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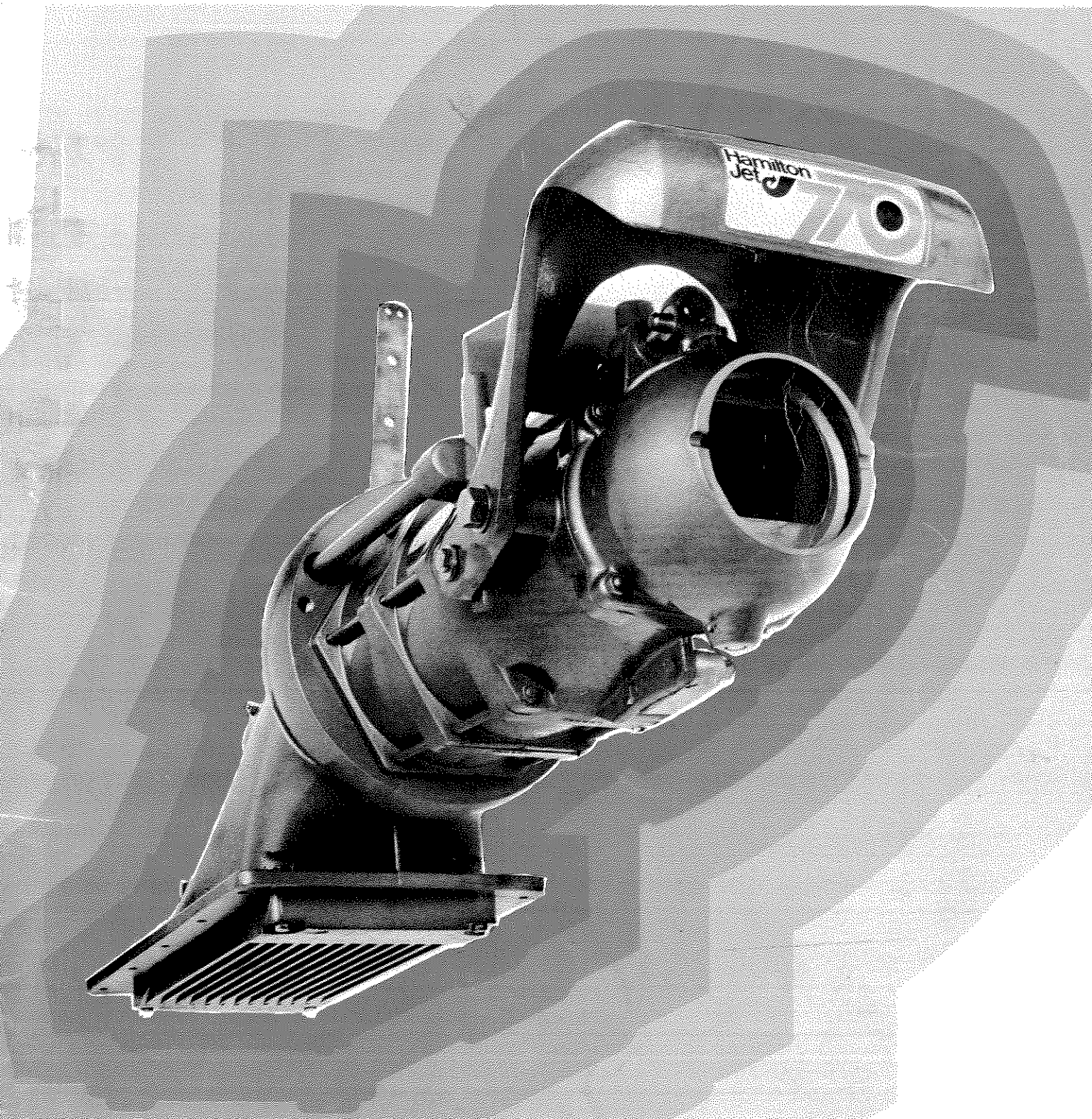
LEONIE AUSTIN

Hamilton Jet 70

(With splined shaft)

WORKSHOP MANUAL



hamilton Jet 70

TECHNICAL INFORMATION

INDEX

Manual Part No 98887
Edition 3
T3 Steering
February 1992

The following Chapters contain a fully comprehensive technical guide to the 770 Series Hamilton Jet Unit. This Section, as with all others in the manual, is designed to serve as a Customer Work Shop manual if required.

The 770 Series Marine Jets are designed for the efficient propulsion of small and medium sized high speed (over 20 knots) planing craft, with gasoline engine drive.

Built for high performance they are designed in light alloy and stainless steel materials. An inboard mounted intake and a discharge section through the transom gives a most compact and easily serviced propulsion unit. Special features include light,balanced deflector steering and a removable inspection cover for internal access to the unit.

770 Series jet units are mounted in a hull in identical manner to the earlier 750 Series units. The two models are, therefore, interchangeable.

All information, illustrations and specifications contained in this Manual are based on the latest production information available at the time of publication. The right is reserved to make changes at any time without notice.

Note: This manual refers to 770 units with splined mainshaft unless otherwise stated. Some early 770 units were fitted with a coupling flange instead of a splined shaft.

All Model 771 units have been and at time of printing, continue to be manufactured with a coupling flange. The short H-Bar driveshaft is not available for use on such units.

Separate installation, driveshaft and parts details are available for 770 Jets with coupling flanges. However the parts list at rear covers 771 Jet with coupling flange as well as 772 and 773 with splined shaft.

T3 STEERING

An improved steering system designated 'T3' (Type 3) was fitted to 770 Jets from April 1984. The nozzle, deflector and pivot pins are all different for the T3 system. Equivalent T3 and MK1 parts are not interchangeable but the nozzle, deflector and pivot pin assemblies are interchangeable as a kit. T3 kits are available to improve steering of early model jet units. For identification the T3 deflector has the letter and numeral 'T3' cast on each side. T3 nozzles are round and each nozzle size has a matching deflector size (refer page B2 for details).

PLANNING YOUR JET BOAT

SUITABILITY

Is your proposed boat:—

- a planing boat?
- designed for speeds of 20 knots or more?
- not more than 2 tons fully laden?
- going to have a gasoline power unit? **E1 — E10**

SHAPE

Is your proposed boat the correct shape for Jet Propulsion? **E1 — E4**

WEIGHT

What is the maximum likely laden operating weight of the boat? **E9 — E10**

HORSEPOWER

What Horsepower is necessary for the required Speed? **E9 — E10**

ENGINE

Knowing the Horsepower requirement, choose your engine. **E5 — E6**
B 1

JET

Match your Engine to one of the 770 Series Jet Units. **E7 — E8**
D1 — D2

RECHECK

A final check of the selected Hull — Engine — Jet combination, i.e. Weight, B.H.P., Boat Length. **E10**
B1

NOTE

Are you still within the Design Limits of the 770 Series jet unit?

BUILDING YOUR JET BOAT

OPERATING YOUR JET BOAT

MODEL	771 Flanged Coupling	772 Splined Shaft	773 Splined Shaft
No. of Stages	1	2	3
Impeller Diameter	190mm (7½")	190mm (7½")	190mm (7½")
Nozzle — Standard (T3)	115mm	106mm	96mm
Nozzle Options (T3)	106mm	96mm	106mm
Engine Size	1 - 3.3 litres 60-200 CID	3 - 5.7 litres 180-350 CID	4 - 8 litres 250-500 CID
Horse Power Range (Pleasure)	50-130	100-240	130-300 *
Horse Power Range (Commercial)	50-100	100-190	130-240
Drive Adaption	1300 H.S. Flange	1 3/8" - 10 SAE Spline	1 3/8" - 10 SAE Spline
Jet Unit Weight	45 kg (100 lb)	55 kg (120 lb)	59 kg (130 lb)
Boat Size (Depending on weight)	3.7 - 6m (12'-20')	4.3 - 7m (14'-23')	4.9 - 8m (16'-26')
Unladen Boat Weight (Maximum)	800 kg (1750 lb)	1200 kg (2650 lb)	1600 kg (3500 lb)
Laden Boat Weight (Maximum)	1300 kg (2,900 lb)	1770 kg (3900 lb)	2200 kg (4800 lb)
Minimum Power/Laden Boat Weight	10 hp/100 kg (4.5 hp/100 lbs)	10 hp/100 kg (4.5 hp/100 lbs)	10 hp/100 kg (4.5 hp/100 lbs)
Rotation	Left Hand	Left Hand	Left Hand
Impeller Options	Fine Standard Coarse	Standard Coarse	Standard Coarse

N.B. Standard pitch impellers are fitted unless otherwise requested. Refer Page N3 for identification.

NOTE: If an engine matches two 770 jet units, in general choose the smaller jet unit for light high performance pleasure craft but move up to the next stage unit for heavier craft and commercial operation. Moving up one stage lowers engine r.p.m. and usually improves fuel consumption.

*For racing applications over 300 hp, a specially 'blue-printed', heavy duty jet unit is available — MODEL 773R. A supplementary manual is available for this unit. Special features include stainless steel impellers custom pitched to suit the engine, heavy duty water cooled thrust bearing, special splined mainshaft and coupling, heavy duty intake-tailpipe studs, oil lubricated bearing.

NOZZLES

(Item No. 68 on Parts List photograph, Section O page 1).

TO ADJUST ENGINE R.P.M.

Changing impellers gives large variations in engine r.p.m. However nozzle variations allow for the fine tuning of jet unit to engine to boat. Increasing the nozzle size increases engine r.p.m. (approx. 100 — 200 r.p.m.). If the nozzle is opened up excessively, the jet unit may slip on take off.

Decreasing the nozzle size will reduce engine r.p.m. (approx. 100 — 200 r.p.m.).

See Common Engine — Jet matchings (Section E page 8) for nozzle recommendations.

FOR MOST APPLICATIONS, STANDARD NOZZLES ARE BEST.

TABLE 1

Jet Unit	Standard T3 Nozzle dia.	Smaller than Standard	Larger than Standard
771	115mm	106mm	—
772	106mm	96mm	115mm
773	96mm	—	106mm

T3 770 NOZZLE DIAMETER	T3 770 NOZZLE PART No.	MATCHING T3 DEFLECTOR PART No.	EQUIVALENT MKI 770 NOZZLE
115mm	104709	104712	103159—103
106mm	104708	104711	103159—088
96mm	104707	104710	103159—074

TO ADJUST BOAT TRIM

770 jet unit nozzles may be inverted to alter boat trim.

NOZZLE DOWN (Standard position) — tips jetstream downwards. This gives best all round performance.

NOZZLE UP — tips the jetstream up and lifts the bow of the boat. This contributes to maximum boat speed.

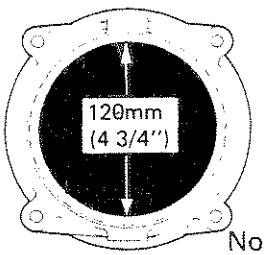
N.B. With the nozzle up, the jetstream may cause annoyance to other boats nearby. The up position is not recommended for water skiing.

See "Maintenance" (Section M page 3) for instructions on how to assemble the nozzle.

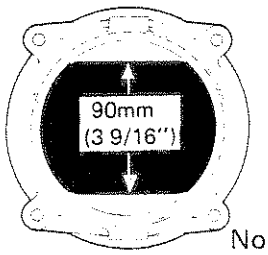
IDENTIFICATION OF MKI 770 NOZZLES

The appropriate nozzle number (103 or 088 or 074) is cast on the inside surface of the nozzle but is difficult to see without removing the nozzle from the unit.

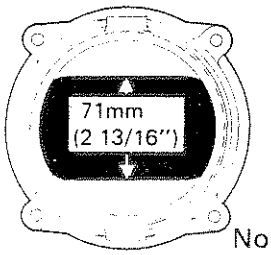
The dimensions below are further identification:



No. 103



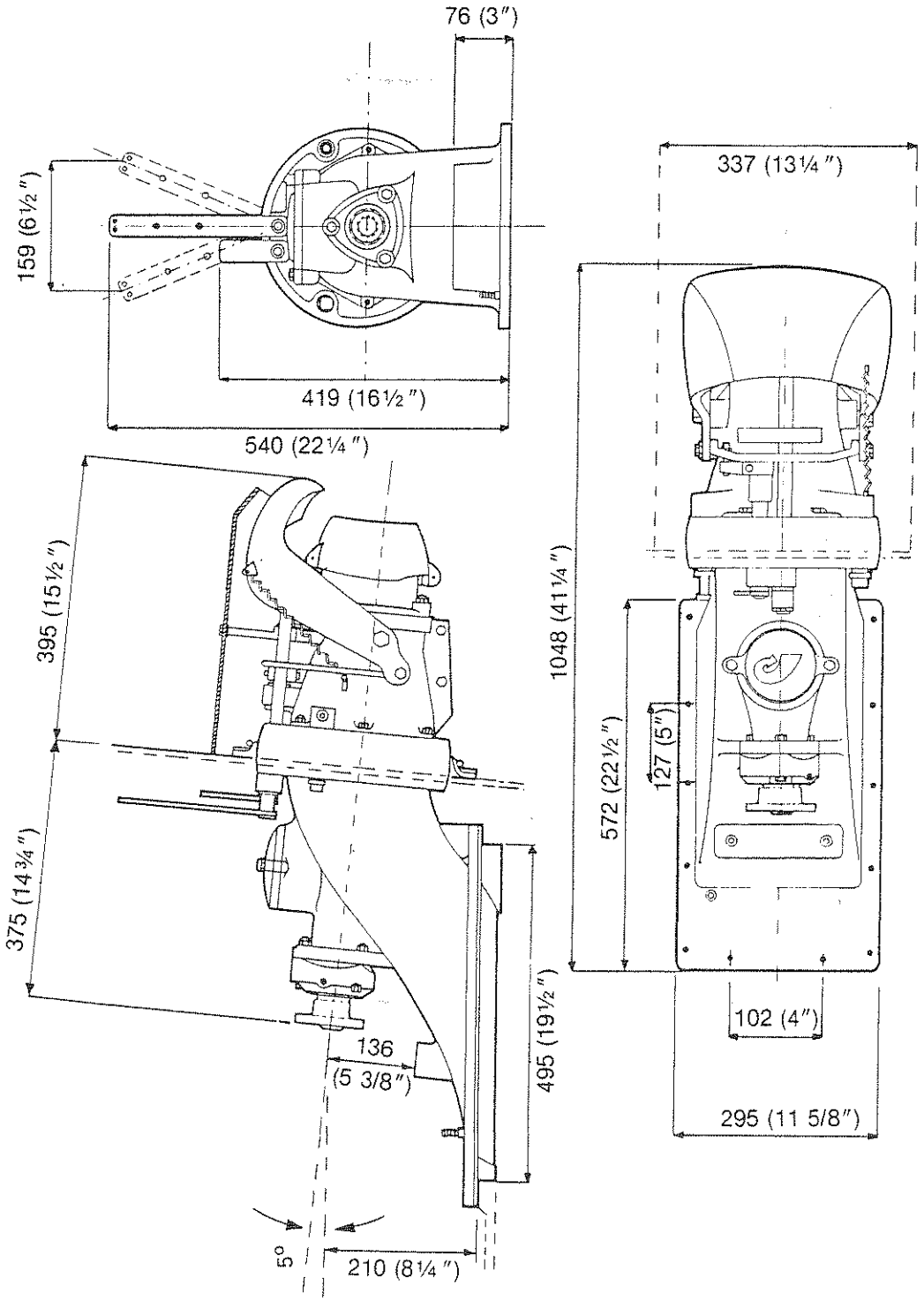
No. 088



No. 074

NOTE Please quote Nozzle Numbers when ordering loose nozzles or jet units with non standard nozzles. Do not quote dimensions.

MODEL 771

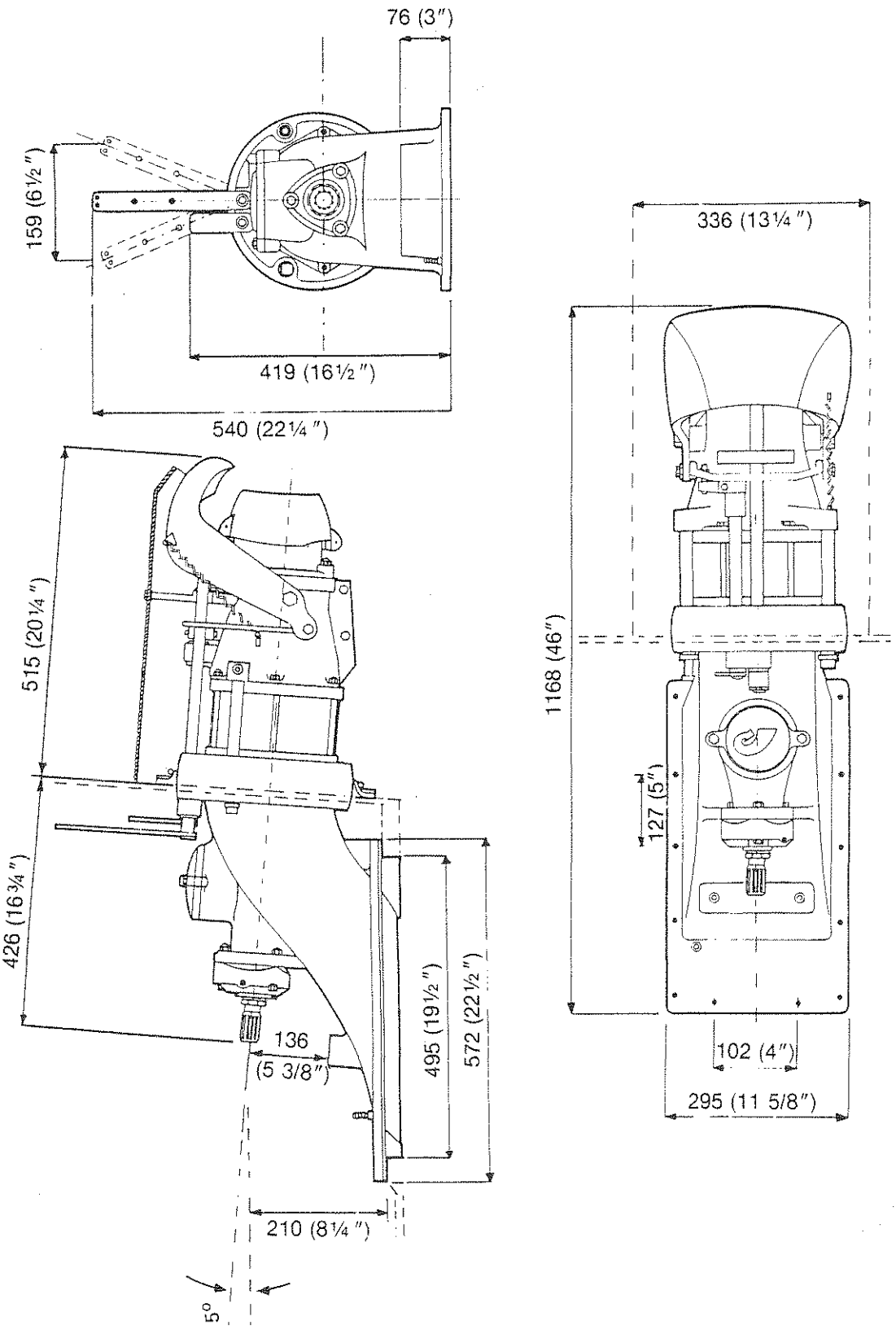


SCALE 1:10
(Approx.)

DIMENSIONS

MODEL 772

MODEL 772



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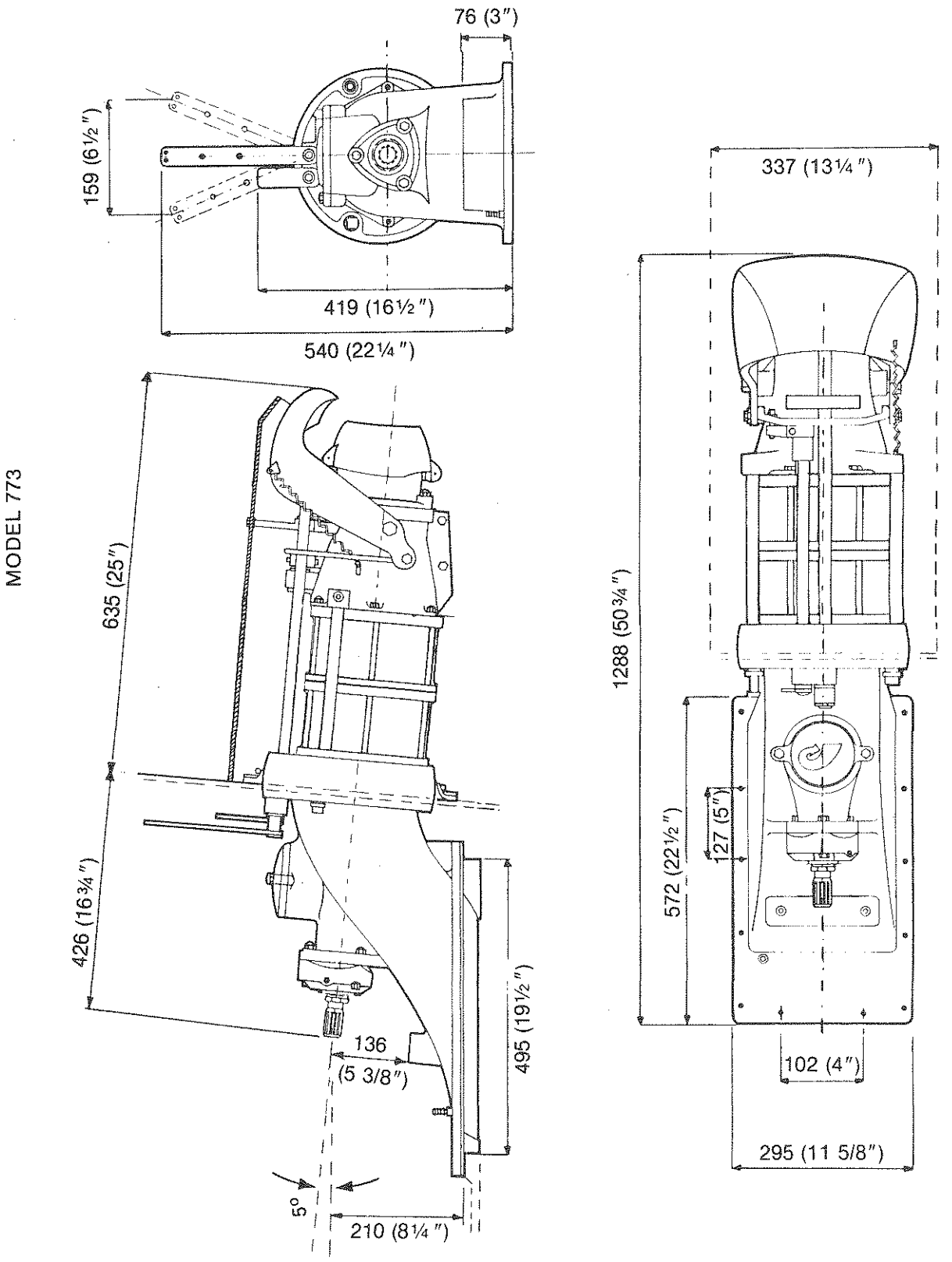
DIMENSIONS

MODEL 773



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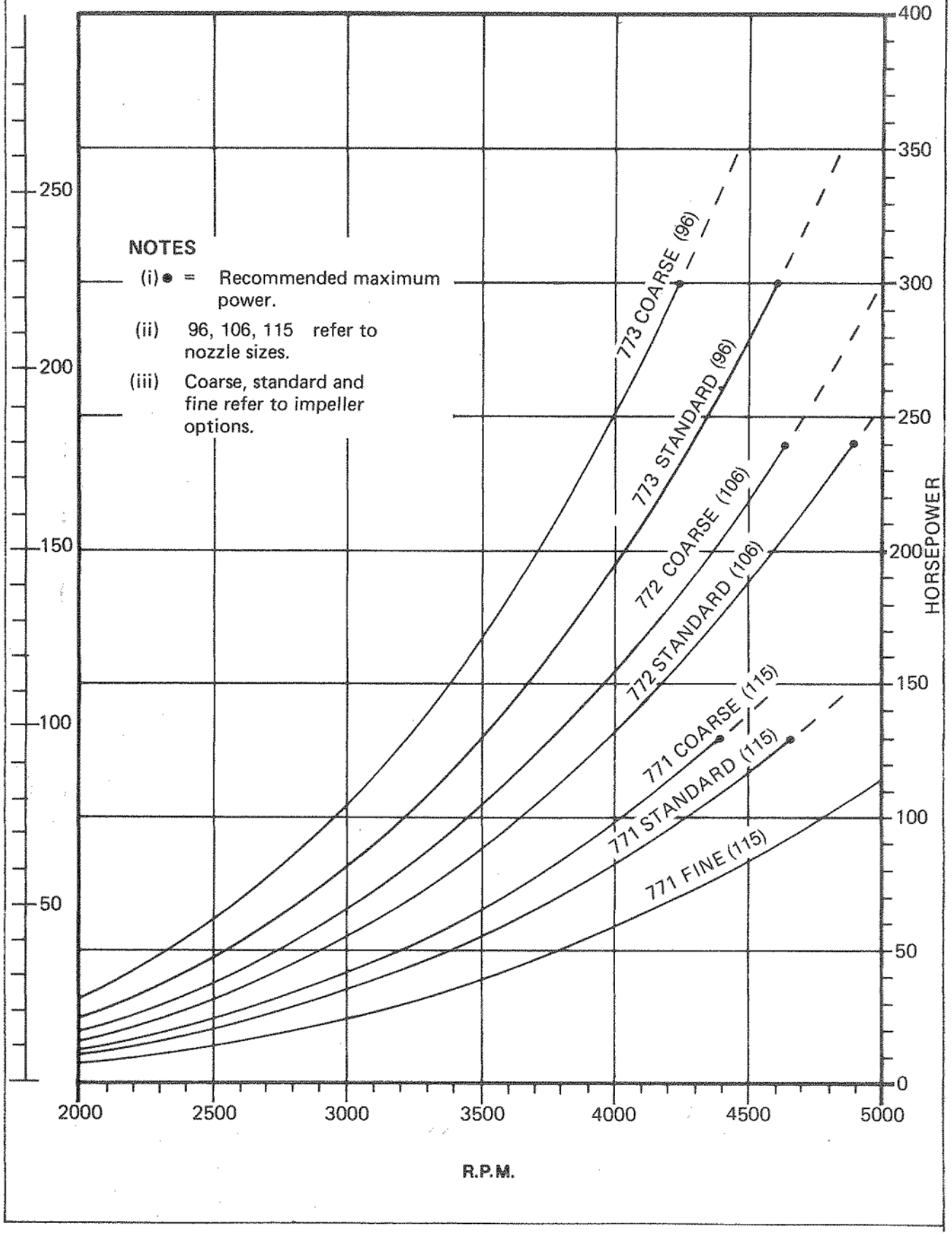
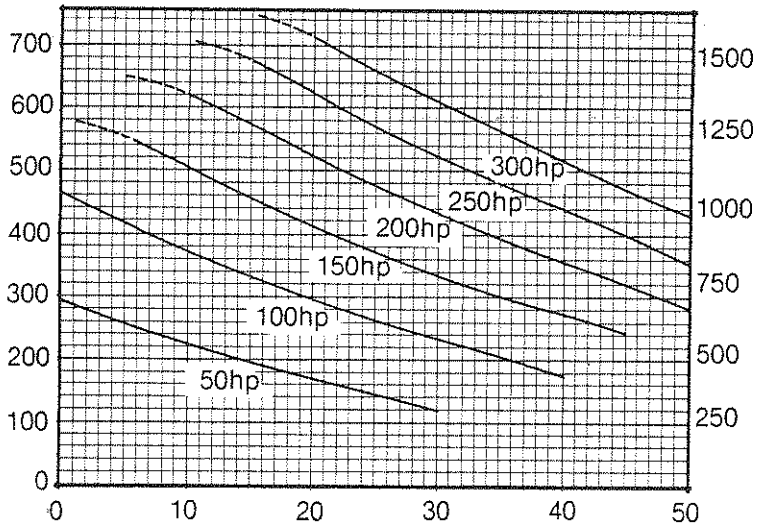
POWER REQUIREMENTS



773 — STD. NOZZLE



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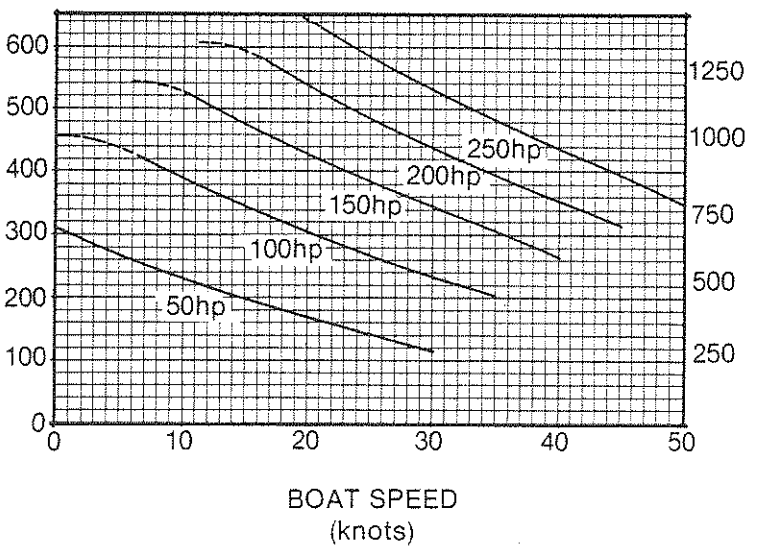
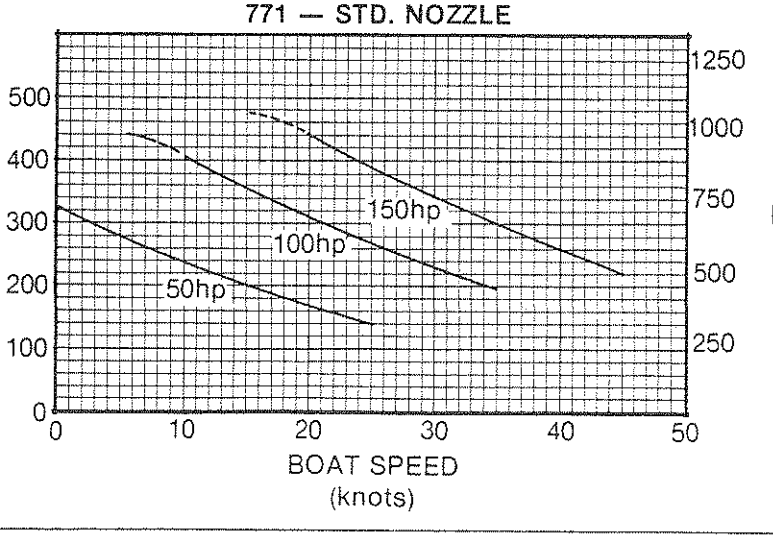


771 — STD. NOZZLE



INTRODUCTION

This section deals with the selection and matching of 770 Series Jet Units with appropriate Hull and Engine combinations.

The 770 Series Jet Unit is designed for the efficient propulsion of small and medium sized high speed planing craft. However this series of Jet can be used on heavier and larger boats, displacement craft and a variety of special purpose vessels. If units are to be used outside their normal design range the manufacturer or local dealer should be consulted for guidance.

There are four major factors that affect the performance of a jet boat. They are:

a) Hull
b) Engine
c) Jet Unit
d) Weight

A guide to selecting and finally combining these four factors, to suit particular requirements is laid out in the following section.

