/ **Cofimco** *Fan – Adjustable Hub* /

***User Manual 03-11A***

SPX
COOLING TECHNOLOGIES

## Fan Components

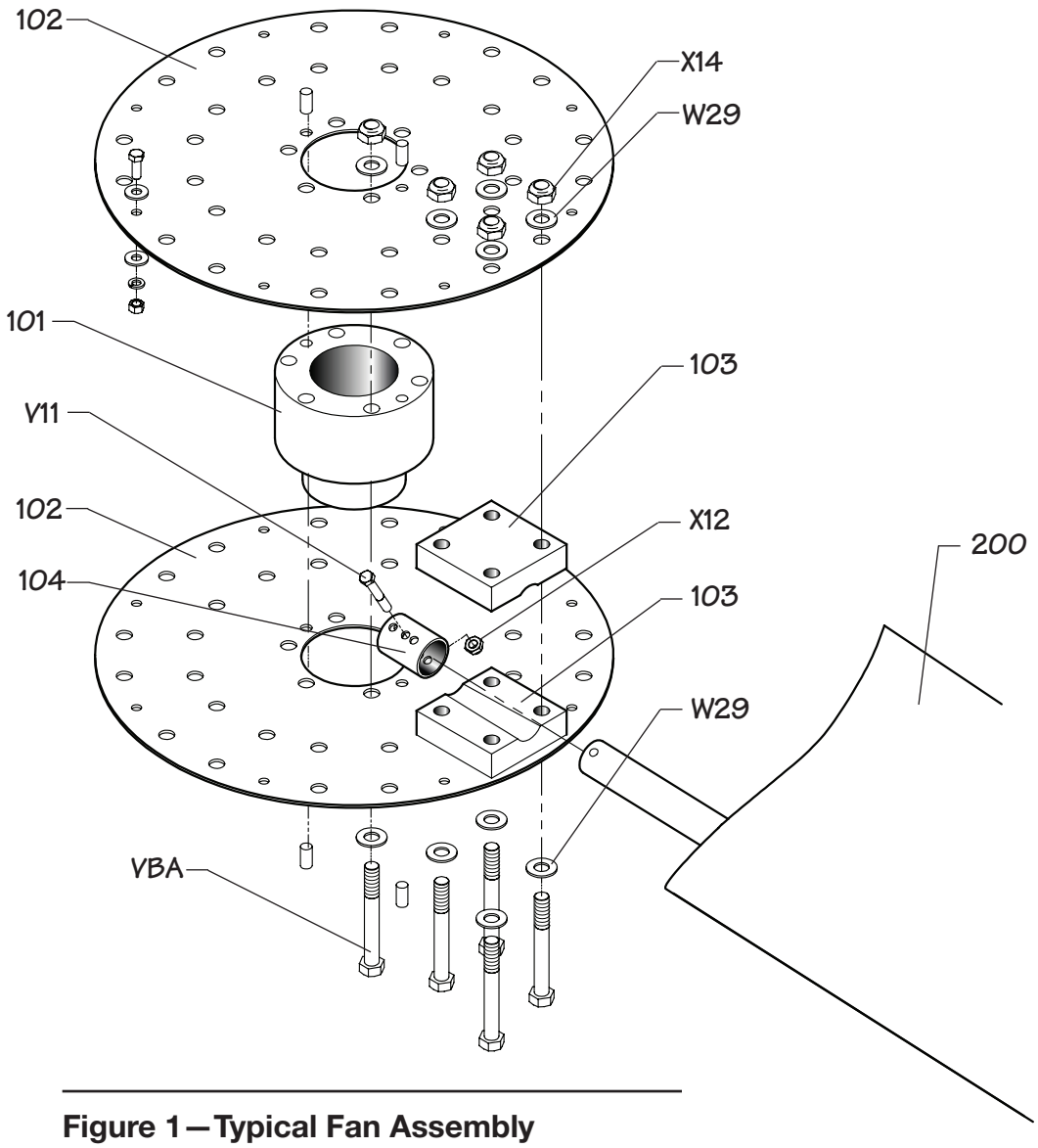


**Figure 1—Typical Fan Assembly**

Order No. _____

Trial Pitch Angle _____

Final Pitch Angle _____

Speed-rpm _____

Contract hp _____

## Fan Assembly Instructions

**Note**

***The following instructions apply to installations having straight bores or tapered output shafts without split taper bushings.***

***It is convenient to preassemble the fan prior to installation on the driving shaft.***

1—Select a large open area corresponding to the fan diameter.

