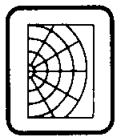
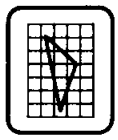
GRAND PRIX PAC


Performance


Polar Plot


Wind Plot


Wind Equations

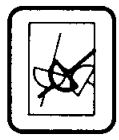

Upwind


Downwind

DESIGN # 145

FOR

B F & A, INC


Hydrostatics

CONFIDENTIAL

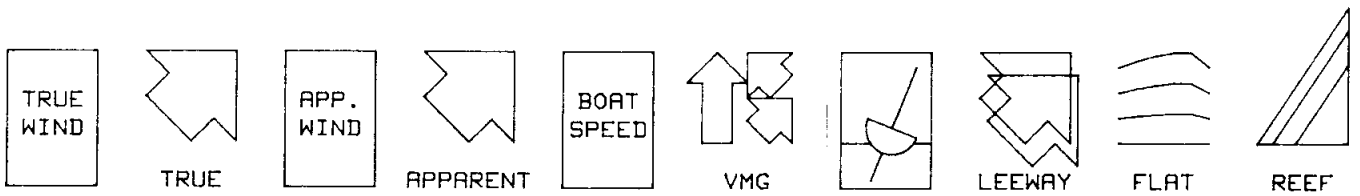

Comparative Performance

DESIGN SYSTEMS

145 MØ1

Performance

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



3.0 knots

	36.0	4.9	25.2	1.978	1.600	1.4	3.8	1.00	1.00
	44.0	5.1	29.0	2.413	1.736	1.5	2.9	1.00	1.00
Tack	**45.9**	**5.2**	**29.8**	**2.499**	**1.741**	**1.6**	**2.8**	**1.00**	**1.00**
	52.0	5.3	32.3	2.749	1.692	1.6	2.4	1.00	1.00
	60.0	5.3	35.6	2.996	1.498	1.6	2.0	1.00	1.00
	70.0	5.2	39.7	3.189	1.091	1.6	1.7	1.00	1.00
	80.0	4.9	44.3	3.258	.566	1.4	1.4	1.00	1.00
	89.9	^ Genoa / Spinnaker v							
	90.0	4.5	49.3	3.221	0.000	1.4	1.2	1.00	1.00
	105.0	3.8	57.8	3.149	-.815	1.1	.9	1.00	1.00
	120.0	3.0	70.7	2.795	-1.397	.7	.6	1.00	1.00
	135.0	2.2	91.1	2.321	-1.641	.3	.3	1.00	1.00
Gybe	**141.6**	**2.0**	**102.7**	**2.116**	**-1.658**	**.2**	**.2**	**1.00**	**1.00**
	150.0	1.8	119.8	1.869	-1.619	.1	.1	1.00	1.00
	165.0	1.6	150.5	1.597	-1.543	0.0	.1	1.00	1.00
	180.0	1.7	180.0	1.477	-1.477	0.0	0.0	1.00	1.00

CONFIDENTIAL

6.0 knots

	36.0	9.5	25.5	3.693	2.988	3.6	4.1	1.00	1.00
Tack	**44.0**	**9.9**	**29.7**	**4.386**	**3.155**	**4.0**	**3.2**	**1.00**	**1.00**
	44.0	9.9	29.7	4.386	3.155	4.0	3.2	1.00	1.00
	52.0	10.0	33.5	4.903	3.018	4.1	2.7	1.00	1.00
	60.0	10.0	37.3	5.291	2.645	4.1	2.3	1.00	1.00
	70.0	9.7	42.1	5.569	1.905	3.8	1.9	1.00	1.00
	80.0	9.1	47.4	5.649	.981	3.5	1.6	1.00	1.00
	83.9	^ Genoa / Spinnaker v							
	90.0	8.5	52.6	5.745	0.000	3.5	1.3	1.00	1.00
	105.0	7.2	62.3	5.532	-1.432	2.7	1.0	1.00	1.00
	120.0	5.7	75.9	4.979	-2.489	1.7	.7	1.00	1.00
	135.0	4.4	95.4	4.280	-3.024	.9	.4	1.00	1.00
Gybe	**144.0**	**3.9**	**110.5**	**3.854**	**-3.118**	**.5**	**.2**	**1.00**	**1.00**
	150.0	3.6	122.0	3.567	-3.089	.4	.2	1.00	1.00
	165.0	3.4	151.2	3.107	-3.001	.2	.1	1.00	1.00
	180.0	3.4	180.0	2.886	-2.886	.1	0.0	1.00	1.00

DESIGN SYSTEMS

145 M$1

Performance

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

TRUE WIND	TRUE	APP. WIND	APPARENT	BOAT SPEED	VMG		LEEWAY	FLAT	REEF
9.0 knots									
	36.0	13.6	25.3	4.982	4.030	12.7	4.7	1.00	1.00
Tack	**42.1**	**14.0**	**28.8**	**5.666**	**4.202**	**14.6**	**3.9**	**1.00**	**1.00**
	44.0	14.0	29.8	5.819	4.186	14.9	3.7	1.00	1.00
	52.0	14.0	34.4	6.263	3.856	14.8	3.2	1.00	1.00
	60.0	13.7	39.2	6.516	3.258	13.5	2.8	1.00	1.00
	70.0	13.1	45.4	6.686	2.287	10.9	2.4	1.00	1.00
	77.3	^ Genoa / Spinnaker v							
	80.0	12.3	51.5	6.804	1.181	12.1	2.0	1.00	1.00
	90.0	11.5	58.2	6.860	0.000	8.2	1.7	1.00	1.00
	105.0	10.0	69.1	6.754	-1.748	4.1	1.2	1.00	1.00
	120.0	8.3	81.9	6.457	-3.229	2.7	.7	1.00	1.00
	135.0	6.7	99.2	5.933	-4.195	1.5	.4	1.00	1.00
Gybe	**144.8**	**5.9**	**114.8**	**5.389**	**-4.402**	**.9**	**.2**	**1.00**	**1.00**
	150.0	5.6	124.4	5.061	-4.383	.7	.2	1.00	1.00
	165.0	5.2	152.1	4.481	-4.328	.4	.1	1.00	1.00
	180.0	5.2	180.0	4.189	-4.189	.2	0.0	1.00	1.00

