



# COOK

# Propeller Inline

Tube Axial Fans

## INSTALLATION, OPERATION, AND MAINTENANCE MANUAL

This publication contains the installation, operation and maintenance procedures for standard units of the ADD, ADB, EDD, EDB, TID & TIB *Tube Axial Fans*:



**Carefully read this publication and any supplemental documents prior to any installation or maintenance procedure.**

Loren Cook catalog *Propeller Inline* provides additional information describing the equipment, fan performance, available accessories and specification data.

For additional safety information, refer to AMCA publication 410-96, *Safety Practices for Users and Installers of Industrial and Commercial Fans*.

All of the publications listed above can be obtained from Loren Cook Company by phoning (417)869-6474, extension 166; by FAX at (417)832-9431; or by e-mail at [info@lorencook.com](mailto:info@lorencook.com).

For information and instructions on special equipment, contact Loren Cook Company at (417)869-6474.

### Receiving and Inspection

Carefully inspect the fan and accessories for any damage and shortage immediately upon receipt of the fan.

- Turn the propeller by hand to ensure it turns freely and does not bind.
- Record on the *Delivery Receipt* any visible sign of damage.

### Handling

Lift tube axial fans by placing a sling around the fan housing or mounting brackets. **NOTICE! Never lift by the shaft or motor.**

## ! WARNING

### Rotating Parts & Electrical Shock Hazard:

Disconnect electric power before working on unit.

Follow proper lockout / tagout procedures to ensure the unit cannot be energized while being installed or serviced.

A disconnect switch should be placed near the fan in order that the power can be swiftly cut off, in case of an emergency and in order that maintenance personnel are provided complete control of the power source.

Grounding is required. All field-installed wiring must be completed by qualified personnel. All field-installed wiring must comply with National Electric Code (NFPA 70) and all applicable local codes.

Failure to follow these instructions could result in death or serious injury.

### Storage

If the fan is stored for any length of time prior to installation, rotate the propeller several revolutions every three to five days. This keeps a coating of grease on all internal bearing parts. Block propeller to prevent natural rotation and store it in its original shipping crate and protect it from dust, debris and the weather.

### Outdoor Storage

To maintain good working condition of the fan when it is stored outdoors or at a construction site, follow the additional instructions below.

- Coat the shaft and bearings with grease or rust preventative compound to help seal out moisture.
- Periodically rotate the propeller and dampers (if supplied) to keep a coating of grease on all internal bearing parts.
- Periodically inspect the fan to prevent damaging conditions.
- Block propeller to prevent natural rotation.
- Cover the unit with some type of weather cover to prevent moisture, corrosion, dirt or dust accumulation.

### Installation

#### Motor Installation

To prevent damage to the fan during shipping, motors 5 HP and larger, and extremely heavy motors (cast iron or severe duty) are shipped loose and must be field mounted by bolting the motor on the motor mounting plate in the existing mounting slots.



EDB

## Belt and Pulley Installation

If your fan is a direct drive, proceed to *Isolator Installation*.

Belt tension is determined by the sound of the belts when the fan is first started. The belts will produce a loud squeal, which dissipates after the fan is operating at full capacity. If belt tension is too tight or too loose, lost efficiency and damage can occur.

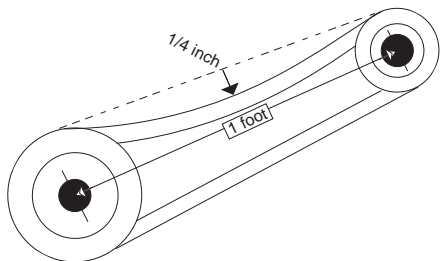


Figure 1

Do not change the pulley pitch diameter to change tension. The change will result in a different fan speed.

- Loosen the motor plate adjustment nuts on motor base and move motor plate in order that the belts can easily slip into the grooves on the pulleys. Never pry, roll, or force the belts over the rim of the pulley.
- Adjust the motor plate until proper tension is reached. For proper tension, a deflection of approximately 1/4" per foot of center distance should be obtained by firmly pressing the belt. Refer to *Figure 1*.
- Lock the motor plate adjustment nuts in place.
- Ensure pulleys are properly aligned. Refer to *Figure 2*.

