

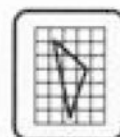
GRAND PRIX PAC



Performance



Polar Plot



Wind Plot



Wind Equations



Upwind



Downwind

PDQ 42



Hydrostatics



Comparative
Performance

STEVE KILLING

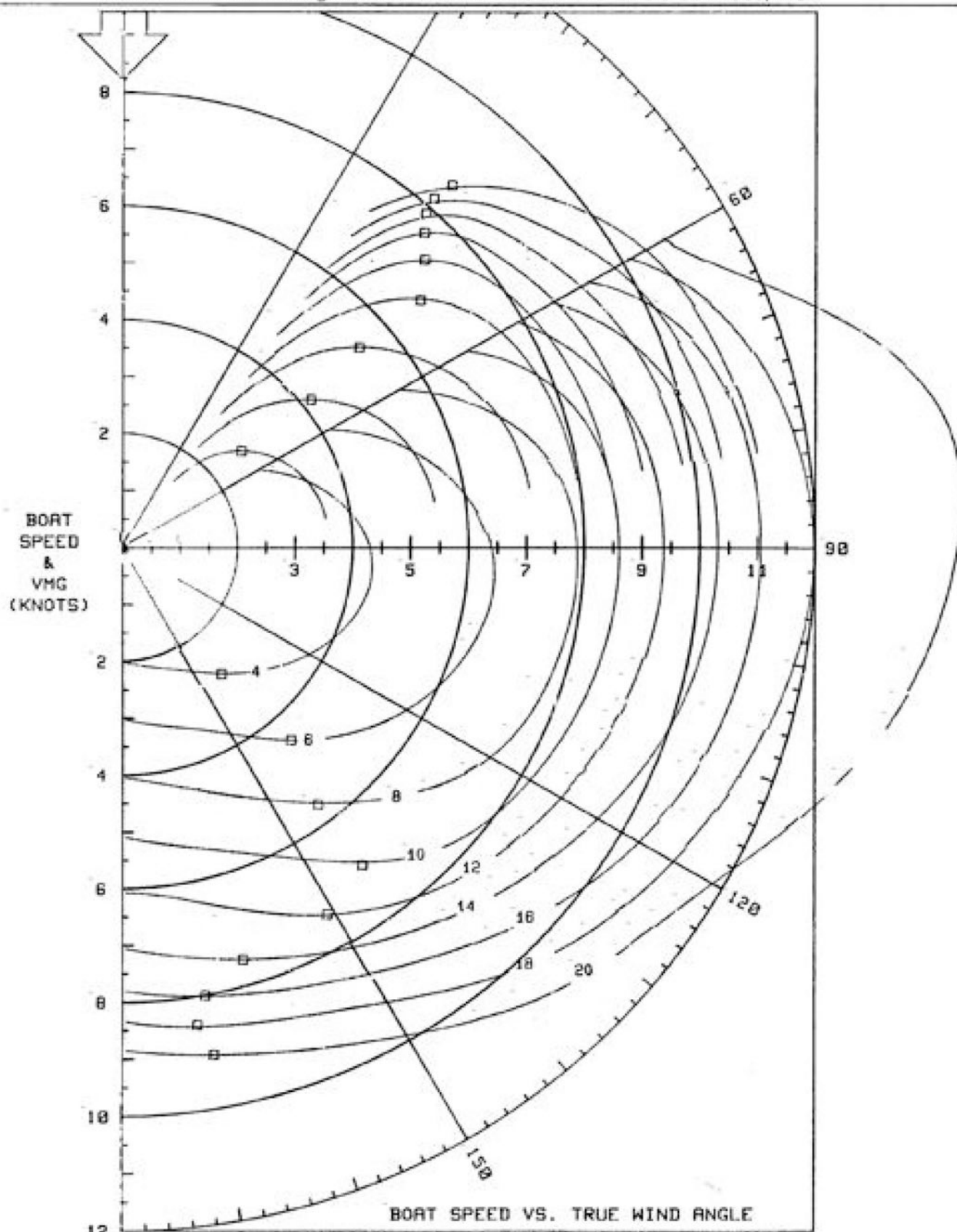


YACHT DESIGN



Polar Plot

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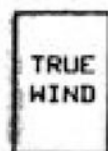
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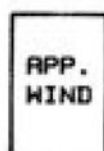


Performance

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TRUE



APPARENT



VHG



FLAT



REEF

----- 4.0 knots True Wind Speed -----									
	36.0	5.5	20.3	1.474	1.193	.2	9.62	1.00	1.00
	44.0	6.1	26.4	2.292	1.649	.2	5.46	1.00	1.00
OPT Tack	50.1	6.3	29.6	2.677	1.717	.3	4.40	1.00	1.00
	52.0	6.4	30.6	2.780	1.711	.3	4.16	1.00	1.00
	60.0	6.4	34.5	3.135	1.567	.3	3.40	1.00	1.00
	69.8								
	70.0	6.3	39.3	3.439	1.176	.3	2.78	1.00	1.00
	80.0	6.3	42.5	3.982	.691	.3	2.43	1.00	1.00
	90.0	6.1	46.1	4.318	0.000	.4	2.14	1.00	1.00
	105.0	5.2	54.6	4.240	-1.098	.3	1.66	1.00	1.00
	120.0	4.0	68.7	3.722	-1.861	.1	1.15	1.00	1.00
	135.0	3.0	90.4	3.072	-2.172	.1	.67	1.00	1.00
OPT Gybe	141.7	2.7	102.8	2.801	-2.199	0.0	.47	1.00	1.00
	150.0	2.4	119.9	2.491	-2.157	0.0	.31	1.00	1.00
	165.0	2.2	150.5	2.154	-2.081	0.0	.19	1.00	1.00
	180.0	2.3	179.9	2.001	-2.001	0.0	.08	1.00	1.00

