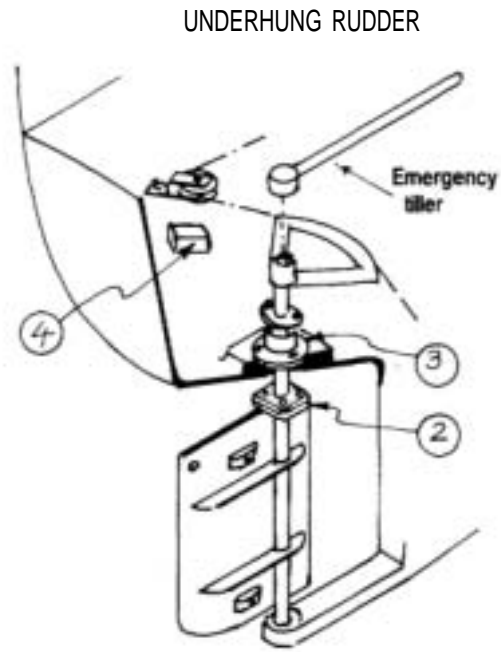


TRANSOM-MOUNTED RUDDER



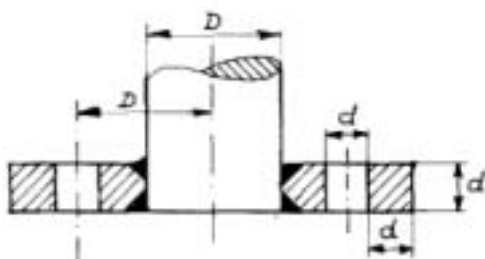
UNDERHUNG RUDDER

A rudder mounted on the transom is the most reliable and should be chosen if it does not obstruct the fishing operation. The two bearings (1) of heavy wood are bolted through the transom. The underhung rudder usually requires a coupling (4), and a bronze bearing with a gland (3).

Rudder stoppers (1) are required to limit swing to 40°.

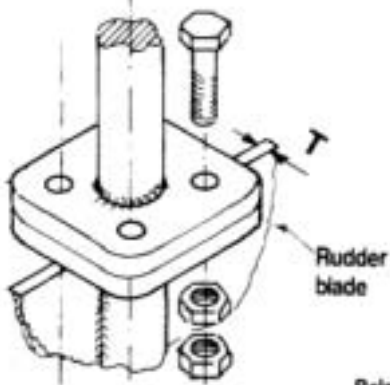
The rudder stock diameter $\cdot D \cdot$ should be selected according to classification societies' rules, but as a guide the following dimensions may be used:

Length x Beam x Depth of boat = CUNO in m3

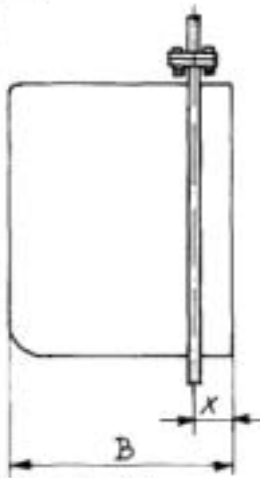


CUNO	D	d	T (steel)
Up to 25	30 mm	10 mm	6 mm
25 - 45	40 mm	12 mm	8 mm
45 - 100	45 mm	14 mm	8 mm

