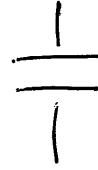
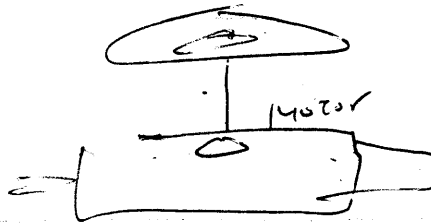


APPS

2012/4/16

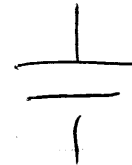
(1)

- Electric Motor



- Trent plane T-86 15 in wing span
43 mph 4.5 minutes

Super - Capacitor
Super - Cap.



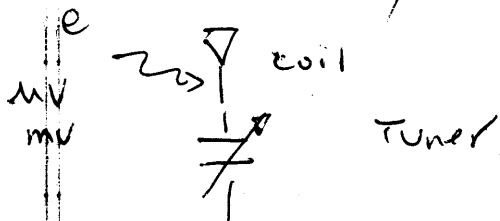
- Hybrid electric vehicle

Brake — Motor/Generator



Communication

Radio / Transistor



$$f = \frac{1}{2\pi LC}$$

AM

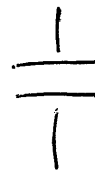
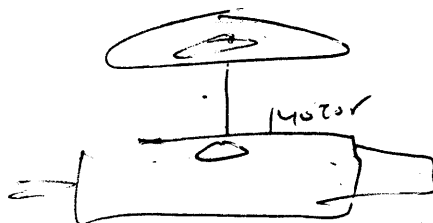
FM

APPS

2012/4/16

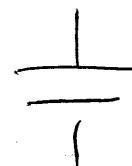
(1)

- Electric Motor



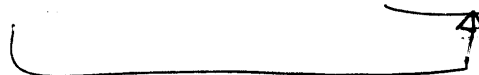
- Trent plane T-86 15 in wing span
43 mph 4.5 minutes

Super - Capacitor
Super - Cap.



