MANOEUVRING BOOKLET

SOLAS II-1, REGULATION 28.3

IMO RESOLUTION A.601(15)

1. GENERAL DESCRIPTION

1.1 Ships Particulars

Ship name : ALNIC MC
Official number : 17930
Gross tonnage : 30040
Deadweight : 44999
Displacement : 54861.2
LOA : 183
LBP : 174
Breadth (moulded) : 32.2
Depth (moulded) : 19.1

at Summer /draft : 11.834m
Normal ballast draft : 6.261
Hull coefficient at summer load draft : 0.8093
Hull coefficient at normal ballast draft : 0.7489
Extreme height of the ships structure : 47
(measured from keel)

Main Engine(s)

Type : MAN BMW 6S50MC-C Number of units : 1 Power output : 9480.0 KW

Propeller(s)

Type : 1x4 BLADES, FIXED PITCH
Number of units : 1
Direction of rotation : RIGHT HAND

Diameter : 5.80m
Pitch : 4.1331m
Propeller immersion : 6.31m

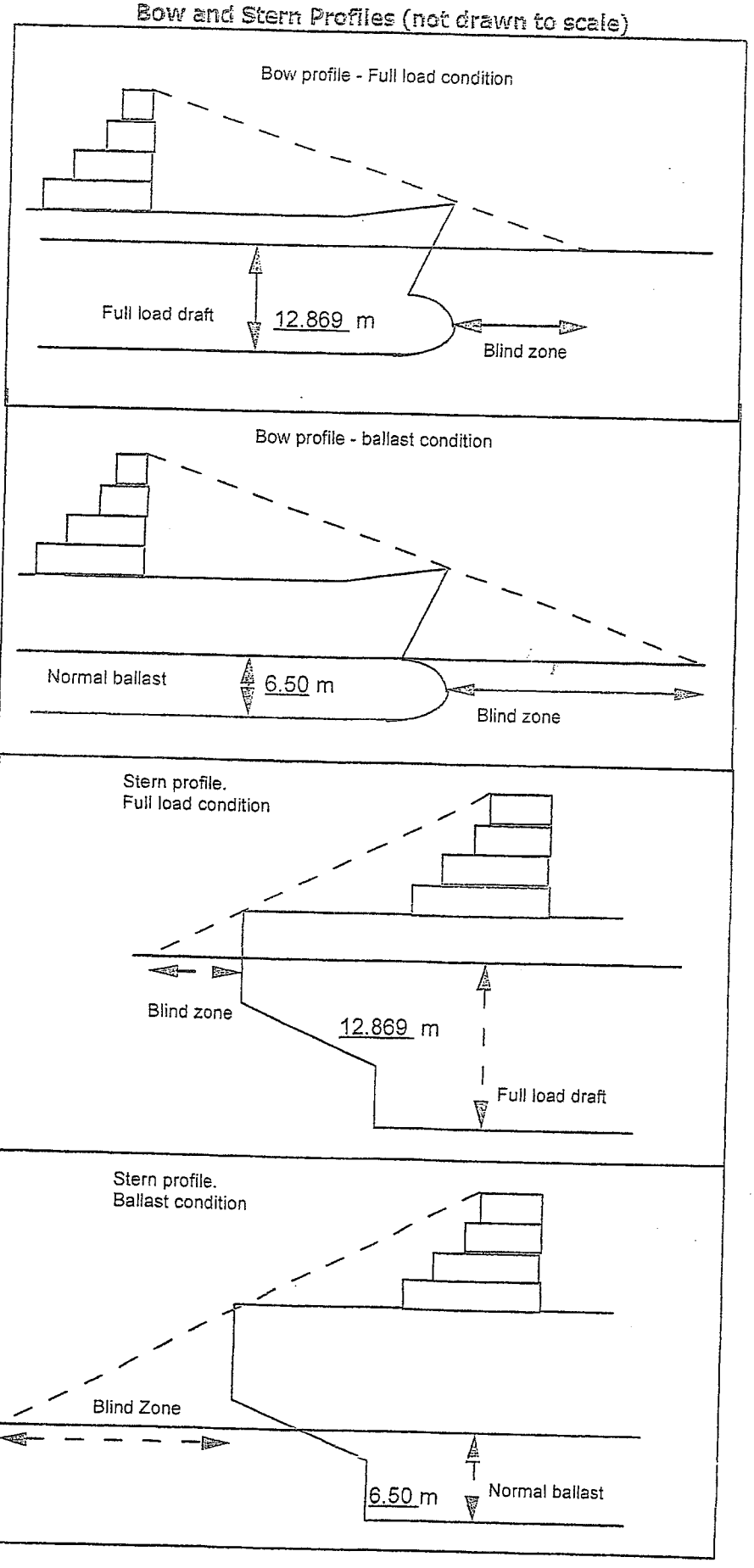
Rudders(s)

Type : SEMI-BALANCE
Number of units : 1
Total rudder area : 47.59m

Bow and Stern Thrusters

Type : N/A
Number of units : N/A
Stern thruster capacity : N/A

Bow and Stern Profiles (not drawn to scale)



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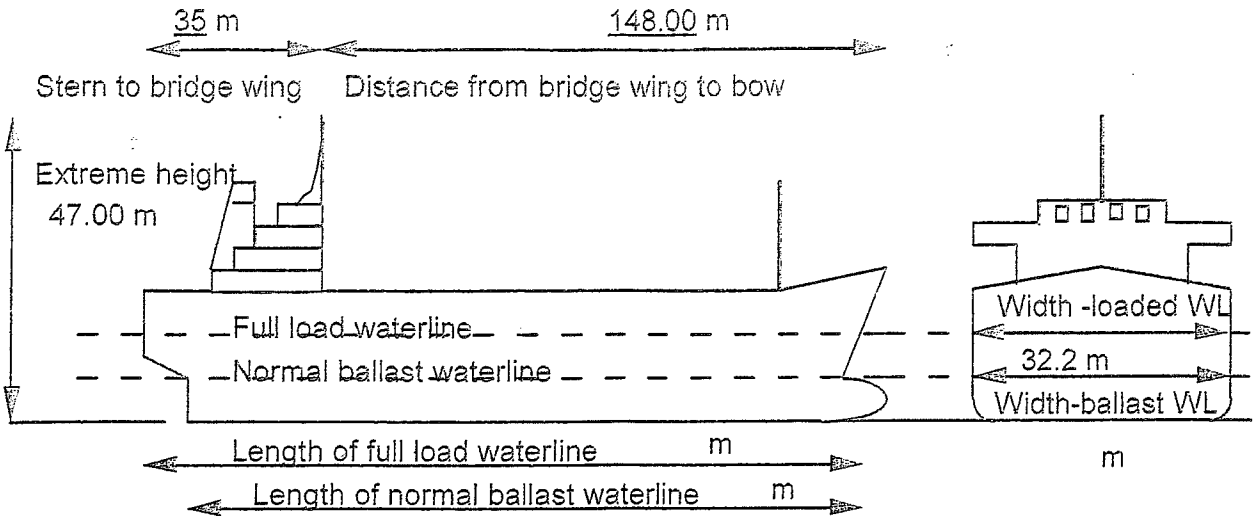
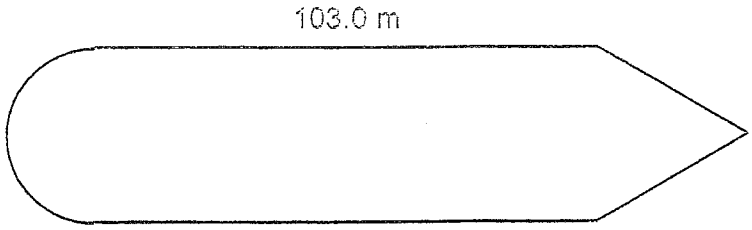
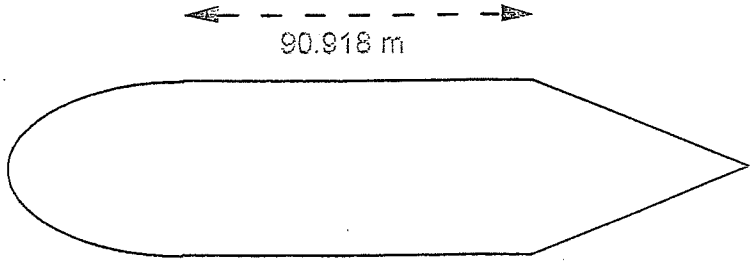
Other Hull Particulars



Length of parallel mid body - full load condition



Length of parallel mid body - normal ballast condition



Please note below any items (including dimensions) of specific hull details not specified above relevant to the vessel, e.g. - protruding bridge wings or bulbous bows.

1.2 Characteristics of Main Engine (Trial or Estimated)

		Speed (Knots)		Thrust	
Engine order	RPM	Ballast	Loaded	Ballast	Loaded
Full Ahead (Sea)	117	15.5	14.5		
Full Ahead (Man)	85	11.5	10.6		
Half Ahead	75	10.2	9.3		
Slow Ahead	67	9.0	8.1		
Dead Slow Ahead	38	4.5	3.6		
Dead Slow Astern	38	3.1	2.5		
Slow Astern	67	6.3	5.7		
Half Astern	75	7.1	6.5		
Full Astern	85	8.0	7.4		

Maximum No. of consecutive starts (diesel engine) 16 Time limit astern

Minimum operating Revolutions 32 rpm Critical revolutions 47-58rpm

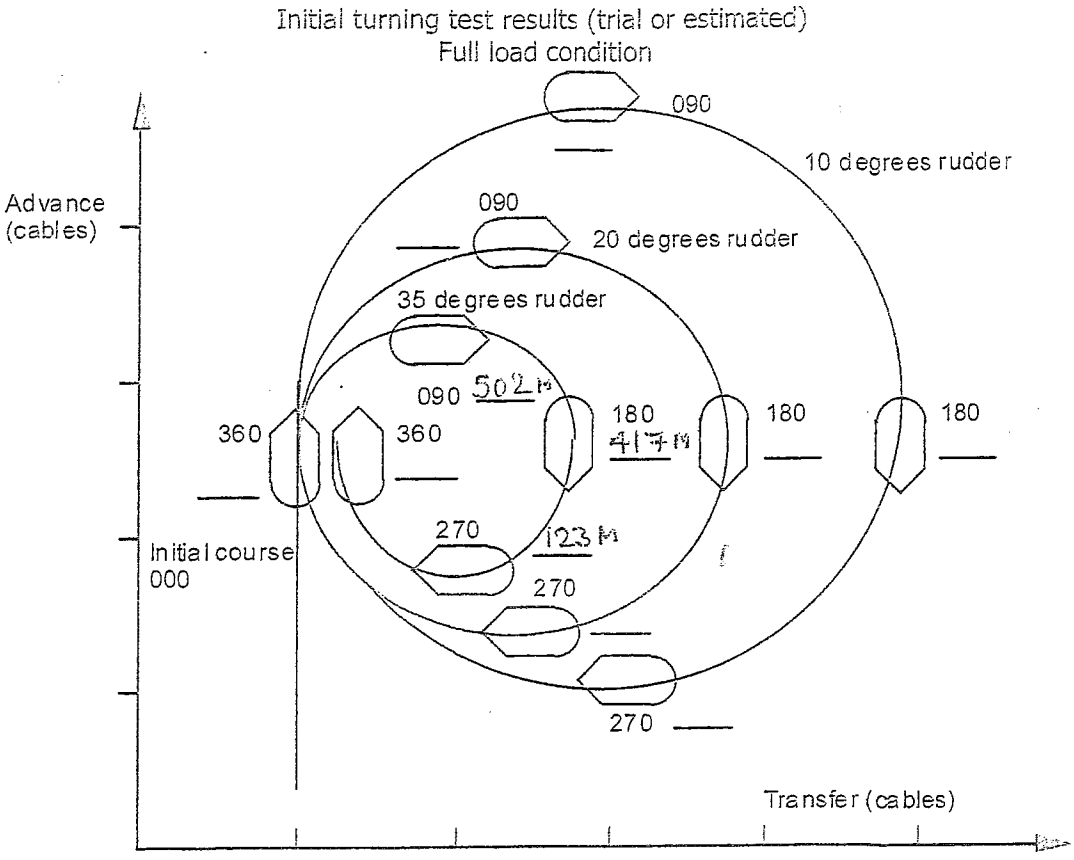
Speed at minimum operating revolutions 4-0 KTS

