February 14, 2018

Dr. Tim Brady
Chair, Aviation Rulemaking Advisory Committee
800 Independence Avenue, SW
Washington, D.C. 20591

Yvette Rose
Vice-Chair, Aviation Rulemaking Advisory Committee
800 Independence Avenue, SW
Washington, D.C. 20591

Dear Dr. Brady and Ms. Rose,

On behalf of the Aviation Rulemaking Advisory Committee's (ARAC) Airman Certification System Working Group (ACSWG), we submit the following recommended changes for the Aviation Maintenance Technician Handbook – Airframe (FAA-H-8083-31A) to the Aviation Rulemaking Advisory Committee (ARAC) for review and submittal to the Federal Aviation Administration (FAA). Additionally, the working group reviewed and provided recommendations to the AMA sample exam.

The recommendation includes feedback compiled from the ACSWG's AMT subgroup that, once incorporated, will help bring the handbook into alignment with the corresponding ACS but also with today's technologies, teachings, and practices.

The ACSWG and its members appreciate the committee's review and approval of the recommendation.

Sincerely,

David Oord
ACSWG Chair
Senior Director, Regulatory Affairs
Aircraft Owners and Pilots Association

Jackie Spanitz,
AMT ACS Subgroup Co-chair
General Manager
Aviation Supplies & Academics, Inc.

Janeen Kochan
Janeen Kochan, PhD, FRAeS
AMT ACS Subgroup Co-chair
Human Factors Scientist/Designated Pilot
Examiner/Instructor Pilot
Aviation Research, Training, and Services, Inc.

Airframe Handbook (FAA-H-8083-31A) Recommendations

Based on Draft Edition:

https://s3.amazonaws.com/FAA/AMT+Airframe+Volume+1+DRAFT+_1%2C+Oct+27%2C+2017.pdf
https://s3.amazonaws.com/FAA/AMT+Airframe+Volume+2+DRAFT+_1%2C+Oct+27%2C+2017.pdf

Feedback from ACS AMT WG:

Pg 1-16, figure 1-32 - “tire rod” should be “tie rod” 2-places

Pg 1-16, Fig. 1-32 The label reading “wing rib or plain rib” actually points to a compression rib. The plain ribs are seen in blue.

Pg 1-28, Fig 1-59 The surface outlined and labeled as “ruddervator” is actually the trim tab which is mounted on the ruddervator.

Pg 1-40, Rt. Col, last Paragraph – “a helicopter can be made of either metal or wood composite materials.” Wood composite materials does not make much sense here discussing helicopter construction.

Pg 2-12, figure 2-12 – Shows trim tab callouts pointing to the flaps.

Pg 2-13, The discussion regarding slats and slots is confusing. This needs to be re-written to assist in understanding.

Pg 2-14, Fig 2-17 shows a Learjet 60 and text refers to it as a Boeing 737.

Pg 2-15, Lt. Col, 2nd Paragraph – Shouldn’t there be a mention of “fly by light” here? That is the newest technology applied here.

Pg 2-29, figure 2-45 – Although this has been changed from the last edition, the arrows shown overlaying the rotor head confuse rather than help. It appears that one set of blades is moving the wrong direction. / Fig 2-45 The order of these photos, and the arrow on the rotor do not appear to be supporting the information in the caption.

Pg 2-35 - figure 2-57 and the copy here is a repeat of information presented in Chapter 1. Is this necessary and/or desirable?

Pg 2-38, Lt Col – Title reading “Airplane Assembly and Rigging” probably should be in red – to indicate the higher level of title.

Pg 2-42, Fig 2-67 The second drawing from the top “shake” should read “shank”

Pg 3-11, Rt Col, 3rd Paragraph – The first sentence need to be rewritten. It really doesn't make any sense.

Pg 3-23, Right column, last paragraph, second sentence "hanger" should be "hangar"

Pg 3-24, Lt Col, 2nd Paragraph – Any references to aircraft covering with fiberglass are referring to the Razorback process. The sentence about ray domes and plywood are irrelevant to this discussion. Also, it is "radomes" not "ray domes."