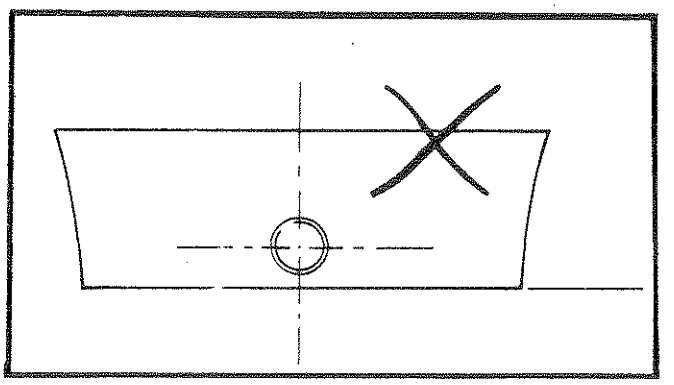
CHAPTER I (A) PLANING HULLS

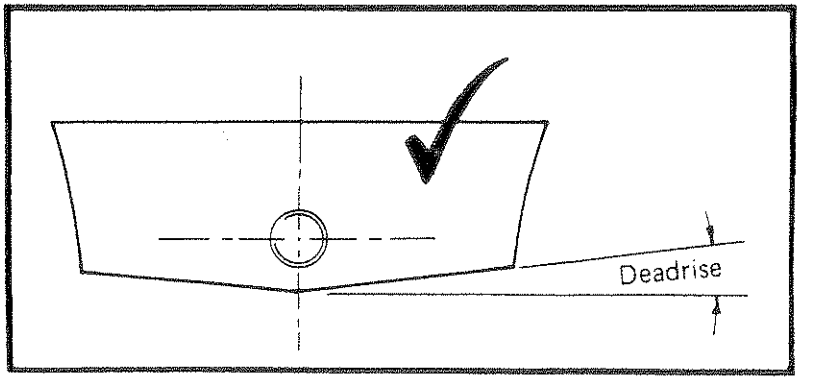
JET BOAT HULL SHAPES AND SIZES

Discussed here are the main features of the shape of the planing hull, leaving the layout, constructional possibilities, and building materials for later. Most of the information is based on a distillation of experience with a wide range of boats over the past twenty years. It should be clearly understood that many other types of hulls either have, or could be used and that this dissertation is a summary of the present jet boats generally found most successful.

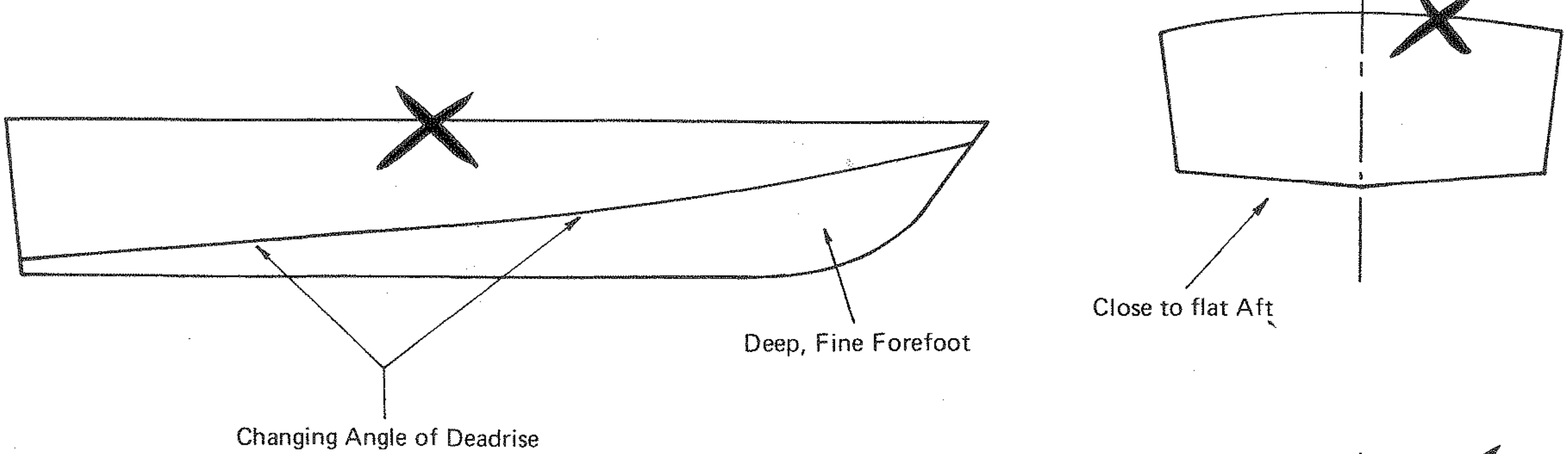
DEADRISE

With jet boats up to about 20 feet in length, it is preferable to have some "deadrise", or vee angle in the bottom carried back to the transom. There are three reasons for this, namely –

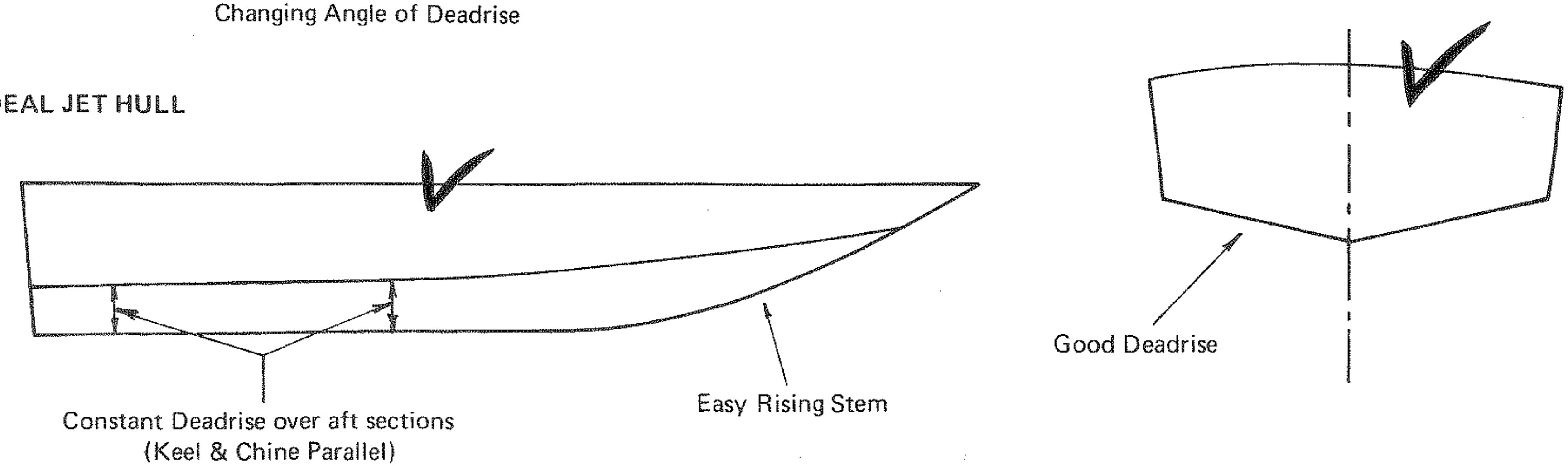




POOR JET HULL



IDEAL JET HULL



CHAPTER I (Cont'd)

1. Some vee angle makes sure that the centrally mounted jet unit is well immersed, thus quick priming is ensured when the engine is started. (The unit should be at least half full of water when standing idle i.e. water should at least come up to the mainshaft level).

2. At speed the vee bottom divides entrained air away from the intake in choppy conditions, thus avoiding excessive engine racing.

3. The more deadrise angle there is, the greater the banking in turns. This is probably safer, due to the added grip in turns and is generally more comfortable.

BOW SECTIONS

A jet boat should have a deadrise of about 25° at 1/4 - 1/3 back from the bow for a reasonably soft ride. The angle should be measured from the keel to the chine, ignoring the intermediate shape.

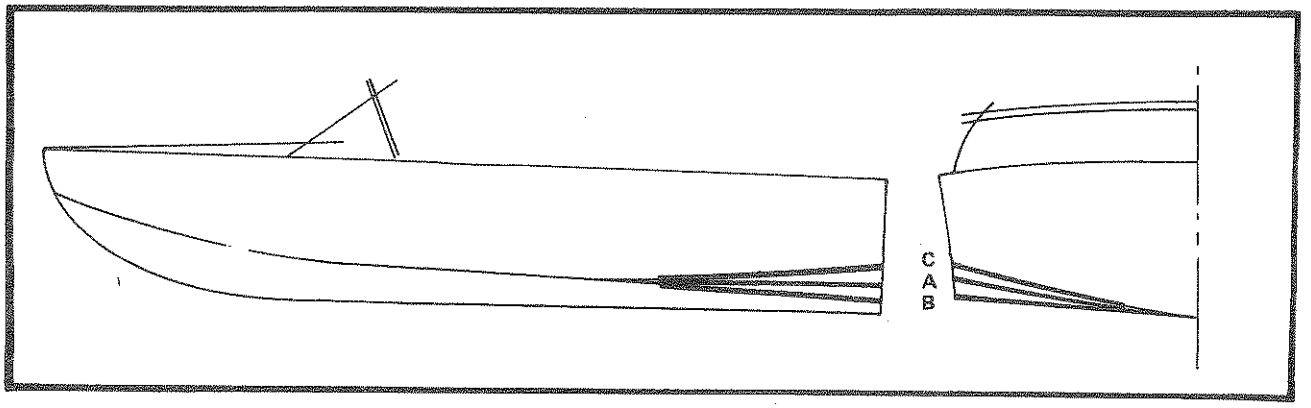
The normal developable convex shape achieved with a plywood boat is satisfactory for a jet boat. Avoid hollow sections and a deep fine forefoot. The stemline should rise from well back along the keel and a full rounded bow maintained. Have a smooth radius on the stem for preference, without any capping that can cause keeling in sharp turns. Due to the lack of rudder, etc. at the stern of a jet boat, surplus keeling effect forward must be avoided to ensure proper handling in turns.

KEELS, RUDDERS & OTHER UNDERWATER APPENDAGES

The ideal jet boat would need no keel or rudder — the deadrise in the hull being sufficient to give true running. But if additional directional stability is required, a fin is available (as an Optional Extra) for mounting onto 770 jet units. See page P1 "Optional Extras".

If required, a keel can be fitted ½ in—2 in deep along the keel, tapering off to nothing forward, and smoothly into the intake aft. Avoid any keel at all behind the intake. Another possibility is twin "sister" keels either side of the intake about 2'—4' apart from the transom forward to amidships of the hull. These should probably be used (quite deep) in larger sea-going boats to aid true running in rough conditions and to improve slow speed manoeuvring. An alternative arrangement to sister keeling and often more effective for larger craft used in open sea conditions, is twin fixed rudders aft. This has a profound steadying effect when coming alongside in a crosswind and will make the clean-bottomed sea going boat as easy to handle at slow speeds as the best propeller craft.

HULL LINES



A "MONOHEDRON" bottom (A) is really the simplest shape, the aft sections having constant dead-rise angle for some distance. This is easily seen by sighting along the bottom. They are best for high speed craft, the trim angle remaining constant as the speed rises in the planing range. They are not so good for medium speed, or lower powered craft as mentioned below.

The "WARPED-PLANE" lines (B) have the chine continuously dropping from the bow to the transom, the deadrise angle thus reducing all the way back. This gives the boat a "flaps-down" effect and a flat planing attitude is obtained. This shape is preferable for lower-powered craft and all boats where nice running in the 18-28 m.p.h. range is required. It is excellent for load-carrying boats, and gives improved riding in choppy conditions due to a generally flatter trim angle at normal cruising speeds. However, as the speed rises, the trim becomes over-flat, the bow may "plough", wetted area increase instead of decreasing and a limitation of speed results. Also in the case of jet boats, bad handling and spinning out can occur at the higher speeds.

The "ROCKER" (C) is roughly the opposite of the above, the deadrise running down to a minimum about amidships and increasing again towards the transom. The bottom is something like a banana. This shape is easily driven in a displacement condition and is suitable for a slower craft that may operate below planing speeds, or in a semi-planing condition. If driven fast, the bow rides high due to suction at the stern and "grip" in turns may be inferior.

The "Hooked-chine" is an exaggeration of the dropping chine and actually curves downward at the transom. This makes a boat plane quickly and adopt a very even trim angle on accelerating. The effect is similar to having flaps on the transom. However, it is not good to have hook in the bottom at higher speeds: it is liable to cause a high speed broach and should be avoided.

BEAM

Plenty of beam is good, but don't overdo it. The wide beam boat is a great load carrier, can plane at low speeds, is roomy and very manoeuvrable. The worst feature is the excessive change of trim on accelerating onto a plane. It will also run with a greater angle of trim at cruising speeds and is generally inferior for sea-going conditions. The long thin boat will give the best ride in a sea, can have a flat, even take-off, and a wide cruising speed range. A compromise is probably the best for general use, a rule of thumb being : beam = 1/3 length.

(B) DISPLACEMENT HULLS

Hull shape for displacement craft has a less critical effect on performance than for planing craft, although the above section on "Keel, Rudders and Other Underwater Appendages" (Page E3) applies equally.

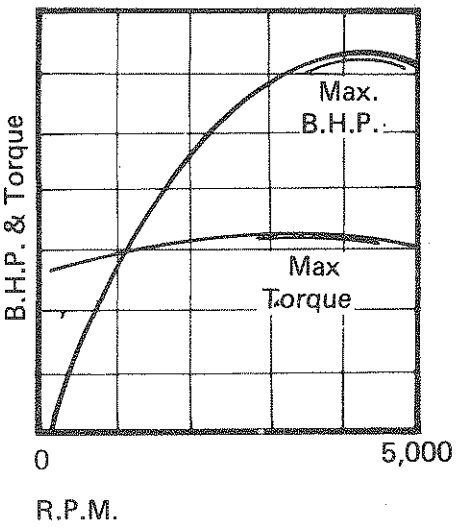
The main requirement as far as jet propulsion is concerned is to ensure that the jet unit primes. Displacement craft are usually fairly flat bottomed and it is important that the unit is mounted so that water comes at least to mainshaft level when the craft is at rest.

CHAPTER II

CORRECT ENGINE TYPE

The 770 Series Jet Units are matched to the average automotive type gasoline engine which develops its maximum power at between 3,600 - 5,000 R.P.M.

DESIRABLE POWER & TORQUE CURVES



The weight of the engine should not be greater than 1.8 kg (4lb)/developed B.H.P. The maximum torque of the engine should be developed in the high R.P.M. region, making a sports type of engine a better choice than a commercial or truck engine, designed for good torque at low R.P.M.

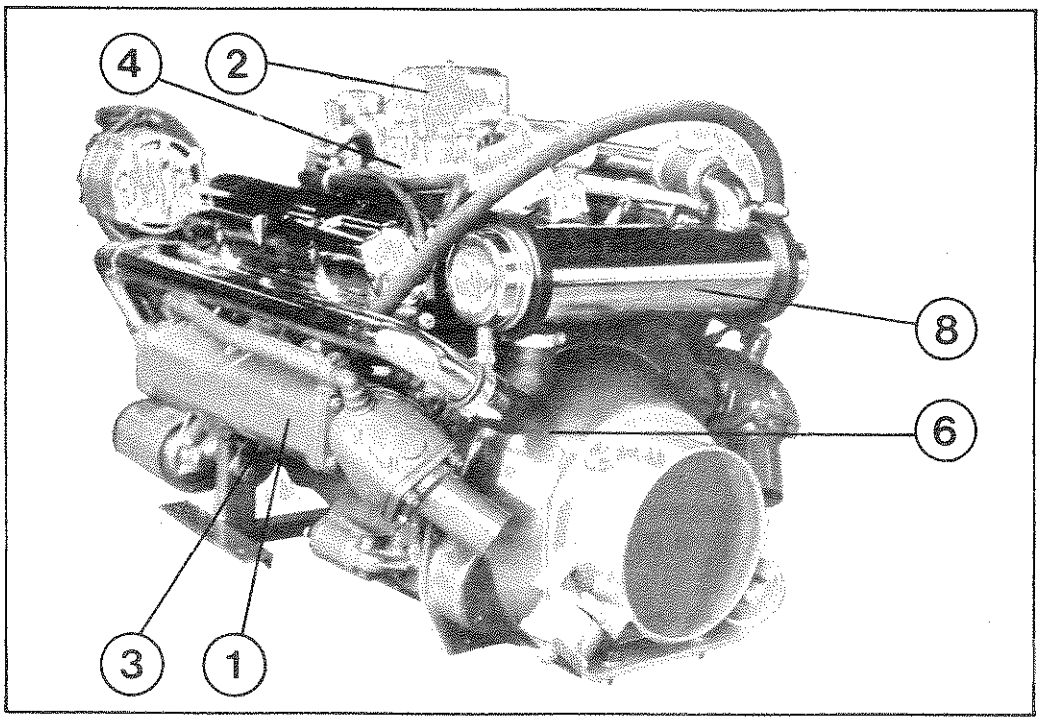
DIESELS

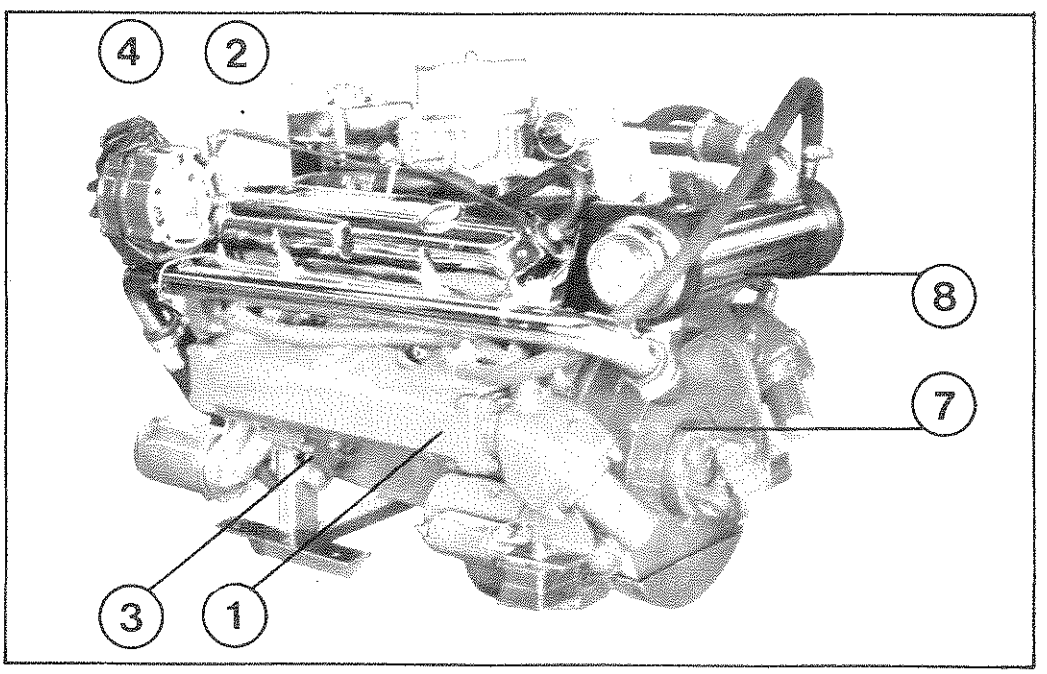
Very few diesel engine specifications can come near these figures, although some automotive diesel conversions are now built with 4,000 R.P.M. peak speed and quite good power/weight ratios. But in general few diesel engines or truck engines are suitable for small fast craft.

The 1000 and 1300 series of jet units are designed specifically for diesel engines suitable for hulls from 22' - 0" upwards.
Details can be obtained from your nearest dealer.

The basic requirement is a standard inboard gasoline marine engine, less transmission (Bob-tailed) with the following features.

1. Water Jacketed exhaust manifolds.
2. Approved flame arrestor – fitted to carburettor air intake.
3. Flexible rubber front engine mounts (preferably adjustable).
4. Throttle connection to carburettor.
5. Instrument Panel with wiring loom.
6. Borg Warner flywheel housing)
7. Hardy Spicer flywheel adaptor) Suits Hamilton short coupling kit
8. Suitable Engine cooling arrangements





CHAPTER III

MATCHING ENGINE & JET UNIT

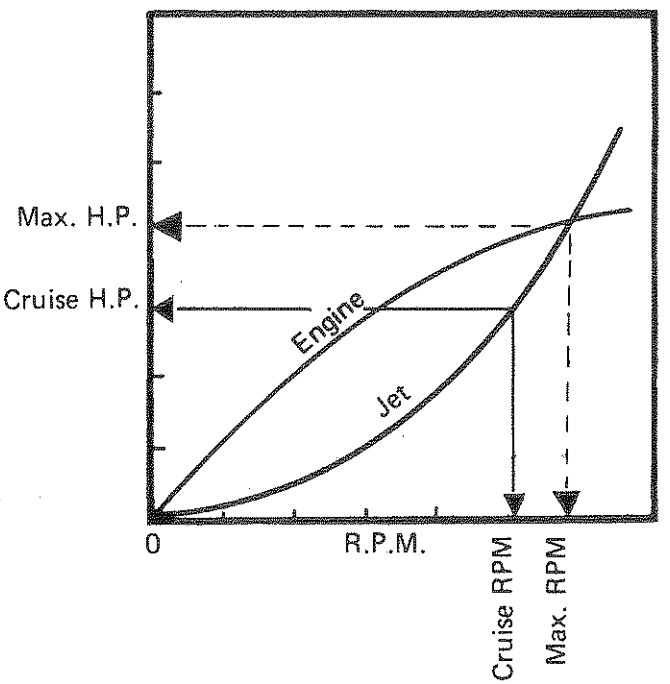
Having satisfied yourself that you have chosen the correct type of engine and hull the next step is to match your engine with a suitable 770 Series Jet Unit. See overleaf for a list of common gasoline engines and their correct jet unit, impeller pitch and nozzle matchings. The steps involved in arriving at these (or any other) matchings are as follows:

A. First determine or estimate the engine's NET SHAFT H.P. curve against revolutions. Remember that S.A.E. rated horse-power maybe 10% - 20% higher than that acutally obtainable.

B. Knowing the maximum engine net shaft horse-power choose the correct matching Jet Unit for this horsepower. Whether it be a 771, 772, 773. (For 770 Series Power Requirements refer to Section D1. Performance Data).

C. Superimpose the engine power curve on the Jet unit Power Requirement Curves (Section D). The point where the curves intersect gives the maximum revolutions obtainable from the engine coupled to a 770 Series Jet.

D. For cruising, reduce revolutions as recommended by the engine manufacturers, but come down the jet curve to determine the horsepower used.



D. If a poor match results an alternative Jet Unit can sometimes be selected provided it covers the power range. There is some overlap between units for this purpose.

TABLE 1 MATCHING 770 JET UNITS TO COMMON GASOLINE ENGINES

MAKE	NO. CYLINDERS	CUBIC INCHES	LITRES	APPROX. MAX. H.P.(NETT) DRIVING JET @ R.P.M.	RECOMMENDED JET UNIT	IMPELLER	NOZZLE
CHEVROLET	4	181	3.0	127 @ 4,300	771	COARSE	STD
	V6	229	3.7	160 @ 4,050	772	COARSE	STD
*	V8	302	4.9	205 @ 4,200	772	COARSE	SMALL
				200 @ 4,000	773	STD	STD
*	V8	305	5.0	205 @ 4,200	772	COARSE	SMALL
				200 @ 4,000	773	STD	STD
	V8	350	5.7	225 @ 4,200	773	STD	STD
	V8	454	7.4	320 @ 4,300	773	COARSE	STD
CHRYSLER	6	225	3.7	150 @ 4,200	772	STD	STD
	6	245	4.0	120 @ 3,680	772	COARSE	STD
	6	265	4.3	145 @ 4,150	772	COARSE	SMALL
	V8	318	5.2	225 @ 4,200	773	STD	STD
	V8	360	5.9	250 @ 4,000	773	COARSE	STD
	V8	440	7.2	330 @ 4,375	773	COARSE	STD
FORD	4	98	1.6	63 @ 4,100	771	FINE	STD
	4	122	2.0	93 @ 4,700	771	FINE	STD
	V6	153	2.5	95 @ 3,950	771	COARSE	STD
	V6	183	3.0	125 @ 3,900	772	STD	STD
	6	200	3.3	105 @ 4,000	772	STD	LARGE
	6	250	4.1	125 @ 3,550	772	COARSE	SMALL
*	V8	302	4.9	205 @ 4,200	772	COARSE	SMALL
				200 @ 4,000	773	STD	STD
	V8	351	5.8	225 @ 4,200	773	STD	STD
	V8	460	7.5	270 @ 4,100	773	COARSE	STD
HOLDEN	6	179	2.9	85 @ 4,000	771	STD	STD
	6	202	3.3	95 @ 3,850	771	COARSE	SMALL
*	V8	308	5.0	205 @ 4,200	772	COARSE	SMALL
				200 @ 4,000	773	STD	STD
LEYLAND	V8	269	4.4	140 @ 3,900	772	COARSE	STD
OLDSMOBILE	V8	350	5.7	225 @ 4,200	773	STD	STD
VOLVO							
125A	4	130	2.13	115 @ 5,000	771	FINE	STD
145	4	140	2.31	130 @ 4,650	771	STD	STD
175A	V6	238	3.8	160 @ 4,200	772	STD	STD
290A	V8	350	5.7	270 @ 4,400	773	STD	STD

NOTES

1. Generally diesel engines with sufficient power for planing speeds do not match 770 Jet Units.
One exception is

VOLVO TAMD 40B	(Diesel) 6	219	359	165 @ 3600	773	COARSE	STD

2. VM Diesels & BMW offer similar engines which also match 773 Jet.
Many other inboard marine engines are based on the above engines. Mercruiser, OMC, Chrysler, Crusader are examples. To choose a matching jet unit, identify the engine by its capacity in cu.in. or litres and match as for engines in the above table. For example
MERCRUISER 233 is based on

FORD	V8	351	5.8	225 @ 4,200	773	STD	STD

*3. For heavy boats and for improved load carrying (commercial use) and water skiing performance, choose the larger of the two jet units recommended.

4. Most engine manufacturers quote gross h.p. which can exceed nett h.p. by up to 20%. The h.p. quoted above is the nett achieved on the stated jet unit at the stated r.p.m.

CHAPTER IV

MATCHING ENGINE & JET TO HULL

So far in this chapter we have looked at suitable hull shapes, engines and matching of engine to jet unit. The sequence of the next two steps is important:

A. Firstly, calculate the boats likely all-up-weight (AUW). It is important that the boat is not too heavy for its size. SEE TABLE 2.

B. Then select the engine/jet which will deliver the power to drive a boat, with AUW from Step A, to the required speed.

A. WEIGHT ESTIMATION

It is important to distinguish between AUW and unladen weight.

AUW = boat complete with engine and jet, instruments, controls etc. and full fuel and passenger load; and picnic baskets, fishing gear, liquid refreshments, diving gear, anchor, life jackets, radio, boat safety equipment etc, etc. AUW should be used in all estimates concerning engine/jet selection and performance.

UNLADEN boat weight does not include fuel, passengers and accessories but does include boat complete with windscreen, steering, seats, fittings, battery, driveshaft, fuel system, instruments, controls, engine cover plus engine and jet unit.

Boats should be built to an unladen weight, **but every effort to keep below the unladen maximums will result in improved performance.**

TABLE 2

		771				772				773			
BOAT LENGTH		MAX UNLADEN		MAX AUW		MAX UNLADEN		MAX AUW		MAX UNLADEN		MAX AUW	
M	FT	KG	LBS	KG	LBS	KG	LBS	KG	LBS	KG	LBS	KG	LBS
4·0	13	650	1400	1100	2400	700	1600	1150	2500				
4·5	15	750	1700	1300	2900	850	1900	1350	3000	950	2100	1400	3100
5·0	17					950	2200	1600	3500	1100	2400	1600	3600
6·0	19					1200	2600	1750	3900	1300	2800	1850	4100
6·5	21									1450	3200	2000	4500
7·0	23									1600	3500	2200	4800

B. SPEED PREDICTION

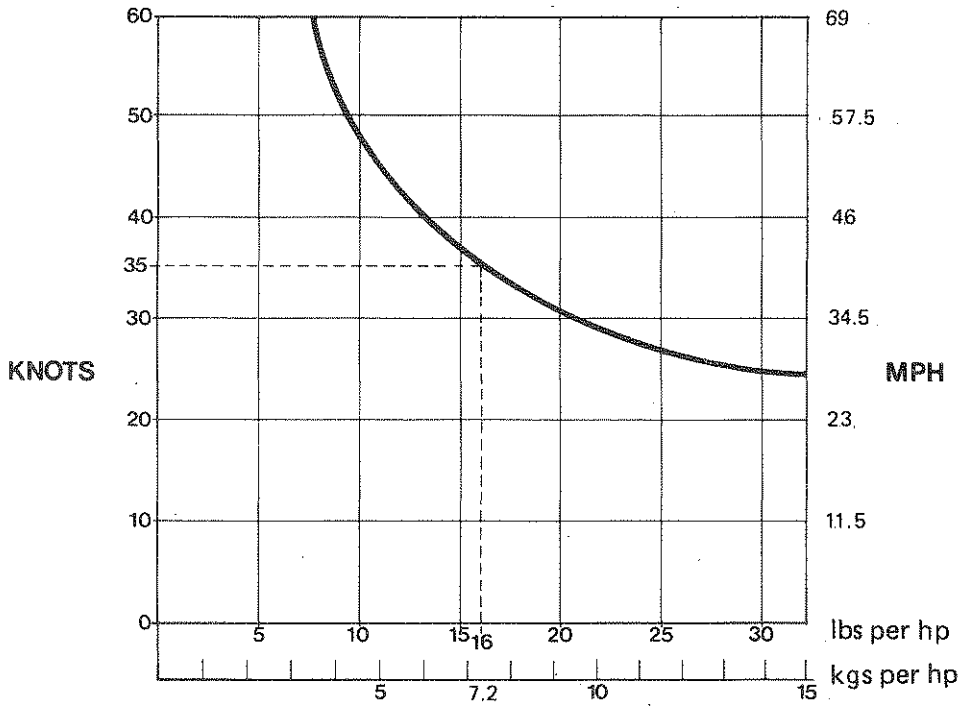
Boat speed depends mainly on engine power and AUW. More power means more speed. More weight means less speed.

By dividing boat AUW by maximum horsepower a predicted speed can be read off the graph below.

Example: $\frac{\text{AUW}}{\text{hp}} = \frac{900\text{ kg}}{125\text{ hp}}$ or $\frac{2000\text{ lb}}{125\text{ hp}}$

= 7.2 kg per hp or 16 lb per hp

PREDICTS 35 KNOTS



FOR SUCCESSFUL PERFORMANCE, DO NOT EXCEED 10 KG PER HP OR 22 LB PER HP.

Alternatively expressed, power weight ratio must exceed 10 hp per 100 kg or 4.5 hp per 100 lb

THE PERFECT PLANNING SEQUENCE

Step 1 Nominate required speed.

Step 2 From speed prediction graph, read off the required power to weight ration (bottom axis of graph) to achieve this speed.

Step 3 Estimate boat AUW and check against boat length in Table 2.

Step 4 Divide AUW by power/weight ratio = power required.

Step 5 Select engine of appropriate power.

Step 6 Select matching jet unit from Table 1.

Step 7 Knowing engine and jet, re-calculate AUW and re-check against boat length in Table 2.

Step 8 With new AUW, divide by engine hp = power/weight ratio.