Time taken to effect changes in Engine Telegraph Settings

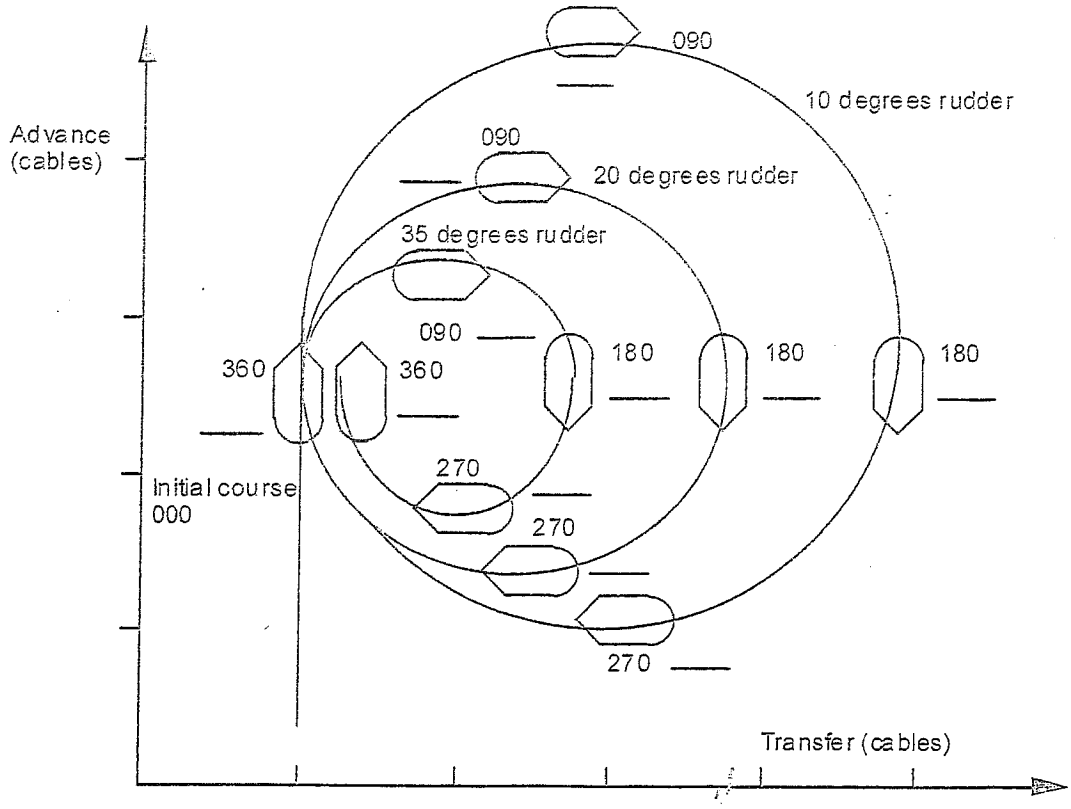
	Time Taken	
Change in Engine Telegraph Settings	Routine	Emergency
Full astern from Full Sea speed Ahead		
Full astern from Full Ahead speed		
Full astern from Half Ahead speed		
Full astern from Slow Ahead speed		
Stop Engine from Full Sea speed Ahead		
Stop Engine from Full Ahead speed		
Stop Engine from Half Ahead speed		
Stop Engine from Slow Ahead speed		

2. MANOEUVRING CHARACTERISTICS IN DEEP WATER

2.1 Ships Particulars



Normal ballast condition



Stern track shown in both of the above diagrams

Environmental conditions during test

Wind Direction	Wind speed	Sea State	Depth of water

Table of Course Change Test Results

Full Ahead Sea Speed

Full load condition, **10 degrees** of rudder

Change of Heading	Time from W/O	Speed after turn	Rate of Turn	Advance in cables	Transfer in cables	Point of initiation of counter rudder	Distance to New course
10 20 30							
40 50 60							
70 80 90							
100 110 120							
130 140 150							
160 170 180							

Full Ahead Sea Speed

Normal ballast condition, **10 degrees** of rudder

Change of Heading	Time from W/O	Speed after turn	Rate of Turn	Advance in cables	Transfer in cables	Point of initiation of counter rudder	Distance to New course
10 20 30							
40 50 60							
70 80 90							
100 110 120							
130 140 150							
160 170 180							

Full Ahead Sea Speed

Full load condition, **20 degrees** of rudder

Change of Heading	Time from W/O	Speed after turn	Rate of Turn	Advance in cables	Transfer in cables	Point of initiation of counter rudder	Distance to New course
10 20 30							
40 50 60							
70 80 90							
100 110 120							
130 140 150							
160 170 180							

Full Ahead Sea Speed

Normal ballast condition, **20 degrees** of rudder

Change of Heading	Time from W/O	Speed after turn	Rate of Turn	Advance in cables	Transfer in cables	Point of initiation of counter rudder	Distance to New course
10 20 30							
40 50 60							
70 80 90							
100 110 120							
130 140 150							
160 170 180							

Full Ahead Sea Speed

Full load condition, **35 degrees** of rudder

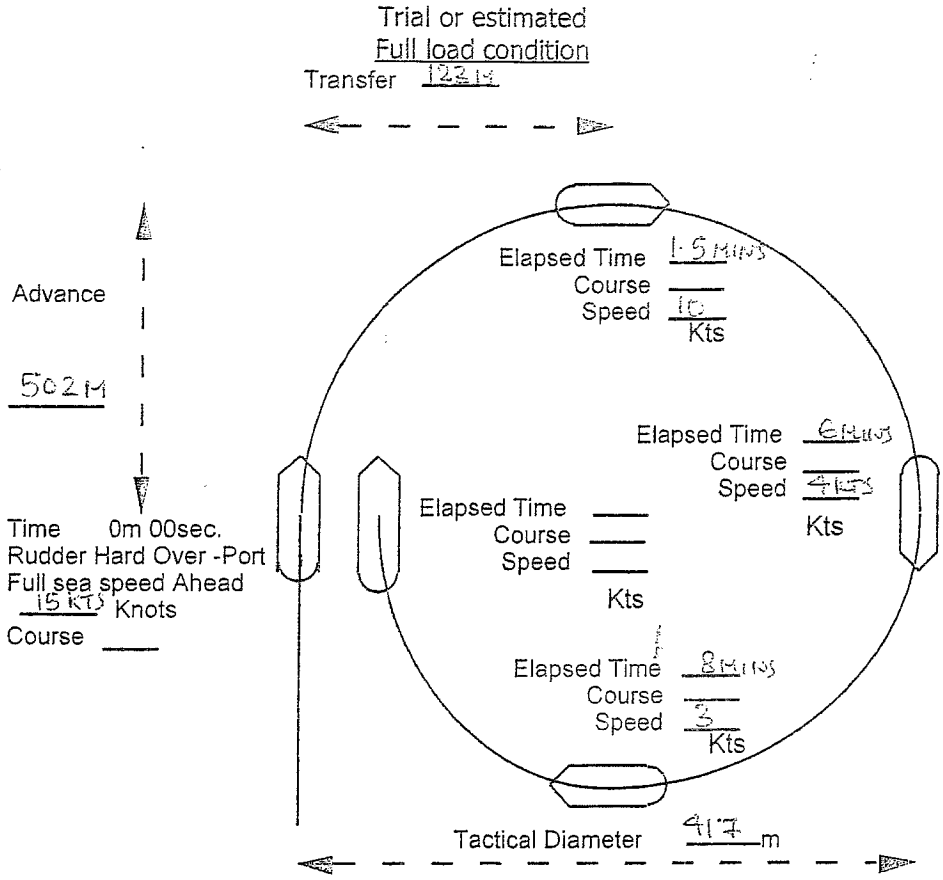
Change of Heading	Time from W/O	Speed after turn	Rate of Turn	Advance in cables	Transfer in cables	Point of initiation of counter rudder	Distance to New course
10 20 30							
40 50 60							
70 80 90							
100 110 120							
130 140 150							
160 170 180							

Full Ahead Sea Speed

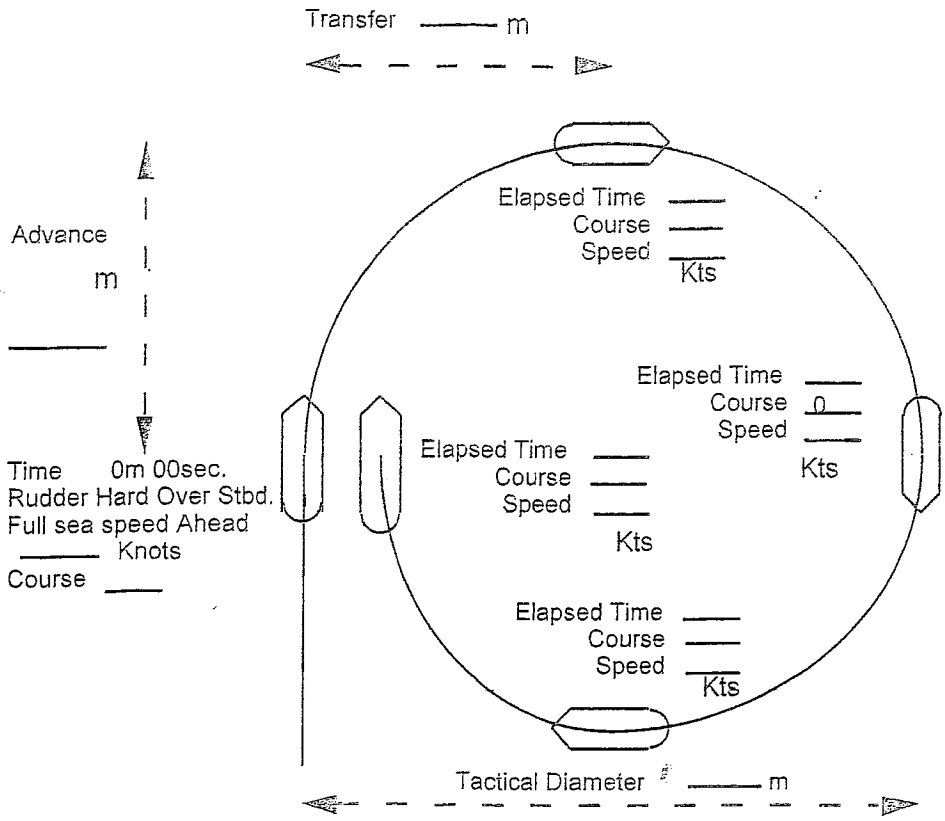
Normal ballast condition, **35 degrees** of rudder

