

INSTALLATION, OPERATING AND MAINTENANCE INSTRUCTIONS
MODEL LIDA — DIRECT DRIVE, MODEL LIBA — BELT DRIVE
TUBEAXIAL EXHAUST OR SUPPLY

CARNES COMPANY, 448 S. Main St., P. O. Box 930040, Verona, WI. 53593-0040 Phone:608/845-6411 Fax: 608/845-6470 carnes@carnes.com www.carnes.com

CAUTION!

DO NOT INSTALL, USE OR OPERATE THIS EQUIPMENT UNTIL THIS MANUAL HAS BEEN READ AND UNDERSTOOD.
READ AND SAVE THESE SHEETS FOR FUTURE USE.

INTRODUCTION

This manual is to be used as an aid in the proper installation, operation, and maintenance of the above Carnes fans.

This information is to be used as a general guide. Due to the variety and complexity of many installations, it is the responsibility of the purchaser to assure that qualified personnel handle these procedures.

SHIPMENT AND RECEIVING

Prior to shipment, all fans have been thoroughly inspected and tested.

All equipment shipped from Carnes is boxed or crated to fully comply with trucking requirements. Inspect the unit for damage upon delivery. If the unit has been damaged in transit, it is the responsibility of the recipient to file all freight claims.

HANDLING

Handle your equipment with caution. Avoid severe jarring or dropping of the unit. Some fans are provided with lifting lugs or holes for easy handling. Others must be handled using nylon straps which protect the fan's coating and housing. Spreader bars should be used with lifting large parts. Fans should be lifted using straps around the fan housing only. **DO NOT** lift fans by the motor, motor base, prop or flanges.

STORAGE

If fans are stored for any length of time, they should be stored in a clean, dry location to prevent rust and corrosion. *Outdoor storage is not recommended.* When outdoor storage is necessary, they should be protected from elements. Cover the fan inlet and outlet. Keep motor dry and clean.

For extended storage (more than 3 months), motor shaft and bearings should be rotated monthly. If stored greater than 6 months, motor bearings and/or fan bearing should be purged and replaced with compatible grease. Storage records should be kept to assure proper maintenance.

If unit is to be left idle for an extended period, (especially over summer months), it is recommended that belts be removed and stored in a cool, dry place to avoid premature belt failure.

MECHANICAL INSTALLATION CAUTIONS

1. Do not operate this fan in an environment where combustible or flammable materials, gasses, or fumes are present unless it has been specifically designed and manufactured for use in that environment.
2. Turn the axial blade by hand to check clearances. If necessary on belt driven unit, adjust the blade/shaft/motor bearing position as required to achieve necessary clearances. On direct drive units, adjust the blade by moving the motor to center on the blade in the inlet venturi, and if necessary, slide the blade on the motor shaft.
3. Ensure that all fasteners and setscrews are tight.

ELECTRICAL INSTALLATION CAUTIONS

1. Be sure the supply voltage matches the motor nameplate voltage. On multiple voltage motors, check the motor wiring to ensure that the motor has been wired for the correct voltage.
2. All fans must be grounded.
3. Keep all wiring clear of rotating components and moving parts such as gravity or motorized dampers.
4. Make sure the power is locked OFF at the service entrance prior to wiring or otherwise approaching the fan.
5. A qualified electrician must do all electrical work in accordance with local and/or the National Electrical Code (NEC).

INSTALLATION OF TUBEAXIAL FANS

1. This fan can be used in supply or exhaust applications.
2. Mounting brackets are available (optional) welded to the fan housing for floor mounting, sidewall mounting or ceiling mounted units. Units may be hung in vertical or horizontal position.
3. Guards must be installed when fan is within reach of personnel, or within (7) seven feet of working level, or when discerned advisable for safety.
4. When using mounting brackets, attach the spring or RIS isolators to the brackets. Be sure all fasteners are securely tightened.
5. Join the fan to the duct using any suitable flexible connector. Flexible connectors should overlap the fan and duct sufficiently to assure against leaks.

