

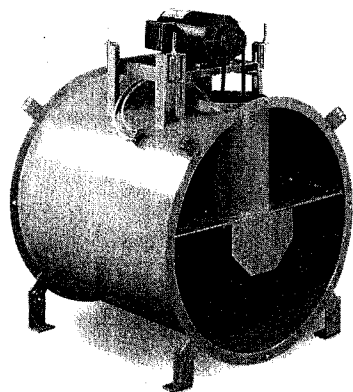
READ AND SAVE THESE INSTRUCTIONS



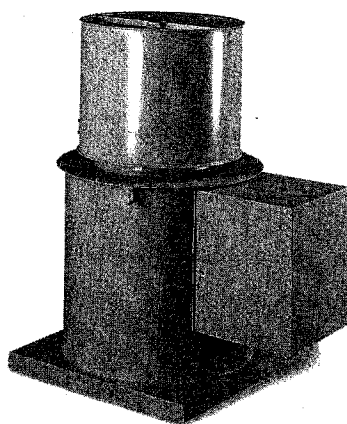
TCB
TCBRU
TCBRS

Tubular Centrifugal Inline Fan
Centrifugal Upblast Fan
Centrifugal Roof Supply Fan

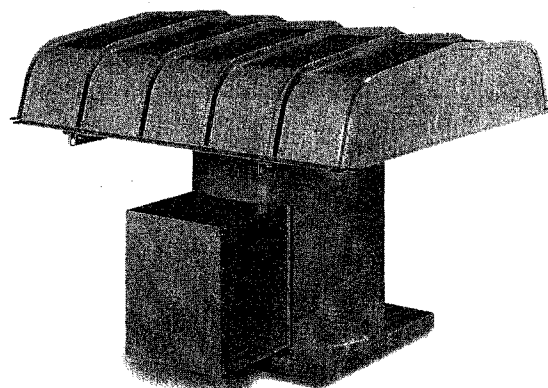
Installation Operation and Maintenance Manual



TCB Inline
Level 1 & 2



TCBRU Roof Upblast
Level 1 & 2



TCBRS Roof Supply
Level 1 & 2

RECEIVING

Greenheck models TCB, TCBRU, and TCBRS are thoroughly inspected and test run at the factory. Items such as proper wheel alignment, balance, vibration and workmanship are analyzed by quality control personnel using state-of-the art equipment. However, damage may occur during handling and shipping. Therefore, it is important that the unit be carefully inspected for visible and concealed damage before beginning installation. In addition, check to see that all accessory items are accounted for.

REPORT ANY DAMAGED EQUIPMENT TO THE SHIPPER IMMEDIATELY!

HANDLING

Fans are to be rigged by either the lifting brackets provided or by the skid when a forklift is used. All TCB Inline models have mounting brackets located at the ends of the fan housing with which slings can be attached (Fig. 1). All TCBRU Roof Upblast models can be lifted by lifting lugs located above the motor cover of the fan (Fig. 2). All TCBRS Roof Supply fans can be lifted by lugs located on the hood rails (Fig. 3).

Fans should **NOT** be lifted by the shaft, housing, motor, belt guard, or any accessories.

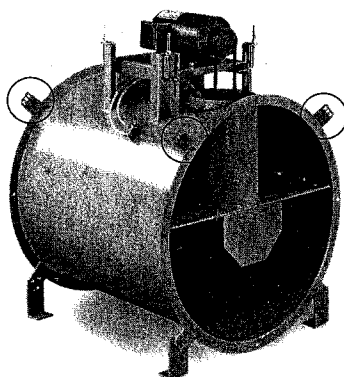


Fig. 1

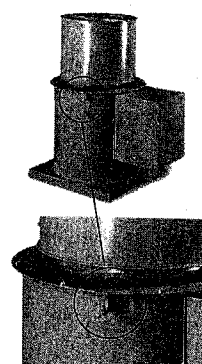


Fig. 2

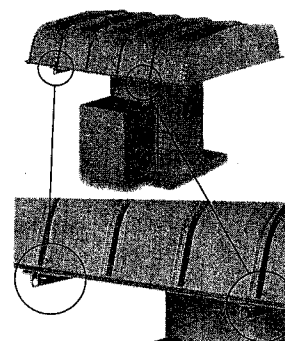


Fig. 3

STORAGE - Indoor and Outdoor

When a fan is to be stored for a period of time, it must be protected from dirt and moisture. Use of a tarp to cover the unit will aid in keeping it clean and dry, but avoid using a black plastic tarp as it will promote condensation. Improper storage which results in damage to the fan will void the warranty. If the storage period is lengthy, the wheel and motor should be rotated periodically and the bearings purged with fresh grease. In humid, dusty, or corrosive atmospheres, rotate the fan and purge the bearings once a month. Under normal conditions, this procedure should be repeated once every three months.

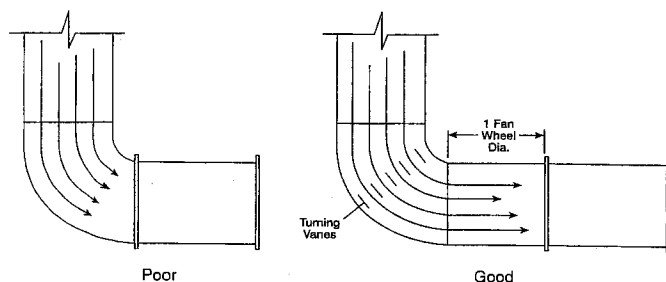
INSTALLATION

EFFECT OF INSTALLATION ON PERFORMANCE

Any installation with inlet or discharge configurations that deviate from these recommendations may result in reduced fan performance. Restricted or unstable flow at the fan inlet can cause pre-rotation of incoming air or uneven loading of the fan wheel yielding large system losses and increased sound levels. Free discharge or turbulent flow in the discharge ductwork will also result in system effect losses.

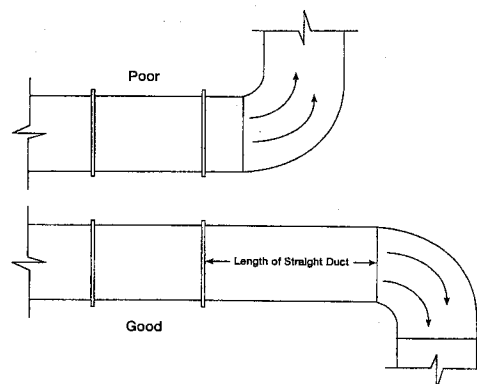
The most common inlet and discharge conditions which affect fan performance are:

INLET DUCT TURNS



Installation of a duct turn or elbow too close to the fan inlet reduces fan performance because air is loaded unevenly into the fan wheel. To achieve full fan performance there should be at least one to two fan wheel diameters between the turn or elbow and the fan inlet.

DISCHARGE DUCT TURNS

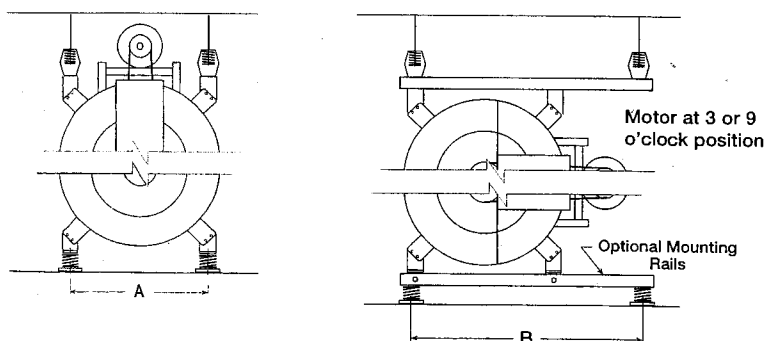


Fan performance is reduced when duct turns are made immediately off the fan discharge. To achieve cataloged fan performance, there should be at least one equivalent duct diameter of straight ductwork between the fan discharge and any duct turns.