Change of Heading	Time from W/O	Speed after turn	Rate of Turn	Advance in cables	Transfer in cables	Point of initiation of counter rudder	Distance to New course
10 20 30							
40 50 60							
70 80 90							
100 110 120							
130 140 150							
160 170 180							

2.2 Turning Circles in Deep Water



Normal ballast condition



Track shown is for stern track

Maximum rudder angle used throughout turn

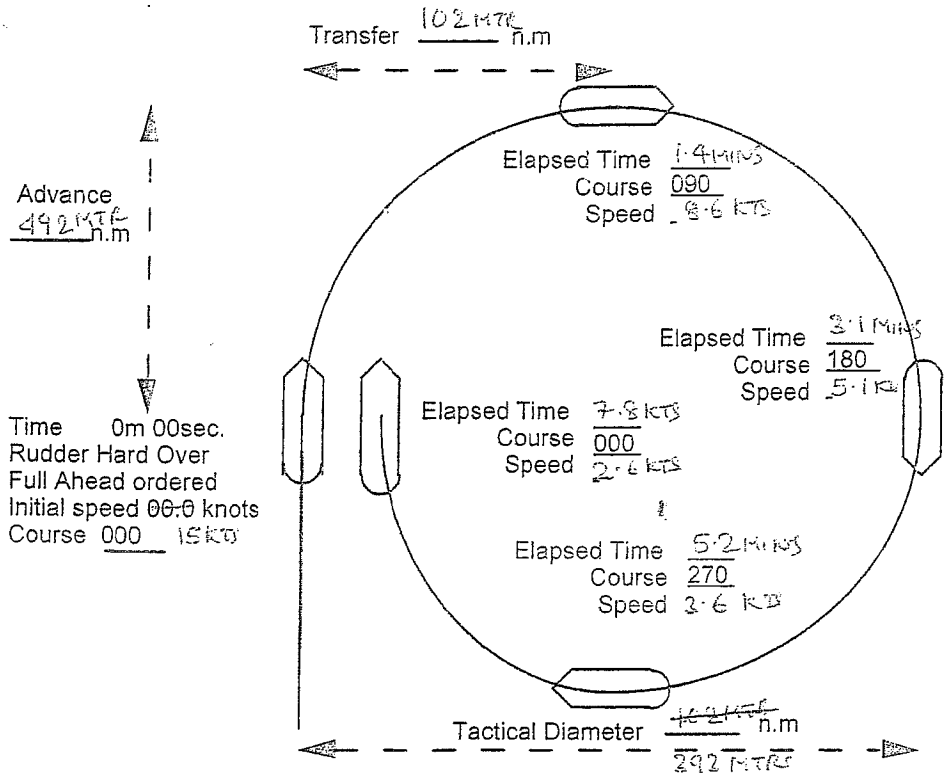
Environmental conditions during Manoeuvring Trial

Wind Direction	Wind speed	Sea State	Depth of water
		Moderate	m

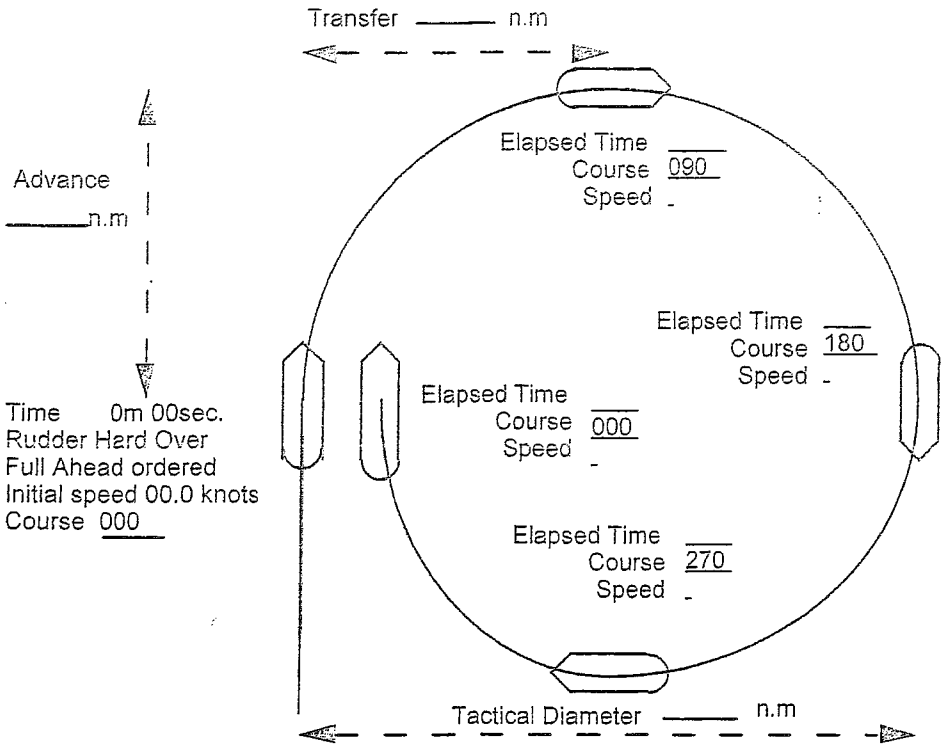
2.3 Accelerating Turn

Trial or estimated

Full load condition



Normal ballast condition



Track shown is for stern track

Maximum rudder angle used throughout turn

Environmental conditions during Manoeuvring Trial

Wind Direction	Wind speed	Sea State	Depth of water

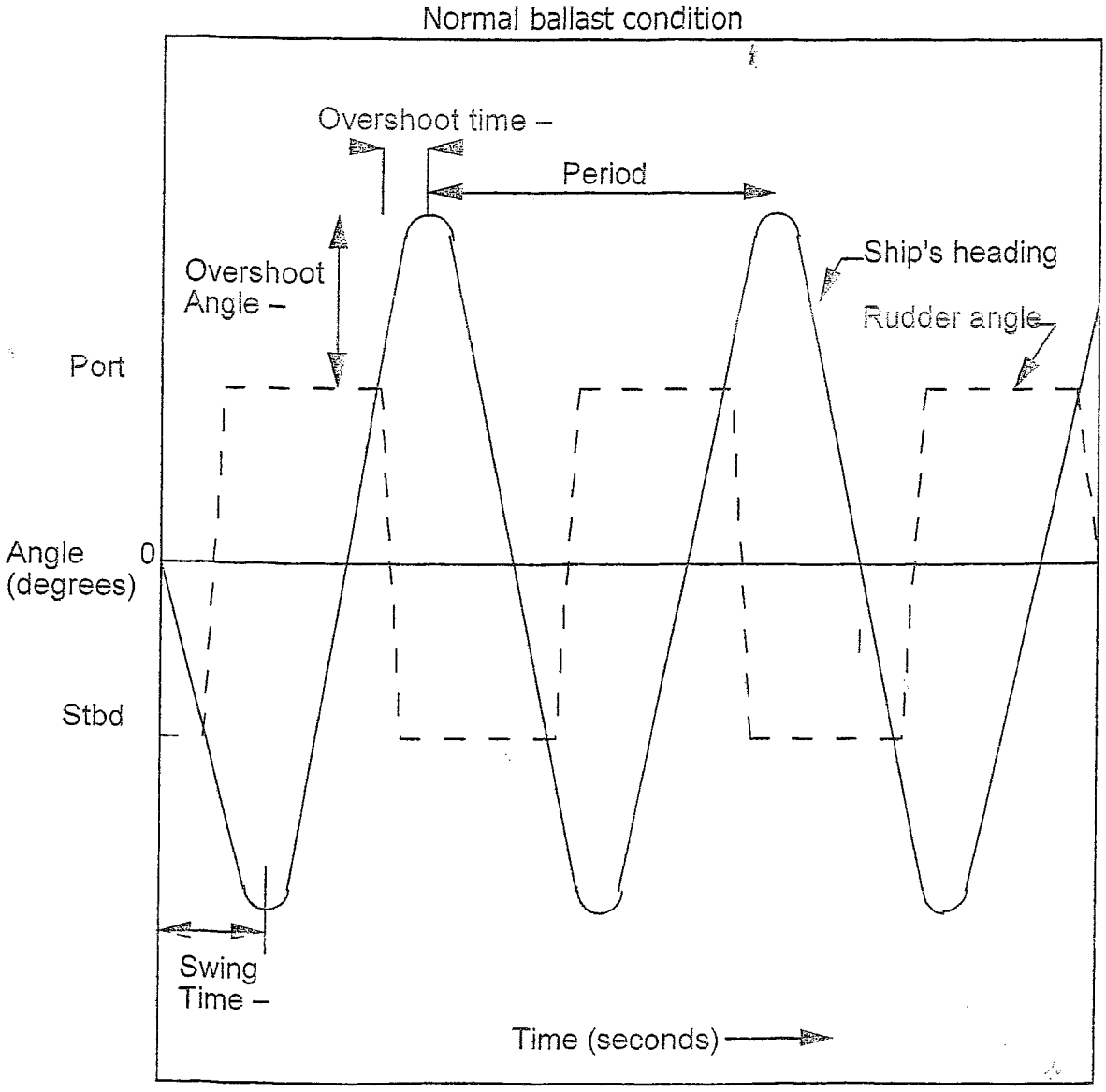
2.4 Yaw Checking Tests (Trial or Estimated)

Zig-zag (or Kempf) Manoeuvre

The manoeuvre provides a qualitative measure of the effectiveness of the rudder to initiate and check changes of heading.

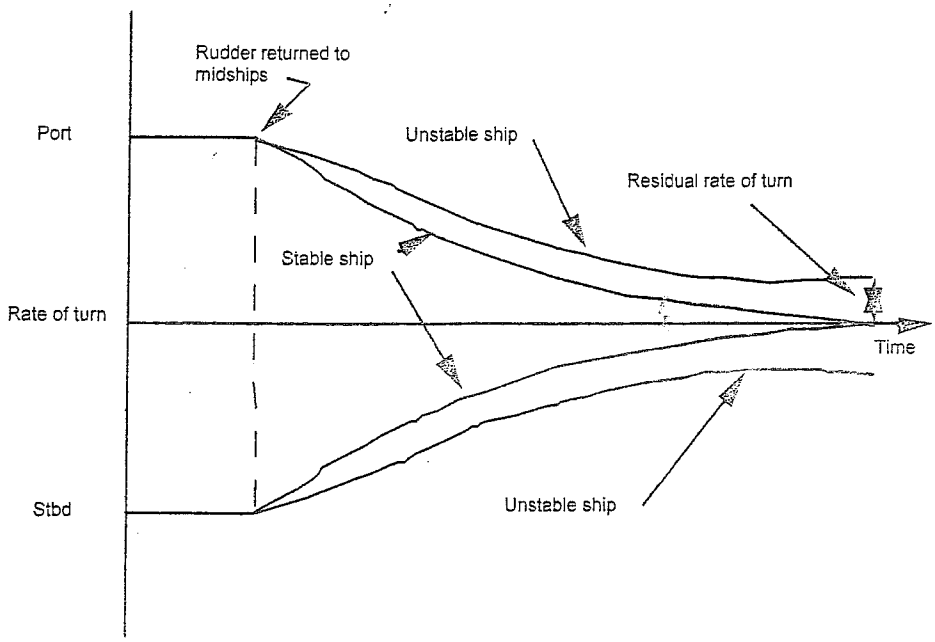
The manoeuvre is performed in the following manner. With the ship steaming at a uniform speed and on a constant heading a nominal rudder angle, say 20 degrees, is applied as quickly and as smoothly as possible and held constant until the ships heading has changed by 20 degrees (check angle) from the base course. At this point 20 degrees of opposite rudder is applied and held until the ship's heading has crossed the base course and is 20 degrees in the opposite direction, the rudder is then reversed as before. This procedure is repeated until the ship's head has passed through the base course 5 times. During the manoeuvre the ship's heading and rudder angle are recorded continuously. The usual rudder angle/check angle used is 20 degrees/20 degrees but other combinations are 5 degrees/20 degrees and 10 degrees/20 degrees. The main parameters used for comparison are the overshoot angle, overshoot time and the period.

