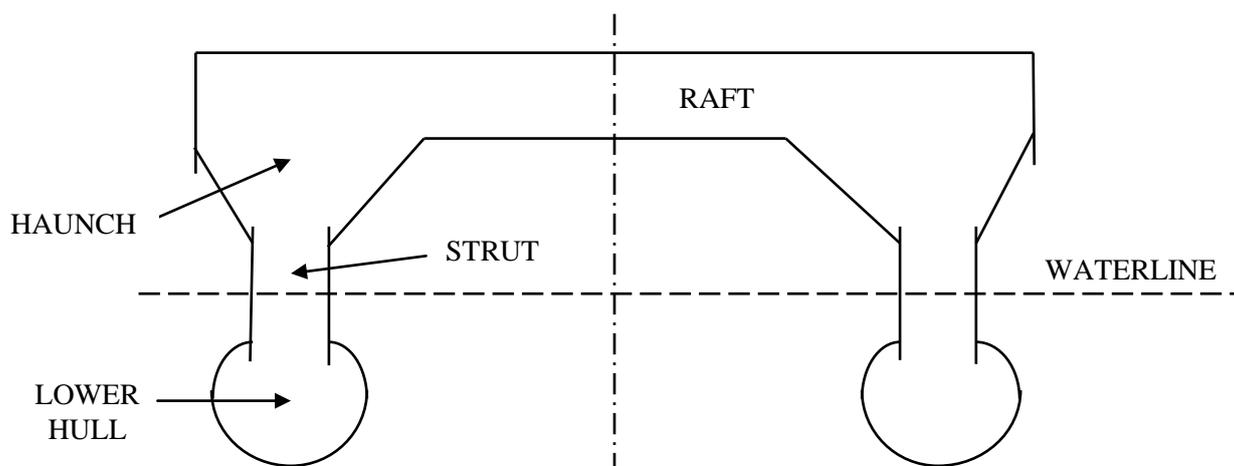


EXTRACT FROM CLOUD X STABILITY BOOK

OPERATIONAL GUIDANCE NOTES.

1.1 INTRODUCTION TO SWATH SHIPS.

- (a) This ship is of a relatively new type known as Small Waterplane Area Twin Hull (abbreviated hereafter to SWATH). The main feature of this special type of catamaran is its exceptional seakeeping properties compared to conventional catamarans and monohulls of similar displacement. Independent trials have shown that a SWATH has motions equivalent to a monohull of about 10 to 15 times the displacement.
- (b) The hullform has a typical cross-section as illustrated below:-



- (c) The seakeeping properties are the result of the hulls being designed to only have sufficient waterplane area to give satisfactory pitch and roll stability, but not to cause excessive excitation in a seaway.
- (d) A consequence of this feature is that the vessel is more sensitive to variations in deadweight and longitudinal center-of-gravity than conventional catamarans and monohulls, thus requiring more care in operation. Guidance information is provided in this Stability Book, and in the ship's Technical Manual (Ref A).

1.2 MANAGEMENT OF DRAFT AND TRIM.

- (a) Because of the relatively small waterplane area, the difference in draft between Maximum Operating Condition and Lightship is about one metre, and in the Full Load Condition the effect of ten people moving from one end of the passenger saloon to the other is to change the trim angle by 0.29° .
- (b) If this reduction in draft due to variation in deadweight were to be permitted in practice, the designed seakeeping, manoeuvring and performance properties would not be achieved because the bulbous lower hull, the rudders and the propellers would be broaching the surface. The vessel must therefore be operated within a designed draft range of about 42 cm (= 0.42 m = 16.7").
- (c) This draft range corresponds to the variation in draft between the Maximum and Minimum Permitted Operating Conditions, and encompasses Full Payload with minimum fluids.
- (d) Thus after or during loading but before departure, water ballast should be taken aboard to bring the vessel to a mean draft at the LCF in the range 3.18 to 3.506 metres (10'-5.2" to

11'-6"), with a difference in draft between forward and aft of between 28 cm (11") by the bow to 84 cm (33") by the stern. Diagrams to assist in estimating the quantity of ballast required to be placed in each Main Ballast Tank are given in Chapter 8 of this Book, so that ballasting operations can be commenced during loading of passengers, with any final adjustment after loading is completed.