CONFIDENTIAL

13.0 knots

	36.0	18.1	24.3	5.743	4.646	22.5	4.7	.75	1.00
Tack	**38.7**	**18.2**	**26.0**	**6.001**	**4.684**	**23.1**	**4.3**	**.75**	**1.00**
	44.0	18.1	29.3	6.365	4.579	24.5	3.9	.78	1.00
	52.0	17.7	34.5	6.735	4.146	26.2	3.6	.86	.99
	60.0	17.1	39.8	6.997	3.498	27.2	3.4	.95	.99
	70.0	16.3	47.2	7.241	2.477	26.1	3.1	1.00	1.00
	80.0	15.7	55.3	7.412	1.287	21.1	2.7	1.00	1.00
	85.4	^ Genoa / Spinnaker v							
	90.0	14.7	63.0	7.551	0.000	20.7	2.1	1.00	1.00
	105.0	13.5	76.1	7.625	-1.973	10.3	1.5	1.00	1.00
	120.0	11.7	90.2	7.420	-3.710	3.9	.9	1.00	1.00
	135.0	9.9	107.2	7.050	-4.985	2.1	.4	1.00	1.00
	150.0	8.5	128.4	6.540	-5.664	1.2	.2	1.00	1.00
	165.0	7.8	153.4	6.106	-5.898	.7	.1	1.00	1.00
Gybe	**166.4**	**7.8**	**155.8**	**6.070**	**-5.900**	**.7**	**.1**	**1.00**	**1.00**
	180.0	7.8	179.9	5.797	-5.797	.4	.1	1.00	1.00

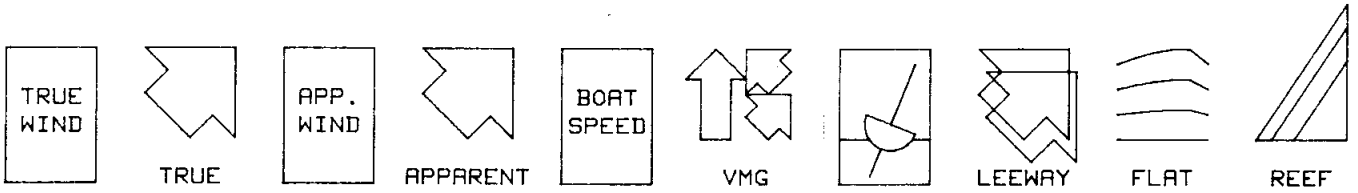
DESIGN SYSTEMS

145 MΦ1

OFFICE USE ONLY

Performance

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



20.0 knots

	36.0	25.2	24.0	6.042	4.888	25.5	5.1	.69	.84
Tack	**38.0**	**25.2**	**25.5**	**6.238**	**4.913**	**25.9**	**4.8**	**.71**	**.83**
	44.0	24.9	29.9	6.654	4.787	26.9	4.4	.82	.80
	52.0	24.3	35.7	7.029	4.328	28.2	4.1	.92	.79
	60.0	23.4	41.8	7.303	3.651	29.3	3.8	1.00	.79
	70.0	22.2	49.9	7.580	2.592	29.5	3.4	1.00	.83
	80.0	20.9	58.5	7.845	1.362	29.8	3.1	1.00	.88
	90.0	19.4	67.6	8.094	0.000	30.2	2.7	1.00	.95
	91.0	---------- ^ Genoa / Spinnaker v ----------							
	105.0	18.1	82.7	8.537	-2.210	26.3	1.8	1.00	1.00
	120.0	17.7	97.8	8.729	-4.365	11.7	1.2	1.00	1.00
	135.0	16.0	114.8	8.373	-5.921	3.5	.6	1.00	1.00
	150.0	14.5	134.5	7.916	-6.856	2.3	.4	1.00	1.00
	165.0	13.7	156.6	7.597	-7.338	1.5	.2	1.00	1.00
Gybe	**173.4**	**13.5**	**169.7**	**7.457**	**-7.408**	**1.1**	**.2**	**1.00**	**1.00**
	180.0	13.5	179.9	7.378	-7.378	.9	.1	1.00	1.00

CONFIDENTIAL

30.0 knots

	36.0	34.8	23.4	5.977	4.835	27.6	6.3	.74	.66
Tack	**39.7**	**34.6**	**26.5**	**6.411**	**4.930**	**28.7**	**5.5**	**.76**	**.65**
	44.0	34.3	29.9	6.745	4.852	29.6	5.2	.86	.63
	52.0	33.3	36.4	7.174	4.417	30.8	4.7	.96	.62
	60.0	32.1	43.2	7.488	3.744	31.3	4.3	1.00	.63
	70.0	30.7	52.3	7.835	2.680	31.3	3.8	1.00	.66
	80.0	29.0	61.8	8.166	1.418	31.6	3.3	1.00	.71
	81.5	---------- ^ Genoa / Spinnaker v ----------							
	90.0	27.5	72.2	8.542	0.000	31.2	2.5	1.00	.73
	105.0	25.1	88.2	9.227	-2.388	32.1	1.9	1.00	.86
	120.0	24.1	104.1	10.159	-5.080	28.0	1.3	1.00	1.00
	135.0	24.5	119.3	10.344	-7.314	12.4	.9	1.00	1.00
	150.0	23.3	137.9	9.807	-8.493	4.5	.6	1.00	1.00
	165.0	22.4	158.5	9.340	-9.022	2.8	.4	1.00	1.00
Gybe	**172.2**	**22.2**	**168.7**	**9.166**	**-9.080**	**2.3**	**.3**	**1.00**	**1.00**
	180.0	22.3	179.8	9.023	-9.023	1.8	.2	1.00	1.00

