

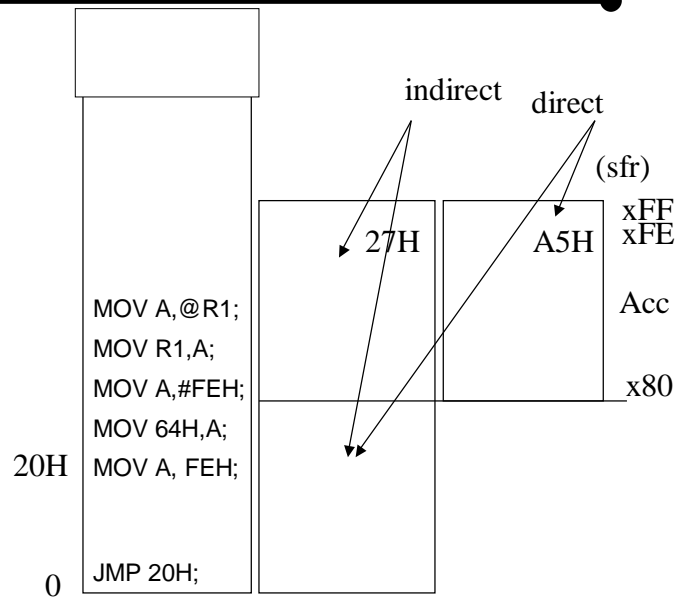
Review and Lab Prep

q hotmail account on mailing list doesn't work

CSE466 Autumn '00- 1

Memory Architecture Review

Show the
memory after
execution from
reset

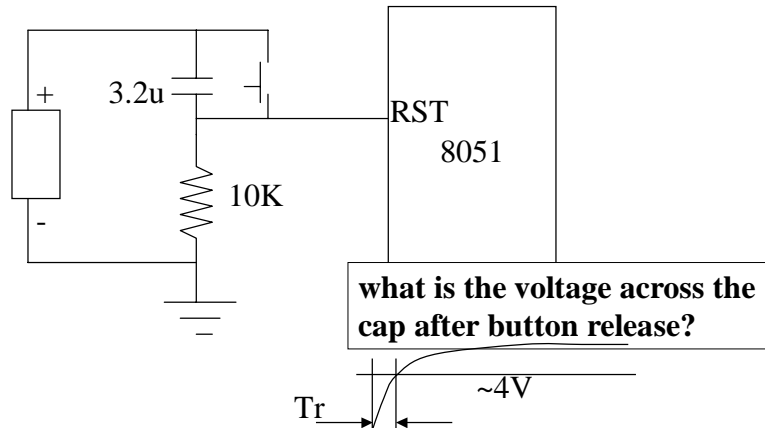


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Basic RC review

$$V_o = V_i(1 - e^{-t/RC}) \text{ so } V_o/V_i = 4/5 = .8 = (1 - e^{-t/RC})$$

$$t = -RC \ln(1 - .8) = 49\text{mSec}$$



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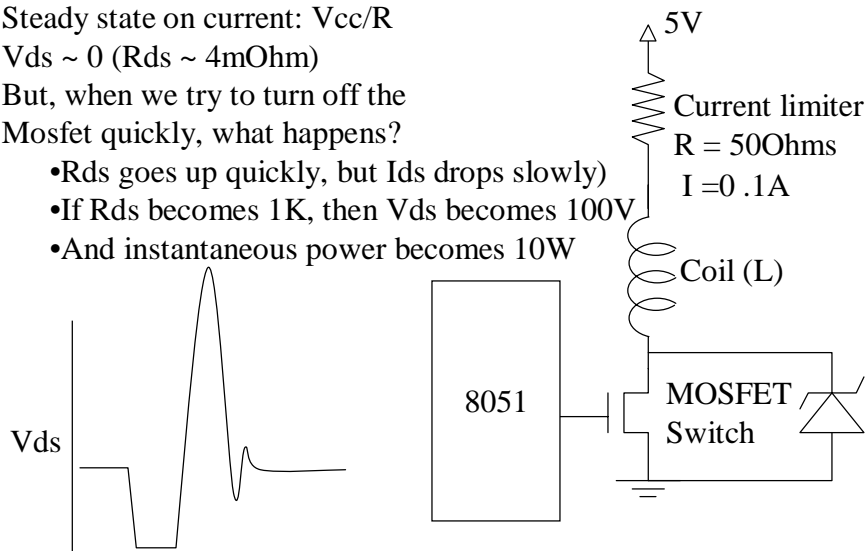
Careful w/ Coils (motors, valves, etc)

Steady state on current: V_{cc}/R

$V_{ds} \sim 0$ ($R_{ds} \sim 4\text{m}\Omega$)

But, when we try to turn off the Mosfet quickly, what happens?

