PARTS LIST OPERATING AND SERVICE MANUAL



LEGEND "P" SERIES BLOWERS

6" – 8" GEAR DIAMETER

Models GAF\_\_P\_ GAG\_\_P\_ GAH\_\_P\_

SB-7-622 Version 04 July 9, 2015



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#### MAINTAIN BLOWER RELIABILITY AND PERFORMANCE WITH GENUINE GARDNER DENVER PARTS AND SUPPORT SERVICES

Factory genuine parts, manufactured to design tolerances, are developed for optimum dependability - - - specifically for your blower. Design and material innovations are born from years of experience with hundreds of different blower applications. When you specify factory genuine parts you are assured of receiving parts that incorporate the most current design advancements manufactured in our state-of-the-art blower factory under exacting quality standards.

Your AUTHORIZED DISTRIBUTOR offers all the backup you require. A worldwide network of authorized distributors provides the finest product support in the blower industry.

- 1. Trained parts technical representatives to assist you in selecting the correct replacement parts.
- 2. Complete inventory of new machines and new, genuine factory parts.
- 3. A full line of factory tested AEONi PD blower lubricants specifically formulated for optimum performance in all blowers.
- 4. Authorized distributor service technicians are factory-trained and skilled in blower maintenance and repair. They are ready to respond and assist you by providing fast, expert maintenance and repair service.

#### INSTRUCTIONS FOR DETERMINING BLOWER CONFIGURATION

- 1. Face the blower drive shaft.
- 2. In a **VERTICAL** configuration, air flow is horizontal.
- 3. In a **HORIZONTAL** configuration, air flow is vertical.
- 4. In a vertical configuration, a **BOTTOM HAND** exists when the drive shaft is below the horizontal center line of the blower. A **TOP HAND** exits when the drive shaft is above the horizontal center line of the blower.
- 5. In a horizontal configuration, a **RIGHT HAND** exists when the drive shaft is to the right of the vertical center line of the blower. A **LEFT HAND** exists when the drive shaft is to the left of the vertical center line of the blower.

#### INSTRUCTIONS FOR ORDERING REPAIR PARTS

For pricing, and ordering information contact your nearest AUTHORIZED FACTORY DISTRIBUTOR. When ordering parts, specify Blower **MODEL** and **SERIAL NUMBER** (see nameplate on unit).

Rely upon the knowledge and experience of your AUTHORIZED DISTRIBUTOR and let them assist you in making the proper parts selection for your blower.

For the location of your local authorized Gardner Denver blower distributor refer to the yellow pages of your phone directory, check the Web site at <u>www.gardnerdenver.com</u> or contact:

Gardner Denver Compressor Division 1800 Gardner Expressway Quincy, IL 62305 Phone: (217) 222-5400 Fax: (217) 221-8780

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## GARDNER DENVER LUBRICANT ORDER INFORMATION

Re--order Part Numbers for Factory--Recommended Lubricants.

## Gear End

AEON PD Synthetic Lubricant or AEON PD--Food Grade Synthetic Lubricant

## **AEON PD Synthetic Lubricant**

Description	Part Number
1 Quart	28G23
Case/12Quarts	28G24
1 Gallon Container	28G40
5 Gallon Pail	28G25
55 Gallon Drum	28G28

## **AEON PD--Food Grade Synthetic Lubricant**

Description	Part Number
1 Quart	28H97
Case/12Quarts	28H98
1 Gallon Container	28H333
5 Gallon Pail	28H99
55 Gallon Drum	28H100

## **Drive End**

AEON PD Grease

Description Case/10 Tubes Part Number 28H283

Call your local Sutorbilt Distributor to place your order for Gardner Denver lubricants. Your Authorized Gardner Denver Distributor is:



### FOREWORD

Sutorbilt<sup>®</sup> blowers are the result of advanced engineering and skilled manufacturing. To be assured of receiving maximum service from this machine, the owner must exercise care in its operation and maintenance. This book is written to give the operator and maintenance department essential information for day-to-day operation, maintenance and adjustment. Careful adherence to these instructions will result in economical operation and minimum downtime.

# 

Danger is used to indicate the presence of a hazard which will cause severe personal injury, death, or substantial property damage if the warning is ignored.

# **WARNING**

Warning is used to indicate the presence of a hazard which can cause severe personal injury, death, or substantial property damage if the warning is ignored.

# 

Caution is used to indicate the presence of a hazard which will or can cause minor personal injury or property damage if the warning is ignored.

## NOTICE

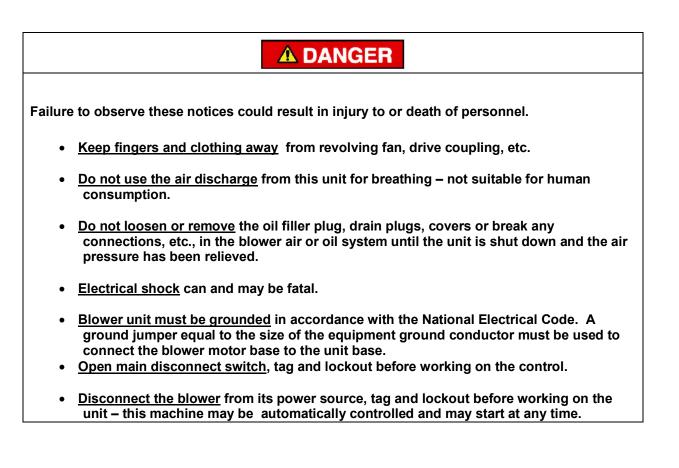
Notice is used to notify people of installation, operation or maintenance information which is important but not hazard-related.





#### SAFETY PRECAUTIONS

Safety is everybody business and is based on your use of good common sense. All situations or circumstances cannot always be predicted and covered by established rules. Therefore, use your past experience, watch out for safety hazards and be cautious. Some general safety precautions are given below:



# **WARNING**

Failure to observe these notices could result in damage to equipment.

- <u>Stop the unit if any repairs or adjustments on or around the blower are required.</u>
- <u>Disconnect the blower</u> from its power source, tag and lockout before working on the unit this machine maybe automatically controlled and may start at any time.
- <u>Do not exceed</u> the rated maximum speed shown on the nameplate.
- <u>Do not operate unit</u> if safety devices are not operating properly. Check periodically. Never bypass safety devices.

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## SUTORBILT LEGEND SERIES BLOWERS MATRIX/MENU

NOTICE TO CUSTOMER. To find the construction options for Your blower unit, FILL IN THE BALANCE OF LETTERS OR G NUMBERS FROM YOUR UNIT NAMEPLATE	A				Ρ	
COLUMN NUMBER: FOLLOW THE LINE DOWN AND OVER FROM EACH SPACE THUS FILLED IN TO FIND THE APPROPRICATE CONSTRUCTION OPTION WITH WHICH YOUR MACHINE IS EQUIPPED.	1	2	3	4	5	67
COLUMN 1 . BASIC DESIGNATOR						
COLUMN 2 . PRODUCT FAMILY						
COLUMN 3 . GEAR DIAMETER F   6+ G   7+ H   8+			_			
COLUMN 4 . CASE LENGTH						
L - Low Pressure M - Medium Pressure H - High Pressure						
COLUMN 5 . CONFIGURATION						
<ul> <li>A Vertical-Top Hand -Central Timed</li> <li>B Vertical-Bottom Hand . Central Timed</li> <li>C Horizontal . Left Hand . Central Timed</li> <li>D Horizontal . Right Hand . Central Timed</li> </ul>						
COLUMN 6 . DESIGN VERSION						
COLUMN 7 . ADDITIONAL DESCRIPTION						
A. Lip Seal						

B. Mechanical Seal

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## INTRODUCTION YOUR KEY TO TROUBLE FREE SERVICE

Thank you for investing in Sutorbilt quality. The Sutorbuilt reputation for rugged dependability has been earned by over 50 years of service in demanding, industrial operations where downtime cannot be tolerated and efficient blower performance is expected.

Your Sutorbilt blower is a precision engineered blower that has been carefully manufactured and thoroughly tested at the state-of the art Gardner Denver Blower Factory in Sedalia, Missouri.

As with other precision machinery, there are several relatively simple installation, operation and maintenance procedures that you must observe to assure optimum blower performance. There is no guesswork in the manufacture of your highly advanced Sutorbilt blower and there must be none in preparing the blower to get the job done in the field.

The purpose of this manual is to help you properly install, operate and maintain your Sutorbilt blower. It is essential that you review all sections of this manual in preparation for installing your blower. Follow the instructions for installing your blower. Follow the instructions carefully and you will be rewarded with trouble-free Sutorbilt service year in and year out.



## SECTION 1 EQUIPMENT CHECK

Before uncrating, check the packing slip carefully to be sure all the parts have been received. All accessories are listed as separate items on the packing slip, and small important accessories such as relief valves can be overlooked or lost. After every item on the packing slip has been checked off, uncrate carefully. Register a claim with the carrier for lost or damaged equipment.

## **WARNING**

Customers are cautioned to provide adequate protection, warning and safety equipment necessary to protect personnel against hazards involved in installation and operation of this equipment in the system or facility.

## STORAGE

Your Gardner Denver Blower was packaged at the factory with adequate protection to permit normal storage for up to six (6) months.

If the unit is to be stored under adverse conditions or for extended periods of time, the following additional measures should be taken to prevent damage.

1. Store the blower in a clean, dry, heated (if possible) area.

- 2. Make certain inlet and discharge air ports are tightly covered to prevent foreign material from entering the air box.
- 3. All exposed, non-painted surfaces should be protected against rust and corrosion.
- 4. Provide adequate protection to avoid accidental mechanical damage.
- 5. In high humidity or corrosive environments, additional measures may be required to prevent rusting of the blower internal surfaces.
- 6. To prevent rusting of gears, bearings, etc., the oil reservoirs may be filled with normal operating oil.

## 

Before running the blower, drain the oil and replace to the proper operating level with clean, fresh lubricant.

