

Chapter Nine

controls be easily distinguished from one another as to shape and color. Instrumentation must use standardized markings: a red radial line indicates maximum operating limitation, a green arc is the normal operating range, a yellow arc is the takeoff and precautionary range, and a red arc is the critical vibration range.

Another critical area covered by regulation is minimum terrain clearance or the space between level ground and the edge of the prop tip. Ground clearance for land aircraft assumes normal inflation of struts and tires. For conventional-gear (tailwheel) aircraft, it must be at least 9 inches in the takeoff attitude; for tricycle gear it is 7 inches in the most nose-low, normal attitude, whether stationary, during taxi, or takeoff. It also requires positive clearance with strut and tire deflated. For the seaplane, minimum prop-to-water clearance is 18 inches.

PREVENTIVE MAINTENANCE

Probably the best preventive maintenance possible is to keep the props clean. If a prop is dirty it is very difficult to see cracks and other problems while they are still repairable. To wash wooden props, use a soft brush or cloth and apply warm water and a mild soap across the entire blade. When finished, dry with a soft towel. Metal props should be cleaned with a non-oil-based cleaning solvent approved by the manufacturer, such as Stoddard solvent. Never use a caustic cleaner or acid. The solvent may be applied with a soft brush or cloth, then wiped dry with a soft cloth. After drying, wax the blades with a good auto paste wax to protect them from corrosion. For the same reason, it is also a good idea to wipe the blades periodically, even after every flight, with a damp cloth.

Propeller repairs typically have to be accomplished by the manufacturer or an authorized repair station. Some may be done by a powerplant mechanic, but there are no repairs authorized for the non-A&P. The owner/operator is primarily limited to basic preventive maintenance, which is essentially no more sophisticated than replacing defective safety wire or cotter keys.

It is permissible to lubricate parts of a propeller not requiring disassembly beyond nonstructural fairings, coverplates, and cowlings. You may also apply coatings such as paint, wax, and other preservatives if they are not prohibited by the manufacturer, are not contrary to good maintenance practice, and only if no disassembly is required. Major alterations and repairs may only be performed by an authorized repair station according to Advisory Circular (AC) 43.13-1, Acceptable Methods, Techniques and Practices. This would include repairs to deep dents, scars, cuts, and nicks.

Prop repair tolerances for cuts and dents are tight with little room to work. For instance, take a prop with a diameter of less than 10 feet, 6 inches. A nick located between the hub and the 24-inch station would not be allowed to exceed $\frac{3}{4}$ ths of the blade width. If the blade width was 6 inches, a nick deeper than approximately $\frac{1}{4}$ inch would be cause for a repair facility to scrap the blade! If that seems unreasonable, consider the forces acting on the propeller.

Vibration is a natural by-product of the propeller producing thrust, but excess vibration will fatigue the metal and lead to failure. Mechanical vibration, the result of piston engine power pulses and crankshaft resonance, is a prime culprit in metal fatigue and prop failure. Some RPMs are particularly harmful to the prop, so the manufacturer puts