4B 5-12-14 part 1

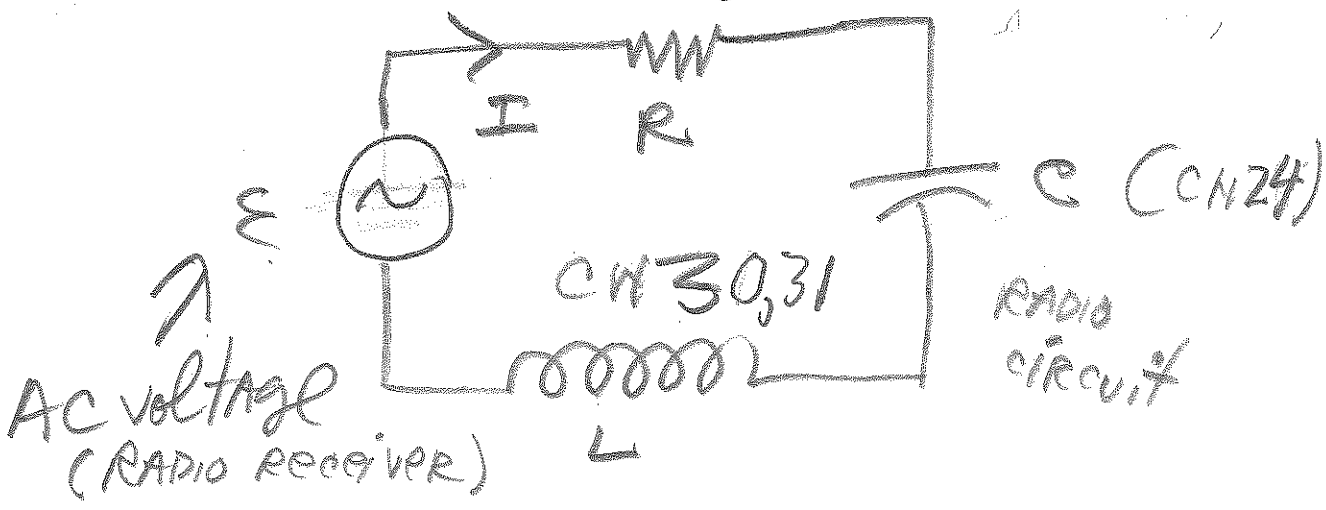
CH 31 — FINAL review

See latest notes on SUNY lab (solenoid) and CH 31.

