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SEYCHELLES

BOATBUILDING REQUIREMENTS AND BOAT DESIGN: 4

A report prepared for the  
Consultant Services to the Department of Agriculture Project

by

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(Boatbuilder)



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## 1. TERMS OF REFERENCE

The consultant will be responsible for the lofting of a 38-ft fishing vessel, designed by an earlier FAO consultant.

Specifically, he will:

advise local boatbuilders in the initial stage of construction

advise on construction details and the installation of the engine and give necessary guidance for outfitting the vessel.

At the end of his assignment, he will prepare a report on his activities.

## 2. PROGRAMME

- 13 Dec. 1979 Flew Khartoum to Victoria, Seychelles
- 14 Dec. Met Mr. K. St. Ange, Minister of Agriculture  
Mrs. M. McGaw, Department of Economic Planning and Development  
Mr. T. Kroeplien, FAO Fisheries Adviser  
Mr. S. Vidot, Senior Fisheries Officer
- 15 Dec. Flew to La Digue to discuss lofting with J. Durup, the boatbuilder,  
assessed materials required and returned to Victoria
- 16 Dec. Obtained materials for lofting
- 17 Dec. Travelled to La Digue, started work on preparing lofting boards
- 18-24 Dec. Work started on construction of mould loft shed
- 25 Dec. Christmas Day
- 26 Dec. Laid floor
- 27-31 Dec. Finished floor and started lofting
- 1 Jan. New Year
- 2-11 Jan. Lofted
- 11 Jan. Returned to Victoria
- 12 Jan. Analysed engine bearer difficulties
- 14-18 Jan. Discussions concerning boat's predicted fishing performance,  
cabin arrangement, fish box installation. Modified where  
necessary
- 18 Jan. Met Ms. Eva Doblemayr and Mr. Dmitry I. Panyushkin, UNIDO  
industrial development officers concerned with proposed  
UNIDO Boatyard

21 Jan. Flew to La Digue via Pralin to loft revised engine installation and fish boxes

22 Jan. Lofted and revised construction notes

23 Jan. Returned to Victoria. Worked on equipment list with Mr. S. Vidot and Mr. R. Morgan

24 Jan. Finalized equipment list and returned to Khartoum

25 Jan. Arrived Khartoum

### 3. TECHNICAL REPORT

It was Mr. S. Vidot who had first contacted Mr. Haug, the designer of SEY-1, and who was therefore well able to explain matters concerning this design and its aims. It was decided to loft the boat first and hold discussions on equipment afterwards. Mr. Durup, whose boatyard is on La Digue Island, about 40 mi from Victoria, had been chosen as builder. There were two options regarding where to loft:

- (1) Obtain suitable floor space in Victoria, which might have been relatively easy to find
- (2) Loft the boat in La Digue at the boatyard. This would require building a simple shed and laying a floor as the yard was entirely open and the rainy season had begun.

The second option was chosen. Had the lofted plan been made in Victoria, 40 mi and a day's schooner trip from the builder in La Digue, small use would have been made of it. A secondary aim was to introduce a new boatbuilding tool to the local craftsmen. Had they not been fully involved in the process, the lofting procedure would not have been understood, the details of the construction not realized and necessary modifications enabling its building in the locality would not have been made. With Mr. Durup, it was decided to construct a simple shed, level the ground and lay a floor of exterior grade 10 mm plywood sheets. This was shortly before Christmas, and the shed and floor were not ready until 26 December. Some preparatory work was done meantime to obtain all the necessary measurements before starting. Although the design had been lofted before, the table of offsets had not been corrected and there were some discrepancies, particularly in the after sections. Mr. Durup's brother, Paul Durup, was to be in charge of the construction, and he assisted in all the stages of lofting and gained a good working knowledge of the process. From the drawing of the grid to completion of essential construction details took 10 working days. Because it takes experience to understand drawings and the complexity of lines in a mould loft, only the basic construction details were lofted, these consisting of back-bone construction, positions of frames, keelson, engine bearers, heights of floors, fish hold and outline of cabin. All fairing was done to outside of planking and the thickness taken off on the sections, waterlines, diagonals and buttocks were applicable and transferred to the body plan. The designed construction was gone over in detail as were the details of the local methods of construction. A few modifications were made and since the available construction plans were sparse in detail, a few construction drawings and construction notes were produced. Steam-bent frames are not common in the Seychelles and the few examples seen were of much lower quality than the

standard grown frames. Crooks and compass timbers are abundant on La Digue and frames never have more than one butt, at the keel, where the butt strap doubles as a floor. Only two local timbers were likely to be sufficiently flexible, bois de table (Hapliteria litoralis) and the roots of the takamaka (Callophyllum inophyllum). Experience with lofting battens had shown that neither would bend to the required curves at the required thickness without steaming or boiling. Extensive boiling tests showed that neither would bend sufficiently without excessive splintering and compression shakes. Takamaka roots might have been suitable for some of the frames but the locating of sufficiently long roots, either straight or of a suitable curvature, posed a problem. The design was modified for grown frames which, to agree with commonly accepted scantlings such as those of Simpson in Fishing Boats of the World, Volume 2, and of Jenkins for IBRD-financed Philippine fishing boats, had their moulded size increased to 76 mm (3 in), the sided size and spacing remaining unaltered. The stem's siding was increased at the sheer to allow an adequate land in the rabbet and the sternpost's siding increased in way of the stern tube. Details of all alterations are in the construction notes and drawings. It was not possible to loft the engine installation as early as is normal since its width is not given and engine drawings had to be sent from Victoria. They arrived just before my proposed return to Victoria and were quickly lofted. It was evident that the bearers came dangerously close to the planking but nothing was foreseen other than minor modifications of which drawings could be done and sent to the builders. Close analysis of the design showed the bearers to cut through both frames and outer planking extending outside the boat from about 250 mm abaft station 8. Shorter engine seats were substituted, let into the engine bearers by 10 mm and bolted to them. The tops of the bearers are now horizontal and the bottom shaped to the contour of the boat notched over the frames and into the floors. Brackets tying the bearers to the lower bilge stringers and intercostals will be of steel. The boatyard has had experience of making templates for this type of work.

