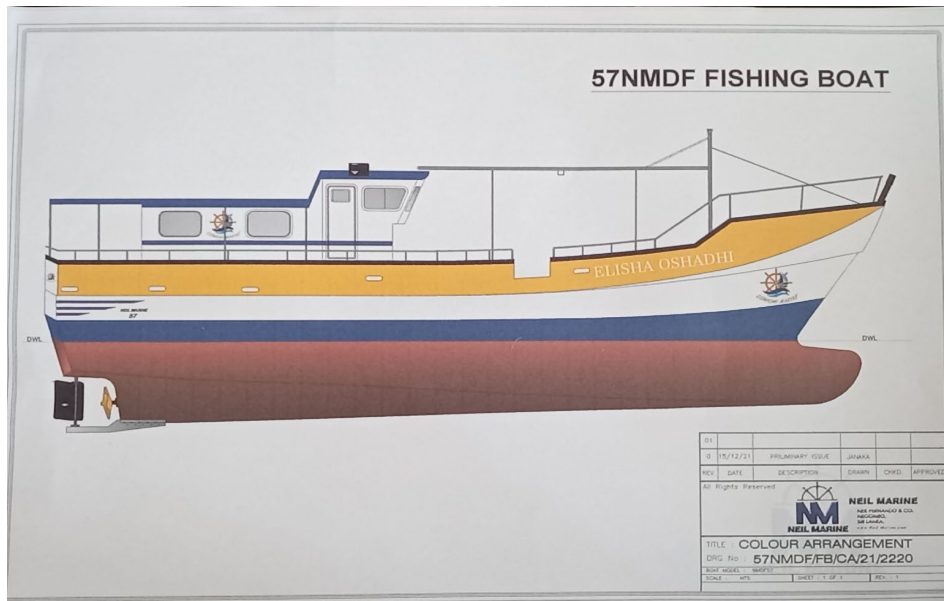


# Multi-day Fishing Vessels

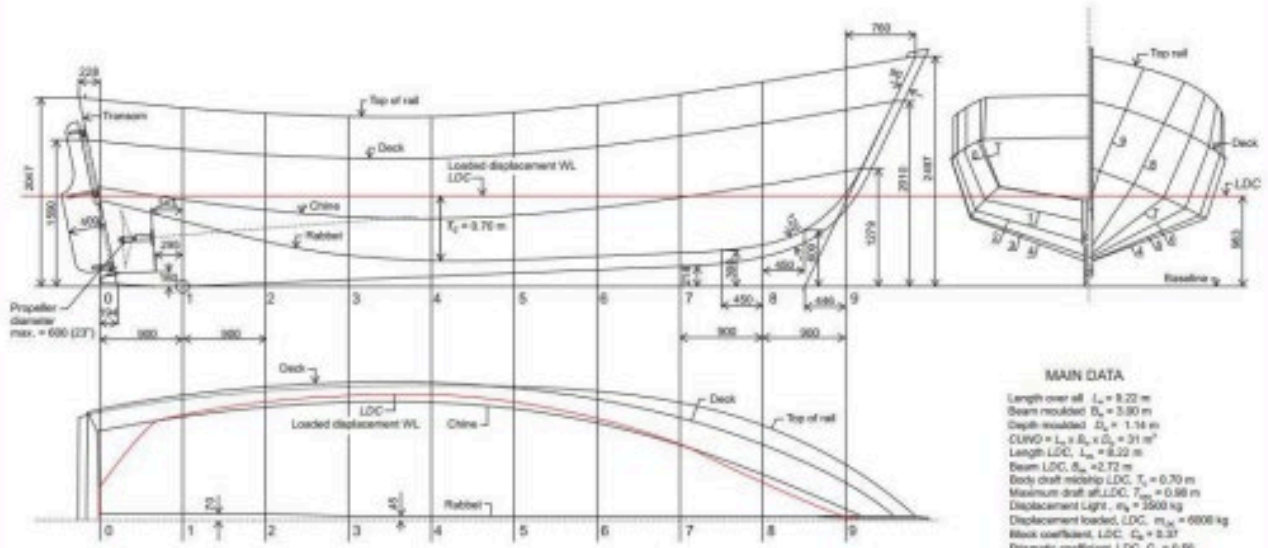


# 45ft to 60ft

## Fuel Efficiency Improvements



# Tested Models (FAO 1-2, 30ft)



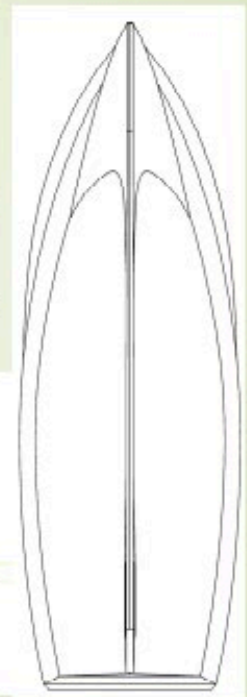
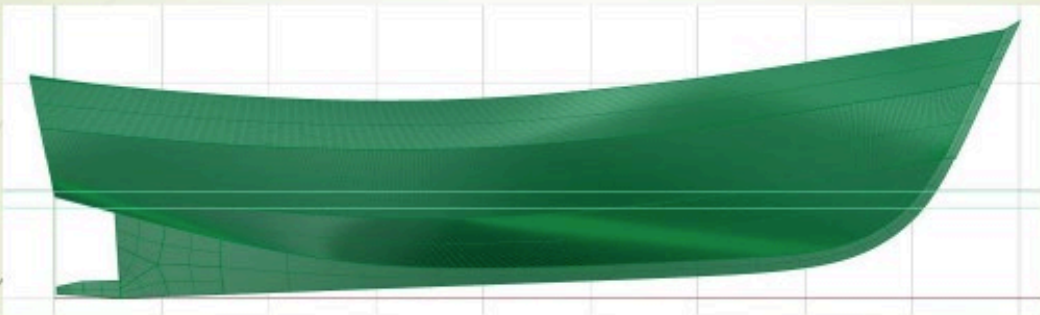
**MAIN DATA**  
 Length over all  $L_o = 9.22$  m  
 Beam rounded  $B_r = 3.90$  m  
 Depth rounded  $D_r = 1.14$  m  
 CURVD =  $L_o \times B_r \times D_r = 31$  m<sup>3</sup>  
 Length LDC  $L_{LDC} = 8.22$  m  
 Beam LDC  $B_{LDC} = 2.72$  m  
 Body draft including LDC  $T_{LDC} = 0.70$  m  
 Maximum draft all LDC  $T_{max} = 0.98$  m  
 Displacement Light  $m_{LDC} = 1500$  kg  
 Displacement loaded, LDC  $m_{LDC} = 6000$  kg  
 Block coefficient, LDC  $C_b = 0.37$   
 Prismatic coefficient, LDC  $C_p = 0.50$   
 Power: 30 hp

		Table of offset in mm to outside of planking														
		Station	0	1	2	3	4	5	6	7	8	9				
Height from baseline	Hulltop	338	713	490	337	280	289	328	384	450	5210					
	Chine	1076	940	825	755	738	773	850	984	1199	1290					
	Deck Rail	1575	1490	1425	1395	1390	1435	1520	1603	1707	1817					
			Stanchions (placed 180°)													
									1972	2084	2217	2364				
