

Report on International Star Class Performance Study - Crew and Helm Weight

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Introduction

The purpose of this study is to utilize VPP predictions to elucidate the effects of variation of crew and helmsman body weights on the performance of a Star class yacht.

U.S. Sailing provided results of full scale tank tests. This contribution is quite important since the standard VPP resistance predictions based on Delft series regression fits are known to be unreliable for light displacement yachts at higher speeds. SSR (zero-order slender ship approximation) was used to estimate the resistance effects of the varying displacements resulting from various crew weights. Crew moment variations were based on crew and helm center of gravity estimates derived from a recent Nelson-Marek study.

VPP and Race Model results are presented for a matrix of nine yachts:

	Crew Body Wt.			
	60.5 kg.	90.7 kg.	120.9 kg.	
Helm body weight	60.5 LH-LC	LH-MC	LH-HC	60.5 kg = 133 lb.
	90.7 MH-LC	MH-MC	MH-HC	90.7 kg. = 200 lb.
	120.9 HH-LC	HH-MC	HH-HC	120.9 kg. = 267 lb.

(Dressed weights were assumed 12.5% above body weight.)

The central case MH-MC (read "medium helm- medium crew") is considered to be the "base boat" throughout the study.

Hull Offsets

Offsets from the hull were required for input in file form into AeroHydro's AHVPP. Offsets were generated in MSURF from the MultiSurf model STAR.MSF using 20 stations with a spacing of 343 mm. Each station typically had 15 or 16 points.

STAR.MSF was constructed using the average of "max" and "min" offsets shown on the standard ISCYRA "Lines and Limitations" drawing no. 1, dated Sept. 1990, revised Feb. 1992. Bottom sections are accurate arcs; topside sections are flat.

Since the MultiSurf model did not include the keel, a point was added to the offset file at the lowest point on the trailing edge of the keel. The addition of this point enabled the VPP to estimate a value for effective draft.

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Flotation in Measurement Trim

Having obtained the offsets, the next step was to determine the correct sinkage and trim required to bring them to the measurement trim condition so that they could be input to the VPP. This was accomplished by compiling a weight schedule and using AeroHydro's Hydro/2 program to find the sinkage and trim.

Star Class Weight Schedule*

<u>Item</u>	<u>Wt(kg)</u>	<u>XCG(m)</u>	<u>ZCG(m)</u>	<u>X-Moment(kg-m)</u>	<u>Z-Moment(kg-m)</u>
Hull	246.5**	3.709	0.094	914.27	23.17
Keel	400.0	4.285	-0.750	1714.00	-300.00
Skeg	2.3	5.374	-0.268	12.36	-0.62
Rudder	4.5	5.782	-0.436	26.02	-1.96
Mast & Rigging	15.0	2.667	4.267	40.01	64.01
Boom	2.7	4.743	0.878	12.81	2.37
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	671.0			2719.47	-213.03

$$XCG = 4.053 \text{ m} \quad ZCG = -0.317 \text{ m}$$

*For boat in measurement trim condition.

**Hull weight includes weights of hull, deck, chainplates, jibstay attachment fitting, mast step and supporting structure, built-in bulkheads and deck supports, rudder post tube and flotation.

The displacement of the boat in measurement trim was taken as the minimum weight of 671 kg given in section 13.1 of the Star class specifications. Individual weights for the keel, skeg and mast were also derived from the specifications. The weights of the boom, rudder and rigging were estimated and the weight of the hull and deck structure was found by adding up the weights of all of the above items and subtracting it from the displacement. The center of gravity of the hull was calculated from the centers of area of the two surfaces in the MultiSurf model. The center of gravity of the other items was either eye-balled or obtained from rough calculations.

The offset file was used as input to Hydro/2 which is a program that performs hydrostatic calculations. While taking into account the missing keel and appendage volume, Hydro/2 was used to bring the offsets to the displacement and center of gravity specified from the weight schedule. The resultant sinkage and trim were then used to change the offsets so that they now represented the boat in its measurement trim condition.

Determination of Resistance Curves

To obtain the upright resistance curves for the five different crew and helmsman weight totals, three sources were checked and compared: a tank test performed on a full-size boat, the curve computed by the resistance model contained in AeroHydro's VPP and the curve computed by AeroHydro's Slender Ship Resistance (SSR) program, an implementation of Noblesse's zero-order slender ship approximation.

Data sheets were supplied by Karl Kirkman (Director of Research, U.S.Sailing) representing a 1986 full-size towing test of a competitive Star hull in the large tank at Tracor Hydronautics. It is our understanding that the towing was performed for the U. S. Olympics Committee. There is no formal report accompanying the data, so there are some assumptions involved in interpreting it, but we feel we are not making any large errors. The weight of the boat in towing condition is indicated as 893.6 kg. (1966 lbs.). (Ref. Karl Kirkman memo to Charles Morgan dated 5/17/94).

The towing test data was released under conditions that its use and distribution be limited to the purposes of this study. For this reason we have obscured the scale on the resistance graph, drag area vs. speed in knots (Figure 1).

Points from the tank test were plotted first. Only those points from Condition A in which the boat was upright without any yaw were used. These points covered a range of speed from 1.89 to 9.20 knots. The displacement of the test boat closely matched that of our base boat, so this curve was taken to represent the resistance for the base boat. It is noted that there is only a single data point from the tank above 7.2 kt., so the shape of the curve over a considerable speed range had to be guessed.

Next, the offset file representing the boat in the measurement trim condition along with the crew and gear weights was input to the VPP and its resistance model was used to compute a resistance curve in the same range as given by the tank test.

Finally, SSR was run with three cases: LH-LC, MH-MC (base) and HH-HC.

To make the UTP (unordered triangular panel surface) file required as input for each case, several steps had to be followed. First, the offset file representing the boat in measurement trim was loaded into Hydro/2. The crew weights for each of the three cases was added and the resulting change in sinkage and trim was noted. Then the Star model was loaded into MultiSurf and adjusted by the sinkage and trim for the first case. Twenty stations from the forward to the aft end of the waterline were created and an offset file of those stations saved. This process was repeated for the other two cases and the three offset files converted to UTP files by a utility program.

These files were input to SSR which computed resistances over the same range of speeds as the tank test. After correcting the frictional resistances for the wetted area of the keel and appendages, these points were plotted.

In comparing the curves, the VPP resistance model predicted about 0.1 sq.ft. (.01 sq. m.) higher drag area than what was found with the tank test, nearly a constant difference up to 6.5 kt. Above this range the VPP resistance is much too high, typical for light displacement cases. The curves obtained from SSR did not yield good quantitative results, presumably due to the Star not being sufficiently slender. As is typical for SSR applied to sailing hulls, the steep resistance increase is too early. However, the high speed behavior of the SSR results is qualitatively correct, i.e. going over a big hump and declining smoothly thereafter.

Thus, it was assumed that the tank test results provided the most accurate resistance curve, while the differences between the SSR curves could be used to estimate the resistance curves for the other four displacements. The curves for the lightest and heaviest displacement were generated by sketching a curve following along the tank test curve and offset by the approximate difference shown by the SSR curves. The two intermediate displacements were interpolated between. The resultant curves were used as input to the VPP in place of the ones computed by the VPP.

Crew Moment

Centers of gravity for the helmsman and crew were calculated from the information given in the report from Nelson/Marek. The report contained scale drawings showing the crew in a hiking position and the helmsman in both sitting and hiking positions. The centers of gravity obtained from the two helmsman positions (sitting and hiking) were averaged together to get one helmsman center. Total "crew moment" for VPP input was the sum of separate moments for helmsman and crew at zero heel. (Ref. "Report on Crew Weight and Stability for ISC Yachts", Nelson-Marek Yacht Design, dated 2/21/94)

Sail Measurements

The sail and hull measurements needed by the VPP to compute sail lift and drag characteristics were obtained from the sail plan and the Star class specifications. The measurements were taken as follows:

LOA: 6.934 m
LWL: 4.633 m
BMAX: 1.750 m
FF: 0.566 m
FA: 0.359 m
MDL1: 0.0635 m
MDT1: 0.0570 m
MDL2: 0.0380 m
MDT2: 0.0250 m
TL: 6.858 m
HBI: 0.438 m
I: 6.470 m
J: 2.201 m
BAS: 0.381 m
P: 9.271 m
E: 4.445 m
Area of Main: 23.356 m²

Explanation of Velocity Prediction Results

VTW: The true wind velocity in knots.

BTW: The track angle with respect to the true wind direction. BTW = 0 is dead to windward, BTW = 180 is dead downwind. This is the true course of the boat relative to still water (heading plus leeway angle) not just where the boat is pointing, but where it's actually going.

VAW: The apparent wind velocity in knots. This is the velocity of the wind as it appears to the boat.

BAW: The apparent wind angle. This is the angle at which the wind appears to be coming at the boat in relation to the course the boat is sailing.

V: The speed of the boat along the boat's true course.

VMG: The speed that the boat is making in either the windward (positive VMG) or downwind (negative VMG) directions. VMG is most relevant in regards to the optimum upwind and downwind cases.

HEEL: The heel angle of the boat.

FLAT (range 0 to 1): The extent to which the sails' lift coefficient is reduced below its maximum value for this apparent wind angle. FLAT = 1.00 is maximum lift; FLAT = 0.00 is zero lift; FLAT = 0.70 means a 30% reduction in lift from the maximum.

REEF (range 0 to 1): The extent to which the span of the rig is reduced by reefing. REEF = 1.00 is full hoist; REEF = 0.00 is bare poles; REEF = 0.80 means sail is reduced by 20% in span (measured from the deck).

SEC/N.M.: The boat's speed expressed in seconds per nautical mile. SEC/N.M. = 3600/V or 3600/VMG for the optimum upwind and downwind cases.

N/S: An "N" appears at the end of each result where the best speed was accomplished without the spinnaker raised or a spinnaker was non-existent. An "S" appears at the end of each result where the best speed was accomplished with the spinnaker raised.

Explanation of Race Model Results

Band Width: A measure of the margin of time required for one boat to be ensured a victory over another in a given race. It allows for the presence of some randomizing factors (i.e., turbulence in the wind and water, small deviations from optimum trim and heading, small errors and accidents) which would produce results different from the simple time differences one could derive from the velocity predictions. Band width is expressed as a percentage of the total time required to complete the course. Examples of typical values would be 2% for high caliber racing (e.g. the America's Cup) and 5% for club racing situations.

2% Band Width was used throughout.

Edge: Represents an arbitrary time advantage due to factors other than the basic design of the boat (such as superior technology, superior sailing ability, or greater knowledge of the race area). This quantity is also expressed as a percentage of the total time required to complete the course. A positive value indicates that "Boat A" has the advantage while a negative value indicates "Boat B" has the advantage.

Edge was taken as 0 throughout.

The upper table on each Race Model output page shows the probabilities that "Boat B" (identified above the table) will beat "Boat A". This will range from 0% (meaning "Boat B" has no chance of beating "Boat A") to 100% ("Boat B" will always beat "Boat A" for the given case). Each row of the table corresponds to a mean true wind speed (6, 8, 10, 12, 14 and 16 knots) for a race series. Each column corresponds to a standard deviation from the mean true wind speed from 0% (wind speed is the same for each race) to 50% (wind fluctuates a good deal from race to race; 2/3 of the races have wind between 0.5 VT and 1.5 VT). An "N/A" in place of a percentage for a case means that the velocity predictions files did not contain a sufficient range of true wind speeds to adequately extrapolate a result.

The lower table shows the total time (in seconds) required for each boat to complete the course in each of the constant true wind speeds, along with the differences in course times.

All results are presented using Boat A as the MH-MC "base boat" for the study.

Figures 2 and 3 are results for a 17.07 naut. mi. triangular course consisting of a 0-degree windward leg and two reaching legs at 135 deg. Figure 2 shows win probabilities of each boat sailing against the base boat, as a function of true wind speed (20% standard deviation). Figure 3 shows course time differences.

Figures 4 and 5 are results for a 10.00 naut. mi. winward-leeward course. Figure 4 shows win probabilities of each boat sailing against the base boat, as a function of true wind speed (20% standard deviation). Figure 5 shows course time differences.

File Naming Conventions

The identification of the boats in the graphs and file names is based upon the different combinations of helmsman and crew weights. Each boat has a five character name. The first two characters identify the weight of the helmsman (LH indicates a light weight helmsman, MH indicates a medium weight helmsman and HH indicates a heavy weight helmsman). The third character is a hyphen and the last two characters identify the weight of the crew (LC indicates a light weight crew, MC indicates a medium weight crew and HC indicates a heavy weight crew).

