

# **H3 and HP3 Fan Service Manual**

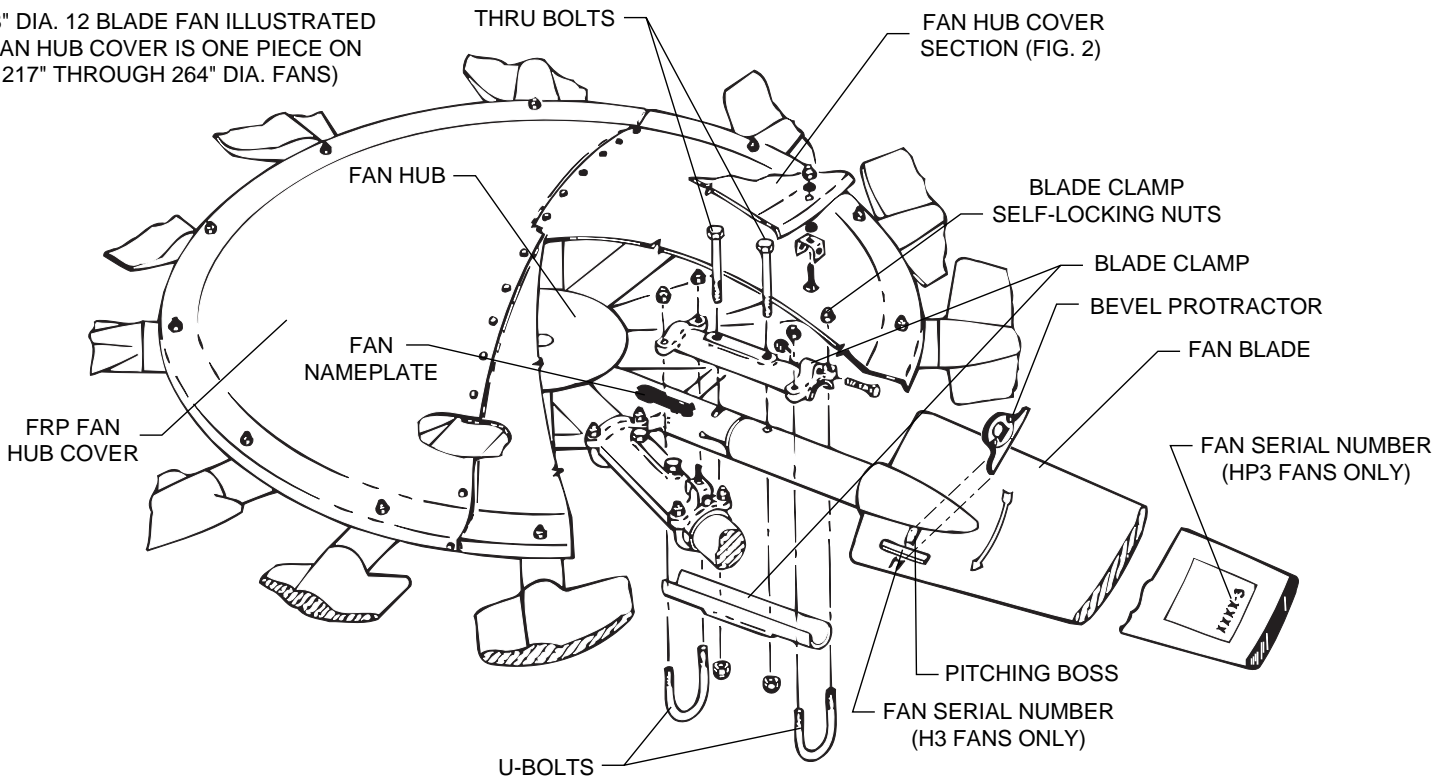
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**217" through 288" Diameter—8 and 12 Blades**

**SERVICE MANUAL—H3 and HP3-217"—288" 8 and 12 BLADES**



288" DIA. 12 BLADE FAN ILLUSTRATED  
 (FAN HUB COVER IS ONE PIECE ON  
 217" THROUGH 264" DIA. FANS)