Machine after welding



Rudder blade



Balance $X = 0.15 \times B$

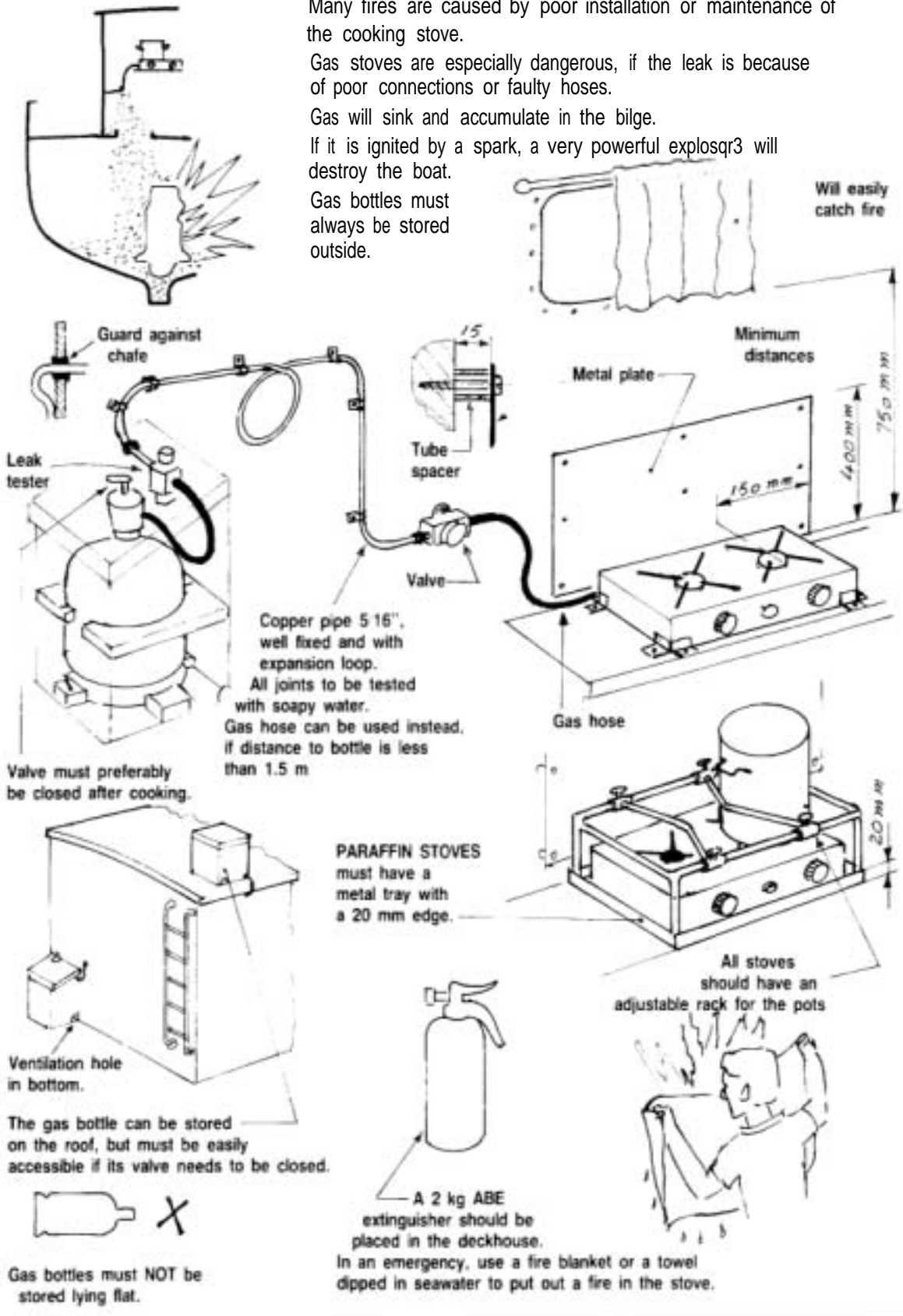
Many fires are caused by poor installation or maintenance of the cooking stove.

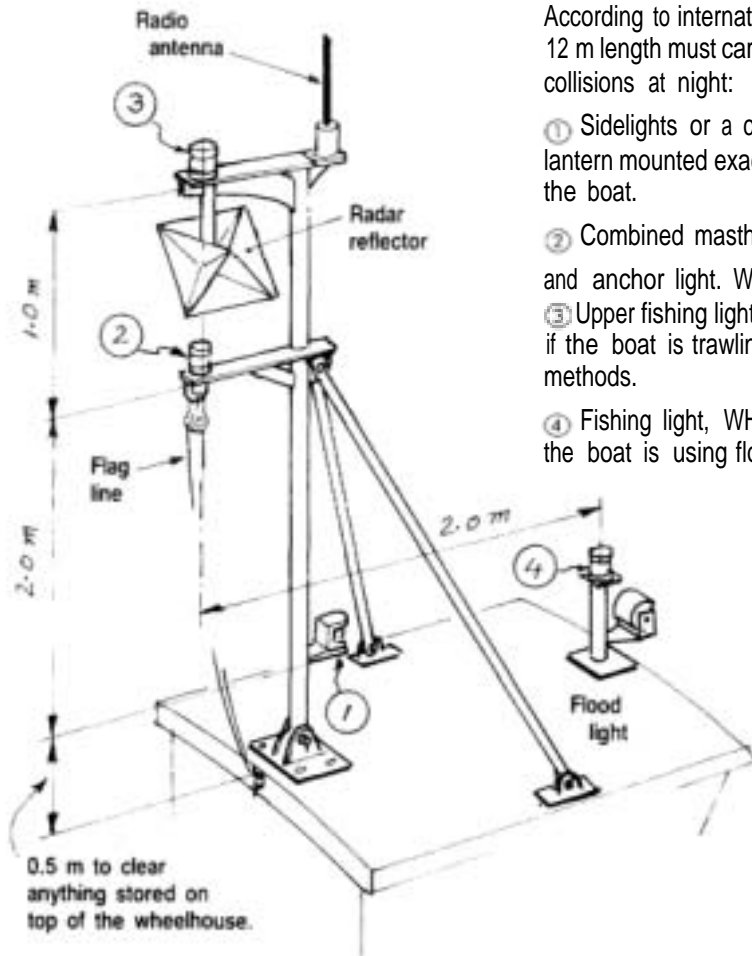
Gas stoves are especially dangerous, if the leak is because of poor connections or faulty hoses.

