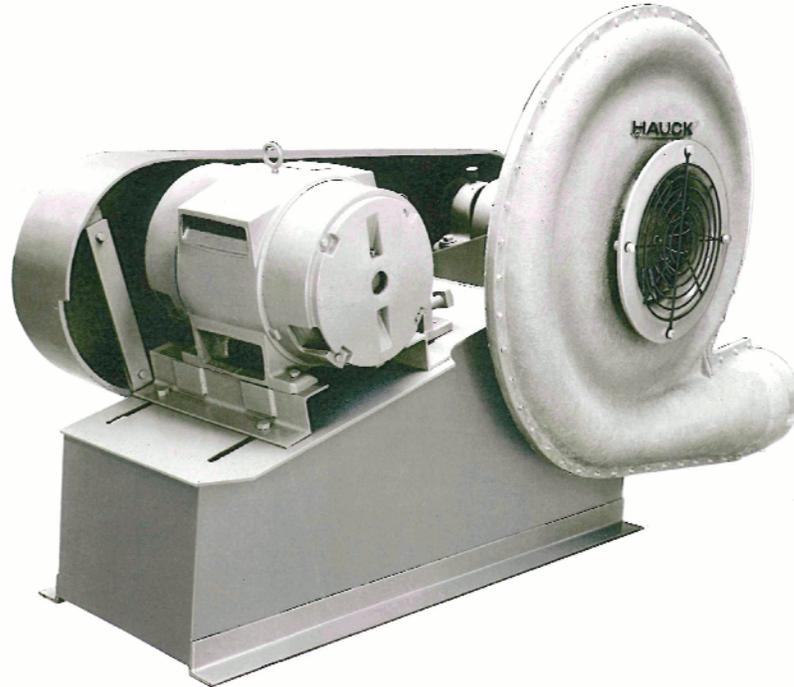




BELT DRIVE TURBO BLOWERS



WARNING

These instructions are intended for use only by experienced, qualified combustion start-up personnel. Adjustment of this equipment and its components by unqualified personnel can result in fire, explosion, severe personal injury, or even death.

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These instructions are intended to serve as guidelines covering the installation, operation, and maintenance of Hauck equipment. While every attempt has been made to ensure completeness, unforeseen or unspecified applications, details, and variations may preclude covering every possible contingency. **WARNING: TO PREVENT THE POSSIBILITY OF SERIOUS BODILY INJURY, DO NOT USE OR OPERATE ANY EQUIPMENT OR COMPONENT WITH ANY PARTS REMOVED OR ANY PARTS NOT APPROVED BY THE MANUFACTURER.** Should further information be required or desired or should particular problems arise which are not covered sufficiently for the purchaser's purpose, contact Hauck Mfg. Co.



WARNING

This equipment is potentially dangerous with the possibility of serious personal injury and property damage. Hauck Manufacturing Company recommends the use of flame supervisory equipment and fuel safety shutoff valves. Furthermore, Hauck urges rigid adherence to National Fire Protection Association (NFPA) standards and insurance underwriter's requirements. Operation and regular preventative maintenance of this equipment should be performed only by properly trained and qualified personnel. Annual review and upgrading of safety equipment is recommended.

A. GENERAL INFORMATION

The Hauck Fiberglass belt drive Turbo Blower is designed for use on any application requiring low pressure air at constant pressure ranging from 8 to 40 osig (34 to 172 mbar). This blower employs a unique molded scroll design and a turbine impeller to produce increased operating efficiency. These blowers are thoroughly tested prior to shipment to assure satisfactory performance when installed.

B. RECEIVING AND INSPECTION

Upon receipt, check each item on the bill of lading and/or invoice to determine that all equipment has been received. A careful examination of all parts should be made to ascertain if there has been any damage in shipment.

IMPORTANT

If the installation is delayed and the equipment is stored outside, provide adequate protection as dictated by climate and period of exposure. Special care should be given to all motors and bearings, if applicable, to protect them from rain or excessive moisture.

C. INSTALLATION

IMPORTANT

Always lift the blower by the lifting access holes in the blower base, never by the motor lifting eye casing outlet, or inlet flange connections since they are not designed to support the weight of the motor and base assembly.

1. Mount the blower on any level concrete floor or pad. The location chosen must provide an unobstructed flow of air to the blower inlet. If the blower is installed on a floor on which other machinery is mounted, install vibration isolation pads between the blower base and the floor. In addition, the mounting bolts must be isolated from the blower base. This configuration is shown in Figure 1. Cork isolation pads are available from Hauck.