MECHANICAL INSTALLATION CAUTIONS

1. Be sure the fan inlet, outlet, and the ductwork are open and free of loose objects.
2. Be sure all personnel are clear of fan rotating parts prior to start-up.

START-UP

Operate the fan under power briefly in order to check for proper rotation. Incorrect fan rotation will cause the motor to over-heat and seriously impede fan operation.

MAINTENANCE CAUTIONS

Before performing any maintenance on the fan, be sure the power is locked **OFF** at the service entrance.

MAINTENANCE

Fans should be carefully checked at least once a year. For critical or rugged applications, a routine check should be done every 2 or 3 months.

1. A periodic motor check should consist of spinning the motor shaft with the power **OFF** to be sure the motor turns freely and the bearings run smoothly. The belt on belt driven units should be removed from the sheave. Check the axial blade motor shaft setscrew to ensure tightness on direct drive units.
2. When removing or installing a belt, do not force the belt over the sheave. Loosen the motor mount so that the belt can be easily slipped over the sheave.
3. The belt on belt driven units should be removed and carefully checked for radial cracks, ply separation or irregular wear. A small irregularity in the contact surface of the belt will result in noisy operation. If any of the defects are apparent, the belt should be replaced. Check the sheave also for chipping, dents or rough surfaces which could damage the belt.
4. The correct belt tension is important. Too tight will result in excess bearing pressure on the motor bearings and shaft pillow blocks, and may overload the motor. Too loose a belt will result in slippage which will quickly "burn" out belts. A belt should feel "live" when thumped approximately 1/4" belt deflection when subjected to finger pressure (3 to 5 lbs.) at midpoint between sheaves.
5. The belt alignment should also be checked to be sure the belt is running perpendicular to the rotating shafts. Motor and drive shafts must be parallel. Improper alignment will result in excessive belt wear.
6. Check sheave set screw to ensure tightness. Proper keys must be in the keyways.
7. **DO NOT ADJUST** blade pitch or fan RPM. If sheaves are replaced, use only sheaves of identical size and type.
8. Do not readjust variable pitch sheave without checking motor amps. Do not readjust variable pitch sheaves above the maximum catalog RPM for unit and motor.

9. If adjustment of two groove variable pitch sheaves is required, each sheave must be opened or closed at the same number of turns. Improper adjustment can cause excessive belt wear and premature failure.
10. The standard pillow block bearings on belt driven ventilators are factory lubricated and are provided with external grease fittings. Relubrication annually or more frequently, if required, is recommended.
11. During the first few months of operation, it is recommended that the setscrews be checked to assure they are tight.
12. The rotating propeller requires particular attention in most applications. Since materials in the air are being handled, they can build up on the blades to cause destructive vibration, and may also corrode and/or erode the blade metal to weaken the structure of the propeller. Regular inspection and corrective action at intervals determined by the severity of each application are essential to good service, life, and safety.

BEARINGS AND LUBRICATION:

Most belt drive fan bearings are heavy duty, self-aligning ball type and are relubricable for continuous service. Bearings without grease fittings cannot and should not be relubricated.

Selection of the correct bearing grease and greasing intervals depends on several things. Extreme high or low temperatures, dirty or damp surroundings, and vibration exceeding 1 or 2 mils are all things that will require more frequent greasing or special greases. For standard service use lithium base grease that conforms to NLGI grade 2 consistency.

The motor bearings and the fan bearings on the belt drive fans should be greased at regular intervals. Motor manufacturers' greasing instructions and recommendations should be followed closely. Avoid the use of a pressure greasing system which tends to fill the bearing chamber completely. *Do not over grease.* Use only 1 or 2 shots with a hand gun in most cases. Maximum hand gun rating 40 P. S.I. Rotate bearings during lubrication where good safety practice permits. NOTE: On motors with non-greaseable sealed bearings, no lubrication is required for the life of the bearings.

Some of the most frequent causes of bearing failure is not greasing often enough, using an excessive quantity of grease, or using incompatible greases. Excessive vibration, especially if the bearing is not rotating, will also cause bearings to fail. Bearings also must be protected from water and moisture to avoid internal corrosion.