**Welded Hub Fan Assembly**

THE MARLEY COOLING TOWER CO. MISSION, KS.  
 FAN SERIAL NO. **288HP312-XXXX**

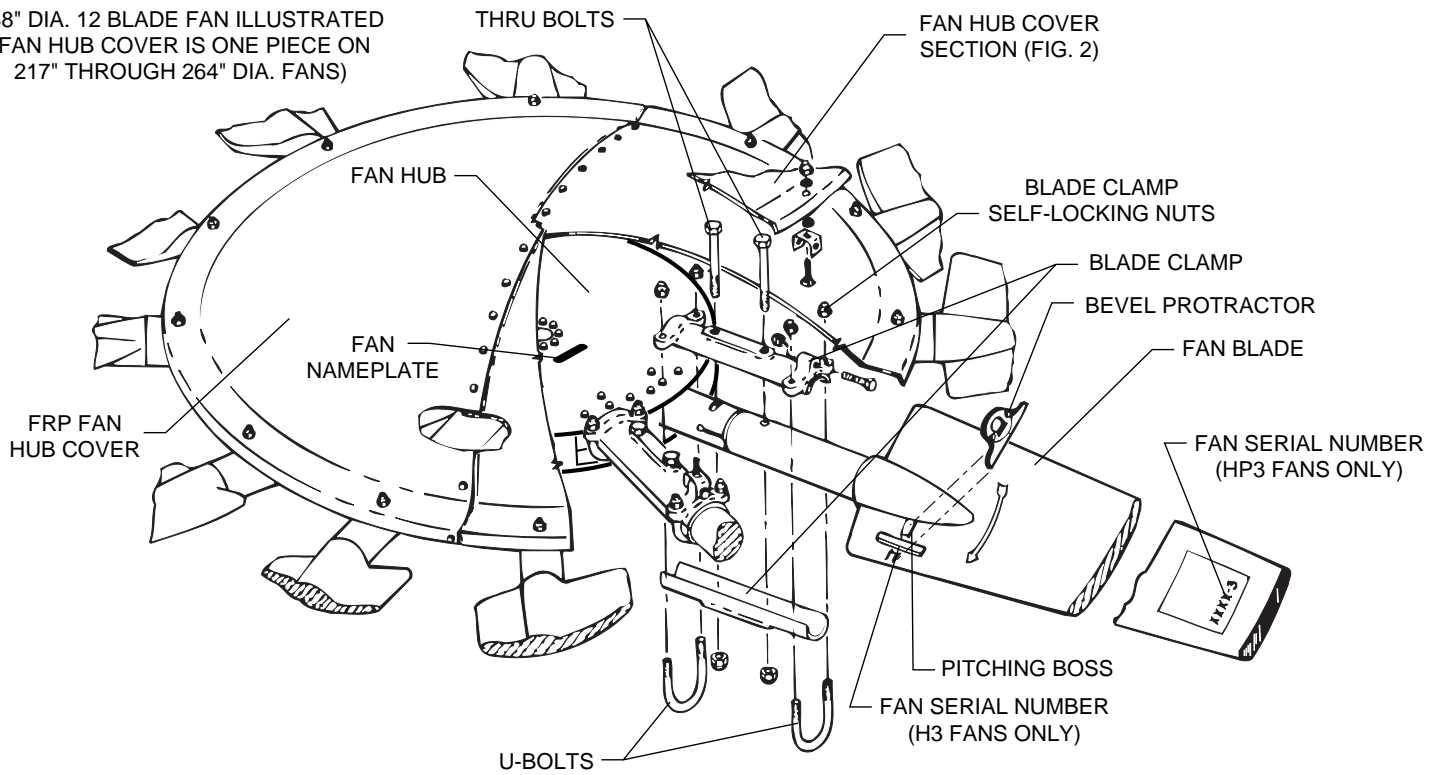
**FAN BLADE CLAMP FASTENER TIGHTENING INSTRUCTIONS**

