THE UNIVERSITY OF MICHIGAN

COLLEGE OF ENGINEERING
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Ship Hydrodynamics Laboratory

Final Report

HULL FORM DEVELOPMENT AND RESISTANCE AND PROPULSION TEST RESULTS OF A SERIES OF SHIP HULLS HAVING EXTREME "V" SECTIONS

(Variations in Geometrical Transverse Inertia)

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ORA Project 04652

under contract with:

U. S. DEPARTMENT OF COMMERCE
MARITIME ADMINISTRATION
CONTRACT NO. MA-2564, TASK II
WASHINGTON, D.C.

administered through:

OFFICE OF RESEARCH ADMINISTRATION ANN ARBOR

July 1963

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INTRODUCTION

Under contract with the Society of Naval Architects and Marine Engineers and the Maritime Administration, the Ship Hydrodynamics Laboratory of the Department of Naval Architecture and Marine Engineering of The University of Michigan has developed the lines of a series of systematic hull forms using Series 60 as a parent series. The transverse sections of the new series are of a pronounced "V" shape as opposed to the "U" shape of the parents. Models were built and tested for both EHP and SHP. The results of the tests as well as the geometric properties of the forms are reported herein.

Under the same contracts, but previously reported, (1,2) The University of Michigan built and tested three of the parent Series 60 hulls with apparent good success. A fourth model, that of the Maritime Administration's high speed cargo liner, PD-108, was also built and tested but with notable discrepancies in results as compared with those obtained on a larger model at David Taylor Model Basin.

At the outset careful consideration was given to the selection of model size. It was thought that in order to avoid appreciable propeller scale effect that model propeller diameters should be six inches or greater. Because of the physical size of the towing tank presently available, ship models of greater than 14 feet LBP were not feasible if the blockage effect was to be small. Therefore, all of the above mentioned models were built 14 feet LBP long and the resulting model propeller diameters were between six and seven inches.

Further analysis of previous results along with analysis of the results reported herein shows evidence of scale effects[3]. As part of the long-range research program of the Maritime Administration The University of Michigan will test a 17 foot LBP model of the C_B = .60 Series 60 parent as well as the "V" form. The results, which will include a blockage correction, will be analyzed for scale effects by comparison with results of tests of the two 14 foot models and the 20 foot model, the latter tested at DTMB. Until the scale effect study is complete, the results in this report should not be considered final.

LINES DEVELOPMENT

The purpose of the current investigation has been set by the Society of Naval Architects and Marine Engineers, H-2 Panel, Task Group VII, as the exploration of the effects of "U" and "V" forms on resistance, propulsion, and stability within and beyond the limits of design currently in practice in the United States. The sectional area curves of the Series 60 parent forms were to be retained (4), and also the parent profiles within practical limits. The criteria were chosen after consideration of the two principal factors in the following. (5)

1. Desirability of reducing the number of variables so as to accentuate the effect of variation in shape of transverse sections, and

2. The paucity of good hull form data in the extreme "V" range.

Inasmuch as the hull forms to be tested fell beyond the category of normal design, the usual method of developing lines from a known ship of good performance could not be adopted, and the development of lines of the "V" forms was carried to the practical extremity of fairing lines drawings. The first proposal by the Maritime Administration included extreme "V", moderate "V" or "U" lines for each of the two hull forms initially chosen for the investigation, i. e., hulls of C_B = .60 and .75. Figs. 1 and 2 show the extreme "U" and "V" sections as originally advanced for the above. However, upon further discussion, it was decided to exclude the extreme "U" lines from the present investigation as the parent series is already quite "U" in section shape.

Thus for the C_B = .60 and .75 hulls, extreme "V" and moderate "V" lines were developed the body plans of which are shown in Figs. 3 and 6.

In developing extreme "V" lines for the remaining hulls, mathematical means were discarded and the following geometric method was adopted. Fig. 8 shows a nondimensional plot of load waterlines of all Series 60 parents and two extreme "V" models and is typical of many such curves prepared for the cross-fairing. By connecting offsets at various stations, a surface representing the waterlines of the parent model is generated. This is a three-dimensional surface and it is faired. A similar surface representing the waterlines of the extreme "V" forms follows the parent surface but should include the two hulls already developed and the surface must likewise be a faired one. The second surface is sketched in and offsets are read off. Lines drawings for the other block models are drawn up using the offset obtained above. If the obtained offsets are unsatisfactory for fairing lines, the surface is modified and the procedure is repeated. All such surfaces actually used in the development are included in the Appendix in Figs. A-1 through A-5. It is to be noted that these plots can be used to obtain nondimensional offsets for a hull of any block coefficient. Nondimensional offsets are given in the Appendix in Tables A-XI through A-XV. Figs. 4, 5, and 7 show the body plans of the remaining hull forms as developed by the method just explained.

The sectional area curves of the original series have been well preserved, although at the stem and stern a small portion of the lines had to be faired irrespective of the sectional area curve. The resulting discrepancy is very small and need not be of concern from a practical standpoint.

In developing the stern lines the extent of the "V" shape near the load waterline was not made as pronounced as originally proposed. Although the load waterlines may still be considered as conforming to the general extreme "V" class of "V" hull shape, reduction of the half-breadths made possible development of moderately deep "U" shaped sections immediately forward of the propeller aperture, a design consideration which is desirable in that a more uniform wake field and less vibration may result. Moderate "V" forms diminished, i. e., with load waterlines about midway between those of the series developed and the parent series, and as developed for the $C_B = .60$ and $.75$ models in Figs. 3 and 6, have not been included in the present testing program.

An effort has been made to retain the waterline length of the parents. Occasionally, however, a slight change in the profile is introduced in fairing, but since it is small, changes in waterline length may be assumed nonexistent.

Above the load waterlines each hull was developed so as to form a deck with nearly the same area as that of the corresponding parent because the deck area of either a "U" or "V" form depends largely upon the intended service which is not known. Therefore, it seemed best to conform to the parent deck areas. Had a knuckle been introduced immediately above the load waterline, even more extreme "V" sections could have been developed. Adoption of such a procedure would have resulted in a higher vertical prismatic coefficient.

Most foreign ships of "V" form have a rather pronounced cut-away at the forefoot, sometimes extending as far aft as Station 2 (1/10 LBP). Modern American practice is to have a plumb bow for deep "U" forms. The parent models have an arbitrary bow profile which is the same for all Series 60 hulls. The effect of cutting away the forefoot is not well understood, although it is easy to understand that partial removal of the forefoot might improve maneuverability and course stability. Changes in resistance were expected to be small [6]. The C_B = .60 and .75 models were tested for resistance with both the parent profile and the forefoot cut away. The results confirmed that changes in resistance were negligible so that, consequently, the remaining lines were developed retaining the parent profiles.

To follow the trend of half angle of entrance of the parent would have made the angle of entrance for the extreme "V" series quite excessive on the large block models. Fig. 9 shows the half angles of entrance at the load waterlines for various well known series. After some discussion the H-2 panel adopted the angles as indicated in the same figure for the present series. It should be noted that the parent series is increasingly "V" shaped for fuller forms. Hence, the trend of the curve of half angle of entrance versus block coefficient, Fig. 9, of the present series is quite natural if one compares with the other hull form series.

Curves of form for Series 60 parent and the U of M "V" series are included in the Appendix, Tables A-I through A-X. In general, these calculations check closely to those of DTMB. The main discrepancy was in vertical prismatic coefficient and is indicated in Fig. 10. Also, a small difference in block coefficient of the C_B = .65 hull was noted. Bonjean's curves are tabulated at the end of each curves of form.

Fig. 10 has been constructed from the curves of form to show the variations in transverse waterplane inertia. The three dimensional surface indicates a smooth variation in vertical prismatic and the transverse waterplane inertia. Similar curves for other variables may be plotted as Fig. 11 shows the wetted surface variations which, due to change in hull form, are not appreciable.

TEST RESULTS

Table I lists the geometric properties of the UM propeller models and compares them with those of the parent propeller models. There were slight discrepancies in pitch owing to model construction inaccuracies which would affect full scale RPM predictions and also the open water characteristics.

Table II lists the particulars of the ship models.

The results of the resistance and self-propulsion tests are given in Figs. 12 through 21 for a 600 foot LBP (λ = 42.857) ship. Open water propeller characteristics are given in Figs. 23 through 27. In addition, propeller efficiency versus ship speed is plotted in Fig. 22. In all the above mentioned figures results obtained at DTMB from the parent Series 60 and propeller models are also plotted.

In general, predicted EHP was higher for the "V" forms than for the parents throughout the speed range except that at high speeds the C_B = .60, .65, and .80 "V" forms had decreased resistance over that of the parents. The increases were the greatest for the hulls of medium fullness, being less for the finest and fullest block models.

The differences in EHP are reflected in SHP, but additionally the shaft horsepower increased owing to decreased propeller efficiency or decreased hull efficiency which gave a lower value of overall propulsion efficiency. Again, the greatest difference occurred for the C_B = .70 form.

Since the largest differences between the parent and "V" hull form were observed for the C_B = .70 hull, those results warrant detailed discussion. Similar analyses could be made for the other block models. At 18 knots, or a speed-length ratio of about .75, the effective horsepower increased by 13 percent and the shaft horsepower by 45 percent whereby the propulsive coefficient decreased from .76 to .60, or 21 percent. See Fig. 16. In Fig. 22 the propeller efficiency dropped from 67 to 61 percent, or a decrease of 9 percent. Therefore, had the propeller used been as efficient behind the "V" form model as it was behind the parent, the P. C. would have decreased about 12 percent instead of 21. That is, the parent propeller design was not as nearly optimum in combination with the "V" hull, or had another propeller been designed from wake survey information, or otherwise, lower shaft horsepower results would have been obtained. In addition, referring to Fig. 25, the U of M Propeller No. 10 had slightly lower efficiency than the parent DTMB Propeller No. 3376 in the operating range of advance coefficient so that not quite all of the decrease in propeller efficiency shown in Fig. 22 is the result of having less than an optimum propeller design for the "V" hull.

There remains approximately 11 percent in propulsive coefficient as yet unaccounted for. Fig. 17 shows an abnormally high thrust deduction which, when combined with an only slightly higher wake fraction than that obtained on the parent model, yields a substantially lower hull efficiency. However, it should be noted that the relative rotative efficiency at a speed corresponding to 18 knots was 1.01 which indicates that serious propeller scale effects in the self-propulsion test were lacking, and therefore, should not be considered as a possible cause of the large differences just discussed.

The differences in SHP and other propulsion components between the "U" form and the "V" form for the finer hulls seems excessive and it is believed reflects some scale effects not understood. This being the case this report is not considered to be a final statement of accurate results for at least the finer hulls. Further investigation of this problem is being made and will be reported at a later date under a different task number.

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3. H. C. Kim, J. L. Moss, "Research in Resistance and Propulsion: Part III. Blockage Correction in a Ship Model Towing Tank and Scale Effect on Propulsive Parameters". The University of Michigan, Department of Naval Architecture and Marine Engineering, Report 04542-3-F, March 1963.

4. F. H. Todd, "Some Further Experiments of Single Screw Merchant Ship Forms--Series 60". TSNAME, vol. 61, 1953.

5. Minutes of Task Group VII, Panel 2, Hydrodynamics Committee, SNAME, January 12, 1960.

6. See, for instance, Edstrand, Freimanis, and Lindgren, <u>Experiments with Tanker Models</u>, <u>I</u>, Goteborg, Sweden, 1953, Report No. 23, Fig. 9.

TABLE I

PROPELLER DATA FOR 600-FOOT (LBP) SHIP

C_B	.60		.65		.70		.75		.80	
	UM	TMB	UM	TMB	UM	TMB	UM	TMB	UM	TMB
Number	1	3378	11	3380	10	3376	2	3379	4	3377
D(ft)	22.40	22.40	23.20	23.20	24.00	24.00	24.89	24.89	25.82	25.82
P(ft)	25.70	24.08	25.54	25.52	26.45	26.40	25.89	25.51	24.92	23.75
P/D	1.147	1.075	1.101	1.100	1.102	1.100	1.040	1.025	0.965	0.920
MWR	0.261	0.261	0.235	0.235	0.237	0.237	0.225	0.225	0.213	0.213
E_A/D_A	0.550	0.550	0.525	0.525	0.500	0.500	0.470	0.475	0.450	0.450
BTF	0.045	0.045	0.045	0.045	0.045	0.045	0.045	0.045	0.045	0.045
Rake(deg)	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00
No. of Blades	4	4	4	4	4	4	4	4	4	4

TABLE II

SHIP MODEL PARTICULARS

	MODEL NO.	924	959	958	952	966
Ship C_B		.60	.65	.70	.75	.80
	LBP(ft)	600	600	600	600	600
	LWL(ft)	610.048	610.048	610.048	610.048	610.048
	B(ft)	40.0	41.379	42.859	44.446	46.155
	H(ft)	31.996	33.104	34.290	35.551	36.931
	Δ(tons)	26,331	30,433	35,275	40,658	46,711
	WS(sq ft)	62,166	66,449	71,799	77,317	84,313
Model						
	λ=42.857					
	LBP(ft)	14.000	14.000	14.000	14.000	14.000
	LWL(ft)	14.235	14.235	14.235	14.235	14.235
	B(in)	22.399	23.171	23.999	24.89	25.848
	H(in)	8.959	9.269	9.601	9.954	10.344
	∇(cu ft)	11.708	13.532	15.684	18.078	20.769
	WS(sq ft)	33.846	36.178	39.091	42.095	45.904
	A (sq ft)	1.361	1.465	1.578	1.533	1.857
	LE/LBP	0.50	.472	.410	.350	.290
	LX/LBP	0	.035	.119	.210	.300
	LR/LBP	0.50	.493	.471	.440	.410
	C_X	.977	.982	.986	.989	.994
	C_P	.614	.661	.710	.759	.805
	C_{PF}	.581	.651	.721	.792	.861
	C_{PA}	.646	.672	.698	.721	.750
	C_{PF}	.581	.630	.660	.704	.761
	C_{PR}	.646	.667	.680	.686	.695
	C_{PV}	.774	.803	.831	.851	.871
	C_W	.741	.807	.843	.882	.918
	C_{IT}	.586	.678	.732	.793	.844
	$\frac{1}{2}\alpha_E$(deg)	12.0	17.0	25.0	36.0	57.5
	LCB(%LBP)	-1.500	- .500	+.490	+1.490	+2.540
	L/B	7.500	7.230	7.000	6.750	6.500
	B/H	2.500	2.500	2.500	2.500	2.500
	$L/\nabla^{1/3}$	6.156	5.869	5.593	5.335	5.092
	$S/\nabla^{2/3}$	6.564	6.350	6.240	6.080	6.040
	$K_R = R/\sqrt{BH}$	.229	.205	.181	.153	.118

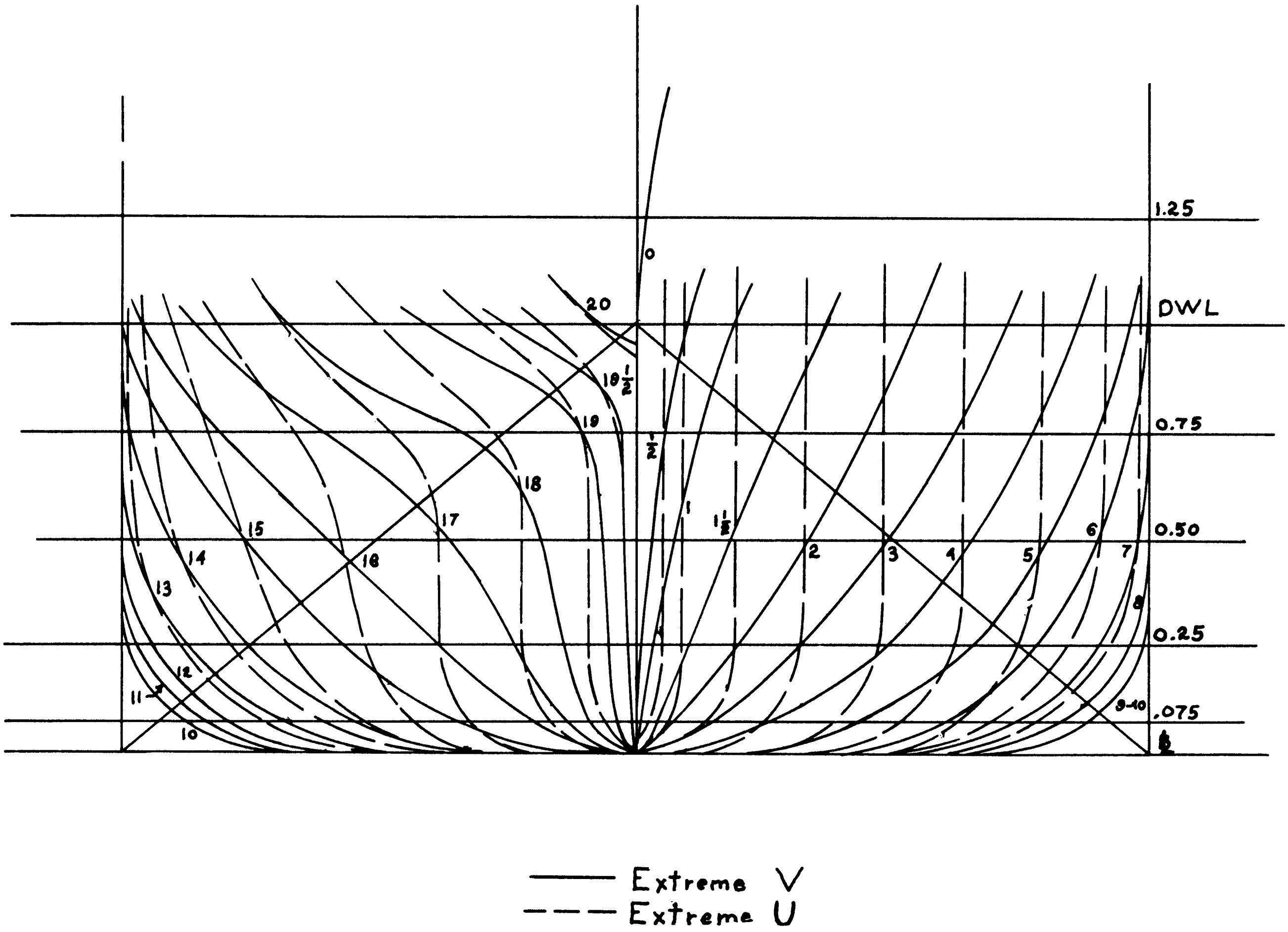

Fig. 1. Original extreme "V" and extreme "U" proposals, C_B = .60.

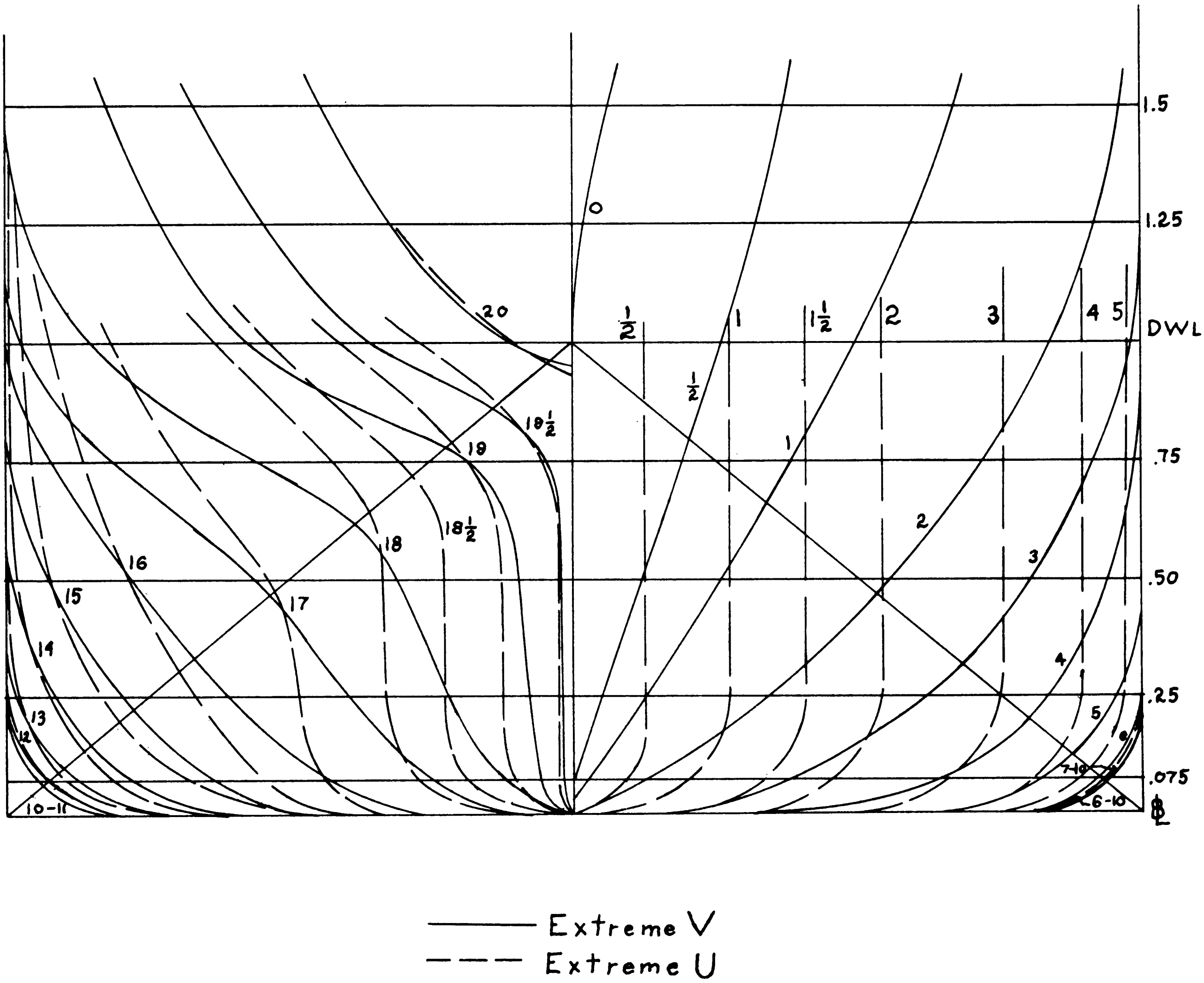

Fig. 2. Original extreme "V" and extreme "U" proposals, C_B = .75.

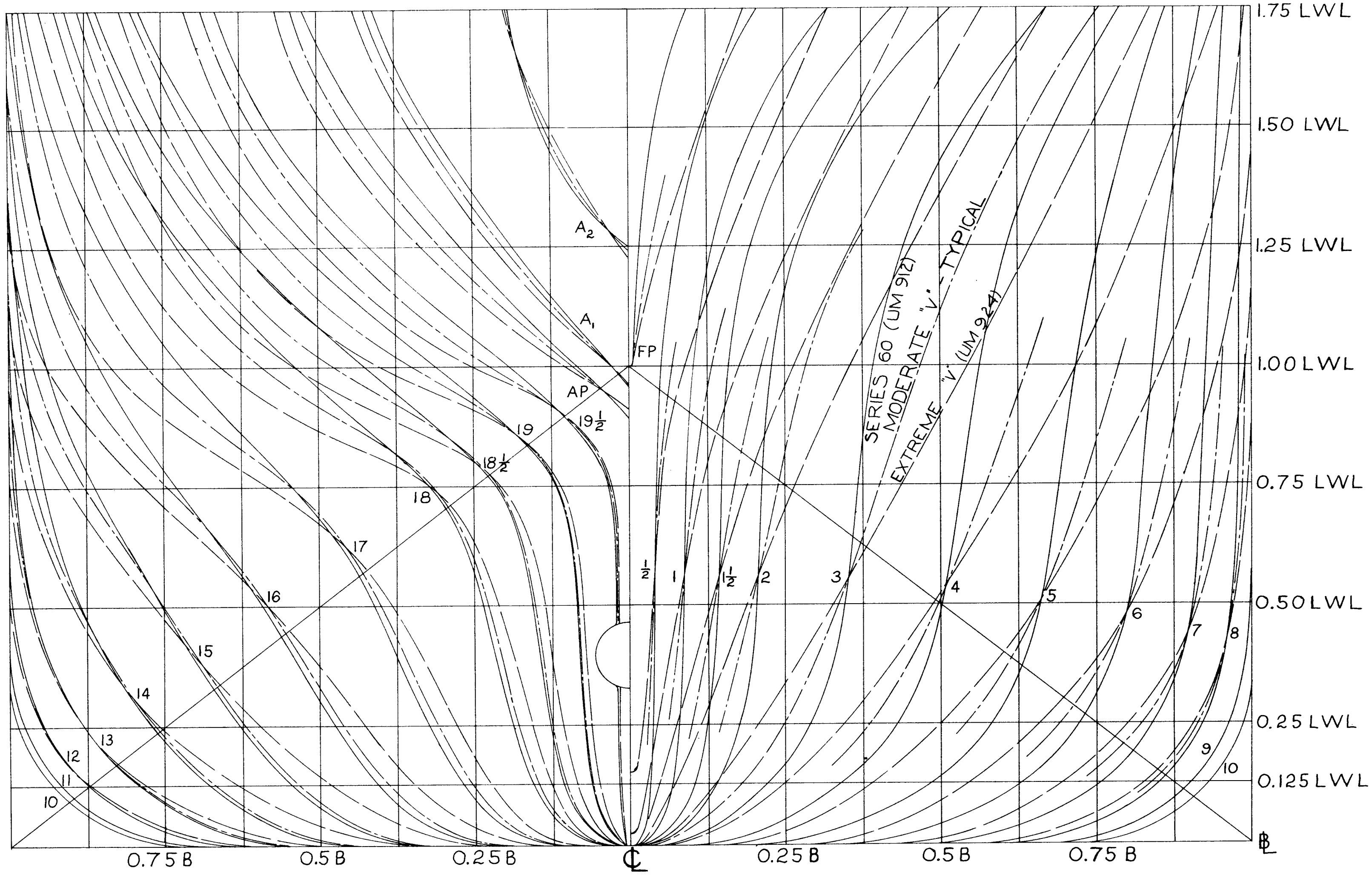

Fig. 3. Composite body plan of C_B = .60 Series 60 parent, U of M "V" Series, and intermediate "V" Series.

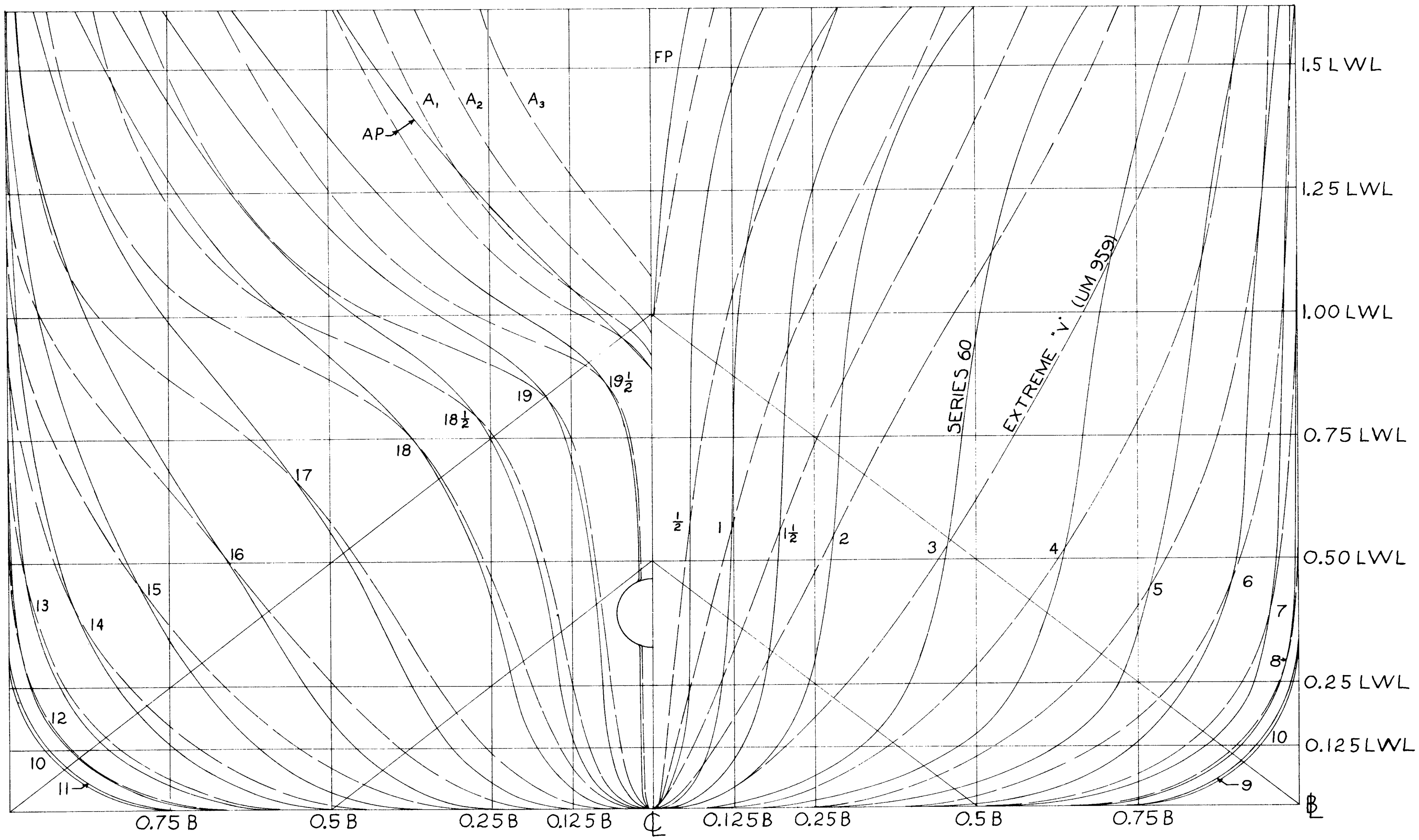

Fig. 4. Composite body plan of C_B = .65 Series 60 parent and U of M "V" Series.

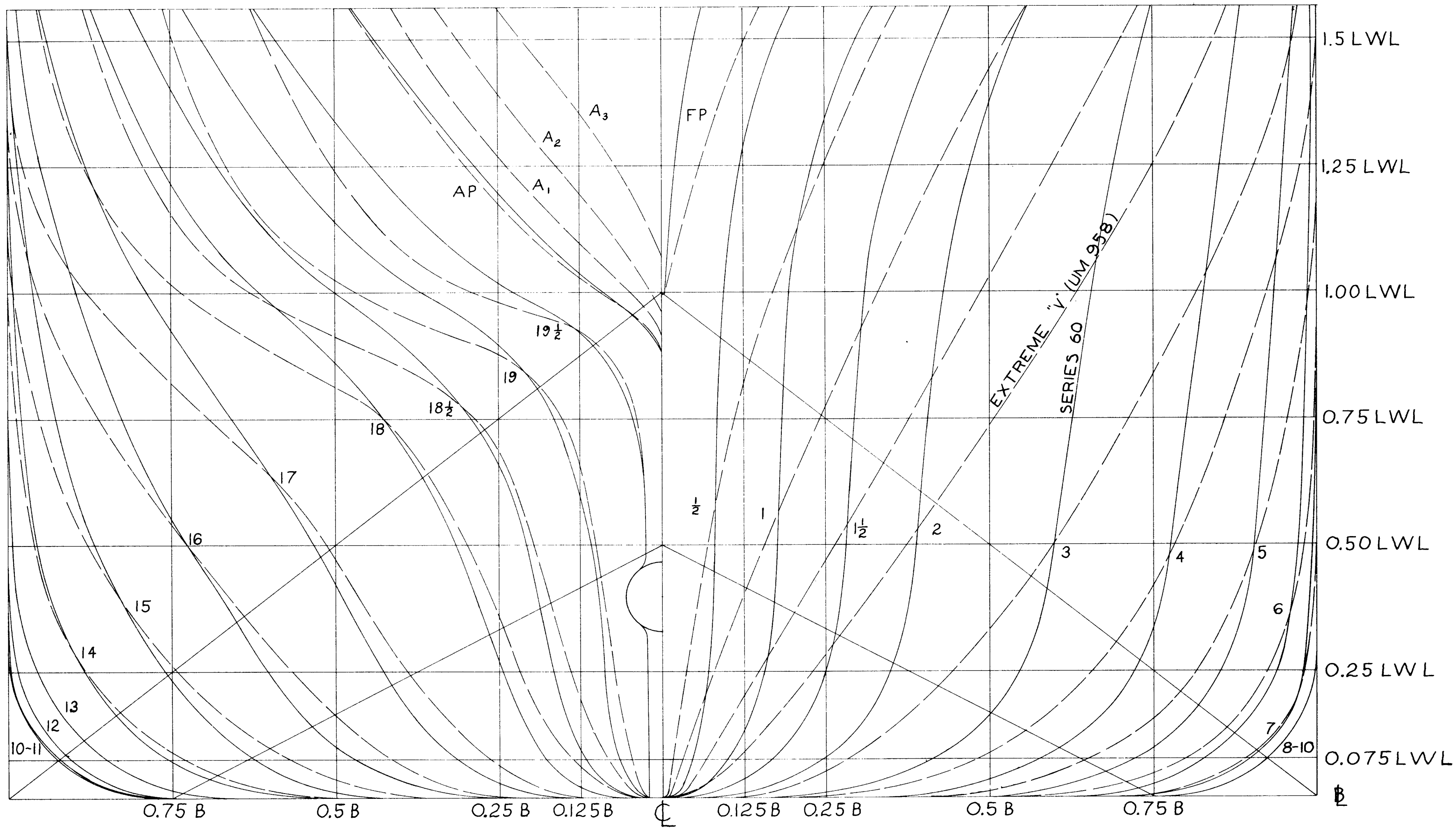

Fig. 5. Composite body plan of C_B = .70 Series 60 parent and U of M "V" Series.

