Last Time

Serial transmission of data

- Asynchronous serial interface on the mega8
- Serial access functions
  - getchar()
  - putchar()
  - printf()
  - scanf()

Today

- Project 2
- A first mega8 circuit
- Serial interface example

- Homework 3 due on Thursday

Setting the Throttle

We want to generate the following string to the serial port:

`tDDD\n\r`

- DDD = 1-3 digit number
- How?

Last Time

- Project 2 specification

Today

- A bit more on project 2
- Timing/counting in hardware

Setting the Throttle

```
void set_throttle(uint8_t val)
{
  if(val > 0 && val <= 255)
    printf(“t%d\n\r”, val);
}

tDDD\n\r
```

Using the Throttle

How do we use this function so that we generate a smooth ramp-up of the throttle?

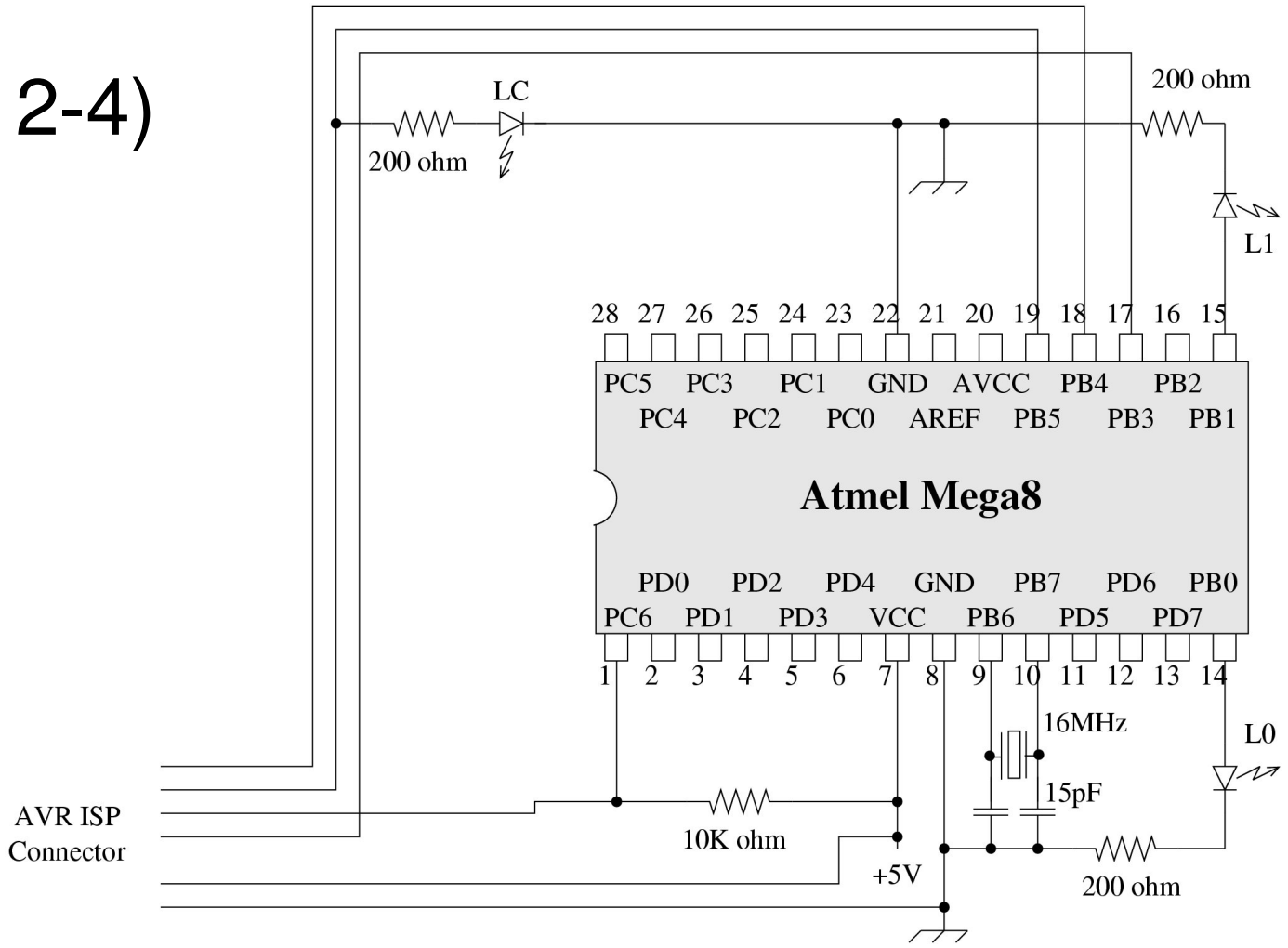
Using the Throttle

```
int main(void)
{
  uint8_t counter;
  ioinit();
  for(counter = 60; counter < 150;
          counter += 5)
  {
     set_throttle(counter);
     delay_ms(500);
  }

}
```

