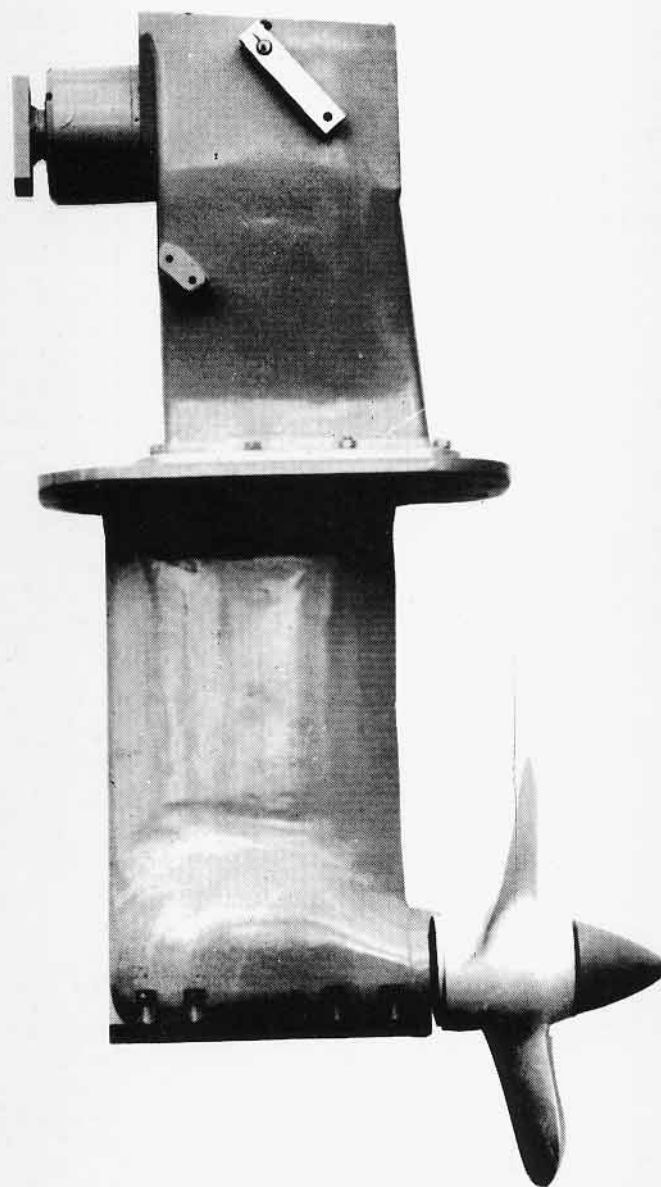


SONIC SAIL DRIVE, Mk. 1

Owners Handbook



BY
SILLETTE SONIC LIMITED

SONIC SAIL DRIVE MK I

OWNERS HANDBOOK

CONTENTS

1.	FOREWORD AND TECHNICAL SPECIFICATION	PAGE 1
2.	INSTALLATION DETAILS	PAGE 2
3.	POINTS TO NOTE	PAGE 10
4.	SERVICING	PAGE 12
5.	GENERAL INFORMATION AND ASSEMBLY DRAWING	PAGE 16
6.	PARTS LIST	PAGE 21
7.	SONIC SAIL DRIVE ACCESSORIES	PAGE 22

1. FOREWORD

The Sonic Sail Drive MK I of which you are now the owner has been designed and manufactured from 2 decades of experience in the marine transmission market.

It should be remembered that when your unit is installed it is subject to varying weather and engine conditions and it's siting makes it vulnerable to collision from flotsam and underwater obstructions. Therefore, do not throw caution to the wind.

It is important that you follow the guidelines of this handbook to obtain the best service from your Sail Drive. Should you require further guidance, do not hesitate to contact your agent or the manufacturers.

TECHNICAL SPECIFICATION for SONIC SAIL DRIVE MK I

Power Capacity + MAX PETROL ENGINE 100 BHP @ 5000 rpm
all SAE ratings + MAX DIESEL ENGINE 62 BHP @ 3600 rpm
(Subject to (Both subject to max input torque as follows)
application and to
be agreed in + MAX INPUT TORQUE 16:1 - 15 KG/MTR - 110 lbs/ft
writing with + MAX INPUT TORQUE 2:1 - 11KG/MTR - 80 lbs/ft
Sillette prior to use)

The above are for pleasure use, in all commercial applications the ratings are reduced by a minimum of 10%.

Gearbox

Ahead - Neutral-Astern with a choice of 1.6:1 or 2:1 reduction ratio. As a guide 2:1 should only be used with 40 BHP Diesel or 60 BHP Petrol Engines maximum, subject to torque limitations.

INPUT CENTRE LINE HEIGHT - 203 mm - 8 inches above mounting flange

DEPTH CENTRE LINE OF PROPSHAFT - 394mm - 15 1/2 inches below mounting flange.

MOUNTING	-	Solid flange mounting Engine behind prop as standard - 'Z' Engine over prop special order - 'C'
PROPELLERS	-	Small shaft standard 20.5mm diameter 12 spline drive L or R hand 3 blades aluminium 13" to 14" dia and 9" to 17" pitch. Also as above as 2 blade LH 13" and 14" dia - 9" pitch Large shaft 28 mm Diameter 17 spline 3 blade aluminium L or R hand - 14" to 16" diameter and 10" to 16" pitch. Also 2 blade 14" to 16" diameter and 9" to 13" pitch. Left hand only. Also 2 blade gear linked folding propeller 12 $\frac{1}{2}$ " to 16 $\frac{1}{2}$ " diameter LH itches 8-13". 1" - 1 in 12 & 25 mm 1 in 10 shafts available for fixed blade bronze propellers, 2 & 3 blade.
LUBRICATION	-	Internal oil bath - Hypoid 90 Gear oil - fill to level Capacity - 6.2 litres/11 pints (except Hydraulic versions)
MATERIAL OPTION (LOWER UNIT)	-	Aluminium standard Bronze optional
WEIGHT	-	Aluminium 40 KG/90 lbs Bronze 70 KG/155 lbs
HYDRAULIC & ELECTRIC POWERED OPTIONS		These models incorporate a mounting flange for the intended motor, in lieu of the upper 90° transmission box, see engineering drawings.

2. INSTALLATION DETAILS

i) INSTALLATION - CHOICE AND PREPARATION OF MOUNTINGS INCLUDING ILLUSTRATIONS

ii) ENGINE MOUNTING AND ALIGNMENT

iii) GEAR CHANGE SETTING

iv) PROPELLER CHOICE AND FITTING

v) PRE LAUNCH CHECKOUT

i) INSTALLATION - CHOICE AND PREPARATION OF MOUNTINGS

It is important when siting the Sail Drive, to consider the least vulnerable position, consistent with availability of space around your engine for ventilation and future servicing. It is always advisable to mount the sail drive aft the skeg in the case of a sail boat or immediately behind the keel of a cruiser.

Having selected the most suitable position, now consider mounting height, in relation to propeller diameter (i.e. allow a minimum of 10% or prop dia, blade tip clearance from the underside of the hull). One must now decide on the method of installation. Engine input mounting having already been decided when purchasing the unit. For most craft built on a one off basis, probably the reinforced pad Method 1, would be the most popular as this offers greater choice of power unit and adaptability to various hulls. Whilst the GRP base unit is probably more suited to the production built craft and limited engine range for which it is designed and in any case, it can only be fitted to a GRP hull.

Note. The GRP Base Method is not essential with the Sonic Saildrive it is an added expense. Use only if production methods demand it.

METHOD 1 PAD MOUNTED See figs 1, 2, 3, 4 and 5

Having calculated the necessary height of the pad from the underside of the hull, laminate a suitable pad from $\frac{1}{2}$ " or $\frac{3}{4}$ " marine ply. Note minimum pad height dimension shown in Figs 4 and 5. In the case of a wooden vessel, screw and glue to the hull and finally fibre glass over, or in the case of a GRP hull, glass over the edges at each layer and screw layers together before the fibre glass cures. Figs 4 and 5 show the minimum pad size to be used. One can feather the layers to the hull (i.e. the uppermost layer being the minimum pad size, gradually increasing nearer to the hull) - or alternatively construct as show in Figs 4 and 5.