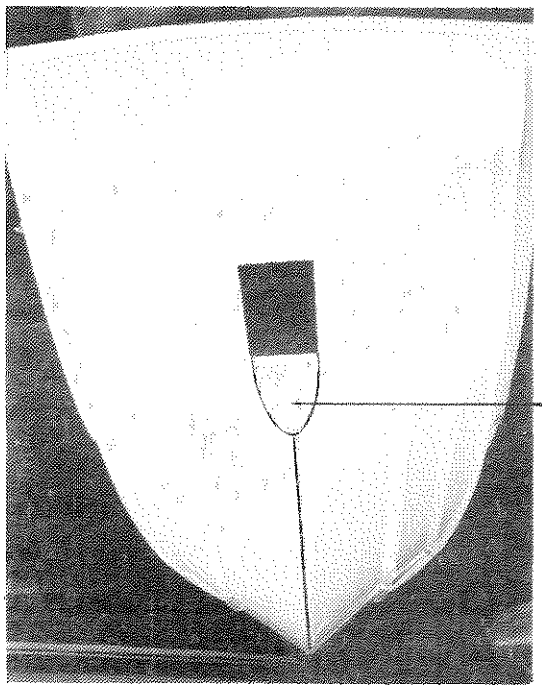
Step 9 From speed prediction graph, read off speed with power/weight ratio from Step 8.

Step 10 Is this the required speed?

MOUNTING AREAS FOR JET UNIT AND ENGINE

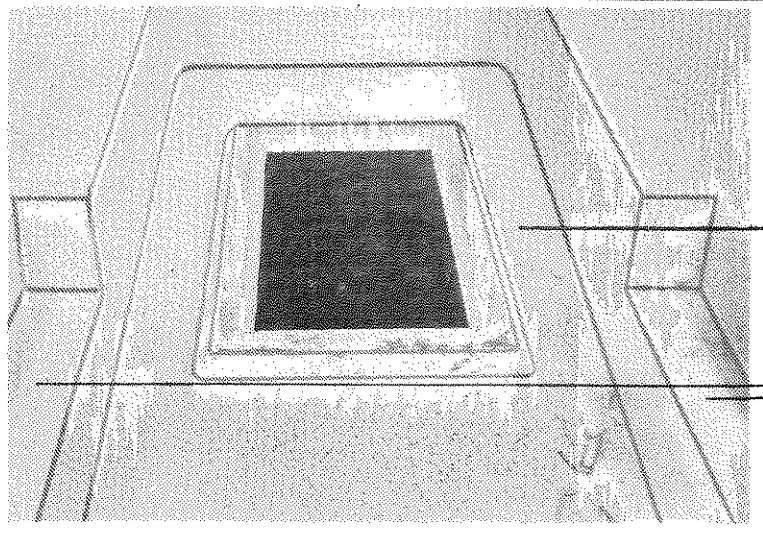
Having decided that the chosen hull is suitable for jet drive, it will then be necessary to prepare an area for mounting the jet unit and engine. The jet unit requires a flat area with a rectangular intake hole built up on the keel line; and two longitudinal bearers, parallel with the bottom of the boat, are required for the engine.

The method of preparing these mounting areas may differ according to the material of the hull and whether the installation is a custom job or a quantity production run. Whichever is the case the finished appearance should be as in Figs 1 and 2. Dimensions as in Figs 3, 4 and 5.



1. OUTSIDE VIEW

Slope to merge smoothly with bottom.



2. INSIDE VIEW

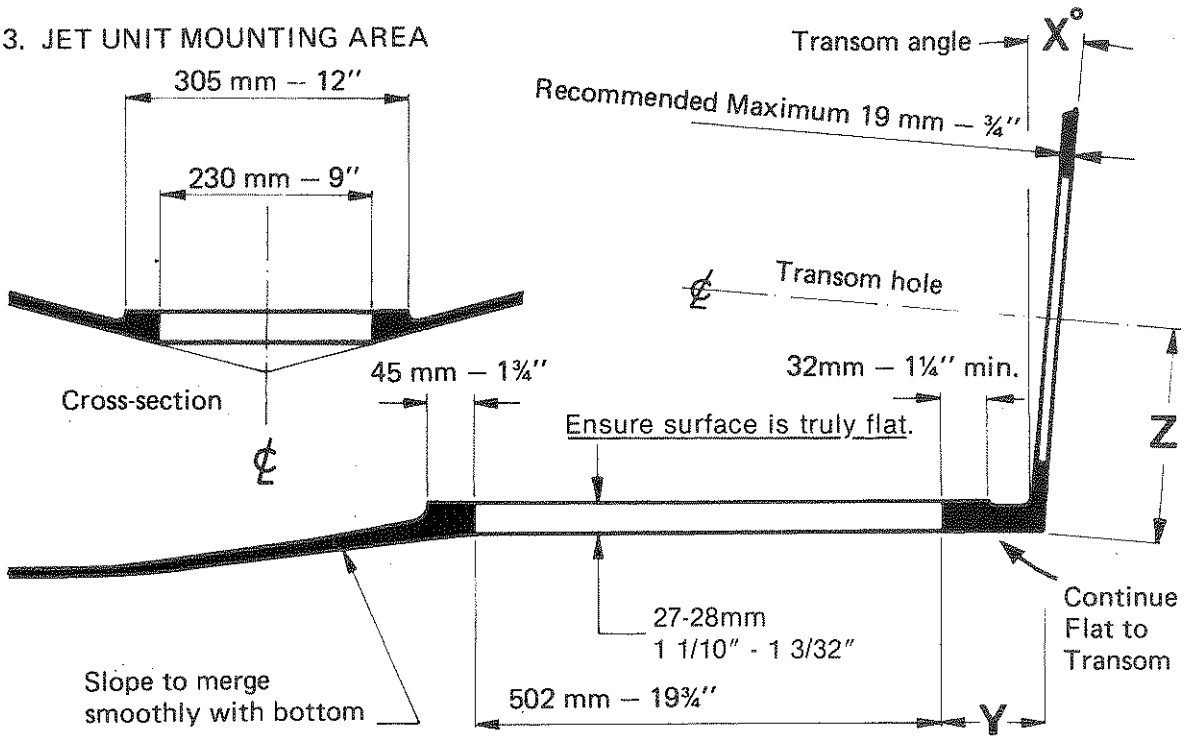
Flat, level mounting area.

Engine bearers.

Using wood or fibreglass (depending on hull material), build up a flat, level area inside the hull, central about the keel line.

Underneath, flatten off the bottom (230mm – 9" wide) so that no 'step' will remain when the flat intake screen is installed. In front of the intake hole, fair off from the flat area smoothly into the the bottom, so that the water can flow smoothly up to the intake. This will need to be done only on vee-bottomed hulls, as flat bottomed hulls will leave no step in this area.

3. JET UNIT MOUNTING AREA



The dimensions Y and Z depend on the transom angle X° and can be determined from the table below or from the templates supplied.

Transom angle	X°		0	2	4	6	8	10	12	14	16
Intake hole Template No. 1	Y	mm	100	90	84	76	68	62	53	45	36
		inches	3 15/16	3 9/16	3 5/16	3	2 11/16	2 7/16	2 1/8	1 3/4	1 7/16
Transom hole Template No. 2	Z	mm	217	218	219	221	223	225	228	230	233
		inches	8 9/16	8 9/16	8 5/8	8 11/18	8 13/16	8 7/8	9	9 1/16	9 3/16

'INBOARD' MOUNTED UNITS.

772 and 773 jet units can be mounted with stator housings inboard, leaving the external overhang from the transom the same as for a 771 unit. The intake moves forward as per the dimensions below.

Special stator/s (Part No. 102327) are required so that the Transom Seal Plate (Item 57) can be located between the aft Stator (Item 59) and the Tailpipe (Item 62).

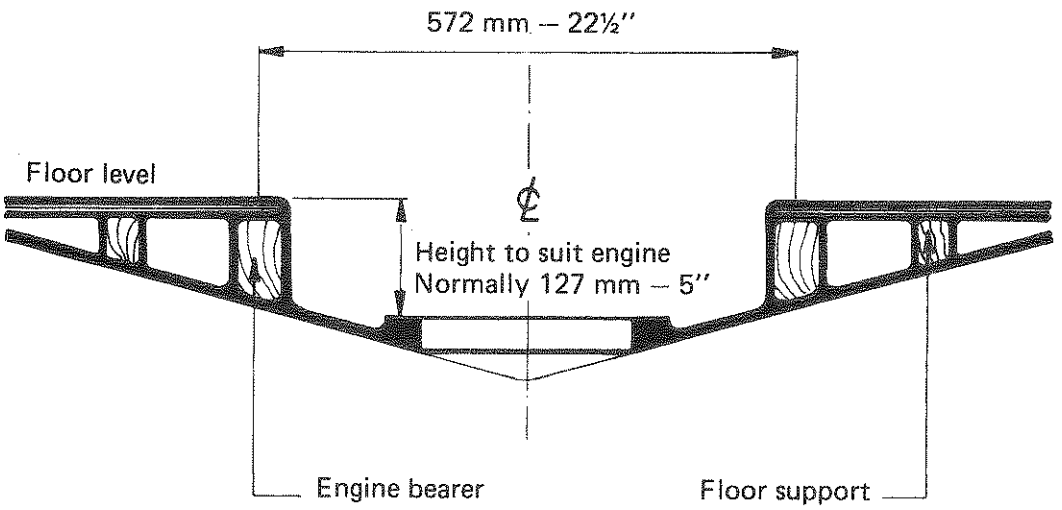
FOR 772 — INCREASE Y DIMENSION BY 120mm — 4¾"
FOR 772 — REDUCE Z DIMENSION BY 10.5mm — 13/32"

FOR 773 — INCREASE Y DIMENSION BY 240mm — 9½"
FOR 773 — REDUCE Z DIMENSION BY 21mm — 13/16"

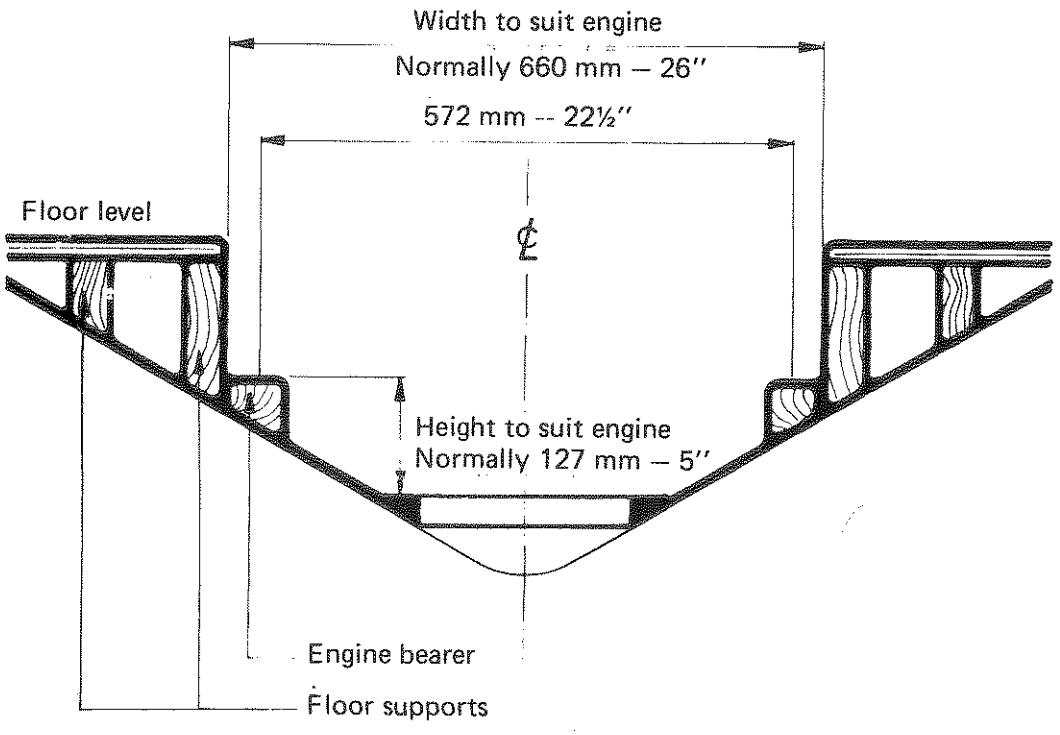
ENGINE COMPARTMENT

Leave an area clear of frames and floorboards down the centre of the boat for the engine and jet unit. The length of the recess will depend on the engine and coupling system used. With a deep vee hull, part of the engine may be below floor level, so make sure that there is adequate clearance around the engine for easy access.

4. SHALLOW VEE HULLS



5. DEEP VEE HULLS

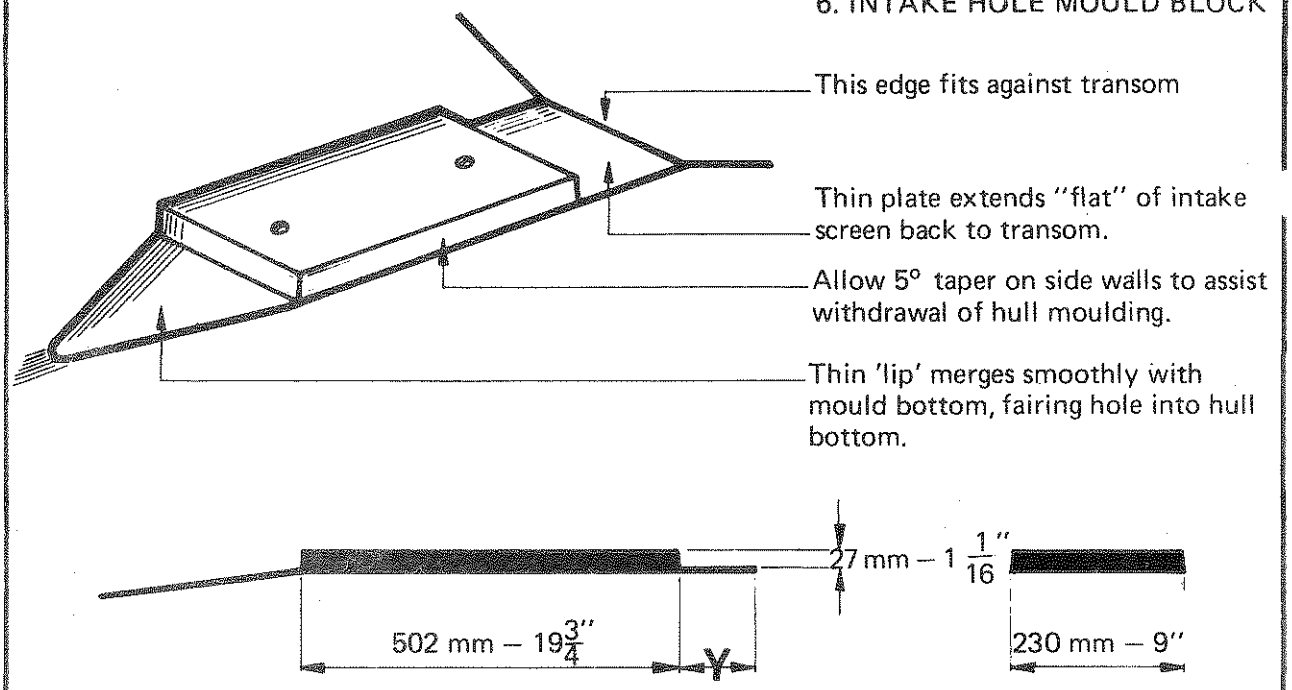


FIBREGLASS HULL PRODUCTION

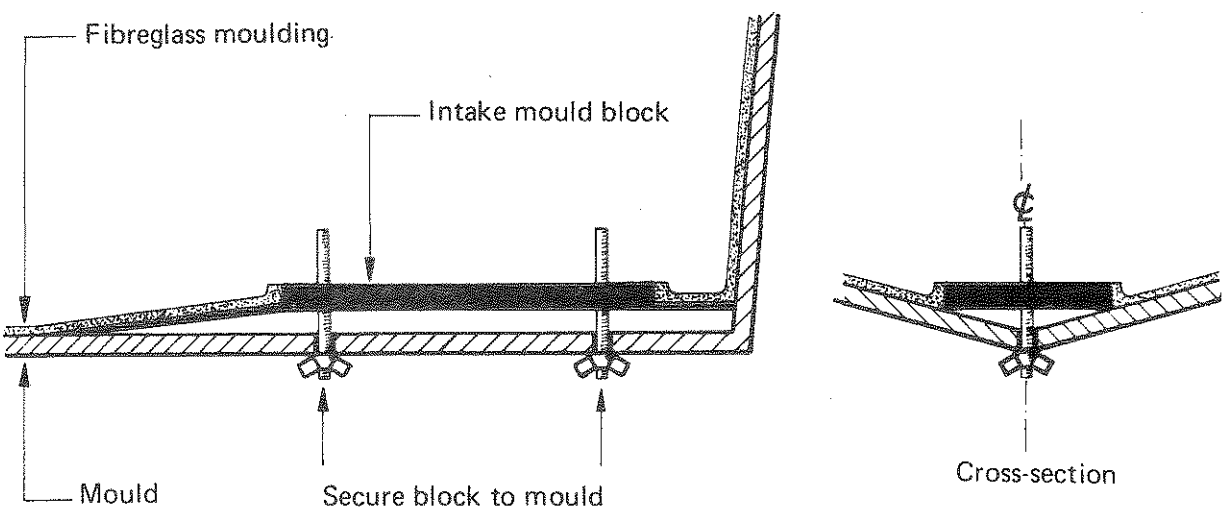
When moulding fibreglass hulls, the intake hole should be formed by securing a steel block to the mould. Figs 6 and 7. Build up a strong fibreglass surround and clamp a heavy plate to the top to provide a level, flat surface. Fig 8.

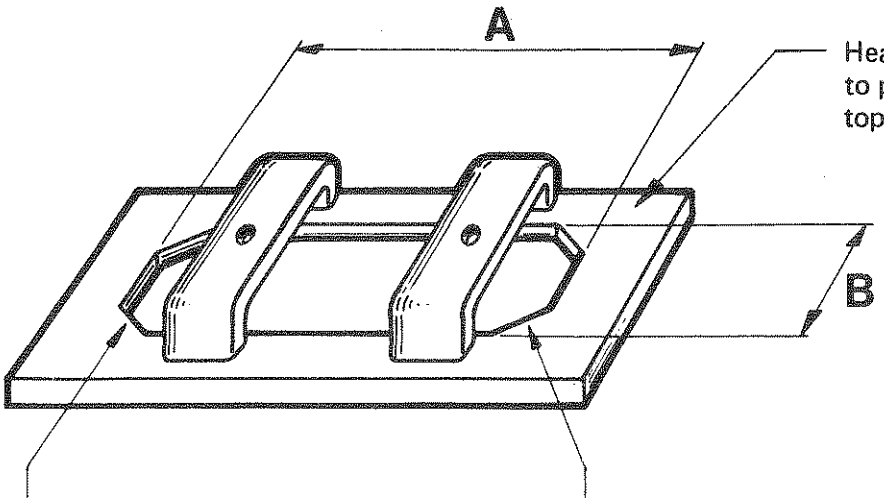
N.B. Where a mould is not going to be inverted, it is generally not necessary to bolt the intake mould block through the hull mould as shown in Figs 7 and 8. It is sufficient to tape the block into the mould. Alternative construction of the intake mould block may be in light alloy or wood.

6. INTAKE HOLE MOULD BLOCK



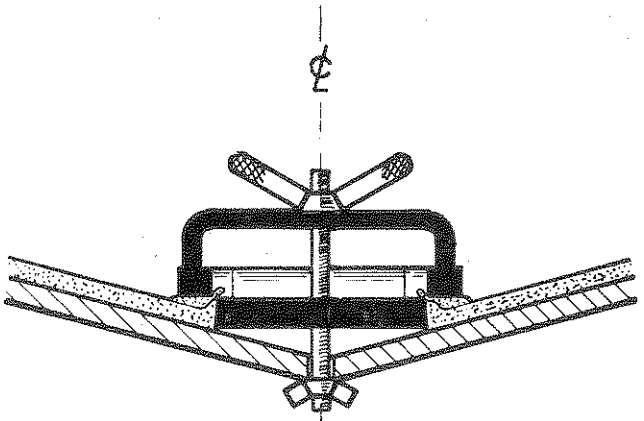
7. FITTING TO HULL MOULD

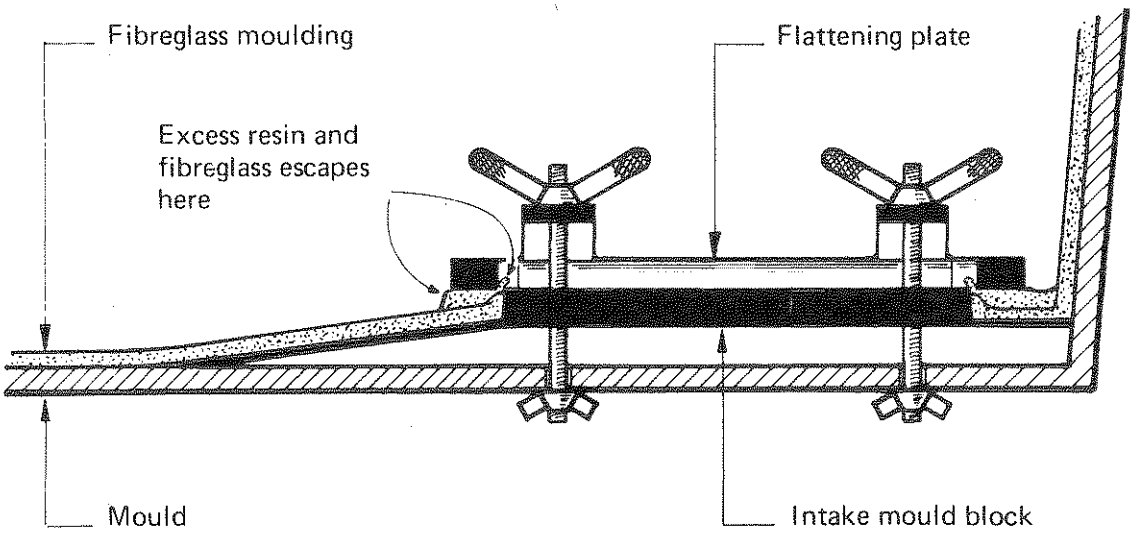




8. INTAKE SURROUND

The angled corners on the flattening plate should just catch on the mould block and dimensions A and B should be 4mm – 1/8" greater than the top of the block to allow excess resin and fibreglass to escape.





TEMPLATES

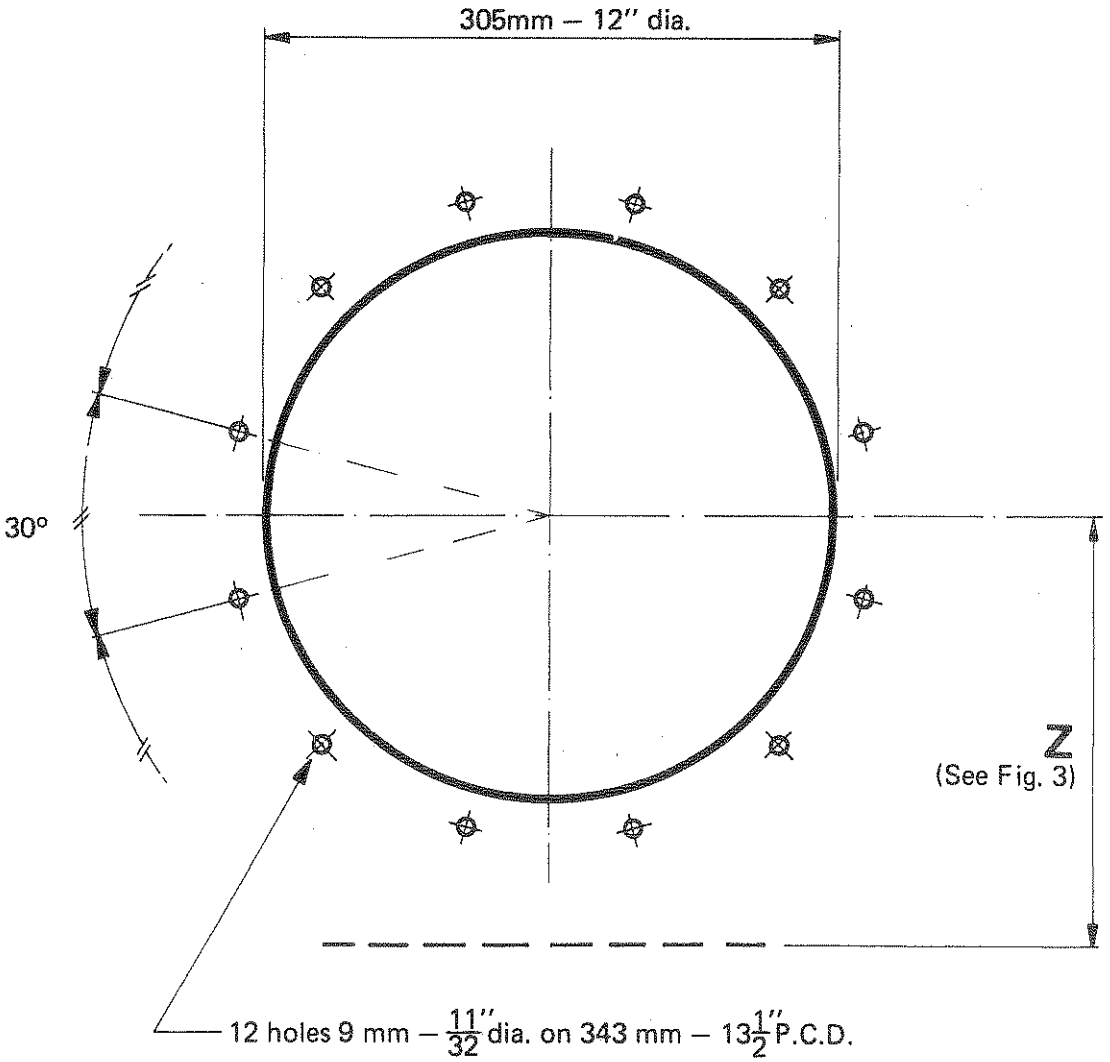
Three paper templates are supplied for custom installations.

No. 1 Intake hole
No. 2 Transom hole
No. 3 Intake bolt holes.

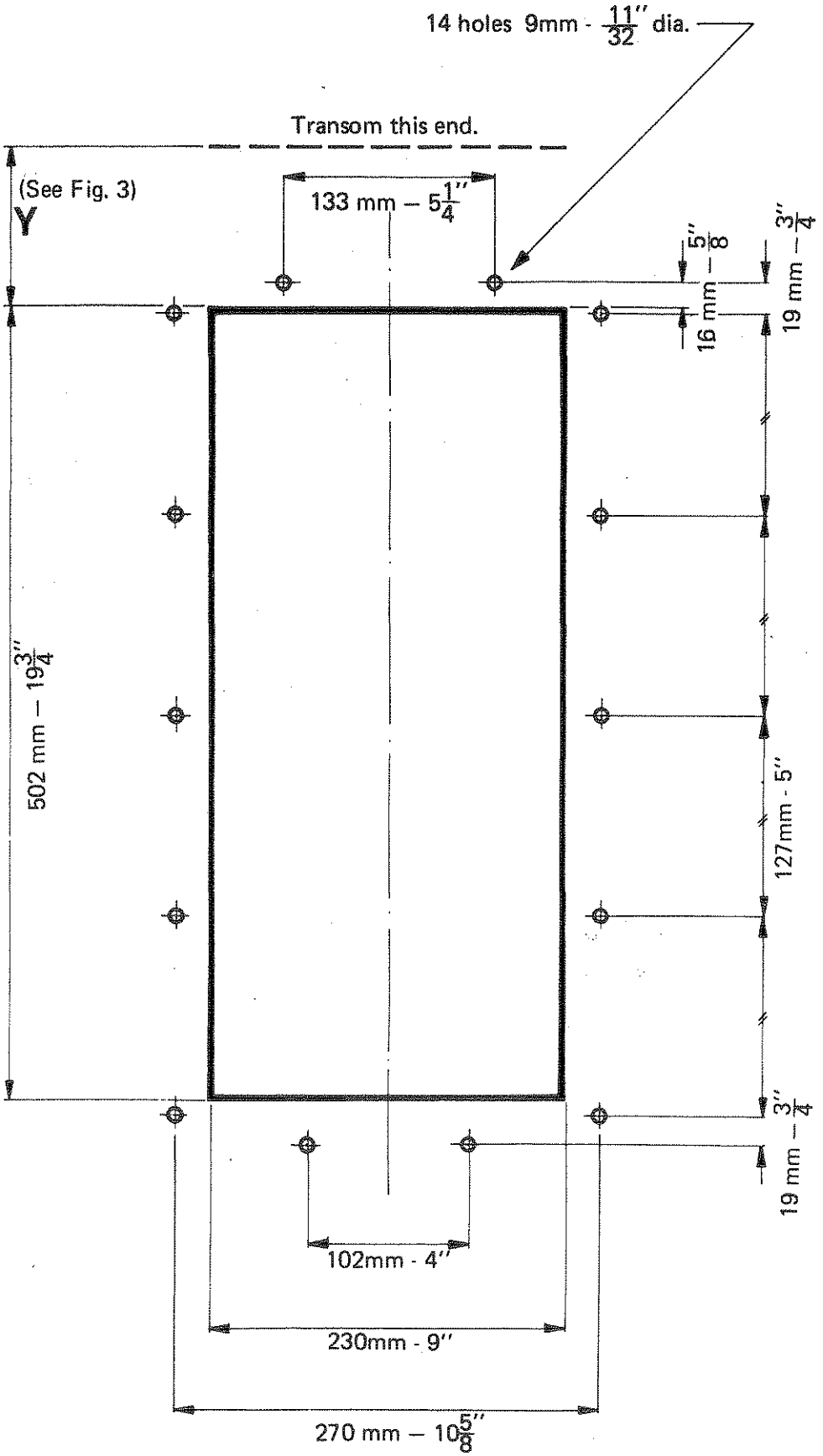
If the intake hole is to be moulded then only templates 2 and 3 will be required.

Paper templates will not be suitable for quantity production so templates of a more permanent nature should be constructed of steel or similar material using the dimensions given in Figs. 9 and 10. Template No. 3 (Intake bolt holes) should be made to locate in the intake hole and have suitable guides so that the holes are drilled perpendicular to the flat mounting area. As the hole spacing is asymetrical the template should be marked to show which end goes toward the transom.

9. TRANSOM HOLE DIMENSIONS

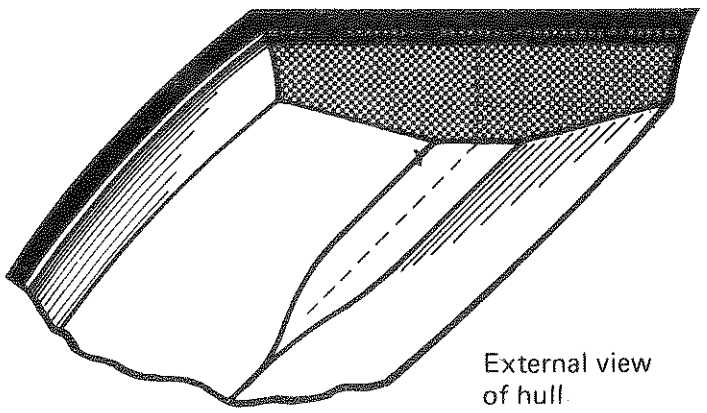


10. INTAKE HOLE DIMENSIONS



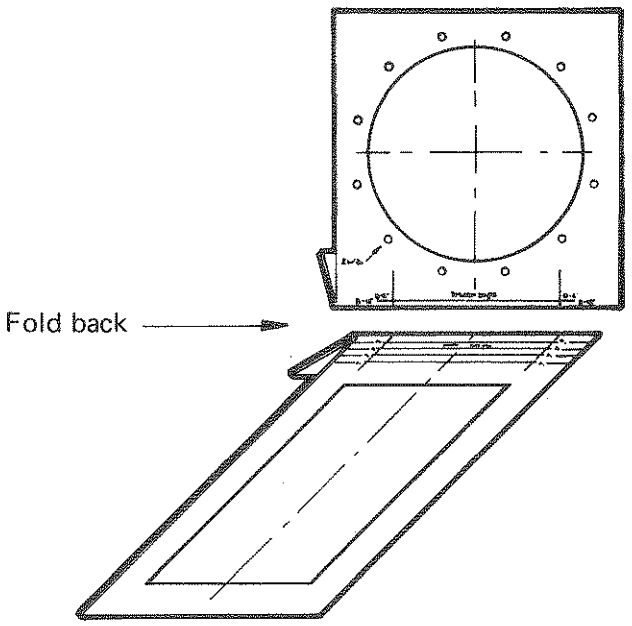
USING TEMPLATES TO CUT INTAKE AND TRANSOM HOLES – Figures 11 to 16.

