

PP 65 JET UNIT (ECONOMY)

OPERATION – PP 65

Running in

Construction of a PP jet is very simple and no running in is required.

Manoeuvring

The jet stream can be deflected in any direction; forwards, backwards or sideways. Hence, PP jet boats are exceptionally manoeuvrable and have the ability to steer in neutral.

To achieve this, the steering is designed so that whenever the steering wheel is turned to port, the boat rotates anti-clockwise whether in neutral, forward or reverse. To those accustomed to outboards or stern drives, this may feel unusual at first, but after a little practise, it will be found that perhaps by using different techniques, the boat is far more manoeuvrable than with other systems. For easiest control in a confined space, the throttle should be set to give a fast idle and with one hand on the steering wheel and one hand on the reverse lever, it will be found that the boat can be held stationary, rotated or manoeuvred simply in either direction forward or backwards.

When driving at very low speeds, greater control is achieved by using the reverse deflector to check boat speed while maintaining a reasonable engine speed. This will give positive steering, for example, when negotiating a narrow channel with a cross wind, or when entering lock gates.

Similarly, when leaving a mooring, the stern can be pushed sideways with the jet, and the boat reversed out.

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In the following sections on shallow water, and driving in weeds, it should be remembered that we are discussing conditions where a propeller driven boat would be unlikely to venture.

Shallow water

PP jets may be operated in very shallow water but it should be noted that particularly with throttle opening there is a high suction force at the intake. Loose objects can be sucked into the intake grill and small objects will pass through the jet. Shingle and stones can cause damage. In sandy conditions there is, inevitably, some wear.

The design of the intake grill is a compromise between free water flow and protection of the internals. In weedy conditions, fewer bars with larger gaps make the grill less prone to blockage but will allow larger objects to pass into the jet unit with greater risk of damage. Weeds passing into the jet are generally chopped up

by the impeller and simply pass through. Alternatively, a grill with very narrow slots will give excellent protection but can become blocked relatively easily in weeds.

If the boat should ground and stop, it is generally more effective to use reverse, and pull clear backwards. Firstly, reverse lifts the stern of the boat slightly and secondly, the water being blown under the boat helps to clear mud or sand.

However, whatever is on the bottom – stones, sand or mud – will be sucked up by the jet. Stones and shingle can cause damage, while sand and mud can cause wear as well as tending to fill up the cooling passages, if engine cooling water is taken from the jet.

Continued high throttle opening when the boat is in any of these conditions is not recommended.

Driving in weeds

At planing speeds, a PP jet boat will usually pass over weeds without trouble. The worst condition for blocking is high suction and low boat speed, such as when climbing on to the plane.

In case of blockage, noticeable as cavitation, the following procedure is recommended. (See also section on cavitation).

1. If a gearbox is fitted, give a few bursts of throttle with the gearbox in reverse and the jet reverse deflector up.
2. Stop the engine. Often obstruction on the intake grill will simply fall clear. If the optional weedrake is fitted, give it a few shakes.
3. Try a few bursts of power. This will often suck an obstruction through the jet and blow it clear.
4. If the boat is able to plane, increase boat speed as far as possible and shut off the throttle. The forward speed of the boat will often wipe the grill clean.
5. Drive the boat as fast as possible in reverse and while it is moving backwards, switch off the engine and raise the reverse bucket. This causes water to flow backwards through the jet and will generally loosen any blockage. It is particularly helpful when the jet is clogged with weeds internally. A sharp burst of power will generally then blow the obstruction clear.

Using these simple techniques, it has almost invariably been found possible to clear a PP jet even after the boat has come to a complete stop in very thick weeds. Unlike a propeller system, the engine will very seldom be stopped by tangling with weeds.

If the jet is still blocked it will be necessary to clear the obstruction through the hand-hole in the top, or from under the intake grill, or through the nozzle.

Where engine cooling water is taken from the jet, there is danger in these conditions of blockage of the engine cooling water pipe, and the first symptom would be

scorching of any rubber exhaust pipes. If blockage is suspected, it should generally be possible to remove one of the hoses and blow backwards down the cooling pipe. In weedy conditions, a special watch should be kept on engine temperature.

