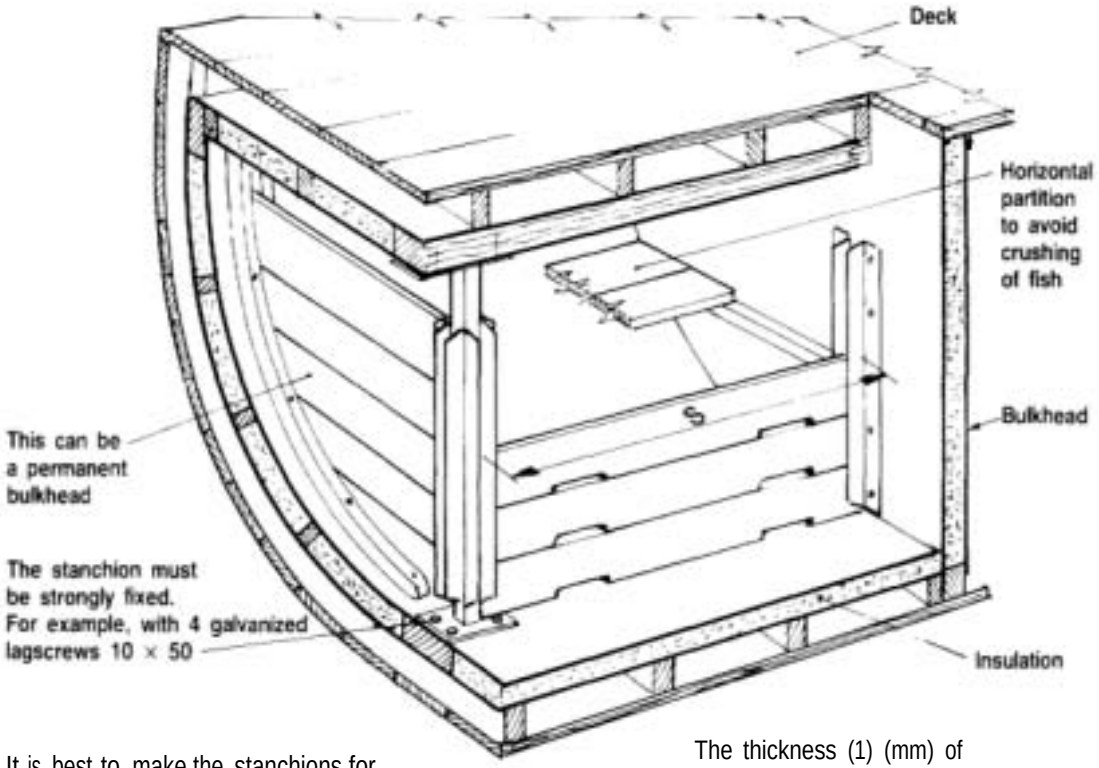
FISH-HOLD PENBOARDS

The penboards and penboard stanchions must be strong to prevent the fish and ice sliding to one side when the boat is hit by a wave

The boat could capsize.

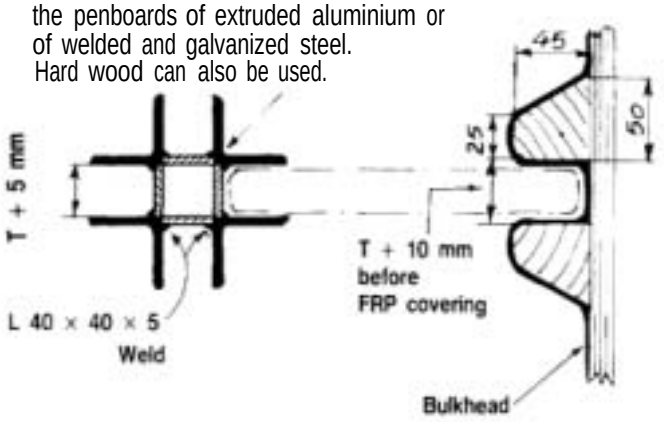


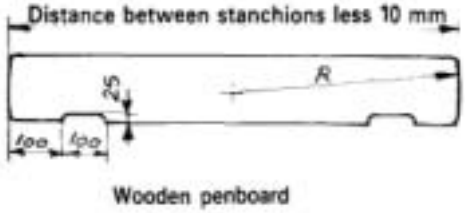
It is best to make the stanchions for the penboards of extruded aluminium or of welded and galvanized steel. Hard wood can also be used.

The thickness (1) (mm) of a wooden penboard is proportional to the span S (m)

T = 24 x S (mm)

EXAMPLE: S = 1.0 m, T = 24 mm



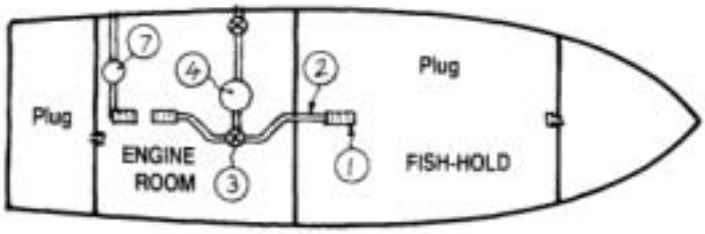


Wooden penboard

Aluminium penboards are best because they are easy to keep clean.

BILGE PUMP SYSTEM

All decked boats should have two pumps; one engine-driven and the other manual to pump out water. The following system is suitable for a boat where the engine room and the fish-hold have watertight bulkheads: (1) Strainer easily accessible and connected with a flexible pipe so that it can be lifted out and cleaned. (2) Pipes must be oil-resistant and reinforced so that they do not collapse under suction. Diameter must be at least the same as the pump inlet (3) Three-way valve, alternatively two valves of stainless steel or bronze. Ball valves are preferable to gate valves because 'on' and 'off' positions are easily seen.



