OPERATING INSTRUCTIONS

HEF DOLPHIN FLOAT PUMP

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This manual is for DARLEY FIRE PUMP:

Model: **HEF** Pump Serial Number: _____

Introduction

This manual provides information for the use and understanding of this manual, correct operation, maintenance, troubleshooting of the Darley HEF Dolphin Float Pump, definition of terms, and contacts. Please read and understand these instructions thoroughly before putting this system into service. Doing so will ensure optimum performance and long life of your Darley Floating Pump.

This manual is divided into eight sections, each section details an important portion of this manual and pump.

Section 1 **Definition of Symbols**

Section 2 **Operation**

Section 3 **Pump Assembly/Disassembly**

Section 4 **Components**

Section 5 **Maintenance Schedule**

Section 6 **Troubleshooting**

Section 7 **Definition of Terms and Operating Characteristics of Pumps.**

Section 8 **Contacts**

Section 1

Definition of Symbols

IMPORTANT

Throughout this manual will find Caution, Warning and Danger symbols. Please pay close attention to these symbols as they are for your safety.

⚠ DANGER - Signifies an imminently hazardous situation that could result in death or serious injury.

⚠ WARNING - Signifies a potentially hazardous situation that could result in death or serious injury.

⚠ CAUTION - Signifies a potentially hazardous situation that might result in minor or moderate injury.

CAUTION - Signifies a potentially hazardous situation that might result in property damage.

Intentionally ignoring any of these identified hazards is not recommended. W.S. Darley does not advise such actions or take responsibility for the actions of any operator of this unit.

Section 2

Operation

Operating Instructions
For Darley "DOLPHIN" Floating Fire Pump

⚠WARNING Do not use this pump for hose testing. Such testing could result in major pump or engine damage. Such damage may cause explosion, overheating of the engine and/or pump, and bodily harm.

PREPARATIONS FOR PUMPING

- Make sure to read the engine instruction manual before usage.
- Check the engine oil level before starting the engine.
- Check the fuel level before starting the engine.
- Do not run the pump dry or at high speed unless it is placed in water of adequate depth.
- Connect the discharge hose to the pump.
- Ensure the discharge breather check valve; located near the Darley emblem on the float; is working, clean and clear of debris.
- Start the engine.
- Place float pump in the water immediately after starting. This Float pump is self-priming due to a flooded suction. The pump will prime more quickly if the engine is run at lower speeds.
- Slowly open the engine throttle once the pump is primed and discharging water.

Recommendations

⚠CAUTION Do not allow unusual elevation of the discharge hose, this may cause the float to overturn.

When pumping salt water or dirty water, flush pump with clean water after usage.

Prepared by: RJG
Approved by: TED
Revised by: TED

Rev. A
Date: 03/04/10
Rev. Date: 30June2015
1200627.doc

Section 3

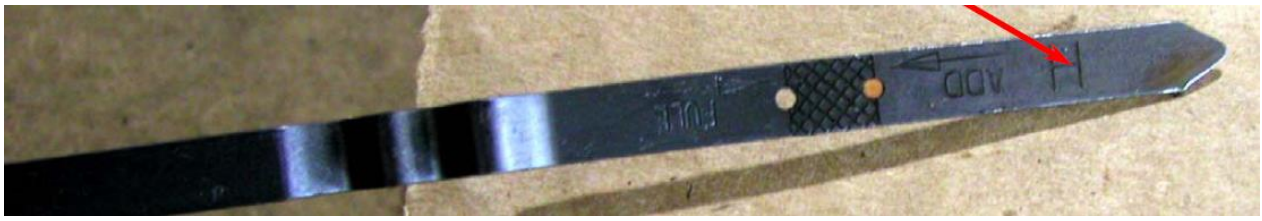
Maintenance (Assembly/Disassembly)

PUMP DISASSEMBLY

Drawing DHC1204

For pump overhaul or disassembly follow the corresponding steps

- Drain oil and gas from engine, ensuring there is no fuel in the tank or lines.
    - There may be small residual amounts of oil remaining in the engine (up to 8 ounces), which may read at the very end of the dipstick (see photo below). If the oil level is up as high as the H on the dipstick, below the ADD mark, the oil needs to be further drained prior to tipping the engine.