MAINTENANCE PP 65 ECONOMY

Dismantling and assembly

Disconnect the steering and reverse at the ball joints on the control shafts. Undo 3 stator bolts and remove complete rear assembly.

On assembly, the cavity in the stator boss should be fitted with gear oil, EP 90 or similar, and care should be taken when fitting not to reverse the lip of the seal or to dislodge it by hydraulicing. The seal should be fitted with the spring facing the water.

Rear bearing

The rear bearing is PTFE coated and the shaft in this area is hard chrome plated. The bearings appear grey when new and as wear takes place, particles of bronze become visible. The bearing requires replacement when more than about 70% of the bearing surface is exposed bronze.

The bearings are a press fit in the housing and can be replaced with the special tool. The tool also acts as a gauge and should be a free fit in the newly fitted bearings.

Impeller

The impeller is held on the shaft with a tapered collet. To remove, loosen the 3 bolts in the rear of the collet and tighten up stator bolts into the 3 threaded holes. This will break the taped lock and the impeller and collet can be removed together.

Impeller tip clearance is adjustable by positioning the impeller axially within the conical wear ring with shims. The simplest way of setting this is to slide the impeller and collet onto the shaft without shims and without tightening the bolts and to fit the stator unit. The impeller may be moved along the shaft until the tips are just clear when rotated. In this position it can be seen how many shims are needed.

Shaft/bearing housing assembly

The complete shaft and bearing housing can be removed as one unit. It is held in place with 4 studs at the forward end.

The front bearing is a double row ball bearing and should be fitted with the filling slots facing forward.

The bearing is grease lubricated and the cavity should be about 1/3 full. Overfilling leads to excessive heat generation.

Seals

The main sealing in the duct is 3 lip seals with grease lubrication. All the seals should be fitted with the springs facing the water and the outer two seals should be pressed in beyond the grease hole.

Wear ring

This is a stainless steel ring pressed into the duct body and held into it's taper housing with a plastic ring clamped by the stator. Wear on the ring is usually small compared to the impeller tip wear. The wear ring can be removed by tapping with a punch from the forward end, or by pushing a screwdriver under the ring from the rear to bend it inwards.

On assembly, the wear ring should first be pushed into place. The retaining ring is a tight fit. It is fitted into the recess by kinking one side of the ring towards the shaft allowing the ring to fit within the housing. The kink is then pushed back to the circumference of the housing. The retaining ring and wear ring can then be tapped in together. The ring can be pressed tightly into the taper housing by fitting and stator and tightening the 3 bolts. The stator is then removed and the surplus material on the retaining ring is ground off to leave it approximately 0.020" (0.5mm) proud of the duct rear face. This provides a camming action when the stator is refitted.

Controls

The control shafts operate in plastic bearings without lubrication. The bearings for the steering nozzle and reverse deflector are plastic and require no lubrication.

Lubrication

<u>Item</u>	<u>Lubricant</u>	
Front bearing Seals	Grease lithium base	Preferred grease: BP MMEP 2 Alternatives: BP LSEP 2 Shell Alvania R3
Rear bearing	Gear oil EP 90	