7. Rotate the blower shaft (10 to 25 turns) weekly during storage. Inspect the blower shaft (near the shaft seal area) monthly and spray with rust inhibitor if needed.

8. For long term storage (over six (6) months), contact Gardner Denver Compressor Division Customer Service for recommendations. **REMOVING PROTECTIVE MATERIALS** 

The shaft extension is protected with rust inhibitor which can be removed with any standard solvent.

## **A**CAUTION

Follow the safety directions of the solvent manufacturer.

Blower inlet and outlet are temporarily capped to keep out dirt and other contaminants during shipment. These covers must be removed before start-up.

The internal surfaces of all Sutorbilt units are mist sprayed with a rust preventative to protect the machine during shipment. Remove this film upon initial startup, using any commercial safety solvent. Position the blower so that the inlet and discharge connections are in the vertical position (vertical airflow). On vertically mounted units, it will be necessary to lay the unit on its side supporting the ends of the unit so as not to restrict the port on the bottom side. Place a shallow pan on the under side of the unit. With the blower disconnected from power, spray the solvent in the top port, rotating the impellers by spinning the shaft manually. Continue this procedure until the unit is visibly clean.

## **WARNING**

Rotating components will cause severe injury in case of personal contact. Keep hands and loose clothing away from blower inlet and discharge ports..



## SECTION 2 INSTALLATION

## LOCATION

Install the blower in a well lit, clean dry place with plenty of room for inspection and maintenance.

### FOUNDATIONS

For permanent installation we recommend concrete foundations be provided, and the equipment should be grouted to the concrete. It is necessary that a suitable base be used, such as a steel combination base under blower and motor, or a separate sole plate under each. Before grouting, equipment must be leveled, free of all stains, and anchored so no movement will occur during setting of grout. After grout has completely hardened, a recheck is necessary to compensate for shrinkage, etc. If required, add shims under blower feet after final tightening of foundation anchor bolts to remove strain from the blower housing.

Where jack screws or wedges are used during grouting, they must be backed off and wedges removed before final tightening of anchor bolts. Refer to grouting instructions.

Where a concrete foundation is not feasible, care must be taken to insure that equipment is firmly

anchored to adequate structural members, restricting movement and vibration. **MOUNTING CONFIGURATIONS** 

The blower flex-mount design enables horizontal and vertical mounting configurations with top or bottom hand, right or left hand shaft positioning. The units are center timed allowing rotation in either direction (refer to Figure 2-1). If converting a blower from vertical to horizontal, or horizontal to vertical mounting configuration, additional mounting feet will be required.

### **REPOSITIONING THE MOUNTING FEET.**

1. Position the mounting feet to the desired location and snug the capscrew.

2. Place the blower on its feet on a flat surface.

3. Loosen mounting feet capscrews and level unit up. The bench or blower base flatness should be within .002 of an inch.

## NOTICE

If the unit is not flat within .002 of an inch, it will be necessary to shim the blower feet at installation.

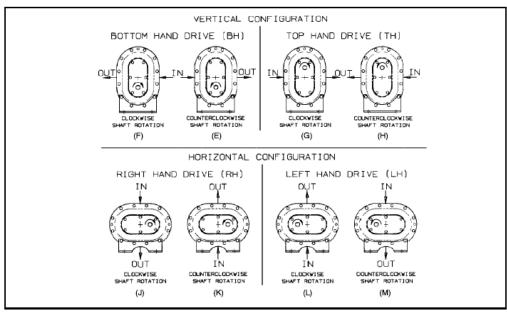


FIGURE 2-1 – BLOWER MOUNTING CONFIGURATIONS



4. Secure the mounting feet capscrews to the torque value in Figure 7-8, page 34.

## NOTICE

Over tightening belts leads to heavy bearing loads and premature failure.

NOTICE When changing mounting configuration, it may be necessary to reposition vent plug (B), and drain plug (A). Refer to Figure 3-1, page 17, for correct location.

#### **DRIVE INSTALLATION**

When selecting a V-belt drive, check to be sure the shaft overhung load limitation is not exceeded. Refer to FIGURE 2-2, page 13, for overhung load calculations and limitations.

Belt drives must be carefully aligned. Motor and blower pulleys must be parallel to each other and in the same plane within 1/32 inch. Belt tension should be carefully adjusted to the belt manufacturers recommendation using a belt tension gauge. Check tension frequently during the first day of operation.

## **WARNING**

Over tightening belts leads to heavy bearing loads and premature failure.

On the direct connected units, alignment and lubrication of couplings to specifications of the coupling manufacturer is very important. When mounted drives are supplied from the factory proper alignment has been established before shipment. However, during shipping, handling and installation, it is likely that the alignment has been disturbed and final adjustment must be made before startup.

## **WARNING**

Exceeding overhung load limitations leads to unwarrantable premature bearing failure and shaft breakage.

The location of the sheave on the blower shaft greatly affects the stress in the shaft. The optimum blower

sheave positioning is as close as possible to the blower drive cover, not to exceed dimension %2+in Drive Shaft Illustration, FIGURE 2-2, page 13

The calculated shaft moment must not exceed the maximum allowable moment listed in Maximum Allowable Moment Chart, FIGURE 2- 2 page 13. If the calculated shaft moment exceed the maximum allowable moment:

- Increase Sheave Diameters to Reduce Belt Pull
- Use Jackshaft Drive
- Use Direct Coupled or Gearbox Drive

To calculate shaft moment for a given V-Belt Drive Arrangement:

- Use the formula for Calculation of Belt Pull, FIGURE 2- 2, page 13, to calculate belt pull. Refer to Arc of Contact Factor Chart, Figure 2-2, page 15.
- Insert the calculated belt pull into the formula for Calculation of Shaft Moment, FIGURE 2- 2, page 13 to arrive at the calculated shaft moment.

#### PIPING

Inlet and discharge connections on all blowers are large enough to handle maximum volume with minimum friction loss. Reducing the pipe diameter on either inlet or discharge will only create additional line loss and increase the overall pressure differential.

Excessive weight of piping and fittings will cause internal misalignment and premature wear. Never allow the blower to carry the weight of the pipe. If possible, a spool or sleeve-type expansion joint should be installed between the unit and the piping. Where a flexible connection is not practical, the weight of the rigid connection must be separately supported.

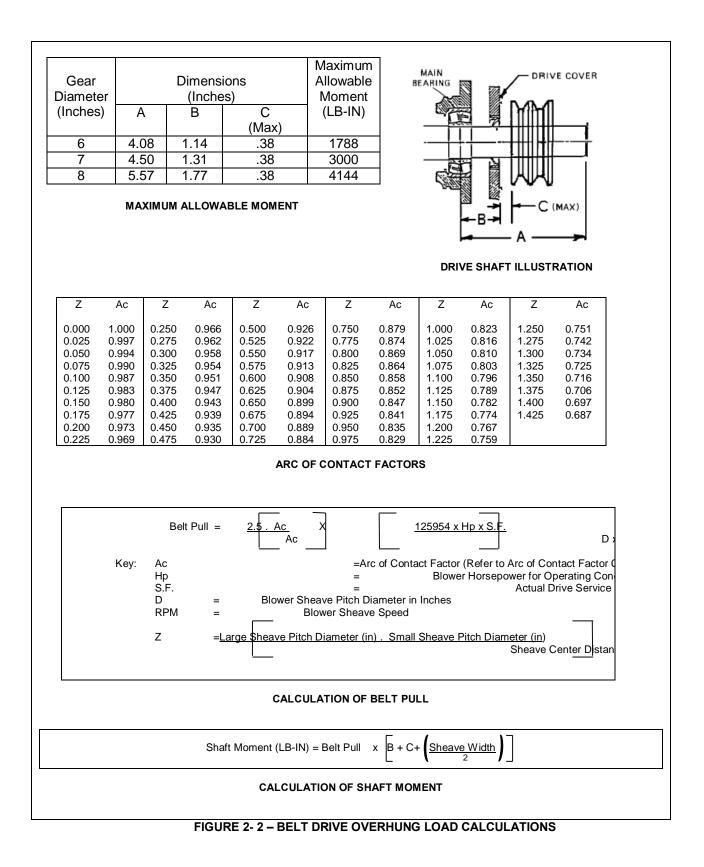
All system piping must be cleaned internally before connecting to the blower.

## **WARNING**

Sutorbilt blowers are shipped dry from the factory. Do not attempt to operate the blower before following proper lubrication instructions. Permanent damage to the gears, bearings and seals will occur.



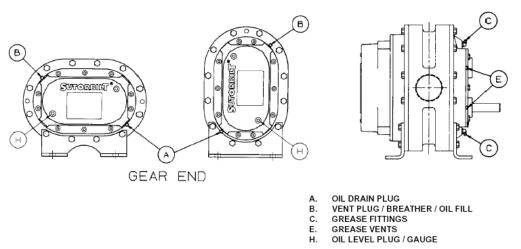
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## SECTION 3 LUBRICATION



#### **FIGURE3-1-LUBRICATION**

At the gear end the timing gear teeth are lubricated by being partially submerged in oil. The gear teeth serve as oil slingers for gear end bearings. At the drive end the bearings are grease lubricated.

### FILLING PROCEDURE

Refer to Figure 3-1. Remove the breather (B) from the gear cover. Add oil to the gear case until it reaches the center line of the oil level gauge (H). Secure breather (B) in its correct location.

#### LUBRICATION SERVICE

Add fresh oil as required to maintain proper level. The oil should be drained, flushed and replaced every 1500 hours or more frequently if inspection so indicates. The oil drain plug is located at (A).

## **WARNING**

Do not overfill as this will tend to cause excessive heating of the gears and may damage the unit.

Bearings on the drive end of the blower require grease lubrication every 500 hours of operation. Lubricate the bearings through grease fitting located at (C). When regreasing, the old grease will be forced out of the vents (E). To prevent damage to seals, these vents must be open at all times.