1/2 Breadth from	Rabbit	70	70	70	45	45	45	45	45	45	45	45				
	Chine	970	1123	1226	1275	1279	1270	1055	816	495	120					
Centre-line	Deck	1206	1305	1447	1494	1483	1432	1310	1113	819	405					
	Rail		stanchions (placed table)									1482	1441	1361	1270	1042

2007 02 21 REVISION		
9.2 m Fishing boat		
LINES		
Scale = 1 : 50	Design no.	Drawing no.
Design: O. Gulbrandsen 1699L, 15, 2/5	NIR - 1	1

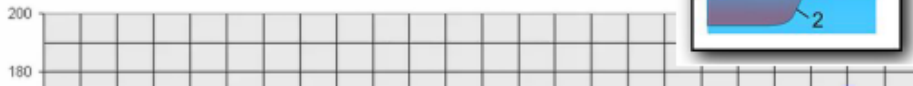
- Fuel efficiency improvements study based on lines plans of the boat

# Tested Models (FAO 1-2)



- Bulbous bow design

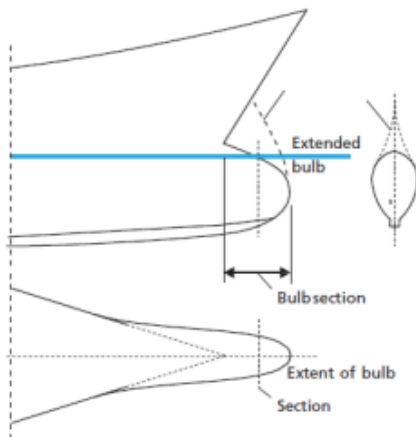
# Bulbous usage



- Prop optimisation and kort nozzle feasibility

# Bulbous usage

## THE SHAPE OF THE BOW 37



### Carefully designed bulbs reduce resistance

Forward bulbs can reduce resistance by 5 to 10% but must be designed carefully to be effective.

They are suitable for FRP, steel and aluminium boats greater than 12 m in length at the service speed shown in Table 2 on page 28. For wooden boats, the same effect as that produced by a bulb can be had by lengthening and sharpening the bow as shown here.

Bulbs will normally reduce the pitching in waves and this can have a positive effect on propeller efficiency.

