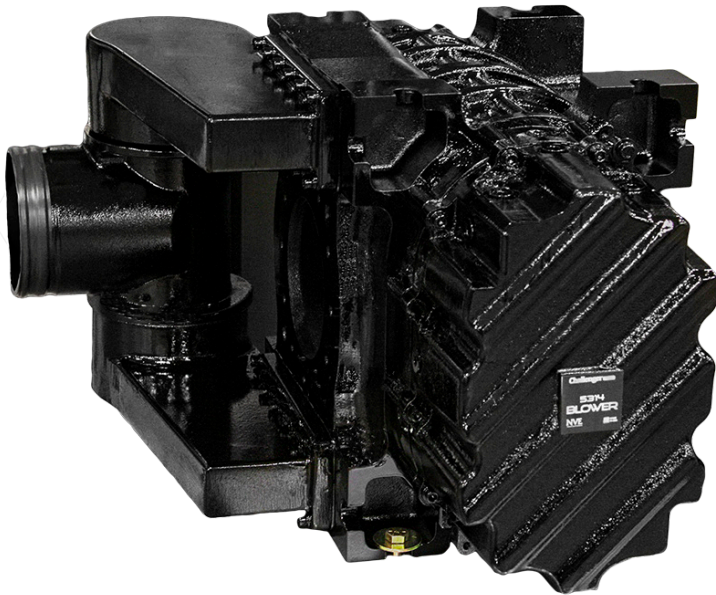


NVE

National Vacuum Equipment



Owner's Manual

1600 Challenger Tri-Lobe Blower



800-253-5500 | natvac.com

1600 Blower

Owner's Record

Date of Purchase: _____

Purchased from: _____

Serial Number: _____

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INTRODUCTION

General Information



About National Vacuum Equipment

Congratulations! You now own a quality vacuum/pressure Blower proudly manufactured in the U.S.A. by National Vacuum Equipment, Inc. You have not only acquired a superior piece of equipment from a qualified dealer, you have hired a team of vacuum experts. We stand ready to work with your dealer to answer your questions and provide you with the information necessary to keep your equipment in peak working condition. Thank you for putting your trust in National Vacuum Equipment.

Our Mission

We are dedicated to the production and wholesale distribution of quality vacuum system products at a reasonable price, on a timely basis. We are a “one-stop shop” for manufacturers and distributors of vacuum equipment.

Our History

National Vacuum Equipment, Inc. was founded in 1980 by Bruce Luoma. The Company started as a retailer of vacuum pumps. Soon after it started, the Company secured the rights to exclusive distribution of the Battioni vacuum pumps in North America. This helped the Company to evolve into its current status as a wholesale supplier.

To reach the goal of becoming a full service supplier of vacuum system components, the Company began fabrication of its own line of componentry, purchased and developed its own line of vacuum pumps, and began purchasing for resale, various valves and accessories.

Today, NVE has full service machine, fabrication and powder-coating shops complete with CNC-controlled production equipment designed for close tolerance work. The company has a highly trained staff, all of whom are dedicated to quality.

LIMITED WARRANTY

Warranty

National Vacuum Equipment, Inc. Guarantees that the product it provides is free of manufacturer's defects, including materials and workmanship. Properly installed and maintained NVE product is warranted for a period of one (1) year subject to the following conditions:

1. A properly completed warranty registration card must be received by us within 30 days of sale to end user for pump sales to be considered warrantable. All pumps received for warranty consideration must retain the original NVE serial number tag.
2. The one (1) year period shall begin the day the product is shipped from our warehouse, unless we are provided with an authentic copy of the original resale invoice, in which case the one (1) year period shall begin at such invoice date.
3. The covered product must be used in an application for which it was intended. We do not recommend our product for particular uses or applications.
4. Damage caused by improper use or lack of proper maintenance is not warrantable.
5. Manufacturer's liability under this or any other warranty, whether express or implied, is limited to repair of or, at the manufacturers' option, replacement of parts which are shown to have been defective when shipped.
6. Manufacturer's liability shall not be enforceable for any product until National Vacuum Equipment, Inc. has been paid in full for such product.
7. Except to the extent expressly stated herein, manufacturer's liability for incidental and consequential damage is hereby excluded to the full extent permitted by law.
8. Manufacturer's liability as stated herein cannot be altered except in writing signed by an officer of National Vacuum Equipment, Inc.
9. Certain products provided by National Vacuum Equipment, Inc. are covered by their respective manufacturer's warranties (e.g., engines used in the NVE engine drive packages). These products are not covered by the National Vacuum Equipment, Inc. Manufacturer's Warranty.