Handicaps: (seconds/mile)

Optimum Tack: 2096.1 Gybe: 1636.7 60deg: 1148.4 ~100: 843.8 135: 1171.9
 Linear-random: 1171.6 Circ: 1240.4 Olymp: 1769.9 W/L: 1866.4 ACC: 1668.6
 BELL Versions: 1192.8 : 1252.3 : 1756.8 : 1852.1 GPH: 571.8

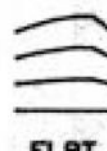
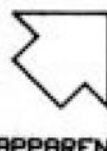
Master File: P42M01

Service Code: gDM2



Performance

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----- 6.0 knots True Wind Speed -----									
	36.0	8.3	20.3	2.211	1.788	.5	9.62	1.00	1.00
	44.0	9.2	26.4	3.448	2.481	.6	5.44	1.00	1.00
OPT Tack	51.3	9.6	30.1	4.197	2.622	.6	4.15	1.00	1.00
	52.0	9.6	30.4	4.256	2.620	.6	4.07	1.00	1.00
	60.0	9.8	34.1	4.856	2.428	.6	3.29	1.00	1.00
	70.0	9.6	38.8	5.304	1.814	.6	2.69	1.00	1.00
	71.3								
	80.0	9.5	42.4	6.001	1.042	.8	2.40	1.00	1.00
	90.0	9.1	46.2	6.454	0.000	.8	2.15	1.00	1.00
	105.0	7.7	54.7	6.346	-1.642	.6	1.66	1.00	1.00
	120.0	6.1	67.8	5.688	-2.844	.3	1.14	1.00	1.00
	135.0	4.5	89.0	4.728	-3.344	.1	.66	1.00	1.00
OPT Gybe	139.0	4.2	96.5	4.452	-3.359	.1	.54	1.00	1.00
	150.0	3.7	119.7	3.757	-3.254	0.0	.31	1.00	1.00
	165.0	3.4	150.5	3.232	-3.122	0.0	.19	1.00	1.00
	180.0	3.4	179.9	3.001	-3.001	0.0	.08	1.00	1.00

Handicaps: (seconds/mile)

Optimum Tack: 1373.2 Gybe: 1071.6 60deg: 741.3 ~100: 564.1 135: 761.3
 Linear-random: 783.5 Circ: 835.9 Olymp: 1157.7 W/L: 1222.4 ACC: 1093.3
 BELL Versions: 818.4 : 858.5 : 1214.5 : 1292.1 GPH: 571.8

Master File: P42M01

Service Code: gDM2



Performance

GRAND PRIX PAC is a registered trademark of DESIGN SYSTEMS & SERVICES, INC.



TRUE

APP.
WIND

APPARENT

BOAT
SPEED

VMG



LEECH



FLAT



REEF

----- 8.0 knots True Wind Speed -----									
	36.0	11.0	20.3	2.941	2.379	.8	9.65	1.00	1.00
	44.0	12.4	26.2	4.724	3.398	1.0	5.28	1.00	1.00
OPT Tack	49.4	12.7	29.1	5.440	3.539	1.1	4.34	1.00	1.00
	52.0	12.8	30.4	5.709	3.515	1.1	4.04	1.00	1.00
	60.0	12.9	34.3	6.382	3.191	1.1	3.34	1.00	1.00
	70.0	12.7	39.1	6.954	2.378	1.1	2.73	1.00	1.00
	70.6								
	80.0	12.4	43.2	7.714	1.340	1.4	2.59	1.00	1.00
	90.0	11.6	48.3	7.944	0.000	1.4	2.37	1.00	1.00
	105.0	10.0	57.4	7.833	-2.027	1.0	1.75	1.00	1.00
	120.0	8.0	69.1	7.371	-3.685	.6	1.16	1.00	1.00
	135.0	6.0	89.6	6.240	-4.412	.2	.66	1.00	1.00
OPT Gybe	142.9	5.3	103.9	5.632	-4.490	.1	.44	1.00	1.00
	150.0	4.8	118.8	5.095	-4.412	.1	.30	1.00	1.00
	165.0	4.4	150.2	4.358	-4.209	0.0	.18	1.00	1.00
	180.0	4.5	179.9	4.029	-4.029	0.0	.08	1.00	1.00

Handicaps: (seconds/mile)