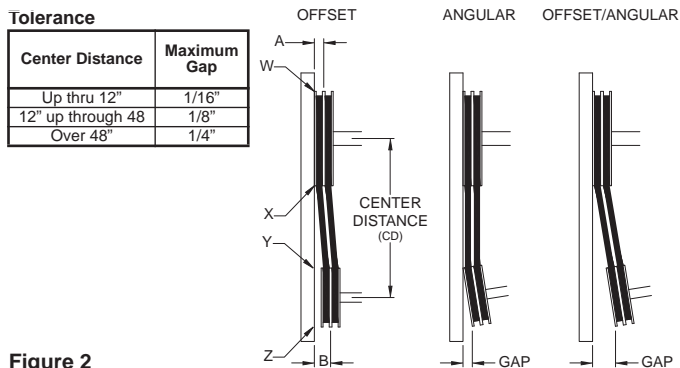


Figure 2

## Pulley Alignment

Pulley alignment is adjusted by loosening the motor pulley setscrew and by moving the motor pulley on the motor shaft.

*Figure 2* indicates where to measure the allowable gap for the drive alignment tolerance. All contact points (indicated by WXYZ) are to have a gap less than the tolerance shown in the table. When the pulleys are not the same width, the allowable gap must be adjusted by half of the difference in width (As shown in A & B of *Figure 2*). *Figure 3* illustrates using a carpenter's square to adjust the position of the motor pulley until the belt is parallel to the longer leg of the square.

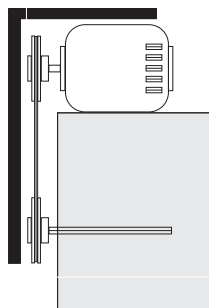


Figure 3

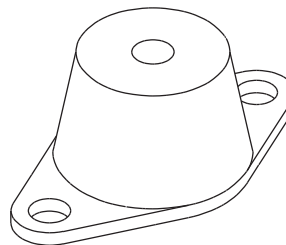
## Isolator Installation

### Floor Mounted Fans

If the fan is being mounted to a metallic base, isolation pads should be used between the unit and its base to reduce vibration and noise.

### Floor Mounted Rubber-In-Shear (RIS) Isolators

- Elevate the fan to provide room to insert isolators between the fan and foundation and block in position.
- Position isolators under the fan and secure bolts.
- Remove blocks and allow the fan to rest on floor. Isolators must be installed on a level surface so leveling should not be required.
- Secure isolators to mounting surface.

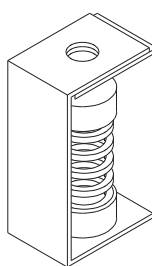


Floor Mounted Rubber-In-Shear Isolator

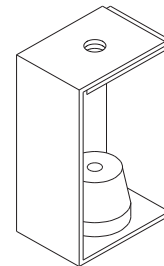
### Ceiling Mounted Fans

The most common method used to mount a ceiling fan to its support structure is with ceiling mounted spring and rubber-in-shear (RIS) isolators.

- Elevate the fan to operating height and brace.
- Attached threaded rod to overhead support structure directly above each mounting hole. The rod should extend to within a few feet of the fan.
- Attach isolator to end of threaded rod using a nut on each side of the isolator bracket.
- Insert another section of threaded rod through the fan mounting hole and isolator.
- Attach two nuts to threaded rod in isolator.
- Place adjusting nut and locking nut on threaded rod near fan mounting bracket.
- Alternately rotate adjusting nut at each mounting location until the fan weight is uniformly transferred to the isolators. Remove bracing.
- Turn locking nut and secure firmly in place against mounting bracket.



Ceiling Mounted Spring Isolator



Rubber-In-Shear Ceiling Isolators

## Fan Installation

If your fan is a direct drive, proceed to *Wiring Installation* before completing attachment to the duct.

### Floor Mounted Units

- Bolt down the fan.
- When the fan is secure, attach the duct to the flanges.
- Drill holes through the flanges to match the duct, then bolt the duct and flanges together.

## Ceiling Mounted Units

- Mount the fan to its support structure.
- When all the installation supports have been removed and the fan is supported only by the permanent structure, attach the duct work.
- Drill holes through the flanges to match the duct, then bolt the duct and flanges together.

## Wiring Installation

All wiring should be in accordance with local ordinances and the National Electrical Code, NFPA 70. Ensure the power supply (voltage, frequency, and current carrying capacity of wires) is in accordance with the motor nameplate. Refer to the *Wiring Diagrams*, next page.

Leave enough slack in the wiring to allow for motor movement when adjusting belt tension. Some fractional motors have to be removed in order to make the connection with the terminal box at the end of the motor.



