

Telescope Focus Controller  
Project Number A3760  
Atmel AVR 2004 Design Contest

**Introduction**

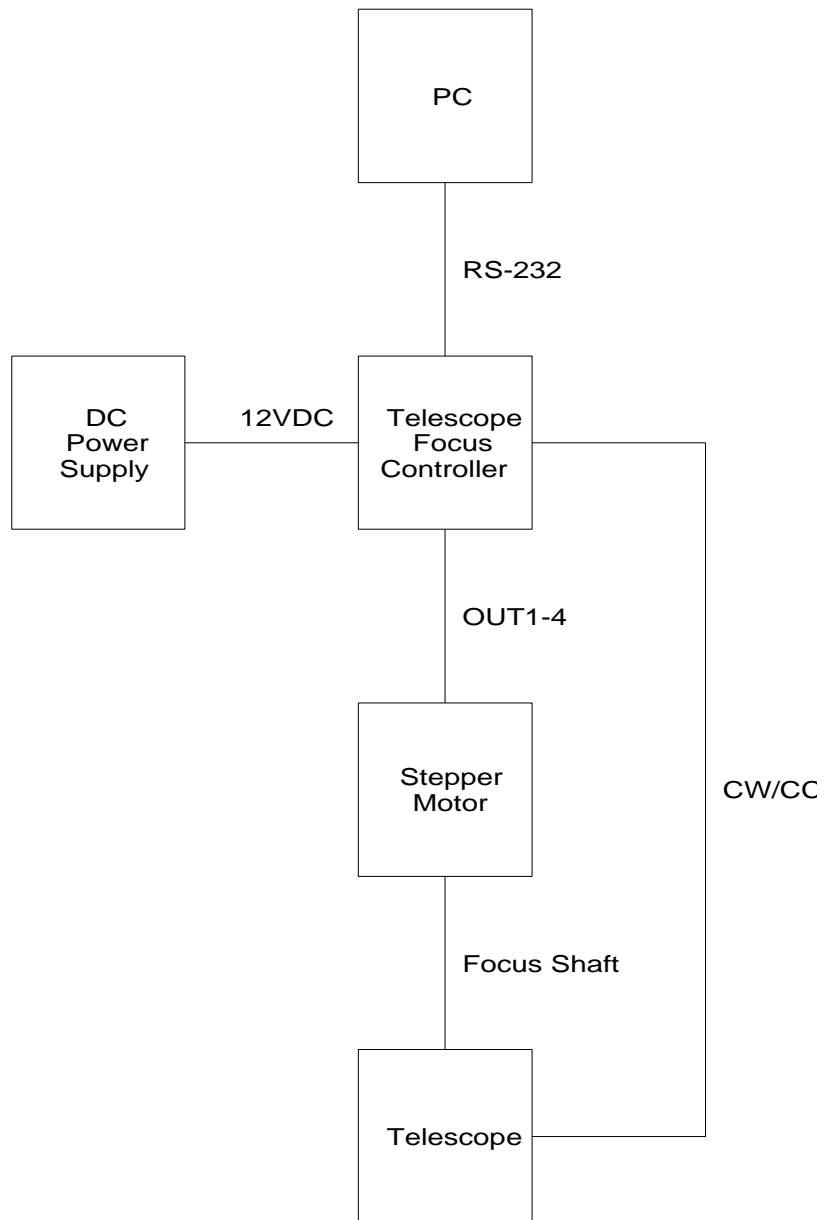
One of the difficulties with capturing images through a telescope with a CCD (charge coupled device) camera is achieving proper focus. I typically have a PC continuously acquiring images while I turn the focus knob and look at the peak intensity of a star. I keep turning the focus knob until I go past the peak and then have to turn the knob in the other direction until I get back to the peak. It is a trial and error process because I have no feedback on focus position and the peak intensity fluctuates due to sky conditions. There now exists PC software to automatically focus a telescope by sending position commands to a focus controller and monitoring the diameter of a star. This software is able to focus a telescope faster than a human can do it. There also exists commercial focus controllers, but I have not been satisfied with either their design or cost. So I decided to make my own.