DESIGN SYSTEMS

DESIGN # 145
for B F & A, INC

14 Mar 1984

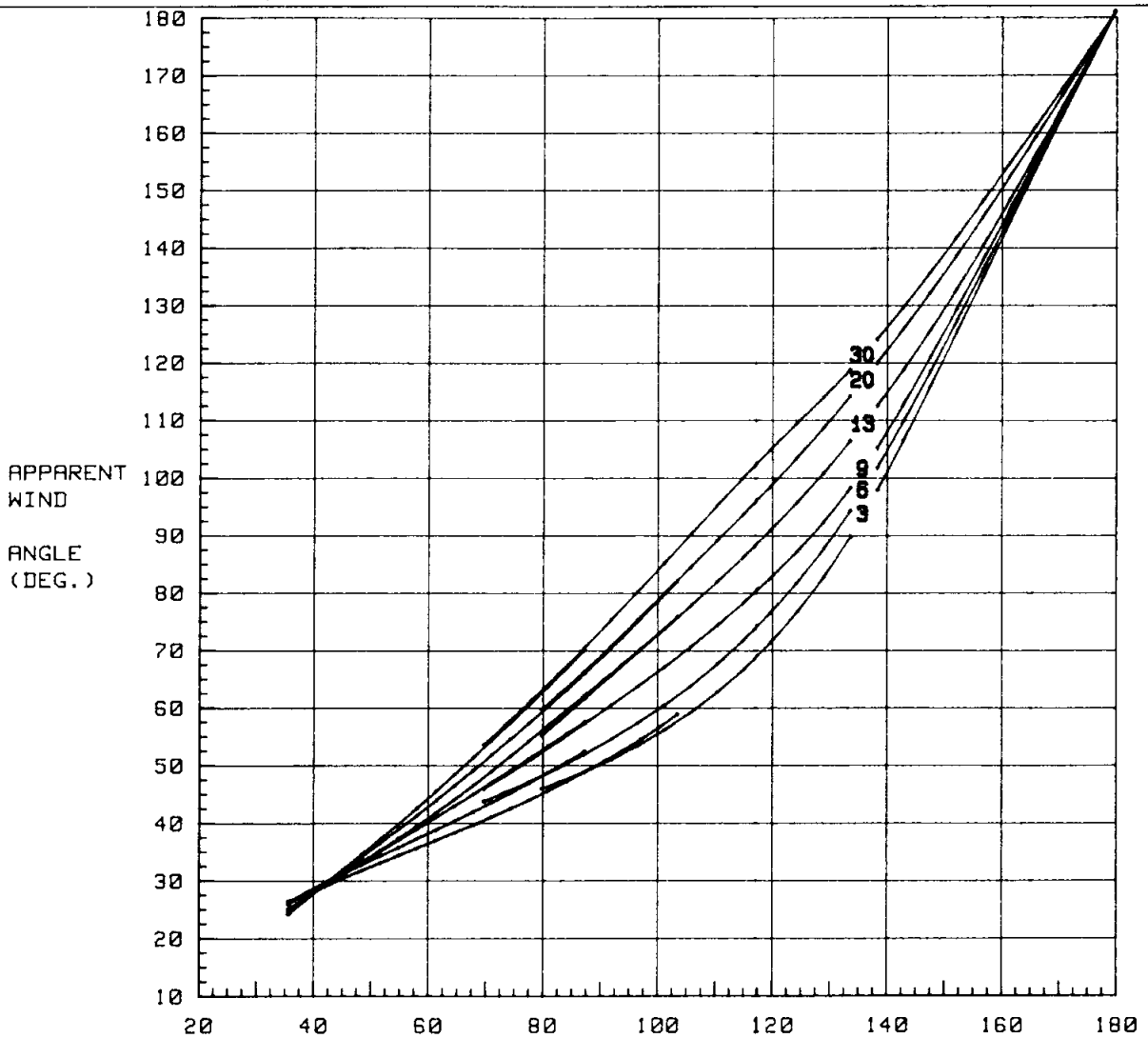
Wind Plot

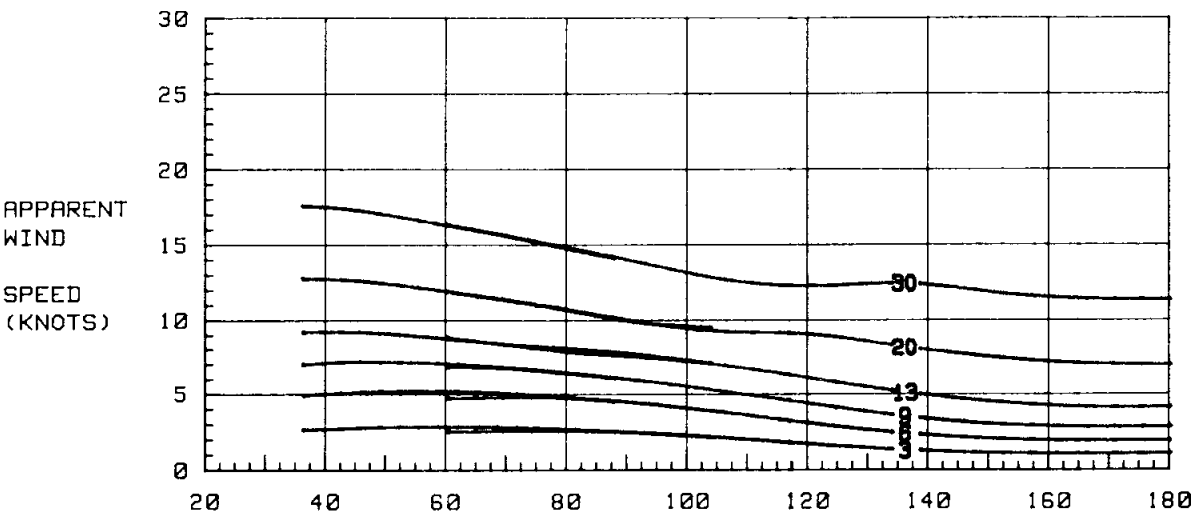
OFFICE USE ONLY

OFFICE USE ONLY

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

2 3 1984

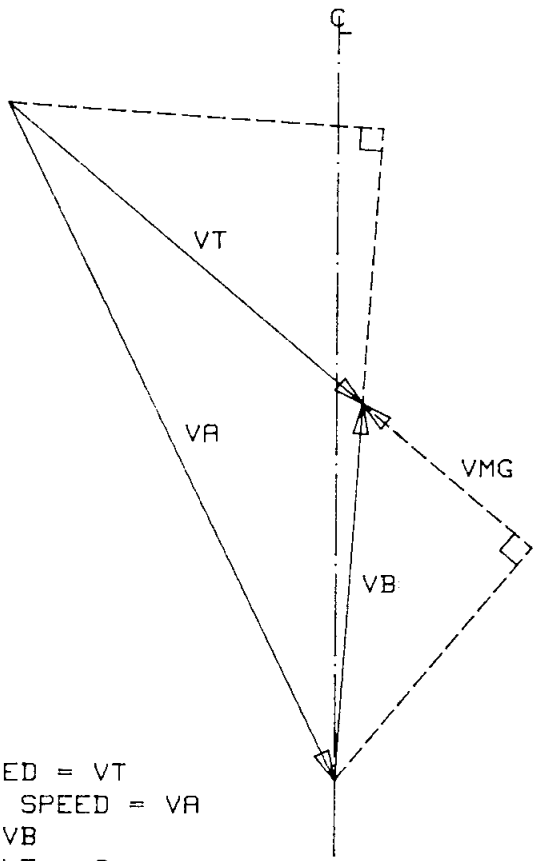




Copyright 14 Mar 1984 by Design Systems and Services Inc.

DESIGN SYSTEMS

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



OFFICE USE ONLY