Pg 4-30, Lt Column 2nd Para, 2nd Line – "AC43.13.1" should be "AC43.13-1"

Pg 4-33, Figure 4-77 – The information for alloy code E is wrong.
Alloy Code E [KE*] *Boeing
Alloy 7075 Aluminum
Head mark raised ring

The bottom panel in the figure can be eliminated.

The caption for the figure should read Rivet "Alloy", not "Allow"

Figure 4-77 uses KSI but I don't find that defined in either the text or the figure.

Pg 4-82, Left column, second paragraph "cornice break" should be "cornice brake"

Pg 5-26, Left column, third paragraph, second sentence "One is the tough or tapping method." Should be "touch" not "tough"

Pg 5-34, Figure 5-50 – This does not make any sense to me. Too many problems to list!

Pg 7-27, Right column, third paragraph "moisture proof back" should be "moisture-proof bag"

Pg 7-56, Figure 7-92 This does not look like a unibit.

Pg 10-10, Fig 10-16 Needle should be in green arc.

Pg 10-13 thru 10-15, Colors used in figures for pitot and static air should be consistent to prevent confusion.

Pg 10-21, Fig 10-35 The altimeter shown does not support the situation described.

Pg 10-43, Fig 10-78 Distance between Geographic pole and magnetic poles is radically different in the two drawings. Does not help with understanding.

Pg 10-46, Left column, second paragraph, last line should read Fig 10-84 only.

Pg 10-48, Fig 10-86 wrong caption

Pg 11-22, Left column, last paragraph. Should read “virtually” not “vertically”

Pg 11-69, Right column, paragraph 3 Should read “12,625 miles” not “feet”

Pg 12-4, Left column, paragraph 2, last sentence. Should be “elastomers” not “elastoiners”

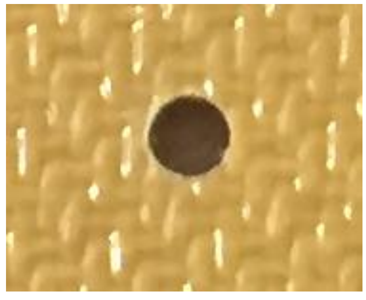
Pg 13-15, Throughout – “tow” should be “toe”

Pg 16-18, Figure 16-32 Pressure should be in “hundreds” not “thousands”

Pg 750 and 751 the book discusses drilling Kevlar® composite materials. I agree that a standard drill bit should not be used, and the best hole is achieved by using a sickle-shaped Klenk drill but the picture you have on page 7-51 labeled “Klenk-type drill for drilling Kevlar®” looks like a standard drill bit to me. I contacted the manufacturer, and this was the response I received:

“Regarding the sickle-shaped drill, this is a product which we developed for drilling fibre reinforced materials like Kevlar a very long time ago. Nowadays similar but improved geometries are in use in the manufacturing of latest aircraft models, e.g. the Airbus A350 XWB. The sickle-shaped drill is basically used in manual hand drilling operations in CFRP or GFRP. To have a general idea of the cutter, please see the attachment picture.”

The picture below on the left is 285 style Kevlar® laminate drilled with a standard drill bit and the one the right was drilled with a sickle-shaped Klenk drill bit.



Pg 7-55 and 7-56 you discuss the drill bit for drilling acrylic materials. The text and the picture suggest a larger included angle of 150° should be used and the rake angle ground to 0°. While I agree on the rake angle the included angle should be smaller, 60°. The *Plexiglass Fabrication Manual* on pages 14-16 call out the 60° included angle anytime you are drilling all the way through the plastic to prevent fracturing when exiting the back side of the sheet. Larger included angles are only used when the hole does not go completely through the sheet to help in chip removal. I have copied page 216 out of AC65-15A which shows the large included angle in the picture but in the text it states that if the hole is to be drilled completely though a 60° angle should be used. I have changed a lot of windows in my career, but I have never drilled a hole in acrylic that did not go all the way through. Any acrylic bit that you purchase will be a 60° bit with rake angle ground to 0°. Here is a picture of one of my bits.