**Follow the wiring diagram in the disconnect switch and the wiring diagram provided with the motor. Correctly label the circuit on the main power box and always identify a closed switch to promote safety (i.e., red tape over a closed switch).**

## Belt Drive Fans

- Run wire to the fan. Restrain wire to the housing or motor plate to prevent it from being pulled into the shaft.
- Pull the wire into the motor. For final connections, follow the wiring diagram provided on the motor.

## Direct Drive Fans

- Drill a hole through the fan housing at a convenient location and pull the wire through it or pull the wire through the intake duct.
- Pull the wire into the motor wiring box. Restrain the wire to prevent it from being pulled into the shaft.
- For final connections, follow the wiring diagram provided on the motor.

## Final Installation Steps

- Inspect fasteners and setscrews, particularly fan mounting and bearing fasteners, and tighten according to the recommended torque shown in the table, *Recommended Torque for Setscrews/Bolts*.
- Inspect for correct voltage with voltmeter.
- Ensure all accessories are installed.
- Test the fan to be sure the rotation is the same as indicated by the arrow marked **Rotation**.

**NOTICE! Do not allow the fan to run in the wrong direction. This will overheat the motor and cause serious damage. For 3-phase motors, if the fan is running in the wrong direction, check the control switch. It is possible to interchange two leads at this location so that the fan is operating in the correct direction.**

## Operation

### Pre-Start Checks

- Lock out all the primary and secondary power sources.
- Inspect fasteners and setscrews, particularly those used for mounting the unit, and tighten if necessary.
- Inspect belt tension and pulley alignment. (Remember, if belt tension is correct, a loud squeal occurs as

## Recommended Torque for Setscrews/Bolts (IN/LB.)

Setscrews				Hold Down Bolts	
Size	Key Hex Across Flats	Recommended Torque			
		Min.	Max.	Size	Wrench Torque
No.10	3/32"	28	33	3/8"-16	240
1/4"	1/8"	66	80	1/2"-13	600
5/16"	5/32"	126	156	5/8"-11	1200
3/8"	3/16"	228	275	3/4"-10	2100
7/16"	7/32"	348	384	7/8"-9	2040
1/2"	1/4"	504	600	1"-8	3000
5/8"	5/16"	1104	1200	1-1/8"-7	4200
3/4"	3/8"	1440	1800	1-1/4"-7	6000

the fan increases to full power.)

- Inspect motor wiring.
- Ensure the belt touches only the pulleys.
- Rotate the prop to ensure it does not rub against the venturi.
- Ensure fan and ductwork are clean and free of debris.
- Test the fan to ensure the rotation of the propeller is the same as indicated by the rotation label.
- Close and secure all access doors.
- Restore power to unit.

## Start Up

Turn the fan on. In variable speed units, set the fan to its lowest speed. Inspect for the following:

- Direction of rotation.
- Excessive vibration.
- Unusual noise.
- Bearing noise.
- Improper belt alignment or tension (listen for a continuous squealing noise).
- Improper motor amperage or voltage.

**NOTICE! If a problem is discovered, immediately shut off the fan. Lock out all electrical power and check for the cause of the trouble. Refer to *Troubleshooting*, page 6.**

## Inspection

Inspection of the fan should be conducted at the first **30 minute, 8 hour and 24 hour** intervals of satisfactory operation. During the inspections, stop the fan and inspect as per directions below.

### 30 Minute Interval

Inspect bolts, setscrews, and motor mounting bolts. Adjust and tighten as necessary.

### 8 Hour Interval

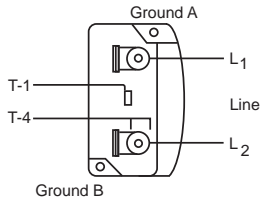
Inspect belt alignment and tension. Adjust and tighten as necessary.

### 24 Hour Interval

Inspect belt tension. Adjust and tighten as necessary.

