

**SWEDISH
FUNDS-IN-TRUST**

FAO/SWE/TF 61

Report on the

**SECOND FAO/SWEDISH
TRAINING CENTRE ON
SMALL FISHING BOAT
DESIGN AND CONSTRUCTION**

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS
Rome, 1972



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TF-AFR (33) SWE

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R E P O R T
on the
SECOND FAO/SWEDISH TRAINING CENTRE ON
SMALL FISHING BOAT DESIGN AND CONSTRUCTION

Held at Entebbe, Uganda
11 January to 6 March 1971

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS
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FAO. Report on the second FAO/Swedish Training Centre on Small Fishing Boat Design and Construction, held at Entebbe, Uganda, 11 January to 6 March 1971, sponsored by the Swedish International Development Authority. Rome, 1972, 22 p. FAO/SWE/TF 61

ABSTRACT

This document is the Report of the Second FAO/Swedish Training Centre on Small Fishing Boat Design and Construction, which was held at Entebbe, Uganda, from 11 January to 6 March 1971, sponsored by the Swedish International Development Authority.

The Training Centre consisted of a Boatbuilding Course and a Seminar for Fisheries Officers.

In the Boatbuilding Course 20 boatbuilders from Kenya (6), Tanzania (6), Uganda (7) and Malawi (1) were trained in low-cost construction techniques in wood and ferro-cement. The emphasis was on practical boatbuilding. Two wooden boats were completed and launched: a 9.3 m boat based on the lines of the traditional canoe, adapted for outboard motor propulsion, and a 7.5 m boat with an 8 hp inboard diesel engine. The hull of a 12.6 m trawler built of ferro-cement was constructed up to the stage of engine installation and decking. The Uganda Fisheries Department was in charge of completion of this boat and covered the cost of the engine. The boat was launched at the end of January 1972 and has completed successful trials. Two similar boats will be built for an FAO/DANIDA Fishermen's Training Centre.

The Seminar for Fisheries Officers was held at the Fisheries Training Institute, Entebbe, 22-27 February 1971 with 37 participants from Kenya, Nigeria, Sudan, Uganda, FAO and industry. Eighteen papers on various aspects of fishing boat development in the Lake Victoria region were presented and will be published separately together with the recorded discussions. The importance of the traditional boat-builder was stressed in papers and during the discussion, as was the necessity of integrating boatbuilding training in a master plan for the introduction of new boat types, provision of credit and fishermen's training.

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1. ACKNOWLEDGEMENTS

The Swedish International Development Authority (SIDA) made the organization of this Training Centre and the Seminar for Fisheries Officers possible through its financial contribution to the FAO/SIDA Cooperative Programme.

The Government of Uganda wholeheartedly supported the Training Centre and made available excellent facilities at the Fisheries Training Centre in Entebbe, including the boatyard belonging to the Fisheries Department.

Special thanks are due to the Chief Fisheries Officer in Uganda, Mr. S. Semakula who, most efficiently, acted as Director of the Training Centre and the Seminar. Thanks should also be addressed to Mr. A. Biribonwoha, Principal of the Fisheries Training Institute, Entebbe, who provided the staff and the participants with invaluable assistance.

2. SUMMARY AND CONCLUSIONS

(a) The Second FAO/Swedish Training Centre on Small Fishing Boat Design and Construction, held in Entebbe, Uganda, 11 January to 6 March 1971, introduced several new cost-saving construction techniques which had not previously been in common use in East Africa:

- (i) Construction of V-bottom wooden boats upside-down on a jig with an extensive use of patterns.
- (ii) Utilization of galvanized steel fastenings instead of copper and bronze.
- (iii) More extensive use of pressure impregnated timber for increased rot resistance.
- (iv) Construction of larger fishing boats of ferro-cement.

(b) Of the 21 participants at the Training Centre 20 are at the present time employed in boatbuilding activities and the majority of them have been able to utilize the experience gained at the Training Centre in their work.

(c) The 12.6 m trawler of ferro-cement is the largest fishing boat yet built in the Lake Victoria area. The fact that the hull of this boat was built in two months by boatbuilders who had never before constructed ferro-cement boats demonstrated conclusively that, provided further training is available, the construction of fishing boats of this size can, in the future, be undertaken by the existing boatyard. This opens up new and interesting possibilities for the future exploitation of the fish resources discovered by the UNDP/SF Lake Victoria Fishery Research Project. It also contributed to the decision to have two more boats of the same type built locally for the FAO/DANIDA Fishermen's Training Scheme, rather than import them from overseas.

(d) Construction of the new type 7.5 m boat introduced at the Training Centre has started in Mwanza, Tanzania, and will in 1972 be taken up also in Dar-es-Salaam. It is expected that this boat will be considerably cheaper to build than the design previously used in these centres.

(e) The Seminar for Fisheries Officers held at the Fisheries Training Institute, Entebbe, 22-27 February 1971, brought together 37 participants from Kenya, Uganda, Sudan, Nigeria and from the industry. Eighteen papers on various aspects of fishing boat development were presented and will be published separately together with the recorded discussions.

(f) The Seminar discussed extensively the relative roles of the traditional boatbuilder and the trained boatbuilder. It was concluded that the traditional boatbuilder still played a very important role in the training of boatbuilders and establishment of boat-yards and should aim at producing new types of boats suitable for new development in fishing gear and methods. Pilot projects will be an essential step in determining the right type and size of boat to be introduced.

(g) It was concluded that the preparatory phase for future boatbuilding training centres and seminars should include a visit by a naval architect to the area covered, to determine in consultation with local fishermen and fisheries officers the types of boats to be built and the construction methods to be adopted. The boat types selected should fit into an existing or contemplated government plan for fishing boat development.

3. BACKGROUND

The First FAO/Swedish Training Centre on Fishing Boat Design was held at Göteborg, Sweden, from 2 August to 31 October 1965. The main objective of this Training Centre was to give further training to men who already had basic technical education in designing small fishing boats, to better equip them for the task of designing fishing boats for their own countries. Seventeen trainees from 10 countries participated in this course.

The report of this Training Centre (FAO Fisheries Reports, No. 31) concluded that the participants generally benefitted from the course but that some problems arose because of the differences in educational and experience level of individual participants; some had good basic training and several years' experience in the design of small boats and others had virtually no prior experience in the subject.