The file names for the race model results have eight characters. All of the race model results are for the base boat being compared against one of the other eight boats, so the first five characters in the file name identify the boat against which the base is being compared. This is followed by

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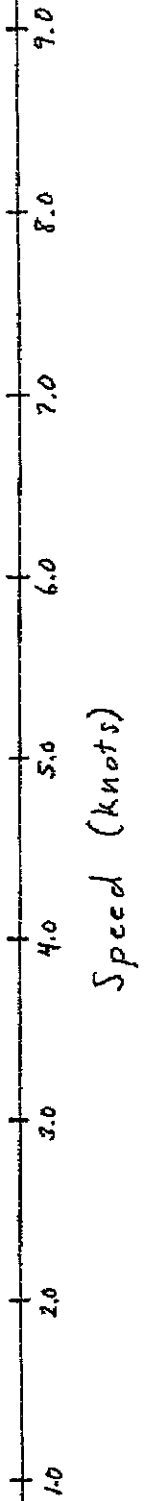
an underscore and two characters which identify the course (TR for triangular course and WL for windward/leeward).

star.wri

Figure 1

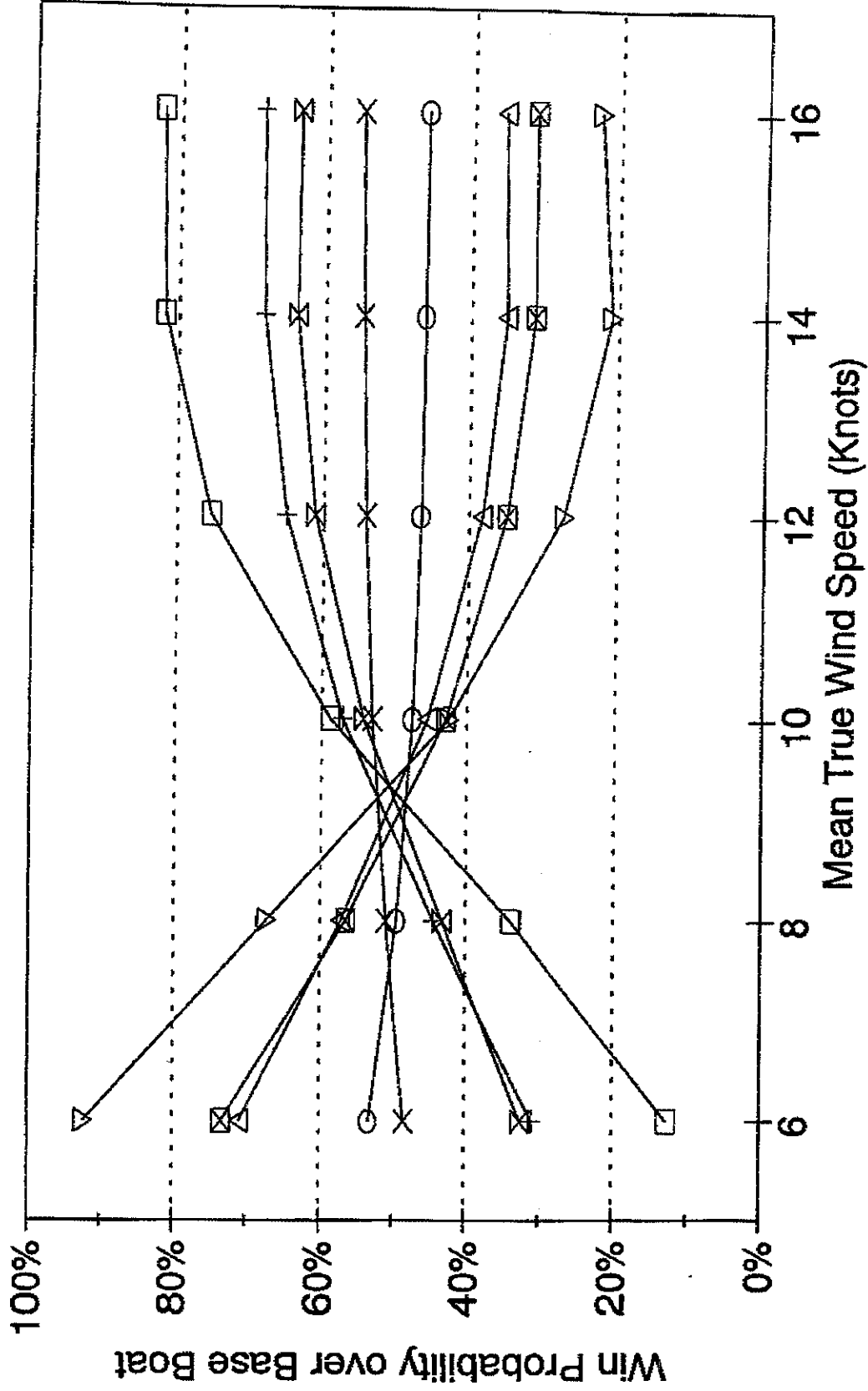
- Tank Test
- VPP Resistance Model
- ◇ SSR (Light Helmsman & Light Crew)
- △ SSR (Medium Helmsman & Medium Crew)
- ▽ SSR (Heavy Helmsman & Heavy Crew)
- Estimated (Heavy Helmsman & Heavy Crew)
- Estimated (Light Helmsman & Light Crew)

Drag Area
x 1000
(m²)



Star Class Triangular Course
 20% Std. Dev. from Mean True Wind

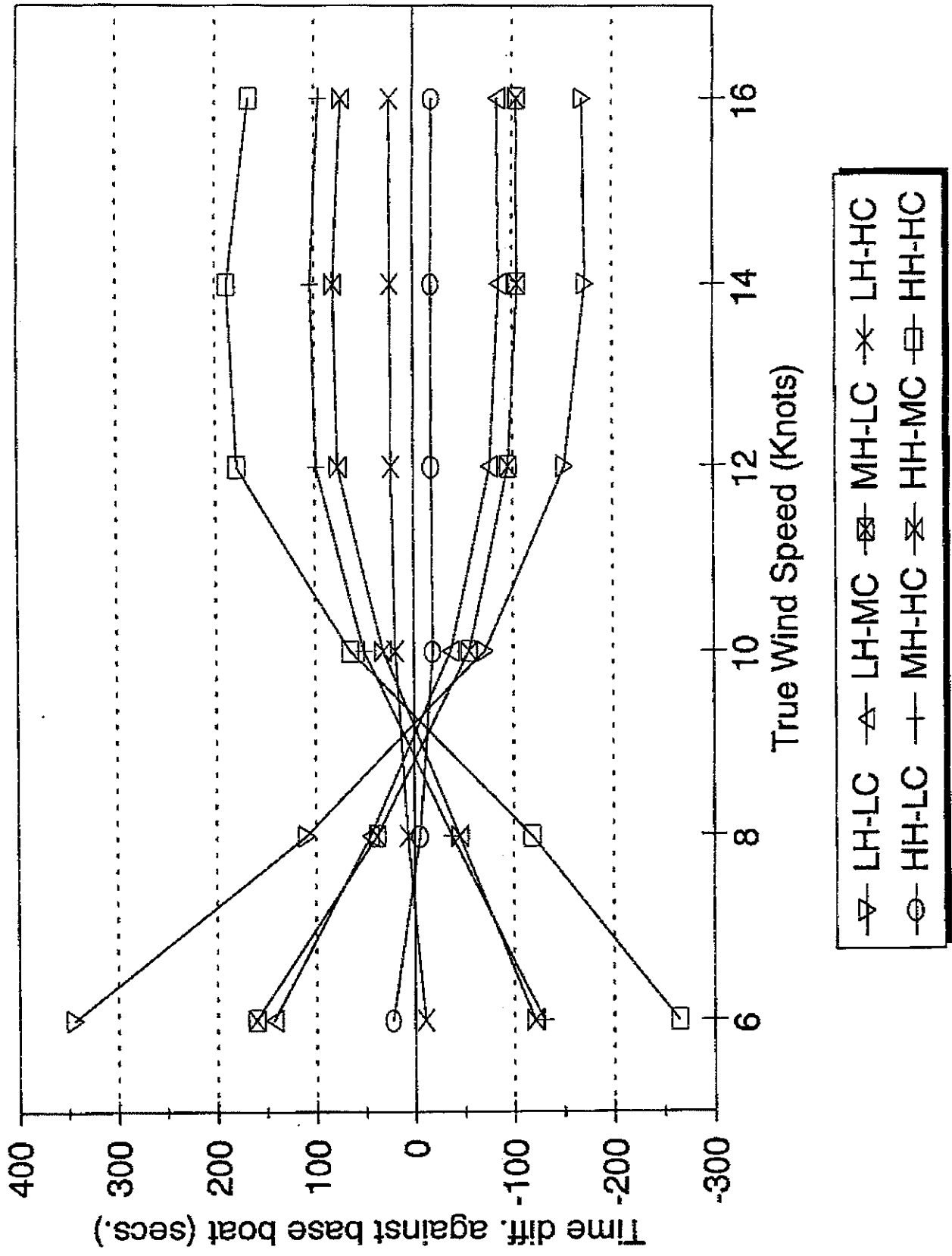
Figure 2



- △— LH-LC
- HH-LC
- LH-MC
- MH-LC
- MH-HC
- HH-HC
- LH-HC
- HH-HC

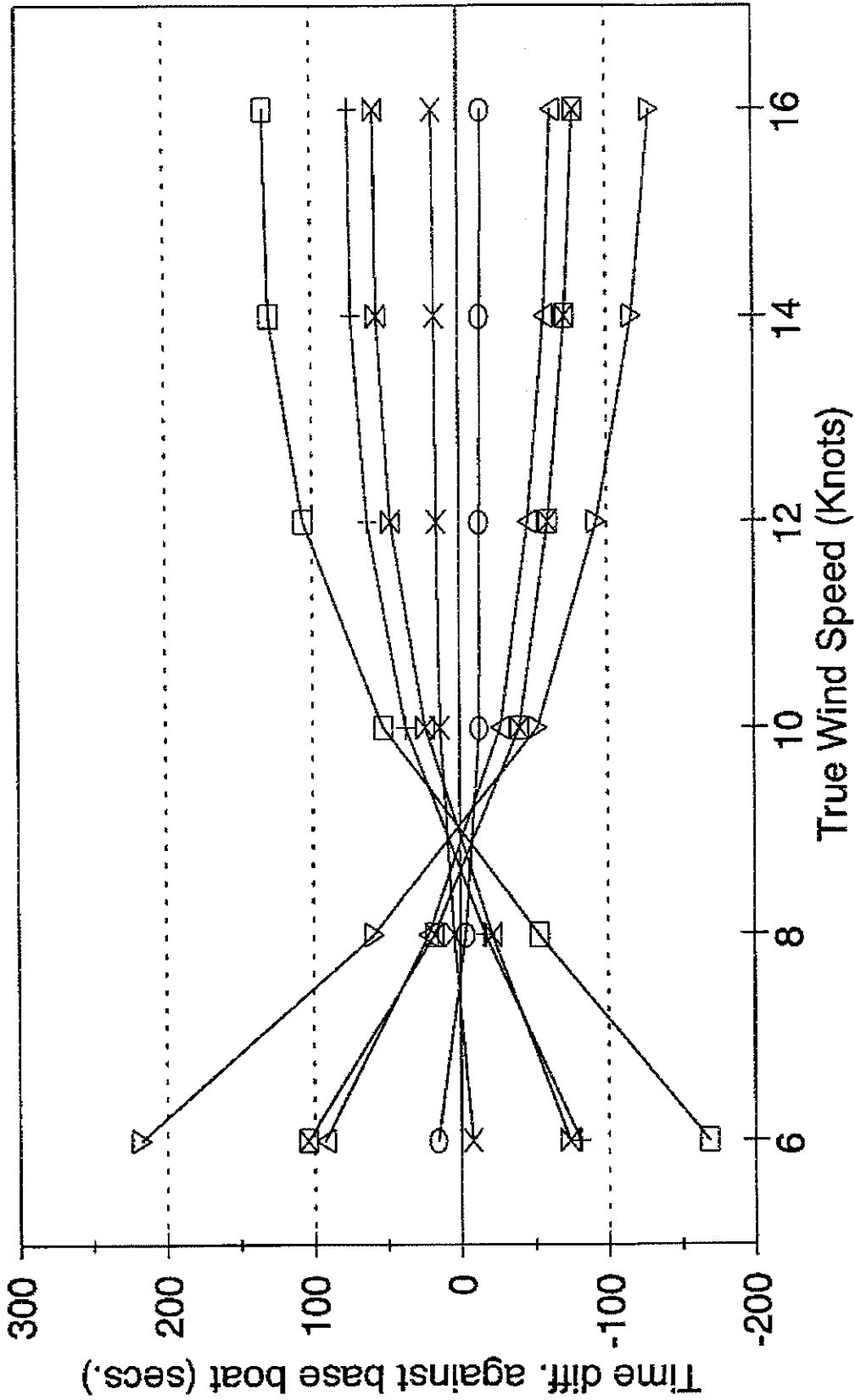
Figure 3

Star Class Triangular Course



Star Class Windward Leeward Course

Figure 5



- ▽— LH-LC
- LH-MC
- +— MH-LC
- *— LH-HC
- +— HH-LC
- HH-HC

Appendix

(Velocity Prediction and Race Model Results)

Velocity Predictions File: LH-LC.VPP -- 06-14-1994 08:03:10
 Star Class - 68 kg helm & 68 kg crew

