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COLORADO EXPLORER

ND 852 UP

Owner's Manual

Parts Catalogue

Fitting and Maintenance Instructions

C. W. F. HAMILTON MARINE LTD.

HEAD OFFICE LUNNS ROAD, P.O. Box 709, CHRISTCHURCH, N.Z.
also at WAIRAU ROAD, TAKAPUNA, AUCKLAND, P.O. Box 30077

WARRANTY

C. W. F. Hamilton & Co. Ltd. (hereinafter called the Manufacturers) guarantee the products manufactured by them to be free from defect in material and workmanship under normal use and service, ordinary wear and tear excepted, their obligation under this warranty being limited to the free replacement or repair (where practicable) at their works of any part or parts which, within six months from the date of Delivery to customer, shall be returned to them with all transportation charges prepaid and which upon examination shall disclose to their satisfaction to have been thus defective, this warranty being expressly in lieu of all other warranties expressed or implied and of all other obligations and liabilities on the Manufacturers' part, and especially excluding consequential damage. The Manufacturers shall not be obliged to pay for labour in replacement of defective parts and in no event shall be liable by reason of failure of equipment to operate, or for breakage, or for delays in work. Goods or parts supplied by the Manufacturers not of their manufacture are not covered by the above warranty, but are subject only to the warranty, if any, of the makers.

C. W. F. HAMILTON & CO. LTD.
LUNNS ROAD, MIDDLETON

INDUSTRIAL EQUIPMENT
CHRISTCHURCH, N.Z.

TURBOCRAFT

Series

No.

ENGINE

Type

No.

JET

Type

No.

NOTE

THE OWNER MUST FILL IN THE
DETACHABLE HALF OF THIS PAGE
AND RETURN TO:—

C. W. F. HAMILTON MARINE

P.O. BOX 709

CHRISTCHURCH

WITHIN 7 DAYS OF PURCHASE

**IF NOT,
ALL WARRANTY
IS VOID**

TURBOCRAFT

Series

No.

ENGINE

Type

No.

JET

Type

No.

DEALER

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OWNER

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Date

Signature of Owner

PLEASE RETURN THE WHOLE OF THIS SIDE



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 this 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 douse all camp fires.

CHECK LOCAL WILDLIFE REGULATIONS FOR THIS TIME OF YEAR !

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 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

COLORADO EXPLORER JET.

RANGE OF APPLICATION.

This Jet unit is designed for higher-powered engines, and the larger range of high-speed planing craft. It is best suited to medium sized hulls and cabin cruisers using the large six cylinder and V.8 engines, giving speeds up to 50 m.p.h.

Recommended hull sizes:	15 - 20 feet.
Engine size	200 - 350 cubic inch capacity
Examples:	Ford V.8, Chev Bel Air V.8, Crusader V.8, Chrysler 6 six cylinder, etc.
Maximum Boat weight:	up to 3000 lbs with larger engines.

Heavier and larger boats can be propelled successfully with equal efficiency to a direct-driven propeller, but planing may be difficult with other than light loads, and economy impaired. As a general guide, keep unladen boat weight about 14 - 15 lbs. per b.h.p. and do not exceed about 20 - 24 lbs per b.h.p. fully laden. If these guides are followed, good performance and quick planing will result, and laden speeds of approaching 30 m.p.h. will be possible.

HULLS:

The Colorado Explorer may be installed in a wide variety of hulls, both round bilge and hard chine. However, for best performance and handling the following points should be observed:-

VEE-ANGLE IN BOTTOM:

Some vee-angle in the bottom at the transom is desirable for the following reasons :-

- (a) Priming: The jet unit can be mounted lower than in a flat bottom, so that instant priming is assured when the engine is started. The unit should be at least half full of water when the craft is standing idle.
- (b) Choppy water: The Vee-angle assists in keeping the jet unit intake down in "green" water at speed in choppy or rough conditions. Also entrained air entering at the bow is more successfully separated out to the side, thus avoiding engine racing in these conditions.

STEMLINE: Avoid a forefoot too fine and deep. This gives too much keeling forward in fast turns causing spinning out. Use a full and convex bow, with a rounded stem rising steadily from well back along the keel.

