OPERATING INSTRUCTIONS

2BEF PORPOISE FLOAT PUMP

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Itasca, Illinois 60143-2072
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WWW.DARLEY.COM

This manual is for DARLEY FIRE PUMP:

Model: **2BEF** Pump Serial Number: _____

Introduction

Included in this manual is information for the correct operation, maintenance, troubleshooting, definition of terms and contacts for the Darley 2BEF Porpoise Float Pump. 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 you 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.

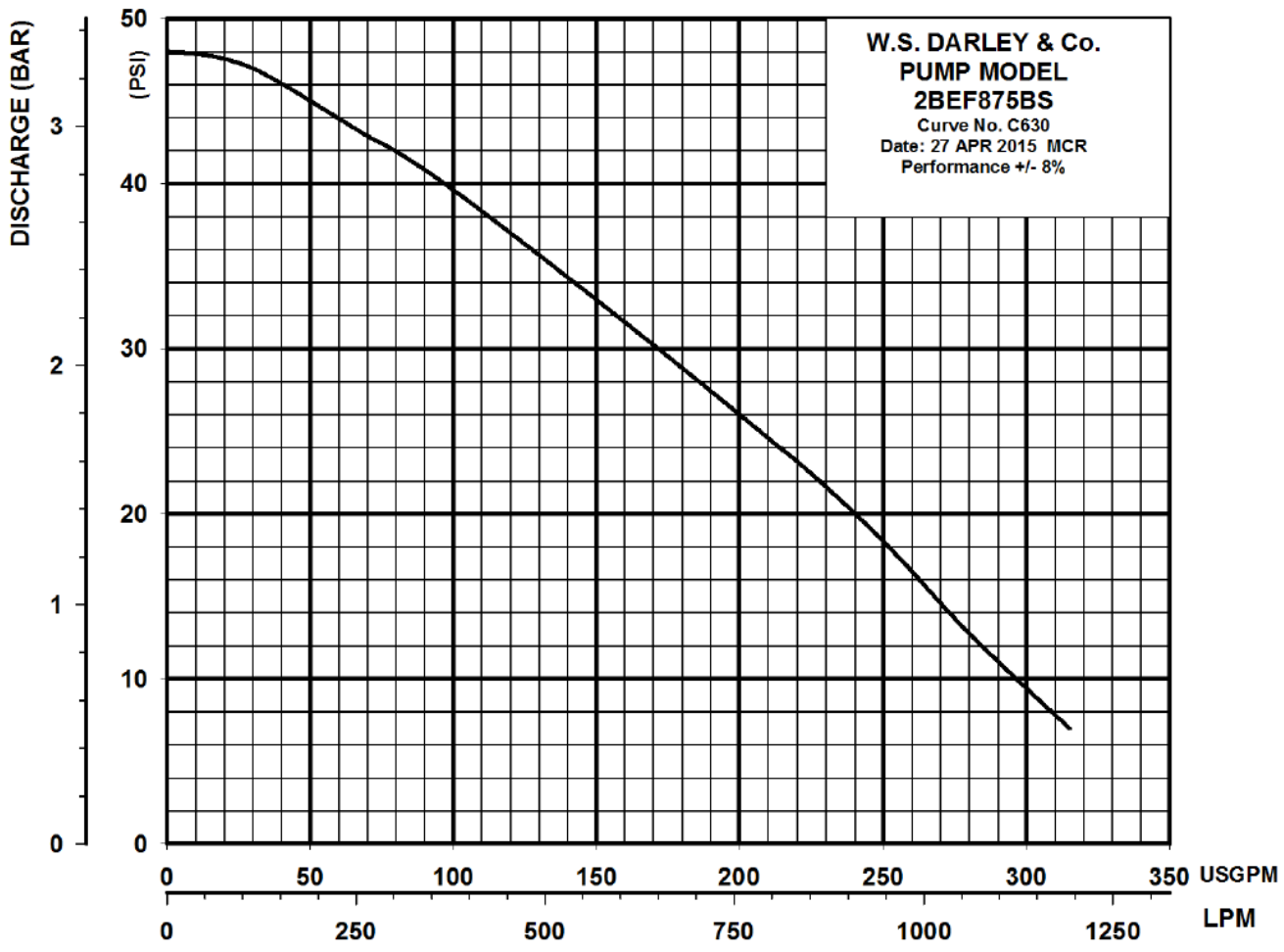
CAUTION - Signifies a potentially hazardous situation that could result in minor or moderate injury.

CAUTION - Signifies a potentially hazardous situation that could 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 "PORPOISE" 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 overheating of the engine and/or pump and bodily harm.

PREPARATIONS FOR PUMPING

- Make sure to read the engine instruction manual before use.
- Check the engine oil level before starting the engine.
- Check the fuel level before starting the engine.
- This pump is equipped with a mechanical seal. 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.
- 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 until fully primed.
- 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 dirty water, flush pump with clean water after usage.

Section 3

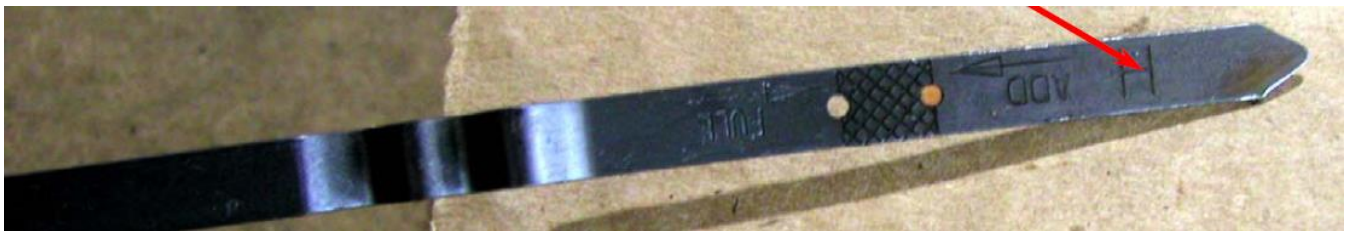
Maintenance (Assembly/Disassembly)

PUMP DISASSEMBLY

Drawing DBC1200

For pump overhaul or disassembly follow the corresponding steps

- Drain oil and gas from engine (2), ensuring there is no fuel in the tank or lines.
    - There may be small residual amounts of oil remaining in the engine (up to 2 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 for removal from the float.



