PARTS LIST
OPERATING AND SERVICE MANUAL

GARDNER DENVER CycloBlower

BLOWERS

3CDL-L SERIES

37-1-600
Version 07
November, 2005

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 AEON™ 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 services.

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 www.gardnerdenver.com or contact:

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

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).

Use this Parts List to select the parts you require. Where NOT specified, quantity of parts required per blower is one (1); where more than one is required per unit, quantity is indicated.

Specify EXACTLY the number of parts required.

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

FOREWORD

Gardner Denver® 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

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

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.

Teflon is a registered trademark of DuPont.

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SAFETY PRECAUTIONS

Safety is everybody's 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:

⚠ DANGER

Failure to observe these notices could result in injury to or death of personnel.

- **Keep fingers and clothing away from revolving sheave, drive coupling, etc.**
- **Do not use the air discharge from this unit for breathing - not suitable for human consumption.**
- **Do not loosen or remove the oil filler plug, drain plugs, covers, or break any connections, etc., in the blower air or oil system until the unit is shut down and the air pressure has been relieved.**
- **Electrical shock can and may be fatal.**
- **Blower unit must be grounded in accordance with the National Electrical Code. A ground jumper equal to the size of the equipment ground conductor must be used to connect the blower motor base to the unit base.**
- **Open main disconnect switch, tag and lockout before working on the blower.**
- **Disconnect the blower unit from its power source, tag and lockout before working on the unit - the machine may be automatically controlled and may start at any time.**

⚠ WARNING

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

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

INTRODUCTION
YOUR KEY TO TROUBLE FREE SERVICE

Although Gardner Denver blowers are sturdy, precision-engineered machines, there are several relatively simple but basic installation and maintenance procedures that must be observed to assure optimum performance. As there is no guesswork in the manufacture of these highly advanced units, there must be none in preparing them to get the job done in the field.

It is the purpose of this manual to help you properly install, maintain and service your Gardner Denver blower. It is important that no section be overlooked when preparing to install your blower.

Follow the instructions carefully and you will be rewarded with years of trouble-free operation.

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.

⚠ CAUTION

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) monthly 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 Blower.

SECTION 2
INSTALLATION

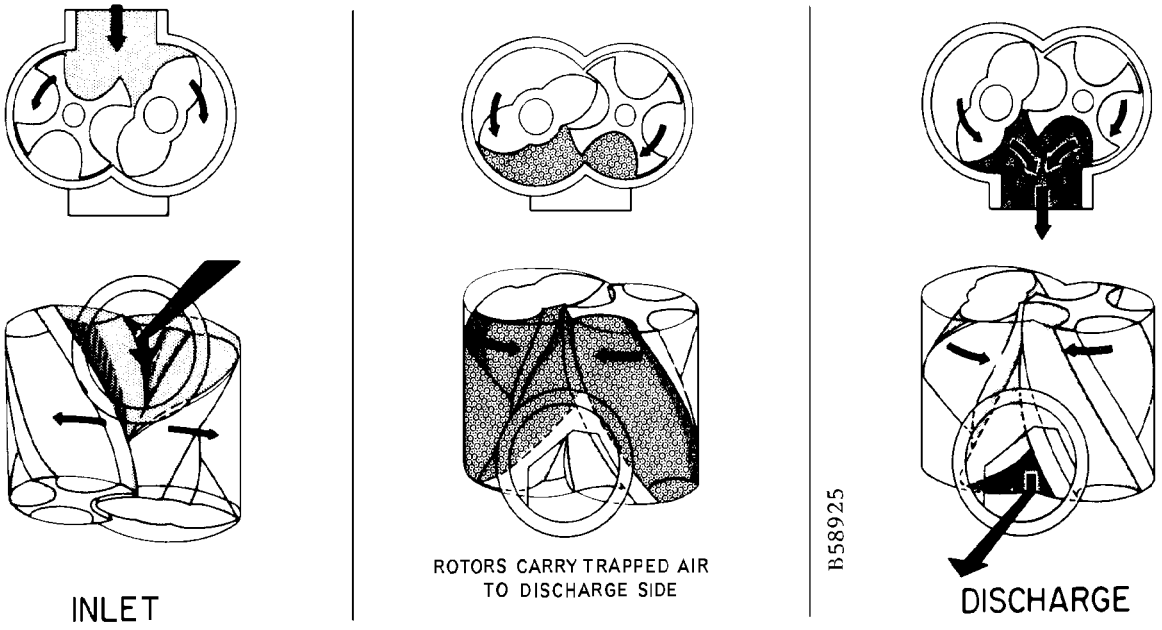


FIGURE 1 - OPERATING PRINCIPLE

The CycloBlower® is a compact, rotary lobe type axial flow blower/compressor. The meshing of two screw type rotors synchronized by timing gears provides controlled compression of the air for maximum efficiency and pulsation-free discharge.

OPERATING PRINCIPLE - Compression is effected by the main (2 lobe) and gate (4 flute) rotors meshing enclosed in the housing. The timing gears maintain close rotor clearances. The rotors do not touch each other, the housing, or the bearing carriers. Although clearances are small, lubrication in the compression chamber is not required, insuring oil-free air delivery.

The compression cycle (FIGURE 1) begins as the rotors unmesh at the inlet port. Air is drawn into the rotor cavities, trapped, and compressed by the reducing cavities as rotation continues. When proper compression is made, the cavities cross the discharge port, completing the cycle. The cycle occurs twice each revolution and is continuous.

DESCRIPTION - On all models two heavy-duty angular-contact ball bearings are used on each rotor shaft, at the discharge end, as fixed bearings to maintain discharge end clearance. The housing is a one-piece casting with threaded inlet and discharge openings. The rotors are ductile iron with integral shaft. All rotors are dynamically balanced for minimal vibration. Helical timing gears are of alloy steel with hardened and ground teeth for quiet operation.

Standard construction is right hand inlet, left hand discharge, with drive shaft extension from the gate rotor at the inlet end. Rotation is clockwise viewing the drive shaft. The blower may be mounted for either V-belt or direct-coupled drive. The main rotor runs twice the speed of the gate rotor.

GENERAL - On receipt of the unit, check for any damage that may have been incurred during transit. Report any damage or missing parts to the carrier as soon as possible. When installation is delayed, store the unit indoors in a clean, dry place. If indoor storage is not available, protect the unit with a weatherproof covering. Factory test of each unit provides an oil film on working parts which provides corrosion protection for a short period of time.

Select a clean, dry, well-ventilated area for installing the blower and allow ample room for normal maintenance. Proper ventilation is necessary for blower cooling and cool air intake.

⚠ WARNING

Do not Electric weld on the blower or base; bearings can be damaged by passage of current.

FOUNDATIONS – Correct support is important. Distortion by incorrect supporting will affect internal operating clearances. The foundation or base must provide a level, rigid, nonworking support for the blower. It must be on uniform and solid footing. Complete foundation design cannot be given because of varying conditions. If necessary, use shims under the feet for leveling to prevent distortion when foundation bolts are tightened. After installation on the foundation is complete, check the alignment of the coupling or drive before starting the blower.

INLET FILTER OR FILTER-SILENCER – For pressure service handling air, the blower inlet must be protected by a filter of suitable size to allow full flow of air to the blower inlet. The filter must be of adequate efficiency to trap any foreign materials which may be in the general area of the air inlet. If noise is a factor, filter-silencers are available. The filters may be installed directly on the blower or at the end of the inlet line when inlet piping is used. In choosing a location for the filter, consideration should be given to a source of cool, clean air and most important, access for maintenance.

Filters generally used for blower service fall under three types: oil-wetted screen type, oil bath, and dry type. Filter-silencers are also available in the above types.

For vacuum service, the type of system used and materials being handled will determine the necessity for an in-line filter.

COUPLINGS – For direct-coupled units, a flexible-type coupling, accurately aligned, should be used between the blower and the power unit. Misaligned couplings may cause vibration, additional bearing loads and stresses which will affect the life of the parts involved. DO NOT drive couplings on the shaft. Check the shaft and coupling bore for burrs. Polish the shaft and bore if necessary for proper fit. Fit keys to keyways. Check coupling alignment. Exact alignment will vary with type of couplings; however, it is not uncommon to hold alignment within .003" in all directions.

With lubricated or special couplings, follow the manufacturer's instructions for installation and maintenance.

V-BELT DRIVE – Follow normal specifications recommended by belt manufacturers for installation of belt drives on blowers. To provide the most compact drive, it is suggested the high capacity V-belt drives be used. Blower shaft and power unit shaft should be parallel, with sheaves aligned on the shafts so belts run true. Use only matched belt sets and replace belts in complete sets only. Belt tension should be according to manufacturer's recommendations. Slippage can be detected by belt squeal, overheating or loss of speed. A few hours after initial starting with new belts, it is advisable to recheck belt tension and provide tension adjustment as necessary.

BYPASS VALVE – Installation of a bypass valve at the blower discharge will allow the blower to be started under no-load. The bypass line may be discharged to atmosphere or to the blower inlet depending on local requirements or material being handled.

HEAT EXCHANGER – When the bypass line discharges to the blower inlet, a heat exchanger must be included in the line between the blower discharge and blower inlet, to remove the heat of compression before the gas is reintroduced into the blower inlet. A check valve should also be placed in the inlet line between the bypass line and the inlet filter or silencer, to prevent discharging backwards through the filter or silencer.

CHECK VALVE – When the blower is used in a pneumatic conveying system, a check valve must be used to prevent back flow of materials into the blower. In any system it is a safety device preventing the downstream pressure from motoring the blower through shutdown periods. A check valve must be provided for each blower when several blowers are manifolded into a common system.

RELIEF VALVE – The relief valve must be installed as close to the blower discharge as possible. There should be no accessories such as valves, check valves, silencers, etc. between the relief valve and blower discharge. Valve set point cannot exceed 2 psi above (pressure valve) or 2 inches Hg below (vacuum valve) the maximum rating of the blower.

HIGH TEMPERATURE AND HIGH PRESSURE SHUTDOWN – All blower installations should be protected with a high temperature shutdown switch. Controls should be set to stop the blower when discharge temperature reaches 355°F.

In some installations, a high pressure shutdown switch may also be available. The sensing element of these controls should be installed as close to the blower discharge as possible.

On remote or unattended installations these controls are normally mandatory.

INLET PIPING – During the installation of piping make sure dirt and other foreign materials do not enter blower openings. When inlet piping is used IT MUST BE CLEAN, FREE OF SCALE AND OTHER FOREIGN MATERIALS WHICH COULD ENTER THE BLOWER. It is suggested that an expansion joint be installed near blower openings to prevent stressing of the blower housing. Support pipe to relieve weight on the expansion joint and blower. Make sure pipe size is adequate and as straight as possible to prevent pressure drop at the blower inlet. Where bends are necessary use long radius fittings. All connections must be air tight.

For vacuum service an accurate vacuum gauge must be used near the blower inlet to indicate operating vacuum, and a suitable vacuum relief valve must be

INLET PIPE SIZE	
Length of Inlet Line	Diameter of Pipe Size
0 to 10 Feet	Same as Blower Inlet Opening
10 to 17 Feet	One Size Larger Than Inlet Opening
17 to 38 Feet	Two Sizes Larger Than Inlet Opening

FIGURE 2 - INLET PIPE SIZE

used. A vacuum blower in pneumatic conveying service requires pre-inlet separation and filtering to prevent material carry-over into the blower.

See FIGURE 2 for inlet pipe size.