VTW	BTW	VAW	BAW	V	VMG	HEEL	FLAT	REEF	SEC/N.M.
6.0	46.64	9.26	24.67	4.6845	3.22	12.0	1.00	1.00	1119.41 N
6.0	174.83	2.54	168.86	2.9344	-2.92	0.2	1.00	1.00	1231.84 N
6.0	60.00	9.26	29.75	5.3247	2.66	12.3	1.00	1.00	678.09 N
6.0	75.00	8.64	37.10	5.4810	1.42	7.8	1.00	1.00	656.82 N
6.0	90.00	7.67	45.14	5.4097	0.00	4.3	1.00	1.00	665.47 N
6.0	105.00	6.46	54.47	5.1677	-1.34	2.9	1.00	1.00	696.63 N
6.0	120.00	5.09	68.02	4.6313	-2.32	1.7	1.00	1.00	777.32 N
6.0	135.00	3.87	94.51	3.5516	-2.51	0.8	1.00	1.00	1013.62 N
6.0	150.00	3.20	121.53	3.0497	-2.64	0.6	1.00	1.00	1180.45 N
6.0	165.00	2.70	148.49	2.9652	-2.86	0.4	1.00	1.00	1214.10 N
VTW	BTW	VAW	BAW	V	VMG	HEEL	FLAT	REEF	SEC/N.M.
9.0	41.43	12.21	23.77	5.1198	3.84	22.9	0.76	1.00	937.80 N
9.0	174.68	3.88	168.73	4.3394	-4.32	0.4	1.00	1.00	833.19 N
9.0	60.00	11.83	31.76	6.0461	3.02	26.3	0.88	0.98	595.43 N
9.0	75.00	11.09	38.81	6.5600	1.70	26.5	1.00	1.00	548.78 N
9.0	90.00	10.29	50.97	6.4796	0.00	11.4	1.00	1.00	555.59 N
9.0	105.00	8.77	63.98	5.9614	-1.54	4.0	1.00	1.00	603.88 N
9.0	120.00	7.22	78.67	5.5078	-2.75	2.4	1.00	1.00	653.62 N
9.0	135.00	5.84	97.84	4.9878	-3.53	1.4	1.00	1.00	721.77 N
9.0	150.00	4.84	122.32	4.4971	-3.89	1.1	1.00	1.00	800.52 N
9.0	165.00	4.10	148.96	4.3843	-4.23	0.8	1.00	1.00	821.11 N
VTW	BTW	VAW	BAW	V	VMG	HEEL	FLAT	REEF	SEC/N.M.
12.0	40.80	14.70	25.28	5.2815	4.00	24.8	0.71	0.90	900.44 N
12.0	176.44	5.59	173.04	5.3395	-5.33	0.6	1.00	1.00	675.53 N
12.0	60.00	14.11	34.94	6.3384	3.17	26.8	0.98	0.84	567.97 N
12.0	75.00	13.26	42.99	6.9724	1.80	27.3	1.00	0.90	516.32 N
12.0	90.00	12.14	51.33	7.5885	0.00	27.6	1.00	1.00	474.40 N
12.0	105.00	11.20	68.76	6.8748	-1.78	7.3	1.00	1.00	523.65 N
12.0	120.00	9.46	85.41	6.2093	-3.10	3.2	1.00	1.00	579.78 N
12.0	135.00	7.97	104.75	5.6829	-4.02	2.1	1.00	1.00	633.48 N
12.0	150.00	6.78	126.48	5.4145	-4.69	1.7	1.00	1.00	664.88 N
12.0	165.00	5.88	151.32	5.3762	-5.19	1.3	1.00	1.00	669.62 N
VTW	BTW	VAW	BAW	V	VMG	HEEL	FLAT	REEF	SEC/N.M.
15.0	41.40	17.03	27.09	5.4095	4.06	25.5	0.75	0.80	887.16 N
15.0	176.35	7.57	173.43	6.0822	-6.07	1.0	1.00	1.00	593.10 N
15.0	60.00	16.34	37.34	6.5471	3.27	27.4	1.00	0.75	549.86 N
15.0	75.00	15.41	46.10	7.3193	1.89	27.8	1.00	0.81	491.85 N
15.0	90.00	14.19	54.94	8.1492	0.00	28.3	1.00	0.91	441.76 N
15.0	105.00	13.29	66.36	8.8196	-2.28	20.8	1.00	1.00	408.18 N
15.0	120.00	11.77	88.91	7.0376	-3.52	4.4	1.00	1.00	511.54 N
15.0	135.00	10.17	108.81	6.3592	-4.50	3.0	1.00	1.00	566.11 N
15.0	150.00	8.86	129.80	6.1312	-5.31	2.5	1.00	1.00	587.16 N
15.0	165.00	7.88	153.41	6.1211	-5.91	1.8	1.00	1.00	588.13 N
VTW	BTW	VAW	BAW	V	VMG	HEEL	FLAT	REEF	SEC/N.M.
18.0	42.47	19.25	28.92	5.5083	4.06	26.3	0.80	0.71	886.04 N
18.0	175.73	9.52	172.65	6.8756	-6.86	1.4	1.00	1.00	525.05 N
18.0	60.00	18.52	39.22	6.6935	3.35	27.9	1.00	0.69	537.84 N
18.0	75.00	17.52	48.48	7.6193	1.97	28.4	1.00	0.75	472.48 N
18.0	90.00	16.25	57.55	8.7196	0.00	28.8	1.00	0.84	412.86 N
18.0	105.00	14.76	65.74	10.1781	-2.63	28.7	1.00	0.94	353.70 N
18.0	120.00	13.97	87.54	8.7613	-4.38	9.2	1.00	1.00	410.90 N
18.0	135.00	12.34	110.83	7.1744	-5.07	4.1	1.00	1.00	501.78 N
18.0	150.00	10.92	131.61	6.9154	-5.99	3.5	1.00	1.00	520.58 N
18.0	165.00	9.83	154.52	6.9233	-6.69	2.5	1.00	1.00	519.98 N
VTW	BTW	VAW	BAW	V	VMG	HEEL	FLAT	REEF	SEC/N.M.
21.0	43.85	21.40	30.77	5.5879	4.03	27.1	0.84	0.65	893.36 N
21.0	174.49	11.23	170.60	7.9203	-7.88	2.0	1.00	1.00	456.64 N
21.0	60.00	20.65	40.75	6.7901	3.40	28.4	1.00	0.64	530.19 N
21.0	75.00	19.59	50.36	7.8752	2.04	29.0	1.00	0.70	457.13 N
21.0	90.00	18.31	59.41	9.3180	0.00	29.2	1.00	0.77	386.35 N
21.0	105.00	16.90	66.21	11.5429	-2.99	28.7	1.00	0.84	311.88 N
21.0	120.00	14.82	73.72	13.4577	-6.73	28.0	1.00	0.96	267.51 N
21.0	135.00	14.30	110.39	8.4997	-6.01	6.1	1.00	1.00	423.54 N
21.0	150.00	12.78	131.96	7.9738	-6.91	4.6	1.00	1.00	451.48 N
21.0	165.00	11.55	154.73	7.9858	-7.71	3.1	1.00	1.00	450.80 N

Velocity Predictions File: LH-MC.VFP -- 06-14-1994 08:05:38
 Star Class - 68 kg helm & 102 kg crew

VTW	BTW	VAW	BAW	V	VMG	HEEL	FLAT	REEP	SEC/N.M.
6.0	46.75	9.21	25.18	4.6091	3.16	8.6	1.00	1.00	1139.99 N
6.0	174.81	2.56	168.86	2.9240	-2.91	0.2	1.00	1.00	1236.27 N
6.0	60.00	9.23	30.29	5.2505	2.63	8.9	1.00	1.00	685.65 N
6.0	75.00	8.62	37.47	5.4277	1.40	5.3	1.00	1.00	663.26 N
6.0	90.00	7.66	45.26	5.3898	0.00	3.7	1.00	1.00	667.93 N
6.0	105.00	6.45	54.70	5.1365	-1.33	2.6	1.00	1.00	700.87 N
6.0	120.00	5.06	68.86	4.5524	-2.28	1.5	1.00	1.00	790.80 N
6.0	135.00	3.87	94.80	3.5324	-2.50	0.7	1.00	1.00	1019.13 N
6.0	150.00	3.21	121.72	3.0372	-2.63	0.5	1.00	1.00	1185.30 N
6.0	165.00	2.71	148.61	2.9545	-2.85	0.4	1.00	1.00	1218.48 N
9.0	41.58	12.27	23.97	5.1661	3.86	21.7	0.80	1.00	931.51 N
9.0	174.78	3.91	169.03	4.3072	-4.29	0.4	1.00	1.00	839.29 N
9.0	60.00	11.94	31.80	6.1205	3.06	25.5	0.88	1.00	588.19 N
9.0	75.00	11.31	39.64	6.6196	1.71	22.3	1.00	1.00	543.34 N
9.0	90.00	10.30	51.72	6.3836	0.00	7.9	1.00	1.00	563.94 N
9.0	105.00	8.77	64.00	5.9620	-1.54	3.5	1.00	1.00	603.82 N
9.0	120.00	7.22	78.72	5.5018	-2.75	2.2	1.00	1.00	654.33 N
9.0	135.00	5.84	98.18	4.9528	-3.50	1.3	1.00	1.00	726.87 N
9.0	150.00	4.86	122.73	4.4560	-3.86	1.0	1.00	1.00	807.89 N
9.0	165.00	4.13	149.19	4.3511	-4.20	0.7	1.00	1.00	827.38 N
12.0	40.79	14.81	25.35	5.3420	4.04	24.0	0.71	0.92	890.16 N
12.0	176.35	5.60	172.88	5.3318	-5.32	0.6	1.00	1.00	676.56 N
12.0	60.00	14.24	34.96	6.4252	3.21	26.1	0.98	0.86	560.29 N
12.0	75.00	13.40	42.99	7.0611	1.83	26.6	1.00	0.91	509.84 N
12.0	90.00	12.47	52.23	7.6404	0.00	23.6	1.00	1.00	471.18 N
12.0	105.00	11.21	69.26	6.7919	-1.76	5.1	1.00	1.00	530.05 N
12.0	120.00	9.46	85.39	6.2126	-3.11	2.9	1.00	1.00	579.47 N
12.0	135.00	7.97	104.73	5.6847	-4.02	1.9	1.00	1.00	633.27 N
12.0	150.00	6.78	126.53	5.4077	-4.68	1.6	1.00	1.00	665.72 N
12.0	165.00	5.89	151.35	5.3690	-5.19	1.2	1.00	1.00	670.52 N
15.0	41.41	17.16	27.17	5.4855	4.11	24.7	0.75	0.81	874.98 N
15.0	176.40	7.57	173.50	6.0892	-6.08	0.9	1.00	1.00	592.38 N
15.0	60.00	16.49	37.37	6.6436	3.32	26.6	1.00	0.77	541.88 N
15.0	75.00	15.57	46.12	7.4124	1.92	27.1	1.00	0.83	485.67 N
15.0	90.00	14.34	55.00	8.2228	0.00	27.5	1.00	0.93	437.81 N
15.0	105.00	13.56	68.73	8.4280	-2.18	15.1	1.00	1.00	427.15 N
15.0	120.00	11.78	89.14	6.9912	-3.50	3.8	1.00	1.00	514.93 N
15.0	135.00	10.17	108.80	6.3602	-4.50	2.7	1.00	1.00	566.02 N
15.0	150.00	8.86	129.78	6.1361	-5.31	2.3	1.00	1.00	586.70 N
15.0	165.00	7.87	153.39	6.1271	-5.92	1.7	1.00	1.00	587.55 N
18.0	42.44	19.41	28.98	5.5958	4.13	25.4	0.79	0.73	871.78 N
18.0	175.93	9.53	172.99	6.8610	-6.84	1.3	1.00	1.00	526.03 N
18.0	60.00	18.59	39.26	6.7991	3.40	27.1	1.00	0.70	529.48 N
18.0	75.00	17.70	48.52	7.7151	2.00	27.6	1.00	0.76	466.61 N
18.0	90.00	16.44	57.56	8.8166	0.00	27.9	1.00	0.85	408.32 N
18.0	105.00	14.93	65.90	10.2272	-2.65	27.8	1.00	0.96	352.00 N
18.0	120.00	14.09	89.77	8.2292	-4.11	5.7	1.00	1.00	437.47 N
18.0	135.00	12.37	111.04	7.1256	-5.04	3.6	1.00	1.00	505.22 N
18.0	150.00	10.93	131.68	6.8936	-5.97	3.1	1.00	1.00	522.22 N
18.0	165.00	9.85	154.57	6.9053	-6.67	2.3	1.00	1.00	521.34 N
21.0	43.76	21.58	30.79	5.6843	4.11	26.2	0.84	0.66	876.84 N
21.0	174.86	11.31	171.32	7.8248	-7.79	1.8	1.00	1.00	461.93 N
21.0	60.00	20.85	40.81	6.9051	3.45	27.6	1.00	0.65	521.35 N
21.0	75.00	19.79	50.42	7.9758	2.06	28.1	1.00	0.71	451.37 N
21.0	90.00	18.55	59.34	9.4574	0.00	28.2	1.00	0.79	380.66 N
21.0	105.00	16.91	68.01	11.0919	-2.87	28.0	1.00	0.88	324.56 N
21.0	120.00	15.56	81.21	11.8260	-5.91	20.0	1.00	1.00	304.41 N
21.0	135.00	14.43	111.30	8.2491	-5.83	4.8	1.00	1.00	436.41 N
21.0	150.00	12.87	132.33	7.8556	-6.80	4.0	1.00	1.00	458.27 N
21.0	165.00	11.65	154.94	7.8836	-7.61	2.8	1.00	1.00	456.65 N

Velocity Predictions File: MH-LC.VPP -- 06-14-1994 08:07:00
 Star Class - 102 kg helm & 68 kg crew