- Remove the (3) bolts holding the support plate (6) to the float (5).
- Remove the pump discharge pipe from the pump discharge.
- Remove the engine and pump by tilting the engine forward and lifting the assembly clear of the float. Only tilt the engine so the exhaust faces down.

⚠CAUTION Titling the engine in other directions may damage the engine. It may also cause fuel to leak out causing a hazardous spill.

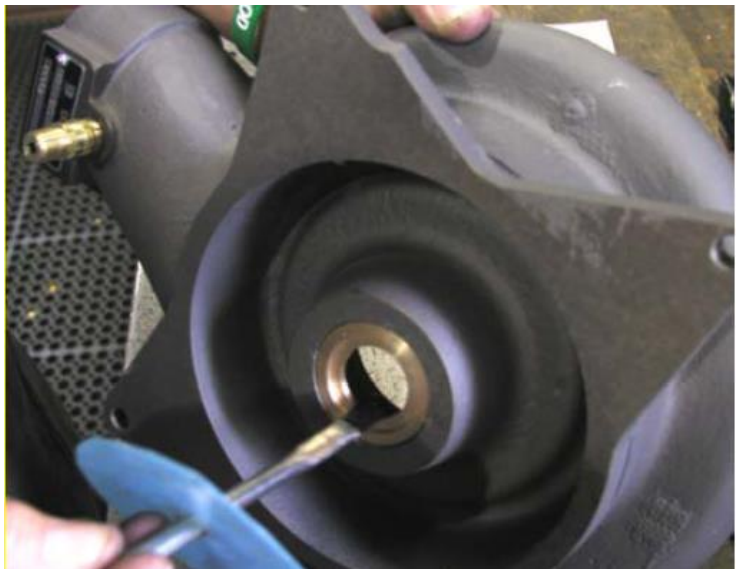
- The suction head (11) may now be removed from pump casing (8) using the tapped pusher holes if necessary.
- Remove the impeller bolt (15). Remove the engine spark plug and insert a clean rope into bore to prevent engine rotation and ease removal of the impeller bolt (15) (see photo below).

- Remove impeller (16) by threading a 9/16-12 NC x 1 3/4 pusher bolt into the tapped hole occupied by the impeller bolt. Do not force impeller, use penetrating oil on the engine shaft if the impeller will not move.
- Pump casing should be removed only if necessary to replace pump pilot bushing (20).
- Inspect and replace worn or damaged parts. If you are unsure if a part is damaged or worn contact Darley Customer Service or Engineering for assistance. If seal rings need to be replaced it is STRONGLY recommended to send the pump unit back to Darley for removal and re-placement. Personal removal and replacement of these seal rings may damage the pump casing if not done properly. If you insist on personal removal contact Darley Engineering for assistance.

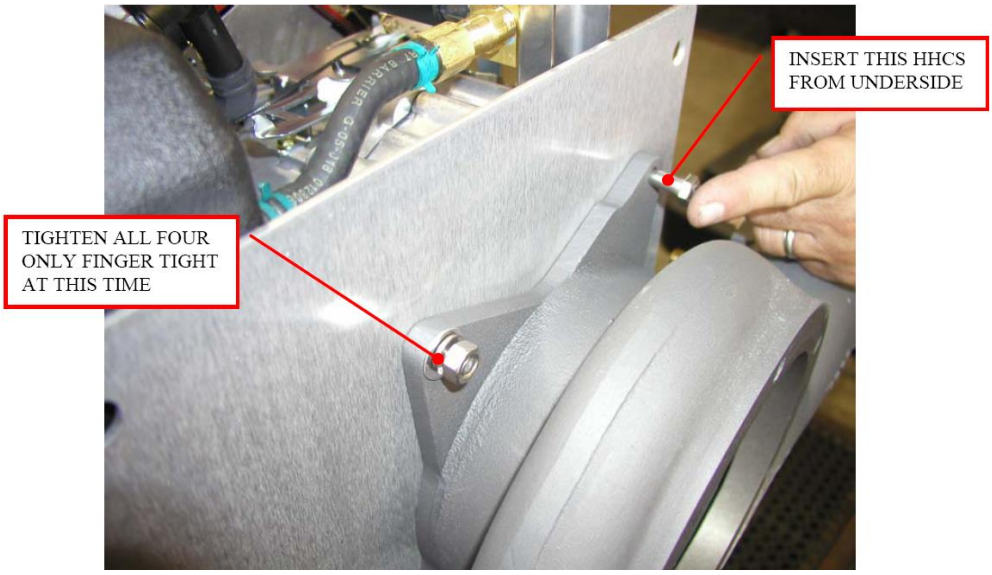
For pump re-assembly follow the corresponding steps