**DO NOT LUBRICATE**

TIGHTEN TO \_\_\_\_\_ FT.LBS. TORQUE

**FAN NAMEPLATE**

288" DIA. 12 BLADE FAN ILLUSTRATED  
 (FAN HUB COVER IS ONE PIECE ON  
 217" THROUGH 264" DIA. FANS)




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## Bolted Steel Hub Fan Assembly

Marley Order No. \_\_\_\_\_  
 Trial Pitch Angle \_\_\_\_\_  
 Final Pitch Angle \_\_\_\_\_  
 Speed-rpm \_\_\_\_\_  
 Contract hp \_\_\_\_\_

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△ **Note**

Each fan is statically balanced at the factory as an assembly. The fan hub is identified with the complete serial number and each hub spoke is identified by number. Each fan blade is marked with the identification portion of the fan serial number and a number indicating the blade's position in the fan hub.

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## Fan Assembly

1—Make certain that the identification number on each blade corresponds with the identification number on the fan serial number nameplate.

2—Blade and clamps marked No. 1 correspond with the No. 1 spoke on the fan hub and so on. Fan must be assembled in numerical order.

3—There is an arrow on each fan blade showing direction of fan rotation. This arrow must be on the air discharge side (top) of the fan.

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△ **Note**

4—Be certain that each blade is as far from the center of the fan as the thru-bolts in the blade shank and hub spoke will permit. This is necessary in order to maintain proper balance.

5—Support blade tips in a horizontal plane when U-bolts are tightened. Hold each blade at the proper pitch angle when tightening.

6—Total vertical tip track variation should not exceed 2 inches ( $\pm 1$  inch from the reference plane of fan rotation). Excessive tip track will cause dynamic imbalance.

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## Setting Fan Blade Pitch

1—The trial pitch angle is the calculated setting for design conditions (water rate, heat load, air density, and contract horsepower). Set the bevel protractor at the trial pitch angle (page 3) and pitch all the blades to the same angle. All blades must be pitched to the same angle with each blade pointing in the same direction in the fan cylinder.

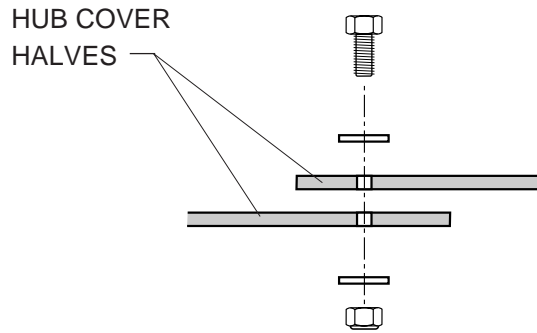
2—Tighten the thru-bolt and U-bolt self locking nuts to 125 ft./lbs. (170 Nm) torque. Tighten to 150 ft./lbs. (203 Nm) if hardware is stainless steel.

3—Recheck the pitch of each blade and adjust if required.

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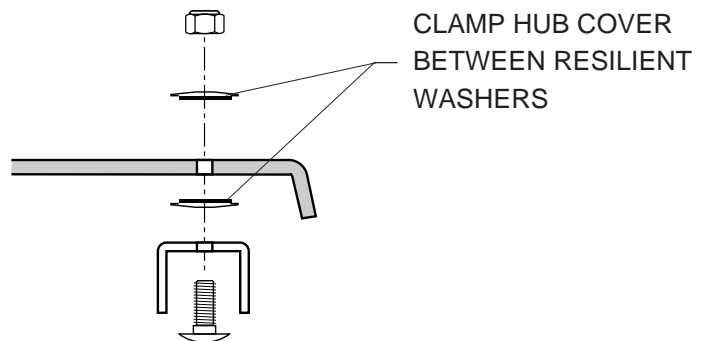
## Hub Cover Installation

1—On 265" through 288" diameter fans, bolt hub cover halves together with bolts, flat washers (outside and inside hub cover), and nuts. See **Figure 1**.