Bulbs are vulnerable to damage by grounding or collision and should, therefore, be separated from the rest of the boat by a watertight bulkhead.

$$Fr = \frac{V[m/s]}{\sqrt{g[m/s^2] \cdot L[m]}} \approx 0.35$$

TABLE 2  
The power and speed n<sup>o</sup>

Length in waterline L <sub>WL</sub>		Service speed	Max. speed
m	ft	Knots	Knots
5	16.4	4.7	5.4
6	19.5	5.1	5.9
7	23	5.6	6.3
8	26	6.0	6.8
9	30	6.3	7.2
10	33	6.6	7.6
12	39	7.3	8.3
14	46	7.9	9.0
16	52	8.4	9.6

5

# Optimized hull form:

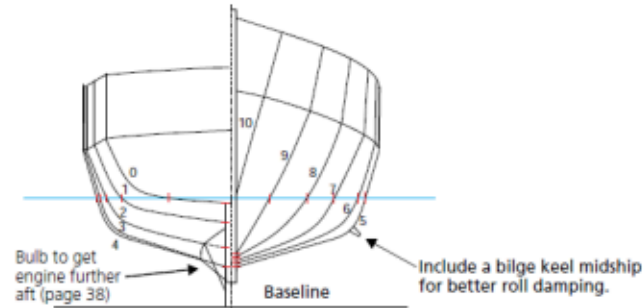
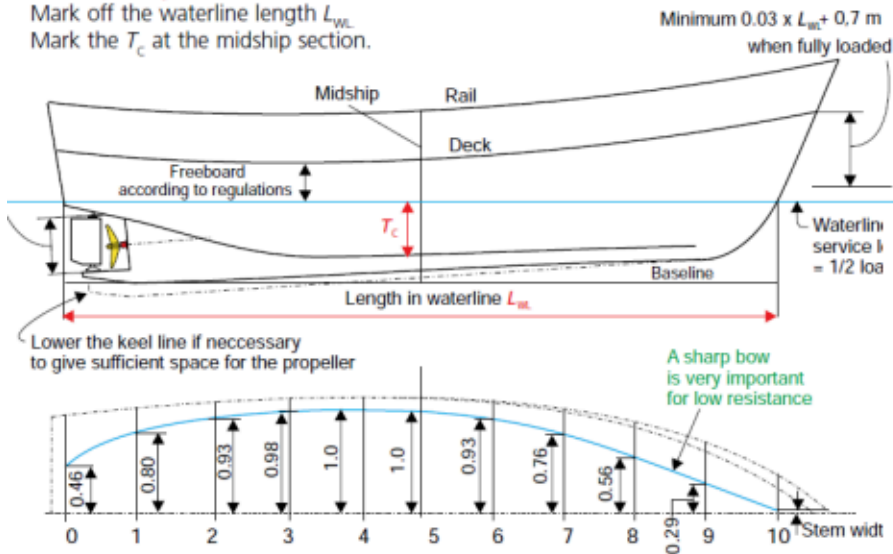
## Round bilge

