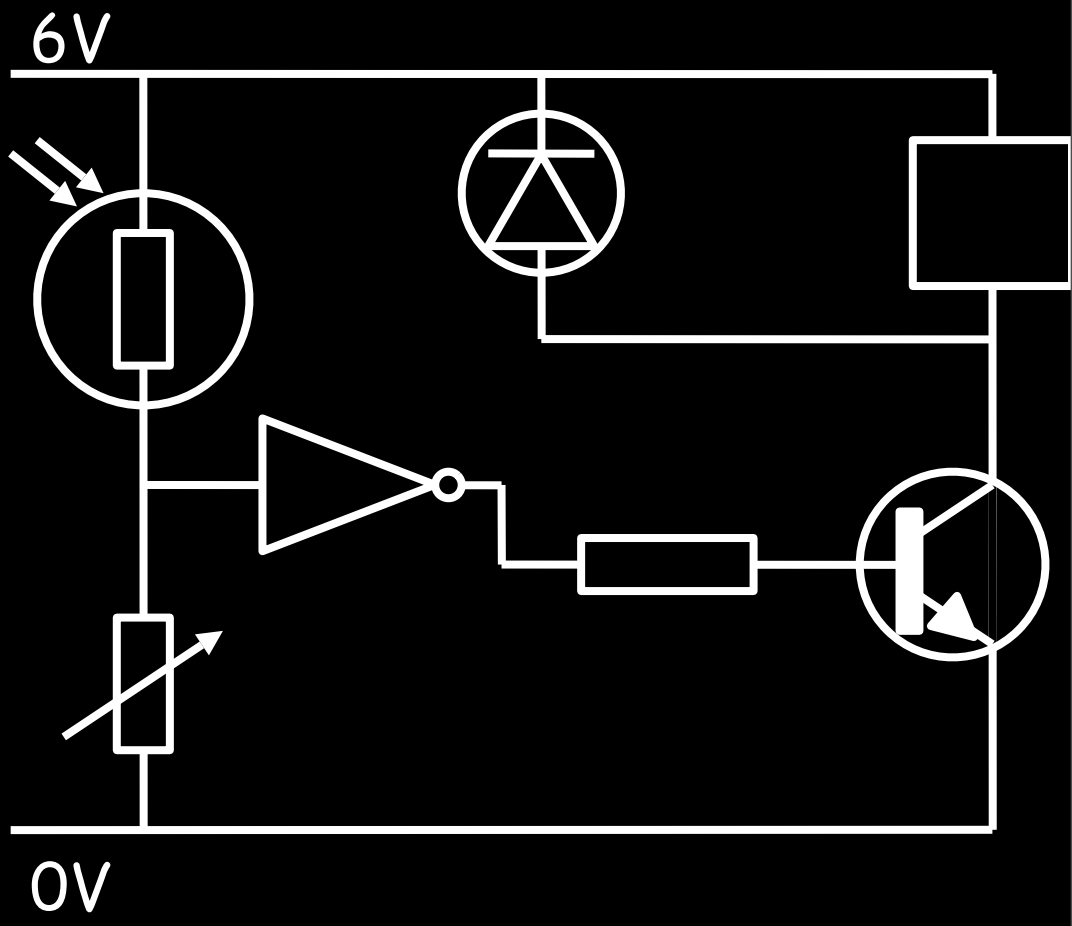

A light dependent switch

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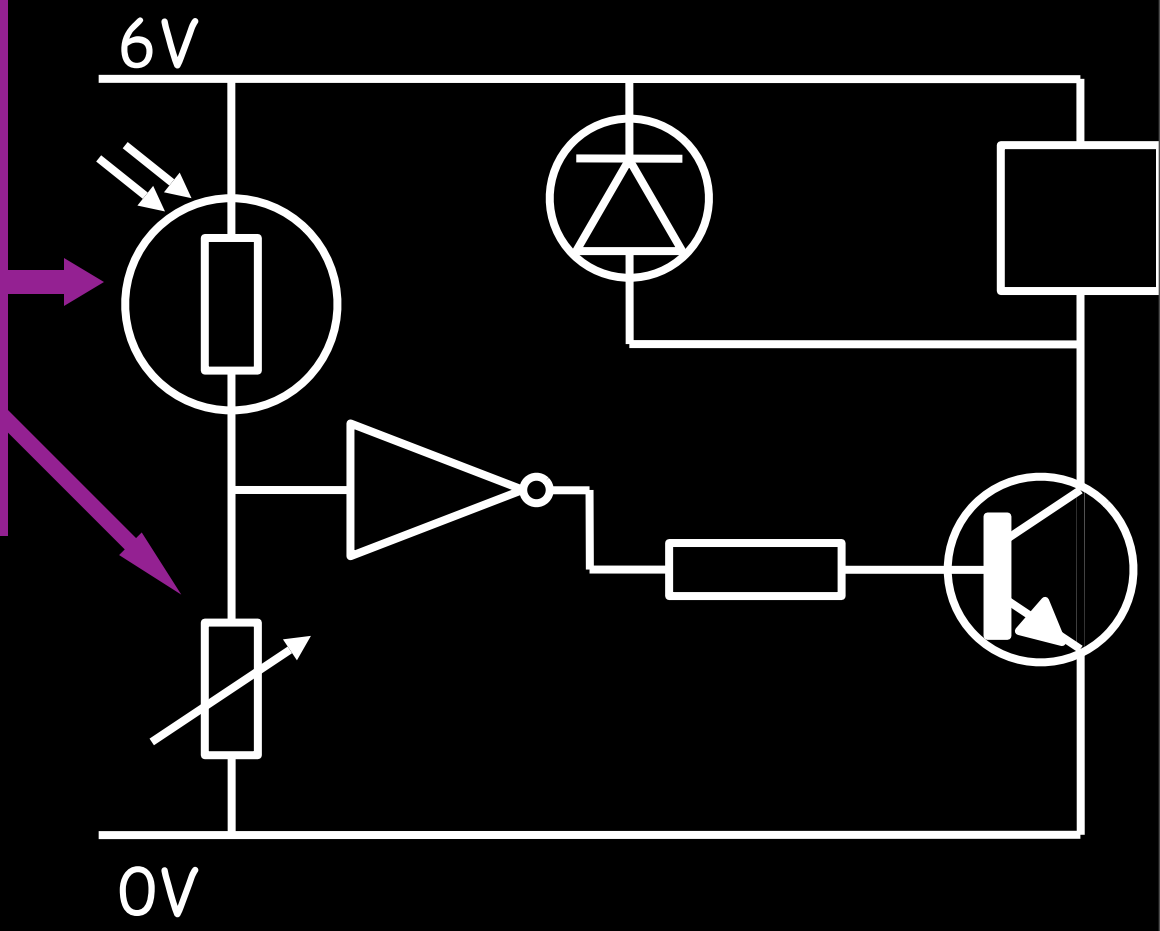
1) Swap these two around and the output will now switch on when it becomes LIGHT, not when it becomes dark