Service Intervals

On first use and every 100 hours or 3 months

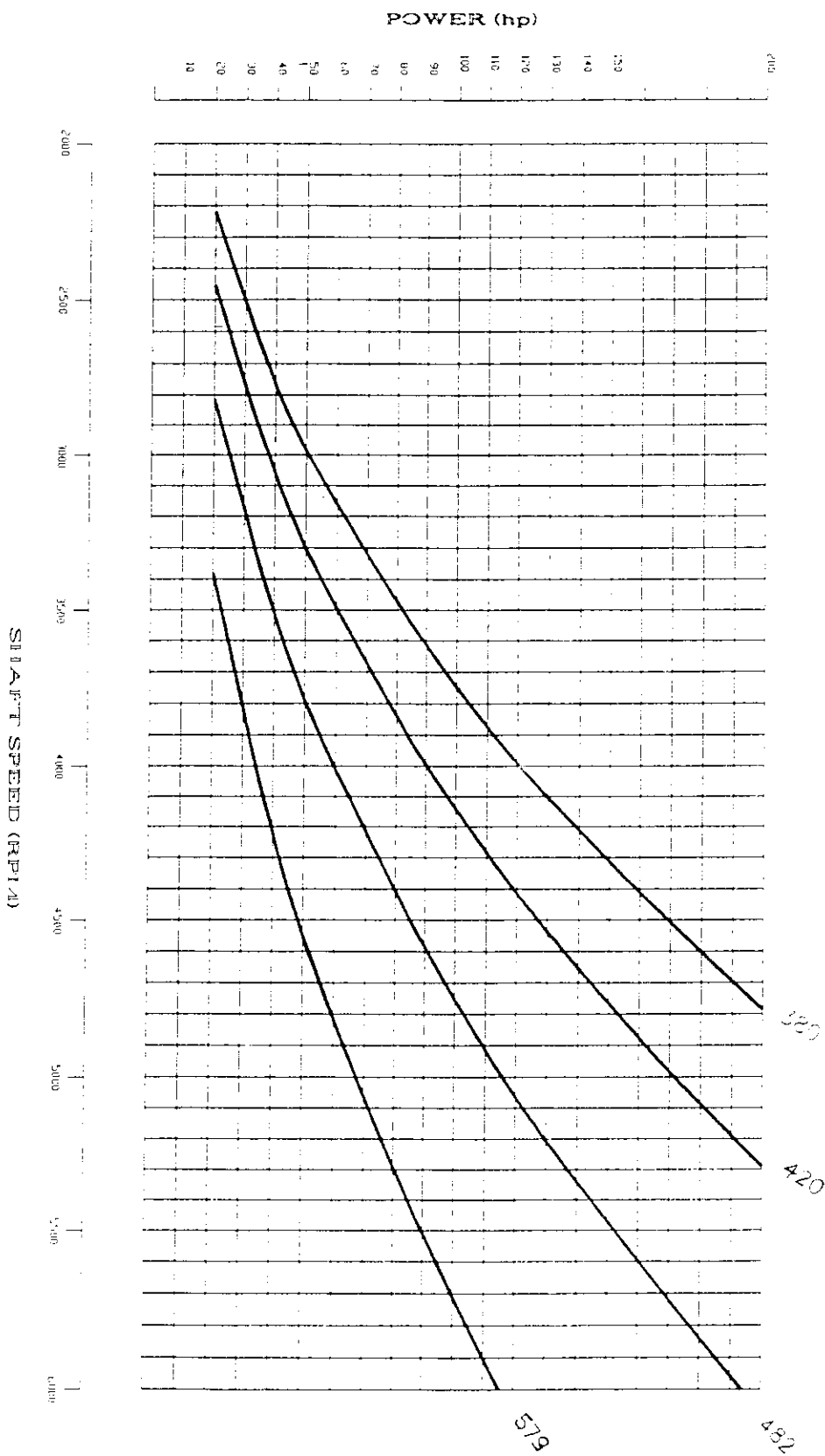
- Grease main bearing sparingly.
- Check main seal for leaks.
- Grease seals.
- Check tightness of all nuts and bolts.

- Check condition of hand-hole 'O' ring.
- Visually check overall for any signs of damage or wear.