## AIR FILTERS AND FILTER SILENCERS

**A**WARNING

Servicing the air filters is one of the most important maintenance operations to be preformed to insure long blower life.

Servicing frequency of filter elements is not time predictable. A differential pressure indicator, with a continuous gauge reading, should be installed across the inlet filter. It will tell how much of the service life of the filter element has been used. It will also eliminate both premature filter servicing and premature blower failure due to a plugged filter when the filter pressure drop is used to establish maintenance points. In all cases refer to the filter manufactureres service instructions. Due to the many types of filters, it is not practical to give specific instructions covering all models.

## NOTICE

Do not overfill as this will tend to cause excessive heating of the gears and may damage the unit.

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### **GEAR END LUBRICATION**

AEON PD Synthetic Blower Lubricant is recommended. Refer to FIGURE 3-3, for AEON PD, AEON PD-FG (Food Grade) and AEON PD-XD (Extreme Duty) part numbers. Order AEON PD from your Gardner Denver Distributor or call Gardner Denver directly.

Convenient		AEON PD-FG	
Package Sizes	Part No.	Part No.	Part No.
1 quart	28G23	28H97	28G46
Case	28G24	28H98	28G47
12 quarts			
1 gallon	28G40	28H333	28G42
Case	28G41	28H334	28G43
6 gallons			
5 gallon pail	28G25	28H99	28G44
55 gallon drum	28G28	28H100	28G45

FIGURE3- 2 – AEON PD SYNTHETIC LUBRICANT

AEON PD is formulated especially for positive displacement blower service to provide maximum blower protection at any temperature. One fill of AEON PD will last a minimum of 4 times longer than a premium mineral oil. Refer to FIGURE 3-4.

		Ambient Temperatures				
		Less than 10° F	10°F to 32°F	32°F to 90°F	Greater than 90°F	
	Less than 32°F	AEON PD AEON PD-FG	AEON PD AEON PD-FG			
Diawar	32° F to 100° F	AEON PD AEON PD-FG	AEON PD AEON PD-FG	AEON PD AEON PD-FG		
Blower Discharge Temperature	100° F to 225°F	AEON PD AEON PD-FG	AEON PD AEON PD-FG	AEON PD AEON PD-FG	AEON PD AEON PD-FG	
-	225° F to 300° F	AEON PD AEON PD-FG	AEON PD AEON PD-FG	AEON PD AEON PD-FG	AEON PD XD	
	Greater than 300°F			AEON PD XD	AEON PD XD	

FIGURE3-3. SYNTHETIC LUBRICANT CHART





## SECTION 4 OPERATION

Future operating problems can be avoided if proper precautions are observed when the equipment is first put into service.

Before starting under power, the blower should be turned over by hand to make certain there is not binding or internal contact.

Each size blower has limits on pressure differential, running speed and discharge temperature which must not be exceeded. These limits are shown in Maximum Operating Limitations+, FIGURE 4-1, below.

## **WARNING**

#### Operating beyond the specified operating limitations will result in damage to the unit.

It is important that the pressures and temperatures are measured directly at the ports of the blower to avoid error that may be caused by intervening pipe runs, fittings, etc.

Relief valves must be used to protect against excessive pressure or vacuum conditions. These valves should be tested at initial startup to be sure they are adjusted to relieve at or below the maximum pressure differential rating of the blower.

## NOTICE

## Relief valves should be placed as close as possible to the blower inlet or discharge.

In some instances, pressure may be relieved at a lower point than the blower maximum in order to protect the motor or the equipment served by the blower.

Discharge temperature switches are recommended to protect against excessive inlet restriction or inlet temperatures. Check valves in the discharge line on pressure blowers and in the inlet line on vacuum blowers are recommended to protect the blower from motoring backwards when shut down under load.

#### LIMITATIONS

For information regarding limitations, refer to FIGURE 4-1, below.

MAXIMUM OPERATING LIMITATIONS						
SIZE	RPM	PRESSURE PSI	VAC IN HG	DISCHARGE TEMPERATURE ° F		
6LP	2350	7	14	260		
6MP	2350	14	16	325		
6HP	2350	15	16	340		
7LP	2050	6	12	260		
7MP	2050	10	16	325		
7HP	2050	15	16	340		
8LP	1800	6	12	260		
8MP	1800	10	16	325		
8HP	1800	15	16	340		
DO NOT EXCEED THESE LIMITS						
NOTICE						

Blower speed, line losses, elevation, and increased inlet temperatures will affect the maximum operating limitations.

#### FIGURE 4-1 - MAXIMUM OPERATING LIMITATIONS



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### **BLOWER STARTUP CHECKLIST**

This startup procedure should be followed during the initial installation and after any shutdown periods or after the blower has been worked on or moved to new location. It is suggested that the steps be followed in sequence and checked off ( $\frac{1}{2}$ ) in the boxes provided.

1.	Check the unit and all piping for foreign material and clean if required.
2.	Check the flatness of the feet and the alignment of the drive. Feet that are bolted down in a bind can cause housing distortion and internal rubbing. Misaligned V-drives can cause the rotors to rub against the headplates and cause a reduction in the volumetric efficiency of the unit. Misaligned couplings can ruin bearings.
3.	If the blower is V-belt driven, check the belt tension and alignment. Over-tensioned belts create heavy bearing/shaft loads which lead to premature failure.
4.	Be sure adequate drive guards are in place to protect the operator from severe personal injury and incidental contact.

- 5. Check the unit for proper lubrication. Proper oil level cannot be over-emphasized. Too little oil will ruin bearings and gears. Too much oil will cause overheating and can ruin gears and cause other damage. Insure that grease lubricated bearings are properly lubricated.
- 6. With motor electrical power locked out and disconnected, turn the drive shaft by hand to be certain the impellers do not bind.
- 7. % log+the unit with the motor a few times to check that rotation is in the proper direction, and to be certain it turns freely and smoothly.
  - 8. The internal surfaces of all Sutorbilt units are mist sprayed with a rust preventive to protect the machine during the shipping and installation period. This film should be removed upon initial startup.
- 9. Start the unit and operate 15 minutes at no load. During this time, check for hot spots and other indications of interference.
- 10. Apply the load and observe the operation of the unit for one hour. Check frequently during the first day of operation.
- 11. If malfunctions occur, do not continue to operate. Problems such as knocking rotors can cause serious damage if the unit is operated without correction.

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## SAFETY PRECAUTIONS

- 1. Do not operate blower with open inlet or outlet port.
- 2. Do not exceed specified vacuum or pressure limitations.
- 3. Do not operate above or below recommended blower speed range.
- 4. Blower is not to be used where non-sparking equipment is specified.
- 5. Do not operate without belt guard or coupling shield.

# **WARNING**

#### Do not exceed sheave or coupling manufacturer's rim speed limit.

- 6. The blower and blower discharge piping may be extremely hot and cause skin burns on contact.
- 7. Prolonged exposure may require ear protection.

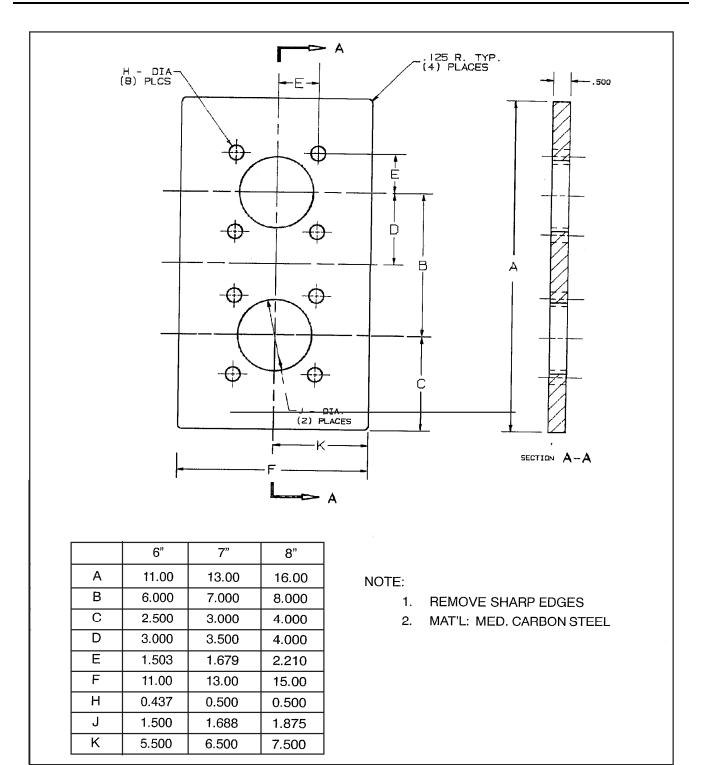
### **TROUBLE SHOOTING**

No matter how well the equipment is designed and manufactured, there may be times when servicing will be required due to normal wear, the need for adjustment, or various external causes. Whenever equipment needs attention, the operator or repairman should be able to locate the cause and correct the trouble quickly. The Trouble Shooting Chart below is provided to assist the mechanic in those respects.

PROBLEM		POSSIBLE CAUSES		SOLUTION
	1.	Unit out of time.	1.	
	2.	Distortion due to improper mounting	2.	Check mounting alignment and relieve pipe
		or pipe strains.		strains.
	3.	Excessive pressure differential.	3.	Reduce to manufactureros recommended
Knocking				pressure. Examine relief valve, re-set if
				necessary.
	4.	Worn gears.	4.	J
	5.	Worn bearings.	5.	Replace bearings
	1.	Too much oil in gear case.	1.	Reduce oil level.
	2.	Too low operating speed.	2.	Increase blower speed.
	3.	Dirty air Filter.	3.	Clean or replace air filter
Excessive blower temperature.	4.	Clogged filter or muffler.	4.	Remove cause of obstruction.
Excessive blower temperature.	5.	Excessive pressure differential.	5.	Reduce pressure differential
				across the blower.
	6.	Worn impeller clearances.		Replace impeller.
	7.	Internal contact.	7.	Correct clearances.
	1.	Insufficient assembled clearances.	1.	Correct clearances.
less allow and an time does	2.	Case or frame distortion.	2.	Check mounting and pipe strain.
Impeller end or tip drag.	3.	Excessive operating pressure.		Remove cause.
	4.	Excessive operating	4.	Remove cause
	1.	Slipping belts.	1.	Tighten belts.
Lack of volume.	2.	Worn clearances.		Re-establish proper clearances.
	3.	Dirty air filter	3.	Clean or replace air filter.
Excessive bearing or gear wear.	1.	Improper lubrication.	1.	Correct lubrication level. Replace dirty oil.
	1.	Headplate, gear case or drive cover		1. Clean vents.
Loss of oil.		vents plugged.		
	2.	Worn Seal.		2. Replace seals.



