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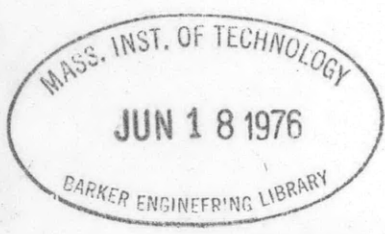
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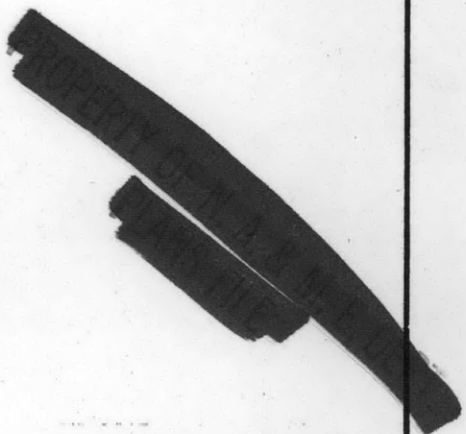
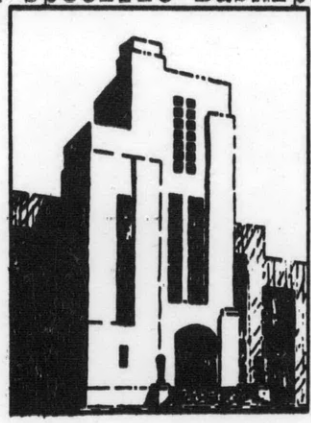
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RESISTANCE OF MODEL 4377 REPRESENTING A
52-FT AIRCRAFT RESCUE BOAT EQUIPPED WITH
PROPULSION UNIT UNDERWATER HOUSINGS

By
George B. Springston Jr.



Prepared for the Bureau of Ships
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Report No. 841
NS 715-086
Subtask 6
P.O. 01727/52
(Subhead .10)

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BOAT EQUIPPED WITH PROPULSION UNIT UNDERWATER HOUSINGS

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References:

- (a) BuShips letter to TMB, S82/3-5(452) Ser 452-82, dtd 28 Apr 1952.
- (b) BuShips Dwg. No. 027025- 52' Rescue Boat, Propulsion Unit Underwater Housing.
- (c) TMB Report 769: "Model Test Results and Predicted EHP for Bureau of Ships Design 52-Foot Aircraft Rescue Boat from Tests of Model 4377", by J.H. Curry, June 1951.

A. Photographs of Model

<u>Plate</u>	<u>Description</u>
1	Photographs of model
2	Photographs of model at test conditions

B. Plots of Test Data

<u>Plate</u>	
3	Model resistance and running trim

C. Tabulated Test Data

<u>Plate</u>	
4	Model resistance, rise, and wetted lengths

D. History

Reference (a) requested that propulsion unit underwater housings as shown in Reference (b) be fitted to a 1/8-scale model (TMB Model 4377) of the 52-ft Rescue Boat and the model towed to determine its resistance with the added units. The purpose of the underwater housing is to provide a short unit consisting of engine, propeller, and propeller shaft which can easily be removed. A report on tests of Model 4377 without the underwater housing units was previously made by Reference (c).

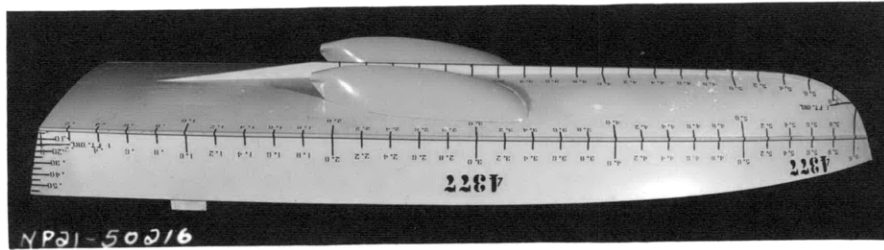
E. Discussion

The model was tested at a full-scale displacement of 40,000 lbs, at 0° initial trim, as specified in Reference (a). It was towed in the shaft line shown in Reference (b). The shaft angle was 13°-3' with the base line and the longitudinal center of gravity was 60.3%