VTW	BTW	VAW	BAW	V	VMG	HEEL	FLAT	REEF	SEC/N.M.
6.0	46.75	9.22	25.13	4.6184	3.16	9.1	1.00	1.00	1137.74 N
6.0	174.80	2.56	168.86	2.9240	-2.91	0.2	1.00	1.00	1236.25 N
6.0	60.00	9.24	30.22	5.2627	2.63	9.3	1.00	1.00	684.06 N
6.0	75.00	8.62	37.44	5.4340	1.41	5.5	1.00	1.00	662.49 N
6.0	90.00	7.66	45.25	5.3930	0.00	3.8	1.00	1.00	667.54 N
6.0	105.00	6.45	54.69	5.1382	-1.33	2.6	1.00	1.00	700.63 N
6.0	120.00	5.06	68.84	4.5535	-2.28	1.5	1.00	1.00	790.60 N
6.0	135.00	3.87	94.79	3.5329	-2.50	0.7	1.00	1.00	1019.00 N
6.0	150.00	3.21	121.72	3.0374	-2.63	0.5	1.00	1.00	1185.24 N
6.0	165.00	2.71	148.61	2.9546	-2.85	0.4	1.00	1.00	1218.45 N
9.0	41.56	12.26	23.97	5.1537	3.86	21.7	0.79	1.00	933.49 N
9.0	174.77	3.91	169.01	4.3073	-4.29	0.4	1.00	1.00	839.28 N
9.0	60.00	11.92	31.85	6.1028	3.05	25.4	0.88	1.00	589.89 N
9.0	75.00	11.27	39.51	6.6080	1.71	23.1	1.00	1.00	544.79 N
9.0	90.00	10.31	51.59	6.4042	0.00	8.4	1.00	1.00	562.13 N
9.0	105.00	8.77	63.98	5.9652	-1.54	3.6	1.00	1.00	603.50 N
9.0	120.00	7.22	78.71	5.5031	-2.75	2.2	1.00	1.00	654.18 N
9.0	135.00	5.84	98.19	4.9522	-3.50	1.3	1.00	1.00	726.96 N
9.0	150.00	4.86	122.73	4.4556	-3.86	1.0	1.00	1.00	807.97 N
9.0	165.00	4.13	149.18	4.3509	-4.20	0.7	1.00	1.00	827.41 N
12.0	40.82	14.79	25.40	5.3279	4.03	23.9	0.71	0.92	892.88 N
12.0	176.34	5.60	172.86	5.3320	-5.32	0.6	1.00	1.00	676.54 N
12.0	60.00	14.22	35.02	6.4043	3.20	26.0	0.98	0.85	562.13 N
12.0	75.00	13.37	43.07	7.0342	1.82	26.5	1.00	0.91	511.78 N
12.0	90.00	12.42	52.17	7.6152	0.00	24.2	1.00	1.00	472.74 N
12.0	105.00	11.21	69.21	6.8011	-1.76	5.2	1.00	1.00	529.32 N
12.0	120.00	9.46	85.38	6.2149	-3.11	2.9	1.00	1.00	579.26 N
12.0	135.00	7.97	104.73	5.6857	-4.02	2.0	1.00	1.00	633.17 N
12.0	150.00	6.78	126.52	5.4082	-4.68	1.6	1.00	1.00	665.65 N
12.0	165.00	5.89	151.35	5.3692	-5.19	1.2	1.00	1.00	670.49 N
15.0	41.43	17.14	27.23	5.4690	4.10	24.6	0.75	0.81	877.94 N
15.0	176.38	7.57	173.48	6.0895	-6.08	0.9	1.00	1.00	592.36 N
15.0	60.00	16.47	37.42	6.6192	3.31	26.5	1.00	0.76	543.87 N
15.0	75.00	15.54	46.22	7.3790	1.91	27.0	1.00	0.83	487.87 N
15.0	90.00	14.31	55.16	8.1726	0.00	27.5	1.00	0.93	440.49 N
15.0	105.00	13.53	68.49	8.4683	-2.19	15.9	1.00	1.00	425.12 N
15.0	120.00	11.78	89.11	6.9962	-3.50	3.9	1.00	1.00	514.57 N
15.0	135.00	10.17	109.79	6.3620	-4.50	2.7	1.00	1.00	565.86 N
15.0	150.00	8.86	129.77	6.1372	-5.32	2.3	1.00	1.00	586.58 N
15.0	165.00	7.87	153.39	6.1278	-5.92	1.7	1.00	1.00	587.49 N
18.0	42.47	19.39	29.03	5.5773	4.11	25.4	0.80	0.72	875.13 N
18.0	175.91	9.53	172.97	6.8616	-6.84	1.3	1.00	1.00	526.00 N
18.0	60.00	18.67	39.32	6.7715	3.39	27.1	1.00	0.70	531.64 N
18.0	75.00	17.67	48.62	7.6739	1.99	27.6	1.00	0.76	469.12 N
18.0	90.00	16.39	57.77	8.7430	0.00	27.9	1.00	0.85	411.76 N
18.0	105.00	14.89	66.27	10.1221	-2.62	27.8	1.00	0.96	355.66 N
18.0	120.00	14.08	89.66	8.2556	-4.13	5.9	1.00	1.00	436.07 N
18.0	135.00	12.36	111.02	7.1296	-5.04	3.6	1.00	1.00	504.94 N
18.0	150.00	10.93	131.67	6.8960	-5.97	3.1	1.00	1.00	522.04 N
18.0	165.00	9.85	154.56	6.9068	-6.67	2.3	1.00	1.00	521.23 N
21.0	43.80	21.55	30.85	5.6641	4.09	26.1	0.84	0.66	880.57 N
21.0	174.83	11.31	171.26	7.8264	-7.79	1.8	1.00	1.00	461.86 N
21.0	60.00	20.82	40.86	6.8744	3.44	27.6	1.00	0.65	523.68 N
21.0	75.00	19.75	50.52	7.9265	2.05	28.1	1.00	0.71	454.17 N
21.0	90.00	18.49	59.61	9.3566	0.00	28.3	1.00	0.78	384.76 N
21.0	105.00	16.87	68.30	10.9964	-2.85	28.0	1.00	0.88	327.38 N
21.0	120.00	15.49	81.24	11.8006	-5.90	20.6	1.00	1.00	305.07 N
21.0	135.00	14.42	111.26	8.2607	-5.84	4.9	1.00	1.00	435.80 N
21.0	150.00	12.87	132.31	7.8610	-6.81	4.1	1.00	1.00	457.96 N
21.0	165.00	11.64	154.93	7.8863	-7.62	2.9	1.00	1.00	456.49 N

Velocity Predictions File: MH-MC.VFP -- 06-14-1994 08:08:19
 Star Class - 102 kg helm & 102 kg crew

VTW	BTW	VAW	BAW	V	VMG	HEEL	FLAT	REEP	SEC/N.M.
6.0	46.78	9.18	25.48	4.5554	3.12	6.0	1.00	1.00	1154.09 N
6.0	174.79	2.57	168.87	2.9137	-2.90	0.2	1.00	1.00	1240.69 N
6.0	60.00	9.21	30.60	5.2068	2.60	6.2	1.00	1.00	691.41 N
6.0	75.00	8.61	37.54	5.4190	1.40	4.5	1.00	1.00	664.33 N
6.0	90.00	7.66	45.30	5.3850	0.00	3.4	1.00	1.00	668.53 N
6.0	105.00	6.44	54.84	5.1178	-1.32	2.4	1.00	1.00	703.42 N
6.0	120.00	5.04	69.44	4.4974	-2.25	1.4	1.00	1.00	800.46 N
6.0	135.00	3.87	95.02	3.5174	-2.49	0.7	1.00	1.00	1023.48 N
6.0	150.00	3.21	121.91	3.0251	-2.62	0.5	1.00	1.00	1190.06 N
6.0	165.00	2.72	148.72	2.9440	-2.84	0.4	1.00	1.00	1222.84 N
9.0	41.77	12.33	24.17	5.2130	3.89	20.6	0.84	1.00	926.00 N
9.0	174.85	3.93	169.23	4.2856	-4.27	0.4	1.00	1.00	843.44 N
9.0	60.00	12.03	31.88	6.1848	3.09	24.4	0.92	1.00	582.07 N
9.0	75.00	11.46	40.41	6.6274	1.72	18.5	1.00	1.00	543.20 N
9.0	90.00	10.32	52.04	6.3469	0.00	5.5	1.00	1.00	567.21 N
9.0	105.00	8.78	63.93	5.9750	-1.55	3.2	1.00	1.00	602.51 N
9.0	120.00	7.22	78.69	5.5050	-2.75	2.0	1.00	1.00	653.95 N
9.0	135.00	5.85	98.43	4.9268	-3.48	1.2	1.00	1.00	730.70 N
9.0	150.00	4.88	123.01	4.4273	-3.83	0.9	1.00	1.00	813.13 N
9.0	165.00	4.15	149.35	4.3283	-4.18	0.7	1.00	1.00	831.73 N
12.0	40.82	14.92	25.42	5.4020	4.09	23.2	0.70	0.94	880.57 N
12.0	176.26	5.60	172.70	5.3299	-5.32	0.6	1.00	1.00	676.88 N
12.0	60.00	14.35	35.00	6.4977	3.25	25.4	0.97	0.87	554.04 N
12.0	75.00	13.51	43.01	7.1295	1.85	26.0	1.00	0.93	504.94 N
12.0	90.00	12.72	53.24	7.6143	0.00	19.4	1.00	1.00	472.81 N
12.0	105.00	11.22	69.37	6.7750	-1.75	4.4	1.00	1.00	531.36 N
12.0	120.00	9.47	85.32	6.2241	-3.11	2.6	1.00	1.00	578.39 N
12.0	135.00	7.97	104.67	5.6935	-4.03	1.8	1.00	1.00	632.31 N
12.0	150.00	6.78	126.53	5.4072	-4.68	1.5	1.00	1.00	665.78 N
12.0	165.00	5.89	151.36	5.3674	-5.18	1.1	1.00	1.00	670.72 N
15.0	41.41	17.29	27.24	5.5568	4.17	23.9	0.75	0.83	863.82 N
15.0	176.43	7.56	173.55	6.0994	-6.09	0.9	1.00	1.00	591.37 N
15.0	60.00	16.62	37.40	6.7221	3.36	25.9	1.00	0.78	535.55 N
15.0	75.00	15.69	46.16	7.4818	1.94	26.5	1.00	0.85	481.17 N
15.0	90.00	14.45	55.09	8.2670	0.00	26.9	1.00	0.95	435.46 N
15.0	105.00	13.68	70.66	8.0489	-2.08	10.7	1.00	1.00	447.27 N
15.0	120.00	11.78	89.25	6.9696	-3.48	3.4	1.00	1.00	516.53 N
15.0	135.00	10.17	108.76	6.3679	-4.50	2.5	1.00	1.00	565.34 N
15.0	150.00	8.86	129.72	6.1459	-5.32	2.1	1.00	1.00	585.75 N
15.0	165.00	7.87	153.36	6.1370	-5.93	1.6	1.00	1.00	586.61 N
18.0	42.39	19.56	29.02	5.6745	4.19	24.6	0.79	0.74	858.96 N
18.0	176.06	9.53	173.22	6.8530	-6.84	1.2	1.00	1.00	526.56 N
18.0	60.00	18.84	39.30	6.8840	3.44	26.5	1.00	0.72	522.95 N
18.0	75.00	17.84	48.56	7.7849	2.01	27.0	1.00	0.78	462.44 N
18.0	90.00	16.56	57.71	8.8461	0.00	27.3	1.00	0.87	406.96 N
18.0	105.00	15.07	65.92	10.2951	-2.66	27.2	1.00	0.98	349.68 N
18.0	120.00	14.11	90.68	8.0090	-4.00	4.7	1.00	1.00	449.49 N
18.0	135.00	12.38	111.15	7.0991	-5.02	3.3	1.00	1.00	507.11 N
18.0	150.00	10.94	131.72	6.8830	-5.96	2.8	1.00	1.00	523.03 N
18.0	165.00	9.86	154.59	6.8958	-6.66	2.1	1.00	1.00	522.06 N
21.0	43.63	21.75	30.78	5.7683	4.18	25.3	0.84	0.67	862.24 N
21.0	175.17	11.38	171.89	7.7525	-7.72	1.6	1.00	1.00	466.02 N
21.0	60.00	21.01	40.84	6.9971	3.50	27.0	1.00	0.66	514.50 N
21.0	75.00	19.94	50.47	8.0472	2.08	27.5	1.00	0.72	447.36 N
21.0	90.00	18.69	59.50	9.4845	0.00	27.6	1.00	0.80	379.56 N
21.0	105.00	17.18	67.13	11.4457	-2.96	27.2	1.00	0.89	314.53 N
21.0	120.00	15.74	79.02	12.4515	-6.23	19.3	1.00	1.00	289.12 N
21.0	135.00	14.50	111.89	8.0853	-5.72	4.2	1.00	1.00	445.25 N
21.0	150.00	12.93	132.58	7.7751	-6.73	3.6	1.00	1.00	463.02 N
21.0	165.00	11.72	155.09	7.8073	-7.54	2.6	1.00	1.00	461.11 N

Velocity Predictions File: LH-RC.VFP -- 06-14-1994 08:09:31
 Star Class - 68 kg helm & 136 kg crew