- Hybrid electric vehicle

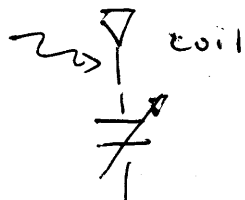
Brake — Motor / ~~Generator~~



Communication

Radio / Transistor

μV
 mV



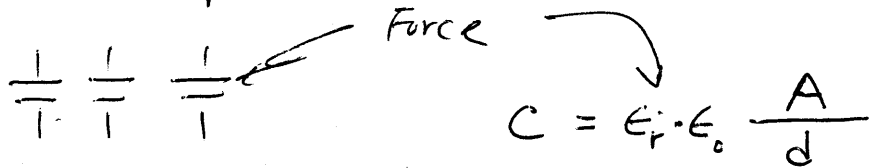
$$f = \frac{1}{2\pi LC}$$

AM

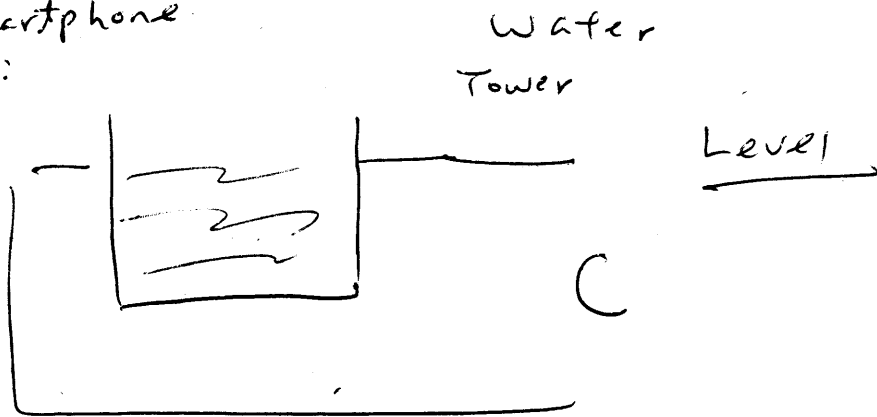
FM

Sensor

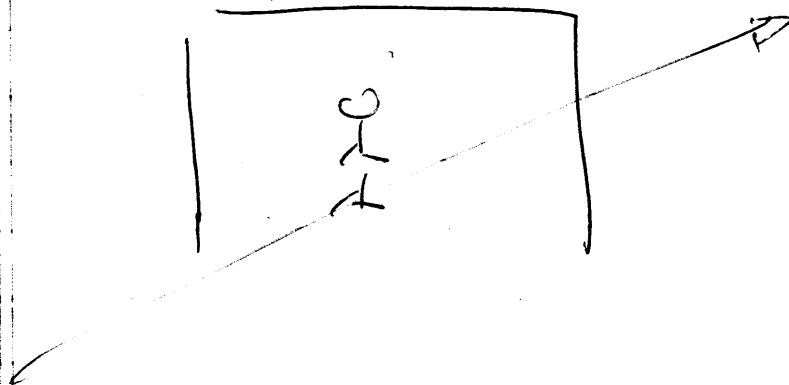
* Touch screen | Capacitive Sensor



IPad
Smartphone

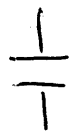
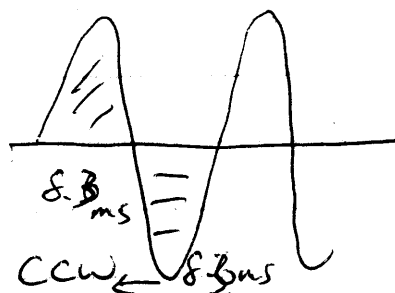
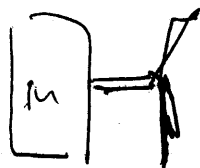


Museum / Homeland Security



(3)

Refrigerator

1 ϕ Air Cond.Starting
Cap.CW $\rightarrow$ 

AC 60 Hz

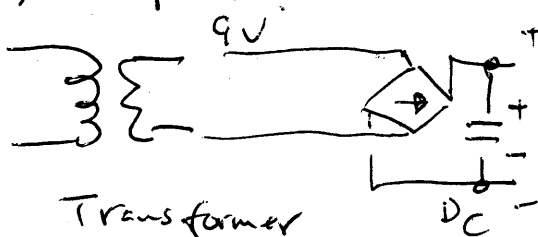
120V rms

$$T = \frac{1}{f} = \frac{1}{60} = 16.67 \text{ ms}$$

Hum

Rectifiers / Adapters

120V



Filter capacitor

(4)