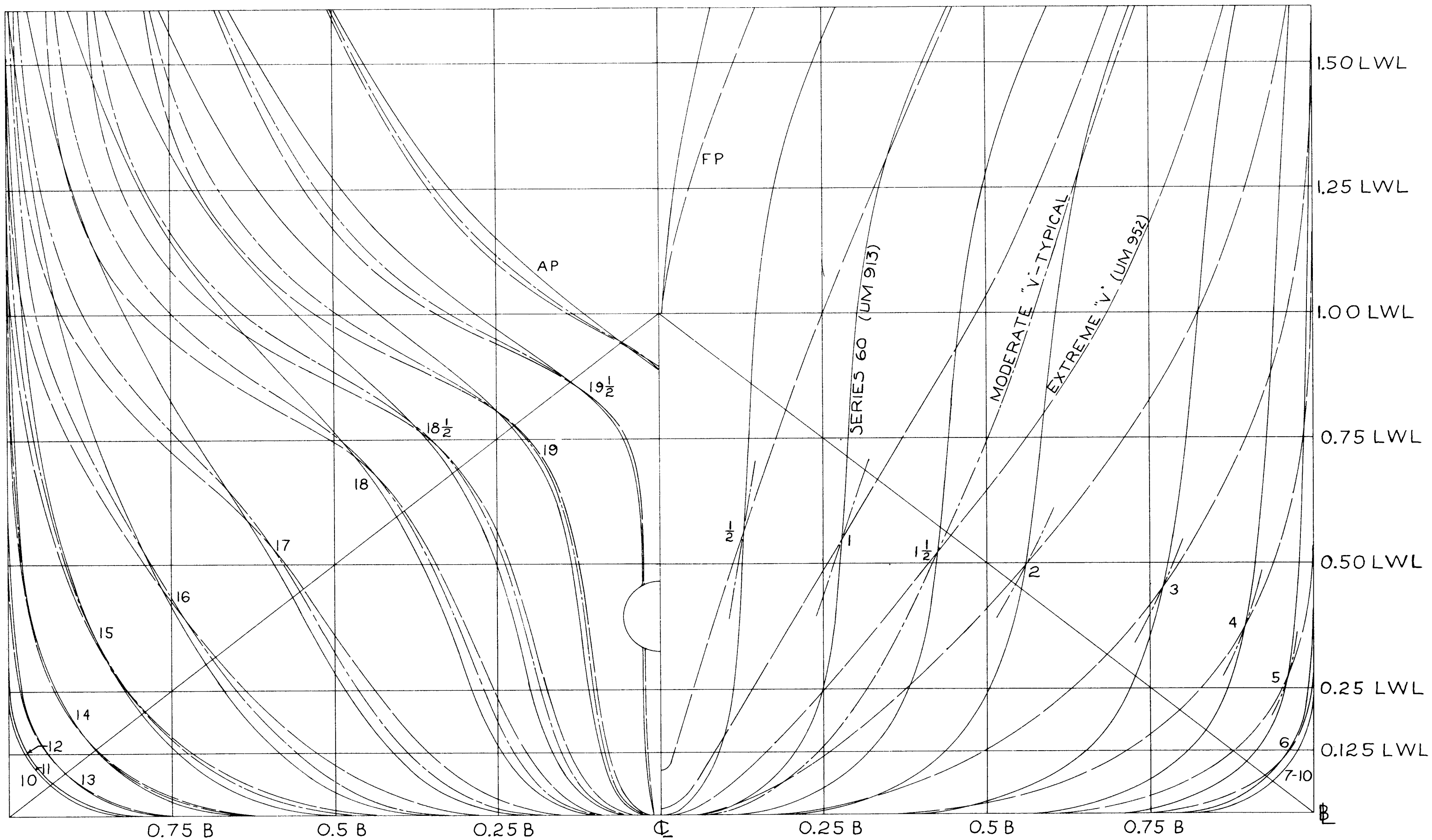

Fig. 6. Composite body plan of C_B = .75 Series 60 parent and U of M "V" Series.

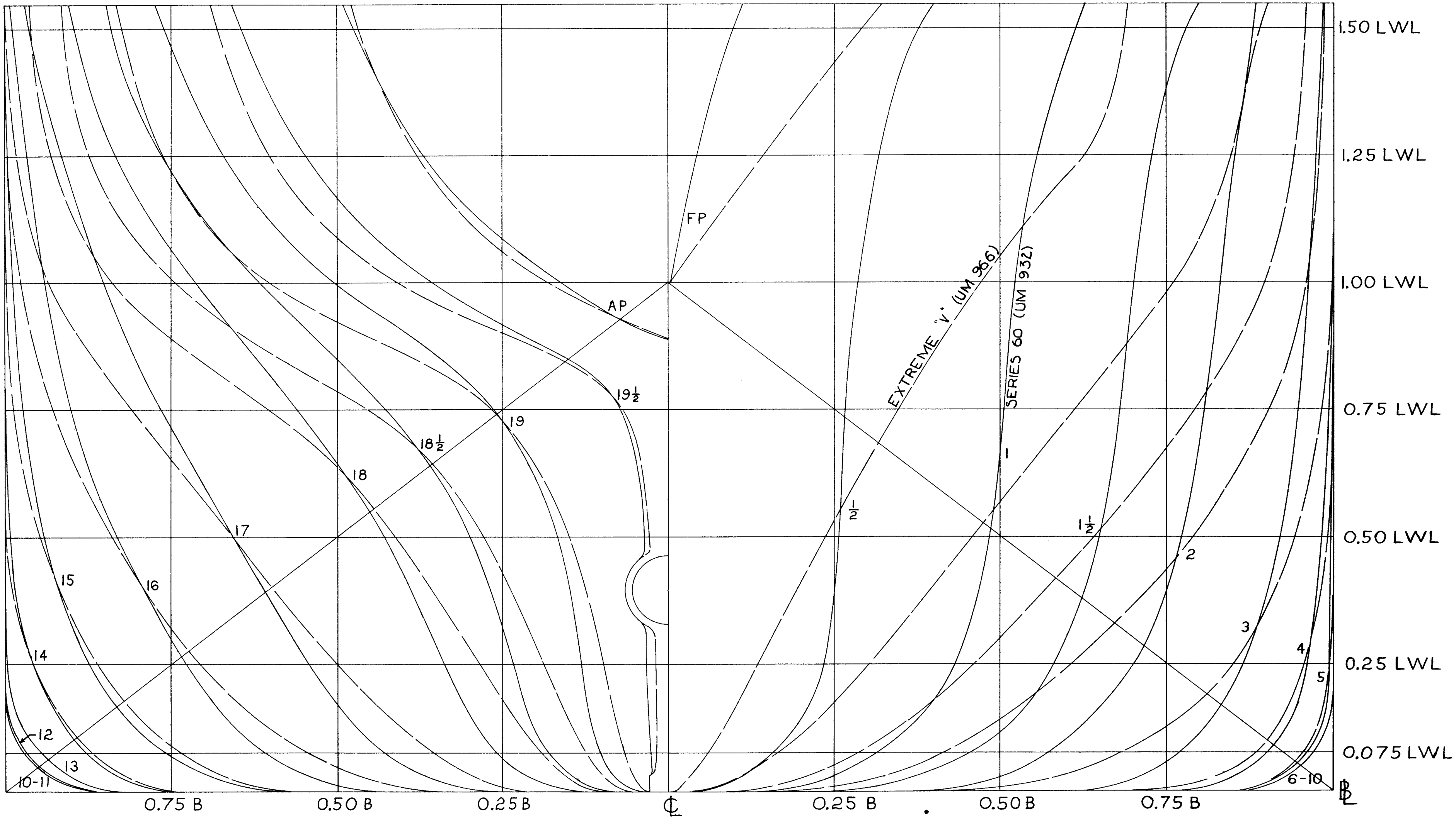

Fig. 7. Composite body plan of C_B = .80 Series 60 parent and U of M "V" Series.

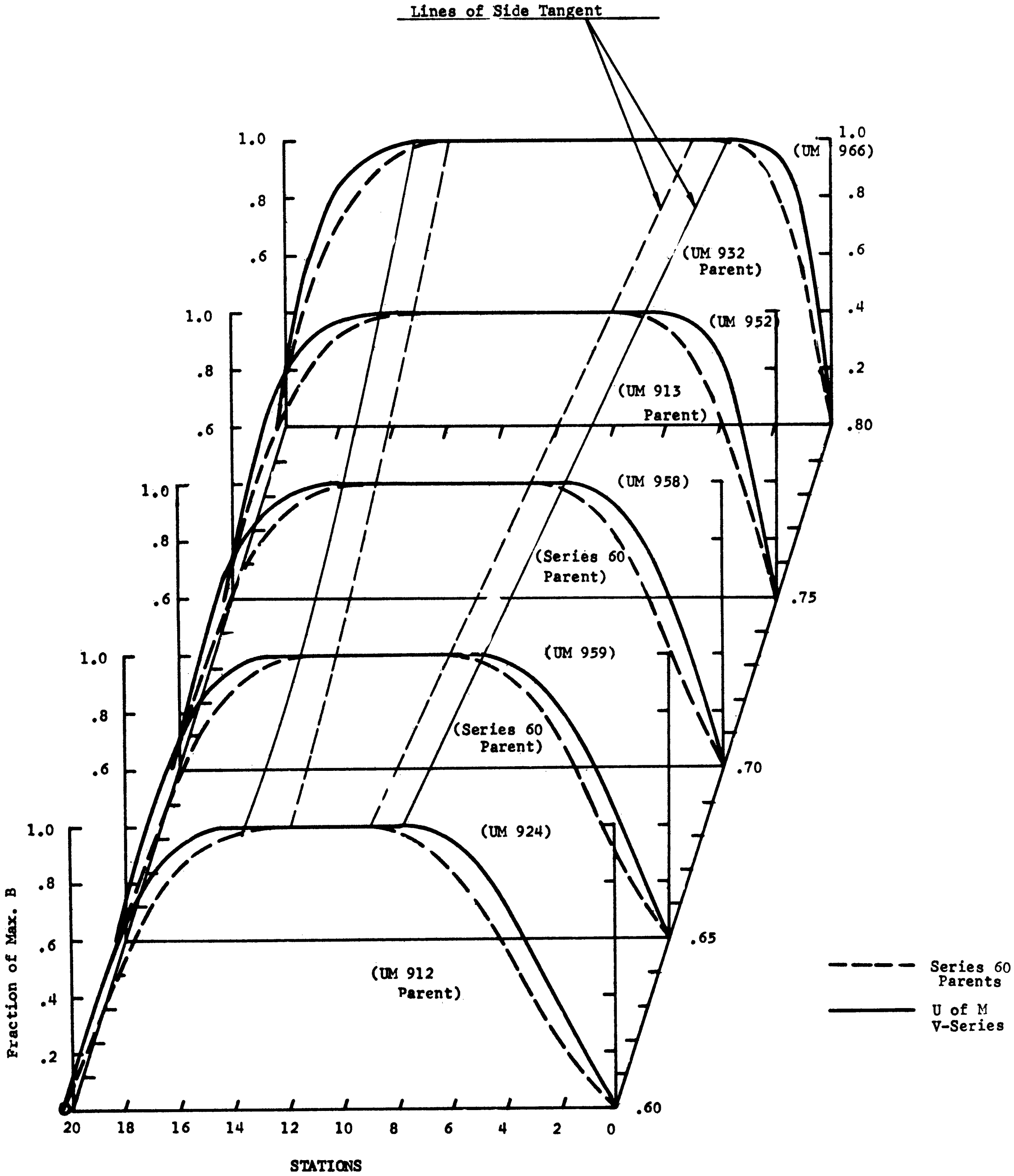

Fig. 8. Orthgonal plot of nondimensional load waterlines for Series 60 and the U of M "V" Series.

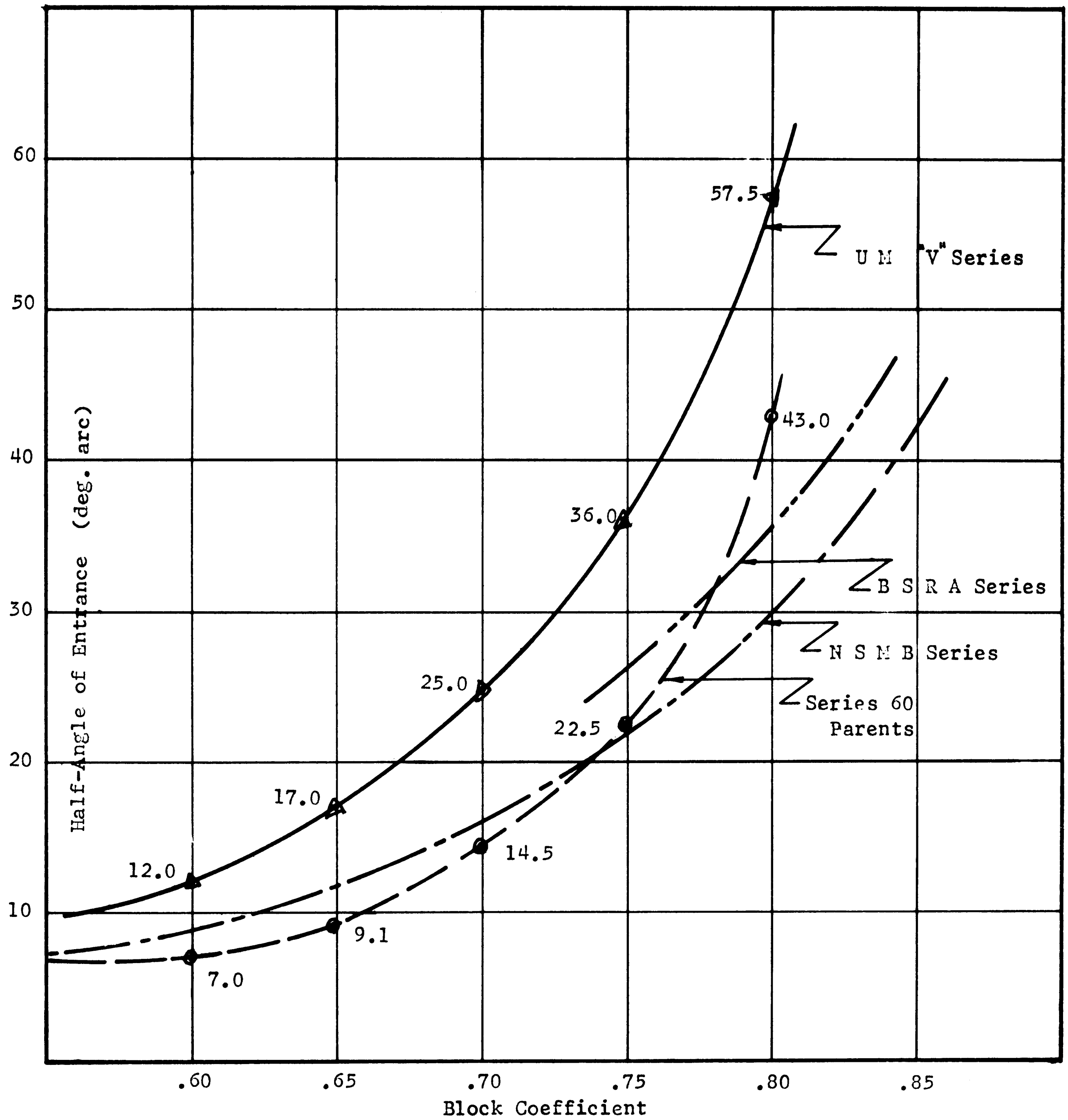

Fig. 9. Half-angle of entrance at the load waterline for various hull form series.

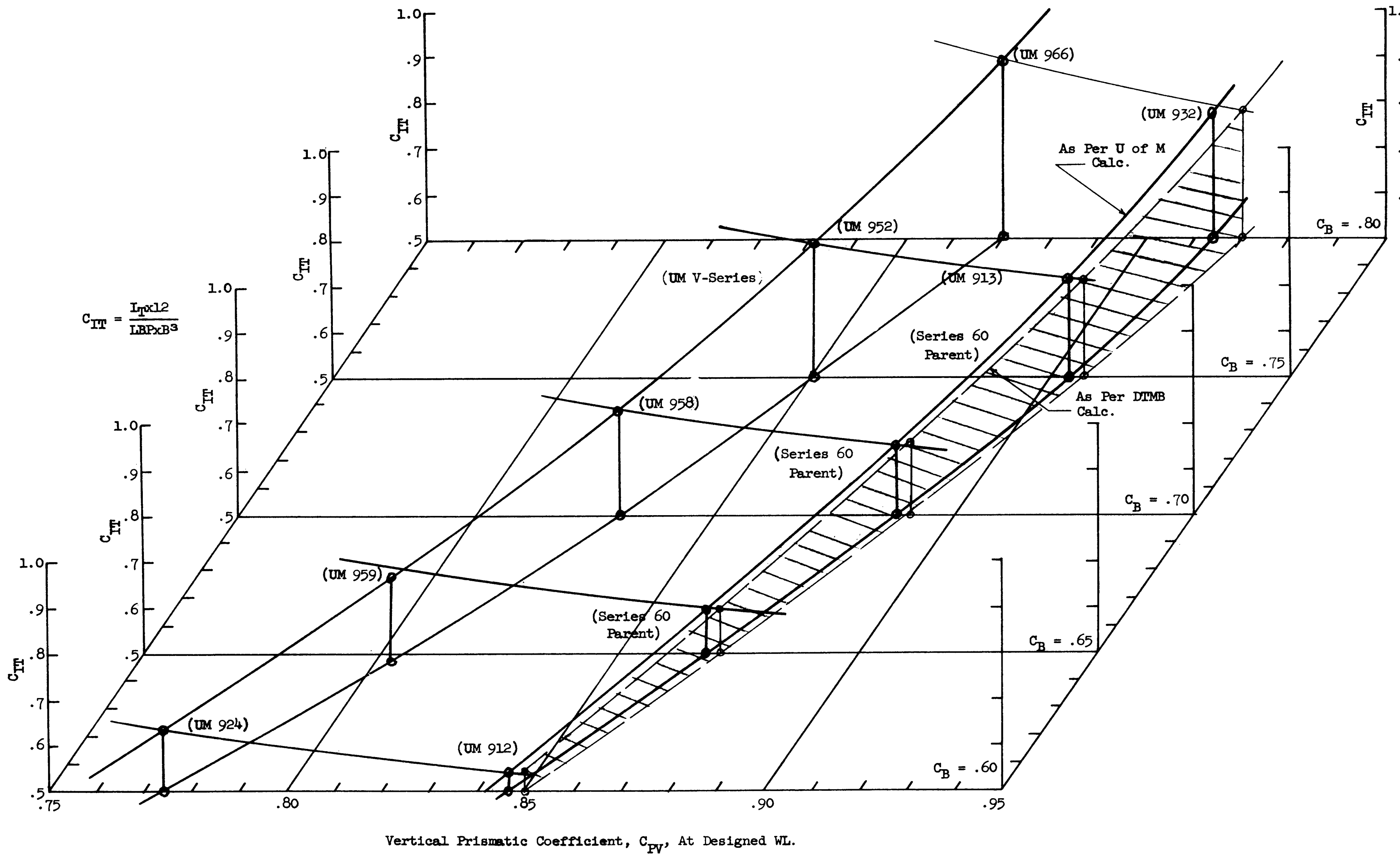

Fig. 10. Orthogonal plot of transverse moment of inertia coefficients at the load waterline for Series 60 and the U of M "V" Series.

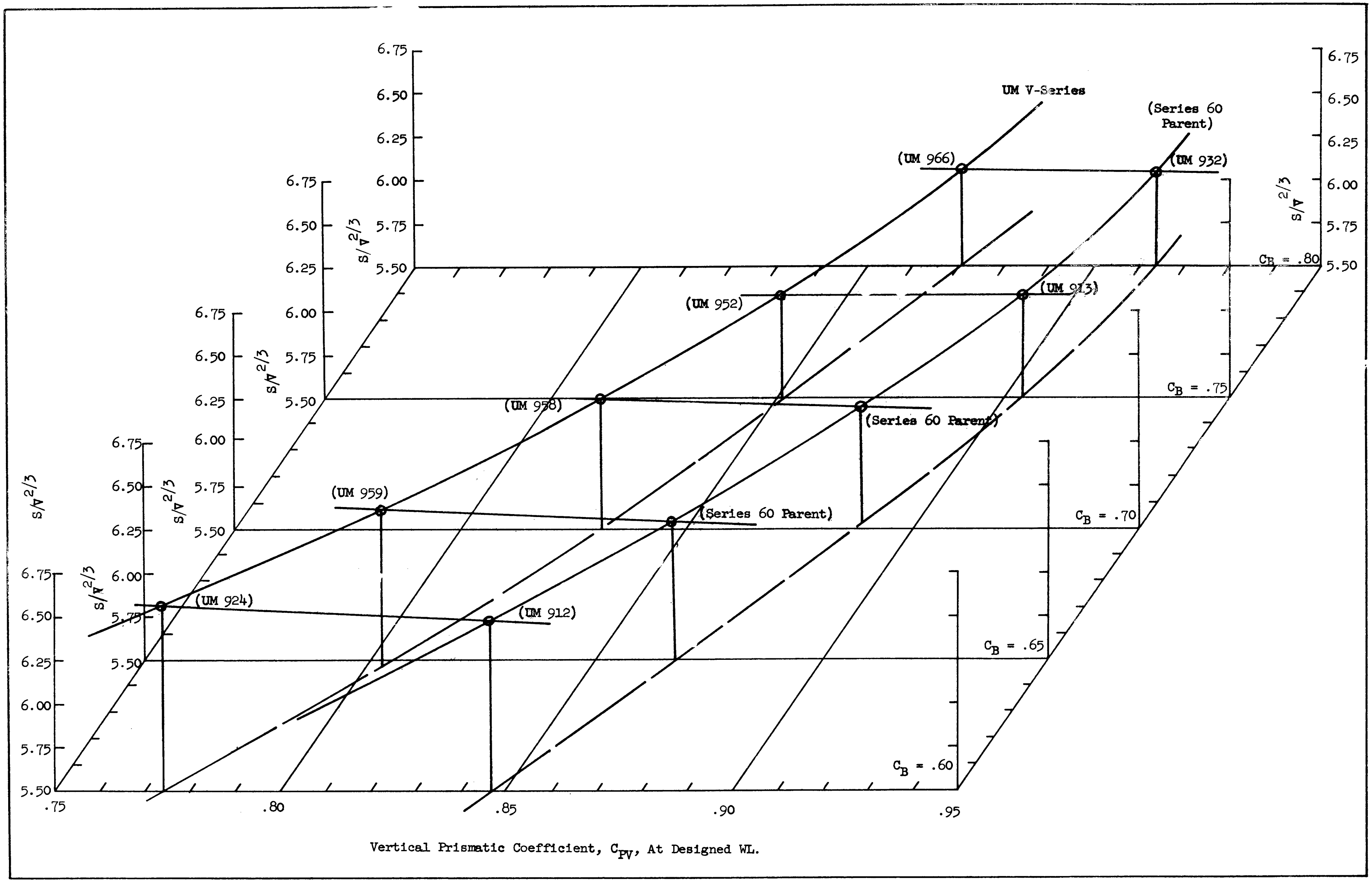

Fig. 11. Orthogonal plot of wetted surface coefficients at the load waterline for Series 60 and the U of M "V" Series.

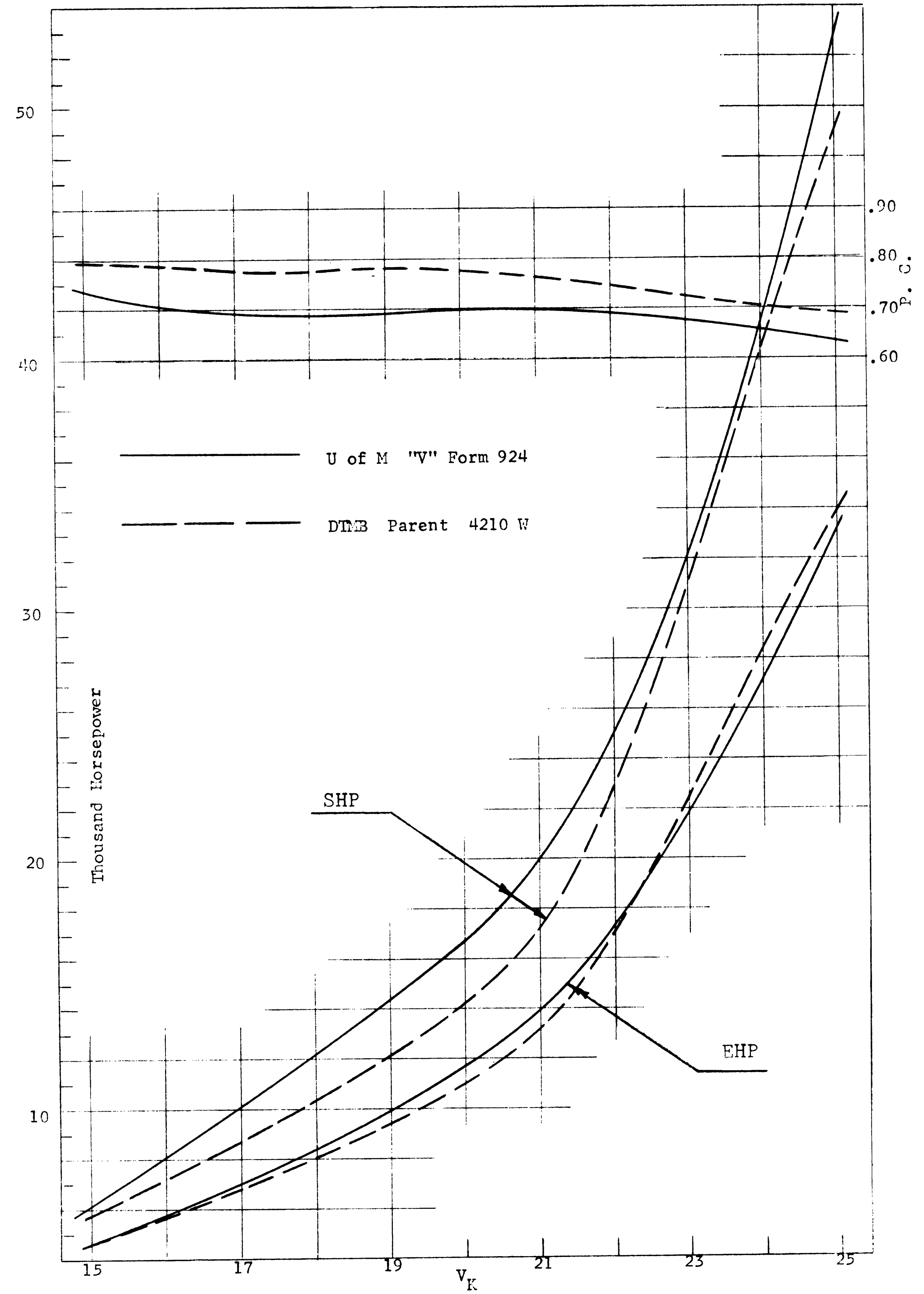

Fig. 12. Effective horsepower, shaft horsepower, and propulsive coefficient versus speed in knots for the C_B = .60 U of M "V" Series and the DTMB Series 60.

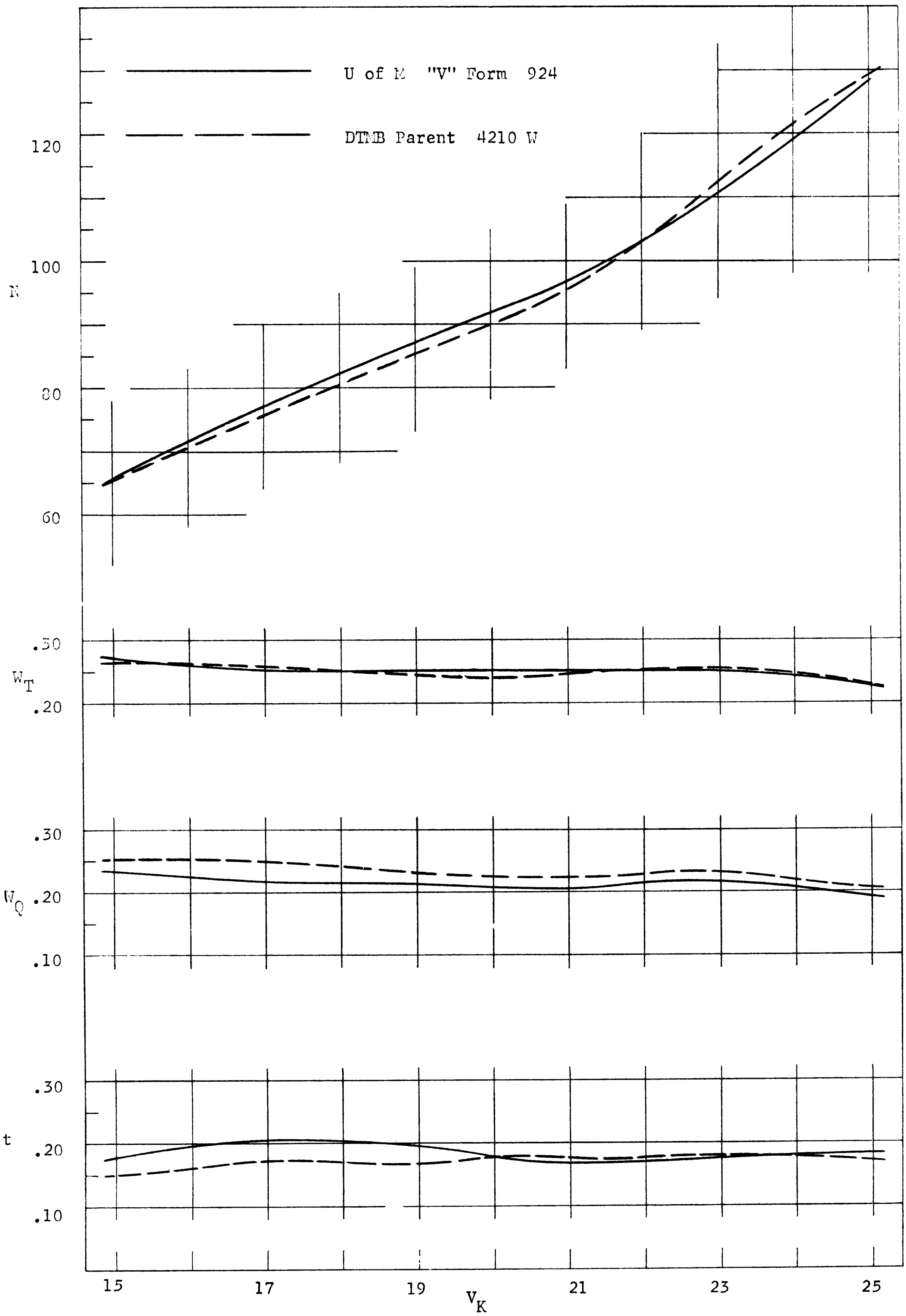

Fig. 13. Revolutions per minute, wake fraction, and thrust deduction versus speed in knots for the C_B = .60 U of M "V" Series and the DTMB Series 60.

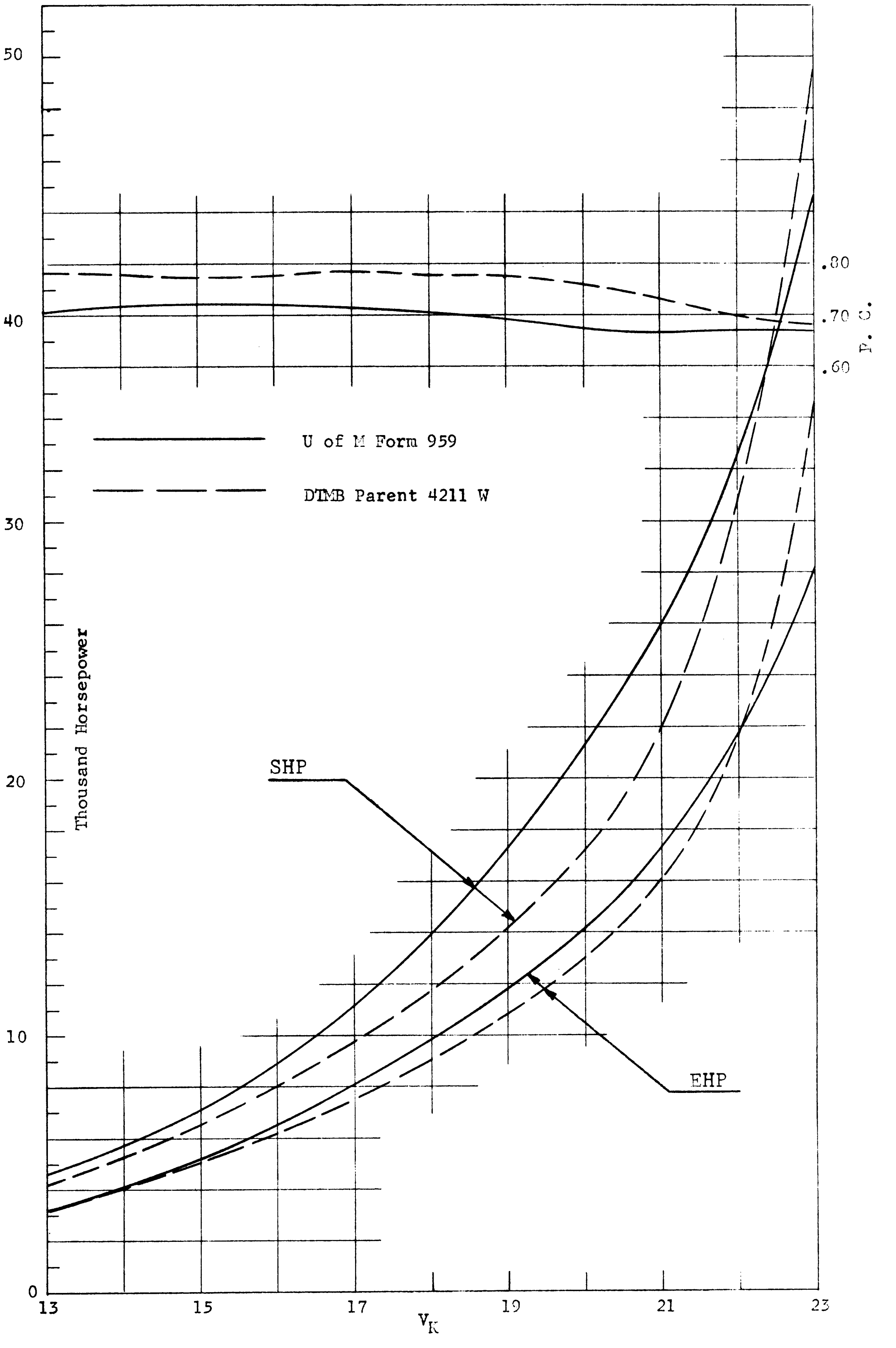

Fig. 14. Effective horsepower, shaft horsepower, and propulsive coefficient versus speed in knots for the C_B = .65 U of M "V" Series and the DTMB Series 60.