## SECTION 5 MAINTENANCE





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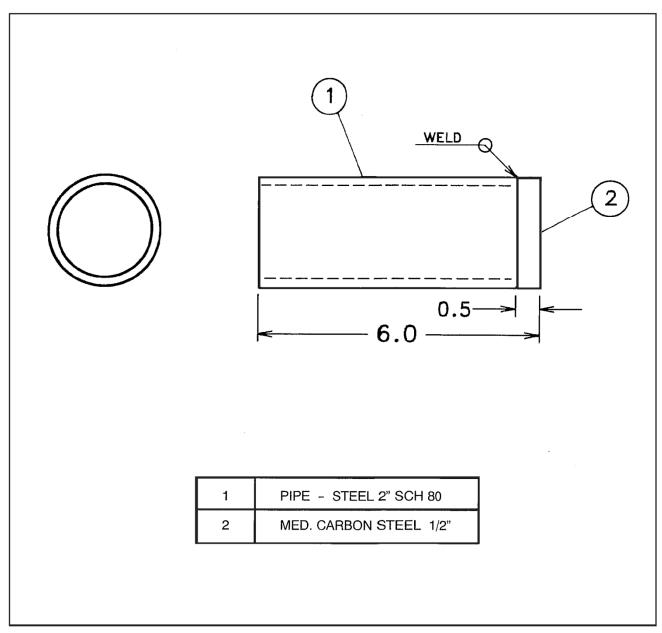


FIGURE 5-2 - GEAR DRIVEN - SK2150



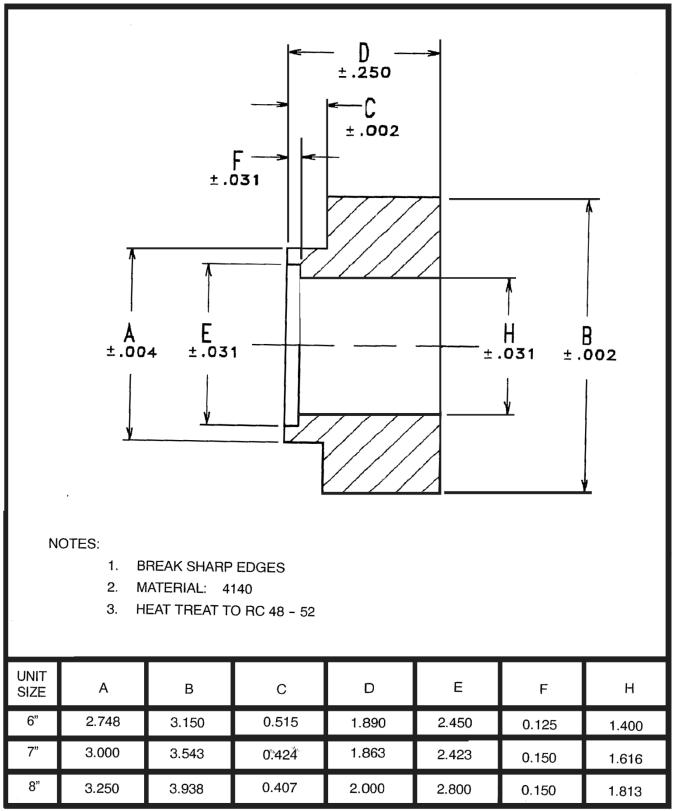


FIGURE 5-3 – MECHANICAL SEAL INSTALLATION TOOL – SK2152



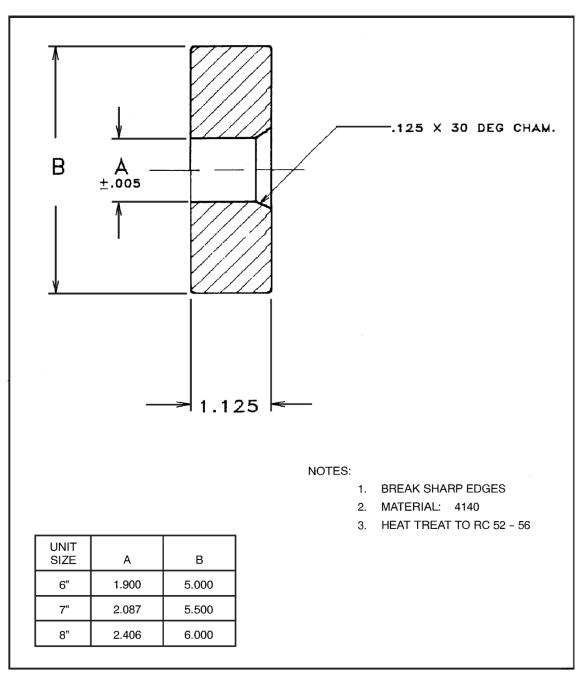


FIGURE 5-4



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# NOTICE

Numbers in parentheses () refer to key numbers in assembly drawings on pages 35, 37 and 39.

- 1. Drain oil from gear case by removing drain plug (4).
- 2. Remove the socket head bolts (5) from the gear cover (3).
- 3. Remove the gear cover from the gear headplate.

# NOTICE

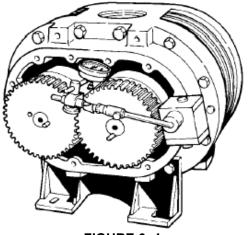
The cover and gear headplate gasket tends to bond tightly to both surfaces. After socket head bolt removal, it is sometimes necessary to take a ball peen hammer and a blunt chisel and drive off the cover.

## IMPORTANT:

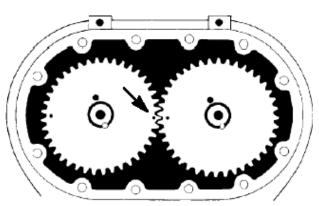
MARK ALL PARTS WITH A CENTER PUNCH SO THEY CAN BE REASSEMBLED IN THE SAMEPOSITION (IMPELLERS, HEADPLATES, AND GEARS).

- 4. If the timing gears appear undamaged, the gear backlash must be checked to see if the gears can be salvaged.
  - A. Mount a magnetic base dial indicator on the gear headplate (see FIGURE 6-1).
  - B. Lock one impeller stationary by wedging a feeler gauge between the impeller and the headplate.
  - C. The tip of the indicator should be placed at the center of the contact surface on a tooth of the gear on the free shaft.
  - D. Rock the impeller back and forth by hand and read the total rotational movement to the nearest .0005 inches. Do this at four gear mesh positions 90 degrees apart.
  - E. Permissible gear backlash is shown below.

GEAR DIA.	GEAR BACKLASH
6+	.002003
7+	.003005
8+	.003006

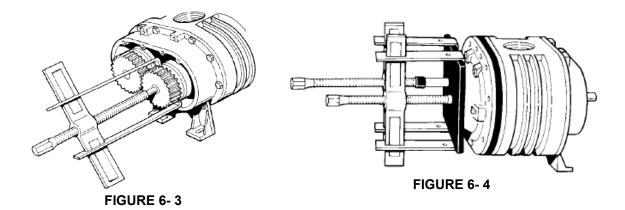












## NOTICE

If backlash is above the specified limit, the gears are not necessarily unusable. Excessive play could be caused by worn bearings.

5. If timing gears appear to be reusable, match mark timing gear tooth mesh by making small punch marks on the ends of meshing gear teeth with a pin punch and hammer (see FIGURE 6-2, page 25). The impeller tip to valley (throat) and the case to headplates should also be match marked to facilitate blower reassembly.

6. Remove each timing hub (39) and the timing gear (9) as a complete assembly with a gear puller. (See Figure 6-3). Do not remove timing bolts (38) or threaded taper pins (36), unless the gears or hubs will be replaced.

## NOTICE

Blowers with mechanical seals have two wavy washers (28) located between the bearings and the cover on the drive end.

7. Remove the socket head cap screws (30) from the drive end bearing cover (29) and remove the cover. Drive shaft oil seal (31) should come free when cover is removed.

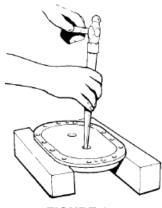


FIGURE 6-5

- 8. Remove mounting foot (17) from the drive headplate (24) by removing the capscrews (16).
- 9. Remove the capscrews (21) which secure the drive headplate (24) to the impeller case (22).

10. Using the fabricated puller plate shown on page 23, bolt to the drive headplate using the tapped holes used to secure the drive cover.

11. Install a gear puller to each shaft and attach puller arms to the plate. Turn each puller only half a revolution at a time keeping the advance of the shafts as uniform as possible (see Figure 6-4). After the headplate has been removed, detach the puller plate.



12. Remove the two drive end bearings (14) from the drive headplate (24) using a ball peen hammer and punch (see Figure 6-5, page 26).

# 

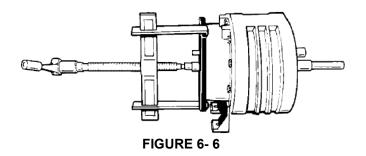
#### Exercise care not to damage the headplate bearing bores when removing bearings.

13. Remove the drive end spacers (33), (34) and (41). The grease seals (15) can now be driven out of the drive headplate with hammer and punch (see Figure 6-5, page 27). Discard the seals as they will not be reused. Replace grease seals each time the headplate is removed.