TYPICAL INSTALLATIONS

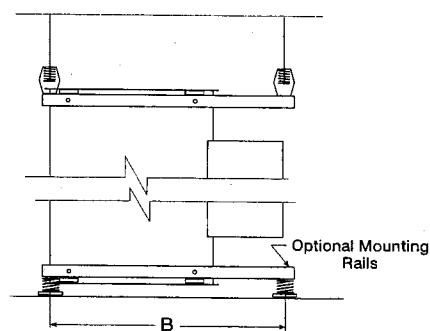
Following are typical mounting installations for models TCB (horizontal or vertical mounting), TCBRU, and TCBRS. For TCB's with motor in the 3 or 9 o'clock position or vertical installations, additional mounting rails are recommended. Mounting rail dimensions are shown for field fabrication.

Horizontal Ceiling Hung



Horizontal Base Mount

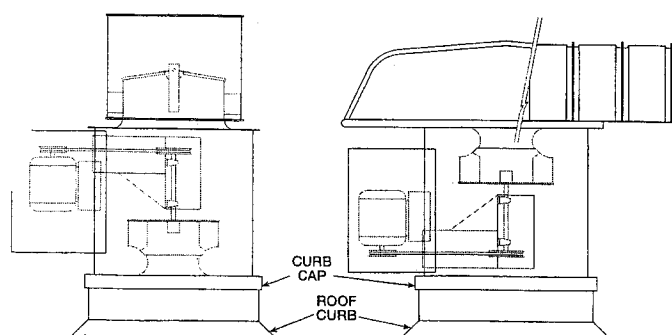
Vertical Ceiling Hung



Vertical Base Mount w/ airflow up or down

Mounting Hole Location

Fan Size	A	B	Depth*	Roof Opening	
				TCBRU	TCBRS
9	17 1/2	26	18 3/8	14 x 14	16 x 16
10	17 1/2	26	18 3/8	14 x 14	16 x 16
12	17 1/2	26	18 3/8	14 x 14	16 x 16
13	19	28 1/2	19 7/8	16 x 16	18 x 18
16	21 3/4	33	23 7/8	18 x 18	22 x 22
18	26 1/4	37	26 3/8	20 x 20	28 x 28
22	30 1/2	44	29 5/8	24 x 24	34 x 34
24	35	50	33 1/8	26 x 26	40 x 40
30	42	56	42 5/8	32 x 32	46 x 46
36	46 3/4	62	48 1/8	38 x 38	52 x 52



OPERATION

ELECTRICAL CONNECTIONS

Before electrical connections are made, the supply voltage, phase and ampere capacity must be checked for compatibility with the fan motor. In addition, the supply wiring must be properly fused and conform to local and national electrical codes.

The supply wires are then connected to an **optional** safety disconnect switch (if supplied) or wired directly to the motor.

PRE-START UP CHECKS

1. Check all fasteners for tightness.
2. The wheel should be aligned as shown in Fig. 4. Although the wheel position is preset and the unit is test run at the factory, movement may occur during shipment.

The radial gap should be consistent at all locations between the centrifugal wheel and the inlet cone. Centering may be accomplished by loosening the inlet cone bolts and repositioning the inlet cone.

To obtain the optimum performance, the centrifugal wheel must overlap the inlet cone. Adjustments can be made by loosening the set screws in the wheel and moving the wheel to the desired position.

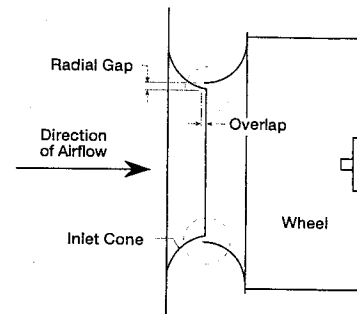


Fig. 4

3. Wheel rotation should be in the same direction as the rotation decal affixed to the unit. For 3-phase installations, fan rotation can be reversed by simply interchanging any two of the three electrical leads. For single phase installations, follow the wiring diagram located on the motor.

Adjustable motor pulleys are preset at the factory for the specified fan RPM. Fan speed can be increased by closing or decreased by opening the adjustable pulley. Two or three groove variable pitch pulleys must be adjusted an equal number of turns open or closed.

Note: Any increase in fan speed represents a substantial increase in horsepower required from the motor. Always check motor load amperage and compare to name plate rating when changing fan speed.

MAINTENANCE

WARNING

DISCONNECT AND SECURE TO THE "OFF" POSITION ALL ELECTRICAL POWER TO THE FAN PRIOR TO INSPECTION OR SERVICING. FAILURE TO COMPLY WITH THIS SAFETY PRECAUTION COULD RESULT IN SERIOUS INJURY OR DEATH.

Once the fan has been put into operation, a periodic maintenance program should be set up to preserve the reliability and performance of the fan. Items to be included in this program are:

- BEARINGS
- BELTS
- FASTENERS
- SET SCREWS
- MOTORS
- REMOVAL OF DUST/DIRT

BEARINGS

Bearings are the most critical moving part of the fan and should be inspected at periodic intervals. Locking collars and set screws, in addition to fasteners attaching the bearing to the bearing plate, must be checked for tightness. In a clean environment and temperature above 32°F and below 200°F, fan shaft bearings with grease fittings should be lubricated semi-annually using a high quality lithium based grease. If unusual environmental conditions exist such as temperatures below 32°F and above 200°F, moisture or contaminants, more frequent lubrication is required.

With the unit running, add grease very slowly with a manual grease gun until a slight bead of grease forms at the seal. Be careful not to unseat the seal by over lubricating or using excessive pressure. Bearings without grease fittings are lubricated for life.

BELTS

Premature belt failures are frequently caused by improper belt tension (either too tight or too loose) or misaligned pulleys. The proper tension for operating a V-belt is the lowest tension at which the belts will not slip at peak load conditions. For initial tensioning, the belt deflection half-way between pulley centers is $1/64$ " for each inch of belt span. For example, if the belt span is 64 inches, the belt deflection should be one inch using moderate thumb pressure at midpoint of the drive. See Fig. 5.

Check belt tension two times during the first 24 hours of operation and periodically thereafter. To adjust belt tension, simply loosen four fasteners (two on each side of the motor plate) and slide the motor plate away from the fan shaft until proper belt tension is attained. On some fans, fasteners attaching the motor to the motor plate must be loosened in order to adjust the belt.

It is very important that the drive pulleys remain in proper alignment after adjustments are made. Misalignment of pulleys will result in premature belt wear, noise, vibration and power loss. See Fig. 6.

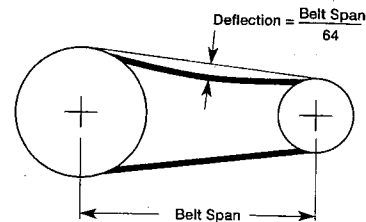


Fig. 5

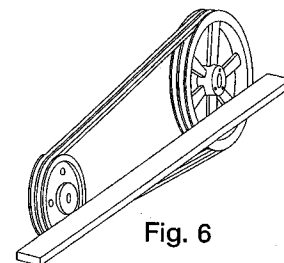


Fig. 6

FASTENERS AND SET SCREWS

A periodic inspection should include checking all fasteners and set screws for tightness. Particular attention should be paid to set screws attaching the propeller to the shaft and the shaft to the bearings. Loose bearing set screws will lead to premature failure of the fan shaft.

MOTORS

Many fractional horsepower motors installed on the smaller fans are lubricated for life and require no further attention. Motors supplied with grease fittings should be greased according to directions printed on the motor.

