

ISOMETRIC VIEW OF THE STEERING MECHNISM

2

Troubleshooting

MOTOR PROBLEMS

The blimp power system uses two servo motors to power the steering system (figure x). One motor controls the horizontal movement of the blimp steering system, while the other controls the vertical movement of the steering system.



X: Propulsion Motor for the Blimp

The two motors are used as the main propulsion for the blimp. The motors have 16" diameter propellers that are capable of producing 5lb of thrust at 10A.

Each servo motor has a power of 25 Watts and has sufficient holding power to compensate for adverse weather conditions.

Despite their simple design, the motors can experience some problems over extended use. In this section you will find a variety of problems the motor can experience and the possible causes.

WARNING

The following inspection list is for experienced engineers. If you attempt to fix the servo motor yourself you may damage the motor.

Motor Not Rotating

1. Check the connections and ensure there are no broken or loose connections in the wiring.
2. Inspect the bearings on the motor and check to see if they are worn. If they are discolored they may require replacement.
3. Look inside the motor and make sure there is no foreign matter.

Motor Overheating

1. Check to see if the voltage of the motor is exceeding the maximum allowed value.
2. Inspect the rotor to ensure it is not partially demagnetized, which would cause excessive motor current.

Abnormal Motor Noise

1. Check the bearings to see if they are worn.
2. Inspect the bolts connecting the motor to the system to make sure they are not loose.
3. Look for any loose parts present in the motor.

If you are having difficulty finding the exact problem with the blimp's motor consult the following sites:

MOTOR REPAIR WEBSITES

- Servotechusa.com
- Industrialautomationrepair.com
- Comotech.ca

SYSTEM LOAD DIFFICULTIES

If the Blimp does not turn on there are a variety of steps you can take to ensure that everything is in working order. The following steps act as a checklist for components to inspect to regain system operation.

Wiring

Making sure everything is properly connected is crucial to the performance of the system. If the blimp does not have proper wiring, the power generated from the solar panels may be lost without reaching the battery bank.

Step 1

Check the connection to the solar cells (figure x).



X: The Connecting Wires

The MC4 wire connectors used to connect the solar cells to the battery.

Step 2

Tighten the connection if it is loose. If the connection is tight, proceed to step 3.

Step 3

Check the wires for fraying. Replace frayed wires.

Battery Level

The problem could be with the system's battery level.

Step 1

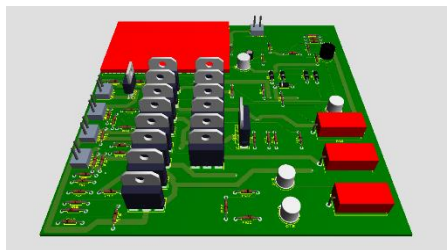
Check the battery level. If the batteries have been depleted then they are not receiving the proper charge.

Step 2

Inspect the voltage on the output bus of the system. The voltage reading should be the same as the one indicated on the solar panel. If they are not the same, proceed to step 3.

Step 3

Check the transistors (figure x) on switch number five on the circuit board (figure x). If they are damaged you will have to replace them. If they are fine, proceed to step 4.



X: The Circuit Board

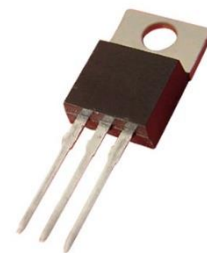
You can take the transistors out of the circuit board to inspect them for any damages.

Step 4

WARNING

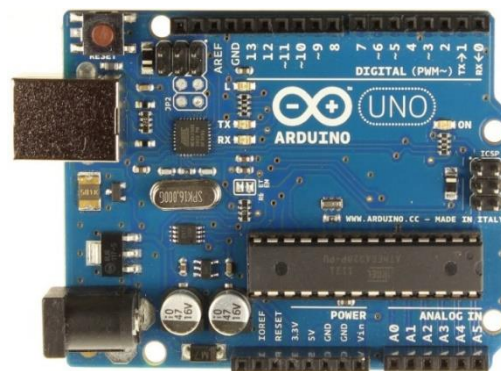
Removing the Arduino UNO microcontroller board without consulting the Arduino UNO's manual could result in a damaged chipboard. Visit Arduino.cc for instructions and more information.

Replace the microcontroller (figure x) on the microcontroller board (figure x). Check online for prices at: nkcelectronics.com



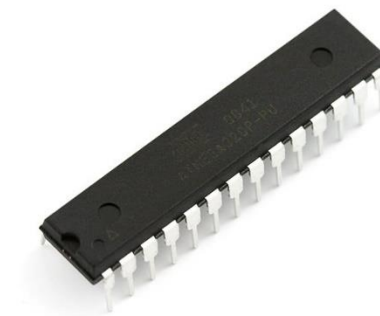
X: A Close Look at an NPN Transistor

A damaged NPN transistor will look bent or burnt. These components are easily replaceable and can be purchased online.



X: Arduino Microcontroller Board

Be careful when removing the microcontroller from the board. Using too much force could result in a damaged board.



The Arduino UNO Microcontroller

The Arduino UNO microcontroller can be detached from the chipboard and replaced for relatively cheap.

SOLAR PANEL PROBLEMS

While the sun may produce an almost unlimited amount of energy, the solar cells on the blimp's panel may experience problems and experience a decrease in energy output. Here are a few troubleshooting steps on how to ensure your panel is working properly.

Poor Solar Panel Performance

If the energy from your solar panels has diminished there are some steps you can take to test its efficiency using a multimeter (figure x):

Step 1

Conduct the test on a sunny day, making sure the panels are positioned in such so that they are fully exposed to the sun.

Step 2

Open the junction box's door to reveal the connections inside (figure x).

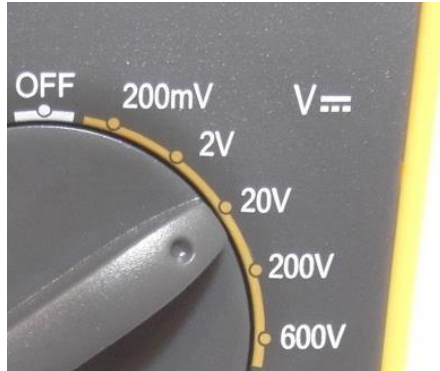


X: Open Junction Box

This is a close up view of the junction box, located in the back of the blimp's solar panels.

Step 3

Setup your multimeter to measure in direct current (figure x). Set to 200V.



X: Multimeter Controls

This is a close up view of the average multimeter. Use the V with straight line beside it to measure DC voltage.

Step 4

WARNING

When the solar panel is facing the sun the electrical current is live. Exercise the proper electrical safety procedures and beware of sparking when handling the wires.

Connect your multimeter to the open junction box. The red wire is positive and the black is negative.

Step 5

Read the test results on your multimeter. You will know if the panel is working properly if the voltage number on the multimeter matches the rated voltage of 12V

If the numbers on the multimeter are too low than the solar panel may be damaged. Consult a professional solar technician to check for deficiencies.



X: A Common Multimeter

A multimeter can be a valuable asset when attempting to discern possible problems with the blimp's power. Using a multimeter can help pinpoint the source of a problem without having to waste money replacing solar panels that are working properly.



X: The Blimp's Solar Panels

A picture of the blimp's solar panels prior to being installed on the blimp's surface.