## NOTICE

Seals and bearings should be replaced during overhaul as a matter of service policy.

NOTICE Seals and bearings should be replaced during overhaul as a matter of service policy.



- 14. Remove the four cap screws (10), which fasten the bearing retainers (12) to the gear headplate.
- 15. Attach fabricated puller late to the gear headplate sing the tapped holes used to secure the bearing retainers.
- 16. Install a gear puller to one f the shafts and attach puller arms to the plate see Figure 6-6).
- 17. Push the impeller shaft through the gear headplate and remove the impeller assembly (23) see Figure 6-6). Remove the other impeller assembly following the same procedure.
- 18. Remove mounting foot (17) from the gear headplate by removing 4 capscrews (16).
- 19. Remove the cap screws (21) securing the gear headplate to the impeller case. Located near each dowel pin on the headplate is a threaded hole. Insert a 5/16-18 UNC capscrew into each of the threaded holes. Tighten the screws evenly until the headplate separates from the impeller case.
- 20. Remove the two gear and bearings (14) from the gear headplate (18) as done in step 12.
- 21. Remove the bearing seal spacers (33) and oil seals (15) from the gear headplate as done in Step 13.

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## SECTION 7 ASSEMBLY INSTRUCTIONS

# NOTICE

## Numbers in parentheses () refer to key numbers in assembly drawings on pages 35, 37, 39 and 41.

1. Make sure all metallic parts are clean and free of any nicks or burrs.

2. Lubricate the outside diameter of the lip seal (15) with a light oil or grease. Install seals in both the drive headplate (24) and gear headplate (18). The seal lip should always face towards the bearing or lubricant. New seals should be installed each time the headplate is removed.

## NOTICE Make sure seals are fully seated. Use extreme care when installing.

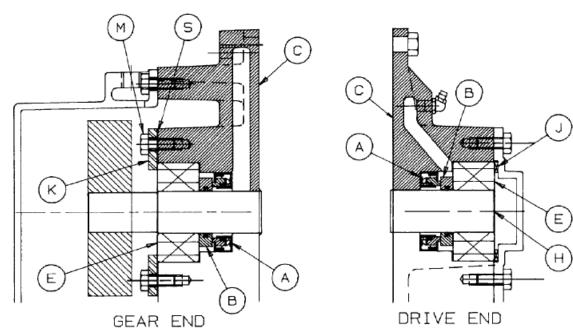
#### MECHANICAL SEALS ONLY

A. Lightly coat the headplate bores with assembly lubricant.

B. Refer to Figure 7-1. Install mechanical seal (A) into the headplate bore (C) using a press and the correct driver shown on page 24. Drive the seal securely on to its seat.

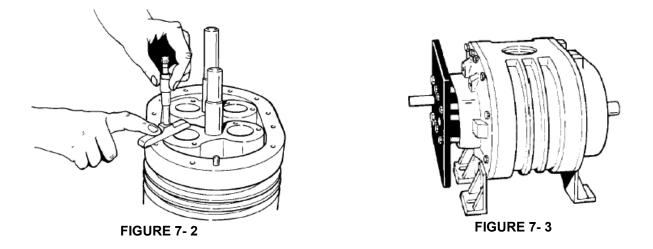
# 

Use extreme care when installing seals in the headplate bores. Do not attempt to install the mechanical seals without the use of a press. Blows from a hammer or mallet can damage the fragile seal surface. Too much force can crush the seal casing. Make certain the seal is properly seated and undamaged before proceeding.





pdbl&wers



- 3. Assemble gear headplate (18) and mounting foot (17) to the impeller case with cap screws (21) and where the mounting foot is secured to the headplate use capscrews (16). The two positioning dowel pins (19) will ensure proper alignment of the headplate and impeller case. Also secure lifting lugs using capscrews (21) (see exploded assembly drawing on page 35. Refer to Figure 7-8, page 34, for torque specifications.
- 4. Apply a light oil or grease on the shaft seal areas and the bearing areas. Insert impellers into the gear headplate using the same headplate bores as used in the original assembly.

# 

Seals are delicate; use extreme care when installing impeller shafts in the headplate bores. A piece of light shim stock wrapped around the shaft keyway will prevent cutting the seal lip.

5. Position blower so that impellers are vertical, with the drive end on top. It will be necessary to use blocks in order for the unit to set level. Measure the total end clearance using a depth micrometer (see Figure 7-2). If total clearance is not within the limits specified in Figure 7-4, page 30, it may be necessary to shim the case to obtain the proper total end clearance. The shim should be placed between the drive headplate and impeller case.

# NOTICE

If more than .007" shim is required, put .007" on the drive end and the remaining on the gear end.

- 6. Assemble drive headplate (24) to impeller case as in step 3 with the gear headplate. If shims were required, place shims between drive headplate and impeller case.
- 7. Insert bearing-seal spacers (34), (41) into the drive shaft headplate bore and spacer (33) into the remaining bores (see exploded view, page 35).

## MECHANICAL SEALS ONLY

- A. Refer to Figure 7-1, page 28. Lightly coat the impeller shaft (H) and the inside diameter of the mating ring (B) with assembly lubricant.
- B. Install the mating ring (B) on the shaft only far enough to install spacer (34), (41) in the bore and allow for the bearing inner race (E) to be started on the shaft.

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# 

Do not drive the mating ring down to the mechanical seal, as this can damage the seal.

- C. Install mating ring (B) on the drive end short shaft and the gear end shaft as done in the previous step, but use spacer (33) (refer to gear end Figure 7-1, page 29).
- D. Brush the bearing inner race (E) with a light oil or grease.
- E. Using a press and the bearing installation tool shown on page 24, install the spherical roller bearing (35) on the drive end drive shaft. Install the three double row ball bearings on the remaining shaft ends. Bearings will position the mating ring (B) to the proper depth with respect to the mechanical seal (A) when the installation tool is tight against the headplate.

	AX BX B		В	A X CC A X	B	7		
	6H 6M	6L	7H	7M	7L	8H	8M	8L
TOTAL END CLEARANCE	.008012		.0	08012			.008012	
IMPELLER TO GEAR HEADPLATE	.004005		.0	04005			.004005	
IMPELLER TIMING (A-A) (C-C)	.009011		.0	09011			.011013	
TIP TO CASE CLEARANCE (B-B)	.006007		.0	06009			.007010	

#### FIGURE 7-4

8. Apply a light oil to the drive headplate bearing bore, bearing inside diameter, and shaft seat. Install the spherical roller bearing (35) on the drive end and the double row ball bearing (14) on the drive end driven shaft. Start the bearing in the bores without force.

9 Attach the puller plate shown on page 11 to the drive headplate using the tapped holes used to secure the drive cover (see Figure 7-2, page 21). Tighten the bolts so that the advance of the bearings stay as uniform as possible. Bearings should be pressed until fully seated in the bore.

# **NOTICE** Bearings will not be flush with gear headplate bores when completely seated

10. Lubricate the gear end bearing fits with a light oil as described previously. Install gear end bearings (14) as far as possible without force. Use the fabricated plate, used to install the drive end bearings, to press the bearings on the shafts as described in Step 9. Press bearings into the gear headplate unit completely seated in the bearing bore.

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11. Impeller should now be checked for free axial movement by hitting the ends of the impeller shafts with the palm of your hand.

12. Push the impellers against the gear headplate and recheck the total end clearance between the drive headplate and the impellers (see FIGURE 7-4, page 31).

A. If total end clearance is insufficient, loosen impeller case to headplate bolts on either headplate, and move the headplate away from the case far enough to insert a paper shim in the amount equal to the insufficient clearance. Retighten case bolts and again check the total end clearance. Refer to FIGURE 7-4, page 31, for correct clearance.

B. Excessive end clearances normally will require new impeller assemblies, but in some circumstances the impeller case can be removed and reduced in width by machining off the amount of excess clearance.



These impeller-to-impeller and impeller-to-case clearances are extremely critical. Even thought the blower may turn freely by hand when cold, under operating conditions, the parts expand, and the rotors are subject to slight deflection.

If the clearances are not sufficient the impellers may contact each other or the housing with destructive results. If the clearances are too great, the blower may not develop the pressure or airflow that is required to perform its function.

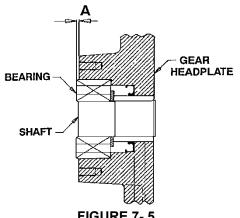


FIGURE 7-5

13. Impeller tip to case clearance should be checked at this time by inserting the correct thickness feeler gauge between the tip and the case (B) and rotating the impeller (see Figure 7-4, page 31). Repeat the procedure on both impellers.

## NOTICE

#### When checking the tip to case clearance, move the feeler gauge over the entire length of the impeller to ensure that the tips do not bind along their length.

14. Replace the drive shaft grease seal (31) in the drive end cover (29). The seal lip should always face toward the bearing or lubricant. Pack the bearing cavities with the recommended grease.

15. Secure drive cover (29) and wavy spring (28) to drive headplate using capscrews (30). Refer to Figure 7-8, page 36, for torgue specifications.

## NOTICE Exercise care not to damage the seal lip as it passes over shaft keyway.

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#### 16 SETTING IMPELLER END CLEARANCE

Refer to Figure 7-1, page 29. The gear end bearings are held in position by the force created by the wavy spring (28) on the drive end and the bearing retainer (12) on the gear end. The interference fit between the shaft (H) and the bearing inner race (E) keeps the shaft from moving axially.

End clearance adjustment of both impellers is controlled by adjustment of the bearing retainer (12). Tightening the bearing retainer screws (10) moves the bearing to load the wavy spring (28), and the impeller is forced toward the drive end. Relaxing the screws allows the wavy spring to return the impeller toward the gear end.

A. With impellers tight against the gear headplate, measure the distance (A) from the bearing outer race to the gear headplate using a depth micrometer (see Figure 7-5, page 32).