If the intake hole has been moulded, then template No. 1 for the intake hole will not need to be used, otherwise proceed as follows:

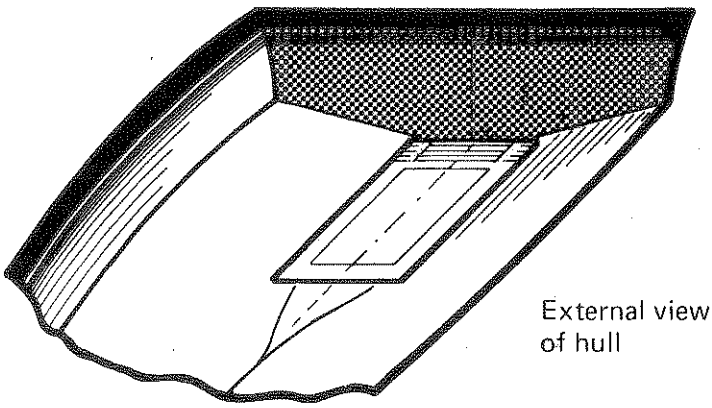


External view of hull

11. Locate the centre of the keel and draw the centre line on the flat area of the keel and up the transom.

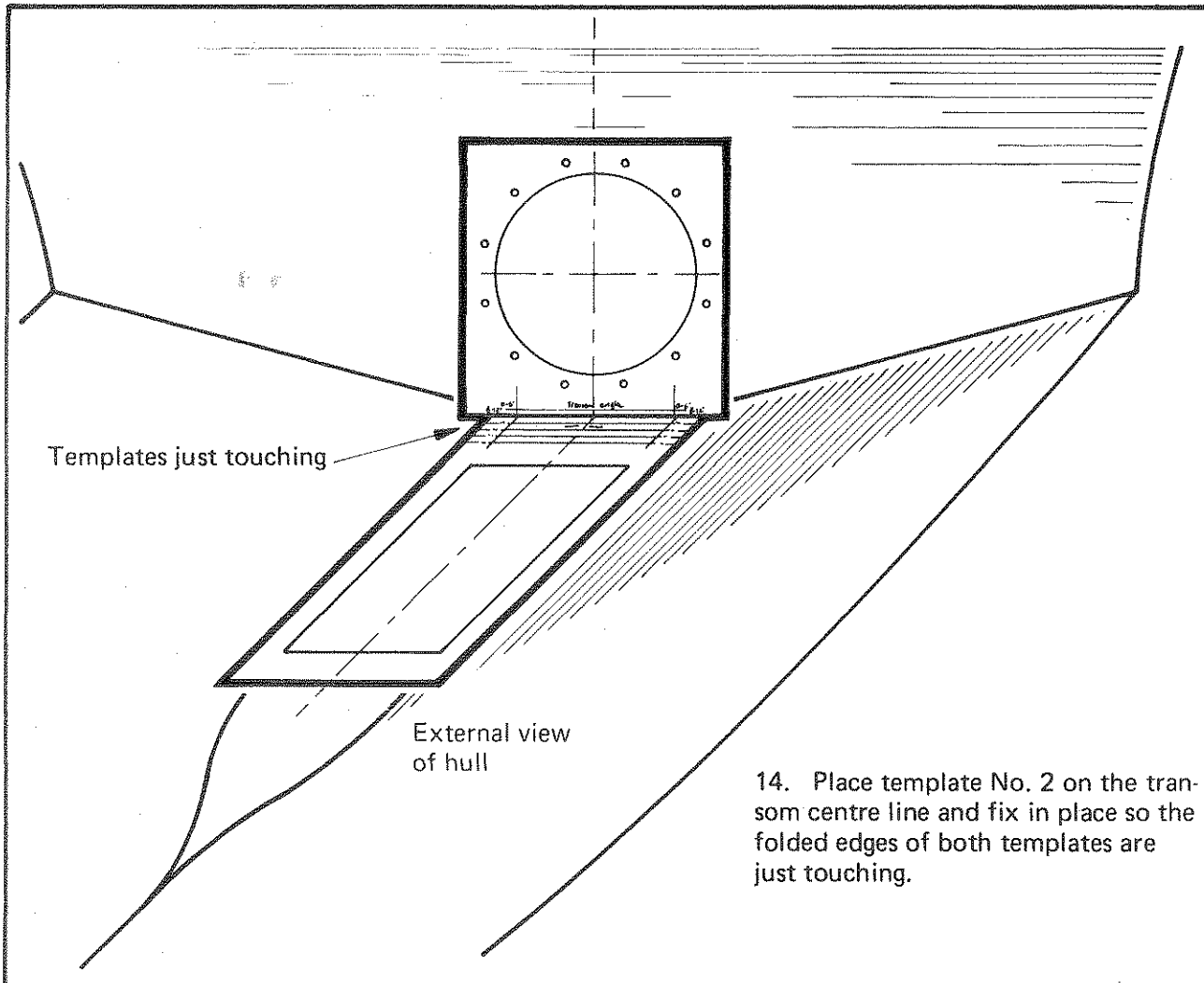


12. The position of intake and transom holes depends on the transom angle. Once this is determined, fold each template (Nos. 1 and 2) on the line corresponding to the transom angle.



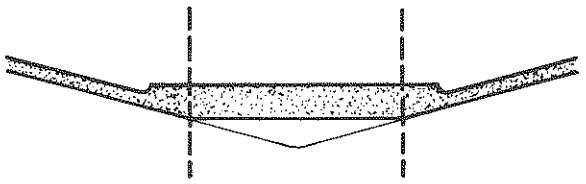
External view of hull

13. Place template No. 1 on the centre line of the keel and fix it in place so the folded end just meets the transom.



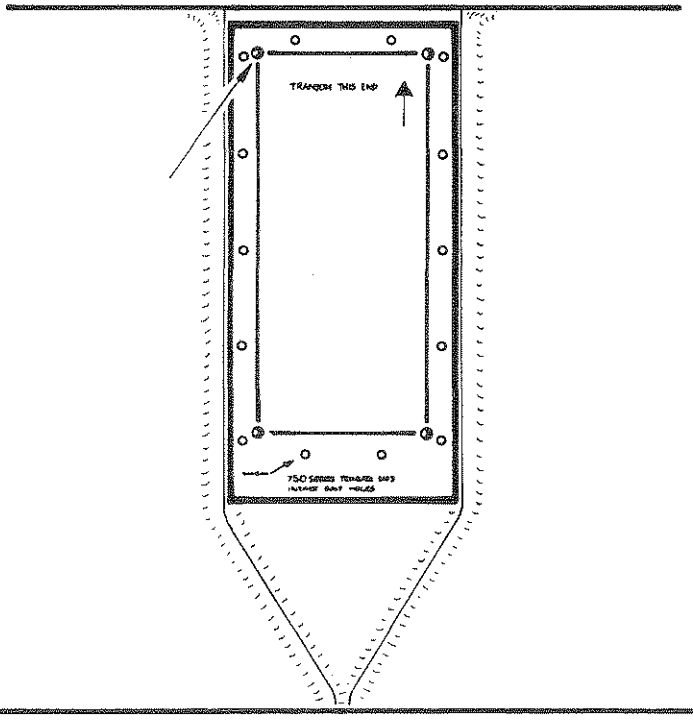
14. Place template No. 2 on the transom centre line and fix in place so the folded edges of both templates are just touching.

Cut the intake hole using a sabre saw, following the outline on the template. If it is easier to cut the hole from inside the boat, drill a small hole through the hull in each corner of the template outline. Draw a line between the four holes inside the boat and cut along this line.



15. When cutting the intake hole, care should be taken to make the cut straight up and down.

Drill the 12 bolt holes in the transom using a 9mm — 11/32" bit. Then cut the transom hole using a sabre saw, following the outline on the template.

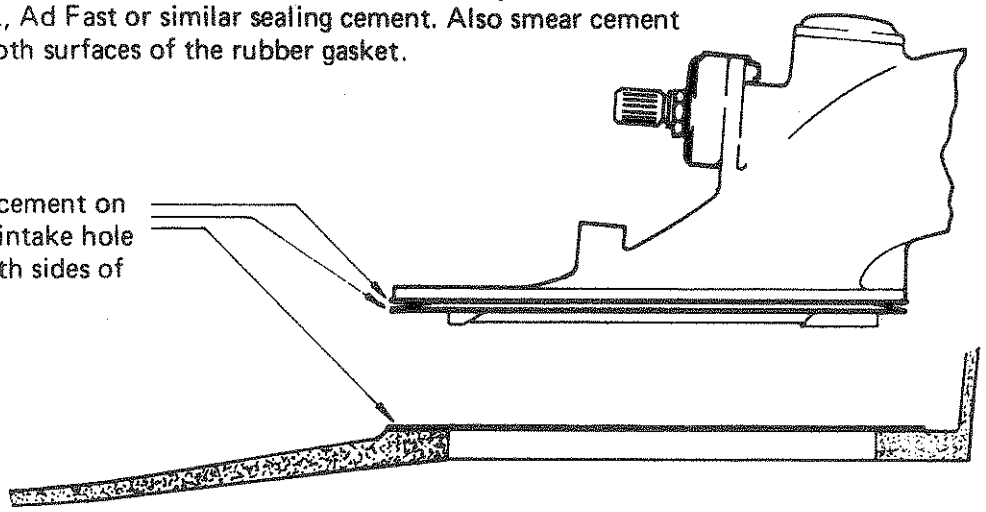


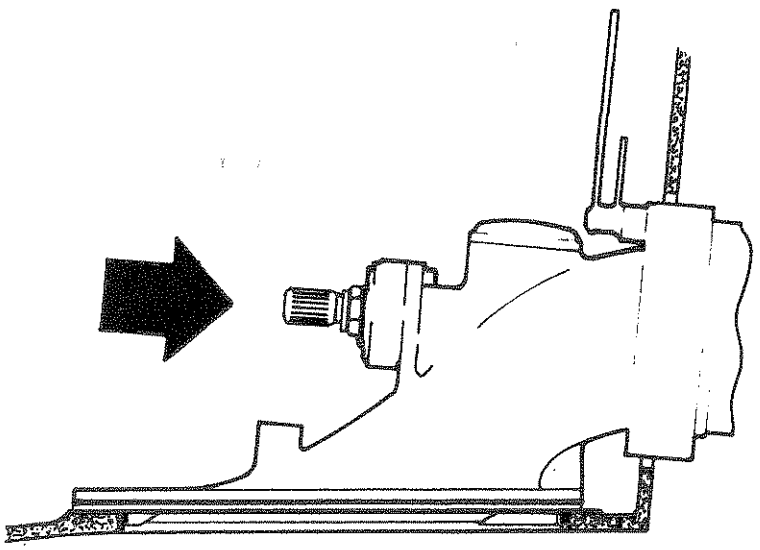
16. Insert a small nail or pin through each corner of the outline on template No. 3 to locate it over the intake hole inside the boat. Fix the template to the flat mounting area making sure the correct end is towards the transom. Drill the 14 bolt holes straight up and down using a 9mm —11/32" bit. Countersink the holes on the outside. With the hull preparation completed the jet unit can now be installed.

JET UNIT INSTALLATION

INTAKE SEAL

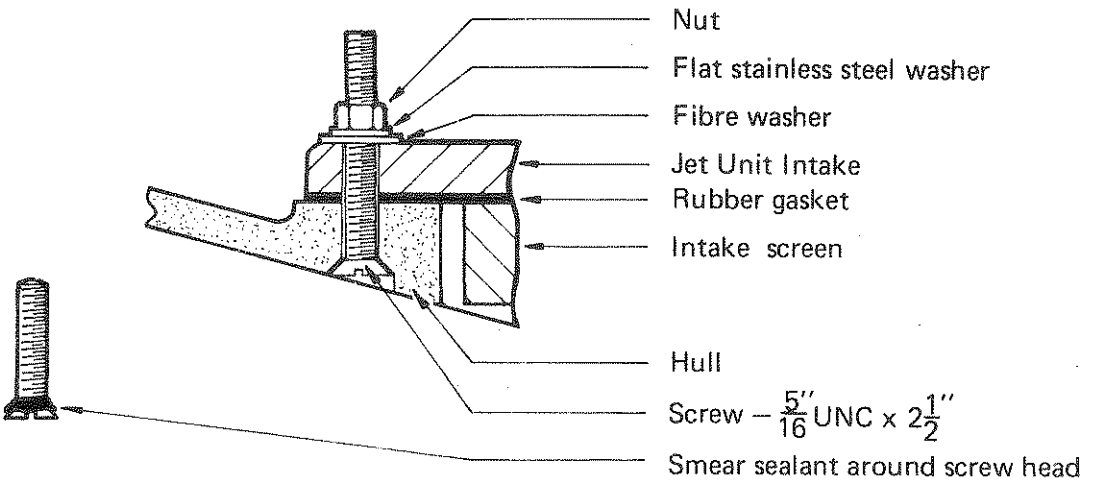
1. Smear the top surface of the intake mounting hole with Bostick, Ad Fast or similar sealing cement. Also smear cement onto both surfaces of the rubber gasket.



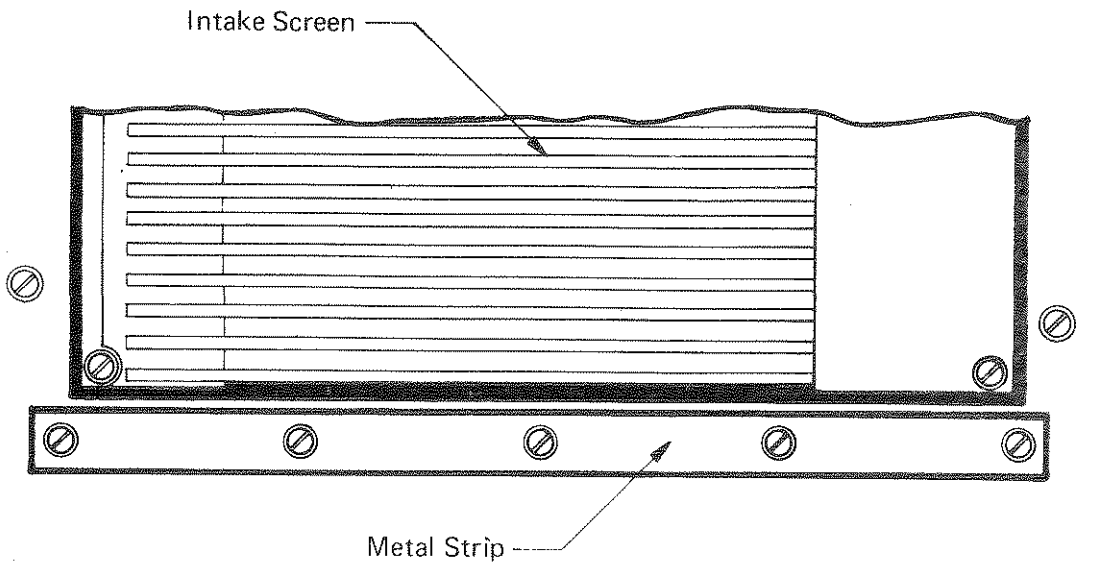


2. From inside the boat, slide the jet unit through the transom hole with the reverse deflector down in the neutral position at first, and then up in the forward position. This will allow the reverse deflector and saddle to pass through the transom hole easily.

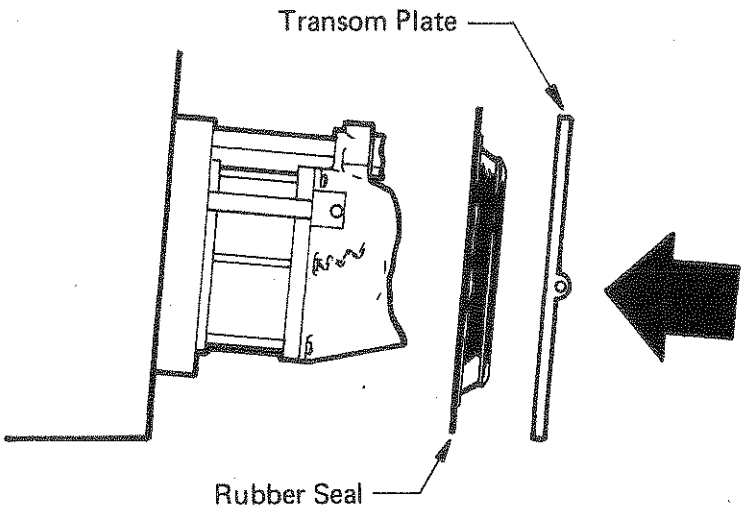
3. Place the jet unit over the intake hole and put the fourteen screws through from the underside, with sealant smearing around the screw heads. Put a fibre washer then a flat stainless steel washer and nut on all screws. Tighten evenly all round, making sure the screw heads pull in just flush with the bottom of the boat and do not protrude.



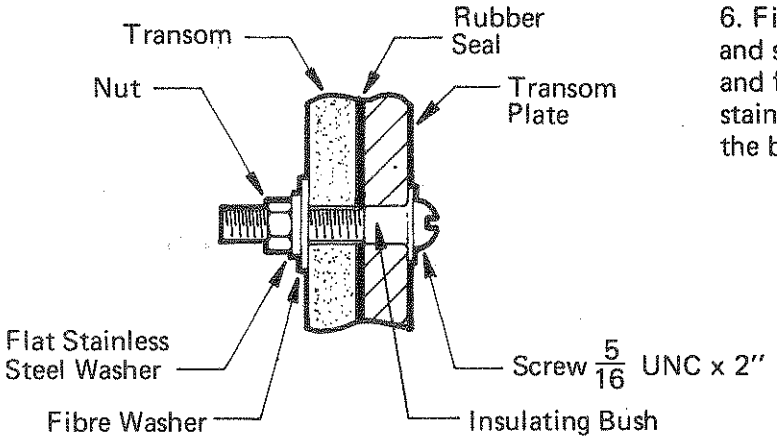
4. In soft wooden hulls, a metal strip with a row of countersunk holes may be required along each side to prevent the screw heads from pulling into the wood.



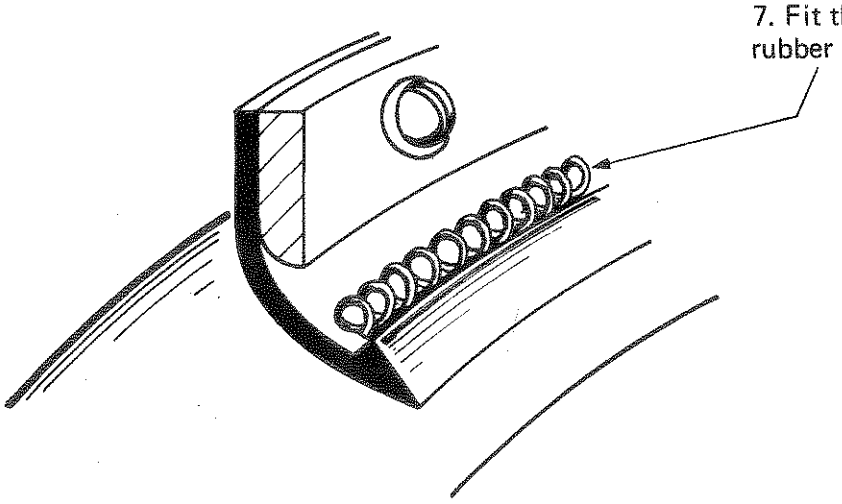
TRANSOM SEAL



5. From outside the boat, stretch the transom rubber seal onto the circular seal ring, and slide the metal transom plate on with the two bosses horizontal

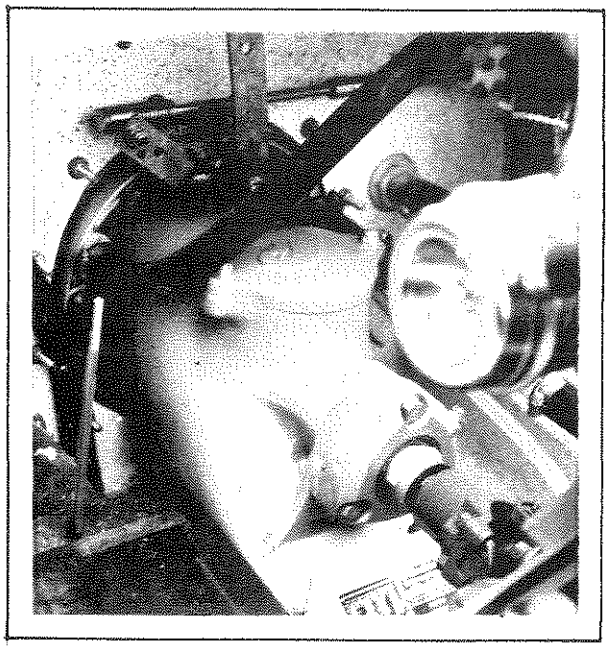


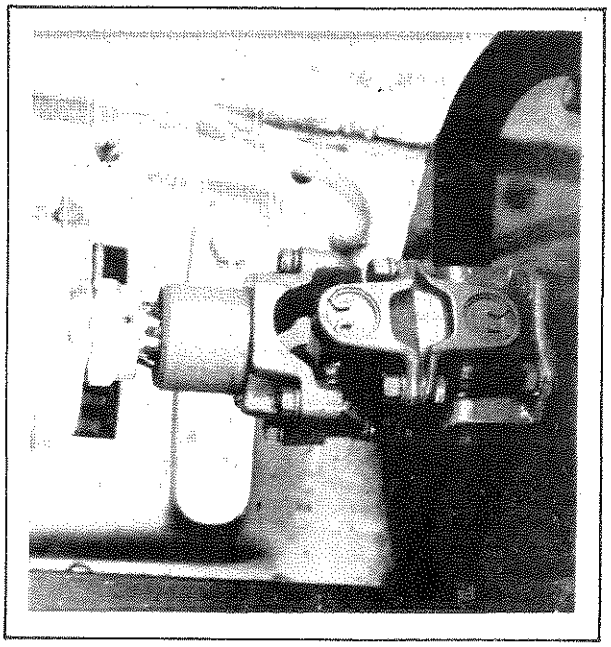
6. Fit the twelve insulating bushes and screws from outside the boat and fasten with a fibre washer, flat stainless steel washer and nut inside the boat.



7. Fit the seal spring onto the rubber seal.

TYPICAL INSTALLATION FOR 770 SERIES





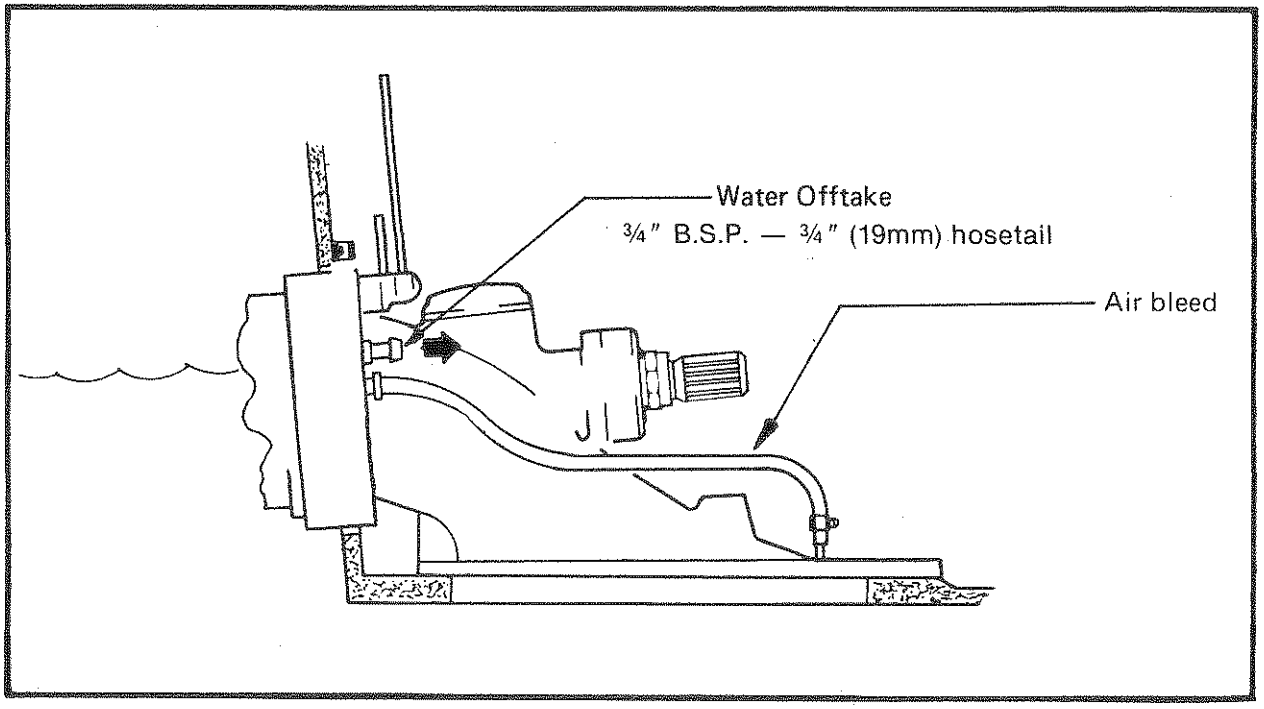
AIR BLEED

This fitting bleeds a controlled amount of air into the unit and aids quiet running. Make sure the plastic tube is firmly connected to the air bleed nipple on the jet unit intake. Connect the other end to the air bleed nipple on the transom plate.

WATER OFFTAKE

Two water offtakes are provided on all 770 models. These can be used for the engine cooling system or jet bilge pump as required. If the water offtake is not required the hose fitting should be removed and the hole plugged.
The water pressure at 4000 r.p.m. is approx:

— 771 — 25psi
— 772 — 50psi
— 773 — 75 psi



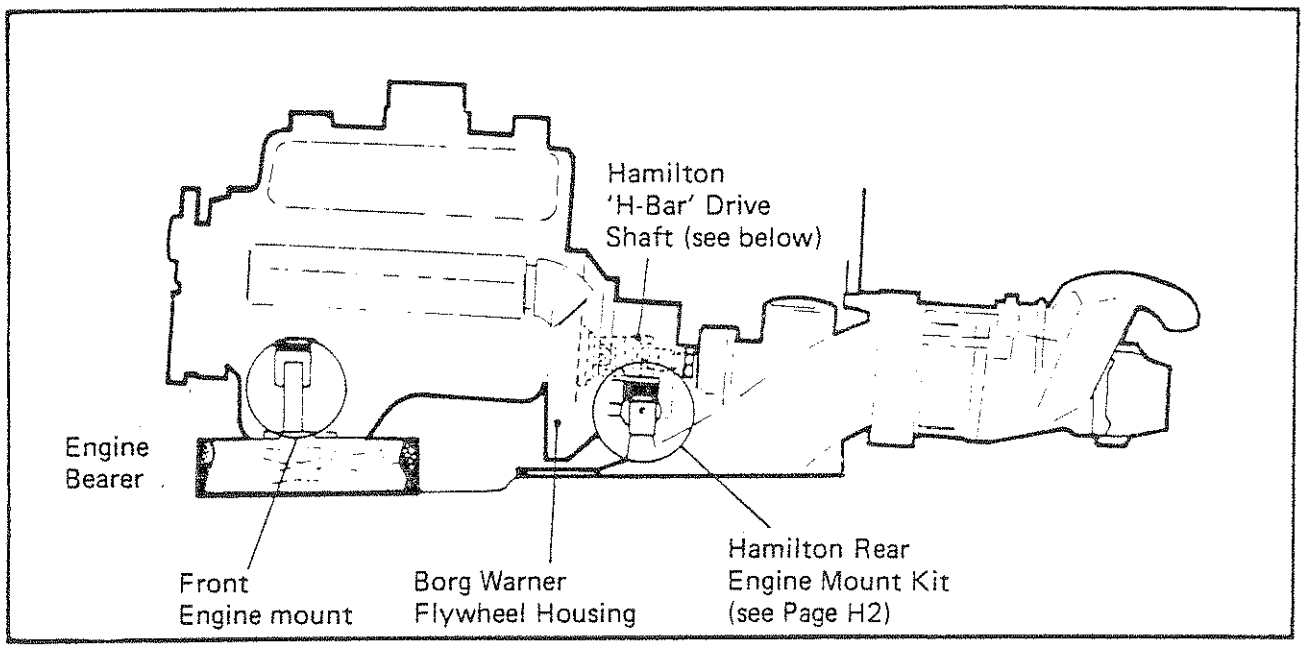
A. SHORT DRIVE SHAFT SYSTEM

HAMILTON 'H-BAR' DRIVE SHAFT AND REAR ENGINE MOUNT KIT

The 'H-Bar' bolts directly to the engine flywheel adaptor and engages with the 1 3/8" S.A.E. spline provided on the jet unit mainshaft.

The Hamilton Rear Engine Mount Kit ensures correct location of rear of engine.

-- Suitable for all pleasure boat applications up to 351 C.I.D. (5.7 litre). For heavy duty work refer to Coupling System B.

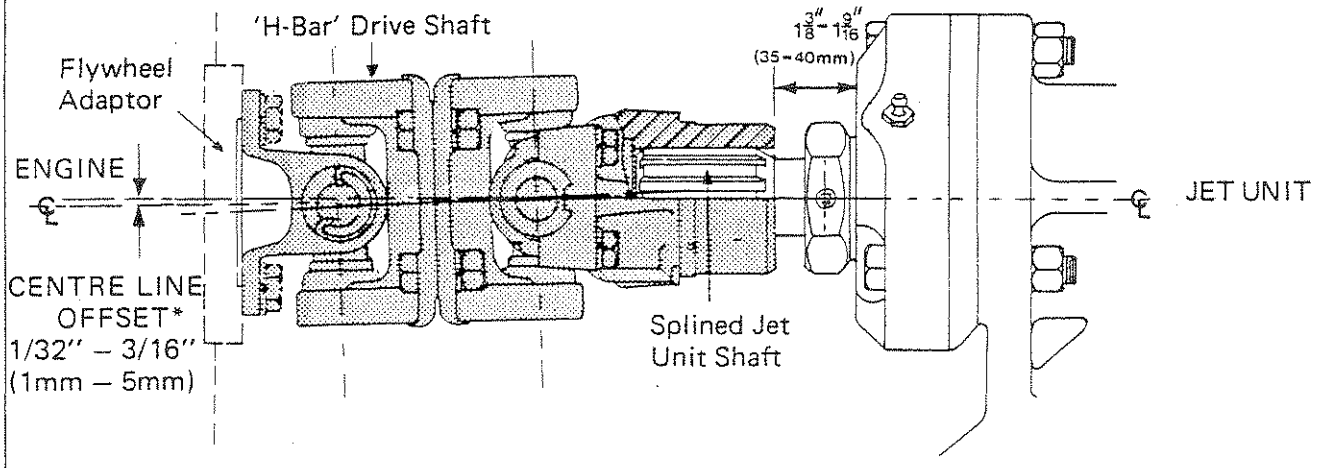


The engine should be supplied with

(i) Borg Warner Flywheel Housing
(ii) Hardy Spicer 1310 Flywheel adaptor
(iii) Adjustable front engine mount.

