SUMMARY

The South Pacific Commission Fisheries Project has operated two jet fishing vessels for the past year. These are a New Zealand built 24ft aluminium diesel driven boat and a Pago Pago 24ft plywood petrol engined dory.

The aluminium boat 'Norman Kirk' is of strong durable construction and is a good stable working platform. It is, however, drastically, underpowered and as a result slow and difficult to handle underway. Consideration is being given to both re-engining and changing the drive unit of this boat. This would be an expensive modification as major structural alterations would be necessary.

The second boat the plywood 'Manulele' is a faster, easier to handle boat more suited to trolling operations. Its major disadvantages are its high operating costs and cracks in the plywood hull.

A third vessel a 24 ft diesel engined shaft driven Pago Pago plywood dory was acquired in early October 1975 and a fourth boat a 28 ft hardwood Apia built, FAO designed craft is expected to be completed in time for the project's move to the Cook Islands in early November.
South Pacific Commission

ICLARM-SPC Small Boat Workshop
(Noumea, New Caledonia 27-28 October 1975)

Boats of the SPC Outer Reef Fisheries Project

by

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Two boats have been used to date on the SPC Outer Reef Artisanal Fishing Project. They are an aluminium boat named "Norman Kirk" and a plywood boat named "Manulele".

The "Norman Kirk"

The "Norman Kirk" was designed and built in New Zealand; is a hard chine hull of 24 foot overall length; has a beam of 9 foot 6 inches; and a draught of approximately 9 inches. The vessel is powered by a Nissan model SD33 six cylinder diesel engine of 52 H.P. at 2600 R.P.M., driving a Hamilton model 1011 series Jet unit. The vessel has a top speed of 6.5 knots with the Nissan diesel running at 2600 R.P.M., (the maximum revolutions that were obtainable) although the engine has an intermittent rating of 72 H.P. at 3200 R.P.M. The information leaflet for this engine gave horse power as 92 at 4000 R.P.M.

Designed as a planing hull, the vessel at her top speed with the power available becomes a displacement hull with the disadvantages of both types.

Hull Construction Material

Aluminium has advantages as it is virtually maintenance free and is not subject to attack by toredos. However there are also disadvantages. If repairs are necessary, except small ones which can be effected by riveting, specialised welding equipment and operators are required; even small structural alterations and modifications are difficult to carry out as all dissimilar metals used (this includes nuts and bolts), must be insulated from the hull, other wise serious electrolysis occurs even above the waterline.

Hull Design as a Fishing Platform

The vessel has a large workspace aft, has good stowage for ropes, anchors etc. in the forepeak and carries 100 gallons of fuel which gives approximately 35 hours steaming. The insulation of the fish boxes is good, the boxes themselves have adequate stowage space and they are positioned fore and aft on either side. It would give more room to fish if the boxes were athwartships, another electric reel could be fitted forward, and it would be more comfortable hand-lining standing at the gunwale rail rather than squatting on the boxes as at present.
The vessel is too slow to be used trolling for tuna, especially skipjack. This is a serious disadvantage as skipjack and mackerel tuna are excellent bait for deep water fishing, and alternative bait in some area is not plentiful.

The high freeboard aft makes landing large fish and sharks difficult. In addition, with the straight sides aft, there is no flare - rather almost tumblehome - and the wire fishing line tends to drag over and cut into the aluminium chine piece.

Due to the shallow draught and large flat underwater section aft (no propeller, skeg or rudder) and the lack of any keel the vessel yaws badly at anchor. She also tends to be wind rode in any breeze irrespective of the tide or current. This is a big disadvantage when line fishing in deep water as the lines on one side of the vessel are swept under the chine.

The fore deck is adequate for handling the anchor and warp but the anchor warp fairlead could be improved.

The vessel has two electric fishing reels operated from a bank of twelve volt batteries charged by the main engine. The electric reels are very efficient, particularly in deep water, i.e. over 100 fathoms, however difficulty is encountered in keeping the batteries charged during a night's fishing due to the method used to drive the jet unit.

The jet unit is driven directly from the engine, the stationary drive being selected by the use of the reverse deflector built into the jet unit. The manufacturers of the jet unit, in listing its advantages, state: "Full steering response at all speeds and direction of travel, including the stationary position". This is a distinct disadvantage with the "Norman Kirk" and it would be a disadvantage with any fishing vessel. A helmsman is required to steer the vessel at all time when the engine is running, even at anchor, a rather soul-destroying occupation.