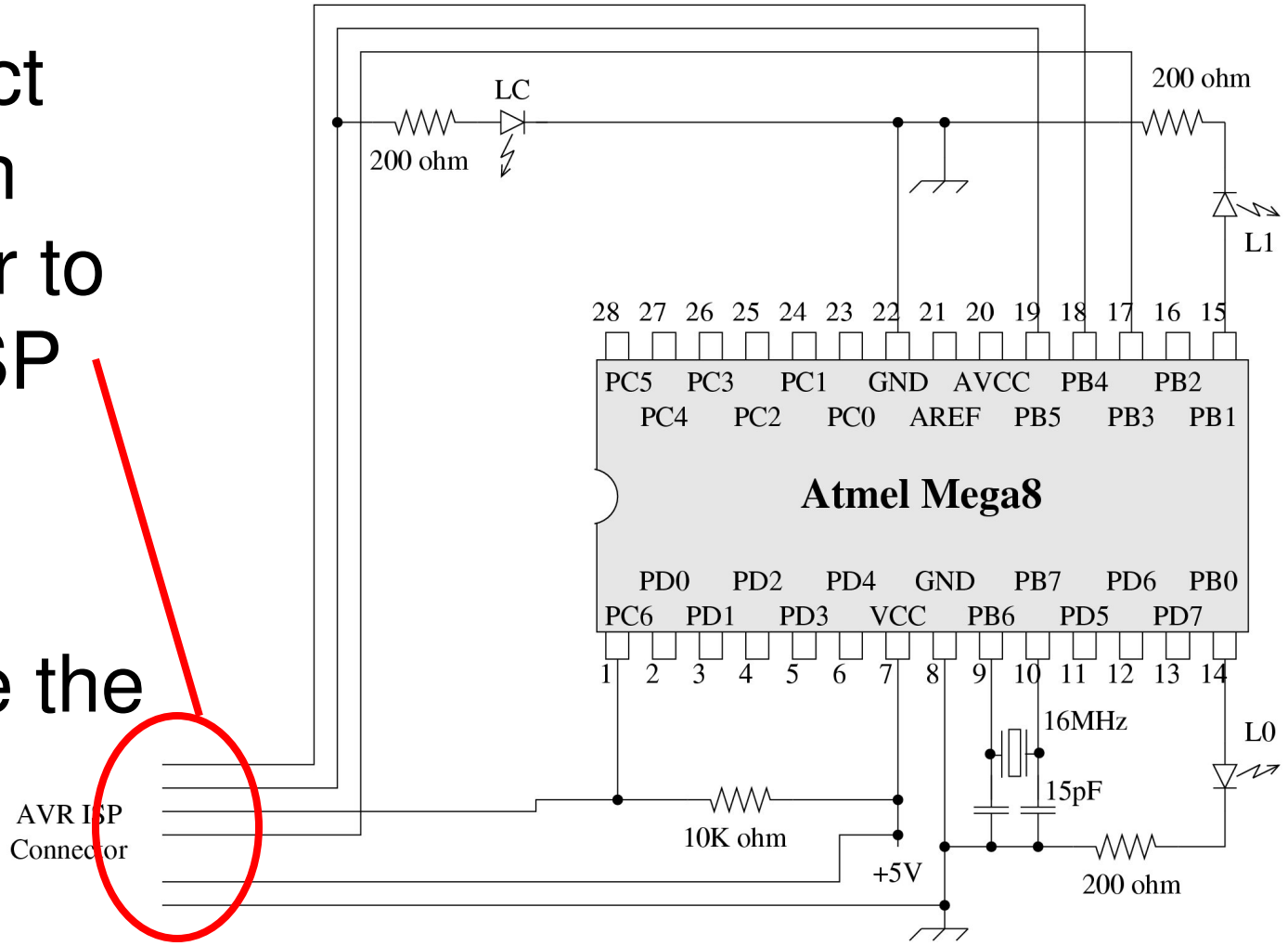
A More Complicated Circuit

(Projects 2-4)