Gas will sink and accumulate in the bilge.

If it is ignited by a spark, a very powerful explosion will destroy the boat.

Gas bottles must always be stored outside.

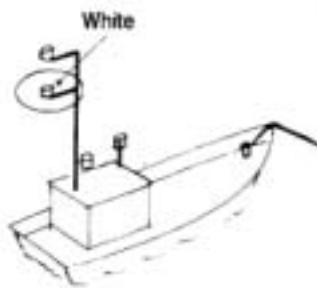




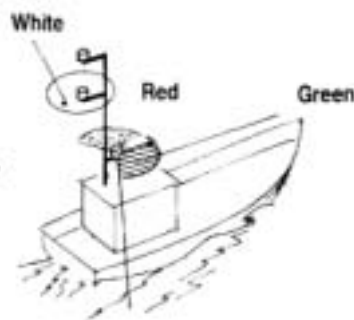
According to international rules, fishing boats under 12 m length must carry the following lights to prevent collisions at night:

- ① Sidelights or a combined (RED and GREEN) lantern mounted exactly parallel to the centre line of the boat.
- ② Combined masthead lantern, lower fishing light and anchor light. WHITE showing all around.
- ③ Upper fishing light showing all around – GREEN if the boat is trawling, RED for other fishing methods.
- ④ Fishing light, WHITE showing all around. When the boat is using floating fishing gear extending more than 150 m from the boat, this light indicates the direction of the floating fishing gear so that other boats can avoid the gear.

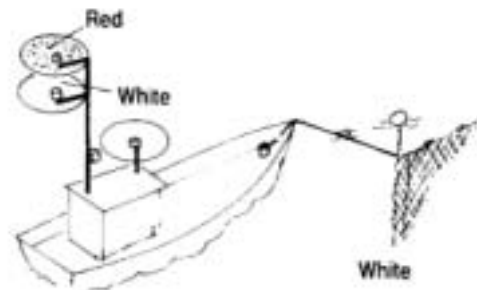
All lights must be fixed at the minimum distances shown in the drawing. All lights must be approved for boats upto 12 m and have bulbs of 18 watts.



Boat at anchor, showing WHITE anchor light



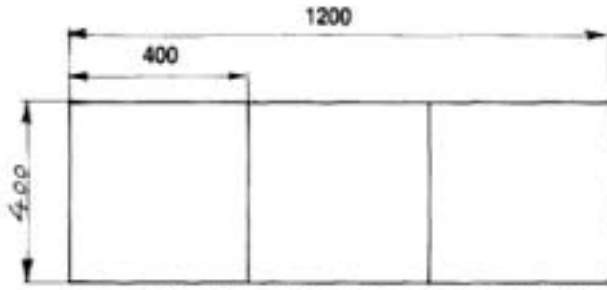
Boat under power, showing RED/GREEN sidelights and WHITE masthead light.



