

# BUFFALO TURBINE

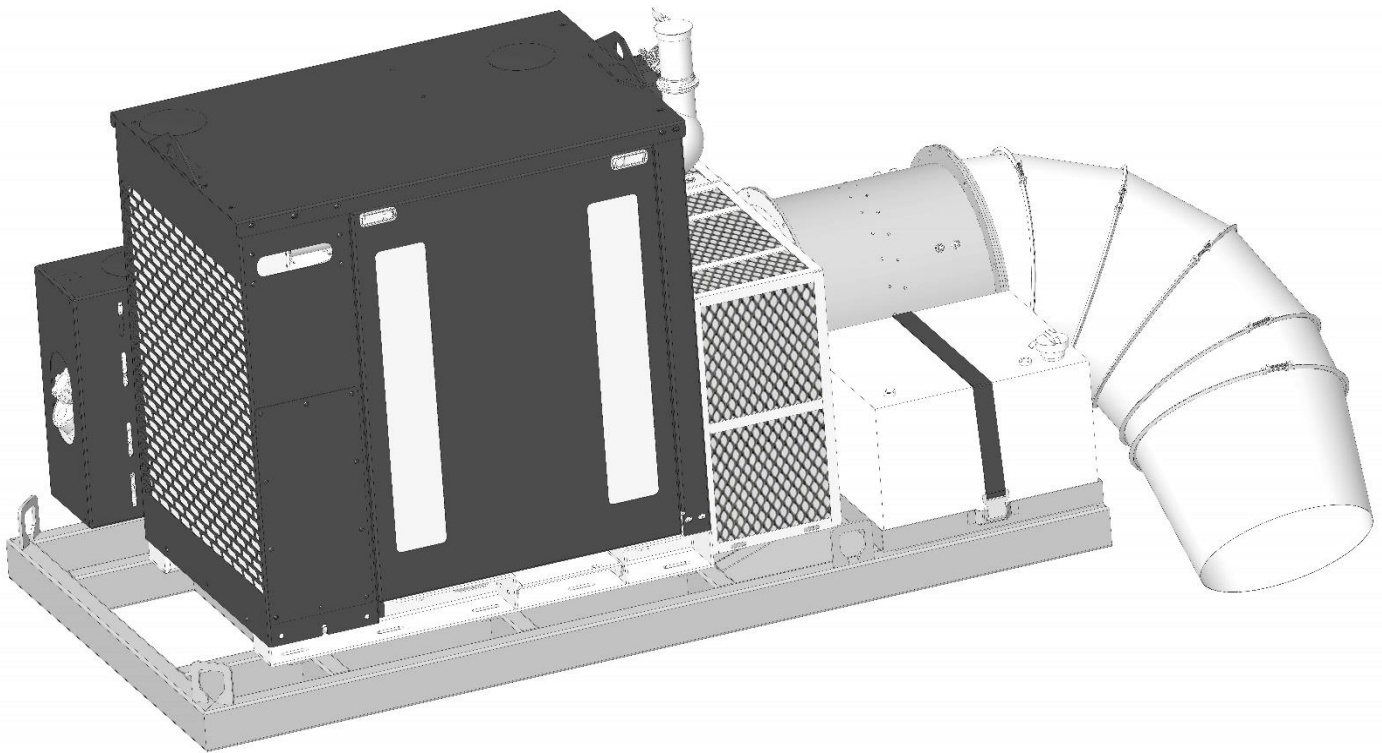
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## BUFFALO TURBINE'S BT-D20DB ORIGINAL INSTRUCTIONS AND PARTS MANUAL

11/20 -BT MAN

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## 1.0 INTRODUCTION

Congratulations on your choice of a Buffalo Turbine Debris Blower. This equipment has been designed and manufactured to meet the needs of the Airport and Racing Industry.

**Safe, efficient and trouble-free operation of your Buffalo Turbine Blower requires that you and anyone else, who will be operating or maintaining the Blower, read and understand all of the safety, operation, maintenance and troubleshooting information contained within this Operator's manual.**

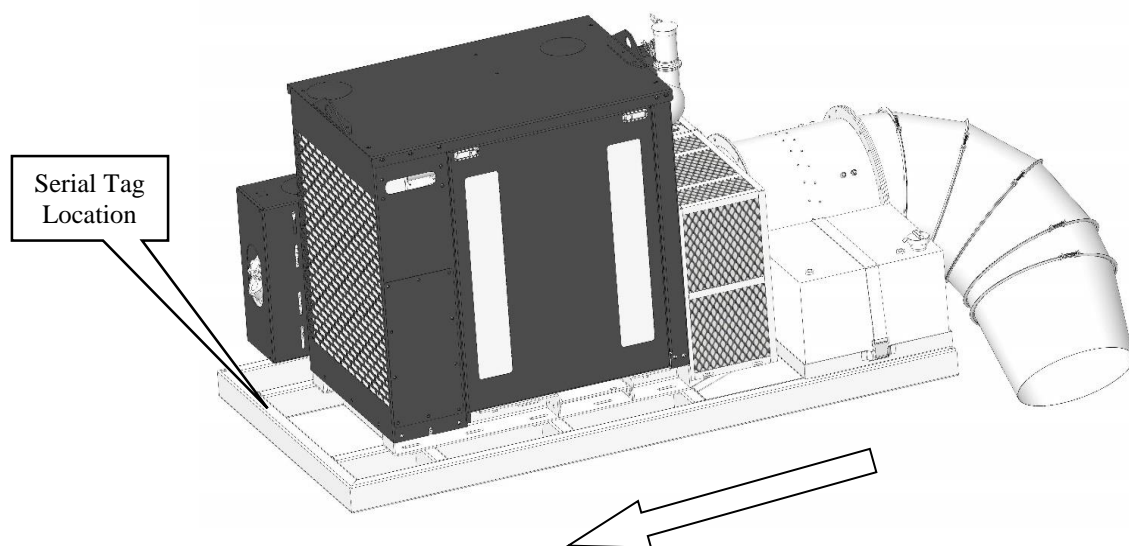
This Manual covers the BT-D20DB Turbine Blower.

Keep this manual handy for frequent reference and to pass on to new operators or owners. Call your Buffalo Turbine dealer or distributor if you need assistance, information, or additional copies of the manuals.

## SERIAL NUMBER LOCATION

Always give your dealer the serial number of your Debris Blower when ordering parts or requesting service or other information.

The serial number plate(s) is located where indicated in the pictures below. Please document the number in the space provided for easy reference.



**OPERATOR ORIENTATION** – The directions left, right, front and rear, as mentioned throughout the manual, are as seen from the driver's seat and facing in the direction of travel.