Order with Jet Unit:

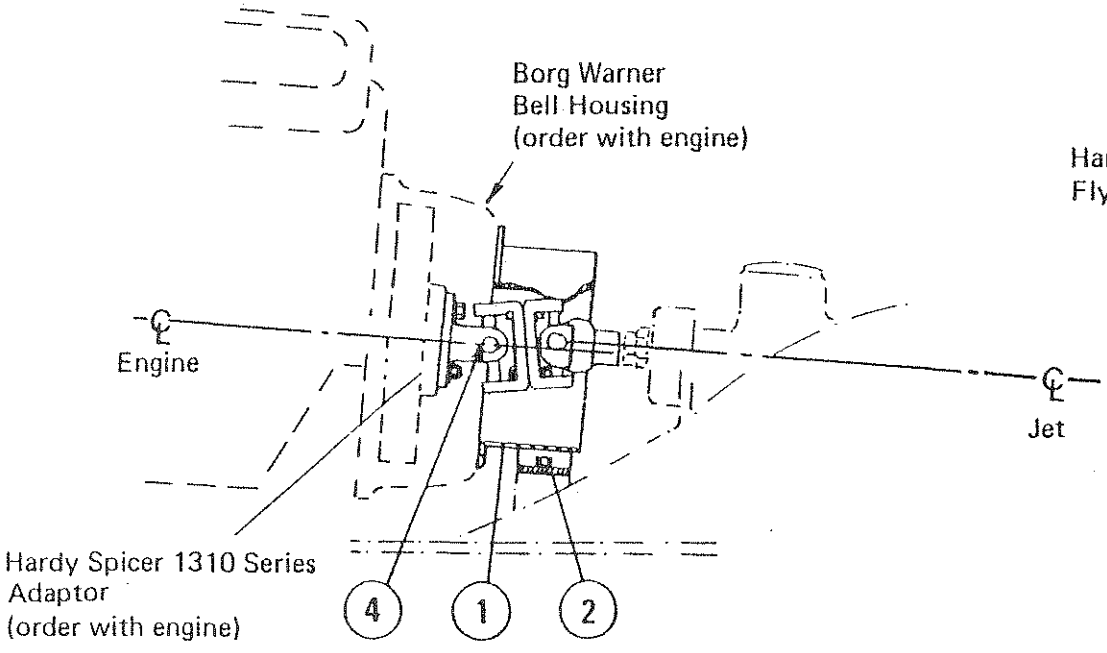
(i) Hamilton Rear Engine Mount Kit (103409)
(ii) Hamilton 'H-Bar' Drive Shaft (63394)

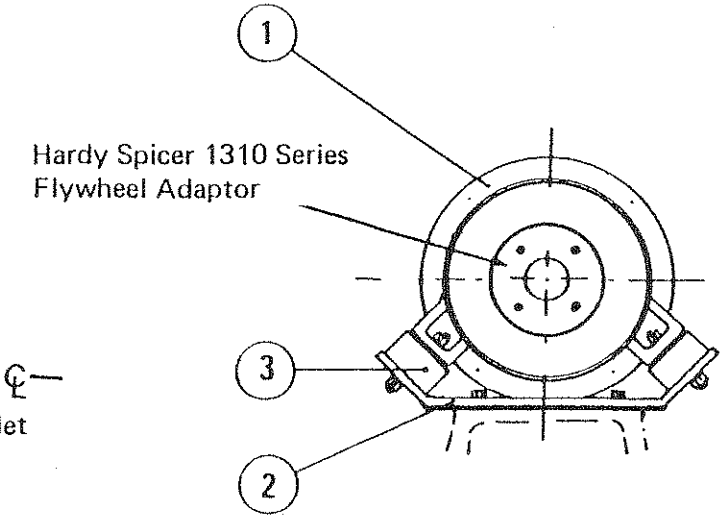


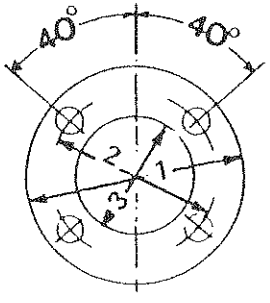
* Using the Hamilton Rear Mount Kit ensures correct offset.
If not using Hamilton rear mount kit follow Section 2 – 'Universal Angles' on Page H5

HAMILTON REAR ENGINE MOUNT KIT, USING 'H-BAR. DRIVE SHAFT

(This kit is recommended to ensure correct alignment of universal joints.)







Spigot recess
5/64" (2mm) deep
at Diam. 3.

	1310 Series	
1	3 13/16"	96.8 mm
2	3 1/8"	79.4mm
3	2.375 2.378	60.32 mm 60.40 mm
4 Holes 3/8"		09 mm

Item	Description	Part No.	
1	Bell Housing Support	103409	Rear Engine Mount Kit (Includes insulating washers and bolts, nuts, etc)
2	Engine Support		
3	Rubber Insulators		
4	'H-Bar' Drive Shaft	63394	

Order Items 1 to 4 with Jet Unit.

ENGINE INSTALLATION PROCEDURE.

(Refer drawing Page H2)

FOR SHORT DRIVE SHAFT SYSTEM (USING H-BAR)

1. Engine Rear Support Assembly –
   Bolt to jet. (Item 2, 3)

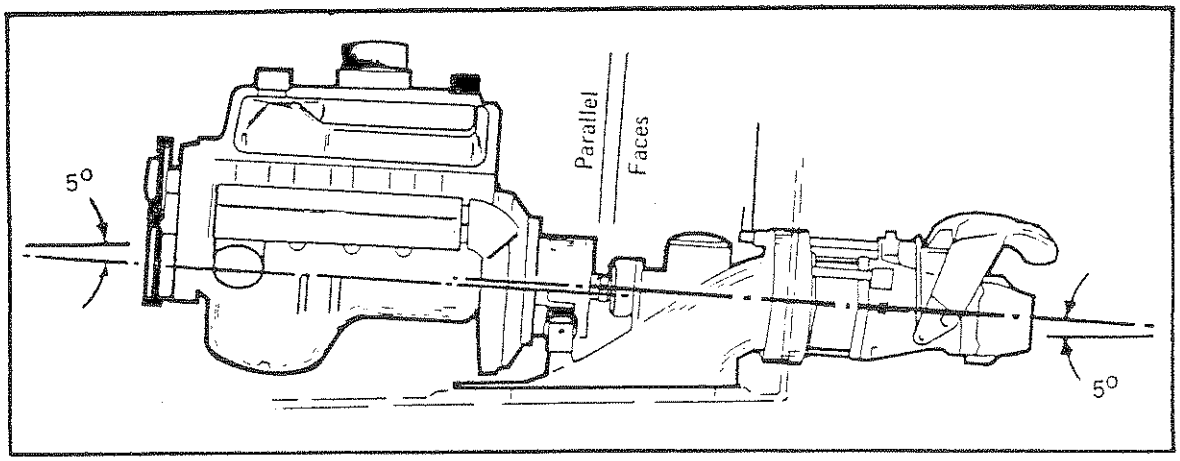
2. 'H-Bar' Drive shaft –
   Bolt to Hardy Spicer flywheel adaptor plate previously fixed to the engine flywheel centre. (Item 4)

3. Bell housing support –
   Bolt to Engine Bell Housing (Borg Warner) (Item 1)

4. Using the rear engine support and rubber insulators as location points, offer the engine to the jet roughly in line with the jet shaft.

5. Engage the 'H-Bar' spline with the jet unit mainshaft and hook the two rear mounting angled feet (with slots) onto the rubber mount bolts then move the engine aft gently until the splined end of the 'H-Bar' is $1\frac{3}{8}$" - $1\frac{9}{16}$" (35 - 40 mm) from the bearing housing (see illustration page H1)

6. Move the front engine mount up or down so that the rear face of the bell housing support and the front face of the bearing housing are parallel. See illustration below. (Place straight edges across the bell housing support and bearing housing faces and view from side.)



7. Check the engine is 'in line' (fore and aft) with the jet unit by repeating check 6, but IN THE HORIZONTAL PLANE.

8. Re-check $1\frac{3}{8}$" - $1\frac{9}{16}$" (35 - 40 mm) gap in 5. above.

9. When the above directions are satisfactory, finally fix the front engine mounts to the engine bearers.

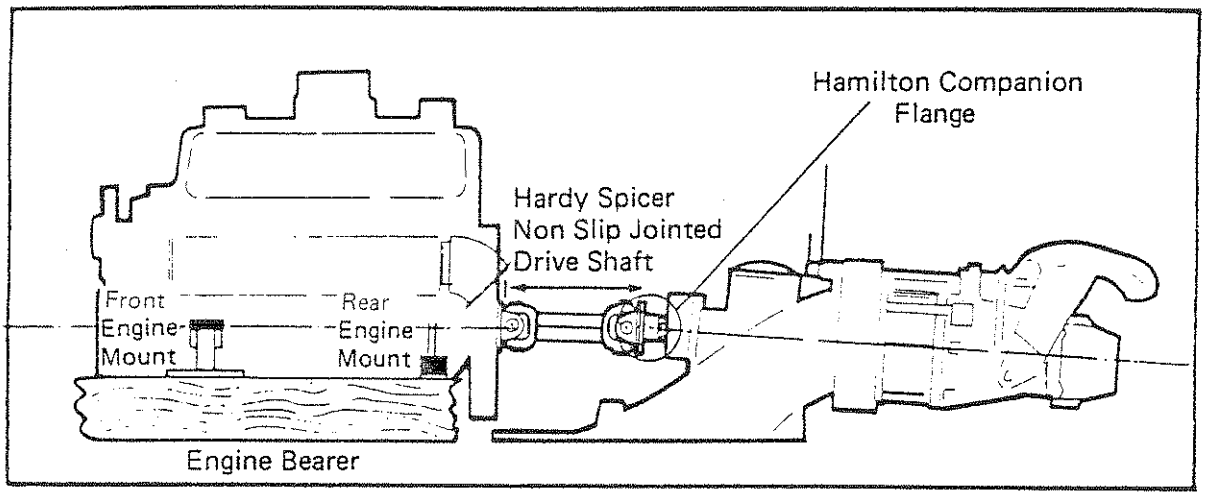
10. Tighten nuts clamping the bell housing support to the rubber insulators.

B. LONG DRIVE SHAFT SYSTEM

HARDY SPICER NON SLIP JOINTED DRIVE SHAFT AND HAMILTON COMPANION FLANGE

For installations requiring a longer Drive Shaft use the 'solid' Hardy Spicer double universal jointed shaft with NO slip joint (sliding spline), of a length to suit, and a Hamilton Companion Flange on the jet unit splined shaft.

For PLEASURE applications with engines up to 351 C.I.D. (5.7 litres) use a Hardy Spicer 1310 Series Drive Shaft and a 1310 Hamilton Companion Flange. For PLEASURE applications with engines over 351 C.I.D. (5.7 litres) AND for all Heavy Duty COMMERCIAL applications use a Hardy Spicer 1410 Series Drive Shaft and a 1410 Hamilton Companion Flange.



The engine should be supplied with:

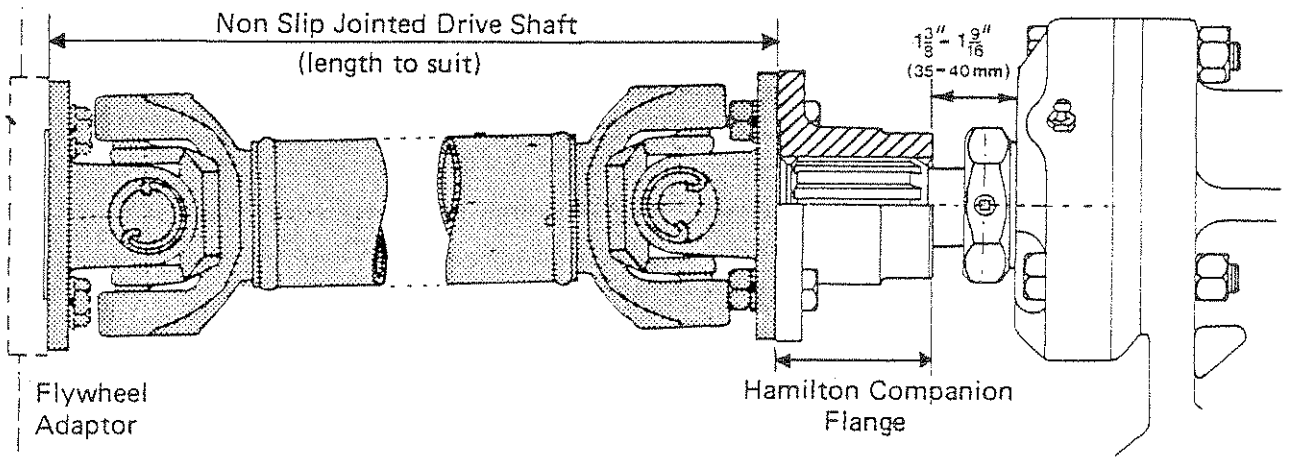
(i) Front and rear engine mounts

(ii) Hardy Spicer 1310 or 1410 Flywheel Adaptor.

Order with Jet Unit:

(i) Hamilton 1310 (103394) or 1410 (103393) Companion Flange.

(ii) Hardy Spicer 1310 or 1410 non slip jointed drive shaft.
(Item (ii) can also be ordered from your local Hardy Spicer stockist.)



1. FLYWHEEL ADAPTOR

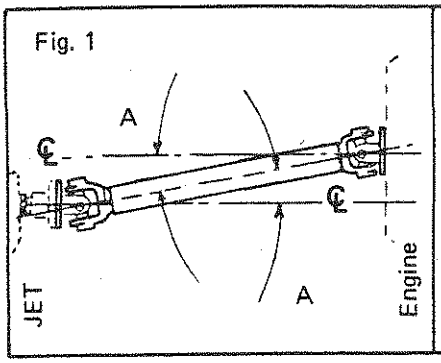
1310 series Adaptor dimensions shown on Page H2.
1410 series Adaptor dimensions
(Item numbers refer to same sketch on Page H2.

1	4 9/16	115.9mm
2	3 3/4	95.3mm
3	2.750 2.753	69.85mm 69.93mm
4 HOLES 7/16		(11.1mm)

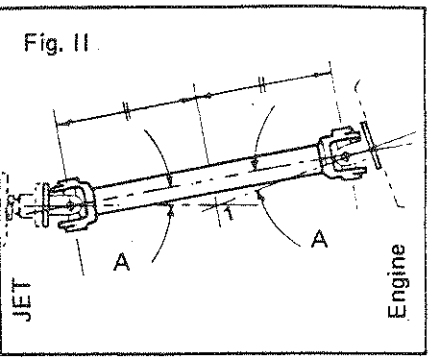
Spigot recess 5/64 (2mm) deep at Diam. 3.

2. UNIVERSAL ANGLES

The angles on the universal joints should be equal and in the range of 1° – 5°. Angles less than 1° or greater than 5° may cause vibration or undue wear. Also make sure the two centre yokes are in the same plane and the two outer yokes in the same plane to avoid torsional vibrations.



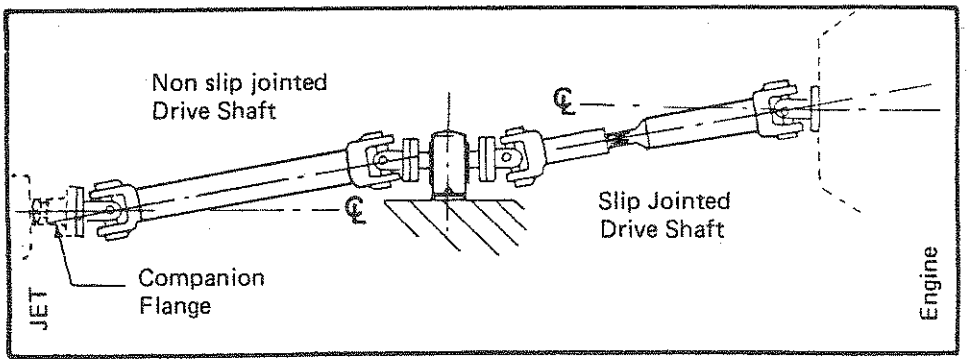
Parallel Shafts o Parallel Flanges
A = 1° - 5°



Angled Shafts o Angled Flanges
A = 1° – 5°

3. LENGTH OF SHAFT

The 1310 Series Hardy Spicer shaft centre can be safely run with a Flange to Flange length of up to 50" using 2" Dia. tube.
These figures are maximums, since usually the shaft is as short as possible, about 12" long. If the shaft has to be longer, use a two piece divided shaft with an intermediate fixed support bearing. Universal angle arrangements should be the same as for a single piece shaft as in Fig. 1 and Fig. 11.



In general follow Automotive and Commercial vehicle drive shaft practice.

4. ENGINE INSTALLATION PROCEDURE

(i) Make sure the Hardy Spicer adaptor plate is securely bolted to the engine flywheel.

(ii) Bolt the Hardy Spicer shaft to the flywheel adaptor plate.

(iii) Bolt the Companion Flange to the Hardy Spicer shaft.

(iv) Offer the engine to the jet unit and engage the Companion Flange spline with the jet unit mainshaft until there is a 1⅜"-1⁹⁄₁₆" (35-40mm) gap, between the Companion Flange and Bearing Housing (Refer illustration page H4.)
Note: In some cases the engine mounts (front or rear) are made into one cradle and this is securely fixed into the boat prior to engine installation.

(v) Lower the engine into the boat, with Front and Rear Engine Mounts bolted on, checking the angles of the Hardy Spicer coupling flanges 1° – 5° refer Section2 above.

CAUTION
Do not exceed the recommended universal joint angles as vibration and damage may result.

(vi) Re-check 1⅜"-1⁹⁄₁₆" (35-40mm) gap (refer (iv) above) and then bolt up the engine mounts.

EXHAUST AND COOLING SYSTEMS

1. Marinised engines required the following important items.

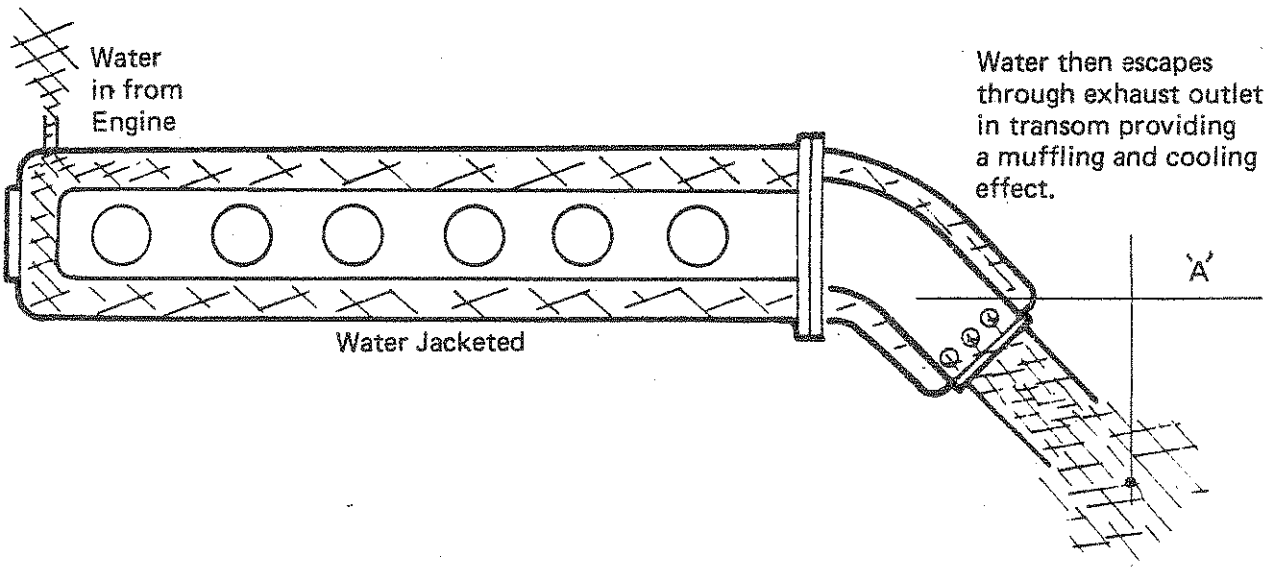
   A. Water jacket exhaust manifolds.

   B. Exhaust outlet system.

   C. Suitable engine cooling systems.

A. WATER JACKETED EXHAUST MANIFOLDS

1. Plain Water Jacketed Manifold

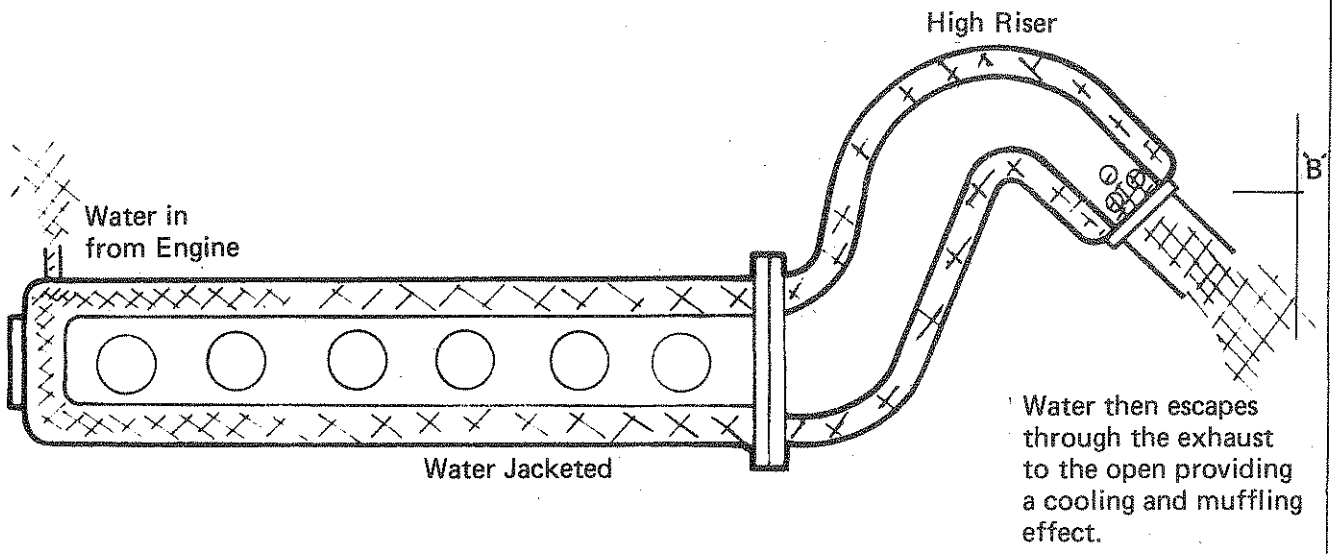


The above system is used on most conventional craft.

Note:
Water should never be able to return back up the exhaust system through the manifold and into the engine. When the boat is at rest the outside water-line must not exceed level "A" in the above diagram. A considerable safety factor below this level is advisable.

If the static water-line is to exceed level "A", a high riser must be used (see page 12).

2. High Riser Exhaust Manifold

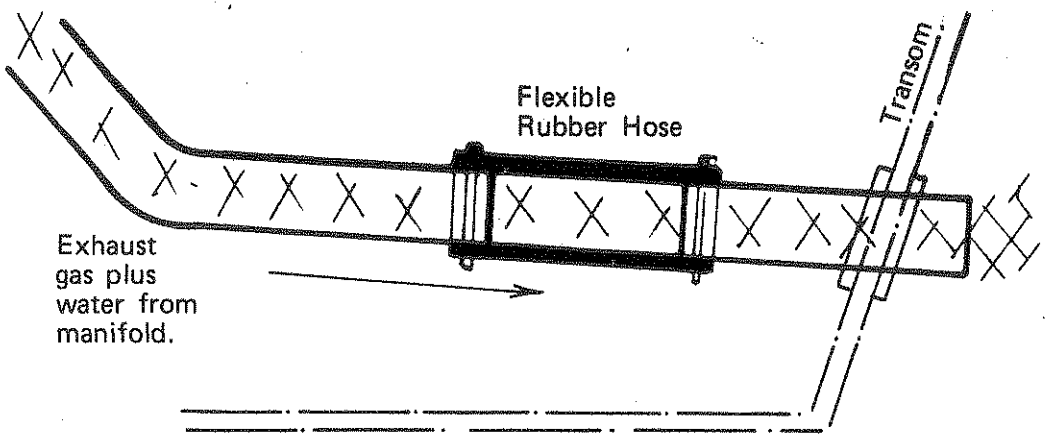


NOTE

This type of 'High Rise' Exhaust manifold is mainly used on 'DEEP VEE' craft or where there is a risk of backwash up the exhaust into the engine. Static water-line must not exceed level 'B' and a considerable safety factor below this level is advisable.

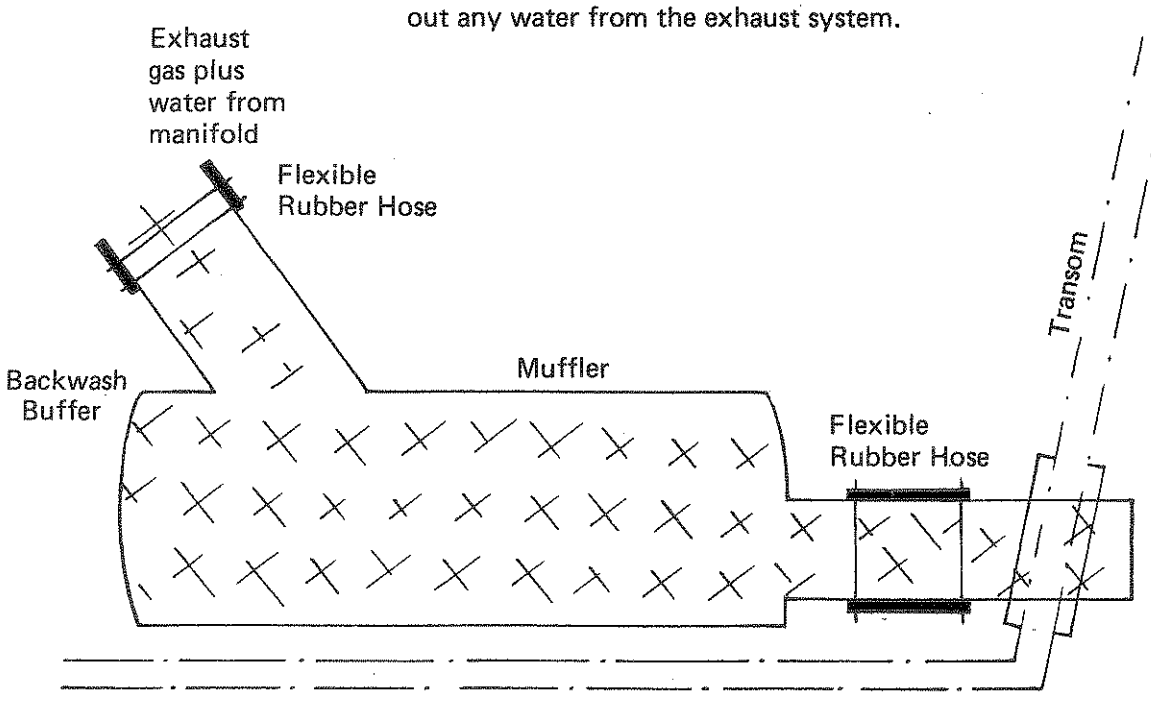
B. OPTIONAL EXHAUST SYSTEM OUTLETS

1. Conventional System



2. Bilge Muffler

NOTE:
It is essential that the engine is run briefly (2–3 secs.) at say 2,500 RPM directly the boat and trailer are clear of the water. This drives out any water from the exhaust system.



C. SUITABLE ENGINE COOLING SYSTEMS

I. RAW WATER SYSTEM

A. Water is taken from the Jet Unit water offtake passing through optional Sand Trap if desired.

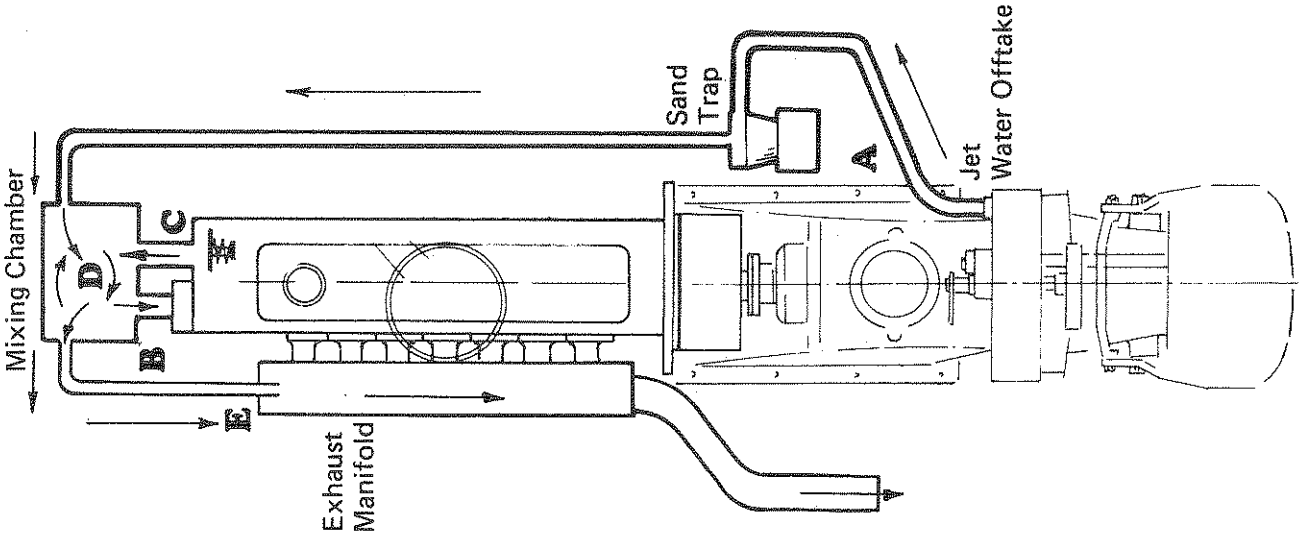
B. Enters Mixing Chamber (D) and passes (warm) into the engine via water pump inlet (B) and circulates through cylinder block.

C. Hot water passes out of engine at thermostat Housing.

D. Enters Mixing Tank,recirculates back to engine, with added cold water from Jet supply water. Temperature, controlled by the thermostat, is reduced in the mixing Chamber.

E. Surplus Hot water bleeds away to exhaust manifold and outlet. (This is cold water when engine cold and thermostat is closed, warm water during normal operation, recirculation controlled by thermostat.

RAW WATER SYSTEM



II. FRESH WATER SYSTEM

A. Cold (raw) water under pressure direct from the Jet Unit passes through the Sand Trap (recommended) to remove foreign particles.

B. Next this water passes through the Heat Exchanger Cooling Tubes in the opposite flow to engine circulating water.

C. From Heat Exchanger to Exhaust Manifold and out through the Exhaust Pipe.

B. Fresh water from Heat Exchanger (having been cooled) to engine block via Water Pump Inlet – circulates through cylinder block.

