Blower Maintenance

This section contains general maintenance instructions for your Blower unit. For specific information about maintenance of components, particularly for special application blowers, contact AIR.

Contents

1. General Motor Maintenance

The three basic rules of motor maintenance are:

a) Keep the motor clean

Keeping motors and windings clean is important because dirt and dust serve as thermal insulators. Heat normally dissipated by the motor is trapped causing overheating and/or premature failure. Blow dust and dirt out of windings and off the motor periodically. Use low pressure (50 psig) airstream so that winding damage does not occur. Keep the area surrounding the motor open so the air can circulate through the motor cooling fan.

b) Keep the motor dry

Motors should be kept dry to avoid electrical short circuit. Motors kept in storage for a long time can have moisture condensate on the windings. Be certain the motor is dry before use.

c) Keep the motor properly lubricated

Some smaller motors are lubricated for life (typically motors less than 10HP). Motor bearing lubrication, if required, must follow a rigorous schedule. Lubrication interval, type, and the amount of grease will be indicated on the motor nameplate.

It must be emphasized that excessive lubrication, i.e. a quantity of grease greater than that recommended on the motor nameplate, can result in the increase of bearing temperatures leading to reduced operating hours.

Grounding rings should be considered for motors controlled by variable frequency drives (VFDs). They can be installed by the end user or purchased with Unit.

2. Drive Maintenance

V-belt drives need periodic inspection and occasional belt replacement. When inspecting drives, look for dirt buildup, burrs or obstructions which can cause premature belt or drive replacement. If burrs are found, use fine emery cloth or a stone to remove the burr. Be careful that dust does not enter the bearings.

Check the sheaves for wear. Excessive slippage of belts on sheaves can cause wear and vibration. Replace worn sheaves with new ones. Carefully align sheaves to avoid premature sheave failure.

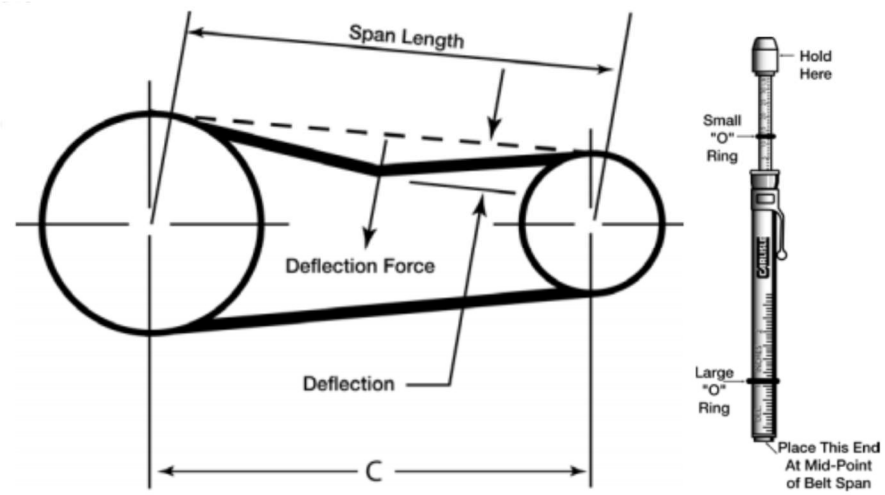
Observe belts for wear. If fraying or other wear is observed to be mostly on one side of the belts, the drives may be misaligned. Reinstall the drives according to instructions bellow. Never use belt dressing on any belts.

When replacing belts, replace the entire set. After initial replacement and tensioning, recheck belt tension after a few days to adjust belt tension again. New belts require a break-in period of operation.

2.1. Belt Tension Adjustment

Follow steps 1 to 8 and record data.

Required equipment: tensiometer, tape measure, straight edge.