Optimum Tack: 1017.2 Gybe: 801.8 60deg: 564.1 ~100: 457.4 135: 576.9
 Linear-random: 603.9 Circ: 637.6 Olymp: 862.5 W/L: 909.5 ACC: 818.8
 BELL Versions: 633.6 : 658.6 : 904.0 : 953.3 GPH: 571.8

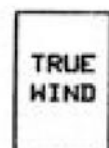
Master File: P42M01

Service Code: gDM2



Performance

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TRUE
WIND

TRUE

APP.
WIND

APPARENT

BOAT
SPEED

VMG



LEEWAY



FLAT



REEF

----- 10.0 knots True Wind Speed -----									
	36.0	13.8	20.3	3.736	3.022	1.3	9.46	1.00	1.00
	44.0	15.4	26.3	5.867	4.220	1.6	5.31	1.00	1.00
OPT Tack	50.0	15.9	29.5	6.797	4.369	1.7	4.33	1.00	1.00
	52.0	16.0	30.5	7.051	4.341	1.7	4.09	1.00	1.00
	60.0	15.9	34.8	7.622	3.811	1.7	3.50	1.00	1.00
	67.8								
	70.0	15.4	40.3	8.103	2.772	2.0	3.20	1.00	1.00
	80.0	14.8	45.7	8.576	1.489	2.2	3.14	1.00	1.00
	90.0	13.7	51.8	8.678	0.000	1.9	2.69	1.00	1.00
	105.0	11.8	62.1	8.542	-2.211	1.3	1.94	1.00	1.00
	120.0	9.6	74.5	8.184	-4.092	.7	1.25	1.00	1.00
	135.0	7.5	91.4	7.552	-5.340	.3	.67	1.00	1.00
OPT Gybe	143.1	6.6	104.9	6.954	-5.561	.2	.43	1.00	1.00
	150.0	6.1	119.3	6.303	-5.458	.1	.31	1.00	1.00
	165.0	5.5	150.1	5.467	-5.280	0.0	.18	1.00	1.00
	180.0	5.6	179.9	5.081	-5.081	0.0	.08	1.00	1.00

Handicaps: (seconds/mile)

Optimum Tack: 824.0 Gybe: 647.3 60deg: 472.3 ~100: 419.2 135: 476.7
 Linear-random: 521.6 Circ: 544.6 Olymp: 700.7 W/L: 735.7 ACC: 669.8
 BELL Versions: 536.6 : 556.8 : 765.1 : 807.7 GPH: 571.8

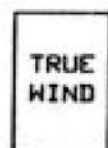
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Service Code: gDM2



Performance

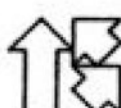
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TRUE

APP.
WIND

APPARENT

BOAT
SPEED

VMG



LEEWAY



FLAT



REEF

----- 12.0 knots True Wind Speed -----									
	36.0	16.8	20.5	4.646	3.759	1.9	9.05	1.00	1.00
	44.0	18.4	26.3	6.982	5.023	2.3	5.36	1.00	1.00
OPT Tack	46.1	18.6	27.5	7.324	5.078	2.4	5.01	1.00	1.00
	52.0	18.7	31.1	7.856	4.837	2.4	4.43	1.00	1.00
	60.0	18.3	36.0	8.217	4.109	2.3	3.92	1.00	1.00
	63.8								
	70.0	17.9	41.7	8.898	3.043	3.0	3.86	1.00	1.00
	80.0	17.1	47.5	9.363	1.626	3.0	3.52	1.00	1.00
	90.0	15.9	54.1	9.465	0.000	2.5	2.94	1.00	1.00
	105.0	13.7	65.4	9.262	-2.397	1.7	2.12	1.00	1.00
	120.0	11.3	79.0	8.812	-4.406	.9	1.36	1.00	1.00
	135.0	9.1	96.3	8.236	-5.824	.4	.72	1.00	1.00
	150.0	7.3	120.2	7.433	-6.437	.1	.32	1.00	1.00
OPT Gybe	151.1	7.3	122.4	7.354	-6.440	.1	.30	1.00	1.00
	165.0	6.7	150.3	6.516	-6.294	.1	.18	1.00	1.00
	180.0	6.7	179.9	6.061	-6.061	0.0	.08	1.00	1.00

Handicaps: (seconds/mile)

Optimum Tack: 709.0 Gybe: 559.0 60deg: 438.1 ~100: 385.9 135: 437.1
 Linear-random: 466.1 Circ: 480.3 Olymp: 610.3 W/L: 634.0 ACC: 584.0
 BELL Versions: 470.8 : 485.0 : 638.6 : 664.9 GPH: 571.8