KEELING: Do not use any centre keel or deadwood, (more than 2" or so). If keeling is required aft to control turns, fit a pair of "sister" keels about 2 feet apart at the stern. These should be 2 - 6 feet long, 1" - 3" deep, and faired off to nothing at the front end.

NOTE: The larger the craft, the less the above points apply so generally tend to choose any hull design that is suited to the purpose. Avoid lapstroke hulls or external stringers on the bottom as they can carry entrained air to the jet intake causing engine racing.

COLORADO EXPLORER MARINE JET

FITTING INSTRUCTIONS

PREPARATION:

First prepare the keel area near the transom as in diagram JE 107. A flat area 12" wide by $34\frac{1}{2}$ " long is required built up on the keel line from wood or fibreglass, which ever is preferred. Note that the depth of the block must be such that the sides of the intake hole are 1" deep finally. A flat bottomed hull, therefore, would require a block 1" deep all over, a vee-bottom would be deeper in the centre, but still 1" deep at the hole side. Mark out the rectangular intake hole ($18\frac{1}{2}$ " long by $8\frac{7}{8}$ " wide) obtaining distance "x" from the table on Diagram JE 107 which shows the relation between distance "x" and the transom angle of the hull. Cut this hole out straight through and check that sides are 1" deep. Make sure the top surface is really level and flat. Underneath, flatten off the bottom (9" wide) from the rear edge of the hole, clear back to the transom so that no "step" will remain when the flat intake screen is installed. This will only need to be done on vee-bottoms, as flat bottoms (or near flat) will leave no step in this area. In front of the intake hole, fair off from the flat area smoothly into the bottom on vee-bottom hulls so that the water can flow smoothly up to the intake.

TRANSOM HOLES:

Mark on the outside of the Transom the hole outline from the full size shape on drawing JE 107. Note the level of the hull bottom on the drawing as a guide to the height. However, check the height of the shaft line $5\frac{1}{8}$ " above TOP surface of block if in doubt. Cut out this hole straight through the transom parallel to the keel line. Also needed is a hole to accomodate the JE 172 Transom Plate. This hole is $2\frac{5}{8}$ " diameter. Refer to the drawing to get the position of the hole above the shaft centre line. The 1" offset is to the left of the transom centre line.

INITIAL JET UNIT FITTING:

Take Jet unit, remove tie bar, hinge pins and deflectors. Remove Steering shaft cotter and Steering shaft. Temporarily screw intake screen directly on the bottom face of the jet unit (say with two screws only). Slide Jet unit into boat, and drop over intake hole, so that the intake screen automatically locates it in the correct position. Juggle a little to divide the clearance roughly equally sideways, and fore and aft. Mark through the 11 holes on the base, lift unit out, drill holes through $5/16$ dia. and countersink slightly on the underside. Fit screen finally to base of unit, with rubber foot gasket sandwiched in between. Smear both surfaces of the gasket liberally with Black Bostick cement, Adfast cement or equivalent. Screw up 4 screws holding screen firmly with

sealant smeared on the threads. Refit unit in hull, fit 11 holding down screws (smeared with Sealant around heads) from underside. In hulls with soft wooden bottoms, a metal strip with a row of countersunk holes may be required along each side to prevent the heads of the bolts pulling into the wood. Put fibre washer, flat washer, nut in that order on each, and pull down evenly all round. Make sure the heads of the screws pull in just flush on the underside and do not protrude.

TRANSOM SEAL:

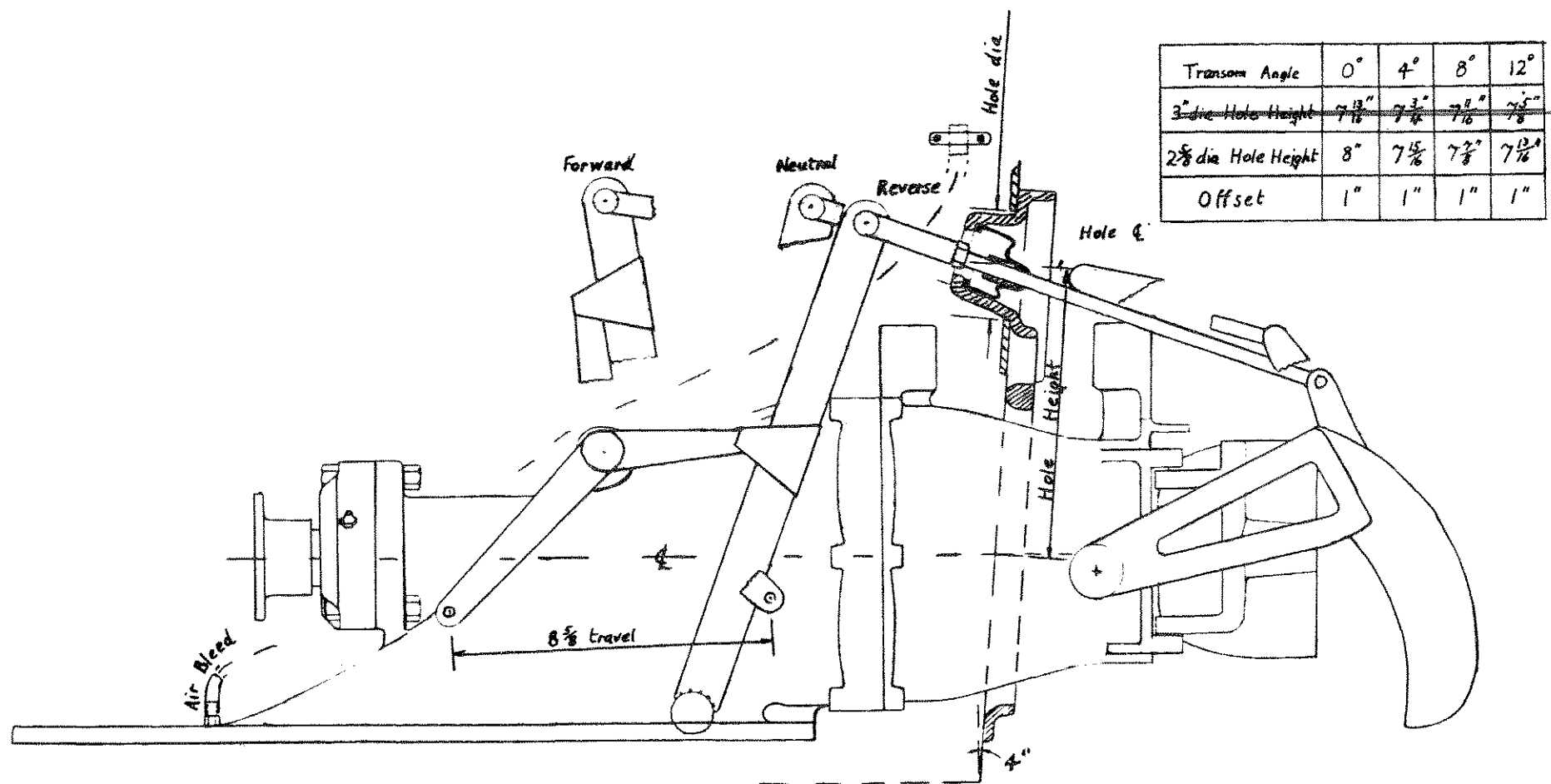
Take moulded rubber seal and check that its shape corresponds with the shape of the transom ring. The hole for the projection on the rear face of JE 172 is supposed to be $2\frac{1}{4}$ " diameter (i.e. smaller than the projection), to provide a good seal. Stretch the rubber seal over the tailpipe and slide it up to the transom and with the small steering shaft hole vertical. Fit the Transom ring against the seal. Fit reverse, and check that the push rod does not foul on the transom ring. Drill screw holes and fasten the ring and seal to the transom with the screws provided. Stretch garter spring around the moulded lip on the seal and hook ends together. Check that sealing lip fits snugly against the tailpipe. Slide steering shaft into place, through small hole in top of rubber seal ring, fix steering shaft inside with cotter pin - nut faces downwards. Replace deflectors. The top of steering arm inside may be connected directly to the steering cable system with small shackles and cable clamps. A hose may be connected to the water offtake nipple to supply the engine with cooling water. Either plug may be used.

STEERING ADJUSTMENT:

Later models are fitted with eccentric bushes in the tie bar connecting the deflectors. These allow adjustment to remove slack in steering. To adjust, slacken the $\frac{3}{8}$ " bolts, and turn the bushes outwards to reduce spacing, inwards to increase spacing. Replace bolts carefully. Eccentric angles should be kept the same both sides. Do not reduce spacing too much or speed may be affected. $3\frac{3}{4}$ " at the deflector tips being a usual optimum figure.

