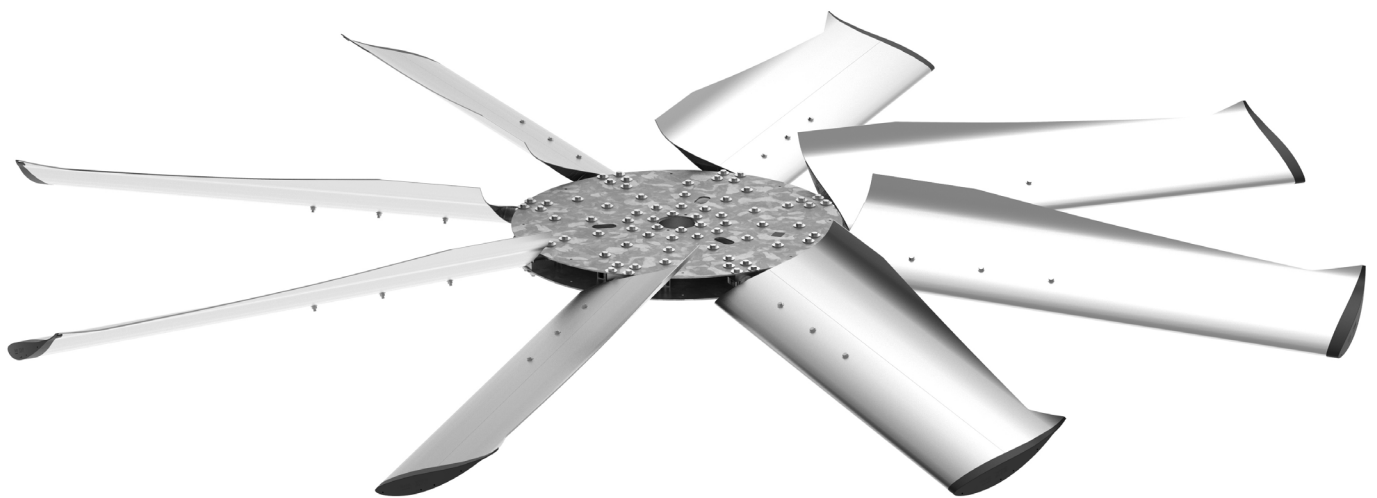


X72 dual-plate hub fan

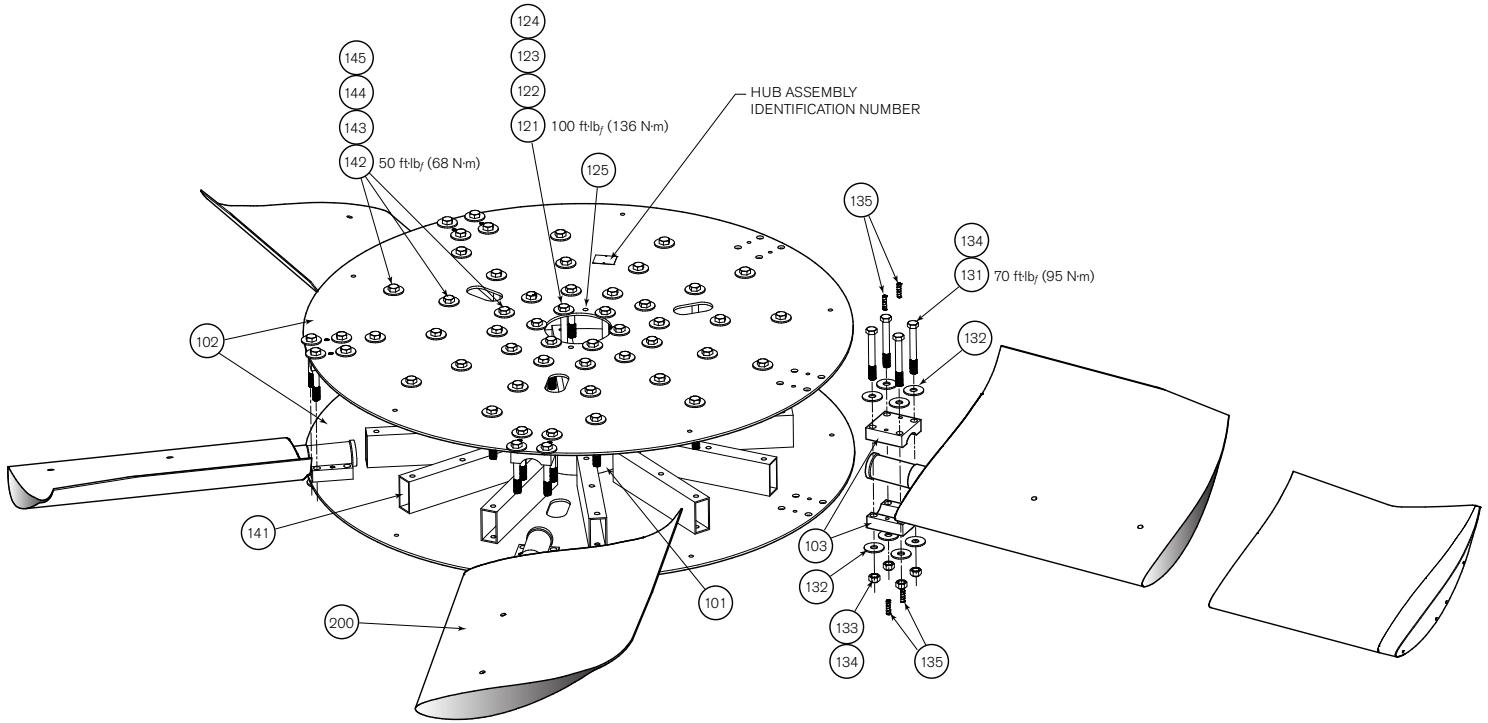
INSTALLATION - OPERATION - MAINTENANCE

Z1047450 ISSUED 02/2017

READ AND UNDERSTAND THIS MANUAL PRIOR TO OPERATING OR SERVICING THIS PRODUCT



fan components



- 100 Hub**
 - 101 Center Hub
 - 102 Hub Plate
 - 103 Blade Clamp Half
 - 120 Kit-Center Hub Hardware**
 - 121 Machine Bolt M16
 - 122 Flat Washer M16
 - 123 Locking Hex Nut M16
 - 124 Thread Lubricant
 - 125 Roll Pin 1/2"
 - 130 Kit-Blade Clamp Hardware**
 - 131 Machine Bolt M16
 - 132 Flat Washer M16
 - 133 Locking Hex Nut M16
 - 134 Thread Lubricant
 - 135 Roll Pin 3/8"
 - 140 Kit-Hub Brace***
 - 141 Hub Brace
 - 142 Machine Bolt M16
 - 143 Flat Washer M16
 - 144 Locking Hex Nut M16
 - 145 Thread Lubricant
- * Not present on all X72 dual-plate fan hubs

200 Blade

Figure 1 Typical Fan Assembly
actual component appearance may vary

Order No. _____
 Trial Pitch Angle _____
 Final Pitch Angle _____
 Speed-rpm _____
 Contract hp _____

installation

The following instructions detail the process for installing a Marley X72 dual plate hub fan on a Marley Geareducer[®] with a tapered fan (output) shaft utilizing a bolted fan hub retention plate. Installation on other gear reduction units may be different. Contact your Marley sales representative for supplemental instructions if required.

Fan Hub Installation

- 1 Remove the retention plate and hardware from the top of the Geareducer shaft. Thoroughly clean the fan shaft, fan shaft key, and the fan hub center bore to remove any debris and/or protective coatings. After cleaning, apply a coat of anti-seize compound to the engagement portion of the shaft.
- 2 Prior to hub installation, fully seat the key in the fan shaft keyway. The top of the key must be below the top of the shaft by no more than $\frac{1}{8}$ " (3mm). The key is a tight fit across the width and must never be altered.
- 3 Raise the fan hub above the fan shaft for installation. Slowly lower the hub onto the shaft with the keyways properly aligned. Make certain the key does not slide down the shaft during installation. Stake the key in the keyway with a center punch if necessary.
- 4 The fan shaft key should be approximately centered in the engaged portion of the hub when engaged on the shaft. Verify the center hub is fully seated by visual inspection.
- 5 Install the hub retention plate and hardware. Torque the hub retention plate bolt to 40 ft·lb (55 N·m).