The success of a Training Centre may be measured ultimately by the extent to which the participants can apply their new knowledge in the work they are performing in their home country. Many of the participants in the First Training Centre could usefully apply the experience gained but for others, mainly from African countries, the training given was less directly applicable. These were foremen in boatbuilding yards and for them the training provided at the Training Centre had been on a higher level than that required for their work.

A study of the fishing boat development in East Africa revealed that a main constraint to development was not the lack of suitable designs but rather the adherence to unnecessarily complicated and expensive construction methods which made the cost of new fishing boats extremely high. The introduction of simpler construction methods appeared therefore to have priority.

For the Second FAO/Swedish Training Centre on Small Fishing Boat Design and Construction it was proposed, rather than organizing a world-wide training centre, to concentrate on the problems connected with boat development in one specific area. In this way it was felt that it would be easier to ensure that the training offered would be more directly applicable to the problems in the area.

The Fisheries Departments of the three East African countries, Kenya, Tanzania and Uganda, were approached by FAO with the idea of holding the Second FAO/Swedish Training Centre on Small Fishing Boat Design and Construction in Entebbe, Uganda, for boatbuilders from the three countries. The Training Centre was planned to consist of two parts, the boatbuilding course and a Seminar for Fisheries Officers to discuss problems connected with fishing boat development in the Lake Victoria area.

At a meeting in February 1970 with representatives from the Fisheries Department of the three countries concerned, the timing of the Training Centre was tentatively fixed for August-September of that year and the types of boats to be built were agreed upon. In June 1970 it was agreed to change the dates of the Training Centre to 11 January-6 March 1971. The boatbuilding course was held throughout that period and the Seminar for Fisheries Officers from 22-27 February 1971.

Official invitations to the Training Centre were sent to the three Governments with a request to submit the names of 6-8 qualified participants for the boatbuilding course and 2-4 persons for the Seminar for Fisheries Officers. In addition to participants from Kenya, Tanzania and Uganda, one boatbuilder from Malawi for the boatbuilding course and two fisheries officers from Sudan and Nigeria for the Seminar for Fisheries Officers were accepted, due to strong interest shown by these countries.

4. ORGANIZATION

The Training Centre was opened on 11 January 1971 at the Fisheries Training Institute, Entebbe, Uganda by the Permanent Secretary, Ministry of Animal Industry, Game and Fisheries, Kampala.

Director	Mr. S.N. Semakula Chief Fisheries Officer, Uganda
Co-Director	Mr. Ø. Gulbrandsen Naval Architect, FAO, Rome
Instructors	Mr. G. Wheeler Ferro-cement Construction Expert New Zealand Mr. B. Machumirwa Boatbuilding Instructor Fisheries Training Institute Entebbe
Secretariat	Mr. A. Biribonwoha Principal, Fisheries Training Institute Entebbe
FAO Training Centre No.	TF-AFR 33 (SWE)

5. BOATBUILDING COURSE

5.1 Objectives

The objectives of the Second FAO/Swedish Training Centre on Small Fishing Boat Design and Construction were:

- (a) To train boatbuilders already having basic skills in the use of boatbuilding tools and in new construction methods leading to lower cost of fishing vessels in their countries.

- (b) To build prototype boats specially designed to suit the current development stage of the fisheries in the three countries.

5.2 Participation

The trainees came from four countries: Kenya (6), Tanzania (6), Uganda (7), Malawi (1). A complete list of participants is given in Appendix 1.

5.3 Work schedule

The working hours of the boatbuilding course were as follows:

Monday to Friday	08.00-12.00 and 13.00-17.00
Saturday	08.00-12.00

This is a total of 44 hours per week and the main emphasis was placed on practical training. The basic idea in this boatbuilding course was "learning by doing"; more theoretical problems were discussed as they arose during the construction of the boats.

It had been intended to have each country group working alternatively one week on each of the three boats under construction but the trainees expressed the wish to have each group work on one boat from start to finish and this was agreed to. Once a week all the trainees together made an inspection of the boats built by the other groups so that they could make themselves acquainted with the details of the other boats and ask questions.

All the participants had previous knowledge of wooden boatbuilding and the instruction during the boatbuilding course concentrated on the following subjects:

- (a) Prevention of rot in wooden boats operating in fresh water.
- (b) The use of construction jigs and templates.
- (c) The use of V-bottom designs for wooden construction.
- (d) Galvanized fastenings as replacement for copper and bronze.
- (e) Introduction to ferro-cement as a construction material for bigger hulls.

Evening classes were organized for those interested in learning the lofting of flat-bottom and V-bottom boats; 15 trainees participated in these classes. Films about fisheries and boatbuilding in other countries were shown.

At the closing ceremony on 10 March a certificate of attendance at the Training Centre was given to each participant with a photograph album showing the various construction stages of the three boats built by the trainees.

Board and lodging were provided by the host Government at the Fisheries Training Institute at Entebbe.

5.4 Fishing boats built

The designs of the three boats built were prepared by FAO on the basis of specific needs of each country as expressed by the relevant Fishery Officers.

- (a) Kenya opted for a fairly large Sesse-type canoe to be utilized along the eastern shores of Lake Victoria. A design of a 30 ft canoe suitable for a 5-15 hp outboard motor was prepared. The frames of this canoe could be prefabricated and the canoe built over a jig, greatly facilitating construction. Fastenings used were galvanized steel bolts and clenched galvanized nails.

Principal dimensions: Length over all 9.35 m (30 ft 8 in)
Maximum beam 1.78 m (5 ft 10 in)
Engine power Outboard 5-15 hp

Fishing method: Gillnets

The boat was completed and launched during the boatbuilding course as scheduled.

(b) Tanzania had, over the last years, built a number of 25 ft open fishing boats according to an older FAO design originally introduced in India, of conventional carvel construction with steam-bent frames. The cost of the hull, excluding engine, was approximately EA sh. 12 000. The principal aim here was to introduce a new design so as to reduce the price considerably by utilizing V-bottom construction.