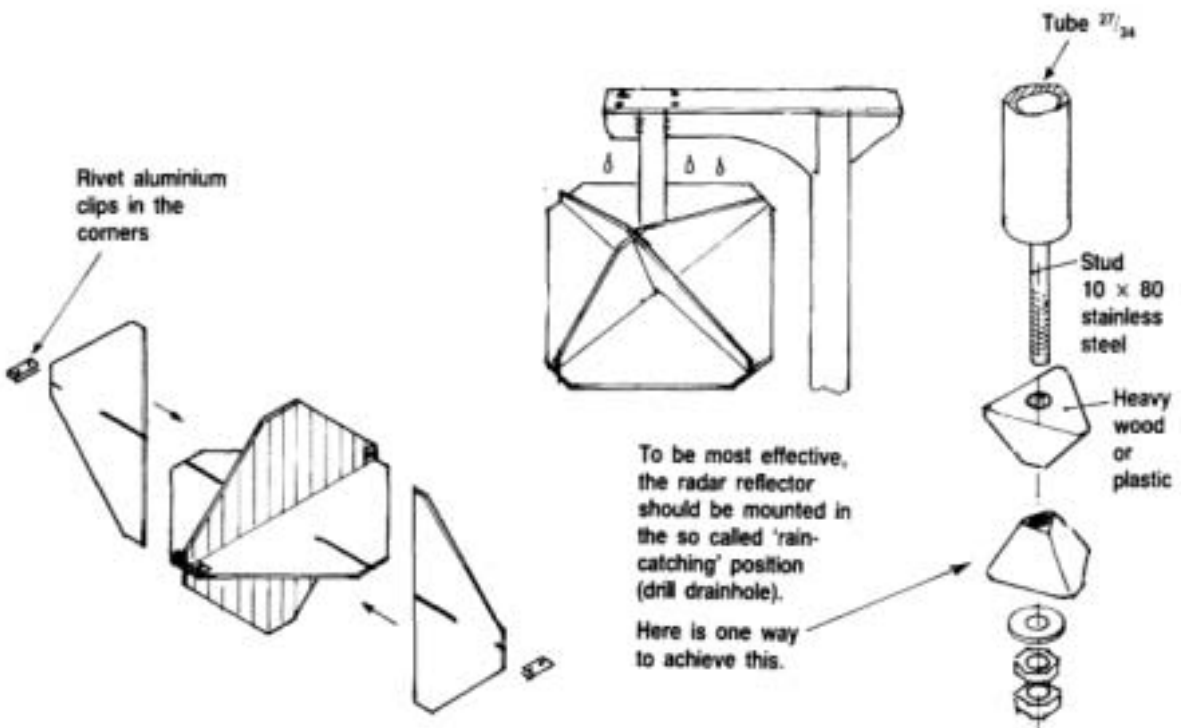
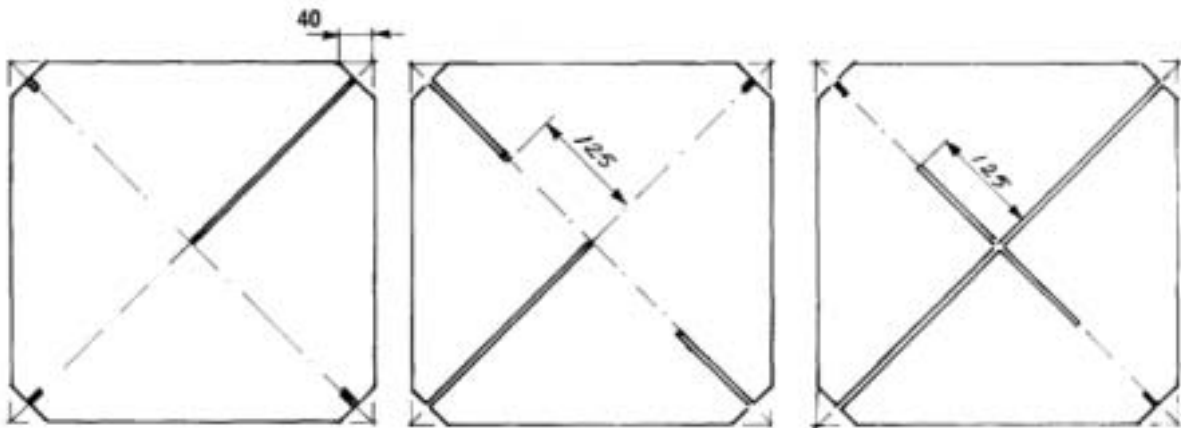
Boat with floating fishing gear extending more than 150 m, showing top RED and lower WHITE fishing light and WHITE directional light.

A small boat must be seen on the radar of a large ship at night if it is not to be run down. The radar beams sent by the big ship must be reflected by the small boat. Since an FRP or wooden boat reflects radar beams poorly, the small boat needs a special radar reflector.

Here is how it is made:

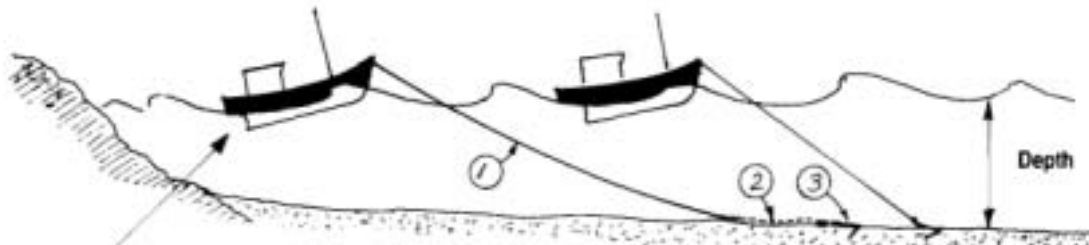


Aluminium sheet minimum 1.6 mm (16 SWG)