REMOVAL OF DUST AND DIRT

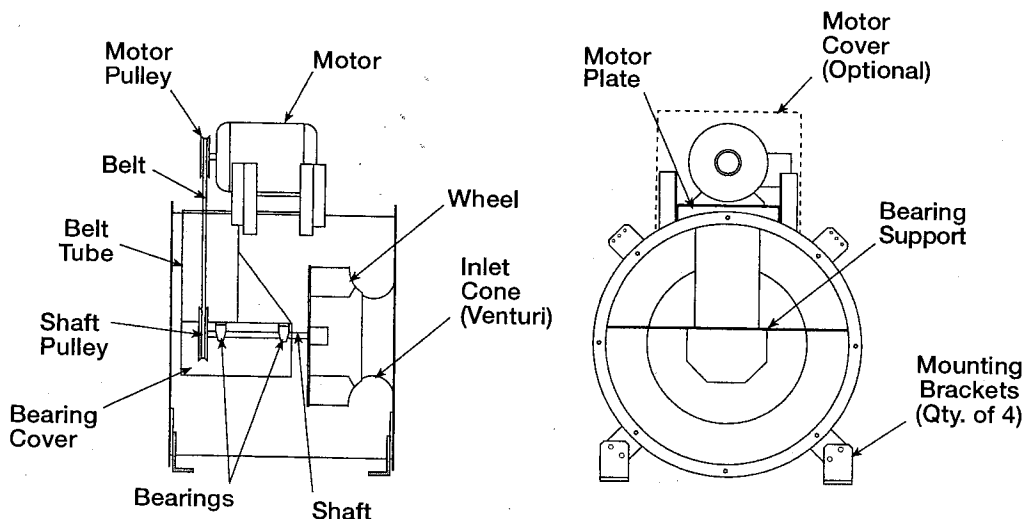
Dirt clogs cooling openings on the motor housing, contaminates bearing lubricant, and collects on the impeller causing severe imbalance if left unchecked. The exterior surface of the motor and impeller should be thoroughly cleaned periodically. Use caution and do not allow water or solvents to enter the motor or bearings. Under no circumstances should motors or bearings be sprayed with steam or water.

PERIODIC INSPECTION AND SERVICE (Model TCBRU Level 1 or 2)

Impeller dampers should be inspected for proper operation at each service interval. Check for freedom of movement and general condition of the damper blades and hinge rods.

PARTS LIST

Each fan bears a manufacturer's nameplate with model number and serial number embossed. This information in addition to the parts list shown will assist the local Greenheck representative and the factory in providing service and replacement parts.



WARRANTY

Greenheck warrants this equipment to be free from defects in material and workmanship for a period of one year from the base date. Any units or parts which prove to be defective during the warranty period will be repaired at our option or returned to our factory, transportation prepaid.

A motor is warranted by the motor manufacturer for a period of one year. Should the motor prove defective during this period, it should be returned to the nearest authorized motor service station.

Greenheck will not be responsible for any installation or removal costs.

MAINTENANCE

Belts tend to stretch after a period of time. They should be checked periodically for wear and tightness. When replacing belts, use the same type as supplied with the unit. Matched belts should always be used on units with multigroove pulleys. For belt replacement, loosen the tensioning device far enough to allow removal of the belt by hand. Do not force belts on or off. This may cause cords to break, leading to premature belt failure. Once installed, adjust belts as shown in "Pre-Starting Checks."

Shaft bearings can be classified in two groups: relubricating and non-relubricating. All bearings on standard Model GB fans are factory lubricated and require no further lubrication under normal use (between -20°F and 180°F in a relatively clean environment). Units installed in hot, humid or dirty locations should be equipped with special bearings. These bearings will require frequent lubrication. Caution should be employed to prevent overpacking or contamination. Grease fittings should be wiped clean. The unit should be in operation while lubricating. Extreme care should be used around moving parts. Grease should be pumped in very slowly until a slight bead forms around the seal. A high grade lithium base grease is recommended.

Motor maintenance is generally limited to cleaning and lubrication (where applicable). Cleaning should be limited to exterior surfaces only. Removing dust buildup on motor housing ensures proper motor cooling. Greasing of motors is only intended when fittings are provided. Many fractional hp motors are permanently lubricated and should not be lubricated further. Motors supplied with grease fittings should be greased in accordance with manufacturers' recommendations. Where motor temperatures do not exceed 104°F (40°C), the grease should be replaced after 2000 hours of running time as a general rule.

Wheels require very little attention when moving clean air. Occasionally, oil and dust may accumulate causing imbalance. When this occurs, the wheel and housing should be cleaned to ensure smooth and safe operation.

The unit should be made non-functional when cleaning the wheel or housing (fuses removed, disconnect locked off, etc.).

All fasteners should be checked for tightness each time maintenance checks are performed prior to restarting unit.

A proper maintenance program will help these units deliver years of dependable service.

TROUBLESHOOTING

PROBLEM	CAUSE	CORRECTIVE ACTION
REDUCED AIR FLOW	System resistance too high.	Check system: Proper operation of backdraft or control dampers, obstruction in ductwork, etc.
	Unit running backwards.	Correct as shown in Fig. 4.
	Excessive dirt buildup on wheels.	Clean wheel.
	Improper wheel alignment.	Center wheel on inlets.
EXCESSIVE NOISE OR VIBRATION	Bad bearings.	Replace.
	Belts too tight or too loose.	Refer to Fig. 8 and adjust tension.
	Wheel improperly aligned and rubbing.	Center wheel on inlets (see Fig. 3).
	Loose drive or motor pulleys.	Align and tighten. See "Pre-Starting Checks."
	Foreign objects in wheel or housing.	Remove objects, check for damage or unbalance.
	Unbalance of wheel caused by excessive dirt and grease buildup.	Remove buildup.

Before taking any corrective action, make certain unit is not capable of operation during repairs.

GB/G FANS

<u>MARK</u>	<u>MODEL #</u>
EF 1-1 ✓	GB200HP-5
EF 1-4 ✓	GB-080D ✓
EF 1-2 ✓	GB-180-5
EF 1-3	GB-200-10

READ AND SAVE THESE INSTRUCTIONS

PN 453005



Model GB Belt Drive Centrifugal Roof Exhaust Fans

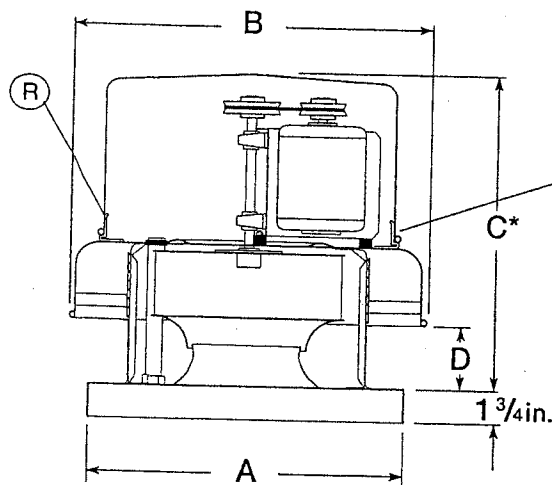
Installation, Operation and Maintenance Manual

Upon receiving unit, check for any damage and report it immediately to the shipper. Also check to see that all accessory items are accounted for.

Move fan to desired location and fasten securely through mounting holes in base. Shims may be necessary depending upon roofing material thickness. The diagram below shows dimensions for Model GB.

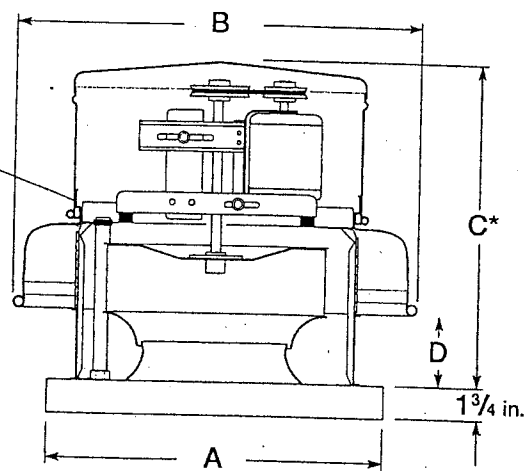
Access to the motor compartment is accomplished by removing the screws designated "R" in Fig. 1 and 2. The cover can then be removed and placed on a flat surface in an area protected from strong winds.

The motor's amperage and voltage ratings must be checked for compatibility to supply voltage prior to final electrical connection. For GB installations, the electrical supply should be routed through the conduit chase provided between the curb cap and the bottom of the motor compartment. Wiring must conform to local and national codes.