Cutting

Scribing and edge sanding is the cutting method most generally used on flat sections or two-dimensional curved pieces. The sheet is first cut to approximate shape on a band saw, using a scribed line as a guide and cutting approximately $\frac{1}{16}$ in. oversize. Use disk sanders when removing material from straightedges and outside curves. Use drum or belt sanders for inside curved edges. When sanding irregular shapes or larger pieces which are awkward to manipulate around a fixed machine, use an air-driven sander or small electric hand sander.

Drilling

For the sake of both accuracy and safety, hold work in suitably designed clamps or fixtures. The twist drills commonly used for soft metals can be used successfully for transparent plastics if ordinary care is observed. However, the best results can be obtained if drills are re-pointed with the following in mind:

(1) The drill should be carefully ground free of nicks and burrs which would affect surface finish.

(2) It is particularly important that the cutting edge be dubbed off to zero rake angle.

(3) The length of the cutting edge (and hence the width of the lip) can be reduced by increasing the included angle of the drill. (See figure 5–96.)

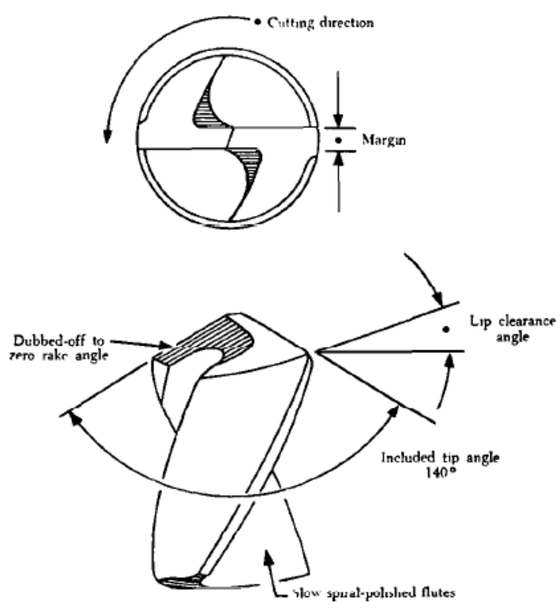


FIGURE 5–96. Drill for acrylic plastics.

Use drills with slow-spiral polished flutes. Flutes should be as wide as possible. The best lubricant and coolant for drilling plastics is a water-soluble cutting oil. For drilling shallow or medium depth holes, no coolant is needed. For deep holes, of course, a coolant is necessary.

Cleaner, more transparent deep holes can be produced by first drilling a pilot hole a little more than half the diameter of the final hole, filling this pilot hole with a wax stick, then redrilling to the final diameter. If the pilot hole is drilled all the way through, the Plexiglas must be backed with wood to close the hole and make the wax stick effective. The wax lubricates the cut and supports and expels the chips during drilling. In clear Plexiglas the resulting hole is cleaner, smoother, and more transparent than holes produced by other methods.

Large diameter holes can be cut with hollow-end mills, hole saws, fly cutters or trepanning tools. The cutters of the latter should be ground to zero rake angle and adequate back clearance, just as lathe tools are ground. All these tools can be used in the standard vertical spindle drill press or in flexible shaft or portable hand drills.

In general, the speed at which Plexiglas sheets can be drilled depends largely on the quality of the equipment used. Plexiglas can be drilled at the highest speed at which the drill will not "wobble" sufficiently to affect the finish of the hole. However, large diameter drills require slower rotative speeds for best results. Also, the Plexiglas should be backed with wood and the feed slowed as the drill point breaks through the underside of the sheet.

Whenever holes are drilled completely through Plexiglas, the standard twist drills should be modified to a 60° tip angle, the cutting edge to a zero rake angle, and the back lip clearance angle increased to 12–15°.

Drills specially modified for drilling Plexiglas are available from authorized distributors and dealers of Plexiglas.

For accuracy and safety, Plexiglas parts should be clamped or held rigidly during drilling.