Every 2000 hours or 2 years

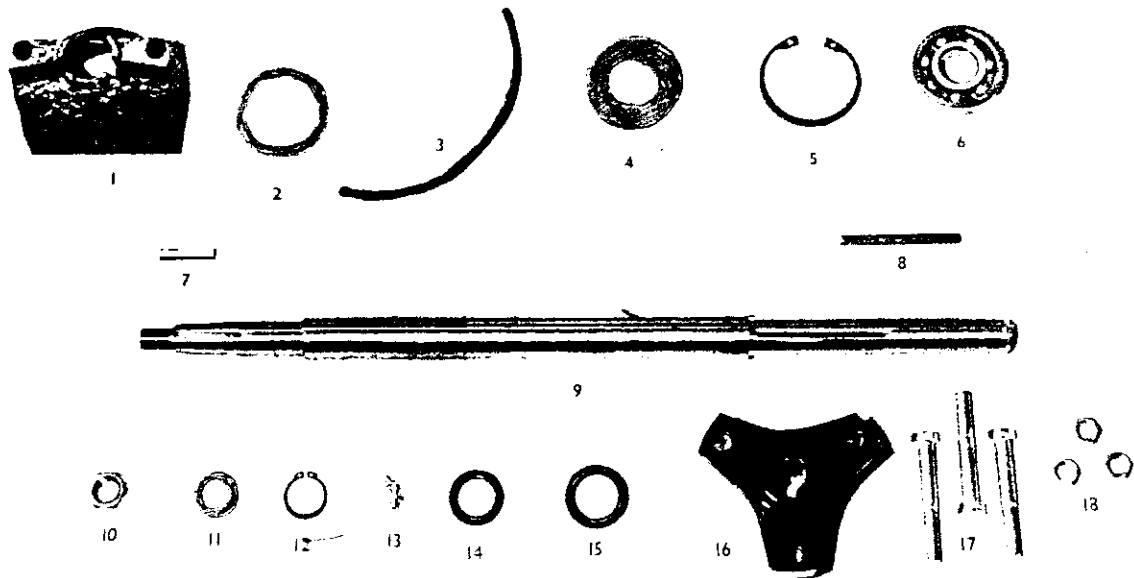
- Remove stator casing and control deflectors complete.
- Clean and check overall for any damage.
- Check bushes of reverse deflector and steering nozzle for wear. These are made with a fairly loose fit to avoid jamming with sand and may have 0.020" (0.5mm) backlash.
- Check tightness of all nuts and bolts.
- Check condition of bearing (see above notes) and replace if necessary. Replace at 4000 hours.
- Replace seals. The seal spring should face the water. On replacement, fill centre cavity with gear oil EP 90.
- Remove impeller and check blades for stone damage – usually flattening of the leading edge or bending of the tip near the leading or trailing edge.
- Remove shaft/bearing housing assembly – remove shaft and bearing from housing and degrease. Check for any signs of corrosion or pitting in the bearing and replace if necessary. Replace at 4000 hours.
- Check shaft for wear and at duct seals and rear bearing. The hard chrome bearing surface should appear polished but not grooved.
- Replace seals and 'O' ring.
- Replace seals in duct.
- Replace hand-hole 'O' ring.
- Check wear ring. Generally wear looks worse than it is. The material thickness is 18 swg (0.048") and odd grooves up to depth 0.020" may be tolerated. If necessary replace wear ring and retaining ring.
- Visually check overall for any sign of damage or wear.

