HAMILTON

Turbocraft

THE SAFEST BOAT AFLOAT

Chinook Unit
S/N 132 up.

Owner's Manual
Parts Catalogue
Fitting and Maintenance Instructions
How to Handle Turbocraft in Rivers

C. W. F. HAMILTON MARINE - P.O. Box 709 - CHRISTCHURCH, N.Z.
DIVISION OF C. W. F. HAMILTON & CO. LTD.

You will shortly begin boating with your new Jet Boat, a remarkable craft with unusual capabilities -

BEFORE CASTING OFF, PLEASE ASK YOURSELF THESE QUESTIONS -

1. Power boats are illegal on some waters. Have I checked this area?
2. Am I attempting to boat where I could disturb wildlife in a National Park Sanctuary, or Refuge?
3. Is the Wildlife fully protected in this area?
4. If not, is it open season, or do I need a Licence to take game?
5. Will I inconvenience, harm, or disturb other users of the water, such as fishermen, property owners, or picnickers?

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In the back country, remember to ask permission to shoot on surrounding territory, and dowse all camp fires.

CHECK LOCAL WILDLIFE REGULATIONS FOR THIS TIME OF THE YEAR!

HAMILTON MARINE JET

PROPULSION UNIT

Model: "Chinook" Serial No. 132 up.

INDEX

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INTRODUCTION

Hamilton Turbocraft have no propeller - they are purely "reaction propelled" similar to a Jet Aircraft, except that the medium used is water, not air.

High propulsive efficiency, together with other unique advantages is widening the use of Hamilton Marine Jet propulsion system throughout the world; especially where conditions are difficult for conventional craft.

Complete lack of any underwater appendages beneath the hull, lively performance, and outstanding manoeuvrability have helped bring this about. The Turbocraft has the ability to operate in water only a few inches deep and in dirty debris-laden conditions that would spell ruin for the conventional propeller.

With experience, they can be handled safely in confined spaces, turbulent rapids, and cataracts. They are almost impossible to upset in the roughest water conditions because of their unusual safety and stability of speed. Hamilton Turbocraft hulls have been designed to sustain unusual punishment. Intentionally contacting rocks, reefs, floating weeds, sandbars, etc. is obviously not recommended when it can be avoided, but a Turbocraft's extra ruggedness will show its worth if you should strike such an obstacle.

REMEMBER: -

> "It takes a lot of experience with any given boat to learn all her whims and traits - to know her strong points and use them wisely to overcome the weak ones.
>
> But boats, like individuals, do respond to understanding treatment."
>
> Chapman, Charles F.
> Piloting, Seamanship
> and Small Boat Handling.

HULLS

Monohedron, or "straight" running lines are most suitable. In addition a full hard chine may be employed for very high speeds. The keel should not be greater than 2 inches deep to take full advantage of the shallow water possibilities. A larger keel will be very much affected by eddies and crosscurrents prevalent in rivers. This shallow keel should be faired off just forward of the Jet Intake and should not extend behind it. Side keels 3 feet long and up to 3" deep can be employed near the stern if the craft tends to oversteer or needs additional directional stability for sea work. They should be fixed at least 2 ft. apart either side of the Intake.

The "Chinook" Unit is most suitable for 13-18 ft. vee-bottomed planing type hulls. Twin Units and Engines can be used for craft up to about 24 ft.

For best results, a 9° - 10° angle should be carried right back to the transom enabling the intake to always be well immersed. This has been found desirable for instant priming, satisfactory performance in choppy water, and to reduce "breakaway" on tight powered turns. A smaller vee-angle may be satisfactory on some craft, especially the larger sizes.

If the above points are adhered to the best results will be obtained from the Jet Unit. Performance in difficult conditions such as rough seas or turbulent rivers will be satisfactory. Turning and general handling will out-class conventional boats, and above all the craft will be safe and practically impossible to capsize in any manoeuvre.

Heavier slower craft such as flat-bottomed barges and other craft required to operate in shallow water can be propelled with these units with about equal efficiency as would be obtained from a Direct-driven propeller. The main point to consider is whether it can be mounted low enough to be at least half full of water when lying idle. If so, it will be self-priming and operate satisfactorily.

In high-speed craft operating in rivers the weight should be kept low, but a strong reinforced bottom will be necessary if shallow water or rocks are encountered, or where there is a likelihood of running aground.

The units are arranged to bolt up to the outside of the transom, or to a matching ring which is fitted to the outside of the transom.

If a hull is being specially built for a Jet Unit the transom angle should be approximately 4° (Refer to the diagram on Drg. J337.)

For any other advice on hulls, consult the manufacturers.

"CHINOOK" JET UNITS

"Chinook" Jet Units are the latest type of Hamilton Marine Jet a completely new design, especially developed for small and medium sized planing hulls.

The Multi-stage axial-flow layout was evolved to provide the correct characteristics for speeds up to about 45 m.p.h. with full power instantly available to tow off a heavy load of water-skiers. The Unit is direct driven by the engine through a short shaft and universal joints. No reduction gears, engine clutch or reverse box are required, a simple built-in control gate operated by a single lever giving forward, stop, reverse or any intermediate position.

Construction.

To resist corrosion, the castings are made from special aluminium alloy, and the steel parts are galvanised. All nuts and bolts are Cadmium-plated. The mainshaft is not exposed to the water at any point, and is carried on a heavy-duty ball thrust race at the front, and water-lubricated rubber bearings in the centre of the Unit. At this point the shaft is provided with replaceable stainless steel sleeves. Also, stainless steel wear rings are pressed into the casing at each impeller.

Special provision is made throughout the Unit to enable sand and small stones to pass without damage to the interior parts.

The gland is a double row synthetic rubber seal, is non-adjustable and requires no maintenance. The whole Unit is sturdily constructed, is quiet in operation, and only requires the very minimum of attention.

Standard transmission kits are available if desired to link the engine with the Jet Unit. The drive coupling on the Unit mates up to a standard Hardy Spicer universal joint.

For advice on size and type of engine, the manufacturers should be contacted. A number of engines can be used, but the normally recommend combinations are:

2-Stage Chinook:	Ford Consul or Zephyr Engine
3-Stage Chinook:	Large 6 or V8 Engine

When used with a Chinook Jet Unit the engine can be fully rubber mounted to eliminate vibration and noise. Thus smoothness of operation and lack of shaft vibration are incidental advantages that go with the installation of a Hamilton Jet Unit.