SHALLOW HOLES—Hole depth/ hole diameter ratio of less than $1\frac{1}{2}$ to 1, use slow spiral twist drills with wide flutes modified as for through drilling. Chip removal is no problem in drilling shallow holes and no coolant is needed.

MEDIUM DEEP HOLES—Hole depth/hole diameter ratio from $1\frac{1}{2}$ to 1 up to 3 to 1.

Use slow spiral twist drills with polished flutes which should be as wide as possible to aid in removing a continuous ribbon of material. The opti-

AMA Sample Exam Review and Recommendations applicable to 8083-31A

2. Moisture, mildew, chemicals, and acids have no effect on

a. glass fabric.
b. linen fabric
c. Dacron fabric.

A reference for the answer to this question could not be found in FAA-H-8083-31, vol. 1 or AC 43.13-1B. Recommend adding a statement in FAA-H-8083-31, vol. 1, page 3-24 in the paragraph that addresses Fiberglass Coverings. Also recommend to add a statement to address this question in AC 43.13-1B, Ch. 2, sec. 1 para. 2-3, to specifically address glass fabric.

22. The purpose of wing slats is to

a. Reduce stalling speed
b. Decrease drag.
c. Increase speed on takeoff.

Although the purpose of wing slats is to reduce stalling speed, is referenced in a table on page 1-29 was found in FAA-H-8083-31. Recommend to add a statement on page 1-30 to the paragraph that discusses the purpose of wing slats.

35. Phosphate ester base hydraulic fluid is very susceptible to contamination from

a. Teflon seal material.
b. water in the atmosphere.
c. ethylene propylene elastomer.

While it is evident that answer b. is the correct answer, nowhere in FAA-H-8083-31,vol. 2 or in AC 43.13-1B is it actually stated. Recommend to add a statement to this information in FAA-H-8083-31, vol. 2, page 12-3 to the paragraph that addresses phosphate ester base hydraulic fluid.

44. 1) When servicing aircraft hydraulic systems, use the type of fluid specified in the aircraft manufacturer's maintenance manual or on the instruction plate affixed to the reservoir or unit.
2) Hydraulic fluids for aircraft are dyed a specific color for each type of fluid.
Regarding the above statements:

a. Only 1 is true.
b. Only 2 is true.
c. Both 1 and 2 are true.

While FAA-H-8083-31-V1, pg. 12-3 specifically states that the color of mineral based fluid is dyed red for identification, there is no mention that any other hydraulic fluid is dyed a particular color for identification. Recommend adding a statement to clarify this.

98. Maintenance of fire detection systems includes the
   a. Repair of damaged sensing elements.
   b. Removal of excessive loop or element material.
   c. Replacement of damaged sensing elements.

In FAA-H-8083-31-V2, page 17-18, contains a section that is titled “Fire Detection System Maintenance” and lists several items to inspect a fire detection system for. Nowhere in this section does it address what the maintenance of fire detection systems consist of.

99. A contaminated carbon monoxide portable test unit would be returned to service by
   a. Heating the indicating element to 300°F to reactivate the chemical.
   b. Installing a new indicating element.
   c. Evacuating the indicating element with CO2.

This information is not addressed in FAA-H-8080-31. Recommend adding a statement that addresses this in Vol. 2, page 16-3, in the section that discusses “Carbon Monoxide Poisoning” and/or adding this information in chapter 17, page 9 in the section on “Carbon Monoxide Detectors”.

100. Smoke detectors which use a measurement of light transmissibility in the air are called
   a. Electromechanical devices.
   b. Photoelectrical devices.
   c. Visual devices.

Recommend adding a sentence to the paragraph on page 17-8 in FAA-H-8083-31-V2 to make this information more clear. Ex. Light Refraction Type – The light refraction type of smoke detector contains a photoelectric cell that detects light refracted by smoke particles. Smoke particles refract the light to the photoelectric cell and, when it senses enough change in the amount of light, it creates an electrical current that sets off a warning light. This type of smoke detector is referred to as a photoelectrical device.