DISCHARGE PIPING - In general the type system used will govern the piping arrangement. However, the following suggestions should be followed for blower protection and efficiency.

Expansion joint should be installed as close to the blower opening as possible to protect the blower housing from stresses. All piping connections should be square and even to prevent distortion from misalignment.

An accurate pressure gauge must be provided near the blower discharge to indicate operating pressure. If noise level is a factor, a discharge silencer should be used. The discharge line should be as straight as possible. When bends are necessary, use long radius fittings. Provision for condensate drainage at lowest point in piping may be required.

VENTILATION - If the blower is to operate in a housing or enclosure, proper ventilation must be provided for adequate blower cooling. Cooling air should be taken from outside the enclosure.

SIMPLE V-BELT DRIVE LIMITATIONS CHART

MINIMUM ALLOWABLE BLOWER SHEAVE DIAMETER (INCHES)
AT VARIOUS SPEEDS AND MOTOR HORSEPOWER

WHERE NO SHEAVE DIAMETER IS SHOWN, JACKSHAFT V-BELT DRIVE IS REQUIRED.

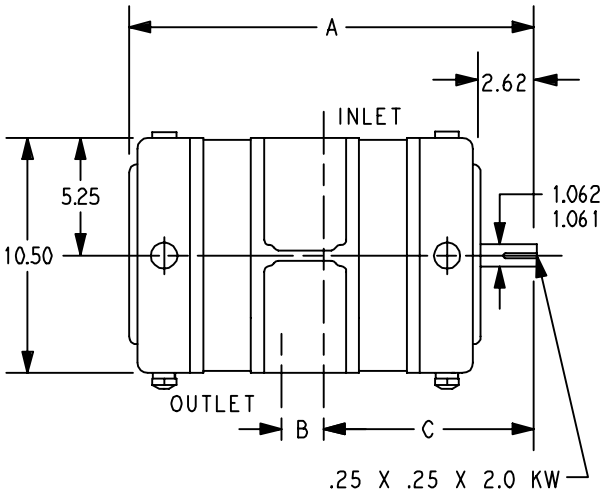
NOTE: This Chart covers two items of primary interest:
1. Simple V-belt drive motor HP limitations; or at what motor HP it becomes necessary to use a jackshaft drive on the blower, and
2. The minimum allowable blower sheave diameter for simple V-belt drive, for a given blower speed and motor horsepower.

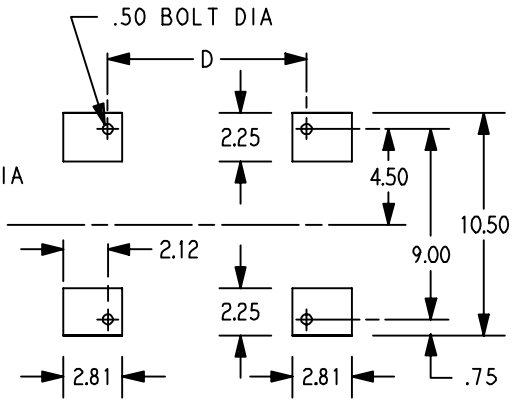
Chart applies to standard blowers only. Contact Blower Sales for belt drive recommendations on blowers with nonstandard driveshaft locations. Motor or Engine Suppliers should be consulted for Driver Limitations.

SIMPLE V-BELT DRIVE LIMITATION CHART FOR 3CDL SERIES						
Motor Nameplate HP To:	**Blower Speed - RPM**					
	1000	**1500**	**2000**	**2500**	**3000**	**3500**
5	6.90	4.50	3.35	2.65	2.65	2.65
7-1/2	10.90	6.50	5.00	4.12	3.35	2.80
10	16.00	9.75	6.50	5.30	4.50	3.65
15	-----	-----	10.90	8.50	6.50	5.60
20 & Up	-----	-----	-----	-----	-----	-----
	Maximum Blower Sheave Diameter For Above Speeds					
	24.70	16.50	12.40	9.90	8.20	7.00

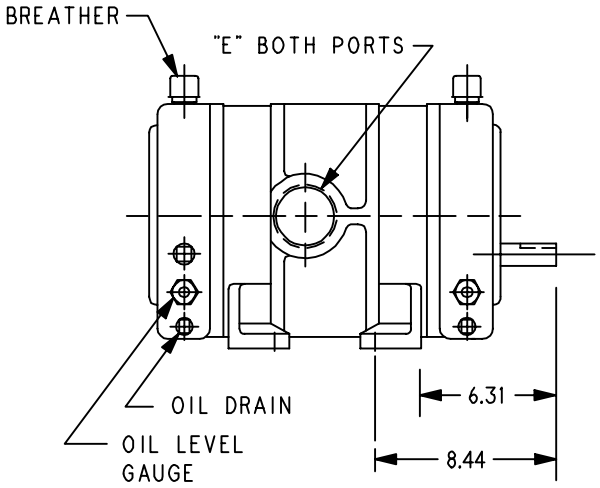
FIGURE 3 - V-BELT DRIVE LIMITATIONS CHART

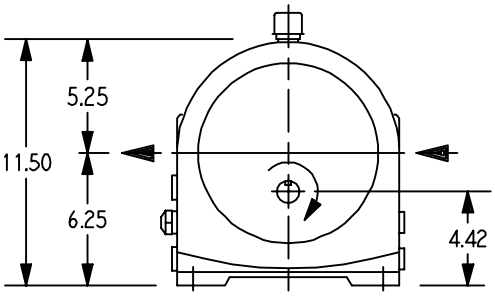
MODEL	WT	A	B	C	D	E
3CDL5L	165	19.12	2.00	9.88	4.88	2.5-8 N.P.T.
3CDL8L	185	22.12	4.25	10.25	7.88	3-8 N.P.T.





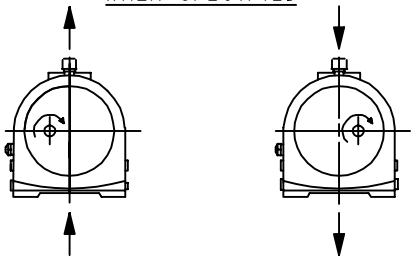
PLAN VIEW SHOWING
MOUNTING HOLE LOCATIONS





STANDARD MOUNTING ARRANGEMENT
RIGHT HAND INLET C.W. ROTATION

OPTIONAL DRIVESHAFT AND PORT LOCATION
WHEN SPECIFIED



BOTTOM INLET
C.W. ROTATION

3CDL_L8

REFER TO 37-1-407
FOR DIMENSIONS.

TOP INLET
C.W. ROTATION

3CDL_L7

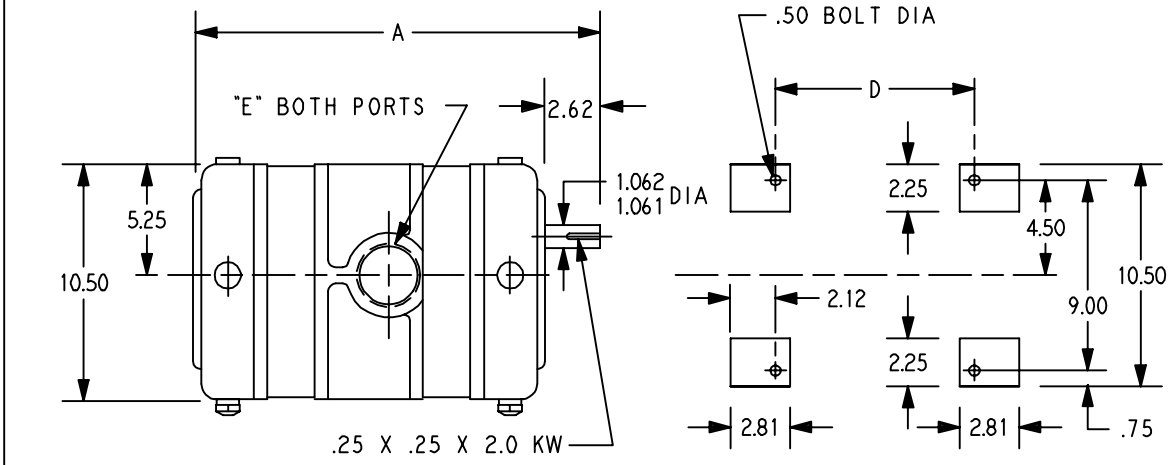
REFER TO PAGE 6
FOR DIMENSIONS.

EXPANSION JOINTS MUST BE USED
BETWEEN BLOWER AND PIPING.

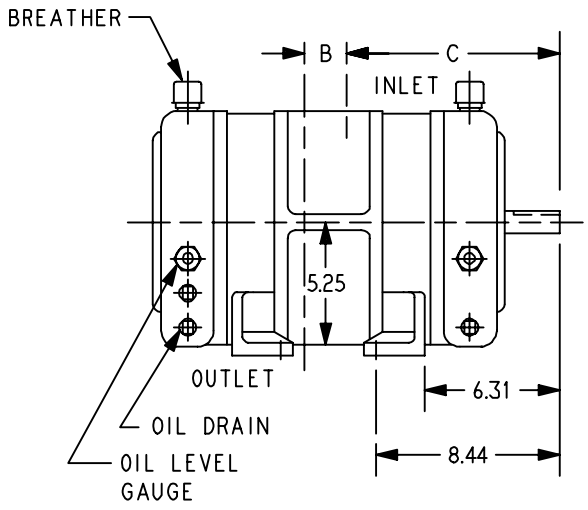
CYCLOBLOWER
MODEL 3CDL-L SERIES

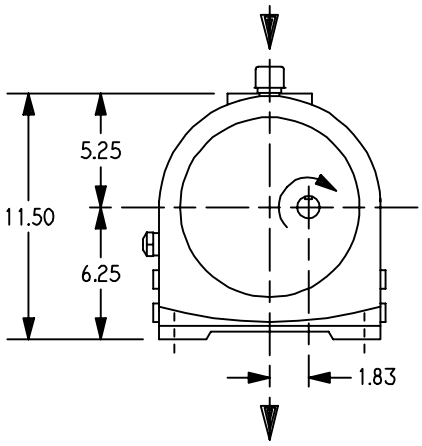
FIGURE 4 - OUTLINE DIMENSIONS - RIGHT HAND INLET (STANDARD)

MODEL	WT	A	B	C	D	E
3CDL5L7	165	19.12	2.00	9.88	4.88	2.5-8 N.P.T.
3CDL8L7	185	22.12	4.25	10.25	7.88	3-8 N.P.T.

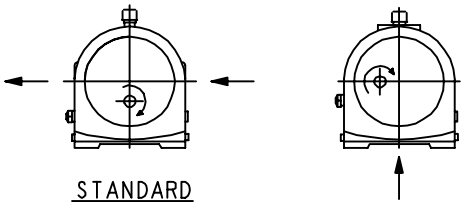


PLAN VIEW SHOWING
MOUNTING HOLE LOCATIONS





OPTIONAL DRIVESHAFT AND PORT LOCATION
WHEN SPECIFIED



STANDARD
RIGHT HAND INLET
C.W. ROTATION

3CDL_L

REFER TO PAGE 5
FOR DIMENSIONS.

BOTTOM INLET
C.W. ROTATION

3CDL_L8

REFER TO 37-1-407
FOR DIMENSIONS.

EXPANSION JOINTS MUST BE USED
BETWEEN BLOWER AND PIPING.