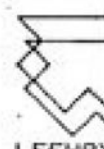
Master File: P42M01

Service Code: gDM2



Performance

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	TRUE WIND	TRUE	APP. WIND	APPARENT	BOAT SPEED	VMG	LEEWAY	FLAT	REEF
----- 14.0 knots True Wind Speed -----									
OPT Tack	36.0	19.5	20.5	5.429	4.392	2.6	9.03	1.00	1.00
	43.5	21.1	26.2	7.657	5.552	3.1	5.77	1.00	1.00
	44.0	21.1	26.5	7.716	5.550	3.1	5.70	1.00	1.00
	52.0	21.1	31.8	8.335	5.132	3.1	4.93	1.00	1.00
	60.0	20.7	37.0	8.712	4.356	2.9	4.36	1.00	1.00
-----	60.6								
	70.0	20.4	42.5	9.784	3.346	4.3	4.27	1.00	1.00
	80.0	19.5	48.6	10.314	1.791	4.1	3.74	1.00	1.00
	90.0	18.2	55.5	10.407	0.000	3.3	3.11	1.00	1.00
	105.0	15.7	67.3	10.171	-2.632	2.1	2.24	1.00	1.00
	120.0	13.1	81.9	9.547	-4.774	1.2	1.45	1.00	1.00
	135.0	10.7	100.3	8.821	-6.237	.5	.78	1.00	1.00
	150.0	8.9	123.2	8.103	-7.018	.2	.36	1.00	1.00
OPT Gybe	163.8	7.9	148.4	7.534	-7.234	.1	.20	1.00	1.00
	165.0	7.9	150.7	7.487	-7.232	.1	.19	1.00	1.00
	180.0	7.9	179.9	7.048	-7.048	0.0	.08	1.00	1.00

Handicaps: (seconds/mile)

Optimum Tack: 648.4 Gybe: 497.7 60deg: 413.2 ~100: 351.2 135: 408.1
 Linear-random: 425.5 Circ: 437.3 Olymp: 557.8 W/L: 573.0 ACC: 531.2
 BELL Versions: 426.5 : 438.8 : 564.7 : 577.8 GPH: 571.8

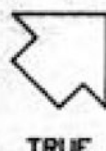
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Service Code: qDM2

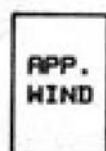


Performance

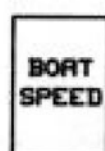
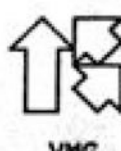
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TRUE

APP.
WIND

APPARENT

BOAT
SPEED

VMG



LEECH



FLAT



REEF

----- 16.0 knots True Wind Speed -----									
	36.0	22.2	20.4	6.103	4.937	3.5	9.21	1.00	1.00
OPT Tack	42.0	23.5	25.3	7.922	5.887	4.0	6.54	1.00	1.00
	44.0	23.6	26.7	8.143	5.857	4.0	6.26	1.00	1.00
	52.0	23.4	32.3	8.778	5.404	3.9	5.41	1.00	1.00
	58.7								
	60.0	23.2	37.5	9.384	4.692	4.6	4.85	1.00	1.00
	70.0	22.9	43.1	10.653	3.643	5.9	4.59	1.00	1.00
	80.0	21.8	49.7	11.076	1.923	5.3	3.99	1.00	1.00
	90.0	20.3	56.9	11.168	0.000	4.2	3.31	1.00	1.00
	105.0	17.7	69.1	10.946	-2.833	2.7	2.37	1.00	1.00
	120.0	14.9	83.8	10.381	-5.191	1.5	1.52	1.00	1.00
	135.0	12.3	102.8	9.492	-6.712	.6	.83	1.00	1.00
	150.0	10.5	125.9	8.643	-7.485	.3	.42	1.00	1.00
	165.0	9.4	152.0	8.122	-7.845	.1	.23	1.00	1.00
OPT Gybe	169.9	9.3	161.0	7.990	-7.866	.1	.17	1.00	1.00
	180.0	9.2	179.9	7.799	-7.799	0.0	.09	1.00	1.00

Handicaps: (seconds/mile)

Optimum Tack: 611.6 Gybe: 457.7 60deg: 389.7 ~100: 326.7 135: 379.3
 Linear-random: 396.5 Circ: 407.9 Olymp: 522.5 W/L: 534.6 ACC: 496.2
 BELL Versions: 392.9 : 405.9 : 521.8 : 532.8 GPH: 571.8

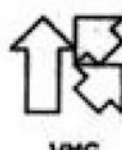
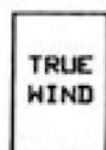
Master File: P42M01

Service Code: gDM2



Performance

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----- 18.0 knots True Wind Speed -----									
TRUE WIND	TRUE	APP. WIND	APPARENT	BOAT SPEED	VMG	LEEWAY	FLAT	REEF	
OPT Tack	36.0	25.0	20.3	6.806	5.506	4.6	9.30	1.00	1.00
	41.5	25.9	25.0	8.213	6.153	5.0	7.22	1.00	1.00
	44.0	25.9	26.8	8.504	6.117	5.1	6.83	1.00	1.00
	52.0	25.9	32.6	9.250	5.695	5.0	5.84	1.00	1.00
----- ^ Genoa Spinnaker v -----									
	57.7								
	60.0	25.7	37.7	10.211	5.105	6.3	5.18	1.00	1.00
	70.0	25.3	43.6	11.398	3.898	7.8	4.91	1.00	1.00
	80.0	24.1	50.4	11.917	2.069	6.9	4.17	1.00	1.00
	90.0	22.6	57.7	12.106	0.000	5.4	3.43	1.00	1.00
	105.0	19.7	70.4	11.744	-3.040	3.3	2.48	1.00	1.00
	120.0	16.6	85.7	11.075	-5.538	1.8	1.61	1.00	1.00
	135.0	13.9	104.4	10.253	-7.250	.8	.86	1.00	1.00
	150.0	12.1	127.7	9.217	-7.983	.3	.47	1.00	1.00
	165.0	11.0	153.1	8.648	-8.354	.2	.27	1.00	1.00
OPT Gybe	171.4	10.8	164.6	8.481	-8.387	.1	.19	1.00	1.00
	180.0	10.8	179.9	8.337	-8.337	.1	.11	1.00	1.00

