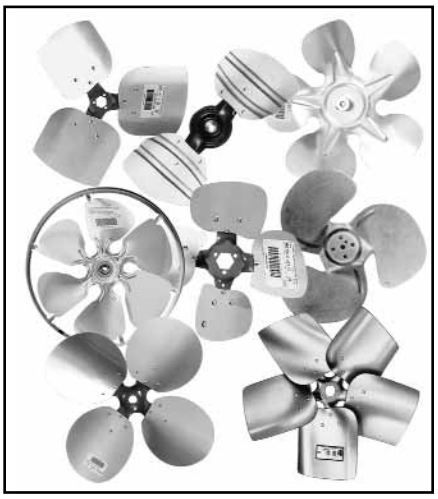
SELECTION & APPLICATION GUIDE FOR REPLACEMENT PROPELLERS



LAU, THE UNIVERSAL REPLACEMENT PROPELLER EXPERTS

Lau's top-quality propellers have been specifically designed, developed, and manufactured to meet the needs of heating, air conditioning, refrigeration, and ventilation servicepersons.

"Universal Replacement" means that Lau may be used to replace any type of propeller – regardless of manufacturer – in virtually all applications.

To ensure satisfaction always use universal replacement propellers manufactured by the experts … Lau Parts Division.

INTRODUCTION …

This guide is intended to provide a basic understanding of propellers and how to select proper replacements.

Refer to your Lau Propeller 2000C Catalog for performance ratings and other pertinent information.

Lau propellers are available from stock though our vast network of wholesalers throughout the U.S.A.

Our line consists of 3-, 4-, 5- and 6-blade props and slinger ring props; up to 40° pitches: up to 60″ in diameter; and both condenser and free air types.

PROPELLER FAILURE – CAUSE AND CURE

WHY DOES A PROPELLER FAIL?

The most common cause of failure is *metal fatigue*. That is, the metal has failed due to repeated fluctuating forces acting on it. This can be envisioned by bending a piece of metal back and forth until it breaks. If you don't bend it very far, you have to bend it many more times before it will fail.

As a propeller rotates, it is subject to fluctuating air forces on the blades causing the blades to bend back and forth. If these forces are great enough, an eventual failure of the blades results. A propeller blade can experience one or more of these bending cycles for each revolution.

If you were to "pluck" the tip of a propeller blade, it would vibrate back and forth at its "natural frequency." When the natural frequency of the blade is close to the operating speed of the motor, the air forces on the blade can be greatly magnified resulting in excessive bending and premature failure.

WHAT SHOULD YOU LOOK FOR?

1. **Excessive Vibration** of the unit can be an indication of a problem. This can be caused by a bent or unbalanced blade, or a bent or undersized motor shaft. When cleaning the motor shaft prior to installing a new prop, use caution – remove only the burrs and rust. Do not reduce shaft diameter by filing or sanding.
2. **Airflow Obstruction:** If an obstruction (leaves, paper, etc.) disrupts the air intake or air discharge area of a unit, thereby restricting the airflow through the unit, the propeller can vibrate, resulting in a failure. A buildup of dirt on the fins of the condenser coil can also produce the same result.
3. **Propeller Obstruction:** If an internal part of the unit detaches and is struck by the propeller, the blades of the propeller can be bent or broken. Check for loose parts.

WHAT IF A REPLACEMENT PROP FAILS?

If your replacement prop fails and none of the above items are found to be a problem, the replacement prop may have a natural frequency close to the operating speed of the motor. In this case, you should choose a prop with a different number of blades.

Usually a prop with a different number of blades will have a different natural frequency, which can reduce the magnifying effect of the air forces on the blades.

Use Caution: *If increasing the number of blades, you may have to reduce the pitch to prevent motor overload.*

If decreasing the number of blades, you may have to increase the pitch to maintain a satisfactory air flow.

In either case, consult the Lau Propeller Catalog 2000C to make your selection.

DEFINITIONS AND HELPFUL HINTS FOR PROPELLER SELECTION

BHP (brake horsepower, also designated H.P.): The horsepower required by the propeller or, the rated horsepower of the motor.

CFM *(Cubic Feet per Minute)***:** The volume of air moved by the propeller per minute. In comparing performances of cross-referenced propellers, CFM values are often not identical. A small variance in CFM can exist without substantially affecting the performance of a unit.