GB Sizes 070-130

Fig. 1



GB Sizes 141-540

Fig. 2

Model	A	B	C*	D	Damper	Roof Opening	Approx. Unit Wt.**
GB 070,080,090	17	21 ³ / ₄	20 ³ / ₄	4	10x10	12 ¹ / ₂ x12 ¹ / ₂	43
GB 101,101HP,121	19	24 ³ / ₈	23 ³ / ₄	4 ³ / ₈	12x12	14 ¹ / ₂ x14 ¹ / ₂	66
GB 131	19	28 ³ / ₈	23 ³ / ₄	4	12x12	14 ¹ / ₂ x14 ¹ / ₂	67
GB 141,141HP,161,161HP	22	28 ³ / ₈	23 ³ / ₄	4	16x16	18 ¹ / ₂ x18 ¹ / ₂	89
GB 180,180HP,200,200HP	30	35 ¹ / ₂	28	5 ¹ / ₂	18x18	20 ¹ / ₂ x20 ¹ / ₂	139
GB 220,220HP,240,240HP	34	42 ³ / ₄	31 ¹ / ₂	5 ³ / ₄	24x24	26 ¹ / ₂ x26 ¹ / ₂	159
GB 260,300,300HP	40	50	36	8 ¹ / ₄	30x30	32 ¹ / ₂ x32 ¹ / ₂	323
GB 330,360,360HP	46	58 ³ / ₄	38 ¹ / ₂	8 ³ / ₈	36x36	38 ¹ / ₂ x38 ¹ / ₂	406
GB 420	52	65 ¹ / ₄	44	9 ³ / ₄	42x42	44 ¹ / ₂ x44 ¹ / ₂	499
GB 480	58	73 ³ / ₄	47 ¹ / ₄	11 ¹ / ₄	48x48	50 ¹ / ₂ x50 ¹ / ₂	629
GB 500,540	64	83	50 ³ / ₄	14 ¹ / ₂	54x54	56 ¹ / ₂ x56 ¹ / ₂	755

*May be greater depending on motor.

**Weight shown is largest cataloged Open Drip Proof motor.

All dimensions are in inches.

Dimension "A" given is the inside dimension of the curb cap.

The roof curb should be 1-1/2 in. less than the curb cap to allow for roofing and flashing.

Pre-Starting Checks

Check all fasteners for tightness. The wheel should rotate freely and be aligned as shown in Fig. 3 (see page 2). Wheel position is preset and the unit is test run at the factory. Movement may occur during shipment, and realignment may be necessary. Centering can be accomplished by loosening the bolts holding the drive frame to the shock mounts and repositioning the drive frame. Wheel and inlet cone overlap can be adjusted by loosening the set screws in the wheel and motor.

2c

WHEEL OVERLAP DIMENSIONS

MODEL	GB
070-161	1/4 in.
180-240	3/8 in.
260-540	1/2 in.

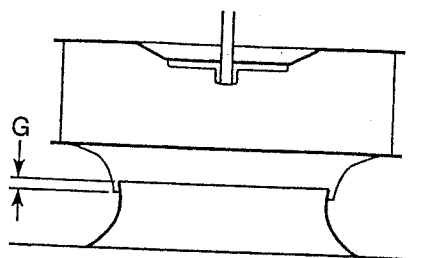


Fig. 3

WHEEL ROTATION

All GB fans have CW wheel rotation when viewed from top of fan.

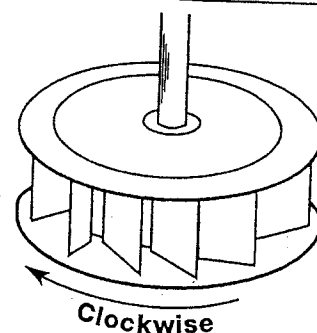


Fig. 4

Direction of wheel rotation is critical. Reversed rotation will result in poor air performance, motor overloading and possible burnout. Check wheel rotation (viewing from the shaft side) by momentarily energizing the unit. Rotation should be clockwise as shown in Fig. 4 and correspond to the rotation decal on the unit.

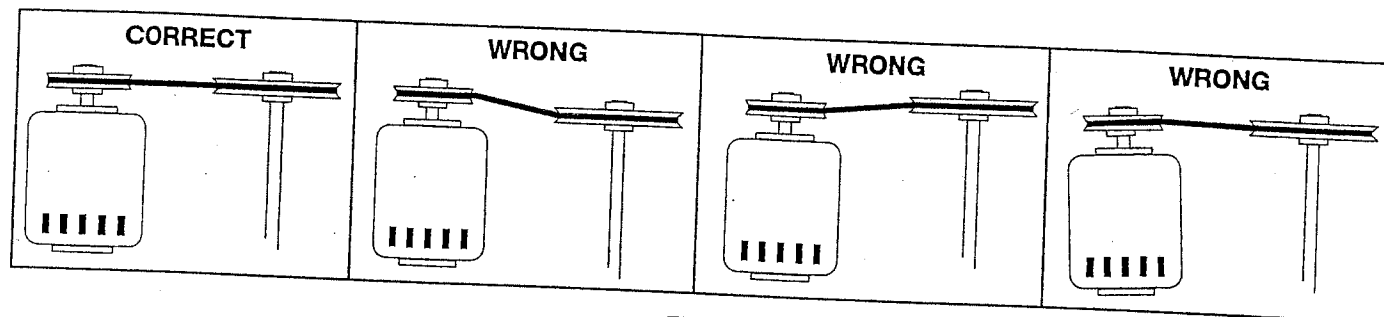


Fig. 5

If adjustments are made, it is very important to check the pulleys for proper alignment. Misaligned pulleys lead to excessive belt wear, vibration, noise and power loss (see Fig. 5).

Belt tension can be adjusted by loosening four fasteners (marked "R") on the drive frame. For GB 70-130 units, pull motor until desired tension is achieved and retighten bolts (see Fig. 6). For GB 140-540 units, the motor plate slides on the slotted adjusting arms and drive frame angles in the same manner (see Fig. 7). Belt tension should be adjusted to allow 1/64 in. of deflection per inch of belt span. For example, a 15 in. belt span should have 15/64 in. (or about 1/4 in.) of deflection with moderate thumb pressure at mid-point between pulleys (see Fig. 8). Over tightening will cause excessive bearing wear and noise. Too little tension will cause slippage at startup and uneven wear.

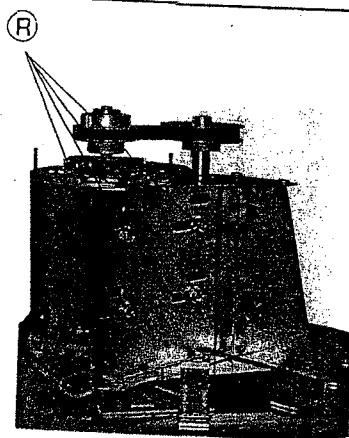


Fig. 6
GB 070-130

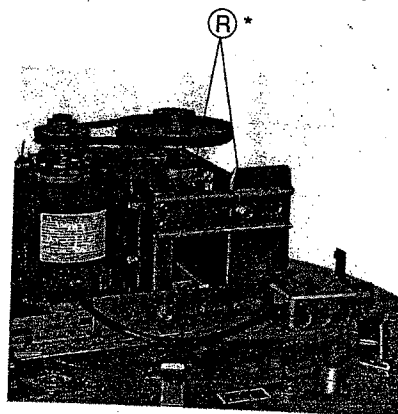


Fig. 7
GB 140-540

$$\text{Deflection} = \frac{\text{Belt Span}}{64}$$

* NOTE:
Identical
fasteners on
opposing side
must also be
loosened.

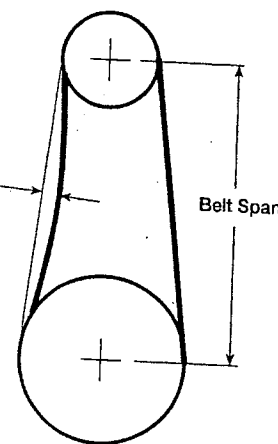


Fig. 8

The adjustable motor pulley is factory set for the RPM specified. Speed can be increased by closing or decreased by opening the adjustable motor sheave. Two groove variable pitch pulleys must be adjusted an equal number of turns open or closed. An increase in speed represents a substantial increase in the horsepower required by a unit. Motor amperage should always be checked to avoid serious damage to the motor when speed is varied.