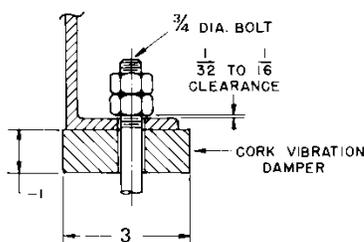
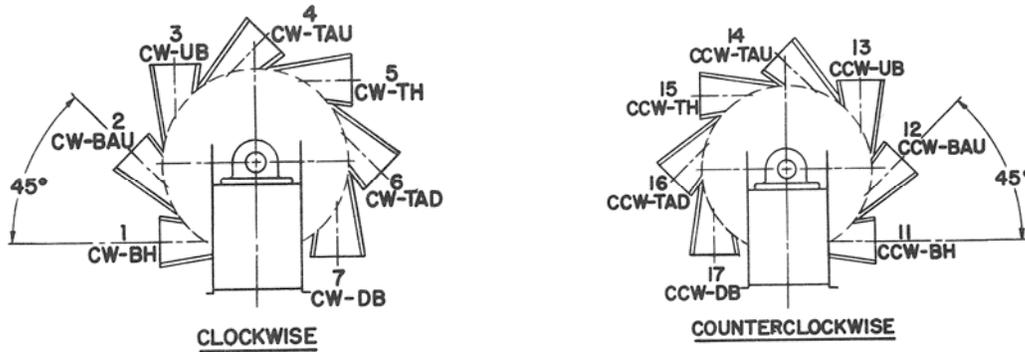


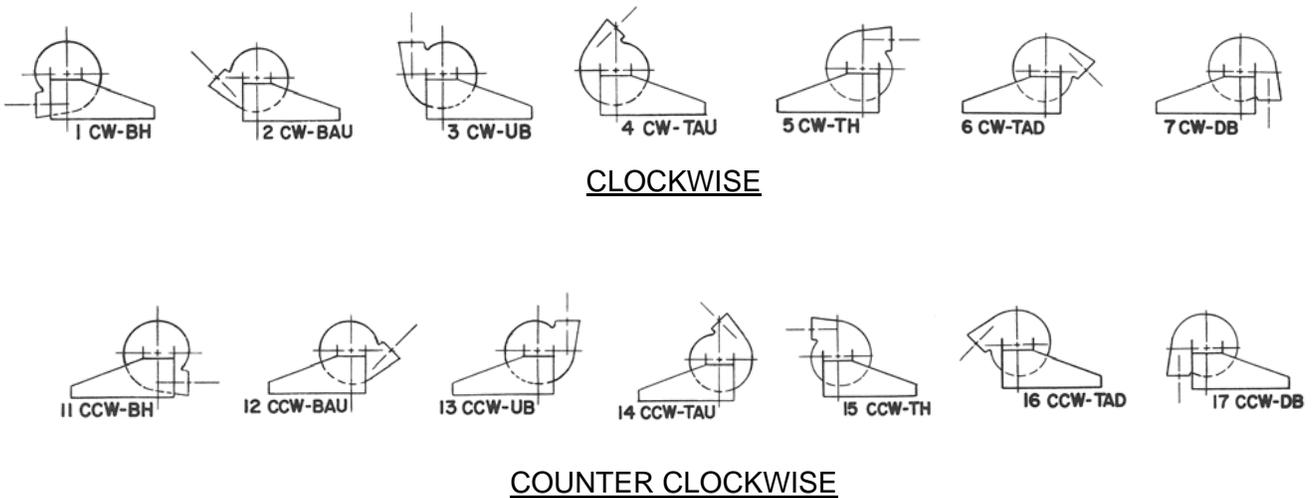
Figure 1. Illustration Depicting the Proper Placement of the Vibration Isolation Pad

If the blower is installed on a structure above the floor, the mass rigidity of the structure must be such that its natural frequency is well above the motor or impeller operating frequency to prevent resonance.

2. Ensure that the piping between the blower and the load has been selected to minimize pressure losses. The pressure drop for the control valve should be selected for the designed control quality, ranging from 5-30% of the system drop. It is suggested that, where practical, the piping, valves, fittings, etc. be sized for a total pressure drop of no more than 3.4"wc (86 mm wc) or 2 osi.
3. Rotate the blower air outlet, as required, to align it with the air piping. Each blower is constructed to allow the impeller to rotate in only one direction. Two types of blowers are manufactured; one provides for clockwise rotation, the other counterclockwise rotation. The discharge outlet on each of these types can be rotated to any one of the seven positions shown in Figure 2.



ARRANGEMENT 1



ARRANGEMENT 9

Figure 2. Standard Discharge Positions Viewed from Motor Drive End

- To rotate the casing, accomplish the following. **Do not disassemble the two casing halves.**
- A. Loosen and remove the eight bolts holding the casing to the base assembly
 - B. Rotate the casing as required and reseat the casing against the base assembly.
 - C. Ensure that all bolt holes are aligned.
 - D. Reinsert and securely tighten all eight bolts.
4. Connect the air piping to the blower outlet using the rubber sleeve and clamps supplied with each blower. **Ensure that the air piping is completely supported by external hangers to prevent unnecessary strain on the blower casing.** In addition to preventing vibration transfer to the blower, the rubber sleeve prevents the induction of loads in the casing due to misalignments between the piping system and the blower discharge connection.
 5. Seal all joints in the air piping. The piping must be airtight to prevent leaks which would cause the motor to run overloaded.
 6. Ensure that the supply voltage and frequency are correct for the motor. The supply voltage at the motor terminals must be within 10% of the nameplate value, and the frequency within 5%, for satisfactory performance of the equipment. **Low voltage or frequency will impair blower performance and can cause motor damage.**