- Remove the four cap screws holding the support plate (16) to the float (3).
- Remove the engine and pump by tilting the engine forward and lifting the assembly clear of the float.
- Remove the pump discharge (1) from the pump casing (17) by removing the three socket head cap screws (21).
- The pump casing (17) may now be removed from inboard head (4) by removing the eight hex headed cap screws (5). Gentle tapping with a rubber mallet may be necessary to free the pump casing from the inboard head, after all eight cap screws are removed.
- Remove the impeller bolt (8). Use a strap wrench to prevent impeller (9) rotation and ease removal of the impeller bolt (8).
- Remove impeller (9) by threading a 1/2-13 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.
- The mechanical seal (19) may be inspected and replaced if necessary when the impeller is removed. The inboard head (4) should be removed only if necessary.
- If necessary to remove the inboard head (4), remove the four 5/16 socket head cap screws (20) and sealing washers (25). Note: These washers are one time use,

and will require replacement when removed. Be cautions to avoid losing the pilot bushing (14).

- Inspect o-ring (13), and replace as necessary.
- Inspect and replace worn or damaged parts. If you are unsure if a part is damaged or worn contact Darley Customer Service for assistance.

Parts Inspection and Measurement

- Clean all parts and examine carefully for wear or deterioration. Replace any questionable parts.
- Use only stainless steel when replacing any fasteners, or washers.
- Inspect the impeller hub seal area (9) for grooves, pits, and scratches in the seal area. Replace if damaged or worn.
- Measure the impeller seal ring (9) and stationary seal ring area of the pump casing (17) for wear. Use the following table for comparison:

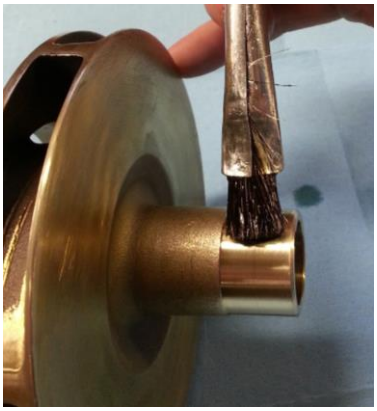
  Original impeller seal ring O.D. (9) ---------- 3.300/3.298”
  Original pump casing seal ring I.D. (17) ---------- 3.316/3.314”
  Original diametral clearance ---------- .018/.014”
  Maximum allowable diametral clearance ---------- .025”

For pump re-assembly follow the corresponding steps

Drawing DBC1200

- Use Loctite 242/243 (Blue) thread locker or equivalent on all pump related fasteners.
- Ensure that the engine is drained of all gas and oil.
- If the mounting plate (16) is not already attached to the engine, it must be installed onto the bottom of the engine using Stainless Steel – HHCS (6 & 7) and Stainless Steel Nyloc nuts (11).
- If the mechanical seal is being replaced, pre-form the lips of the seal as follows (see photo below):

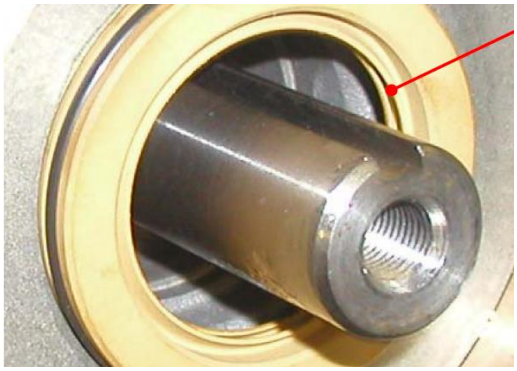
- Apply a thin coating of oil onto the impeller hub (9)



- Slide the seal (19) onto the impeller hub (9) so that the lips are facing away from the impeller (this is reversed from normal operating direction)
- The seal (19) must be on the impeller hub (9) in this orientation for a minimum of 2 minutes, allowing the lips to take shape. Only remove the seal from the sleeve when ready to be installed into the pump casing.

- In the woodruff keyway closest to the engine, install the #505 stainless steel woodruff drive key (10) into the engine shaft.
- If the inboard head (4) was removed, re-install the pump pilot bushing (14) and attach the head to the engine using the four new sealing washers (25) and socket head cap screws (20) torqued evenly to 100 in-lbs using an alternating opposite corner pattern. DO NOT OVER TIGHTEN.
- Lightly oil the mechanical seal bore inside of the inboard head (4).
- Apply a light coat of light weight grease or Never Seize to the engine shaft.

- Remove the shaft seal (19) from the impeller hub (9), and using a pusher tool (PVC tubing of a close diameter in relation to the seal, or a ¾" PVC coupling), push the mechanical seal into its pocket in the inboard head (4), with the LIPS CURLING AWAY from the engine (see photo below).