- Use Loctite 242/243 (Blue) thread locker or equivalent on all pump related fasteners.
- If the pump casing was removed, re-install the pump pilot bushing (see photo below). With a small punch, in a 90 degree pattern, punch the pilot bushings edges into the pump casings bore for the bushing. (see photo below).

- Lightly oil the inside diameter of the pilot bushing, and re-attach the pump casing to the engine (see photo below).



- Ensure that the engine is laying with the exhaust facing down. FINGER TIGHTEN fasteners between the pump casing and the engine evenly in an alternating opposite corner pattern to prevent cocking of the pump assembly in relation to the engine (see photo below).



- Place the drive key in the engine shaft keyway.
- Lightly oil the bore of the impeller.

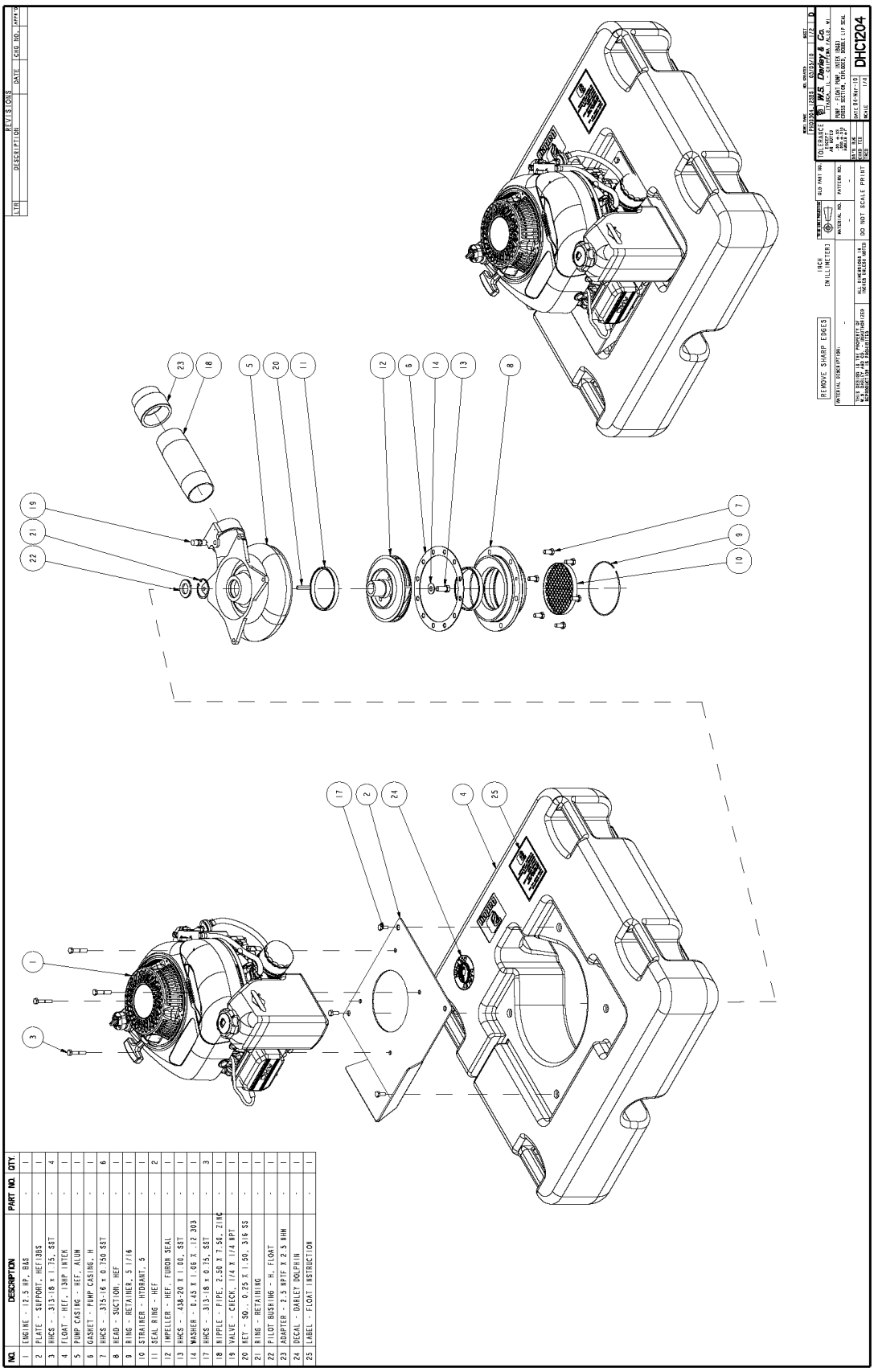
- Slide the impeller onto the shaft, being careful not to roll the lips of the mechanical seal backwards.
- Install the impeller washer and 7/16-20 x 1.00 lg. SST HHCS with a small drop of Loctite 242/243 (Blue) thread locker to hold the impeller in place. Ensure that the spark plug is removed from the engine and a clean rope is in its place. This will allow you to effectively tighten the impeller fastener without the engine shaft rotating.
- Using the rubber gasket to seal the flange (see photo below), install the suction head on the pump casing with six 3/8-16 x 0.75 lg HHCS with a small drop of Loctite 242/243 (Blue) thread locker on each.