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.

```
L = 49.13 * H/[VB]^3
E = 6.87 * SIN[(180-Bm)/1.667]^2.5 * REEF^2 * FLAT
B = Bm + 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) + .892)
```

Copyright 14 Mar 1984 by Design Systems and Services Inc.

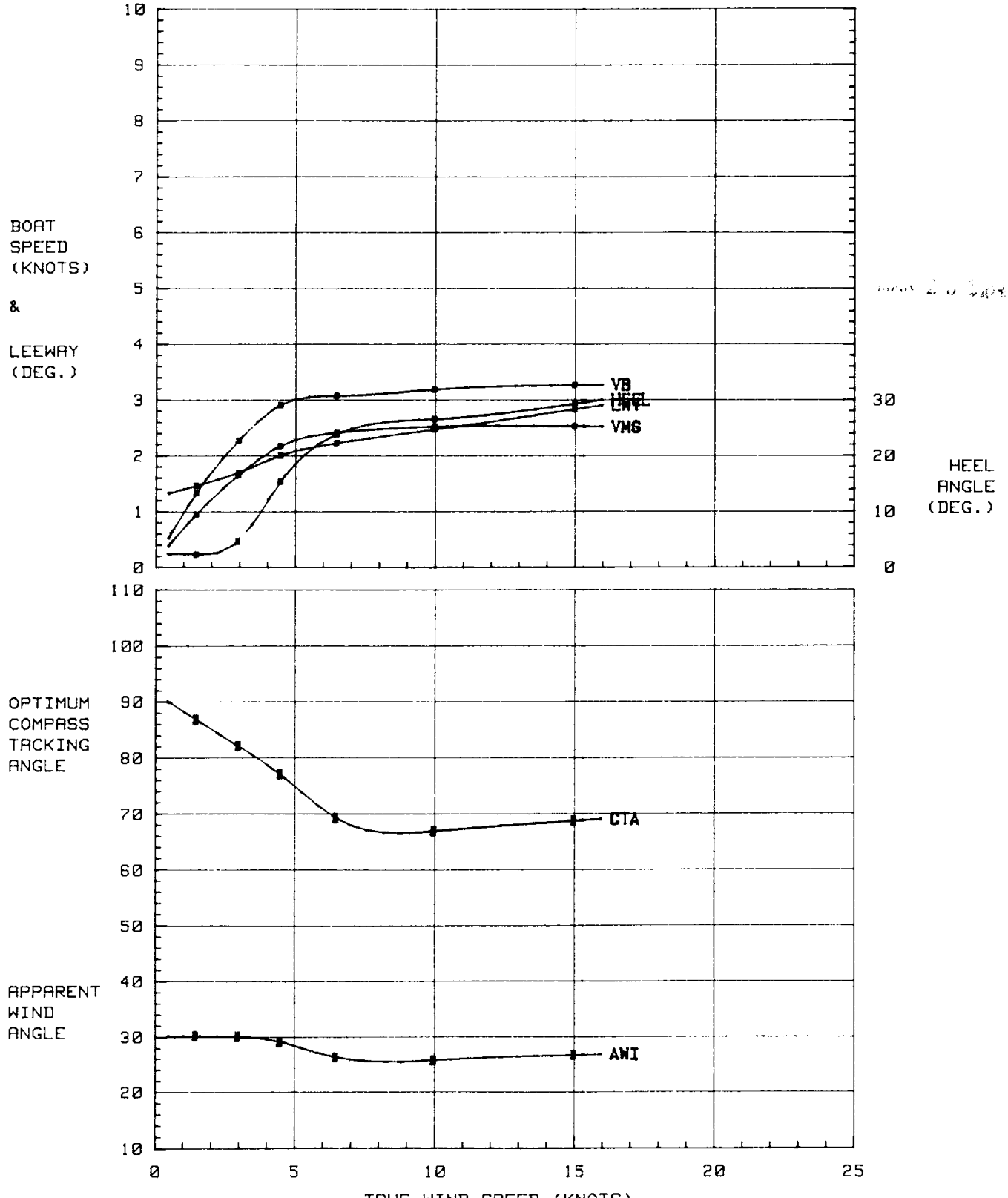
DESIGN # 145
for B F & A, INC

14 Mar 1984

OFFICE USE ONLY

Upwind

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



Copyright 14 Mar 1984 by Design Systems and Services Inc.