Fan Blade Installation

Marley X72 dual-plate hub fan blades are manufactured to equal moment weight and blade clamps to equal static weight. The blades and clamps can be installed in any blade position without affecting fan balance.

- 1 Lubricate the M16 bolts and hex nut threads with thread lubricant. Set the hardware aside.
- 2 Remove one set of blade clamps from the hub assembly. Blade clamps are installed on the hub assembly at the factory with spacers for shipping purposes. Remove and discard the spacers.
- 3 Position the blade clamps around the shank of a blade so that the blade will slope downwards when installed. The blade clamps must comply with **Figure 2**. Ensure that the blade clamps are positioned against the blade safety shoulder. Large nylon cable ties can be used to temporarily hold blade clamps on the blade during installation.



installation

- 4 Insert the blade with blade clamps around the shank between the hub assembly plates as shown in **Figure 2**.
- 5 Vertically align the four bolt holes in the clamps and plates. Install four lubricated M16 bolts, eight M16 flat washers, and four lubricated M16 hex nuts. Engage the nuts only three or four threads.
- 6 Install two $\frac{3}{8}$ " roll pins using a hammer through the hub plate into each blade clamp half. See **Figure 1**.
- 7 Repeat until all blades, clamps, and hardware have been installed in the hub assembly.

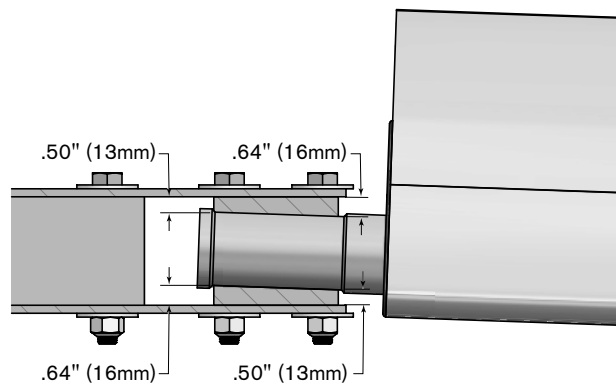


Figure 2

Adjusting Fan Blade Pitch

The trial pitch is the calculated setting for design conditions (water rate, heat load, air density, and brake horsepower). The trial pitch is provided on **Page 2**.

- 1 Select a position on the fan circumference and rotate each blade to this common location when setting or checking blade pitch. Support the blade tip to maintain a common rotation plane while setting the fan pitch. The pitch is set by placing a protractor on top of a straight edge or with a digital level that extends across the blade near the tip. For flare-tip blades, the pitch is measured across the end cap as shown in **Figure 3**. For full chord blades, the pitch is measured across the aluminum airfoil about 1" inboard of the blade end cap as shown in **Figure 4**.
- 2 Pull the blade outward so the safety shoulder is in contact with the blade clamp, then set the pitch. Blades should be within $\pm 1/4^\circ$ of the desired pitch angle. After the desired pitch angle is obtained, progressively tighten the M16 hex nuts using a crosswise tightening sequence to 70 ft-lb (95 N·m).
- 3 Repeat Step 2 for all blades.

installation

- 4 Check the vertical blade-tip track variation. The allowable vertical variation from a reference plane is $\pm 1"$ (25mm). If a blade's tip track is out of tolerance, loosen the M16 hardware and change the plate tip support location higher or lower as required to adjust the tip track. Then recheck blade pitch angle.

