ICLARM-SPC/Small Boat/WP.6
13 October 1975
ORIGINAL : ENGLISH

SOUTH PACIFIC COMMISSION

ICLARM-SPC SMALL BOAT WORKSHOP
(Noumea, New Caledonia, 27 - 28 October 1975)

FACTORS TO BE CONSIDERED IN THE SELECTION OF POWER UNITS FOR SMALL FISHING BOATS

by

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Manager
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Andrews and Beaven Limited
Auckland, New Zealand

SUMMARY

In deciding the best type of engine for our own particular purpose, we must first of all take into account the size of the boat, the speed we wish to travel and the duty cycle.

In this decision for reliability and economy, it should be realized that diesel is the better choice. Having decided on the horse power and weight of unit, the most important consideration will be the availability of a reliable spares and service support background.

Then having chosen the size and make of motor, we must carefully consider the accessories required, the type of gear box etc. The correct and careful installation of this engine cannot be over-stressed and with continual intelligent care and attention by the operator to the maintenance, the unit will give him many hours of reliable, efficient boating. It has been proven in our experience that attention to the above details, has, on many occasions, enabled the motor to be used almost continuously, without the necessity of overhaul, for many thousands of hours. Remember, when at sea if a breakdown occurs, that you cannot get out and walk.

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The following are pertinent points which are required to operate the machinery of a fishing vessel successfully.

The following is a selection of engines available in New Zealand. Prices, except where indicated, include 20% Sales Tax.

UP TO 12 H.P.

TYPE	DIESEL OR PETROL	HAND OR ELECTRIC START	COOLING	BUDGET PRICE T.I.
BUKH. DV10M	D	H or E	Sea Water	$2000
Lees One - 11	D	E	Sea Water	$1650
Stuart Turner	D	H	" "	-
Yanmar YSE 8	D	H or E	" "	$850/$1350
Yanmar YSE 12	D	H or E	" "	$960/$1550
Penta MD 1B	D	H or E	" "	$1200
Kubota	D	H or E	" "	$1300
Lister SRIMG	D	H or E	Air	$1200
Petter AC1WM	D	H or E	Sea Water	$2000
Stuart Turner	P	H	"	$1050
Honda	P	H or E	Air	up to $200
Kawasaki	P	H	Air	up to $415
Briggs & Stratton	P	H	"	up to $350
Various makes of Petrol Outboards			Water	up to $700

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12 TO 27 H.P.

TYPE	DIESEL OR PETROL	HAND OR ELECTRIC START	COOLING	BUDGET PRICE T.I.
Petter PH2W	D	H or E	Sea Water	$1640
Yanmar 2QM20	D	H or E	" "	$2000
Volvo Penta MD2B	D	H or E	" "	$2800
Lister ST2MG/R	D	H or E	Air	$2300 + Tax
Lister SW2	D	H or E	Sea Water	$2300 + Tax
Volvo Penta MD 11C/100B (Inboard Outboard)	D	H or E	Sea Water	$3650
BUKH DV20M	D	H or E	" "	$2700
Lees 4/27	D	E	Fresh "	$3100
Volvo Penta MB 10A	P	E	Sea "	$2000
Wisconsin THOM	P	E	Air	-
Briggs & Stratton	P	H	"	$400
Outboards up to	-	-	-	$850

27 to 50 H.P.

Lister ST3MG/R	D	H or E	Air	$2700 + Tax
Lister HRW3	D	H or E	Water	$5450 + Tax
Lister HR3	D	H or E	Air	$3800 + Tax
Perkins 4/1-8M	D	E	Water	-
Perkins D3/152	D	E	Water	-
B.M.C. Captain	D	E	Water	$2700
Volvo Penta MD3B	D	H or E	"	$3800
Lees 4/53	D	E	"	$3400
Volva Penta MB20C	P or Kero	H or E	"	$3000
Ford Escort	P	E	"	$2300
Wisconsin VH4DM	P	E	Air	-
Outboards up to	-	-	-	$1500

50 to 80 H.P.

TYPE	DIESEL OR PETROL	HAND OR ELECTRIC START	COOLING	BUDGET PRICE T.I.
B.M.C. COMMANDER	D	E	Water	$3300
Perkins 4/236M	D	E	"	-
Lees 4/75	D	E	"	$5320
G.M. Detroit 3/53	D	E	"	$7000
Volvo Penta MD21A	D	E	"	$7000
Fiat C03M	D	E	"	$6800
Volvo Penta AQD21A/2700 (Inboard Outboard)	D	E	"	$5100
Lister HRW4	D	E	"	$8750 + Tax
Lister HR4	D	E	Air	$5800 + Tax
Ford Cortina	P	E	Water	$2400
Outboards up to	-	-	-	$1900

80 to 100 H.P.