A light dependent switch

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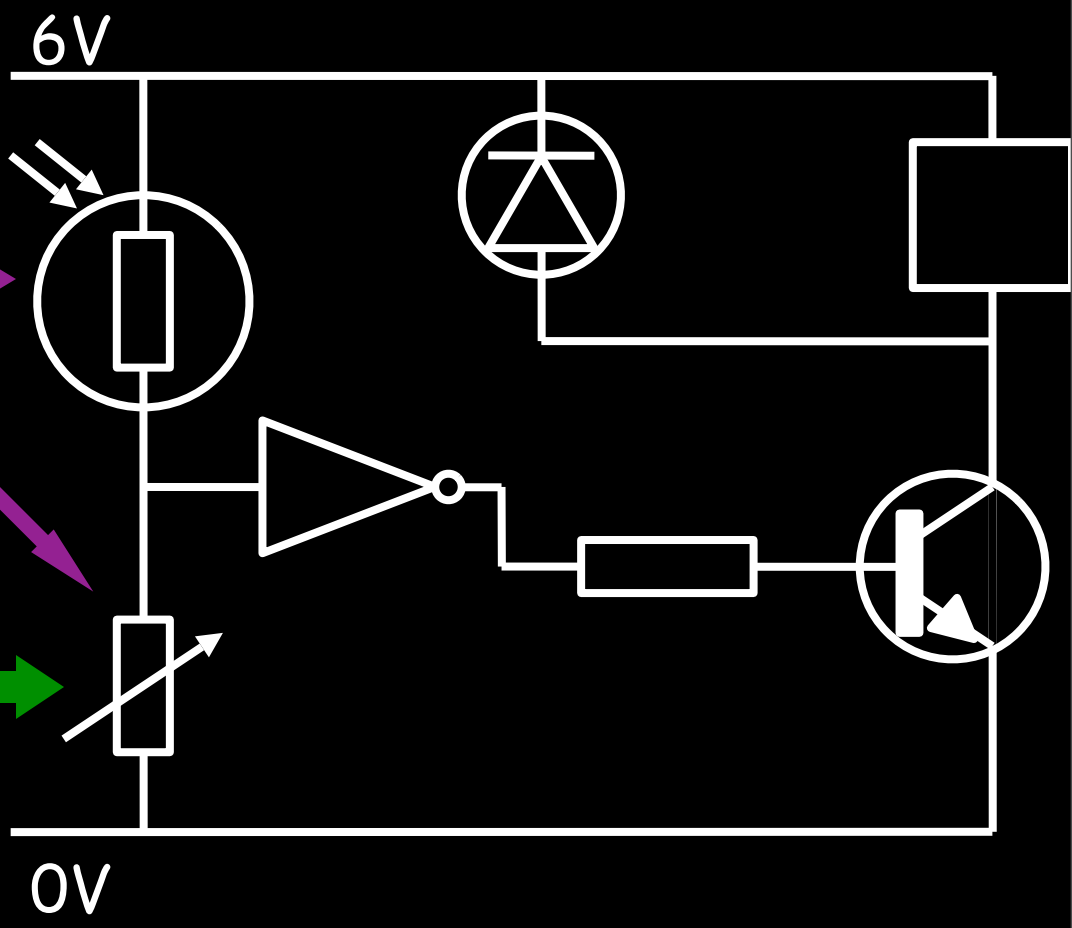
2) Adjust this resistor to vary the sensitivity



The Capacitor

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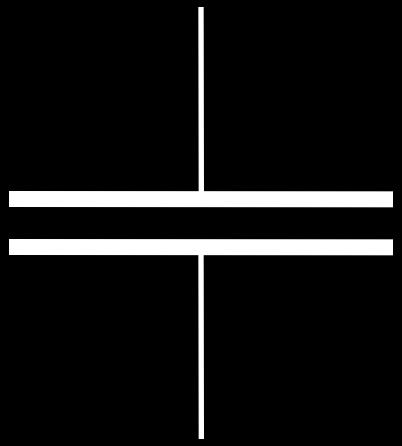
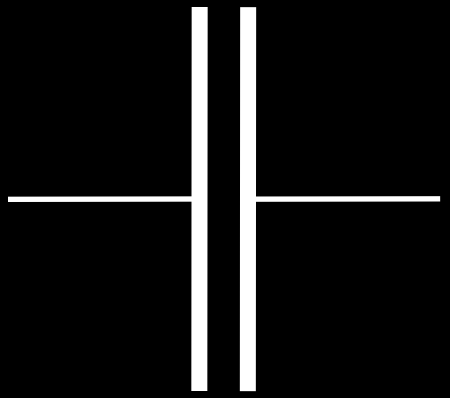


...or...



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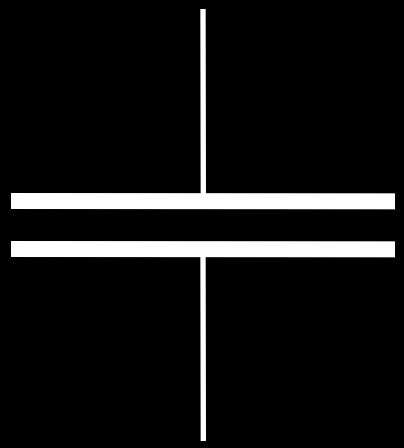

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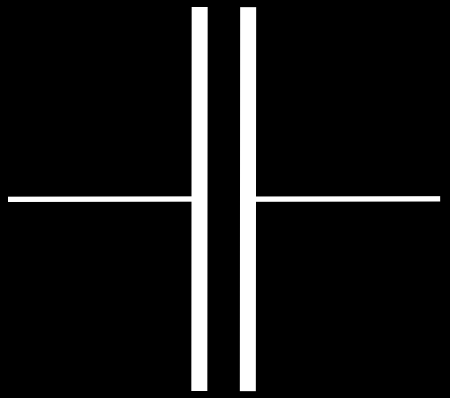
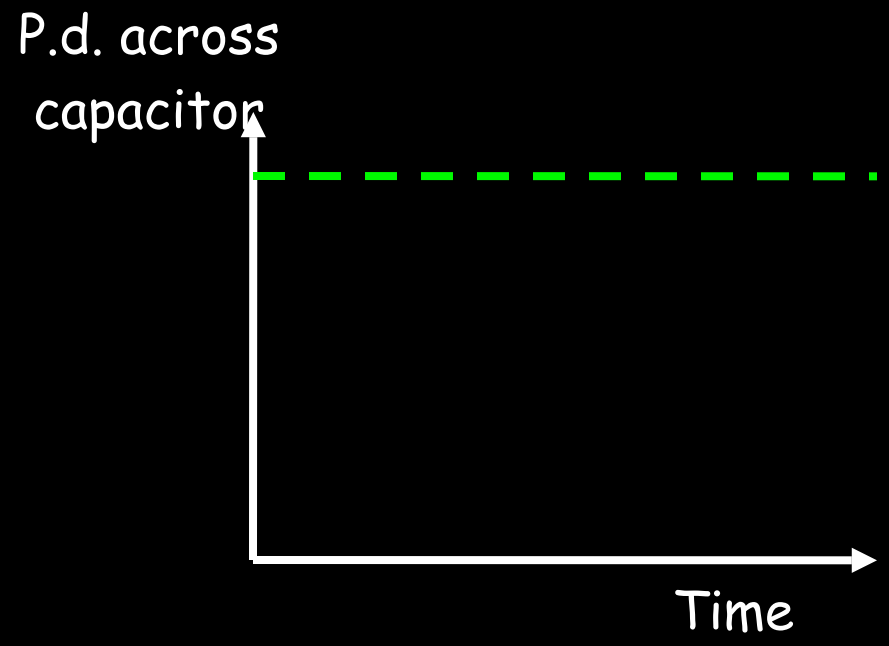
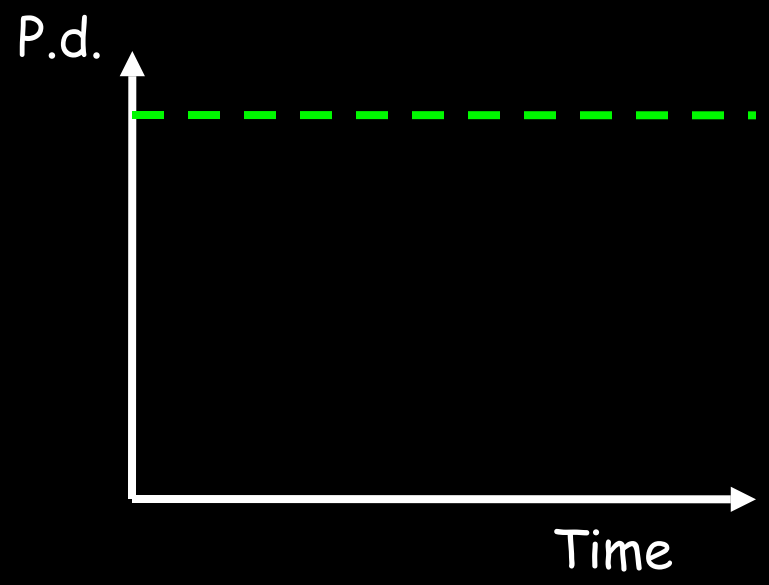
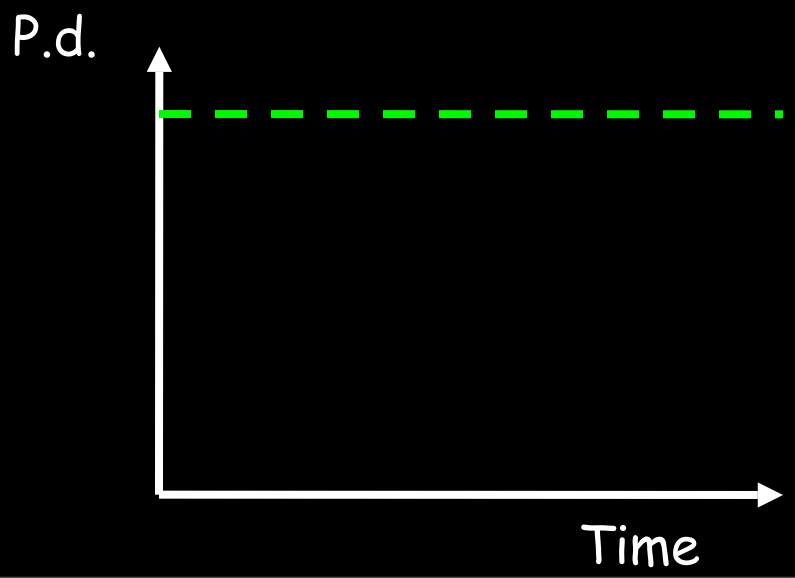