BEARING REPLACEMENT:

Fan bearings on belt drive fans should not need to be replaced for many years if the above recommendations are strictly adhered to. However, use the following procedure when bearing replacement is necessary.

1. Gain access to the fan bearings. Remove the bearing cover, if any.
2. Loosen the belts by shifting the motor.
3. Remove the propeller and disconnect the remote lube tubes (if applicable).
4. Measure the location of the bearing to the propeller end of the shaft and the bearing spacing.
5. Remove the shaft and bearing assembly. Note the position of the bearing's shims, (if applicable).
6. Loosen all bearing/shaft setscrews or other locking device.
7. Remove bearings (may have to be pressed off shaft).
8. Polish the shaft with fine emery paper (240 Grit or finer) and file the setscrew dimples flat.
9. Install new bearings on the shaft, making sure the collars are together. (i.e., facing each other on the shaft). Lightly seat one setscrew or eccentric locking collar on each bearing to hold in the approximate marked position.
10. Mount the shaft/bearing assembly in the fan, with bolts. Do not fully tighten bolts at this time. Loosen setscrew.
11. Center the shaft in the housing (both ends) as closely as possible. The fan propeller may need to be temporarily installed to get its clearances equal.
12. Tighten the bearing mounting bolts.
13. Reinstall the lube tubes (if applicable).
14. Install bearing cover, propeller, and belts, and adjust the motor to get proper belt tension. Also, make sure that the sheaves are properly aligned.
15. If a new shaft is supplied, then ignore items #6 through #8.

V-BELTS

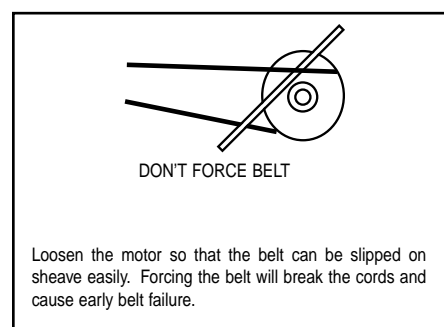
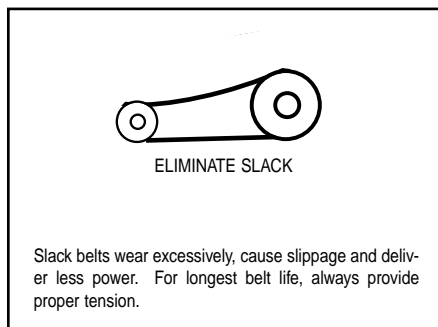
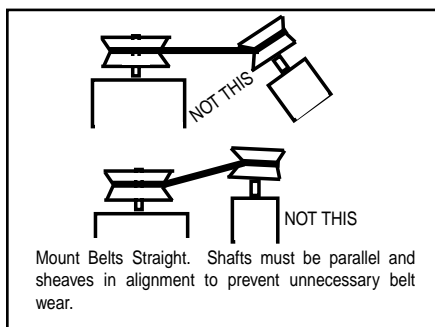
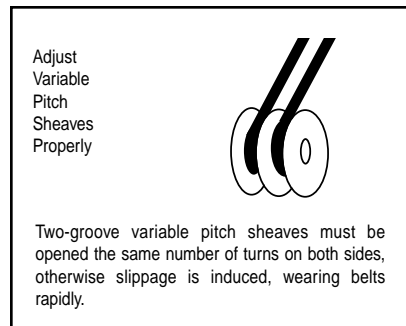
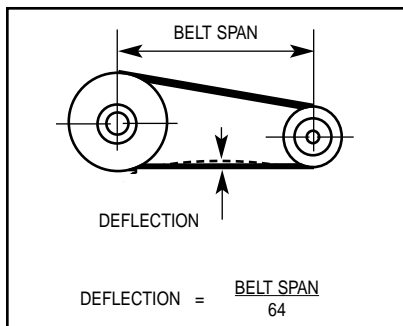
V-belts on these belt drive fans are oil, heat, and static resistant type, and oversized for continuous duty. With proper installation and maintenance, years of operating efficiency can be added to the life span of the V-belt drive.