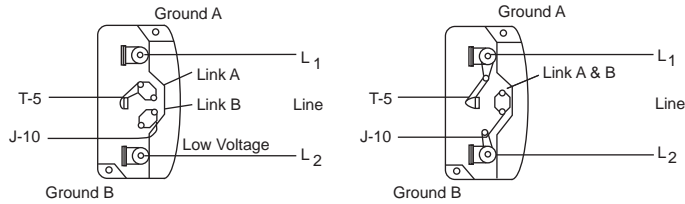
## Wiring Diagrams

### Single Speed, Single Phase Motor



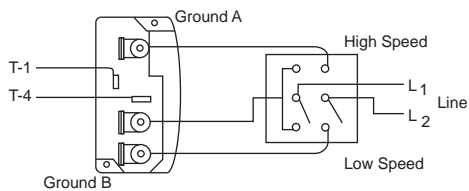
When ground is required, attach to ground A or B with no. 6 thread forming screw. To reverse, interchange T-1 and T-4.

### 2 Speed, 2 Winding, Single Phase Motor



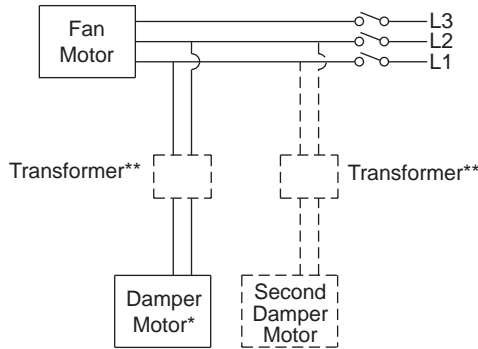
When ground required, attach to ground A or B with No. 6 thread forming screw. To reverse, interchange T-1 and T-4 leads.

### Single Speed, Single Phase, Dual Voltage



When ground required, attach to ground A or B with No. 6 thread forming screw. To reverse, interchange T-5 and J-10 leads.

### Typical Damper Motor Schematic



For 3 phase, damper motor voltage should be the same between L<sub>1</sub> and L<sub>2</sub>. For single phase application, disregard L<sub>3</sub>. \*Damper motors may be available in 115, 230 and 460 volt models. The damper motor nameplate voltage should be verified prior to connection. \*\* A transformer may be provided in some installations to correct the damper motor voltage to the specified voltage.

## Maintenance

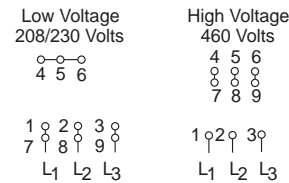
Establish a schedule for inspecting all parts of the fan. The frequency of inspection depends on the operating conditions and location of the fan.

Inspect fans exhausting corrosive or contaminated air within the first month of operation. Fans exhausting contaminated air (airborne abrasives) should be inspected every three months. Clean the propeller and air inlets if material build-up is excessive. Excessive build-up can cause imbalance and failure of the propeller. Always clean the entire propeller as partial cleaning will cause imbalance and fan failure.

Regular inspections are recommended for fans exhausting non-contaminated air.

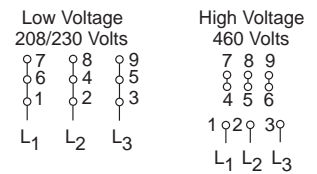
## Wiring Diagrams

### 3 Phase, 9 Lead Motor Y-Connection



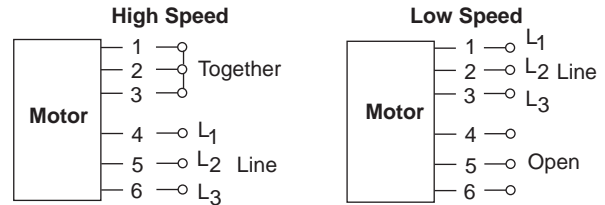
To reverse, interchange any 2 line leads.

### 3 Phase, 9 Lead Motor Delta-Connection



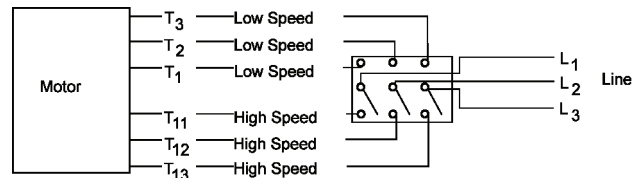
To reverse, interchange any 2 line leads.

### 2 Speed, 1 Winding, 3 Phase Motor



To reverse, interchange any 2 line leads. Motors require magnetic control.

### 2 Speed, 2 Winding, 3 Phase



To reverse: High Speed-interchange leads T<sub>11</sub> and T<sub>12</sub>. Low Speed-interchange leads T<sub>1</sub> and T<sub>2</sub>. Both Speeds-interchange any 2 line leads.