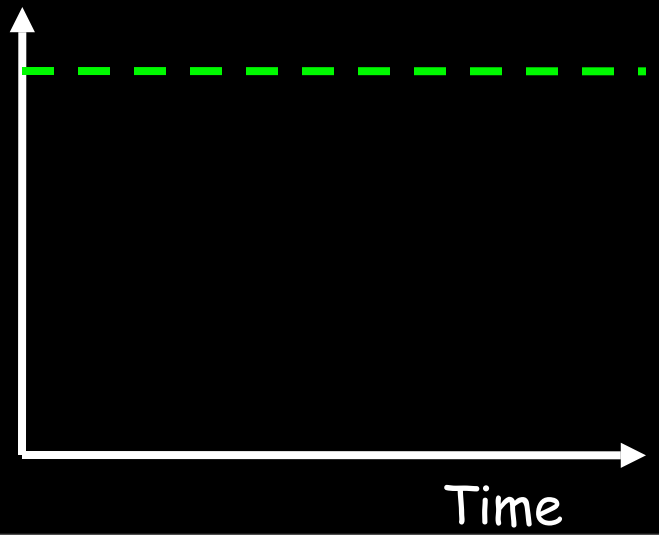
Charge builds up on these plates and the voltage between them increases until it reaches the supply voltage.

Charging and discharging a capacitor









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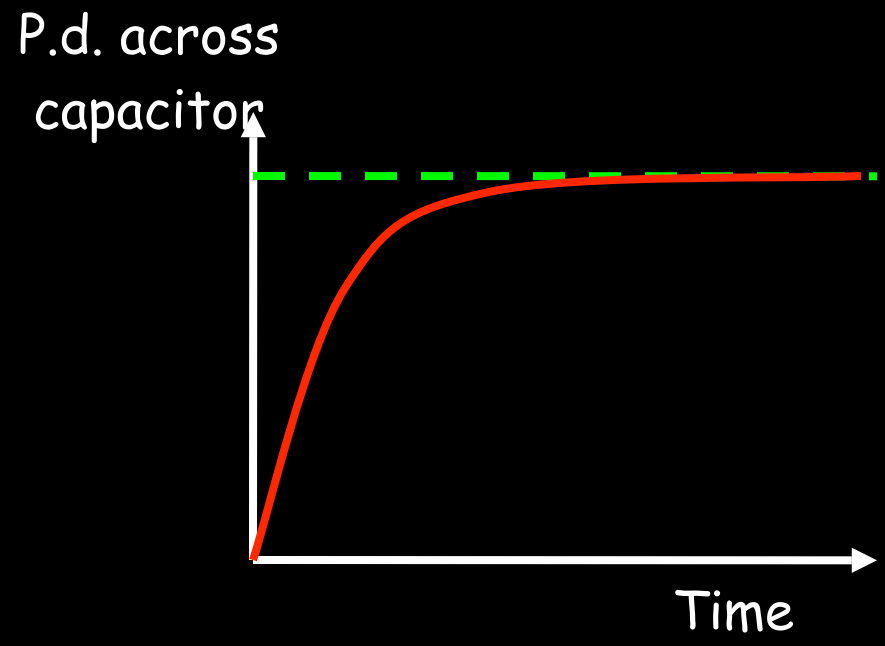