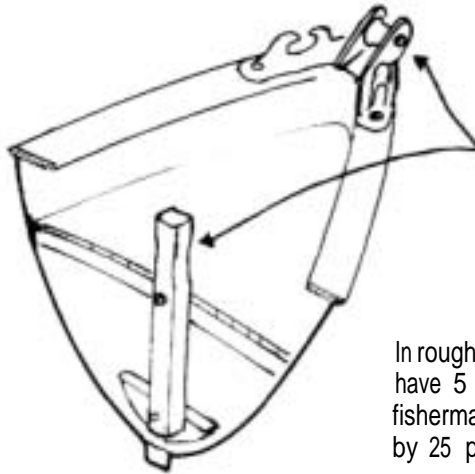
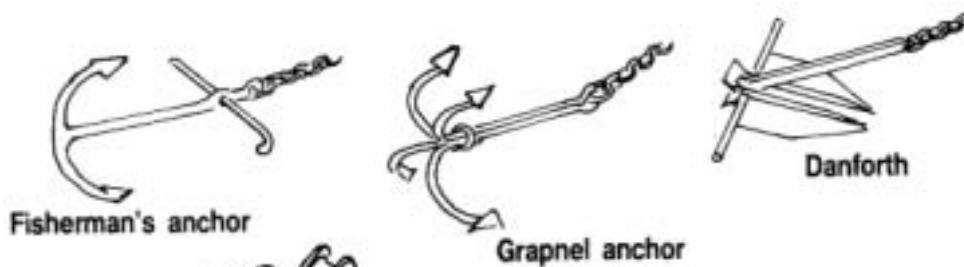
In this situation you want an anchor that holds well.

Which boat is safest?



This boat is safest because it has: ① An anchor rope of sufficient diameter and at least 55 m length. The length of the anchor rope should be 7 times the depth. ② A galvanized chain of minimum 8 mm and length 5 m attached to the anchor. ③ An anchor of high holding power. The type of anchor depends on the bottom condition:

Fisherman's anchor and grapnel can be used in rocky areas, but only a high holding power anchor, like Danforth, will hold well in mud or sand.

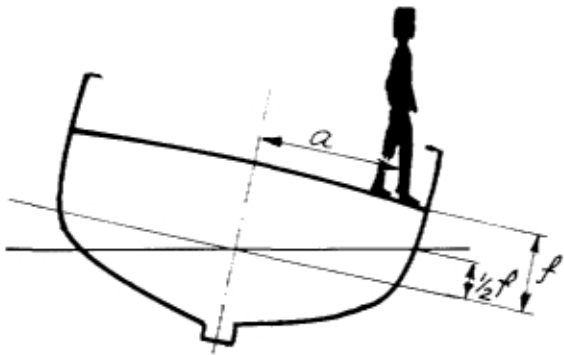


Having a good anchor is not enough. You must also have a strong point on the boat to fix the anchor rope and be able to protect it against chafe with a good fairlead. To haul up a heavy anchor, an anchor roller will be of great help.

Every boat should carry two anchors, one main anchor used for anchoring overnight and in heavy wind and one kedge for anchoring for a short time.

In rough weather, both anchors can be used. Each anchor should have 5 m of chain and at least 60 m of rope. If you use a fisherman's or a grapnel, increase anchor weight by 25 per cent.

Length of boat m	High holding anchor weight (kg)		Main anchor rope [diameter (mm)]			Kedge anchor rope [diameter (mm)]		
	Main	Kedge	PA	PP	PE	PA	PP	PE
8	13	7	12	14	16	10	12	14
9	15	8	12	14	16	10	12	14
10	17	9	14	18	20	12	14	16
11	20	10	14	18	20	12	14	16
12	23	12	14	18	20	12	14	16



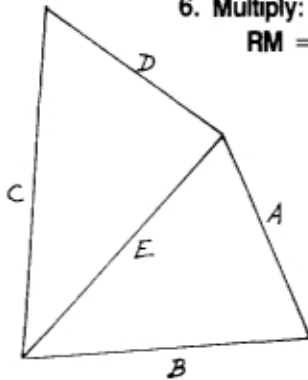
If your engine breaks down and you are far from shore, an emergency sail may be your only means to get home. The simplest type of sail is the dipping lug sail. The sail area will depend on the stability of your boat. Estimate the sail area as follows:

1. Measure the minimum freeboard (f) without any load in the fish-hold.
2. Make a mark on the side of the boat at half f.
3. Get a number of people to stand alongside the rail until the boat is inclined to half f.