7. Connect the line leads to the motor. Follow the wiring diagram on the motor. **The use of a VFD or soft start is recommended in any application and is required where the blower is not being used to supply combustion air. Frequent starting and stopping of the blower without a VFD or soft start can lead to premature fatigue failure in the impeller.** Supply the power through a properly sized contactor or magnetic starter with thermal overload protection. Pre-sized motor starters are available from Hauck.
8. Belt drive turbo blowers are supplied with either oil or grease lubricated bearings. Prior to operation, ensure proper bearing lubrication as follows:
 - A. Oil lubricated bearings are supplied from the factory **without oil** for shipping purposes. Hauck recommends use of oil which contains oxidation inhibitors, defoam additives, and an ISO VG100 (SAE 30) viscosity rating. Add oil at the top cup until the bottom cup is full.
 - B. Grease lubricated bearings are supplied from factory with a NLGI Grade 2 grease. TBA Blowers work in a high speed, high temperature environment and require superior bearing protection. Prior to use, check grease cup or zerc fitting to ensure that the bearing is lubricated.
9. Rotate the impeller by hand to ensure that there are no restrictions.
10. Ensure that the three set screws on the impeller hub are tight. (Refer to Maintenance Section).
11. Adjust the belt tension on belt drive models. It is imperative that proper belt tension be maintained. Too little tension will cause belt slippage thus reducing blower performance and belt life. Too much tension can produce excessive bearing loads. Use the following steps to check and adjust the belt tension.
 - A. Loosen and remove the bolts which hold the belt guard in place. Remove the belt guard.

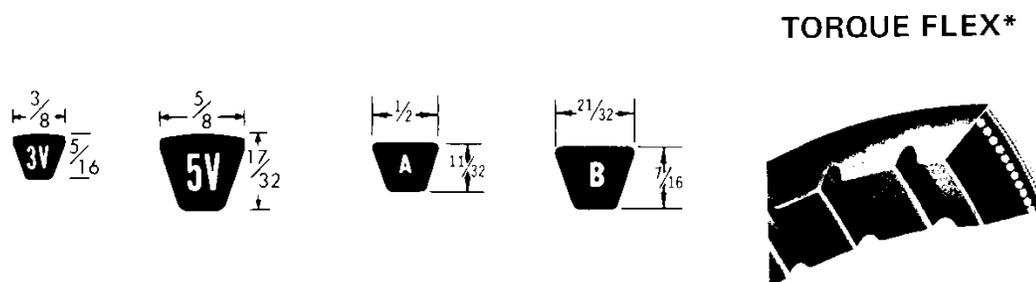


Figure 3. Drive Belt Types (*A & B Available In Standard Or Torque Flex)

BELT SECTION	INITIAL INSTALLTION		AFTER 48 OR MORE HOURS RUNNING	
	lb _f	kg _f	lb _f	kg _f
3V	8.3	3.8	6.8	3.1
5V	21.0	9.5	14.3	6.5
A	6.5	2.9	4.3	2.0
B	10.5	4.8	7.0	3.2
TORQUE A	9.5	4.3	7.0	3.2
FLEX B	14.0	6.4	9.5	4.3

Table 1. Belt Deflection Forces

- B. Determine the type of belt used on the blower. Hauck belt driven blowers use one of the six assemblies shown in Table 1.
- C. Measure the distance, in inches (or cm) between shaft centers. This distance is referred to as the span.