B. Subtract 1/3 of the total end clearance from the value measured at point (A). This value is the amount of shim (13) that should be placed between the retainer and the headplate at point (S).

C. Secure bearing retainer (12) with the correct amount of shim, to the headplate using capscrews (10). Torque capscrews to the specifications given in Figure 7-7, page 34.

D. Recheck end clearances. Approximately 1/3 of the total end clearance should be on the gear end and the remaining 2/3 on the drive end (refer to Figure 7-4, page 31).

If clearances require adjusting, loosen the bearing retainer capscrews (10) and insert shims to move the impeller closer to the gear headplate and remove shims to move the impellers away from the gear headplate.

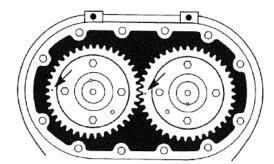


FIGURE 7-6

#### 17. INSTALLING THE TIMING GEARS

Impellers are held in time by gears which are taper pinned and bolted to a timing hub, which in turn is pressed and taper pinned onto the shaft. The timing gears can be rotated in relation to the hub by removing the taper pins in the web on the gear and loosening the capscrews. Because the capscrews are oversized, the gear will rotate . within limits . relative to the timing hub when the screws are loosened.

- A. Apply a light grease, or oil, on the shaft area where the timing gear will be positioned.
- B. Lubricate the inside diameter of spacers (32) with assembly lubricant and install on the gear end shafts.
- C. Using a piece of paper large enough to cover the open end of the gear headplate, trace the shafts on the paper and cut-out shaft holes. This will be placed on the shafts before the gears to protect the bearings from metal shavings when drilling taper pin holes in the following procedure.
- D. Place feeler stock in the amount of 1/3 of the total end clearance between drive headplate and both impellers. This will stop the impellers from contacting the headplate while the gears are being driven on.

# **A**CAUTION

If installing gears on a blower containing mechanical seals, a press must be used to drive gears on the shafts. Blows from a hammer or mallet will damage the seal..

E. If reusing the timing gears and hubs, they should be returned to their original position with respect to the impellers.

If replacement gears are used, secure each gear (9) to its timing hub (39) with capscrews (38) and lockwasher (37) and tighten slightly.

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# NOTICE

### Replacement gears have minimum backlash marks on the outside diameter of the gear face. These marks should be located 180 degrees from each other (see Figure 7-6).

F. Position impellers so they are 90 degrees to each other. Using the driving tool shown on page 22, install the gears and hubs on the shafts using the taper pin holes and match marks for correct positioning. Check to be sure impellers are in correct position as previously match marked.

# NOTICE

## Utilize a press whenever possible when installing gears.

G. Refer to diagram in Figure 7-4, page 31. Use feeler gauges to check clearances between impeller lobes at A-A and C-C. Add the clearances, and divide the total clearance evenly between A-A and C-C.

H. Loosen the four capscrews (38) in one gear only. Wedge the correct amount of feeler gauge between impeller at A-A. If movement between the gear and hub is not sufficient to time the impellers, it will be necessary to loosen the four capscrews (38) in the mating gear to obtain a large adjustment range. Adjust so that the clearance at A-A is equal to C-C within .001 inch.

Clearances must be checked on both sides of each impeller lobe over the entire length. This procedure may require repeating several times until impeller lobe clearance is equal on both sides.

I. Secure the timing gears (9) to hubs (39) with capscrews (38) and lockwasher (37). Tighten capscrews to the torque specification listed in Figure 7-6, page 35.

J. Check gear backlash four places at 90 degree intervals as described in the disassembly procedure (Item 4).

## NOTICE

If any of the four gear backlash readings are not within the specified limits, the gears must be replaced.

K. Reream taper pin hole between the shaft and hub with a hand reamer and replace taper pin (8) if movement between the shaft and hub (39) was negligible. If rereaming fails to eliminate edges due to slight misalignment, drill and ream a new hole approximately 90 degrees from the original hole. Control the depth of the taper pin, leaving approximately 1/8+taper pin protruding beyond the hub and shaft.

L. Reream center drilled hole in the hub and gear web. If rereaming fails to eliminate edges set up by retiming, ream hole for the next larger taper pin or drill and ream a new hole approximately 90 degrees from the original hole. Control the depth of the threaded taper pin (36), leaving the threaded portion of the pin protruded beyond the hub.

Replacement gears are not drilled for taper pin (8). These holes must be drilled and reamed after the gears are in proper position and the unit retimed.

# NOTICE

## Be careful not to allow cuttings to drop behind the gears and contaminate the bearings.

M. Remove paper from behind the gears. Make certain metal cuttings did not contaminate the bearings.

18 Assemble gear cover (3) and gasket (7) to the gear headplate (18) using capscrew (5). Tighten capscrews alternately and evenly. Refer to Figure 7-6, page 35 for torque specifications.

19 Place blower on its feet on a flat surface. Loosen capscrews (16) and level unit up. The bench or blower base flatness should be within .002 of an inch. Re-tighten capscrews (16) to the specifications in Figure 7-6, page 35.

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Ref.		GEAR DIAMETER			
No.	FASTENERS	6	7	8	
5	Screw . Gear Case Headplate	16	30	30	
10	Screw . Bearing Retainer to Headplate	16	30	30	
16	Screw. Mounting Foot to Headplate	30	75	75	
21	Screw . Headplate to Impeller Case	30	75	75	
30	Screw - Drive Cover to Headplate	16	30	30	
38	Screw. Timing Hub to Gear	30	75	75	

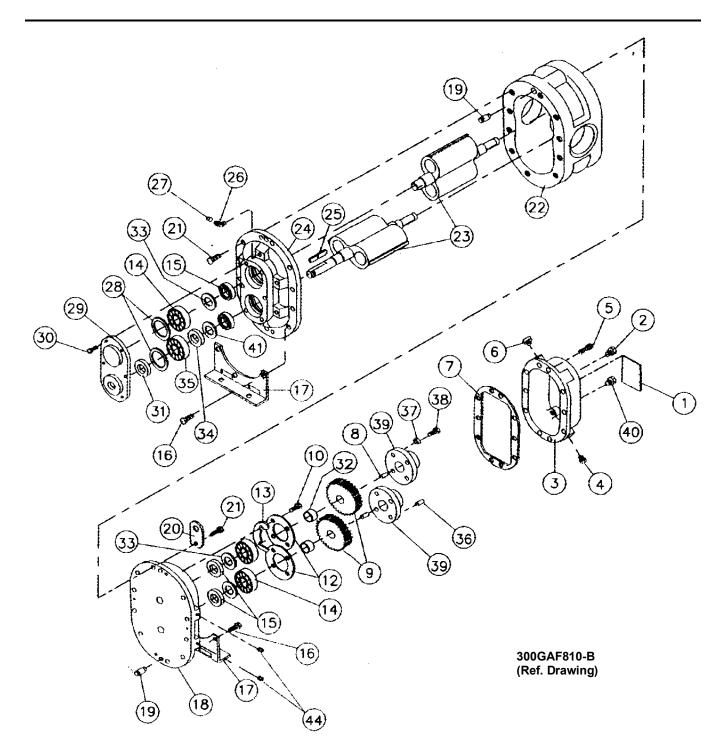
NOTE: REF. NO. DENOTES ITEMS IN EXPLODED VIEW DRAWINGS ON PAGES 36, 38, AND 40.

FIGURE 7-7 - TORQUE (FT-LBS.)





## SECTION 8 PARTS LIST



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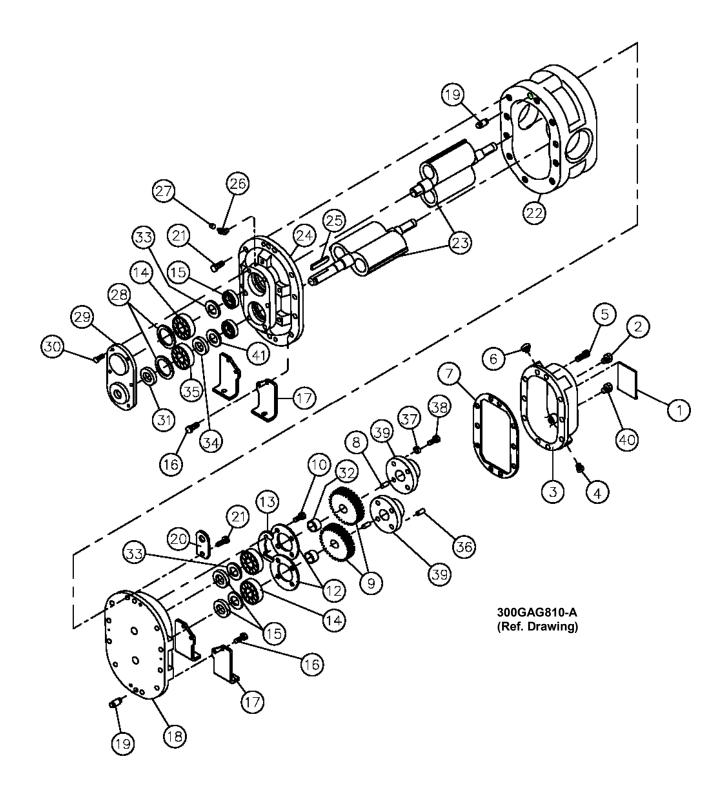
## Order by Part Number and Description. Reference Numbers are for your convenience only.

