SECTION 5. FINISHING WOOD STRUCTURES

1-64. GENERAL. Any repair to spars, ribs, skin surfaces, or other structural parts of the airframe involves finishing as the final step of the job. The surface finish is the final line of defense to prevent the destructive effects of moisture entry into the structure. The time and effort spent during the preparatory phase of the refinishing process will be reflected in the appearance and longevity of the finished surface. Adherence to the instructions issued by the finish manufacturer is necessary to obtain the appearance desired and protective characteristics for the product used. The primary objective of interior finishes is to afford protection of the wood against serious change in moisture content when exposed to damp air or to water that gains entrance to closed spaces by condensation or by penetration of rain, mist, or fog. Coatings, on contact areas between wood and metal protect the metal against corrosion from moisture in the wood. The primary objectives of the exterior finish are to protect the wood against weathering, provide a suitable appearance, and present a smooth surface in flight.

1-65. ACCEPTABLE FINISHES. Any varnish conforming to Federal Specification TT-V-109, as amended, or other coating approved by the airframe manufacturer or the FAA is acceptable. Exterior surfaces must be further protected from the effects of abrasion, weather, and sunlight. A number of systems for exterior finishing have STC approval and are manufactured under a PMA. (See Chapter 2, Fabric Covering.) Low viscosity epoxy adhesive (meeting the requirements of paragraph 1-4 for that purpose) may be used as an internal surface finish when subsequent bonding is necessary.

1-66. PRECAUTIONS.

a. When making repairs, avoid excessive contamination of surfaces with adhesive squeeze-out at joints and on all surfaces. Excess adhesive should always be removed before applying finish. Because many paints and adhesives are incompatible, even a slight amount of adhesive underneath the finish may cause premature deterioration of the finish.

b. Soiling substances, such as oil and grease, should be removed as completely as possible. Naphtha may be used to remove surface deposits of oil and grease; however, thinned residue may penetrate into any unprotected wood. In areas where minor amounts of oil or grease have penetrated the wood surface, removal may be accomplished by use of an absorbent type of cleaner such as gunsmith's whiting or a clothing spot lifter such as K2r™. Marks that are made by grease pencils or lumber crayons containing wax are harmful and should be removed, but marks made by ordinary soft graphite pencils and nonoily stamp pad inks may be safely finished over. All dust, dirt, and other solid particles should be removed.

c. Sawdust, shavings, and chips must be removed from enclosed spaces before they are sealed off by replacement of skin. A vacuum cleaner is useful for such cleaning.

d. Since most adhesives will not bond satisfactorily to sealers, it is necessary to avoid applying sealer over the areas where adhesive will be applied. Mark off areas to receive adhesive, and allow an additional 1/4 inch on each side of the adhesive area to provide for

misalignment when mating the parts. It is preferable to leave some unsealed areas rather than risk weakening the joint by accidental overlap of the sealer into the bonded areas. Wherever possible, apply sealer to the margins after the adhesive has cured. As an example, the lower skin of a wing bay would be installed first, leaving access from above to apply sealer. All low spots (where moisture would collect) are well sealed. The top skin would be installed last, so that the only unsealed margins would be on upper surfaces where moisture is least likely to collect.

e. An alternative to the previous paragraph is to use an approved epoxy coating and compatible epoxy adhesive. Apply the coating, allowing 1/4 inch margins as in the previous paragraph. After the coating has cured, apply epoxy adhesive to joint surfaces, and overlap the adhesive onto the sealer. Close joint and clamp. The epoxy adhesive will bond satisfactorily to the coating and ensure a complete coverage of the wood surfaces. Use only approved and compatible adhesives and coatings for this method.

1-67. FINISHING OF INTERIOR SURFACES. Finish repaired ribs, spars, interior of plywood skin, and other internal members, including areas of contact between metal and wood, by applying one thinned coat (for penetration into wood grain) of varnish or other acceptable finish, followed by two full coats. Protect built-up box spars and similar closed structures on the interior in the same way. Where better protection is required, as on the surfaces of wheel wells and the bottoms of hulls below the floor boards, an additional coat of aluminized sealer consisting of 12 to 16 ounces of aluminum paste per gallon of sealer, may be applied.

1-68. FINISHING OF EXTERIOR SURFACES. Exterior surfaces require more protection than interior areas due to the effects of abrasion, weather, and sunlight. (See chapter 2.) Tests have shown that the interior temperature of wooden aircraft structures can reach 185 §F when the aircraft is finished in a dark color and parked outdoors on a hot, still day. Exposure to prolonged high temperature is detrimental to wood, adhesives, and finishes. Wood loses approximately 25 percent of its strength at 125 §F. For this reason, the mechanic should consider temperature effects when selecting finish colors or looking for areas of likely deterioration. The lowest temperatures are found when the aircraft is finished in white or very light colors, while darker colors produce higher temperatures. A general trend toward higher temperatures may be seen when exterior colors are yellow, pink, light blue, aluminum, purple, blue, light green, orange, tan, red, green, brown, and black. A lighter shade of a particular color helps to reduce temperatures.

1-69. FINISHING OF END GRAIN SURFACES. End grain portions of wooden members are much more absorbent than side grain. Because of this extreme vulnerability to moisture entry, it is necessary to take extra precautions to seal end grain.

a. Apply at least one thinned coat of acceptable sealer to ensure maximum penetration, and then follow with as many full strength coats as necessary to achieve a smooth, glossy coating. Depending on the type wood to be finished, two to four full coats will be required. A final coat of aluminized varnish may be applied to end grain surfaces. If the surfaces are to be finished with dope or lacquer, a dope-proof sealer, similar to Federal Specification TT-V-109, or epoxy sealer should be used.

b. Exposed end grain includes such surfaces as spar butts, skin edges, areas around vent holes, inspection holes, fittings, and exposed scarfed or tapered surfaces.

1-70. FINISHING WITH FABRIC OR TAPE. A number of systems for exterior finishing have STC approval and are manufactured under a PMA. Follow the product manufacturer's instructions for the system used.

a. If the finish surrounding the repair is a traditional dope system, seal the wood grain with a suitable solvent resistant one-part varnish, commonly described as “dope proof,” or a two-part epoxy varnish. Follow with two coats of clear dope, and allow sufficient drying time between coats.

b. Apply a third coat of clear dope and lay a piece of pinked-edge airplane cloth into the wet film. All air bubbles should be worked out by brushing to ensure maximum adhesion. When dry, apply one brush coat, to ensure proper penetration, and at least one spray coat of clear dope. The dried spray coat may be sanded with fine sandpaper to obtain a smoother finish. Complete the refinishing of the surface by application of a topcoat as required to match the adjacent area.

1-71. SEALING OF BOLT HOLES. Bolt holes in wooden structure provide a vulnerable entry point for moisture. Variations in moisture content around bolt holes can lead to decay or splitting. In addition, excessive moisture at bolt holes promotes corrosion of the bolts. Sealing of the wood surfaces in bolt holes can be accomplished by application of varnish or other acceptable sealer into the open hole. The sealer must be allowed to dry or cure thoroughly prior to bolt installation.

1-72.—1-79. [RESERVED.]