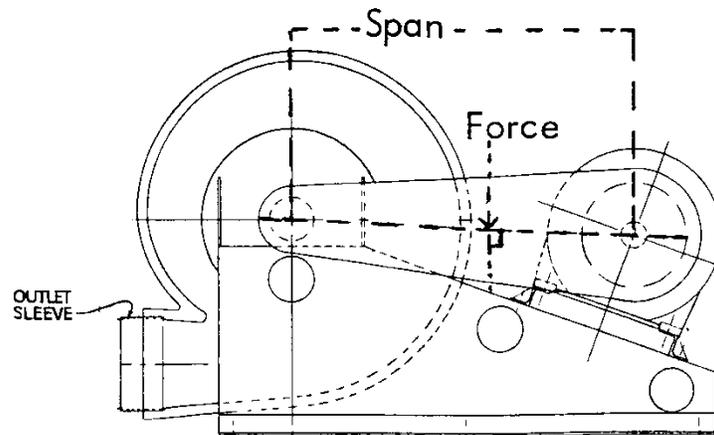


Figure 4. Blower and Motor Assembly Span and Belt Deflection Force

- D. Loosen the motor mounting bolts to allow movement of the motor assembly.
 - E. Using a spring scale or other suitable device, apply the appropriate force (as given in Table 1) to the belt. This force should be applied at the center of, and perpendicular to, the span and be directed toward the center of the drive.
 - F. Adjust the drive, using the adjustment screws on the motor assembly, until the belt is deflected 1/64 inch for every inch of span length (0.0156 cm for every cm of span length).
 - G. Tighten securely all motor mounting bolts. **Ensure that the shafts are parallel and that the faces of the sheaves are in the same plane.**
 - H. Replace the belt guard.
12. Install the filter, silencer, or combination filter-silencer if used. Blowers are normally purchased with these accessories. However, any of these accessories may be purchased separately. To properly install the unit, accomplish the following:
- A. Dip the new filter in oil and allow it to drain thoroughly. Use SAE 10-30 oil when ambient temperatures are below 70°F (21°C) and SAE 30-50 oil when temperatures are above 70°F (21°C).
 - B. Bolt the accessory to the inlet flange of the blower. These accessories are designed to be attached by an eight-stud flange (ten-stud flange for the 18" model). In some cases, four additional holes must be drilled in the inlet flange to accommodate these studs. **When drilling, ensure that the blower casing is not damaged.**
 - C. Properly position the accessory's supporting leg (Hauck supplied if required). **Do not allow the entire weight of these accessories to be supported by the flange of the blower casing.**

NOTE

All rotating components were balanced from factory at a level meeting ISO 1940-2. A variety of external causes such as handling, installation, or misalignment may cause imbalance prior to use. To ensure the intended long life of the equipment and components, and to meet warranty requirements, equipment and vibration levels should be checked by experienced personnel and trim balanced if no longer meeting ISO 1940-2 requirements. Under no circumstances should equipment with excessive vibration be operated at the risk of damaging that equipment or the personnel operating it.

D. OPERATION

Never run the blower without either a discharge or an inlet restriction. If run wide open at both inlet and outlet, the motor will be severely overloaded and probably damaged.

Always check the direction of impeller rotation at first start-up and after all wiring changes.

Before starting the blower for the first time, the impeller should be rotated to be sure there are no restrictions to its free turning. Ensure that the three setscrews on the impeller hub are tight. **Run the blower for 15 minutes, then recheck the setscrews. After one week of operation, recheck the setscrews and tighten if necessary.** Thereafter, periodically check the setscrews (Refer to Maintenance Section).

Never expose the belts of belt-driven models to temperatures in excess of 140°F (60°C).

E. MAINTENANCE

Filters

Periodically clean all filters by accomplishing the following:

1. Remove the filter by releasing the restraining screw located on the end of the filter.
2. Clean the filter with a suitable solvent.
3. Allow the filter to dry thoroughly.
4. Dip the new filter in oil and allow it to drain thoroughly. Use SAE 10-30 oil when ambient temperatures are below 70°F (21°C) and SAE 30-50 oil when temperatures are above 70°F (21°C).



WARNING

If flammable solvents are used to clean a filter element for a blower supplying air for combustion, be sure the element is completely dry before oiling. Make sure all excess oil has drained from the element before reinstalling it on the blower. Combustible vapors drawn into this type of air system can cause serious explosions.

5. Reinsert the filter in the mounting collar. Securely fasten in place. Ensure that the supporting leg (if present) is properly positioned.

Impeller Removal/Replacement

IMPORTANT

Upon receipt, carefully check the replacement impeller to be sure no damage has occurred during shipment or handling. Any changes made to the turbo blower assembly could cause detectable differences in vibration levels. However, since each impeller is centrifugally balanced before shipment Quality Grade G6.3 of the ISO Standard 1940, impeller replacement in itself should not cause concern. If excessive vibration level is suspected before or after impeller replacement, obtain quantitative peak-to-peak displacement or velocity vibration readings at the motor bearings prior to consulting the factory.

If it should become necessary to inspect and/or replace the impeller, the following procedures should be followed. The numbers in parentheses refer to items in Figure 5.

