Project Identity

Adjustable Back Angle Controller
Week 4
February 21, 2007
Ray Pennoyer

Work Completed

This week we expected to have the bed frame and the motor delivered to us by Friday the 16th, but we only received the motor in on Tuesday the 20th. The bed frame still has not been received, even though it has been in transit for over a week. The reason for the delays is presumably the bad weather on Wednesday, but the fact remains that we did not have much time to work with our new motor this week.

We unpacked the box and assured that we received what we had ordered. We obtained a MMP-PS-320W-48V power source with wall cord, MMP25A-48V speed control box, and MMPS28 150E-48V GP81-014 DC gear motor. Unfortunately, the packing slip seems to have been misplaced, and we are still working to find who has it.

The power supply has 9 connections as shown in Figure 1. The first 3 from the left are positive voltage outputs, the next three are negative, and then come the three connections for the wall plug. It was confirmed to have a 48V DC output.

Figure 1
Power Supply
The speed control that came with the motor used a single turn 10kΩ potentiometer, which is just what we needed. This pot has 3 long leads, each with a different color. The red and black ones are the 2 end leads, and the white one is the wiper. The pot attaches to the speed control box, which also has connections for ground, positive dc voltage, and the two motor leads. This control box is small (about 4.5”X2.25”X1”) and is manufactured in a way that makes it impossible to open without permanently damaging it. It works perfectly, but the problem is that this system only works in a single direction, and we need both. I will look into this issue further in the next few days.

The motor itself worked perfectly when we connected it to the power source and speed control as shown in Figure 2. When we turned the pot up the motor driveshaft spun faster, and vice versa. We could not, however, load the motor at this time because the gears that we had used previously on our test motor did not fit the key on the new motor’s driveshaft. Unloaded, it drew .18A of current and spun at a speed too fast to reliably measure using a stopwatch. Loading the motor will be a priority in the coming week.

![Figure 2](image)

**Figure 2**

*Assembled Motor Components*

In order to connect the motor to the scissor jack, we plan to use the connection from the manual handle that came with the jack. One end of this socket is machined with a hex connection that fits perfectly with the jack. The other end was designed to house a handle and is a circular socket that fits the motor’s driveshaft with a small amount of room to spare. If a 6mm key slot was cut into this side, the motor would be able to directly drive the jack.

One potential problem with this design is the machinability of the socket. Bill raised the point that it was made of super hardened metal that
may resist milling. We plan to meet with Rich and Serge in the machine shop as soon as possible.

**Future Work**

Now that we have the motor and the bed frame parts shipping this week, we can finally begin work constructing the prototype. I will immediately set to work researching a switch that will work with our new speed control system, and if I cannot find one, solidifying a circuit based on a microcontroller, and possibly an Allegro 3940 H-bridge driver. The motor frame can also be finished. The bed frame will also be worked around these dimensions. When I have the finished control circuit, we can buy or construct the insulated control box that will house both the circuit and the control handle mechanism.

**Project Review**

At this point we are excited that the end of the design phase is in sight, and we look forward to completing the project. I have multiple options for the control circuit, should one fail to work as expected. While I am a slightly wary that such a large portion of our budget has been used already, I know that the high cost parts have already been purchased, so it is unlikely that we will need the full amount of our remaining budget.

**Hours Worked**

Total hours worked this week: 10