

COOK

AQ/SEP/ETE/ETS

Propeller Roof Fans

INSTALLATION, OPERATION, AND MAINTENANCE MANUAL

This publication contains the installation, operation and maintenance procedures for standard units of the AQ/SEP/ETE/ETS - Propeller Roof Fans.

Carefully read this publication prior to any installation or maintenance procedure.

Loren Cook catalog, *Propeller Roof Fans*, 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.

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.
- Check dampers (if included) for free operation of all moving parts.
- Record on the *Delivery Receipt* any visible sign of damage.

Handling

Lift the fan by the base or by the shipping carton. Never lift by the shaft, motor or housing.

If your fan is covered with a protective coating (e.g., phenolic enamels, or other protective coatings), **handle with extreme care**. Even a small chip will break the coating's continuity and destroy its ability to protect the metal.

Propellers are carefully balanced to give smooth, vibration-free operation. If the propeller is damaged during handling, it will require rebalancing.

WARNING

This unit has rotating parts. Safety precautions should be exercised at all times during installation, operation, and maintenance. ALWAYS disconnect power prior to working on fan.

Storage

If the fan is stored for any length of time prior to installation, 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 operate the 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.

Personal Safety

Disconnect switches are recommended. Place the disconnect switch 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.

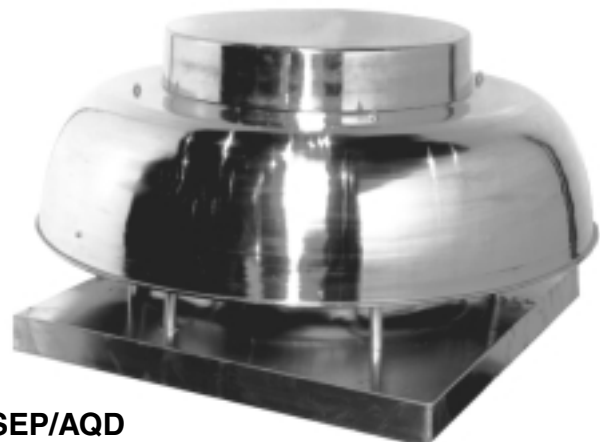
Installation

Damper Installation

If your fan is supplied with dampers, follow the directions below. If your fan does not include dampers, proceed to *Motor Installation*.

- a. Place the damper inside the curb. Ensure the damper will open freely for the correct direction of the airflow.
- b. Secure to curb at the damper shelf by installing at least two sheet metal screws (#10 x 1/2") on each side of the damper, through the tray, with the screw head catching the flange on the damper. This will prevent the exhaust dampers from lifting and keep the supply dampers centered.

Damper Installation continued



SEP/AQD

- c. Drill a hole in the curb shelf for conduit needed for motor wiring.
- d. Operate the dampers manually to ensure the blades move freely. Dampers should be released from full open position to check for proper closing.

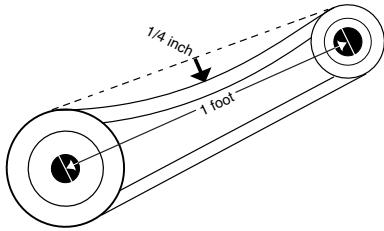


Figure 1

Motor Installation (Belt Drive fans)

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.

- a. Remove the motor plate mounting bolts and the motor plate.
- b. Remove the motor mounting bolts from the motor plate.
- c. Mount the motor to the motor plate aligning to the appropriate holes.
- d. Place the motor plate on the power assembly and reinstall the mounting bolts.

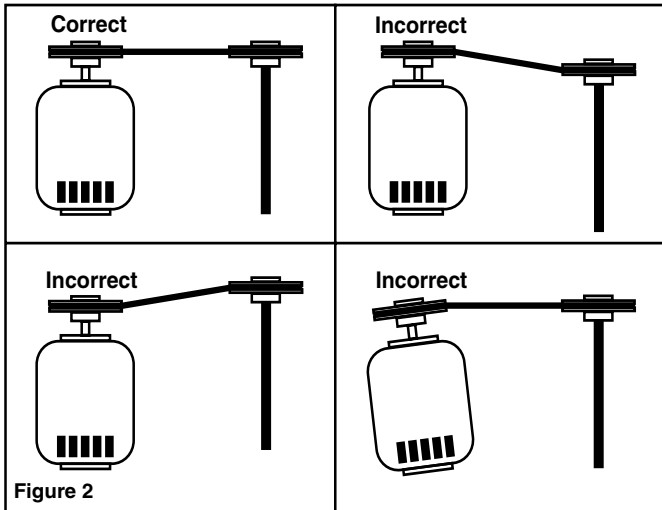


Figure 2

Belt and Pulley Installation

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

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

- a. 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.
- b. 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*.