### MODEL BT-D20DB RIGHT FRONT TOP SURFACE OF FRAME

Serial Number: \_\_\_\_\_

## 2.0 SAFETY

**YOU** are responsible for the **SAFE** operation and maintenance of your Buffalo Turbine Debris Blower. **YOU** must ensure that you and anyone else, who is going to operate, maintain or work around the Buffalo Turbine Debris Blower be familiar with the operating and maintenance procedures and related **SAFETY** information contained in this manual. This manual will take you step-by-step through your working day and alerts you to all good safety practice while operating the Blower.

Remember **YOU** are the key to safety. Good safety practices not only protect you but also the people around you. Make these practices a working part of your safety program. Be certain that **EVERYONE** operating this machine is familiar with the procedures recommended and follows safety precautions. Remember most accidents can be prevented. Do not risk injury or death by ignoring good safety practices.

- Blower owners must give operating instructions to operators or employees before allowing them to operate the Blower, and at least annually thereafter.
- The most important safety device on this equipment is a **SAFE** operator. It is the operator's responsibility to read and understand ALL Safety and Operating instructions in the manual and to follow these. All accidents can be avoided.
- A person who has not read and understood all operating instructions is not qualified to operate the machine. An untrained operator exposes themselves and bystanders to possible serious injury or death.
- Do not modify the equipment in any way. Unauthorized modification may impair the function and/or safety which could affect the life of the equipment.
- Think **SAFETY!** Work **SAFELY!**

This Safety Alert symbol means **ATTENTION! BECOME ALERT! YOUR SAFETY IS INVOLVED!**

The Safety Alert symbol identifies important safety messages on the Buffalo Turbine Blower and in the manual. When you see this symbol, be alert to the possibility of personal injury or death. Follow the instructions in the safety message.

Why is **SAFETY** important to you?



### 3 Big Reasons: Accidents Disable and Kill

**Accidents Cost**

**Accidents Can Be Avoided**

**SIGNAL WORDS:** Note the use of the signal words **DANGER**, **WARNING** and **CAUTION** with the safety messages. The appropriate signal word for each message has been selected using the following guidelines

1. **DANGER** –injury or death if the proper precautions are not taken.
2. **WARNING** -- A specific hazard or unsafe practice that **COULD** result in severe personal injury or death if proper precautions are not taken.
3. **CAUTION** – Unsafe practices that **COULD** result in personal injury if proper practices are not taken, or as a reminder of good safety.

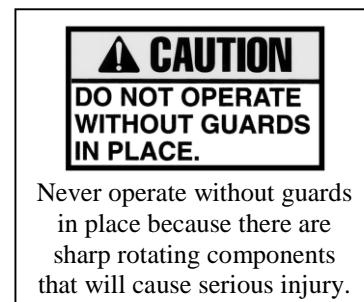
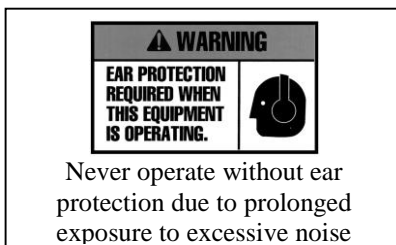
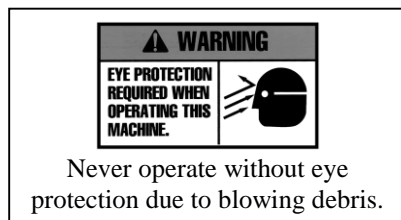
**The Safety Alert symbol identifies important safety messages on the Buffalo Turbine Blower and in the manual. When you see this symbol, be alert to the possibility of personal injury or death. Follow the instructions in the safety message.**

## 2.1 SAFETY DECALS

The types of decals on the blower unit are shown below. Good safety requires that you familiarize yourself with the various Safety Decals, the type of warning and the area, or particular function related to that area that requires your **SAFETY AWARENESS.\* THINK SAFETY! WORK SAFELY!**

### **!ATTENTION!**

1. **KEEP HANDS, FEET AND CLOTHING AWAY FROM POWER DRIVEN PARTS.**
2. **STOP ENGINE AND REMOVE KEY BEFORE LEAVING OPERATOR'S POSITION.**
3. **MACHINE MUST COME TO A COMPLETE STOP BEFORE ANY MAINTENANCE, TO INCLUDE ADJUSTING, LUBRICATING OR CLEANING, IS PERFORMED.**
4. **KEEP PEOPLE AND PETS AT SAFE DISTANCE FROM MACHINE.**
5. **KEEP ALL GUARDS AND SHIELDS IN PLACE.**



**REMEMBER – If safety decals have been damaged, removed, become illegible or parts replaced without decals, new decals must be applied. New decals are available from your authorized dealer.**

## 2.2 GENERAL SAFETY

1. Read and understand the Operator's Manual and all safety signs before operating, maintaining, and adjusting.
2. Provide a first-aid kit for use in case of an accident. Store in a highly visible place.
3. Provide a fire extinguisher for use in case of an accident. Store in a highly visible place.
4. Wear appropriate protective gear. This list includes but is not limited to:
  - A hard hat
  - Protective shoes with slip resistant soles
  - Protective glasses or goggles
  - Heavy gloves
  - Wet weather gear
  - Hearing protection
5. Do not operate without guards or shields properly installed.
6. Do not allow riders.
7. **Wear appropriate ear protection for prolonged exposure to excessive noise.**
8. **(All Models) Set Blower on the ground, stop engine, set park brake, remove ignition key and wait for all moving parts to stop before dismounting to service or adjust.**
9. Clear the area of people, especially small children, before starting the unit.
10. Review all safety related items annually with all personnel who will be operating or maintaining the Blower.
11. Keep hands, feet, hair and clothing away from moving parts. Operate equipment only while seated in the operator's seat.

## 2.3 OPERATING SAFETY

1. Read and understand the Operator's Manual and all safety signs before operating, servicing or adjusting.
2. Before servicing or repairing, **Set blower on the ground, stop engine, set park brake, remove key, and wait for all moving parts to stop.**

## 2.4 MAINTENANCE SAFETY

1. Read and follow ALL general, operating, maintenance and safety information in this manual.
2. Support the machine with blocks or safety stands when changing tires or working beneath it.
3. Set Blower on the ground, stop engine, set park brake, remove ignition key and wait for all moving parts to stop before operating, servicing or adjusting.
4. Make sure all guards are in place and properly secured when operating or maintaining the Blower.

**\* NEVER HAVE NOZZLE POINTING AT/NEAR ANYONE DURING STARTUP\***

## 2.5 TRANSPORT SAFETY

1. The D20DB is a Skid Mount Model which can easily be transported and operated in the bed of a standard pick-up truck. Be sure to block, anchor and secure the unit before operating or transporting. **Do not use the top of the Turbine housing to strap or tie down blower unit.**

## 2.6 STORAGE SAFETY

1. Store the Blower on a firm, level surface.
2. Store away from areas of human activity. Do not permit children to play on or around the stored machine.
3. Make sure the unit is sitting, or blocked up firm and solid and will not tip or sink into a soft area.
4. Cover with a weatherproof tarpaulin and tie down securely.