Principal dimensions: Length over all 7.62 m (25 ft 0 in)
Maximum beam 2.50 m (8 ft 2 in)
Engine power Non-trawling 8-10 hp
Trawling 20-30 hp

Fishing methods: Gillnets, pair trawl, traps

The boat was launched immediately after the completion of the boatbuilding course.

(c) Uganda, based on the findings of the UNDP/FAO Fisheries Research Project, expressed interest in the design of a trawler suitable for exploitation of the resources of Lake Victoria. The size of trawler finally decided on was 12.5 m (41 ft) length over all with an 80 hp diesel engine. The selection of ferro-cement as a construction material for this boat was made because of the relative ease with which this material can be utilized by boatbuilders possessing little experience in building larger hulls, provided sufficient technical supervision is available. Investigations showed that the cost of a ferro-cement hull in East Africa would be lower than any other material, including timber.

Principal dimensions: Length over all 12.60 m (41 ft 1 in)
Maximum beam 4.03 m (13 ft 3 in)
Depth moulded 1.85 m (6 ft 1 in)
Displacement to DWL 19.4 m³ (20 tons)
Fish hold capacity 12 m³ (420 ft³)
Crew 5 men
Engine power 80 hp/1 800 rpm

Fishing method: Trawling

The hull of this boat was completed during the boatbuilding course and the responsibility of the fitting-out work has since been transferred to the boatyard of the Uganda Fisheries Department; the boat was expected to be launched in January 1972.

6. SEMINAR FOR FISHERIES OFFICERS

6.1 Objectives

The Seminar was held at the Fisheries Training Institute, Entebbe, Uganda, 22-27 February 1971, with the following objectives:

To bring together fishery officers and people from the industry on a regional basis, to discuss mutual problems in small boat development and mechanization.

6.2 Participation

A total of 37 persons participated in this Seminar. They included:

Fisheries officers from Kenya, Uganda, Sudan and Nigeria, FAO staff from Headquarters and field projects; a guest lecturer from U.S.A. and interested people from industries. The names of participants are given in Appendix 4.

6.3 Papers presented:

Eighteen papers were presented at the Seminar covering the fields of:

- Past development
- Social and economic problems
- Selection of optimum size boats
- Selection of construction materials
- Selection of engine type and power
- Fishing methods and deck arrangement
- Establishment of boatbuilding yards
- Financing of boat development
- Future outlook

A complete list of the papers presented is given in Appendix 5.

7. EVALUATION

Included in the budgetary provision for the Training Centre was a follow-up visit by an FAO staff member to be made within a year of the Centre's completion. The purpose of this trip was to evaluate the results of the Centre and to find out whether the participants, in their present employment, could utilize the experience gained at the Training Centre and whether it had led to any improvement in the construction of fishing boats in the area around Lake Victoria. Based on the results of this investigation, recommendations should be made regarding the organization of future training centres.

In November and December 1971, Mr. Ø. Gulbrandsen, FAO Naval Architect and Co-Director of the Training Centre, travelled to Kenya, Uganda and Tanzania and contacted boatbuilders and fisheries officers who took part in the Training Centre.

It was found that all participants, except one, were at the present time employed in building fishing boats, and there was a general appreciation of what had been learned at the Training Centre. Most had attained a better understanding of the importance of economy in fishing boat construction and had come to realize that what is the accepted practice in yacht construction might not, from an economic point of view, be acceptable in fishing

boat construction. Also the introduction to new construction materials like ferro-cement has created a keen interest in the possible utilization of this material for larger fishing boats. Many of the participants thought that the course was too short and that if it had been longer more time could have been devoted to learning how to loft a boat in full size.

The participants from Kenya came mainly from the Kisumu area and had previously built boats of traditional type, mainly Nyanza-type canoes, similar to the Sesse-type and flat-bottom sailing boats called "Karuas". The boatbuilders were very interested in utilizing their experience from Entebbe in building larger canoes on a jig. The fishermen in the area were, however, reluctant to place an order for a type of canoe they had not tried and it is clear that more demonstration work will have to be carried out by the Fisheries Department if a new boat type is to be introduced. The boatbuilders themselves have no funds to enable them to build a new boat on speculation. There is no doubt, however, that the boatbuilders, by seeing different types of boats being built at the Training Centre, were stimulated into trying to change some of the traditional construction methods, and this will be a valuable asset in a future Government programme for the introduction of new boat types.

Since completion of the Training Centre the participants from Uganda had mainly worked on the fitting out of the 12.6 m ferro-cement boat. This boat, the biggest fishing boat yet constructed in the Lake Victoria area, had provided a unique experience in the construction of trawlers of the size that will be required in the future. Since launching in January 1972, which was attended by the President of Uganda, the boat has been utilized for a comparative trawling experiment together with the 16 m vessel of the UNDP/SF Fisheries Research Project. If the profitability of the 12.6 m trawler should be proved by these trials, it will, with some modifications, be the model for two trawlers to be built and utilized in a training scheme for trawler crews financed by DANIDA. The Training Centre demonstrated convincingly the possibility of having boats of this size built locally rather than importing them from overseas. There is, furthermore, no doubt that locally constructed trawlers will represent a major input into the future development of a commercial trawl fishery on Lake Victoria. The Second FAO/Swedish Training Centre on Small Fishing Boat Design and Construction therefore represented a valuable first step in this direction.

In Mwanza, Tanzania, the construction of the first 7.5 m boat of the design introduced during the Training Centre, had started and was progressing well. It was the opinion of the participants of the Training Centre that after experience had been gained with one or two more boats it would be possible to reduce the construction time to half of the previous one and also make a saving in materials by utilizing straight planking instead of spiled planks and galvanized nails instead of copper nails. In Dar-es-Salaam the construction of a boat of the new design had not been initiated yet since the boatyard of the Fisheries Department had been fully occupied with completing a series of boats started earlier in 1971. The construction of boats of the new design was, however, due to start early in 1972.