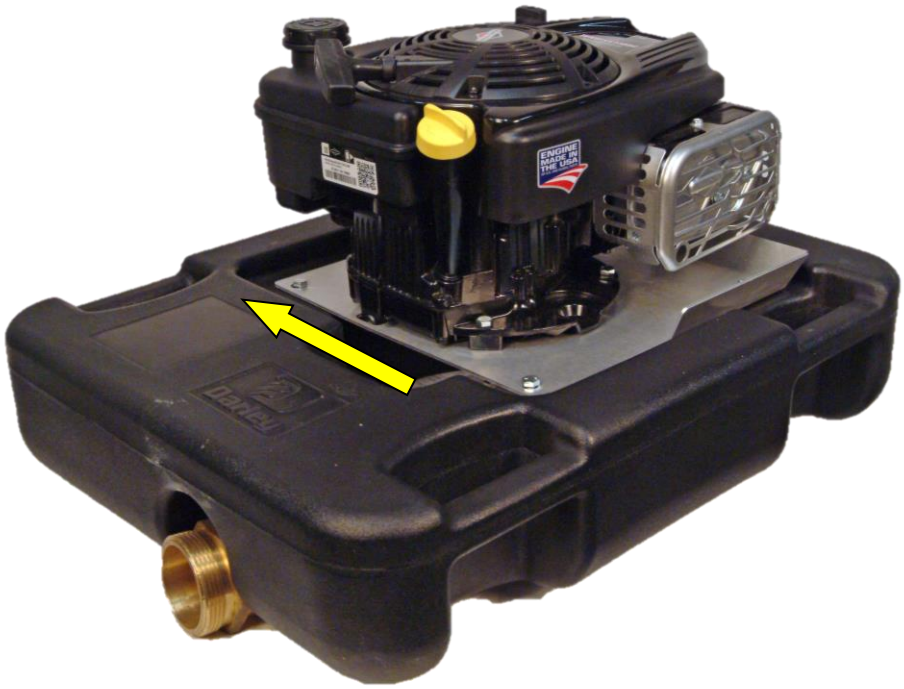
- Slide the impeller (9) onto the shaft, being careful not to roll the lips of the mechanical seal (19) backwards.

CAUTION If care is not exercised when installing the mechanical seal and it is damaged, the pump will not perform to full efficiency, and water may be forced into the engine.

⚠WARNING Ensure that the spark plug wire is removed from the engine spark plug. This will prevent the engine from starting if the engine shaft rotates.

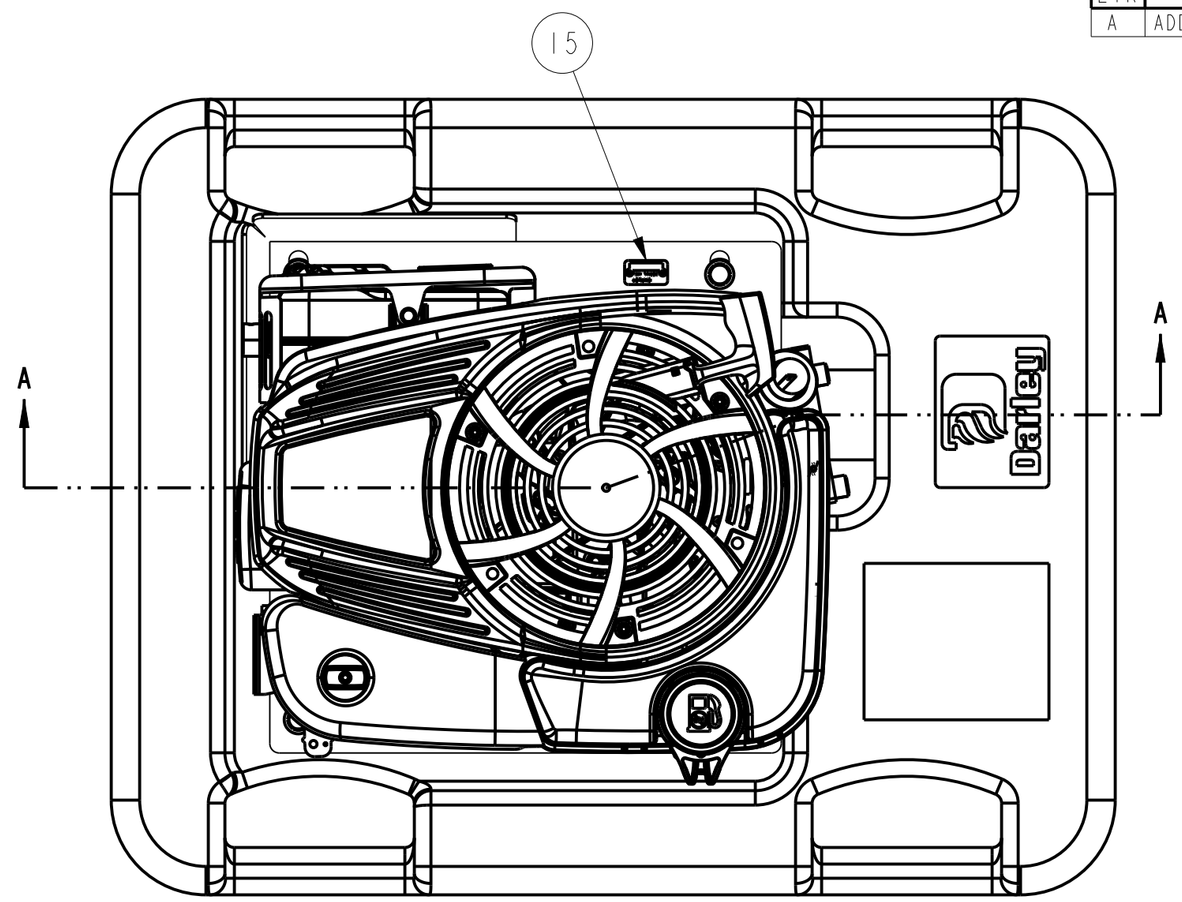
- Install the stainless steel impeller washer (24) and 3/8-24 x 1.00 lg. stainless steel HHCS (8) with a small drop of Loctite 242/243 (Blue) thread locker to hold the impeller (9) in place. Ensure that the spark plug wire is removed from the engine spark plug. This will prevent the engine from starting if the engine shaft rotates.
- Using the o-ring (13) with a very thin film of silicone based grease to seal the flange, install the pump casing (17) onto the inboard head (4) with six 3/8-16 x 0.75 lg HHCS (5) with a small drop of Loctite 242/243 (Blue) thread locker on each. The discharge flange of the pump casing will be located below the engine oil dipstick.
- Pull the recoil rope two or three times, to ensure that the pump assembly and engine are aligned.
- Reinstall the spark plug wire.