From the height of the pad, the engine bearer height can be established. It is probably better that this is $\frac{1}{4}$ " -6 mm lower than that required as the engine can always be shimmed up with 3 mm ply or aluminium to give the correct alignment at a later stage. The engine bearers should be long enough to take all the engine mounts and also key in to the sail drive mounting pad for at least a $\frac{1}{4}$ of the pad length.

One can of course, make the pad length as long as the whole transmission package and mount the engine bearers directly on the pad, this then makes for a much stronger installation. We recommend a minimum engine bearer width of 2" - 50 mm made from hard wood, for most engines. Also a minimum mounting pad thickness adjacent to the sail drive mounting flange of 2" - 50 mm.

Having set the bearers in position, mark out the crank centre line of the engine and continue this line onto the sail drive mounting pad marking in pencil. Then pick out the desired position for the sail drive and mark a centre line at 90° to the first, make a template of the mounting flange and position lining up the centre lines. Drill ten holes 7/16" diameter for the sail drive mounting bolts and then proceed to cut out the 6 1/2"/160 mm x 12"/310 mm aperture with a suitable jig saw. The holes should then be spot faced on the underside of the hull. It is then advisable to glass over all exposed woodwork in the cut out and around the holes where they break out under the hull. (use 3/8"/10 mm mounting bolts for the Saildrive fixing).

Having allowed the fibre glass to cure, apply Jelcoat to the surfaces previously glassed over and allow to finally cure.

The sail drive can now be mounted to the pad. If you are in doubt as to the flatness of your pad, we recommend using a rubber gasket cut from 1/8" or 3/16" 3 or 5 mm sheet rubber. In either case, proceed to apply suitable mastic to the underside of the sail drive mounting flange and to the surface of the pad. Then lower the sail drive into position, apply mastic to the ten holes and fit ten stainless steel 3/8" or 10 mm diameter bolts and stainless steel washers, fit washers and nuts to the bolts under the hull and proceed to gradually tighten opposing bolts until the flange is fully tightened down - clean off excess mastic, leave for a day and retighten bolts. Cut off bolts flush with nuts if they protrude too far. The nuts under the hull can be glassed over and Jelcoat applied, so that the nuts are now captured, making it easier should you wish to remove the unit single handed at a later stage. This is, of course, not essential.

Remove dipstick / filler plus (30) and fill your unit with Hypoid 90 gear oil until the correct level is achieved on the dipstick, which should be resting on the lid and not screwed down, to check level - leave the unit for one hour and re-check level, top up if necessary and refit dipstick / filler plus (30) sealing the threads with Instant Gasket. Do not overfill as this may cause leakage at the input seal.

METHOD 2. FIBRE GLASS BASE MOUNTING (GRP BASE)

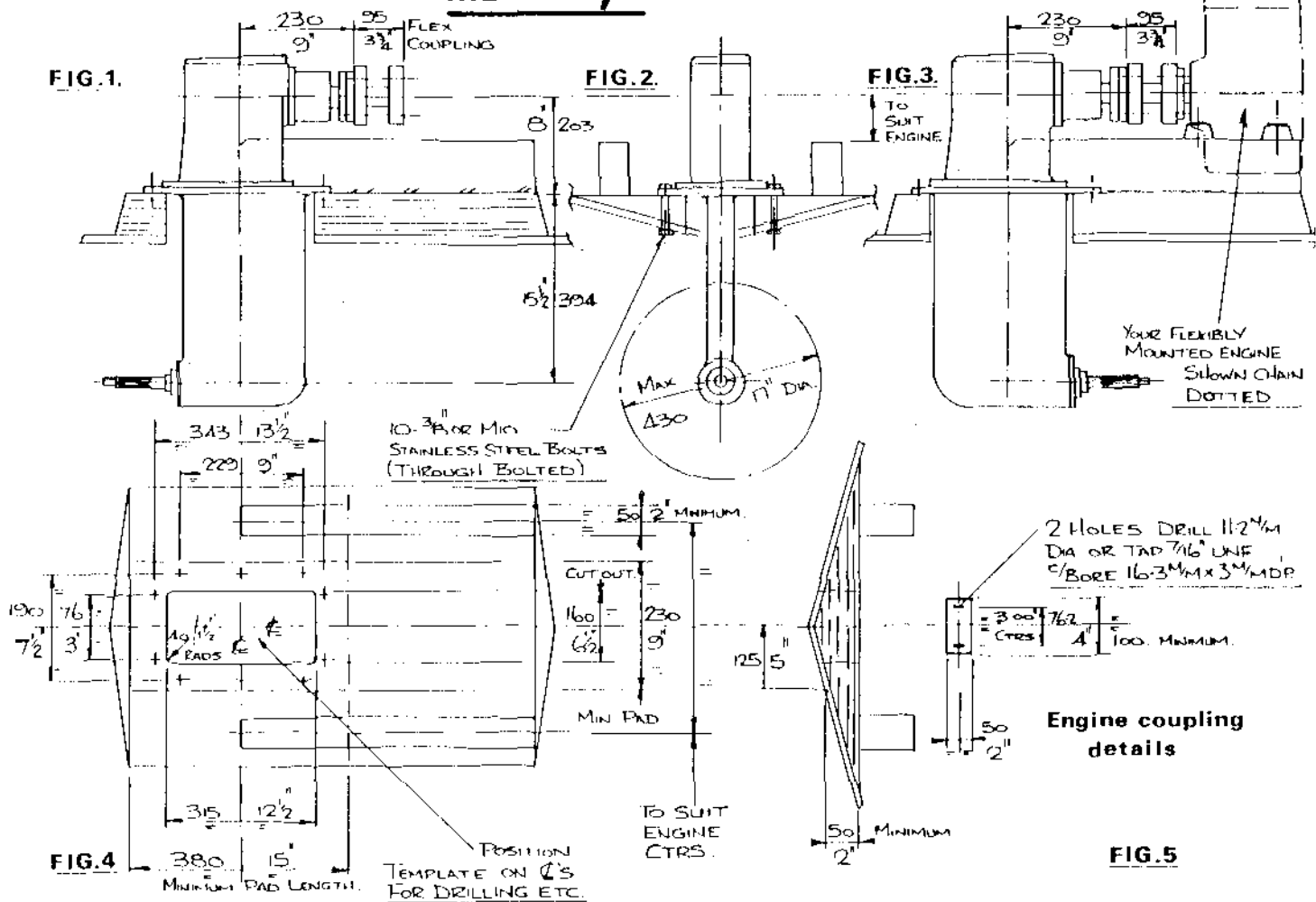
See Figs 6, 7, 8 and 9

Having calculated the required height of the base, proceed to trim the skirt of the base to marry with your hull. The lower the base, within reason, the stronger the installation consistent with correct protrusion through the hull of the drive unit. From Figs 6, 7, 8 and 9 establish position of engine relative to raised engine bearers in base unit. Then either manufacture engine mount brackets to suit base unit or if existing engine brackets and mounts come above the fibre glass bearers, packing bearers can be added to make up the difference.

STANDARD MOUNTING,

METHOD 1.