36

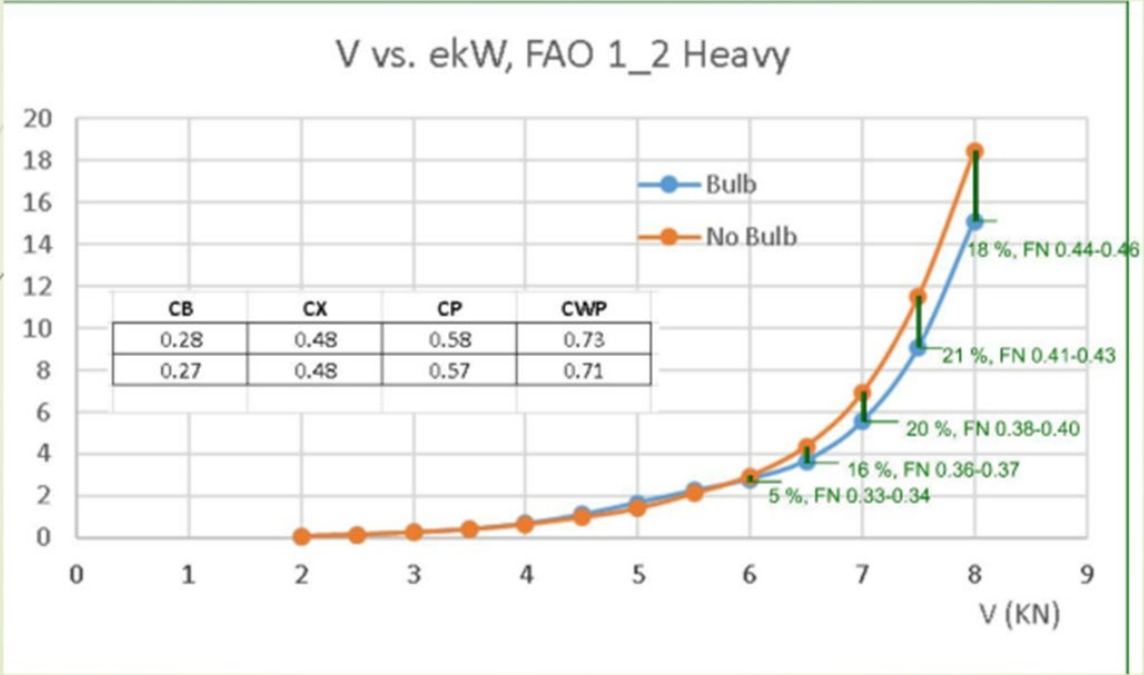
BOAT LINES FOR LOW RESISTANCE

### 2. Draw the profile (decked boat)

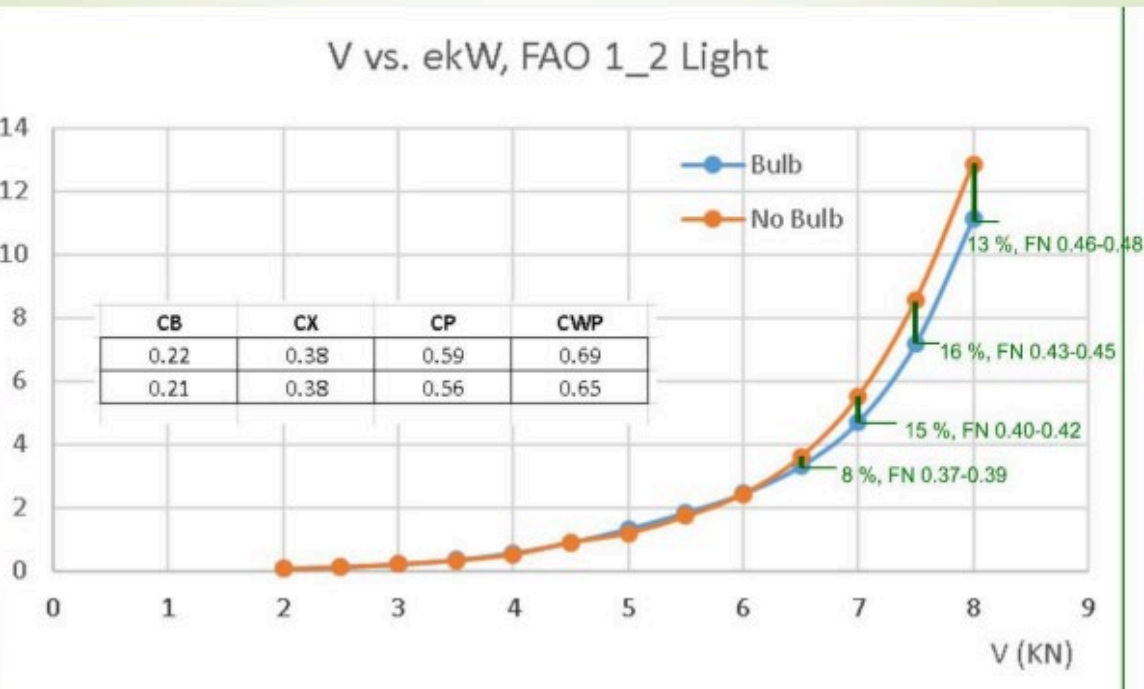
Mark off the waterline length  $L_{wl}$   
Mark the  $T_c$  at the midship section.