- R_{ds} goes up quickly, but I_{ds} drops slowly)
- If R_{ds} becomes 1K, then V_{ds} becomes 100V
- And instantaneous power becomes 10W

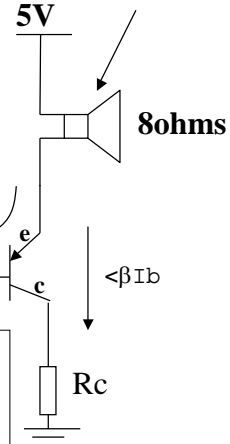


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Saturation Mode Amp

- q Use a current amplifier (PNP Transistor)
 - $I_{ce} \leq \beta I_b$ (assume $\beta=100$)
 - Assume $V_{be} = 0.7V$ when "on"
 - Assume $V_{ce} = 1V$ when "on"
 - Assume $\text{tone1} = 0V$
 - Pick R_c to protect the speaker
 - Pick R_b to protect the processor while tuning the transistor

could be any power device



$$I_s = ((.2/8)^{.5})/3 = \sim 50\text{mA}$$

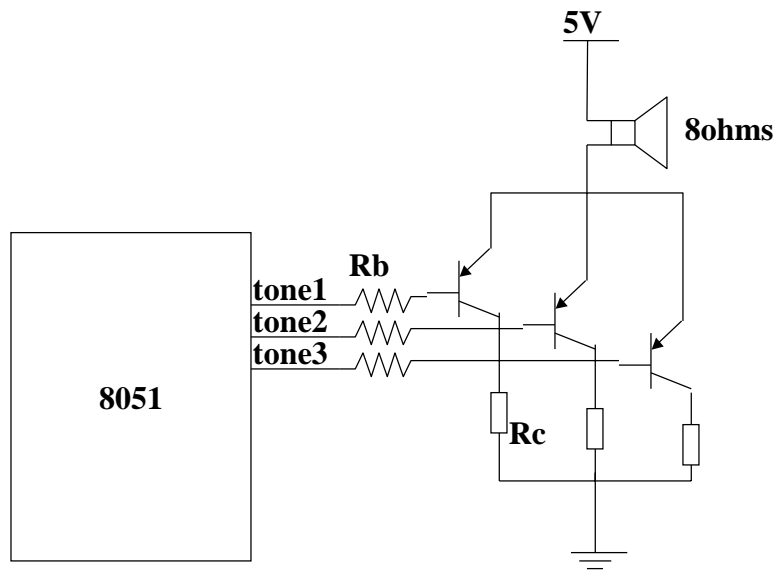
$$R_c: 5 - (50\text{mA} * 8) - V_{ce} - (50\text{mA} * R_c) = 0$$

$$\text{so: } R_c = (5 - 1 - 0.4) / .05 = 72\text{ohms}$$

$$R_b: V_b / 1\text{mA} = [5 - (8 * .05) - .7] / 1\text{mA} = 3.9\text{K!}$$

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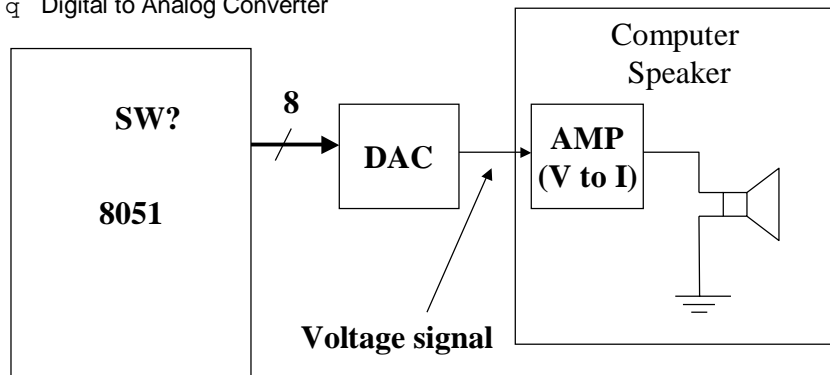
Last Year's Model



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This Year's Model

q Digital to Analog Converter



Speaker cares about current, not voltage

How can we generate two simultaneous tones of 500Hz and 1KHz using only 1 timer interrupt?