PIP65 Impeller Curves



FRONT BEARING ASSY. & SHAFT

PARTS LIST
SHEET No. I
Jan. 1978



FRONT BEARING ASSY AND SHAFT - ECONOMY JET - SHEET No 1

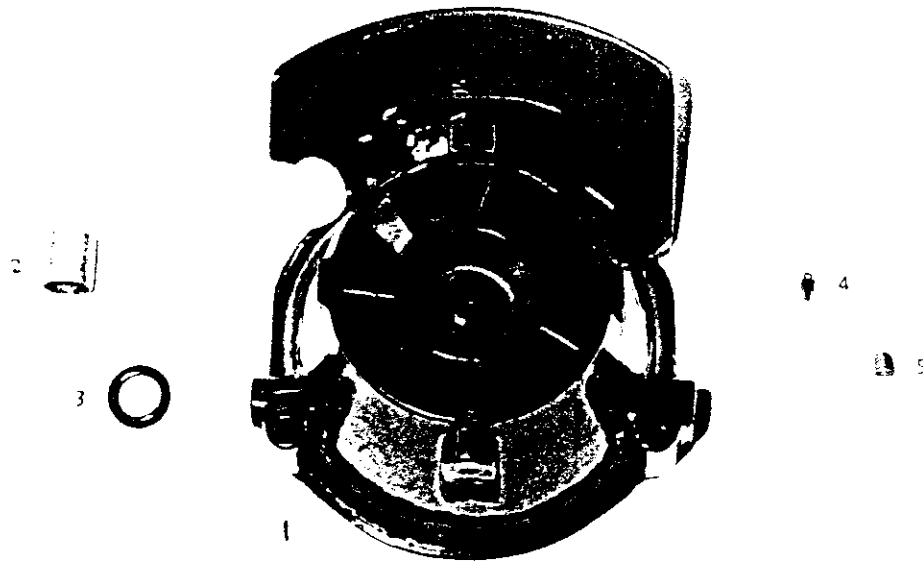
ITEM	DESCRIPTION	PP PART No	VT PART No
1	BEARING HOUSING-SQUARE 62MM INNER DIAMETER (EARLY JETS HAD 65MM INNER DIA NO LONGER AVAILABLE)	02-1013	H6133042A
2	INSULATING WASHER	02-103	W00790320
3	INSULATING STRIP	02-104	I1990104A
4A	ALLY HOUSING SEAL - 65 MM	02-105	S34212120
4B	ALLY HOUSING SEAL 62 MM	65-105	S34212130
4C	"O" RING FOR 62MM HOUSING SEAL		S34631040
5	CIRCLIP		C27309010
6A	SINGLE BEARING	6305	B23127370
6B	DOUBLE BEARING	3305	B23127300
7	COUPLING KEY	02-304	K1311015A
8	IMPELLER KEY	02-305	K1311014A
9	TAPER SHAFT	02-308	S4438025A
10	M16 NUT		N88228090
11	M16 WASHER		W00790200
12	CIRCLIP		C27309130
13	GREASE NIPPLE	310-345	N47103010
14	LIP SEAL		S34212430
15	LIP SEAL		S34212460
16	COUPLING FLANGE	02-703	F4100104A
17	BOLT 7/16 UNF x3"		S13002440
18	7/16" FULL NUT		N88120020

65 IMP RATINGS

VP 65 IMPELLER SPECIFICATIONS				
ITEM	PAT	VT NO	ENG USED	RATING
IMPELLER 573 PITCH C	C	I0600101A	FORD 1600	80HP - 5000RPM
IMPELLER 380 PITCH A	A	I0600102A	FORD V6	125HP - 4000RPM
IMPELLER 420 PITCH E	E	I0600103A	FORD V6	125HP - 4500RPM
IMPELLER 482 PITCH B	B	I0600104A	2L FORD	95HP - 5000RPM