# Results FAO 1-2 (Displacement type)

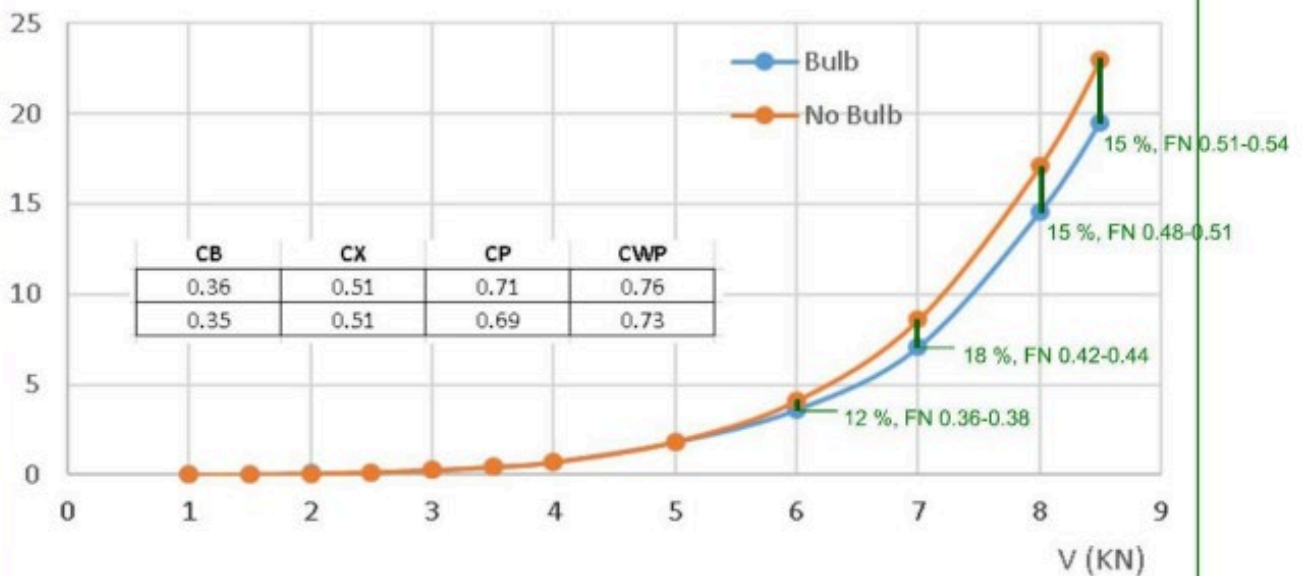


# Results FAO 1-2



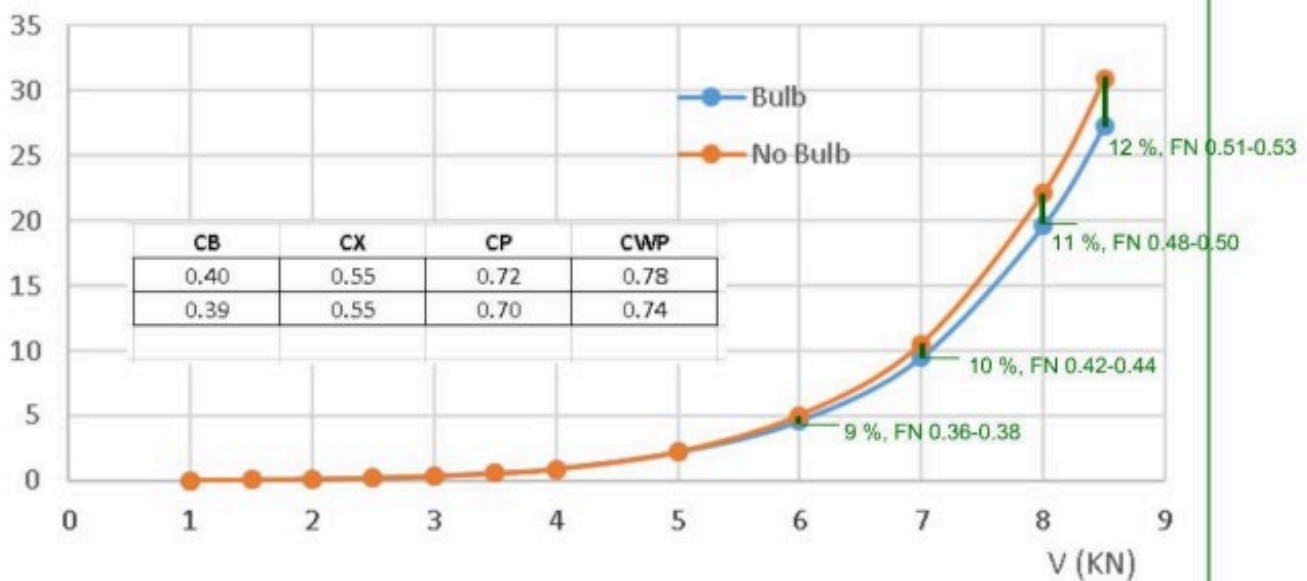
## Results FAO 3-4

V vs. ekW, FAO 3\_4 Light



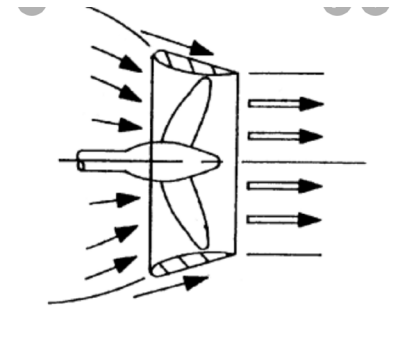
## Results FAO 3-4 (Semidisplacement Type)

V vs. ekW, FAO 3\_4 Heavy



## Conclusions

- Important Power Reductions in  $0.3 < FN < 0.45$  (Pre Planing)
- Fuel Savings not speed increment
- Form Coefficients: **extrapolate** to other ships
- Developable (Easy to build)