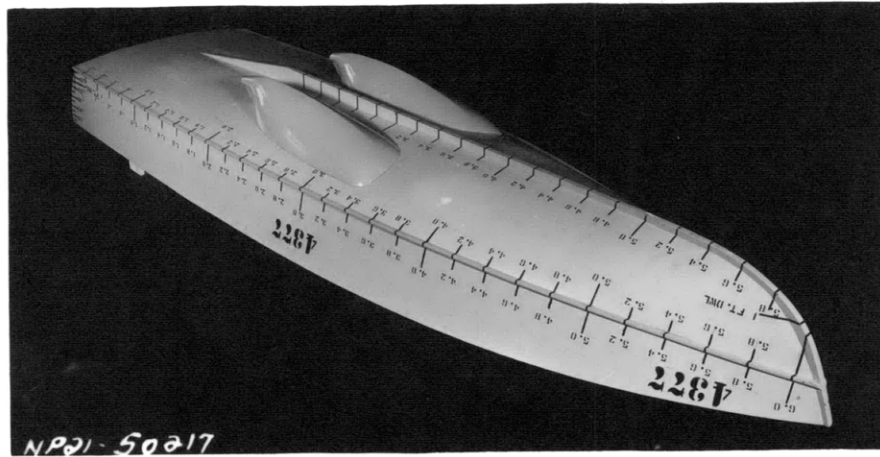
of the distance from Sta 0 to Sta 10. The model draft at rest was 0.489 ft measured from the base line.

The air drag of the towing gear has been subtracted from the resistance data. The rise data are presented as change of level at Sta 0 and Sta 10 from zero rise at zero speed. The wetted lengths are measured from Sta 10, parallel to the base line, to the intersection of keel and chine with solid water.

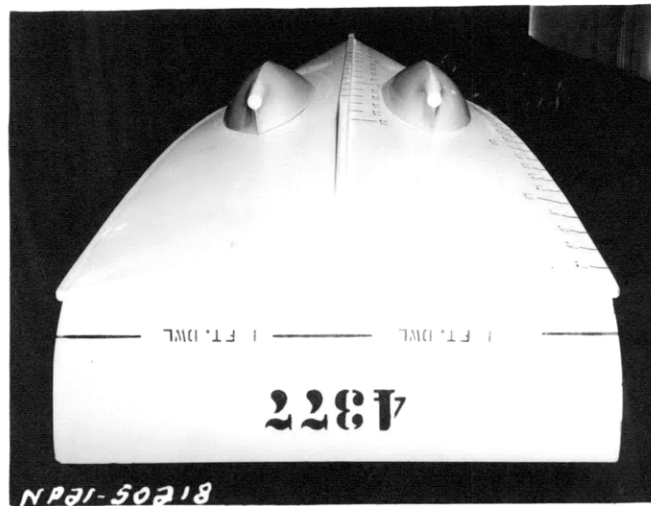
The resistance of the model was increased considerably by the addition of the underwater housing units. At speeds corresponding to 42 knots and above, full scale, the model resistance was more than doubled (see Plate 3). As shown in Plate 2, the height and extent of the spray at high speeds were also augmented by the underwater housing units. Thus, it appears that the units, as designed, are impractical for the speed range desired for this type of boat.