(4) Engine-driven pump, self-priming of the following capacity:

Boats up to 8 m: 60 litres per minute

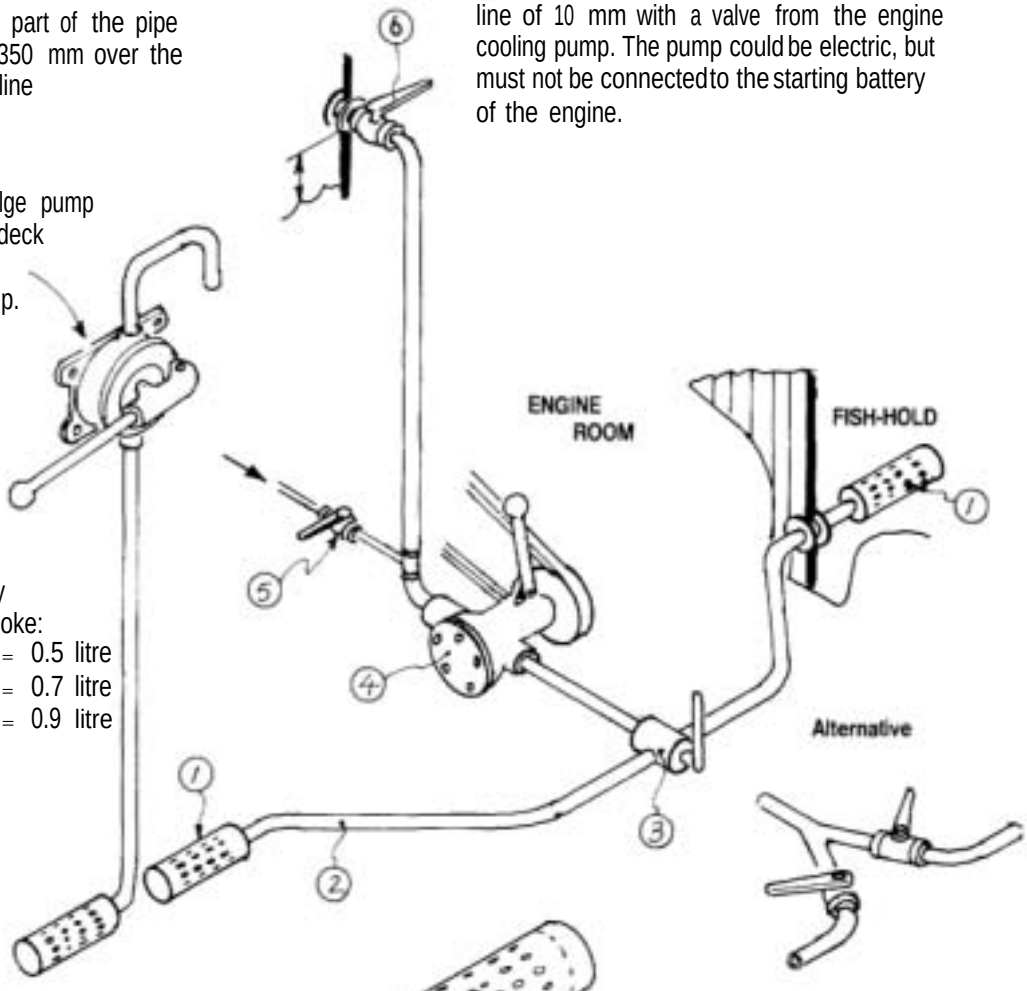
8 m - 10 m : 80 litres per minute

10 m - 12 m : 120 litres per minute

(6) A valve must be used if the outlet or any part of the pipe is less than 350 mm over the loaded waterline

(5) Rubber impeller pump must have a bleed line of 10 mm with a valve from the engine cooling pump. The pump could be electric, but must not be connected to the starting battery of the engine.

(7) Manual bilge pump fixed above deck can also be a piston pump.



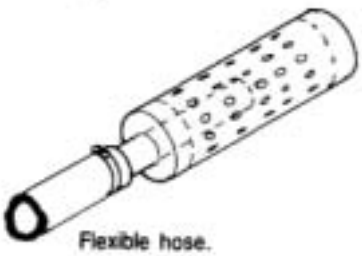
Manual bilge pump. Capacity in litres per stroke:

Boatupto8m = 0.5 litre

8m-10m = 0.7 litre

10m-12m = 0.9 litre

Strainer made from PVC pipe with 8 mm holes. Ends blocked. Suction pipe to middle of strainer.

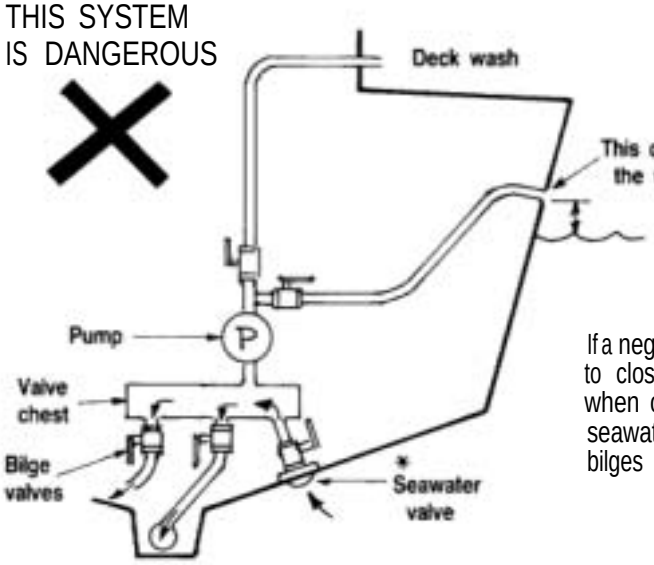


(9) All boats should have an alarm to indicate high water-level in the engine room.

BILGE PUMP – DECKWASH SYSTEM

A seawater outlet on deck that can be used for cleaning fish as well as washing the deck and fish-hold is very convenient. On some boats, the bilge pump is used for this purpose, but experience has shown that this has, in many cases, resulted in seawater accidentally entering the bilges and the boat sinking.