USE OF CONTROLS

Steering:

The jet nozzle has a pair of deflectors arranged one either side and coupled together. These are connected by suitable links, chain and cable to the steering wheel. Turning the steering wheel operates the deflectors turning the whole jet stream left or right to give powerful and accurate steering. Remember -

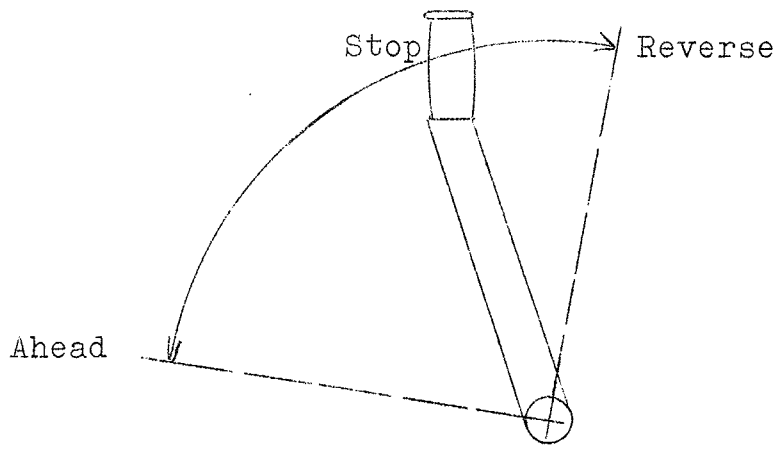
1. The engine must be running in order to obtain steering.

2. The wider the throttle, the more steering effect is available.

3. Never stop the engine when approaching a mooring, or any other time when steering will be required. However, you have full turning power even when stationery in the water at a touch of the throttle.

Gate Control:

The lever at the helmsman's seat operates a sliding gate over the jet nozzle controlling the efflux of water. As well as shutting off the water altogether in one position, it may be lowered further, forming a nozzle facing forward for reversing purposes. Reverse power is only about one third of ahead power.



The Lever positions are:

Lever down on floor to the left - Gate fully open = Normal AHEAD

Lever approximately Vertical engaging selector Notch - Gate Shut = Neutral or STOP

Lever hard over to the right - reversing jet open = Normal Reverse

The following rules should be observed when using the control gate:

1. Only move control lever with engine running slow.

2. In shallow water, do not close the gate for more than a few seconds. The reverse flow under the hull will stir the sand off the bottom which will circulate through the jet unit and jam the gate, making it impossible to move.

3. If the gate is left open during shallow water manoeuvring, the bottom will not be disturbed. Always leave gate open when ever possible.

4. When reversing away from banks, do not allow the boat to remain for more than a few seconds in shallow water for the above reasons. Reverse off rapidly with plenty of throttle, opening gate as soon as possible.

ENGINE INFORMATION

1. Cooling System:

The engine is supplied with water direct from the Jet Unit. There is no water pump required as on propeller craft. The water passes through a sump oil cooler, the exhaust manifold jacket/s, then into the cylinder block. The hot water from the thermostat is led into the exhaust. A bypass lead in the system bleeds off surplus water not required by the engine direct into the exhaust also, this flow cooling and silencing the exhaust gases.

Note: A loud crisp exhaust note indicates that no water is flowin and should be investigated if it continues for more than a short time after starting.

The cooling system is self-regulating and automatic in action, and requires no attention or adjustment, other than periodic flushing if operated in very sandy or dirty water.

2. Electrical System:

All engines have a 12^{V} positive earth system using a standard Lucas 22258 generator. The Chevrolet system has a resistor in series with the coil which gives reduced voltage for normal running.

3. Engine Mounting:

All engines are suspended on three-point fully-floating rubber mounts, thus giving smooth and vibration-free running. The engines are mounted almost flat in the hull, and drive shaft alignment is not critical due to the use of twin Hardy-Spicer universal joints and a sliding splined connecting shaft.

4. Lubrication:

It is recommended that a heavy duty detergent oil be used in all engines.

(a) 10/30 or 10/40 Multigrade, or
(b) SAE 20 Grade in normal temperatures
(c) SAE 30 Grade in very hot temperatures

The oil can be drained from the pipe on the side of the sump with the suction pump provided.

5. Engine Details:

Engine	Consul	Zephyr	Chevrolet
No Cylinders	4	6	V8
Capacity	104 cub.in	156 cub.in	283 cub. in.
Firing Order	1243	153624	18436572
Valve Clearance	0.014"	0.014"	Automatic
Sump Capacity	7½ pints	8½ pints	8 pints
Spark Plug Replacement recommended	Champion N5	Champion N5	Champion J9Y
Spark Plug Gap	0.032"	0.032"	0.025"
Contact Breaker Gap	0.015"	0.015"	Special Adjustment Method
Normal Oil Pressure	50-55	50-55	20-35

BREAKING-IN NEW ENGINES

Your new Turbocraft will be fitted with one of the following types of engines, fully converted for marine use:-

Ford Consul Mark II
Ford Zephyr Mark II
Chevrolet Bel Air V8

1. For 15 Hours:

   Do not exceed 3000 r.p.m. for normal cruising. Only use full throttle momentarily for getting craft planing cleanly, then throttle back to cruising r.p.m. indicated above.

2. 15 Hour Check:

   It is advisable at this stage to have your dealer check over the engine, including:-

   (a) Check for Water and Fuel Leaks
   Fuel Filter Bowl
   Electrical Wiring
   Generator Belt Tension
   Distributor Timing
   Breaker Points
   Tappet Clearances on Ford Engines

   (b) Tighten Cylinder Head Bolts (Torque 70 lb. ft.)

   (c) Change engine oil and oil filter element. Refill with recommended grade.

   Note: On Chev. engines it is necessary to lift the rear of the engine, to provide clearance for filter casing removal.)

3. For a Further 15 Hours:

   Consul: Do not drive continuously on full throttle.

   Zephyr: Do not exceed 3200 r.p.m. for cruising.

   Chevrolet: Do not exceed 3600 r.p.m. for cruising.

4. After 30 Hours:

   The engine may now be considered fully run-in. Carry out maintenance at regular intervals as indicated elsewhere.

   Maximum economical cruising r.p.m. are approximately 90% of full throttle r.p.m.

DAILY PRE-START CHECK

1. Ventilate engine compartment.

2. See that bilges are dry.

3. Check that the intake screen is clear. (This is best done when the boat is on the trailer.)

4. Check hydrant filter on tailpipe of Jet Unit. This is accessible from outside the transom beneath the splash guard.

5. Check fuel level.

6. Check that fuel valves are open. (Do not normally turn these off.)

7. With oil can containing engine oil top up thrust bearing filler, (mark on dipstick) and gland oiler on Jet Unit.

8. Normally leave bilge pump valve shut off.

9. See that engine cooling valve (if fitted) is open.

10. Check engine oil level. Top up, if necessary, with the recommended grade of oil.

STARTING ENGINE

1. If in deep water, select neutral position for gate control lever.

2. If in shallow water, tie boat up, or allow the bow to press against the bank or jetty to prevent forward movement, and move lever to the AHEAD position, thus opening gate. This avoids stirring up the bottom when engine is running.

