

## SOUND FIGHTER FANS™

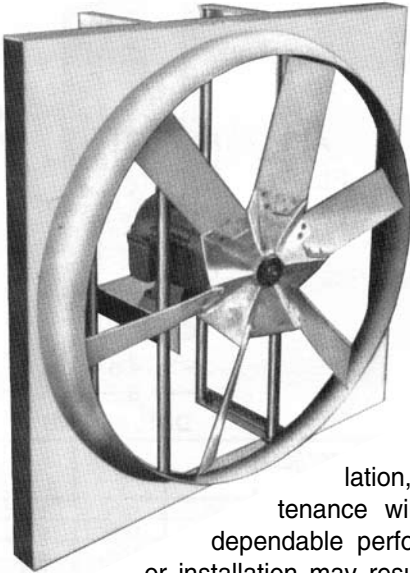


TRIANGLE ENGINEERING  
OF ARKANSAS, INC.

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# FHI SERIES PANEL FANS

## INSTALLATION, OPERATING AND MAINTENANCE INSTRUCTIONS FOR ALL PANEL FANS



These instructions provide proper installation and maintenance instructions for Triangle Engineering products. Proper installation, operation and maintenance will assure efficient and dependable performance. Improper use or installation may result in personal injury or property damage. Trained and experienced personnel should perform and installation according to manufacturer's instructions and in compliance with federal, state and local government.

RETAIN THESE INSTRUCTIONS FOR FUTURE REFERENCE. READ ALL INSTRUCTIONS THOROUGHLY BEFORE PROCEEDING.

### RECEIVING, HANDLING AND STORAGE

Our Panel Fans are carefully inspected before leaving the factory. When the unit is received, on-site inspection should be made. The unit is factory balanced, all components (propeller, shaft, bearings, etc.) have been tested prior to shipment. Units have been given an operating and running test before leaving the factory. Units which are mishandled can void the warranty provisions. If units have been damaged in transit, it is the responsibility of the receiver to make all claims against the carrier. Triangle Engineering of Arkansas, Inc. is not responsible for damages incurred during shipment.

Units should be handled with care to prevent possible damage. Avoid jarring and/or dropping. Units which are supplied with special painted or coated finishes should be handled with care to protect the surfaces. If the continuity of the coating is scratched and damaged due to mishandling, the protective coating may be adversely affected.

Long term storage requires special attention. All units should be stored on a level, solid surface (preferably indoors). If outdoor storage is necessary, provide protection against moisture and dirt. Protect all bearings and shafts with lubricant and encase the entire unit in plastic or some

similar weatherproof material. To prevent deterioration of lubricants, special finishes, etc., periodic inspections should be made. During these inspections, it is good practice to rotate the propeller by hand to spread bearing lubrication. It is advisable to remove V-belts if units are to be stored for an extended period of time. V-belts which remain under tension in a stationary position for extended periods are likely to have reduced operating life.

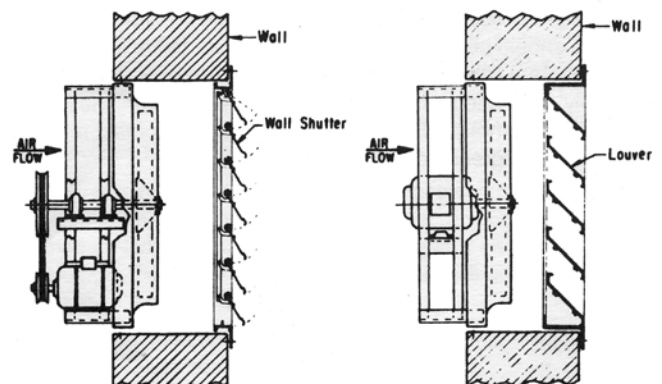
### INSTALLATION

**INSTALLING THE PANEL FAN:** Wall openings must be square and should be 1/4" to 1/2" greater than the outside dimension of the panel fan housing when recessed within the wall. Fan should be leveled and securely anchored to the wall through holes in the mounting flange. The type, size and number of fasteners depends upon the unit size and wall construction. If the contractor removes ventilator parts to facilitate installation and electrical connections, all parts should be reassembled by placing all spacers, washers, nuts, bolts, fasteners and components exactly as they were found, prior to removal. All fasteners are to be drawn tight and secure.

**POSITIONING AND RUNNING POWER LINES:** Normally, power is brought up from within the building through proper conduit lines to the wall opening. It is then fed to the (disconnect switch, if furnished, and) motor.

