

References to Manufacturer's Instructions for Substitution of Parts and Aerodynamic Smoothness

The following references list information found in the three handbooks AFS-630 maintains: Aviation Maintenance Technician Handbook—General (FAA-H-8083-30A), Aviation Maintenance Technician Handbook—Airframe (FAA-H-8083-31A), and Aviation Maintenance Technician Handbook—Powerplant (FAA-H-8083-32A).

General

Page 7-1: "Aircraft Metals

Knowledge and understanding of the uses, strengths, limitations, and other characteristics of structural metals is vital to properly construct and maintain any equipment, especially airframes. **In aircraft maintenance and repair, even a slight deviation from design specification, or the substitution of inferior materials, may result in the loss of both lives and equipment.** The use of unsuitable materials can readily erase the finest craftsmanship. The selection of the correct material for a specific repair job demands familiarity with the most common physical properties of various metals."

Page 7-12: "Substitution of Aircraft Metals- In selecting substitute metals for the repair and maintenance of aircraft, it is very important to check the appropriate structural repair manual. Aircraft manufacturers design structural members to meet a specific load requirement for an aircraft. The methods of repairing these members, apparently similar in construction, vary with different aircraft.

Four requirements must be kept in mind when selecting substitute metals. The first and most important of these is maintaining the original strength of the structure. The other three are maintaining contour or **aerodynamic smoothness**; maintaining original weight, if possible, or keeping added weight to a minimum; and maintaining the original corrosion-resistant properties of the metal.

Page 7-59: "If the rivet is to be installed on an aerodynamically smooth surface, or if clearance for an assembly is needed, countersunk head rivets should be selected. In other areas **where clearance or smoothness is not a factor, the protruding head type rivet may be utilized."**

Page 7-66: "The total amount of material thickness to be secured with the Airloc fastener must be known before the correct length of stud can be selected for installation. The total thickness of material that each stud satisfactorily locks together is stamped on the head of the stud in thousandths of an inch (0.040, 0.070, 0.190, and so forth). Studs are manufactured in three head styles: flush, oval, and wing."

Page 10-4: "Manufacturers' Service Bulletins/Instructions

Service bulletins or service instructions are two of several types of publications issued by airframe, engine, and component manufacturers. The bulletins may include: purpose for issuing the publication;

name of the applicable airframe, engine, or component; detailed instructions for service, adjustment, modification or inspection, and source of parts, if required; and estimated number of man-hours required to accomplish the job.”

“Maintenance Manual

The manufacturer’s aircraft maintenance manual contains complete instructions for maintenance of all systems and components installed in the aircraft. It contains information for the mechanic who normally works on components, assemblies, and systems while they are installed in the aircraft, but not for the overhaul mechanic. A typical aircraft maintenance manual contains:

- Tolerances and adjustments necessary to proper functioning of the airplane
- Frequency and extent of inspections necessary to the proper operation of the airplane
- Special repair methods applicable to the airplane”

“Structural Repair Manual

The structural repair manual contains the manufacturer’s information and specific instructions for repairing primary and secondary structures. Typical skin, frame, rib, and stringer repairs are covered in this manual. Also, included are material and fastener substitutions and special repair techniques.”

“Illustrated Parts Catalog

The illustrated parts catalog presents component breakdowns of structure and equipment in disassembly sequence. Also, included are exploded views or cutaway illustrations for all parts and equipment manufactured by the aircraft manufacturer.”

AF Vol. 1

Page 4-97: “Minor damage to the outside skin of the aircraft can be repaired by applying a patch to the inside of the damaged sheet. A filler plug must be installed in the hole made by the removal of the damaged skin area. It plugs the hole and forms a smooth outside surface necessary for aerodynamic smoothness of the aircraft. The size and shape of the patch is determined in general by the number of rivets required in the repair. If not otherwise specified, calculate the required number of rivets by using the rivet formula. Make the patch plate of the same material as the original skin and of the same thickness or of the next greater thickness.”

And-

“The lap or scab type of patch is an external patch where the edges of the patch and the skin overlap each other. The overlapping portion of the patch is riveted to the skin. Lap patches may be used in most areas where aerodynamic smoothness is not important. Figure 4-174 shows a typical patch for a crack and or for a hole.”

Page 4-98: “Usually, repairs to open skin can be made in the conventional manner using standard rivets, but in repairing closed skin, some type of special fastener must be used. The exact type to be used depends on the type of repair being made **and the recommendations of the aircraft manufacturer.**”

Page 7-45: “*Step 6: Fastener Installation-* Once fastener holes are drilled full size and reamed, permanent fasteners are installed. Before installation, measure the fastener grip length for each fastener using a grip length gauge. **As different fasteners are required for different repairs, consult the SRM for permissible fastener type and installation procedure.** However, install all fasteners wet with sealant and with proper torque for screws and bolts.”

Powerplant Vol 2.

Page 8-10: “When the engine has been aligned correctly in the nacelle, insert the mounting bolts into their holes and start all of the nuts on them. **Always use the type of bolt and nut recommended by the manufacturer. Never use an unauthorized substitution of a different type or specification of nut and bolt than that prescribed.**”

Pages 8-16 & 8-17: “The installation procedures are essentially the reverse of the removal procedures. Move the QECA straight back into the nacelle structure and align the mount bolt holes and the firewall. Start all the bolts before torqueing. With all the bolts started, and using the correct torque wrench adapter, tighten the mount bolts to their proper torque. Remove the sling and install the access covers at the lift point. Using the reverse of the removal procedures, connect the various lines and connectors. New O-ring seals should be used. **The manufacturer’s instructions should be consulted for the proper torque limits for the various clamps and bolts.**”