Handicaps: (seconds/mile)

Optimum Tack: 585.1 Gybe: 429.3 60deg: 363.4 ~100: 303.4 135: 351.1
 Linear-random: 371.7 Circ: 383.7 Olymp: 495.2 W/L: 507.2 ACC: 469.2
 BELL Versions: 363.0 : 378.1 : 492.7 : 503.2 GPH: 571.8

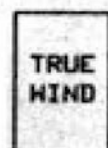
Master File: P42M01

Service Code: gDM2



Performance

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TRUE

APP.
WIND

APPARENT

BOAT
SPEED

VMG



LEEWAY



FLAT



REEF

----- 20.0 knots True Wind Speed -----									
	36.0	27.5	20.2	7.337	5.936	5.9	9.64	1.00	1.00
OPT Tack	42.0	28.2	25.3	8.601	6.387	6.3	7.72	1.00	1.00
	44.0	28.3	26.8	8.856	6.371	6.3	7.37	1.00	1.00
	52.0	28.3	32.7	9.842	6.059	6.3	6.14	1.00	1.00
	57.4								
	60.0	28.2	37.8	10.915	5.458	8.3	5.55	1.00	1.00
[NG:.02]	70.0	28.0	43.4	12.705	4.345	10.5	4.84	1.00	1.00
[NG:.03]	80.0	27.5	48.5	14.549	2.526	10.1	3.74	1.00	1.00
	90.0	25.7	55.6	14.668	0.000	7.8	3.13	1.00	1.00
	105.0	22.0	69.3	13.567	-3.511	4.4	2.38	1.00	1.00
	120.0	18.5	87.0	11.853	-5.927	2.1	1.67	1.00	1.00
	135.0	15.6	106.0	10.906	-7.712	.9	.91	1.00	1.00
	150.0	13.6	128.8	9.895	-8.569	.4	.51	1.00	1.00
	165.0	12.6	153.9	9.199	-8.886	.2	.30	1.00	1.00
OPT Gybe	170.1	12.5	162.8	9.039	-8.905	.2	.24	1.00	1.00
	180.0	12.4	179.9	8.841	-8.841	.1	.13	1.00	1.00

Handicaps: (seconds/mile)

Optimum Tack: 563.6 Gybe: 404.3 60deg: 341.6 ~100: 258.4 135: 330.1
 Linear-random: 339.3 Circ: 356.1 Olymp: 473.2 W/L: 484.0 ACC: 444.1
 BELL Versions: 334.8 : 353.6 : 472.0 : 482.0 GPH: 571.8