## 2.7 SIGN-OFF FORM

- Buffalo Turbine recommends that anyone who will be operating and/or maintaining the Buffalo Turbine Blower must read and clearly understand ALL Safety, Operating and Maintenance information presented in this manual.
- Do not operate or allow anyone else to operate this equipment until such information has been reviewed. Annually review this information before the season start-up.
- Make these periodic reviews of SAFETY and OPERATION a standard practice for all of your equipment. We feel that an untrained operator is unqualified to operate this machine.

A sign-off sheet is provided for your record keeping to show that all personnel who will be working with the equipment have read and understand the information in the Operator's Manual and have been instructed in the operation of the equipment.

## SIGN-OFF FORM

[illegible]

# **Buffalo Turbine Debris Blowers**

## **Buffalo Turbine Warranty Policy**

### **3.0 MACHINE WARRANTY INFORMATION**

Buffalo Turbine LLC, Inc. warrants the DEBRIS BLOWER, to the original owner, to be free from defects in material and workmanship, under normal use and service. **All machines must have a completed registration form sent to Buffalo Turbine within 30 days of purchase for warranty to apply.** Obligation under this warranty shall extend for a period of 10 years from date of purchase and, at the option of Buffalo Turbine, replacement of any parts found, upon inspection by Buffalo Turbine, to be defective. Any parts replaced under warranty will have the remainder of the warranty from the original date of purchase.

**Warranty parts during first 2 years will be shipped free of charge via standard ground shipping**

**\*If expedited shipping is required charges will be paid by the end user\***

Year 1: parts and labor

Year 2: parts only

**Customer will be required to pay shipping charges for years 3-10**

Year 3: Engine, per engine manufacturer's standard / Turbine Assembly / Frame (parts only)

Year 4-10: Turbine Assembly / Frame (parts will be prorated)

**Buffalo Turbine reserves the right to incorporate improvements in material and design of its products without notice and is not obligated to make the same improvements to equipment previously manufactured.**

**ALL WARRANTY REPAIRS NEED PRE-APPROVAL BY A FACTORY PERSON (FROM BUFFALO TURBINE) PRIOR TO COMMENCING WITH A WARRANTY REPAIR TO INCLUDE SERIAL NUMBER AND HOURS FROM HOUR METER (IF EQUIPPED). PRE-APPROVAL WILL BE REQUIRED BY THE END USER AND DEALER/DISTRIBUTOR LEVEL.**

**Factory ordered Buffalo Turbine parts must be used when filing a warranty claim.**

### **LIMITATIONS OF LIABILITY**

This warranty is expressly in lieu of all other warranties expressed or implied and all other obligations or liabilities on our part of any kind or character, including liabilities for alleged representations or negligence. We neither assume nor authorize any other person to assume on our behalf, any liability in connection with the subsequent sale of the **DEBRIS BLOWER**. This warranty shall not apply to any DEBRIS BLOWER, which has been altered outside the factory in any way so as, in the judgment of Buffalo Turbine, to affect its operation or reliability, or which has been subject to misuse, neglect, or accident. This warranty does not cover parts and accessories, which are under separate guarantee from the manufacturers and service can be, obtained from their service facilities. No warranty is extended to regular service items such as lubricants, belts, paint and the like.

### **Original Instruction Manual**

The Purchaser acknowledges having receiving training in the safe operation of the DEBRIS BLOWER and further acknowledges that Buffalo Turbine does not assume any liability resulting from the operation of the DEBRIS BLOWER in any manner other than described in the Operator's Manual supplied at the time of purchase.

**WARRANTY VOID IF NOT REGISTERED (see Page 2 for warranty registration form)**

**DO NOT SPLIT THE TURBINE HOUSING FOR ANY REASON.**

**DO NOT ATTEMPT TO SERVICE OR DISASSEMBLE THE TURBINE BLOWER.**

**DO NOT USE THE TOP OF THE TURBINE HOUSING TO STRAP OR TIE DOWN BLOWER UNITS.**

**Unauthorized service work on the Turbine Blower will null and void all warranties.**

If there are any questions regarding any of our products call Buffalo Turbine at 716 592 2700.

### 3.1 Warranty Registration Form

## BUFFALO TURBINE

### WARRANTY REGISTRATION FORM & INSPECTION REPORT

Any units not registered with Buffalo Turbine are not eligible for warranty claims

This form must be filled out by the dealer and signed by both the dealer and the customer at the time of delivery

Customer's Name \_\_\_\_\_ Dealer's Name \_\_\_\_\_

Address \_\_\_\_\_ Address \_\_\_\_\_

City, State, Zip, Country \_\_\_\_\_ City, State, Zip, Country \_\_\_\_\_

Email Address (important) \_\_\_\_\_ Email Address \_\_\_\_\_

Telephone Number \_\_\_\_\_

Blower Model \_\_\_\_\_

**Circle one:**

Serial Number \_\_\_\_\_

Commercial Use

Delivery Date \_\_\_\_\_

Private Use

#### DEALER INSPECTION REPORT

#### SAFETY CHECKS

\_\_\_\_\_ Tire Pressure Check -- Model KB

\_\_\_\_\_ All Decals Installed

\_\_\_\_\_ Wheel Bolts

\_\_\_\_\_ Review Operating and Safety Instructions

\_\_\_\_\_ Belt Tension

\_\_\_\_\_ Lubricate Machine

\_\_\_\_\_ Guards in Place

\_\_\_\_\_ Fasteners Tight

\_\_\_\_\_ Trailer assembly bolts properly installed and tightened

#### **ALL 3 POINT HITCH MODELS: PTO SHAFTS MUST TELESCOPE IN EVERY POSITION**

I have thoroughly instructed the buyer on the above described equipment which reviews the included Operator's Manual content, equipment care, adjustments, safe operation and applicable warranty policy.

Date \_\_\_\_\_

Dealer's Rep. Signature \_\_\_\_\_

The above equipment and Operator's Manual has been received by me and I have been thoroughly instructed as to the care, adjustments, safe operation and applicable warranty policy.

Date \_\_\_\_\_

Owner's Signature \_\_\_\_\_

**PLEASE EMAIL TO BUFFALO TURBINE AT - [service@buffaloturbine.com](mailto:service@buffaloturbine.com)**

**Or fax to 716 592 2460**



## 4.0 OPERATIONS

### 4.1 TO THE NEW OPERATOR OR OWNER

Buffalo Turbine Debris Blowers are designed to quickly and efficiently, blow away leaves, cuttings and other debris. The material is conveyed on a stream of high volume and velocity of air to remove it from the area of concern. When the material is removed, it gives a neat, professional look to the working area.