Ref. No.	Description	Req'd	Size 6H GAFH_P_	Size 6M GAFM_P_	Size 6L GAFL_P_
1	NAMEPLATE	1	301GAE496	301GAE496	301GAE496
2	PLUG FOR ALTERNATE OIL LEVEL CONN.	-	64AC4	64AC4	64AC4
3	GEAR CASE		900883064201	900883064201	90088306420
4	DRAIN PLUG	-	64AC4	64AC4	64AC4
-	SCREWGEAR CASE TO HEADPLATE	-			
5			75LM113	75LM113	75LM113
6	BREATHER		5L223	5L223	5L223
ð 7	GASKET GEAR CASE		200GAF715	200GAF715	200GAF715
ð 8	TAPER PIN		62V59	62V59	62V59
9	TIMING GEAR GROUP	1	200GAF6008	200GAF6008	200GAF6008
ð 10	SCREWBEARING RETAINER TO HEADPLATE	8	75A33N	75A33N	75A33N
12	BEARING RETAINER	2	900883065501	900883065501	9008830655
ð 13	SHIM SET	1	900881065400	900881065400	9008810654
ð 14	BEARING		900639080506	900639080506	9006390805
Ø 15	MAIN SEALPER APPLICATION BELOW	-	000000000000000000000000000000000000000	000000000000000000000000000000000000000	00000000000
5 15	MECHANICAL SEAL VERSION		000971020006	000971020006	0009710200
		-	900871020006	900871020006	9008710200
			60DD657	60DD657	60DD657
16	SCREWFOOT TO HEADPLATE		655ED060	655ED060	655ED060
17	FOOT GROUP				
	VERTICAL FOOT GROUP		GAF81950	GAF81950	GAF81950
	HORIZONTAL FOOT GROUP	1	GAF81951	GAF81951	GAF81951
18	HOUSINGBEARING (GEAR END)				
	LIP SEAL	1	900883064401	90088364401	9008830644
	MECHANICAL SEAL		900883064501	90088364501	9008830645
19	DOWEL PIN	-	62M48	62M48	62M48
20	LIFTING LUG.		200GAF451	200GAF451	200GAF451
20	SCREWHEADPLATES TO IMPELLER CASE				
			655ED050	655ED050	655ED050
22	IMPELLER CASE		900883063901	900883064001	9008830641
23	SHAFT ASSEMBLY GROUP	1	GAF81952	GAF81954	GAF81953
	SHAFT ASSEMBLY GROUP CONSISTS OF:				
(1)	ASSEMBLY SHAFT . LONG				
(1)	ASSEMBLY SHAFT . SHORT				
24	HOUSINGBEARING (DRIVE END)				
	LIP SEAL	1	900883064901	900883064901	9008830649
	MECHANICAL SEAL	1	900883064801	900883064801	9008830648
25	DRIVE KEY		900639910406	900639910406	9006399104
26	GREASE FITTING	-	911659990606	911659990606	9116599906
20	GREASE FITTING CAP		40P41	40P41	40P41
			-	-	-
28	WAVY SPRING		900669170506	900669170506	9006691705
29	DRIVE COVER		900883064601	900883064601	9008830646
30	SCREWDRIVE COVER TO HEADPLATE	8	75LM113	75LM113	75LM113
ð 31	DRIVE SEAL	1	60DD658	60DD658	60DD658
32	SPACERGEAR END	2	900811060401	900811060401	9008110604
33	SPACERGEAR & DRIVE ENDSEAL/BRG	3	900881066201	900881066201	9008810662
34	SPACERDRIVE END DRIVE SHAFTSEAL/BRG	1	900881066401	900881066401	9008810664
ð 35	BEARINGDRIVE END DRIVE SHAFT	1	900811060801	900811060801	9008110608
36	THREADED TAPER PIN	-	62V67	62V67	62V67
37		-	900649440205	900649440205	9006494402
38	SCREWTIMING HUB TO GEAR		655ED060	655ED060	655ED060
39	HUB. TIMING		900713060101	900713060101	9007130601
40	GAUGEOIL LEVEL		40P31	40P31	40P31
41	SPACERDRIVE END DRIVE SHAFTHD PLT- BRG	1	900881066301	900881066301	9008810663
	REQUIRED WITH MECHANICAL SEAL UNITS				
	PLUGS REQUIRED WITH MECHANICAL SEAL UNITS	8	64AC2	64AC2	64AC2
42					
42 44		4	76F92	76F92	76F92
42 44 2	SCREW- SET OVERHAUL KIT LIP SEAL		76F92 203GAF6010	76F92 203GAF6010	76F92 203GAF6010

\*

NOT SHOWN INCLUDED IN OVERHAUL KIT. Ø





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## Order by Part Number and Description. Reference Numbers are for your convenience only.

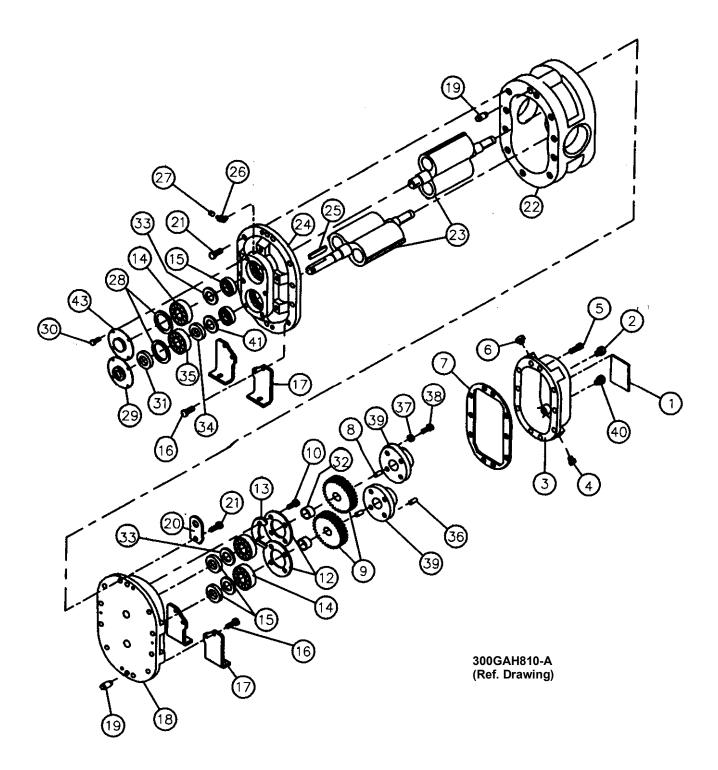
Ref. No.		Description	No. Req'd	Size 7H GAGH_P_	Size 7M GAGM_P_	Size 7L GAGL_P_	
	1	NAMEPLATE	1	301GAE496	301GAE496	301GAE496	
	2	PLUG FOR ALTERNATE OIL LEVEL CONN	1	64B4	64B4	64B4	
	3	GEAR CASE	1	900893071701	900893071701	90089307170 <sup>-</sup>	
	4	DRAIN PLUG	1	64AC6	64AC6	64AC6	
	4 5	SCREWGEAR CASE TO HEADPLATE	12	75LM122	75LM122	75LM122	
	-		12	-	5L223	5L223	
a	6	BREATHER GASKET GEAR CASE	-	5L223	200GAG715	200GAG715	
Ø	7		1	200GAG715			
Ø	8		2	62V60	62V60	62V60	
~	9	TIMING GEAR GROUP	1	200GAG6008	200GAG6008	200GAG6008	
Ø	10	SCREWBEARING RETAINER TO HEADPLATE	8	655ED040N	655ED040N	655ED040N	
	12	BEARING RETAINER	2	900893070401	900893070401	90089307040	
Ø	13	SHIM SET	1	900891073800	900891073800	90089107380	
Ø	14	BEARING	3	DF138116	DF138116	DF138116	
Ø	15	MAIN SEALPER APPLICATION BELOW					
		MECHANICAL SEAL VERSION	4	900871020007	900871020007	90087102000	
		LIP SEAL VERSION	4	60DD715	60DD715	60DD715	
	16	SCREWFOOT TO HEADPLATE	8	655EE070	655EE070	655EE070	
	17	FOOT GROUP					
		VERTICAL FOOT GROUP	1	GAG81958	GAG81958	GAG81958	
		HORIZONTAL FOOT GROUP	1	GAG81959	GAG81959	GAG81959	
	18	HOUSINGBEARING (GEAR END)					
		LIP SEAL	1	900893072801	900893072801	90089307280	
		MECHANICAL SEAL	1	200GAG006	200GAG006	200GAG006	
	19	DOWEL PIN	4	62M48	62M48	62M48	
	20	LIFTING LUG	2	200GAF451	200GAF451	200GAF451	
	20	SCREWHEADPLATES TO IMPELLER CASE	24	655EE050	655EE050	655EE050	
			24 1		900893070201	90089307030	
	22		1	900893070101			
	23	SHAFT ASSEMBLY GROUP	1	GAG81960	GAG81962	GAG81961	
	(1)	SHAFT ASSEMBLY GROUP CONSISTS OF:					
	(1)	ASSEMBLY SHAFT . LONG					
	(1)	ASSEMBLY SHAFT . SHORT					
	24	HOUSINGBEARING (DRIVE END)					
		LIP SEAL	1	900893070601	900893070601	90089307060	
		MECHANICAL SEAL	1	900893072601	900893072601	90089307260	
	25	DRIVE KEY	1	900639910407	900639910407	90063991040	
	26	GREASE FITTING	2	911659990606	911659990606	91165999060	
	27	GREASE FITTING CAP	2	40P41	40P41	40P41	
	28	WAVY SPRING	2	900669170607	900669170607	90066917060	
	29	DRIVE COVER	1	900883073701	900883073701	90088307370	
	30	SCREWDRIVE COVER TO HEADPLATE	8	75LM122	75LM122	75LM122	
Ø	31	DRIVE SEAL	1	60DD727	60DD727	60DD727	
	32	SPACERGEAR END	2	900891073001	900891073001	90089107300	
	33	SPACERGEAR & DRIVE ENDSEAL/BRG	3	200GAG144	200GAG144	200GAG144	
	34	SPACERDRIVE END DRIVE SHAFTSEAL/BRG	1	201GAG144	201GAG144	201GAG144	
Ø	35	BEARINGDRIVE END DRIVE SHAFT	1	910712068201	910712068201	91071206820	
0	36	THREADED TAPER PIN	2	62V68	62V68	62V68	
	37	WASHER GEAR	8	900649440507	900649440507	90064944050	
	38	SCREWTIMING HUB TO GEAR	о 8	900849440307 655EE060	655EE060	655EE060	
		HUB. TIMING HUB TO GEAR	8 2				
	39 40		_	900713060102	900713060102	90071306010	
	40		1	VP1004935	VP1004935	VP1004935	
*	41	SPACERDRIVE END DRIVE SHAFTHD PLT- BRG	1	900881073301	900881073301	90088107330	
		REQUIRED WITH MECHANICAL SEAL UNITS					
*	42	PLUGS REQ. W/MECH. SEAL UNITS(GEAR END)	4	64AC3	64AC3	64AC3	
۲	46	PLUGS REQ. W/MECH. SEAL UNITS (DRIVE END)	4	64AC2	64AC2	64AC2	
Ø		OVERHAUL KIT LIP SEAL	0	200GAG6010	200GAG6010	200GAG6010	
Ø		OVERHAUL KIT MECHANICAL SEAL	0	201GAG6010	201GAG6010	201GAG6010	

\* NOT SHOWN

Ø INCLUDED IN OVERHAUL KIT.