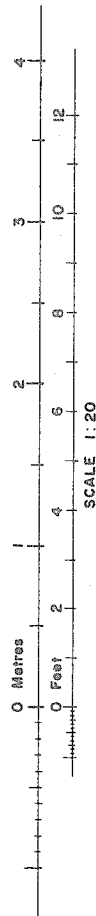
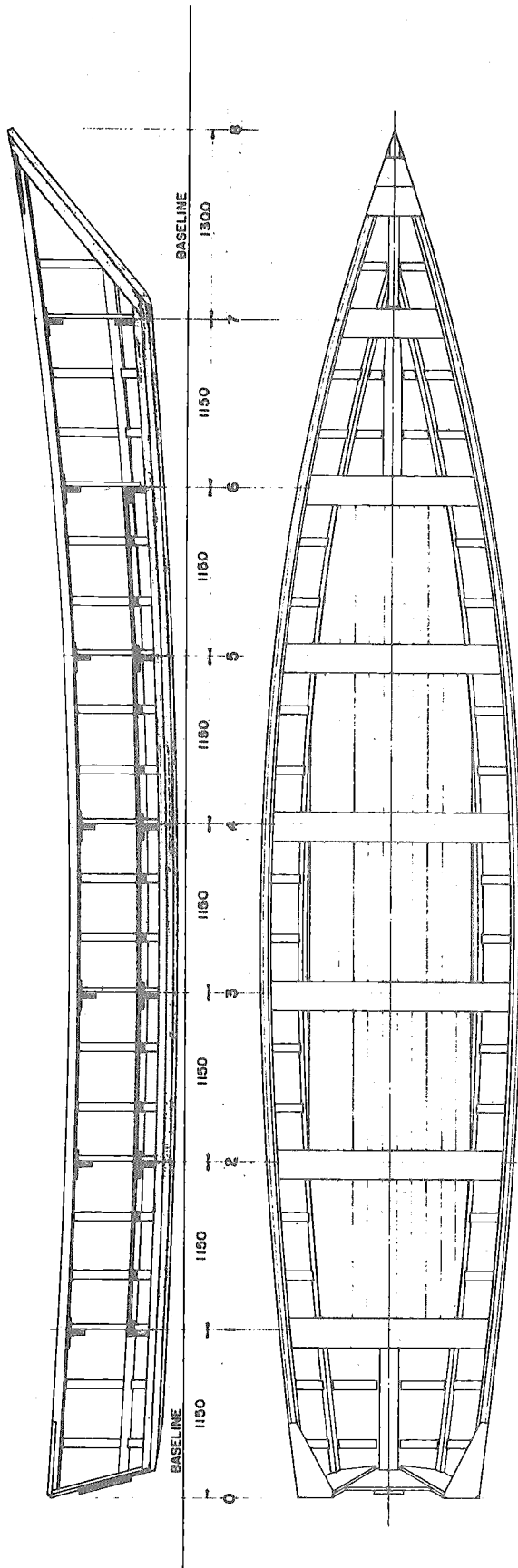
Participants in the Boatbuilding Course

<u>Name</u>	<u>Title or designation</u>	<u>Address</u>
<u>KENYA</u>		
JAKO, Mangla	Local boatbuilder	Wanyama School P.O. Mbita, Rusinga Island
MUSE, Adam Ojwang	Local boatbuilder	Uyoma Fishermen's Co- operative Society Naya Beach, P.O. Nyilima Uyoma Location
MWAKAMUSHA, Isaac	Boatbuilder Fisheries Department Boatyard Mombasa	Fisheries Department Box 1146 Mombasa
NANGA, Harison Owade	Local boatbuilder	West Karachwonyo Kanam, Alara School P.O. Kendu Bay
ODUM, Joshua Obwombe	Local boatbuilder	Osiri School P.O. Box 904 Kisumu
OMOLO, Jackson Tembo	Local boatbuilder	Primary School Mfangano Location P.O. Mbita
<u>MALAWI</u>		
PHIRI, E.H.	Boatbuilder FAO/UNDP Fisheries Training Centre, Lake Malawi	Fisheries Training Centre Box 72 Mangochi
<u>TANZANIA</u>		
HAULE, Magnus Samuel	Boatbuilder Fisheries Department Boatyard Mwanza	Fisheries Division P.O. Box 226 Mwanza
MKWIZU, Bernard Sekiondo	Assistant Field Officer Fisheries Department Boatyard Dar-es-Salaam	Fisheries Division P.O. Box 2687 Dar-es-Salaam
MSOVELLA, Gwerino Mwaluselage	Field Assistant III Fisheries Department Boatyard Dar-es-Salaam	Fisheries Division P.O. Box 2687 Dar-es-Salaam
MWAIPOPO, Adam Abraham	Field Assistant II Fisheries Department Boatyard Dar-es-Salaam	Fisheries Division P.O. Box 2687 Dar-es-Salaam

SAMBAI, Japhet Kilundu	Assistant Field Officer Fisheries Department Boatyard Dar-es-Salaam	Fisheries Division P.O. Box 2687 Dar-es-Salaam
YORAM, Peter	Assistant Field Officer Fisheries Department Boatyard Mwanza	Fisheries Division P.O. Box 226 Mwanza
<u>UGANDA</u>		
BARWOGIZA, Gahurra Efuraimu	Boatbuilding Manager Wanseko	Butiaba Boatbuilding P.O. Buliisa Via Masindi, Wanseko
KAHWA, Balamu Murasa	Boatbuilder Fisheries Department Boatyard Entebbe	Fisheries Department P.O. Box 4 Entebbe
KALENGANA, William Ziraaga	Boatbuilder Fisheries Department Boatyard Entebbe	Fisheries Department P.O. Box 4 Entebbe
NGASAKI, Yoasi Tibamwenda	Boatbuilder Fisheries Department Boatyard Entebbe	Fisheries Department P.O. Box 4 Entebbe
NSUBUGA, Patrick William	Boatbuilder Fisheries Department Boatyard Entebbe	Fisheries Department P.O. Box 4 Entebbe
NTALO, George Williams	Boatbuilder Fisheries Department Boatyard Entebbe	Fisheries Department P.O. Box 4 Entebbe
OKESA, Elijah Ojama	Boatbuilder and Carpenter Ministry of Works	Ministry of Works P.O. Box 145, Entebbe

Appendix 2

Boats built during Boatbuilding Course



MAIN DIMENSIONS :	
Length over all	9.35 m = 30 ft 8 in
Beam over all	1.78 m = 5 ft 10 in
For paddling or outboard engines 5-15 hp	

