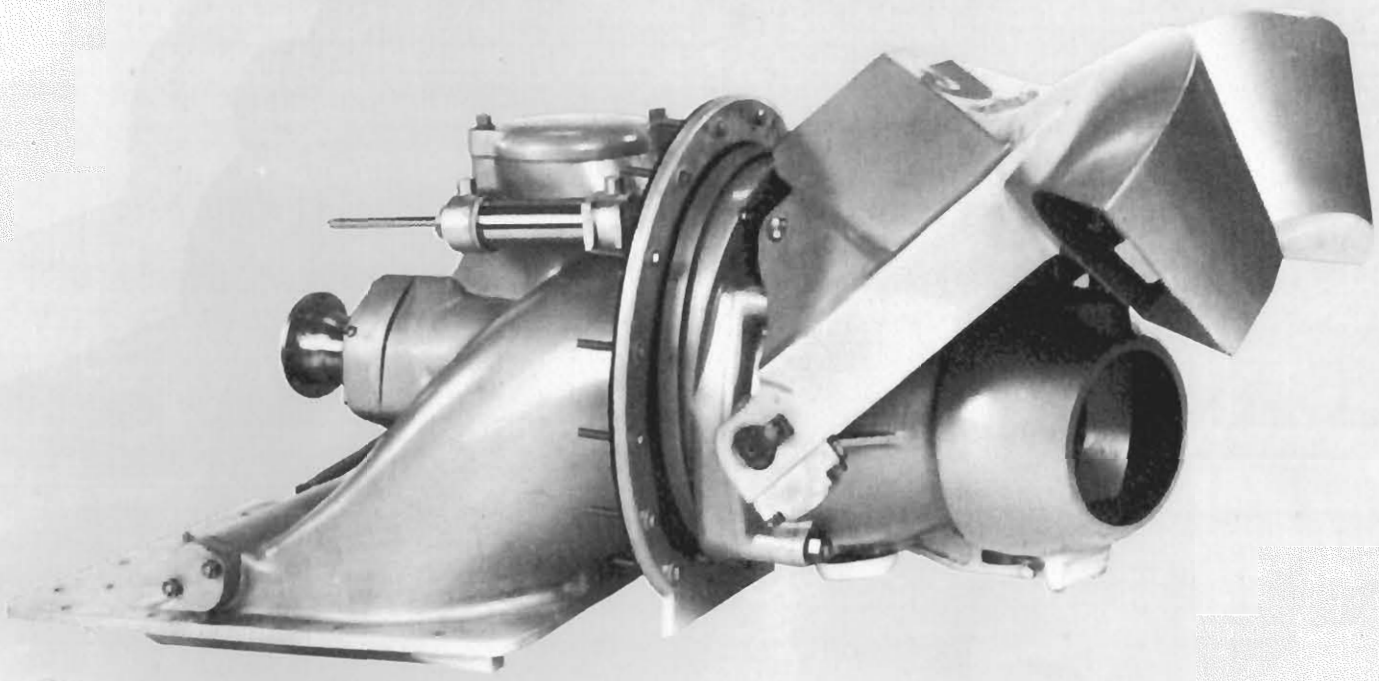
271 MASTER



HamiltonJet

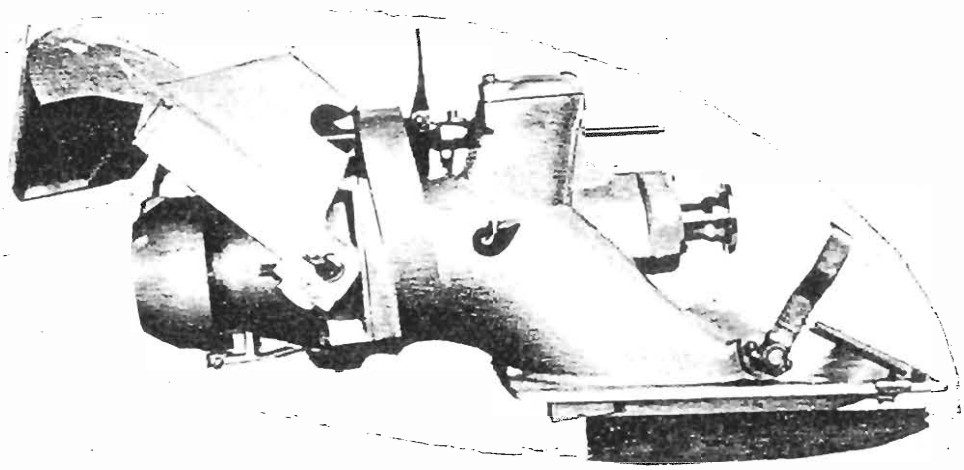
INSTALLATION & SERVICE MANUAL

271

HamiltonJet

MARINE PROPULSION UNITS

MODEL 27i



MODEL 271

INDEX

HamiltonJet

MODEL 271

The Hamilton 271 water jet is a highly efficient, axial-flow pumping unit which provides propulsive thrust from the reaction of the water jetstream being ejected rearwards. Normally driven by a diesel or gasolene marine engine, the unit can be used in planing and displacement craft or in a dual speed role as both loiter and high speed boost propulsion. Any number of water jets can be employed without loss of propulsive efficiency.

The water jet mounts inboard at the stern, drawing water through a reinforced opening in the hull bottom. Propulsive thrust generated is fully transferred through the jet intake to the hull - no thrust is transmitted through the driveshaft to the engine. The intake is protected by a highly developed screen which at planing speeds is largely self cleaning.

The pumping unit carries through the transom, where it is sealed with a flexible rubber seal, and discharges water directly aft through the outlet nozzle.

A single conical steering deflector aft of the nozzle deflects the water to port and starboard, giving powerful steering. Steering is manual hydraulic, activated via an inboard mounted tiller.

A hydraulically controlled thrust reversing deflector cuts the jetstream aft of the steering deflectors providing an infinite range of forward, zero or reverse manoeuvring speeds. Hamiltons Synchronised Reverse Control (HSRC) system gives fingertip reverse control. Full steerage is always available even at "zero speed".

By working the reverse and steering controls in unison a resultant thrust can be obtained in any direction giving 360 degree thrusting ability. In an emergency the reverse deflector can be lowered while underway acting as a powerful brake.

Designed and manufactured in corrosion resistant materials to international certifying authorities standards, the 271 is further protected by the fitting of large sacrifical anodes. The units are supplied as a complete package including steering and reverse systems with controls. A marine gearbox is not necessary, the water jet matches a large range of common diesel engines and is normally directly driven by a short driveline connecting to the engine flywheel.

SPECIFICATIONS

Configuration ..	Single stage axial flow.
Rotation	Left hand only (anti-clockwise looking at engine flywheel).
Casings	Cast LM6 aluminium alloy to BS1490 Q.C.
Mainshaft	70mm diam. SAF 2205 stainless steel.
Impeller	4 or 5 bladed, cast CF8M stainless steel to ASTM A296.
Thrust Bearing .	Grease lubricated ball type.
Tail Bearing ..	Water lubricated cutless bearing.
Corrosion Protection ...	Cathodic with anodes.
Std. Coupling Flange ..	120mm diam., 8 bolt.
Unit Weight Dry	115 kg
Entrained Water Weight .	35 kg
H.S.R.C. Controls Weight	6.3 kg
Aluminium Intake Block Weight	14 kg
Steering System	Manual hydraulic.
Reverse System	H.S.R.C. system - synchronised control over power assisted hydraulics.
Mounting	Conventional inboard.
Transom Angle	12 ± 1°

STANDARD EQUIPMENT

Impeller and Nozzle to match engine.

Installation Kit.

Single station HSRC Reverse Control system with vee belt drive hydraulic power unit.

Single station Manual Hydraulic Steering System.

Transom Seal assembly.

Heavy duty aluminium bar Intake Screen.

Cathodic protection with anodes.

Inspection Hatch - inboard.

Outboard Water Offtake.

Jet and HSRC System Manuals.

OPTIONAL EQUIPMENT

Joystick reverse with D.C. E.H.P.U.

Intake Raking Screen - kick down operated.

Dual station steering and reverse controls.

Multiple Jet Reverse Controls.

Kit for hydraulic operation of raking screen.

Steering and Reverse Position Indicator Kit.

Universal and Tortionally Flexible Driveshaft systems.

Flywheel or Gearbox Flange Adaptor Plates.

Certification (ABS, Lloyds, etc).

Coupling Flange to suit Hardy Spicer 1550 series Universal Driveshaft.

Steering Kit for Catamarans.

On-board Spares Kit.

Special Tools Kit.

HamiltonJet

PLANING SPEED CRAFT (Over 20 knots)

- Plan for a minimum of 25 knots (laden speed) for good propulsive efficiency.
- Monohedron (constant deadrise) hull shape preferred (being directionally stable without the addition of appendages) with deadrise angles greater than 8° (to avoid air entry to the jet).

	Single Jet	Twin Jet	Triple Jet
Maximum recommended boat displacement ::::::	5 Tonnes	11 Tonnes	17 Tonnes
Minimum recommended power/weight ratio :::::	·41 kW/Tonne (55 hp/Tonne)	37 kW/Tonne (50 hp/Tonne)	34 kW/Tonne (45 hp/Tonne)
Maximum continuous power input (per jet) ::::	225 kW (300 hp)		

SEMI-PLANING SPEED CRAFT (10-20 knots)

- Hull resistance for some craft can be extremely high in this speed region and C.W.F. Hamilton & Co Ltd should be consulted in all cases.
- Long narrow hulls are suitable including multi-hulls.
- In general best results will be obtained using less input power with lighter displacements than is recommended for planing craft above. Example : For a single jet use up to 150 kW (200 hp) at up to 3 tonnes displacement.

DISPLACEMENT SPEED CRAFT (under 10 knots)

- A conventional vee'd stem bow with a minimum deadrise of 5° is recommended to avoid air entry into the jet.
- Minimum jet immersion is with the waterline just below the mainshaft - see pages E1 and F6.
- For displacement speed hulls, speed depends more on efficient hull shape than displacement or input power. The following displacements can be at least doubled for long narrow easily driven craft.
- Best efficiency will be obtained using low input power at, or below the crafts natural displacement speed.

	Single Jet	Twin Jet	Triple Jet
Recommended maximum displacement ::::::::::	8 Tonnes	18 Tonnes	30 Tonnes
Maximum recommended power input ::::::::::::	110 kW (150 hp) per jet		

MULTIPLE SPEED CRAFT

- Because engine overload does not occur and appendage drag is eliminated, 271 water jets are a simple solution to multiple speed capability whether mixed with water jets or other propulsors.
- Follow the guidelines for Planing and/or Displacement Speed Craft as appropriate.

N O T E : The above Scope of Use is only a guide :-

If the application is outside any of the above limits, it is most important to seek the detailed advice of C.W.F. Hamilton & Co Ltd before proceeding. We will be happy to advise on the available options.

HamiltonJet

Where bare hull resistance (no appendages) is known this can be plotted directly against the jet thrust curves. (Divide the hull resistance by the number of jets before plotting).

Compare the inter-section of hull resistance and jet thrust curves with speed to estimate the unknown factor.

NOTE :-

If hull resistance is not known, supply the following to C.W.F. Hamilton & Co Ltd for an estimate :- displacement laden and unladen; LWL (water line length); maximum chine beam and the deadrise both amidships and at the transom.

REVERSE THRUST - is from 55% of forward thrust at light throttle to 45% at high throttle openings.

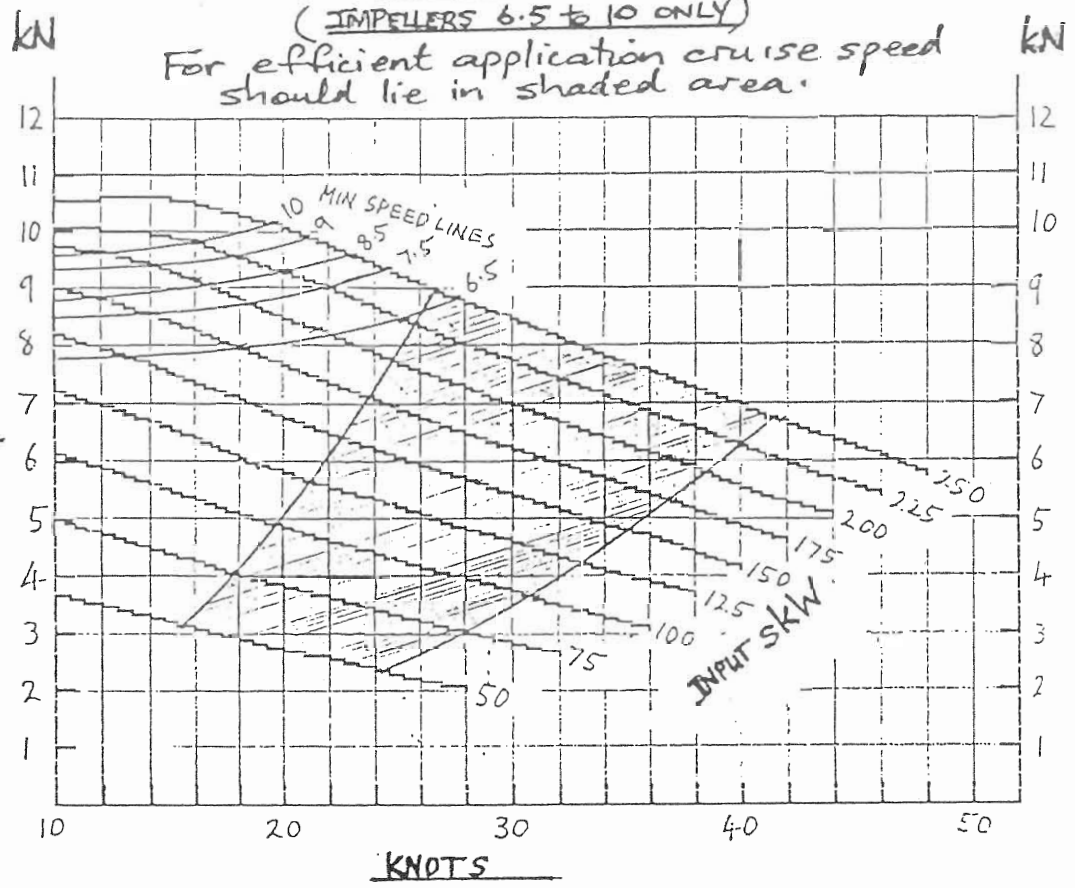
STEERING THRUST - at right angles to the craft is up to 40% of forward thrust at full lock and is available at all speeds from full astern through to full ahead including at zero speed.

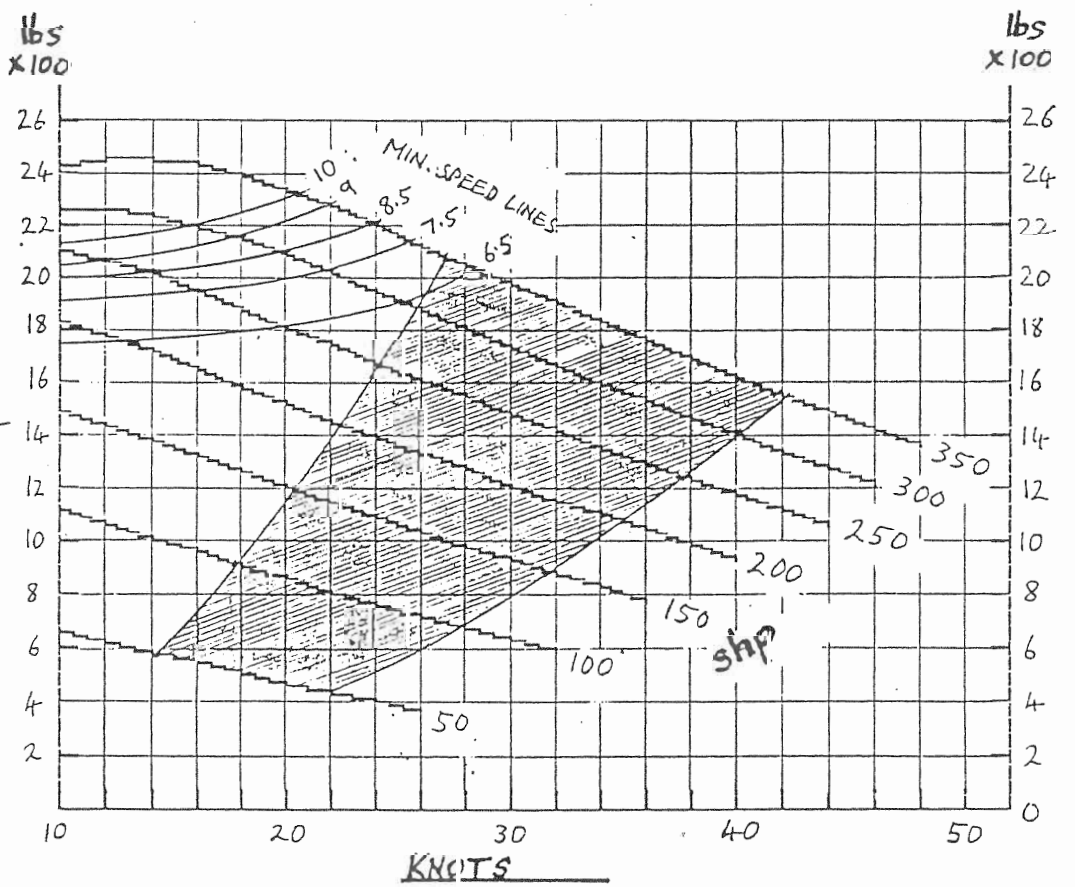
271 DYNAMIC THRUST

1/8/88

145 NOZZLE
(IMPELLERS 6.5 to 10 ONLY)

For efficient application cruise speed should lie in shaded area.



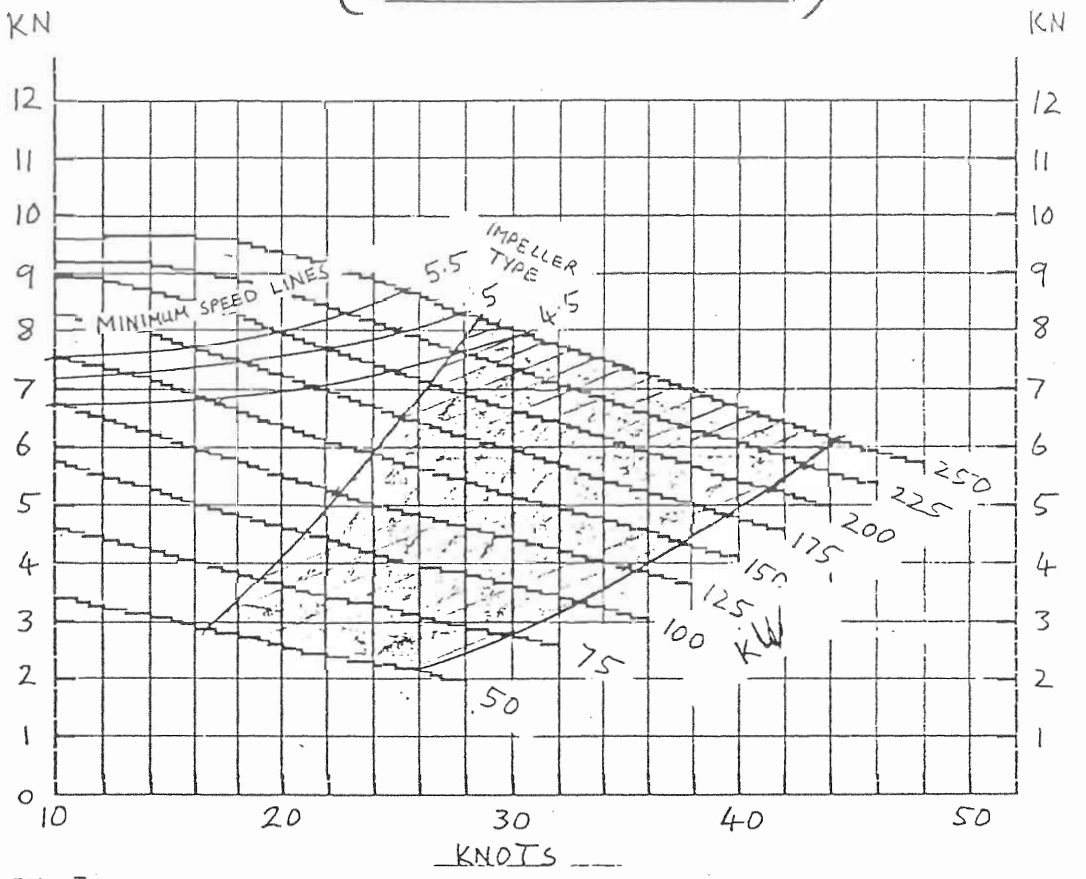


271 DYNAMIC THRUST

3/8/88

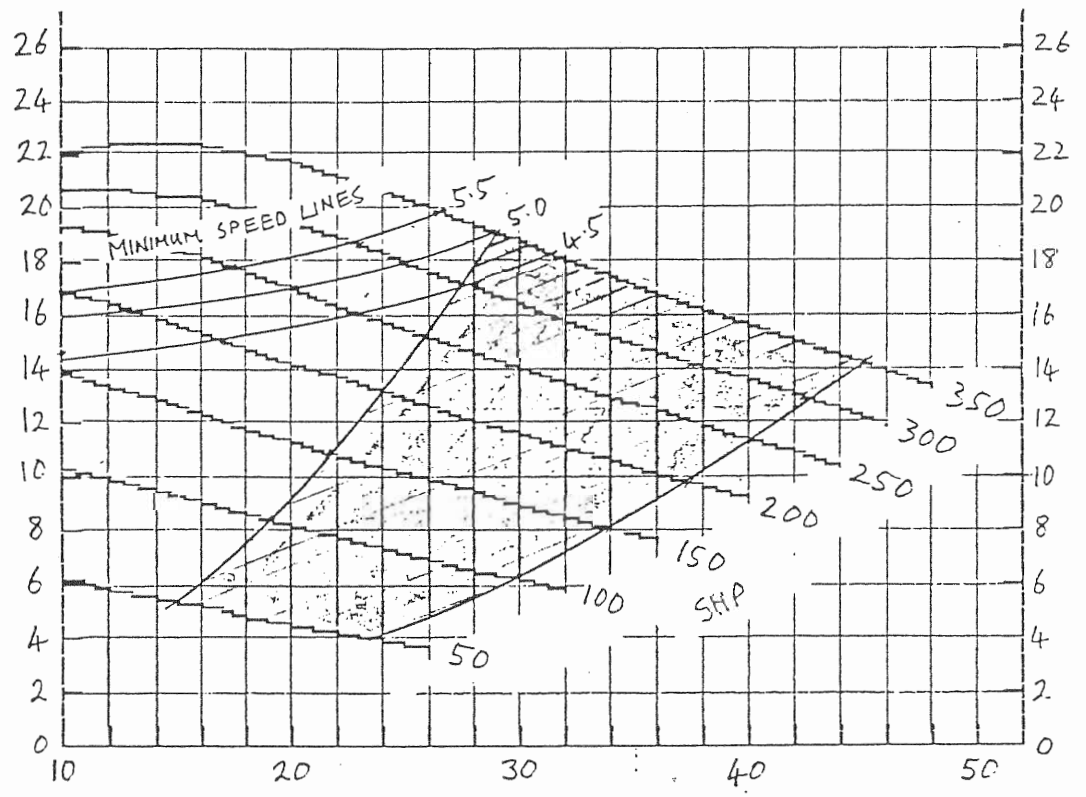
130 NOZZLE

(IMPELLERS 4·5 to 6·5 ONLY)



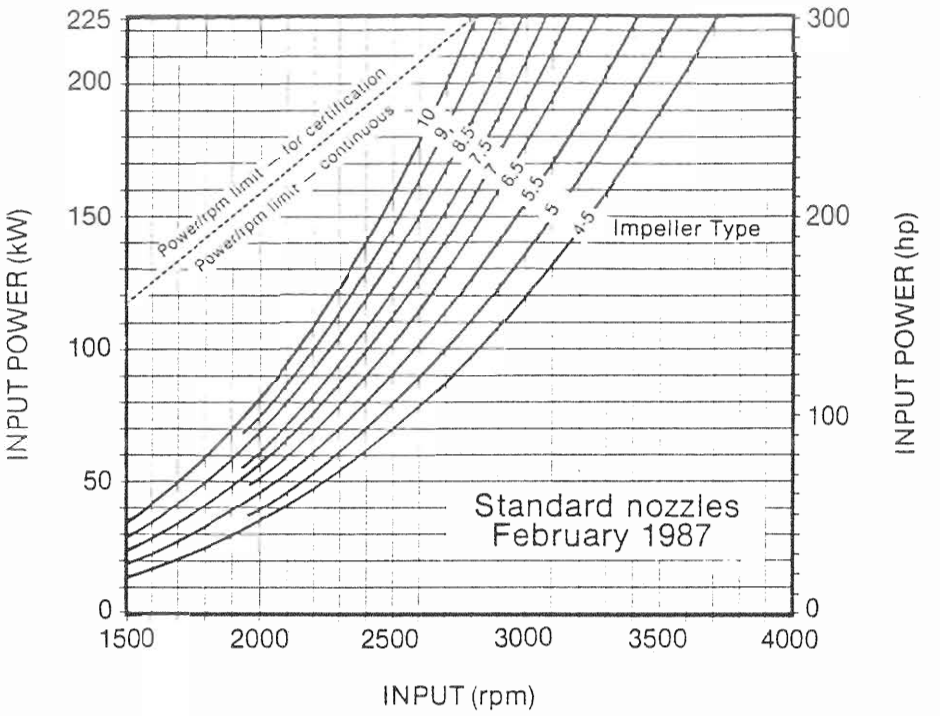
THRUST LBS x100

SHADED AREA = EFFICIENT APPLICATION



SHADED AREA = EFFICIENT APPLICATION

POWER/RPM CURVES



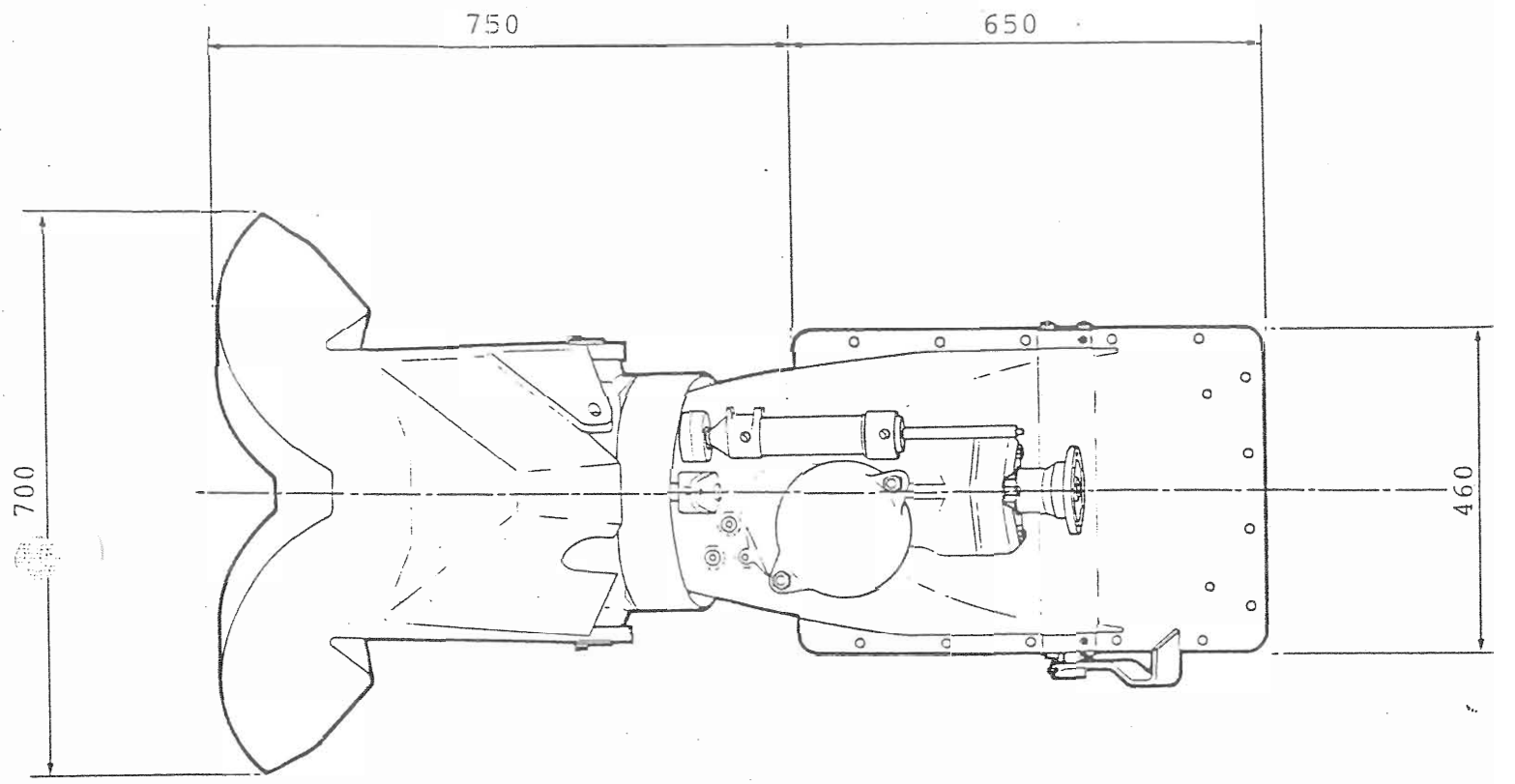
The engines maximum flywheel power/rpm output (or shaft output if a gearbox is used) should lie within the area between the types 4.5 and 10 impellers.

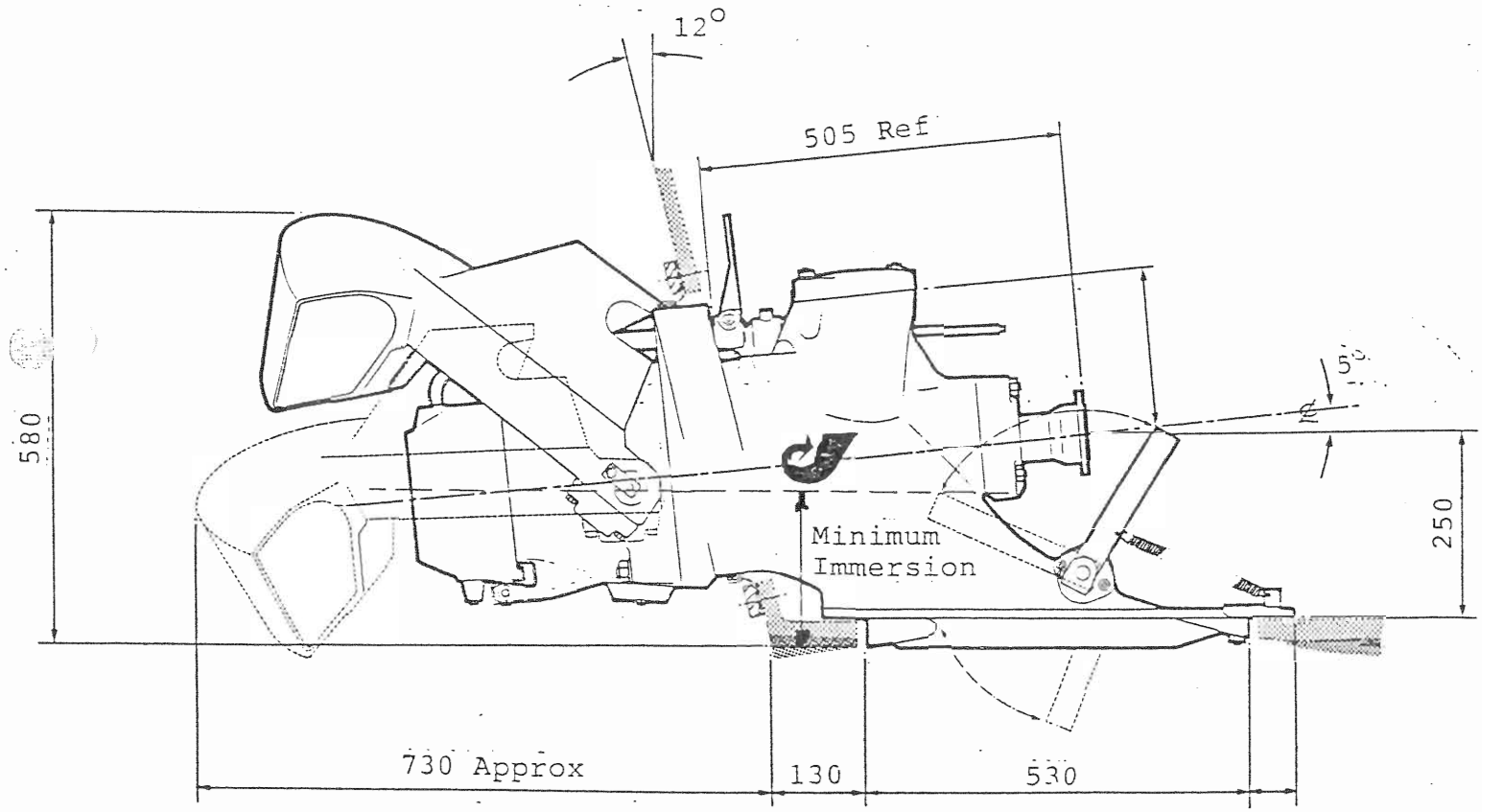
TYPICAL MATCHING ENGINES

These are direct drive matchings - a gearbox is not necessary. Many other matchings are possible both with and without use of a gearbox.