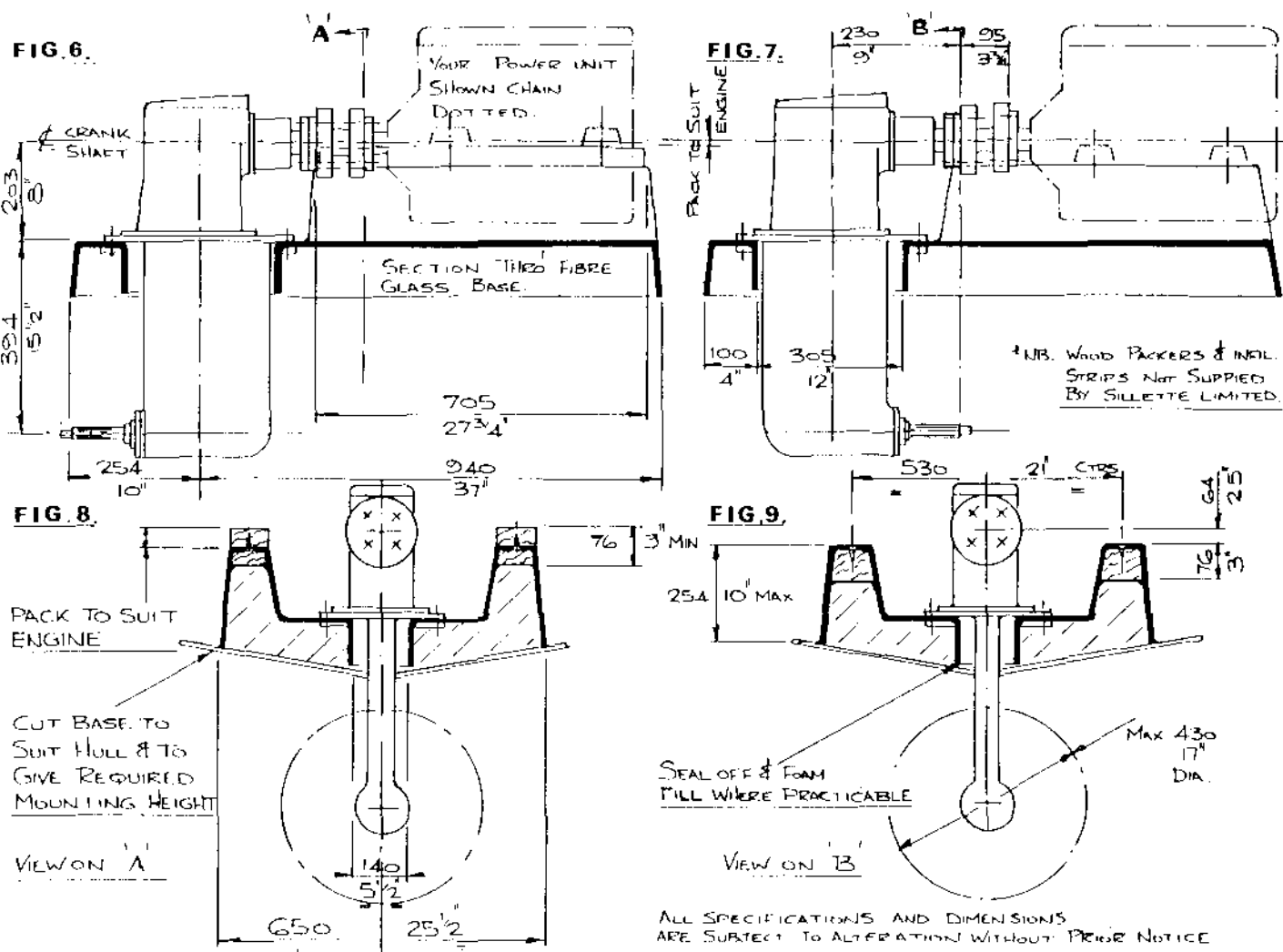
OPTIONAL REVERSE MOUNTING,



STANDARD MOUNTING,

METHOD 2.

OPTIONAL REVERSE MOUNTING,



ALL SPECIFICATIONS AND DIMENSIONS ARE SUBJECT TO ALTERATION WITHOUT PRIOR NOTICE

If the latter is the case, proceed as follows:

Calculate the height of your engine bearers to suit drive and engine, deduct $\frac{1}{4}$ "/6 mm for final adjustment, cut bearers as long as possible from 2" - 50 mm hardwood. See Figs 6 and 7. Mark out for 5 to 8 wood screws per side and drill base for these wood screws from underside. Roughen surface of base adjacent to where bearers are to be mounted and apply fibre glass resin. Then screw bearers into place from underside using suitable wood screws. Using 2-3" - 50-75 mm lay up matting and resin, proceed to glass in each side and end of bearer to the base, applying say, four to five layers all round, letting each layer cure, i.e. 2 oz/600 gm lay up. Repeat to cover screw heads on underside of base and completely sheet over the bearers with one layer of matting. Finally, Jelcoat over all glass lay ups.

If your engine is to be mounted directly to the fibre glass base through flexible mounts, it is necessary for you to bond inside the fibre glass bearers, a piece of $2\frac{1}{2}$ " x 3" hardwood planed to suit the inside profile in each bearer cavity.

Proceed as follows:

Having planed up suitable timbers each approximately $27\frac{1}{2}$ " long, apply fibre glass resin to the timber and screw up from above with six wood screws per side, avoiding areas where flexible mounts will be fitted. Then using $4\frac{7}{8}$ " - 100/125mm strips of lay up matting, proceed to glass over the timber infills on the underside using, say, 4 to 5 layers, letting each cure, i.e. 2 oz/600 gm lay up. This lay up must provide a complete seal from the water when in situ. Note if packaging bearers described in the previous paragraph are less than $2\frac{1}{2}$ " thick it will be necessary to repeat the above for this method also.

Position base inside hull and mark out aperture in hull from that in the base unit, remove base and cut out hull with jig saw. Roughen up area on hull where base is to be joined and the lower edges of the base skirt. Cut $4\frac{7}{8}$ " - 100/125 mm strips of lay up matting, position base and apply 8 to 10 layers of matting, overlapping base and hull by $3\frac{3}{4}$ " and allow each layer to cure, giving 4 oz/1200 gm lay up. Finally, finish off with Jelcoat. You can now fill the enclosed chamber with foam by applying through the sail drive aperture and finally seal off with a fibre glass lay up and Jelcoat to the previous specification.

See Fig 9.

We advise that you seek professional advice on the application of fibre glass products from Messrs Bondaglass Voss. Tel No 0181-778-0071 should you be in any doubt as to your ability with these products. If still in doubt, it may be worth asking your boat builder, boatyard or Sillette to carry out this work for you.

It is important that this preliminary work is carried out correctly for your safety and those who use your craft in the future.

Select the correct length of 10 mm/ $\frac{3}{8}$ " bolts so as not to bottom out when fitting. Apply suitable mastic to the underside of the mounting flange and to the mounting pad and fit a rubber gasket. Position sail drive through aperture and proceed to bolt up, gradually tightening opposing bolts until the drive is firmly in place. Leave for two days and re-tighten. Clean off excess mastic.

Finally fill sail drive with Hypoid 90 gear oil as described in Method 1.

ii) ENGINE MOUNTING AND ALIGNMENT

Attach the double flexible coupling (listed under accessories) to the sail drive. Ensure that the engine is fitted with a compatible drive flange (see Fig 5). Lower engine into position complete with flexible mountings, roughly align with sail drive and connect coupling, pack mountings as necessary or adjust centre bolt to suit. Partially bolt or screw down flexible mountings with suitable fasteners, as per your engine supplier's advice. To check alignment of coupling, first view from above and from the side, adjust to give visual alignment.

Then measure (using a packer and feeler gauge or similar) between opposing coupling bolt heads. Turn through 90° check again, repeat at 180° and 270° from start, variation between same pair of boltheads should not exceed .25 mm/.010" in all cases, when the engine is in line. Finally, bolt down engine and re-check coupling tightness. Check alignment several times and adjust as necessary. Re-check once the engine has run. Follow your engine supplier's/manufacturer's instructions to complete your engine installation.

NB. All engines must be flexibly mounted.

iii) GEAR CHANGE SETTING

A single lever gearchange/throttle control must be used.

The gearchange system should give between $1\frac{3}{8}$ " to $1\frac{1}{4}$ " 35/32 mm linear movement to operate F N and R gears. The MV2 control modified by Sillette is suitable. If controls using longer strokes are used a reducing linkage must be used to achieve the desired stroke - contact Sillette if in doubt.

The drive unit is tapped to accept the standard Sillette clamp fitting and the Sillette quick release ball fitting.

Cables should not be made to operate in too tight a bend, type of cable used is the morse teleflex 33c - to set unit proceed as follows:

- a) Set the single lever control with cable attached in neutral, set drive unit in neutral, fit Sillette quick release ball to gear lever and end fitting to cable - clamp cable to drive using Sillette clamp and shim. Note whether L or R hand props are in use as this will govern direction of gear lever - see general assembly.