- Using o-ring (12) with a very thin film of silicone based grease to seal the flange, install the discharge (1) to the discharge flange of the pump casing (17) with three 3/8-16 x 1.25 lg. SHCS (21) with a small drop of Loctite 242/243 (Blue) thread locker.
- Install the suction strainer (22) into the suction of the pump casing (17). Retainer ring (18) is used to hold the strainer in place. The retainer ring may need to be slightly expanded to achieve a tight fit in the groove in the pump casing.
- Set the pump assembly into the float (3). Using the slots in the mounting plate (16), slide the pump assembly as far towards the fuel tank side as possible before tightening the four fasteners (see photo below). Final balance can be checked by placing the pump assembly into water and adjusting the pump from side to side on the float. Using four 5/16 flat washers (23), lock washers, and 5/16 x 0.75 lg HHCS (5), fasten the mounting plate (16) to the float. DO NOT OVER TIGHTEN. DO NOT USE THREAD LOCKER.

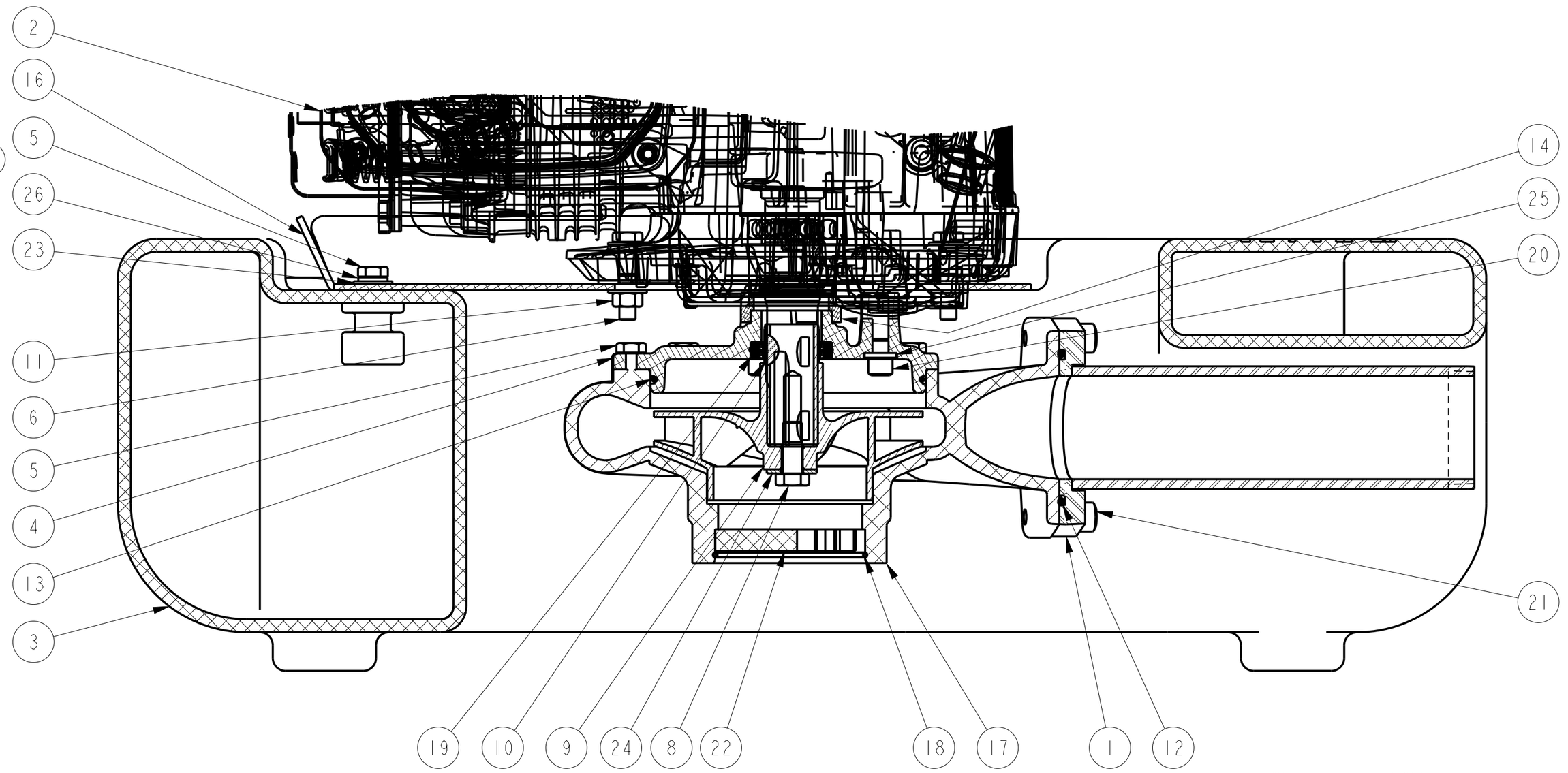


NO.	DESCRIPTION	PART NO.	QTY.
1	BODY - DISCH, LIGHT FLOAT	2056002	1
2	ENGINE - B&S 875, VERTICAL	4229400	1
3	FLOAT - 2BEF	4436600	1
4	HEAD - INBOARD	2810002	1
5	HHCS - .313-18 x 0.75, SST	5400641	12
6	HHCS - .313-18 x 1.50, SST	5400613	2
7	HHCS - .313-18 x 2.50, SST	5400688	1
8	HHCS - .375-24 x 1.00, SST	5400620	1
9	IMPELLER - 2BEF	2907721	1
10	KEY - WOODRUFF, 505, SST	3602203	1
11	NUT - HEX, .313-18, NYLOC, SST	5403400	3
12	O-RING - 2.75 x 3.00 x 0.12	3601206	1
13	O-RING - 5.25 x 5.44 x 0.09	3601117	1
14	PILOT BUSHING - 2BEF, FLOAT	2002002	1
15	PLATE - SERIAL #, A-PUMP	1963105	1
16	PLATE - SUPPORT, 2BEF	4012507	1
17	PUMP CASING - 2BEF	2055902	1
18	RING - RETAINER, 2 13/16	3600423	1
19	SEAL - FURON MECHANICAL, 1.12	1843400	1
20	SHCS - .313-24 x 1.25, SST	5401420	4
21	SHCS - .375-16 x 1.00, SST	5401410	3
22	STRAINER - HYDRANT, 3.00	1121389	1
23	WASHER - FLAT, 0.31 ID, SST	3603812	10
24	WASHER - FLAT, 3/8, SST	3603809	1
25	WASHER - SS/RUBBER SEAL	3603915	4
26	WASHER - LOCK, 0.313 ID, SST	3603530	4