## Lubricants

Loren Cook Company uses petroleum lubricant in a lithium base conforming to NLGI grade 2 consistency. Other grades of grease should not be used unless the bearings and lines have been flushed clean. If another grade of grease is used, it should be lithium-based.

A NLGI grade 2 grease is a light viscosity, low-torque, rust-inhibiting lubricant that is water resistant. Its temperature range is from -30°F to +200°F and capable of intermittent highs of +250°F.

## Motor Bearings

Motor bearings are pre-lubricated and sealed. Under normal conditions they will not require further maintenance for a period of ten years. However, it is advisable to have your maintenance department remove and disassemble the motor, and lubricate the bearings after three years of operation in excessive heat and or in a contaminated airstream consisting of airborne abrasives.

Conditions Chart			
RPM	Temperature	Fan Status	Greasing Interval
100	Up to 120°F	Clean	6 to 12 months
500	Up to 150°F	Clean	2 to 6 months
1000	Up to 210°F	Clean	2 weeks to 2 months
1500	Over 210°F	Clean	Weekly
Any Speed	Up to 150°F	Dirty	1 week to 1 month
Any Speed	Over 150°F	Dirty	Daily to 2 weeks
Any Speed	Any Temperature	Very Dirty	Daily to 2 weeks
Any Speed	Any Temperature	Extreme Conditions	Daily to 2 weeks

## Fan Bearings

Fan bearings are lubricated through a grease connector and should be lubricated by the schedule, *Conditions Chart*, shown above.

For best results, lubricate the bearing while the fan is rotating. Slowly pump grease into the bearing until a slight bead forms around the bearing seals. Excessive grease can burst seals thus reduce bearing life.

In the event the bearing cannot be seen, use no more than three injections with a hand-operated grease gun.

## Motor Services

Should the motor prove defective within a one-year period, contact your local Loren Cook representative or your nearest authorized electric motor service representative.

## Changing Shaft Speed

All belt driven Tube Axial fans with motors up to and including 5HP are equipped with variable pitch pulleys. To change the fan speed, perform the following:

- Loosen setscrew on driver (motor) pulley and remove key, if equipped.
- Turn the pulley rim to open or close the groove facing. If the pulley has multiple grooves, all must be adjusted to the same width.
- After adjustment, inspect for proper belt tension.

## Speed Reduction

Open the pulley in order that the belt rides deeper in the groove (smaller pitch diameter).

## Speed Increase

Close the pulley in order that the belt rides higher in the groove (larger pitch diameter). Ensure that the RPM limits of the fan and the horsepower limits of the motor are maintained.

## Pulley and Belt Replacement

- Clean the motor and fan shafts.
- Loosen the motor plate mounting bolts to relieve the belt tension. Remove the belt.
- Loosen the pulley setscrews and remove the pulleys from the shaft.  
If excessive force is required to remove the pulleys, a three-jaw puller can be used. This tool, however, can easily warp a pulley. If the puller is used, inspect the trueness of the pulley after it is removed from the shaft. The pulley will need replacement if it is more than 0.020 inch out of true.
- Clean the bores of the pulleys and place a light coat of oil on the bores.
- Remove grease, rust and burrs from the shaft.
- Place fan pulley on the fan shaft and the motor pulley on the motor shaft. Damage to the pulleys can occur when excessive force is used in placing the pulleys on their respective shafts.
- After the pulleys have been correctly placed back onto their shafts, tighten the pulley setscrews.
- Install the belts on the pulleys. Align and adjust the belts to the proper tension as described in *Belt and Pulley Installation*, page 1.

## Bearing Replacement

The fan bearings are pillow block ball bearings.

- Loosen the motor plate mounting bolts and remove the drive belts.
- Gain access to the interior of the fan. Remove duct work and/or guards as necessary.
- Remove the propeller from the shaft.
- Remove the bearing cover from the bearing plate.
- Remove the four bearing hold-down bolts and then remove the shaft, bearings, and driven sheave from the unit as an assembly.
- Mark the location of the bearings and sheave on the shaft. This will aid the reassembly.
- Remove the anti-corrosion coating from the shaft with a suitable degreaser and then remove the pulley from the shaft.
- Remove the bearings from the shaft using a bearing puller.
  - Clean the shaft and bearing bores thoroughly.
  - Place the bearings into position making sure they are not on a worn section of the shaft. Tapping the inner ring face with a soft driver may be required.