Zig-zag (or Kempf) Manoeuvre: Ship's Heading and Rudder Angle against Time



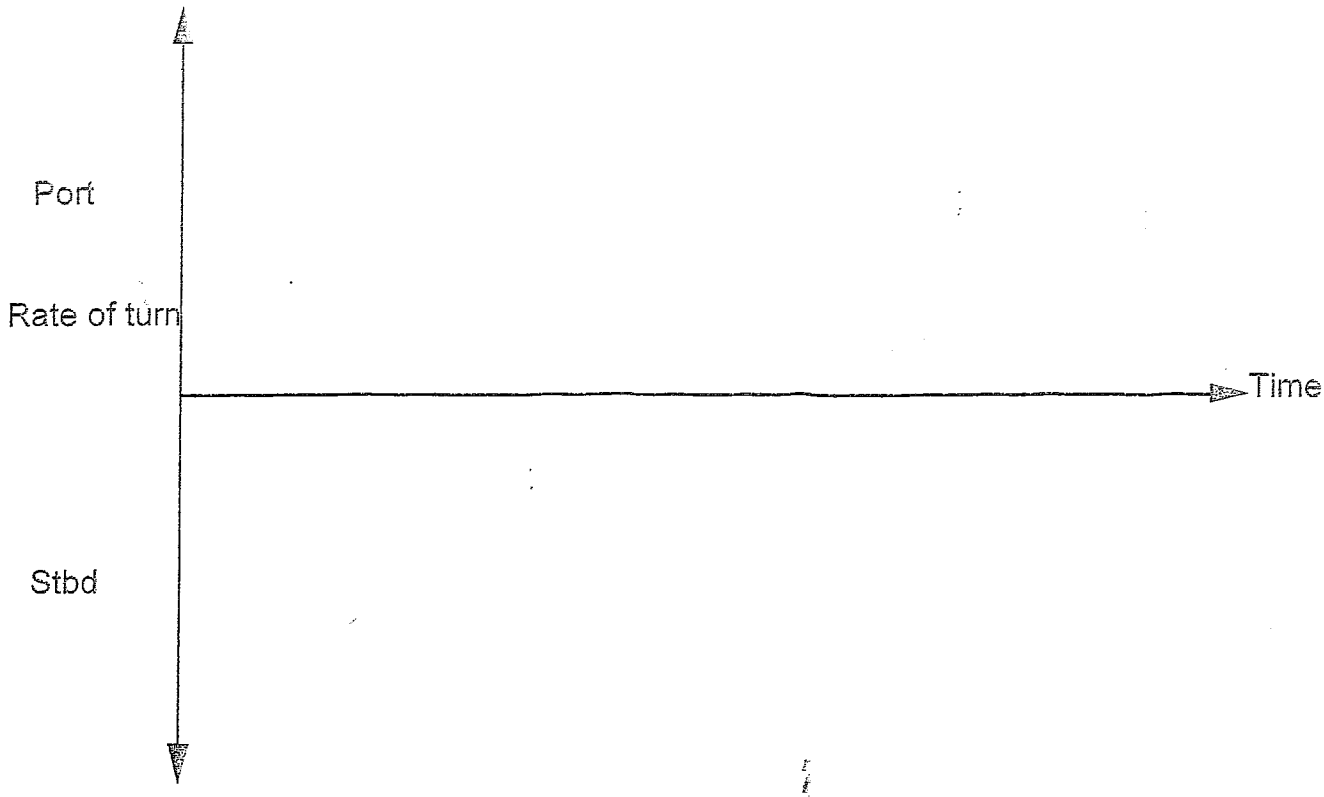
2.5 Pull Out Manoeuvre

The pull out manoeuvre was developed as a simple test to give a quick indication of a ship's course stability. The ship is held on a steady course and at a steady speed. A rudder angle of approximately 20 degrees is applied and the ship allowed to achieve a steady rate of turn; at this point the rudder is returned to midships. The rate of turn is now allowed to decay with the rudder held amidships. If the ship is stable the rate of turn will decay to zero for turns to both port and starboard. If the ship has a steering bias, then port and starboard turns will decay to the same small rate of turn on whichever hand the bias exists. If the ship is unstable then the rate of turn will reduce to some residual rate of turn as shown in the diagram.



Enter below the relevant values for own vessel and note whether stable or unstable

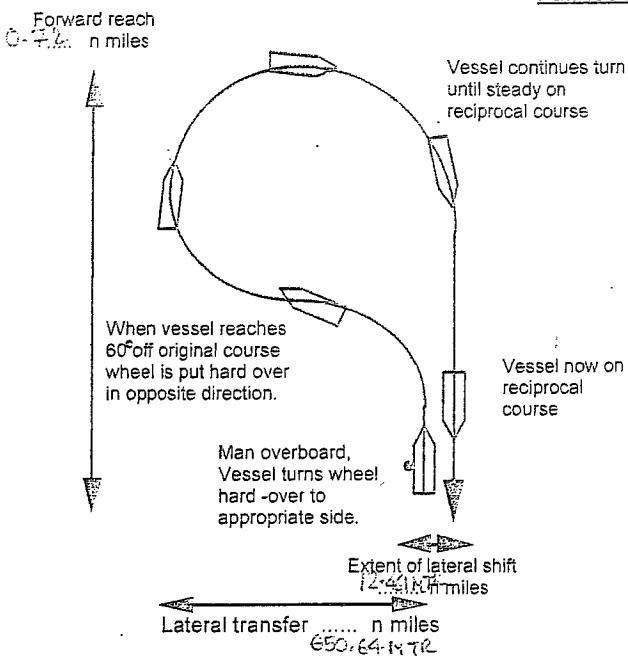
Pull out Manoeuvre: Rate of turn against Time

