

# Herbert Software Solutions, Inc.

# Incline



## Inclining & Stability Test Program

Complete Inclining data input, calculations and report.

Flexible design allows user to make the most of the program capabilities.

Power and speed result in valuable cost saving in manpower and equipment during the test.

Thorough documentation includes operating instructions, sample calculations, recommended test procedures and program theory.

Full Warranty and support from Herbert Engineering with over 20 years experience in providing software solutions to the marine industry.

*Developed in cooperation with the USCG Engineering Logistics Center.*

INCLINE is a complete tool for recording, checking and reporting the results of a vessel's stability test. This includes the inclining, freeboard measurement and deadweight survey. The program's format follows the guidance of USCG NVC 15-81 and ASTM F1321-92. Printed reports from INCLINE also follow these official formats. INCLINE will show an immediate return on investment with the cost savings being realized on the first one or two inclining experiments it is used upon.

The screenshot displays the INCLINE software interface with the following data:

Trial Data Entry / Summary						
Trial No	Time	Total Moment ft-LT	Zero Moment for Pend Ref	Average Tangent	Trial GMT ft	Notes
1	1200	0.00	Yes	0.00059S	---	
2	1210	56.65S	No	0.01453S	2.423	
3	1220	114.19S	No	0.02893S	2.454	
4	1245	57.56S	No	0.01462S	2.448	
5	1300	0.08S	Yes	0.00026S	---	
6	1320	57.30P	No	0.01421P	2.506	
7	1405	116.13P	No	0.02824P	2.556	
8	1435	58.76P	No	0.01467P	2.490	
9	1455	0.05S	Yes	0.00085P	---	

Trial No. 7 - Weight Movements						
Weight ID Label	Weight LT	Initial Position ft-CL	Distance Moved ft	Trial Position ft-CL	Tran. Moment ft-LT	
No. 1	2,179	13.000P	0.010S	12.990P	0.02S	
No. 2	2,210	13.000S	25.963P	12.963P	57.38P	
No. 3	2,214	13.000P	0.026S	12.974P	0.06S	
No. 4	2,259	13.000S	26.042P	13.042P	58.83P	
<b>Total Weight</b>	<b>8.862</b>				<b>Total Tran. Moment</b>	<b>116.13P</b>

Trial No. 7 - Pendulum Movements							
Pendulum No.	Length in	Ref. Position Initial in	Ref. Position Calculated in	Pendulum Reading in	Pendulum Movement in	Use in Average Tangent	
1	273.62S	-24.668	-24.776	-32.460	7.684P	Yes	3.02808F
2	209.370	-18.990	-19.203	-25.160	5.957P	Yes	3.02845F
3	199.750	-20.500	-20.570	-26.200	5.630P	Yes	3.02819F
							<b>Average Tangent</b> 1.02824I

The interface also includes a graph titled 'Stbd Tan' showing a linear relationship between Port Heeling Moment (ft-LT) and Stbd Heeling Moment (ft-LT). The graph shows a positive slope, indicating that as the port side heels, the starboard side heels in the opposite direction.

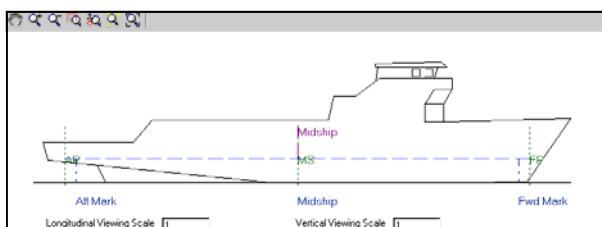


# Incline

## Inclining & Stability test Program

### Key Program Features:

- Records all general information required on Stability Test Report.
- Plots ship profile showing vessel trim and hog/sag at the time of the test. The plot also shows the location of draft marks and freeboard readings. (If the ship profile is not entered by the user a generic vessel profile is available.)