Static Pressure *(Inches of Water)***:** A measure of the resistance to airflow caused by a condenser coil or other obstruction.

Condenser Propellers: Designed to operate against static pressure. When choosing a replacement propeller for a condenser-type application where the static pressure is unknown, use the BHP required at .3″ static pressure for the appropriate RPM. This will usually prevent the motor from being overloaded.

Free Air: A term used to define a static pressure of zero.

Free Air Propellers: Designed to operate at zero static pressure. Its blades are usually wide and round in shape. An example of a free air propeller is one that would be used on a pedestal fan where the airflow is unrestricted by condenser coils, unit walls, louvers, etc.

NUMBER OF BLADES

It is common for propellers of slightly different pitches and number of blades to achieve the same performance. This is possible because of the various blade shapes and forms employed by each manufacturer. It is, however, usually desirable for a replacement propeller to have the same number of blades as the original propeller.

PROPELLER PITCHES

The pitches of cross-referenced propellers are often not identical for the same reasons stated above. It is common for propellers of slightly different pitches to achieve the same performance.

Pitch is measured at the spider lobe, not on the blade.

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ROTATION

The propeller's rotation direction is determined to be clockwise (CW) or counterclockwise (CCW) when viewed from the air discharge side (air blowing in your face). The discharge side is the concave ("cupped") side of the blade.

Imagine standing in a sandbox and dropping the propeller face up, or face down, on the sand. Regardless of which side is up, the direction of rotation is the same as the direction required to turn the propeller into the sand.

MOTOR NAMEPLATE

The motor nameplate provides the most important information for selection of a replacement propeller – the RPM and the BHP. The horsepower required by the propeller selected should not exceed the BHP of the motor nameplate at the rated RPM.

If the motor nameplate does not include the BHP rating, the replacement propeller must be selected only on the basis of the pitch and the number of blades of the old propeller. In this case, it is advisable after replacement of the propeller to check the actual amperage draw of the motor to ensure that it does not exceed the rated amps.

PROPELLER SELECTION CHECKLIST

To help you make the best selection of a replacement propeller, regardless of manufacturer, use this checklist to record the necessary information from the motor nameplate and from the broken or faulty propeller.

_____ Diameter

_____ Number of Blades

_____ Pitch

_____ Rotation (CW or CCW)

_____ Bore Size

_____ Propeller Type (Free Air or Condenser)

_____ Motor Nameplate RPM

_____ Motor Nameplate HP, or if not available, AMP rating

Match above listed information with the performance tables given in the Lau Universal Replacement 2000C Catalog to select the proper Lau replacement.

INSTALLATION TIPS

1. Disconnect electrical power before working on unit.
2. Note location of old propeller in unit. Remove old propeller from motor shaft. Use a proper type of puller. *Do not hammer* on propeller as this can result in a bent shaft or bearing damage.
3. Remove burrs and rust from motor shaft.
4. Use extra care in handling and installation. Locate interchangeable hub on desired side of propeller (air intake or air discharge). Attach hub to propeller with three (3) screws provided (to determine side to locate hub on, it will be helpful to note hub location of old propeller). Tighten screws to approximately 30 in.-lbs..
5. Place propeller on motor shaft in unit and locate in approximately the same position as the old propeller.
6. Make sure that the propeller will be rotating in the right direction.
7. Fasten the propeller to the motor shaft by tightening set screws securely. Be sure to align set screw with flat on motor shaft.

Set Screw Diameter	Recommended Seating Torque
1/4	70 in. - lbs.
5/6	130 in. - lbs.

8. Rotate the propeller by hand to make sure that the blades clear any obstructions by at least 1/4″.

HORSEPOWER CONVERSION CHART

Decimal Horsepower										
	0.010	0.014	0.017	0.020	0.025	0.033	0.040	0.050	0.67	
Fractional Horsepower										
	1/100	1/70	1/60	1/50	1/40	1/30	1/25	1/20	1/15	
Decimal Horsepower										
	0.083	0.100	0.125	0.167	0.250	0.333	0.500	0.750	1.000	
Fractional Horsepower										
	1/12	1/10	1/8	1/6	1/4	1/3	1/2	3/4	1	

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