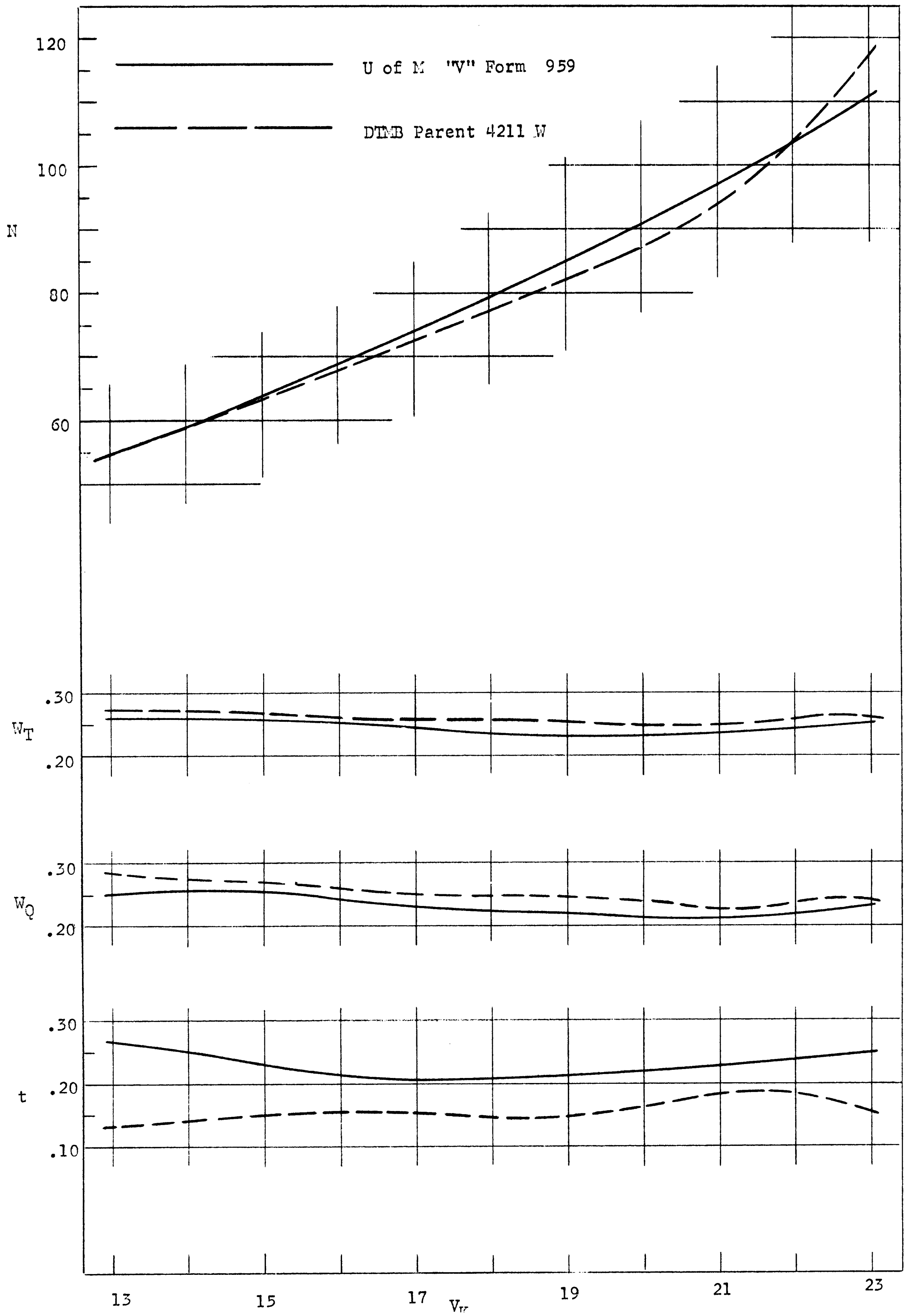

Fig. 15. Revolutions per minute, wake fraction, and thrust deduction versus speed in knots for the C_B = .65 U of M "V" Series and the DTMB Series 60.

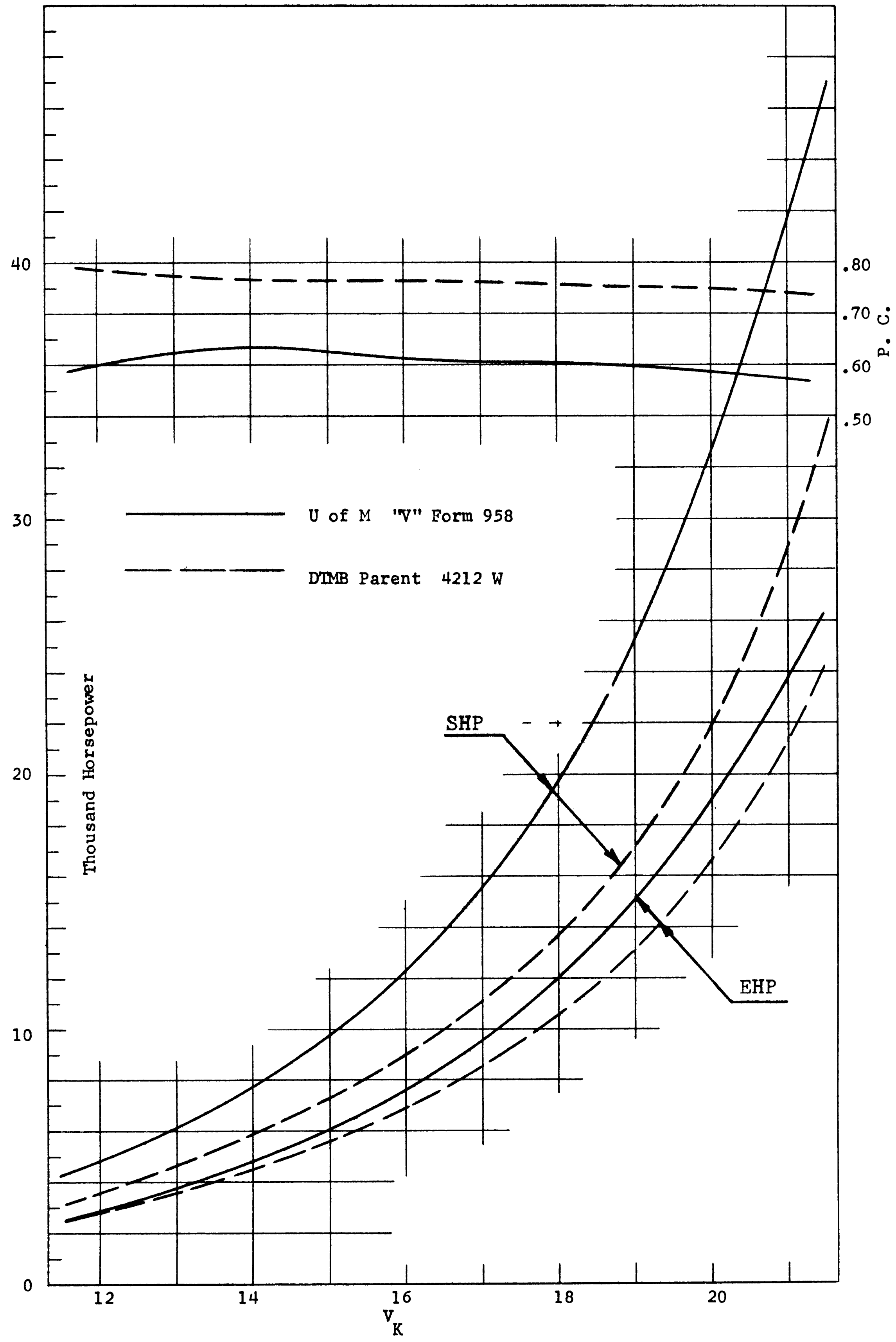

Fig. 16. Effective horsepower, shaft horsepower, and propulsive coefficient versus speed in knots for the C_B = .70 U of M "V" Series and the DTMB Series 60.

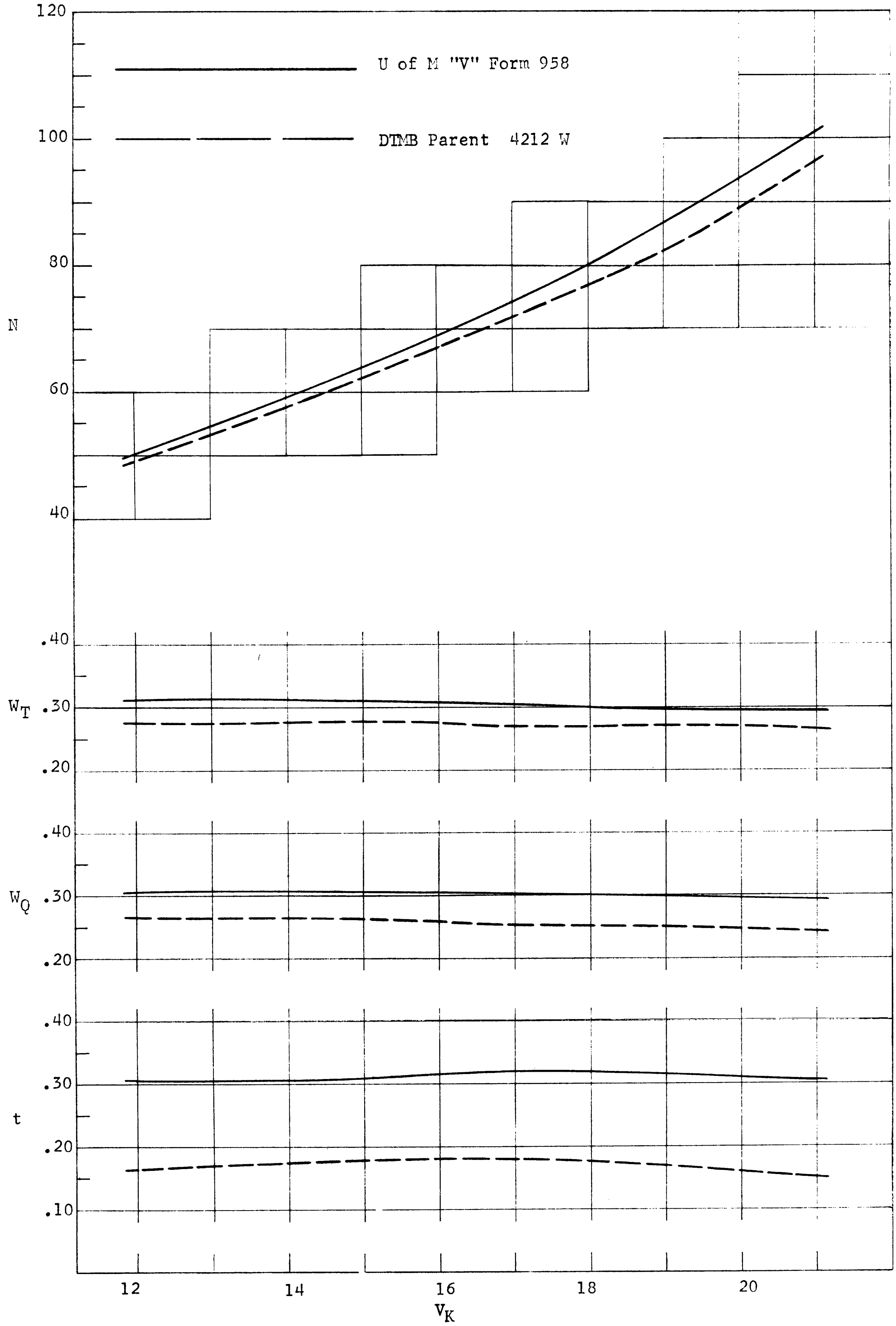

Fig. 17. Revolutions per minute, wake fraction, and thrust deduction versus speed in knots for the C_B = .70 U of M "V" Series and the DTMB Series 60.

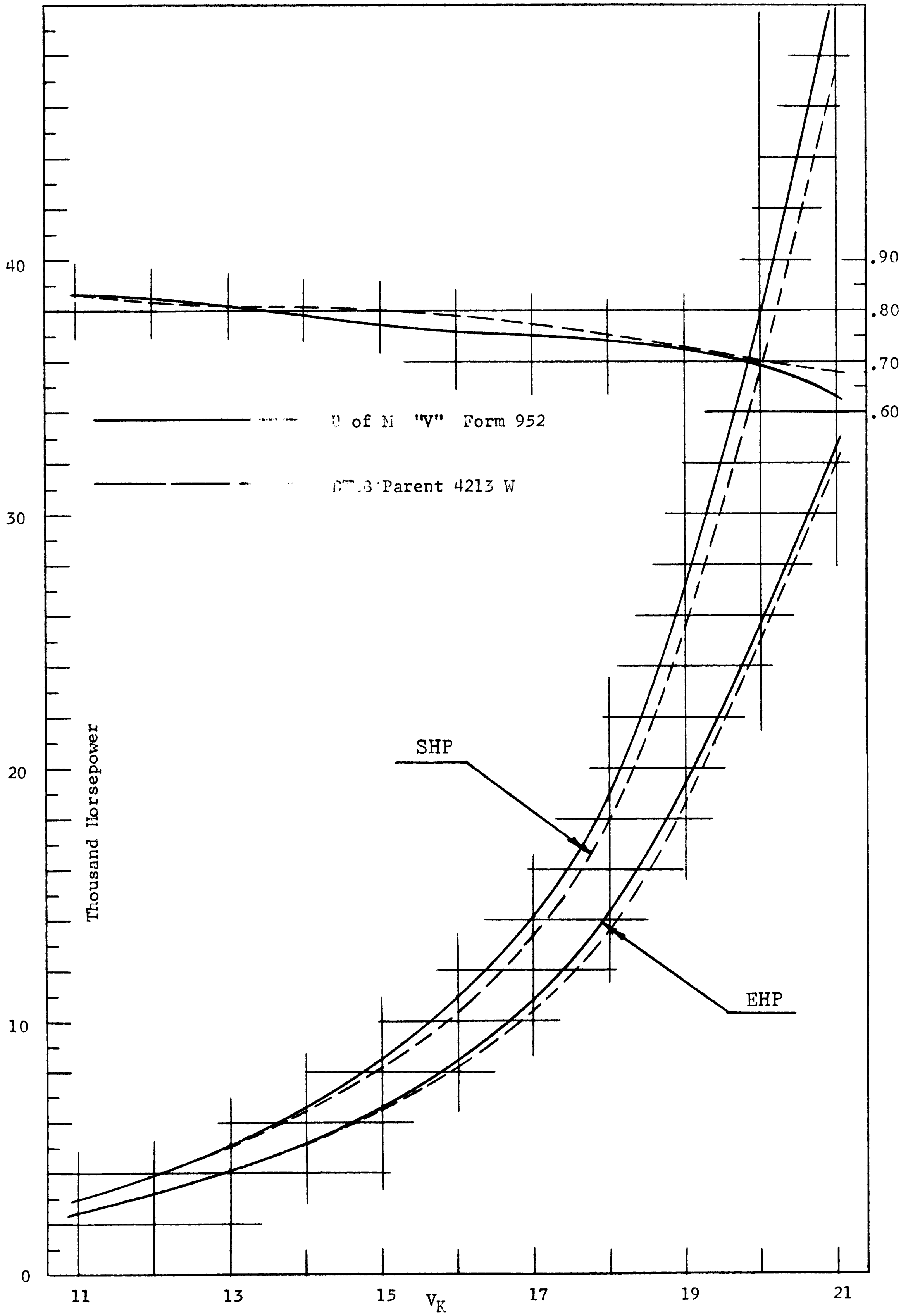

Fig. 18. Effective horsepower, shaft horsepower, and propulsive coefficient versus speed in knots for the C_B = .75 U of M "V" Series and the DTMB Series 60.

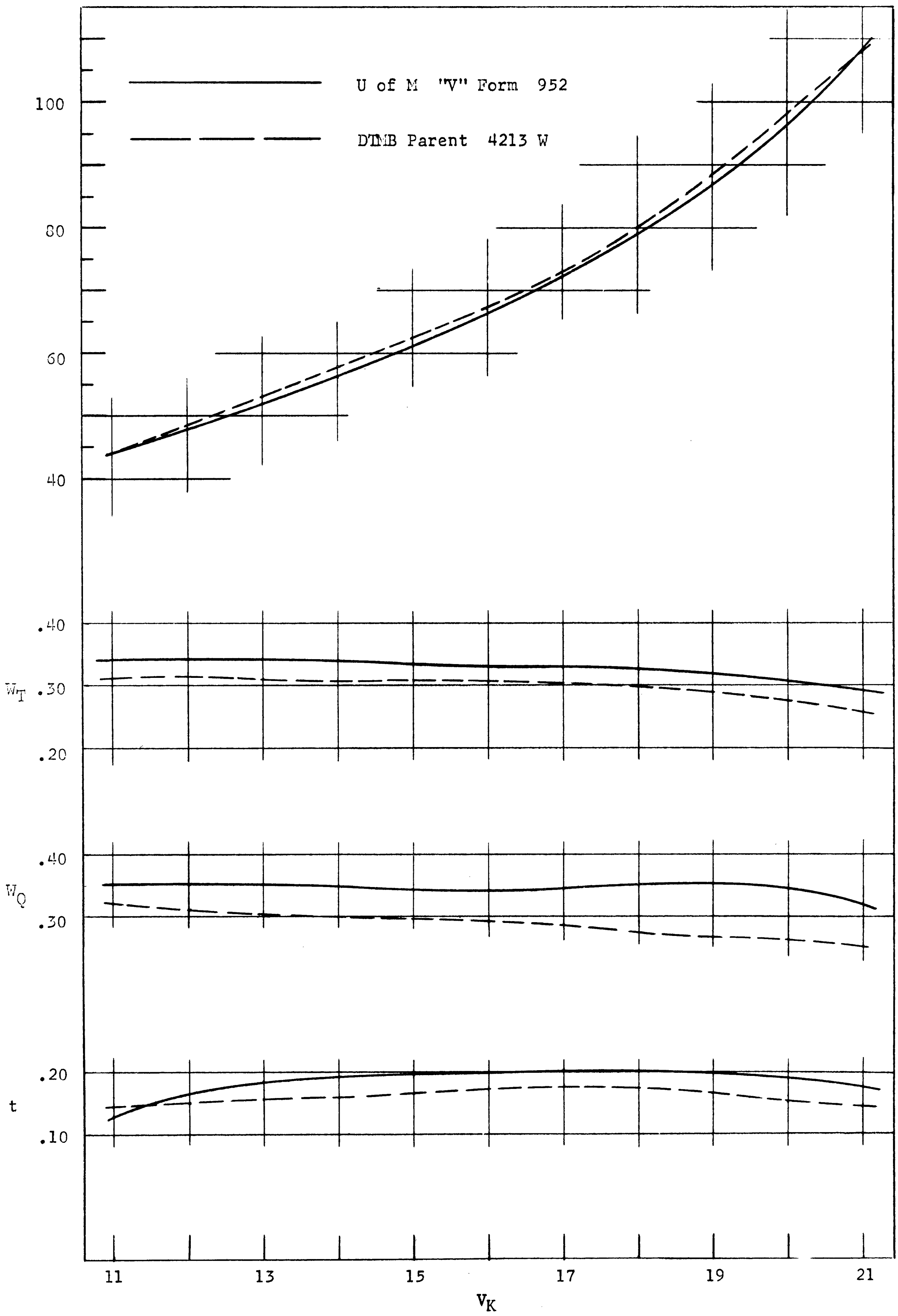

Fig. 19. Revolutions per minute, wake fraction, and thrust deduction versus speed in knots for the C_B = .75 U of M "V" Series and the DTMB Series 60.

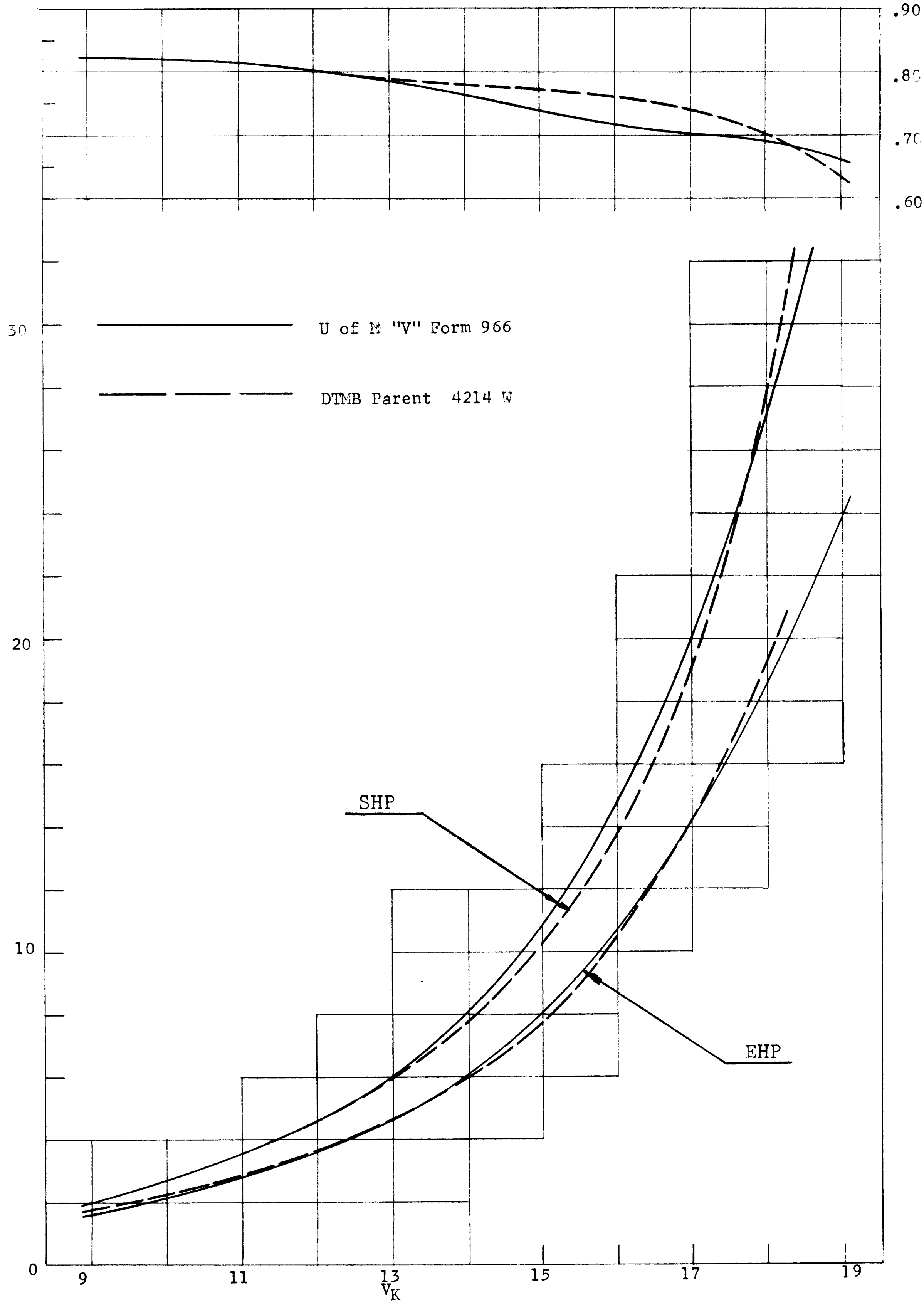

Fig. 20. Effective horsepower, shaft horsepower, and propulsive coefficient versus speed in knots for the C_B = .80 U of M "V" Series and the DTMB Series 60.

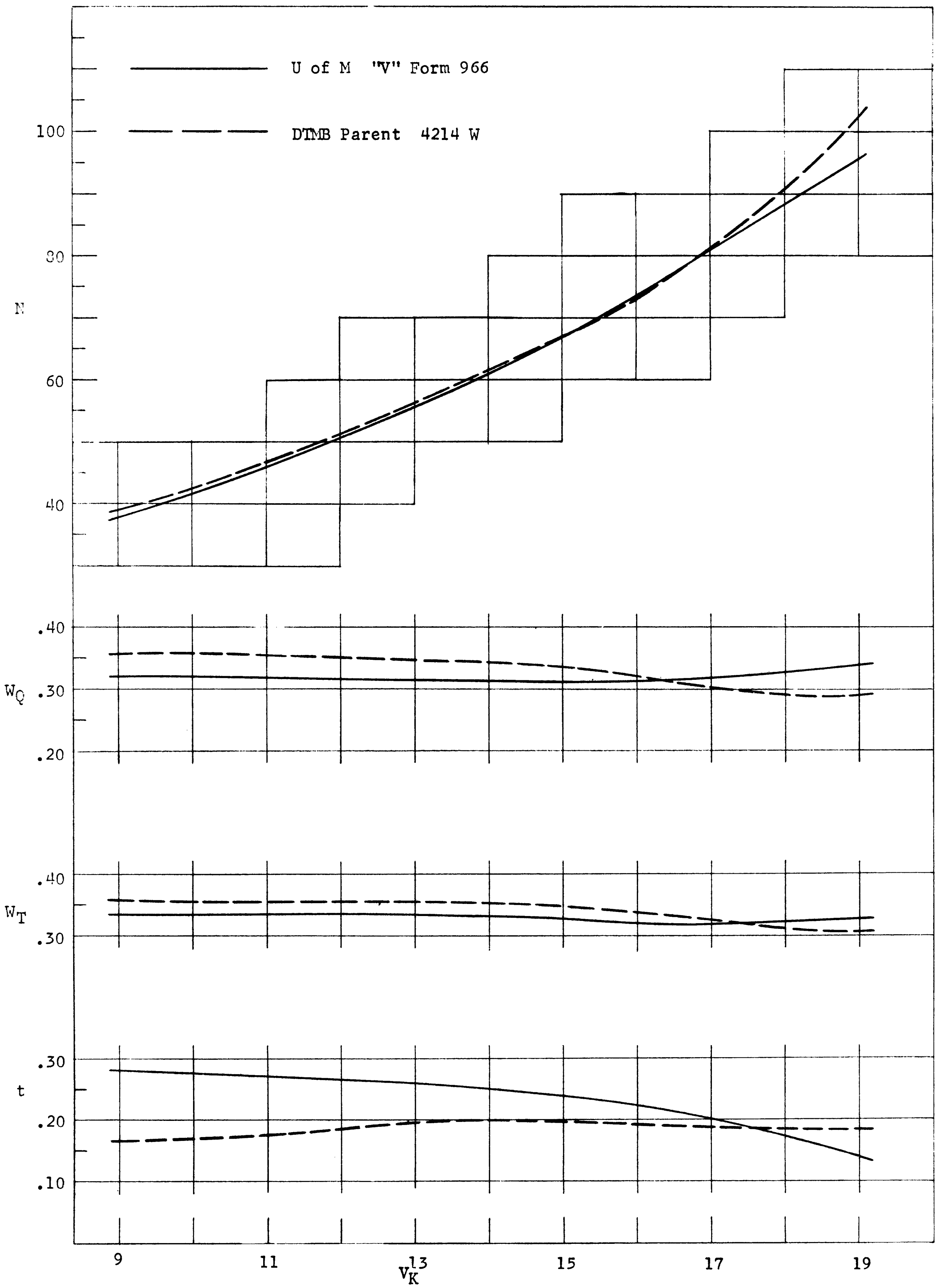

Fig. 21. Revolutions per minute, wake fraction, and thrust deduction versus speed in knots for the C_B = .80 U of M "V" Series and the DTMB Series 60.

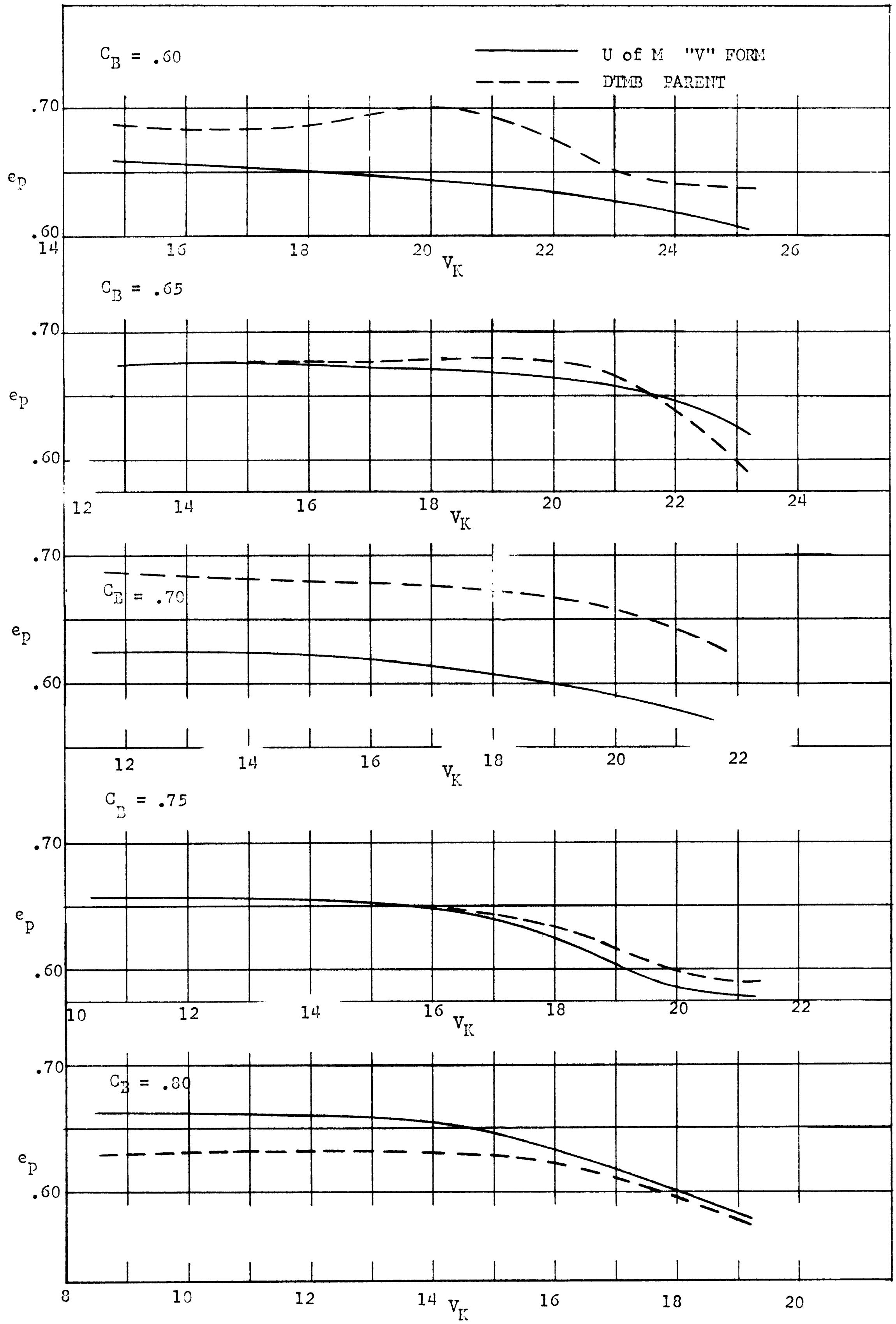

Fig. 22. Propeller efficiency versus speed in knots for the U of M "V" Series and the DTMB Series 60.