STATOR ASSEMBLY

PARTS LIST
SHEET No. 2
Jan. 1978

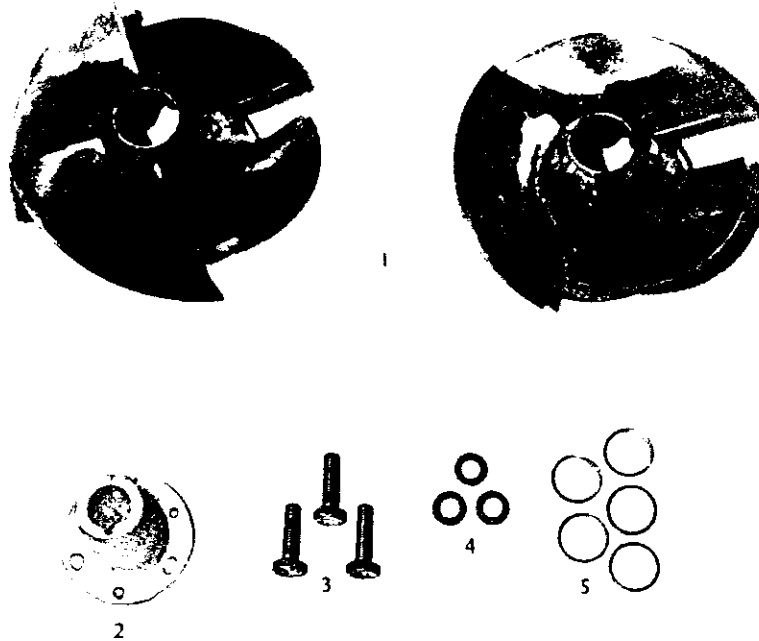


STATOR ASSEMBLY SHEET No 2

ITEM	DESCRIPTION	PP PART No	VT PART No
1	STATOR HOUSING 5 BLADE	02-201-5	S8200103A
1	STATOR HOUSING 7 BLADE	02-201-7	S8200104A
2	BEARING BUSH		B23127410
3	LIP SEAL 35 MM		S34212430
4	GREASE NIPPLE	301601	N47102040
5	HELICOIL INSERT	M10 X 1.5 NL	I22610080

IMPELLER ASSEMBLY

PARTS LIST
SHEET No. 3
Jan. 1978

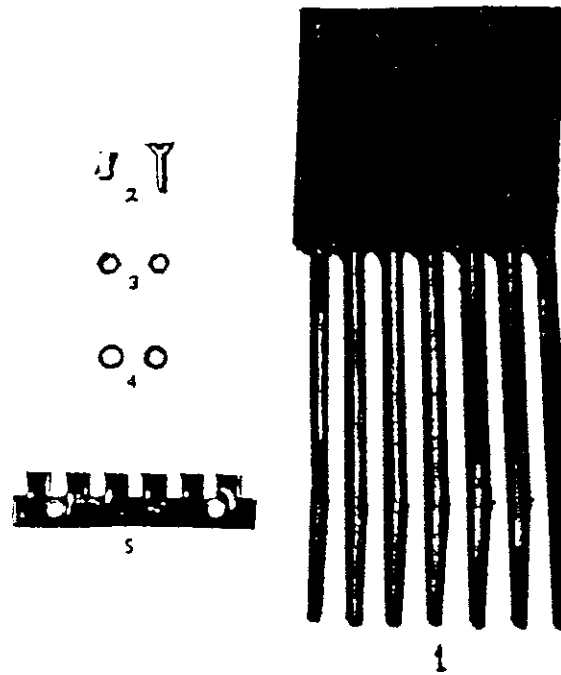


IMPELLER ASSEMBLY SHEET No 3

ITEM	DESCRIPTION	PP PART No	VT PART No
1	IMPELLER - C	573	I0600101A
1	IMPELLER - A (4 BLADES)	380	I0600102A
1	IMPELLER - E	420	I0600103A
1	IMPELLER - B	482	I0600104A
2	COLLET	02-303	C4830103A
3	BOLT M10 X 35		S13002030
4	M10 FLAT WASHER		W00726020
5	IMPELLER SPACER	02-106	S68335210

