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(1)

NAVY DEPARTMENT

THE DAVID W. TAYLOR MODEL BASIN

WASHINGTON 7, D.C.

ADDITIONAL TESTS OF SERIES 58 FORMS

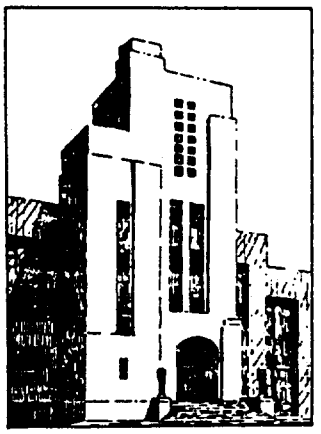
PART I

RESISTANCE TESTS OF A PARALLEL MIDDLE BODY SERIES

by

C. A. Larsen

~~Prepared for the Bureau of Ships~~
~~Distribution only upon specific BuShips authorization~~



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INTERIM REPORT
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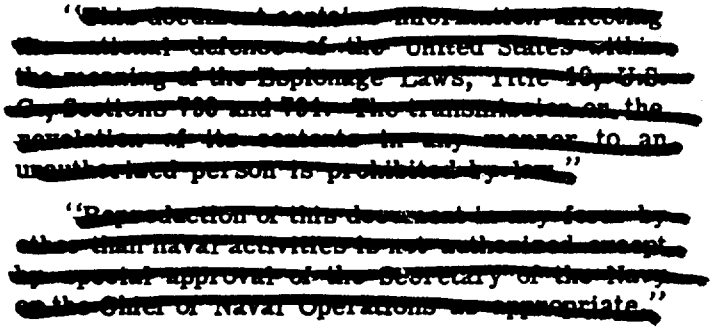

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INTRODUCTION

The Bureau of Ships requested[1] the David Taylor Model Basin to determine the resistance characteristics of a Series 70 basic form, Model 4165, with 40 and 50 percent parallel middle body. A 60 percent parallel middle body form was also tested to obtain an end point so that the resultant merit and C_r curves would be more accurately defined. The resistance tests were conducted on Model 4350 with various lengths of parallel middle body inserted at the maximum section. Model 4350, except for the 30 percent parallel middle body, is geometrically similar to Model 4165. The results of the tests with 40, 50 and 60 percent parallel middle body inserts are shown in Figure 1. The results of tests with 0 and 30 percent parallel middle body, previously reported[2], are included in order that the series may be readily evaluated.

Curves of C_r, $EHP_t/EHP_{t(min)}$ and ship length versus percent parallel middle body are given in Figure 1. The EHP's and the ship lengths are computed for prototypes having a volume equal to 60,000 cubic feet. Diagrams of the bodies tested are also presented in Figure 1. These diagrams show for each of the bodies, the length to diameter ratio and the length of parallel middle body expressed as a ratio of the overall length. The hull characteristics and offsets for the basic body, Model 4165, are given in Figure 2.

DISCUSSION OF RESULTS

The results of the resistance tests indicate that for a given volume the C_r and EHP increase with the addition of parallel middle body. The 60 percent parallel middle body shows a 30 percent increase in EHP over the body without parallel middle body.

[1] References are listed on page 2

REFERENCES

1. FONECON between CDR Arentzen, BuShips, and Mr. Posner, DTMB of 13 Jul 1955

2. TMB CONF ltr ser 0274, C-NS 715-080, C-SS1,(524:JLB:or) of 12 Mar 1951 to BuShips

LIST OF FIGURES

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11 CDR, Portsmouth Naval Shipyard, Portsmouth, N.H.