- (e) Since this method of operation is assumed in assessing the stability of the vessel against the regulatory criteria:

IT IS IMPORTANT THAT THIS OPERATING PROCEDURE IS ADHERED TO!

- (f) Failure to observe this procedure will not actually hazard the vessel, but may result in excessive deck inclinations after damage has been sustained, potentially causing difficulty in evacuation.

1.3 PROCEDURE FOR EMERGENCY EVACUATION.

- (a) The nature of the vessel's hullform is such that the freeboard from the Main Deck to the waterline is about 4 metres (13'), and the relative motion between the surface of the sea and the hull will be greater than for more conventional ships. In addition, due to the beam of the ship, any heel due to damage or passenger crowding will cause the freeboard to vary significantly between port and starboard. All of these factors may cause difficulties in the event of emergency evacuation.
- (b) For this reason, the vessel has been designed with four "flood-down" tanks, situated low in each hull forward and aft, each equipped with duplicated flooding valves controlled from the Bridge. In the event that Emergency Evacuation is decided upon, the flooding valves are actuated, and the vessel adopts a lower position in the water, such that:-
 - (i) The freeboard at the Emergency Exits is generally reduced to less than about 2 metres (6'-7"), thus facilitating access to the inflatable liferafts.
 - (ii) The residual angle of heel is reduced and the metacentric height is increased.
 - (iii) The vessel contours the sea surface, thus minimising relative motion between the Emergency Exits and the liferafts.
- (c) It should be noted that the vessel still has ample reserve buoyancy and stability even after flooding-down or if some extreme combination of failures causes only the flood-down tanks on the damaged side to be filled. The flood-down tanks are sized so that the volume of buoyancy lost is self-limiting, and no action on the part of the crew is required other than to initiate actuation. The valves are sized so as to achieve the majority of flood-down in the time taken to deploy and bouse-in the liferafts (5 minutes).
- (d) Freeboards (in metres) to the upper and lower Emergency Evacuation Exits, both port and starboard, forward and aft, have been calculated for the four main load conditions, both intact and after damage. A selection of those for the Minimum Arrival Condition (which tends to result in the maximum deck inclinations) are tabulated below for typical three-compartment damage cases, and provide guidance on which exits to use for the most convenient and rapid evacuation. Having investigated all two- and three-compartment damage conditions for all four selected load conditions, there is only a 3.6% occurrence of the freeboard at any exit location lying outside the range +2.1 to -0.3 metres.

CONDITION	INTACT		DAMAGED		
	no	yes	yes	yes	yes
Free-flooding tanks open ?	no	yes	yes	yes	yes

Bulkheads damaged		-	-	18+27	54+63	63+72	
SIDE OF SHIP	EMERGENCY EXIT POSITION	EMERGENCY EXIT FREEBOARDS (metres)					
HIGH SIDE	Aft	Upper	4.425	3.581	3.600	4.179	4.661
		Lower	2.030	1.188	1.163	1.741	2.235
	Fwd	Upper	4.322	2.844	4.254	3.388	3.075
		Lower	1.927	0.452	1.817	0.950	0.649
LOW SIDE	Aft	Upper	4.425	3.581	1.346	1.738	2.503
		Lower	2.030	1.188	-0.966	-0.563	0.198
	Fwd	Upper	4.322	2.844	2.000	0.947	0.917
		Lower	1.927	0.452	-0.311	-1.355	-1.388

Note: The freeboards shown in bold type are those for the preferred exits for the case under consideration.

(e) The above figures are for guidance, but in practice the "drill" once a decision has been taken to evacuate has been taken should be as follows:-

1. Send MAYDAY signal, actuate liferafts, and initiate flood-down.
2. Broadcast to crew and passengers.
3. Passengers don lifejackets.
4. Send one crew member to each Emergency Exit, launch Rescue Boat.
5. Crew member lifts hatch to lower exit, opens main hull side door, inspects freeboard and decides locally whether upper or lower exit is to be preferred.
6. If necessary, crew member closes the main hull side door, ascends stairwell and closes hatch to lower exit, then opens superstructure side door.