

# The 2001 Solar/Electric Boat Project

The College of New Jersey  
Department of Engineering



**The 2001 Solar/Electric Boat Team at Hoyte Lake in Buffalo, New York. From the left: Norm "Doc" Asper, advisor; Joe Balisteri (Junior) rudder and steering designer; Steve Martenz (Senior) telemetry designer and fabricator; Bob Rasmussen (Senior) power system designer and fabricator; Marian Laboes (Junior) launching dolly designer and fabricator.**

**Contact:**

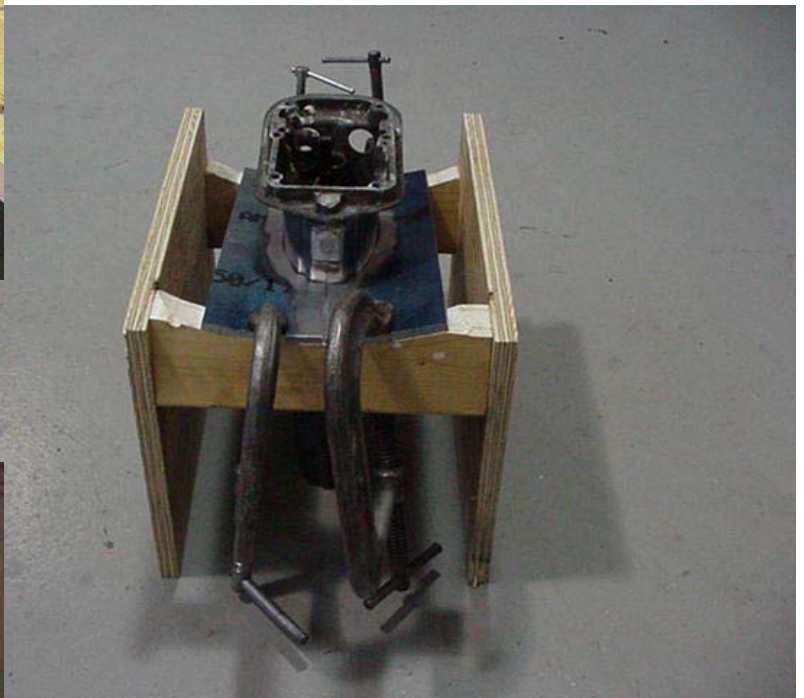
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Bob reassembling the modified OMC lower unit.



Welding jig used to attach mounting plate to lower unit



Fitting entire drive unit to bottom of hull.



Marian drilling mounting holes to attach lower unit.



John, Steve and Bob applying roving and resin under mounting flange.



Screwing lower unit and fiberglass sandwich to bottom of hull. Patch in foreground fills the drive unit opening used in the 2000 boat.



Casting A-B foam to shape keel/drive unit support. Aluminum post in center is mount for main hydrofoil.

Joe shaping foam keel in preparation for fiberglass.



Fiberglass applied to foam and plywood keel.



Moving amas and hydrofoil supports forward from 2000 position.

Determining driving position and size of cockpit.



Locating seat back, helm, and hydrofoil support bulkheads.



Brian verifying front hydrofoil mechanism on "Working Model".

Hydrofoil mechanism assembled with amas, wings, and skimmers.



Connecting/adjusting link between skimmer arm and wing supporting column.



Rear wing adjuster. Can change angle of attack of rear wing between sprint wings and endurance wings. Angle can also be changed between drivers. Tiller rod in background.



Tiller assembly. Actuated by "teleflex" cable and steering wheel.



John and Bob assembling new display boards. 2000 boards at rear. The new visual display was judged in third place by a panel of judges, netting 44 out of 50 points in overall score.



Interlux "Brightside" marine enamel applied to hull. Blue selected to match the "Solarex" solar panels. The school colors are blue and *gold*, but yellow seemed to be a better complement to the blue.





Graphics applied.



Launching dolly complete.



Final evening test on campus – Lake Sylva, at which point the decision was made to abandon the hydrofoils. It takes much more test time than we had allotted to be able to control a hydrofoil system. These final tests were eventually used to evaluate the performance of the boat as a conventional hull, stabilized by amas. Not as good as we had hoped, but acceptable.





Tent display area. Visual display on left won third place. The stationary (adjustable) solar charging panels are on the right.

In tent display area. Public had free access to this "pit" area.



"WAX ON – WAX OFF"



Launching area for qualifying.

Final instructions from Victor (in red shirt) the "launch master".





Steve in boat; "the team" on the dock. Boat is configured for sprint/slalom qualifying (36 volt sprint motor and vinyl cover).

Rice Univ. queuing up in slip behind us.

Qualifying also included assembling the boat in it's endurance configuration. The boat performed perfectly with it's 24 volt Elco motor and the solar panels in place.





Tom Batton and Rino Maglino (lower left to right) left work on Friday to join the team for the weekend. Both are juniors considering joining the team for 2002.

No trip to Buffalo would be complete without a visit to the original home of the "Buffalo Wing" -- and they were every bit of what you would expect!



Any trip to Buffalo would also have to include a night visit to "The Falls".



Not a good day for a solar event, so all the sprint heats were scheduled for the rainy Saturday. Good launching technique! Under umbrella is Jay Ross, owner of Protocol Electronics, a sponsor and industrial advisor for the telemetry system.