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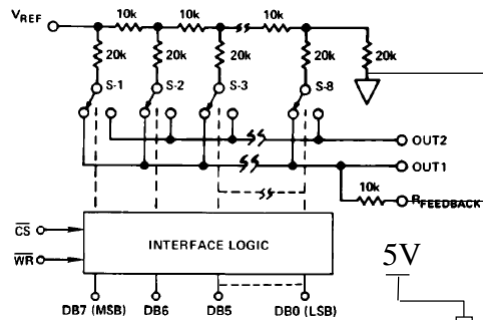
Sine Wave Program (in psuedo-C)

```
const unsigned byte sine[256] = {  
rom  
};  
interrupt routine (25.6KHz):  
    P0 = sine[i];  
    i++;  
    return
```

How do I get two tones with one interrupt (constant sample rate) ?

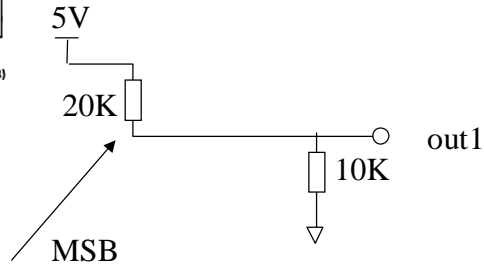
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Digital to Analog Converter



each bit pumps more current into Rfb in different amounts depending on position

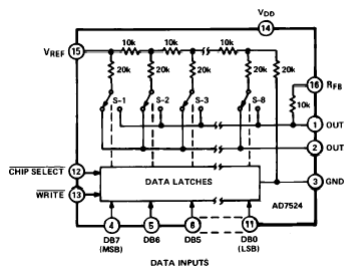
Effective network is
 $DB[7:0] = 10000000$
 out =
 $DB[7:0] = 10000001$
 out =



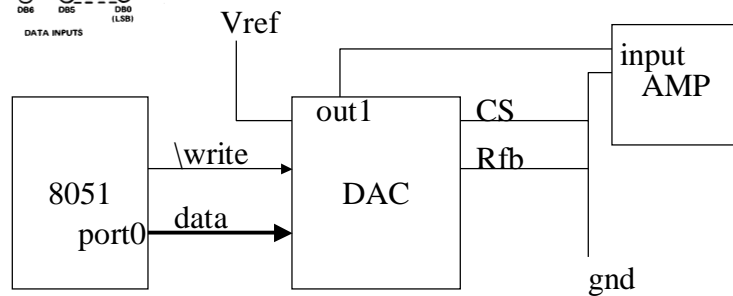
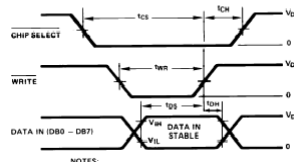
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Digital-to-Analog Converter

FUNCTIONAL BLOCK DIAGRAM



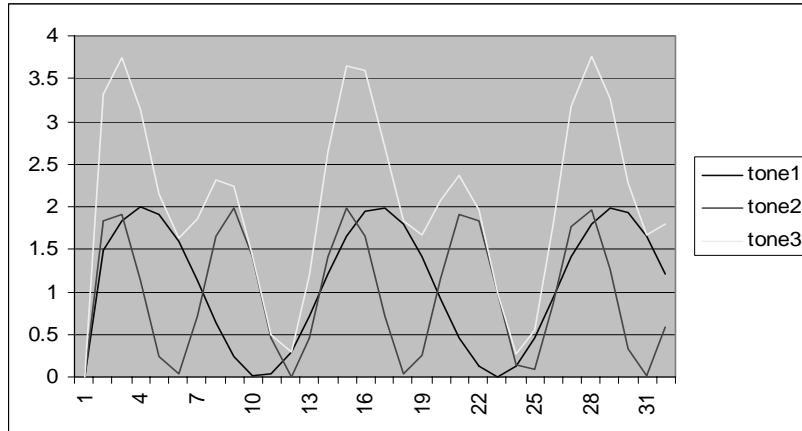
WRITE CYCLE TIMING DIAGRAM



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Sampling

□ Add sampled sine waves to get multiple tones



two frequencies with same rate. How fast can you go?