PLANING SPEED CRAFT :	RATED MAX. KW (HP)/RPM
Diesel - Baudouin 6F11SRM	225(306)/3000
Caterpillar 3208T	239(320)/2800
Cummins 6BTA 5.9-M	186(250)/2600
Detroit 8.2T	187(250)/3200
Ford 2728 TIM	149(200)/2450
Perkins Range 4 240	164(220)/2600
Volvo TAMD 61A	225(306)/2800
Gasolene - 7.4 litre (454-460 c.i.d.) V8	Typically - 224(300)/

DISPLACEMENT SPEED CRAFT :	
Caterpillar 3208NA	112(150)/2400
Detroit 4-53	80(107)/2400
Ford 2723	77(103)/2500
Perkins Range 4 135	84(114)/2500





Scale 1:10

HamiltonJet

PLANING GUIDE (Planing Craft)

1. IS THE HULL SHAPE SUITABLE - refer "HULL SHAPE GUIDE" (page F2).

2. DETERMINE REQUIRED POWER/WEIGHT RATIO - refer "SPEED GUIDE TABLE" (page F3). Knowing the speed required and the approximate W.L.L. read off the required power/weight ratio.

3. ESTIMATE THE BOATS AUW (APPROXIMATELY).

4. REQUIRED TOTAL HP = Power/Weight Ratio x AUW.

5. CHECK THAT 271 JET(S) ARE SUITABLE - The maximum AUW's for the 271 Jet(s) in planing craft are :-

Single 271 Jet	-	5 Tonnes max AUW
Twin 271 Jets	-	11 Tonnes max AUW
Triple 271 Jets	-	17 Tonnes max AUW

If the customers requirements give an AUW outside these limits then either :-

(a) a lightened boat AUW is necessary; or

(b) larger jet(s) are required.

6. DETERMINE SUITABLE ENGINE - refer engine selection table (Page D1). Divide the "Required total hp" by the number of engines to be used to determine required hp of each engine. From the Table of Matching engines for the choosen jet select an engine of hp equal to or greater than that required.

NOTE : It may be necessary to select a different model of jet than indicated by the above planning just to match the customers choice of engine. In this case re-check the AUW is within the capability of this jet or jets. If the desired engine does not appear in the table consult C.W.F. Hamilton & Co Ltd.

7. RE-CHECK SPEED - Re-estimate AUW knowing actual weights of the selected engine(s) and jet(s). Determine :-

$$\text{Power/weight ratio} = \frac{\text{Total input hp}}{\text{AUW}}$$

From Power/Weight ratio and boat's W.L.L. check predicted speed on "SPEED GUIDE TABLE". This should exceed the desired speed to allow a performance margin.

8. MORE ACCURATE SPEED ESTIMATE - The above planning is a guide to performance. Having selected the engine and jet combination and finalised AUW etc, a more accurate speed estimate can be made by comparing the boats hull resistance with the jet thrust.

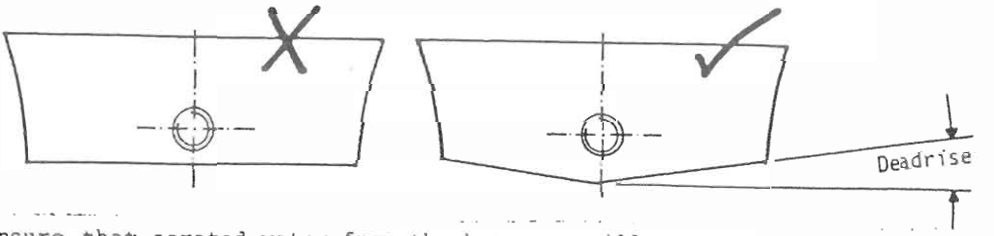
If hull resistance is not known supply the following information to C.W.F. Hamilton & Co Ltd for an estimate :-

- OAL
- WLL
- Max. Chine Beam
- Deadrise Amidships
- Deadrise at Transom

9. INSTALLATION DATA - If the above planning gives a suitable solution consult Section G for hull preparation and installation data.

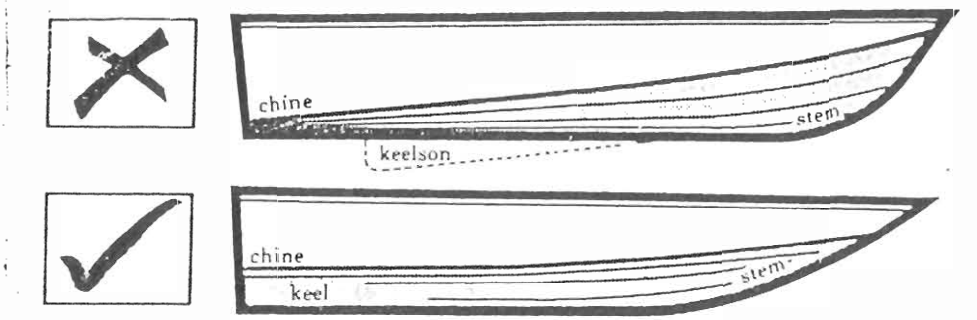
10. IF IN DOUBT - CONSULT C.W.F. HAMILTON & CO LTD.

Some DEADRISE angle in planing hulls is desirable. 10° minimum is recommended.



This will ensure that aerated water from the bow wave will not enter the jet unit causing slip and loss of power.

Monohedron lines are recommended i.e. chine and keel parallel, at least over the planing area.



Monohedron - constant deadrise or vee angle.

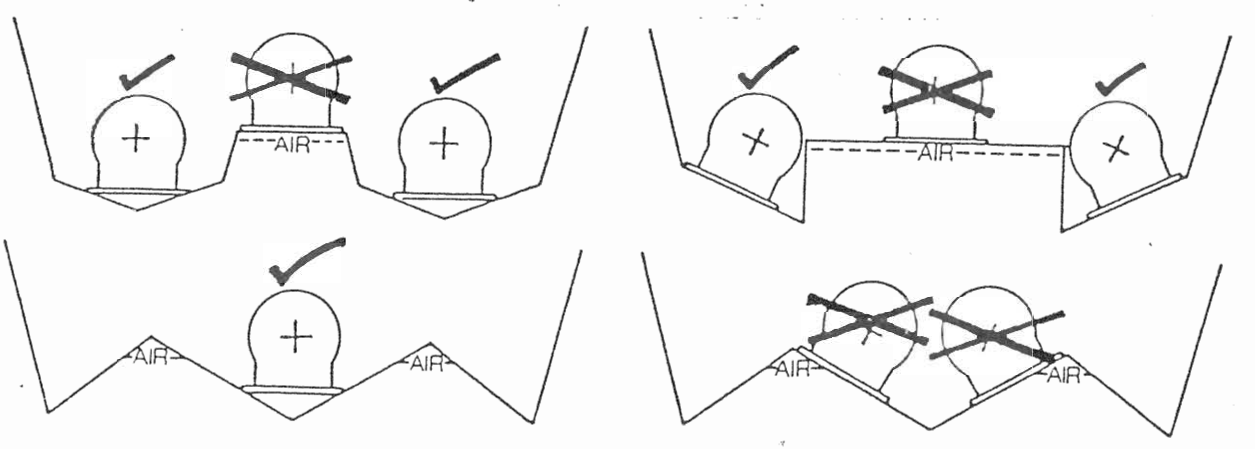
The STEM should be easy rising as a deep, fine forefoot can cause steering problems if the hull has any tendency to ride flat.

There must be NO KEEL, RUDDER, PLANING STRAKES OR ANY OTHER UNDERWATER APPENDAGES FOR AT LEAST 2m (7 ft) IN FRONT OF THE JET INTAKE. Such protrusions from the hull can interrupt water flow and divide water away from the intake. Strakes and/or keels outside the intake area are acceptable.

To ensure that the static draught is sufficient to PRIME THE JET UNIT, water must reach at least to the level of the main shaft when the boat is at rest.

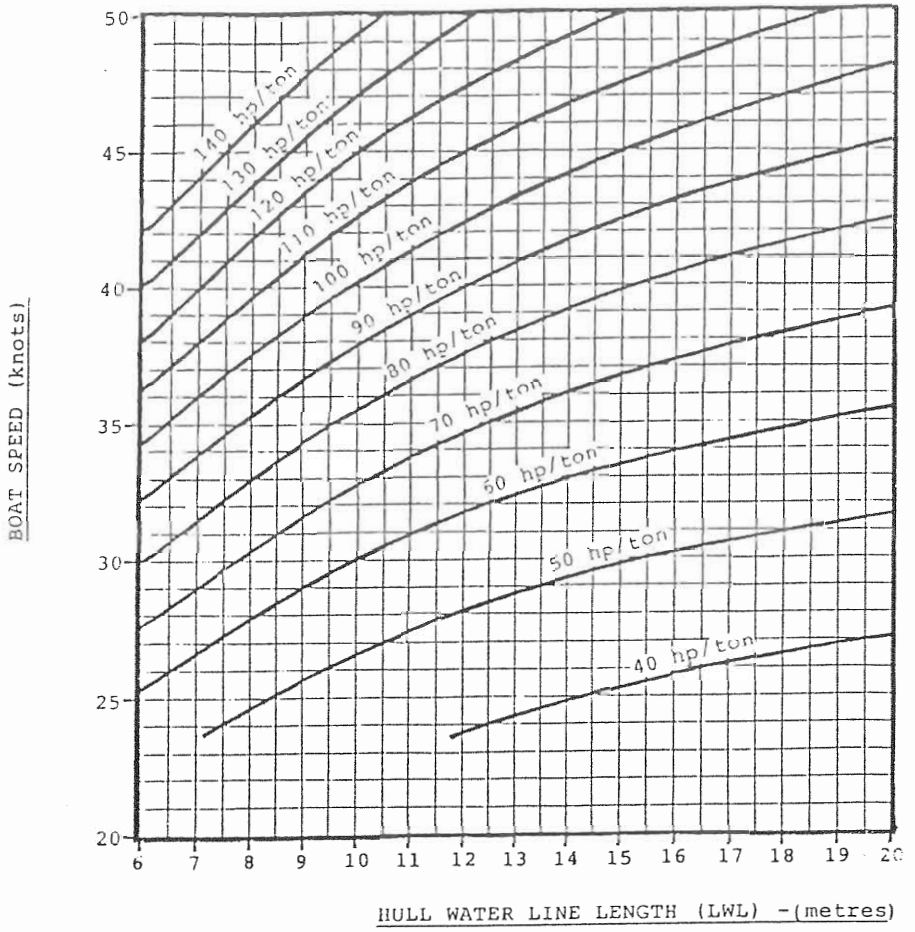
MULTI-HULLS

Jets can be fitted in catamaran or trimaran hulls. Air entrainment between the hulls is part of the function of these craft in order to reduce hull resistance. Care must be taken that this entrained air does not enter the jet intake(s). This is alleviated if the hulls are deep in relation to the air tunnels so that the jet(s) when mounted in the hull(s) sit well down in the water. The reverse duct of the jet, when in the "up" (ahead) position must not project beyond the sidewalls of a catamaran or trimaran hull otherwise substantial drag may be caused.



HamiltonJet

GUIDE TO PLANING SPEEDS



NOTES :-

- This table should be used as a guide only for conventional monohedron planing hulls. For a more accurate speed estimate compare hull resistance with jet thrust.
- Water jet efficiency improves when craft displacement is less than the maximum recommended for each jet (or jets) - see Scope of Use, page B1.
- Water jet efficiency improves with speed. Plan for a minimum speed of 25 knots with directly driven water jets.

To determine input power required :-

- Plot the point of intersection of the hulls LWL and the required speed.
- Read off the Power/displacement ratio at that point.
- The total input power required is then :- Power/displacement ratio x estimated displacements.
- To determine the number of jets refer to "Scope of Use", planing craft, recommended maximum displacements page B1.
- To determine engine power required : divide the total hp required by the number of jets.

(Alternatively with a given power input use the sequence in reverse to determine estimated speed).

Note :- Due to design differences other than the four factors considered this chart will not provide a completely accurate speed estimate.

HamiltonJet

PLANING GUIDE (Displacement Craft)

1. GENERAL - The 271 Jet will give acceptable propulsion efficiencies when used in displacement speed craft with easily driven fine lines (preferred length/beam ratio 5:1 or more) provided only moderate power input is used e.g. up to 80 kW (110 hp). However, continuous inputs up to 110 kW (150 hp) can be used where shallow draft and/or very high degree of manoeuvrability are the prime requirements.

   Flat bottomed craft can be jet propelled at displacement speed but a vee'd bow and/or some deadrise is always preferable.

   Do not attempt to drive a pure displacement speed hull shape beyond natural displacement speed (refer page F5) with directly driven jets - a semi-planing or planing hull should be used.

2. ESTIMATE LIKELY CRAFT SPEED - Refer to "SPEED GUIDE TABLE" page F5. Plot W.L.L. against low, medium or high resistance and read off likely natural displacement speed.

3. DETERMINE THE POWER/WEIGHT RATIO - To reach the crafts natural displacement speed and obtain good manoeuvrability use between :-

   - 5 hp/ton - for low resistance full displacement shape designs, especially with length/beam ratios of 5:1 or more; and

   - 15 hp/ton - for high resistance hulls that are poorly shaped for displacement speeds.

4. ESTIMATE THE BOATS AUW (approximately).

   REQUIRED TOTAL HP = Power/Weight ratio x AUW.

6. CHECK THAT 271 JET(S) ARE SUITABLE - For reasonable efficiency and good manoeuvrability the following AUW limits are a guide for displacement speed craft:-

   Single 271 Jet - 8 Tonnes
   Twin 271 Jet - 18 Tonnes
   Triple 271 Jet - 40 Tonnes

   Note however, that weight is not as critical for displacement speed craft, speed depending more on hull shape. Thus with easily driven long, narrow boats and barges the above weights can be doubled or even trebled.

   If the customers requirements give an AUW outside the above limits then either :-

   (a) a lighter and/or longer narrower boat is required to suit the 271 jet(s); or

   (b) larger jet unit(s) are required.

7. DETERMINE SUITABLE ENGINE - Refer engine selection tables page D1 for displacement speed craft. Divide the "Required total hp" by the number of engines to be used to determine required hp of each engine. From the Table of Matching engines for the choosen jet select an engine of hp equal to or greater than required. Note power input recommendations in 1. above.

   NOTE : It may be necessary to select a different model of jet than indicated by the above planning just to match the customers choice of engine. In this case re-check the AUW is within the capability of this jet or jets.

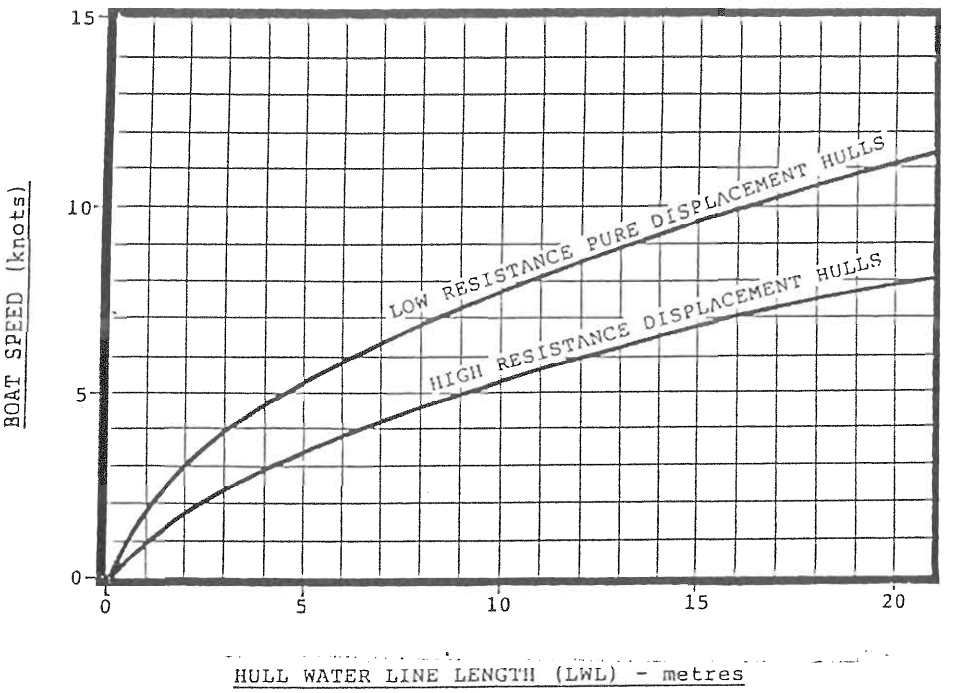
   If the desired engine does not appear in any of the tables consult C.W.F. Hamilton & Co Ltd.

8. MORE ACCURATE SPEED ESTIMATE - The above planning is a guide to performance. Having selected the engine and jet combination and finalised AUW etc, a more accurate speed estimate can be made by comparing the boats hull resistance with jet thrust. (Refer to the Owner's Manual of selected jet model for thrust data). It may be necessary to consult a Naval Architect to estimate hull resistance for a displacement speed craft.

9. INSTALLATION DATA - If the above planning gives a suitable solution refer to "INSTALLATION" page F6.

10. IF IN DOUBT - consult C.W.F. Hamilton & Co Ltd.

GUIDE TO NATURAL DISPLACEMENT SPEEDS



INSTALLATION NOTES (Displacement Craft)

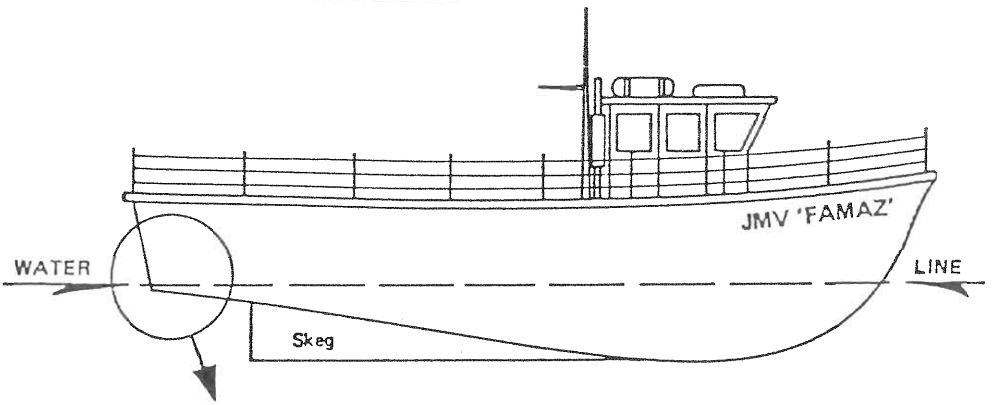
1. The jet unit is installed generally as for planing speed craft.

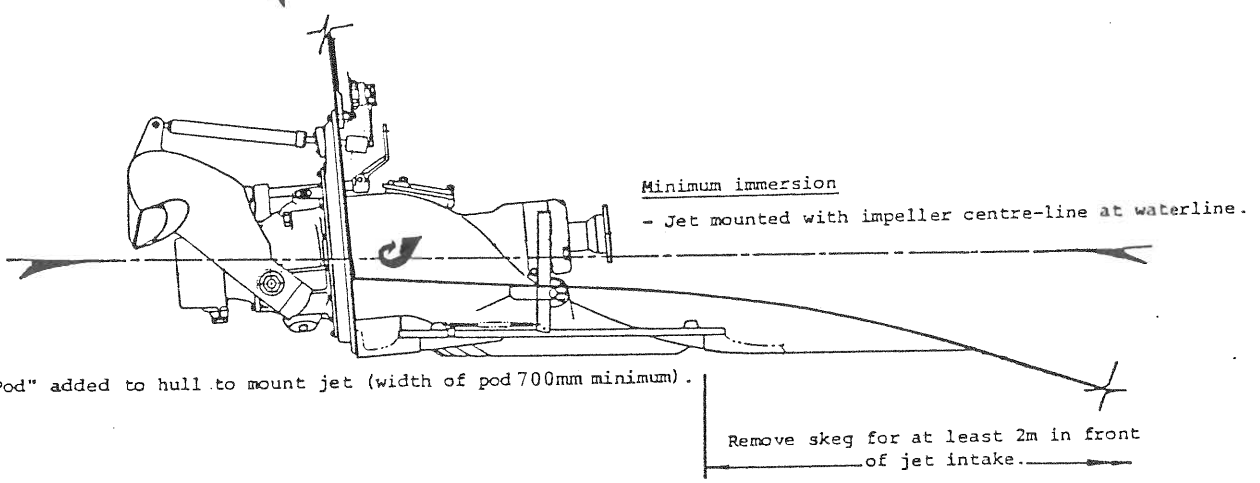
2. The jet can be installed completely submersed - it does not matter whether the jetstream exists into air or water.

3. There must not be any keel, rudder, strakes or other appendages for at least 2m (7') in front of the jet intake.

4. For hulls with low transom immersion hull modification may be necessary so that the jet can be immersed sufficiently to prime. Refer sketches below.

DISPLACEMENT SPEED HULLS - WITH LOW TRANSOM IMMERSION

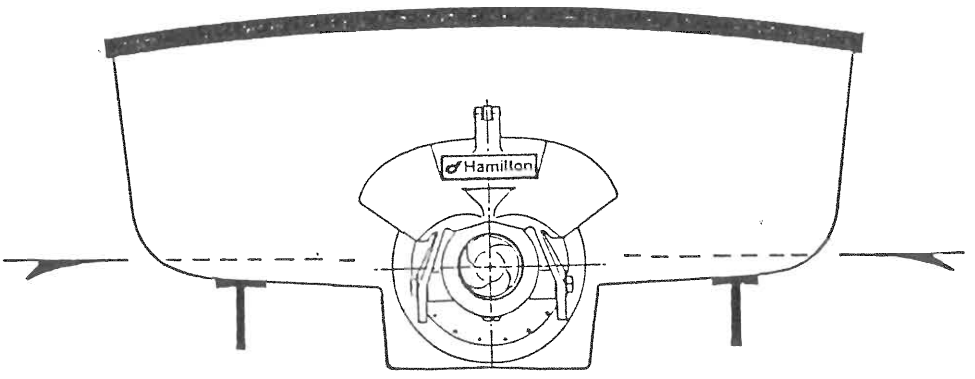




NOTES :-

- Engine should be installed in same position as it would be for a propeller installation or slightly aft of that position, which will improve priming of the jet.

- If more keeling is desired twin keels abeam of the intake is acceptable. (See sketch below).



TWIN BILGE KEELS (optional)

HamiltonJet

PERFORMANCE CHECK

If the application is outside the limits outlined in this manual OR if a check on your design proposal is required, complete the following details and forward to C.W.F. Hamilton & Co Ltd.

Hull resistance curve attached : Yes No

Drawing and/or Photograph of hull attached : Yes No

If the hull resistance curve is not available, quote the following :-

Max. Laden Displacement : .....

Waterline Length : .....

Max. Chine Beam : .....

Deadrise Angle Amidships : .....

Deadrise Angle Transom : .....

Required Speed(s) : .....

Proposed Engine(s) : .....

Make and Model : .....

Number of Engines : .....

* Max. Intermittent Rating (kW/rpm) : .....

* Max. Continuous Rating (kW/rpm) : .....

* For engine ratings state nett output at flywheel or if a gearbox is proposed, the shaft output kW/rpm.

TO ORDER

Complete the above "Performance Check" details in full.

Certification required : Yes No

State Authority : .....

Hull Construction : Wooden GRP Aluminium Steel

State other : .....

Single Jet Twin Jet Triple Jet

Distance between jet centres : (multiple installatins only) .....

Ships Voltage : 24V D.C. 12V D.C.

Standard "HSRC" Reverse Control required : (refer pages I9, I10) Yes No

OR state option :

Twin jet controller.

Single lever (combined throttle and reverse) controller.

Dual station steering and reverse controls required : Yes No

Flywheel adaptor(s) required to suit engine(s) listed above : Yes No

Driveshaft(s) required : (indicate type below - refer to pages H2, H3) Yes No

Double Universal Driveshaft Tortionally Flexible Type

Tortionally Flexible Flywheel Coupling for above.

Distance between engine flywheel (or gearbox flange) and jet coupling : .....

On-board spares required : Yes No

PERFORMANCE CHECK

If the application is outside the limits outlined in this manual OR if a check on your design proposal is required, complete the following details and forward to C.W.F. Hamilton & Co Ltd.

Hull resistance curve attached : Yes No

Drawing and/or Photograph of hull attached : Yes No

If the hull resistance curve is not available, quote the following :-

Max. Laden Displacement : .....

Waterline Length : .....

Max. Chine Beam : .....

Deadrise Angle Amidships : .....

Deadrise Angle Transom : .....

Required Speed(s) : .....

Proposed Engine(s) : .....

Make and Model : .....

Number of Engines : .....

* Max. Intermittent Rating (kW/rpm) : .....

* Max. Continuous Rating (kW/rpm) : .....

* For engine ratings state nett output at flywheel or if a gearbox is proposed, the shaft output kW/rpm.

TO ORDER

Complete the above "Performance Check" details in full.

Certification required : Yes No

State Authority : .....

Hull Construction : Wooden GRP Aluminium Steel

State other : .....

Single Jet Twin Jet Triple Jet

Distance between jet centres : (multiple installatins only) .....

Ships Voltage : 24V D.C. 12V D.C.

Standard "HSRC" Reverse Control required : (refer pages I9, I10) Yes No

OR state option :

Twin jet controller.

Single lever (combined throttle and reverse) controller.

Dual station steering and reverse controls required : Yes No

Flywheel adaptor(s) required to suit engine(s) listed above : Yes No

Driveshaft(s) required : (indicate type below - refer to pages H2, H3) Yes No

Double Universal Driveshaft Tortionally Flexible Type

Tortionally Flexible Flywheel Coupling for above.

Distance between engine flywheel (or gearbox flange) and jet coupling : .....

On-board spares required : Yes No

HamiltonJet

PERFORMANCE CHECK

If the application is outside the limits outlined in this manual OR if a check on your design proposal is required, complete the following details and forward to C.W.F. Hamilton & Co Ltd.

Hull resistance curve attached : Yes No

Drawing and/or Photograph of hull attached : Yes No

If the hull resistance curve is not available, quote the following :-

Max. Laden Displacement : .....

Waterline Length : .....

Max. Chine Beam : .....

Deadrise Angle Amidships : .....

Deadrise Angle Transom : .....

Required Speed(s) : .....

Proposed Engine(s) : .....

Make and Model : .....

Number of Engines : .....

* Max. Intermittent Rating (kW/rpm) : .....

* Max. Continuous Rating (kW/rpm) : .....

* For engine ratings state nett output at flywheel or if a gearbox is proposed, the shaft output kW/rpm.

TO ORDER

Complete the above "Performance Check" details in full.

Certification required : Yes No

State Authority : .....

Hull Construction : Wooden GRP Aluminium Steel

State other : .....

Single Jet Twin Jet Triple Jet

Distance between jet centres : (multiple installatins only) .....

Ships Voltage : 24V D.C. 12V D.C.

Standard "HSRC" Reverse Control required : (refer pages I9, I10) Yes No

OR state option :

Twin jet controller.

Single lever (combined throttle and reverse) controller.

Dual station steering and reverse controls required : Yes No

Flywheel adaptor(s) required to suit engine(s) listed above : Yes No

Driveshaft(s) required : (indicate type below - refer to pages H2, H3) Yes No

Double Universal Driveshaft Tortionally Flexible Type

Tortionally Flexible Flywheel Coupling for above.

Distance between engine flywheel (or gearbox flange) and jet coupling : .....

On-board spares required : Yes No

HamiltonJet

BASIC INSTALLATION DATA AND DRAWING REFERENCES

G.R.P. or Wooden Hulls :

A G.R.P. "Intake Moulding Block" (part number 105471) is supplied with the installation kit for fibreglass and wooden hulls. It can either be fitted in the hull mould prior to moulding or inserted into a prepared opening in an existing hull to mould the correct shape for mounting the jet unit intake through the hull bottom.

Refer to the following installation drawings for fibreglass hulls at the rear of the manual :

- 105742 - Hull Preparation
- 105743 - Installation Information

Aluminium Hulls :

An "Intake Block" manufactured in marine grade aluminium (part number 105744Y) is supplied ready to weld into a prepared opening in the hull bottom for port or starboard jets. For centrally mounted jets however, the block must be machined to match the hull deadrise angle.

Refer to the following installation drawings at the rear of the manual :

- 105744Y - Intake Block
- 105745 - Hull Preparation
- 105746 - Installation Information

Steel Hulls :

A steel "Intake Block" (part number 105747Y) is supplied (or can be fabricated by the boat builder, if desired) to weld into a prepared opening in the hull bottom. An insulation kit is supplied to totally insulate the jet unit from the hull.

Refer to the following installation drawings at the rear of the manual :

- 105747Y - Intake Block
- 105748 - Hull Preparation
- 105749 - Installation Information

MOUNTING THE JET UNIT

After preparing the intake mounting block and transom hole in the hull, remove the reverse deflector and transom seal plate from the jet unit ready for installation. Lift the jet unit (complete with the intake screen) into the hull and position the unit so that the tailpipe passes out through the transom opening and the intake screen fits centrally in the rectangular intake hole. Check that the unit is correctly located in relation to the transom and proceed as follows:

Fibreglass and Wooden Hulls (Refer drawing 105743 at rear) :

Using the jet flange as a template, drill 14 10.0mm dia. holes through the intake block.

There are 4 more holes at the rear of the unit which are obscured by the jet casing. Scribe through these holes to mark their position on the intake block. Remove the jet unit and drill the 4 10.0mm holes at 90° to the top face of the block.

From underneath the hull spot-face the 18 holes 25.0mm dia x 10.0mm deep using a 25mm dia. spot-facing cutter.

Aluminium Hulls (Refer drawing 105746 at rear) :

Screw in and tighten the studs provided into the tapped holes in the intake block. A convenient method of fitting studs is to tighten two nuts together on the top of the stud so a spanner can be engaged on the nuts to tighten the stud into the base. Use of thread locking fluid here is recommended.

Steel Hulls (Refer drawing 105749 at rear) :

Screw in and tighten the studs provided into the tapped holes in the intake block. Drill out the 18 holes in the intake flange to 16.0mm dia. to accept the insulating bushes. After apply R.T.V. silicone sealant as below. Place gasket over studs onto the intake base, install the jet unit in place over the studs and fit the insulating bushes.

BOLTING DOWN :

Liberally apply neutral cure R.T.V. silicone sealant (supplied) to the top of the intake block, underside of the jet flange and to the bolt heads. Carefully position the jet unit flange on the intake base and bolt down as shown in the appropriate installation drawing.

Torque 18 nuts to 33 Nm (25 ft.lbs.) and remove excess sealant from inside and outside the jet unit.

TRANSOM SEAL ASSEMBLY

Place the transom seal assembly over the tailpipe, hold against the transom and centralise it in relation to the intake. Using a 9.5mm dia. drill bit, drill through the holes to just dimple the transom for correct hole location.

Remove the transom seal assembly and proceed as follows :-

Fibreglass, Wooden and Aluminium Hulls :

Drill 16 holes 11m dia. through the transom at the dimpled holes.

Steel Hulls :

Drill 16 holes 8.5mm dia. x 20mm deep and tap M10 x 1.5-6H x 18mm deep. The transom seal plate must be totally insulated from the hull by a rubber gasket, insulating bushes and fibre washers fitted to the transom plate mounting blocks.

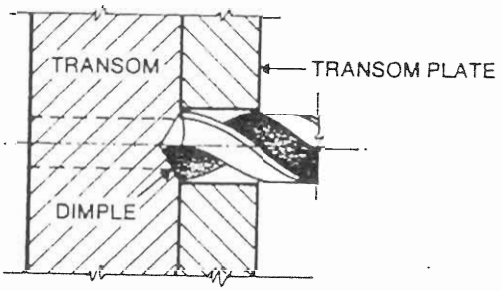
Drill out the 16 transom seal plate holes to 11.5mm dia. to accept the insulating bushes.