Many of the features incorporated into the machine are the result of suggestions made by customers like you. Read the manual carefully to learn to operate the machine safely and how to set it to provide maximum efficiency. The manual will take you step-by-step through your working day. By following the operating instructions in conjunction with a good maintenance program, your Blower will provide many years of trouble-free service.

#### Potential Mechanical Hazards while operating your machine:

Never operate the debris blower around others to prevent the possibility of being run over by equipment.

Never ride on your debris blower to prevent the possibility of being thrown off the machine or hurt severely.



#### WARNING:

This Product can expose you to chemicals including carbon monoxide and benzene, which are known to the State of California to cause cancer and birth defects or other reproductive harm.

For more information go to [www.P65Warnings.ca.gov](http://www.P65Warnings.ca.gov).

### 4.2 BREAK-IN

Although there are no operational restrictions on the Blower when it is used for the first time, it is recommended that the following mechanical items be checked:

#### A. Operating for first ½ hour

1. Re-torque all wheel bolts, axle nuts and trailer mounting bolts and nuts.
2. Re-torque all other fasteners and hardware.
3. Check set screw (nozzle pulley) to ensure it tightened.

#### B. Operating for first 5 hours

1. Re-torque all hardware and fasteners.
2. Check set screw (nozzle pulley) to ensure it tightened.
3. Go to the normal servicing and maintenance schedule as defined in the Maintenance Section of the manual.

### 4.3 PRE-OPERATION CHECKS

Efficient and safe operation of the Buffalo Turbine Blower requires that each operator reads and understands the operating procedures and all related safety precautions outlined in this section. A pre-operation checklist is provided for the operator. It is important for both personal safety and maintaining the good mechanical condition of the machine that this checklist is followed.

#### BATTERY MUST BE CONNECTED BEFORE OPERATION (DISCONNECTED FOR SHIPPING).

Before Operating the Blower and each time thereafter, the following areas should be checked off.

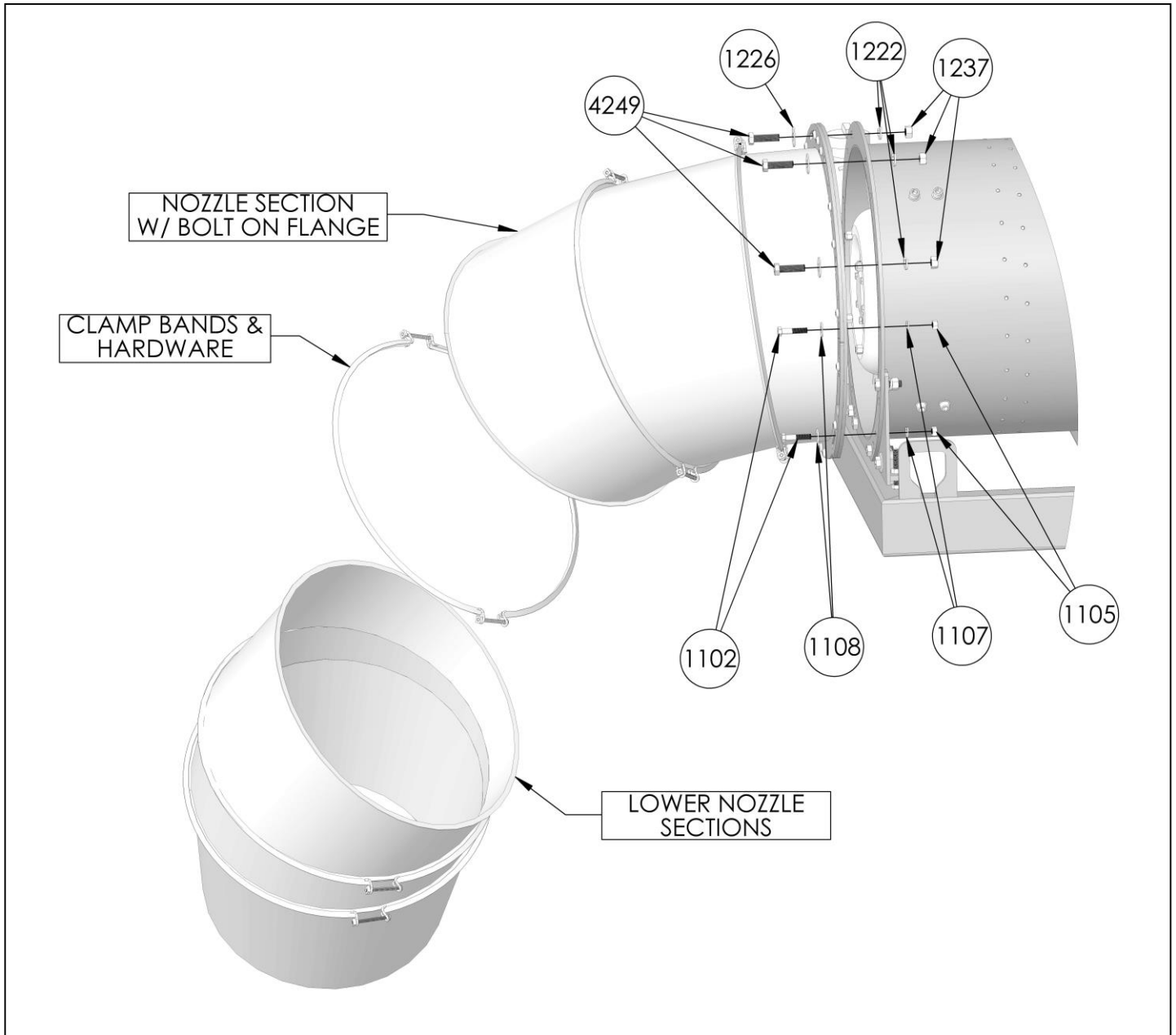
1. For fuel, oil, and operating information of the Kohler Engine, refer to the Manufacturers specs included with this manual.
2. Make sure all guards and shields are in place, secured and functioning as designed.
3. Check that all clamp bands are secure.

**CAUTION !** DO NOT ALLOW LEAVES OR DEBRIS TO ACCUMULATE ON OR NEAR THE ENGINE OR EXHAUST SYSTEM OF THE MODEL KB BLOWER, TRACTOR ENGINE OR ANY INTERNAL COMBUSTION ENGINE.

#### 4.4 MODEL BT-D20DB Assembly Instructions

1. Fill engine oil to proper level. (overseas shipments)
2. Attach Nozzle Section w/ Bolt on Flange to back of turbine (see photo below).
3. Install Hardware through the Red Nozzle Flange and Turbine Housing (see photo below for hardware locations)
4. Attach Lower Nozzle Sections (see photo below) using clamp band to Nozzle Section w/Bolt on Flange.
5. Attach Nozzle retainers (see PG. 16)
6. Reattach positive battery cable (RED) and ground cable (Black) to proper terminals.