Discussions in Victoria with Mr. Vidot and Mr. Morgan, fisheries officers, gave a clear indication of what was expected of the boat in its role of upgrading the schooner fishing. Although no precise figures had been given, it had been understood that SEY-1 would hold about 6 tons of fish and ice. However, the average figure is 40.2 lb of fish and ice/ft<sup>3</sup> giving SEY-1 a capacity of  $78 \times 3 \times 40.2 \div 2240 = 4.2$  tons. Considering the advances made in fish boxes in the Seychelles since the boat was designed, the increase in tonnage capacity is not what was originally expected. To enable the maximum quantity of fish to be carried, it was decided to eliminate the dividing beams in the fish hold and make one or two closely fitting boxes. The bottom of the boxes would be shaped to fit the boat. This gives a total volume of 286.6 ft<sup>3</sup> giving a capacity of 5.143 tons fish and ice. This necessitates a reduction in the depth of floors toward amidships but the change to grown frames had increased their depth and that of the short intermediate frames by 50%, so no weakening of the hull may be expected. The cost of construction should be no greater than that of three separate boxes and the modification demonstrated to the builders the use of a mould loft when wanting to optimize a layout.

Given a Load Water Line plane of about 228.6 ft<sup>2</sup>, the tons required to sink SEY-1 one inch =  $228.6 \div 12 \div 35 = 0.54$  inches.

The extra load =  $5.143 - 4.2 = .943$  tons will sink SEY-1  $.943 \div .54 = 1\frac{3}{4}$  inches.

This will have no effect on her seaworthiness except that the low centre of gravity of the additional weight will add to her stability. Mr. Kroeplien stressed the importance of ease of work loading and off-loading fish to preserve its quality and the hatches were designed with Mr. Morgan's experienced advice. If the fish boxes are completely sheathed with glass fibre, their life could be extended and with reinforcing on the top edges and on the insides, where the ice hits the sides on loading, a much greater increase in life can be expected than at present.

Eliminating the dividing beams in the fish hold made tie bolts necessary, and details are in the construction notes.

The original cabin was designed as a shelter for a particular fisherman wanting the best sailing performance. Surprise was shown that the same cabin should be considered suitable for the Fisheries Department's needs. The shelter cannot house equipment or shelter a helmsman. There was no time to design a deck house in detail. A basic arrangement was planned extending the cabin over the hold to give a console, raising the forward end of the cabin top to give standing head room at the wheel and an all-round view leaving the original sitting head room over the bunk, chart table and cooker. Being uncertain as to the nature of the funding, I could give no answer concerning covering the extra cost. Wheel steering is common. Chain rather than wire is preferred by the Fisheries Department but, lacking the necessary catalogues (Davey's of London have a good range for heavy duty work boats), this point was left undecided and the gear will probably be made locally to suit wire cable, leaving the tiller as designed for emergencies. It was evident that the modifications would need explaining to the builders. I returned to La Digue and, with Paul Durup's assistance, lofted the alterations. New drawings were completed and the construction notes revised.

On Friday 13 January a meeting had been held with Mr. Panyushkin and Ms. Doblemyr, industrial development officers from UNIDO, who were investigating the establishment of a model boatyard or boatyards in the Seychelles. They were interested in building SEY-1 schooners and the design with all modifications is being made available to them. There was not time to go into the detailed requirements of a boatyard in the Seychelles, but the standard FAO list of equipment for a boatyard in developing countries has also been made available.

Finally, discussions were held concerning the boat's equipment. FAO is not financing this but advising on what is suitable. The British Ministry of Overseas Development has been approached and is providing funds for the equipment and the engine. The extensive proposed list of electrical equipment had been prepared by a number of sources as to what could be used with adequate funds. Of these, good depth sounding equipment and radio equipment are of importance to the Department and are being given priority.

#### 4. SUMMARY

All points in the terms of reference were covered and although there was not time for detailed plans of the cabin or rig to have been made, these can be agreed between the builder and the Fisheries Department, and completed according to tradition. However, to ensure that there are no further difficulties installing any of the equipment and incorporating any strong points, such as for the line and net hauler, placing any hydraulic pumps, making detailed plans of cabin and rig if required, etc., another visit of one week should be made when the planking has been completed and the deck beams are being fitted. This is the last stage at which

adjustment can be cheaply made and problems that have arisen easily solved. The builders should inform FAO through the Fisheries Department when the planking is nearing completion.

The last visit should be at the launching and trials. Full fishing trials should be made, attended by both the builder and consultant and the performance carefully noted and compared with other similar sized schooners.

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APPENDIX 1

Modifications to Equipment List  
(Items otherwise as originally stated)

Bulwark mounted line and net hauler suited to line fishing, purse seining and pot hauling

Danforth anchor 27 kg

Chain galvanized 3/8" 7 fath

Anchor warp manille 1 1/2" diameter 30 fath

Simpson Lawrence 555 2-speed anchor winch

Baby Blake marine toilet

Optimus 535 paraffin pressure cooker

Aqua signal '40' navigation lights

Deck house search light

Clip-on inspection lamp and 20 ft flex and 4 sockets

Flexible chart light

Sestrel Medina steering compass

Sestrel Radiant hand-bearing compass

Mariner Range clock and barometer

Sum log

Seafarer Seascribe echo sounder

Sea voice VHF

Sea Fix RDF

LOCAT Radio distress beacon

6-man inflatable life raft

The SSB radio was not chosen, this being deferred until further details and prices could be obtained.

APPENDIX 2

Corrected Offsets to Outside of Planking (mm)

Station	1	2	3	4	5	6	7	8	9	Transom
Sheer line	1170	1562	1750	1808	1815	1798	1770	1703	1563	1227
W.L. 1000	1030	1500	1728	1805	1815	1798	1770	1703	1545	1196
W.L. 750	933	1424	1685	1798	1815	1798	1765	1675	1492	1085
W.L. 500	812	1320	1633	1777	1813	1790	1738	1612	1372	820
W.L. 250	665	1184	1545	1720	1775	1760	1664	1460	1090	318
D.W.L.	480	983	1410	1605	1685	1640	1540	1130	553	
W.L. -250	272	630	1050	1355	1485	1380	1065	575	210	
W.L. -500		150	235	451	645	570	322	155	85	
Sheer line	1438		1150		1000		1014		1178	1385
Buttock 1400		677	-10	-228	-304	-238	-88	187	545	
Buttock 1050	1060	75	-250	-380	-430	-382	-250	-43	230	695
Buttock 700	310	-203	-377	-457	-487	-470	-378	-198	74	438
Buttock 350	-162	-384	-494	-515	-543	-545	-480	-350	-114	270
Rabbit line	-490		-540		-590		-640		-690	56
Diagonal A	957	1418	1712	1860	1908	1895	1820	1680	1460	1060
Diagonal B	828	1260	1580	1740	1815	1764	1636	1400	1110	704
Diagonal C	620	923	1115	1235	1290	1245	1120	915	663	304
Diagonal C1	477	693	830	910	950	930	834	665	460	122
Diagonal D	318	434	516	560	590	587	530	414	270	

Half breadths

Heights from D.W.L.