Warranty Procedures

Should a potential warranty situation arise, the following procedures must be followed:

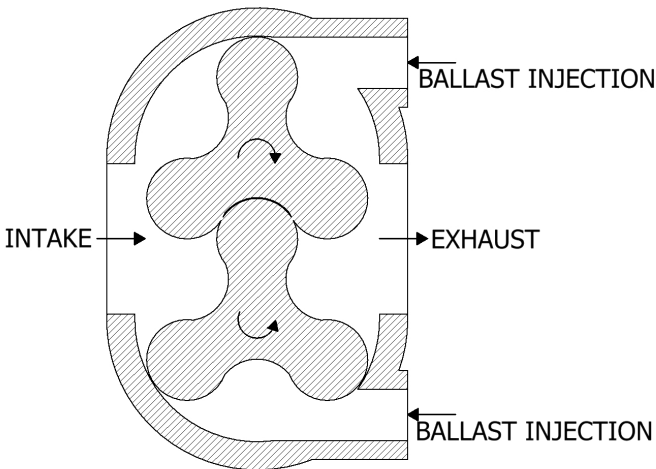
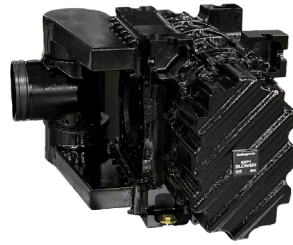
- Contact your dealer or NVE immediately upon the occurrence of the event and within the warranty period.
- Customer must receive a return materials authorization (RMA) form from NVE before returning product.
- All serial-numbered products must retain the original NVE serial number tag to be qualified for warranty.
- Product must be returned to NVE intact for inspection before warranty will be honored.
- Product must be returned to NVE freight prepaid in the most economical way.
- Credit will be issued for material found to be defective upon our inspection, based upon prices at the time of purchase.

The maximum allowable operating vacuum will vary depending on R.P.M., ambient temperature, altitude and time running. The basic principle to keep in mind is - faster R.P.M., higher air temperature and longer run time all equal more heat in blower. When installing an NVE 1600 blower we recommend a normal R.P.M. of 3600. Other speeds are ok as long as exhaust gas temperatures read on the supplied thermometer do not exceed 380 degrees F.

Weights and measurements are for reference only.

1600 TRI-LOBE BLOWERS

NVE 1600 TRI-LOBE BLOWERS



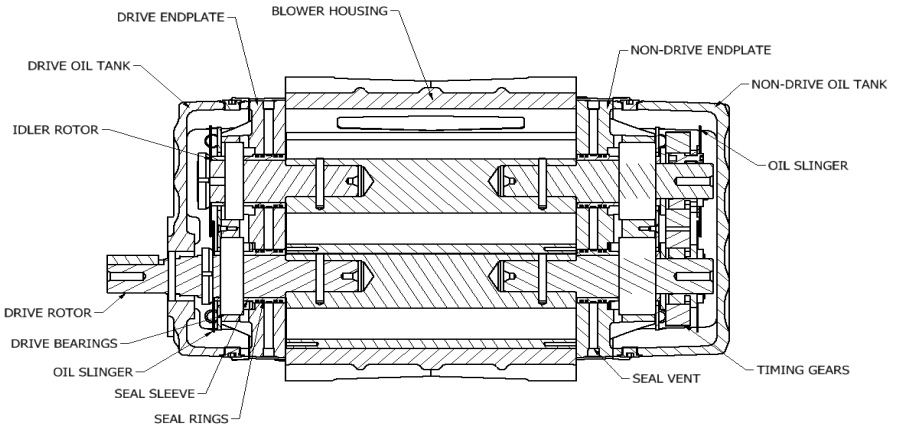
General Blower Operation

The NVE blowers are severe duty vacuum pumps, designed to be used in liquid waste pumping systems where extended operation is desired. The pump incorporates a ballast air cooling system to provide superior cooling, allowing for extended operation.

The air enters the intake under vacuum or at atmospheric pressure. As the rotors rotate, a fixed volume of air is moved along the wall of the cylinder towards the exhaust where the pressure and temperature of the volume of air increases. If the intake air is below atmospheric pressure, cooling air will be drawn in when the rotor tip passes the ballast port.

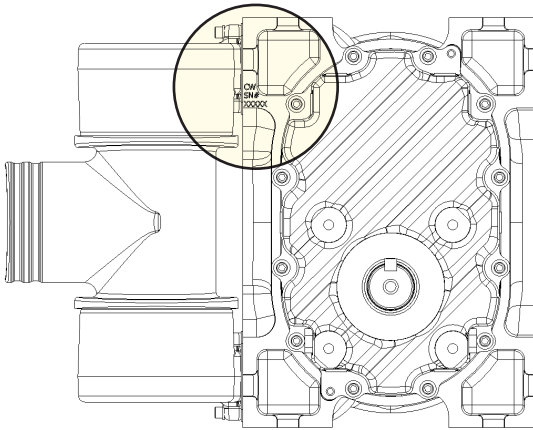
The airflow capacity of the machine (in ACFM) is nearly proportional to the speed of the machine and is nearly constant with changes in inlet or outlet pressures.

General Blower Construction



Location of Serial Number

Each blower should have a brass colored tag with an embossed serial number. In addition, the serial number and blower direction as assembled at the factory are stamped into the top of the housing as shown:



SPECIFICATIONS

Operating Environment

The 1600 blower is designed to move atmospheric air. Do not use to move explosive or corrosive gasses or operate the blower in an area with explosive gases. Any materials in the intake air must be filtered and separated from the air by means of an intake filter, moisture trap and/or a cyclonic filter. The ballast inlet must be positioned and protected from ingesting debris, fluid or explosive gases.

Operating Limits

The blower must be operated within all limits at all times. This typically means the blower performance is limited by the exhaust temperature and temperature rise over ambient for the blower.