- Remove the rope from the spark plug bore and pull the recoil rope two or three times to align the pump assembly and engine (see photo below).

- Tighten the four fasteners that hold the pump assembly to the engine evenly in an alternating opposite corner pattern to prevent cocking of the pump assembly in relation to the engine (see photo below). DO NOT OVERTIGHTEN.

- Pull the recoil rope two or three times again, to ensure that the pump assembly and engine are aligned. If the assembly is binding, or turns over hard, loosen the fasteners, and repeat the previous two steps.
- Reinstall the spark plug.
- Set the pump assembly into the float (see photo below). But do not fasten the engine to the float yet.

- Install the discharge pipe to the pump casing discharge nipple using Loctite 242/243 (Blue) thread locker.
- Using three flat washers, lock washers, and 5/16 x 0.75 lg HHCS, fasten the mounting plate to the float. DO NOT OVER TIGHTEN. DO NOT USE THREAD LOCKER.



NO.	DESCRIPTION	PART NO.	QTY.
1	ENGINE - 12.5 HP, B&S	-	1
2	PLATE - SUPPORT, HEF/30S	-	1
3	HHCS - 313-18 x 1.75, SST	-	4
4	FLOAT - HEF, 13HP INTEK	-	1
5	PUMP CASING - HEF, ALUM	-	1
6	GASKET - PUMP CASING, H	-	1
7	HHCS - 375-16 x 0.750 SST	-	6
8	HEAD - SUCTION, HEF	-	1
9	RING - RETAINER, 5 1/16	-	1
10	STRAINER - HYDRANT, 5	-	1
11	SEAL RING - HEF	-	2
12	IMPELLER - HEF, FURON SEAL	-	1
13	HHCS - .438-20 X 1.00, SST	-	1
14	WASHER - 0.45 X 1.06 X .12 303	-	1
17	HHCS - 313-18 x 0.75, SST	-	3
18	NIPPLE - PIPE, 2.50 X 7.50, ZINC	-	1
19	VALVE - CHECK, 1/4 X 1/4 NPT	-	1
20	KEY - SQ., 0.25 X 1.50, 316 SS	-	1
21	RING - RETAINING	-	1
22	PILOT BUSHING - H, FLOAT	-	1
23	ADAPTER - 2.5 NPTF X 2.5 NHM	-	1
24	DECAL - DARLEY DOLPHIN	-	1
25	LABEL - FLOAT INSTRUCTION	-	1

REVISIONS

LTR	DESCRIPTION	DATE	CHG NO.