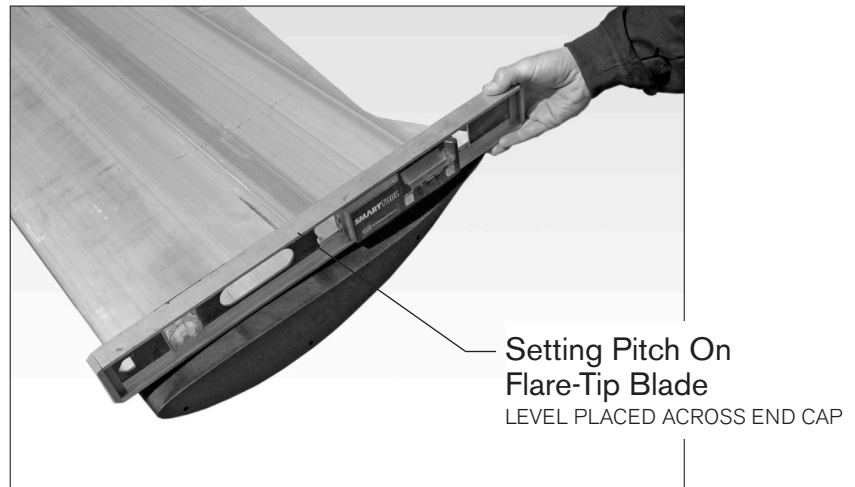


Figure 3

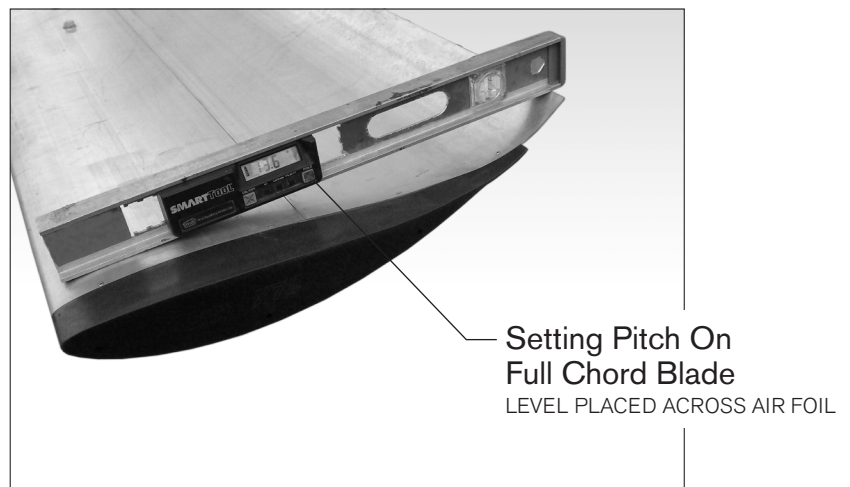


Figure 4

maintenance

Fan Maintenance

Preventative maintenance will prolong useful life and assure continued trouble-free operation. After the first week and subsequently at six month intervals:

- Torque all hardware to specifications referenced in this manual.
- Visually inspect the fan for airborne debris damage, contact with fan cylinder segments, and corrosive attack. Correct any situations determined detrimental to fan operation.
- Remove any accumulated scale or dirt.
- Clear blade drain holes.

Service

Proper identification of your fan is necessary to insure you receive correct replacement parts. The Marley cooling tower serial number can be used to determine the fan and any components installed and maintained as original equipment on a Marley cooling tower. The fan hub assembly identification number is required to identify a replacement hub assembly or repair components. See **Figure 1**. Please provide the Marley sales office or sales representative the necessary information when ordering replacement fans or components.

Blades can be replaced without rebalancing the entire fan.

If rebalancing is desired, contact the Marley sales office or representative in your area.

maintenance

Motor Load

The corrected horsepower should be close to but not exceed the contract horsepower specified by Marley. Determine corrected horsepower using the following equation.

$$HP_C = \frac{VOLTS_A \times AMPS_A \times DENSITY_D}{VOLTS_N \times AMPS_N \times DENSITY_A} \times HP_N$$

HP _C	=	Corrected Horsepower	VOLTS _N	=	Nameplate Volts
VOLTS _A	=	Actual Volts	AMPS _N	=	Nameplate Amperage
AMPS _A	=	Actual Amperage	HP _N	=	Nameplate Horsepower
DENSITY _A	=	Actual Air Density	DENSITY _D	=	Design Air Density

Actual volts and amperage must be obtained with the fan running and the specified rate of water flowing over the tower after the motor and Geareducer have reached operating temperature (approximately 30 minutes of operation).

Note

Measurements taken on motors operating with Variable Frequency Drive controls may read up to 15% high from errors in measuring the approximated sine wave. Instruments capable of measuring a squared off wave form accurately should be used for measuring power in this situation.

Do not start the motor more than four to five times per hour (each low speed start and each high speed start count as one start).

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