4. If you don't have a weighing scale, estimate the weight of the people : Number × 70 kg

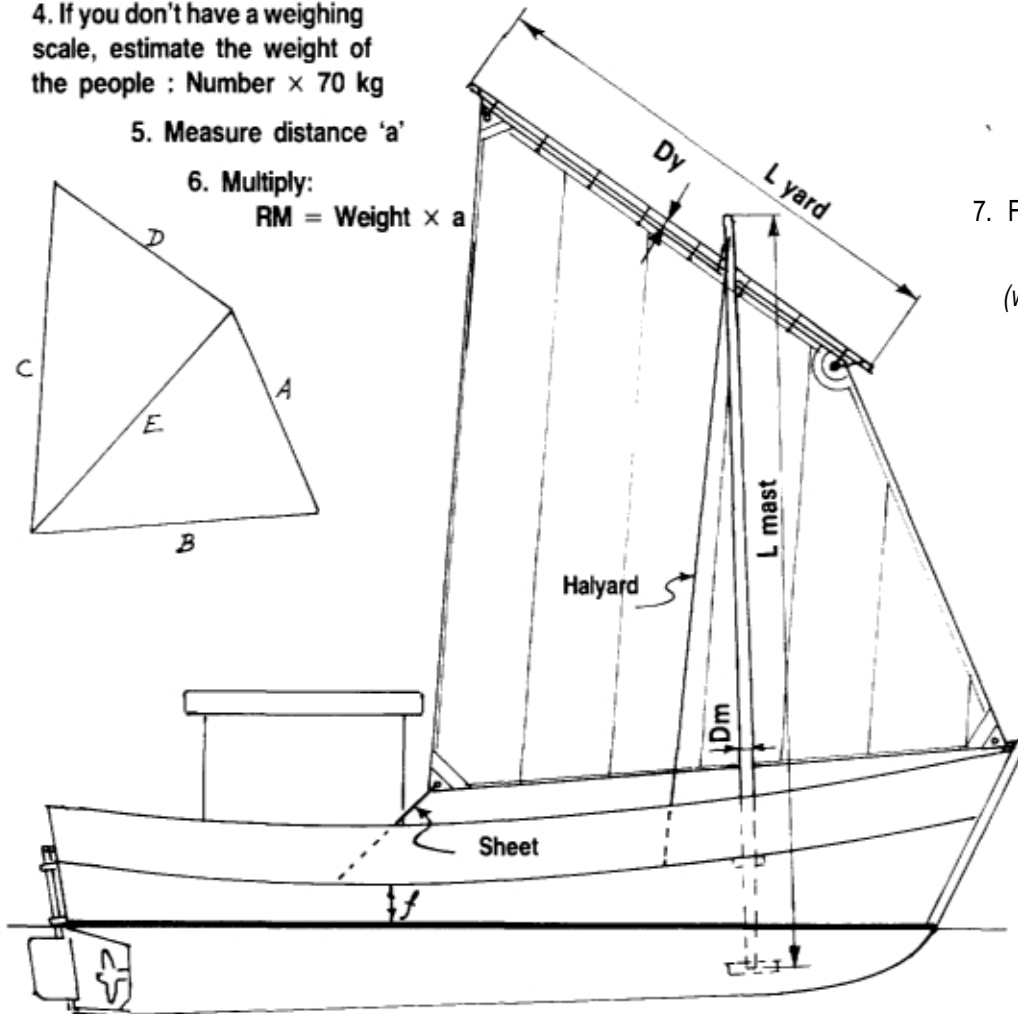
5. Measure distance 'a'