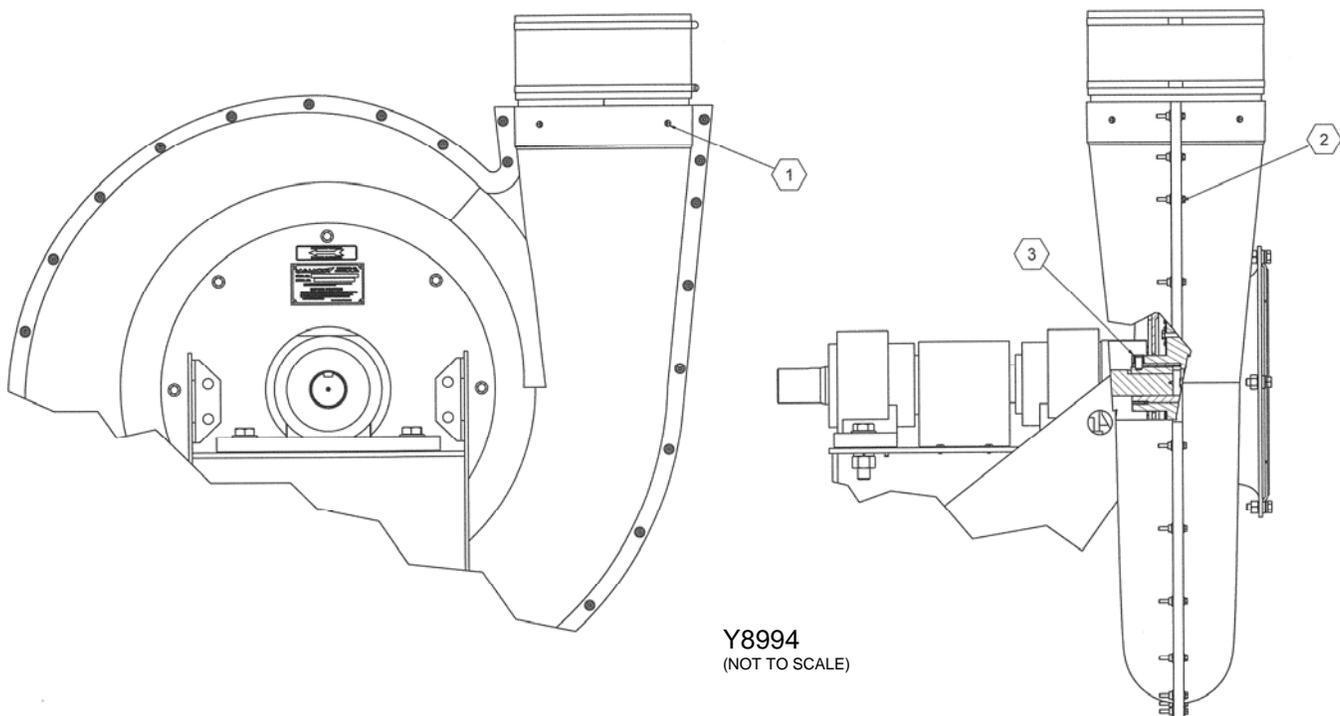


Figure 5. Typical Direct Drive Turbo Blower

1. Remove bolt self-tapping screws (1) holding the front half of the casing to the outlet adapter.
2. Remove all of the hex head bolts (2) located around the casing flange.
3. Separate the two halves. The two halves are factory sealed with a resin coating. To facilitate their separation, it is recommended that a knife be drawn along the joining edge of the halves. Moderate force may be required to overcome the seal between the casing halves.
4. Loosen the three setscrews (3) at the rear of the impeller hub. **Do not remove the stud or lock nut at the center of the impeller.**
5. Pull the impeller from the drive shaft. The key will separate from the drive shaft and impeller hub keyway (Do not misplace the key as it will be reused).

6. Inspect the impeller and replace if necessary.
7. Clean any burrs from the shaft caused by the setscrews. If necessary, use an emery cloth to restore a smooth surface.
8. Apply an antiseize compound to the impeller hub bore and the shaft.
9. Place the motor shaft keyway at the 12 o'clock position and insert the key.
10. After ensuring that the impeller hub keyway is aligned with the key on the motor shaft, slide the impeller on the shaft.
11. Add a thin bead of latex caulk to help re-seal the casing halves, and replace the front half of the casing and tighten all casing hex head bolts (2). (Hauck recommends a quick-dry siliconized acrylic caulk).

NOTE

In order to ensure an effective air seal, it is important that a suitable acrylic latex caulking be placed between the outlet adapter and the casing halves for a short distance in each direction. Suggested approximate area of caulking is shown shaded in Figure 5.

12. Replace the self-tapping screws (1) which hold the front half of the casing to the outlet adapter.

IMPORTANT

It is important to reinsert the key before attempting to tighten the impeller setscrews. Failure to do so will prevent proper tightening of the key setscrew. It is also imperative that the sequence and torquing procedure outlined be followed exactly. Failure to sufficiently tighten the setscrews may allow the impeller to further loosen during operation of the blower, while excessive tightening may damage the setscrews as well as impair their effectiveness.