CYCLOBLOWER
MODEL 3CDL-L SERIES

FIGURE 5 - OUTLINE DIMENSIONS - TOP INLET (OPTIONAL)

SECTION 3
OPERATION

GENERAL – A new blower from the factory must be checked and serviced before operation. The blower must be lubricated and operated according to the following instructions. Blower failure can be caused by operation at above rated pressure or below rated minimum speed. Both cause excessive discharge temperature and seizure of rotating parts.

ALTITUDE – Maximum allowable discharge pressure and/or inlet vacuum will be decreased with operation at altitude. See Figure 3.

SPEED – Refer to FIGURE 6 for maximum and FIGURE 8, page 8, for minimum speeds. Never operate the blower below the minimum or above the maximum speed shown. There is a definite relationship between blower speed, discharge pressure and/or inlet vacuum, and the resulting discharge air temperature. Reduced speed at high pressure or vacuum can cause excessive heating which may result in rapid blower failure. For engine-driven units provide an accurate speed indicator.

OPERATING TEMPERATURE – Blower air discharge temperature will vary with operating conditions. It is not unusual to experience a discharge temperature of 300° F. at full load conditions; however, it should not exceed 350° F. in any case.

If extreme heating occurs, stop the blower at once and correct the trouble.

⚠ WARNING

Do not continue to run a blower that is overheating. Check blower for damage before restarting.

Lubricating oil temperature will increase with increasing discharge air temperature. Oil sump temperatures at the discharge end in the 200-225° F. range are not uncommon.

	Maximum Drive Shaft RPM	Discharge Pressure* Sea Level	Dry Vacuum* Inches Hg.
All Models 3CDL	3600	18 PSIG Continuous	16 Continuous

* Pressures or vacuums are gauged at immediate blower discharge or inlet. For suggested maximum ratings at reduced speeds, see below. Minimum rated speed is 1000 RPM.

FIGURE 6 - MAXIMUM RATINGS

Altitude Feet A.S.L.	* Maximum Discharge Pressure Continuous PSIG	Maximum Inlet Vacuum Continuous "Hg Gauge
1000	17.0	15.5
2000	16.5	15.0
3000	16.0	14.5
4000	15.5	14.0
5000	15.0	13.5

* Gauge readings are taken as close as possible to the blower port. Above 5000 feet, consult the factory.

FIGURE 7 - ALTITUDE/PRESSURE CHART

All Models	Discharge Pressure PSIG *						Inlet Vacuum Inches Hg. *				
	5	9	12	15	18	20	6	10	12	14	16
3CDL5	1000	1000	1000	1000	1800	----	1000	1300	1500	1650	1800
3CDL8	1000	1000	1000	1000	2000	----	1000	1000	1300	1600	1800

FIGURE 8 - MINIMUM SPEEDS

PRESTART CHECK (For a New or Overhauled Blower)

1. Base Leveled accurately.
2. Correct alignment of coupling and/or V-belt drive.
3. All pipes and joints tight and properly supported.
4. Expansion joint in discharge and (if used) inlet line.
5. Check valve in line (if required).
6. Proper relief valve in line.
7. Air inlet clean and tight.
8. Air filter serviced.
9. All bolts tight.
10. Correct rotation.
11. Blower turns freely.
12. Oil sumps filled to proper level.
13. Power unit serviced per manufacturer's instructions.

STARTING BLOWER - Start at reduced speeds and no-load if possible. If speed is fixed, start without load by bleeding discharge to atmosphere. Starting should be smooth and free of vibrations. After initial no-load start, and operation is satisfactory, apply load gradually until maximum operating conditions are attained. BE SURE OPERATING CONDITIONS ARE WITHIN BLOWER RATINGS. Maintain a close check for severe vibration, unusual noise, leaks and undue heating. The blower will gradually heat up due to compression, but after a reasonable length of time temperatures will stabilize. With very cold ambient conditions, warm up the blower at no-load before going into full load service.

If the blower is used as part of a specific system, check the system's manual for any instructions that may be necessary when starting the blower.

PRESTART CHECK (For New or Overhauled Blower) - See "Blower Startup Checklist", page 13.

STOPPING BLOWER - Where possible, reduce system pressure to zero gauge before stopping the blower. To prevent backflow of foreign material into the blower on shutdown, provide a check valve in the discharge line. On engine driven units, idle the engine for a few minutes prior to shutdown.

EMERGENCIES - In the event of system failures, shut down the blower immediately. Inspect the blower for foreign material backflow. If materials are found inside the blower housing, a thorough cleaning is necessary before restarting.

⚠ WARNING

Do not operate a blower which is noisy, vibrating, or heating excessively.

SECTION 4
MAINTENANCE

GENERAL – Blower efficiency and life depend on the quality of maintenance the blower receives. Maintenance must be done regularly and with care. Clean work space, tools, solvents, and wiping rags are necessary to avoid transferring dirt into the unit. A maintenance chart listing each blower and scheduling regular checks of the unit is valuable. A good program, well carried out, will insure long trouble-free service from the CycloBlower®.

LUBRICATION – Gears and gear end bearings are oil splash lubricated. Filling the gear case with the amount of oil shown in FIGURE 10. will bring the oil level to about half covering the sight glass. Add more oil if necessary to bring the level to half of the sight glass. Do not overfill. Keep the sight glass clean. Oil is added through the breather filter hole on top of the end cover.

⚠ CAUTION

Do not operate the blower unless oil shows in the sight glass.

RECOMMENDED LUBRICANT – AEON PD Synthetic Blower Lubricant is recommended. Refer to Recommended Lubricant Chart, FIGURE 9, for AEON PD temperature recommendations.

AEON PD is formulated especially for positive displacement blower service to provide maximum blower protection at any temperature. One filling of AEON PD will last a minimum of 4 times longer than a premium mineral oil, depending on actual operating conditions.

Blower Discharge Temperature		Factory Tested Recommended and Approved Lubricant
° C	° F	
0° 38° 135° 177°	32° 100° 275° 350°	AEON PD Synthetic Blower Lubricant One Superior Lubricant For All Operating Temperatures

AEON PD	1 Qt. Bottle	Part No. 28G23
AEON PD	12 Qt. Case	Part No. 28G24
AEON PD	5 Gal. Pail	Part No. 28G25
AEON PD	55 Gal. Drum	Part No. 28G28

FIGURE 9 - RECOMMENDED LUBRICANT

If not using AEON PD synthetic blower lubricant, use turbine quality oils with rust and oxidation inhibitors, anti-foam additives and the viscosities listed in Viscosity Requirements Chart, FIGURE 11, page 10.

Check the oil level of the blower daily. The oil change period is governed by operating conditions, such as load, temperature, dirt, humidity, fumes and quality of oil used. Under severe operating conditions the oil should be changed every 100 hours or more often. Under ideal operating conditions oil may be used up to 1000 hours. Use of AEON PD could extend the change interval up to 8000 hours based on a good oil analysis program. Change the oil often enough that it appears clean and clear when drained from the sump.

Model	Housing Mounting Arrangement			
	Side Air Inlet		Top & Bottom Air Inlet	
	Discharge End	Inlet End	Discharge End	Inlet End
3CDL5 3CDL8	1-1/8 Pints	1-1/8 Pints	3 Pints	3-1/4 Pints

FIGURE 10 - OIL CAPACITY

Blower Discharge Temperature	Oil Grade ISO	Oil Viscosity SUS @ 100° F
32° F to 100° F (0° C to 38° C)	100	465
100° F to 225° F (38° C to 105° C)	150	700
225° F to 300° F (105° C to 149° C)	220	1000
Over 300° F (149° C)	*	*

* The oil viscosity must be 70 SUS minimum at blower discharge temperature minus 50° F.

NOTES:

1. Napthenic base lubricants are not recommended.
2. For operation at ambient temperatures below –12° C (10° F.), the use of oil sump heaters or synthetic lubricants is recommended. The pour point of the lubricant should be at least 3° to 6° C (5° to 10° F.) below the minimum expected ambient temperature.
3. For continuous operation where oil sump temperatures exceed 93° C (200° F.), use AEON PD Synthetic Blower Lubricant.

FIGURE 11 - VISCOSITY REQUIREMENTS

NOTICE

Always use clean containers for oil.

AIR FILTERS AND FILTER-SILENCERS

⚠ WARNING

Servicing the air filters is one of the most important maintenance operations to be performed 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 manufacturer's service instructions. Due to the many types of filters, it is not practical to give specific instructions covering all models; however, the following paragraphs describe some of those most commonly used.

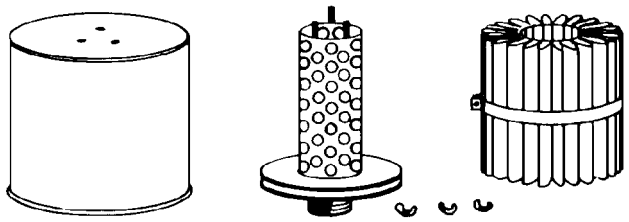


FIGURE 12 - DRY TYPE FILTER AND FILTER-SILENCER

NOTICE

No matter what type of filter is used, always make sure all seats, gaskets, clamps and hose connections on the filter and inlet line are absolutely air tight. Each time the filter is serviced, inspect interior of the blower for dirt.

Dry Type Filter and Filter-Silencer (FIGURE 12) – When the outside surface of the element appears to be

evenly coated with dirt, it should be cleaned as follows:

1. Remove wing nuts and lift off the hood.
2. Loosen the outside retaining strap to remove the media.
3. Vibrate or blow off heavy dirt accumulation.
4. If required, wash the media in any carbon base commercial solvent and blow off the excess solvent.
5. Allow to dry and examine for damage or conditions requiring replacement.

Because the media in the dry type filter is of wool felt, it may become impregnated with oil or water, if present in any large degree. Corrosive gases may also attack the media. While such conditions are not common, they should be kept in mind.

DISCHARGE SILENCER – A drain may be provided in the silencer at the lowest point for draining condensate. Draining intervals will depend upon humidity conditions and must be established by the user.

Other **BLOWER ACCESSORIES** also require periodic service.

1. Drain condensate from discharge silencer
2. Check pressure or vacuum gauges for accuracy.
3. Check relief valve for setting and operation.
4. Inspect check valve seat for wear.

BEARING CARRIER VENT HOLES – There are two vent holes in each bearing carrier. Each hole connects the space between the shaft air seal and the lip-type bearing oil seal with the atmosphere. The vent bleeds the controlled leakage of air from the shaft air seal to atmosphere. More air will bleed through the gear end holes since the gear (discharge) end is at a higher pressure than the inlet end. Inspect vent holes for obstruction by foreign material. Plugged vents may cause pressurization of the oil sump and blow oil out through the oil sump breather-filter.

BEARING OIL SEALS – Oil leakage along each shaft from the oil sumps is prevented by a lip type seal pressed into the bearing carrier. Usual causes of seal failure are: high temperature, rough surface on bearing spacer, damage during installation, and improper seal used. The radius at the step in the shaft should be highly polished to prevent seal lip damage during installation. Use only seals shown in parts list as they have been selected for blower service.

PERIODIC INSPECTIONS – A well-organized maintenance program will provide for periodic inspection of the blower, drive and components. These inspections may prevent major repair and downtime.

1. Observe the blower for vibration, heating, noise, oil seal leaks and excessive shaft air leaks.
2. Check for proper operation of the filters, coupling, drive, power unit, relief and check valves, gauges and other controls.
3. Disconnect the drive and turn the blower by hand to check for drag, tight spots, bearing wear (radial and axial) and gear backlash. Rotation should be free with no indication of drag or metallic interference.
4. Inspect the interior through the inlet or discharge port for cleanliness, corrosion or parts contact.