- b) Adjust quick release fitting to engage on ball fitted to gear lever then dis-engage.
- c) Select ahead at control and engage drive in ahead by hand. Check alignment of quick release fitting to ball and adjust if necessary making allowance for cable backlash.
- d) Repeat for astern setting.
- e) Repeat for ahead and astern, balancing out cable stroke into each gear which should if stroke length is correct, provide full movement into each gear without any over-travel, if in doubt contact Sillette.
- f) Finally, lock up backnut on quick release fitting and ensure cable and linkage is well lubricated with WD40.

It is important that you turn either propeller or input shaft whilst changing gear as above, otherwise gear change linkage may become damaged. Engine must be set to tick over at 800 RPM or less to achieve best shift operation with minimum wear.

Always run engine at tick over whilst changing gear.

There will always be a clonk when changing gear - however, correct setting and positive use of the shift level will minimise this.

When connecting the throttle cable to the engine ensure that it does not activate the throttle until the gear shift has completed its full stroke and is fully engaged. If necessary fit a delay in the cable (LAZYLINK). If further detail is required, contact Sillette, or your agent.

iv) PROPELLER CHOICE AND FITTING

The Sonic MK I sail drive has one standard type of propeller shaft which is - a 12 spline 13/16" diameter / 21 mm, for use with two and three blade fixed aluminium propellers up to 14" diameter. Also supplied to special order is a 17 spline 1 1/8" diameter / 28 mm for use with two or three blade fixed aluminium props, from 14" to 16" diameter and for two blade gear linked propellers, and for use on the bronze sail drive, a 1" diameter 1 - 12 taper with 1/4" square key 3/4" UNF retaining nut thread, for two and three fixed blade bronze propellers (type A), or 25 mm 1 in 10 taper with 6 mm square key - 3/4" UNF retaining nut (type B) metric option.

Your agent or Sillette will have discussed the Propeller possibilities with you prior to purchasing and the choice is now already made. However, by way of guidance when using aluminium lower unit, we advise using aluminium propellers to minimise anode deterioration and conversely, bronze propellers with bronze lower units. If your craft is primarily a cruiser type, then you should consider using a three blade fixed propeller for best efficiency. For a motor sailer, choose between a two or three blade fixed propeller. N.A.B. folding propeller can be used with either aluminium or bronze lower unit, however 17 spline shaft must be fitted.

If the craft is primarily a sailing vessel then a two blade fixed or folding propeller should be your consideration. Bronze gives a greater degree of durability whilst aluminium is cheaper, if not so durable.

Always check with your agent or manufacturing as to the propeller diameter and pitch requirement. The propeller should be pitched to suit the boat manufacturer's recommended speed for a certain size power unit, ensure engine is not overloaded.

The diameter is then a function of the engine RPM and HP. Do not be disappointed by the results of the first propeller you are advised to use as it is very difficult to prescribe exactly the correct propeller with so many variant factors to consider.

To fit the propeller proceed as follows:

For 12 & 17 spline fixed blade propeller, grease the propeller shaft, fit the spacer followed by the propeller, then locate the tab-washer on the splines and hold in position whilst screwing the nose cone onto the shaft. Finally, tighten the nose cone fully home and bend back two locking tabs onto the flats of the nose cone.

For types A & B first check that the key is a good fit in both the shaft and the propeller. Check that when the propeller is fully home, there is a minimum gap of .005"/.1 mm between the top of the key and the bottom of the keyslot in the prop hub (i.e. to ensure that the propeller is seating fully on the taper of the shaft). Having made those checks, make sure the shaft and propeller bore are clean. Fit the key, lightly smear the shaft with Duckhams "Keenol" grease, wipe off any excess. Fit the propeller and lightly tap the end with a wooden drift. Fit the castellated hexagon nut accessory and fully tighten, fit the stainless steel split pin and bend over to lock in situ.

If your propeller manufacturer supplies you with a nose cone type retaining nut, before fitting make sure that the thread is compatible with your sail drive, i.e. $\frac{3}{4}$ " UNF and that the tab or locking washer will function when fitted. If it is a split pin type locking, first see if this will line up with the existing split pin holes in the shaft. If you have to drill a second hole, avoid being too close to the original hole.

Instructions for fitting propellers are supplied with the propeller. However, in all cases, the propeller retaining nut should incorporate a tab washer, split pin or suitable secondary retention from unscrewing.

v) PRE-LAUNCH CHECK OUT

Your sail drive has provision for a "ZINC ANODE" to be fitted adjacent to the propeller shaft in the "HOUSING" (38 or 452); or face mounted. Ensure that an anode is fitted prior to fitting the propeller. The anode should make metal to metal contact with the housing (38 or 452). Therefore, remove any paint or grease from the anode seating and do not paint or anti-foul the anode. If an aluminium lower end unit is fitted, it is important that any anti-fouling is copper or yellow metal free to avoid serious corrosion. International's MPX. Anti-foul is suitable and it would be advisable to use this type of anti-foul on all installations using sail drive, irrespective of sail drive lower end material.

For further protection, a proprietary zinc anode can be screwed to the hull and wired to the sail drive mounting bolt beneath the craft. Ensure that your engine is earthed to the sail drive in all cases.

Having filled your sail drive with oil after bolting down, check for any seepage and re-check level as previously described, using suitable box spanner. Fit anode, fit propeller, check tightness of installation bolts and coupling bolts, visually check fibre glass work and take corrective action, if necessary. Re-check gearshift set up as previously described, and ensure engine tick-over does not exceed 800 RPM, adjust if necessary.

Having completed all other pre-launch work, the craft can now be tested - assuming engine installation and services to be completed.

On launch, check all fibre glass work and mounting flange for seepage, start engine whilst moored and engage ahead and astern gears, adjust engine tick over once engine is warm. With engine running, re-check fibre glass work and sealing faces. Everything being satisfactory, proceed with sea trials, paying attention to notes on Chapter 3.

If any doubt regarding potential electrolysis of both, sail drive and propeller, consult a surveyor specialist for further advice on additional anode protection. Be warned stray currents from your onboard electronics or those of a nearby vessel can cause irrecoverable damage.

3. POINTS TO NOTE

- i) RUNNING IN AND AFTER
- ii) LUBRICATION
- iii) REVERSING
- iv) UNDERWATER OBSTRUCTIONS

i) RUNNING IN AND AFTER WATER

Run in your Sonic Sail Drive at half engine speed for a period of 15/20 hours general use in both ahead and astern gears. You may find during this period, slight gear whine, which can last longer than this running in period, dependent on engine size, but in either case, this will decrease with use.

Having completed the running in period, carry out first service as per Chapter 4 (i).

Once this service has been completed, we advise that the engine be gradually increased to use full power over a further 20 hour period on an intermittent basis, to afford gradual running in to both engine and drive.

We do not at any time recommend the use of full power when encountering head winds or adverse currents etc., as this gives excessive loads to both engine and drive. The propeller supplied or recommended should be for average conditions and, as such, will give the effect of too high a gear when encountering adverse weather and sea conditions. Therefore, slightly lower revs will make better use of your engine torque.

ii) LUBRICATION

It is important to keep a close check on oil levels and condition, as this will seriously affect the life of the unit. Check the level before the engine is run weekly, or daily if used on a daily basis and top up if necessary. Check the condition once the unit has been run for $\frac{1}{4}$ hour by removing the dipstick (30), remove a small quantity of oil on one's finger and compare colour with fresh oil, disregard froth. If there is water in the oil, it will have become much lighter in colour, i.e. emulsified, losing some of its viscosity. Some oils can take up to ten per cent water without serious affect. However, it is advisable to find the cause of any emulsification and rectify immediately. When running, in the oil may become slightly emulsified until the seals have fully bedded in.

iii) REVERSING

It is not advisable to make quick changes from ahead to astern as this puts undue stresses on your unit and is only necessary in emergency. A smooth change can be effected by dropping the engine revs to below 800, changing gear and gradually accelerating the engine as required. A single level control is essential to provide this smooth handling for the novice helmsman.

iv) UNDERWATER OBSTRUCTIONS

Because of its design and siting, the sail drive is a piece of precision engineering in a hostile environment, which if used correctly, can be a very useful asset, used unwisely - a liability.

Firstly, avoid all underwater obstructions where they are known to exist, ensure there is ample depth to take your craft. If you should encounter flotsam and jetsam, proceed with caution at low speed.

In most instances, the sail drive and propeller are most vulnerable when going astern as this drive is not offered any protection by the keel or skeg.