Diagonals

APPENDIX 3

SEY-1

Construction Notes

1. MODIFICATIONS TO ORIGINAL SPECIFICATION

Stem siding increased to 200 mm at sheer tapering to 140 mm at heel.

Sternport siding increased to 200 mm at the propeller shaft and above.

Stem and sternport may be cut from timber incorporating a natural crook at the heel to be scarfed into the keel. In this case fore and aft knees (dead woods) item (11) on drawing SEY - 1/3 may be of straight grained stock.

Grown frames may be used instead of bent timbers (see Fig. 1) but the dimensions must be increased to 76 mm (3 in) moulded from keel to bilge and may taper to 65 mm (2 1/2 in) at beam shelf. The sided thickness remains at 60 mm (2 3/8 in). The spacing remains at 350 mm centre to centre at the sides, 175 mm in the bottom with grown frames. The floors may be side fastened, in which case care must be taken in the positioning of floors at stations 3 to avoid mast and 7, both of which may need to be placed on the after face. For spacing of frames and floors in engine room see engine installation (Figs. 3 and 4).

Butts in frames must be secured with butt straps of the same dimensions as the frame with a minimum length of 12 times the sided thickness ( $12 \times 60 = 720 \text{ mm} = 28 \frac{3}{8} \text{ in}$ ). The floors do not constitute butt straps at the keel because of the large cut out for the keelson. Intermediate short frames should be in one piece and extend 20 mm (7/8 in) beyond the lowest bilge stringer. Bulwark stanchions should be separate from frames. The keelson should only be notched on its outer lower edges to enable it to sit firmly on the frames.

The emergency tiller should come square off the rudder stock to be angled to allow the helmsman to see over the after end of the cabin.

One 130 mm x 130 mm Takamaka Samson post to be positioned abaft the second deckbeam down to for'd of the floor station, 1 tenoned into the for'd dead wood.

CONSTRUCTION NOTES

Engine Installation

The engine installation as shown in the original plan is impractical, and the engine should be installed according to drawing of modified engine beds and fish hold (see Fig. 3) and as lofted. The engine will be fixed to engine seats 170 mm deep by 110 mm wide, to which the engine will be bolted. These 170 mm x 110 mm seats are bolted to 120 mm thick bearers being let in 10 mm to be a firm fit along the bottom edge and the ends. The engine bearers are bolted to the frames and floors. The bearers should be notched over the frames and where there is sufficient depth of floor, both floors and engine beds should be notched. The engine bearers should also be braced athwartships with steel brackets connecting the bearers to the bilge stringers and frames as close to the engine holding down bolts as possible (see Fig. 4).

Frames and floors must be as lofted with the frame on station 8 being placed so that its aft face touches the station and the floor should be on the forward face of the frame to give room for the engine holding down bolt. For the same reason, the floor on frame 7 + 350 should be on the forward face of frame. Otherwise, all floors to be fitted to give optimum support to the bearers with sufficient clearance from engine and shaft.

#### Engine Room Ventilation

Minimum inlet area  $72 \text{ m}^2$  (including area for combustion). The gap between the boxes and the edge of fish hold will be sufficient for the boat to operate. To reduce engine room temperature to a good working level, not less than  $1/2$  the inlet requirement ( $72 \text{ m}^2 \div 2 = 36 \text{ in}^2$ ) should be used. A circular vent of  $6 \frac{3}{4}$  in gives  $36 \text{ in}^2$  area. A vent or vents giving  $72 \text{ in}^2$  would be preferable. These vents should run from underside of deck to top of cabin or high on the cabins sides or back. As there is no division between the engine room and the rest of the interior, air drawn through the hull will ventilate the boat. If at any time this is partitioned off a vent leading to the bilges in the engine room with an area of  $72 \text{ in}^2$  will be required.

#### Lower Bilge Stringer

This must be kept out board of the engine bearer to facilitate the installation.

After end keelson with 3-in grown frames, the after end of keelson will curve upward. To assist the bend, the keelson may taper for a length of approximately 800 mm ( $31 \frac{1}{2}$  in) to a thickness of 30 mm.

#### Fish Hold

In plan view this has been modified to eliminate the dividing beams and to take one or two boxes. If as is intended the cabin is extended over the top of the fish hold, two boxes will need to be made to enable the boxes to be removed for hull and box maintenance (see Fig. 6). To facilitate the lifting out of the large box, the bottom boards and the under side of the smaller should be painted with non-slip deck paint. No further locking device should be required. Fish boxes must drain freely to the bilge. Bottom boards should be not less than 2 cm thick and gaps between boards may be up to 1.5 cm wide.

Heights of floors should be taken from loft floor. A template made to lower face of bottom boards might be of assistance.

Make sure lower bilge stringer runs below bottom of boxes. Two tie bolts should be incorporated between fish hold carlines and gunwhales as shown in the modified deck beam lay-out of 24.1.30. These should be  $5/8$  in (16 mm) bronze, stainless steel, galvanized steel or mild steel. If only mild steel available, these should be cleaned to bright metal and cleaned of grease and coated with zinc epoxide paint or epoxide tar or heated to red heat and quenched in ordinary tar. Heads of tie bolts must be sunk flush with inside face of carline.

It is recommended that the boxes should be sheathed completely in GRP inside and out. Extra reinforcing should be incorporated at the edges where the fish and ice hit the sides of the box during loading, and an area of aluminium sheet at these points could add years to the life of the box. To reflect radiated heat, a layer of aluminium foil could be incorporated into the construction of the tops. A method of keeping the lids firmly attached to the boxes in bad weather should be incorporated. The top surfaces should have anti-slip properties.

#### Floors in Way of Mast Step

Floor at frame 3 + 350 to be fastened to aft face of frame floor at station 2 + 350 to be positioned on for'd face of frame. This allows mast step to extend over one extra frame each end.