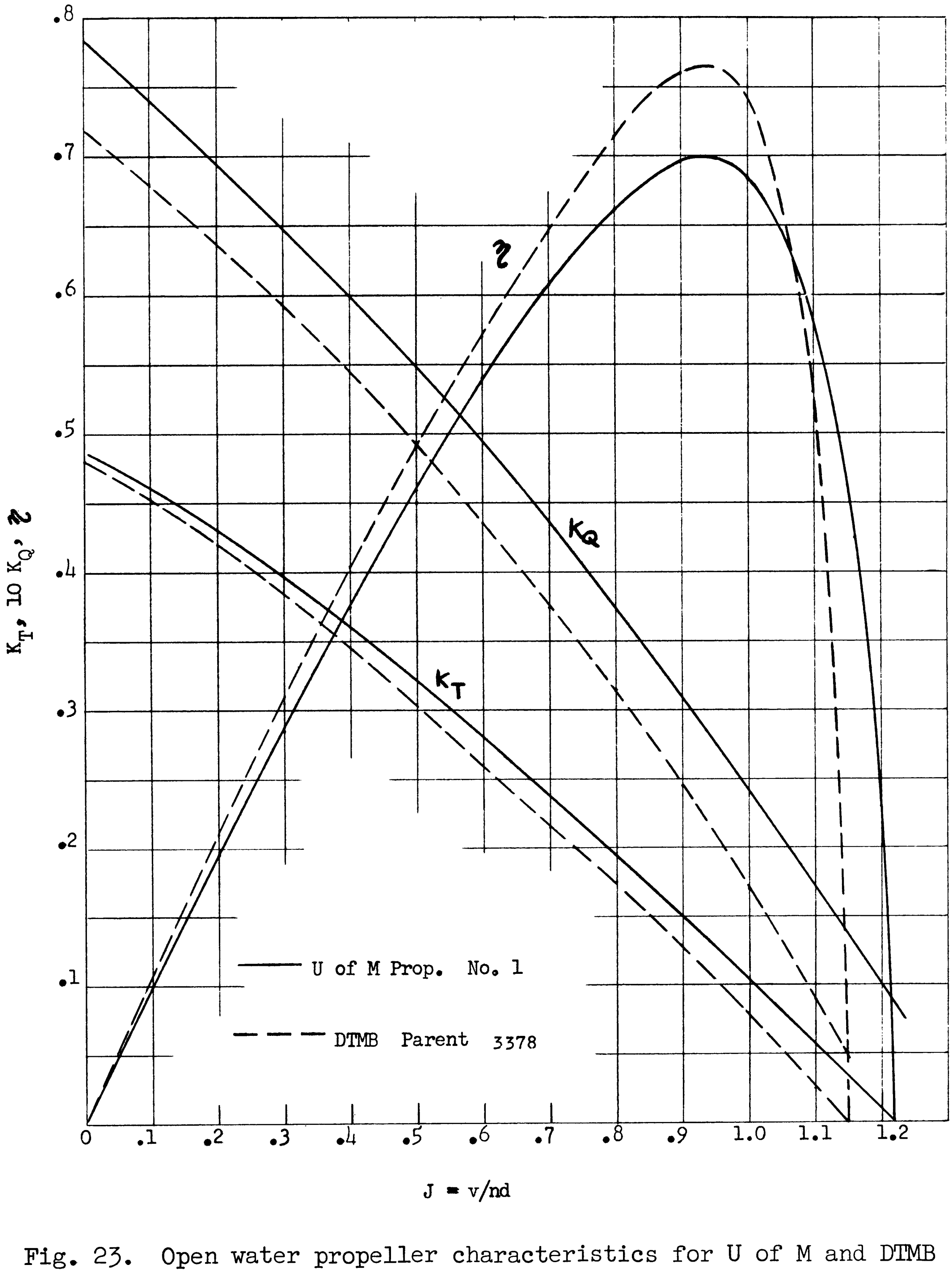

Fig. 23. Open water propeller characteristics for U of M and DTMB propellers used on the C_B = .60 models.

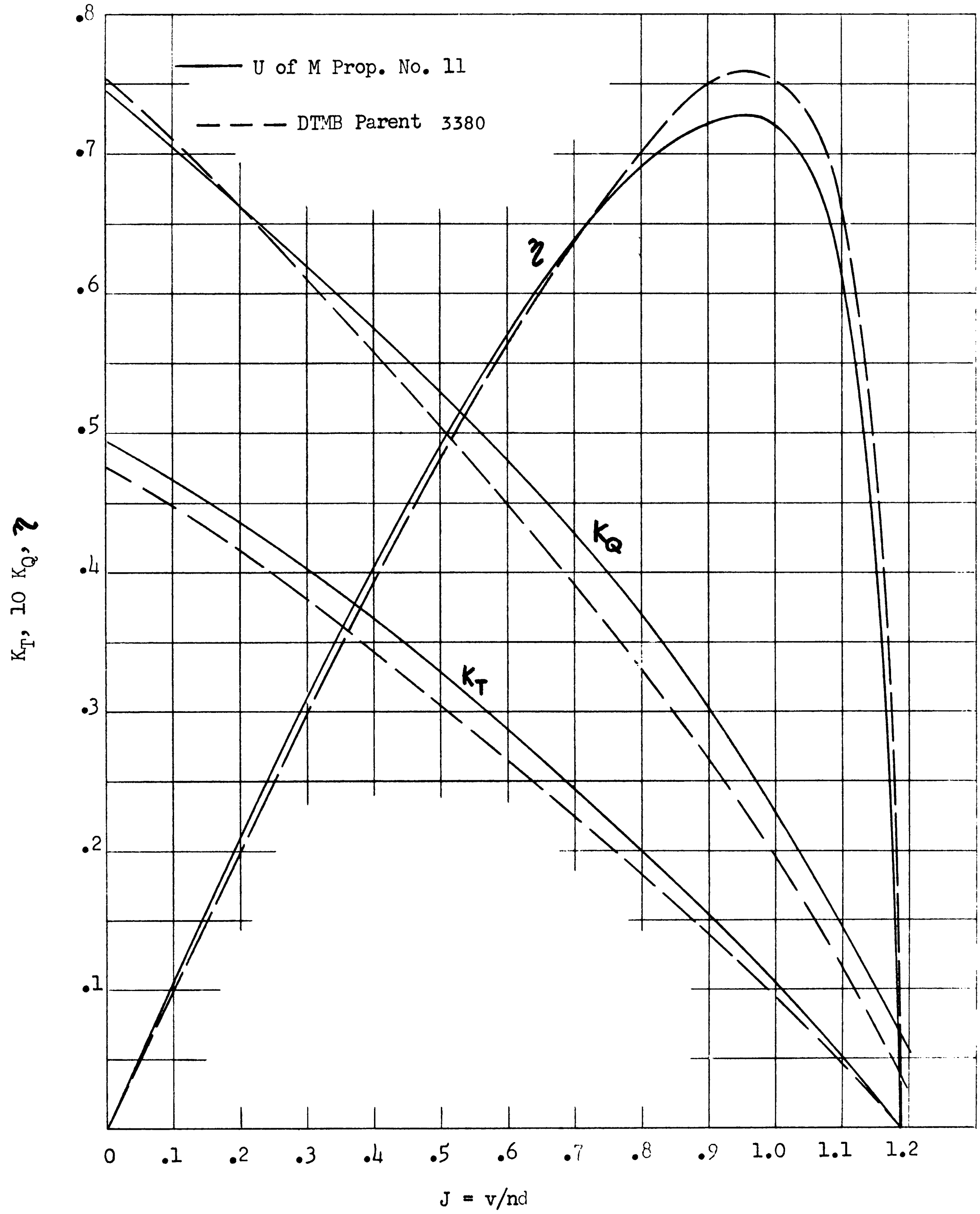

Fig. 24. Open water propeller characteristics for U of M and DTMB propellers used on the C_B = .65 models.

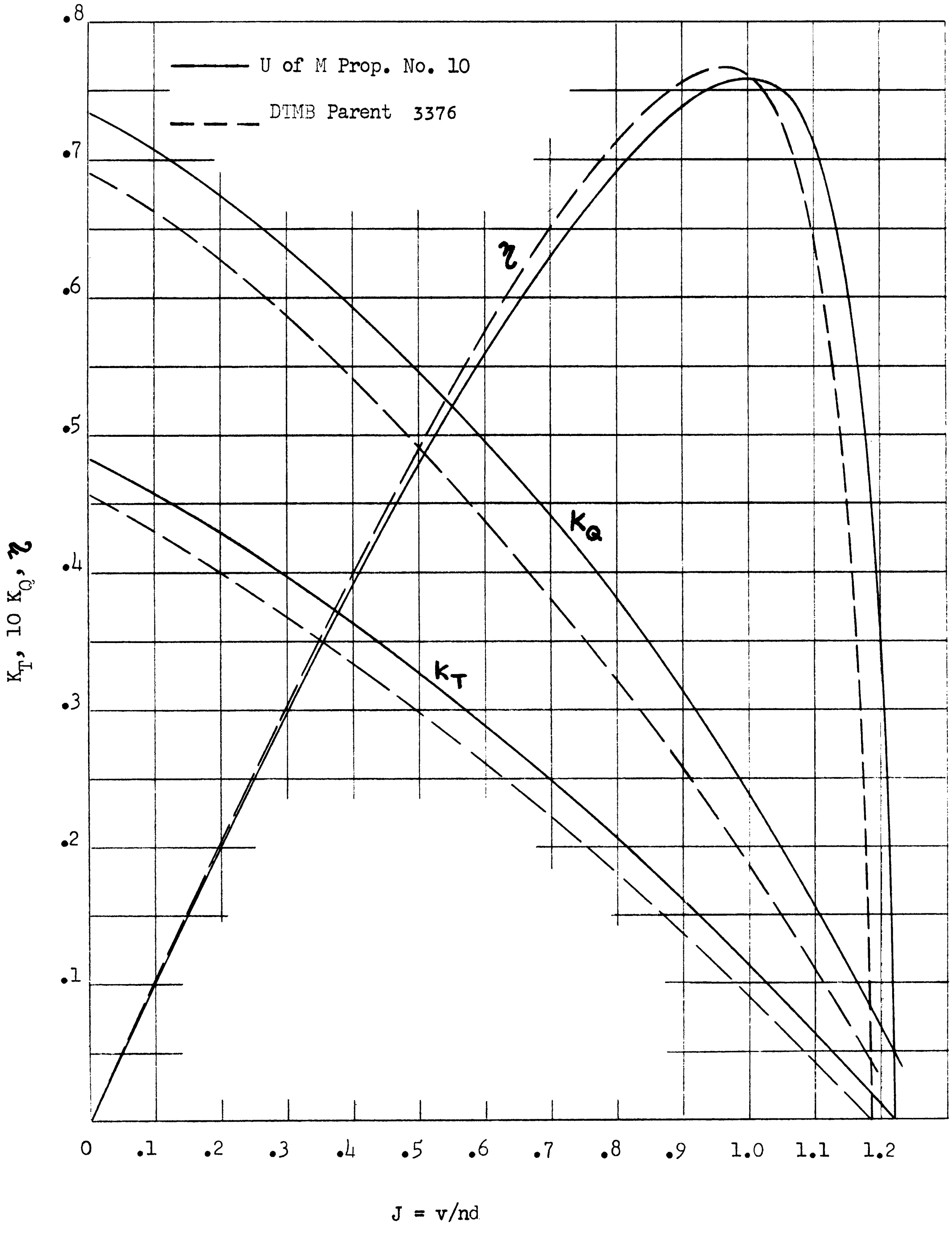

Fig. 25. Open water propeller characteristics for U of M and DTMB propellers used on the C_B = .70 models.

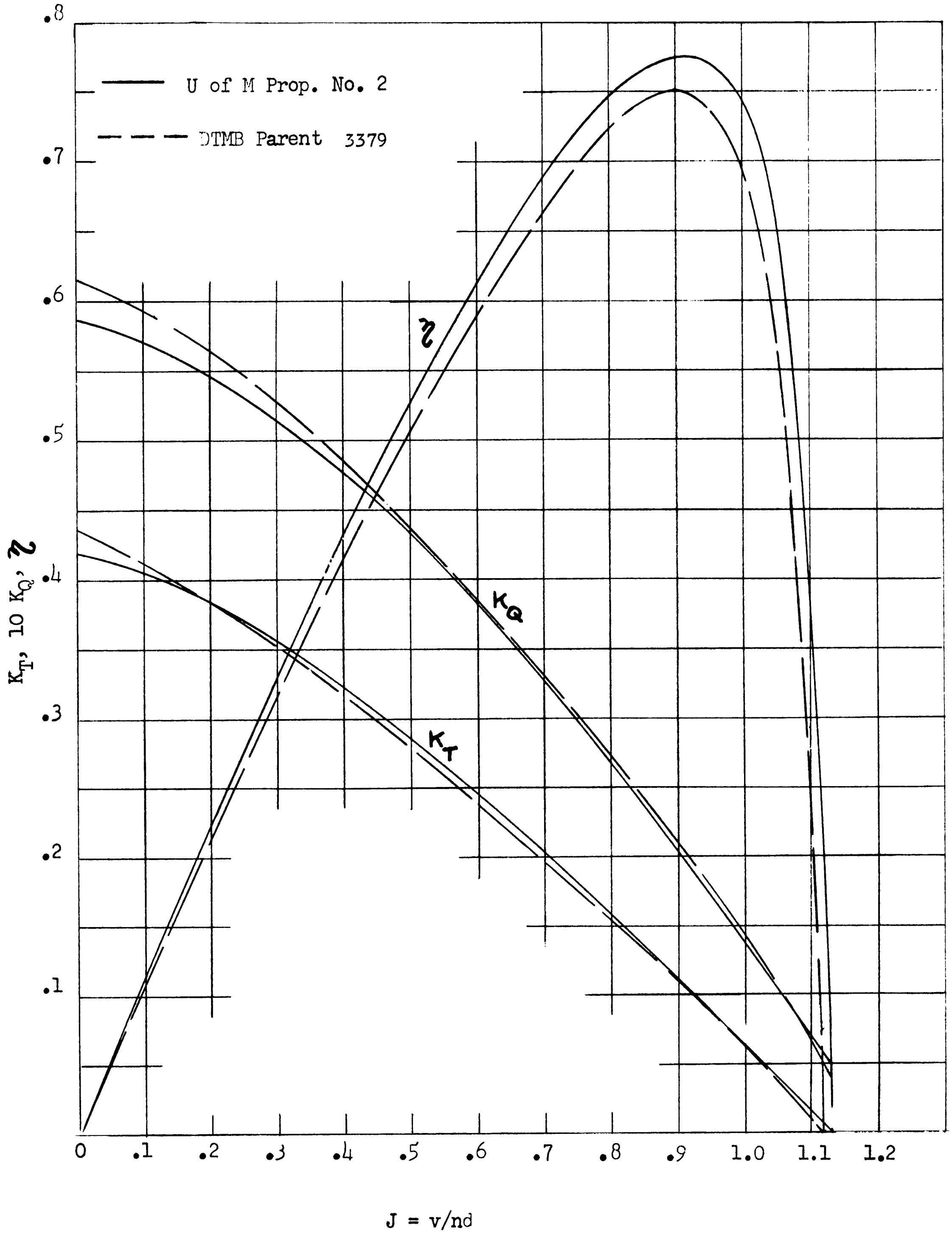

Fig. 26. Open water propeller characteristics for U of M and DTMB propellers used on the C_B = .75 models.

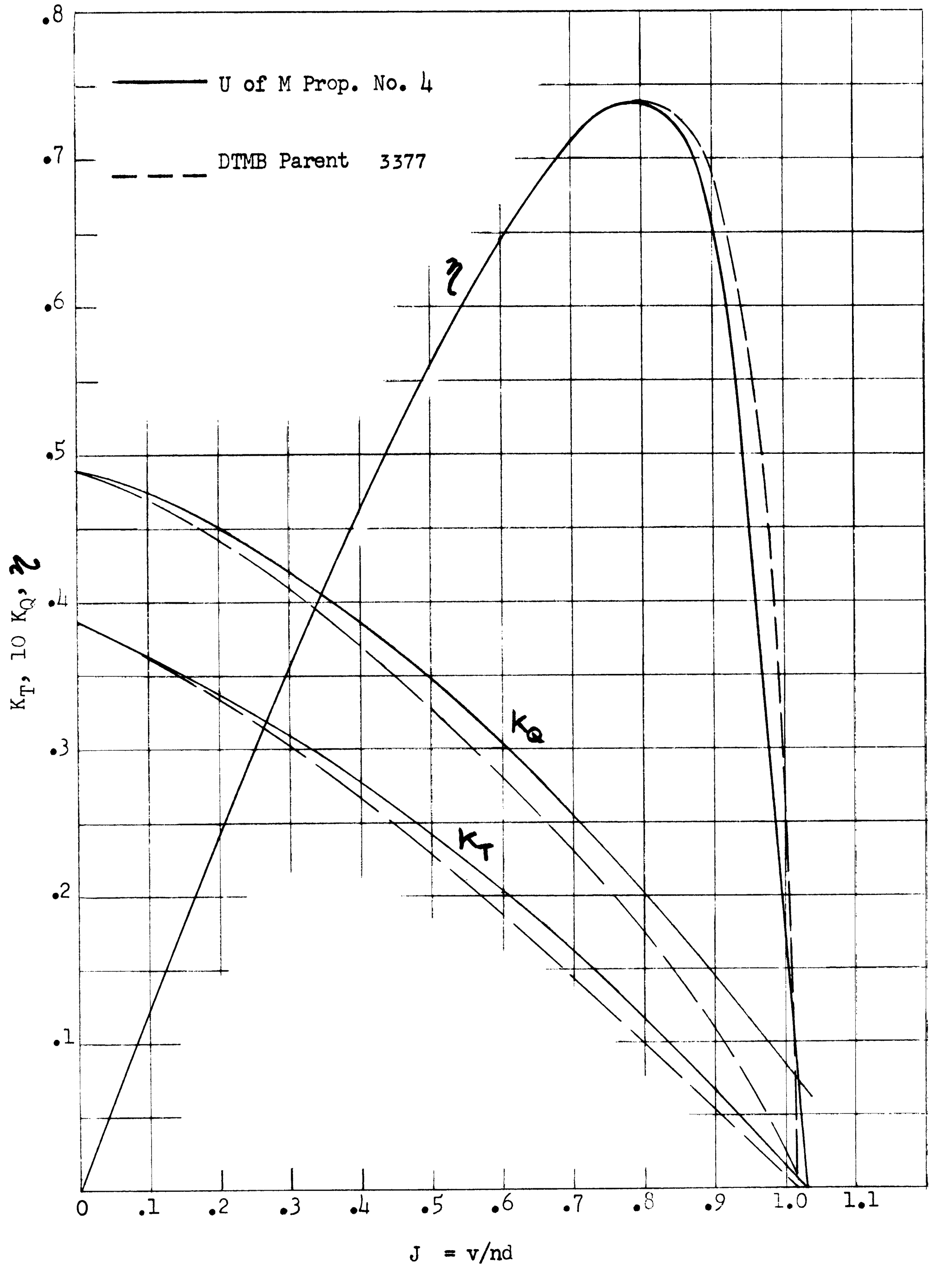

Fig. 27. Open water propeller characteristics för U of M and DTMB propellers used on the C_B = .80 models.

APPENDIX

TABLE A-I

CURVES OF FORM FOR THE SERIES 60, $C_B = .60$

CALCULATIONS FOR THE CURVES OF FORM AND BONJEAN CURVES

SHIP NO.912

R. A. YAGLE, H. C. KIM

BASIC DIMENSIONS

THE LENGTH BETWEEN PERPENDICULARS IS 600.000 FEET

THE MOLDED HALF BEAM IS 39.997 FEET

THERE ARE 5 DIFFERENT STATION SPACINGS ALONG THE SHIP

THERE ARE 2 DIFFERENT WATERLINE SPACINGS UP THE SHIP

MIDSHIP IS LOCATED AT STATION 14

CALCULATED ON 8/22/62

TABLE A-I (Continued)

WATERPLANE CALCULATIONS
SHIP NO.912

CF IS IN FEET FORWARD (+) OR AFT (-) OF MIDSHIPS

WATERLINE	WP AREAS	CF (FROM MID.)	TONS PER INCH	WP COEFF.	TRANSV. I. COEFF.	LONG. I. COEFF.
.000	14768	-14.504	35.161	.3077	.09383	.12483
4.000	24142	-4.343	57.480	.5030	.27574	.27151
8.000	27003	-2.915	64.292	.5626	.36036	.31663
15.999	29751	-5.261	70.836	.6199	.44542	.36689
23.997	31475	-11.329	74.940	.6558	.49057	.41039
31.996	33994	-23.217	80.937	.7082	.54383	.49491
39.994	36569	-31.600	87.070	.7619	.60010	.59163
47.993	39010	-33.202	92.880	.8128	.66079	.68884

MOLDED DISPLACEMENTS
SHIP NO.912

ALL VALUES ARE IN LONG TONS

WATERLINE	DISP. SALT WATER	DISP. FRESH WATER
4.000	2285	2222
8.000	5270	5124
15.999	11830	11502
23.997	18846	18322
31.996	26312	25581
39.994	34373	33419
47.993	43012	41817

TABLE A-I (Continued)

LONGITUDINAL AND VERTICAL CENTERS OF BUOYANCY
SHIP NO.912

VCB IS IN FEET ABOVE THE BASELINE

WATERLINE	VCB	LCB
4.000	2.319	-7.630
8.000	4.354	-5.149
15.999	8.578	-4.287
23.997	12.831	-5.678
31.996	17.155	-8.875
39.994	21.586	-13.295
47.993	26.094	-17.236

TRANSVERSE AND LONGITUDINAL METACENTRIC HEIGHTS
SHIP NO.912

ALL VALUES ARE IN FEET ABOVE THE BASE LINE

WATERLINE	KM TRANS.	KM LONG.
4.000	32.341	2249.319
8.000	42.617	2123.857
15.999	30.853	1109.658
23.997	30.114	813.741
31.996	30.790	658.833
39.994	33.155	613.922
47.993	36.297	591.974

TABLE A-I (Continued)

MOMENT TO TRIM ONE INCH AND
CHANGES IN DISPLACEMENT FOR A ONE INCH TRIM AFT
SHIP NO.912

THE MOMENTS ARE IN FOOT LONG TONS
THE CHANGE IN DISP. IS IN LONG TONS

WATERLINE	MOM. TO TRIM 1 IN.	CHANGE IN DISP.
4.000	713.244	.416
8.000	1809.207	.312
15.999	2096.378	.621
23.997	2344.936	1.415
31.996	2827.861	3.132
39.994	3380.505	4.586
47.993	3935.986	5.140

BLOCK, PRISMATIC, MIDSHIP, AND VERTICAL PRISMATIC COEFFICIENTS
SHIP NO.912

WATERLINE	BLOCK	PRISMATIC	MIDSHIP	VERTICAL PRISMATIC
4.000	.4166	.4992	.8346	.8283
8.000	.4804	.5317	.9034	.8538
15.999	.5392	.5658	.9531	.8699
23.997	.5727	.5909	.9691	.8733
31.996	.5997	.6139	.9768	.8467
39.994	.6267	.6386	.9815	.8226
47.993	.6535	.6638	.9846	.8041

TABLE A-I (Continued)

SECTIONAL AREAS FROM BONJEAN CURVES
SHIP NO.912

LOCATION OF STATIONS

STATION	DISTANCE FROM STA. 0
0	.000
1	2.176
2	4.352
3	19.352
4	34.352
5	49.352
6	64.352
7	94.352
8	124.352
9	154.352
10	184.352
11	214.352
12	244.352
13	274.352
14	304.352
15	334.352
16	364.352
17	394.352
18	424.352
19	454.352
20	484.352
21	514.352
22	544.352
23	559.352
24	574.352
25	589.352
26	604.352
27	608.495
28	612.637
29	616.780
30	620.923

TABLE A-I (Continued)

SECTIONAL AREAS

STATION	4.000	8.000	15.999	23.997	31.996	39.994	47.993
	WATERLINES						
	AREAS (SQ. FT.)						
0	.000	.000	.000	.000	.000	.000	.000
1	.000	.000	.000	.000	.000	.000	8.094
2	.000	.000	.000	.000	.000	5.332	25.053
3	6.621	18.771	46.341	73.265	103.016	142.736	204.424
4	13.548	38.552	93.631	150.416	211.358	285.525	389.640
5	20.107	58.486	145.019	238.012	336.304	448.655	597.414
6	27.312	79.952	204.421	338.902	479.677	637.544	836.551
7	44.529	129.143	338.278	568.532	811.289	1075.770	1384.191
8	73.238	199.962	505.885	839.759	1191.049	1564.077	1975.123
9	113.805	289.181	693.928	1128.774	1579.765	2050.200	2547.677
10	169.902	402.048	890.099	1413.410	1946.386	2491.017	3050.884
11	201.759	462.448	1029.023	1615.132	2204.875	2800.544	3402.665
12	235.252	523.448	1135.383	1760.967	2386.955	3014.009	3642.097
13	255.738	558.419	1192.478	1832.537	2472.594	3112.439	3752.285
14	267.069	578.124	1219.722	1860.369	2500.214	3140.060	3779.905
15	260.581	567.562	1206.208	1847.378	2487.224	3127.069	3766.915
16	243.850	538.486	1165.305	1805.592	2445.758	3085.604	3725.449
17	217.750	488.943	1084.446	1711.106	2345.840	2983.021	3621.919
18	182.750	417.914	951.800	1539.267	2154.314	2783.849	3420.482
19	143.240	334.581	780.350	1296.891	1872.073	2486.554	3118.355
20	103.231	247.476	590.683	1011.926	1519.379	2094.876	2707.095
21	68.190	169.295	404.728	707.793	1109.850	1615.288	2182.977
22	34.800	92.629	230.241	406.353	673.600	1074.142	1570.325
23	22.467	61.790	153.643	270.941	468.073	804.755	1254.142
24	12.469	35.324	87.612	150.806	277.855	544.345	936.913
25	4.236	10.486	23.934	41.060	105.448	297.466	619.818
26	.000	.000	.000	.000	21.853	128.805	351.594
27	.000	.000	.000	.000	13.807	95.412	293.566
28	.000	.000	.000	.000	6.904	64.608	229.292
29	.000	.000	.000	.000	.000	28.566	137.832
30	.000	.000	.000	.000	.000	.000	.000

TABLE A-I (Continued)

```
$ DATA                                                                                    002936   11/27/62     9 23  5.3 AM

MAP
    ERROR  00000*     SYSTEM 00000*     SPRINT 00000*     SKIP6  00000*     SCARDS 00000*     SPEEK  00000*
    .EXIT  00000*     FTRAP  00000*     (MAIN) 10000      .IOH   47671*     .READ  52107*     .PRINI 52247*
    .PRSLT 52330*     .PCOMT 53026*     .01301 53045*     ZERO   53137*     .03311 53173*     .ERR   53210*
    BNBCD  53272*     (PROG) 53315      (SUBT) 74712      (ERAS) 77776
21365 LOCS. CAN BE SAFELY USED IN EXPANDING PROG. (OCTAL)

INPUT VALUES READ WERE
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             NBL =               5,          NBV =              2,          DST =             14

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                 LN(1)...LN(5)
             2              4             16              4              4

                 D(1)...D(2)
  2.240000E 00   1.343800E 01

                 VN(1)...VN(2)
             2              5

                 OFS(0,0)...OFS(30,7)
   .000000E 00    .000000E 00    .000000E 00    .000000E 00    .000000E 00    .000000E 00    .000000E 00    .000000E 00
   .000000E 00    .000000E 00    .000000E 00    .000000E 00    .000000E 00    .000000E 00    .000000E 00   3.400000E-01
   .000000E 00    .000000E 00    .000000E 00    .000000E 00    .000000E 00    .000000E 00   2.240000E-01   4.700000E-01
  7.200000E-02   3.600000E-01   4.590000E-01   4.630000E-01   4.820000E-01   5.712000E-01   8.510000E-01   1.344000E 00
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  1.910000E-01   1.560000E 00   1.964000E 00   2.285000E 00   2.386000E 00   2.553000E 00   3.024000E 00   4.032000E 00
  4.370000E-01   2.470000E 00   3.243000E 00   3.875000E 00   4.121000E 00   4.379000E 00   4.928000E 00   5.947000E 00
  1.066000E 00   3.780000E 00   4.810000E 00   5.622000E 00   5.992000E 00   6.294000E 00   6.798000E 00   7.649000E 00
  2.187000E 00   5.420000E 00   6.497000E 00   7.392000E 00   7.739000E 00   8.041000E 00   8.444000E 00   9.004000E 00
```

TABLE A-I (Concluded)

3.729000E 00	7.600000E 00	8.086000E 00	8.982000E 00	9.229000E 00	9.419000E 00	9.654000E 00	9.955000E 00
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6.608000E 00	9.510000E 00	1.031400E 01	1.087500E 01	1.094200E 01	1.096400E 01	1.098700E 01	1.099800E 01
7.514000E 00	1.008000E 01	1.080000E 01	1.115500E 01	1.119930E 01	1.119930E 01	1.119930E 01	1.119930E 01
7.952000E 00	1.043000E 01	1.103100E 01	1.119930E 01	1.119930E 01	1.119930E 01	1.119930E 01	1.119930E 01
7.673000E 00	1.025000E 01	1.092100E 01	1.119930E 01	1.119930E 01	1.119930E 01	1.119930E 01	1.119930E 01
7.013000E 00	9.740000E 00	1.056800E 01	1.113200E 01	1.119930E 01	1.119930E 01	1.119930E 01	1.119930E 01
6.099000E 00	8.850000E 00	9.840000E 00	1.077400E 01	1.105400E 01	1.113200E 01	1.116600E 01	1.119930E 01
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1.110000E-01	6.900000E-01	8.380000E-01	9.520000E-01	1.299000E 00	3.449000E 00	5.936000E 00	7.683000E 00
8.000000E-02	2.000000E-01	2.210000E-01	2.460000E-01	3.700000E-01	2.162000E 00	4.681000E 00	6.484000E 00
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.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00

TABLE A-II

CURVES OF FORM FOR THE SERIES 60, C_B = .65

CALCULATIONS FOR THE CURVES OF FORM AND BONJEAN CURVES

SHIP NO..65PAR

R. A. YAGLE, H. C. KIM

BASIC DIMENSIONS

THE LENGTH BETWEEN PERPENDICULARS IS 600.000 FEET

THE MOLDED HALF BEAM IS 41.379 FEET

THERE ARE 5 DIFFERENT STATION SPACINGS ALONG THE SHIP

THERE ARE 2 DIFFERENT WATERLINE SPACINGS UP THE SHIP

MIDSHIP IS LOCATED AT STATION 14

CALCULATED ON 8/22/62

TABLE A-II (Continued)

WATERPLANE CALCULATIONS
SHIP NO..65PAR

CF IS IN FEET FORWARD (+) OR AFT (-) OF MIDSHIPS

WATERLINE	WP AREAS	CF (FROM MID.)	TONS PER INCH	WP COEFF.	TRANSV. I. COEFF.	LONG. I. COEFF.
.000	17553	-5.787	41.794	.3535	.12687	.15317
4.137	27734	2.044	66.034	.5585	.34046	.32018
8.275	30746	2.708	73.205	.6192	.43442	.37103
16.551	33160	-.054	78.951	.6678	.50743	.42157
24.828	34791	-5.820	82.837	.7007	.54959	.46684
33.104	37109	-16.362	88.356	.7474	.59780	.54898
41.381	39546	-24.534	94.157	.7964	.65214	.64258
49.657	41760	-26.535	99.430	.8410	.70817	.73168

MOLDED DISPLACEMENTS
SHIP NO..65PAR

ALL VALUES ARE IN LONG TONS

WATERLINE	DISP. SALT WATER	DISP. FRESH WATER
4.137	2747	2671
8.275	6275	6100
16.551	13925	13539
24.828	21975	21365
33.104	30463	29616
41.381	39524	38426
49.657	49141	47776

TABLE A-II (Continued)

LONGITUDINAL AND VERTICAL CENTERS OF BUOYANCY
SHIP NO..65PAR

VCB IS IN FEET ABOVE THE BASELINE

WATERLINE	VCB	LCB
4.137	2.379	-.494
8.275	4.480	1.309
16.551	8.811	1.542
24.828	13.165	-.018
33.104	17.586	-3.024
41.381	22.103	-7.070
49.657	26.692	-10.777

TRANSVERSE AND LONGITUDINAL METACENTRIC HEIGHTS
SHIP NO..65PAR

ALL VALUES ARE IN FEET ABOVE THE BASE LINE

WATERLINE	KM TRANS.	KM LONG.
4.137	39.770	2375.116
8.275	48.413	2176.235
16.551	34.070	1142.612
24.828	31.862	829.647
33.104	32.194	669.826
41.381	34.350	613.265
49.657	37.437	583.225

TABLE A-II (Continued)

MOMENT TO TRIM ONE INCH AND
CHANGES IN DISPLACEMENT FOR A ONE INCH TRIM AFT
SHIP NO..65PAR

THE MOMENTS ARE IN FOOT LONG TONS
THE CHANGE IN DISP. IS IN LONG TONS

WATERLINE	MOM. TO TRIM 1 IN.	CHANGE IN DISP.
4.137	905.413	-.225
8.275	2193.260	-.330
16.551	2491.970	.007
24.828	2759.588	.804
33.104	3245.123	2.410
41.381	3798.435	3.850
49.657	4325.141	4.397

BLOCK, PRISMATIC, MIDSHIP, AND VERTICAL PRISMATIC COEFFICIENTS
SHIP NO..65PAR

WATERLINE	BLOCK	PRISMATIC	MIDSHIP	VERTICAL PRISMATIC
4.137	.4681	.5480	.8542	.8380
8.275	.5345	.5826	.9174	.8632
16.551	.5930	.6167	.9617	.8880
24.828	.6239	.6401	.9747	.8904
33.104	.6486	.6612	.9810	.8679
41.381	.6732	.6836	.9848	.8453
49.657	.6976	.7065	.9873	.8294

TABLE A-II (Continued)

SECTIONAL AREAS FROM BONJEAN CURVES
SHIP NO..65PAR

LOCATION OF STATICNS

STATION	DISTANCE FROM STA. 0
0	.000
1	2.176
2	4.352
3	19.352
4	34.352
5	49.352
6	64.352
7	94.352
8	124.352
9	154.352
10	184.352
11	214.352
12	244.352
13	274.352
14	304.352
15	334.352
16	364.352
17	394.352
18	424.352
19	454.352
20	484.352
21	514.352
22	544.352
23	559.352
24	574.352
25	589.352
26	604.352
27	608.495
28	612.637
29	616.780
30	620.923

TABLE A-II (Continued)