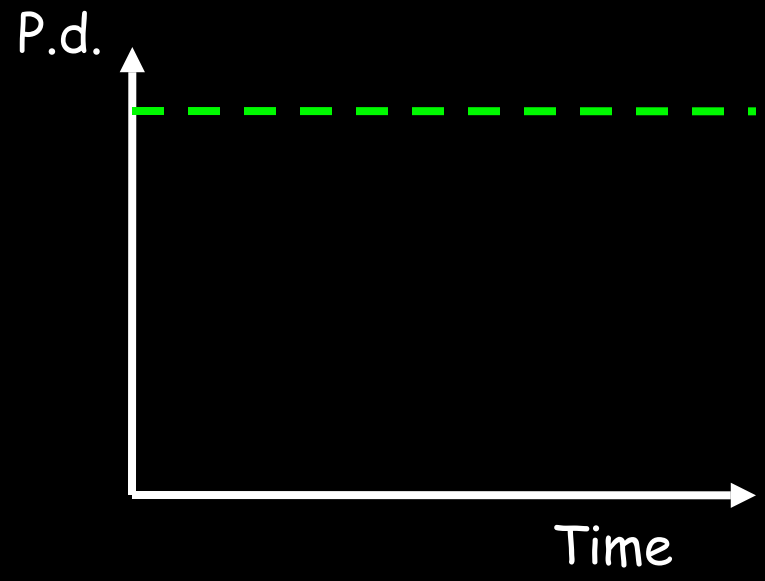

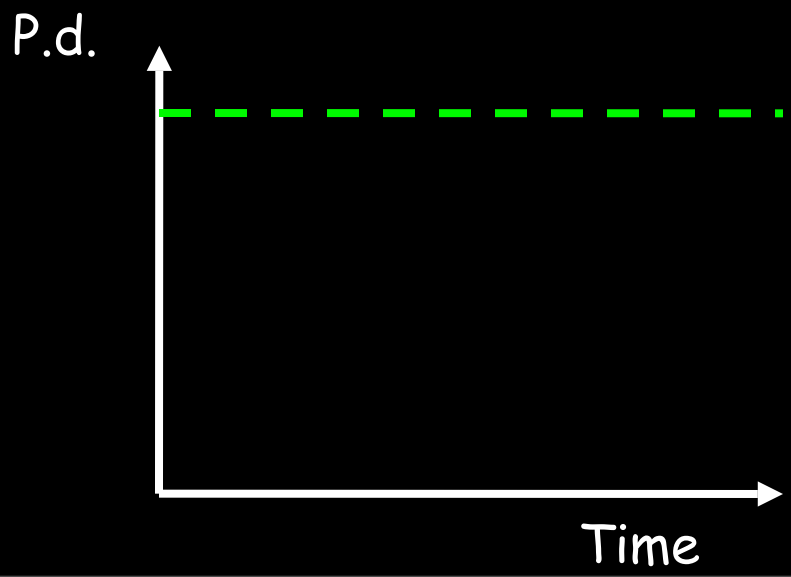

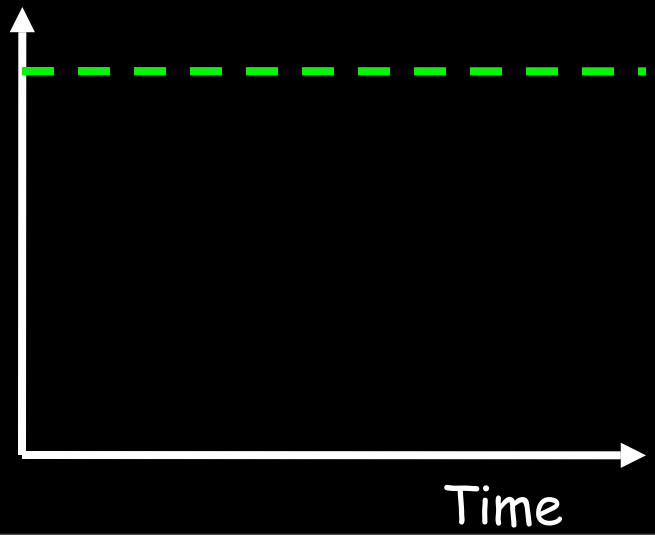

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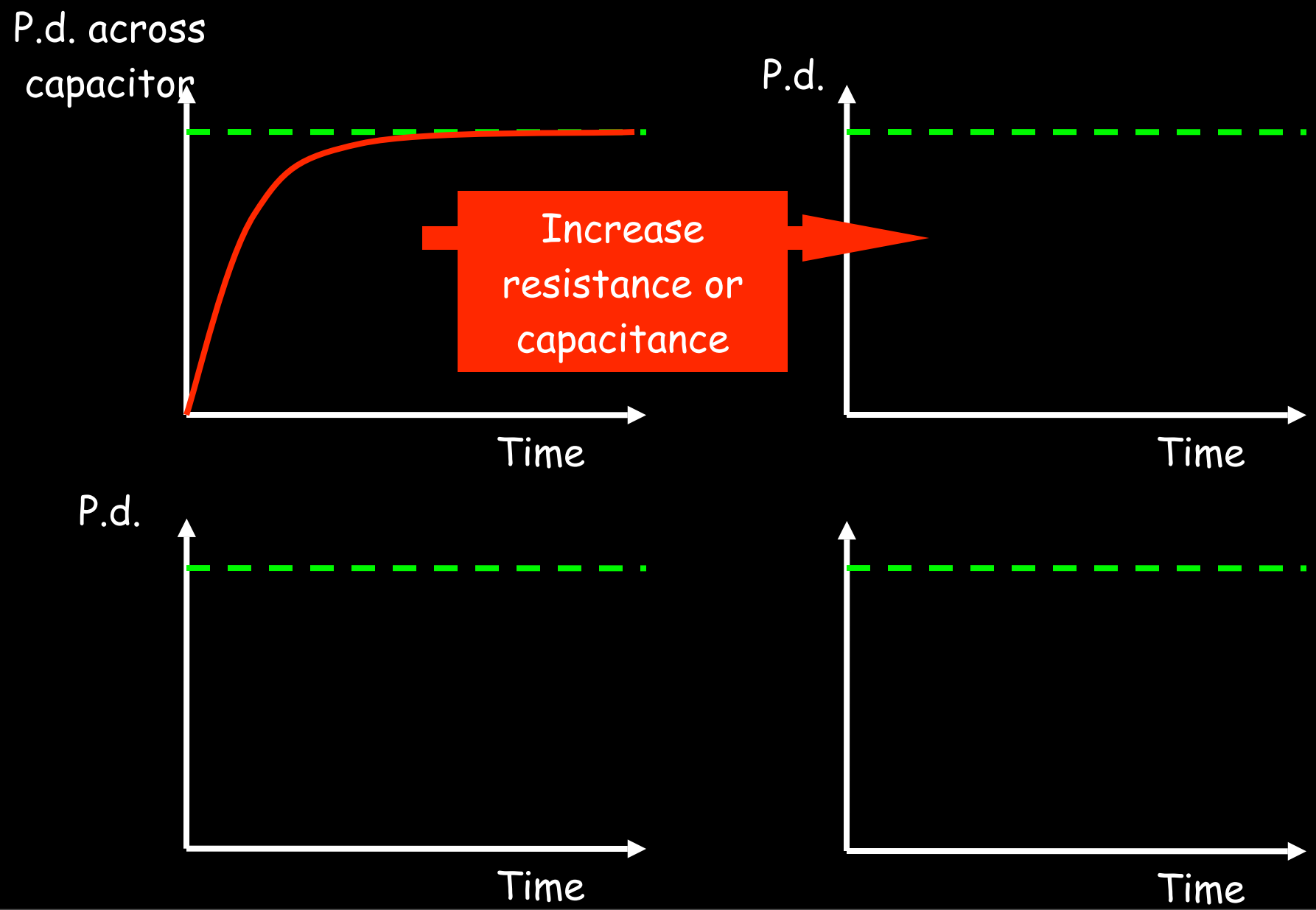

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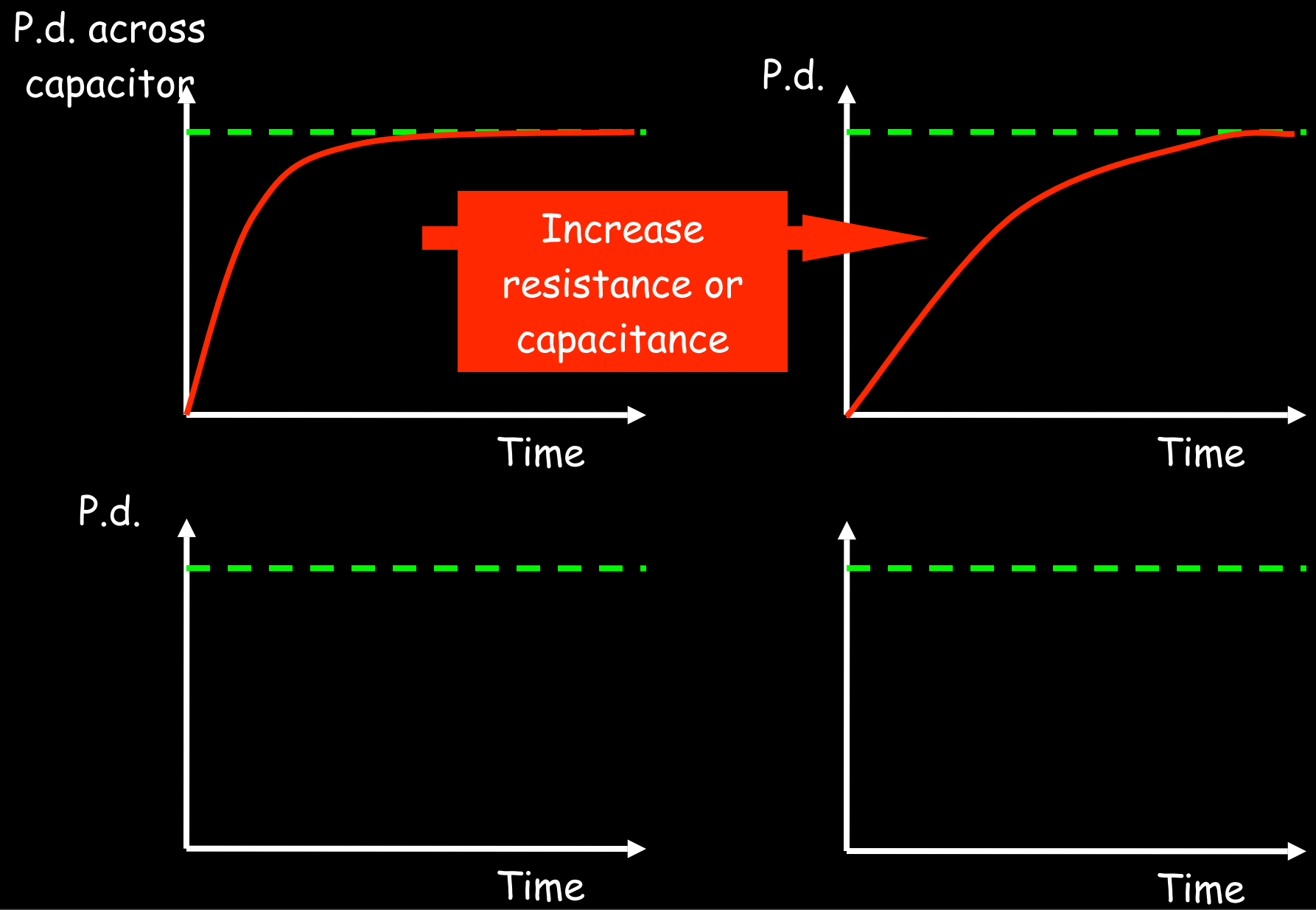