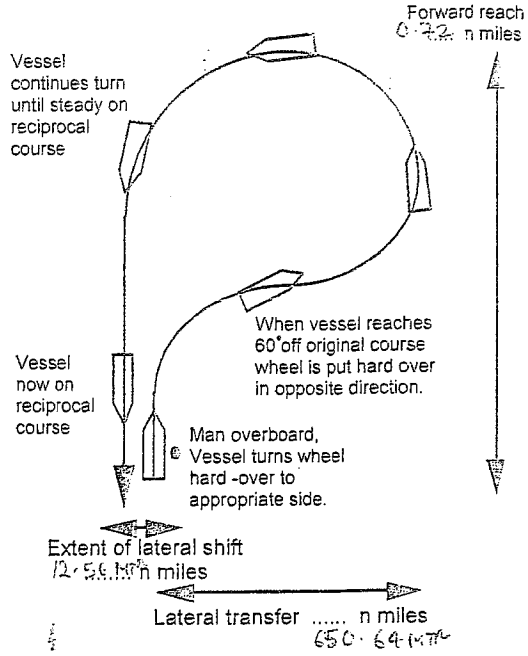

Port
Rate of turn
Time
Stbd

2.6 Man-Overboard and Parallel Course Manoeuvres

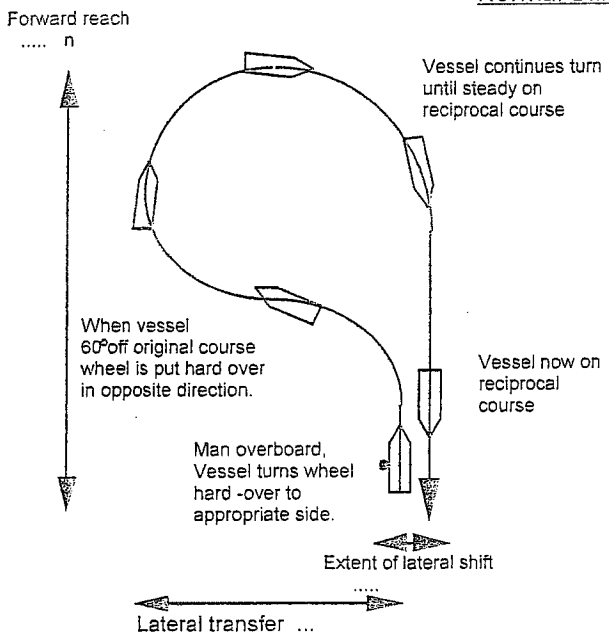
Williamson Turn shown

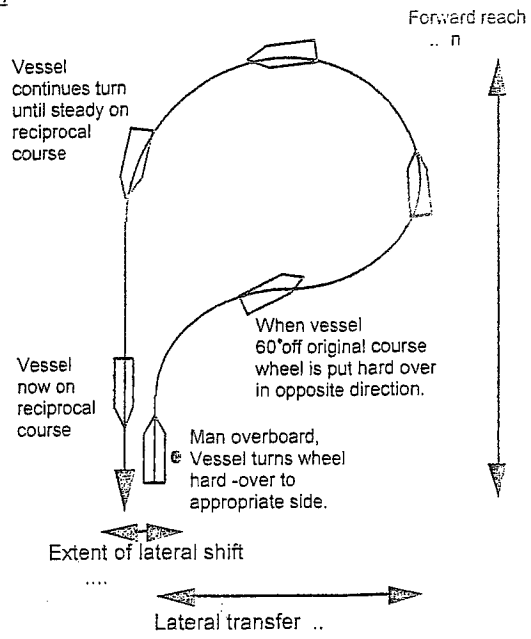
Full load condition



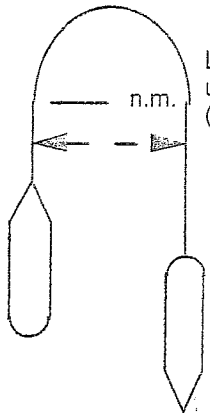


Normal ballast condition





Parallel course manoeuvre

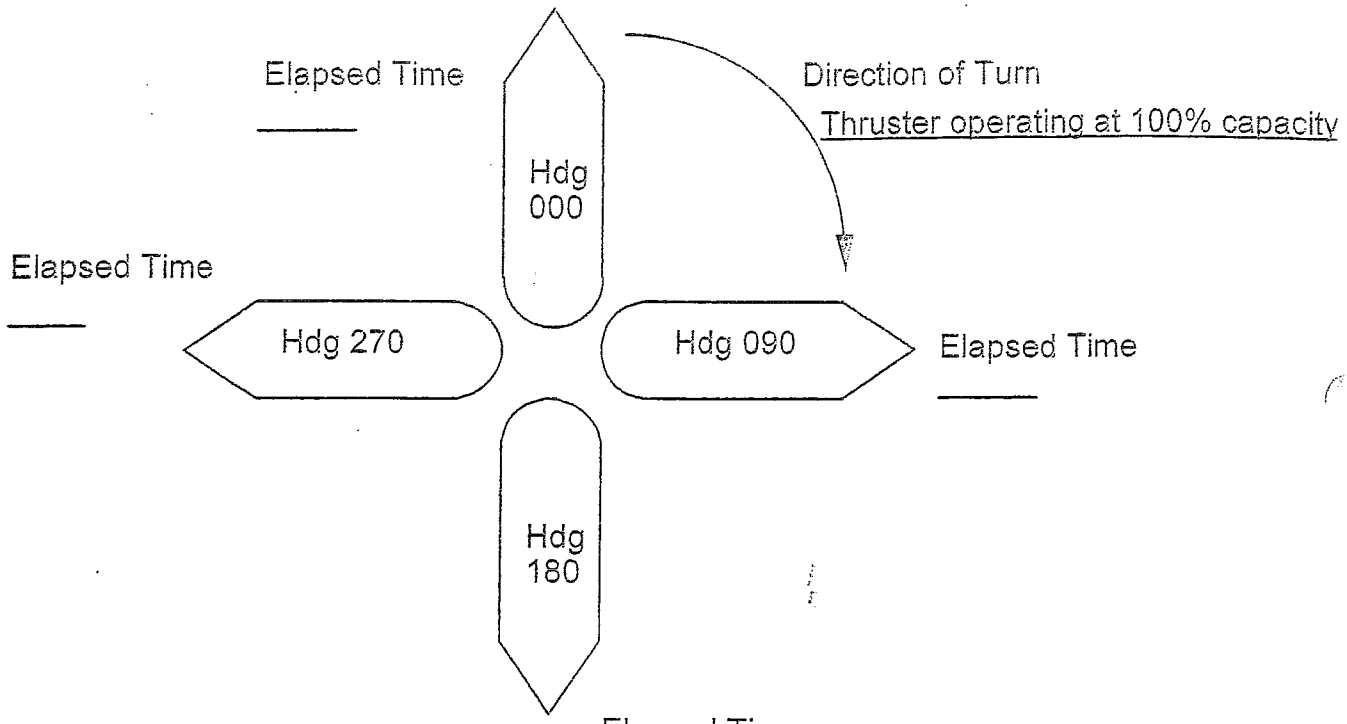


Lateral shift to a parallel course using maximum rudder angle. (assume loaded condition)

2.7 Lateral Thruster Capabilities (Trial or Estimated)

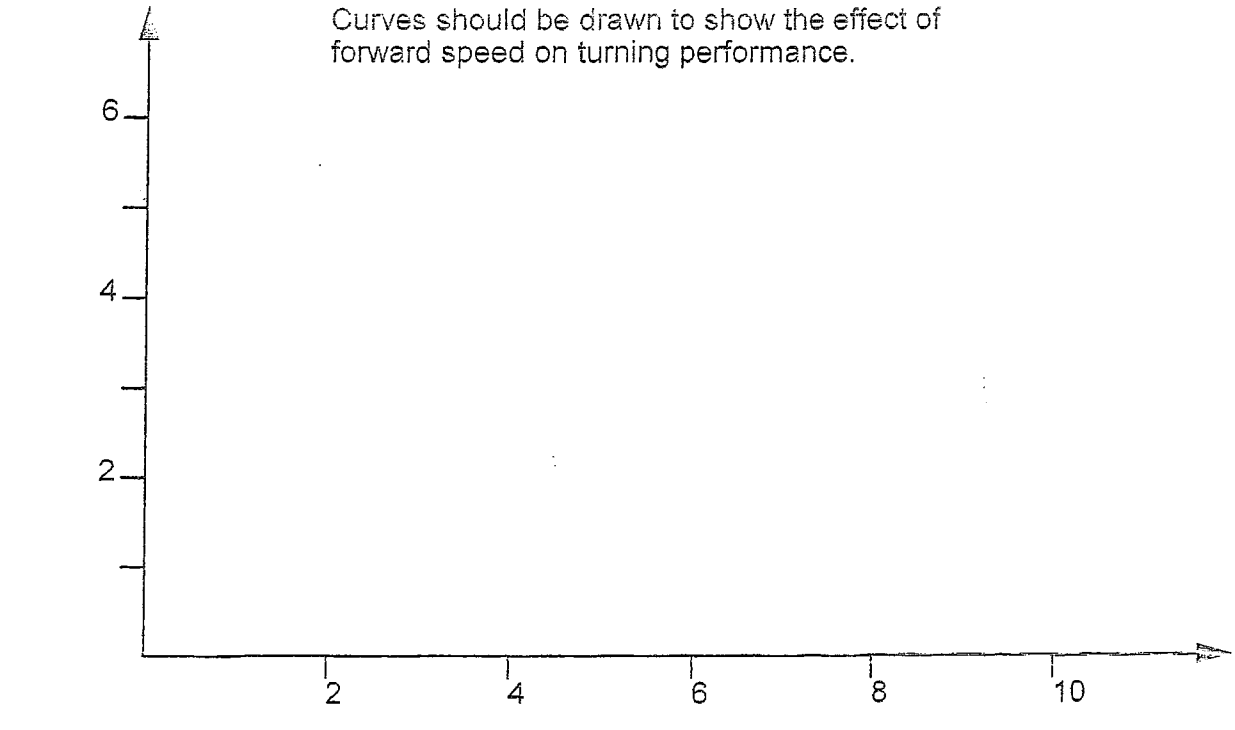
Zero forward speed

FULL LOAD CONDITION



Effect of forward speed on turning performance

Curves should be drawn to show the effect of forward speed on turning performance.

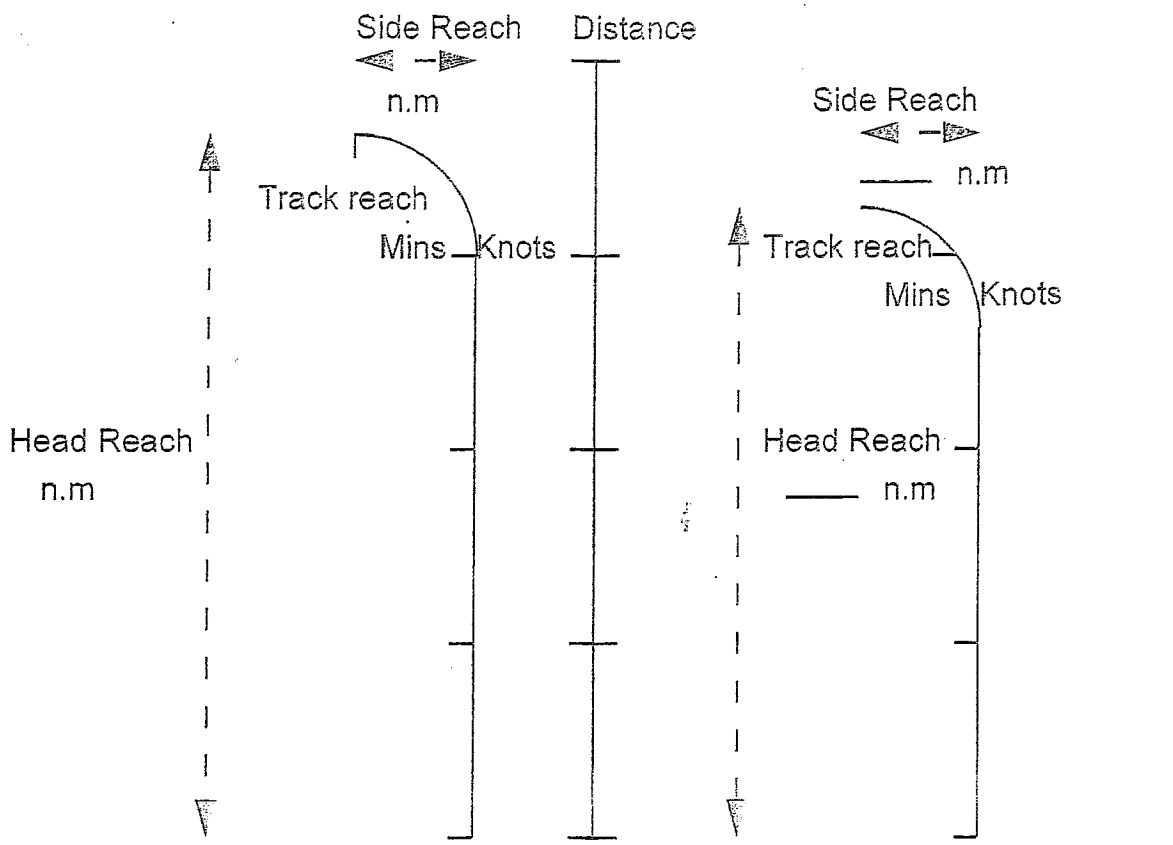


The bow thruster becomes ineffective at forward speeds in excess of _____ Knots

In wind speeds in excess of _____ knots the bow thruster becomes ineffective.

3. STOPPING AND SPEED CONTROL CHARACTERISTICS IN DEEP WATER

3.1 Stopping Ability



FULL ASTERN FROM FULL SEA AHEAD

FULL ASTERN FROM FULL AHEAD

From full ahead sea to full astern

Initial rpm	Final rpm	Initial Speed	Final Speed	Track reach	Head reach	Side reach
		Kts.	knots	n. miles	n. miles	n. miles

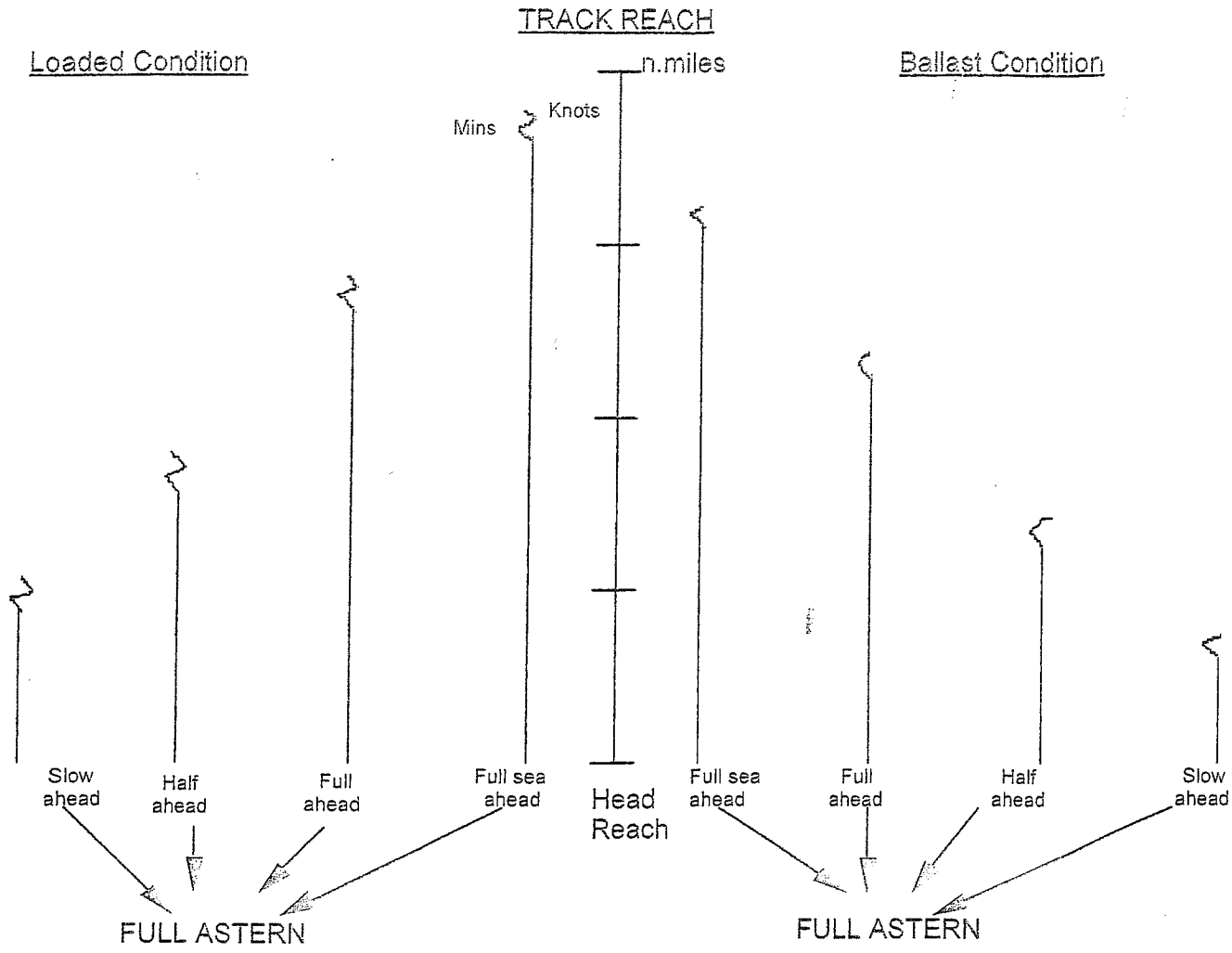
From full ahead to full astern

Initial rpm	Final rpm	Initial Speed	Final Speed	Track reach	Head reach	Side reach
			0.0 knots	n. miles	n. miles	n. miles