BOLTING UP

Liberally apply neutral cure R.T.V. silicone sealant (supplied) to the transom plate contact area on the hull, the joint face of the transom plate and bolt heads. Fit the transom seal assembly over the tailpipe and into place against the transom. Fit bolts, washers and nuts etc to secure the transom plate as per the appropriate installation drawing (at rear of manual) - in particular, fit insulating gasket, bushes and washers as indicated for steel hulls. With through bolt systems install with bolt heads to the outside of the boat.

Torque the 16 M10 transom seal securing bolts up to 24 Nm (18 ft.lbs.) and remove excess sealant.

Fit transom seal clamp over body of jet unit and transom seal. Fit bolt, nut, washer and tighten.



GENERAL

The engine(s) should be located in a position that will give the craft the most suitable fore and aft trim for the proposed boat speed. For semi-planing and moderate planing speed craft it is likely that the engine should be positioned well forward towards amidships for best trim and thus speed. For very high speed craft it is likely the engine should be positioned aft, close to the jet unit, to obtain best trim and speed. Follow the recommendations of the boat designer in this regard or consult C.W.F. Hamilton & Co Ltd.

MOUNTING

Mount the engine via mounting feet fixed to the engine bearers. The feet and bearers do not have to withstand the propulsion thrust load which is transmitted from the jet directly to the hull. Flexible engine mounts will reduce vibration and noise but these must be used in conjunction with a driveshaft system which does not cause a radial or side load at the jet coupling as the engine moves. Refer "DRIVESHAFTS" (pages H1, H2) for recommended driveshafts and engine installation angles.

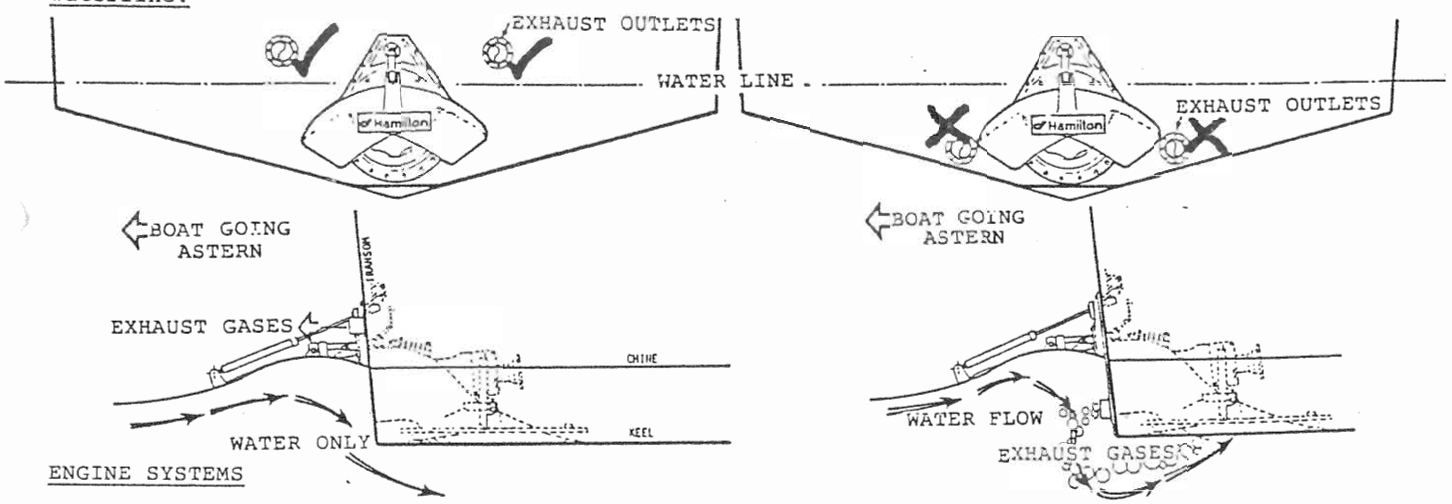
COOLING

The 271 jet has a 1¼" BSP outboard water offtake which provides water at approximately 1 kN per sq.m. (1½ psi) at 600 rpm and 310 kW per sq.m. (45 psi) at full throttle - 225 kW (300 hp). The water may be fed directly to the engine without the need for a raw water pump, provided - (a) the pressure from the water offtake at idle is sufficient to cool the engine and (b) that the engine can withstand the full pressure from the jet offtake. To be sure of correct flow for engine cooling a conventional water pick up and the engine raw water pump should be used. The jet water offtake can be used for a deck cleaning hose but the pressure is not high enough for a fire hose. CAUTION - if a gearbox or clutch are fitted to the engine a conventional hull water pick-up and engine raw water pump must be used.

ENSURE THAT THE WATER PICK-UP IS NOT DIRECTLY AHEAD OF THE JET INTAKE, BUT WELL TO THE SIDE TO AVOID TURBULENT WATER FLOW INTO THE JET.

EXHAUST SYSTEMS

The exhaust system can be any conventional system approved by the engine manufacturer, except that for the efficient operation of the jet in reverse, exhaust outlets are best sited above the waterline.



ENGINE SYSTEMS

Engine wiring, instrumentation and throttle systems are all conventional - follow the manufacturers recommendations. With the standard two lever control system (throttle reverse) Hamiltons supply the HERC Reverse Control Lever and the boat builder supplies the separate throttle control lever, cable and linkages.

GOVERNOR SETTINGS

The "no load" governor setting (or "high idle") on diesel engines should be set well clear of the full throttle R.P.M. achieved when driving the jet unit so that there is no chance of the governor reducing power (and performance) at full throttle.

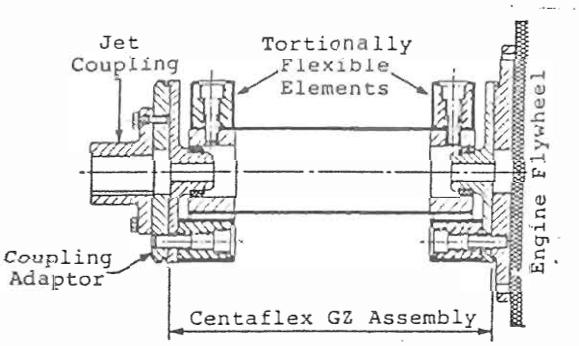
Example - if max. rpm driving jet is 2800 rpm then governor should not begin to act until at least 2850 rpm. On most diesel engines this means the "no lead governor setting" (or high idle) should be at least 3250 rpm.

Depending on the distance between the engine and jet coupling flange, there are two recommended systems for coupling the engine to the jet. The main requirement of each system is that it must accommodate parallel and angular misalignment plus allow for axial movement.

Thrust loads are absorbed by the jet - the engine and coupling are only subject to tortional loading.

DOUBLE ELEMENT TORTIONALLY FLEXIBLE DRIVESHAFT - 300mm long or over.

Use a double element tortionally flexible driveshaft with support bearings such as the "Centaflex GZ" type illustrated. The engine is located in-line with the jet and can be flexibly mounted with this type of coupling.

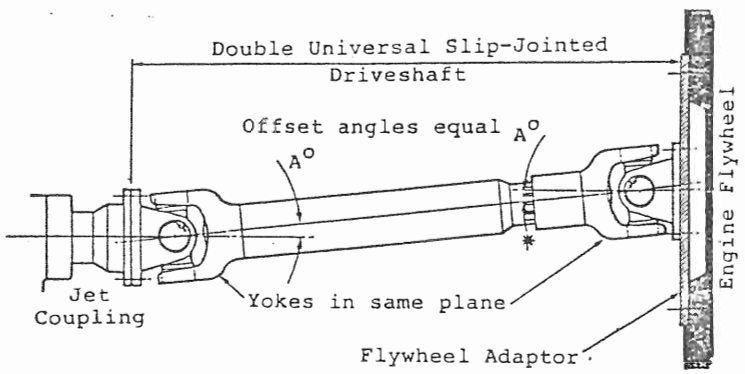


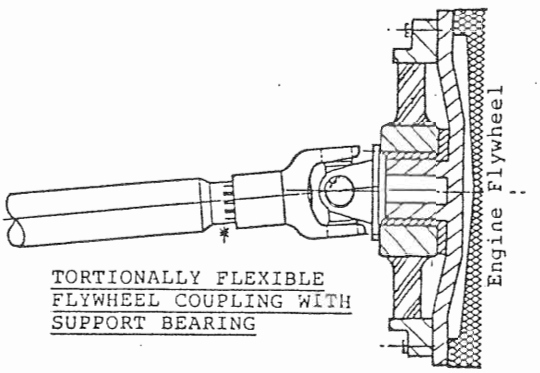
DOUBLE UNIVERSAL SLIP-JOINTED DRIVESHAFT
250 up to approx. 1500mm long.

The usual method of coupling the engine to the jet is the double universal slip-jointed driveshaft (Cardan Shaft). It bolts directly to the jet coupling flange and to the engine flywheel (via an adaptor plate) or alternatively a suitable tortionally flexible flywheel coupling can be used between the universal driveshaft and the engine flywheel. This coupling must be of the type with a support bearing to support the universal driveshaft. "Vulkardan" or "Centamax" have suitable couplings for use with universal driveshafts.

Notes :

- If a gearbox is used a tortionally flexible coupling is normally fitted between the engine and gearbox, a universal driveshaft can therefore be bolted directly between the jet and gearbox (an adaptor will normally be required at the gearbox flange).
- The engine should be positioned so that the universal joints of the driveshaft each have equal offset angles of between 1.5 and 5 degrees - this is most important.
- Details of the driveshaft make, model and length should be supplied to C.W.F. Hamilton & Co Ltd for a critical speed check.



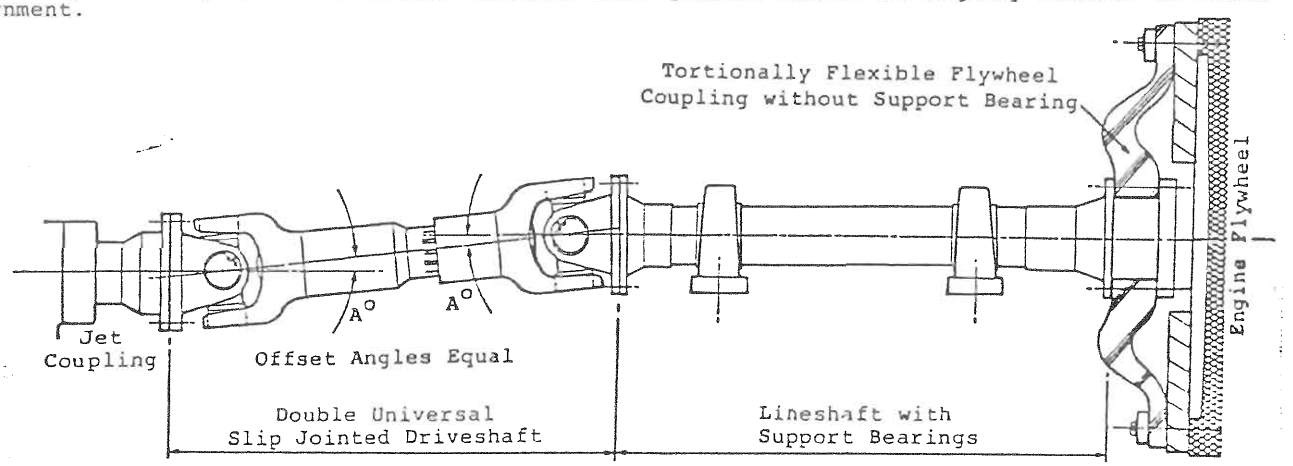


* Correct running length of shaft is with the shaft extended to half the total spline extension.

HamiltonJet

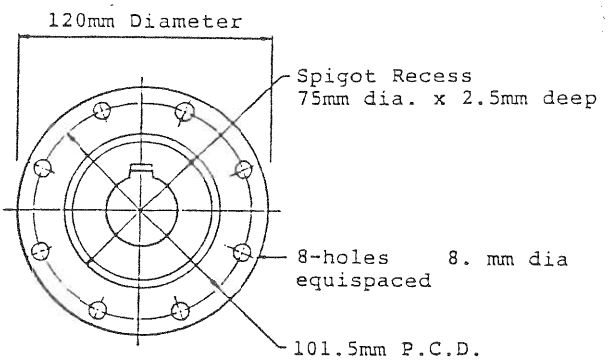
LONG DRIVESHAFTS - Over 1500mm long.

Where the distance between the engine flywheel and jet coupling flange exceeds 1500mm, a fixed lineshaft supported in pedestal bearings should be used in conjunction with either universal driveshafts or tortionally flexible couplings between both (a) jet and lineshaft and (b) lineshaft and engine flywheel. If a gearbox is fitted the lineshaft can be directly attached to the gearbox flange using normal propeller shafting criteria i.e. gearbox should be rigidly mounted to avoid misalignment.

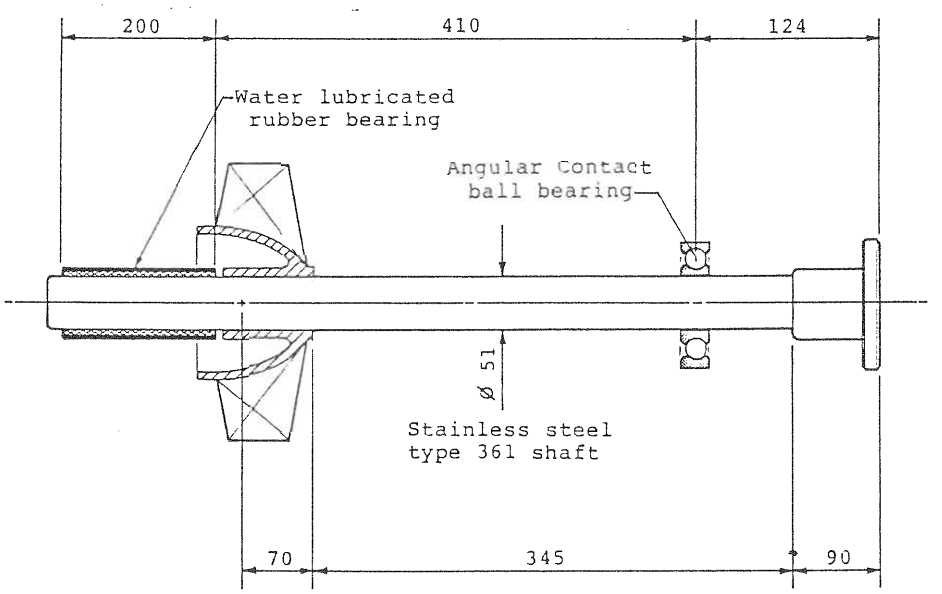


JET COUPLING FLANGE DETAILS

(a) Standard



MOMENTS OF INERTIA DATA



IMPELLER

TYPE 10 M = 9.5 kg
Ip = 0.059 kgm^2

TYPE 5 M = 9.07 kg
Ip = 0.056 kgm^2

Coupling

M = 2.2 kg

Ip = 0.0027 kgm^2

HamiltonJet

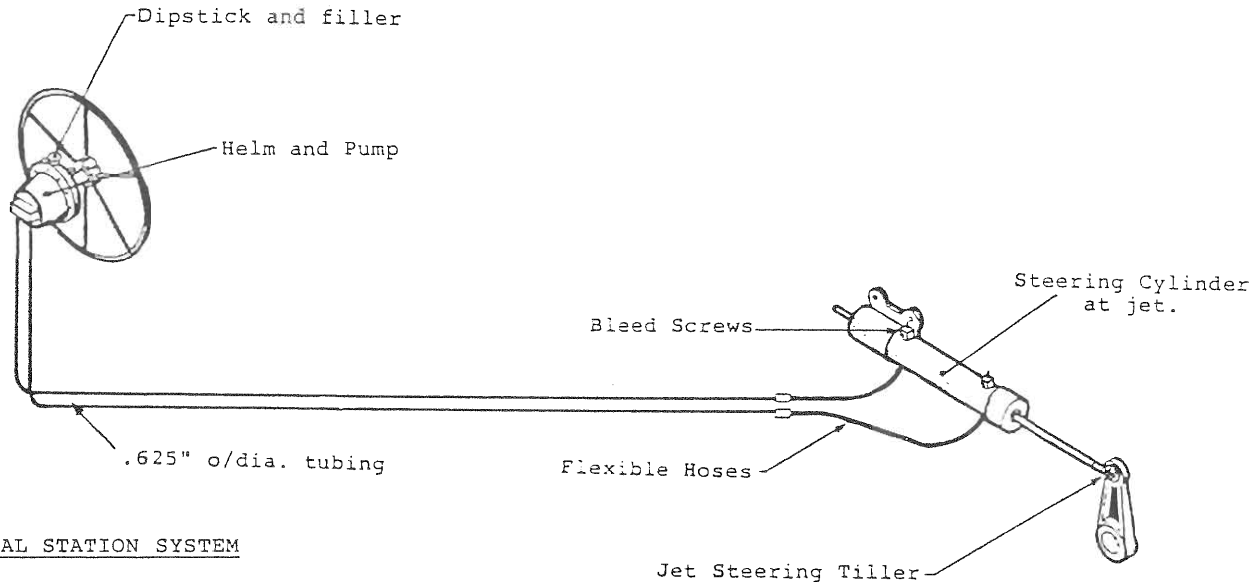
DESCRIPTION :

The steering system on the 271 jet is balanced so that power assisted controls are not necessary even for multiple jet units.

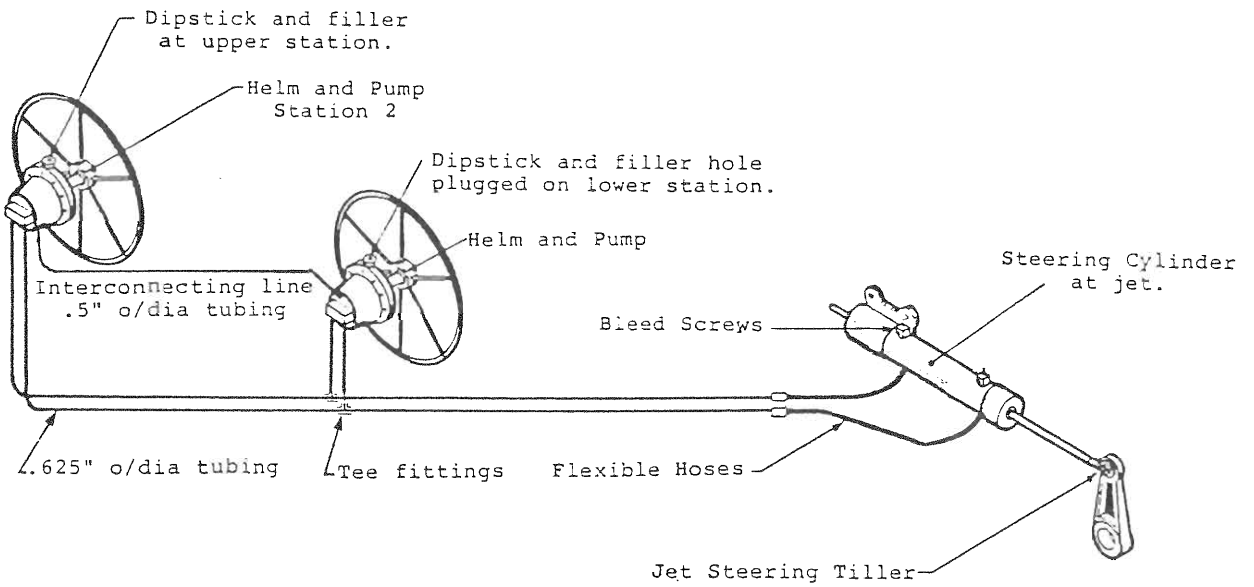
A manual hydraulic steering system is included with the jet which gives 1.9 turns of the helm from full lock to full lock. (A greater number of turns will reduce sensitivity of steering due low speed manoeuvring).

A steering position indicator system is available as optional equipment.

SINGLE STATION SYSTEM



DUAL STATION SYSTEM

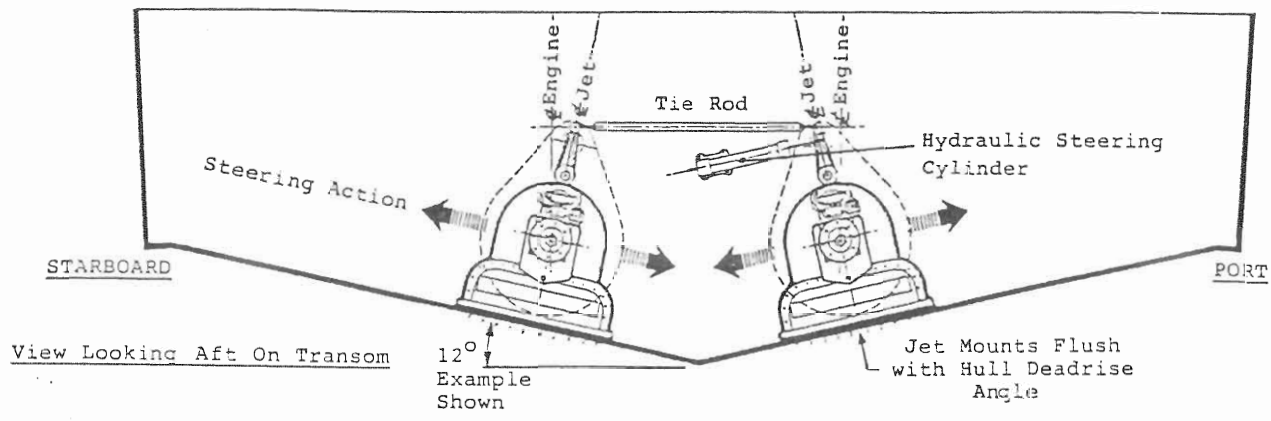


SCOPE OF SUPPLY

All equipment and fittings supplied except for .5" and .625" o/dia. tubing which boat builder supplies. The tubing should be suitable for 70 bar (1000 psi) working pressure. Single station system standard - dual station system optional at extra charge.

MULTIPLE JET INSTALLATIONS :

Ganged control of steering in multiple jet installations is achieved by swivel ended tie rod(s) interconnecting the jet tiller arms. An adjustable length tie rod is supplied to facilitate accurate centring of the jets.



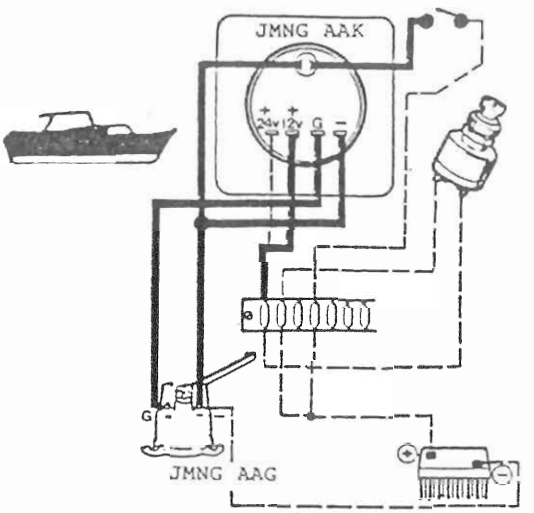
TRIPLE JET INSTALLATIONS :

- One steering cylinder only is required which mounts on the centre jet.
- Two swivel ended tie rods are used to interconnect the jet tillers : from starboard to centre jet and from centre to port jet. Bolt one tie rod aft and one ahead of centre jet tiller.
- A sketch for triple steering arrangement can be supplied on request quoting the hull deadrise angle.

POSITION INDICATOR - (Optional)

Wiring Diagram - Single Station :

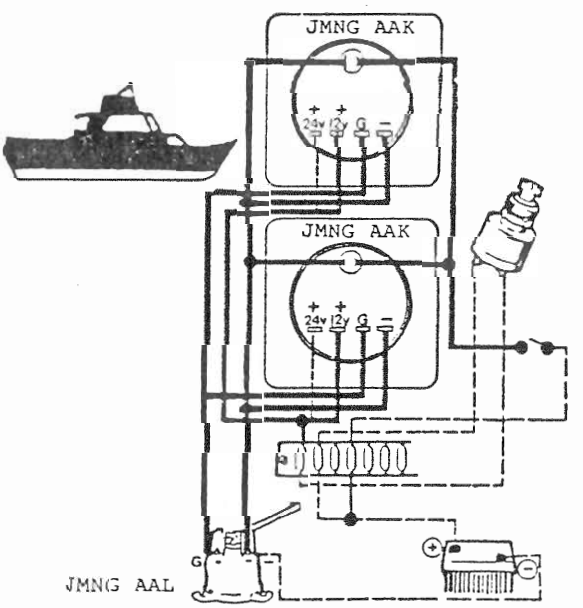
- With 12V DC system connect to 12V terminal on indicator.
- With 24V DC system connect to 24V terminal on indicator.



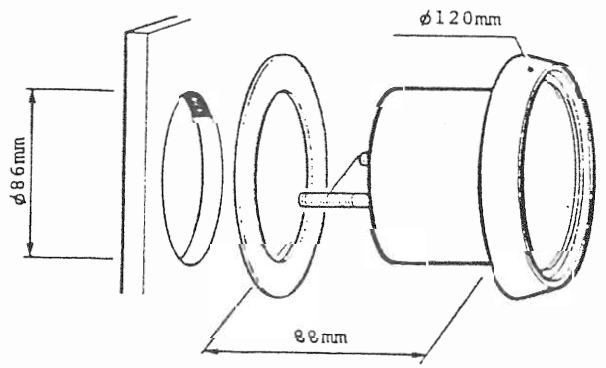
Wiring Diagram - Dual Station :

The sender must be changed to Hamilton part no. JMNG AAL "Dual Station Sender" and an additional Indicator JMNG AAK purchased.

Wire to 12V or 24V terminals of Indicators depending on ships DC voltage.



Mounting Indicator :



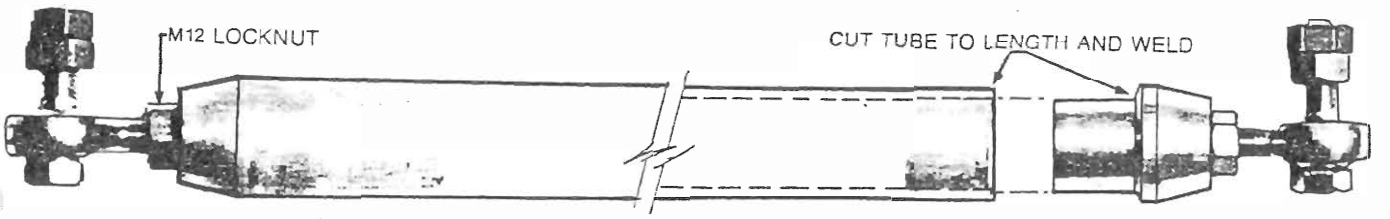
HamiltonJet

Steering Tie Rod Assembly : (Multiple jets only)

A tie rod kit is supplied with one end not welded so the rod tube can be cut to length required and welded.

With the steering deflector of the port jet (with steering cylinder) already clamped in the central or dead ahead position, repeat procedure by clamping the starboard (and centre with triple jets) jet deflector in its central or dead ahead position.

Offer the tie rod up to the upper holes of the steering tillers and mark the length to cut the rod tube. Cut tube and weld to rod end. Bolt one end of tie rod onto forward side of tiller. Adjust thread lengths at ends until the hole at the unbolted end exactly lines up with the hole in the tiller (make sure the jet deflectors have not moved) and bolt up. Check the M12 locknut on the length adjustment are tight and unclamp the deflectors.



NOTE : Some steering "lock" (or motion) is lost through the imperfect geometry of this tie rod system. However, this can be ignored as the loss of steering thrust is small.

Mounting the Helm Pump :

The helm pump may be mounted with the shaft at any angle between horizontal and vertical. The pump has a lockvalve mounted on the rear with 3/8 NPT outlet ports.

With lockvalves the operator does not have to hold the helm against the loads caused by cross winds. However, the lockvalves thereby eliminate any self centring effect. If self centring is desired the lockvalves can be removed.

Piping the System :

Keep working conditions as clean as possible. Contamination of any form must be prevented from entering the system. It is essential that all hydraulic tubing is clean inside before starting the installation.

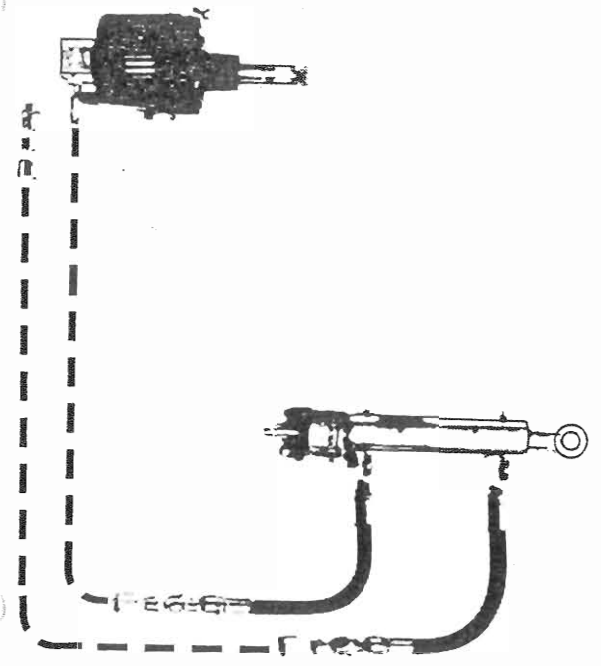
Teflon tape or pipe fitting compounds, commonly used to seal threaded joints, must be used sparingly and applied to the male threads only. The first two threads of the fitting should not be covered. If it is necessary to remove a fitting for any reason, the female thread must be cleaned before reinstalling the fitting.

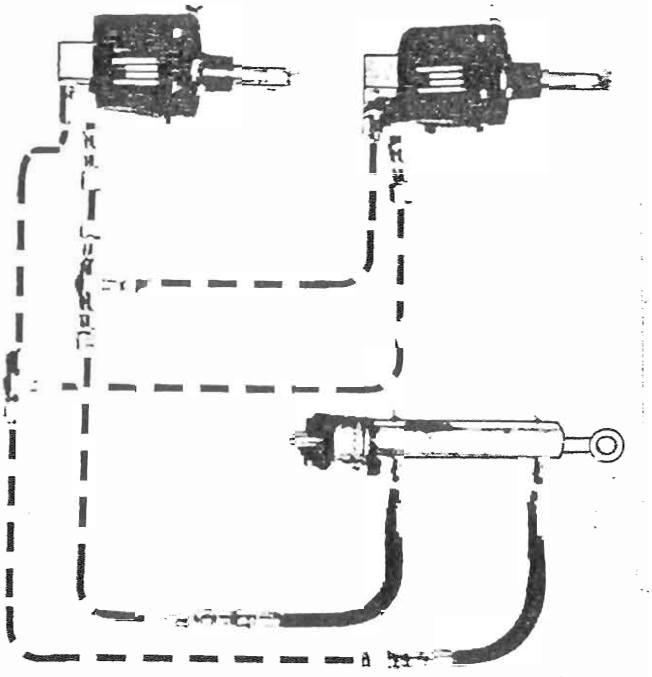
Steel or soft refrigeration-type tubing rated at a minimum working pressure of 7000 kPa (1000 psi) is recommended. Flexible hose must not be used in place of the recommended tubing (other than the two short lengths supplied) as it will adversely affect the performance of the system.

The tubing should be installed with lengths as straight as possible. Bends should be as gradual as possible. All lines should have a gradual rise toward the helm pump(s) to provide self-venting. Goosenecks (a vertical bend resembling an inverted letter "U") must be avoided if possible, otherwise vent plugs must be installed at the high point of the bend to provide a means for removing entrapped air.

The tubing must be held rigidly where it connects to the cylinder flex hose.

A complete kit of adaptors and sleeves is optional extra to suit 5/8" o/dia. tubing for helm to cylinder lines and for dual station controls the kit includes tee fittings and the adaptors and sleeves required for ½" o/dia. on the interconnecting line.





In a multiple station system, all helm pumps are connected in an identical manner to the hydraulic lines leading to the steering cylinder. (Refer to the Piping drawings page I1). The pump reservoirs must be interconnected to create a continuous flow path. That is, connect the bottom of the highest pump to the top of the next highest, etc. This interconnection is required to fill and vent the system. All other connection ports on the pump housings must be plugged. The dipstick tube supplied must be installed in the top of the highest helm pump. The design of this dipstick fitting also allows the system to vent. DO NOT PLUG.

When connecting the steering lines to the cylinder, be certain that the tiller will move in the correct direction. (When standing in front of the wheel, turning a helm pump clockwise pumps oil out of the starboard side of the pump and should give starboard tiller).

If the vessel requires an "inspection approval", a bypass valve to allow emergency mechanical steering may have to be connected between the cylinder ports.