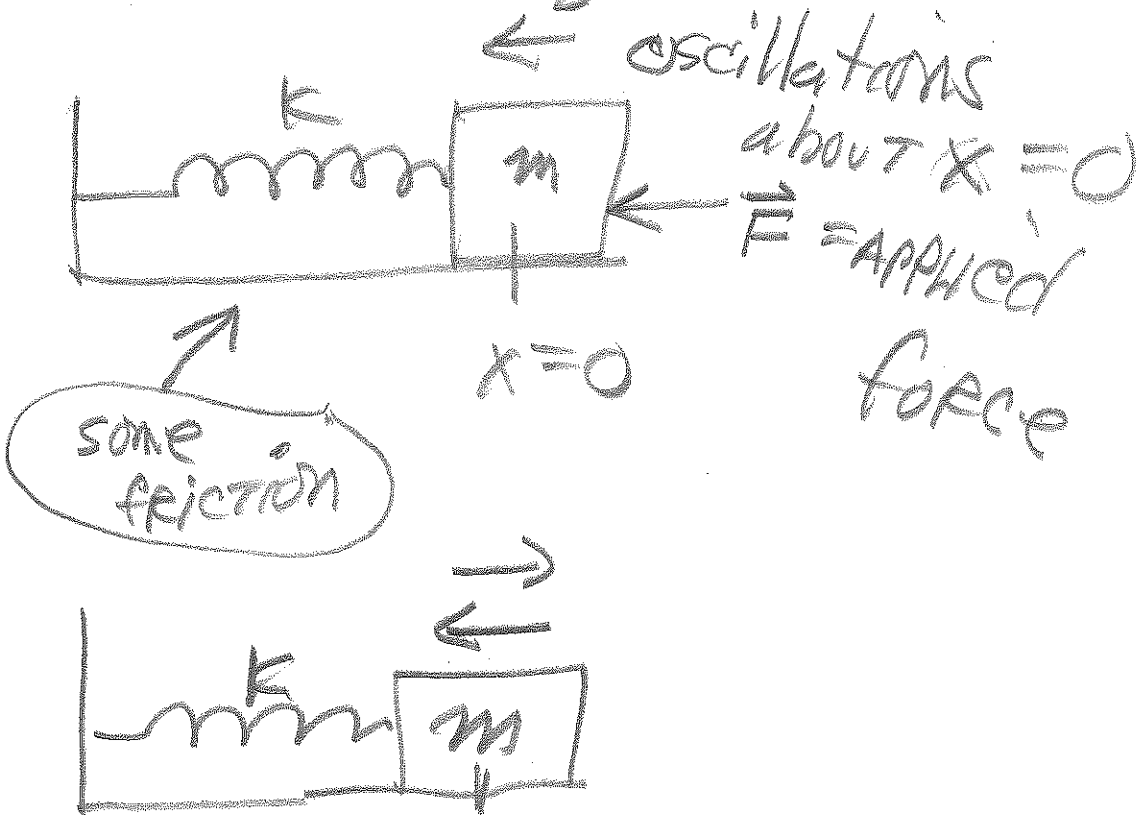
CH 31 AC circuits

Applications: W.F. circuits, TV, radio receivers, etc

Medical application: special transmission or receiver circuits. (CH 25) 26



mass-spring on HORIZONTAL table:

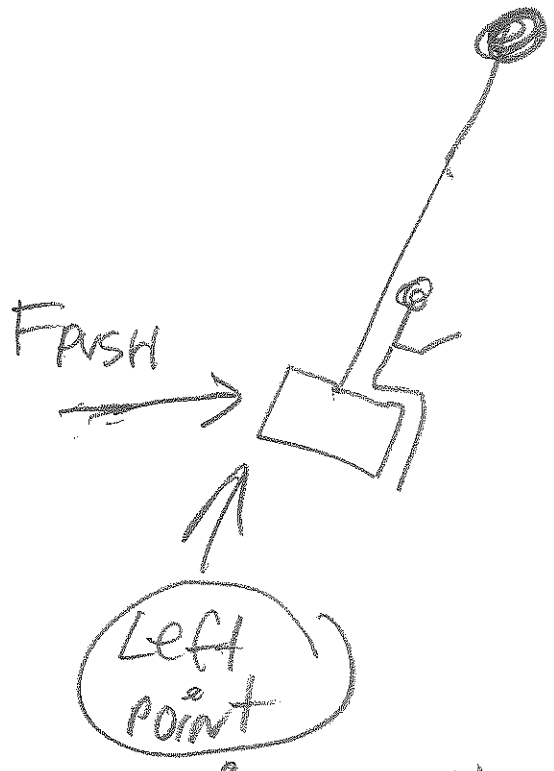


Natural frequency:

CN 14 $\omega = \sqrt{\frac{k}{m}}$

If applied force is delivered at natural frequency, system (mass + spring) has a HUGE response: resonance!

KID on swing.