REVISIONS				
LTR	DESCRIPTION	DATE	CHG NO.	APPR'D
A	ADDED FOUR LOCK WASHERS (26)	16JUL2015	11063	TED



SCALE 1/4



SECTION A-A

REMOVE SHARP EDGES

INCH [MILLIMETER]

THIRD ANGLE PROJECTION

OLD PART NO.

MATERIAL DESCRIPTION: SEE TABLE

MATERIAL NO. -

PATTERN NO. -

TOLERANCE EXCEPT AS NOTED .00 ±.03 .000 ±.010 ANGLES ±1°

DR'N MWE

CHKD TED

TRCD

ALL DIMENSIONS IN INCHES UNLESS NOTED

DO NOT SCALE PRINT

W.S. Darley & Co.
ITASCA, IL - CHIPPEWA FALLS, WI

DWG - 2BE-FLOAT
-

DATE 14MAY2015

SCALE 1/2

DBC1200

MODEL NAME	MDL CREATED	SHEET	
DBD1300	21NOV2014	1/2	C

NO.	DESCRIPTION	PART NO.	QTY.
1	BODY - DISCH, LIGHT FLOAT	2056002	1
2	ENGINE - B&S 875, VERTICAL	4229400	1
3	FLOAT - 2BEF	4436600	1
4	HEAD - INBOARD	2810002	1
5	HHCS - .313-18 x 0.75, SST	5400641	12
6	HHCS - .313-18 x 1.50, SST	5400613	2
7	HHCS - .313-18 x 2.50, SST	5400688	1
8	HHCS - .375-24 x 1.00, SST	5400620	1
9	IMPELLER - 2BEF	2907721	1
10	KEY - WOODRUFF, 505, SST	3602203	1
11	NUT - HEX, .313-18, NYLOC, SST	5403400	3
12	O-RING - 2.75 x 3.00 x 0.12	3601206	1
13	O-RING - 5.25 x 5.44 x 0.09	3601117	1
14	PILOT BUSHING - 2BEF, FLOAT	2002002	1
15	PLATE - SERIAL #, A-PUMP	1963105	1
16	PLATE - SUPPORT, 2BEF	4012507	1
17	PUMP CASING - 2BEF	2055902	1
18	RING - RETAINER, 2 13/16	3600423	1
19	SEAL - FURON MECHANICAL, 1.12	1843400	1
20	SHCS - .313-24 x 1.25, SST	5401420	4
21	SHCS - .375-16 x 1.00, SST	5401410	3
22	STRAINER - HYDRANT, 3.00	1121389	1
23	WASHER - FLAT, 0.31 ID, SST	3603812	10
24	WASHER - FLAT, 3/8, SST	3603809	1
25	WASHER - SS/RUBBER SEAL	3603915	4
26	WASHER - LOCK, 0.313 ID, SST	3603530	4