Size	RPM		Inlet Vac (in Hg)	Press. Rise† (psig)	Exh. Press. (psig)	Inlet Temp (°F)	Exh. Temp (°F)	Temp Rise‡ (°F)	Ballast Inlet Temp (°F)
	Max	Min	Max	Max	Max	-	Max	Max	-
1600	3600	1500	FULL VAC	14	10	*	380	260	*

*Exhaust temp and temp rise limited, †Pressure rise is from inlet to outlet, ‡Temperature rise is exhaust minus ambient temperature surrounding blower (note if enclosed)

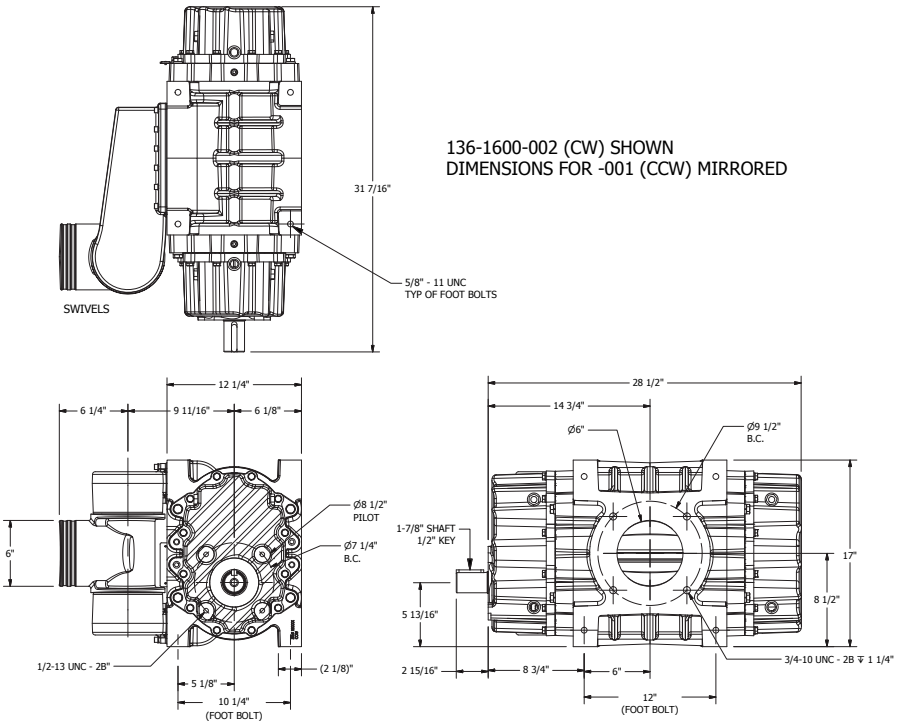
Performance (Reference Only)

		VACUUM - INCHES OF MERCURY							Press PSI
RPM		0	9	15	18	21	24	27	10
1500	HP	1.5	14.3	22.8	27.0	31.3	-	-	30.4
	ACFM	661	394	253	161	37	-	-	326
2000	HP	2.0	19.0	30.3	36.0	41.7	47.4	-	40.5
	ACFM	882	615	474	382	257	62	-	546
2500	HP	2.5	23.8	37.9	45.0	52.1	59.2	-	50.6
	ACFM	1102	835	694	602	478	283	-	767
3000	HP	3.0	28.5	45.5	54.0	62.5	71.0	79.5	60.7
	ACFM	1323	1056	915	823	698	503	B.O.	987
3500	HP	3.5	33.3	53.1	63.0	73.0	82.9	92.8	70.8
	ACFM	1543	1276	1135	1043	919	724	B.O.	1207
3600	HP	3.6	34.2	54.6	64.8	75.0	85.2	95.4	72.9
	ACFM	1587	1320	1179	1087	963	768	B.O.	1252

ACFM - Actual CFM generated on the vacuum or pressure side of the machine

B.O. - Blanked Off

Dimensions



Air Flow Control

The airflow rate on the blower can be adjusted by changing the speed of the blower. This can be accomplished by changing the PTO ratio, gearbox ratio, belt drive pulley diameters or engine speed.

Noise Level

The noise level of the blower increases significantly with higher levels of vacuum and RPM. To minimize noise, operate the blower at the minimum speed and vacuum level to achieve the desired performance results.

It is recommended the operator monitor the blower while running and listen for resonances (increased levels of noise) that may occur at certain RPM's and operate the blower at speeds above or below the resonance speeds to reduce excess noise.

Limitations of Use

Limitation of Use	Reason for Limitation and/or Risk	Corrective Actions
Operation of the blower in an explosive environment	Fire and/or explosion can result	DO NOT USE
Using blower to move explosive, toxic or dangerous gases	Fire and/or explosion can result Pollution of the environment Health risks to operators	
Liquid drawn into blower intake	Blower seizure, damage to blower and ejection of parts	Install a moisture trap or cyclonic separator on the intake nozzle of the blower.
Operation with the exhaust or ballast blocked off.	Overheating	Remove the blockage and minimize restriction in the exhaust or ballast circuits
Rotating blower in wrong direction	Damage to blower	Change the direction of rotation of the drive or order correct rotation of blower.
Operating in excess of recommended speed	Seizure of blower, damage to blower and ejection of parts	Operate the blower within recommended speed range
Operating blower below minimum speed	Seizure of blower, damage to blower and ejection of parts	
Exceeding the maximum pressure rise from blower inlet to outlet	Overheat of Blower Fire Seizure of blower, damage to blower and ejection of parts	Check inlet and exhaust restrictions and reduce as necessary.
Operating at excessively hot inlet or ballast temperatures	Overheating Fire Seizure of Blower, damage to blower and ejection of parts	Monitor the inlet temperature and make corrections to the system to bring temperature within limits.
Operating at excessively cold inlet temperatures.	Seizure of Blower, damage to blower and ejection of parts	Review precautions in cold weather conditions. Use recommended lubrication.
Operating above the exhaust temperature upper limit	Overheating Fire Seizure of Blower, damage to blower and ejection of parts	Reduce the vacuum level in high ambient conditions. Reduce the blower speed. Remove restrictions in the intake and exhaust circuits.
Operating in excess of the specified temperature rise across the blower	Seizure of Blower, damage to blower and ejection of parts	Reduce the vacuum or pressure level to bring within limits.