And finally ropes, ensure all unused mooring lines are aboard and coiled, watch out for your neighbour's mooring line when manoeuvring into port, etc. The results of negligence can be costly.

4. SERVICING

- i) FIRST SERVICE AT 20 HRS - SEE CHART FIG. 10
- ii) GENERAL SERVICING - SEE CHART FIG. 10
- iii) WINTERISING AND DE-WINTERISING

i) FIRST SERVICE AT 20 HOURS

Having completed the first 20 hours running, proceed to carry out service and checks as follows, referring to chart Fig.10.

- a) If practicable lift out craft or slip. Drain Sail Drive oil by first removing the filler plug (30) and then unscrewing the drain plug (99). (Have a bucket close by to catch the oil). Flush through and leave to drain for one hour, clean drain plug threads and refit using Instant Gasket to seal off the threads and fully tighten. Refill with oil as previously described in Chapter 2 (i), recheck level after half an hour.
- b) Check tightness of all bolts, screws, nuts, etc.
- c) Check for oil or water seepage, contact your agent or Sillette if in doubt.
- d) Check gear shift setting as previously described in Chapter 2 (iii) and adjust if necessary.
- e) Check propeller for damage and retention.
- f) Carry out any first service checks to engine etc.
- g) Re-launch.

ii) GENERAL SERVICING

The normal periodic attention required by your Sonic Sail Drive is at intervals of 50 hours running or monthly (whichever is the shorter). Attention should be given on a weekly basis to certain time, these are noted below.

- a) Remove dipstick/filler (30) with a 1" A/F Box Spanner and check oil by resting dipstick on top cover (423), top up if necessary with Hypoid 90 gear oil and replace dipstick/filler plug - Repeat on a weekly basis. (Do not overfill)
- b) Run engine for $\frac{1}{4}$ hour with unit in gear. Switch off, unscrew filler plug (30), remove a sample of oil and check for emulsification (see Chapter 3 (ii)). If emulsification is excessive replace filler plug - find cause and rectify and refill. Repeat on a weekly basis.
- c) Check tightness of coupling bolts - Repeat on a weekly basis.
- d) Check input shaft oil seal for seepage - Repeat on a weekly basis.
- e) Check tightness of Allen Screws (Inboard).

- f) Check gear shift setting as previously described in Chapter 2 (iii), and adjust if necessary - lubricate cable with WD40.

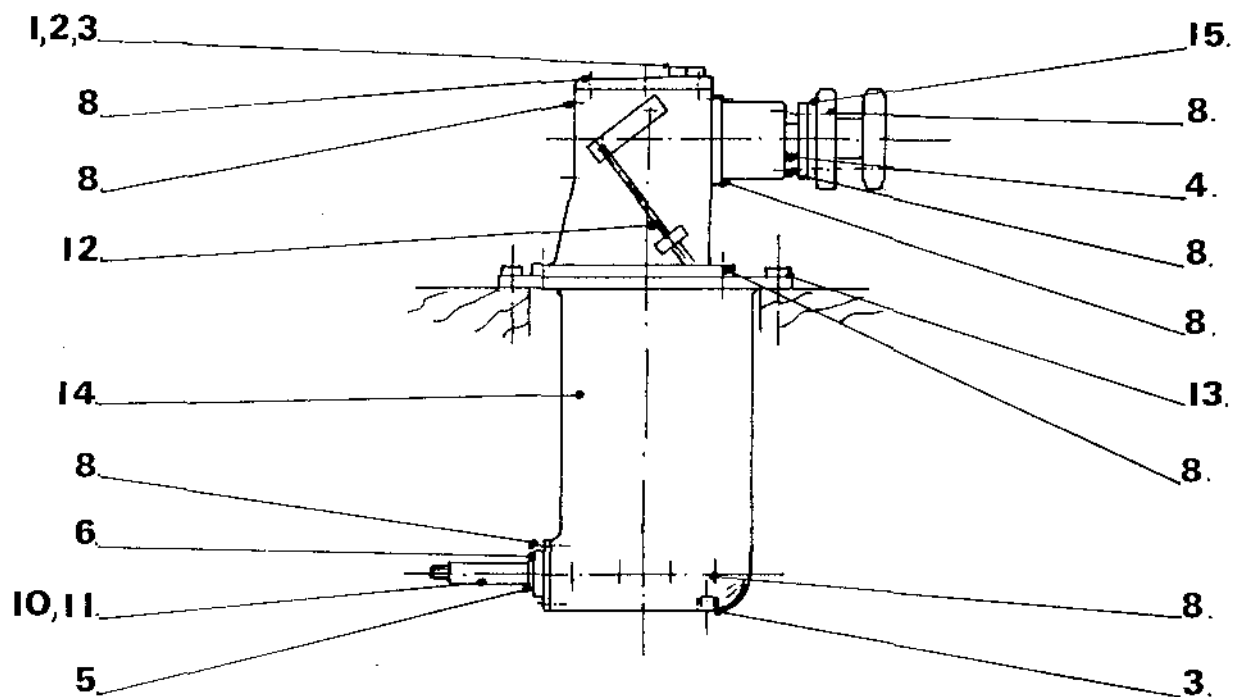
We recommend that once a year the boat is slipped or lifted and a major service is carried out, as follows.

Alternatively the sail drive can be removed and a blanking plate fitted between tides (blanking plates available from Sillette) for those with a mooring that dries out. Proceed as follows for both methods, making allowances where the unit is removed.

- g) Remove propeller, check for damage, repair or replace as necessary.
- h) Drain oil by first removing filler plug (30) and then the drain plug (99), flush through and leave to drain for one hour, refit drain plug (99) using Instant Gasket to seal the threads and fully tighten. Refill with Hypoid 90 gear oil, check level and repeat after $\frac{1}{2}$ hour and top up if necessary, replace filler plug using 1" A/F Box Spanner only.
- i) Check tightness of all Allen Screws, nuts, etc. (Inboard and Outboard).
- j) Check anode in housing (38/452) for condition. If anode is 1/3 or more corroded or powdery, fit a replacement, otherwise leave in situ. Also check and replace if necessary any external bolt on anodes.
- k) Check propeller shaft oil seals and input shaft oil seals for seepage. If there were any fishing line or similar behind propeller, pay particular attention to lower prop shaft oil seals.
- l) Check propeller shaft for side play by hand and check straightness, turning prop shaft whilst in neutral.
- m) Clean propeller shaft, apply a thin film of "Keenol" grease and refit propeller as per instructions in Chapter 2 (iv).
- n) Check tightness of flange mounting bolts and coupling bolts.
- o) Check mounting pad or fibre glass base bonding.
- p) Check gear shift setting as previously described in Chapter 2 (iii), and adjust if necessary - lubricate cable with WD40 and lubricate control box with Duckhams "Keenol" grease and WD40.
- q) Clean down and make good any damaged paintwork.
- r) Carry out any further work on craft before re-launching.
- s) Check shear pin is not partially sheared by viewing from above to establish straightness.

SERVICE CHART.

FIG 10,



	Instruction.	at 20hr	weekly	50hrs	yearly
1	CHECK OIL LEVEL WITH DIPSTICK/FILLER PLUG		●	●	
2	REMOVE DIPSTICK AND CHECK OIL FOR EMULSIFICATION		●	●	
3	DRAIN FLUSH AND RE-FILL WITH HYPOID 90 GEAR OIL	●			●
4	CHECK INPUT SHAFT OIL SEAL FOR LEAKAGE	●	●	●	●
5	CHECK PROP SHAFT OIL SEAL FOR LEAKAGE	●			●
6	CHECK PROP SHAFT ANODE FOR CORROSION				●
7	CHECK ANY BOLT ON ANODES FOR CORROSION				●
8	CHECK INBOARD BOLTS SCREWS NUTS ETC INCLUDING COUPLING BOLTS FOR TIGHTNESS	●		●	●
9	CHECK BOLTS SCREWS NUTS ETC OUTBOARD	●			●
10	REMOVE PROP - GREASE SHAFT - CHECK PROP FOR DAMAGE - REPAIR & REPLACE				●
11	CHECK PROP SHAFT FOR SIDE PLAY AND RUN OUT				●
12	CHECK GEAR SHIFT SET UP & LUBRICATE CABLES WITH WD 40	●		●	●
13	CHECK TIGHTNESS OF MOUNTING FLANGE BOLTS. OBSERVE FOR LEAKS WHEN LAUNCHED	●			●
14	CHECK PAINTWORK FOR DAMAGE AND REPAIR IF NECESSARY				●
15	CHECK SHEAR PIN IS IN GOOD ORDER				●

iii) WINTERISING AND DE-WINTERISING

It is advisable, wherever possible, to put your fibre glass craft on hard standing for the winter (not wooden craft) and perhaps incorporate the yearly major service with this lift out. In which case, we advise removal of the propeller, drain and refill oil (as at Chapter 4 (ii, h and g) at the end of the season. Coat the propeller shaft in Duckhams "Keenol" grease then cover the lower unit with polythene or similar for the winter.