1. Make sure the motor is de-energized.
2. Measure the span length of the belt. Span length is the distance the belt spans between the sheaves. The desired belt deflection is 1/64 of an inch for every inch of belt span. For example, if the span length is 32 inches, the desired belt deflection is ½ inch.
3. Set the large “O” ring on the tensiometer to the desired deflection determined in Step 2.
4. Set the small “O” ring on the tensiometer to the zero mark.
5. Holding the tensiometer, press the opposing end of the tensiometer to the midpoint of the belt span as indicated in Figure 1. Press down on the tensiometer (deflecting the belt) until the large “O” ring is even with the original location of the belt. For a single belt drive, the tensiometer should be depressed until the large “O” ring is lined up with the bottom of the straight edge placed on the outside rims of the two sheaves. For a multiple belt drive, depress the tensiometer until the large “O” ring is even with the top of the next belt. Take a reading from each belt for an average.
6. The small “O” ring now indicates the force (lbs) required to get the desired belt deflection. Check this reading against the recommended range of belt deflection force in the table at the end of this document.
7. Tighten or loosen the belt accordingly to achieve the recommended belt deflection force for initial installation. Tightening the belt will increase the force; loosening the belt will decrease the belt deflection force.
8. Inspect the belt drive after 24-48 hours of run time. The initial stretch is taken out of the belts and the belts seat lower in the sheaves. Check belt tension to assure it fall between the maximum and minim values show in the table.

V-Belt Cross Section	Small Sheave Diameter Range (Inches)	Recommended Deflection Force (Lbs)		
		Initial Installation	Retensioning	
			Maximum	Minimum
A	- 3	3.6	3.1	2.4
	3.1 - 4.0	4.2	3.6	2.8
	4.1 - 5.0	5.2	4.6	3.5
	5.1 -	6.1	5.3	4.1
B	- 4.6	7.3	6.4	4.9
	4.7 - 5.6	8.7	7.5	5.8
	5.7 - 7.0	9.3	8.1	6.2
	7.1 -	10.0	8.8	6.8
AX	- 3	5.1	4.4	3.4
	3.1 - 4.0	5.5	4.8	3.7
	4.1 - 5.0	6.0	5.2	4.0
	5.1 -	6.7	5.9	4.5
BX	- 4.6	10.0	8.7	6.7
	4.7 - 5.6	11.0	9.5	7.3
	5.7 - 7.0	11.5	9.9	7.6
	7.1 -	12.0	10.1	7.8
5V	7.1 - 10.3	16.5	14.3	11.0
	10.9 - 11.8	19.5	16.9	13.0
	12.5 - 16.0	21.0	18.2	14.0
5VX	- 5.5	15.0	13.0	10.0
	5.9 - 8.0	19.0	16.9	13.0
	8.5 - 10.9	21.0	18.2	14.0
	11.8 -	22.0	19.5	15.0

2.2. Sheave Aligment

Precise alignment of belt driven machinery is essential to increase belt and pulley life, reduce vibration, and reduce energy costs.

It is possible to determine the type of misalignment and how to correct it by using this document:

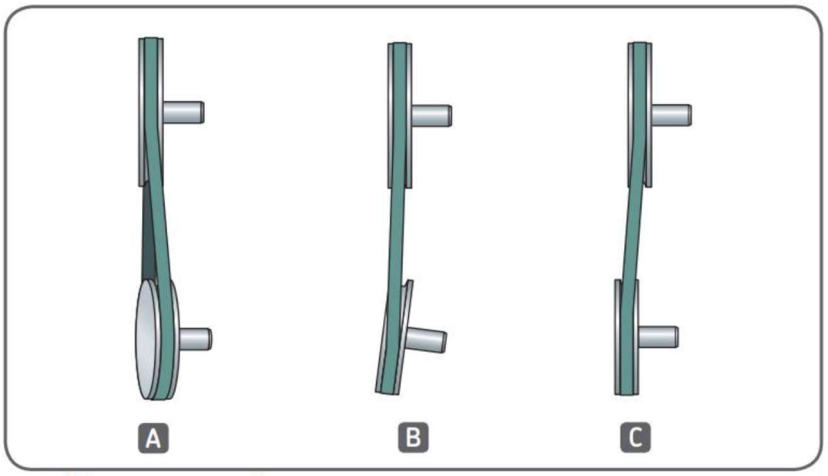


Fig 1 Different types of pulley misalignment

A	Vertical angle misalignment
B	Horizontal angle misalignment
C	Parallel misalignment

Follow steps 1 to 6.