REMOVE SHARP EDGES

INCH
[MILLIMETER]

DO NOT SCALE PRINT

W.S. Darley & Co.
SCHILLER PARK, ILLINOIS

DHC1204

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Rev. A
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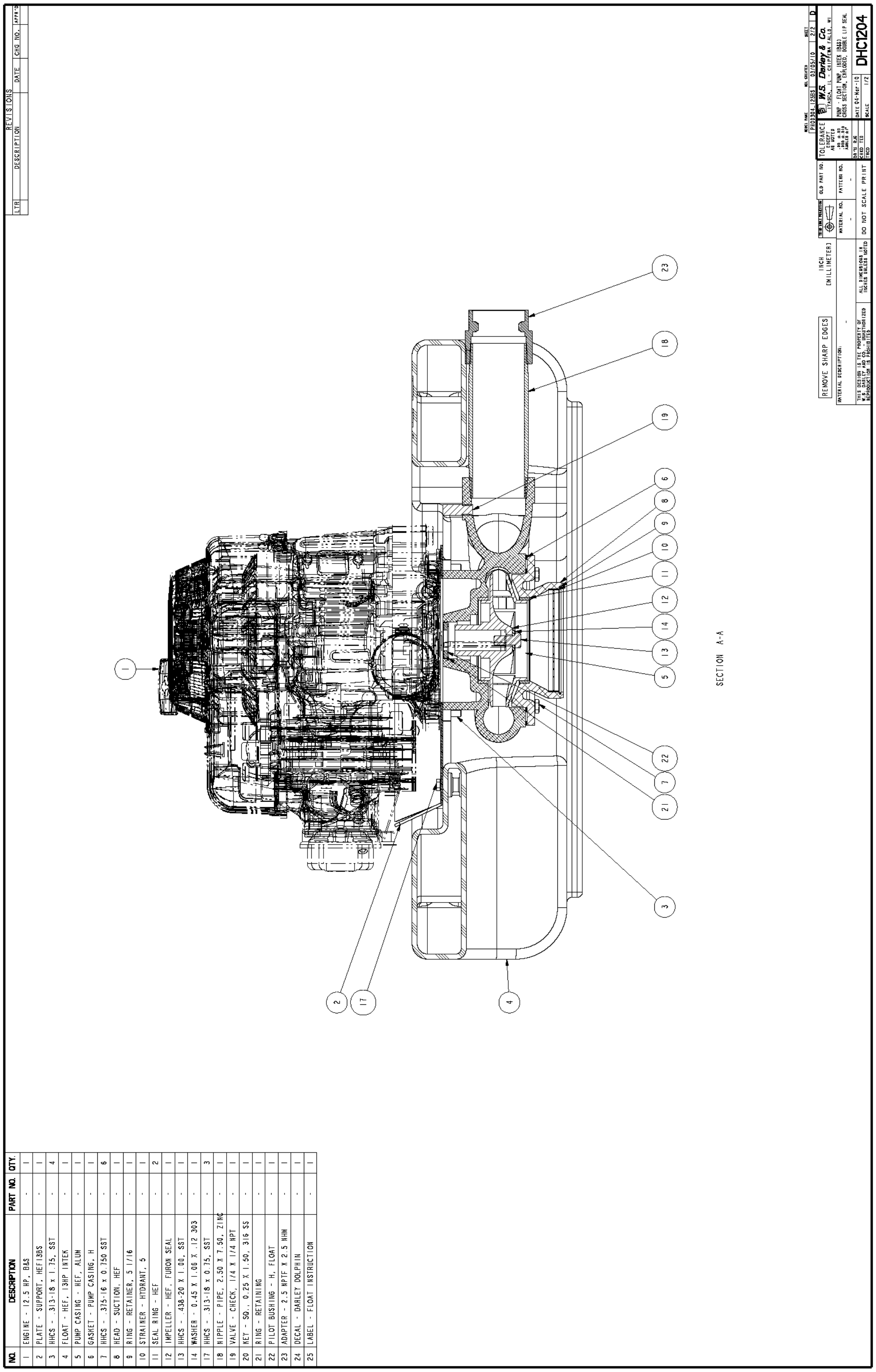