VTW	BTW	VAW	BAW	V	VMG	HEEL	FLAT	REEF	SEC/N.M.
6.0	46.74	9.17	25.50	4.5461	3.12	5.7	1.00	1.00	1155.57 N
6.0	174.79	2.57	169.87	2.9137	-2.90	0.2	1.00	1.00	1240.68 N
6.0	60.00	9.21	30.65	5.1979	2.60	5.9	1.00	1.00	692.58 N
6.0	75.00	8.61	37.56	5.4151	1.40	4.5	1.00	1.00	664.81 N
6.0	90.00	7.66	45.31	5.3832	0.00	3.4	1.00	1.00	668.74 N
6.0	105.00	6.44	54.85	5.1172	-1.32	2.3	1.00	1.00	703.52 N
6.0	120.00	5.04	69.44	4.4976	-2.25	1.4	1.00	1.00	800.42 N
6.0	135.00	3.87	95.02	3.5175	-2.49	0.7	1.00	1.00	1023.44 N
6.0	150.00	3.21	121.91	3.0251	-2.62	0.5	1.00	1.00	1190.04 N
6.0	165.00	2.72	148.72	2.9440	-2.84	0.4	1.00	1.00	1222.83 N
VTW	BTW	VAW	BAW	V	VMG	HEEL	FLAT	REEF	SEC/N.M.
9.0	41.83	12.34	24.16	5.2297	3.90	20.6	0.85	1.00	923.85 N
9.0	174.85	3.93	169.23	4.2856	-4.27	0.4	1.00	1.00	843.42 N
9.0	60.00	12.05	31.84	6.2660	3.10	24.4	0.93	1.00	580.09 N
9.0	75.00	11.48	40.53	6.6271	1.72	17.8	1.00	1.00	543.22 N
9.0	90.00	10.31	52.10	6.3365	0.00	5.3	1.00	1.00	568.13 N
9.0	105.00	8.78	63.94	5.9732	-1.55	3.2	1.00	1.00	602.69 N
9.0	120.00	7.22	78.69	5.5051	-2.75	2.0	1.00	1.00	653.94 N
9.0	135.00	5.85	98.44	4.9264	-3.48	1.2	1.00	1.00	730.76 N
9.0	150.00	4.88	123.01	4.4271	-3.83	0.9	1.00	1.00	813.17 N
9.0	165.00	4.15	149.35	4.3283	-4.18	0.7	1.00	1.00	831.74 N
VTW	BTW	VAW	BAW	V	VMG	HEEL	FLAT	REEF	SEC/N.M.
12.0	40.81	14.94	25.38	5.4207	4.10	23.3	0.70	0.95	877.40 N
12.0	176.26	5.60	172.70	5.3301	-5.32	0.6	1.00	1.00	676.85 N
12.0	60.00	14.38	34.95	6.5229	3.26	25.4	0.97	0.87	551.90 N
12.0	75.00	13.53	42.93	7.1613	1.85	26.0	1.00	0.93	502.70 N
12.0	90.00	12.76	53.32	7.6237	0.00	18.8	1.00	1.00	472.21 N
12.0	105.00	11.22	69.40	6.7690	-1.75	4.3	1.00	1.00	531.84 N
12.0	120.00	9.47	85.33	6.2234	-3.11	2.6	1.00	1.00	578.46 N
12.0	135.00	7.97	104.67	5.6937	-4.03	1.8	1.00	1.00	632.28 N
12.0	150.00	6.78	126.53	5.4074	-4.68	1.5	1.00	1.00	665.75 N
12.0	165.00	5.89	151.36	5.3677	-5.18	1.1	1.00	1.00	670.68 N
VTW	BTW	VAW	BAW	V	VMG	HEEL	FLAT	REEF	SEC/N.M.
15.0	41.40	17.31	27.20	5.5778	4.18	23.9	0.75	0.93	860.44 N
15.0	176.43	7.55	173.54	6.0998	-6.09	0.9	1.00	1.00	591.34 N
15.0	60.00	16.65	37.35	6.7509	3.38	25.9	1.00	0.78	533.27 N
15.0	75.00	15.72	46.07	7.5204	1.95	26.4	1.00	0.85	478.70 N
15.0	90.00	14.49	54.93	8.3234	0.00	26.9	1.00	0.95	432.51 N
15.0	105.00	13.69	70.92	7.9942	-2.07	10.1	1.00	1.00	450.33 N
15.0	120.00	11.78	89.26	6.9666	-3.48	3.4	1.00	1.00	516.75 N
15.0	135.00	10.17	108.76	6.3675	-4.50	2.5	1.00	1.00	565.37 N
15.0	150.00	8.86	129.72	6.1459	-5.32	2.1	1.00	1.00	585.76 N
15.0	165.00	7.87	153.36	6.1372	-5.93	1.6	1.00	1.00	586.58 N
VTW	BTW	VAW	BAW	V	VMG	HEEL	FLAT	REEF	SEC/N.M.
18.0	42.37	19.59	28.97	5.6973	4.21	24.6	0.79	0.74	855.30 N
18.0	176.07	9.53	173.25	6.8533	-6.84	1.2	1.00	1.00	526.53 N
18.0	60.00	18.87	39.25	6.9160	3.46	26.4	1.00	0.72	520.53 N
18.0	75.00	17.88	48.47	7.8311	2.03	26.9	1.00	0.78	459.71 N
18.0	90.00	16.61	57.49	8.9268	0.00	27.3	1.00	0.87	403.28 N
18.0	105.00	15.13	65.47	10.4287	-2.70	27.1	1.00	0.98	345.20 N
18.0	120.00	14.12	90.73	7.9970	-4.00	4.6	1.00	1.00	450.17 N
18.0	135.00	12.38	111.16	7.0968	-5.02	3.2	1.00	1.00	507.27 N
18.0	150.00	10.94	131.72	6.8821	-5.96	2.8	1.00	1.00	523.10 N
18.0	165.00	9.86	154.59	6.8958	-6.66	2.1	1.00	1.00	522.06 N
VTW	BTW	VAW	BAW	V	VMG	HEEL	FLAT	REEF	SEC/N.M.
21.0	43.60	21.78	30.73	5.7925	4.19	25.3	0.84	0.68	858.23 N
21.0	175.20	11.38	171.93	7.7526	-7.73	1.6	1.00	1.00	466.00 N
21.0	60.00	21.05	40.79	7.0322	3.52	26.9	1.00	0.67	511.93 N
21.0	75.00	19.99	50.37	8.1022	2.10	27.5	1.00	0.73	444.32 N
21.0	90.00	18.75	59.22	9.5977	0.00	27.6	1.00	0.80	375.09 N
21.0	105.00	17.23	66.73	11.5784	-3.00	27.2	1.00	0.89	310.92 N
21.0	120.00	15.79	78.90	12.4991	-6.25	18.9	1.00	1.00	288.02 N
21.0	135.00	14.50	111.91	8.0779	-5.71	4.2	1.00	1.00	445.66 N
21.0	150.00	12.93	132.59	7.7716	-6.73	3.6	1.00	1.00	463.22 N
21.0	165.00	11.72	155.09	7.8064	-7.54	2.6	1.00	1.00	461.16 N

Velocity Predictions File: BR-IC.VFP -- 06-14-1994 08:10:41
 Star Class - 136 kg helm & 68 kg crew

VTW	BTW	VAW	BAW	V	VMG	HEEL	FLAT	REEP	SEC/N.M.
6.0	46.82	9.19	25.44	4.5715	3.13	6.4	1.00	1.00	1150.78 N
6.0	174.79	2.57	168.87	2.9136	-2.90	0.2	1.00	1.00	1240.70 N
6.0	60.00	9.23	30.52	5.2243	2.61	6.7	1.00	1.00	689.08 N
6.0	75.00	8.62	37.50	5.4275	1.40	4.6	1.00	1.00	663.29 N
6.0	90.00	7.66	45.28	5.3894	0.00	3.4	1.00	1.00	667.98 N
6.0	105.00	6.44	54.83	5.1190	-1.32	2.4	1.00	1.00	703.26 N
6.0	120.00	5.04	69.44	4.4974	-2.25	1.4	1.00	1.00	800.47 N
6.0	135.00	3.87	95.02	3.5172	-2.49	0.7	1.00	1.00	1023.54 N
6.0	150.00	3.21	121.91	3.0250	-2.62	0.5	1.00	1.00	1150.10 N
6.0	165.00	2.72	148.73	2.9439	-2.84	0.4	1.00	1.00	1222.87 N
VTW	BTW	VAW	BAW	V	VMG	HEEL	FLAT	REEP	SEC/N.M.
9.0	41.73	12.32	24.17	5.1987	3.88	20.6	0.83	1.00	927.87 N
9.0	174.85	3.93	169.24	4.2854	-4.27	0.4	1.00	1.00	843.46 N
9.0	60.00	12.01	31.90	6.1677	3.08	24.6	0.91	1.00	583.69 N
9.0	75.00	11.44	40.27	6.6284	1.72	19.2	1.00	1.00	543.12 N
9.0	90.00	10.33	51.94	6.3678	0.00	5.8	1.00	1.00	565.34 N
9.0	105.00	8.78	63.90	5.9797	-1.55	3.2	1.00	1.00	602.04 N
9.0	120.00	7.22	78.69	5.5060	-2.75	2.0	1.00	1.00	653.83 N
9.0	135.00	5.85	98.44	4.9260	-3.48	1.2	1.00	1.00	730.81 N
9.0	150.00	4.88	123.02	4.4268	-3.83	1.0	1.00	1.00	813.22 N
9.0	165.00	4.15	149.36	4.3280	-4.18	0.7	1.00	1.00	831.79 N
VTW	BTW	VAW	BAW	V	VMG	HEEL	FLAT	REEP	SEC/N.M.
12.0	40.84	14.89	25.46	5.3874	4.08	23.3	0.71	0.94	883.34 N
12.0	176.27	5.60	172.71	5.3296	-5.32	0.6	1.00	1.00	676.91 N
12.0	60.00	14.33	35.03	6.4775	3.24	25.4	0.98	0.87	555.77 N
12.0	75.00	13.48	43.07	7.1041	1.84	26.0	1.00	0.93	506.75 N
12.0	90.00	12.68	53.14	7.6068	0.00	20.0	1.00	1.00	473.26 N
12.0	105.00	11.22	69.30	6.7885	-1.76	4.5	1.00	1.00	530.31 N
12.0	120.00	9.47	85.31	6.2271	-3.11	2.7	1.00	1.00	578.12 N
12.0	135.00	7.97	104.67	5.6941	-4.03	1.8	1.00	1.00	632.24 N
12.0	150.00	6.78	126.53	5.4073	-4.68	1.5	1.00	1.00	665.76 N
12.0	165.00	5.89	151.36	5.3673	-5.18	1.1	1.00	1.00	670.73 N
VTW	BTW	VAW	BAW	V	VMG	HEEL	FLAT	REEP	SEC/N.M.
15.0	41.44	17.26	27.27	5.5404	4.15	23.9	0.75	0.82	866.75 N
15.0	176.42	7.56	173.53	6.0892	-6.09	0.9	1.00	1.00	591.40 N
15.0	60.00	16.59	37.44	6.6989	3.35	25.9	1.00	0.78	537.40 N
15.0	75.00	15.66	46.23	7.4506	1.93	26.4	1.00	0.84	483.18 N
15.0	90.00	14.42	55.23	8.2211	0.00	26.9	1.00	0.95	437.90 N
15.0	105.00	13.67	70.22	8.1434	-2.11	11.5	1.00	1.00	442.08 N
15.0	120.00	11.78	89.21	6.9772	-3.49	3.5	1.00	1.00	515.97 N
15.0	135.00	10.17	108.75	6.3702	-4.50	2.5	1.00	1.00	565.13 N
15.0	150.00	8.86	129.72	6.1471	-5.32	2.1	1.00	1.00	585.65 N
15.0	165.00	7.87	153.36	6.1372	-5.93	1.6	1.00	1.00	586.58 N
VTW	BTW	VAW	BAW	V	VMG	HEEL	FLAT	REEP	SEC/N.M.
18.0	42.42	19.53	29.05	5.6566	4.18	24.6	0.80	0.74	862.14 N
18.0	176.03	9.53	173.18	6.8531	-6.84	1.2	1.00	1.00	526.57 N
18.0	60.00	18.81	39.34	6.8579	3.43	26.5	1.00	0.71	524.95 N
18.0	75.00	17.81	48.65	7.7470	2.01	27.0	1.00	0.78	464.69 N
18.0	90.00	16.52	57.90	8.7793	0.00	27.3	1.00	0.87	410.05 N
18.0	105.00	15.03	66.33	10.1798	-2.63	27.2	1.00	0.98	353.64 N
18.0	120.00	14.11	90.57	8.0343	-4.02	4.8	1.00	1.00	448.08 N
18.0	135.00	12.38	111.12	7.1051	-5.02	3.3	1.00	1.00	506.68 N
18.0	150.00	10.94	131.71	6.8865	-5.96	2.9	1.00	1.00	522.76 N
18.0	165.00	9.86	154.58	6.8972	-6.66	2.1	1.00	1.00	521.95 N
VTW	BTW	VAW	BAW	V	VMG	HEEL	FLAT	REEP	SEC/N.M.
21.0	43.67	21.72	30.82	5.7490	4.16	25.4	0.84	0.67	865.72 N
21.0	175.11	11.38	171.79	7.7538	-7.73	1.6	1.00	1.00	465.99 N
21.0	60.00	20.98	40.89	6.9681	3.48	26.9	1.00	0.66	516.64 N
21.0	75.00	19.91	50.57	8.0018	2.07	27.5	1.00	0.72	449.90 N
21.0	90.00	18.64	59.75	9.3893	0.00	27.6	1.00	0.80	383.42 N
21.0	105.00	17.14	67.51	11.3241	-2.93	27.2	1.00	0.89	317.91 N
21.0	120.00	15.68	79.12	12.4090	-6.20	19.8	1.00	1.00	290.11 N
21.0	135.00	14.49	111.83	8.1017	-5.73	4.3	1.00	1.00	444.35 N
21.0	150.00	12.92	132.56	7.7834	-6.74	3.7	1.00	1.00	462.53 N
21.0	165.00	11.71	155.09	7.8108	-7.54	2.6	1.00	1.00	460.90 N

Velocity Predictions File: MH-HC.VPP -- 06-14-1994 08:11:52
 Star Class - 102 kg helm & 136 kg crew

VTW	BTW	VAW	BAW	V	VMG	HEEL	FLAT	REEF	SEC/N.M.
6.0	46.77	9.14	25.65	4.5092	3.09	4.8	1.00	1.00	1165.73 N
6.0	174.78	2.58	168.89	2.9032	-2.89	0.2	1.00	1.00	1245.17 N
6.0	60.00	9.20	30.75	5.1798	2.59	4.9	1.00	1.00	695.00 N
6.0	75.00	8.61	37.58	5.4132	1.40	4.0	1.00	1.00	665.04 N
6.0	90.00	7.65	45.33	5.3813	0.00	3.1	1.00	1.00	668.99 N
6.0	105.00	6.43	54.98	5.0996	-1.32	2.2	1.00	1.00	705.94 N
6.0	120.00	5.03	69.98	4.4471	-2.22	1.3	1.00	1.00	809.51 N
6.0	135.00	3.87	95.26	3.5011	-2.48	0.7	1.00	1.00	1028.25 N
6.0	150.00	3.22	122.10	3.0125	-2.61	0.5	1.00	1.00	1195.02 N
6.0	165.00	2.73	148.84	2.9333	-2.83	0.4	1.00	1.00	1227.31 N

