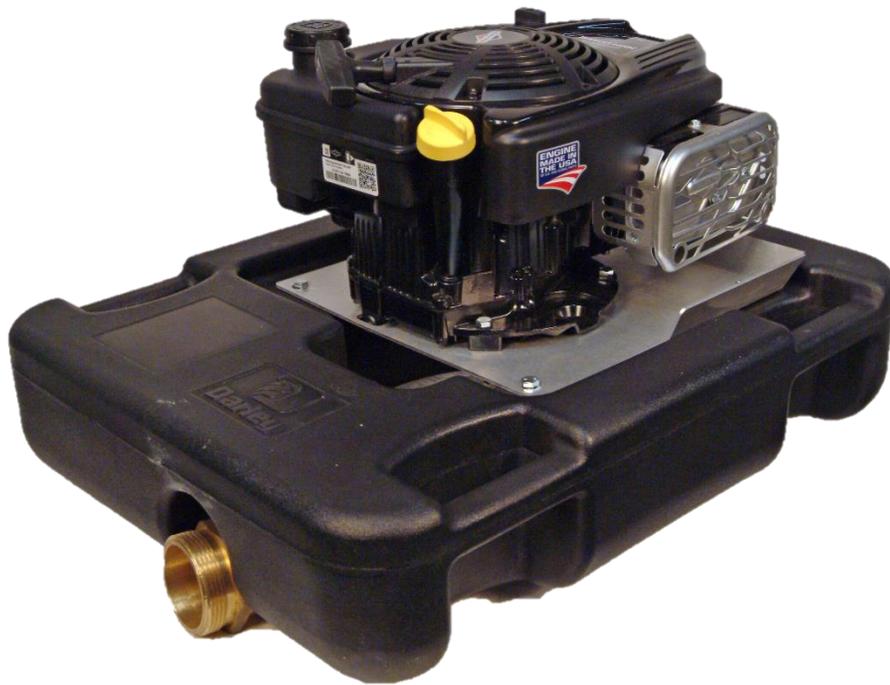




OPERATING INSTRUCTIONS 2BEF-EX PORPOISE FLOAT PUMP



Corporate Office:

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

Pump Manufacturing:

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

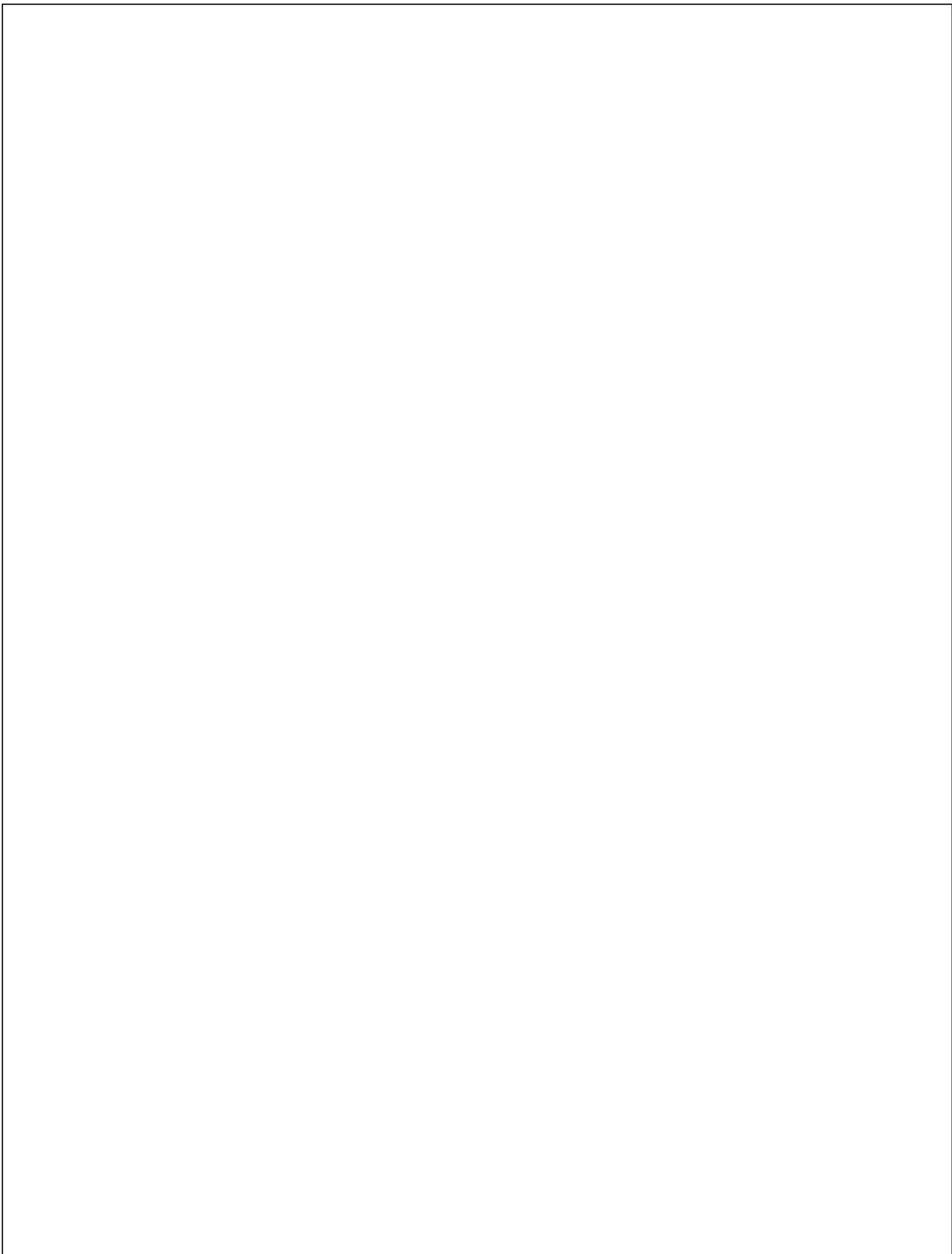
Apparatus Division:

920 Kurth Rd.
Chippewa Falls, WI 54729
800-527-0068, Fax 726-2648

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.