MAIN WOODEN MATERIALS		
DIMENSION	RUNNING LENGTH	PURPOSE
1 in x 2 1/2 in	300 ft net	Scam battens, stiffeners for planking and floor boards
1 in x 3 in	27 ft net	Rubbing strip under keel
1 in x 4 in	235 ft net	Floor boards, transom
1 in x 9 in	380 ft net	Planking, thwart, transom, reinforcements
1/2 in x 2 1/2 in	65 ft net	Gunwales
1/2 in x 3 in	58 ft net	Chine logs
1/2 in x 4 in	65 ft net	Frames
1/2 in x 6 in	20 ft net	Floors
2 in x 3 in	32 ft net	Keel, outer stem
2 in x 5 in	27 ft net	Hog
3 in x 3 in	5 ft net	Inner stem

9.35 m v-bottom canoe

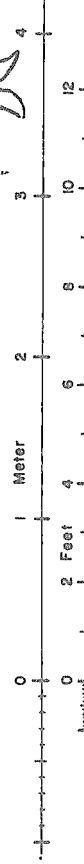
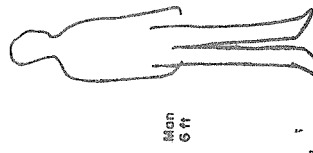
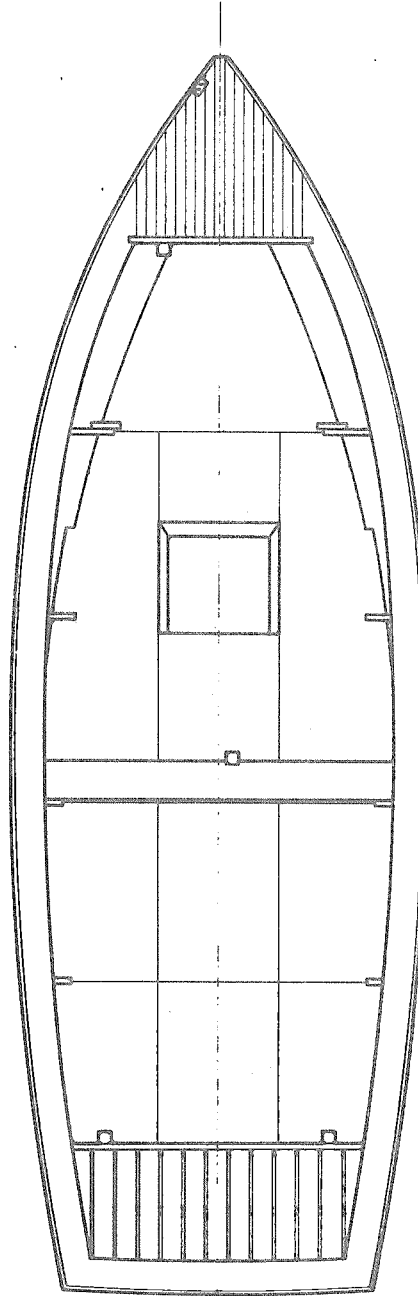
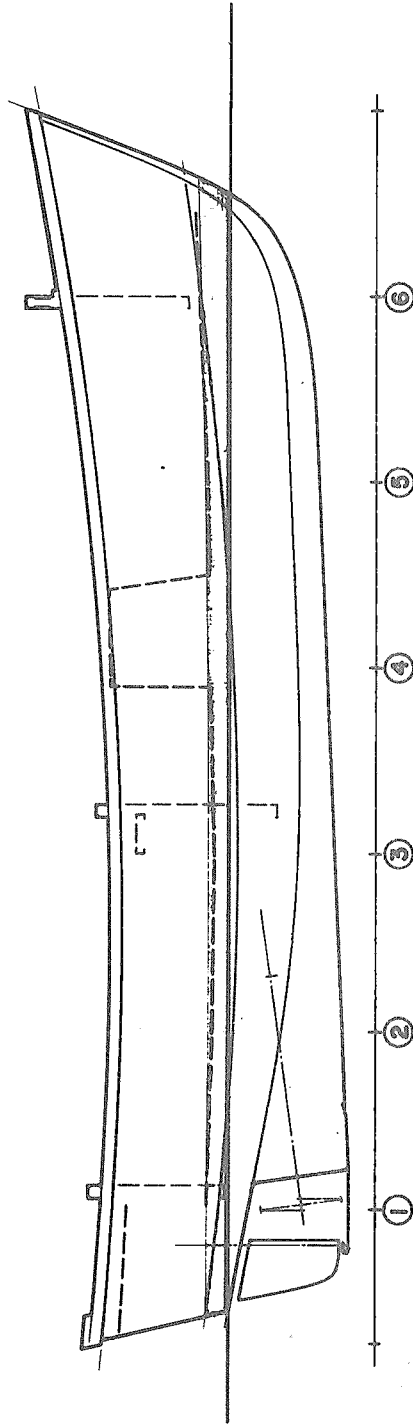
CONSTRUCTION

Scale 1:20

Design J.F. Inc.

Route, October 1970

KEN-2-2



MAIN DIMENSIONS:

Length over all	7.62 m - 25 ft 0 in
Max. beam outside plating	2.50 m - 8 ft 2 in
Length of D.W.L.	6.90 m - 22 ft 8 in
Max. beam of D.W.L.	2.20 m - 7 ft 2 in
Displacement to D.W.L.	2.0 tons
Engine for trawling	10-25 hp
Propeller diameter	max. 51 cm 20 in