**NOTICE! Do not hammer on the housing. This may cause damage to the bearings.**

- k. Install the pulley in the correct location on the shaft. Secure the bearing hold-down bolts, but do not fully tighten.
- l. Align the setscrews on the top bearing with those on the lower bearing. Tighten one of the setscrews on each bearing.
- m. Rotate the shaft to allow the bearing outer rings to find their center of free movement. If your fan is supplied with a lube line, attach it to the grease connection.
- n. Install the propeller on the shaft and adjust bearing position to center the propeller in the opening.
- o. Tighten hold-down bolts to proper torque. Refer to the torque chart on page 3.
- p. Turn the shaft by hand. Resistance should be the same as it was before hold-down bolts were fully tightened.
- r. Re-assembly the fan.

After 24 hours of continuous operation, tighten the setscrews to the appropriate torque. This assures the full locking of the inner race to the shaft. Ensure the socket key or driver is in good condition with no rounded corners. The key should be fully engaged in the setscrew and held squarely to prevent the rounding out of the setscrew socket when applying maximum torque.

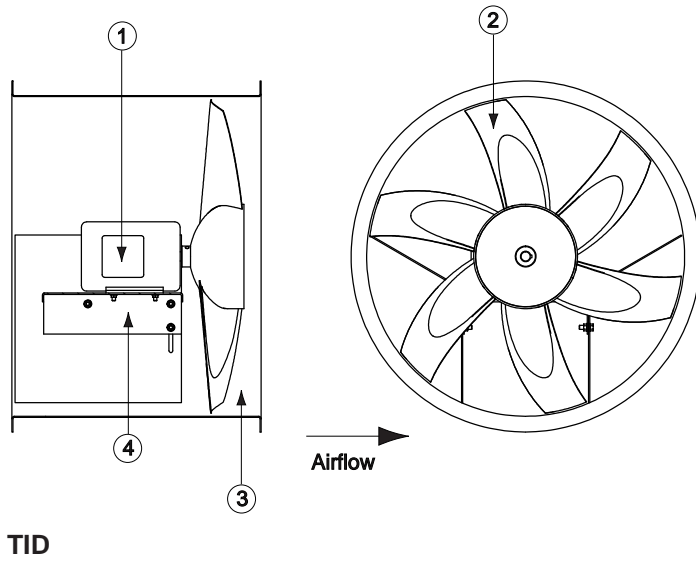
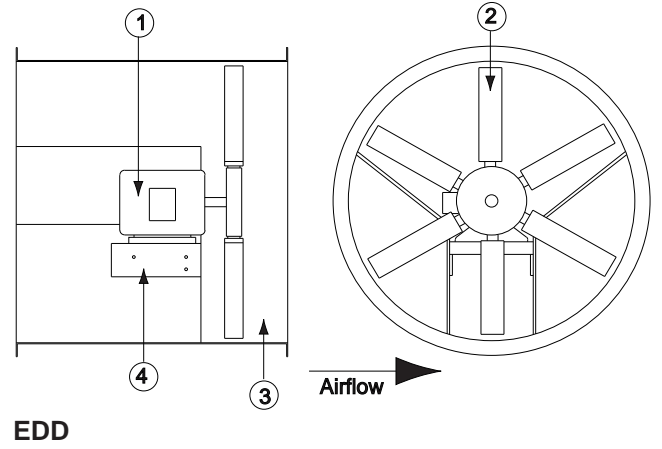
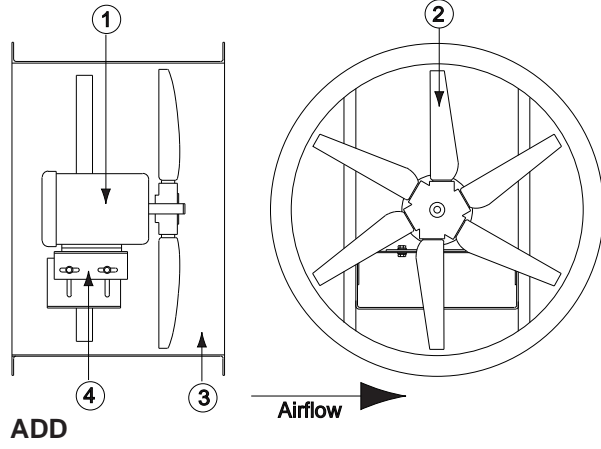
## Propeller and Shaft Replacement Precautions

- If the shaft is dropped and bent, it may cause unbalanced operation of the fan.
- When handling the propeller separately from the shaft, place a support through the hub for lifting, making sure not to injure the finished bore of the propeller.
- Never allow the propeller to rest its entire weight on the blades. The propeller and shaft can be lifted by slings around the shaft on each side of the propeller so the propeller is supported by its hub.
- If using a chain to lift the propeller, make sure there is sufficient padding on the shaft and propeller. This prevents the scoring of the shaft or injury to the propeller. The chain or cable should be spread with timbers, or braced by some other method to prevent damage to the propeller side plates.