STORAGE

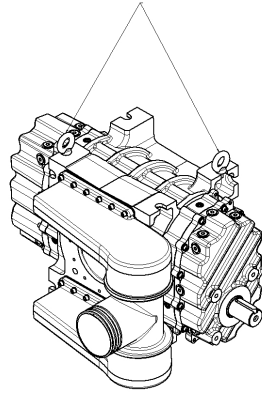
Unpacking Blower

When unpacking the blower or blower package from the skid, verify the packing list matches the product supplied and that no visible damage has occurred during shipping. In the event damage has occurred, first file a claim with the carrier and then contact NVE for assistance.

Keep all intake, exhaust and ballast ports covered to prevent accidental ingestion of material into the blower.

Handling

Use an appropriately sized lift strap for lifting the blower. Thread two 3/4" eye bolts into unused mounting feet as shown.



Model	Weight (Lbs)
1600	604

Preservation

Keep all intake, exhaust and ballast port coverings in place to prevent debris or liquids from entering blower. Reapply rust preventative oil to all metal parts, including the compression chamber every 6 months or more frequently if the relative humidity is greater than 80%.

While in storage, rotate the shaft three to four revolutions every two weeks to keep gears coated in oil.

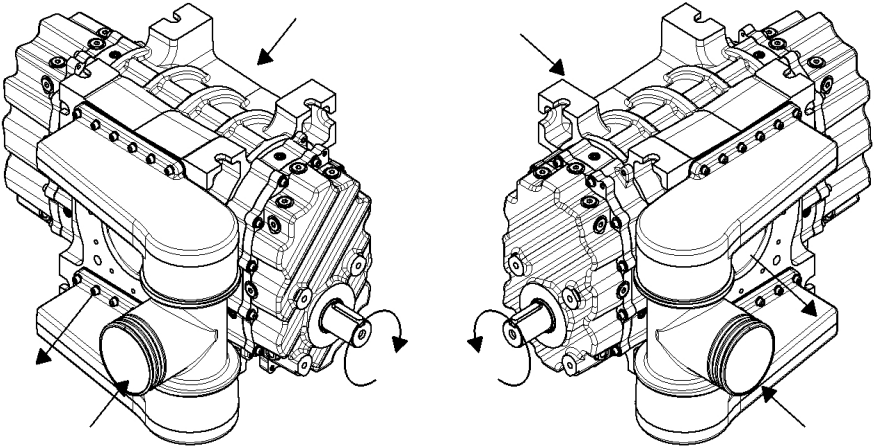
Before installing a blower that has been stored for any length of time, remove the intake and exhaust covers and inspect the rotors and cylinders to insure the absence of rust. In addition, remove the oil fill plug on drive oil tank and inspect the gear for absence of rust.



- Use a rust preventative oil with a flash point over 400° F.
- Dispose of used rust preventative oil according to local regulations.

INSTALLATION

Rotation and Airflow



Diesel Engine Precautions



- Do not operate blower with a diesel engine running at low RPMs as torque pulses can cause rotor lobe contact and damage to the blower.

When directly driving the blower with Diesel engine, bring the engine up to operating RPM and then engage the blower via the clutch. Be sure to start the blower under no load conditions.

Use caution when using a Diesel engine that is significantly oversized for the operating point of the blower. Doing so can result in an inertial mismatch, excess torsional vibrations at low RPM's and blower lobe contact.

Direct Coupling

Installation and Alignment

Slide the couplers onto the blower shaft and prime mover shaft using appropriate tools.



Do not use a hammer to slide the coupler onto the shaft as this may result in blower damage.



- Failure to properly align the couplers can cause premature wear of the blower bearings and coupler sleeve.
- Couplers must be guarded to prevent entanglement.

Belt Drive

We do not recommend the use of cogged, synchronous or timing belts.

The driving pulley from the prime mover must be mounted on the intake side of the blower to prevent unloading of the blower bearings.

Use a narrow hub sheave and insure that the inner hub face is not more than 1/4" from the face of the gearbox. Be sure to also use an adjustable belt tensioning system to allow compensation for belt wear.



- Excessive belt tension could damage the blower and prime mover.
- Belts and pulleys must be guarded to prevent entanglement.

Use matched sets of V-belts to insure uniform torque transmission. If a belt goes out, replace the whole set.

Drive Shaft

U-Joint operating angles at each end of the shaft should always be at least 1° to prevent yoke bearing failure, but do not exceed the manufacturers maximum recommended angles for the operating RPM.

U-Joint operating angles on each end of a drive shaft should always be equal within 1° of each other to cancel an angle vibration.



- Use a drive shaft loop to catch shaft in the event of failure.
- It is suggested that overload protection be used on the blower driveline.