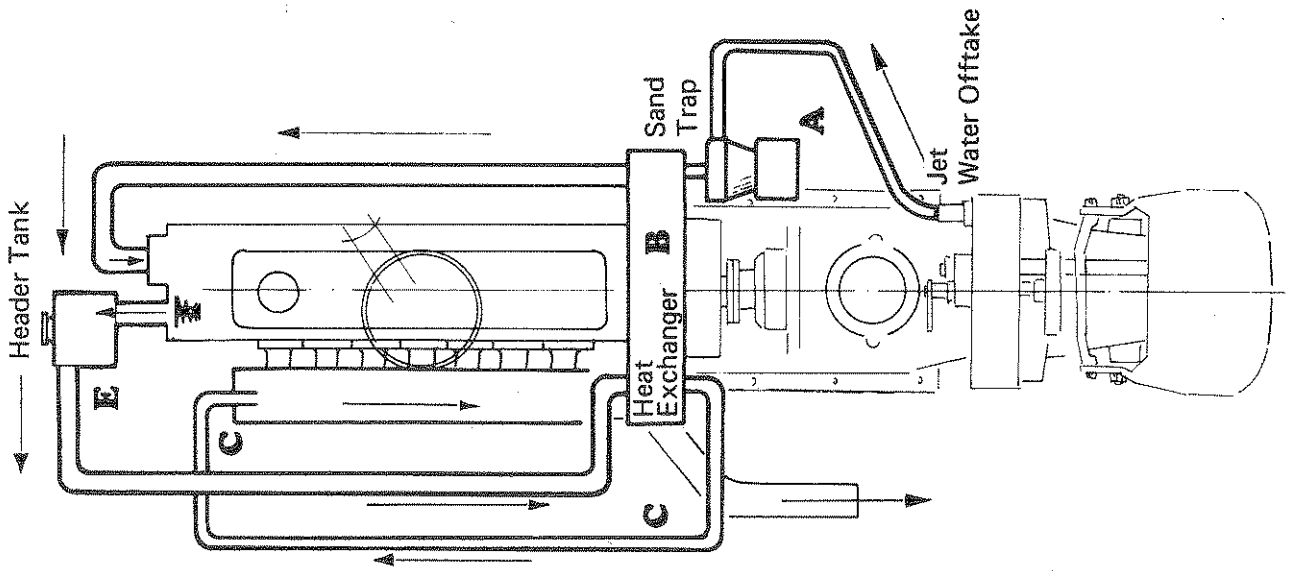
E. Out through Engine Thermostat Housing and into a Header Tank mounted high on the engine. (includes fresh water filler cap.)

B. Back into Heat Exchanger for re-cooling.

NOTE:

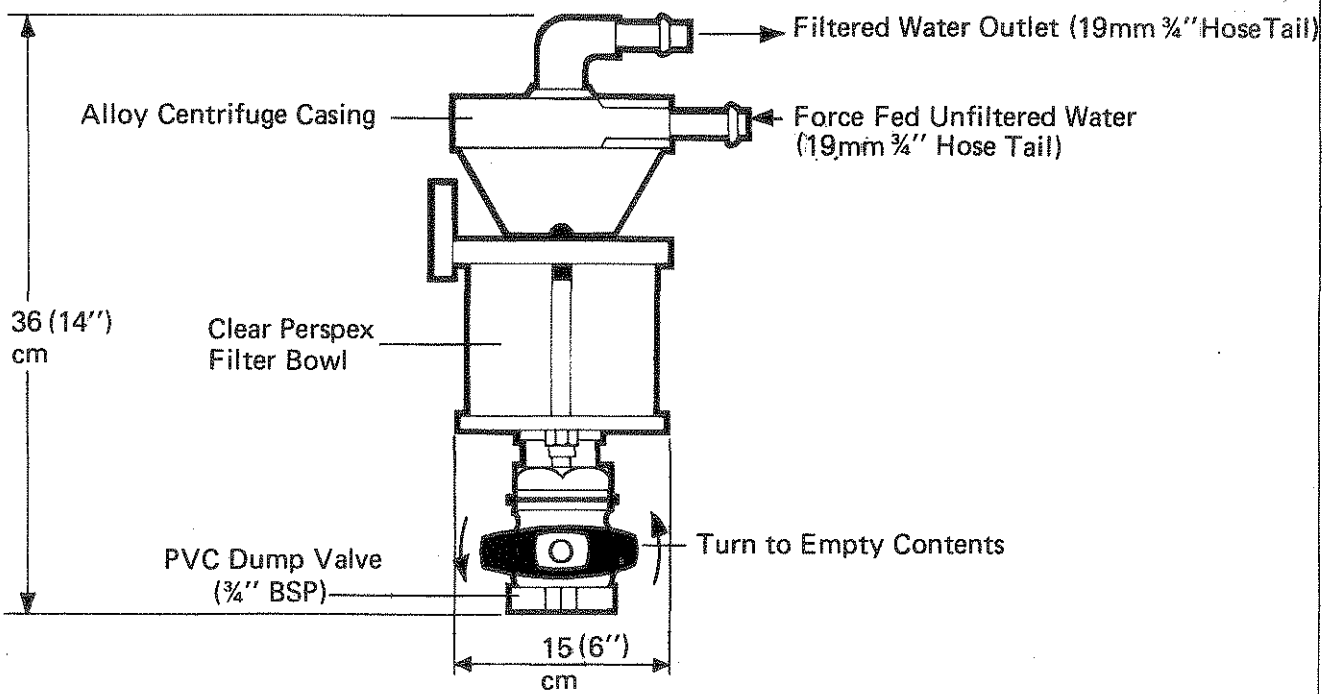
This circuit closely resembles the standard automotive cooling system, except that the conventional radiator is replaced with a heat exchanger.

FRESH WATER SYSTEM

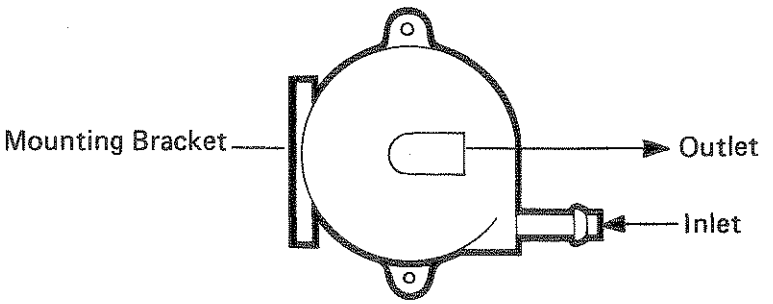


SANDTRAP

Sea water (raw water) fed into a centrifuge, drops out foreign matter (sand, shells, stones, etc) into a clear perspex bowl, easily visually inspected. Opening the dump valve, while water is being fed in, drops out the collected material.



SIDE VIEW



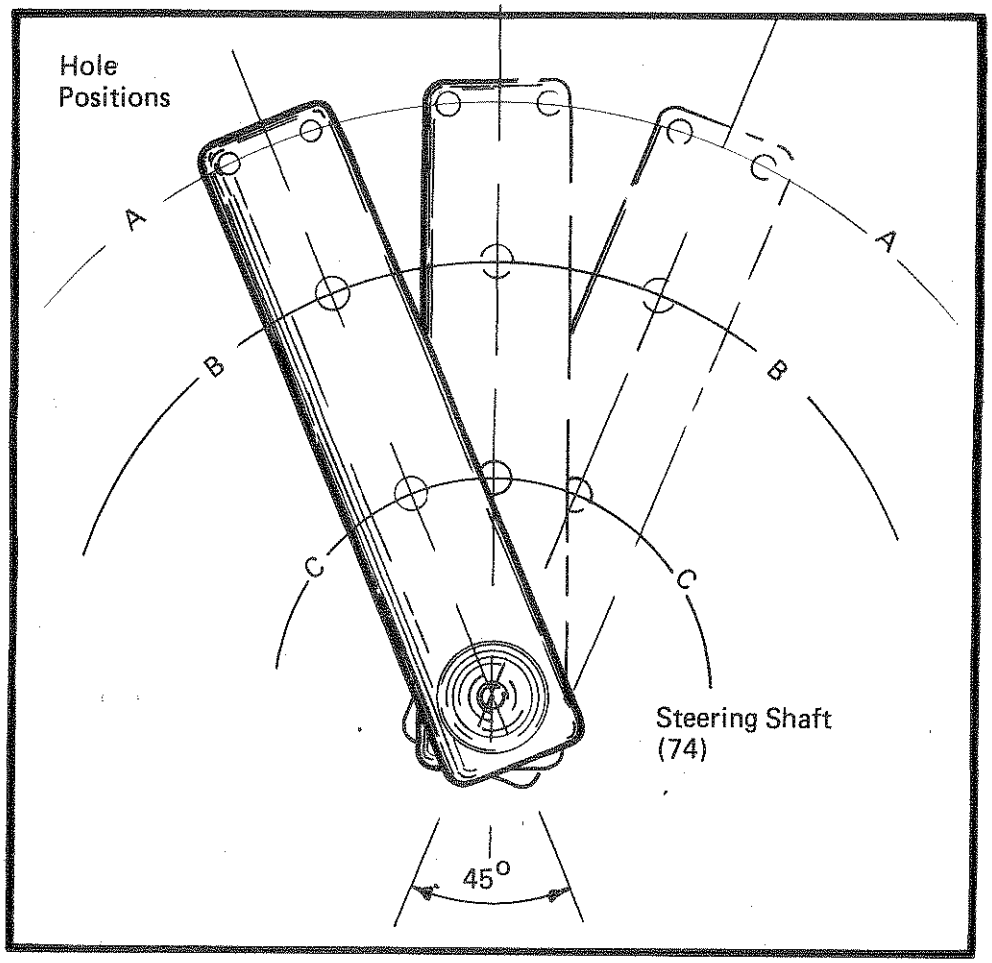
TOP VIEW

Optional Extra
- 1¼" Inlet and Outlet Fittings (For 1031 jet & diesel engines)
- Brass Dump Valve

This Section deals with the control systems associated with the 770 Series Jet Unit. The controls available are cable and pulley or push-pull single cable proprietary systems.

STEERING

Good quality steering is of paramount importance in a jet boat.



NOTE:

The Hole positions on the steering shaft are suitable for the connection of both cable and pulley or push-pull single cable systems as shown below.

Types of Steering Available	Number of Turns (L-L) of the steering wheel for the following classes of boats					
	Small Light Craft		Average Runabouts		Heavier Cruisers	
	Hole Pos.	Turns (L-L)	Hole Pos.	Turns (L-L)	Hole Pos.	Turns (L-L)
Hamilton Cable-Pulley	A	5/8 – 3/4	A	3/4 – 7/8	A	3/4 – 1¼
Teleflex/Morse/ Flexatrol	C	1	C	1	B	1-3/8
Steermaster	C	1¼	C	1¼	C	1¼

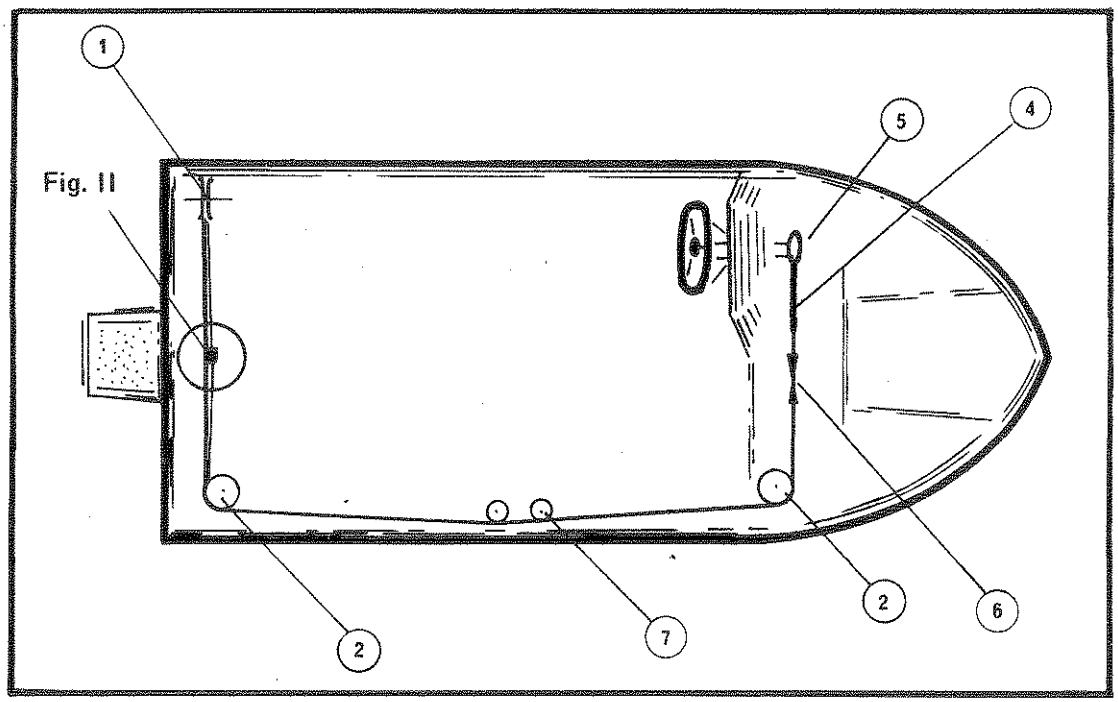
THE HAMILTON CABLE PULLEY STEERING SYSTEM

The Hamilton system takes a little longer to install, however it is the lightest method of connecting the steering wheel forward to the unit steering arm aft. It is a positive type of steering allowing the normal self-centring feature, similar to a car.

The System is made up of:--

1. Single Nylon Pulley
2. Double Nylon Pulley
3. Galvanized or stainless steel wire rope
4. Chain
5. Chain Sprocket
6. Rigging Screw
7. Small Diameter Pulleys
   (Required for boats over 20 feet in length or boats required for heavy duty work.)

Fig. I

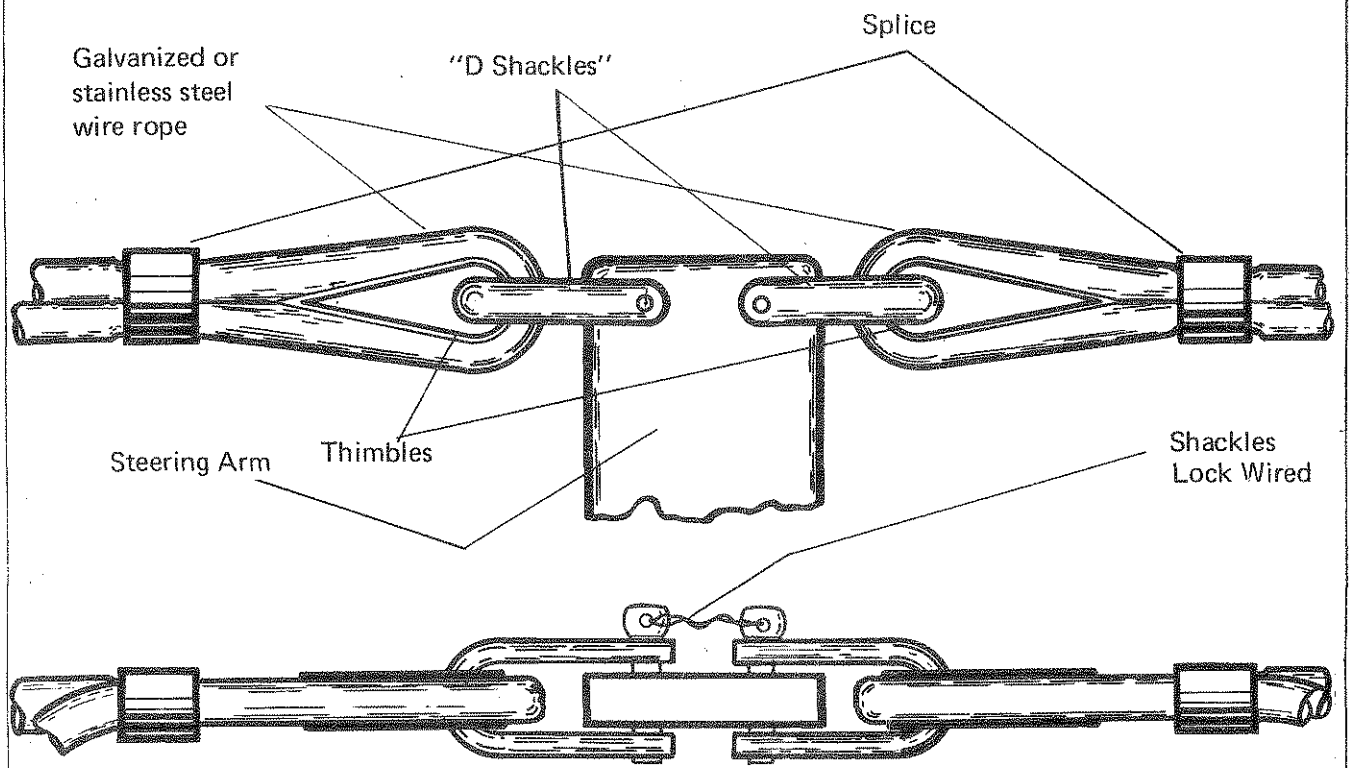


The Rigging Screw is an essential part of the cable pulley system for it allows you to correctly tension your wire rope. The Rigging Screw can either be at the front of your boat or the back.

NOTE:

The Rigging Screw should be lock-wired after tensioning.

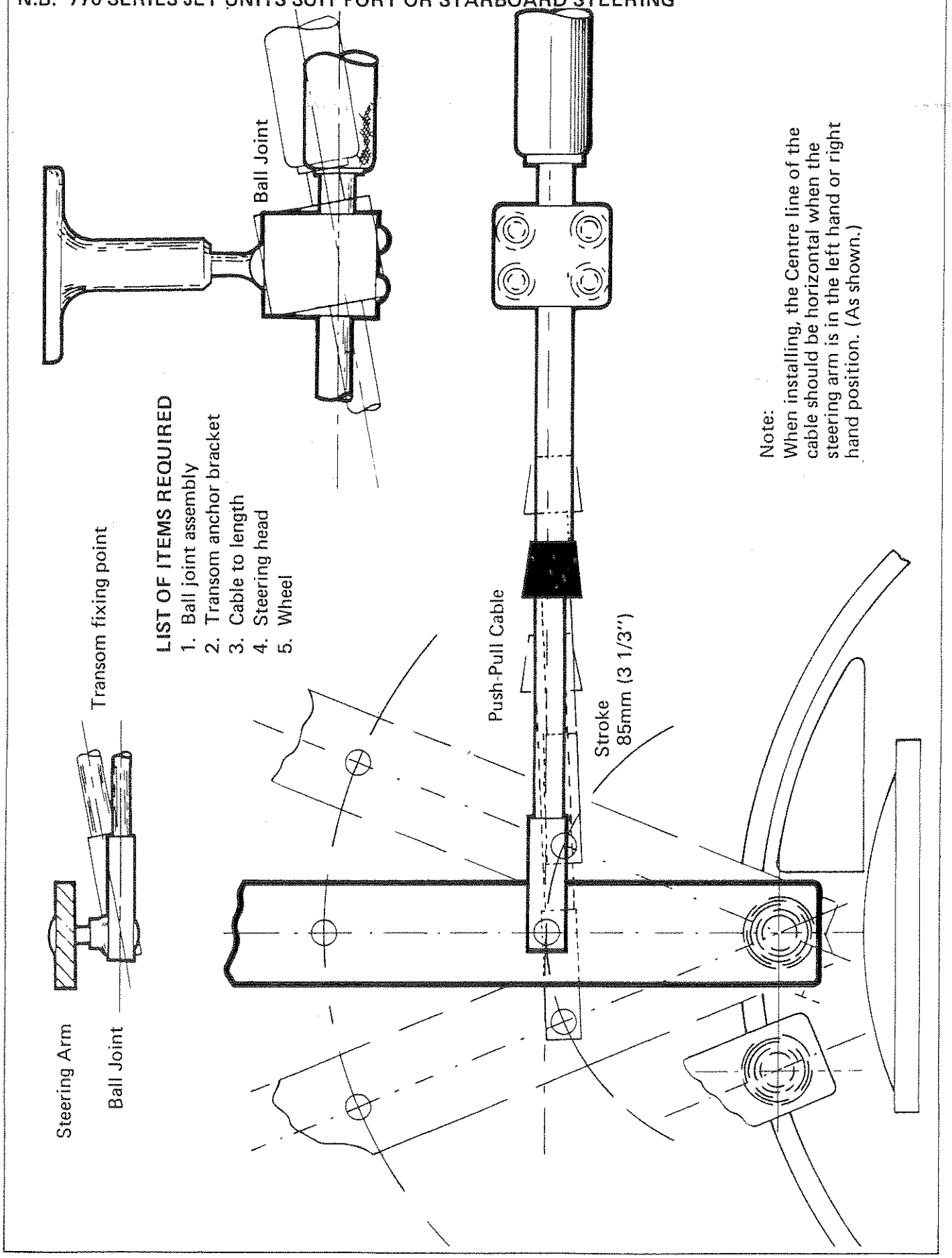
Fig. II



IMPORTANT:

1. The Cable should be shackled to the steering arm and not looped through the arm.
2. The wire rope must not be sheathed in plastic.
3. The Shackle pins and Rigging Screws should be LOCK WIRED after tensioning.

TYPICAL SINGLE CABLE STEERING INSTALLATION
N.B. 770 SERIES JET UNITS SUIT PORT OR STARBOARD STEERING



SINGLE PUSH-PULL CABLE STEERING

Single cable control systems take up very little room and are simple to install. The cable is lined with low friction flexible conduit with plastic outer covering.

The single cable control can either be installed on the port or starboard side of the craft depending on the required steering wheel position. Always check that the installation is giving the correct sense of steering i.e. when the wheel is turned to port, the craft will in fact also turn to port.

PROPRIETARY CABLE SYSTEMS SUITABLE FOR 770 UNITS

A. OUTSIDE USA:

1. Teleflex Morse — Available from C.W.F. Hamilton & Co.

1. Steering Head : D290
2. Cable (to length) : D450 with stainless steel ends.*
3. Ball Joint : 12.7mm (½")
4. Transom Kit : D837*
5. Wheel : JM154 (white or black)

*ALTERNATIVELY : D345 CABLE & 300617 TRANSOM KIT

2. Flexatrol—Safe—T Steering System

1. Steering Head
2. Cable Assembly (to length)
3. Bezel and mounting bracket
4. Connection Kit
5. Wheel

3. Utraflex—T56 Steering System

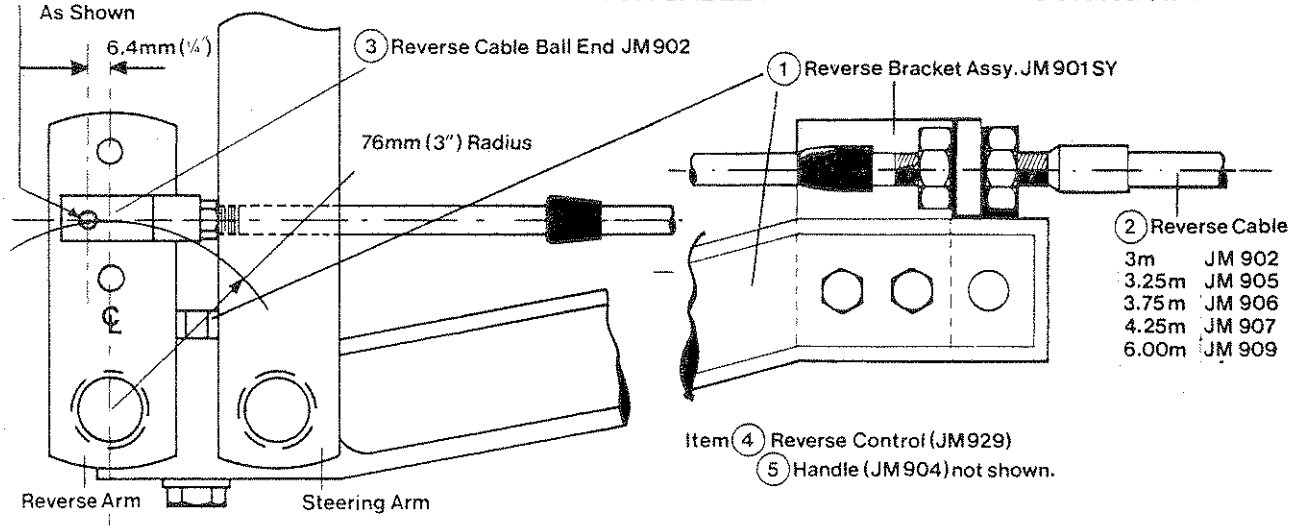
Same basic components as for flexatrol required.

B. INSIDE USA:

1. Morse command 2 or Morse D290 system.
   Same basic components as for Teleflex—Morse required.

2. Teleflex Inc. (USA)—Safe T System
   Same basic components as for Flexatrol required.

HAMILTON CABLE REVERSE – VIEW LOOKING AFT



OTHER PROPRIETARY PUSH PULL CABLE SYSTEMS FOR REVERSE

1. TELEFLEX MORSE (AUSTRALIA) – AVAILABLE FROM C.W.F. HAMILTON & CO.

A. COMMERCIAL AND HEAVY DUTY APPLICATIONS

1. Control Head and Lever : D2
2. Cable (to length) : D499*
3. Ball Joint
4. Teleflex-Morse Anchor Bracket C737*

B. LIGHT PLEASURE BOATS ONLY

1. Control Head and Lever : B71 (with B73 lever)
2. Cable (to length) : B569
3. Ball Joint
4. Hamilton Reverse Cable Anchor Bracket. Part No. JM 901 SY

C. COMBINATION REVERSE AND HAND THROTTLE

1. Control Head and Lever : D4 (side mounted) or D9 (top mounted)
2. Cable (to length) reverse : D499*
3. Ball Joint : 12.7mm (½")
4. Teleflex-Morse Anchor Bracket C737*
5. Cable (to length) throttle : Teleflex A401 or Morse 33C
6. Ball Joint : 4.8mm (3/16")

*(Alternatively use D345 Cable with 103366 Adaptor and 300617 Anchor Bracket)

2. MORSE (U.S.A.)

1. Control Head Options : MSC
   : MC
   MS (Combination Throttle/Reverse)
   MJB (Combination Throttle/Reverse)
   MJ (Combination Throttle/Reverse)
2. Cable (to length) : 64BC or 44BC
3. Ball Joint
4. Hamilton Reverse Cable Anchor Bracket. Part No. 103280

3. FLEXATROL (U.S.A.) – SAILBOAT CONTROLS

1. Control Head : CH6100
   CH6000 (Combination Throttle/Reverse)
2. Cable (to length) : 6400
3. Ball Joint
4. Hamilton Reverse Cable Anchor Bracket. Part No. 103280.

PRECAUTIONS AGAINST CORROSION

C.W.F. Hamilton & Co. Ltd, have taken precautions during manufacture and assembly of the jet unit, by using materials that are resistant to salt water corrosion and by placing an anode in the most effective place on the jet. The unit however, is still vulnerable to the actions of the person who fits the entire power pack into the hull and to the actions of his electrician.

One of the major causes of corrosion of metal parts in salt water, particularly impeller, is stray currents emanating from the vessel's electrical system. These currents can be very small, often defying detection, but acting over a considerable period can cause heavy corrosion. A protection method for the jet unit depends on the hull material of the boat. Therefore, boats using Hamilton Jet Units at sea should be bonded and wired as follows:—

A. Aluminium, GRP, Wood Hulls (other than Steel):—

1. Bonding System: (Refer diagram page L3)

   The bond strip and connecting wires should be insulated copper of at least 14.5sq.mm cross section area (e.g. 5mm dia) to give very low (e.g. 0.01 ohm) electrical resistance. All junctions should preferably be welded, but if bolted, should be clean, have a good contact, and be regularly inspected. The bond wire or strip which runs fore and aft down the hull, should be kept clear of bilge water where possible, and connected to:—

   (a) The engine frame (the engine must have a negative earth).

   (b) The jet unit casing.

   (c) All anodes attached to the hull.

   (d) The fuel tanks and any other major metal items.

   (e) Casings of all major items of electrical equipment.

   (f) In the case of a wood or fibreglass hull, to an external earth plate in an area of the hull bottom which is always under water.

   (g) In the case of an aluminium hull, to a connection welded to the hull in an area where the hull is always touching water.

   (h) Directly to the NEGATIVE pole of the battery.

2. Electrical Wiring System:

   Every part of the electrical system should use **TWO** wires, positive and negative, i.e. the negative must not run through the frame of any major unit, through the hull of the boat, or through the bonding system. That is to say, **do not use an EARTH return system.**

   For example, the negative to the starter motor should be a separate large section cable from the negative pole of the battery, to the holding bolt of the starter motor, and NOT to an engine bolt somewhere near the starter.

3. Radio, Transceivers, Depth Sounders and other electrical auxiliaries:

   Batteries, radio transmitter or other electrical equipment should **NOT** be earthed to the jet unit.

   Be guided by your radio technician, but in general these systems should either be entirely insulated i.e. separate insulated alternator, separate batteries etc., or the system should be incorporated in the bonding system but with a separate earth plate well removed from the bonding earth strip and from the jet. The metal used for the separate earth plate must be compatible with the bonded earth strip metal and the hull material.

4. Zinc Anodes:

   The casing of the jet unit is electrically connected to the jet unit anode . The anode, which are zinc blocks, are fixed to the tailpipe of the jet unit below the water line. If the anodes are being eaten away they are providing protection. They should be inspected and replaced when badly consumed. Further anodes should be fitted on the hull, sufficient for hull protection, (see diagram).

5. In Service Checks:

   In service, two items should be inspected regularly:—

   (a) The bonding system — for loose or corroded connections and test to ensure that electrical resistance is still low.

   (b) All anodes — if any are more than half-eroded away replace them with a new anode.

6. Anti-Fouling Paint:

   Keep stainless steel clean. **Only use tin-base anti-fouling** on the unit. **Do not use** any paint containing **copper** as this could cause corrosion of the jet unit.

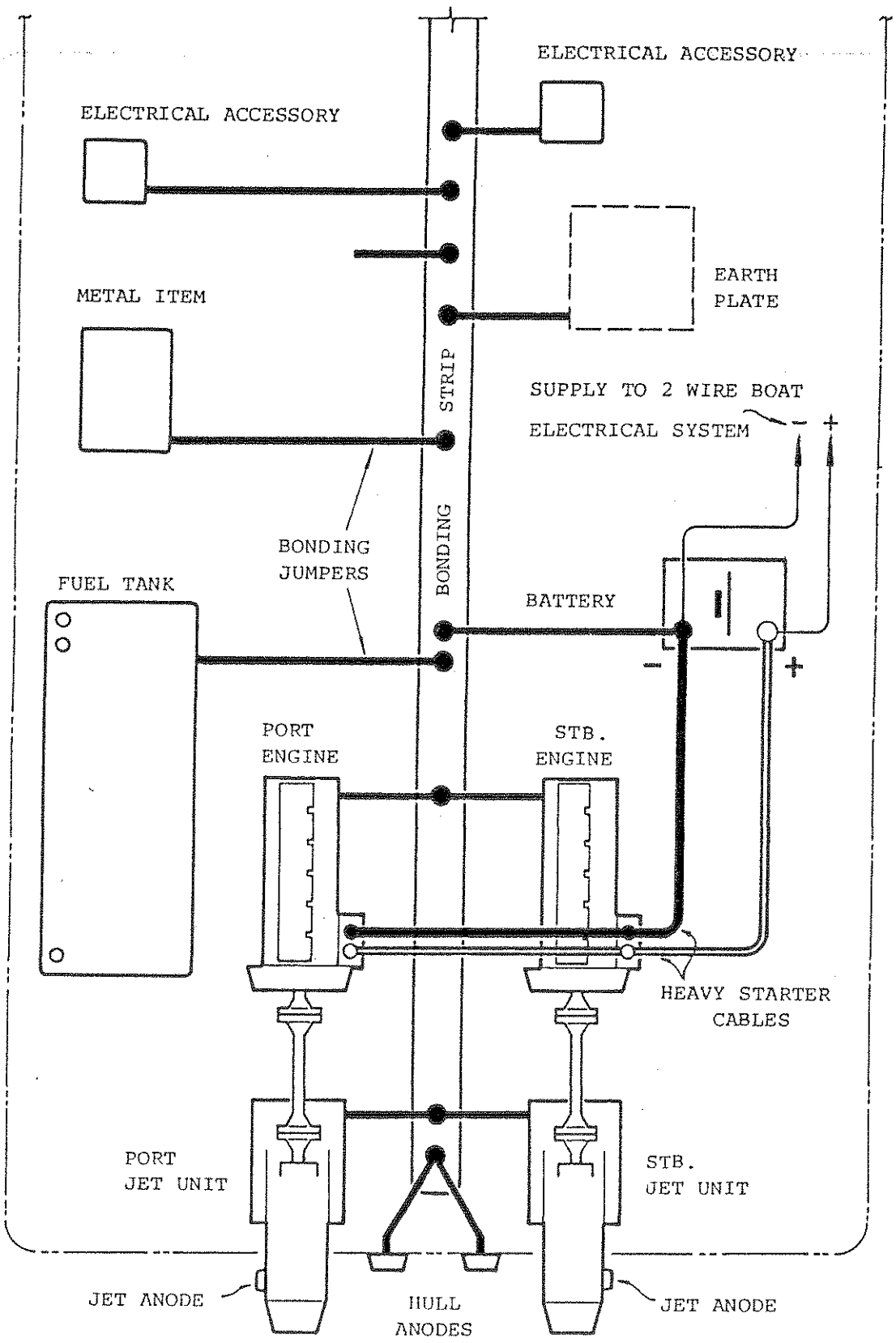
7. Impressed Current Protection:

   Impressed current protection may be used if desired. Follow the Suppliers instructions.