Environmental conditions during Manoeuvring Trial

Wind Direction	Wind speed	Sea State	Depth of water
	m/s	Smooth	m

Stopping Ability (Estimated)



Full Load condition

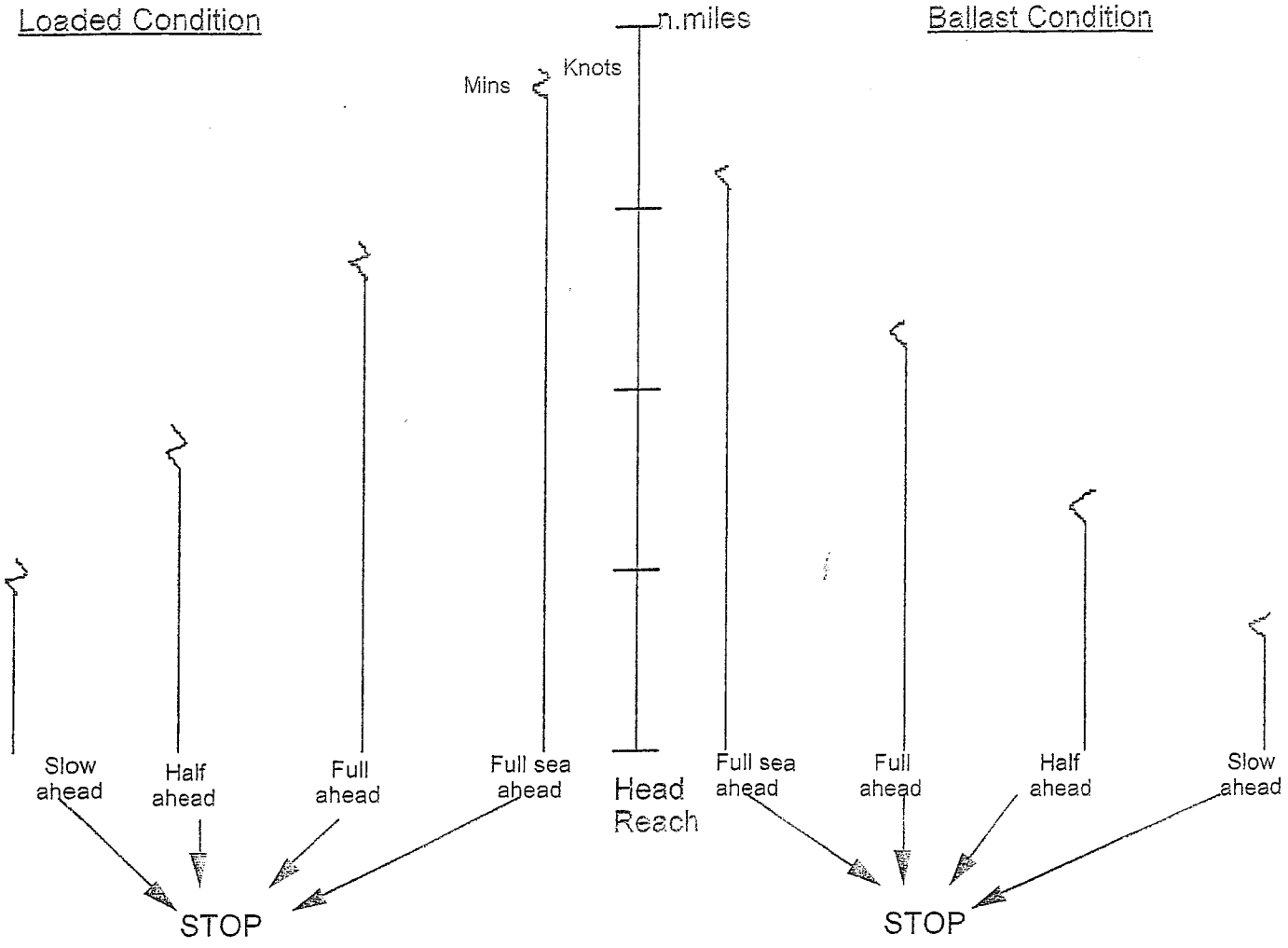
Full astern from:	Track Reach	Head Reach	Side Reach	Time required	Track reach deceleration factor
Full ahead (sea)	n.miles	n.miles	n.miles		
Full ahead	n.miles	n.miles	n.miles		
Half Ahead	n.miles	n.miles	n.miles		
Slow Ahead	n.miles	n.miles	n.miles		

Normal Ballast condition

Full astern from:	Track Reach	Head Reach	Side Reach	Time required	Track reach deceleration factor
Full ahead (sea)	n.miles	n.miles	n.miles		
Full ahead	n.miles	n.miles	n.miles		
Half Ahead	n.miles	n.miles	n.miles		
Slow Ahead	n.miles	n.miles	n.miles		

Stopping Ability (Estimated)

TRACK REACH



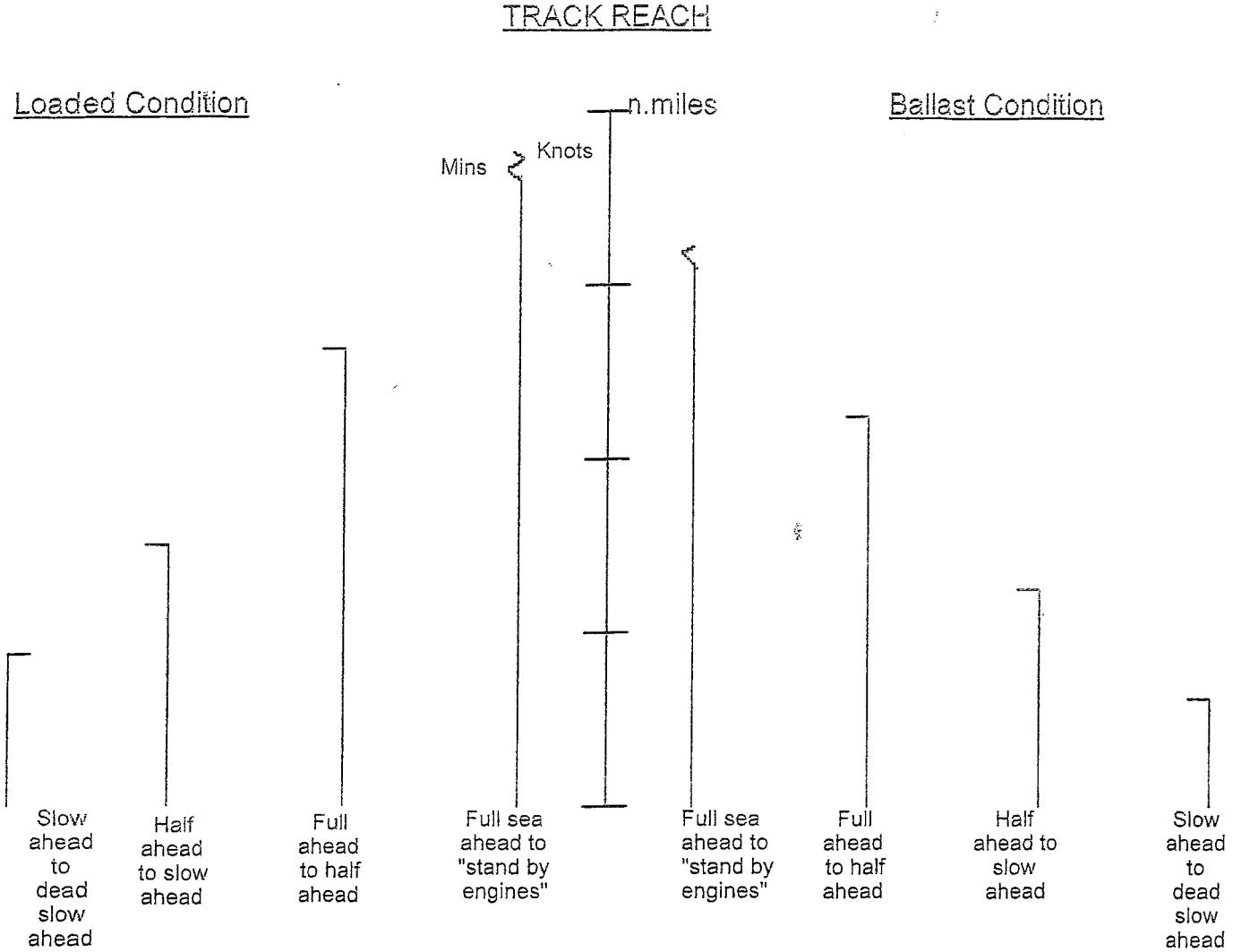
Full Load Condition

Stop Engine from:	Track Reach	Head Reach	Side Reach	Time required	Track reach deceleration factor
Full ahead (sea)	n.miles	n.miles	n.miles		
Full ahead	n.miles	n.miles	n.miles		
Half Ahead	n.miles	n.miles	n.miles		
Slow Ahead	n.miles	n.miles	n.miles		

Normal Ballast Condition

Stop Engine from:	Track Reach	Head Reach	Side Reach	Time required	Track reach deceleration factor
Full ahead (sea)	n.miles	n.miles	n.miles		
Full ahead	n.miles	n.miles	n.miles		
Half Ahead	n.miles	n.miles	n.miles		
Slow Ahead	n.miles	n.miles	n.miles		