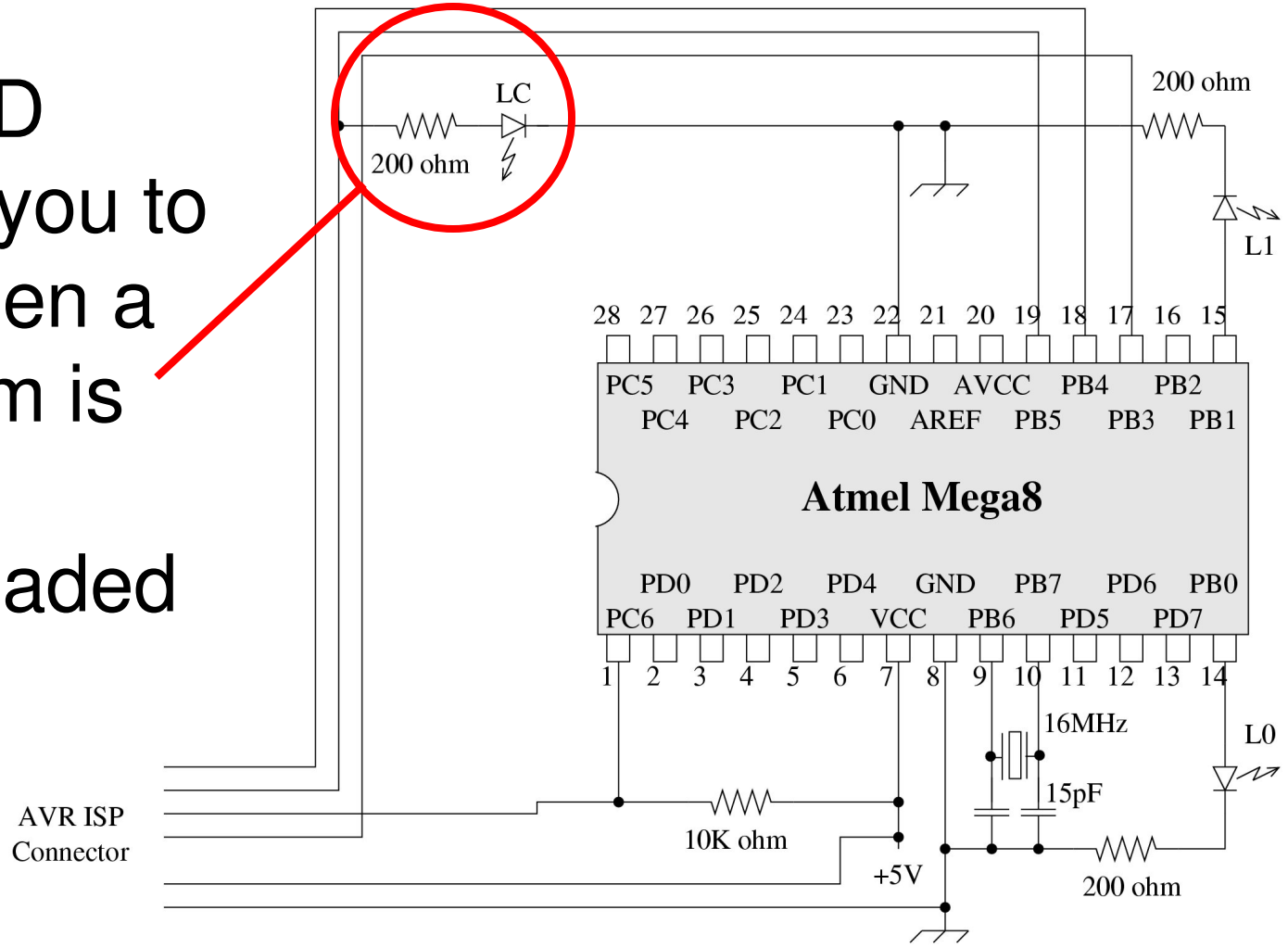
A More Complicated Circuit

- Connect through adapter to AVR ISP
- Do not reverse the pins!