SECTIONAL AREAS

STATION	WATERLINES 4.137	8.275	16.551	24.828	33.104	41.381	49.657
	AREAS (SQ. FT.)						
0	.000	.000	.000	.000	.000	.000	.000
1	.000	.000	.000	.000	.000	.000	5.665
2	.000	.000	.000	.000	.000	5.419	26.923
3	9.497	27.505	67.849	108.281	151.205	203.622	280.346
4	18.867	54.388	135.613	221.038	310.142	411.957	547.385
5	29.123	84.769	213.962	350.937	494.685	653.317	851.488
6	41.353	118.953	301.571	497.289	702.264	926.156	1192.243
7	74.219	202.757	501.627	823.679	1161.859	1523.963	1925.365
8	117.227	301.023	721.048	1169.556	1635.893	2124.203	2644.637
9	165.406	403.249	931.967	1487.542	2057.394	2642.424	3247.958
10	209.875	485.151	1085.753	1714.259	2348.105	2990.223	3644.209
11	252.346	564.463	1222.849	1888.185	2556.009	3227.931	3904.268
12	278.350	605.789	1287.348	1970.607	2652.619	3335.892	4020.091
13	290.814	624.910	1314.391	1999.837	2684.770	3369.703	4054.637
14	292.474	628.260	1317.231	2002.623	2687.556	3372.489	4057.423
15	288.906	622.969	1310.726	1996.344	2681.277	3366.211	4051.144
16	276.653	602.410	1282.498	1967.870	2652.976	3337.909	4022.842
17	251.806	558.996	1215.811	1892.030	2574.101	3258.586	3943.633
18	214.830	486.442	1094.702	1742.220	2410.255	3088.287	3771.373
19	171.219	399.919	922.775	1509.214	2141.868	2803.844	3481.117
20	123.566	298.777	712.035	1203.744	1771.162	2394.859	3053.111
21	78.383	199.280	491.052	856.761	1319.699	1876.698	2493.528
22	41.600	111.704	279.289	495.880	812.665	1262.765	1807.329
23	26.474	73.264	184.747	329.166	563.881	944.503	1437.911
24	14.792	41.139	101.202	178.119	328.858	628.415	1057.085
25	4.729	11.467	25.901	45.361	119.474	332.824	682.754
26	.000	.000	.000	.000	23.967	139.931	380.908
27	.000	.000	.000	.000	14.287	99.219	302.089
28	.000	.000	.000	.000	4.434	56.851	203.856
29	.000	.000	.000	.000	.000	22.662	123.949
30	.000	.000	.000	.000	.000	.000	.000

TABLE A-II (Continued)

3.476000E 00	7.270000E 00	8.378000E 00	9.199000E 00	9.512000E 00	9.755000E 00	1.004500E 01	1.046200E 01
5.171000E 00	8.620000E 00	9.597000E 00	1.048500E 01	1.065900E 01	1.077500E 01	1.096000E 01	1.116900E 01
6.747000E 00	9.940000E 00	1.079200E 01	1.119200E 01	1.126200E 01	1.133100E 01	1.140100E 01	1.148200E 01
7.946000E 00	1.057000E 01	1.126800E 01	1.154000E 01	1.152800E 01	1.155100E 01	1.156300E 01	1.158600E 01
8.553000E 00	1.085000E 01	1.148200E 01	1.158600E 01	1.158600E 01	1.158600E 01	1.158600E 01	1.158600E 01
8.562000E 00	1.093000E 01	1.149300E 01	1.158600E 01	1.158600E 01	1.158600E 01	1.158600E 01	1.158600E 01
8.391000E 00	1.085000E 01	1.144700E 01	1.158600E 01	1.158600E 01	1.158600E 01	1.158600E 01	1.158600E 01
7.894000E 00	1.051000E 01	1.121700E 01	1.155100E 01	1.158600E 01	1.158600E 01	1.158600E 01	1.158600E 01
6.918000E 00	9.790000E 00	1.066600E 01	1.130800E 01	1.149300E 01	1.156300E 01	1.158600E 01	1.158600E 01
5.642000E 00	8.580000E 00	9.620000E 00	1.065900E 01	1.115700E 01	1.140100E 01	1.151600E 01	1.158600E 01
4.213000E 00	7.070000E 00	8.103000E 00	9.419000E 00	1.035800E 01	1.099500E 01	1.135400E 01	1.152800E 01
2.757000E 00	5.330000E 00	6.252000E 00	7.624000E 00	9.014000E 00	1.013800E 01	1.090200E 01	1.130800E 01
1.456000E 00	3.610000E 00	4.333000E 00	5.469000E 00	6.963000E 00	8.747000E 00	1.001000E 01	1.077500E 01
5.651000E-01	2.070000E 00	2.494000E 00	3.128000E 00	4.287000E 00	6.627000E 00	8.527000E 00	9.790000E 00
2.911000E-01	1.370000E 00	1.666000E 00	2.062000E 00	2.897000E 00	5.306000E 00	7.542000E 00	9.025000E 00
1.370000E-01	7.800000E-01	9.190000E-01	1.089000E 00	1.564000E 00	3.835000E 00	6.338000E 00	8.029000E 00
9.400000E-02	2.100000E-01	2.300000E-01	2.550000E-01	4.280000E-01	2.375000E 00	4.947000E 00	6.766000E 00
.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00	9.730000E-01	3.151000E 00	4.936000E 00
.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00	5.800000E-01	2.520000E 00	4.320000E 00
.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00	1.800000E-01	1.840000E 00	3.060000E 00
.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00	9.200000E-01	2.640000E 00
.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00

TABLE A-II (Concluded)

SHIP NO. .65PAR

INPUT VALUES READ WERE

LBP = 168.000000, BE = 11.586000, INCH = 18, LAMBDA = 42.857140

NBL = 5, NBV = 2, DST = 14

L(1)...L(5)

1.218500E 00	1.801850E 01	1.524185E 02	1.692185E 02	1.738585E 02

LN(1)...LN(5)

2	4	16	4	4

D(1)...D(2)

2.317000E 00	1.390400E 01

VN(1)...VN(2)

2	5

OFS(0,0)...OFS(30,7)

.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00
.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00	2.300000E-01
.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00	2.200000E-01	5.210000E-01
6.800000E-02	5.200000E-01	6.440000E-01	6.720000E-01	6.950000E-01	7.650000E-01	1.043000E 00	1.599000E 00
1.370000E-01	1.030000E 00	1.264000E 00	1.413000E 00	1.460000E 00	1.564000E 00	1.923000E 00	2.734000E 00
2.050000E-01	1.600000E 00	2.000000E 00	2.248000E 00	2.364000E 00	2.503000E 00	2.908000E 00	3.893000E 00
3.510000E-01	2.230000E 00	2.804000E 00	3.209000E 00	3.372000E 00	3.568000E 00	4.055000E 00	5.028000E 00
9.330000E-01	3.760000E 00	4.609000E 00	5.272000E 00	5.561000E 00	5.886000E 00	6.395000E 00	7.241000E 00
2.046000E 00	5.490000E 00	6.551000E 00	7.369000E 00	7.728000E 00	8.041000E 00	8.504000E 00	9.130000E 00

TABLE A-III

CURVES OF FORM FOR THE SERIES 60. C_B = .70

CALCULATIONS FOR THE CURVES OF FORM AND BONJEAN CURVES

SHIP NO.913

R. A. YAGLE, H. C. KIM

BASIC DIMENSIONS

THE LENGTH BETWEEN PERPENDICULARS IS 600.000 FEET

THE MOLDED HALF BEAM IS 44.446 FEET

THERE ARE 5 DIFFERENT STATION SPACINGS ALONG THE SHIP

THERE ARE 2 DIFFERENT WATERLINE SPACINGS UP THE SHIP

MIDSHIP IS LOCATED AT STATION 14

CALCULATED ON 8/22/62

TABLE A-III (Continued)

WATERPLANE CALCULATIONS
SHIP NO..70PAR

CF IS IN FEET FORWARD (+) OR AFT (-) OF MIDSHIPS

WATERLINE	WP AREAS	CF (FROM MID.)	TONS PER INCH	WP COEFF.	TRANSV. I. COEFF.	LONG. I. COEFF.
.000	21606	6.833	51.443	.4202	.17908	.20257
4.286	31979	8.887	76.141	.6219	.42324	.38182
8.571	34747	8.671	82.732	.6757	.51275	.43322
17.144	36813	5.020	87.650	.7159	.57294	.48339
25.717	38328	-.331	91.257	.7453	.61084	.52960
34.290	40485	-9.893	96.393	.7873	.65318	.61157
42.863	42729	-17.935	101.737	.8309	.70159	.70212
51.436	44579	-20.853	106.141	.8669	.74679	.77954

MOLDED DISPLACEMENTS
SHIP NO..70PAR

ALL VALUES ARE IN LONG TONS

WATERLINE	DISP. SALT WATER	DISP. FRESH WATER
4.286	3358	3265
8.571	7521	7312
17.144	16380	15925
25.717	25593	24883
34.290	35233	34254
42.863	45422	44160
51.436	56123	54564

TABLE A-III (Continued)

LONGITUDINAL AND VERTICAL CENTERS OF BUOYANCY
SHIP NO..70PAR

VCB IS IN FEET ABOVE THE BASELINE

WATERLINE	VCB	LCB
4.286	2.426	8.236
8.571	4.591	8.606
17.144	9.035	7.837
25.717	13.502	5.904
34.290	18.032	2.963
42.863	22.650	-.858
51.436	27.325	-4.469

TRANSVERSE AND LONGITUDINAL METACENTRIC HEIGHTS
SHIP NO..70PAR

ALL VALUES ARE IN FEET ABOVE THE BASE LINE

WATERLINE	KM TRANS.	KM LONG.
4.286	50.386	2661.119
8.571	55.202	2242.255
17.144	37.189	1174.838
25.717	33.636	846.007
34.290	33.625	680.590
42.863	35.583	616.126
51.436	38.568	578.762

TABLE A-III (Continued)

MOMENT TO TRIM ONE INCH AND
CHANGES IN DISPLACEMENT FOR A ONE INCH TRIM AFT
SHIP NO..70PAR

THE MOMENTS ARE IN FOOT LONG TONS
THE CHANGE IN DISP. IS IN LONG TONS

WATERLINE	MOM. TO TRIM 1 IN.	CHANGE IN DISP.
4.286	1240.108	-1.128
8.571	2652.153	-1.196
17.144	2959.260	-.733
25.717	3242.165	.050
34.290	3744.009	1.589
42.863	4298.350	3.041
51.436	4772.269	3.689

BLOCK, PRISMATIC, MIDSHIP, AND VERTICAL PRISMATIC COEFFICIENTS
SHIP NO..70PAR

WATERLINE	BLOCK	PRISMATIC	MIDSHIP	VERTICAL PRISMATIC
4.286	.5333	.6081	.8771	.8576
8.571	.5972	.6396	.9338	.8839
17.144	.6503	.6699	.9707	.9083
25.717	.6773	.6908	.9805	.9088
34.290	.6993	.7097	.9854	.8883
42.863	.7212	.7298	.9883	.8680
51.436	.7426	.7499	.9903	.8567

TABLE A-III (Continued)

SECTICNAL AREAS FRCM BCNJEAN CURVES
SHIP NC..70PAR

LCCATICN CF STATICNS

STATICN	CISTANCE FROM STA. 0
C	.000
1	2.176
2	4.352
3	19.352
4	34.352
5	49.352
6	64.352
7	94.352
8	124.352
9	154.352
10	184.352
11	214.352
12	244.352
13	274.352
14	304.352
15	334.352
16	364.352
17	394.352
18	424.352
19	454.352
2C	484.352
21	514.352
22	544.352
23	559.352
24	574.352
25	589.352
26	604.352
27	608.495
28	612.637
29	616.780
3C	620.923

TABLE A-III (Continued)

SECTIONAL AREAS

	WATERLINES						
	4.286	8.571	17.144	25.717	34.290	42.863	51.436
STATION	AREAS (SQ. FT.)						
0	.000	.000	.000	.000	.000	.000	.000
1	.000	.000	.000	.000	.000	.000	9.951
2	.000	.000	.000	.000	.000	6.123	31.536
3	12.533	36.990	95.007	156.619	222.569	299.786	406.212
4	28.452	82.173	209.162	342.551	481.248	635.131	826.979
5	48.474	135.490	336.593	548.863	770.594	1011.613	1292.987
6	72.740	195.469	472.732	766.520	1073.735	1403.973	1772.948
7	126.707	320.377	750.720	1202.454	1673.410	2166.778	2688.864
8	185.995	442.796	1003.147	1585.514	2183.900	2800.410	3435.108
9	240.699	546.816	1201.125	1873.278	2554.820	3246.710	3948.031
10	283.469	622.041	1332.219	2050.313	2772.453	3498.023	4226.348
11	310.770	668.898	1400.837	2133.143	2867.286	3602.163	4336.918
12	321.926	685.806	1426.128	2161.005	2895.760	3630.515	4365.270
13	322.168	686.000	1426.322	2161.199	2895.954	3630.709	4365.464
14	322.168	686.000	1426.322	2161.199	2895.954	3630.709	4365.464
15	322.199	685.877	1425.587	2160.526	2895.280	3630.035	4364.791
16	313.819	672.806	1409.114	2144.665	2879.420	3614.175	4348.930
17	290.416	635.337	1358.605	2092.620	2827.804	3562.559	4297.314
18	253.656	570.051	1253.810	1968.403	2693.238	3424.197	4158.524
19	204.638	474.694	1081.804	1743.843	2438.979	3154.507	3883.690
20	150.281	362.735	854.424	1425.632	2059.900	2739.605	3450.662
21	96.663	245.245	599.932	1036.341	1567.246	2182.654	2853.419
22	51.189	136.388	342.770	611.744	988.679	1497.595	2096.164
23	33.390	91.071	228.741	409.465	692.614	1127.355	1671.420
24	18.773	50.602	123.057	220.246	406.706	752.044	1225.199
25	6.293	14.622	31.363	54.944	144.346	389.346	773.201
26	.000	.000	.000	.000	27.224	158.348	427.112
27	.000	.000	.000	.000	16.329	114.917	345.976
28	.000	.000	.000	.000	4.848	66.185	249.174
29	.000	.000	.000	.000	.000	27.556	141.044
30	.000	.000	.000	.000	.000	.000	.000

TABLE A-III (Continued)

SHIP NO. .70PAR

INPUT VALUES READ WERE

LBP =	168.000000,	BE =	11.999000,	INCH =	16,	LAMBDA =	42.857140
NEL =	5,	NBV =	2,	OST =	14		

L(1)...L(5)

1.218500E 00	1.801850E 01	1.524185E 02	1.692185E 02	1.738585E 02

LN(1)...LN(5)

2	4	16	4	4

D(1)...D(2)

2.400000E 00	1.440200E 01

VN(1)...VN(2)

2	5

CFS(0,0)...CFS(30,7)

.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00
.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00	3.900000E-01
.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00	2.400000E-01	6.120000E-01
8.300000E-02	6.720000E-01	8.620000E-01	9.720000E-01	1.032000E 00	1.128000E 00	1.428000E 00	2.112000E 00
2.410000E-01	1.483000E 00	1.892000E 00	2.124000E 00	2.208000E 00	2.328000E 00	2.748000E 00	3.588000E 00
5.000000E-01	2.440000E 00	3.018000E 00	3.372000E 00	3.528000E 00	3.720000E 00	4.200000E 00	5.052000E 00
9.250000E-01	3.510000E 00	4.191000E 00	4.668000E 00	4.884000E 00	5.160000E 00	5.664000E 00	6.431000E 00
2.211000E 00	5.650000E 00	6.586000E 00	7.187000E 00	7.523000E 00	7.859000E 00	8.267000E 00	8.807000E 00
4.044000E 00	7.670000E 00	8.670000E 00	9.335000E 00	9.623000E 00	9.923000E 00	1.021100E 01	1.052300E 01

TABLE A-III (Concluded)

5.977000E 00	9.340000E 00	1.025100E 01	1.084700E 01	1.103900E 01	1.121900E 01	1.137500E 01	1.153100E 01
7.680000E 00	1.050000E 01	1.128000E 01	1.165100E 01	1.175900E 01	1.181900E 01	1.187900E 01	1.190300E 01
8.689000E 00	1.127000E 01	1.178300E 01	1.192700E 01	1.197500E 01	1.199900E 01	1.199900E 01	1.199900E 01
9.234000E 00	1.150000E 01	1.197500E 01	1.199900E 01	1.199900E 01	1.199900E 01	1.199900E 01	1.199900E 01
9.253000E 00	1.150000E 01	1.197500E 01	1.199900E 01	1.199900E 01	1.199900E 01	1.199900E 01	1.199900E 01
9.253000E 00	1.150000E 01	1.197500E 01	1.199900E 01	1.199900E 01	1.199900E 01	1.199900E 01	1.199900E 01
9.253000E 00	1.150000E 01	1.196300E 01	1.199900E 01	1.199900E 01	1.199900E 01	1.199900E 01	1.199900E 01
8.892000E 00	1.130000E 01	1.184300E 01	1.199900E 01	1.199900E 01	1.199900E 01	1.199900E 01	1.199900E 01
7.911000E 00	1.072000E 01	1.147200E 01	1.191500E 01	1.199900E 01	1.199900E 01	1.199900E 01	1.199900E 01
6.523000E 00	9.680000E 00	1.062200E 01	1.148300E 01	1.175900E 01	1.189100E 01	1.197500E 01	1.199900E 01
4.923000E 00	8.100000E 00	9.197000E 00	1.041500E 01	1.112300E 01	1.153100E 01	1.181900E 01	1.197500E 01
3.183000E 00	6.290000E 00	7.245000E 00	8.711000E 00	9.899000E 00	1.076300E 01	1.139900E 01	1.178300E 01
1.721000E 00	4.300000E 00	5.113000E 00	6.395000E 00	7.895000E 00	9.455000E 00	1.057100E 01	1.126700E 01
7.120000E-01	2.430000E 00	2.934000E 00	3.768000E 00	5.100000E 00	7.367000E 00	9.179000E 00	1.024700E 01
3.890000E-01	1.640000E 00	1.976000E 00	2.484000E 00	3.504000E 00	5.988000E 00	8.159000E 00	9.467000E 00
2.130000E-01	9.200000E-01	1.066000E 00	1.284000E 00	1.968000E 00	4.416000E 00	6.863000E 00	8.447000E 00
1.300000E-01	2.600000E-01	2.630000E-01	2.880000E-01	5.160000E-01	2.736000E 00	5.328000E 00	7.067000E 00
.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00	1.067000E 00	3.432000E 00	5.256000E 00
.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00	6.400000E-01	2.840000E 00	4.640000E 00
.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00	1.900000E-01	2.100000E 00	3.850000E 00
.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00	1.080000E 00	2.720000E 00
.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00

TABLE A-IV

CURVES OF FORM FOR THE SERIES 60, C_B = .75

CALCULATIONS FOR THE CURVES OF FORM AND BONJEAN CURVES

SHIP NO.913

R. A. YAGLE, H. C. KIM

BASIC DIMENSIONS

THE LENGTH BETWEEN PERPENDICULARS IS 600.000 FEET

THE MOLDED HALF BEAM IS 44.446 FEET

THERE ARE 5 DIFFERENT STATION SPACINGS ALONG THE SHIP

THERE ARE 2 DIFFERENT WATERLINE SPACINGS UP THE SHIP

MIDSHIP IS LOCATED AT STATION 14

CALCULATED ON 8/22/62

TABLE A-IV (Continued)

WATERPLANE CALCULATIONS
SHIP NO.913

CF IS IN FEET FORWARD (+) OR AFT (-) OF MIDSHIPS

WATERLINE	WP AREAS	CF (FROM MID.)	TONS PER INCH	WP COEFF.	TRANSV. I. COEFF.	LONG. I. COEFF.
.000	26734	17.023	63.651	.5012	.25225	.27579
4.445	36571	15.531	87.075	.6857	.51491	.45339
8.889	38867	14.583	92.540	.7287	.56734	.50267
17.776	40711	11.030	96.931	.7633	.63793	.55398
26.664	42213	5.667	100.508	.7915	.67385	.60447
35.551	44256	-3.783	105.372	.8298	.71136	.68810
44.438	46301	-11.690	110.242	.8681	.75479	.77451
53.325	47863	-14.604	113.959	.8974	.79467	.84030

MOLDED DISPLACEMENTS
SHIP NO.913

ALL VALUES ARE IN LONG TONS

WATERLINE	DISP. SALT WATER	DISP. FRESH WATER
4.445	4099	3985
8.889	8969	8720
17.776	19150	18618
26.664	29685	28860
35.551	40652	39522
44.438	52149	50700
53.325	64114	62333

TABLE A-IV (Continued)

LONGITUDINAL AND VERTICAL CENTERS OF BUOYANCY
SHIP NO.913

VCB IS IN FEET ABOVE THE BASELINE

WATERLINE	VCB	LCB
4.445	2.465	16.141
8.889	4.699	15.546
17.776	9.271	14.186
26.664	13.873	12.160
35.551	18.536	9.207
44.438	23.274	5.438
53.325	28.055	1.896

TRANSVERSE AND LONGITUDINAL METACENTRIC HEIGHTS
SHIP NO.913

ALL VALUES ARE IN FEET ABOVE THE BASE LINE

WATERLINE	KM TRANS.	KM LONG.
4.445	64.212	3078.071
8.889	62.307	2315.640
17.776	40.048	1209.296
26.664	35.438	867.028
35.551	35.169	698.310
44.438	36.962	626.498
53.325	39.869	580.319

TABLE A-IV (Continued)

MOMENT TO TRIM ONE INCH AND
CHANGES IN DISPLACEMENT FOR A ONE INCH TRIM AFT
SHIP NO.913

THE MOMENTS ARE IN FOOT LONG TONS
THE CHANGE IN DISP. IS IN LONG TONS

WATERLINE	MOM. TO TRIM 1 IN.	CHANGE IN DISP.
4.445	1751.115	-2.254
8.889	3191.681	-2.249
17.776	3517.479	-1.782
26.664	3838.045	-.949
35.551	4369.076	.664
44.438	4917.749	2.148
53.325	5335.454	2.774

BLOCK, PRISMATIC, MIDSHIP, AND VERTICAL PRISMATIC COEFFICIENTS
SHIP NO.913

WATERLINE	BLOCK	PRISMATIC	MIDSHIP	VERTICAL PRISMATIC
4.445	.6052	.6697	.9038	.8827
8.889	.6621	.6955	.9520	.9086
17.776	.7069	.7223	.9786	.9261
26.664	.7306	.7411	.9858	.9231
35.551	.7504	.7585	.9893	.9043
44.438	.7701	.7767	.9915	.8871
53.325	.7890	.7946	.9929	.8792

TABLE A-IV (Continued)

SECTICNAL AREAS FRCM BCNJEAN CURVES
SHIP NC.913

LOCATICN CF STATICNS

STATION	CISTANCE FROM STA. 0
C	.000
1	2.176
2	4.352
3	19.352
4	34.352
5	49.352
6	64.352
7	94.352
8	124.352
9	154.352
10	184.352
11	214.352
12	244.352
13	274.352
14	304.352
15	334.352
16	364.352
17	394.352
18	424.352
19	454.352
2C	484.352
21	514.352
22	544.352
23	559.352
24	574.352
25	589.352
26	604.352
27	608.495
28	612.637
29	616.780
3C	620.923

TABLE A-IV (Continued)

SECTIONAL AREAS

STATION	WATERLINES 4.445	8.889	17.776	26.664	35.551	44.438	53.325
	AREAS (SQ. FT.)						
0	.000	.000	.000	.000	.000	.000	.000
1	.000	.000	.000	.000	.000	.000	13.225
2	.000	.000	.000	.000	.000	8.226	41.807
3	22.564	64.098	162.141	267.533	380.807	508.110	668.348
4	54.608	148.123	362.205	586.505	821.126	1073.378	1364.008
5	90.060	233.185	557.150	900.061	1255.891	1632.071	2045.825
6	129.339	320.776	748.142	1202.444	1673.785	2165.794	2689.421
7	209.705	486.953	1084.063	1711.321	2355.850	3014.884	3691.069
8	276.846	613.964	1324.946	2053.580	2793.805	3543.213	4300.213
9	326.168	701.005	1472.515	2248.680	3028.913	3812.632	4599.461
10	351.312	742.911	1535.223	2325.623	3115.626	3905.630	4695.633
11	357.079	752.287	1546.451	2336.454	3126.457	3916.461	4706.464
12	357.079	752.287	1546.451	2336.454	3126.457	3916.461	4706.464
13	357.079	752.287	1546.451	2336.454	3126.457	3916.461	4706.464
14	357.079	752.287	1546.451	2336.454	3126.457	3916.461	4706.464
15	357.079	752.287	1546.451	2336.454	3126.457	3916.461	4706.464
16	353.635	747.589	1542.052	2332.124	3122.127	3912.130	4702.134
17	336.819	721.323	1507.036	2296.817	3087.021	3877.025	4667.028
18	304.402	666.538	1421.544	2200.528	2985.501	3774.049	4564.317
19	249.019	562.469	1251.483	1989.407	2752.484	3529.115	4315.474
20	187.916	440.644	1016.992	1668.457	2374.725	3118.315	3887.100
21	123.971	304.786	732.825	1247.169	1852.108	2531.419	3264.142
22	68.392	176.928	436.043	769.930	1220.143	1796.939	2459.666
23	44.825	119.317	296.470	531.159	883.529	1387.330	1994.697
24	24.043	65.167	162.484	295.860	538.658	951.757	1485.985
25	6.704	16.424	37.517	70.674	192.470	494.850	933.277
26	.000	.000	.000	.000	37.850	203.732	513.142
27	.000	.000	.000	.000	27.772	167.427	447.531
28	.000	.000	.000	.000	9.522	95.643	316.128
29	.000	.000	.000	.000	.000	40.733	181.552
30	.000	.000	.000	.000	.000	.000	.000

TABLE A-IV (Continued)

SHIP NO. 913

INPUT VALUES READ WERE

LBP = 168.000000, BE = 12.445000, INCH = 18, LAMBDA = 42.857140

NEL = 5, NBV = 2, OST = 14

L(1)...L(5)

1.218500E 00	1.801850E 01	1.524185E 02	1.692185E 02	1.738585E 02

LN(1)...LN(5)

2	4	16	4	4

D(1)...D(2)

2.489000E 00	1.493100E 01

VN(1)...VN(2)

2	5

CFS(0,0)...CFS(30,7)

.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00
.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00	5.000000E-01
.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00	3.110000E-01	7.720000E-01
2.110000E-01	1.110000E 00	1.406000E 00	1.593000E 00	1.717000E 00	1.854000E 00	2.190000E 00	2.925000E 00
6.730000E-01	2.550000E 00	3.124000E 00	3.435000E 00	3.609000E 00	3.783000E 00	4.206000E 00	5.015000E 00
1.386000E 00	3.980000E 00	4.729000E 00	5.264000E 00	5.488000E 00	5.725000E 00	6.160000E 00	6.932000E 00
2.360000E 00	5.420000E 00	6.272000E 00	6.969000E 00	7.280000E 00	7.566000E 00	7.952000E 00	8.587000E 00
4.680000E 00	8.100000E 00	8.935000E 00	9.670000E 00	1.003000E 01	1.025400E 01	1.051600E 01	1.079000E 01
7.030000E 00	1.004000E 01	1.082700E 01	1.133700E 01	1.157400E 01	1.173500E 01	1.187200E 01	1.197200E 01

TABLE A-IV (Concluded)

8.868000E 00	1.136000E 01	1.193400E 01	1.217100E 01	1.225800E 01	1.232000E 01	1.237000E 01	1.242000E 01
9.832000E 00	1.200000E 01	1.237000E 01	1.244500E 01	1.244500E 01	1.244500E 01	1.244500E 01	1.244500E 01
1.004300E 01	1.215000E 01	1.244500E 01	1.244500E 01	1.244500E 01	1.244500E 01	1.244500E 01	1.244500E 01
1.004300E 01	1.215000E 01	1.244500E 01	1.244500E 01	1.244500E 01	1.244500E 01	1.244500E 01	1.244500E 01
1.004300E 01	1.215000E 01	1.244500E 01	1.244500E 01	1.244500E 01	1.244500E 01	1.244500E 01	1.244500E 01
1.004300E 01	1.215000E 01	1.244500E 01	1.244500E 01	1.244500E 01	1.244500E 01	1.244500E 01	1.244500E 01
1.004300E 01	1.215000E 01	1.244500E 01	1.244500E 01	1.244500E 01	1.244500E 01	1.244500E 01	1.244500E 01
9.892000E 00	1.208000E 01	1.243200E 01	1.244500E 01	1.244500E 01	1.244500E 01	1.244500E 01	1.244500E 01
9.179000E 00	1.170000E 01	1.218300E 01	1.240700E 01	1.244500E 01	1.244500E 01	1.244500E 01	1.244500E 01
7.874000E 00	1.090000E 01	1.151100E 01	1.214600E 01	1.232000E 01	1.239500E 01	1.244500E 01	1.244500E 01
6.146000E 00	9.200000E 00	1.020500E 01	1.130000E 01	1.186000E 01	1.213400E 01	1.232000E 01	1.244500E 01
4.218000E 00	7.280000E 00	8.301000E 00	9.719000E 00	1.074000E 01	1.146200E 01	1.192200E 01	1.228300E 01
2.430000E 00	5.090000E 00	6.011000E 00	7.367000E 00	8.861000E 00	1.016700E 01	1.118800E 01	1.183500E 01
1.055000E 00	3.020000E 00	3.584000E 00	4.542000E 00	6.073000E 00	8.213000E 00	9.881000E 00	1.088900E 01
5.830000E-01	2.060000E 00	2.452000E 00	3.099000E 00	4.405000E 00	6.894000E 00	8.898000E 00	1.010500E 01
2.810000E-01	1.130000E 00	1.357000E 00	1.680000E 00	2.626000E 00	5.314000E 00	7.641000E 00	9.035000E 00
1.210000E-01	2.800000E-01	3.110000E-01	3.480000E-01	7.590000E-01	3.460000E 00	6.048000E 00	7.591000E 00
.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00	1.431000E 00	3.982000E 00	5.613000E 00
.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00	1.050000E 00	3.600000E 00	5.040000E 00
.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00	3.600000E-01	2.680000E 00	4.120000E 00
.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00	1.540000E 00	2.860000E 00
.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00

TABLE A-V

CURVES OF FORM FOR THE SERIES 60, $C_B = .80$

CALCULATIONS FOR THE CURVES OF FORM AND BONJEAN CURVES

SHIP NO.932

R. A. YAGLE, H. C. KIM

BASIC DIMENSIONS

THE LENGTH BETWEEN PERPENDICULARS IS 600.000 FEET

THE MOLDED HALF BEAM IS 46.154 FEET

THERE ARE 5 DIFFERENT STATION SPACINGS ALONG THE SHIP

THERE ARE 2 DIFFERENT WATERLINE SPACINGS UP THE SHIP

MIDSHIP IS LOCATED AT STATION 14

CALCULATED ON 8/22/62

TABLE A-V (Continued)

WATERPLANE CALCULATIONS
SHIP NO.932

CF IS IN FEET FORWARD (+) OR AFT (-) OF MIDSHIPS

WATERLINE	WP AREAS	CF (FROM MID.)	TONS PER INCH	WP COEFF.	TRANSV. I. COEFF.	LONG. I. COEFF.
.000	32140	23.576	76.523	.5803	.34[illegible]48	.35700
4.616	41220	21.491	98.144	.7443	.59963	.53233
9.232	43573	20.374	102.556	.7777	.65327	.57987
18.465	44870	17.108	106.833	.8102	.70209	.63474
27.698	46371	11.968	110.408	.8373	.73866	.68834
36.931	48471	2.357	115.408	.8752	.77548	.77998
46.164	5[illegible]331	-4.953	119.835	.9088	.81523	.86215
55.396	51655	-7.496	122.987	.9327	.85086	.91897

MOLDED DISPLACEMENTS
SHIP NO.932

ALL VALUES ARE IN LONG TONS

WATERLINE	DISP. SALT WATER	DISP. FRESH WATER
4.616	4917	4780
9.232	10555	10262
18.465	22211	21594
27.698	34252	33300
36.931	46748 ✓	45450
46.164	59785	58124
55.396	73249	71214

TABLE A-V (Continued)

LONGITUDINAL AND VERTICAL CENTERS OF BUOYANCY
SHIP NO.932

VCB IS IN FEET ABOVE THE BASELINE

WATERLINE	VCB	LCB
4.616	2.514	22.347
9.232	4.826	21.570
18.465	9.554	20.144
27.698	14.316	18.222
36.931	19.140	15.346
46.164	24.031	11.673
55.396	28.949	8.314

TRANSVERSE AND LONGITUDINAL METACENTRIC HEIGHTS
SHIP NO.932

ALL VALUES ARE IN FEET ABOVE THE BASE LINE

WATERLINE	KM TRANS.	KM LONG.
4.616	80.317	3449.201
9.232	68.656	2399.014
18.465	42.601	1248.936
27.698	37.347	894.048
36.931	36.894	718.138
46.164	38.606	643.369
55.396	41.454	587.708

TABLE A-V (Continued)

MOMENT TO TRIM ONE INCH AND
CHANGES IN DISPLACEMENT FOR A ONE INCH TRIM AFT
SHIP NO.932

THE MOMENTS ARE IN FOOT LONG TONS
THE CHANGE IN DISP. IS IN LONG TONS

WATERLINE	MOM. TO TRIM 1 IN.	CHANGE IN DISP.
4.616	2353.837	-3.515
9.232	3823.271	-3.482
18.465	4185.048	-3.046
27.698	4538.449	-2.202
36.931	5142.671	-.453
46.164	5684.491	.989
55.396	6059.123	1.536

BLOCK, PRISMATIC, MIDSHIP, AND VERTICAL PRISMATIC COEFFICIENTS
SHIP NO.932

WATERLINE	BLOCK	PRISMATIC	MIDSHIP	VERTICAL PRISMATIC
4.616	.6732	.7221	.9322	.9045
9.232	.7225	.7451	.9697	.9290
18.465	.7601	.7711	.9857	.9383
27.698	.7815	.7890	.9905	.9334
36.931	.7999	.8057	.9929	.9140
46.164	.8184	.8231	.9943	.9006
55.396	.8356	.8396	.9952	.8959

TABLE A-V (Continued)

SECTIONAL AREAS FROM BONJEAN CURVES
SHIP NO.932

LOCATION OF STATIONS

STATION	DISTANCE FROM STA. 0
0	.000
1	2.176
2	4.352
3	19.352
4	34.352
5	49.352
6	64.352
7	94.352
8	124.352
9	154.352
10	184.352
11	214.352
12	244.352
13	274.352
14	304.352
15	334.352
16	364.352
17	394.352
18	424.352
19	454.352
20	484.352
21	514.352
22	544.352
23	559.352
24	574.352
25	589.352
26	604.352
27	608.495
28	612.637
29	616.780
30	620.923

TABLE A-V (Continued)

SECTIONAL AREAS

WATERLINES

AREAS (SQ. FT.)

