

~~CONFIDENTIAL~~

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

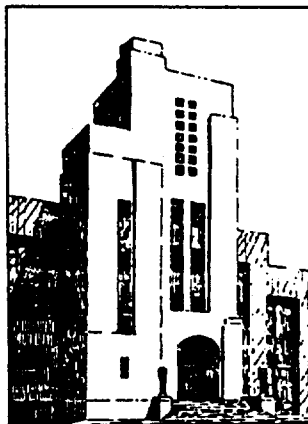
~~Prepared for the Bureau of Ships  
Distributed only upon specific BuShips authorization~~

C-738  
MASTER FILE COPY  
C-138

ADA 951810

DTIC FILE COPY

SDTIC  
ELECTE  
JUN 30 1982  
H D



CLASSIFICATION CHANGED TO  
UNCLASSIFIED  
IN ACCORDANCE WITH  
Memos Code 1541  
PAUL E. HANCOCK  
DATE 9/2/75

NOVEMBER 1955

INTERIM REPORT  
C-738

APPROVED FOR public release;  
distribution unlimited 9/2/75

~~CONFIDENTIAL~~

~~CONFIDENTIAL~~

ADDITIONAL TESTS OF SERIES 58 FORMS

PART I

RESISTANCE TESTS OF A PARALLEL MIDDLE BODY SERIES

by

C. A. Larsen

~~"This document contains information affecting the national defense of the United States within the meaning of the Espionage Laws, Title 18, U.S. Code, Sections 793 and 794. The transmission or the revelation of its contents in any manner to an unauthorized person is prohibited by law."~~

~~"Reproduction of this document in any form by other than naval activities is not authorized except by special approval of the Secretary of the Navy or the Chief of Naval Operations as appropriate."~~

NOVEMBER 1955

INTERIM REPORT  
C-738

~~CONFIDENTIAL~~

~~CONFIDENTIAL~~

## INTRODUCTION

The Bureau of Ships requested<sup>1</sup> the David Taylor Model Basin to determine the resistance characteristics of a Series 78 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<sup>2</sup>, 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.

References are listed on page 2

Copy available to DTIC does not permit fully legible reproduction



Accession For	
NTIS GRA&I	<input checked="" type="checkbox"/>
DTIC TAB	<input type="checkbox"/>
Unannounced	<input type="checkbox"/>
Justification	
By _____	
Distribution/ _____	
Availability Codes	
Dist	Avail and/or Special

**A**  
**UNANNOUNCED**

## 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

- FIGURE 1 Merit and  $C_r$  Curves Showing the Effect of Inserting Various Lengths of Parallel Middle Body into a Body of Revolution
- FIGURE 2 Hull Characteristics and Offsets of Model 4165

## INITIAL DISTRIBUTION

## Serials

- 1 - 10 Chief, BuShips, Technical Library (Code 312),  
for distribution:
- 1 - 5 Technical Library
  - 6 Technical Consultant to Chief (Code 106)
  - 7 Preliminary Design and Ship  
Protection (Code 420)
  - 8 Hull Design (Code 440)
  - 9 Propellers and Shafting (Code 554)
  - 10 Submarines (Code 525)
- 11 CDR, Portsmouth Naval Shipyard, Portsmouth, N.H.
- 12 CDR, Mare Island Naval Shipyard, Vallejo, Calif.