2—Position the fan hub in the center of the work area with the center spool **101** oriented as shown in **Figure 1**.

3—Secure blade retention sleeves **104** to the blade **200** using machine bolt **V11** and locking nut **X12**. Tighten ⅜" nut **X12** to 40 ft·lb$_f$.

4—Position the blade clamp blocks **103** around the blade shank so that the blade **200** droops slightly downward when the blade clamp hardware is tight.

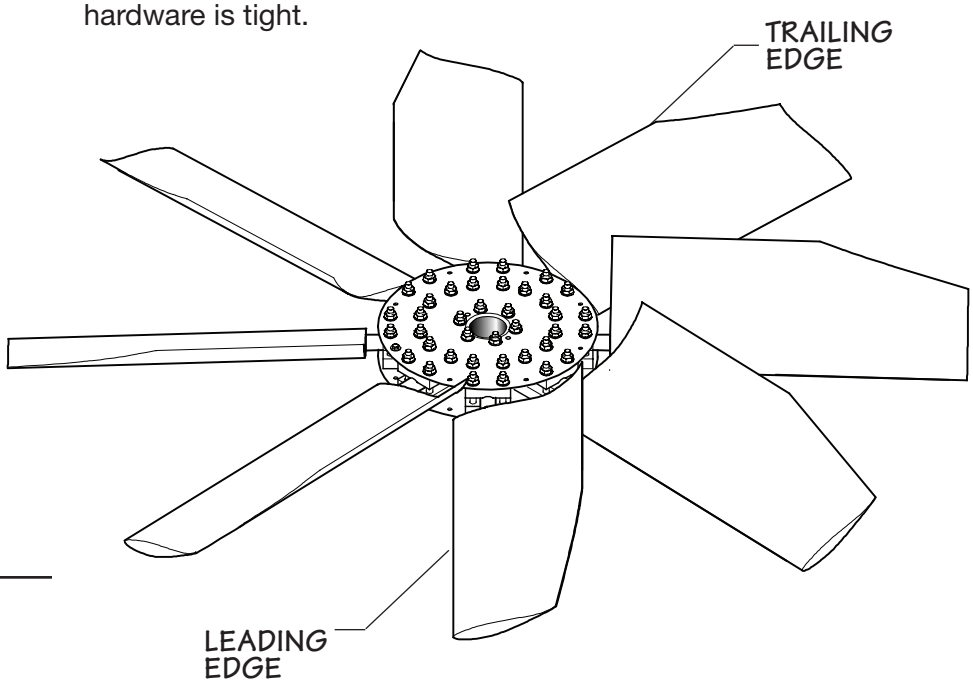


**Figure 2**

5—Position the blade clamps and blade between the hub plates **102** to align bolt holes. Loosely install ⅝" bolts **VBA**, flat washers **W29** and self locking nuts **X14** to secure blades. Finger tighten all ⅝" nuts.

6—On fans where the blades overlap at the hub be sure to have the leading edge under the trailing edge of the forward blade. Refer to **Figure 2**.

7—Pull the blades radially outward until the blade retention sleeve bears against the back side of the blade clamp.

8—Repeat steps 3 through 7 for all blades.

9—Progressively tighten all blade clamp nuts **X14** until the blades are barely able to move when twisting the blade.