AIR BLEED:

Push one end of the plastic hose over the nipple mounted on the front of the intake, and fix with hose clip. Mount the other end either on the engine or on the transom so that the open end is at least 6" above the water line, preferably higher if possible. Take care to keep the hose clear of the universal and other moving parts.



THIS DIAGRAM SHOWS "JUNIOR" UNIT.

TABLE OF MEASUREMENTS also suitable for EXPLORER JET.

IMPELLER INSPECTION:

The impellers may be withdrawn from the stern by removing steering shaft, water leads, transom ring and rubber seal. From inside remove nuts and bolts holding unit together and withdraw tailpipe complete rearwards out through the hole in the transom. Watch for large O-ring seal in recess. Undo shaft nut, and withdraw bearing sleeve, impellers and casing. Keep leading edges of impellers reasonably sharp for good performance.

FITTING OF REVERSE GEAR:

Fit Reverse pivot bushes into the holes in bucket side arms. Put $\frac{5}{8}$ " dia. washers on $\frac{3}{8}$ " dia x $1\frac{1}{2}$ " bolts and bolt the bucket onto the threaded Bosses on the tailpipe. Tighten bolts.

Bolt the reverse control linkage assembly onto the side of the jet unit intake casting, and fix return spring anchor under a holding-down bolt. Fit chrom rod through the bucket, and adjust clevis so that when the bucket is down in reverse, it is quite close to top of deflectors; and in forward, at least $\frac{3}{4}$ " higher than deflectors. Rod should be free running in rubber bush.

ENGINE INSTALLATION HINTS.

POSITION.

The engine should be mounted where recommended by the hull designer, or astern of this position if desired. The latter may improve priming when starting, will give more forward cockpit space, and may improve top speed. The closest possible position to the jet will normally be the length of the standard Hamilton drive shaft (available as an extra). This shaft is approximately 18" long.

LEVEL.

Mount engine preferably on longitudinal bearers so that the crank-shaft line is level with the keel, and with a small clearance of about 1" under the flywheel or oil sump, whichever is closest to the bottom.

DRIVE SHAFT.

The drive coupling on the jet is made to take the Hardy-Spicer universal joint used on most medium-sized cars (1260 or 1300 series). Use a double universal joint shaft with a sliding spline of an overall length to suit the chosen engine position. Run the universal joint at a slight, but not too great an angle to avoid wear and vibration. 1° & 4° angle, equal on each is recommended. Make sure that the two centre yokes are in the same plane, the outer yokes in the same plane to avoid torsional vibrations. No special care is required in lining up the engine, the universal will take care of small differences. An absolute maximum universal angle of 8° is permitted.

COOLING SYSTEM.

The following cooling circuit is recommended :-

1. Carry a $\frac{1}{2}$ " hose from the jet unit offtake through the oil sump cooling coil. (if fitted)
2. Connect through the water-jacketed exhaust manifold. (in such a manner so as to keep the jacket full of water if possible)
3. Pipe through the engine block in at the water pump inlet (or direct into the block if pump not used), and out at the thermostat cover. Retain thermostat in position, but drill $\frac{1}{8}$ " hole in valve disc.
4. From the thermostat cover, pipe to the exhaust pipe outlet about 6" below the nearest exhaust port, pointing down the pipe. This flow will cool the gases and pipe from there on.
5. If the jet pressure appears excessive, shown by too cool a running temperature, a small adjustable bypass pipe can be arranged from the cylinder block inlet to the exhaust waste pipe to relieve excess pressure when driving hard. Lack of cooling water flow can be noticed first by a louder note from the exhaust, then by the temperature gauge if fitted. Stop immediately, switch off engine and check.

OPERATION OF JET UNIT

STEERING:

This is effected by the pair of coupled deflectors arranged either side of the jet nozzle. Turning the steering wheel turns the deflectors, and thus the whole jet stream left or right for 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. You have full steering power even when stationary at the touch of the throttle.