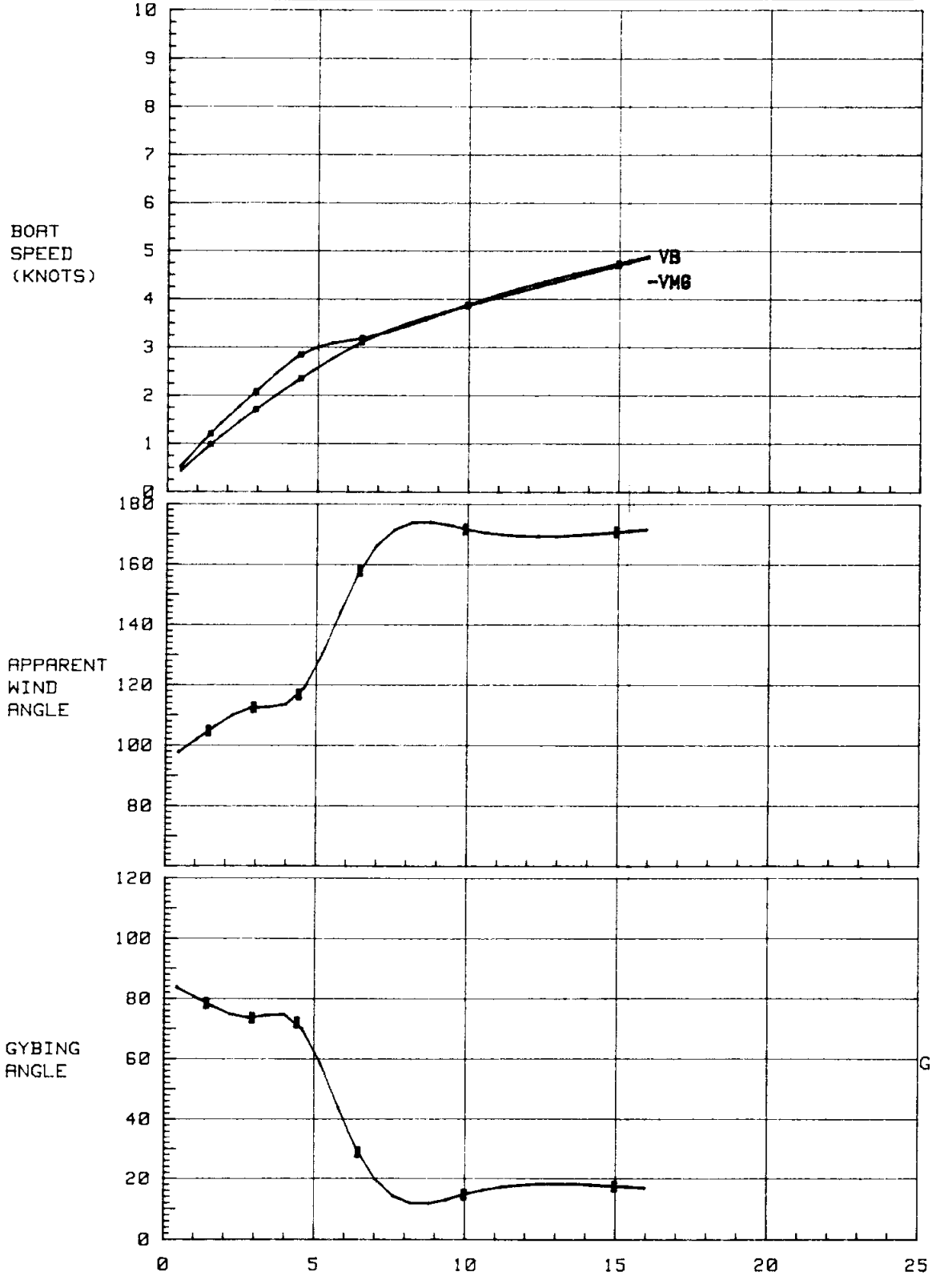
DESIGN SYSTEMS

DESIGN # 145
for B F & A, INC

14 Mar 1984

OFFICE USE ONLY

Downwind



Copyright 14 Mar 1984 by Design Systems and Services Inc.

145 M91

Office Use Only — CONFIDENTIAL

Hydrostatics 1

UPRIGHT MEASUREMENT TRIM

DISPLACEMENT...	9238.7	WATER DENSITY..	64.00	FGO.....	2.13
LONG. CG.....	-.70	LWL.....	26.96	FF.....	3.27
VERT. CG.....	-.20	MTI.....	963.75	FA.....	3.29
VERT. CB.....	.66	PPI.....	800.44	LBG.....	28.12
METACENTER.....	-3.94	WETTED SURF....	216.29	TOTAL SURF.....	726.80
LONG. CF.....	-1.47	RM/DEG.....	605.79	LCG TOT. SURF..	-2.27
VERT. CF.....	0.00	MAX. DRAFT.....	6.73	VCG TOT. SURF..	-1.89

UPRIGHT SAILING TRIM

DISPLACEMENT...	10888.4	WATER DENSITY..	64.00	FF.....	3.51
LONG. CG.....	-1.69	LWL.....	27.40	FA.....	2.83
VERT. CG.....	-.52	MTI.....	1109.66	CREW WT.....	1200.30
VERT. CB.....	.55	PPI.....	866.02	GEAR WT.....	449.40
METACENTER.....	-3.87	WETTED SURF....	232.75	SAILING LEN....	27.18
LONG. CF.....	-2.18	RM/DEG.....	665.68	EFF. B/Tc.....	4.67
VERT. CF.....	-.15	MAX. DRAFT.....	6.90	EFF. DRAFT.....	6.71