Master File: P42M01

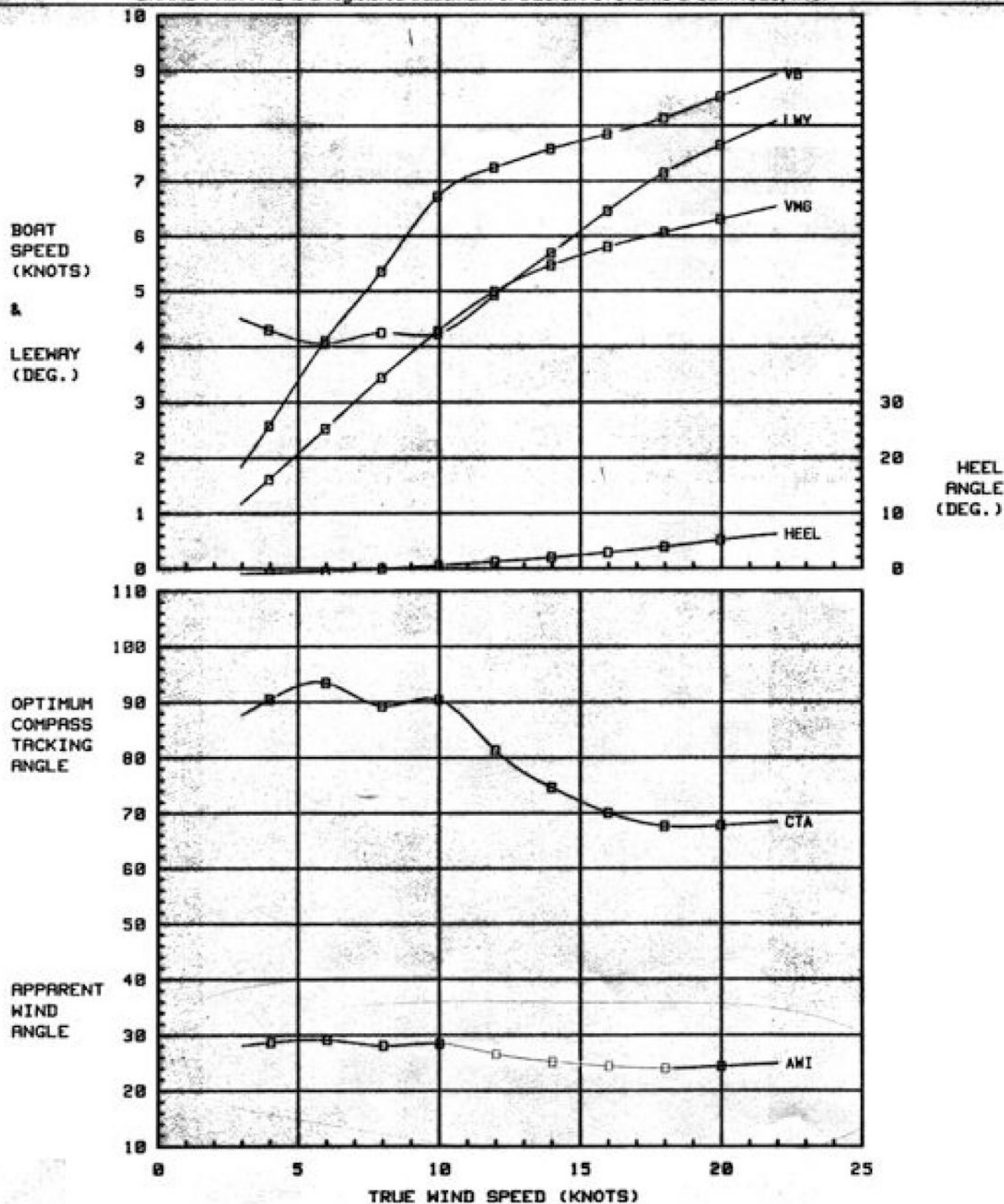
Service Code: gDM2





Upwind

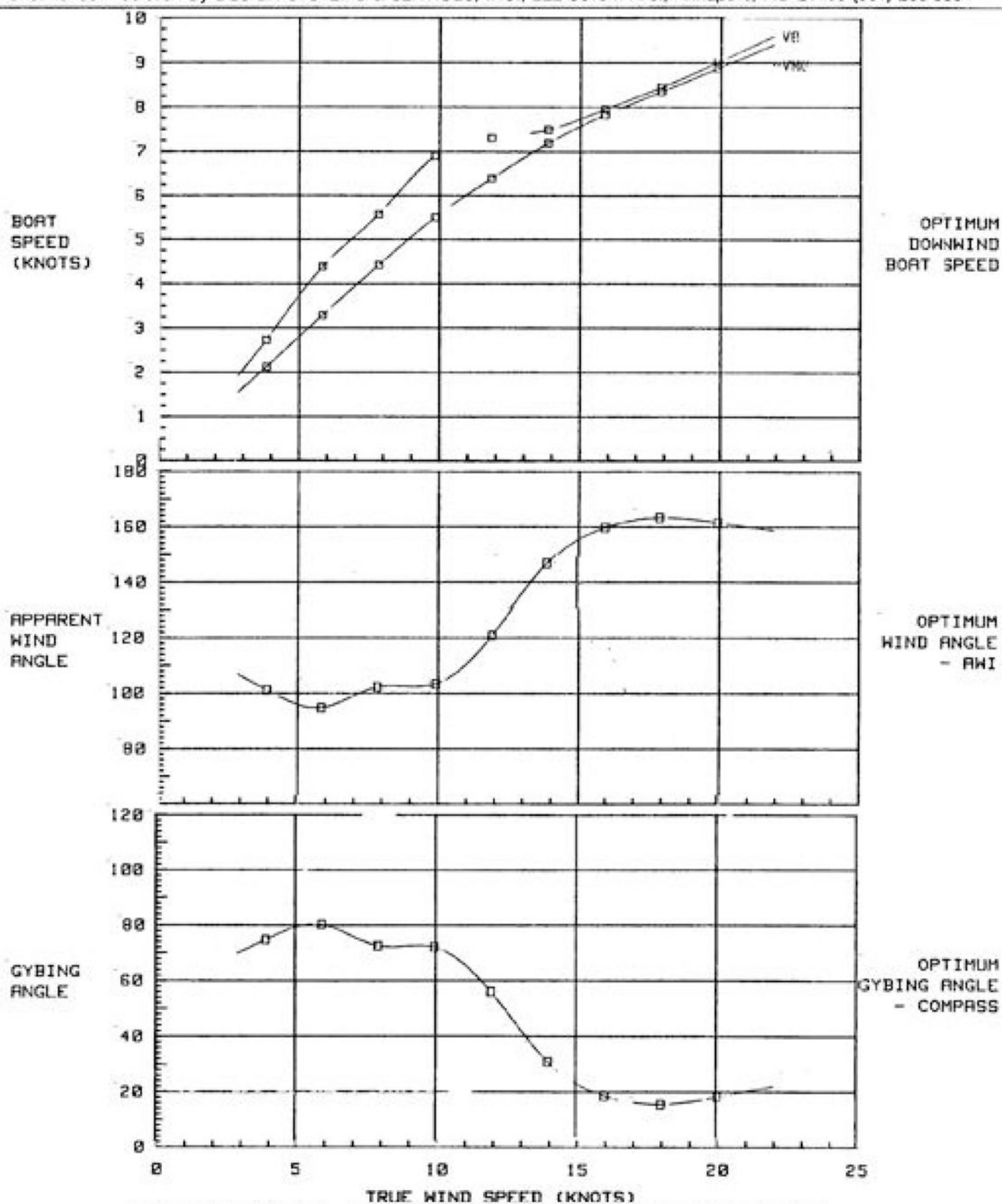
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Downwind