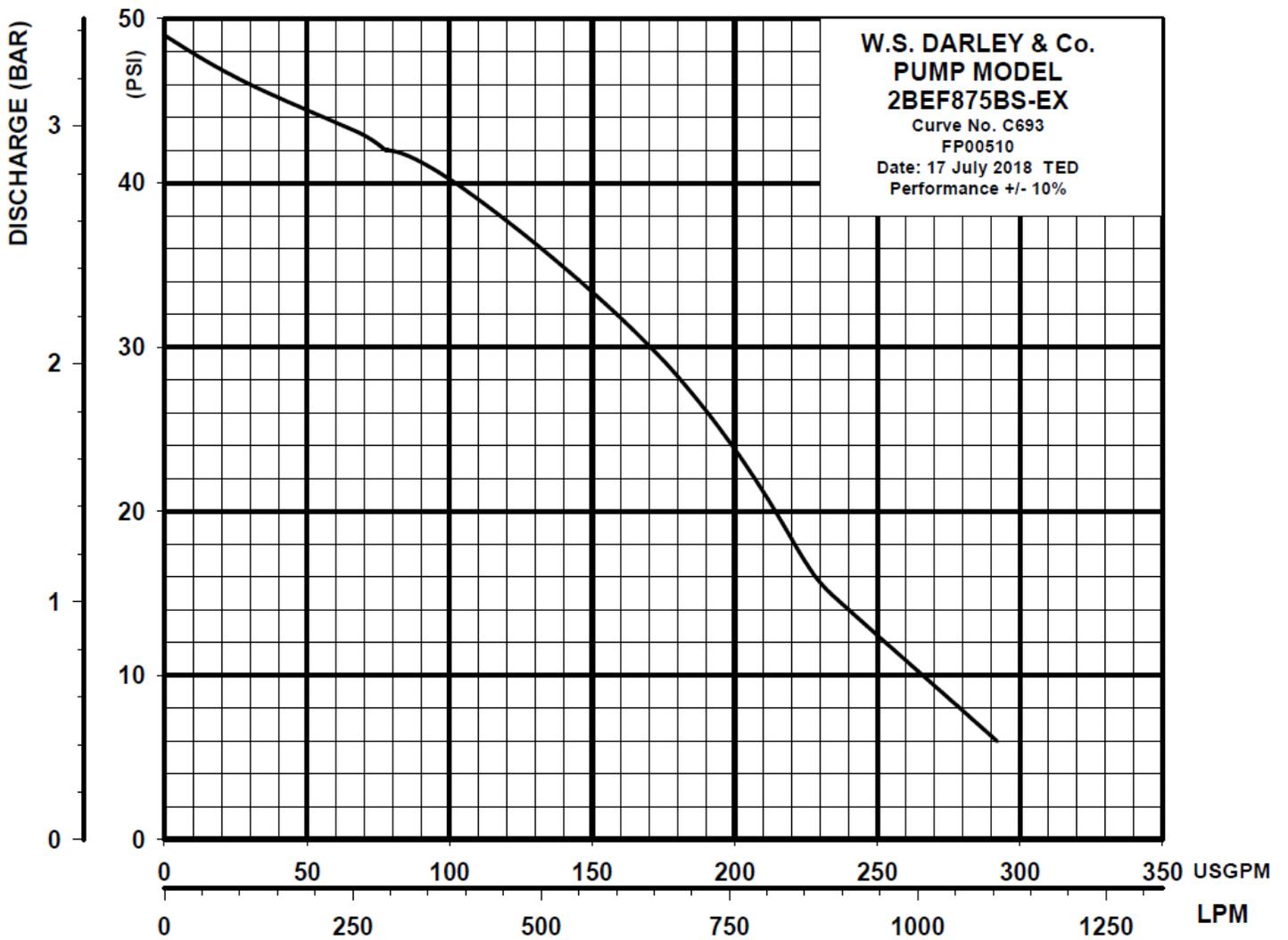
⚠ CAUTION - Signifies a potentially hazardous situation that could result in minor or moderate injury.

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



Prepared by: TED
Approved by: CLH
Revised by:

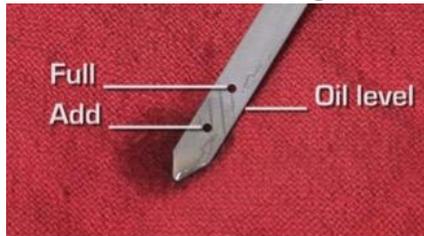
Rev. 0
Date: 03/19/15
Rev. Date:
1200690

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.
 - Use clean fresh fuel with a minimum of 87 octane and not more than 10% ethanol. See the engine owner’s manual and www.briggsandstratton.com for more information.
- 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.
- Open the fuel valve.
- Advance the throttle off the stop position by pulling the throttle lever out.
- Close the choke as necessary by pushing the choke lever to the right. A warm engine normally does not require the use of the choke.
- Start the engine by pulling briskly on the recoil rope. More than one pull may be required to start the engine.
- Move the throttle to idle by pushing it in and open the choke by pushing the choke lever left.