REVISIONS				
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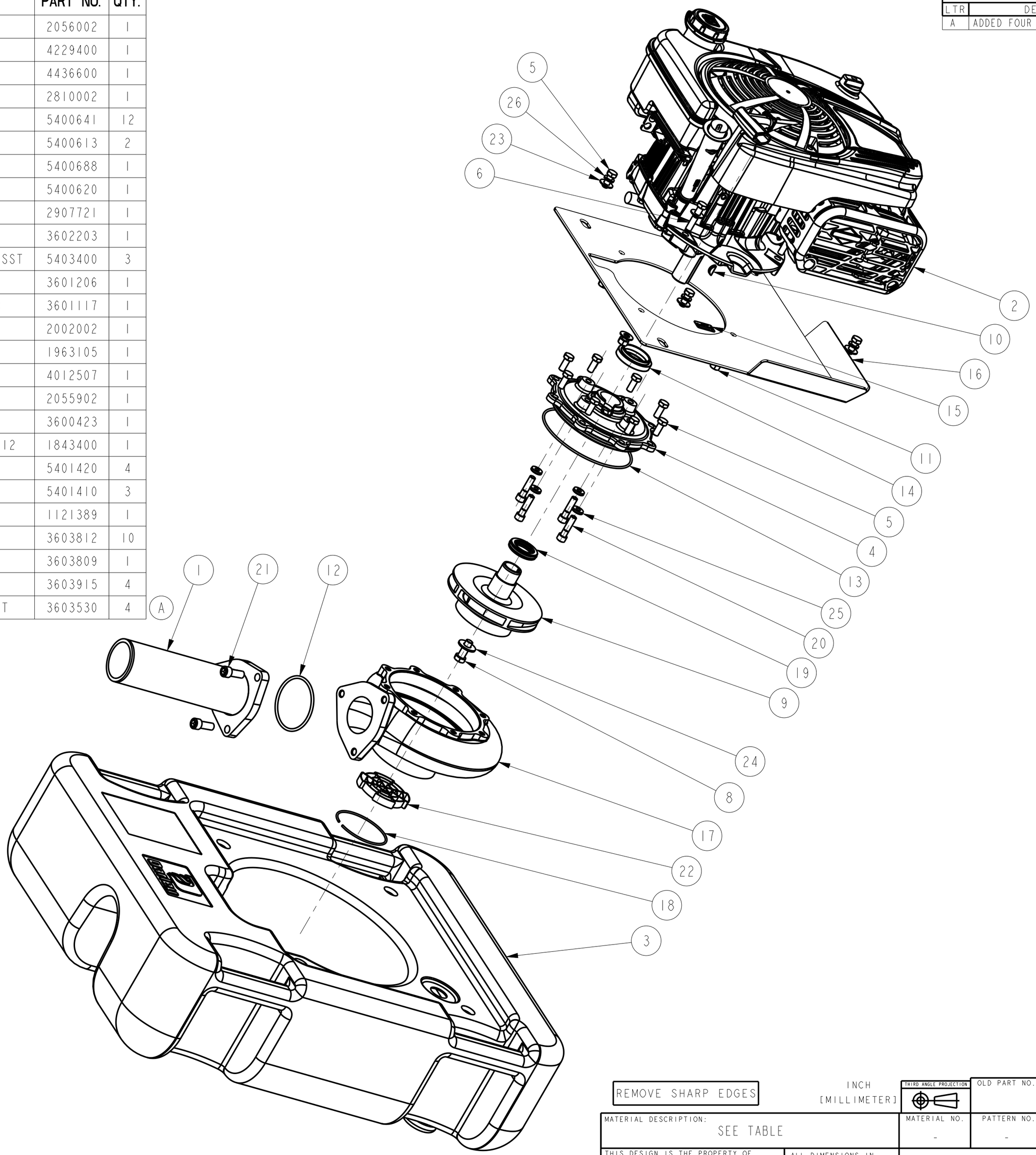
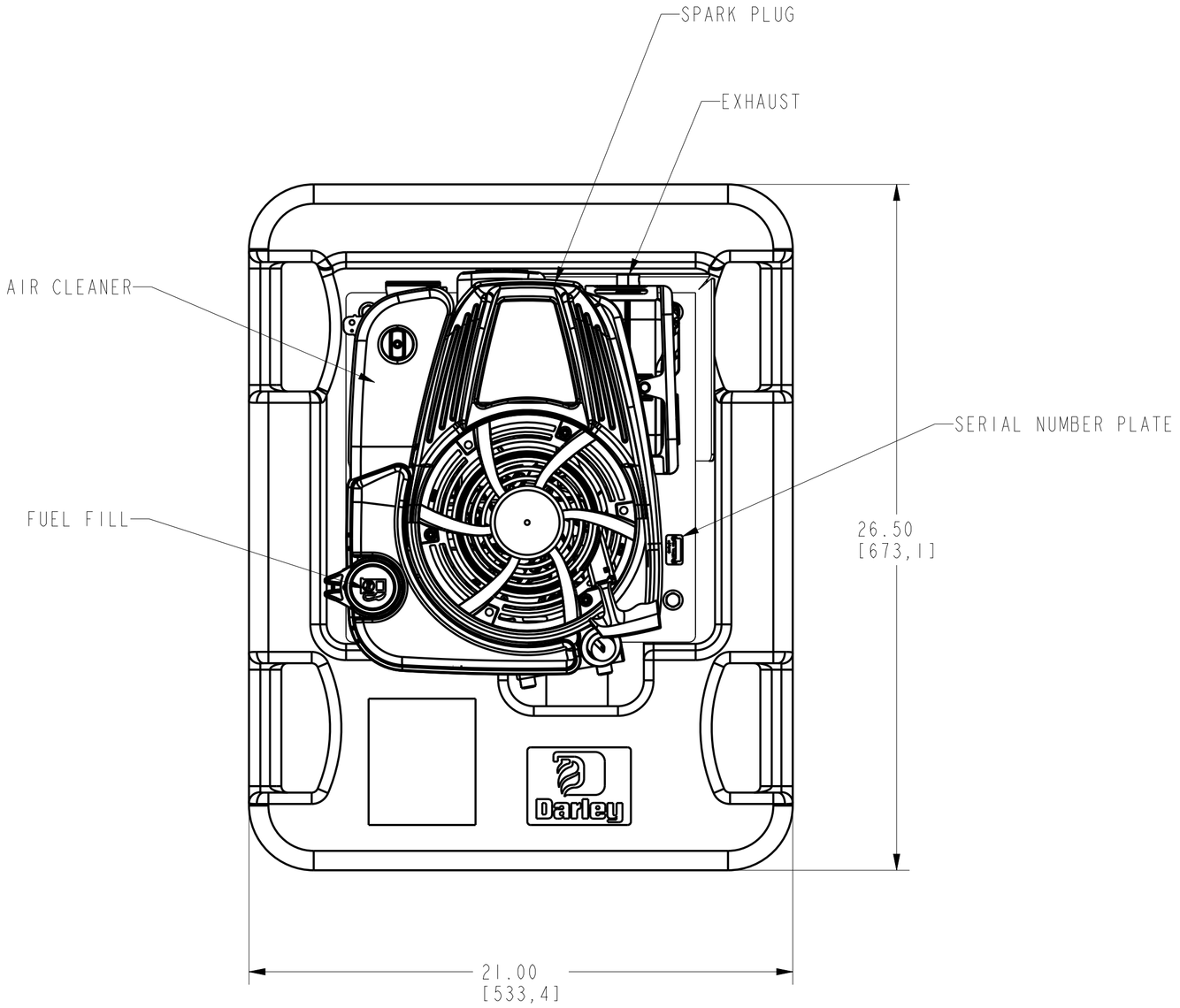
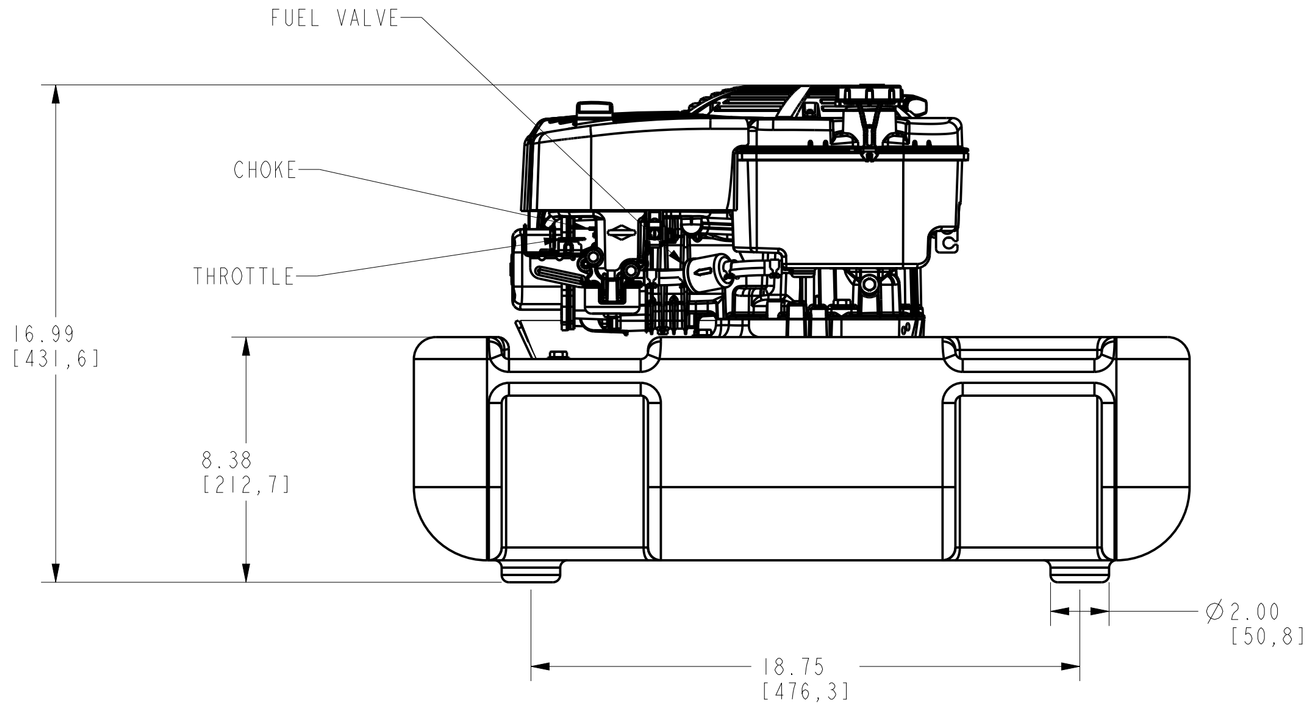
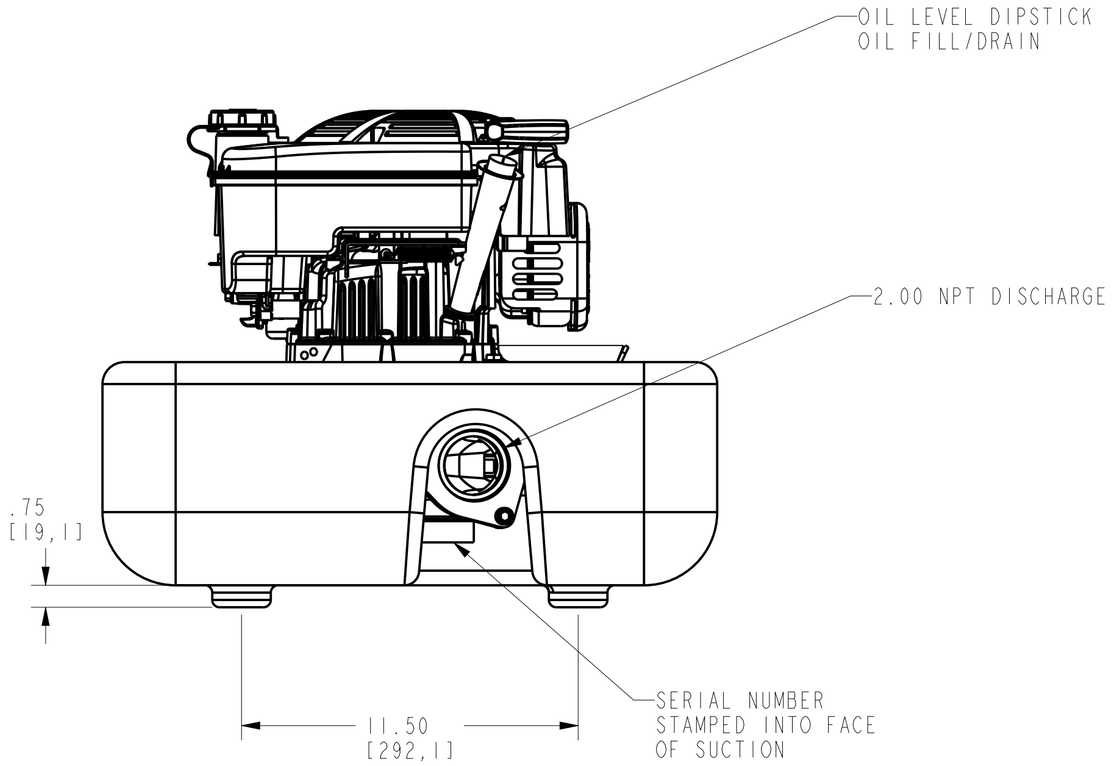