PC

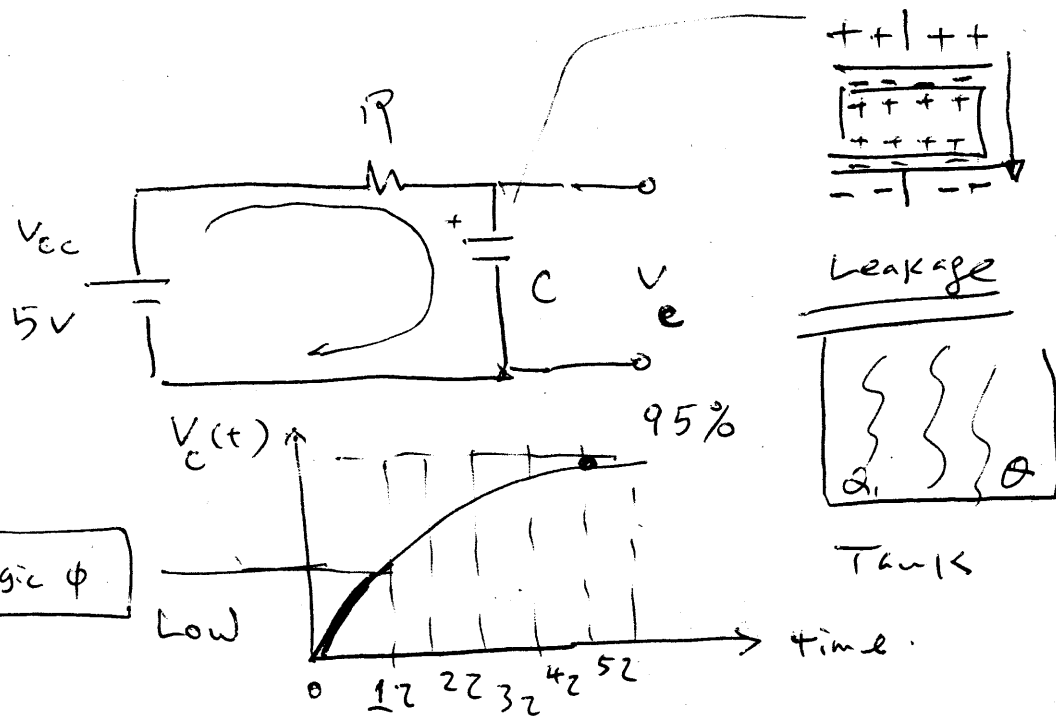
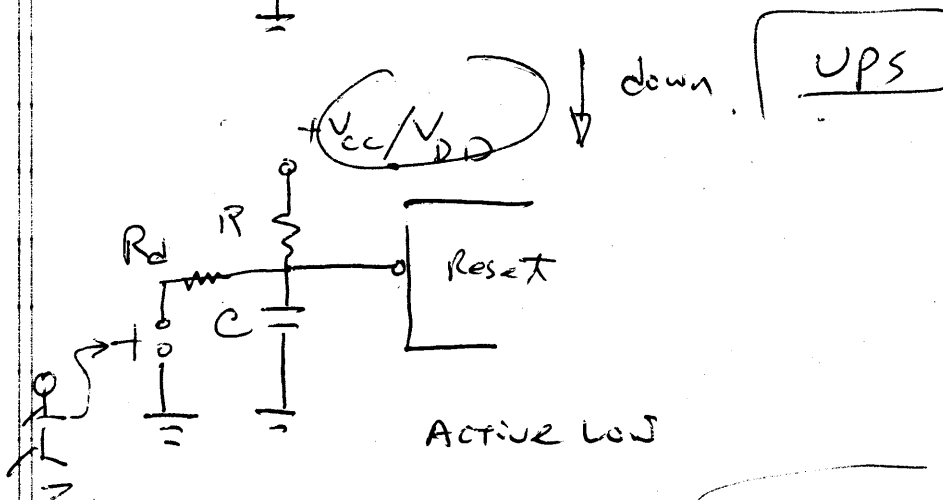
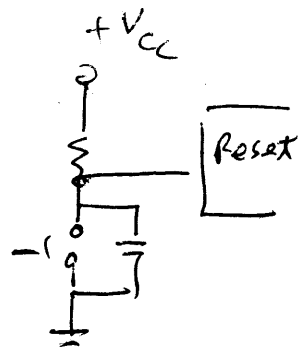
* Cold Boot

Push power off

Warm Boot

Ctrl, Alt, Del.

Reset system



(5)

$$V_c(t) = 5(1 - e^{-t/\tau})$$

$$t = 2$$

$$t = 22$$

$$t = 32$$

$$t = 42$$

$$t = 52$$

$$V_c(t) =$$

$$5 \cdot (1 - e^{-t/2})$$

$$= 5(1 - \frac{1}{e})$$

$$= 5 \cdot (1 - e^{-1})$$

$$= 5(1 - \frac{1}{e})$$

$$= 5 \times 0.632$$

$$= 3.2 \text{ V}$$

$$V_c(t=22)$$

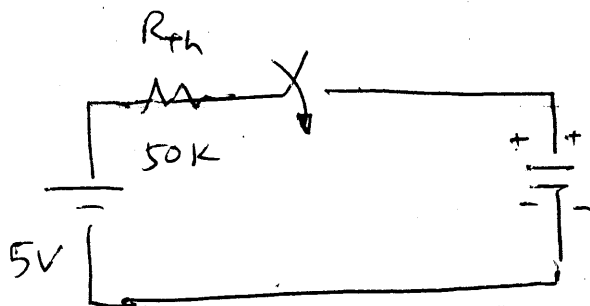
$$= 5(1 - e^{-22/2})$$

$$= 5(1 - e^{-2})$$

$$= 5(1 - \frac{1}{e^2})$$

$$= 5 \times 0.865$$

$$e = 2.713$$



KVL

$$C = 200 \mu\text{F}$$

$$E = i R_{th} + V_c(t)$$

$$\text{Charging } i = \frac{E - V_c(t)}{R_{th}}$$

$$V_c(t)$$

$$t=0 \quad V_c(t)=0$$

$$= \frac{E-0}{R_{th}}$$

$$= 5\text{V}/50\text{k}$$

$$= 0.1 \text{ mA}$$

$$i_c(t)$$

$$0.1 \text{ mA}$$

$$t=0$$

$$\text{when } V_c(t) = 5\text{V}$$

$$i = \frac{5-5}{50\text{k}} = 0 \text{ mA}$$