The vessel is difficult to steer and in a moderate following sea she is almost impossible, swinging through an arc of 180 degrees. She is down by the head and it would require about one thousand pounds of ballast to correct this. Unfortunately with the aluminium hull it is not simply a matter of placing metal ingots in the bilges, due to the electrolysis set up between the two different metals. The ballast would need to be totally insulated from the hull. Concrete would not be dense enough to give the required weight in the space available in the bilges.

The visibility from the steering position in a head sea is inadequate, especially at night, and an efficient windscreen wiper is required.
There is no self-draining cockpit although there are two small apertures in the stern of the hull which can be opened, when the vessel is at full speed, which drain the cockpit. At other times the water drains forward and empties into the bilges through numerous unsealed openings in the cockpit deck.

This vessel is of excellent construction, makes a good stable working platform, but trim and propulsion result in a difficult boat to handle with poor performance.

THE "MANULELE"

The "Manulele" is a 24 foot plywood Pago Pago style dory powered by a Lees Ford Falcon petrol engine of 200 cubic inches with a 12 hour rating of 56 H.P. at 2800 R.P.M., driving a Hamilton Model 750 Jet unit. The vessel has a top speed of thirteen knots at 3200 R.P.M.

HULL DESIGN AS A FISHING PLATFORM

The vessel is in some respects a better designed vessel for deep water line fishing than the "Norman Kirk". She has a lower freeboard aft and more flare on the sides which are an advantage. She has the speed to troll for tuna although the jet unit creates a great deal of turbulence at the stern which necessitates using very long trolling lines to clear this,

The absence of a keel combined with the flat under water hull section aft tends to let the vessel yaw badly at anchor, as with the "Norman Kirk".

The foredeck is entirely inadequate to handle the anchor and warps.

The vessel is fitted with two hand reels for deep water fishing.

The "Manulele" has the same problems with the jet drive as the "Norman Kirk". She is difficult to steer unless the engine revolutions are kept above 2600 per minute.

There is no self draining cockpit but there is a plug which can be removed at speed to drain the bilges.

Whether the "Norman Kirk" could be altered economically to correct the design faults is problematical.

A more powerful engine would be required, if the boat is to reach its design speed. A diesel of at least 150 shaft horse power driving a conventional propeller would be required. Weight then becomes a problem if the engine is installed amidships, the boat going down further by the head unless drastic changes to the hull are made. A Vee drive would perhaps be the easiest solution with the engine being installed at the stern, although fishing space would be reduced in the after cockpit. A great deal of alteration would be necessary to fit a propeller drive but the vessel's handling should be improved if a keel was fitted also.
The Project took delivery of another Pago Pago-built dory two weeks ago. This vessel is powered by a Chrysler Nissan diesel of the same horse power as the "Norman Kirk's" engine, but it is driving a conventional propeller. The vessel's top speed is 13 knots at 3000 R.P.M., and cruising speed is 9.5 knots at 2600 R.P.M.

Although only three short fishing trips in the new dory were made, trolling for tuna, the advantages of the propeller drive were obvious - a much cleaner wake and the vessel very easy to steer and manoeuvre at all speeds.

The "Manulele" could be converted to a propeller drive with a lot less trouble than the "Norman Kirk", but the plywood bottom has serious athwartship cracks and whether it would be satisfactory to repair these without strengthening and altering the shape of the frames to take the plywood skin, would require the advice of a competent shipwright or boat designer.

From the experience gained with the two vessels we have used to date, I consider the basic requirements for a line vessel fishing deep water and also capable of trolling for tuna (at least for bait) to be:

1. **Speed**: A minimum of ten knots. However if the vessel is not to be used for skipjack fishing then speed is not such a critical factor unless the fishing grounds are a considerable distance from the base.

2. **Weighing Anchor**: Weighing anchor when fishing in depths of up to 200 fathoms presents problems, although we stream and then float the anchor with the aid of a large float, retrieving the warp in moderate to rough seas is difficult and time consuming. A simple cathead, driven by a flat belt from the main engine and controlled by a jockey pulley, would simplify matters. The anchor warp could be led by suitable blocks to the cathead and all hauling done from inside the vessel, a far safer procedure than at present.

3. **Visibility**: Good visibility from the steering position in all conditions is essential.

4. **Hull Design**: Low freeboard aft, a self draining cockpit and adequate flare to the sides of the vessel aft.