Blower Hub Locking Mechanism

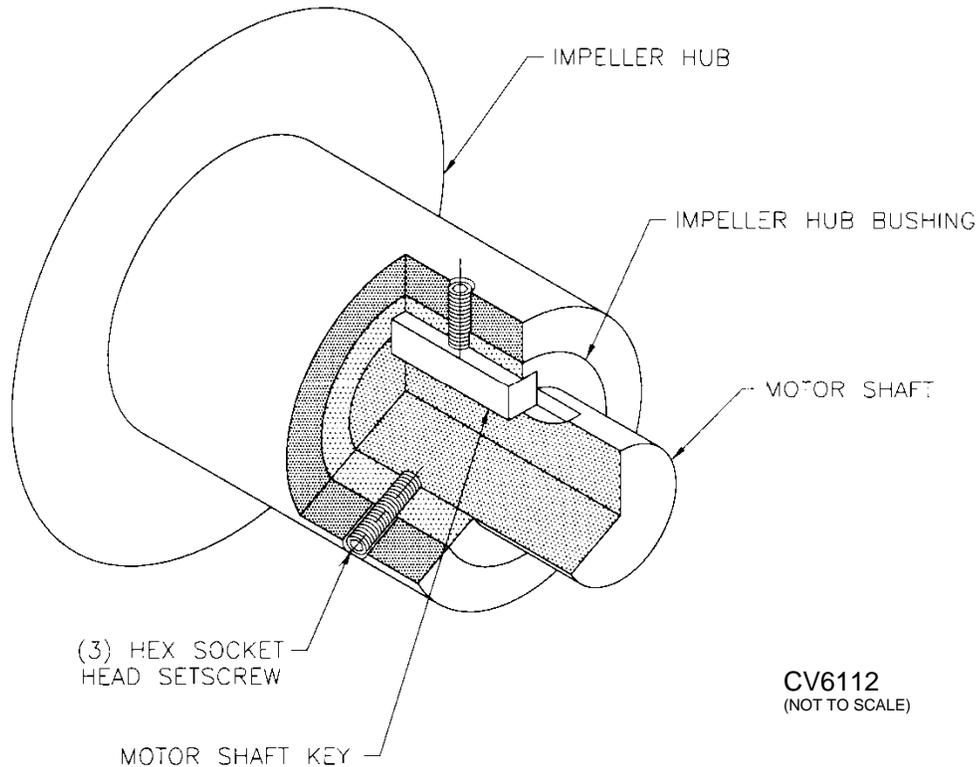


Figure 6. Blower Hub Locking Mechanism Cutaway

There are three setscrews, positioned 120° apart, that are used to secure the impeller to the shaft by means of the blower hub locking mechanism. One of the three setscrews is located over the key. The procedure below should be followed closely to properly secure the impeller.

1. Remove the three hex socket head setscrews and liberally apply Loctite 243.
2. Replace the setscrew loosely and slide the impeller back and forth on the shaft until the impeller is positioned at the midpoint of its travel range.
3. Snug **either** setscrew that is **not** over the key. Then snug the second setscrew that is **not** over the key.
4. Snug the setscrew that **is** over the key.
5. Torque the three setscrews to 400 in-lb (45 N-m).

IMPORTANT

Before starting the blower for the first time, the impeller should be rotated to be sure there are no restrictions to its free turning. **Operate the blower for 15 minutes**, then recheck the setscrews. **After one week of operation**, recheck the setscrews and retorque if necessary. Thereafter, periodically check the setscrews.

Motor Removal/Replacement

If it should become necessary to remove and replace the motor on a Hauck belt drive Turbo Blower, follow the appropriate procedure given below.

CAUTION

Ensure that electrical power cannot be accidentally applied to the motor during disassembly.

1. Remove the belt guard.
2. Loosen the motor mounting bolts to allow movement of the motor assembly.
3. Release the belt tension and remove the belts.
4. Loosen and remove the sheave on the motor shaft.
5. Remove the four nuts and bolts which fasten the motor to the Z bar mounting bracket.
6. Repair or replace the motor, as required.
7. Place the motor on the Z bar mounting bracket and securely fasten it in place.
8. Securely fasten the sheave to the motor shaft. **Check the alignment between the impeller and motor sheaves with a straight edge or piece of string drawn taut along the faces of the sheaves.** The motor shaft must be level and parallel to the impeller shaft.
9. Replace the belts and adjust them for the proper tension as described in steps 11E and 11F under INSTALLATION.
10. Tighten securely all motor mounting bolts.
11. Replace the belt guard.

The bearings in the motor have been lubricated by the motor manufacturer. The re-lubrication guide attached to the motor should be followed. Generally the grease packed bearings have been lubricated to provide 1-2 years of continuous service, without re-lubrication, in a moderately clean indoor atmosphere.

IMPORTANT

Packing too much grease into a bearing is a major cause of motor bearing failure. Be sure to follow the manufacturer's recommendations for proper motor maintenance.

Belt Drive Bearings, Belts & Sheaves

1. Periodically check the alignment of the sheaves and shafts. The shafts must be parallel and the faces of the sheaves must be in the same plane.
2. Always use matched belts on the drive assembly.
3. Never use belt dressing. Oil the machine carefully, avoid getting oil on the belts as this can cause swelling and premature failure.
4. Periodically check the belt tension. For new belts, check the tension after every 8-hour period during the first 48 hours of running. When checking the tension follow steps 11A thru 11H under INSTALLATION.

Ball bearings consume a very small amount of lubricant during operation. The length of time a bearing can run without re-lubrication depends on the lubricant properties, the size of bearing, the speed and the opening conditions.

1. **Oil lubricated** bearings are supplied with overflow cups. Keep oil in these cups at all times. After any prolonged shut-down period, check the oil level before restarting the blower. Do not check the oil level in a bearing while the machine is running since most of the oil will not be in the sump. When a bearing is continually supplied with new oil, cleaning is seldom required. It is usually sufficient to drain off the old lubricant, flush out the bearing and refill with new lubricating oil.
2. **Grease lubricated** bearings require periodic additions of grease to function properly. The grease does not suddenly lose its lubricating ability, rather it is reduced gradually.
The following is a guide to normal re-lubricating periods:
 - a. For shaft speeds of 3600 rpm or less, re-lubricating after every 1800-2000 hours of operation.
 - b. For shaft speeds greater than 3600 rpm, re-lubricate after every 1000-1200 hours of operation.

The following are suggested lubricants:

Oil Lubricated Bearings (All Shaft Speeds)

Oil lubricated bearings are supplied from the factory **without oil** for shipping purposes. Hauck recommends use of oil which contains oxidation inhibitors, defoamant additives, and an ISO VG100 (SAE 30) viscosity rating. A lubricating oil meeting this specification **MUST** be used.