The condition of V-belts and the amount of belt tension should be checked prior to start-up. When it becomes necessary to adjust belt tension, do not over tighten as bearing damage will occur. Recommended belt tension should permit 1/64" per inch of span deflection on the belt. On each side of the belt measure half-way between the pulley centerline to determine correct tension (see drawing below). Extreme care must be exercised when adjusting V-belt as not to misalign the pulleys. Misalignment will cause a sharp reduction in belt life and will also produce squeaky, annoying noises. On units equipped with 2 or 3 groove pulleys, adjustment must be made so that there is equal tension on all belts.

1. Where tensioning rods are not provided, adjustment is more easily obtained by loosening and adjusting one side of the motor bracket at a time.
2. Always loosen tension adjustment enough to place belts on sheaves without running belts over the edge of either sheave. A new belt may be seriously damaged internally by careless handling.

WARNING: Whenever belts are removed or installed, never force belts over pulleys without loosening motor first to relieve belt tension. The fan has been checked at the factory prior to shipment for mechanical noises. If mechanical noises should develop, then some suggestions are offered here as a guide toward remedying the cause.

1. Check rotating members for adequate clearance.
2. Check proper belt tension and pulley alignment.
3. Check installation and anchoring.
4. Check fan bearings.



MOTORS:

The fundamental principle of electrical maintenance is **KEEP THE MOTOR CLEAN AND DRY!** This requires periodic inspection of the motor. The frequency depends upon type of motor and the service.

We recommend periodic checks of voltage, frequency, and current of a motor while in operation. Such checks assure the correctness of frequency and voltage applied to the motor, and yield an indication of the fan load. Comparison of this data will give you an indication of the fan performance. Any serious deviations should be investigated and corrected.

Fractional motors usually have prelubricated sealed bearings with no grease fittings and are lubricated for life.

Lubricate integral horsepower motors per the motor manufacturer's recommendations. Lubrication frequency depends on the motor horsepower, speed, and service. Use compatible greases.

1. All motors carry a one year warranty from date of shipment. For repairs within the warranty period, the motor must be taken to the motor manufacturer's authorized service dealer. Contact your local Carnes representative for additional warranty details.
2. A periodic motor check should consist of spinning the motor shaft with the power OFF to be sure the motor turns freely and the bearings run smoothly. The belt on belt driven units should be removed from the motor pulley.

RECOMMENDED BALL AND ROLLER BEARING GREASES

SUGGESTED REGREASING INTERVALS

INTERVAL	TYPES OF SERVICE
1 - 2 YEARS	INFREQUENT OPERATION OR LIGHT DUTY IN CLEAN ATMOSPHERE
1 YEAR	8-15 HRS/DAY IN CLEAN, RELATIVELY DRY ATMOSPHERE
6 MONTHS	12-24 HRS/DAY, HEAVY DUTY, OR IF MOISTURE IS PRESENT
3 MONTHS	HEAVY DUTY IN DIRTY DUSTY LOCATIONS: HIGH AMBIENTS: MOISTURE LADEN ATMOSPHERE

CAUTION

Greases of different soap bases (lithium, sodium, etc.) may not be compatible when mixed. prevent such intermixing by completely purging the bearing of old greases.