Ford 2715	D	E	Water	$6500
Perkins 6/354	D	E	"	-
Caterpillar 3304	D	E	"	$10,000
G.M. Detroit 4/53	D	E	"	$7500
Fiat OM CP3M	D	E	"	$8600
Lister HRGMG/R	D	E	"	$9100 + Tax
Lister HR6	D	E	Air	$7100 + Tax
Volvo Penta AQ115A/100 (Inboard Outboard)	P	E	Water	$2300
Volvo Penta BB115C	P	E	"	$3800
Outboards up to	-	-	-	$2300

JET UNITS

Berkeley 5J5	P	7/10 H.P.	$160
Berkeley 6JA	P	10/40 H.P.	$260
Hamilton 751	P	50/150 H.P.	$670
1011	D	up to 98 H.P.	$1530

From experience gained, I would recommend the following engines for marine use:-

UP TO 12 H.P.

Yanmar YSE 8)	Simple to operate and instal. Economical and
Yanmar YSE12)	very reliable, Has hand and/or electric starting.
Lister SRIN/G)	For air cooled applications.
Volvo Penta MD1B)	Similar to Yanmar.
Stuart Turner)	Good reliable petrol engine.

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12 TO 27 H.P.

Yanmar 2QM20))	Simple to operate. Reliable, economical and has optional starting.
Lister ST2MG/R)	For air cooled application.
Volvo Penta MD2B)	For inboard use.
Volvo Penta MB2A)	For petrol fuel.
Volvo Penta MD11C/100B	Diesel Inboard/outboard use.

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27 TO 50 H.P.

Lister ST3MG/R)	For air cooled applications.
Volvo Penta M 3B)	For diesel inboard.
Volvo Penta MB20C)	For petrol fuel.

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50 TO 80 H.P.

Fiat C03M)	Reliable diesel.
G.M. Detroit 3/53)	Compact 2-stroke diesel. Has good power to weight ratio.
Volvo Penta AQD21A/2700)	Reliable diesel for inboard/outboard application.
Ford Cortina)	Compact petrol engine.

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80 TO 100 H.P.

Fiat OMCP3M)	Compact and reliable.
G.M. 4/53)	Compact 2-stroke diesel. Has good power to weight characteristics.
Lister HR 6)	For air cooled applications.
Volvo Penta AQ115A/100	Petrol inboard/outboard.
Volvo Penta BB115C	Petrol Inboard.

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Outboard motors are available throughout the range.

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1/ ENGINE HORSE POWER SELECTION

We now must choose the type of engine we feel is best suited to our vessel and application. This obviously depends on various factors, namely,

a) The speed we require the vessel to travel at, always keeping in mind that the hull has a maximum speed no matter if we grossly over power the vessel.

b) The duties we require our vessel to carry out i.e. line fishing, trolling, trawling etc. We must also bear in mind other duties we may require the engine to perform i.e. to drive a 230 volt alternator, freezer compressor, deck and bilge pump, trawl winch etc. These auxiliary duties all take horse power from the engine and must be allowed for in our choice of engines.

c) The lines of the vessel together with the displacement and weight of the vessel. We must also bear in mind where we are to place the engine in the vessel. If we have a displacement hull, weight of the engine against horse power of the engine is not so important but if we have a planning type hull weight, it is a very important factor.

When inspecting the lines of the proposed vessel or the hull itself, we must note how big the aperture or space for the propellor is. On the majority of planning type hulls, the propellor shaft is extended to a strut or "A" frame in the case of twin engines. This has the disadvantage of leaving the propellor unprotected and therefore more liable to damage from flotsam, reefs etc.

Bearing all the above in mind, as a general rule, we could apply the following:-

Vessels up to 4M in length require up to 6 H.P.

Vessels	of	7M	require	6/15 H.P.
"	"	8M	"	15/25 H.P.
"	"	10M	"	25/50 H.P.
"	"	12M	"	50/100 H.P.

Having selected our H.P. requirements, we now must decide on what particular engine we are to fit.

2/ ENGINE TYPE SELECTION & DRIVE

a) Should we fit a petrol or diesel engine. We must firstly consider the availability of the fuel. Assuming both are available, the cost per gallon/litre should be assessed against the amount the engine will burn per hour.