Grease Lubricated Bearings (All Shaft Speeds)

Grease lubricated bearings are supplied from factory with a NLGI Grade 2 grease. TBA blowers work in a high speed, high temperature environment and require superior bearing protection. A lubricating grease meeting this specification **MUST** be used.

NOTE

For units equipped with a motorized single point lubricator, the lubrication rate may be adjusted to meet the application needs. Where the unit is depleted, a replacement cartridge is available which provides a full grease can and battery (see parts list).

Bearing and Shaft Assembly Removal/Replacement

If it should become necessary to remove and replace the bearing and shaft assembly on a Hauck belt drive Turbo Blower, follow the procedure below.

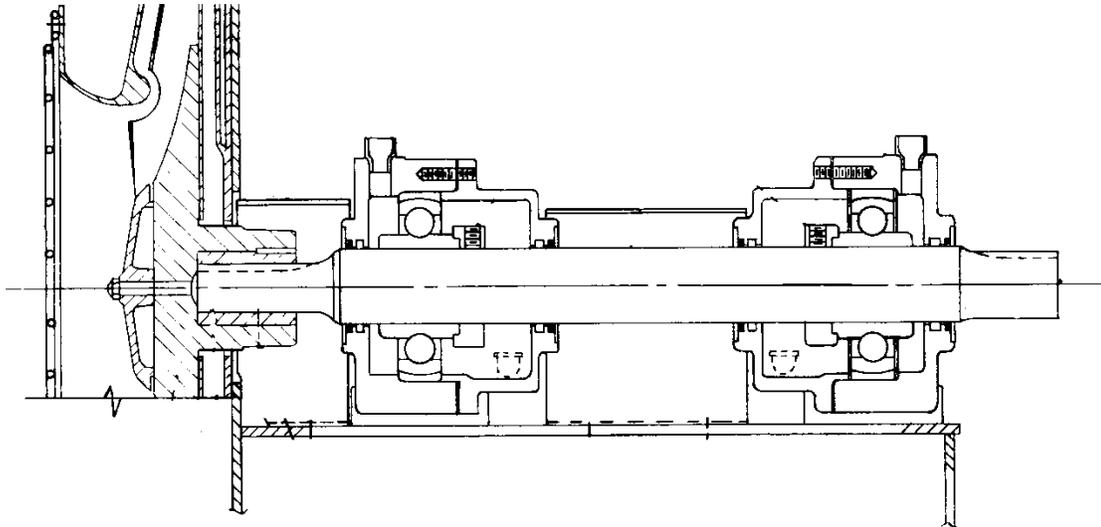


Figure 7

1. Remove the front half of the blower casing (see Impeller Removal/Replacement in Maintenance Section).
2. Remove the impeller (see Impeller Removal/Replacement in Maintenance Section).
3. Remove the existing bearing and shaft assembly.
4. Place the new bearing and shaft assembly on the blower base, aligning the bearing mounting holes with the holes in the base. If the holes do not line up, either open up the holes in the base with a suitable drill or mark the blower base and drill new holes of the same diameter, as required.
5. Some bearings on Hauck blowers have special mounting instruction labels attached. Bearings in these blowers float axially to allow for thermal expansion and contraction. On these blowers, follow the label directions to set the floating bearing midway within its floating range.
6. Slide the impeller on the shaft, pushing it against the rear casing. DO NOT tighten the setscrews at this time.
7. Align the shaft so that the impeller hub is in the approximate center of the opening in the rear casing.
8. Rotate the impeller and shaft and realign the shaft so that the narrowest gap between the impeller and casing is even over 360° of rotation.

NOTE

The shaft may have to be shifted from side to side or a bearing may have to be shimmed to accomplish this. Keep the hub in the center of the casing as per step 6. See Figure 8.