STONEGUARD ASSEMBLY

PARTS LIST
SHEET No.4
Jan. 1978

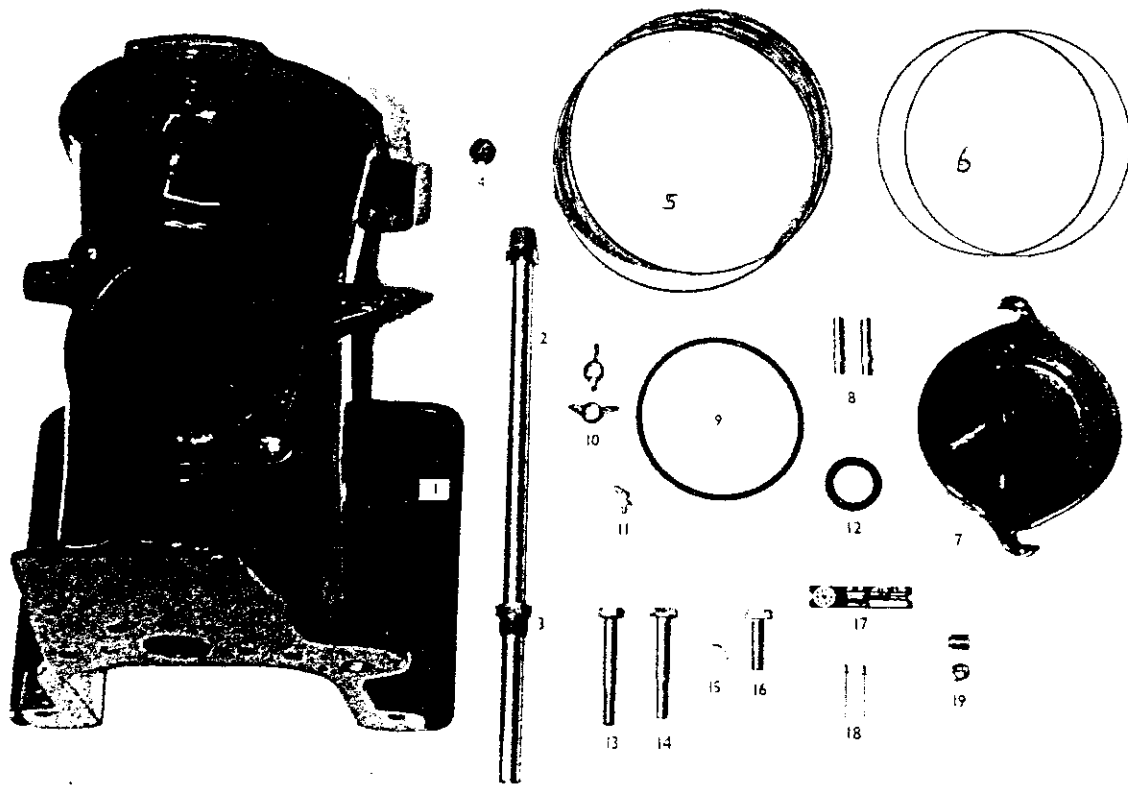


STONEGUARD ASSEMBLY SHEET No 4

ITEM	DESCRIPTION	PP PART No	VT PART No
1	STONEGUARD	02-620	G8820111A
2	M8 X 30 COUNTERSUNK SCREW		S17624070
3	M8 FULL NUT		N88270180
4	M8 SPRING WASHER		W00724080
5	SUPPORT	02-622	B7214558A