#### Cabin

The cabin may be extended over the fish hold and the carlines need to be opened to align with the front edges of the cabin on the hatch coaming (see Fig 5 and 6). The cabin sole should be as low as practicable. The engine's highest point is the fresh water filler cap for the heat exchanger and this must be readily accessible.

#### General Points

With the particular need for accuracy in way of the engine, it might prove worthwhile to set the keel at its designed angle to the horizontal on the building stocks. A building board showing the longitudinal position of all items which need accurate placing can then be placed horizontally over the hull and all positions can then be marked with a plumb bob.

All butt joints to be joined with straps of the same width and thickness as the pieces joined the lengths being at least 12 times the thickness (a 28 mm needs a butt strap  $12 \times 28 = 336 \text{ mm} = 13 \frac{1}{4} \text{ in}$  (scarf joints should have a minimum length of 6 times the thickness). All joints should be coated with a preservative or mastic compound before fastening.

Copper sheet to be placed around the base of the keel before fastening.

The exterior of the hull to be painted with epoxy tar up to 4 inches above the designed DWL.

APPENDIX 4

Comparison of SEY-1 with Average Schooner

Boat performance related to present catch rates. All figures concerning catches are means. Optimum figures may be more than three times as high.

Normal type of fishing handlining.

Common Factors

Maximum number of days fish can be stored in fish boxes	10 days
Number of days fish can be stored with a good safety margin	8 "
Number of days spent travelling to and from grounds	2 "
Fish to ice ratio in boxes	1:1
Weight of fish caught for man-day	45 kg (100 lb)
Deck length required per fisherman for optimum catch	1.5 m (5 ft)

	<u>Average schooner</u>	<u>SEY-1</u>
Number of crew	6	6
Capacity fish and ice	3 tons	5 tons
Capacity fish	1.5 tons	2.5 tons
Days required to catch full load	5 1/2 days	9 1/4 days
Days travelling to and from grounds	2 days	2 days
Total fishing trip	7 1/2 days	11 1/4 days

The average modern Seychelles schooner will normally complete its trip in 7 1/2 days, close to optimum for the ice-box system. Ten days is considered the maximum for fish in good condition with some danger that the quality might decline. This leaves little incentive to develop methods giving higher catch rates per crew member. Although higher catches occur entailing more trips in a given period and frequently a better fish-to-ice ratio, travelling time per catch is then increased and the larger capacity boat will gain more fishing time. SEY-1 allows for improvements in both fishing and storage methods. The Fisheries Division intends to experiment with trolling, seine netting and possibly longlining, although previous experience with longlines has shown the catch to be often spoiled by predators. The Fisheries Division also wants to experiment with pair trawling on similarly sized and powered boats. Although it is clear that SEY-1 is not suited to heavy trawling equipment, whenever the necessary boat and equipment become available, trials will be made.

Seychelles fishing schooners seldom encounter bad weather and, for years, may only average one day operating in winds above force 5 per year. This is reflected in their construction which would be considered light in many areas. The comparably weaker areas are some of the joints and the engine installation in way of the stern tube. SEY-1 is designed to commonly accepted scantlings involving more timber and labour. However, her working life should be longer and her earnings greater.

Considerable interest was shown in the design and some constructive criticism offered. The fish boxes were considered high. They are normally mounted as low as possible for stability particularly for sailing. The division of the fish boxes into three was considered wasteful in space. Fish boxes are often designed around the standard plywood sheet and a similar boat would carry one box 8 ft long by 4 ft wide by 4 ft deep and one box a 4 ft cube. These being narrower, would then be easier to stow lower than those on SEY-1. More frequent attempts are now being made to increase capacity by lining the hulls with insulation to form fish holds; but little thought has been given to the hull's ventilation. Insulated fish boxes are the intermediate step to insulated holds, with the advantages of ease of manufacture, installation and maintenance to both boxes and hull. The modified installation is at the limit that can be cheaply installed and to fit boxes closer to the hull would be no more economical than investing the greater cost in a fitted insulated fish hold of much greater capacity. When the mean catch rates match SEY-1's carrying capacity as they now match today's 3-ton capacity schooner, an integral fish hold will be the next step.

The engine installation, criticized for the shaft angle of about  $10^{\circ}$ , is the only one possible with direct drive and leaving enough space for the boxes. The Seychelles boatbuilders have been limited in the space available for the fish boxes by the engine position. The difficulty experienced in lofting the engine installation is typical and the position leads to shorter bearers than the builders have been encouraged to install. (Bearer length  $2 \frac{1}{2}$  times engine length.) This either entails strongly connecting the bearers to the bilge stringers or making the bearers in the form of heavy frames which spread the load around the hull and use the deck as part of the supporting space frame. This unusual method has been tested by the British Royal Navy, found suited to their motor launches, and could be used here. At  $10^{\circ}$  shaft angle the losses in thrust are below those incurred through more complex installations, belt, chain, hydraulic drives, etc.

## APPENDIX 5

### Present Boatbuilding Situation

This is as observed whilst working with Seychelles boat La Digue and in discussions with them.

#### Craftsmanship

The standard of craftsmanship in the Seychelles is high. Most of the boat builders started their trade at about 12 years old or out-of-school hours if they continued their education longer. Hence, they have grown up with the local boats and need no more in the way of a design than a few moulds to build one. The assessment of weight, buoyancy, trim, stability, seakindliness and speed is gained from practical experience and, although they cannot express themselves in the terms common to boat design, their expression is in their product. One boat builder was seen cutting a stem rabbet without reference to drawings, templates or even to any mould. Neighbouring boatbuilders disapprove of such practice, but their business seemed well established. Their standard range of launches, fishing and trading schooners and a few schooner-type yachts were well finished and of a good shape. The same applies to the earlier pirogues.

#### Design

The standard process is as follows:

- (1) Draw the desired profile to a scale 1 inch to the foot
- (2) Draw the plan view of the sheer. 1 inch to the foot
- (3) Draw full size to inside of planking the midship section, the transom and one intermediate section each end

No attempt at fairing the sections is made until the moulds are erected on the centre line structure when ribbands are sprung round and the moulds faired accordingly.