3. If craft has been standing for a long period, or in cold conditions, the choke on the carburettor may have to be used for an initial start.

4. A cold start can normally be obtained if the accelerator is opened and shut two or three times. This injects some fuel into the induction manifold.

5. Hold accelerator open a small amount.

6. Switch on and start engine.

7. Allow engine to fast idle at about 800 - 1000 r.p.m.

8. Check that oil pressure is normal and that ammeter shows a charge.

9. After a time, the engine water temperature should rise to normal. Normal temperature about ~~150 - 180°F~~. 140° F

Note 1. Do not run the engine for any time in shallow water with the gate closed. It is better to leave the gate open (AHEAD position) and nose craft into bank to prevent movement. This avoids stirring up the bottom, circulating sand through the Jet Unit, and jamming the gate in the closed position.

Note 2. Do not run the Jet Unit out of water. The aft bearings of the Jet Unit are of the water lubricated cutless rubber type and may suffer some damage if run dry. If it is necessary to run the engine when the boat is out of water, disconnect the forward end of the drive shaft from the engine flywheel before starting, or make sure that the rubber bearing is wet.

CRUISING TECHNIQUE

1. Loading.

Never carry more weight aboard than absolutely necessary. Remember that a high speed planing hull, like an aeroplane, is sensitive to excess weight. The lighter the load, the better the performance and the shallower will be the draught. Keep disposable weight about central, or forward of centre for best get-away.

2. Cruising.

With engine running slowly, manoeuvre into deep enough water to start off, open throttle fully until the craft is planing cleanly, then ease the throttle back slightly to economical cruising revs. (About 3000 - 3200 r.p.m.)

3. Bad Practice.

Avoid using large throttle openings, at slow speeds, in shallow water. The bottom may be sucked up into the intake.

Avoid driving the boat in the 10 - 15 m.p.h. range. The corresponding engine revolutions will be about 2200 - 2600 r.p.m. At these speeds the draught and drag are at a maximum.

4. Use of Bilge Pump.

Do not use ejector bilge pump on Jet Unit continuously. The increased flow through the hydrant may cause the hydrant filter to become clogged more quickly, and could starve the engine of cooling water. Only use the pump when necessary, and notice that it works more efficiently at high engine speeds where the ejector nozzle pressure is highest. If the bilge pump suction hose should become blocked with debris from the bilges, it can be cleared by momentarily blocking the pump exhaust outside the transom with the hand. The resulting back flow through the suction hose will clear the blockage.

5. Blocked Intake Screen.

During operation in debris-laden water the intake screen of the Jet Unit may become clogged. Floating sticks, weeds and leaves are the worse offenders. The effect is a falling off in thrust and speed, and in extreme cases, by increased noise from the Jet Unit.

Close the throttle momentarily, close gate down, and rev the engine for a few seconds. Open the gate again, and in most cases it will be found that the backflow through the screen from the shutoff Jet Unit will have blown off most of the material from the screen bars.

If this fails, stop the engine, and remove the blockage manually. A rake is provided with all Turbocraft for this purpose.

6. Starting Off and Stopping.

Avoid shallow water except when travelling at high speed. Pick a deep area for starting off and stopping.

MAINTENANCE

3. Refer to Maker's Handbook for Regular engine maintenance.

ention.

Pre-start check listed elsewhere.

2 Operation.

intake screen and auxilliary water filter are
quent intervals when operating in weedy or
waters, and especially after running aground.

3. rs.

Engine Oil.

gine Oil Filter Element.

ter level in battery.

generator rear bearing.

distributor.

sediment bowl.

7 me trap for cleanliness.

8 g gear, control linkages, etc.

9. on on steering cables if necessary.

10. sal joints on drive shaft.

4. Salt Water Operation.

After use in salt water either give the craft a run in fresh water or flush out the jet unit by hosing fresh water through the nozzle.

INSTALLATION INSTRUCTIONS

1. The Chinook Jet Unit is designed to fit over an intake aperture formed in the hull as shown in the Diagram J.337. The standard intake screen will fit this hole from the underside and will match a 9° vee-bottom. Build up a wedge-shaped mounting block over the keel as shown.

2. Then cut stern hole in transom working from measurements in diagram.

3. Dismantle unit partially (as described elsewhere for installation) and fit over intake hole positioned correctly. Use a cork or rubber packing under the flange of the intake casting.

4. In fibreglass hulls, drill and tap holes around intake flange for set screws. In wooden hulls, long bolts passing through the bottom, countersunk on the underside, are used.

5. Assemble casings through the stern hole and bolt up temporarily. (Do not fit tailpipe at this stage.) Make sure the flange holes are correctly positioned so that the steering column will be vertical when the tailpipe assembly is fitted.

6. In the gap remaining between the transom and the casing flange, make either a wooden wedge filling piece to attach to the transom, or fill with a thick chopped fibreglass mat and resin paste. In the latter case, a temporary filling or ring will be required to hold the paste outside the $8\frac{3}{8}$" dia. (A fixed thin aluminium ring can be used outside the wedge if desired, but is not essential).

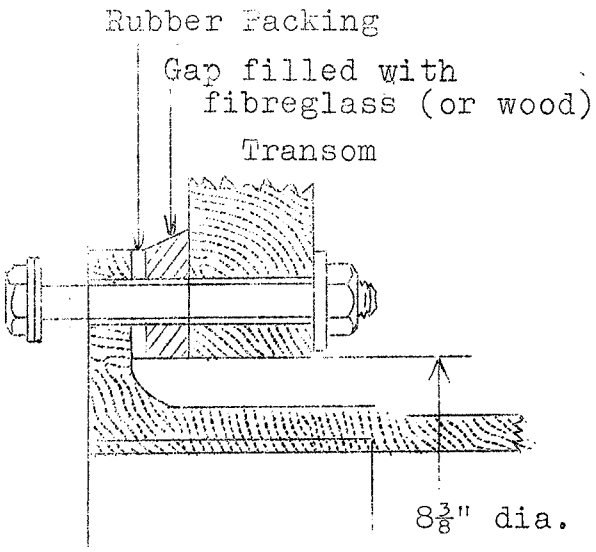
7. Drill the 6 holes through the transom with 5/16" clearance drill. If the lower holes should be "blind", drill smaller and use coach screws.

8. Remove unit, making sure the casings can be withdrawn easily through the stern hole with the intake fixed in position.

9. Fit intake finally with sealing compound on both faces of the packing. Bolt down loosely. Assembly casings, etc. through stern holes from assembly instructions. Fit tailpipe, complete with 'O' Ring in place. Bore hole for auxiliary water lead through transom and fit small seal ring against transom. Bolt up tailpipe to transom, then tighten down intake flange finally.

10. Smooth irregularities on intake so that there will be the minimum disturbance of the water, and fit intake screen.

11. Check that shaft turns freely. Some resistance or chatter may be present from the rubber bearing running dry. This is normal.