Prior to re-launch, carry out the balance of items, (i.e. Chapter 4 (ii) and (i-s)) and re-check oil level.

If it is not possible to hard stand your craft over the winter, check oil level for emulsification. If emulsified, either remove as much oil as possible and refill with fresh oil, keeping a regular check over the winter, or find cause of emulsification and rectify.

NB. Emulsified oil left in the unit over winter can separate with water settling to the bottom. Apart from causing corrosion, it is liable to freeze and split the case.

5. GENERAL INFORMATION AND ASSEMBLY DRAWING

- i) USE OF LOCTITE AND INSTANT GASKET
- ii) PROPELLER SHAFT BEARING ADJUSTMENT AND SEAL REPLACEMENT
- iii) CHECKING AND REPLACING SHEAR PIN
- iv) PROPELLER HANDLING RELATIVE TO INPUT ROTATION

i) USE OF LOCTITE AND INSTANT GASKET

When fitting bearings, screws and fasteners, Loctite must be used as follows:

- a) Degrease both mating parts with Loctite Primer 'T'. Allow 5 to 10 minutes to cure. (Spray brake cleaner can be used to degrease).
- b) Apply a minimal film of Loctite bearing fit, or equivalent, to one of the mating parts and disperse evenly.
- c) Fit the 2 mating parts together and allow to cure for 2 to 3 hours without disturbing.

All mating surfaces are sealed with Instant Gasket compound.

Sealing procedure as follows:

- a) Thoroughly clean mating surfaces and check for score marks.
- b) Make up a gasket if one was previously fitted.
- c) Apply Instant Gasket to both sealing surfaces. Spread evenly, fit gasket if required.
- d) Fit the 2 mating parts and screw together to within $\frac{1}{2}$ turn.
- e) Clean away excess sealant.
- f) Leave for one hour, then finally tighten screws and trim gasket with a knife.

iii) PROPELLER SHAFT BEARING ADJUSTMENT AND SEAL REPLACEMENT

Refer to assembly drawing.

- a) Remove propeller.
- b) Check for free play on propeller shaft (i.e. side movement) if this exists proceed as follows:
- c) Drain oil
- d) Unscrew 4 screws (item 87) and 8 screws (item 88).
- e) Remove skeg (item 425 and 451) and propeller cap (item 38 or 452) a tap with a hide mallet is required to break seal.

- f) The prop shaft (item 11 or 120) is then free to drop downwards, complete with bearings and gear.
 - g) Check bearings for damage. Replace if necessary, polish shaft (11 or 120) where seals have been running, replace shaft if heavily grooved by the oil seals.
 - h) It is advisable to replace the two shaft oil seals (item 53) at this stage, these are housed in item 38 and 452 and should be driven out as a pair. NB. They are mounted back to back.
 - i) Clean seal housing and press in new seals back to back. Apply waterproof grease to O/D of seal before fitting and to seal tips after fitting.
 - j) Remove gasket shims from behind flange of (item 38 or 452) cap - clean up all mating faces, or add shim between cap (38 or 462) and bearing (51).
 - k) Bind masking tape around splines of prop shaft and form a lead onto the sealing diameter. Slide prop cap (item 38) onto shaft (11) over masking tape.
 - l) Offer up to leg casting (item 424 or 450) and check gap behind cap flange (item 38) and mating face, with bearings suitably loaded using a feeler gauge. Then make up the gasket shims to .005" less than the amount measured.
 - m) Refit items 11 and 38, fitting shim gaskets and sealing with Hermalite Instant Gasket.
 - n) Tighten up screws (items 87 and 88) evenly.
 - o) Lightly tap end of prop shaft (item 11) to seat.
 - p) Check for any side play and that the shaft will turn with a slight resistance.
 - q) If side play exists, remove shim gaskets, .005" at a time and repeat m to p. If shaft will not turn, add shim gaskets .005" at a time and repeat m to p.
 - r) Refill with Hypoid 90.
 - s) Reptace propeller.
- NB. If there is no gap behind cap flange (38 or 452) then it will be necessary to shim between bearing (51) and cap flange (38 or 452) until the desired pre-load is achieved. In this case use .005" steel shims, obtainable from Sillette.

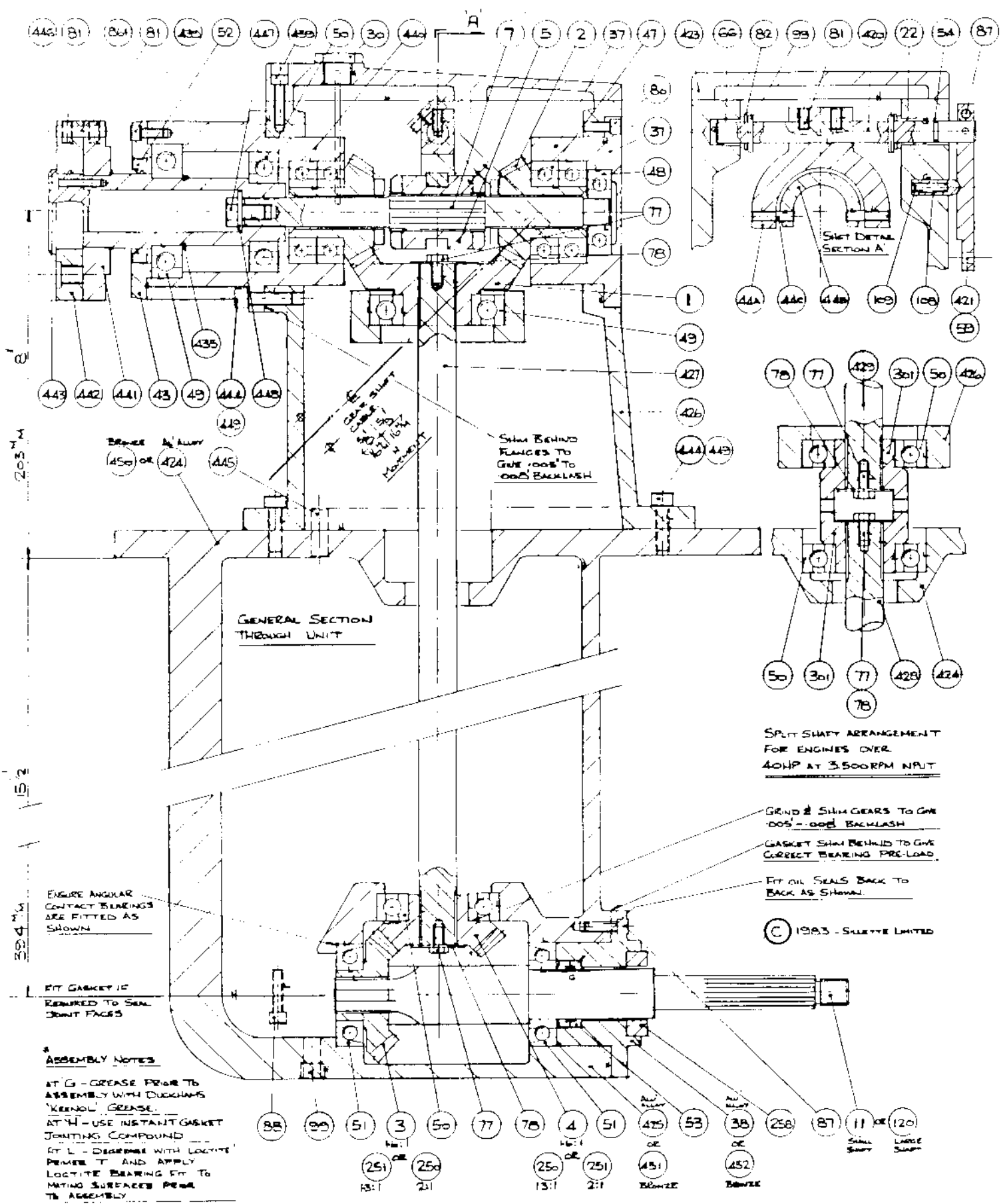
iii) CHECKING AND REPLACING SHEAR PIN / SHEAR KEY FITTED FROM 1992

The shear pin is a safety feature which should only fail if you over-load the sail drive or strike an obstruction with your propeller.