NO.	DESCRIPTION	PART NO.	QTY.
1	ENGINE - 12.5 HP, B&S	-	1
2	PLATE - SUPPORT, HEF13BS	-	1
3	HHCS - .313-18 x 1.75, SST	-	4
4	FLOAT - HEF, 13HP INTEK	-	1
5	PUMP CASING - HEF, ALUM	-	1
6	GASKET - PUMP CASING, H	-	1
7	HHCS - .375-16 x 0.750 SST	-	6
8	HEAD - SUCTION, HEF	-	1
9	RING - RETAINER, 5 1/16	-	1
10	STRAINER - HYDRANT, 5	-	1
11	SEAL RING - HEF	-	2
12	IMPELLER - HEF, FURON SEAL	-	1
13	HHCS - .438-20 X 1.00, SST	-	1
14	WASHER - 0.45 X 1.06 X .12 303	-	1
17	HHCS - .313-18 x 0.75, SST	-	3
18	NIPPLE - PIPE, 2.50 X 7.50, ZINC	-	1
19	VALVE - CHECK, 1/4 X 1/4 NPT	-	1
20	KEY - SQ., 0.25 X 1.50, 316 SS	-	1
21	RING - RETAINING	-	1
22	PILOT BUSHING - H, FLOAT	-	1
23	ADAPTER - 2.5 NPTF X 2.5 NHM	-	1
24	DECAL - DARLEY DOLPHIN	-	1
25	LABEL - FLOAT INSTRUCTION	-	1

Section 4

Components

- The float for this unit is foam filled to assist in buoyancy.
- The pump casing is hard anodized aluminum.
- The impeller is manufactured from bronze. It is ground and dynamically balanced for maximum performance.
- The suction head is anodized aluminum.
- The engine is a gasoline powered, Briggs and Stratton, vertical shaft model.
- The engine has a built in governor to limit the engine speed.
- The fuel tank is plastic.
- The fuel tank capacity is 2.8 quarts and should allow for an approximate run time of 47 minutes at full load.
- The throttle has an integrated on/off design, off is full slow.
- The engine choke is built into the throttle.

Section 5

Maintenance Schedule

IMPORTANT

Check your engine instruction manual for recommended maintenance schedule.

Darley recommends flushing the pump and minor disassembly inspections if the pump is not performing as intended.

Section 6

Troubleshooting

Pump does not make advertised performance anymore.

- The mechanical seal may be damaged and this is reducing the flow and/or pressure of the pump unit.
- The seal rings may be damaged due to pumping dirty or salt water.
- The engine needs to be checked for problems.
- There is debris lodged in the suction inlet strainer or impeller vane.
- The pump is in an insufficient depth of water.
- The pump impeller is no longer sufficiently tightening to the engine shaft.
- The engine fuel filter may be dirty or clogged.
- The fuel may be bad and needs replacing.

The engine takes a lot of effort to turn over with the recoil starter rope.

- The pump mounting fasteners have loosened some, the pump assembly shifted and now there is excessive side loading on the engine shaft by the pump pilot bushing.
- Debris may be lodged in the pump, causing rubbing on the impeller.

The engine takes excessive recoil starter rope pulls to start.

- The engine spark plug needs to be replaced.
- The air filter is dirty.
- Fuel system may need priming by actuating the fuel primer.
- The fuel line needs to be clean or the fuel primer assembly needs to be overhauled.
- Water got into the exhaust and therefore the engine block.
- Fuel filter may need replacing.