- Place float pump in the water immediately after starting. This float pump is self-priming due to flooded suction. The pump will prime more quickly if engine is run at lower speeds until fully primed.
- Slowly open the engine throttle once the pump is primed and discharging water.

Recommendations



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)

Prepared by: TED
Approved by: CLH
Revised by:

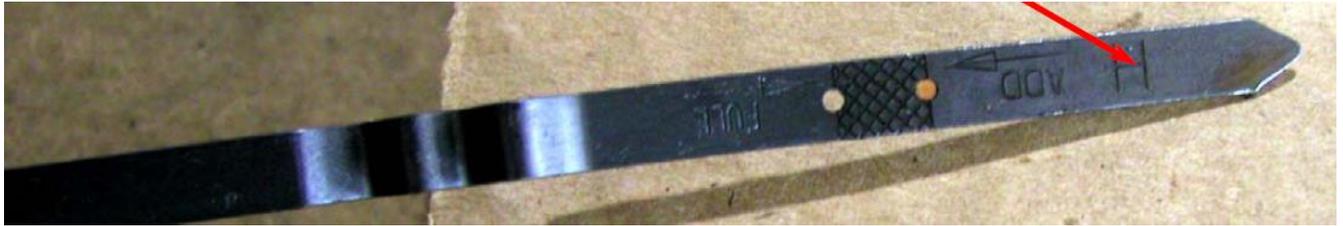
Rev. 0
Date: 03/19/15
Rev. Date:
1200690

PUMP DISASSEMBLY

Drawing DBC1201

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.



- Disconnect and remove the spark plug
- 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 the 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 long 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 cautious 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"

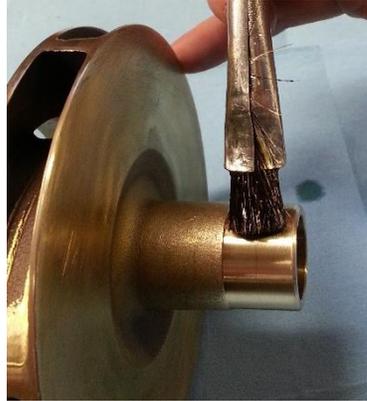
Maximum allowable diametral clearance ----- .025"

For pump re-assembly follow the corresponding steps

Drawing DBC1201

- 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, and spark plug is disconnected and removed.
- 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), flat washers (23) on each end, 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 ¼" 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

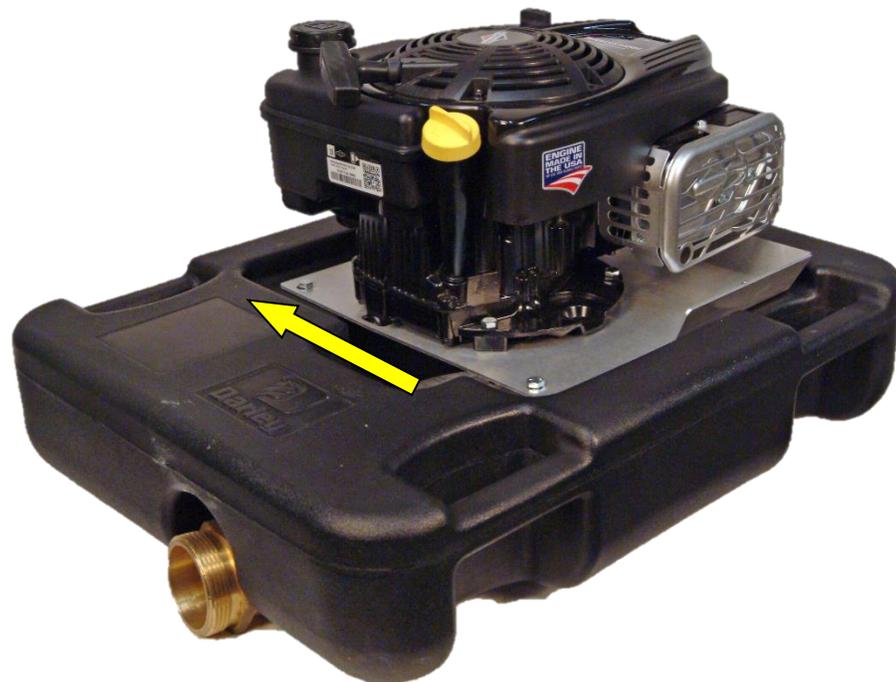
If care is not exercised when installing the mechanical seal and it is damaged, the pump will not perform to full efficiency, and water may be forced into the engine.