REVERSE CONTROL:

When fitted this control will enable you to go forward, hold still, or reverse with the movement of the lever. It is possible to brake to a stop by using reverse, or to creep slowly in either direction merely by moving the lever a small amount only the required way. Steering is available the whole time, whether moving forward or back, or even when stationary. Do not use excessive throttle when operating this contro.

C R U I S I N G T E C H N I Q U E

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 75% of maximum.

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. At these speeds the draught and drag are at a maximum.

4. 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 worst 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 and switch off the engine for a few seconds. In most cases it will be found that most of this material will fall 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. They are also available separately from the manufacturers.

5. STARTING OFF AND STOPPING:

Avoid shallow water except when travelling at a clean planing speed. Pick a deep area for starting off and stopping. Avoid large throttle openings in shallow water at slow speed as small stones can be sucked from the bottom and block the intake screen.

If this occurs, stop the engine and restart when the intake is in deeper water. Allow boat to move across the bottom before using too much throttle. When running at a reasonable speed, no trouble will be experienced from this source in shallows.

COLORADO EXPLORER JET

M A I N T E N A N C E

NOTE: This unit has been designed to require the absolute minimum of maintenance. The main moving parts which may require occasional attention are described below to enable the owner to better understand the design.

THRUST BEARING:

This is a special high thrust capacity Duplex Ball Bearing with separate grease seals. The bearing can be lubricated every 30 hours with a water repellant Lithium based grease. Do not overgrease.

REAR BEARING:

This is a water-lubricated cutless rubber bearing. It requires no attention. DO NOT RUN THE UNIT WITH A DRY BEARING as this will damage the bearing. Application of a garden hose to the small hole in the fairing inside the nozzle will wet the bearing sufficiently to allow the unit to be run for a short time, but REMEMBER, the engine still has no water circulation and prolonged running will cause damage.

GLAND SEAL:

This is a Carbon face seal with a bronze counterface and should need no attention. If any water leaks appear at the hole under the coupling, check that the counterface holding screws are firm but not too tight as they bear against a plastic surface.

DRIVE SHAFT UNIVERSALS:

Every 30 hours sparingly grease the universal joints and sliding splines. Do not overgrease.

TRANSOM SEAL:

Occasionally inspect the rubber and check that it is sealing effectively.

SALT-WATER OPERATION:

The unit is designed for fresh or salt water use, however, it is not recommended that they are moored out in the sea for long periods unused. It is advisable to flush out the unit with a fresh water hose, or run the craft in fresh water before storage for any length of time. A rub over the outside with an oily rag is helpful.

ADVICE PROJECTIONS



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				MATERIAL		UNLIMITED DIMENSIONS TO BE <u>3</u>	
				DRAWN		NAME	
				CHECKED		SEAL & BEARING	
				APPROVED		ASSY	
				DATE		COL. EXPLORER JET	
				ASSEMBLERS		SCALE	
						INCHES	
						JH 166 SY	
225	NO.	BY	DATE				

COLORADO EXPLORER JET - GENERAL PARTS LIST (for Nos. 852 up)