Then engine is much more smoky than before.

- Engine oil should be replaced.
- Air filter may need to be replaced because it got wet or dirty.
- See engine technician if you are still having problems.

Section 7

Definition of Terms and Operating Characteristics of Pumps

DEFINITIONS

HEAD OF WATER -- vertical depth of water measured in feet or in pressure per unit or area. In hydraulics, head always represents pressure and it is expressed interchangeably in feet of water or pounds per square inch and sometimes in inches of depth of mercury.

STATIC HEAD -- the pressure that is exerted by a stationary column of water of a given height or depth.

TOTAL HEAD OR TOTAL DYNAMIC HEAD -- the maximum height above the source of supply to which the pump would elevate the water plus all the resistance to flow in the pipe or hose line.

DISCHARGE HEAD -- the pressure measured at the discharge outlet of a pump.

SUCTION HEAD -- the positive pressure measured at the suction entrance of a pump (when pumping from an elevated tank or hydrant).

VELOCITY HEAD -- the equivalent pressure represented by fluid in motion as measured by means of a Pitot Gage.

STATIC LIFT -- the vertical height of the center of the pump above the source of supply (when pump from draft).

TOTAL SUCTION LIFT -- the static lift plus the friction in suction line plus entrance losses.

NET PUMP PRESSURE -- the total dynamic head of the pump.

EFFECTIVE NOZZLE PRESSURE -- the pump discharge pressure minus hose friction plus or minus the difference in elevation above or below pump.

WATER HORSEPOWER - the theoretical power required to deliver a given quantity of water per minute against a given head.

BRAKE HORSEPOWER -- Actual power as delivered by a motor or engine to a driven machine.

PUMP EFFICIENCY -- The quotient of the water horsepower divided by brake horsepower required to produce it.

WATER HAMMER -- a series of shock waves produced in a pipeline or pump by a sudden change in water velocity. A sudden change in flow velocity can result from rapid closure of valves. A pressure wave is set up which travels back and forth in the water column at extremely high speed producing rapid vibrations that may be violent and destructive if the water column is long.

THE MAXIMUM THEORETICAL LIFT of a pump is 34 feet, which is the pressure of the atmosphere at sea level. The maximum practical total lift at sea level is 20 to 25 feet (depending on the type and condition of the pump) and this decreases with drops in barometric pressure.

OPERATING CHARACTERISTICS OF PUMPS

CENTRIFUGAL PUMPS: A centrifugal pump develops pressure by centrifugal force of the liquid rotating in the impeller wheel. The pressure developed depends upon the peripheral speed of the impeller (increasing as the square of the speed) and it remains fairly constant over a wide range of capacities up to the maximum output of the pump, if speed remains constant.

If the discharge outlet of a centrifugal pump is entirely shut off, with speed kept constant, there is a small rise in pressure, the water churns in the pump casing and the power drops to a low value. If the discharge is opened wide, with little resistance to flow the pressure drops while the capacity and power both increase to their maximum.

A centrifugal pump is an extremely simple mechanism mechanically, but rather complex hydraulically; in that many factors enter into the design of the impeller and water ways which will affect the pump's efficiency.

DISPLACEMENT PUMPS: Rotary and piston pumps are termed "Positive Displacement" pumps because each revolution displaces or discharge (theoretically) an exact amount of liquid, regardless of the resistance. The capacity is, therefore, proportional to the number of revolutions of the pump per minute and independent of the discharge pressure except as it is reduced by "slip" (leakage past the pistons or rotors). For a given speed the power is directly proportional to the head. If the discharge is completely shut off, the pressure, power, and torque climb indefinitely until the drive power is stalled or breakage occurs.

Slip is the greatest factor affecting efficiency of a displacement pump, and this factor is greatly influenced by the condition of and wears on the working parts.

Section 8

Contacts

Corporate Darley Office

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Briggs and Stratton

Visit www.briggsandstratton.com and find a dealer near you for technical support, or contact the Darley Company and we can help or direct your call as needed.