**INSTALLING THE WALL SHUTTER:** When required, the wall shutter must be level and fastened to the wall through the mounting holes provided in the shutter mounting flange. Consult the diagram below for the proper mounting arrangements. Shutters must be secured to the wall opening without any twisting which may distort the frame. Check for free operation. If shutters are motor operated type, ascertain the proper voltage is impressed on motor terminals. The fan is now ready for service.

### TYPICAL MOUNTING ARRANGEMENTS



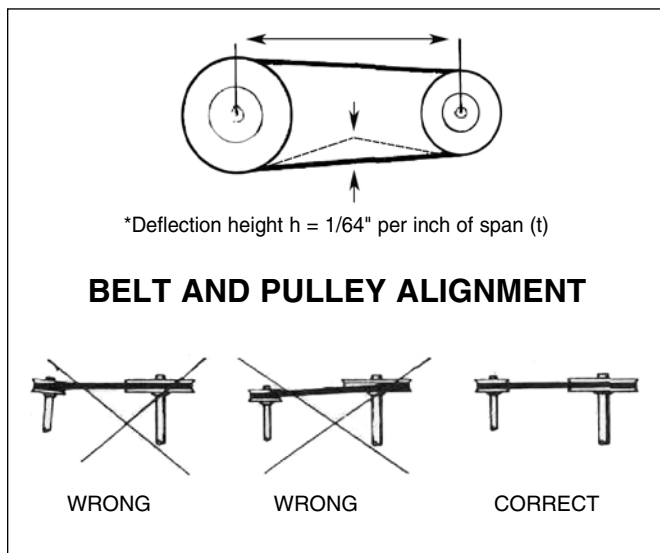
## INSTALLATION

**INSTALLING THE PANEL FAN:** Wall openings must be square and should be 1/4" to 1/2" greater than the outside dimension of the panel.

### START-UP AND OPERATION

Careful inspection should be made before start-up. All motor bearings should be properly lubricated, all fasteners should be securely tightened. Impeller should be rotated by hand to insure free movement. (NOTE: Before placing hand on propeller, or V-belts local out primary and secondary power source). Check all set-screws and keys. Tighten where necessary.

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 of the belt on each side of the belt measured halfway between the pulley centerline. Extreme care must be exercised when adjusting V-belts as not to misalign the pulleys. Any 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, adjustments must be made so that there is equal tension on all belts (see drawing below).



**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 noise 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.

The inlets and approaches to the exhauster should be free from obstructions. To assure maximum air movement an adequate supply air must be available.

Power lines compatible with the motor requirements are brought up from an electrical source to the unit. A generous amount of slack in power lines should be provided to allow for motor deflections and to permit movement of motor for belt-tension adjustments. Motor must be securely and adequately grounded. Protect power lines from sharp objects. Do not kink power line or permit it to contact hot surfaces, chemicals, grease or oil.

Before putting any fan into operation, the following check list should also be completed:

- a. Lock out primary and secondary power source.
- b. Make sure installation is in accordance with manufacturer's instructions.
- c. Check and tighten all fasteners.
- d. Spin propeller to see if rotation is free and does not bind or rub.
- e. Check all set-screws and keys and tighten if necessary.
- f. Check V-belt or direct drive coupling for alignment. Use recommended belt tension.
- g. Check V-belt for proper sheave selection and make sure they are not in reverse position.
- h. Make sure there is no foreign loose material in duct work leading to and from fan or in the fan itself.
- j. Properly secure all safety guards.
- k. Secure all access doors to fan and duct work.
- l. Check line voltage with motor nameplate.
- m. Check wiring. (NOTE: On single phase motors, the terminal block must be set up in accordance with the nameplate instructions and/or wiring diagram. The set-up must match the line voltage. If the motor is 3 phase, the winding leads must be grouped and connected as shown on the wiring diagram. The line voltage must correspond with proper grouping of motor leads. On 2-speed motors the wiring diagram must be followed precisely or serious motor damage will occur.)

Switch on electrical supply and allow fan to reach full speed. If heater elements are tripping out the starters, the following items should be investigated:

- Is the heater element the correct size for the motor?
- Is the starter located in a high ambient temperature?
- Is the propeller rotating in the correct direction?
- Is the line voltage excessively low?
- Is the motor wired properly to suit the line voltage?