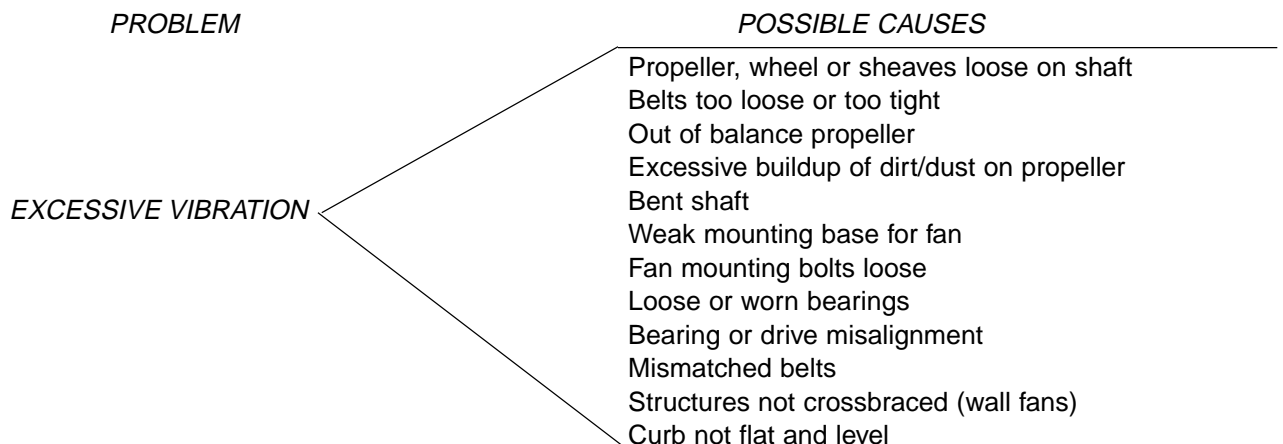
NOTE: Use regreasing intervals and grease as noted in tables, unless a lubrication plate on motor indicates otherwise. Refer to motor lubrication plate for specific type and/or grade of lubricant to be used. *Example:*

MANUFACTURER	GREASE (NLGI No. 2)
U. S. Electric Motors	Grease No. 83343
Chevron U. S. A., Inc.	Chevron SRI Grease No. 2
Mobile Oil Corp.	Moblux 2
Texaco, Inc.	Premium BRB No. 2

REPAIR PARTS:

1. **Belts** - use only belts of the same type and size furnished.
2. **Bearings** - Replacement adaptor bearing units are available from trade channels for installation in pillow block housing when required.
3. **Fan** - Blades - Repair of individual fan blades or propeller assemblies *is not* recommended. Contact factory with blade size, number of blades, bore size, motor HP, airflow direction, rotation, fan RPM or sheave sizes and any ordering/tag information that is available for replacement.
4. **Misc. Parts** - Not available from local trade channels should be returned for repair or replacement. Be sure to obtain return tags or authorization before shipment.
5. **Electric Motors** - Repair or replacement of motors is normally performed by a repair station authorized by the manufacturer. Contact your local Carnes representative or the factory for locations nearest to you. **DO NOT SHIP** motor to the factory without specific authorization forms.

FAN TROUBLE SHOOTING CHART



FAN TROUBLE SHOOTING CHART *(Continued)*

<i>PROBLEM</i>	<i>POSSIBLE CAUSES</i>
<i>EXCESSIVE HORSEPOWER</i>	Static pressure higher than design Propeller, wheel or rotating in wrong direction Fan speed higher than design
<i>TOO LITTLE AIR</i>	Restricted fan inlet or outlet Filters are dirty or clogged Propeller or wheel rotating in the wrong direction System is more restrictive (more static pressure) than expected Fan speed lower than design Inlet or outlet screens clogged
<i>TOO MUCH AIR</i>	Filter not in place Fan speed higher than design System less restrictive (less static pressure) than expected
<i>EXCESSIVE NOISE</i>	Propeller, wheel or sheaves loose Bearing or drive misalignment Accumulation of material on propeller Worn or corroded propeller Propeller or wheel out of balance Propeller or wheel hitting housing Bent Shaft Defective or bad bearings Bearings need lubrication Loose bearing bolts Loose or worn bearings Mismatched belts Belts too loose or too tight Belts oily or dirty Belts worn Loose fan mounting bolts Rattle of components in high velocity airstream Electrical noise Noise from high velocity air stream Vibrating parts not isolated from building Vibrating duct work (VSBB Model Only)

It is recommended that the users and installers of this equipment familiarize themselves with AMCA Publication #201, "Fans and Systems", and AMCA Publication #202 "Trouble-Shooting", which are published by Air Movement and Control Association, 30 West University Drive, Arlington Heights, Illinois, 60004.

"Due to ongoing research and development CARNES reserves the right to change specifications without notice"
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