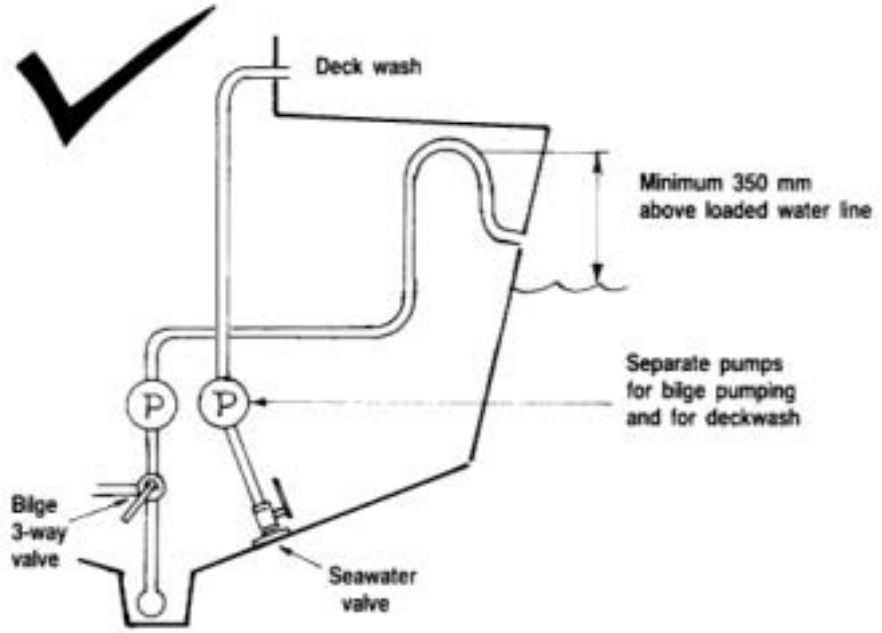
THIS SYSTEM
IS DANGEROUS



WARNING

If a negligent crew member forgets to close the seawater valve,* when opening the bilge valves, seawater will flood into the bilges when the pump stops.

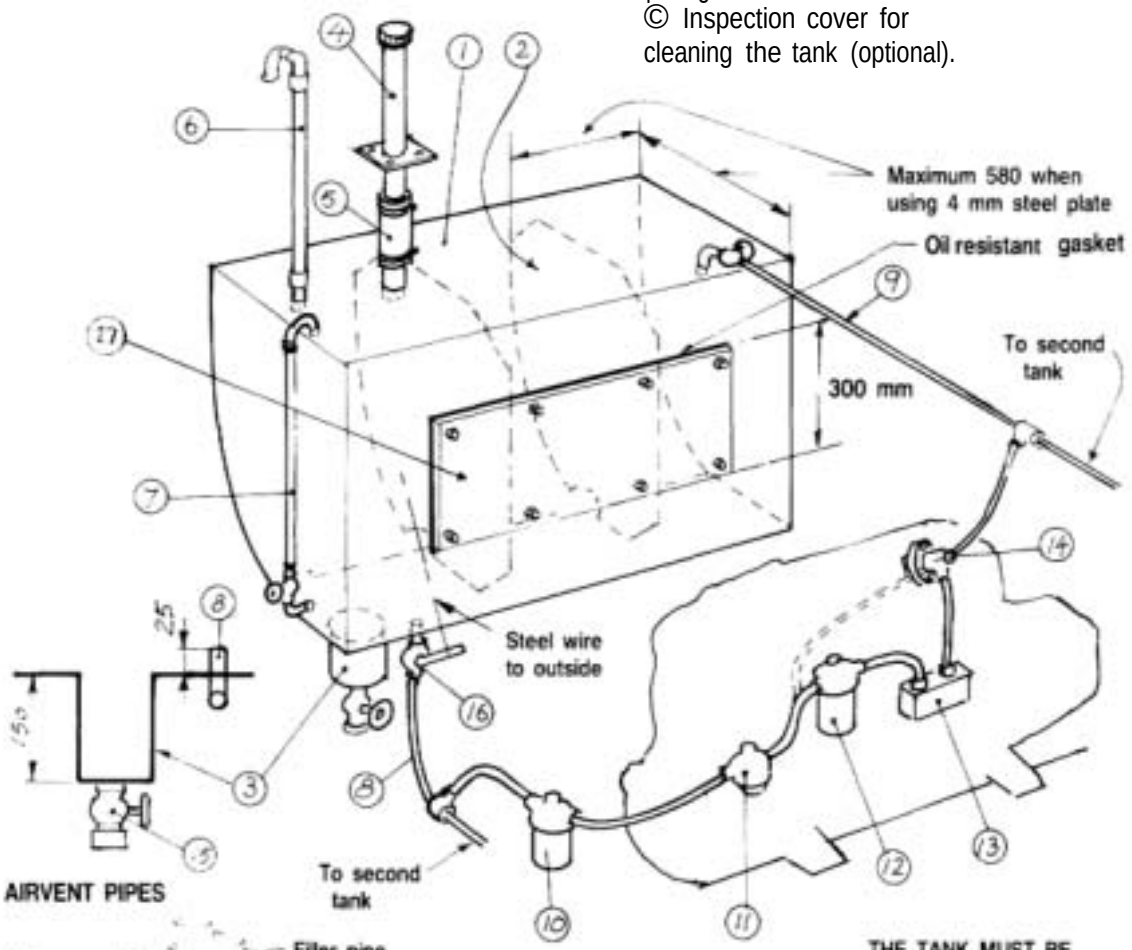
THIS IS A BETTER SYSTEM



FUEL SYSTEM

POOR INSTALLATION AND DIRTY FUEL ARE FREQUENT CAUSES OF ENGINE BREAKDOWN. Shown below is a typical installation with two fuel tanks each of 200-500 l capacity and made of mild steel. The tank can also be made of FRP (minimum T=6.5 mm).