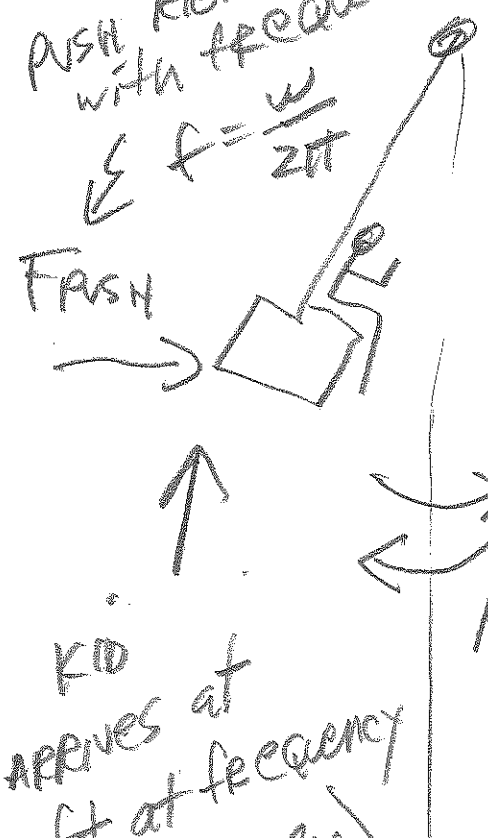


natural frequency $\left(\frac{RAD}{SEC}\right)$

$$\omega = \sqrt{\frac{g}{\ell}} = 2\pi f$$

Pendulum natural frequency.