The dangers of petrol must not be overlooked nor the fact that petrol exhaust fumes are toxic whilst diesel fumes are non-toxic. The petrol engine is very suspect to moisture in the electrical system and is much more complicated to maintain. In general the diesel engine will give many more hours of trouble free running than the petrol engine.

b) Having selected our type of engine we now look at the drive required. This can be a conventional shaft directly coupled to the gear box, fee belt drive from engine to propellor shaft, inboard/outboard drive, outboard motor, jet unit, or vee gear box drive. Gear boxes can be either manually operated or hydraulic operation. The advantage of the hydraulic gear box is its "finger tip control". Within this gear box, or bolted directly behind, is the reducation gears and thrust bearing. As a general rule, the slower the propellor turns the more efficient the propellor becomes, i.e. less slip.

When using the vee belt drive between engine and shaft, it is important to fit a thrust bearing onto the propellor shafts. A 'jockey pulley' can be incorporated in this drive to allow the propellor to be stationary whilst engine is running.

Unlike the gear box, which can reverse the propellor rotation, this method is one direction only.

If the inboard/outboard unit or outboard motor is chosen, the engine must be mounted right aft in the vessel. In both cases, the purchase price includes a complete unit i.e. propellor and shaft etc. These methods have the advantage of being able to raise the propellor clear of any obstructions. The outboard motor can be readily removed in the smaller horse power for servicing etc. The jet unit is also fitted near the stern of the vessel and requires a high R.P.M. engine to drive the unit. Having no propellor has definite advantages as we have stated earlier and the main disadvantage is that it is very inefficient at low r.p.m. i.e. picking up long-line, trolling etc.

3/ SELECTING EQUIPMENT WITH ENGINE

When purchasing a marine engine, we must decide on a variety of "optional extras" offered by the manufacturer.

a) Cooling:- We have three ways of cooling an engine. Firstly we have salt water cooling whereby the salt water is pumped directly through the engine. It is simple to instal but all engines are subject to severe internal corrosion.

Secondly, we have air cooling. If the motor is in an open cockpit this presents no problem, but if the engine is installed in an engine room, air must be ducted to and from the engine.

Thirdly, we have the best system of fresh water cooling. The simplest way is to "keel cool" an engine. The fresh water is circulated through external pipes on the hull, which the salt water cools, and then through the engine. The other fresh water method is by means of a heat exchanger whereby salt water is pumped through a stack of tubes whilst the fresh water is circulated around these tubes and through the engine.

b) Starting:- The simplest method here is of course hand starting. The other type of common starting is electric. This system relies on power from batteries and is by no means fool proof. Some manufacturers offer both forms of starting and this is a big advantage.

c) Auxiliary Drives:- If we are required to drive a trawl winch, line hauler, freezer etc. it is an advantage to purchase a clutch operated power take off, if available. Generally speaking, if no P.T.O. is available, there are vee pulleys mounted on the front end of the crankshaft.

d) Instruments:- These can be either mounted on the engine or remote mounted on dash, and can be either capillary tubes or electric. They should consist of a tachometer, preferably with a service hour meter, oil pressure guage and water temperature gauge. If electricity is available, combined alarm units for low oil pressure, high water temperature should be fitted, as they will give warning before a serious breakdown occurs.

4/ OPERATION OF ENGINE

a) For the greatest reliability of an engine, some simple training should be given to the person who is going to operate the engine. Firstly, the operator should read the manufacturers handbook to familiarize himself with the engine.

b) He should be capable of changing the lubricating oil and lube oil filters after the number of hours specified by the manufacturer. When lubrication oil is first purchased it is imperative that the correct grade of oil be used. The oil level in the sump should be checked daily, together with the fresh water level if applicable.

c) Fuel System:- The operator should be capable of tracing the fuel system from the tanks, through a primary filter / water trap, to left pump and thence to the fuel pump via the secondary fuel filter. All fuel filters should be changed periodically and the water trap drained regularly. In the case of petrol engines, a simple knowledge of electrical connections and how to deal with dampness on leads etc.

d) General Knowledge:- Battery water level should be checked consistently. Air filters to be kept clean. A knowledge of the bilge pumping arrangements if applicable should be noted. Ability to assess daily fuel consumptions.

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Having chosen and fitted our marine engine correctly, we can now look forward to many hours of trouble free fishing, providing the above simple procedures are carried out.

In general terms, all modern engines require a valve grind at about 3500/4500 service hours and this should be carried out in a workshop by qualified engineers. These hours will vary between makes and models and should be used as a guide only.

All engines will give a better performance and lower running costs if they are not "overpropped" i.e. they must obtain their designed r.p.m. when steaming. If a diesel engine becomes hard to start, and has fuel, it can be assumed that the compression is down and the cylinder head should be removed to grind the valves.

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