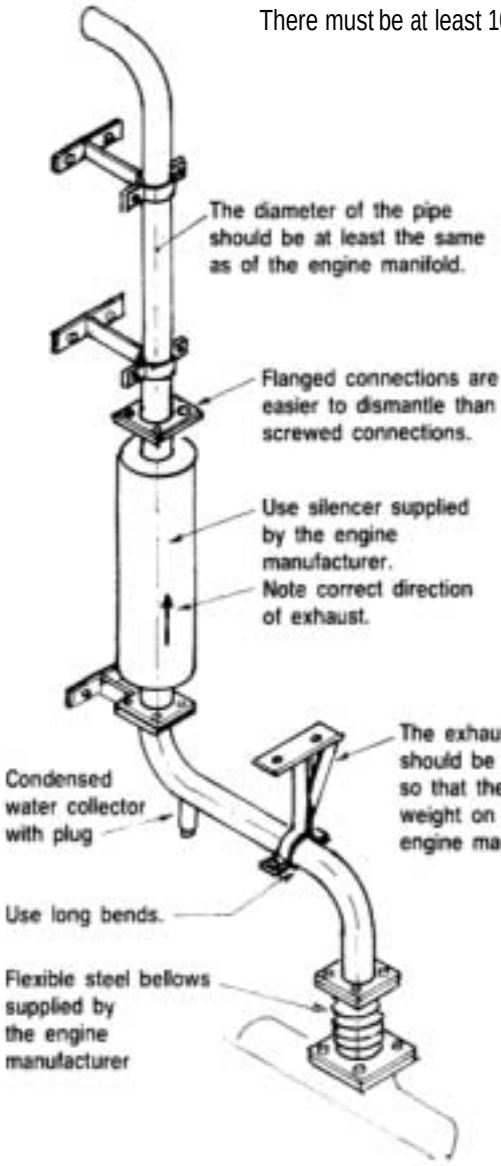
① Tank welded from 4 mm steel plate. ② Baffles of 4 mm plate with maximum spacing, as shown. ③ Sump made from pipe 105/114to collect water and dirt. ④ Filler pipe 38'47 with cap. ⑤ Flexible hose 50 iD of diesel-resistant material. ⑥ Airvent pipe 15'21 with gooseneck. ⑦ Level gauge, plastic 15 21, with self-closing valve on bottom. ⑧ Fuel supply hose, steel, soft copper 68, or metal-braided flexible fuel hose. ⑨ Fuel return pipe 68. ⑩ Primary fuel filterwater separator. ⑪ Fuel pump ⑫ Engine fuel filter ⑬ Injector pump ⑭ Injector ⑮ Drain valve 19 blanketed with a plug. ⑯ Ball valve 10. Can be shut from outside by pulling steel wire in case of fire ⑰ Inspection cover for cleaning the tank (optional).

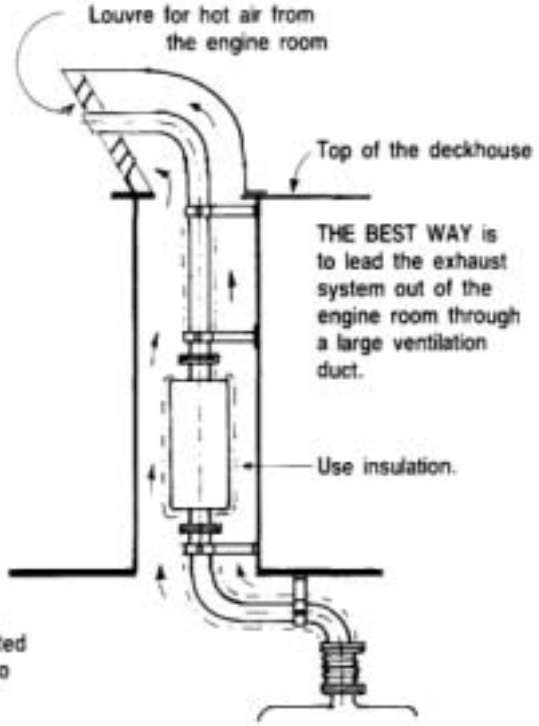


DRY EXHAUST SYSTEM

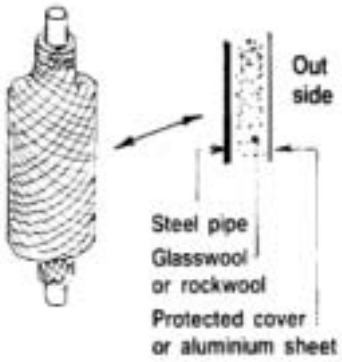
The exhaust system and piping should be leakproof to prevent toxic fumes from fouling the accommodation spaces.

Pipes should be insulated, as a dry exhaust system gets very hot. There must be at least 100 mm clearance for any wood or FRP material.