DUCT ASSEMBLY

PARTS LIST
SHEET No. 5
Jan. 1978

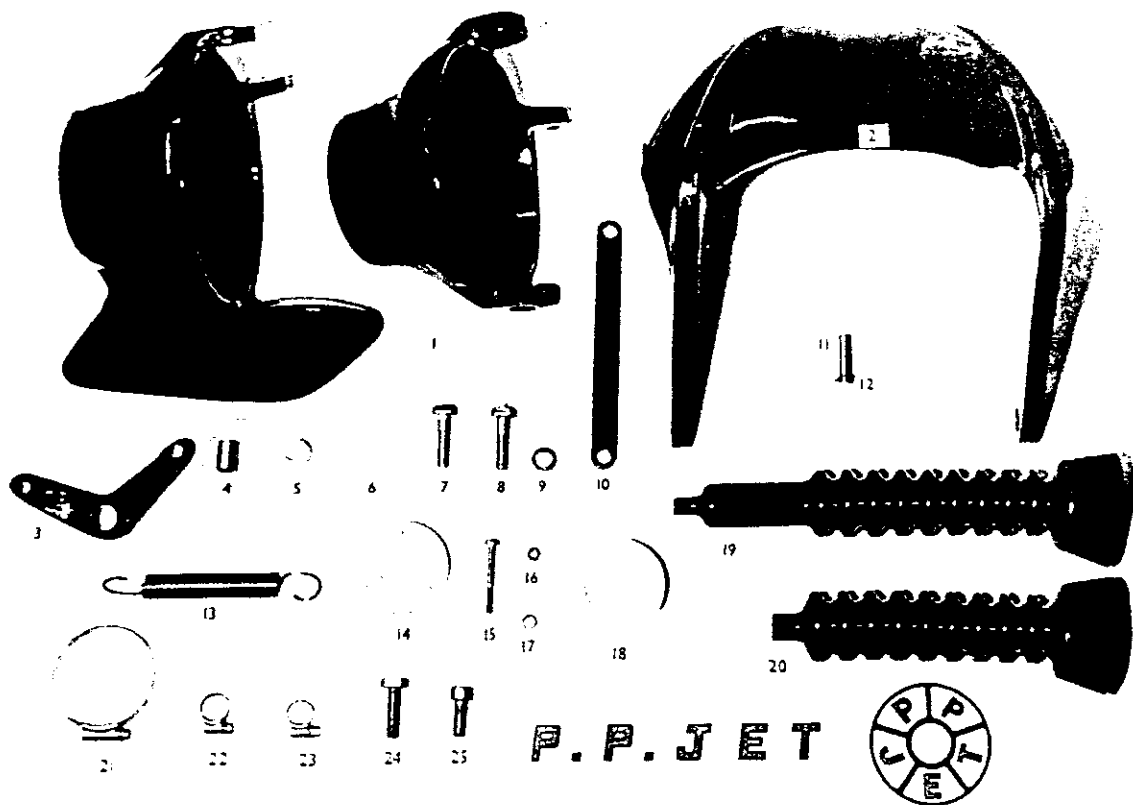


STONEGUARD ASSEMBLY SHEET No 4

ITEM	DESCRIPTION	PP PART No	VT PART No
1	DUCT	02-410	D8550103A
2	COOLING TUBE	02-402	T86419040
3	TUBE CLAMP - REVERSE	02-403	C34535080
4	THREADED PLUG	02-408	F21360180
5	ST STEEL WEAR RING	02-404	R71633030
6	NYLON RETAINING RING	02-405	R71633040
7	HANDHOLE COVER	02-406	C4910308A
8	HANDHOLE COVER STUD	02-407	S7640736A
9	"O" RING		S34675510
10	WING NUT		N88270230
11	GREASE NIPPLE		N47103010
12	LIP SEAL		S34212460
13	BOLT M10 X 75		S13002100
14	BOLT M10 X 70		S13002090
15	M10 FLAT WASHER		W00726020
16	SOCKET CAP SCREW		S13002160
17	SERIAL NUMBER PLATE		N/A
18	RIVET		N/A
19	HELICOIL M10 X 1.5		I22610110

STEERING & REVERSE ASSY.

PARTS LIST
SHEET No. 6
Jan. 1978



STEERING REVERSE ASSY - ECONOMY JET SHEET No 6

ITEM	DESCRIPTION	PP PART No	VT PART No
1A	STEERING NOZZLE WITH FIN	02-501F	N5000102A
1B	STEERING NOZZLE-NO FIN	02-501	N5000101A
2	REVERSE DEFLECTOR	02-502	B8790101A
3	CABLE LEVER	02-503	L29109150
4	CONTROL SPACER	02-505	S68335220
5	NYLON HEADED BUSH	3/8" x 1/2"	B88130570
6	NYLON WASHER	3/4"	W00790420
7&8	M10 x 35 HEX HD BOLT	02-501	S13002030
9	M10 FLAT WASHER	M10SS	W00726020
10	REVERSE LINK	02-506	L48303090
11	PIN - FRONT	02-513F	L29109160
12	PIN - REVERSE	02-513R	P36663080
13	REVERSE SPRING	02-508	S68215060
14	STEERING CLAMP	02-512	C34535100
15	BOLT M6 x 50	M6X50	S13001520
16	M6 FULL NUT	M6	N88270150
17	M6 WASHER	M6	W00722090
18	MOUNTING - REVERSE GAITER	02-517	G16002070
19	STEERING GAITER	02-515	G16002060
20	REVERSE GAITER	02-514	G16002050
21	HOSE CLIP	55-70 MM	C34210050
22	HOSE CLIP	11-16 MM	NOT USED
23	HOSE CLIP	13-20 MM	C34210100
24	BOLT M10 X 40	M10X40	S13002040
25	FIN BOLT-SUPERCEDED	N/A	NOT USED
26	BALL HALVES-SUPERCEDED	N/A	NOT USED