⚠ WARNING

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

5. Check tightness of all screws and bolts.

SOME COMMON CAUSES OF BLOWER FAILURE:

1. Poor air filter maintenance or incorrect selection.
2. Inadequate lubrication (wrong, dirty or low oil).
3. Backflow of materials into the blower.
4. Discharge pressure or inlet vacuum above blower rating.
5. Blower speed below minimum rating.
6. Blower speed too low for discharge pressure or inlet vacuum.

BLOWER OVERHAUL – Refer to Disassembly Section, page 16, and Assembly Section, page 19.

REPAIR PARTS – When ordering parts, specify Blower Model, Size and Serial Number.

Reference numbers shown in the left hand column of the parts list are used to help locate the parts shown on the drawing and sectional view. DO NOT ORDER BY REFERENCE NUMBERS. After locating the reference number, the part number may be found for your particular blower under the correct Model Number Column.

Specify exactly the number of parts required (see column “Qty.”). DO NOT ORDER BY SETS.

OVERHAUL KIT - 8508094
(Models 3CDL5L & 3CDL8L)

Qty.	Part Number	Description
4	8501071	Seal-Rotor Shaft
4	8500405	Bearing-Angular Contact
2	8500398	Bearing-Ball (Double Row)
2	8500246	Shim-Shaft (Set)
4	8500067	Seal-Oil
2	50Z6	Locknut, Bearing
2	95N6	Washer-Lock, Bearing
1	8500072	Seal-Oil
1	8501069	Shim-Housing (Set)
2	8501068	Gasket-Cover
16	75P192N	Screw-SoHd Lock
7	75P55N	Screw-SoHd Lock
11	75P22N	Screw-SoHd Lock
10	95W48	Washer-Plain
1	8501235	Shim-Housing
5	75P56N	Screw-SoHd Lock

IMPORTANT: For spare parts requirement in remote areas, export or where more than one unit is operating, a spare gear set is recommended. For 3CDL series order part number 300CBD6008 which includes a pinion gear and timing gear.

NOTE: Overhaul kit is recommended for spare parts and/or scheduled maintenance or overhaul requirements.

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 a new location. It is suggested that the steps be followed in sequence and checked off (✓) 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 from 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.

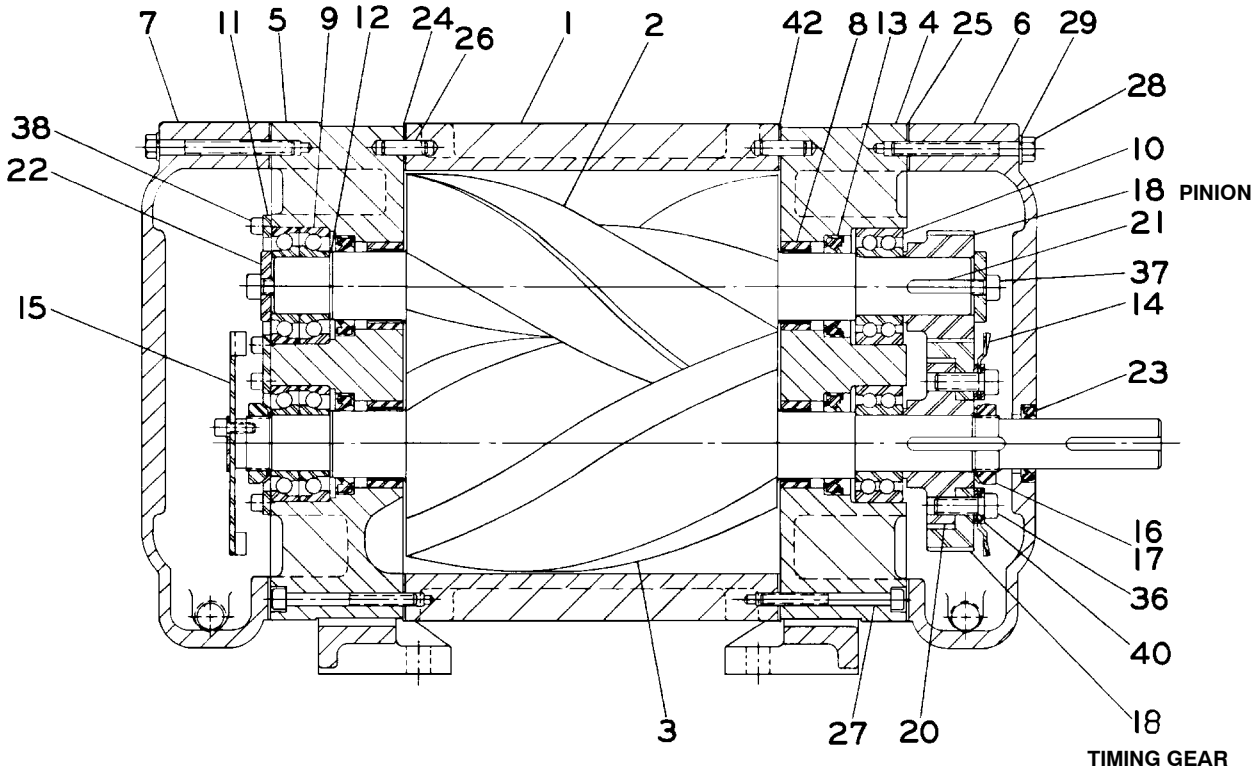
☐ 6. Turn the driveshaft by hand to be certain the rotors do not bind.

☐ 7. “Jog” 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.

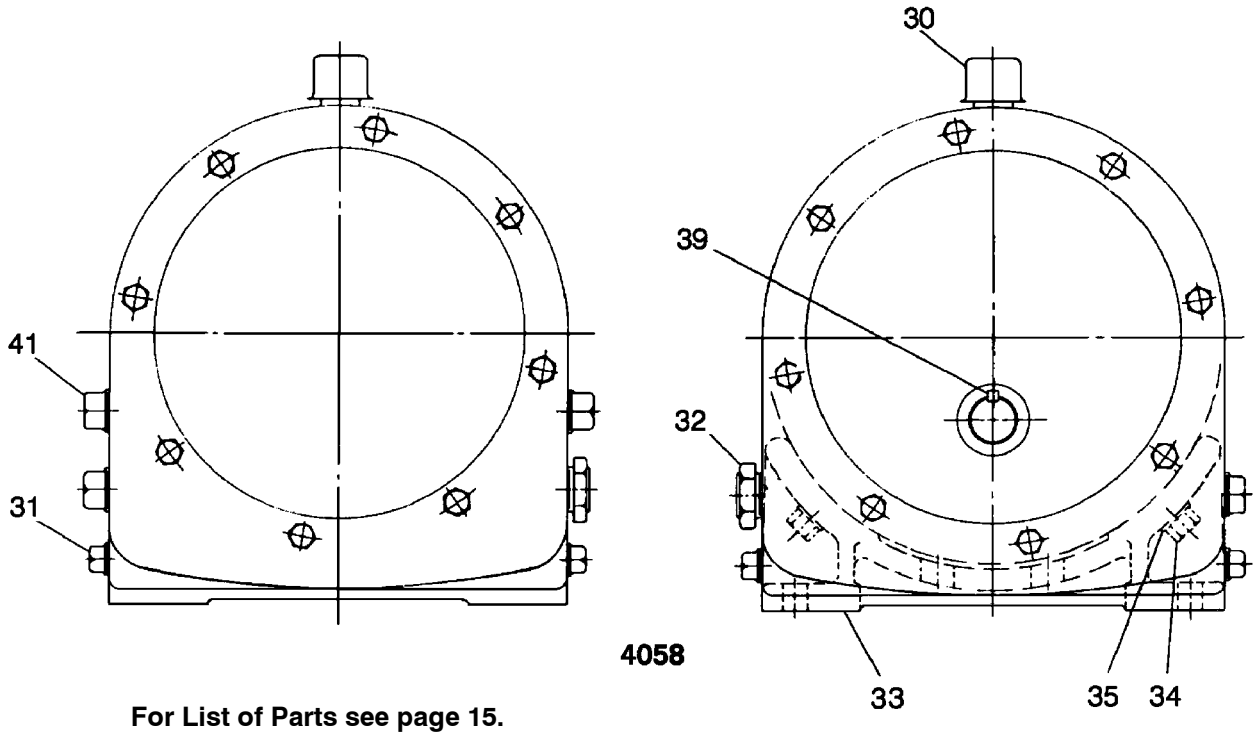
☐ 8. Start the unit and operate 15 minutes at no load. During this time, check for hot spots and other indications of interference.

☐ 9. Apply the load and observe the operation of the unit for one hour. Check frequently during the first day of operation.

☐ 10. If malfunctions occur, do not continue to operate. Problems such as knocking rotors can cause serious damage if the unit is operated without correction.



NOTE: This drawing covers Right Hand Air Inlet, Bottom Air Inlet and Top Air Inlet Arrangements. For Top and Bottom Air Inlet, Oil Level Gauge must be relocated in the highest hole in the End Cover.



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For List of Parts see page 15.

Order By Part Number And Description. Reference Numbers For Your Convenience Only.

Ref. No.	Name of Part	Qty.	Model 3CDL5L	Model 3CDL8L
1	HOUSING	1	8501062	8501074
	ROTOR GROUP (Includes Items 2 & 3)	1	204CBD4028	205CBD4028
2	ROTOR – MAIN			
3	ROTOR – GATE			
4	BEARING CARRIER (Inlet End)	1	8501063	8501075
5	BEARING CARRIER (Discharge End)	1	8501164	8501168
6 *	COVER – END (Inlet End)	1	8504029	8504029
7	COVER – END (Discharge End)	1	8504028	8504028
8	SEAL–ROTOR SHAFT	4	8501071	8501071
9	BEARING – ANGULAR CONTACT	4	8500405	8500405
10	BEARING – BALL (Double Row)	2	8500398	8500398
11	CLAMP PLATE – BEARING	1	8501067	8501067
12	SHIM – SHAFT (Set)	2	8500246	8500246
13	SEAL – OIL	4	8500067	8500067
14	SLINGER – OIL (Inlet End)	1	8504032	8504032
15	SLINGER – OIL (Discharge End)	1	8504033	8504033
16	LOCKNUT, BEARING	2	50Z6	50Z6
17	WASHER – LOCK, BEARING	2	95N6	95N6
18	GEAR KIT (Includes next two items)	1	300CBD6008	300CBD6008
	GEAR–TIMING			
	GEAR (PINION)			
20	HUB – GEAR	1	8500277	8500277
21	KEY – SQUARE	2	8500125	8500125
22	CLAMP PLATE – SHAFT	2	8500278	8500278
23	SEAL – OIL	1	8500072	8500072
24	SHIM – HOUSING (Set)	1	8501069	8501069
25	GASKET – COVER	2	8501068	8501068
26	PIN – DOWEL	6	62M35	62M35
27	SCREW – SoHd LOCK	16	75P192N	75P192N
28	SCREW – HEX HD	16	75A200	75A200
29	LOCKWASHER	16	95B2	95B2
30	BREATHER FILTER	2	DF140867	DF140867
31	PLUG – MAGNETIC	4	64BJ2	64BJ2
32	GAUGE – OIL LEVEL	2	40P45	40P45
33	FOOT SUPPORT	2	8501066	8501066
34	SCREW – HEX HD	4	655EE050	655EE050
35	WASHER – LOCK	4	95B5	95B5
36	SCREW–SoHd LOCK	5	75P56N	75P56N
37	SCREW–SoHd LOCK	2	75P55N	75P55N
38	SCREW–SoHd LOCK	11	75P22N	75P22N
39	KEY – SQUARE	1	8500126	8500126
40	WASHER – PLAIN	10	95U3	95U3
41	PLUG – SqHd PIPE	4	64AA3	64AA3
42	SHIM – HOUSING	1	8501235	8501235

* For Top Inlet Construction, use End Cover Part Number 8504030 or for Bottom Inlet Construction, use End Cover Part Number 8504031.