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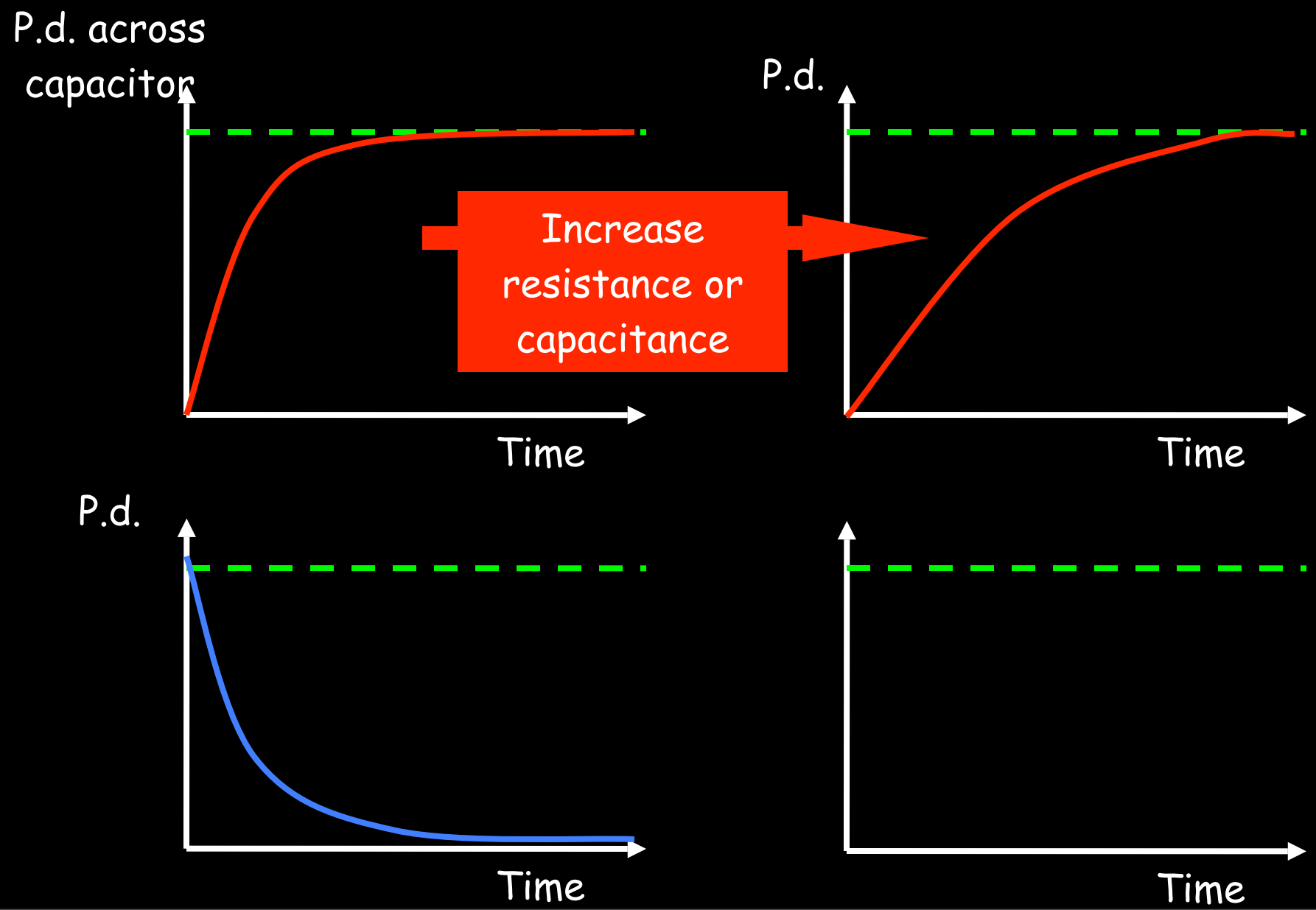

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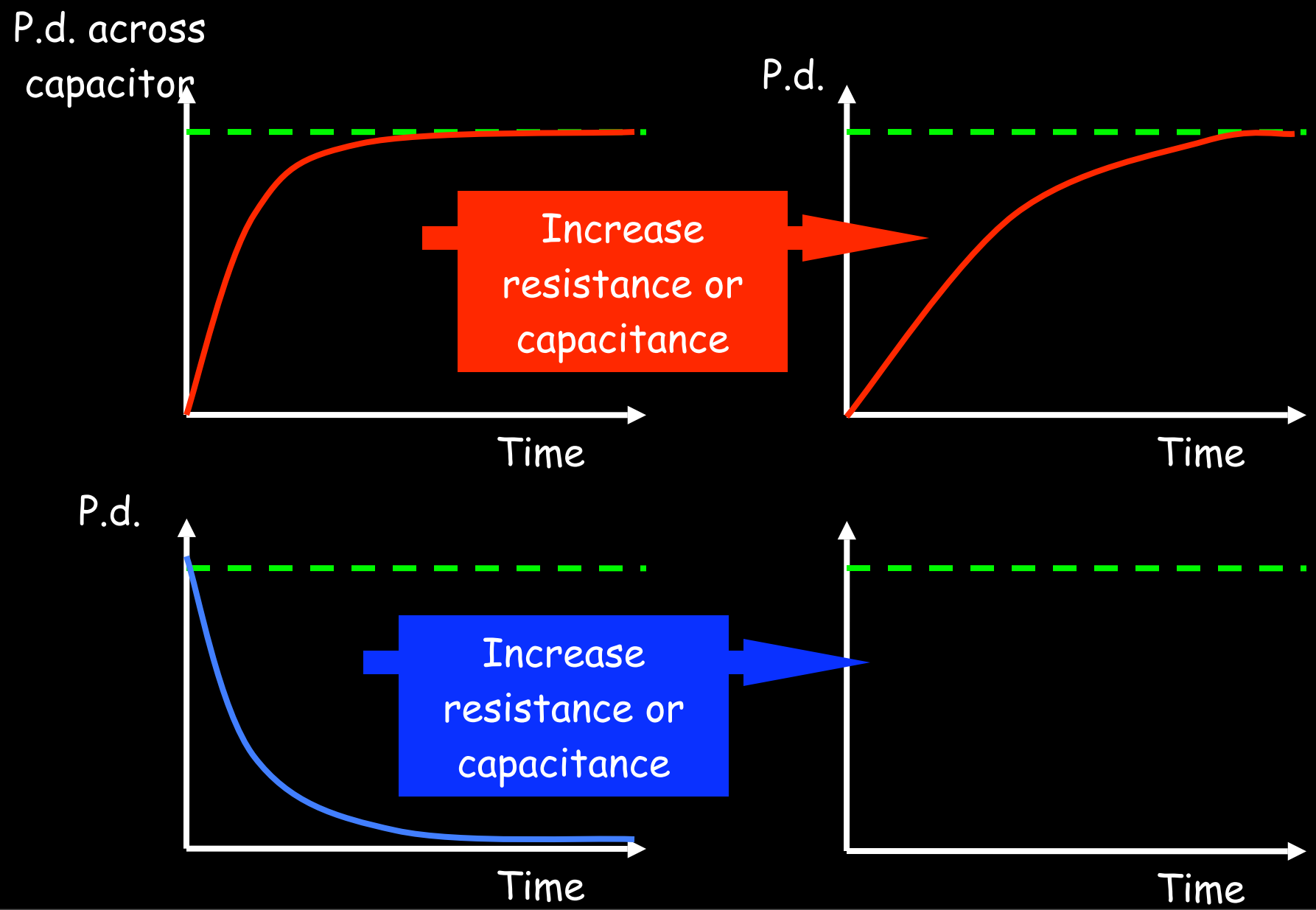