SAILING TRIM WITH HEEL

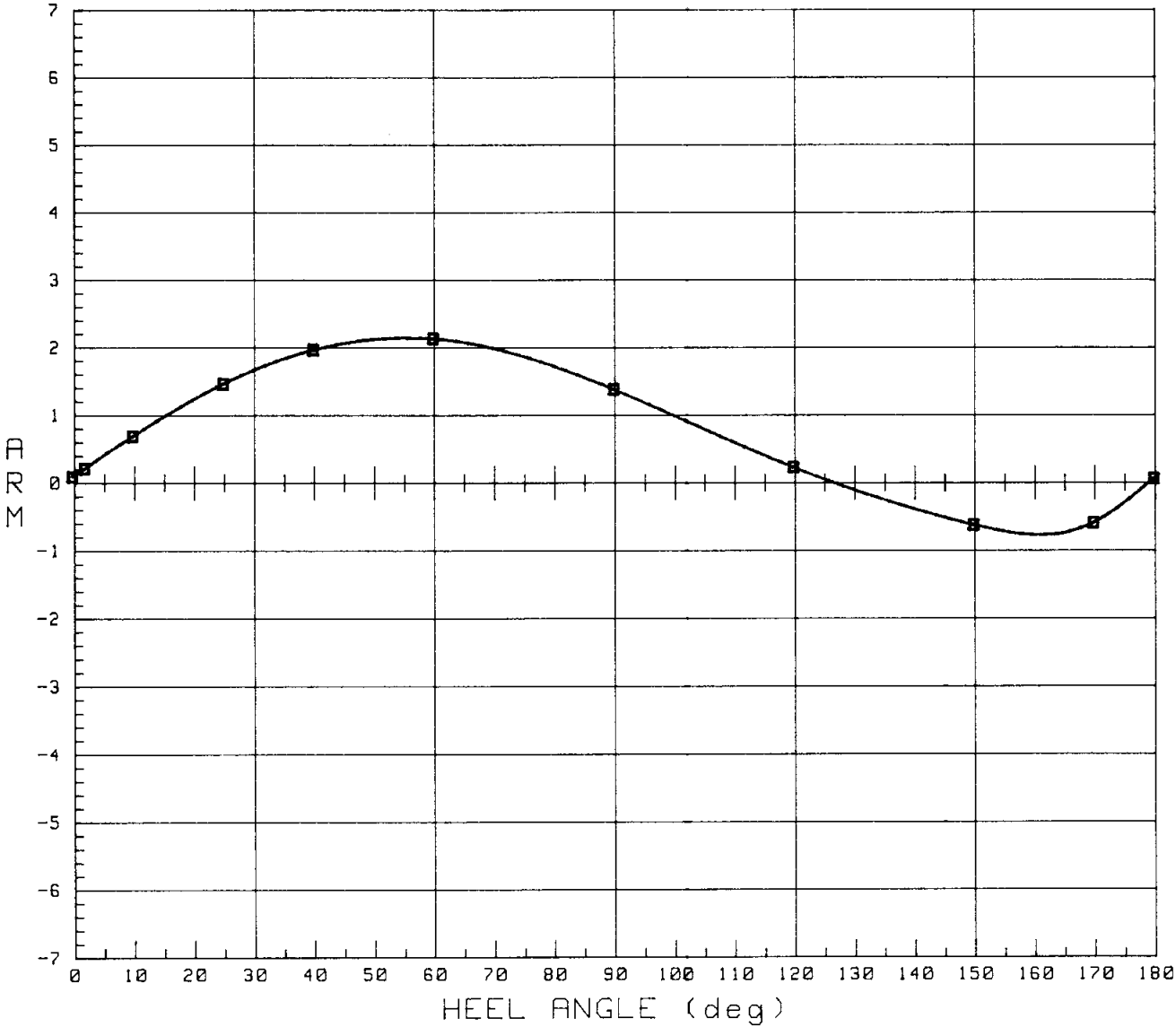
HEEL ANGLE	DWL @ FF	DWL @ FA	RIGHT'G ARM	LONG. C.B.	WETTED SURF.	SAILING LEN.	EFF. B/Tc
0.0	.12	.17	-0.000	-1.69	232.75	27.18	4.67
2.0	.12	.17	.122	-1.69	232.73	27.18	4.68
10.0	.11	.09	.599	-1.71	232.13	27.16	4.59
25.0	.02	-.35	1.369	-1.79	225.00	26.74	4.30
40.0	-.14	-1.10	1.876	-1.82	214.86	25.70	3.74
60.0	-.42	-2.20	2.043	-1.65	194.73		
90.0	-1.07	-3.48	1.298	-1.38	182.70		
120.0	-2.23	-3.92	.161	-1.44	188.28		
150.0	-3.34	-3.46	-.688	-1.75	200.57		
170.0	-3.68	-2.92	-.654	-1.82	221.63		

NOTES

1# Longitudinal positions are relative to station 5 (+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 dec. feet, displacement in lbs., moments in ft-lbs. and water density in lbs/cu. ft.

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

RIGHTING ARM vs.HEEL ANGLE



CONFIDENTIAL

Copyright 14 Mar 1984 by Design Systems and Services Inc.