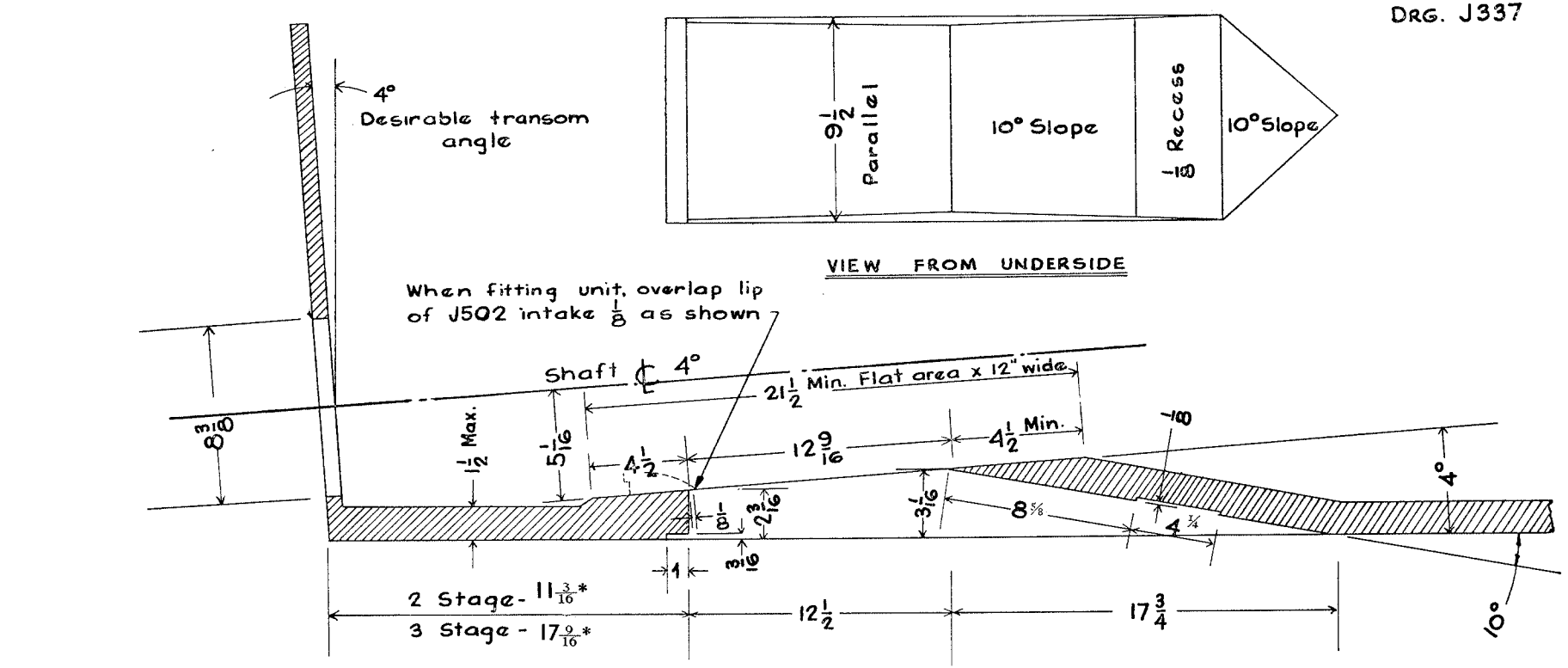


12. Assemble plumbing inside transom. Use only water grease and hemp on joints. No shellac. Arrange outlet for bilge pump. This should be smooth curve of 1" hose out through transom above static water level.

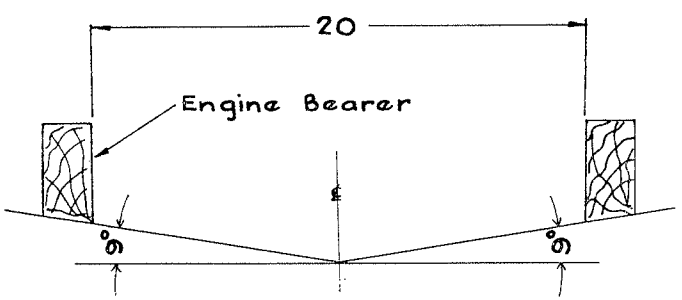
13. Fit combination steering wheel bracket and splash guard to transom, and bolt to steering wheel bearing block. Connect steering cables.

14. Fit clutch control gear, working from diagram J.342. Make sure gate opens fully clear of the nozzle with the hand lever down on the floor. Adjust selector, so that notches correspond to fully open and stop positions.

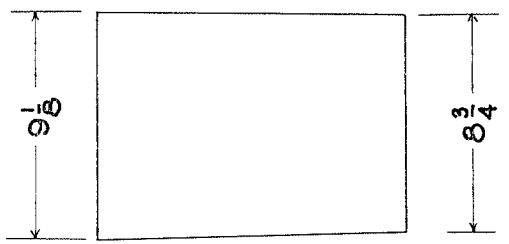
DRG. J337



VIEW FROM UNDERSIDE



SECTION OF BOTTOM



DIMENSIONS OF TOP SURFACE OF INTAKE HOLE

To suit J502 intake pipe and J5177 screen

* For transom angles other than 4°, reduce this dimension sufficiently to allow space for tapered packing.

Clarity Press Ltd.

ASSEMBLY OF UNIT

A. Assembly of Thrust Bearing Housing.

1. Take bearing housing (52) and place on bench with large flange downwards.
2. Smear rubber-based cement down 2¼" bore, and on the outer surface of each seal (51) as it is fitted. Fit each seal quickly after applying cement, and add fresh cement to bore for each seal fitted.
3. Press the three seals (51) into housing as follows:

   First seal, with lips facing downwards, press in 1½" from top face of housing.

   Second seal, with lips facing upwards, press in 3/4" from top face of housing.

   Third seal, with lips facing downwards, press in flush with face of housing.

4. Fit gasket (63) on to top face of housing flange.
5. Fit small 'O' Ring (47) into its recess in the bore of the seal sleeve (49) well smeared with water-repellant grease. Slide small spacer ring into sleeve bore following the 'O' Ring.
6. Oil outer surface of sleeve (47), then push carefully into the bearing housing (52) through the gland seals with the flange inside the housing.
7. Fit three 'O' rings (53) into the grooves on the outside of housing (52) well smeared with water-repellant grease.
8. Smear whole outer surface of housing (52) and machined bore intake pipe casting (27) liberally with water-repellant grease, taking care not to block off any holes.
9. Slide this bearing housing assembly (with gasket), into intake pipe (27) making sure 'O' rings enter without being damaged. Line up holes so that "T" or "TOP" on the housing is uppermost.