MAINTENANCE

Belts tend to stretch after a period of time. They should be checked periodically for wear and tightness. When replacing belts, use the same type as supplied with the unit. Matched belts should always be used on units with multigroove pulleys. For belt replacement, loosen the tensioning device far enough to allow removal of the belt by hand. Do not force belts on or off. This may cause cords to break, leading to premature belt failure. Once installed, adjust belts as shown in "Pre-Starting Checks."

Shaft bearings can be classified in two groups: relubricating and non-relubricating. All bearings on standard Model GB fans are factory lubricated and require no further lubrication under normal use (between -20°F and 180°F in a relatively clean environment). Units installed in hot, humid or dirty locations should be equipped with special bearings. These bearings will require frequent lubrication. Caution should be employed to prevent overpacking or contamination. Grease fittings should be wiped clean. The unit should be in operation while lubricating. Extreme care should be used around moving parts. Grease should be pumped in very slowly until a slight bead forms around the seal. A high grade lithium base grease is recommended.

Motor maintenance is generally limited to cleaning and lubrication (where applicable). Cleaning should be limited to exterior surfaces only. Removing dust buildup on motor housing ensures proper motor cooling. Greasing of motors is only intended when fittings are provided. Many fractional hp motors are permanently lubricated and should not be lubricated further. Motors supplied with grease fittings should be greased in accordance with manufacturers' recommendations. Where motor temperatures do not exceed 104°F (40°C), the grease should be replaced after 2000 hours of running time as a general rule.

Wheels require very little attention when moving clean air. Occasionally, oil and dust may accumulate causing imbalance. When this occurs, the wheel and housing should be cleaned to ensure smooth and safe operation.

The unit should be made non-functional when cleaning the wheel or housing (fuses removed, disconnect locked off, etc.).

All fasteners should be checked for tightness each time maintenance checks are performed prior to restarting unit.

A proper maintenance program will help these units deliver years of dependable service.

TROUBLESHOOTING

PROBLEM	CAUSE	CORRECTIVE ACTION
REDUCED AIR FLOW	System resistance too high.	Check system: Proper operation of backdraft or control dampers, obstruction in ductwork, etc.
	Unit running backwards.	Correct as shown in Fig. 4.
	Excessive dirt buildup on wheels.	Clean wheel.
	Improper wheel alignment.	Center wheel on inlets.
EXCESSIVE NOISE OR VIBRATION	Bad bearings.	Replace.
	Belts too tight or too loose.	Refer to Fig. 8 and adjust tension.
	Wheel improperly aligned and rubbing.	Center wheel on inlets (see Fig. 3).
	Loose drive or motor pulleys.	Align and tighten. See "Pre-Starting Checks."
	Foreign objects in wheel or housing.	Remove objects, check for damage or unbalance.
	Unbalance of wheel caused by excessive dirt and grease buildup.	Remove buildup.

: Before taking any corrective action, make certain unit is not capable of operation during repairs.

READ AND SAVE THESE INSTRUCTIONS

PN 453149



Model G Direct Drive Centrifugal Roof Exhaust Fans

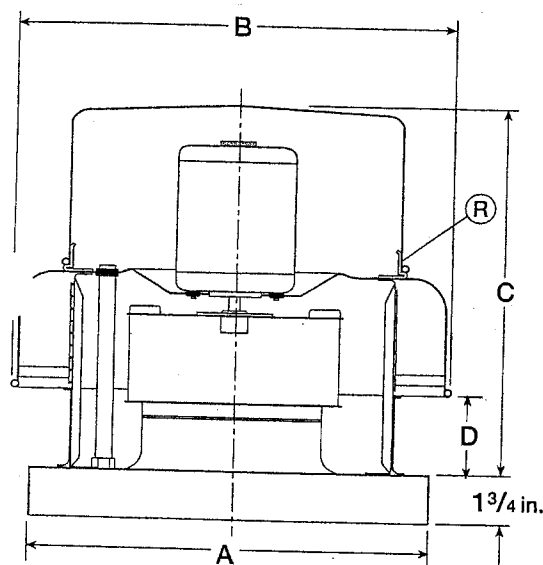
Installation, Operation and Maintenance Manual

Upon receiving unit, check for any damage and report it immediately to the shipper. Also check to see that all accessory items are accounted for.

Move fan to desired location and fasten securely through mounting holes in base. Shims may be necessary depending upon roofing material thickness. The diagram below shows dimensions for Model G.

Access to the motor compartment is accomplished by removing the screws designated "R" in the drawing below. The cover can then be removed and placed on a flat surface in an area protected from strong winds that could blow it off the roof.

The voltage rating of the motor must be checked for compatibility to supply voltage prior to final electrical connection. Electrical lead-in wires should be run through the conduit provided between the curb and the bottom of the motor compartment. Wiring must conform to local and national codes.



Model	A	B	C*	D	Damper	Roof Opening	Approx. Unit Wt.**
G 060,065,070,075	17	19 ^{3/8}	12 ^{1/8}	3	8x8	10 ^{1/2} x10 ^{1/2}	18
G 080,085,090,095	17	21 ^{3/4}	14 ^{5/8}	4	10x10	12 ^{1/2} x12 ^{1/2}	26
G 101,121	19	24 ^{5/8}	20	5 ^{1/16}	12x12	14 ^{1/2} x14 ^{1/2}	43
G 131,141	22	28 ^{7/8}	20	5 ^{1/16}	16x16	18 ^{1/2} x18 ^{1/2}	58
G 150	26	35 ^{1/2}	21 ^{1/8}	4	16x16	18 ^{1/2} x18 ^{1/2}	59
G 160,170	30	35 ^{1/2}	21 ^{5/8}	5 ^{1/2}	18x18	20 ^{1/2} x20 ^{1/2}	81
G 180	30	35 ^{1/2}	22 ^{3/4}	6 ^{3/8}	18x18	20 ^{1/2} x 20 ^{1/2}	118

*May be greater depending on motor.

**Weight shown is largest cataloged Open Drip Proof motor.

All dimensions are in inches.

Dimension "A" given is the inside dimension of the curb cap.

The roof curb should be 1-1/2 in. less than the curb cap to allow for roofing and flashing.

Pre-Starting Checks

Check all fasteners for tightness. The wheel should rotate freely and be aligned as shown below. Wheel position is preset and the unit tested at the factory. However, movement may occur during shipment, and realignment may be necessary. Centering (height alignment) may be accomplished by loosening the set screws in the wheel and moving the wheel to the desired position.

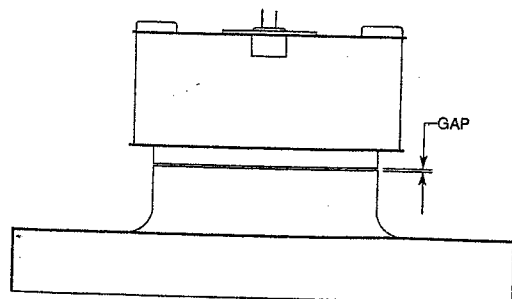
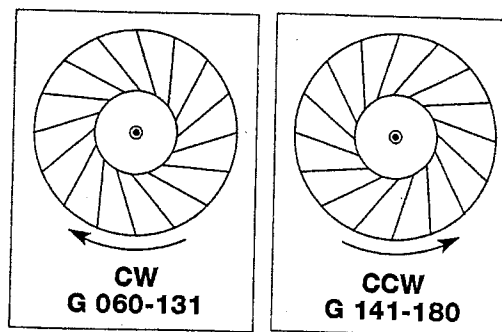


Fig. 1

Wheel Rotation

Direction of rotation is very critical. Improper rotation will result in excessive horsepower and possible motor burnout. Check rotation by energizing the unit only momentarily. The rotation should be as shown in the diagrams below and should be in the same direction as the rotation decals affixed to the unit.