Setting the boat gently into the water.

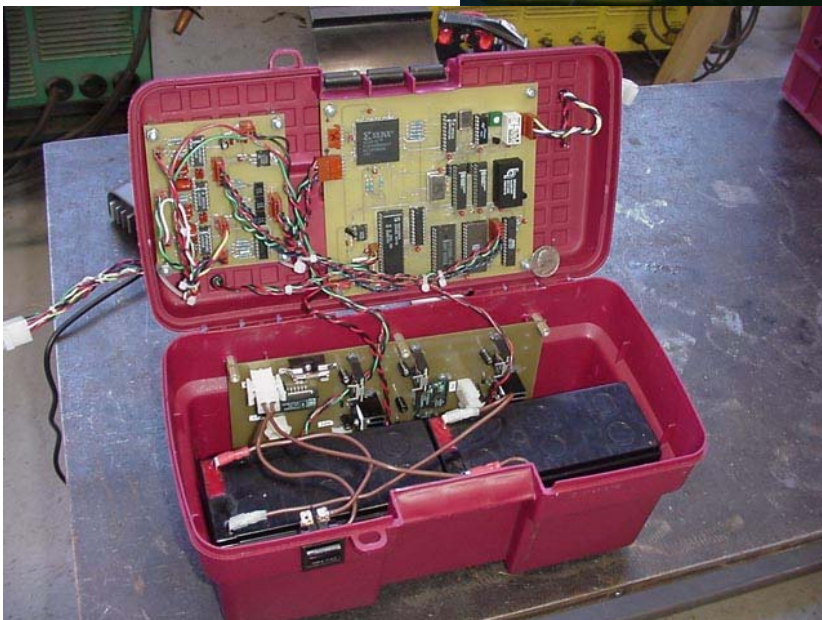


Steve's first heat went well, but the military surplus motor began falling off at about 275 meters. In the second heat, the motor would not respond at all, resulting in a DNS (Did Not Start). When disassembled, the motor, which was to deliver almost 15 hp at 8400 rpm, was completely burned up. All connections were melted off. The team earned a minimum number of points for this event.



As promised, Sunday dawned bright and sunny. A perfect day for a solar race. The charging panel topping off our endurance batteries.

The helm from the drivers vantage point. On the left the master override switch. The panel, in box above and to the left of the wheel, is the data monitoring system for the entire endurance electrical system. To the right of the wheel is the key switch, and the throttle. In the hat to the left of the picture is Jay Ross, Steve's industrial advisor for telemetry development.



Steve's on-board data collection system monitoring motor speed, boat speed, volts, amps, and count down timer. This data was then transmitted to a computer on shore.



The on-shore computer system receiving data from the telemetry system and analyzing it in real time.

Data analysis center. The next step will be a lap-top computer and receiver powered by one of our deep cycle batteries.



Boat launched for first heat (Sunday Morning) of the endurance race. Note the antenna mounted at the bow.



Ready for first heat of the endurance race.

The casual pace of the endurance race – how far can you go in two hours. A long time to be squeezed into that narrow cockpit. The boat performed well enough to earn a spot in the championship heat Sunday afternoon.





Boat on launching dolly before championship heat on Sunday afternoon. A good photo showing some of our very generous 2001 sponsors: Interpool Inc., Hess Oil, General Motors Truck Div., Elco Electric Launch Co., Schoor DePalma, Protocol Electronics, and Beesley's Point Sea-Doo. Elsewhere on the boat there are corporate logos of companies who helped us build the hull in 2000. These are AeroHydro Inc., Baltek Corporation, Hexcel Corp., and Mahogany of Mays Landing.





Hooking up solar panels for final endurance heat.

Moving to the highline.



Highline start of parade lap for the championship heat.



The endurance setup worked perfectly. At the end of two hours, the total available input from the solar panels and batteries was 2 volts, and the boat was still moving – albeit slowly. We finished in sixth place in total endurance points. We will need to build a new hull for 2002. If we drop the notion of flying on hydrofoils, and go back to AeroHydro's MultiSurf to design a hull which is stable without amas, we can easily drop 100 lbs from the overall weight. With conservative decision making and employing KISS engineering, we should be able to drop an additional 50 lbs. The endurance system with the Elco motor will work perfectly as a straight out inboard. More work has to be done with propeller selection, and the peak power tracking system must be improved. We will obviously have to find a new sprint motor and matching propeller. In the final official results, we slipped to a disappointing ninth place. Definitely a time for change.



One highlight of our participation in the event occurred at the opening dinner at the Buffalo Yacht Club. We were awarded the trophy for having submitted the best "Technical Report" of the project. The reports were evaluated by a panel of ASME judges, and this award added 100 (out of 100) total points to our overall score.

## The College of New Jersey Department of Engineering

## Solar Splash 2001

Date: June 20 to 24

Location: Buffalo, NY

### Technical Report

#### 2001 Team Members:

Project Manager: John Jacobsen

Telemetry Development: Steve Martenz

Peak Power Tracking: Sandin Feuss

Drive Train Design: Bob Rasmussen

Foil Design: Kelly Roche

# Boat # 5 Flyin' Lion II



Advisor: Dr. Norm Asper, Professor

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