12 CDR, Mare Island Naval Shipyard, Vallejo, Calif.

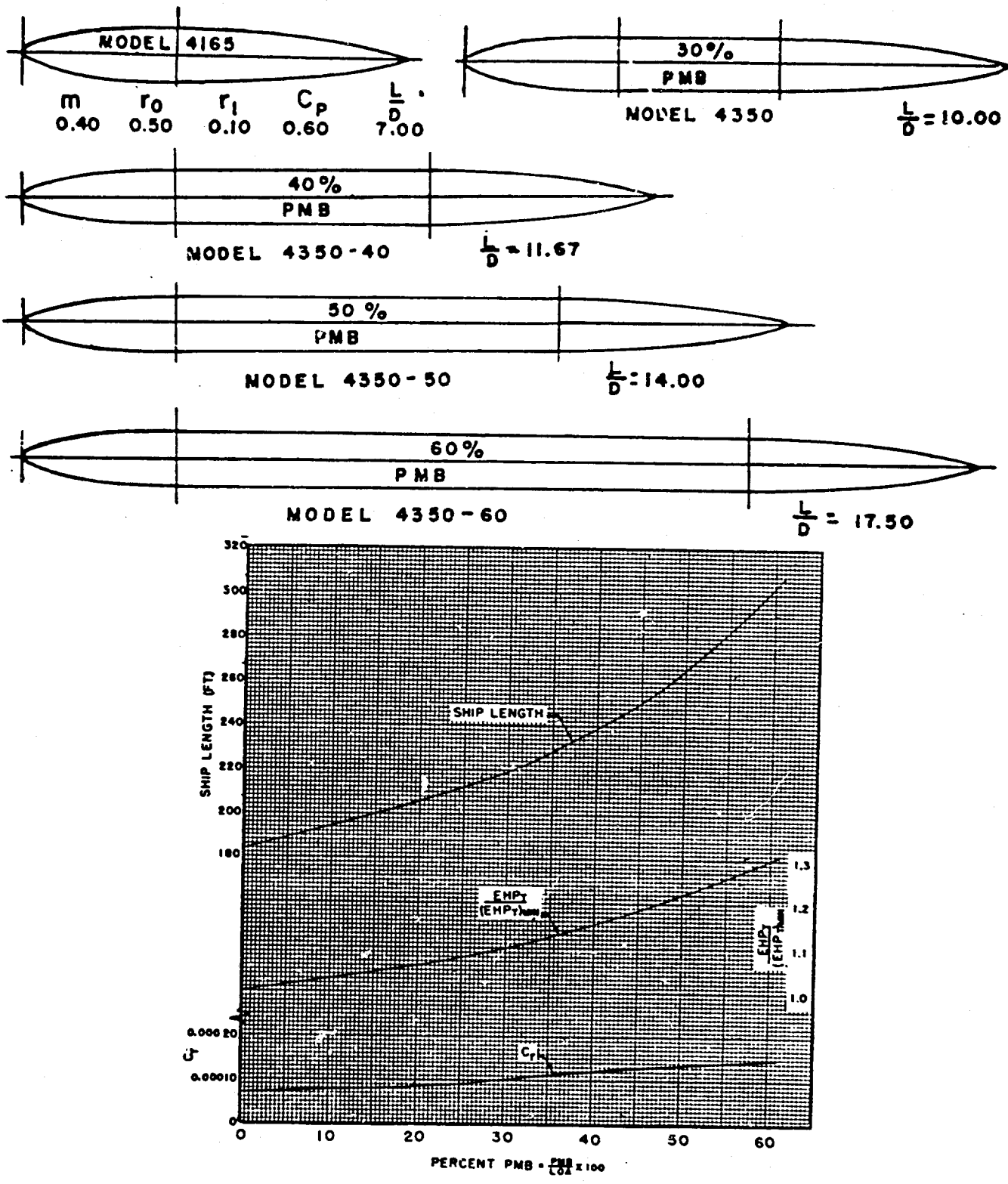

FIGURE 1: MERIT & C_T CURVES SHOWING THE EFFECT OF INSERTING VARIOUS LENGTHS OF PARALLEL MIDDLE BODY INTO A BODY OF REVOLUTION

Model 4165 Serial 400501 60-70

X/L	X in inches	Y/D	Y in inches
0.00	0.00	0.0000	0.000
.02	2.16	.1423	2.195
.04	4.32	.2020	3.117
.06	6.48	.2476	3.820
.08	8.64	.2855	4.405
.10	10.80	.3179	4.905
.12	12.96	.3462	5.341
.14	15.12	.3710	5.724
.16	17.28	.3930	6.063
.18	19.44	.4123	6.361
.20	21.60	.4260	6.573
.22	23.76	.4439	6.849
.24	25.92	.4565	7.043
.26	28.08	.4674	7.211
.28	30.24	.4765	7.352
.30	32.40	.4841	7.469
.32	34.56	.4900	7.560
.34	36.72	.4944	7.628
.36	38.88	.4976	7.677
.38	41.04	.4994	7.705
.40	43.20	.5000	7.714
.42	45.36	.4995	7.707
.44	47.52	.4978	7.680
.46	49.68	.4950	7.637
.48	51.84	.4911	7.577
.50	54.00	.4864	7.504
.52	56.16	.4806	7.415
.54	58.32	.4739	7.312
.56	60.48	.4665	7.197
.58	62.64	.4580	7.066
.60	64.80	.4486	6.921
.62	66.96	.4384	6.764
.64	69.12	.4273	6.593
.66	71.28	.4154	6.409
.68	73.44	.4026	6.212
.70	75.60	.3890	6.002
.72	77.76	.3743	5.775
.74	79.92	.3588	5.536
.76	82.08	.3422	5.280
.78	84.24	.3245	5.007
.80	86.40	.3059	4.720
.82	88.56	.2861	4.414
.84	90.72	.2652	4.092
.86	92.88	.2429	3.748
.88	95.04	.2193	3.383
.90	97.20	.1941	2.995
.92	99.36	.1672	2.580
.94	101.52	.1383	2.134
.96	103.68	.1065	1.643
.98	105.84	.0699	1.078
1.00	108.00	0.0000	0.000

Formula:

$$y^2 = a_1 x + a_2 x^2 + a_3 x^3 + a_4 x^4 + a_5 x^5 + a_6 x^6$$

where a_1 = + 1.000000

a_2 = + 0.837153

a_3 = - 8.585996

a_4 = + 14.075954

a_5 = - 10.542535

a_6 = + 3.215422

Wetted Surface Coefficient = $\frac{S}{\pi L D}$

= 0.7374

Longitudinal Center of Buoyancy = $\frac{X}{L}$

= 0.4484

Model Particulars:

Length, ft	9.000
Diameter, ft	1.286
Nose radius, ft	0.0918
Tail radius, ft	0.0184
Wetted surface, ft^2	26.81
Volume, ft^3	7.011
Longitudinal center of buoyancy, ft from nose	4.036

FIGURE 2: HULL CHARACTERISTICS AND OFFSETS OF MODEL 4165

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PRNC-GEN-1/5

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