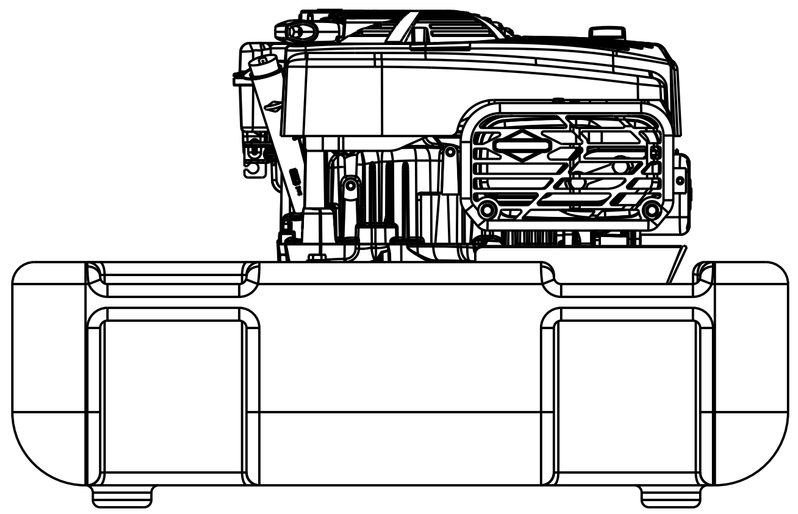
MODEL NAME: DBD1300	MDL CREATED: 21NOV2014	SHEET: 2/2	C		
REMOVE SHARP EDGES	INCH [MILLIMETER]	THIRD ANGLE PROJECTION	OLD PART NO.	TOLERANCE EXCEPT AS NOTED .00 ±.03 .000 ±.010 ANGLES ±1°	W.S. Darley & Co. ITASCA, IL - CHIPPEWA FALLS, WI
MATERIAL DESCRIPTION: SEE TABLE		MATERIAL NO. -	PATTERN NO. -		DWG - 2BE-FLOAT -
THIS DESIGN IS THE PROPERTY OF W.S. DARLEY AND CO. - UNAUTHORIZED REPRODUCTION IS PROHIBITED	ALL DIMENSIONS IN INCHES UNLESS NOTED	DO NOT SCALE PRINT		DR'N MWE CHKD TED TRCD	DATE 18MAY2015 SCALE 1/4 DBC1200