Hydraulic Drive

The blower can be driven with an appropriately sized hydraulic system utilizing a hydraulic motor with an SAE C, 4-bolt or 2-bolt flange by purchasing a hydraulic mount (purchased separately) and appropriate couplers.

PTO Drive

PTO's must be properly sized to drive the blower. For more information on driving blowers with PTO's.



- Improper use of "Hot Shift" (i.e. clutch type, constant mesh) PTO's can result in severe damage to the blower driveline and blower. Take extra precautions to operate PTO's within the manufacturer's recommendations

Plumbing and Piping

Do not hang plumbing from blower flanges. Use isolating flanges or isolating hose to couple blower to piping to prevent dead weight from hanging off blower and to allow for thermal expansion. Failure to do so may result in rotor contact with housing. Use only clean piping insuring it is free of dirt, scale, cuttings, weld spatter, and foreign materials of any kind.

The intake and exhaust system can be plumbed with 6" hose. The ballast system should be plumbed using 6" hose minimum. Be sure to locate the ballast inlet away from heat, debris and fluid sources as exposure to these may result in damage to the blower.

RECOMMENDED ACCESSORIES

Exhaust Silencer

Positive displacement blowers are inherently noisy due to their design. NVE offers compatible silencers for the exhaust to reduce decibel levels in the operating environment. If using a non-OEM silencer, it should be tested for effectiveness by blanking off the inlet and monitoring exhaust gas temperature with the blower running for at least one hour. The blower should not exceed specified exhaust gas temperatures.

Inlet Filter

The intake filters are designed to ensure maximum airflow efficiency while keeping out unwanted debris. The filters supplied by NVE use a stainless steel screen and can be cleaned.

Four Way Valve and Hoses

If it is intended to operate the blower in the pressure mode, a four way valve will be required. The 4-way valve size should match the hose size used in the application.

Pressure Relief Valve

If the blower is intended to be used in pressure mode then a pressure relief valve is required. NVE recommends the use of Kunkle pressure relief valves as they have been proven to work well and have sufficient flow capacity. The valves we supply are factory set to 10 PSI and are sealed. We do not recommend the blower to be operated over 10 PSI nor do we recommend the use of imported relief valves.

Vacuum Relief Valve

Vacuum relief valves are not typically needed with NVE blowers. If the application indicates the use of a vacuum relief valve would be called for, we recommend you thoroughly test your blower system to confirm the desired performance is reached (i.e. tank protection or overheat protection). We would recommend the use of a high quality vacuum relief valve such as Kunkle.

Check Valves

For vacuum only setups, the blower system will need to have an appropriately sized check valve on the inlet side of the blower. If the blower is to be operated in a pressure mode, a check valve will need to be used on both the ballast air system and the intake side of the blower. Note that the ballast circuit normally draws air into the blower. Use the same size check valve as the hose used to plumb the system.

Primary Shutoff

A primary shutoff is to be used with the blower as a first line of defense to prevent liquid from entering the blower. It is critical that an appropriately sized primary shut off is used. Contact NVE for assistance with selecting the shutoff.

Secondary Shutoff/Moisture Trap

The secondary shutoff or Moisture Trap should also be appropriately sized for the air flow application. Contact NVE for assistance with selecting the shutoff.

Bag House

Bag houses are typically used in systems where dry material is being pumped. Specification of a proper bag house depends on the frequency and type of dry material being pumped. Consult the factory for assistance in selecting a bag house.

OPERATION

Initial Start Up

Preliminary Checks

Before operating a blower that has been stored for any length of time, remove the intake and exhaust covers and inspect the rotors and cylinders to insure the absence of rust. In addition, remove the oil fill plug on the drive oil tank and inspect the gear for absence of rust.

- Verify the blower spins freely by hand.
- Verify all connections between the plumbing system and the blower flanges are in place and tight.
- Verify oil levels through sight eyes. If additional oil is required, see the maintenance section for details.
- Verify the blower is set-up to spin the correct direction, especially when using a gearbox.
- Verify all guards are in place.
- Insure personnel wear hearing protection as noise levels can exceed 85 dB.
- Do not rotate the blower in the reverse direction for more than a few revolutions.



Starting the blower

HOT Shift PTO's - Do not engage "Hot Shift PTO's" outside of manufacturers specifications as damage to the PTO, driveline or blower may occur. Slowly ramp the blower up to speed to prevent shocking the system.

Increase the vacuum level slowly until the rated level is reached. During the first 8 hours of operation, check that there are no vacuum leaks, oil leaks, vibrations or strange noises.

Operating

Start the blower and check the appropriate parameters as listed in the maintenance schedule under the Maintenance section.

Stopping the Blower

When stopping the blower, if possible, remove all vacuum and pressure from the blower.

Cold Weather Operation

During very cold weather conditions, always warm the blower before operating at full rated vacuum or pressure. Damage to the blower can result from operating for short intervals in very cold weather conditions.

If using a coupler with a rubber jaw or sleeve in shear during extremely cold weather, take note that elastomeric materials become stiffer in cold weather. This results in a reduction of the shear protection in the event of a lock up of the blower because the jaw or sleeve can handle more torque before giving way.

If hydraulically driving the blower, allow the hydraulic fluid to warm up before operating the blower at full load. Use the correct viscosity of hydraulic oil for the operating temperature as recommended by the manufacturer of your system.

Before starting blower, verify the shaft rotates freely by hand. Water can condense and freeze in the blower cylinder without warning causing a stall condition at start up.