ITEM	PART NO.	DESCRIPTION	NO. REQD.
1	JE 168	Hinge Pin	2
2	JE 134	Steering shaft bush	2
3	JE 184	Steering control	1
4	JE 142	Steering arm	1
5	$\frac{3}{8}$ x $1\frac{5}{8}$	Cycle cotter pin w/nut & washer	1
6	63097	Name plate	1
7	63135	Patent plate	1
8	$\frac{1}{8}$ BSF	Straight grease nipple	1
9	$2\frac{1}{2}$ x $2\frac{3}{4}$ x $\frac{1}{8}$	"O" Ring G.S.	1
10	$2\frac{3}{4}$ x 3 x $\frac{1}{8}$	"O" Ring W.S.	1
11	JE 211	Set screw (cone point)	2
12	$\frac{3}{8}$ UNC	Lock nut	2
13	5/16 x 2 UNC	Csk hd M/C screw	4
14	JE 118Y	Intake screen	1
15	JE 201	Intake casting	1
16	JE 132	Intake gasket	1
17	5/16 x $2\frac{1}{4}$ BSW	Csk hd M/C screw, w/nut, washer & fibre washer	11
18	JE 106	Tie bar	1
19	$\frac{3}{8}$ x $L\frac{1}{4}$ UNC	Hex hd bolt	2
20	JE 162	Eccentric tie bar bush	2
21	$\frac{3}{4}$ BSP	Plug	1
22	JE 163	Conical spring	1
23	JE 167	Air bleed nipple	1
24	J 634	Plastic hose $\frac{3}{8}$ " x 30"	1
25	MOO	Hose clip	1
26	JE 178	Seal spring	1
27	$\frac{3}{4}$ "	Flat washer	1
28	$\frac{1}{8}$ x 1	Brass split pin	1
29	JH 143	Deflector L.H.	1
30	JH 144	Deflector R.H.	1
31	SCR 664/150	"Romet" carbon seal	1
32	MIS 112	Oil seal	1
33	MIS 20	Oil seal	1
34	JH 204	Bearing spacer	1
35	JH 206	Locating ring	1
36	$\frac{3}{8}$ x $2\frac{3}{4}$ UNC	Hex hd bolt w/nut	3
37	$\frac{3}{8}$ "	Plain washer	6
38	JH 110	Coupling	1
39	$\frac{3}{4}$ UNF	Slotted nut	1
40	$\frac{1}{8}$ x $1\frac{1}{4}$	Split pin	1
41	$\frac{3}{4}$ UNF	Stainless steel nut	1
42	JH 117	Washer	2
43	JH 203	Sealing face	1
44	3/16 x 2	Split pin	1
45	JH 202	Shaft slinger	1
46	JH 132	Coupling key	1
47	JE 112-4	Nozzle	1
48	JH 107	Fairing	1
49	JH 208	Large insulating washer	1
50	5/16 UNC	Nut and washer	6
51	JE 210	Bearing assembly	1
52	JH 167	Water Intake	1

ITEM	PART NO.	DESCRIPTION	NO. REQD.
53	JE 181 SY	Transom plate assembly	1
54	JE 176	Moulded transom seal	1
55	3/16 x 1½ BSW	Csk hd M/C screws w/nut, washer & fibre washer	19
56	JE 154-1	Splash guard	1
57	3/16 BSW x ¾	M/C screws w/nut & washer	3
58		Plain washer	6
59	3/8 x 1	Split pin	2
60	JE 157 Y	Push rod	1
61	JE 159	Transom seal bush	1
62	" 97013	Clevis	1
63	UNF	Nut	1
64	1 x 1½ UNC	Hex hd bolt w/nut & lock nut	1
65	¾ x 1½ UNC	Hex hd bolt w/nut & lock nut	1
66	JE 175 SY	Reverse bucket assembly	1
67	JE 161	Pivot bush	2
68	5/8 x 1½ UNC	Hex hd bolt	2
69	JE 169	Spring	1
70	J 672	Seal strip 24" long	1
71	JH 150 Y	Overcentre lever	1
72	JH 149 Y	Overcentre link	1
73	JH 148 Y	Reverse lever	1
74	5/8 x 1¼ UNC	Hex hd. bolt	2
75	5/8 dia	Plain washer	2
76	3/32 x 1	Split pin	2

PARTS REQUIRED FOR 2B OPTION (Long 2-stage)

77	7¾ x 8 x 1/8	"O" ring W.S.	2
78	JE 147	Wear ring insulator	2
79	JE 144	Wear ring	2
80	JC 49	Cutless rubber bearing	1
81	JH 201	Mainshaft	1
82	JH 113	Bearing sleeve	1
83	JH 116	Key	2
84	JE 115	Tailpipe	1
85	JH 103	Stator	1
86	JH 130 Y	Tie bolt	6
87	JH 106	Impeller	2
88	JH 151 Y	Mounting plate	1

PARTS REQUIRED FOR 3C OPTION (Short 3-stage)

89	7¾ x 8 x 1/8	"O" ring W.S.	3
90	JE 147	Wear ring insulator	3
91	JE 185	Wear ring	3
92	JH 160	Cutless rubber bearing	2
93	JH 211	Mainshaft	1
94	JH 159	Bearing sleeve	2
95	JH 116	Key	3
96	JH 158	Tailpipe	1
97	JH 156	Front stator	1
98	JH 157	Rear stator	1
99	JH 130 Y	Tie bolt	6
100	JH 106	Impeller	3
101	JH 151 Y	Mounting plate	1