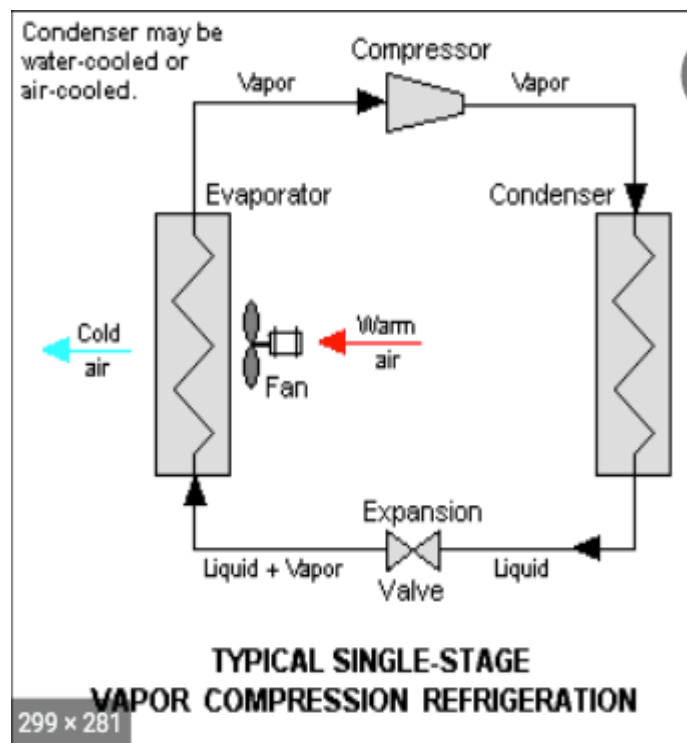
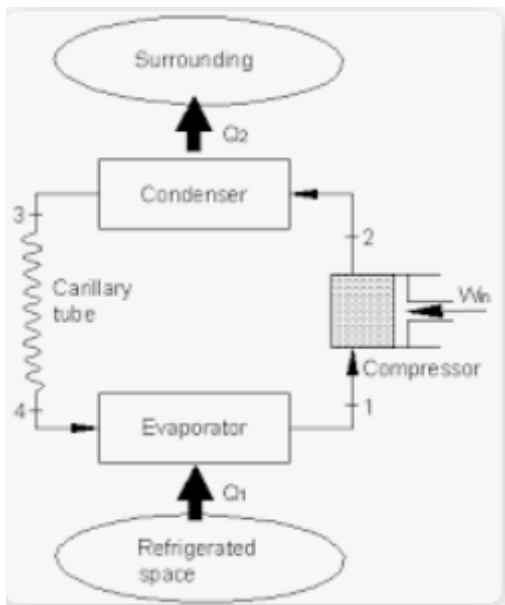


# Refrigeration

Refrigeration aims at

- Catch loss reduction
- Extending the ice to last the duration of the fishing trip

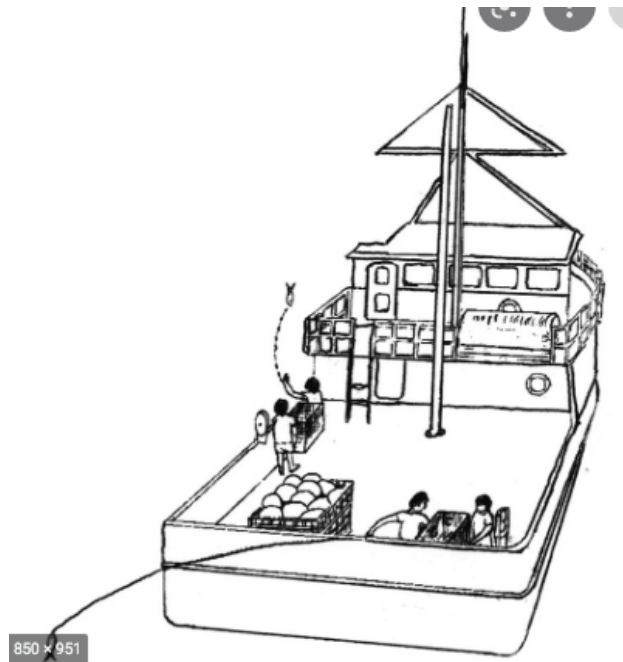
Options below



# Operational Upgrades

- Deck options for long lining

Deck  
stern-  
vessels



positions for side-versus  
setting on longline fishing

- Increase in accommodation beam and hence space increase.
- Fish hold protection and insulation: Instillation of a protective liner to prevent damage to the FRP hold lining during operations.

Fish hold

The hold shall be **constructed** in such a way that it is readily **accessible** for **cleaning and disinfection**.

The **material** of construction shall be **non corrodible** and shall not **impart colour or odour** to the fish. Wood is generally used in boat construction and in such cases the hold may be lined with a suitable non-corrodible material.

The fish hold shall be sufficiently **insulated** and shall be **divided** into pounds **or pens** not more than 1.4 x 1.4 m.

There shall be sufficient **drainage** facilities in the hold, so that the ice melt water and other liquid wastes are discharged into a central drain.