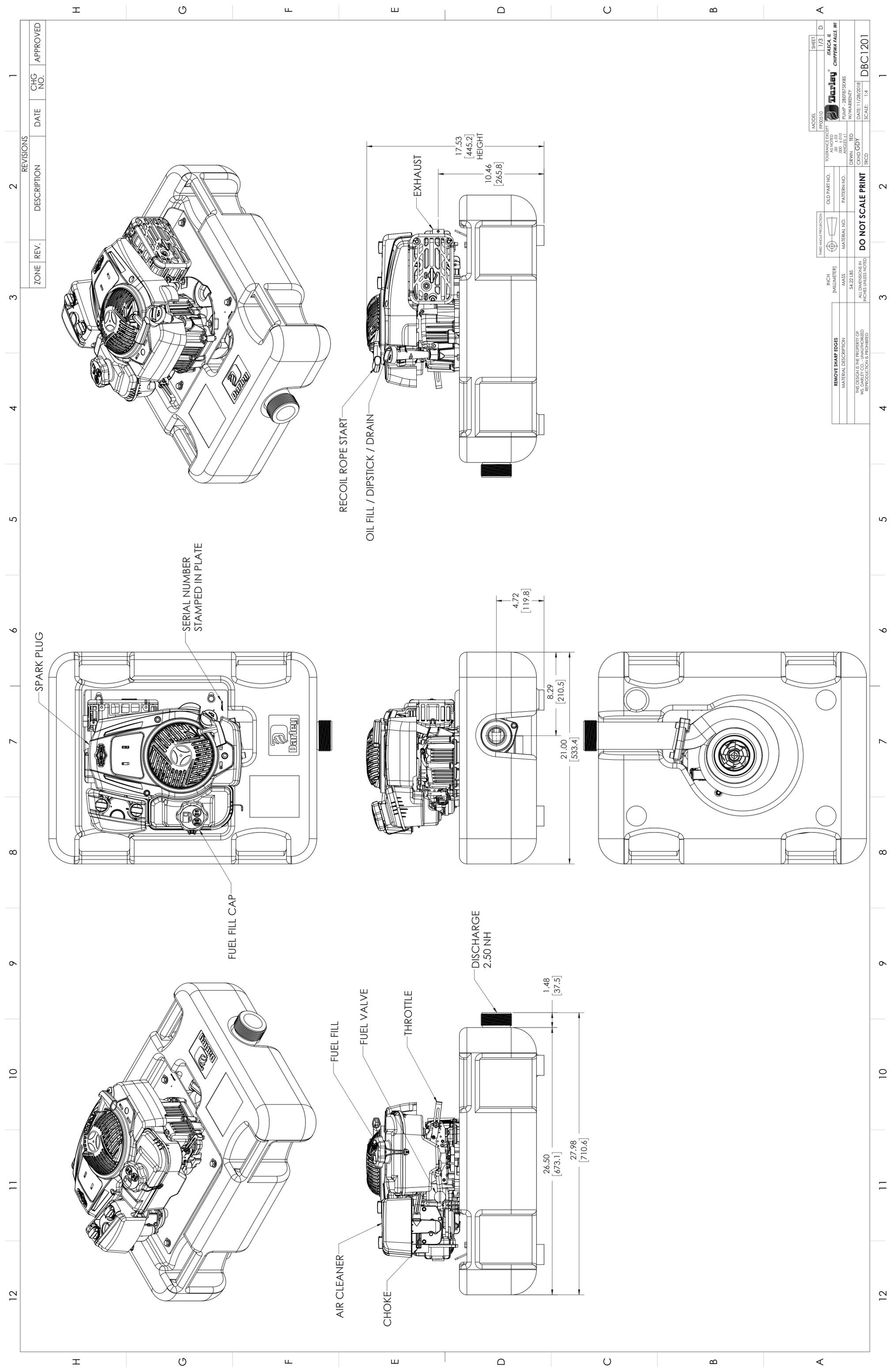
WARNING

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) coated with a very thin film of silicone 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.
 - Use Briggs and Stratton service part number 692051 or Champion spark plug RC12YC with a gap of .020" [0.51 mm].

- Put a 3/16" bead of silicone grease, such as Molykote/Dow Corning 111, between the spark plug boot and the end of the porcelain of the spark plug to keep water from getting in and grounding the spark plug.
- Re-connect the spark plug wire to the spark plug.
- Using o-ring (12) coated with a very thin film of silicone 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.**





| ZONE | REV. | DESCRIPTION | DATE | CHG NO. | APPROVED |
|------|------|-------------|------|---------|----------|
| 1 | | | | | |

| REVISIONS | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|-----------|---|---|---|---|---|---|---|---|---|----|----|----|
| | | | | | | | | | | | | |