**\*\*For machines with Rotating Nozzle Assembly to attach nozzles (see PG.15)\*\***



## 4.5 FIELD OPERATION

1. Do not direct debris blower towards people, pets, autos, windows, etc.
2. **Starting blower unit:** Always start engine at a lower engine speed with nozzle pointed down or away.
3. **Stopping blower unit:** Shut engine off at idle by turning key switch to off position to avoid engine backfire.
5. Allow the blower fan speed to come to a complete stop before disconnecting or servicing.

## 4.6 Operating RPM (All Models)

The manufacturer's engine section normally recommends the unit be run at a RPM that will insure efficient operation. The Blower can operate at a slower RPM if it can effectively move the debris. Increase engine RPM as needed.

Moving light material, such as dry leaves, requires much less wind than wet or heavier material.

Always try to blow with the wind. The Blower can be used for a wide variety of applications to move leaves, grass clippings, and debris.

## 4.7 Storage

At the end of the working season or before storing the blower unit, prepare the machine by following this procedure:

1. Select a storage area that is dry, level and free of debris.
2. Thoroughly wash the machine with a water hose to remove all debris and residue.
3. Run the machine at low RPM to dry the Blower Components.
4. Touch up all paint chips and scratches to prevent rusting.
5. Inspect for worn or failed components. Order the replacement parts and repair the blower unit when time allows. This will eliminate unnecessary down time at the start of next season.
6. Store in an enclosed building. If space is not available, cover with a waterproof tarpaulin and tie it down securely.
7. Store the machine away from areas of human activity.
8. Do not allow children to play around the stored unit.

## 5.0 TROUBLE SHOOTING

The Buffalo Turbine Debris Blower uses a high volume and velocity of air to move material from one place to another. The system is simple and reliable requiring minimal maintenance.

If you encounter a problem that is difficult to solve, even after reading through this trouble shooting section, please call your local dealer or distributor. **Before calling, please have this Operator's Manual and the serial number from your Blower ready.**

In the following section, we have listed causes and solutions to the problems that you may have encountered.

**TURN OFF ENGINE, REMOVE KEY, AND DISCONNECT BATTERY BEFORE SERVICING BLOWER UNITS. INSTALL GUARDS BEFORE OPERATING.**

PROBLEM	CAUSE	SOLUTION
No air flow	Buildup of debris inside turbine	Remove nozzle and clean debris from inside turbine
	Broken coupling	Replace coupling
No air flow	Blower fan not turning	See solutions above
Reduced or no air flow	Blower fan turns	Air intake or exhaust restricted Shut off engine Blower or tractor – remove restrictions Debris cannot be allowed to build up between the blower fan and stationary vanes
Machine vibrates or Unusual sounds	Bearing or coupling failure Out-of-balance	Replace bearings or coupling Have your dealer check blower for damaged blades Wash and clean blower fan blades

## **6.0 Machine Specifications**

### **Model BT-D20DB Series**

<b>Length:</b>	<b>92.5” Without nozzle</b>
<b>Width:</b>	<b>47”</b>
<b>Height:</b>	<b>54.5”</b>
<b>Weight:</b>	<b>Approx. 2400 lbs</b>
<b>Electrical System:</b>	<b>12 Volt battery / 1000 CCA</b>
<b>Fuel Capacity:</b>	<b>23-gallon Unleaded Fuel only</b>
<b>Input Power:</b>	<b>Kohler 134HP Diesel Engine</b>
<b>Input RPM:</b>	<b>Up to 2200 RPM</b>
<b>Outlet Size:</b>	<b>Approximately 17”</b>

## 7.0 MAINTENANCE SECTION

### 7.1 Maintenance Safety

1. Set Blower on a level surface, stop engine, set park brake, remove ignition key and wait for all moving parts to stop before dismounting to service, adjust or repair.
2. Reinstall and secure all guards removed for servicing before starting to use machine again. \*We recommend wearing gloves when removing or installing the guard to avoid getting cut\*
3. Securely support machine with blocks or safety stands when changing tires or working beneath it.

### 7.2 Fluids

Change oil per Manufacturer's specification (see Engine owner's manual section).

A Teflon spray type lubricant on the nozzle base and slides provides for freer rotation.

### 7.3 SERVICE CHECKLIST

See Lubrication and Maintenance sections for details of service. Copy this page to continue record.

#### **TURN OFF ENGINE, REMOVE KEY & DISCONNECT BATTERY BEFORE SERVICING BLOWER UNIT**

CODE: LUBRICATE-(L) / CHECK-(\*) / CHANGE-(C) / REPLACE-(B) / CLEAN-(CL)

**SCHEDULED MAINTENANCE HOURS** \_\_\_\_\_

**SERVICED BY** \_\_\_\_\_

#### **MAINTENANCE**

##### **8 hrs or daily**

- (\*) Remove all debris that has settled between the blower wheel fan and the stationary vanes. Helps maintain peak performance.
- (\*) Check engine oil and fill to proper level – Do not overfill
- (\*) Check air filter and precleaner
- (CL) Clean debris from air intake and other cooling areas on the engine
- (\*) Check Clamp Band Bolt for tightness

