prop, long a coveted decoration for the pilot's den, is still providing excellent service in the air, though it is rarely, if ever, used in the manufacture of new aircraft.

Construction of a wooden prop, as depicted in Figure 9-2, consists of several laminated layers of wood with a doped cotton fabric sheathing glued to the last 12–15 inches of the blade. Occasionally a plastic coating will be used instead of fabric, but they both serve to reinforce the thin blade tip. On top of this runs a metal (usually brass, Monel, or stainless steel) tipping along the leading edge of the prop, which helps prevent foreign object damage. Small holes are drilled into the metal tip to allow the wood to breathe and moisture to escape.

For ease of maintenance and reduced weight, most modern fixed-pitch props are made of aluminum. Fixed-pitch props can be purchased, depending on the operator's needs, for maximum efficiency during climb or cruise. Most aircraft would have the latter installed, but aircraft primarily used for hauling skydivers should have a climb prop. It makes the climb to altitude much quicker, sometimes even before the first-time jumpers lose their nerve. Other operations that benefit from a climb prop are aircraft that operate routinely off of a short, sod strip, or those that tow gliders.

CONSTANT-SPEED PROPELLER

The modern constant-speed propeller allows the pilot to select an engine RPM based on current operating conditions. The prop governor adjusts the blade angle to maintain selected RPM. This type of prop is used on most medium- and high-performance singles and practically all propeller-driven multiengine aircraft. One significant advantage is the ability to reduce prop drag to near zero (called feathering) should an engine fail in flight. When feathered, the prop blade turns its edge into the wind and the prop comes to a stop. Some aircraft, typically large recips and turboprops, even have the ability to rotate the blade angle to a negative value, which effectively creates thrust in the opposite or reverse direction. Prop reverse significantly reduces landing roll, and when combined with differential power (varying left and right engine power to aid steering) it greatly improves ground handling.

A constant-speed propeller system is one in which propeller blade angle is varied by a governor so that a constant propeller RPM can be maintained despite engine throttle changes or variations in aircraft speed. This allows the pilot to operate the propeller at a high level of efficiency. Unlike the fixed-pitch propeller, which is efficient under only one set of circumstances (either in cruise or climb, depending on type of propeller), the constant-speed prop permits both efficient climb and cruise. Figure 9-3 compares the takeoff climb performance of both types of propellers. For any given phase of flight, there is one RPM setting that is most efficient; it gives you the greatest gain for the least amount of energy. The constant-speed prop allows you to operate, within limitations, at that RPM.

For a propeller to turn at a constant RPM as power conditions change, the angle of attack of the blades must be adjustable. Because it would be impractical for the pilot to make such frequent adjustments, it is done automatically by the propeller's constant-speed governor.