For evolving boats for particular needs from well known types, the method can hardly be improved. For designing new types of boat meeting specifications of which there has been no previous experience, the method is insufficient. At present there is a wide age range of competent boatbuilders and those in their teens and twenties could learn to use the basic simple formulae of boat design and have at their disposal design tools with which to widen their range of products. Also, the suitability of various foreign designs to local needs could readily be assessed. As the school leaving age is raised and as the range of activities open to young people on the islands increases, intuitive boatbuilding and design will decline as it has elsewhere and will need to be replaced with technical understanding to maintain the present standard.

## Materials

The traditional material is locally grown timber which is well understood but which varies from island to island. The availability of crooks and compass timber on La Digue, where tree felling is largely for boatbuilding, is better than on Mahe where other industries take priority. What can be economically transported between the islands is limited by length and ultimately whether the timber is sufficiently buoyant to be towed at sea.

## Plywood

This is used extensively for planking hulls. Urea formaldehyde glue is being used which, although only rated as moisture-resistant, has proved itself well on many light craft. Examples inspected were generally good, but some revealed the problems commonly encountered when the limitations of the material are not fully understood and the standard of the material is inconsistent.

## GRP

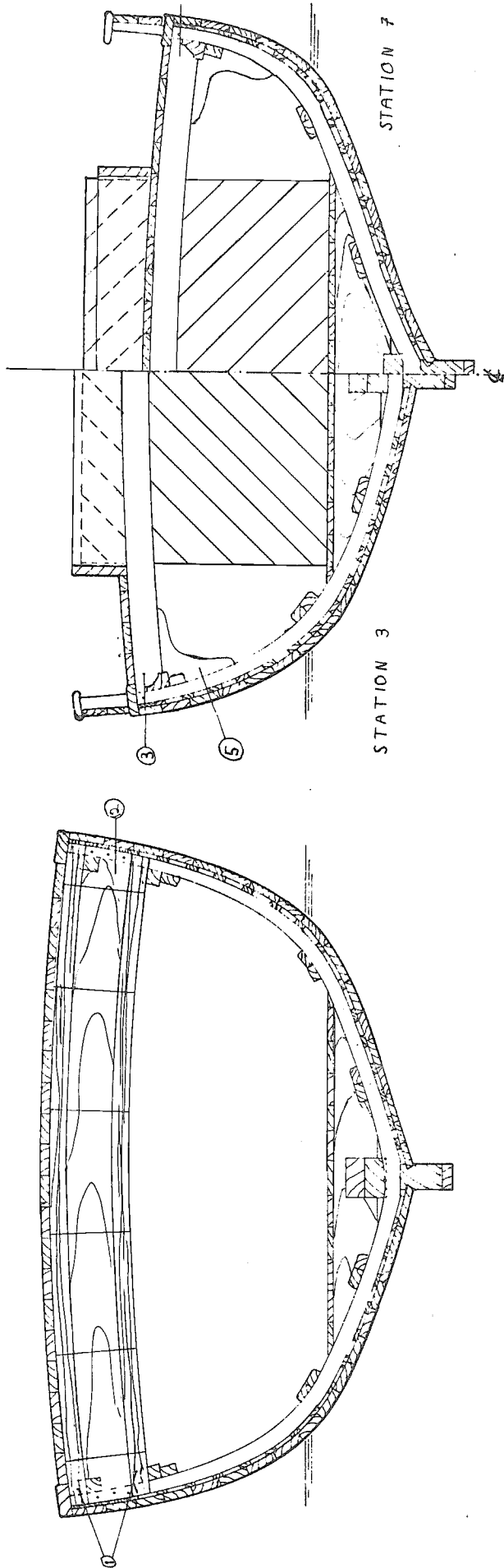
There was insufficient time to visit the manufacturers but the open boats seen seemed to be giving good service. Comments were heard concerning the strength of the transoms and this could also be that more experience or basic appreciation of the material is required.

## Ferro Cement

Only one ferro cement boat has been completed. It has been mentioned in other reports and has not yet become operational through various set-backs which have no connexion with the material. There was insufficient time to investigate the boat and the material's relative costs. There was some interest in the material's possibilities.

## Steel

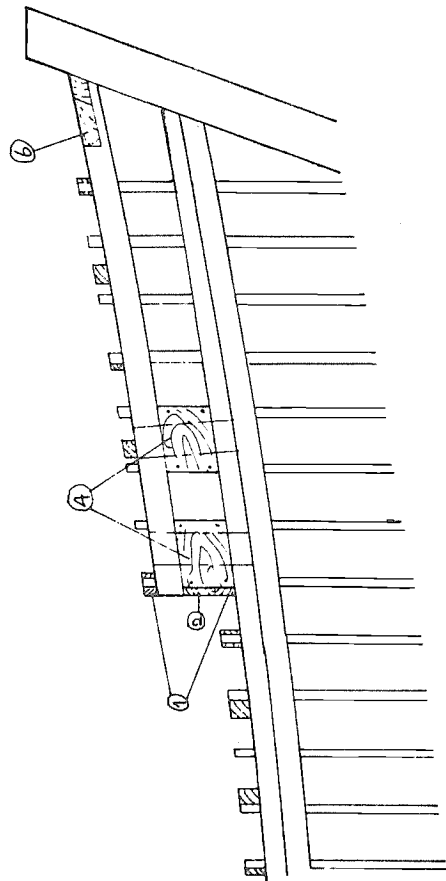
There is no steel plate bending equipment for producing compound curves. V bottom launches have been built. Ship repairs have been undertaken and shot blasting equipment exists. There is no galvanizing plant but epoxide zinc and epoxide tar paints have been used by M. Masocci at his ship repair yard and he is keen to build a chine fishing boat of about 60 ft. Epoxide tar has also been used on wooden boats and has been found as effective as copper sheets in preventing teredo worm attack. It still needs antifouling to prevent marine growths.