**Description**

The Telescope Focus Controller was designed to allow computer control of the telescope focus position through a serial port. It also allows manual control through clockwise and counter-clockwise buttons on the telescope's keypad. It is a controller that drives a stepper motor that turns the focus shaft of a telescope.

### System Block Diagram

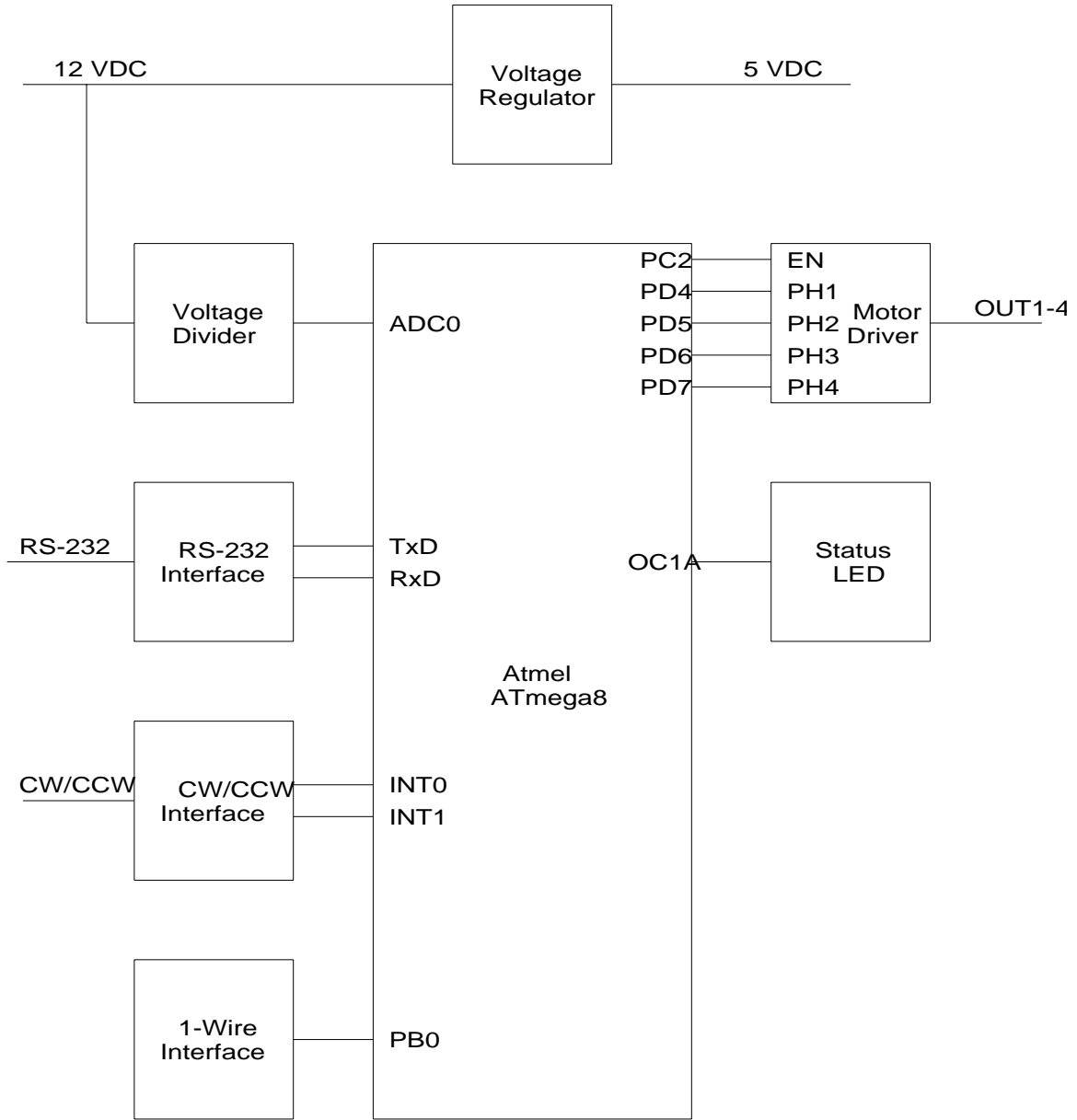
The System Block Diagram in Figure 1 shows how the Telescope Focus Controller connects to the telescope and the PC.