Recommended Oils :

The following oils are preferred due to their superior qualities :

Chevron	:	AW Machine 32, EP Hydraulic MV
Esso	:	Nuto H32
Gulf	:	Harmony AW32, Harmony HVI 36
Mobil	:	DTE 24, DTE 13
Shell	:	Tellus 32, Tellus T37
Texaco	:	Rando HD32, Rando HD AZ

DO NOT USE BRAKE FLUID or a heavier viscosity oil.

FILLING AND BLEEDING THE SYSTEM :

Ensure that all fittings and plugs are tight as this filling procedure must develop a vacuum in the steering lines.

Connect the two identical lengths of clear plastic tubing to the bleed fittings on the steering cylinder. Place the free ends into a container (about one litre capacity) to catch any oil carried with the expelled air. Determine which steering line and bleed screw fitting will be pressurised when turning a steering wheel CLOCKWISE. Open the bleed screw at this fitting 2 turns. The other must remain tight. If a cylinder bypass valve is installed, it must be closed.

Next, fill all helm pump housings starting at the lowest and progressing to the highest. Plug each pump tightly after it is filled except the highest (or only) which is also the filler/vent for the system and it must be fitted with the dipstick tube.

Screw the plastic tubing assembled with a black plastic fitting into the end of the dipstick tube (where the dipstick is normally inserted) until it seats tightly against the "O" Ring on the fitting. This fitting will self-thread into the tube.

Place the free end of this (filling) tube into a container of oil and hold the container at, or above, the pump level. The end of the tube must continually remain below the oil level. THIS IS VERY IMPORTANT!

Turn the steering wheel CLOCKWISE on this pump only at about one revolution per second. Oil will be drawn into the pump after about 20 revolutions. A mixture of air and oil will be expelled from the bleed fitting on the cylinder. After most of the air is expelled, the system will begin to feel steady and solid. Close the bleed screw tightly and open the opposite bleed screw 2 turns.

Now turn the steering wheel COUNTER-CLOCKWISE until most of the air is expelled. Close the bleed screw and apply light pressure at both hardover positions.

Remove the black plastic fitting and filling tube assembly. Ensure that the oil level in this pump just shows on the dipstick. Wrap a wiping rag around the dipstick tube. (It is advisable to keep this rag in place for the first week as any air remaining in the system may foam the oil as it naturally vents).

Starting at the lowest helm pump and progressing to the highest, apply first light, then heavier wheel pressure alternately at both hardover positions. The bleed screws at the alternately pressurised ends of the cylinder should be opened several times as each pump is pressurised. KEEP THE SYSTEM FULL OF OIL!

The system is now usable but it will not be smoothly responsive until the air is expelled. Air may continue to work out of the oil for some time so keep a regular check on the oil level for the first few days of operation.

If the plastic tubing assembled with a black plastic fitting is not available, the oil must be poured slowly into the dipstick tube. The rest of the procedure is the same, but the oil level in the highest (or only) helm pump must be maintained to prevent pumping air into the system.

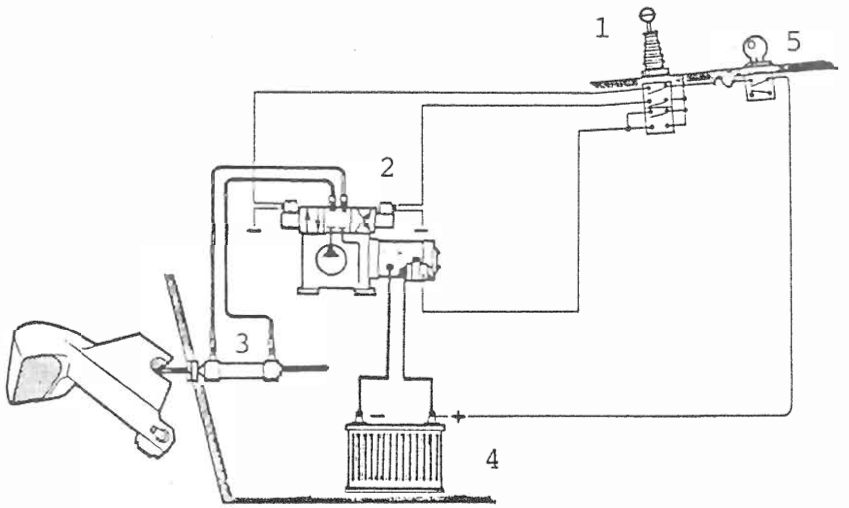
271 REVERSE CONTROL OPTIONS

(A) 271 "BASIC" PACKAGE - JOYSTICK REVERSE

Essentially a power assisted non follow-up system, joystick reverse comprises a two-way joystick at the helm which activates an electro-hydraulic power unit (E.H.P.U.) to raise and lower the reverse deflector. Systems are available for either 12 or 24V D.C. supply, including the following components:

- Two-way joystick controller.
- D.C. electro-hydraulic power unit.
- Hydraulic hoses and fittings to suit 271 reverse cylinder.

A reverse position indicator kit including gauge, sender and mounting hardware is available as an optional extra.



(B) 271 "FULL" PACKAGE - HAMILTON SYNCRONISED REVERSE CONTROL (H.S.R.C.)

H.S.R.C. provides synchronised reverse control so that the control lever and reverse deflector move in unison - a position indicator is not necessary.

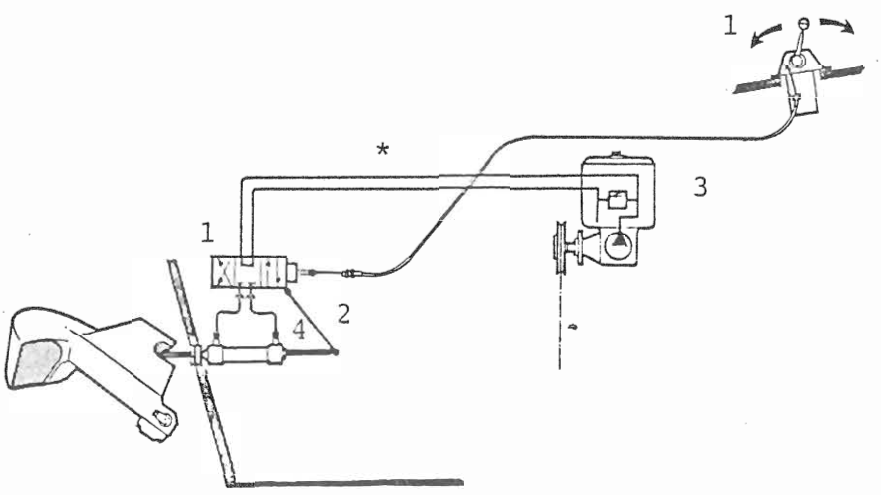
A reverse control lever at the helm connects to a position control valve mounted at the jet via a 75mm stroke cable (Morse 33C or equivalent).

Linkages from the hydraulic reverse cylinder provide feedback enabling the valve to control oil flow from the hydraulic power unit (H.P.U.). Thus moving the reverse deflector.

Power assistance is provided by a vane type hydraulic pump/reservoir unit which is normally belt driven from the engine crankshaft pulley by a single "A" section vee belt. Hydraulic lines connect the pump to the cylinder control valve.

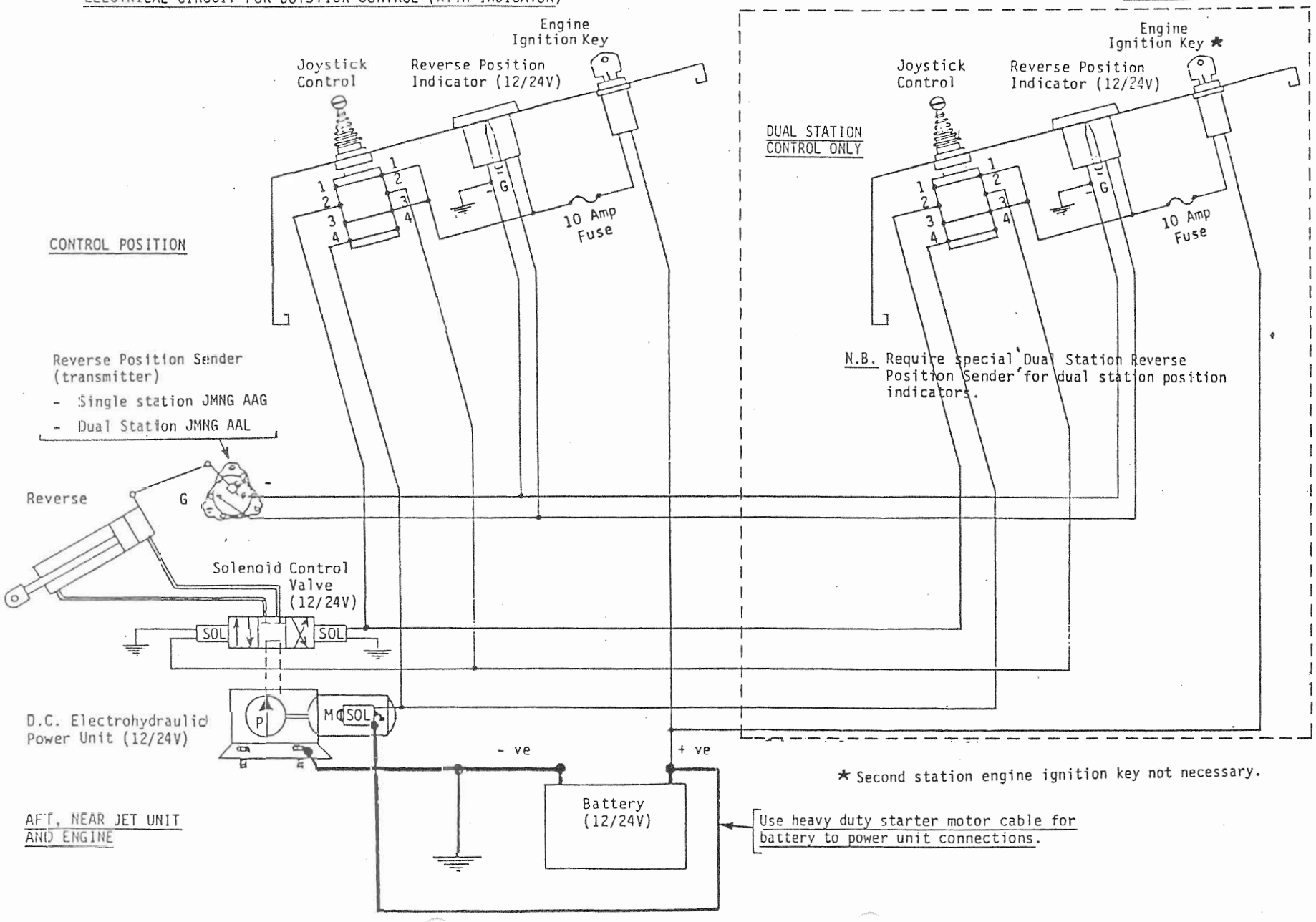
H.S.R.C. system components supplied standard include :-

- Control lever (cable supplied by builder).
- Cylinder control valve/manifold assembly.
- Mounting hardware and linkages.
- Belt driven hydraulic power unit, reservoir and pulley.
- Hydraulic hoses interconnecting reverse cylinder and control valve. (Hydraulic tubing from pump supplied by others).



ELECTRICAL CIRCUIT FOR JOYSTICK CONTROL (WITH INDICATOR)

AJS 80-2



"HAMILTON SYNCHRONISED REVERSE CONTROL" - (HSRC) :

Description :

The control lever is synchronised with the reverse deflector so lever position indicates deflector position and a separate position indicator gauge is not necessary.

The shipyard supplies a Morse 33C cable (3" stroke), or equivalent, to connect the control lever to a hydraulic valve mounted on the jet. Low friction cables recommended, e.g. Morse "Supreme".

Power assistance is provided by an "A" section vee belt driven hydraulic power unit (H.P.U.). This is normally driven from the engines front crankshaft pulley but can be driven by an auxiliary engine or AC motor if these are available.

STANDARD EQUIPMENT :

Includes all equipment for single station control except for control cable.

MULTIPLE JETS :

Standard supply for single jet is repeated for each jet unit of multiple jets, i.e. each jet has a totally separate system.

CONTROL LEVER OPTIONS :

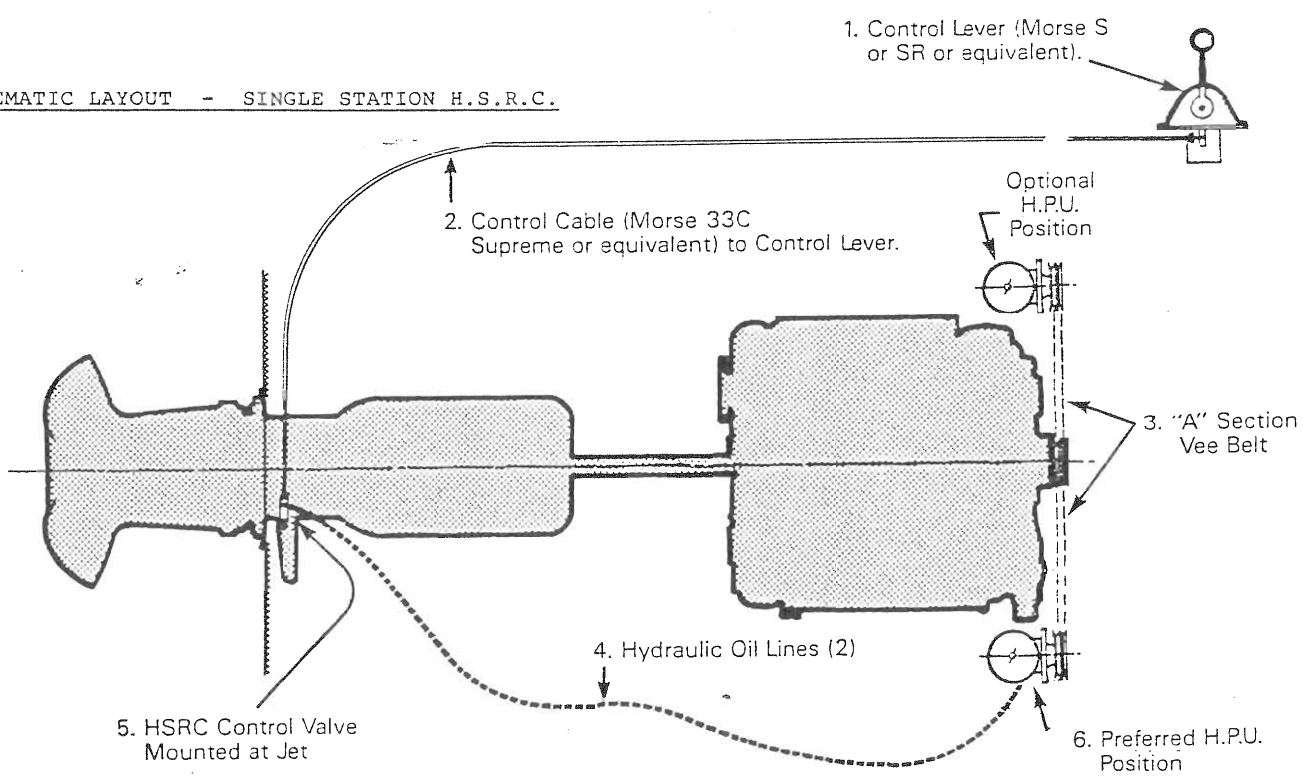
As the HSRC system is operated by the same 3" push-pull cable as hydraulic gearboxes any of the proprietory "TWO LEVER" (reverse only) or "SINGLE LEVER" (combined engine throttle and shift) controls can be used as with a propellered craft engine and gearbox shift system.

The standard control lever can be deleted from Hamiltons supply and replaced with a control selected and supplied by the shipyard.

DUAL STATION CONTROL :

This is arranged as for hydraulic gearboxes, e.g. with Morse controls a "dual station transfer unit" can be used.

SCHEMATIC LAYOUT - SINGLE STATION H.S.R.C.



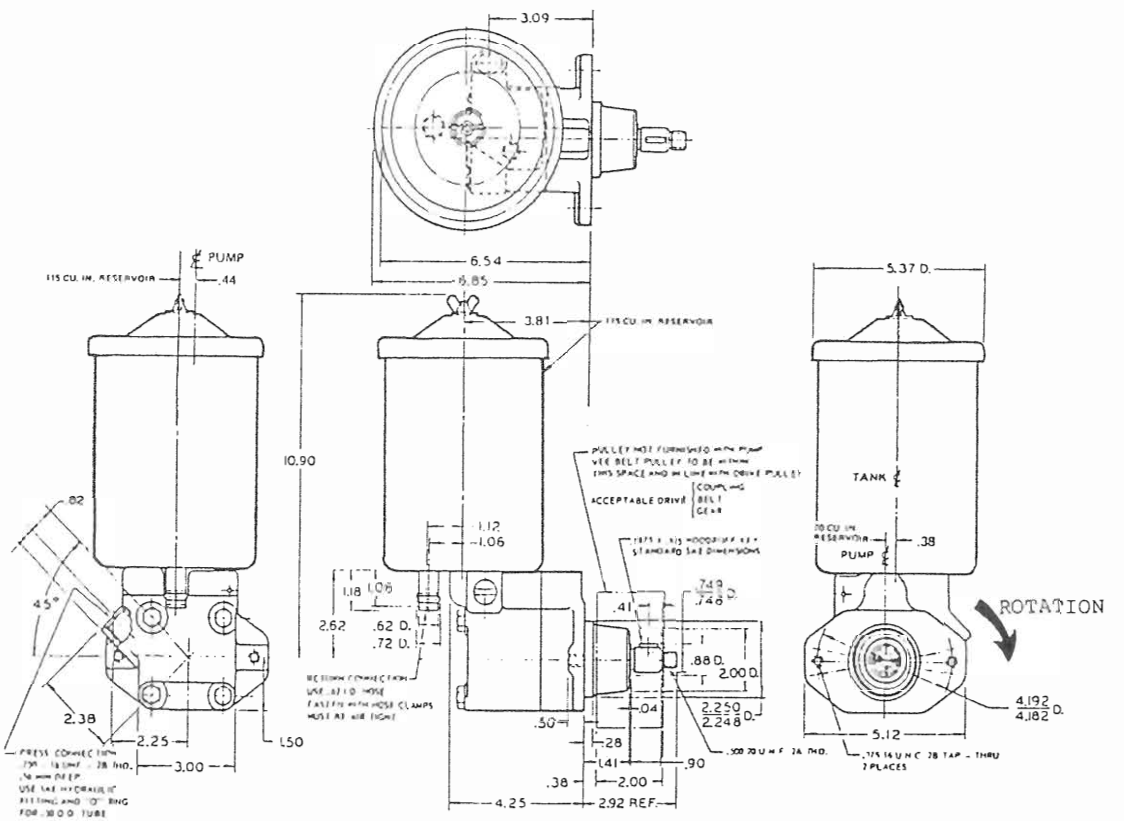
Items 1 to 4 inclusive are optional extras.

DESCRIPTION :

The Reverse Hydraulic Power Unit supplied is a Model VTM42 vane type belt driven hydraulic pump equipped with integral flow control and relief valves. A hydraulic oil reservoir (115 cu.inch capacity) bolts directly to the top of the unit. Remote hydraulic oil reservoir is available as an optional extra.

INSTALLATION INFORMATION :

The Reverse Hydraulic Power Unit is normally driven from the engine crankshaft pulley using double "A" section vee belts. Pump pulley diameter should be 85% the diameter of the engine pulley. A purpose built bracket (with facility for belt adjustment) is required to mount the power unit to the engine. Rotation is right hand looking at pump shaft. Maximum pump speed at 7 bar (100 psi) is 7000 rpm and at relief valve pressure of 103 bar (1500 psi) is 2800 rpm. This is well within the normal operation with the HSRC system, except for a "crash stop" when we recommend closing the throttle before engaging reverse.



Recommended Oil : Use an I.S.O. viscosity Grade 32 oil such as Shell Tellus 32 or equivalent.

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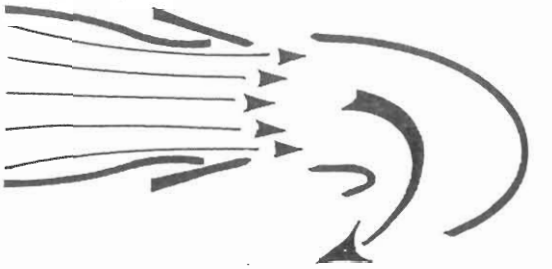
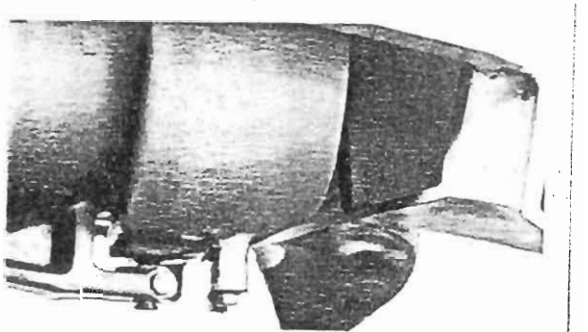
HSRC ADJUSTMENT - 271 JET

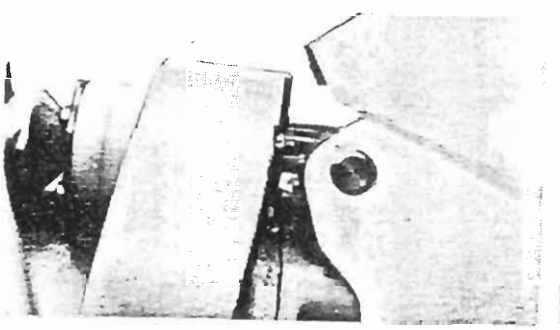
DO NOT ATTEMPT TO OPERATE THE REVERSE SYSTEM BEFORE IT IS FULLY ADJUSTED AS PER THESE INSTRUCTIONS. If the engine is to be run for any reason prior to HSRC adjustment, remove the vee belt driving the reverse hydraulic power unit (HPU) before starting the engine. A Teleflex-Morse 33c, or optionally a 43c cable, is required between controller and HSRC valve. The cable must be installed with a 90° bend next to the jet.



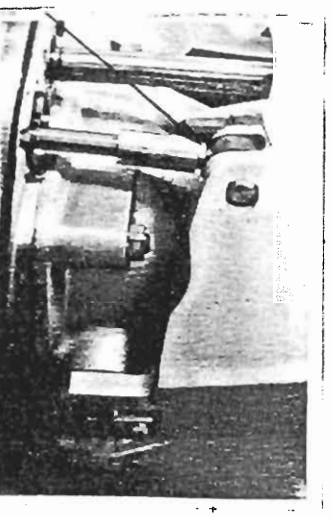
1. ADJUST REVERSE DUCT UP AND DOWN POSITION :

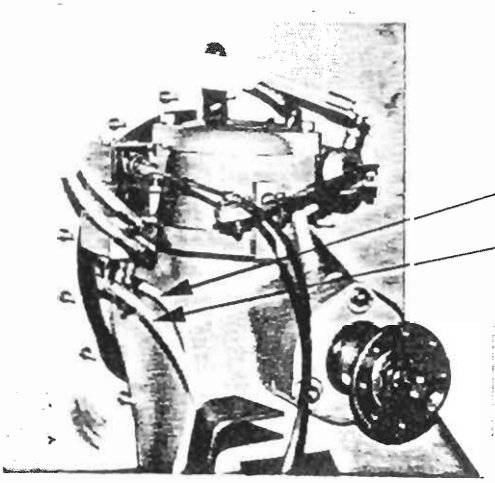
- Disconnect the two hydraulic hoses at the reverse cylinder.
- Manually lower the reverse duct until it is "down" to the limit of the cylinder travel.
- Check the duct is positioned adjacent to the nozzle so that all the water exiting from the jet will pass into the reverse duct. If necessary, adjust the cylinder eye thread to raise or lower the reverse duct, then retighten the locknut.





- Manually raise the reverse duct fully and check the top fairing of the duct is not touching any part of the jet, e.g. tailpipe, steering shaft or transom seal.
- Adjust the cylinder eye thread to lower the reverse duct the minimum amount required to avoid touching any other part in the fully "up" position. Retighten cylinder eye locknut.





HYDRAULIC OIL LINE CONNECTIONS

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ADJUSTING "HSRC STOP KIT" - 80930

Refer to HSRC (or 271) Manual for mechanical adjustments to the jet, installation of hydraulic equipment and the location of the test hydraulic pressure gauge. Refer to illustrations on the following page when making adjustments.

1. Fit linkages and cable as shown. For retro-fit kits only - initially position lock nuts at (A) and (B) at the extreme ends of rod (O). For factory fitted kits nuts (A) and (B) have been adjusted to approximately the correct positions - do not move them except for any final adjustment in 4. and 5. below.

2. Unscrew controller stop screws sufficient to allow full controller stroke.

3. Fit test pressure gauge, start engine and run at idle rpm then gently move controller to approximate mid-travel position.

4. Full ahead (reverse duct up) adjustment :

   - Move controller to full ahead (do not use excessive force).

   - Rotate rod (O) in lug (A) (threaded) (varying dimension "X" from shoulder (C)) until the reverse cylinder is between 5 and 10mm (3/16" and 3/8") from fully closed (duct up) and the pressure gauge reading falls from 100 bar (1500 psi) down to 7-10 bar (100-150 psi) (circulation pressure may be higher if the sizing of hydraulic lines is not to Hamiltons recommendations).

   - Clamp rod (O) to prevent it rotating and tighten lock nut (A) up against the lug (C).

   - Screw in controller full ahead stop screw until it makes contact with the control lever (this prevents excessive loads being applied from the controller to the "Stop Kit" linkage at the jet).

5. Full astern (reverse duct down) adjustment :

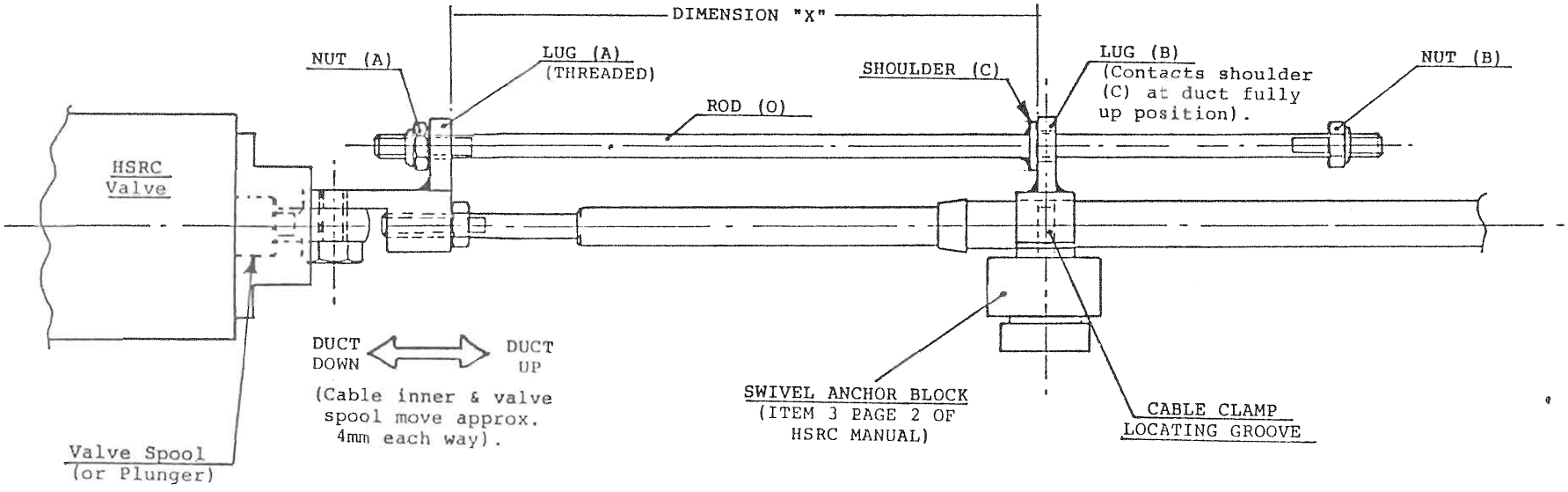
   - Move controller to full astern (do not use excessive force).

   - Screw in lock nut (B) until it contacts lug (B) (unthreaded), the reverse cylinder is fully extended (reverse duct fully down) and the pressure gauge reading falls from 100 bar (1500 psi) to 7-10 bar (100-150 psi).

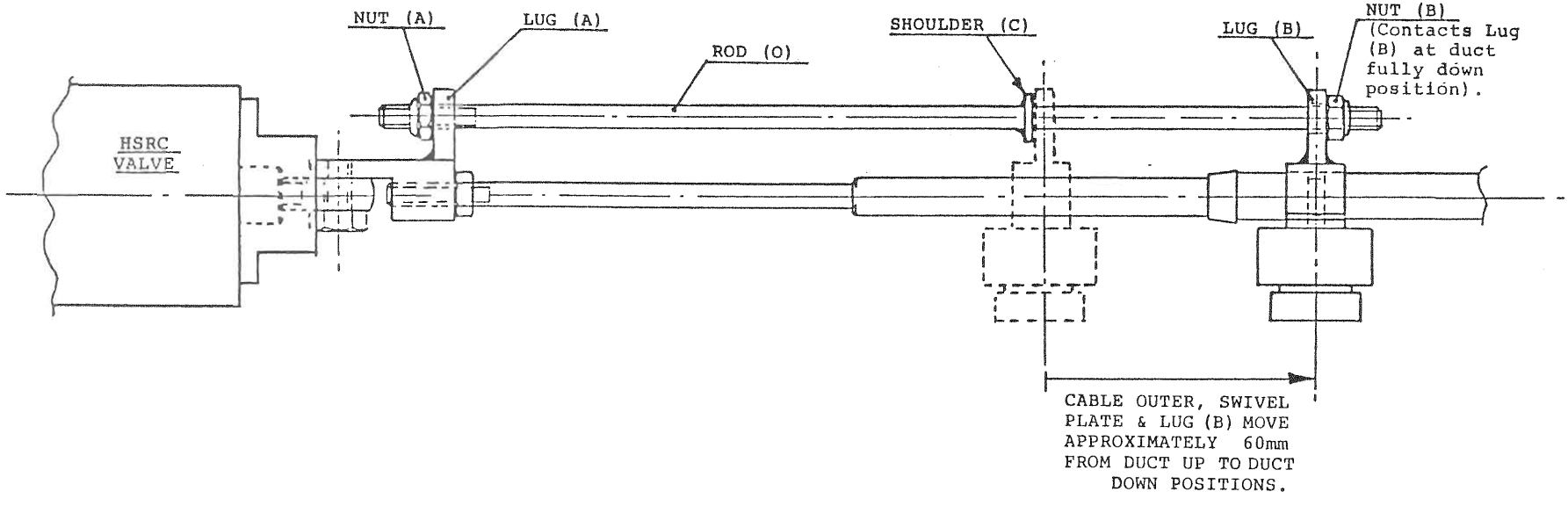
   - Screw in the full astern controller stop screw until it makes contact with the control lever (this prevents excessive loads being applied from the controller to the "Stop Kit" linkage at the jet).

6. Run engine at increased rpm moving controller from full ahead to full astern ensuring at full ahead and full astern only circulation pressure of 7-10 bar (100-150 psi) remains on test pressure gauge.

4. Full ahead (reverse duct up) adjustment :

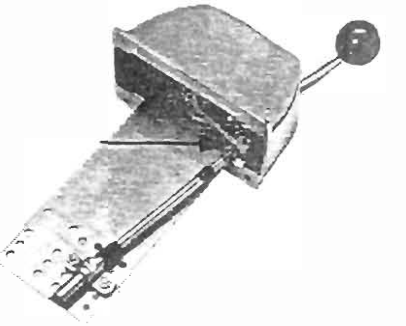


5. Full ahead (reverse duct down) adjustment :

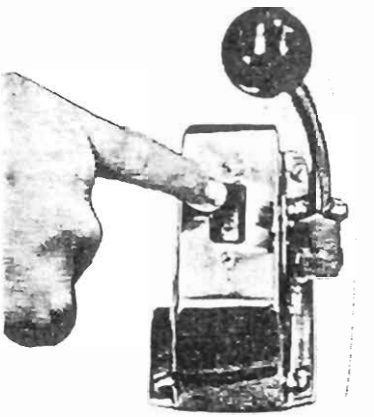


2. PARTIALLY ASSEMBLE CONTROL SYSTEM :

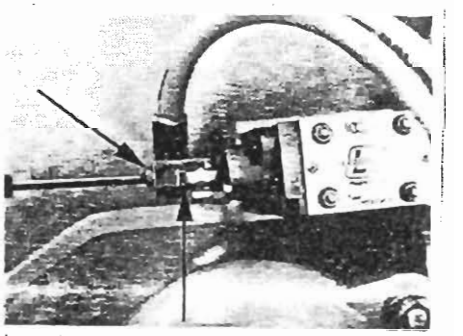
- Do not connect the hydraulic hoses at the cylinder.
- Connect up other hydraulic oil lines. Note the pressure line from the HPU (Hydraulic Pump Unit) connects to the HSRC valve port nearest to the jet.
- Assemble the control cable rod into the outer hole at the controller with thread fully engaged and clamp cable as shown.