Check the intake filter and air intake daily. If snow is present, check the air intake more frequently.

DO NOT thin out the oil in the gear cases with any other fluids such as Kerosene. Use the recommended oil for the operating temperatures. If temperatures are so cold that the blower cannot warm up, enclose the blower allowing for sufficient clearance from parts to prevent contact with hot or moving components.

MAINTENANCE

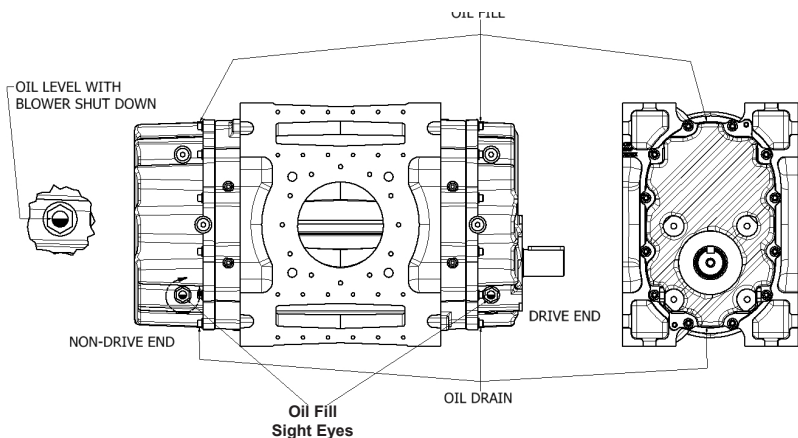


- Lock out any equipment before performing maintenance. On vehicles, remove the negative terminal from the batteries.
- Remove all pressure and vacuum from the system, i.e. discharge any stored energy in the system.
- Allow the blower to cool to below 100 °F before beginning work to prevent burns.
-

MAINTENANCE SCHEDULE						
CHECK	PARAMETER	FREQUENCY				COMMENTS
		H	D	W	M	
VISUAL	Pressure		1			Blower Running
	Temperature		1			
	Noise		1			
LUBRICATION	Oil Level		1			Blower Shutdown
	Oil Leakage			1		
	Oil Change-Initial	500				
	Oil Change-Normal	1000			6	
FILTER	Vacuum		1			<1 in Hg
	Clogging				2	
DRIVETRAIN	Wear	2000				Blower Shutdown
	Belt Tension	2000				
	Belt Change	15000			24	
RIGHT ANGLE GEARBOX	Oil Change-Initial	50				
	Oil Change-Normal	500			6	
MOISTURE TRAP/ SECONDARY	Drain Fluid		1			

Oil Capacities and Recommendations

The initial oil change on the blower is after 500 hours of operation per the maintenance table.



CHANGE OIL IN BOTH DRIVE AND NON-DRIVE OIL TANKS

Size	Blower Oil Capacity - Do Not Overfill		
	Drive Side Oz. (Liters)	Non-Drive Side Oz. (Liters)	Total
1600	13 (.38)	18 (.53)	31 (.92)

Recommended Oils for Blower (Synthetic Only)				
Ambient Temp °F (°C)	Type	Viscosity	Pour Point	Color
Above 90°F (32°C)	Summit Syngear SH-7320 Mobile SHC 632	ISO 320	-40 (-40) -40 (-40)	Clear Orange
32° to 90° (0° to 32°)	Summit Syngear SH-7220 Mobil SHC 630	ISO 220	-45 (-43) -41 (-42)	Clear Orange
0° to 32° (-18° to 0°)	Summit Syngear SH-7150 Mobile SHC 629	ISO 150	-60 (-51) -45 (-43)	Clear Orange
Below 0° (-18°)	Summit Syngear SH-7100 Mobil SHC 627	ISO 100	-60 (-51) -45 (-43)	Clear Orange

*Ambient temp is the temperature of the space where the blower is located or enclosed.



- Dispose of used oil according to local regulations.