Required equipment: TKBA 40 Belt alignment tool or similar (consists of two units and four sizes of V-guides that attach magnetically to the grooves of each pulley).

1. Make sure the motor is de-energized.
2. Four sizes of V-guides are supplied with the TKBA 40 to fit pulley grooves of most widths and types. Select and attach the appropriate V-guides as shown in figure 2.
3. The units are provided with strong magnets and V-guides. Place the V-guides of the first unit in the groove of the first pulley and press the unit firmly until the magnet secures it to the pulley. Place the second unit in the opposite groove of the second pulley. Position both units facing each other as shown in Figure 4.
4. Switch on the laser unit by pressing the ON/OFF button.
5. The laser line emitted from the laser unit will now appear on the receiver unit so that the type of misalignment can be determined. The pattern will vary depending on the type of misalignment, as shown in figure 5, 6, 7 and 8.

Fig 2 Fitting or removal of V-guides

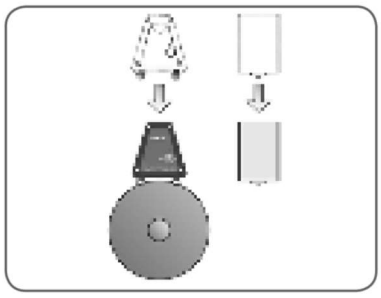


Fig 3 Mounting the unit

Fig 4 Units on pulleys

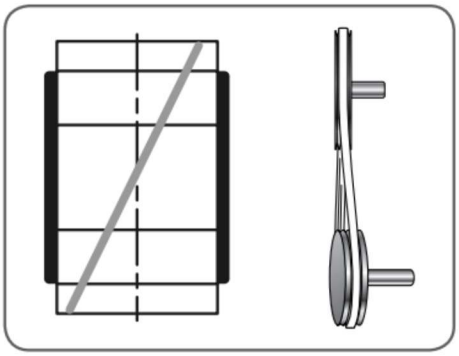


Fig 5 Display of vertical angle misalignment

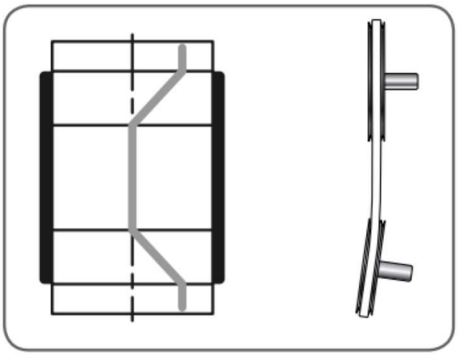


Fig 6 Display of horizontal angle misalignment

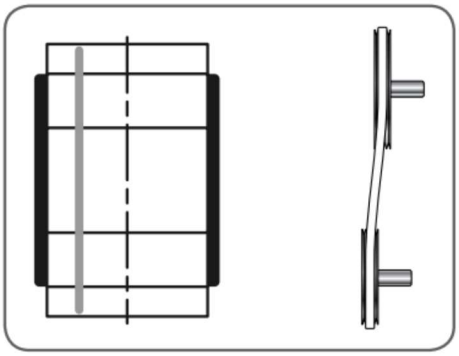


Fig 7 Display of parallell misalignment

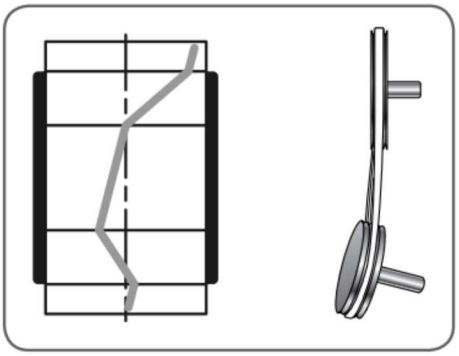


Fig 8 Display of all three misalignments combined

6. Before aligning the pulleys, it is important that the pulleys are mounted correctly on the shafts and that the shafts are straight. Buckled pulleys will have a detrimental effect on the alignment quality. Adjust one (or both) pulley machines(s) step by step until the laser line hit the three reference lines of the receiver unit.