3.2 Deceleration Performance (Estimated)



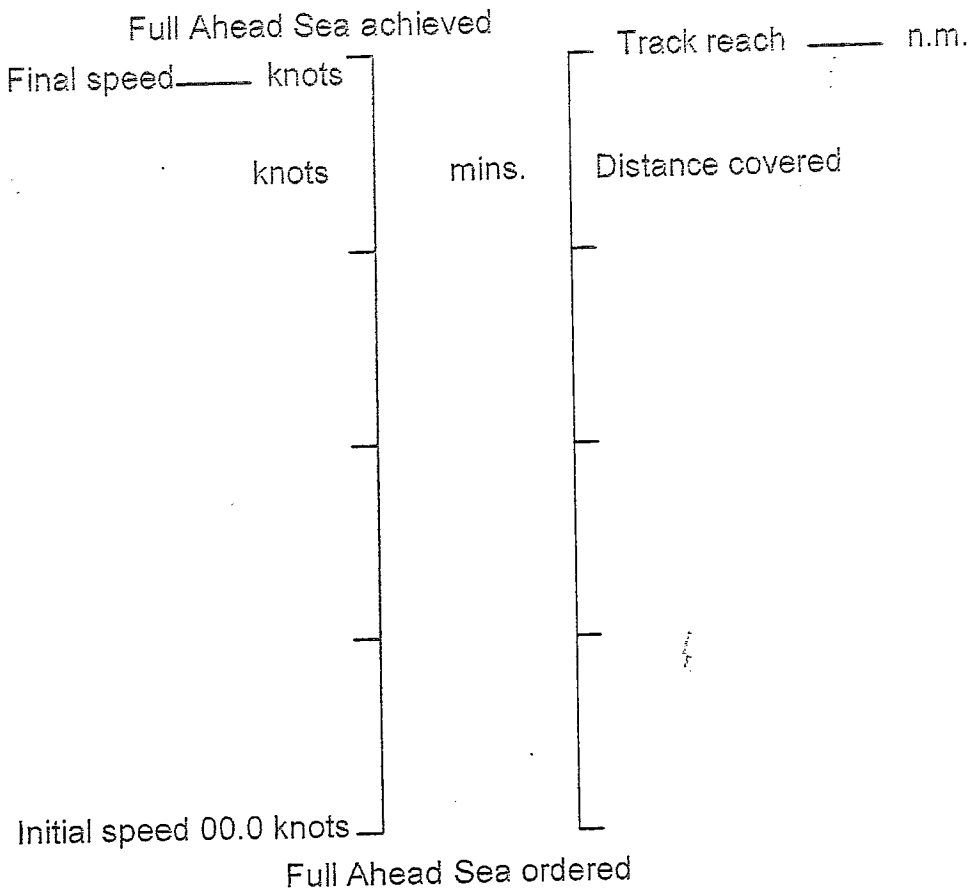
Full Load condition

Engine orders	Track reach	Time required	Deceleration factor
Full sea speed to "stand by engines"	n. mile		
Full ahead to half ahead	n. mile		
Half ahead to slow ahead	n. mile		
Slow ahead to dead slow ahead	n. mile		

Normal Ballast condition

Engine orders	Track reach	Time required	Deceleration factor
Full sea speed to "stand by engines"	n. mile		
Full ahead to half ahead	n. mile		
Half ahead to slow ahead	n. mile		
Slow ahead to dead slow ahead	n. mile		

3.3 Acceleration Performance



Time taken for ship to reach full sea speed ahead from zero speed

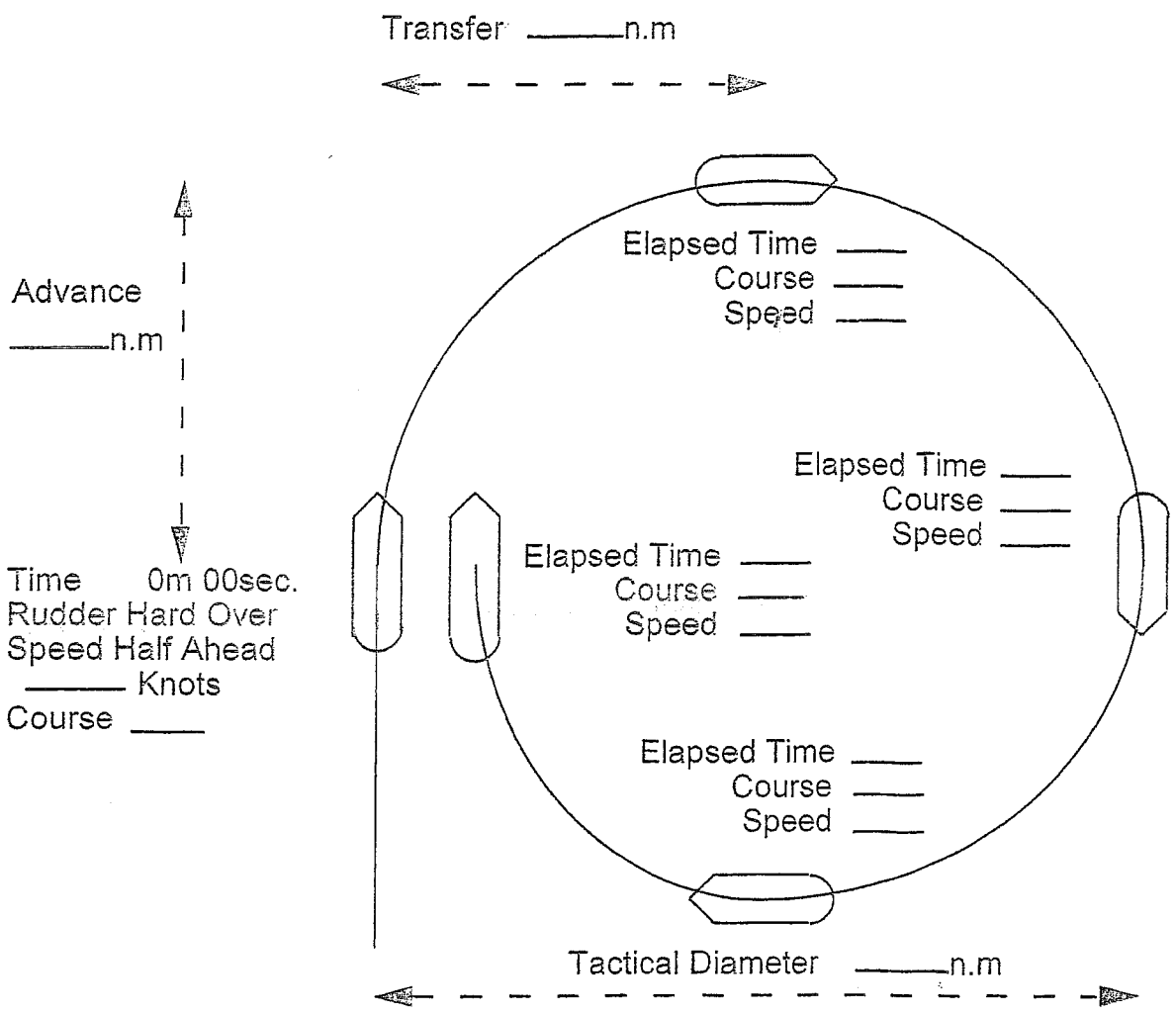
Speed	Distance covered	Elapsed time
2 knots	n.miles	
4 knots	n.miles	
6 knots	n.miles	
8 knots	n.miles	
10 knots	n.miles	
12 knots	n.miles	
14 knots	n.miles	
16 knots	n.miles	
18 knots	n.miles	