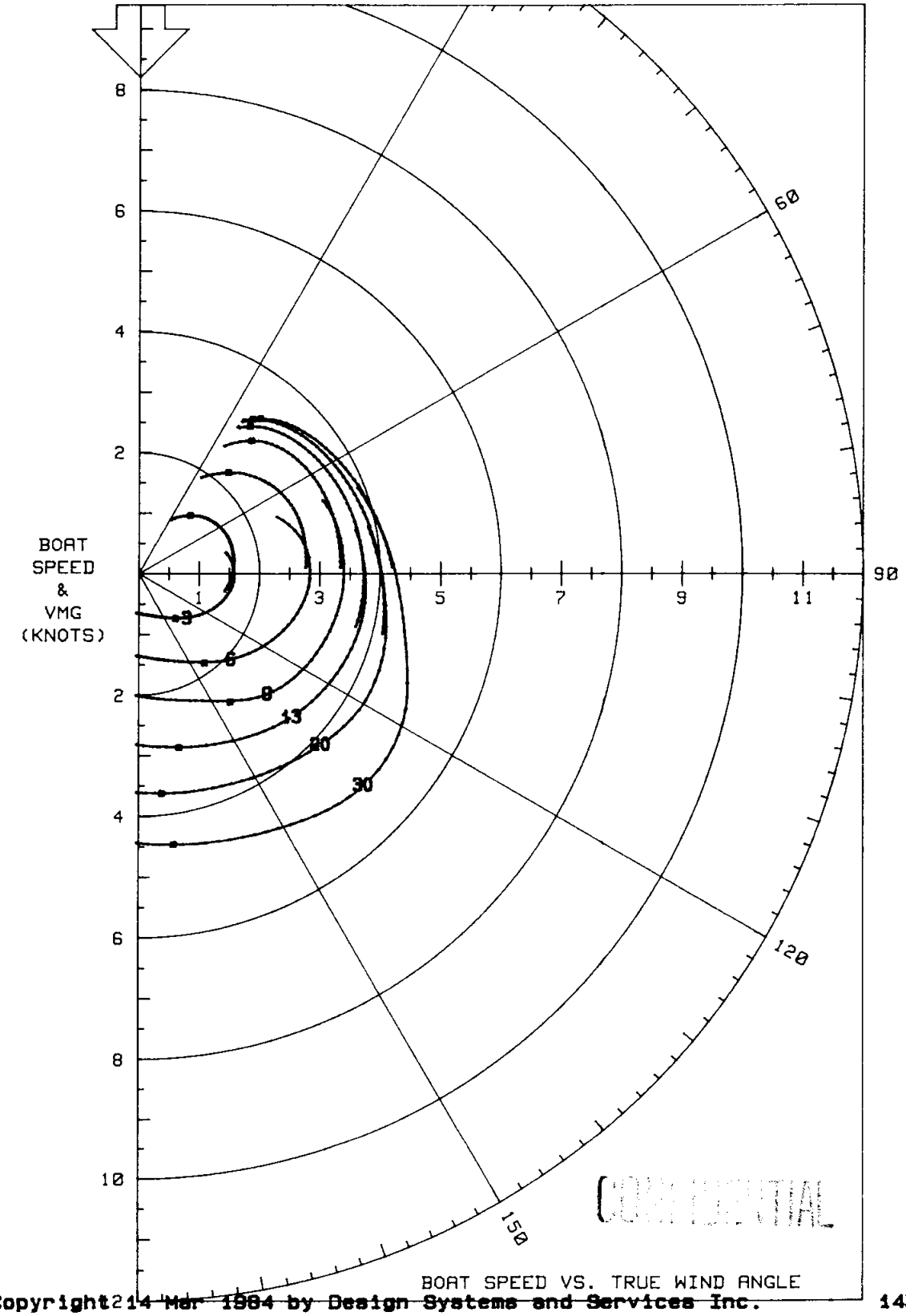
DESIGN # 145
for B F & A, INC

14 Mar 1984

OFFICE USE ONLY

Polar Plot

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



CONFIDENTIAL

Copyright 14 Mar 1984 by Design Systems and Services Inc.

DESIGN SYSTEMS

145M01

GRAND PRIX PAC

Brian 84

Job # [redacted] Do not fill in gray areas

Please print title as you would like it to appear on the output

Boat 145

For: HCY

Your Name _____

(if different from above)

Address _____

Home Phone: _____ Business: _____

☐ Boat Owner ☐ Navigator ☐ Designer ☐ Sailmaker ☐ Builder

1.

If stock boat, model _____

Boat Designer: _____

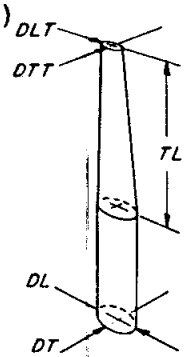
In order to determine hull form, designer's line drawings are required.

2. SPAR INFO: (can substitute spars detail drawing)

MAIN

DT	DTT	DL	DLT	TL	HBIS
.33	.2	.53	.32	9.06	3.49

DTY	DTTY	DLY	DLTY	TLY	HBIYS



DT: Transverse (side to side) thickness max.
DTT: Transverse (side to side) thickness min.
DL: Longitudinal (fore and aft) thickness max.
DLT: Longitudinal (fore and aft) thickness min.
TL: Length of tapered section of mast
HBIS: Height from DWL to the base to I.
DTY, DTY, DLY, DLTY & TLY: Denote measurements (if any) for mizzen mast.

3. APPENDAGES INFO: (can substitute keel & rudder detail drawings)

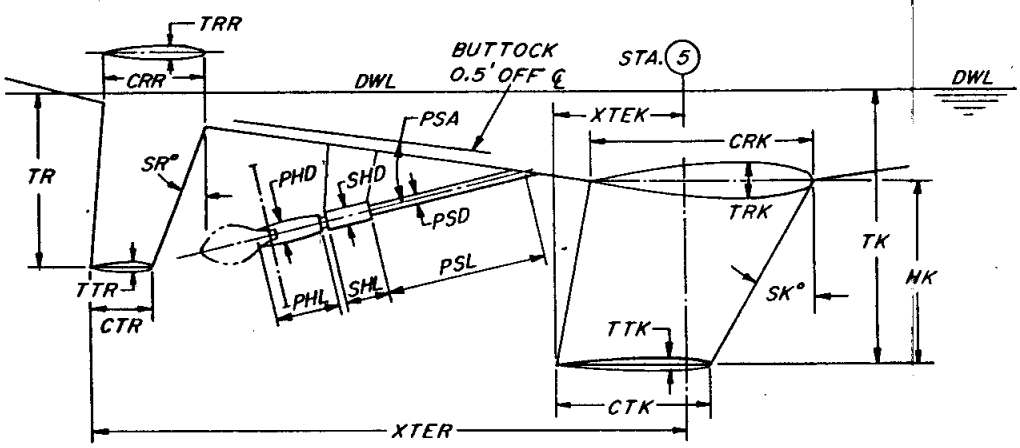
KEEL

TK	HK	CRK	CTK	TRK	TTK	SK	XTEK
6.75	5.28	4.61	1.79	.52	.24	28	-2.41 AFT ☐ FWD of STA. 5

RUDDER

TR	HR	CRR	CTR	TRR	TTR
4.38	4.99	2.25	1.16	.46	.14

SR	XTER
19	-16.18 AFT ☐ FWD of STA. 5



TK: Height from design waterline to bottom of keel
HK: Height from canoe body to bottom of keel
CRK: Cord length at root of keel
CTK: Cord length at tip of keel
TRK: Thickness at root of keel
TTK: Thickness at tip of keel
SK: Sweep angle of keel leading edge
XTEK: X location of trailing edge of keel (origin is station 5)
TR, HR, CRR, CTR, TRR, TTR, SR & XTER: Denote measurements for rudder