7.6 m Boat for pair trawling

GENERAL ARRANGEMENT

Scale 1:20

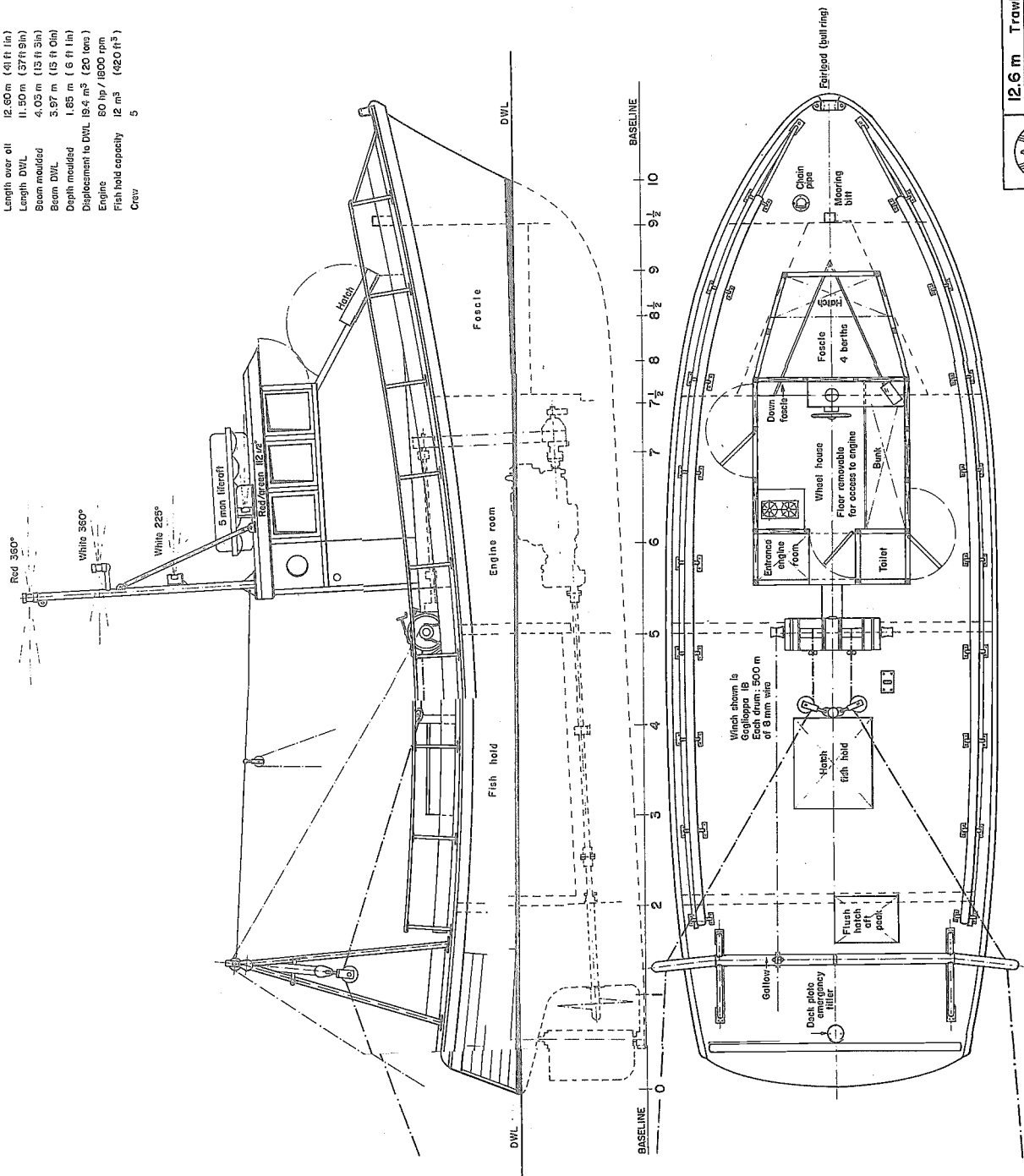
Designed *J.F. AUSA*

Rome, February 1970

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MAIN PARTICULARS

Length over all 12.60 m (41 ft 1 in)
 Length DWL 11.50 m (37 ft 9 in)
 Beam moulded 4.03 m (13 ft 3 in)
 Beam DWL 3.97 m (13 ft 0 in)
 Depth moulded 1.85 m (6 ft 1 in)
 Displacement to DWL 19.4 m³ (20 tons)
 Engine 60 hp / 1800 rpm
 Fish hold capacity 12 m³ (420 ft³)
 Crew 5



	12.6 m Trawler	
	GENERAL ARRANGEMENT	
	Scale 1:50	UGA-2-1

Designed by *[Signature]*
 Roma, December 1970



Fig. 1:
Participants and staff of the
2nd FAO/SIDA Training Centre on Small
Fishing Boat Design and Construction.

Fig. 2:
The prefabricated frames
for the 9.35 m canoe are
erected on the building-jig.



Fig. 3:
After planking the boat is turned
over and completed on the inside.

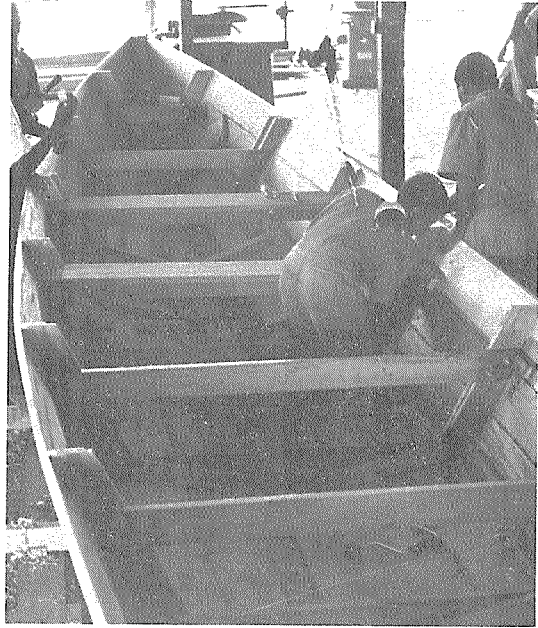


Fig. 4:
The completed canoe
is launched.

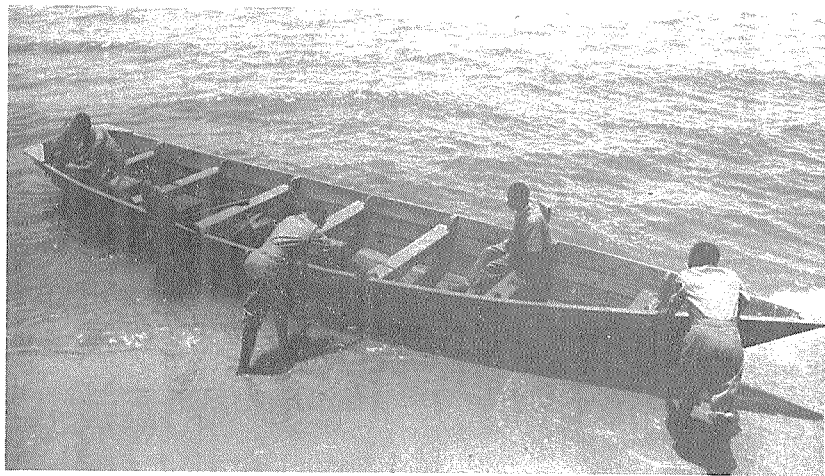


Fig. 5:
With a 10 hp outboard engine
the speed was approximately
8 knots.