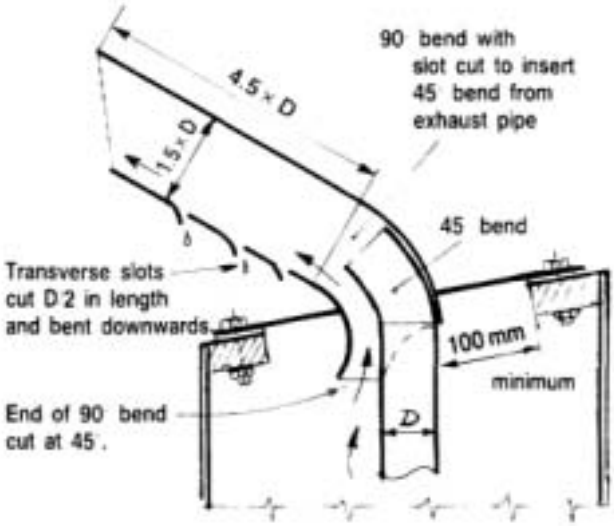




INSULATION



EXHAUST AIR EJECTOR



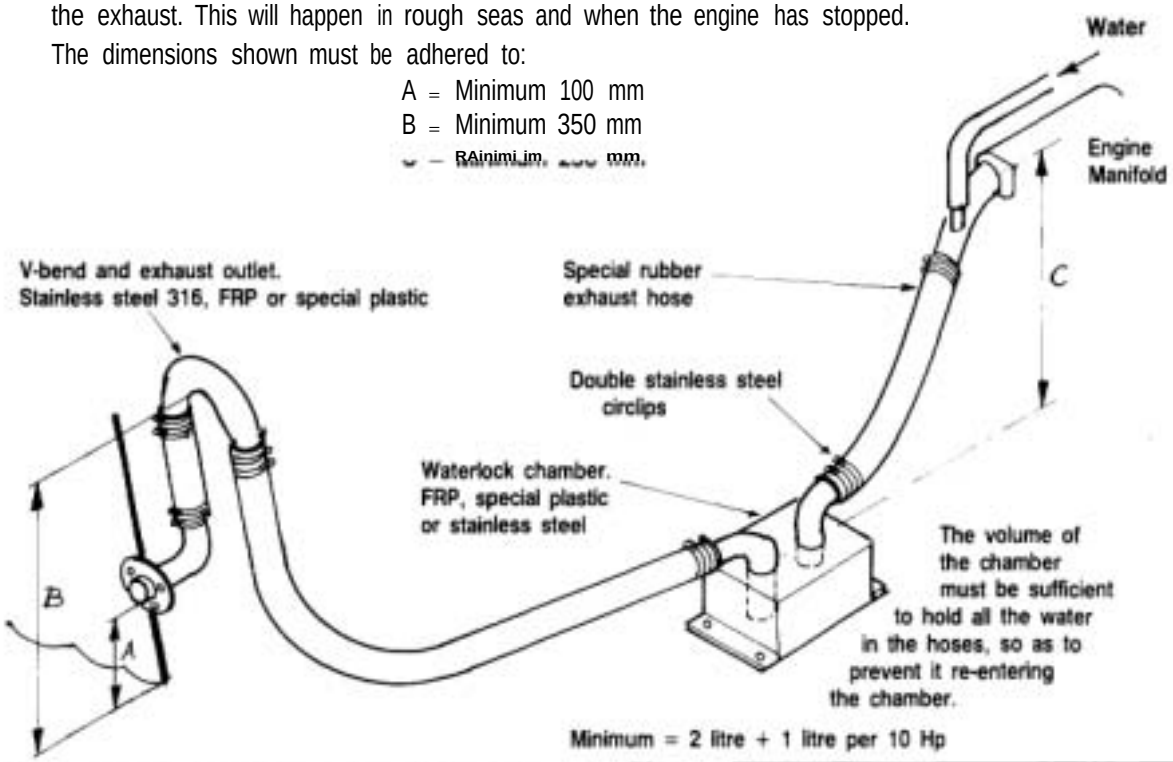
The ejector will suck warm air from the engine room and improve ventilation considerably. Based on recommendations from Caterpillar Diesels Ltd.

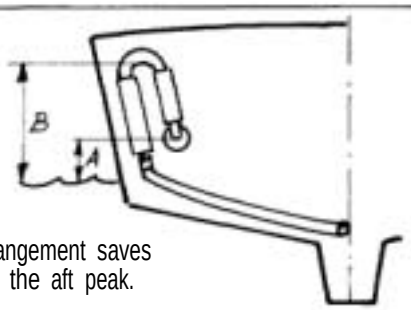
ENGINE MANIFOLD IS ABOVE THE LOADED WATERLINE

If the wet exhaust system is not correctly installed, water can enter into the cylinders through the exhaust. This will happen in rough seas and when the engine has stopped.

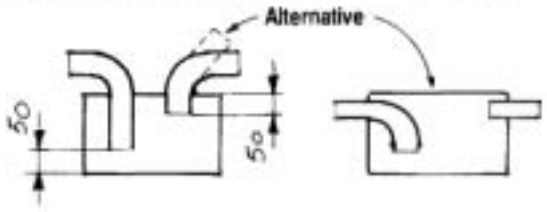
The dimensions shown must be adhered to:

A = Minimum 100 mm
B = Minimum 350 mm
C = Minimum 200 mm.



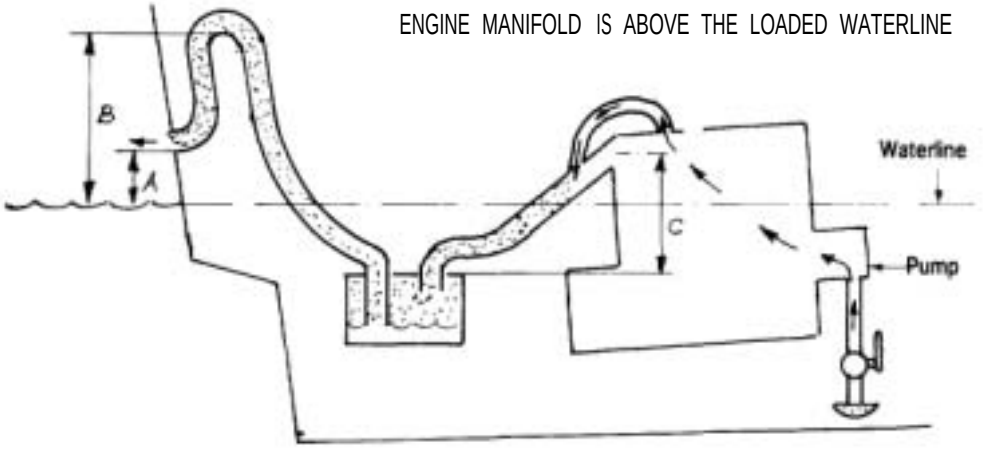


This arrangement saves space in the aft peak.