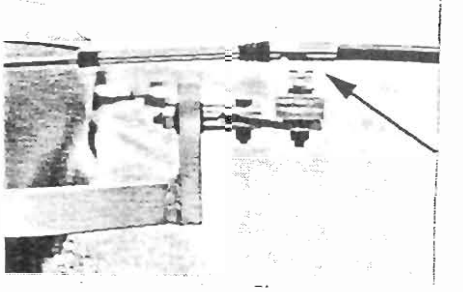
- Do not fit controller stop screws at this point.



- Assemble the cable into the HSRC valve. (Thread the cable rod into clevis so the thread is fully engaged, i.e. rod end is flush with inner face of clevis. Tighten locknut).



- Do not clamp the cable at this point but leave free as shown.



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3. HSRC CABLE ADJUSTMENT

At this point adjustment can proceed manually (engine not running - i.e. prior to launching) or with engine and thus HPU running (giving power assistance, i.e. boat launched).

(a) Sequence without engine/HPU running :

- Leave hoses, controller and cable as instructed in Step 2. and proceed to Step (i) on following page.

(a) Sequence with engine/HPU running :

- Disconnect drive between engine and jet or securely tie up craft to the wharf.
- Connect hydraulic hoses at the cylinder.
- Fill hydraulic reservoir with Shell Tellus 46 or equivalent hydraulic oil.
- Move the controller to mid-travel position.
- Move the cable rod and HSRC valve spool "in" and "out" by hand as shown to locate the "mid-travel" position.

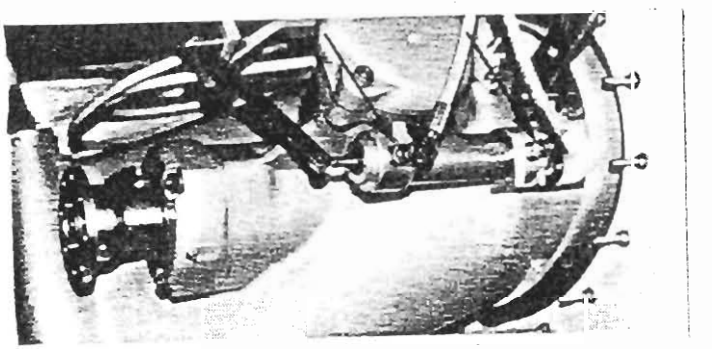
(The spool may be stiff to move initially but once moved should then move easily).

SPOOL POSITIONS

At spool fully "in" or "out" the reverse duct will move up or down (direction will depend on which way hoses are connected between HSRC valve and cylinder).

At spool mid-travel position, the reverse duct will not move.

- Leave spool in the "mid-travel" position and start the engine (and HPU). If the reverse duct moves the HSRC valve is not at "mid-travel" so move spool by hand until duct stops moving.
- Top up the HPU oil reservoir.
- Moving HSRC valve spool "in" and "out" by hand, move the reverse duct up and down several times while loosening the hose connections at the cylinder to bleed air from the cylinder.



WHEN THE REVERSE DUCT REACHES FULLY "UP" OR FULLY "DOWN", MOVE HSRC VALVE SPOOL BACK TO MID-TRAVEL AS SOON AS POSSIBLE.

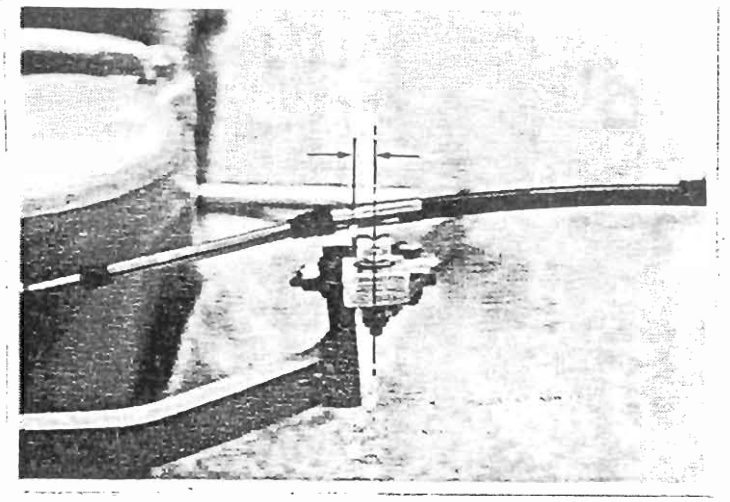
(i) Move the controller to full ahead position (duct up).

(ii) Raise the duct manually to fully up position.

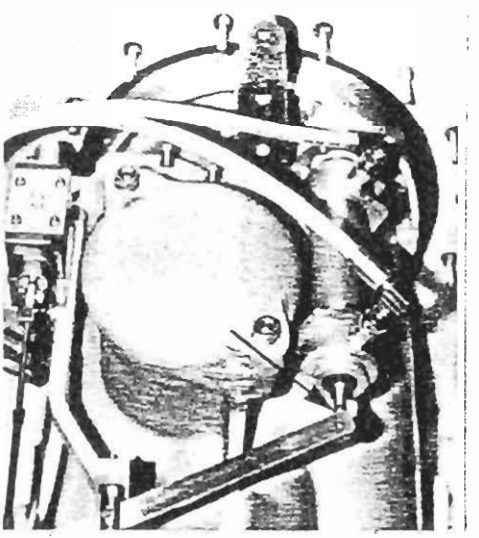
(ii) Pull the HSRC valve spool "out" until the duct is fully up then return spool to "mid-travel" position.

(If the duct moves down instead of up reverse the hose connections at the cylinder).

(iii) Check the anchor groove in cable is nearer transom than the anchor point.



If not, first check the controller, stop screws are removed and the cable is connected in outer hole of the controller. If necessary, screw cable rods further in at the controller and out at the HSRC valve. If the cable groove still not forward of anchor point, unscrew eye linkage on the end of the cylinder. Tighten all locknuts.



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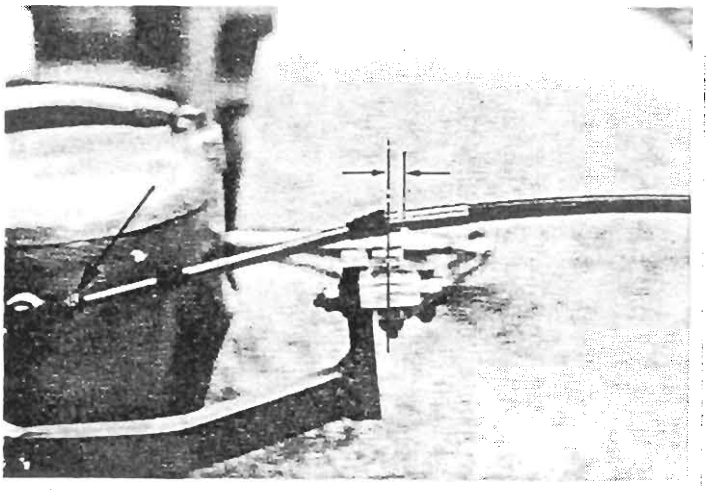
(iv) Move controller to full astern.

(v) Lower the duct manually to fully down position.

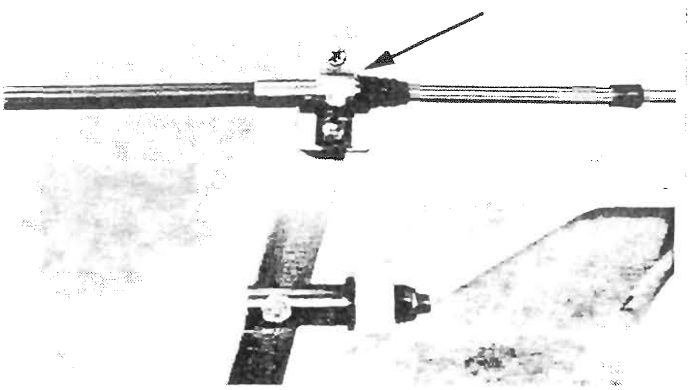
(v) Push HSRC valve spool in until the duct is fully down then return spool to "mid-travel" position.



(vi) Check the anchor groove in the cable is forward (nearer bow) of anchor point by at least 1mm.

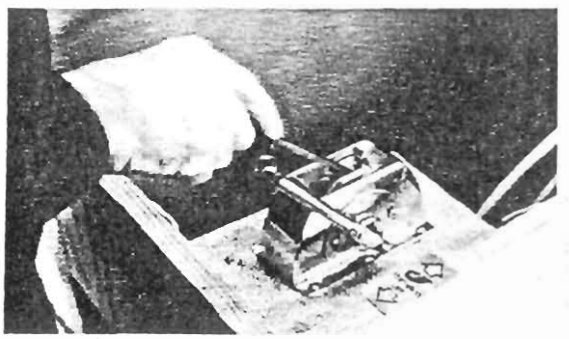
If not see same adjustment techniques as in (iii) above but if any adjustment is made repeat check (iii).

(vii) Clamp cable to anchor at HSRC valve.

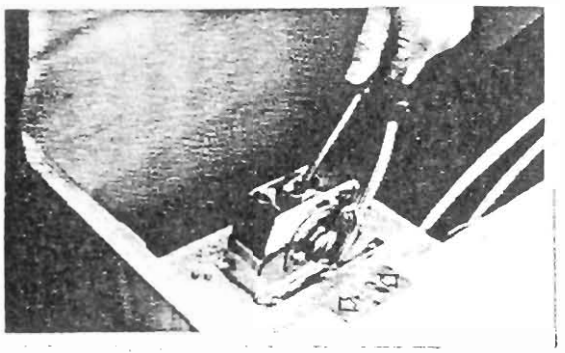


No further adjustment can be done until the HPU can be run normally when the boat is launched. Revert to step (A) but "sequence <u>with</u> engine/HPU running". Follow adjustments down as far as step (i).

(viii) The final adjustment is to fit the stop screws into the controller. These have to be screwed in until the HPU relief valve stops operating at controller full ahead and full astern positions.



Full Astern Stop Screw



Full Ahead Stop Screw

Normally the noise of the HPU relief valve operating is quite light but if it cannot be heard over the engine noise hold one hand around the pressure hose from the HPU to the HSRC valve when the reverse duct reaches fully up or fully down the pressure hose will become firm and tend to straighten if the relief valve is operating. Fitting a pressure gauge in this pressure line would be the ideal way of adjusting. Relief valve pressure is 103 bar (1500 psi). If relief valve not operating gauge pressure will be only a few bars (very low).

Adjustment :

- Operate the controller from near astern to full astern positions and continue to screw astern stop screw in until relief valve stops operating. Recheck several times ensuring that the duct is still travelling fully down (if the stop screw is screwed in too far duct not travelled fully down).
- Repeat for the ahead position screwing in the ahead stop screw until the relief valve stops operating.

  If stop screw screwed in too far the duct will not travel fully up.

Apply thread locking fluid to both stop screws.

Fit name plate over stop screws.

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 anodes in the most effective places on the jet. The unit however, is still vulnerable to the actions of the person who fits the propulsion system 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 J3)

The bond strip and connecting wires should be aluminium or copper of at least 14.5 sq.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 the 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) Direct to 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 anodes. The anodes, which are zinc blocks, are fixed to various parts 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 half consumed. Further anodes should be fitted on the hull, sufficient for hull protection, (see diagram page J3).

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-eaten away replace them with a new anode.

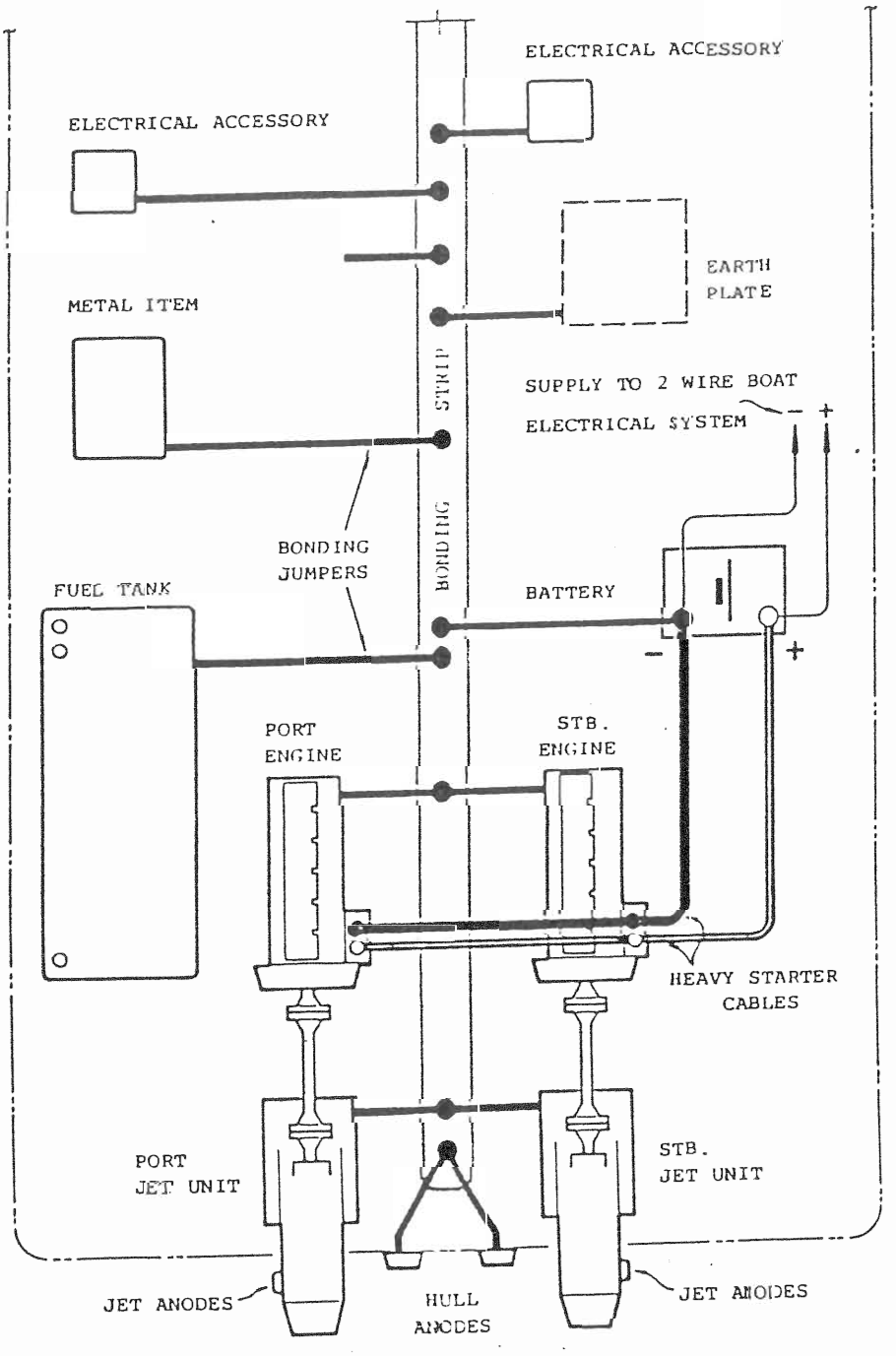
6. Anti-Fouling Paint

Keep stainless steel clean. Only use tin-based 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 supplier's instructions.

EXAMPLE OF A BONDING LAYOUT (NOT STEEL HULLS)



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B. STEEL HULLS :

The complete jet unit must be electrically isolated from the hull, engine etc. For the insulation instructions see the steel hull installation section for your jet unit, but specifically, insulation of the jet unit must be accomplished. The remainder of the boat should, in all respects, employ the Bonding System as described in A. above.

Key areas for insulation of the jet unit are :-

(a) Base mounting flange and bolts.

(b) Transom seal to transom (sometimes by means of the rubber seal ring or gasket).

(c) Control connections such as steering and reverse cables, hydraulic hoses, etc - (standard 271 reverse hoses are non wire wound - i.e. insulating) but the standard 271 steering hoses must be replaced with non wire wound type).

(d) Driveshaft - A coupling shaft using resilient rubber elements can provide the insulation most simply, or a flywheel plate insulated from engine flywheel by means of reinforced insulating sheet, bushes and washers (e.g. Tufnol).

The following are additional details :-

1. If a negative earth system is used on the boat it must not be connected to the jet unit casing or its anodes.

2. Every part of the boat's electrical system should have TWO wires to it - a positive and a negative wire.

3. With electrical auxiliary equipment installation be guided by your electrician. Do not earth electrical equipment to the jet unit.

4. Separate zinc anodes are provided on the jet to protect the jet unit against corrosion.

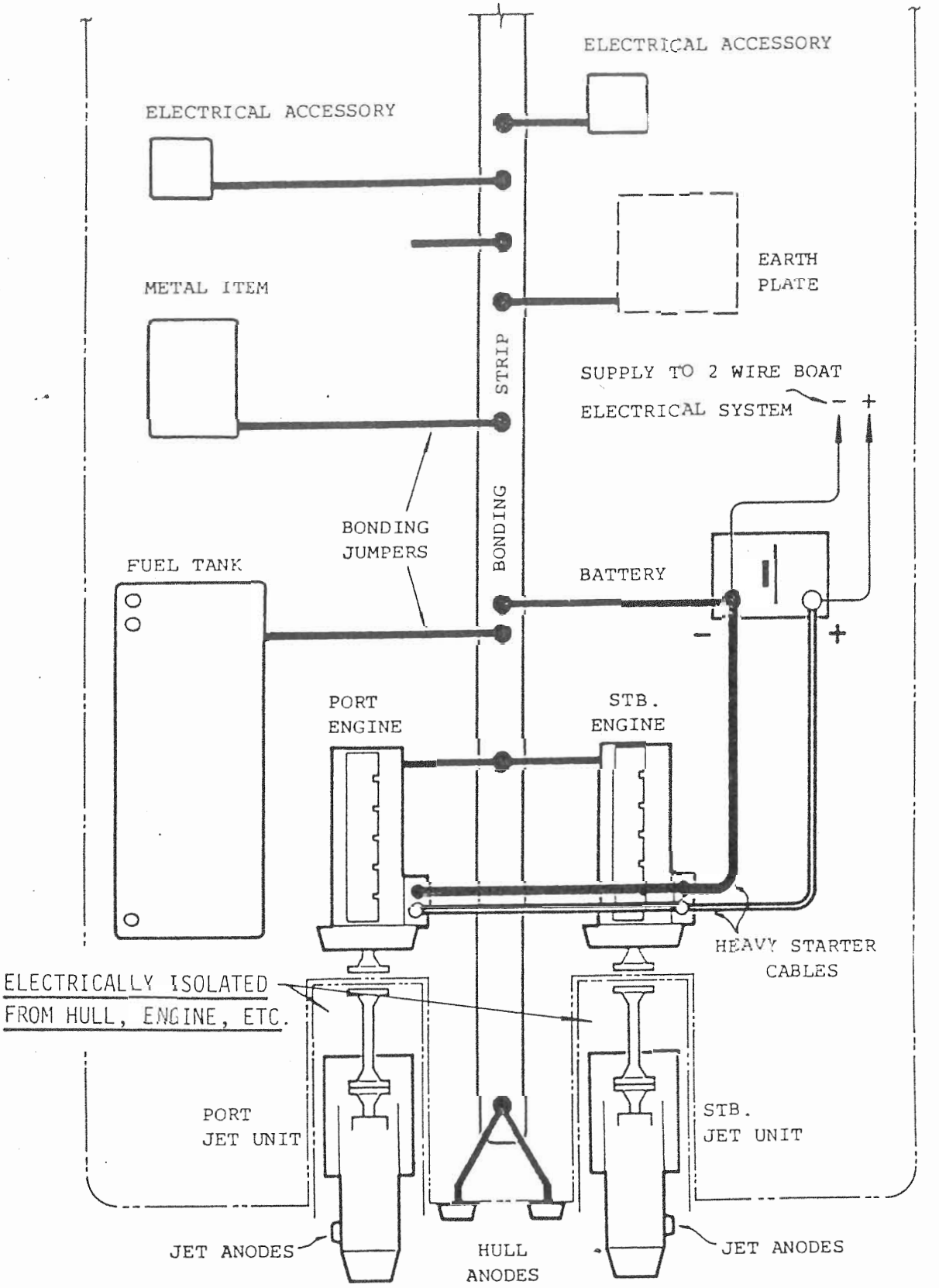
5. Regularly inspect all anodes and replace any that are more than half-eaten away.

6. Keep stainless steel clean.

7. If anti-fouling paint is used, use tin-based paint. Particularly do not use paints containing any copper at all.

8. A separate impressed current protection for the jet unit is also recommended if desired.

EXAMPLE OF A BONDING LAYOUT (STEEL HULLS ONLY)



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STEERING :

The steering deflector deflects the jet of water to port or starboard causing the boat to steer to port or starboard respectively.

The following points should be remembered when operating a jet craft :-

(a) If the engine is stopped there is no jet of water to deflect and thus the craft cannot be steered.

Never stop the engine when approaching a mooring or at any time when steering will be required.

(b) The wider the throttle is opened the greater the steering effect - i.e. the sharper the turn.

(c) Steering is available at "zero speed" as well as all ahead and astern speeds - a feature which gives the Hamilton Jet unrivalled manoeuvrability.

Remember though that whether going ahead, at "zero speed", or astern the bow of the boat will always turn the way the steering wheel is turned, i.e. turn wheel to port, bow of boat will move to port and vice versa.

This means that going astern the boat has the opposite steering to a motor car, a feature which can be used to advantage when manoeuvring.

AHEAD/ZERO SPEED/ASTERN CONTROL :

Astern and "zero speed" are achieved by redirecting the jetstream. If the reverse duct is lowered fully all of the jetstream is redirected back under the boat giving full astern thrust. If the reverse duct is lowered partially the jetstream is split giving some ahead and some astern thrust. At one reverse duct position the ahead and astern thrusts will be equal so the boat will not move ahead or astern regardless of the throttle opening.

This positions is referred to by Hamiltons as "zero speed". (It should not be confused with the neutral position of a gearbox when the driveline stops rotating).

When operating the Hamilton Reverse Control the jet unit is always rotating regardless of the position of the reverse duct. Any intermediate position between ahead and astern can be selected to give infinitely variable speeds when manoeuvring.

CAUTION

If in lightweight planing craft, the astern or zero speed positions are selected with the throttle left open and the boat moving forward at speed, the resultant "braking effect" is very severe - even more so than full braking with a motor car.

The above procedure should therefore be used only in an emergency.

EMERGENCY BRAKING :

For normal operation to "brake" the boat's forward motion :-

(i) Close the throttle.

(ii) Select zero speed or astern.

(iii) Open the throttle, gently at first.

MANOEUVRING AND DOCKING :

It has been found that the boat is best manoeuvred as follows :-

(i) Move the reverse control lever to the "zero speed" position.

(ii) Set the throttle up to 1/3 open - say approx. 1,200 rpm. (In strong tide or wind conditions increasse the throttle opening to obtain greater response as necessary).

(iii) A slight movement either way from the "zero speed" position will be sufficient to move the boat ahead or astern until the manoeuvre is complete.

(iv) Steering will be excellent also at this throttle opening. Full steering control is available at all Ahead/Astern control lever positions and there is no change of steering "sense" at any time.

Summary - manoeuvre at fixed throttle opening working the steering with one hand and the Ahead/Astern control lever with the other hand.

SHALLOW WATER OPERATION :

Avoid pumping stones, sand etc. through the jet unit - this will blunt and wear the impeller.

(a) At high planing speeds this is not a problem until the boat is nearly ground.

(b) At slow displacement speeds avoid using large throttle openings in shallow water. If it is not possible to pick a deep water area to start off and stop in, "idle" over the shallow area into deep water before accelerating up to speed.

BLOCKAGES, DEBRIS, ETC. IN THE UNIT :

Small pieces of debris, water weed or large logs, etc. will not normally block or harm the unit. However, it is good practice to steer around such debris if possible as any caught in the intake screen, impeller or tailpipe stator vanes can effect the jet unit's performance.

Blockages of the unit are usually noticed by :-

(a) The engine unloading (rpm increases).

(b) Lack of jet thrust (boat speed drops).

(c) Excessive noise and vibration from the unit.

If a blockage is indicated, close the throttle of the blocked unit, or stop the engine. Most times, especially if the boat is moving forwards, the obstruction will fall away.

If unsuccessful :-

(a) If a gearbox is fitted, momentarily reversing the jet unit rotation very effectively clears debris from the intake screen;

or, with the engine stopped :-

either -

(b) Operate the raking screen; or

(c) Remove the inspection cover (9) on the intake housing and clear the obstruction.

CAUTION : Before removing the inspection cover :-

(i) Stop all engines.

(ii) Check that the static water level will be below the intake inspection cover lip.

If the static water level is too high, weight can be placed on the bow end to raise the stern end enough to allow the cover to be removed.

A. STEERING :

Air continues to work its way out of manual hydraulic systems for some time. Regularly check the oil reservoir level for some weeks with a new boat and top up if necessary. With air in the system the steering will be soft - and not accurate. Ensure all air is bled from the system. Ensure number of turns of the wheel is not more than 1.9 full lock to full lock otherwise steering will be insensitive.

With mulitple jets ensure the steering tie rod length is adjusted so that all jets steer straight ahead at the same time.

1. If the steering wheel is still difficult to turn, check the following :-

(a) The jet tiller moves easily. Remove the cylinder rod end bolt and operate the wheel. If the cylinder operates easily, the jet tiller and steering assembly very likely has too much friction. Check the steering deflector and steering shaft rotate freely. If the cylinder does not move, and the wheel is still hard to turn, check :

(b) The system is free of entrapped air.

(c) The system is piped using only the two short lengths of flex hose supplied for the cylinder connection.

(d) The hydraulic oil is one of the types recommended, that is, not more viscous (thicker) than automatic transmission fluid.

(e) The tubing used is at least the size recommended.

2. If the steering wheel continues to turn easily and the cylinder does not feel like it reaches hardover, check the following :

(a) The cylinder bypass valve (if installed) is in the closed (normal) position.

(b) All system fittings are tight.

(c) The system is free of entrapped air. If air is in the system, the wheel will spring back when turned and released.

(d) A lockvalve on another helm pump is not contaminated. Contamination is indicated by the wheel turning at that station. That lockvalve must be disassembled and cleaned. When removing the slotted lockvalve inserts, take care not to lose the retained spring and steel ball or to damage the seals.

(e) The cylinder piston seals are not damaged. All of the above should be checked and determined to be satisfactory first. Remove the cylinder rod end bolt and attempt to stroke the cylinder rod fully back and forth by hand. If the rod moves, the piston seals must be replaced. Oil leaking along the cylinder rod from either end of the cylinder indicates the rod seals are defective and must be replaced.

3. If the number of wheel turns is different when turning hardover to port and hardover to starboard, check the following :

(a) The system is free of entrapped air.

(b) The system is piped using only the two short lengths of flex hose supplied for the connection of the cylinder.

B. REVERSE :

- Refer to HSRC instructions.

- Poor reverse thrust - Reverse duct not travelling fully down so whole jetstream enters it.
  - Reversed jetstream hitting hull or hull extension such as a trim plate.
  - Boat has insufficient immersion at transom and air being sucked from rear into jet intake.

Note effect of engine exhaust on jet reverse - page H1.

C. JET :

Note - assuming the correct impeller and nozzle combination are fitted then :-

High RPM - means jet is at fault.

Low RPM - means engine is at fault.

1.	Water leaking from under front bearing housing.	-	Faulty water seal or counter face.
2.	Excessive high pitched rattling whine.	-	Faulty thrust bearing.
3.	Bad vibrations.	-	Worn cutless bearing. - Worn driveshaft universal joints.
4.	Engine revclutions 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 noticeable decrease in jet thrust.	-	Fully tachometer.
6.	Excessive engine revolutions, noisy jet unit with aerated water from nozzle.	-	Screen blocked with weed, debris or rope through screen and wrapped around unit shaft or object jammed in stators and/or impeller.

N O T E : All the symptoms described in items 2, 3 and 4 may be caused by the same fault as in item 6.

GENERAL

This unit has been designed to require the absolute minimum of maintenance. However, it is recommended that the unit be dismantled and inspected for wear on bearings, seals, etc. and corrosion annually as a minimum requirement.

Day to day maintenance should be negligible, but the following points and checks should be noted:-

HYDRAULIC OIL RESERVOIRS

Check oil levels daily.

THRUST BEARING

Grease with a good quality Lithium-based ball bearing grease every 30 hours' operation. Do not overgrease.

REAR BEARING

This is a water lubricated, cutless rubber bearing and requires no attention.

DO NOT RUN THE UNIT OUT OF WATER as this will damage the bearing. Application of a hose to the small hole at the back cone fairing of the tailpipe of single stage unit will wet the bearing sufficiently to allow the unit to run for a short time, but remember the engine will have no water circulation and prolonged running will cause damage.

An optional rear bearing arrangement is available for situations where engine must be started before launching.

GLAND SEAL

This is a carbon face seal type with bronze counterface and should require no attention. Should this seal be faulty water will leak from under the bearing housing. To inspect seals see dismantling procedure section. Inspect at least every 500 hours.

DRIVESHAFT UNIVERSALS

Every 30 hours sparingly grease the universal joints and sliding splines if Hardy Spicer type employed. Do not over grease.

SACRIFICIAL ANODES

The unit is fitted with anodes on the tailpipe steering deflector, reverse deflector and cylinder which will waste away in sea or contaminated water. Regularly inspect these anodes and replace immediately if reduced in size to a serious degree. If allowed to disappear, corrosion will start on the aluminium parts which could eventually damage the unit.

DEBRIS IN UNIT

Any debris such as wood, water weed, etc. caught in the intake screen, impeller or tailpipe stator vanes will affect the jet unit's performance. If operating in debris laden water inspect interior and intake screen daily. The jet is provided with an inspection cover lip and the cover can be removed provided the engine is stopped and the craft is stationary.

On most installations the static level of water inside the jet unit will be below the intake inspection cover lip and the cover can be removed provided the engine is stopped and the craft is stationary.

If the static water line is too high then often by moving the load to the bow of the boat or placing a heavy load on the bow end the stern is raised enough to allow the cover to be removed.

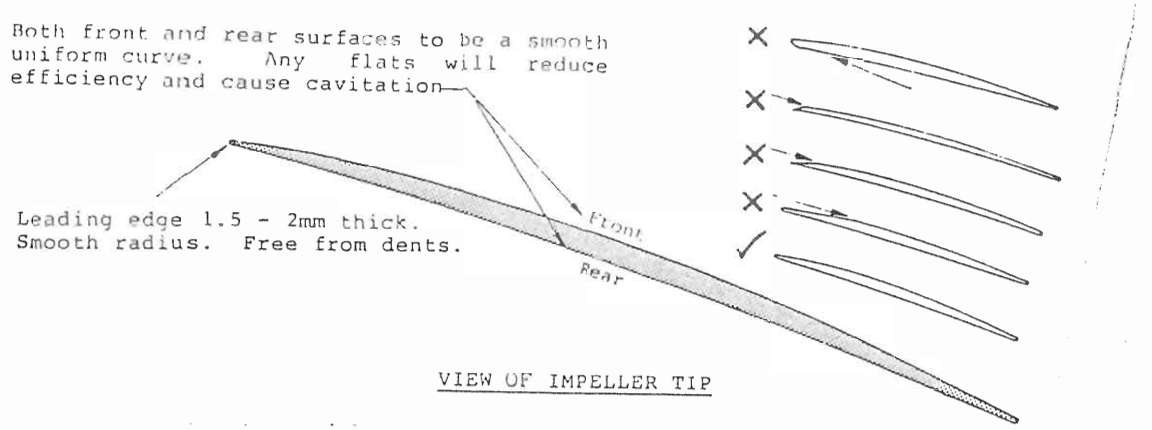
To remove the cover - remove the two nuts and washers and draw the cover off.

IMPELLER :

The leading edges of the impeller (66) may tend to become "blunt" after a period of time with the action of small solid particles in the water. The performance of the impeller will drop as a result.

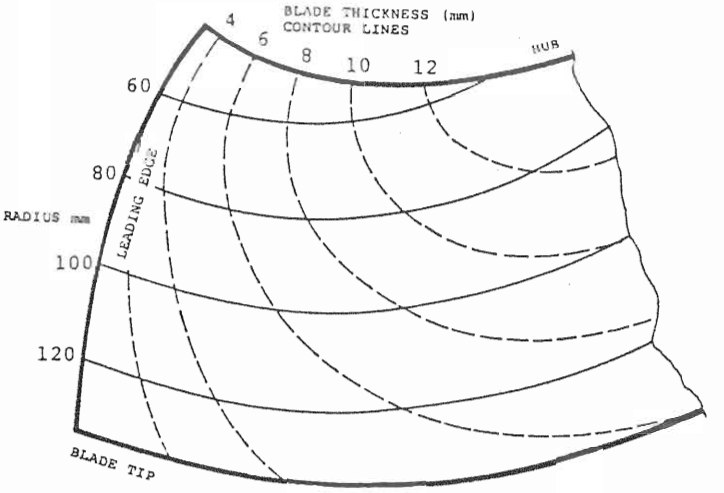
Anytime the inspection cover is removed (as above) the leading edge of the blades should be inspected for wear. If badly worn, remove impeller (see section on dismantling unit) and sharpen as shown.