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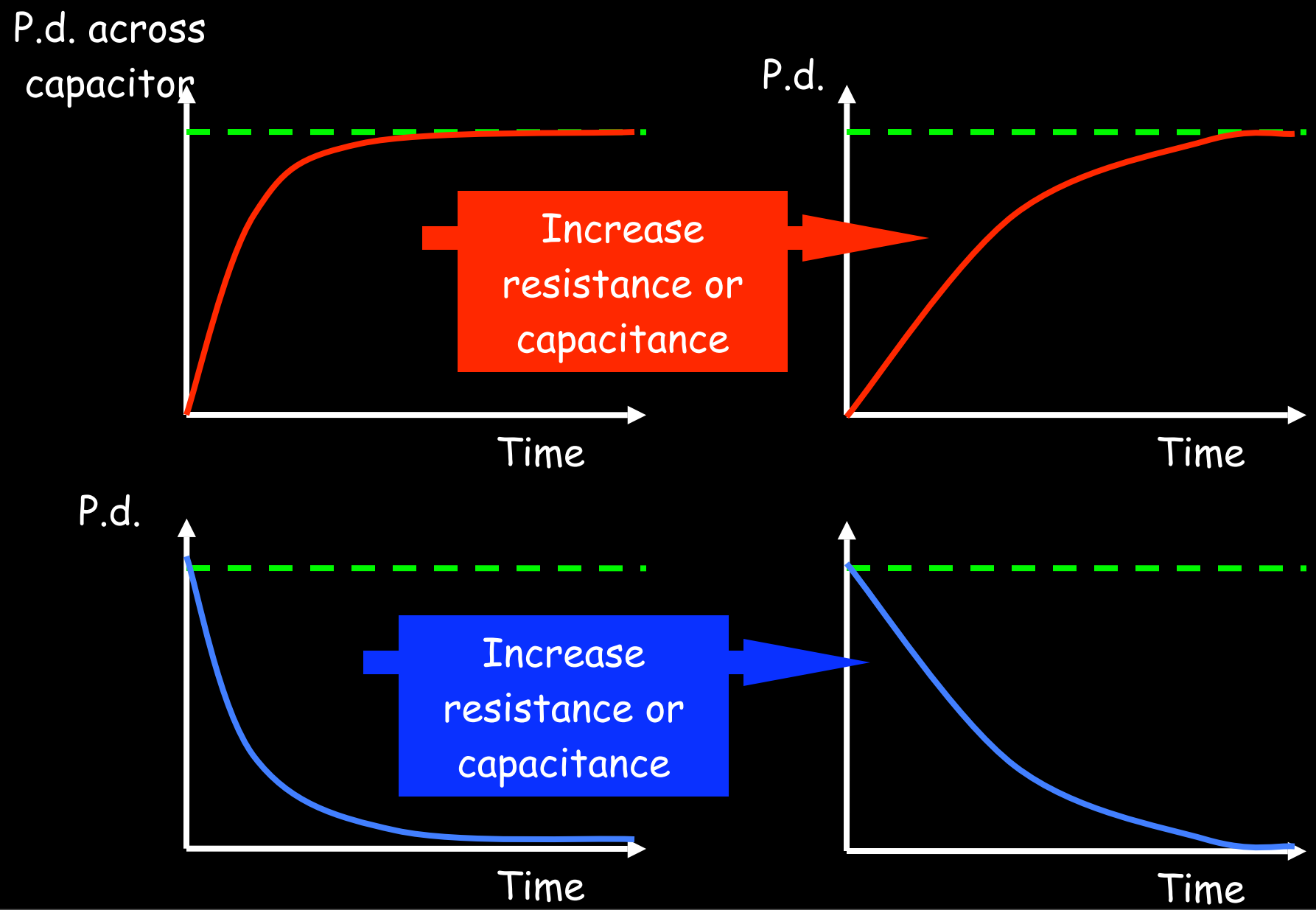

Time delay circuits

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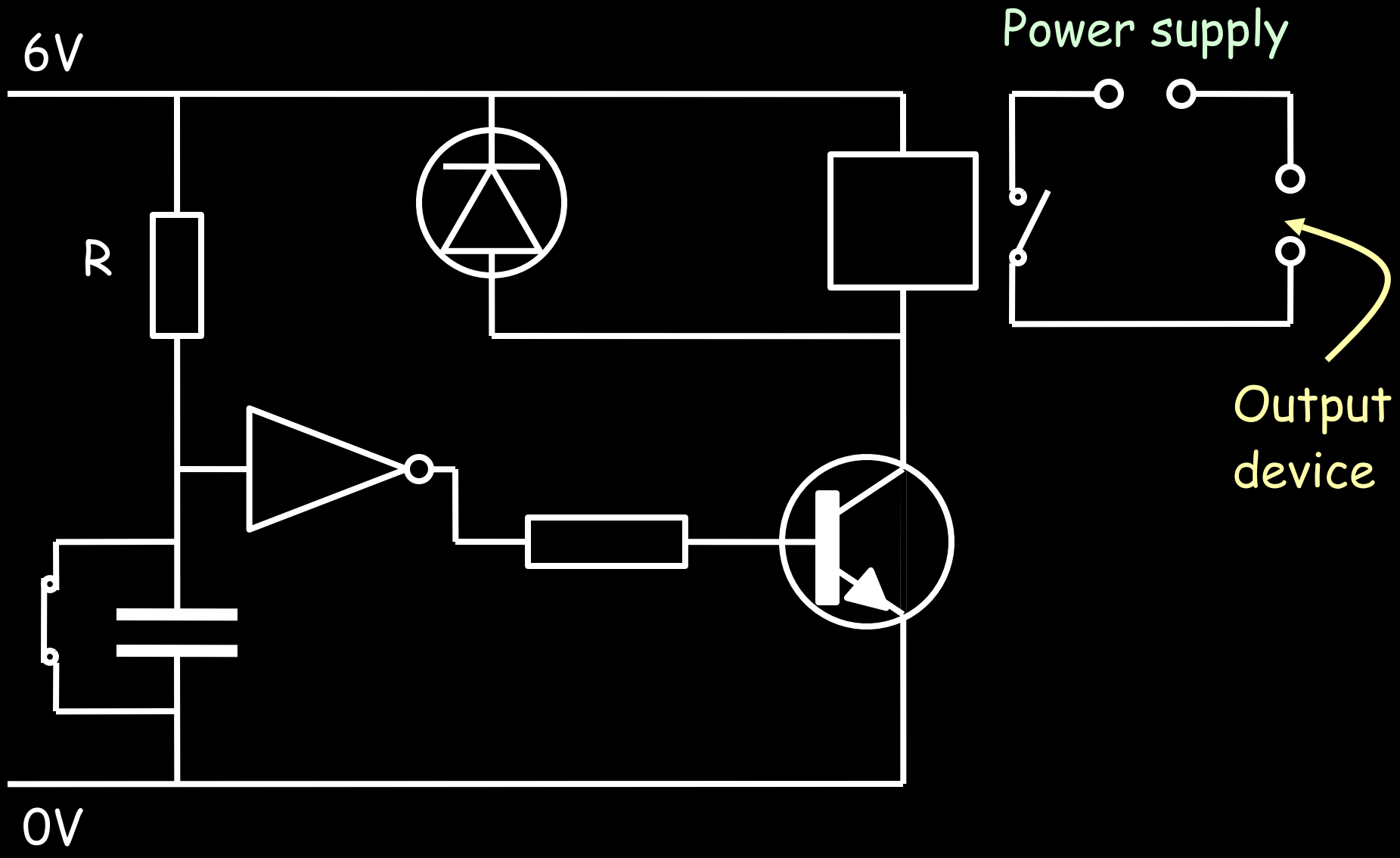