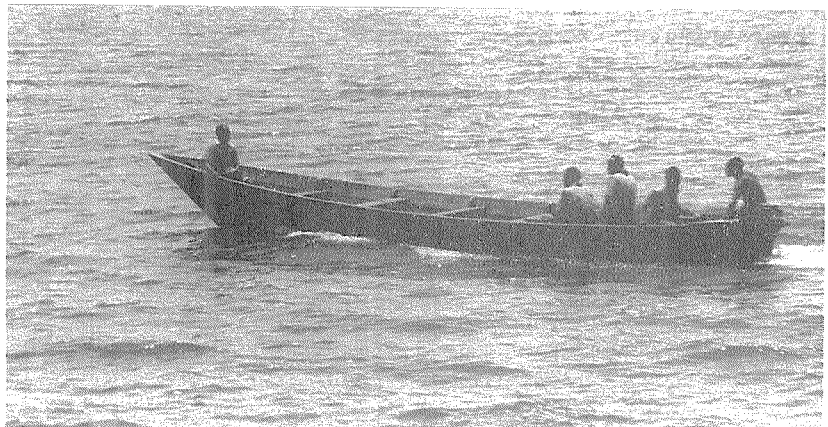


Fig. 6:
The 7.6 m boat is also built
upside down to facilitate
construction.

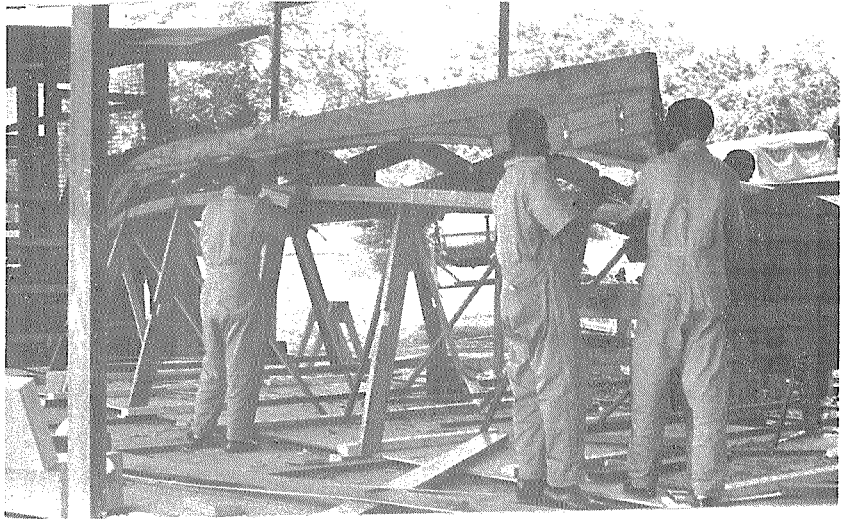


Fig. 7:
The boat is planked and
ready to be turned over.
Note cross-planking on
bottom.

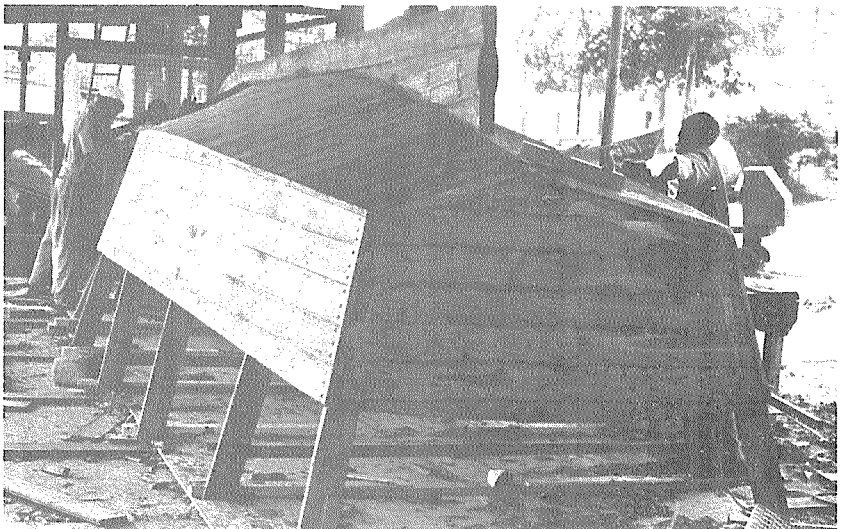


Fig. 8:
An 8 hp inboard diesel
engine gave the 7.6 m boat
a speed of 6 knots.



Fig. 9:
The prefabricated frames
for the 12.6 m ferro-cement
trawler have been
positioned and the first
four layers of galvanized
reinforcing mesh applied.

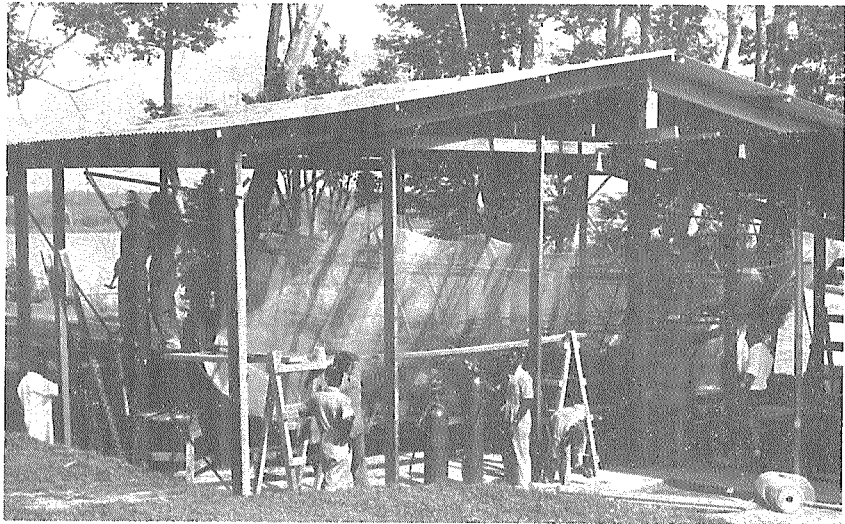


Fig. 10:
Steel rods are tied longi-
tudinally and transversely
before the last four layers
of mesh are applied.