REVISIONS				
LTR	DESCRIPTION	DATE	CHG NO.	APPR'D









WEIGHT: 61 LBS [27.7 KG]

REMOVE SHARP EDGES	INCH [MILLIMETER]	THIRD ANGLE PROJECTION	OLD PART NO.	TOLERANCE EXCEPT AS NOTED .00 ±.03 .000 ±.010 ANGLES ±1°	MODEL NAME DBD1300	MDL CREATED 21NOV2014	SHEET 1/1 D
MATERIAL DESCRIPTION: -		MATERIAL NO. -	PATTERN NO. -	DR'N TED	W.S. Darley & Co. ITASCA, IL - CHIPPEWA FALLS, WI		
THIS DESIGN IS THE PROPERTY OF W.S. DARLEY AND CO. - UNAUTHORIZED REPRODUCTION IS PROHIBITED	ALL DIMENSIONS IN INCHES UNLESS NOTED	DO NOT SCALE PRINT		CHKD AAN	DWG - 2BE-FLOAT -		
				TRCD	DATE 07-Apr-15	SCALE 1/4	DBD1300

Section 4

Components

- The float for this unit is foam filled to assist in buoyancy.
- The pump casing is aluminum for light weight portability.
- The impeller is manufactured from bronze. It is ground and balanced for maximum performance.
- The suction head is aluminum for light weight portability.
- The engine is a gasoline powered, Briggs and Stratton, vertical shaft model that is made in USA.
- The engine has a built in governor to limit the engine speed.
- The fuel tank is plastic, with a capacity is 1.2 quarts. This should allow for a run time of approximately 45 minutes at full load.
- The fuel system is equipped with a manual shutoff valve to prevent flooding during transporting.
- The throttle has an integrated on/off design. Off is full slow.
- The engine choke is independent from the throttle for easy starting.

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

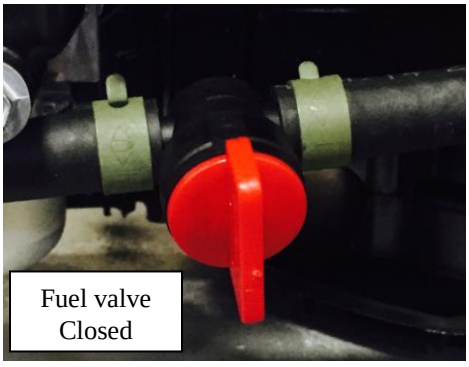
Troubleshooting

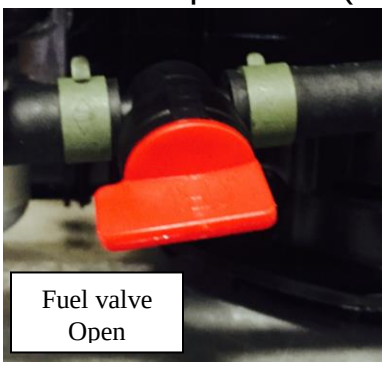
Pump does not make advertised performance anymore.

- 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.
- There is debris lodged in the suction inlet strainer or impeller vanes.
- The pump is in an insufficient depth of water.
- The pump impeller is no longer sufficiently tightening to the engine shaft.
- The engine needs to be checked for problems.
- The engine fuel filter may be dirty or clogged.
- The fuel may be bad and needs replacing.

Engine will not start or perform normally:

- Gum deposits may have obstructed passages in the carburetor. Stale fuel causes gum deposits in the fuel system and carburetor parts. Always use a fuel stabilizer to protect your system. Refer to engine operators manual
- Verify that there is no water within the fuel system
- Verify the fuel shut off valve is turned to the "On" position. (see photos)


Fuel valve Closed


Fuel valve Open

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.
- 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.
- The fuel line needs to be cleaned.
- Water got into the exhaust and therefore the engine block.

- Fuel filter may need replacing.

The engine smokes excessively.

- Choke may be in the “Choke” position
- Engine oil should be replaced.
- Excessive tipping of the engine may have gotten oil into the cylinder.
- Spark plug may need replacing.
- 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

Equipment/Catalog Division

325 Spring Lake Drive
Itasca, Illinois 60143-2072
Phone: 800-323-0244
Fax: (708) 345-8993

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Chippewa Falls, WI 54729
Phone: 800-527-0068
Fax: (715) 726-2648

Pump Manufacturing

1051 Palmer St.
Chippewa Falls, WI 54729
Phone: 800-634-7812
Fax: (715) 726-2656

Briggs and Stratton

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