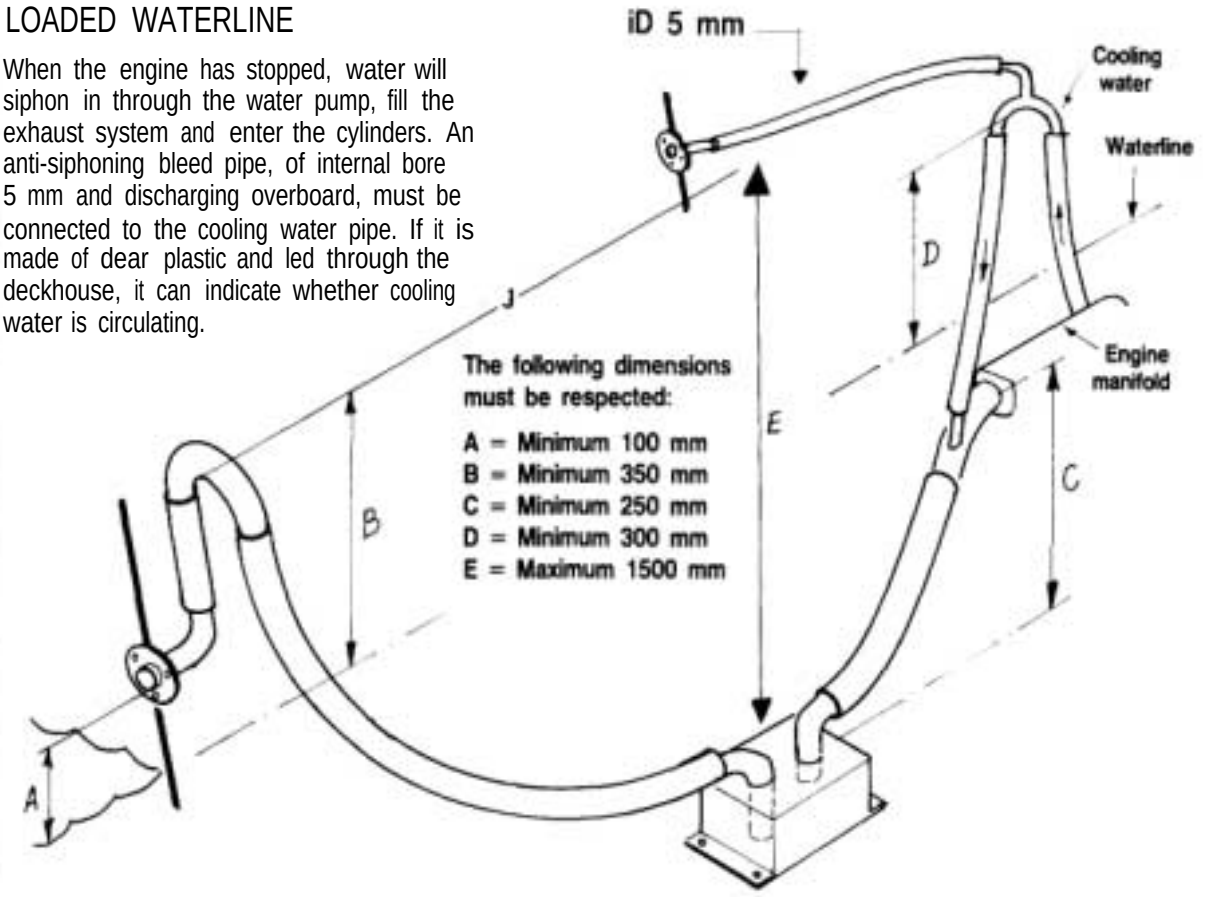
WATERLOCK CHAMBER

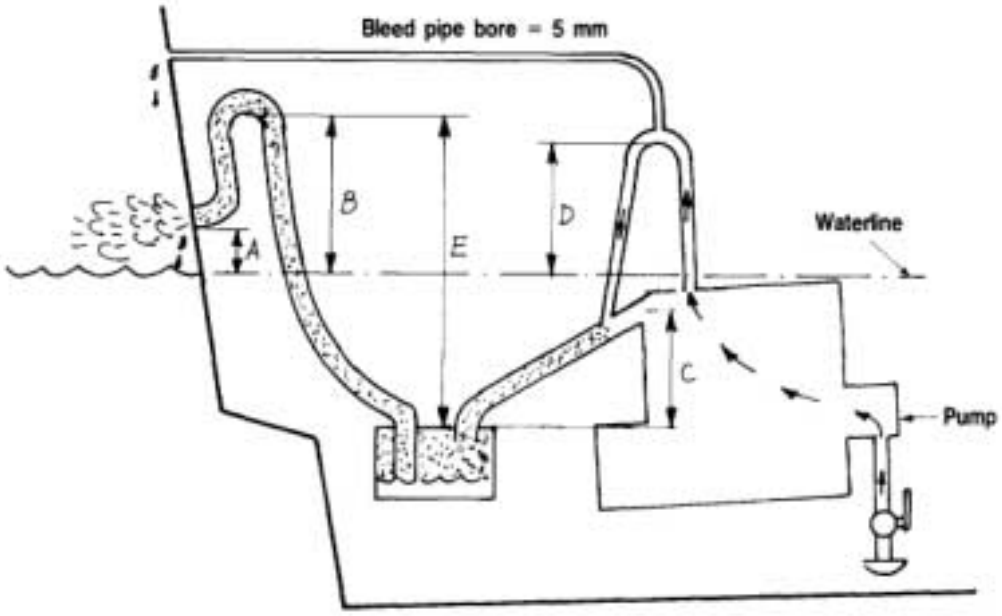
ENGINE MANIFOLD IS ABOVE THE LOADED WATERLINE



ENGINE MANIFOLD IS BELOW LOADED WATERLINE

When the engine has stopped, water will siphon in through the water pump, fill the exhaust system and enter the cylinders. An anti-siphoning bleed pipe, of internal bore 5 mm and discharging overboard, must be connected to the cooling water pipe. If it is made of dear plastic and led through the deckhouse, it can indicate whether cooling water is circulating.





ENGINE ROOM VENTILATION

Would you like to be in a room without ventilation on a hot day?

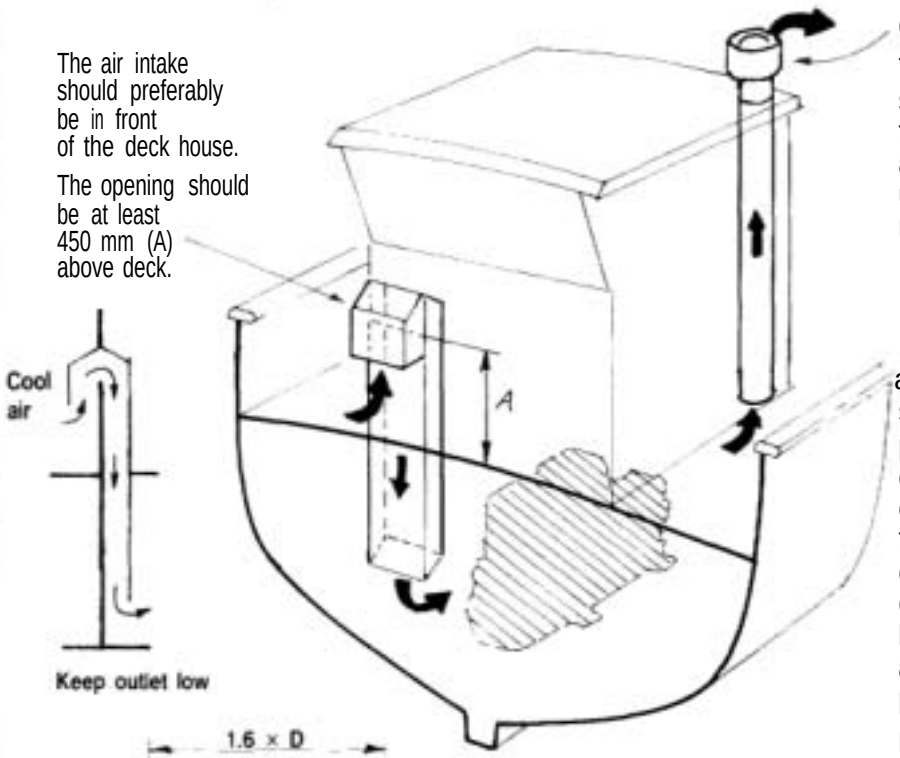
Your engine does not like it either. It needs plenty of fresh air for combustion. If the air in the engine room gets too hot, it will produce less power.