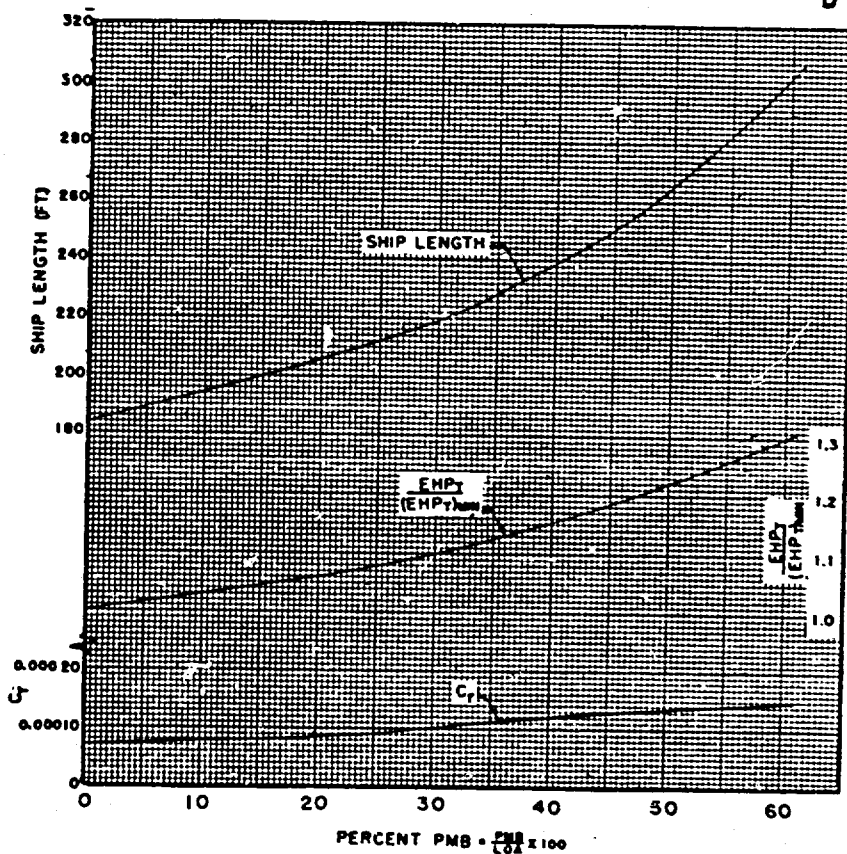
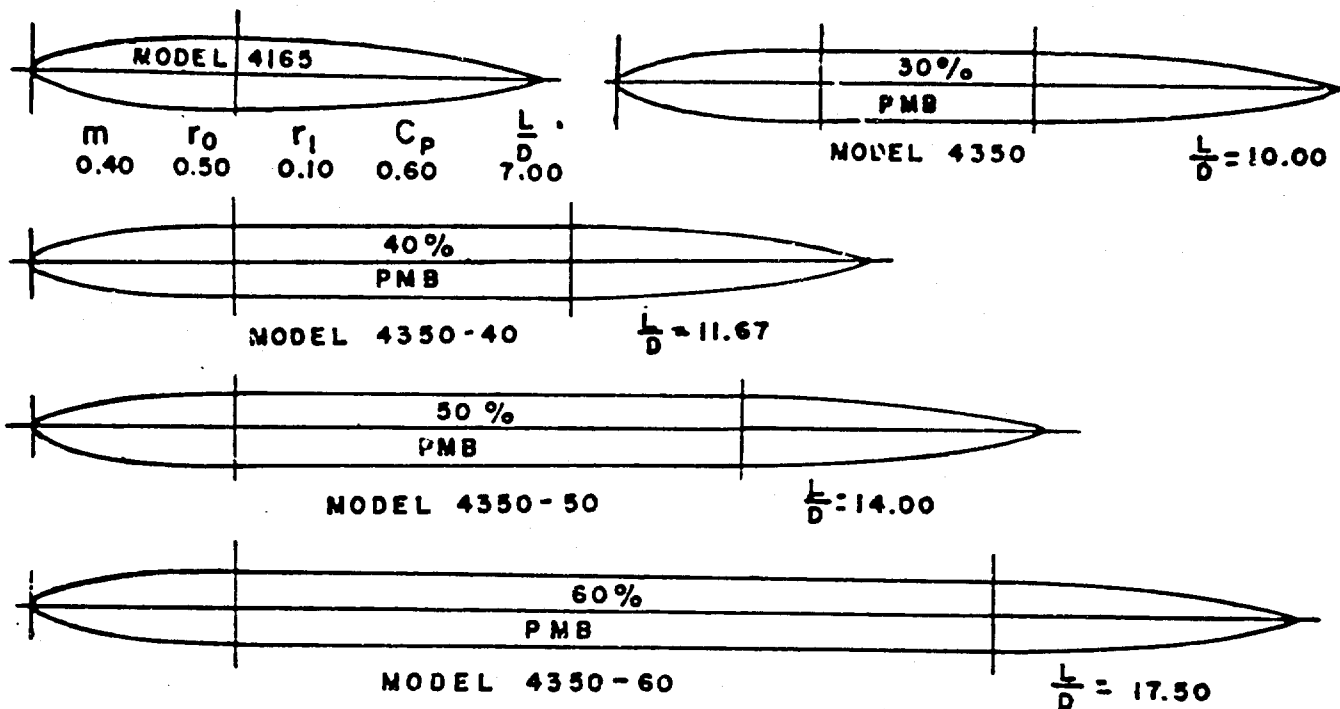
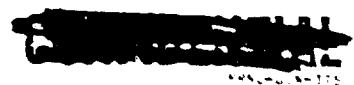