Fish **hold lining** should be completely **water tight**.

When **chutes** are provided for discharging fish to the hold, they shall be fitted in such a way that fish do not have to **drop more than 1m** into the hold.

**All surfaces** coming in contact with fish shall be made of **non corrodible** material.

In very small boats provision of fish hold is difficult. In such cases, sufficient number of storage containers may be used. Refrigerated sea water or refrigerated brine may also be used in many cases in place of ice.

# Safety at Sea

- Safety equipment life rafts
- Grab bag
- EPIRB, AIS

## Marine Safety grab bag

The image displays a variety of marine safety equipment items, each numbered from 1 to 16. The items include a yellow grab bag (1), a blue life jacket (2), a compass (11), a hand-held GPS (14), a mobile phone (13), a hand-held VHF radio (10), a sea anchor or drogue (16), a manual inflatable lifejacket (2), a sea rescue streamer (3), a whistle (4), a mirror (5), a rescue laser (6), a personal locator beacon (7), a solas strobe light (8), batteries (9), and emergency blankets (12).

**1 Floating emergency grab bag**  
Water-proof bag used to store all of the items below; it should be of a size large enough to store additional items such as tinned food, water bottles, a knife and some fishing tackle.

**2 Manual inflatable lifejackets**  
Very light-weight and compact personal flotation device that may be inflated by either activating a self-contained CO<sub>2</sub> cartridge or blowing through an inflation tube.

**3 Sea rescue streamer**  
Floating signalling device used during day-time, it lasts indefinitely and is visible for miles by airplanes.

**4 Whistle**  
Signalling device used at night or in foggy conditions to attract the attention of nearby boats.

**5 Mirror**  
Signalling device used during day-time to attract the attention of nearby boats as well as airplanes.

**6 Rescue laser**  
Long-range, AAA battery-operated laser device used at night to attract the attention of nearby boats as well as airplanes; the rescue laser replaces flares or parachute-rockets (no expiry date and can be air-shipped) although the latter may still be required under national sea safety regulations.

**7 Personal locator beacon**  
When activated the PLB transmits a signal with the beacon's ID and vessel position to the nearest search-and-rescue operation centre via satellite relay.

**8 Solas strobe light**  
AAA battery-operated, water-proof, flashing light that is visible for miles at night and continuously indicates the distressed boat's position.

**9 Batteries**  
AAA-size dry cell batteries used in portable electronic devices such as hand-held GPS and VHF radios, strobe light and rescue laser.

**10 Hand-held VHF radio (waterproof)**  
Multi-channel, two-way radio (can transmit and receive), which enables boat-to-boat and boat-to-land communication; the operating range is 5-10 nautical miles in open water and distress signals should be sent on channel 16 (international calling frequency for distress messages).

**11 Compass**  
A device used to determine geographic direction and consisting of a horizontally-mounted magnetic needle that is free to pivot until aligned with the Earth's magnetic field.

**12 Emergency blankets**  
Very low-weight, low-bulk first-aid blanket made of heat-reflective plastic sheeting; it reduces the heat loss in a person's body and because of its large, metallic and radar-reflective surface, it can be used as an improvised signalling device by drifters if the sun is shining, and as a reference point for searchers.

**13 Mobile phone**  
Useful communication tool in areas with adequate mobile phone coverage; does not allow boat-to-boat communication with unidentified/unknown boats and, from a legal/regulatory point of view, does not replace the VHF radio.

**14 Hand-held GPS**  
Navigation device that uses the Global Positioning System (GPS) and relies on a network of satellites to give the user's geographical position; it increases the safety of boat operators navigating at night or with poor visibility and, in a distress situation, the exact geographic position of the vessel is known and can be given to the rescue team using the VHF radio or mobile phone.