SECTION AND PROFILE OF RAISED FORE DECK CONSTRUCTION

FORE AND AFT ENDS OF FISH HOLD STNS 3 & 7

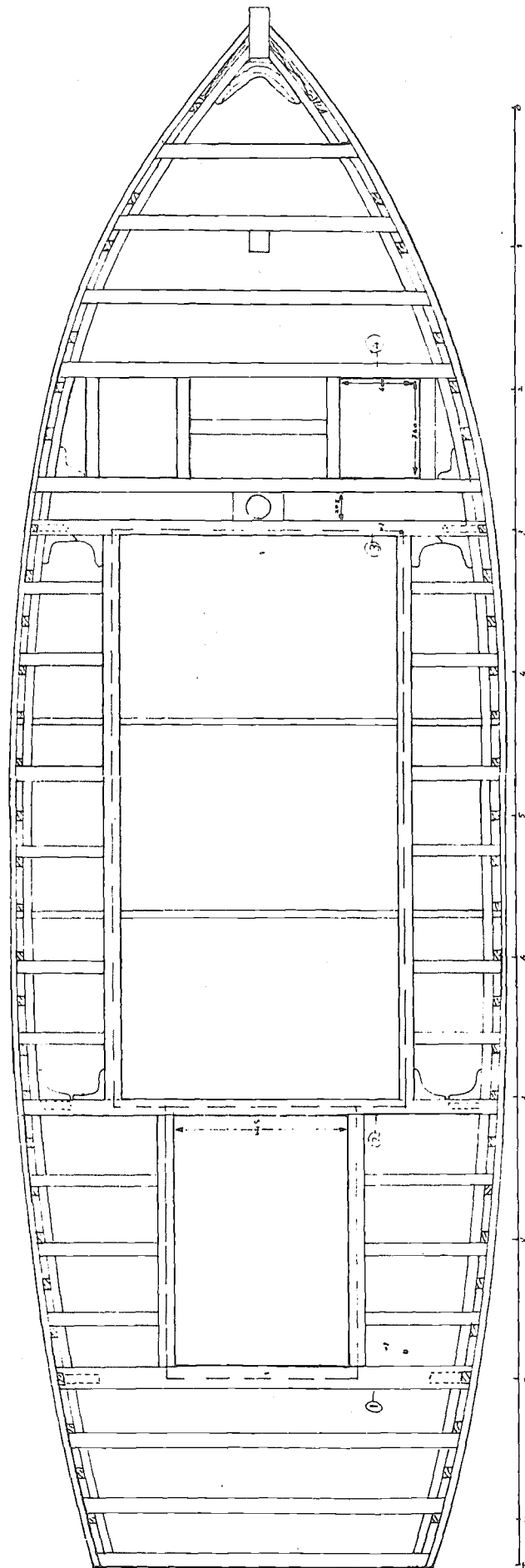
- ① DECK BEAMS MOULDED 70 mm, SIDED 100 mm
  - ② SPACING BEAM FROM 50 mm PLANK
  - ③ DECK BEAMS MOULDED 135 mm, SIDED 100 mm
  - ④ SPACING CHOCKS THROUGH FASTENED BETWEEN BEAM SHELVES AND TO FRAMES, CUT FROM 60 mm STOCK
  - ⑤ HANGING KNEES 60 mm SIDED GROWN CROOKS
  - ⑥ BREAST HOOK 80 mm GROWN CROOK
- ALL MEASUREMENTS, NOT STATED, ARE AS LOFTED OR FROM  
FAO DRAWING SEY-1/3