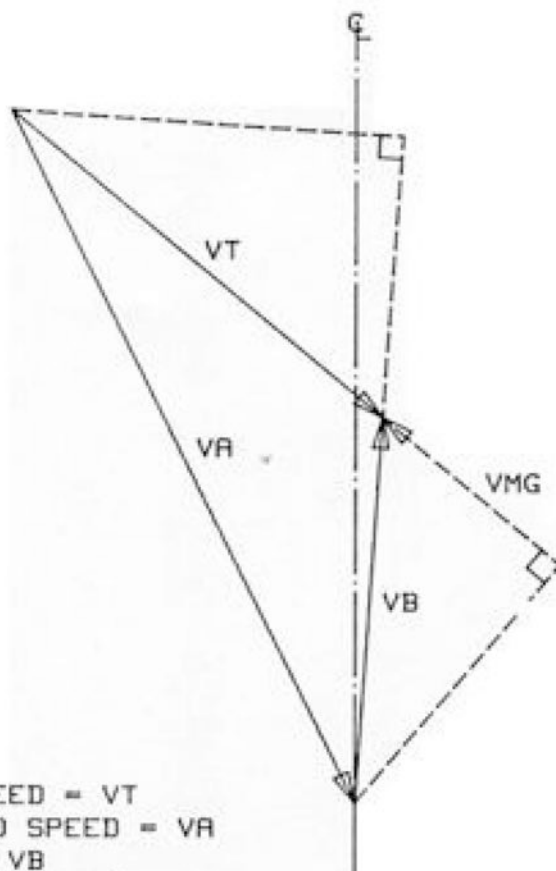
A Performance Prediction By DESIGN SYSTEMS & SERVICES, INC., 222 Severn Ave., Annapolis, MD 21403 (301) 268-5551





Wind Equations

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TRUE WIND SPEED = VT
APPARENT WIND SPEED = VA
BOAT SPEED = VB
TRUE WIND ANGLE = G
APPARENT WIND ANGLE = B
LEEWAY ANGLE = L
UPWASH ANGLE = E
HEEL ANGLE = H

THE SYMBOL ^ INDICATES EXPONENTIATION.
THE SYMBOL * INDICATES MULTIPLICATION.
THE LETTER m INDICATES A MEASURED QUANTITY.
THE LETTERS mh INDICATE A VALUE TAKEN AT THE MASTHEAD.