Wheel rotation shown as viewed from top of fan.

Fig. 2

Maintenance

Motor maintenance is generally limited to cleaning and lubrication (where applicable). Cleaning should be limited to exterior surfaces only. Removing dust buildup on motor housing ensures proper motor cooling. Greasing of motors is only intended when fittings are provided. Many fractional motors are permanently lubricated and should not be lubricated after installation. Motors supplied with grease fittings should be greased in accordance with manufacturers' recommendations. With motor temperatures under 104°F (40°C), the grease should be replaced after 2000 hours of running time as a general rule.

Wheels require very little attention when moving clean air. Occasionally, oil and dust may accumulate causing imbalance. When this occurs, the wheel and housing should be cleaned to ensure smooth and safe operation.

All fasteners should be checked for tightness each time maintenance checks are performed prior to restarting unit.

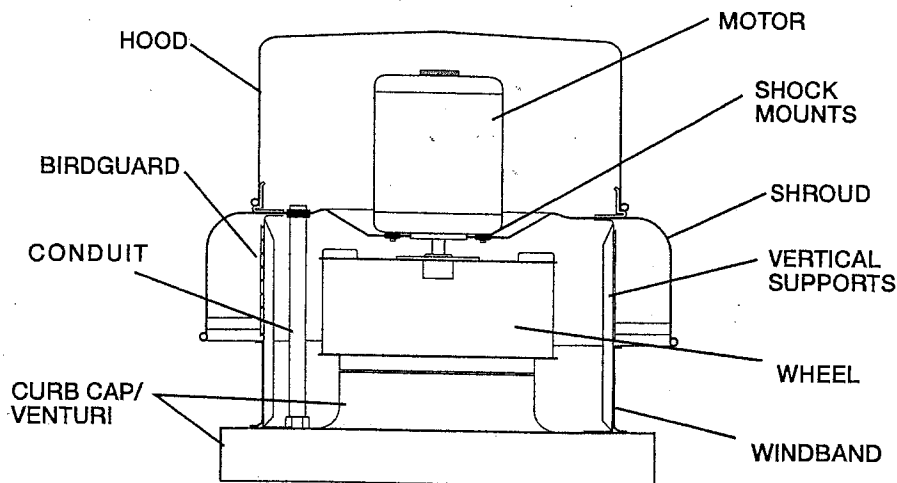
A proper maintenance program will help these units deliver years of dependable service.

Troubleshooting

PROBLEM	CAUSE	CORRECTIVE ACTION
REDUCED AIRFLOW	System resistance too high.	Check system: Proper operation of backdraft or control dampers, obstruction in ductwork, etc.
	Improper wheel alignment.	See Fig. 1 and Pre-Starting Checks.
	Excessive dirt buildup on wheel.	Clean wheel.
	Unit running backwards.	Correct as shown in Fig. 2.
EXCESSIVE NOISE OR VIBRATION	Wheel improperly aligned and rubbing.	See Fig. 1 and Pre-Starting Checks.
	Foreign objects in wheel or housing.	Remove objects, check for damage.
	Unbalance of wheel caused by excessive dirt and grease buildup.	Remove buildup.

NOTE: Before taking any corrective action, make certain unit is not capable of operation during repairs.

Replacement Parts



NOTE: Each fan bears a manufacturer's nameplate with model number and serial number embossed. This information will assist the local Greenheck representative and the factory in providing service and replacement parts.

Warranty

SIDEWALL FANS

<u>MARK</u>	<u>MODEL #</u>
SF-4 ✓	SE1-10-428-P-1
SF-1 ✓	SS1-20-432-A15
EF-3 ✓	SE1-12-432-A4
EF-5, 6, 7 ✓	SE1-10-428-P-1



Sidewall Propeller Fans Belt Drive and Direct Drive

Installation, Operating and Maintenance Manual

Upon receiving the unit, check for any damage and report it immediately to the shipper. Also assure all accessory items are accounted for.

Move fan to the desired location and determine the method by which the fan is to be mounted as shown below in figures 1, 2 and 3. Optional wall mount housings (Fig. 1) and wall mount collars (Fig. 2) provide a convenient means of mounting sidewall fans while maintaining the proper distance between propeller and damper.

Attach the fan by inserting a suitable fastener through each of the pre-punched mounting holes in the fan panel. Care should be taken not to bend or distort the fan panel or drive components during installation.

The motor voltage and amperage rating must be checked for compatibility with the electrical supply. Supply wiring to the fan must be properly fused and conform to local and national electrical codes.

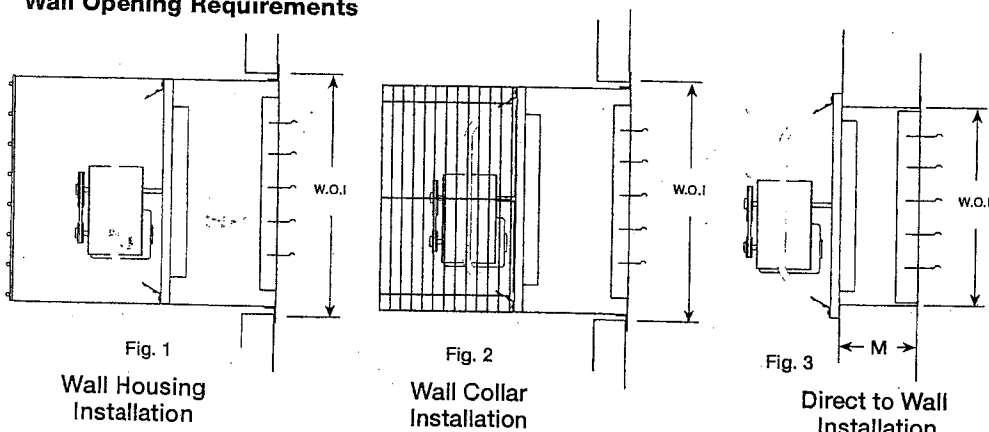
TYPICAL INSTALLATIONS

Wall opening size and propeller-to-damper distance are two important dimensions for fan installation. Fans mounted to the wall require a different opening (W.O.) size than those mounted in collars or wall housings. Propeller-to-damper distance (M) is important to reduce turbulence and damper flutter which may lead to premature damper failure.

Figs. #1 and #2, show the wall opening (W.O.) required for installations with either a wall housing or collar.

Fig. #3 shows the recommended wall opening (W.O.) and the minimum distance (M) suggested between the fan and damper for direct to wall installations.

Wall Opening Requirements



Fan Size	D Damper Size	WO-I Sq.	WO-II Sq.	M Min.
8	10x10	14 ¹ / ₄	10 ¹ / ₂	13
10	12x12	16 ¹ / ₄	12 ¹ / ₂	13
12	14x14	19 ¹ / ₄	14 ¹ / ₂	13
14	16x16	21 ¹ / ₄	16 ¹ / ₂	13
16	18x18	23 ¹ / ₄	18 ¹ / ₂	13
18	20x20	25 ¹ / ₄	20 ¹ / ₂	13
20	22x22	27 ¹ / ₄	22 ¹ / ₂	13
24	26x26	33 ³ / ₄	26 ¹ / ₂	13
30	32x32	39 ³ / ₄	32 ¹ / ₂	13
36	38x38	45 ³ / ₄	38 ¹ / ₂	14
42	44x44	51 ³ / ₄	45 ¹ / ₂	15
48	50x50	57 ³ / ₄	50 ¹ / ₂	16
54	56x56	63 ³ / ₄	56 ¹ / ₂	17
60	62x62	69 ³ / ₄	62 ¹ / ₂	18
72	74x74	83 ³ / ₄	74 ¹ / ₂	19

PRESTARTING CHECKS

Check all fasteners and set screws for tightness. This is especially important for bearing set screws.

The propeller should rotate freely and not rub on the fan panel venturi. Rotation direction of the propeller should be checked by momentarily turning the unit on. Rotation should be in the same direction as the rotation decal affixed to the unit or as shown in Fig. 4. For 3-phase installations, fan rotation can be reversed by simply interchanging any two of the three electrical leads. For single phase installations follow the wiring diagram located on the motor.