Side view

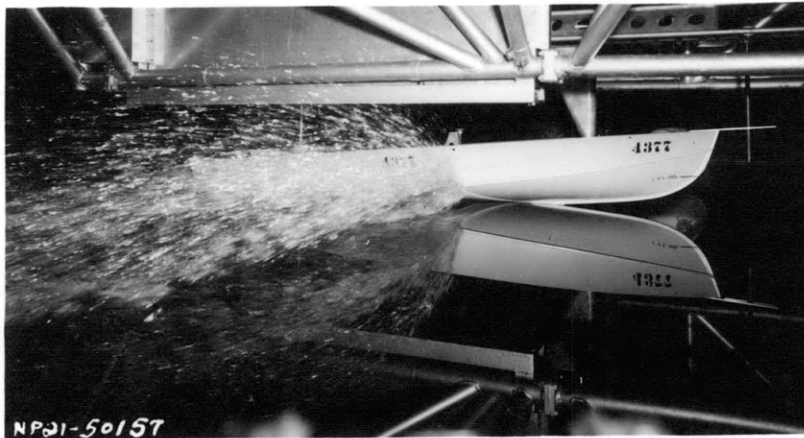


Oblique view



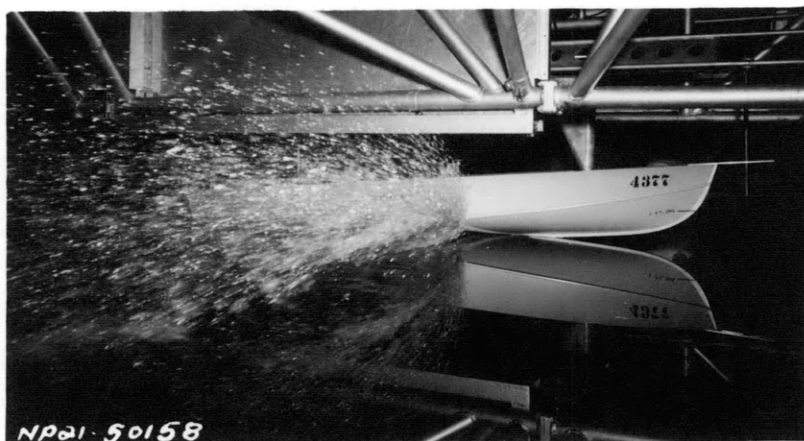
Stern view

Plate 1 - Photographs of model with underwater housing units.

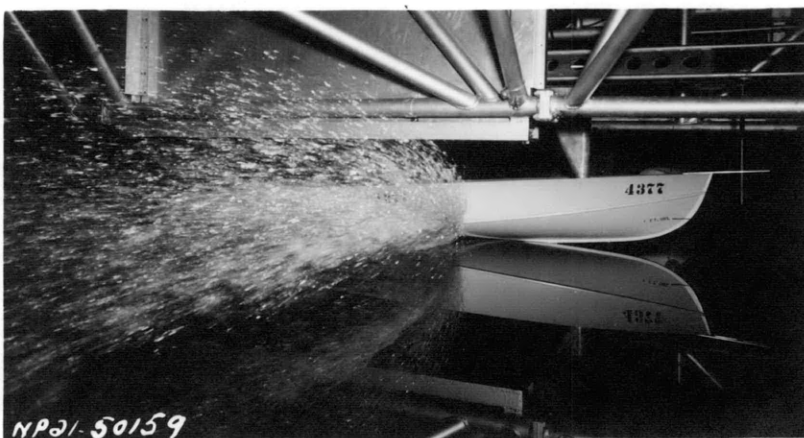


Full Scale
Speed knots

36.77



39.60



42.43

Plate 2 - Photographs of model with underwater housing units at test conditions. Full scale displacement 40,000 lbs. Initial trim 0°.