B. Temporary Bearing Assembly.

1. Take coupling (35) and place on bench flange downwards. Smear oil over surfaces, (but not flange).
2. Take bearing retainer (33) and fit seal (59) into its recess with lip facing the machined surface.

3. Slide this assembly over coupling (35) with the machined surface uppermost.

4. Lie gasket (63) on the face of the retainer (33).

5. Take thrust bearing (54) and drive onto the coupling (35) with the mark (@) on the inner race uppermost.

6. Fit this assembly into bearing housing (52), with Mark "T" or "TOP" on retainer (33) corresponding to similar markings on housing and intake pipe.

7. Temporarily secure with 2 screws.

C. Shaft Installation.

1. Liberally smear water-repellant grease over mainshaft (50) and inside spacer sleeve (48).

2. Slide spacer sleeve over shaft towards the end with the chamfer, which will enter into the bearing housing.

3. Slide shaft into intake pipe (27), through bearing housing (52) until threaded portion extends through coupling.

   Note: Take special care feeding shaft through small 'O' ring (47) in the seal sleeve. The small 'O' ring spacer may be pushed out, in which case the shaft may be fed right through, then the 'O' ring and spacer put into place in the seal sleeve afterwards.

4. Fit washer (36) and nut (37) temporarily, screwing up a few turns.

5. Slide fairing (46) onto other end of shaft until small end butts against spacer sleeve (48). Grease bore and all mating surfaces.

6. Fit long impeller key (42) in position in shaft, well greased.

7. Slide on first impeller (41) until it butts against the fairing (46).

   Note: The leading face of the impeller is convex, which should face forward towards the bearing housing.

8. Slide on bearing sleeve (44) right up to impeller hub.

   Important: Wipe off surplus grease so that outer surface of the sleeve is clean and dry.

D. For 3-Stage Units only.

The booster casing (38) should have its wear-ring (65) fitted, and the 8" diameter 'O' ring (45) in its groove at the rim. Also the rubber bearing (43) should be pressed into the casing hub. Slide this assembly over the shaft, and bolt up to intake flange with split ring pair (26) and nuts and washers (25). Liberally smear grease on all mating surfaces before assembly, but avoid grease on the rubber bearing (43) and the bearing sleeve (44). Slide on second impeller (41), convex face forward, followed by second bearing sleeve (44). (Make sure the outer surface of latter is left clean and dry.)

E. Install this assembly into the Hull.

(See Installation Section.)

F. Fitting Reaction Casing. (For all Units).

1. 2-Stage Units, the reaction casing (24) should have two identical 1¾" wear-rings (65) and rubber bearing (43) as before.

2. 3-Stage Units, the reaction casing (24) is identical except that the front wear-ring (66) is 1⅞" long and extends ⅜" from the front face.

3. Slide in reaction casing assembly, with a well greased 8" diameter 'O' ring (44) installed in its groove at the rim.

4. 2-Stage Units, bolt up casing direct to intake pipe (27) with split ring (26) and nuts and washers (25).

5. 3-Stage Units, bolt up joint between reaction casing (24) and booster casing (38) with split damping ring (55) and split ring (26) with nuts and washers (25). First clamp up lightly with screws (58), tighten nuts (25), then finally clamp up screws (58). In all cases grease all mating surfaces before assembly.

6. Slide on rear impeller (41) making sure the convex face is forward.

7. Smear grease over protruding shaft threads, and inside shaft nut (40). Do up this nut (40) all the way, then back off about 2 turns until the grubscrew (39) can be locked down into the Keyway in the Mainshaft. Smear grease over outside of nut, and especially over the grubscrew (39).

G. Final Assembly, Front End.

1. Having ensured that Unit revolves freely, remove self-locking nut (37), washer (36), and coupling (35) complete with ball bearing.

2. Place Key (67) into Keyway in shaft ensuring that it engages in the slot in the seal sheeve (49).

3. Replace coupling, sliding it over the key, and secure retainer (33) with six screws and fibre washers (34).

4. Again replace washer (36) and nut (37) and screw up right.

5. Check that shaft turns freely. Some "chatter" may be present from the dry rubber bearing. This is normal.

H. Fitting Tailpipe.

Fit tailpipe assembly, plumbing, controls, steering, etc. (See Installation No. 9 onwards.)

HANDLING TURBOCRAFT IN RIVERS

A Hamilton Jet Unit in a well designed hull with special strengthening for the purpose is easily handled in most rivers. In fact, it may appear so easy and safe that the novice is inclined to become over-confident after the first few runs. This is where trouble occurs and boats are damaged. It takes considerable river experience and study of river habits before one can be reasonably sure of not hitting some submerged rock or sandbar. It is for this reason that we give the following advice which has been gathered over a number of years in the hope that it will help others to negotiate rivers in safety:

Shallows:

The principle we have adopted for shallow water work is to use a hard-chine vee-bottom planing hull, so keeping as much on top of the water as possible. Propulsion is by Hamilton Marine Jet Units which have no underwater parts whatever, driven by light-weight high speed marine engines. The bottom of such a craft is completely free of any obstruction.

The faster you travel the less water the hull draws. When a sand bar is encountered just below the surface, a wedge of water forms between this and the hull bottom, buoying the craft still further out of the water till you can travel in only a few inches of water without touching the bottom. This effect is very marked and easily felt. The trim of the craft will flatten out and the speed rise for no apparent reason. This immediately indicates very shallow water. Do not make the mistake, however, that the same thing happens over an individual rock or stone. The procedure is to make sure the craft is planing cleanly (about 20 mph or more) when you come to shallows, and allow the boat to take as straight a line as possible over the worse parts, only attempting to turn where the water is a little deeper.

Try to judge the water ahead of you for if you have to slow down or stop, the craft will cease planing, sink deeper, and you may run aground. If the boat runs aground on a sandbar, it will stop so rapidly that the occupants may be thrown forward and injured. Beware of this. In the case of a larger craft, it may take some hauling back into deep water too. Do not run the engine when aground. When approaching shallows, and it seems advisable to turn back, do so while still in deep water, for the turn will cause the boat to draw more water. Remember that the faster the speed, the more likelihood there is of damage if you run aground (or hit a rock), although it will be minimised if you are travelling straight at the time. Take extra care going down-stream as in this case your ground speed will be higher.

The full thrust of the jetstream is utilized to steer the boat, and so the wider the throttle opening, the quicker will be the turn. Do not make the turn tighter than necessary.

Also for best performance always keep the hull bottom clean and smooth. A rough and dirty bottom will reduce your speed very considerably, so keep it in good condition.

Weight:

The boat will draw more water when stationary or going slow, and possibly most when going 8 - 10 mph. At higher speeds the hull lifts reducing the draught considerably. With a planing hull the Power/Weight ratio is most important. The greater the weight the poorer will be the performance. Be weight conscious. Do not carry more weight than is absolutely necessary. Unfortunately, the weight of a properly strengthened hull for river work is rather high, but this extra capacity to withstand bumps and groundings is essential. If an extremely shallow place has to be negotiated, lighten the load in the boat as much as possible.