FIGURE 1: MERIT &  $C_T$  CURVES SHOWING THE EFFECT OF INSERTING VARIOUS LENGTHS OF PARALLEL MIDDLE BODY INTO A BODY OF REVOLUTION



Model 4165

Serial 40050160-70

X/L	X in inches	Y/D	Y in inches	
0.00	0.00	0.0000	0.000	<p>Formula:</p> $y^2 = a_1x + a_2x^2 + a_3x^3 + a_4x^4 + a_5x^5 + a_6x^6$ <p>where <math>a_1 = + 1.000000</math>  <math>a_2 = + 0.837153</math>  <math>a_3 = - 8.585996</math>  <math>a_4 = + 14.075954</math>  <math>a_5 = - 10.542535</math>  <math>a_6 = + 3.215422</math></p> <p>Wetted Surface Coefficient = <math>\frac{S}{\pi L D}</math>  <math>= 0.7374</math></p> <p>Longitudinal Center of Buoyancy = <math>\frac{X}{L}</math>  <math>= 0.4484</math></p> <p>Model Particulars:</p> <p>Length, ft                    9.000  Diameter, ft                 1.286  Nose radius, ft              0.0918  Tail radius, ft              0.0184  Wetted surface, ft<sup>2</sup>        26.81  Volume, ft<sup>3</sup>                 7.011  Longitudinal center of buoyancy, ft from nose        4.036</p>
.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	

FIGURE 2: HULL CHARACTERISTICS AND OFFSETS OF MODEL 4165

#### DTNSRDC ISSUES THREE TYPES OF REPORTS

1. DTNSRDC REPORTS, A FORMAL SERIES, CONTAIN INFORMATION OF PERMANENT TECHNICAL VALUE. THEY CARRY A CONSECUTIVE NUMERICAL IDENTIFICATION REGARDLESS OF THEIR CLASSIFICATION OR THE ORIGINATING DEPARTMENT.

2. DEPARTMENTAL REPORTS, A SEMIFORMAL SERIES, CONTAIN INFORMATION OF A PRELIMINARY, TEMPORARY, OR PROPRIETARY NATURE OR OF LIMITED INTEREST OR SIGNIFICANCE. THEY CARRY A DEPARTMENTAL ALPHANUMERICAL IDENTIFICATION.

3. TECHNICAL MEMORANDA, AN INFORMAL SERIES, CONTAIN TECHNICAL DOCUMENTATION OF LIMITED USE AND INTEREST. THEY ARE PRIMARILY WORKING PAPERS INTENDED FOR INTERNAL USE. THEY CARRY AN IDENTIFYING NUMBER WHICH INDICATES THEIR TYPE AND THE NUMERICAL CODE OF THE ORIGINATING DEPARTMENT. ANY DISTRIBUTION OUTSIDE DTNSRDC MUST BE APPROVED BY THE HEAD OF THE ORIGINATING DEPARTMENT ON A CASE-BY-CASE BASIS.