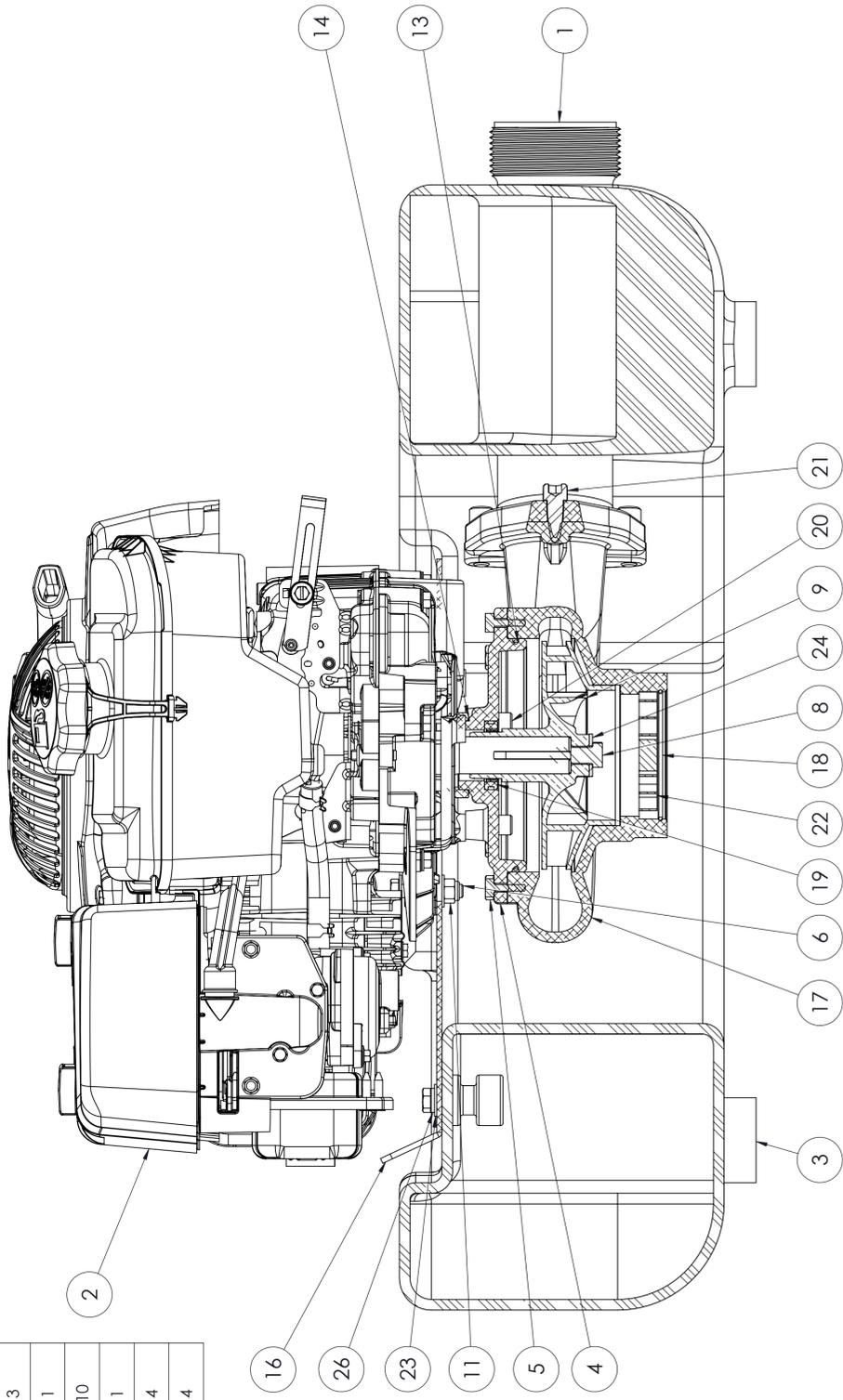
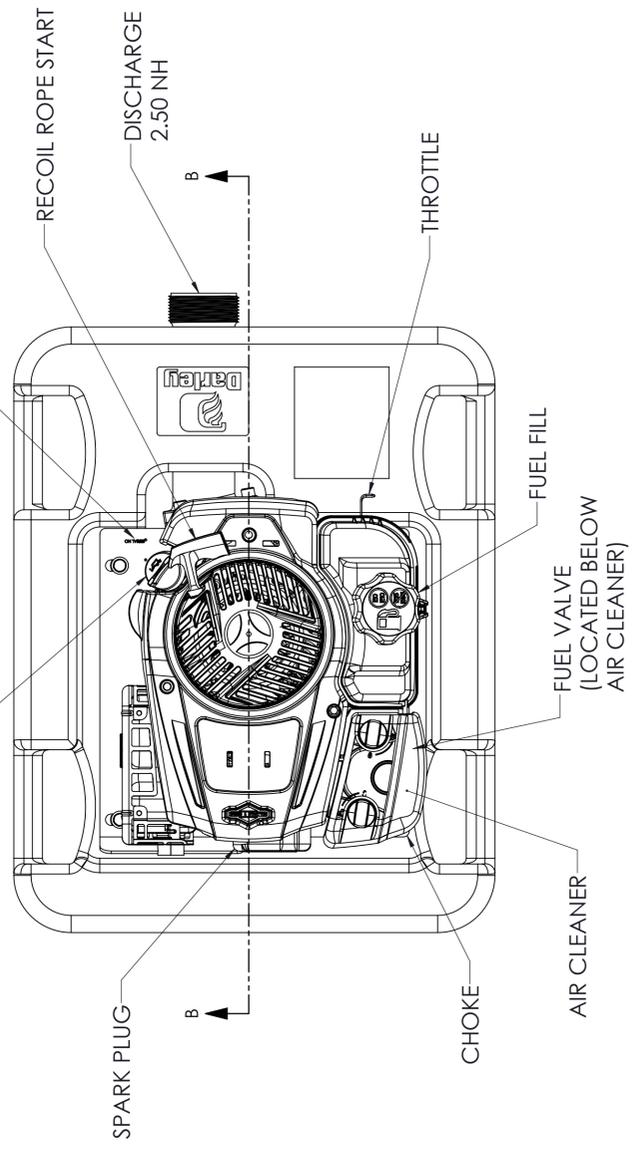
| MODEL | SHEET | DESCRIPTION | DATE | SCALE |
|--------|-------|---------------------------------------|------------|-------|
| FP0510 | 1/3 | TOURNAISE EXCEPT AS NOTED | 11/28/2018 | 1:4 |
| | | OLD PART NO. | | |
| | | PATTERN NO. | | |
| | | MATERIAL NO. | | |
| | | MASS | 54.22 LBS | |
| | | ALL DIMENSIONS IN INCHES UNLESS NOTED | | |
| | | DRWN | TED | |
| | | CKHD | GJY | |
| | | TRCD | | |

| THIRD ANGLE PROJECTION | INCH [MILLIMETER] | REMOVE SHARP EDGES |
|------------------------|-------------------|-------------------------------|
| | | MATERIAL DESCRIPTION |
| | | THE DESIGN IS THE PROPERTY OF |
| | | REPRODUCTION IS PROHIBITED |