SEY-1  
CONSTRUCTION DETAILS

Fig. 1



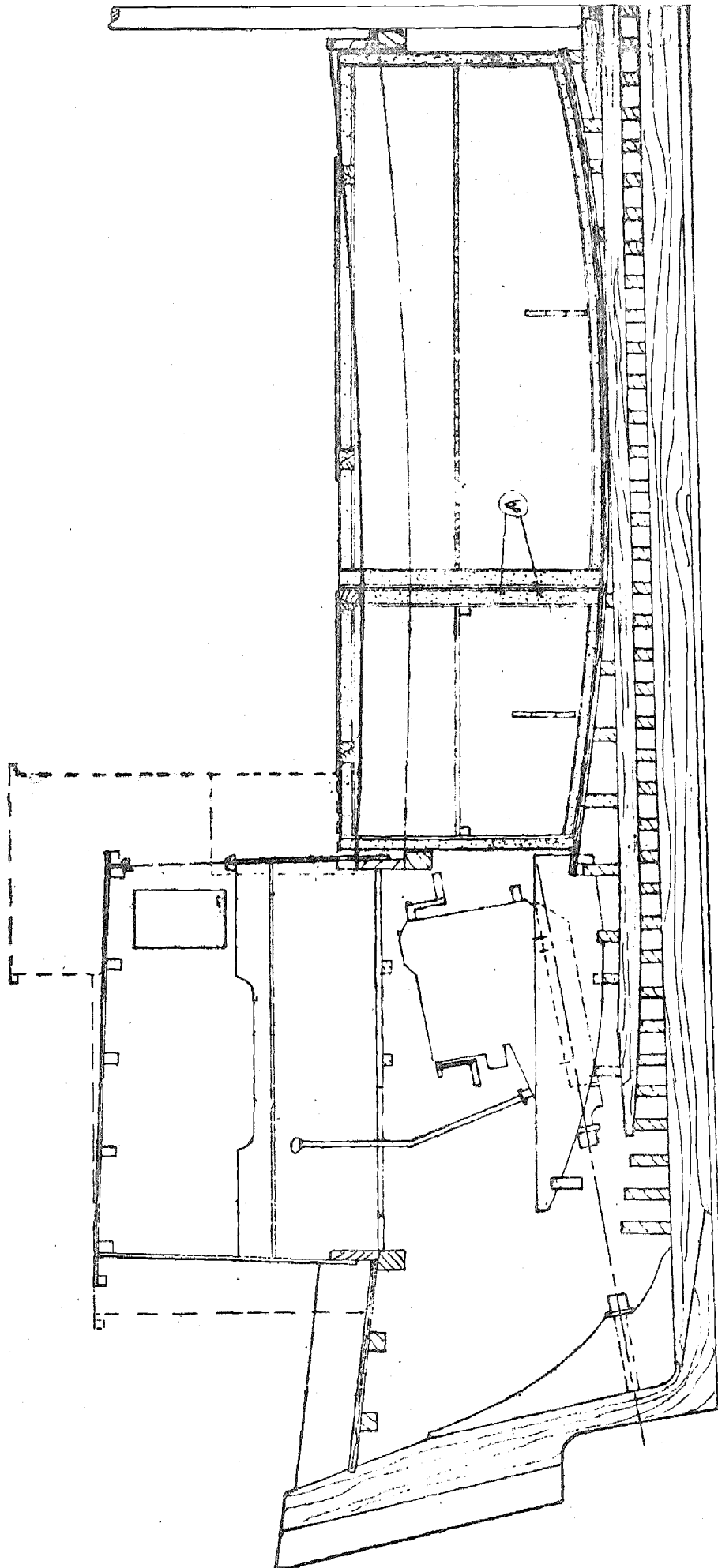


SEY-1  
DECK BEAM LAY OUT

DECK BEAMS 90 mm MOULDED 100 mm SIDED  
 DECK BEAMS Nos. 100 @ 135 MOULDED 100 mm SIDED  
 CARLINS 90 mm MOULDED 100 mm SIDED  
 KNEES 60 mm SIDED GROWN CROOKS FAKAMAKA BOIS DE TABLE OR SIMILAR. HANGING KNEES FROM BEAMS AT STATIONS 3, 7, 9  
 SAMSON POST 130 mm x 130 mm TAKAMAKA  
 DECK BEAMS BETWEEN STATIONS 0 AND 2 SPACED AT 350 mm CENTERS  
 DECK BEAMS BETWEEN STATIONS 3 AND TRANSOM SPACED ACCORDING TO FRAMES AS SHOWN  
 DO NOT ATTEMPT TO SCALE OFF THIS DRAWING  
 ALL MEASUREMENTS AS LOFTED OR FROM DRAWING SEY-1/3

Fig. 2





THE FISH BOXES MADE OF PLYWOOD AND ONLY PAINTED. A 20mm (3/4") MINIMUM AIR GAP TO BE LEFT BETWEEN THEM TO PREVENT DECAY. IF BOXES SHEATHED COMPLETELY IN PLASTIC OR P.E.C. AN INSULATING FILLER PIECE SUCH AS 10mm POLYSTYRENE SHEET TO BE PLACED BETWEEN BOXES TO PREVENT AIR CIRCULATION AND THE INSULATING MATERIAL AT A OMITTED.

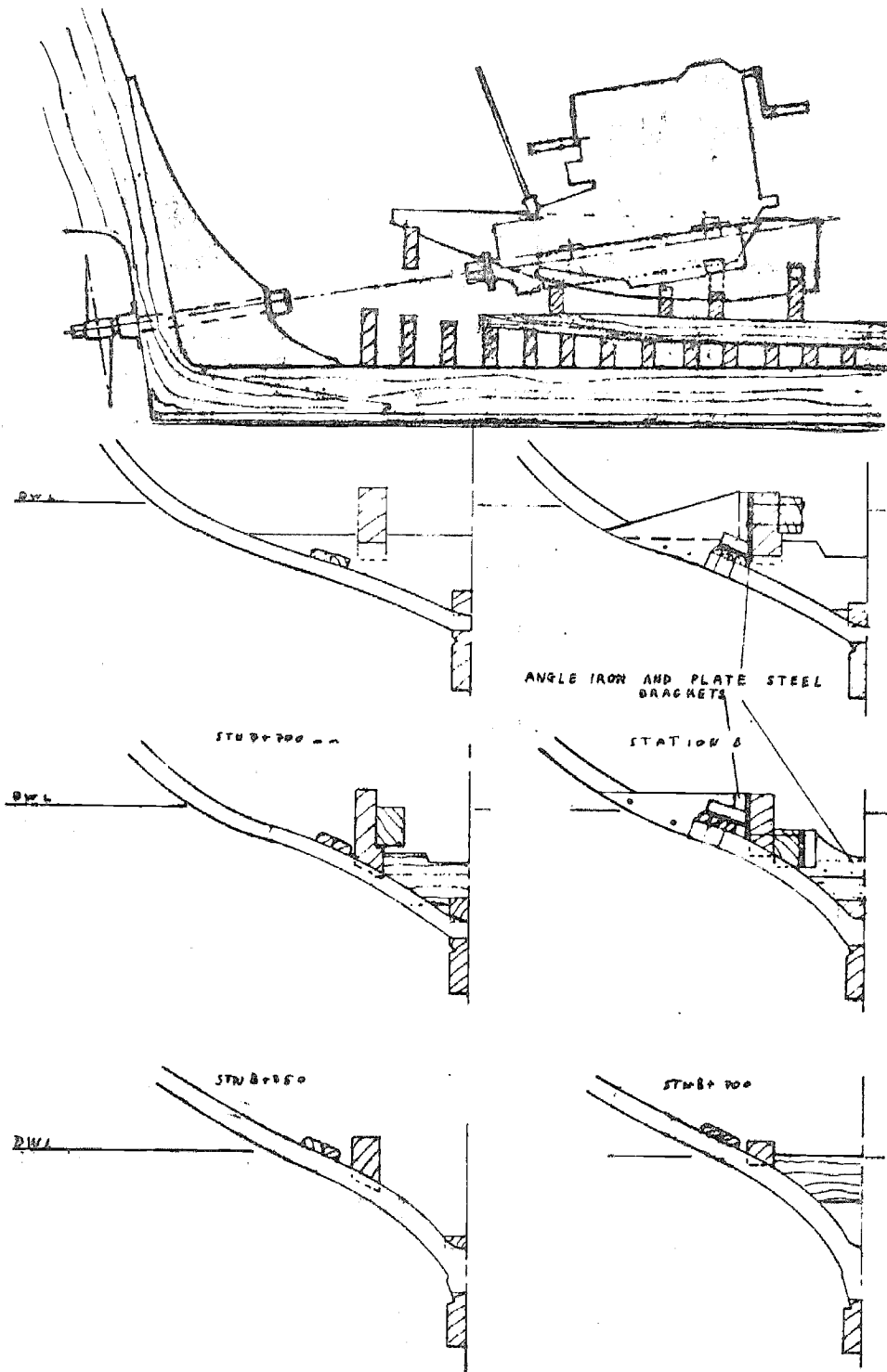
TWO BOXES ONLY REQUIRED TO EASE REMOVAL. IF CABIN EXTENDED OVER FISH HOLD DOTTED LINE SHOWS PROFILE OF PROPOSED WHEEL HOUSE