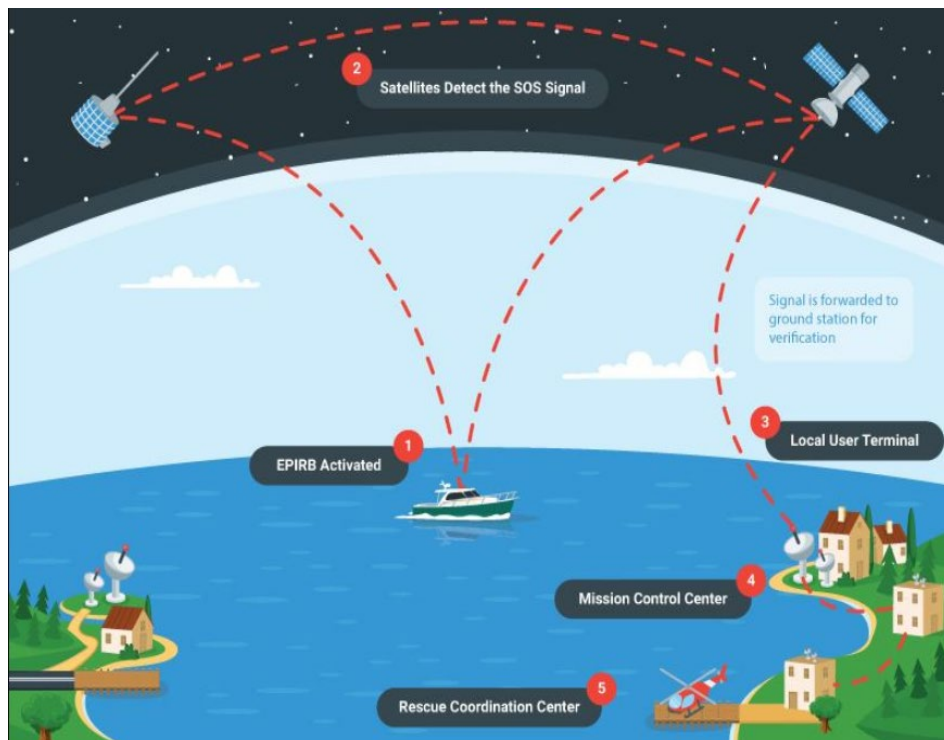
**15 Medical kit**  
Box or bag containing medical supplies and tools to give emergency medical treatment to a sick or injured person on board.

**16 Sea anchor or drogue (125 cm)**  
Device, usually made of canvas, deployed upwind of the vessel heading into the wind and to slow its drift; unlike conventional bottom anchor, the sea anchor can be deployed at any depth.

## Life Saving Equipment

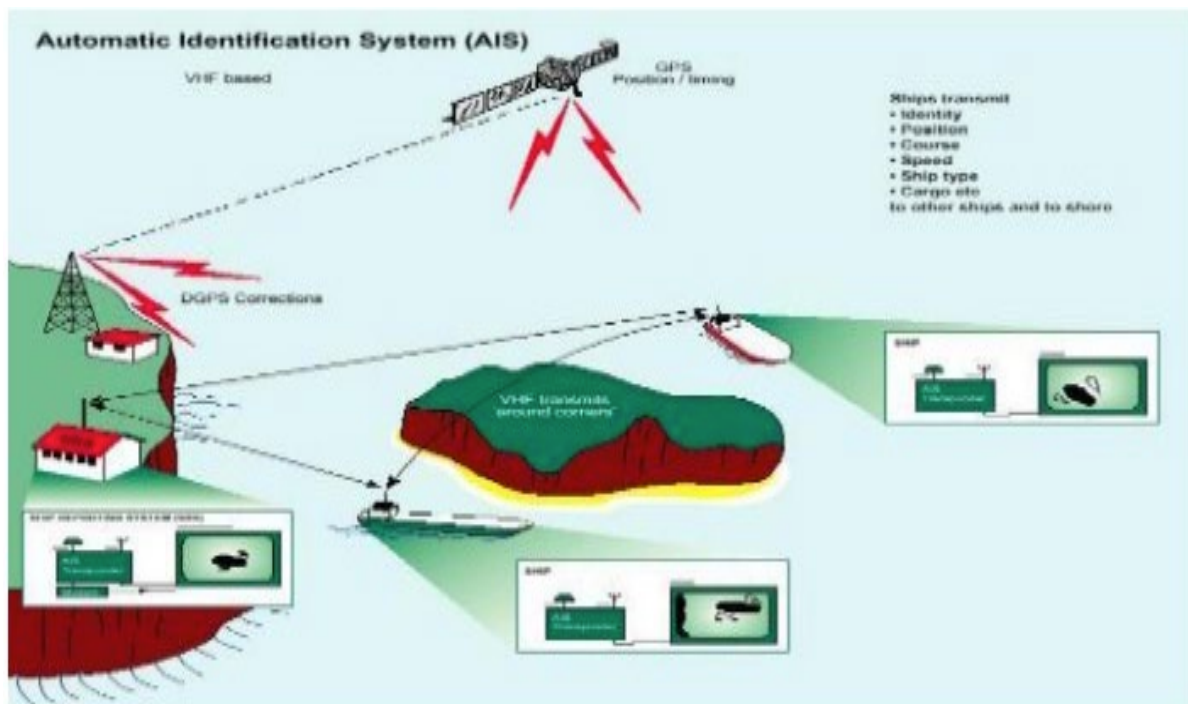


**EPIRB or Emergency Position Indicating Radio Beacon is a safety device carried by a vessel to alert search and rescue services, allowing them to quickly locate you in the event of an emergency. When activated it transmits a coded message on the 406 MHz distress frequency which is monitored by the COSPAS-SARSAT satellite system.**



EPIRB1 Pro - Ocean Signal

AIS



AIS tracking system for vessels.



AIS Fishing Buoy Tracking T...