| OLD PART NO. | PATTERN NO. | MATERIAL NO. | MASS | ALL DIMENSIONS IN INCHES UNLESS NOTED | DRWN | CKHD | TRCD |
|--------------|-------------|--------------|-----------|---------------------------------------|------|------|------|
| | | | 54.22 LBS | | TED | GJY | |

| ZONE | REV. | DESCRIPTION | DATE | CHG NO. | APPROVED |
|------|------|-------------|------|---------|----------|
| | | See Sheet 1 | | | |

| ITEM NO. | File Name | DESCRIPTION | QTY. |
|----------|-----------|-----------------------------------|------|
| 1 | 2056005 | BODY - DISCH, LIGHT FLOAT | 1 |
| 2 | 4229401 | ENGINE - B&S 875EX, VERTICAL | 1 |
| 3 | 4436600 | FLOAT - 2BEF | 1 |
| 4 | 2810002 | HEAD - INBOARD, 2BEF | 1 |
| 5 | 5400641 | HHCS - .313-18 x 0.75, SST | 12 |
| 6 | 5400613 | HHCS - .313-18 x 1.50, SST | 2 |
| 7 | 5400688 | HHCS - .313-18 x 2.50, SST | 1 |
| 8 | 5400620 | HHCS - .375-24 x 1.00, SST | 1 |
| 9 | 2907721 | IMPELLER - 2BEF | 1 |
| 10 | 3602203 | KEY - WOODRUFF, 505, SST | 1 |
| 11 | 5403400 | NUT - HEX, .313-18, NYLOC, SST | 3 |
| 12 | 3601206 | O-RING - 2.75 x 3.00 x 0.12 | 1 |
| 13 | 3601117 | O-RING - 5.25 x 5.44 x 0.09 | 1 |
| 14 | 2002002 | PILOT BUSHING - 2BEF, FLOAT | 1 |
| 16 | 4012507 | PLATE - SUPPORT, 2BEF | 1 |
| 17 | 2055902 | PUMP CASING - 2BEF | 1 |
| 18 | 3600423 | RING - RETAINER, 2.81 ID | 1 |
| 19 | 1843400_1 | SEAL - MECHANICAL, DBL LIP, 1.12" | 1 |
| 20 | 5401420 | SHCS - .313-24 x 1.25, SST | 4 |
| 21 | 5401410 | SHCS - .375-16 x 1.00, SST | 3 |
| 22 | 1121389 | STRAINER - HYDRANT, 3.00 | 1 |
| 23 | 3603812 | WASHER - FLAT, 0.31 ID, SST | 10 |
| 24 | 3603809 | WASHER - FLAT, 0.375 SST | 1 |
| 25 | 3603915 | WASHER - SPECIAL, .31 ID X .63 OD | 4 |
| 26 | 3603530 | WASHER - LOCK, 0.313 ID, SST | 4 |



SECTION B-B

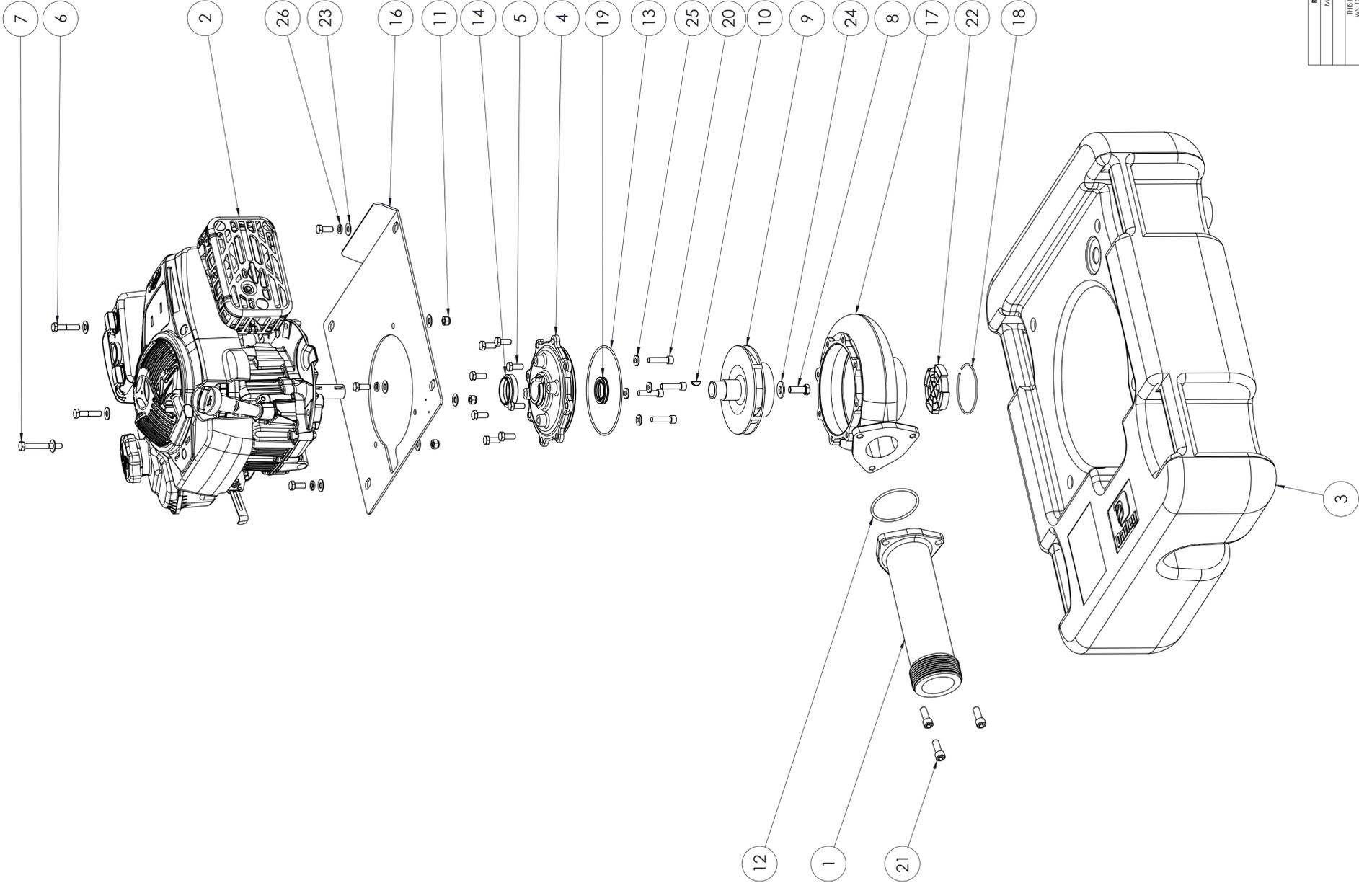
| | | | | | | |
|-------|--------|---------------------------|-------------|--------------|------|---------------------------------------|
| MODEL | FP0510 | TOLERANCE EXCEPT AS NOTED | 0.00 ± 0.01 | DRWN | TED | DATE: 11/28/2018 |
| SHEET | 2/3 | OLD PART NO. | PATTERN NO. | MATERIAL NO. | MASS | 54.22 LBS |
| | | | | | | ALL DIMENSIONS IN INCHES UNLESS NOTED |
| | | | | | | REPRODUCTION IS PROHIBITED |