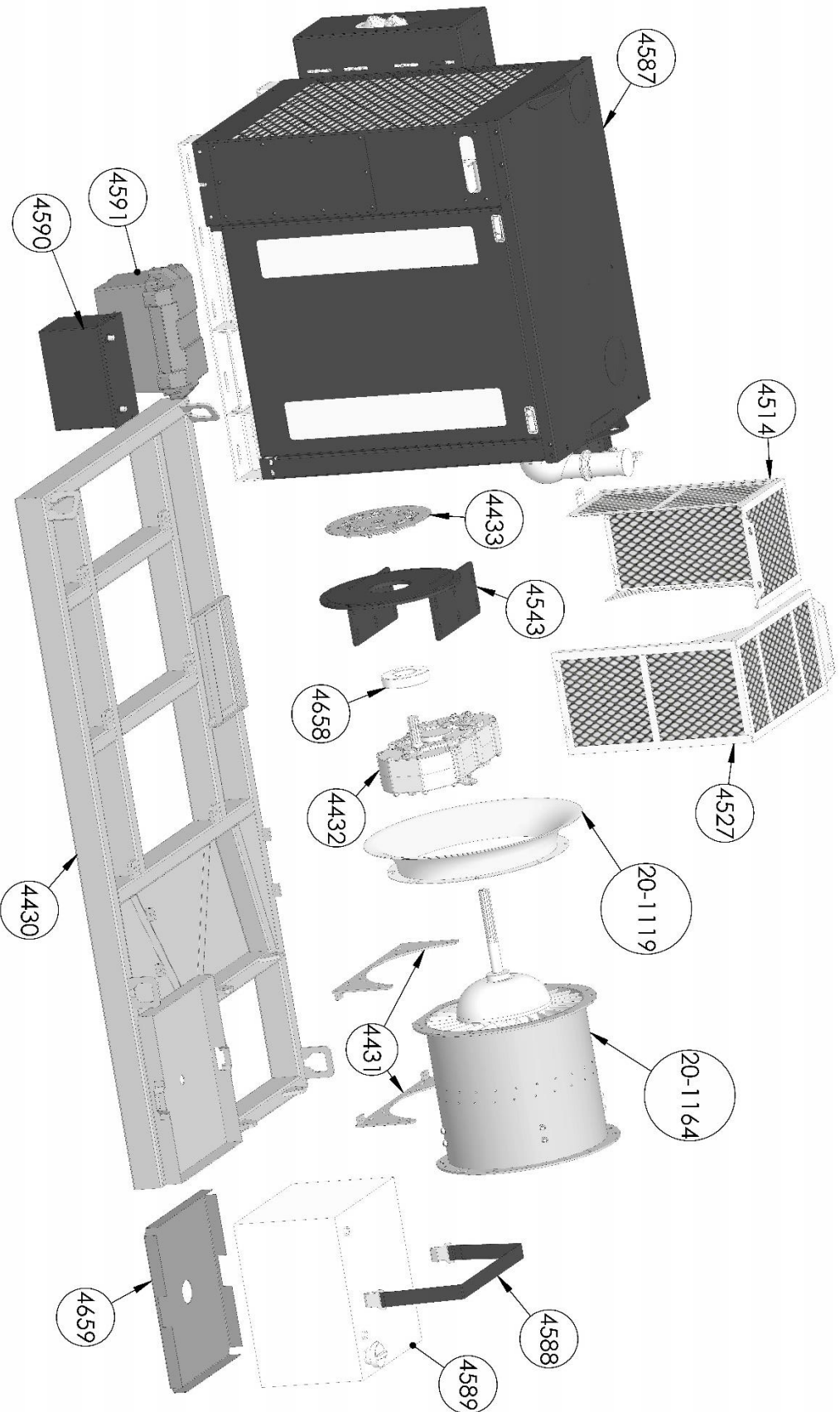
##### **40 hours or weekly**

- (\*) Inspect battery terminals for any corrosion, broken wires, or loose connections.
- (\*) Remove Battery and clean debris from inside of battery box
- (\*) Wash and Clean any dirt or grime build up that has accumulated on blower wheel fan blades. Helps to minimize vibration balance and maintain peak performance.
- (L) Flange Bearings (2-3 shots of grease)