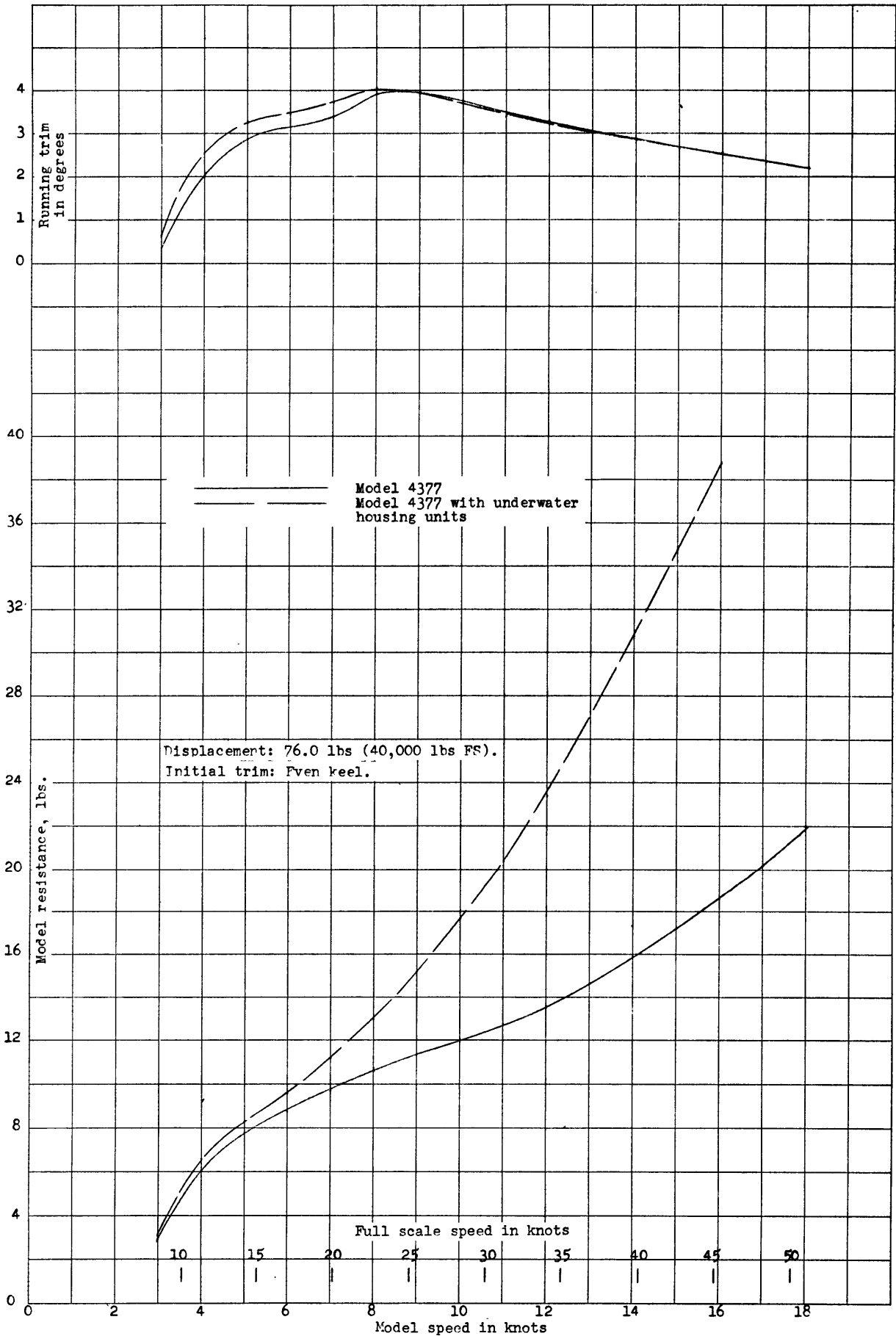


Plate 3 - Model resistance and running trim

PLATE 4

MODEL TEST RESULTS

Model resistance, rise, and wetted lengths

Agency: BuShips
 Lines Plan: 5820305/52/1170374
 Appendages: Spray strips, keel, and
 underwater housing units
 Underwater housing plan: 027025

Model: 4377
 Displ., Lbs.: 76.0
 Linear Ratio: 8
 Vessel: 52' ARB
 Displ., Lbs.: 40,000

Model Speed in Knots	Model Resistance in Lbs.	Model Rise in Inches		Model Wetted Lengths in Feet		Remarks
		Sta 0	Sta 10	Keel	Chine	
3.00	3.20	0.15	-0.60	5.9	5.6	Initial trim: Even keel
4.00	6.60	1.40	-1.75	5.8	4.6	
5.00	8.30	2.30	-1.80	5.6	4.1	Water temper- ature: 72° F
6.00	9.60	2.80	-1.50	5.5	3.8	
7.00	11.20	3.25	-1.35	5.2	3.6	
8.00	12.95	3.85	-1.15	4.85	3.5	
9.00	15.20	4.10	-0.75	4.6	3.5	
10.00	17.70	4.10	-0.50	4.5	3.5	
11.00	20.40	4.05	-0.20	4.45	3.5	
12.00	23.40	4.15	+0.05	4.4	3.5	
13.00	27.25	4.00	+0.20	4.4	2.2	
14.00	30.80	3.90	+0.35	4.4	1.7	
15.00	34.75					
16.00	38.75					

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