## Troubleshooting

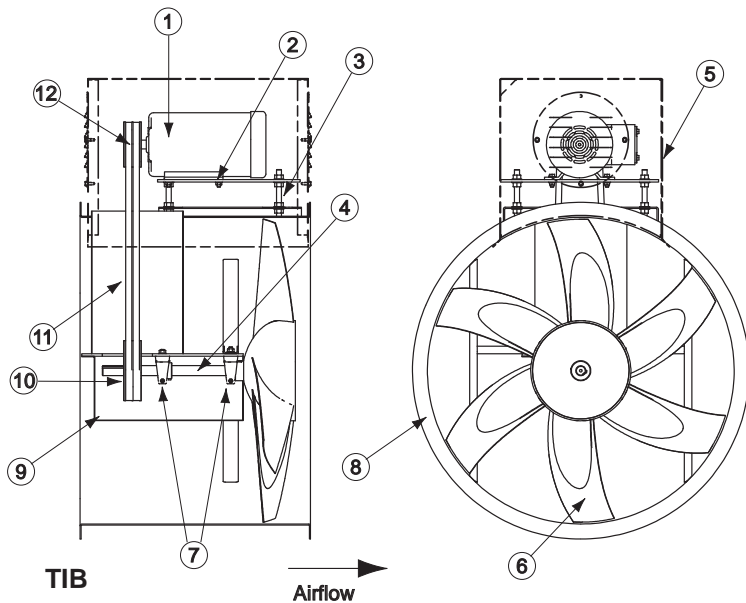
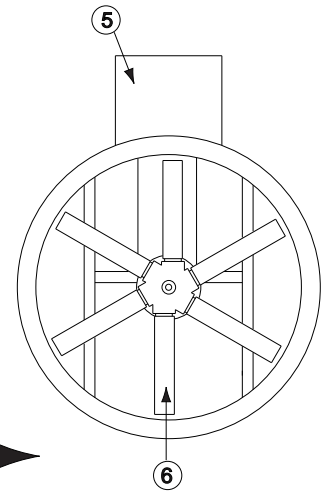
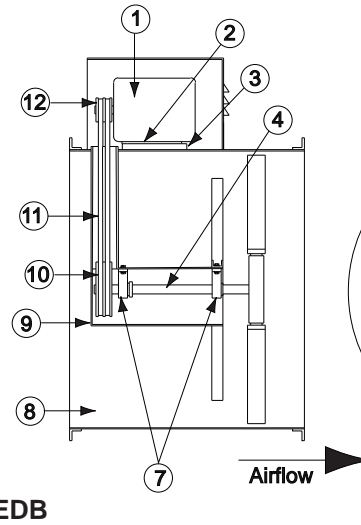
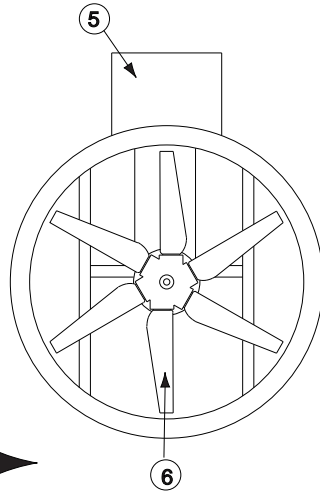
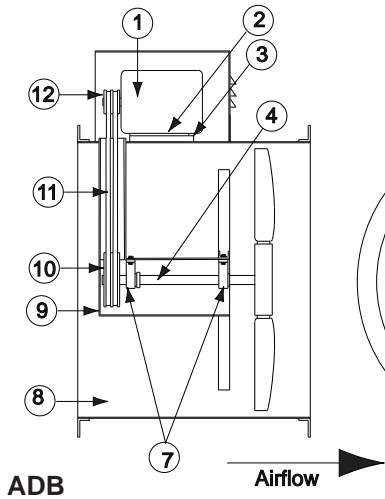
Problem and Potential Cause	
<p><b>Low Capacity or Pressure</b></p> <ul style="list-style-type: none"> <li>•Incorrect direction of rotation. Make sure the fan rotates in same direction as the arrows on the motor or belt drive assembly.</li> <li>•Poor fan inlet conditions. There should be a straight clear duct at the inlet.</li> <li>•Improper propeller alignment.</li> </ul>	<p><b>Overheated Motor</b></p> <ul style="list-style-type: none"> <li>•Motor improperly wired.</li> <li>•Incorrect direction of rotation. Make sure the fan rotates in same direction as the arrows on the motor or belt drive assembly.</li> <li>•Cooling air diverted or blocked.</li> <li>•Improper inlet clearance.</li> <li>•Incorrect fan RPMs.</li> <li>•Incorrect voltage.</li> </ul>
<p><b>Excessive Vibration and Noise</b></p> <ul style="list-style-type: none"> <li>•Damaged or unbalanced propeller.</li> <li>•Belts too loose; worn or oily belts.</li> <li>•Speed too high.</li> <li>•Incorrect direction of rotation. Make sure the fan rotates in same direction as the arrows on the motor or belt drive assembly.</li> <li>•Bearings need lubrication or replacement.</li> <li>•Fan surge.</li> </ul>	<p><b>Overheated Bearings</b></p> <ul style="list-style-type: none"> <li>•Improper bearing lubrication</li> <li>•Excessive belt tension.</li> </ul>