VTW	BTW	VAW	BAW	V	VMG	HEEL	FLAT	REEF	SEC/N.M.
9.0	42.16	12.40	24.40	5.2826	3.92	19.6	0.89	1.00	919.29 N
9.0	174.91	3.95	169.41	4.2661	-4.25	0.4	1.00	1.00	847.20 N
9.0	60.00	12.12	31.90	6.2594	3.13	23.5	0.97	1.00	575.13 N
9.0	75.00	11.55	41.28	6.5770	1.70	14.2	1.00	1.00	547.36 N
9.0	90.00	10.32	52.15	6.3315	0.00	4.6	1.00	1.00	568.58 N
9.0	105.00	8.79	63.89	5.9831	-1.55	2.9	1.00	1.00	601.69 N
9.0	120.00	7.22	78.66	5.5092	-2.75	1.9	1.00	1.00	653.45 N
9.0	135.00	5.85	98.67	4.9024	-3.47	1.2	1.00	1.00	734.33 N
9.0	150.00	4.89	123.26	4.4018	-3.81	0.9	1.00	1.00	817.84 N
9.0	165.00	4.17	145.50	4.3080	-4.16	0.7	1.00	1.00	835.66 N

VTW	BTW	VAW	BAW	V	VMG	HEEL	FLAT	REEF	SEC/N.M.
12.0	40.86	15.04	25.44	5.4838	4.15	22.7	0.70	0.96	867.99 N
12.0	176.18	5.60	172.55	5.3290	-5.32	0.6	1.00	1.00	677.05 N
12.0	60.00	14.48	34.99	6.5802	3.29	24.8	0.97	0.89	547.10 N
12.0	75.00	13.62	43.00	7.2067	1.87	25.4	1.00	0.95	499.53 N
12.0	90.00	12.90	54.53	7.4870	0.00	14.4	1.00	1.00	480.84 N
12.0	105.00	11.22	69.52	6.7464	-1.75	3.9	1.00	1.00	533.61 N
12.0	120.00	9.47	85.31	6.2275	-3.11	2.5	1.00	1.00	578.08 N
12.0	135.00	7.97	104.61	5.7019	-4.03	1.7	1.00	1.00	631.37 N
12.0	150.00	6.78	126.52	5.4078	-4.68	1.4	1.00	1.00	665.71 N
12.0	165.00	5.89	151.36	5.3670	-5.18	1.0	1.00	1.00	670.77 N

VTW	BTW	VAW	BAW	V	VMG	HEEL	FLAT	REEF	SEC/N.M.
15.0	41.37	17.43	27.22	5.6464	4.24	23.3	0.75	0.85	849.64 N
15.0	176.48	7.55	173.64	6.1053	-6.09	0.8	1.00	1.00	590.77 N
15.0	60.00	16.76	37.40	6.8094	3.40	25.4	1.00	0.80	528.68 N
15.0	75.00	15.82	46.14	7.5665	1.96	25.9	1.00	0.86	475.78 N
15.0	90.00	14.58	55.02	8.3595	0.00	26.4	1.00	0.97	430.65 N
15.0	105.00	13.74	71.97	7.7764	-2.01	6.8	1.00	1.00	462.94 N
15.0	120.00	11.79	89.42	6.9353	-3.47	3.1	1.00	1.00	519.08 N
15.0	135.00	10.17	108.77	6.3667	-4.50	2.3	1.00	1.00	565.45 N
15.0	150.00	8.85	129.70	6.1507	-5.33	2.0	1.00	1.00	585.30 N
15.0	165.00	7.86	153.34	6.1421	-5.93	1.5	1.00	1.00	586.12 N

VTW	BTW	VAW	BAW	V	VMG	HEEL	FLAT	REEF	SEC/N.M.
18.0	42.25	19.72	28.94	5.7679	4.27	23.9	0.79	0.76	843.14 N
18.0	176.19	9.55	173.46	6.8357	-5.82	1.1	1.00	1.00	527.81 N
18.0	60.00	18.99	39.30	6.9779	3.49	25.9	1.00	0.73	515.91 N
18.0	75.00	17.99	48.54	7.8804	2.04	26.4	1.00	0.80	456.83 N
18.0	90.00	16.72	57.59	8.9641	0.00	26.7	1.00	0.89	401.60 N
18.0	105.00	15.30	65.24	10.5648	-2.73	26.5	1.00	0.99	340.75 N
18.0	120.00	14.13	91.25	7.8683	-3.93	4.1	1.00	1.00	457.53 N
18.0	135.00	12.40	111.30	7.0630	-4.99	3.0	1.00	1.00	509.70 N
18.0	150.00	10.96	131.79	6.8626	-5.94	2.6	1.00	1.00	524.58 N
18.0	165.00	9.88	154.63	6.8768	-6.64	2.0	1.00	1.00	523.50 N

VTW	BTW	VAW	BAW	V	VMG	HEEL	FLAT	REEF	SEC/N.M.
21.0	43.37	21.94	30.64	5.8630	4.26	24.6	0.83	0.69	844.66 N
21.0	175.39	11.44	172.29	7.6906	-7.67	1.5	1.00	1.00	469.62 N
21.0	60.00	21.18	40.85	7.0992	3.55	26.3	1.00	0.68	507.10 N
21.0	75.00	20.13	50.43	8.1578	2.11	26.9	1.00	0.74	441.30 N
21.0	90.00	18.90	59.28	9.6549	0.00	27.0	1.00	0.82	372.87 N
21.0	105.00	17.68	64.67	12.3283	-3.19	26.1	1.00	0.88	292.01 N
21.0	120.00	15.65	73.11	13.9627	-6.98	23.3	1.00	1.00	257.83 N
21.0	135.00	14.55	112.31	7.9671	-5.63	3.8	1.00	1.00	451.86 N
21.0	150.00	12.98	132.80	7.7053	-6.67	3.3	1.00	1.00	467.21 N
21.0	165.00	11.78	155.22	7.7420	-7.48	2.4	1.00	1.00	465.00 N

Velocity Predictions File: HH-MC.VPP --- 06-14-1994 08:13:07
 Star Class - 136 kg helm & 102 kg crew

VTW	BTW	VAV	BAW	V	VMG	HEEL	FLAT	REEF	SEC/N.M.
6.0	46.77	9.15	25.63	4.5148	3.09	4.9	1.00	1.00	1164.15 N
6.0	174.78	2.58	168.90	2.9032	-2.89	0.2	1.00	1.00	1245.19 N
6.0	60.00	9.20	30.72	5.1863	2.59	5.0	1.00	1.00	694.14 N
6.0	75.00	8.61	37.56	5.4176	1.40	4.1	1.00	1.00	664.51 N
6.0	90.00	7.66	45.32	5.3835	0.00	3.1	1.00	1.00	668.71 N
6.0	105.00	6.43	54.98	5.0998	-1.32	2.2	1.00	1.00	705.91 N
8.0	120.00	5.02	69.98	4.4469	-2.22	1.3	1.00	1.00	809.55 N
6.0	135.00	3.87	95.26	3.5008	-2.48	0.7	1.00	1.00	1028.32 N
6.0	150.00	3.22	122.10	3.0124	-2.61	0.5	1.00	1.00	1195.06 N
6.0	165.00	2.73	148.84	2.9332	-2.83	0.4	1.00	1.00	1227.34 N
VTW	BTW	VAV	BAW	V	VMG	HEEL	FLAT	REEF	SEC/N.M.
9.0	42.07	12.39	24.40	5.2540	3.91	19.5	0.88	1.00	921.22 N
9.0	174.91	3.95	169.42	4.2660	-4.25	0.4	1.00	1.00	847.22 N
9.0	60.00	12.11	31.94	6.2384	3.12	23.5	0.96	1.00	577.07 N
9.0	75.00	11.55	41.13	6.5932	1.71	14.8	1.00	1.00	546.02 N
9.0	90.00	10.32	52.11	6.3397	0.00	4.7	1.00	1.00	567.85 N
9.0	105.00	8.79	63.88	5.9855	-1.55	3.0	1.00	1.00	601.46 N
9.0	120.00	7.22	78.66	5.5095	-2.75	1.9	1.00	1.00	653.42 N
9.0	135.00	5.85	98.68	4.9017	-3.47	1.2	1.00	1.00	734.45 N
9.0	150.00	4.89	123.26	4.4014	-3.81	0.9	1.00	1.00	817.92 N
9.0	165.00	4.17	149.50	4.3877	-4.16	0.7	1.00	1.00	835.71 N
VTW	BTW	VAV	BAW	V	VMG	HEEL	FLAT	REEF	SEC/N.M.
12.0	40.86	15.01	25.48	5.4644	4.13	22.6	0.70	0.96	871.10 N
12.0	176.19	5.60	172.57	5.3287	-5.32	0.6	1.00	1.00	677.08 N
12.0	60.00	14.45	35.04	6.5548	3.28	24.8	0.97	0.89	549.22 N
12.0	75.00	13.60	43.08	7.1748	1.86	25.4	1.00	0.95	501.76 N
12.0	90.00	12.88	54.35	7.5087	0.00	15.1	1.00	1.00	479.44 N
12.0	105.00	11.22	69.49	6.7526	-1.75	4.0	1.00	1.00	533.13 N
12.0	120.00	9.47	85.30	6.2287	-3.11	2.5	1.00	1.00	577.97 N
12.0	135.00	7.97	104.61	5.7019	-4.03	1.7	1.00	1.00	631.36 N
12.0	150.00	6.78	126.52	5.4077	-4.68	1.4	1.00	1.00	665.72 N
12.0	165.00	5.89	151.36	5.3668	-5.18	1.1	1.00	1.00	670.80 N
VTW	BTW	VAV	BAW	V	VMG	HEEL	FLAT	REEF	SEC/N.M.
15.0	41.38	17.40	27.26	5.6250	4.22	23.3	0.75	0.84	852.99 N
15.0	176.48	7.55	173.64	6.1050	-6.09	0.8	1.00	1.00	590.79 N
15.0	60.00	16.73	37.45	6.7807	3.39	25.4	1.00	0.80	530.92 N
15.0	75.00	15.79	46.23	7.5275	1.95	25.9	1.00	0.86	478.25 N
15.0	90.00	14.55	55.19	8.3031	0.00	26.4	1.00	0.97	433.57 N
15.0	105.00	13.73	71.77	7.8200	-2.02	7.3	1.00	1.00	460.36 N
15.0	120.00	11.79	89.40	6.9388	-3.47	3.2	1.00	1.00	518.83 N
15.0	135.00	10.17	108.76	6.3676	-4.50	2.3	1.00	1.00	565.37 N
15.0	150.00	8.85	129.70	6.1511	-5.33	2.0	1.00	1.00	585.26 N
15.0	165.00	7.86	153.34	6.1421	-5.93	1.5	1.00	1.00	586.12 N
VTW	BTW	VAV	BAW	V	VMG	HEEL	FLAT	REEF	SEC/N.M.
18.0	42.26	19.70	28.98	5.7450	4.25	23.9	0.79	0.75	846.73 N
18.0	176.18	9.55	173.45	6.8355	-6.82	1.1	1.00	1.00	527.84 N
18.0	60.00	18.96	39.35	6.9459	3.47	25.9	1.00	0.73	518.29 N
18.0	75.00	17.96	48.64	7.8340	2.03	26.4	1.00	0.79	459.53 N
18.0	90.00	16.68	57.81	8.8841	0.00	26.7	1.00	0.89	405.22 N
18.0	105.00	15.23	65.79	10.4062	-2.69	26.5	1.00	1.00	345.95 N
18.0	120.00	14.13	91.21	7.8789	-3.94	4.1	1.00	1.00	456.92 N
18.0	135.00	12.40	111.29	7.0657	-5.00	3.0	1.00	1.00	509.50 N
18.0	150.00	10.96	131.79	6.8640	-5.94	2.6	1.00	1.00	524.48 N
18.0	165.00	9.88	154.63	6.8772	-6.64	2.0	1.00	1.00	523.47 N
VTW	BTW	VAV	BAW	V	VMG	HEEL	FLAT	REEF	SEC/N.M.
21.0	43.40	21.91	30.69	5.8390	4.24	24.6	0.83	0.68	848.55 N
21.0	175.36	11.44	172.24	7.6908	-7.67	1.5	1.00	1.00	469.63 N
21.0	60.00	21.15	40.90	7.0642	3.53	26.3	1.00	0.68	509.61 N
21.0	75.00	20.08	50.54	8.1025	2.10	26.9	1.00	0.74	444.31 N
21.0	90.00	18.84	59.58	9.5388	0.00	27.0	1.00	0.82	377.41 N
21.0	105.00	17.59	65.26	12.1307	-3.14	26.1	1.00	0.88	296.77 N
21.0	120.00	15.60	73.43	13.8615	-6.93	23.5	1.00	1.00	259.71 N
21.0	135.00	14.55	112.29	7.9745	-5.64	3.9	1.00	1.00	451.44 N
21.0	150.00	12.98	132.79	7.7092	-6.68	3.4	1.00	1.00	466.97 N
21.0	165.00	11.77	155.22	7.7434	-7.48	2.5	1.00	1.00	464.91 N

Velocity Predictions File: HH-HC.VPP -- 06-14-1994 08:14:31
 Star Class - 136 kg helm & 136 kg crew