There is a grill on the Jet Unit intake to limit the size of stones that can pass through. Although the unit is designed to withstand this treatment, you should do all you can to avoid too much going through. When stationary, small stones and gravel can be lifted up from as deep as three feet down if the throttle is opened too far, sometimes blocking the screen bars and spoiling the thrust. It should be pointed out that the jetstream may be virtually unchanged in appearance, but a distinct lack of thrust will be noticed. If this occurs the engine may be stoppe or the gate closed momentarily, in which case most of the stones will fall away. After this it is advisable to take out any remaining stones lodged between the bars as soon as convenient. When travelling at speed, even in extremely shallow water, there is apparently no tendency for the intake to pick up stones.

If starting off over a shingle bottom, make sure there is sufficient water under the intake before starting the engine, and only use a very small amount of throttle until in deep water, or a reasonable speed is attained.

When using the gate control in shallow water the reverse flow may stir up sand and small stones which can enter the intake and may jam the sliding surfaces of the gate. Try to avoid using it in these conditions, but if it should become clogged a vigorous shaking of the hand lever usually frees it.

River Habits:

Rivers vary greatly, and the knowledge of one river, or part of a river may be of little help in another.

Generally speaking, large rocks, stones and boulders are washed down the mountain slopes together with sand, gravel, and stones of various sizes. The water carries the smallest particles farthest, therefore, the further upstream you go the larger the

the stones become. Nearer the mouth sand and small stones are predominant. At the conflux of two rivers or at a side stream, larger rocks may be carried into the mainstream A lookout should be maintained at these points, but usually the bottom reverts to normal after passing the branch.

Gravel, sand and stones are relatively easy to negotiate as in the event of touching bottom no harm is likely to be done to the bottom provided it has been specially strengthened for the purpose. On the other hand, in gorges or near steep rock faces you must be especially wary, as the water may be deep and slow moving, and rocks just under the surface are difficult to detect in time. Generally keep well out from such places.

Usually small ripples, other than wind ripples, denote shallows, and the bigger the waves become, the deeper the water. A continually breaking wave in one place is evidence of a submerged rock which is to be avoided, although often it is well below the surface.

Rapids:

The normal rapid starts in a pool of slower-moving water, descends a slope and finishes in another pool of comparatively smooth water. When entering the slope the water gradually gathers speed until it reaches its maximum at the bottom, where it enters the lower pool amongst waves and turbulent water. Care should be taken to distinguish between these waves and waves caused by a rock which could well be situated in the rapid. In approaching a rapid from below, slower moving water is often on one or either side of the main tongue of the rapid and it is normally best to travel fast through this smooth patch alongside the main flow, and only go into the rapid when it is necessary, and the same time easing the throttle a little. You then should skim over the rough part without losing much speed, or over-revving the engine through the unit sucking air in the turbulent trough. A special note of caution though. Ofter a reverse flow or minor whirlpool is found beside the main tongue of the rapid, and this water, although helping the craft to gain ground speed, may hide a big rock just below the surface which is impossible to see because of the lack of movement on the surface. This seems to be more often the case where solid rock formation is present so then be extra careful. To hit such a rock at speed is not over pleasant. If not sure of the place go where there is sufficient current to show up snags near the surface.

This brings up an important point. When once you have gained some river experience, turbulent water, within reason, is not difficult as you can tell by the appearance of the surface what depth you have, whereas still water can be any depth. With just a little current in the water, you can usually see ripples or a whirl around a snag provided there is no wind ripple. Log snags are usually deposited around bends in the river or towards the sides, but rocks can be anywhere.

If you have had a long and trouble free run it is easy to be brought back to earth with a bump.

Very often in rivers severe crosscurrents are encountered but with plenty of speed very little effect will be felt. It should be mentioned here that when it is necessary to make right angle turn in fast flowing water, allowance should be made for a considerable sideslip which causes loss of speed and may wash you into the obstacle you wish to avoid.

Take care when following close to another boat particularly in shallow water as he may have displaced what little water was there during his passage leaving you with a rocky path to follow. Watch also for the disturbance of his wake which will upset you when you attempt to cross it. In an approach to a rapid his wake may increase in size in the fast water and become quite a hazard.

On becoming accustomed to rivers, discoloured and dirty water are no problem as you will know the depth of the water from the appearance of the surface, except, of course, in still water. The main thing to be careful of is debris carried down in suspension which may block the intake screens making it necessary to stop and clear it periodically. Also during floods in bush country logs can be carried down which may hit the bottom and rear up out of the water.

A very necessary rule on the river is to carry lifejackets, and never wear waders in the boat. Drowning may result from neglect of these precautions. Fishermen and others using the river often resent boats in their vicinity and there are in places stopbanks and groynes which could be effected by the wash. Some people have gardens which extend to the river's edge and enjoy the privacy of them Every effort should be made not to spoil other people's pleasures or damage their property.

To Summarize:

1. DO keep your boat in good condition.
2. DO travel fast enough to keep your boat planing cleanly when crossing shallows.
3. DO watch for submerged rocks in pools and near outcrops or rocks.
4. DO take extra care going downstream. Remember your speed is higher.
5. DO keep your load to a minimum always.
6. DO check your intake screen regularly for cleanliness.
7. DO keep a good lookout all the time.
8. DO keep where there is a current to help show up snags and shallows.

1. DON'T carry unnecessary weight aboard.
2. DON'T wear waders in the boat.
3. DON'T use large throttle openings when going slow in shallows.
4. DON'T turn sharply in shallow water.
5. DON'T allow sand and stones to circulate through unit unnecessarily.
6. DON'T unnecessarily use the gate control in shallows.
7. DON'T run over areas of small ripples, indicating shallows.
8. DON'T become careless.