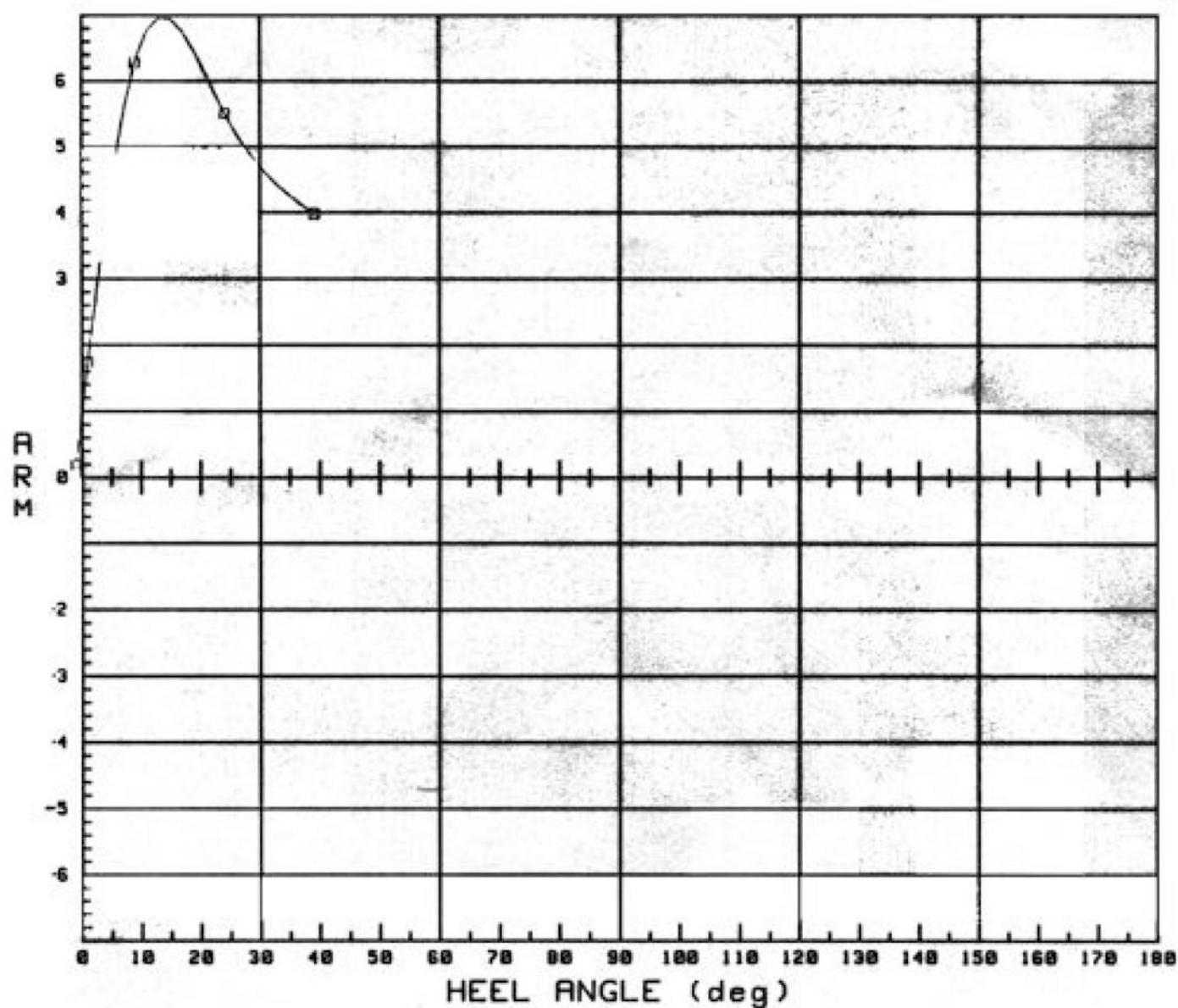
$$\begin{aligned}L &= 472.38 * H / [VB]^3 \\E &= 2.87 * \sin[(180 - B_m) / 1.667]^{2.5} * REEF^2 * FLAT \\B &= B_m + L - E \\VBAUG &= \cos(B) * VAm \\VTMCG &= VBAUG - VB \\G &= \arctan[TAN(B) * VBAUG / (\cos(H) * VTMCG)] \\VTmh &= VTMCG / \cos(G) \\VT &= VTmh / (.15055 * \cos(H) + .914)\end{aligned}$$





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RIGHTING ARM vs. HEEL ANGLE



UPRIGHT MEASUREMENT TRIM

DISPL...lbs...	19500.0	WATER DENSITY.	64.00	FGO.....	1.750
LONG. CG.....	.127	LWL.....	41.100	FF.....	6.503
VERT. CG.....	-4.200	MTI.....	3373.051	FA.....	5.889
VERT. CB.....	1.134	PPI.....	1263.060	LBG.....	36.000
METACENTER....	-49.232	WETTED SURF...	487.628	TOTAL SURF....	1611.784
LONG. CF.....	-1.383	RM/DEG.....	15260.007	LCG TOT. SURF.	.084
VERT. CF.....	.188	MAX. DRAFT....	5.326	VCG TOT. SURF.	-1.949

UPRIGHT SAILING TRIM

DISPL...lbs...	19500.0	WATER DENSITY.	64.00	FF.....	6.503
LONG. CG.....	.127	LWL.....	41.100	FA.....	5.889
VERT. CG.....	-4.200	MTI.....	3373.052	CREW WT.....	0.000
VERT. CB.....	1.134	PPI.....	1263.060	GEAR WT.....	0.000
METACENTER....	-49.232	WETTED SURF...	487.628	SAILING LEN...	43.387
LONG. CF.....	-1.383	RM/DEG.....	15260.009	RATED BEAM....	5.367
VERT. CF.....	.188	MAX. DRAFT....	5.326	EFF. B/Tc.....	1.846
AMAX.....	11.311	EFF. DRAFT....	5.001	SUNK LENGTH...	48.276
RATED LENGTH..	43.258	SA/WETTED SURF	1.631	DISP/LENGTH...	107.545

SAILING TRIM WITH HEEL

HEEL ANGLE	DWL @ FF	DWL @ FA	RIGHT'G ARM	LONG. C.B.	WETTED SURF.	SAILING LEN.	EFF. B/Tc
0.0	-.253	-.139	-0.000	.110	487.628	43.387	1.846
2.0	-.227	-.178	1.557	.221	484.697	43.772	1.829
10.0	.252	-1.199	6.106	1.983	432.702	45.153	1.589
25.0	-2.266	-2.697	5.326	.193	369.631	47.231	1.480
40.0	-4.178	-4.597	3.793	.203	301.287	47.186	1.963

NOTES

1. Long. positions are relative to dig. file origin (+Fwd,-Aft)
2. Vertical positions are relative to DWL (+Below -Abv), except DWL @FF and DWL @FA which locate the DWL relative to the LWL (positive=DWL Below LWL negative=DWL Above LWL)
3. Metacenter ht. is relative to the Center of Flotation, (CF)
4. Dimensions are in currently selected system units