- c. Lock the motor plate adjustment nuts in place.
- d. Ensure pulleys are properly aligned. Refer to *Figure 2*.

Pulley Alignment

Pulley alignment is adjusted by loosening the motor pulley setscrew and by moving the motor pulley on the motor shaft or by moving the entire motor along the motor mounting bracket.

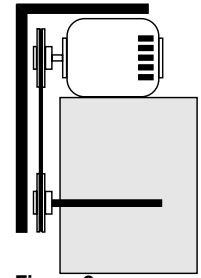


Figure 3

Figure 2 illustrates correct and incorrect pulley alignment. A recommended method of inspecting the pulley alignment is shown in *Figure 3*. With the shorter leg of a carpenter's square or other straight edge lying along the case of the motor, adjust the position of the motor pulley (or the motor) until the longer leg of the square is parallel to the belt.

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* on page 3.

Lock off all power sources before unit is wired to power source.

Leave enough slack in the wiring to allow for motor movement when adjusting belt tension.

Personal Safety

Disconnect switches are recommended. Place the disconnect switch 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.

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).

Fan Installation

The fan support (roof curb) should provide a level surface for installation. If the roof is pitched more than 1/2:12, a sloped curb must be used to correct for the incline.

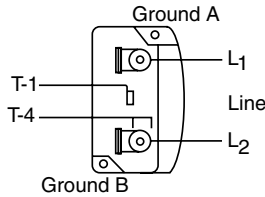
Place fan over roof opening. Secure the fan with lag screws, anchor bolts, or other suitable fasteners.

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

Setscrews				Hold Down Bolts	
Size	Key Hex Across Flats	Recommended Torque		Size	Wrench Torque
		Min.	Max.		
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

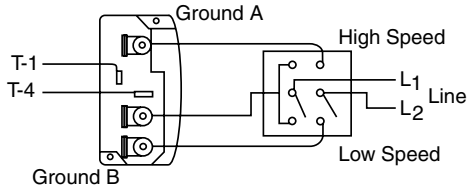
Wiring Diagrams

Single Speed, Single Phase Motor



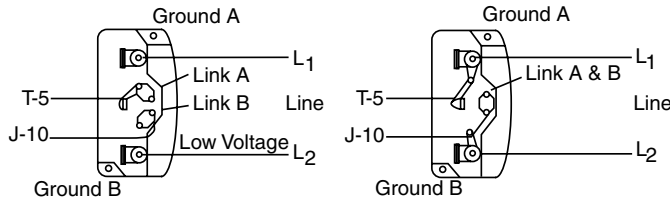
When ground is required, attach to ground A or B with no. 6 thread forming screw. To reverse, interchange T-1 and T-4.

2 Speed, 2 Winding, Single Phase Motor



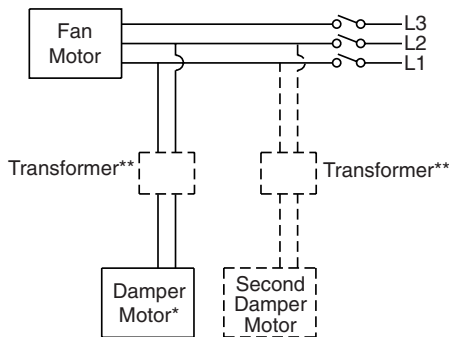
When ground required, attach to ground A or B with No. 6 thread forming screw. To reverse, interchange T-1 and T-4 leads.

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 L₁ and L₂. For single phase application, disregard L₃. *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.

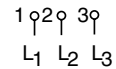
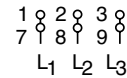
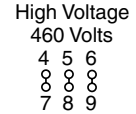
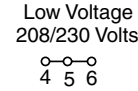
Final Installation Steps

- Inspect fasteners and setscrews, particularly fan mounting and bearing fasteners, and tighten according to the recommended torque shown in the table below, *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**.

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.

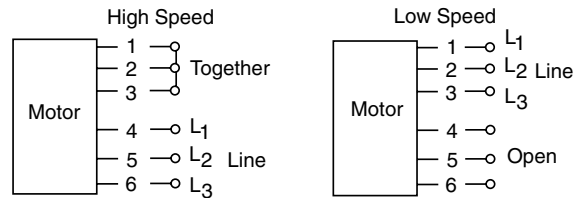
Wiring Diagrams

3 Phase, 9 Lead Motor



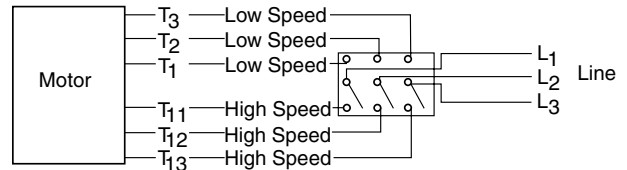
To reverse, interchange any 2 line leads.