IMPELLER SHARPENING :



VIEW OF IMPELLER TIP

IMPELLER SHARPENING - CONTOUR LINES



FRONT VIEW OF IMPELLER BLADE

REVERSE AND STEERING HYDRAULICS :

Check oil levels daily and externally inspect all system components to ensure no oil leaks have developed. Top up reservoirs, if necessary. Refer HSRC Manual for details on reverse system and pages K1 and L1 for steering system. Note that the steering system must use a "lighter" oil than the reverse system. Change oil annually or if contaminated in any way - see maintenance section.

REVERSE AND STEERING JOINTS :

All reverse bucket and steering joints outside the hull should be oiled and checked to see they are operating freely. Once in the water these joints will be water lubricated. The bushes should be removed from the housings approximately every six months and the housings bores scraped of corrosion and painted with two pot epoxy etch primer. Anytime stiffness is noted in the steering, the bushes should be checked for corrosion build up.

RAKING SCREEN BEARINGS :

The screen rake should be checked at regular intervals for free operation. Stiffness or binding may be caused by debris caught in the screen or seized bearings. Grease bearings periodically with water repellent grease.

CARE OF JET UNIT PAINTWORK :

The main body of the unit is constructed from Silicon-Aluminium alloy (LM6) which best resists corrosion from salt water. These castings are finished in a Polyurethane paint. Periodic cleaning down, wire-brushing, and re-painting may be necessary depending on water conditions prevailing and extent of use.

When the craft is on the slip, or at least annually, the complete unit should be removed from the boat and inspected internally and externally for faults, corrosion, or breakages (follow the maintenance instructions in Section N). Clean down and repaint the castings. DO NOT use copper-based antifouling paints. Tin based antifouling paints are suitable. Leave all stainless steel parts polished and unpainted.

RECOMMENDED LUBRICANTS :

For main thrust bearing (10) grease nipple with Shell Avania R2. Steering and reverse hydraulic systems use I.S.O. viscosity grade 32 oil such as Shell Tellus 32 or equivalent.

For all other applications (bearings, tapers, threads, mating joints and corrosion protection) - BP ENERGREASE MM - EP2 (Marine multi-purpose extreme pressure grease) or equivalent.
DO NOT USE GRAPHITE BASED LUBRICANTS ON ANY JET PARTS.

TIGHTENING TORQUES (for lubricated threads - see above) :

Thread Size	Description	Torque Nm	Torque lbs.ft.
M 6	Nut	5	3.7
M 8	Nut	12	9
M10	Nut	24	18
M12	Nut	40	30
M16	Nut	100	75
-	Impeller Nut	400	170
-	Coupling Nut	400	170

A. THRUST BEARING ASSEMBLY AND WATER SEAL :

Warning : If boat is afloat check that water level is below bearing housing before proceeding.

(i) Dismantling Thrust Bearing, Grease Seals and Water Seals :

1. Uncouple the driveshaft from the jet unit.
2. Remove coupling flange grub screw (16), prevent coupling flange (13) from turning and unscrew nut (15).
3. Use a puller to draw the coupling flange (13) free of the mainshaft. Unscrew nut (15), remove coupling flange (13) and key (14A).
4. Unscrew 3 bearing housing retainer nuts (20) from studs (18) and remove spring washers (19).
5. Slide bearing housing (9) off the main shaft (the housing will still contain bearing (10), outer sleeve and seal (12)). Check that the "O" Ring is in the bearing housing.
6. Withdraw the stationary face housing (21) and inner sleeve (12).
7. Slide water seal assembly (23) back off main shaft.

(ii) Checking for Wear :

Check the following parts for wear and replace where necessary -

8. Oil seals and sleeves (12).
9. Bearing (10).
10. Water seal and stationary face assembly (23). Check to see if mating faces are scored or chipped. Always replace both seal and counterface even if one or other appears unworn.
11. "O" Rings (11, 22). Check for cuts or deformation.
12. Thoroughly clean all parts.

(iii) Re-assembly of Water Seal :

(Refer Recommended Lubricants and Tightening Torques - page M3).

1. Lubricate the mainshaft with a 2:1 water and household detergent mix and carefully replace seal parts in the following order :- cup washer, spring, rubber drive ring and rotating carbon seal face.
2. Slide the assembly down the mainshaft, through the hole in the intake until the cup washer rests against the split pin (24) through the mainshaft.
3. Press seal stationary face into housing (21).
4. Press inner oil seal (12) into housing (21) so that the lip faces towards the coupling flange (13) (refer drawing).
5. Coat "O" Ring (22) and stationary face housing to intake (3) contact faces with marine grease, fit over mainshaft and push into place.

Warning : Water seal faces must remain free of dirt and grease.

(iv) Re-assembly of Bearing Housing :

6. Grease outside surface of inner seal sleeve (12), slide over shaft and push through the seal until it rests firmly against the shoulder of the shaft.
7. Press outer seal (12) into the bearing housing up to the shoulder (9) so that the lip faces towards the coupling flange (refer drawing).
8. Pre-pack bearing (10) with grease then press into bearing housing (9).
9. Coat "O" Ring (11) with grease and place in bore of bearing housing (9) next to bearing (10).

10. Feed bearing housing (9) over shaft and locate on three studs (18). Fit spring washers (19) and nuts (20), tighten to 30 lb.ft.

11. Coat bearing carrier (17) in grease, push over shaft and gently tap inside bearing (10) until it is flush with face of bearing.

12. Grease outside surface of outer seal sleeve (12), slide over shaft and push through the seal until it rests firmly against the bearing.

13. Lightly grease bore and keyway of coupling flange (13), keyway and thread of the mainshaft plus face of coupling nut (15). Fit coupling key (14A), coupling flange (13) and coupling nut (15). Prevent coupling flange (13) from turning and torque nut (15) up to 400 Nm (295 lbs.ft.). Fit and tighten grub screw (16).

14. Check mainshaft rotates before connecting up the drive shaft.

B. IMPELLER/WEAR RING :

(i) Checking for Wear :

Before dismantling the tailpipe end of the jet, remove the inspection cover (29) (or intake screen (4) if in dry dock) and carry out the following checks :

1. Using feeler gauges, check clearance between the tips of the impeller blades and wear ring (1) at each side of the unit (i.e. not top and bottom). Maximum recommended worn clearance is 1.0mm (.040 ins) per side.

2. Push the mainshaft (25) hard from side to side. Check total sideways movement at blade tips. Maximum recommended worn total movement is 0.6mm (.024 ins). This indicates the amount of wear in the cutless bearing (67) and shaft sleeve (68).

(ii) Dismantling :

3. Disconnect reverse cylinder (95) from duct (44) by removing pin (99). Move duct through full arc to check for stiffness or slack bushes.

4. Remove lock bolts (73), reverse duct pivot pins (75) and reverse duct (44).

5. Disconnect steering tiller (35) from steering cylinder. Check steering shaft (36) for :

   (a) Free rotation and axial movement.

   (b) Undue wear in bushes (42) and (38).

   (c) Undue wear in ball end of crank (43). (Check fit in deflector bush (91)).

6. Remove cotter (31) from steering crank (43) and ensure that crank rotates freely on shaft.

7. Rotate steering deflector (50) through full arc, to check for stiffness or slack bushes (46) and (48). If these seem to be in good condition the deflector can remain on the tailpipe assembly (41).

8. Remove four tailpipe nuts (72). Hit tailpipe sideways with the heel of the hand or a rubber mallet to free the joint. Remove tailpipe (41) from the remainder of the jet unit, the steering crank (43) must be slipped off the shaft (36) at the same time.

9. Prevent coupling flange (13) from turning and unscrew impeller nut (15). If stiff gentle heat on the nut will destroy "Loctite".

10. Withdraw shaft sleeve (68).

11. Draw impeller (66) off mainshaft and remove impeller key (14).

12. Examine wear ring (1). In the unlikely event of this being very badly scored, or if it has swollen inwards, it should be replaced. If possible, request your local agent to carry out the replacement.

(iii) Replacing the Wear Ring :

(a) Find the joint in the wear sleeve and force a fine screw driver between the sleeve and the intake casting adjacent to the joint until the end of the sleeve is free (fig. 1 and fig. 2). Pull the end of the sleeve inwards and remove it from intake.

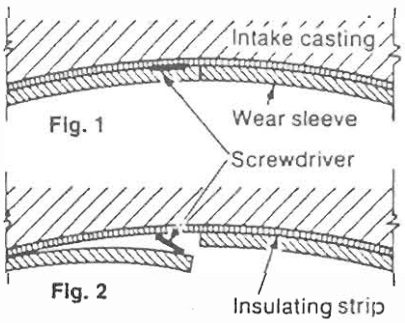


Fig. 1

Fig. 2

(b) Remove the insulating strip and thoroughly clean intake bore.

(c) Paint the intake bore with a thin layer of etch primer only.

(d) Put in a new insulating strip while etch primer is still wet then grease its inside diameter.

(e) Take a new wear strip and with chamfer end leading, butt the strip at the chamfers by twisting slightly, Fig. 3, (this reduces the lead in diameter) and feed it inside the insulating strip, as it goes in straighten the strip gradually until it butts normally, Fig. 4. Slide in as far as possible and complete assembly by tapping gently with a wood block round and round the outside edge. The wear strip is in the correct position when it is flush with the face of the bore, see Fig. 5. The 0.8mm gap must be maintained to prevent electrical contact between the wear ring and the intake casting.

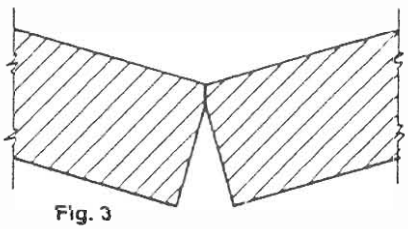


Fig. 3

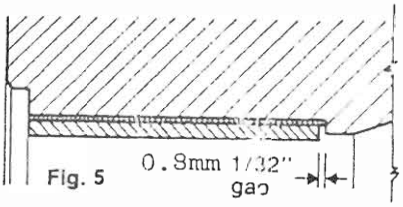


Fig. 5

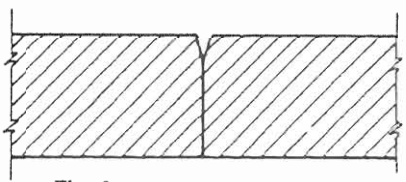


Fig. 4

(iv) Impeller Overhaul :

(a) Check the impeller leading edge, if blunt or dented file out the dents following the profile of the blade, and then sharpen in line with instruction on page M2.

(b) If you decided at point 1. in these assembly instructions that the outside diameter of the impeller was badly worn, check it again in the new wear ring, if the clearance is still too great proceed as follows -

- Build up impeller tips by welding.

  Stainless Steel : Filler metal chemical analysis similar to ASIM 2769 316L (carbon content less than .03%). Post weld heat treatment not required.

- Turn the outside diameter to 269-269.2 making sure that it is concentric with the bore. (Light cuts should be taken when turning outside diameter to avoid deformation of the impeller blades).

- File and polish.

- Balance the impeller statically, preferably on its main shaft (25) with the coupling (13) and all keys in place. Balance to within 45 gm-cm (0.63 oz.ins.).

(v) Re-assembly :

1. Check the cutless bearing (67) and its sleeve (68) for wear (refer item 2 page N2) or bad scoring and if necessary replace. Replace automatically if the impeller has just been built up and the wear sleeve replaced. Use either an internal extractor to pull bearing (67) from the tailpipe (41) or place tailpipe under a press and press bearing (67) and fairing (69) out together. Fix fairing back in with "Loctite 601" locking fluid or equivalent. Apply grease to tailpipe bore before inserting new bearing but keep grease away from rubber bearing surfaces. When pressing the new bearing in, use a wooden block under the nose of the tailpipe fairing to take the load.
2. Remove all steering and reverse system bushes. Scrape any corrosion out of housing bores and paint surface with 2 pot epoxy etch primer before refitting bushes. Worn bushes should be replaced.
3. Clean all parts thoroughly.
4. Smear a light coating of grease over complete mainshaft.
5. Insert impeller key (14) chamfers down into shaft keyway.
6. Slide impeller (66) onto shaft followed by the shaft sleeve (68).
7. Apply "Loctite" to shaft thread of nut (15), torque impeller nut to 400 Nm (295 lbs.ft.).
8. Dust cutless bearing (67) with talc or french chalk.
9. Clean and grease tailpipe/intake contact faces. Refit seal (40) and replace tailpipe, at the same time steering crank (43) onto shaft (36). Screw on nuts with spring washers (71), (72) - threads greased. Torque to 100 Nm. (75 lbs.ft.).
10. Turn the coupling flange (13) to ensure assembly will rotate.
11. Replace and tighten cotter (31) in steering crank (43). Torque to 40 Nm. (30 lbs.ft.). Ensure cotter fitted opposite way round to tiller cotter.
12. Replace reverse bucket pivot pins (75). Grease bushes (76). Fit lock bolts and spring washers (73) and (74).
13. Check that steering control from helm to steering arm is free and then reconnect cylinder to arm (35).

C. STEERING SYSTEM :

The Steering Cylinder and helm pump parts lists and illustrations are shown in Sections O, P and Q. For fault finding with Steering System refer to Fault Finding page L1.

The system oil should be changed annually or immediately if contaminated in anyway. If the oil has been contaminated in any way, all components including the helm pumps must be disassembled, cleaned and the hydraulic lines flushed clean with kerosene, varsol or diesel oil. Check the condition of the cylinder seals carefully before reassembly and replace if necessary. Note - a cylinder seal kit part number 105369 is available. Refill system with oil and bleed.

D. REVERSE CYLINDER :

The Reverse Cylinder assembly is as Parts List page R1 and Drawing page R2.

For fault finding with the Reverse System refer to the H.S.R.C. System Manual.

Maintenance :

1. The Reverse Cylinder need only be dismantled if it is suspected that a seal has failed. Typical symptons of seal failure are :

   Piston Seal : Reverse bucket creeping down from up position. (Can also be caused by a faulty control valve - refer H.S.R.C. Manual).

   Front Head Seals : Oil leaking from the fronthead retainer.

Dismantling :

2. Disconnect hydraulic hoses and sender linkage ball joint.
3. Remove Split Pin (98) and Cylinder Pin (99) at Reverse Duct (44).

4. Unscrew four nuts (97) and washers (96). Withdraw reverse cylinder assembly (95) through hole in transom.

5. Loosen locknut (C3) and unscrew rod end (C2) from shaft (C4). Remove anode (C20).

6. Loosen lockring (C16). Apply gentle heat to backhead (C17) to soften threadlock and unscrew from cylinder (C14).

7. Withdraw shaft/piston assembly out of cylinder (C14) from backhead end.

8. Remove free half of hemispherical seat (C8) over studs (C18). Remove "O" Ring (C7) and place in groove of loose hemispherical seat.

9. Apply gentle heat to fronthead (C10) to soften threadlock and unscrew cylinder (C14) using a strap wrench.

10. Apply gentle heat to fronthead (C10) to soften threadlock and unscrew ball (C6) using a strap wrench.

11. Remove all seals (C5), (C11), (C12) and (C15). Thoroughly clean all parts, ensuring "Loctite" residue is removed from engaging threads between ball (C6) and fronthead (C10), cylinder (C14) and fronthead (C10) and backhead (C17).

12. Check cylinder (C14) bore and shaft (C4) and (C15) outside diameter. Replace if obviously worn or scored. Light marks in cylinder (C14) bore can be removed by honing.

Re-assembly :

13. Fit new seals (C5), (C11), (C12) and (C15) as illustrated on page R2. It may be necessary to use a special 3-finger seal compressing tool to fit the shaft seals (C11) into the fronthead (C10) and backhead (C17). NOTE - a cylinder overhaul kit (part no.105369) which includes all seals and a container of "Loctite 569" is available.

14. Apply "Loctite 569" to thread of ball (C6). Fit one half of hemispherical seat (C8) and mounting plate (C9) over threaded end of ball (C6). Clamp fronthead (C10), being careful not to distort casting and screw ball (C6) into fronthead using a strap wrench.

15. Apply "Loctite 569" to thread on one end of cylinder (C14) and screw fully into fronthead (C10) using a strap wrench. Wipe off excess "Loctite".

16. Oil shaft/piston assembly (C4), (C13) and (C15) and insert into cylinder (C14), taking care that the seals (C12) are compressed when entering cylinder (C14).

17. Screw lockring (C16) onto cylinder end (C14) up to end of thread. Clamp backhead (C17), being careful not to distort the casting. Apply oil to shaft seal (C11) and wiper (C5), ensure internal thread on backhead (C17) is free from oil. Apply "Loctite 569" to thread on cylinder up to the lockring (C16). Offer compensator shaft (C15) through backhead (C17) taking care not to damage shaft seal (C11). Using a strap wrench, screw cylinder (C14) fully into backhead (C17)- tighten lockring (C16).

18. If possible pressure test the reverse cylinder to 103 bar (1500 psi) before fitting in boat.

19. Fit four studs through fitted half of hemispherical seat (C8). Grease ball (C6), fit "O" ring (C7) and slide other half of hemispherical seat over studs.

20. Check for wear in rod end bush (C1). (Reverse cylinder pin (99) should be neat fit). Replace bush if necessary. Screw rod end (C2) into shaft (C4) with new anode (C20).

21. Apply neutral cure R.T.V. silicone sealant to spigot and surface of hemispherical seat (C8) mating transom plate hole. Locate four studs (C18) into transom plate holes and push cylinder until the hemispherical seat (C8) contacts the transom plate.

22. Replace and tighten four washers (96) and four nuts (97) to studs (18).

23. Connect cylinder to reverse duct with pin (99) and fit split pin (98).

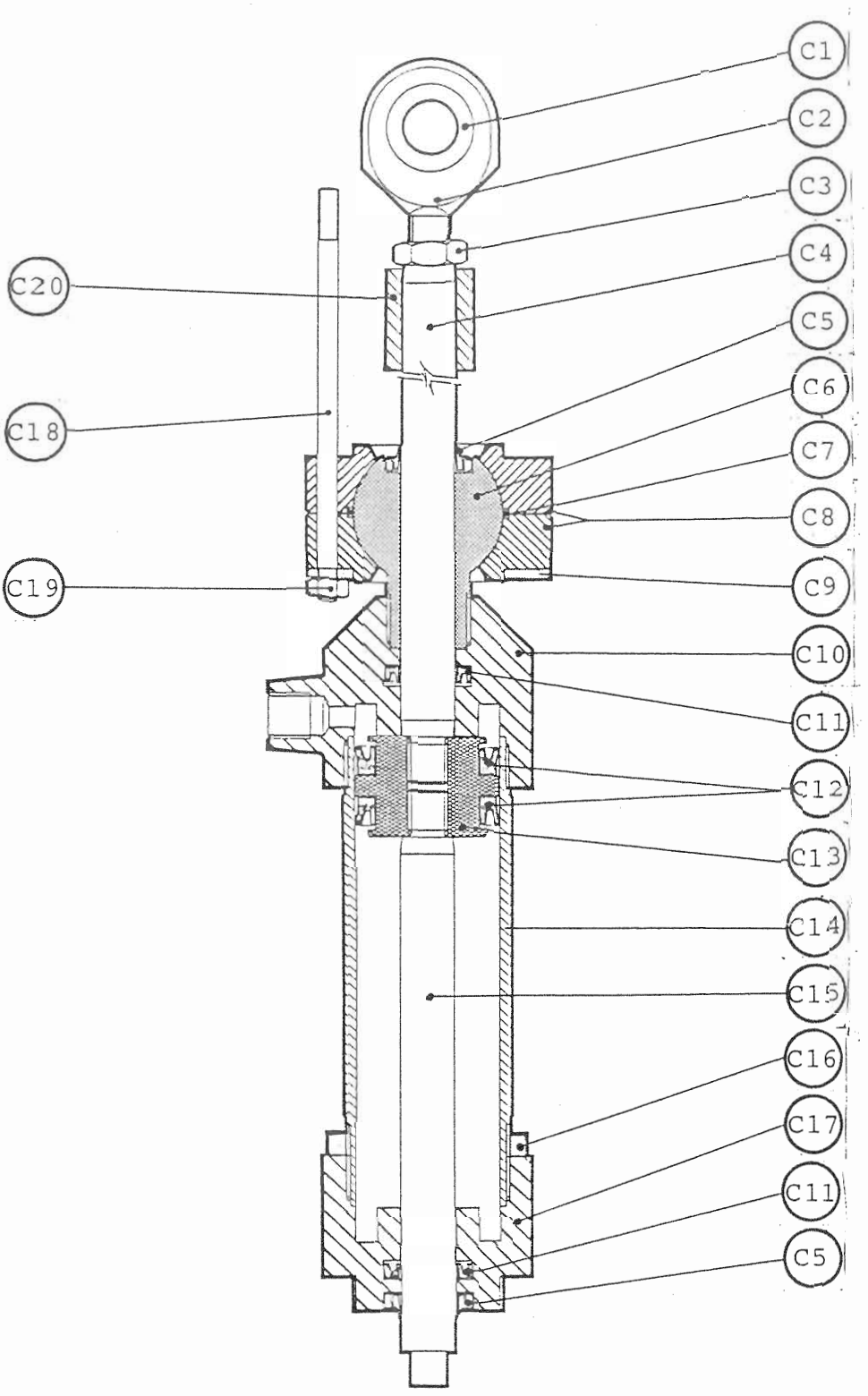
24. Fit hydraulic hoses and connect up H.S.R.C. operating lever - refer H.S.R.C. Instructions.

25. Operate hydraulics, bleed system of air and check for leaks - refer H.S.R.C. Instructions.

NOTE - FOR REPLACING SEALS ONLY : If heat is not required to break the joint between fronthead (C10) and cylinder (C14), seals can be replaced without further dismantling. Replace all seals as previously described, clean "Loctite" residue from cylinder (C14) and fronthead (C10) re-assemble using Loctite 569.

ITEM	PART NUMBER	REQ'D	DESCRIPTION
C1	104654	1	Bush - Rod End
C2	105335	1	Rod End
C3	JDQK XAH	1	Hex Thin Nut M12 - 1.75 316SS
C4	105324	1	Shaft
C5	JWKZ ADR	2	Wiper
C6	105331	1	Ball
C7	HMHR XAH	1	"O" Ring
C8	105330	2	Hemispherical Seat
C9	105572	1	Mounting Plate
C10	105327	1	Front Head
C11	JWKZ ADS	2	Shaft Seal - Dichtomatik MA25-16
C12	JWKZ ADT	2	Piston Seal - Dichtomatik MA25-32A
C13	105326	1	Piston
C14	105332	1	Cylinder
C15	105325	1	Compensator Shaft
C16	105333	1	Locking Ring
C17	105328	1	Back Head
C18	30682	4	Tie Rod
C19	JDQH XAA	4	Hex Nut M6-1.0 316SS
C20	105753	1	Anode

Reverse Hydraulic Cylinder Seal Kit Available - Part No.105369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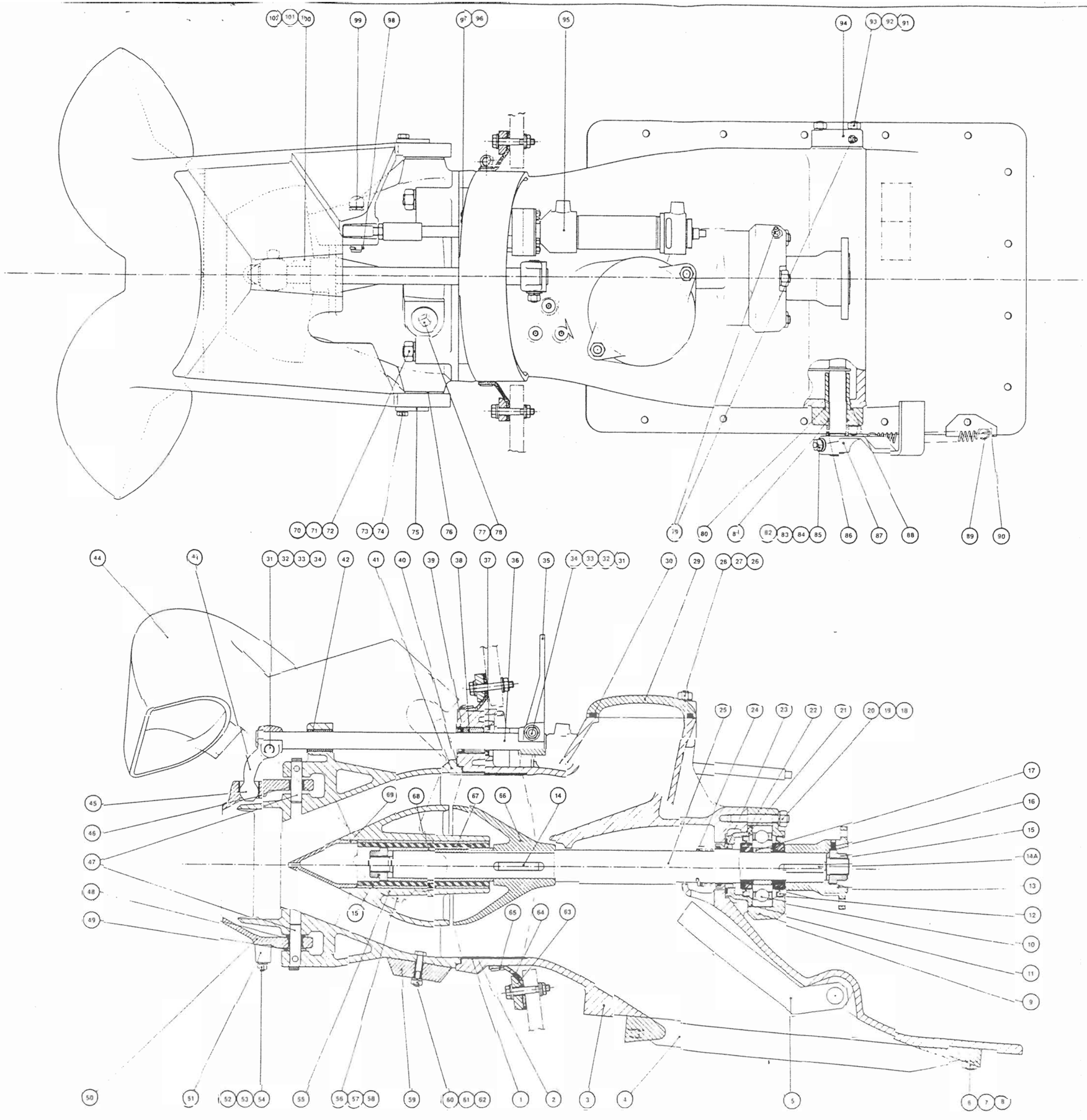
C20
C18
C19

ITEM	PART NUMBER	REQ'D	DESCRIPTION
1	103362	1	Wear Ring
2	103363	1	Insulator - Wear Ring
3	105272	1	Intake
4	105276	1	Intake Screen
5	105277Y	1	Intake Screen Rake
6	30677	4	Stud M12
7	JEQK XAH	4	Spring Washer Ø12
8	JDQH XAH	4	Hex. Nut M12
9	105274	1	Bearing Housing
10	JNOD AFB	1	Bearing
11	HMHR ABH	1	O Ring 2-3/4" x 3" x 1/8"
12	JWKZ ACA 105279	2 2	Seals Sleeves
13	105284	1	Coupling Flange
14	105283-1	1	Key Impeller
14A	105283-2		Key Coupling
15	105286	2	Coupling and Impeller Nut
16	JAJM YBR	1	Socket Set Screw M8
17	105280	1	Bearing Carrier
18	30639	3	Stud M12
19	JEQK XAH	3	Spring Washer Ø12
20	JDQH XAH	3	Hex. Nut M12
21	105288	1	Stationary Face Housing
22	HMHR ABV	1	O Ring
23	61363SY	1	Water Seal & Stationary Face
24	HUIL ABD	1	Split Pin
25	105278	1	Mainshaft
26	30678	2	Stud M12
27	JEQK XAH	2	Spring Washer Ø12
28	JDQH XAH	2	Hex. Nut M12
29	102659	1	Inspection Cover
30	102280	1	Inspection Cover Seal
31	102834	2	Cotter
32	102993	2	Thick Flat Washer
33	JEQK XAE	2	Spring Washer Ø10
34	JDQH XAE	2	Hex. Nut M10
35	105352	1	Tiller
36	102832	1	Shaft
37	61362	1	Seal - Steering Shaft
38	102728	1	Bush - Steering Shaft
39	61353	1	Scraper Ring - Steering Shaft
40	105360	1	Seal - Intake/Tailpipe
41	105273	1	Tailpipe
42	104755	1	Steering Bush
43	102833	1	Crank
44	105275Y	1	Reverse Duct
45	102961	1	Bush - Crank
46	102838	1	Bush - Upper
47	105354	1	Deflector Pivot Pin
48	102734	1	Bush - Lower
49	102154	1	Washer
50	105353	1	Deflector

ITEM	PART NUMBER	REQ'D	DESCRIPTION
51	103359	1	Anode - Deflector
52	30632	2	Stud M8
53	JEQK XAC	2	Spring Washer Ø8
54	JDQH XAC	2	Hex. Nut M8
55	104634	2	Anode - Reverse Deflector
56	30632	4	Stud M8
57	JEQK XAC	4	Spring Washer Ø8
58	JDQH XAC	4	Hex Nut M8
59	102185-4	1	Anode - Tailpipe
60	HYQH XCB	1	Hex. Head Bolt M8 x 45
61	JEQK XAC	1	Spring Washer Ø8
62	JDQH XAC	1	Hex. Nut M8
63	102940	1	Transom Plate
64	102939	1	Transom Seal
65	103237	1	Transom Clamp assy
66	105830) 105379))	1	Impeller Type 4.5 Impeller Type 5.5 Impeller Type 6.5
	) 105381) 105791 105768 105380		Impeller Type 7 Impeller Type 7.5 Impeller Type 8.5 Impeller Type 9 Impeller Type 10
67	JNNH AAO	1	Cutless Bearing
68	105285	1	Shaft Sleeve
69	105287	1	Tailpipe Fairing
70	30680	4	Stud M16
71	JEQK XAJ	4	Spring Washer Ø16
72	JDQH XAL	4	Hex Nut M16
73		2	Hex Head Bolt M8
74	JEQK XAC	2	Spring Washer Ø8
75	105291Y	2	Pivot Pin
76	105356	2	Bush
77	103043	1	Plug 1¼" B.S.P.
78	105273-2	1	Internal Water Offtake Screen
79	HEID AAA	2	Grease Nipple
80	HMHR AAW	2	"O" Ring .13" x 1.44" x 1.69"
81	HMHR AAS	1	"O" Ring .13" x 1" x 1.25"
82	103170	1	Cotter
83	JDQH XAC	1	Hex Nut M8
84	JEQK XAC	1	Spring Washer Ø8
85	103637	1	Flat Washer Ø8
86	104647	1	Spacer
87	105132Y	1	Screen Rake Actuating Arm
88	104638	1	Bearing - Starboard
89	102364	1	Spring
90	105359	1	Spring Anchor
91	30638	4	Stud M10
92	JEQK XAE	4	Spring Washer Ø10
93	JDQH XAE	4	Hex Nut M10
94	104644	1	Bearing - Port

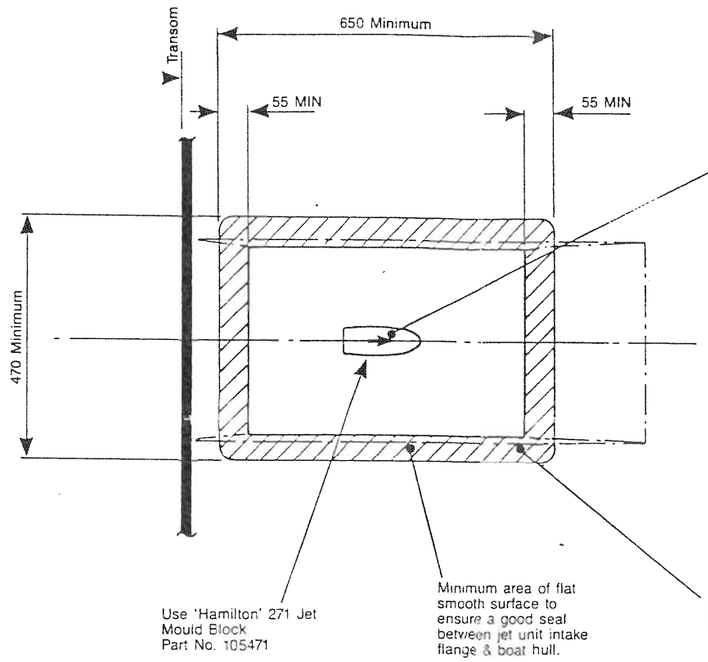
ITEM	PART NUMBER	REQ'D	DESCRIPTION
95	105289SY	1	Reverse Hydraulics Assembly - Refer Page for parts details.
96	JEQK XAA	4	Spring Washer Ø6
97	JDQH XAA	4	Hex Nut M6
98	HUIL AAH	1	Split Pin
99	104633	1	Hydraulic Cylinder Pin
100	HYQH XCC	2	Bolt M8
101	JEQK XAC	2	Spring Washer Ø8
102	JDQH XAC	2	Hex Nut M8