A More Complicated Circuit

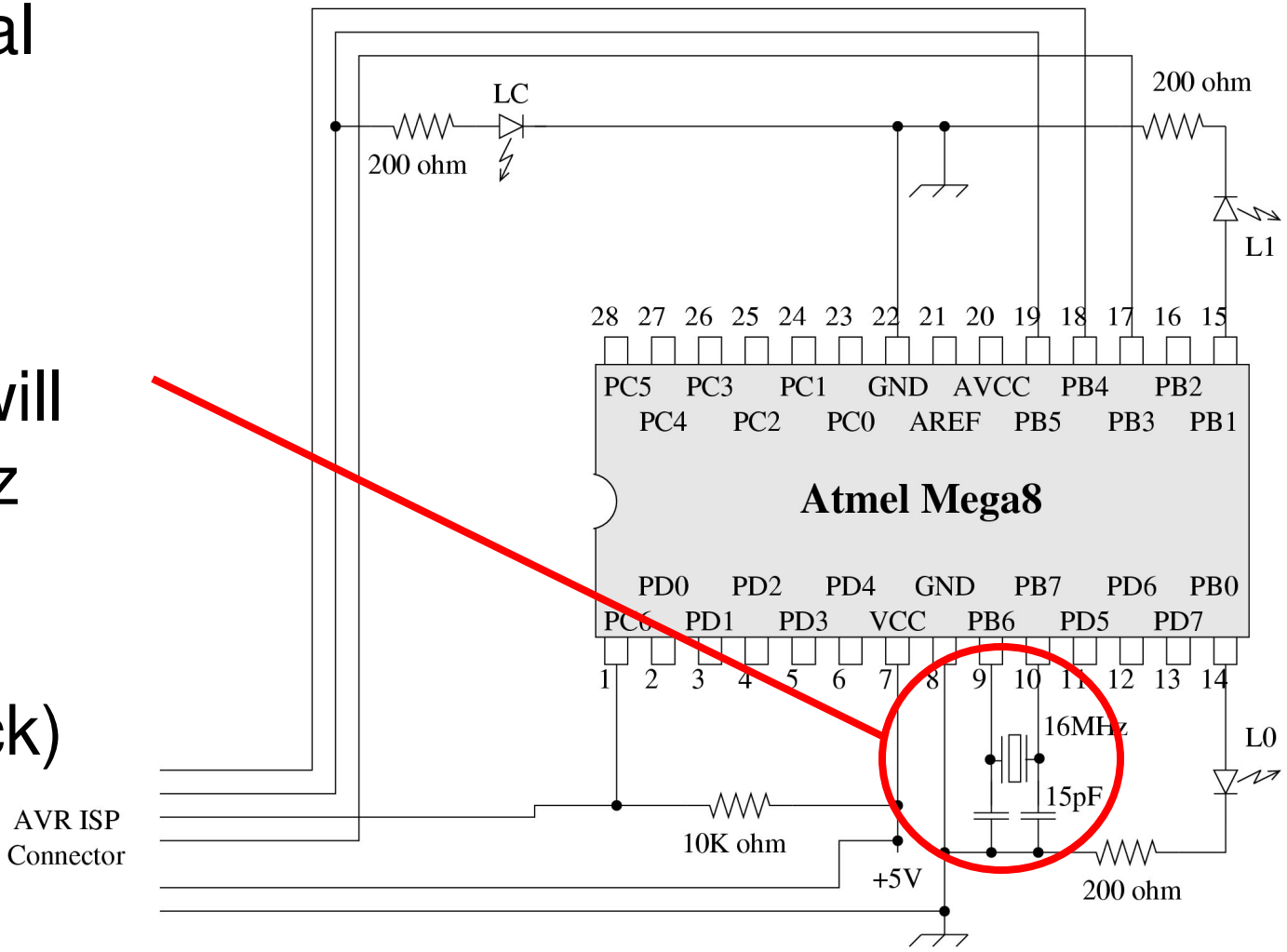
Extra LED allows you to see when a program is being downloaded



A More Complicated Circuit

16 MHz crystal

- Optional!
- Without it, your processor will run at 1MHz (in general, we will use 16MHz clock)



Project 2 In-Class Work I

- Given: a compass bearing and a goal bearing
- How do you properly compute the difference between the two?
  - Must account for the fact that 5 degrees is near 355 degrees
  - We also call this the **heading error**

Project 2 In-Class Work II

Given the current compass heading: how do you estimate the yaw velocity?

- Again – you must deal with the issue of wrap-around

- Hint: assuming that the heading goal is not changing, error velocity and yaw velocity will be the same thing

Project 2 In-Class Work III

What does the implementation of `get_heading()` look like?