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 T₁₁ and T₁₂. Low Speed-interchange leads T₁ and T₂. Both Speeds-interchange any 2 line leads.

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 the fan increases to full power.)
- Inspect motor wiring.
- Ensure the belt touches only the pulleys.
- Rotate the propeller to ensure it does not rub against the base.
- 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.
- 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.

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 5.

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 the chart 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.

WARNING

Disconnect power before checking and cleaning filters. Inadvertent operation of the fan could pull objects from the roof into the propeller.

Filter

If you fan is not supplied with filters proceed to *Maintenance*.

Inspect filters within the first two weeks of operation. If there is no excessive build-up, monthly servicing should be adequate.

To clean reusable aluminum filters, back flush with soap and water. When clean, shake off excess water and allow the filter to air-dry before reinstalling it.

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.

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

It is recommended the following inspections be conducted twice per year.

- Inspect bolts and setscrews for tightness. Tighten as necessary.

- Inspect belt wear and alignment. Replace worn belts with new belts and adjust alignment as needed. See *Belt and Pulley Installation*, page 2.
- Bearings should be inspected as recommended in the *Conditions Chart*.
- Inspect for cleanliness. Clean exterior surfaces only. Removing dust and grease on motor housing assures proper motor cooling.

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 air-stream 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 propeller roof fans with motors up to and including 5HP are equipped with variable pitch pulleys. To change the fan speed, perform the following:

- a. Loosen setscrew on driver (motor) pulley and remove key, if equipped.
- b. 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.
- c. 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

- a. Clean the motor and fan shafts.
- b. Loosen the motor plate mounting bolts to relieve the belt tension. Remove the belt.
- c. 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.

- d. Clean the bores of the pulleys and place a light coat of oil on the bores.
- e. Remove grease, rust and burrs from the shaft.
- f. 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.
- g. After the pulleys have been correctly placed back onto their shafts, tighten the pulley setscrews.
- h. Install the belts on the pulleys. Align and adjust the belts to the proper tension as described in *Belt and Pulley Installation*, page 2.

Bearing Replacement

The fan bearings are pillow block ball bearings.

- a. Remove the top cap to gain access to the fan.
- b. Loosen the motor plate mounting bolts and remove the drive belts.
- c. Remove the propeller from the shaft.
- d. Remove the four (4) bearing hold-down bolts and then remove the shaft and bearings from the fan as an assembly.
- e. Measure and record the location of the bearings on the shaft. This will aid the reassembly.
- f. Loosen the bearing setscrews and remove the bearings from the shaft.

- g. Remove any imperfections in the shaft using a smooth file or emery cloth.
- h. Place new bearings on the shaft.
 - i. Locate one of the bearings using the previous measurements and tighten one setscrew.
 - j. Install the propeller on the shaft. Center the propeller in the opening and tighten the bearing bolts.
 - k. Rotate the propeller to allow the bearings to find their center of free movement.
 - l. Align the bearing setscrews and tighten to proper torque. Refer to the *Torque chart* on page 2.
- m. Reassemble drive assembly and replace top cap.

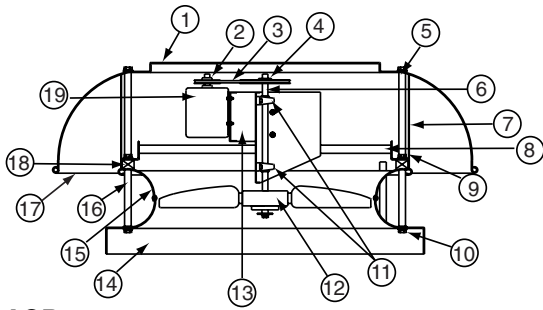
Propeller and Shaft Replacement Precautions

- 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.