##### **200hrs or annually**

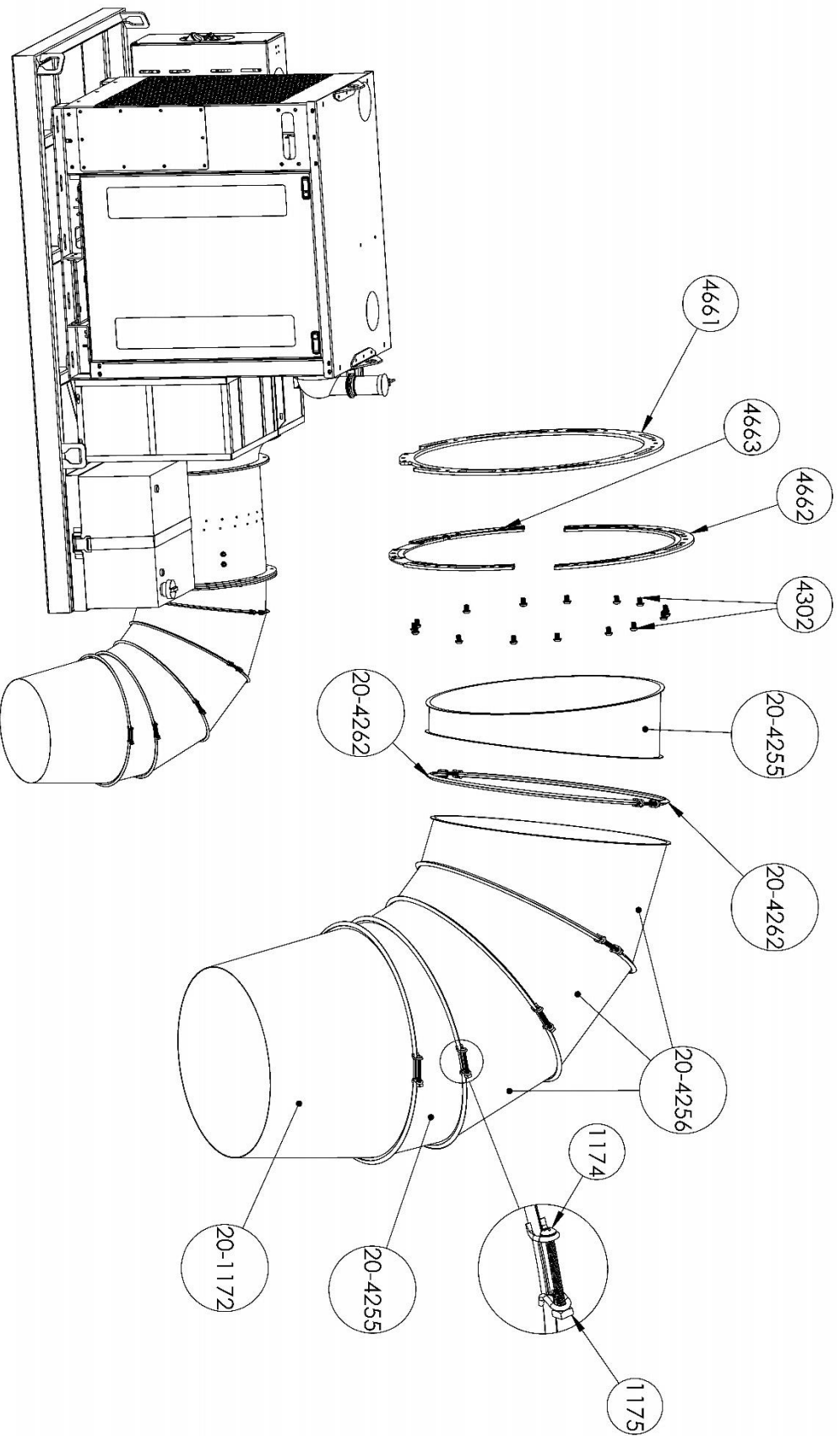
- (CL) Machine

# BT-D20DB PARTS REFERENCE (BEGINNING W/ SERIAL #31507)



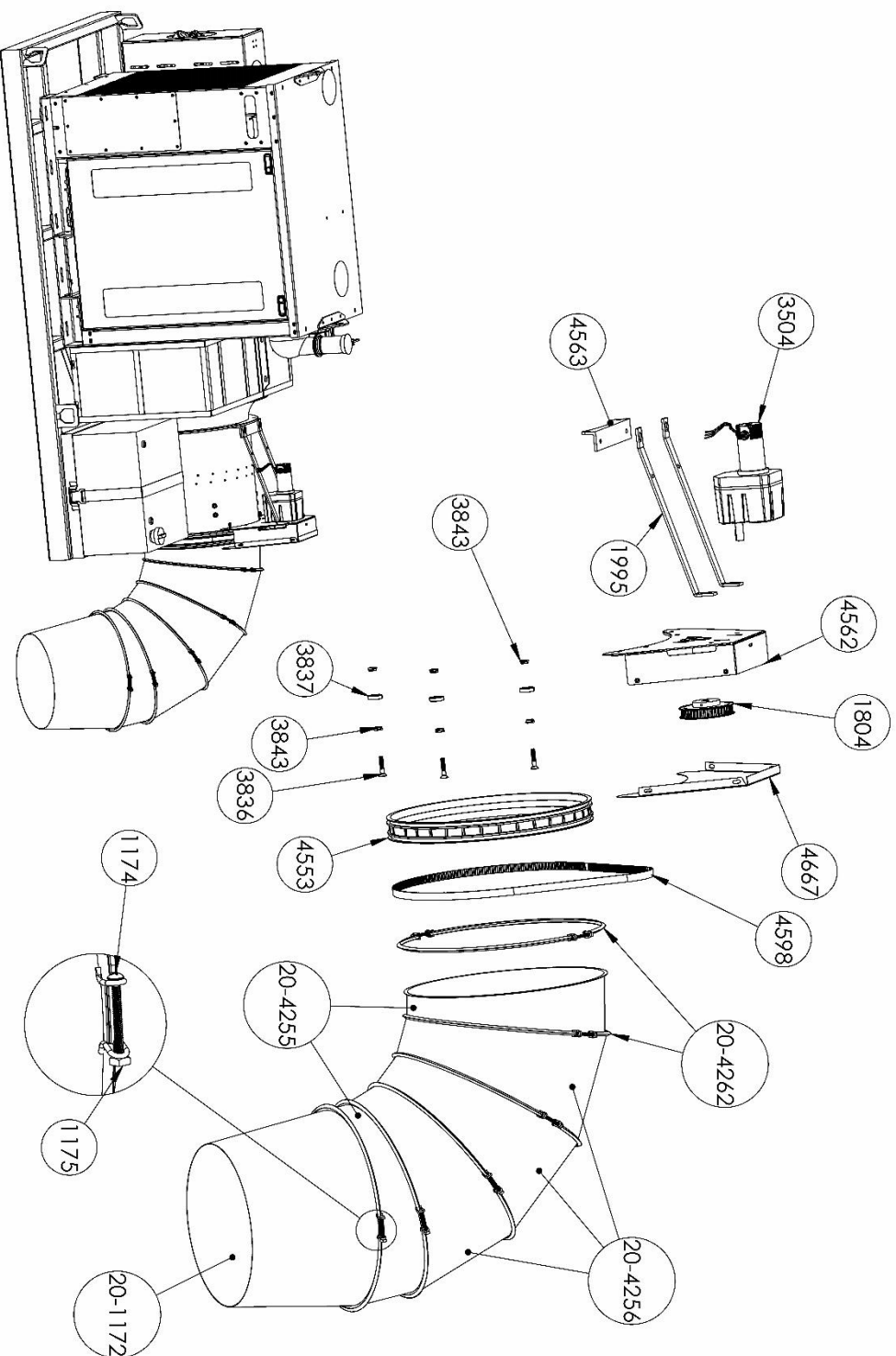
**\*NOT ALL HARDWARE/WIRING IS SHOWN**

# BOLT ON NOZZLE SUB-ASSEMBLY (#4685)



**\*NOT ALL HARDWARE SHOWN**

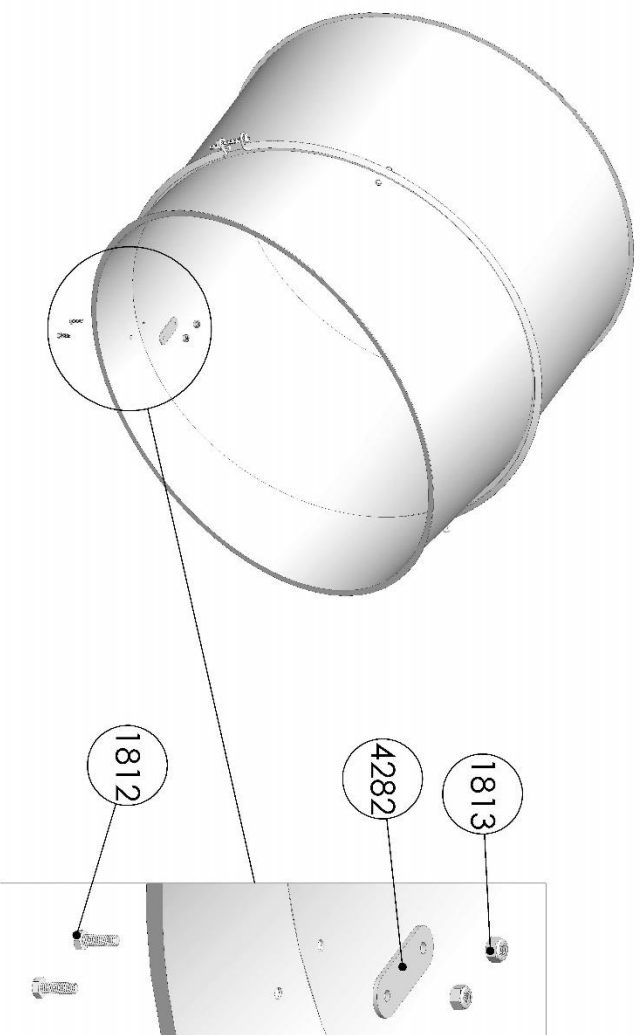
# ROTATION NOZZLE SUB-ASSEMBLY (#4686)



**\*NOT ALL HARDWARE/WIRING IS SHOWN**



# BT-D20DB PARTS REFERENCE CONT. (NOZZLE ASSEMBLY)



\*NOZZLE RETAINERS (PN 4282) ARE INCLUDED WITH MACHINE. ONCE NOZZLE ASSEMBLY IS POSITIONED WHERE DESIRED, IT IS RECOMMENDED TO USE RETAINERS. 3 RETAINERS ARE TO BE USED FOR CONNECTING TWO NOZZLES TOGETHER AND SHOULD BE EQUAL DISTANCE APART. USING THE RETAINER, MARK HOLE LOCATIONS IN NOZZLE AND DRILL FOR HARDWARE. **DO NOT TRY AND PUT RETAINER ON CRIMPED SEAM.**