   6.1. Elimination of vertical angle misalignment: Place shims beneath the front or rear feet of the moveable machine until the laser line is parallel to the reference lines (as per figure 11).

   6.2. Elimination of horizontal angle misalignment: Move the machine until the laser line is positioned equidistantly from the three reference lines, the top line and the two bottom reference lines (as per figure 13).

   6.3. Elimination of parallel misalignment: Move one of the pulleys on its shaft unit the laser line exactly matches the three reference lines (as per figure 15).

   The pulleys are now successfully aligned!

   *NOTE: When tightening the belt, check the horizontal angle alignment and adjust if necessary.

   WARNING: Switch OFF THE LASER UNIT AND REMOVE BOTH UNITS before starting machinery.

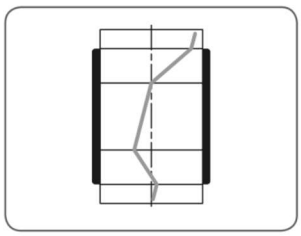


Fig 9 Pulleys with all three misalignments combined

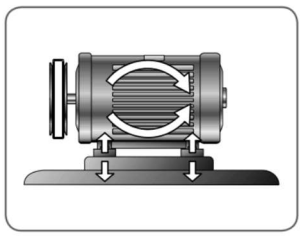


Fig 10 Vertical angle alignment

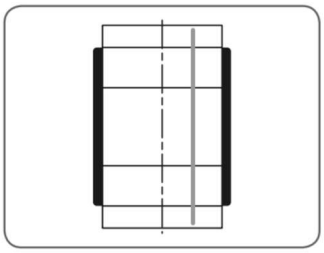


Fig 13 Pulleys with parallel misalignment

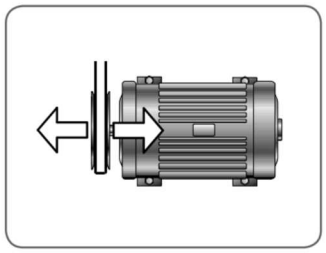


Fig 14 Parallel alignment

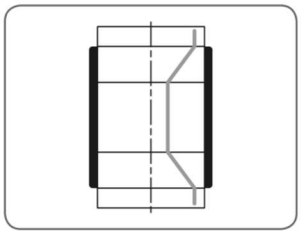


Fig 11 Pulleys with combined horizontal angle and parallel misalignments

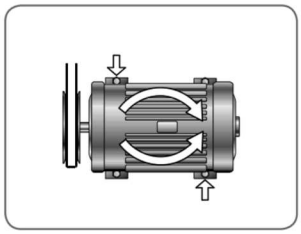


Fig 12 Horizontal angle alignment

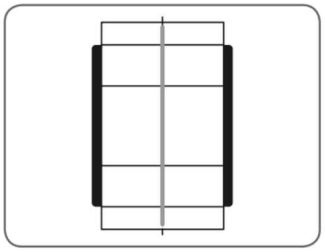


Fig 15 Pulleys perfectly aligned

3. Bearing Maintenance

For instructions covering bearing assembly or disassembly, or installation details, please contact AIR Engineering. Any bearing which is disassembled should be kept separate from other bearing parts as components may not be interchangeable. Maintain cleanliness of components and bearings to prevent bearing contamination.

3.1. Bearings NTN

Apply to models:

UCP206-103D3

UCP207-107D3

Inspect and tighten all bearing collar and wheel setscrews after the first 50 to 100 hours of operation and monthly thereafter. For torque values, refer to table “Recommended Torque” on section 3.2.

This blower bearing types are permanently lubricated and require no further lubrications.