VTW	BTW	VAW	BAW	V	VMG	HEEL	FLAT	REEF	SEC/N.M.
6.0	46.72	9.10	25.78	4.4552	3.05	4.3	1.00	1.00	1178.75 N
6.0	174.77	2.59	168.91	2.8927	-2.88	0.2	1.00	1.00	1249.71 N
6.0	60.00	9.18	30.83	5.1598	2.58	4.4	1.00	1.00	697.70 N
6.0	75.00	8.61	37.59	5.4141	1.40	3.7	1.00	1.00	664.94 N
6.0	90.00	7.66	45.34	5.3805	0.00	2.9	1.00	1.00	669.08 N
6.0	105.00	6.41	55.19	5.0706	-1.31	2.1	1.00	1.00	709.97 N
6.0	120.00	5.00	70.69	4.3813	-2.19	1.2	1.00	1.00	821.67 N
6.0	135.00	3.87	95.48	3.4865	-2.47	0.6	1.00	1.00	1032.56 N
6.0	150.00	3.23	122.28	3.0001	-2.60	0.5	1.00	1.00	1199.94 N
6.0	165.00	2.74	148.96	2.9225	-2.82	0.3	1.00	1.00	1231.81 N

VTW	BTW	VAW	BAW	V	VMG	HEEL	FLAT	REEF	SEC/N.M.
9.0	42.72	12.45	24.75	5.3491	3.93	18.6	0.93	1.00	916.07 N
9.0	175.02	3.97	169.69	4.2413	-4.23	0.4	1.00	1.00	852.02 N
9.0	60.00	12.22	32.12	6.3071	3.15	21.9	1.00	1.00	570.79 N
9.0	75.00	11.60	41.82	6.5315	1.69	11.0	1.00	1.00	551.17 N
9.0	90.00	10.33	52.16	6.3343	0.00	4.2	1.00	1.00	568.33 N
9.0	105.00	8.80	63.79	6.0013	-1.55	2.8	1.00	1.00	599.87 N
9.0	120.00	7.22	78.60	5.5180	-2.76	1.8	1.00	1.00	652.41 N
9.0	135.00	5.86	99.04	4.8643	-3.44	1.1	1.00	1.00	740.09 N
9.0	150.00	4.91	123.59	4.3685	-3.78	0.9	1.00	1.00	824.08 N
9.0	165.00	4.19	149.68	4.2819	-4.14	0.6	1.00	1.00	840.75 N

VTW	BTW	VAW	BAW	V	VMG	HEEL	FLAT	REEF	SEC/N.M.
12.0	41.07	15.13	25.56	5.5595	4.19	22.2	0.70	0.98	858.92 N
12.0	176.07	5.60	172.32	5.3275	-5.31	0.6	1.00	1.00	677.33 N
12.0	60.00	14.56	35.02	6.6296	3.31	24.4	0.97	0.91	543.02 N
12.0	75.00	13.69	43.08	7.2381	1.87	25.0	1.00	0.97	497.37 N
12.0	90.00	12.97	55.49	7.3473	0.00	10.7	1.00	1.00	489.97 N
12.0	105.00	11.21	69.62	6.7261	-1.74	3.6	1.00	1.00	535.23 N
12.0	120.00	9.47	85.25	6.2368	-3.12	2.3	1.00	1.00	577.22 N
12.0	135.00	7.96	104.51	5.7166	-4.04	1.6	1.00	1.00	629.75 N
12.0	150.00	6.78	126.51	5.4094	-4.68	1.3	1.00	1.00	665.51 N
12.0	165.00	5.89	151.36	5.3665	-5.18	1.0	1.00	1.00	676.83 N

VTW	BTW	VAW	BAW	V	VMG	HEEL	FLAT	REEF	SEC/N.M.
15.0	41.42	17.54	27.25	5.7221	4.29	22.8	0.74	0.86	838.99 N
15.0	176.55	7.54	173.76	6.1150	-6.10	0.8	1.00	1.00	589.78 N
15.0	60.00	16.85	37.45	6.8566	3.43	24.9	1.00	0.81	525.05 N
15.0	75.00	15.91	46.23	7.5965	1.97	25.4	1.00	0.88	473.90 N
15.0	90.00	14.67	55.15	8.3796	0.00	25.9	1.00	0.99	429.61 N
15.0	105.00	13.74	72.60	7.6351	-1.98	5.1	1.00	1.00	471.51 N
15.0	120.00	11.79	89.56	6.9051	-3.45	2.9	1.00	1.00	521.35 N
15.0	135.00	10.17	108.75	6.3693	-4.50	2.2	1.00	1.00	565.21 N
15.0	150.00	8.85	129.65	6.1601	-5.33	1.9	1.00	1.00	584.40 N
15.0	165.00	7.85	153.31	6.1513	-5.94	1.4	1.00	1.00	585.24 N

VTW	BTW	VAW	BAW	V	VMG	HEEL	FLAT	REEF	SEC/N.M.
18.0	42.13	19.86	28.88	5.8402	4.33	23.3	0.79	0.77	831.19 N
18.0	176.31	9.57	173.69	6.8179	-6.80	1.1	1.00	1.00	529.12 N
18.0	60.00	19.09	39.36	7.0258	3.51	25.4	1.00	0.75	512.40 N
18.0	75.00	18.09	48.63	7.9129	2.05	25.9	1.00	0.81	454.95 N
18.0	90.00	16.82	57.75	8.9750	0.00	26.3	1.00	0.91	401.11 N
18.0	105.00	15.79	67.83	10.1465	-2.63	20.7	1.00	1.00	354.80 N
18.0	120.00	14.14	91.68	7.7626	-3.88	3.7	1.00	1.00	463.76 N
18.0	135.00	12.41	111.44	7.0294	-4.97	2.8	1.00	1.00	512.14 N
18.0	150.00	10.97	131.87	6.8431	-5.93	2.5	1.00	1.00	526.08 N
18.0	165.00	9.89	154.68	6.8577	-6.62	1.9	1.00	1.00	524.96 N

VTW	BTW	VAW	BAW	V	VMG	HEEL	FLAT	REEF	SEC/N.M.
21.0	43.11	22.09	30.50	5.9304	4.33	23.9	0.83	0.70	831.47 N
21.0	175.54	11.49	172.58	7.6328	-7.61	1.4	1.00	1.00	473.08 N
21.0	60.00	21.30	40.91	7.1503	3.58	25.8	1.00	0.69	503.48 N
21.0	75.00	20.24	50.52	8.1957	2.12	26.4	1.00	0.75	439.26 N
21.0	90.00	18.98	59.58	9.6125	0.00	26.5	1.00	0.84	374.51 N
21.0	105.00	17.36	69.09	11.2882	-2.92	26.3	1.00	0.94	318.92 N
21.0	120.00	16.44	89.30	9.7367	-4.87	5.5	1.00	1.00	369.74 N
21.0	135.00	14.59	112.65	7.8728	-5.57	3.6	1.00	1.00	457.27 N
21.0	150.00	13.02	132.99	7.6439	-6.62	3.1	1.00	1.00	470.96 N
21.0	165.00	11.83	155.34	7.6822	-7.42	2.3	1.00	1.00	468.62 N

Race Predictions File: LH-IC TR.RPP -- 06-14-1994 16:42:57

BOAT A: Star Class - 102 Kg helm & 102 kg crew

BOAT B: Star Class - 68 kg helm & 68 kg crew

Course: Triangular Course Band Width: 2.00% Edge: 0.00%

Probabilities that BOAT B beats BOAT A

		Standard Deviations from Mean True Wind Speed					
		0%	10%	20%	30%	40%	50%
Mean True Wind Speed (knots)	6	97.2	95.7	92.3	N/A	N/A	N/A
	8	68.6	68.2	67.3	65.8	N/A	N/A
	10	36.6	38.5	42.5	45.8	48.2	N/A
	12	19.9	21.9	27.2	33.7	39.8	44.7
	14	14.3	15.5	21.0	29.8	N/A	N/A
	16	13.4	15.6	22.7	N/A	N/A	N/A

Total Seconds to Complete Course

VTW	BOAT A	BOAT B	DIFFERENCE
6	18394.9	18050.9	344.0
8	14796.7	14687.3	109.4
10	13254.3	13325.7	-71.4
12	12549.8	12701.8	-151.9
14	12003.9	12176.5	-172.6
16	11542.8	11712.8	-170.1

N/A - No Answer: Insufficient range of VTW's in Velocity Prediction Files.

Race Predictions File: LH-MC TR.RPP -- 06-14-1994 16:43:52
 BOAT A: Star Class - 102 kg helm & 102 kg crew
 BOAT B: Star Class - 68 kg helm & 102 kg crew

Course: Triangular Course Band Width: 2.00% Edge: 0.00%

Probabilities that BOAT B beats BOAT A

		Standard Deviations from Mean True Wind Speed					
		0%	10%	20%	30%	40%	50%
Mean True Wind Speed (knots)	6	69.5	70.3	70.8	N/A	N/A	N/A
	8	57.5	57.3	57.2	57.8	N/A	N/A
	10	43.0	43.8	45.5	47.7	49.8	N/A
	12	34.7	35.7	38.3	41.6	45.1	48.0
	14	32.1	32.7	35.2	39.4	N/A	N/A
	16	31.7	32.6	35.7	N/A	N/A	N/A

Total Seconds to Complete Course

VTW	BOAT A	BOAT B	DIFFERENCE
6	18394.9	18251.9	143.0
8	14796.7	14752.4	44.3
10	13254.3	13291.4	-37.1
12	12549.8	12626.7	-76.9
14	12003.9	12090.3	-86.4
16	11542.8	11627.5	-84.7

N/A - No Answer: Insufficient range of VTW's in Velocity Prediction Files.

Race Predictions File: MH-LC TR.RPP -- 06-14-1994 16:45:04
 BOAT A: Star Class - 102 kg helm & 102 kg crew
 BOAT B: Star Class - 102 kg helm & 68 kg crew

Course: Triangular Course Band Width: 2.00% Edge: 0.00%

Probabilities that BOAT B beats BOAT A

		Standard Deviations from Mean True Wind Speed					
		0%	10%	20%	30%	40%	50%
Mean True Wind Speed (knots)	6	71.9	72.8	73.3	N/A	N/A	N/A
	8	56.4	56.3	56.5	57.4	N/A	N/A
	10	39.6	40.7	42.9	45.6	48.1	N/A
	12	31.1	32.1	34.9	38.7	42.5	45.7
	14	28.2	28.8	31.4	35.9	N/A	N/A
	16	27.5	28.4	31.5	N/A	N/A	N/A

Total Seconds to Complete Course

VTW	BOAT A	BOAT B	DIFFERENCE
6	18394.9	18234.2	160.7
8	14796.7	14758.8	37.9
10	13254.3	13309.7	-55.4
12	12549.8	12645.1	-95.3
14	12003.9	12108.8	-104.9
16	11542.8	11647.1	-104.3

N/A - No Answer: Insufficient range of VTW's in Velocity Prediction Files.

Race Predictions File: LH-HC TR.RPP -- 06-14-1994 16:45:57
 BOAT A: Star Class - 102 kg helm & 102 kg crew
 BOAT B: Star Class - 68 kg helm & 136 kg crew

Course: Triangular Course Band Width: 2.00% Edge: 0.00%

Probabilities that BOAT B beats BOAT A

		Standard Deviations from Mean True Wind Speed					
		0%	10%	20%	30%	40%	50%
Mean True Wind Speed (knots)	6	48.6	48.4	48.4	N/A	N/A	N/A
	8	51.1	51.1	51.0	50.8	N/A	N/A
	10	53.6	53.4	53.0	52.5	52.1	N/A
	12	54.5	54.4	54.1	53.6	53.1	52.7
	14	54.9	54.9	54.7	54.3	N/A	N/A
	16	55.2	55.2	55.1	N/A	N/A	N/A

Total Seconds to Complete Course

VTW	BOAT A	BOAT B	DIFFERENCE
6	18394.9	18405.2	-10.3
8	14796.7	14790.3	6.4
10	13254.3	13235.3	19.0
12	12549.8	12527.2	22.6
14	12003.9	11980.5	23.4
16	11542.8	11518.9	23.9

N/A - No Answer: Insufficient range of VTW's in Velocity Prediction Files.

Race Predictions File: HH-LC TR.RPP -- 06-14-1994 16:46:55
 BOAT A: Star Class - 102 kg helm & 102 kg crew
 BOAT B: Star Class - 136 kg helm & 68 kg crew

Course: Triangular Course Band Width: 2.00% Edge: 0.00%

Probabilities that BOAT B beats BOAT A

		Standard Deviations from Mean True Wind Speed					
		0%	10%	20%	30%	40%	50%
Mean True Wind Speed (knots)	6	53.0	53.1	53.2	N/A	N/A	N/A
	8	49.1	49.2	49.5	50.1	N/A	N/A
	10	46.4	46.8	47.5	48.2	48.9	N/A
	12	46.4	46.4	46.6	47.3	48.0	48.6
	14	46.2	46.2	46.3	46.8	N/A	N/A
	16	45.9	46.0	46.2	N/A	N/A	N/A

Total Seconds to Complete Course

VTW	BOAT A	BOAT B	DIFFERENCE
6	18394.9	18372.8	22.1
8	14796.7	14802.2	-5.5
10	13254.3	13273.2	-18.9
12	12549.8	12567.9	-18.1
14	12003.9	12022.3	-18.4
16	11542.8	11561.7	-18.9

N/A - No Answer: Insufficient range of VTW's in Velocity Prediction Files.