**System Block Diagram**

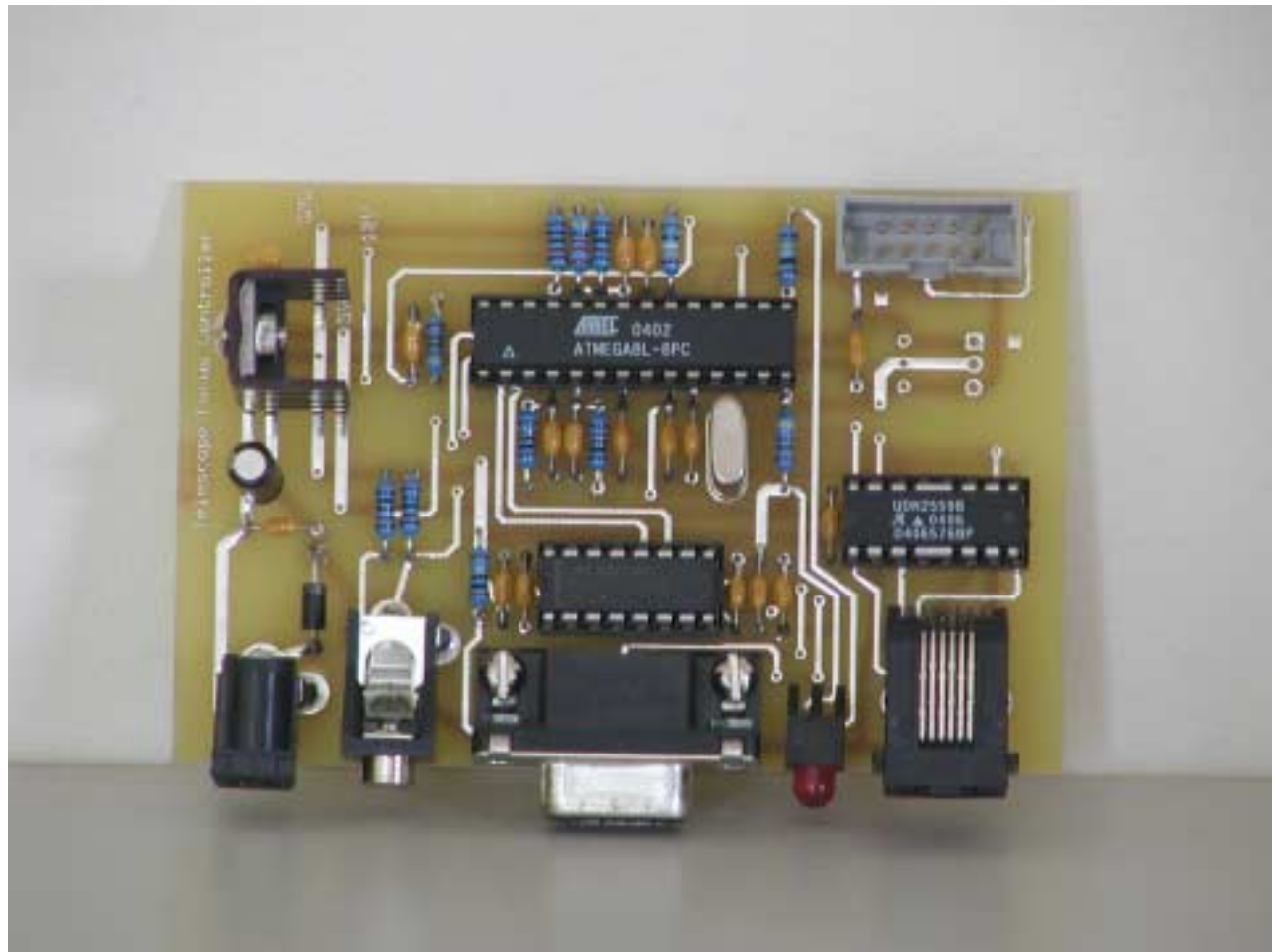
### Controller Block Diagram

The Controller Block Diagram in Figure 2 shows the major building blocks of the controller.



**Controller Block Diagram**





**Circuit Board Assembly**



**Controller**



**Motor Assembly**