IF YOU PUSH KID RIGHTWARD EACH TIME KID ARRIVES at LEFT and STARTS TO MOVE RIGHT: RESONANCE

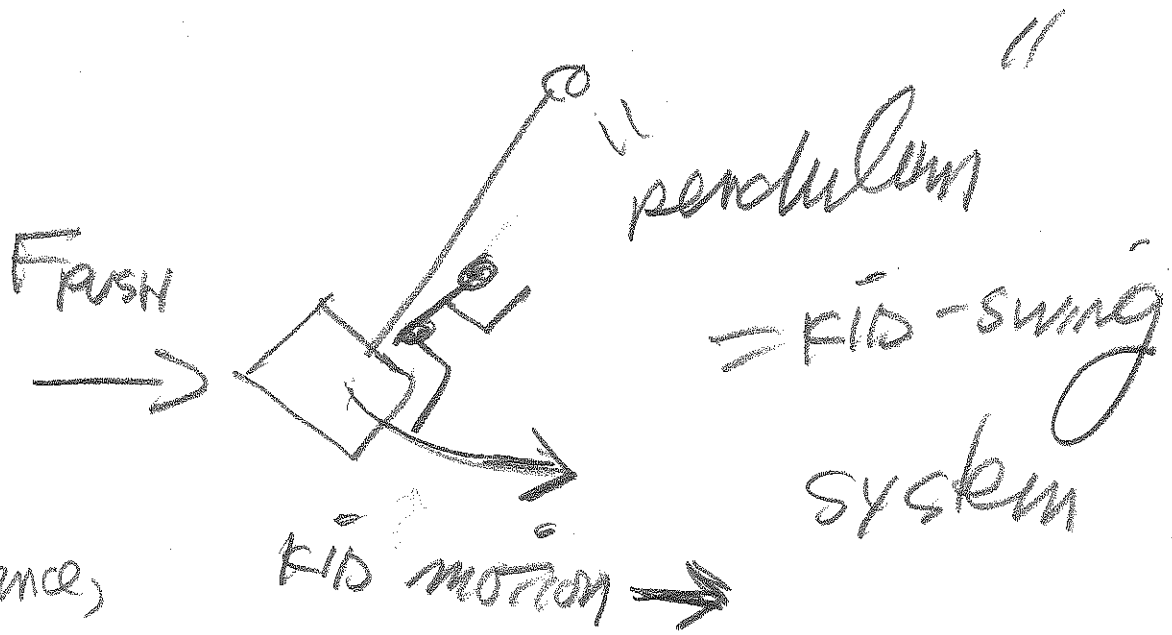


$f = \frac{\omega}{2\pi}$ $\left(\frac{\text{cycles}}{\text{sec}}\right)$ Hz

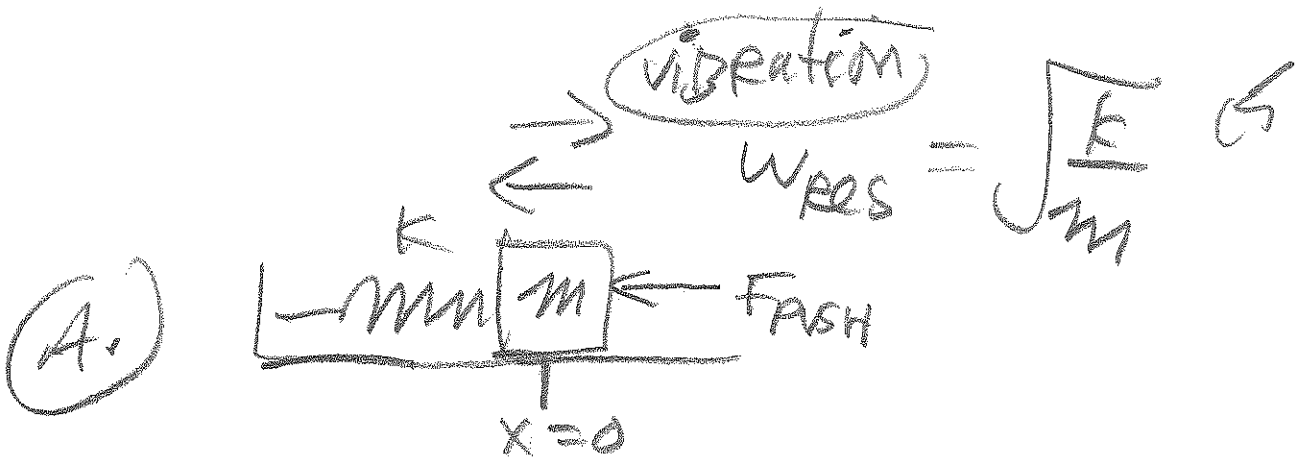
RESONANT condition:

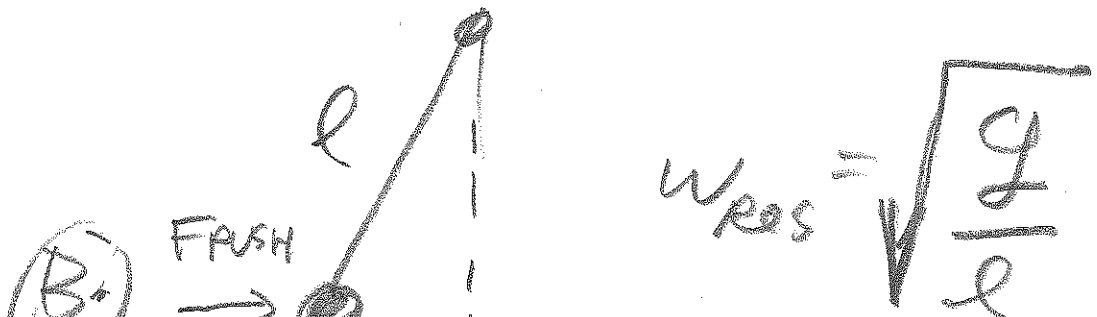
Let $f = 2\text{Hz} = \omega/2\pi$

EVERY 0.5 sec, KID ARRIVES at LEFT POINT. YOU PUSH RIGHT EVERY 0.5 sec.