SECTION 6
DISASSEMBLY INSTRUCTIONS

NOTICE

Numbers in parentheses ( ) refer to key numbers in assembly drawings on page 14.

To prevent damage to parts and for easier overhaul of the blower, the use of adaptor plates is highly recommended. Where a jaw-type puller is used to pull the gear hub, FIGURE 3 provide adaptor plate shown in FIGURE 8, page 18. Adaptor plate for alternate method is shown in FIGURE 9, page 18.

Pulling directly on the gear hub flange will distort the flange causing gear run-out.

Provide a bearing press plate, FIGURE 10, page 18, for installing the bearings at assembly, Steps 15 and 16, page 23. This method of installing bearings is highly recommended as it reduces the chance of bearing damage, which justifies making the plate.

1. Drain oil from the gear end cover (6), remove the cover, shaft clamp plate (22), locknut (16), washer (17), oil slinger (14) and timing gear (18) (FIGURE 1). The gear is slip fit on the hub. Do not damage gear teeth.

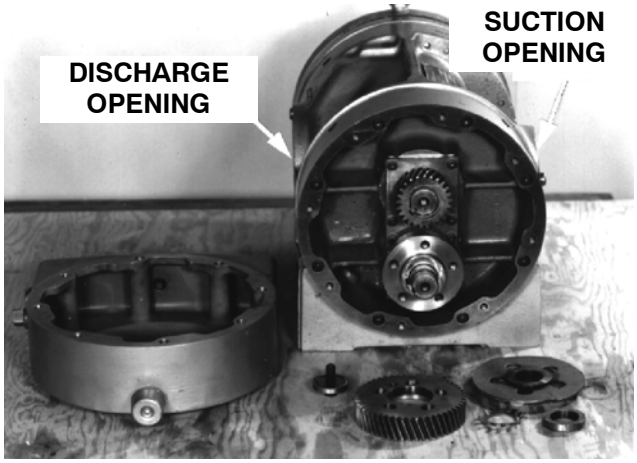


FIGURE 1

2. Rig the adaptor plate (shown in FIGURE 8, page 18) and puller, and pull the gear hub (20) as shown in FIGURE 2. **Use a shaft protector to prevent damage to the shaft.** Remove the key from the shaft. If jaw-type hydraulic puller is not available, the hub may be pulled as shown in FIGURE 9,

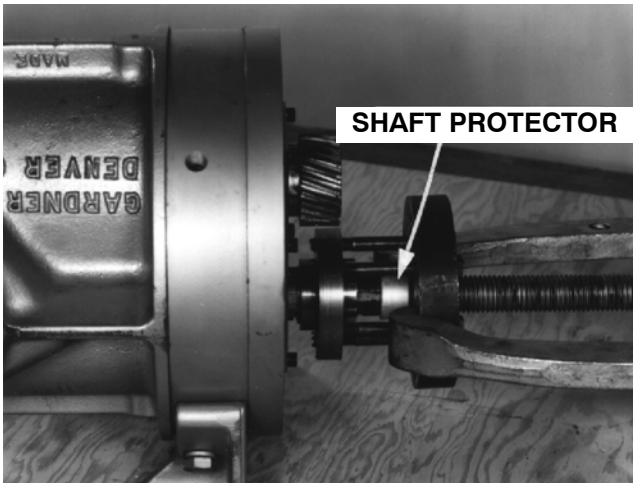


FIGURE 2

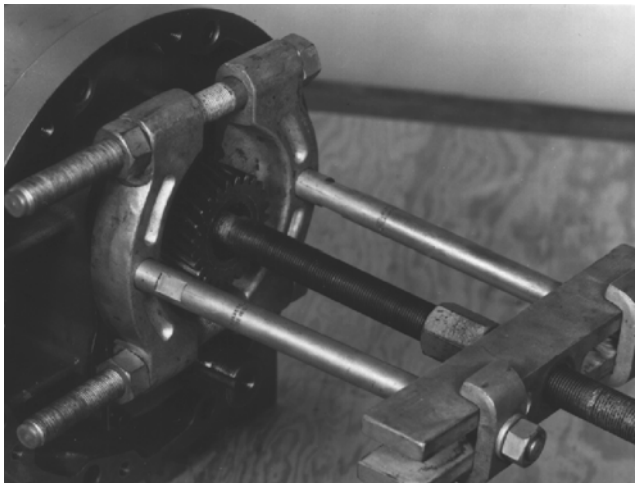


FIGURE 3

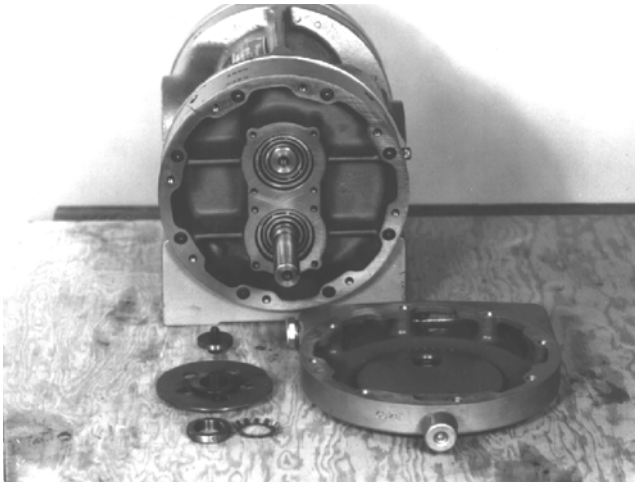


FIGURE 4

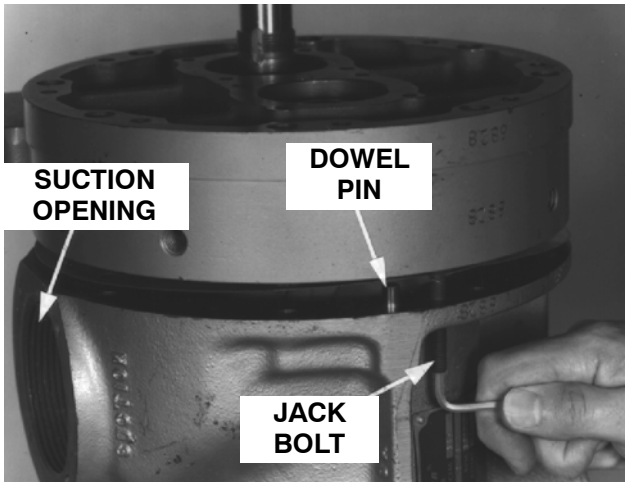


FIGURE 5

page 18. A hydraulic ram (Porta-power) can be used in place of the spacer in FIGURE 8, page 18.

3. Pull the pinion as shown in FIGURE 3, page 16. The pinion is too small to provide puller holes, so take care when pulling so teeth are not damaged if pinion is to be reused. **Use a shaft protector.**

4. Drain oil from the discharge end cover (7), remove the cover, shaft clamp plate (22), nut (16), lockwasher (17) and oil slinger (15) (FIGURE 4).

5. Stand the unit on end with the inlet opening up. With jack bolts, FIGURE 5, one on each side, jack the inlet end bearing carrier (6) and rotor assembly from the housing. This operation also pulls the rotor shafts through the bearings in the gear end carrier.

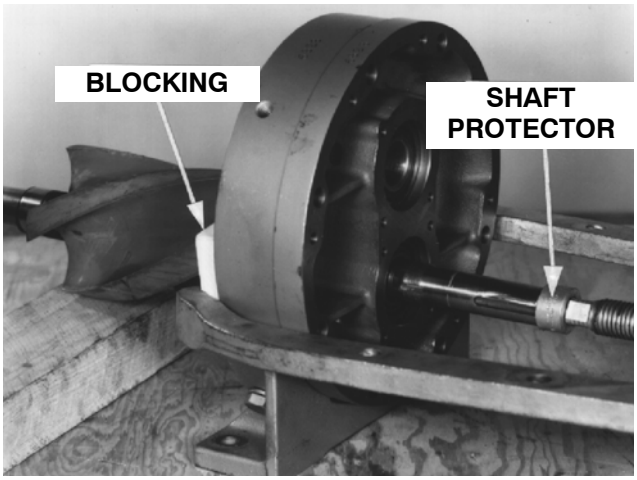


FIGURE 6

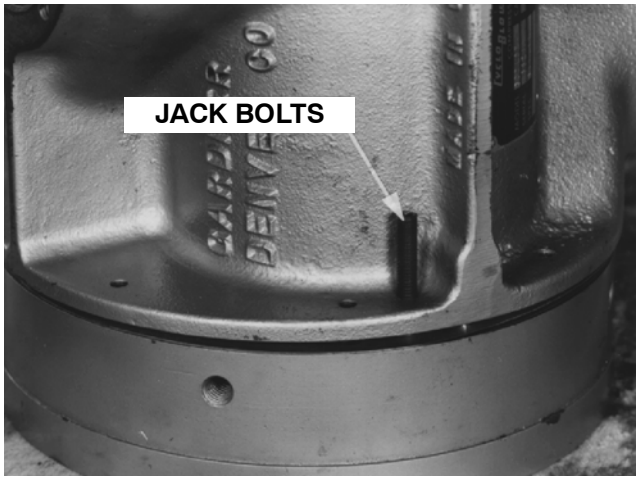
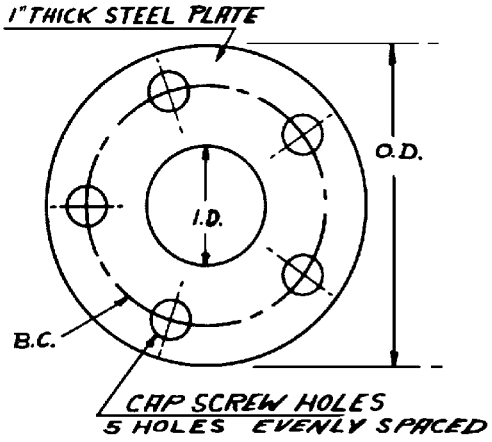
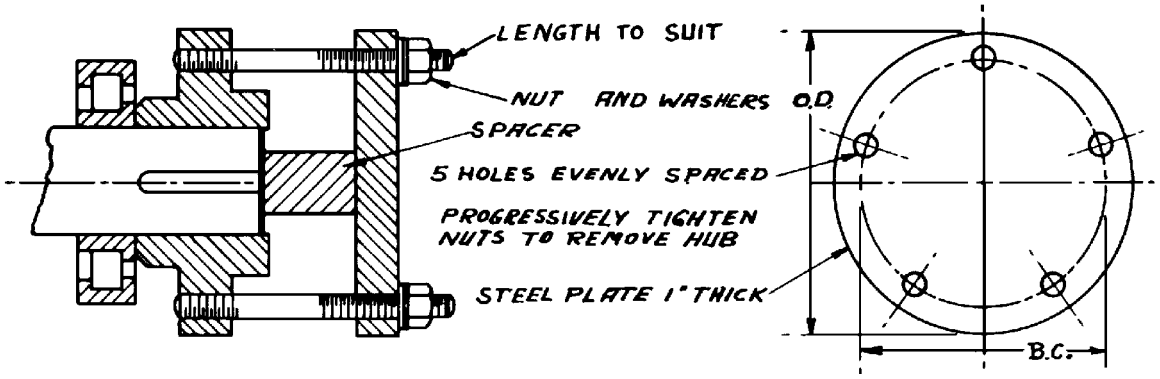


FIGURE 7



O.D.	I.D.	B.C.	Holes	Screw
4	1-3/4	2-5/8	5 - 7/16	3/8 - 16

FIGURE 8 - ADAPTOR PLATE



O.D.	B.C.	Holes	Screw
4	2-5/8	5 - 7/16	3/8 - 16

FIGURE 9 - ALTERNATE ADAPTOR PLATE

6. Place the inlet end bearing carrier and rotor assembly on suitable blocking and press the rotors from the carrier as shown in FIGURE 6, page 17. **Use a shaft protector.**

   Protect the finished side of the carrier as shown or in a manner to suit the method used for removing the rotors from the carrier.