THIS IS HOW VENTILATION SHOULD BE DONE:
To get rid of the hot air, an efficient ventilation outlet is very important. It should be located above the roof of the deckhouse.

The hot air outlet should be located far from the cool air inlet and high up in the engine room.

The air intake should preferably be in front of the deck house.

The opening should be at least 450 mm (A) above deck.



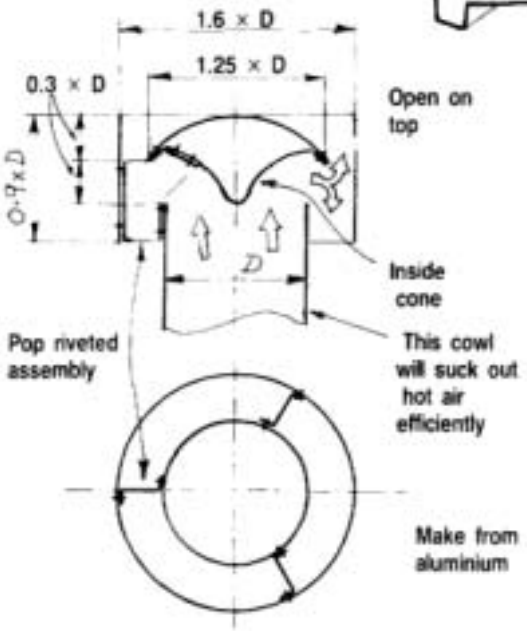
If the engine has a dry exhaust system, it is possible to combine the exhaust duct and the ventilation duct and get efficient air suction by ejector action as shown on page 15.

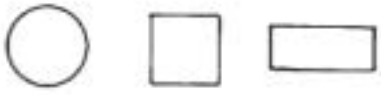
For tropical countries, the cross-section area of the air ducts should be 8 cm2 per engine hp (10 cm2/kw)

EXAMPLE : A 30 Hp engine requires:

30 x 8 240 cm2 of duct area.

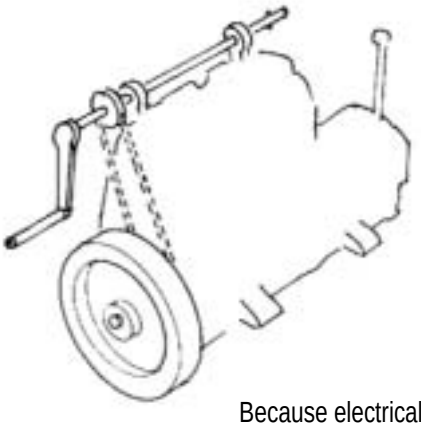
This can be arranged with different shapes of ducts.





Intake and exhaust ducts should have the same cross-section area.

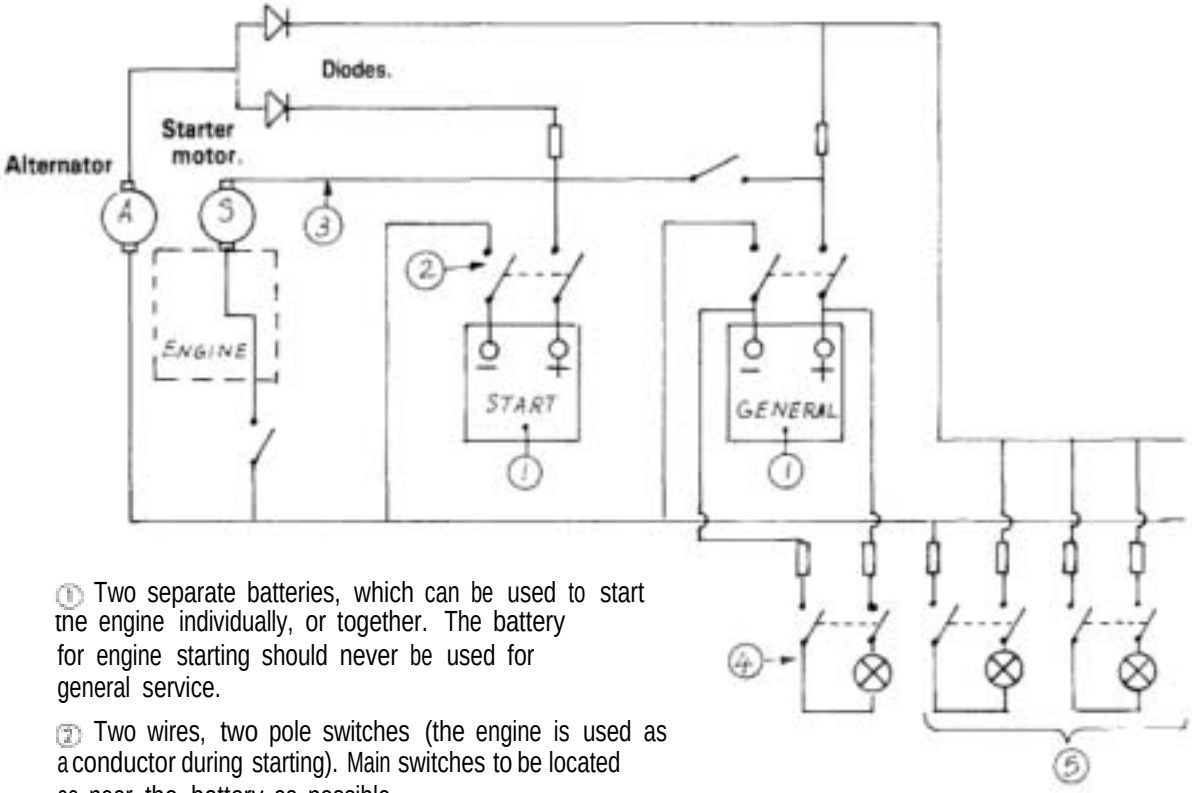
HAND STARTING



Hand-starting is the most dependable in tropical countries. Preferably choose an engine with hand-starting even if it is fitted with an electric starting system. REMEMBER that space is required in front, or aft, of the engine for one or two men to exert full force during starting.