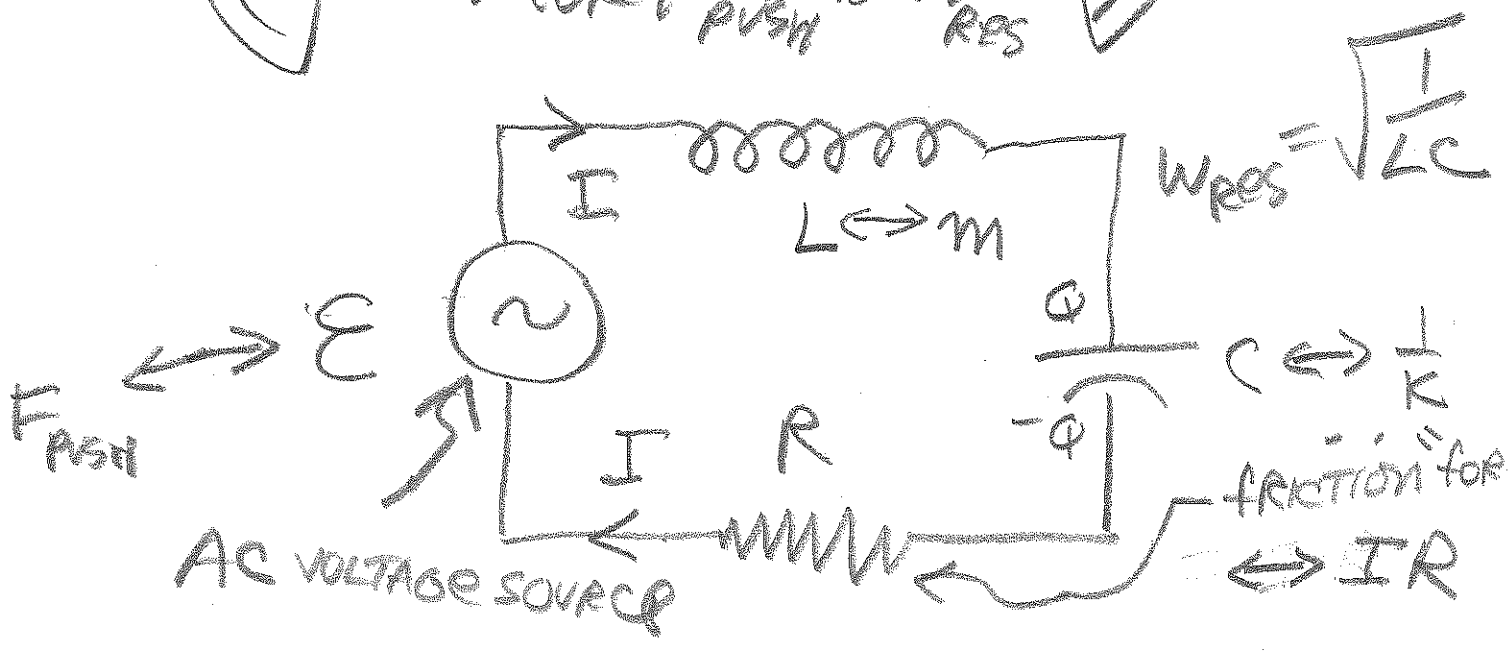
AT resonance, you are feeding "energy" into KID-swing system: resonance → swing amplitude and Average speed become huge!