FOR BELT DRIVE FANS

The adjustable motor pulley is preset at the factory for the specified fan RPM. Fan speed can be increased by closing or decreased by opening the adjustable pulley. Two or three groove variable pitch pulleys must be adjusted an equal number of turns open. Any increase in fan speed represents a substantial increase in horsepower required from the motor. Always check motor load amperage and compare to name

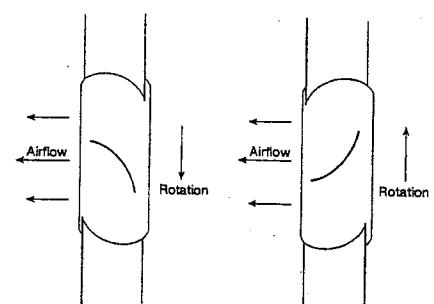


Fig. 4

ROUTINE MAINTENANCE

2B

WARNING

DISCONNECT AND SECURE TO THE "OFF" POSITION ALL ELECTRICAL POWER TO THE FAN PRIOR TO INSPECTION OR SERVICING. FAILURE TO COMPLY WITH THIS SAFETY PRECAUTION COULD RESULT IN SERIOUS INJURY OR DEATH.

Once the fan has been put into operation, a periodic maintenance program should be set up to preserve the reliability and performance of the fan. Items to be included in this program are:

- BELTS
- BEARINGS
- FASTENERS
- SET SCREWS
- LUBRICATION
- REMOVAL OF DUST/DIRT

BELTS

Premature belt failures are frequently caused by improper belt tension (either too tight or too loose) or misaligned pulleys. The proper tension for operating a V-belt is the lowest tension at which the belts will not slip at peak load conditions. For initial tensioning, the proper belt deflection half way between pulley centers is $1/64$ " for each inch of belt span. For example, if the belt span is 64 inches, the belt deflection should be one inch using moderate thumb pressure at midpoint of the drive (Fig. 5).

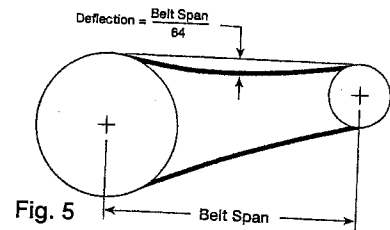


Fig. 5

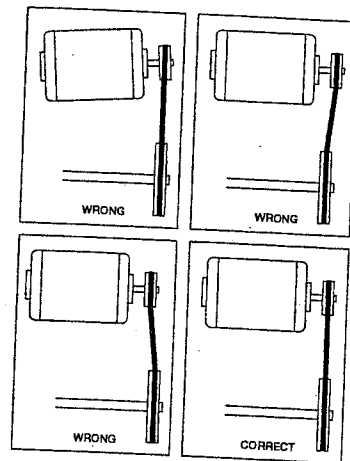


Fig. 6

Check belt tension two times during the first 24 hours of operation and periodically thereafter. To adjust belt tension, simply loosen four fasteners (two on each side of the motor plate) and slide the motor plate away from the fan shaft until proper belt tension is attained. On some fans, fasteners attaching the motor to the motor plate must be loosened in order to adjust the belt.

It is very important that the drive pulleys remain in proper alignment after adjustments are made. Misalignment of pulleys will result in premature belt wear noise, vibration and power loss. See Fig. 6.

BEARINGS (For belt drive fans only)

Bearings are the most critical moving part of the fan and should be inspected at periodic intervals. Locking collars and set screws, in addition to fasteners attaching the bearings to the bearing plate, must be checked for tightness. In a clean environment and temperatures above 32°F./below 200°F., fan shaft bearings with grease fittings should be lubricated semi-annually using a high quality lithium based grease. If unusual environmental conditions exist temperatures below 32°F./above 200°F., moisture or contaminants, more frequent lubrication is required.

With the unit running, add grease very slowly with a manual grease gun until a slight bead of grease forms at the seal. Be careful not to unseat the seal by over lubricating or using excessive pressure. Bearings without grease fittings are lubricated for life.

FASTENERS AND SET SCREWS

Any fan vibration has a tendency to loosen mechanical fasteners. A periodic inspection should include checking all fasteners and set screws for tightness. Particular attention should be paid to set screws attaching the propeller to the shaft and the shaft to the bearings. Loose bearing set screws will lead to premature failure of the fan shaft.

LUBRICATION

Refer to the paragraph on bearings for bearing lubrication. Many fractional horsepower motors installed on the smaller fans are lubricated for life and require no further attention. Motors equipped with oil holes should be oiled in accordance with the manufacturer's instructions printed on the motor. Use a high grade SAE 20 machine oil and use caution not to over lubricate. Motors supplied with grease fittings should be greased according to directions printed on the motor.

REMOVAL OF DUST AND DIRT

Dust clogs cooling openings on the motor housing, contaminates bearing lubricant and collects on propeller blades causing severe imbalance if left unchecked. The exterior surface of the motor, fan panel and entire propeller should be thoroughly cleaned periodically. Use caution and do not allow water or solvents to enter the motor or bearings. Under no circumstances should motors or bearings be sprayed with steam or water.

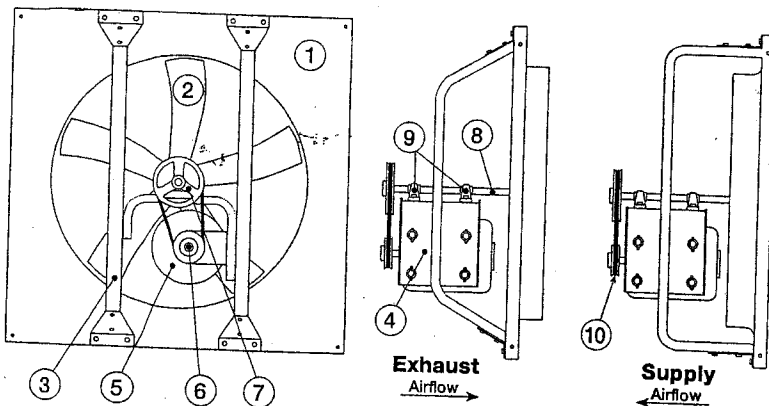
TROUBLESHOOTING

PROBLEM	CAUSE	CORRECTIVE ACTION
Reduced airflow	System resistance is too high.	Check backdraft dampers for proper operation. Remove obstructions in ductwork. Clean dirty filters. Check for adequate supply air for exhaust fans or exhaust air for supply fans.
	Fan too close to damper.	Increase distance between fan and damper.
	Unit running backwards.	See pre-starting checks.
	Fan speed too low.	Increase fan speed.
	Excessive dirt on propeller.	Clean propeller.
Excessive Noise	Bearings	Tighten bearing collars and set screws Lubricate bearings. Replace defective bearings.
	V-Belt drive	Tighten pulleys on motor and fan shaft. Adjust belt tension. Align pulleys. Replace worn belts or pulleys. See "Routine Maintenance".
	Excessive vibration	Clean dirt build-up from propeller. Check all set screws and fasteners for tightness. Check for worn bearing. Correct propeller imbalance. Check for loose dampers, guards or ductwork.
	Defective Motor	Replace motor.

Motor load amperage must be checked and compared to nameplate rating to avoid serious damage to motor when speed is increased.