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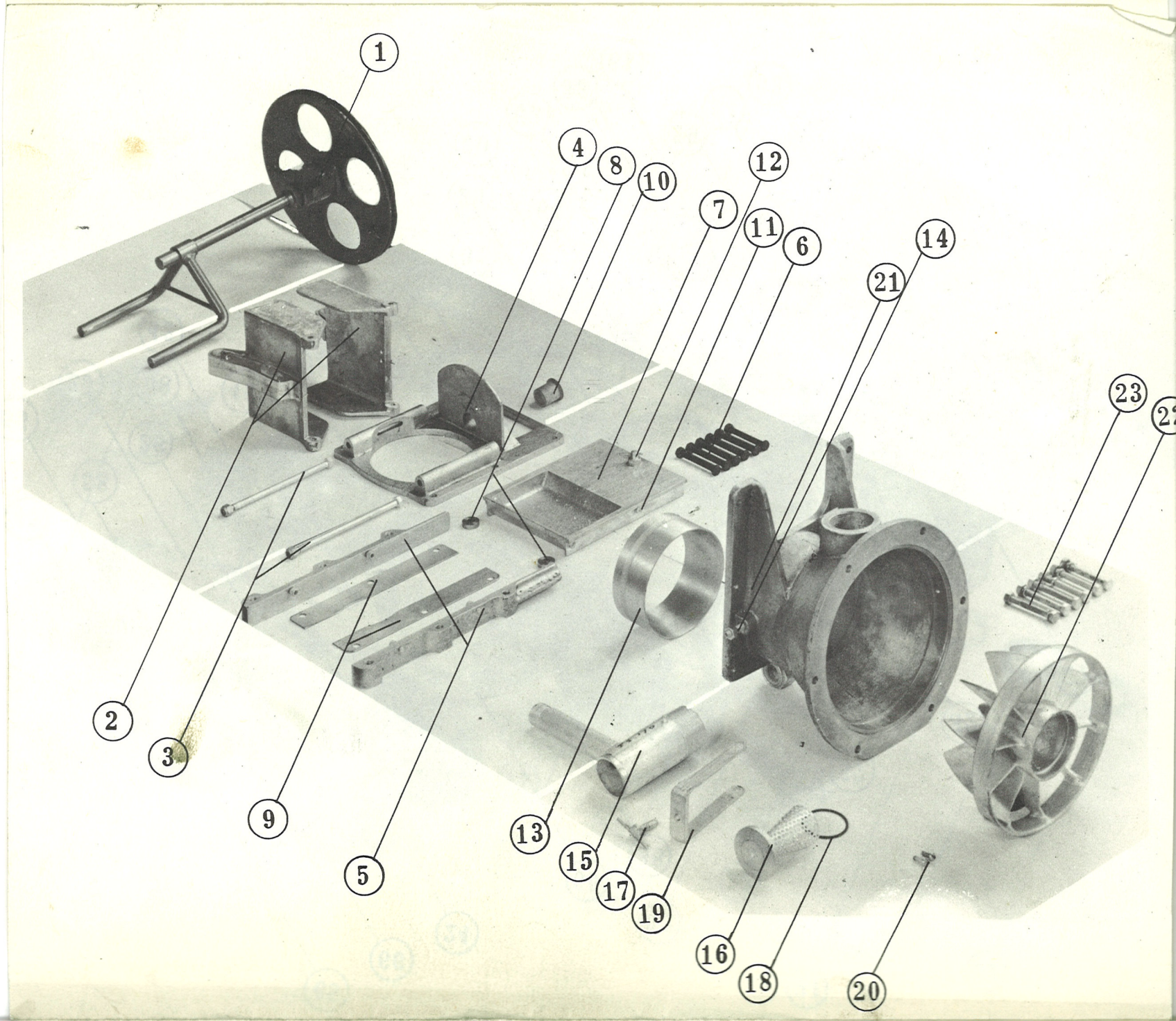
HAMILTON MARINE JET UNIT

(Serial No. 132 up)

GENERAL PARTS LIST

Refer to Diagrams at the back of this Handbook.