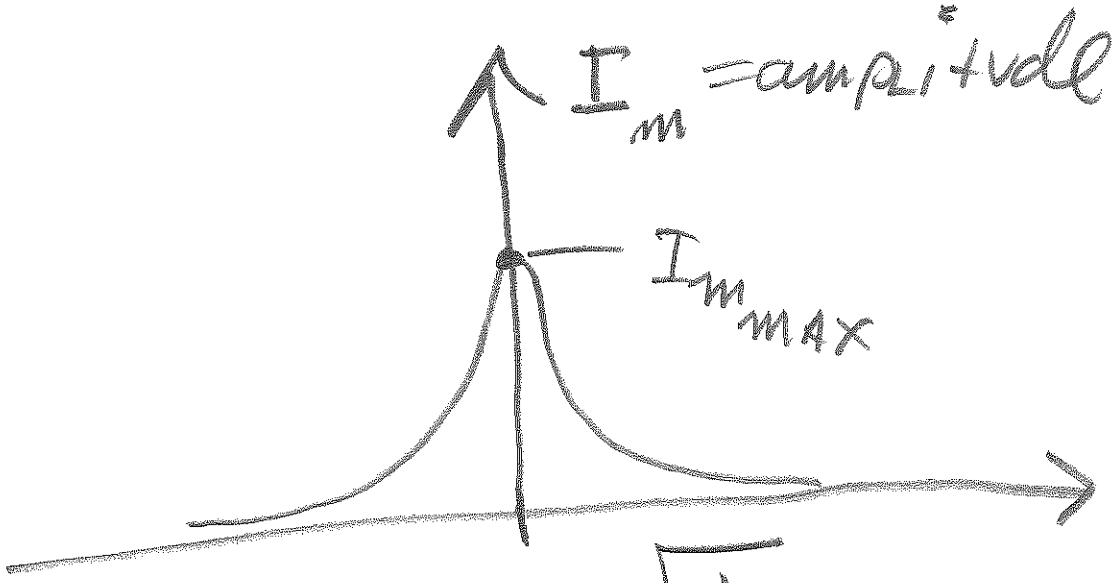


HARMONIC SYSTEMS

RESONANCE IS WHEN ω FOR F_{PUSH} IS ω_{RES}

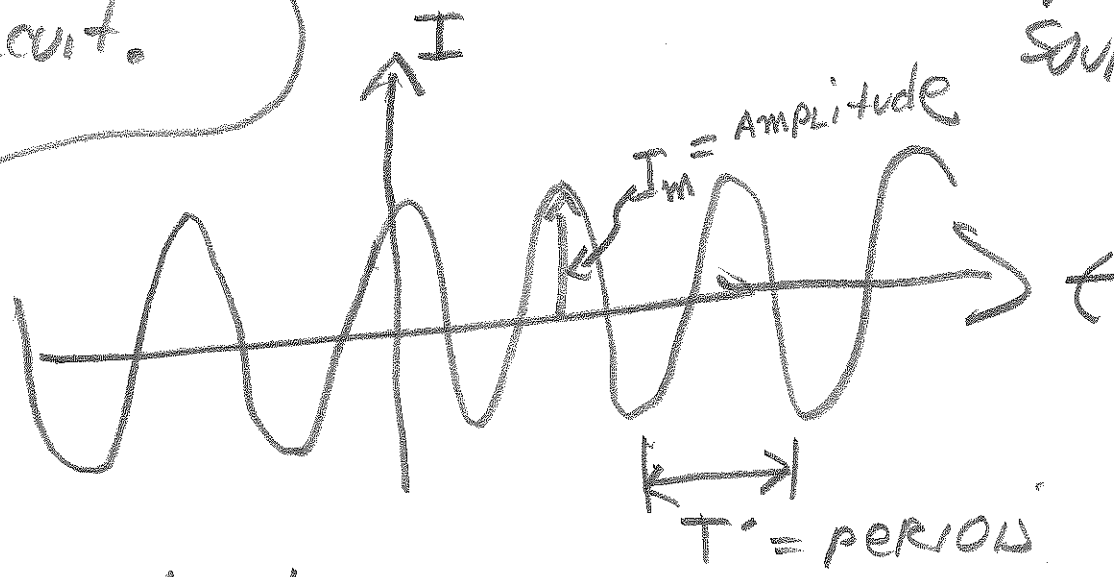


RLC - circuit



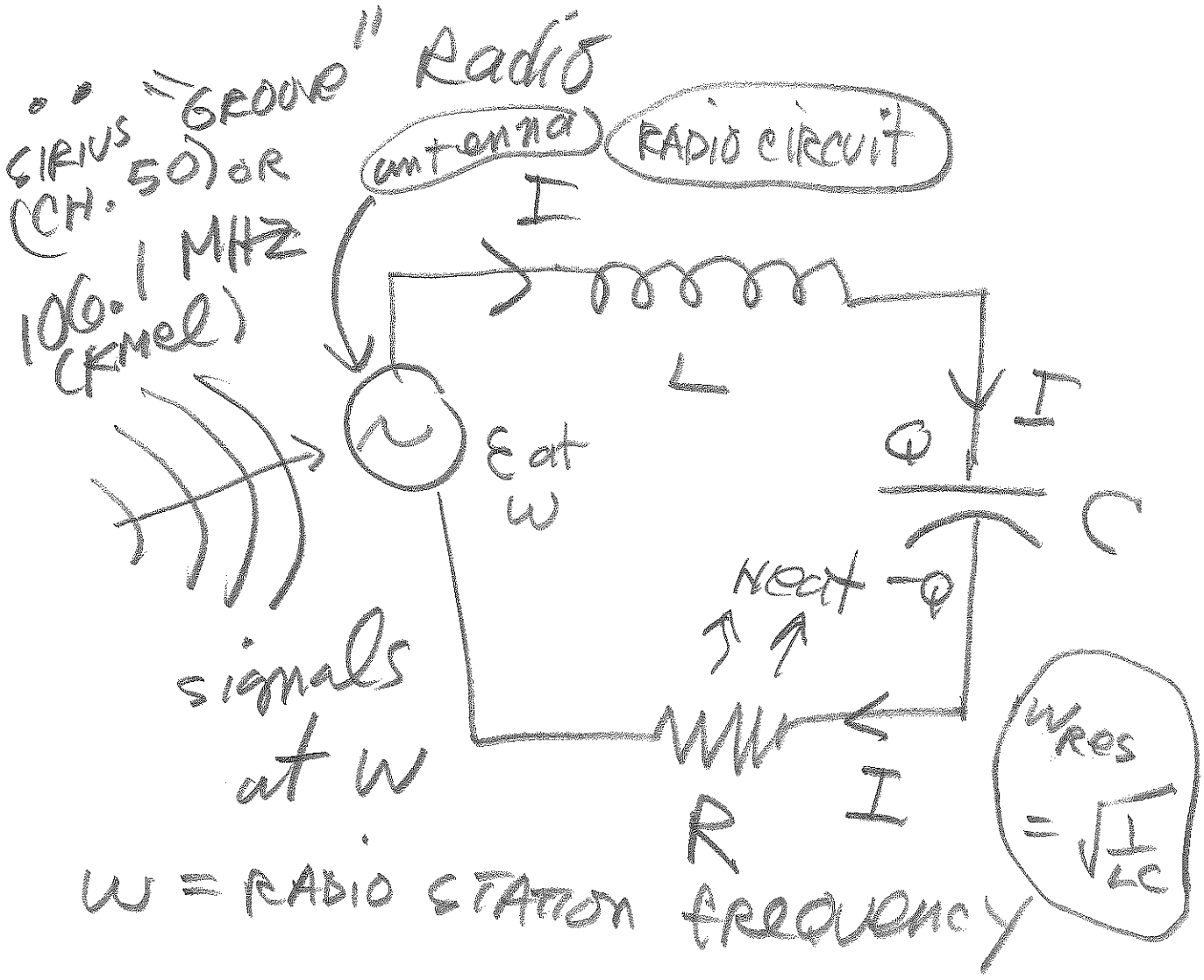
$\omega_{RES} = \sqrt{\frac{1}{LC}}$

RADIO circuit.



$T \approx \frac{1}{f}$, $f = \frac{\omega}{2\pi}$

NOTE: $\omega \neq \omega_{RES} = \sqrt{\frac{1}{LC}}$, in general



SIRIUS (CH. 50) OR 106.1 MHz (KMEL)

$= 2\pi \cdot f$, $f = 88.5$ MHz (KQBS)

$= 106.1$ MHz (KMEL)

$= 106.9$ (KCBS) (FM)

RADIO KNOBS.

TURN TO CHANGE w → KNOB ADJUSTS C UNTIL $\sqrt{\frac{1}{LC}} = w$ FOR RADIO STATION.

TO $w_{RES} = \sqrt{\frac{1}{LC}}$.