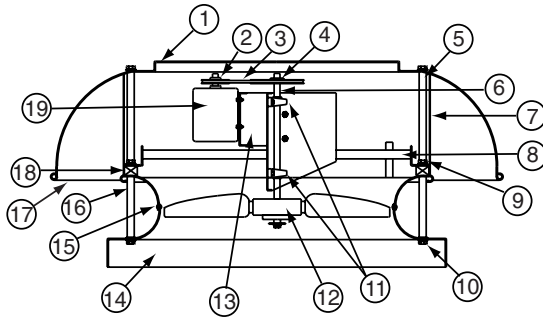
Troubleshooting

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

AQB/SEP Parts List



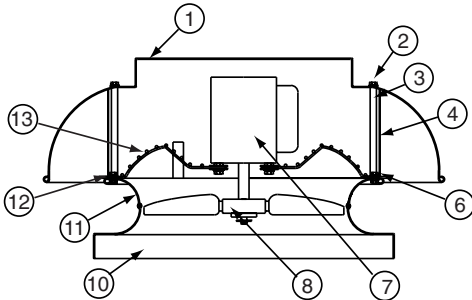
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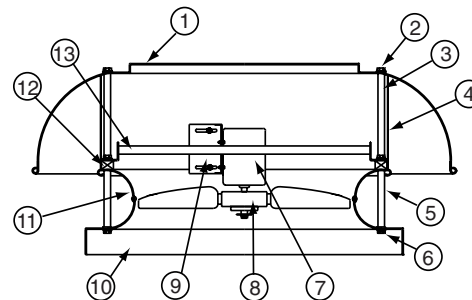
SEP

Parts No.	Description				
	Size 24	Size 30	Size 36	Size 42	Size 48
1	Baffle		Baffle		
2	Driver Sheave		Driver Sheave		
3	Belt Set		Belt Set		
4	Driven Sheave		Driven Sheave		
5	Upper Post (4)		Upper Post (8)		Upper Post (8)
6	Shaft		Shaft		
7	Birdscreen		Birdscreen		
8	Power Assembly		Power Assembly		
9	3/8" Nut (4)		3/8" Nut (8)		
10	3/8" Bolt (4)		3/8" Bolt (8)		
11	Bearings (2)		Bearings (2)		
12	Cast Propeller Assembly		Cast Propeller Assembly		
13	Motor Plate		Motor Plate		
14	Base		Base		
15	Venturi		Venturi		
16	Lower Posts(4)		Lower Post (4)		
17	Baffle Brake		Baffle Brake		
18	Isolators (4)		Isolators (4)		
19	Motor		Motor		

AQD Parts List



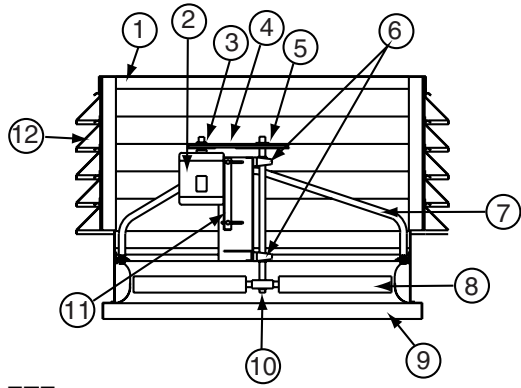
Size 12



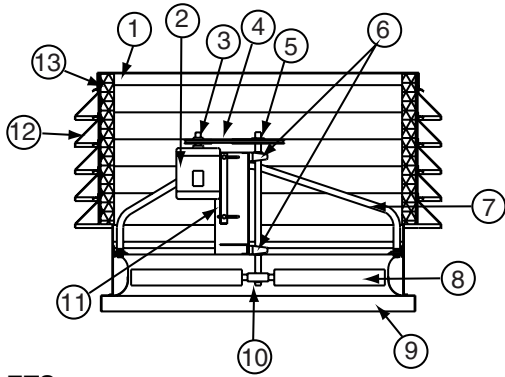
Size 16-24

Parts No.	Description			
	Size 12	Size 16	Size 20	Size 24
1	Baffle		Baffle	
2	5/16" Bolt (12)		5/16" Bolt (12)	
3	Upper Post (4)		Upper Post (4)	
4	Birdscreen		Birdscreen	
5	—		—	Lower Post (4)
6	5/16" Nut (4)		5/16" Nut (4)	
7	Motor		Motor	
8	Propeller		Propeller	
9	—	Motor Plate		Motor Plate
10	Base		Base	
11	Venturi		Venturi	
12	Isolator (4)		Isolator (4)	
13	Power Assembly		Power Assembly	

ETE/ETS Parts List



ETE



ETS

Parts No.	Description	
	ETE Sizes 24-60	ETS Sizes 24-60
1	Top Cap	Top Cap
2	Motor	Motor
3	Driver Sheave	Driver Sheave
4	Belt Set	Belt Set
5	Driven Sheave	Driven Sheave
6	Bearings (2)	Bearings (2)
7	Power Assembly	Power Assembly
8	Propeller	Propeller
9	Base	Base
10	Shaft	Shaft
11	Motor Plate	Motor Plate
12	Tiered Hood	Tiered Hood
13	—	Filters

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.

LOREN COOK COMPANY

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www.lorencook.com

AQ/SEP/ETE/ETS IOM - January1999