STATION	4.616	9.232	18.465	27.698	36.931	46.164	55.396
0	.000	.000	.000	.000	.000	.000	.000
1	.000	.000	.000	.000	.000	.000	21.433
2	.000	.000	.000	.000	.000	15.635	75.440
3	54.165	148.802	364.870	589.564	824.485	1080.961	1375.582
4	112.236	288.175	689.208	1113.787	1551.562	2008.984	2504.305
5	167.173	406.324	937.947	1507.840	2097.193	2705.061	3345.606
6	214.765	502.481	1140.334	1817.157	2516.018	3232.751	3973.902
7	304.183	667.022	1434.720	2233.071	3046.618	3875.250	4710.175
8	366.326	774.082	1606.948	2450.089	3299.770	4151.886	5004.215
9	393.237	819.166	1670.453	2521.926	3374.327	4226.586	5078.844
10	397.207	826.365	1680.133	2532.391	3384.649	4236.908	5089.166
11	397.207	826.365	1680.133	2532.391	3384.649	4236.908	5089.166
12	397.207	826.365	1680.133	2532.391	3384.649	4236.908	5089.166
13	397.207	826.365	1680.133	2532.391	3384.649	4236.908	5089.166
14	397.207	826.365	1680.133	2532.391	3384.649	4236.908	5089.166
15	397.207	826.365	1680.133	2532.391	3384.649	4236.908	5089.166
16	395.724	824.122	1678.477	2530.735	3382.994	4235.252	5087.510
17	385.522	809.736	1664.310	2516.854	3369.113	4221.371	5073.629
18	353.308	755.332	1592.258	2442.401	3295.297	4147.555	4999.813
19	300.514	662.571	1441.803	2259.702	3095.974	3941.978	4792.802
20	232.653	531.958	1199.594	1939.788	2726.307	3541.145	4376.773
21	159.312	379.408	893.075	1498.937	2189.181	2943.280	3745.070
22	91.621	228.594	555.083	972.617	1513.305	2173.514	2913.847
23	63.243	159.243	384.375	688.125	1127.510	1719.166	2407.706
24	34.483	88.519	214.317	392.791	709.055	1214.065	1828.868
25	8.740	21.948	51.017	93.840	257.075	646.492	1160.323
26	.000	.000	.000	.000	56.799	279.080	646.987
27	.000	.000	.000	.000	36.547	205.761	524.569
28	.000	.000	.000	.000	12.915	119.313	379.207
29	.000	.000	.000	.000	.000	52.210	229.172
30	.000	.000	.000	.000	.000	.000	.000

TABLE A-V (Continued)

SHIP NO. 932

INPUT VALUES READ WERE

LBP = 168.000000, BE = 12.923000, INCH = 18, LAMBDA = 42.857140

NBL = 5, NBV = 2, OST = 14

L(1)...L(5)

1.218500E 00	1.801850E 01	1.524185E 02	1.692185E 02	1.738585E 02

LN(1)...LN(5)

2	4	16	4	4

D(1)...D(2)

2.585000E 00	1.551100E 01

VN(1)...VN(2)

2	5

OFS(0,0)...OFS(30,7)

.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00
.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00	7.800000E-01
.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00	5.690000E-01	1.266000E 00
5.820000E-01	2.480000E 00	3.037000E 00	3.334000E 00	3.450000E 00	3.696000E 00	4.110000E 00	4.885000E 00
1.758000E 00	4.710000E 00	5.622000E 00	6.281000E 00	6.526000E 00	6.746000E 00	7.158000E 00	7.922000E 00
3.142000E 00	6.580000E 00	7.508000E 00	8.400000E 00	8.801000E 00	9.046000E 00	9.408000E 00	1.006700E 01
4.647000E 00	8.000000E 00	9.072000E 00	1.000200E 01	1.044200E 01	1.072600E 01	1.101000E 01	1.150100E 01
7.646000E 00	1.046000E 01	1.120400E 01	1.190200E 01	1.225100E 01	1.245800E 01	1.260000E 01	1.271600E 01
9.919000E 00	1.202000E 01	1.243200E 01	1.270300E 01	1.284500E 01	1.291000E 01	1.292300E 01	1.292300E 01

TABLE A-V (Concluded)

1.087500E 01	1.270000E 01	1.285800E 01	1.289700E 01	1.292300E 01	1.292300E 01	1.292300E 01	1.292300E 01
1.098500E 01	1.282000E 01	1.292300E 01	1.292300E 01	1.292300E 01	1.292300E 01	1.292300E 01	1.292300E 01
1.098500E 01	1.282000E 01	1.292300E 01	1.292300E 01	1.292300E 01	1.292300E 01	1.292300E 01	1.292300E 01
1.098500E 01	1.282000E 01	1.292300E 01	1.292300E 01	1.292300E 01	1.292300E 01	1.292300E 01	1.292300E 01
1.098500E 01	1.282000E 01	1.292300E 01	1.292300E 01	1.292300E 01	1.292300E 01	1.292300E 01	1.292300E 01
1.098500E 01	1.282000E 01	1.292300E 01	1.292300E 01	1.292300E 01	1.292300E 01	1.292300E 01	1.292300E 01
1.098500E 01	1.282000E 01	1.292300E 01	1.292300E 01	1.292300E 01	1.292300E 01	1.292300E 01	1.292300E 01
1.094100E 01	1.278000E 01	1.292300E 01	1.292300E 01	1.292300E 01	1.292300E 01	1.292300E 01	1.292300E 01
1.052400E 01	1.257000E 01	1.287100E 01	1.292300E 01	1.292300E 01	1.292300E 01	1.292300E 01	1.292300E 01
9.425000E 00	1.173000E 01	1.238000E 01	1.280700E 01	1.292300E 01	1.292300E 01	1.292300E 01	1.292300E 01
7.536000E 00	1.037000E 01	1.126900E 01	1.216100E 01	1.256100E 01	1.276800E 01	1.287100E 01	1.292300E 01
5.339000E 00	8.420000E 00	9.382000E 00	1.073900E 01	1.163100E 01	1.216100E 01	1.252200E 01	1.280700E 01
3.317000E 00	6.050000E 00	7.004000E 00	8.477000E 00	9.886000E 00	1.099700E 01	1.182500E 01	1.245800E 01
1.604000E 00	3.710000E 00	4.355000E 00	5.518000E 00	7.237000E 00	9.201000E 00	1.075200E 01	1.157900E 01
1.011000E 00	2.620000E 00	2.998000E 00	3.851000E 00	5.492000E 00	7.973000E 00	9.873000E 00	1.085500E 01
4.940000E-01	1.470000E 00	1.680000E 00	2.145000E 00	3.399000E 00	6.500000E 00	8.658000E 00	9.821000E 00
1.430000E-01	3.600000E-01	4.140000E-01	4.520000E-01	9.180000E-01	4.562000E 00	7.056000E 00	8.322000E 00
.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00	2.067000E 00	4.782000E 00	6.151000E 00
.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00	1.330000E 00	4.030000E 00	5.420000E 00
.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00	4.700000E-01	3.120000E 00	4.560000E 00
.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00	1.900000E 00	3.400000E 00
.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00

TABLE A-VI

CURVES OF FORM FOR THE U OF M "V" SERIES, $C_B = .60$

CALCULATIONS FOR THE CURVES OF FORM AND BONJEAN CURVES

SHIP NO.924

R. A. YAGLE, H. C. KIM

BASIC DIMENSIONS

THE LENGTH BETWEEN PERPENDICULARS IS 600.000 FEET

THE MOLDED HALF BEAM IS 40.000 FEET

THERE ARE 5 DIFFERENT STATION SPACINGS ALONG THE SHIP

THERE ARE 2 DIFFERENT WATERLINE SPACINGS UP THE SHIP

MIDSHIP IS LOCATED AT STATION 14

CALCULATED ON 8/22/62

TABLE A-VI (Continued)

WATERPLANE CALCULATICNS
SHIP NC.924

CF IS IN FEET FCRWARD (+) CR AFT (-) OF MIDSHIPS

WATERLINE	WP AREAS	CF (FRCM MID.)	TCNS PER INCH	WP COEFF.	TRANSV. I. COEFF.	LCNG. I. COEFF.
.CCO	13372	-12.640	31.839	.2786	.08410	.10113
4.CCO	22024	-9.874	52.439	.4588	.24833	.22037
8.COO	25438	-7.580	60.567	.5300	.33836	.27478
15.999	29533	-5.125	7C.316	.6153	.44799	.35610
23.997	32918	-7.760	78.377	.6858	.53529	.44423
31.996	37208	-18.338	88.590	.7752	.63599	.59496
39.994	4C272	-21.917	95.885	.8390	.71196	.72093
47.993	42364	-20.704	10C.868	.8826	.76876	.81418

ALL VALUES ARE IN LONG TONS

WATERLINE	DISP. SALT WATER	DISP. FRESH WATER
4.CCC	2073	2015
8.CCO	4835	4700
15.999	11185	10875
23.997	18335	17825
31.996	26331	25599
39.994	35207	34229
47.993	44668	43427

TABLE A-VI (Continued)

LONGITUDINAL AND VERTICAL CENTERS OF BUOYANCY
SHIP NO.924

VCB IS IN FEET ABOVE THE BASELINE

WATERLINE	VCB	LCB
4.000	2.303	-10.992
8.000	4.380	-9.706
15.999	8.712	-7.693
23.997	13.132	-7.077
31.996	17.679	-8.764
39.994	22.302	-11.756
47.993	26.899	-13.856

TRANSVERSE AND LONGITUDINAL METACENTRIC HEIGHTS
SHIP NO.924

ALL VALUES ARE IN FEET ABOVE THE BASE LINE

WATERLINE	KM TRANS.	KM LONG.
4.000	31.983	2009.810
8.000	41.951	1879.764
15.999	30.838	1019.450
23.997	31.004	812.211
31.996	32.548	711.810
39.994	35.515	717.572
47.993	38.557	690.932

TABLE A-VI (Continued)

MOMENT TO TRIM ONE INCH AND
CHANGES IN DISPLACEMENT FOR A ONE INCH TRIM AFT
SHIP NO.924

THE MOMENTS ARE IN FOOT LONG TONS
THE CHANGE IN DISP. IS IN LONG TONS

WATERLINE	MOM. TO TRIM 1 IN.	CHANGE IN DISP.
4.000	577.871	.863
8.000	1570.185	.765
15.999	2034.846	.601
23.997	2538.450	1.014
31.996	3399.776	2.708
39.994	4119.590	3.503
47.993	4652.459	3.481

BLOCK, PRISMATIC, MIDSHIP, AND VERTICAL PRISMATIC COEFFICIENTS
SHIP NO.924

WATERLINE	BLOCK	PRISMATIC	MIDSHIP	VERTICAL PRISMATIC
4.000	.3778	.4527	.8345	.8234
8.000	.4407	.4878	.9033	.8315
15.999	.5098	.5350	.9529	.8286
23.997	.5571	.5749	.9690	.8124
31.996	.6001	.6144	.9767	.7741
39.994	.6419	.6541	.9814	.7651
47.993	.6787	.6894	.9845	.7689

TABLE A-VI (Continued)

SECTIONAL AREAS FRCM BCNJEAN CURVES
SHIP NC.924

LCCATICN CF STATICNS

STATICN	CISTANCE FROM STA. C
C	.OCC
1	2.176
2	4.352
3	19.352
4	34.352
5	49.352
6	64.352
7	94.352
8	124.352
9	154.352
1C	184.352
11	214.352
12	244.352
13	274.352
14	3C4.352
15	334.352
16	364.352
17	394.352
18	424.352
19	454.352
2C	484.352
21	514.352
22	544.352
23	559.352
24	574.352
25	589.352
26	6C4.352
27	6C8.495
28	612.637
29	616.780
3C	620.923

TABLE A-VI (Continued)

SECTIONAL AREAS

STATION	WATERLINES 4.000	8.000	15.999	23.997	31.996	39.994	47.993
	AREAS (SQ. FT.)						
0	.000	.000	.000	.000	.000	.000	.000
1	.000	.000	.000	.000	.000	4.999	38.469
2	.000	.000	.000	.000	.000	13.807	66.607
3	2.310	7.333	26.346	54.150	97.333	174.176	298.297
4	5.000	16.000	55.548	118.299	211.092	348.829	542.651
5	9.119	28.667	94.019	195.906	339.547	537.083	797.751
6	13.976	44.095	141.537	286.368	484.380	742.572	1067.038
7	26.857	83.429	255.745	501.130	814.788	1194.768	1639.783
8	51.333	148.381	418.044	770.648	1196.143	1685.294	2227.626
9	88.405	233.809	608.152	1065.499	1585.215	2155.828	2762.528
10	133.762	329.524	804.007	1348.862	1936.233	2554.884	3191.175
11	183.714	426.857	983.135	1587.218	2212.392	2849.730	3490.125
12	228.809	510.476	1118.238	1749.649	2388.320	3028.477	3668.305
13	255.690	558.381	1192.329	1832.191	2472.252	3112.081	3751.909
14	267.048	578.095	1219.639	1860.272	2500.100	3139.929	3779.757
15	260.548	567.524	1206.115	1847.272	2487.101	3126.929	3766.757
16	240.738	535.333	1164.551	1806.175	2446.141	3085.970	3725.798
17	207.786	477.428	1075.382	1706.840	2347.750	2987.669	3627.497
18	162.595	388.476	925.900	1526.269	2159.132	2800.526	3440.355
19	119.690	295.524	735.632	1271.775	1879.333	2517.814	3158.447
20	83.095	209.905	533.781	967.989	1519.415	2141.494	2782.165
21	51.571	134.286	346.278	650.271	1100.667	1673.231	2285.550
22	27.738	75.333	193.978	361.996	663.561	1141.713	1688.996
23	17.524	49.905	129.795	237.728	463.211	875.852	1375.334
24	10.095	28.762	72.944	130.791	280.955	612.943	1056.863
25	3.286	8.000	18.411	32.932	112.346	351.589	721.237
26	.000	.000	.000	.000	27.614	161.066	428.114
27	.000	.000	.000	.000	16.664	116.884	343.843
28	.000	.000	.000	.000	7.856	78.272	263.524
29	.000	.000	.000	.000	.000	27.852	132.405
30	.000	.000	.000	.000	.000	.000	.000

TABLE A-VI (Continued)

```
$    DATA

MAP
    ERROR  00000*     SYSTEM 00000*     SPRINT 00000*     SKIP6  00000*     SCARDS 00000*     SPEEK  00000*
    .EXIT  00000*     FTRAP  00000*     (MAIN) 10000      .IOH   47637*     .READ  52066*     .PRINT 52231*
    .PRSLT 52314*     .PCCMT 53012*     .01301 53031*     ZERO   53123*     .03311 53157*     .ERR   53174*
    BNECD  53256*     (PRCG) 53301      (SUBT) 74712      (ERAS) 77776
21401 LOCS. CAN BE SAFELY USED IN EXPANDING PRCG. (OCTAL)


                                   SHIP NC. 924

INPUT VALUES READ WERE

        LBP =     168.000000,        BE =     11.200000,        INCH =          18,        LAMBDA =     42.857140

        NBL =              5,        NBV =             2,        OST =           14

              L(1)...L(5)

 1.218500E 00   1.801850E 01   1.524185E 02   1.692185E 02   1.738585E 02

              LN(1)...LN(5)

            2              4             16              4              4

              D(1)...D(2)

 2.240000E 00   1.343800E 01

              VN(1)...VN(2)

            2              5

              CFS(0,0)...CFS(30,7)

  .000000E 00    .000000E 00    .000000E 00    .000000E 00    .000000E 00    .000000E 00    .000000E 00    .000000E 00
  .000000E 00    .000000E 00    .000000E 00    .000000E 00    .000000E 00    .000000E 00   2.100000E-01   1.070000E 00
  .000000E 00    .000000E 00    .000000E 00    .000000E 00    .000000E 00    .000000E 00   5.800000E-01   1.290000E 00
 5.000000E-02   1.220000E-01   2.400000E-01   4.100000E-01   5.600000E-01   1.000000E 00   1.740000E 00   2.630000E 00
 7.000000E-02   2.820000E-01   4.900000E-01   8.900000E-01   1.310000E 00   1.980000E 00   2.880000E 00   3.930000E 00
10.000000E-02   5.200000E-01   8.300000E-01   1.460000E 00   2.110000E 00   2.950000E 00   4.000000E 00   5.140000E 00
```

TABLE A-VI (Concluded)

1.500000E-01	8.000000E-01	1.280000E 00	2.100000E 00	2.980000E 00	3.970000E 00	5.090000E 00	6.280000E 00
2.400000E-01	1.550000E 00	2.320000E 00	3.670000E 00	4.900000E 00	6.070000E 00	7.230000E 00	8.340000E 00
6.500000E-01	2.770000E 00	3.850000E 00	5.470000E 00	6.830000E 00	8.040000E 00	9.050000E 00	9.910000E 00
1.600000E 00	4.340000E 00	5.590000E 00	7.350000E 00	8.570000E 00	9.590000E 00	1.034000E 01	1.086000E 01
3.030000E 00	6.050000E 00	7.370000E 00	9.020000E 00	9.930000E 00	1.059000E 01	1.103000E 01	1.119900E 01
4.810000E 00	7.760000E 00	8.970000E 00	1.025000E 01	1.077000E 01	1.108000E 01	1.119900E 01	1.119900E 01
6.450000E 00	9.250000E 00	1.015000E 01	1.089000E 01	1.113000E 01	1.119900E 01	1.119900E 01	1.119900E 01
7.510000E 00	1.008000E 01	1.038000E 01	1.115000E 01	1.119900E 01	1.119900E 01	1.119900E 01	1.119900E 01
7.950000E 00	1.043000E 01	1.103000E 01	1.119900E 01	1.119900E 01	1.119900E 01	1.119900E 01	1.119900E 01
7.670000E 00	1.025000E 01	1.092000E 01	1.119900E 01	1.119900E 01	1.119900E 01	1.119900E 01	1.119900E 01
6.820000E 00	9.700000E 00	1.059000E 01	1.117000E 01	1.119900E 01	1.119900E 01	1.119900E 01	1.119900E 01
5.500000E 00	8.700000E 00	9.830000E 00	1.082000E 01	1.118000E 01	1.119900E 01	1.119900E 01	1.119900E 01
4.060000E 00	7.060000E 00	8.490000E 00	1.003000E 01	1.087000E 01	1.119900E 01	1.119900E 01	1.119900E 01
2.750000E 00	5.400000E 00	6.680000E 00	8.580000E 00	1.013000E 01	1.103000E 01	1.119900E 01	1.119900E 01
1.730000E 00	3.880000E 00	4.790000E 00	6.530000E 00	8.750000E 00	1.047000E 01	1.113000E 01	1.119900E 01
9.400000E-01	2.510000E 00	3.120000E 00	4.290000E 00	6.530000E 00	9.330000E 00	1.043000E 01	1.090000E 01
3.800000E-01	1.440000E 00	1.770000E 00	2.370000E 00	3.620000E 00	7.350000E 00	9.050000E 00	9.980000E 00
1.800000E-01	9.600000E-01	1.220000E 00	1.530000E 00	2.330000E 00	6.050000E 00	8.120000E 00	9.200000E 00
9.000000E-02	5.600000E-01	6.900000E-01	8.300000E-01	1.240000E 00	4.490000E 00	7.010000E 00	8.330000E 00
7.000000E-02	1.540000E-01	1.700000E-01	1.900000E-01	3.400000E-01	2.830000E 00	5.590000E 00	7.150000E 00
.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00	1.160000E 00	3.750000E 00	5.450000E 00
.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00	7.000000E-01	3.090000E 00	4.730000E 00
.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00	3.300000E-01	2.430000E 00	3.960000E 00
.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00	1.170000E 00	2.520000E 00
.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00

TABLE A-VII

CURVES OF FORM FOR THE U OF M "V" SERIES, C_B = .65

CALCULATICNS FCR THE CURVES CF FCRM AND BONJEAN CURVES

SHIP NC.959

R. A. YAGLE, H. C. KIM

BASIC CIMENSIONS

THE LENGTH BETWEEN PERPENDICULARS IS 600.000 FEET

THE MCLDEC HALF BEAM IS 41.379 FEET

THERE ARE 5 CIFFERENT STATION SPACINGS ALONG THE SHIP

THERE ARE 2 CIFFERENT WATERLINE SPACINGS UP THE SHIP

MIDSHIP IS LCCATED AT STATION 14

CALCULATED ON 8/22/62

TABLE A-VII (Continued)

WATERPLANE CALCULATIONS
SHIP NO.959

CF IS IN FEET FORWARD (+) OR AFT (-) OF MIDSHIPS

WATERLINE	WP AREAS	CF (FROM MID.)	TONS PER INCH	WP COEFF.	TRANSV. I. COEFF.	LONG. I. COEFF.
.000	16163	-5.363	38.484	.3255	.11612	.12691
4.137	25611	-3.819	60.978	.5158	.31231	.26486
8.275	29207	-1.669	69.540	.5882	.40992	.32822
16.551	33053	-.356	78.699	.6657	.51086	.41475
24.828	36027	-2.066	85.778	.7256	.58741	.49844
33.104	40055	-12.774	95.369	.8067	.67777	.64847
41.381	42712	-16.989	101.695	.8602	.74364	.76002
49.657	44456	-17.178	105.847	.8953	.78700	.84088

MOLDED DISPLACEMENTS
SHIP NO.959

ALL VALUES ARE IN LONG TONS

WATERLINE	DISP. SALT WATER	DISP. FRESH WATER
4.137	2527	2457
8.275	5825	5663
16.551	13274	12905
24.828	21459	20863
33.104	30433	29588
41.381	40246	39128
49.657	50571	49166

TABLE A-VII (Continued)

LONGITUDINAL AND VERTICAL CENTERS OF BUOYANCY
SHIP NO.959

VCB IS IN FEET ABOVE THE BASELINE

WATERLINE	VCB	LCB
4.137	2.363	-4.551
8.275	4.503	-3.563
16.551	8.934	-1.981
24.828	13.431	-1.609
33.104	18.042	-3.169
41.381	22.726	-6.141
49.657	27.381	-8.437

TRANSVERSE AND LONGITUDINAL METACENTRIC HEIGHTS
SHIP NO.959

ALL VALUES ARE IN FEET ABOVE THE BASE LINE

WATERLINE	KM TRANS.	KM LONG.
4.137	39.573	2140.037
8.275	47.918	1939.860
16.551	33.939	1061.329
24.828	32.707	836.034
33.104	33.670	715.106
41.381	36.362	708.493
49.657	39.287	667.019

TABLE A-VII (Continued)

MOMENT TO TRIM ONE INCH AND
CHANGES IN DISPLACEMENT FOR A ONE INCH TRIM AFT
SHIP NO.959

THE MOMENTS ARE IN FOOT LONG TONS
THE CHANGE IN DISP. IS IN LONG TONS

WATERLINE	MOM. TO TRIM 1 IN.	CHANGE IN DISP.
4.137	750.204	.388
8.275	1940.177	.193
16.551	2451.663	.047
24.828	2946.390	.295
33.104	3833.279	2.030
41.381	4492.625	2.879
49.657	4970.606	3.030

BLOCK, PRISMATIC, MIDSHIP, AND VERTICAL PRISMATIC COEFFICIENTS
SHIP NO.959

WATERLINE	BLOCK	PRISMATIC	MIDSHIP	VERTICAL PRISMATIC
4.137	.4305	.5040	.8542	.8346
8.275	.4961	.5408	.9174	.8435
16.551	.5653	.5878	.9617	.8492
24.828	.6092	.6251	.9747	.8397
33.104	.6480	.6606	.9810	.8033
41.381	.6856	.6961	.9848	.7970
49.657	.7178	.7271	.9873	.8018

TABLE A-VII (Continued)

SECTIONAL AREAS FROM BONJEAN CURVES
SHIP NO.959

LOCATION OF STATIONS

STATION	DISTANCE FROM STA. 0
0	.000
1	2.176
2	4.352
3	19.352
4	34.352
5	49.352
6	64.352
7	94.352
8	124.352
9	154.352
10	184.352
11	214.352
12	244.352
13	274.352
14	304.352
15	334.352
16	364.352
17	394.352
18	424.352
19	454.352
20	484.352
21	514.352
22	544.352
23	559.352
24	574.352
25	589.352
26	604.352
27	608.495
28	612.637
29	616.780
30	620.923

TABLE A-VII (Continued)

SECTIONAL AREAS

STATION	4.137	8.275	16.551	24.828	33.104	41.381	49.657
	WATERLINES						
	AREAS (SQ. FT.)						
0	.000	.000	.000	.000	.000	.000	.000
1	.000	.000	.000	.000	.000	.000	9.360
2	.000	.000	.000	.000	1.232	13.301	50.939
3	4.852	13.102	40.480	83.902	149.581	245.844	387.873
4	7.339	23.249	81.316	174.278	308.868	499.226	752.613
5	12.457	41.316	139.971	289.331	496.113	770.270	1111.889
6	19.569	63.580	208.254	421.668	705.303	1066.559	1502.106
7	43.365	129.878	389.229	734.129	1155.784	1646.901	2193.736
8	87.429	235.443	620.307	1092.004	1631.026	2215.943	2825.561
9	136.636	344.792	850.249	1426.199	2043.384	2683.428	3335.708
10	190.680	452.879	1050.723	1693.121	2355.600	3028.602	3706.451
11	240.931	544.810	1199.281	1873.091	2554.280	3239.203	3924.215
12	275.533	600.863	1282.245	1967.908	2652.969	3337.903	4022.836
13	290.773	624.782	1313.199	1998.743	2683.676	3368.610	4053.543
14	292.474	628.260	1317.231	2002.623	2687.556	3372.489	4057.423
15	288.783	622.930	1310.263	1995.915	2680.849	3365.782	4050.716
16	274.257	599.346	1278.810	1965.744	2650.677	3335.610	4020.544
17	243.640	546.977	1203.150	1882.979	2569.164	3254.097	3939.031
18	200.890	466.060	1070.597	1729.075	2409.890	3095.838	3780.772
19	147.989	360.613	877.400	1482.121	2143.201	2827.434	3512.939
20	102.196	258.062	656.325	1161.827	1768.864	2440.486	3127.360
21	61.619	166.682	440.036	807.303	1311.968	1939.400	2601.819
22	32.297	91.281	245.841	460.161	811.722	1349.227	1962.540
23	21.481	61.609	162.254	300.884	564.991	1027.929	1583.760
24	11.009	31.741	84.651	156.676	331.909	695.580	1165.286
25	4.103	9.477	21.051	38.480	132.911	389.687	761.214
26	.000	.000	.000	.000	32.515	179.126	452.051
27	.000	.000	.000	.000	14.287	115.722	349.925
28	.000	.000	.000	.000	5.912	74.488	257.062
29	.000	.000	.000	.000	.000	30.051	143.655
30	.000	.000	.000	.000	.000	.000	.000

TABLE A-VII (Continued)

SHIP NO. 959

INPUT VALUES READ WERE

LBP = 168.000000, BE = 11.586000, INCH = 18, LAMBDA = 42.857140

NBL = 5, NBV = 2, OST = 14

L(1)...L(5)

1.218500E 00	1.801850E 01	1.524185E 02	1.692185E 02	1.738585E 02

LN(1)...LN(5)

2	4	16	4	4

D(1)...D(2)

2.317000E 00	1.390400E 01

VN(1)...VN(2)

2	5

OFS(0,0)...OFS(30,7)

.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00
.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00	3.800000E-01
.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00	5.000000E-02	4.100000E-01	8.820000E-01
1.100000E-01	2.200000E-01	3.400000E-01	5.880000E-01	8.900000E-01	1.360000E 00	1.910000E 00	2.982000E 00
1.100000E-01	3.900000E-01	6.900000E-01	1.270000E 00	1.880000E 00	2.710000E 00	3.768000E 00	4.800000E 00
1.100000E-01	7.160000E-01	1.220000E 00	2.086000E 00	2.970000E 00	4.060000E 00	5.228000E 00	6.316000E 00
1.640000E-01	1.118000E 00	1.818000E 00	3.036000E 00	4.170000E 00	5.450000E 00	6.780000E 00	7.924000E 00
5.600000E-01	2.286000E 00	3.480000E 00	5.130000E 00	6.490000E 00	7.760000E 00	8.820000E 00	9.640000E 00
1.440000E 00	4.230000E 00	5.540000E 00	7.286000E 00	8.600000E 00	9.580000E 00	1.013800E 01	1.044400E 01

TABLE A-VII (Concluded)

2.760000E 00	6.160000E 00	7.600000E 00	9.220000E 00	1.015000E 01	1.066000E 01	1.095800E 01	1.108000E 01
4.510000E 00	8.028000E 00	9.350000E 00	1.055600E 01	1.106000E 01	1.131000E 01	1.143800E 01	1.148000E 01
6.330000E 00	9.596000E 00	1.059000E 01	1.125800E 01	1.146000E 01	1.157000E 01	1.158600E 01	1.158600E 01
7.860000E 00	1.047600E 01	1.123000E 01	1.156000E 01	1.158600E 01	1.158600E 01	1.158600E 01	1.158600E 01
8.536000E 00	1.085600E 01	1.146200E 01	1.158600E 01	1.158600E 01	1.158600E 01	1.158600E 01	1.158600E 01
8.562000E 00	1.093000E 01	1.149300E 01	1.158600E 01	1.158600E 01	1.158600E 01	1.158600E 01	1.158600E 01
8.370000E 00	1.085600E 01	1.144000E 01	1.158600E 01	1.158600E 01	1.158600E 01	1.158600E 01	1.158600E 01
7.740000E 00	1.048000E 01	1.118000E 01	1.158600E 01	1.158600E 01	1.158600E 01	1.158600E 01	1.158600E 01
6.550000E 00	9.596000E 00	1.059000E 01	1.133200E 01	1.158600E 01	1.158600E 01	1.158600E 01	1.158600E 01
5.080000E 00	8.200000E 00	9.430000E 00	1.077400E 01	1.138000E 01	1.158600E 01	1.158600E 01	1.158600E 01
3.356000E 00	6.380000E 00	7.730000E 00	9.560000E 00	1.080000E 01	1.147000E 01	1.158600E 01	1.158600E 01
2.118000E 00	4.582000E 00	5.750000E 00	7.620000E 00	9.480000E 00	1.100000E 01	1.156200E 01	1.158600E 01
9.500000E-01	3.020000E 00	3.890000E 00	5.280000E 00	7.240000E 00	9.960000E 00	1.098400E 01	1.131000E 01
3.700000E-01	1.680000E 00	2.176000E 00	3.020000E 00	4.304000E 00	7.990000E 00	9.898000E 00	1.066000E 01
1.880000E-01	1.154000E 00	1.450000E 00	1.930000E 00	2.830000E 00	6.580000E 00	8.832000E 00	9.750000E 00
1.020000E-01	5.500000E-01	7.600000E-01	1.010000E 00	1.460000E 00	4.980000E 00	7.088000E 00	8.724000E 00
9.400000E-02	1.720000E-01	1.800000E-01	2.160000E-01	3.980000E-01	3.240000E 00	5.320000E 00	7.219000E 00
.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00	1.320000E 00	3.840000E 00	5.200000E 00
.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00	5.800000E-01	3.190000E 00	4.520000E 00
.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00	2.400000E-01	2.400000E 00	3.620000E 00
.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00	1.220000E 00	2.660000E 00
.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00

TABLE A-VIII

CURVES OF FORM FOR THE U OF M "V" SERIES, C_B = .70

CALCULATIONS FOR THE CURVES OF FORM AND BONJEAN CURVES

SHIP NO.958

R. A. YAGLE, H. C. KIM

BASIC DIMENSIONS

THE LENGTH BETWEEN PERPENDICULARS IS 600.000 FEET

THE MOLDED HALF BEAM IS 42.854 FEET

THERE ARE 5 DIFFERENT STATION SPACINGS ALONG THE SHIP

THERE ARE 2 DIFFERENT WATERLINE SPACINGS UP THE SHIP

MIDSHIP IS LOCATED AT STATION 14

CALCULATED ON 8/22/62

TABLE A-VIII (Continued)

WATERPLANE CALCULATIONS
SHIP NO.958

CF IS IN FEET FORWARD (+) OR AFT (-) OF MIDSHIPS

WATERLINE	WP AREAS	CF (FROM MID.)	TONS PER INCH	WP COEFF.	TRANSV. I. COEFF.	LONG. I. COEFF.
.000	19736	2.022	46.990	.3838	.16135	.16410
4.286	30712	3.352	73.123	.5972	.42515	.33306
8.571	33305	4.369	79.298	.6477	.49374	.38926
17.144	36734	5.295	87.463	.7143	.57681	.47737
25.717	39486	3.662	94.014	.7678	.64422	.56278
34.290	43350	-6.004	103.215	.8430	.73242	.71230
42.863	46354	-10.203	109.653	.8956	.80512	.82675
51.436	47633	-9.993	113.531	.9272	.84880	.90239

MOLDED DISPLACEMENTS
SHIP NO.958

ALL VALUES ARE IN LONG TONS

WATERLINE	DISP. SALT WATER	DISP. FRESH WATER
4.286	3174	3086
8.571	7179	6980
17.144	15805	15366
25.717	25153	24454
34.290	35275	34295
42.863	46248	44964
51.436	57750	56146

TABLE A-VIII (Continued)

LONGITUDINAL AND VERTICAL CENTERS OF BUOYANCY
SHIP NO.958

VCB IS IN FEET ABOVE THE BASELINE

WATERLINE	VCB	LCB
4.286	2.467	2.821
8.571	4.616	3.395
17.144	9.126	4.240
25.717	13.711	4.395
34.290	18.414	2.938
42.863	23.201	.221
51.436	27.971	-1.902

TRANSVERSE AND LONGITUDINAL METACENTRIC HEIGHTS
SHIP NO.958

ALL VALUES ARE IN FEET ABOVE THE BASE LINE

WATERLINE	KM TRANS.	KM LONG.
4.286	48.185	2281.226
8.571	57.880	2049.548
17.144	37.053	1094.741
25.717	34.337	850.251
34.290	34.839	721.626
42.863	37.445	702.072
51.436	40.510	658.990

TABLE A-VIII (Continued)