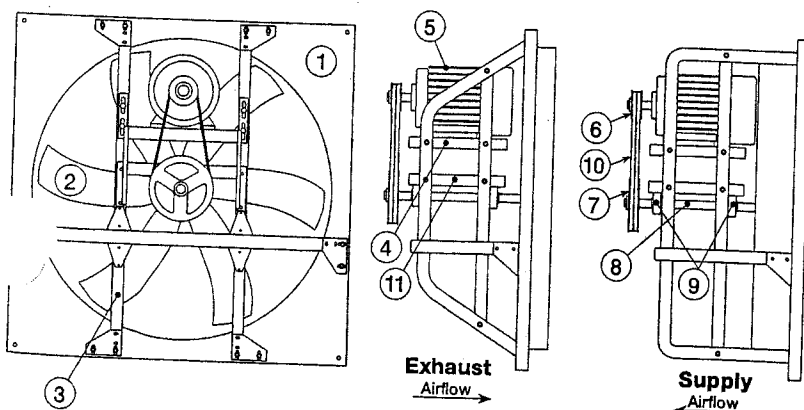
Belt Drive Fans Parts List

For SB-1L/H and SBC-2L/H Fans



1. Fan Panel
2. Propeller
3. Drive Frame Channel (2)
4. Motor/Bearing Plate
5. Motor
6. Motor Pulley
7. Shaft Pulley
8. Fan Shaft
9. Bearings (2)
10. Belt

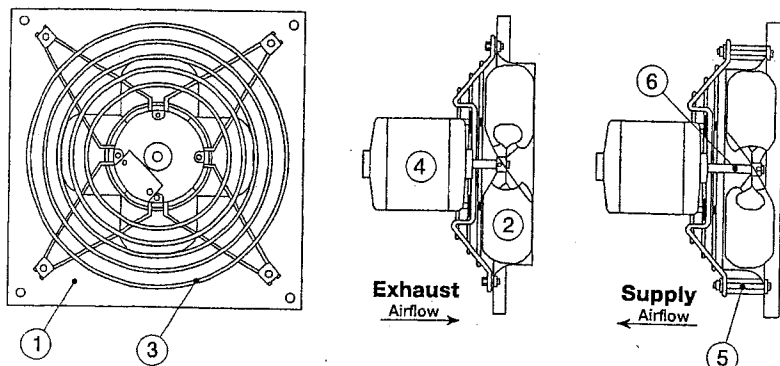
For SB-3L/H and SBC-3L/H Fans



1. Fan Panel
2. Propeller
3. Drive Frame Channel (2)
4. Motor Plate
5. Motor
6. Motor Pulley
7. Shaft Pulley
8. Fan Shaft
9. Bearings (2)
10. Belt
11. Bearing Plate

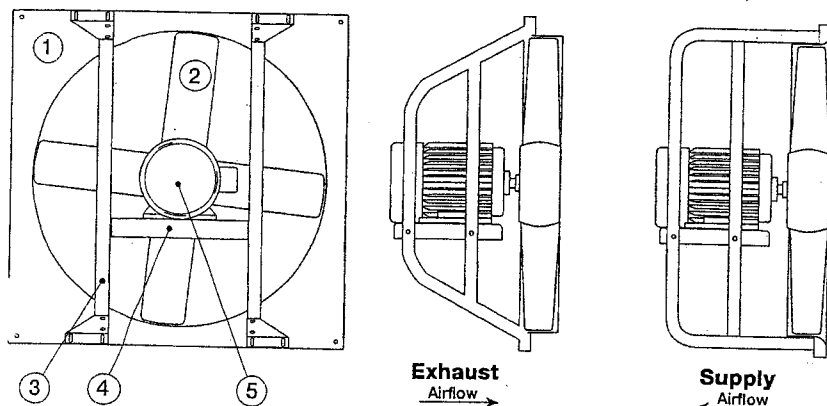
Direct Drive Fans Parts List

For S1 Fans (sizes 8 thru 12 D, G, and E motor speeds)



1. Fan Panel
2. Propeller
3. Drive Frame/Motor Support
4. Motor
5. Riser Blocks (4) - supply fan only
6. Shaft Extension- supply fan only

For S1 (sizes 12 thru 24 A, B, and C motor speeds), S2, and SC3 Fans



1. Fan Panel
2. Propeller
3. Drive Frame Channels (2)
4. Motor Plate
5. Motor

Warranty

Greenheck warrants its equipment to be free from defects in materials and workmanship for a period of one year from the date of purchase. Any unit or part which proves defective within this warranty period will be repaired or replaced at no charge. Return of defective units to our factory, by transportation charges prepaid by the purchaser, is required for warranty service.

Motors are warranted by the motor manufacturer for a period of one year. Should a motor manufactured by Greenheck prove defective during this period, they shall be repaired, replaced or returned to the motor manufacturer at no charge. Greenheck will be responsible for removal or installation of the motor.

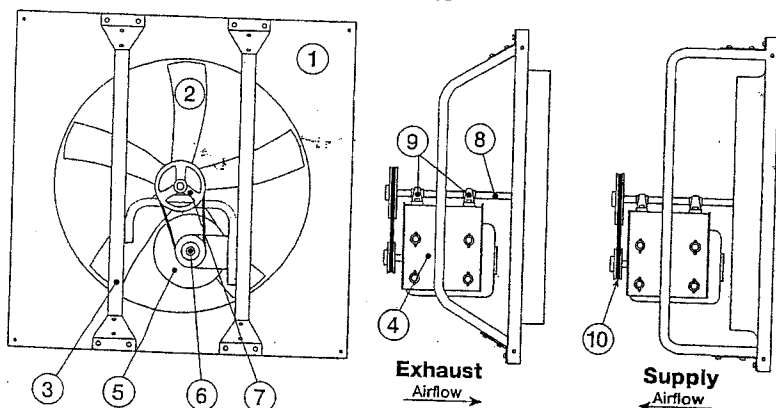
TROUBLESHOOTING

PROBLEM	CAUSE	CORRECTIVE ACTION
Reduced airflow	System resistance is too high.	Check backdraft dampers for proper operation. Remove obstructions in ductwork. Clean dirty filters. Check for adequate supply air for exhaust fans or exhaust air for supply fans.
	Fan too close to damper.	Increase distance between fan and damper.
	Unit running backwards.	See pre-starting checks.
	Fan speed too low.	Increase fan speed.
	Excessive dirt on propeller.	Clean propeller.
Excessive Noise	Bearings	Tighten bearing collars and set screws Lubricate bearings. Replace defective bearings.
	V-Belt drive	Tighten pulleys on motor and fan shaft. Adjust belt tension. Align pulleys. Replace worn belts or pulleys. See "Routine Maintenance".
	Excessive vibration	Clean dirt build-up from propeller. Check all set screws and fasteners for tightness. Check for worn bearing. Correct propeller imbalance. Check for loose dampers, guards or ductwork.
	Defective Motor	Replace motor.

Motor load amperage must be checked and compared to nameplate rating to avoid serious damage to motor when speed is increased.

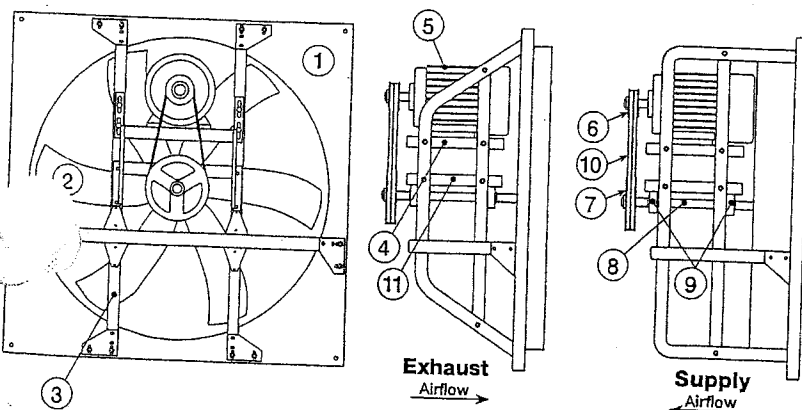
Belt Drive Fans Parts List

For SB-1L/H and SBC-2L/H Fans



1. Fan Panel
2. Propeller
3. Drive Frame Channel (2)
4. Motor/Bearing Plate
5. Motor
6. Motor Pulley
7. Shaft Pulley
8. Fan Shaft
9. Bearings (2)
10. Belt

For SB-3L/H and SBC-3L/H Fans



1. Fan Panel
2. Propeller
3. Drive Frame Channel (2)
4. Motor Plate
5. Motor
6. Motor Pulley
7. Shaft Pulley
8. Fan Shaft
9. Bearings (2)
10. Belt
11. Bearing Plate