3.2. Bearings - DODGE

Apply to models:

P2B-DLMAH-103	P2B-DLMAH-115	P2B-SCMAH-103
P2B-DLMAH-107	P2B-SCAH-100	P2B-DLAH-115
P2B-DLMAH-111	P2B-SCAH-103	

For setscrew mounted bearings:

After 24 hours operation, the setscrews should be retightened to the torque as shown on "Recommended Torque" table below to assure full locking of the inner race to the shaft. Care should be taken that the socket key or driver is in good condition with no rounded corners and the key is fully engaged in the setscrew and held square with the setscrew to prevent rounding out of the setscrew socket when applying maximum torque.

Do not drill through the setscrew holes for spot drilling of the shaft. (Some inner rings have tempered setscrew threads and can be damaged by a drill.)

NOTE: On all Setscrew Product the setscrews can be re-torqued many times without damage to the bearing system. AIR recommends a monthly inspection and tightens of all set screws. To achieve maximum shaft holding power it is highly recommended that setscrews be replaced with new hardware after any disassembly operation.

For D-LOK mounted bearings:

Be sure collar is square and tight against shoulder on inner ring. Tighten cap screw to recommended torque shown in the table below.

Recommended Torque					
Setscrews				D-LOK	
Setscrew Size	Key Hex Across Flats	Standard Ball Bearing Insert		Cap Screw Size	Recommended Torque
		Min	Max		
(in.)	(in.)	(in-lbs.)	(in-lbs.)	(in.)	(in-lbs.)
#10	3/32	28	33	#8-32	58
1/4	1/8	66	80	#10-32	90
5/16	5/32	126	156	1/4-28	180
3/8	3/16	228	275	5/16-24	400
(mm)	(mm)	(N-m)	(N-m)	(mm)	(N-m)
M5	2.5	3.2	3.7	M4	5.85
M6	3	6.2	7.7	M5	10.75
M8	4	14.2	17.8	M6	20.5

Proper lubrication of bearings helps assure maximum bearing life. All fans are equipped with decals indicating relubrication intervals for normal operating conditions. However, every installation is different and the frequency of lubrication should be established accordingly.

Relubricate while running, if safety permits, until some purging occurs at seals. Adjust lubrication frequency depending on conditions of purged grease. **Use one-half of listed interval for vertical shaft applications or for 24-hour operation.**

Lubricate with a high quality NLGI No. 2 lithium-base grease having rust inhibitors and antioxidant additives, and a minimum oil viscosity of 500 SUS at 100°F (38°C). Some greases having these properties are:

- Shell - Gadus S2 V100 2
- Exxon - Ronex MP.
- Mobil - Mobilith SHC100
- Mobil - Mobilith SHC220

Lubricate bearings prior to extended shutdown or storage and rotate shaft monthly to aid corrosion protection.

Observation of the condition of the grease expelled from unit ball or roller bearings at the time of relubrication is the best guide as to whether re-greasing intervals and the amount of grease added should be altered. This observation is particularly important when bearings operate continuously over 160°F.

Greases are made with different bases. There are synthetic base greases, lithium base, sodium base, etc. **Avoid mixing greases with different bases. They could be incompatible and result in rapid deterioration or breakdown of the grease.**

All bearings are filled with grease before leaving the factory. When the fans are started, the bearings may discharge excess grease through the seals for a short period of time. Do not replace the initial discharge because leakage will cease when the excess grease has worked out. Sometimes the bearing has a tendency to run hotter during this period and one should not get alarmed unless it lasts over 48 hours or gets above 220°F.

4. Blower Wheel and Shaft Maintenance

Periodically inspect the shaft and wheel for dirt buildup, corrosion, and signs of excess stress or fatigue. Clean the components and, when appropriate, apply new coatings. (Any addition of coatings or weld can create an imbalance.) Check the balance of the assembly.

5. Structural Maintenance

All structural components or devices used to support or attach the blower or blower motor to a structure should be checked at regular intervals. Vibration isolators, bolts, foundations, etc., are subject to failure from corrosion, erosion, and other causes. Improper mounting can lead to poor operation characteristics or fan fatigue and failure.