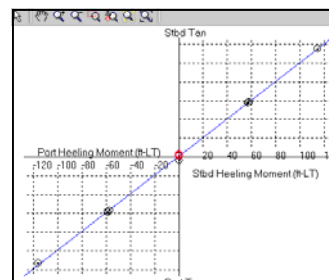


- Records draft and freeboard readings and averages the corresponding keel drafts at each longitudinal location. The user can exclude erroneous readings from the calculations and develop a waterline using a second order least squares fit of the drafts or optionally, straight line segments or a parabola.

Keel Draft Summary and WL Calculation											
No.	Side	Location	Label	ft-MS	Drafts from Freeboards	Draft Marks	Combined Draft	Average Draft	Use for WL	Calculated Draft	Deviation
				ft	ft	ft	ft	ft			ft
1	Port	Aft Mark	121.500A	0.000	12.958	12.958	12.958	12.948	2nd Order	12.948	0.000
	Stbd				0.000	12.937	12.937				
2	Port	Midship	0.000		12.948	0.000	12.948	12.958	2nd Order	12.958	
	Stbd				12.969	0.000	12.969				
3	Port	Fwd Mark	121.500F	0.000	13.000	13.000	13.000	13.000	2nd Order	13.000	
	Stbd				0.000	13.000	13.000				

- Calculates the Displacement, LCF, KMI, and LCB at the correct sea water density and measured freeboards/drafts from hydrostatic tables entered by the user. (If hydrostatics are not entered these values can be entered manually.)

- Records pendulum deflections and weight movements and provides a plot of tangent vs weight moment. The GM at the time of inclining is calculated from this plot and an estimate of error is presented.



- Records deadweight survey items and adjusts GM for free surface as required.
- Calculates the vertical and longitudinal center of gravity of the ship in the test condition and in the "light ship" condition with adjustments from the deadweight survey.

Condition 1 - Light Ship								
Item	Weight	VCG	V Moment	LCG	L Moment	TCG	T Moment	FS Moment
		LT	R-BL	R-LT	R-MS	R-LT	R-CL	R-LT
Ship in Condition 0	1,609,006	17.463	28,097.75	1.697A	2,731.18A	0.001S	2.36S	266.50
Liquids as Inclined to be deducted	-176,730	7.498	1,325.21	2.018A	356.58A	0.000	0.00	266.50
Dry items to be deducted for Lightship	-25,169	25.668	646.02	22.165A	557.85A	0.039S	0.99S	---
Items to be relocated for Lightship	0.067	---	0.00	---	0.13F	---	0.00	---
Dry items to be added for Lightship	1,721	22.220	38.24	26.209F	45.11F	0.000	0.00	---
Light Ship (Condition 1)	1,408,828	18.572	26,164.76	1.257A	1,771.51A	0.001S	1.37S	0.00

- Calculates the draft, trim and stability of the light ship condition.
- Calculates the displacement, center of gravity, drafts, trim and GM of the vessel in any number of additional user defined loading conditions.
- Prints out the final Stability test report with the additional loading conditions.

### San Francisco

**Herbert Software Solutions, Inc.**  
 2417 Mariner Square Loop, Suite 125  
 Alameda, CA 94501  
 Tel: +1 510 814 9065  
 Fax: +1 510 814 9763  
 E-Mail: info@herbertsoftware.com

### Glasgow

**Herbert Engineering Europe (UK) Ltd.**  
 1 Cairnlea Road  
 Strathaven, ML10 6EY, UK  
 Tel. (UK): +44 (141) 416 4775  
 Mobile (UK): +44 7595 020 934  
 Tel. (USA): +1 (510) 962 5814  
 E-mail: lletizia@herbert.com

### China

**Herbert Engineering Shanghai, Ltd.**  
 World Plaza, Suite 10G  
 855 Pudong Nan Lu  
 Shanghai 200120  
 Tel: +86 21 5836 9620  
 Fax: +86 21 5836 9542  
 E-Mail: info@shanghai.herbert.com