4. MANOEUVRING CHARACTERISTICS IN SHALLOW WATER

4.1 Turning Circle in Shallow Water (Estimated)

Full load condition

Track shown is for stern track



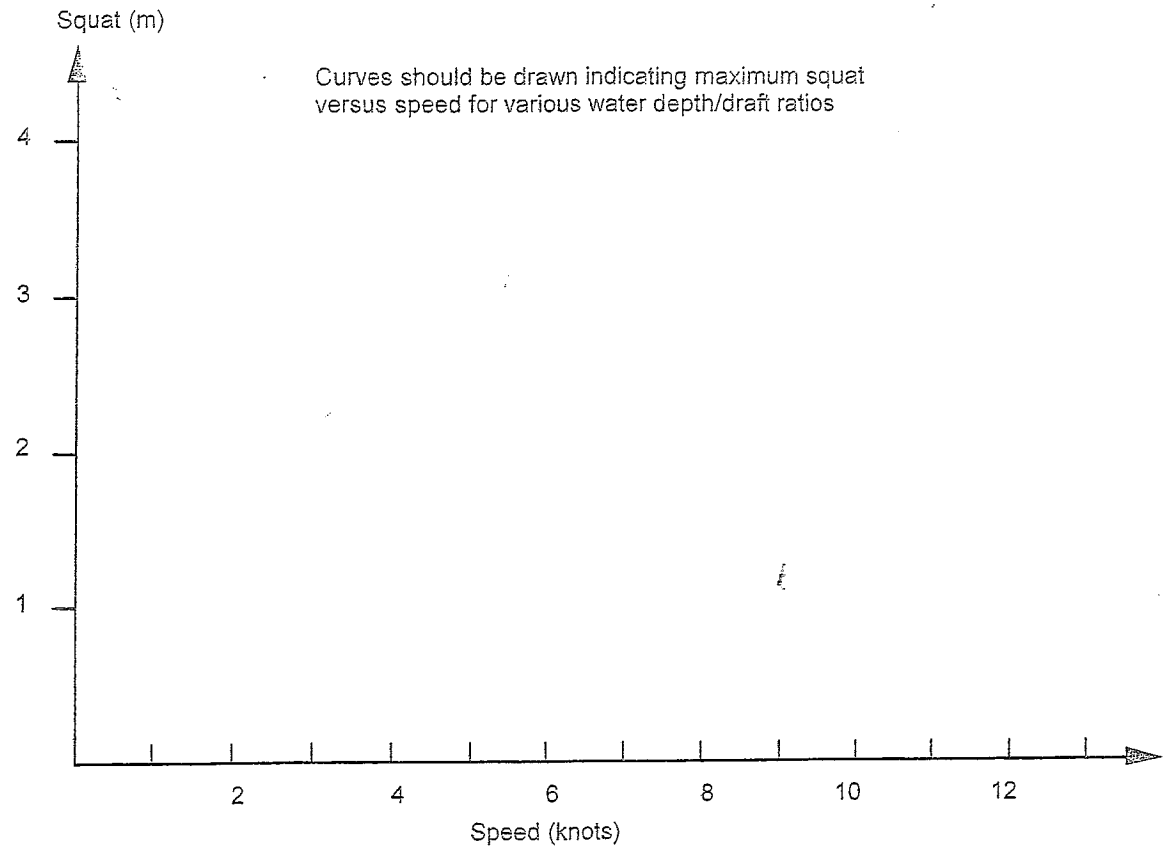
Initial speed Half Ahead

Rudder angle applied should be the maximum throughout the turn

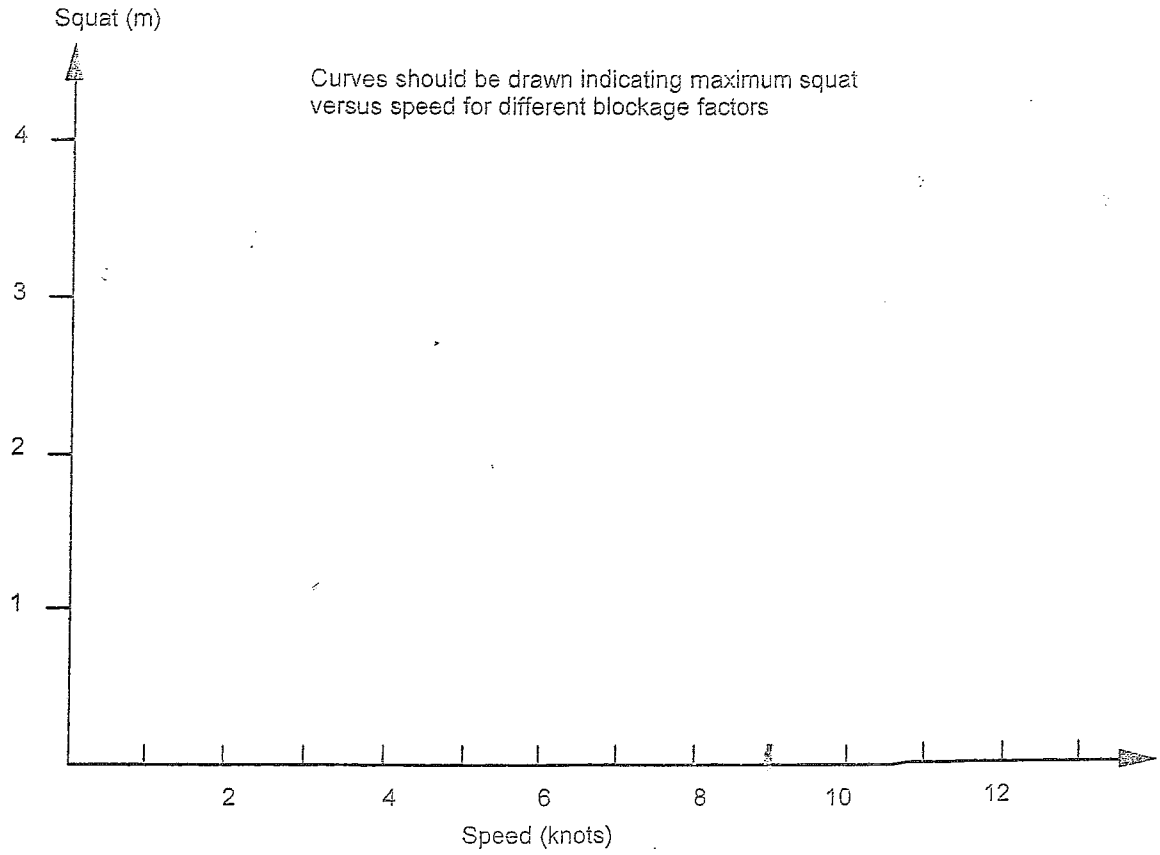
Water depth to draft ratio should be 1.2

4.2 Squat (Estimated)

Shallow water - infinite width of channel



Shallow and confined water


Squat (m)
Curves should be drawn indicating maximum squat versus speed for different blockage factors
4
3
2
1
2
4
6
8
10
12
Speed (knots)

SQUAT TABLE - CONFIND WATER

5. EFFECT OF SQUAT IN CONFINED WATERS ON VESSEL'S DRAFT (In Metres)

DRAFT IN METRES (ENTER CORRESPONDING Cb SUITABLE TO YOUR VESSEL)

DRAFT		6.00	6.50	7.00	7.50	8.00	8.50	9.00	9.50	10.00	10.50	11.00	11.50	12.00	12.50	13.00
Cb		0.746	0.752	0.757	0.762	0.767	0.772	0.776	0.781	0.786	0.790	0.794	0.799	0.803	0.807	0.810
VESSEL'S SPEED THROUGH WATER IN KNOTS (V)	4	0.2388	0.2406	0.2422	0.2438	0.2454	0.2470	0.2484	0.2500	0.2516	0.2528	0.2540	0.2556	0.2570	0.2582	0.2592
	6	0.5372	0.5414	0.5450	0.5486	0.5522	0.5558	0.5588	0.5624	0.5660	0.5688	0.5716	0.5752	0.5782	0.5810	0.5832
	8	0.9548	0.9626	0.9690	0.9754	0.9818	0.9882	0.9932	0.9996	1.0060	1.0112	1.0164	1.0228	1.0278	1.0330	1.0368
	9	1.2086	1.2182	1.2264	1.2344	1.2426	1.2506	1.2572	1.2652	1.2734	1.2798	1.2862	1.2944	1.3008	1.3074	1.3122
	10	1.4920	1.5040	1.5140	1.5240	1.5340	1.5440	1.5520	1.5620	1.5720	1.5800	1.5880	1.5980	1.6060	1.6140	1.6200
	11	1.8054	1.8198	1.8320	1.8440	1.8562	1.8682	1.8780	1.8900	1.9022	1.9118	1.9214	1.9336	1.9432	1.9530	1.9602
	12	2.1480	2.1658	2.1802	2.1946	2.2090	2.2234	2.2348	2.2492	2.2636	2.2752	2.2868	2.3012	2.3126	2.3242	[illegible]8
	13	2.5214	2.5418	2.5586	2.5756	2.5924	2.6094	2.6228	2.6398	2.6566	2.6702	2.6838	2.7006	2.7142	2.7276	[illegible]78
	14	2.9240	2.9478	2.9674	2.9870	3.0066	3.0262	3.0420	3.0616	3.0812	3.0968	3.1124	3.1320	3.1478	3.1634	3.1752
	15	3.3570	3.3840	3.4066	3.4290	3.4516	3.4740	3.4920	3.5146	3.5370	3.5550	3.5730	3.5956	3.6136	3.6316	3.6450

ABOVE SQUAT IS CALCULATED USING FORMULA : (2 x V x V x Cb) / 100

V = Speed Through Water

Squat effect in open waters is normally considered to be half of the Confined waters.

Cb = Vessel's Block Coefficient at Draft

5. MANOEUVRING CHARACTERISTICS IN WIND

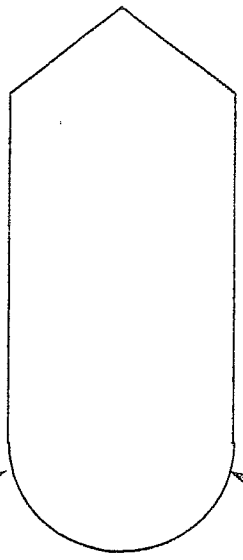
5.1 Wind Forces and Moments (Estimated)

Full load condition

Wind speed	Force (T)	Moment (tm)
10 knots		
20 knots		
30 knots		

Wind speed	Force (T)	Moment (tm)
10 knots		
20 knots		
30 knots		

Wind speed	Force (T)	Moment (tm)
10 knots		
20 knots		
30 knots		



Wind speed	Force (T)	Moment (tm)
10 knots		
20 knots		
30 knots		

Wind speed	Force (T)	Moment (tm)
10 knots		
20 knots		
30 knots		

Wind speed	Force (T)	Moment (tm)
10 knots		
20 knots		
30 knots		

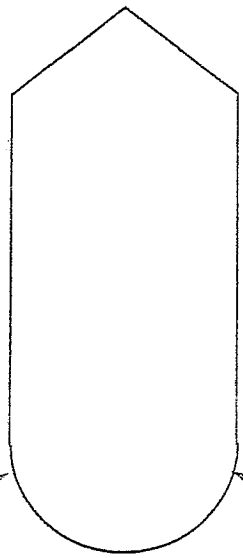
Wind speed	Force (T)	Moment (tm)
10 knots		
20 knots		
30 knots		

Normal ballast condition

Wind speed	Force (T)	Moment (tm)
10 knots		
20 knots		
30 knots		

Wind speed	Force (T)	Moment (tm)
10 knots		
20 knots		
30 knots		

Wind speed	Force (T)	Moment (tm)
10 knots		
20 knots		
30 knots		



Wind speed	Force (T)	Moment (tm)
10 knots		
20 knots		
30 knots		

Wind speed	Force (T)	Moment (tm)
10 knots		
20 knots		
30 knots		

Wind speed	Force (T)	Moment (tm)
10 knots		
20 knots		
30 knots		

Wind speed	Force (T)	Moment (tm)
10 knots		
20 knots		
30 knots		

5.2 Course Keeping Limitation (Estimated)

Full load condition

Relative wind direction	Rudder amount required to maintain course at following wind speeds; Engine on Full Ahead			
	15 knots	30 knots	45 knots	60 knots
000				
045				
090				
135				
180				
225				
270				
315				
360				

Normal Ballast condition

Relative wind direction	Rudder amount required to maintain course at following wind speeds; Engine on Full Ahead			
	15 knots	30 knots	45 knots	60 knots
000				
045				
090				
135				
180				
225				
270				
315				
360				

5.3 Drifting Under Wind Influence (Estimated)

Full load condition

Drifting behaviour under wind influence (no engine power)		
Wind speed	**Direction of drift**	**Rate of drift**
10 knots		
20 knots		
30 knots		
40 knots		
50 knots		
60 knots		

Normal ballast condition

Drifting behaviour under wind influence (no engine power)		
Wind speed	**Direction of drift**	**Rate of drift**
10 knots		
20 knots		
30 knots		
40 knots		
50 knots		
60 knots		

6. MANOEUVRING CHARACTERISTICS AT LOW SPEED (TRIAL OR ESTIMATED)

Minimum operating revolutions of the Main Engine _____

Corresponding speed _____ Kts.

Minimum speed at which course can be kept after stopping engines _____

Main Engine (FuelType:) STX MAN B&W 6S50MC-C Fuel Type : HSFO/ LSMGO)

Laden Voyage

Condition	RPM	Speed (kn)	Fuel Consumption (mt/day)	CLO (lit/day)	SO (lit/day)
Speed Up	113	13.0	(30+2.5) Mt/day	230 lit/day	25 lit/day
Normal	110	12.8	(28.5+2.5) Mt/day	220 lit/day	25 lit/day
Economical	101	11	(25+2.5) Mt/day	180 lit/day	20 lit/day
Slow steaming	NA RPM	NA kn	Mt/day	lit/day	lit/day

Is the Main Engine fitted with following (pls indicate Yes or No) :

Alpha-Lub System	:	NO
Fuel Slide Valves	:	YES
Any Slow steaming devices	:	NO
Bearing Condition Monitor	:	NO
Shaft power monitor	:	NO

Ballast Voyage

Condition	RPM	Speed (kn)	Fuel Consumption (mt/day)	CLO (lit/day)	SO (lit/day)
Normal	110	13.0	(27+2.5) Mt/day	195 lit/day	25 lit/day
Economical	101	12.5	(23+2.5) Mt/day	170 lit/day	20 lit/day
Slow steamin	NA	NA kn	Mt/day	lit/day	lit/day

Request for copies of past 3 voyages (ballast and laden) abst log and reports to be provided.

Auxiliary Engine/s(Fuel Type :) - Fuel Type: HSFO/LSMGO)

Make / Model	:	YANMAR 6N21AL-EV
Rating	:	900KW
Fuel Type	:	HSFO/LSMGO
Fuel Consumption	:	2.5 mt/day per unit
LO Consumption	:	8.0 Lit/day per unit

Boiler/s(Fuel Type :) AALBORGTM OL 18000 , Fuel Type : HSFO/LSMGO)

In Port Operation

Loading Full Cargo	:	7.0 Mt/day(HSFO)
Discharging Full Cargo	:	7.0 Mt/day (HSFO) + 13 Mt/day (LSMGO)(IGG+ FRAMO ENGINES)
Ballast / Deballast	:	5.0 Mt/day
Cargo Heating	:	9.0 Mt/day (Basis BOILER + 2X AE'S) subject to cargo temp to be maintained.
Tank Cleaning	:	15Mt/day HSFO + 15 Mt LSMGO (subject to the type of cargo loaded and cleaning requirement)
Full Re-inerting	:	6.0 Mt/day + 15Mt LSMGO
Idle Standby	:	4.5Mt/day HSFO

Is the Boiler fitted with following (pls indicate Yes or No*) :

LS MGO operations with Class survey statement	:	YES

7. ADDITIONAL INFORMATION

Include here any relevant additional information, particularly information concerned with the operation of the bridge manoeuvring controls. If the vessel is equipped with multiple propellers then detail here the results of trial manoeuvres with one or more propellers inoperative.