It is therefore essential that you carry shear pins on board and the tools to replace them.

The shear pin can, over a period of time assume a slightly distorted shape and if this occurs it is best replaced.

SONIC SAIL DRIVE MK1, with F.N.R. gearbox.



SPLIT SHAFT ARRANGEMENT FOR ENGINES OVER 40HP AT 3500RPM INPUT

- GRIND & SHIM GEARS TO GIVE .005" - .008" BACKLASH
- GASKET SHIM BEHIND TO GIVE CORRECT BEARING PRE-LOAD
- FIT OIL SEALS BACK TO BACK AS SHOWN

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ASSEMBLY NOTES

AT G - GREASE PRIOR TO ASSEMBLY WITH DUCKHAMS 'KEENOL' GREASE.

AT H - USE INSTANT GASKET JOINTING COMPOUND

AT L - DISMANTLE WITH LOCKITE PRIMER T AND APPLY LOCKITE BEARING FIT TO MATING SURFACES PRIOR TO ASSEMBLY.

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To check for distortion refer to Fig 11, this shows the correct position of the 2 shear pin retaining screws when the shear pin is in good order. If the screws are slightly out of position when the shear pin is distorted, if the screws are a long way out of position then the shear pin will have broken and you will have lost drive.

To replace the shear pin - first line up the coupling halves (411 and 442) so that the shear pin retaining screws (81) are in position as per Fig 11. Then remove the shear pin retaining screws (81) and drift out the shear pin using a $\frac{1}{8}$ " or 5/32" DRIFT. Clean out hole and check for ovality, lightly grease replacement pin and tap into position. Prime and Loctite the two retaining screws (81) and refit, making sure that they fully grip the shear pin.

NB. If the Dunlop 'Metalastic' coupling is fitted between Sail Drive and engine it will be necessary to remove it before replacing shear pin. If the 'Polymer' type coupling is fitted it can remain in situ whilst the shear pin is replaced.

From 1992 an $\frac{1}{8}$ " x $\frac{1}{4}$ " shear key is fitted, this is accessible from the circumference of flanges 442 and 441, and is also visible for checking distortion. To replace key simply unscrew 2 x 5/16" allen grub screws using 5/32" / 4 mm A/F Allen Key, ease out key, clean slot, slip in a replacement. Retain with the 2 x 5/16". Allen grub screws, apply loctite to threads to retain. With these models the metalastic coupling is used instead of the polymer type used previously.

iv) PROPELLER HANDING RELATIVE TO INPUT ROTATIONS

For detail on this point refer to Fig 12 which shows diagrammatically the relative rotations, prop hand and gear lever positions for four possibilities in the standard mounting situation, for optional reverse mounting the gear positions are reversed.

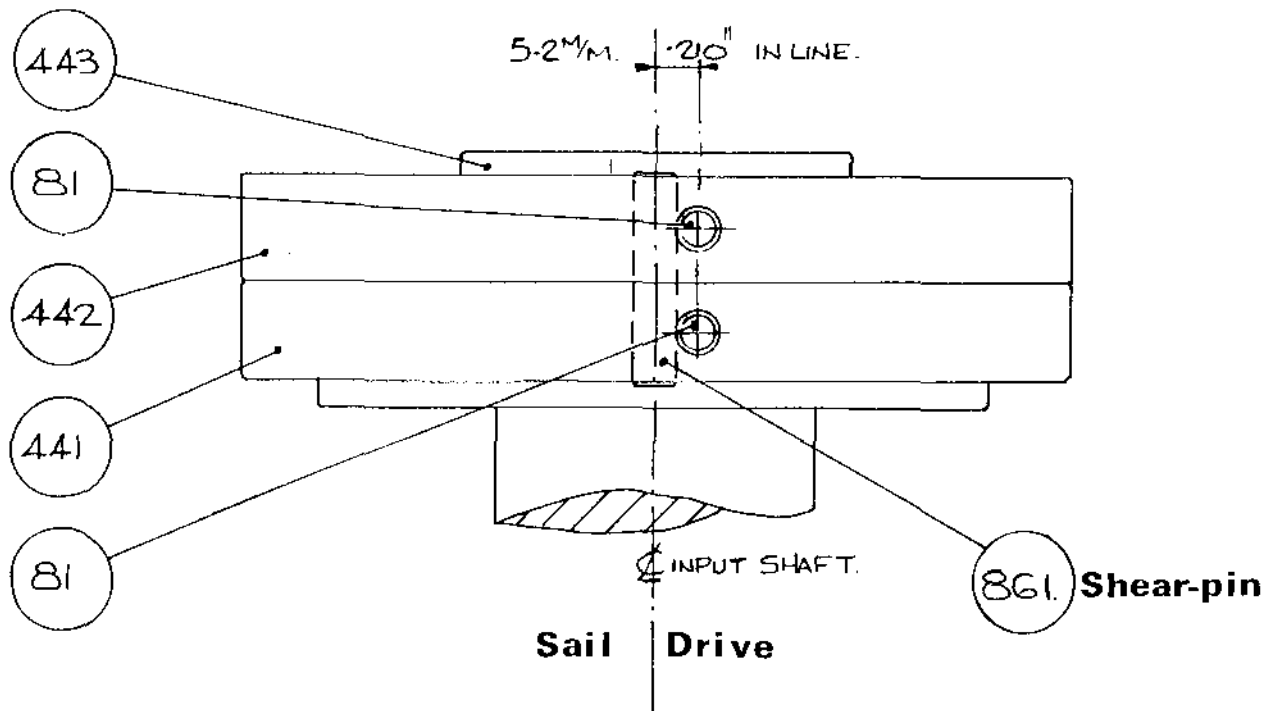
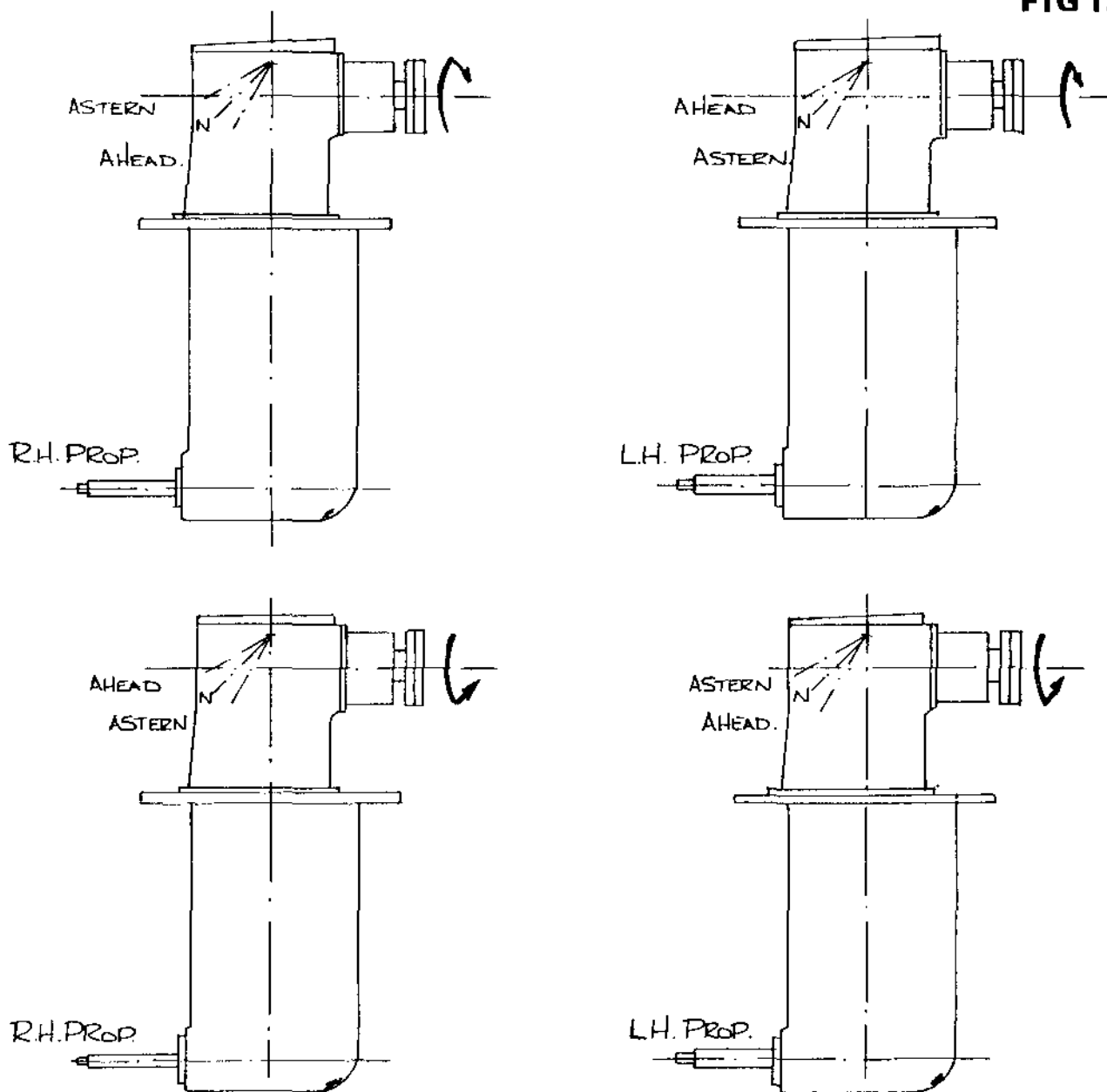