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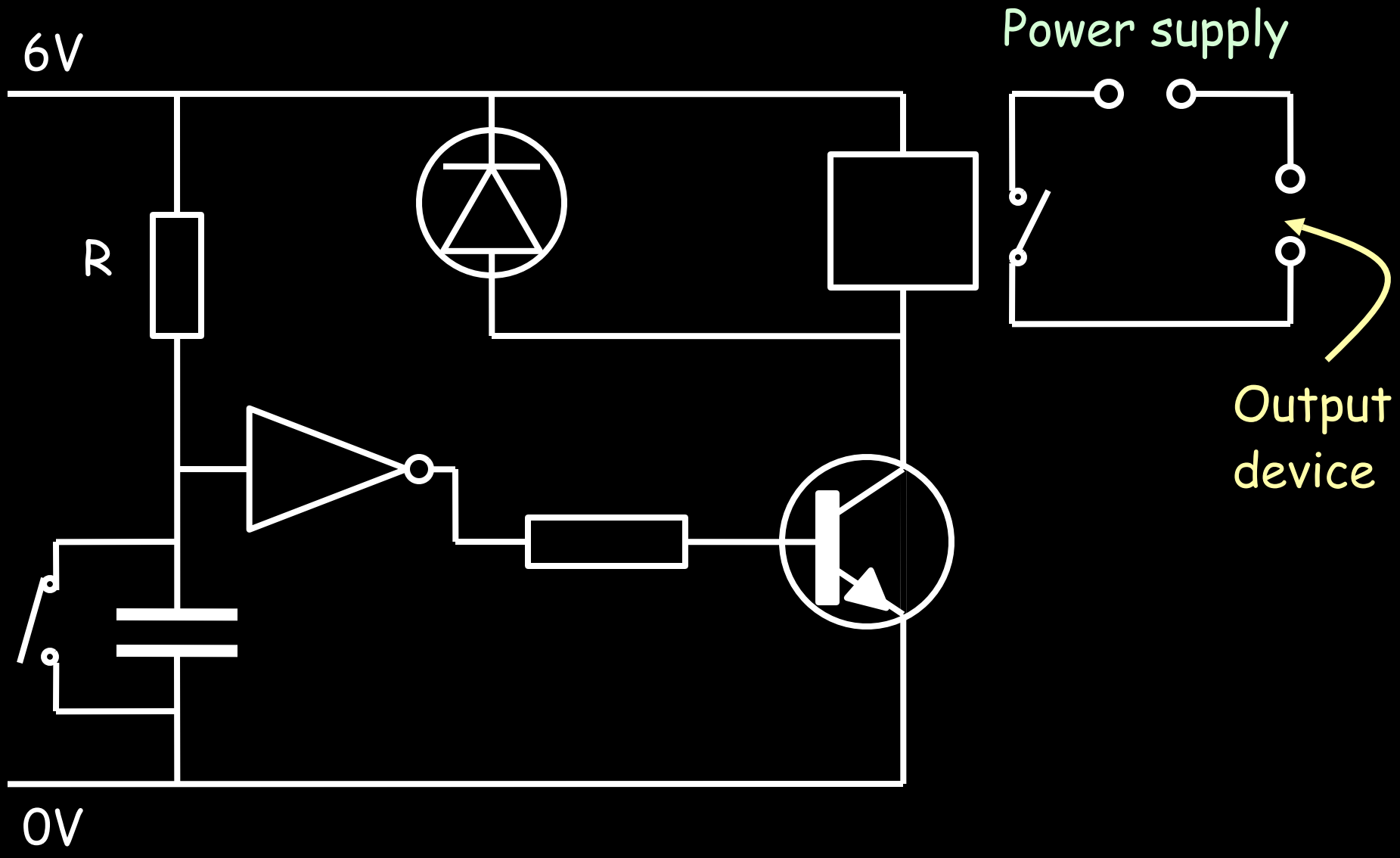

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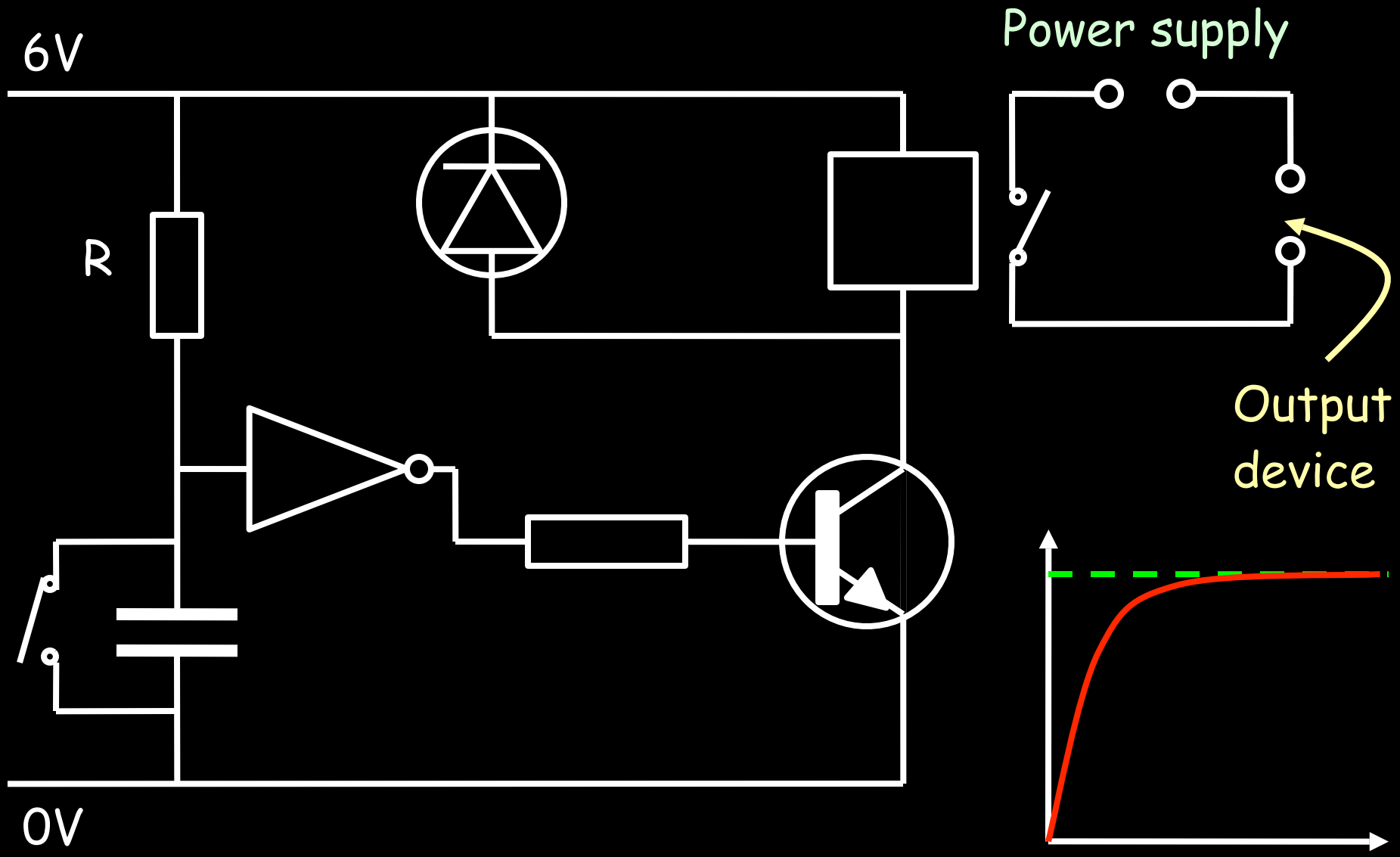