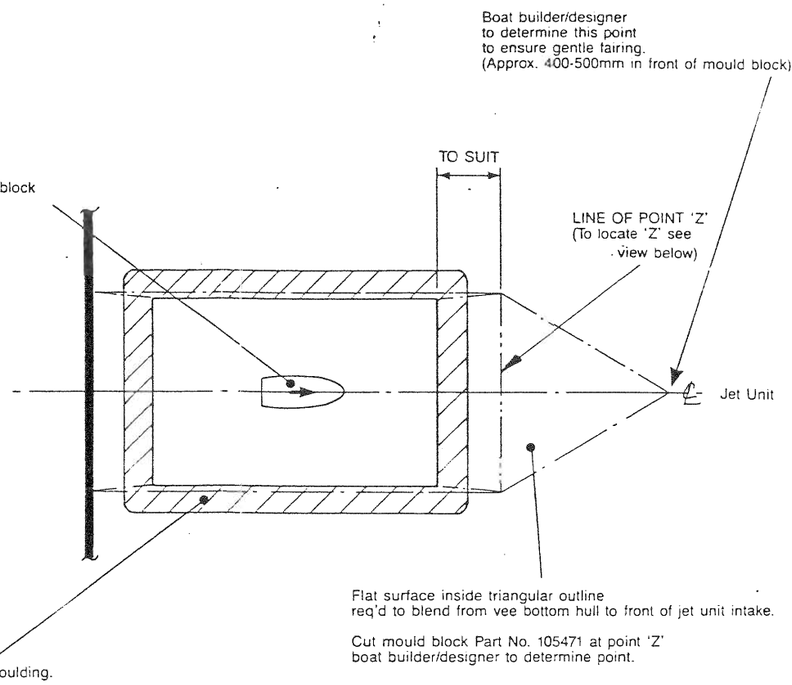
271 JET

105271 ST

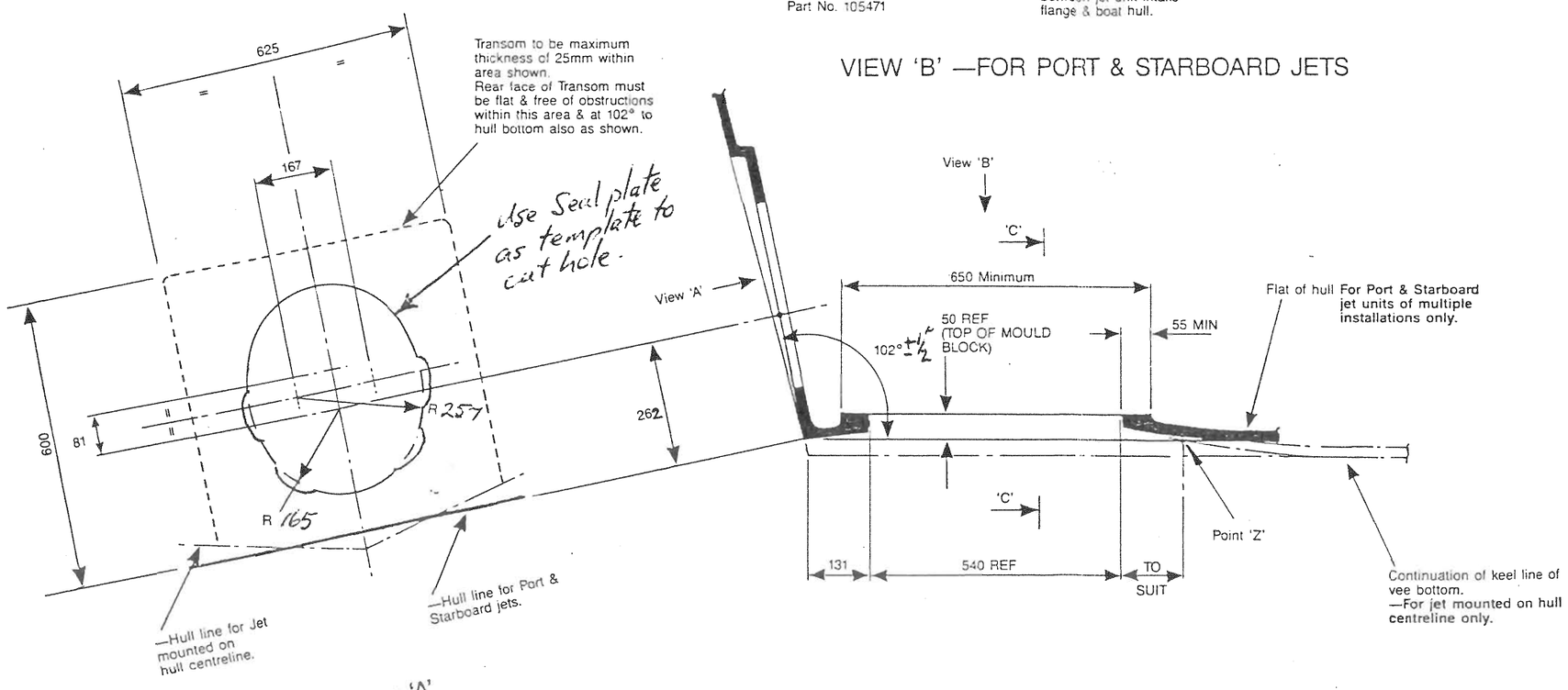
105742 | | REMOVE SHARP CORNERS DO NOT SCALE DIMENSIONS IN INCHES/M M ANGLE PROJECTION

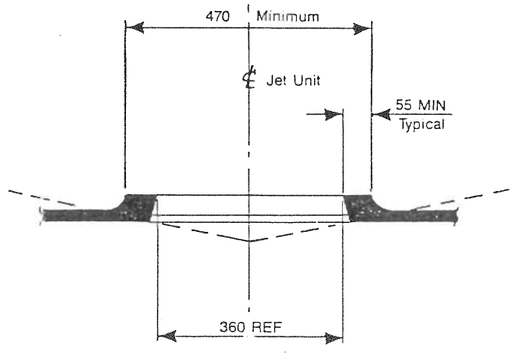


VIEW 'B' —FOR PORT & STARBOARD JETS



VIEW 'B'—FOR JET ON HULL CENTRELINE





SECTION:CC

NOTE
—This drawing is to be read in close conjunction with:
DRG NO. —General Arrangement Page E1
105473—Installation Information
Planing Craft
Fibre Glass Hull

REF	NO	BY	DATE	AMENDMENTS

C W F HAMILTON & CO LTD. CH.CH. N.Z.

MATERIAL

√-√ EXCEPT AS STATED

UNLIMITED DIMENSIONS TO BE ±

MAT'L CERT YES NO

DRAWN DATE

CHECKED

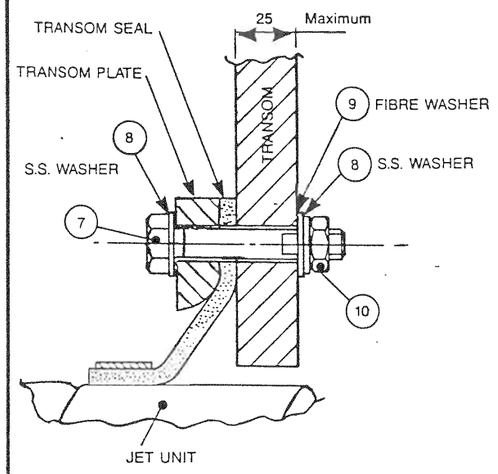
APPROVED

NAME 271 JET

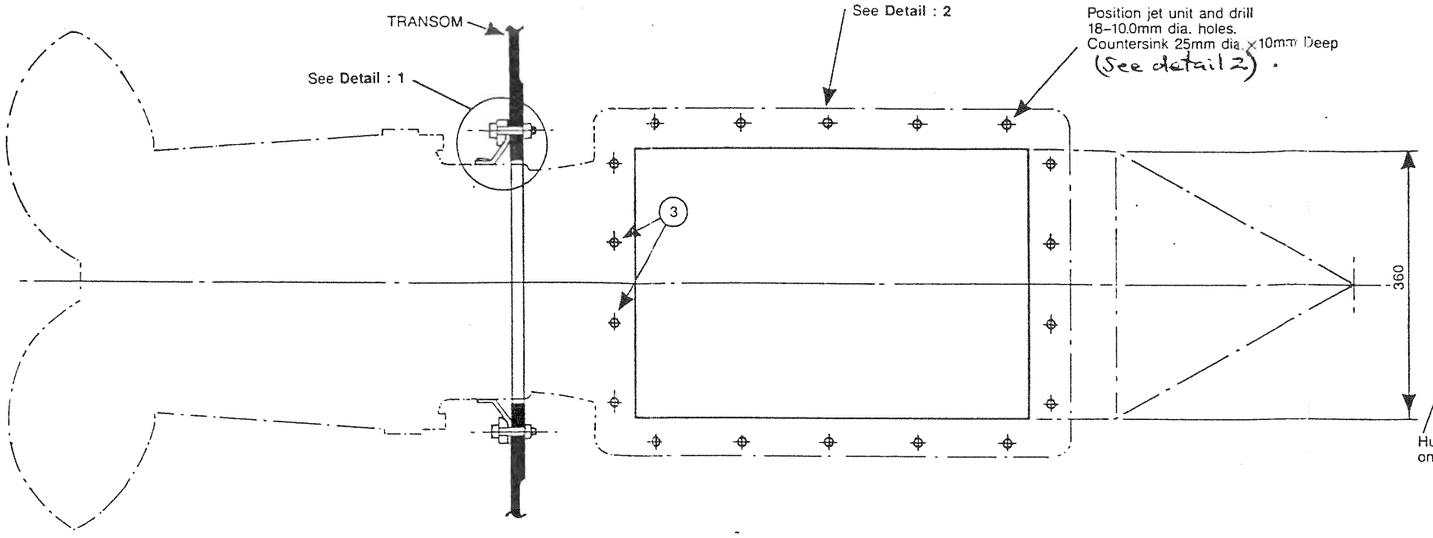
HULL PREPARATION
PLANING CRAFT
FIBRE GLASS HULL

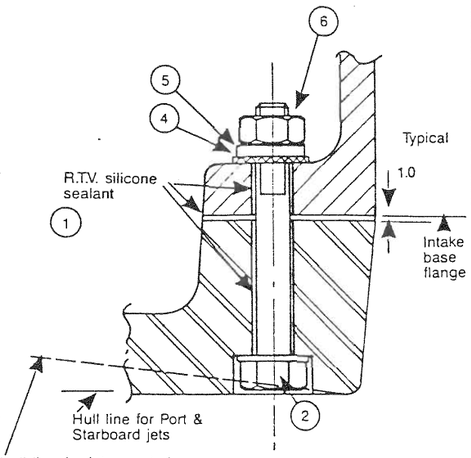
SCALE NUMBER 105742

105743 | | REMOVE SHARP CORNERS DO NOT SCALE DIMENSIONS IN INCHES/MM ANGLE PROJECTION



DETAIL : 1





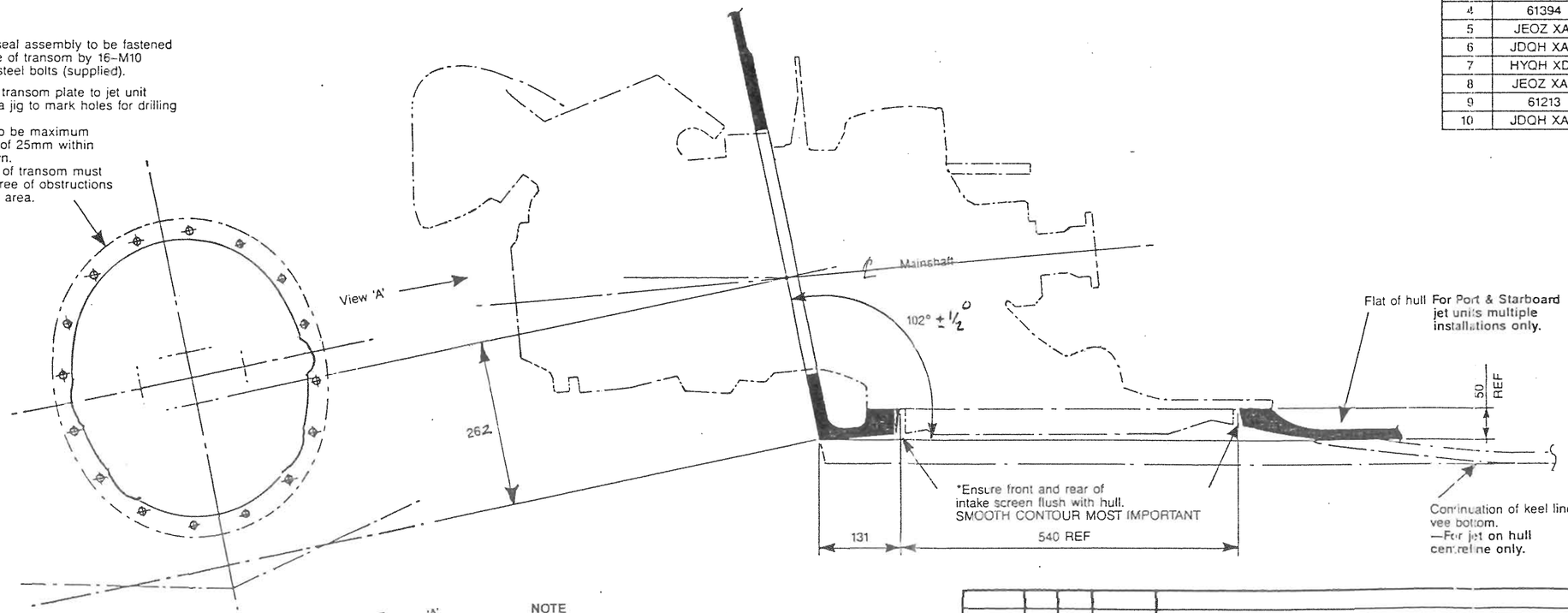
DETAIL : 2

ITEM	PART No.	QTY	DESCRIPTION
1	JMNG AAR	1	Tube R.T.V. Silicone Sealant—Neutral cure
2	HYQH XEA	16	M10×60 Hex. Head Bolt—316 SS
3	HYQH XEE	2	M10×80 Hex. Head Bolt—316 SS
4	61394	18	10 dia. Fibre Washer
5	JEOZ XAI	18	10 dia. Flat Washer—316 SS
6	JDQH XAE	18	M10 Hex. Nut—316 SS
7	HYQH XDX	16	M8×45 Hex. Head Bolt—316 SS
8	JEOZ XAF	32	8 dia. Flat Washer—316 SS
9	61213	16	8 dia. Fibre Washer
10	JDQH XAC	16	M8 Hex. Nut—316 SS

Transom seal assembly to be fastened on outside of transom by 16–M10 stainless steel bolts (supplied).

Assemble transom plate to jet unit & use as a jig to mark holes for drilling

Transom to be maximum thickness of 25mm within area shown.
Rear face of transom must be flat & free of obstructions within this area.



TRANSOM HOLE DETAILS View 'A'

NOTE
—This drawing is to be read in close conjunction with:
DRG No. 105472 —General Arrangement Page E1
—Hull Preparation Planing Craft Fibre Glass Hull
—Installation Notes Pages G2

REF	NO	BY	DATE	AMENDMENTS

C. W. F. HAMILTON & CO. LTD., CH.CH., N.Z.

MATERIAL

√ = 1.6 EXCEPT AS STATED

UNLIMITED DIMENSIONS TO BE ±

MAIN 271 JET

INSTALLATION INFORMATION
PLANING CRAFT
FIBREGLASS HULL

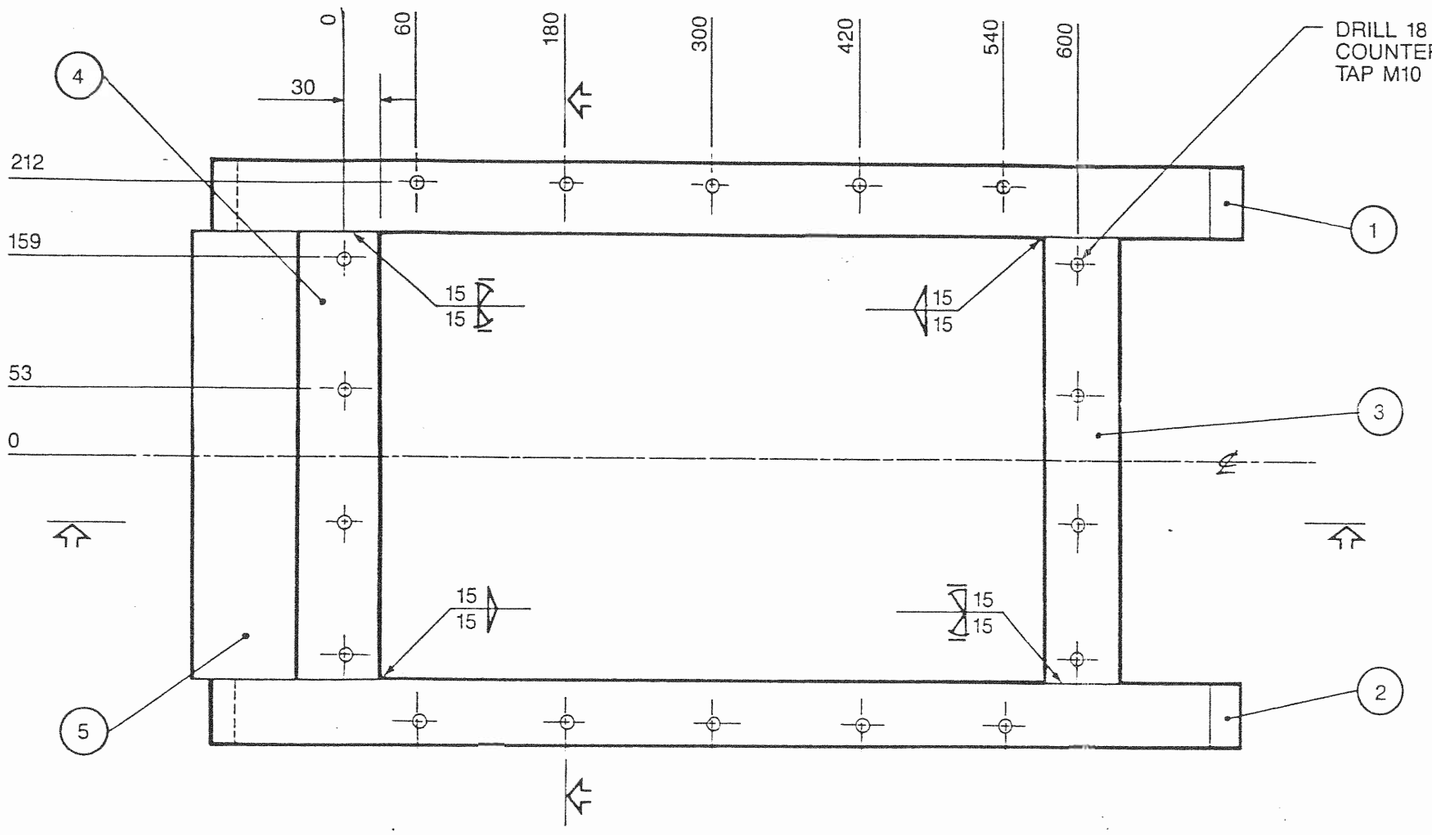
MAT'L CERT | YES | NO

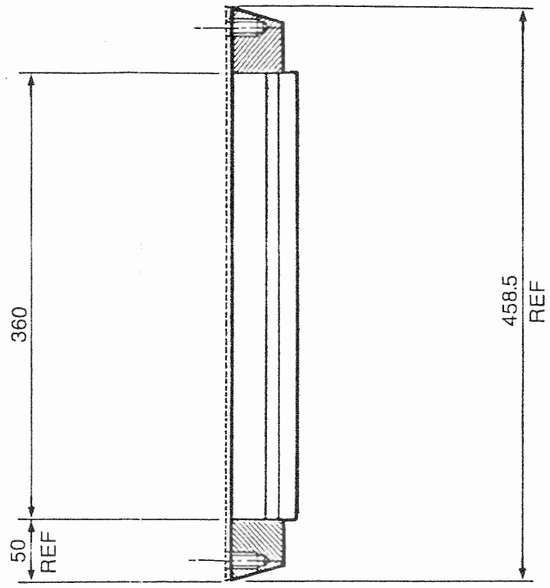
DRAWN | DATE

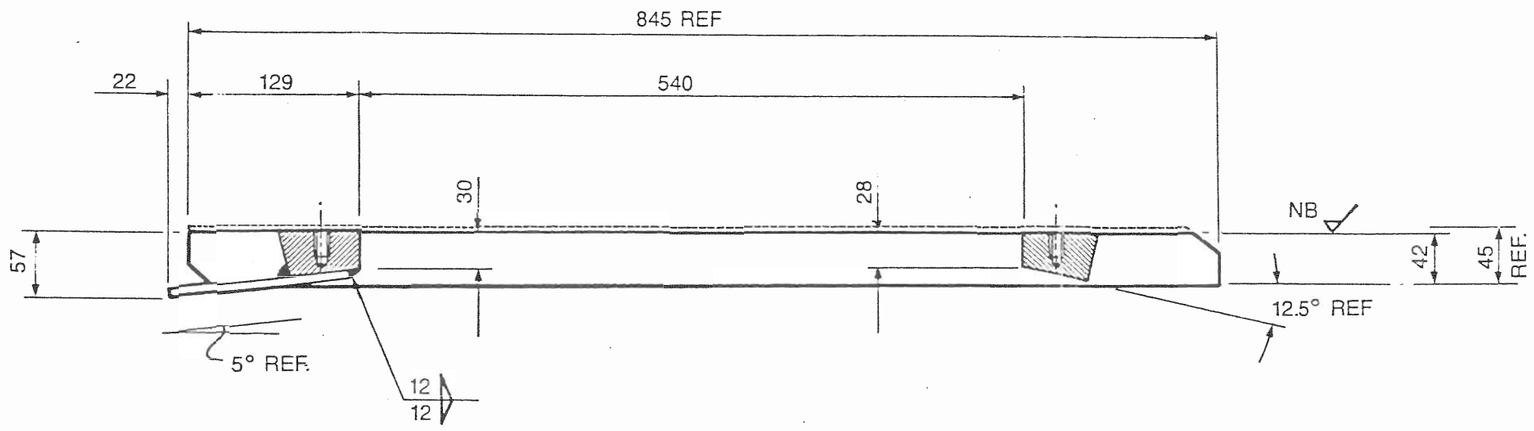
CHECKED

APPROVED

SCALE | NUMBER 105743







ITEM	PART No.	QTY.	DESCRIPTION	DRG. No.
5	105744-5		SLOPE SHEET	105744-5
4	105744-4		REAR CROSS MEMBER	105744-4
3	105744-3		FRONT CROSS MEMBER	105744-3
2	105744-2		SIDE MEMBER STARBOARD	105744-2
1	105744-1		SIDE MEMBER PORT	105744-1

REF	NO	BY	DATE	AMENDMENTS

C W F HAMILTON & CO LTD. CH CH., N.Z

MATERIAL

$\sqrt{}$ = 250 EXCEPT AS STATED

UNLIMITED DIMENSIONS TO BE ±

NAME

ALUMINIUM INTAKE BLOCK 271 JET

DRAWN	DATE
A.S.H.	1/7/87
CHECKED	
APPROVED	

SCALE 1:5

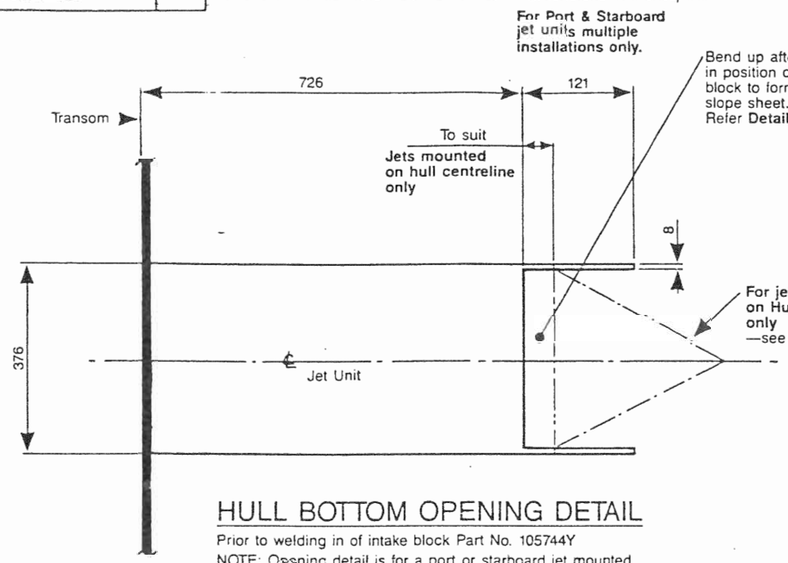
NUMBER 105744-Y

DIMENSIONS IN INCHES/MM ANGLE PROJECTION

REMOVE SHARP CORNERS. DO NOT SCALE

105744-Y

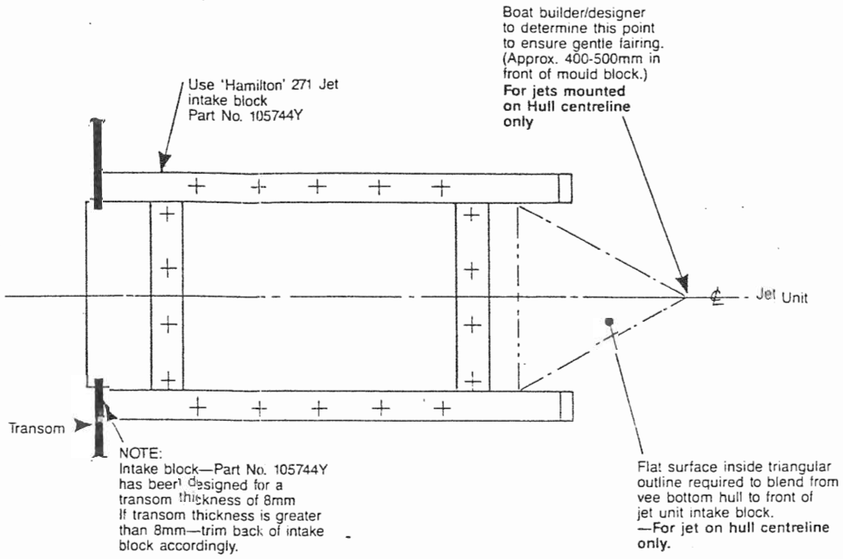
105745 | REMOVE SHARP CORNERS DO NOT SCALE DIMENSIONS IN INCHES/M M ANGLE PROJECTION

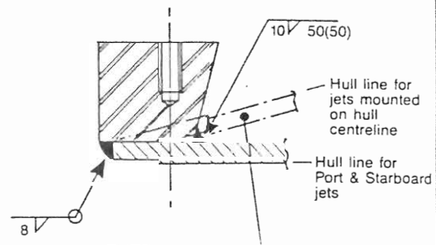


HULL BOTTOM OPENING DETAIL

Prior to welding in of intake block Part No. 105744Y

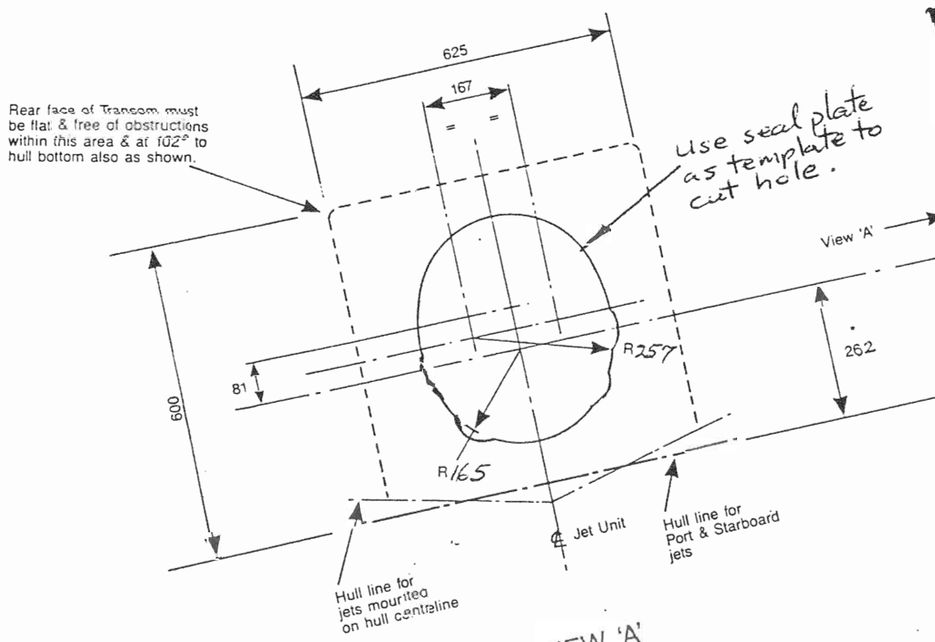
NOTE: Opening detail is for a port or starboard jet mounted to the flat hull surface. Additional material will be required to be removed inside triangular outline for centrally mounted jet units in a vee bottom hull & replaced with a triangular flat sheet to blend from vee bottom to front of intake block.



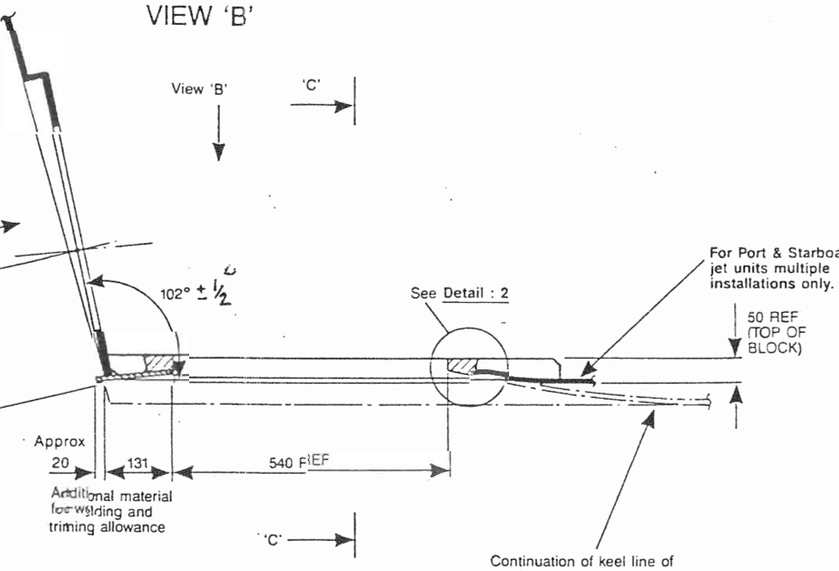


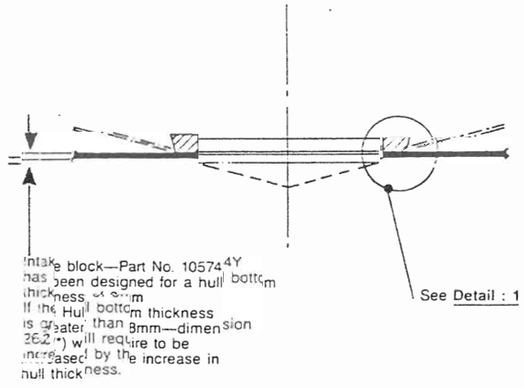
DETAIL : 1

For jets on hull centreline, the intake block must be machined to match the hull deadrise angle.