# ADD, EDD, and TID Parts List



Part No.	Description		
	ADD Sizes 12-24	EDD Sizes 24-48	TID Sizes 20-60
1	Motor (as required)	Motor (as required)	Motor (as required)
2	Cast Aluminum Propeller	Extruded Aluminum Propeller	Welded Steel Propeller
3	Housing/Power Assembly	Housing/Power Assembly	Housing/Power Assembly
4	Motor Plate	Motor Plate	Motor Plate

## ADB, EDB, and TIB Parts List



Parts No.	Description		
	ADB 16-48	EDB 24-60	TIB 20-72
1	Motor	Motor	Motor
2	Motor Plate	Motor Plate	Motor Plate
3	Motor Plate Studs (4)	Motor Plate Studs (4)	Motor Plate Studs (4)
4	Shaft	Shaft	Shaft
5	Weather Cover (optional)	Weather Cover (optional)	Weather Cover (optional)
6	Cast Aluminum Propeller	Extruded Aluminum Propeller	Welded Steel Propeller
7	Bearings	Bearings	Bearings
8	Housing/Power Assembly	Housing/Power Assembly	Housing/Power Assembly
9	Bearing Cover	Bearing Cover	Bearing Cover
10	Driven Sheave	Driven Sheave	Driven Sheave
11	Belt Set	Belt Set	Belt Set
12	Driver Sheave	Driver Sheave	Driver Sheave

### Limited Warranty

Loren Cook Company warrants that your Loren Cook fan was manufactured free of defects in materials and workmanship, to the extent stated herein. For a period of one (1) year after date of shipment, we will replace any parts found to be defective without charge, except for shipping costs which will be paid by you.

This warranty is granted only to the original purchaser placing the fan in service.

This warranty is void if the fan or any part thereof has been altered or modified from its original design or has been abused, misused, damaged or is in worn condition or if the fan has been used other than for the uses described in the company manual. This warranty does not cover defects resulting from normal wear and tear.

To make a warranty claim, notify Loren Cook Company, General Offices, 2015 East Dale Street, Springfield, Missouri 65803-4637, explaining in writing, in detail, your complaint and referring to the specific model and serial numbers of your fan. Upon receipt by Loren Cook Company of your written complaint, you will be notified, within thirty (30) days of our receipt of your complaint, in writing, as to the manner in which your claim will be handled. If you are entitled to warranty relief, a warranty adjustment will be completed within sixty (60) business days of the receipt of your written complaint by Loren Cook Company.

This warranty gives only the original purchaser placing the fan in service specifically the right. You may have other legal rights which vary from state to state.

For fans provided with motors, the motor manufacturer warrants motors for a designated period stated in the manufacturer's warranty. Warranty periods vary from manufacturer to manufacturer. Should motors furnished by Loren Cook Company prove defective during the designated period, they should be returned to the nearest authorized motor service station. Loren Cook Company will not be responsible for any removal or installation costs.

## LOREN COOK COMPANY

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