REMOVE SHARP EDGES
 MATERIAL DESCRIPTION
 THIS DESIGN IS THE PROPERTY OF
 ALL DIMENSIONS IN INCHES UNLESS NOTED
 REPRODUCTION IS PROHIBITED

DO NOT SCALE PRINT
 SCALE: 1:2
 DATE: 11/28/2018
 W/WARRANTY
 PUMP - 2BEF/35/8S
 CHIPPEWA FALLS, WI
 IRASCA, IL

| ZONE | REV. | DESCRIPTION | DATE | CHG NO. | APPROVED |
|------|------|-------------|------|---------|----------|
| | | | | | |

| ITEM NO. | PART # | DESCRIPTION | QTY. |
|----------|-----------|-----------------------------------|------|
| 1 | 2056005 | BODY - DISCH. LIGHT FLOAT | 1 |
| 2 | 4229401 | ENGINE - B&S 875EX, VERTICAL | 1 |
| 3 | 4436600 | FLOAT - 2BEF | 1 |
| 4 | 2810002 | HEAD - INBOARD, 2BEF | 1 |
| 5 | 5400641 | HHCS - .313-18 x 0.75, SST | 12 |
| 6 | 5400613 | HHCS - .313-18 x 1.50, SST | 2 |
| 7 | 5400688 | HHCS - .313-18 x 2.50, SST | 1 |
| 8 | 5400620 | HHCS - .375-24 x 1.00, SST | 1 |
| 9 | 2907721 | IMPELLER - 2BEF | 1 |
| 10 | 3602203 | KEY- WOODRUFF, 505, SST | 1 |
| 11 | 5403400 | NUT - HEX. .313-18, NYLOC, SST | 3 |
| 12 | 3601206 | O-RING - 2.75 x 3.00 x 0.12 | 1 |
| 13 | 3601117 | O-RING - 5.25 x 5.44 x 0.09 | 1 |
| 14 | 2002002 | PILOT BUSHING - 2BEF, FLOAT | 1 |
| 16 | 4012507 | PLATE - SUPPORT, 2BEF | 1 |
| 17 | 2055902 | PUMP CASING - 2BEF | 1 |
| 18 | 3600423 | RING - RETAINER, 2.81 ID | 1 |
| 19 | 1843400_1 | SEAL - MECHANICAL, DBL LIP 1.12" | 1 |
| 20 | 5401420 | SHCS - .313-24 x 1.25, SST | 4 |
| 21 | 5401410 | SHCS - .375-16 x 1.00, SST | 3 |
| 22 | 1121389 | STRAINER - HYDRANT, 3.00 | 1 |
| 23 | 3603812 | WASHER - FLAT, 0.31 ID, SST | 10 |
| 24 | 3603809 | WASHER - FLAT, 0.375 SST | 1 |
| 25 | 3603915 | WASHER - SPECIAL, .31 ID X .63 OD | 4 |
| 26 | 3603530 | WASHER - LOCK, 0.313 ID, SST | 4 |



12

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| | | | | | |
|-------|--------|---------------------------|------|------|------|
| MODEL | FR0510 | TOLERANCE EXCEPT AS NOTED | 0.00 | 0.00 | 0.00 |
| SHEET | 3/3 | ANGLE ±1 | DRWN | TED | TRCD |

| | | | | | |
|------------------------|--------------|---------------------------|------|------|------|
| THIRD ANGLE PROJECTION | OLD PART NO. | TOURNAISE EXCEPT AS NOTED | 0.00 | 0.00 | 0.00 |
| INCH [MILLIMETER] | PATTERN NO. | ANGLE ±1 | DRWN | TED | TRCD |

| | | | | | |
|----------------------|--------------|---------------------------|------|------|------|
| REMOVE SHARP EDGES | OLD PART NO. | TOURNAISE EXCEPT AS NOTED | 0.00 | 0.00 | 0.00 |
| MATERIAL DESCRIPTION | PATTERN NO. | ANGLE ±1 | DRWN | TED | TRCD |