Check carefully for:

1. Correct rotation of the propeller. (NOTE: Incorrect rotation overloads motor severely and results in serious motor damage. To change rotation of 3 phase units, simply interchange any two of the three line leads. On single phase units, change the terminal block set-up following the wiring diagram.)
2. Check motor and bearing temperatures so that they are not excessively hot. (NOTE: Use care when touching the exterior of an operating motor. Modern motors normally run hot. They are designed to operate at higher temperatures. This is a normal condition, but they may be hot enough to be painful or injurious to the touch.) If any problem is indicated, SWITCH OFF IMMEDIATELY, Lock out the electrical supply and check carefully for the cause of the trouble and correct as needed. Even if the fan appears to be operating satisfactorily, shut down after a brief period and check all fasteners, set-screws and keys for tightness.

The fan may now be put into operation but during the first eight (8) hours of running it should be periodically observed and checked for excessive vibration or noise. At this time checks should be made on motor input current and motor bearing temperatures to insure they do not exceed manufacturer's recommendations. After eight hours of satisfactory operation, the fan should be shut down and the electrical power locked out to check the following items and adjust if necessary:

- a. All set-screws, keys and fasteners.
- b. Drive coupling alignment.
- c. V-belt drive alignment.
- d. V-belt tension.

## NOTE

- Care should be taken to follow all local electrical, safety and building codes.
- Provisions of the National Electrical Code, as well as the Occupational Safety and Health Acts should be followed.
- All motors are checked prior to shipment; however, if motor defects should develop, prompt service can be obtained from the nearest authorized service station of the Motor Manufacturer while under warranty. Exchange, repair or replacement will be provided on a no charge basis if the motor is defective within the warranty period. The Triangle representative in your area will provide a name and address of an authorized service station if requested. Do not return defective motors to Triangle Engineering. WARNING: Motor guarantee is void unless overload protection is provided in motor wiring circuit.

## MAINTENANCE

Do not attempt any maintenance on a fan unless the electrical supply has been completely disconnected. If a disconnect switch has not been provided, remove all fuses from the circuit and lock the fuse panel so they cannot be accidentally replaced.

Lubrication is a primary maintenance responsibility. All bearings should be checked periodically. V-belts also, should be inspected for tightness. If the fan is installed in a corrosive or dirty atmosphere, the propeller, inlet and other moving parts should be cleaned periodically.

RECOMMENDED LUBRICANTS		
MANUFACTURER	PRODUCT NAME	TEMP. RANGE
Chevron	SRI-2	
Gulf	Gulfcrown EP-1	Below 32°F. (0°C)
Imperial Oil	Unirex EP-1	
Shell	Alvania R-2	
Sun Oil	Sunaplex IEP	
Texaco	Regal AFB2	
Gulf	Gulfcrown EP-2	Range 32°F to 150°F (0°C to 66°C)
Imperial Oil	Unirex EP-2	
Shell	Alvania R-3	
Sun Oil	Sun Prestige 42 grease	
Texaco	Regal AFB-2	

**MOTOR LUBRICATION:** In general, standard motors that are furnished have prelubricated, sealed-for-life ball bearings which require no lubrication for seven to ten years of normal service. In cases where motors have been ordered with greasable bearings, these bearings have been lubricated at the factory and do not require any attention for one year under normal conditions. If the particular motor is equipped with grease relief fittings, these should be removed to allow old grease to flow out when maintenance is performed. Whenever possible, grease should be applied while the motor is running. This practice should not supersede any safety consideration. **DO NOT OVER GREASE** - as most lubricants deteriorate motor windings, thereby reducing motor life.

**FAN SHAFT LUBRICATION:** Fan shaft ball bearings are furnished in either the pre-lubricated sealed-for-life type or the greasable type depending on what was ordered. Here again, the pre-lubricated type requires no servicing for seven or ten years of normal use, and the greasable type are factory greased eliminating the need for greasing initially. Whenever grease is required, depending on the lubricating schedule, it should be applied while the shaft is rotating. This practice should not supersede any safety considerations.

**IMPORTANT:** Use low pressure grease guns only. High pressure guns tend to blow out or unseat bearing seals, leaving the bearing open to collect grime, dust and foreign particles.

## LUBRICATION SCHEDULE:

- a. Under average conditions where ambient temperatures do not exceed 120°F, lubrication is required once or twice a year.
- b. Under a dirt laden atmosphere where there is a temperature range from 10°F. to 120°F, lubrication is required from three to six times a year.
- c. Under extreme temperature conditions and extremely dirty atmospheres, lubrication should be scheduled at least once or twice a month.