6. Multiply:
 $RM = \text{Weight} \times a$



7. Find sail area:

RM (weight x a) kgm	Sail area m ²
310	15
470	20
650	25
880	30



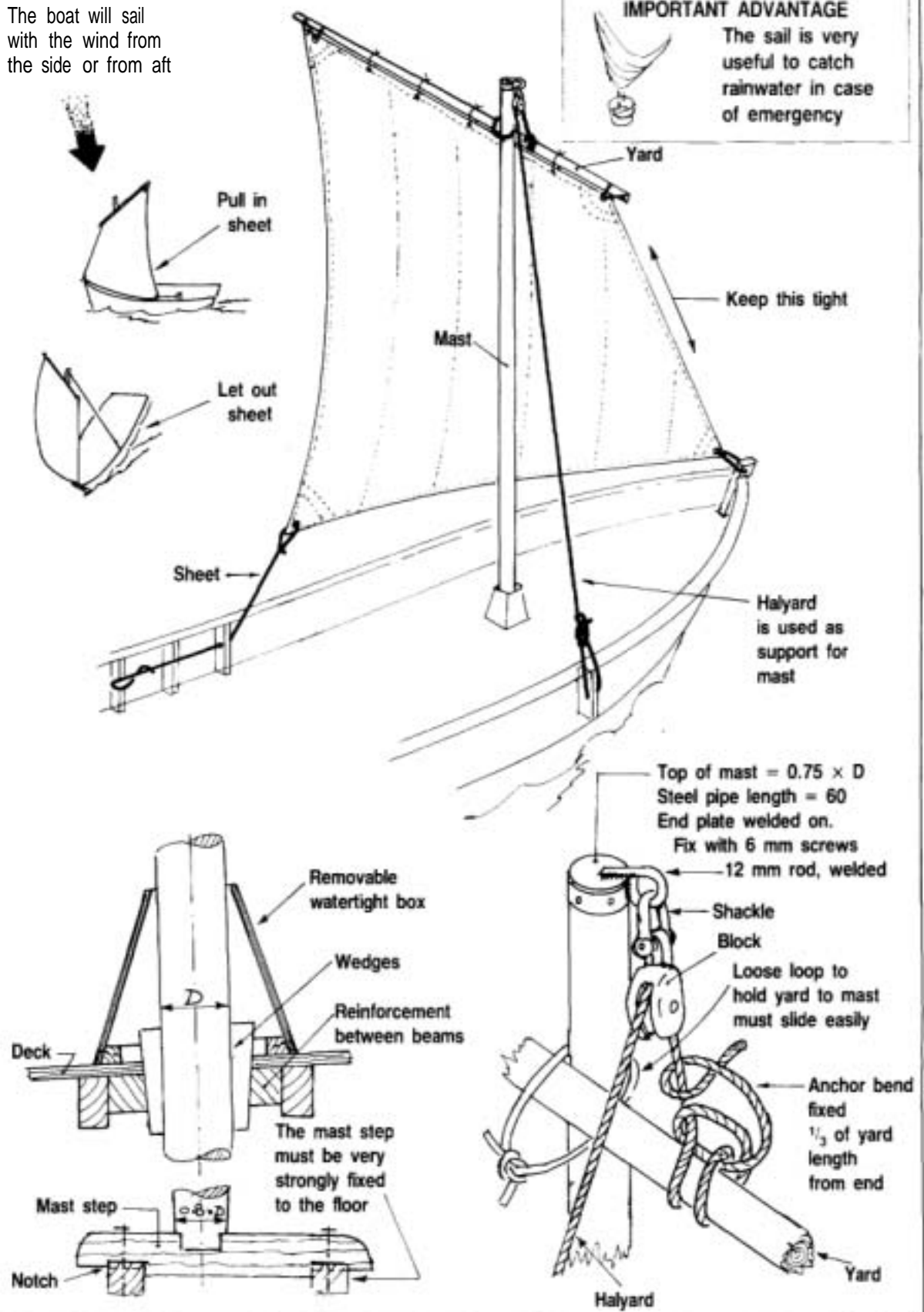
8. Find dimensions of sail, mast and yard from tables (in m)

Sail area m ²	Sail					Halyard		Sheet		Sail area m ²	Mast		Yard	
	A	B	C	O	E	Length m	Dia mm	Length m	Tha mm		Length m	Dia mm	Length m	Dia mm
15	3.4	4.5	5.5	3.3	4.8	13	10	12	10	15	6.4	105	3.6	60
20	4.0	5.2	6.3	3.8	5.5	15	12	14	10	20	7.0	120	4.1	65
25	4.4	5.8	7.1	4.4	6.1	16	12	15	10	25	7.7	130	4.7	70
30	4.8	6.4	7.8	4.9	6.5	18	12	17	12	30	8.8	140	5.2	

The boat will sail with the wind from the side or from aft

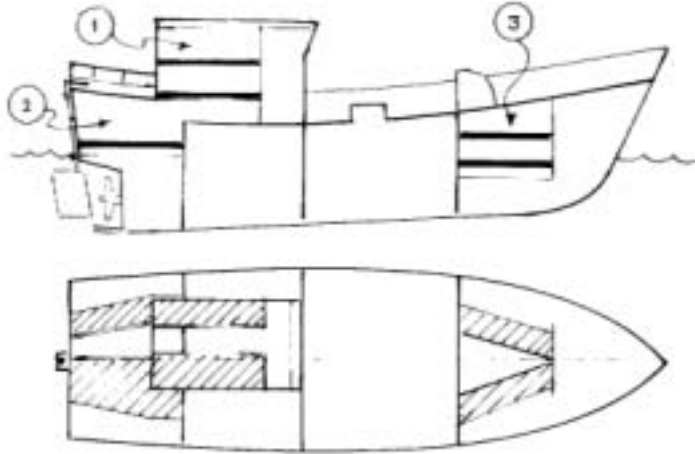
IMPORTANT ADVANTAGE

The sail is very useful to catch rainwater in case of emergency



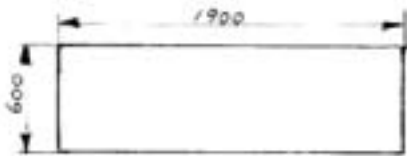
A CREW THAT GETS A GOOD REST MAKES FEWER MISTAKES.

The number of berths should be at least the number of crew less one person who will be on duty.