FIG 12



MK I F.N.R. SAIL DRIVE SPARES

<u>ITEM</u>	<u>DESCRIPTION</u>	<u>ITEM</u>	<u>DESCRIPTION</u>
1	UPPER GEAR	109	PLUNGER SPRING
2	AHEAD AND ASTERN PINION	120	LARGE PROP SHAFT 17SP
3	PROPELLER SHAFT GEAR 12SP	250/251	OPTIONAL 2:1 RATIO
4	VERTICAL SHAFT GEAR	252	NOSE CONE 12SP SHAFT
5	DOG CLUTCH	253	NOSE CONE 17SP SHAFT
7	DOG CLUTCH SHAFT	254	SPACER 12 SPLINE
11	PROPELLER SHAFT 13/16" Ø	255	SPACER 17 SPLINE
22	CLUTCH FORK SHAFT BUSH	256	TAB WASHER 12SP
30	FILLER PLUG	257	TAB WASHER 17SP
31	LOCK SCREW	258	ANODE - STD 2" Dia
32	LOCK PIN	260	PROP SHAFT GEAR 25+.HD
37	END BEARING HOUSING	261	VERT SHAFT GEAR 25+.HD
38	PROP CAP ALUMINIUM	301	DRIVING DOGS
43	BEARING CAP TRANSOM END	420	SELECTOR SHAFT
44	CLUTCH FORK	421	GEAR CHANGE LEVER
47	BALL RACE - 30	423	TOP COVER
48	BALL RACE - 17	424	LOWER UNIT ALUMINIUM
49	BALL RACE - 40	425	SKEG ALUMINIUM
50	BALL RACE - 35	426	UPPER UNIT
51	ANGULAR CONTACT BALL RACE	427	VERTICAL SHAFT
52	TRANSOM PLATE OIL SEAL	435	EXTERNAL CIRCLIP
53	PROPELLER SHAFT OIL SEAL	439	1/4" Ø x 1/2" ALLEN SCREW
54	SHAFT 'O' RING	440	INPUT BEARING HOUSING
59	TAPER RING	441	DRIVE FLANGE
66	1/2" HEADED NYLON BUSH	442	SHEARING PLATE
74	NAME PLATE	443	PLUG
77	BOLT HEX 3/4" x 1/2" LONG	444	5/16" Ø x 1 1/4" ALLEN SCREW
78	MUDGUARD WASHER	445	DOWEL
80	ALLEN SCREW BLACK 1/4" x 3/4" LONG	446	2 BA x 3/4" ALLEN SCREW
81	GRUB SCREW BLACK 1/4" x 1/2" LONG	447	3/8" x 5/8" HEX BOLT
82	1/2" WASHER	448	3/8" Ø WASHER
85	HAMMER DRIVE SCREW	449	5/16" Ø SPRING WASHER
86	OWNERS HANDBOOK	450	LOWER UNIT BRONZE
87	ALLEN SCREW STAINLESS 1/4" x 3/4" LONG	451	SKEG BRONZE
88	ALLEN SCREW STAINLESS 1/4" x 1" LONG	452	PROP CAP BRONZE
93	3/8" SPLIT PIN	453	ANODE - USE WITH RADICE/ GORI PROPS - for 17 spline
99	DRAIN PLUG	861	SHEAR PIN 3/16" Dia
108	GEARCHANGE PLUNGER	863	TAB PLATE
		887	SHEAR KEY 1/8" FLAT TYPE

MK I SONIC SAIL DRIVE ACCESSORIES

ALUMINIUM PROPELLERS FOR 12 SPLINE SHAFT

3 BLADED

LEFT HAND/RIGHT HAND

13 x 8 13 x 11 13 x 14 14 x 11 14 x 16
13 x 9 13 x 12 14 x 9 14 x 12 14 x 17 LH only
13 x 10 13 x 13 14 x 10 14 x 13

2 BLADED LEFT HAND ONLY

13 x 9
14 x 9

ALUMINIUM PROPELLERS FOR 17 SPLINE SHAFT

3 BLADED LEFT HAND/RIGHT HAND

14 x 9 14 x 13 15 x 12
14 x 10 15 x 9 15 x 13
14 x 11 15 x 10 15 x 14
14 x 12 15 x 11

2 BLADED LEFT HAND ONLY

14 x 7 15 x 9
14 x 8 15 x 11
14 x 9 15 x 13
14 x 10 16 x 11
16 x 13

FOLDING PROPELLER

-2 BLADE GEAR LINKED FOR 17 SPLINE SHAFT LEFT HAND ONLY

12½ x 8 15 x 10 16½ x 11
13 x 9 15 x 11 16½ x 13
14 x 9 15 x 12

MANGANESE BRONZE PROPELLERS TO FIT TAPER SHAFTS A OR B

TURBINE TYPE 3 BLADE E13 -.51 DAR

12" DIAMETER
13" DIAMETER
14" DIAMETER
15" DIAMETER

FINE 3 BLADE E12 -.43DAR

12" DIAMETER
13" DIAMETER
14" DIAMETER
15" DIAMETER
16" DIAMETER

SAILING 2 BLADE M12 -.23 DAR

12" DIAMETER
13" DIAMETER
14" DIAMETER
15" DIAMETER
16" DIAMETER

MOST PITCHES AVAILABLE TO ORDER - LEFT OR RIGHT HAND

DOUBLE FLEXIBLE COUPLING KIT WITH BOLTS.

Specify - Polymer or Metalastic type - Metalastic 1992 onward

VARIOUS ENGINE - GEARBOX ADAPTORS

ANODE TO FIT PROP THRUST HOUSING 258 & 453.

Specify bronze or aluminium lower unit.

STAINLESS STEEL BOLTS AND STUDDING VARIOUS LENGTHS 3/8" Ø/10 mm

ONBOARD SPARESKIT - ONBOARD TOOL KIT

ALSO AVAILABLE

- MORSE, STEERING SYSTEMS AND GEAR CHANGE CONTROLS
- MARINE CONVERSION PARTS
- MARINE ENGINES TO ORDER
- COMPLETE TRANSMISSION PACKAGES PETROL OR DIESEL

FROM **SILLETTE SONIC LTD**

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