MOMENT TO TRIM ONE INCH AND
CHANGES IN DISPLACEMENT FOR A ONE INCH TRIM AFT
SHIP NO.958

THE MOMENTS ARE IN FOOT LONG TONS
THE CHANGE IN DISP. IS IN LONG TONS

WATERLINE	MOM. TO TRIM 1 IN.	CHANGE IN DISP.
4.286	1004.601	-.408
8.571	2383.016	-.577
17.144	2922.440	-.772
25.717	3445.276	-.574
34.290	4360.640	1.033
42.863	5061.311	1.865
51.436	5524.385	1.891

BLOCK, PRISMATIC, MIDSHIP, AND VERTICAL PRISMATIC COEFFICIENTS
SHIP NO.958

WATERLINE	BLOCK	PRISMATIC	MIDSHIP	VERTICAL PRISMATIC
4.286	.5041	.5659	.8907	.8441
8.571	.5701	.6017	.9474	.8862
17.144	.6274	.6434	.9752	.8783
25.717	.6657	.6768	.9835	.8670
34.290	.7002	.7089	.9877	.8306
42.863	.7344	.7417	.9901	.8200
51.436	.7642	.7705	.9918	.8241

TABLE A-VIII (Continued)

SECTIONAL AREAS FRCM BCNJEAN CURVES
SHIP NC.958

LCCATICN CF STATICNS

STATICN	DISTANCE FROM STA. 0
0	.000
1	2.176
2	4.352
3	19.352
4	34.352
5	49.352
6	64.352
7	94.352
8	124.352
9	154.352
1C	184.352
11	214.352
12	244.352
13	274.352
14	304.352
15	334.352
16	364.352
17	394.352
18	424.352
19	454.352
2C	484.352
21	514.352
22	544.352
23	559.352
24	574.352
25	589.352
26	604.352
27	608.495
28	612.637
29	616.780
3C	620.923

TABLE A-VIII (Continued)

SECTIONAL AREAS

STATION	4.286	8.571	17.144	25.717	34.290	42.863	51.436
	WATERLINES						
	AREAS (SQ. FT.)						
0	.000	.000	.000	.000	.000	.000	.000
1	.000	.000	.000	.000	.000	.000	27.811
2	.000	.000	.000	.000	.000	18.115	86.137
3	5.168	16.673	56.789	123.484	225.695	378.118	590.807
4	9.758	32.786	119.434	265.938	476.381	753.213	1101.587
5	19.747	64.337	216.513	454.410	774.259	1173.458	1650.170
6	34.135	106.459	332.050	658.176	1079.215	1588.637	2174.500
7	85.324	235.133	623.377	1107.284	1669.980	2303.462	2993.046
8	152.360	383.439	919.551	1528.020	2184.966	2882.939	3609.31[illegible]
9	214.069	507.500	1148.391	1836.057	2550.819	3282.650	4018.114
10	272.997	610.847	1316.408	2045.203	2778.667	3513.723	4248.478
11	310.319	672.173	1401.319	2137.396	2872.151	3606.906	4341.661
12	326.084	695.132	1432.120	2166.997	2901.752	3636.507	4371.262
13	327.168	696.000	1432.987	2167.864	2902.619	3637.374	4372.130
14	327.168	696.000	1432.987	2167.864	2902.619	3637.374	4372.130
15	326.786	695.694	1432.681	2167.558	2902.313	3637.068	4371.823
16	316.569	680.969	1413.789	2149.356	2884.111	3618.865	4353.621
17	291.597	642.796	1363.026	2097.204	2832.362	3567.117	4301.872
18	247.525	564.633	1245.973	1964.460	2695.168	3430.734	4165.490
19	189.837	451.306	1049.476	1726.068	2443.815	3179.514	3914.514
20	132.324	329.500	805.677	1389.958	2059.559	2779.959	3517.567
21	82.594	216.296	549.939	988.889	1565.516	2253.385	2984.961
22	42.467	116.969	307.152	568.726	982.468	1585.732	2262.579
23	25.635	72.010	196.175	370.745	690.645	1225.223	1841.857
24	14.064	38.459	101.892	193.081	404.187	828.492	1355.774
25	4.439	12.857	29.629	51.112	155.976	450.719	867.013
26	.000	.000	.000	.000	29.086	168.242	446.350
27	.000	.000	.000	.000	9.695	97.924	329.698
28	.000	.000	.000	.000	4.848	62.102	236.009
29	.000	.000	.000	.000	.000	21.432	121.806
30	.000	.000	.000	.000	.000	.000	.000

TABLE A-VIII (Continued)

SHIP NC. 958

INPUT VALUES READ WERE

LBP = 168.000000, BE = 11.999000, INCH = 16, LAMBDA = 42.857140

NBL = 5, NBV = 2, OST = 14

	L(1)...L(5)			
1.218500E 06	1.801850E 01	1.524185E 02	1.692185E 02	1.738585E 02

	LN(1)...LN(5)			
2	4	16	4	4

	D(1)...D(2)
2.400000E 00	1.440200E 01

	VN(1)...VN(2)
2	5

CFS(0,0)...CFS(30,7)

.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00
.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00	1.090000E 00
.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00	7.100000E-01	1.530000E 00
4.600000E-02	2.820000E-01	4.600000E-01	8.600000E-01	1.330000E 00	2.050000E 00	2.960000E 00	4.010000E 00
9.300000E-02	5.400000E-01	9.600000E-01	1.890000E 00	2.910000E 00	3.970000E 00	5.080000E 00	6.320000E 00
1.570000E-01	1.092000E 00	1.780000E 00	3.200000E 00	4.560000E 00	5.880000E 00	7.150000E 00	8.420000E 00
3.050000E-01	1.832000E 00	2.800000E 00	4.520000E 00	6.110000E 00	7.630000E 00	8.980000E 00	1.012000E 01
1.147000E 00	4.134000E 00	5.360000E 00	7.180000E 00	8.550000E 00	9.810000E 00	1.084000E 01	1.153000E 01
2.757000E 00	6.730000E 00	7.900000E 00	9.430000E 00	1.034000E 01	1.109000E 01	1.168000E 01	1.199900E 01

TABLE A-VIII (Concluded)

4.635000E 00	8.820000E 00	9.820000E 00	1.091000E 01	1.146000E 01	1.186000E 01	1.199900E 01	1.199900E 01
6.883000E 00	1.046500E 01	1.112000E 01	1.178000E 01	1.194000E 01	1.199900E 01	1.199900E 01	1.199900E 01
8.373000E 00	1.144000E 01	1.174000E 01	1.199900E 01	1.199900E 01	1.199900E 01	1.199900E 01	1.199900E 01
9.168000E 00	1.174500E 01	1.197500E 01	1.199900E 01	1.199900E 01	1.199900E 01	1.199900E 01	1.199900E 01
9.253000E 00	1.174500E 01	1.197500E 01	1.199900E 01	1.199900E 01	1.199900E 01	1.199900E 01	1.199900E 01
9.253000E 00	1.174500E 01	1.197500E 01	1.199900E 01	1.199900E 01	1.199900E 01	1.199900E 01	1.199900E 01
9.223000E 00	1.174500E 01	1.197500E 01	1.199900E 01	1.199900E 01	1.199900E 01	1.199900E 01	1.199900E 01
8.715000E 00	1.154500E 01	1.184000E 01	1.199900E 01	1.199900E 01	1.199900E 01	1.199900E 01	1.199900E 01
7.586000E 00	1.098200E 01	1.148000E 01	1.192000E 01	1.199900E 01	1.199900E 01	1.199900E 01	1.199900E 01
6.014000E 00	9.690000E 00	1.056000E 01	1.152000E 01	1.184000E 01	1.199900E 01	1.199900E 01	1.199900E 01
4.200000E 00	7.787000E 00	8.880000E 00	1.054000E 01	1.143000E 01	1.195100E 01	1.199900E 01	1.199900E 01
2.563000E 00	5.732000E 00	6.800000E 00	8.700000E 00	1.034000E 01	1.144000E 01	1.199900E 01	1.199900E 01
1.341000E 00	3.794000E 00	4.680000E 00	6.150000E 00	8.300000E 00	1.055000E 01	1.174000E 01	1.199900E 01
5.270000E-01	2.079000E 00	2.620000E 00	3.560000E 00	5.080000E 00	8.800000E 00	1.058000E 01	1.136000E 01
3.150000E-01	1.268000E 00	1.670000E 00	2.360000E 00	3.400000E 00	7.570000E 00	9.520000E 00	1.045000E 01
1.850000E-01	6.810000E-01	8.600000E-01	1.210000E 00	1.810000E 00	5.620000E 00	8.000000E 00	8.990000E 00
.000000E 00	2.500000E-01	2.600000E-01	2.900000E-01	4.300000E-01	3.480000E 00	6.070000E 00	7.300000E 00
.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00	1.140000E 00	3.630000E 00	5.320000E 00
.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00	3.800000E-01	2.850000E 00	4.600000E 00
.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00	1.900000E-01	1.940000E 00	3.750000E 00
.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00	8.400000E-01	2.590000E 00
.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00

TABLE A-IX

CURVES OF FORM FOR THE U OF M "V" SERIES, C_B = .75

CALCULATIONS FOR THE CURVES OF FORM AND BONJEAN CURVES

SHIP NO. 952 E

R. A. YAGLE, H. C. KIM

BASIC DIMENSIONS

THE LENGTH BETWEEN PERPENDICULARS IS 600.000 FEET

THE MOLDED HALF BEAM IS 44.446 FEET

THERE ARE 5 DIFFERENT STATION SPACINGS ALONG THE SHIP

THERE ARE 2 DIFFERENT WATERLINE SPACINGS UP THE SHIP

MIDSHIP IS LOCATED AT STATION 14

CALCULATED ON 6/19/1962

TABLE A-IX (Continued)

WATERPLANE CALCULATIONS
SHIP NO. 952 E

CF IS IN FEET FORWARD (+) OR AFT (-) OF MIDSHIPS

WATERLINE	WP AREAS	CF (FROM MID.)	TONS PER INCH	WP COEFF.	TRANSV. I. COEFF.	LONG. I. COEFF.
.000	23861	6.389	56.813	.4474	.21630	.21523
4.445	34504	9.189	82.151	.6469	.48446	.39160
8.889	37497	10.427	89.279	.7033	.56796	.45727
17.776	40773	12.081	97.078	.7645	.64827	.55048
26.664	43564	9.309	103.724	.8168	.71654	.64528
35.551	47033	-.708	111.984	.8818	.79321	.78974
44.438	49167	-5.690	117.064	.9218	.84603	.88586
53.325	50275	-6.376	119.702	.9426	.87264	.93953

MOLDED DISPLACEMENTS
SHIP NO. 952 E

ALL VALUES ARE IN LONG TONS

WATERLINE	DISP. SALT WATER	DISP. FRESH WATER
4.445	3787	3682
8.889	8439	8205
17.776	18453	17940
26.664	29171	28360
35.551	40658	39529
44.438	52900	51431
53.325	65547	63726

TABLE A-IX (Continued)

LONGITUDINAL AND VERTICAL CENTERS OF BUOYANCY
SHIP NO. 952 E

VCB IS IN FEET ABOVE THE BASELINE

WATERLINE	VCB	LCB
4.445	2.497	8.126
8.889	4.749	9.087
17.776	9.403	10.305
26.664	14.126	10.565
35.551	18.944	8.925
44.438	23.816	6.032
53.325	28.651	3.639

TRANSVERSE AND LONGITUDINAL METACENTRIC HEIGHTS
SHIP NO. 952 E

ALL VALUES ARE IN FEET ABOVE THE BASE LINE.

WATERLINE	KM TRANS.	KM LONG.
4.445	59.814	2600.841
8.889	62.352	2126.037
17.776	40.289	1142.277
26.664	36.426	876.847
35.551	36.629	744.496
44.438	38.863	706.311
53.325	41.603	646.505

TABLE A-IX (Continued)

MOMENT TO TRIM ONE INCH AND
CHANGES IN DISPLACEMENT FOR A ONE INCH TRIM AFT
SHIP NO. 952 E

THE MOMENTS ARE IN FOOT LONG TONS
THE CHANGE IN DISP. IS IN LONG TONS

WATERLINE	MOM. TO TRIM 1 IN.	CHANGE IN DISP.
4.445	1366.592	-1.258
8.889	2903.456	-1.552
17.776	3495.290	-1.955
26.664	4097.198	-1.609
35.551	5014.462	.132
44.438	5624.781	1.110
53.325	5965.558	1.272

BLOCK, PRISMATIC, MIDSHIP, AND VERTICAL PRISMATIC COEFFICIENTS
SHIP NO. 952 E

WATERLINE	BLOCK	PRISMATIC	MIDSHIP	VERTICAL PRISMATIC
4.445	.5591	.6229	.8975	.8643
8.889	.6230	.6559	.9498	.8862
17.776	.6812	.6969	.9775	.8911
26.664	.7179	.7289	.9850	.8790
35.551	.7505	.7591	.9887	.8511
44.438	.7812	.7883	.9910	.8474
53.325	.8066	.8127	.9925	.8557

TABLE A-IX (Continued)

SECTIONAL AREAS FROM BONJEAN CURVES
SHIP NO. 952 E

LOCATION OF STATIONS

STATION	DISTANCE FROM STA. 0
0	.000
1	2.176
2	4.352
3	19.352
4	34.352
5	49.352
6	64.352
7	94.352
8	124.352
9	154.352
10	184.352
11	214.352
12	244.352
13	274.352
14	304.352
15	334.352
16	364.352
17	394.352
18	424.352
19	454.352
20	484.352
21	514.352
22	544.352
23	559.352
24	574.352
25	589.352
26	604.352
27	608.495
28	612.637
29	616.780
30	620.923

TABLE A-IX (Continued)

SECTIONAL AREAS

STATION	4.445	8.889	17.776	26.664	35.551	44.438	53.325
	WATERLINES — AREAS (SQ. FT.)						
0	.000	.000	.000	.000	.000	.000	.000
1	.000	.000	.000	.000	.000	.000	22.747
2	.000	.000	.000	.000	.000	15.341	77.974
3	6.297	23.070	90.369	206.525	375.380	634.118	897.606
4	21.324	65.823	223.250	471.561	810.436	1232.893	1721.897
5	38.626	122.333	387.392	771.972	1266.161	1845.095	2483.699
6	64.553	192.601	566.491	1072.423	1681.721	2364.232	3093.824
7	138.472	364.249	925.897	1600.156	2337.259	3110.652	3898.646
8	221.227	533.569	1243.053	2008.405	2794.705	3584.524	4374.660
9	295.675	665.003	1445.163	2238.050	3028.079	3818.083	4608.086
10	340.174	734.636	1529.592	2319.728	3109.731	3899.734	4689.738
11	354.606	750.562	1544.585	2334.588	3124.591	3914.595	4704.598
12	354.606	750.562	1544.585	2334.588	3124.591	3914.595	4704.598
13	354.606	750.562	1544.585	2334.588	3124.591	3914.595	4704.598
14	354.606	750.562	1544.585	2334.588	3124.591	3914.595	4704.598
15	354.606	750.562	1544.585	2334.588	3124.591	3914.595	4704.598
16	352.291	745.853	1539.963	2330.099	3120.102	3910.106	4700.109
17	336.735	721.725	1510.333	2301.527	3091.530	3881.533	4671.537
18	297.315	655.902	1418.429	2201.873	2990.316	3780.663	4570.667
19	231.121	540.976	1233.745	1981.429	2758.022	3545.833	4336.363
20	164.028	399.171	969.283	1642.061	2387.417	3167.792	3956.527
21	103.973	264.774	667.513	1194.181	1863.891	2616.547	3393.009
22	58.733	152.388	390.152	721.092	1225.331	1905.198	2635.319
23	38.838	102.438	259.302	485.607	879.392	1483.823	2159.669
24	20.477	56.510	144.182	268.602	538.390	1034.272	1625.690
25	5.979	14.181	31.955	59.674	196.473	551.429	1027.737
26	.000	.000	.000	.000	46.023	235.509	565.074
27	.000	.000	.000	.000	27.772	167.427	447.796
28	.000	.000	.000	.000	9.257	97.335	321.683
29	.000	.000	.000	.000	.000	40.468	181.128
30	.000	.000	.000	.000	.000	.000	.000

TABLE A-IX (Continued)

```
$    DATA

MAP
    ERROR  00000*     SYSTEM 00000*     SPRINT 00000*     SKIP6  00000*     SCARDS 00000*     SPEEK  00000*
    .EXIT  00000*     FTRAP  00000*     (MAIN) 10000      .IOH   47637*     .READ  52066*     .PRINT 52231*
    .PRSLT 52314*     .PCOMT 53012*     .01301 53031*     ZERO   53123*     .03311 53157*     .ERR   53174*
    BNBCD  53256*     (PROG) 53301      (SUBT) 74712      (ERAS) 77776
21401 LOCS. CAN BE SAFELY USED IN EXPANDING PROG. (OCTAL)


                                  SHIP NO.  952 E


INPUT VALUES READ WERE
        LBP =     168.000000,          BE =     12.445000,          INCH =        18,     LAMBDA =     42.857140
        NBL =              5,         NBV =             2,           OST =        14

            L(1)...L(5)
  1.218500E 00  1.801850E 01  1.524185E 02  1.692185E 02  1.738585E 02

            LN(1)...LN(5)
        2            4           16            4            4

            D(1)...D(2)
  2.489000E 00  1.493100E 01

            VN(1)...VN(2)
        2            5

            OFS(0,0)...OFS(30,7)
   .000000E 00   .000000E 00   .000000E 00   .000000E 00   .000000E 00   .000000E 00   .000000E 00   .000000E 00
   .000000E 00   .000000E 00   .000000E 00   .000000E 00   .000000E 00   .000000E 00   .000000E 00  8.600000E-01
   .000000E 00   .000000E 00   .000000E 00   .000000E 00   .000000E 00   .000000E 00  5.800000E-01  1.440000E 00
  4.000000E-02  3.600000E-01  7.000000E-01  1.440000E 00  2.220000E 00  3.120000E 00  4.100000E 00  5.160000E 00
  3.000000E-01  1.040000E 00  1.760000E 00  3.200000E 00  4.620000E 00  6.060000E 00  7.200000E 00  8.180000E 00
  3.200000E-01  2.000000E 00  3.160000E 00  5.120000E 00  6.980000E 00  8.540000E 00  9.620000E 00  1.046000E 01
```

TABLE A-IX (Concluded)

6.600000E-01	3.220000E 00	4.660000E 00	7.000000E 00	8.860000E 00	1.026000E 01	1.116000E 01	1.178000E 01
2.140000E 00	6.160000E 00	7.640000E 00	9.900000E 00	1.118000E 01	1.196000E 01	1.234000E 01	1.244000E 01
4.580000E 00	8.860000E 00	1.032000E 01	1.170000E 01	1.228000E 01	1.242000E 01	1.244500E 01	1.244500E 01
7.220000E 00	1.094000E 01	1.186000E 01	1.244000E 01	1.244500E 01	1.244500E 01	1.244500E 01	1.244500E 01
9.000000E 00	1.200000E 01	1.242000E 01	1.244500E 01	1.244500E 01	1.244500E 01	1.244500E 01	1.244500E 01
9.840000E 00	1.216000E 01	1.244500E 01	1.244500E 01	1.244500E 01	1.244500E 01	1.244500E 01	1.244500E 01
9.840000E 00	1.216000E 01	1.244500E 01	1.244500E 01	1.244500E 01	1.244500E 01	1.244500E 01	1.244500E 01
9.840000E 00	1.216000E 01	1.244500E 01	1.244500E 01	1.244500E 01	1.244500E 01	1.244500E 01	1.244500E 01
9.840000E 00	1.216000E 01	1.244500E 01	1.244500E 01	1.244500E 01	1.244500E 01	1.244500E 01	1.244500E 01
9.840000E 00	1.216000E 01	1.244500E 01	1.244500E 01	1.244500E 01	1.244500E 01	1.244500E 01	1.244500E 01
9.820000E 00	1.206000E 01	1.242000E 01	1.244500E 01	1.244500E 01	1.244500E 01	1.244500E 01	1.244500E 01
9.180000E 00	1.170000E 01	1.222000E 01	1.244500E 01	1.244500E 01	1.244500E 01	1.244500E 01	1.244500E 01
7.700000E 00	1.068000E 01	1.156000E 01	1.222000E 01	1.238000E 01	1.244500E 01	1.244500E 01	1.244500E 01
5.200000E 00	8.940000E 00	1.016000E 01	1.140000E 01	1.206000E 01	1.234500E 01	1.244500E 01	1.244500E 01
3.460000E 00	6.580000E 00	7.940000E 00	9.840000E 00	1.128000E 01	1.210000E 01	1.240000E 01	1.240000E 01
1.880000E 00	4.420000E 00	5.460000E 00	7.140000E 00	9.580000E 00	1.142000E 01	1.210000E 01	1.228000E 01
9.800000E-01	2.560000E 00	3.180000E 00	4.280000E 00	6.300000E 00	9.840000E 00	1.122000E 01	1.162000E 01
5.400000E-01	1.760000E 00	2.100000E 00	2.860000E 00	4.400000E 00	8.420000E 00	1.026000E 01	1.082000E 01
2.200000E-01	9.800000E-01	1.200000E 00	1.540000E 00	2.480000E 00	6.540000E 00	8.780000E 00	9.620000E 00
1.200000E-01	2.400000E-01	2.600000E-01	3.000000E-01	6.200000E-01	4.240000E 00	6.760000E 00	8.040000E 00
.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00	1.740000E 00	4.380000E 00	5.800000E 00
.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00	1.050000E 00	3.600000E 00	5.050000E 00
.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00	3.500000E-01	2.770000E 00	4.120000E 00
.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00	1.530000E 00	2.870000E 00
.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00

TABLE A-X

CURVES OF FORM FOR THE U OF M "V" SERIES, C_B = .80

CALCULATIONS FOR THE CURVES OF FORM AND BONJEAN CURVES

SHIP NO.966

R. A. YAGLE, H. C. KIM

BASIC DIMENSIONS

THE LENGTH BETWEEN PERPENDICULARS IS 600.000 FEET

THE MOLDED HALF BEAM IS 46.155 FEET

THERE ARE 5 DIFFERENT STATION SPACINGS ALONG THE SHIP

THERE ARE 2 DIFFERENT WATERLINE SPACINGS UP THE SHIP

MIDSHIP IS LOCATED AT STATION 14

CALCULATED ON 20/3/63

TABLE A-X (Continued)

WATERPLANE CALCULATIONS
SHIP NO.966

CF IS IN FEET FORWARD (+) OR AFT (-) OF MIDSHIPS

WATERLINE	WP AREAS	CF (FROM MID.)	TONS PER INCH	WP COEFF.	TRANSV. I. COEFF.	LONG. I. COEFF.
.000	29940	15.743	71.285	.5406	.31965	.29684
4.616	39362	19.283	93.720	.7107	.57127	.47174
9.232	41862	18.908	99.672	.7558	.63586	.53624
18.465	44867	17.615	106.826	.8101	.70873	.63058
27.698	47466	13.925	113.014	.8570	.77148	.72557
36.931	50818	3.313	120.995	.9175	.84402	.87235
46.164	52701	-.534	125.479	.9515	.89112	.95916
55.396	53559	-1.660	127.521	.9670	.91093	1.00153

MOLDED DISPLACEMENTS
SHIP NO.966

ALL VALUES ARE IN LONG TONS

WATERLINE	DISP. SALT WATER	DISP. FRESH WATER
4.616	4646	4517
9.232	10079	9799
18.465	21576	20977
27.698	33764	32826
36.931	46711	45413
46.164	60397	58719
55.396	74435	72367

TABLE A-X (Continued)

LONGITUDINAL AND VERTICAL CENTERS OF BUOYANCY
SHIP NO.966

VCB IS IN FEET ABOVE THE BASELINE

WATERLINE	VCB	LCB
4.616	2.524	18.067
9.232	4.856	18.752
18.465	9.651	18.519
27.698	14.511	17.588
36.931	19.465	15.225
46.164	24.468	11.974
55.396	29.428	9.468

TRANSVERSE AND LONGITUDINAL METACENTRIC HEIGHTS
SHIP NO.966

ALL VALUES ARE IN FEET ABOVE THE BASE LINE

WATERLINE	KM TRANS.	KM LONG.
4.616	79.833	3035.637
9.232	68.549	2226.919
18.465	42.767	1189.527
27.698	38.098	901.136
36.931	38.024	756.893
46.164	40.171	710.164
55.396	42.881	641.170

TABLE A-X (Continued)

MOMENT TO TRIM ONE INCH AND
CHANGES IN DISPLACEMENT FOR A ONE INCH TRIM AFT
SHIP NO.966

THE MOMENTS ARE IN FOOT LONG TONS
THE CHANGE IN DISP. IS IN LONG TONS

WATERLINE	MOM. TO TRIM 1 IN.	CHANGE IN DISP.
4.616	1957.259	-3.012
9.232	3535.761	-3.141
18.465	4157.753	-3.136
27.698	4784.128	-2.623
36.931	5751.927	-.668
46.164	6324.291	.112
55.396	6603.683	.353

BLOCK, PRISMATIC, MIDSHIP, AND VERTICAL PRISMATIC COEFFICIENTS
SHIP NO.966

WATERLINE	BLOCK	PRISMATIC	MIDSHIP	VERTICAL PRISMATIC
4.616	.6360	.6835	.9306	.8950
9.232	.6899	.7128	.9678	.9127
18.465	.7384	.7496	.9851	.9115
27.698	.7703	.7780	.9901	.8989
36.931	.7993	.8053	.9926	.8711
46.164	.8268	.8317	.9941	.8689
55.396	.8491	.8533	.9950	.8781

TABLE A-X (Continued)

SECTIONAL AREAS FROM BONJEAN CURVES
SHIP NO.966

LOCATION OF STATIONS

STATION	DISTANCE FROM STA. 0
0	.000
1	2.176
2	4.352
3	19.352
4	34.352
5	49.352
6	64.352
7	94.352
8	124.352
9	154.352
10	184.352
11	214.352
12	244.352
13	274.352
14	304.352
15	334.352
16	364.352
17	394.352
18	424.352
19	454.352
20	484.352
21	514.352
22	544.352
23	559.352
24	574.352
25	589.352
26	604.352
27	608.495
28	612.637
29	616.780
30	620.923

TABLE A-X (Continued)

SECTIONAL AREAS

	WATERLINES						
	4.616	9.232	18.465	27.698	36.931	46.164	55.396
STATION	AREAS (SQ. FT.)						
0	.000	.000	.000	.000	.000	.000	.000
1	.000	.000	.000	.000	.000	.000	66.498
2	.000	.000	.000	.000	1.374	54.133	238.625
3	21.349	68.911	227.849	476.587	824.193	1289.133	1855.140
4	55.310	167.168	495.119	951.376	1535.958	2224.905	2964.358
5	96.168	273.447	747.842	1360.508	2083.693	2871.124	3682.241
6	140.048	379.507	981.073	1707.831	2505.978	3334.572	4172.948
7	252.125	601.848	1375.797	2200.214	3046.559	3898.988	4751.401
8	342.056	748.573	1582.974	2433.936	3286.145	4138.503	4990.788
9	391.487	815.286	1666.885	2519.683	3371.967	4224.252	5076.537
10	396.533	824.775	1679.162	2531.447	3383.732	4236.016	5088.301
11	396.533	824.775	1679.162	2531.447	3383.732	4236.016	5088.301
12	396.533	824.775	1679.162	2531.447	3383.732	4236.016	5088.301
13	396.533	824.775	1679.162	2531.447	3383.732	4236.016	5088.301
14	396.533	824.775	1679.162	2531.447	3383.732	4236.016	5088.301
15	396.533	824.775	1679.162	2531.447	3383.732	4236.016	5088.301
16	395.544	823.456	1678.136	2530.421	3382.706	4234.990	5087.275
17	384.727	808.032	1661.902	2514.591	3366.875	4219.160	5071.445
18	349.805	750.551	1590.339	2444.636	3297.050	4149.334	5001.619
19	288.669	643.612	1419.979	2246.979	3094.533	3946.303	4798.771
20	207.751	491.831	1157.075	1911.806	2725.561	3568.883	4422.301
21	133.536	328.400	823.642	1447.519	2191.643	3014.192	3860.867
22	70.752	179.917	474.929	902.114	1515.329	2284.514	3095.960
23	44.842	116.721	313.982	619.326	1124.715	1831.742	2598.674
24	23.575	60.668	163.036	335.053	695.519	1298.897	1981.799
25	5.798	13.079	30.555	67.762	255.606	707.686	1262.042
26	.000	.000	.000	.000	71.170	320.512	689.002
27	.000	.000	.000	.000	38.745	205.431	506.708
28	.000	.000	.000	.000	12.365	102.221	322.326
29	.000	.000	.000	.000	.000	30.227	149.209
30	.000	.000	.000	.000	.000	.000	.000

TABLE A-X (Continued)

```
$ DATA

MAP
    ERROR  00000*     SYSTEM 00000*     SPRINT 00000*     SKIP6  00000*     SCARDS 00000*     SPEEK  00000*
    FTRAP  00000*     (MAIN) 10000      .IOH   47637*     .ERR   52066*     .READ  52150*     .PRINT 52314*
    .PRSLT 52400*     .PCOMT 53076*     .EXIT  53115*     ATLOC  53172*     .01301 53220*     ZERO   53312*
    .03311 53346*     BNBCD  53363*     (PROG) 53406      (SUBT) 74676      (ERAS) 77776
21260 LOCS. CAN BE SAFELY USED IN EXPANDING PROG. (OCTAL)
```

SHIP NO. 966

INPUT VALUES READ WERE

```
      LBP =    168.000000,        BE =    12.923400,        INCH =         18,      LAMBDA =    42.857140
      NBL =             5,       NBV =            2,         DST =         14
```

L(1)...L(5)

1.218500E 00	1.801850E 01	1.524185E 02	1.692185E 02	1.738585E 02

LN(1)...LN(5)

2	4	16	4	4

D(1)...D(2)

2.585000E 00	1.551100E 01

VN(1)...VN(2)

2	5

OFS(0,0)...OFS(30,7)

.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00
.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00	2.420000E 00
.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00	5.000000E-02	1.840000E 00	3.780000E 00
1.600000E-01	1.090000E 00	1.750000E 00	3.070000E 00	4.490000E 00	6.080000E 00	8.090000E 00	8.870000E 00
4.900000E-01	2.700000E 00	3.920000E 00	5.930000E 00	7.900000E 00	9.820000E 00	1.094000E 01	1.137000E 01
1.040000E 00	4.470000E 00	5.960000E 00	8.280000E 00	1.024000E 01	1.159000E 01	1.216000E 01	1.238000E 01

TABLE A-X (Concluded)

1.810000E 00	6.220000E 00	7.840000E 00	1.021000E 01	1.168000E 01	1.240000E 01	1.265000E 01	1.275000E 01
5.060000E 00	9.680000E 00	1.098000E 01	1.218000E 01	1.271000E 01	1.290000E 01	1.292340E 01	1.292340E 01
8.440000E 00	1.183000E 01	1.235000E 01	1.283000E 01	1.291000E 01	1.292340E 01	1.292340E 01	1.292340E 01
1.087000E 01	1.262000E 01	1.283000E 01	1.292340E 01	1.292340E 01	1.292340E 01	1.292340E 01	1.292340E 01
1.100000E 01	1.278000E 01	1.292340E 01	1.292340E 01	1.292340E 01	1.292340E 01	1.292340E 01	1.292340E 01
1.100000E 01	1.278000E 01	1.292340E 01	1.292340E 01	1.292340E 01	1.292340E 01	1.292340E 01	1.292340E 01
1.100000E 01	1.278000E 01	1.292340E 01	1.292340E 01	1.292340E 01	1.292340E 01	1.292340E 01	1.292340E 01
1.100000E 01	1.278000E 01	1.292340E 01	1.292340E 01	1.292340E 01	1.292340E 01	1.292340E 01	1.292340E 01
1.100000E 01	1.278000E 01	1.292340E 01	1.292340E 01	1.292340E 01	1.292340E 01	1.292340E 01	1.292340E 01
1.100000E 01	1.278000E 01	1.292340E 01	1.292340E 01	1.292340E 01	1.292340E 01	1.292340E 01	1.292340E 01
1.096000E 01	1.276000E 01	1.292340E 01	1.292340E 01	1.292340E 01	1.292340E 01	1.292340E 01	1.292340E 01
1.051000E 01	1.254000E 01	1.285000E 01	1.292340E 01	1.292340E 01	1.292340E 01	1.292340E 01	1.292340E 01
9.280000E 00	1.166000E 01	1.237000E 01	1.290000E 01	1.292340E 01	1.292340E 01	1.292340E 01	1.292340E 01
7.090000E 00	1.009000E 01	1.111000E 01	1.223000E 01	1.275000E 01	1.289000E 01	1.292340E 01	1.292340E 01
4.500000E 00	7.780000E 00	9.130000E 00	1.082000E 01	1.198000E 01	1.261000E 01	1.291000E 01	1.292340E 01
2.720000E 00	5.180000E 00	6.440000E 00	8.470000E 00	1.044000E 01	1.207000E 01	1.271000E 01	1.289000E 01
1.320000E 00	2.850000E 00	3.650000E 00	5.310000E 00	7.780000E 00	1.093000E 01	1.206000E 01	1.242000E 01
7.700000E-01	1.860000E 00	2.410000E 00	3.590000E 00	5.850000E 00	9.750000E 00	1.130000E 01	1.178000E 01
4.100000E-01	9.700000E-01	1.230000E 00	1.910000E 00	3.450000E 00	7.980000E 00	9.880000E 00	1.064000E 01
1.300000E-01	2.100000E-01	2.200000E-01	3.300000E-01	8.700000E-01	5.510000E 00	7.810000E 00	8.780000E 00
.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00	2.590000E 00	4.930000E 00	6.040000E 00
.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00	1.410000E 00	3.810000E 00	5.150000E 00
.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00	4.500000E-01	2.550000E 00	4.020000E 00
.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00	1.100000E 00	2.570000E 00
.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00	.000000E 00