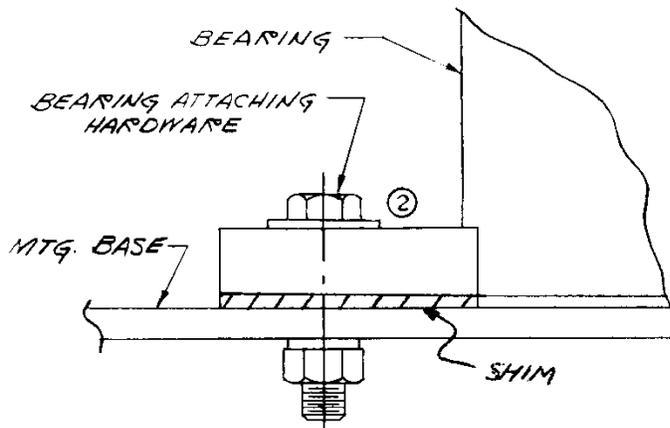


Figure 8

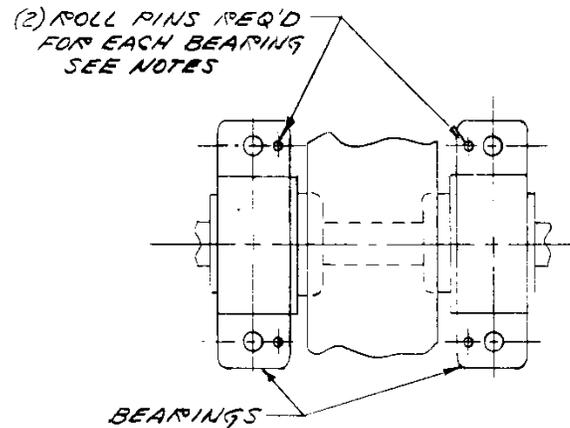


Figure 9

9. When the shaft is properly aligned, it is square to, and centered with, the casing.
10. Install and tighten the bearing mounting bolts.
11. Assemble the front half of the casing (see Impeller Removal/Replacement in Maintenance Section).
12. With the casing assembled, slide the impeller back and forth, measuring the full clearance the impeller has within the casing.
 - a. If the total clearance is $\frac{3}{8}$ " (9.5 mm) or greater, position the impeller $\frac{1}{8}$ " (3.2 mm) away from the REAR casing and tighten the setscrews.
 - b. If the total clearance is less than $\frac{3}{8}$ " (9.5 mm), position the impeller $\frac{1}{3}$ of the total clearance away from the REAR casing and tighten the setscrews.

CAUTION

It is very important that the procedures for tightening the setscrews be followed exactly as outlined under Impeller Removal/Replacement in Maintenance Section. Failure to do so may allow the impeller to loosen during operation or damage the setscrews and impair their effectiveness.

13. With all hardware tightened, rotate the impeller to be sure that it is free. If not, repeat this entire procedure.
14. When proper alignment of the shaft and bearing assembly has been verified, drill and install two roll pins in each bearing mount as shown in Figure 9. DO NOT USE THE EXISTING ROLL PIN HOLES - make new ones.
15. Lubricate bearings before use per Oil Lubricated Bearings or Grease Lubricated Bearings In Maintenance Section.
16. The blower is now ready to operate.

A Troubleshooting Checklist is provided in the appendix of these instructions.

APPENDIX:

TROUBLESHOOTING CHECKLIST

<u>Symptom</u>	<u>Cause</u>	<u>Correction</u>
1. Motor Will Not Start	A. Open Circuited	-Check Continuity Of Wiring
	B. One Phase Not Connected (Motor Hums but Doesn't Turn)	-Check Continuity Of Wiring -Check For Open Breakers or Blown Fuses -Check Proper Terminal Wiring
	C. Motors Burned Out	-Check Last Known Operating Load For Possible Overload Conditions -Check Ambient Operating Conditions
2. Motor Blows Fuses When Starting Is Attempted	A. Grounded Internal Winding	-Replace Motor
	B. Improper Terminal Wiring	-Rewire
3. Motor Operates Very Hot	A. High Ambient Temperature	-Class B Insulation Rated For Maximum Service At 104°F (40°C) Ambient
	B. Motor Running Overloaded	-Check For Excessive Leaks In The System or Blower -Check Design Capacity Against System Rating
	C. Improper Voltage Applied To Terminals or Improperly Wired	-Check Voltage Against Rating -Check Wiring Connections
	D. Interference Between the Rotor and Stator	-Replace motor
	E. Short Circuited Windings In Motor	-Replace Motor
4. Generated Pressure Lower Then Rated Value	A. Improperly Located Pressure Gauge	-Check For Improper Location Location Downstream Of Elbows, Butterfly Valves, etc.
	B. Blower Operating Above Design Capacity (Motor Overloaded)	-Check For Excessive Leaks In The System or Blower -Check Design Capacity Against System Rating -Check For Missing Orifice Plates -Check Burner Discharge For Areas Opened By Excessive Heat
	C. Impeller Running Backwards	-Rewire Motor to Reverse Rotation
	D. Impeller Running Correctly but Built For Wrong Direction Of Rotation	-Replace Impeller With One For Proper Direction of Rotation

APPENDIX:

TROUBLESHOOTING CHECKLIST

<u>Symptom</u>	<u>Cause</u>	<u>Correction</u>
	E. Motor Not Generating Nameplate Speed	-Check Motor Voltage and Frequency Against Nameplate Rating and Proper Wiring -Replace Motor
	F. High Ambient Temperature and/or High Altitude	-Check Inlet Conditions; consult Hauck.
	G. Inlet Obstructed	-Remove Obstruction or Move Blower To Provide Free Air Flow Into Inlet Opening
5. Blower Vibrates Excessively	A. Rotor Unbalanced	-Class For Material Buildup On Impeller -Check For Mechanical Damage To Impeller, Repair or Replace -Rebalance Impeller
	B. Loose Motor Mounts	-Tighten Bolts
6. Excessively Noisy Operation	A. Vibration Being Transmitted To Surrounding Structure	-See Vibration Corrections Above -Install Isolation Pads and Flexible Connections Between Blower and Surroundings
	B. Rotating Member Touching A Stationary Member	-Check Free Turning In Both the Impeller and Motor, Adjust as Necessary
	C. Motor Bearings Worn-out	-Replace Motor
	D. Air Leaking From System	-Tighten Joints, Flanges and Fittings. Look for Unplugged Holes In Piping
	E. Loose Sheave	-Align and Tighten Sheaves