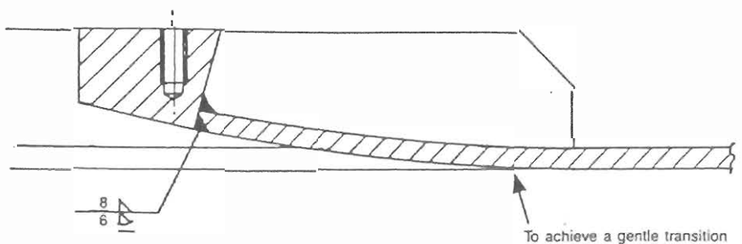


VIEW 'A'





SECTION:CC



DETAIL : 2

NOTE
—This drawing is to be read in close conjunction with:
DRG NO. —General Arrangement Page E1
105746—Installation Information Planing Craft Aluminium Hull
105744Y—Intake Block Planing Craft Aluminium Hull

C. W. F. HAMILTON & CO. LTD. CHCH. NZ

MATERIAL

EXCEPT AS STATED

UNLIMITED DIMENSIONS TO BE ±

NAME 271 JET

HULL PREPARATION PLANING CRAFT ALUMINIUM HULL

MATL CERT YES NO

DRAWN DATE

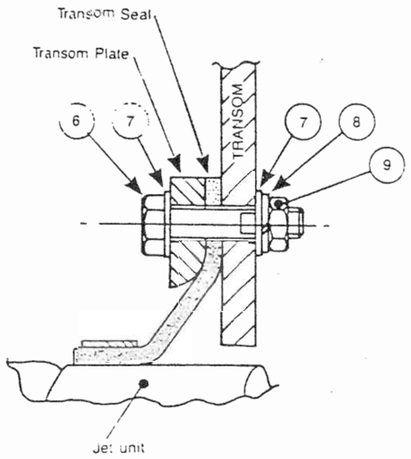
CHECKED

APPROVED

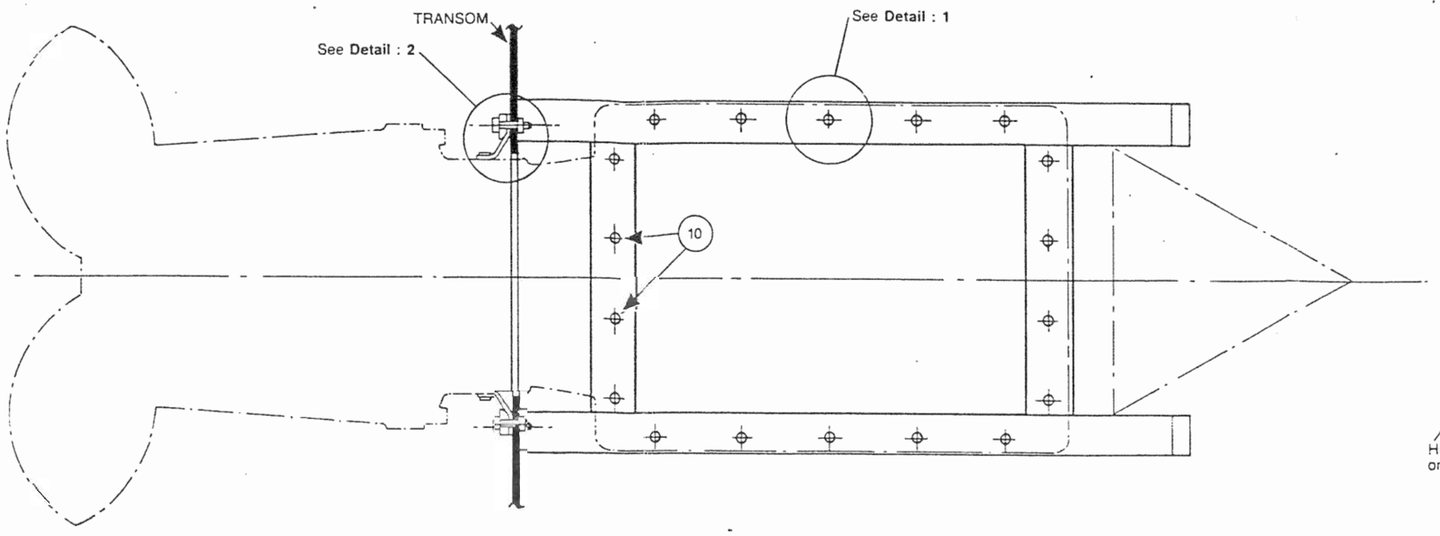
SCALE NUMBER 105745

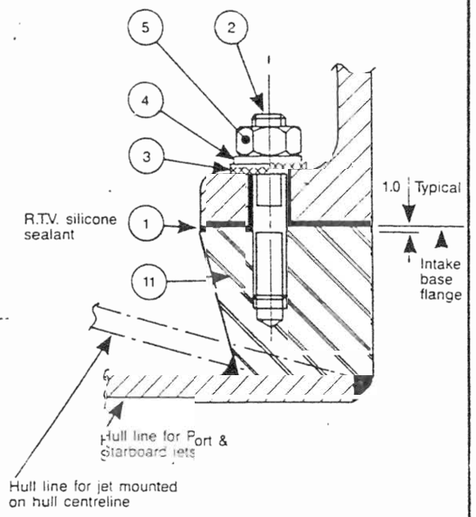
REF	NO	BY	DATE	AMENDMENTS

105746 | REMOVE SHARP CORNERS DO NOT SCALE DIMENSIONS IN INCHES/M M ANGLE PROJECTION



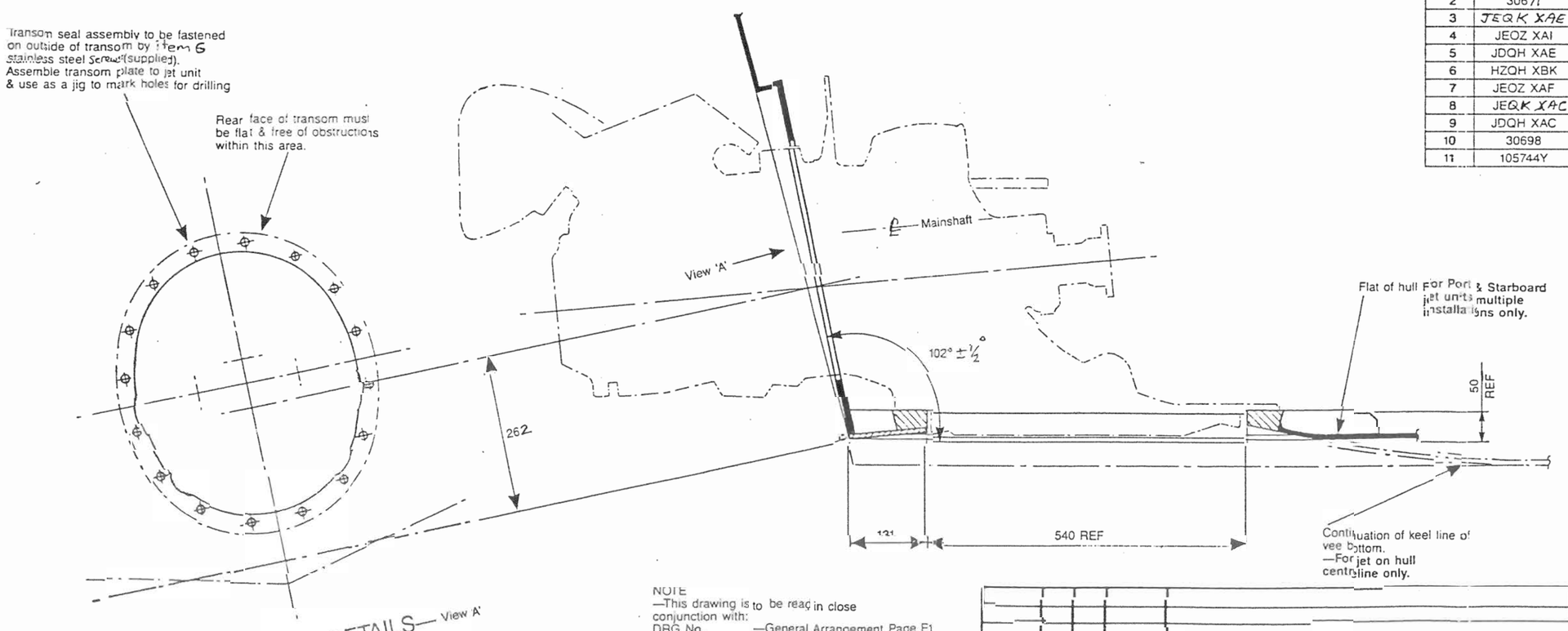
DETAIL : 2





DETAIL : 1

ITEM	PART No.	QTY	DESCRIPTION
1	JMNG AAR	1	Tube R.T.V. Silicone Sealant—Neutral cure
2	30671	16	M10×51 Stud-316 SS
3	JEQK XAE	18	10 dia Spng Washer
4	JEOZ XAI	18	10 dia Flat Washer—316 SS
5	JDQH XAE	18	M10 Hex Nut—316 SS
6	HZQH XBK	16	M8 Hex Screw—316 SS
7	JEOZ XAF	32	8 dia Flat Washer—316 SS
8	JEQK XAC	16	8 dia Spring Washer—316 SS
9	JDQH XAC	16	M8 Hex Nut—316 SS
10	30698	2	M10×70 Stud—316 SS
11	105744Y	REF.	Aluminium Intake Block



TRANSOM HOLE DETAILS— View A'

NOTE
—This drawing is to be read in close conjunction with:
DRG No. 105745 —General Arrangement Page E1
—Hull Preparation Planing Craft Aluminium Hull
—Installation Notes Pages G2

C W F HAMILTON & CO LTD. CHCH. N.Z.

MATERIAL

EXCEPT AS STATED

UNLIMITED DIMENSIONS TO BE ±

NAME 271 JET

INSTALLATION INFORMATION
PLANING CRAFT
ALUMINIUM HULL

MAT'L CERT YES NO

DRAWN DATE

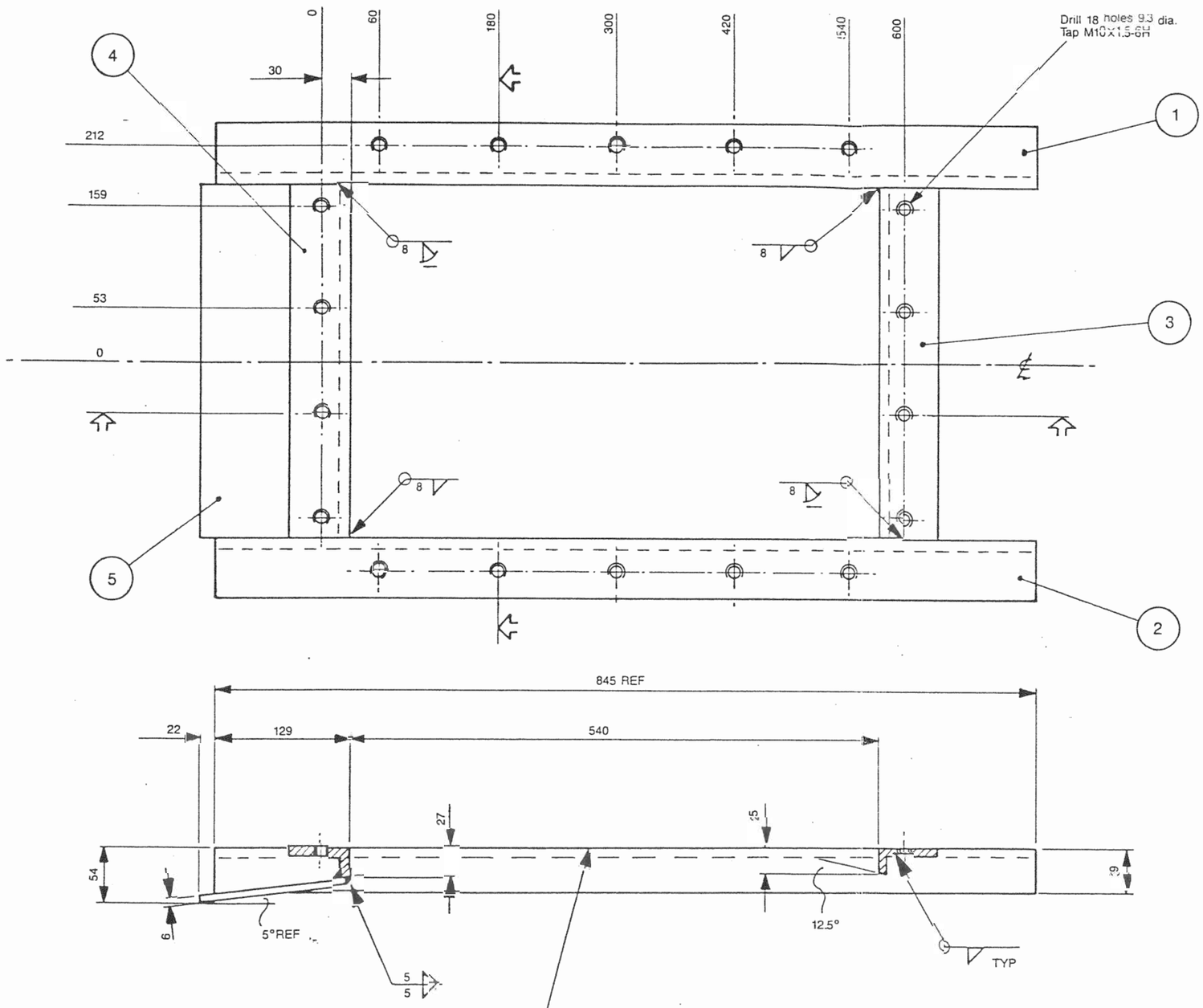
CHECKED

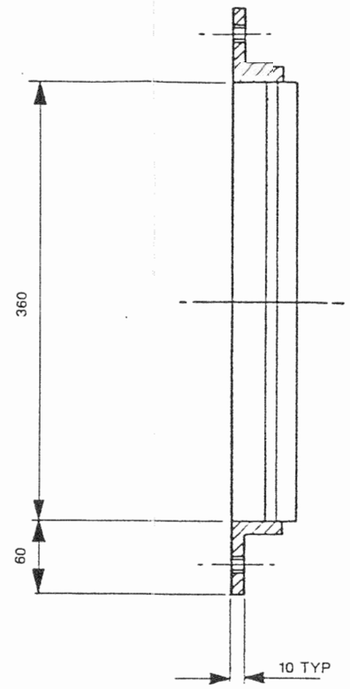
APPROVED

SCALE NUMBER 105746

REF NO BY DATE AMENDMENTS

105747Y | 0 | REMOVE SHARP CORNERS DO NOT SCALE DIMENSIONS IN INCHES/M M ANGLE PROJECTION





NOTE

Top surface of intake frame is to be flat within 2.0mm to ensure a good water seal with jet unit base flange

Item	Part No.	Qty	Description
5	105747-5	1	Slope Sheet
4	105747-4	1	Rear Cross Member
3	105747-3	1	Front Cross Member
2	105747-2	1	Side Member—Stb'd
1	105747-1	1	Side Member—Port

REF	NO	BY	DATE	AMENDMENTS

C W F HAMILTON & CO LTD. CHCH. NZ

MATERIAL

✓ EXCEPT AS STATED

UNLIMITED DIMENSIONS TO BE ± 1.0

MAT'L CERT YES NO

DRAWN C.W.R DATE 9-3-88

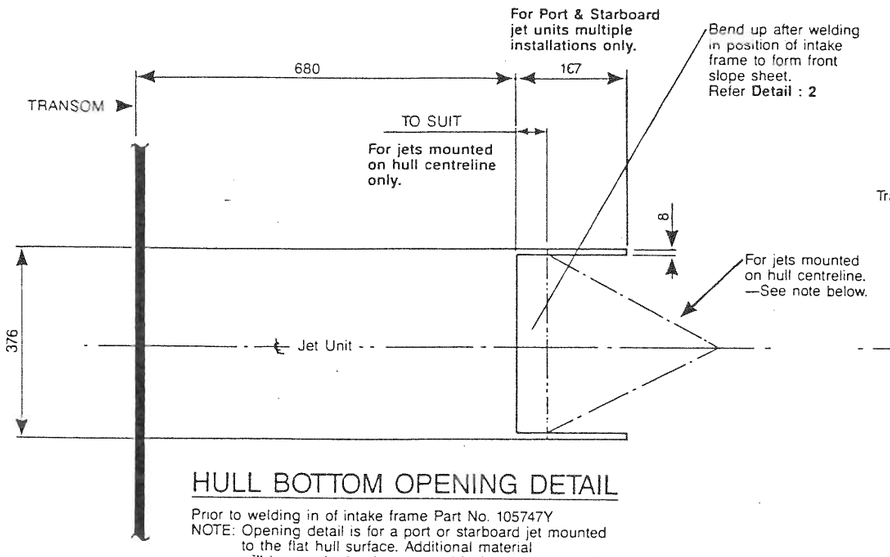
CHECKED

APPROVED

NAME
271 JET
STEEL INTAKE BLOCK

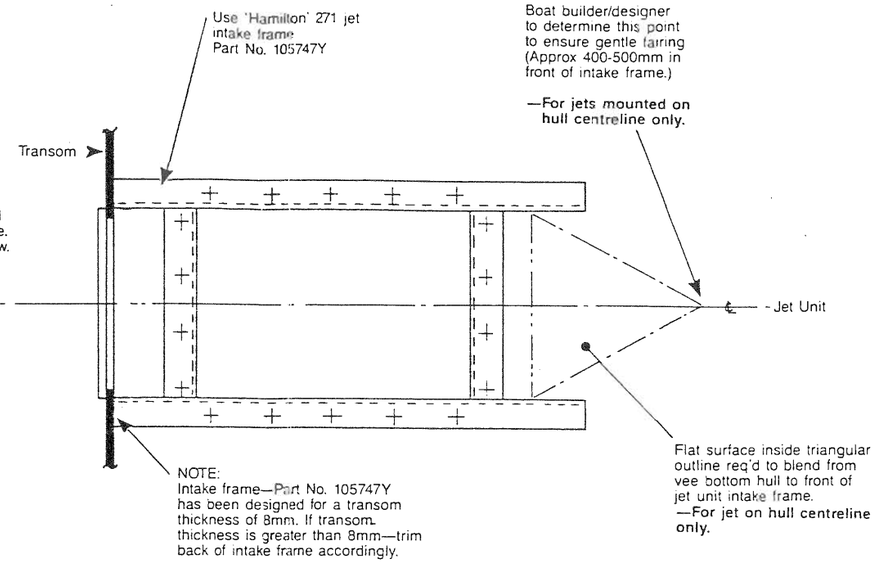
SCALE NUMBER 105747Y 0

105748 | | REMOVE SHARP CORNERS DO NOT SCALE DIMENSIONS IN INCHES/MM ANGLE PROJECTION

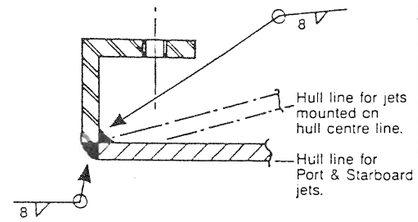


HULL BOTTOM OPENING DETAIL

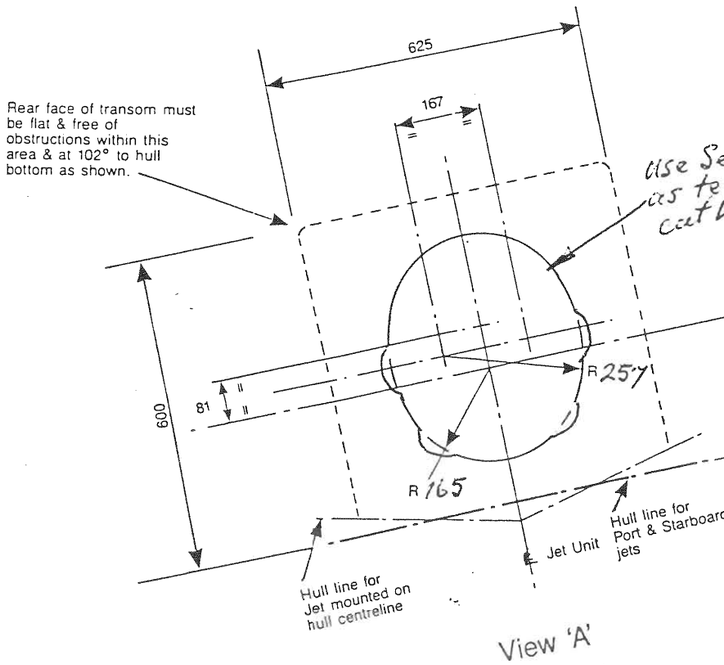
Prior to welding in of intake frame Part No. 105747Y
NOTE: Opening detail is for a port or starboard jet mounted to the flat hull surface. Additional material will be required to be removed inside triangular outline for centrally mounted jet units in a vee bottom hull and replaced with a triangular flat sheet to blend from vee bottom to front of intake frame.



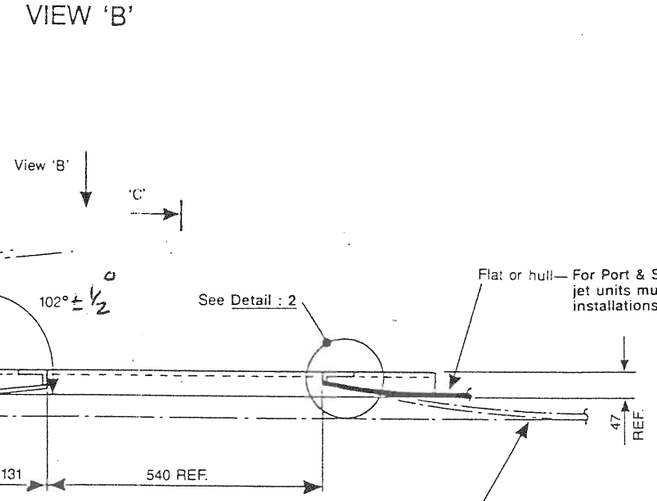
VIEW 'B'

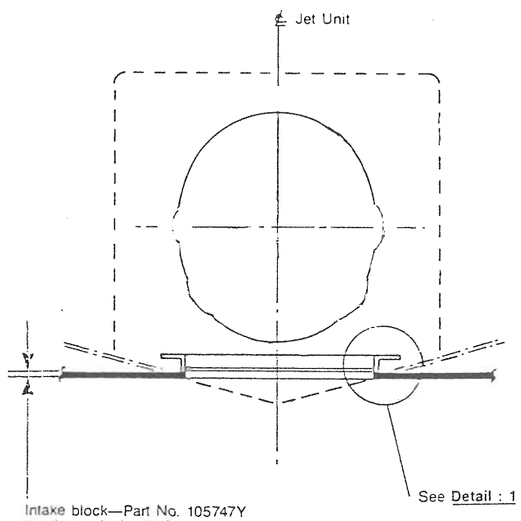


DETAIL : 1



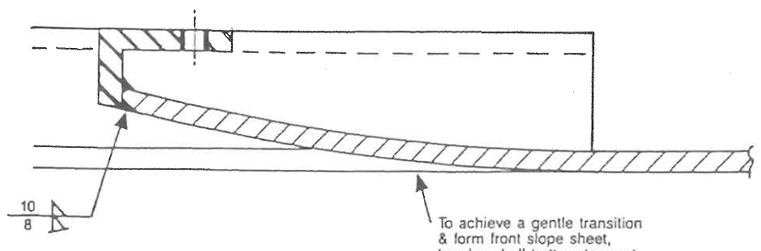
View 'A'





Intake block—Part No. 105747Y has been designed for a hull bottom thickness of 8mm
If the hull bottom thickness is greater than 8mm—dimension 262 (*) will require to be increased by the increase in hull thickness.

SECTION: CC



DETAIL : 2

NOTE
—This drawing is to be read in close conjunction with:
DRG No. —General Arrangement Page E1
105749 —Installation Information Planing/Displacement Craft Steel Hull
105747Y —Intake Frame Planing/Displacement Craft Steel Hull.

REF	NO	BY	DATE	AMENDMENTS

C W F HAMILTON & CO LTD. CHCH. N.Z

MATERIAL

√ = ▽ EXCEPT AS STATED

UNLIMITED DIMENSIONS TO BE ±

MAT'L CERT | YES | NO

DRAWN | DATE

CHECKED

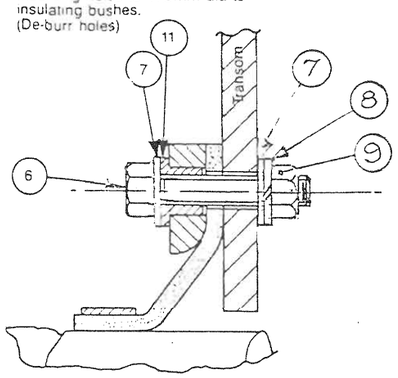
APPROVED

NAME 271 JET
HULL PREPARATION
PLANING/DISPLACEMENT CRAFT
STEEL HULL

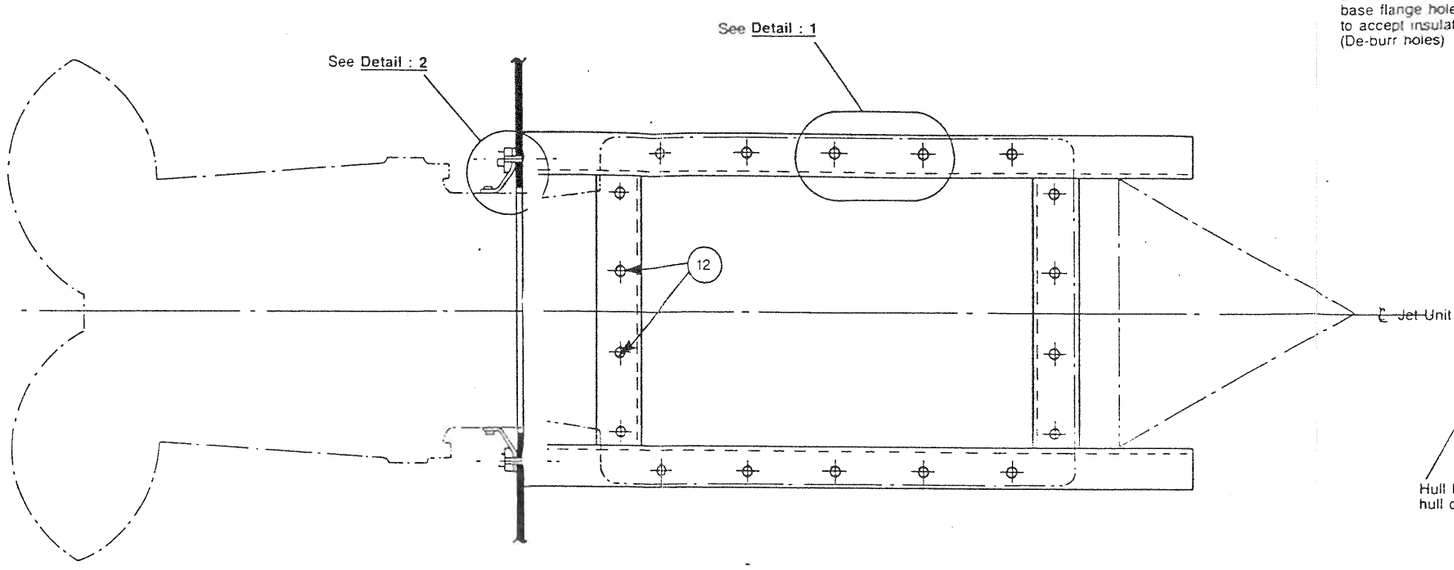
SCALE | NUMBER 105748

105749 | REMOVE SHARP CORNERS DO NOT SCALE DIMENSIONS IN INCHES/M.M. ANGLE PROJECTION

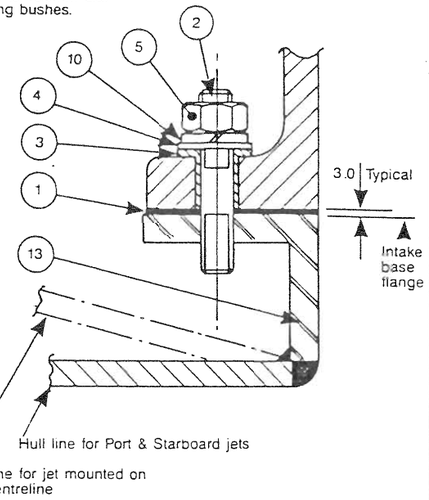
NOTE
Drill out standard transom plate mounting holes to 11.5mm dia to insulating bushes. (De-burr holes)



DETAIL : 2



NOTE:
Drill out standard intake base flange holes to 16.0mm dia. to accept insulating bushes. (De-burr holes)



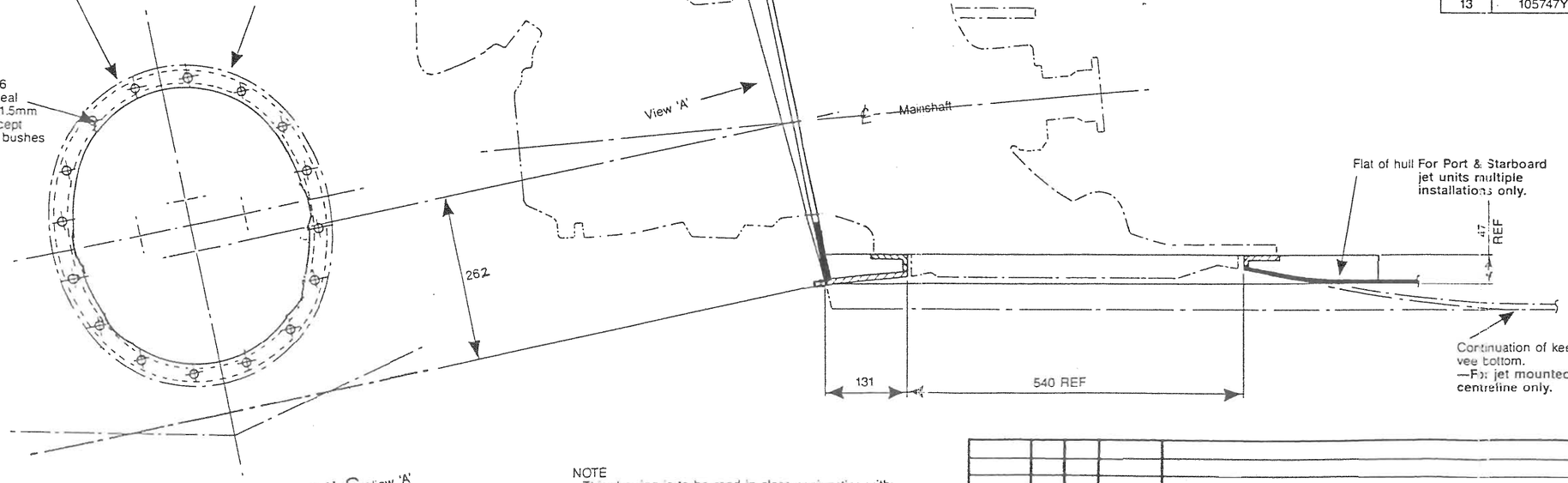
DETAIL : 1

ITEM	PART No.	QTY	DESCRIPTION
1	JMNG AAR	1	Tube R.T.V. Silicone Sealant—Neutral cure
2	30671	16	M10×51 Stud—316 SS
3	KHACXAO	18	Insulating Bush
4	JEOZ XAI	18	10 dia Flat Washer—316 SS
5	JDQH XAE	18	M10 Hex Nut—316 SS
6	HEQH X6F	16	SCREW - HEX SET M8×55
7	JEOZ XAF	32	8 dia Flat Washer—316 SS
8	JEQK XAC	16	8 dia Spring Washer—316 SS
9	JDQH XAC	16	M8 Hex Nut—316 SS
10	JEQK XAE	18	10 dia Spring Washer—316 SS
11	JE 262	16	Insulating Bush
12	30698	2	M10×70 Stud—316 SS
13	105747Y	REF.	Steel Intake Block

Transom seal assembly to be fastened on outside of transom by 16–M10 stainless steel bolts (supplied). Assemble transom plate to jet unit & use as a jig to mark holes for drilling and tapping.

Rear face of transom must be flat & free of obstructions within this area.

Drill out 16 transom seal holes to 11.5mm dia. to accept insulating bushes



TRANSOM HOLE DETAILS View 'A'

NOTE
—This drawing is to be read in close conjunction with:
DRG NO. —General Arrangement Page E1
105478—Hull Preparation
Planing/Displacement Craft
Steel Hull
—Installation Notes Pages G2

REF	NO	BY	DATE	AMENDMENTS

C. W. F. HAMILTON & CO. LTD., CH.CH., N.Z.

MATERIAL

MAT'L CERT YES NO

DRAWN DATE

CHECKED

APPROVED

√-V EXCEPT AS STATED

UNLIMITED DIMENSIONS TO BE ±

NAME 271 JET

INSTALLATION INFORMATION
PLANING/DISPLACEMENT CRAFT
STEEL HULL

SCALE NUMBER 105749