B. Steel Hulls:—

The complete jet unit must be **electrically isolated** from the hull, engine etc. For the insulation instructions consult C.W.F. Hamilton & Co. Ltd.

EXAMPLE OF A BONDING LAYOUT (NOT STEEL HULLS)



770 jet units have been designed to require the absolute minimum of maintenance. The main moving parts which may require occasional attention are described below. Routine checks and lubrication at regular intervals will ensure a long trouble-free life.

THRUST BEARING

This is a special high thrust capacity duplex ball bearing with separate grease seals. The bearing should be lubricated after every 30 hours use with a water repellant Lithium based grease (Shell Alvania R2 or equivalent).

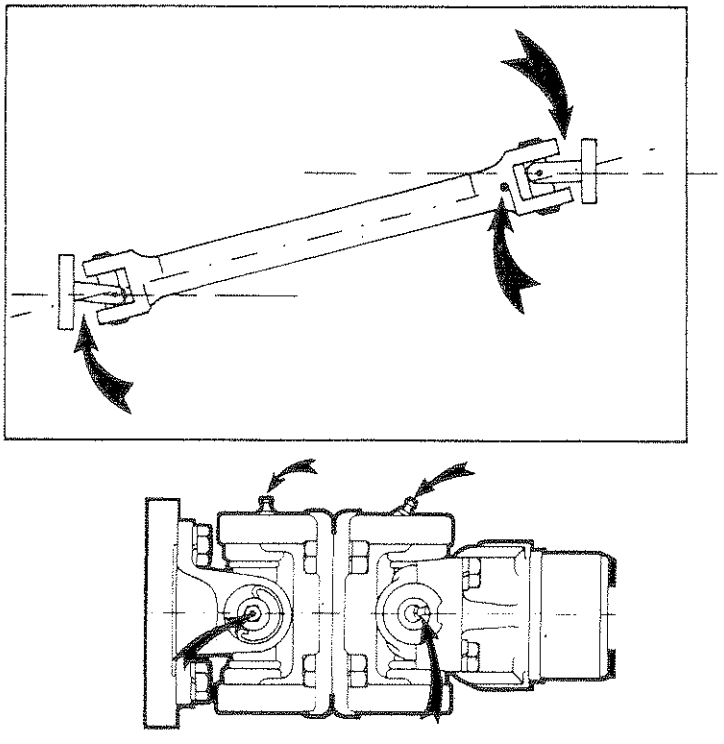
REAR BEARING

This is a water lubricated, Cutless rubber bearing. It requires no attention. DO NOT RUN THE UNIT OUT OF WATER as this will damage the bearing. Because there will be no cooling water, the engine could also be damaged.

DRIVE SHAFT UNIVERSALS

A) — EARLY TYPE H-BARS (as illustrated below):
Grease the joints sparingly after every 30 hours use, as for Thrust Bearing.
Do not overgrease.

B) — LATER TYPE H-BARS (one piece centre 'H')
These are sealed for life — do not need greasing



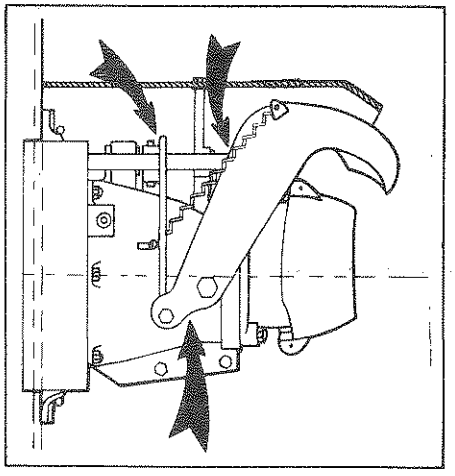
H-Bar

MAINSHAFT SPLINE

This should be smeared with water repellant lithium based grease prior to assembly with mating spline on 'Drive shaft' or 'Companion flange'. Inspect regularly that spline is not dry of grease. Strip and repack with grease as necessary or annually.

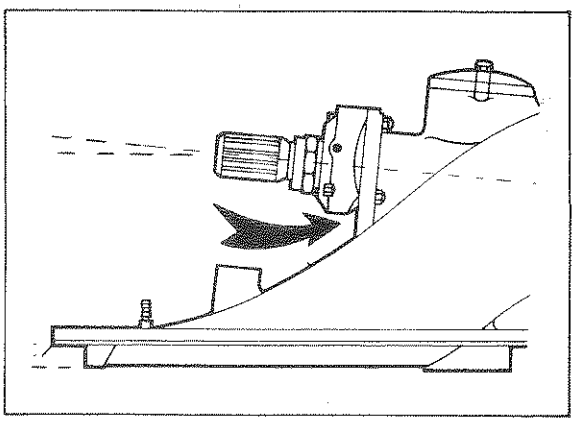
REVERSE & STEERING MECHANISMS

Occasionally check all bolts for tightness. Make sure the cotter pins are tight when reassembled.



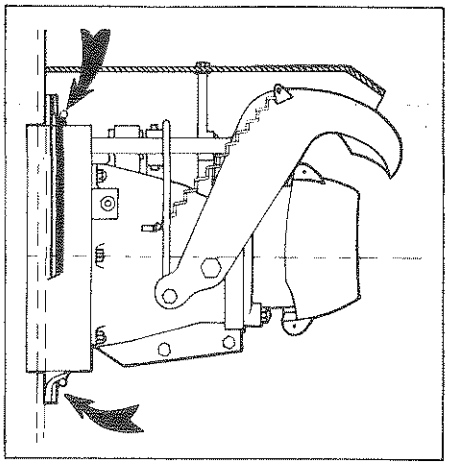
ROMET SHAFT SEAL

This is a carbon face seal with a bronze counterface and needs no attention. If a leak appears below the bearing housing (see arrow in diagram below) this is an indication of a cracked or chipped carbon face. Replace it with another seal. For details see Service Information.



TRANSOM SEAL

Occasionally inspect the rubber to check that it is sealing effectively and is in sound condition. If the rubber is hard and brittle it should be replaced.



SALT WATER OPERATION

770 units are designed for high speed planing craft where light weight is important. Therefore aluminium alloy components have been used. Use freely in the sea, but the boat should be trailered or slipped and flushed with fresh water or given a short run in fresh water before extended storage.

If it is used extensively in salt water, it is recommended that all casings and seals be inspected regularly. Occasionally dismantle and inspect all internal and external surfaces for corrosion. Rubber seals should be replaced where required.

Protective spray on machinery, fittings, wirings, instruments, etc is recommended.

STORAGE

Always clean down the whole boat, and wash inside and out with fresh water (and detergent if desired). Hose out interior of jet unit through the intake and the nozzle. Allow to dry completely, and spray with a suitable corrosion protection liquid. Oil and lubricate all moving parts, including the steering gear and deflector pins and pivots. Keep well aired in storage to avoid condensation.

CORROSION PROTECTION

For salt water operation, the protective sacrificial ZINC ANODE (136) is provided. Check constantly the condition of the anode and replace when approximately half original size.

NOZZLE TRIM (For nozzle details, see page B2).

NOZZLE DOWN (standard position) – tips jetstream downwards. This gives best all round boat performance.

NOZZLE UP – tips jetstream up. This normally gives maximum boat speed. To assemble with nozzle up – remove the cotter pin (79) from the steering crank (84), pushing the steering shaft forward to remove the crank. Remove the nozzle (68) and steering deflector (90) assembly by removing 4 nuts (63).

Remove the split pins (89) and pivot pins (88) to separate nozzle and deflector. Turn the nozzle upside down and reassemble into steering deflector. Reverse above procedure to reassemble unit.

The adjustment of the reverse bucket now has to be altered by adjusting the eccentric bushes (92), and by refitting the two bolts (93) into the alternative holes in the reverse yoke (91). Use tophole in reverse yoke when nozzle down and vice versa.

WARNING — with the nozzle up the jetstream may cause annoyance to other boats nearby. The up position is not recommended for water skiing.

LAYING UP A JET BOAT FOR LONG TERM STORAGE

1. **THE JET UNIT**
   - (a) If the unit was last used in salt water – rinse thoroughly with fresh water – either by running the boat in fresh water or by hosing inside and out.
   - (b) Grease the thrust bearing.
   - (c) Checking the various seals, thrust and rubber bearings and impellers for wear is advisable.
   - (d) Check the watertight seals around the transom.

2. THE ENGINE

Flush any salt water from the cooling circuit — either by running in fresh water or by connecting a garden hose to the cooling water inlet and briefly running the engine.

WARNING:— (i) The drive shaft must be disconnected at the fly-wheel as the jet unit must not be run out of water.

(ii) Start the motor immediately before turning the hose on.

(iii) Turn the hose off just before stopping the motor.

(a) FOG OUT THE ENGINE — To stop valves and valve seals corroding, slowly drip or spray SAE 30 oil down the carburettor air intake with the engine running. Clouds of smoke will come from the exhaust and the engine until the motor stops. **Do not pour** the oil too fast or overheat the motor (if running without cooling water). Clean the plugs to restart.

(b) FUEL — check fuel lines, tanks for leaks. Fill tanks to minimise water condensation during lay up.

(c) Plug exhaust outlets.

(d) Check heat exchanger for blockages — a job best done by your Hamilton dealer.

(e) Change old engine oil.

(f) Spray **all** exposed parts well with anti-corrosive spray e.g. CRC, including all electrics **except electronic equipment** such as radios and depth finders which are best stored inside in a dry place.

(g) Drain all water from engine and boat bilges. Ideally store your boat under cover in a dry and aired shed. If outside, use a vented cover that allows the air to flow under it.

(h) Check and regrease trailer wheel bearings — replace if necessary.

(i) Leave the boat propped up at the front with the bungs out.

MAINTAINING PUSH PULL CABLES

Like any other mechanical equipment and whilst all cables are pre-greased before leaving the factory, they need regular servicing, particularly at the end of each season.

To service, the following procedure should be adopted:—

1. Undo the motor attachment. Disconnect cable at motor or at output ends.
2. Undo the knurled nut which contains a neoprene "O" ring Part No. A190908, check for wear. Replace if necessary, remove inner rod and cable by winding wheel.
3. Clean rod and cable then smear with grease, Shell SP2628 or alternatively, Tivela "A". Do not pack or over grease.
4. Replace rod and cable and wind the wheel until the rod is re-located in the tube and comes to a stop.
5. Replace knurled nut, being careful not to damage the seal.
6. It is also recommended that all metal fittings on transom end of steering be always covered with a thin coating of grease.
7. With cable types D335, D450, D451, and the new C315 which are fitted with rubber boots seals, the inner cable should only be removed by the manufacturer. However, to service these cables, the grease should be smeared on the push rod after it has been fully extended. The felt seal and the rubber boot should be replaced if worn—Part No. B100351 for D450 and D451; Part No. B166488 for D335 and C315.

THRUST BEARING, GREASE SEAL & CARBON SEAL

Removal

Undo the two nuts and remove the inspection cover (9) to withdraw split pin (135) inside the intake. Remove the drive shaft. Back off the set screw (130) and unscrew the retaining nut (129) The retaining nut can now be removed by engaging it with the spline on the shaft and sliding it forward. Carefully remove the front bearing spacer (127). Undo the three nuts and bolts (22 and 24) and carefully remove the bearing housing (120) with the bearing inside. One half of the bearing race will probably stay on the shaft. Remove this and keep with the bearing. DO NOT EXCHANGE THE BEARING INNER RACE HALVES. KEEP THE BEARING CLEAN. Remember with this type of thrust bearing, even a new one will have considerable slack. Therefore, excessive noise, obvious water damage or wear on the inner races and balls should be the only reason to replace the bearing. The bearing is locked tight inside the housing for insulation purposes and if it needs replacing it can be bought as a unit from the factory or your Hamilton dealer.

To remove the grease seals continue by removing the O-ring (125), locating ring (126) and the rear bearing spacer (127). Check the bearing spacers for wear caused by the seals (124). Check the seals in the bearing housing and locating ring for wear and replace if necessary.

A worn or damaged carbon seal is indicated by water leakage from the hole beneath the bearing housing. To remove the carbon seal continue by removing the shaft slinger (132). The seal face (133) and carbon seal assembly (134) can now be removed by reaching into the intake and pushing them off the shaft. If the seal face is difficult to remove, two bolts (22) may be screwed into the tapped holes in the seal face to allow it to be pulled out. Inspect the sealing faces carefully and if they are scored or chipped they should be replaced. The seal can be bought from the factory or dealer as a unit.

Assembly

Assembly is the reverse of removal. Oil or grease the shaft surface before sliding the carbon seal assembly on the shaft with spring retainer, spring, flat washer, O-ring, carbon seal in that order. When replacing the bearing housing some difficulty may be experienced with one inner race half, which may need to be pushed on with the retaining nut. Tighten the retaining nut to 70-80 lb. ft. torque. Retighten the set screw. Refit the split pin, and inspection cover. Check that the shaft turns freely, regrease the shaft spline and the bearing with Lithium based water repellent grease, then refit the drive shaft.

IMPELLER

Removal

Remove the two nuts and bolts (111 and 109). Then remove bolt (107), splash guard (113), and support (106). Remove bucket spring (86). Remove nuts and cotter pins (79) from the reverse and steering cranks (77 and 84) and remove both cranks by pushing the shafts forward slightly. Remove the six stud nuts (13) and withdraw the tailpipe (62). The two water delivery tubes (58) will now be free and care should be taken of the four O-rings (61). Prevent the mainshaft from rotating and undo the mainshaft nut (49) and remove washer (44), bearing sleeve (128), impeller (41), and key (48). (For two or three stage units, continue with stator casing (59) next bearing sleeve, impeller and key etc.) Take care not to damage the large O-ring in the tailpipe and stator casing recesses. Blunt leading edges on impellers can reduce performance considerably, so the edges should be kept reasonably sharp, but take care to sharpen only as shown in the diagram on page N4. Tip clearance of impeller blades should not be more than .060" (about 1/16") for best best performance. (See page N3 for details of impeller tolerances).

Assembly

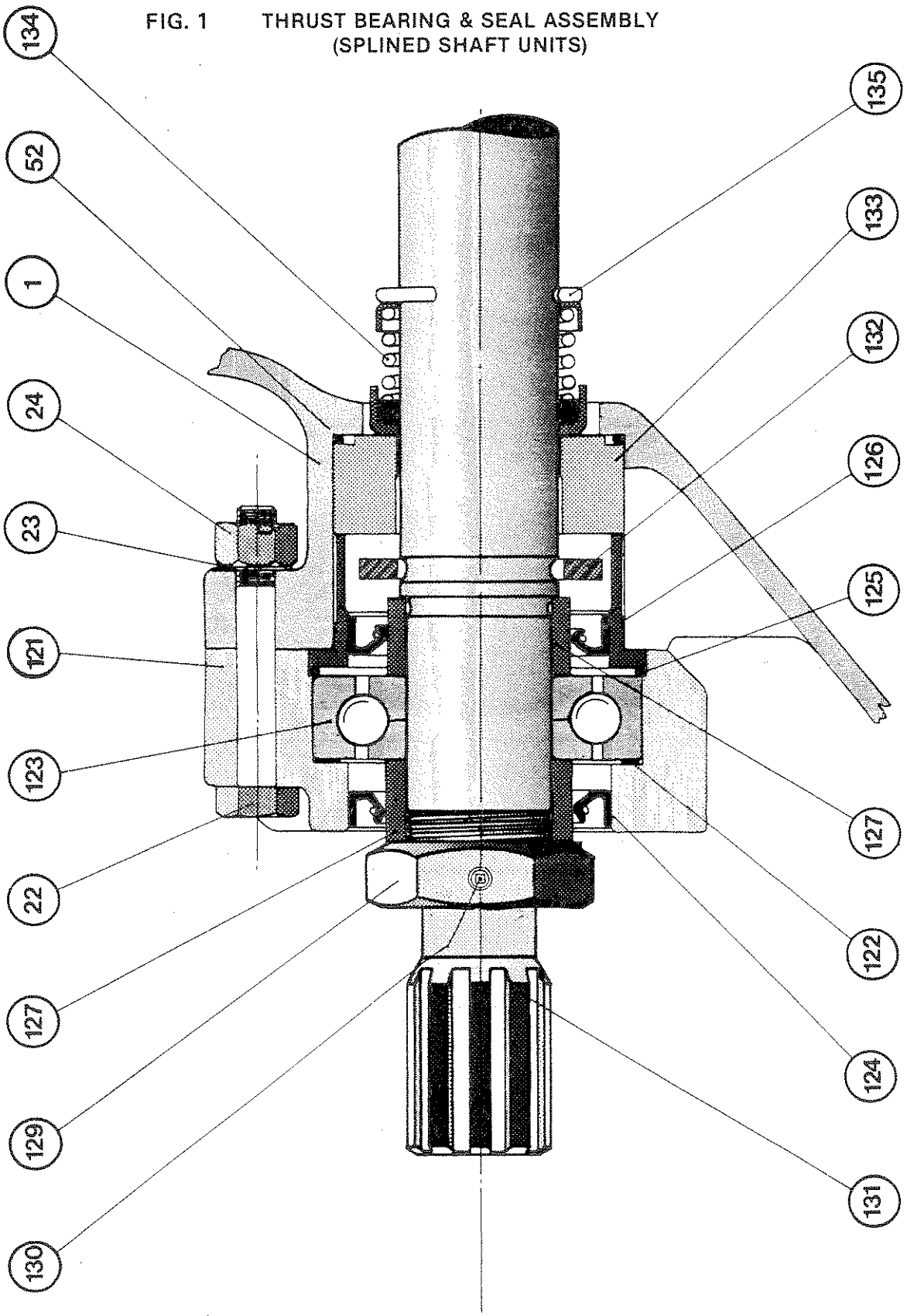
IMPORTANT. Clean all traces of grease from the bearing sleeves. It is often helpful to dust the sleeve with French Chalk to act as a lubricant for the bearings during assembly. When the sleeve measures about .007" under 1½" diameter by micrometer, replacement is advised. The cutless rubber bearing should be replaced if wear is apparent on the fluted surfaces by eye, and the new sleeve is excessively slack. Make sure all parts are clean, and grease all mating surfaces. Fit keys in keyways in shaft, and slide impellers over the shaft and key. Slide on bearing sleeves and when tightening the nut, ensure that the washer is central, otherwise it can prevent the tailpipe from fitting on.

Tightening torque for the mainshaft nut is 70 lb. ft.

NOTE:
Both the steering and the reverse crank cotter pins are fitted from left to right looking foward i.e. port to starboard (nut on starboard side).

*771 Impellers fit with smallest end of tapered hub to the front. 772, 773 impellers fit with the part numbered hub end to the front.

FIG. 1 THRUST BEARING & SEAL ASSEMBLY
(SPLINED SHAFT UNITS)



NOTE: To identify the above item numbers either refer to your 770 Series Owner's Manual or the 770 Series Workshop Manual Parts List.

770 IMPELLER TOLERANCES

A. Blade Length.
B. Tip Clearance (as measured with the opposite side of the impeller hard against the Wear Ring).

FIG. 2

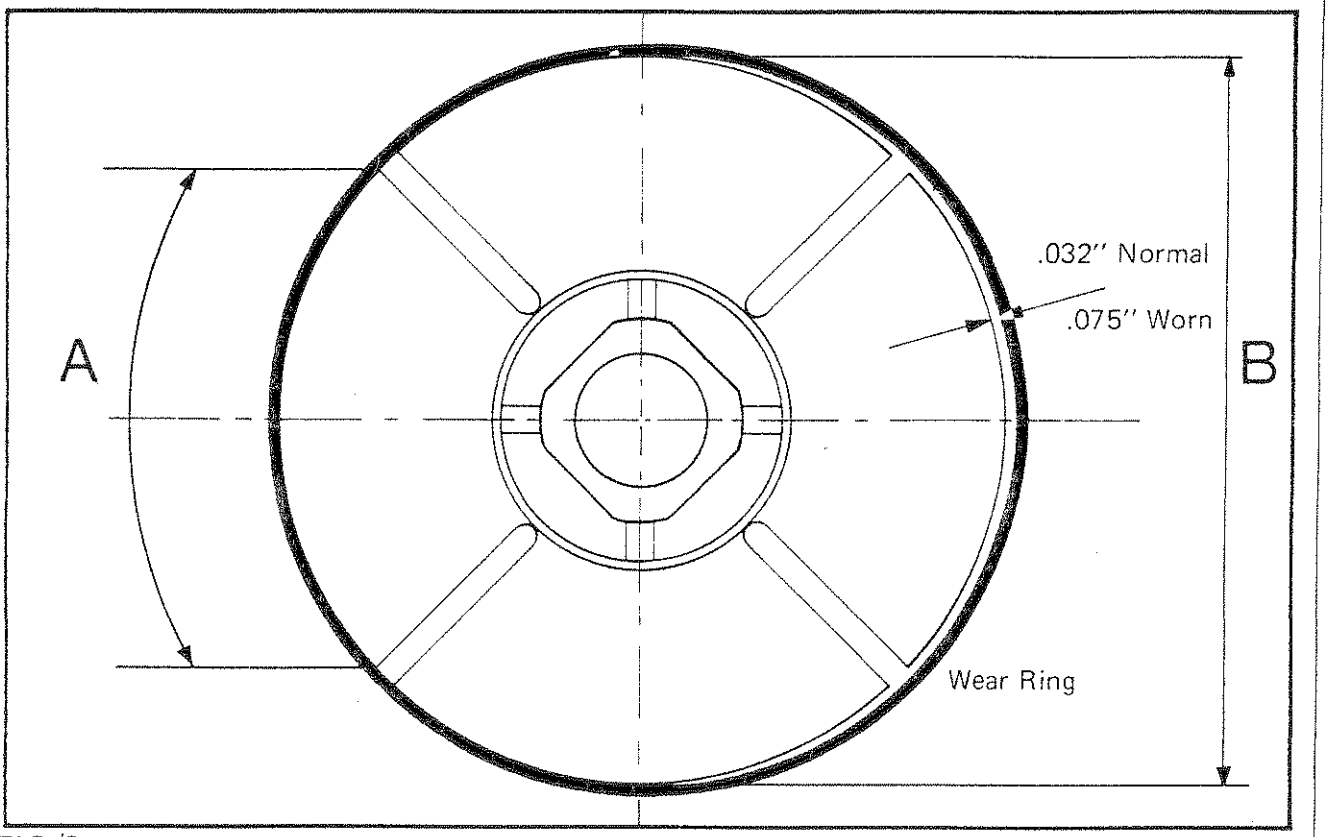


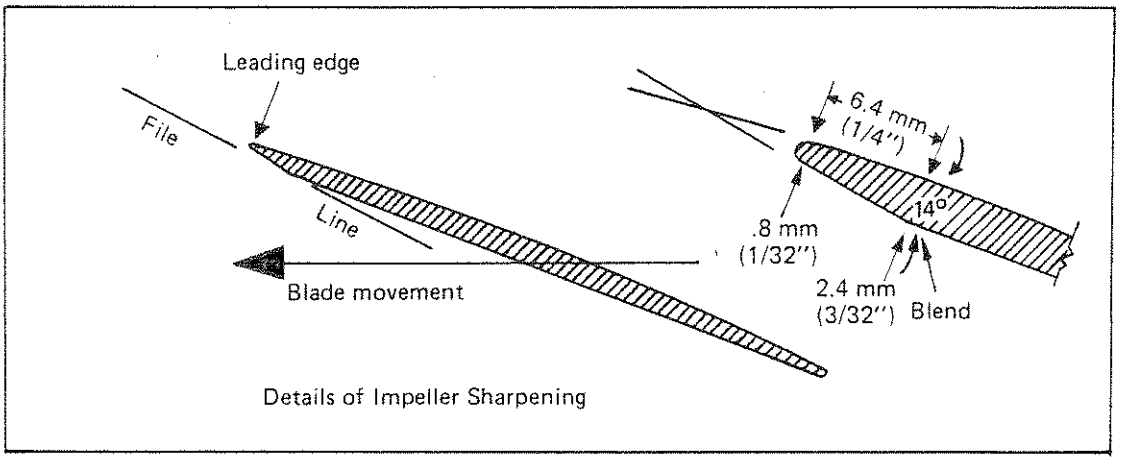
FIG. 3

IMPELLER TOLERANCES
(Identification — Last 2 figures of part number stamped on hub)

Blade Dimensions (Refer Fig. 2)	771 IMPELLERS						772 – 773 IMPELLERS			
Blade Length **A**	Coarse (80620)		Standard (80609)		Fine (JE104)		Standard (JH106)		Coarse (103348)	
	mm	(ins)	mm	(ins)	mm	(ins)	mm	(ins)	mm	(ins)
worn	171	(6¾")	165	(6½")	152	(6")	121	(4¾")	121	(4¾")
Normal	184	(7¼")	178	(7")	165	(6½")	133	(5¼")	133	(5¼")

Impeller Diameters **B**	mm	(ins)	
worn	186	(7-5/16")	NOTE: The same Diameter for all units in
Normal	189	(7-7/16")	the 770 Series.

IMPELLER SHARPENING PROCEDURE
FIG. 4



Details of Impeller Sharpening

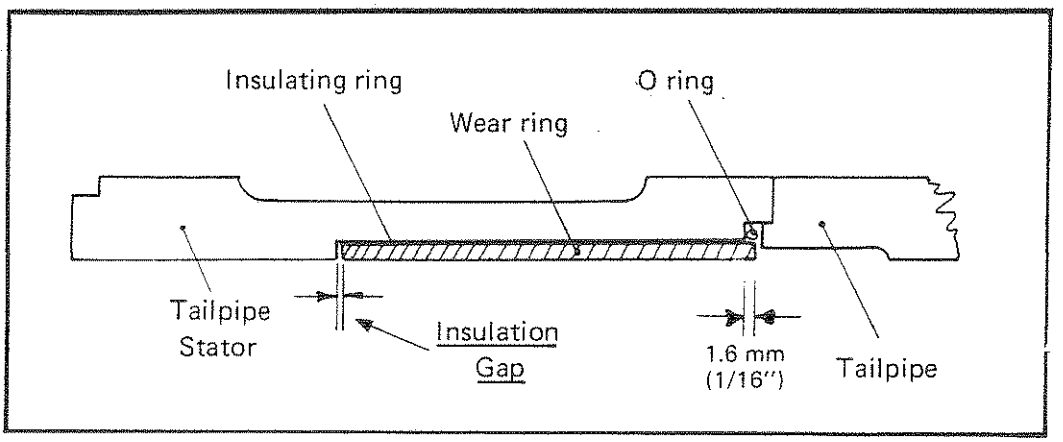
WEAR RINGS

Replacement of wear-rings (19 and 70) and wear-ring insulators (20 and 71).

1. Before replacing the wear-ring insulator, make sure its mating surface on the intake or stator has been thoroughly cleaned and scraped and repainted with zinc chromate.
2. Apply a generous coat of bitumous paint to this surface (e.g. 'Bitumex').
3. Replace the wear-ring insulator while 'Bitumex' is still wet. This insulator provides electrical insulation between the aluminium intake or stator and the stainless steel wear-ring. Wipe off excess 'Bitumex' and allow to dry. Smear an even coating of marine grease (or lanoline over insulator).
4. Fit the wear-ring. The wear-ring has had two facing corners removed and thus allows it to have a smaller lead-in diameter, so that it may be started easier.

   Finally fit the wear-ring using a soft faced hammer and leave it protruding 1.6mm (1/16") from the O-ring groove as in Fig. 5. Make sure it does not touch the intake or stator at the front edge as this will short out the insulator.

FIG. 5



GENERAL

Remove any dirt or old grease from all components and mating faces before assembly. All mating faces and O-ring recesses to be assembled with a liberal smear of lanoline (or marine grease). Insulation quality between shaft and intake must not be less than 1000 ohms. resistance. If the unit is dismantled, it is worth while examining the seals, bearings, and impellers at the same time. A complete check before the start of the season usually pays dividends in terms of assured reliability and peak performance.

BEARING SLEEVES AND CUTLESS BEARINGS

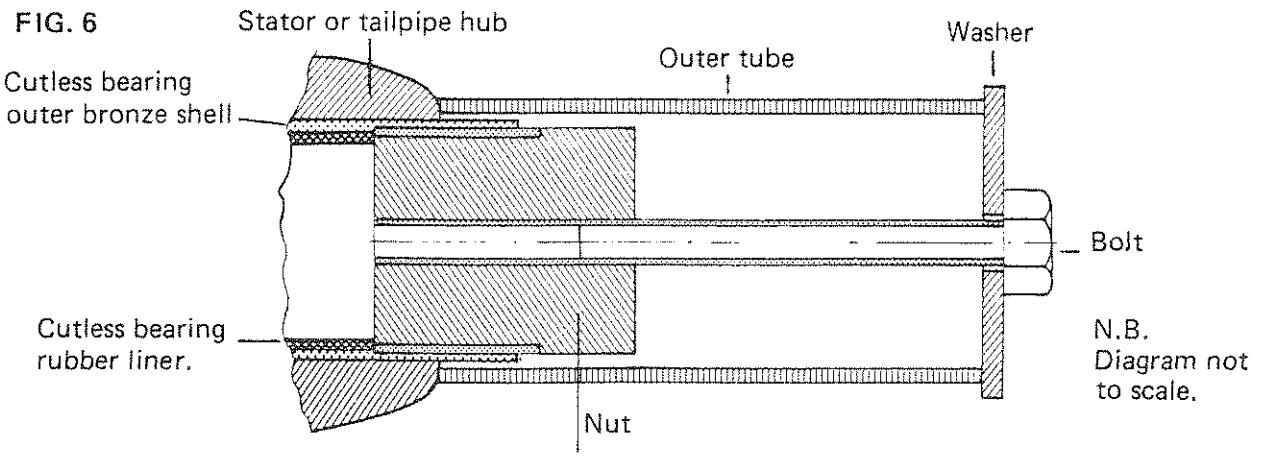
The bearing sleeves (128) should be replaced if they are scored or worn. The cutless bearing (69) should be replaced if wear is apparent on the fluted surfaces by eye and the old or new bearing sleeve is excessively slack. It is often helpful to dust the sleeve with french chalk to act as a lubricant for the bearings during assembly.

METHODS OF REMOVING CUTLESS BEARINGS

1. In cases where the cutless bearing protrudes far enough from the tailpipe hub, drill a hole across the cutless bearing to insert a bolt or pin through. Attach bolt/pin to a general purpose puller to remove cutless bearing.

2. Where the cutless bearing does not protrude, tap the bronze shell of the cutless bearing with a 1½" BSP tap (available from C.W.F. Hamilton & Co.). Tap deep enough to engage a male 1½" BSP thread. Proceed to remove cutless bearing either by
   A. using a general purpose puller, or arranging a simple type of puller as a Fig. 6

FIG. 6



Tightening bolt will pull cutless bearing out.

B. Drill a 9.5 mm (3/8") hole through the nose cone of the tailpipe (a small hole already exists) and by means of successively longer rods passed through this hole, press against the tap to force out the bearing.