4. PROP INSTALLATION INFO:

TYPE	PSA	PSL	PSD	SHL	SHD	PHL	PHD	PRD	PIPA
FOLD	20	1.38	.07	.51	.11	.3	.11	1.41	

TYPE: Folding, feathering or solid
PSA: Prop shaft angle
PSL: Exposed prop shaft length to strut
PSD: Prop shaft diameter
SHL: Strut hub length
SHD: Strut hub diameter
PHL: Prop hub length
PHD: Prop hub diameter
PRD: Prop diameter open

5. SAIL INFO: (can substitute IOR certificate)

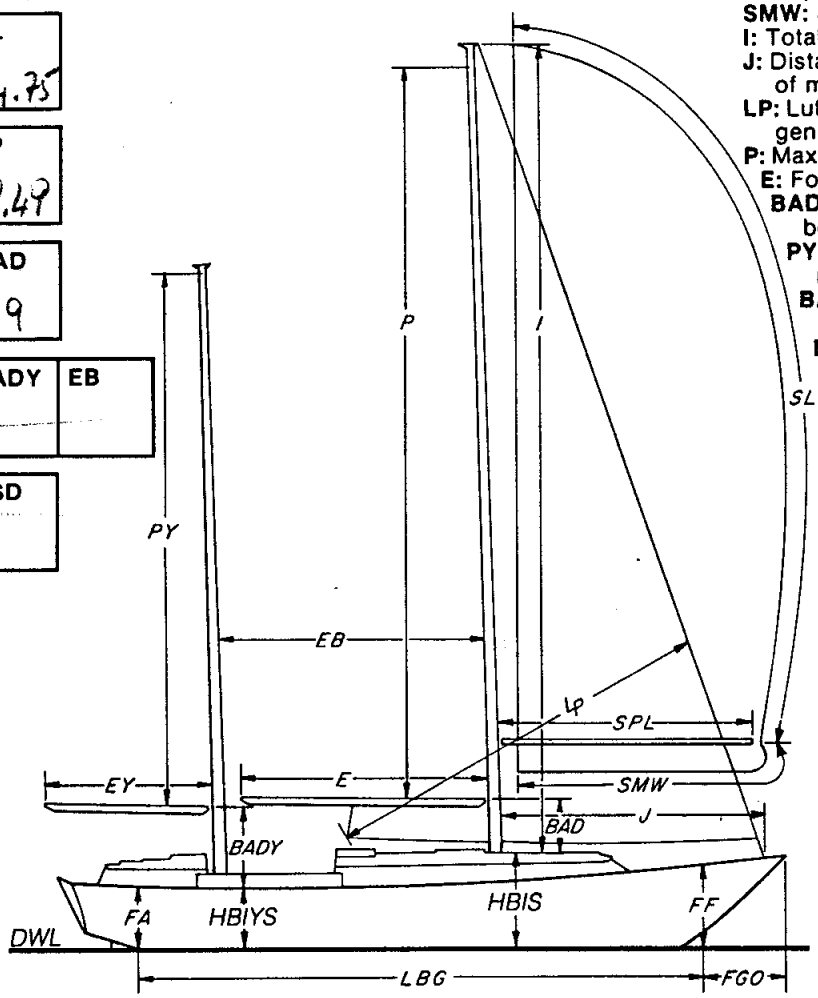
SPL	SMW	SL
12.99	23.39	44.75

I	J	LP
45.28	12.92	19.49

P	E	BAD
39.34	13.68	4.9

PY	EY	BADY	EB

YSF	YSMG	YSD



SPL: Spinnaker pole length
SL: Spinnaker luff
SMW: Spinnaker max length
I: Total height foretriangle
J: Distance from jib tack to forward side of mainmast
LP: Luff perpendicular to clew for largest genoa
P: Max hoist of mainsail from top of boom
E: Foot length of mainsail
BAD: Boom above deck (from top of boom to base of "I")
PY & EY: Same as P & E but for mizzen (if any)
BADY: BAD for mizzen (from top of boom to shear)
EB: Distance between masts
YSF: Mizzen staysail foot
YSD: Mizzen staysail depth (shortest distance between mizzen head and foot)
YSMG: Length from mid-leach staysail to mid-luff staysail

6. FLOTATION INFO: (can substitute IOR certificate)

FGO	LBG	FFS	FAS	FF	FA	RMC	BDK	SFJ
2.13	28.12	3.27	2.99	3.61	3.29	603.9	11,57	.72

Flotation figures above are for measurement trim (no crew) and a specific gravity of water of _____. (FW = 1.0 SW = 1.026)
☐ Please use standard M.H.S. crew and gear weights
☐ Use weights listed below.

FGO: Stem to fwd flotation station
LBG: Distance between FA and FF stations
FF: Freeboard forward
FA: Freeboard aft
RMC: Righting moment/degree
BDK: Beam on deck
SFJ: Horiz. Dist from stem to tack fitting.

ROUND THE BUOYS

Crew wt. (7.3) 1200,3	Crew aft Sta. 5 (7.873) -7.65	Crew above DWL -3.22
Gear wt. 449.4	Gear aft Sta. 5 (7.324) -6.19	Gear above DWL 2.3

DSPL.	LCG	VCG

ADDITIONAL INFORMATION

If additional information or clarification is needed, call (301) 268-5551

TERMS OF SERVICE

All services will be paid for on a cash basis in advance of the performance of services. Special projects or consulting will be done on an individual quotation basis. All information must be received in writing to warrant performance of a job.