**PARTS REPLACEMENT:** If replacing parts, do so with properly selected components, which duplicate original parts correctly. Incorrectly sized shafts, belts, pulleys, propellers, etc. can damage the fan.

## SPECIAL PURPOSE SYSTEMS

Explosive, corrosive, high temperature, etc. conditions may require special construction, inspection and maintenance. It is necessary to observe the fan manufacturer's recommendations and limitation concerning the type of material to be handled by the fan and its application to special conditions.

## THE HIDDEN DANGER

In addition to the normal dangers of rotating machinery, fans present an additional hazard in their ability to suck in not only air, but loose material as well. Solid objects can pass through the fan and be discharged by the propeller as potentially dangerous projectiles. Intake to duct work should, whenever possible, be screened to prevent the accidental entrance of solid objects.

Access doors to a duct system should never be opened when the fan is running. On the downstream (or pressure) side of the system, releasing the door with the system in operation may result in an explosive opening. On the upstream (or suction) side, the inflow may be sufficient to suck tools, clothing, etc., and may even cause a man to lose his balance.

When a fan is being started for the first time, a complete inspection of the duct work and interior of the fan should be made (with the power locked off), to make certain there is no foreign material which can be sucked into or blown through the duct work.

## FAN GUARDS INLET AND OUTLET GUARDS DRIVE GUARDS

All fans have moving parts which require guarding in the same way as other moving machinery. In areas which are accessible only to experienced personnel, a standard industrial type guard may be adequate. This type of guard will prevent the entry of thrown or dropped objects with a minimum restriction of air flow.

Where the fan is accessible to untrained personnel or the general public, maximum safety guards should be used, even at the cost of some loss of performance. Fans located less than 7' above the floor require special consideration as specified in the Occupational Safety and Health Act. Roof mounted equipment will require guards when access is possible, for example, by climbing children.

Upblast and hooded fans may be connected directly to ductwork which will prevent contact with the internal moving parts, but when the inlet or outlet is exposed, a suitable guard should be installed. Accordingly, roof openings for these units can be easily and neatly fitted with framed safety guards.

Fans may be driven from the motor shaft or through a belt drive. In every case where the bearing assembly, rotating shaft, sheaves or belts are exposed, a suitable guard should be provided.

## WARRANTY

**WARRANTY** Upon payment of this invoice in full, the seller warrants those goods manufactured by it and sold hereby to be free of defects in material and workmanship only if properly installed, cared for, and operated with competent supervision under normal conditions as specified to us in writing. The seller's obligation under this warranty is limited to replacing or repairing at its option and at its own factory any defective part or parts thereof which shall, within one year after shipment by it to the original purchaser, be returned to its factory with transportation charges prepaid. Upon such repair or replacement all obligations under this warranty shall be deemed fulfilled and terminated. Triangle Engineering makes no warranty whatsoever in respect to parts or accessories not supplied by or installed by Triangle Engineering. The seller shall not be liable for any loss or damage whatsoever to any person, firm, or corporation, and shall not be liable or responsible for any repairs made outside of its own factory. There are no other warranties or representations, express or implied, made or effective upon this sale. The above warranty supersedes and is in lieu of all other warranties express or implied which extend beyond the description contained herein. No person, firm, corporation, agent, or dealer is authorized to make any warranties on behalf of Triangle Engineering nor to assume for Triangle Engineering any liability in connection with any of Triangle Engineering's products.

All quotations are subject to acceptance within sixty (60) days. Prices in quotation covering Triangle Engineering's manufactured products are firm for one year from date of order. All orders are subject to approval by Triangle Engineering of Arkansas, Inc.

All customer purchase orders are hereby made subject to the provisions of this acceptance and the seller's failure to object to provisions contained in customer's purchase orders or other communications shall not be deemed a waiver of the terms and conditions hereof nor acceptance of such provisions. No representations or guarantees other than those contained herein shall be binding upon Triangle Engineering unless made in writing and signed by an official of Triangle Engineering.

**NOTICE** The Purchaser agrees, in exchange for the pricing schedules used in this transaction, that any litigation of any nature arising from this transaction, or in any other way related to the relationships involved herein shall be exclusively subject to venue, in personam and subject matter jurisdiction in any other court or courts in any other county or state are hereby waived; further, any transaction in which the Purchaser is a corporation, other than a corporation with publicly traded stock, is recognized to include the guaranty of performance from and by the principal shareholders thereof whose authorization of such guaranty is represented to have been secured prior to the first and subsequent transaction and which guaranty is evidenced through the corporation's purchase.



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