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**Figure 1**



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**Figure 2**

2—Install resilient washers and hub cover on carriage bolts as shown in **Figure 2**.

3—Tighten self-locking nuts to 10-15 ft./lbs. (14-20 Nm) torque.

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## Checking Load at Motor

1— Operate the fan until motor and Geareducer® have reached operating temperature (approximately 30 minutes ). Take operating voltage and amperage measurements for use in calculating motor HP by the following equation:

$$HP_A = \frac{VOLTS_A \times AMPS_A}{VOLTS_N \times AMPS_N} \times HP_N$$

HP<sub>A</sub> = Actual Horsepower  
VOLTS<sub>A</sub> = Actual Volts  
AMPS<sub>A</sub> = Actual Amperage  
VOLTS<sub>N</sub> = Nameplate Volts  
AMPS<sub>N</sub> = Nameplate Amperage  
HP<sub>N</sub> = Nameplate Horsepower

2—The calculated horsepower should equal but not exceed the specified contract horsepower. Measurements used in above calculations **must** be made with hot water flowing through the tower. Re-pitch blades as required to obtain contract horsepower. Measurements made with no water or cold water will result in an erroneous calculated horsepower.

3—A one-degree change in blade pitch will vary the power (HP) required by approximately 4 HP for 240" fans, 5 HP for 264" fans, and 6 HP for 288" fans.

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△ **Note**

***When checking and/or changing blade pitch or cycling fan in normal operation, do not exceed 30 sec./hour total motor starting time as motor may become overheated.***

4—If blades are re-pitched, self locking nuts must be retightened to 125 ft./lbs. (170 Nm) torque. Tighten to 150 ft./lbs. (203 Nm) if hardware is stainless steel.

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## Fan Rebalance

1—Replacement blades can be installed requiring only minimal field rebalancing. When ordering a replacement blade, give the fan serial number and blade number so that the balancing moment of the new blade can be matched to the recorded moment of the original blade.

2—If rebalance is required, trial and error attachment of balance weights at various locations on the hub plates or spoke braces may produce a satisfactory dynamic balance with the fan operating on the tower. If this is not satisfactory, it is recommended that the complete fan assembly be returned to the Marley factory located in Olathe, Kansas for selection of replacement parts and factory rebalance. Obtain “Customer Return Material” tag from a Marley sales office or representative in your area. If return of the parts is not practical, the fan assembly can be statically rebalanced as follows:

A—Fan assembly should be mounted on a suitable mandrel matching the hub bore, and the mandrel placed on knife wheels or level, parallel bars with the fan blades in a vertical plane. This must be done in a draft-free area.

B—Apply balance weights at selected locations on the hub plates (bolted hub) or spoke brace (welded hub) until all tendency for fan to rotate is overcome. This is accomplished by allowing the fan assembly to rotate freely on the knives until it comes to rest with the heaviest portion at the bottom. Manually rotate the fan 90° so that the heaviest portion is at either side of the fan center line. Add weights to the light side of fan.

C—If one or more blades are replaced, relocating some of the blades in other hub spokes may simplify balance and result in fewer balance weights being required.

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## Fan Maintenance

1—Check and, if necessary, retighten blade clamping hardware to prescribed torque after the first week of operation and subsequently at 6-month intervals. This should be done at the time the Geareducer oil is changed.

2—A monthly inspection of the fan should be made to assure continued trouble-free operation. Any accumulation of dirt or scale deposits on the fan should be carefully and completely removed if there are any indications of balance being affected. Preventive maintenance to control corrosive attack will prolong the useful life of the fan.

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## Mechanical Service

When writing the Marley sales office or representative for repair or replacement parts, please refer to the tower order number and fan serial number.

**The Marley  
Cooling Tower  
Company**  
5800 Foxridge Drive  
Mission, KS 66202  
913 362-1818