7. With jack bolt on each side, jack the housing (1) from the discharge end bearing carrier, FIGURE 7, page 17. Tighten jack bolts evenly to prevent binding on the dowel pins.

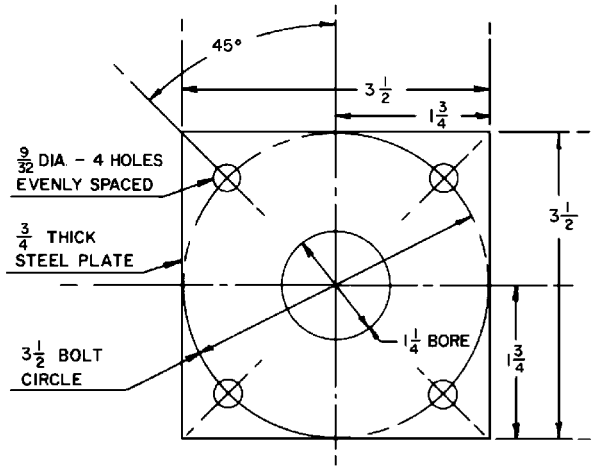


FIGURE 10 - BEARING PRESS PLATE

SECTION 7
ASSEMBLY INSTRUCTIONS

The CycloBlower is manufactured with close tolerances for efficient operation. All parts must be handled carefully to prevent burrs which will give false tolerance readings and/or cause rapid wear. Clean work areas, washing tank, tools and wiping rags must be provided. Refer to parts list, Section 5, page 14, for sectional view showing complete assembly of parts.

There may be cases where foreign materials have entered the blower, or other causes have resulted in scoring of rotor ends, bearing carrier faces, rotor lobes, or housing walls. Since the blower is designed with no contact of parts within the rotor chamber, these parts may be cleaned and polished for reuse unless galling is severe. Reuse of parts severely scored may result in loss of blower efficiency. All damaged parts which have been reworked should be checked for run-out or warpage before reuse.

NOTICE

Numbers in parentheses ( ) refer to key numbers in assembly drawings on page 14.

1. Remove bearings (9, 10) and oil seals (13) (lip seals) from both bearing carriers (4, 5). Remove with care to prevent damage to the bronze-filled Teflon lining of the rotor shaft seal (8), since it may be reusable.

NOTICE

If bearings are to be reused, keep the races in matched sets. Never reuse worn bearings.

The rotor shaft seal may be reused if:

(a) The bronze-filled Teflon lining is not obviously damaged (radial grooves are worn into the seal).

(b) The clearance between the labyrinth seal portion of the shaft and the I.D. of the seal is no more than .004". Check this clearance with a feeler gauge, FIGURE 1. Greater clearance will cause excessive air leakage and lower the blower efficiency.

FIGURE 1

When checking the rotor shaft seal for clearance, be sure there are no burrs on the shaft or seal.

If the rotor shaft seal can be reused, skip Step 2 and proceed to Step 3. If the shaft seals are to be replaced, remove the oil seal and proceed with Step 2.

2. Oil the O.D. of the seal (8) to prevent seizure in the bore. Install the seals in the bearing carriers, FIGURE 2, page 20. Press or drive the seal about .005" below flush to prevent interference with the end of the rotor; .005" shim stock (cut to diameter of the seal) placed over the end of the seal will allow the seal to be driven to the proper depth. A flat driver as shown in FIGURE 2, page 20, will prevent damage to the seal. Check the clearance as described in Step 1.

3. Install the oil seals (13) in the bearing carriers (4, 5), FIGURE 3, page 20. The lip of the seal points up in the bearing bore. The seal bottoms against the shoulder in the bore. Use sealing compound on the O.D. of the seal for ease of installation and to prevent leakage around the seal. Be sure the driver used is large enough to bear against the outer ring of the seal case to prevent damage to the case and distortion of the seal lip. Use only

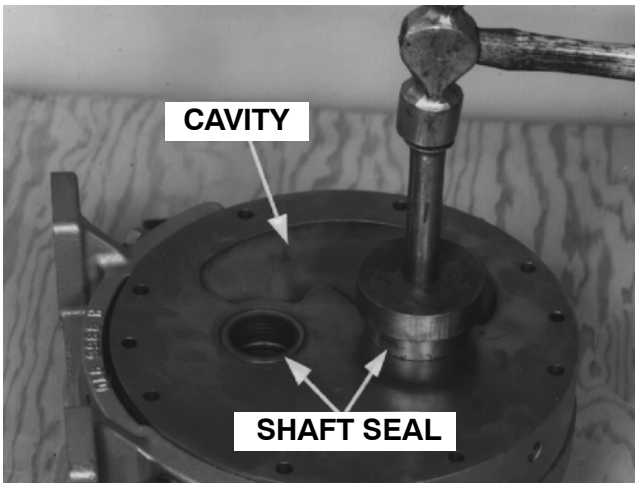


FIGURE 2

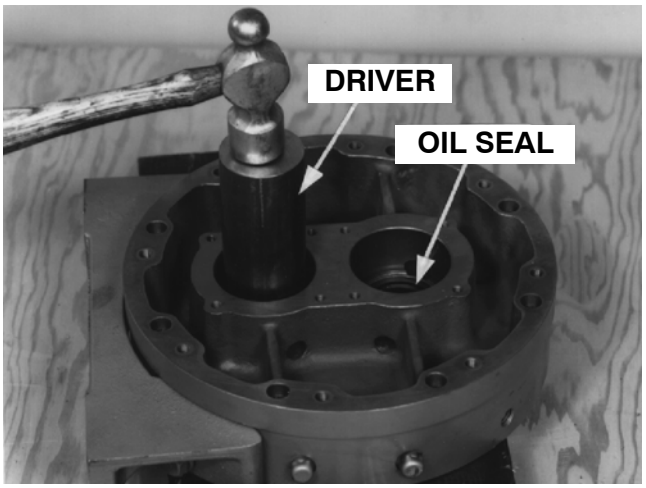


FIGURE 3

seals shown in the parts list as they are selected for blower service.

4. Stand housing (1) on end with the inlet opening up, FIGURE 4. Place the .030" shim (42) on the end of the housing. Position the inlet end bearing carrier (4) over the dowel pins (26) on the housing so the cavity of the carrier (FIGURE 2) is in line with the inlet opening, and pull up tight with Nylok type screws (27).

5. Stand the assembly on the inlet end carrier (4) blocked high enough to clear the rotor shaft extension. Coat I.D. of shaft air seals and seal area of shaft extension on the inlet end (drive end) of the rotors with "Moly" type grease for break-in purposes. Make sure the oil seal area of the shaft extension is perfectly smooth to prevent possible oil leaks. Lower the gate rotor (3), inlet end shaft extension down, into the housing first. Match timing marks, if present on older models, FIGURE 5, and lower main rotor (2) into the housing, inlet end shaft extension down. When lowering the rotors into the housing, take care the shaft shoulder does not damage the air seal and oil seal. Rotate rotors several times to be sure they rest squarely on the carrier face.

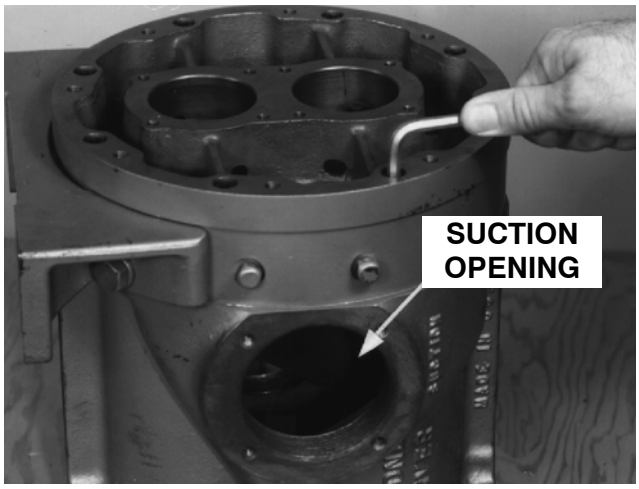


FIGURE 4

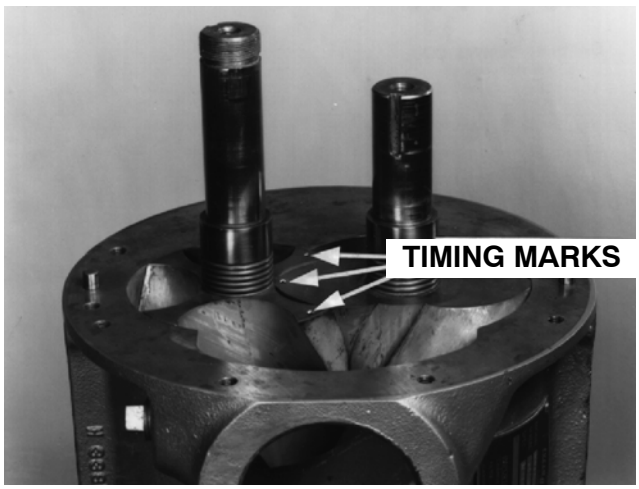


FIGURE 5

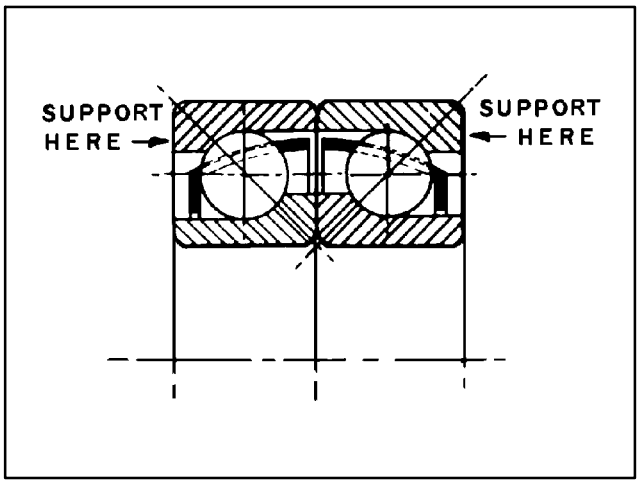


FIGURE 6

FIGURE 7

NOTICE

The CycloBlower is designed for no metal-to-metal contact of parts within the housing. To achieve this, some preliminary measurements are necessary before completing the assembly.