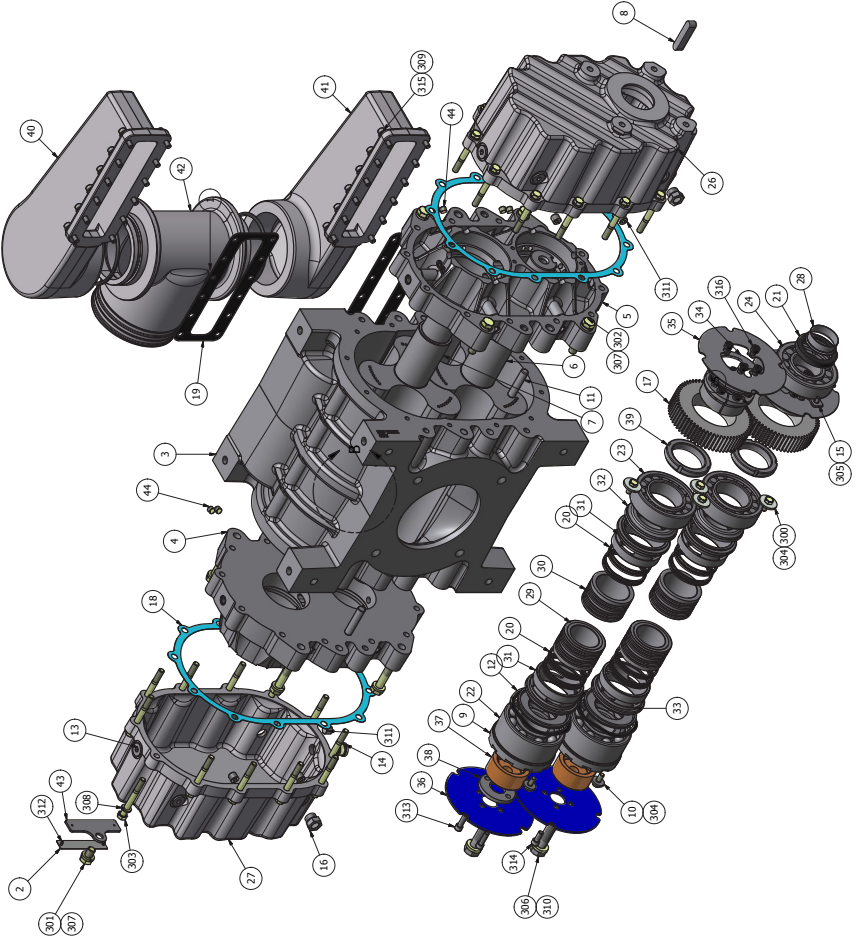
Rebuilding

Rebuilding is beyond the scope of this owner's manual and should be performed only by trained technicians. Consult an authorized distributor or NVE to arrange rebuilding of the blower.

Cleanout Procedure if Flooded

1. Remove the inlet filter, exhaust silencer and ballast silencer.
2. With high pressure water, clean intake, exhaust and ballast areas.
3. Have an assistant slowly turn the input shaft as you clean the lobes with water.
4. Run the blower at the lowest speed possible and continue to spray water into the inlet of the machine until the discharge shows only clean water.
5. With the blower running, spray a small amount of penetrating oil into the intake and run until no liquid comes out the exhaust. **DO NOT SPRAY OIL INTO THE BLOWER WITH THE SILENCERS IN PLACE.**
6. Disassemble and clean the manifold/4-way valve assembly. Allow to dry then reassemble.
7. If the blower was flooded, it is highly probable the exhaust silencer has material in it as well. Clean it out as best you can. Drain all fluids from the silencer and allow it to dry.
8. When everything is clean and dry, reassemble the manifold and silencers. Make sure flange bolts on the blower are tightened evenly.

1600 Blower | Parts Diagram



1600 Blower | Parts List

ITEM	QTY	PART NUMBER	DESCRIPTION
1	2	120-064-021	O-RING 2-348 VITON
2	1	120-107-001	SERIAL TAG SS
3	1	150-001-1600	HOUSING BLOWER 1600 MACHINED
4	1	150-003-013	HORIZONTAL ENDPLATE 8.2/1600 NON-DRIVE END MACH
5	1	150-003-014	HORIZONTAL ENDPLATE 8.2/1600 DRIVE END MACH
6	1	150-005-1600-D	ROTOR DRIVE 1600
7	1	150-005-1600-I	ROTOR IDLER 1600
8	1	150-006-002	KEY .5"X.5"X2.5" 1018 BER
9	2	150-011-001	ROTOR ADJUSTMENT NUT
10	2	150-011-002	ROTOR ADJUSTMENT NUT LOCK WASHER
11	4	150-043-007	DOWEL PIN 1/2 X 2.25
12	2	150-045-001	WAVE WASHER
13	6	150-047-004	PLUG SAE ORB -08
14	2	150-047-005	DRAIN PLUG SAE ORB -08 MAGNETIC
15	2	150-047-957	BEARING RETAINER, 957
16	4	150-048-002	SIGHT EYE 3/4-16"-08 SAE W/ O-RING
17	2	150-612-957	TIMING GEAR, DRIVE 957/1457
18	2	150-616-005	ENDPLATE GASKET 8.2/1600
19	2	150-616-5314	GASKET BALLAST MANIFOLD 5314
20	16	150-618-957	SEAL RING, 3 OD CAST IRON
21	1	150-620-747	SEAL, 50 X 72 X .10 AS FMK
22	2	150-621-001	BEARING 3310A
23	2	150-622-001	BEARING NU 2212
24	1	150-623-957	BEARING, NU 310 (50X110X27)
25	2	150-624-957	RETAINING RING B-LOC FLANGED 957/1457/1600
26	1	150-627-002	END COVER 8.2/1600 DRIVE END MACH VERTICAL
27	1	150-628-002	END COVER 8.2/1600 NON DRIVE END MACH VERTICAL
28	1	150-629-001	SEAL SLEEVE 5314
29	2	150-629-003	SEAL SLEEVE ID 8.2/1600 NON-DRIVE END
30	2	150-629-004	SEAL SLEEVE ID 8.2/1600 DRIVE END
31	4	150-630-5314	OD SEAL SLEEVE 5314
32	2	150-631-001	SEAL SLINGER 8.2/1600 MACHINED DRIVE END
33	2	150-631-002	SEAL SLINGER 8.2/1600 MACHINED NON-DRIVE END
34	1	150-633-005	SLINGER SPACER 5314
35	2	150-635-003	OIL SLINGER GEAR END 5314
36	2	150-635-006	OIL SLINGER, NON DRIVE END
37	2	150-636-003	BEARING RETAINER, SLINGER MOUNT 8.2/1600
38	1	150-636-004	BEARING RETAINER SPACER 8.2/1600
39	2	150-645-5314	LOCK NUT 5314
40	1	150-650-012	BALLAST MANIFOLD LH 5314
41	1	150-650-013	BALLAST MANIFOLD RH 5314
42	1	150-650-014	BALLAST TEE 5314, MACH
43	1	280-355-169	SERIAL TAG MOUNTING PLATE SS
44	8	872-001	PLUG 1/8" NPT SOCKET AS YZ DRYSEAL