| | |
|---------------------------------------|-----------|
| MASS | 54.22 LBS |
| ALL DIMENSIONS IN INCHES UNLESS NOTED | |

| | |
|--------------------|--------------------|
| DATE: 11/28/2018 | DATE: 11/28/2018 |
| W/WARRANTY | W/WARRANTY |
| PUMP - 2BEF/250RS | PUMP - 2BEF/250RS |
| CHIFFAWA FALLS, WI | CHIFFAWA FALLS, WI |
| ITASCA, IL | ITASCA, IL |

| | |
|--------------------|--------------------|
| SCALE: 1:4 | SCALE: 1:4 |
| DO NOT SCALE PRINT | DO NOT SCALE PRINT |

| | |
|--------------------|--------------------|
| DATE: 11/28/2018 | DATE: 11/28/2018 |
| W/WARRANTY | W/WARRANTY |
| PUMP - 2BEF/250RS | PUMP - 2BEF/250RS |
| CHIFFAWA FALLS, WI | CHIFFAWA FALLS, WI |
| ITASCA, IL | ITASCA, IL |

| | |
|--------------------|--------------------|
| SCALE: 1:4 | SCALE: 1:4 |
| DO NOT SCALE PRINT | DO NOT SCALE PRINT |

| | |
|--------------------|--------------------|
| DATE: 11/28/2018 | DATE: 11/28/2018 |
| W/WARRANTY | W/WARRANTY |
| PUMP - 2BEF/250RS | PUMP - 2BEF/250RS |
| CHIFFAWA FALLS, WI | CHIFFAWA FALLS, WI |
| ITASCA, IL | ITASCA, IL |

| | |
|--------------------|--------------------|
| SCALE: 1:4 | SCALE: 1:4 |
| DO NOT SCALE PRINT | DO NOT SCALE PRINT |

Section 4

Components

- The float for this unit is foam filled to assist in buoyancy in case of a leak in the outer plastic shell of the float.
- 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

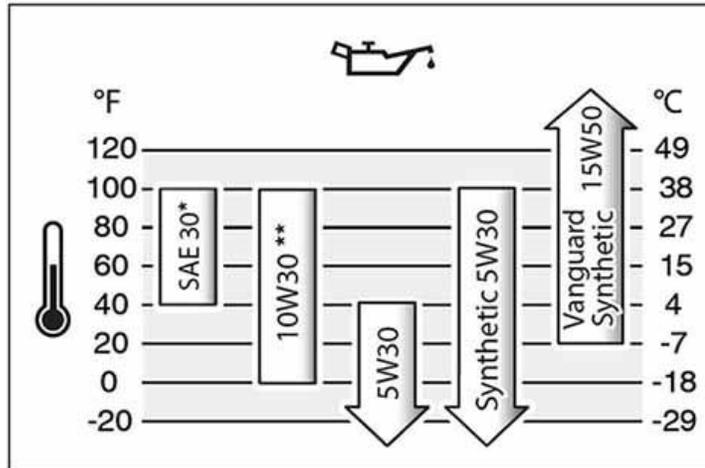
IMPORTANT

Check your engine instruction manual for recommended maintenance schedule.

Check the oil before each use.



Change the oil annually or every 35-50 hours, whichever comes first.



Change the engine air filter annually

Change the spark plug annually

Use Briggs and Stratton service part number 692051 or Champion spark plug RC12YC with a gap of .020" [0.51 mm].

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

Section 6

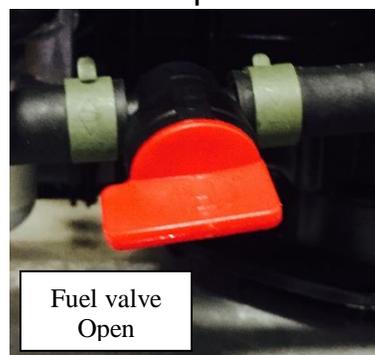
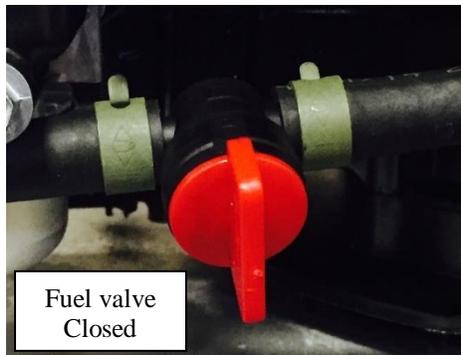
Troubleshooting

Pump does not make advertised performance anymore.

- The mechanical seal may be damaged.
- 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 tightened to the engine shaft.
- The fuel may be bad and needs replacing.
- The engine spark plug may be bad or dirty.
 - Use Briggs and Stratton service part number 692051 or Champion spark plug RC12YC with a gap of .020”.
- The engine needs to be checked by an engine technician for problems.

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 operator's manual
- Verify that there is no water within the fuel system
- Verify the fuel shut off valve is turned to the "On" position.



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

- The engine may have ingested water.
- The piston may have become flooded with gasoline or oil.
- 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.
 - Use Briggs and Stratton service part number 692051 or Champion spark plug RC12YC with a gap of .020”.
- The air filter is dirty.
- The fuel line needs to be cleaned.
- Water got into the exhaust and therefore the engine block.

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.
 - Use Briggs and Stratton service part number 692051 or Champion spark plug RC12YC with a gap of .020”.
- 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

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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.