The first set of measurements are used to determine the shim set thickness necessary for positioning the rotors in the housing to give the required clearance between the end of the rotors and the carrier face at the discharge end by two angular contact bearings and shim set. The shim set is determined as outlined in Steps 6, 7, 8 and 9.

6. The angular contact bearings (9) must be assembled as shown in FIGURE 6 to assure a "fixed" bearing. The marked face of the inner bearing is placed down in the bearing bore; the marked face of the outer bearing is placed up.

7. Inspect the bearing bore and shoulder in the bearing bore and the discharge end bearing carrier (5) for burrs and dirt. Slip the bearings (9) into the bore (see Step 6) and install clamp plate (22), FIGURE 7. Bearings are slip fit in the bore. **DO NOT USE WORN BEARINGS.**

FIGURE 8

8. Turn the carrier over and with a depth micrometer, measure the distance from the flat machined surface of the carrier to the end of the bearing inner race, FIGURE 8. Measure the distance at both bearing bores. Record the measurement for both gate rotor and main rotor. When operation is completed, remove the bearings from the carrier and tag them in respect to the bearing bore in which they are to be used.

9. At the discharge end shaft extension, measure the distance from the shaft seal shoulder to the end of the rotor, FIGURE 9, page 22 . Check for burrs. Make measurements on both rotors and match with measurements recorded under Step 8.

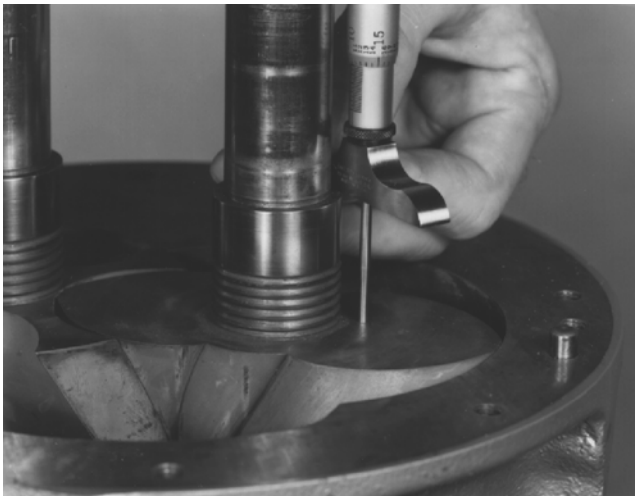


FIGURE 9

Models	Total End Clearance (Inlet + Discharge)	Inlet End	Discharge End
3CDL5	.010	.006	.004
3CDL8	.014	.010	.004

(Dimensions [inches] are for ideal clearances – allow +/– .001" for tolerances)

FIGURE 10 - ROTOR END CLEARANCE CHART (UNIT COLD)

10. To establish the shim set required, subtract the measurement under Step 8 from the measurement under Step 9 and to the remainder, add the discharge end clearance shown in FIGURE 10, plus .002" for crush. Figure and record the shaft shim set for each rotor for use later in assembly. Do not install shims on the shaft seat as damage will result when installing the carrier.

Example for 3CDL8: Step 8 measurement is 1.592", Step 9 measurement is 1.557", when subtracted leaves a remainder of .035". Adding .004" discharge end clearance shown in FIGURE 10, plus .002" for crush fit, equals a shim set of .041".

NOTICE

The second set of measurements is used to determine total end clearance. To give proper rotor end clearance at BOTH inlet and discharge end (referred to as total end clearance) the distance between the face of the bearing carriers must be equal to the rotor length plus both end clearances. Total end clearance is obtained by adding shims as required between the flange of the housing and discharge end bearing carrier. The thickness of the shim is determined as outlined in Steps 10 and 11.

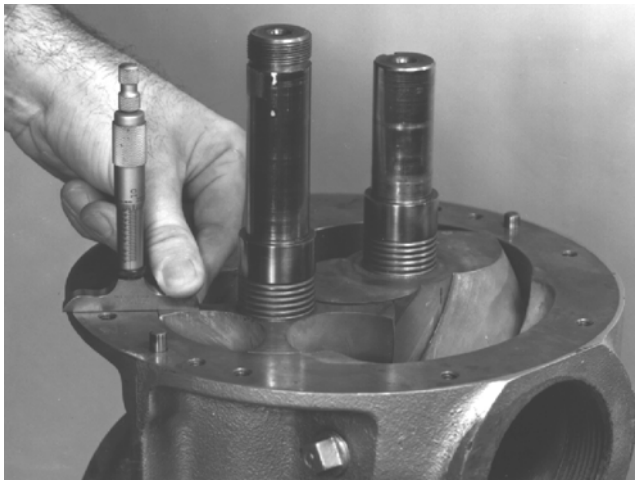


FIGURE 11

11. With depth micrometer measure the distance from the end of each rotor lobe to the end of the housing, FIGURE 11. Rotate rotors so all lobes can be checked on both rotors and use the greatest micrometer reading.

    To the micrometer reading, add the total end clearance shown in FIGURE 10, plus .002" for crush fit to determine the housing shim set needed.

    Example for 3CDL8: Micrometer reading of .015" plus total end clearance .014" (FIGURE 10), plus .002" for crush fit equals shim set of .031" thickness.

12. The thickness is stamped on each aluminum shim. Select the proper amount of shims established in Step 10. It is recommended the shim set be

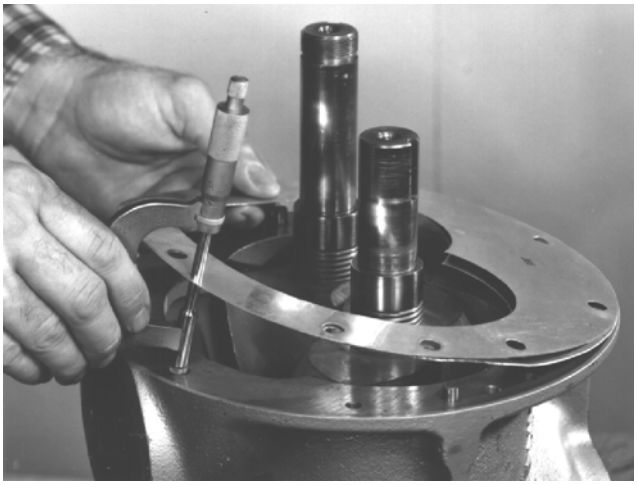


FIGURE 12

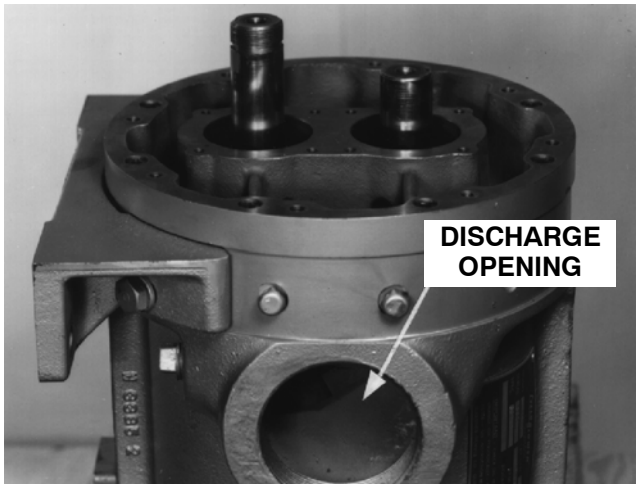


FIGURE 13

checked with an outside micrometer, FIGURE 12. Place shims (24) on the end of the housing to match the contour of the housing and dowels.

13. Make sure the oil seal area of the shaft extension is perfectly smooth to prevent possible oil leak. Coat I.D. of the shaft seal in the discharge end bearing carrier and seal portion of the shaft extension with “Moly” type grease for break–in purposes. Lower the bearing carrier on to the housing, FIGURE 13. The cavity in the bearing carrier (FIGURE 8) lines up with the discharge opening in the housing. As the carrier is lowered into position, be careful not to damage the air seal or oil seal. Pull up evenly to prevent damage to dowel pins or holes; use Nylok type screws.

14. With a dial indicator attached as shown in FIGURE 14, check total end clearance. Set the indicator on zero and lift the rotor with a pry bar through the suction port. Check both rotors. **Be careful not to damage the end of the rotor.** The reading of the indicator will be the total end clearance and should match dimensions shown in the clearance chart, FIGURE 10, page 22. If the figures do not match, check for miscalculations when figuring the shim set (Steps 10 and 11, page 20) or for burrs at the ends of the rotors.

NOTICE

Due to machining tolerances of rotor length, there may be cases where one rotor will be within limits and the other slightly over or under.

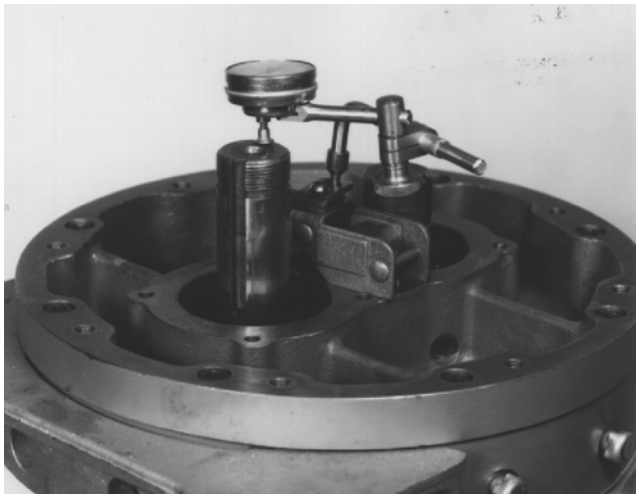


FIGURE 14

15. Lightly coat the shaft extension and bearing bore with oil. Assemble press plate (refer to FIGURE 10 in the Disassembly Section, page 18) and jack screws as shown in FIGURE 15, page 24. Tighten the nuts on the jack screws evenly to prevent cocking of the bearing as it is pressed into the plate.

NOTICE

It is not recommended to drive the bearings in place. Oil bearings liberally.

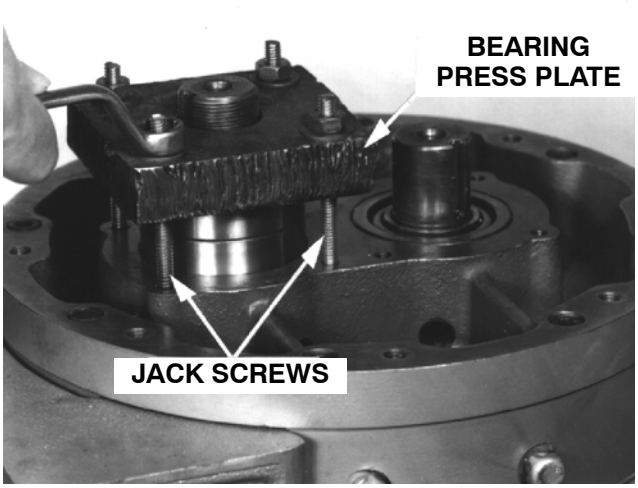


FIGURE 15

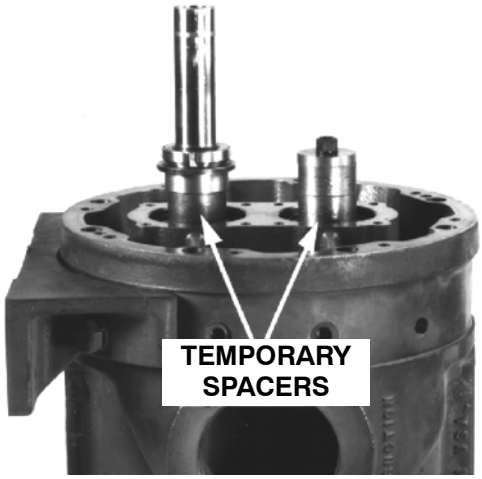


FIGURE 16

Install the bearing clamp plate (11) and eight (8) Nylok type screws (38). Install the shaft clamp plate (22) on the main rotor shaft, bearing lock washer and locknut (16) on the gate rotor shaft and drive up tight. This operation pulls the rotor shaft through the bearings until the inner race jams against the shims and the shaft shoulder, placing rotors in fixed position. With a feeler gauge through the discharge port, check clearance between the end of each rotor and the face of the carrier. This clearance must correspond with the discharge end clearance listed in FIGURE 10, page 22. Oil the bearings liberally, install the oil slinger (15) with three (3) Nylok type screws (38). Install the cover gasket (25) and cover (7).