BILL OF MATERIALS FOR BT-D20DB			
REF PAGE #	PN	DESCRIPTION	QTY
	1105	3/8-24 HEX NUT ZINC PLATED GRADE 5	6
	1107	3/8 LOCK WASHER ZINC PLATED	24
	1108	3/8 FLAT WASHER ZINC PLATED	18
	1116	¼-14 x 1 HEX HEAD WASHER SELF DRILLING SCREW	2
	1168	HOSE CLAMP	4
	1169	¼-20 X 1 HHCS ZINC GRADE 5	1
	1221	½-20 X 2 HHCS GR 5	4
	1222	½ LOCK WASHER, ZINC	21
	1226	½" FLAT WASHER	28
	1236	3/16 X 1 ROLL PIN	6
	1237	½-20 HEX NUT ZINC GR 5	20
	1259	¼ LOCKWASHER	1
	1415	¼"FLAT WASHER	1
	1538	3/8-24 x 1 HHCS GR.5 ZINC	6
	1669	¼-20 X .055 HEAD INSERT	1
	1727	PUSHOVER BOLT	4
13	20-1119	BELLMOUTH, 20" BLOWER	1
13	20-1164	20" RH BLOWER ASSEMBLY	1
	3559	5/8" SPLIT LOCKWASHER ZINC GRADE 5	6
	4098	5/8-11 X 2" HHCS ZINC GRADE 5	6
	4099	5/8-11 HEX NUT ZINC GRADE 5	6
	4248	5/8" FLAT WASHER GRADE 8	12
	4250	½-20 X 1-1/2" HHCS ZINC GRADE 5	16
13	4430	FRAME, D134 20" BLOWER	1
13	4431	20" BLOWER END SUPPORT	2
13	4432	1:1.6 RATIO GEARBOX	1
13	4433	SPRING COUPLING,TCP	1
	4466	BATTERY POST TERMINAL, POSITIVE	1
	4467	BATTERY POST TERMINAL, NEGATIVE	1
	4470	5/16" ID FUEL HOSE	120"
13	4514	GUARD D20DB, TURBINE SIDE	1
13	4527	GUARD D20DB, ENGINE SIDE	1
13	4543	GEARBOX MOUNT BRACKET	1
	4564	1 GAUGE BATTERY CABLE (POSITIVE)	46"
	4565	1 GAUGE BATTERY CABLE (NEGATIVE)	34"
	4566	LUG TERMINAL FOR 1 GAUGE WIRE (3/8" EYELET)	1
	4567	LUG TERMINAL FOR 1 GAUGE WIRE (1/2" EYELET)	1
	4568	3/8" RING TERMINAL, 10-12 WIRE	3
13	4587	134HP KOHLER ENGINE	1
13	4588	TANK STRAP	1
13	4589	ALUMINUM FUEL TANK, 23 GALLON	1
13	4590	12V BATTERY 1000CCA	1
13	4591	BATTERY BOX, FOR 1000CCA BATTERY	1
	4592	3/8-16 X 1" LG SHCS, BLACK OXIDE	8
	4593	3/8-16 X 3" LG HHCS ZINC GRADE 5	10
	4594	M14-2MM X 30MM LG 8.8 HHCS ZINC GRADE 5	12
	4595	M14 FLAT WASHER, ZINC	12
	4596	M14 SPLIT LOCKWASHER, ZINC	12
	4597	M12-1.75 X 25MM LG SHCS,ZINC	1
	4599	½" NOTCHED WASHER	4
13	4658	GEARBOX SPACER RING	1
	4659	FUEL TANK ISOLATION PAD	1
	4660	M8-1.25MM X 30MM LG SHCS	3

## GEARBOX LUBRICATION INFORMATION

**Type of Oil:** A good quality SAE 90 EP gear oil is the basic requirement. A multi-grade gear oil may be used as long as the span includes the 90 weight (i.e. 75-90), and they have the EP (Extreme Pressure) additives.

Bima gearboxes are shipped to the manufacturer without oil. It is the responsibility of the manufacturer, dealer, or end user to properly fill the gearbox before initial use.

**Filling:** The gearbox should be filled while in a level position. Prior to filling the gearbox for the first time, the drain plug should be removed and coated with thread sealing compound (i.e. pipe dope) or Teflon tape, and then tightened firmly into the threads. Remove the level and fill plugs. Slowly pour the oil in the fill hole until it reaches the bottom of the level plug hole. Apply sealant to the level and fill plugs and replace in their respective holes. Oil required for Gearbox is approx. 1-3/4 quarts (1.7 Liters)

Note that some gearboxes are equipped with sight plugs – these do not require removal, and oil should be added until it is just visible in the sight plug. Some gearboxes may be equipped with a dipstick on the fill plug – fill with oil until the level reaches the ring inscribed on the dipstick.

**Changing:** It is recommended that the oil be changed after the first 50 hours of use, and then after every 500 hours of use. The initial change is critical to remove fine metal particles produced as the gears polish their contact surfaces. Flushing the gearbox with a solvent is not required.

**Checking:** Remove the level plug and check if the oil is at the proper level (if equipped with a dipstick, check the level against the ring inscribed on the tube). Add oil as required.

If a gearbox loses oil during use, inspect oil seals for damage or leaking. If a gearbox repeatedly loses oil from its seals, it is an indication that the internal pressure is too high. Causes of high internal pressure may be:

- Overfilling with oil (especially when used at higher rpm's)
- Gearbox being used at too high a load or duty cycle
- Overheating
- Incorrectly installed oil seal
- Damage to sealing surface on shaft

A breather plug can sometimes help alleviate high internal pressures due to high loads and/or duty cycles, but is not a solution for an undersized gearbox.

If any covers are removed for inspection, scrape off any old sealant from all surfaces and re-seal with an oil resistant RTV sealant (Permatex Blue #80022 or equivalent).

# BUFFALO TURBINE PRODUCTS

## CYCLONE 8000

The Cyclone 8000 Debris Blower is strategically priced to fit most budgets. This little powerhouse is already proving its worthiness in saving Time and Labor.



## MEGA

The word "MEGA" is defined as Impressive, Extreme and Mammoth. The NEW Buffalo Turbine MEGA lives up to its name!



## CYCLONE PTO

The Cyclone PTO incorporates an "Advanced" direct drive gearbox which significantly reduces routine maintenance. At 238lbs, it's the lightest, meanest turbine style PTO blower available!



## CYCLONE SQUARED

The Cyclone Squared with its "Twin Turbines", and wireless controlled dual independent nozzles, in most cases can handle twice the work in half the time. This versatile powerhouse is already a favorite on Golf courses, Racetracks, and the Paving Industry.



## CYCLONE KB4

The Cyclone KB4 with its "More Powerful" CH740 Kohler Engine and a "State of the Art" Wireless Remote System is the most powerful KB unit to date.



## HYDRAULIC

The Hydraulic debris blower features our built in "flow and pressure" control system and easily attaches to most skid steers. This handy attachment comes complete with mounting plate and hoses.