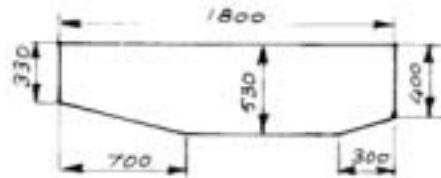


In a boat with an aft deckhouse, there are the following alternatives (listed in order of priority):

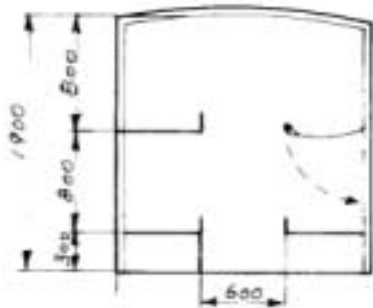
- ① Deckhouse. Good ventilation.
- ② Aft peak. Difficult to get good ventilation. Double berth necessary to utilize space. Note that outside rudder saves much space. Raised aft-deck may be needed.
- ③ Fore peak. Difficult to get good ventilation (except with deckhouse forward). Uncomfortable when the boat is pitching.



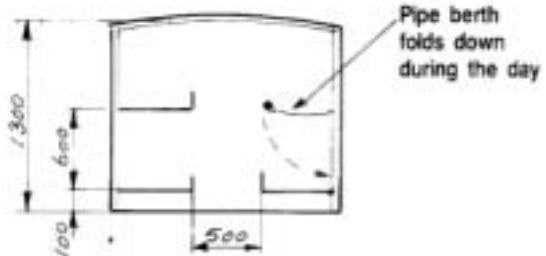
This is the normal size of a berth and should be preferred.



This is the minimum size of a berth. Use foam mattresses that have a cover of a material that does not easily catch fire.



Normal space requirement in deckhouse



Minimum space requirement

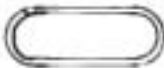

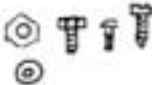
Engine room ventilation duct

REGULAR MAINTENANCE IS THE BEST WAY TO PREVENT BREAKDOWNS



The engine manufacturer knows best how the engine should be taken care of. Read the manual carefully and follow the instructions regarding maintenance, regular checks and periodic overhauling.

	<p>CHECK DAILY, BEFORE STARTING</p> <ol style="list-style-type: none"> ① Oil level of engine. ② Water level, if the engine has freshwater cooling. ③ One turn on the sterntube greasing cup. ④ Sufficient fuel for the trip.
	<p>CHECK DAILY, AFTER STARTING</p> <ol style="list-style-type: none"> ① Whether engine cooling water is flowing. ② The water pipes, exhaust pipe, fuel pipes and oil pipes – for leaks. ③ Oil pressure gauge. ④ Battery charging gauge.
	<p>CHECK EVERY 14 DAYS</p> <ol style="list-style-type: none"> ① Belt tension on alternator belt. With proper tension, it should be possible to push belt down 5 mm-10 mm. ② Dirt and water in fuel tank sump and primary filter. Drain off. ③ Battery level. Fill with distilled water as necessary. ④ Whether bolts of engine mount and propeller shaft coupling are tight. ⑤ Gland, packing of stuffing box. Replace packing as necessary.
	<p>EVERY 100-150 ENGINE HOURS</p> <p>Follow the engine-maker's recommendations on:</p> <ol style="list-style-type: none"> ① Change of engine oil. ② Change of oil filter. ③ Change of fuel filter. ④ Change of gear oil.

TOOLS AND SPARE PARTS TO BE CARRIED ON BOARD		30
	Combination spanners set 8 mm – 24 mm	 Fuel injector with sealing washer
	Adjustable spanners 6" and 10"	 Fuel injection pipe with end fittings
	Pipe wrench 18"	 1 set spare parts for engine waterpump,
	Ball peen hammer 0.5 kg	 V-belts for alternator waterpump etc.
	Combination pliers 6"	 Cartridges for fuel and lub-oil filters
	Pump pliers 12"	 Gland packing for sterntube with special spanner
	Vice grip 10"	 Spare parts for manual pump
	Diagonal cutting pliers, 6"	 Coil of copper wire. Stiff steel wire
	Hacksaw, with spare blades	 Insulating tape. Tape for pipe threads
	Cold chisel	 Spare bulbs and fuses
	Flat single-cut file, fine	 Engine oil 2-5 litres Oil squirt can.
	Flat screwdrivers, 3 mm, 6 mm, 10 mm	 Grease gun
	Pozidrive screwdrivers, Nos 2 and 3. Philips, type 1	 Gasket cement. Epoxy glue
	Hand drill One set of drill bits, high speed 3mm-10mm	 Assorted bolts, nuts, washers, screws, hoseclips
		 Waterproof torch