SEE CONSTRUCTION NOTES FOR DETAILS

SEY-1  
 MODIFIED ENGINE BEDS AND FISH HOLD

Fig. 3



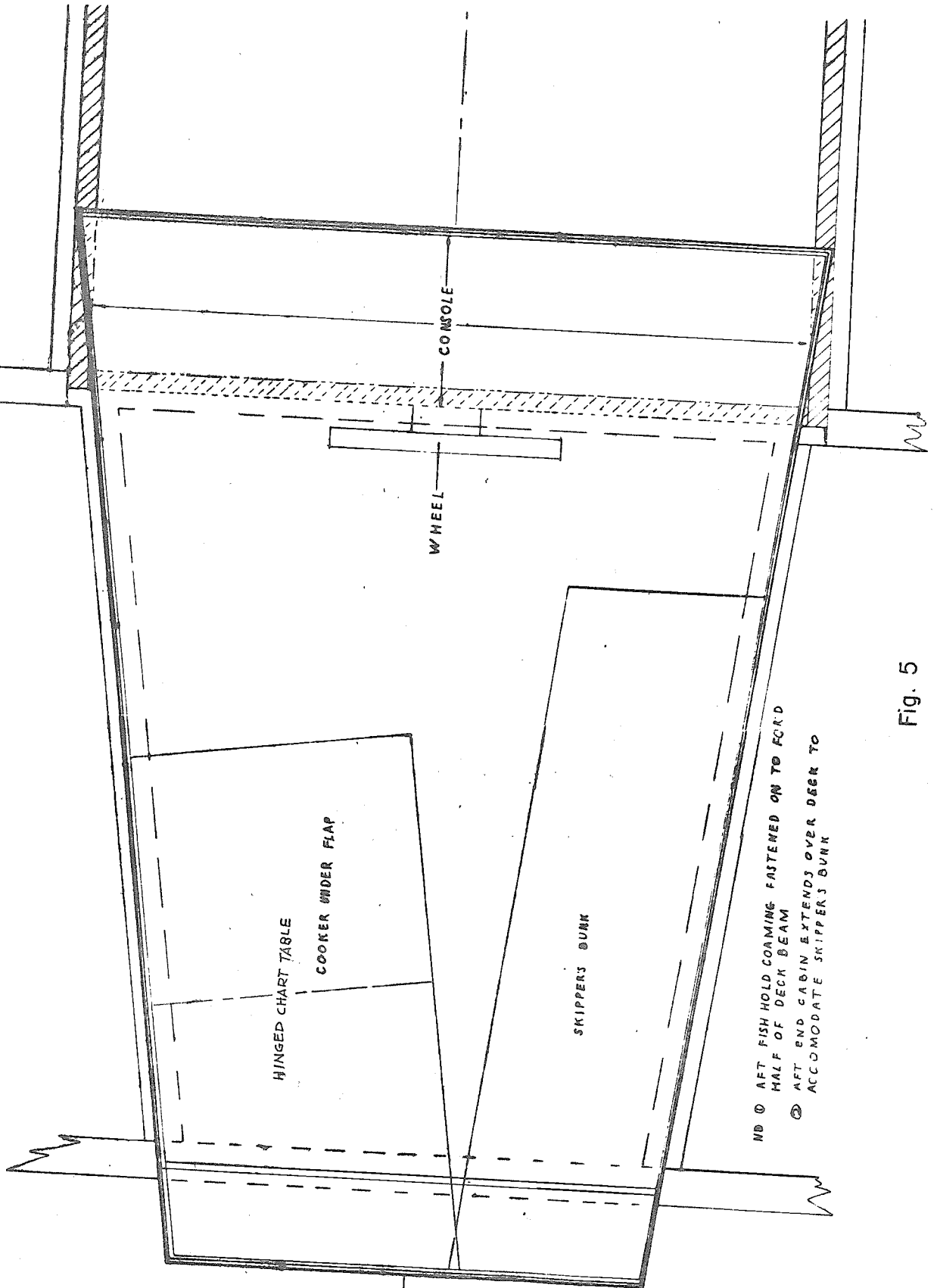


SE Y- 1  
MODIFIED ENGINE SEAT  
BEARERS, AND SECTIONS

Fig. 4



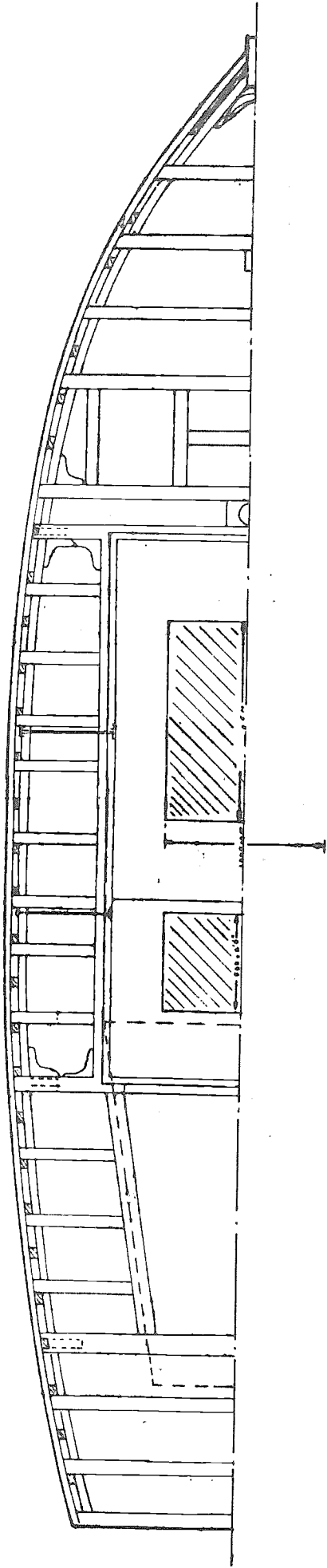
SEY-1  
PLAN VIEW, MODIFIED CABIN



ND ⊙ AFT FISH HOLD COAMING FASTENED ON TO FORD  
HALF OF DECK BEAM  
⊙ AFT END CABIN EXTENDS OVER DECK TO  
ACCOMMODATE SKIPPER'S BUNK

Fig. 5





SEY-1  
DECK BEAM LAY-OUT FOR  
MODIFIED CABIN, FISH HOLD AND  
FISH BOX HATCHES

TIMBER SIZES AS SPECIFIED IN ORIGINAL LAY-OUT.  
MEASUREMENTS NOT SHOWN ARE AS LOFTED OR FROM DRAWING SEY-1/5.  
FOR CONSTRUCTION DETAILS, SEE CONSTRUCTION NOTES.

Fig. 6