Check metallic components for corrosion, cracks, or other signs of stress.

6. Troubleshooting Guidelines

Use current safety practices when investigating blower or system performance problems. General safety practices and performance troubleshooting guidelines can be found in AMCA Publications 410 and 202, respectively. Fan application and field measurement procedures can be found in AMCA Publications 201 and 203.

6.1. Troubleshooting Performance Problems

The lists below indicate possible areas to check when air or sound values do not match expectations. Most fan problems can be pinpointed to one of these common causes.

6.1.1. Air Capacity Problems

1. Resistance of system not at design rating. If resistance is lower than expected, both airflow and horsepower may be up. If resistance is higher than anticipated, air volume will be down.
2. Fan speed is not at design speed.
3. Air density not at design values. Also check air performance measurement techniques and procedures.
4. Devices for air modulation are closed or plugged. Also check filters.
5. Wheel mounted improperly or is rotating in reverse.
6. Parts of system or fan have been damaged or need cleaning.

6.1.2. Noise

1. Air performance is incorrect and fan is not at design point of operation. Fan forced to operate in an unstable flow region.
2. Bearing failure. Check bearings (lubrication).
3. Supply voltage high or inconsistent supply frequency. Adjustable frequency controllers can generate motor noise.
4. Objects which are installed in a high velocity airstream can generate noise. This includes flow sensors, turning vanes, etc.
5. Poor fan inlet conditions.
6. Acoustics or sound measurement procedure incorrect.

6.1.3. Vibration

1. Misalignment of drive components.
2. Poor foundations or mounting structure (resonances).

3. Foreign material attached to rotating components.
4. Damaged rotating components (bearings, shaft, fan, wheel, sheaves).
5. Broken, lose or missing setscrews.
6. Loose bolts.
7. Vibration transmitted by another source.
8. Water accumulating in airfoil blades.
9. Fan is operating in stall or unstable flow region.

6.1.4. Motor Problems

1. Incorrect wiring.
2. Speed of fan too high.
3. Parts improperly installed - binding.
4. Bearings improperly lubricated.
5. WR2 capability of motor too low for application.
6. Protection devices may be improperly sized.
7. When used with VFD, a high pitch motor noise may be associated with the harmonic natural frequency of the motor and the switching frequency of the VFD. Changing the VFD switching frequency parameter may solve the problem.

6.1.5. Drive Problems

1. Belts improperly tensioned.
2. Drive alignment is poor.

6.1.6. Bearing Problems

Common failure causes are:

1. Setscrews loosening and shaft turning within the bearing
2. Crowned bearing supports. Loosen one bolt and measure the clearance between the pillow block and the support. Add shim to compensate.
3. Noise: If a bearing is increasing in noise intensity and/or vibration, it will probably result in failure.
4. Temperature: If a bearing temperature begins to gradually rise, it will generally result in failure. A bearing can operate up to 200 degrees and operate satisfactorily if the temperature remains constant and the bearing receives adequate lubrication.

7. Lubrication (Only applies to DODGE bearings):

The major cause of bearing failure is contamination of grease, insufficient grease, or incompatibility of grease. If a fan is to be stored for any length of time at the job site, the bearings immediately should be filled with grease while rotating the shaft and then the bearings should be re-greased and rotated monthly. This will prevent moisture, which condenses within the bearing, from corroding the raceways.

Most greases used on fan pillow blocks are lithium base. Use the greases shown on the bearing decal. Do not mix the bases without completely purging out the initial grease.

Initially, follow the lubrication instruction on the side of the fan. The frequency of lubrication should be adjusted depending on the condition of the old grease being purged. This is the responsibility of the user. If the grease is dirty, the lubrication frequency should be more often.

Rough handling and/or dropping a fan can result in brinelling the bearing. This appears as a clicking noise at first, then gradually worsens until failure.

When replacing a bearing, always align the bearings first, then bolt the pillow blocks to their support, rotate the shaft, fasten the bearings to it. If the bearing is fastened to the shaft first, tightening the pillow block bolts may bind the shaft and preload the bearings.