Race Predictions File: MH-HC TR.RPP -- 06-14-1994 16:48:27
 BOAT A: Star Class - 102 kg helm & 102 kg crew
 BOAT B: Star Class - 102 kg helm & 136 kg crew

Course: Triangular Course Band Width: 2.00% Edge: 0.00%

Probabilities that BOAT B beats BOAT A

		Standard Deviations from Mean True Wind Speed					
		0%	10%	20%	30%	40%	50%
Mean True Wind Speed (knots)	6	32.4	31.5	31.0	N/A	N/A	N/A
	8	43.6	44.0	44.5	44.2	N/A	N/A
	10	59.6	58.8	57.1	55.0	52.9	N/A
	12	69.7	68.2	65.1	61.5	58.3	55.8
	14	71.7	70.9	68.3	64.5	N/A	N/A
	16	70.8	70.5	68.6	N/A	N/A	N/A

Total Seconds to Complete Course

VTW	BOAT A	BOAT B	DIFFERENCE
6	18394.9	18524.6	-129.7
8	14796.7	14834.8	-38.1
10	13254.3	13203.7	50.6
12	12549.8	12451.3	98.5
14	12003.9	11900.3	103.6
16	11542.8	11447.2	95.5

N/A - No Answer: Insufficient range of VTW's in Velocity Prediction Files.

Race Predictions File: HH-MC TR.RPP -- 06-14-1994 16:49:01
 BOAT A: Star Class - 102 kg helm & 102 kg crew
 BOAT B: Star Class - 136 kg helm & 102 kg crew

Course: Triangular Course Band Width: 2.00% Edge: 0.00%

Probabilities that BOAT B beats BOAT A

		Standard Deviations from Mean True Wind Speed					
		0%	10%	20%	30%	40%	50%
Mean True Wind Speed (knots)	6	33.7	32.9	32.5	N/A	N/A	N/A
	8	42.3	42.7	43.3	43.3	N/A	N/A
	10	56.0	55.4	54.2	52.5	50.7	N/A
	12	65.3	63.9	61.1	58.0	55.1	52.9
	14	66.9	66.2	63.8	60.3	N/A	N/A
	16	65.8	65.5	63.7	N/A	N/A	N/A

Total Seconds to Complete Course

VTW	BOAT A	BOAT B	DIFFERENCE
6	18394.9	18515.3	-120.4
8	14796.7	14842.4	-45.7
10	13254.3	13222.6	31.7
12	12549.8	12473.1	76.7
14	12003.9	11923.1	80.8
16	11542.8	11470.2	72.6

N/A - No Answer: Insufficient range of VTW's in Velocity Prediction Files.

Race Predictions File: HH-HC TR.RPP -- 06-14-1994 16:49:37

BOAT A: Star Class - 102 kg helm & 102 kg crew

BOAT B: Star Class - 136 kg helm & 136 kg crew

Course: Triangular Course Band Width: 2.00% Edge: 0.00%

Probabilities that BOAT B beats BOAT A

		Standard Deviations from Mean True Wind Speed					
		0%	10%	20%	30%	40%	50%
Mean True Wind Speed (knots)	6	14.2	12.3	12.7	N/A	N/A	N/A
	8	30.1	31.4	33.9	35.9	N/A	N/A
	10	62.2	61.1	58.8	56.2	54.1	N/A
	12	85.9	82.3	75.3	68.9	63.8	60.3
	14	89.5	87.8	81.9	74.6	N/A	N/A
	16	86.3	86.1	82.4	N/A	N/A	N/A

Total Seconds to Complete Course

VTW	BOAT A	BOAT B	DIFFERENCE
6	18394.9	18659.8	-264.9
8	14796.7	14915.1	-118.4
10	13254.3	13189.7	64.6
12	12549.8	12370.8	179.0
14	12003.9	11815.7	188.2
16	11542.8	11376.2	166.5

N/A - No Answer: Insufficient range of VTW's in Velocity Prediction Files.

Race Predictions File: LH-1C WL.RPP -- 06-14-1994 16:53:56

BOAT A: Star Class - 102 kg helm & 102 kg crew

BOAT B: Star Class - 68 kg helm & 68 kg crew

Course: Windward/Leeward Band Width: 2.00% Edge: 0.00%

Probabilities that BOAT B beats BOAT A

		Standard Deviations from Mean True Wind Speed					
		0%	10%	20%	30%	40%	50%
Mean True Wind Speed (knots)	6	95.9	94.7	91.1	N/A	N/A	N/A
	8	65.5	65.4	65.0	64.1	N/A	N/A
	10	34.5	36.7	40.8	43.8	45.4	N/A
	12	20.5	21.3	24.9	29.7	33.6	36.1
	14	10.8	11.8	15.4	21.1	N/A	N/A
	16	5.0	6.6	10.6	N/A	N/A	N/A

Total Seconds to Complete Course

VTW	BOAT A	BOAT B	DIFFERENCE
6	11973.4	11755.7	217.7
8	9527.2	9468.5	58.7
10	8374.0	8426.0	-52.0
12	7787.5	7879.8	-92.3
14	7420.0	7537.1	-117.1
16	7148.5	7278.4	-129.9

N/A - No Answer: Insufficient range of VTW's in Velocity Prediction Files.

Race Predictions File: LH-MC WL.RPP -- 06-14-1994 16:54:25
 BOAT A: Star Class - 102 kg helm & 102 kg crew
 BOAT B: Star Class - 88 kg helm & 102 kg crew

Course: Windward/Leeward Band Width: 2.00% Edge: 0.00%

Probabilities that BOAT B beats BOAT A

		Standard Deviations from Mean True Wind Speed					
		0%	10%	20%	30%	40%	50%
Mean True Wind Speed (knots)	6	69.4	70.0	70.5	N/A	N/A	N/A
	8	55.8	55.8	56.1	57.0	N/A	N/A
	10	41.9	42.9	44.7	46.8	48.6	N/A
	12	35.3	35.7	37.3	40.0	42.6	44.5
	14	30.7	31.2	32.9	35.8	N/A	N/A
	16	28.1	28.9	30.7	N/A	N/A	N/A

Total Seconds to Complete Course

VTW	BOAT A	BOAT B	DIFFERENCE
6	11973.4	11881.0	92.4
8	9527.2	9505.2	22.0
10	8374.0	8401.0	-27.0
12	7787.5	7833.3	-45.9
14	7420.0	7477.5	-57.5
16	7148.5	7211.4	-62.9

N/A - No Answer: Insufficient range of VTW's in Velocity Prediction Files.

Race Predictions File: MH-IC WL.RPP -- 06-14-1994 17:00:27

BOAT A: Star Class - 102 kg helm & 102 kg crew

BOAT B: Star Class - 102 kg helm & 68 kg crew

Course: Windward/Leeward Band Width: 2.00% Edge: 0.00%

Probabilities that BOAT B beats BOAT A

		Standard Deviations from Mean True Wind Speed					
		0%	10%	20%	30%	40%	50%
Mean True Wind Speed (knots)	6	71.8	72.5	73.0	N/A	N/A	N/A
	8	54.7	54.8	55.3	56.5	N/A	N/A
	10	38.2	39.4	41.8	44.4	46.5	N/A
	12	30.9	31.3	33.3	36.4	39.4	41.5
	14	26.0	26.5	28.2	31.4	N/A	N/A
	16	22.9	23.6	25.5	N/A	N/A	N/A

Total Seconds to Complete Course

VTW	BOAT A	BOAT B	DIFFERENCE
6	11973.4	11869.6	103.8
8	9527.2	9509.2	18.0
10	8374.0	8413.6	-39.7
12	7787.5	7847.1	-59.6
14	7420.0	7491.5	-71.6
16	7148.5	7226.4	-77.9

N/A - No Answer: Insufficient range of VTW's in Velocity Prediction Files.

Race Predictions File: LH-HC_WL.RPP -- 06-14-1994 16:58:08
 BOAT A: Star Class - 102 kg helm & 102 kg crew
 BOAT B: Star Class - 68 kg helm & 136 kg crew

Course: Windward/Leeward Band Width: 2.00% Edge: 0.00%

Probabilities that BOAT B beats BOAT A

		Standard Deviations from Mean True Wind Speed					
		0%	10%	20%	30%	40%	50%
Mean True Wind Speed (knots)	6	48.4	48.3	48.2	N/A	N/A	N/A
	8	51.3	51.3	51.2	50.9	N/A	N/A
	10	54.1	53.9	53.4	52.9	52.4	N/A
	12	55.1	55.0	54.7	54.2	53.7	53.3
	14	55.7	55.6	55.5	55.1	N/A	N/A
	16	56.1	56.2	56.1	N/A	N/A	N/A

Total Seconds to Complete Course

VTW	BOAT A	BOAT B	DIFFERENCE
6	11973.4	11980.9	-7.5
8	9527.2	9522.3	4.9
10	8374.0	8360.2	13.7
12	7787.5	7771.5	16.0
14	7420.0	7403.2	16.8
16	7148.5	7130.9	17.6

N/A - No Answer: Insufficient range of VTW's in Velocity Prediction Files.

Race Predictions File: HH-LC WL.RPP -- 06-14-1994 16:58:37
 BOAT A: Star Class - 102 kg helm & 102 kg crew
 BOAT B: Star Class - 136 kg helm & 68 kg crew

Course: Windward/Leeward Band Width: 2.00% Edge: 0.00%

Probabilities that BOAT B beats BOAT A

		Standard Deviations from Mean True Wind Speed					
		0%	10%	20%	30%	40%	50%
Mean True Wind Speed (knots)	6	53.3	53.5	53.5	N/A	N/A	N/A
	8	49.2	49.3	49.6	50.1	N/A	N/A
	10	46.1	46.4	47.1	47.9	48.6	N/A
	12	45.7	45.7	46.0	46.6	47.3	47.8
	14	45.2	45.2	45.3	45.8	N/A	N/A
	16	44.7	44.7	44.8	N/A	N/A	N/A

Total Seconds to Complete Course

VTW	BOAT A	BOAT B	DIFFERENCE
6	11973.4	11957.6	15.8
8	9527.2	9530.4	-3.1
10	8374.0	8387.0	-13.1
12	7787.5	7800.9	-13.4
14	7420.0	7434.3	-14.3
16	7148.5	7163.8	-15.3

N/A - No Answer: Insufficient range of VTW's in Velocity Prediction Files.

Race Predictions File: MH-HC WL.RPP -- 06-14-1994 16:59:03

BOAT A: Star Class - 102 kg helm & 102 kg crew

BOAT B: Star Class - 102 kg helm & 136 kg crew

Course: Windward/Leeward Band Width: 2.00% Edge: 0.00%

Probabilities that BOAT B beats BOAT A

		Standard Deviations from Mean True Wind Speed					
		0%	10%	20%	30%	40%	50%
Mean True Wind Speed (knots)	6	33.2	32.4	32.0	N/A	N/A	N/A
	8	45.6	45.9	46.0	45.5	N/A	N/A
	10	61.0	60.2	58.5	56.6	54.8	N/A
	12	70.0	69.2	66.9	64.0	61.3	59.4
	14	74.5	73.8	71.7	68.6	N/A	N/A
	16	76.2	75.7	74.1	N/A	N/A	N/A

Total Seconds to Complete Course

VTW	BOAT A	BOAT B	DIFFERENCE
6	11973.4	12054.0	-80.6
8	9527.2	9544.0	-16.7
10	8374.0	8337.2	36.8
12	7787.5	7725.3	62.2
14	7420.0	7347.5	72.5
16	7148.5	7074.1	74.4

N/A - No Answer: Insufficient range of VTW's in Velocity Prediction Files.

Race Predictions File: HH-MC WL.RPP -- 06-14-1994 16:59:34
 BOAT A: Star Class - 102 kg helm & 102 kg crew
 BOAT B: Star Class - 136 kg helm & 102 kg crew

Course: Windward/Leeward Band Width: 2.00% Edge: 0.00%

Probabilities that BOAT B beats BOAT A

		Standard Deviations from Mean True Wind Speed					
		0%	10%	20%	30%	40%	50%
Mean True Wind Speed (knots)	6	34.7	34.0	33.7	N/A	N/A	N/A
	8	44.4	44.7	44.9	44.6	N/A	N/A
	10	57.1	56.5	55.2	53.7	52.2	N/A
	12	65.0	64.3	62.3	59.9	57.6	56.0
	14	68.9	68.2	66.3	63.6	N/A	N/A
	16	70.1	69.7	68.2	N/A	N/A	N/A

Total Seconds to Complete Course

VTW	BOAT A	BOAT B	DIFFERENCE
6	11973.4	12046.8	-73.3
8	9527.2	9548.6	-21.3
10	8374.0	8350.1	23.8
12	7787.5	7740.8	46.6
14	7420.0	7364.2	55.8
16	7148.5	7091.3	57.2

N/A - No Answer: Insufficient range of VTW's in Velocity Prediction Files.

Race Predictions File: HH-HC WL.RPP -- 06-14-1994 16:59:58

BOAT A: Star Class - 102 kg helm & 102 kg crew

BOAT B: Star Class - 136 kg helm & 136 kg crew

Course: Windward/Leeward Band Width: 2.00% Edge: 0.00%

Probabilities that BOAT B beats BOAT A

		Standard Deviations from Mean True Wind Speed					
		0%	10%	20%	30%	40%	50%
Mean True Wind Speed (knots)	6	15.1	13.5	14.4	N/A	N/A	N/A
	8	36.1	36.8	37.9	38.9	N/A	N/A
	10	65.6	64.2	61.6	59.1	57.4	N/A
	12	84.3	82.7	78.2	73.2	69.2	66.7
	14	93.7	92.1	87.6	81.8	N/A	N/A
	16	96.5	95.5	92.0	N/A	N/A	N/A

Total Seconds to Complete Course

VTW	BOAT A	BOAT B	DIFFERENCE
6	11973.4	12141.9	-168.4
8	9527.2	9580.3	-53.0
10	8374.0	8321.8	52.2
12	7787.5	7681.2	106.2
14	7420.0	7291.3	128.7
16	7148.5	7016.7	131.8

N/A -- No Answer: Insufficient range of VTW's in Velocity Prediction Files.