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## Order by Part Number and Description. Reference Numbers are for your convenience only.

Rei No		Description	No. Req'd	Size 8H GAHH_P_	Size 8M GAHM_P_	Size 8L GAHL_P_
	1	NAMEPLATE	1	301GAE496	301GAE496	301GAE496
	2	PLUG FOR ALTERNATE OIL LEVEL CONN	1	64AC5	64AC5	64AC5
			1	900893082501		
	3	GEAR CASE	=		900893082501	90089308250
	4	DRAIN PLUG	1	64AC5	64AC5	64AC5
	5	SCREWGEAR CASE TO HEADPLATE	12	2009649	2009649	2009649
	6	BREATHER	1	5L223	5L223	5L223
Ø	7	GASKET GEAR CASE	1	200GAH715	200GAH715	200GAH715
Ø	8	TAPER PIN	2	62V61	62V61	62V61
	9	TIMING GEAR GROUP	1	200GAH6008	200GAH6008	200GAH6008
	10	SCREWBEARING RETAINER TO HEADPLATE	8	655ED04N	655ED04N	655ED04N
	11	LOCKWASHER	8	95B3	95B3	95B3
	12	BEARING RETAINER	2	900893083101	900893083101	90089308310
ð	13	SHIM SET	1	910639630008	910639630008	91063963000
ž	14	BEARING	3			
		-	3	900639080808	900639080808	90063908080
ð	15	MAIN SEAL-PER APPLICATION BELOW			00007400000	
		MECHANICAL SEAL VERSION	4	900871020008	900871020008	90087102000
		LIP SEAL VERSION	4	910751061902	910751061902	91075106190
	16	SCREWFOOT TO HEADPLATE	8	655EE080	655EE080	655EE080
	17	FOOT GROUP				
		VERTICAL FOOT GROUP	1	GAH81966	GAH81966	GAH81966
		HORIZONTAL FOOT GROUP	1	GAH81967	GAH81967	GAH81967
	18	HOUSINGBEARING (GEAR END)				
			1	900894082301	900894082301	90089408230
		MECHANICAL	1	200GAH006	200GAH006	200GAH006
	19	DOWEL PIN	4	62M48	62M48	62M48
	-	-	-			
	20		2	200GAF451	200GAF451	200GAF451
	21	SCREWHEADPLATES TO IMPELLER CASE	36	655EE060	655EE060	655EE060
	22	IMPELLER CASE	1	900653021708	910613746808	91061374700
	23	SHAFT ASSEMBLY GROUP	1	GAH81968	GAH81970	GAH81969
		SHAFT ASSEMBLY GROUP CONSISTS OF:				
	(1)	ASSEMBLY SHAFT . LONG				
	(1)	ASSEMBLY SHAFT . SHORT				
	24	HOUSINGBEARING (DRIVE END)				
			1	900894082101	900894082101	90089408210
			1	201GAH006	201GAH006	201GAH006
	25	DRIVE KEY	1	900639910407	900639910407	90063991040
	25 26	GREASE FITTING	2	911659990606		
	-				911659990606	91165999060
	27	GREASE FITTING CAP	2	40P41	40P41	40P41
	28	WAVY SPRING	2	900669170708	900669170708	90066917070
	29	DRIVE COVER	1	900693086301	900693086301	90069308630
	30	SCREWDRIVE COVER TO HEADPLATE	8	655ED030	655ED030	655ED030
ð	31	DRIVE SEAL	1	60DD676	60DD676	60DD676
	32	SPACERGEAR END	2	900811060403	900811060403	90081106040
	33	SPACERGEAR & DRIVE END SEAL/BRG	3	900871060803	900871060803	90087106080
	34	SPACERDRIVE END DRIVE SHAFTSEAL/BRG	1	202GAH144	202GAH144	202GAH144
Ø	35	BEARINGDRIVE END DRIVE SHAFT	1	910721070501	910721070501	91072107050
-	36	THREADED TAPER PIN	2	62V69	62V69	62V69
	30 37	WASHER GEAR	2	900649440507	900649440507	90064944050
			-			
	38	SCREWTIMING HUB TO GEAR	8	655EE080	655EE080	655EE080
	39	HUB- TIMING	2	900713060103	900713060103	90071306010
	40	GAUGEOIL LEVEL	1	40P45	40P45	40P45
	41	SPACERDRIVE END DRIVE SHAFTHD PLT- BRG REQUIRED WITH MECHANICAL SEAL UNITS	1	900881082401	900881082401	90088108240
r	42	PLUGS REQUIRED WITH MECHANICAL SEAL UNITS	8	64AC3	64AC3	64AC3
	43	DRIVEN COVER	1	900693086401	900693086401	90069308640
R	-10	OVERHAUL KIT LIP SEAL	0			
Ø Ø			-	GAH81972	GAH81972	GAH81972
		OVERHAUL KIT MECHANICAL SEAL	0	GAH81971	GAH81971	GAH81971

\* NOT SHOWN

Ø INCLUDED IN OVERHAUL KIT.

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## <u>Gardner</u> Denve

#### GENERAL PROVISIONS AND LIMITATIONS

Gardner Denver (the "Company") warrants to each original retail purchaser ("Purchaser") of its new products from the Company or its authorized distributor that such products are, at the time of delivery to the Purchaser, made with good material and workmanship. No warranty is made with respect to:

- Any product which has been repaired or altered in such a way, in the Company's judgment, as to affect the product adversely.
- Any product which has, in the Company's judgment been subject to negligence, accident, improper storage, or improper installation or application.
- Any product which has not been operated or maintained in accordance with normal practice and with the recommendations of the Company.
- Components or accessories manufactured, warranted and serviced by others.
- 5. Any reconditioned or prior owned product.

Claims for items described in (4) above should be submitted directly to the manufacturer.

#### WARRANTY PERIOD

The Company's obligation under this warranty is limited to repairing or, at its option, replacing, during normal business hours at an authorized service facility of the Company, any part which in its judgment proved not to be as warranted within the applicable Warranty Period as follows.

#### BARE BLOWERS

Basic bare blowers, consisting of all parts within, are warranted for 18 months from date of initial use or 24 months from date of shipment to the first purchaser, whichever occurs first.

Any disassembly or partial disassembly of the blower, or failure to return the "unopened" blower per Company instructions, will be cause for denial of warranty.

#### OTHER COMPONENTS

All other components are warranted for 12 months from date of initial use or 18 months from date of shipment to first purchaser, whichever comes first.

The Company reserves the right to withdraw the Warranty where evidence indicates application outside the stated performance area, or where there is evidence of abuse.

#### LABOR TRANSPORTATION AND INSPECTION

The Company will provide labor, by Company representative or authorized service personnel, for repair or replacement of any product or part thereof which in the

# SUTORBILT BLOWERS

WARRANTY

# SUTORBILT LEGEND SERIES

Company's judgment is proved not to be as warranted. Labor shall be limited to the amount specified in the Company's labor rate schedule.

Labor costs in excess of the Company rate schedule amounts or labor provided by unauthorized service personnel is not provided for by this warranty.

Transportation of Company's choice, within the continental United States, is covered by this warranty for replacement of any blower which in the Company's judgement proved not to be as warranted. For user locations outside the continental United States, the Company will provide transportation, by the carrier of its choice to and from the nearest Authorized Distributor and the Company's designated facility. The Company may require the return of any blower claimed not to be as warranted to one of its facilities as designated by the Company, transportation prepaid by Purchaser, to establish a claim under this warranty.

Replacement parts provided under the terms of the warranty are warranted for the remainder of the Warranty Period of the product upon which installed to the same extent as if such parts were original components thereof.

#### DISCLAIMER

THE FOREGOING WARRANTY IS EXCLUSIVE AND IT IS EXPRESSLY AGREED THAT, EXCEPT AS TO TITLE, THE COMPANY MAKES NO OTHER WAR-RANTIES, EXPRESSED, IMPLIED OR STATUTORY, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY.

THE REMEDY PROVIDED UNDER THIS WARRAN-TY SHALL BE THE SOLE, EXCLUSIVE AND ONLY REMEDY AVAILABLE TO PURCHASER AND IN NO CASE SHALL THE COMPANY BE SUBJECT TO ANY OTHER OBLIGATIONS OR LIABILITIES. UNDER NO CIRCUMSTANCES SHALL THE COMPANY BE LIABLE FOR SPECIAL, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES, EXPENSES, LOSSES OR DELAYS HOWSOEVER CAUSED.

No statement, representation, agreement, or understanding, oral or written, made by any agent, distributor, representative, or employee of the Company which is not contained in this Warranty will be binding upon the Company unless made in writing and executed by an officer of the Company.

This warranty shall not be effective as to any claim which is not presented within 30 days after the date upon which the product is claimed not to have been as warranted. Any action for breach of this warranty must be commenced within one year after the date upon which the cause of action occurred.

Any adjustment made pursuant to this warranty shall not be construed as an admission by the Company that any product was not as warranted.

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