Item	Part No.	Description	Number Required 2-Stage	3-Stage
1	-	Steering assembly consisting of	1	1
	J 353	Steering Wheel	1	1
	J 283	Steering Wheel Key	1	1
	-	Bolt, Nut, L'Washer $\frac{1}{4}$" UNF x $2\frac{1}{4}$" long	2	2
	J 127	Steering Wheel Bearing	1	1
	J 127/1	Bush	1	1
	-	Bolt, Nut, Flat ° L'Washer $\frac{1}{4}$" UNC x $1\frac{1}{4}$"	2	2
	J 125	Retaining Collar	1	1
	-	Lockscrew $\frac{1}{4}$" UNC x $\frac{1}{4}$" long	1	1
		Cable Lockbolt, Nut, 2 Flat Washers ($\frac{1}{4}$" UNC x $\frac{3}{4}$")	1	1
	JS151	Steering Column W.A.	1	1
2	JS154Y	Steering Deflectors	2	2
3	JS159	Hinge Pin and S/L Nut 5/16" UNC	2	2
4	JS114	Gate Housing	1	1
5	JS115	Gate Housing Spacers	1 pr.	1 pr.
6	-	Bolt, Nut, L'Washer 5/16" UNC x $2\frac{1}{4}$"	6	6
7	JS116	Reverse Gate	1	1
8	JS141	Gate Roller	2	2
9	JS167	Gate Roller Rail	2	2
10	J 123	Steering Column Bush	1	1
11	-	(Roller Stop Screw) $\frac{1}{4}$" UNC x $\frac{3}{8}$" Skt.Hd. Capscrew	8	8
12	JS142	Gate Pin ($\frac{3}{8}$" UNC), 2 Nuts	1	1
	J 403	Drop Link	1	1
	-	Brass Split Pin 1/16"dia.x 1" long	2	2
13	JS107	Nozzle (size marked)	1	1
14	-	Nozzle Setscrew and L'Nut 5/16" UNC x $1\frac{1}{4}$"	2	2
15	JS170Y	Hydrant	1	1
16	JS171	Cap and Filler Assy.	1	1
17	JS173	Hydrant Yoke Screw	1	1
18	61024	Fibre Washer	1	1
19	JS174	Yoke W.A.	1	1
	-	Tee $\frac{1}{2}$ x $\frac{3}{4}$ BSP Banded Galv. Mllble.	1	1
	-	Nipple $\frac{1}{2}$" Std. BSP Hex	3	3
	-	Gate Valve $\frac{1}{2}$" BSP	2	2
	J 370	Hose Connection	1	1
	J 390	Bilge Pump Nozzle	1	1
	J 391	Bilge Pump Body	1	1
	J 392	Bilge Pump Outlet	1	1
20	-	Vane Ring Screw 3/16" BSW x $\frac{3}{8}$" Rd.Hd.	2	2
21	JS101	Tailpipe	1	1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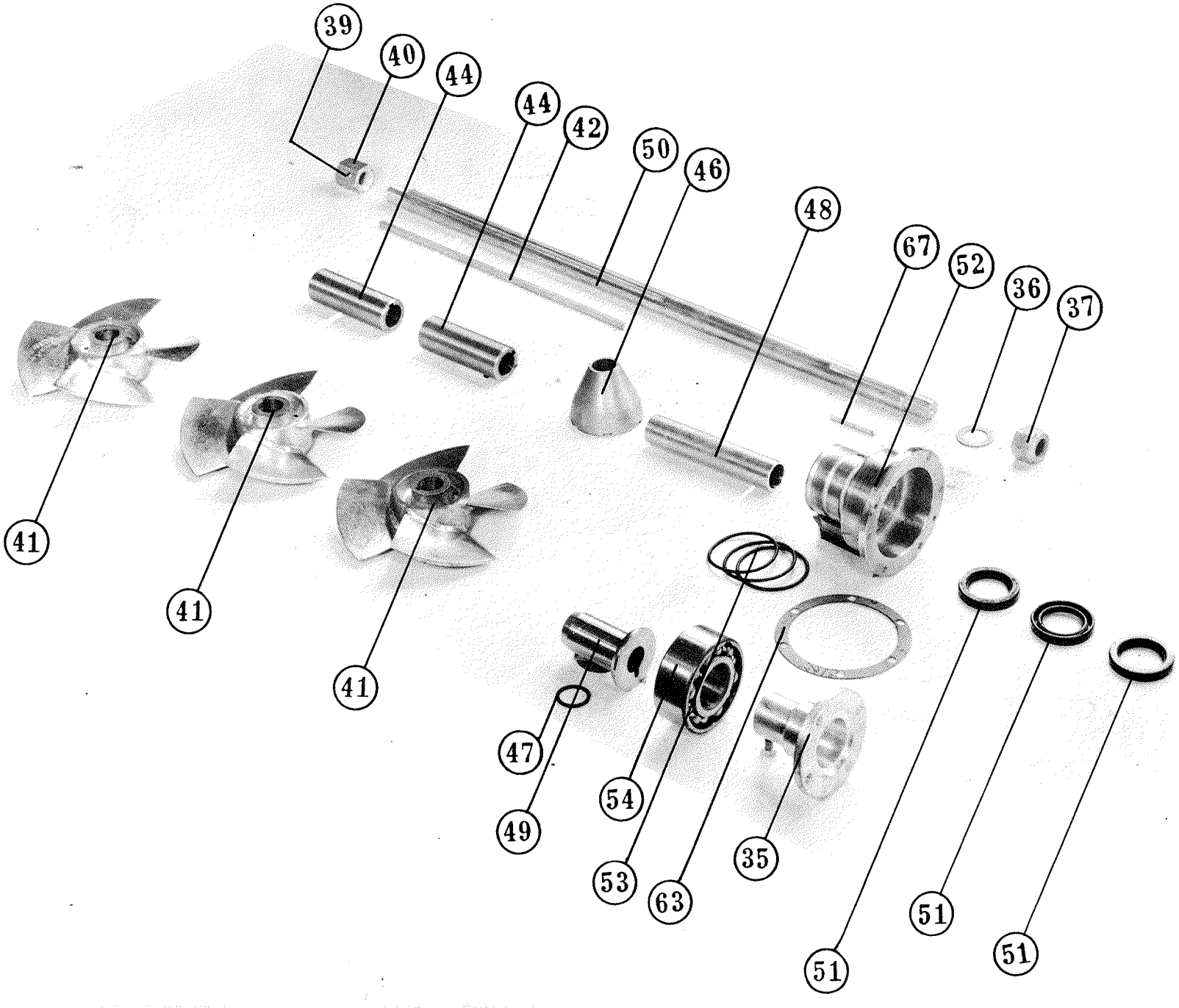
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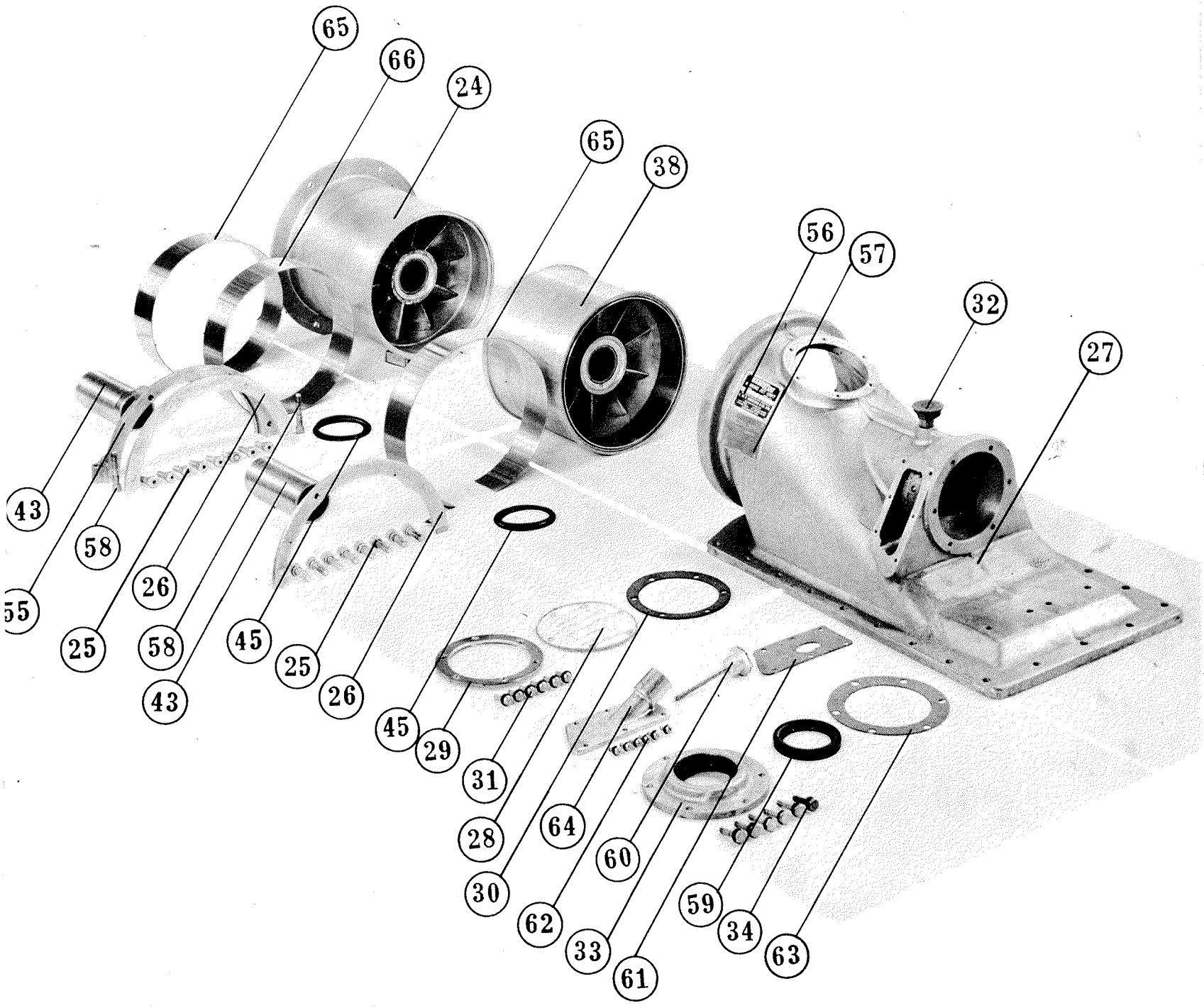
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