3. Cut through the bearing longitudinally with a hack saw blade, or machine out on boring machine or lathe.

CONTROL SHAFT SEALS

If water has been found to be leaking from the steering (74) or reverse shaft (75), the O ring seal (61) may be replaced by two methods. The same procedure applies where the control shaft bushes (76) have seized on the shaft and are restricting steering or reverse action.

1. If there is sufficient room between the seal plate (57) and the engine to get the control shafts out: Loosen the steering and reverse crank clamp bolts (79) and remove any cables from the control arms. Then slide the shafts forward out of the seal plate. Remove the control shaft bush (76) and the O ring (61). Clean the bore. Re-paint the bore with zinc chromate for maximum protection.

   With a liberal smear of water repellent grease, re-locate the O ring as shown in Fig. 7. This automatically gives the correct spacing between the O ring seal and the control shaft bush which is replaced next. Finally, replace the control shaft and re-connect controls.

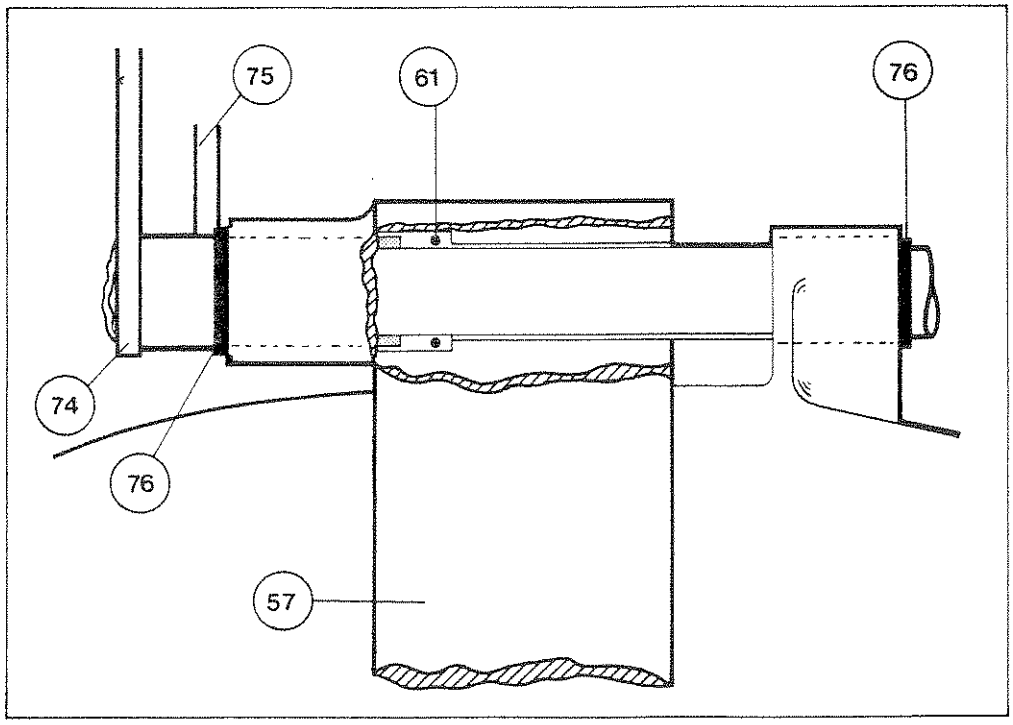
2. If the engine is close to the jet unit, not allowing the control shaft to be pulled free of the seal plate (57): Remove the tailpipe, stators and impellers as previously discussed.

   Remove the morse bracket (if used), hoses from the water off-takes (55), transom seal spring (101) and the large O ring (21) from its cavity. Slide the seal plate off the studs leaving the control shafts hanging.

   Replace with O ring as previously mentioned in this section. Clean the mating surfaces of the seal plate and intake. Slide the seal plate back along the studs feeding the control shafts through at the same time. Carefully prize the transom seal back over the seal plate and push it home. Replace water hoses, morse bracket and O ring in its cavity.

FIG. 7

CONTROL SHAFT BUSH & SEAL DETAIL



TRANSOM SEAL

Inspect the transom seal occasionally and if it has deteriorated in condition or become damaged it should be replaced.

Remove all the transom plate bolts and nuts (102 and 105), seal spring (101), transom plate (99) transom seal (100). Replace in the reverse order.

TROUBLE SHOOTING

Note:— Provided correct impeller(s) and nozzle installed, high rpm means the jet is at fault and low rpm means the engine is at fault.

1. JET UNIT

1.	Water leaking from under front bearing housing.	— Faulty carbon seal on thrust face
2.	Excessive high pitched rattling whine	— Faulty thrust bearing
3.	Bad vibrations	— Worn cutless bearings Worn drive shaft universal joints
4.	Engine revolutions gradually increasing over a period of time. Take-off performance poor.	— Worn or blunt impellers Excessive impeller tip clearance
5.	Sudden increase in engine revolutions, no noticable decrease in power.	— Faulty tachometer
6.	Excessive engine revolutions, noisy jet unit with aerated water from nozzle	— Screen blocked with weed, debris or rope up through grill and wrapped around unit shaft — Impeller(s) in wrong way round (refer page N3)

(Note all the symptoms described in items 2, 3 and 4 may be caused by the same fault as in item 6.)

2. ENGINE

ENGINE MISFIRES

- **Ignition**
  - High tension leads to spark plugs shorting;
  - Incorrect spacing of spark plug points
  - Cracked spark plug insulator;
  - Battery connections loose (coil only);
  - Faulty or damp cap.
- **Carburettor**
  - Water in carburettor;
  - Fuel line partly choked;
  - Fuel lift pump pressure low;
  - Fuel lift pump filter choked;
  - Needle valve faulty or dirty.
- **Mechanical**
  - Valves sticking;
  - Valves burnt;
  - Valve spring broken;
  - Incorrect valve clearance.

ENGINE STARTS AND STOPS

- **Ignition**
  - Low tension connection loose;
  - Faulty switch contact;
  - Dirty contact points
- **Carburettor**
  - Fuel line blocked;
  - Water in fuel;
  - Needle valve sticking;
  - Fuel lift pump faulty;
  - Fuel exhaust;
  - Air leaks.

ENGINE RUNS ON FULL THROTTLE ONLY

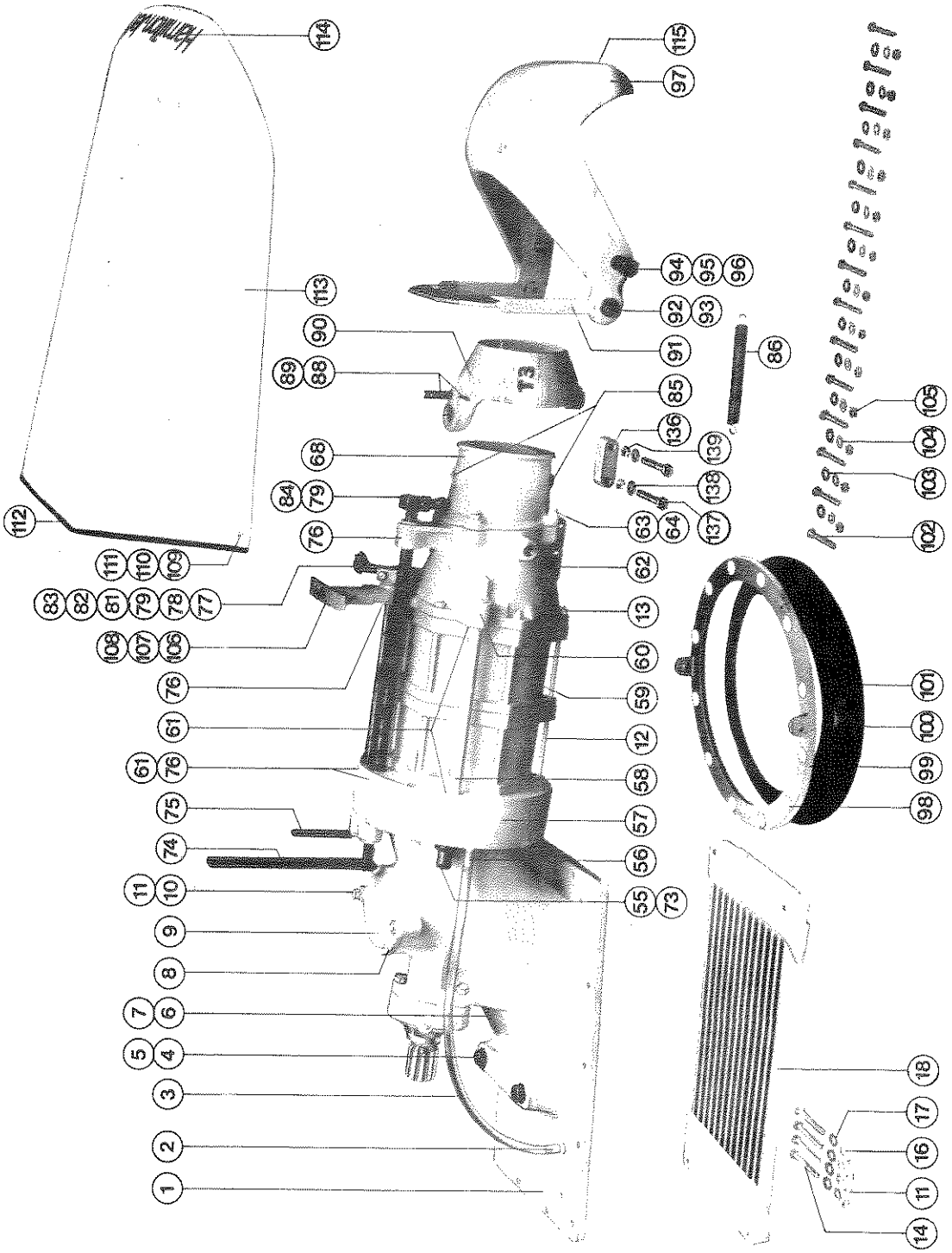
- **Carburettor**
  - Slow-running jet blocked;
  - Slow-running adjusting screw incorrectly adjusted.
- **Mechanical**
  - Valve sticking;
  - Valve burnt;
  - Valve spring broken.

ENGINE DOES NOT GIVE FULL POWER

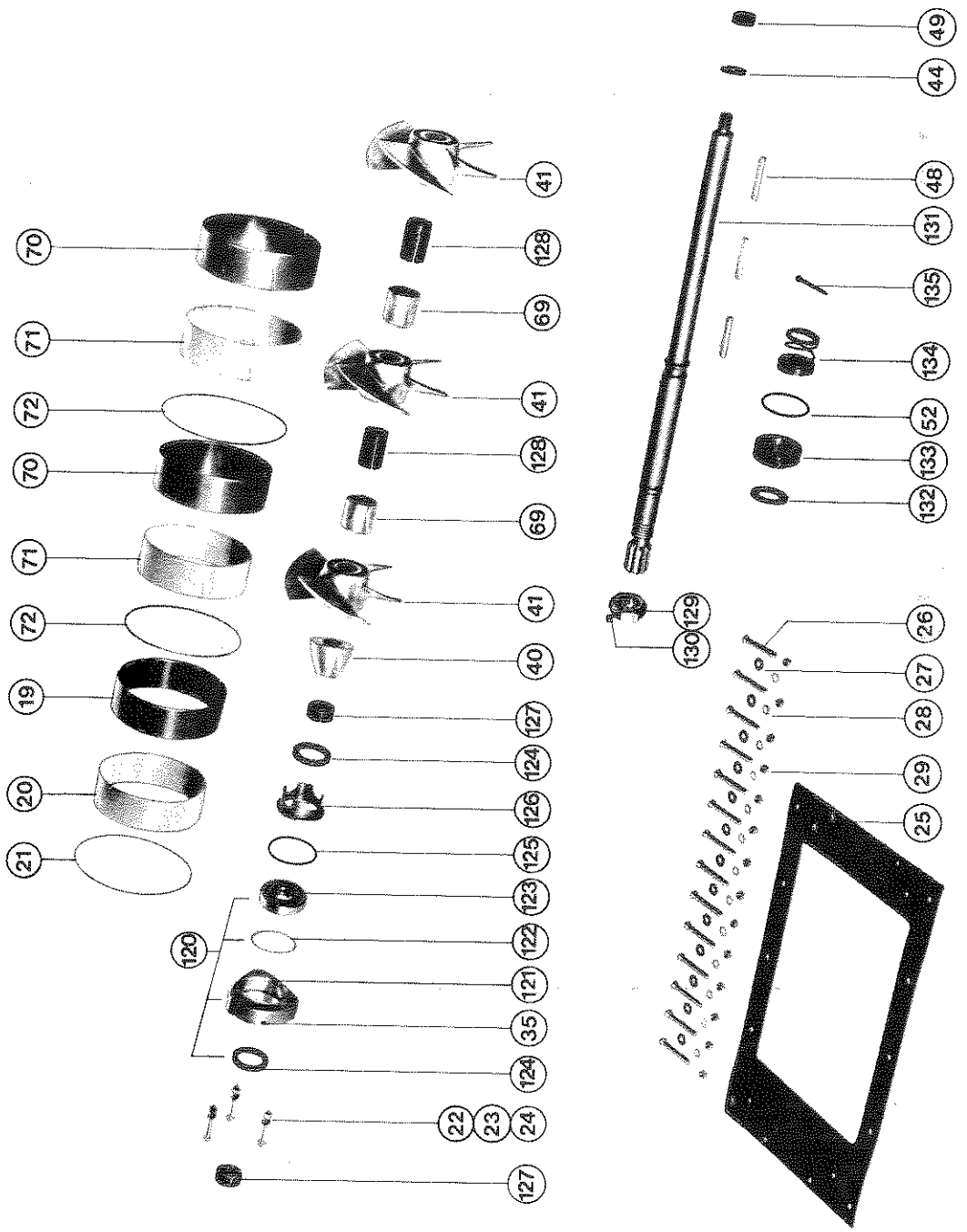
- **Carburettor**
  - Fuel supply faulty;
  - Air leaks in inlet manifold;
  - Jet partly choked
  - Flame Arrestor blocked.
- **Mechanical and Ignition**
  - Ignition retarded;
  - High tension lead shorting;
  - Valve burnt or bad seating;
  - Incorrect valve clearance;
  - Faulty distributor cap;
  - Wrong distributor fitted.

ENGINE RUNS IMPERFECTLY

- Weak mixture;
- Fuel feed faulty;
- Inlet valve(s) not closing;
- Ignition timing incorrect;
- Carburettor flooding.
- **Engine knocks**
  - Timing too far advanced;
  - Excessive carbon deposit;
  - Loose bearing or pistons;
  - Plug leads crossed.



773 ILLUSTRATED



773 ILLUSTRATED

INTAKE ASSEMBLY

NOTE: Always supply the serial number(s) of your jet unit when ordering parts.

This parts list covers units with T3 steering (identified with the letters T3 cast on the side of the deflector) Parts for units with Mk 1 770 steering are also given in footnotes. T3 is fitted as standard equipment as from serial No 10227 but earlier units may have had field change kits fitted.

Item	Description	771 with flanged coupling		772 with splined shaft		773 with splined shaft	
		Part No	Qty	Part No	Qty	Part No	Qty
1	Intake housing	102319	1	102319	1	102319	1
2	Male hose connector	63370	1	63370	1	63370	1
3	Hose	63373	1	63373	1	63373	1
4	Bolt	HZJC ABQ	2	HZJC ABQ	2	HZJC ABQ	2
5	Washer	JEOZ XAM	2	JEOZ XAM	2	JEOZ XAM	2
6	Name plate	63097	1	63097	1	63097	1
7	Patent plate	63513	1	63135	1	63135	1
8	O - ring	HMHR ADF	1	HMHR ADF	1	HMHR ADF	1
9	Inspection cover	102320	1	102320	1	102320	1
10	Inspection cover stud	102321	2	102321	2	102321	2
11	Lock nut	JDQS AAD	6	JDQS AAD	6	JDQS AAD	6
12	Intake tailpipe stud	102323	6	102324	6	102325	6
13	Nut	JDJC AAC	6	JDJC AAC	6	JDJC AAC	6
14	Bolt	HYJC AAR	4	HYJC AAR	4	HYJC AAR	4
16	Washer	JELK AAD	4	JELK AAD	4	JELK AAD	4
17	Fibre washer	61213	4	61213	4	61213	4
18	Intake screen*	103113	1	103113	1	103113	1
19	Wear ring	JE 144	1	JE 185	1	JE 185	1
20	Wear ring insulator	JE 147	1	JE 147	1	JE 147	1
21	O - ring	HMHR ACB	1	HMHR ACB	1	HMHR ACB	1
22	Bolt	HYJC ABE	3	HYJC ABE	3	HYJC ABE	3
23	Flat washer	JELK AAE	3	JELK AAE	3	JELK AAE	3
24	Nut	JDJC AAD	3	JDJC AAD	3	JDJC AAD	3
25	Intake gasket	103149	1	103149	1	103149	1
26	M/C screw	HZJW AAX	14	HZJW AAX	14	HZJW AAX	14
27	Washer	JELK AAD	14	JELK AAD	14	JELK AAD	14
28	Fibre washer	61213	14	61213	14	61213	14
29	Nut	JDJC AAC	14	JDJC AAC	14	JDJC AAC	14
76	Bush (reverse shaft)	JE 248	1+1	JE 248	1+1	JE 248	1+1
	* Optional screens						
	Free finger	JE 292	1	JE 292	1	JE 292	1
	Aluminium bar	103112	1	103112	1	103112	1
136	Warning plate	63610	1	63610	1	63610	1

SPARES KIT

Part No	Description	Consists of items
105031 SY	Intake assy 771	1, 2, 10, 12, 19, 20
105032 SY	Intake assy 772/773	1, 2, 10, 19, 20

SHAFT AND BEARING HOUSING ASSEMBLY

Item	Description	771 with flanged coupling		772 with splined shaft		773 with splined shaft	
		Part No	Qty	Part No	Qty	Part No	Qty
120	Bearing assembly	JE 217 SY	1	103377 SY	1	103377 SY	1
	Consists of:						
	121 - Housing	106050	1	106051	1	106051	1
	122 - Tufnol washer	JE 216	1	JH 209	1	JH 209	1
	123 - Bearing	63564	1	JNOD ACG	1	JNOD ACG	1
	35 - Grease nipple	HEID AAA	1	HEID AAA	1	HEID AAA	1
	124 - Seal	61180	1	61315	1	61315	1
125	O - ring	HMHR ABF	1	HMHR ABJ	1	HMHR ABJ	1
126	Locating ring	JE 298	1	JH 252	1	JH 252	1
124	Oil seal	61180	1	61315	1	61615	1
127	Bearing spacer	JE 205	1	JH 204	2	JH 204	2
40	Thrust collar / fairing	JE 219	1	JH 107	1	JH 107	1
41	Impeller (standard)*	80609	1	JH 106	2	JH 106	3
128	Bearing sleeve	JE 122	1	JH 159	2	JH 159	2
129	Retaining nut	See note		103848	1	103848	1
130	Set screw	below		JAJM PAK	1	JAJM PAK	1
131	Shaft	JE 220	1	103374	1	103375	1
48	Impeller key	JE 121	1	JH 239	2	JH 239	3
44	Washer	JELL AAB	1	JH 117	1	JH 117	1
49	Nut	JDLA AAG	1	JDLA AAG	1	JDLA AAG	1
132	Shaft slinger	JE 290	1	JH 251	1	JH 251	1
133	Seal face†	JE 295	1	JH 250	1	JH 250	1
52	O - ring	HMHR ABF	1	HMHR ABF	1	HMHR ABF	1
134	Carbon seal	61317	1	61318	1	61318	1
153	Split pin	HUIL AAJ	1	HUIL AAZ	1	HUIL AAZ	1
	* Optional impellers	Refer Page N3 of Workshop Manual for impeller identification					
	Fine pitch	JE 104	1				
	Coarse pitch	80620	1	103348	2	103348	3
	Stainless steel						
	Standard	-		80656	2	80656	3
	Coarse	-		102716	2	102716	3
	† With optional Dry run kit						
133	Counterface	-		104758	1	104758	1

Note: 771 is fitted with 1 each of : Self locking nut - JDKL AAH, Washer - JELL AAB, Coupling flange - JE 244 Key (coupling) - JE 121

BOOSTER ASSEMBLY

Item	Description	771 with flanged coupling		772 with splined shaft		773 with splined shaft	
		Part No	Qty	Part No	Qty	Part No	Qty
55	Water offtake	JMNG AAE	1	JMNG AAE	1	JMNG AAE	1
56	Male hose connector	63370	1	63370	1	63370	1
57	Seal plate	102603	1	102603	1	102603	1
58	Water delivery tube	102332	2	102333	2	102334	2
59	Stator⊗			102326	1	102326	2
60	Screen spring	JE 309	2	JE 309	2	JE 309	2
61	O - ring	HMHO XDL	4	HMHO XDL	4	HMHO XDL	4
62	Tailpipe	103358	1	103358	1	103358	1
63	Nut	JDJC AAC	4	JDJC AAC	4	JDJC AAC	4
65	0 - Ring	HMHOXFS	2	HMHOXFS	2	HMHOXFS	2
64	Stud (tailpipe to nozzle)	103250	4	103250	4	103250	4
136	Anode	103359	1	103359	1	103359	1
137	Bolt	HYIU PAW	2	HYIU PAW	2	HYIU PAW	2
138	Washer	JELH PAD	2	JELH PAD	2	JELH PAD	2
139	Nut	JDKB PAD	2	JDKB PAD	2	JDKB PAD	2
68	Nozzle (standard)†*	104709	1	104708	1	104707	1
69	Cutless bearing⊗	JH 160	1	JH 160	2	JH 160	2
70	Wear ring	-		JE 185	1	JE 185	2
71	Wear ring insulator	-		JE 147	1	JE 147	2
72	O - ring	-		HMHRACB	1	HMHRACB	2
73	Plug	102560	1	102560	1	102560	1
	⊗Optional bearing						
	Dry run bearing	-		104757	1	104757	2
	* Optional nozzles for T3 steering						
	Smaller	104708	1	-	-		
	Larger	-		104709	1	104708	1
For units prior to T3 steering:							
	Nozzle (standard)	103159 - 103	1	103159 - 088	1	103159 - 074	1
	Nozzle (small)	103159 - 088	1	103159 - 074	1		
	Nozzle (large)	-		103159 - 103	1	103159 - 088	1

† Refer Page B2 for nozzle identification.

SPARES KIT

Part No	Description	Consists of items
105033 SY	Stator assy 772, 773	59, 69, 70, 71
105037 SY	Tailpipe assy 771, 772	62, 64, 69, 76, 136, 137, 138, 139
105038 SY	Tailpipe assy 773	62, 64, 76, 136, 137, 138, 139
⊗ 105010	Stator assy (dry run kit) "outboard" 772, 773	59, 69, (dry run option), 70, 71
⊗105011	Stator assy (dry run kit) "inboard" 772, 773	59, 69, (dry run option), 70, 71

CONTROL ASSEMBLY

Item	Description	771 with flanged coupling		772 with splined shaft		773 with splined shaft	
		Part No	Qty	Part No	Qty	Part No	Qty
74	Steering shaft assembly	103224	1	103223	1	103222	1
75	Reverse shaft	103230	1	103229	1	103228	1
76	Bush (control shaft)	JE 248	1+1	JE 248	1+1	JE 248	1+1
77	Reverse crank assembly	103476 SY	1	103476 SY	1	103476 SY	1
	Consists of						
	78 - Reverse crank & pin	103177	1	103177	1	103177	1
	79 - Cotter pin assembly	103171 SY	1+1	103171 SY	1+1	103171 SY	1+1
	Flat washer 103637						
	Nut JDQH XAC †						
	Cotter pin 103170 †						
	Spring washer JEQK XAC †						
81	Split pin	HUIL AAC	1	HUIL AAC	1	HUIL AAC	1
82	Roller	102876	1	102876	1	102876	1
83	Washer	63368	2	63368	2	63368	2
84	Steering crank	103169	1	103169	1	103169	1
85	Deflector bush*	104719	2	104719	2	104719	2
86	Spring	102364	1	102364	1	102364	1
88	Deflector pivot pin*	104713	1	104713	2	104713	2
89	Split pin*	HUIL AAZ	2	HUIL AAZ	2	HUIL AAZ	2
90	Steering deflector*	104712	1	104711	1	104710	1
91	Reverse yoke	103175	1	103175	1	103175	1
92	Yoke eccentric bush	103176	2	103176	2	103176	2
93	Screw	HZJC AAV	2	HZJC AAV	2	HZJC AAV	2
94	Pivot sleeve	103181	2	103181	2	103181	2
95	Bolt	HZJC ABR	2	HZJC ABR	2	HZJC ABR	2
96	Flat washer	JELK AAH	2	JELK AAH	2	JELK AAH	2
97	Reverse bucket T3	105907	1	105906	1	105906	1
* For units prior to T3 steering							
85	Deflector bush	103164	2	103164	2	103146	2
88	Deflector pivot pin	103165	2	103165	2	103165	2
89	Split pin	HUIL AAJ	2	HUIL AAJ	2	HUIL AAJ	2
90	Steering deflector	103163	1	103163	1	103163	1

† In March 1986, the cotter pin thread was changed from $^{5}/_{16}$ UNC to M8. - When replacing the cotter pin, to ensure a tight fit, order nut and spring washer as well as the pin.

TRANSOM SEAL ASSEMBLY

Item	Description	771 with flanged coupling		772 with splined shaft		773 with splined shaft	
		Part No	Qty	Part No	Qty	Part No	Qty
98	Insulating bush	JE 262	12	JE 262	12	JE 262	12
99	Transom plate	102331	1	102331	1	102331	1
100	Transom seal	102330	1	102330	1	1023301	1
101	Seal spring	102336	1	102336	1	102336	1
102	M/c screw	HZJX AAT	12	HZJX AAT	12	HZJX AAT	12
103	Flat washer	JELK AAD	12	JELK AAD	12	JELK AAD	12
104	Fibre washer	61213	12	61213	12	61213	12
105	Nut	JDJC AAD	12	JDJC AAC	12	JDJC AAC	12
106	Splash guard support	103182	1	103182	1	103182	1
107	Bolt	HYJC ABI	1	HYJC ABI	1	HYJC ABI	1
108	Flat washer	JELK AAE	1	JELK AAE	1	JELK AAE	1

MISCELLANEOUS PARTS

Item	Description	771 with flanged coupling		772 with splined shaft		773 with splined shaft	
		Part No	Qty	Part No	Qty	Part No	Qty
109	Bolt	HYJC AAL	2	HYJC AAL	2	HYJC AAL	2
110	Flat washer	JELK AAD	2	JELK AAD	2	JELK AAD	2
111	Lock nut	JDQR AAC	2	JDQR AAC	2	JDQR AAC	2
112	Sealing strip	102543	1	102543	1	102543	1
113	Splash guard	102977	1	102978	1	102979	1
114	Transom sticker	63349	1	63349	1	63349	1
115	770 jet sticker	63383	1	63383	1	63383	1
116	Foil sticker*	63234	2	63234	2	63234	2
117	Screen rake	J656 SY	1	J 656 SY	1	J 656 SY	1
	* Not illustrated						

OPTIONAL EXTRAS

1. * IMPELLER PITCH OPTIONS

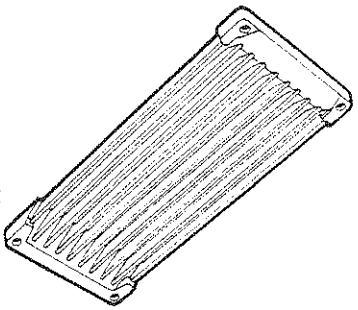
   See "Specification" (Page B1) for details & Page N3 for identification.

2. * NOZZLE OPTIONS

   See "Nozzles" (Page B2) for details.

3. * FREE FINGER INTAKE GRILL (for weed conditions)

   With bars free at the aft end, weed that may have been sucked up onto the intake grill will wipe off with the speed of the boat. This grill is **not** recommended unless only operating in deep water. Stones or debris sucked up onto the grill may force the bars open and result in damage to the unit.



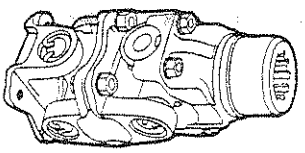
Part No. JE 292

4. STAINLESS STEEL IMPELLERS

   770 Jet units are supplied with bronze impellers as standard equipment. Models 772 and 773 are available with stainless steel impellers, as an optional extra. (80656 = STD Pitch, 102716 = Coarse Pitch).

5. SHORT H-BAR DRIVE-SHAFT

   This splined driveshaft slides onto the jet unit's splined shaft. No bolting necessary. Available only in 1310 size.

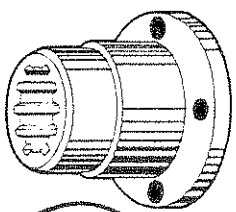


Part No. 63394

6. COMPANION FLANGE

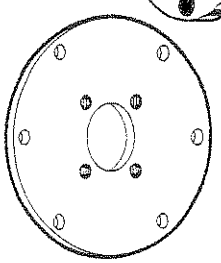
   A splined coupling is available which slides onto the unit's splined main-shaft to accept non slip jointed Hardy Spicer drive shafts 1310 or 1410 sizes available.

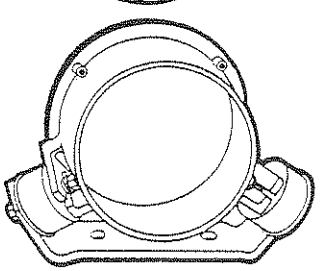
   Part Nos. 1310 103394
   1410 103393



7. ENGINE FLYWHEEL ADAPTOR

   To match coupling flange. When ordering, please state whether 1310 or 1410 size coupling is being used (N.B. Short H-Bar driveshaft only available with 1310 flange). Also state exact model of engine.





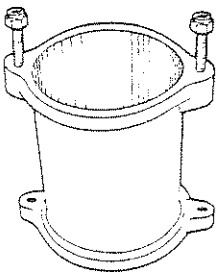
8. ENGINE MOUNT KIT

   A rear engine mount, which matches motors with a Borg Warner fly-wheel housing, and bolts onto the intake of the jet unit. This may be used with the short H-Bar driveshaft.

Part No. 103409

9. INSPECTION HATCH EXTENSION.

   Where the original inspection hatch cover may be below water level in a boat, this extension enables the cover to be removed at sea to give access to the inside of the unit.



Part No. 102564

10. STEERING AND REVERSE CONTROL SYSTEMS

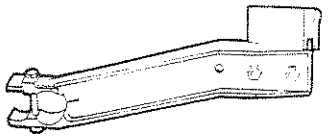
    See "Controls" (Section K) for details.

* Options at no extra charge.

11. REVERSE CABLE ANCHOR BRACKET

To suit Morse 64BC or 44BC cables. The bracket mounts on the seal plate of the jet unit.

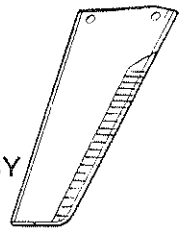
See "Controls" (Page K6 K7) for further details.



Part No. 103280

12. FIN

To aid directional stability if the hull requires it. The fin mounts onto the bottom of the tailpipe.



Part No. 103355SY

13. INBOARD MOUNTING FOR 772 and 773 UNITS

Special stator/s (Part No. 102327) are required.

See "Hull Preparation" (Page F 2) for details.

14. RACING JET UNIT

Model 773R.

See "Specifications" (Page B1) for details.

15. T3 STEERING KIT

A bolt on kit including T3 nozzle, deflector and pivot pins is available for 770 jet units with Mark I steering giving improved steering performance. For identification and nozzle size details refer to pages A1 and B2.

Kit Part Numbers are:

115mm nozzle (STD for 771) — 104718 SY
106mm nozzle (STD for 772) — 104717 SY
96mm nozzle (STD for 773) — 104716 SY