1600 Ballast Manifold | Parts Diagram

ITEM	QTY	PART NUMBER	DESCRIPTION
300	4	FW - 5_16 X 1.25	FW - 5_16 X 1.25
301	1	HHCS - 1_2-13 UNC - 0.75	HEX HEAD CAP SCREW - 1/2-13 UNC - 0.75
302	8	HHCS - 1_2-13 UNC X 2.50	HEX HEAD CAP SCREW - 1/2 -13 UNC X 2.50"
303	24	HHCS - 3_8-16 UNC X 3.25	HEX HEAD CAP SCREW - 3/8-16 UNC X 2.25
304	6	HHCS - 5/16-18 UNC x 0.75	HEX HEAD CAP SCREW - 5/16-18 UNC x 0.75
305	2	HHCS - 5_16-18 UNC X 0.50	HEX HEAD CAP SCREW - 5_16-18 UNC X 0.50
306	2	HHCS - 5_8-18 UNF X 2.25	HEX HEAD CAP SCREW 5_8-18 UNF X 2.25
307	9	LW - 1_2	LOCK WASHER, 1/2
308	24	LW - 3_8	LOCK WASHER, 3/8"
309	24	LW - 5_16	LOCK WASHER, 5/16"
310	2	LW - 5_8	LOCK WASHER - 5/8"
311	6	PLUG - 1_4 NPT SH	SOCKET HEAD PLUG - 1/4 NPT
312	2	RVT 3_32 D X 1_4L SS	BLIND RIVET, 3/32 DIA X 1/4 GRIP, SS
313	2	SHCS - 5/16-18 UNC X 1	SHCS - 5/16-18 UNC X 1
314	2	ANSI B18.3 - 5/16 18 UNC - 3/4 HS HCS	Hexagon Socket Head Cap Screw
315	24	SHCS - 5_16-18 UNC X 1.25	SOCKET HEAD CAP SCREW - 5/16-18 UNC X 1.25
316	8	SHCS - M8 X 12MM	SHCS - M8 X 12MM

TROUBLESHOOTING

Operating Problem	Probable Cause (See Next Table)
Blower does not spin freely	A, B & C
Inlet vacuum is not what's expected	D , E, X, Y, Z, AA & AB
Outlet pressure is not what's expected STOP THE BLOWER TO PREVENT DAMAGE	E, F & H
Outlet temperature is not what's expected STOP THE BLOWER TO PREVENT DAMAGE	D, E, F, G, H, J & K
Prime mover (engine or motor) is laboring excessively when driving blower.	A, B, C, D, E, F, L, M & N
Oil or liquid leaking from blower	M, P, R, S & T
Oil temperature is high	D, E, F, H, K, U & V
Blower is creating unusual noises or vibrations STOP THE BLOWER TO PREVENT DAMAGE	A, B, C, D, F, G,H, K, L, N, W & AC

Probable Cause		Remedy
A	Rotors are contacting each other	Stop the blower immediately and check the internal clearances of the blower.
B	Deposit build up on cylinder wall	Clean the cylinder walls and rotors.
C	Object was ingested into the blower	Remove the object, clean the internal walls of blower and check the internal clearances.
D	Inlet plumbing or filter clogged	Check and clean the inlet plumbing and filter.
E	Blower not at correct RPM	Verify blower RPM and adjust accordingly.
F	Exhaust plumbing clogged	Clean exhaust plumbing and mufflers.
G	Rotors are worn	Verify internal clearances and replace or rebuild blower as necessary.
H	Ballast plumbing is clogged	Check and clean the ballast plumbing. If a ballast filter is installed, clean it also.
J	Ballast air temperature out of specification	Verify ballast air temperature is within specification and adjust accordingly
K	Inlet temperature out of specification	Verify inlet temperature is within specification and adjust accordingly
L	Bearings worn	Have blower rebuilt
M	Oil level too high	Check required oil level in each tank and remove oil as necessary.
N	Coupler or belts not aligned	Check the alignment
P	Oil tank gaskets worn	Replace oil tank gaskets
R	Drive shaft seal worn	Replace shaft seal for drive oil tank
S	Oil tank plugs or sight eyes fault	Replace the plugs or sight eyes. Use thread sealer on NPT threads.
T	Blower operated at excessive angle	Verify blower is level during operation
U	Oil too thick	Use correct viscosity oil.
V	Oil is foaming	Use correct type of oil
W	Operating Diesel engine at too low of an RPM causing rotor contact.	Increase Engine RPM and adjust drive ratios according. Use a vibration dampened drive shaft.
X	Moisture trap or shut off is full and closed off	Empty the moisture trap or shut off of fluid.
Y	Plugged or collapsed hose (not always visible from outside of hose)	Unplug or replace hoses
Z	Vacuum Leaks in tank or fittings	Repair leaks
AA	Four way valve not fully seated in proper position	Seat the 4-way valve. Clean if debris built up has occurred.
AB	Faulty relief valve	Replace relief valve
AC	Rotors timing is off	Have blower rebuilt



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