ELECTRIC STARTING

Because electrical systems are vulnerable in tropical countries, correct installation is very important. Shown below is a good system



① Two separate batteries, which can be used to start the engine individually, or together. The battery for engine starting should never be used for general service.

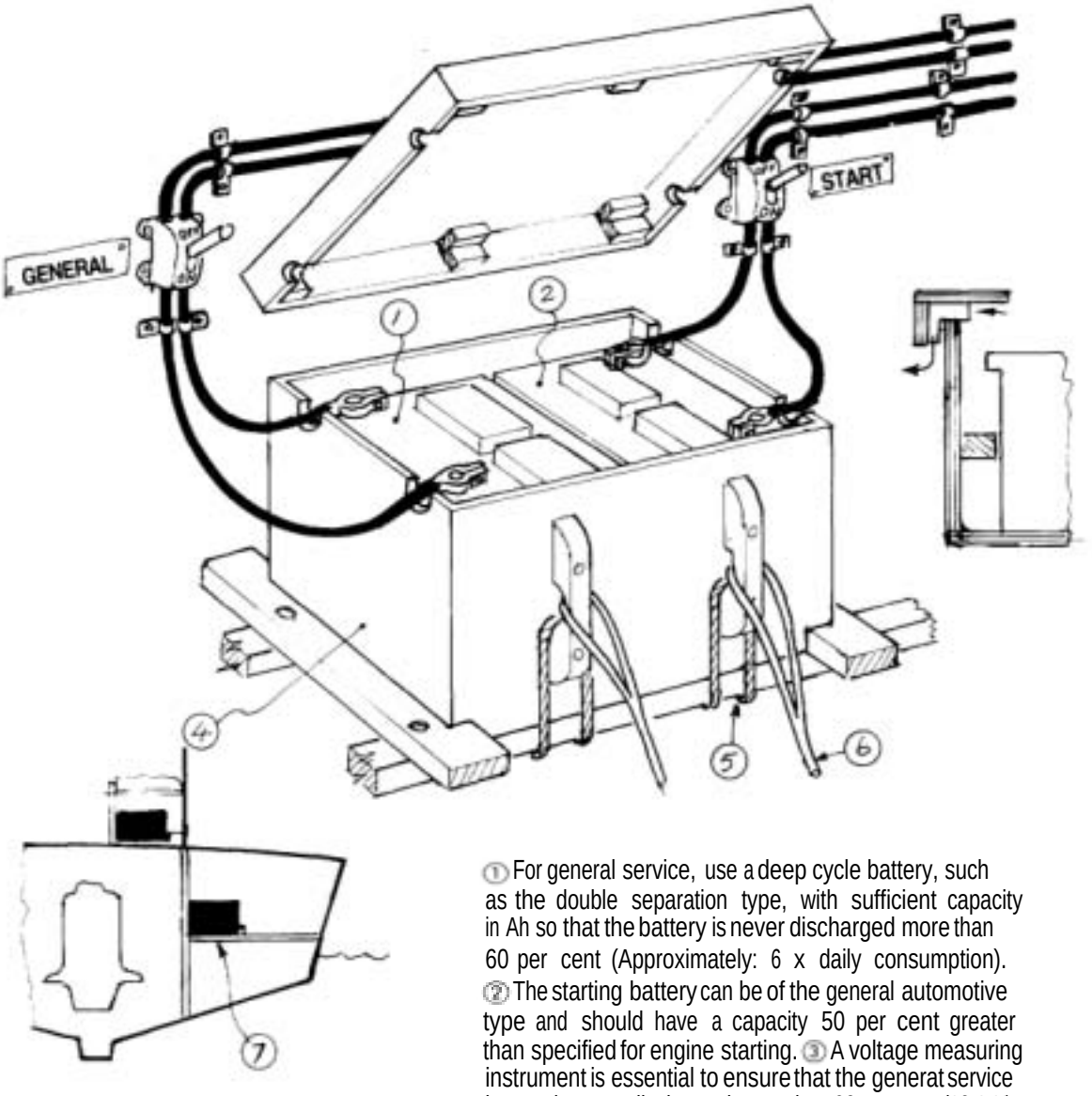
② Two wires, two pole switches (the engine is used as a conductor during starting). Main switches to be located as near the battery as possible.

③ Batteries should be placed as near the starter motor as possible. Use wire of size recommended by the engine manufacturers.

④ All user points to be disconnected when the main switches are off, with the exception of the bilge water level alarm and the automatic electrical bilge pumps.

⑤ General switchboard, Navigation lights to have separate fuses. All switches and fuses to be clearly marked.

Without the possibility of starting the engine manually, you will be in a precarious situation if you are far offshore with dead batteries. Therefore, take good care of your batteries.



① For general service, use a deep cycle battery, such as the double separation type, with sufficient capacity in Ah so that the battery is never discharged more than 60 per cent (Approximately: 6 x daily consumption). ② The starting battery can be of the general automotive type and should have a capacity 50 per cent greater than specified for engine starting. ③ A voltage measuring instrument is essential to ensure that the generat service battery is never discharged more than 60 per cent (12.1 V) and the starting battery 25 per cent (12.5 V). ④ Battery box made of 12 mm marine plywood lined with FRP on the inside and on the outside corners. There must be a 10 mm ventilation gap all around the lid and adequate space to lift the batteries out. ⑤ The box must be bolted or lashed down to prevent sliding. ⑥ The lid must be lashed down. ⑦ The batteries must be easily accessible and placed high so that any short circuiting is delayed in case the engine room is flooded. ⑧ The alternator should be capable of delivering 30A for every 100 Ah of total installed battery capacity. ***(See page 19)***