16. Stand the unit on the discharge end. Lightly coat the bearing bore and shaft extension with oil. Assemble double row ball bearing (10), press plate (FIGURE 10, page 18), and jack bolts and press bearings in the bore. Tighten the nuts on the jack bolts evenly to prevent cocking of the bearings. The press plate will press the bearings only flush with the face of the carrier. Bearings must seat against the shaft shoulder. Install temporary spacers as shown in FIGURE 16. Spacers must bear against the bearing inner race; 1-1/4" x 1-1/2" pipe nipples make good spacers. For the main rotor, install the clamp plate and Nylok type screw and pull the bearing into the bore until it jams tight against the shoulder of the shaft. For the gate rotor, use a large washer between the spacer and bearing locknut and pull the bearing into the unit it jams tight against the shoulder of the shaft. Oil bearings liberally.

    Remove temporary spacers. Check the fit of the key in the gear hub and pinion. Check pinion, hub and shaft extension for burrs. Install keys in the shafts, making sure of snug fit. Heat the pinion and hub in oil or dry heat such as oven – **NEVER USE TORCH** – to 350° F. for thirty minutes minimum to allow for complete heat penetration. If heating with oil in a confined area, use of cooking oils will prevent undesirable odors. Lock rotors from turning with a piece of hard wood or belting. To prevent the possibility of the rotor shaft moving back through the bearings, jam shim stock between the end of each rotor and the face of the bearing carrier at the inlet end. Install hub (20) and pinion (18) and pull tight with a locking device. As the hub and pinion cool, check for tightness; bearings must be clamped tight between the shoulders on the shaft and and pinion or hub to maintain fixed end clearance. Remove shim stock from between the ends of the rotors and inlet end bearing carrier.

TIMING OF ROTORS

NOTICE

The final check to be made for running clearances is dividing the interlobe clearance of the rotors to prevent metal-to-metal contact. This is referred to as "Timing of Rotors" and is accomplished in the following five steps.

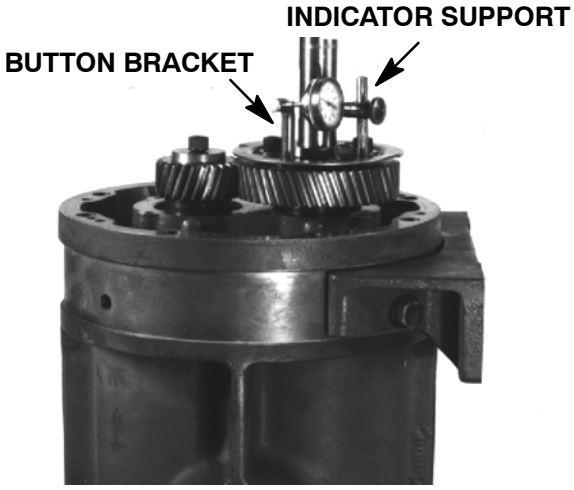


FIGURE 17

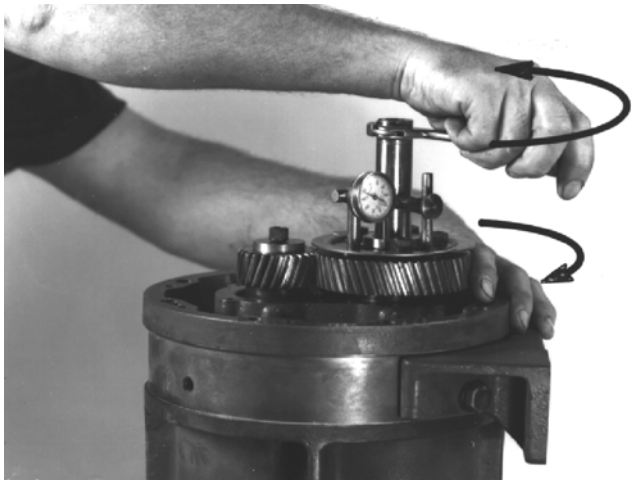


FIGURE 18

17. Be sure the gear hub has cooled to room temperature. Install the timing gear (18) on the hub. Tapped holes in the hub should be centered with slotted holes in the gear, as nearly as possible, to provide movement for timing. The gear must move freely on the hub. Install five new flat washers (40) between the gear and oil slinger and five new flat washers on top of the slinger (14) using new Nylok type screws (36). Tighten screws just enough to prevent up and down movement of the gears, but allowing radial movement on the hub.

    Install the indicator button bracket, indicator support and indicator as shown in FIGURE 17. Make sure the jam nut holding the button bracket is tight as the unit is turned with this cap screw.

In order to accurately follow the next three steps in timing, the indicator must be mounted in a counterclockwise position from the bracket. The indicator support is made from a 3/8–16 stud turned at one end to fit clamp. The button bracket can be made from 1/8" flat stock bent to suit.

18. Set the indicator on zero. Hold the gear under pressure clockwise to take up all backlash, FIGURE 18. Normal gear backlash is .002" to .004". While holding pressure on the gear, rotate the rotor counterclockwise with a wrench engaged as shown, allowing the gear to slip through the hand. Do not rotate the assembly by moving the gear – use a wrench only. Make two complete revolutions. Notice the place of the smallest reading (this is the smallest number of thousandths from zero and not the smallest figure on the indicator dial). Continue rotation and stop at the point of the smallest reading and reset indicator to zero. If the indicator pointer flutters at any one point during rotation, check for burrs or dirt on rotors or gear teeth.

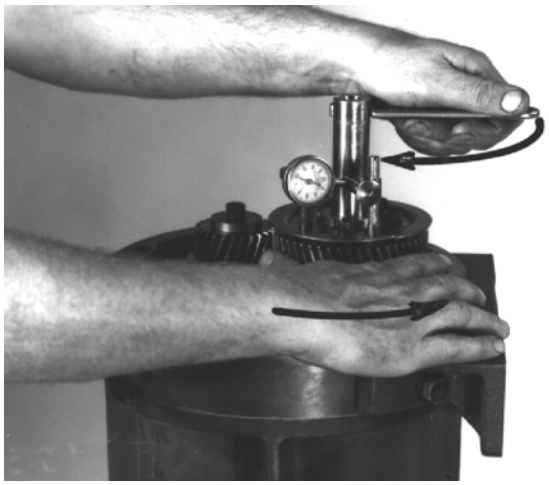


FIGURE 19

19. Hold the gear under pressure counterclockwise to take up all slack, FIGURE 19, and rotate clockwise two complete revolutions. Note the position of the smallest indicator reading. Continue rotation and stop at the point of smallest reading. This is the point of minimum total interlobe clearance.

20. The interlobe clearance is divided with 2/3 on the discharge side and 1/3 on the inlet side. Hold the gear from turning, FIGURE 20, page 26 and move the rotor counterclockwise until the indicator reading is 2/3 total indicator reading obtained in Step 19.

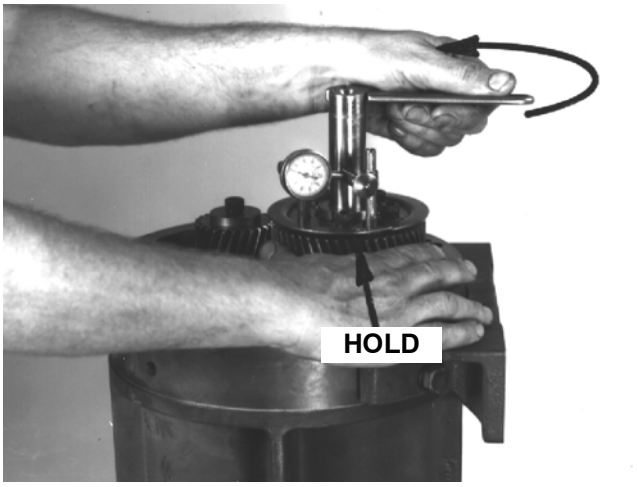


FIGURE 20

FIGURE 21

Example: if the indicator reading in Step 19 is +15, then move the rotor clockwise until the indicator reads +10. Tighten the gear to hub Nylok type screws evenly. Be sure the indicator reading does not change. The rotors are held in time by the clamping action of the screws and distortion of flat washers into slotted holes in the gear. Rotate rotors to be sure timing has not slipped and there is no interlobe interference.

21. Remove the indicator equipment. Recheck tightness of the pinion clamp screw and gear locknut (16), FIGURE 21. Bend the ear of the lock washer (17) into the slot in the nut.

22. Install the oil seal (23) in the end cover (6). Protect the keyway of the shaft so it will not damage the oil seal. Install the gasket (25) and cover (6) on the bearing carrier, FIGURE 22. Make sure the shaft is smooth and clean in the oil seal area, or oil leakage may result.

    Check magnetic drain plugs (31) in both oil sumps to be sure they are clean, reinstall and pull tight. Place the blower on support feet. Remove breather filters (30) from both end covers and inspect for cleanliness and damage. Replace with new filters if damaged; do not operate the blower with damaged breather.

    Install oil level gauges (32) in the top hole for top and bottom air inlet blowers or in the middle hole for right hand air inlet blowers. See Outline Dimensions drawings, FIGURE 4 and FIGURE 5, pages 5 and 6, for correct locations.

FIGURE 22

Fill both oil sumps to the proper level with oil; see “Lubrication”, Section 4, page 9, for oil specifications.

Refer to “Storage” , Section 1, page 1, if the blower is to be stored.

⚠ WARNING

Cover all openings to prevent dirt entering blower during transportation or storage.

Gardner Denver

WARRANTY

GARDNER DENVER®

CDL SERIES CYCLOBLOWERS®

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:

1. Any product which has been repaired or altered in such a way, in the Company's judgment, as to affect the product adversely.
2. Any product which has, in the Company's judgment been subject to negligence, accident, improper storage, or improper installation or application.
3. Any product which has not been operated or maintained in accordance with normal practice and with the recommendations of the Company.
4. 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 12 months from date of initial use or 18 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.

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 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.

All costs of transportation of product, labor or parts claimed not to be as warranted and, of repaired or replacement parts to or from such service facilities shall be borne by the Purchaser. The Company may require the return of any part claimed not to be as warranted to one of its facilities as designated by 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 WARRANTIES, EXPRESSED, IMPLIED OR STATUTORY, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY.

THE REMEDY PROVIDED UNDER THIS WARRANTY 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.

For additional information, contact your local representative or

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