REPORT OF ROLLING EXPERIMENTS WITH MODEL NO. 2697

REPRESENTING

U. S. LIGHT CRUISERS NOS. 26-31.

U. S. Experimental Model Basin,
Navy Yard, Washington, D. C.

November 1930. Report No. 270.

Rolling Experiments with Model No. 2697.

U. S. Light Cruisers Nos. 26-31.

1. The object of the tests was to determine the roll quenching power of model bilge keels of various depths.

2. The corresponding ship and model data for the tests, and the depths of keels used are given in the following table:

	Ship	Model	Corresponding roll - Fig. 1.
Displacement	11583 tons	1028 lbs.	
Trim	E.K.	E.K.	
Cyclic period	10.8 sec.	2 sec.	
Bilge Keels - Test 1	23 in.	.79 in.	1, 2, 3
" " " 2	None	None	4, 5, 6
" " " 3	36 in.	1.24 in.	7, 8, 9
" " " 4	54 in.	1.85 in.	10,11,12
Length of keels	204 ft.	7.0 ft.	

Linear ratio of ship to model 29.1

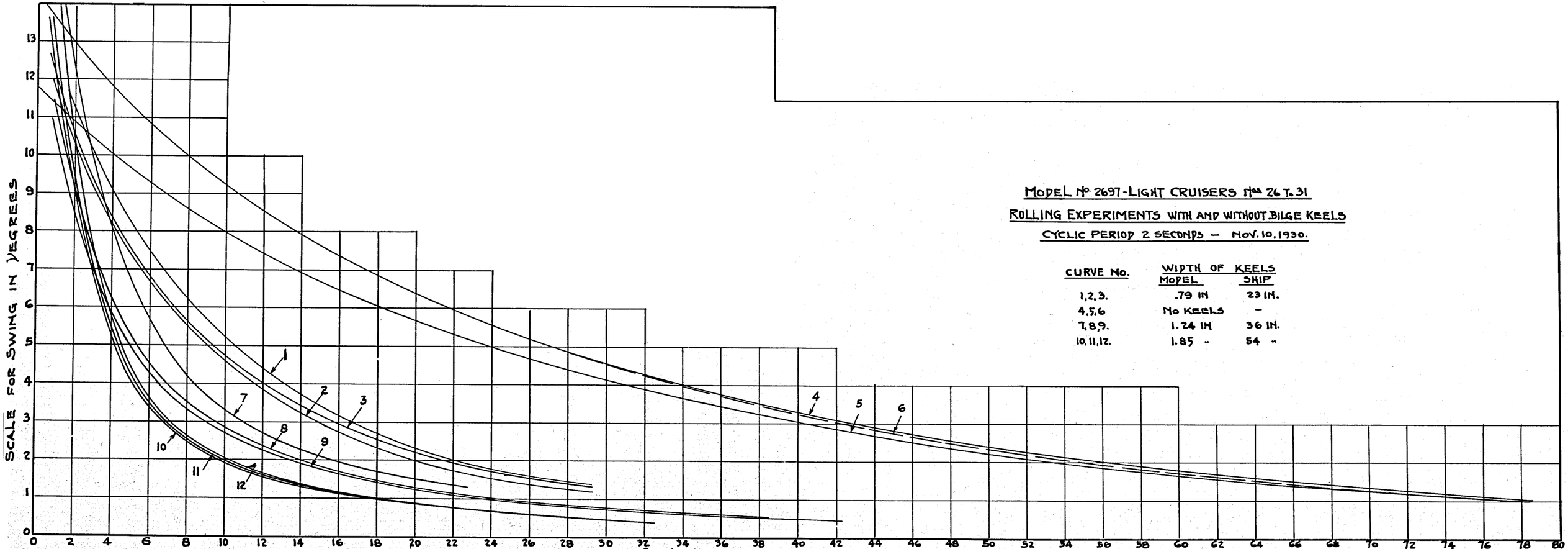
Tests made in still water

3. The model was ballasted to give a cyclic period of 2 seconds, and then rolled several times for each condition. The declining angle curves are shown in Fig. 1, three curves for each condition being given. Fig. 2 contains curves of roll quenching in degrees per cycle plotted on angle of inclination; also curves of roll quenching per cycle at

10 degrees inclination, and number of swings to reduce from 10 degrees to 2 degrees, the latter two curves being plotted against depth of bilge keel.

4. The model was towed for resistance with the 1.85 inch (54 inch F.S.) keels on and also with the keels off. The increase in resistance with the deep keels, over that without keels, appears to be about 50 per cent greater than would be attributed to the increased area, which would be equivalent to a reduction of speed at 32 knots of about 3 tenths knot.

5. As regards rolling, the model and ship are not dynamically comparable. The roll quenching is partly due to the frictional resistance of the hull. There is no known law by which the ship results can be derived from the model results. Therefore the model results cannot be safely used to predict the ship behavior.



MODEL Nº 2697-LIGHT CRUISERS Nos 26 T. 31

ROLLING EXPERIMENTS WITH AND WITHOUT BILGE KEELS

CYCLIC PERIOD 2 SECONDS — NOV. 10, 1930.

CURVE No.	WIDTH OF KEELS MODEL	SHIP
1, 2, 3.	.79 IN	23 IN.
4, 5, 6	NO KEELS	—
7, 8, 9.	1.24 IN	36 IN.
10, 11, 12.	1.85 "	54 "

FIG. 1

MODEL No 2697 - LIGHT CRUISERS Nos 26-31
CURVES OF ROLL QUENCHING FOR DIFFERENT
WIDTHS OF BILGE KEELS.
Derived from the roll extinction curves
obtained from experiments made Nov 10, 1930.
ROLL QUENCHING PER CYCLE - DEGREES
DEGREES INCLINATION
WIDTH OF BILGE KEELS - INCHES
ROLL QUENCHING IN DEGREES PER CYCLE AT 10 DEGREES INCLINATION
NUMBER OF SWINGS TO REDUCE FROM 10° TO 2°
ROLL QUENCHING PER CYCLE
WIDTH OF BILGE KEELS 24"
36"
23"
WITHOUT BILGE KEELS.
NUMBER OF SWINGS TO REDUCE FROM 10° TO 2°
ROLL QUENCHING IN DEGREES PER CYCLE AT 10 DEGREES INCLINATION
KAECO.NY

FIG. 2.