Fig. 11:
One of the trainees built
a scale model of the
ferro-cement boat.

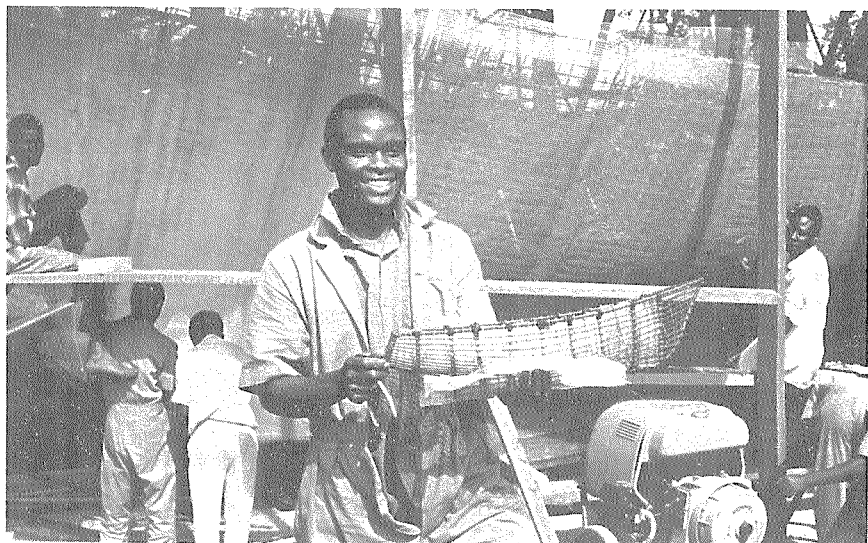
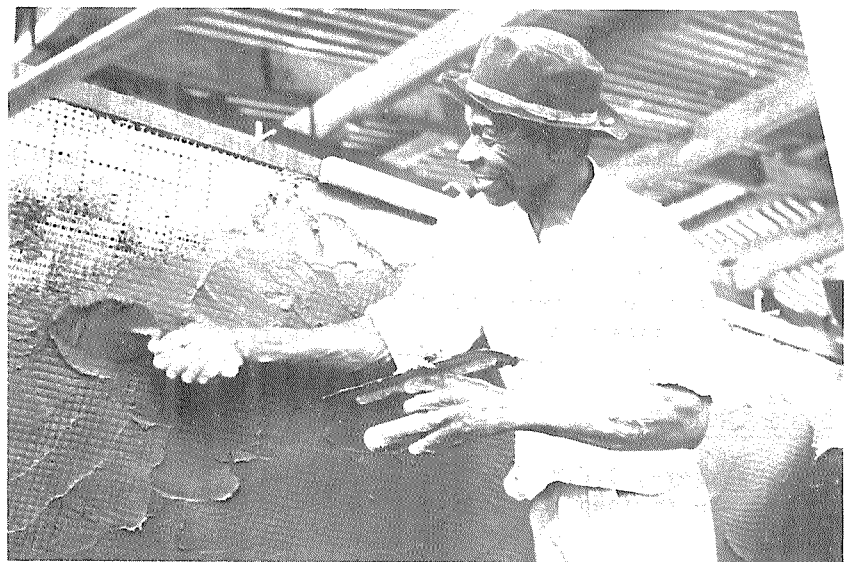


Fig. 12:
Many thousands of ties keep the steel
reinforcements together.



Fig. 13:
The plastering of the
hull is carried out by
skilled craftsmen.



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(22 to 27 February 1971)

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Appendix 5

List of Papers presented to the Seminar for Fisheries Officers
(22 to 27 February 1971)

Session 1 - Review of Past Experience

Semakula, S.N. Evolution of fishing boats in the Lake Victoria Region

Session 2 - Social and Economic Problems in Relation to Boat Development

Stoneman, J. Social and economic problems in relation to fishing boat development

Session 3 - New Methods for Selection of Optimum Boats

Engström, J. Evaluation of fishing boat investments

Session 4 - Selection of Construction Material

Holness, A.P.J. Inland fishing boats - Progress of boat building in Kenya

Gulbrandsen, Ø. Selection of construction material for fishing vessels

Eyres, D.J. Some notes on the survey of ferro-cement fishing vessels built in New Zealand

Session 5 - Experience of Timber as a Boatbuilding Material in East Africa

Plumptre, R.A. Timber for boatbuilding in East Africa

Session 6 - Selection of Engine Type and Size

Kvaran, E.R. Engines for small fishing craft

Haug, A.F. The powering of small fishing craft

Session 7 - Experience with Outboard Mechanization in Lake Victoria Area

Stoneman, J. Experience with outboard mechanization in the Lake Victoria area

Holness, A.P.J. Outboard engines for inland waters

Session 8 - Fishing Methods and Deck Arrangement for Small Fishing Boats

Tait, C.C. and Illugason, O.S. Deck layout for small mechanized commercial fishing vessels for Lake Victoria

Beach, D.D. Simplified small fishing boat construction

Session 9 - Fishing Gear and Boats for Lake Victoria

Jackson, P.B.N. Problems of mechanizing fisheries in African lakes

Session 10- Establishing a Boatbuilding Yard

Gooding, B.T. Establishing a boatbuilding yard

Holness, A.P.J. Establishing a boatbuilding yard

Session 11 - Cost Estimates for Boats

Haug, A.F. Pricing a new boat

Session 12 - Financing Boat Development

Crutchfield, J.A. Financing Boat Development: Experience with credit
schemes

Session 13 - East African Fishing Boats - 1980

Semakula, S.N. East African fishing boats - 1980