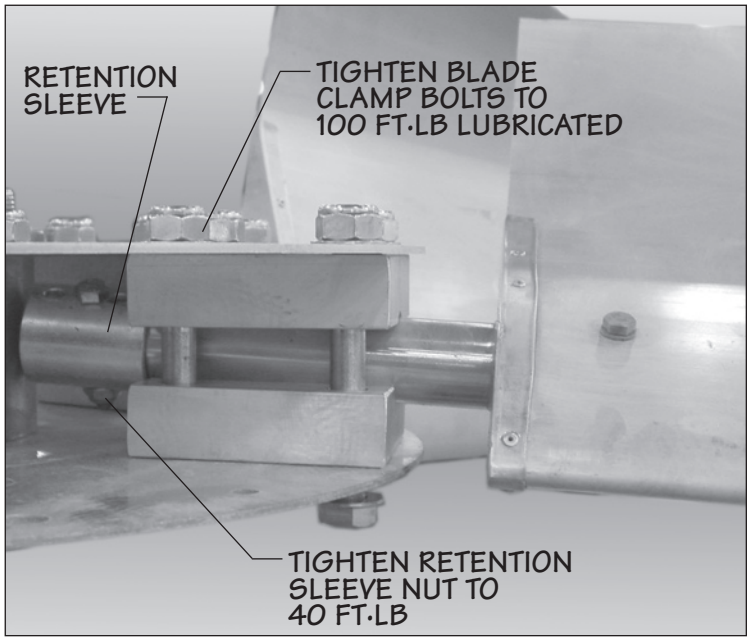


**Figure 3**

10- Measure the final fan diameter. By using a different hole in the blade retention sleeves the fan diameter can be altered for the appropriate fit within the cylinder. ½" minimum clearance between all blade tips and the fan cylinder is recommended.

## Fan Installation Instructions

1—Be sure motor is locked out.

2—Clean the hub bore and driving shaft extension for the full length of the key.

3—Insert the key in the keyway. The top of the key must be below the top of the shaft by not more than ⅛" (3 mm) . The key is a tight fit across the width and must never be altered.

4—After cleaning, apply a coat of anti-seize compound to the engagement portion of the shaft.

5—Raise the fan assembly above the shaft and slowly lower the hub onto the shaft with the keyways aligned. Make certain the key does not slide down during installation.

6—Install the Hub Retention Cap Screw with Lock Washer. Torque hub retention cap screw to 40 ft·lb$_f$ (54 N·m).

## Adjusting Fan Blade Pitch

**Note**

***The trial pitch is the calculated setting for design conditions*** *(water rate , heat load, air density, and brake horsepower)****. The trial pitch is provided by SPX*** *(see 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 3⁄16" (5 mm) inboard of the blade tip by placing a protractor on top of a parallel sided straight edge that extends across blade width as shown in **Figure 4**.

2–Be sure all blades are positioned correctly on hub, then set the pitch. Blades should be within ± ¼° of the desired pitch angle. After the desired setting is obtained, progressively tighten the hardware according to **Table 5**. Recheck the pitch angle. If required, loosen the hex nuts and reset the pitch as necessary until the proper pitch angle is obtained.

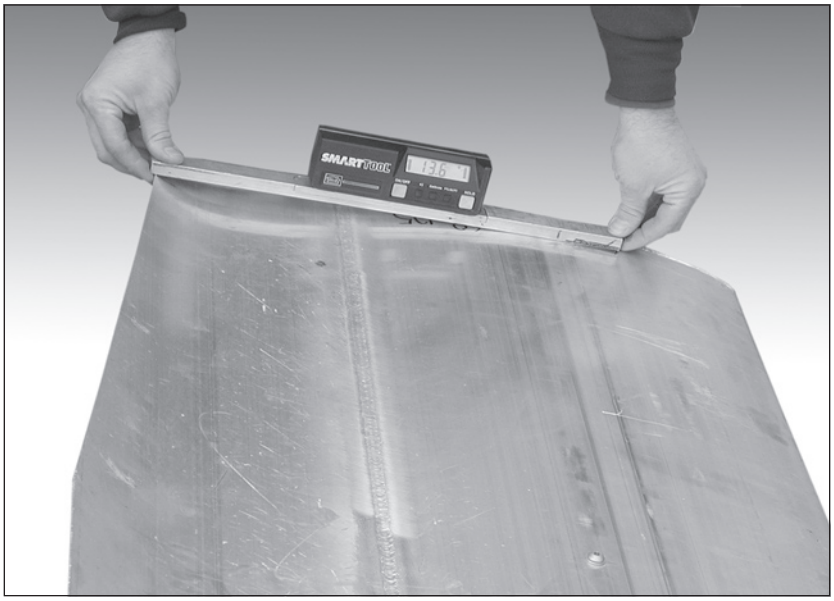


**Figure 4**

| Bolt Diameter | Torque Wrench Setting | |
|---|---|---|
| | $ft{\cdot}lb_f$ | N·m |
| 3⁄8" | 40 | 55 |
| 5⁄8" | 100 | 136 |

**Table 5**

## 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 at fan tip.

## 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. Please provide the Marley 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 representative in your area.

## Motor Load

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

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).

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

| | | | | | |
|---|---|---|---|---|---|
| $HP_C$ | = | 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 |

## 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 exceed 30 sec/hour total motor starting time as motor may overheat.***

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