TABLE A-XI

NONDIMENSIONAL OFFSETS FOR THE U OF M "V" SERIES, $C_B = .60$

NON-DIMENSIONAL OFFSETS - HALF BREADTH									UM V-SERIES
STA.	TANGENT	.075 WL	.125 WL	.25 WL	.50 WL	.75 WL	1.00 WL	1.25 WL	1.50 WL	MODEL NO.:924 C_B=.60 EXT "V"
FP	0	0	0	0	0	0	0	0.0518	0.1152	
½	0.0063	0.0111	0.0150	0.0217	0.0366	0.0500	0.0893	0.1554	0.2348	
1	0.0089	0.0212	0.0268	0.0444	0.0795	0.1170	0.1768	0.2572	0.3509	
1½	0.0125	0.0372	0.0500	0.0752	0.1304	0.1884	0.2634	0.3572	0.4590	
2	0.0189	0.0574	0.0767	0.1161	0.1875	0.2661	0.3545	0.4545	0.5607	
3	0.0301	0.1158	0.1486	0.2100	0.3277	0.4375	0.5420	0.6456	0.7447	
4	0.0817	0.2186	0.2656	0.3490	0.4884	0.6099	0.7179	0.8081	0.8849	
5	0.2010	0.3675	0.4161	0.5068	0.6563	0.7652	0.8563	0.9233	0.9697	
6	0.3812	0.5377	0.5801	0.6682	0.8054	0.8867	0.9496	0.9849	1.0000	
7	0.6050	0.7099	0.7440	0.8132	0.9152	0.9617	0.9893	1.0000	1.0000	
8	0.8112	0.8197	0.8869	0.9202	0.9724	0.9938	1.0000	1.0000	1.0000	
9	0.9446	0.9627	0.9664	0.9791	0.9954	1.0000	1.0000	1.0000	1.0000	
10	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	
11	0.9648	0.9839	0.9827	0.9900	1.0000	1.0000	1.0000	1.0000	1.0000	
12	0.8579	0.9134	0.9300	0.9601	0.9983	1.0000	1.0000	1.0000	1.0000	
13	0.6918	0.7996	0.8341	0.8912	0.9661	0.9983	1.0000	1.0000	1.0000	
14	0.5106	0.6323	0.6769	0.7697	0.8956	0.9706	1.0000	1.0000	1.0000	
15	0.3460	0.4713	0.5177	0.6056	0.7661	0.9045	0.9849	1.0000	1.0000	
16	0.2176	0.3383	0.3720	0.4343	0.5831	0.7813	0.9349	0.9938	1.0000	
17	0.1182	0.2186	0.2407	0.2829	0.3831	0.5831	0.8331	0.9313	0.9733	
18	0.0478	0.1238	0.1381	0.1604	0.2116	0.3232	0.6563	0.8081	0.8911	
18½	0.0227	0.0795	0.0920	0.1106	0.1366	0.2080	0.5402	0.7250	0.8215	
19	0.0113	0.0433	0.0537	0.0625	0.0741	0.1107	0.4009	0.6259	0.7438	
19½	0.0089	0.0131	0.0140	0.0154	0.0170	0.0277	0.2527	0.4991	0.6384	
AP	0	0	0	0	0	0	0.1036	0.3348	0.4866	
MAX. B LWL	.7099	0.8867	0.934	0.9849	1.0000	1.0000	1.0000	1.0000	1.0000	

TABLE A-XII

NONDIMENSIONAL OFFSETS FOR THE U OF M "V" SERIES, C_B = .65

STA	NON-DIMENSIONAL OFFSETS - HALF BREADTH UM V-SERIES									MODEL NO.:959 C_B=65* EXT"V"
	TANGENT	.075 WL	.125 WL	.25 WL	.50 WL	.75 WL	1.00 WL	1.25 WL	1.50 WL	
FP	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0043	0.0354	0.0761	
½	0.0128	0.0172	0.0201	0.0296	0.0508	0.0768	0.1174	0.1649	0.2574	
1	0.0128	0.0269	0.0357	0.0600	0.1096	0.1623	0.2339	0.3252	0.4143	
1½	0.0128	0.0474	0.0655	0.1062	0.1800	0.2563	0.3504	0.4512	0.5451	
2	0.0192	0.0783	0.1023	0.1582	0.2620	0.3559	0.4704	0.5852	0.6839	
3	0.0654	0.1804	0.2091	0.3028	0.4428	0.5602	0.6698	0.7613	0.8320	
4	0.1678	0.3397	0.3870	0.4820	0.6286	0.7423	0.8269	0.8750	0.9014	
5	0.3224	0.5156	0.5636	0.6613	0.7958	0.8761	0.9201	0.9458	0.9563	
6	0.5267	0.6889	0.7345	0.8135	0.9111	0.9546	0.9762	0.9872	0.9909	
7	0.7393	0.8478	0.8790	0.9214	0.9717	0.9891	0.9986	1.0000	1.0000	
8	0.9180	0.9528	0.9585	0.9771	0.9978	1.0000	1.0000	1.0000	1.0000	
9	0.9977	0.9948	0.9932	0.9973	1.0000	1.0000	1.0000	1.0000	1.0000	
10	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	
11	0.9776	0.9929	0.9932	0.9954	1.0000	1.0000	1.0000	1.0000	1.0000	
12	0.9040	0.9492	0.9588	0.9728	1.0000	1.0000	1.0000	1.0000	1.0000	
13	0.7650	0.8520	0.8790	0.9214	0.9780	1.0000	1.0000	1.0000	1.0000	
14	0.5933	0.7176	0.7502	0.8205	0.9299	0.9822	1.0000	1.0000	1.0000	
15	0.3920	0.5468	0.5837	0.6726	0.8251	0.9322	0.9900	1.0000	1.0000	
16	0.2474	0.3834	0.4192	0.5000	0.6578	0.8182	0.9494	0.9979	1.0000	
17	0.1110	0.2436	0.2763	0.3385	0.4557	0.6248	0.8597	0.9480	0.9762	
18	0.0432	0.1337	0.1537	0.1893	0.2607	0.3715	0.6896	0.8543	0.9201	
18½	0.0220	0.0955	0.1056	0.1262	0.1666	0.2443	0.5679	0.7623	0.8415	
19	0.0119	0.0477	0.0540	0.0661	0.0872	0.1260	0.4298	0.6118	0.7530	
19½	0.0110	0.01623	0.0157	0.0148	0.0186	0.0344	0.2796	0.4592	0.6231	
AP	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.1139	0.2914	0.4488	
MAX $\frac{B}{2}$	0.7390	0.9040	0.9434	0.9920	1.0000	1.0000	1.0000	1.0000	1.0000	

*C_B=.648

TABLE A-XIII

NONDIMENSIONAL OFFSETS FOR THE U OF M "V" SERIES, $C_B = .70$

NON-DIMENSIONAL OFFSETS - HALF BREADTH UM V-SERIES

MODEL NO.:958 C_B=.70 EXT "V"

STA	TANGENT	.075 WL	.125 WL	.25 WL	.50 WL	.75 WL	1.00 WL	1.25 WL	1.50 WL
FP	0	0	0	0	0	0	0	.0592	.1275
½	.005	.0171	0.024	.0384	.0717	.1108	.1708	.2467	.3342
1	.01	.0342	0.046	.0801	.1575	.2425	.3309	.4234	.5267
1½	.017	.0729	0.093	.1486	.2667	.3800	.4900	.5959	.7017
2	.033	.1260	0.156	.2338	.3767	.5092	.6359	.7484	.8434
3	.124	.3060	0.352	.4475	.5984	.7126	.8176	.9034	.9609
4	.298	.5229	0.573	.6597	.7867	.8617	.9242	.9742	1.0000
5	.501	.7065	0.751	.8200	.9075	.9551	.9884	1.0000	1.0000
6	.744	.8676	0.891	.9286	.9818	.9951	1.0000	1.0000	1.0000
7	.905	.9612	0.974	.9804	1.0000	1.0000	1.0000	1.0000	1.0000
8	.991	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
9	1.000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
10	1.000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
11	.997	.9963	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
12	.942	.9783	0.983	.9887	1.0000	1.0000	1.0000	1.0000	1.0000
13	.820	.9180	0.935	.9586	.9934	1.0000	1.0000	1.0000	1.0000
14	.650	.7902	0.825	.8818	.9601	.9867	1.0000	1.0000	1.0000
15	.454	.6174	0.663	.7415	.8784	.9526	.9925	1.0000	1.0000
16	.277	.4491	0.488	.5678	.7251	.8617	.9534	.9950	1.0000
17	.145	.2853	0.323	.3908	.5126	.6917	.8792	.9784	1.0000
18	.057	.1494	0.177	.2188	.2967	.4234	.7333	.8817	.9467
18½	.034	.0900	0.108	.1395	.1967	.2834	.6309	.7934	.8709
19	.020	.0504	0.958	.0718	.1008	.1508	.4684	.6667	.7492
19½	0	.0216	0.025	.0217	.0242	.03584	.2900	.5059	.6084
AP	0	0	0	0	0	0	.0950	.3025	.4434
	0.771	0.926	0.953	0.998	1.000	1.000	1.000	1.000	1.000

TABLE A-XIV

NONDIMENSIONAL OFFSETS FOR THE U OF M "V" SERIES, C_B = .75

NON-DIMENSIONAL OFFSETS - HALF BREADTH UM V-SERIES										MODEL NO.:952 C_B=.75 EXT. "V"
STA.	TANGENT	.075 WL	.125 WL	.25 WL	.50 WL	.75 WL	1.00 WL	1.25 WL	1.50 WL	
FP	0	0	0	0	0	0	0	0.0466	0.1157	
½	0.0398	0.0187	0.0296	0.0562	0.1157	0.1783	0.2505	0.3293	0.4146	
1	0.0149	0.0612	0.0855	0.1414	0.2570	0.3711	0.4867	0.5783	0.6573	
1½	0.0319	0.1259	0.1661	0.2538	0.4112	0.5606	0.6859	0.7727	0.8405	
2	0.0657	0.2126	0.2648	0.3743	0.5622	0.7116	0.8241	0.8964	0.9466	
3	0.2131	0.4388	0.5066	0.6137	0.7952	0.8980	0.9606	0.9912	0.9996	
4	0.4560	0.6752	0.7303	0.8289	0.9398	0.9863	0.9976	1.0000	1.0000	
5	0.7189	0.8707	0.8997	0.9526	0.9992	1.0000	1.0000	1.0000	1.0000	
6	0.8961	0.9779	0.9868	0.9950	1.0000	1.0000	1.0000	1.0000	1.0000	
7	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	
8	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	
9	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	
10	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	
11	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	
12	0.9778	0.9949	0.9918	0.9980	1.0000	1.0000	1.0000	1.0000	1.0000	
13	0.9141	0.9524	0.9622	0.9815	1.0000	1.0000	1.0000	1.0000	1.0000	
14	0.7667	0.8520	0.8783	0.9285	0.9815	0.9944	1.0000	1.0000	1.0000	
15	0.5178	0.6888	0.7352	0.8161	0.9157	0.9687	0.9916	1.0000	1.0000	
16	0.3445	0.4915	0.5411	0.6378	0.7904	0.9060	0.9718	0.9964	0.9964	
17	0.1872	0.3248	0.3635	0.4692	0.5734	0.7695	0.9173	0.9723	0.9867	
18	0.0976	0.1871	0.2105	0.2554	0.3438	0.5060	0.7903	0.9105	0.9337	
18½	0.0538	0.1786	0.1447	0.1689	0.2297	0.3534	0.6763	0.8244	0.8694	
19	0.0219	0.0714	0.0806	0.0964	0.1237	0.1992	0.5253	0.7055	0.7730	
19½	0.0119	0.0170	0.0197	0.0209	0.0241	0.0498	0.3406	0.5432	0.6460	
AP	0	0	0	0	0	0	0.1396	0.3519	0.4661	
MAX $\frac{B}{2}$	0.8067	0.9449	0.973	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	

TABLE A-XV

NONDIMENSIONAL OFFSETS FOR THE U OF M "V" SERIES, $C_B = .80$

NON-DIMENSIONAL OFFSETS - HALF BREADTH									UM V-SERIES	
STA.	TANGENT	.075 WL	.125 WL	.25 WL	.50 WL	.75 WL	1.00 WL	1.25 WL	1.50 WL	MODEL NO.:UM966 C_B: 80 EXT"V"
FP	0	0	0	0	0	0	0.0039	0.1424	0.2925	
½	0.0145	0.0606	0.0853	0.1354	0.2376	0.3474	0.4705	0.6260	0.6864	
1	0.0445	0.1683	0.2113	0.3033	0.4589	0.6113	0.7599	0.8465	0.8798	
1½	0.0945	0.2943	0.3498	0.4612	0.6409	0.7924	0.8968	0.9409	0.9580	
2	0.1645	0.4266	0.4867	0.6067	0.7901	0.9038	0.9595	0.9789	0.9866	
3	0.4600	0.7026	0.7574	0.8496	0.9425	0.9835	0.9982	1.0000	1.0000	
4	0.7672	0.9114	0.9256	0.9556	0.9928	0.9990	1.0000	1.0000	1.0000	
5	0.9881	0.9832	0.9874	0.9928	0.9998	1.0000	1.0000	1.0000	1.0000	
6	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	
7	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	
8	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	
9	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	
10	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	
11	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	
12	0.9963	0.9960	0.9984	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	
13	0.9554	0.9736	0.9812	0.9943	1.0000	1.0000	1.0000	1.0000	1.0000	
14	0.8436	0.8939	0.9123	0.9572	0.9599	1.0000	1.0000	1.0000	1.0000	
15	0.6445	0.7560	0.7895	0.8597	0.9464	0.9866	0.9974	1.0000	1.0000	
16	0.4091	0.5590	0.6088	0.7065	0.8372	0.9270	0.9758	0.9990	1.0000	
17	0.2472	0.3628	0.4053	0.4983	0.6554	0.8078	0.9340	0.9835	0.9974	
18	0.1200	0.1962	0.2230	0.2824	0.4109	0.6020	0.8458	0.9332	0.9611	
18½	0.0700	0.1260	0.1455	0.1870	0.2778	0.4527	0.7545	0.8744	0.9115	
19	0.0373	0.0670	0.0759	0.0952	0.1478	0.2670	0.6175	0.7645	0.8233	
19½	0.0119	0.0160	0.0164	0.0170	0.0255	0.0673	0.4264	0.6043	0.6794	
AP	0	0	0	0	0	0	0.2004	0.3815	0.4674	
MAX $\frac{B}{2}$	0.850	0.970	0.991	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	

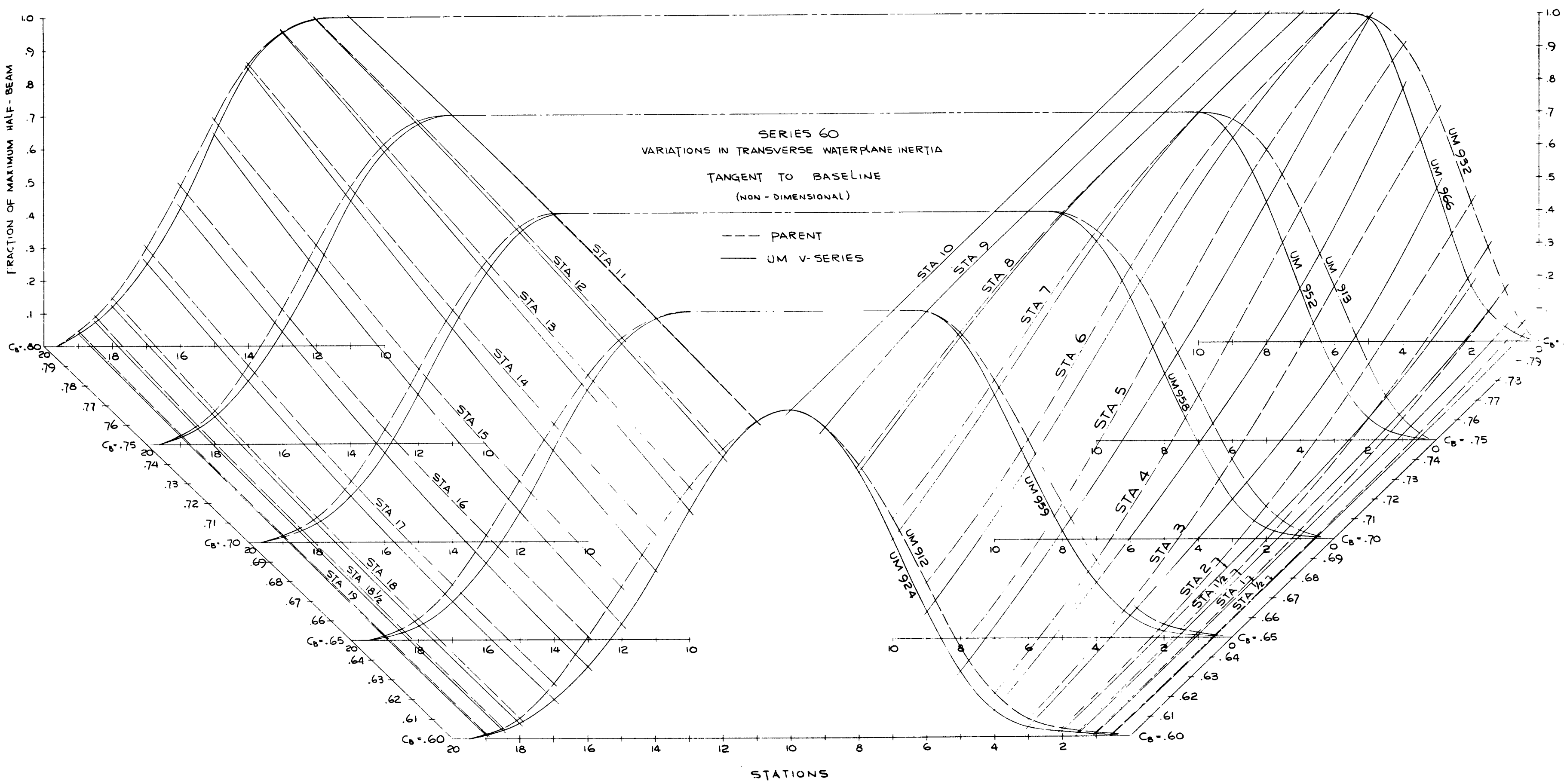

Fig. A-1. Orthogonal plot of nondimensional baseline tangent waterlines for Series 60 and the U of M "V" Series.

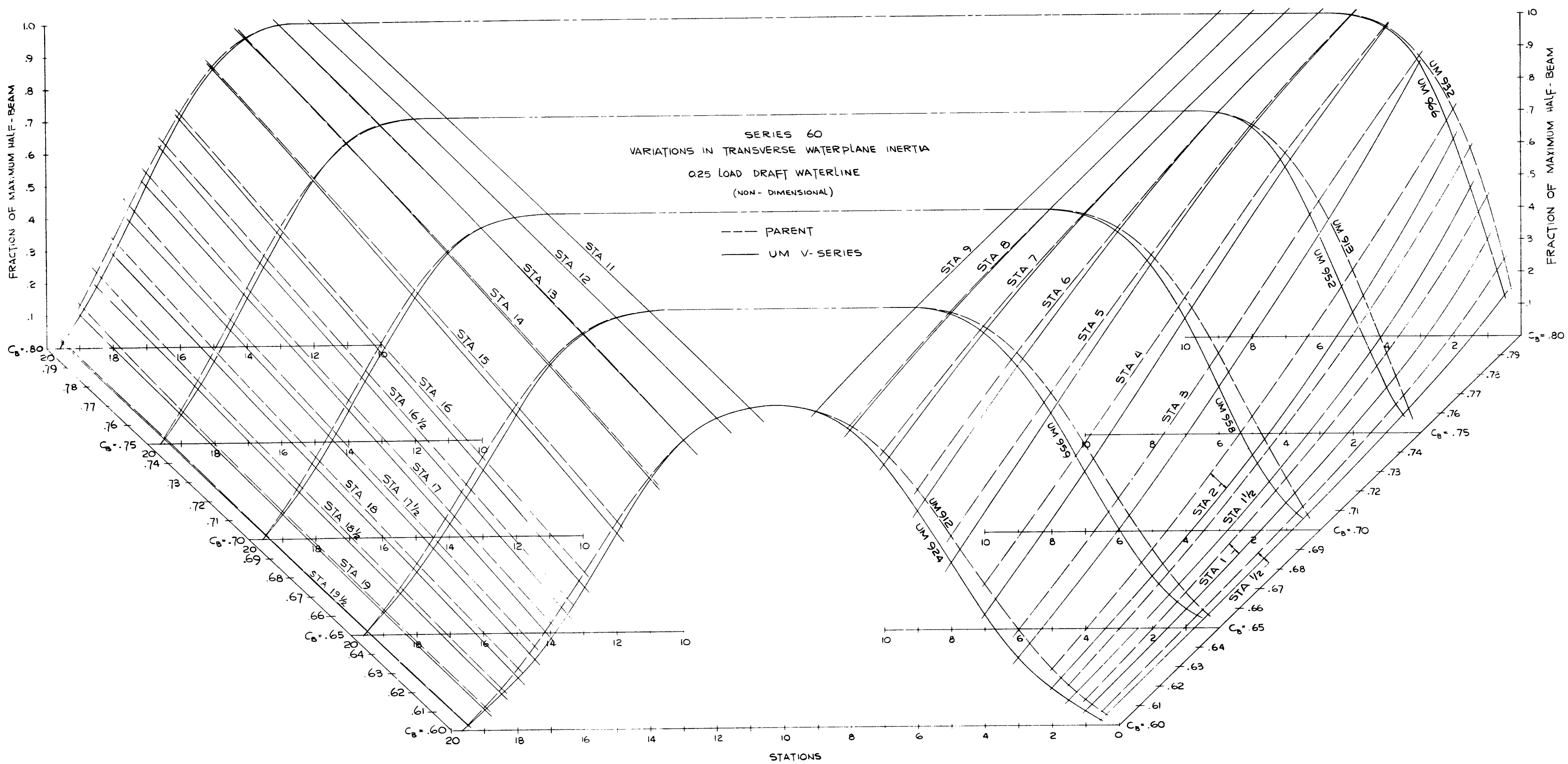

Fig. A 2. Orthogonal plot of nondimensional 0.25 waterlines for Series 60 and the U of M "V" Series.

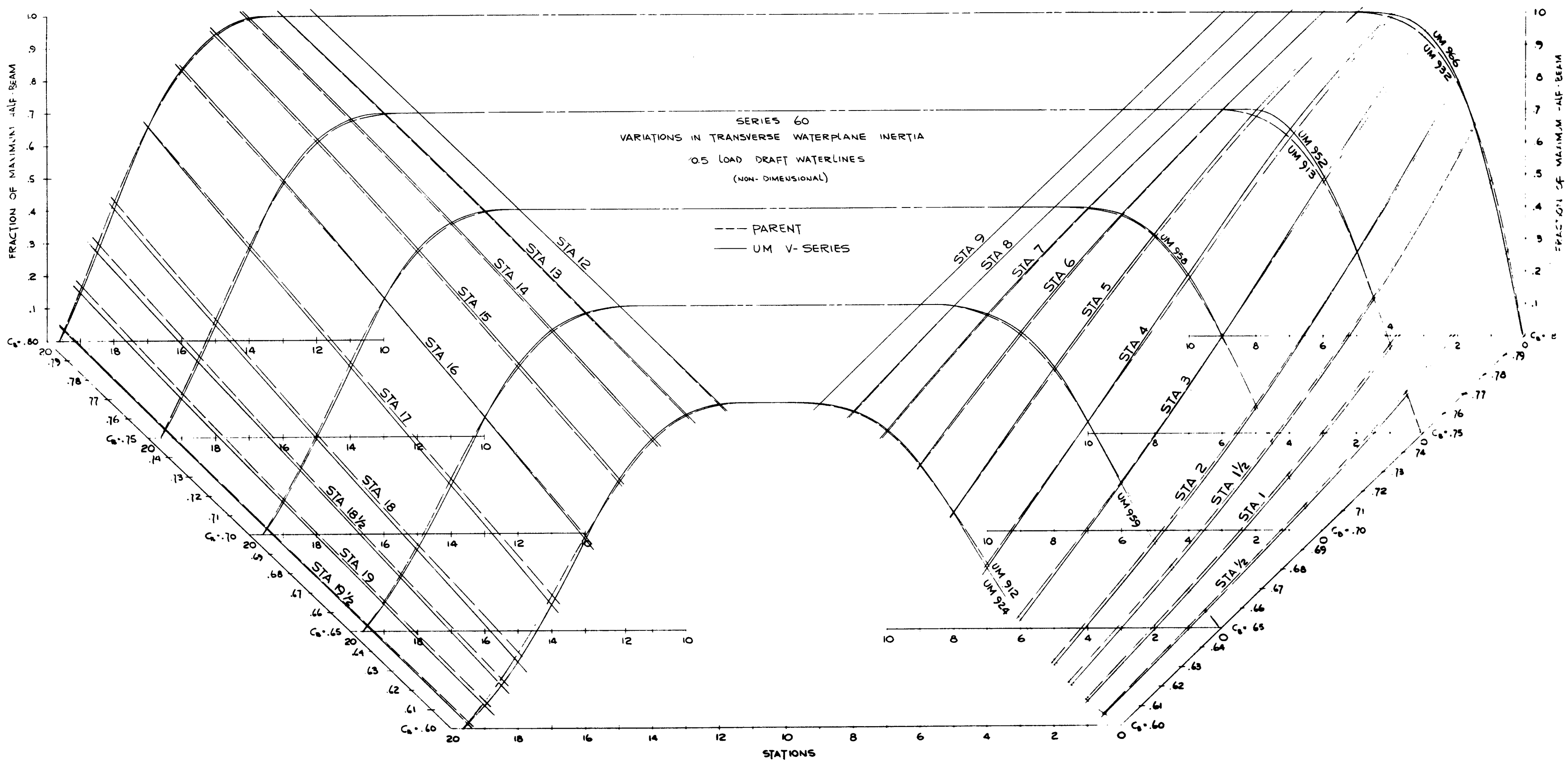

Fig. A-3. Orthogonal plot of nondimensional 0.50 waterlines for Series 60 and the U of M "V" Series.

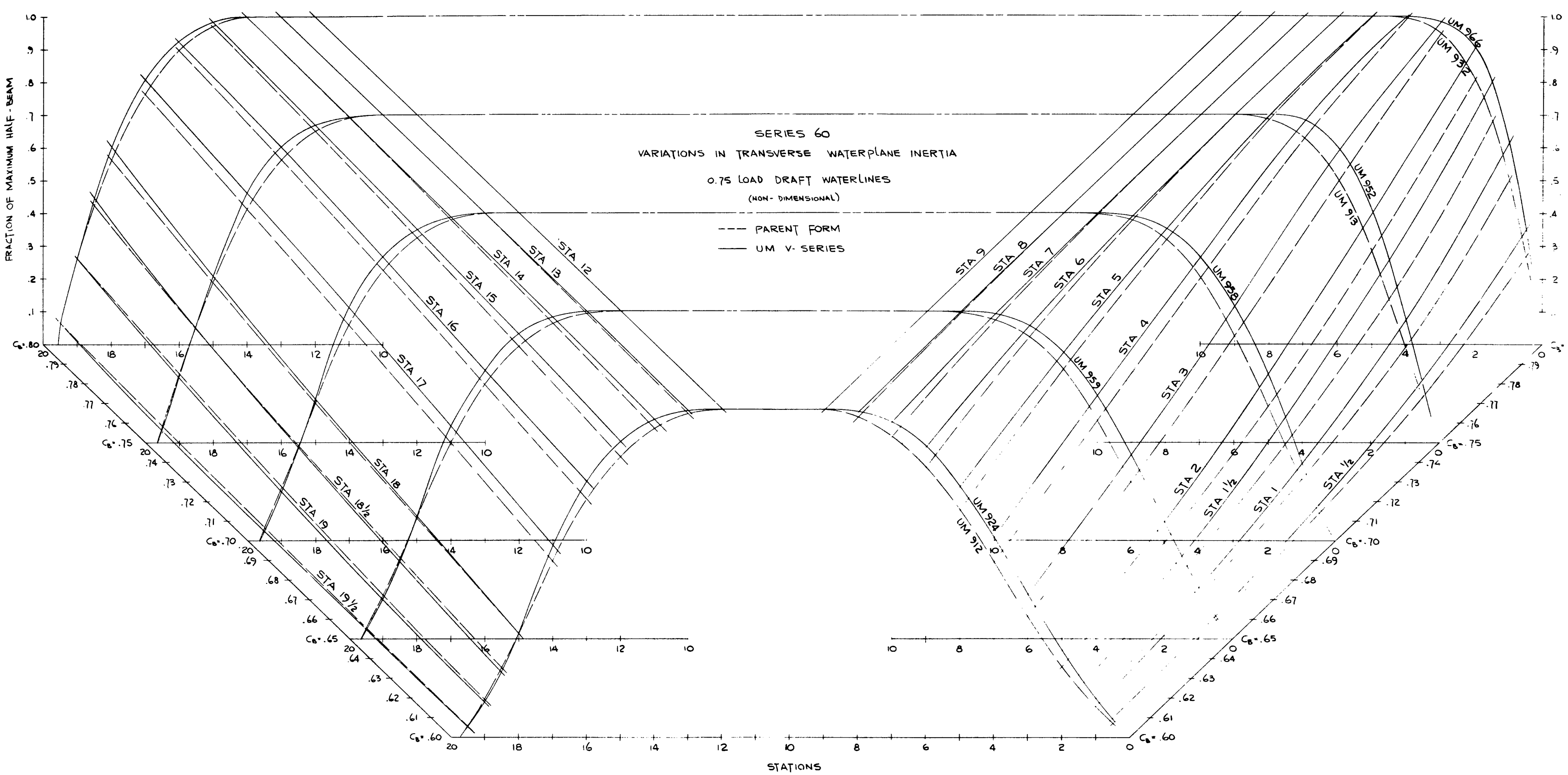

Fig. A-4. Orthogonal plot of nondimensional 0.75 waterlines for Series 60 and the U of M "V" Series.

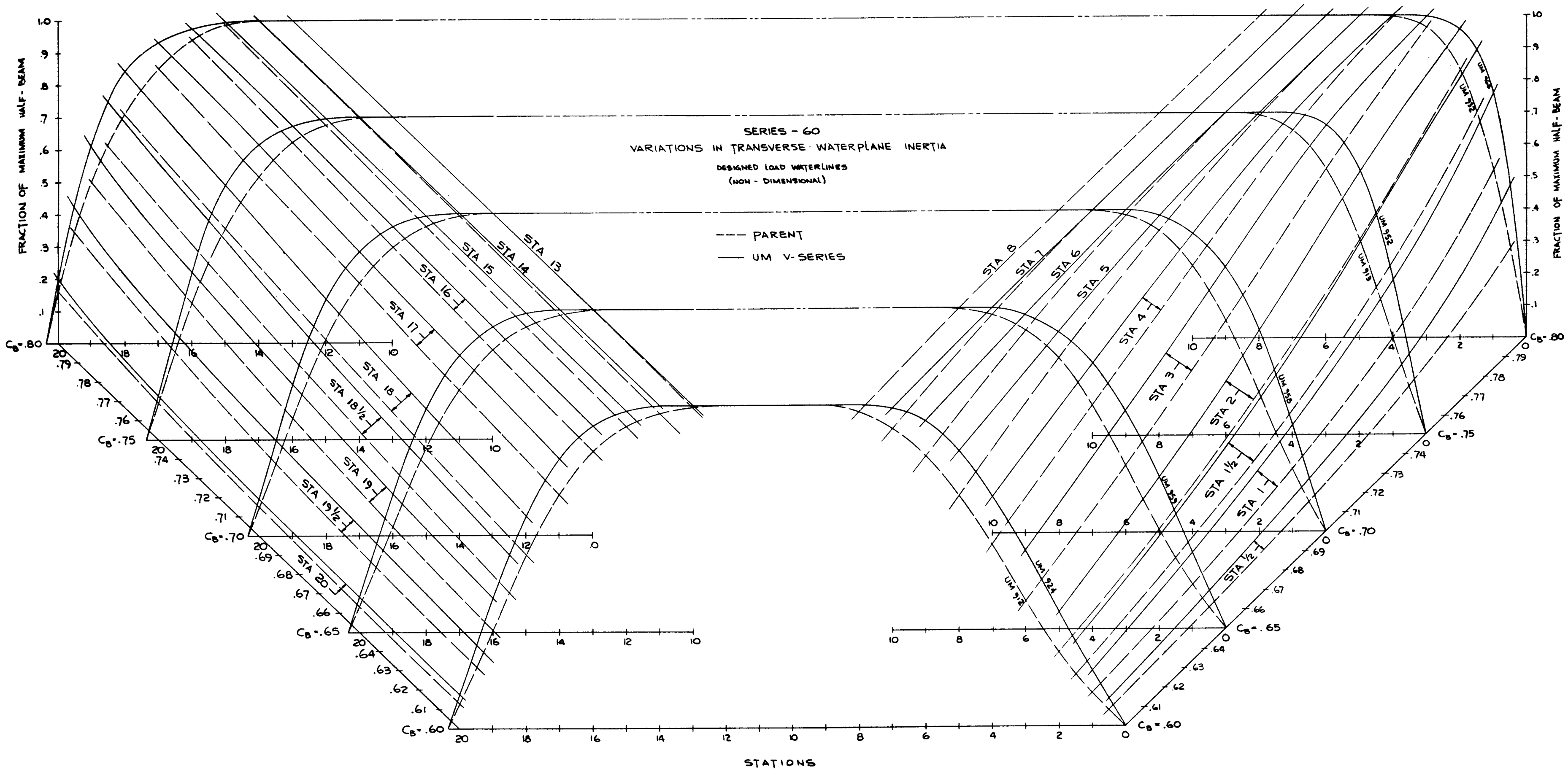

Fig. A-5. Orthogonal plot of nondimensional load waterlines for Series 60 and the U of M "V" Series.