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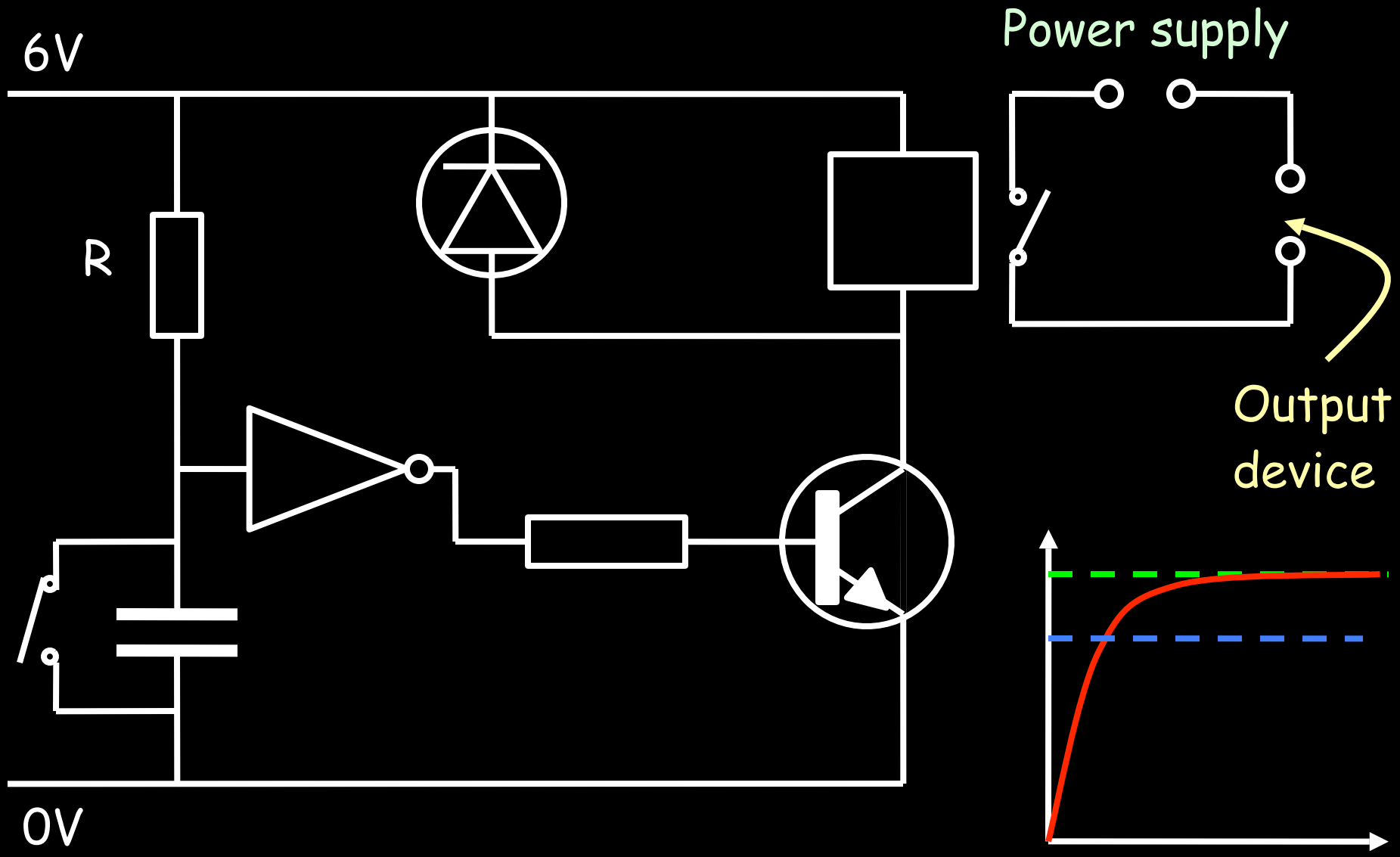

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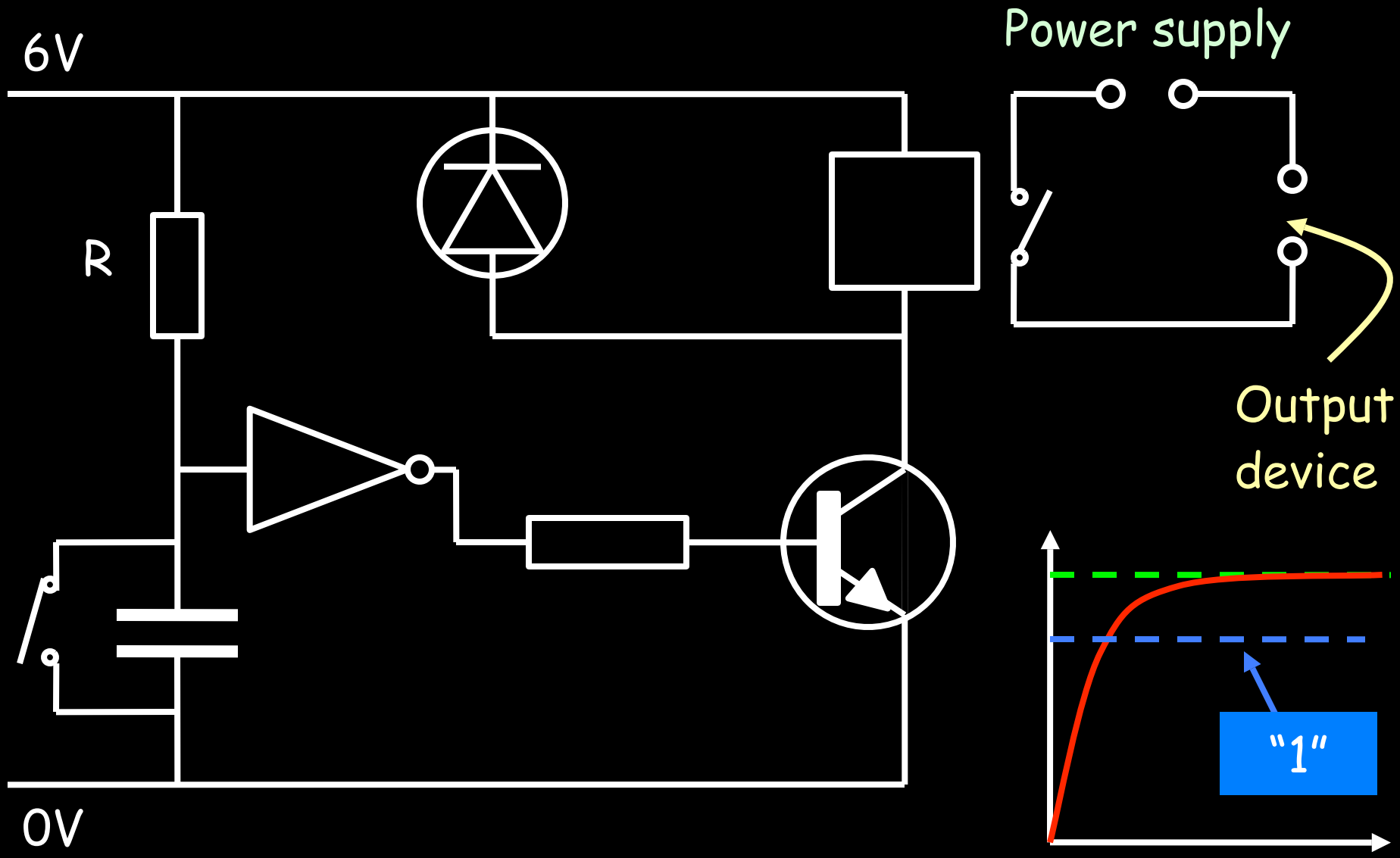

Time delay circuits

1) When the switch is closed the capacitor is being short circuited so no charge builds up on it
2) This means that the input to the NOT gate is __, so the output is 1 and the output device is ___
3) When the switch is released the capacitor starts to _____ up
4) When the voltage across the capacitor reaches a certain level the input to the NOT gate becomes __ so its output is 0
5) This means that the output device is now switched ___
6) To INCREASE the amount of time taken to switch the device off you could:
    1) Increase the _____ of the capacitor
    2) the resistance of the resister R

Words - ~~charge~~, 1, capacitance, increase, 0, off, on